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CONFIRMATION NO. 8867

SERIAL NUMBER	FILING or 371(c) DATE RULE	CLASS	GROUP ART UNIT	ATTORNEY DOCKET NO.
90/013,587	09/14/2015	701	3993	C13-03895

APPLICANTS

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KPPB LLP, ANAHEIM, CA

**** CONTINUING DATA ***************************

This application is a REX of 11/773,272 07/03/2007 PAT 8032278
which is a CIP of 11/076,259 03/09/2005 PAT 7720597
which is a CON of 10/383,496 03/07/2003 PAT 7149623
which is a CON of 09/859,972 05/17/2001 PAT 6606561
which claims benefit of 60/264,811 01/29/2001
and claims benefit of 60/258,005 12/22/2000
and claims benefit of 60/251,552 12/06/2000
and claims benefit of 60/252,125 11/20/2000
and claims benefit of 60/236,890 09/29/2000
and claims benefit of 60/246,463 11/07/2000
and claims benefit of 60/222,777 08/03/2000
and claims benefit of 60/205,178 05/17/2000

**** FOREIGN APPLICATIONS ***************************

**** IF REQUIRED, FOREIGN FILING LICENSE GRANTED ** **** SMALL ENTITY **

Foreign Priority claimed ☐ Yes ☐ No 35 USC 119(a-d) conditions met ☐ Yes ☐ No Verified and Acknowledged _____ Examiner's Signature	☐ Met after Allowance _____ Initials	STATE OR COUNTRY	SHEETS DRAWINGS	TOTAL CLAIMS	INDEPENDENT CLAIMS
				22	3

ADDRESS

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UNITED STATES

TITLE

Vehicle Tracking Unit with Downloadable Codes and Associated Methods

FILING FEE RECEIVED		
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BIB (Rev. 05/07).

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Doc Code: IDS
Document Description: Information Disclosure Statement filed

PTO/SB/42 (07-09)
Approved for use through 07/31/2012. OMB 0651-0031
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37 CFR 1.501
INFORMATION DISCLOSURE CITATION IN A PATENT
(Sheet 1 of 1)

Docket Number (Optional)	Patent Number
58106CIP1	8,032,278
Applicant: Flick, Kenneth E.	
Issue Date: October 4, 2011	Art Unit: 3661

U.S. PATENT DOCUMENTS

EXAMINER INITIAL	DOCUMENT NUMBER	DATE	NAME	CLASS	SUBCLASS	FILING DATE IF APPROPRIATE
	5208756	5/93	Song, Han L.	364	449	1/28/91
	5555498	9/96	Berra, Charles J. et al.	364	424.03	3/18/94
	5557254	9/96	Johnson, Sam et al.	340	426	11/16/94
	5732074	3/98	Spaur, Charles W. et al.	370	313	1/16/96
	5877724	3/99	Davis, Paul M.	342	357	3/25/97
	6028537	1/97	Suman, Michael J. et al.	340	988	2/22/00
	6346876	2/02	Flick, Kenneth E.	340	426	5/31/00

FOREIGN PATENT DOCUMENTS

	DOCUMENT NUMBER	DATE	COUNTRY	CLASS	SUBCLASS	TRANSLATION YES	TRANSLATION NO
			USA				

OTHER DOCUMENTS (Including Author, Title, Date, Pertinent Pages, Etc.)

EXAMINER

DATE CONSIDERED September 14, 2015

This collection of information is required by 37 CFR 1.501. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 2 hours to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

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EFS ID:	23488734
Application Number:	90013587
International Application Number:	
Confirmation Number:	8867
Title of Invention:	Vehicle Tracking Unit with Downloadable Codes and Associated Methods
First Named Inventor/Applicant Name:	Kenneth E. Flick
Customer Number:	71897
Filer:	Samuel Patrick Richey
Filer Authorized By:	
Attorney Docket Number:	C13-03896
Receipt Date:	14-SEP-2015
Filing Date:	
Time Stamp:	19:02:45
Application Type:	Reexam (Third Party)

Payment information:

Submitted with Payment	yes
Payment Type	Credit Card
Payment was successfully received in RAM	$6000
RAM confirmation Number	6208
Deposit Account	504407
Authorized User	BAILEY, DAVID

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OMEGA EXHIBIT 2035

Charge any Additional Fees required under 37 C.F.R. Section 1.19 (Document supply fees)

Charge any Additional Fees required under 37 C.F.R. Section 1.20 (Post Issuance fees)

Charge any Additional Fees required under 37 C.F.R. Section 1.21 (Miscellaneous fees and charges)

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1		reexam.pdf	1292334 87c6d9b2c9a7a37359912dc81ea2a134870 34ec8	yes	82

Multipart Description/PDF files in .zip description

Document Description	Start	End
Transmittal of New Application	1	2
Receipt of Orig. Ex Parte Request by Third Party	3	80
Reexam Certificate of Service	81	81
Reexam - Info Disclosure Statement Filed by 3rd Party	82	82

Warnings:

Information:

2	Copy of patent for which reexamination is requested	exhibitA.pdf	4725059 cd844923d2399f1fc202109804fc4c732ce6f b1a	no	30

Warnings:

Information:

3		part2.pdf	558093 1951aec6bd4da3cab2630b5b7bec4ece469 618c0	yes	104

Multipart Description/PDF files in .zip description

Document Description	Start	End
Receipt of Orig. Ex Parte Request by Third Party	1	14
Receipt of Orig. Ex Parte Request by Third Party	15	34
Receipt of Orig. Ex Parte Request by Third Party	35	54
Receipt of Orig. Ex Parte Request by Third Party	55	76
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	Receipt of Orig. Ex Parte Request by Third Party		98	104	
Warnings:					
Information:					
4	Fee Worksheet (SB06)	fee-info.pdf	30087 8ecac45d896a5ba13ca5cc90055575691ce32f37	no	2
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If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371
If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office
If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re U.S. Patent No. 8,032,278

Issued:	October 4, 2011	Reexamination Control No.:	Not Yet Assigned
Filed:	July 3, 2007	Examiner:	Not Yet Assigned
Applicant:	Kenneth FLICK	Art Unit:	Not Yet Assigned
Title:	Vehicle Tracking Unit with Downloadable Codes and Associated Methods		

Mail Stop "Ex Parte Re Examination"
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P.O. Box 1450
Alexandria, VA 22313-1450

Request for *Ex Parte* Reexamination of U.S. Patent 8,032,278

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I. INTRODUCTION

CalAmp Corp., ("Requester") requests reexamination under 35 U.S.C. §§ 301-307 and 37 C.F.R. § 1.510 *et. seq.* of claims 1 – 22 of U.S. Patent No. 8,032,278 ("Flick '278 patent"), a copy of which is attached as Exhibit A. The Flick '278 patent issued on October 4, 2011, listing Kenneth E. Flick as the sole inventor. The Flick '278 patent is believed to be currently assigned to Omega Patents, LLC ("Applicant"). This is a new reexamination request.

For the reasons explained in detail below, there is significant prior art not previously considered by the Patent Office that raises substantial new questions of patentability with respect to the claims of the Flick '278 patent.

II. REEXAMINATION REQUEST SATISFIES REQUIREMENTS OF 37 C.F.R. § 1.510(B)

37 C.F.R. § 1.510(b)(1): A statement of each substantial new question of patentability with respect to the relevant prior patents and printed publications is provided in Section VI of this request.

37 C.F.R. § 1.510(b)(2): Reexamination of claims 1 – 22 of the Flick '278 patent is requested as discussed in Section IV. A detailed explanation of the proper application of the prior art to each claim element, and a set of proposed rejections based on such application, is provided in Section VII by reference to the claim charts attached as Exhibits B – G.

37 C.F.R. § 1.510(b)(3): This reexamination request is based on the prior art references listed below and attached as Exhibits listed in Section VI of this Request. A copy of every patent or printed publication relied upon is attached as an Exhibit and are listed in a PTO/SB/42 form submitted herewith, with the exception of U.S. Patents which are listed in the

PTO/SB/42 form only per "Best Practices and FAQs for filing requests for reexamination compliant with 37 C.F.R. 1.510 and 1.915" dated May 2010.

37 C.F.R. § 1.510(b)(4): A copy of the Flick '278 patent is attached as Exhibit A.

37 C.F.R. § 1.510(b)(5): A certificate of service confirming service of this reexamination request in its entirety on the attorney of record is provided on the last page of this reexamination request.

The fee for this Request for Ex Parte Reexamination has been paid by credit card as part of the EFS-WEB submission.

III. RELATED LITIGATION

To the best of Requester's knowledge, Applicant has asserted the Flick '278 patent in the following related prior or co-pending litigation:

- Omega Patents, LLC v. Enfora, Inc., Northern District of Georgia, Case No. 1:13-cv-00646-TWT; and
- Omega Patents, LLC v. CalAmp Corp., Middle District of Florida, Orlando Division, Case No. 6:13-cv-1950-PGB-DAB.

Additionally, to the best of Requester's knowledge, the Flick '278 patent has not been subject to any reexamination proceedings.

IV. CITATION OF PERTINENT AND APPLICABLE PRIOR ART BELIEVED TO HAVE BEARING ON PATENTABILITY

As explained in detail in this Request, the following prior art references, as they would have been understood by one of ordinary skill in the art at the time of the invention of the Flick

'278 patent, raise substantial new questions of patentability with respect to claims 1 – 22. Reexamination of Claims 1 – 22 is therefore respectfully requested. The prior art references relied upon in this Request that raise new questions of patentability and not previously considered are as follows:

Title	Hereinafter
U.S. Patent No. 5,208,756 to Song (issued May 4, 1993)	"Song '756 patent"
U.S. Patent No. 5,555,498 to Berra et al. (issued September 10, 1996)	"Berra '498 patent"
U.S. Patent No. 5,557,254 to Johnson et al. (issued September 17, 1996)	"Johnson '254 patent"
U.S. Patent No. 5,732,074 to Spaur et al. (issued March 24, 1998)	"Spaur '074 patent"
U.S. Patent No. 5,877,724 to Davis (issued March 2, 1999)	"Davis '724 patent"
U.S. Patent No. 6,028,537 to Suman et al. (issued February 22, 2000)	"Suman '537 patent"
U.S. Patent No. 6,346,876 to Flick (issued February 12, 2002)	"Flick '876 patent"

Previously considered prior art relied upon in combination with the above references in the proposed rejections of claims 1 – 22 of the Flick '278 patent is as follows:

Title	Hereinafter
U.S. Patent No. 6,011,460 to Flick (issued January 4, 2000)	"Flick '460 patent"

V. STATEMENTS POINTING OUT EACH SUBSTANTIAL NEW QUESTION OF PATENTABILITY

As explained in greater detail below, A) the Suman '537 patent; B) the Spaur '074 patent; and C) the Flick '876 patent, either alone or in combination with a variety of references published prior to the earliest claimed priority date of the Flick '278 patent, raise substantial new questions of patentability based on new teachings not previously considered or addressed in the prior examination of the Flick '278 patent.

A. U.S. Patent No. 6,028,537

The Suman '537 patent issued February 22, 2000 and therefore is prior art to the Flick '278 patent under 35 U.S.C. §§ 102(a) and 102(e). This reference was not considered during the prosecution of the Flick '278 patent. This reference provides a new technological teaching that raises a substantial new question of patentability.

1. Technological Teaching: Obtaining and Transmitting Location Data using a Standard Vehicle Bus

The Suman '537 patent teaches a vehicle communication and control system including a wireless communications device, a vehicle location determination device, and a controller capable of communicating with a variety of vehicle devices via a standardized vehicle data bus. An illustration of the components of the Suman '537 patent is conceptually shown in FIG. 44:

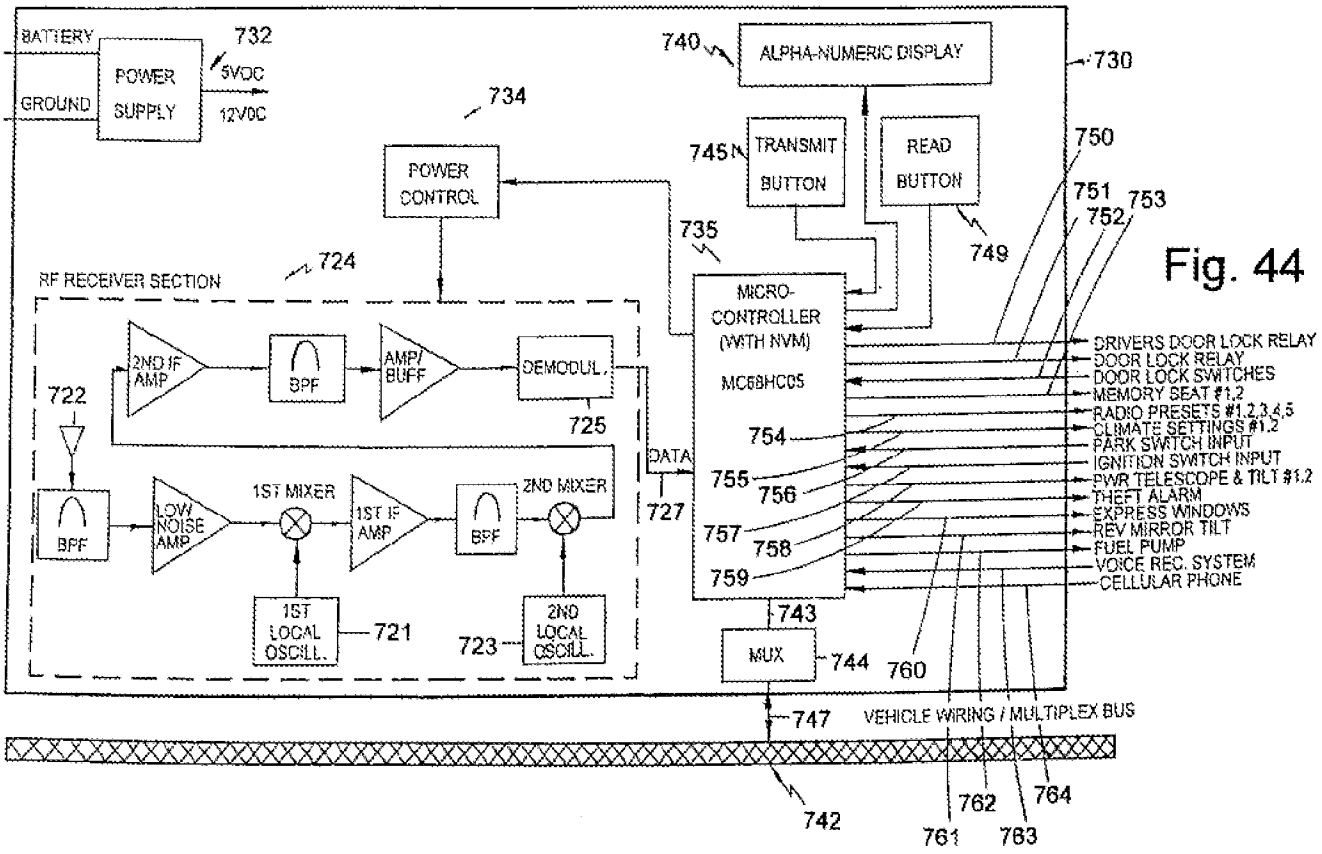


Fig. 44

Thus, the Suman '537 patent discloses technological teachings that the Examiner previously found to be missing from the prior art of record disclosed in the Flick '278 patent.

2. The Suman '537 Patent is Analogous Art to the Flick '278 Patent

The Suman '537 patent is analogous art because it is in the same field of endeavor as the Flick '278 patent, namely location tracking units, and more specifically location tracking devices that can be installed in vehicles and communicate with vehicle devices using a vehicle bus. *See In re Klein, 647 F.3d 1343, 1349 (Fed. Cir. 2011)* (Noting that a reference is analogous when "the art is from the same field of endeavor, regardless of the problem addressed...").

3. Substantial New Question of Patentability as to Claims 1 – 22 because the Suman '537 Patent Teaches all Claim Elements

Each of claims 1 – 22 require a multi-vehicle compatible controller coupled to a vehicle data bus for communication thereover with at least one vehicle device. As shown above, and in more detail in the claim charts attached as Exhibit B, the Suman '537 patent discloses this and all other required limitations, explicitly disclosing communicating via a "vehicle data bus" and a "downloading interface." Accordingly, it is submitted that all aspects of claims 1 – 22 are disclosed by the Suman '537 patent in at least as complete detail as contained in the claims. A reasonable examiner would consider the teachings important in deciding whether or not claims 1 – 22 of the Flick '278 patent are patentable. For these reasons, the Suman '537 patent raises a substantial new question of patentability as to claims 1 – 22.

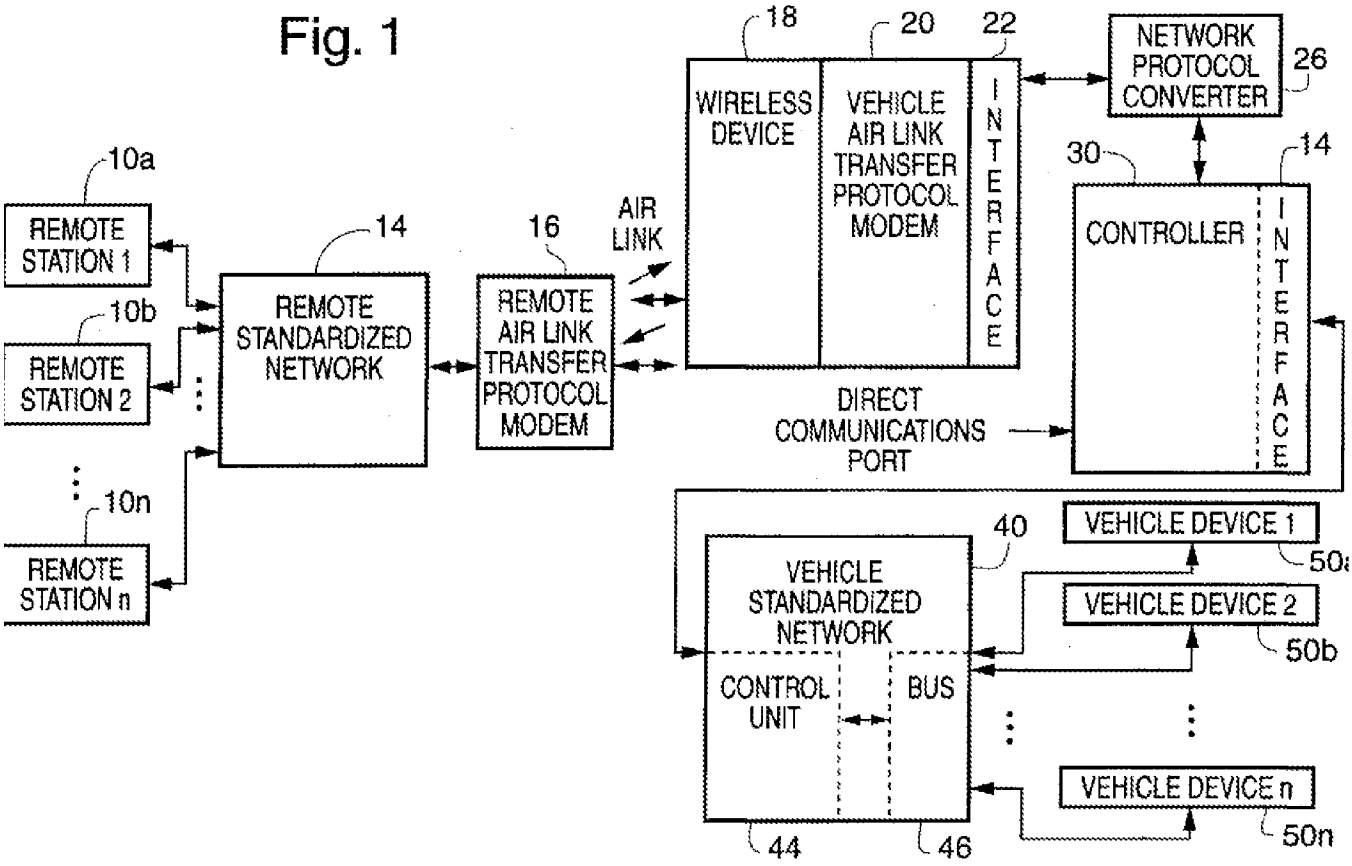
B. U.S. Patent No. 5,732,074

The Spaur '074 patent issued March 24, 1998 and therefore is prior art to the Flick '278 patent under 35 U.S.C. §§ 102(a), 102(b), and 102(e). This reference was not considered during prosecution. This reference provides a new technological teaching that raises a substantial new question of patentability.

1. Technological Teaching: Obtaining and Transmitting Location Data using a Standard Vehicle Bus

The Spaur '074 patent teaches a controller having a wireless device, a direct communications port, and a connection to a vehicle standardized network that can be utilized to read data from vehicle devices and transmit that data via the wireless device. An illustration of the system taught by the Spaur '074 patent is illustrated in FIG. 1:

Fig. 1



Thus, the Spaur '074 patent discloses technological teachings that the Examiner previously found to be missing from the prior art of record disclosed in the Flick '278 patent.

2. The Spaur '074 Patent is Analogous to the Flick '278 patent

The Spaur '074 patent is analogous art because it is in the same field of endeavor as the Flick '278 patent, namely location tracking units, and more specifically location tracking devices that can be installed in vehicles and communicate with vehicle devices using a vehicle bus. *See In re Klein, 647 F.3d 1343, 1349 (Fed. Cir. 2011)* (Noting that a reference is analogous when "the art is from the same field of endeavor, regardless of the problem addressed...").

3. Substantial New Question of Patentability as to Claims 1 – 22 Because Spaur '074 Teaches all Claim Elements

Each of claims 1 – 22 require a multi-vehicle compatible controller coupled to a vehicle data bus for communication thereover with at least one vehicle device. As shown above, and in more detail in the claim charts attached as Exhibit C, the Spaur '074 patent discloses this and all other required limitations, explicitly disclosing communicating via a "vehicle data bus" and a "downloading interface." Accordingly, it would have been obvious to one skilled in the art that all aspect of claims 1 – 22 are disclosed by the Spaur '074 patent. A reasonable examiner would consider the teachings important in deciding whether or not claims 1 – 22 of the Flick '278 patent are patentable. For these reasons, the Spaur '074 patent raises a substantial new question of patentability as to claims 1 – 22.

C. U.S. Patent No. 5,732,074 in view of U.S. Patent Nos. 5,043,736 and 5,877,724

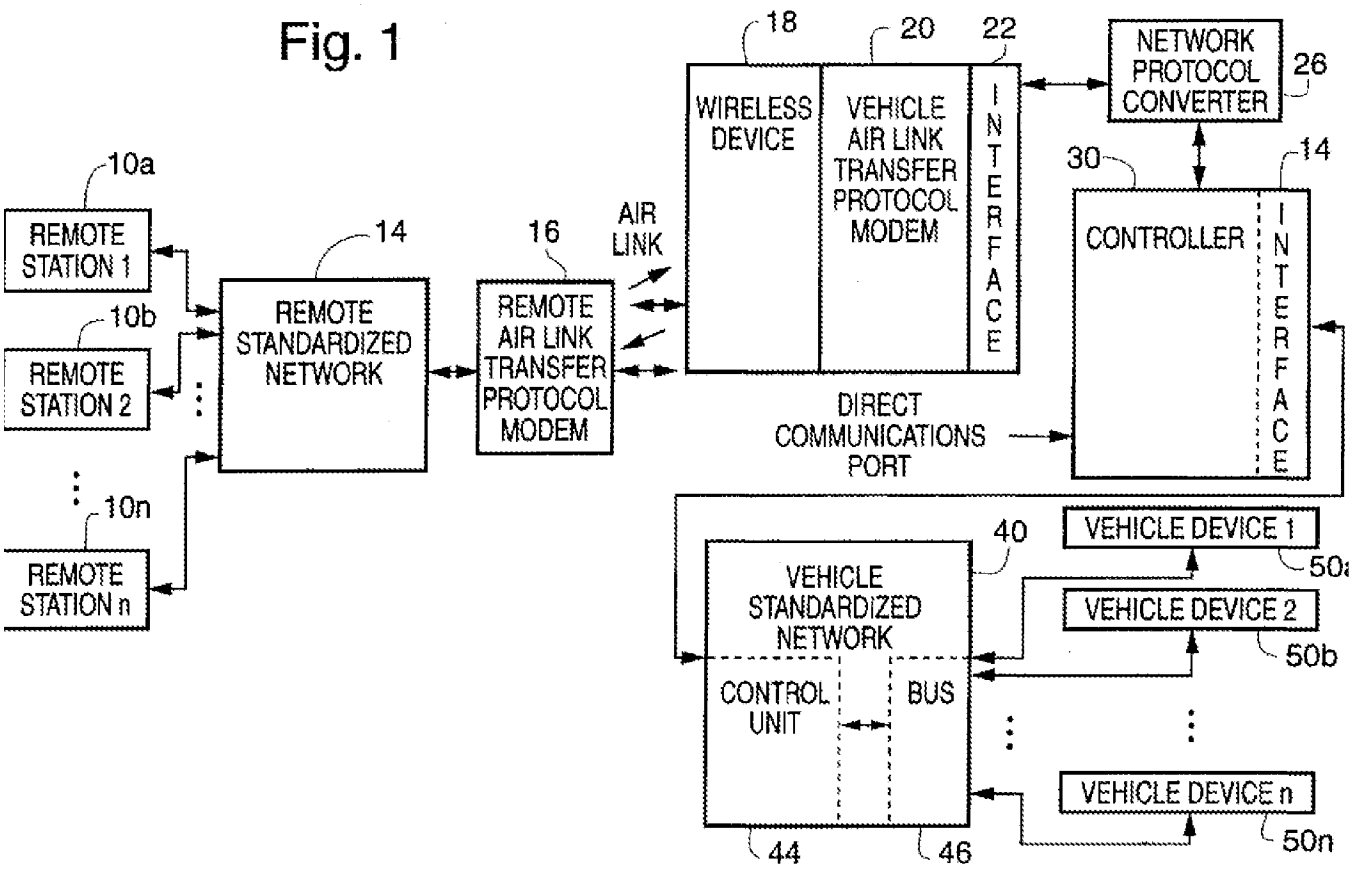
The Spaur '074 patent issued March 24, 1998 and the Davis '724 patent issued March 2, 1999. Therefore, all of the references are prior art to the Flick '278 patent under 35 U.S.C. §§ 102(a), 102(b), and 102(e). These references were not considered during prosecution of the Flick '278 patent. These references provide a new technological teaching that raises a substantial new question of patentability.

1. Technological Teaching: Obtaining and Transmitting Location Data using a Standard Vehicle Bus

The Spaur '074 patent teaches a controller having a wireless device, a direct communications port, and a connection to a vehicle standardized network that can be utilized

to read data from vehicle devices and transmit that data via the wireless device. An illustration of the system taught by the Spaur '074 patent is illustrated in FIG. 1:

Fig. 1



Thus, the Spaur '074 patent discloses technological teachings that the Examiner previously found to be missing from the prior art of record disclosed in the Flick '278 patent.

The Davis '724 patent teaches a compact combined positon locating and cellular telephone unit. It would have been obvious to substitute the wireless device described in the Spaur '074 patent with the position locating and cellular telephone unit taught by the Davis '724 patent to incorporate the location determination capabilities of the positon locating and cellular telephone unit taught by the Davis '724 patent into the controller of the Spaur '074 patent.

2. The Spaur '074 Patent and Davis '724 Patent are Analogous to the Flick '278 patent

The Spaur '074 patent is analogous art because it is in the same field of endeavor as the Flick '278 patent, namely location tracking units, and more specifically location tracking devices that can be installed in vehicles and communicate with vehicle devices using a vehicle bus. The Davis '724 patent is analogous art as it are in the same field of endeavor as the wireless communication devices described in both the Spaur '074 patent and the Flick '278 patent. *See In re Klein, 647 F.3d 1343, 1349 (Fed. Cir. 2011)* (Noting that a reference is analogous when "the art is from the same field of endeavor, regardless of the problem addressed...").

3. Substantial New Question of Patentability as to Claims 1 – 22 because the Spaur '074 Patent in view of the Davis '724 Patent Teaches all Claim Elements

Each of claims 1 – 22 require a multi-vehicle compatible controller coupled to a vehicle data bus for communication thereover with at least one vehicle device. As shown above, and in more detail in the claim charts attached as Exhibit D, the Spaur '074 patent in view of the Davis '724 patent discloses this and all other required limitations, explicitly disclosing communicating via a "vehicle data bus" and a "downloading interface." Accordingly, it would have been obvious to one skilled in the art that all aspect of claims 1 – 22 are disclosed by the Spaur '074 patent in view of the Davis '724 patent. A reasonable examiner would consider the teachings important in deciding whether or not claims 1 – 22 of the Flick '278 patent are patentable. For these reasons, the Spaur '074 patent in view of the Davis '724 patent raises a substantial new question of patentability as to claims 1 – 22.

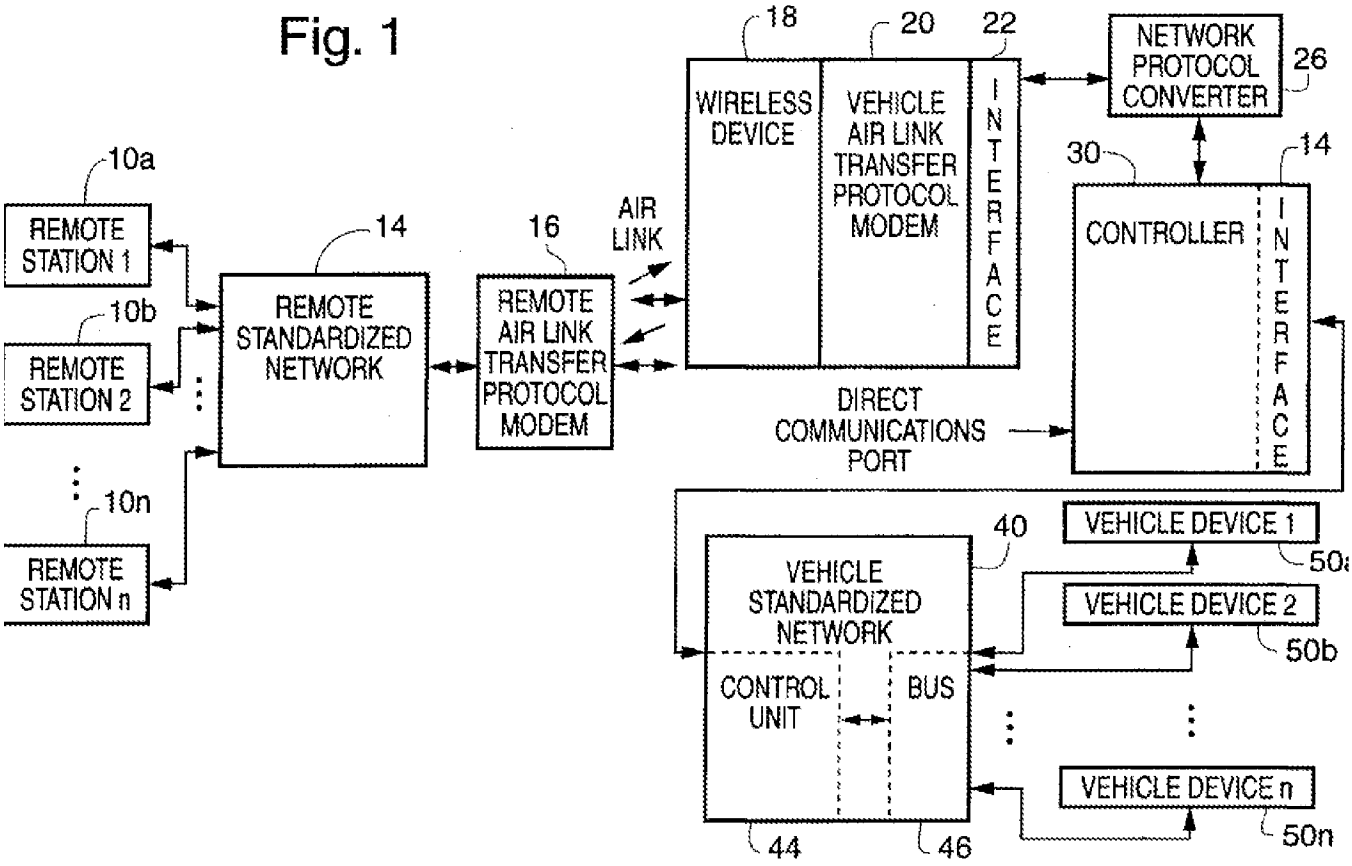
D. U.S. Patent No. 5,732,074 in view of U.S. Patent No. 5,208,756

The Spaur '074 patent issued March 24, 1998 and the Song '756 patent issued May 4, 1993. Therefore, all of the references are prior art to the Flick '278 patent under 35 U.S.C. §§ 102(a), 102(b), and 102(e). These references were not considered during prosecution of the Flick '278 patent. These references provide a new technological teaching that raises a substantial new question of patentability.

1. Technological Teaching: Obtaining and Transmitting Location Data using a Standard Vehicle Bus

The Spaur '074 patent teaches a controller having a wireless device, a direct communications port, and a connection to a vehicle standardized network that can be utilized to read data from vehicle devices and transmit that data via the wireless device. An illustration of the system taught by the Spaur '074 patent is illustrated in FIG. 1:

Fig. 1



Thus, the Spaur '074 patent discloses technological teachings that the Examiner previously found to be missing from the prior art of record disclosed in the Flick '278 patent.

The Song '756 patent teaches a vehicle locating and navigating system including locating and tracking vehicles using a cellular telephone network. It would have been obvious to incorporate the location determining techniques described in the Song '756 patent into the wireless device described in the Spaur '074 patent to incorporate location determination capabilities into the controller of the Spaur '074 patent.

2. The Spaur '074 Patent and Song '756 Patent are Analogous to the Flick '278 patent

The Spaur '074 patent and Song '756 patent are analogous art because it is in the same field of endeavor as the Flick '278 patent, namely location tracking units, and more specifically location tracking devices that can be installed in vehicles and communicate with vehicle devices using a vehicle bus. *See In re Klein, 647 F.3d 1343, 1349 (Fed. Cir. 2011)* (Noting that a reference is analogous when "the art is from the same field of endeavor, regardless of the problem addressed...").

3. Substantial New Question of Patentability as to Claims 1 – 22 because the Spaur '074 Patent in view of the Song '756 Patent Teaches all Claim Elements

Each of claims 1 – 22 require a multi-vehicle compatible controller coupled to a vehicle data bus for communication thereover with at least one vehicle device. As shown above, and in more detail in the claim charts attached as Exhibit E, the Spaur '074 patent in view of the Song '756 patent discloses this and all other required limitations, explicitly disclosing communicating via a "vehicle data bus" and a "downloading interface." Accordingly, it would have been obvious to one skilled in the art that all aspect of claims 1 – 22 are disclosed by the Spaur '074 patent in view of the Song '756 patent. A reasonable examiner would consider the teachings important in deciding whether or not claims 1 – 22 of the Flick '278 patent are patentable. For these reasons, the Spaur '074 patent in view of the Song '756 patent raises a substantial new question of patentability as to claims 1 – 22.

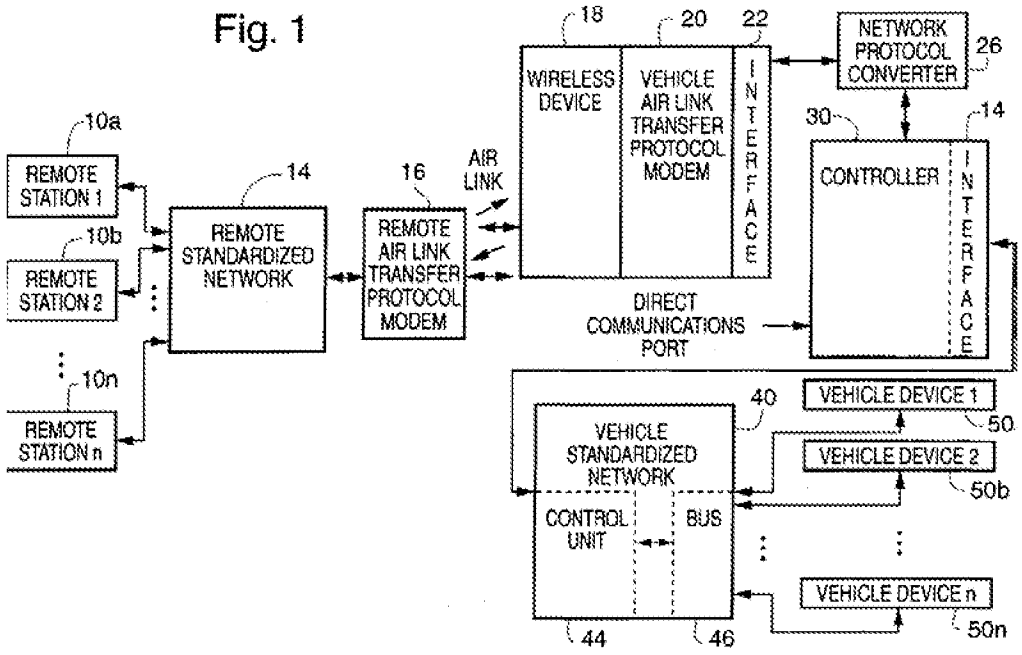
E. U.S. Patent No. 5,732,074 in view of U.S. Patent No. 5,557,254

The Spaur '074 patent issued March 24, 1998 and the Johnson '254 patent issued September 17, 1996. Therefore, both of the references are prior art to the Flick '278 patent under 35 U.S.C. §§ 102(a), 102(b), and 102(e). These references were not considered during prosecution of the Flick '278 patent. These references provide a new technological teaching that raises a substantial new question of patentability.

1. Technological Teaching: Obtaining and Transmitting Location Data using a Standard Vehicle Bus

The Spaur '074 patent teaches a controller having a wireless device, a direct communications port, and a connection to a vehicle standardized network that can be utilized to read data from vehicle devices and transmit that data via the wireless device. An illustration of the system taught by the Spaur '074 patent is illustrated in FIG. 1:

Fig. 1



Thus, the Spaur '074 patent discloses technological teachings that the Examiner previously found to be missing from the prior art of record disclosed in the Flick '278 patent.

The Johnson '254 patent teaches a vehicle security system having two-way communication with a central monitoring station. One device included in the security system taught in the Johnson '254 patent is a global positioning system (GPS) receiver. It would have been obvious to incorporate the global positioning system receiver described in the Johnson '254 patent into the wireless device described in the Spaur '074 patent to incorporate location determination capabilities into the controller of the Spaur '074 patent in those vehicles that do not have a global positioning system receiver incorporated into the vehicle.

2. The Spaur '074 Patent and the Johnson '254 patent are Analogous to the Flick '278 patent

The Spaur '074 patent and the Johnson '254 patent are analogous art because it is in the same field of endeavor as the Flick '278 patent, namely location tracking units, and more specifically location tracking devices that can be installed in vehicles and communicate with vehicle devices using a vehicle bus. *See In re Klein, 647 F.3d 1343, 1349 (Fed. Cir. 2011)* (Noting that a reference is analogous when "the art is from the same field of endeavor, regardless of the problem addressed...").

3. Substantial New Question of Patentability as to Claims 1 – 22 because the Spaur '074 Patent in view of the Johnson '254 Patent Teaches all Claim Elements

Each of claims 1 – 22 require a multi-vehicle compatible controller coupled to a vehicle data bus for communication thereover with at least one vehicle device. As shown above, and

in more detail in the claim charts attached as Exhibit F, the Spaur '074 patent in view of the Johnson '254 patent discloses this and all other required limitations, explicitly disclosing communicating via a "vehicle data bus" and a "downloading interface." Accordingly, it would have been obvious to one skilled in the art that all aspect of claims 1 – 22 are disclosed by the Spaur '074 patent in view of the Johnson '254 patent. A reasonable examiner would consider the teachings important in deciding whether or not claims 1 – 22 of the Flick '278 patent are patentable. For these reasons, the Spaur '074 patent in view of the Johnson '254 patent raises a substantial new question of patentability as to claims 1 – 22.

F. U.S. Patent No. 6,346,876

The Flick '876 patent issued February 12, 2002 and claims priority to U.S. Patent No. 5,719,551 having a filing date of August 22, 1996. This reference was not considered during prosecution of the Flick '278 patent. The Flick '876 patent is commonly owned along with the Flick '278 patent and raises substantial new issues regarding obviousness-type double patenting with respect to claims 1 – 22 of the Flick '278 patent.

1. Technological Teaching: Multi-Vehicle Compatible Control Systems

The Flick '876 patent teaches a multi-vehicle compatible controller having a bus interface and a wireless communications device. An illustration of the system taught by the Flick '876 patent is illustrated in FIG. 1:

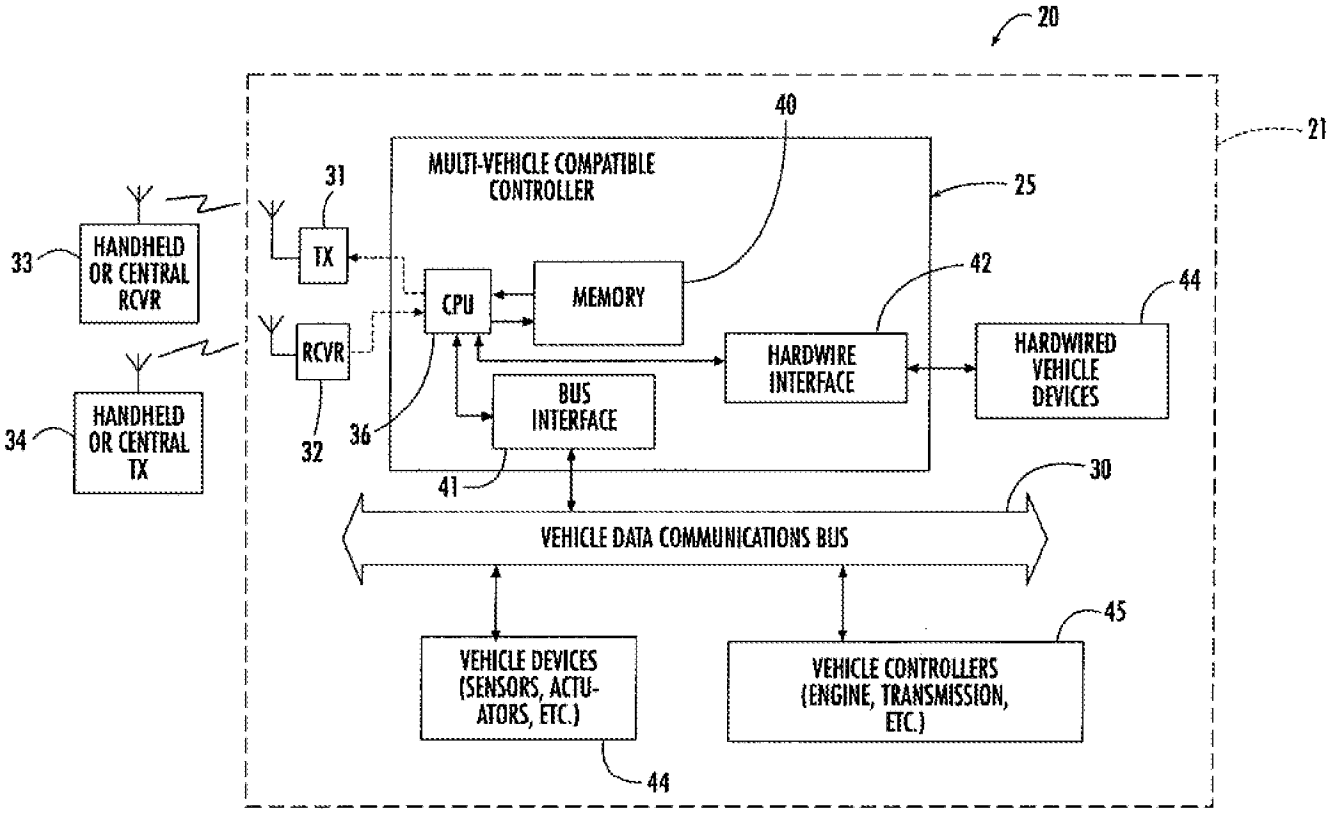


FIG. 1.

Thus, the Flick '876 patent discloses technological teachings of the claims of the Flick '278 patent. Additionally, the Flick '460 patent is incorporated by reference into the Flick '876 patent. The Flick '460 patent provides additional context with respect to the scope of the claims of the Flick '876 patent.

2. The Flick '876 Patent is Analogous Art to the Flick '278 Patent

The Flick '876 patent is analogous art because it is in the same field of endeavor as the Flick '278 patent, namely control system including transmitters, receivers, and a multi-vehicle compatible controller for communicating with a plurality of vehicle devices. *See In re Klein*, 647 F.3d. 1343, 1348 (Fed. Cir. 2011) (Noting that a reference is analogous when "the art is from the same field of endeavor, regardless of the problem addressed...").

3. Substantial New Question of Patentability as to Claims 1 – 22 Because Claims of Flick '876 Patent are Not Patentably Distinct

Each of claims 1 – 22 of the Flick '278 patent require a "multi-vehicle compatible controller" and a "downloading interface." As shown above, and in more detail in the claim chart attached as Exhibit G, the claims of the Flick '876 patent contain all limitations of the claims of the Flick '278 patent. The Flick '876 patent was not considered during prosecution of the Flick '278 patent. A reasonable examiner would consider the claims of the Flick '876 patent relevant to determining the scope of the claims of the Flick '278 patent, particularly for issues related to double-patenting and impermissible extension of claim terms. For these reasons, the Flick '876 patent raises substantial issues of patentability with respect to claims 1 – 22 of the Flick '278 patent.

VI. PROPOSED REJECTIONS AND DETAILED EXPLANATIONS OF THE PERTINENCY AND MANNER OF APPLYING THE CITED PRIOR ART TO EVERY CLAIM FOR WHICH REEXAMINATION IS REQUESTED

The above-referenced prior art raises substantial new questions of patentability with respect to claims 1 – 22 of the Flick '278 patent. Below, Requester sets out proposed rejections that provide a detailed explanation of the pertinency and manner of applying these patents and to each of these claims. Consistent with Patent Office practice, this detailed explanation gives "each term in the claim its broadest reasonable construction consistent with the specification," unless otherwise indicated. *See* MPEP §§ 2111, 2280; *In re Morris,* 127 F.3d 1048, 1054-55 (Fed. Cir. 1997).

SUMMARY OF PROPOSED REJECTIONS	**SUPPORTING CLAIM CHART**
Claims 1 – 22 are rejected under 35 U.S.C. § 102 as anticipated by the Suman '537 patent.	**Exhibit B**
Claims 1 – 22 are rejected under 35 U.S.C. § 102 as anticipated by the Spaur '074 patent.	**Exhibit C**
Claims 1 – 22 are rejected under 35 U.S.C. § 103 as unpatentable over the Spaur '074 patent in view of the Davis '724 patent.	**Exhibit D**
Claims 1 – 22 are rejected under 35 U.S.C. § 103 as unpatentable over the Spaur '074 patent in view of the Song '756 patent.	**Exhibit E**
Claims 1 – 22 are rejected under 35 U.S.C. § 103 as unpatentable over the Spaur '074 patent in view of the Johnson '254 patent.	**Exhibit F**
Claims 1, 4, 5, 9, 10, 13, 17, 18, and 22 are rejected on the grounds of nonstatutory obviousness-type double patenting in view of the Flick '876 patent.	**Exhibit G**

A. Claims 1 – 22 are Anticipated by the Suman '537 Patent

Each and every limitation of claims 1 – 22 is disclosed by the Suman '537 patent as shown in detail in the claim chart attached as Exhibit B. Accordingly, the following proposed rejection is appropriate.

1. Proposed rejection

Claims 1 – 22 are rejected under 35 U.S.C. § 102(a) and 35 U.S.C. § 102(e) as being unpatentable over the Suman '537 patent.

With regard to claim 1, as set out in detail in Exhibit B, the Suman '537 patent teaches all limitations of claim 1. In particular, the SAE J1850 standard referred to in the Suman '537 patent defines a minimum set of data communications requirements such that the resulting network is a data communications network that satisfies the needs of automotive manufacturers. It is inherently disclosed that any "multiplex bus" as described in the Suman '537 patent that conforms to the SAE J1850 standard constitutes a vehicle data bus extending throughout a vehicle and compatible with a plurality of vehicles and vehicle devices. Specifically, vehicle data busses, such as those described in SAE J1850, have been federally mandated for inclusion in all vehicles sold in the United States since at least 1996. Indeed, the Flick '278 patent states:

> "In all of the embodiments and variations described herein, the tracking device may communicate with one or more other vehicle devices via a vehicle data communications bus. Further aspects of interfacing with a vehicle data communications bus are described in U.S. Pat. Nos. 5,719,551 and 6,011,460 assigned to the assignee of the present invention, the entire contents of which are incorporated herein by reference." (Flick '278 patent, col. 22, lines 1 – 7).

In its Background of the Invention, the Flick '460 patent states "Several standards have been proposed for vehicle multiplex networks including, for example, the Society of Automotive Engineers "Surface Vehicle Standard, Class B Data Communications Network Interface", SAE 11850, July 1995." (Flick '460 patent, col. 2, lines 44 – 48). Accordingly, it is noted that the Flick '278 patent admits that the SAE J1850 standard constitutes a vehicle data bus extending throughout a vehicle and that the vehicle data bus constitutes prior art as early as July 1995.

With regard to claim 2, as set out in detail in Exhibit B, the Suman '537 patent discloses "wherein said downloading interface comprises a wired signal downloading interface." Specifically, the Suman '537 patent discloses a RS-232 serial connector. It is inherently disclosed that a RS-232 connector is defined to have particular electrical signal characteristics and mechanical interfaces per the Electronic Industries Association (EIA) standard RS-232-C, established in 1969.

With regard to claim 3, as set out in detail in Exhibit B, the Suman '537 patent discloses "wherein said wired signal downloading interface comprises a connector for temporary connection to a downloading device." Specifically, it is inherently disclosed that a RS-232 port has a pluggable, and therefore unpluggable, mechanical interface as per EIA RS-232-C.

With regard to claim 4, as set out in detail in Exhibit B, the Suman '537 patent discloses "wherein said downloading interface comprises a wireless signal downloading interface." Specifically, the Suman '537 patent describes cellular telephone transceivers capable of transmitting and receiving signals from a conventional cellular telephone network. (Suman '537 patent, col. 10, lines 59 – 61).

With regard to claim 5, as set out in detail in Exhibit B, the Suman '537 patent discloses "wherein said wireless signal downloading interface comprises a wireless receiver for temporary connection to a downloading device." Specifically, it is inherently disclosed that cellular telephone connections are temporary connections.

With regard to claim 6, as set out in detail in Exhibit B, the Suman '537 patent discloses "wherein the corresponding at least one vehicle code is for reading from the at least one vehicle device." Additionally, it is inherently disclosed that a vehicle data bus conforming to

the SAE J1850 standard can utilize vehicle codes to obtain data from at least one vehicle device connected to the vehicle data bus and that data can then be read from the vehicle data bus.

With regard to claim 7, as set out in detail in Exhibit B, the Suman '537 patent discloses "wherein the corresponding at least one vehicle code is for writing to the at least one vehicle device." Specifically, the Suman '537 patent discloses the control of a variety of vehicle devices connected to a vehicle data bus, thereby inherently disclosing the writing of vehicle codes to the vehicle devices in order to cause the desired action by the vehicle device.

With regard to claim 8, as set out in detail in Exhibit B, the Suman '537 patent discloses "wherein said downloading interface is also for permitting downloading of at least one programming instruction for said multi-vehicle compatible controller."

With regard to claim 9, as set out in detail in Exhibit B, the Suman '537 patent discloses "a remote transmitter; and wherein said multi-vehicle compatible controller also performs at least one vehicle remote control function responsive to said remote transmitter." Indeed, it is noted that RF remote controls for controlling vehicle functions, such as remote door control, are notoriously well-known in the prior art.

With regard to claim 10, as set out in detail in Exhibit B, the Suman '537 patent discloses "wherein the at least one vehicle remote control function comprises at least one of a vehicle security function, a remote keyless entry function, and a remote engine starting function." Specifically, it is inherently disclosed that vehicle security functions can include locking doors, rolling up windows, and activating an alarm system.

With regard to claim 11, this claim is indefinite as there is no antecedent basis for "said wireless position determining device." This claim limitation is interpreted as "said vehicle

position determining device" as defined in claim 1. As set out in detail in Exhibit B, the Suman '537 patent discloses "wherein said vehicle position determining device comprises a Global Positioning System (GPS) receiver."

With regard to claim 12, as set out in detail in Exhibit B, the Suman '537 patent discloses "a housing containing said vehicle position determining device, said wireless communications device, said multi-vehicle compatible controller, and said downloading interface." Additionally, it is noted that all of the components of the "vehicle electrical control system" as shown in FIG. 44 and the "control circuit" as shown in FIG. 45 of the Suman '537 patent are all contained within a vehicle. To that end, the vehicle itself serves as "a housing containing said vehicle position determining device, said wireless communications device, said multi-vehicle compatible controller, and said downloading interface."

With regard to claim 13, as set out in detail in Exhibit B, the Suman '537 patent teaches all limitations of claim 13. In particular, the SAE J1850 standard referred to in the Suman '537 patent defines a minimum set of data communications requirements such that the resulting network is a data communications network that satisfies the needs of automotive manufacturers. It is inherently disclosed that any "multiplex bus" as described in the Suman '537 patent that conforms to the SAE J1850 standard constitutes a vehicle data bus extending throughout a vehicle and compatible with a plurality of vehicles and vehicle devices. Specifically, vehicle data busses, such as those described in SAE J1850, have been federally mandated for inclusion in all vehicles sold in the United States since at least 1996. Indeed, the Flick '278 patent states:

> "In all of the embodiments and variations described herein, the tracking device may communicate with one or more other vehicle devices via a vehicle data communications bus. Further aspects of interfacing with a vehicle data communications bus are described in U.S. Pat. Nos. 5,719,551 and 6,011,460

> assigned to the assignee of the present invention, the entire contents of which are incorporated herein by reference." (Flick '278 patent, col. 22, lines 1 – 7).

In its Background of the Invention, the Flick '460 patent states "Several standards have been proposed for vehicle multiplex networks including, for example, the Society of Automotive Engineers "Surface Vehicle Standard, Class B Data Communications Network Interface", SAE 11850, July 1995." (Flick '460 patent, col. 2, lines 44 – 48). Accordingly, it is noted that the Flick '278 patent admits that the SAE J1850 standard constitutes a vehicle data bus extending throughout a vehicle and that the vehicle data bus constitutes prior art as early as July 1995. Additionally, it is inherently disclosed that cellular telephone connections are temporary connections.

With regard to claim 14, as set out in detail in Exhibit B, the Suman '537 patent discloses "wherein the corresponding at least one vehicle code is for reading from the at least one vehicle device." Additionally, it is inherently disclosed that a vehicle data bus conforming to the SAE J1850 standard can utilize vehicle codes to obtain data from at least one vehicle device connected to the vehicle data bus and that data can then be read from the vehicle data bus.

With regard to claim 15, as set out in detail in Exhibit B, the Suman '537 patent discloses "wherein the corresponding at least one vehicle code is for writing to the at least one vehicle device." Specifically, the Suman '537 patent discloses the control of a variety of vehicle devices connected to a vehicle data bus, thereby inherently disclosing the writing of vehicle codes to the vehicle devices in order to cause the desired action by the vehicle device.

With regard to claim 16, as set out in detail in Exhibit B, the Suman '537 patent discloses "wherein said downloading interface is also for permitting downloading of at least one programming instruction for said multi-vehicle compatible controller."

With regard to claim 17, as set out in detail in Exhibit B, the Suman '537 patent discloses "a remote transmitter; and wherein said multi-vehicle compatible controller also performs at least one vehicle remote control function responsive to said remote transmitter." Indeed, it is noted that RF remote controls for controlling vehicle functions, such as remote door control, are notoriously well-known in the prior art.

With regard to claim 18, as set out in detail in Exhibit B, the Suman '537 patent teaches all limitations of claim 18. In particular, the SAE J1850 standard referred to in the Suman '537 patent defines a minimum set of data communications requirements such that the resulting network is a data communications network that satisfies the needs of automotive manufacturers. It is inherently disclosed that any "multiplex bus" as described in the Suman '537 patent that conforms to the SAE J1850 standard constitutes a vehicle data bus extending throughout a vehicle, connected to a plurality of vehicle devices, and compatible with a plurality of vehicles. Specifically, vehicle data busses, such as those described in SAE J1850, have been federally mandated for inclusion in all vehicles sold in the United States since at least 1996. Indeed, the Flick '278 patent states:

> "In all of the embodiments and variations described herein, the tracking device may communicate with one or more other vehicle devices via a vehicle data communications bus. Further aspects of interfacing with a vehicle data communications bus are described in U.S. Pat. Nos. 5,719,551 and 6,011,460 assigned to the assignee of the present invention, the entire contents of which are incorporated herein by reference." (Flick '278 patent, col. 22, lines 1 – 7).

In its Background of the Invention, the Flick '460 patent states "[s]everal standards have been proposed for vehicle multiplex networks including, for example, the Society of Automotive Engineers "Surface Vehicle Standard, Class B Data Communications Network Interface", SAE 11850, July 1995." (Flick '460 patent, col. 2, lines 44 – 48). Accordingly, it is noted that the Flick '278 patent admits that the SAE J1850 standard constitutes a vehicle data bus extending throughout a vehicle and that the vehicle data bus constitutes prior art as early as July 1995. Additionally, it is inherently disclosed that a cellular telephone transceiver constitutes a wireless receiver and that cellular telephone connections are temporary connections.

With regard to claim 19, as set out in detail in Exhibit B, the Suman '537 patent discloses "wherein the corresponding at least one vehicle code is for reading from the at least one vehicle device." Additionally, it is inherently disclosed that a vehicle data bus conforming to the SAE J1850 standard can utilize vehicle codes to obtain data from at least one vehicle device connected to the vehicle data bus and that data can then be read from the vehicle data bus.

With regard to claim 20, as set out in detail in Exhibit B, the Suman '537 patent discloses "wherein the corresponding at least one vehicle code is for writing to the at least one vehicle device." Specifically, the Suman '537 patent discloses the control of a variety of vehicle devices connected to a vehicle data bus, thereby inherently disclosing the writing of vehicle codes to the vehicle devices in order to cause the desired action by the vehicle device.

With regard to claim 21, as set out in detail in Exhibit B, the Suman '537 patent discloses "wherein said downloading interface is also for permitting downloading of at least one programming instruction for said multi-vehicle compatible controller."

With regard to claim 22, as set out in detail in Exhibit B, the Suman '537 patent discloses "a remote transmitter; and wherein said multi-vehicle compatible controller also performs at least one vehicle remote control function responsive to said remote transmitter." Indeed, it is noted that RF remote controls for controlling vehicle functions, such as remote door control, are notoriously well-known in the prior art.

B. Claims 1 – 22 are Anticipated by the Spaur '074 Patent

Each and every limitation of claims 1 – 22 is disclosed by the Spaur '074 patent as shown in detail in the claim chart attached as Exhibit C. Accordingly, the following proposed rejection is appropriate.

1. Proposed rejection

Claims 1 – 22 are rejected under 35 U.S.C. § 102(b) as being unpatentable over the Spaur '074 patent.

With regard to claim 1, as set out in detail in Exhibit C, the Spaur '074 patent teaches all limitations of claim 1.

With regard to claim 2, as set out in detail in Exhibit C, the Spaur '074 patent discloses "wherein said downloading interface comprises a wired signal downloading interface." Specifically, the Spaur '074 patent discloses a RS-232 serial connector. It is inherently disclosed that a RS-232 connector is defined to have particular electrical signal characteristics and mechanical interfaces per the Electronic Industries Association (EIA) standard RS-232-C, established in 1969. Additionally, the PCMCIA unit and Ethernet connection are both wired interfaces.

With regard to claim 3, as set out in detail in Exhibit C, the Spaur '074 patent discloses "wherein said wired signal downloading interface comprises a connector for temporary

connection to a downloading device." Specifically, it is inherently disclosed that a RS-232 port, a PCMCIA unit, and an Ethernet connection include a pluggable, and therefore unpluggable, mechanical interface.

With regard to claim 4, as set out in detail in Exhibit C, the Spaur '074 patent discloses "wherein said downloading interface comprises a wireless signal downloading interface." Specifically, the Spaur '074 patent describes a "cellular digitized packet data (CDPD) network," which is a wireless cellular network.

With regard to claim 5, as set out in detail in Exhibit C, the Spaur '074 patent discloses "wherein said wireless signal downloading interface comprises a wireless receiver for temporary connection to a downloading device." Specifically, it is inherently disclosed that cellular network connections are temporary connections.

With regard to claim 6, as set out in detail in Exhibit C, the Spaur '074 patent discloses "wherein the corresponding at least one vehicle code is for reading from the at least one vehicle device." Specifically, the Spaur '074 patent teaches two-way (i.e. reading from and writing to) communication with vehicle devices connected to the CAN using device drivers.

With regard to claim 7, as set out in detail in Exhibit C, the Spaur '074 patent discloses "wherein the corresponding at least one vehicle code is for writing to the at least one vehicle device." Specifically, the Spaur '074 patent teaches two-way (i.e. reading from and writing to) communication with vehicle devices connected to the CAN using device drivers.

With regard to claim 8, as set out in detail in Exhibit C, the Spaur '074 patent discloses "wherein said downloading interface is also for permitting downloading of at least one programming instruction for said multi-vehicle compatible controller."

With regard to claim 9, as set out in detail in Exhibit C, the Spaur '074 patent discloses "a remote transmitter; and wherein said multi-vehicle compatible controller also performs at least one vehicle remote control function responsive to said remote transmitter." Specifically, the Spaur '074 patent teaches that a remote station can provide commands that cause the controller to perform a control function. Accordingly, a remote station includes a remote transmitter, thereby fulfilling the requirements of claim 9.

With regard to claim 10, as set out in detail in Exhibit C, the Spaur '074 patent discloses "wherein the at least one vehicle remote control function comprises at least one of a vehicle security function, a remote keyless entry function, and a remote engine starting function." Further, it is inherently disclosed that vehicle security functions can include locking doors, rolling up windows, and activating an alarm system.

With regard to claim 11, this claim is indefinite as there is no antecedent basis for "said wireless position determining device." This claim limitation is interpreted as "said vehicle position determining device" as defined in claim 1. As set out in detail in Exhibit C, the Spaur '074 patent discloses "wherein said vehicle position determining device comprises a Global Positioning System (GPS) receiver."

With regard to claim 12, as set out in detail in Exhibit C, the Spaur '074 patent discloses "a housing containing said vehicle position determining device, said wireless communications device, said multi-vehicle compatible controller, and said downloading interface."

With regard to claim 13, as set out in detail in Exhibit C, the Spaur '074 patent teaches all limitations of claim 13. Additionally, a cellular telephone transceiver constitutes a

downloading interface and it is inherently disclosed that cellular connections are temporary connections.

With regard to claim 14, as set out in detail in Exhibit C, the Spaur '074 patent discloses "wherein the corresponding at least one vehicle code is for reading from the at least one vehicle device." Specifically, the Spaur '074 patent teaches two-way (i.e. reading from and writing to) communication with vehicle devices connected to the CAN using device drivers.

With regard to claim 15, as set out in detail in Exhibit C, the Spaur '074 patent discloses "wherein the corresponding at least one vehicle code is for writing to the at least one vehicle device." Specifically, the Spaur '074 patent teaches two-way (i.e. reading from and writing to) communication with vehicle devices connected to the CAN using device drivers.

With regard to claim 16, as set out in detail in Exhibit C, the Spaur '074 patent discloses "wherein said downloading interface is also for permitting downloading of at least one programming instruction for said multi-vehicle compatible controller."

With regard to claim 17, as set out in detail in Exhibit C, the Spaur '074 patent discloses "a remote transmitter; and wherein said multi-vehicle compatible controller also performs at least one vehicle remote control function responsive to said remote transmitter." Specifically, the Spaur '074 patent teaches that a remote station can provide commands that cause the controller to perform a control function. Accordingly, a remote station includes a remote transmitter, thereby fulfilling the requirements of claim 17.

With regard to claim 18, as set out in detail in Exhibit C, the Spaur '074 patent teaches all limitations of claim 18. Additionally, a cellular telephone transceiver constitutes a wireless downloading interface and it is inherently disclosed that cellular connections are temporary connections.

With regard to claim 19, as set out in detail in Exhibit C, the Spaur '074 patent discloses "wherein the corresponding at least one vehicle code is for reading from the at least one vehicle device." Specifically, the Spaur '074 patent teaches two-way (i.e. reading from and writing to) communication with vehicle devices connected to the CAN using device drivers.

With regard to claim 20, as set out in detail in Exhibit C, the Spaur '074 patent discloses "wherein the corresponding at least one vehicle code is for writing to the at least one vehicle device." Specifically, the Spaur '074 patent teaches two-way (i.e. reading from and writing to) communication with vehicle devices connected to the CAN using device drivers.

With regard to claim 21, as set out in detail in Exhibit C, the Spaur '074 patent discloses "wherein said downloading interface is also for permitting downloading of at least one programming instruction for said multi-vehicle compatible controller."

With regard to claim 22, as set out in detail in Exhibit C, the Spaur '074 patent discloses "a remote transmitter; and wherein said multi-vehicle compatible controller also performs at least one vehicle remote control function responsive to said remote transmitter." Specifically, the Spaur '074 patent teaches that a remote station can provide commands that cause the controller to perform a control function. Accordingly, a remote station includes a remote transmitter, thereby fulfilling the requirements of claim 22.

C. Claims 1 – 22 are Unpatentable over the Spaur '074 Patent in view of the Davis '724 Patent

Each and every limitation of claims 1 – 22 is disclosed by the Spaur '074 patent in view of the Davis '724 patent as shown in detail in the claim chart attached as Exhibit D. Accordingly, the following proposed rejection is appropriate.

1. Motivation to Combine the References

The Spaur '074 patent and the Davis '724 patent qualify as prior art with respect to the Flick '278 patent under 35 U.S.C. § 102(b). Therefore, it is appropriate to rely on these references to support a rejection under 35 U.S.C. § 103 following MPEP § 2141.01. "In order for a reference to be proper for use in an obviousness rejection under 35 U.S.C. 103, the reference must be analogous art to the claimed invention. In re Bigio, 381 F.3d 1320, 1325, 72 USPQ2d 1209, 1212 (Fed. Cir. 2004)." (MPEP § 2141.01(a)). "[A] reference is analogous art to the claimed invention if: (1) the reference is from the same field of endeavor as the claimed invention (even if it addresses a different problem); or (2) the reference is reasonably pertinent to the problem faced by the inventor (even if it is not in the same field of endeavor as the claimed invention). See Bigio, 381 F.3d at 1325, 72 USPQ2d at 1212." (*Id.*)

The Flick '278 patent claims "a multi-vehicle compatible tracking unit" that can be used to control operable vehicle devices connected to a vehicle data bus. The Spaur '074 patent states: "a system is provided in which communication of information, including requests, commands and data, is achieved between vehicle having physical vehicle devices and one or more sites that are remote from the vehicle. The information communication is implemented using certain standardized network communication links that enable multiple users, either simultaneously or at separate times, with different communications and processing hardware, software and different applications and requiring information from different vehicle devices, to obtain the desired information while avoiding design complexities in interfacing the remote site with the vehicle devices." (Spaur '074 patent, col. 2, lines 11 – 24). As the Spaur '074 patent is directed toward systems for communicating with vehicle devices using a controller connected to a vehicle data bus, it is in the same field of endeavor as the claimed invention of the Flick

'278 patent and the Spaur '074 patent is analogous art for the purposes of a 35 U.S.C. § 103 analysis.

The Davis '724 patent discloses "GPS and cellular telephone devices. Specifically, the present invention relates to a combined GPS and analog cellular telephone unit." (Davis '724 patent, col. 1, lines 6 – 8). It is noted that the Flick '278 patent claims a "wireless communications device" that is described as including a cellular communications system. Additionally, the Flick '278 patent claims a "vehicle position determining device" that can include a GPS. As the Davis '724 patent discloses a cellular communications system and a satellite navigation system, the references are reasonably pertinent to the problem faced by the inventor and are therefore analogous art to the Flick '278 patent for the purposes of a 35 U.S.C. § 103 analysis.

"The key to supporting any rejection under 35 U.S.C. 103 is the clear articulation of the reason(s) why the claimed invention would have been obvious. The Supreme Court in KSR noted that the analysis supporting a rejection under 35 U.S.C. 103 should be made explicit. The Court quoting In re Kahn, 441 F.3d 977, 988, 78 USPQ2d 1329, 1336 (Fed. Cir. 2006), stated that "'[R]ejections on obviousness cannot be sustained by mere conclusory statements; instead, there must be some articulated reasoning with some rational underpinning to support the legal conclusion of obviousness.'" KSR, 550 U.S. at 418, 82 USPQ2d at 1396. Exemplary rationales that may support a conclusion of obviousness include:

> (A) Combining prior art elements according to known methods to yield predictable results;
>
> (B) Simple substitution of one known element for another to obtain predictable results;
>
> (C) Use of known technique to improve similar devices (methods, or products) in the same way;

(D) Applying a known technique to a known device (method, or product) ready for improvement to yield predictable results;

(E) "Obvious to try" – choosing from a finite number of identified, predictable solutions, with a reasonable expectation of success;

(F) Known work in one field of endeavor may prompt variations of it for use in either the same field or a different one based on design incentives or other market forces if the variations are predictable to one of ordinary skill in the art;

(G) Some teaching, suggestion, or motivation in the prior art that would have led one of ordinary skill to modify the prior art reference or to combine prior art reference teachings to arrive at the claimed invention."

(MPEP § 2141). As is set out in detail in Exhibit D, the Spaur '074 patent utilizes a variety of cellular communication techniques along with a separate GPS receiver for obtaining position data. As above, the Davis '724 patent is directed toward cellular communication devices that incorporate a GPS receiver. It would be a simple substitution of one known element for another known element to substitute the devices taught by the Davis '724 patent for the cellular communication devices taught in the Spaur '074 patent. This substitution would have the predictable result of maintaining the cellular communications capability as described in the Spaur '074 patent while providing access to a GPS receiver that is not on the vehicle bus. This would be a predictable and rational substitution for a variety of reasons, including providing compatibility with vehicles that do not have a GPS receiver as a vehicle device on the vehicle data bus. As the Spaur '074 patent already teaches the use of a GPS receiver, the result is predictable as no new data or processes are being introduced with the substitution. Therefore, as described in more detail below, the claimed invention of the Flick '074 patent would have been obvious in view of the Spaur '074 patent in view of the Davis '724 patent in accordance with MPEP § 2141.

2. Secondary Considerations

"Objective evidence relevant to the issue of obviousness must be evaluated by Office personnel. [] Such evidence, sometimes referred to as "secondary considerations," may include evidence of commercial success, long-felt but unsolved needs, failure of others, and unexpected results. The evidence may be included in the specification as filed, accompany the application on filing, or be provided in a timely manner at some other point during the prosecution. The weight to be given any objective evidence is made on a case-by-case basis. The mere fact that an applicant has presented evidence does not mean that the evidence is dispositive of the issue of obviousness." (MPEP § 2141). "Such secondary considerations as commercial success, long felt but unsolved needs, failure of others, etc., might be utilized to give light to the circumstances surrounding the origin of the subject matter sought to be patented. As indicia of obviousness or nonobviousness, these inquires may have relevancy." Graham v. John Deere Co. of Kansas City, 383 U.S. 1, 17-18 (internal citations omitted). Other secondary indicia can include simultaneous invention, existence of prior art that teach away from the invention, and acclamation and copying of the invention by others. (See Ecolochem, Inc. v. Southern Cal. Edison Co., 277 F.3d 1361, 1379-1380 (Fed. Cir. 2000)).

To be relevant, the secondary indicia must relate to the patented invention. "When a patentee asserts that commercial success supports its contention of nonobviousness, there must of course be a sufficient relationship between the commercial success and the patented invention. The term 'nexus' is often used, in this context, to designate a legally and factually sufficient connection between the proven success and the patented invention, such that the objective evidence should be considered in the determination of nonobviousness. The burden

of proof as to this connection or nexus resides with the patentee." Demaco Corp. v. F. Von Langsdorff Licensing Ltd., 851 F.2d 1387, 1392 (internal citations omitted).

As the Spaur '074 patent and the Davis '724 patent both pre-date the earliest priority date and the filing date of the Flick '278 patent, any secondary considerations to be considered must outweigh the simple substitution of one known element for another to obtain predictable results well known to one of ordinary skill in the art along well before the filing of the Flick '278 patent.

3. Proposed Rejection

Claims 1 – 22 are rejected under 35 U.S.C. § 103(a) as being unpatentable over the Spaur '074 patent in view of the Davis '724 patent.

With regard to claim 1, as set out in detail in Exhibit D, the Spaur '074 patent in view of the Davis '724 patent teaches all limitations of claim 1. Specifically, it would have been obvious to substitute the cellular communication devices that combine a GPS receiver as taught by the Davis '724 patent for the "wireless device 18" capable of communicating via a cellular network as disclosed in the Spaur '074 patent. The Spaur '074 patent clearly teaches both a wireless communications device and a GPS receiver in the vehicle capable of determining vehicle position information. The Davis '724 patent teaches a combined cellular telephone and GPS receiver device. It would have been obvious to substitute the combined cellular telephone and GPS receiver device as taught by the Davis '724 patent for the separate wireless communications device and GPS receiver taught in the Spaur '074 patent. In this case, the controller taught by the Spaur '074 patent could be modified to obtain vehicle position information using the GPS receiver in the combined cellular telephone and GPS receiver device. It would have been obvious to modify the system disclosed in the Spaur '074 patent in

this way to enable its use in vehicles that do not possess a GPS receiver as a vehicle device on a CAN bus.

With regard to claim 2, as set out in detail in Exhibit D, the Spaur '074 patent in view of the Davis '724 patent teaches "wherein said downloading interface comprises a wired signal downloading interface." Specifically, the Spaur '074 patent discloses a RS-232 serial connector. It is inherently disclosed that a RS-232 connector is defined to have particular electrical signal characteristics and mechanical interfaces per the Electronic Industries Association (EIA) standard RS-232-C, established in 1969. Additionally, the PCMCIA unit and Ethernet connection are both wired interfaces.

With regard to claim 3, as set out in detail in Exhibit D, the Spaur '074 patent in view of the Davis '724 patent teaches "wherein said wired signal downloading interface comprises a connector for temporary connection to a downloading device." Specifically, it is inherently disclosed that a RS-232 port, a PCMCIA unit, and an Ethernet connection include a pluggable, and therefore unpluggable, mechanical interface.

With regard to claim 4, as set out in detail in Exhibit D, the Spaur '074 patent in view of the Davis '724 patent teaches "wherein said downloading interface comprises a wireless signal downloading interface." Specifically, the Spaur '074 patent describes a "cellular digitized packet data (CDPD) network," which is a wireless cellular network. Furthermore, the Davis '724 patent teaches the use of cellular telephone technologies and cellular telephone systems.

With regard to claim 5, as set out in detail in Exhibit D, the Spaur '074 patent in view of the Davis '724 patent teaches "wherein said wireless signal downloading interface comprises a wireless receiver for temporary connection to a downloading device." Specifically, it is inherently disclosed that cellular network connections are temporary connections.

With regard to claim 6, as set out in detail in Exhibit D, the Spaur '074 patent in view of the Davis '724 patent teaches "wherein the corresponding at least one vehicle code is for reading from the at least one vehicle device." Specifically, the Spaur '074 patent teaches two-way (i.e. reading from and writing to) communication with vehicle devices connected to the CAN using device drivers.

With regard to claim 7, as set out in detail in Exhibit D, the Spaur '074 patent in view of the Davis '724 patent teaches "wherein the corresponding at least one vehicle code is for writing to the at least one vehicle device." Specifically, the Spaur '074 patent teaches two-way (i.e. reading from and writing to) communication with vehicle devices connected to the CAN using device drivers.

With regard to claim 8, as set out in detail in Exhibit D, the Spaur '074 patent in view of the Davis '724 patent teaches "wherein said downloading interface is also for permitting downloading of at least one programming instruction for said multi-vehicle compatible controller."

With regard to claim 9, as set out in detail in Exhibit D, the Spaur '074 patent in view of the Davis '724 patent teaches "a remote transmitter; and wherein said multi-vehicle compatible controller also performs at least one vehicle remote control function responsive to said remote transmitter." Specifically, the Spaur '074 patent teaches that a remote station can provide commands that cause the controller to perform a control function. Accordingly, a remote station includes a remote transmitter, thereby fulfilling the requirements of claim 9.

With regard to claim 10, as set out in detail in Exhibit D, the Spaur '074 patent in view of the Davis '724 patent teaches "wherein the at least one vehicle remote control function comprises at least one of a vehicle security function, a remote keyless entry function, and a

remote engine starting function." Further, it is inherently disclosed that vehicle security functions can include locking doors, rolling up windows, and activating an alarm system.

With regard to claim 11, this claim is indefinite as there is no antecedent basis for "said wireless position determining device." This claim limitation is interpreted as "said vehicle position determining device" as defined in claim 1. As set out in detail in Exhibit D, the Spaur '074 patent in view of the Davis '724 patent teaches "wherein said vehicle position determining device comprises a Global Positioning System (GPS) receiver." Specifically, the Spaur '074 patent teaches a GPS receiver as a vehicle device connected to a vehicle data bus, while the Davis '724 patent teaches GPS receivers integrated with cellular telephones.

With regard to claim 12, as set out in detail in Exhibit D, the Spaur '074 patent in view of the Davis '724 patent teaches "a housing containing said vehicle position determining device, said wireless communications device, said multi-vehicle compatible controller, and said downloading interface."

With regard to claim 13, as set out in detail in Exhibit D, the Spaur '074 patent in view of the Davis '724 patent teaches all limitations of claim 13. The Spaur '074 patent clearly teaches both a wireless communications device and a GPS receiver in the vehicle capable of determining vehicle position information. The Davis '724 patent teaches a combined cellular telephone and GPS receiver device. It would have been obvious to substitute the combined cellular telephone and GPS receiver device as taught by the Davis '724 patent for the separate wireless communications device and GPS receiver taught in the Spaur '074 patent. In this case, the controller taught by the Spaur '074 patent could be modified to obtain vehicle position information using the GPS receiver in the combined cellular telephone and GPS receiver device. It would have been obvious to modify the system disclosed in the Spaur '074

patent in this way to enable its use in vehicles that do not possess a GPS receiver as a vehicle device on a CAN bus.

Additionally, a cellular telephone transceiver constitutes a downloading interface and it is inherently disclosed that cellular connections are temporary connections.

With regard to claim 14, as set out in detail in Exhibit D, the Spaur '074 patent in view of the Davis '724 patent teaches "wherein the corresponding at least one vehicle code is for reading from the at least one vehicle device." Specifically, the Spaur '074 patent teaches two-way (i.e. reading from and writing to) communication with vehicle devices connected to the CAN using device drivers.

With regard to claim 15, as set out in detail in Exhibit D, the Spaur '074 patent in view of the Davis '724 patent teaches "wherein the corresponding at least one vehicle code is for writing to the at least one vehicle device." Specifically, the Spaur '074 patent teaches two-way (i.e. reading from and writing to) communication with vehicle devices connected to the CAN using device drivers.

With regard to claim 16, as set out in detail in Exhibit D, the Spaur '074 patent in view of the Davis '724 patent teaches "wherein said downloading interface is also for permitting downloading of at least one programming instruction for said multi-vehicle compatible controller."

With regard to claim 17, as set out in detail in Exhibit D, the Spaur '074 patent in view of the Davis '724 patent teaches "a remote transmitter; and wherein said multi-vehicle compatible controller also performs at least one vehicle remote control function responsive to said remote transmitter." Specifically, the Spaur '074 patent teaches that a remote station can

provide commands that cause the controller to perform a control function. Accordingly, a remote station includes a remote transmitter, thereby fulfilling the requirements of claim 17.

With regard to claim 18, as set out in detail in Exhibit D, the Spaur '074 patent in view of the Davis '724 patent teaches all limitations of claim 18. The Spaur '074 patent clearly teaches both a wireless communications device and a GPS receiver in the vehicle capable of determining vehicle position information. The Davis '724 patent teaches a combined cellular telephone and GPS receiver device. It would have been obvious to substitute the combined cellular telephone and GPS receiver device as taught by the Davis '724 patent for the separate wireless communications device and GPS receiver taught in the Spaur '074 patent. In this case, the controller taught by the Spaur '074 patent could be modified to obtain vehicle position information using the GPS receiver in the combined cellular telephone and GPS receiver device. It would have been obvious to modify the system disclosed in the Spaur '074 patent in this way to enable its use in vehicles that do not possess a GPS receiver as a vehicle device on a CAN bus.

Additionally, a cellular telephone transceiver constitutes a wireless downloading interface and it is inherently disclosed that cellular connections are temporary connections.

With regard to claim 19, as set out in detail in Exhibit D, the Spaur '074 patent in view of the Davis '724 patent teaches "wherein the corresponding at least one vehicle code is for reading from the at least one vehicle device." Specifically, the Spaur '074 patent teaches two-way (i.e. reading from and writing to) communication with vehicle devices connected to the CAN using device drivers.

With regard to claim 20, as set out in detail in Exhibit D, the Spaur '074 patent in view of the Davis '724 patent teaches "wherein the corresponding at least one vehicle code is for

writing to the at least one vehicle device." Specifically, the Spaur '074 patent teaches two-way (i.e. reading from and writing to) communication with vehicle devices connected to the CAN using device drivers.

With regard to claim 21, as set out in detail in Exhibit D, the Spaur '074 patent in view of the Davis '724 patent teaches "wherein said downloading interface is also for permitting downloading of at least one programming instruction for said multi-vehicle compatible controller."

With regard to claim 22, as set out in detail in Exhibit D, the Spaur '074 patent in view of the Davis '724 patent teaches "a remote transmitter; and wherein said multi-vehicle compatible controller also performs at least one vehicle remote control function responsive to said remote transmitter." Specifically, the Spaur '074 patent teaches that a remote station can provide commands that cause the controller to perform a control function. Accordingly, a remote station includes a remote transmitter, thereby fulfilling the requirements of claim 22.

D. Claims 1 – 22 are Unpatentable over the Spaur '074 Patent in view of the Song '756 Patent

Each and every limitation of claims 1 – 22 is disclosed by the Spaur '074 patent in view of the Song '756 patent as shown in detail in the claim chart attached as Exhibit E. Accordingly, the following proposed rejection is appropriate.

1. Motivation to Combine the References

The Spaur '074 patent and the Song '756 patent all qualify as prior art with respect to the Flick '278 patent under 35 U.S.C. § 102(b). Therefore, it is appropriate to rely on these references to support a rejection under 35 U.S.C. § 103 following MPEP § 2141.01. "In order for a reference to be proper for use in an obviousness rejection under 35 U.S.C. 103, the

reference must be analogous art to the claimed invention. In re Bigio, 381 F.3d 1320, 1325, 72 USPQ2d 1209, 1212 (Fed. Cir. 2004)." (MPEP § 2141.01(a)). "[A] reference is analogous art to the claimed invention if: (1) the reference is from the same field of endeavor as the claimed invention (even if it addresses a different problem); or (2) the reference is reasonably pertinent to the problem faced by the inventor (even if it is not in the same field of endeavor as the claimed invention). See Bigio, 381 F.3d at 1325, 72 USPQ2d at 1212." (*Id.*)

The Flick '278 patent claims "a multi-vehicle compatible tracking unit" that can be used to control operable vehicle devices connected to a vehicle data bus. The Spaur '074 patent states: "a system is provided in which communication of information, including requests, commands and data, is achieved between vehicle having physical vehicle devices and one or more sites that are remote from the vehicle. The information communication is implemented using certain standardized network communication links that enable multiple users, either simultaneously or at separate times, with different communications and processing hardware, software and different applications and requiring information from different vehicle devices, to obtain the desired information while avoiding design complexities in interfacing the remote site with the vehicle devices." (Spaur '074 patent, col. 2, lines 11 – 24). As the Spaur '074 patent is directed toward systems for communicating with vehicle devices using a controller connected to a vehicle data bus, it is in the same field of endeavor as the claimed invention of the Flick '278 patent and the Spaur '074 patent is analogous art for the purposes of a 35 U.S.C. § 103 analysis.

The Song '756 patent teaches "an inexpensive, accurate system for determining a vehicle's location using the existing base stations and signals of a cellular telephone network." (Song '756 patent, col. 2, lines 57 – 60). "The system includes a small, preferably hidden,

vehicle locating transceiver 19 affixed to vehicle 1 which operates within a geographical area served by a cellular telephone network 2." (Song '756 patent, col. 5, lines 62 – 68). "Vehicle locating transceiver 19 also could be designed to operate independently of a mobile telephone and, in that case, all components of the mobile telephone used by the transceiver, as shown in FIG. 2, could be included in the transceiver." (Song '756 patent, col. 7, lines 34 – 42). The "vehicle locating transceiver" "receives signals transmitted from several of the base stations in the network. These signals preferably are the signals transmitted on the control or set-up channels from these base stations. The device includes means for determining the power at which each of these signals is received. These means preferably include means for sampling the received-power of each signal over a fixed period of time and for calculating the average received power of these samples for each signal." (Song '756 patent, col. 3, lines 33 – 41). It is noted that the Flick '278 patent claims a "wireless communications device" that is described as including a cellular communications system. Additionally, the Flick '278 patent claims a "vehicle position determining device" that can include a GPS. As the Song '756 patent discloses a cellular communications system capable of determining location information, the references are reasonably pertinent to the problem faced by the inventor and are therefore analogous art to the Flick '278 patent for the purposes of a 35 U.S.C. § 103 analysis.

"The key to supporting any rejection under 35 U.S.C. 103 is the clear articulation of the reason(s) why the claimed invention would have been obvious. The Supreme Court in KSR noted that the analysis supporting a rejection under 35 U.S.C. 103 should be made explicit. The Court quoting In re Kahn, 441 F.3d 977, 988, 78 USPQ2d 1329, 1336 (Fed. Cir. 2006), stated that "'[R]ejections on obviousness cannot be sustained by mere conclusory statements; instead, there must be some articulated reasoning with some rational underpinning to support

the legal conclusion of obviousness.'" KSR, 550 U.S. at 418, 82 USPQ2d at 1396. Exemplary rationales that may support a conclusion of obviousness include:

> (A) Combining prior art elements according to known methods to yield predictable results;
>
> (B) Simple substitution of one known element for another to obtain predictable results;
>
> (C) Use of known technique to improve similar devices (methods, or products) in the same way;
>
> (D) Applying a known technique to a known device (method, or product) ready for improvement to yield predictable results;
>
> (E) "Obvious to try" – choosing from a finite number of identified, predictable solutions, with a reasonable expectation of success;
>
> (F) Known work in one field of endeavor may prompt variations of it for use in either the same field or a different one based on design incentives or other market forces if the variations are predictable to one of ordinary skill in the art;
>
> (G) Some teaching, suggestion, or motivation in the prior art that would have led one of ordinary skill to modify the prior art reference or to combine prior art reference teachings to arrive at the claimed invention."

(MPEP § 2141). As is set out in detail in Exhibit E, the Spaur '074 patent utilizes a variety of cellular communication techniques along with a separate GPS receiver for obtaining position data. As above, the Song '756 patent is directed toward cellular communication devices that are capable of determining location information. It would be a simple substitution of one known element for another known element to substitute the devices taught by the Song '756 patent for the cellular communication devices taught in the Spaur '074 patent. This substitution would have the predictable result of maintaining the cellular communications capability as described in the Spaur '074 patent while providing a means for determining location information independent of the GPS receiver on the vehicle data bus. This would be a predictable and rational substitution for a variety of reasons, including providing location data, and therefore compatibility, with vehicles that do not have a GPS receiver as a vehicle device

on the vehicle data bus and additionally providing vehicle location data in situations where GPS receivers are unable to obtain location data. As the Spaur '074 patent already teaches the use of location data, the result is predictable as no new data or processes are being introduced with the substitution. Therefore, as described in more detail below, the claimed invention of the Flick '074 patent would have been obvious in in view of the Spaur '074 patent in view of the Song '756 patent in accordance with MPEP § 2141.

2. Secondary Considerations

"Objective evidence relevant to the issue of obviousness must be evaluated by Office personnel. [] Such evidence, sometimes referred to as 'secondary considerations,' may include evidence of commercial success, long-felt but unsolved needs, failure of others, and unexpected results. The evidence may be included in the specification as filed, accompany the application on filing, or be provided in a timely manner at some other point during the prosecution. The weight to be given any objective evidence is made on a case-by-case basis. The mere fact that an applicant has presented evidence does not mean that the evidence is dispositive of the issue of obviousness." (MPEP § 2141). "Such secondary considerations as commercial success, long felt but unsolved needs, failure of others, etc., might be utilized to give light to the circumstances surrounding the origin of the subject matter sought to be patented. As indicia of obviousness or nonobviousness, these inquires may have relevancy." Graham v. John Deere Co. of Kansas City, 383 U.S. 1, 17-18 (internal citations omitted). Other secondary indicia can include simultaneous invention, existence of prior art that teach away from the invention, and acclamation and copying of the invention by others. (See Ecolochem, Inc. v. Southern Cal. Edison Co., 277 F.3d 1361, 1379-1380 (Fed. Cir. 2000)).

To be relevant, the secondary indicia must relate to the patented invention. "When a patentee asserts that commercial success supports its contention of nonobviousness, there must of course be a sufficient relationship between the commercial success and the patented invention. The term 'nexus' is often used, in this context, to designate a legally and factually sufficient connection between the proven success and the patented invention, such that the objective evidence should be considered in the determination of nonobviousness. The burden of proof as to this connection or nexus resides with the patentee." Demaco Corp. v. F. Von Langsdorff Licensing Ltd., 851 F.2d 1387, 1392 (internal citations omitted).

As the Spaur '074 patent and the Song '756 patent pre-date the earliest priority date and the filing date of the Flick '278 patent, any secondary considerations to be considered must outweigh the simple substitution of one known element for another to obtain predictable results well known to one of ordinary skill in the art well before the filing of the Flick '278 patent.

3. Proposed Rejection

Claims 1 – 22 are rejected under 35 U.S.C. § 103(a) as being unpatentable over the Spaur '074 patent in view of the Song '756 patent.

With regard to claim 1, as set out in detail in Exhibit E, the Spaur '074 patent in view of the Song '756 patent teaches all limitations of claim 1. Specifically, it would have been obvious to substitute the cellular communication devices that can determine location information related to a vehicle as taught by the Song '756 patent for the "wireless device 18" capable of communicating via a cellular network as disclosed in the Spaur '074 patent. The Spaur '074 patent clearly teaches both a wireless communications device and a GPS receiver in the vehicle capable of determining vehicle position information. The Song '756 patent teaches a

combined cellular telephone and vehicle locating transceiver that can determine vehicle position data using a cellular telephone network. It would have been obvious to substitute the cellular telephone and vehicle locating transceiver of the Song '756 patent for the wireless communications device as taught by the Spaur '074 patent. In this case, the controller taught by the Spaur '074 patent could obtain vehicle position data from both the GPS receiver connected to the vehicle data bus and from the cellular telephone and vehicle locating transceiver. It would have been obvious to modify the system disclosed in the Spaur '074 patent in this way to enable use of the controller in vehicles that do not have a GPS receiver as a vehicle and device and to also provide a system that can generate vehicle position data in areas where a GPS signal is not available.

With regard to claim 2, as set out in detail in Exhibit E, the Spaur '074 patent in view of the Song '756 patent teaches "wherein said downloading interface comprises a wired signal downloading interface." Specifically, the Spaur '074 patent discloses a RS-232 serial connector. It is inherently disclosed that a RS-232 connector is defined to have particular electrical signal characteristics and mechanical interfaces per the Electronic Industries Association (EIA) standard RS-232-C, established in 1969. Additionally, the PCMCIA unit and Ethernet connection are both wired interfaces.

With regard to claim 3, as set out in detail in Exhibit E, the Spaur '074 patent in view of the Song '756 patent teaches "wherein said wired signal downloading interface comprises a connector for temporary connection to a downloading device." Specifically, it is inherently disclosed that a RS-232 port, a PCMCIA unit, and an Ethernet connection include a pluggable, and therefore unpluggable, mechanical interface.

With regard to claim 4, as set out in detail in Exhibit E, the Spaur '074 patent in view of the Song '756 patent teaches "wherein said downloading interface comprises a wireless signal downloading interface." Specifically, the Spaur '074 patent describes a "cellular digitized packet data (CDPD) network," which is a wireless cellular network. Furthermore, the Song '756 patent teaches the use of cellular telephone technologies and cellular telephone systems.

With regard to claim 5, as set out in detail in Exhibit E, the Spaur '074 patent in view of the Song '756 patent teaches "wherein said wireless signal downloading interface comprises a wireless receiver for temporary connection to a downloading device." Specifically, it is inherently disclosed that cellular network connections are temporary connections.

With regard to claim 6, as set out in detail in Exhibit E, the Spaur '074 patent in view of the Song '756 patent teaches "wherein the corresponding at least one vehicle code is for reading from the at least one vehicle device." Specifically, the Spaur '074 patent teaches two-way (i.e. reading from and writing to) communication with vehicle devices connected to the CAN using device drivers.

With regard to claim 7, as set out in detail in Exhibit E, the Spaur '074 patent in view of the Song '756 patent teaches "wherein the corresponding at least one vehicle code is for writing to the at least one vehicle device." Specifically, the Spaur '074 patent teaches two-way (i.e. reading from and writing to) communication with vehicle devices connected to the CAN using device drivers.

With regard to claim 8, as set out in detail in Exhibit E, the Spaur '074 patent in view of the Song '756 patent teaches "wherein said downloading interface is also for permitting downloading of at least one programming instruction for said multi-vehicle compatible controller."

With regard to claim 9, as set out in detail in Exhibit E, the Spaur '074 patent in view of the Song '756 patent teaches "a remote transmitter; and wherein said multi-vehicle compatible controller also performs at least one vehicle remote control function responsive to said remote transmitter." Specifically, the Spaur '074 patent teaches that a remote station can provide commands that cause the controller to perform a control function. Accordingly, a remote station includes a remote transmitter, thereby fulfilling the requirements of claim 9.

With regard to claim 10, as set out in detail in Exhibit E, the Spaur '074 patent in view of the Song '756 patent teaches "wherein the at least one vehicle remote control function comprises at least one of a vehicle security function, a remote keyless entry function, and a remote engine starting function." Further, it is inherently disclosed that vehicle security functions can include locking doors, rolling up windows, and activating an alarm system.

With regard to claim 11, this claim is indefinite as there is no antecedent basis for "said wireless position determining device." This claim limitation is interpreted as "said vehicle position determining device" as defined in claim 1. As set out in detail in Exhibit E, the Spaur '074 patent in view of the Song '756 patent teaches "wherein said vehicle position determining device comprises a Global Positioning System (GPS) receiver." Specifically, the Spaur '074 patent teaches a GPS receiver as a vehicle device connected to a vehicle data bus when the vehicle contains a GPS receiver.

With regard to claim 12, as set out in detail in Exhibit E, the Spaur '074 patent in view of the Song '756 patent teaches "a housing containing said vehicle position determining device, said wireless communications device, said multi-vehicle compatible controller, and said downloading interface."

With regard to claim 13, as set out in detail in Exhibit E, the Spaur '074 patent in view of the Song '756 patent teaches all limitations of claim 13. Specifically, it would have been obvious to substitute the cellular communication devices that can determine location information related to a vehicle as taught by the Song '756 patent for the "wireless device 18" capable of communicating via a cellular network as disclosed in the Spaur '074 patent. The Spaur '074 patent clearly teaches both a wireless communications device and a GPS receiver in the vehicle capable of determining vehicle position information. The Song '756 patent teaches a combined cellular telephone and vehicle locating transceiver that can determine vehicle position data using a cellular telephone network. It would have been obvious to substitute the cellular telephone and vehicle locating transceiver of the Song '756 patent for the wireless communications device as taught by the Spaur '074 patent. In this case, the controller taught by the Spaur '074 patent could obtain vehicle position data from both the GPS receiver connected to the vehicle data bus and from the cellular telephone and vehicle locating transceiver. It would have been obvious to modify the system disclosed in the Spaur '074 patent in this way to enable use of the controller in vehicles that do not have a GPS receiver as a vehicle and device and to also provide a system that can generate vehicle position data in areas where a GPS signal is not available.

Additionally, a cellular telephone transceiver constitutes a downloading interface and it is inherently disclosed that cellular connections are temporary connections.

With regard to claim 14, as set out in detail in Exhibit E, the Spaur '074 patent in view of the Song '756 patent teaches "wherein the corresponding at least one vehicle code is for reading from the at least one vehicle device." Specifically, the Spaur '074 patent teaches two-

way (i.e. reading from and writing to) communication with vehicle devices connected to the CAN using device drivers.

With regard to claim 15, as set out in detail in Exhibit E, the Spaur '074 patent in view of the Song '756 patent teaches "wherein the corresponding at least one vehicle code is for writing to the at least one vehicle device." Specifically, the Spaur '074 patent teaches two-way (i.e. reading from and writing to) communication with vehicle devices connected to the CAN using device drivers.

With regard to claim 16, as set out in detail in Exhibit E, the Spaur '074 patent in view of the Song '756 patent teaches "wherein said downloading interface is also for permitting downloading of at least one programming instruction for said multi-vehicle compatible controller."

With regard to claim 17, as set out in detail in Exhibit E, the Spaur '074 patent in view of the Song '756 patent teaches "a remote transmitter; and wherein said multi-vehicle compatible controller also performs at least one vehicle remote control function responsive to said remote transmitter." Specifically, the Spaur '074 patent teaches that a remote station can provide commands that cause the controller to perform a control function. Accordingly, a remote station includes a remote transmitter, thereby fulfilling the requirements of claim 17.

With regard to claim 18, as set out in detail in Exhibit E, the Spaur '074 patent in view of the Song '756 patent teaches all limitations of claim 1. Specifically, it would have been obvious to substitute the cellular communication devices that can determine location information related to a vehicle as taught by the Song '756 patent for the "wireless device 18" capable of communicating via a cellular network as disclosed in the Spaur '074 patent. The Spaur '074 patent clearly teaches both a wireless communications device and a GPS receiver

in the vehicle capable of determining vehicle position information. The Song '756 patent teaches a combined cellular telephone and vehicle locating transceiver that can determine vehicle position data using a cellular telephone network. It would have been obvious to substitute the cellular telephone and vehicle locating transceiver of the Song '756 patent for the wireless communications device as taught by the Spaur '074 patent. In this case, the controller taught by the Spaur '074 patent could obtain vehicle position data from both the GPS receiver connected to the vehicle data bus and from the cellular telephone and vehicle locating transceiver. It would have been obvious to modify the system disclosed in the Spaur '074 patent in this way to enable use of the controller in vehicles that do not have a GPS receiver as a vehicle and device and to also provide a system that can generate vehicle position data in areas where a GPS signal is not available.

Additionally, a cellular telephone transceiver constitutes a wireless downloading interface and it is inherently disclosed that cellular connections are temporary connections.

With regard to claim 19, as set out in detail in Exhibit E, the Spaur '074 patent in view of the Song '756 patent teaches "wherein the corresponding at least one vehicle code is for reading from the at least one vehicle device." Specifically, the Spaur '074 patent teaches two-way (i.e. reading from and writing to) communication with vehicle devices connected to the CAN using device drivers.

With regard to claim 20, as set out in detail in Exhibit E, the Spaur '074 patent in view of the Song '756 patent teaches "wherein the corresponding at least one vehicle code is for writing to the at least one vehicle device." Specifically, the Spaur '074 patent teaches two-way (i.e. reading from and writing to) communication with vehicle devices connected to the CAN using device drivers.

With regard to claim 21, as set out in detail in Exhibit E, the Spaur '074 patent in view of the Song '756 patent teaches "wherein said downloading interface is also for permitting downloading of at least one programming instruction for said multi-vehicle compatible controller."

With regard to claim 22, as set out in detail in Exhibit E, the Spaur '074 patent in view of the Song '756 patent teaches "a remote transmitter; and wherein said multi-vehicle compatible controller also performs at least one vehicle remote control function responsive to said remote transmitter." Specifically, the Spaur '074 patent teaches that a remote station can provide commands that cause the controller to perform a control function. Accordingly, a remote station includes a remote transmitter, thereby fulfilling the requirements of claim 22.

E. Claims 1 – 22 are Unpatentable over the Spaur '074 Patent in view of the Johnson '254 Patent

Each and every limitation of claims 1 – 22 is disclosed by the Spaur '074 patent in view of the Johnson '254 patent as shown in detail in the claim chart attached as Exhibit F. Accordingly, the following proposed rejection is appropriate.

1. Motivation to Combine the References

The Spaur '074 patent and the Johnson '254 patent all qualify as prior art with respect to the Flick '278 patent under 35 U.S.C. § 102(b). Therefore, it is appropriate to rely on these references to support a rejection under 35 U.S.C. § 103 following MPEP § 2141.01. "In order for a reference to be proper for use in an obviousness rejection under 35 U.S.C. 103, the reference must be analogous art to the claimed invention. In re Bigio, 381 F.3d 1320, 1325, 72 USPQ2d 1209, 1212 (Fed. Cir. 2004)." (MPEP § 2141.01(a)). "[A] reference is analogous art to the claimed invention if: (1) the reference is from the same field of endeavor as the claimed

invention (even if it addresses a different problem); or (2) the reference is reasonably pertinent to the problem faced by the inventor (even if it is not in the same field of endeavor as the claimed invention). See Bigio, 381 F.3d at 1325, 72 USPQ2d at 1212." (*Id.*)

Analogous Art

The Flick '278 patent claims "a multi-vehicle compatible tracking unit" that can be used to control operable vehicle devices connected to a vehicle data bus. The Spaur '074 patent states: "a system is provided in which communication of information, including requests, commands and data, is achieved between vehicle having physical vehicle devices and one or more sites that are remote from the vehicle. The information communication is implemented using certain standardized network communication links that enable multiple users, either simultaneously or at separate times, with different communications and processing hardware, software and different applications and requiring information from different vehicle devices, to obtain the desired information while avoiding design complexities in interfacing the remote site with the vehicle devices." (Spaur '074 patent, col. 2, lines 11 – 24). As the Spaur '074 patent is directed toward systems for communicating with vehicle devices using a controller connected to a vehicle data bus, it is in the same field of endeavor as the claimed invention of the Flick '278 patent and the Spaur '074 patent is analogous art for the purposes of a 35 U.S.C. § 103 analysis.

The Johnson '254 patent relates to "vehicle location and alarm systems, and more particularly to a system for determining the location, speed and direction of a vehicle, if moving, and a means for monitoring a set of vehicle intrusion sensors to determine if a violation has occurred. The system utilizes bi-directional cellular telephone network

communication to signal a remote central monitoring station which can issue signal commands to the vehicle capable of affecting various functions or mechanisms in order to immobilize the vehicle." (Johnson '254 patent, col. 1, lines 8 – 17). As shown in FIGS. 2 and 3 and described from col. 4, line 38 to col. 7, line 42 of the Johnson '254 patent, "[t]he control and communications unit 201 receives input signals from various intrusion detection devices (as shown in FIG. 2). These signals are transmitted to the control and communications unit 201 on an input bus 237 that is connected to the control and communications unit 201. The control and communications unit 201 outputs signals to several control devices (as shown in FIG. 2). The output signals are placed by the control and communications unit 201 onto an output bus 239 that is connected to the control 30 and communications unit 201." It is noted that the "input bus 237" and the "output bus 239" connect the "control and communications unit" to a variety of devices within the "vehicle 200." Accordingly, As the Johnson '254 patent is directed toward systems for communicating with vehicle devices using a controller connected to a data bus, it is in the same field of endeavor as the claimed invention of the Flick '278 patent and the Johnson '254 patent is analogous art for the purposes of a 35 U.S.C. § 103 analysis.

To the extent that it is argued that the Johnson '254 patent does not teach a "vehicle data bus" as in the Flick '278 patent and is therefore not analogous art, it is noted that U.S. Patent No. 5,719,551, U.S. Patent 6,011,460, and U.S. Patent No. 6,756,885, all having the same inventive entity and assignee as the Flick '278 patent, are cited in the 'Background of the Invention' of the Flick '278 patent. (Flick '278 patent, col. 2, lines 17 – 37). All of U.S. Patent No. 5,719,551, U.S. Patent 6,011,460, and U.S. Patent No. 6,756,885 have been cited as prior art on the front page of the Flick '278 patent. Additionally, U.S. Patent No. 5,719,551 and U.S. Patent 6,011,460 are incorporated by reference in their entirety into the specification of the

Flick '278 patent. (Flick '278 patent, col. 22, lines 1 – 7). Each of U.S. Patent No. 5,719,551, U.S. Patent 6,011,460, and U.S. Patent No. 6,756,885 cite, as prior art on the front page of the patent, U.S. Patent No. 5,555,498 to Berra et al. (the Berra '498 patent). As such, the Berra '498 patent constitutes background prior art with respect to the Flick '278 patent. The Berra '498 patent "relates generally to on-board vehicle computer systems and, more particularly, to a service adapter for allowing access by existing diagnostic tools to new on-board vehicle computer systems." (Berra '498 patent, col. 1, lines 8 – 11). In particular, in the 'Background of the Invention,' the Berra '498 patent states (emphasis added) "**[f]or over a decade, computers have been used on vehicles to control various vehicle systems such as engine and transmission systems, brake systems, suspension systems and even motorized seats.** Due to the complexity and inter-relationship between some of these vehicle systems, onboard computer communication systems have been developed to enable data and control signals to be passed between particular vehicle computers. **These communication systems typically include a plurality of wires which are connected to the vehicle computers in a particular electronic configuration, generally referred to as a "bus"**." (Berra '498 patent, col. 1, lines 12 – 23). That is, the Berra '498 patent clearly states that a plurality of wires connected to vehicle computers (i.e. vehicle devices) in a particular electronic configuration constitutes a vehicle data bus. To wit, "[o]ne example of vehicle bus structure is represented by the Chrysler Collision Detection ("C2D") Serial Data Bus," a well-known vehicle data bus installed in a variety of makes and models of Chrysler vehicles. (Berra '498 patent, col. 1, lines 24 – 25). Additionally, the Berra '498 patent was filed March 18, 1994 and issued September 10, 1996. Therefore, it is noted that the Berra '498 patent teaches a "vehicle data bus" known to one of ordinary skill in the art at least as early as March 18, 1984. Accordingly, it

is noted that a plurality of wires connected to vehicle devices constitutes a vehicle data bus and that this was common knowledge to one of ordinary skill in the art at least as early as March 1984. As the Johnson '254 patent clearly illustrates a variety of vehicle devices connected to a "control and communications unit" with a plurality of wires, it is noted that this constitutes a "vehicle data bus" as described in the Flick '278 patent.

Motivation to Combine

"The key to supporting any rejection under 35 U.S.C. 103 is the clear articulation of the reason(s) why the claimed invention would have been obvious. The Supreme Court in KSR noted that the analysis supporting a rejection under 35 U.S.C. 103 should be made explicit. The Court quoting In re Kahn, 441 F.3d 977, 988, 78 USPQ2d 1329, 1336 (Fed. Cir. 2006), stated that "'[R]ejections on obviousness cannot be sustained by mere conclusory statements; instead, there must be some articulated reasoning with some rational underpinning to support the legal conclusion of obviousness.'" KSR, 550 U.S. at 418, 82 USPQ2d at 1396. Exemplary rationales that may support a conclusion of obviousness include:

> (A) Combining prior art elements according to known methods to yield predictable results;
>
> (B) Simple substitution of one known element for another to obtain predictable results;
>
> (C) Use of known technique to improve similar devices (methods, or products) in the same way;
>
> (D) Applying a known technique to a known device (method, or product) ready for improvement to yield predictable results;
>
> (E) "Obvious to try" – choosing from a finite number of identified, predictable solutions, with a reasonable expectation of success;
>
> (F) Known work in one field of endeavor may prompt variations of it for use in either the same field or a different one based on design incentives or other market forces if the variations are predictable to one of ordinary skill in the art;
>
> (G) Some teaching, suggestion, or motivation in the prior art that would have led one of ordinary skill to modify the prior art reference or to combine prior art reference teachings to arrive at the claimed invention."

(MPEP § 2141). As is set out in detail in Exhibit F, the Spaur '074 patent utilizes a variety of cellular communication techniques along with a separate GPS receiver for obtaining position data. As above, the Johnson '254 patent is directed toward a similar vehicle security system having an integrated GPS receiver. It would be a simple combination of known prior art elements according to known methods to combine a GPS receiver as taught by the Johnson '254 patent into the controller as taught in the Spaur '074 patent. This combination would have the predictable result of providing the ability to obtain location data using a GPS receiver even in vehicles not having GPS receivers installed as vehicle devices connected to a vehicle communications bus. This would be a predictable and rational combination for a variety of reasons, including increasing the compatibility of the controller taught in the Spaur '074 patent with a broader set of vehicles. As the Spaur '074 patent already teaches the use of location data and GPS receivers, the result is predictable as no new data or processes are being introduced with the substitution. Therefore, as described in more detail below, the claimed invention of the Flick '074 patent would have been obvious in in view of the Spaur '074 patent in view of the Johnson '254 patent in accordance with MPEP § 2141.

2. Secondary Considerations

"Objective evidence relevant to the issue of obviousness must be evaluated by Office personnel. [] Such evidence, sometimes referred to as "secondary considerations," may include evidence of commercial success, long-felt but unsolved needs, failure of others, and unexpected results. The evidence may be included in the specification as filed, accompany the application on filing, or be provided in a timely manner at some other point during the prosecution. The weight to be given any objective evidence is made on a case-by-case basis.

The mere fact that an applicant has presented evidence does not mean that the evidence is dispositive of the issue of obviousness." (MPEP § 2141). "Such secondary considerations as commercial success, long felt but unsolved needs, failure of others, etc., might be utilized to give light to the circumstances surrounding the origin of the subject matter sought to be patented. As indicia of obviousness or nonobviousness, these inquires may have relevancy." Graham v. John Deere Co. of Kansas City, 383 U.S. 1, 17-18 (internal citations omitted). Other secondary indicia can include simultaneous invention, existence of prior art that teach away from the invention, and acclamation and copying of the invention by others. (See Ecolochem, Inc. v. Southern Cal. Edison Co., 277 F.3d 1361, 1379-1380 (Fed. Cir. 2000)).

To be relevant, the secondary indicia must relate to the patented invention. "When a patentee asserts that commercial success supports its contention of nonobviousness, there must of course be a sufficient relationship between the commercial success and the patented invention. The term 'nexus' is often used, in this context, to designate a legally and factually sufficient connection between the proven success and the patented invention, such that the objective evidence should be considered in the determination of nonobviousness. The burden of proof as to this connection or nexus resides with the patentee." Demaco Corp. v. F. Von Langsdorff Licensing Ltd., 851 F.2d 1387, 1392 (internal citations omitted).

As the Spaur '074 patent and the Johnson '254 patent pre-date the earliest priority date and the filing date of the Flick '278 patent, any secondary considerations to be considered must outweigh the simple substitution of one known element for another to obtain predictable results well known to one of ordinary skill in the art well before the filing of the Flick '278 patent.

3. Proposed Rejection

Claims 1 – 22 are rejected under 35 U.S.C. § 103(a) as being unpatentable over the Spaur '074 patent in view of the Johnson '254 patent.

With regard to claim 1, as set out in detail in Exhibit F, the Spaur '074 patent in view of the Johnson '254 patent teaches all limitations of claim 1. Specifically, it would have been obvious to incorporate the GPS receiver disclosed in the Johnson '254 patent into the controller taught by the Spaur '074 patent. The Spaur '074 patent clearly teaches a GPS receiver in the vehicle capable of determining vehicle position information. The Johnson '254 patent teaches a GPS receiver directly connected to a processor. It would have been obvious to substitute the GPS receiver of the Johnson '254 patent for the GPS receiver as taught by the Spaur '074 patent. In this case, the controller taught by the Spaur '074 patent could obtain vehicle position data from the GPS receiver. It would have been obvious to modify the system disclosed in the Spaur '074 patent in this way to improve compatibility with vehicles that do not have a GPS receiver as a vehicle device.

With regard to claim 2, as set out in detail in Exhibit F, the Spaur '074 patent in view of the Johnson '254 patent teaches "wherein said downloading interface comprises a wired signal downloading interface." Specifically, the Spaur '074 patent discloses a RS-232 serial connector. It is inherently disclosed that a RS-232 connector is defined to have particular electrical signal characteristics and mechanical interfaces per the Electronic Industries Association (EIA) standard RS-232-C, established in 1969. Additionally, the PCMCIA unit and Ethernet connection are both wired interfaces.

With regard to claim 3, as set out in detail in Exhibit F, the Spaur '074 patent in view of the Johnson '254 patent teaches "wherein said wired signal downloading interface comprises a

connector for temporary connection to a downloading device." Specifically, it is inherently disclosed that a RS-232 port, a PCMCIA unit, and an Ethernet connection include a pluggable, and therefore unpluggable, mechanical interface.

With regard to claim 4, as set out in detail in Exhibit F, the Spaur '074 patent in view of the Johnson '254 patent teaches "wherein said downloading interface comprises a wireless signal downloading interface."

With regard to claim 5, as set out in detail in Exhibit F, the Spaur '074 patent in view of the Johnson '254 patent teaches "wherein said wireless signal downloading interface comprises a wireless receiver for temporary connection to a downloading device." Specifically, it is inherently disclosed that cellular network connections are temporary connections.

With regard to claim 6, as set out in detail in Exhibit F, the Spaur '074 patent in view of the Johnson '254 patent teaches "wherein the corresponding at least one vehicle code is for reading from the at least one vehicle device." Specifically, the Spaur '074 patent teaches two-way (i.e. reading from and writing to) communication with vehicle devices connected to the CAN using device drivers.

With regard to claim 7, as set out in detail in Exhibit F, the Spaur '074 patent in view of the Johnson '254 patent teaches "wherein the corresponding at least one vehicle code is for writing to the at least one vehicle device." Specifically, the Spaur '074 patent teaches two-way (i.e. reading from and writing to) communication with vehicle devices connected to the CAN using device drivers.

With regard to claim 8, as set out in detail in Exhibit F, the Spaur '074 patent in view of the Johnson '254 patent teaches "wherein said downloading interface is also for permitting

downloading of at least one programming instruction for said multi-vehicle compatible controller."

With regard to claim 9, as set out in detail in Exhibit F, the Spaur '074 patent in view of the Johnson '254 patent teaches "a remote transmitter; and wherein said multi-vehicle compatible controller also performs at least one vehicle remote control function responsive to said remote transmitter." Specifically, the Spaur '074 patent teaches that a remote station can provide commands that cause the controller to perform a control function. Accordingly, a remote station includes a remote transmitter, thereby fulfilling the requirements of claim 9.

With regard to claim 10, as set out in detail in Exhibit F, the Spaur '074 patent in view of the Johnson '254 patent teaches "wherein the at least one vehicle remote control function comprises at least one of a vehicle security function, a remote keyless entry function, and a remote engine starting function." Further, it is inherently disclosed that vehicle security functions can include locking doors, rolling up windows, and activating an alarm system. Additionally, the Johnson '254 patent teaches a wide variety of vehicle-security related functions.

With regard to claim 11, this claim is indefinite as there is no antecedent basis for "said wireless position determining device." This claim limitation is interpreted as "said vehicle position determining device" as defined in claim 1. As set out in detail in Exhibit F, the Spaur '074 patent in view of the Johnson '254 patent teaches "wherein said vehicle position determining device comprises a Global Positioning System (GPS) receiver." Specifically, the Spaur '074 patent teaches a GPS receiver as a vehicle device connected to a vehicle data bus and the Johnson '254 patent teaches a GPS receiver integrated into a control device.

With regard to claim 12, as set out in detail in Exhibit F, the Spaur '074 patent in view of the Johnson '254 patent teaches "a housing containing said vehicle position determining device, said wireless communications device, said multi-vehicle compatible controller, and said downloading interface."

With regard to claim 13, as set out in detail in Exhibit F, the Spaur '074 patent in view of the Johnson '254 patent teaches all limitations of claim 13. Specifically, it would have been obvious to incorporate the GPS receiver disclosed in the Johnson '254 patent into the controller taught by the Spaur '074 patent. The Spaur '074 patent clearly teaches a GPS receiver in the vehicle capable of determining vehicle position information. The Johnson '254 patent teaches a GPS receiver directly connected to a processor. It would have been obvious to substitute the GPS receiver of the Johnson '254 patent for the GPS receiver as taught by the Spaur '074 patent. In this case, the controller taught by the Spaur '074 patent could obtain vehicle position data from the GPS receiver. It would have been obvious to modify the system disclosed in the Spaur '074 patent in this way to improve compatibility with vehicles that do not have a GPS receiver as a vehicle device.

Additionally, a cellular telephone transceiver constitutes a downloading interface and it is inherently disclosed that cellular connections are temporary connections.

With regard to claim 14, as set out in detail in Exhibit F, the Spaur '074 patent in view of the Johnson '254 patent teaches "wherein the corresponding at least one vehicle code is for reading from the at least one vehicle device." Specifically, the Spaur '074 patent teaches two-way (i.e. reading from and writing to) communication with vehicle devices connected to the CAN using device drivers.

With regard to claim 15, as set out in detail in Exhibit F, the Spaur '074 patent in view of the Johnson '254 patent teaches "wherein the corresponding at least one vehicle code is for writing to the at least one vehicle device." Specifically, the Spaur '074 patent teaches two-way (i.e. reading from and writing to) communication with vehicle devices connected to the CAN using device drivers.

With regard to claim 16, as set out in detail in Exhibit F, the Spaur '074 patent in view of the Johnson '254 patent teaches "wherein said downloading interface is also for permitting downloading of at least one programming instruction for said multi-vehicle compatible controller."

With regard to claim 17, as set out in detail in Exhibit F, the Spaur '074 patent in view of the Johnson '254 patent teaches "a remote transmitter; and wherein said multi-vehicle compatible controller also performs at least one vehicle remote control function responsive to said remote transmitter." Specifically, the Spaur '074 patent teaches that a remote station can provide commands that cause the controller to perform a control function. Accordingly, a remote station includes a remote transmitter, thereby fulfilling the requirements of claim 17.

With regard to claim 18, as set out in detail in Exhibit F, the Spaur '074 patent in view of the Johnson '254 patent teaches all limitations of claim 1. Specifically, it would have been obvious to incorporate the GPS receiver disclosed in the Johnson '254 patent into the controller taught by the Spaur '074 patent. The Spaur '074 patent clearly teaches a GPS receiver in the vehicle capable of determining vehicle position information. The Johnson '254 patent teaches a GPS receiver directly connected to a processor. It would have been obvious to substitute the GPS receiver of the Johnson '254 patent for the GPS receiver as taught by the Spaur '074 patent. In this case, the controller taught by the Spaur '074 patent could obtain

vehicle position data from the GPS receiver. It would have been obvious to modify the system disclosed in the Spaur '074 patent in this way to improve compatibility with vehicles that do not have a GPS receiver as a vehicle device.

Additionally, a cellular telephone transceiver constitutes a wireless downloading interface and it is inherently disclosed that cellular connections are temporary connections.

With regard to claim 19, as set out in detail in Exhibit F, the Spaur '074 patent in view of the Johnson '254 patent teaches "wherein the corresponding at least one vehicle code is for reading from the at least one vehicle device." Specifically, the Spaur '074 patent teaches two-way (i.e. reading from and writing to) communication with vehicle devices connected to the CAN using device drivers.

With regard to claim 20, as set out in detail in Exhibit F, the Spaur '074 patent in view of the Johnson '254 patent teaches "wherein the corresponding at least one vehicle code is for writing to the at least one vehicle device." Specifically, the Spaur '074 patent teaches two-way (i.e. reading from and writing to) communication with vehicle devices connected to the CAN using device drivers.

With regard to claim 21, as set out in detail in Exhibit F, the Spaur '074 patent in view of the Johnson '254 patent teaches "wherein said downloading interface is also for permitting downloading of at least one programming instruction for said multi-vehicle compatible controller."

With regard to claim 22, as set out in detail in Exhibit F, the Spaur '074 patent in view of the Johnson '254 patent teaches "a remote transmitter; and wherein said multi-vehicle compatible controller also performs at least one vehicle remote control function responsive to said remote transmitter." Specifically, the Spaur '074 patent teaches that a remote station can

provide commands that cause the controller to perform a control function. Accordingly, a remote station includes a remote transmitter, thereby fulfilling the requirements of claim 22.

F. Claims 1, 4, 5, 9, 10, 13, 17, 18, and 22 of the Flick '278 Patent are not Patentably Distinct from the Flick '876 Patent

Each and every limitation of claims 1, 4, 5, 9, 10, 13, 17, 18, and 22 is not patentably distinct from claims 1 – 51 of the Flick '876 patent as shown in detail in the claim chart attached as Exhibit G. Accordingly, the following proposed rejection is appropriate.

1. Nonstatutory-type Double Patenting

"A nonstatutory obviousness-type double patenting rejection is appropriate where the conflicting claims are not identical, but at least one examined application claim is not patentably distinct from the reference claim(s) because the examined application claim is either anticipated by, or would have been obvious over, the reference claim(s). See, e.g., In re Berg, 140 F.3d 1428, 46 USPQ2d 1226 (Fed. Cir. 1998); In re Goodman, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); and In re Longi, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985). In determining whether a nonstatutory basis exists for a double patenting rejection, the first question to be asked is — does any claim in the application define an invention that is anticipated by, or is merely an obvious variation of, an invention claimed in the patent? If the answer is yes, then an "obviousness-type" nonstatutory double patenting rejection may be appropriate. Obviousness-type double patenting requires rejection of an application claim when the claimed subject matter is not patentably distinct from the subject matter claimed in a commonly owned patent, or a non-commonly owned patent but subject to a joint research agreement as set forth in 35 U.S.C. 103(c)(2) and (3), when the issuance of a second patent would provide unjustified extension of the term of the right to exclude granted by a patent. See

Eli Lilly & Co. v. Barr Labs., Inc., 251 F.3d 955, 58 USPQ2d 1869 (Fed. Cir. 2001); Ex parte Davis, 56 USPQ2d 1434, 1435-36 (Bd. Pat. App. & Inter. 2000)." (MPEP, § 804).

2. Proposed Rejection

Claims 1, 4, 5, 9, 10, 13, 17, 18, and 22 are rejected on the grounds of nonstatutory obviousness-type double patenting with respect to claims 1 – 51 of the Flick '876 patent.

With regard to claim 1, as set out in detail in Exhibit G, claims 1, 12, and 16 of the Flick '876 patent contain all limitations of claim 1.

With respect to "a vehicle position determining device," it is well known to one of ordinary skill in the art that a "vehicle device" connected to a "vehicle data bus" as in claim 1 can include a GPS receiver. See, e.g. the Spaur '074 patent for an illustration of the knowledge of one of ordinary skill in the art. It is also notoriously well known to one of ordinary skill in the art that a wireless communications device can also determine vehicle location information in a manner similar to a vehicle position determining device. See, e.g. the Davis '724 patent and the Song '756 patent. The Davis '724 patent teaches a combined cellular telephone and GPS receiver device capable of determining vehicle location information using the GPS receiver. The Song '756 patent teaches a combined cellular telephone and vehicle locating transceiver that can determine vehicle position data using a cellular telephone network.

With respect to sending "vehicle position information," it would have been obvious to one of ordinary skill in the art, given the transmission of data from a vehicle device generally as claimed in the Flick '876 patent, to transmit a specific form of data (vehicle position data) provided by a specific vehicle device (a vehicle position determining device).

With regard to claim 4, as set out in detail in Exhibit G, claims 13 – 17 of the Flick '876 patent contain the limitation "wherein said downloading interface comprises a wireless signal

downloading interface." Specifically, claims 13 – 17 of the Flick '876 claim a number of variations of wireless interfaces between the "control system" and remote systems, such as "remote handheld transmitters" and "central station transmitters."

With regard to claim 5, as set out in detail in Exhibit G, claims 13 – 17 of the Flick '876 patent contain the limitation "wherein said wireless signal downloading interface comprises a wireless receiver for temporary connection to a downloading device." Specifically, it is inherently disclosed that cellular network connections are temporary connections.

With regard to claim 9, as set out in detail in Exhibit G, claim 13 of the Flick '876 patent contains the limitation "a remote transmitter; and wherein said multi-vehicle compatible controller also performs at least one vehicle remote control function responsive to said remote transmitter." Claim 1 of the Flick '876 patent claims the "multi-vehicle compatible controller" cooperates "with said transmitter and receiver" and generates "at least one of set of command signals on the data communications bus for the at least one vehicle device." It would have been obvious to one of ordinary skill in the art that "cooperating with said transmitter and receiver" includes performing operations in response to signals received using the transmitter. Claim 13 of the Flick '876 patent claims a remote handheld transmitter and a receiver located in the vehicle; accordingly, it would be obvious that claim 13 includes performing a remote control function based on a signal received from the remote handheld transmitter.

With regard to claim 10, as set out in detail in Exhibit G, claims 6 – 8 of the Flick '876 patent contains the limitation "wherein the at least one vehicle remote control function comprises at least one of a vehicle security function, a remote keyless entry function, and a remote engine starting function." Indeed, each of the listed "vehicle remote control functions" is claimed in the Flick '876 patent.

With regard to claim 13, as set out in detail in Exhibit G, claims 1 and 12 – 17 of the Flick '876 patent contain all limitations of claim 13.

With respect to "a vehicle position determining device," it is well known to one of ordinary skill in the art that a "vehicle device" connected to a "vehicle data bus" as in claim 1 can include a GPS receiver. See, e.g. the Spaur '074 patent for an illustration of the knowledge of one of ordinary skill in the art. It is also notoriously well known to one of ordinary skill in the art that a wireless communications device can also determine vehicle location information in a manner similar to a vehicle position determining device. See, e.g. the Davis '724 patent and the Song '756 patent. The Davis '724 patent teaches a combined cellular telephone and GPS receiver device capable of determining vehicle location information using the GPS receiver. The Song '756 patent teaches a combined cellular telephone and vehicle locating transceiver that can determine vehicle position data using a cellular telephone network.

With respect to sending "vehicle position information," it would have been obvious to one of ordinary skill in the art, given the transmission of data from a vehicle device generally as claimed in the Flick '876 patent, to transmit a specific form of data (vehicle position data) provided by a specific vehicle device (a vehicle position determining device).

Claims 13 – 17 of the Flick '876 claim a number of variations of wireless interfaces between the "control system" and remote systems, such as "remote handheld transmitters" and "central station transmitters." It is inherently disclosed that cellular network connections are temporary connections.

With regard to claim 17, as set out in detail in Exhibit G, claim 13 of the Flick '876 patent contains the limitation "a remote transmitter; and wherein said multi-vehicle compatible controller also performs at least one vehicle remote control function responsive to said remote

transmitter." Claim 1 of the Flick '876 patent claims the "multi-vehicle compatible controller" cooperates "with said transmitter and receiver" and generates "at least one of set of command signals on the data communications bus for the at least one vehicle device." It would have been obvious to one of ordinary skill in the art that "cooperating with said transmitter and receiver" includes performing operations in response to signals received using the transmitter. Claim 13 of the Flick '876 patent claims a remote handheld transmitter and a receiver located in the vehicle; accordingly, it would be obvious that claim 13 includes performing a remote control function based on a signal received from the remote handheld transmitter.

With regard to claim 18, as set out in detail in Exhibit G, claims 1 and 12 – 17 of the Flick '876 patent contain all limitations of claim 18.

With respect to "a vehicle position determining device," it is well known to one of ordinary skill in the art that a "vehicle device" connected to a "vehicle data bus" as in claim 1 can include a GPS receiver. See, e.g. the Spaur '074 patent for an illustration of the knowledge of one of ordinary skill in the art. It is also notoriously well known to one of ordinary skill in the art that a wireless communications device can also determine vehicle location information in a manner similar to a vehicle position determining device. See, e.g. the Davis '724 patent and the Song '756 patent. The Davis '724 patent teaches a combined cellular telephone and GPS receiver device capable of determining vehicle location information using the GPS receiver. The Song '756 patent teaches a combined cellular telephone and vehicle locating transceiver that can determine vehicle position data using a cellular telephone network.

With respect to sending "vehicle position information," it would have been obvious to one of ordinary skill in the art, given the transmission of data from a vehicle device generally as

claimed in the Flick '876 patent, to transmit a specific form of data (vehicle position data) provided by a specific vehicle device (a vehicle position determining device).

Claims 13 – 17 of the Flick '876 claim a number of variations of wireless interfaces between the "control system" and remote systems, such as "remote handheld transmitters" and "central station transmitters." It is inherently disclosed that cellular network connections are temporary connections.

With regard to claim 22, as set out in detail in Exhibit G, claim 13 of the Flick '876 patent contains the limitation "a remote transmitter; and wherein said multi-vehicle compatible controller also performs at least one vehicle remote control function responsive to said remote transmitter." Claim 1 of the Flick '876 patent claims the "multi-vehicle compatible controller" cooperates "with said transmitter and receiver" and generates "at least one of set of command signals on the data communications bus for the at least one vehicle device." It would have been obvious to one of ordinary skill in the art that "cooperating with said transmitter and receiver" includes performing operations in response to signals received using the transmitter. Claim 13 of the Flick '876 patent claims a remote handheld transmitter and a receiver located in the vehicle; accordingly, it would be obvious that claim 13 includes performing a remote control function based on a signal received from the remote handheld transmitter.

VII. CONCLUSION

Each of the Song '756 patent, Berra '498 patent, Johnson '254 patent, Spaur '074 patent, Davis '724 patent, Suman '537 patent, and Flick '876 patent raise substantial new questions of patentability with respect to the Flick '278 patent. As shown in detail above, and in the attached claim charts, the elements of each claim were disclosed in the prior art. Based on the teachings of the prior art previously described, claims 1 – 22 of the Flick '278 patent fail to satisfy the requirements for patentability set out in 35 U.S.C. § 102, 35 U.S.C. § 103, and the judicially created doctrine of non-statutory double patent and are, therefore, unpatentable. For these reasons, and those more fully stated above and in the attached claim charts, it is respectfully requested that this Request for Ex Parte Reexamination be granted and that all claims of the Flick '278 patent be finally rejected.

Dated: September 14, 2015

Respectfully submitted,

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CERTIFICATE OF SERVICE

Certificate of Service in compliance with 37 C.F.R. § 1.510(b)(5)

Pursuant to 37 C.F.R. § 1.510(b)(5) and 37 C.F.R. § 1.33(c), I hereby certify that on September 14, 2015, a complete copy of this *ex parte* reexamination request, including the accompanying transmittal, FORM PTO/SB/42, and all attachments and exhibits, are being served via First Class U.S. Mail upon Applicant at the correspondence address as shown in PAIR:

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Exhibit B

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Flick '278 Claims	PRIOR ART – U.S. Pat. No. 6,028,537 to Suman et al.
1. A multi-vehicle compatible tracking unit for a vehicle comprising a vehicle data bus extending throughout the vehicle, the multi-vehicle compatible tracking unit comprising:	The Suman '537 patent discloses a multi-vehicle compatible tracking unit for a vehicle comprising a data bus, such as a multiplex bus. See, e.g., col. 8, line 58-col. 9, line 16; Figs. 3, 5, 44, 45; see also col. 36, line 53-col. 37, line 17. The Suman '537 patent notes that the multiplexing scheme for such a bus is set forth in SAE J1850. In addition to the teachings of the Suman '537 patent, it would have been obvious to one skilled in the art that a tracking unit compatible with an SAE standard bus would be compatible with multiple vehicles.
a vehicle position determining device;	The Suman '537 patent discloses a GPS or DGPS as a vehicle position determining device. See, e.g., Figs. 3, 5.
a wireless communications device;	The Suman '537 patent discloses a transmitter (see e.g., Figs. 1a, 1b, 2; col. 3, lines 1-3; col. 7, lines 26-30) and a receiver (see e.g., Figs. 1b, 3, 44; col. 3, lines 1-3; col. 7, lines 31-34) for wirelessly receiving signals from the transmitter. In one embodiment disclosed in the Suman '537 patent, the receiver is a cell phone (and thus also includes a transmitter) coupled to the vehicle bus. See, e.g., Figs. 5, 45; col. 36, line 53 – col. 37, line 17.
a multi-vehicle compatible controller for cooperating with said vehicle position determining device and said wireless communications device to send vehicle position information;	The Suman '537 patent discloses a controller that cooperates with the GPS device and the wireless communication device to send vehicle position information. See, e.g., col. 2 lines 3-10; see also col. 6, lines 19-49; col. 11, lines 8-13; col. 12, lines 7-13; col. 14, lines 11-21.
said multi-vehicle compatible controller to be coupled to the vehicle data bus for communication thereover with at least one vehicle device using at least one corresponding vehicle device code from among a plurality thereof for different vehicles; and	The Suman '537 patent discloses that the controller is coupled to the vehicle data bus for communication thereover with at least one vehicle device, using a corresponding vehicle device code, from among a plurality of codes for different vehicles. See, e.g., Figs. 3, 5, 44, 45, 47; see also col. 43, lines 27-47 (including sensors and controls for doors, windows, ignition, speedometer, RPMs, fuel level, turn signals, lights, gears, temperature, oil pressure, defroster, headlights, etc.). The Suman '537 patent, col. 37, lines 15 – 17: "The multiplexing scheme is set forth in SAE standard J1850 and is universally used in the automotive industry." It is inherently disclosed that the J1850 bus described in the Suman '537 patent is included in a variety of different makes and models of vehicles per the federally mandated standard.
a downloading interface for permitting downloading of enabling data related to the	The Suman '537 patent, col. 36, lines 31-52: "To achieve these aspects and other advantages, the vehicle accessory control system of the present invention includes a

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Flick '278 Claims	PRIOR ART – U.S. Pat. No. 6,028,537 to Suman et al.
at least one corresponding vehicle device code for use by said multi-vehicle compatible controller.	plurality of electrically-operated vehicle accessories, a receiver to be mounted in a vehicle for receiving RF signals from a land-based transmitter, and a control circuit coupled to the receiver and to the vehicle accessories for controlling the operation of the vehicle accessories in accordance with a control program. The RF signals include an address uniquely identifying the vehicle and a reprogramming signal for reprogramming the operation of at least one of the vehicle accessories. The control circuit includes an input interface for receiving information regarding a plurality of sensed conditions, control means for controlling the operation of the vehicle accessories in accordance with the control program and in response to sensed conditions received from the input interface. The control circuit further includes reprogramming means for selectively reprogramming the control program in response to the detection of an RF signal including an address identifying the vehicle and the reprogramming signal, to selectively change the manner in which the control means controls the operation of at least one of the vehicle accessories."
2. The multi-vehicle compatible tracking unit according to claim 1 wherein said downloading interface comprises a wired signal downloading interface.	The Suman '537 patent, col. 42, line 52 – col. 43, line 6, discloses that the cellular phone could be connected through the vehicle bus, or a wired RS-232 serial connection of the controller, and thus the RS-232 connector provides an additional wired connection.
3. The multi-vehicle compatible tracking unit according to claim 2 wherein said wired signal downloading interface comprises a connector for temporary connection to a downloading device.	It is inherently disclosed that a cellular telephone connected to a RS-232 serial port can be connected and disconnected.
4. The multi-vehicle compatible tracking unit according to claim 1 wherein said downloading interface comprises a wireless signal downloading interface.	the Suman '537 patent, col. 36, lines 31-52: "To achieve these aspects and other advantages, the vehicle accessory control system of the present invention includes a plurality of electrically-operated vehicle accessories, a receiver to be mounted in a vehicle for receiving RF signals from a land-based transmitter, and a control circuit coupled to the receiver and to the vehicle accessories for controlling the operation of the vehicle accessories in accordance with a control program. The RF signals include an address uniquely identifying the vehicle and a reprogramming signal for reprogramming the operation of at least one of the vehicle accessories. The control circuit includes an input interface for receiving information regarding a plurality of sensed conditions, control

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Flick '278 Claims	PRIOR ART – U.S. Pat. No. 6,028,537 to Suman et al.
	means for controlling the operation of the vehicle accessories in accordance with the control program and in response to sensed conditions received from the input interface. The control circuit further includes reprogramming means for selectively reprogramming the control program in response to the detection of an RF signal including an address identifying the vehicle and the reprogramming signal, to selectively change the manner in which the control means controls the operation of at least one of the vehicle accessories."
5. The multi-vehicle compatible tracking unit according to claim 4 wherein said wireless signal downloading interface comprises a wireless receiver for temporary connection to a downloading device.	It is inherently disclosed that cellular and paging systems can temporarily connect to the network to connect to a "downloading device"
6. The multi-vehicle compatible tracking unit according to claim 1 wherein the corresponding at least one vehicle code is for reading from the at least one vehicle device.	The Suman '537 patent, col. 37, lines 1 – 17: "Microcontroller 735 includes an integral non-volatile memory for retaining data when the vehicle is not in operation. In vehicles including a single wire multiplex bus 742, an output terminal 743 of microcontroller 735 is coupled to the input of a multiplex communication circuit 744 comprising a 728 pin integrated circuit which is coupled by output conductor 747 to a single wire data bus 742. The average data rate for the multiplex circuit 744 is 10.4 kilobits per second. Microcontroller 735 communicates with circuit 744 through its SPI serial interface port 743. When circuit 744 receives a message over the bus 742, it interrupts the microprocessor, which in turn initiates communication with the circuit through its SPI port. Microprocessor 735 then reads the data from the SPI register and acts upon the information. The multiplexing scheme is set forth in SAE standard 11850 and is universally used in the automotive industry."
7. The multi-vehicle compatible tracking unit according to claim 1 wherein the corresponding at least one vehicle code is for writing to the at least one vehicle device.	The Suman '537 patent, col. 15, line 64 – col 16, line 15: The present invention may also provide for remote control of the vehicle's accessories in response to an appropriate RF signal. For example, in the event the driver has accidentally locked his or her keys in the vehicle, the driver may simply call the service center to have a control signal transmitted to their vehicle causing their doors to unlock. Further, if the vehicle owner has parked his or her vehicle in an airport parking lot and subsequently realized the doors were not locked, the owner may call the service center and have the center transmit an RF signal

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Flick '278 Claims	PRIOR ART – U.S. Pat. No. 6,028,537 to Suman et al.
	causing the doors to lock or possibly causing the windows to be rolled up in the event it begins to rain. Another remote control function that may be advantageous is to have a signal transmitted to the vehicle causing its horn to honk at periodic intervals to allow its owner to find it in a crowded parking lot. The detailed operation of the present invention for performing these functions is described below under the heading "Detailed Description of Vehicle Personalization and Remote Control Functions."
8. The multi-vehicle compatible tracking unit according to claim 1 wherein said downloading interface is also for permitting downloading of at least one programming instruction for said multi-vehicle compatible controller.	the Suman '537 patent, col. 44, lines 7 – 16: "Referring to FIG. 48A during system initialization, microcontroller 735 begins the execution of the main control program by clearing its RAM, recalling the last user ID by reading the same from the non-volatile memory, and reading a flag table associated with the last ID (step 1201). Initially, the associated flag table may be set in the factory or by the dealer to specify default values. As described below, the flags in the flag table may subsequently be modified by a reprogramming signal included in either a paging signal or a cellular RF control signal having the vehicle's ID." the Suman '537 patent, col. 36, lines 31-52: "To achieve these aspects and other advantages, the vehicle accessory control system of the present invention includes a plurality of electrically-operated vehicle accessories, a receiver to be mounted in a vehicle for receiving RF signals from a land-based transmitter, and a control circuit coupled to the receiver and to the vehicle accessories for controlling the operation of the vehicle accessories in accordance with a control program. The RF signals include an address uniquely identifying the vehicle and a reprogramming signal for reprogramming the operation of at least one of the vehicle accessories. The control circuit includes an input interface for receiving information regarding a plurality of sensed conditions, control means for controlling the operation of the vehicle accessories in accordance with the control program and in response to sensed conditions received from the input interface. The control circuit further includes reprogramming means for selectively reprogramming the control program in response to the detection of an RF signal including an address identifying the vehicle and the reprogramming signal, to selectively change the manner in which the control means controls the operation of at least one of the vehicle accessories."
9. The multi-vehicle compatible tracking unit according to claim 1 further comprising	The Suman '537 patent, col. 2, lines 24 – 32: "It is an additional aspect of the present invention to provide a system allowing for remote control of vehicle functions and

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Flick '278 Claims	PRIOR ART – U.S. Pat. No. 6,028,537 to Suman et al.
a remote transmitter; and wherein said multi-vehicle compatible controller also performs at least one vehicle remote control function responsive to said remote transmitter.	accessories using an RF signal. Thus, vehicle owners may lock their vehicle doors, roll up their windows, or activate an alarm system from any location in response to a[] RF signal. Further, the vehicle owner may use the system of the present invention to immobilize a vehicle to insure safe storage of the vehicle." The Suman '537 patent, col. 5, line 65 – col. 6, line 4: "Referring initially to FIG. 1, there is shown a land-based system for communicating with the vehicle communication and remote control system of the present invention as implemented in a vehicle 20. The system shown in FIG. 1 also allows remote control signals and other commands to be issued to and from a system of the present invention within vehicle 20 via its antenna 22." The Suman '537 patent, col. 20, lines 19 – 30: "The train fob subroutine 316 shown in FIG. 12 is selected if it is desired to train a keyless entry-type RF transmitting key fob such that various codes available by the actuation of switches on the key fob can be programmed to control various vehicle personalization functions. The programming for training the keyless entry fob and the various personalization functions can be done using a variety of conventional programming methods. One programming system for the personalization of the various vehicle options and training of a key fob is disclosed in U.S. Pat. No. 5,278,547 issued Jan. 11, 1994, the disclosure of which is incorporated herein by reference"
10. The multi-vehicle compatible tracking unit according to claim 9 wherein the at least one vehicle remote control function comprises at least one of a vehicle security function, a remote keyless entry function, and a remote engine starting function.	The Suman '537 patent, col. 2, lines 24 – 32: "It is an additional aspect of the present invention to provide a system allowing for remote control of vehicle functions and accessories using an RF signal. Thus, vehicle owners may lock their vehicle doors, roll up their windows, or activate an alarm system from any location in response to an RF signal. Further, the vehicle owner may use the system of the present invention to immobilize a vehicle to insure safe storage of the vehicle. The Suman '537 patent, col. 14, lines 1 – 10: "Utilizing the interface to vehicle bus 42 or 86, the present invention may immobilize the stolen vehicle upon receipt of a proper control signal sent from the police. Thus, the present invention provides significant improvements in vehicle security and retrieval of stolen vehicles. Preferably, microprocessors 26 and 66 are appropriately programmed to respond to an activation of the vehicle's alarm system via vehicle bus 42 and 86 so as to immobilize the vehicle or otherwise alert the police and/or owner if the vehicle alarm has been tripped."

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Flick '278 Claims	PRIOR ART – U.S. Pat. No. 6,028,537 to Suman et al.
11. The multi-vehicle compatible tracking unit according to claim 1 wherein said wireless position determining device comprises a Global Positioning System (GPS) receiver.	The Suman '537 patent, col. 9, line 65 – col. 10, line 4: "In addition, the vehicle communication and control system includes a navigation module 38 coupled to a suitable receiving antenna 40. In the preferred embodiment, module 38 is a commercially-available GPS module of the type manufactured by a number of suppliers including Motorola, Inc., Trimble Navigation, Ltd., or the like."
12. The multi-vehicle compatible tracking unit according to claim 1 further comprising a housing containing said vehicle position determining device, said wireless communications device, said multi-vehicle compatible controller, and said downloading interface.	The Suman '537 patent discloses a variety of housings in which the components could be housed. See, e.g., Fig. 4, Fig. 6, Fig. 22, Fig. 27, Fig. 28, Fig. 32, et al. It would have been obvious to one of skill in the art to include the GPS receiver, the RF transceiver, the controller and the downloading interface in a housing.
13. A multi-vehicle compatible tracking unit for a vehicle comprising a vehicle data bus extending throughout the vehicle, the multi-vehicle compatible vehicle tracking unit comprising:	The Suman '537 patent discloses a multi-vehicle compatible tracking unit for a vehicle comprising a data bus, such as a multiplex bus. See, e.g., col. 8, line 58-col. 9, line 16; Figs. 3, 5, 44, 45; see also col. 36, line 53-col. 37, line 17. The Suman '537 patent notes that the multiplexing scheme for such a bus is set forth in SAE J1850. In addition to the teachings of the Suman '537 patent, it would have been obvious to one skilled in the art that a tracking unit compatible with an SAE standard bus would be compatible with multiple vehicles.
a vehicle position determining device;	The Suman '537 patent discloses a GPS or DGPS as a vehicle position determining device. See, e.g., Figs. 3, 5.
a wireless communications device;	The Suman '537 patent discloses a transmitter (see e.g., Figs. 1a, 1b, 2; col. 3, lines 1-3; col. 7, lines 26-30) and a receiver (see e.g., Figs. 1b, 3, 44; col. 3, lines 1-3; col. 7, lines 31-34) for wirelessly receiving signals from the transmitter. In one embodiment disclosed in the Suman '537 patent, the receiver is a cell phone (and thus also includes a transmitter) coupled to the vehicle bus. See, e.g., Figs. 5, 45; col. 36, line 53 – col. 37, line 17.
a multi-vehicle compatible controller for cooperating with said vehicle position determining device and said wireless communications device to send vehicle position information;	The Suman '537 patent discloses a controller that cooperates with the GPS device and the wireless communication device to send vehicle position information. See, e.g., col. 2 lines 3-10; see also col. 6, lines 19-49; col. 11, lines 8-13; col. 12, lines 7-13; col. 14, lines 11-21.

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Flick '278 Claims	PRIOR ART – U.S. Pat. No. 6,028,537 to Suman et al.
said multi-vehicle compatible controller to be coupled to the vehicle data bus for communication thereover with at least one vehicle device using at least one corresponding vehicle device code from among a plurality thereof for different vehicles;	The Suman '537 patent discloses that the controller is coupled to the vehicle data bus for communication thereover with at least one vehicle device, using a corresponding vehicle device code, from among a plurality of codes for different vehicles. See, e.g., Figs. 3, 5, 44, 45, 47; see also col. 43, lines 27-47 (including sensors and controls for doors, windows, ignition, speedometer, RPMs, fuel level, turn signals, lights, gears, temperature, oil pressure, defroster, headlights, etc.). The Suman '537 patent, col. 37, lines 15 – 17: "The multiplexing scheme is set forth in SAE standard J1850 and is universally used in the automotive industry." It is inherently disclosed that the J1850 bus described in the Suman '537 patent is included in a variety of different makes and models of vehicles per the federally mandated standard.
and a downloading interface for permitting downloading of enabling data related to the at least one corresponding vehicle device code for use by said multi-vehicle compatible controller;	the Suman '537 patent, col. 36, lines 31-52: "To achieve these aspects and other advantages, the vehicle accessory control system of the present invention includes a plurality of electrically-operated vehicle accessories, a receiver to be mounted in a vehicle for receiving RF signals from a land-based transmitter, and a control circuit coupled to the receiver and to the vehicle accessories for controlling the operation of the vehicle accessories in accordance with a control program. The RF signals include an address uniquely identifying the vehicle and a reprogramming signal for reprogramming the operation of at least one of the vehicle accessories. The control circuit includes an input interface for receiving information regarding a plurality of sensed conditions, control means for controlling the operation of the vehicle accessories in accordance with the control program and in response to sensed conditions received from the input interface. The control circuit further includes reprogramming means for selectively reprogramming the control program in response to the detection of an RF signal including an address identifying the vehicle and the reprogramming signal, to selectively change the manner in which the control means controls the operation of at least one of the vehicle accessories."
said downloading interface comprising a connector for temporary connection to a downloading device.	It is inherently disclosed that a cellular telephone connected to a RS-232 serial port can be connected and disconnected.
14. The multi-vehicle compatible tracking unit according to claim 13 wherein the corresponding at least one vehicle code is	The Suman '537 patent, col. 37, lines 1 – 17: "Microcontroller 735 includes an integral non-volatile memory for retaining data when the vehicle is not in operation. In vehicles including a single wire multiplex bus 742, an output terminal 743 of microcontroller 735 is

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for reading from the at least one vehicle device.	coupled to the input of a multiplex communication circuit 744 comprising a 728 pin integrated circuit which is coupled by output conductor 747 to a single wire data bus 742. The average data rate for the multiplex circuit 744 is 10.4 kilobits per second. Microcontroller 735 communicates with circuit 744 through its SPI serial interface port 743. When circuit 744 receives a message over the bus 742, it interrupts the microprocessor, which in turn initiates communication with the circuit through its SPI port. Microprocessor 735 then reads the data from the SPI register and acts upon the information. The multiplexing scheme is set forth in SAE standard 11850 and is universally used in the automotive industry."
15. The multi-vehicle compatible tracking unit according to claim 13 wherein the corresponding at least one vehicle code is for writing to the at least one vehicle device.	The Suman '537 patent, col. 15, line 64 – col 16, line 15: The present invention may also provide for remote control of the vehicle's accessories in response to an appropriate RF signal. For example, in the event the driver has accidentally locked his or her keys in the vehicle, the driver may simply call the service center to have a control signal transmitted to their vehicle causing their doors to unlock. Further, if the vehicle owner has parked his or her vehicle in an airport parking lot and subsequently realized the doors were not locked, the owner may call the service center and have the center transmit an RF signal causing the doors to lock or possibly causing the windows to be rolled up in the event it begins to rain. Another remote control function that may be advantageous is to have a signal transmitted to the vehicle causing its horn to honk at periodic intervals to allow its owner to find it in a crowded parking lot. The detailed operation of the present invention for performing these functions is described below under the heading "Detailed Description of Vehicle Personalization and Remote Control Functions."
16. The multi-vehicle compatible tracking unit according to claim 13 wherein said downloading interface is also for permitting downloading of at least one programming instruction for said multi-vehicle compatible controller.	the Suman '537 patent, col. 44, lines 7 – 16: "Referring to FIG. 48A during system initialization, microcontroller 735 begins the execution of the main control program by clearing its RAM, recalling the last user ID by reading the same from the non-volatile memory, and reading a flag table associated with the last ID (step 1201). Initially, the associated flag table may be set in the factory or by the dealer to specify default values. As described below, the flags in the flag table may subsequently be modified by a reprogramming signal included in either a paging signal or a cellular RF control signal having the vehicle's ID."

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Flick '278 Claims	PRIOR ART – U.S. Pat. No. 6,028,537 to Suman et al.
	the Suman '537 patent, col. 36, lines 31-52: "To achieve these aspects and other advantages, the vehicle accessory control system of the present invention includes a plurality of electrically-operated vehicle accessories, a receiver to be mounted in a vehicle for receiving RF signals from a land-based transmitter, and a control circuit coupled to the receiver and to the vehicle accessories for controlling the operation of the vehicle accessories in accordance with a control program. The RF signals include an address uniquely identifying the vehicle and a reprogramming signal for reprogramming the operation of at least one of the vehicle accessories. The control circuit includes an input interface for receiving information regarding a plurality of sensed conditions, control means for controlling the operation of the vehicle accessories in accordance with the control program and in response to sensed conditions received from the input interface. The control circuit further includes reprogramming means for selectively reprogramming the control program in response to the detection of an RF signal including an address identifying the vehicle and the reprogramming signal, to selectively change the manner in which the control means controls the operation of at least one of the vehicle accessories."
17. The multi-vehicle compatible tracking unit according to claim 13 further comprising a remote transmitter; and wherein said multi-vehicle compatible controller also performs at least one vehicle remote control function responsive to said remote transmitter.	The Suman '537 patent, col. 2, lines 24 – 32: "It is an additional aspect of the present invention to provide a system allowing for remote control of vehicle functions and accessories using an RF signal. Thus, vehicle owners may lock their vehicle doors, roll up their windows, or activate an alarm system from any location in response to a[] RF signal. Further, the vehicle owner may use the system of the present invention to immobilize a vehicle to insure safe storage of the vehicle." The Suman '537 patent, col. 5, line 65 – col. 6, line 4: "Referring initially to FIG. 1, there is shown a land-based system for communicating with the vehicle communication and remote control system of the present invention as implemented in a vehicle 20. The system shown in FIG. 1 also allows remote control signals and other commands to be issued to and from a system of the present invention within vehicle 20 via its antenna 22." The Suman '537 patent, col. 20, lines 19 – 30: "The train fob subroutine 316 shown in FIG. 12 is selected if it is desired to train a keyless entry-type RF transmitting key fob such that various codes available by the actuation of switches on the key fob can be programmed to control various vehicle personalization functions. The programming for training the keyless entry fob and the various personalization functions can be done using a variety of

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Flick '278 Claims	PRIOR ART – U.S. Pat. No. 6,028,537 to Suman et al.
	conventional programming methods. One programming system for the personalization of the various vehicle options and training of a key fob is disclosed in U.S. Pat. No. 5,278,547 issued Jan. 11, 1994, the disclosure of which is incorporated herein by reference"
18. A multi-vehicle compatible tracking unit for a vehicle comprising a vehicle data bus extending throughout the vehicle, the multi-vehicle compatible vehicle tracking unit comprising:	The Suman '537 patent discloses a multi-vehicle compatible tracking unit for a vehicle comprising a data bus, such as a multiplex bus. See, e.g., col. 8, line 58-col. 9, line 16; Figs. 3, 5, 44, 45; see also col. 36, line 53-col. 37, line 17. The Suman '537 patent notes that the multiplexing scheme for such a bus is set forth in SAE J1850. In addition to the teachings of the Suman '537 patent, it would have been obvious to one skilled in the art that a tracking unit compatible with an SAE standard bus would be compatible with multiple vehicles.
a vehicle position determining device;	The Suman '537 patent discloses a GPS or DGPS as a vehicle position determining device. See, e.g., Figs. 3, 5.
a wireless communications device;	The Suman '537 patent discloses a transmitter (see e.g., Figs. 1a, 1b, 2; col. 3, lines 1-3; col. 7, lines 26-30) and a receiver (see e.g., Figs. 1b, 3, 44; col. 3, lines 1-3; col. 7, lines 31-34) for wirelessly receiving signals from the transmitter. In one embodiment disclosed in the Suman '537 patent, the receiver is a cell phone (and thus also includes a transmitter) coupled to the vehicle bus. See, e.g., Figs. 5, 45; col. 36, line 53 – col. 37, line 17.
a multi-vehicle compatible controller for cooperating with said vehicle position determining device and said wireless communications device to send vehicle position information;	The Suman '537 patent discloses a controller that cooperates with the GPS device and the wireless communication device to send vehicle position information. See, e.g., col. 2 lines 3-10; see also col. 6, lines 19-49; col. 11, lines 8-13; col. 12, lines 7-13; col. 14, lines 11-21.
said multi-vehicle compatible controller to be coupled to the vehicle data bus for communication thereover with at least one vehicle device using at least one corresponding vehicle device code from among a plurality thereof for different vehicles; and	The Suman '537 patent discloses that the controller is coupled to the vehicle data bus for communication thereover with at least one vehicle device, using a corresponding vehicle device code, from among a plurality of codes for different vehicles. See, e.g., Figs. 3, 5, 44, 45, 47; see also col. 43, lines 27-47 (including sensors and controls for doors, windows, ignition, speedometer, RPMs, fuel level, turn signals, lights, gears, temperature, oil pressure, defroster, headlights, etc.). The Suman '537 patent, col. 37, lines 15 – 17: "The multiplexing scheme is set forth in SAE standard J1850 and is universally used in the automotive industry." It is inherently

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Flick '278 Claims	PRIOR ART – U.S. Pat. No. 6,028,537 to Suman et al.
	disclosed that the J1850 bus described in the Suman '537 patent is included in a variety of different makes and models of vehicles per the federally mandated standard.
a downloading interface for permitting downloading of enabling data related to the at least one corresponding vehicle device code for use by said multi-vehicle compatible controller;	the Suman '537 patent, col. 36, lines 31-52: "To achieve these aspects and other advantages, the vehicle accessory control system of the present invention includes a plurality of electrically-operated vehicle accessories, a receiver to be mounted in a vehicle for receiving RF signals from a land-based transmitter, and a control circuit coupled to the receiver and to the vehicle accessories for controlling the operation of the vehicle accessories in accordance with a control program. The RF signals include an address uniquely identifying the vehicle and a reprogramming signal for reprogramming the operation of at least one of the vehicle accessories. The control circuit includes an input interface for receiving information regarding a plurality of sensed conditions, control means for controlling the operation of the vehicle accessories in accordance with the control program and in response to sensed conditions received from the input interface. The control circuit further includes reprogramming means for selectively reprogramming the control program in response to the detection of an RF signal including an address identifying the vehicle and the reprogramming signal, to selectively change the manner in which the control means controls the operation of at least one of the vehicle accessories."
said downloading interface comprising a wireless receiver for temporary connection to a downloading device.	See above. The receiver receiving RF signals is a wireless receiver. It is inherently disclosed that wireless communications include a temporary connection.
19. The multi-vehicle compatible tracking unit according to claim 18 wherein the corresponding at least one vehicle code is for reading from the at least one vehicle device.	The Suman '537 patent, col. 37, lines 1 – 17: "Microcontroller 735 includes an integral non-volatile memory for retaining data when the vehicle is not in operation. In vehicles including a single wire multiplex bus 742, an output terminal 743 of microcontroller 735 is coupled to the input of a multiplex communication circuit 744 comprising a 728 pin integrated circuit which is coupled by output conductor 747 to a single wire data bus 742. The average data rate for the multiplex circuit 744 is 10.4 kilobits per second. Microcontroller 735 communicates with circuit 744 through its SPI serial interface port 743. When circuit 744 receives a message over the bus 742, it interrupts the microprocessor, which in turn initiates communication with the circuit through its SPI port. Microprocessor 735 then reads the data from the SPI register and acts upon the information. The multiplexing scheme is set forth in SAE standard 11850 and is universally used in the automotive industry."

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Flick '278 Claims	PRIOR ART – U.S. Pat. No. 6,028,537 to Suman et al.
20. The multi-vehicle compatible tracking unit according to claim 18 wherein the corresponding at least one vehicle code is for writing to the at least one vehicle device.	The Suman '537 patent, col. 15, line 64 – col 16, line 15: The present invention may also provide for remote control of the vehicle's accessories in response to an appropriate RF signal. For example, in the event the driver has accidentally locked his or her keys in the vehicle, the driver may simply call the service center to have a control signal transmitted to their vehicle causing their doors to unlock. Further, if the vehicle owner has parked his or her vehicle in an airport parking lot and subsequently realized the doors were not locked, the owner may call the service center and have the center transmit an RF signal causing the doors to lock or possibly causing the windows to be rolled up in the event it begins to rain. Another remote control function that may be advantageous is to have a signal transmitted to the vehicle causing its horn to honk at periodic intervals to allow its owner to find it in a crowded parking lot. The detailed operation of the present invention for performing these functions is described below under the heading "Detailed Description of Vehicle Personalization and Remote Control Functions."
21. The multi-vehicle compatible tracking unit according to claim 18 wherein said downloading interface is also for permitting downloading of at least one programming instruction for said multi-vehicle compatible controller.	the Suman '537 patent, col. 44, lines 7 – 16: "Referring to FIG. 48A during system initialization, microcontroller 735 begins the execution of the main control program by clearing its RAM, recalling the last user ID by reading the same from the non-volatile memory, and reading a flag table associated with the last ID (step 1201). Initially, the associated flag table may be set in the factory or by the dealer to specify default values. As described below, the flags in the flag table may subsequently be modified by a reprogramming signal included in either a paging signal or a cellular RF control signal having the vehicle's ID." the Suman '537 patent, col. 36, lines 31-52: "To achieve these aspects and other advantages, the vehicle accessory control system of the present invention includes a plurality of electrically-operated vehicle accessories, a receiver to be mounted in a vehicle for receiving RF signals from a land-based transmitter, and a control circuit coupled to the receiver and to the vehicle accessories for controlling the operation of the vehicle accessories in accordance with a control program. The RF signals include an address uniquely identifying the vehicle and a reprogramming signal for reprogramming the operation of at least one of the vehicle accessories. The control circuit includes an input interface for receiving information regarding a plurality of sensed conditions, control means for controlling the operation of the vehicle accessories in accordance with the

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Flick '278 Claims	PRIOR ART – U.S. Pat. No. 6,028,537 to Suman et al.
	control program and in response to sensed conditions received from the input interface. The control circuit further includes reprogramming means for selectively reprogramming the control program in response to the detection of an RF signal including an address identifying the vehicle and the reprogramming signal, to selectively change the manner in which the control means controls the operation of at least one of the vehicle accessories."
22. The multi-vehicle compatible tracking unit according to claim 18 further comprising a remote transmitter; and wherein said multi-vehicle compatible controller also performs at least one vehicle remote control function responsive to said remote transmitter.	The Suman '537 patent, col. 2, lines 24 – 32: "It is an additional aspect of the present invention to provide a system allowing for remote control of vehicle functions and accessories using an RF signal. Thus, vehicle owners may lock their vehicle doors, roll up their windows, or activate an alarm system from any location in response to a[] RF signal. Further, the vehicle owner may use the system of the present invention to immobilize a vehicle to insure safe storage of the vehicle." The Suman '537 patent, col. 5, line 65 – col. 6, line 4: "Referring initially to FIG. 1, there is shown a land-based system for communicating with the vehicle communication and remote control system of the present invention as implemented in a vehicle 20. The system shown in FIG. 1 also allows remote control signals and other commands to be issued to and from a system of the present invention within vehicle 20 via its antenna 22." The Suman '537 patent, col. 20, lines 19 – 30: "The train fob subroutine 316 shown in FIG. 12 is selected if it is desired to train a keyless entry-type RF transmitting key fob such that various codes available by the actuation of switches on the key fob can be programmed to control various vehicle personalization functions. The programming for training the keyless entry fob and the various personalization functions can be done using a variety of conventional programming methods. One programming system for the personalization of the various vehicle options and training of a key fob is disclosed in U.S. Pat. No. 5,278,547 issued Jan. 11, 1994, the disclosure of which is incorporated herein by reference"

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Exhibit C

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The '278 Patent	PRIOR ART - US Patent 5,732,074 to Spaur et al.
1. A multi-vehicle compatible tracking unit for a vehicle comprising a vehicle data bus extending throughout the vehicle, the multi-vehicle compatible tracking unit comprising, lines	The Spaur '074 patent teaches a multi-vehicle compatible tracking unit in the form of a controller 30 that is electrically linked to a bus in the form a vehicle standardized network 40 (an example of which is a controller area network or CAN bus). Specifically, the Spaur '074 patent teaches: "The controller 30 is responsible for a number of functions related to understanding and acting on information received from one or more remote stations 10, obtaining and responding to 35 requested information and operatively functioning with information including data available from other elements in the vehicle. In that regard, the controller 30 communicates with a controller interface 34 that electrically links the controller 30 with a vehicle standardized network 40. The vehicle standardized network 40 includes a controller unit 44 that provides appropriate message and data handling functions associated with sending and receiving information including data from each of a plurality of physical vehicle devices 50 that are operatively connected to a bus 46 of the vehicle standardized network 40. Like the remote standardized network 14, the vehicle standardized network 40 is an established and previously developed network that interfaces with components in a vehicle, such as engine related components in order to provide desired or requested data concerning the operations or status of these components. (Spaur '074 patent, col. 6, lines 31-50) The Spaur '074 patent further states: "In a preferred embodiment, this further standardized network is a network that has been previously devised and is commonly used in a number of makes and models of vehicles. This communications network is defined as the controller area network (CAN) 124. Although the CAN 124 has previously commonly been used in operative association with automotive electronics including engine control elements, sensors, lamps, electric windows etc., the present invention also enables the CAN 124 to be used with a variety of other devices contained in the vehicle, such as the previously described devices." (Spaur '074 patent, col. 10, lines 18-39) See also FIG. 1 and FIG. 2 of the Spaur '074 patent.
a vehicle position determining device;	The Spaur '074 patent discloses a GPS receiver (vehicle position determining device) at column 14, lines 4 – 9: "At block 300, vehicle positioning data is available from one of the vehicle devices 50, which might be a GPS. On a requested or regular input scheme, such vehicle device data is sent to the CAN bus 126 at block 304. The CAN controller 122 is responsible for controlling the receipt and transmitting of such data to the controller 30 at block 308." Additionally, the Spaur '074 patent discloses several wireless communication devices. For

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	example, the wireless device 18 and remote air link transfer protocol modem 20 in Fig. 1, or the cellular phone 80 and vehicle CDPD network modem 82 in Fig. 2. It was notoriously well-known as of the earliest claimed priority date of the Spaur '074 patent that cellular telephones are capable of determining position information, both by the inclusion of GPS receivers in the cellular phone (see, e.g., U.S. Patent 5,043,736 to Darnell et al. in 1991 and Davis in 1997) and by calculating position using cellular tower triangulation techniques (see e.g. Song in 1993).
a wireless communications device;	The Spaur '074 patent teaches a wireless communications device in the form of a CDPD network modem 76. Specifically, the Spaur '074 patent states: "In one embodiment, the cellular digitized packet data (CDPD) network provides the desired link including arrangement of information being communicated and where the destination site, namely the particular vehicle, is found in the network. If a channel is available to the particular vehicle, the CDPD link can proceed to transmit the Internet packets to the vehicle of interest. Instead of the CDPD network as the link, a communications interface could be employed that involves data only, such as a two way paging interface with the vehicle. (Spaur '074 patent, col. 2, lines 41-50) "In one embodiment, the communication information is formatted in accordance with a CDPD (cellular digitized packet data) configuration. At the vehicle, this information is received by a wireless device 18 that is able to transmit and receive information via the airlink. The wireless device 18 is operatively associated with a vehicle airlink transfer protocol modem 20 for the proper handling of the airlink formatted transmission. In one embodiment, the wireless device 18 includes a cellular phone that is selected from a plurality of conventional or commercially available cellular phones. The wireless device 18 bi-directionally communicates with a controller 30 contained in the vehicle through a network protocol converter 26 using a wireless device interface 22. The wireless device interface 22 establishes the necessary signal compatibilities and connections from the wireless device 18." (Spaur '074 patent, col. 6, lines 1-16) "The Internet 68 operatively communicates with a standardized network transmission protocol that permits information to be bi-directionally communicated over the airlink and, in one embodiment, includes a remote CDPD network modem 76 which prepares the information in a conventionally acceptable manner for transmission and communication with a cellular phone 80 which is contained in the vehicle. The cellular phone 80 can be any selected one of a number of conventional cellular phones that have the capability of properly communicating with the desired formatted or arranged information. In the illustrated embodiment of FIG. 2, the cellular phone 80 is operatively associated with a vehicle CDPD network modem 82 that demodulates the received information so that it is acceptable for further handling or processing. (Spaur '074

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	patent, col. 7, lines 40-54)
a multi-vehicle compatible controller for cooperating with said vehicle position determining device and said wireless communications device to send vehicle position information;	The Spaur '074 patent discloses a multi-vehicle compatible controller (30) that cooperates with a vehicle position determining device (GPS receiver) and a wireless communications device (CDPD network modem) to send vehicle location data over an airlink. Specifically, the Spaur '074 patent states: "At block 300, vehicle positioning data is available from one of the vehicle devices 50, which might be a GPS. On a requested or regular input scheme, such vehicle device data is sent to the CAN bus 126 at block 304. The CAN controller 122 is responsible for controlling the receipt and transmitting of such data to the controller 30 at block 308. The vehicle data that is to be transmitted over the wire link, in accordance with the predetermined or determinable procedure, is appropriately processed, analyzed or otherwise acted on using the controller 30 at block 312. In one embodiment, vehicle device data, such as GPS data, do not rely on the web server 102 but may utilize a different communications pathway, such as E-mail. In any event, the controller 30 gates the vehicle location data to the cellular phone having the vehicle airlink transfer protocol modem 20, such as a CDPD network modem 82, at block 316. The vehicle location data is properly formatted and transmitted through the cellular phone over the airlink at block 320." (Spaur '074 patent, col. 14, lines 4-21)
said multi-vehicle compatible controller to be coupled to the vehicle data bus for communication thereover with at least one vehicle device using at least one corresponding vehicle device code from among a plurality thereof for different vehicles; and	The Spaur '074 patent discloses that the controller (30) interfaces with a CAN controller (122) and communicates with different vehicle devices 50a – 50n using device drivers 128 that enable communication using device codes with a specific vehicle device connected to the CAN bus (124). The device drivers 128 that are utilized are dependent upon the vehicle devices present on a particular vehicle. Specifically, the Spaur '074 patent states: "The controller 30 is responsible for a number of functions related to understanding and acting on information received from one or more remote stations 10, obtaining and responding to 35 requested information and operatively functioning with information including data available from other elements in the vehicle. In that regard, **the controller 30 communicates with a controller interface 34 that electrically links the controller 30 with a vehicle standardized network** 40. The vehicle standardized network 40 includes a controller unit 44 that provides appropriate message and data handling functions associated with **sending and receiving information including data from each of a plurality of physical vehicle devices 50 that are operatively connected to a bus 46 of the vehicle standardized network** 40. Like the remote standardized network 14**, the vehicle standardized network 40 is an established and previously developed network that interfaces with components in a vehicle**, such as engine related components in order to provide desired or requested data concerning the operations or status of these components." (Spaur '074 patent,

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	col. 6, lines 31-50) "This further standardized communications network is responsible for handling the communication exchange functions associated with sending and receiving information relative to the vehicle devices 50. **In a preferred embodiment, this further standardized network is a network that has been previously devised and is commonly used in a number of makes and models of vehicles.** This communications network is defined as the controller area network (CAN) 124. Although the CAN 124 has previously commonly been used in operative association with automotive electronics including engine control elements, sensors, lamps, electric windows etc., **the present invention also enables the CAN 124 to be used with a variety of other devices contained in the vehicle**, such as the previously described devices." (Spaur '074 patent, col. 10, lines 15-29) "In interfacing with the CAN 124, the **controller 30 also has device drivers 128 that are useful in achieving desired communications in both directions between the CAN 124 and the controller 30**. For example, the processor 90 is able to **obtain data** or other information **from the vehicle devices 50a-50n using the device drivers 128** and which information can be used by the processor 90 including, for example, storing data in the data memory 106 for subsequent access and transmission to a remote station 10." (Spaur '074 patent, col. 10, lines 55-64)
a downloading interface for permitting downloading of enabling data related to the at least one corresponding vehicle device code for use by said multi-vehicle compatible controller.	The Spaur '074 patent teaches both wired and wireless downloading interfaces that permit downloading of enabling data. The Spaur '074 patent teaches that the wireless communications device can be utilized to download enabling data in a variety of forms including received information associated with vehicle devices and executable software downloaded from a remote site: "since bi-directional communications involving a vehicle are conducted wirelessly for at least a portion of the communications link, it is necessary for the Internet to communicate with an appropriate interface or network that wirelessly links with the vehicle. In one embodiment, the cellular digitized packet data (CDPD) network provides the desired link including arrangement of information being communicated and where the destination site, namely the particular vehicle, is found in the network." (Spaur '074 patent, col. 2, lines 37 – 46). "A combination of controller related components are containable in a vehicle for responding to requests from remote sites, obtaining and storing information associated with vehicle devices

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	and running executable software that may be available in the program memory of the controller or downloaded from the remote site, while handling and configuring information including data that is communicative with the remote site over an established network, such as the Internet." (Spaur '074 patent, col. 4, line 64 – col. 5, line 5). Furthermore, "Preferably, the controller in the vehicle is also associated with an interface for communication with one or more available systems, such as an RS232 connection, an Ethernet connection and/or a PCMCIA unit. In a related embodiment, the controller includes a direct communications port for receiving and sending information without requiring the wireless device and the Internet connection to the wireless device." (Spaur '074 patent, col. 4, lines 38 – 45).
2. The multi-vehicle compatible tracking unit according to claim 1 wherein said downloading interface comprises a wired signal downloading interface.	Figure 2 of the Spaur '074 patent describes the direct communications port. One skilled in the art would recognize that this interface is a wired interface to the controller and would enable downloading to the controller. "Preferably, the controller in the vehicle is also associated with an interface for communication with one or more available systems, such as an RS232 connection, an Ethernet connection and/or a PCMCIA unit. In a related embodiment, the controller includes a direct communications port for receiving and sending information without requiring the wireless device and the Internet connection to the wireless device." (Spaur '074 patent, col. 4, lines 38-45)
3. The multi-vehicle compatible tracking unit according to claim 2 wherein said wired signal downloading interface comprises a connector for temporary connection to a downloading device.	One skilled in the art would understand that the wired port could be used temporarily. Therefore, it is inherently disclosed that the wired signal downloading interface, i.e. the RS232 connection, Ethernet connection, or PCMCIA connection, comprise a connector for a temporary connection.
4. The multi-vehicle compatible tracking unit according to claim 1 wherein said downloading interface comprises a wireless signal downloading interface.	Figure 1 of the Spaur '074 patent includes a wireless communication interface. As noted above with respect to Claim 1, Figure 2 of Spaur '074 patent also includes a wireless communications interface. "In one embodiment, the cellular digitized packet data (CDPD) network provides the desired link

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	including arrangement of information being communicated and where the destination site, namely the particular vehicle, is found in the network. If a channel is available to the particular vehicle, the CDPD link can proceed to transmit the Internet packets to the vehicle of interest. Instead of the CDPD network as the link, a communications interface could be employed that involves data only, such as a two way paging interface with the vehicle." (Spaur '074 patent, col. 2, lines 41-50) In accordance with the present invention, a system is provided in which communication of information, including requests, commands and data, is achieved between vehicle having physical vehicle devices and one or more sites that are remote from the vehicle. (Spaur '074 patent, col. 2, lines 11-15)
5. The multi-vehicle compatible tracking unit according to claim 4 wherein said wireless signal downloading interface comprises a wireless receiver for temporary connection to a downloading device.	One skilled in the art would understand that the Spaur '074 patent discloses a wireless downloading interface comprising a wireless receiver for temporary connection to a downloading device. Therefore, it is inherently disclosed that the wireless connections can be temporary connections.
6. The multi-vehicle compatible tracking unit according to claim 1 wherein the corresponding at least one vehicle code is for reading from the at least one vehicle device.	As described in the Spaur '074 patent: "With respect to getting information, the controller 30 further includes a data storage unit or data memory 106. Generally, the data memory 106 stores data that has been generated and is expected to be useful in handling requests or commands. Such data may be data obtained from monitoring a physical device associated with a vehicle and/or may include data useful in running executable software that is intended to provide further information or data useful to a requestor." (Spaur '074 patent, col. 8, lines 45-53)
7. The multi-vehicle compatible tracking unit according to claim 1 wherein the corresponding at least one vehicle code is for writing to the at least one vehicle device.	As taught in the Spaur '074 patent: "With regard to obtaining information or data from these vehicle devices for appropriate processing using, for example, one or more executable programs in the program memory, the controller communicates with a second standardized network in the form of a network that is commercially available and used in vehicles, such as the previously devised controller area network (CAN). The CAN is operatively connected to each of a plurality of vehicle devices that transmit, receive, or both transmit and receive desired data." (Spaur '074 patent, col. 3, lines 57 – 65).

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	Also see the Spaur '074 patent, col. 10, lines 55 – 64: "In interfacing with the CAN 124, the controller 30 also has device drivers 128 that are useful in achieving desired communications in both directions between the CAN 124 and the controller 30. For example, the processor 90 is able to obtain data or other information from the vehicle devices 50a-50n using the device drivers 128 and which information can be used by the processor 90 including, for example, storing data in the data memory 106 for subsequent access and transmission to a remote station 10."
8. The multi-vehicle compatible tracking unit according to claim 1 wherein said downloading interface is also for permitting downloading of at least one programming instruction for said multi-vehicle compatible controller.	"In a further and related variation, information or executable software may be downloaded from the remote station to the controller 30 for execution as part of responding to an accompanying or future request, which software may be executed in conjunction with the operation of an applet that is stored as part of the controller 30." (Spaur '074 patent, col. 9, lines 45-50)
9. The multi-vehicle compatible tracking unit according to claim 1 further comprising a remote transmitter; and wherein said multi-vehicle compatible controller also performs at least one vehicle remote control function responsive to said remote transmitter.	The Spaur '074 patent teaches using the wireless communications device to communicate with a remote station; the remote station can provide commands that cause the controller to perform a control function: "The controller 30 includes a number of elements for handling the functions and responsibilities associated with responding to messages, such as requests or commands, from one or more of the remote stations 10, running executable software and obtaining data, as well as achieving the necessary communications protocols with the Internet 68." (Spaur '074 patent, col. 8, lines 1 – 7).
10. The multi-vehicle compatible tracking unit according to claim 9 wherein the at least one vehicle remote control function comprises at least one of a vehicle security function, a remote keyless entry function, and a remote engine starting function.	"The controller 30 further includes a data storage unit or data memory 106." (Spaur '074 patent, col. 8, lines 46 – 47). "In addition to application software that might be involved with such functions, the short programs in the program memory 114 may include software related to safety and security considerations, including, lines […] (c) providing an indication of key or alarm related events, such as when roadside assistance is required, the vehicle or the driver of the vehicle faces a threatening situation, an unauthorized vehicle door unlocking and/or initiating an automatic call

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	for assistance in light of an airbag detonation." (Spaur '074 patent, col. 9, lines 16 – 30).
11. The multi-vehicle compatible tracking unit according to claim 1 wherein said wireless position determining device comprises a Global Positioning System (GPS) receiver.	The Spaur '074 patent discloses a GPS receiver in column 14, lines 4 – 9: "At block 300, vehicle positioning data is available from one of the vehicle devices 50, which might be a GPS. On a requested or regular input scheme, such vehicle device data is sent to the CAN bus 126 at block 304. The CAN controller 122 is responsible for controlling the receipt and transmitting of such data to the controller 30 at block 308." Furthermore, it was notoriously well known that the cellular telephone can incorporate a GPS to determine location data. Therefore, the GPS is inherently disclosed in the "wireless device" described in the Spaur '074 patent.
12. The multi-vehicle compatible tracking unit according to claim 1 further comprising a housing containing said vehicle position determining device, said wireless communications device, said multi-vehicle compatible controller, and said downloading interface.	The Spaur '074 patent discloses a combination of components located in a vehicle: "A combination of controller related components are containable in a vehicle for responding to requests from remote sites, obtaining and storing information associated with vehicle devices and running executable software that may be available in the program memory of the controller or downloaded from the remote site, while handling and configuring information including data that is communicative with the remote site over an established network, such as the Internet." (Spaur '074 patent, col. 4, line 64 – col. 5, line 5). It is inherently disclosed that the components are contained in a housing within the vehicle to aid in the installation of the system described in the Spaur '074 patent. In the alternative, FIG. 1 illustrates a variety of components contained in a vehicle and one or more remote stations 10a-10n. As all of the components are stored in the vehicle, the vehicle itself constitutes a housing containing all elements of the claimed invention.
13. A multi-vehicle compatible tracking unit for a vehicle comprising a vehicle data bus extending throughout the vehicle, the multi-vehicle compatible vehicle tracking unit comprising, lines	The Spaur '074 patent teaches a multi-vehicle compatible tracking unit in the form of a controller 30 that is electrically linked to a bus in the form a vehicle standardized network 40 (an example of which is a controller area network or CAN bus). Specifically, the Spaur '074 patent teaches: "The controller 30 is responsible for a number of functions related to understanding and acting on information received from one or more remote stations 10, obtaining and responding to 35 requested information and operatively functioning with information including data available from other elements in the vehicle. In that regard, the controller 30 communicates with a controller

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	interface 34 that electrically links the controller 30 with a vehicle standardized network 40. The vehicle standardized network 40 includes a controller unit 44 that provides appropriate message and data handling functions associated with sending and receiving information including data from each of a plurality of physical vehicle devices 50 that are operatively connected to a bus 46 of the vehicle standardized network 40. Like the remote standardized network 14, the vehicle standardized network 40 is an established and previously developed network that interfaces with components in a vehicle, such as engine related components in order to provide desired or requested data concerning the operations or status of these components. (Spaur '074 patent, col. 6, lines 31-50) The Spaur '074 patent further states: "In a preferred embodiment, this further standardized network is a network that has been previously devised and is commonly used in a number of makes and models of vehicles. This communications network is defined as the controller area network (CAN) 124. Although the CAN 124 has previously commonly been used in operative association with automotive electronics including engine control elements, sensors, lamps, electric windows etc., the present invention also enables the CAN 124 to be used with a variety of other devices contained in the vehicle, such as the previously described devices." (Spaur '074 patent, col. 10, lines 18-39) See also FIG. 1 and FIG. 2 of the Spaur '074 patent.
a vehicle position determining device;	The Spaur '074 patent discloses a GPS receiver (vehicle position determining device) at column 14, lines 4 – 9: "At block 300, vehicle positioning data is available from one of the vehicle devices 50, which might be a GPS. On a requested or regular input scheme, such vehicle device data is sent to the CAN bus 126 at block 304. The CAN controller 122 is responsible for controlling the receipt and transmitting of such data to the controller 30 at block 308." Additionally, the Spaur '074 patent discloses several wireless communication devices. For example, the wireless device 18 and remote air link transfer protocol modem 20 in Fig. 1, or the cellular phone 80 and vehicle CDPD network modem 82 in Fig. 2. It was notoriously well-known as of the earliest claimed priority date of the Spaur '074 patent that cellular telephones are capable of determining position information, both by the inclusion of GPS receivers in the cellular phone (see, e.g., U.S. Patent 5,043,736 to Darnell et al. in 1991 and Davis in 1997) and by calculating position using cellular tower triangulation techniques (see e.g. Song in 1993).
a wireless communications device;	The Spaur '074 patent teaches a wireless communications device in the form of a CDPD network modem 76. Specifically, the Spaur '074 patent states: "In one embodiment, the cellular

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	digitized packet data (CDPD) network provides the desired link including arrangement of information being communicated and where the destination site, namely the particular vehicle, is found in the network. If a channel is available to the particular vehicle, the CDPD link can proceed to transmit the Internet packets to the vehicle of interest. Instead of the CDPD network as the link, a communications interface could be employed that involves data only, such as a two way paging interface with the vehicle. (Spaur '074 patent, col. 2, lines 41-50) "In one embodiment, the communication information is formatted in accordance with a CDPD (cellular digitized packet data) configuration. At the vehicle, this information is received by a wireless device 18 that is able to transmit and receive information via the airlink. The wireless device 18 is operatively associated with a vehicle airlink transfer protocol modem 20 for the proper handling of the airlink formatted transmission. In one embodiment, the wireless device 18 includes a cellular phone that is selected from a plurality of conventional or commercially available cellular phones. The wireless device 18 bi-directionally communicates with a controller 30 contained in the vehicle through a network protocol converter 26 using a wireless device interface 22. The wireless device interface 22 establishes the necessary signal compatibilities and connections from the wireless device 18." (Spaur '074 patent, col. 6, lines 1-16) "The Internet 68 operatively communicates with a standardized network transmission protocol that permits information to be bi-directionally communicated over the airlink and, in one embodiment, includes a remote CDPD network modem 76 which prepares the information in a conventionally acceptable manner for transmission and communication with a cellular phone 80 which is contained in the vehicle. The cellular phone 80 can be any selected one of a number of conventional cellular phones that have the capability of properly communicating with the desired formatted or arranged information. In the illustrated embodiment of FIG. 2, the cellular phone 80 is operatively associated with a vehicle CDPD network modem 82 that demodulates the received information so that it is acceptable for further handling or processing. (Spaur '074 patent, col. 7, lines 40-54)
a multi-vehicle compatible controller for cooperating with said vehicle position determining device and said wireless communications device to send vehicle position information;	The Spaur '074 patent discloses a multi-vehicle compatible controller (30) that cooperates with a vehicle position determining device (GPS receiver) and a wireless communications device (CDPD network modem) to send vehicle location data over an airlink. Specifically, the Spaur '074 patent states: "At block 300, vehicle positioning data is available from one of the vehicle devices 50, which might be a GPS. On a requested or regular input scheme, such vehicle device data is sent to the CAN bus 126 at block 304. The CAN controller 122 is responsible for controlling the receipt and transmitting of such data to the controller 30 at block 308. The vehicle

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	data that is to be transmitted over the wire link, in accordance with the predetermined or determinable procedure, is appropriately processed, analyzed or otherwise acted on using the controller 30 at block 312. In one embodiment, vehicle device data, such as GPS data, do not rely on the web server 102 but may utilize a different communications pathway, such as E-mail. In any event, the controller 30 gates the vehicle location data to the cellular phone having the vehicle airlink transfer protocol modem 20, such as a CDPD network modem 82, at block 316. The vehicle location data is properly formatted and transmitted through the cellular phone over the airlink at block 320." (Spaur '074 patent, col. 14, lines 4-21)
said multi-vehicle compatible controller to be coupled to the vehicle data bus for communication thereover with at least one vehicle device using at least one corresponding vehicle device code from among a plurality thereof for different vehicles;	The Spaur '074 patent discloses that the controller (30) interfaces with a CAN controller (122) and communicates with different vehicle devices 50a – 50n using device drivers 128 that enable communication using device codes with a specific vehicle device connected to the CAN bus (124). The device drivers 128 that are utilized are dependent upon the vehicle devices present on a particular vehicle. Specifically, the Spaur '074 patent states: "The controller 30 is responsible for a number of functions related to understanding and acting on information received from one or more remote stations 10, obtaining and responding to 35 requested information and operatively functioning with information including data available from other elements in the vehicle. In that regard, **the controller 30 communicates with a controller interface 34 that electrically links the controller 30 with a vehicle standardized network** 40. The vehicle standardized network 40 includes a controller unit 44 that provides appropriate message and data handling functions associated with **sending and receiving information including data from each of a plurality of physical vehicle devices 50 that are operatively connected to a bus 46 of the vehicle standardized network** 40. Like the remote standardized network 14**, the vehicle standardized network 40 is an established and previously developed network that interfaces with components in a vehicle**, such as engine related components in order to provide desired or requested data concerning the operations or status of these components." (Spaur '074 patent, col. 6, lines 31-50) "This further standardized communications network is responsible for handling the communication exchange functions associated with sending and receiving information relative to the vehicle devices 50. **In a preferred embodiment, this further standardized network is a network that has been previously devised and is commonly used in a number of makes and models of vehicles.** This communications network is defined as the controller area network (CAN) 124. Although the CAN 124 has previously commonly been used in operative

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	association with automotive electronics including engine control elements, sensors, lamps, electric windows etc., **the present invention also enables the CAN 124 to be used with a variety of other devices contained in the vehicle**, such as the previously described devices." (Spaur '074 patent, col. 10, lines 15-29) "In interfacing with the CAN 124, the **controller 30 also has device drivers 128 that are useful in achieving desired communications in both directions between the CAN 124 and the controller 30**. For example, the processor 90 is able to **obtain data** or other information **from the vehicle devices 50a-50n using the device drivers 128** and which information can be used by the processor 90 including, for example, storing data in the data memory 106 for subsequent access and transmission to a remote station 10." (Spaur '074 patent, col. 10, lines 55-64)
and a downloading interface for permitting downloading of enabling data related to the at least one corresponding vehicle device code for use by said multi-vehicle compatible controller;	The Spaur '074 patent teaches both wired and wireless downloading interfaces that permit downloading of enabling data. The Spaur '074 patent teaches that the wireless communications device can be utilized to download enabling data in a variety of forms including received information associated with vehicle devices and executable software downloaded from a remote site: "since bi-directional communications involving a vehicle are conducted wirelessly for at least a portion of the communications link, it is necessary for the Internet to communicate with an appropriate interface or network that wirelessly links with the vehicle. In one embodiment, the cellular digitized packet data (CDPD) network provides the desired link including arrangement of information being communicated and where the destination site, namely the particular vehicle, is found in the network." (Spaur '074 patent, col. 2, lines 37 – 46). "A combination of controller related components are containable in a vehicle for responding to requests from remote sites, obtaining and storing information associated with vehicle devices and running executable software that may be available in the program memory of the controller or downloaded from the remote site, while handling and configuring information including data that is communicative with the remote site over an established network, such as the Internet." (Spaur '074 patent, col. 4, line 64 – col. 5, line 5). Furthermore, "Preferably, the controller in the vehicle is also associated with an interface for communication with one or more available systems, such as an RS232 connection, an Ethernet connection and/or a PCMCIA unit. In a related embodiment, the controller includes a direct

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	communications port for receiving and sending information without requiring the wireless device and the Internet connection to the wireless device." (Spaur '074 patent, col. 4, lines 38 – 45).
said downloading interface comprising a connector for temporary connection to a downloading device.	One skilled in the art would understand that the Spaur '074 patent discloses a wireless downloading interface comprising a wireless receiver for temporary connection to a downloading device. Therefore, it is inherently disclosed that the wireless connections can be temporary connections.
14. The multi-vehicle compatible tracking unit according to claim 13 wherein the corresponding at least one vehicle code is for reading from the at least one vehicle device.	The Spaur '074 patent states: "With respect to getting information, the controller 30 further includes a data storage unit or data memory 106. Generally, the data memory 106 stores data that has been generated and is expected to be useful in handling requests or commands. Such data may be data obtained from monitoring a physical device associated with a vehicle and/or may include data useful in running executable software that is intended to provide further information or data useful to a requestor." (Spaur '074 patent, col. 8, lines 45-53)
15. The multi-vehicle compatible tracking unit according to claim 13 wherein the corresponding at least one vehicle code is for writing to the at least one vehicle device.	The Spaur '074 patent states: "As taught in the Spaur '074 patent: " With regard to obtaining information or data from these vehicle devices for appropriate processing using, for example, one or more executable programs in the program memory, the controller communicates with a second standardized network in the form of a network that is commercially available and used in vehicles, such as the previously devised controller area network (CAN). The CAN is operatively connected to each of a plurality of vehicle devices that transmit. receive, or both transmit and receive desired data." (Spaur '074 patent, col. 3, lines 57 – 65). See also the Spaur '074 patent, col. 10, lines 55 – 64: "In interfacing with the CAN 124, the controller 30 also has device drivers 128 that are useful in achieving desired communications in both directions between the CAN 124 and the controller 30. For example, the processor 90 is able to obtain data or other information from the vehicle devices 50a-50n using the device drivers 128 and which information can be used by the processor 90 including, for example, storing data in the data memory 106 for subsequent access and transmission to a remote station 10."
16. The multi-vehicle compatible tracking unit according to claim 13 wherein said downloading interface is also for permitting downloading of	The Spaur '074 patent states: "In a further and related variation, information or executable software may be downloaded from the remote station to the controller 30 for execution as part of responding to an accompanying or future request, which software may be executed in conjunction with the operation of an applet that is stored as part of the controller 30." (Spaur

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at least one programming instruction for said multi-vehicle compatible controller.	'074 patent, col. 9, lines 45-50)
17. The multi-vehicle compatible tracking unit according to claim 13 further comprising a remote transmitter; and wherein said multi-vehicle compatible controller also performs at least one vehicle remote control function responsive to said remote transmitter.	The Spaur '074 patent teaches using the wireless communications device to communicate with a remote station; the remote station can provide commands that cause the controller to perform a control function: "The controller 30 includes a number of elements for handling the functions and responsibilities associated with responding to messages, such as requests or commands, from one or more of the remote stations 10, running executable software and obtaining data, as well as achieving the necessary communications protocols with the Internet 68." (Spaur '074 patent, col. 8, lines 1 – 7).
18. A multi-vehicle compatible tracking unit for a vehicle comprising a vehicle data bus extending throughout the vehicle, the multi-vehicle compatible vehicle tracking unit comprising, lines	The Spaur '074 patent teaches a multi-vehicle compatible tracking unit in the form of a controller 30 that is electrically linked to a bus in the form a vehicle standardized network 40 (an example of which is a controller area network or CAN bus). Specifically, the Spaur '074 patent teaches: "The controller 30 is responsible for a number of functions related to understanding and acting on information received from one or more remote stations 10, obtaining and responding to 35 requested information and operatively functioning with information including data available from other elements in the vehicle. In that regard, the controller 30 communicates with a controller interface 34 that electrically links the controller 30 with a vehicle standardized network 40. The vehicle standardized network 40 includes a controller unit 44 that provides appropriate message and data handling functions associated with sending and receiving information including data from each of a plurality of physical vehicle devices 50 that are operatively connected to a bus 46 of the vehicle standardized network 40. Like the remote standardized network 14, the vehicle standardized network 40 is an established and previously developed network that interfaces with components in a vehicle, such as engine related components in order to provide desired or requested data concerning the operations or status of these components. (Spaur '074 patent, col. 6, lines 31-50) The Spaur '074 patent further states: "In a preferred embodiment, this further standardized network is a network that has been previously devised and is commonly used in a number of makes and models of vehicles. This communications network is defined as the controller area network (CAN) 124. Although the CAN 124 has previously commonly been used in operative

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	association with automotive electronics including engine control elements, sensors, lamps, electric windows etc., the present invention also enables the CAN 124 to be used with a variety of other devices contained in the vehicle, such as the previously described devices." (Spaur '074 patent, col. 10, lines 18-39) See also FIG. 1 and FIG. 2 of the Spaur '074 patent.
a vehicle position determining device;	The Spaur '074 patent discloses a GPS receiver (vehicle position determining device) at column 14, lines 4 – 9: "At block 300, vehicle positioning data is available from one of the vehicle devices 50, which might be a GPS. On a requested or regular input scheme, such vehicle device data is sent to the CAN bus 126 at block 304. The CAN controller 122 is responsible for controlling the receipt and transmitting of such data to the controller 30 at block 308." Additionally, the Spaur '074 patent discloses several wireless communication devices. For example, the wireless device 18 and remote air link transfer protocol modem 20 in Fig. 1, or the cellular phone 80 and vehicle CDPD network modem 82 in Fig. 2. It was notoriously well-known as of the earliest claimed priority date of the Spaur '074 patent that cellular telephones are capable of determining position information, both by the inclusion of GPS receivers in the cellular phone (see, e.g., U.S. Patent 5,043,736 to Darnell et al. in 1991 and Davis in 1997) and by calculating position using cellular tower triangulation techniques (see e.g. Song in 1993).
a wireless communications device;	The Spaur '074 patent teaches a wireless communications device in the form of a CDPD network modem 76. Specifically, the Spaur '074 patent states: "In one embodiment, the cellular digitized packet data (CDPD) network provides the desired link including arrangement of information being communicated and where the destination site, namely the particular vehicle, is found in the network. If a channel is available to the particular vehicle, the CDPD link can proceed to transmit the Internet packets to the vehicle of interest. Instead of the CDPD network as the link, a communications interface could be employed that involves data only, such as a two way paging interface with the vehicle. (Spaur '074 patent, col. 2, lines 41-50) "In one embodiment, the communication information is formatted in accordance with a CDPD (cellular digitized packet data) configuration. At the vehicle, this information is received by a wireless device 18 that is able to transmit and receive information via the airlink. The wireless device 18 is operatively associated with a vehicle airlink transfer protocol modem 20 for the proper handling of the airlink formatted transmission. In one embodiment, the wireless device 18 includes a cellular phone that is selected from a plurality of conventional or commercially available cellular phones. The wireless device 18 bi-directionally communicates with a controller

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	30 contained in the vehicle through a network protocol converter 26 using a wireless device interface 22. The wireless device interface 22 establishes the necessary signal compatibilities and connections from the wireless device 18." (Spaur '074 patent, col. 6, lines 1-16) "The Internet 68 operatively communicates with a standardized network transmission protocol that permits information to be bi-directionally communicated over the airlink and, in one embodiment, includes a remote CDPD network modem 76 which prepares the information in a conventionally acceptable manner for transmission and communication with a cellular phone 80 which is contained in the vehicle. The cellular phone 80 can be any selected one of a number of conventional cellular phones that have the capability of properly communicating with the desired formatted or arranged information. In the illustrated embodiment of FIG. 2, the cellular phone 80 is operatively associated with a vehicle CDPD network modem 82 that demodulates the received information so that it is acceptable for further handling or processing. (Spaur '074 patent, col. 7, lines 40-54)
a multi-vehicle compatible controller for cooperating with said vehicle position determining device and said wireless communications device to send vehicle position information;	The Spaur '074 patent discloses a multi-vehicle compatible controller (30) that cooperates with a vehicle position determining device (GPS receiver) and a wireless communications device (CDPD network modem) to send vehicle location data over an airlink. Specifically, the Spaur '074 patent states: "At block 300, vehicle positioning data is available from one of the vehicle devices 50, which might be a GPS. On a requested or regular input scheme, such vehicle device data is sent to the CAN bus 126 at block 304. The CAN controller 122 is responsible for controlling the receipt and transmitting of such data to the controller 30 at block 308. The vehicle data that is to be transmitted over the wire link, in accordance with the predetermined or determinable procedure, is appropriately processed, analyzed or otherwise acted on using the controller 30 at block 312. In one embodiment, vehicle device data, such as GPS data, do not rely on the web server 102 but may utilize a different communications pathway, such as E-mail. In any event, the controller 30 gates the vehicle location data to the cellular phone having the vehicle airlink transfer protocol modem 20, such as a CDPD network modem 82, at block 316. The vehicle location data is properly formatted and transmitted through the cellular phone over the airlink at block 320." (Spaur '074 patent, col. 14, lines 4-21)
said multi-vehicle compatible controller to be coupled to the vehicle data bus for communication thereover with at least one vehicle device using at least one corresponding vehicle	The Spaur '074 patent discloses that the controller (30) interfaces with a CAN controller (122) and communicates with different vehicle devices 50a – 50n using device drivers 128 that enable communication using device codes with a specific vehicle device connected to the CAN bus (124). The device drivers 128 that are utilized are dependent upon the vehicle devices present on a particular vehicle.

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device code from among a plurality thereof for different vehicles;	Specifically, the Spaur '074 patent states: "The controller 30 is responsible for a number of functions related to understanding and acting on information received from one or more remote stations 10, obtaining and responding to 35 requested information and operatively functioning with information including data available from other elements in the vehicle. In that regard, **the controller 30 communicates with a controller interface 34 that electrically links the controller 30 with a vehicle standardized network** 40. The vehicle standardized network 40 includes a controller unit 44 that provides appropriate message and data handling functions associated with **sending and receiving information including data from each of a plurality of physical vehicle devices 50 that are operatively connected to a bus 46 of the vehicle standardized network** 40. Like the remote standardized network 14**, the vehicle standardized network 40 is an established and previously developed network that interfaces with components in a vehicle**, such as engine related components in order to provide desired or requested data concerning the operations or status of these components." (Spaur '074 patent, col. 6, lines 31-50) "This further standardized communications network is responsible for handling the communication exchange functions associated with sending and receiving information relative to the vehicle devices 50. **In a preferred embodiment, this further standardized network is a network that has been previously devised and is commonly used in a number of makes and models of vehicles.** This communications network is defined as the controller area network (CAN) 124. Although the CAN 124 has previously commonly been used in operative association with automotive electronics including engine control elements, sensors, lamps, electric windows etc., **the present invention also enables the CAN 124 to be used with a variety of other devices contained in the vehicle**, such as the previously described devices." (Spaur '074 patent, col. 10, lines 15-29) "In interfacing with the CAN 124, the **controller 30 also has device drivers 128 that are useful in achieving desired communications in both directions between the CAN 124 and the controller 30**. For example, the processor 90 is able to **obtain data** or other information **from the vehicle devices 50a-50n using the device drivers 128** and which information can be used by the processor 90 including, for example, storing data in the data memory 106 for subsequent access and transmission to a remote station 10." (Spaur '074 patent, col. 10, lines 55-64)
and a downloading interface for permitting downloading of enabling	The Spaur '074 patent teaches both wired and wireless downloading interfaces that permit downloading of enabling data.

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data related to the at least one corresponding vehicle device code for use by said multi-vehicle compatible controller;	The Spaur '074 patent teaches that the wireless communications device can be utilized to download enabling data in a variety of forms including received information associated with vehicle devices and executable software downloaded from a remote site: "since bi-directional communications involving a vehicle are conducted wirelessly for at least a portion of the communications link, it is necessary for the Internet to communicate with an appropriate interface or network that wirelessly links with the vehicle. In one embodiment, the cellular digitized packet data (CDPD) network provides the desired link including arrangement of information being communicated and where the destination site, namely the particular vehicle, is found in the network." (Spaur '074 patent, col. 2, lines 37 – 46). "A combination of controller related components are containable in a vehicle for responding to requests from remote sites, obtaining and storing information associated with vehicle devices and running executable software that may be available in the program memory of the controller or downloaded from the remote site, while handling and configuring information including data that is communicative with the remote site over an established network, such as the Internet." (Spaur '074 patent, col. 4, line 64 – col. 5, line 5). Furthermore, "Preferably, the controller in the vehicle is also associated with an interface for communication with one or more available systems, such as an RS232 connection, an Ethernet connection and/or a PCMCIA unit. In a related embodiment, the controller includes a direct communications port for receiving and sending information without requiring the wireless device and the Internet connection to the wireless device." (Spaur '074 patent, col. 4, lines 38 – 45).
said downloading interface comprising a wireless receiver for temporary connection to a downloading device.	One skilled in the art would understand that the Spaur '074 patent discloses a wireless downloading interface comprising a wireless receiver for temporary connection to a downloading device. Therefore, it is inherently disclosed that the wireless connections can be temporary connections.
19. The multi-vehicle compatible tracking unit according to claim 18 wherein the corresponding at least one vehicle code is for reading from the at least one vehicle device.	The Spaur '074 patent states: "With respect to getting information, the controller 30 further includes a data storage unit or data memory 106. Generally, the data memory 106 stores data that has been generated and is expected to be useful in handling requests or commands. Such data may be data obtained from monitoring a physical device associated with a vehicle and/or may include data useful in running executable software that is intended to provide further information or data useful to a requestor." (Spaur '074 patent, col. 8, lines 45-53)

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20. The multi-vehicle compatible tracking unit according to claim 18 wherein the corresponding at least one vehicle code is for writing to the at least one vehicle device.	As taught in the Spaur '074 patent: "With regard to obtaining information or data from these vehicle devices for appropriate processing using, for example, one or more executable programs in the program memory, the controller communicates with a second standardized network in the form of a network that is commercially available and used in vehicles, such as the previously devised controller area network (CAN). The CAN is operatively connected to each of a plurality of vehicle devices that transmit, receive, or both transmit and receive desired data." (Spaur '074 patent, col. 3, lines 57 – 65). Spaur '074 patent, col. 10, lines 55 – 64: "In interfacing with the CAN 124, the controller 30 also has device drivers 128 that are useful in achieving desired communications in both directions between the CAN 124 and the controller 30. For example, the processor 90 is able to obtain data or other information from the vehicle devices 50a-50n using the device drivers 128 and which information can be used by the processor 90 including, for example, storing data in the data memory 106 for subsequent access and transmission to a remote station 10."
21. The multi-vehicle compatible tracking unit according to claim 18 wherein said downloading interface is also for permitting downloading of at least one programming instruction for said multi-vehicle compatible controller.	The Spaur '074 patent states: "In a further and related variation, information or executable software may be downloaded from the remote station to the controller 30 for execution as part of responding to an accompanying or future request, which software may be executed in conjunction with the operation of an applet that is stored as part of the controller 30." (Spaur '074 patent, col. 9, lines 45-50)
22. The multi-vehicle compatible tracking unit according to claim 18 further comprising a remote transmitter; and wherein said multi-vehicle compatible controller also performs at least one vehicle remote control function responsive to said remote transmitter.	The Spaur '074 patent teaches using the wireless communications device to communicate with a remote station; the remote station can provide commands that cause the controller to perform a control function: "The controller 30 includes a number of elements for handling the functions and responsibilities associated with responding to messages, such as requests or commands, from one or more of the remote stations 10, running executable software and obtaining data, as well as achieving the necessary communications protocols with the Internet 68." (Spaur '074 patent, col. 8, lines 1 – 7).

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Exhibit D

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The '278 Patent	PRIOR ART - US Patent 5,732,074 to Spaur et al. and U.S. Patent No. 5,877,724 to Davis
1. A multi-vehicle compatible tracking unit for a vehicle comprising a vehicle data bus extending throughout the vehicle, the multi-vehicle compatible tracking unit comprising:	The Spaur '074 patent teaches a multi-vehicle compatible tracking unit in the form of a controller 30 that is electrically linked to a bus in the form a vehicle standardized network 40 (an example of which is a controller area network or CAN bus). Specifically, the Spaur '074 patent teaches: "The controller 30 is responsible for a number of functions related to understanding and acting on information received from one or more remote stations 10, obtaining and responding to 35 requested information and operatively functioning with information including data available from other elements in the vehicle. In that regard, the controller 30 communicates with a controller interface 34 that electrically links the controller 30 with a vehicle standardized network 40. The vehicle standardized network 40 includes a controller unit 44 that provides appropriate message and data handling functions associated with sending and receiving information including data from each of a plurality of physical vehicle devices 50 that are operatively connected to a bus 46 of the vehicle standardized network 40. Like the remote standardized network 14, the vehicle standardized network 40 is an established and previously developed network that interfaces with components in a vehicle, such as engine related components in order to provide desired or requested data concerning the operations or status of these components. (Spaur '074 patent, col. 6, lines 31-50) The Spaur '074 patent further states: "In a preferred embodiment, this further standardized network is a network that has been previously devised and is commonly used in a number of makes and models of vehicles. This communications network is defined as the controller area network (CAN) 124. Although the CAN 124 has previously commonly been used in operative association with automotive electronics including engine control elements, sensors, lamps, electric windows etc., the present invention also enables the CAN 124 to be used with a variety of other devices contained in the vehicle, such as the previously described devices." (Spaur '074 patent, col. 10, lines 18-39) See also FIG. 1 and FIG. 2 of the Spaur '074 patent.
a vehicle position determining device;	The Spaur '074 patent discloses a GPS receiver (vehicle position determining device) at column 14, lines 4 – 9: "At block 300, vehicle positioning data is available from one of the vehicle devices 50, which might be a GPS. On a requested or regular input scheme, such vehicle device data is sent to the CAN bus 126 at block 304. The CAN controller 122 is responsible for controlling the receipt and transmitting of such data to the controller 30 at block 308." The Spaur '074 patent also discloses several wireless communication devices. For example, the

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	wireless device 18 and remote air link transfer protocol modem 20 in Fig. 1, or the cellular phone 80 and vehicle CDPD network modem 82 in Fig. 2. While the Spaur '074 patent teaches a separate wireless communications device and a GPS receiver capable of determining vehicle position information, the Davis '724 patent teaches a combined cellular telephone and GPS receiver device. It would have been obvious to substitute the combined cellular telephone and GPS receiver device as taught by the Davis '724 patent for the separate wireless communications device and GPS receiver taught in the Spaur '074 patent to enable use in vehicles that do not possess a GPS receiver. The controller taught by the Spaur '074 patent would simply obtain vehicle position information from a GPS receiver in the combined cellular telephone and GPS receiver device instead of from a vehicle GPS receiver via the CAN bus. Specific teachings of the Davis '724 patent with respect to the combined cellular telephone and GPS receiver device are as follows: The Davis '724 patent teaches a "single processor combined position locating and analog cellular telephone system." (Davis '724 patent, col. 3, lines 27 – 29). The Davis '724 patent further teaches that the "position locating and analog cellular telephone system" includes "a power and input output (110) portion, a single processor portion 110, a GPS RF portion 120, and a shared baseband and RF portion 130." (Davis '724 patent, col. 3, lines 29 – 32). Further, "portion 100 of the present invention includes a power supply 132 for providing power to the present single processor combined GPS and cellular telephone invention." (Davis '724 patent, col. 3, lines 37 – 40). The Davis '724 patent further teaches "I/O circuitry 134 is also contained within portion 100 for receiving and transmitting control signals to interface with, for example, external peripheral devices coupled to the present invention. Such external peripheral devices include, for example, panic buttons, vehicle alarms, and the like. The present invention further includes a modem 136. Modem 136 of the present embodiment is a one chip modem LSI applicable to transceiving both fax and data." (Davis '724 patent, col. 3, lines 40 – 47).
a wireless communications device;	As noted above, the Spaur '074 patent discloses that the multi-vehicle compatible tracking unit includes a wireless communications device in the form of a CDPD network modem (see e.g. FIG. 2 and column 14, lines 4 – 9). For the reasons outlined above, it would have been obvious to substitute the wireless communications device disclosed in the Spaur '074 patent for the wireless communications device disclosed in the Davis '724 patent (e.g. col. 3, lines 27 – 29) in order to utilize the multi-vehicle compatible tracking unit disclosed in the Spaur '074 patent in vehicles that do not possess a GPS receiver.
a multi-vehicle compatible controller	The Spaur '074 patent discloses a multi-vehicle compatible controller (30) that cooperates with a

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for cooperating with said vehicle position determining device and said wireless communications device to send vehicle position information;	vehicle position determining device (GPS receiver) and a wireless communications device (CDPD network modem) to send vehicle location data over an airlink. Specifically, the Spaur '074 patent states: "At block 300, vehicle positioning data is available from one of the vehicle devices 50, which might be a GPS. On a requested or regular input scheme, such vehicle device data is sent to the CAN bus 126 at block 304. The CAN controller 122 is responsible for controlling the receipt and transmitting of such data to the controller 30 at block 308. The vehicle data that is to be transmitted over the wire link, in accordance with the predetermined or determinable procedure, is appropriately processed, analyzed or otherwise acted on using the controller 30 at block 312. In one embodiment, vehicle device data, such as GPS data, do not rely on the web server 102 but may utilize a different communications pathway, such as E-mail. In any event, the controller 30 gates the vehicle location data to the cellular phone having the vehicle airlink transfer protocol modem 20, such as a CDPD network modem 82, at block 316. The vehicle location data is properly formatted and transmitted through the cellular phone over the airlink at block 320." (Spaur '074 patent, col. 14, lines 4-21)
said multi-vehicle compatible controller to be coupled to the vehicle data bus for communication thereover with at least one vehicle device using at least one corresponding vehicle device code from among a plurality thereof for different vehicles; and	The Spaur '074 patent discloses that the controller (30) interfaces with a CAN controller (122) and communicates with different vehicle devices 50a – 50n using device drivers 128 that enable communication using device codes with a specific vehicle device connected to the CAN bus (124). The device drivers 128 that are utilized are dependent upon the vehicle devices present on a particular vehicle. Specifically, the Spaur '074 patent states: "The controller 30 is responsible for a number of functions related to understanding and acting on information received from one or more remote stations 10, obtaining and responding to 35 requested information and operatively functioning with information including data available from other elements in the vehicle. In that regard, **the controller 30 communicates with a controller interface 34 that electrically links the controller 30 with a vehicle standardized network** 40. The vehicle standardized network 40 includes a controller unit 44 that provides appropriate message and data handling functions associated with **sending and receiving information including data from each of a plurality of physical vehicle devices 50 that are operatively connected to a bus 46 of the vehicle standardized network** 40. Like the remote standardized network 14**, the vehicle standardized network 40 is an established and previously developed network that interfaces with components in a vehicle**, such as engine related components in order to provide desired or requested data concerning the operations or status of these components." (Spaur '074 patent, col. 6, lines 31-50)

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	"This further standardized communications network is responsible for handling the communication exchange functions associated with sending and receiving information relative to the vehicle devices 50. **In a preferred embodiment, this further standardized network is a network that has been previously devised and is commonly used in a number of makes and models of vehicles.** This communications network is defined as the controller area network (CAN) 124. Although the CAN 124 has previously commonly been used in operative association with automotive electronics including engine control elements, sensors, lamps, electric windows etc., **the present invention also enables the CAN 124 to be used with a variety of other devices contained in the vehicle**, such as the previously described devices." (Spaur '074 patent, col. 10, lines 15-29) "In interfacing with the CAN 124, the **controller 30 also has device drivers 128 that are useful in achieving desired communications in both directions between the CAN 124 and the controller 30**. For example, the processor 90 is able to **obtain data** or other information **from the vehicle devices 50a-50n using the device drivers 128** and which information can be used by the processor 90 including, for example, storing data in the data memory 106 for subsequent access and transmission to a remote station 10." (Spaur '074 patent, col. 10, lines 55-64)
a downloading interface for permitting downloading of enabling data related to the at least one corresponding vehicle device code for use by said multi-vehicle compatible controller.	The Spaur '074 patent teaches both wired and wireless downloading interfaces that permit downloading of enabling data. The Spaur '074 patent teaches that the wireless communications device can be utilized to download enabling data in a variety of forms including received information associated with vehicle devices and executable software downloaded from a remote site: "since bi-directional communications involving a vehicle are conducted wirelessly for at least a portion of the communications link, it is necessary for the Internet to communicate with an appropriate interface or network that wirelessly links with the vehicle. In one embodiment, the cellular digitized packet data (CDPD) network provides the desired link including arrangement of information being communicated and where the destination site, namely the particular vehicle, is found in the network." (Spaur '074 patent, col. 2, lines 37 – 46). "A combination of controller related components are containable in a vehicle for responding to requests from remote sites, obtaining and storing information associated with vehicle devices and running executable software that may be available in the program memory of the controller or downloaded from the remote site, while handling and configuring information including data

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	that is communicative with the remote site over an established network, such as the Internet." (Spaur '074 patent, col. 4, line 64 – col. 5, line 5). Furthermore, "Preferably, the controller in the vehicle is also associated with an interface for communication with one or more available systems, such as an RS232 connection, an Ethernet connection and/or a PCMCIA unit. In a related embodiment, the controller includes a direct communications port for receiving and sending information without requiring the wireless device and the Internet connection to the wireless device." (Spaur '074 patent, col. 4, lines 38 – 45).
2. The multi-vehicle compatible tracking unit according to claim 1 wherein said downloading interface comprises a wired signal downloading interface.	Figure 2 of the Spaur '074 patent describes the direct communications port. One skilled in the art would recognize that this interface is a wired interface to the controller and would enable downloading to the controller. "Preferably, the controller in the vehicle is also associated with an interface for communication with one or more available systems, such as an RS232 connection, an Ethernet connection and/or a PCMCIA unit. In a related embodiment, the **controller includes a direct communications port for receiving and sending information without requiring the wireless device** and the Internet connection to the wireless device." (Spaur '074 patent, col. 4, lines 38-45)
3. The multi-vehicle compatible tracking unit according to claim 2 wherein said wired signal downloading interface comprises a connector for temporary connection to a downloading device.	One skilled in the art would understand that the wired port could be used temporarily. Therefore, it is inherently disclosed that the wired signal downloading interface, i.e. the RS232 connection, Ethernet connection, or PCMCIA connection, comprise a connector for a temporary connection.
4. The multi-vehicle compatible tracking unit according to claim 1 wherein said downloading interface comprises a wireless signal downloading interface.	Figure 1 of the Spaur '074 patent includes a wireless communication interface. As noted above with respect to Claim 1, Figure 2 of Spaur '074 patent also includes a wireless communications interface. "In one embodiment, the cellular digitized packet data (CDPD) network provides the desired link including arrangement of information being communicated and where the destination site, namely the particular vehicle, is found in the network. If a channel is available to the particular

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	vehicle, the CDPD link can proceed to transmit the Internet packets to the vehicle of interest. Instead of the CDPD network as the link, a communications interface could be employed that involves data only, such as a two way paging interface with the vehicle." (Spaur '074 patent, col. 2, lines 41-50) In accordance with the present invention, a system is provided in which communication of information, including requests, commands and data, is achieved between vehicle having physical vehicle devices and one or more sites that are remote from the vehicle. (Spaur '074 patent, col. 2, lines 11-15)
5. The multi-vehicle compatible tracking unit according to claim 4 wherein said wireless signal downloading interface comprises a wireless receiver for temporary connection to a downloading device.	One skilled in the art would understand that the Spaur '074 patent discloses a wireless downloading interface comprising a wireless receiver for temporary connection to a downloading device. Therefore, it is inherently disclosed that the wireless connections can be temporary connections.
6. The multi-vehicle compatible tracking unit according to claim 1 wherein the corresponding at least one vehicle code is for reading from the at least one vehicle device.	As described in the Spaur '074 patent: "With respect to getting information, the controller 30 further includes a data storage unit or data memory 106. Generally, the data memory 106 **stores data that has been generated and is expected to be useful in handling requests or commands**. Such **data may be data obtained from monitoring a physical device associated with a vehicle** and/or may include data useful in running executable software that is intended to provide further information or data useful to a requestor." (Spaur '074 patent, col. 8, lines 45-53)
7. The multi-vehicle compatible tracking unit according to claim 1 wherein the corresponding at least one vehicle code is for writing to the at least one vehicle device.	As taught in the Spaur '074 patent: "With regard to obtaining information or data from these vehicle devices for appropriate processing using, for example, one or more executable programs in the program memory, the controller communicates with a second standardized network in the form of a network that is commercially available and used in vehicles, such as the previously devised controller area network (CAN). The CAN is operatively connected to each of a plurality of vehicle devices that transmit, receive, or both transmit and receive desired data." (Spaur '074 patent, col. 3, lines 57 – 65).

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	Also see the Spaur '074 patent, col. 10, lines 55 – 64: "In interfacing with the CAN 124, the controller 30 also has device drivers 128 that are useful in achieving desired communications in both directions between the CAN 124 and the controller 30. For example, the processor 90 is able to obtain data or other information from the vehicle devices 50a-50n using the device drivers 128 and which information can be used by the processor 90 including, for example, storing data in the data memory 106 for subsequent access and transmission to a remote station 10."
8. The multi-vehicle compatible tracking unit according to claim 1 wherein said downloading interface is also for permitting downloading of at least one programming instruction for said multi-vehicle compatible controller.	"In a further and related variation, information or **executable software may be downloaded from the remote station to the controller** 30 for execution as part of responding to an accompanying or future request, which software may be executed in conjunction with the operation of an applet that is stored as part of the controller 30." (Spaur '074 patent, col. 9, lines 45-50)
9. The multi-vehicle compatible tracking unit according to claim 1 further comprising a remote transmitter; and wherein said multi-vehicle compatible controller also performs at least one vehicle remote control function responsive to said remote transmitter.	The Spaur '074 patent teaches using the wireless communications device to communicate with a remote station; the remote station can provide commands that cause the controller to perform a control function: "The controller 30 includes a number of elements for handling the functions and responsibilities associated with responding to messages, such as requests or commands, from one or more of the remote stations 10, running executable software and obtaining data, as well as achieving the necessary communications protocols with the Internet 68." (Spaur '074 patent, col. 8, lines 1 – 7).
10. The multi-vehicle compatible tracking unit according to claim 9 wherein the at least one vehicle remote control function comprises at least one of a vehicle security function, a remote keyless entry function, and a remote engine starting function.	"The controller 30 further includes a data storage unit or data memory 106." (Spaur '074 patent, col. 8, lines 46 – 47). "In addition to application software that might be involved with such functions, the short programs in the program memory 114 may include software related to safety and security considerations, including, lines […] (c) providing an indication of key or alarm related events, such as when roadside assistance is required, the vehicle or the driver of the vehicle faces a threatening situation, an unauthorized vehicle door unlocking and/or initiating an automatic call for assistance in light of an airbag detonation." (Spaur '074 patent, col. 9, lines 16 – 30).

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11. The multi-vehicle compatible tracking unit according to claim 1 wherein said wireless position determining device comprises a Global Positioning System (GPS) receiver.	The vehicle position determining device taught in the Davis '724 patent is a GPS receiver. (see e.g. Davis '724 patent, col. 3, lines 29 – 32).
12. The multi-vehicle compatible tracking unit according to claim 1 further comprising a housing containing said vehicle position determining device, said wireless communications device, said multi-vehicle compatible controller, and said downloading interface.	The Spaur '074 patent discloses a combination of components located in a vehicle: "A combination of controller related components are containable in a vehicle for responding to requests from remote sites, obtaining and storing information associated with vehicle devices and running executable software that may be available in the program memory of the controller or downloaded from the remote site, while handling and configuring information including data that is communicative with the remote site over an established network, such as the Internet." (Spaur '074 patent, col. 4, line 64 – col. 5, line 5). It is inherently disclosed that the components are contained in a housing within the vehicle to aid in the installation of the system described in the Spaur '074 patent. In the alternative, FIG. 1 illustrates a variety of components contained in a vehicle and one or more remote stations 10a-10n. As all of the components are stored in the vehicle, the vehicle itself constitutes a housing containing all elements of the claimed invention.
13. A multi-vehicle compatible tracking unit for a vehicle comprising a vehicle data bus extending throughout the vehicle, the multi-vehicle compatible vehicle tracking unit comprising:	The Spaur '074 patent teaches a multi-vehicle compatible tracking unit in the form of a controller 30 that is electrically linked to a bus in the form a vehicle standardized network 40 (an example of which is a controller area network or CAN bus). Specifically, the Spaur '074 patent teaches: "The controller 30 is responsible for a number of functions related to understanding and acting on information received from one or more remote stations 10, obtaining and responding to 35 requested information and operatively functioning with information including data available from other elements in the vehicle. In that regard, the controller 30 communicates with a controller interface 34 that electrically links the controller 30 with a vehicle standardized network 40. The vehicle standardized network 40 includes a controller unit 44 that provides appropriate message and data handling functions associated with sending and receiving information including data from each of a plurality of physical vehicle devices 50 that are operatively connected to a bus 46 of the vehicle standardized network 40. Like the remote standardized network 14, the vehicle

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	standardized network 40 is an established and previously developed network that interfaces with components in a vehicle, such as engine related components in order to provide desired or requested data concerning the operations or status of these components. (Spaur '074 patent, col. 6, lines 31-50) The Spaur '074 patent further states: "In a preferred embodiment, this further standardized network is a network that has been previously devised and is commonly used in a number of makes and models of vehicles. This communications network is defined as the controller area network (CAN) 124. Although the CAN 124 has previously commonly been used in operative association with automotive electronics including engine control elements, sensors, lamps, electric windows etc., the present invention also enables the CAN 124 to be used with a variety of other devices contained in the vehicle, such as the previously described devices." (Spaur '074 patent, col. 10, lines 18-39) See also FIG. 1 and FIG. 2 of the Spaur '074 patent.
a vehicle position determining device;	The Spaur '074 patent discloses a GPS receiver (vehicle position determining device) at column 14, lines 4 – 9: "At block 300, vehicle positioning data is available from one of the vehicle devices 50, which might be a GPS. On a requested or regular input scheme, such vehicle device data is sent to the CAN bus 126 at block 304. The CAN controller 122 is responsible for controlling the receipt and transmitting of such data to the controller 30 at block 308." The Spaur '074 patent also discloses several wireless communication devices. For example, the wireless device 18 and remote air link transfer protocol modem 20 in Fig. 1, or the cellular phone 80 and vehicle CDPD network modem 82 in Fig. 2. While the Spaur '074 patent teaches a separate wireless communications device and a GPS receiver capable of determining vehicle position information, the Davis '724 patent teaches a combined cellular telephone and GPS receiver device. It would have been obvious to substitute the combined cellular telephone and GPS receiver device as taught by the Davis '724 patent for the separate wireless communications device and GPS receiver taught in the Spaur '074 patent to enable use in vehicles that do not possess a GPS receiver. The controller taught by the Spaur '074 patent would simply obtain vehicle position information from a GPS receiver in the combined cellular telephone and GPS receiver device instead of from a vehicle GPS receiver via the CAN bus. Specific teachings of the Davis '724 patent with respect to the combined cellular telephone and GPS receiver device are as follows:

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	The Davis '724 patent teaches a "single processor combined position locating and analog cellular telephone system." (Davis '724 patent, col. 3, lines 27 – 29). The Davis '724 patent further teaches that the "position locating and analog cellular telephone system" includes "a power and input output (110) portion, a single processor portion 110, a GPS RF portion 120, and a shared baseband and RF portion 130." (Davis '724 patent, col. 3, lines 29 – 32). Further, "portion 100 of the present invention includes a power supply 132 for providing power to the present single processor combined GPS and cellular telephone invention." (Davis '724 patent, col. 3, lines 37 – 40). The Davis '724 patent further teaches "I/O circuitry 134 is also contained within portion 100 for receiving and transmitting control signals to interface with, for example, external peripheral devices coupled to the present invention. Such external peripheral devices include, for example, panic buttons, vehicle alarms, and the like. The present invention further includes a modem 136. Modem 136 of the present embodiment is a one chip modem LSI applicable to transceiving both fax and data." (Davis '724 patent, col. 3, lines 40 – 47).
a wireless communications device;	As noted above, the Spaur '074 patent discloses that the multi-vehicle compatible tracking unit includes a wireless communications device in the form of a CDPD network modem (see e.g. FIG. 2 and column 14, lines 4 – 9). For the reasons outlined above, it would have been obvious to substitute the wireless communications device disclosed in the Spaur '074 patent for the wireless communications device disclosed in the Davis '724 patent (e.g. col. 3, lines 27 – 29) in order to utilize the multi-vehicle compatible tracking unit disclosed in the Spaur '074 patent in vehicles that do not possess a GPS receiver.
a multi-vehicle compatible controller for cooperating with said vehicle position determining device and said wireless communications device to send vehicle position information;	The Spaur '074 patent discloses a multi-vehicle compatible controller (30) that cooperates with a vehicle position determining device (GPS receiver) and a wireless communications device (CDPD network modem) to send vehicle location data over an airlink. Specifically, the Spaur '074 patent states: "At block 300, vehicle positioning data is available from one of the vehicle devices 50, which might be a GPS. On a requested or regular input scheme, such vehicle device data is sent to the CAN bus 126 at block 304. The CAN controller 122 is responsible for controlling the receipt and transmitting of such data to the controller 30 at block 308. The vehicle data that is to be transmitted over the wire link, in accordance with the predetermined or determinable procedure, is appropriately processed, analyzed or otherwise acted on using the controller 30 at block 312. In one embodiment, vehicle device data, such as GPS data, do not rely on the web server 102 but may utilize a different communications pathway, such as E-mail. In any event, the controller 30 gates the vehicle location data to the cellular phone having the vehicle airlink transfer protocol modem 20, such as a CDPD network modem 82, at block 316. The vehicle location data is properly formatted and transmitted through the cellular phone over

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	the airlink at block 320." (Spaur '074 patent, col. 14, lines 4-21)
said multi-vehicle compatible controller to be coupled to the vehicle data bus for communication thereover with at least one vehicle device using at least one corresponding vehicle device code from among a plurality thereof for different vehicles;	The Spaur '074 patent discloses that the controller (30) interfaces with a CAN controller (122) and communicates with different vehicle devices 50a – 50n using device drivers 128 that enable communication using device codes with a specific vehicle device connected to the CAN bus (124). The device drivers 128 that are utilized are dependent upon the vehicle devices present on a particular vehicle. Specifically, the Spaur '074 patent states: "The controller 30 is responsible for a number of functions related to understanding and acting on information received from one or more remote stations 10, obtaining and responding to 35 requested information and operatively functioning with information including data available from other elements in the vehicle. In that regard, **the controller 30 communicates with a controller interface 34 that electrically links the controller 30 with a vehicle standardized network** 40. The vehicle standardized network 40 includes a controller unit 44 that provides appropriate message and data handling functions associated with **sending and receiving information including data from each of a plurality of physical vehicle devices 50 that are operatively connected to a bus 46 of the vehicle standardized network** 40. Like the remote standardized network 14**, the vehicle standardized network 40 is an established and previously developed network that interfaces with components in a vehicle**, such as engine related components in order to provide desired or requested data concerning the operations or status of these components." (Spaur '074 patent, col. 6, lines 31-50) "This further standardized communications network is responsible for handling the communication exchange functions associated with sending and receiving information relative to the vehicle devices 50. **In a preferred embodiment, this further standardized network is a network that has been previously devised and is commonly used in a number of makes and models of vehicles.** This communications network is defined as the controller area network (CAN) 124. Although the CAN 124 has previously commonly been used in operative association with automotive electronics including engine control elements, sensors, lamps, electric windows etc., **the present invention also enables the CAN 124 to be used with a variety of other devices contained in the vehicle**, such as the previously described devices." (Spaur '074 patent, col. 10, lines 15-29) "In interfacing with the CAN 124, the **controller 30 also has device drivers 128 that are useful in achieving desired communications in both directions between the CAN 124 and**

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	the controller 30. For example, the processor 90 is able to **obtain data** or other information **from the vehicle devices 50a-50n using the device drivers 128** and which information can be used by the processor 90 including, for example, storing data in the data memory 106 for subsequent access and transmission to a remote station 10." (Spaur '074 patent, col. 10, lines 55-64)
and a downloading interface for permitting downloading of enabling data related to the at least one corresponding vehicle device code for use by said multi-vehicle compatible controller;	The Spaur '074 patent teaches both wired and wireless downloading interfaces that permit downloading of enabling data. The Spaur '074 patent teaches that the wireless communications device can be utilized to download enabling data in a variety of forms including received information associated with vehicle devices and executable software downloaded from a remote site: "since bi-directional communications involving a vehicle are conducted wirelessly for at least a portion of the communications link, it is necessary for the Internet to communicate with an appropriate interface or network that wirelessly links with the vehicle. In one embodiment, the cellular digitized packet data (CDPD) network provides the desired link including arrangement of information being communicated and where the destination site, namely the particular vehicle, is found in the network." (Spaur '074 patent, col. 2, lines 37 – 46). "A combination of controller related components are containable in a vehicle for responding to requests from remote sites, obtaining and storing information associated with vehicle devices and running executable software that may be available in the program memory of the controller or downloaded from the remote site, while handling and configuring information including data that is communicative with the remote site over an established network, such as the Internet." (Spaur '074 patent, col. 4, line 64 – col. 5, line 5). Furthermore, "Preferably, the controller in the vehicle is also associated with an interface for communication with one or more available systems, such as an RS232 connection, an Ethernet connection and/or a PCMCIA unit. In a related embodiment, the controller includes a direct communications port for receiving and sending information without requiring the wireless device and the Internet connection to the wireless device." (Spaur '074 patent, col. 4, lines 38 – 45).
said downloading interface comprising a connector for temporary connection to a downloading device.	One skilled in the art would understand that the Spaur '074 patent discloses a wireless downloading interface comprising a wireless receiver for temporary connection to a downloading device. Therefore, it is inherently disclosed that the wireless connections can be temporary connections.

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14. The multi-vehicle compatible tracking unit according to claim 13 wherein the corresponding at least one vehicle code is for reading from the at least one vehicle device.	The Spaur '074 patent states: "With respect to getting information, the controller 30 further includes a data storage unit or data memory 106. Generally, the data memory 106 stores data that has been generated and is expected to be useful in handling requests or commands. Such data may be data obtained from monitoring a physical device associated with a vehicle and/or may include data useful in running executable software that is intended to provide further information or data useful to a requestor." (Spaur '074 patent, col. 8, lines 45-53)
15. The multi-vehicle compatible tracking unit according to claim 13 wherein the corresponding at least one vehicle code is for writing to the at least one vehicle device.	The Spaur '074 patent states: "As taught in the Spaur '074 patent: " With regard to obtaining information or data from these vehicle devices for appropriate processing using, for example, one or more executable programs in the program memory, the controller communicates with a second standardized network in the form of a network that is commercially available and used in vehicles, such as the previously devised controller area network (CAN). The CAN is operatively connected to each of a plurality of vehicle devices that transmit. receive, or both transmit and receive desired data." (Spaur '074 patent, col. 3, lines 57 – 65). See also the Spaur '074 patent, col. 10, lines 55 – 64: "In interfacing with the CAN 124, the controller 30 also has device drivers 128 that are useful in achieving desired communications in both directions between the CAN 124 and the controller 30. For example, the processor 90 is able to obtain data or other information from the vehicle devices 50a-50n using the device drivers 128 and which information can be used by the processor 90 including, for example, storing data in the data memory 106 for subsequent access and transmission to a remote station 10."
16. The multi-vehicle compatible tracking unit according to claim 13 wherein said downloading interface is also for permitting downloading of at least one programming instruction for said multi-vehicle compatible controller.	The Spaur '074 patent states: "In a further and related variation, information or executable software may be downloaded from the remote station to the controller 30 for execution as part of responding to an accompanying or future request, which software may be executed in conjunction with the operation of an applet that is stored as part of the controller 30." (Spaur '074 patent, col. 9, lines 45-50)
17. The multi-vehicle compatible tracking unit according to claim 13	The Spaur '074 patent teaches using the wireless communications device to communicate with a remote station; the remote station can provide commands that cause the controller to perform

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further comprising a remote transmitter; and wherein said multi-vehicle compatible controller also performs at least one vehicle remote control function responsive to said remote transmitter.	a control function: "The controller 30 includes a number of elements for handling the functions and responsibilities associated with responding to messages, such as requests or commands, from one or more of the remote stations 10, running executable software and obtaining data, as well as achieving the necessary communications protocols with the Internet 68." (Spaur '074 patent, col. 8, lines 1 – 7).
18. A multi-vehicle compatible tracking unit for a vehicle comprising a vehicle data bus extending throughout the vehicle, the multi-vehicle compatible vehicle tracking unit comprising:	The Spaur '074 patent teaches a multi-vehicle compatible tracking unit in the form of a controller 30 that is electrically linked to a bus in the form a vehicle standardized network 40 (an example of which is a controller area network or CAN bus). Specifically, the Spaur '074 patent teaches: "The controller 30 is responsible for a number of functions related to understanding and acting on information received from one or more remote stations 10, obtaining and responding to 35 requested information and operatively functioning with information including data available from other elements in the vehicle. In that regard, the controller 30 communicates with a controller interface 34 that electrically links the controller 30 with a vehicle standardized network 40. The vehicle standardized network 40 includes a controller unit 44 that provides appropriate message and data handling functions associated with sending and receiving information including data from each of a plurality of physical vehicle devices 50 that are operatively connected to a bus 46 of the vehicle standardized network 40. Like the remote standardized network 14, the vehicle standardized network 40 is an established and previously developed network that interfaces with components in a vehicle, such as engine related components in order to provide desired or requested data concerning the operations or status of these components. (Spaur '074 patent, col. 6, lines 31-50) The Spaur '074 patent further states: "In a preferred embodiment, this further standardized network is a network that has been previously devised and is commonly used in a number of makes and models of vehicles. This communications network is defined as the controller area network (CAN) 124. Although the CAN 124 has previously commonly been used in operative association with automotive electronics including engine control elements, sensors, lamps, electric windows etc., the present invention also enables the CAN 124 to be used with a variety of other devices contained in the vehicle, such as the previously described devices." (Spaur '074 patent, col. 10, lines 18-39) See also FIG. 1 and FIG. 2 of the Spaur '074 patent.

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a vehicle position determining device;	The Spaur '074 patent discloses a GPS receiver (vehicle position determining device) at column 14, lines 4 – 9: "At block 300, vehicle positioning data is available from one of the vehicle devices 50, which might be a GPS. On a requested or regular input scheme, such vehicle device data is sent to the CAN bus 126 at block 304. The CAN controller 122 is responsible for controlling the receipt and transmitting of such data to the controller 30 at block 308." The Spaur '074 patent also discloses several wireless communication devices. For example, the wireless device 18 and remote air link transfer protocol modem 20 in Fig. 1, or the cellular phone 80 and vehicle CDPD network modem 82 in Fig. 2. While the Spaur '074 patent teaches a separate wireless communications device and a GPS receiver capable of determining vehicle position information, the Davis '724 patent teaches a combined cellular telephone and GPS receiver device. It would have been obvious to substitute the combined cellular telephone and GPS receiver device as taught by the Davis '724 patent for the separate wireless communications device and GPS receiver taught in the Spaur '074 patent to enable use in vehicles that do not possess a GPS receiver. The controller taught by the Spaur '074 patent would simply obtain vehicle position information from a GPS receiver in the combined cellular telephone and GPS receiver device instead of from a vehicle GPS receiver via the CAN bus. Specific teachings of the Davis '724 patent with respect to the combined cellular telephone and GPS receiver device are as follows: The Davis '724 patent teaches a "single processor combined position locating and analog cellular telephone system." (Davis '724 patent, col. 3, lines 27 – 29). The Davis '724 patent further teaches that the "position locating and analog cellular telephone system" includes "a power and input output (110) portion, a single processor portion 110, a GPS RF portion 120, and a shared baseband and RF portion 130." (Davis '724 patent, col. 3, lines 29 – 32). Further, "portion 100 of the present invention includes a power supply 132 for providing power to the present single processor combined GPS and cellular telephone invention." (Davis '724 patent, col. 3, lines 37 – 40). The Davis '724 patent further teaches "I/O circuitry 134 is also contained within portion 100 for receiving and transmitting control signals to interface with, for example, external peripheral devices coupled to the present invention. Such external peripheral devices include, for example, panic buttons, vehicle alarms, and the like. The present invention further includes a modem 136. Modem 136 of the present embodiment is a one chip modem LSI applicable to transceiving both fax and data." (Davis '724 patent, col. 3, lines 40 – 47).
a wireless communications device;	As noted above, the Spaur '074 patent discloses that the multi-vehicle compatible tracking unit

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	includes a wireless communications device in the form of a CDPD network modem (see e.g. FIG. 2 and column 14, lines 4 – 9). For the reasons outlined above, it would have been obvious to substitute the wireless communications device disclosed in the Spaur '074 patent for the wireless communications device disclosed in the Davis '724 patent (e.g. col. 3, lines 27 – 29) in order to utilize the multi-vehicle compatible tracking unit disclosed in the Spaur '074 patent in vehicles that do not possess a GPS receiver.
a multi-vehicle compatible controller for cooperating with said vehicle position determining device and said wireless communications device to send vehicle position information;	The Spaur '074 patent discloses a multi-vehicle compatible controller (30) that cooperates with a vehicle position determining device (GPS receiver) and a wireless communications device (CDPD network modem) to send vehicle location data over an airlink. Specifically, the Spaur '074 patent states: "At block 300, vehicle positioning data is available from one of the vehicle devices 50, which might be a GPS. On a requested or regular input scheme, such vehicle device data is sent to the CAN bus 126 at block 304. The CAN controller 122 is responsible for controlling the receipt and transmitting of such data to the controller 30 at block 308. The vehicle data that is to be transmitted over the wire link, in accordance with the predetermined or determinable procedure, is appropriately processed, analyzed or otherwise acted on using the controller 30 at block 312. In one embodiment, vehicle device data, such as GPS data, do not rely on the web server 102 but may utilize a different communications pathway, such as E-mail. In any event, the controller 30 gates the vehicle location data to the cellular phone having the vehicle airlink transfer protocol modem 20, such as a CDPD network modem 82, at block 316. The vehicle location data is properly formatted and transmitted through the cellular phone over the airlink at block 320." (Spaur '074 patent, col. 14, lines 4-21)
said multi-vehicle compatible controller to be coupled to the vehicle data bus for communication thereover with at least one vehicle device using at least one corresponding vehicle device code from among a plurality thereof for different vehicles;	The Spaur '074 patent discloses that the controller (30) interfaces with a CAN controller (122) and communicates with different vehicle devices 50a – 50n using device drivers 128 that enable communication using device codes with a specific vehicle device connected to the CAN bus (124). The device drivers 128 that are utilized are dependent upon the vehicle devices present on a particular vehicle. Specifically, the Spaur '074 patent states: "The controller 30 is responsible for a number of functions related to understanding and acting on information received from one or more remote stations 10, obtaining and responding to 35 requested information and operatively functioning with information including data available from other elements in the vehicle. In that regard, **the controller 30 communicates with a controller interface 34 that electrically links the controller 30 with a vehicle standardized network** 40. The vehicle standardized network 40 includes a controller unit 44 that provides appropriate message and data handling functions associated with **sending and receiving information including data from each of a plurality**

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	of physical vehicle devices 50 that are operatively connected to a bus 46 of the vehicle standardized network 40. Like the remote standardized network 14**, the vehicle standardized network 40 is an established and previously developed network that interfaces with components in a vehicle**, such as engine related components in order to provide desired or requested data concerning the operations or status of these components." (Spaur '074 patent, col. 6, lines 31-50) "This further standardized communications network is responsible for handling the communication exchange functions associated with sending and receiving information relative to the vehicle devices 50. **In a preferred embodiment, this further standardized network is a network that has been previously devised and is commonly used in a number of makes and models of vehicles.** This communications network is defined as the controller area network (CAN) 124. Although the CAN 124 has previously commonly been used in operative association with automotive electronics including engine control elements, sensors, lamps, electric windows etc., **the present invention also enables the CAN 124 to be used with a variety of other devices contained in the vehicle**, such as the previously described devices." (Spaur '074 patent, col. 10, lines 15-29) "In interfacing with the CAN 124, the **controller 30 also has device drivers 128 that are useful in achieving desired communications in both directions between the CAN 124 and the controller 30**. For example, the processor 90 is able to **obtain data** or other information **from the vehicle devices 50a-50n using the device drivers 128** and which information can be used by the processor 90 including, for example, storing data in the data memory 106 for subsequent access and transmission to a remote station 10." (Spaur '074 patent, col. 10, lines 55-64)
and a downloading interface for permitting downloading of enabling data related to the at least one corresponding vehicle device code for use by said multi-vehicle compatible controller;	The Spaur '074 patent teaches both wired and wireless downloading interfaces that permit downloading of enabling data. The Spaur '074 patent teaches that the wireless communications device can be utilized to download enabling data in a variety of forms including received information associated with vehicle devices and executable software downloaded from a remote site: "since bi-directional communications involving a vehicle are conducted wirelessly for at least a portion of the communications link, it is necessary for the Internet to communicate with an appropriate interface or network that wirelessly links with the vehicle. In one embodiment, the cellular digitized packet data (CDPD) network provides the desired link including arrangement of

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	information being communicated and where the destination site, namely the particular vehicle, is found in the network." (Spaur '074 patent, col. 2, lines 37 – 46). "A combination of controller related components are containable in a vehicle for responding to requests from remote sites, obtaining and storing information associated with vehicle devices and running executable software that may be available in the program memory of the controller or downloaded from the remote site, while handling and configuring information including data that is communicative with the remote site over an established network, such as the Internet." (Spaur '074 patent, col. 4, line 64 – col. 5, line 5). Furthermore, "Preferably, the controller in the vehicle is also associated with an interface for communication with one or more available systems, such as an RS232 connection, an Ethernet connection and/or a PCMCIA unit. In a related embodiment, the controller includes a direct communications port for receiving and sending information without requiring the wireless device and the Internet connection to the wireless device." (Spaur '074 patent, col. 4, lines 38 – 45).
said downloading interface comprising a wireless receiver for temporary connection to a downloading device.	One skilled in the art would understand that the Spaur '074 patent discloses a wireless downloading interface comprising a wireless receiver for temporary connection to a downloading device. Therefore, it is inherently disclosed that the wireless connections can be temporary connections.
19. The multi-vehicle compatible tracking unit according to claim 18 wherein the corresponding at least one vehicle code is for reading from the at least one vehicle device.	The Spaur '074 patent states: "With respect to getting information, the controller 30 further includes a data storage unit or data memory 106. Generally, the data memory 106 stores data that has been generated and is expected to be useful in handling requests or commands. Such data may be data obtained from monitoring a physical device associated with a vehicle and/or may include data useful in running executable software that is intended to provide further information or data useful to a requestor." (Spaur '074 patent, col. 8, lines 45-53)
20. The multi-vehicle compatible tracking unit according to claim 18 wherein the corresponding at least one vehicle code is for writing to the at least one vehicle device.	As taught in the Spaur '074 patent: "With regard to obtaining information or data from these vehicle devices for appropriate processing using, for example, one or more executable programs in the program memory, the controller communicates with a second standardized network in the form of a network that is commercially available and used in vehicles, such as the previously devised controller area network (CAN). The CAN is operatively connected to each of a plurality of vehicle devices that transmit, receive, or both transmit and receive desired data." (Spaur '074 patent, col. 3, lines 57 – 65).

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	Spaur '074 patent, col. 10, lines 55 – 64: "In interfacing with the CAN 124, the controller 30 also has device drivers 128 that are useful in achieving desired communications in both directions between the CAN 124 and the controller 30. For example, the processor 90 is able to obtain data or other information from the vehicle devices 50a-50n using the device drivers 128 and which information can be used by the processor 90 including, for example, storing data in the data memory 106 for subsequent access and transmission to a remote station 10."
21. The multi-vehicle compatible tracking unit according to claim 18 wherein said downloading interface is also for permitting downloading of at least one programming instruction for said multi-vehicle compatible controller.	The Spaur '074 patent states: "In a further and related variation, information or executable software may be downloaded from the remote station to the controller 30 for execution as part of responding to an accompanying or future request, which software may be executed in conjunction with the operation of an applet that is stored as part of the controller 30." (Spaur '074 patent, col. 9, lines 45-50)
22. The multi-vehicle compatible tracking unit according to claim 18 further comprising a remote transmitter; and wherein said multi-vehicle compatible controller also performs at least one vehicle remote control function responsive to said remote transmitter.	The Spaur '074 patent teaches using the wireless communications device to communicate with a remote station; the remote station can provide commands that cause the controller to perform a control function: "The controller 30 includes a number of elements for handling the functions and responsibilities associated with responding to messages, such as requests or commands, from one or more of the remote stations 10, running executable software and obtaining data, as well as achieving the necessary communications protocols with the Internet 68." (Spaur '074 patent, col. 8, lines 1 – 7).

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Exhibit E

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The '278 Patent	PRIOR ART - US Patent 5,732,074 to Spaur et al., U.S. Patent No. 5,208,756 to Song
1. A multi-vehicle compatible tracking unit for a vehicle comprising a vehicle data bus extending throughout the vehicle, the multi-vehicle compatible tracking unit comprising, lines	The Spaur '074 patent teaches a multi-vehicle compatible tracking unit in the form of a controller 30 that is electrically linked to a bus in the form a vehicle standardized network 40 (an example of which is a controller area network or CAN bus). Specifically, the Spaur '074 patent teaches: "The controller 30 is responsible for a number of functions related to understanding and acting on information received from one or more remote stations 10, obtaining and responding to 35 requested information and operatively functioning with information including data available from other elements in the vehicle. In that regard, the controller 30 communicates with a controller interface 34 that electrically links the controller 30 with a vehicle standardized network 40. The vehicle standardized network 40 includes a controller unit 44 that provides appropriate message and data handling functions associated with sending and receiving information including data from each of a plurality of physical vehicle devices 50 that are operatively connected to a bus 46 of the vehicle standardized network 40. Like the remote standardized network 14, the vehicle standardized network 40 is an established and previously developed network that interfaces with components in a vehicle, such as engine related components in order to provide desired or requested data concerning the operations or status of these components. (Spaur '074 patent, col. 6, lines 31-50) The Spaur '074 patent further states: "In a preferred embodiment, this further standardized network is a network that has been previously devised and is commonly used in a number of makes and models of vehicles. This communications network is defined as the controller area network (CAN) 124. Although the CAN 124 has previously commonly been used in operative association with automotive electronics including engine control elements, sensors, lamps, electric windows etc., the present invention also enables the CAN 124 to be used with a variety of other devices contained in the vehicle, such as the previously described devices." (Spaur '074 patent, col. 10, lines 18-39) See also FIG. 1 and FIG. 2 of the Spaur '074 patent.
a vehicle position determining device;	The Spaur '074 patent discloses a GPS receiver (vehicle position determining device) at column 14, lines 4 – 9: "At block 300, vehicle positioning data is available from one of the vehicle devices 50, which might be a GPS. On a requested or regular input scheme, such vehicle device data is sent to the CAN bus 126 at block 304. The CAN controller 122 is responsible for controlling the receipt and transmitting of such data to the controller 30 at block 308." The Spaur '074 patent also discloses several wireless communication devices. For example, the

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	wireless device 18 and remote air link transfer protocol modem 20 in Fig. 1, or the cellular phone 80 and vehicle CDPD network modem 82 in Fig. 2. While the Spaur '074 patent teaches a separate wireless communications device and a GPS receiver capable of determining vehicle position information, the Song '756 patent teaches a cellular telephone and vehicle locating transceiver that are capable of determining location information utilizing signals transmitted on a cellular telephone network. It would have been obvious to substitute the cellular telephone and vehicle locating transceiver of the Song '756 patent for the wireless communications device as taught by the Spaur '074 patent to enable use in vehicles that do not possess a GPS receiver. The controller taught by the Spaur '074 patent would simply obtain vehicle position information from the vehicle locating transceiver in the combined cellular telephone and vehicle locating transceiver instead of from a vehicle GPS receiver via the CAN bus. Specific teachings of the Song '756 patent with respect to the combined cellular telephone and vehicle locating transceiver are as follows. The Song '756 patent teaches "an inexpensive, accurate system for determining a vehicle's location using the existing base stations and signals of a cellular telephone network." (Song '756 patent, col. 2, lines 57 – 60). "The system includes a small, preferably hidden, vehicle locating transceiver 19 affixed to vehicle 1 which operates within a geographical area served by a cellular telephone network 2. Vehicle 1 also includes a standard cellular telephone 27, including antenna 21, for receiving signals from, and transmitting signals to, the base stations of the cellular network." (Song '756 patent, col. 5, lines 62 – 68). "Vehicle locating transceiver 19 preferably is a modular, add-on component to a standard, mobile telephone and, therefore, takes advantage of components already present in such a phone. […] Vehicle locating transceiver 19 also could be designed to operate independently of a mobile telephone and, in that case, all components of the mobile telephone used by the transceiver, as shown in FIG. 2, could be included in the transceiver." (Song '756 patent, col. 7, lines 34 – 42). The "vehicle locating transceiver" "receives signals transmitted from several of the base stations in the network. These signals preferably are the signals transmitted on the control or set-up channels from these base stations. The device includes means for determining the power at which each of these signals is received. These means preferably include means for sampling the received-power of each signal over a fixed period of time and for calculating the average received power of these samples for each signal." (Song '756 patent, col. 3, lines 33 – 41). The "vehicle locating transceiver" also "includes means for determining the location of each base station from which each signal is transmitted, the transmitting power at which each signal is transmitted, and the

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	signal-attenuation factor of each signal." (Song '756 patent, col. 3, lines 42 – 46). "The device in the vehicle further includes means for calculating the distance between the vehicle and each of the base stations as a function of the transmitting power, received-power, and signal-attenuation factor of the signal transmitted by the base station." (Song '756 patent, col. 4, lines 1 – 5). "The device further includes means for calculating the location of the vehicle as a function of these distances and the location of each of the base stations. These means preferably use trilateralization or arculation to accomplish this task." (Song '756 patent, col. 4, lines 10 – 14).
a wireless communications device;	As noted above, the Spaur '074 patent discloses that the multi-vehicle compatible tracking unit includes a wireless communications device in the form of a CDPD network modem (see e.g. FIG. 2 and column 14, lines 4 – 9). For the reasons outlined above, it would have been obvious to substitute the wireless communications device disclosed in the Spaur '074 patent for the wireless communications device disclosed in the Song '756 patent (e.g. col. 3, lines 27 – 29) in order to utilize the multi-vehicle compatible tracking unit disclosed in the Spaur '074 patent in vehicles that do not possess a GPS receiver.
a multi-vehicle compatible controller for cooperating with said vehicle position determining device and said wireless communications device to send vehicle position information;	The Spaur '074 patent discloses a multi-vehicle compatible controller (30) that cooperates with a vehicle position determining device (GPS receiver) and a wireless communications device (CDPD network modem) to send vehicle location data over an airlink. Specifically, the Spaur '074 patent states: "At block 300, vehicle positioning data is available from one of the vehicle devices 50, which might be a GPS. On a requested or regular input scheme, such vehicle device data is sent to the CAN bus 126 at block 304. The CAN controller 122 is responsible for controlling the receipt and transmitting of such data to the controller 30 at block 308. The vehicle data that is to be transmitted over the wire link, in accordance with the predetermined or determinable procedure, is appropriately processed, analyzed or otherwise acted on using the controller 30 at block 312. In one embodiment, vehicle device data, such as GPS data, do not rely on the web server 102 but may utilize a different communications pathway, such as E-mail. In any event, the controller 30 gates the vehicle location data to the cellular phone having the vehicle airlink transfer protocol modem 20, such as a CDPD network modem 82, at block 316. The vehicle location data is properly formatted and transmitted through the cellular phone over the airlink at block 320." (Spaur '074 patent, col. 14, lines 4-21)
said multi-vehicle compatible controller to be coupled to the vehicle data bus for communication thereover with at least one vehicle device using at least one	The Spaur '074 patent discloses that the controller (30) interfaces with a CAN controller (122) and communicates with different vehicle devices 50a – 50n using device drivers 128 that enable communication using device codes with a specific vehicle device connected to the CAN bus (124). The device drivers 128 that are utilized are dependent upon the vehicle devices present on a particular vehicle.

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corresponding vehicle device code from among a plurality thereof for different vehicles; and	Specifically, the Spaur '074 patent states: "The controller 30 is responsible for a number of functions related to understanding and acting on information received from one or more remote stations 10, obtaining and responding to 35 requested information and operatively functioning with information including data available from other elements in the vehicle. In that regard, **the controller 30 communicates with a controller interface 34 that electrically links the controller 30 with a vehicle standardized network** 40. The vehicle standardized network 40 includes a controller unit 44 that provides appropriate message and data handling functions associated with **sending and receiving information including data from each of a plurality of physical vehicle devices 50 that are operatively connected to a bus 46 of the vehicle standardized network** 40. Like the remote standardized network 14**, the vehicle standardized network 40 is an established and previously developed network that interfaces with components in a vehicle**, such as engine related components in order to provide desired or requested data concerning the operations or status of these components." (Spaur '074 patent, col. 6, lines 31-50) "This further standardized communications network is responsible for handling the communication exchange functions associated with sending and receiving information relative to the vehicle devices 50. **In a preferred embodiment, this further standardized network is a network that has been previously devised and is commonly used in a number of makes and models of vehicles.** This communications network is defined as the controller area network (CAN) 124. Although the CAN 124 has previously commonly been used in operative association with automotive electronics including engine control elements, sensors, lamps, electric windows etc., **the present invention also enables the CAN 124 to be used with a variety of other devices contained in the vehicle**, such as the previously described devices." (Spaur '074 patent, col. 10, lines 15-29) "In interfacing with the CAN 124, the **controller 30 also has device drivers 128 that are useful in achieving desired communications in both directions between the CAN 124 and the controller 30**. For example, the processor 90 is able to **obtain data** or other information **from the vehicle devices 50a-50n using the device drivers 128** and which information can be used by the processor 90 including, for example, storing data in the data memory 106 for subsequent access and transmission to a remote station 10." (Spaur '074 patent, col. 10, lines 55-64)
a downloading interface for	The Spaur '074 patent teaches both wired and wireless downloading interfaces that permit

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permitting downloading of enabling data related to the at least one corresponding vehicle device code for use by said multi-vehicle compatible controller.	downloading of enabling data. The Spaur '074 patent teaches that the wireless communications device can be utilized to download enabling data in a variety of forms including received information associated with vehicle devices and executable software downloaded from a remote site: "since bi-directional communications involving a vehicle are conducted wirelessly for at least a portion of the communications link, it is necessary for the Internet to communicate with an appropriate interface or network that wirelessly links with the vehicle. In one embodiment, the cellular digitized packet data (CDPD) network provides the desired link including arrangement of information being communicated and where the destination site, namely the particular vehicle, is found in the network." (Spaur '074 patent, col. 2, lines 37 – 46). "A combination of controller related components are containable in a vehicle for responding to requests from remote sites, obtaining and storing information associated with vehicle devices and running executable software that may be available in the program memory of the controller or downloaded from the remote site, while handling and configuring information including data that is communicative with the remote site over an established network, such as the Internet." (Spaur '074 patent, col. 4, line 64 – col. 5, line 5). Furthermore, "Preferably, the controller in the vehicle is also associated with an interface for communication with one or more available systems, such as an RS232 connection, an Ethernet connection and/or a PCMCIA unit. In a related embodiment, the controller includes a direct communications port for receiving and sending information without requiring the wireless device and the Internet connection to the wireless device." (Spaur '074 patent, col. 4, lines 38 – 45).
2. The multi-vehicle compatible tracking unit according to claim 1 wherein said downloading interface comprises a wired signal downloading interface.	Figure 2 of the Spaur '074 patent describes the direct communications port. One skilled in the art would recognize that this interface is a wired interface to the controller and would enable downloading to the controller. "Preferably, the controller in the vehicle is also associated with an interface for communication with one or more available systems, such as an RS232 connection, an Ethernet connection and/or a PCMCIA unit. In a related embodiment, the controller includes a direct communications port for receiving and sending information without requiring the wireless device and the Internet connection to the wireless device." (Spaur '074 patent, col. 4, lines 38-45)

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3. The multi-vehicle compatible tracking unit according to claim 2 wherein said wired signal downloading interface comprises a connector for temporary connection to a downloading device.	One skilled in the art would understand that the wired port could be used temporarily. Therefore, it is inherently disclosed that the wired signal downloading interface, i.e. the RS232 connection, Ethernet connection, or PCMCIA connection, comprise a connector for a temporary connection.
4. The multi-vehicle compatible tracking unit according to claim 1 wherein said downloading interface comprises a wireless signal downloading interface.	Figure 1 of the Spaur '074 patent includes a wireless communication interface. As noted above with respect to Claim 1, Figure 2 of Spaur '074 patent also includes a wireless communications interface. "In one embodiment, the cellular digitized packet data (CDPD) network provides the desired link including arrangement of information being communicated and where the destination site, namely the particular vehicle, is found in the network. If a channel is available to the particular vehicle, the CDPD link can proceed to transmit the Internet packets to the vehicle of interest. Instead of the CDPD network as the link, a communications interface could be employed that involves data only, such as a two way paging interface with the vehicle." (Spaur '074 patent, col. 2, lines 41-50) In accordance with the present invention, a system is provided in which communication of information, including requests, commands and data, is achieved between vehicle having physical vehicle devices and one or more sites that are remote from the vehicle. (Spaur '074 patent, col. 2, lines 11-15)
5. The multi-vehicle compatible tracking unit according to claim 4 wherein said wireless signal downloading interface comprises a wireless receiver for temporary connection to a downloading device.	One skilled in the art would understand that the Spaur '074 patent discloses a wireless downloading interface comprising a wireless receiver for temporary connection to a downloading device. Therefore, it is inherently disclosed that the wireless connections can be temporary connections.
6. The multi-vehicle compatible	As described in the Spaur '074 patent: "With respect to getting information, the controller 30

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tracking unit according to claim 1 wherein the corresponding at least one vehicle code is for reading from the at least one vehicle device.	further includes a data storage unit or data memory 106. Generally, the data memory 106 stores data that has been generated and is expected to be useful in handling requests or commands. Such data may be data obtained from monitoring a physical device associated with a vehicle and/or may include data useful in running executable software that is intended to provide further information or data useful to a requestor." (Spaur '074 patent, col. 8, lines 45-53)
7. The multi-vehicle compatible tracking unit according to claim 1 wherein the corresponding at least one vehicle code is for writing to the at least one vehicle device.	As taught in the Spaur '074 patent: "With regard to obtaining information or data from these vehicle devices for appropriate processing using, for example, one or more executable programs in the program memory, the controller communicates with a second standardized network in the form of a network that is commercially available and used in vehicles, such as the previously devised controller area network (CAN). The CAN is operatively connected to each of a plurality of vehicle devices that transmit, receive, or both transmit and receive desired data." (Spaur '074 patent, col. 3, lines 57 – 65). Also see the Spaur '074 patent, col. 10, lines 55 – 64: "In interfacing with the CAN 124, the controller 30 also has device drivers 128 that are useful in achieving desired communications in both directions between the CAN 124 and the controller 30. For example, the processor 90 is able to obtain data or other information from the vehicle devices 50a-50n using the device drivers 128 and which information can be used by the processor 90 including, for example, storing data in the data memory 106 for subsequent access and transmission to a remote station 10."
8. The multi-vehicle compatible tracking unit according to claim 1 wherein said downloading interface is also for permitting downloading of at least one programming instruction for said multi-vehicle compatible controller.	"In a further and related variation, information or executable software may be downloaded from the remote station to the controller 30 for execution as part of responding to an accompanying or future request, which software may be executed in conjunction with the operation of an applet that is stored as part of the controller 30." (Spaur '074 patent, col. 9, lines 45-50)
9. The multi-vehicle compatible tracking unit according to claim 1 further comprising a remote transmitter; and wherein said multi-	The Spaur '074 patent teaches using the wireless communications device to communicate with a remote station; the remote station can provide commands that cause the controller to perform a control function: "The controller 30 includes a number of elements for handling the functions and responsibilities associated with responding to messages, such as requests or commands,

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vehicle compatible controller also performs at least one vehicle remote control function responsive to said remote transmitter.	from one or more of the remote stations 10, running executable software and obtaining data, as well as achieving the necessary communications protocols with the Internet 68." (Spaur '074 patent, col. 8, lines 1 – 7).
10. The multi-vehicle compatible tracking unit according to claim 9 wherein the at least one vehicle remote control function comprises at least one of a vehicle security function, a remote keyless entry function, and a remote engine starting function.	"The controller 30 further includes a data storage unit or data memory 106." (Spaur '074 patent, col. 8, lines 46 – 47). "In addition to application software that might be involved with such functions, the short programs in the program memory 114 may include software related to safety and security considerations, including, lines […] (c) providing an indication of key or alarm related events, such as when roadside assistance is required, the vehicle or the driver of the vehicle faces a threatening situation, an unauthorized vehicle door unlocking and/or initiating an automatic call for assistance in light of an airbag detonation." (Spaur '074 patent, col. 9, lines 16 – 30).
11. The multi-vehicle compatible tracking unit according to claim 1 wherein said wireless position determining device comprises a Global Positioning System (GPS) receiver.	The Spaur '074 patent discloses a GPS receiver in column 14, lines 4 – 9: "At block 300, vehicle positioning data is available from one of the vehicle devices 50, which might be a GPS. On a requested or regular input scheme, such vehicle device data is sent to the CAN bus 126 at block 304. The CAN controller 122 is responsible for controlling the receipt and transmitting of such data to the controller 30 at block 308." Where the multi-vehicle compatible tracking unit taught by the combination of the Spaur '074 patent and the Song '756 patent is used in a vehicle including a GPS receiver, the multi-vehicle compatible controller can also obtain vehicle position information from the GPS receiver.
12. The multi-vehicle compatible tracking unit according to claim 1 further comprising a housing containing said vehicle position determining device, said wireless communications device, said multi-vehicle compatible controller, and said downloading interface.	The Spaur '074 patent discloses a combination of components located in a vehicle: "A combination of controller related components are containable in a vehicle for responding to requests from remote sites, obtaining and storing information associated with vehicle devices and running executable software that may be available in the program memory of the controller or downloaded from the remote site, while handling and configuring information including data that is communicative with the remote site over an established network, such as the Internet." (Spaur '074 patent, col. 4, line 64 – col. 5, line 5). It is inherently disclosed that the components are contained in a housing within the vehicle to aid in the installation of the system described in the Spaur '074 patent. In the alternative, FIG. 1

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	illustrates a variety of components contained in a vehicle and one or more remote stations 10a-10n. As all of the components are stored in the vehicle, the vehicle itself constitutes a housing containing all elements of the claimed invention.
13. A multi-vehicle compatible tracking unit for a vehicle comprising a vehicle data bus extending throughout the vehicle, the multi-vehicle compatible vehicle tracking unit comprising, lines	The Spaur '074 patent teaches a multi-vehicle compatible tracking unit in the form of a controller 30 that is electrically linked to a bus in the form a vehicle standardized network 40 (an example of which is a controller area network or CAN bus). Specifically, the Spaur '074 patent teaches: "The controller 30 is responsible for a number of functions related to understanding and acting on information received from one or more remote stations 10, obtaining and responding to 35 requested information and operatively functioning with information including data available from other elements in the vehicle. In that regard, the controller 30 communicates with a controller interface 34 that electrically links the controller 30 with a vehicle standardized network 40. The vehicle standardized network 40 includes a controller unit 44 that provides appropriate message and data handling functions associated with sending and receiving information including data from each of a plurality of physical vehicle devices 50 that are operatively connected to a bus 46 of the vehicle standardized network 40. Like the remote standardized network 14, the vehicle standardized network 40 is an established and previously developed network that interfaces with components in a vehicle, such as engine related components in order to provide desired or requested data concerning the operations or status of these components. (Spaur '074 patent, col. 6, lines 31-50) The Spaur '074 patent further states: "In a preferred embodiment, this further standardized network is a network that has been previously devised and is commonly used in a number of makes and models of vehicles. This communications network is defined as the controller area network (CAN) 124. Although the CAN 124 has previously commonly been used in operative association with automotive electronics including engine control elements, sensors, lamps, electric windows etc., the present invention also enables the CAN 124 to be used with a variety of other devices contained in the vehicle, such as the previously described devices." (Spaur '074 patent, col. 10, lines 18-39) See also FIG. 1 and FIG. 2 of the Spaur '074 patent.
a vehicle position determining device;	The Spaur '074 patent discloses a GPS receiver (vehicle position determining device) at column 14, lines 4 – 9: "At block 300, vehicle positioning data is available from one of the vehicle devices 50, which might be a GPS. On a requested or regular input scheme, such vehicle

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	device data is sent to the CAN bus 126 at block 304. The CAN controller 122 is responsible for controlling the receipt and transmitting of such data to the controller 30 at block 308." The Spaur '074 patent also discloses several wireless communication devices. For example, the wireless device 18 and remote air link transfer protocol modem 20 in Fig. 1, or the cellular phone 80 and vehicle CDPD network modem 82 in Fig. 2. While the Spaur '074 patent teaches a separate wireless communications device and a GPS receiver capable of determining vehicle position information, the Song '756 patent teaches a cellular telephone and vehicle locating transceiver that are capable of determining location information utilizing signals transmitted on a cellular telephone network. It would have been obvious to substitute the cellular telephone and vehicle locating transceiver of the Song '756 patent for the wireless communications device as taught by the Spaur '074 patent to enable use in vehicles that do not possess a GPS receiver. The controller taught by the Spaur '074 patent would simply obtain vehicle position information from the vehicle locating transceiver in the combined cellular telephone and vehicle locating transceiver instead of from a vehicle GPS receiver via the CAN bus. Specific teachings of the Song '756 patent with respect to the combined cellular telephone and vehicle locating transceiver are as follows. The Song '756 patent teaches "an inexpensive, accurate system for determining a vehicle's location using the existing base stations and signals of a cellular telephone network." (Song '756 patent, col. 2, lines 57 – 60). "The system includes a small, preferably hidden, vehicle locating transceiver 19 affixed to vehicle 1 which operates within a geographical area served by a cellular telephone network 2. Vehicle 1 also includes a standard cellular telephone 27, including antenna 21, for receiving signals from, and transmitting signals to, the base stations of the cellular network." (Song '756 patent, col. 5, lines 62 – 68). "Vehicle locating transceiver 19 preferably is a modular, add-on component to a standard, mobile telephone and, therefore, takes advantage of components already present in such a phone. […] Vehicle locating transceiver 19 also could be designed to operate independently of a mobile telephone and, in that case, all components of the mobile telephone used by the transceiver, as shown in FIG. 2, could be included in the transceiver." (Song '756 patent, col. 7, lines 34 – 42). The "vehicle locating transceiver" "receives signals transmitted from several of the base stations in the network. These signals preferably are the signals transmitted on the control or set-up channels from these base stations. The device includes means for determining the power at which each of these signals is received. These means preferably include means for sampling the received-

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	power of each signal over a fixed period of time and for calculating the average received power of these samples for each signal." (Song '756 patent, col. 3, lines 33 – 41). The "vehicle locating transceiver" also "includes means for determining the location of each base station from which each signal is transmitted, the transmitting power at which each signal is transmitted, and the signal-attenuation factor of each signal." (Song '756 patent, col. 3, lines 42 – 46). "The device in the vehicle further includes means for calculating the distance between the vehicle and each of the base stations as a function of the transmitting power, received-power, and signal-attenuation factor of the signal transmitted by the base station." (Song '756 patent, col. 4, lines 1 – 5). "The device further includes means for calculating the location of the vehicle as a function of these distances and the location of each of the base stations. These means preferably use trilateralization or arculation to accomplish this task." (Song '756 patent, col. 4, lines 10 – 14).
a wireless communications device;	As noted above, the Spaur '074 patent discloses that the multi-vehicle compatible tracking unit includes a wireless communications device in the form of a CDPD network modem (see e.g. FIG. 2 and column 14, lines 4 – 9). For the reasons outlined above, it would have been obvious to substitute the wireless communications device disclosed in the Spaur '074 patent for the wireless communications device disclosed in the Song '756 patent (e.g. col. 3, lines 27 – 29) in order to utilize the multi-vehicle compatible tracking unit disclosed in the Spaur '074 patent in vehicles that do not possess a GPS receiver.
a multi-vehicle compatible controller for cooperating with said vehicle position determining device and said wireless communications device to send vehicle position information;	The Spaur '074 patent discloses a multi-vehicle compatible controller (30) that cooperates with a vehicle position determining device (GPS receiver) and a wireless communications device (CDPD network modem) to send vehicle location data over an airlink. Specifically, the Spaur '074 patent states: "At block 300, vehicle positioning data is available from one of the vehicle devices 50, which might be a GPS. On a requested or regular input scheme, such vehicle device data is sent to the CAN bus 126 at block 304. The CAN controller 122 is responsible for controlling the receipt and transmitting of such data to the controller 30 at block 308. The vehicle data that is to be transmitted over the wire link, in accordance with the predetermined or determinable procedure, is appropriately processed, analyzed or otherwise acted on using the controller 30 at block 312. In one embodiment, vehicle device data, such as GPS data, do not rely on the web server 102 but may utilize a different communications pathway, such as E-mail. In any event, the controller 30 gates the vehicle location data to the cellular phone having the vehicle airlink transfer protocol modem 20, such as a CDPD network modem 82, at block 316. The vehicle location data is properly formatted and transmitted through the cellular phone over the airlink at block 320." (Spaur '074 patent, col. 14, lines 4-21)
said multi-vehicle compatible	The Spaur '074 patent discloses that the controller (30) interfaces with a CAN controller (122)

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controller to be coupled to the vehicle data bus for communication thereover with at least one vehicle device using at least one corresponding vehicle device code from among a plurality thereof for different vehicles;	and communicates with different vehicle devices 50a – 50n using device drivers 128 that enable communication using device codes with a specific vehicle device connected to the CAN bus (124). The device drivers 128 that are utilized are dependent upon the vehicle devices present on a particular vehicle. Specifically, the Spaur '074 patent states: "The controller 30 is responsible for a number of functions related to understanding and acting on information received from one or more remote stations 10, obtaining and responding to 35 requested information and operatively functioning with information including data available from other elements in the vehicle. In that regard, **the controller 30 communicates with a controller interface 34 that electrically links the controller 30 with a vehicle standardized network** 40. The vehicle standardized network 40 includes a controller unit 44 that provides appropriate message and data handling functions associated with **sending and receiving information including data from each of a plurality of physical vehicle devices 50 that are operatively connected to a bus 46 of the vehicle standardized network** 40. Like the remote standardized network 14**, the vehicle standardized network 40 is an established and previously developed network that interfaces with components in a vehicle**, such as engine related components in order to provide desired or requested data concerning the operations or status of these components." (Spaur '074 patent, col. 6, lines 31-50) "This further standardized communications network is responsible for handling the communication exchange functions associated with sending and receiving information relative to the vehicle devices 50. **In a preferred embodiment, this further standardized network is a network that has been previously devised and is commonly used in a number of makes and models of vehicles.** This communications network is defined as the controller area network (CAN) 124. Although the CAN 124 has previously commonly been used in operative association with automotive electronics including engine control elements, sensors, lamps, electric windows etc., **the present invention also enables the CAN 124 to be used with a variety of other devices contained in the vehicle**, such as the previously described devices." (Spaur '074 patent, col. 10, lines 15-29) "In interfacing with the CAN 124, the **controller 30 also has device drivers 128 that are useful in achieving desired communications in both directions between the CAN 124 and the controller 30**. For example, the processor 90 is able to **obtain data** or other information **from the vehicle devices 50a-50n using the device drivers 128** and which information can be

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	used by the processor 90 including, for example, storing data in the data memory 106 for subsequent access and transmission to a remote station 10." (Spaur '074 patent, col. 10, lines 55-64)
and a downloading interface for permitting downloading of enabling data related to the at least one corresponding vehicle device code for use by said multi-vehicle compatible controller;	The Spaur '074 patent teaches both wired and wireless downloading interfaces that permit downloading of enabling data. The Spaur '074 patent teaches that the wireless communications device can be utilized to download enabling data in a variety of forms including received information associated with vehicle devices and executable software downloaded from a remote site: "since bi-directional communications involving a vehicle are conducted wirelessly for at least a portion of the communications link, it is necessary for the Internet to communicate with an appropriate interface or network that wirelessly links with the vehicle. In one embodiment, the cellular digitized packet data (CDPD) network provides the desired link including arrangement of information being communicated and where the destination site, namely the particular vehicle, is found in the network." (Spaur '074 patent, col. 2, lines 37 – 46). "A combination of controller related components are containable in a vehicle for responding to requests from remote sites, obtaining and storing information associated with vehicle devices and running executable software that may be available in the program memory of the controller or downloaded from the remote site, while handling and configuring information including data that is communicative with the remote site over an established network, such as the Internet." (Spaur '074 patent, col. 4, line 64 – col. 5, line 5). Furthermore, "Preferably, the controller in the vehicle is also associated with an interface for communication with one or more available systems, such as an RS232 connection, an Ethernet connection and/or a PCMCIA unit. In a related embodiment, the controller includes a direct communications port for receiving and sending information without requiring the wireless device and the Internet connection to the wireless device." (Spaur '074 patent, col. 4, lines 38 – 45).
said downloading interface comprising a connector for temporary connection to a downloading device.	One skilled in the art would understand that the Spaur '074 patent discloses a wireless downloading interface comprising a wireless receiver for temporary connection to a downloading device. Therefore, it is inherently disclosed that the wireless connections can be temporary connections.
14. The multi-vehicle compatible	The Spaur '074 patent states: "With respect to getting information, the controller 30 further

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tracking unit according to claim 13 wherein the corresponding at least one vehicle code is for reading from the at least one vehicle device.	includes a data storage unit or data memory 106. Generally, the data memory 106 stores data that has been generated and is expected to be useful in handling requests or commands. Such data may be data obtained from monitoring a physical device associated with a vehicle and/or may include data useful in running executable software that is intended to provide further information or data useful to a requestor." (Spaur '074 patent, col. 8, lines 45-53)
15. The multi-vehicle compatible tracking unit according to claim 13 wherein the corresponding at least one vehicle code is for writing to the at least one vehicle device.	The Spaur '074 patent states: "As taught in the Spaur '074 patent: " With regard to obtaining information or data from these vehicle devices for appropriate processing using, for example, one or more executable programs in the program memory, the controller communicates with a second standardized network in the form of a network that is commercially available and used in vehicles, such as the previously devised controller area network (CAN). The CAN is operatively connected to each of a plurality of vehicle devices that transmit. receive, or both transmit and receive desired data." (Spaur '074 patent, col. 3, lines 57 – 65). See also the Spaur '074 patent, col. 10, lines 55 – 64: "In interfacing with the CAN 124, the controller 30 also has device drivers 128 that are useful in achieving desired communications in both directions between the CAN 124 and the controller 30. For example, the processor 90 is able to obtain data or other information from the vehicle devices 50a-50n using the device drivers 128 and which information can be used by the processor 90 including, for example, storing data in the data memory 106 for subsequent access and transmission to a remote station 10."
16. The multi-vehicle compatible tracking unit according to claim 13 wherein said downloading interface is also for permitting downloading of at least one programming instruction for said multi-vehicle compatible controller.	The Spaur '074 patent states: "In a further and related variation, information or executable software may be downloaded from the remote station to the controller 30 for execution as part of responding to an accompanying or future request, which software may be executed in conjunction with the operation of an applet that is stored as part of the controller 30." (Spaur '074 patent, col. 9, lines 45-50)
17. The multi-vehicle compatible tracking unit according to claim 13 further comprising a remote transmitter; and wherein said multi-	The Spaur '074 patent teaches using the wireless communications device to communicate with a remote station; the remote station can provide commands that cause the controller to perform a control function: "The controller 30 includes a number of elements for handling the functions and responsibilities associated with responding to messages, such as requests or commands,

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vehicle compatible controller also performs at least one vehicle remote control function responsive to said remote transmitter.	from one or more of the remote stations 10, running executable software and obtaining data, as well as achieving the necessary communications protocols with the Internet 68." (Spaur '074 patent, col. 8, lines 1 – 7).
18. A multi-vehicle compatible tracking unit for a vehicle comprising a vehicle data bus extending throughout the vehicle, the multi-vehicle compatible vehicle tracking unit comprising, lines	The Spaur '074 patent teaches a multi-vehicle compatible tracking unit in the form of a controller 30 that is electrically linked to a bus in the form a vehicle standardized network 40 (an example of which is a controller area network or CAN bus). Specifically, the Spaur '074 patent teaches: "The controller 30 is responsible for a number of functions related to understanding and acting on information received from one or more remote stations 10, obtaining and responding to 35 requested information and operatively functioning with information including data available from other elements in the vehicle. In that regard, the controller 30 communicates with a controller interface 34 that electrically links the controller 30 with a vehicle standardized network 40. The vehicle standardized network 40 includes a controller unit 44 that provides appropriate message and data handling functions associated with sending and receiving information including data from each of a plurality of physical vehicle devices 50 that are operatively connected to a bus 46 of the vehicle standardized network 40. Like the remote standardized network 14, the vehicle standardized network 40 is an established and previously developed network that interfaces with components in a vehicle, such as engine related components in order to provide desired or requested data concerning the operations or status of these components. (Spaur '074 patent, col. 6, lines 31-50) The Spaur '074 patent further states: "In a preferred embodiment, this further standardized network is a network that has been previously devised and is commonly used in a number of makes and models of vehicles. This communications network is defined as the controller area network (CAN) 124. Although the CAN 124 has previously commonly been used in operative association with automotive electronics including engine control elements, sensors, lamps, electric windows etc., the present invention also enables the CAN 124 to be used with a variety of other devices contained in the vehicle, such as the previously described devices." (Spaur '074 patent, col. 10, lines 18-39) See also FIG. 1 and FIG. 2 of the Spaur '074 patent.
a vehicle position determining device;	The Spaur '074 patent discloses a GPS receiver (vehicle position determining device) at column 14, lines 4 – 9: "At block 300, vehicle positioning data is available from one of the vehicle

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	devices 50, which might be a GPS. On a requested or regular input scheme, such vehicle device data is sent to the CAN bus 126 at block 304. The CAN controller 122 is responsible for controlling the receipt and transmitting of such data to the controller 30 at block 308." The Spaur '074 patent also discloses several wireless communication devices. For example, the wireless device 18 and remote air link transfer protocol modem 20 in Fig. 1, or the cellular phone 80 and vehicle CDPD network modem 82 in Fig. 2. While the Spaur '074 patent teaches a separate wireless communications device and a GPS receiver capable of determining vehicle position information, the Song '756 patent teaches a cellular telephone and vehicle locating transceiver that are capable of determining location information utilizing signals transmitted on a cellular telephone network. It would have been obvious to substitute the cellular telephone and vehicle locating transceiver of the Song '756 patent for the wireless communications device as taught by the Spaur '074 patent to enable use in vehicles that do not possess a GPS receiver. The controller taught by the Spaur '074 patent would simply obtain vehicle position information from the vehicle locating transceiver in the combined cellular telephone and vehicle locating transceiver instead of from a vehicle GPS receiver via the CAN bus. Specific teachings of the Song '756 patent with respect to the combined cellular telephone and vehicle locating transceiver are as follows. The Song '756 patent teaches "an inexpensive, accurate system for determining a vehicle's location using the existing base stations and signals of a cellular telephone network." (Song '756 patent, col. 2, lines 57 – 60). "The system includes a small, preferably hidden, vehicle locating transceiver 19 affixed to vehicle 1 which operates within a geographical area served by a cellular telephone network 2. Vehicle 1 also includes a standard cellular telephone 27, including antenna 21, for receiving signals from, and transmitting signals to, the base stations of the cellular network." (Song '756 patent, col. 5, lines 62 – 68). "Vehicle locating transceiver 19 preferably is a modular, add-on component to a standard, mobile telephone and, therefore, takes advantage of components already present in such a phone. [...] Vehicle locating transceiver 19 also could be designed to operate independently of a mobile telephone and, in that case, all components of the mobile telephone used by the transceiver, as shown in FIG. 2, could be included in the transceiver." (Song '756 patent, col. 7, lines 34 – 42). The "vehicle locating transceiver" "receives signals transmitted from several of the base stations in the network. These signals preferably are the signals transmitted on the control or set-up channels from these base stations. The device includes means for determining the power at which each

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	of these signals is received. These means preferably include means for sampling the received-power of each signal over a fixed period of time and for calculating the average received power of these samples for each signal." (Song '756 patent, col. 3, lines 33 – 41). The "vehicle locating transceiver" also "includes means for determining the location of each base station from which each signal is transmitted, the transmitting power at which each signal is transmitted, and the signal-attenuation factor of each signal." (Song '756 patent, col. 3, lines 42 – 46). "The device in the vehicle further includes means for calculating the distance between the vehicle and each of the base stations as a function of the transmitting power, received-power, and signal-attenuation factor of the signal transmitted by the base station." (Song '756 patent, col. 4, lines 1 – 5). "The device further includes means for calculating the location of the vehicle as a function of these distances and the location of each of the base stations. These means preferably use trilateralization or arculation to accomplish this task." (Song '756 patent, col. 4, lines 10 – 14).
a wireless communications device;	As noted above, the Spaur '074 patent discloses that the multi-vehicle compatible tracking unit includes a wireless communications device in the form of a CDPD network modem (see e.g. FIG. 2 and column 14, lines 4 – 9). For the reasons outlined above, it would have been obvious to substitute the wireless communications device disclosed in the Spaur '074 patent for the wireless communications device disclosed in the Song '756 patent (e.g. col. 3, lines 27 – 29) in order to utilize the multi-vehicle compatible tracking unit disclosed in the Spaur '074 patent in vehicles that do not possess a GPS receiver.
a multi-vehicle compatible controller for cooperating with said vehicle position determining device and said wireless communications device to send vehicle position information;	The Spaur '074 patent discloses a multi-vehicle compatible controller (30) that cooperates with a vehicle position determining device (GPS receiver) and a wireless communications device (CDPD network modem) to send vehicle location data over an airlink. Specifically, the Spaur '074 patent states: "At block 300, vehicle positioning data is available from one of the vehicle devices 50, which might be a GPS. On a requested or regular input scheme, such vehicle device data is sent to the CAN bus 126 at block 304. The CAN controller 122 is responsible for controlling the receipt and transmitting of such data to the controller 30 at block 308. The vehicle data that is to be transmitted over the wire link, in accordance with the predetermined or determinable procedure, is appropriately processed, analyzed or otherwise acted on using the controller 30 at block 312. In one embodiment, vehicle device data, such as GPS data, do not rely on the web server 102 but may utilize a different communications pathway, such as E-mail. In any event, the controller 30 gates the vehicle location data to the cellular phone having the vehicle airlink transfer protocol modem 20, such as a CDPD network modem 82, at block 316. The vehicle location data is properly formatted and transmitted through the cellular phone over the airlink at block 320." (Spaur '074 patent, col. 14, lines 4-21)

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said multi-vehicle compatible controller to be coupled to the vehicle data bus for communication thereover with at least one vehicle device using at least one corresponding vehicle device code from among a plurality thereof for different vehicles;	The Spaur '074 patent discloses that the controller (30) interfaces with a CAN controller (122) and communicates with different vehicle devices 50a – 50n using device drivers 128 that enable communication using device codes with a specific vehicle device connected to the CAN bus (124). The device drivers 128 that are utilized are dependent upon the vehicle devices present on a particular vehicle. Specifically, the Spaur '074 patent states: "The controller 30 is responsible for a number of functions related to understanding and acting on information received from one or more remote stations 10, obtaining and responding to 35 requested information and operatively functioning with information including data available from other elements in the vehicle. In that regard, **the controller 30 communicates with a controller interface 34 that electrically links the controller 30 with a vehicle standardized network** 40. The vehicle standardized network 40 includes a controller unit 44 that provides appropriate message and data handling functions associated with **sending and receiving information including data from each of a plurality of physical vehicle devices 50 that are operatively connected to a bus 46 of the vehicle standardized network** 40. Like the remote standardized network 14**, the vehicle standardized network 40 is an established and previously developed network that interfaces with components in a vehicle**, such as engine related components in order to provide desired or requested data concerning the operations or status of these components." (Spaur '074 patent, col. 6, lines 31-50) "This further standardized communications network is responsible for handling the communication exchange functions associated with sending and receiving information relative to the vehicle devices 50. **In a preferred embodiment, this further standardized network is a network that has been previously devised and is commonly used in a number of makes and models of vehicles.** This communications network is defined as the controller area network (CAN) 124. Although the CAN 124 has previously commonly been used in operative association with automotive electronics including engine control elements, sensors, lamps, electric windows etc., **the present invention also enables the CAN 124 to be used with a variety of other devices contained in the vehicle**, such as the previously described devices." (Spaur '074 patent, col. 10, lines 15-29) "In interfacing with the CAN 124, the **controller 30 also has device drivers 128 that are useful in achieving desired communications in both directions between the CAN 124 and the controller 30**. For example, the processor 90 is able to **obtain data** or other information

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	from the vehicle devices 50a-50n using the device drivers 128 and which information can be used by the processor 90 including, for example, storing data in the data memory 106 for subsequent access and transmission to a remote station 10." (Spaur '074 patent, col. 10, lines 55-64)
and a downloading interface for permitting downloading of enabling data related to the at least one corresponding vehicle device code for use by said multi-vehicle compatible controller;	The Spaur '074 patent teaches both wired and wireless downloading interfaces that permit downloading of enabling data. The Spaur '074 patent teaches that the wireless communications device can be utilized to download enabling data in a variety of forms including received information associated with vehicle devices and executable software downloaded from a remote site: "since bi-directional communications involving a vehicle are conducted wirelessly for at least a portion of the communications link, it is necessary for the Internet to communicate with an appropriate interface or network that wirelessly links with the vehicle. In one embodiment, the cellular digitized packet data (CDPD) network provides the desired link including arrangement of information being communicated and where the destination site, namely the particular vehicle, is found in the network." (Spaur '074 patent, col. 2, lines 37 – 46). "A combination of controller related components are containable in a vehicle for responding to requests from remote sites, obtaining and storing information associated with vehicle devices and running executable software that may be available in the program memory of the controller or downloaded from the remote site, while handling and configuring information including data that is communicative with the remote site over an established network, such as the Internet." (Spaur '074 patent, col. 4, line 64 – col. 5, line 5). Furthermore, "Preferably, the controller in the vehicle is also associated with an interface for communication with one or more available systems, such as an RS232 connection, an Ethernet connection and/or a PCMCIA unit. In a related embodiment, the controller includes a direct communications port for receiving and sending information without requiring the wireless device and the Internet connection to the wireless device." (Spaur '074 patent, col. 4, lines 38 – 45).
said downloading interface comprising a wireless receiver for temporary connection to a downloading device.	One skilled in the art would understand that the Spaur '074 patent discloses a wireless downloading interface comprising a wireless receiver for temporary connection to a downloading device. Therefore, it is inherently disclosed that the wireless connections can be temporary connections.

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19. The multi-vehicle compatible tracking unit according to claim 18 wherein the corresponding at least one vehicle code is for reading from the at least one vehicle device.	The Spaur '074 patent states: "With respect to getting information, the controller 30 further includes a data storage unit or data memory 106. Generally, the data memory 106 stores data that has been generated and is expected to be useful in handling requests or commands. Such data may be data obtained from monitoring a physical device associated with a vehicle and/or may include data useful in running executable software that is intended to provide further information or data useful to a requestor." (Spaur '074 patent, col. 8, lines 45-53)
20. The multi-vehicle compatible tracking unit according to claim 18 wherein the corresponding at least one vehicle code is for writing to the at least one vehicle device.	As taught in the Spaur '074 patent: "With regard to obtaining information or data from these vehicle devices for appropriate processing using, for example, one or more executable programs in the program memory, the controller communicates with a second standardized network in the form of a network that is commercially available and used in vehicles, such as the previously devised controller area network (CAN). The CAN is operatively connected to each of a plurality of vehicle devices that transmit, receive, or both transmit and receive desired data." (Spaur '074 patent, col. 3, lines 57 – 65). Spaur '074 patent, col. 10, lines 55 – 64: "In interfacing with the CAN 124, the controller 30 also has device drivers 128 that are useful in achieving desired communications in both directions between the CAN 124 and the controller 30. For example, the processor 90 is able to obtain data or other information from the vehicle devices 50a-50n using the device drivers 128 and which information can be used by the processor 90 including, for example, storing data in the data memory 106 for subsequent access and transmission to a remote station 10."
21. The multi-vehicle compatible tracking unit according to claim 18 wherein said downloading interface is also for permitting downloading of at least one programming instruction for said multi-vehicle compatible controller.	The Spaur '074 patent states: "In a further and related variation, information or executable software may be downloaded from the remote station to the controller 30 for execution as part of responding to an accompanying or future request, which software may be executed in conjunction with the operation of an applet that is stored as part of the controller 30." (Spaur '074 patent, col. 9, lines 45-50)
22. The multi-vehicle compatible tracking unit according to claim 18 further comprising a remote	The Spaur '074 patent teaches using the wireless communications device to communicate with a remote station; the remote station can provide commands that cause the controller to perform a control function: "The controller 30 includes a number of elements for handling the functions

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transmitter; and wherein said multi-vehicle compatible controller also performs at least one vehicle remote control function responsive to said remote transmitter.	and responsibilities associated with responding to messages, such as requests or commands, from one or more of the remote stations 10, running executable software and obtaining data, as well as achieving the necessary communications protocols with the Internet 68." (Spaur '074 patent, col. 8, lines 1 – 7).

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Exhibit F

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The '278 Patent	PRIOR ART - US Patent 5,732,074 to Spaur et al., U.S. Patent No. 5,557,254 to Johnson et al.
1. A multi-vehicle compatible tracking unit for a vehicle comprising a vehicle data bus extending throughout the vehicle, the multi-vehicle compatible tracking unit comprising, lines	The Spaur '074 patent teaches a multi-vehicle compatible tracking unit in the form of a controller 30 that is electrically linked to a bus in the form a vehicle standardized network 40 (an example of which is a controller area network or CAN bus). Specifically, the Spaur '074 patent teaches: "The controller 30 is responsible for a number of functions related to understanding and acting on information received from one or more remote stations 10, obtaining and responding to 35 requested information and operatively functioning with information including data available from other elements in the vehicle. In that regard, the controller 30 communicates with a controller interface 34 that electrically links the controller 30 with a vehicle standardized network 40. The vehicle standardized network 40 includes a controller unit 44 that provides appropriate message and data handling functions associated with sending and receiving information including data from each of a plurality of physical vehicle devices 50 that are operatively connected to a bus 46 of the vehicle standardized network 40. Like the remote standardized network 14, the vehicle standardized network 40 is an established and previously developed network that interfaces with components in a vehicle, such as engine related components in order to provide desired or requested data concerning the operations or status of these components. (Spaur '074 patent, col. 6, lines 31-50) The Spaur '074 patent further states: "In a preferred embodiment, this further standardized network is a network that has been previously devised and is commonly used in a number of makes and models of vehicles. This communications network is defined as the controller area network (CAN) 124. Although the CAN 124 has previously commonly been used in operative association with automotive electronics including engine control elements, sensors, lamps, electric windows etc., the present invention also enables the CAN 124 to be used with a variety of other devices contained in the vehicle, such as the previously described devices." (Spaur '074 patent, col. 10, lines 18-39) See also FIG. 1 and FIG. 2 of the Spaur '074 patent.
a vehicle position determining device;	The Spaur '074 patent discloses a GPS receiver (vehicle position determining device) at column 14, lines 4 – 9: "At block 300, vehicle positioning data is available from one of the vehicle devices 50, which might be a GPS. On a requested or regular input scheme, such vehicle device data is sent to the CAN bus 126 at block 304. The CAN controller 122 is responsible for controlling the receipt and transmitting of such data to the controller 30 at block 308."

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	The Spaur '074 patent clearly teaches a GPS receiver in the vehicle capable of determining vehicle position information. The Johnson '254 patent teaches a GPS receiver directly connected to a processor. It would have been obvious to substitute the GPS receiver of the Johnson '254 patent for the GPS receiver as taught by the Spaur '074 patent. In this case, the controller taught by the Spaur '074 patent could obtain vehicle position data from the GPS receiver. It would have been obvious to modify the system disclosed in the Spaur '074 patent in this way to improve compatibility with vehicles that do not have a GPS receiver as a vehicle device. Specific teachings regarding the GPS receiver as disclosed in the Johnson '254 patent are as follows: The Johnson '254 patent teaches a vehicle security system that can be installed in a vehicle. (Johnson '254 patent, col. 4, lines 37 – 39). "The control and communications unit 201 upon receiving a signal from any of the intrusion detection devices may act as a car alarm system and sound a siren, e.g., a horn 231." (Johnson '254 patent, col. 4, lines 47 – 49). "The vehicle 200 is further equipped with a GPS receiver unit (internal to the control and communications unit 201) which is connected to a GPS antenna 220. The GPS receiver unit is a multi-channel GPS receiver and can thus receive time and location signals from multiple GPS satellites simultaneously." (Johnson '254 patent, col. 4, lines 51 – 56).
a wireless communications device;	The Spaur '074 patent teaches a wireless communications device in the form of a CDPD network modem 76. Specifically, the Spaur '074 patent states: "In one embodiment, the cellular digitized packet data (CDPD) network provides the desired link including arrangement of information being communicated and where the destination site, namely the particular vehicle, is found in the network. If a channel is available to the particular vehicle, the CDPD link can proceed to transmit the Internet packets to the vehicle of interest. Instead of the CDPD network as the link, a communications interface could be employed that involves data only, such as a two way paging interface with the vehicle. (Spaur '074 patent, col. 2, lines 41-50) "In one embodiment, the communication information is formatted in accordance with a CDPD (cellular digitized packet data) configuration. At the vehicle, this information is received by a wireless device 18 that is able to transmit and receive information via the airlink. The wireless device 18 is operatively associated with a vehicle airlink transfer protocol modem 20 for the proper handling of the airlink formatted transmission. In one embodiment, the wireless device 18 includes a cellular phone that is selected from a plurality of conventional or commercially available cellular phones. The wireless device 18 bi-directionally communicates with a controller 30 contained in the vehicle through a network protocol converter 26 using a wireless device

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	interface 22. The wireless device interface 22 establishes the necessary signal compatibilities and connections from the wireless device 18." (Spaur '074 patent, col. 6, lines 1-16) "The Internet 68 operatively communicates with a standardized network transmission protocol that permits information to be bi-directionally communicated over the airlink and, in one embodiment, includes a remote CDPD network modem 76 which prepares the information in a conventionally acceptable manner for transmission and communication with a cellular phone 80 which is contained in the vehicle. The cellular phone 80 can be any selected one of a number of conventional cellular phones that have the capability of properly communicating with the desired formatted or arranged information. In the illustrated embodiment of FIG. 2, the cellular phone 80 is operatively associated with a vehicle CDPD network modem 82 that demodulates the received information so that it is acceptable for further handling or processing. (Spaur '074 patent, col. 7, lines 40-54)
a multi-vehicle compatible controller for cooperating with said vehicle position determining device and said wireless communications device to send vehicle position information;	The Spaur '074 patent discloses a multi-vehicle compatible controller (30) that cooperates with a vehicle position determining device (GPS receiver) and a wireless communications device (CDPD network modem) to send vehicle location data over an airlink. Specifically, the Spaur '074 patent states: "At block 300, vehicle positioning data is available from one of the vehicle devices 50, which might be a GPS. On a requested or regular input scheme, such vehicle device data is sent to the CAN bus 126 at block 304. The CAN controller 122 is responsible for controlling the receipt and transmitting of such data to the controller 30 at block 308. The vehicle data that is to be transmitted over the wire link, in accordance with the predetermined or determinable procedure, is appropriately processed, analyzed or otherwise acted on using the controller 30 at block 312. In one embodiment, vehicle device data, such as GPS data, do not rely on the web server 102 but may utilize a different communications pathway, such as E-mail. In any event, the controller 30 gates the vehicle location data to the cellular phone having the vehicle airlink transfer protocol modem 20, such as a CDPD network modem 82, at block 316. The vehicle location data is properly formatted and transmitted through the cellular phone over the airlink at block 320." (Spaur '074 patent, col. 14, lines 4-21)
said multi-vehicle compatible controller to be coupled to the vehicle data bus for communication thereover with at least one vehicle device using at least one corresponding vehicle device code from among a plurality thereof for	The Spaur '074 patent discloses that the controller (30) interfaces with a CAN controller (122) and communicates with different vehicle devices 50a – 50n using device drivers 128 that enable communication using device codes with a specific vehicle device connected to the CAN bus (124). The device drivers 128 that are utilized are dependent upon the vehicle devices present on a particular vehicle. Specifically, the Spaur '074 patent states: "The controller 30 is responsible for a number of

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different vehicles; and	functions related to understanding and acting on information received from one or more remote stations 10, obtaining and responding to 35 requested information and operatively functioning with information including data available from other elements in the vehicle. In that regard, **the controller 30 communicates with a controller interface 34 that electrically links the controller 30 with a vehicle standardized network** 40. The vehicle standardized network 40 includes a controller unit 44 that provides appropriate message and data handling functions associated with **sending and receiving information including data from each of a plurality of physical vehicle devices 50 that are operatively connected to a bus 46 of the vehicle standardized network** 40. Like the remote standardized network 14**, the vehicle standardized network 40 is an established and previously developed network that interfaces with components in a vehicle**, such as engine related components in order to provide desired or requested data concerning the operations or status of these components." (Spaur '074 patent, col. 6, lines 31-50) "This further standardized communications network is responsible for handling the communication exchange functions associated with sending and receiving information relative to the vehicle devices 50. **In a preferred embodiment, this further standardized network is a network that has been previously devised and is commonly used in a number of makes and models of vehicles.** This communications network is defined as the controller area network (CAN) 124. Although the CAN 124 has previously commonly been used in operative association with automotive electronics including engine control elements, sensors, lamps, electric windows etc., **the present invention also enables the CAN 124 to be used with a variety of other devices contained in the vehicle**, such as the previously described devices." (Spaur '074 patent, col. 10, lines 15-29) "In interfacing with the CAN 124, the **controller 30 also has device drivers 128 that are useful in achieving desired communications in both directions between the CAN 124 and the controller 30**. For example, the processor 90 is able to **obtain data** or other information **from the vehicle devices 50a-50n using the device drivers 128** and which information can be used by the processor 90 including, for example, storing data in the data memory 106 for subsequent access and transmission to a remote station 10." (Spaur '074 patent, col. 10, lines 55-64)
a downloading interface for permitting downloading of enabling data related to the at least one	The Spaur '074 patent teaches both wired and wireless downloading interfaces that permit downloading of enabling data.

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corresponding vehicle device code for use by said multi-vehicle compatible controller.	The Spaur '074 patent teaches that the wireless communications device can be utilized to download enabling data in a variety of forms including received information associated with vehicle devices and executable software downloaded from a remote site: "since bi-directional communications involving a vehicle are conducted wirelessly for at least a portion of the communications link, it is necessary for the Internet to communicate with an appropriate interface or network that wirelessly links with the vehicle. In one embodiment, the cellular digitized packet data (CDPD) network provides the desired link including arrangement of information being communicated and where the destination site, namely the particular vehicle, is found in the network." (Spaur '074 patent, col. 2, lines 37 – 46). "A combination of controller related components are containable in a vehicle for responding to requests from remote sites, obtaining and storing information associated with vehicle devices and running executable software that may be available in the program memory of the controller or downloaded from the remote site, while handling and configuring information including data that is communicative with the remote site over an established network, such as the Internet." (Spaur '074 patent, col. 4, line 64 – col. 5, line 5). Furthermore, "Preferably, the controller in the vehicle is also associated with an interface for communication with one or more available systems, such as an RS232 connection, an Ethernet connection and/or a PCMCIA unit. In a related embodiment, the controller includes a direct communications port for receiving and sending information without requiring the wireless device and the Internet connection to the wireless device." (Spaur '074 patent, col. 4, lines 38 – 45).
2. The multi-vehicle compatible tracking unit according to claim 1 wherein said downloading interface comprises a wired signal downloading interface.	Figure 2 of the Spaur '074 patent describes the direct communications port. One skilled in the art would recognize that this interface is a wired interface to the controller and would enable downloading to the controller. "Preferably, the controller in the vehicle is also associated with an interface for communication with one or more available systems, such as an RS232 connection, an Ethernet connection and/or a PCMCIA unit. In a related embodiment, the controller includes a direct communications port for receiving and sending information without requiring the wireless device and the Internet connection to the wireless device." (Spaur '074 patent, col. 4, lines 38-45)
3. The multi-vehicle compatible	One skilled in the art would understand that the wired port could be used temporarily. Therefore,

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tracking unit according to claim 2 wherein said wired signal downloading interface comprises a connector for temporary connection to a downloading device.	it is inherently disclosed that the wired signal downloading interface, i.e. the RS232 connection, Ethernet connection, or PCMCIA connection, comprise a connector for a temporary connection.
4. The multi-vehicle compatible tracking unit according to claim 1 wherein said downloading interface comprises a wireless signal downloading interface.	Figure 1 of the Spaur '074 patent includes a wireless communication interface. As noted above with respect to Claim 1, Figure 2 of Spaur '074 patent also includes a wireless communications interface. "In one embodiment, the cellular digitized packet data (CDPD) network provides the desired link including arrangement of information being communicated and where the destination site, namely the particular vehicle, is found in the network. If a channel is available to the particular vehicle, the CDPD link can proceed to transmit the Internet packets to the vehicle of interest. Instead of the CDPD network as the link, a communications interface could be employed that involves data only, such as a two way paging interface with the vehicle." (Spaur '074 patent, col. 2, lines 41-50) In accordance with the present invention, a system is provided in which communication of information, including requests, commands and data, is achieved between vehicle having physical vehicle devices and one or more sites that are remote from the vehicle. (Spaur '074 patent, col. 2, lines 11-15)
5. The multi-vehicle compatible tracking unit according to claim 4 wherein said wireless signal downloading interface comprises a wireless receiver for temporary connection to a downloading device.	One skilled in the art would understand that the Spaur '074 patent discloses a wireless downloading interface comprising a wireless receiver for temporary connection to a downloading device. Therefore, it is inherently disclosed that the wireless connections can be temporary connections.
6. The multi-vehicle compatible tracking unit according to claim 1 wherein the corresponding at least	As described in the Spaur '074 patent: "With respect to getting information, the controller 30 further includes a data storage unit or data memory 106. Generally, the data memory 106 stores data that has been generated and is expected to be useful in handling requests or commands.

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one vehicle code is for reading from the at least one vehicle device.	Such data may be data obtained from monitoring a physical device associated with a vehicle and/or may include data useful in running executable software that is intended to provide further information or data useful to a requestor." (Spaur '074 patent, col. 8, lines 45-53)
7. The multi-vehicle compatible tracking unit according to claim 1 wherein the corresponding at least one vehicle code is for writing to the at least one vehicle device.	As taught in the Spaur '074 patent: "With regard to obtaining information or data from these vehicle devices for appropriate processing using, for example, one or more executable programs in the program memory, the controller communicates with a second standardized network in the form of a network that is commercially available and used in vehicles, such as the previously devised controller area network (CAN). The CAN is operatively connected to each of a plurality of vehicle devices that transmit, receive, or both transmit and receive desired data." (Spaur '074 patent, col. 3, lines 57 – 65). Also see the Spaur '074 patent, col. 10, lines 55 – 64: "In interfacing with the CAN 124, the controller 30 also has device drivers 128 that are useful in achieving desired communications in both directions between the CAN 124 and the controller 30. For example, the processor 90 is able to obtain data or other information from the vehicle devices 50a-50n using the device drivers 128 and which information can be used by the processor 90 including, for example, storing data in the data memory 106 for subsequent access and transmission to a remote station 10."
8. The multi-vehicle compatible tracking unit according to claim 1 wherein said downloading interface is also for permitting downloading of at least one programming instruction for said multi-vehicle compatible controller.	"In a further and related variation, information or executable software may be downloaded from the remote station to the controller 30 for execution as part of responding to an accompanying or future request, which software may be executed in conjunction with the operation of an applet that is stored as part of the controller 30." (Spaur '074 patent, col. 9, lines 45-50)
9. The multi-vehicle compatible tracking unit according to claim 1 further comprising a remote transmitter; and wherein said multi-vehicle compatible controller also	The Spaur '074 patent teaches using the wireless communications device to communicate with a remote station; the remote station can provide commands that cause the controller to perform a control function: "The controller 30 includes a number of elements for handling the functions and responsibilities associated with responding to messages, such as requests or commands, from one or more of the remote stations 10, running executable software and obtaining data, as

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performs at least one vehicle remote control function responsive to said remote transmitter.	well as achieving the necessary communications protocols with the Internet 68." (Spaur '074 patent, col. 8, lines 1 – 7).
10. The multi-vehicle compatible tracking unit according to claim 9 wherein the at least one vehicle remote control function comprises at least one of a vehicle security function, a remote keyless entry function, and a remote engine starting function.	"The controller 30 further includes a data storage unit or data memory 106." (Spaur '074 patent, col. 8, lines 46 – 47). "In addition to application software that might be involved with such functions, the short programs in the program memory 114 may include software related to safety and security considerations, including, lines […] (c) providing an indication of key or alarm related events, such as when roadside assistance is required, the vehicle or the driver of the vehicle faces a threatening situation, an unauthorized vehicle door unlocking and/or initiating an automatic call for assistance in light of an airbag detonation." (Spaur '074 patent, col. 9, lines 16 – 30).
11. The multi-vehicle compatible tracking unit according to claim 1 wherein said wireless position determining device comprises a Global Positioning System (GPS) receiver.	The vehicle position determining device taught in the Johnson '254 patent is a GPS receiver. (see e.g. Johnson '254 patent, col. 4, lines 51 – 56).
12. The multi-vehicle compatible tracking unit according to claim 1 further comprising a housing containing said vehicle position determining device, said wireless communications device, said multi-vehicle compatible controller, and said downloading interface.	The Spaur '074 patent discloses a combination of components located in a vehicle: "A combination of controller related components are containable in a vehicle for responding to requests from remote sites, obtaining and storing information associated with vehicle devices and running executable software that may be available in the program memory of the controller or downloaded from the remote site, while handling and configuring information including data that is communicative with the remote site over an established network, such as the Internet." (Spaur '074 patent, col. 4, line 64 – col. 5, line 5). It is inherently disclosed that the components are contained in a housing within the vehicle to aid in the installation of the system described in the Spaur '074 patent. In the alternative, FIG. 1 illustrates a variety of components contained in a vehicle and one or more remote stations 10a-10n. As all of the components are stored in the vehicle, the vehicle itself constitutes a housing containing all elements of the claimed invention.

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13. A multi-vehicle compatible tracking unit for a vehicle comprising a vehicle data bus extending throughout the vehicle, the multi-vehicle compatible vehicle tracking unit comprising, lines	The Spaur '074 patent teaches a multi-vehicle compatible tracking unit in the form of a controller 30 that is electrically linked to a bus in the form a vehicle standardized network 40 (an example of which is a controller area network or CAN bus). Specifically, the Spaur '074 patent teaches: "The controller 30 is responsible for a number of functions related to understanding and acting on information received from one or more remote stations 10, obtaining and responding to 35 requested information and operatively functioning with information including data available from other elements in the vehicle. In that regard, the controller 30 communicates with a controller interface 34 that electrically links the controller 30 with a vehicle standardized network 40. The vehicle standardized network 40 includes a controller unit 44 that provides appropriate message and data handling functions associated with sending and receiving information including data from each of a plurality of physical vehicle devices 50 that are operatively connected to a bus 46 of the vehicle standardized network 40. Like the remote standardized network 14, the vehicle standardized network 40 is an established and previously developed network that interfaces with components in a vehicle, such as engine related components in order to provide desired or requested data concerning the operations or status of these components. (Spaur '074 patent, col. 6, lines 31-50) The Spaur '074 patent further states: "In a preferred embodiment, this further standardized network is a network that has been previously devised and is commonly used in a number of makes and models of vehicles. This communications network is defined as the controller area network (CAN) 124. Although the CAN 124 has previously commonly been used in operative association with automotive electronics including engine control elements, sensors, lamps, electric windows etc., the present invention also enables the CAN 124 to be used with a variety of other devices contained in the vehicle, such as the previously described devices." (Spaur '074 patent, col. 10, lines 18-39) See also FIG. 1 and FIG. 2 of the Spaur '074 patent.
a vehicle position determining device;	The Spaur '074 patent discloses a GPS receiver (vehicle position determining device) at column 14, lines 4 – 9: "At block 300, vehicle positioning data is available from one of the vehicle devices 50, which might be a GPS. On a requested or regular input scheme, such vehicle device data is sent to the CAN bus 126 at block 304. The CAN controller 122 is responsible for controlling the receipt and transmitting of such data to the controller 30 at block 308." The Spaur '074 patent clearly teaches a GPS receiver in the vehicle capable of determining

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	vehicle position information. The Johnson '254 patent teaches a GPS receiver directly connected to a processor. It would have been obvious to substitute the GPS receiver of the Johnson '254 patent for the GPS receiver as taught by the Spaur '074 patent. In this case, the controller taught by the Spaur '074 patent could obtain vehicle position data from the GPS receiver. It would have been obvious to modify the system disclosed in the Spaur '074 patent in this way to improve compatibility with vehicles that do not have a GPS receiver as a vehicle device. Specific teachings regarding the GPS receiver as disclosed in the Johnson '254 patent are as follows: The Johnson '254 patent teaches a vehicle security system that can be installed in a vehicle. (Johnson '254 patent, col. 4, lines 37 – 39). "The control and communications unit 201 upon receiving a signal from any of the intrusion detection devices may act as a car alarm system and sound a siren, e.g., a horn 231." (Johnson '254 patent, col. 4, lines 47 – 49). "The vehicle 200 is further equipped with a GPS receiver unit (internal to the control and communications unit 201) which is connected to a GPS antenna 220. The GPS receiver unit is a multi-channel GPS receiver and can thus receive time and location signals from multiple GPS satellites simultaneously." (Johnson '254 patent, col. 4, lines 51 – 56).
a wireless communications device;	The Spaur '074 patent teaches a wireless communications device in the form of a CDPD network modem 76. Specifically, the Spaur '074 patent states: "In one embodiment, the cellular digitized packet data (CDPD) network provides the desired link including arrangement of information being communicated and where the destination site, namely the particular vehicle, is found in the network. If a channel is available to the particular vehicle, the CDPD link can proceed to transmit the Internet packets to the vehicle of interest. Instead of the CDPD network as the link, a communications interface could be employed that involves data only, such as a two way paging interface with the vehicle. (Spaur '074 patent, col. 2, lines 41-50) "In one embodiment, the communication information is formatted in accordance with a CDPD (cellular digitized packet data) configuration. At the vehicle, this information is received by a wireless device 18 that is able to transmit and receive information via the airlink. The wireless device 18 is operatively associated with a vehicle airlink transfer protocol modem 20 for the proper handling of the airlink formatted transmission. In one embodiment, the wireless device 18 includes a cellular phone that is selected from a plurality of conventional or commercially available cellular phones. The wireless device 18 bi-directionally communicates with a controller 30 contained in the vehicle through a network protocol converter 26 using a wireless device interface 22. The wireless device interface 22 establishes the necessary signal compatibilities

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	and connections from the wireless device 18." (Spaur '074 patent, col. 6, lines 1-16) "The Internet 68 operatively communicates with a standardized network transmission protocol that permits information to be bi-directionally communicated over the airlink and, in one embodiment, includes a remote CDPD network modem 76 which prepares the information in a conventionally acceptable manner for transmission and communication with a cellular phone 80 which is contained in the vehicle. The cellular phone 80 can be any selected one of a number of conventional cellular phones that have the capability of properly communicating with the desired formatted or arranged information. In the illustrated embodiment of FIG. 2, the cellular phone 80 is operatively associated with a vehicle CDPD network modem 82 that demodulates the received information so that it is acceptable for further handling or processing. (Spaur '074 patent, col. 7, lines 40-54)
a multi-vehicle compatible controller for cooperating with said vehicle position determining device and said wireless communications device to send vehicle position information;	The Spaur '074 patent discloses a multi-vehicle compatible controller (30) that cooperates with a vehicle position determining device (GPS receiver) and a wireless communications device (CDPD network modem) to send vehicle location data over an airlink. Specifically, the Spaur '074 patent states: "At block 300, vehicle positioning data is available from one of the vehicle devices 50, which might be a GPS. On a requested or regular input scheme, such vehicle device data is sent to the CAN bus 126 at block 304. The CAN controller 122 is responsible for controlling the receipt and transmitting of such data to the controller 30 at block 308. The vehicle data that is to be transmitted over the wire link, in accordance with the predetermined or determinable procedure, is appropriately processed, analyzed or otherwise acted on using the controller 30 at block 312. In one embodiment, vehicle device data, such as GPS data, do not rely on the web server 102 but may utilize a different communications pathway, such as E-mail. In any event, the controller 30 gates the vehicle location data to the cellular phone having the vehicle airlink transfer protocol modem 20, such as a CDPD network modem 82, at block 316. The vehicle location data is properly formatted and transmitted through the cellular phone over the airlink at block 320." (Spaur '074 patent, col. 14, lines 4-21)
said multi-vehicle compatible controller to be coupled to the vehicle data bus for communication thereover with at least one vehicle device using at least one corresponding vehicle device code from among a plurality thereof for different vehicles;	The Spaur '074 patent discloses that the controller (30) interfaces with a CAN controller (122) and communicates with different vehicle devices 50a – 50n using device drivers 128 that enable communication using device codes with a specific vehicle device connected to the CAN bus (124). The device drivers 128 that are utilized are dependent upon the vehicle devices present on a particular vehicle. Specifically, the Spaur '074 patent states: "The controller 30 is responsible for a number of functions related to understanding and acting on information received from one or more remote

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	stations 10, obtaining and responding to 35 requested information and operatively functioning with information including data available from other elements in the vehicle. In that regard, **the controller 30 communicates with a controller interface 34 that electrically links the controller 30 with a vehicle standardized network** 40. The vehicle standardized network 40 includes a controller unit 44 that provides appropriate message and data handling functions associated with **sending and receiving information including data from each of a plurality of physical vehicle devices 50 that are operatively connected to a bus 46 of the vehicle standardized network** 40. Like the remote standardized network 14**, the vehicle standardized network 40 is an established and previously developed network that interfaces with components in a vehicle**, such as engine related components in order to provide desired or requested data concerning the operations or status of these components." (Spaur '074 patent, col. 6, lines 31-50) "This further standardized communications network is responsible for handling the communication exchange functions associated with sending and receiving information relative to the vehicle devices 50. **In a preferred embodiment, this further standardized network is a network that has been previously devised and is commonly used in a number of makes and models of vehicles.** This communications network is defined as the controller area network (CAN) 124. Although the CAN 124 has previously commonly been used in operative association with automotive electronics including engine control elements, sensors, lamps, electric windows etc., **the present invention also enables the CAN 124 to be used with a variety of other devices contained in the vehicle**, such as the previously described devices." (Spaur '074 patent, col. 10, lines 15-29) "In interfacing with the CAN 124, the **controller 30 also has device drivers 128 that are useful in achieving desired communications in both directions between the CAN 124 and the controller 30**. For example, the processor 90 is able to **obtain data** or other information **from the vehicle devices 50a-50n using the device drivers 128** and which information can be used by the processor 90 including, for example, storing data in the data memory 106 for subsequent access and transmission to a remote station 10." (Spaur '074 patent, col. 10, lines 55-64)
and a downloading interface for permitting downloading of enabling data related to the at least one corresponding vehicle device code	The Spaur '074 patent teaches both wired and wireless downloading interfaces that permit downloading of enabling data. The Spaur '074 patent teaches that the wireless communications device can be utilized to

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for use by said multi-vehicle compatible controller;	download enabling data in a variety of forms including received information associated with vehicle devices and executable software downloaded from a remote site: "since bi-directional communications involving a vehicle are conducted wirelessly for at least a portion of the communications link, it is necessary for the Internet to communicate with an appropriate interface or network that wirelessly links with the vehicle. In one embodiment, the cellular digitized packet data (CDPD) network provides the desired link including arrangement of information being communicated and where the destination site, namely the particular vehicle, is found in the network." (Spaur '074 patent, col. 2, lines 37 – 46). "A combination of controller related components are containable in a vehicle for responding to requests from remote sites, obtaining and storing information associated with vehicle devices and running executable software that may be available in the program memory of the controller or downloaded from the remote site, while handling and configuring information including data that is communicative with the remote site over an established network, such as the Internet." (Spaur '074 patent, col. 4, line 64 – col. 5, line 5). Furthermore, "Preferably, the controller in the vehicle is also associated with an interface for communication with one or more available systems, such as an RS232 connection, an Ethernet connection and/or a PCMCIA unit. In a related embodiment, the controller includes a direct communications port for receiving and sending information without requiring the wireless device and the Internet connection to the wireless device." (Spaur '074 patent, col. 4, lines 38 – 45).
said downloading interface comprising a connector for temporary connection to a downloading device.	One skilled in the art would understand that the Spaur '074 patent discloses a wireless downloading interface comprising of a wireless receiver for temporary connection to a downloading device. Therefore, it is inherently disclosed that the wireless connections can be temporary connections.
14. The multi-vehicle compatible tracking unit according to claim 13 wherein the corresponding at least one vehicle code is for reading from the at least one vehicle device.	The Spaur '074 patent states: "With respect to getting information, the controller 30 further includes a data storage unit or data memory 106. Generally, the data memory 106 stores data that has been generated and is expected to be useful in handling requests or commands. Such data may be data obtained from monitoring a physical device associated with a vehicle and/or may include data useful in running executable software that is intended to provide further information or data useful to a requestor." (Spaur '074 patent, col. 8, lines 45-53)
15. The multi-vehicle compatible	The Spaur '074 patent states: "As taught in the Spaur '074 patent: " With regard to obtaining

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tracking unit according to claim 13 wherein the corresponding at least one vehicle code is for writing to the at least one vehicle device.	information or data from these vehicle devices for appropriate processing using, for example, one or more executable programs in the program memory, the controller communicates with a second standardized network in the form of a network that is commercially available and used in vehicles, such as the previously devised controller area network (CAN). The CAN is operatively connected to each of a plurality of vehicle devices that transmit. receive, or both transmit and receive desired data." (Spaur '074 patent, col. 3, lines 57 – 65). See also the Spaur '074 patent, col. 10, lines 55 – 64: "In interfacing with the CAN 124, the controller 30 also has device drivers 128 that are useful in achieving desired communications in both directions between the CAN 124 and the controller 30. For example, the processor 90 is able to obtain data or other information from the vehicle devices 50a-50n using the device drivers 128 and which information can be used by the processor 90 including, for example, storing data in the data memory 106 for subsequent access and transmission to a remote station 10."
16. The multi-vehicle compatible tracking unit according to claim 13 wherein said downloading interface is also for permitting downloading of at least one programming instruction for said multi-vehicle compatible controller.	The Spaur '074 patent states: "In a further and related variation, information or executable software may be downloaded from the remote station to the controller 30 for execution as part of responding to an accompanying or future request, which software may be executed in conjunction with the operation of an applet that is stored as part of the controller 30." (Spaur '074 patent, col. 9, lines 45-50)
17. The multi-vehicle compatible tracking unit according to claim 13 further comprising a remote transmitter; and wherein said multi-vehicle compatible controller also performs at least one vehicle remote control function responsive to said remote transmitter.	The Spaur '074 patent teaches using the wireless communications device to communicate with a remote station; the remote station can provide commands that cause the controller to perform a control function: "The controller 30 includes a number of elements for handling the functions and responsibilities associated with responding to messages, such as requests or commands, from one or more of the remote stations 10, running executable software and obtaining data, as well as achieving the necessary communications protocols with the Internet 68." (Spaur '074 patent, col. 8, lines 1 – 7).
18. A multi-vehicle compatible tracking unit for a vehicle	The Spaur '074 patent teaches a multi-vehicle compatible tracking unit in the form of a controller 30 that is electrically linked to a bus in the form a vehicle standardized network 40 (an example

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comprising a vehicle data bus extending throughout the vehicle, the multi-vehicle compatible vehicle tracking unit comprising, lines	of which is a controller area network or CAN bus). Specifically, the Spaur '074 patent teaches: "The controller 30 is responsible for a number of functions related to understanding and acting on information received from one or more remote stations 10, obtaining and responding to 35 requested information and operatively functioning with information including data available from other elements in the vehicle. In that regard, the controller 30 communicates with a controller interface 34 that electrically links the controller 30 with a vehicle standardized network 40. The vehicle standardized network 40 includes a controller unit 44 that provides appropriate message and data handling functions associated with sending and receiving information including data from each of a plurality of physical vehicle devices 50 that are operatively connected to a bus 46 of the vehicle standardized network 40. Like the remote standardized network 14, the vehicle standardized network 40 is an established and previously developed network that interfaces with components in a vehicle, such as engine related components in order to provide desired or requested data concerning the operations or status of these components. (Spaur '074 patent, col. 6, lines 31-50) The Spaur '074 patent further states: "In a preferred embodiment, this further standardized network is a network that has been previously devised and is commonly used in a number of makes and models of vehicles. This communications network is defined as the controller area network (CAN) 124. Although the CAN 124 has previously commonly been used in operative association with automotive electronics including engine control elements, sensors, lamps, electric windows etc., the present invention also enables the CAN 124 to be used with a variety of other devices contained in the vehicle, such as the previously described devices." (Spaur '074 patent, col. 10, lines 18-39) See also FIG. 1 and FIG. 2 of the Spaur '074 patent.
a vehicle position determining device;	The Spaur '074 patent states: "At block 300, vehicle positioning data is available from one of the vehicle devices 50, which might be a GPS. On a requested or regular input scheme, such vehicle device data is sent to the CAN bus 126 at block 304. The CAN controller 122 is responsible for controlling the receipt and transmitting of such data to the controller 30 at block 308." (Spaur '074 patent, col. 14, lines 4 – 9). The Spaur '074 patent clearly teaches a GPS receiver in the vehicle capable of determining vehicle position information. The Johnson '254 patent teaches a GPS receiver directly connected to a processor. It would have been obvious to substitute the GPS receiver of the Johnson '254 patent for the GPS receiver as taught by the Spaur '074 patent. In this case, the

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	controller taught by the Spaur '074 patent could obtain vehicle position data from the GPS receiver. It would have been obvious to modify the system disclosed in the Spaur '074 patent in this way to improve compatibility with vehicles that do not have a GPS receiver as a vehicle device. Specific teachings regarding the GPS receiver as disclosed in the Johnson '254 patent are as follows: The Johnson '254 patent teaches a vehicle security system that can be installed in a vehicle. (Johnson '254 patent, col. 4, lines 37 – 39). "The control and communications unit 201 upon receiving a signal from any of the intrusion detection devices may act as a car alarm system and sound a siren, e.g., a horn 231." (Johnson '254 patent, col. 4, lines 47 – 49). "The vehicle 200 is further equipped with a GPS receiver unit (internal to the control and communications unit 201) which is connected to a GPS antenna 220. The GPS receiver unit is a multi-channel GPS receiver and can thus receive time and location signals from multiple GPS satellites simultaneously." (Johnson '254 patent, col. 4, lines 51 – 56).
a wireless communications device;	The Spaur '074 patent teaches a wireless communications device in the form of a CDPD network modem 76. Specifically, the Spaur '074 patent states: "In one embodiment, the cellular digitized packet data (CDPD) network provides the desired link including arrangement of information being communicated and where the destination site, namely the particular vehicle, is found in the network. If a channel is available to the particular vehicle, the CDPD link can proceed to transmit the Internet packets to the vehicle of interest. Instead of the CDPD network as the link, a communications interface could be employed that involves data only, such as a two way paging interface with the vehicle. (Spaur '074 patent, col. 2, lines 41-50) "In one embodiment, the communication information is formatted in accordance with a CDPD (cellular digitized packet data) configuration. At the vehicle, this information is received by a wireless device 18 that is able to transmit and receive information via the airlink. The wireless device 18 is operatively associated with a vehicle airlink transfer protocol modem 20 for the proper handling of the airlink formatted transmission. In one embodiment, the wireless device 18 includes a cellular phone that is selected from a plurality of conventional or commercially available cellular phones. The wireless device 18 bi-directionally communicates with a controller 30 contained in the vehicle through a network protocol converter 26 using a wireless device interface 22. The wireless device interface 22 establishes the necessary signal compatibilities and connections from the wireless device 18." (Spaur '074 patent, col. 6, lines 1-16) "The Internet 68 operatively communicates with a standardized network transmission protocol

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	that permits information to be bi-directionally communicated over the airlink and, in one embodiment, includes a remote CDPD network modem 76 which prepares the information in a conventionally acceptable manner for transmission and communication with a cellular phone 80 which is contained in the vehicle. The cellular phone 80 can be any selected one of a number of conventional cellular phones that have the capability of properly communicating with the desired formatted or arranged information. In the illustrated embodiment of FIG. 2, the cellular phone 80 is operatively associated with a vehicle CDPD network modem 82 that demodulates the received information so that it is acceptable for further handling or processing. (Spaur '074 patent, col. 7, lines 40-54)
a multi-vehicle compatible controller for cooperating with said vehicle position determining device and said wireless communications device to send vehicle position information;	The Spaur '074 patent discloses a multi-vehicle compatible controller (30) that cooperates with a vehicle position determining device (GPS receiver) and a wireless communications device (CDPD network modem) to send vehicle location data over an airlink. Specifically, the Spaur '074 patent states: "At block 300, vehicle positioning data is available from one of the vehicle devices 50, which might be a GPS. On a requested or regular input scheme, such vehicle device data is sent to the CAN bus 126 at block 304. The CAN controller 122 is responsible for controlling the receipt and transmitting of such data to the controller 30 at block 308. The vehicle data that is to be transmitted over the wire link, in accordance with the predetermined or determinable procedure, is appropriately processed, analyzed or otherwise acted on using the controller 30 at block 312. In one embodiment, vehicle device data, such as GPS data, do not rely on the web server 102 but may utilize a different communications pathway, such as E-mail. In any event, the controller 30 gates the vehicle location data to the cellular phone having the vehicle airlink transfer protocol modem 20, such as a CDPD network modem 82, at block 316. The vehicle location data is properly formatted and transmitted through the cellular phone over the airlink at block 320." (Spaur '074 patent, col. 14, lines 4-21)
said multi-vehicle compatible controller to be coupled to the vehicle data bus for communication thereover with at least one vehicle device using at least one corresponding vehicle device code from among a plurality thereof for different vehicles;	The Spaur '074 patent discloses that the controller (30) interfaces with a CAN controller (122) and communicates with different vehicle devices 50a – 50n using device drivers 128 that enable communication using device codes with a specific vehicle device connected to the CAN bus (124). The device drivers 128 that are utilized are dependent upon the vehicle devices present on a particular vehicle. Specifically, the Spaur '074 patent states: "The controller 30 is responsible for a number of functions related to understanding and acting on information received from one or more remote stations 10, obtaining and responding to 35 requested information and operatively functioning with information including data available from other elements in the vehicle. In that regard, **the controller 30 communicates with a controller interface 34 that electrically links the**

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	controller 30 with a vehicle standardized network 40. The vehicle standardized network 40 includes a controller unit 44 that provides appropriate message and data handling functions associated with **sending and receiving information including data from each of a plurality of physical vehicle devices 50 that are operatively connected to a bus 46 of the vehicle standardized network** 40. Like the remote standardized network 14**, the vehicle standardized network 40 is an established and previously developed network that interfaces with components in a vehicle**, such as engine related components in order to provide desired or requested data concerning the operations or status of these components." (Spaur '074 patent, col. 6, lines 31-50) "This further standardized communications network is responsible for handling the communication exchange functions associated with sending and receiving information relative to the vehicle devices 50. **In a preferred embodiment, this further standardized network is a network that has been previously devised and is commonly used in a number of makes and models of vehicles.** This communications network is defined as the controller area network (CAN) 124. Although the CAN 124 has previously commonly been used in operative association with automotive electronics including engine control elements, sensors, lamps, electric windows etc., **the present invention also enables the CAN 124 to be used with a variety of other devices contained in the vehicle**, such as the previously described devices." (Spaur '074 patent, col. 10, lines 15-29) "In interfacing with the CAN 124, the **controller 30 also has device drivers 128 that are useful in achieving desired communications in both directions between the CAN 124 and the controller 30**. For example, the processor 90 is able to **obtain data** or other information **from the vehicle devices 50a-50n using the device drivers 128** and which information can be used by the processor 90 including, for example, storing data in the data memory 106 for subsequent access and transmission to a remote station 10." (Spaur '074 patent, col. 10, lines 55-64)
and a downloading interface for permitting downloading of enabling data related to the at least one corresponding vehicle device code for use by said multi-vehicle compatible controller;	The Spaur '074 patent teaches both wired and wireless downloading interfaces that permit downloading of enabling data. The Spaur '074 patent teaches that the wireless communications device can be utilized to download enabling data in a variety of forms including received information associated with vehicle devices and executable software downloaded from a remote site: "since bi-directional communications involving a vehicle are conducted wirelessly for at least a portion of the

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	communications link, it is necessary for the Internet to communicate with an appropriate interface or network that wirelessly links with the vehicle. In one embodiment, the cellular digitized packet data (CDPD) network provides the desired link including arrangement of information being communicated and where the destination site, namely the particular vehicle, is found in the network." (Spaur '074 patent, col. 2, lines 37 – 46). "A combination of controller related components are containable in a vehicle for responding to requests from remote sites, obtaining and storing information associated with vehicle devices and running executable software that may be available in the program memory of the controller or downloaded from the remote site, while handling and configuring information including data that is communicative with the remote site over an established network, such as the Internet." (Spaur '074 patent, col. 4, line 64 – col. 5, line 5). Furthermore, "Preferably, the controller in the vehicle is also associated with an interface for communication with one or more available systems, such as an RS232 connection, an Ethernet connection and/or a PCMCIA unit. In a related embodiment, the controller includes a direct communications port for receiving and sending information without requiring the wireless device and the Internet connection to the wireless device." (Spaur '074 patent, col. 4, lines 38 – 45).
said downloading interface comprising a wireless receiver for temporary connection to a downloading device.	One skilled in the art would understand that the Spaur '074 patent discloses a wireless downloading interface comprising a wireless receiver for temporary connection to a downloading device. Therefore, it is inherently disclosed that the wireless connections can be temporary connections.
19. The multi-vehicle compatible tracking unit according to claim 18 wherein the corresponding at least one vehicle code is for reading from the at least one vehicle device.	The Spaur '074 patent states: "With respect to getting information, the controller 30 further includes a data storage unit or data memory 106. Generally, the data memory 106 stores data that has been generated and is expected to be useful in handling requests or commands. Such data may be data obtained from monitoring a physical device associated with a vehicle and/or may include data useful in running executable software that is intended to provide further information or data useful to a requestor." (Spaur '074 patent, col. 8, lines 45-53)
20. The multi-vehicle compatible tracking unit according to claim 18 wherein the corresponding at least one vehicle code is for writing to the	As taught in the Spaur '074 patent: "With regard to obtaining information or data from these vehicle devices for appropriate processing using, for example, one or more executable programs in the program memory, the controller communicates with a second standardized network in the form of a network that is commercially available and used in vehicles, such as the

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at least one vehicle device.	previously devised controller area network (CAN). The CAN is operatively connected to each of a plurality of vehicle devices that transmit, receive, or both transmit and receive desired data." (Spaur '074 patent, col. 3, lines 57 – 65). Spaur '074 patent, col. 10, lines 55 – 64: "In interfacing with the CAN 124, the controller 30 also has device drivers 128 that are useful in achieving desired communications in both directions between the CAN 124 and the controller 30. For example, the processor 90 is able to obtain data or other information from the vehicle devices 50a-50n using the device drivers 128 and which information can be used by the processor 90 including, for example, storing data in the data memory 106 for subsequent access and transmission to a remote station 10."
21. The multi-vehicle compatible tracking unit according to claim 18 wherein said downloading interface is also for permitting downloading of at least one programming instruction for said multi-vehicle compatible controller.	The Spaur '074 patent states: "In a further and related variation, information or executable software may be downloaded from the remote station to the controller 30 for execution as part of responding to an accompanying or future request, which software may be executed in conjunction with the operation of an applet that is stored as part of the controller 30." (Spaur '074 patent, col. 9, lines 45-50)
22. The multi-vehicle compatible tracking unit according to claim 18 further comprising a remote transmitter; and wherein said multi-vehicle compatible controller also performs at least one vehicle remote control function responsive to said remote transmitter.	The Spaur '074 patent teaches using the wireless communications device to communicate with a remote station; the remote station can provide commands that cause the controller to perform a control function: "The controller 30 includes a number of elements for handling the functions and responsibilities associated with responding to messages, such as requests or commands, from one or more of the remote stations 10, running executable software and obtaining data, as well as achieving the necessary communications protocols with the Internet 68." (Spaur '074 patent, col. 8, lines 1 – 7).

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The '278 Patent	PRIOR ART - US Patent 6,346,876 to Flick and U.S. Patent No. 6,011,460 to Flick
1. A multi-vehicle compatible tracking unit for a vehicle comprising a vehicle data bus extending throughout the vehicle, the multi-vehicle compatible tracking unit comprising, lines	Claim 1 of the Flick '876 patent includes "A control system for a vehicle comprising a data communications bus and at least one vehicle device connected to the data communications bus."
a vehicle position determining device;	It is notoriously well-known to one of ordinary skill in the art that a vehicle device as in Claim 1 of the Flick '876 patent can include a GPS receiver.
a wireless communications device;	Claim 1 of the Flick '876 patent includes "a transmitter and a receiver for receiving signals from said transmitter."
a multi-vehicle compatible controller for cooperating with said vehicle position determining device and said wireless communications device to send vehicle position information;	Claim 16 of the Flick '876 patent includes "wherein said receiver comprises at least a central station transmitter; and wherein said transmitter is at the vehicle." As the transmitter is in the vehicle, it would have been obvious to transmit data from a vehicle device connected to the controller.
said multi-vehicle compatible controller to be coupled to the vehicle data bus for communication thereover with at least one vehicle device using at least one corresponding vehicle device code from among a plurality thereof for different vehicles; and	Claim 12 of the Flick '876 patent includes: "wherein said multi-vehicle compatible controller is further for storing a set of device codes for a given vehicle device for a plurality of different vehicles, for reading a device code from the data communications bus, and for determining a match between a read device code and the stored device codes to thereby provide reading compatibility with a plurality of different vehicles."
a downloading interface for permitting downloading of enabling data related to the at least one corresponding vehicle device code for use by said multi-vehicle compatible controller.	Claim 1 of the Flick '876 patent includes "a transmitter and a receiver for receiving signals from said transmitter." The Flick '460 patent, incorporated by reference in its entirety in col. 10, lines 25 – 36 of the Flick '876 patent, states "a transmitter and receiver 13 are connected to the CPU 12 for receiving signals from a remote transmitter and for transmitting signals to a remote unit." (Flick '460 patent, col. 4, lines 50 – 54). "The desired signal enabling means 17"' includes a signal set memory 81 operatively connected to the schematically illustrated download learning means 84. The download learning means 84 may include an interface connected to the illustrated vehicle cellular telephone 86 to permit learning or downloading of the desired signal set from a remote or central monitoring and control station 88." As the Flick '460 patent teaches the "transmitter and receiver" (i.e. cellular telephone) can be utilized to permit the downloading of enabling data to a

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	"download learning means," the cited aspect of Claim 1 of the Flick '876 patent is not patentably distinct from the "downloading interface" of Claim 1 of the Flick '278 patent.
4. The multi-vehicle compatible tracking unit according to claim 1 wherein said downloading interface comprises a wireless signal downloading interface.	Claims 13 – 17 of the Flick '876 patent claim a variety of wireless transmitters and receivers.
5. The multi-vehicle compatible tracking unit according to claim 4 wherein said wireless signal downloading interface comprises a wireless receiver for temporary connection to a downloading device.	It is inherently disclosed that the wireless signal downloading interfaces as claimed in Claims 13 – 17 of the Flick '876 patent utilize temporary connections.
9. The multi-vehicle compatible tracking unit according to claim 1 further comprising a remote transmitter; and wherein said multi-vehicle compatible controller also performs at least one vehicle remote control function responsive to said remote transmitter.	Claim 13 of the Flick '876 patent includes "wherein said transmitter comprises a remote handheld transmitter to be carried by a user when away from the vehicle; and wherein said receiver is at the vehicle."
10. The multi-vehicle compatible tracking unit according to claim 9 wherein the at least one vehicle remote control function comprises at least one of a vehicle security function, a remote keyless entry function, and a remote engine starting function.	Claim 6 of the Flick '876 patent includes "wherein the at least one vehicle device comprises an alarm indicating device; and wherein the at least one set of command signals is for operating the alarm indicating device." Claim 7 of the Flick '876 patent includes "wherein the at least one vehicle device comprises at least one vehicle door lock actuator; and wherein the at least one set of command signals is for operating the at least one door lock actuator.

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	Claim 8 of the Flick '876 patent includes "where the at least one vehicle device comprises at least one device relating to starting a vehicle engine; and wherein the at least one set of command signals is for operating the at least one vehicle device relating to starting the vehicle engine."
13. A multi-vehicle compatible tracking unit for a vehicle comprising a vehicle data bus extending throughout the vehicle, the multi-vehicle compatible vehicle tracking unit comprising, lines	Claim 1 of the Flick '876 patent includes "A control system for a vehicle comprising a data communications bus and at least one vehicle device connected to the data communications bus."
a vehicle position determining device;	It is notoriously well-known to one of ordinary skill in the art that a vehicle device as in Claim 1 of the Flick '876 patent can include a GPS receiver.
a wireless communications device;	Claim 1 of the Flick '876 patent includes "a transmitter and a receiver for receiving signals from said transmitter."
a multi-vehicle compatible controller for cooperating with said vehicle position determining device and said wireless communications device to send vehicle position information;	Claim 16 of the Flick '876 patent includes "wherein said receiver comprises at least a central station transmitter; and wherein said transmitter is at the vehicle." As the transmitter is in the vehicle, it would have been obvious to transmit data from a vehicle device connected to the controller.
said multi-vehicle compatible controller to be coupled to the vehicle data bus for communication thereover with at least one vehicle device using at least one corresponding vehicle device code from among a plurality thereof for different vehicles;	Claim 12 of the Flick '876 patent includes: "wherein said multi-vehicle compatible controller is further for storing a set of device codes for a given vehicle device for a plurality of different vehicles, for reading a device code from the data communications bus, and for determining a match between a read device code and the stored device codes to thereby provide reading compatibility with a plurality of different vehicles."
and a downloading interface for permitting downloading of enabling data related to the at least one corresponding vehicle device code	Claim 1 of the Flick '876 patent includes "a transmitter and a receiver for receiving signals from said transmitter." The Flick '460 patent, incorporated by reference in its entirety in col. 10, lines 25 – 36 of the Flick '876 patent, states "a transmitter and receiver 13 are connected to the CPU 12 for receiving signals from a remote transmitter and for transmitting signals to a remote unit." (Flick '460 patent, col. 4, lines 50 – 54). "The desired signal enabling means 17"' includes a signal

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for use by said multi-vehicle compatible controller;	set memory 81 operatively connected to the schematically illustrated download learning means 84. The download learning means 84 may include an interface connected to the illustrated vehicle cellular telephone 86 to permit learning or downloading of the desired signal set from a remote or central monitoring and control station 88." As the Flick '460 patent teaches the "transmitter and receiver" (i.e. cellular telephone) can be utilized to permit the downloading of enabling data to a "download learning means," the cited aspect of Claim 1 of the Flick '876 patent is not patentably distinct from the "downloading interface" of Claim 1 of the Flick '278 patent.
said downloading interface comprising a connector for temporary connection to a downloading device.	Claims 13 – 17 of the Flick '876 patent claim a variety of wireless transmitters and receivers. It is inherently disclosed that the wireless signal downloading interfaces as claimed in Claims 13 – 17 of the Flick '876 patent utilize temporary connections.
17. The multi-vehicle compatible tracking unit according to claim 13 further comprising a remote transmitter; and wherein said multi-vehicle compatible controller also performs at least one vehicle remote control function responsive to said remote transmitter.	Claim 13 of the Flick '876 patent includes "wherein said transmitter comprises a remote handheld transmitter to be carried by a user when away from the vehicle; and wherein said receiver is at the vehicle."
18. A multi-vehicle compatible tracking unit for a vehicle comprising a vehicle data bus extending throughout the vehicle, the multi-vehicle compatible vehicle tracking unit comprising, lines	Claim 1 of the Flick '876 patent includes "A control system for a vehicle comprising a data communications bus and at least one vehicle device connected to the data communications bus."
a vehicle position determining device;	It is notoriously well-known to one of ordinary skill in the art that a vehicle device as in Claim 1 of the Flick '876 patent can include a GPS receiver.
a wireless communications device;	Claim 1 of the Flick '876 patent includes "a transmitter and a receiver for receiving signals from said transmitter."

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a multi-vehicle compatible controller for cooperating with said vehicle position determining device and said wireless communications device to send vehicle position information;	Claim 16 of the Flick '876 patent includes "wherein said receiver comprises at least a central station transmitter; and wherein said transmitter is at the vehicle." As the transmitter is in the vehicle, it would have been obvious to transmit data from a vehicle device connected to the controller.
said multi-vehicle compatible controller to be coupled to the vehicle data bus for communication thereover with at least one vehicle device using at least one corresponding vehicle device code from among a plurality thereof for different vehicles;	Claim 12 of the Flick '876 patent includes: "wherein said multi-vehicle compatible controller is further for storing a set of device codes for a given vehicle device for a plurality of different vehicles, for reading a device code from the data communications bus, and for determining a match between a read device code and the stored device codes to thereby provide reading compatibility with a plurality of different vehicles."
and a downloading interface for permitting downloading of enabling data related to the at least one corresponding vehicle device code for use by said multi-vehicle compatible controller;	Claim 1 of the Flick '876 patent includes "a transmitter and a receiver for receiving signals from said transmitter." The Flick '460 patent, incorporated by reference in its entirety in col. 10, lines 25 – 36 of the Flick '876 patent, states "a transmitter and receiver 13 are connected to the CPU 12 for receiving signals from a remote transmitter and for transmitting signals to a remote unit." (Flick '460 patent, col. 4, lines 50 – 54). "The desired signal enabling means 17"' includes a signal set memory 81 operatively connected to the schematically illustrated download learning means 84. The download learning means 84 may include an interface connected to the illustrated vehicle cellular telephone 86 to permit learning or downloading of the desired signal set from a remote or central monitoring and control station 88." As the Flick '460 patent teaches the "transmitter and receiver" (i.e. cellular telephone) can be utilized to permit the downloading of enabling data to a "download learning means," the cited aspect of Claim 1 of the Flick '876 patent is not patentably distinct from the "downloading interface" of Claim 1 of the Flick '278 patent.
said downloading interface comprising a wireless receiver for temporary connection to a downloading device.	Claims 13 – 17 of the Flick '876 patent claim a variety of wireless transmitters and receivers. It is inherently disclosed that the wireless signal downloading interfaces as claimed in Claims 13 – 17 of the Flick '876 patent utilize temporary connections.

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22. The multi-vehicle compatible tracking unit according to claim 18 further comprising a remote transmitter; and wherein said multi-vehicle compatible controller also performs at least one vehicle remote control function responsive to said remote transmitter.	Claim 13 of the Flick '876 patent includes "wherein said transmitter comprises a remote handheld transmitter to be carried by a user when away from the vehicle; and wherein said receiver is at the vehicle."

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Exhibit A

US008032278B2

(12) **United States Patent**
Flick

(10) **Patent No.: US 8,032,278 B2**
(45) **Date of Patent: Oct. 4, 2011**

(54) **VEHICLE TRACKING UNIT WITH DOWNLOADABLE CODES AND ASSOCIATED METHODS**

(75) Inventor: **Kenneth E. Flick**, Douglasville, GA (US)

(73) Assignee: **Omega Patents, L.L.C.**, Douglasville, GA (US)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 840 days.

(21) Appl. No.: 11/773,272

(22) Filed: Jul. 3, 2007

(65) **Prior Publication Data**

US 2007/0279283 A1 Dec. 6, 2007

Related U.S. Application Data

(63) Continuation-in-part of application No. 11/076,259, filed on Mar. 9, 2005, now Pat. No. 7,720,597, which is a continuation of application No. 10/383,496, filed on Mar. 7, 2003, now Pat. No. 7,149,623, which is a continuation of application No. 09/859,972, filed on May 17, 2001, now Pat. No. 6,606,561.

(60) Provisional application No. 60/264,811, filed on Jan. 29, 2001, provisional application No. 60/258,005, filed on Dec. 22, 2000, provisional application No. 60/251,552, filed on Dec. 6, 2000, provisional application No. 60/252,125, filed on Nov. 20, 2000, provisional application No. 60/236,890, filed on Sep. 29, 2000, provisional application No. 60/246,463, filed on Nov. 7, 2000, provisional application No. 60/222,777, filed on Aug. 3, 2000, provisional application No. 60/205,178, filed on May 17, 2000.

(51) **Int. Cl.**
G01C 21/00 (2006.01)

(52) **U.S. Cl.** 701/36; 701/33; 382/104; 382/988; 455/575.9

(58) **Field of Classification Search** 701/36, 701/207–209; 340/500, 506, 515, 531, 533–534
See application file for complete search history.

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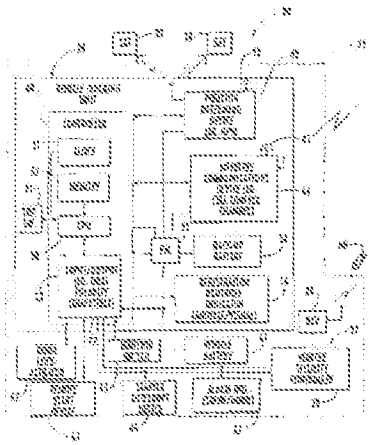
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Primary Examiner — Cuong H Nguyen
(74) *Attorney, Agent, or Firm* — Allen, Dyer, Doppelt, Milbrath & Gilchrist, P.A.

(57) **ABSTRACT**

A multi-vehicle compatible tracking unit is for a vehicle including a vehicle data bus extending throughout the vehicle. The vehicle tracking unit may include a vehicle position determining device, a wireless communications device, and a multi-vehicle compatible controller for cooperating with the vehicle position determining device and the wireless communications device to send vehicle position information. The multi-vehicle compatible controller may be coupled to the vehicle data bus for communication thereover with at least one vehicle device using at least one corresponding vehicle device code from among a plurality thereof for different vehicles. A downloading interface may be included for permitting downloading of enabling data related to the at least one corresponding vehicle device code for use by the multi-vehicle compatible controller.

22 Claims, 13 Drawing Sheets



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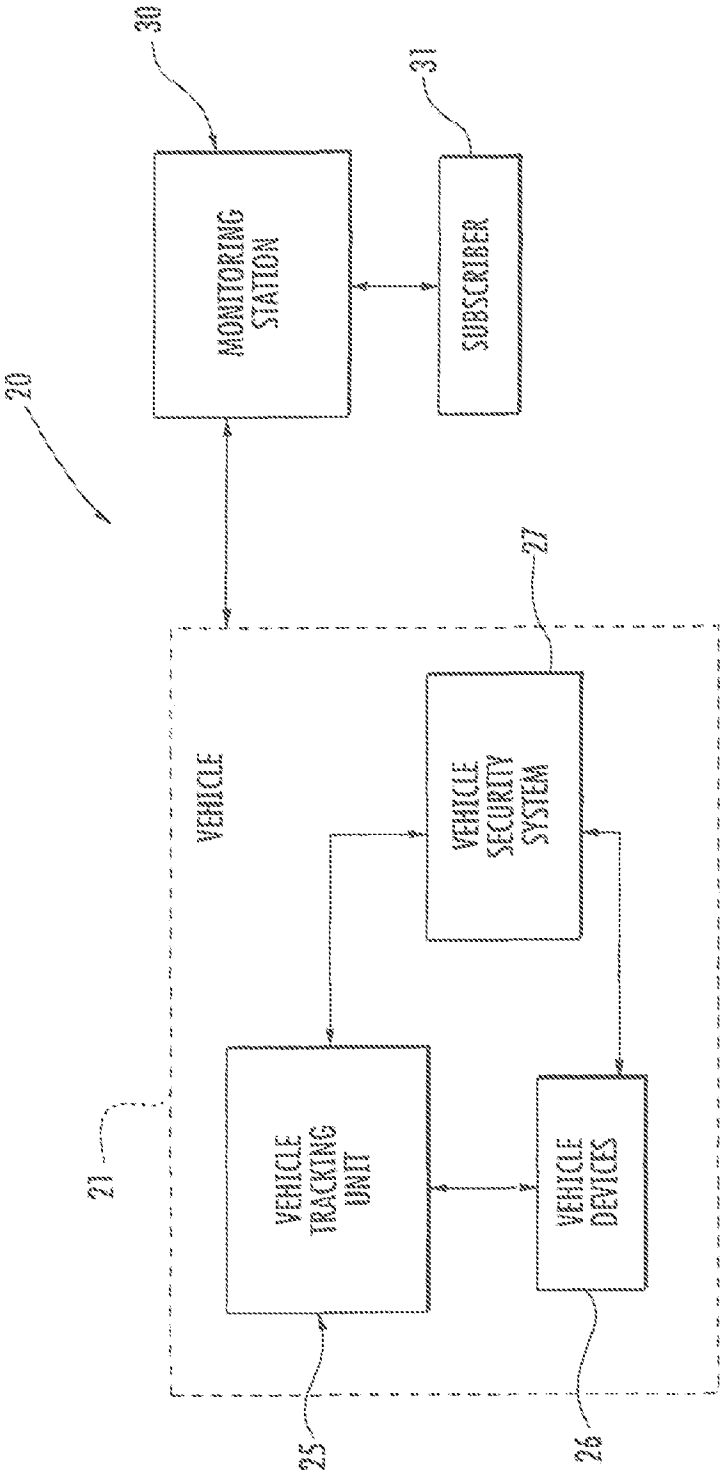

30
31
MONITORING STATION
SUBSCRIBER
20
27
VEHICLE
VEHICLE SECURITY SYSTEM
21
VEHICLE TRACKING UNIT
VEHICLE DEVICES
25
26

FIG. 1

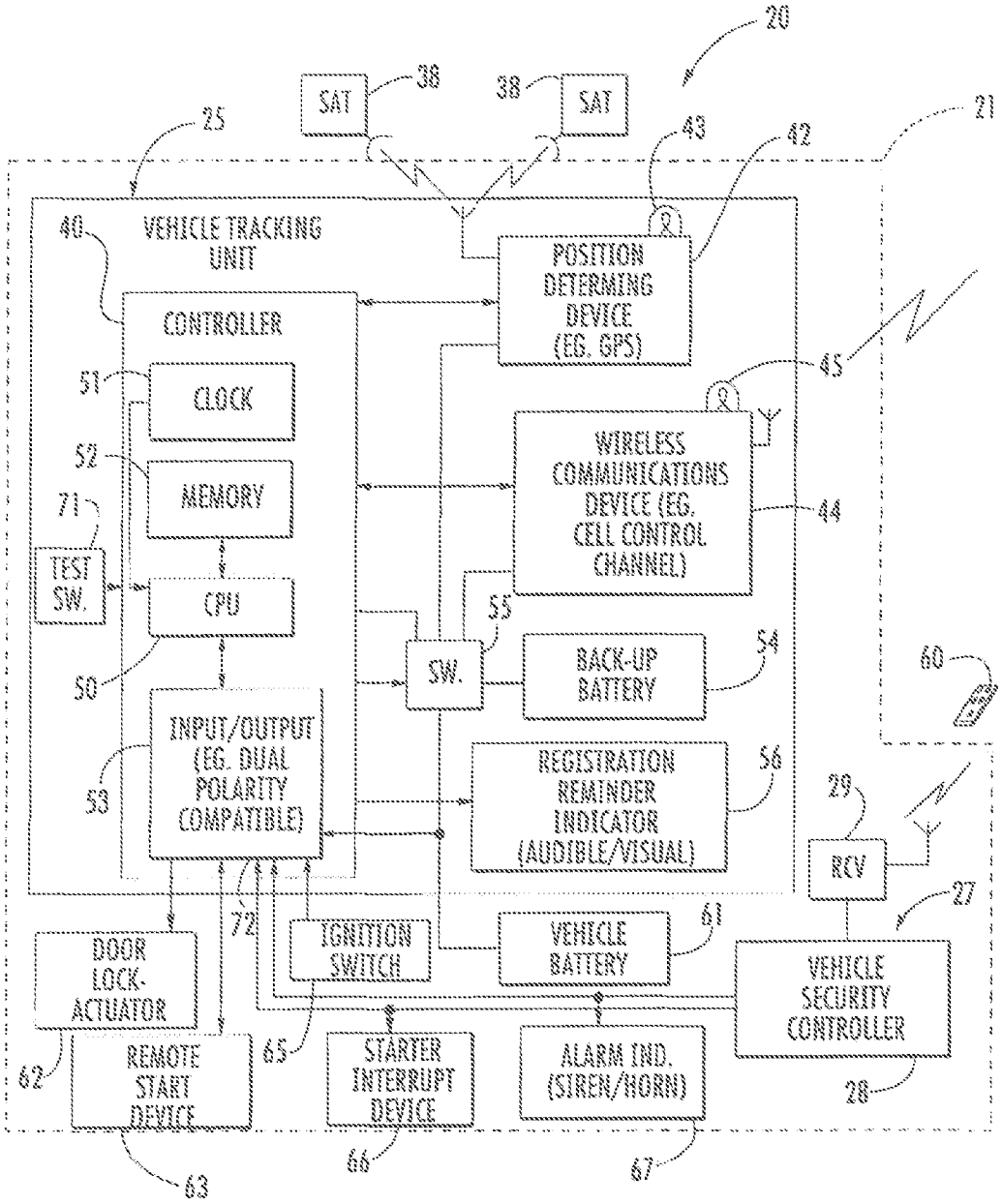

20
SAT
38
38
SAT
25
21
43
42
40
VEHICLE TRACKING UNIT
POSITION DETERMING DEVICE (EG. GPS)
CONTROLLER
45
51
CLOCK
52
MEMORY
WIRELESS COMMUNICATIONS DEVICE (EG. CELL CONTROL CHANNEL)
44
71
TEST SW.
CPU
55
SW.
BACK-UP BATTERY
54
60
50
INPUT/OUTPUT (EG. DUAL POLARITY COMPATIBLE)
53
REGISTRATION REMINDER INDICATOR (AUDIBLE/VISUAL)
56
29
RCV
27
72
DOOR LOCK-ACTUATOR
IGNITION SWITCH
VEHICLE BATTERY
61
VEHICLE SECURITY CONTROLLER
62
REMOTE START DEVICE
65
STARTER INTERRUPT DEVICE
ALARM IND. (SIREN/HORN)
28
63
66
67

FIG. 2

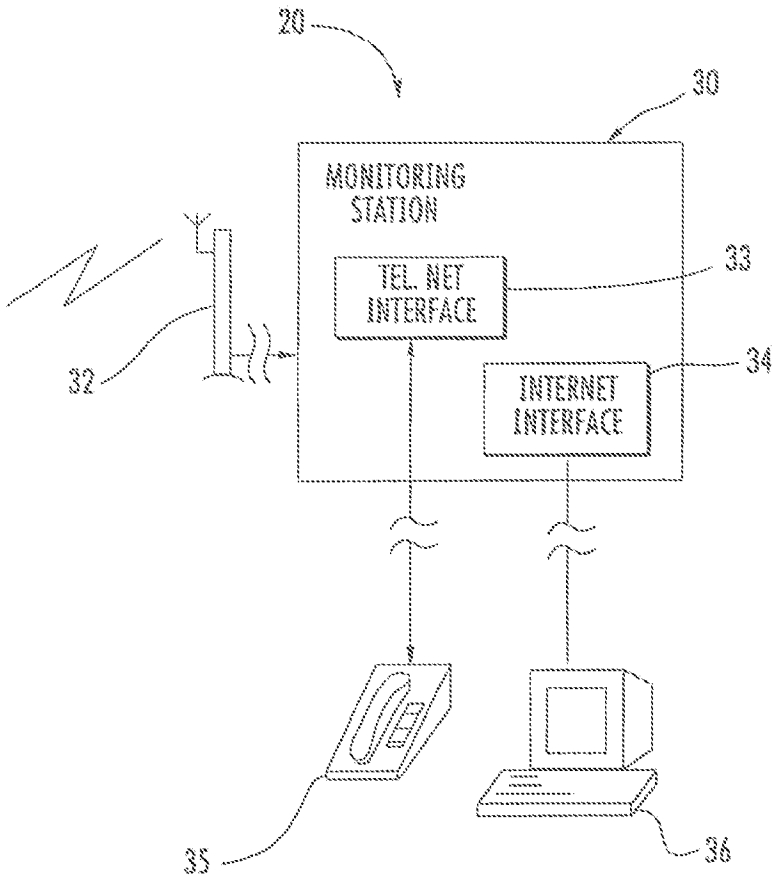

20
30
MONITORING STATION
TEL. NET INTERFACE
33
INTERNET INTERFACE
34
32
35
36

FIG. 3

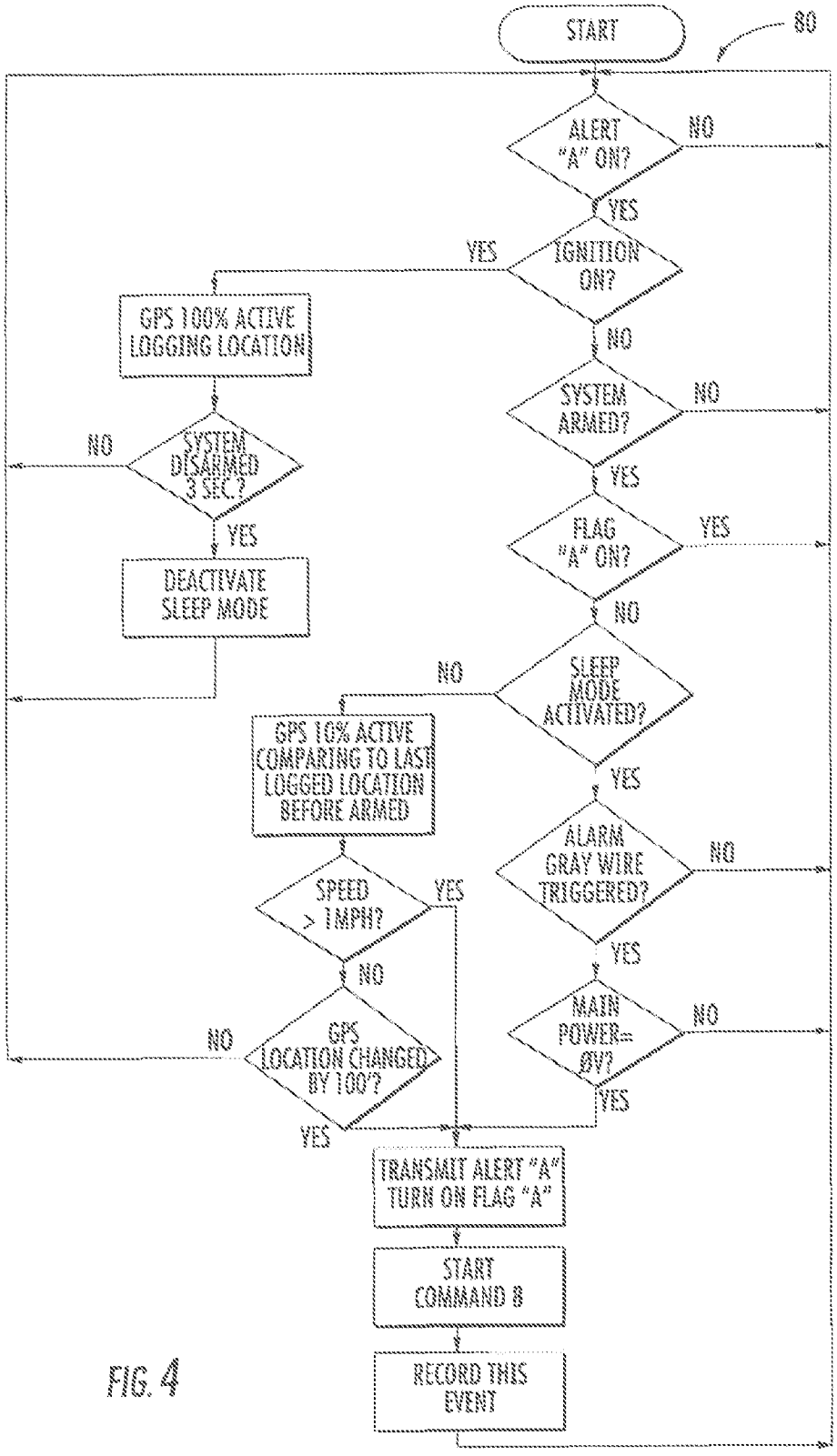

START
80
ALERT "A" ON?
NO
YES
IGNITION ON?
YES
GPS 100% ACTIVE LOGGING LOCATION
NO
SYSTEM ARMED?
NO
YES
SYSTEM DISARMED 3 SEC.?
NO
YES
FLAG "A" ON?
YES
DEACTIVATE SLEEP MODE
NO
SLEEP MODE ACTIVATED?
NO
GPS 10% ACTIVE COMPARING TO LAST LOGGED LOCATION BEFORE ARMED
YES
ALARM GRAY WIRE TRIGGERED?
NO
SPEED > 1MPH?
YES
YES
NO
MAIN POWER= 0V?
NO
GPS LOCATION CHANGED BY 100'?
NO
YES
YES
TRANSMIT ALERT "A" TURN ON FLAG "A"
START COMMAND 8
RECORD THIS EVENT

FIG. 4

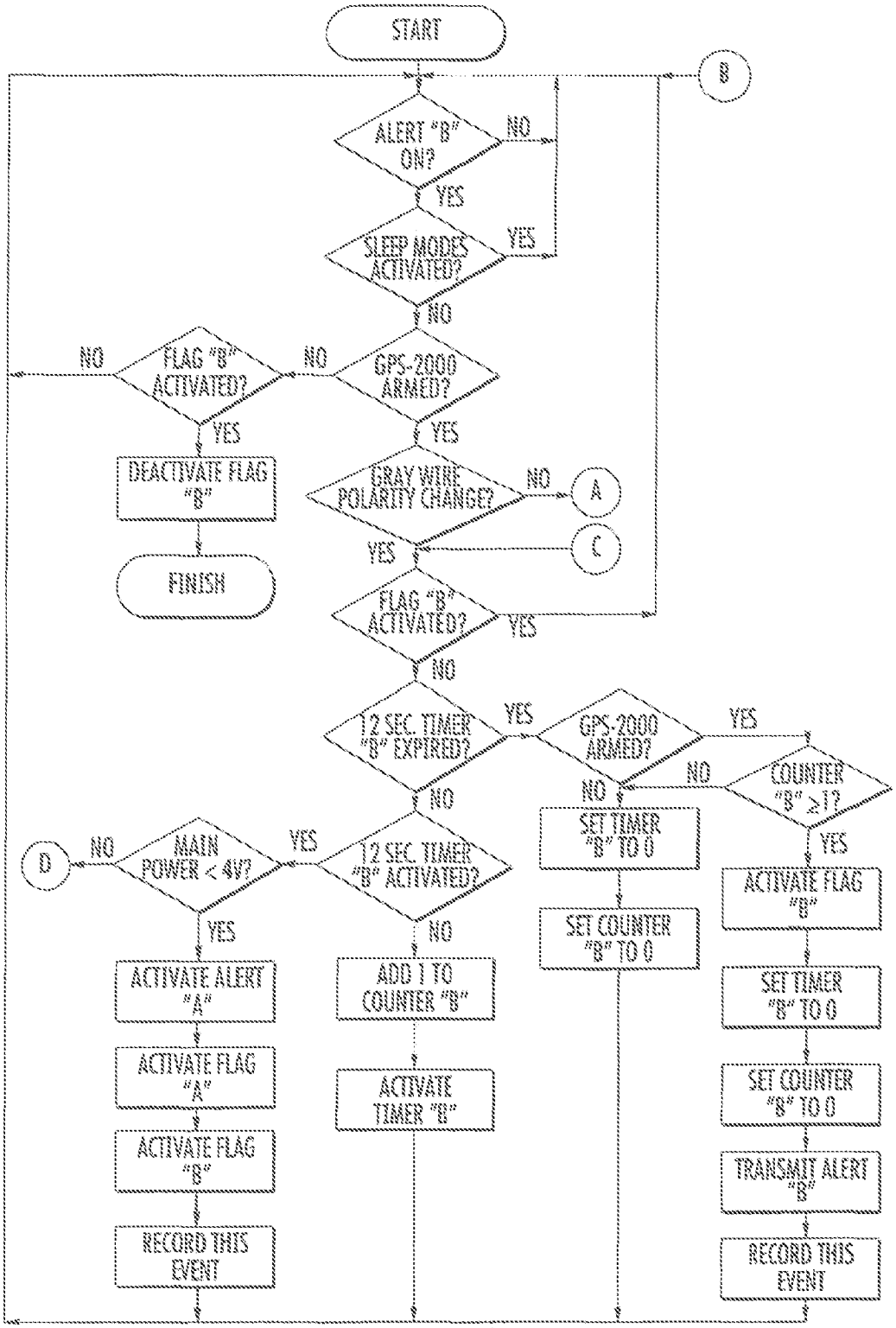

START
B
ALERT "B" ON?
NO
YES
SLEEP MODES ACTIVATED?
YES
NO
NO
FLAG "B" ACTIVATED?
NO
GPS-2000 ARMED?
YES
YES
DEACTIVATE FLAG "B"
GRAY WIRE POLARITY CHANGE?
NO
A
C
YES
FINISH
FLAG "B" ACTIVATED?
YES
NO
12 SEC. TIMER "B" EXPIRED?
YES
GPS-2000 ARMED?
YES
NO
NO
COUNTER "B" ≥1?
NO
SET TIMER "B" TO 0
YES
D
NO
MAIN POWER < 4V?
YES
12 SEC. TIMER "B" ACTIVATED?
YES
NO
NO
SET COUNTER "B" TO 0
ACTIVATE FLAG "B"
ACTIVATE ALERT "A"
ADD 1 TO COUNTER "B"
SET TIMER "B" TO 0
ACTIVATE FLAG "A"
ACTIVATE TIMER "B"
SET COUNTER "B" TO 0
ACTIVATE FLAG "B"
TRANSMIT ALERT "B"
RECORD THIS EVENT
RECORD THIS EVENT

FIG. 5A

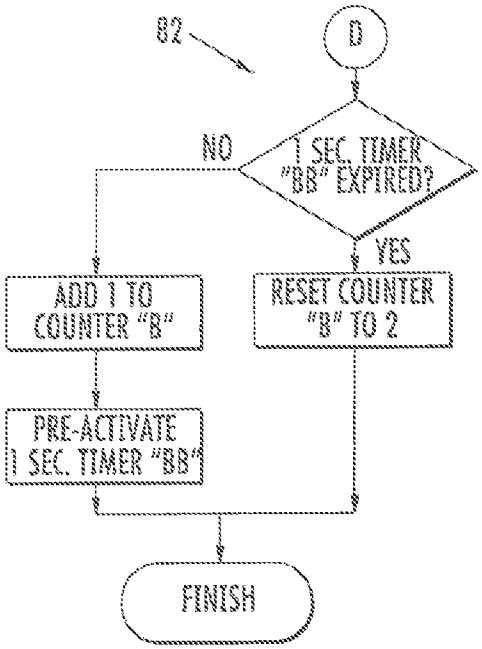

82
D
1 SEC. TIMER "BB" EXPIRED?
NO
YES
ADD 1 TO COUNTER "B"
RESET COUNTER "B" TO 2
PRE-ACTIVATE 1 SEC. TIMER "BB"
FINISH

FIG. 5B

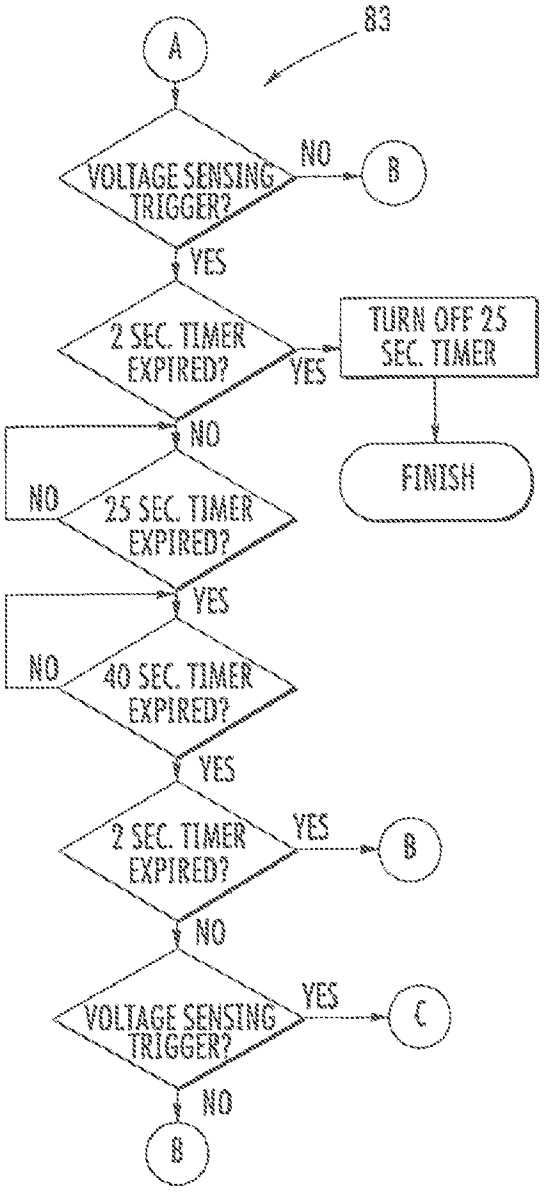

83
A
VOLTAGE SENSING TRIGGER?
NO
B
YES
2 SEC. TIMER EXPIRED?
YES
TURN OFF 25 SEC. TIMER
FINISH
NO
NO
25 SEC. TIMER EXPIRED?
YES
NO
40 SEC. TIMER EXPIRED?
YES
2 SEC. TIMER EXPIRED?
YES
B
NO
VOLTAGE SENSING TRIGGER?
YES
C
NO
B

FIG. 5C

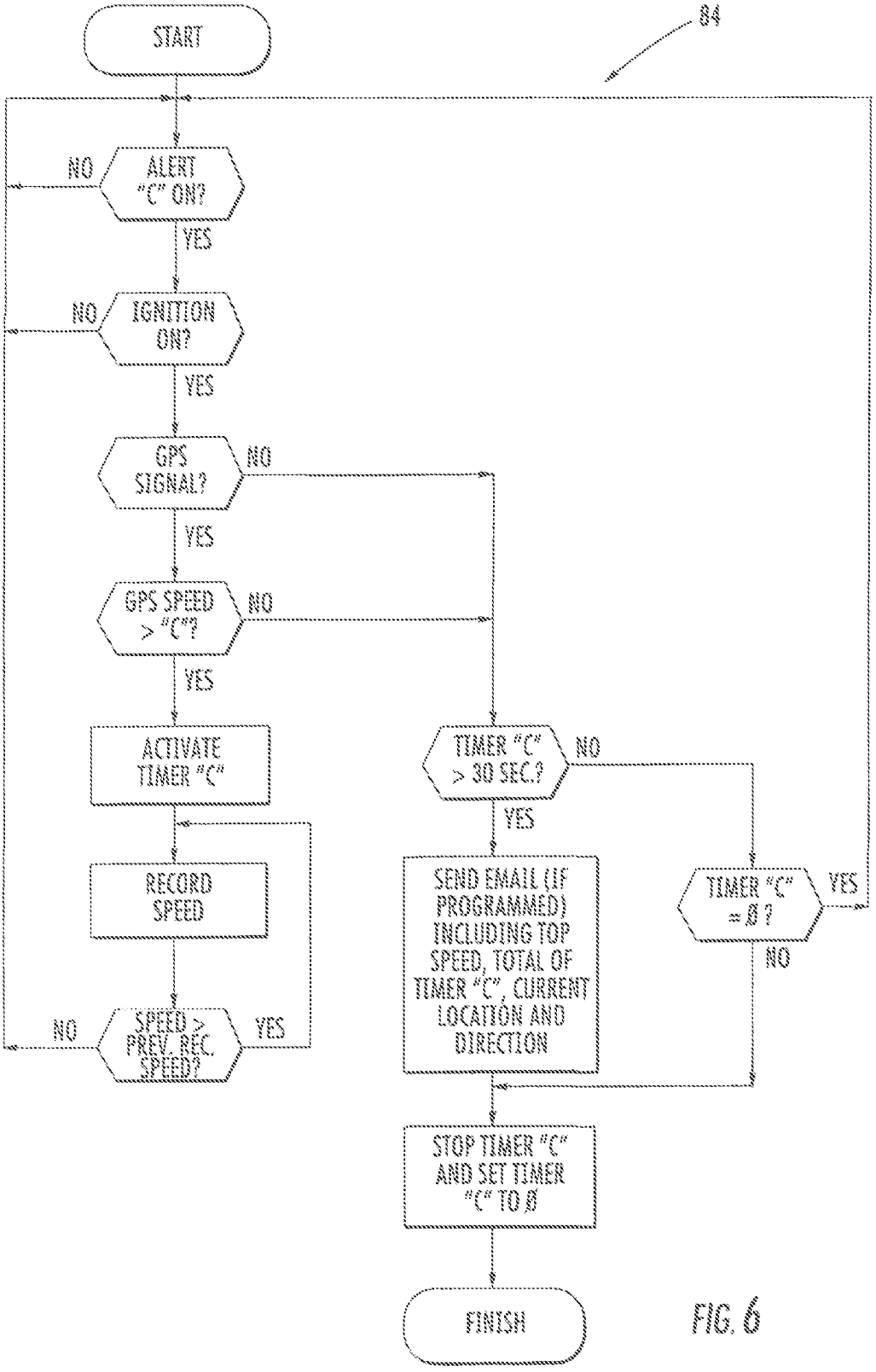

84
START
ALERT "C" ON?
NO
YES
IGNITION ON?
NO
YES
GPS SIGNAL?
NO
YES
GPS SPEED > "C"?
NO
YES
ACTIVATE TIMER "C"
RECORD SPEED
SPEED > PREV. REC. SPEED?
NO
YES
TIMER "C" > 30 SEC.?
NO
YES
SEND EMAIL (IF PROGRAMMED) INCLUDING TOP SPEED, TOTAL OF TIMER "C", CURRENT LOCATION AND DIRECTION
TIMER "C" = Ø ?
YES
NO
STOP TIMER "C" AND SET TIMER "C" TO Ø
FINISH

FIG. 6

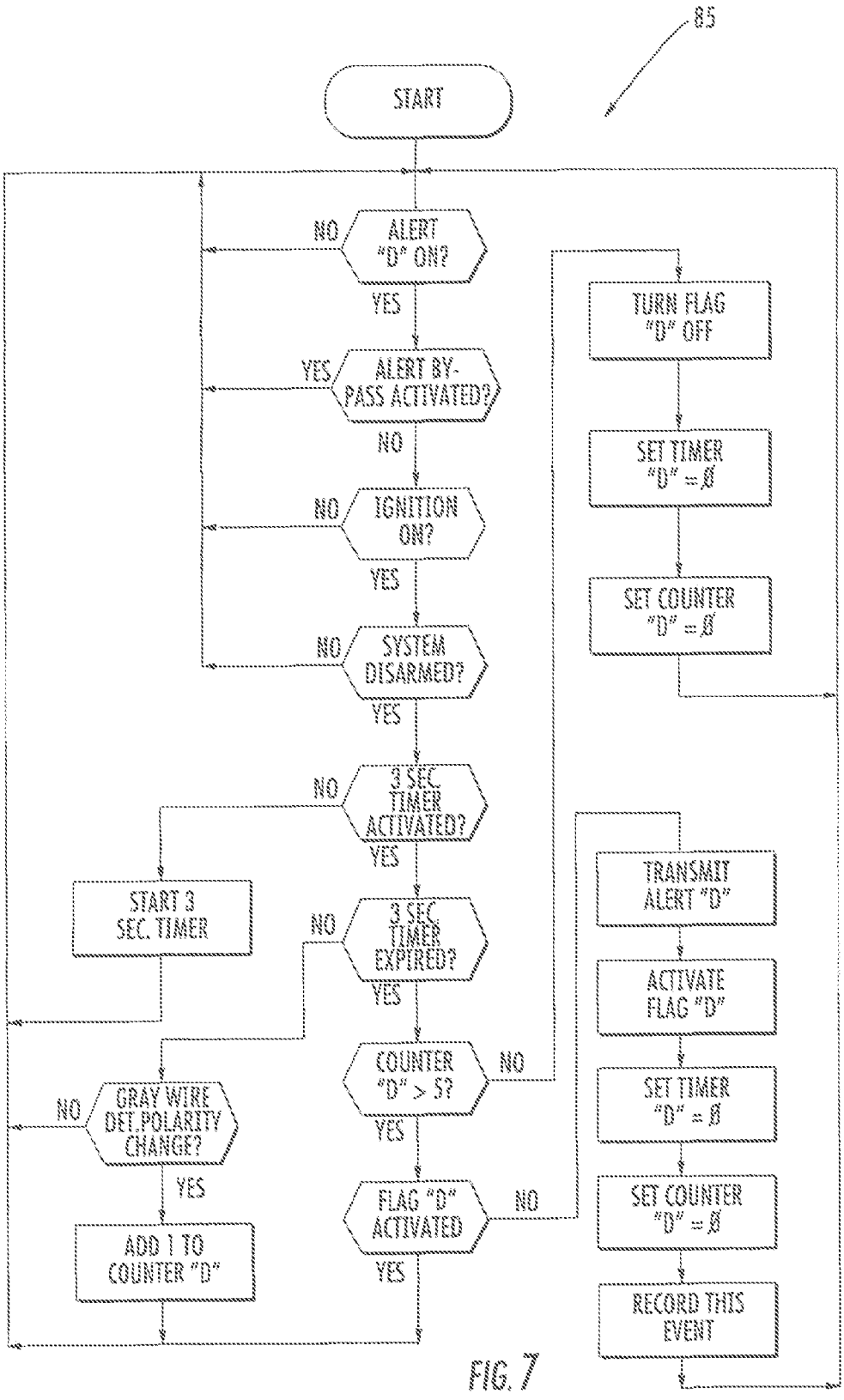

85
START
ALERT "D" ON?
NO
YES
ALERT BY-PASS ACTIVATED?
YES
NO
IGNITION ON?
NO
YES
SYSTEM DISARMED?
NO
YES
3 SEC. TIMER ACTIVATED?
NO
YES
START 3 SEC. TIMER
3 SEC. TIMER EXPIRED?
NO
YES
COUNTER "D" > 5?
NO
YES
GRAY WIRE DET. POLARITY CHANGE?
NO
YES
ADD 1 TO COUNTER "D"
FLAG "D" ACTIVATED
NO
YES
TURN FLAG "D" OFF
SET TIMER "D" = Ø
SET COUNTER "D" = Ø
TRANSMIT ALERT "D"
ACTIVATE FLAG "D"
SET TIMER "D" = Ø
SET COUNTER "D" = Ø
RECORD THIS EVENT

FIG. 7

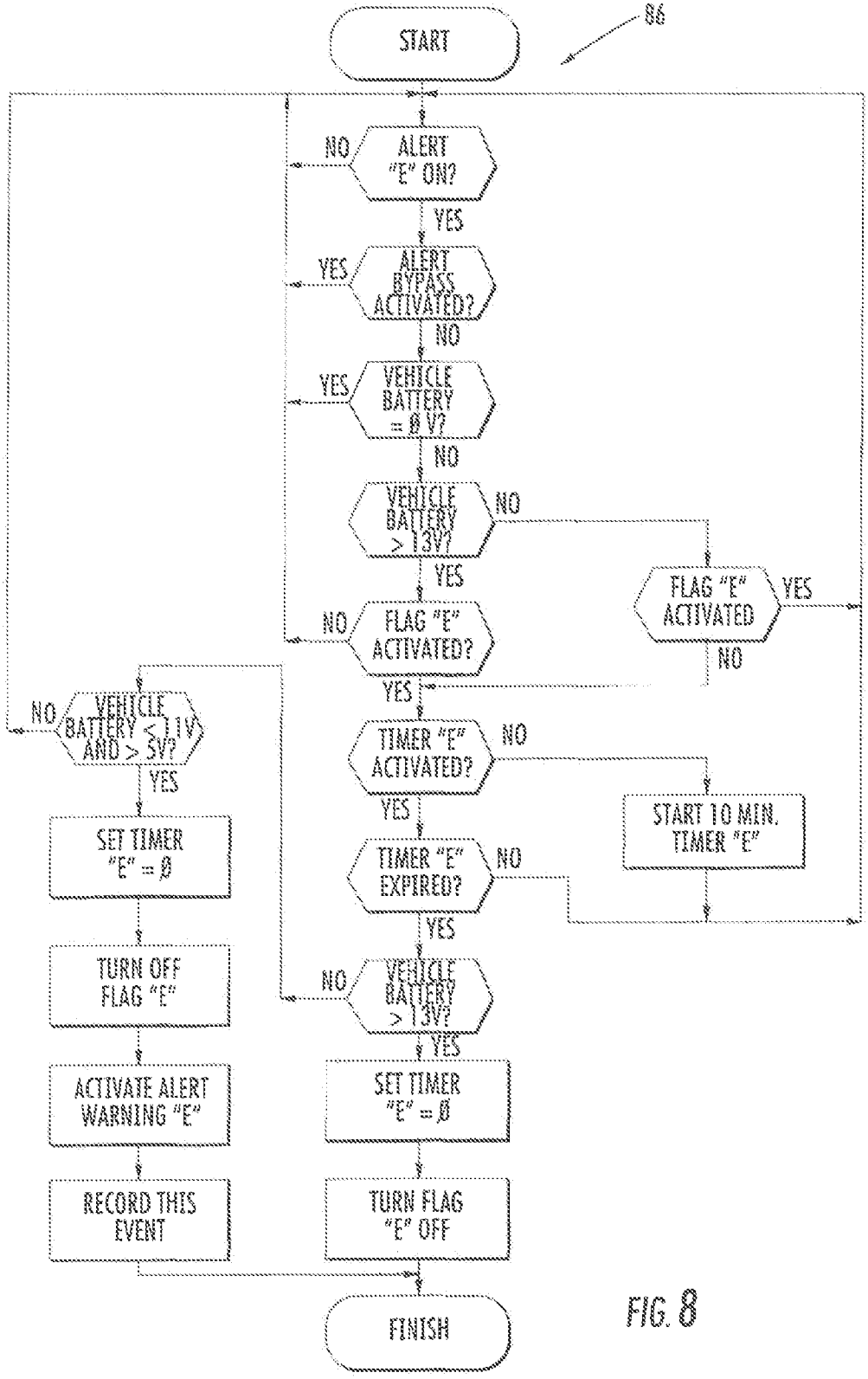

86
START
ALERT "E" ON?
NO
YES
ALERT BYPASS ACTIVATED?
YES
NO
VEHICLE BATTERY = 0 V?
YES
NO
VEHICLE BATTERY > 13V?
NO
YES
FLAG "E" ACTIVATED?
NO
YES
FLAG "E" ACTIVATED
YES
NO
VEHICLE BATTERY < 11V AND > 5V?
NO
YES
TIMER "E" ACTIVATED?
NO
YES
START 10 MIN. TIMER "E"
SET TIMER "E" = 0
TIMER "E" EXPIRED?
NO
YES
TURN OFF FLAG "E"
VEHICLE BATTERY > 13V?
NO
YES
ACTIVATE ALERT WARNING "E"
SET TIMER "E" = 0
RECORD THIS EVENT
TURN FLAG "E" OFF
FINISH

FIG. 8

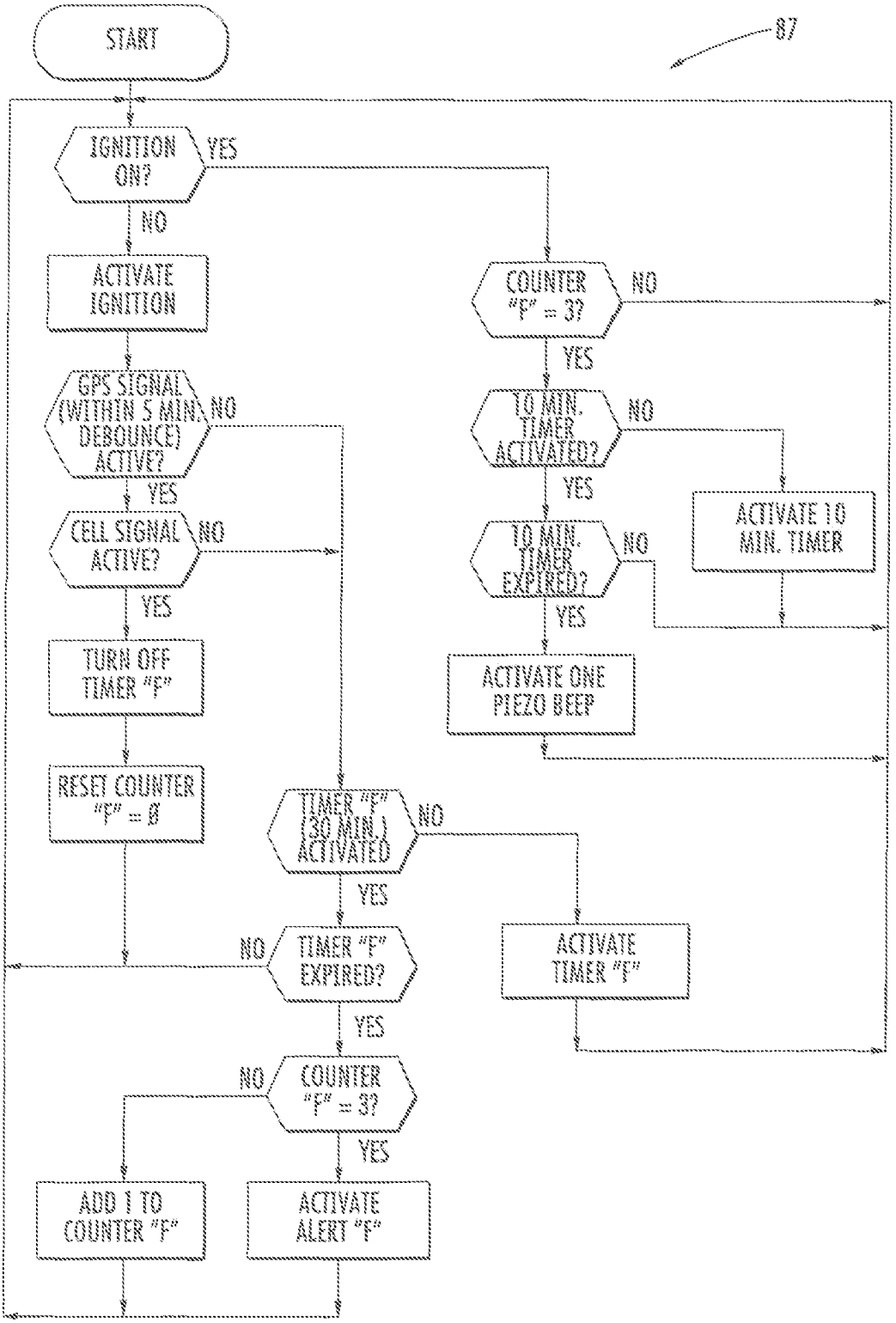

87
START
IGNITION ON?
YES
NO
ACTIVATE IGNITION
GPS SIGNAL (WITHIN 5 MIN. DEBOUNCE) ACTIVE?
NO
YES
CELL SIGNAL ACTIVE?
NO
YES
TURN OFF TIMER "F"
RESET COUNTER "F" = 0
TIMER "F" (30 MIN.) ACTIVATED
NO
YES
TIMER "F" EXPIRED?
NO
YES
COUNTER "F" = 3?
NO
YES
ADD 1 TO COUNTER "F"
ACTIVATE ALERT "F"
COUNTER "F" = 3?
NO
YES
10 MIN. TIMER ACTIVATED?
NO
YES
ACTIVATE 10 MIN. TIMER
10 MIN. TIMER EXPIRED?
NO
YES
ACTIVATE ONE PIEZO BEEP
ACTIVATE TIMER "F"

FIG. 9

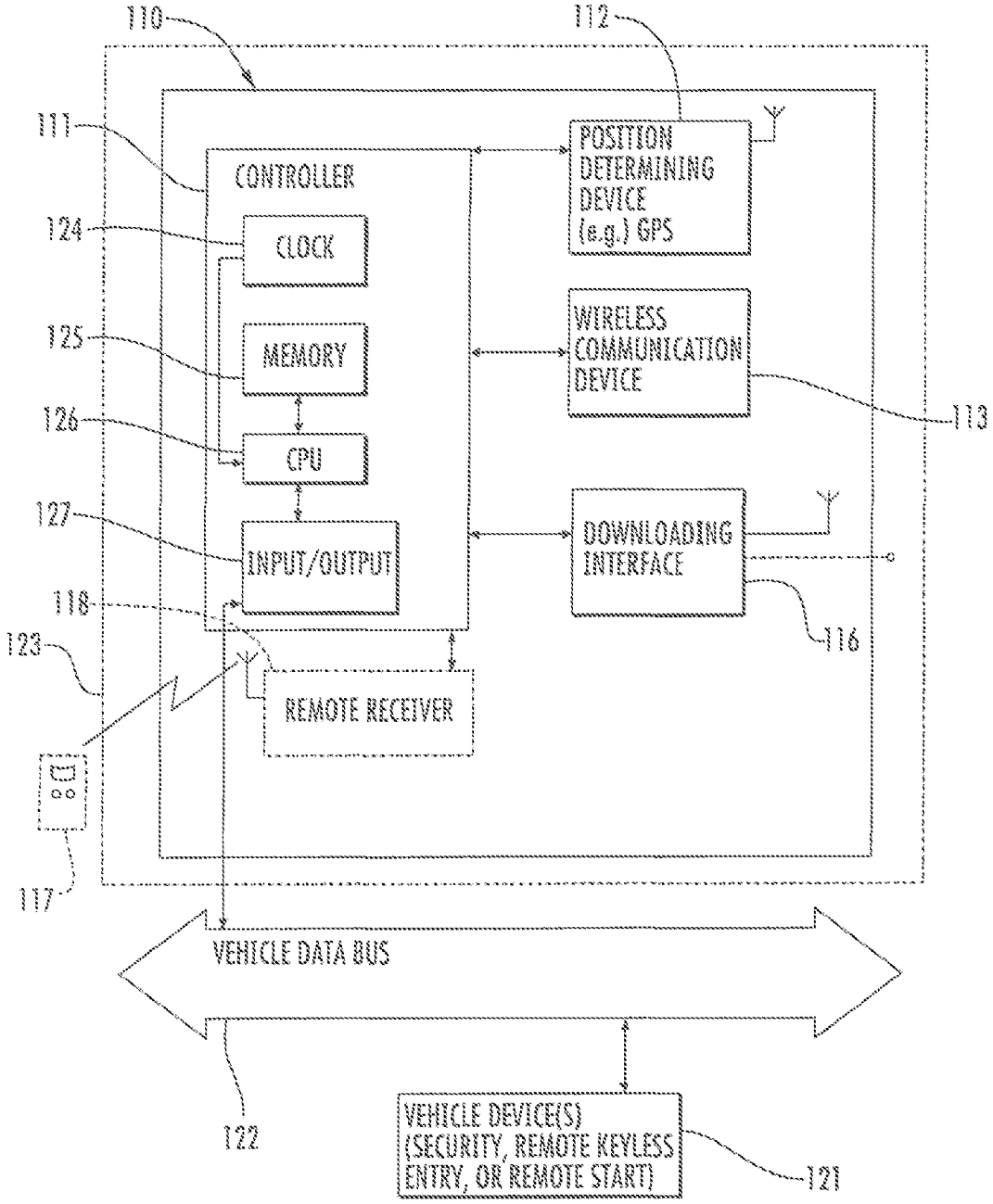

110
112
111
CONTROLLER
POSITION DETERMINING DEVICE (e.g.) GPS
124
CLOCK
125
MEMORY
WIRELESS COMMUNICATION DEVICE
113
126
CPU
127
INPUT/OUTPUT
DOWNLOADING INTERFACE
118
116
123
REMOTE RECEIVER
117
VEHICLE DATA BUS
122
VEHICLE DEVICE(S) (SECURITY, REMOTE KEYLESS ENTRY, OR REMOTE START)
121

FIG. 10

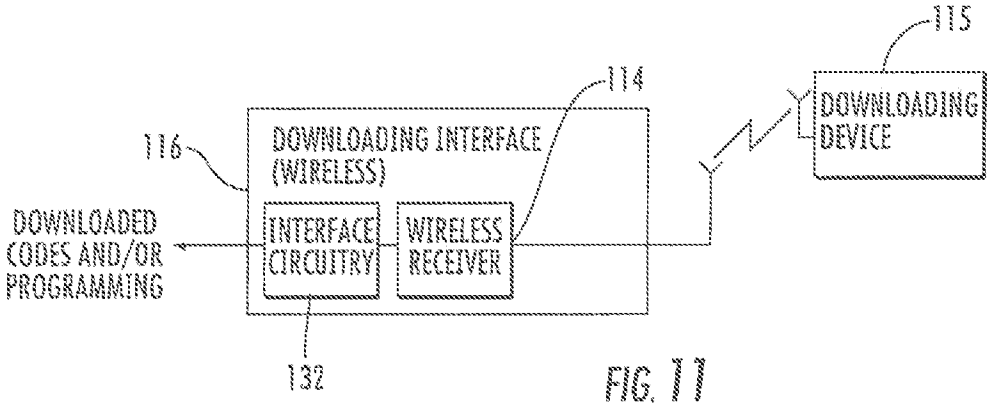


FIG. 11

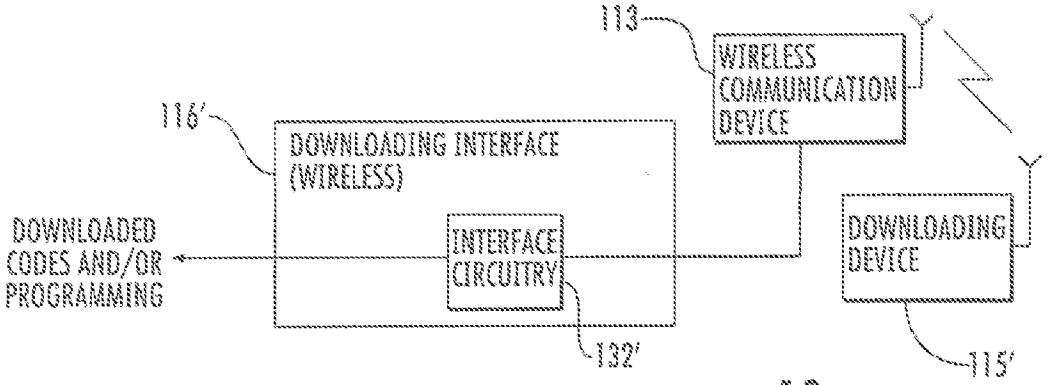


FIG. 12

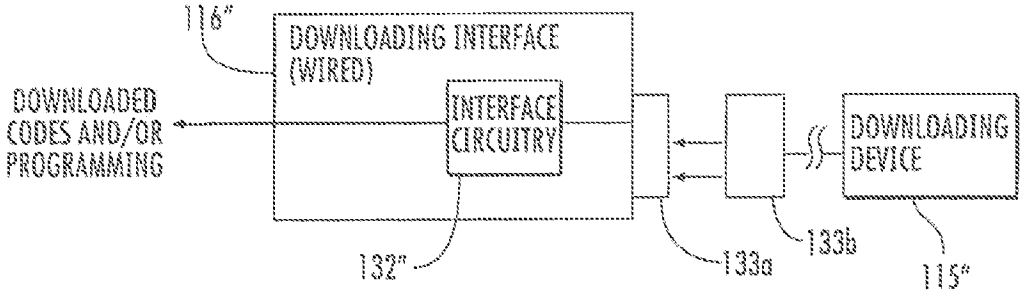


FIG. 13

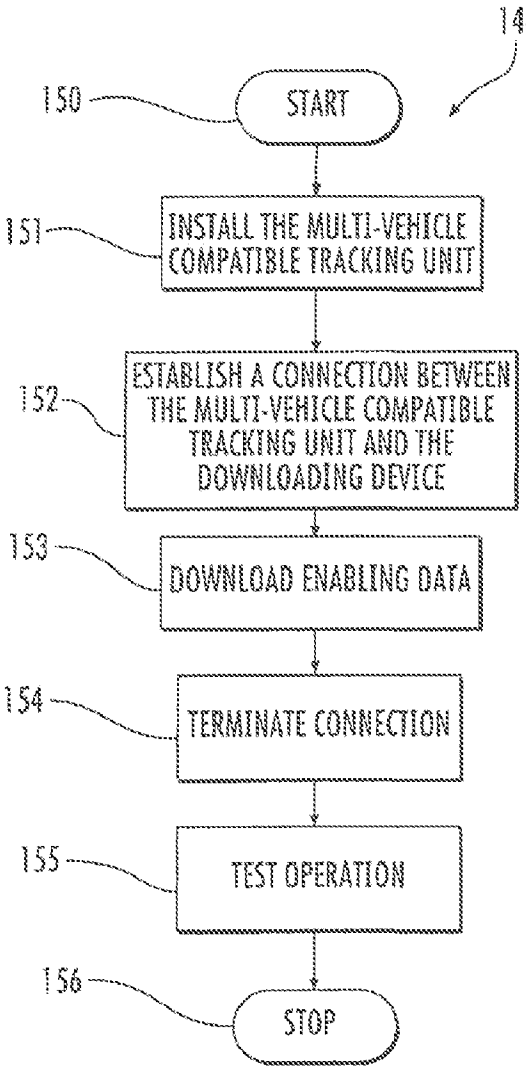

148
150
START
151
INSTALL THE MULTI-VEHICLE COMPATIBLE TRACKING UNIT
152
ESTABLISH A CONNECTION BETWEEN THE MULTI-VEHICLE COMPATIBLE TRACKING UNIT AND THE DOWNLOADING DEVICE
153
DOWNLOAD ENABLING DATA
154
TERMINATE CONNECTION
155
TEST OPERATION
156
STOP

FIG. 14

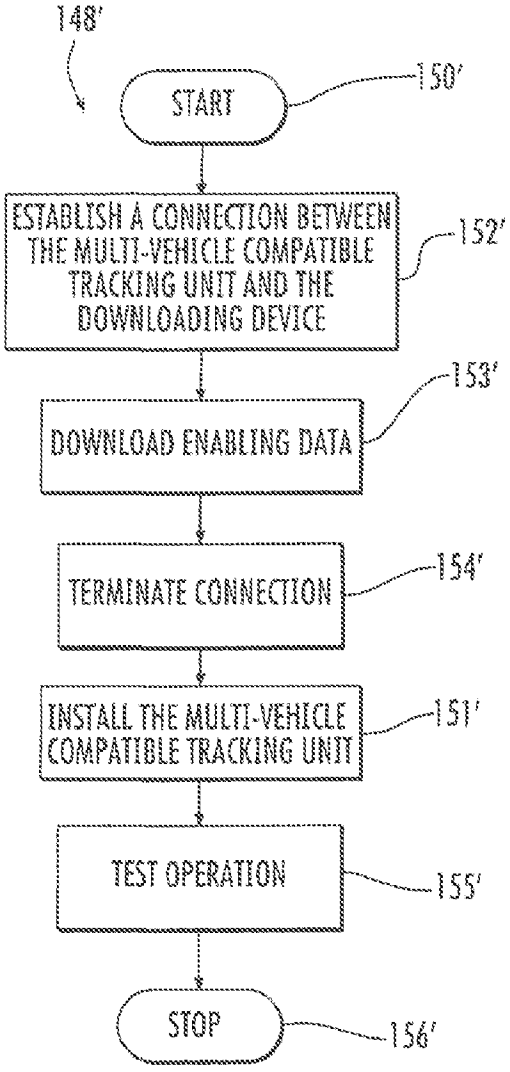

148'
150'
START
152'
ESTABLISH A CONNECTION BETWEEN THE MULTI-VEHICLE COMPATIBLE TRACKING UNIT AND THE DOWNLOADING DEVICE
153'
DOWNLOAD ENABLING DATA
154'
TERMINATE CONNECTION
151'
INSTALL THE MULTI-VEHICLE COMPATIBLE TRACKING UNIT
155'
TEST OPERATION
156'
STOP

FIG. 15

VEHICLE TRACKING UNIT WITH DOWNLOADABLE CODES AND ASSOCIATED METHODS

RELATED APPLICATIONS

The present application is a continuation-in-part of U.S. patent application Ser. No. 11/076,259 filed Mar. 9, 2005 now U.S. Pat. No. 7,720,597, which is a continuation of U.S. patent application Ser. No. 10/383,496 filed Mar. 7, 2003 now U.S. Pat. No. 7,149,623, which is a continuation of U.S. patent application Ser. No. 09/859,972 filed on May 17, 2001 now U.S. Pat. No. 6,606,561 which, in turn, was based upon provisional patent application Ser. Nos. 60/264,811 filed on Jan. 29, 2001, 60/258,005, filed Dec. 22, 2000; 60/251,552, filed Dec. 6, 2000; 60/252,125, filed Nov. 20, 2000; 60/236,890, filed Sep. 29, 2000; 60/246,463, filed Nov. 7, 2000; 60/222,777, filed Aug. 3, 2000; and 60/205,178, filed May 17, 2000, the entire contents of each of which are incorporated herein by reference.

FIELD OF THE INVENTION

The present invention relates to the field of vehicle devices, and, more particularly, to a tracking system for vehicles, and related methods.

BACKGROUND OF THE INVENTION

Motor vehicles, such as passenger cars, trucks, busses, fleet vehicles, etc. are widely used and knowing the locations of such vehicles is often desired. For example, should a vehicle be stolen, it would be beneficial to know the vehicle's location so that authorities could be promptly and accurately directed to retrieve the vehicle. Indeed, the tracking system could plot the getaway path of the thief.

For a company with hired drivers, it may be desirable to know the driver's whereabouts during the course of the day. Similarly, a rental car agency or other fleet operator, for example, may wish to know the whereabouts of its fleet of vehicles.

It may also be desirable to track the location of a vehicle as it is used throughout the course of a normal day. For parents of younger or older drivers, for example, knowledge of the vehicle's location may provide some assurance that the driver is in designated locations and following a prescribed route.

A number of patents disclose various systems and approaches to tracking vehicles. For example, U.S. Pat. No. 5,223,844 discloses a tracking system including a control center and a mobile unit installed in the vehicle. The mobile unit may send security warnings to the command center via a wireless transceiver. Position information for the vehicle is determined using a GPS receiver at the vehicle.

U.S. Pat. No. 5,515,043 discloses a similar system which may send one or more preprogrammed telephone messages to a user when away from the vehicle. The user may remotely access location information or cause certain commands to be carried out by entering a personal identification number (PIN).

The widespread availability and use of the Internet has prompted a number of vehicle tracking systems to also make use of the Internet. For example, TelEvoke, Inc. proposed such a system in combination with Clifford Electronics. The system was to provide notification, control and tracking services via the telephone or the Internet. Users could be notified via phone, e-mail, or pager of events such as a car alarm being triggered. Users could control the vehicle remote devices via phone, web, or PDA such as unlocking car doors. Additionally, users could track TelEvoke-enabled vehicles on the Internet or via the telephone. An Internet map could be viewed by the user showing the actual and prior vehicle locations. TelEvoke offered its services via a centralized fully automated Network Operations Center. To reduce the communications costs, it was proposed to use the control channel of the cellular telephone network.

There are, of course, a number of vehicles which come from the manufacturer with some form of security system already installed. In addition, a number of vehicles are also equipped with aftermarket security systems. Many conventional vehicle tracking units may not be readily installed in vehicles, particularly those vehicles already including a vehicle security system. In addition, complexity of installation may significantly increase the system costs.

A number of patents disclose various security and control systems that address data bus interoperability. For example, U.S. Pat. No. 5,719,551, assigned to Omega Patents, L.L.C. the assignee of the present invention, discloses a vehicle security system for a vehicle including a data bus connecting a plurality of vehicle devices. A signal enabling circuit enables the alarm controller to operate using a set of desired signals selected from a plurality of possible sets for different vehicles. U.S. Pat. No. 6,011,460, assigned to Omega Patents, L.L.C., discloses a similar system where the set of desired signals from the plurality of different sets of signals for different vehicles is obtained, such as by connection and communication with a downloading device. Additionally, U.S. Pat. No. 6,756,885, also assigned to Omega Patents, L.L.C, discloses a multi-vehicle control system whereby a multi-vehicle compatible controller stores a set of device codes for a given vehicle device for a plurality of different vehicles. Device codes are read from the data communications bus, and a match between a read device code and the stored device codes is determined to provide compatibility with different vehicles.

Unfortunately, such advanced techniques for dealing with multiple device codes for a vehicle having a data communications bus have not yet been developed for vehicle tracking units.

SUMMARY OF THE INVENTION

In view of the foregoing background, it is therefore an object of the present invention to provide a multi-vehicle compatible tracking unit which may be used to control operable vehicle devices, and/or read information therefrom via the vehicle data communications bus and related methods.

This and other objects, features, and advantages in accordance with the present invention are provided by a multi-vehicle compatible tracking unit for a vehicle comprising a vehicle data bus extending throughout the vehicle. The multi-vehicle compatible tracking unit may include a vehicle position determining device, a wireless communications device, and a multi-vehicle compatible controller for cooperating with the vehicle position determining device and the wireless communications device to send vehicle position information. The multi-vehicle compatible controller may be coupled to the vehicle data bus for communication therewith with at least one vehicle device. The at least one vehicle device may use at least one corresponding vehicle device code from among a plurality thereof for different vehicles. The tracking unit may also include a downloading interface for permitting downloading of enabling data related to the at least one corresponding vehicle device code for use by the multi-vehicle compatible controller. Accordingly, the multi-vehicle compatible

tracking unit may be used to control operable vehicle devices, and/or read information therefrom via the vehicle data communications bus.

The downloading interface may comprise either a wired or wireless signal downloading interface. The wired signal downloading interface may comprise a connector for temporary connection to a downloading device, for example. The wireless signal downloading interface may include a wireless receiver for temporary connection to a downloading device. The wireless signal downloading interface may also be in the form of a connection to the wireless communications device used for sending position information. The downloading interface may also be for permitting downloading of at least one programming instruction for the multi-vehicle compatible controller, in some embodiments.

The corresponding at least one vehicle code may be for reading from the at least one vehicle device, and/or for writing to the at least one vehicle device. Further, the multi-vehicle compatible tracking unit may comprise a remote transmitter. At least one vehicle remote control function responsive to the remote transmitter may be performed by the multi-vehicle compatible controller. For example, the at least one vehicle remote control function may include at least one of a vehicle security function, a remote keyless entry function, and a remote engine starting function. Also, the wireless position determining device may comprise a Global Positioning System (GPS) receiver. A tracking unit may also include a common housing for its various components.

A method aspect is for using a multi-vehicle compatible tracking unit for a vehicle comprising a vehicle data bus extending throughout the vehicle. The multi-vehicle compatible tracking unit may include a vehicle position determining device, a wireless communications device, and a multi-vehicle compatible controller for cooperating with the vehicle position determining device and the wireless communications device to send vehicle position information. The multi-vehicle compatible controller may be coupled to the vehicle data bus for connection thereover with at least one vehicle device using at least one corresponding vehicle device code from among a plurality of thereof for different vehicles. The method may include downloading the enabling data related to at least one corresponding vehicle device code for use by the multi-vehicle compatible controller via a downloading interface.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a simplified block diagram of a vehicle tracking system in accordance with the present invention.

FIG. 2 is a more detailed block diagram of the vehicle tracking unit as shown in FIG. 1.

FIG. 3 is a more detailed block diagram of the monitoring station as shown in FIG. 1.

FIG. 4 is a flowchart for operation of the vehicle tracking system as shown in FIG. 1 illustrating a vehicle stolen alert.

FIGS. 5A-5C are a flowchart for operation of the vehicle tracking system as shown in FIG. 1 illustrating a vehicle alarm sounding alert.

FIG. 6 is a flowchart for operation of the vehicle tracking system as shown in FIG. 1 illustrating a vehicle speeding alert.

FIG. 7 is a flowchart for operation of the vehicle tracking system as shown in FIG. 1 illustrating an unauthorized transmitter learned alert.

FIG. 8 is a flowchart for operation of the vehicle tracking system as shown in FIG. 1 illustrating a low battery alert.

FIG. 9 is a flowchart for operation of the vehicle tracking system as shown in FIG. 1 illustrating a GPS or cellular unit failure alert.

FIG. 10 is a simplified block diagram of a multi-vehicle compatible tracking unit in accordance with the invention.

FIG. 11 is a more detailed block diagram of an embodiment of the downloading interface as shown in FIG. 10.

FIG. 12 is a more detailed block diagram of another embodiment of a downloading interface as shown in FIG. 10.

FIG. 13 is a more detailed block diagram of yet another embodiment of the downloading interface as shown in FIG. 10.

FIG. 14 is a flowchart showing a method in accordance with the invention.

FIG. 15 is a flowchart showing another embodiment of a method in accordance with the invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

The present invention will now be described more fully hereinafter with reference to the accompanying drawings in which preferred embodiments of the invention are shown. This invention may, however, be embodied in many different forms and should not be construed as limited to the illustrated embodiments set forth herein. Rather, these embodiments are provided so that this disclosure will be thorough and complete, and will fully convey the scope of the invention to those skilled in the art. Like numbers refer to like elements throughout, and prime notation and multiple prime notation are used to indicate similar elements in alternate embodiments.

Referring to FIGS. 1-3, the vehicle tracking system 20 in accordance with the invention is now initially described. The vehicle system 20 illustratively includes a vehicle tracking unit 25 to be mounted in the vehicle 21 and a monitoring station 30 which is remote from the vehicle and which is typically in a fixed location. In the illustrated embodiment, the vehicle tracking unit 25 interfaces with various vehicle devices, such as may include security sensors, door locks, etc. as will be appreciated by those skilled in the art.

The vehicle tracking unit 25 is also illustratively connected to a separate vehicle security system 27 as may already be installed in the vehicle 21, from the factory or installed as an aftermarket product. Those of skill in the art will appreciate that in some embodiments of the vehicle tracking system 20 a separate vehicle security system 27 may not be needed, and/or various features thereof can be readily incorporated in the vehicle tracking unit 25.

The monitoring station 30 may typically service a number of subscribers 31. As shown perhaps best in FIG. 3, the monitoring station 30 may include a user interface, such as the schematically illustrated telephone network interface 33 and the Internet interface 34 which are schematically coupled to a telephone 35, and a computer 36, respectively. Of course in other embodiments, other interfaces may be used and only one of the illustrated interfaces may be needed. Those of skill in the art will also recognize that messages may be sent to a subscriber or user via preprogrammed voice messages, e-mail messages, facsimile messages, pager alerts, etc. In addition commands or instructions from the subscriber can also be input to the monitoring station 30 via the telephone network interface 33 and/or the Internet interface 34, from the subscribers telephone 35 or computer 36.

The monitoring station 30 is illustratively connected to a cellular telephone tower 32 which, in turn, may communicate with the vehicle tracking unit 25 in some embodiments. Of course, in other embodiments other communications

approaches are also contemplated, such as, for example, including satellite communications.

The monitoring station 30 may typically include the necessary modems, and other communications electronics, and computers for its functions which are described in greater detail below. The configuration of such components and their details will be readily apparent to those skilled in the art. Accordingly, no further discussion of these details is needed.

Referring now more specifically to FIG. 2, additional details of the vehicle tracking unit 25 and devices at the vehicle are now further described. The vehicle tracking unit 25 illustratively includes a controller 40, a vehicle position determining device 42, and a wireless communications device 44 connected together. The vehicle position determining device 42 may be provided by a GPS receiver, for example. The GPS receiver typically operates by receiving multiple signals from spaced apart satellites 38 as will be appreciated by those skilled in the art.

In other embodiments, the vehicle position determining device 42 may be provided based upon communications with the cellular telephone network, or based upon other satellite transmissions, for example. As a particular example, time of arrival techniques are available based upon multiple reception paths to determine position via the cellular telephone network as will be appreciated by those skilled in the art. The vehicle position determining device 42 also illustratively includes an indicator 43 associated therewith, such as for indicating an operating mode, or proper operation of the device as will be addressed in greater detail below.

The wireless communications device 44 may be provided by a cellular telephone transceiver configured to operate on a control channel of the cellular network. Such a control channel may provide nearly universal coverage for the tracking system 20 as will be appreciated by those skilled in the art. In addition, the control channel may offer relatively inexpensive communications between the monitoring station 30 and the vehicle tracking unit 25 as will be appreciated by those skilled in the art. The wireless communications device 44 also illustratively includes an optional status indicator 45 with a similar function as the indicator 43 for the vehicle position determining device.

The wireless communications device 44 in other embodiments, may transmit in the voiceband of the cellular network. Alternately, the wireless communications device may communicate over other networks, such as over satellite or via wireless internet services, as will be appreciated by those skilled in the art.

The controller 40 illustratively includes a central processing unit (CPU) 50 or other logic circuitry which is connected to a clock signal generator 51 and a memory 52. In other embodiments, the memory 52 may be an embedded memory in the CPU 50. The controller 40 also includes schematically illustrated input/output circuitry 53 to interface with various vehicle devices. In particular the input/output circuitry 53 may provide dual polarity compatibility for one or more inputs or outputs as will be described in greater detail below. One or more of the terminals of the input/output circuitry 53 may also provide both input and output functions as will also be described in greater detail below. This may significantly simplify and accelerate installation of the vehicle tracking unit 25 in the vehicle 21.

Also illustratively shown as part of the vehicle tracking unit 25 are a back-up battery 54, and switch 55 connected thereto for selectively powering certain of the components based upon the controller 40. Of course, the vehicle 21 also includes an electrical system including the vehicle battery 61. Powering of the vehicle tracking unit 25 is described in greater detail below.

The vehicle 21 also includes a number of other components that may relate to vehicle tracking, security, and/or convenience features provided by the vehicle tracking system 20. For example, the vehicle 21 may include one or more door lock actuators 62, an optional remote starting device 63, a starter interrupt device 66 and an alarm indicator 67. For example, the alarm indicator may be provided by a vehicle horn or vehicle siren, and/or flashing of the lights.

The optional separate security system 27 illustratively includes a vehicle security controller 28 and a receiver 29 connected thereto. As is conventional, the vehicle security system 27 may be switched between armed and disarmed modes, for example, by one or more uniquely coded remote transmitters 60. The vehicle security controller 28 may also be capable of learning a new uniquely coded remote transmitter 60 as will be appreciated by those skilled in the art. The vehicle security controller 28 also illustratively is connected to the starter interrupt device 66 and the alarm indicator 67.

For ease of explanation, a number of the features of the vehicle tracking system 20 are now described. The vehicle tracking system 20 includes a number of features that may simplify installation and maintenance. For example, as shown in FIG. 2, the vehicle tracking unit 25 may have a test switch 71 connected to the controller 40.

In normal operation, the controller 40 may be called upon to operate at least one vehicle device. Of course, the controller 40 also cooperates with the wireless communications device 44 and the vehicle position determining device 42 to determine and send vehicle position information to the monitoring station 30. Moreover, the controller 40 may be switchable to a test mode for test operation of the at least one vehicle device responsive to activation of the test switch 71.

In some embodiments, the at least one vehicle device may be a plurality of vehicle devices that are tested by operation in sequence. For example, the at least one vehicle device may comprise at least one door lock actuator 62. The at least one vehicle device may also comprise the starter interrupt device 66, or the engine remote starter 63 if remote starting is an implemented feature. The at least one vehicle device which is tested, may also be the alarm indicator 67. Accordingly, an installer, for example, can quickly check that the tracking unit has been properly installed.

To further provide for ready determination of proper operation of the vehicle tracking unit 25, one or both of the position determining and wireless communications devices 42, 44 may include associated indicators 43, 45 as mentioned briefly above, and which provide an indication relating to proper operation. Each indicator 43, 45 may indicate a mode of operation of the device, its proper operation, or a partial or complete failure of the device.

Another aspect of the invention is that the controller 40 may provide a selectable polarity for the at least one vehicle device based upon sensing thereof. Accordingly, a predetermined activation of the test switch 71 may cause the controller 40 to sense and select the proper polarity. Pressing the test switch 71 for a predetermined time or in a predetermined pattern may sense and set the polarity.

Another feature of the vehicle tracking unit 25 and vehicle tracking system 20 relates to conservation of the number of codes or messages that need to be sent to the vehicle tracking unit. In particular, the controller 40 may have a plurality of different controller states and respond differently to a same message from the monitoring station 30 at different times depending upon the controller state at a given time. Accord-

ingly, a number of codes or messages used by the system can be conserved. Various messages are described in greater detail below.

A controller state may change based upon several different occurrences or events. For example the controller may change states in response to a change in at least one vehicle device, or based upon a message received by the wireless communications device **44** from the monitoring station **30**, and/or based upon elapsed time. The controller states, for example, may include an alert sent state based upon an alert message being sent from the wireless communications device **44**. Thereafter, receipt of a predetermined message by the wireless communications device **44** when the controller **40** is in the alert sent state may confirm receipt of the alert message by the monitoring station.

Receipt of the predetermined message by the wireless communications device **44** when the controller **40** is in another state different than the alert sent state may thus cause a different response by the controller. The alert sent state may comprise at least one of a vehicle stolen alert sent state, a vehicle alarm sounding alert sent state, a vehicle speeding alert sent state, an unauthorized remote transmitter alert sent state, a low vehicle battery alert sent state, and a device malfunction alert sent state. The various alert messages and confirmation thereof are described in greater detail below.

The code or message conservation aspects of the vehicle tracking system **20** also permit sending a sequence of codes or messages within a predetermined time to also cause a different response at the vehicle tracking unit **25**. In other words, the plurality of controller states may comprise a received first message state based upon a first message being received by the wireless communications device **44** from the monitoring station **30**. Receipt of a second message by the wireless communications device **44** when the controller **40** is in the received first message state, such as within a predetermined time window, for example, may thus cause a different response by the controller than does receipt of the second message when the controller is in another state than the received first message state.

The plurality of controller states may comprise a vehicle finder state sounding an audible signal via the alarm indicator **67** at the vehicle **21**. In this state the controller **40** would bypass sending a vehicle alarm sounding alert to the monitoring station **30**.

Another aspect of the vehicle tracking system **20** is the provision of certain power conservation and management techniques, such as to permit extended periods where the vehicle **21** is not in operation. During such extended periods, the vehicle battery **61** provides power to the vehicle tracking unit **25** as well as other vehicle devices. Accordingly, the voltage of the vehicle battery **61** drops over time. The vehicle tracking unit **25** may provide a significant drain on the vehicle battery **61** because of the power consumed by the wireless communications device **44** during transmission as will be appreciated by those skilled in the art.

The vehicle position determining device **42**, the wireless communications device **44** and the controller **40** may be considered as defining a power load of the vehicle tracking unit **25**. The controller **40** may operate the schematically illustrated power switch **55** to isolate the back-up battery **54** from the power load as a voltage of the vehicle battery **61** drops until reaching a threshold. After or below the threshold the controller **40** may cause the back-up battery **54** to selectively power only a first portion of the power load while a second portion of the power load remains powered by the vehicle battery.

For example, the wireless communications device **44** may have a higher operating voltage than the vehicle position determining device **42**. The first portion of the power load that is selectively powered despite the low vehicle battery voltage may thus be the wireless communications device **44**. In particular, the wireless communications device **44** may be powered for transmission. Accordingly, the back-up battery **54** can be saved for limited communication using the higher voltage wireless communications device **44**. This provides useful features even after an extended period during which the vehicle **21** is left unattended and the vehicle battery **61** gradually discharges.

To further conserve power, the controller **40** may reduce operation of the power load as vehicle battery voltage falls. Conversely, the controller **40** may restore operation of the power load based upon the voltage of the vehicle battery **61** rising again, such as upon being recharged.

Also relating to power consumption, the controller **40** further causes transmission of a low vehicle battery voltage alert to the monitoring station **30** based upon the voltage of the vehicle battery **61** falling below the threshold. The user or subscriber may cause the monitoring station **30** to issue a remote start command. The controller **40** may then generate a remote start output to the remote start device **63** to thereby start the engine and recharge the vehicle battery.

Another feature of the vehicle tracking system **20** is that the vehicle tracking unit **25** may be readily installed and connected to a vehicle **21**, such as in the illustrated embodiment where the vehicle includes a starter interrupt device **66** and a separate vehicle security controller **28**. More particularly, the controller **40** may switch between an armed mode and a disarmed mode based upon operation of the engine starter interrupt device **66**. The controller **40** when in the armed mode may cooperate with the wireless communications device **44** to send an alert message to the monitoring station **30** and including vehicle position information, for example, based upon the vehicle position determining device **42**. The controller **40** is also for selectively operating the engine starter interrupt device **66** to provide additional security features.

In one advantageous embodiment, the controller **40** preferably comprises a combination input and output terminal for connection to the engine starter interrupt device. This terminal is at the input/output circuitry **53** and is schematically illustrated by reference numeral **72**. The controller **40** may switch to the armed mode when in the disarmed mode and based upon the engine starter interrupt device **66** being operated to disable engine starting. Conversely, the controller **40** may switch to the disarmed mode based upon the engine starter interrupt device **66** being operated to enable engine starting. In other words, the vehicle tracking unit **25** can piggyback its arming and disarming off the existing vehicle security system **27**, for example.

The controller **40** may also selectively operate the engine starter interrupt device **66** based upon a command message from the monitoring station **30**. The controller **40** may selectively operate the engine starter interrupt device **66** based upon a command message from the monitoring station **30**. Alternately, or in addition thereto, the controller **40** may selectively operate the engine starter interrupt device **66** based upon the ignition switch **65**.

The following descriptive portions relate to various user or subscriber notifications and features provided by the vehicle tracking system **20**. Of course, the controller **40** preferably cooperates with the wireless communications device **44** to send an alert message. The monitoring station **30** may comprise a user interface, such as one or both of the telephone

network or internet interfaces 33, 34, respectively (FIG. 3), for generating a sequence of alert message notifications based upon receiving the alert message sent from the vehicle tracking unit 25. More particularly, the monitoring station interface permits canceling any remaining alert message notification based upon a cancellation command response from a user or subscriber having already received the alert message notification. The user may send the cancellation response via the telephone 35 or computer 36 (FIG. 3), for example. Thus, if the user may be reached at different telephone numbers or different users are desirably notified of the alert, this aspect of the vehicle tracking system 20 can make the notifications efficiently and without making unnecessary notifications.

The vehicle tracking system 20 may provide any of a number of very useful alerts, as discussed herein. For example, the alert message sent from the vehicle tracking unit may comprise at least one of a vehicle stolen alert message, and a vehicle alarm sounding alert message. The alert message may be one of a vehicle speeding alert message, and a vehicle acceleration alert message. In addition, the alert message may comprise an unauthorized remote transmitter alert message. Also, the alert message may be at least one of a low vehicle battery alert message, and a device malfunction alert message.

The speeding alert may be based upon exceeding a speed threshold for greater than a certain time, which may be user selectable. The acceleration alert may also be useful as such is also indicative of aggressive driving along with the speeding alert. The unauthorized remote transmitter alert increases overall security since a user will be notified if a would-be thief learns an unauthorized transmitter to operate the controller. These alerts are described in greater detail below.

The vehicle tracking system 20 may be implemented as a service to a subscriber. In other words, the subscriber pays a monthly fee for the service. Accordingly, it may be important to encourage a user to register. Similar subscriber or registrations systems in the past have suffered revenue losses since some users would wait to activate the system until the vehicle was stolen. In other words, the user would only subscribe or register and pay a single month's fee.

In accordance with this aspect of the vehicle tracking system 20 prompt user registration is encouraged. In particular, the vehicle tracking unit 25 may include the user registration reminder indicator 56 and the controller 40 may be switchable from an unregistered mode to a registered mode. In the registered mode, the controller 40 may cooperate with the wireless communications device 44 and the vehicle position determining device 42 to determine and send vehicle position information to the monitoring station 30. In the unregistered mode, the controller 40 may activate the user registration reminder indicator 56 to encourage registration by the user.

The controller 40 may be switchable to the registered mode based upon an activation message from the monitoring station 30. For example, when the registration payment has been received, the monitoring station can send one or more messages to the vehicle tracking unit 25 to stop activation of the registration reminder indicator 56. The indicator 56 may be audible, visual or both. For example, the registration reminder indicator 56 could be a beeping sound generated by a small piezoelectric transducer every ten minutes or so when the ignition 65 is on.

In other words, the user registration reminder indicator 56 may provide a minor but irritating annoyance to the user to encourage registration. Upon successfully registering, the annoyance is abated. Accordingly, a relatively straightforward approach is provided to encourage user registration.

Along these lines, the controller 40 when in the unregistered mode may have reduced features compared to the registered mode. For example, the controller 40 when in the unregistered mode may be restricted or limited in sending messages with the wireless communications device 44. Accordingly, usage of the wireless communications network may be reduced. Transmissions from the vehicle tracking unit 25 may also be beneficially suppressed during original installation, for example.

Returning again to features of the vehicle tracking unit 25 which facilitate installation, the controller 40 may send an alarm indication alert responsive to a continuous activation of the alarm indicator 67 for greater than a predetermined time. Alternately, or in addition thereto, the controller 40 may send an alarm indication alert responsive to a repetitive pattern of alarm indicator 67 activations. In other words, the controller may be configured to distinguish between normal operation of a vehicle horn by the driver, and activation of the horn by the security system 27. As mentioned above, the controller 40 may also monitor signals of at least one of a first and second polarity. The controller 40 thus advantageously piggybacks off the alarm indication generated by the vehicle security system 27 to determine and send a vehicle alarm sounding alert to the monitoring station 30.

In one variation, the controller 40 may monitor signals delivered directly to the vehicle alarm indicator by the vehicle security controller 28. In another variation, the controller 40 monitors signals of voltage dips of the vehicle battery 61. Circuitry is conventionally and readily available for both such functions, as will be readily appreciated by those skilled in the art.

The controller 40 may also include a dual polarity compatible output in the input/output circuitry 53 for a vehicle device, such as the vehicle alarm indicator 67. The controller 40 may further monitor signals relating to activation of the vehicle alarm indicator 67 and send an alarm indication alert with position information from the vehicle position determining device and using the wireless communication device.

For the dual polarity output compatibility, the controller 40 may generate a first polarity output pulse followed by a second polarity output pulse. The controller 40 may also generate a repeating pattern of a first polarity output pulse followed by a second polarity output pulse on the dual polarity compatible output. In yet other embodiments, the controller 40 may sense an actual polarity of the device and thereafter use the actual polarity for the dual polarity compatible output.

Where the vehicle device is a vehicle horn, the controller 40 may typically be configured to generate a negative polarity output on the dual polarity compatible output. Conversely, wherein the vehicle device is a vehicle alarm indicator siren, the controller 40 may be configured to generate a positive polarity output on the dual polarity compatible output.

Another aspect of the vehicle tracking system 20 relates to conserving memory space and/or reducing transmission time over the communications network. In accordance with this advantageous feature, the controller 40 may determine the vehicle position information including a vehicle location and an associated stationary period for each occurrence of the vehicle remaining stationary for greater than a predetermined period. In one embodiment, the controller 40 may cooperate with the wireless transmission device 44 to send the vehicle position information to the monitoring station based upon each occurrence of the vehicle remaining stationary for greater than the predetermined period. In this embodiment, the monitoring station 30 may associate a time with each occurrence of the vehicle remaining stationary for greater

than the predetermined period. In other words, the monitoring station 30 may time stamp the received information.

In another embodiment, the controller 40 cooperates with the wireless transmission device 44 to send the vehicle position information to the monitoring station 30 for a plurality of occurrences of the vehicle remaining stationary for greater than the predetermined period. In this embodiment, the controller 40 may associate a time with each occurrence of the vehicle remaining stationary for greater than the predetermined period. In other words, the controller time stamps the position and stationary period information.

As an example, the predetermined time which determines whether the vehicle 21 is stationary and the position should be determined, may be less than about three minutes. This time may filter out vehicle stops in normal traffic, but which will keep track of stops where the driver likely leaves the vehicle 21. Accordingly, only the important information necessary to track the vehicle need be stored and/or transmitted thereby reducing the system costs. If the vehicle 21 is stationary overnight, for example, unnecessary position information need not be determined, stored, and/or transmitted to the monitoring station 30.

The controller 40 may comprise the memory 52 for storing the vehicle position information therein. In one configuration, the controller 40 downloads the vehicle position information from the memory 52 to the monitoring station 30 based upon a predetermined schedule. In another configuration, the controller 40 downloads the vehicle position information from the memory 52 to the monitoring station 30 based upon a predetermined event. In yet another configuration, the controller 40 downloads the vehicle position information from the memory 52 to the monitoring station 30 based upon a predetermined percentage of memory usage.

Having now described certain general features and advantages of the vehicle tracking system 20, this description now turns to additional specific details which are provided as examples. In particular, vehicle tracking system 20 preferably implements one or more of the following features:

a. Detects the vehicle being stolen and transmits a signal to the monitoring station to contact up to 3 people, for example, predetermined by the user, of theft of the vehicle and then starts tracking the vehicle. The contact may be by one or more of the following: an e-mail message, a pager alert, a cellular telephone call, or other telephone call.

b. Detects an optional vehicle security or alarm system activation and transmits a signal to the monitoring station to contact up to 3 predetermined people to inform them the vehicle's alarm is being activated.

c. Detects an optional vehicle alarm system's remote PANIC activation and transmits a signal to the monitoring station to contact up to 3 predetermined people to inform them of the vehicle's PANIC being activated.

d. Detects a vehicle being programmed to operate from an unauthorized remote transmitter, key transponder, other transponder, or other device that has a unique coding, and the vehicle unit transmits a signal to the monitoring station to contact up to 3 predetermined people to inform them of this occurrence. The system can also make available information relating to a number of such coded devices, or a change therein, or when a change occurred. A message can be sent to the user or the information can be available to the user on the website. The vehicle would be equipped with a security system as disclosed in U.S. Pat. No. 5,654,688, for example, which determines an unauthorized transmitter and provides an alert feature. This patent is incorporated herein in its entirety by reference.

e. Detects the vehicle traveling over a predetermined speed, such as for a predetermined time, and transmits a signal to the monitoring station to send a message, such as an e-mail informing the user (and/or others) of this occurrence. Of course, the message could also be sent via a telephone call or page, should additional urgency be required. The vehicle's predetermined maximum speed limit and duration thereof can be selected by the user.

f. Detects a low battery voltage such as for a predetermined time and transmits a signal to the monitoring station to contact up to 3 predetermined people to inform them of vehicle's low battery voltage. This is especially advantageous during winter so that the vehicle could be started, for example, to prevent a problem before it happens. The time setting is preferably selectable by the user.

g. Detects the vehicle not moving for a predetermined time and transmits a signal to the monitoring station to send, for example, a nightly e-mail informing the user of all the vehicle's location and stationary time occurrences. The stationary time length is also selectable. This may be advantageous to encourage patrolling personnel not to remain for a long time in a same location.

h. The vehicle unit preferably includes a back-up battery system making it more reliable.

The vehicle unit may be relatively inexpensive. In addition, the monitoring fee that includes sending up to 60 e-mails and making up to 6 phone calls per month, may also be relatively low. The relatively low monitoring fee is based, at least in part, on the current relatively low rates charged for use of the control channel of the cellular telephone network. It is also noted that access to the control channel provides coverage for almost the entire U.S., for example.

The user or subscriber also preferably has access to an Internet site that will display a map and silently contact the vehicle to acquire its current location, speed, direction of travel, and previous multiple locations with speeds, for example, the user's personal identification number (PIN) can be quickly activated by a telephone call. No additional installation may be required.

Certain annual pre-pay package arrangements may be available. For example, up to 10 access entries per month can be provided on a low monthly billing. Up to 30 access entries could be provided also for a relatively low monthly fee.

The present invention provides a number of other significant advantages including optional access from any phone or from any computer to access the monitoring station internet site. The user may control various vehicle functions remotely via the telephone or the internet site. The only charge may be for additional equipment and installation.

Additional features can also be included with the system and subscribed to by the user in accordance with the invention. For example, these include Hijack, Car Finding, Unlock Doors and Unauthorized Transmitter Alert Features. The equipment and installation is relatively inexpensive. For the hijack feature: from any phone or computer, the user may activate vehicle starter interrupt and sound the horn until the vehicle is retrieved (Command 4).

For the Car Finding feature: from any phone or computer, the user may activate the vehicle's horn, or siren and sound same for 30 seconds. This allows the user to find his vehicle in a crowded parking lot (Command 5).

For the Lock/Unlock vehicle doors feature: from any phone or computer a predetermined command (Command 7)

activates unlocking of vehicle doors to retrieve keys, for example, that may have been accidentally locked inside the vehicle. Of course, the system can also be used to lock vehicle doors if this was forgotten (Command 6). The unauthorized transmitter alert feature is similarly selected as described above.

In addition, a remote vehicle start feature may also be provided, such as to start the vehicle's engine to heat or cool the vehicle prior to entry. The equipment and installation for remote starting may be relatively low. Some further details of a specific embodiment of the vehicle tracking unit 28 are provided below as relating to use of red and green LED indicators as may be coupled to the controller 40 and operated thereby. Also various representative wires, designated by color, are provided as an example embodiment.

The red LED verifies the GPS receiving signal. With a yellow wire having positive 12 volts, the red LED blinking indicates searching GPS location, constant indicates found location, and off indicates no GPS signal found. With the yellow wire not having positive 12 volts, if the red LED is off, the LED is not functioning.

The green LED verifies receiving the cell tower signal. With the yellow wire having positive 12 volts, blinking indicates the cell control channel signal is detected, constant indicates sending a micro burst signal (LED stays on 5 seconds after each transmission), and off indicates no cell tower signal received. With the yellow wire not having positive 12 volts, off indicates the green LED is not functioning.

An example of representative DIP switch feature selection is as follows. A first switch may be used for adding the orange wire for controlling arm/disarming of the system. When on, the orange wire controls arm/disarm as follows: to arm, the orange wire is grounded and the yellow wire does not have 12 volts positive. To disarm, the orange wire is not grounded. When the first switch is off, then only the yellow wire controls arm/disarm as follows: to arm, the yellow wire is without 12 volts positive, and 30 seconds after continued arm mode then the orange wire activates a constant 500 ma grounded output to operate an external starter interrupt relay until the system is disarmed. To disarm, the yellow wire is connected to 12 volts positive.

A main 5-pin plug may be provided on the vehicle unit and connected as follows:

a. The Red Wire is connected to the 12 vdc power. An alert warning, "E" is given if the system is armed and the battery voltage becomes lower than 11 volts for longer than ## minutes. This alert feature "E" will not operate again until the voltage is above 12 volts to re-set this feature.

b. The black wire is connected to ground.

c. The yellow wire is connected to the ignition 12 volts so that if the key is on, 12 volts is supplied thereto and if the key is off, the yellow wire is connected to ground. Further: if the system is in an armed mode and the Ign/Run changes, then Alert "A" is given. If the system is disarmed and within 2.5 seconds after the yellow wire receives 12 volts and the gray wire detects 3 or more positive pulses the system activates Alert "D". If the first DIP switch is in the off position then: if 12 volts is on yellow wire, the system is disarmed and the orange wire discontinues from the 500 ma ground, and if the yellow wire sees ground or neutral, then the system is armed and 30 seconds after the continued arm mode the orange wire activates a constant 500 ma grounded output to operate an external starter interrupt relay until the system is disarmed.

d. The gray wire is for input and output, and can be connected to an alarm siren or horn positive terminal. In addition:

i. With the system armed and if the gray wire detects +12 v pulsing on/off or on constant for more than 10 seconds from an alarm siren or horn honking activation, then alert warning "I" alarm activation is given.

ii. With system disarmed and if the gray wire detects +12 v pulsing on/off or on constant for more than 10 seconds from an alarm siren or horn honking activation, then alert warning "C" panic activation is given.

iii. With system disarmed and if the Gray wire detects 3 or more 12 volt positive pulses within 2.5 seconds of yellow wire receiving +12 v and the gray wire by-pass not being activated, then alert warning "D" is given.

iv. The gray wire bypass operates as follows:

1. After alert warning "B" bypass all future alert "B" signals until system is disarmed.

2. After alert warning "C" bypass all future alert "C" signals until system is armed.

3. After alert warning "D" bypass all future alert "D" signals until no 12 volt pulses are detected on the gray wire within 3 seconds of the yellow wire having 12 volts.

v. With the system armed or disarmed. The Output: Internal +12 v, 1 amp transistor with pulses 1 second on and 3 seconds off to activate siren or honk car horn or flashing light relay.

1. Non-stop activation from (Command "4")

2. 30-second activation from (Command "5")

vi. Turn off the above alert "A" from (Command "1").

e. The orange wire is for the starter interrupt and arm/disarm system, and operates as follows:

i. If first DIP switch is in the:

1. On position and: the orange wire has 12 volts or neutral, the system switches to the disarmed mode; the orange wire is grounded, then the system is switched to the armed mode; and the starter interrupt output will not automatically operate. It can only be activated from "Command 4"

2. Off position and the orange wire does not effect the arming or disarming of the system: 30 seconds after system arms the orange wire will automatically activate constant 500 ma ground until the system is disarmed. And from "command #4". Connect to Starter interrupt relay output.

ii. Command 4 activates Orange wire to have 500 ma, negative until Command 1 is received.

iii. After alert warning "B" is activated the first time it is thereafter bypassed while the orange wire remains grounded. Alert warning "B" is re-set to operate again 3 seconds after orange wire becomes ungrounded.

The vehicle unit may also include a Door Lock Plug configured as follows, for example. A green wire provides a 250 ma, negative 1 second pulse for Lock Doors. (Command "6"). A red wire provides a constant 12 v output from the red power wire. A blue wire provides a 250 ma., negative 1 second pulse for Unlock Doors (Command "7"). A pink wire provides a 250 ma., negative 1 second pulse for remote Car Starter (Command "2").

An installation test button may also be provided to work as follows. Pressing the button activates the orange wire for 10-seconds (starter interrupt), with these circuits in sequence. First, it activates the gray wire for 1-second (siren/horn). After the first stops, it activates the green wire for 1 second to lock the doors. After the second stops, it activates the blue

wire for 1 second to unlock the doors. After the third stops, it activates the pink wire for 1 second to activate an optional item.

Representative warning alerts are as follows:

a. Alert Warning "A" (FIG. 4): Automatic activation of "Command 8" and the vehicle unit contacts monitoring station to instantly call 3 phone numbers with the message "Your vehicle is stolen please confirm then call 911 to advise police of website and your pin # so police can locate the vehicle". This is detected with the system armed and the GPS indicating movement. Bypasses all future alert warning "A" signals until the system is re-armed.

b. Alert Warning "B" (FIGS. 5A-5C): the vehicle unit contacts the monitoring station to instantly call 3 phone numbers with the following message "Vehicle alarm activated please confirm". This is with the system armed and detecting gray wire having 12 volts pulsing or on constant for longer than 10-seconds. After alert warning "B" is activated the first time, it is thereafter bypassed while the orange wire remains grounded. Alert warning "B" is re-set to operate again 3 seconds after orange wire becomes ungrounded.

c. Alert Warning "C" (FIG. 6): the vehicle unit contacts the monitoring station to instantly send e-mail message "vehicle was traveling faster than your preset amount of "###" and time limit of "##" seconds. Indicates the vehicle speed and location that the speeding started and how long speeding occured" (Detected from GPS). This aspect is further understood with reference to the enclosed flowchart 84 of FIG. 6.

d. Alert Warning "D" (FIG. 7): the vehicle unit contacts the monitoring station to instantly call 3 phone numbers with the message "Unauthorized remote transmitter was just programmed to operate your vehicle." This is with the system disarmed and the Gray wire detecting three or more 12 volt pulses within 2.5 seconds of the yellow wire having seen 12 volts positive. All future alerts "D" are bypassed until no 12 volt pulses are detected on the gray wire within 3 seconds of the yellow wire seeing 12 volts. This aspect is further understood with reference to the enclosed flowchart 86 of FIG. 7.

e. Alert Warning "E" (FIG. 8): the vehicle unit contacts the monitoring station to instantly call 3 phone numbers with the message "Vehicle has low battery voltage and system has changed to low voltage mode". This is with the system armed and detecting the red wire with lower than 11 volts for ## minutes. All future alerts "E" are bypassed until, first, more than 13.5 volts are detected on the red wire and, second, after the yellow wire stops having positive voltage the red wire then must detect more than 12 volts.

The following are representative commands for use in the system:

Command 1: Reset all circuits and system remains asleep until the ignition key is turned on. Resets the triggered mode and unit is asleep to prevent power drain on vehicle battery.

Command 2: (Accessory activation) monitoring station Command to the system to activate Pink wire to pulse 250 ma negative for 1 second.

Command 3: (Vehicle Location) website to indicate present location and past events in memory.

Command 4: (Hijack or Stolen) monitoring station Command to vehicle system to activate:

iv. Gray wire to pulse 1 sec on/1 sec off with 1 amp positive output and which continues until receive command # 1.

v. Orange wire to have 500 ma ground and which continues until receive command # 1.

Command 5: (Car Find) monitoring station Command to system activating Gray wire for 30 seconds pulsing 1 sec on/1 sec off with 1 amp positive output.

Command 6: (Lock Doors) monitoring station Command to system activating Green wire to pulse 1 second with 250 ma negative.

Command 7: (Unlock Doors) monitoring station Command to system to activate Blue wire to pulse 1 second with 250 ma negative.

Command 8: (Start Constant Vehicle Tracking) sends previous 2 events in memory and then every 120 seconds get update of location information sent to the Web site.

The system is also operable in a battery saver mode which operates as follows:

i. With the ignition key off, if the battery voltage drops below 11.5 volts for more than 5 seconds, the GPS verification wakes up to look:

ii. Once instantly.

iii. Once in 1 hour if at the same location.

iv. Once in 6 hours if at the same location.

v. Once in 12 hours if at the same location.

vi. Once every 24 hours if at the same location.

vii. Activate alert "E" when the battery saver mode is activated, and bypass sending all future Alert "E" until the battery voltage goes above 13 volts for 10 minutes to reset this feature.

Another aspect of the invention relates to automatic vehicle alert e-mails sent containing some or all of the previous system events. This sending can be triggered as follows:

a. At a user selected predetermined time ## (01-24) of each day, or

b. At a predetermined memory fill level, such as full or near full.

In addition, each system event may contain one or more of the following:

a. Vehicle Location

b. Vehicle total time at location

c. Time of day

d. Mph traveling

e. Total time traveling above MPH

f. Direction traveling

g. Delta

h. Special Alert messages, if any, including:

i. GPS signal not received for longer than 5 minutes.

ii) Traveling above ###MPH for ## minutes.

iii) Vehicle is stolen.

iv) Alarm activated.

v) Unauthorized remote transmitter alert.

vi) Battery saver mode activated

vii) Command 1: Reset all circuits and system remains asleep until the ignition key is turned on.

viii) Command 2: (Accessory activation)

ix) Command 3: (Vehicle Location was retrieved)

x) Command 4: (Hijack or Stolen mode activated)

xi) Command 5: (Car Find mode activated)

xii) Command 6: (Locked Doors)

xiii) Command 7: (Unlocked Doors)

xiv) Command 8: (Started 2-second incremental Vehicle Tracking)

Another feature of the invention relates to the selectable threshold conditions causing an event to be recorded into the memory of the vehicle unit. For example, this may include: while the yellow wire has 12 volts, record events every "??" default 15 minutes time if the GPS location has changed. If the GPS location is the same then only update stationary total

time. If the GPS antenna is not receiving any signal then enter last known GPS location and with an indication that this was the last known GPS location before the GPS signal stopped, how long no GPS signal was received, and the GPS location in the on-hold file, when the vehicle is traveling above ### MPH for ##-minutes.

The monitoring station may also provide a number of automated phone calls as described above. These may include:

The user's vehicle has issued a stolen alert:

If vehicle is stolen, after receiving the phone message the user then calls 911 to advise police of the theft, and gives the police the website address and an identification number, such as the user's PIN, to allow the police to locate where your vehicle has been, where it is now and keep tracking it until the police can retrieve the vehicle.

If this is a false alert due to vehicle being towed away for service, for example, then the user may press "1" to put the vehicle in an off mode. Once the ignition key is turned on again the system will reset back to its normal operation mode.

The user's vehicle has issued an alarm activated for more than 10 seconds alert. The system will not respond to this alert again until ignition key is turned on again to reset this feature.

The vehicle battery voltage is low or has been disconnected. The tracking system is in low voltage mode. The system will not respond to this alert again until the battery voltage goes above 13 volts for 10 minutes to reset this feature.

The backup battery may be sized according to the GPS receiver and processing power draw. In addition, the battery may also be sized based upon estimated micro burst transmitting power draw. Such transmissions are typically at about 3 watts power to the antenna.

The system according to the invention including the vehicle unit and monitoring station provides a number of significant advantages and features. For example, the police may be directly contacted by the user when the vehicle is stolen. The user receives the telephone message from the monitoring station, and this is done without requiring the intervention of a manual security monitoring operator, such as an ADT operator, for example. In addition, once in the stolen mode, the vehicle unit will periodically continue to send out its location, so that the police may track the vehicle via the WEB, for example. This location sending feature may begin immediately, that is, without requiring the user to connect the vehicle to begin tracking. Having the vehicle contacting the monitoring station is considerably less expensive than other schemes where the vehicle is periodically polled via the cellular network, for example.

The system may also be interfaced to a breath alcohol sensor in the vehicle, for example, and this information recorded in memory. The information could be passed along to the monitoring station, which, in turn, could send out a notification message (e-mail or telephone) that the vehicle is being operated by a driver who may be impaired by alcohol. The vehicle's location could then be tracked to permit the police to detain the driver.

Another aspect of the unit is that it may be able to recognize the desirability to bypass certain security breach triggers or other events. For example, a car finding feature can be provided that will allow the user to sound the horn or siren when near the vehicle to help locate the vehicle, as in a crowded parking area. Without the bypass feature, the unit could recognize the horn or siren as a security breach and transmit such information to the monitoring center. In accordance with this aspect of the invention, the unit would recognize the car finding feature was activated and thereby bypass sending a security breach transmission, for example. Again, false alarms and unneeded usage and expense of the communications infrastructure would be avoided.

Yet another aspect of the invention relates to thwarting a would-be thief who attempts to disable the alarm by cutting the battery cable or power supplied to the system. The unit preferably includes a back-up battery. More particularly, upon being in an armed mode and sensing a breach of security, such as the hood opening, for example, the unit will send out a signal indicating the alarm or security breach and while the alarm is indicated, if the battery is disconnected then the unit will send out a message indicating the vehicle is stolen, and also providing the vehicle's current position. Accordingly, the would-be thief is not able to defeat the security system by quickly disrupting power to the unit during an alarm indication or security breach. Also, to prevent additional alerts, this message is prevented from being transmitted again until the user returns to the vehicle to disarm the system and/or turn on the ignition so that the unit sees a voltage above 13 volts, indicating the vehicle has started using the owner's ignition key. This aspect is further understood with reference to the enclosed flowchart 80 (FIG. 4).

Still another aspect of the invention relates to how the unit can discriminate between ordinary usage or honking of the horn as compared to a security system triggered alarm. Most vehicle security systems will provide a pattern of horn soundings as an alarm indication, and this can be determined and used to reduce false alarm transmissions from the unit. For example, the unit can look at the number of leading and trailing edges of the power pulse used to sound the horn. A single pressing of the horn switch by the user will cause two edges within a predetermined time, such as about 10 to 12 seconds. Accordingly, the unit can be configured to not send a security breach transmission to the control center based upon detecting two transitions. Since a number of vehicle security systems may have a continuous sounding of the horn within the predetermined time, the unit can send the transmission upon detecting only a single transition.

A number of other vehicle security systems provide a series of pulses or horn soundings within the predetermined time. Accordingly, the unit may also be configured to send a security breach transmission upon detecting greater than a predetermined number of transitions, such as greater than nine, for example. This number is also typically higher than a user would generate honking the horn several times within the predetermined time. In other terms, the number of transitions of the horn pulses can be counted, and if equal to one, or greater than nine, for example, the transmission is triggered, and otherwise the sounding of the horn is ignored. Also, to prevent additional alerts, this message is prevented from being transmitted again until the user returns to the vehicle to disarm the system and/or turn on the ignition so that the unit sees a voltage above 13 volts, indicating the vehicle has started using the owner's ignition key. This aspect is further understood with reference to the enclosed flowcharts 81-83 (FIGS. 5A-5C').

Yet another feature of the invention relates to a low vehicle battery alert. For example, the unit may monitor the battery voltage over a predetermined time such as ten minutes. The ten minute window prevents false tripping, for example, when the voltage dips during engine cranking. In particular, the voltage can be sensed and it can be determined whether it is greater than zero (e.g. greater than six volts) and less than a high value (e.g. eleven or twelve volts), and, if so, a low battery voltage transmission can be communicated to the monitoring station, and ultimately to the vehicle user when away from the vehicle. If the vehicle is being serviced and the battery is disconnected, this will cause the battery voltage to

be equal to zero. Then, the low battery voltage transmission will not be communicated to the monitoring station. Also, to prevent additional alerts, this message is prevented from being transmitted again until the user returns to the vehicle to disarm the system and/or turn on the ignition so that the unit sees a voltage above 13 volts, indicating the vehicle has started using the owner's ignition key. Again, false triggerings are reduced. This aspect is further understood with reference to the enclosed flowchart 86 (FIG. 8).

Yet another advantageous feature of some embodiments of the invention relates to the ability to conserve electrical power. More particularly, when the vehicle is stopped and in the armed mode, the GPS receiver may be periodically operated to determine the vehicle position. If the vehicle position changes, this is indicative that the vehicle is being moved or stolen. For example, the GPS receiver may be operated to generate new vehicle position information every 20 seconds. These relatively quick successive position determinations or readings are generally termed hot start. These are relatively less complicated than a cold start position determination which takes longer, since the cold start position determination requires greater time to acquire and receive data from multiple satellites, as will be appreciated by those skilled in the art.

Unfortunately, this relatively high repeated usage of the GPS receiver may cause unnecessary battery drain, especially when the vehicle is left armed and unattended by the user for an extended period. Accordingly, the power conserving feature of the invention permits the GPS receiver to be turned off when the vehicle is in the armed mode, and the GPS receiver is turned on only when needed. For example, a vehicle sensor, such as a shock sensor, motion sensor, ignition sensor, door sensor, or other sensor, or combinations thereof could be used to start the GPS receiver. This sensor could also be used to trigger an alarm if desired; however it need not be so used in all embodiments. The GPS receiver, once turned on, could operate in the normal periodic fashion as described above, or for a fixed period of time. The GPS receiver could also be turned off again after some predetermined time if no further sensor signal is received, or if the position fails to change on subsequent position readings or determinations.

Yet another feature relates to permitting more colorful audible alert messages to be generated for the user. The user can, in some embodiments, access an internet site to type or enter the text for a message to be sent, such as to alert the user that his vehicle is being stolen. The audible message then communicated by a telephone call to the user is generated by a speech message synthesizer based upon the entered text. In accordance with this aspect of the invention, the user could type in phonetically spelled words or phrases, such as to create more colorful messages including slang terms, various accents, and/or to mimic various dialects, for example. The speech synthesizer would then generate the desired message customized for the user. Of course, the system could also permit the user to test or preview the pronunciation generated by the speech message synthesizer based on the entered text message prior to its adoption.

Another aspect relates to requesting GPS position information from a vehicle. If a command is sent downstream to the vehicle requesting that GPS information in turn be sent upstream from the vehicle, and the GPS information is not received within a predetermined time, such as about four minutes, then another command may be sent to the vehicle requesting the GPS information. This may keep repeating until GPS information is received, for a predetermined number of tries, or until a user instructs stopping of the requests. This helps to ensure and confirm the activation and reception of GPS tracking coordinates from the vehicle.

Yet another aspect relates to reducing a frequency with which GPS information is sent from the vehicle. More particularly, the unit may be configured to activate GPS information transmission upstream every 2 minutes. To reduce system usage expense and power consumption at the vehicle, this rate of transmission of GPS information could be progressively decreased over time. For example, in one embodiment, upon activation the GPS location signals could be sent every 2 minutes during the first hour, then once an hour for the next 23 hours, after which only one signal would be sent per day.

Turning now to the flowchart 87 of FIG. 9, still another aspect relates to warning the user of an inoperable or malfunctioning GPS or cellular telephone section. More particularly, if the GPS or cellular telephone antenna wire is cut or the mounting position of either is changed causing the antenna to stop receiving the signal the user would not ordinarily know of this problem quickly. In accordance with one embodiment, if the ignition is turned on a predetermined number of times, such as about three, and each time ignition turns on if no GPS or no cell signal is received for a minimum time, such as about 15 to 30 minutes or longer, an audible warning beeper may be activated in the vehicle. This beeper may be sounded once every 15-minutes. At anytime if the GPS or cell signal is received properly then the system re-sets automatically stopping the beeper sound.

As an example, if the ignition key is turned on and no GPS or no Cell signal is being received for 15-minutes, and the vehicle ignition stays on for 45-minutes and there is still no GPS or no cell signal, the unit counts one. Thereafter, if the ignition key is turned on and no GPS or no cell signal is being received for 15-minutes, and the vehicle ignition stays on for 60-minutes and there is still no GPS or no cell signal, a second count is determined. Thereafter, if the ignition is turned on and no GPS or no cell signal is received for 10-minutes, and the vehicle ignition stays on for only 10-minutes and there is still no GPS or no cell signal, no count is determined. Thereafter, if the ignition is turned on and no GPS or no cell signal is being received for 15-minutes, a third count is determined and the beeper is activated as described above. This beeping may continue every 15-minutes while the vehicle ignition stays on as long as the vehicle ignition stays on for 16-minutes and still no GPS or no Cell signal is being received. If thereafter, the ignition is turned on and no GPS or no cell signal is being received, the beeper beeps once and again beeps once every 15-minutes while vehicle ignition stays on. If in 10-minutes both GPS or cell signal is being received, the beeper system is turned off and the warning count is reset.

By way of example, if the ignition key is turned on and no GPS or no cell signal is being received for only 5, 10 or 12 minutes (with the threshold set at 15 minutes), then no count is determined.

In certain circumstances, the GPS signal may fail, but the cell signal may still be working. Accordingly, it may be desirable to send an indication of the failure of the GPS signal to the central monitoring station to thereby alert the user as described above. If the cell signal also failed, or if the cell signal failed by itself, in other embodiments a separate paging device would transmit the failure or loss of the cell signal information to the central monitoring station, to thereby alert the user.

Yet another feature is directed to efficient use of a relatively small number of codes available to communicate with the tracking unit from the cellular network and central station.

More particularly, a typical arrangement may provide eight basic codes and two Awildcard@ codes. The two wildcard codes are reserved for future or other uses. A particular tracking device will respond directly to any of the eight basic codes. For example, the doors could be locked or unlocked, a present location downloaded from the vehicle, etc.

In accordance with this feature, the tracking device may respond differently to the same code or command depending upon the state or condition of the tracking device. For example, if an alarm is triggered at the vehicle, it may be desired that the tracking device continue to send the alarm signal until confirmation is received that the central monitoring station has received the alarm signal. This confirmation can be sent using the same code as may provide another function if the device were not indicating an alarm. Any of a number of such tracking device conditions may trigger a different message to be interpreted from the received code. For example, if any of the above Alerts A-E were triggered, the receipt of a predetermined code, such as code eight, would confirm receipt of the alert by the central station, and this receipt of code eight would not cause the other response (no alarm triggered) in the tracking device. Of course this concept can be extended to other features as will be appreciated by those skilled in the art.

In accordance with another feature, the rate of sending the location or position data (or change in position data) from the vehicle may be varied to reduce system usage and thereby reduce expenses. More particularly, in one embodiment, the rate of sending may be based upon how long the vehicle has remained stationary. This time period may be selected by the user. For example, the selected time may be in the range of 15 minutes to six hours. If the vehicle has been stationary for the selected time period, then the rate of transmission may be reduced. This reduces or eliminates the need to send home position data and send all the over 15-minute stops made that day. Otherwise, that is when the vehicle is moving, the device may send data at a faster rate. Of course, a system user would not likely be interested in quick updates, especially where the position information is not changing. Conversely, if the vehicle is being moved, it may be desirable to receive more frequent position updates.

Another variation of this transmission rate conservation feature bases the rate of transmission on the vehicle position. For example, a reduced rate of transmission may be selected if the vehicle is in a predetermined area where the user has a lesser interest in quickly updated position information. The user may also have a reduced interest in an area that can be defined outside of a predetermined distance from a reference point.

Yet another variation of the vehicle position transmission rate conservation feature is based upon the vehicle's speed, such as the vehicle's average or maximum speed, for example. Accordingly, if the vehicle is traveling above a preset speed, the rate of transmission may be increased.

In accordance with another aspect of the invention, the tracking device may send the alert indication a predetermined number of times without receiving an acknowledgment as described above, and then wait until the vehicle position has changed before trying again or the cell re-registers or its RSS (received signal strength) changes. Thus, power is conserved. When the vehicle has moved to a new position, any obstructions may no longer be present thereby increasing the likelihood of a successful communication. In addition, the change in position may be determined when the vehicle is sensed to be moving about a predetermined relatively small speed, such as greater than 1 mph, for example.

In all of the embodiments and variations described herein, the tracking device may communicate with one or more other vehicle devices via a vehicle data communications bus. Further aspects of interfacing with a vehicle data communications bus are described in U.S. Pat. Nos. 5,719,551 and 6,011,460 assigned to the assignee of the present invention, the entire contents of which are incorporated herein by reference.

Yet another aspect relates to efficient use of available codes on the cellular telephone control channel. In one particular example, ten codes may be available to be transmitted from the monitoring station to the vehicle trackers. The first eight or nine codes are command codes that will cause a specific action by the tracking device at the vehicle. The other one or two codes may be wildcard codes as mentioned above, that may set a stand-by mode for one or a group of vehicles, for example.

It may be desirable to provide more than eight commands at the vehicle responsive to the corresponding eight available codes. For example, it may be desirable to set a feature on or off, or to set a different feature setting or threshold. In accordance with this aspect of the invention, the commands at the tracker are determined based upon a series of different command codes being received within a predetermined time window.

For example, the monitoring station may send code 9 that switches the tracker in the car into a stand-by mode for a predetermined time and which causes the tracker to respond with an upstream confirmation code 7 or 9 indicating receiving code 9. During the predetermined time of the stand-by mode another code follows that causes a system programmable feature or setting to change. Note that the second code would otherwise cause a different function at the vehicle. Note that system might operate a function 9 if another code 1-9 is not received in the predetermined time. The following list is exemplary for features resulting from second codes 1-9:

Code 1—Tracker will turn off feature of upstream code caused by vehicle alert being detected.

Code 2—Tracker will turn on feature of upstream code caused by vehicle alert being detected.

Code 3—Tracker deactivates cell receiver from operating due to a non-paying customer for monitoring service. That phone number can then be allocated to another customer.

Code 4—Turn on audio buzzer feature that will sound once each 10 minutes. The monitoring station need only send the command to activate the feature, as the tracker will time the period and drive the buzzer thereafter. The monitoring station will normally not need to send this command because the tracker will be configured out of the box with this feature activated to sound the buzzer every 10 minutes until the next command is received.

Code 5—Turn off the audio buzzer. This is to be sent by the monitoring station after a user has successfully activated his account.

Code 6—Turn on the 80 mph speed limit reporting. This will normally not be sent as this feature will be the default setting of the tracker.

Code 7—a Turn off the 80 mph speed limit reporting.

Code 8—Increase speed limit 5 mph and increase the time 5 minutes.

Code 9—Decrease speed limit 5 mph and decrease the time 5 minutes, and wait 5 minutes if another code number follows. It could operate this way to allow another set of codes to change more features.

In this example, in response to the tracker receiving the system code 1-9, the tracker sends an upstream code 7 to acknowledge receipt of the system code 1-9. Upon receipt of code 9 the tracker waits up to 5 minutes to determine if

another system code is received. If no code is received, then the tracker performs the code 9 operation. Of course, in other embodiments other features or settings can be selected. In general, it may be preferred that the first code sent in a series of two codes, for example, be a code that causes only a minor function to be performed at the vehicle. This is so because if the second code is sent from the monitoring station, but not received at the tracker, only a minor function is performed. For example, the first code may switch between armed and disarmed modes. This is in contrast to using a remote engine starting code or engine shutdown code as the first code. The vehicle may be moving or positioned in a marginal reception area, and the second command may not be received by the tracker within the predetermined time window. As will be appreciated by those skilled in the art, this concept of multiple digit codes, can be extended beyond two digits to three or more.

To further conserve cellular transmissions and as described above, the tracker may be set to record a position based upon a determined event. Only this recorded position information may be downloaded either by user request or at set times. It is desired that such events be relatively few, but that the information still be helpful to the user.

For example, an event for recording of position may be determined based upon the vehicle being stopped for greater than a first time and less than a second time. For example, the first time may be 15 minutes and the second time may be 6 hours. Determination of the vehicle being stopped can be made based upon one or both of the GPS position or the vehicle ignition being turned off. The second time prevents the recording of position information when the vehicle is stopped at the owner's house during the evening, for example. Accordingly, the important information of the vehicle stops being made is recorded and made available to the user, while system communications resources are conserved.

In another example, if the mode is selected to send the vehicle's location every 10 min and the vehicle is in the same location for greater than a set time, then no more vehicle locations are sent until the vehicle location has changed to start the every 10 min reporting again.

Now referring to FIGS. 10 and 11, in yet another embodiment the potential difficulties of interfacing to a vehicle data bus and devices connected thereto are further discussed. The multi-vehicle compatible tracking unit 110 is for a vehicle comprising a vehicle data bus 122 extending throughout the vehicle. The multi-vehicle compatible tracking unit 110 includes a vehicle position determining device 112, a wireless communications device 113, and a multi-vehicle compatible controller 111 for cooperating with the vehicle position determining device and the wireless communications device to send vehicle position information. The vehicle position determining device 112 may be provided by a GPS receiver, for example, or any of the other such devices described in detail above.

The wireless communications device 113 may be provided by a cellular telephone transceiver configured to operate on a control channel of the cellular network, or any of the other such devices described in detail above.

The multi-vehicle compatible controller 111 is coupled to the vehicle data bus 122 for communication therewith with a vehicle device 121. The controller 111 illustratively includes a central processing unit (CPU) 126 or other logic circuitry which is connected to a clock signal generator 124, a memory 125, and input/output circuitry 127 to interface with the vehicle device 121 using at least one corresponding vehicle device code from among a plurality thereof for different vehicles. The corresponding vehicle code may be for reading from the vehicle device 121. Similarly, the corresponding vehicle code may be additionally or alternatively for writing to the vehicle device 121.

The multi-vehicle compatible tracking unit 110 also illustratively includes a downloading interface 116 for permitting downloading of enabling data related to the at least one corresponding vehicle device code for use by the multi-vehicle compatible controller 111. The enabling data may be the vehicle device code or codes, an instruction to select a code or codes from among those already stored, or the data or sequence to allow the controller 111 to generate the vehicle device code or codes, for example.

In the embodiment as shown in FIG. 11, the downloading interface 116 is a category of wireless signal downloading interfaces that illustratively include a wireless receiver 114, such as for temporary connection to the downloading device 115. The wireless downloading interface 116 may communicate with the downloading device 115 via any one or more of a number of wireless technologies, such as cellular, satellite, IR, Bluetooth or WiFi technologies for example, as will also be appreciated by those skilled in the art. Interface circuitry 132 is included in the wireless signal downloading interface 116 for controlling communication with the downloading device 115. The interface circuitry 132 may be logic circuitry or other control circuitry along with switching components.

In other embodiments, for example as shown in FIG. 12, the wireless downloading interface 116' does not include the wireless receiver 114, as a temporary wireless communication link is instead provided by sharing the wireless communications device 113 that sends position data as described above.

The downloading interface may also be in the form of a wired signal downloading interface 116" as shown in FIG. 13. The wired signal downloading interface 116" comprises a connector 133*a* for temporary connection to a downloading device 115" with a mating connector 133*b*. Interface circuitry 132" is provided for controlling communication with the downloading device 115". The wired downloading interface 116" may connect directly to a downloading device 115", such as a laptop computer, via RS232/429 protocol, USB, FireWire, TCP/IP (Internet), or any other wired protocol as will be appreciated by those skilled in the art. The connector 133*a* of the wired downloading interface 116" may alternatively be in the form of a socket to accept a memory card or other data storage medium capable of transferring data. The downloading interfaces 116, 116' and 116", may also advantageously be for permitting downloading of programming instructions for the multi-vehicle compatible controller 111, to allow remote programming, for example, as will also be appreciated by those skilled in the art.

Referring again briefly to FIG. 10, the multi-vehicle compatible tracking unit 110 further comprises a remote transmitter 117, such as typically in the form of a small handheld device to be carried by a user when away from the vehicle. The multi-vehicle compatible controller 111 also performs at least one vehicle remote control function responsive to the remote transmitter 117. The remote transmitter 117 illustratively communicates with the remote receiver 118, which is coupled to the multi-vehicle compatible controller 111. The vehicle remote control functions may include a vehicle security function, a remote keyless entry function, and a remote engine starting function, for example, implemented via the data bus 122 using one or more vehicle devices 121. Such a vehicle device 121 may also include another vehicle controller, as well as a sensor, or actuator as will be appreciated by those skilled in the art.

The multi-vehicle compatible tracking unit 110 illustratively includes a common housing 123 for its various components. In other embodiments, more than one housing may be used for the various components.

Referring additionally to FIGS. 14 and 15, several methods for using a multi-vehicle compatible tracking unit 110 for a vehicle comprising a vehicle data bus 122 extending throughout the vehicle are described with reference to the respective flowcharts 148, 148'. Beginning at Block 150, the multi-vehicle compatible tracking unit 110 is installed in vehicle (Block 151). At Block 152 a connection is then established between the multi-vehicle compatible tracking unit 110 and a downloading device 115 using a downloading interface 116. Enabling data related to at least one corresponding vehicle device code for use by the multi-vehicle compatible controller 111 is downloaded via a downloading interface 116 (Block 153). Once the enabling data is downloaded, the connection between the multi-vehicle tracking unit 110 and the downloading device 115 is terminated at Block 154. Of course the multi-vehicle compatible tracking unit 110 may be optionally programmed via the downloading interface while the connection is established. The operation of the tracking unit may be tested at Block 155 before stopping at Block 156. With particular reference to the flowchart 148' of FIG. 15, the multi-vehicle compatible tracking unit 110 may be connected to the downloading device 115 (Block 152'), etc., before installation in the vehicle (Block 151') and testing (Block 155').

Other features relating to vehicle control systems are disclosed in copending patent applications entitled VEHICLE TRACKER INCLUDING STATIONARY TIME DETERMINATION AND ASSOCIATED METHODS, Ser. No. 09/859,727 filed May 17, 2001, now U.S. Pat. No. 6,512,465; VEHICLE TRACKER CONSERVING CODES AND RELATED METHODS, Ser. No. 09/859,673 filed May 17, 2001, now U.S. Pat. No. 6,522,267; VEHICLE TRACKER WITH POWER SAVING FEATURES AND RELATED METHODS, Ser. No. 09/859,728 filed May 17, 2001, now U.S. Pat. No. 6,512,466; VEHICLE TRACKER COOPERATING WITH A STARTER INTERRUPT AND RELATED METHODS, Ser. No. 09/859,973 filed May 17, 2001; VEHICLE TRACKER WITH USER NOTIFICATIONS AND ASSOCIATED METHODS, Ser. No. 09/859,733 filed May 17, 2001, now U.S. Pat. No. 6,509,868; VEHICLE TRACKER WITH USER REGISTRATION REMINDER AND RELATED METHODS, Ser. No. 09/859,971 filed May 17, 2001, now U.S. Pat. No. 6,507,786; VEHICLE TRACKER INCLUDING INPUT/OUTPUT FEATURES AND RELATED METHODS, Ser. No. 09/859,972 filed May 17, 2001, now U.S. Pat. No. 6,606,561; and VEHICLE TRACKER WITH TEST FEATURES AND RELATED METHODS, Ser. No. 09/859,729 filed May 17, 2001, now U.S. Pat. No. 6,809,659, the entire disclosures of which are incorporated herein by reference.

Many modifications and other embodiments of the invention will come to the mind of one skilled in the art having the benefit of the teachings presented in the foregoing descriptions and the associated drawings. Accordingly, it is understood that the invention is not to be limited to the embodiments disclosed, and that other modifications and embodiments are intended to be included within the spirit and scope of the appended claims.

That which is claimed is:

1. A multi-vehicle compatible tracking unit for a vehicle comprising a vehicle data bus extending throughout the vehicle, the multi-vehicle compatible tracking unit comprising:

a vehicle position determining device;

a wireless communications device;

a multi-vehicle compatible controller for cooperating with said vehicle position determining device and said wireless communications device to send vehicle position information;

said multi-vehicle compatible controller to be coupled to the vehicle data bus for communication thereover with at least one vehicle device using at least one corresponding vehicle device code from among a plurality thereof for different vehicles; and

a downloading interface for permitting downloading of enabling data related to the at least one corresponding vehicle device code for use by said multi-vehicle compatible controller.

2. The multi-vehicle compatible tracking unit according to claim 1 wherein said downloading interface comprises a wired signal downloading interface.

3. The multi-vehicle compatible tracking unit according to claim 2 wherein said wired signal downloading interface comprises a connector for temporary connection to a downloading device.

4. The multi-vehicle compatible tracking unit according to claim 1 wherein said downloading interface comprises a wireless signal downloading interface.

5. The multi-vehicle compatible tracking unit according to claim 4 wherein said wireless signal downloading interface comprises a wireless receiver for temporary connection to a downloading device.

6. The multi-vehicle compatible tracking unit according to claim 1 wherein the corresponding at least one vehicle code is for reading from the at least one vehicle device.

7. The multi-vehicle compatible tracking unit according to claim 1 wherein the corresponding at least one vehicle code is for writing to the at least one vehicle device.

8. The multi-vehicle compatible tracking unit according to claim 1 wherein said downloading interface is also for permitting downloading of at least one programming instruction for said multi-vehicle compatible controller.

9. The multi-vehicle compatible tracking unit according to claim 1 further comprising a remote transmitter; and wherein said multi-vehicle compatible controller also performs at least one vehicle remote control function responsive to said remote transmitter.

10. The multi-vehicle compatible tracking unit according to claim 9 wherein the at least one vehicle remote control function comprises at least one of a vehicle security function, a remote keyless entry function, and a remote engine starting function.

11. The multi-vehicle compatible tracking unit according to claim 1 wherein said wireless position determining device comprises a Global Positioning System (GPS) receiver.

12. The multi-vehicle compatible tracking unit according to claim 1 further comprising a housing containing said vehicle position determining device, said wireless communications device, said multi-vehicle compatible controller, and said downloading interface.

13. A multi-vehicle compatible tracking unit for a vehicle comprising a vehicle data bus extending throughout the vehicle, the multi-vehicle compatible vehicle tracking unit comprising:

a vehicle position determining device;

a wireless communications device;

a multi-vehicle compatible controller for cooperating with said vehicle position determining device and said wireless communications device to send vehicle position information;

said multi-vehicle compatible controller to be coupled to the vehicle data bus for communication thereover with at least one vehicle device using at least one corresponding vehicle device code from among a plurality thereof for different vehicles; and

a downloading interface for permitting downloading of enabling data related to the at least one corresponding vehicle device code for use by said multi-vehicle compatible controller;

said downloading interface comprising a connector for temporary connection to a downloading device.

14. The multi-vehicle compatible tracking unit according to claim 13 wherein the corresponding at least one vehicle code is for reading from the at least one vehicle device.

15. The multi-vehicle compatible tracking unit according to claim 13 wherein the corresponding at least one vehicle code is for writing to the at least one vehicle device.

16. The multi-vehicle compatible tracking unit according to claim 13 wherein said downloading interface is also for permitting downloading of at least one programming instruction for said multi-vehicle compatible controller.

17. The multi-vehicle compatible tracking unit according to claim 13 further comprising a remote transmitter; and wherein said multi-vehicle compatible controller also performs at least one vehicle remote control function responsive to said remote transmitter.

18. A multi-vehicle compatible tracking unit for a vehicle comprising a vehicle data bus extending throughout the vehicle, the multi-vehicle compatible vehicle tracking unit comprising,

a vehicle position determining device;

a wireless communications device;

a multi-vehicle compatible controller for cooperating with said vehicle position determining device and said wireless communications device to send vehicle position information;

said multi-vehicle compatible controller to be coupled to the vehicle data bus for communication thereover with at least one vehicle device using at least one corresponding vehicle device code from among a plurality thereof for different vehicles; and

a downloading interface for permitting downloading of enabling data related to the at least one corresponding vehicle device code for use by said multi-vehicle compatible controller;

said downloading interface comprising a wireless receiver for temporary connection to a downloading device.

19. The multi-vehicle compatible tracking unit according to claim 18 wherein the corresponding at least one vehicle code is for reading from the at least one vehicle device.

20. The multi-vehicle compatible tracking unit according to claim 18 wherein the corresponding at least one vehicle code is for writing to the at least one vehicle device.

21. The multi-vehicle compatible tracking unit according to claim 18 wherein said downloading interface is also for permitting downloading of at least one programming instruction for said multi-vehicle compatible controller.

22. The multi-vehicle compatible tracking unit according to claim 18 further comprising a remote transmitter; and wherein said multi-vehicle compatible controller also performs at least one vehicle remote control function responsive to said remote transmitter.

* * * * *

PTO/SB/57 (09-14)
Approved for use through 07/31/2015. OMB 0651-0064
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(Also referred to as FORM PTO-1465)

REQUEST FOR *EX PARTE* REEXAMINATION TRANSMITTAL FORM

Address to:
Mail Stop *Ex Parte* Reexam
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Attorney Docket No.: C13-03895

Date: September 14, 2015

1. [✓] This is a request for *ex parte* reexamination pursuant to 37 CFR 1.510 of patent number 8,032,278 issued October 4, 2011. The request is made by:
   [ ] patent owner. [✓] third party requester.
2. [✓] The name and address of the person requesting reexamination is:
   Samuel P. Richey
   KPPB LLP
   2400 E. Katella Ave, Suite 1050, Anaheim, CA 92806
3. Requester asserts [✓] small entity status (37 CFR 1.27) or [ ] certifies micro entity status (37 CFR 1.29). Only a patent owner requester can certify micro entity status. Form PTO/SB/15A or B must be attached to certify micro entity status.
4. [ ] a. A check in the amount of $_____ is enclosed to cover the reexamination fee, 37 CFR 1.20(c)(1);
   [ ] b. The Director is hereby authorized to charge the fee as set forth in 37 CFR 1.20(c)(1) to Deposit Account No. _____;
   [ ] c. Payment by credit card. Form PTO-2038 is attached; **or**
   [✓] d. Payment made via EFS-Web.
5. [✓] Any refund should be made by [ ] check or [✓] credit to Deposit Account No. 50-4407. 37 CFR 1.26(c). If payment is made by credit card, refund must be to credit card account.
6. [✓] A copy of the patent to be reexamined having a double column format on one side of a separate paper is enclosed. 37 CFR 1.510(b)(4).
7. [ ] CD-ROM or CD-R in duplicate, Computer Program (Appendix) or large table
   [ ] Landscape Table on CD
8. [ ] Nucleotide and/or Amino Acid Sequence Submission
   If applicable, items a. -- c. are required.
   a. [ ] Computer Readable Form (CRF)
   b. Specification Sequence Listing on:
      i. [ ] CD-ROM (2 copies) or CD-R (2 copies); **or**
      ii. [ ] paper
   c. [ ] Statements verifying identity of above copies
9. [✓] A copy of any disclaimer, certificate of correction or reexamination certificate issued in the patent is included.
10. [✓] Reexamination of claim(s) 1 - 22 is requested.
11. [✓] A copy of every patent or printed publication relied upon is submitted herewith including a listing thereof on Form PTO/SB/08, PTO-1449, or equivalent.
12. [✓] An English language translation of all necessary and pertinent non-English language patents and/or printed publications is included.

This collection of information is required by 37 CFR 1.510. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) a request for reexamination. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 18 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Mail Stop *Ex Parte* Reexam, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**
If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

13. [✓] The attached detailed request includes at least the following items:

a. A statement identifying each substantial new question of patentability based on prior patents and printed publications. 37 CFR 1.510(b)(1).

b. An identification of every claim for which reexamination is requested, and a detailed explanation of the pertinency and manner of applying the cited art to every claim for which reexamination is requested. 37 CFR 1.510(b)(2).

14. [ ] A proposed amendment is included (only where the patent owner is the requester). 37 CFR 1.510(e).

15. [✓] It is certified that the statutory estoppel provisions of 35 U.S.C. 315(e)(1) or 35 U.S.C. 325(e)(1) do not prohibit requester from filing this *ex parte* reexamination request. 37 CFR 1.510(b)(6).

16. [✓] a. It is certified that a copy of this request (if filed by other than the patent owner) has been served in its entirety on the patent owner as provided in 37 CFR 1.33(c).

The name and address of the party served and the date of service are:

CHRISTOPHER F. REGAN, ESQUIRE, ALLEN, DYER, DOPPELT, MILBRATH & GILCHRIST, P.A.

P.O. Box 3791, Orlando FL 32802-3791

Date of Service: September 14, 2015; or

[ ] b. A duplicate copy is enclosed since service on patent owner was not possible. An explanation of the efforts made to serve patent owner is attached. See MPEP 2220.

17. Correspondence Address: Direct all communication about the reexamination to:

[✓] The address associated with Customer Number: 71897

OR

[ ] Firm or Individual Name

Address

City	State	Zip
Country		
Telephone	Email	

18. [✓] The patent is currently the subject of the following concurrent proceeding(s):

[ ] a. Copending reissue Application No.

[ ] b. Copending reexamination Control No.

[ ] c. Copending Interference No.

[✓] d. Copending litigation styled:

Omega Patents, LLC v. CalAmp Corp., Middle District of Florida, Orlando Division, Case No. 6:13-cv-1950-PGB-DAB

WARNING: Information on this form may become public. Credit card information should not be included on this form. Provide credit card information and authorization on PTO-2038.

Authorized Signature — September 14, 2015 (Date)

Samuel P. Richey (Typed/Printed Name) — 64,085 (Registration No.)

[ ] For Patent Owner Requester

[✓] For Third Party Requester

Electronic Patent Application Fee Transmittal

Application Number:	
Filing Date:	
Title of Invention:	Vehicle Tracking Unit with Downloadable Codes and Associated Methods
First Named Inventor/Applicant Name:	Kenneth E. Flick
Filer:	Samuel Patrick Richey
Attorney Docket Number:	C13-03896

Filed as Small Entity

Filing Fees for ex parte reexam

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
REQUEST FOR EX PARTE REEXAMINATION	2812	1	6000	6000
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Extension-of-Time:				
Miscellaneous:				
			Total in USD ($)	**6000**

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United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

REEXAM CONTROL NUMBER	FILING OR 371 (c) DATE	PATENT NUMBER
90/013,587	09/14/2015	

CONFIRMATION NO. 8867

REEXAM ASSIGNMENT NOTICE

CHRISTOPHER R. REGAN, ESQ.
ALLEN, DYER, DOPPELT, MILBRATH & GILCHRIST, PA
P O BOX 3791
ORLANDO, FL 32802-3791

OC000000077455750

Date Mailed: 09/15/2015

NOTICE OF ASSIGNMENT OF REEXAMINATION REQUEST

The above-identified request for reexamination has been assigned to Art Unit 3993. All future correspondence to the proceeding should be identified by the control number listed above and directed to the assigned Art Unit.

A copy of this Notice is being sent to the latest attorney or agent of record in the patent file or to all owners of record. (See 37 CFR 1.33(c)). If the addressee is not, or does not represent, the current owner, he or she is required to forward all communications regarding this proceeding to the current owner(s). An attorney or agent receiving this communication who does not represent the current owner(s) may wish to seek to withdraw pursuant to 37 CFR 1.36 in order to avoid receiving future communications. If the address of the current owner(s) is unknown, this communication should be returned within the request to withdraw pursuant to Section 1.36.

NOTICE OF USPTO EX PARTE REEXAMINATION PATENT OWNER STATEMENT WAIVER PROGRAM

The USPTO has implemented a pilot program where, after a reexamination proceeding has been granted a filing date and before the examiner begins his or her review, the patent owner may orally waive the right to file a patent owner's statement. See *"Pilot Program for Waiver of Patent Owner's Statement in Ex Parte Reexamination Proceedings,"* 75 FR 47269 (August 5, 2010). One goal of the pilot program is to reduce the pendency of reexamination proceedings and improve the efficiency of the reexamination process.

Ordinarily when ex parte reexamination is ordered, the USPTO must wait until after the receipt of the patent owner's statement and the third party requester's reply, or after the expiration of the time period for filing the statement and reply (a period that can be as long as 5 to 6 months), before mailing a first determination of patentability. The USPTO's first determination of patentability is usually a first Office action on the merits or a Notice of Intent to Issue Reexamination Certificate (NIRC).

Under the pilot program, the patent owner's oral waiver allows the USPTO to act on the first determination of patentability immediately after determining that reexamination will be ordered, and in a suitable case issue the reexamination order and the first determination of patentability (which could be a NIRC if the claims under reexamination are confirmed) at the same time.

Benefits to the Patent Owner for participating in this pilot program include reduction in pendency.

To participate in this pilot program, Patent Owners may contact the USPTO's Central Reexamination Unit (CRU) at 571-272-7705. The USPTO will make the oral waiver of record in the reexamination file in an interview summary and a copy will be mailed to the patent owner and any third party requester.

cc: Third Party Requester(if any)
KPPB LLP
2400 EAST KATELLA AVENUE
SUITE 1050
ANAHEIM, CA 92806

/rbell/

Legal Instruments Examiner
Central Reexamination Unit 571-272-7705; FAX No. 571-273-9900

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REEXAM CONTROL NUMBER	FILING OR 371 (c) DATE	PATENT NUMBER
90/013,587	09/14/2015	

CONFIRMATION NO. 8867
REEXAMINATION REQUEST NOTICE

KPPB LLP
2400 EAST KATELLA AVENUE
SUITE 1050
ANAHEIM, CA 92806

OC000000077455748

Date Mailed: 09/15/2015

NOTICE OF REEXAMINATION REQUEST FILING DATE

(Third Party Requester)

Requester is hereby notified that the filing date of the request for reexamination is 09/14/2015, the date that the filing requirements of 37 CFR § 1.510 were received.

A decision on the request for reexamination will be mailed within three months from the filing date of the request for reexamination. (See 37 CFR 1.515(a)).

A copy of the Notice is being sent to the person identified by the requester as the patent owner. Further patent owner correspondence will be the latest attorney or agent of record in the patent file. (See 37 CFR 1.33). Any paper filed should include a reference to the present request for reexamination (by Reexamination Control Number).

cc: Patent Owner
CHRISTOPHER R. REGAN, ESQ.
ALLEN, DYER, DOPPELT, MILBRATH & GILCHRIST, PA
P O BOX 3791
ORLANDO, FL 32802-3791

/rbell/

Legal Instruments Examiner
Central Reexamination Unit 571-272-7705; FAX No. 571-273-9900

Patent Assignment Abstract of Title

Total Assignments: 1

Application #: 11773272 **Filing Dt:** 07/03/2007 **Patent #:** 8032278 **Issue Dt:** 10/04/2011
PCT #: NONE **Intl Reg #:** **Publication #:** US20070279283 **Pub Dt:** 12/06/2007
Inventor: Kenneth E. Flick
Title: VEHICLE TRACKING UNIT WITH DOWNLOADABLE CODES AND ASSOCIATED METHODS

Assignment: 1

Reel/Frame: 019515 / 0350 **Received:** 07/03/2007 **Recorded:** 07/03/2007 **Mailed:** 07/03/2007 **Pages:** 3
Conveyance: ASSIGNMENT OF ASSIGNORS INTEREST (SEE DOCUMENT FOR DETAILS).
Assignor: FLICK, KENNETH E., MR. **Exec Dt:** 07/02/2007
Assignee: OMEGA PATENTS, L.L.C.
5326 PRESLEY PLACE
DOUGLASVILLE, GEORGIA 30135
Correspondent: CHRISTOPHER F. REGAN
255 S. ORANGE AVENUE
SUITE 1401
ORLANDO, FL 32801

Search Results as of: 09/15/2015 10:49 AM

If you have any comments or questions concerning the data displayed, contact PRD / Assignments at 571-272-3350. v.2.4
Web interface last modified: Jul 25, 2014 v.2.4

Litigation Search Report CRU 3999

Reexam Control No. 90/013,587

TO: EILEEN LILLIS Location: CRU Art Unit: 3993 Date: 09/15/2015	From: MANUEL SALDANA Location: CRU 3999 MDE 5D14 Phone: (571) 272-7740 MANUEL.SALDANA@uspto.gov

Search Notes

Litigation was found for US Patent Number: 8,032,278

Omega Patents, Llc V. Enfora, Inc.	1:13cv646
Omega Patents, Llc V. Calamp Corp.	6:13cv1950

1) I performed a KeyCite Search in Westlaw, which retrieves all history on the patent including any litigation.

2) I performed a search on the patent in Lexis CourtLink for any open dockets or closed cases.

3) I performed a search in Lexis in the Federal Courts and Administrative Materials databases for any cases found.

4) I performed a search in Lexis in the IP Journal and Periodicals database for any articles on the patent.

5) I performed a search in Lexis in the news databases for any articles about the patent or any articles about litigation on this patent.

US District Court Civil Docket

U.S. District - Georgia Northern
(Atlanta)

1:13cv646

Omega Patents, Llc v. Enfora, Inc.

This case was retrieved from the court on Monday, June 24, 2013

Date Filed:	02/28/2013	Class Code:	CLOSED
Assigned To:	Judge Thomas W. Thrash, Jr	Closed:	Yes
Referred To:		Statute:	28:1338
Nature of suit:	Patent (830)	Jury Demand:	Plaintiff
Cause:	Patent Infringement	Demand Amount:	$0
Lead Docket:	None	NOS Description:	Patent
Other Docket:	None		
Jurisdiction:	Federal Question		

Litigants	Attorneys
Omega Patents, Llc Plaintiff	Cynthia Jeannette Lee LEAD ATTORNEY;ATTORNEY TO BE NOTICED Thomas, Kayden, Horstemeyer & Risley, LLP Suite 1500 400 Interstate North Parkway Atlanta, GA 30339 USA 770-933-9500 Email:Cynthia.Lee@thomashorstemeyer.Com Dan Robert Gresham LEAD ATTORNEY;ATTORNEY TO BE NOTICED Thomas Horstemeyer, LLP Suite 1500 400 Interstate North Parkway, Se Atlanta, GA 30339 USA 770-933-9500 Email:Dan.Gresham@thomashorstemeyer.Com
Enfora, Inc. Defendant	
Novatel Wireless, Inc. Defendant	

Date	#	Proceedings Text
02/28/2013	1	COMPLAINT with Jury Demand, filed by Omega Patents, LLC. Consent form to proceed before U.S. Magistrate and pretrial instructions provided. (Filing fee $ 350.00 receipt number 113E-4436675.) (Attachments: # 1 Exhibit A - '876, # 2 Exhibit B - '727, # 3 Exhibit C -'278, # 4 Exhibit D - '886, # 5 Civil Cover Sheet)(eop) Please visit our website at http://www.gand.uscourts.gov to obtain

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		Pretrial Instructions. (Entered: 02/28/2013)
02/28/2013	2	Electronic Summons Issued as to Enfora, Inc.. (eop) (Entered: 02/28/2013)
02/28/2013	3	Certificate of Interested Persons by Omega Patents, LLC. (eop) (Entered: 02/28/2013)
02/28/2013	4	AO Form 120 forwarded to Commissioner. (eop) (Entered: 02/28/2013)
03/01/2013		Clerks Notation re 3 Certificate of Interested Persons, OK per TWT. (ss) (Entered: 03/01/2013)
03/07/2013	5	First AMENDED COMPLAINT against Enfora, Inc., Novatel Wireless, Inc.with Jury Demand, filed by Omega Patents, LLC. (Attachments: # 1 Exhibit A - '876 Patent, # 2 Exhibit B - '727 Patent, # 3 Exhibit C - '278 Patent, # 4 Exhibit D - '886 Patent, # 5 Summons Novatel Wireless, Inc.)(Gresham, Dan) Please visit our website at http://www.gand.uscourts.gov to obtain Pretrial Instructions. (Entered: 03/07/2013)
03/07/2013	6	Supplemental Certificate of Interested Persons and Corporate Disclosure Statement by Omega Patents, LLC identifying Other Affiliate Kenneth Flick for Omega Patents, LLC. (Gresham, Dan) (Entered: 03/07/2013)
06/19/2013	7	NOTICE of Voluntary Dismissal Without Prejudice filed by Omega Patents, LLC (Gresham, Dan) (Entered: 06/19/2013)
06/20/2013		Clerk's Entry of Dismissal APPROVING 7 Notice of Voluntary Dismissal pursuant to Fed.R.Civ.P.41(a)(1)(i) (dr) (Entered: 06/20/2013)
06/20/2013		Civil Case Terminated. (dr) (Entered: 06/20/2013)
06/20/2013	8	AO Form 120 forwarded to Commissioner. (dr) (Entered: 06/20/2013)

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US District Court Civil Docket

U.S. District - Florida Middle
(Orlando)

6:13cv1950

Omega Patents, Llc v. Calamp Corp.

This case was retrieved from the court on Friday, January 23, 2015

Date Filed:	12/20/2013	Class Code:	OPEN
Assigned To:	Judge Paul G. Byron	Closed:	
Referred To:	Magistrate Judge David A. Baker	Statute:	35:271
Nature of suit:	Patent (830)	Jury Demand:	Both
Cause:	Patent Infringement	Demand Amount:	$0
Lead Docket:	None	NOS Description:	Patent
Other Docket:	None None		
Jurisdiction:	Federal Question		

Parties	Attorneys
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Calamp Corp. Defendant	Christopher S. Carver LEAD ATTORNEY;ATTORNEY TO BE NOTICED Akerman Senterfitt, LLP 25th Floor 1 Se 3rd Ave Miami, FL 33131-1714 USA 305/374-5600 Fax: 305/374-5095

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Omega Patents, Llc Counter Defendant	Brian R. Gilchrist LEAD ATTORNEY; ATTORNEY TO BE NOTICED Allen, Dyer, Doppelt, Milbrath & Gilchrist, PA 255 S Orange Ave - Ste 1401 Po Box 3791 Orlando, FL 32802-3791 USA 407-841-2330 Fax: 407-841-2343 Email: Bgilchrist@addmg.Com Ryan Thomas Santurri LEAD ATTORNEY; ATTORNEY TO BE NOTICED Allen, Dyer, Doppelt, Milbrath & Gilchrist, PA 255 S Orange Ave - Ste 1401 Po Box 3791 Orlando, FL 32802-3791 USA 407/841-2330 Fax: 407/841-2343 Email: Rsanturri@addmg.Com

Date	#	Proceedings Text
12/20/2013	1	COMPLAINT Injunctive Relief Requested against Calamp Corp. with Jury Demand (Filing fee $ 400 receipt number Orl-030433) filed by Omega Patents, LLC. (Attachments: # 1 Civil Cover Sheet, # 2 Exhibit A-C, # 3 Exhibit D-F)(JEV) (Entered: 12/20/2013)
12/20/2013	2	SUMMONS issued as to Calamp Corp. (JEV) (Entered: 12/20/2013)
12/20/2013	3	Patent Report sent to Alexandria, VA. (Attachments: # 1 Complaint, # 2 Exhibit A-C, # 3 Exhibit D-F) (JEV) (Entered: 12/20/2013)
12/30/2013	4	RELATED CASE ORDER AND NOTICE of designation under Local Rule 3.05 - track 2. Notice of pendency of other actions due by 1/13/2014. Signed by Judge Gregory A. Presnell on 12/30/2013. Copies mailed.(LAM) (Entered: 12/30/2013)
12/30/2013	5	INTERESTED PERSONS ORDER. Certificate of interested persons and corporate disclosure statement due by 1/13/2014. Signed by Judge Gregory A. Presnell on 12/30/2013. Copies mailed.(LAM) (Entered: 12/30/2013)
01/14/2014	6	NOTICE of pendency of related cases re 4 Related case order and track 2 notice per Local Rule 1.04(d) by Omega Patents, LLC. Related case(s): Yes. (Santurri, Ryan) Modified on 1/15/2014 (JEV). (Entered: 01/14/2014)
01/14/2014	7	CERTIFICATE of interested persons and corporate disclosure statement re 5 Interested persons order by Omega Patents, LLC. (Santurri, Ryan) (Entered: 01/14/2014)
01/15/2014	8	NOTICE of Appearance by Christopher S. Carver on behalf of Calamp Corp. (Carver, Christopher) (Entered: 01/15/2014)

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01/15/2014	9	NOTICE of pendency of related cases re 4 Related Case Order per Local Rule 1.04(d) by Calamp Corp. Related case(s): yes (Carver, Christopher) Modified on 1/16/2014 (JET). (Entered: 01/15/2014)
01/15/2014	10	ANSWER and affirmative defenses to 1 Complaint with Jury Demand , COUNTERCLAIM against Omega Patents, LLC by Calamp Corp. (Carver, Christopher) Modified on 1/16/2014 (JET). (Entered: 01/15/2014)
01/15/2014	11	CERTIFICATE of interested persons and corporate disclosure statement re 5 Interested persons order by Calamp Corp.. (Carver, Christopher) (Entered: 01/15/2014)
01/15/2014	12	*** PRO HAC VICE FEES paid and Special Admission Attorney Certification Form filed by attorney Joel A. Kauth, appearing on behalf of Calamp Corp. (Filing fee $10 receipt number ORL31013) re 22 MOTION for Joel A. Kauth to appear pro hac vice by Calamp Corp. (JET) (JET). Modified on 3/4/2014 (IGC). (Entered: 01/15/2014)
01/16/2014	13	NOTICE to counsel Joel A. Kauth of Local Rule 2.02 (signed by deputy clerk). (JET) (Entered: 01/16/2014)
01/17/2014	14	NOTICE to counsel Christopher S. Carver of Local Rule 2.01 (signed by deputy clerk). (JET) (Entered: 01/17/2014)
01/17/2014	15	NOTICE of Appearance by Peter A. Chiabotti on behalf of Calamp Corp. (Chiabotti, Peter) (Entered: 01/17/2014)
01/29/2014	16	CERTIFICATE of compliance re: Service of documents 4 , 5 , 6 and 7 on Defendant by Omega Patents, LLC. (Gilchrist, Brian) Modified on 1/30/2014 (JET). (Entered: 01/29/2014)
02/05/2014	17	MOTION to Dismiss Counterclaims and Memorandum in Support by Omega Patents, LLC. (Santurri, Ryan) (Entered: 02/05/2014)
02/06/2014	18	Unopposed MOTION to Appear Telephonically at Case Management Conference by Calamp Corp. (Carver, Christopher) Modified on 2/7/2014 (JET). (Entered: 02/06/2014)
02/07/2014	19	ORDER granting 18 Motion to attend case management conference by phone. Signed by Judge Gregory A. Presnell on 2/7/2014. (TKW) (Entered: 02/07/2014)
02/24/2014	20	Amended COUNTERCLAIM -- CalAmp Corp.'s First Amended Counterclaim against Omega Patents, LLC filed by Calamp Corp..(Carver, Christopher) (Entered: 02/24/2014)
02/26/2014	21	ORDER denying as moot 17 motion to dismiss original counterclaim. Signed by Judge Gregory A. Presnell on 2/26/2014. (TKW) (Entered: 02/26/2014)
03/03/2014	22	MOTION for Joel A. Kauth to appear pro hac vice by Calamp Corp.. (Attachments: # 1 Exhibit A - (proposed) Order Granting Motion to Appeal Pro Hac Vice of Attorney Joel A. Kauth)(Carver, Christopher) Motions referred to Magistrate Judge David A. Baker. (Entered: 03/03/2014)
03/03/2014	23	Written designation and consent to act by Christopher S. Carver on behalf of Calamp Corp.. Local Counsel: Christopher S. Carver. Non-Resident Counsel: Joel A. Kauth. (Carver, Christopher) (Entered: 03/03/2014)
03/04/2014	24	ENDORSED ORDER granting 22 motion to appear pro hac vice. Provided, all counsel shall register for and use the electronic filing system as adopted by the Court. After this Order, the Clerk will no longer send copies of docket entries by U.S. Mail to counsel in this case. Appearance and participation by more than one attorney at any hearing or trial is subject to the discretion of the presiding judge. Signed by Magistrate Judge David A. Baker on 3/4/2014. (Baker, David) (Entered: 03/04/2014)
03/11/2014	25	REPLY to 20 Counterclaim by Omega Patents, LLC.(Santurri, Ryan) (Entered: 03/11/2014)
03/11/2014	26	CASE MANAGEMENT REPORT. (Gilchrist, Brian) (Entered: 03/11/2014)
03/12/2014	27	ORDER of recusal. Signed by Judge Gregory A. Presnell on 3/12/2014. (TKW) (Entered: 03/12/2014)
03/12/2014	28	Case Reassigned to Judge Charlene Edwards Honeywell. New case number: 6:13-cv-1950-Orl-36DAB. Judge Gregory A. Presnell no longer assigned to the case. (IGC) (Entered: 03/12/2014)
03/14/2014	29	CASE MANAGEMENT AND SCHEDULING ORDER: Amended Pleadings due by 4/18/2014, Joinder of

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		Parties due by 4/18/2014, Discovery due by 6/1/2015, Dispositive motions due by 7/1/2015, Pretrial statement due by 9/15/2015, Conduct mediation hearing by 6/16/2015. Lead counsel to coordinate dates. Claim Construction Hearing set for 11/24/2014 at 10:00 AM in Orlando Courtroom 5 B before Judge Charlene Edwards Honeywell. Final Pretrial Conference set for 10/20/2015 at 01:30 PM in Orlando Courtroom 5 B before Judge Charlene Edwards Honeywell, Jury Trial set for 11/2/2015 term in Orlando Courtroom 5 B before Judge Charlene Edwards Honeywell. Signed by Judge Charlene Edwards Honeywell on 3/14/2014. (NBL) (Entered: 03/14/2014)
03/14/2014	30	CASE REFERRED to Mediation. (MAA) (Entered: 03/19/2014)
03/27/2014	31	NOTICE of mediation conference/hearing to be held on 11/10/2014 at 9:30 a.m. before Emery H. Rosenbluth, Jr., Esq..(Santurri, Ryan) (Entered: 03/27/2014)
04/16/2014	32	* * * PRO HAC VICE FEES paid and Special Admission Attorney Certification Form filed by attorney Eugene K. Chong, appearing on behalf of Calamp Corp. (Filing fee $10 receipt number ORL-33338). (MAA) (MAA). (Entered: 04/16/2014)
05/07/2014	33	MOTION for Eugene Chong to appear pro hac vice by Calamp Corp.. (Attachments: # 1 Exhibit A - (proposed) Order Granting Motion to Appear Pro Hace Vice)(Carver, Christopher) Motions referred to Magistrate Judge David A. Baker. (Entered: 05/07/2014)
05/07/2014	34	ENDORSED ORDER granting 33 motion to appear pro hac vice. Provided, all counsel shall register for and use the electronic filing system as adopted by the Court. After this Order, the Clerk will no longer send copies of docket entries by U.S. Mail to counsel in this case. Signed by Magistrate Judge David A. Baker on 5/7/2014. (Baker, David) (Entered: 05/07/2014)
07/02/2014	35	Case Reassigned to Judge Paul G. Byron. New case number: 6:13-cv-1950-Orl-40-DAB. Judge Charlene Edwards Honeywell no longer assigned to the case. (SC) (Entered: 07/02/2014)
07/03/2014	36	AMENDED NOTICE of Claim Construction Hearing: Claim Construction Hearing set for 11/24/2014 at 10:00 AM in Orlando Courtroom 4 B before Judge Paul G. Byron, U.S. District Court, 401 West Central Blvd., Orlando, Florida. (NBL) copies e-mailed (Entered: 07/03/2014)
07/07/2014	37	AMENDED NOTICE of hearing: Final Pretrial Conference set for 10/20/2015 at 1:30 PM in Orlando Courtroom 4 B before Judge Paul G. Byron, Jury Trial set for the November 2015 Trial term, term commencing 11/2/2015 at 09:00 AM in Orlando Courtroom 4 B before Judge Paul G. Byron. (NBL) copies e-mailed (Entered: 07/07/2014)
09/05/2014	38	MOTION for miscellaneous relief, specifically Motion for Claim Construction by Omega Patents, LLC. (Attachments: # 1 Exhibit A - U.S. Patent 6,346,876, # 2 Exhibit B - U.S. Patent 6,756,885, # 3 Exhibit C - U.S. Patent 5,719,551)(Santurri, Ryan) (Entered: 09/05/2014)
09/05/2014	39	DEFENDANT'S Opening Claim Construction Brief re 29 Case management and scheduling orderSet Hearings filed by Calamp Corp.. (Attachments: # 1 Exhibit A, # 2 Exhibit B, # 3 Exhibit C, # 4 Exhibit D)(Kauth, Joel) Modified on 9/8/2014 (MAA). (Entered: 09/05/2014)
10/03/2014	40	RESPONSE in opposition to 39 Motion for Claim Construction filed by Omega Patents, LLC. (Santurri, Ryan) Modified on 10/6/2014 (LAK). (Entered: 10/03/2014)
10/03/2014	41	RESPONSIVE Claim Construction brief filed by Calamp Corp. (Kauth, Joel) Modified on 10/6/2014 (LAK). (Entered: 10/03/2014)
10/30/2014	42	ORDER re: Claim Construction Hearing. Signed by Judge Paul G. Byron on 10/30/2014. (RML) (Entered: 10/30/2014)
11/11/2014	43	MEDIATION report Hearing held on 111014. Hearing outcome: Impasse.. (Rosenbluth, Emery) (Entered: 11/11/2014)
11/17/2014	44	RESPONSE re 42 Order pdf -- Joint Pre-Hearing Statement filed by Omega Patents, LLC. (Gilchrist, Brian) (Entered: 11/17/2014)
11/21/2014	45	NOTICE of Appearance by Carrie Ann Wozniak on behalf of Calamp Corp. (Wozniak, Carrie) (Entered: 11/21/2014)
11/24/2014	46	Minute Entry (CLAIM CONSTRUCTION HEARING) Proceedings held before Judge Paul G. Byron on 11/24/2014. Written Order to issue. Court Reporter: Koretta Stanford (NBL) (Entered: 11/24/2014)
11/28/2014	47	NOTICE RESCHEDULING FINAL PRETRIAL CONFERENCE (TIME ONLY): Final Pretrial Conference reset for 10/20/2015 at 3:00 PM in Orlando Courtroom 4 B before Judge Paul G. Byron, U.S. District Court, 401 West Central Blvd., Orlando, Florida. * (previously noticed for 1:30 p.m.) (NBL)

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		copies mailed/e-mailed (Entered: 11/28/2014)
12/12/2014	48	PLAINTIFF'S BRIEF/Memorandum of Law on Markman Issues re 46 Miscellaneous Hearing filed by Omega Patents, LLC. (Santurri, Ryan) Text modified on 12/15/2014 (RDO). (Entered: 12/12/2014)
12/12/2014	49	SUPPLEMENTAL BRIEF on Claim Construction re 46 Miscellaneous Hearing filed by Calamp Corp.. (Kauth, Joel) Text modified on 12/15/2014 (RDO). (Entered: 12/12/2014)
02/20/2015	50	ORDER ON CLAIM CONSTRUCTION re: 38 , 39 . Signed by Judge Paul G. Byron on 2/20/2015. (RML) (Entered: 02/20/2015)
03/23/2015	51	Joint MOTION for Extension of Time to Complete Discovery to June 15, 2015 by Calamp Corp.. (Kauth, Joel) Motions referred to Magistrate Judge David A. Baker. (Entered: 03/23/2015)
03/24/2015	52	ENDORSED ORDER granting 51 Motion for Extension of Time to Complete Discovery. Provided, however, this extension in no way relieves the parties of other obligations and deadlines set forth in the Scheduling Order. Further, this extension shall not be the basis for seeking relief from that Order. Provided further, this extension assumes that there will be no disputes regarding discovery within this extended period, and the Court will not entertain any motions pertaining to such disputes. In particular, the parties are reminded that the deadline for filing of dispositive motions is NOT extended. Signed by Magistrate Judge David A. Baker on 3/24/2015. (Baker, David) (Entered: 03/24/2015)
03/25/2015	--	Set/reset scheduling order deadlines: Discovery due by 6/15/2015 (RDO) (Entered: 03/25/2015)
07/01/2015	53	Joint MOTION for leave to file Exhibits Under Seal in Connection with Daubert and Dispositive Motions by Omega Patents, LLC. (Santurri, Ryan) (Entered: 07/01/2015)
07/01/2015	54	MOTION for summary judgment as to Validity, Infringement, Enforceability, and Unfair Competition by Omega Patents, LLC. (Santurri, Ryan) (Entered: 07/01/2015)
07/01/2015	55	MOTION for miscellaneous relief, specifically Motion and Memorandum of Law to Exclude the Testimony of Defendant's Expert Eric Andrews by Omega Patents, LLC. (Santurri, Ryan) (Entered: 07/01/2015)
07/01/2015	56	MOTION for miscellaneous relief, specifically Motion and Memorandum to Exclude the Testimony of Defendant's Expert on Damages, DeForest McDuff, Ph.D. by Omega Patents, LLC. (Santurri, Ryan) (Entered: 07/01/2015)
07/01/2015	57	APPENDIX re 56 MOTION for miscellaneous relief, specifically Motion and Memorandum to Exclude the Testimony of Defendant's Expert on Damages, DeForest McDuff, Ph.D. , 54 MOTION for summary judgment as to Validity, Infringement, Enforceability, and Unfair Competition, 55 MOTION for miscellaneous relief, specifically Motion and Memorandum of Law to Exclude the Testimony of Defendant's Expert Eric Andrews by Omega Patents, LLC. (Attachments: # 1 Exhibit 1, # 2 Exhibit 2, # 3 Exhibit 3, # 4 Exhibit 4, # 5 Exhibit 5, # 6 Exhibit 6, # 7 Exhibit 7, # 8 Exhibit 8, # 9 Exhibit 9, # 10 Exhibit 10, # 11 Exhibit 11, # 12 Exhibit 12)(Santurri, Ryan) (Entered: 07/01/2015)
07/01/2015	58	MOTION for summary judgment of invalidity by Calamp Corp.. (Kauth, Joel) (Entered: 07/01/2015)
07/01/2015	59	DECLARATION of Eric Andrews by Calamp Corp.. (Attachments: # 1 Exhibit A, # 2 Exhibit B, # 3 Exhibit C, # 4 Exhibit D, # 5 Exhibit E, # 6 Exhibit F, # 7 Exhibit G, # 8 Exhibit H, # 9 Exhibit I, # 10 Exhibit J, # 11 Exhibit K, # 12 Exhibit L, # 13 Exhibit M, # 14 Exhibit N)(Kauth, Joel) (Entered: 07/01/2015)
07/01/2015	60	MOTION for summary judgment of noninfringement by Calamp Corp.. (Kauth, Joel) (Entered: 07/01/2015)
07/02/2015	61	DECLARATION of Eric Andrews by Calamp Corp.. (Attachments: # 1 Exhibit A)(Kauth, Joel) (Entered: 07/02/2015)
07/02/2015	62	ENDORSED ORDER granting 53 Joint Motion for Leave to File Exhibits Under Seal in Connection with Daubert and Dispositive Motions. Signed by Judge Paul G. Byron on 7/2/2015. (MMW) (Entered: 07/02/2015)
07/02/2015	63	APPENDIX re 61 Declaration of Eric Andrews in Support of Motion for Summary Judgment of Noninfringement by Calamp Corp.. (Attachments: # 1 Exhibit B-1, # 2 Exhibit B-2, # 3 Exhibit C-1, # 4 Exhibit C-2, # 5 Exhibit D-1, # 6 Exhibit D-2, # 7 Exhibit E-1, # 8 Exhibit E-2, # 9 Exhibit F-1, # 10 Exhibit F-2, # 11 Exhibit F-3)(Kauth, Joel) (Entered: 07/02/2015)

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07/02/2015	64	MOTION to Strike 60 MOTION for summary judgment of noninfringement in Exceedence of CMSO Limitation on Motions for Summary Judgment by Omega Patents, LLC. (Santurri, Ryan) Motions referred to Magistrate Judge David A. Baker. (Entered: 07/02/2015)
07/06/2015	65	SUMMARY JUDGMENT NOTICE re 58 MOTION for summary judgment of invalidity, 54 MOTION for summary judgment as to Validity, Infringement, Enforceability, and Unfair Competition, 60 MOTION for summary judgment of noninfringement. Unless the Court notifies the parties otherwise, there will not be a hearing on this motion. (NBL) copies e-mailed (Entered: 07/06/2015)
07/06/2015	--	Sealed Document S-66. (MAA) (Entered: 07/06/2015)
07/08/2015	67	Unopposed MOTION for Extension of Time to File Response to Document 60 Pending Ruling on Plaintiff's Motion to Strike by Omega Patents, LLC. (Santurri, Ryan) (Entered: 07/08/2015)
07/09/2015	68	ENDORSED ORDER granting 67 Motion for Extension of Time to File. Signed by Judge Paul G. Byron on 7/9/2015. (MMW) (Entered: 07/09/2015)
07/09/2015	69	AMENDED CASE MANAGEMENT AND SCHEDULING ORDER. Signed by Judge Paul G. Byron on 7/9/2015. (MMW) (Entered: 07/09/2015)
07/10/2015	--	Set/reset scheduling order deadlines: Pretrial statement due by 9/22/2015, All other motions due by 9/29/2015, Final Pretrial Conference set for 10/20/2015 at 03:00 PM in Orlando Courtroom 4 B before Judge Paul G. Byron, Jury Trial set for trial term beginning on 11/2/2015 at 09:00 AM in Orlando Courtroom 4 B before Judge Paul G. Byron. (RDO) (Entered: 07/10/2015)
07/20/2015	70	RESPONSE in Opposition re 58 MOTION for summary judgment of invalidity filed by Omega Patents, LLC. (Attachments: # 1 Exhibit 13)(Santurri, Ryan) (Entered: 07/20/2015)
07/20/2015	71	STIPULATION re 54 MOTION for summary judgment as to Validity, Infringement, Enforceability, and Unfair Competition (Stipulation of Undisputed Facts) by Omega Patents, LLC. (Santurri, Ryan) (Entered: 07/20/2015)
07/20/2015	72	RESPONSE in Opposition re 64 MOTION to Strike 60 MOTION for summary judgment of noninfringement in Exceedence of CMSO Limitation on Motions for Summary Judgment filed by Calamp Corp.. (Kauth, Joel) (Entered: 07/20/2015)
07/20/2015	73	STIPULATION re 58 MOTION for summary judgment of invalidity (Joint Stipulation of Agreed Material Facts) by Calamp Corp.. (Kauth, Joel) (Entered: 07/20/2015)
07/20/2015	74	RESPONSE in Opposition re 56 MOTION for miscellaneous relief, specifically Motion and Memorandum to Exclude the Testimony of Defendant's Expert on Damages, DeForest McDuff, Ph.D. filed by Calamp Corp.. (Kauth, Joel) (Entered: 07/20/2015)
07/20/2015	75	RESPONSE in Opposition re 55 MOTION for miscellaneous relief, specifically Motion and Memorandum of Law to Exclude the Testimony of Defendant's Expert Eric Andrews filed by Calamp Corp.. (Kauth, Joel) (Entered: 07/20/2015)
07/20/2015	76	RESPONSE in Opposition re 54 MOTION for summary judgment as to Validity, Infringement, Enforceability, and Unfair Competition filed by Calamp Corp.. (Attachments: # 1 Appendix, # 2 Exhibit 1, # 3 Exhibit 2, # 4 Exhibit 3, # 5 Exhibit 4, # 6 Exhibit 5, # 7 Exhibit 6, # 8 Exhibit 7, # 9 Exhibit 8, # 10 Exhibit 9, # 11 Exhibit 10, # 12 Exhibit 11, # 13 Exhibit 12)(Kauth, Joel) (Entered: 07/20/2015)
07/21/2015	77	ORDER granting in part 64 Motion to strike 58 MOTION for summary judgment and 60 MOTION for summary judgment. Defendant shall have until Monday, July 27, 2015, in which to file a single compliant motion for summary judgment. Signed by Magistrate Judge David A. Baker on 7/21/2015. (LAK) (Entered: 07/21/2015)
07/27/2015	78	MOTION for summary judgment and memorandum of law regarding invalidity and noninfringement by Calamp Corp.. (Kauth, Joel) (Entered: 07/27/2015)
08/03/2015	79	REPLY to Response to Motion re 54 MOTION for summary judgment as to Validity, Infringement, Enforceability, and Unfair Competition filed by Omega Patents, LLC. (Santurri, Ryan) (Entered: 08/03/2015)
08/04/2015	80	SUMMARY JUDGMENT NOTICE re 78 MOTION for summary judgment and memorandum of law regarding invalidity and noninfringement. Unless the Court notifies the parties otherwise, there will not be a hearing on this motion. (NBL) copies e-mailed (Entered: 08/04/2015)
08/06/2015	81	RESPONSE in Opposition re 78 MOTION for summary judgment and memorandum of law regarding

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		invalidity and noninfringement filed by Omega Patents, LLC. (Attachments: # 1 Exhibit 13)(Santurri, Ryan) (Entered: 08/06/2015)
08/06/2015	82	REQUEST for oral argument re 56 MOTION for miscellaneous relief, specifically Motion and Memorandum to Exclude the Testimony of Defendant's Expert on Damages, DeForest McDuff, Ph.D. , 54 MOTION for summary judgment as to Validity, Infringement, Enforceability, and Unfair Competition, 55 MOTION for miscellaneous relief, specifically Motion and Memorandum of Law to Exclude the Testimony of Defendant's Expert Eric Andrews by Omega Patents, LLC. (Santurri, Ryan) (Entered: 08/06/2015)
08/24/2015	83	REPLY to Response to Motion re 78 MOTION for summary judgment and memorandum of law regarding invalidity and noninfringement filed by Calamp Corp.. (Kauth, Joel) (Entered: 08/24/2015)
08/27/2015	84	MOTION for miscellaneous relief, specifically For Lead Counsel To Attend Meeting to Prepare Joint Final Pretrial Statement by Video Conference by Calamp Corp.. (Kauth, Joel) (Entered: 08/27/2015)
08/28/2015	85	ENDORSED ORDER granting 84 Unopposed Motion for Lead Counsel to Attend Meeting to Prepare Joint Final Pretrial Statement by Video Conference. Signed by Judge Paul G. Byron on 8/28/2015. (MMW) (Entered: 08/28/2015)
09/08/2015	86	MOTION for Charles Halloran to appear pro hac vice by Calamp Corp.. (Wozniak, Carrie) Motions referred to Magistrate Judge David A. Baker. (Entered: 09/08/2015)
09/09/2015	87	ENDORSED ORDER granting 86 motion to appear pro hac vice. Signed by Magistrate Judge David A. Baker on 9/9/2015. (Baker, David) (Entered: 09/09/2015)
09/09/2015	88	* * * PRO HAC VICE FEES paid and Special Admission Attorney Certification Form filed by attorney Charles Halloran, appearing on behalf of Calamp Corp. (Filing fee $150 receipt number ORL-46938.) Related document: 86 MOTION for Charles Halloran to appear pro hac vice. (MAA) (MAA). (Entered: 09/09/2015)

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4. 8812173, August 19, 2014, Systems and methods for collecting information from vehicle devices via a vehicle data bus, Chen, Gallin, Irvine, California, United States of America(US); Ramachandran, Radhakrishnan, San Diego, California, United States of America(US); 332848, February 23, 2012, ASSIGNMENT OF ASSIGNORS INTEREST (SEE DOCUMENT FOR DETAILS)., CALAMP CORP., 1401 N. RICE AVENUE, OXNARD, CALIFORNIA, UNITED STATES OF AMERICA(US), 93030, reel-frame:027754/0207, Calamp Corp., Oxnard, California, United States of America(US), United States company or corporation

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No Documents Found

No documents were found for your search terms
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1. US Fed News, October 10, 2011 Monday 1:28 PM EST, , 267 words, US Patent Issued to Omega Patents on Oct. 4 for "Vehicle Tracking Unit with Downloadable Codes and Associated Methods" (Georgia Inventor), ALEXANDRIA, Va.

... Va., Oct. 10 -- United States Patent no. 8,032,278, issued on Oct. 4, was assigned to Omega Patents ...
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Citing References (14)

Treatment	Title	Date	Type	Depth	Headnote(s)
Examined by	**1. Defendant CalAmp Corp.'s Opening Claim Construction Brief** Out Of Pate OMEGA PATENTS, LLC, a Georgia Limited Liability Company, Plaintiff, v. CALAMP CORP., a Delaware Corporation, Defendant. 2014 WL 7691270, *1+ , M.D.Fla. (Trial Motion, Memorandum and Affidavit)	Sep. 05, 2014	Motion		—
Mentioned by	**2. Multi-vehicle compatible control system generating command signals on a data bus and associated methods** LitAlert P2013-52-29	Dec. 20, 2013	Lit Alert		—
—	**3. MULTI VEHICLE COMPATIBLE TRACKING UNIT FOR VEHICLES HAS DOWNLOADING INTERFACE, WHICH ENABLES DOWNLOADING OF ENABLING DATA RELATED TO AT LEAST ONE CORRESPONDING VEHICLE DEVICE CODE TO BE USED BY MULTI-VEHICLE COMPATIBLE CONTROLLER** Out Of Pate DWPI 2008-A15683	May 17, 2000	DWPI	—	—
—	**4. RF 019515/0350** Out Of Pate	July 03, 2007	Assignments	—	—
—	**5. OMEGA PATENTS, LLC v. CALAMP CORP**	Dec. 20, 2013	Docket Summaries	—	—
—	**6. OMEGA PATENTS, LLC v. ENFORA, INC**	Feb. 28, 2013	Docket Summaries	—	—
—	**7. VEHICLE WITH AT LEAST ONE ENVIRONMENT DETECTION SYSTEM** Out Of Pate US PAT 9111452 , U.S. PTO Utility A vehicle is equipped with at least one environment detection system, a communication system which transmits information by remote transmission to receivers external to the...	Aug. 18, 2015	Patents	—	—
—	**8. COMMUNICATION DEVICE AND CAR FINDER SYSTEM** Out Of Pate US PAT 9037081 , U.S. PTO Utility A car finder system has a portable terminal that receives a preset operation performed thereon for wirelessly transmitting a preset car finder instruction. A communication device...	May 19, 2015	Patents	—	—

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Treatment	Title	Date	Type	Depth	Headnote(s)
—	**9. SYSTEM INCLUDING VEHICLE SPEED ALERT BASED COMMUNICATION WITH A VEHICLE AUDIO ENTERTAINMENT SYSTEM AND RELATED METHODS** Out Of Plan US PAT 9031546+ , U.S. PTO Utility A system for a vehicle having a data communications bus extending throughout the vehicle, and an audio entertainment system coupled to the data communications bus may include a...	May 12, 2015	Patents	—	—
—	**10. SYSTEMS AND METHODS FOR COLLECTING INFORMATION FROM VEHICLE DEVICES VIA A VEHICLE DATA BUS** Out Of Plan US PAT 8812173 , U.S. PTO Utility Systems and methods in accordance with embodiments of the invention continuously collect information from vehicle devices via a vehicle data bus, store information in a database,...	Aug. 19, 2014	Patents	—	—
—	**11. REMOTE FUNCTION CONTROL SYSTEM FOR A VEHICLE HAVING A DATA COMMUNICATIONS BUS AND RELATED METHODS** Out Of Plan US PAT APP 20150246658 , U.S. PTO Application A remote function control system is for a vehicle including a data communications bus extending throughout the vehicle and coupled to a plurality of vehicle devices, and a wired...	Sep. 03, 2015	Patents	—	—
—	**12. SYSTEM INCLUDING VEHICLE LOCATION ALERT BASED COMMUNICATION WITH A VEHICLE AUDIO ENTERTAINMENT SYSTEM AND RELATED METHODS** Out Of Plan US PAT APP 20140266811 , U.S. PTO Application A system for a vehicle having a data communications bus extending throughout the vehicle, and an audio entertainment system coupled to the data communications bus may include a...	Sep. 18, 2014	Patents	—	—
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Treatment	Title	Date	Type	Depth	Headnote(s)
—	**14. REMOTE FUNCTION CONTROL SYSTEM FOR A VEHICLE HAVING A DATA COMMUNICATIONS BUS AND RELATED METHODS** Cit. C. Rec. US PAT APP 20140277838 , U.S. PTO Application A remote function control system for a vehicle including a data communications bus extending throughout the vehicle and coupled to vehicle devices may include a wireless data bus...	Sep. 18, 2014	Patents	—	—

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
90/013,587	09/14/2015	8032278	C13-03895	8867

7590 09/22/2015

CHRISTOPHER R. REGAN, ESQ.
ALLEN, DYER, DOPPELT, MILBRATH & GILCHRIST, PA
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EXAMINER	
GRAHAM, MATTHEW C	

ART UNIT	PAPER NUMBER
3993	

MAIL DATE	DELIVERY MODE
09/22/2015	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

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THIRD PARTY REQUESTER'S CORRESPONDENCE ADDRESS

KPPB LLP
2400 EAST KATELLA AVENUE
SUITE 1050
ANAHEIM, CA 92806

Date: MAILED

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CENTRAL REEXAMINATION UNIT

EX PARTE REEXAMINATION COMMUNICATION TRANSMITTAL FORM

REEXAMINATION CONTROL NO. : 90013587
PATENT NO. : 8032278
ART UNIT : 3993

Enclosed is a copy of the latest communication from the United States Patent and Trademark Office in the above identified ex parte reexamination proceeding (37 CFR 1.550(f)).

Where this copy is supplied after the reply by requester, 37 CFR 1.535, or the time for filing a reply has passed, no submission on behalf of the ex parte reexamination requester will be acknowledged or considered (37 CFR 1.550(g)).

Ex Parte Reexamination Interview Summary – Pilot Program for Waiver of Patent Owner's Statement	Control No. 90/013,587	Patent For Which Reexamination is Requested 8032278
	Examiner EILEEN LILLIS	Art Unit 3993

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address. --

All participants (USPTO official and patent owner):

(1) MANUEL SALDANA, CRU (3)

(2) CHRISTOPHER R. REGAN, REG. NO. 34,906 (4)

Date of Telephonic Interview: 09/16/2015.

The USPTO official requested waiver of the patent owner's statement pursuant to the pilot program for waiver of patent owner's statement in *ex parte* reexamination proceedings.*

☐ The patent owner **agreed** to waive its right to file a patent owner's statement under 35 U.S.C. 304 in the event reexamination is ordered for the above-identified patent.

☒ The patent owner **did not agree** to waive its right to file a patent owner's statement under 35 U.S.C. 304 at this time.

The patent owner is not required to file a written statement of this telephone communication under 37 CFR 1.560(b) or otherwise. However, any disagreement as to this interview summary must be brought to the immediate attention of the USPTO, and no later than one month from the mailing date of this interview summary. Extensions of time are governed by 37 CFR 1.550(c).

*For more information regarding this pilot program, see *Pilot Program for Waiver of Patent Owner's Statement in Ex Parte Reexamination Proceedings*, 75 *Fed. Reg.* 47269 (August 5, 2010), available on the USPTO Web site at http://www.uspto.gov/patents/law/notices/2010.jsp.

☐ USPTO personnel were unable to reach the patent owner.

The patent owner may contact the USPTO personnel at the telephone number provided below if the patent owner decides to waive the right to file a patent owner's statement under 35 U.S.C. 304.

/MANUEL SALDANA/ 571-272-7740
Signature and telephone number of the USPTO official who contacted or attempted to contact the patent owner.

cc: Requester (if third party requester)

PTO/SB/42 (07-09)
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37 CFR 1.501 INFORMATION DISCLOSURE CITATION IN A PATENT

(Sheet 1 of 1)

Docket Number (Optional)	Patent Number
58106CIP1	8,032,278
Applicant: Flick, Kenneth E.	
Issue Date: October 4, 2011	Art Unit: 3661

U.S. PATENT DOCUMENTS

EXAMINER INITIAL	DOCUMENT NUMBER	DATE	NAME	CLASS	SUBCLASS	FILING DATE IF APPROPRIATE
	5208756	5/93	Song, Han L.	364	449	1/28/91
	5555498	9/96	Berra, Charles J. et al.	364	424.03	3/18/94
	5557254	9/96	Johnson, Sam et al.	340	426	11/16/94
	5732074	3/98	Spaur, Charles W. et al.	370	313	1/16/96
	5877724	3/99	Davis, Paul M.	342	357	3/25/97
	6028537	1/97	Suman, Michael J. et al.	340	988	2/22/00
	6346876	2/02	Flick, Kenneth E.	340	426	5/31/00

FOREIGN PATENT DOCUMENTS

	DOCUMENT NUMBER	DATE	COUNTRY	CLASS	SUBCLASS	TRANSLATION YES	TRANSLATION NO
			USA				

OTHER DOCUMENTS (Including Author, Title, Date, Pertinent Pages, Etc.)

EXAMINER	/Matthew Graham/ (10/14/2015)	DATE CONSIDERED	September 14, 2015

This collection of information is required by 37 CFR 1.501. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 2 hours to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
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BIB DATA SHEET

CONFIRMATION NO. 8867

SERIAL NUMBER	FILING or 371(c) DATE	CLASS	GROUP ART UNIT	ATTORNEY DOCKET NO.
90/013,587	09/14/2015 RULE	701	3993	C13-03895

APPLICANTS

INVENTORS

8032278, Residence Not Provided;
OMEGA PATENTS, LLC, DOUGLASVILLE, GA;
SAMUEL P. RICHEY (3RD PTY REQ.), ANAHEIM, CA;
KPPB LLP, ANAHEIM, CA

**** CONTINUING DATA ***************************

This application is a REX of 11/773,272 07/03/2007 PAT 8032278
which is a CIP of 11/076,259 03/09/2005 PAT 7720597
which is a CON of 10/383,496 03/07/2003 PAT 7149623
which is a CON of 09/859,972 05/17/2001 PAT 6606561
which claims benefit of 60/264,811 01/29/2001
and claims benefit of 60/258,005 12/22/2000
and claims benefit of 60/251,552 12/06/2000
and claims benefit of 60/252,125 11/20/2000
and claims benefit of 60/236,890 09/29/2000
and claims benefit of 60/246,463 11/07/2000
and claims benefit of 60/222,777 08/03/2000
and claims benefit of 60/205,178 05/17/2000

**** FOREIGN APPLICATIONS ***************************

**** IF REQUIRED, FOREIGN FILING LICENSE GRANTED **** ** SMALL ENTITY **

Foreign Priority claimed ☐ Yes ☑ No 35 USC 119(a-d) conditions met ☐ Yes ☐ No Verified and Acknowledged /MATTHEW C GRAHAM/ Examiner's Signature	☐ Met after Allowance Initials	STATE OR COUNTRY	SHEETS DRAWINGS	TOTAL CLAIMS	INDEPENDENT CLAIMS
				22	3

ADDRESS

CHRISTOPHER R. REGAN, ESQ.
ALLEN, DYER, DOPPELT, MILBRATH & GILCHRIST, PA
P O BOX 3791
ORLANDO, FL 32802-3791
UNITED STATES

TITLE

Vehicle Tracking Unit with Downloadable Codes and Associated Methods

FILING FEE RECEIVED		
6000	FEES: Authority has been given in Paper No._____ to charge/credit DEPOSIT ACCOUNT No._____ for following:	☐ All Fees ☐ 1.16 Fees (Filing) ☐ 1.17 Fees (Processing Ext. of time) ☐ 1.18 Fees (Issue)

BIB (Rev. 05/07).

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UNITED STATES DEPARTMENT OF COMMERCE
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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
90/013,587	09/14/2015	8032278	C13-03895	8867

7590 11/10/2015

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EXAMINER	
GRAHAM, MATTHEW C	

ART UNIT	PAPER NUMBER
3993	

MAIL DATE	DELIVERY MODE
11/10/2015	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Commissioner for Patents
United States Patent and Trademark Office
P.O. Box 1450
Alexandria, VA 22313-1450
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(THIRD PARTY REQUESTER'S CORRESPONDENCE ADDRESS)

KPPB LLP

2400 EAST KATELLA AVENUE

SUITE 1050

ANAHEIM, CA 92806

EX PARTE REEXAMINATION COMMUNICATION TRANSMITTAL FORM

REEXAMINATION CONTROL NO. *90/013,587*.

PATENT NO. *8032278*.

ART UNIT *3993*.

Enclosed is a copy of the latest communication from the United States Patent and Trademark Office in the above identified *ex parte* reexamination proceeding (37 CFR 1.550(f)).

Where this copy is supplied after the reply by requester, 37 CFR 1.535, or the time for filing a reply has passed, no submission on behalf of the *ex parte* reexamination requester will be acknowledged or considered (37 CFR 1.550(g)).

ORDER

1. A substantial new question of patentability affecting claims 1-22 of United States Patent Number 8,032,278 to Flick is raised by the request for *ex parte* reexamination.

Extensions of time under 37 CFR 1.136(a) will not be permitted in these proceedings because the provisions of 37 CFR 1.136 apply only to "an applicant" and not to parties in a reexamination proceeding. Additionally, 35 U.S.C. 305 requires that *ex parte* reexamination proceedings "will be conducted with special dispatch" (37 CFR 1.550(a)). Extensions of time in *ex parte* reexamination proceedings are provided for in 37 CFR 1.550(c).

The Requester contends that the following US Patents raise a substantial new question of patentability of claims 1-22 of Flick '278:

US Patent 6,028,537 to Suman et al. (Suman);

US Patent 5,732,074 to Spaur et al. (Spaur);

US Patent 5,557,254 to Johnson et al. (Johnson);

US Patent 5,208,756 to Song;

US Patent 5,877,724 to Davis.

Independent claim 1 of Flick recites a multi-vehicle compatible tracking unit for a vehicle comprising a vehicle data bus extending throughout the vehicle, the multi-vehicle compatible tracking unit comprising: a vehicle position determining device; a wireless communications device; a multi-vehicle compatible controller for cooperating with said vehicle position determining device and said wireless communications device

to send vehicle position information; said multi-vehicle compatible controller to be coupled to the vehicle data bus for communication thereover with at least one vehicle device using at least one corresponding vehicle device code from among a plurality thereof for different vehicles; and a downloading interface for permitting downloading of enabling data related to the at least one corresponding vehicle device code for use by said multi-vehicle compatible controller.

Independent claim 13 of Flick recites a multi-vehicle compatible tracking unit for a vehicle comprising a vehicle data bus extending throughout the vehicle, the multi-vehicle compatible vehicle tracking unit comprising: a vehicle position determining device; a wireless communications device; a multi-vehicle compatible controller for cooperating with said vehicle position determining device and said wireless communications device to send vehicle position information; said multi-vehicle compatible controller to be coupled to the vehicle data bus for communication thereover with at least one vehicle device using at least one corresponding vehicle device code from among a plurality thereof for different vehicles; and a downloading interface for permitting downloading of enabling data related to the at least one corresponding vehicle device code for use by said multi-vehicle compatible controller; said downloading interface comprising a connector for temporary connection to a downloading device.

Independent claim 18 of Flick recites a multi-vehicle compatible tracking unit for a vehicle comprising a vehicle data bus extending throughout the vehicle, the multi-vehicle compatible vehicle tracking unit comprising: a vehicle position determining

device; a wireless communications device; a multi-vehicle compatible controller for cooperating with said vehicle position determining device and said wireless communications device to send vehicle position information; said multi-vehicle compatible controller to be coupled to the vehicle data bus for communication thereover with at least one vehicle device using at least one corresponding vehicle device code from among a plurality thereof for different vehicles; and a downloading interface for permitting downloading of enabling data related to the at least one corresponding vehicle device code for use by said multi-vehicle compatible controller; said downloading interface comprising a wireless receiver for temporary connection to a downloading device.

Key to each of these claims is the reaction of a “vehicle data bus” and a “downloading interface for permitting downloading of enabling data”.

Suman teaches a vehicle data bus – an SAE standard J1850 See col. 37, lines 15 – 17. In addition Suman teaches a downloading interface for permitting downloading of enabling data. In particular, Suman teaches at col. 36, lines 31-52: "To achieve these aspects and other advantages, the vehicle accessory control system of the present invention includes a plurality of electrically-operated vehicle accessories, a receiver to be mounted in a vehicle *for receiving RF signals* from a land-based transmitter, and a control circuit coupled to the receiver and to the vehicle accessories *for controlling the operation of the vehicle accessories in accordance with a control program*. The RF signals include an address uniquely identifying the vehicle and a reprogramming signal for reprogramming the operation of at least one of the vehicle accessories. The control

circuit includes an input interface for receiving information regarding a plurality of sensed conditions, control means for controlling the operation of the vehicle accessories in accordance with the control program and in response to sensed conditions received from the input interface. *The control circuit further includes reprogramming means for selectively reprogramming the control program in response to the detection of an RF signal* including an address identifying the vehicle and the reprogramming signal, to selectively change the manner in which the control means controls the operation of at least one of the vehicle accessories."

There is a substantial likelihood that a reasonable examiner would have considered these teachings in Suman to be important in the determination of patentability of claims 1-22 of Flick '278. Accordingly, Suman raises a substantial new question of patentability, which question has not been previously raised.

Spaur teaches a vehicle data bus 46 and teaches that a wireless communications device can be utilized to download enabling data in a variety of forms including received information associated with vehicle devices and executable software downloaded from a remote site: "since bi-directional communications involving a vehicle are conducted wirelessly for at least a portion of the communications link, it is necessary for the Internet to communicate with an appropriate interface or network that wirelessly links with the vehicle. In one embodiment, the cellular digitized packet data (CDPD) network provides the desired link including arrangement of information being communicated and where the destination site, namely the particular vehicle, is found in the network." (See col. 2, lines 37 - 46).

Spaur also notes that a “combination of controller related components are containable in a vehicle for responding to requests from remote sites, obtaining and storing information associated with vehicle devices and running executable software that may be available in the program memory of the controller or downloaded from the remote site, while handling and configuring information including data that is communicative with the remote site over an established network, such as the Internet." (See col. 4, line 64 - col. 5, line 5).

Furthermore, Spaur teaches that “the controller in the vehicle is also associated with an interface for communication with one or more available systems, such as an RS232 connection, an Ethernet connection and/or a PCMCIA unit. In a related embodiment, the controller includes a direct communications port for receiving and sending information without requiring the wireless device and the Internet connection to the wireless device." (See col. 4, lines 38 - 45).

There is a substantial likelihood that a reasonable examiner would have considered these teachings in Spaur to be important in the determination of patentability of claims 1-22 of Flick ‘278. Accordingly, Spaur raises a substantial new question of patentability, which question has not been previously raised.

Another key aspect of claims 1, 13 and 18 is the recitation of a “vehicle position determining device”.

Johnson teaches that the “vehicle 200 is further equipped with a GPS receiver unit (internal to the control and communications unit 201) which is connected to a GPS antenna 220. The GPS receiver unit is a multi-channel GPS receiver and can thus

receive time and location signals from multiple GPS satellites simultaneously." (See col. 4, lines 51 - 56).

Song teaches "an inexpensive, accurate system for determining a vehicle's location using the existing base stations and signals of a cellular telephone network." (See, col. 2, lines 57 - 60).

Davis teaches a "single processor combined position locating and analog cellular telephone system." (See, col. 3, lines 27 - 29). Davis further teaches that system can be used with vehicles, such as vehicle alarms. (See col. 3, lines 43-45).

There is a substantial likelihood that a reasonable examiner would have considered these teachings in Johnson, Song and Davis to be important in the determination of patentability of claims 1-22 of Flick '278. Accordingly, Johnson, Song and Davis each raises a substantial new question of patentability, which question has not been previously raised.

The Requester also contends that US Patent 6,346,976 to Flick (Flick '876) raises a substantial new question of patentability in relation to obvious-type nonstatutory double patenting.

While Flick '876 recites a vehicle data bus in claim 1, none of the claims recite a downloading interface. The requester points to other previous patents by Flick that are incorporated by reference for the teaching of structure similar to a "downloading interface". However, double patenting relates to claimed subject matter, not to material that is disclosed. The Requester also fails to show a "vehicle positon determining device" as recited in the claims of Flick '876. The Requester asserts that it is

notoriously old and well known that a vehicle device can include a GPS receiver, without any evidence to back up this assertion. Accordingly, Flick '876 fails to raise a substantial new question of patentability of the claims of Flick relating to double patenting in that the claims of Flick ‘876 are directed to a different claimed invention than Flick ‘278.

Lastly, the Requester notes that US Patent 5,555,498 to Berra constitutes background prior art with respect to Flick ‘278. However, the Requester has not set forth that Berra raises any substantial new question of patentability. Accordingly, Berra does not raise a substantial new question of patentability.

2. The patent owner is reminded of the continuing responsibility under 37 CFR 1.565(a) to apprise the Office of any litigation activity, or other prior or concurrent proceeding, involving Patent No. 8,032,278 throughout the course of this reexamination proceeding. The third party requester is also reminded of the ability to similarly apprise the Office of any such activity or proceeding throughout the course of this reexamination proceeding. See MPEP §§ 2207, 2282 and 2286.

3. Patent Owner is notified that any proposed amendment to the specification and/or claims in this reexamination proceeding must comply with 37 CFR 1.530(d)-(j), must be formally presented pursuant to 37 CFR 1.52(a) and (b), and must contain any fees required by 37 CFR 1.20(c).

4. Any inquiry concerning this communication should be directed to Matthew C. Graham at telephone number 571-272-7116.

Please mail any communications to:

Attn: Mail Stop "Ex Parte Reexam"
Central Reexamination Unit
Commissioner for Patents
P. O. Box 1450
Alexandria VA 22313-1450

Please FAX any communications to:
(571) 273-9900
Central Reexamination Unit

Please hand-deliver any communications to:

Customer Service Window
Attn: Central Reexamination Unit
Randolph Building, Lobby Level
401 Dulany Street
Alexandria, VA 22314

Any inquiry concerning this communication or earlier communications from the Reexamination Legal Advisor or Examiner, or as to the status of this proceeding, should be directed to the Central Reexamination Unit at telephone number (571) 272-7705.

Signed:

/Matthew C. Graham/

Matthew C. Graham
CRU Examiner, AU 3993
(571) 272-7116

Conferees: /PCE/
/EDL/

Order Granting Request For Ex Parte Reexamination	Control No. 90/013,587	Patent Under Reexamination 8032278
	Examiner MATTHEW C. GRAHAM	Art Unit 3993

--The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

The request for *ex parte* reexamination filed *14 September 2015* has been considered and a determination has been made. An identification of the claims, the references relied upon, and the rationale supporting the determination are attached.

Attachments: a)☐ PTO-892, b)☒ PTO/SB/08, c)☐ Other: _____

1. ☒ The request for *ex parte* reexamination is GRANTED.

RESPONSE TIMES ARE SET AS FOLLOWS:

For Patent Owner's Statement (Optional): TWO MONTHS from the mailing date of this communication (37 CFR 1.530 (b)). **EXTENSIONS OF TIME ARE GOVERNED BY 37 CFR 1.550(c).**

For Requester's Reply (optional): TWO MONTHS from the **date of service** of any timely filed Patent Owner's Statement (37 CFR 1.535). **NO EXTENSION OF THIS TIME PERIOD IS PERMITTED.** If Patent Owner does not file a timely statement under 37 CFR 1.530(b), then no reply by requester is permitted.

cc:Requester (if third party requester)

Electronic Acknowledgement Receipt

EFS ID:	24570660
Application Number:	90013587
International Application Number:	
Confirmation Number:	8867
Title of Invention:	Vehicle Tracking Unit with Downloadable Codes and Associated Methods
First Named Inventor/Applicant Name:	8032278
Correspondence Address:	CHRISTOPHER R. REGAN, ESQ. ALLEN, DYER, DOPPELT, MILBRATH & GILCHRIST, PA P O BOX 3791 - ORLANDO FL 32802-3791 US 407-841-2330 -
Filer:	Christopher F. Regan/Sherry Leonard
Filer Authorized By:	Christopher F. Regan
Attorney Docket Number:	C13-03895
Receipt Date:	08-JAN-2016
Filing Date:	14-SEP-2015
Time Stamp:	14:23:17
Application Type:	Reexam (Patent Owner)

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Reexam Timely Requester's Reply to an Owner's Statement	0058106CIP1_REX_Patent_Owner_Statement.pdf	1095734 3ba262e2bd43ade6a3bc22618126bbb2af5a8497	no	16
Warnings:					
The page size in the PDF is too large. The pages should be 8.5 x 11 or A4. If this PDF is submitted, the pages will be resized upon entry into the Image File Wrapper and may affect subsequent processing					
Information:					
2	Reexam Timely Patent Owner's Stmnt in Resp to Order	0058106CIP1_REX_Exhibit_A1.pdf	6315095 e8fe4aa6a8527d8ea0fb007166b6fc8878cd0201	no	90
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Information:					
3	Reexam Timely Patent Owner's Stmnt in Resp to Order	0058106CIP1_REX_Exhibit_A2.pdf	4967312 0d4539b67f867b1ac0594eee4d9e74b4855e9096	no	62
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Information:					
4	Reexam Timely Patent Owner's Stmnt in Resp to Order	0058106CIP1_REX_Exhibits_B-E.pdf	5785871 f8b1e4f75ddfa3eda0f98b8fede0c5ac62429430	no	103
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Information:					
		Total Files Size (in bytes):	18164012		

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

EXHIBIT A

IN THE UNITED STATES DISTRICT COURT
FOR THE MIDDLE DISTRICT OF FLORIDA
ORLANDO DIVISION

OMEGA PATENTS, LLC,
a Georgia limited liability company,

Plaintiff,

vs. **Case No. _____**

CALAMP CORP.,
a Delaware corporation,

INJUNCTIVE RELIEF REQUESTED

JURY TRIAL REQUESTED

Defendant.
_____/

COMPLAINT

Plaintiff Omega Patents, LLC, through its undersigned counsel, for its complaint against Defendant CALAMP CORP., states:

PARTIES, JURISDICTION AND VENUE

1. Plaintiff Omega Patents, LLC ("Omega") is a Georgia limited liability company.

2. Defendant CalAmp Corp., ("CalAmp") is, upon information and belief, a Delaware corporation, which sells and offers for sale infringing products in the United States, including within this Judicial District.

3. This Court has jurisdiction over the subject matter of this action as to CalAmp pursuant to 28 U.S.C. §§ 1331 and 1338(a).

4. This Court has *in personam* jurisdiction as to CalAmp because, upon information and belief, CalAmp is subject to both general and specific jurisdiction in this State. More particularly, upon information and belief, CalAmp

regularly conducts business activity in the State of Florida and sells and offers to sell products that infringe one or more claims of Omega's patents in the State of Florida. Additionally, CalAmp expressly consented to jurisdiction and venue in this District and Division pursuant to a negotiated settlement agreement. A copy of the Settlement Agreement is attached hereto as Exhibit A.

5. Venue properly lies within this judicial district and division, pursuant to 28 U.S.C. §§1391(c) and 1400(b), and by express consent of CalAmp.

STATEMENT OF FACTS

6. Omega is the sole and exclusive owner of the following valid and enforceable United States Patents (collectively, the "Patents-in-Suit"):

PATENT NO.	TITLE
6,346,876 B1 ("the '876 Patent")	Multi-vehicle compatible control system generating command signals on a data bus and associated methods
6,737,989 B2 ("the '989 Patent")	Vehicle tracker including variable frequency transmission and related methods
6,756,885 B1 ("the '885 Patent")	Multi-vehicle compatible control system for reading from a data bus and associated methods
7,671,727 B2 ("the '727 Patent")	Speed exceeded notification device for vehicle having a data bus and associated methods
8,032,278 B2 ("the '278 Patent")	Vehicle tracking unit with downloadable codes and associated methods

True and correct copies of the Patents-in-Suit are attached hereto as Exhibit B-F.

7. Kenneth E. Flick, the inventor of the Patents-in-Suit, is recognized as an innovator in the vehicle security systems industry. Mr. Flick has invented many improvements for the vehicle security industry, including innovations covering vehicle tracking.

8. The Patents-in-Suit claim some of Mr. Flick's inventions in the field. Mr. Flick has assigned all of his rights to the inventions claimed in the Patents-in-Suit to Omega.

9. Upon information and belief, CalAmp has sold and offered for sale in the United States and in this Judicial District vehicle tracking products that directly or indirectly infringe upon one or more claims of the Patents-in-Suit.

10. Omega has not granted CalAmp a license to practice the Patents-in-Suit for the accused products.

COUNT I

Action for Infringement of the Patents-in-Suit

11. Count I is an action by Omega against CalAmp for monetary damages and injunctive relief for CalAmp's infringement of the Patents-in-Suit.

12. Omega herein restates and reincorporates into this Count the allegations of Paragraphs 1 through 11 herein.

13. Upon information and belief, CalAmp has made and/or offered for sale and sold and/or distributed vehicle tracking products, including but not limited to a product identified as the LMU-3000, that infringe directly, by inducement and/or contributorily, one or more claims of the Patents-in-Suit.

14. Omega is entitled to compensatory damages and injunctive relief for CalAmp's infringing activities.

15. Omega put CalAmp on notice of one or more of these patents at least as early as June 2010.

16. Upon information and belief, CalAmp lacks justifiable belief that there is no infringement or that the infringed claims are invalid or has acted with objective and subjective recklessness in its infringing activity. CalAmp's infringement is therefore willful, and Omega is entitled to an award of exemplary damages, attorneys' fees, and costs in bringing this action.

Wherefore, Plaintiff Omega prays this Honorable Court enter such preliminary and final orders and judgments as are necessary to provide Omega with the following requested relief:

A. A preliminary and then permanent injunction enjoining CalAmp from infringing each of the Patents-in-Suit;

B. An award of damages against CalAmp under 35 U.S.C. §284 in an amount adequate to compensate Omega for CalAmp's infringement, but in no event less than a reasonable royalty for the use made by CalAmp of the inventions set forth in the Patents-in-Suit;

C. An award against CalAmp for exemplary damages, attorneys' fees, and costs under 35 U.S.C. § 285; and

D. Such other and further relief as this Court deems just and proper.

JURY TRIAL REQUEST

Omega requests a trial by jury as to all matters so triable.

Respectfully submitted December 20, 2013.

Brian R. Gilchrist
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Ryan T. Santurri
Florida Bar No. 0015698
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Facsimile: 407-841-2343

Attorneys for Plaintiff, Omega Patents, LLC

EXHIBIT A

DISMISSAL AGREEMENT

This Agreement is made effective as of the 9th day of June, 2010, by and between Plaintiff OMEGA PATENTS, LLC ("Plaintiff" or "Omega"), and Defendant CALAMP CORP. ("Defendant," or "CALAMP").

WHEREAS, Plaintiff has asserted various claims against Defendants in an action entitled OMEGA PATENTs, LLC vs. CALAMP CORP., No. 1:09-cv-3474-JOF (the "Action"), presently pending in the United States District Court for the Northern District of Georgia (the "Court"); and

WHEREAS, Plaintiff and Defendant desire to work towards an amicable resolution without the time constraints of the existing action;

NOW, THEREFORE, in consideration of the respective undertakings of the parties to this Agreement, and for other good and valuable consideration, the sufficiency of which is acknowledged, parties hereto agree to the terms set forth below:

1. Upon execution of this Agreement, but in no case later than June 11, 2010, Plaintiff will instruct their counsel of record to execute and file with the Court a Request for Dismissal Without Prejudice, thereby dismissing Plaintiff's complaint without prejudice. Each Party shall bear its own costs and attorneys' fees. The dismissal shall not be used in any manner against Plaintiff in any subsequent proceeding in which Defendant seeks relief.

2. Defendant agrees that it will not file for declaratory judgment relief against Plaintiff regarding the following patents:
U.S. Letters Patent No. 6,509,868 B2;
U.S. Letters Patent No. 6,606,561 B2;
U.S. Letters Patent No. 6,737,989 B2;
U.S. Letters Patent No. 6,741,187 B2;
U.S. Letters Patent No. 6,765,499 B2;
U.S. Letters Patent No. 6,798,355 B2;
U.S. Letters Patent No. 7,149,623 B2; and
U.S. Letters Patent No. 7,343,244 B2.

3. Defendant agrees that if Plaintiff files suit against it in the future for infringement of one or more of U.S. Letters Patent No. 6,509,868 B2, U.S. Letters Patent No. 6,606,561 B2, U.S. Letters Patent No. 6,737,989 B2, U.S. Letters Patent No. 6,741,187 B2, U.S. Letters Patent No. 6,765,499 B2, U.S. Letters Patent No. 6,798,355 B2, U.S. Letters Patent No. 7,149,623 B2 or U.S. Letters Patent No. 7,343,244 B2 in the U.S. District Court for the Middle District of Florida, Orlando Division, that Defendant will not move to dismiss such suit based on lack of personal jurisdiction, improper venue or forum non conveniens; Defendants expressly consent to jurisdiction and venue in this District. Except as expressly stated herein, Defendant reserves the right to raise any and all defenses available to it in any suit filed against it in any jurisdiction by Plaintiff.

4. Each Party to this Agreement acknowledges and affirms that such Party has been advised and has had the opportunity to consult with an attorney prior to signing this Agreement; that this Agreement was drafted and reviewed by each Party's counsel; that such Party has fully read and reviewed the terms and provisions of this Agreement; that such Party understands, accepts, and agrees to the content and consequences hereof freely and without reservation; and that such Party has

not executed this Agreement in reliance on any promise, representation, or warranty not contained herein.

5. Each of the Parties to this Agreement represents that it has the full power and authority to enter into and consummate the obligations created hereby. Each of the Parties to this Agreement warrants that such Party has full authority to enter into this Agreement and to enter into the undertakings and obligations set forth in this Agreement. The Parties hereby warrant that they have not assigned or transferred their respective claims to any other party or person.

6. Each of the Parties hereto has been fully and competently represented by counsel of its own choosing in the negotiation and drafting of this Agreement. Accordingly, the Parties agree that the rule of construction of contracts resolving any ambiguities against the drafting party shall be inapplicable to this Agreement. Each of the Parties hereto further acknowledges that it has read this entire Agreement and fully understands its terms, conditions and effects.

7. This Agreement forms the entire understanding and agreement between the parties hereto concerning the matters addressed herein and supersedes all other prior or contemporaneous agreements between the parties on such matters, either oral or written. This Agreement may not be modified except by a writing executed by all parties. In executing this Agreement and making the settlement contained herein, none of the parties is relying upon any promise, representation, or statement not contained within this Agreement. This Agreement shall be deemed effective when it has been executed by the last party to sign. This Agreement may be executed in counterparts, each of which shall be deemed an original hereof.

IN WITNESS WHEREOF, the Parties hereto, intending to be legally bound hereby, have each caused to be affixed hereto its or his/her hand and seal the day indicated.

OMEGA PATENTS LLC

By: _____
KENNETH E FLICK

Title: PRES

Date: 6-10-10

CALAMP CORP

By: _____
Richard Vitelle

Title: CFO

Date: 6/10/10

EXHIBIT B

US006346876B1

(12) **United States Patent**
Flick

(10) **Patent No.: US 6,346,876 B1**
(45) **Date of Patent: *Feb. 12, 2002**

(54) **MULTI-VEHICLE COMPATIBLE CONTROL SYSTEM GENERATING COMMAND SIGNALS ON A DATA BUS AND ASSOCIATED METHODS**

(76) Inventor: **Kenneth E. Flick**, 5236 Presley Pl., Douglasville, GA (US) 30135

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

This patent is subject to a terminal disclaimer.

(21) Appl. No.: **09/583,332**

(22) Filed: **May 31, 2000**

Related U.S. Application Data

(63) Continuation-in-part of application No. 09/382,245, filed on Aug. 25, 1999, now Pat. No. 6,275,147, which is a continuation of application No. 09/023,838, filed on Feb. 13, 1998, now Pat. No. 6,011,460, which is a continuation-in-part of application No. 08/701,356, filed on Aug. 22, 1996, now Pat. No. 5,719,551.

(51) **Int. Cl.**[7] **B60R 25/10**

(52) **U.S. Cl.** **340/426**; 340/531; 340/533; 307/10.2; 180/287

(58) **Field of Search** 340/426, 425.5, 340/428, 429, 430, 576, 539, 825.69, 531, 533, 534; 180/167, 287; 307/10.2, 10.3, 10.4, 10.5

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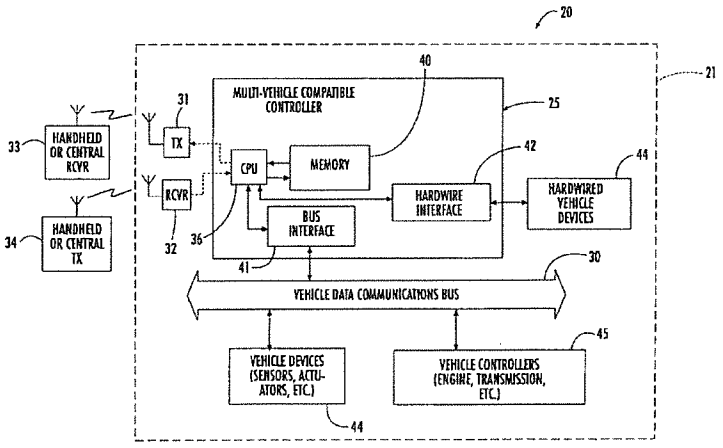
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Primary Examiner—Daniel J. Wu
Assistant Examiner—Toan Pham
(74) *Attorney, Agent, or Firm*—Allen, Dyer, Doppelt, Milbrath & Gilchrist, P.A.

(57) **ABSTRACT**

A control system includes a transmitter and a receiver for receiving signals from the remote transmitter, and a multi-vehicle compatible controller cooperating with the transmitter and receiver. The multi-vehicle compatible controller preferably generates at least one set of command signals on the data communications bus for the at least one vehicle device. The at least one set of command signals may include at least one working command signal and at least one non-working command signal for a given vehicle to thereby provide compatibility with a plurality of different vehicles. Multiple signals or codes can be generated on the data communications bus, and only that code for the given vehicle will cause an operation or response from the vehicle device. Such an arrangement provides for a relatively simple and straightforward approach to interface with a vehicle having a data communications bus. The features are also readily implemented in an adaptor to use with conventional security or other control system controllers for vehicles.

51 Claims, 8 Drawing Sheets



OMEGA EXHIBIT 2035

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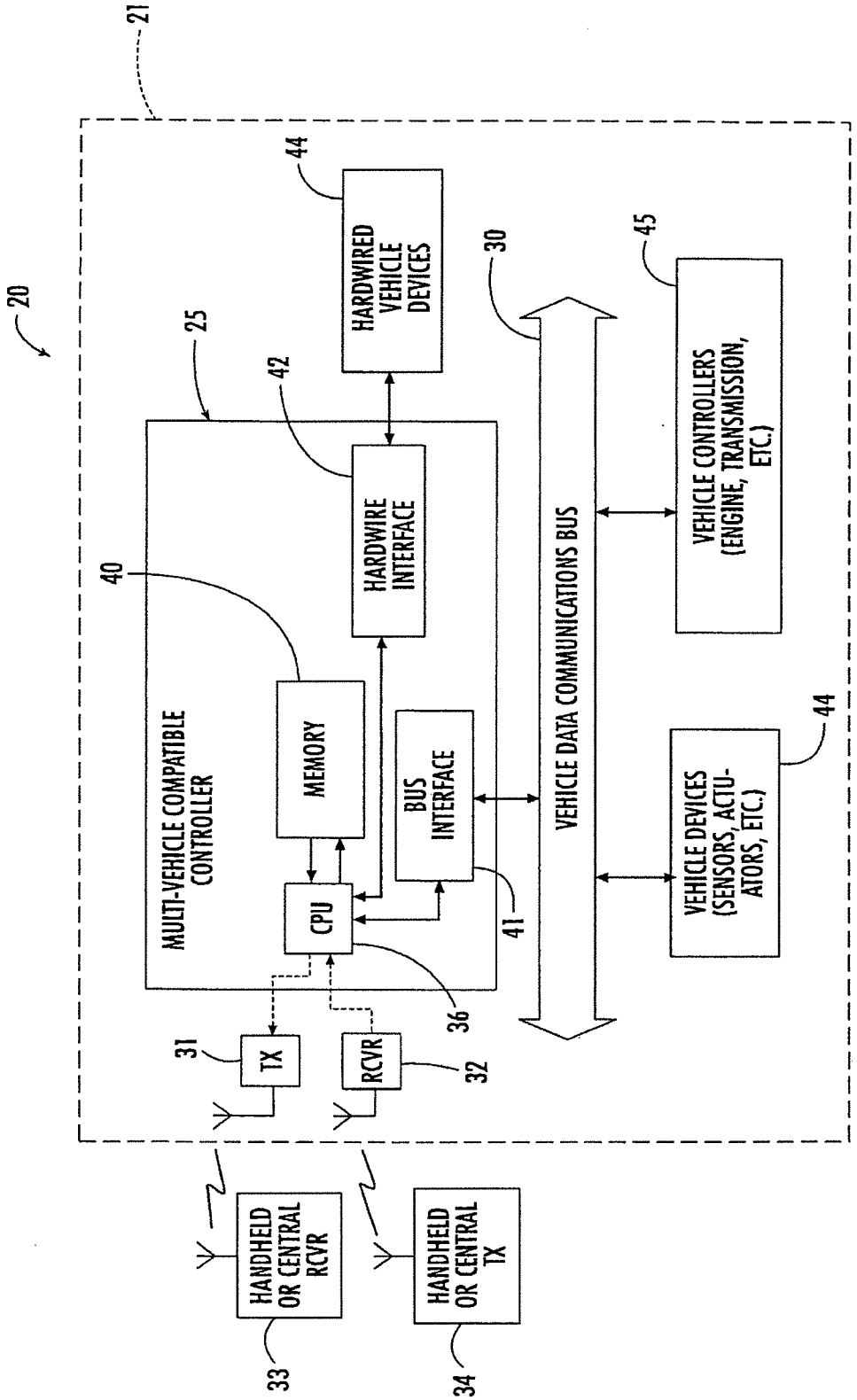

20
21
25
40
42
44
HARDWIRED VEHICLE DEVICES
HARDWIRE INTERFACE
MULTI-VEHICLE COMPATIBLE CONTROLLER
MEMORY
CPU
BUS INTERFACE
30
VEHICLE DATA COMMUNICATIONS BUS
45
VEHICLE CONTROLLERS (ENGINE, TRANSMISSION, ETC.)
VEHICLE DEVICES (SENSORS, ACTU-ATORS, ETC.)
41
36
31
TX
RCVR
32
HANDHELD OR CENTRAL RCVR
HANDHELD OR CENTRAL TX
33
34

FIG. 1.

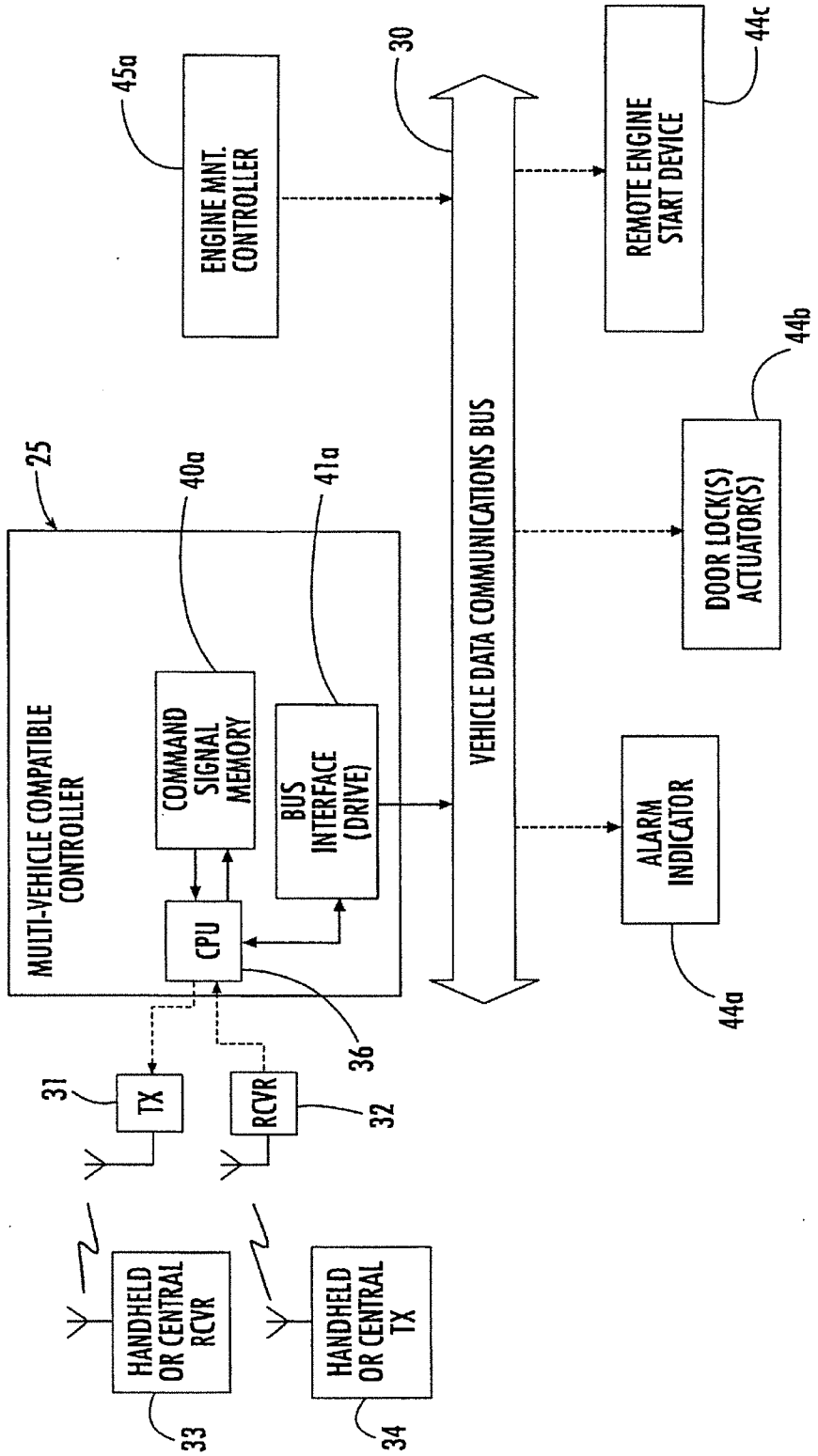

45a
ENGINE MNT. CONTROLLER
30
44c
REMOTE ENGINE START DEVICE
44b
DOOR LOCK(S) ACTUATOR(S)
25
40a
41a
MULTI-VEHICLE COMPATIBLE CONTROLLER
COMMAND SIGNAL MEMORY
BUS INTERFACE (DRIVE)
VEHICLE DATA COMMUNICATIONS BUS
CPU
ALARM INDICATOR
44a
36
31
TX
RCVR
32
HANDHELD OR CENTRAL RCVR
HANDHELD OR CENTRAL TX
33
34

FIG. 2.

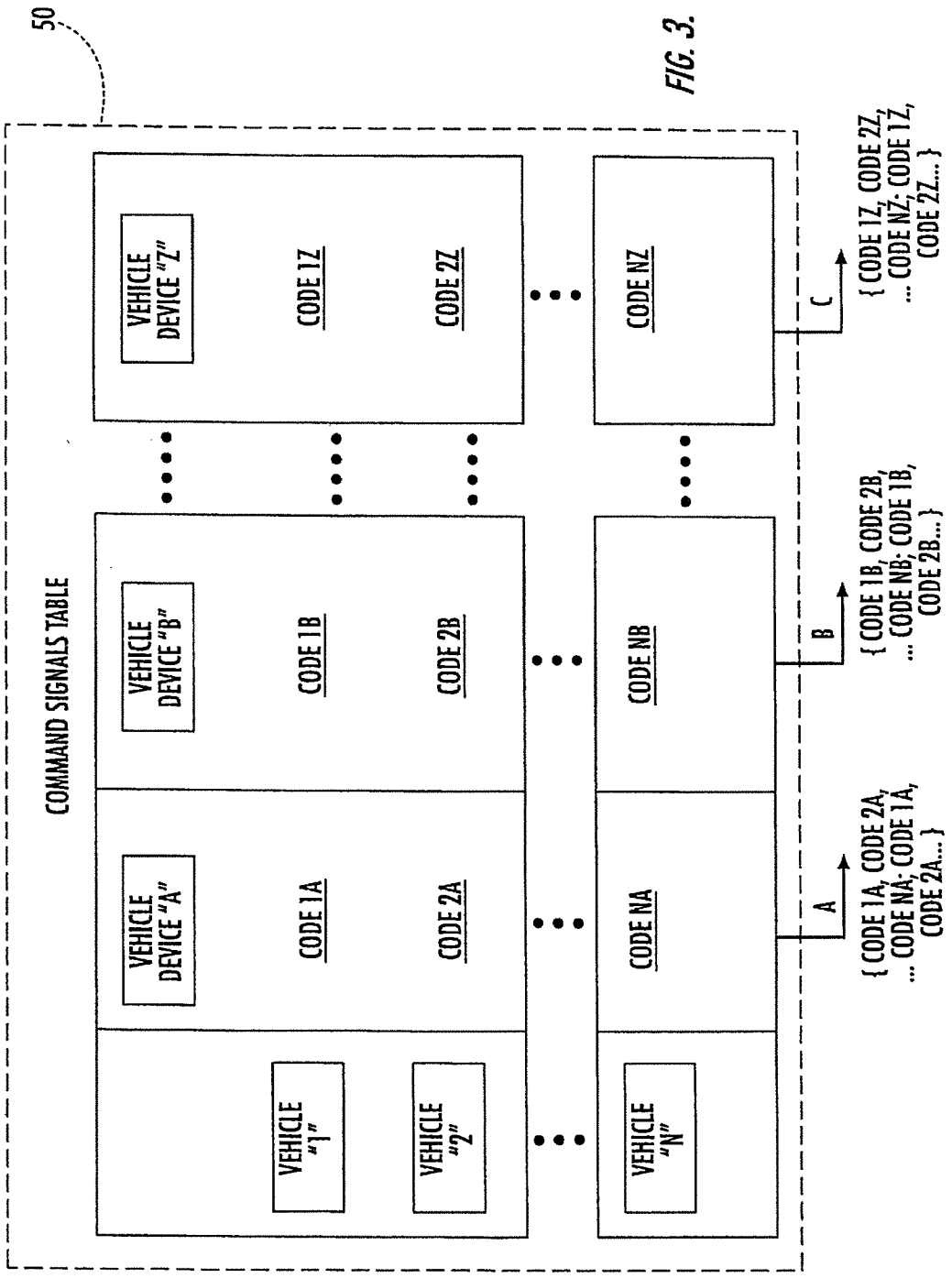

50
COMMAND SIGNALS TABLE
VEHICLE "1"
VEHICLE "2"
VEHICLE "N"
VEHICLE DEVICE "A"
VEHICLE DEVICE "B"
VEHICLE DEVICE "Z"
CODE 1A
CODE 2A
CODE NA
CODE 1B
CODE 2B
CODE NB
CODE 1Z
CODE 2Z
CODE NZ
A
B
C
{ CODE 1A, CODE 2A, ... CODE NA; CODE 1A, CODE 2A... }
{ CODE 1B, CODE 2B, ... CODE NB; CODE 1B, CODE 2B... }
{ CODE 1Z, CODE 2Z, ... CODE NZ; CODE 1Z, CODE 2Z... }

FIG. 3.

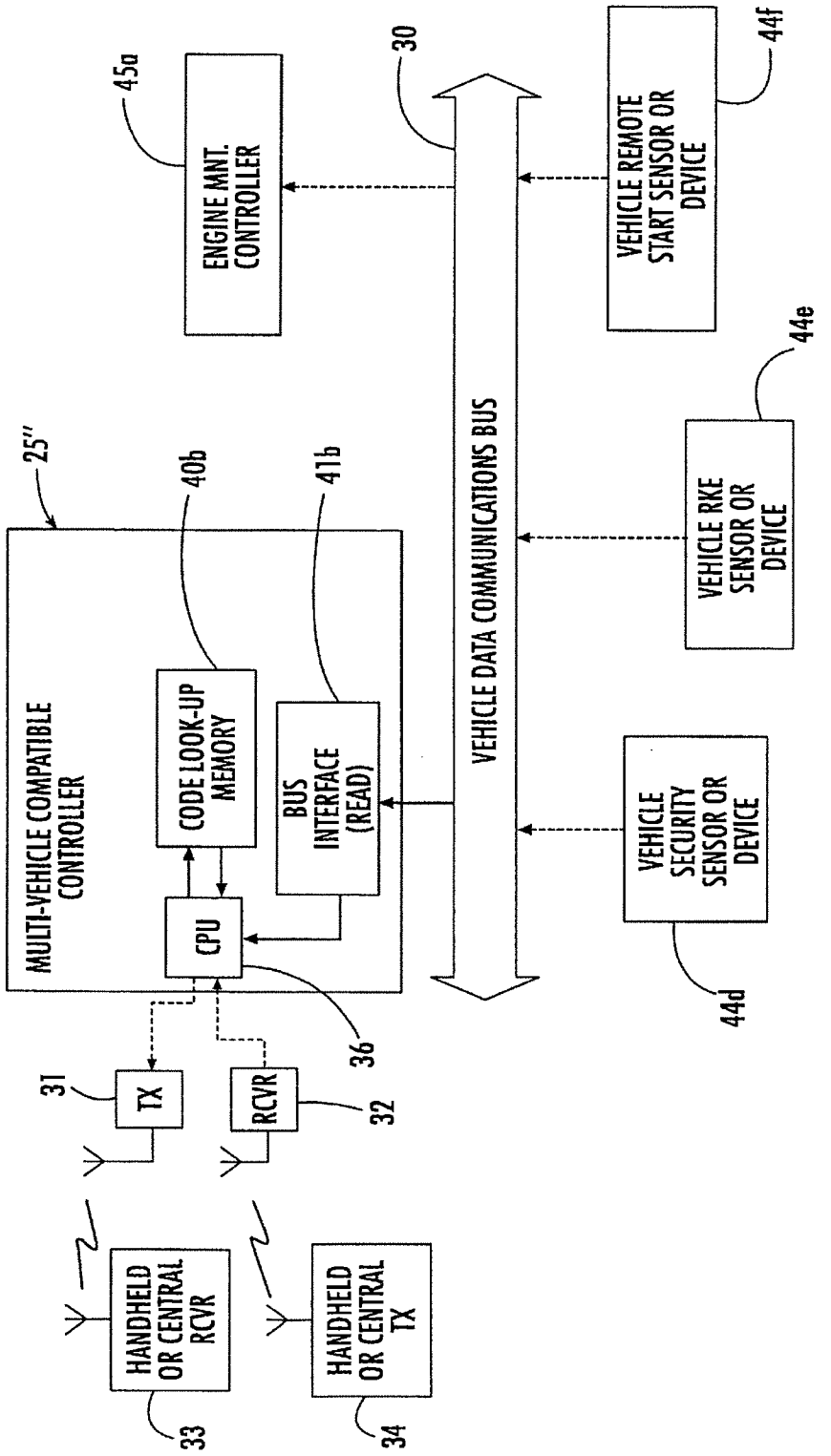

45a
ENGINE MNT. CONTROLLER
30
VEHICLE REMOTE START SENSOR OR DEVICE
44f
44e
VEHICLE RKE SENSOR OR DEVICE
25''
40b
41b
MULTI-VEHICLE COMPATIBLE CONTROLLER
CODE LOOK-UP MEMORY
BUS INTERFACE (READ)
VEHICLE DATA COMMUNICATIONS BUS
CPU
VEHICLE SECURITY SENSOR OR DEVICE
44d
36
31
TX
RCVR
32
HANDHELD OR CENTRAL RCVR
HANDHELD OR CENTRAL TX
33
34

FIG. 4.

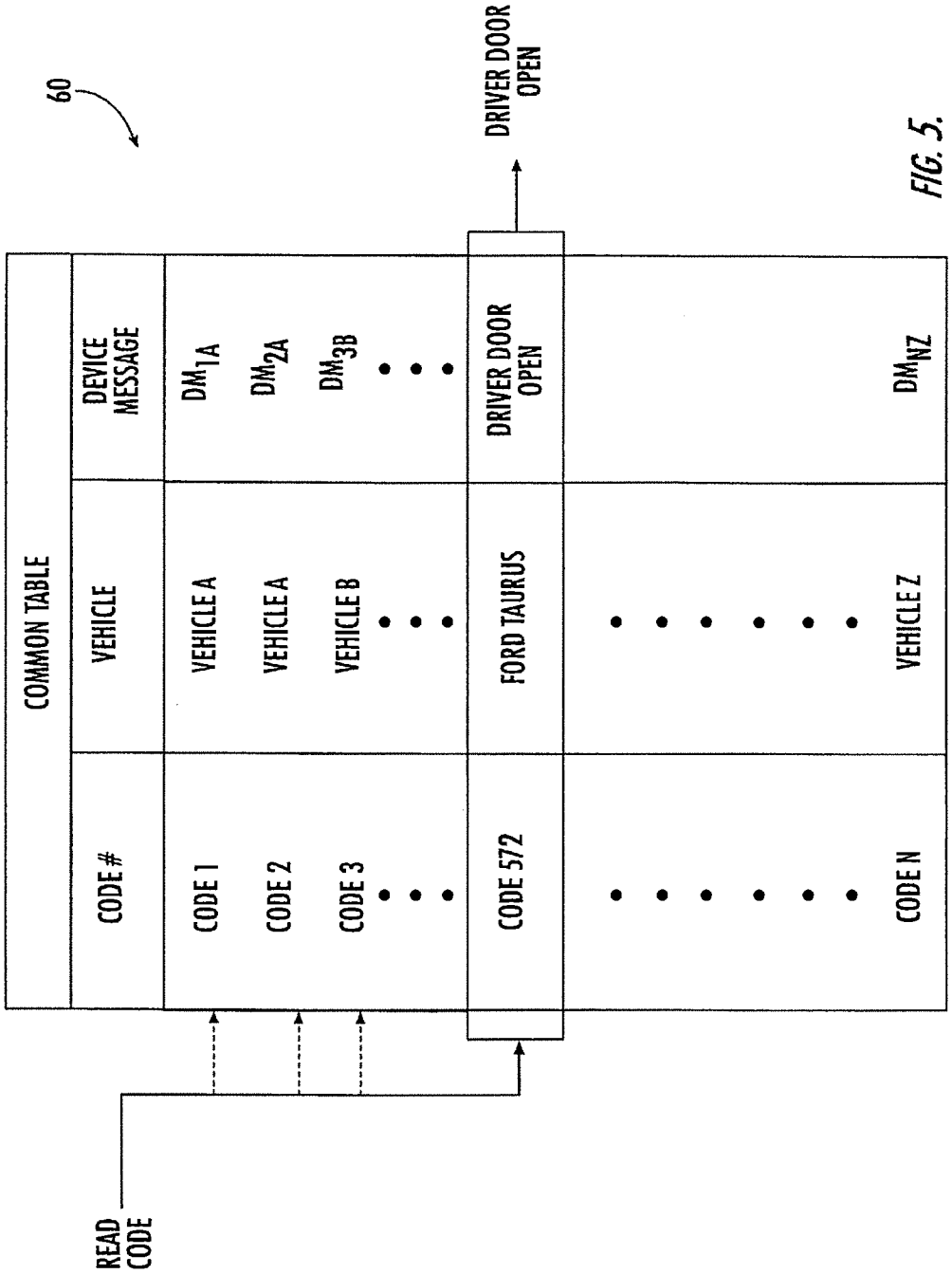

60
DRIVER DOOR OPEN
COMMON TABLE
CODE #
VEHICLE
DEVICE MESSAGE
CODE 1
CODE 2
CODE 3
CODE 572
CODE N
VEHICLE A
VEHICLE A
VEHICLE B
FORD TAURUS
VEHICLE Z
DM_{1A}
DM_{2A}
DM_{3B}
DRIVER DOOR OPEN
DM_{NZ}
READ CODE

FIG. 5.

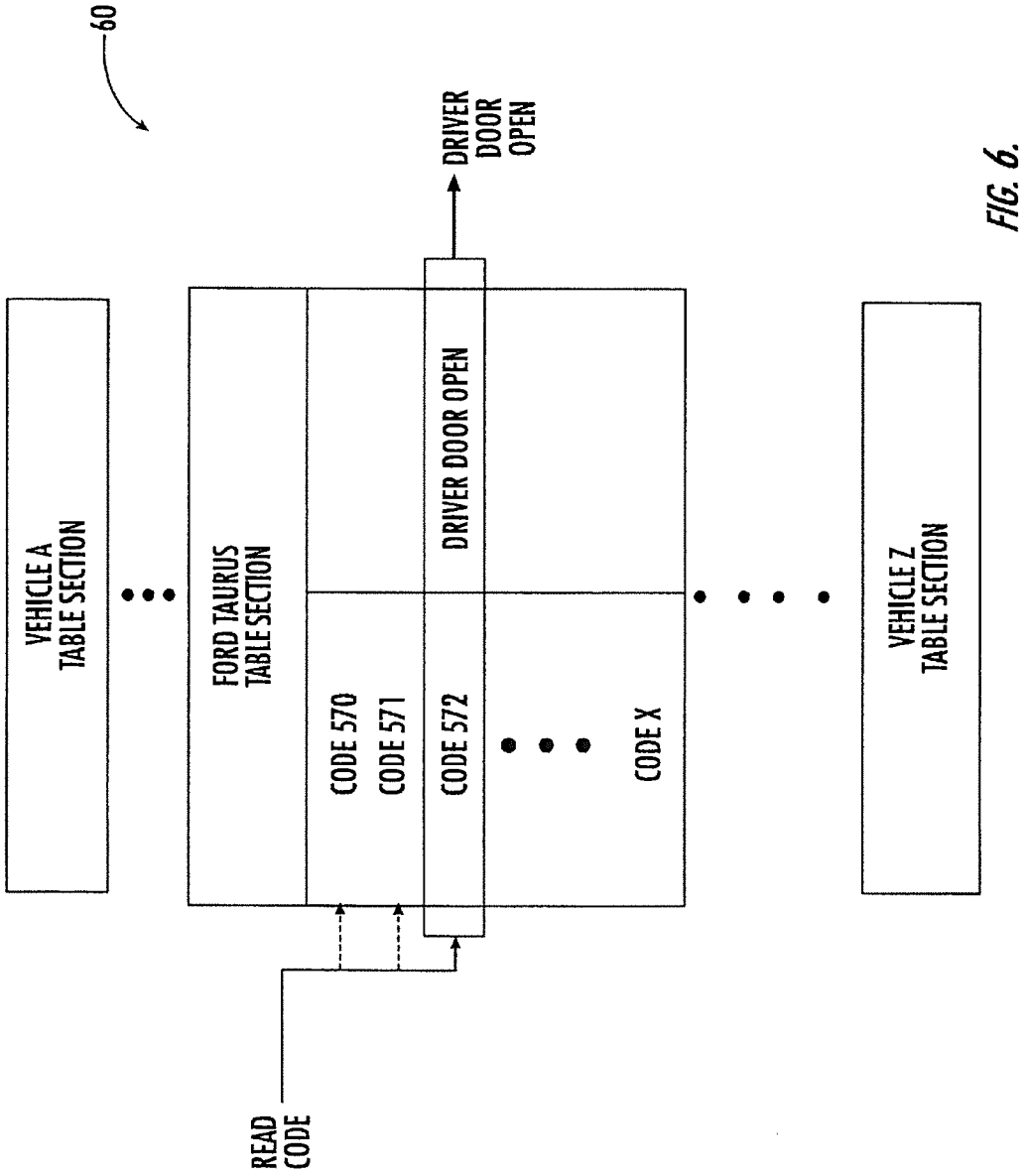

60
DRIVER DOOR OPEN
VEHICLE A TABLE SECTION
FORD TAURUS TABLE SECTION
DRIVER DOOR OPEN
CODE 570
CODE 571
CODE 572
CODE X
VEHICLE Z TABLE SECTION
READ CODE

FIG. 6.

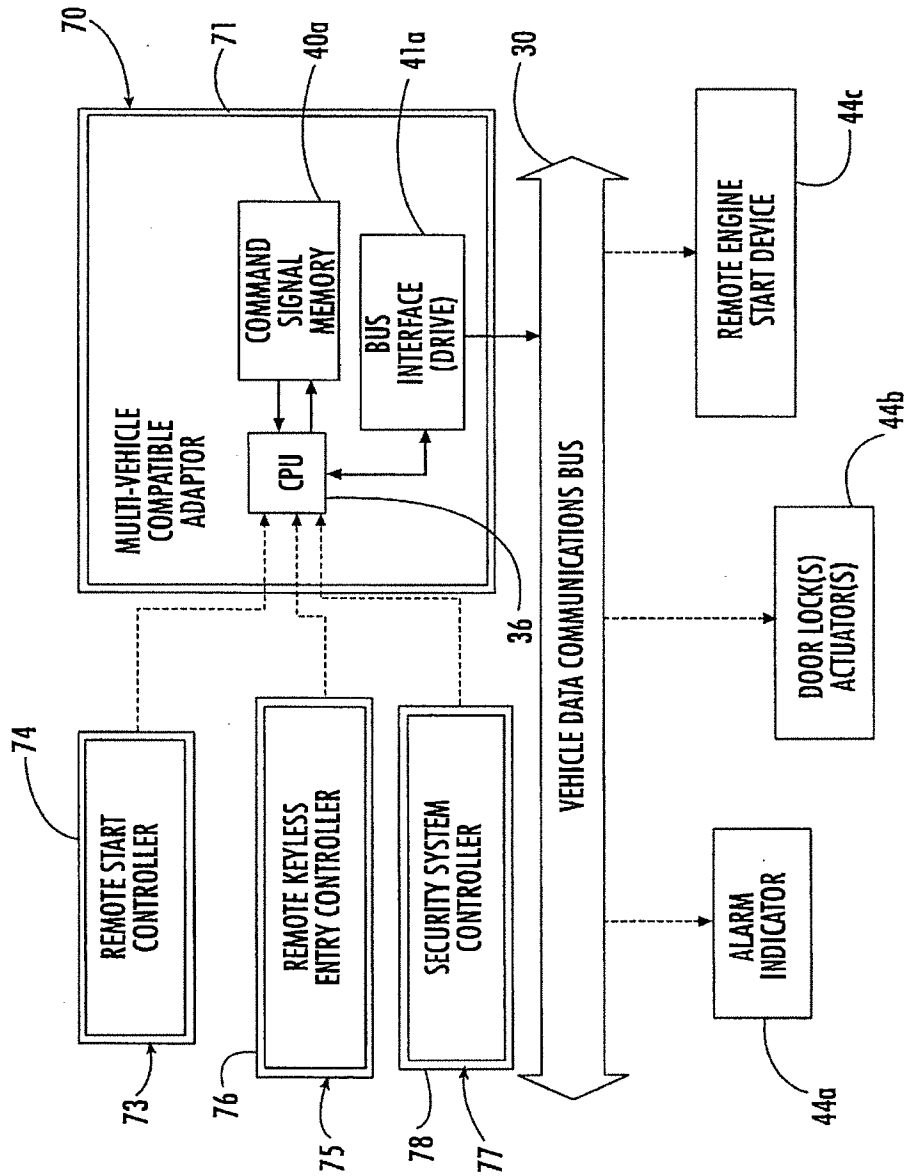

70
71
40a
41a
30
MULTI-VEHICLE COMPATIBLE ADAPTOR
COMMAND SIGNAL MEMORY
BUS INTERFACE (DRIVE)
CPU
36
VEHICLE DATA COMMUNICATIONS BUS
REMOTE ENGINE START DEVICE
44c
DOOR LOCK(S) ACTUATOR(S)
44b
ALARM INDICATOR
44a
74
REMOTE START CONTROLLER
73
REMOTE KEYLESS ENTRY CONTROLLER
76
75
SECURITY SYSTEM CONTROLLER
78
77

FIG. 7.

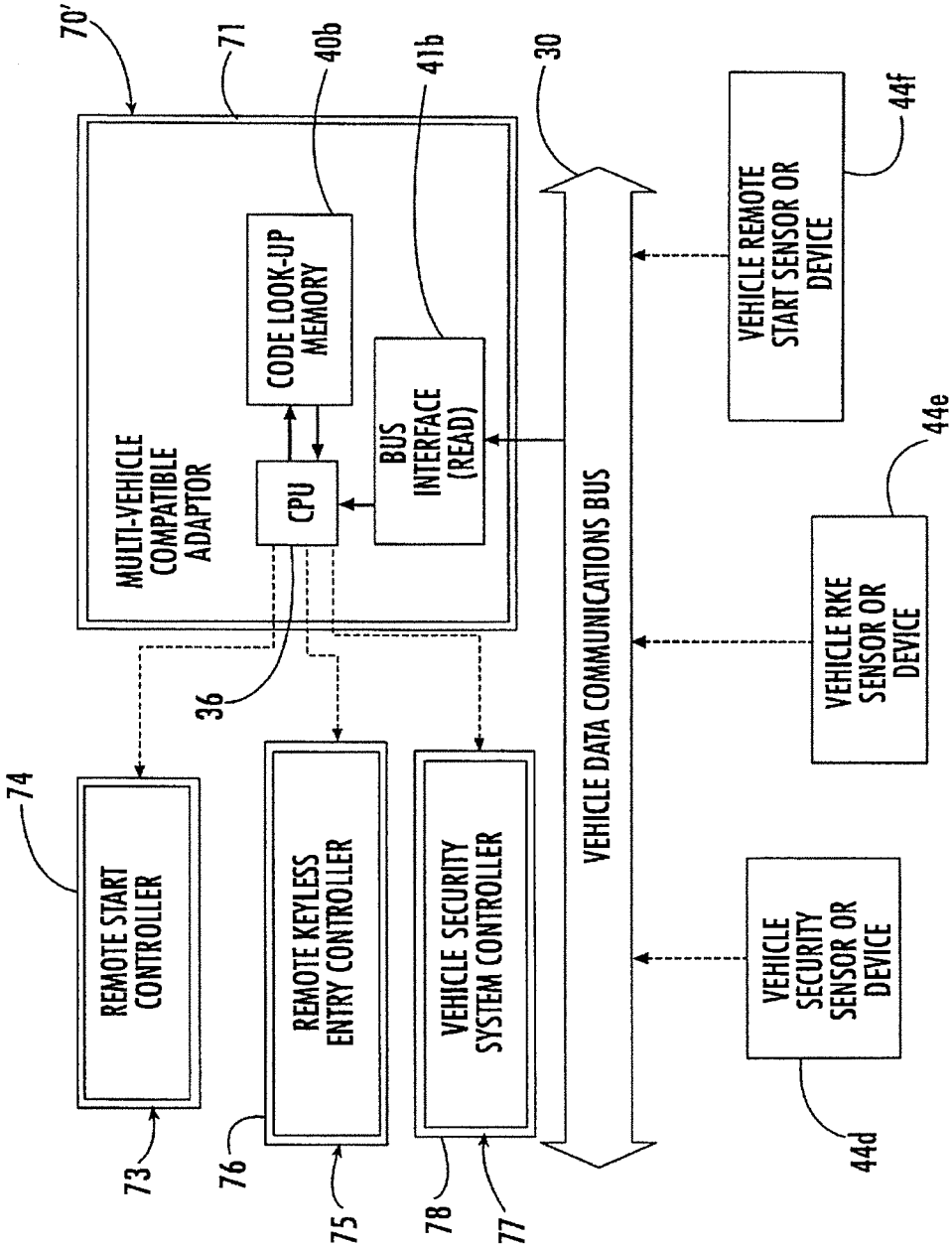

70'
71
40b
41b
30
MULTI-VEHICLE COMPATIBLE ADAPTOR
CODE LOOK-UP MEMORY
CPU
BUS INTERFACE (READ)
36
VEHICLE DATA COMMUNICATIONS BUS
VEHICLE REMOTE START SENSOR OR DEVICE
44f
VEHICLE RKE SENSOR OR DEVICE
44e
VEHICLE SECURITY SENSOR OR DEVICE
44d
74
REMOTE START CONTROLLER
73
REMOTE KEYLESS ENTRY CONTROLLER
76
75
VEHICLE SECURITY SYSTEM CONTROLLER
78
77

FIG. 8.

MULTI-VEHICLE COMPATIBLE CONTROL SYSTEM GENERATING COMMAND SIGNALS ON A DATA BUS AND ASSOCIATED METHODS

RELATED APPLICATIONS

The present application is a continuation-in-part of U.S. patent application Ser. No. 09/382,245 filed Aug. 25, 1999, U.S. Pat. No. 6,275,147 which in turn, is a continuation of Ser. No. 09/023,838 now U.S. Pat. No. 6,011,460, filed Feb. 13, 1998 which in turn, is a continuation-in-art of Ser. No. 08/701,356 now U.S. Pat. No. 5,719,551 filed Aug. 22, 1996.

FIELD OF THE INVENTION

This application is related to the field of control systems and, more particularly, to a remote control system and related methods for vehicles.

BACKGROUND OF THE INVENTION

Vehicle security systems are widely used to deter vehicle theft, prevent theft of valuables from a vehicle, deter vandalism, and to protect vehicle owners and occupants. A typical automobile security system, for example, includes a central processor or controller connected to a plurality of vehicle sensors. The sensors, for example, may detect opening of the trunk, hood, doors, windows, and also movement of the vehicle or within the vehicle. Ultrasonic and microwave motion detectors, vibration sensors, sound discriminators, differential pressure sensors, and switches may be used as sensors. In addition, radar sensors may be used to monitor the area proximate the vehicle.

The controller typically operates to give an alarm indication in the event of triggering of a vehicle sensor. The alarm indication may typically be a flashing of the lights and/or the sounding of the vehicle horn or a siren. In addition, the vehicle fuel supply and/or ignition power may be selectively disabled based upon an alarm condition.

A typical security system also includes a receiver associated with the controller that cooperates with one or more remote transmitters typically carried by the user as disclosed, for example, in U.S. Pat. No. 4,383,242 to Sassover et al. and U.S. Pat. No. 5,146,215 to Drori. The remote transmitter may be used to arm and disarm the vehicle security system or provide other remote control features from a predetermined range away from the vehicle. Also related to remote control of a vehicle function U.S. Pat. No. 5,252,966 to Lambropoulous et al. discloses a remote keyless entry system for a vehicle. The keyless entry system permits the user to remotely open the vehicle doors or open the vehicle trunk using a small handheld transmitter.

Unfortunately, the majority of vehicle security systems need to be directly connected by wires to individual vehicle devices, such as the vehicle horn or door switches of the vehicle. In other words, a conventional vehicle security system is hardwired to various vehicle components, typically by splicing into vehicle wiring harnesses or via interposing T-harnesses and connectors. The number of electrical devices in a vehicle has increased so that the size and complexity of wiring harnesses has also increased. For example, the steering wheel may include horn switches, an airbag, turn-signal and headlight switches, wiper controls, cruise control switches, ignition wiring, an emergency flasher switch, and/or radio controls. Likewise, a door of a vehicle, for example, may include window controls, locks, outside mirror switches, and/or door-panel light switches.

In response to the increased wiring complexity and costs, vehicle manufacturers have begun attempts to reduce the amount of wiring within vehicles to reduce weight, reduce wire routing problems, decrease costs, and reduce complications which may arise when troubleshooting the electrical system. For example, some manufacturers have adopted multiplexing schemes to reduce cables to three or four wires and to simplify the exchange of data among the various onboard electronic systems as disclosed, for example, in "The Thick and Thin of Car Cabling" by Thompson appearing in the IEEE Spectrum, February 1996, pp. 42–45.

Implementing multiplexing concepts in vehicles in a cost-effective and reliable manner may not be easy. Successful implementation, for example, may require the development of low or error-free communications in what can be harsh vehicle environments. With multiplexing technology, the various electronic modules or devices may be linked by a single signal wire in a bus also containing a power wire, and one or more ground wires. Digital messages are communicated to all modules over the data communications bus. Each message may have one or more addresses associated with it so that the devices can recognize which messages to ignore and which messages to respond to or read.

The Thompson article describes a number of multiplexed networks for vehicles. In particular, the Grand Cherokee made by Chrysler is described as having five multiplex nodes or controllers: the engine controller, the temperature controller, the airbag controller, the theft alarm, and the overhead console. Other nodes for different vehicles may include a transmission controller, a trip computer, an instrument cluster controller, an antilock braking controller, an active suspension controller, and a body controller for devices in the passenger compartment.

A number of patent references are also directed to digital or multiplex communications networks or circuits, such as may be used in a vehicle. For example, U.S. Pat. No. 4,538,262 Sinniger et al. discloses a multiplex bus system including a master control unit and a plurality of receiver-transmitter units connected thereto. Similarly, U.S. Pat. No. 4,055,772 to Leung discloses a power bus in a vehicle controlled by a low current digitally coded communications system. Other references disclosing various vehicle multiplex control systems include, for example, U.S. Pat. No. 4,760,275 to Sato et al.; U.S. Pat. No. 4,697,092 to Roggendorf et al.; and U.S. Pat. No. 4,792,783 to Burgess et al.

Several standards have been proposed for vehicle multiplex networks including, for example, the Society of Automotive Engineers "Surface Vehicle Standard, Class B Data Communications Network Interface", SAE J1850, July 1995. Another report by the SAE is the "Surface Vehicle Information Report, Chrysler Sensor and Control (CSC) Bus Multiplexing Network for Class 'A' Applications", SAE J2058, July 1990. Many other networks are also being implemented or proposed for communications between vehicle devices and nodes or controllers.

Unfortunately, conventional vehicle control systems, such as aftermarket vehicle security systems, are for hardwired connection to vehicle devices and are not readily adaptable to a vehicle including a data communications bus. Moreover, a vehicle security system if adapted for a communications bus and devices for one particular model, model year, and manufacturer, may not be compatible with any other models, model years, or manufacturers. Other systems for the control of vehicle functions may also suffer from such shortcomings.

SUMMARY OF THE INVENTION

In view of the foregoing background it is therefore an object of the invention to provide a control system and

related method for a vehicle comprising a data communications bus and at least one vehicle device connected to the data communications bus, and wherein the system is adapted to operate with different vehicles.

This and other objects, features and advantages in accordance with the invention are provided by a vehicle control system including a transmitter and a receiver for receiving signals from the transmitter, and a multi-vehicle compatible controller cooperating with the transmitter and receiver. The multi-vehicle compatible controller preferably generates at least one set of command signals on the data communications bus for the at least one vehicle device. The at least one set of command signals preferably comprises at least one working command signal and at least one non-working command signal for a given vehicle to thereby provide compatibility with a plurality of different vehicles. In other words, multiple signals or codes can be generated on the data communications bus, and only that code for the given vehicle and device will cause an operation or response from the vehicle device. Such an arrangement provides for a relatively simple and straightforward approach to interface with a vehicle having a data communications bus.

The at least one vehicle device may, of course, comprise a plurality of vehicle devices. Accordingly, the multi-vehicle compatible controller may generate a respective set of command signals for each of the vehicle devices. In one embodiment, the multi-vehicle compatible controller generates the different command signals sequentially. Of course, the multi-vehicle compatible controller may preferably generate command signals, with each representing digitally coded information, and the multi-vehicle compatible controller may include a memory for storing data relating to the command signals.

The remote control system may be for vehicle security, remote keyless entry, or remote vehicle starting, or combinations of such features, for example. More particularly, the at least one vehicle device may comprise an alarm indicating device, and the at least one set of command signals may be for operating the alarm indicating device. The at least one vehicle device may be one or more door lock actuators, and the at least one set of command signals may be for operating the door lock actuators. In addition, the at least one vehicle device may comprise at least one device relating to starting a vehicle engine, and the at least one set of command signals may be for operating such a device.

In accordance with another aspect of the invention, the multi-vehicle compatible controller may generate each command signal of a set of command signals a plurality of times. This may ensure that the signal is received even when there is other data traffic on the data communications bus.

The multi-vehicle compatibility concept may be extended to an adaptor device, such as for after-market installation, and may be especially advantageous when used in combination with a conventional vehicle function controller. In other words, the multi-vehicle compatible controller may comprise a controller, such as a conventional security, keyless entry, or remote start controller, and a multi-vehicle adaptor connected to the controller. The multi-vehicle adaptor may generate the at least one set of command signals on the data communications bus responsive to a signal from the controller.

The control system can be operated directly by the user, or via an intervening communications network. In other words, in some embodiments, the transmitter may be a remote handheld transmitter to be carried by a user when away from the vehicle, and the receiver is at the vehicle. In other embodiments, the transmitter may include at least a central station transmitter, and the receiver is at the vehicle. The central station transmitter may be part of a satellite or cellular telephone network.

In yet other embodiments, the receiver may be a handheld unit carried by the user or a central station receiver, such as to notify the user or others of a vehicle security breach, for example. In these embodiments, the transmitter is then located at the vehicle.

The multi-vehicle compatible controller may, in some embodiments, also be for reading signals on the data communications bus. This reading function may also have multi-vehicle compatibility.

A method aspect of the invention is directed to a control method for a vehicle comprising a data communications bus and at least one vehicle device connected to the data communications bus. The method preferably comprises generating at least one set of command signals on the data communications bus for the at least one vehicle device and wherein the at least one set of command signals preferably comprises at least one working command signal and at least one non-working command signal for a given vehicle to thereby provide compatibility with a plurality of different vehicles. The method may also include receiving signals at the vehicle from a remote transmitter, and the generation of command signals may be further based on receiving such signals.

Another method aspect of the invention is for adapting a control system for a vehicle to be compatible with different vehicles, wherein each vehicle includes a data communications bus and at least one vehicle device connected to the data communications bus. The control system preferably includes a transmitter and a receiver for receiving signals from the transmitter, and a controller cooperating with the transmitter and receiver. The method for adapting preferably comprises monitoring an output of the controller, and generating at least one set of command signals on the data communications bus responsive to the output of the controller. Again, the at least one set of command signals preferably includes at least one working command signal and at least one non-working command signal for a given vehicle to thereby provide compatibility with a plurality of different vehicles.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is a schematic block diagram of a vehicle control System including the multi-vehicle compatible controller connected to a data communications bus and other hard-wired devices in accordance with the invention.

FIG. **2** is a more detailed schematic block diagram of an embodiment of the multi-vehicle compatible controller illustrating the command signal generation in accordance with the invention.

FIG. **3** is a schematic diagram illustrating processing of command signals by the multi-vehicle compatible controller of FIG. **2**.

FIG. **4** is a more detailed schematic block diagram of an embodiment of the multi-vehicle compatible controller illustrating the code signal look-up in accordance with the invention.

FIG. **5** is a schematic diagram illustrating processing of a code read from the data communications bus in accordance with a first embodiment of the multi-vehicle compatible controller of FIG. **4**.

FIG. **6** is a schematic diagram illustrating processing of a code read from the data communications bus in accordance

with a second embodiment of the multi-vehicle compatible controller of FIG. 4.

FIG. 7 is a schematic block diagram of a multi-vehicle compatible adaptor in accordance with the present invention and illustrating the command signal processing portion.

FIG. 8 is a schematic block diagram of a multi-vehicle compatible adaptor in accordance with the present invention and illustrating the read code processing.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

The present invention will now be described more fully hereinafter with reference to the accompanying drawings in which preferred embodiments of the invention are shown. This invention may, however, be embodied in many different forms and should not be construed as limited to the illustrated embodiments set forth herein. Rather, these embodiments are provided so that this disclosure will be thorough and complete, and will fully convey the scope of the invention to those skilled in the art. Like numbers refer to like elements throughout. Prime and multiple prime notation are used in alternate embodiments to indicate similar elements.

Referring initially to FIG. **1**, a control system **20** for a vehicle **21** is now described. The control system includes a multi-vehicle compatible controller **25** connected to a data communications bus **30** in the vehicle **21**. The data communications bus **30** may be any of several types, such as compatible with the J1850 or CAN standards, or other type of bus as will be appreciated by those skilled in the art. The multi-vehicle compatible controller **25**, as its name suggests, provides compatibility with different codes used on the data bus and which may vary by vehicle as described in greater detail below.

The control system **20** preferably includes a transmitter, and a receiver for receiving signals from the transmitter. As shown in the illustrated embodiment, both a transmitter **31** and a receiver **32** are provided at the vehicle **21**. In addition, both a receiver **33** and a transmitter **34** are provided remotely or away from the vehicle. The first transmitter/receiver pair **31**, **33** may be used, for example, to provide a remote alert or page to a user when away from the vehicle of a security breach at the vehicle, for example. The second transmitter/receiver pair **32**, **34** may be used to cause a desired function to be performed at the vehicle, such as remote starting the engine, remotely unlocking the vehicle doors, or changing the mode of a security system between armed and disarmed modes, for example. Many other similar applications are contemplated by the present invention as will be appreciated by those skilled in the art. As will also be appreciated by those skilled in the art, in other embodiments, only one of these pairs of transmitters and receivers may be provided in the control system.

The remote transmitter **34** may be a small portable unit including a housing, function control switches carried by the housing, a battery within the housing, and the associated transmitter circuitry. This type of remote handheld transmitter is commonly used in conventional vehicle security systems, remote start systems, and remote keyless entry systems. The communications from the remote transmitter **34** to the receiver **32** at the vehicle is typically a direct radio frequency link, that is, there is no intervening communications links. However, in other embodiments, the remote transmitter **34** may indirectly communicate with the receiver **32** via other communications infrastructure, such as via satellite, or cellular communications, via the public switched telephone network (PSTN) and/or over the world wide web or Internet, as will be appreciated by those skilled in the art.

The remote transmitter **34** may also be a passive transponder type device, that takes power from an associated transponder reader as will be appreciated by those skilled in the art, and automatically transmits a signal to the reader. For example, the transponder may be of the type carried in conjunction with the vehicle keys, or may be embedded in the key as will be readily appreciated by those skilled in the art.

The remote transmitter **34** may also include one or more central station transmitters, such as may be provided by a satellite transmitter or cellular telephone transmitter, for example. Such a central station transmitter may also be connected to other communications infrastructure.

The remote receiver **33** may also be a small portable unit including a housing, one or more indicators carried by the housing, a battery within the housing, and the associated receiver circuitry. This type of remote receiver may also directly communicate with the vehicle transmitter **31**, or there may be intervening communications links as will be appreciated by those skilled in the art. In some embodiments, the remote transmitter **34** and remote receiver **33** may be packaged together in a common handheld housing. Of course the remote receiver **33** may also include one or more central stations along the lines as described above for the central station remote transmitter.

The multi-vehicle compatible controller **25** may also include a central processing unit (CPU) **36** and one or more memories **40** connected thereto. Although the memory **40** is illustrated as a separate device, those of skill in the art will recognize that the memory may alternately be embedded on the same integrated circuit as the processing circuitry of the CPU.

The multi-vehicle compatible controller **25** also may optionally include a hardwire interface **42** which may be directly connected to one or more vehicle devices **44**. For example, in some embodiments for a security system, direct connections may be made to one or more vehicle sensors, an indicator LED, a siren, or the headlight relay. For a remote start system, hardwire connections may be made to a starter motor relay, for example. Those of skill in the art will recognize other devices **44** that may be directly connected to the multi-vehicle compatible controller **25** via the hardwire interface **42**. The hardwire interface **42** may included circuitry for sending signals to or reading signals from the vehicle devices **44** as will be appreciated by those skilled in the art. In some embodiments, the hardwire interface **42** may not be needed or incorporated in the multi-vehicle compatible controller **25**.

The multi-vehicle compatible controller **25** also illustratively includes a bus interface **41** cooperating with the CPU **36** to perform at least one of reading signals from the data communications bus **30**, or generating signals on the data bus. The bus interface **41** includes circuitry for interfacing to the proper signal levels and formats on the data communications bus **30** as will be appreciated by those skilled in the art without further discussion herein.

As will also be readily appreciated by those skilled in the art, the vehicle **21** includes a number of electrical/electronic devices that can be controlled and/or the status thereof read via the data communications bus **30**. For simplicity of explanation, these devices are schematically illustrated by the two blocks **44**, **45**, respectively labeled "vehicle devices (sensors, actuators, etc.)," and "vehicle controllers (engine controller, transmission controller, etc.)." In other words, the

vehicle devices connected to the data bus **30** may be considered to be relatively simple devices, such as sensors, or more complicated devices with some internal processing, such as may generally be considered as controllers.

The multi-vehicle compatibility controller **25** may provide its multi-vehicle compatibility in one or both directions of communications via the data communications bus **30**. Referring now additionally to FIGS. **2** and **3**, the drive or generation of signals on the data bus portion of communication is now further described. In this embodiment, the multi-vehicle compatible controller **25'** illustratively includes a command signal memory **40***a*, and a bus interface **41***a* only for the drive direction for simplicity of explanation.

The devices connected to the data communications bus **30** illustratively include an alarm indicator **44***a*, such as can be provided by a separate siren or the vehicle horn, for example. The alarm indicator **44***a* would likely be included for a security system. The vehicle devices may also include one or more door lock actuators **44***b* as would be likely used by a security system or remote keyless entry system, for example, as would be readily appreciated by those skilled in the art.

For a remote start system, one or more remote starting device **44***c* may be connected to the data communications bus **30** as shown in the illustrated embodiment. Such a remote starting device **44***c* may be a starter relay, for example, controlled by signals from the data communications bus. The remote starting device **44***c* could also be a device or circuit to bypass an engine immobilizer circuit as will be appreciated by those skilled in the art.

The vehicle device to which signals are to be sent by the multi-vehicle controller **25'** may also include another controller, such as the schematically illustrated engine management controller **45***a*. The engine management controller **45***a* could be sent signals such as to prevent or enable starting for security or remote start applications as will be appreciated by those skilled in the art.

The multi-vehicle compatible controller **25'** may also include an optional hardwire interface and other components as mentioned above. For clarity and simplicity of explanation, these components need no further description.

In accordance with this aspect of the invention, the multi-vehicle compatible controller **25'** preferably generates at least one set of command signals on the data communications bus **30** for the at least one vehicle device. The at least one set of command signals preferably comprises at least one working command signal and at least one non-working command signal for a given vehicle to thereby provide compatibility with the plurality of different vehicles. In other words, multiple signals or codes can be generated on the data communications bus **30**, and only that code for the given vehicle and device will cause an operation or response from the vehicle device. This provides for a relatively simple and straightforward approach to interface or cooperate with a vehicle having a data communications bus **30**, and wherein the controller is advantageously compatible with a number of different vehicles. Since typically it may be desired to interface to a plurality of vehicle devices, the multi-vehicle compatible controller **25'** may generate a respective set of command signals for each of the vehicle devices.

Such multi-vehicle compatibility provided by the controller **25'** is especially advantageous in after-market systems, such as for security, remote keyless entry, or remote starting for example. The ability to interface through the data communications bus **30** also significantly reduces the wiring complexity needed to interface to the associated vehicle devices.

The multi-vehicle compatible controller **25'** may sequentially generate the different command signals (working and non-working) for an intended vehicle device. To ensure effective communications even in the presence of noise, for example, the multi-vehicle compatible controller **25'** may generate the set of command signals a plurality of times, such as, for example, two to five times. The need to effectively communicate should be balanced against possible traffic congestion on the data bus **30** as will be appreciated by those skilled in the art.

Referring now more specifically to the diagram of FIG. **3**, the operation of the multi-vehicle controller **25'** is further described. The controller **25'** may operate by arranging in the command signals memory **40***a* a common table **50** as shown. The CPU **36** upon determining that an action needs to be performed, such as unlocking the driver's door, for example, would identify the appropriate column from the table **50** from among the columns labeled "vehicle device A" to "vehicle device Z". For example, the appropriate column may be "vehicle device B", in which case the CPU would then read the memory locations in this column to generate on the bus **30** the appropriate set of codes to lock the driver's door for each of the N vehicles with which the multi-vehicle compatible controller **25'** is compatible. Of course, only one of the codes would be a working code, and the other codes would cause no vehicle function to be performed. For example, if vehicle **2** was the vehicle in which the multi-vehicle compatible controller **25'** were installed, only the code 2B would cause the driver's door to unlock.

The actual coded signals would be compatible with the particular data communications bus **30** as will be appreciated by those skilled in the art. The codes may be binary codes, which for convenience can be represented more simply by corresponding hexadecimal codes as would also be appreciated by those skilled in the art. For example, for an unlock all vehicle doors to be commanded in a 1995 Jeep Grand Cherokee, the code may be 03868004, for a 2000 Jeep Grand Cherokee, the code may be 0422A00400. As will be readily appreciated by those skilled in the art, such codes can be obtained from the manufacturers directly, or may be read from the data bus **30** using any one of a number of commercially available diagnostic tools for reading the data bus **30**, for example.

The set of command signals may be repeated as mentioned above, and as schematically illustrated at the lower portion of the table **50**. Of course, the memory **40***a* may store the actual codes, but may also store data enabling generation of the set of command signals by the CPU **36**. This may be particularly so where certain portions of the code, e.g. preamble, or some other portion, are common across either multiple vehicles, and/or over multiple vehicle devices.

The number of vehicles and number of devices to be controlled using the multi-vehicle compatible controller **25'** can both be relatively large to cover a substantial portion of the vehicle marketplace. Alternatively, the multiple command signal concept may also be advantageously used to provide compatibility for as few as two vehicles, and even a single vehicle device.

Turning now to FIGS. **4–6**, the other direction of communication is now described. In particular, the reverse direction or reading of signals from the data communications bus **30** is now described. Many of the components are the same as those described above, and, hence, need no further description. In the illustrated embodiment, the CPU **36** is connected to a code look-up memory **40***b*. In addition, only the read or receive side of the bus interface **41***b* is

schematically illustrated. The data bus **30** also illustratively connects one or more of vehicle security sensors or devices **44***d*, vehicle remote keyless entry sensors or devices, and vehicle remote start sensors or devices **44***f* to the multi-vehicle compatible controller **25"**. An engine management controller **45***a* is also illustratively connected to the data communications bus **30** as may be used for vehicle security or remote starting as mentioned above. Considered in somewhat different terms, the multi-vehicle compatible controller **25"** may be for one or more of the conventional vehicle remote control functions broadly considered as vehicle security, remote keyless entry, or remote starting. Other similar control functions for a vehicle are also contemplated by the present invention.

The compatibility to read a code and determine the message or content thereof for a vehicle device from among a plurality of vehicles can be used alone or in combination with the compatibility for writing or generating signals on the bus described above. More particularly, the multi-vehicle compatible controller **25"** is for storing a set of device codes for a given vehicle device for a plurality of different vehicles, for reading a device code from the data communications bus **30**, and for determining a match between a read device code and the stored device codes to thereby provide compatibility with a plurality of different vehicles. Such an arrangement provides for a relatively simple and straightforward approach to interface with a vehicle having a data communications bus **30**.

As noted briefly above, the multi-vehicle compatible controller **25"** may comprise the code look-up memory **40***b* for the stored device codes, and a processor or CPU **36** cooperating with the memory for determining the match between the read device code and the stored device codes. The at least one vehicle device may include a plurality of vehicle devices, and, accordingly, the memory **40***b* of the multi-vehicle compatible controller **25"** preferably stores a respective set of device codes for each of the plurality of vehicle devices.

Referring now more specifically to FIG. **5**, the look-up table feature of the multi-vehicle compatible controller **25"** is now described. A common table **60** may be created which contains a column for the vehicle codes in some predefined sequence, such as in a numerical order beginning with a first code, Code 1, and ending with a last code, Code N, as illustrated. The central column in the illustrated embodiment includes the corresponding vehicle identification with the vehicles extending from a first vehicle, Vehicle A, to a last vehicle, Vehicle Z. The number of codes and vehicles may be selected so that a given multi-vehicle compatible controller **25"** is useable across an economically large number of vehicles as will be appreciated by those skilled in the art.

The last or rightmost column in the illustrated table **60** is the device data or message corresponding to the associated vehicle and code. These device messages extend from a first message, DM_{1A}, to a last device message, DM_{NZ}. The messages may be of many different types, such as driver door open or closed, hood open or closed, shock sensor triggered, brake pressure indicated, gearshift selector in Park, etc. as will be appreciated by those skilled in the art.

By way of example, the common table **60** includes a blocked row schematically illustrating a match for a Code **572**. This code is for a Ford Taurus and indicates that the driver's door is open. This type of data may be useful in any of the illustrated implementations including vehicle security, remote keyless entry, or remote starting. The CPU **36** would read the code on the data bus **30** and compare the code against the stored codes to determine a match. The CPU **36** is likely to buffer some or all of a code when received to subsequently be compared using the table **60** as will be understood by those skilled in the art. In other embodiments, individual bits or blocks thereof may be compared as they are received.

An alternate embodiment of the common table **60** is now explained with reference to FIG. **6**. In this case the overall or common table **60'**, may be considered parsed or divided into a plurality of vehicle table sections. The first table section is for vehicle A, and the last for vehicle Z in the illustrated embodiment. This embodiment also illustrates the driver door for the Ford Taurus as being matched from the read signal from the data communications bus **30**. What is of interest in this embodiment, is that upon initial set-up or an initial learning period, only the codes for the learned vehicle need then later be compared to the read code. Accordingly, a time savings may be realized.

Those of skill in the art will recognize that the tables **60** and **60'** of FIGS. **5** and **6** are exemplary illustrations from among many possible configurations of look-up tables that may be used in accordance with the present invention. Other configurations are also contemplated by the present invention.

Since it may also be desirable to re-install the multi-vehicle compatible controller **25"** in another vehicle, the controller may be reset and another vehicle learned or configured during an initial set-up. This concept is generally described as an embodiment of a desired signal enabling function or feature in related parent U.S. patent application Ser. No. 09/382,245 filed Aug. 25, 1999, which in turn, is a continuation of U.S. Pat. No. 6,011,460, which in turn, is a continuation-in-part of U.S. Pat. No. 5,719,551, and the disclosure of each of which are incorporated herein by reference in its entirety.

Turning now to FIG. **7**, we again revisit the command signal concept for driving the communications bus **30** with a plurality of signal codes to provide the multi-vehicle compatibility. In this variation, the multi-vehicle controller is divided into two sections or portions. More particularly, the multi-vehicle compatibility is provided by the illustrated multi-vehicle compatible adaptor **70**. The adaptor **70** illustratively includes the CPU **36**, the command signal memory **40***a*, and the bus interface **41***a*. The adaptor **70** also includes its own housing **71**. The adaptor **70**, may include a hardwire interface as discussed above, or such could already be provided with any of the controllers **73**, **75** or **77** as would more typically be the case.

The adaptor **70** is fed signals from one or more of the illustrated conventional controllers, that is, one or more of the remote start controller **73**, the remote keyless entry controller **75** or the security system controller **77**. Each of the these controllers **73**, **75** and **77** may also include its own respective housing **74**, **76** and **78**.

As will be appreciated by those skilled in the art, one scenario where the adaptor **70** may be especially useful is to adapt a conventional security or other system controller to operate via the data communications bus **30**. Since the data bus technology is being slowly phased in by automobile manufacturers, suppliers may provide their conventional systems for conventional vehicles, and add the adaptor **70** with the conventional controller when the vehicle requires interface to the data communications bus **30**.

Turning now to FIG. **8**, it can be seen that similar concepts can be extended to the multi-vehicle compatible adaptor **70'** for the other direction of communication, that is, from the

data communications bus **30** to one or more of the controllers **73, 75** and **77**. The adaptor **70'** illustratively includes the CPU **36**, bus interface circuit **41***b* for reading the bus, and the code look-up memory **40***b* as described above with reference to FIG. **4**.

The operation of the multi-vehicle compatible adaptor **70'** will be readily understood by those of skill in the art based upon the above provided descriptions relating to FIGS. **4–6** without requiring further discussion herein. Of course, as will be appreciated by those skilled in the art, the adaptors **70, 70'** may be used independently, may be used together, or may be combined into a single unit.

Other features relating to vehicle control systems are disclosed in copending patent applications entitled "REMOTE START SYSTEM FOR A VEHICLE HAVING A DATA COMMUNICATIONS BUS AND RELATED METHODS" (attorney docket no. 16635E) and "MULTI-VEHICLE COMPATIBLE CONTROL SYSTEM FOR READING FROM A DATA BUS AND ASSOCIATED METHODS" (attorney docket no. 16635H), the entire disclosures of which are incorporated herein by reference.

Many modifications and other embodiments of the invention will come to the mind of one skilled in the art having the benefit of the teachings presented in the foregoing descriptions and the associated drawings. Accordingly, it is understood that the invention is not to be limited to the illustrated embodiments disclosed, and that other modifications and embodiments are intended to be included within the spirit and scope of the appended claims.

That which is claimed:

1. A control system for a vehicle comprising a data communications bus and at least one vehicle device connected to the data communications bus, the control system comprising:

a transmitter and a receiver for receiving signals from said transmitter; and

a multi-vehicle compatible controller at the vehicle and cooperating with said transmitter and receiver, said multi-vehicle compatible controller generating at least one set of command signals on the data communications bus for the at least one vehicle device, the at least one set of command signals comprising at least one working command signal and at least one non-working command signal for a given vehicle to thereby provide command compatibility with a plurality of different vehicles.

2. A control system according to claim **1** wherein the at least one vehicle device comprises a plurality of vehicle devices; and wherein said multi-vehicle compatible controller generates a respective set of command signals for each vehicle device of the plurality thereof.

3. A control system according to claim **1** wherein said multi-vehicle compatible controller generates command signals sequentially.

4. A control system according to claim **1** wherein said multi-vehicle compatible controller generates command signals each representing digitally coded information.

5. A control system according to claim **1** wherein said multi-vehicle compatible controller comprises a memory for storing data relating to the at least one set of command signals.

6. A control system according to claim **1** wherein the at least one vehicle device comprises an alarm indicating device; and wherein the at least one set of command signals is for operating the alarm indicating device.

7. A control system according to claim **1** wherein the at least one vehicle device comprises at least one vehicle door lock actuator; and wherein the at least one set of command signals is for operating the at least one door lock actuator.

8. A control system according to claim **1** where the at least one vehicle device comprises at least one device relating to starting a vehicle engine; and wherein the at least one set of command signals is for operating the at least one vehicle device relating to starting the vehicle engine.

9. A control system according to claim **1** wherein said multi-vehicle compatible controller generates each command signal of the at least one set of command signals a plurality of times.

10. A control system according to claim **1** wherein said multi-vehicle compatible controller comprises:

a controller for generating at least one controller signal; and

a multi-vehicle compatible adaptor connected to said controller for generating the at least one set of command signals on the data communications bus responsive to the at least one controller signal.

11. A control system according to claim **10** wherein said controller further comprises a first housing; and said multi-vehicle adaptor comprises a second housing.

12. A control system according to claim **1** wherein said multi-vehicle compatible controller is further for storing a set of device codes for a given vehicle device for a plurality of different vehicles, for reading a device code from the data communications bus, and for determining a match between a read device code and the stored device codes to thereby provide reading compatibility with a plurality of different vehicles.

13. A control system according to claim **1** wherein said transmitter comprises a remote handheld transmitter to be carried by a user when away from the vehicle; and wherein said receiver is at the vehicle.

14. A control system according to claim **1** wherein said transmitter comprises at least a central station transmitter; and wherein said receiver is at the vehicle.

15. A control system according to claim **1** wherein said receiver comprises a remote receiver to be carried by a user when away from the vehicle; and wherein said transmitter is at the vehicle.

16. A control system according to claim **1** wherein said receiver comprises at least a central station transmitter; and wherein said transmitter is at the vehicle.

17. A control system according to claim **1** wherein said transmitter comprises a transponder transmitter to be carried by a user; and wherein said receiver is at the vehicle.

18. An adaptor for adapting a control system for a vehicle to be compatible with a plurality of different vehicles, each vehicle comprising a data communications bus and at least one vehicle device connected thereto, the control system comprising a transmitter and a receiver for receiving signals from the remote transmitter, and a controller cooperating with the transmitter and receiver, the adaptor comprising:

a housing; and

a multi-vehicle compatible adaptor circuit mounted in said housing for generating at least one set of command signals on the data communications bus responsive to the controller, the at least one set of command signals comprising at least one working command signal and at least one non-working command signal for a given vehicle to thereby provide command compatibility with a plurality of different vehicles.

19. An adaptor according to claim 18 wherein the at least one vehicle device comprises a plurality of vehicle devices; and wherein said multi-vehicle compatible adaptor circuit generates a respective set of command signals for each vehicle device of the plurality thereof.

20. An adaptor according to claim 18 wherein said multi-vehicle compatible adaptor circuit generates command signals sequentially.

21. An adaptor according to claim 18 wherein said multi-vehicle compatible adaptor circuit generates command signals each representing digitally coded information.

22. An adaptor according to claim 18 wherein said multi-vehicle compatible adaptor circuit comprises a memory for storing data relating to the at least one set of command signals.

23. An adaptor according to claim 18 wherein the at least one vehicle device comprises an alarm indicating device; and wherein the at least one set of command signals is for operating the alarm indicating device.

24. An adaptor according to claim 18 wherein the at least one vehicle device comprises at least one vehicle door lock actuator; and wherein the at least one set of command signals is for operating the at least one door lock actuator.

25. An adaptor according to claim 18 where the at least one vehicle device comprises at least one device relating to starting a vehicle engine; and wherein the at least one set of command signals is for operating the at least one vehicle device relating to starting the vehicle engine.

26. An adaptor according to claim 18 wherein said multi-vehicle compatible adaptor circuit generates each command signal of the at least one set of command signals a plurality of times.

27. An adaptor according to claim 18 wherein said multi-vehicle compatible adaptor circuit is further for storing a set of device codes for a given vehicle device for a plurality of different vehicles, for reading a device code from the data communications bus, and for determining a match between a read device code and the stored device codes to thereby provide reading compatibility with a plurality of different vehicles.

28. A control method for a vehicle comprising a data communications bus and at least one vehicle device connected to the data communications bus, the method comprising:

generating at least one set of command signals on the data communications bus for the at least one vehicle device, the at least one set of command signals comprising at least one working command signal and at least one non-working command signal for a given vehicle to thereby provide command compatibility with a plurality of different vehicles.

29. A method according to claim 28 further comprising receiving a signal from a transmitter; and wherein generating the at least one set of command signals is responsive to receiving the signal from the transmitter.

30. A method according to claim 29 wherein the transmitter comprises a handheld remote transmitter to be carried by a user when away from the vehicle.

31. A method according to claim 29 wherein the transmitter comprises at least a central station transmitter.

32. A method according to claim 29 wherein the transmitter comprises a handheld transponder to be carried by a user when away from the vehicle.

33. A method according to claim 28 wherein the at least one vehicle device comprises a plurality of vehicle devices; and further comprising generating a respective set of command signals for each vehicle device of the plurality thereof.

34. A method according to claim 28 wherein the command signals are generated sequentially.

35. A method according to claim 28 the command signals each represent digitally coded information.

36. A method according to claim 28 further comprising storing in a memory data relating to the at least one set of command signals.

37. A method according to claim 28 wherein the at least one vehicle device comprises an alarm indicating device; and wherein the at least one set of command signals is for operating the alarm indicating device.

38. A method according to claim 28 wherein the at least one vehicle device comprises at least one vehicle door lock actuator; and wherein the at least one set of command signals is for operating the at least one door lock actuator.

39. A method according to claim 28 where the at least one vehicle device comprises at least one device relating to starting a vehicle engine; and wherein the at least one set of command signals is for operating the at least one vehicle device relating to starting the vehicle engine.

40. A method according to claim 28 wherein each command signal of the at least one set of command signals is generated a plurality of times.

41. A method according to claim 28 further comprising:

storing a set of device codes for a given vehicle device for a plurality of different vehicles;

reading a device code from the data communications bus; and

determining a match between a read device code and the stored device codes to thereby provide reading compatibility with a plurality of different vehicles.

42. A method for adapting a control system for a vehicle to be compatible with plurality of different vehicles, each vehicle comprising a data communications bus and at least one vehicle device connected to the data communications bus, the control system comprising a transmitter and a receiver for receiving signals from the transmitter, and a controller cooperating with the transmitter and receiver, the method comprising:

monitoring an output of the controller; and

generating at least one set of command signals on the data communications bus responsive to the output of the controller, the at least one set of command signals comprising at least one working command signal and at least one non-working command signal for a given vehicle to thereby provide command compatibility with a plurality of different vehicles.

43. A method according to claim 42 wherein the at least one vehicle device comprises a plurality of vehicle devices; and further comprising generating a respective set of command signals for each vehicle device of the plurality thereof.

44. A method according to claim 42 wherein the command signals are generated sequentially.

45. A method according to claim 42 wherein the command signals each represent digitally coded information.

46. A method according to claim 42 further comprising storing in a memory data relating to the at least one set of command signals.

47. A method according to claim 42 wherein the at least one vehicle device comprises an alarm indicating device; and wherein the at least one set of command signals is for operating the alarm indicating device.

48. A method according to claim 42 wherein the at least one vehicle device comprises at least one vehicle door lock actuator; and wherein the at least one set of command signals is for operating the at least one door lock actuator.

49. A method according to claim 42 where the at least one vehicle device comprises at least one device relating to starting a vehicle engine; and wherein the at least one set of command signals is for operating the at least one vehicle device relating to starting the vehicle engine.

50. A method according to claim 42 wherein each command signal of the at least one set of command signals is generated a plurality of times.

51. A method according to claim 42 further comprising:

storing a set of device codes for a given vehicle device for a plurality of different vehicles;

reading a device code from the data communications bus; and

determining a match between a read device code and the stored device codes to thereby provide reading compatibility with a plurality of different vehicles reading signals on the data communications bus.

* * * * *

EXHIBIT C

US006737989B2

(12) **United States Patent**
Flick

(10) **Patent No.: US 6,737,989 B2**
(45) **Date of Patent: May 18, 2004**

(54) **VEHICLE TRACKER INCLUDING VARIABLE FREQUENCY TRANSMISSION AND RELATED METHODS**

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(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 17 days.

(21) Appl. No.: **10/105,676**

(22) Filed: **Mar. 25, 2002**

(65) **Prior Publication Data**

US 2002/0158777 A1 Oct. 31, 2002

Related U.S. Application Data

(63) Continuation-in-part of application No. 09/859,727, filed on May 17, 2001, now Pat. No. 6,512,465.

(60) Provisional application No. 60/264,811, filed on Jan. 29, 2001, provisional application No. 60/258,005, filed on Dec. 22, 2000, provisional application No. 60/251,552, filed on Dec. 6, 2000, provisional application No. 60/252,125, filed on Nov. 20, 2000, provisional application No. 60/246,463, filed on Nov. 7, 2000, provisional application No. 60/236,890, filed on Sep. 29, 2000, provisional application No. 60/222,777, filed on Aug. 3, 2000, and provisional application No. 60/205,178, filed on May 17, 2000.

(51) **Int. Cl.**[7] **G08G 1/123**

(52) **U.S. Cl.** **340/989**; 340/426.2; 701/209

(58) **Field of Search** 340/989, 426.2, 340/992, 539.32, 539.21, 426.19, 995.23, 995.21; 701/209

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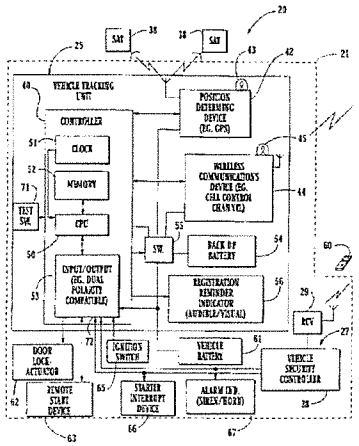
Omega Research and Development, Inc., "Omega Thinks Customers Don't Know Jack!", distributed at Consumer Electronics Show in Las Vegas, NV, Jan. 2001, one page.

Primary Examiner—John Tweel
(74) *Attorney, Agent, or Firm*—Allen, Dyer, Doppelt, Milbrath & Gilchrist, P.A.

(57) **ABSTRACT**

A tracking unit for a vehicle may include a vehicle position determining device, a wireless communications device, and a controller cooperating with the wireless communications device and the vehicle position determining device to determine and send vehicle position information to a monitoring station. The controller may store a user selected reference location and send the vehicle position information based upon the vehicle moving beyond a radial threshold distance from the user selected reference location. More particularly, the vehicle position information may be sent a threshold time after the vehicle moves beyond the radial threshold distance from the user selected reference location if the vehicle has not moved back within the radial threshold distance. Additionally, the vehicle tracking unit may further include at least one input device to be positioned within the vehicle for setting the user selected reference location.

48 Claims, 36 Drawing Sheets



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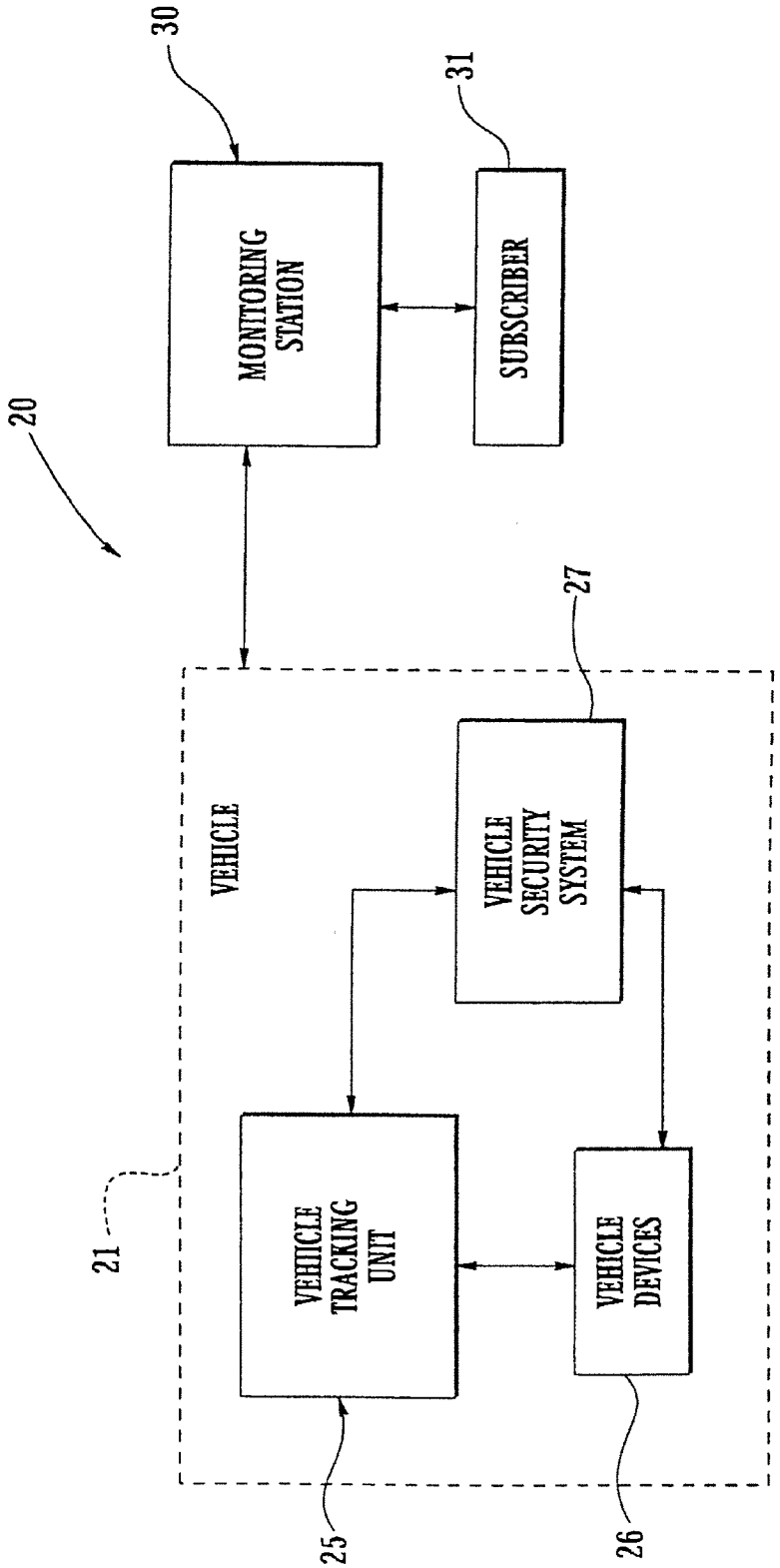

30
31
MONITORING STATION
SUBSCRIBER
20
27
VEHICLE
VEHICLE SECURITY SYSTEM
21
VEHICLE TRACKING UNIT
VEHICLE DEVICES
25
26

FIG. 1.

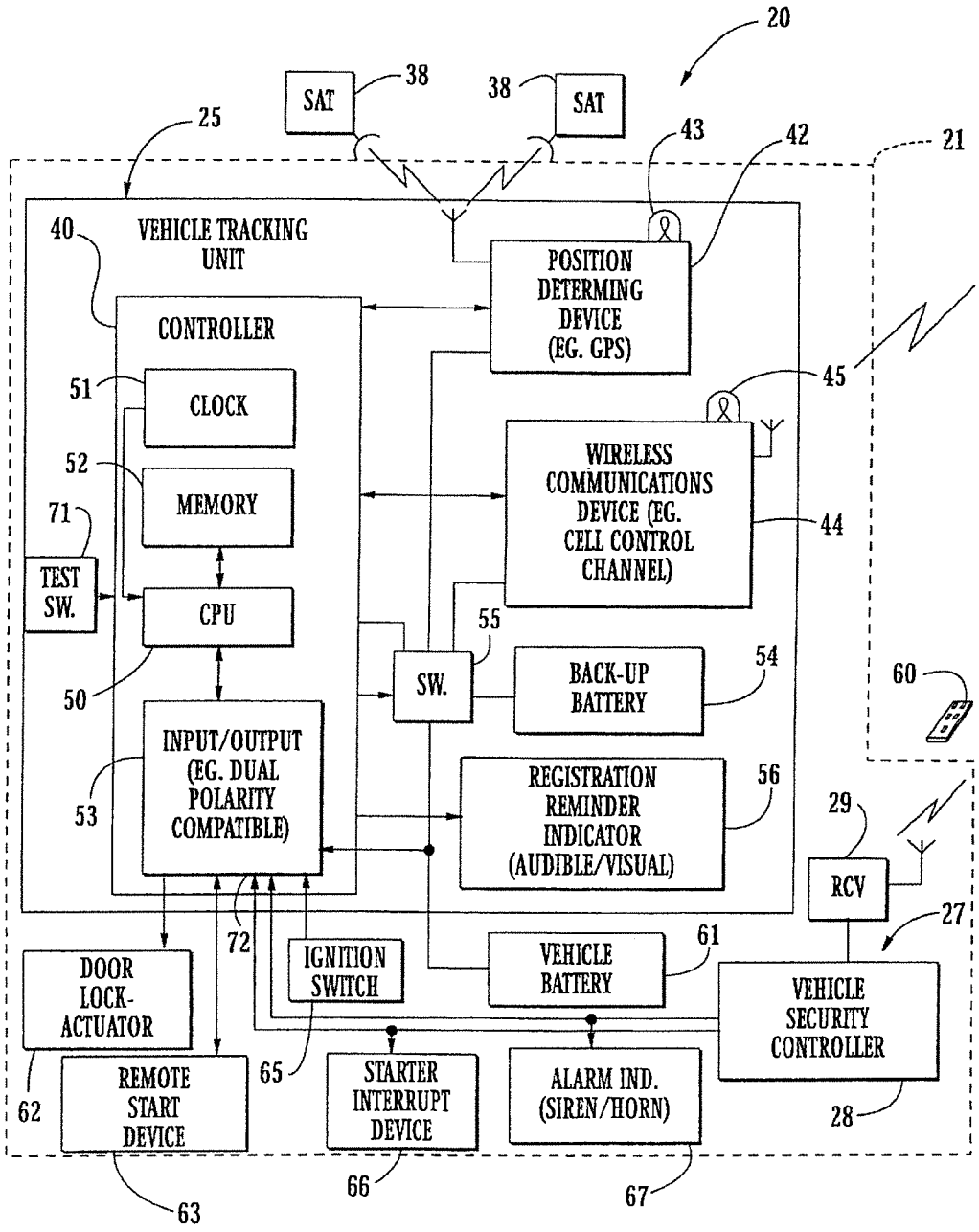

20
SAT
38
38
SAT
25
43
42
21
40
VEHICLE TRACKING UNIT
POSITION DETERMING DEVICE (EG. GPS)
CONTROLLER
45
51
CLOCK
52
MEMORY
WIRELESS COMMUNICATIONS DEVICE (EG. CELL CONTROL CHANNEL)
44
71
TEST SW.
CPU
55
SW.
BACK-UP BATTERY
54
60
50
INPUT/OUTPUT (EG. DUAL POLARITY COMPATIBLE)
53
REGISTRATION REMINDER INDICATOR (AUDIBLE/VISUAL)
56
29
RCV
27
72
IGNITION SWITCH
VEHICLE BATTERY
61
DOOR LOCK-ACTUATOR
VEHICLE SECURITY CONTROLLER
62
REMOTE START DEVICE
65
STARTER INTERRUPT DEVICE
ALARM IND. (SIREN/HORN)
28
63
66
67

FIG. 2.

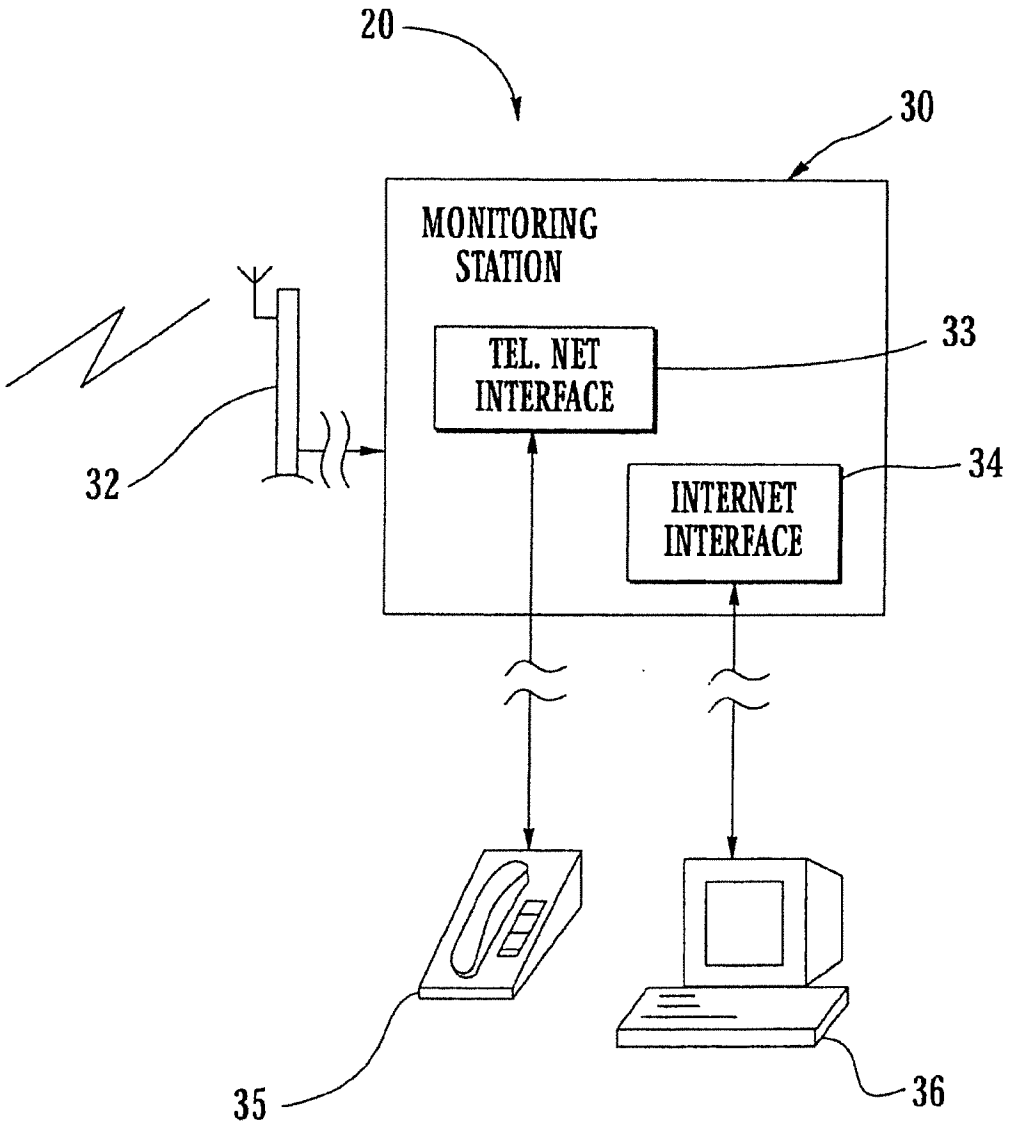

20
30
MONITORING STATION
TEL. NET INTERFACE
33
INTERNET INTERFACE
34
32
35
36

FIG. 3.

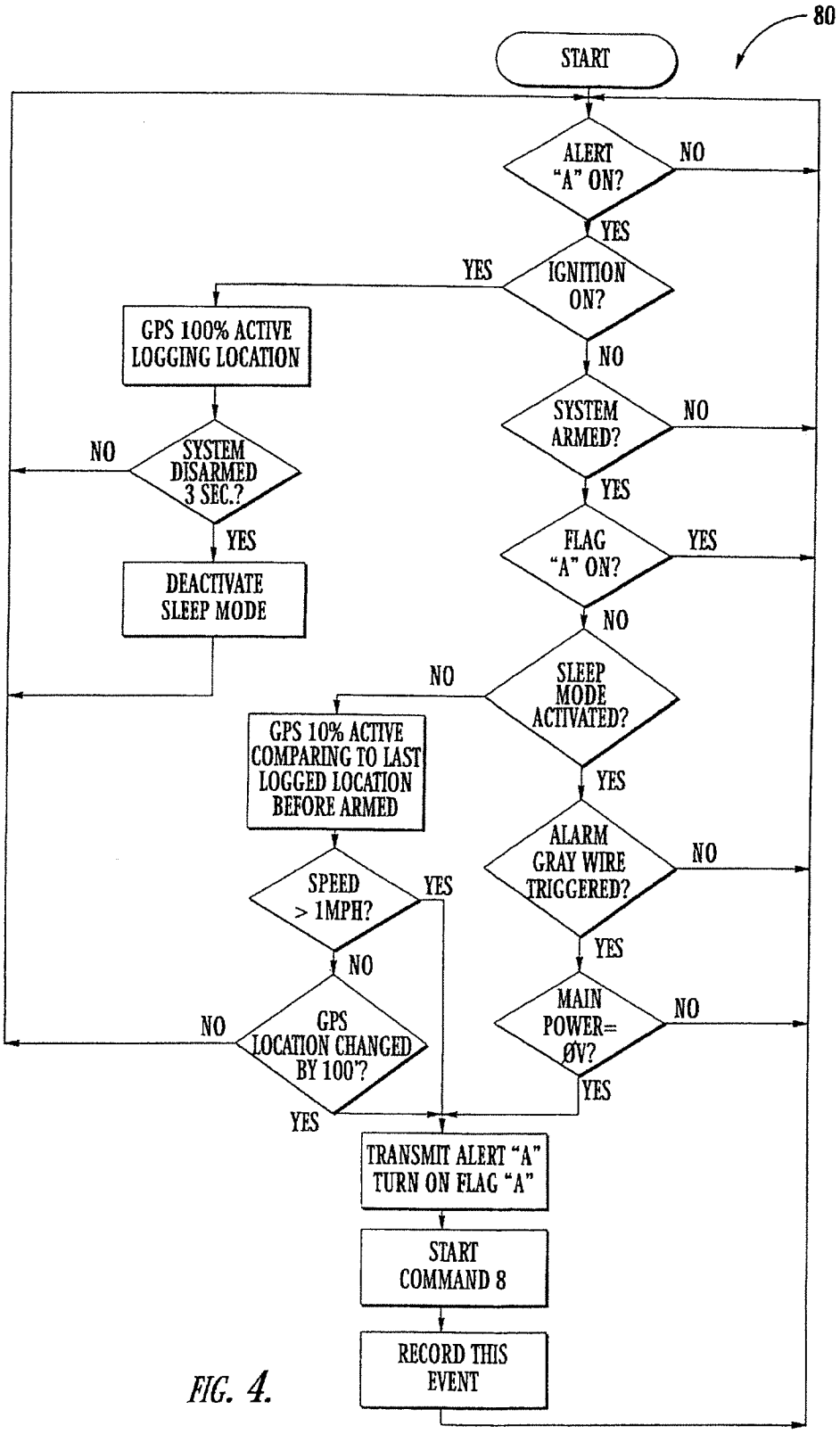

80
START
ALERT "A" ON?
NO
YES
IGNITION ON?
YES
GPS 100% ACTIVE LOGGING LOCATION
NO
SYSTEM ARMED?
NO
YES
NO
SYSTEM DISARMED 3 SEC.?
YES
DEACTIVATE SLEEP MODE
FLAG "A" ON?
YES
NO
NO
SLEEP MODE ACTIVATED?
GPS 10% ACTIVE COMPARING TO LAST LOGGED LOCATION BEFORE ARMED
YES
ALARM GRAY WIRE TRIGGERED?
NO
SPEED > 1MPH?
YES
YES
NO
MAIN POWER= ØV?
NO
NO
GPS LOCATION CHANGED BY 100'?
YES
YES
TRANSMIT ALERT "A" TURN ON FLAG "A"
START COMMAND 8
RECORD THIS EVENT

FIG. 4.

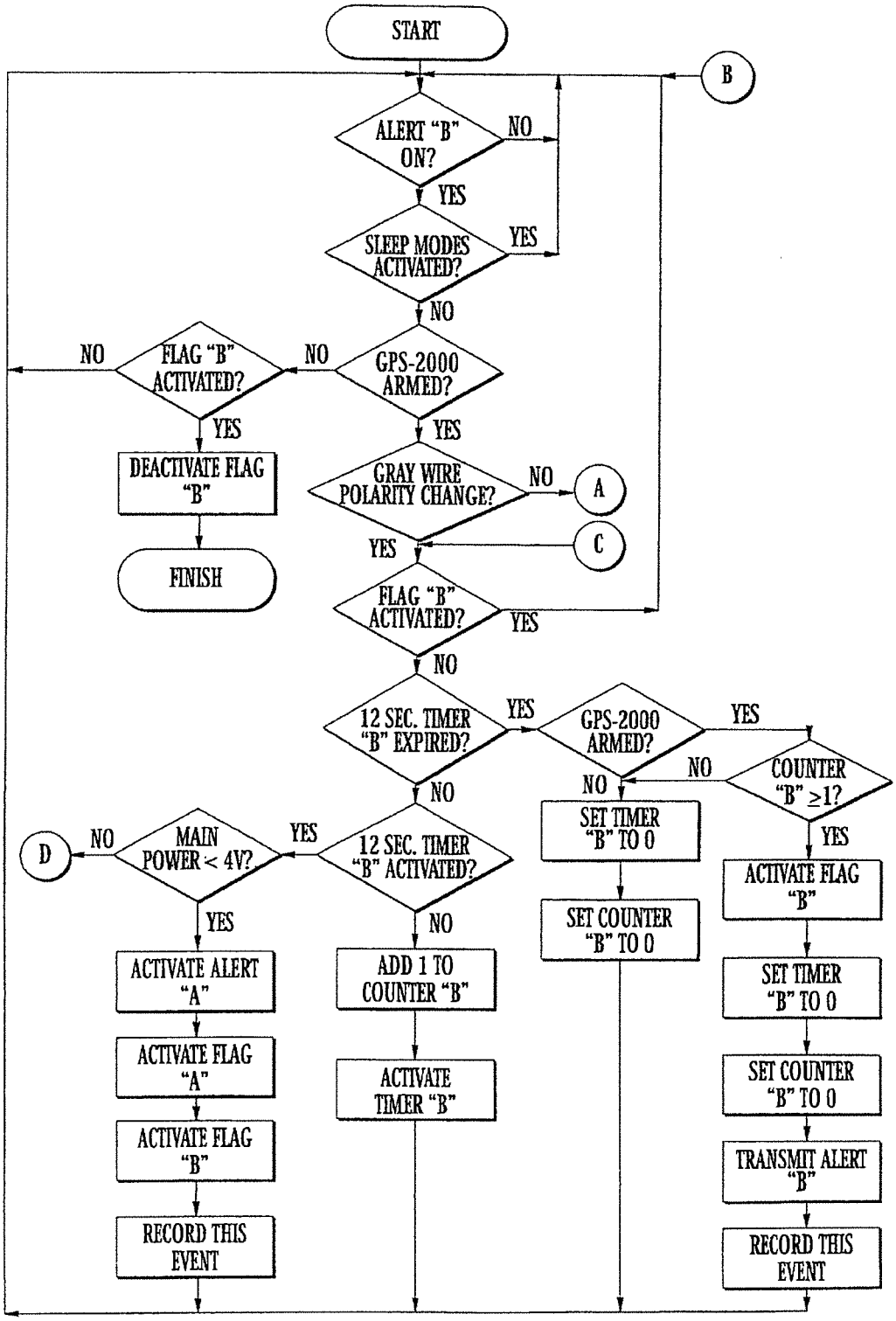

START
B
ALERT "B" ON?
NO
YES
SLEEP MODES ACTIVATED?
YES
NO
NO
FLAG "B" ACTIVATED?
NO
GPS-2000 ARMED?
YES
YES
DEACTIVATE FLAG "B"
GRAY WIRE POLARITY CHANGE?
NO
A
C
YES
FINISH
FLAG "B" ACTIVATED?
YES
NO
12 SEC. TIMER "B" EXPIRED?
YES
GPS-2000 ARMED?
YES
NO
NO
COUNTER "B" ≥1?
D
NO
MAIN POWER < 4V?
YES
12 SEC. TIMER "B" ACTIVATED?
YES
NO
NO
SET TIMER "B" TO 0
YES
ACTIVATE FLAG "B"
YES
NO
SET COUNTER "B" TO 0
ACTIVATE ALERT "A"
ADD 1 TO COUNTER "B"
SET TIMER "B" TO 0
ACTIVATE FLAG "A"
ACTIVATE TIMER "B"
SET COUNTER "B" TO 0
ACTIVATE FLAG "B"
TRANSMIT ALERT "B"
RECORD THIS EVENT
RECORD THIS EVENT

FIG. 5A.

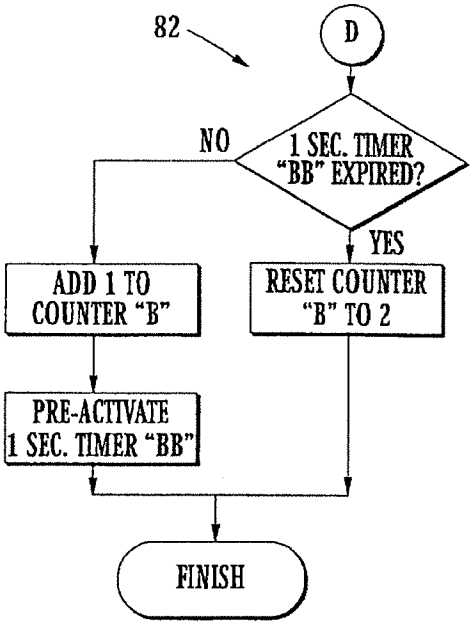

82
D
1 SEC. TIMER "BB" EXPIRED?
NO
YES
ADD 1 TO COUNTER "B"
RESET COUNTER "B" TO 2
PRE-ACTIVATE 1 SEC. TIMER "BB"
FINISH

FIG. 5B.

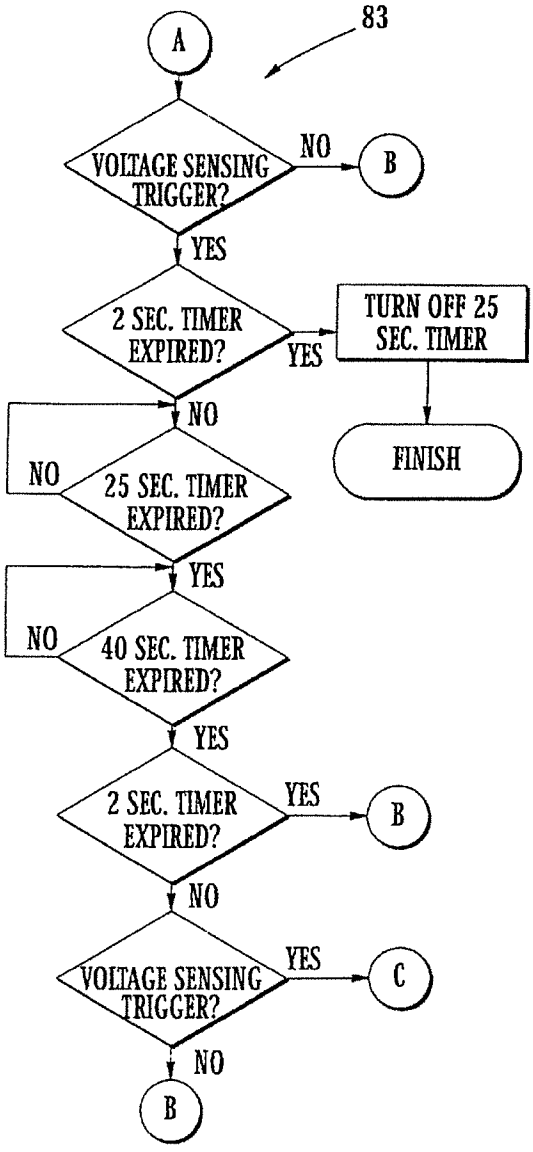

83
A
VOLTAGE SENSING TRIGGER?
NO
B
YES
2 SEC. TIMER EXPIRED?
YES
TURN OFF 25 SEC. TIMER
FINISH
NO
NO
25 SEC. TIMER EXPIRED?
YES
NO
40 SEC. TIMER EXPIRED?
YES
2 SEC. TIMER EXPIRED?
YES
B
NO
VOLTAGE SENSING TRIGGER?
YES
C
NO
B

FIG. 5C.

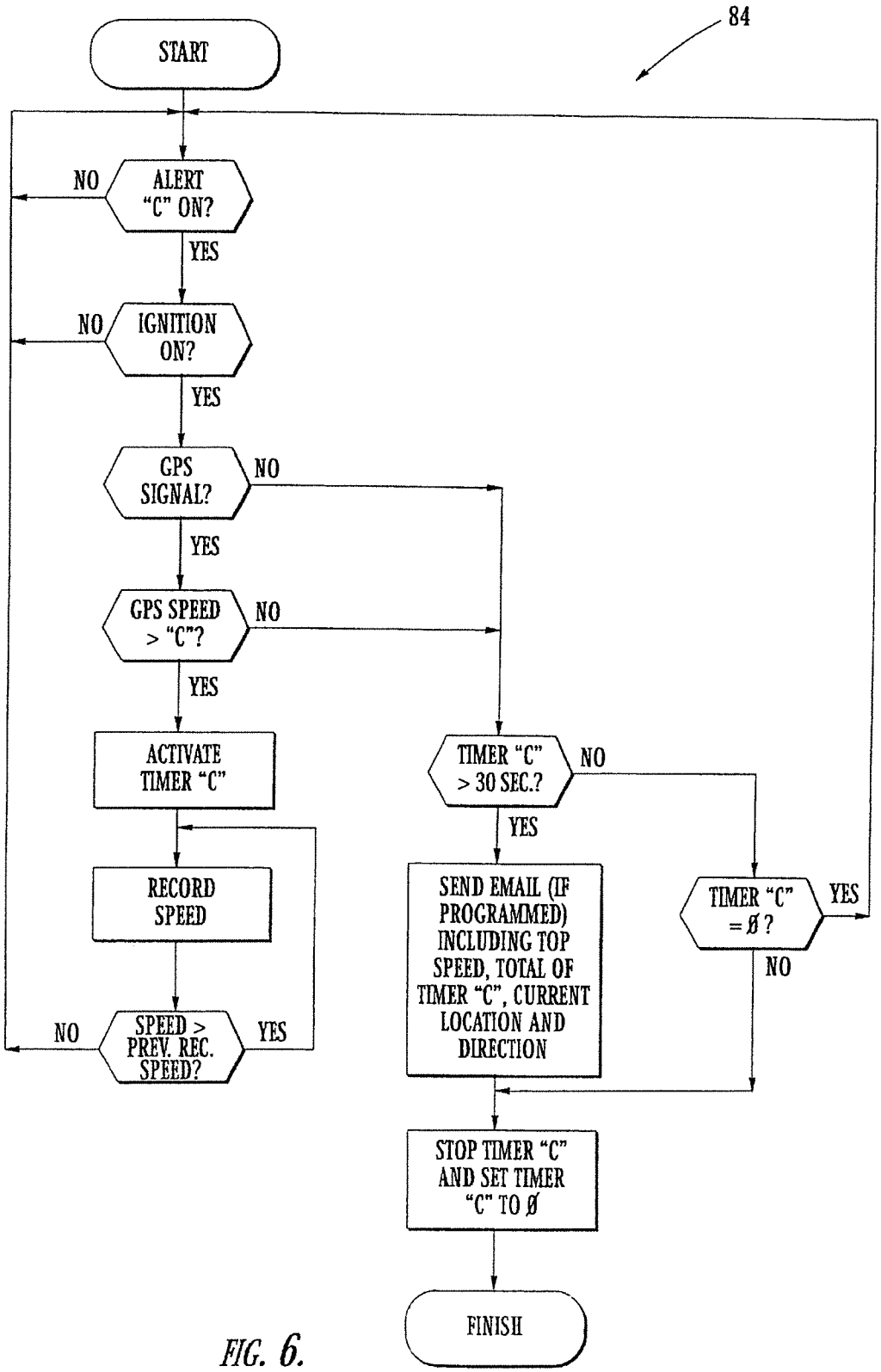

84
START
ALERT "C" ON?
NO
YES
IGNITION ON?
NO
YES
GPS SIGNAL?
NO
YES
GPS SPEED > "C"?
NO
YES
ACTIVATE TIMER "C"
RECORD SPEED
SPEED > PREV. REC. SPEED?
NO
YES
TIMER "C" > 30 SEC.?
NO
YES
SEND EMAIL (IF PROGRAMMED) INCLUDING TOP SPEED, TOTAL OF TIMER "C", CURRENT LOCATION AND DIRECTION
TIMER "C" = Ø ?
YES
NO
STOP TIMER "C" AND SET TIMER "C" TO Ø
FINISH

FIG. 6.

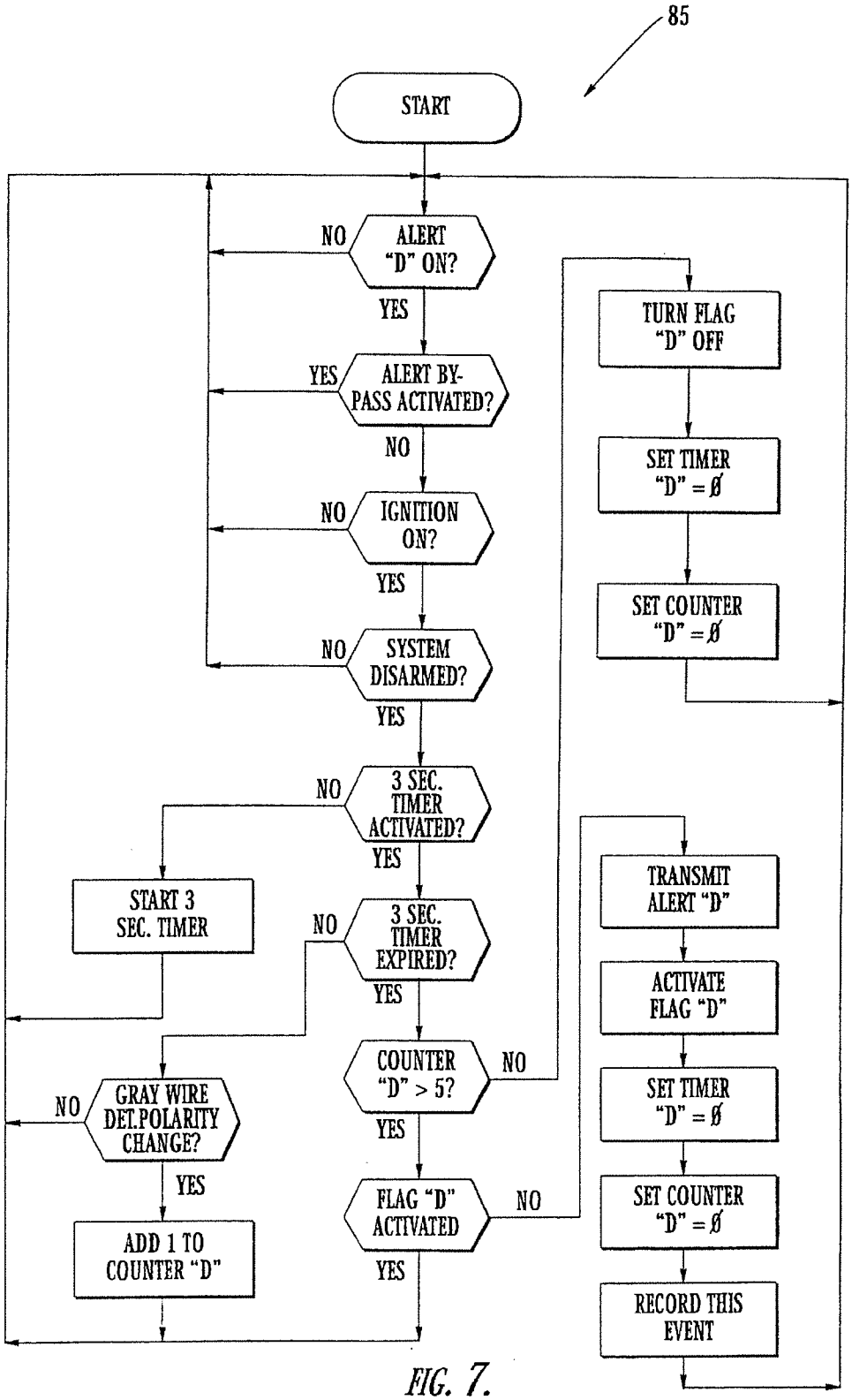

85
START
NO
ALERT "D" ON?
YES
YES
ALERT BY-PASS ACTIVATED?
NO
NO
IGNITION ON?
YES
NO
SYSTEM DISARMED?
YES
NO
3 SEC. TIMER ACTIVATED?
YES
START 3 SEC. TIMER
NO
3 SEC. TIMER EXPIRED?
YES
COUNTER "D" > 5?
NO
YES
NO
GRAY WIRE DET.POLARITY CHANGE?
YES
ADD 1 TO COUNTER "D"
FLAG "D" ACTIVATED
NO
YES
TURN FLAG "D" OFF
SET TIMER "D" = Ø
SET COUNTER "D" = Ø
TRANSMIT ALERT "D"
ACTIVATE FLAG "D"
SET TIMER "D" = Ø
SET COUNTER "D" = Ø
RECORD THIS EVENT

FIG. 7.

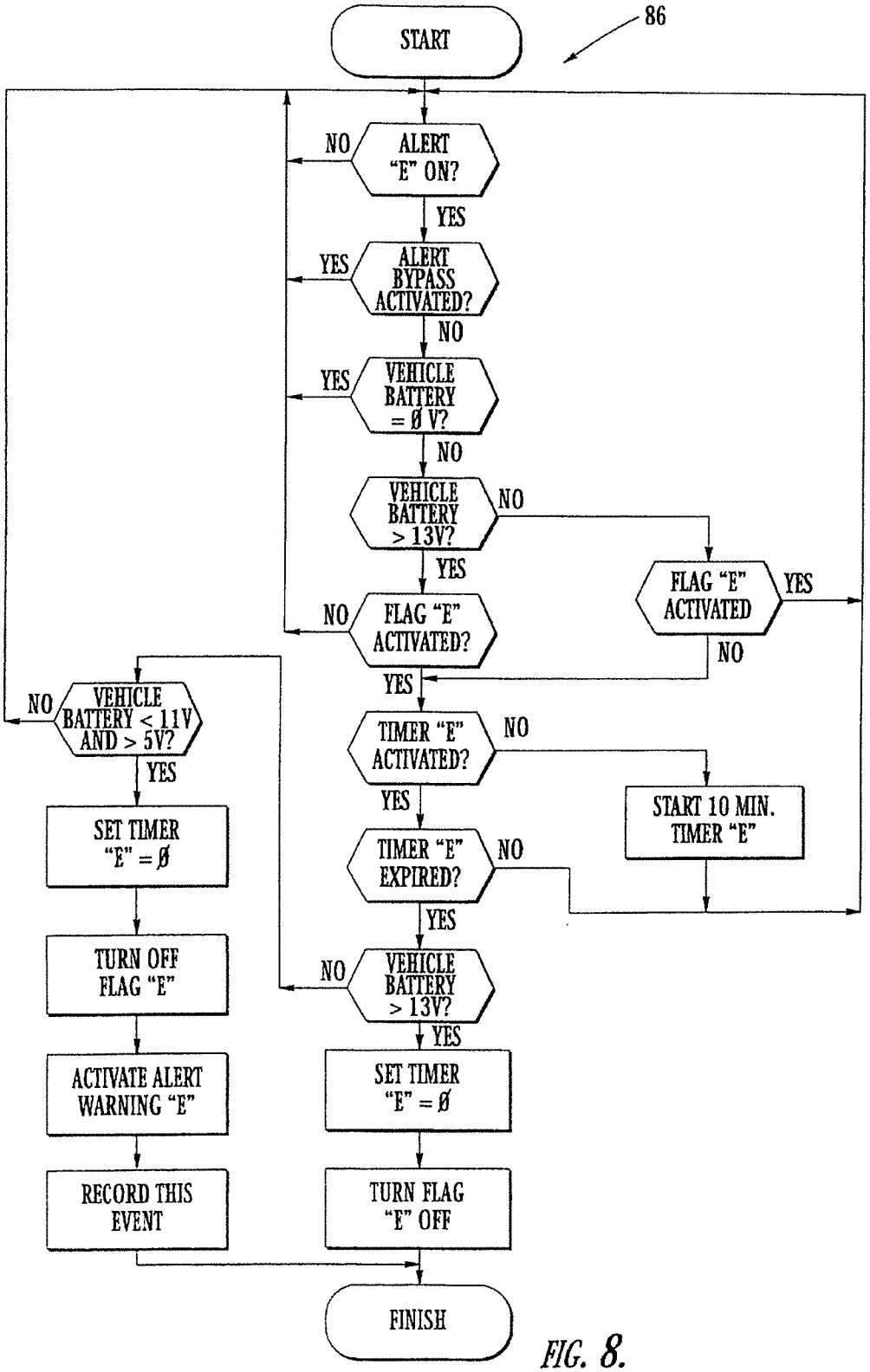

86
START
ALERT "E" ON?
NO
YES
ALERT BYPASS ACTIVATED?
YES
NO
VEHICLE BATTERY = Ø V?
YES
NO
VEHICLE BATTERY > 13V?
NO
YES
FLAG "E" ACTIVATED?
NO
FLAG "E" ACTIVATED
YES
NO
YES
TIMER "E" ACTIVATED?
NO
YES
START 10 MIN. TIMER "E"
TIMER "E" EXPIRED?
NO
YES
VEHICLE BATTERY > 13V?
NO
YES
SET TIMER "E" = Ø
TURN FLAG "E" OFF
VEHICLE BATTERY < 11V AND > 5V?
NO
YES
SET TIMER "E" = Ø
TURN OFF FLAG "E"
ACTIVATE ALERT WARNING "E"
RECORD THIS EVENT
FINISH

FIG. 8.

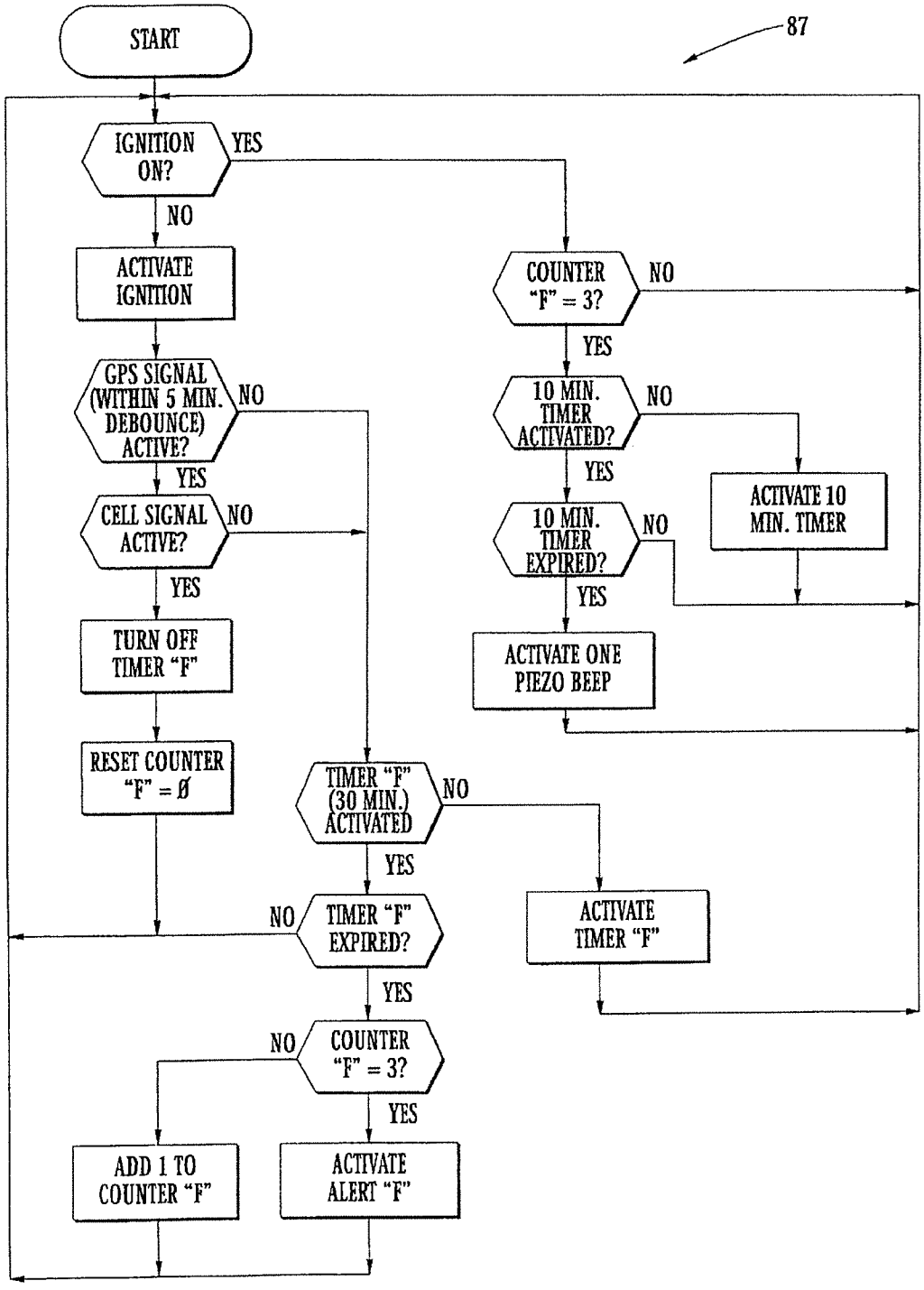

87
START
IGNITION ON?
YES
NO
ACTIVATE IGNITION
GPS SIGNAL (WITHIN 5 MIN. DEBOUNCE) ACTIVE?
NO
YES
CELL SIGNAL ACTIVE?
NO
YES
TURN OFF TIMER "F"
RESET COUNTER "F" = Ø
COUNTER "F" = 3?
NO
YES
10 MIN. TIMER ACTIVATED?
NO
YES
ACTIVATE 10 MIN. TIMER
10 MIN. TIMER EXPIRED?
NO
YES
ACTIVATE ONE PIEZO BEEP
TIMER "F" (30 MIN.) ACTIVATED
NO
YES
ACTIVATE TIMER "F"
TIMER "F" EXPIRED?
NO
YES
COUNTER "F" = 3?
NO
YES
ADD 1 TO COUNTER "F"
ACTIVATE ALERT "F"

FIG. 9.

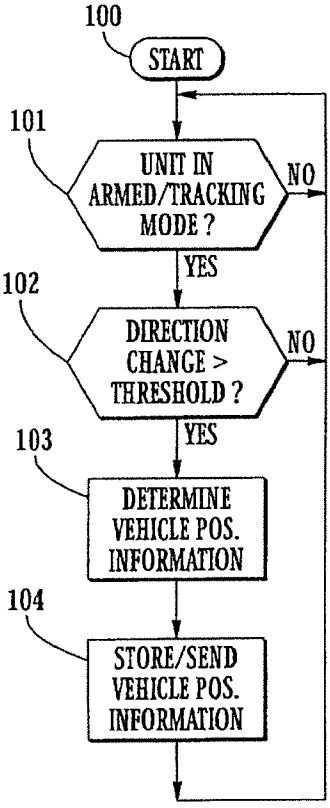

100
START
101
UNIT IN ARMED/TRACKING MODE ?
NO
YES
102
DIRECTION CHANGE > THRESHOLD ?
NO
YES
103
DETERMINE VEHICLE POS. INFORMATION
104
STORE/SEND VEHICLE POS. INFORMATION

FIG. 10.

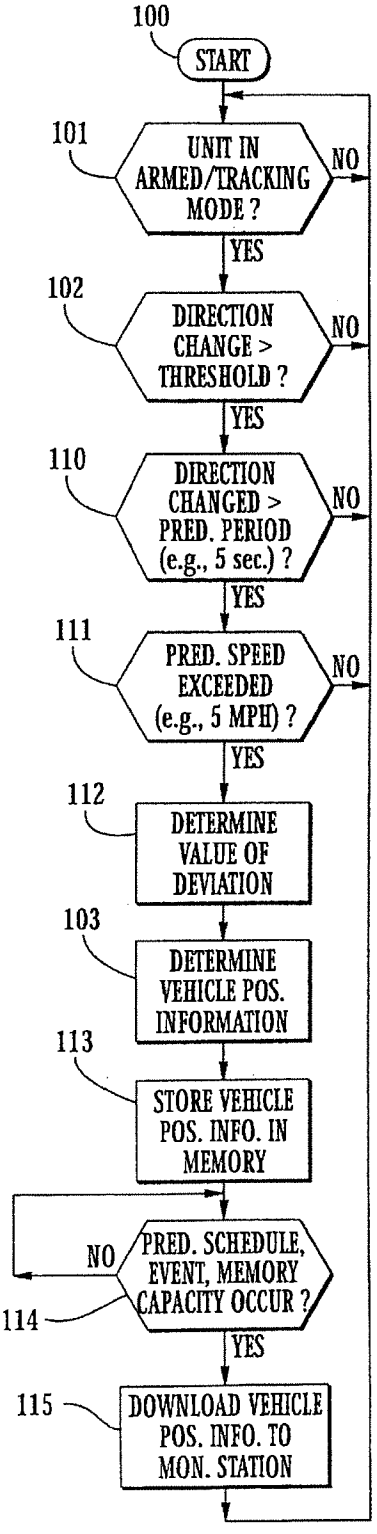

100
START
101
UNIT IN ARMED/TRACKING MODE ?
NO
YES
102
DIRECTION CHANGE > THRESHOLD ?
NO
YES
110
DIRECTION CHANGED > PRED. PERIOD (e.g., 5 sec.) ?
NO
YES
111
PRED. SPEED EXCEEDED (e.g., 5 MPH) ?
NO
YES
112
DETERMINE VALUE OF DEVIATION
103
DETERMINE VEHICLE POS. INFORMATION
113
STORE VEHICLE POS. INFO. IN MEMORY
NO
PRED. SCHEDULE, EVENT, MEMORY CAPACITY OCCUR ?
114
YES
115
DOWNLOAD VEHICLE POS. INFO. TO MON. STATION

FIG. 11.

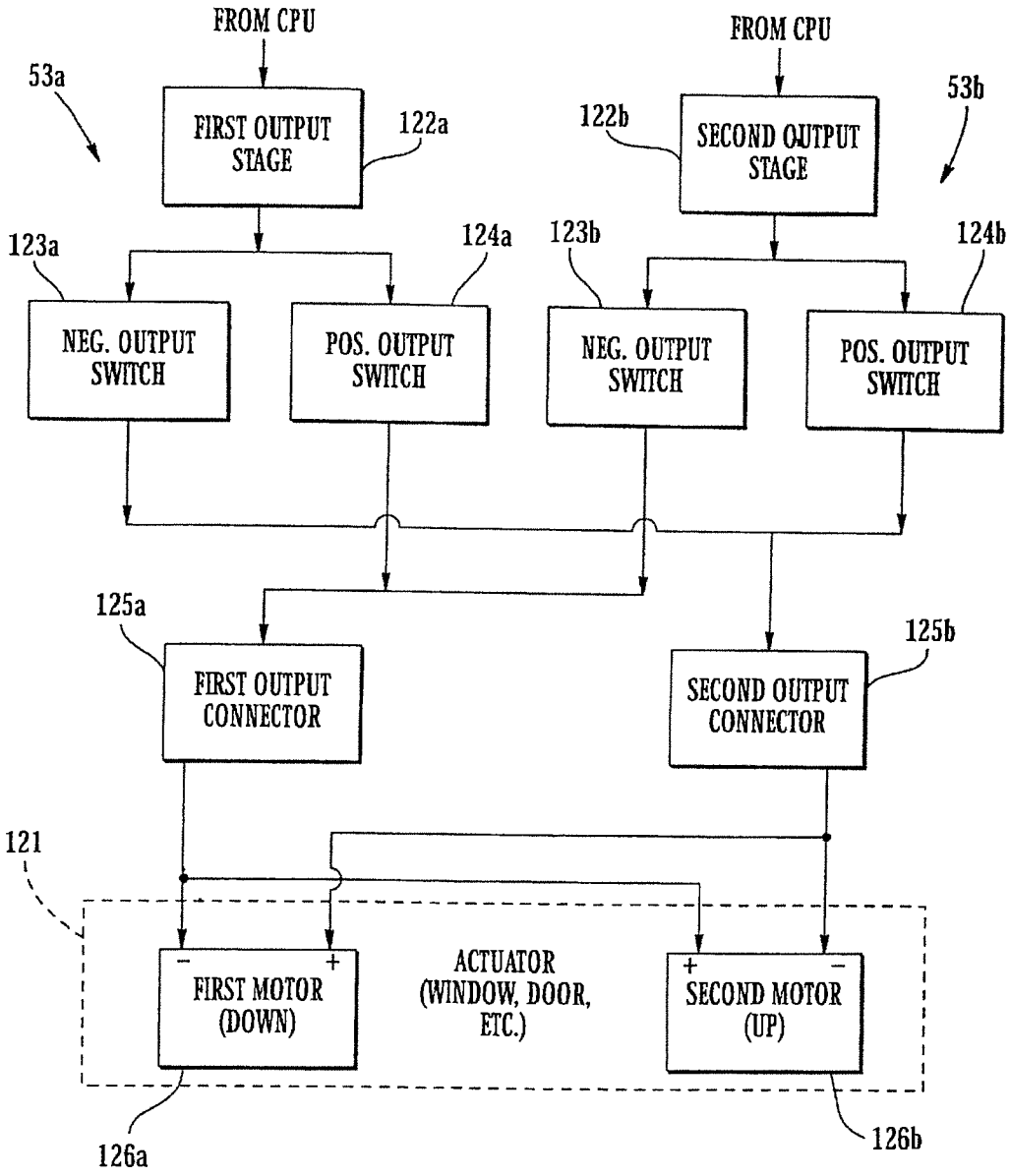

FROM CPU
FROM CPU
53a
53b
FIRST OUTPUT STAGE
122a
122b
SECOND OUTPUT STAGE
123a
124a
123b
124b
NEG. OUTPUT SWITCH
POS. OUTPUT SWITCH
NEG. OUTPUT SWITCH
POS. OUTPUT SWITCH
125a
125b
FIRST OUTPUT CONNECTOR
SECOND OUTPUT CONNECTOR
121
FIRST MOTOR (DOWN)
ACTUATOR (WINDOW, DOOR, ETC.)
SECOND MOTOR (UP)
126a
126b

FIG. 12.

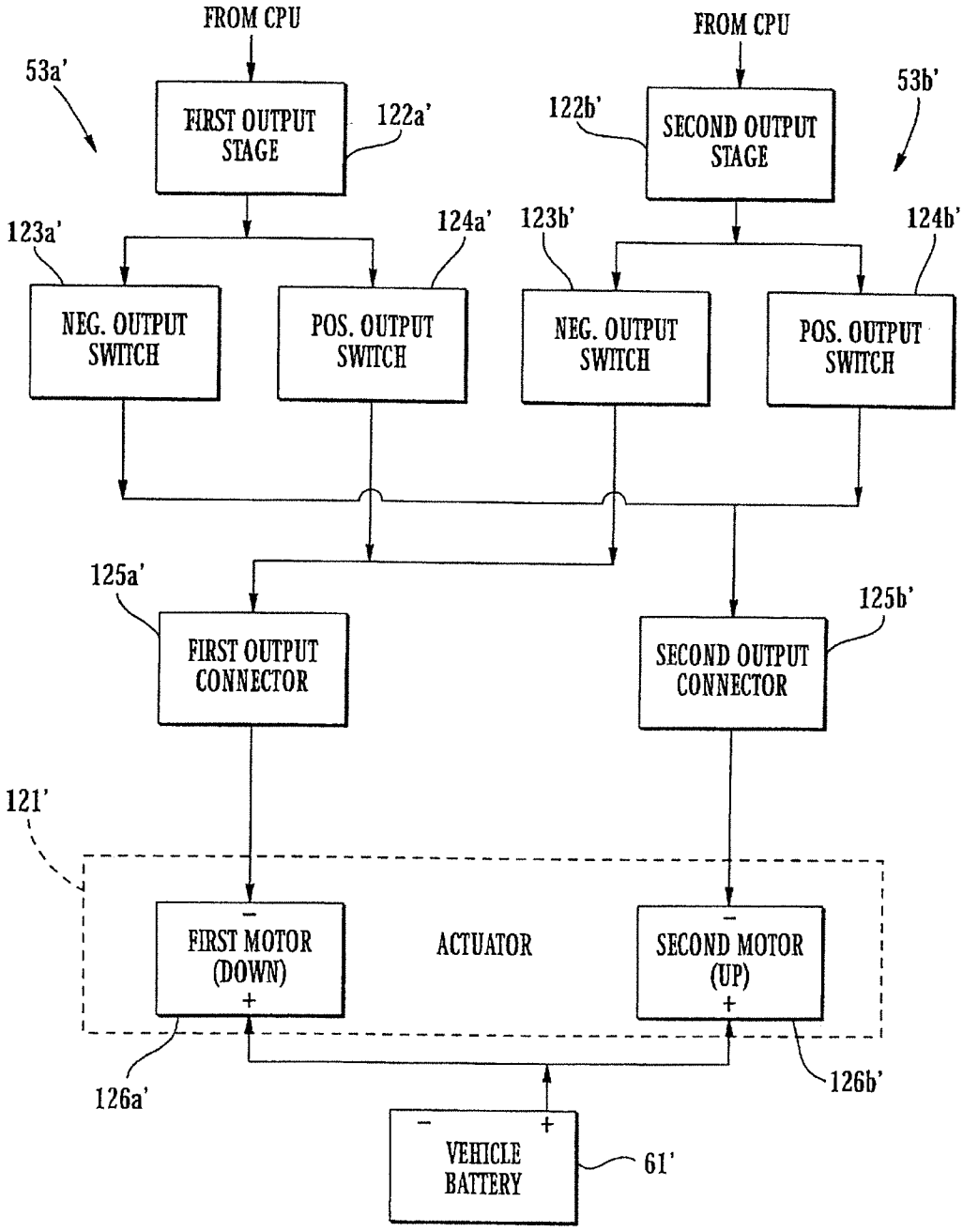

FROM CPU
FROM CPU
53a'
53b'
FIRST OUTPUT STAGE
122a'
122b'
SECOND OUTPUT STAGE
123a'
124a'
123b'
124b'
NEG. OUTPUT SWITCH
POS. OUTPUT SWITCH
NEG. OUTPUT SWITCH
POS. OUTPUT SWITCH
125a'
125b'
FIRST OUTPUT CONNECTOR
SECOND OUTPUT CONNECTOR
121'
FIRST MOTOR (DOWN)
ACTUATOR
SECOND MOTOR (UP)
126a'
126b'
VEHICLE BATTERY
61'

FIG. 13.

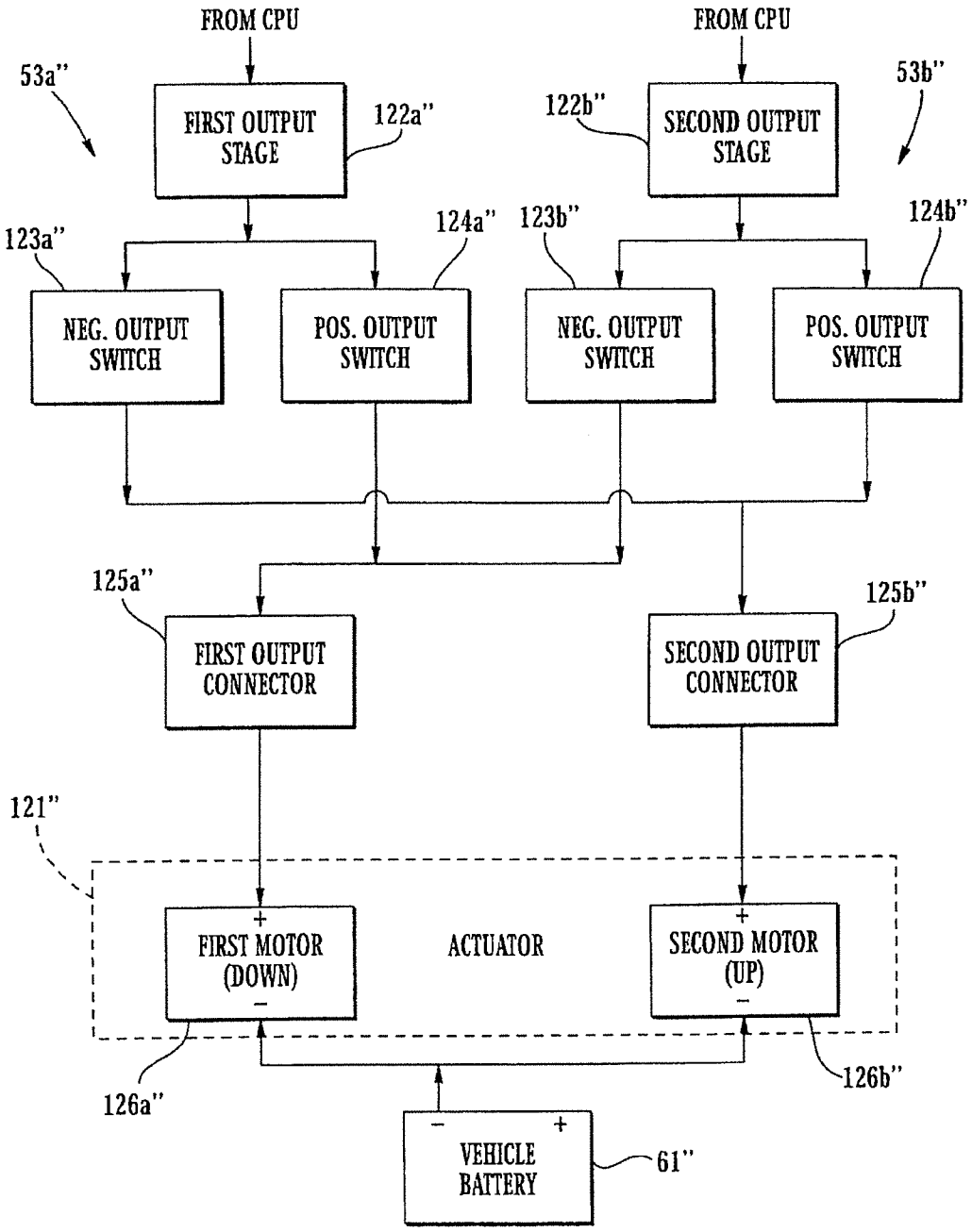

FROM CPU
FROM CPU
53a"
53b"
FIRST OUTPUT STAGE
122a"
122b"
SECOND OUTPUT STAGE
123a"
124a"
123b"
124b"
NEG. OUTPUT SWITCH
POS. OUTPUT SWITCH
NEG. OUTPUT SWITCH
POS. OUTPUT SWITCH
125a"
125b"
FIRST OUTPUT CONNECTOR
SECOND OUTPUT CONNECTOR
121"
+
FIRST MOTOR (DOWN)
−
ACTUATOR
+
SECOND MOTOR (UP)
−
126a"
126b"
−
+
VEHICLE BATTERY
61"

FIG. 14.

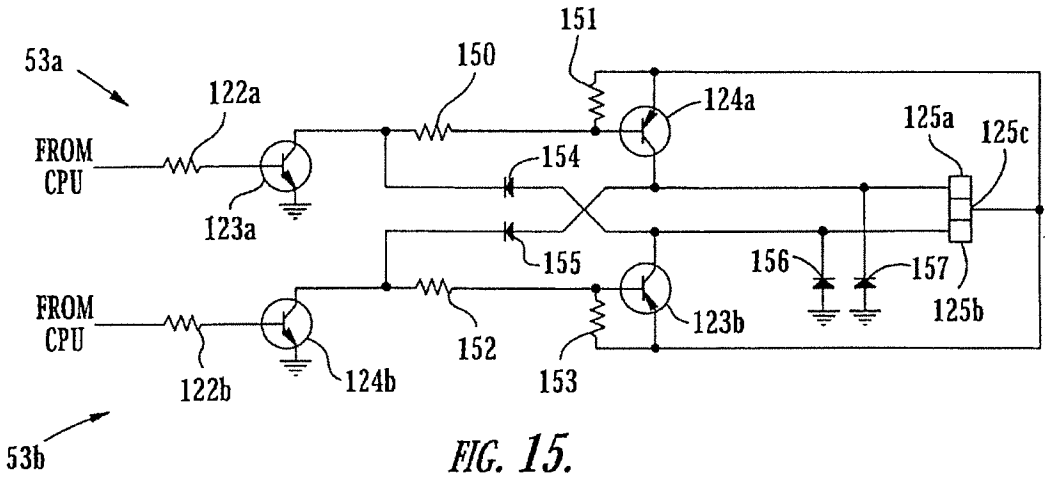

53a
122a
150
151
124a
125a
125c
FROM CPU
154
123a
155
156
157
125b
FROM CPU
123b
152
153
122b
124b
53b

FIG. 15.

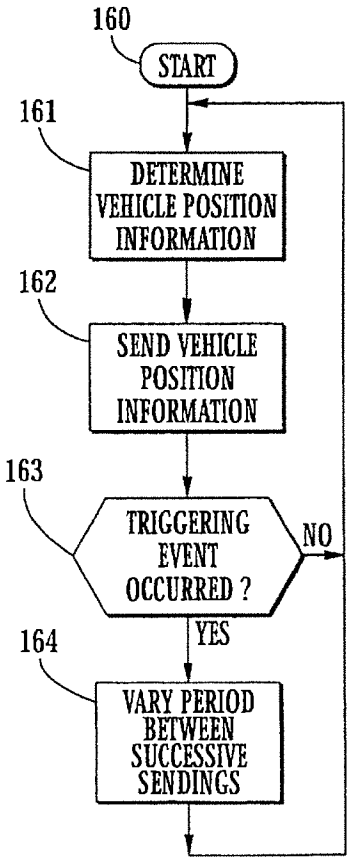

160
START
161
DETERMINE VEHICLE POSITION INFORMATION
162
SEND VEHICLE POSITION INFORMATION
163
TRIGGERING EVENT OCCURRED ?
NO
YES
164
VARY PERIOD BETWEEN SUCCESSIVE SENDINGS

FIG. 16.

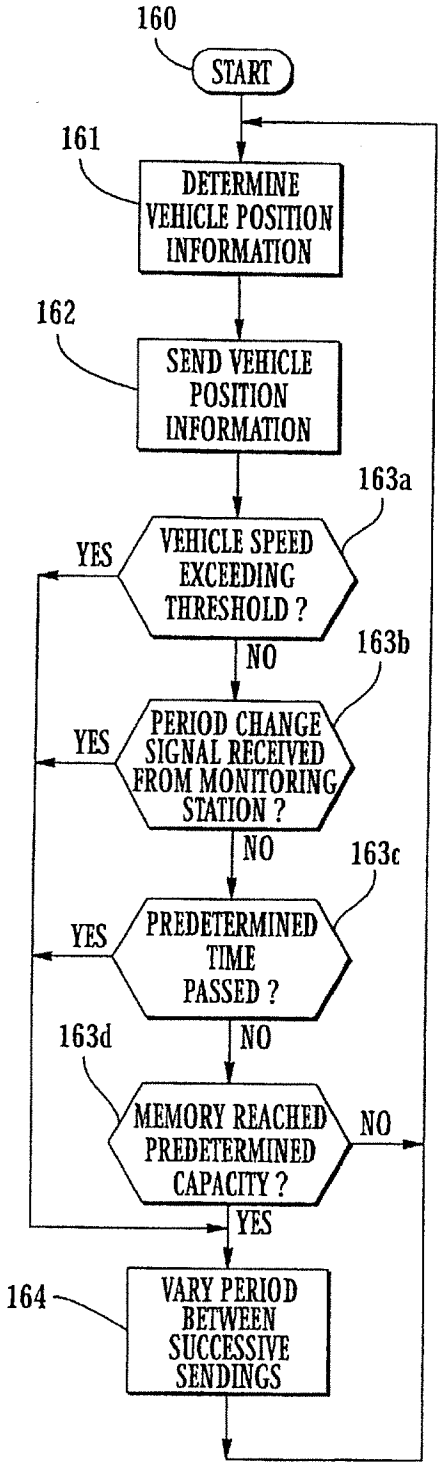

160
START
161
DETERMINE VEHICLE POSITION INFORMATION
162
SEND VEHICLE POSITION INFORMATION
163a
VEHICLE SPEED EXCEEDING THRESHOLD ?
YES
NO
163b
PERIOD CHANGE SIGNAL RECEIVED FROM MONITORING STATION ?
YES
NO
163c
PREDETERMINED TIME PASSED ?
YES
NO
163d
MEMORY REACHED PREDETERMINED CAPACITY ?
NO
YES
164
VARY PERIOD BETWEEN SUCCESSIVE SENDINGS

FIG. 17.

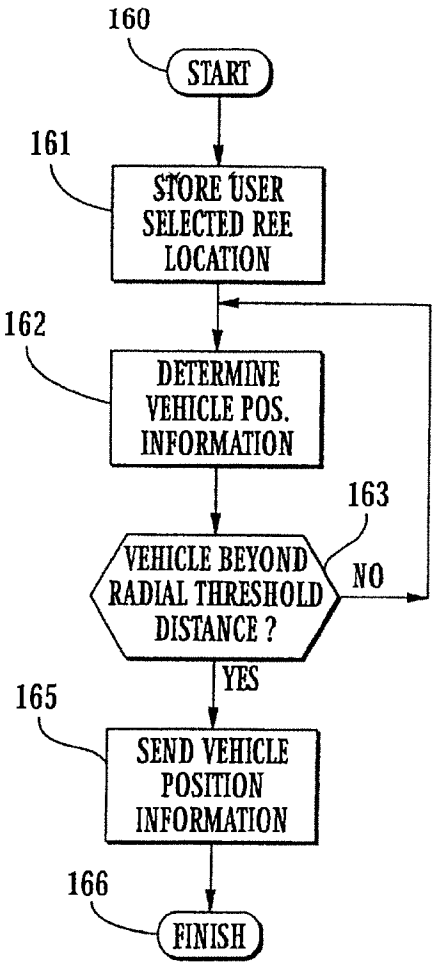


FIG. 18A.

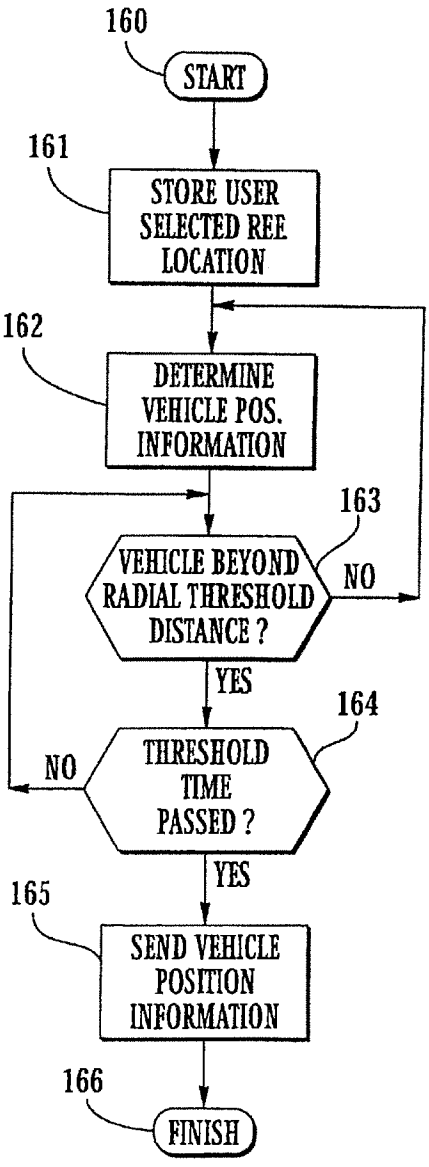


FIG. 18B.

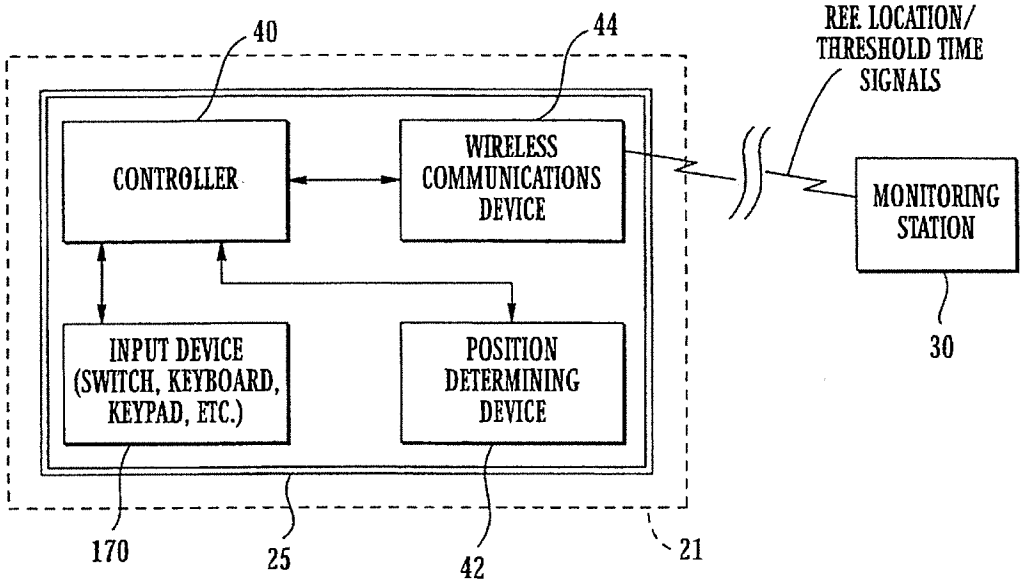

40
44
REF. LOCATION/
THRESHOLD TIME
SIGNALS
CONTROLLER
WIRELESS
COMMUNICATIONS
DEVICE
MONITORING
STATION
INPUT DEVICE
(SWITCH, KEYBOARD,
KEYPAD, ETC.)
POSITION
DETERMINING
DEVICE
30
170
25
42
21

FIG. 19.

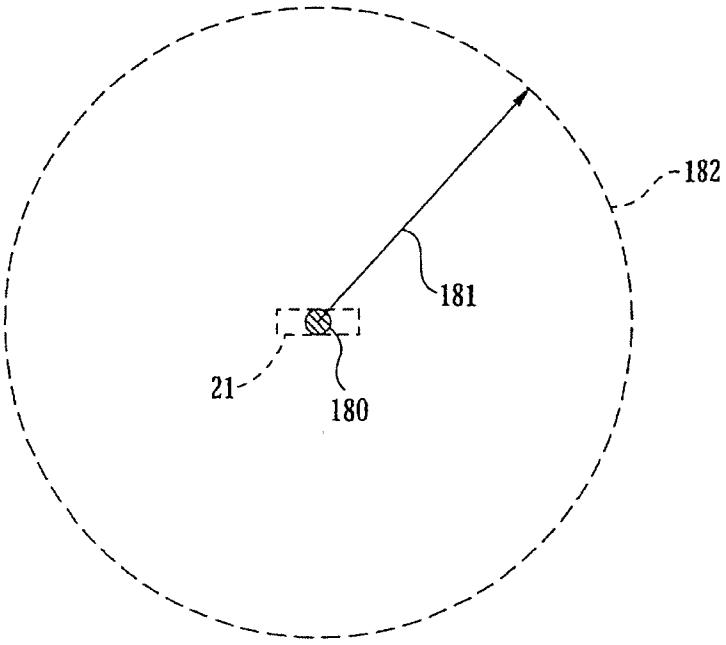

182
181
21
180

FIG. 20.

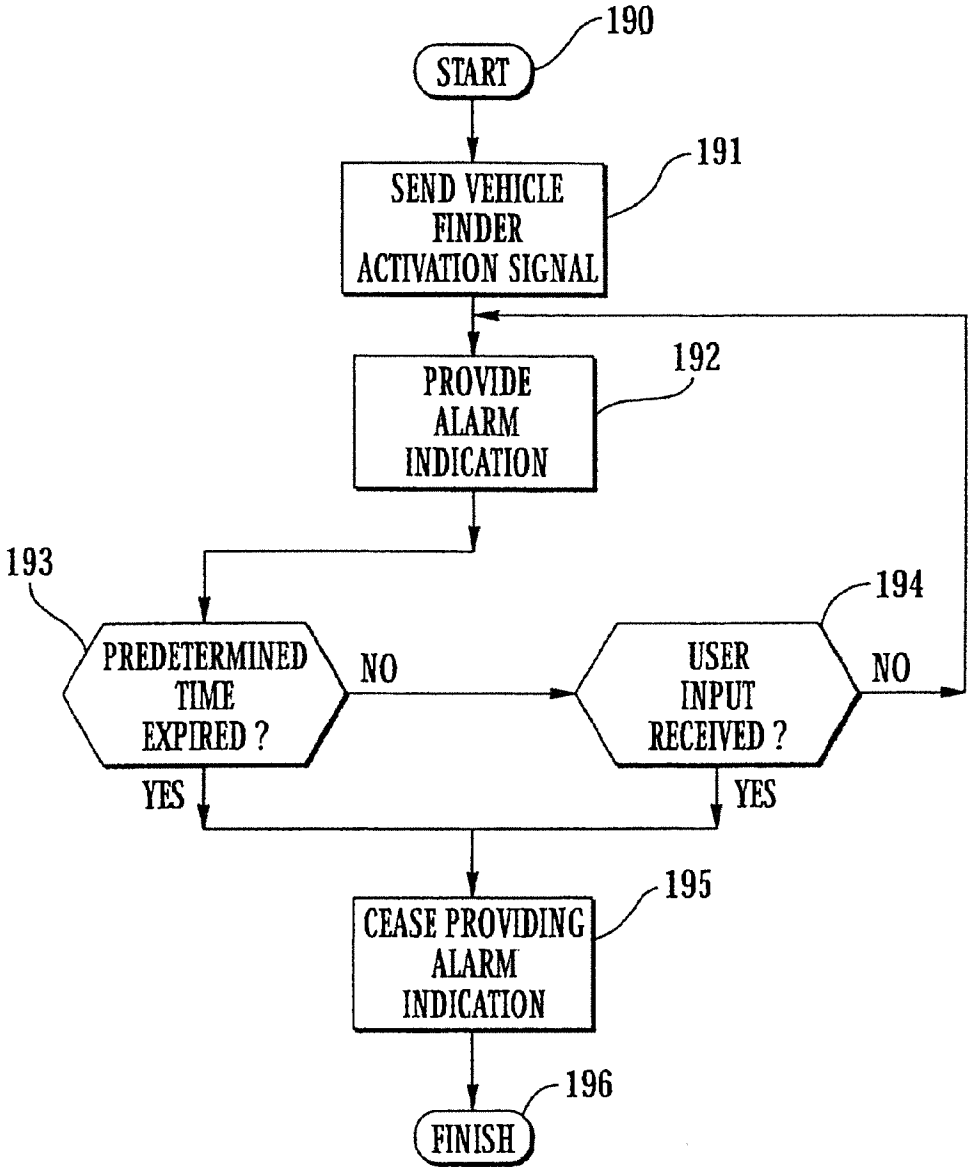

190
START
191
SEND VEHICLE FINDER ACTIVATION SIGNAL
192
PROVIDE ALARM INDICATION
193
PREDETERMINED TIME EXPIRED ?
NO
194
USER INPUT RECEIVED ?
NO
YES
YES
195
CEASE PROVIDING ALARM INDICATION
196
FINISH

FIG. 21.

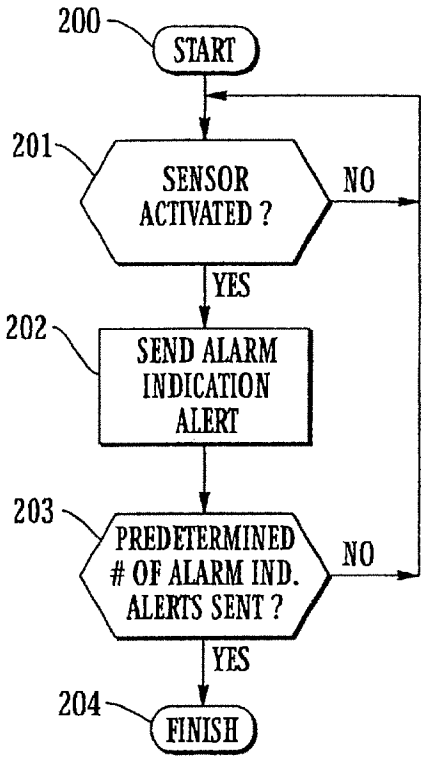

200
START
201
SENSOR ACTIVATED ?
NO
YES
202
SEND ALARM INDICATION ALERT
203
PREDETERMINED # OF ALARM IND. ALERTS SENT ?
NO
YES
204
FINISH

FIG. 22.

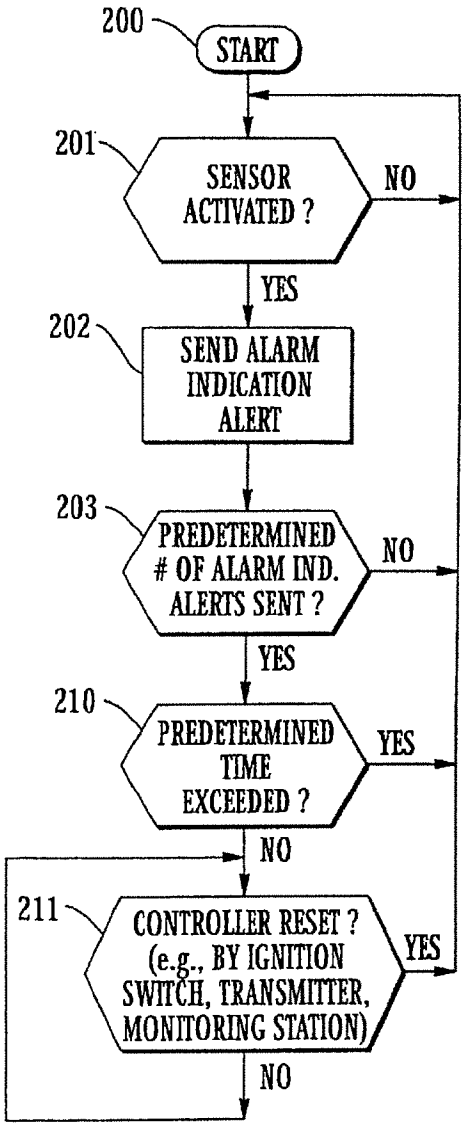

200
START
201
SENSOR ACTIVATED ?
NO
YES
202
SEND ALARM INDICATION ALERT
203
PREDETERMINED # OF ALARM IND. ALERTS SENT ?
NO
YES
210
PREDETERMINED TIME EXCEEDED ?
YES
NO
211
CONTROLLER RESET ? (e.g., BY IGNITION SWITCH, TRANSMITTER, MONITORING STATION)
YES
NO

FIG. 23.

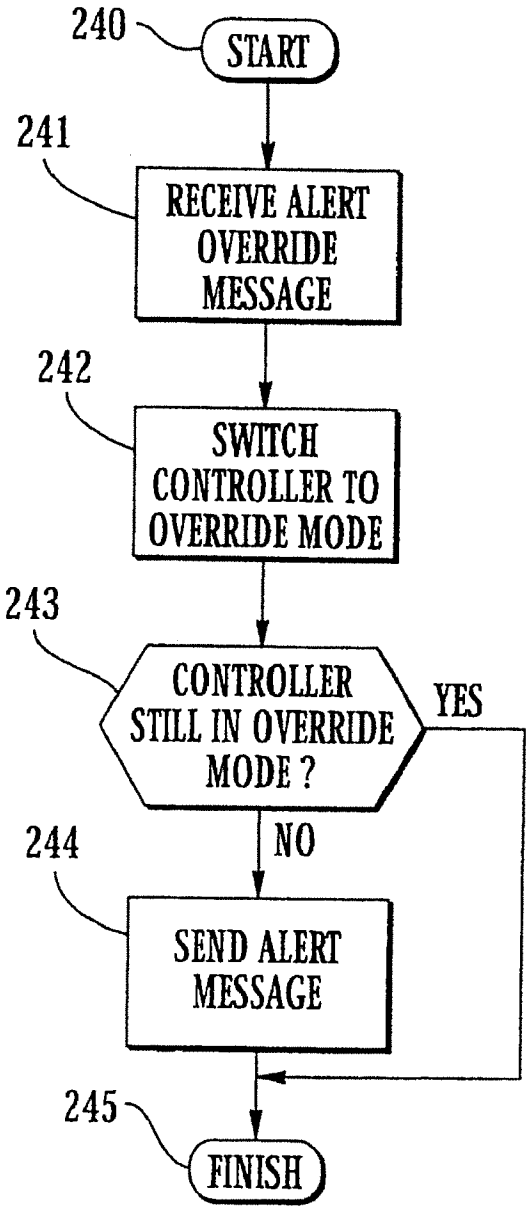

240
START
241
RECEIVE ALERT OVERRIDE MESSAGE
242
SWITCH CONTROLLER TO OVERRIDE MODE
243
CONTROLLER STILL IN OVERRIDE MODE ?
YES
NO
244
SEND ALERT MESSAGE
245
FINISH

FIG. 24.

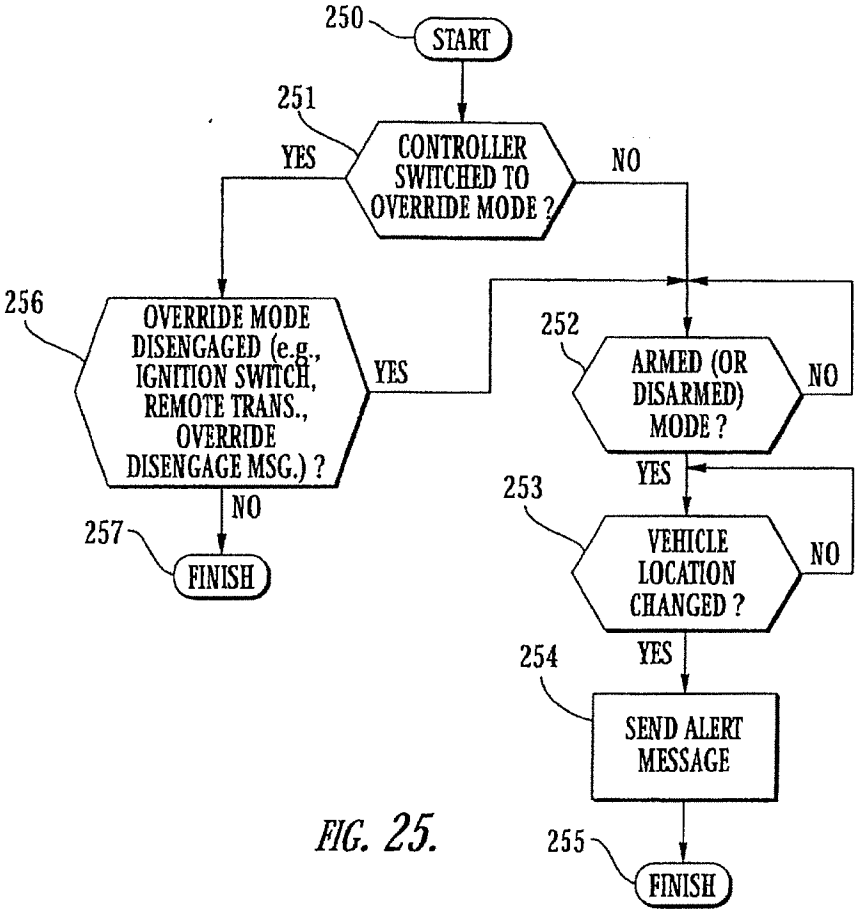

250
START
251
CONTROLLER SWITCHED TO OVERRIDE MODE ?
YES
NO
256
OVERRIDE MODE DISENGAGED (e.g., IGNITION SWITCH, REMOTE TRANS., OVERRIDE DISENGAGE MSG.) ?
YES
NO
257
FINISH
252
ARMED (OR DISARMED) MODE ?
NO
YES
253
VEHICLE LOCATION CHANGED ?
NO
YES
254
SEND ALERT MESSAGE
255
FINISH

FIG. 25.

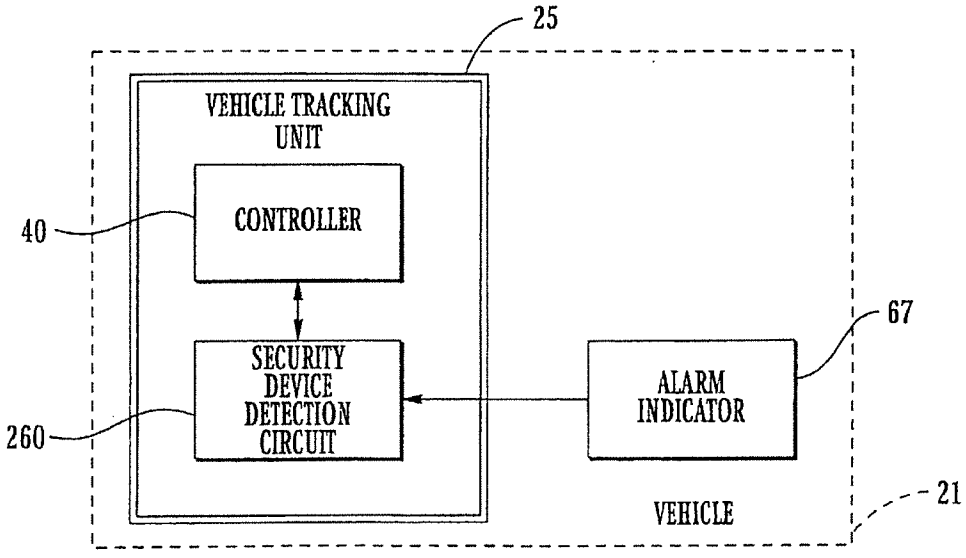

25
VEHICLE TRACKING UNIT
CONTROLLER
40
SECURITY DEVICE DETECTION CIRCUIT
260
ALARM INDICATOR
67
VEHICLE
21

FIG. 26.

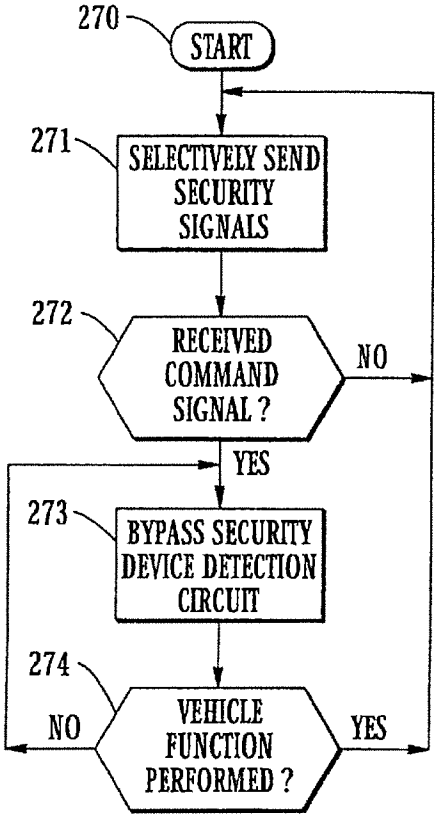

270
START
271
SELECTIVELY SEND SECURITY SIGNALS
272
RECEIVED COMMAND SIGNAL ?
NO
YES
273
BYPASS SECURITY DEVICE DETECTION CIRCUIT
274
VEHICLE FUNCTION PERFORMED ?
NO
YES

FIG. 27.

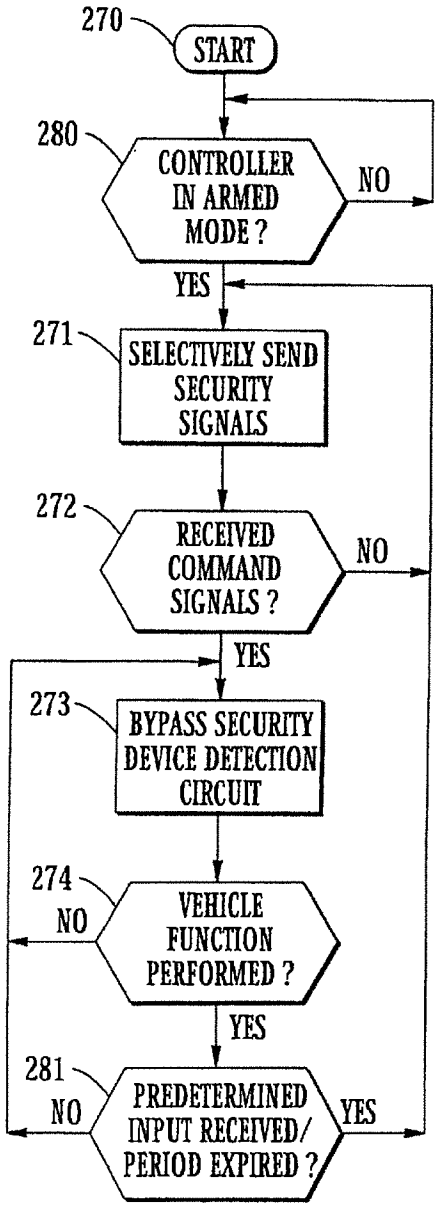

270
START
280
CONTROLLER IN ARMED MODE ?
NO
YES
271
SELECTIVELY SEND SECURITY SIGNALS
272
RECEIVED COMMAND SIGNALS ?
NO
YES
273
BYPASS SECURITY DEVICE DETECTION CIRCUIT
274
VEHICLE FUNCTION PERFORMED ?
NO
YES
281
PREDETERMINED INPUT RECEIVED/ PERIOD EXPIRED ?
NO
YES

FIG. 28.

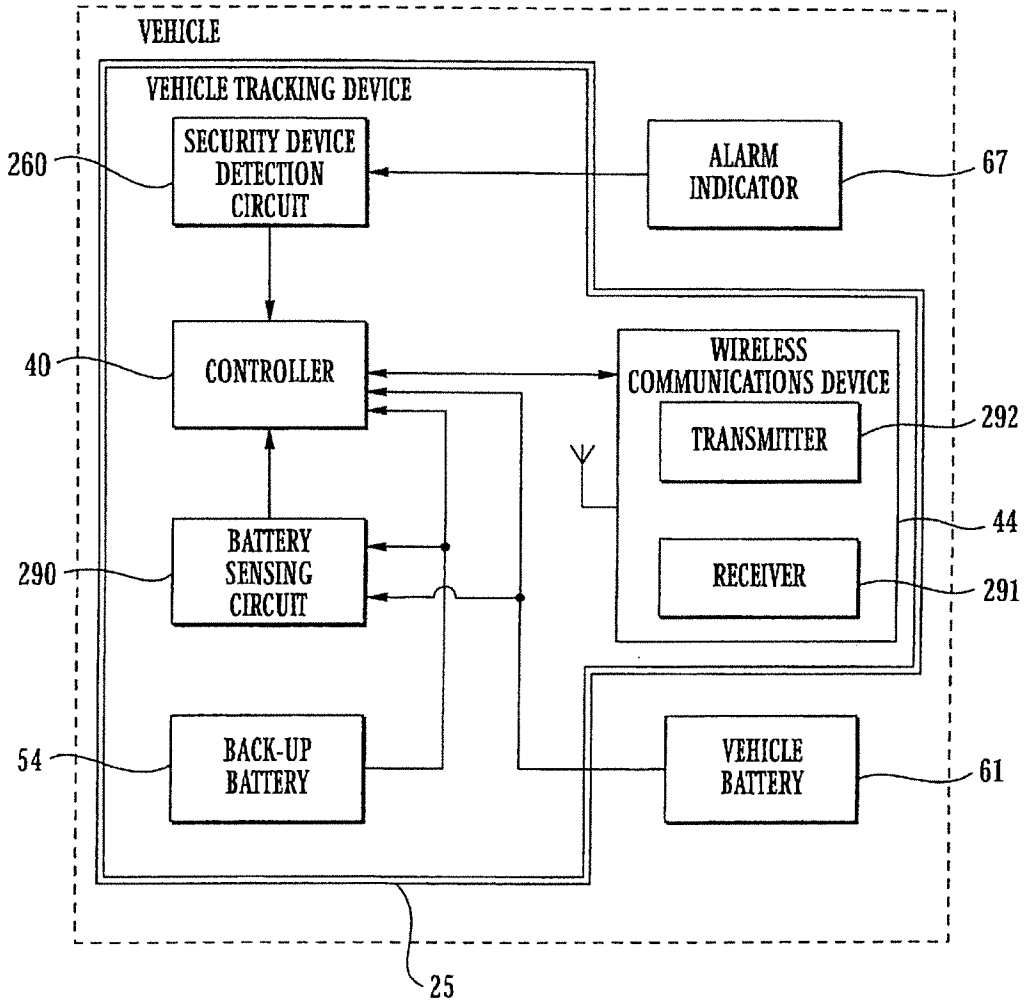

VEHICLE
VEHICLE TRACKING DEVICE
SECURITY DEVICE DETECTION CIRCUIT
260
ALARM INDICATOR
67
CONTROLLER
40
WIRELESS COMMUNICATIONS DEVICE
TRANSMITTER
292
44
BATTERY SENSING CIRCUIT
290
RECEIVER
291
BACK-UP BATTERY
54
VEHICLE BATTERY
61
25

FIG. 29.

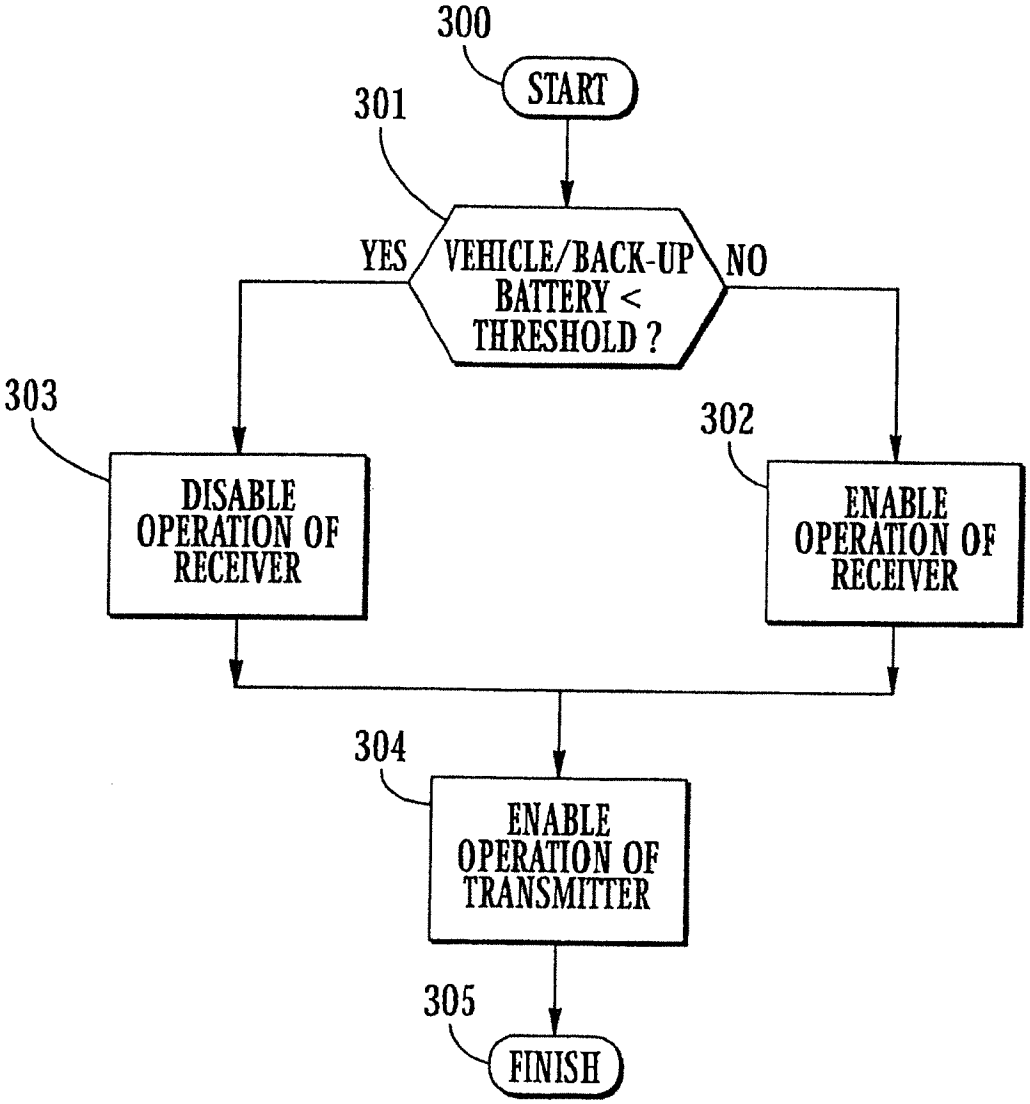

300
START
301
VEHICLE/BACK-UP BATTERY < THRESHOLD ?
YES
NO
303
DISABLE OPERATION OF RECEIVER
302
ENABLE OPERATION OF RECEIVER
304
ENABLE OPERATION OF TRANSMITTER
305
FINISH

FIG. 30.

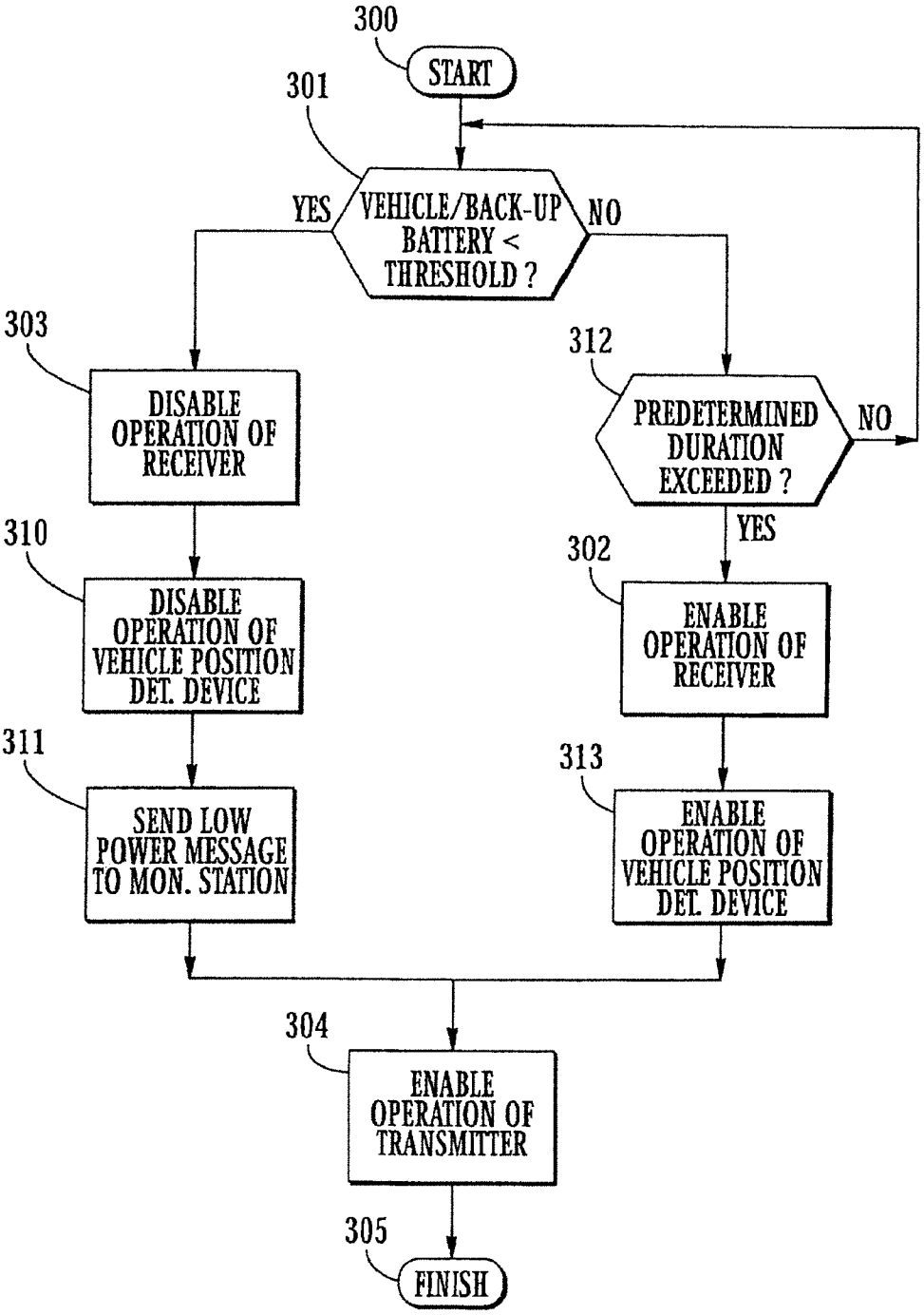

300
START
301
VEHICLE/BACK-UP BATTERY < THRESHOLD ?
YES
NO
303
DISABLE OPERATION OF RECEIVER
310
DISABLE OPERATION OF VEHICLE POSITION DET. DEVICE
311
SEND LOW POWER MESSAGE TO MON. STATION
312
PREDETERMINED DURATION EXCEEDED ?
NO
YES
302
ENABLE OPERATION OF RECEIVER
313
ENABLE OPERATION OF VEHICLE POSITION DET. DEVICE
304
ENABLE OPERATION OF TRANSMITTER
305
FINISH

FIG. 31.

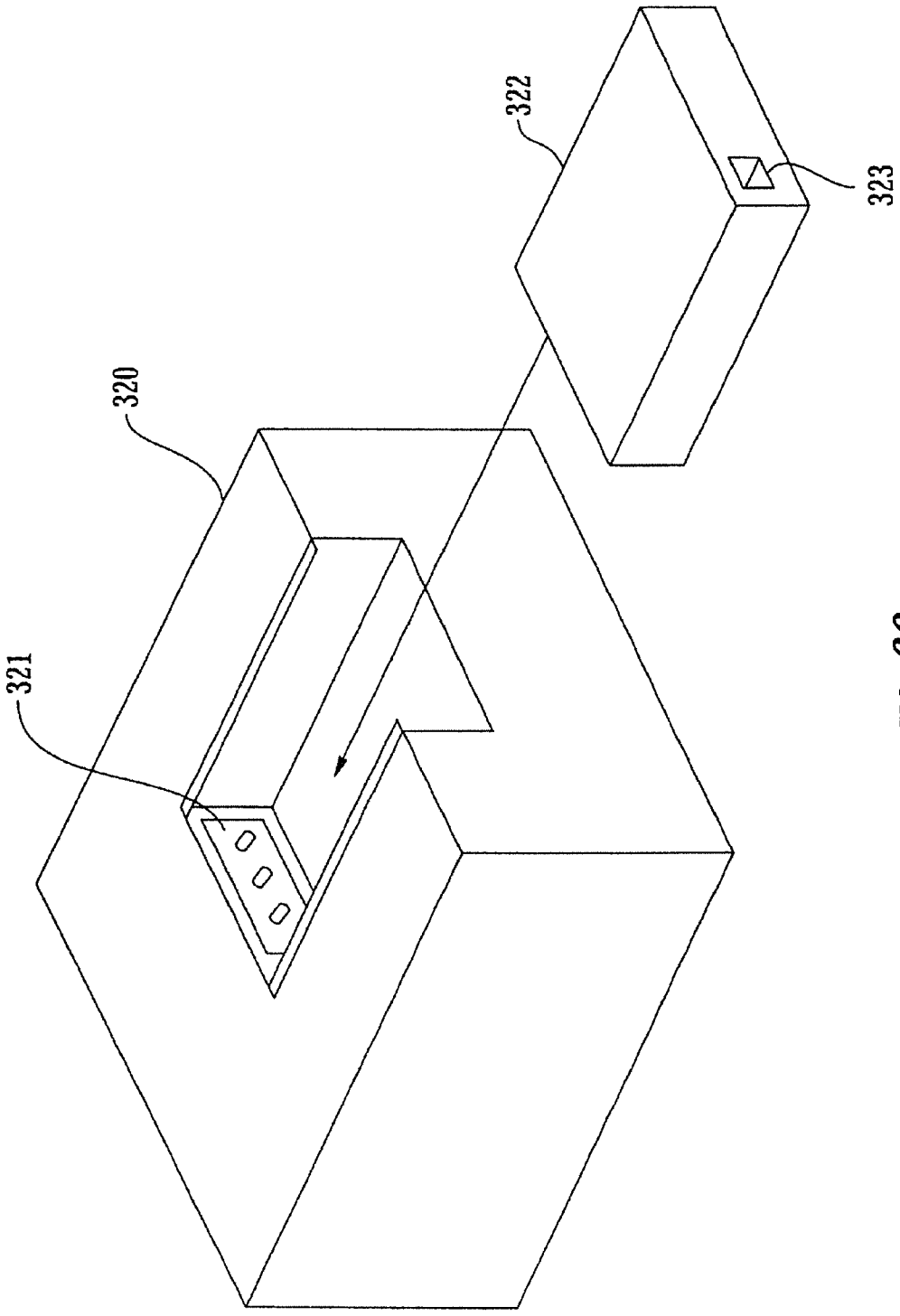


FIG. 32.

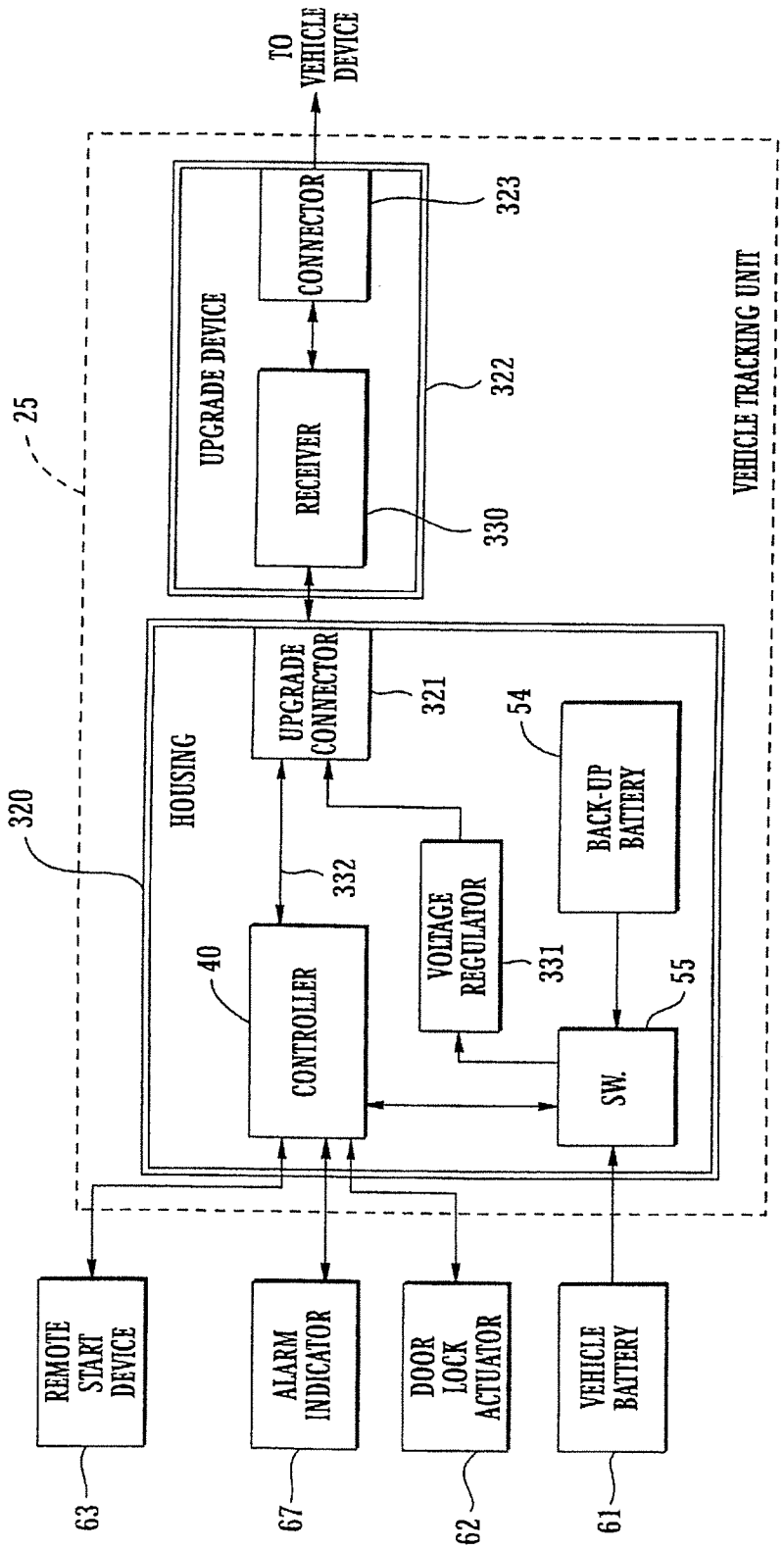

TO VEHICLE DEVICE
25
VEHICLE TRACKING UNIT
UPGRADE DEVICE
CONNECTOR
323
RECEIVER
322
330
320
HOUSING
UPGRADE CONNECTOR
321
54
BACK-UP BATTERY
332
40
CONTROLLER
VOLTAGE REGULATOR
331
55
SW.
REMOTE START DEVICE
ALARM INDICATOR
DOOR LOCK ACTUATOR
VEHICLE BATTERY
63
67
62
61

FIG. 33.

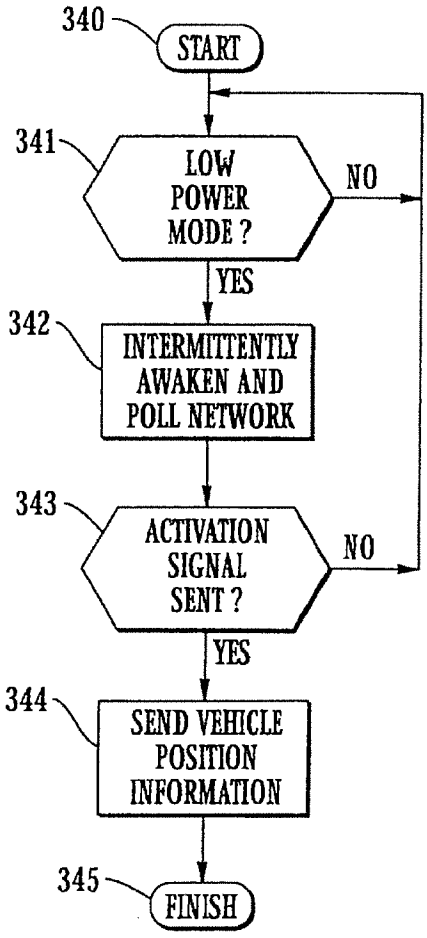

340
START
341
LOW POWER MODE ?
NO
YES
342
INTERMITTENTLY AWAKEN AND POLL NETWORK
343
ACTIVATION SIGNAL SENT ?
NO
YES
344
SEND VEHICLE POSITION INFORMATION
345
FINISH

FIG. 34.

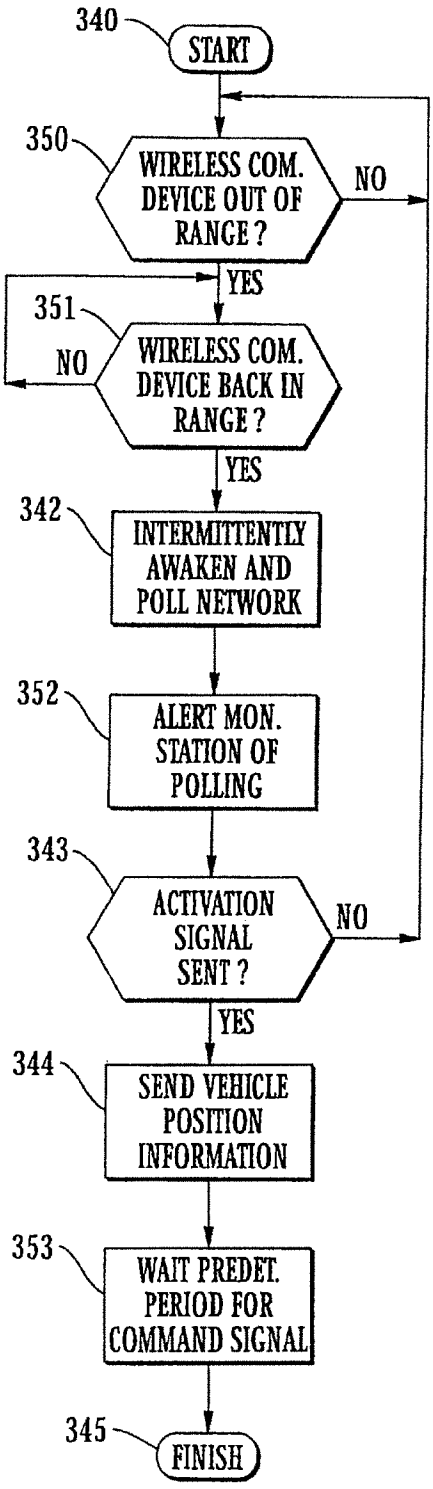

340
START
350
WIRELESS COM. DEVICE OUT OF RANGE ?
NO
YES
351
NO
WIRELESS COM. DEVICE BACK IN RANGE ?
YES
342
INTERMITTENTLY AWAKEN AND POLL NETWORK
352
ALERT MON. STATION OF POLLING
343
ACTIVATION SIGNAL SENT ?
NO
YES
344
SEND VEHICLE POSITION INFORMATION
353
WAIT PREDET. PERIOD FOR COMMAND SIGNAL
345
FINISH

FIG. 35.

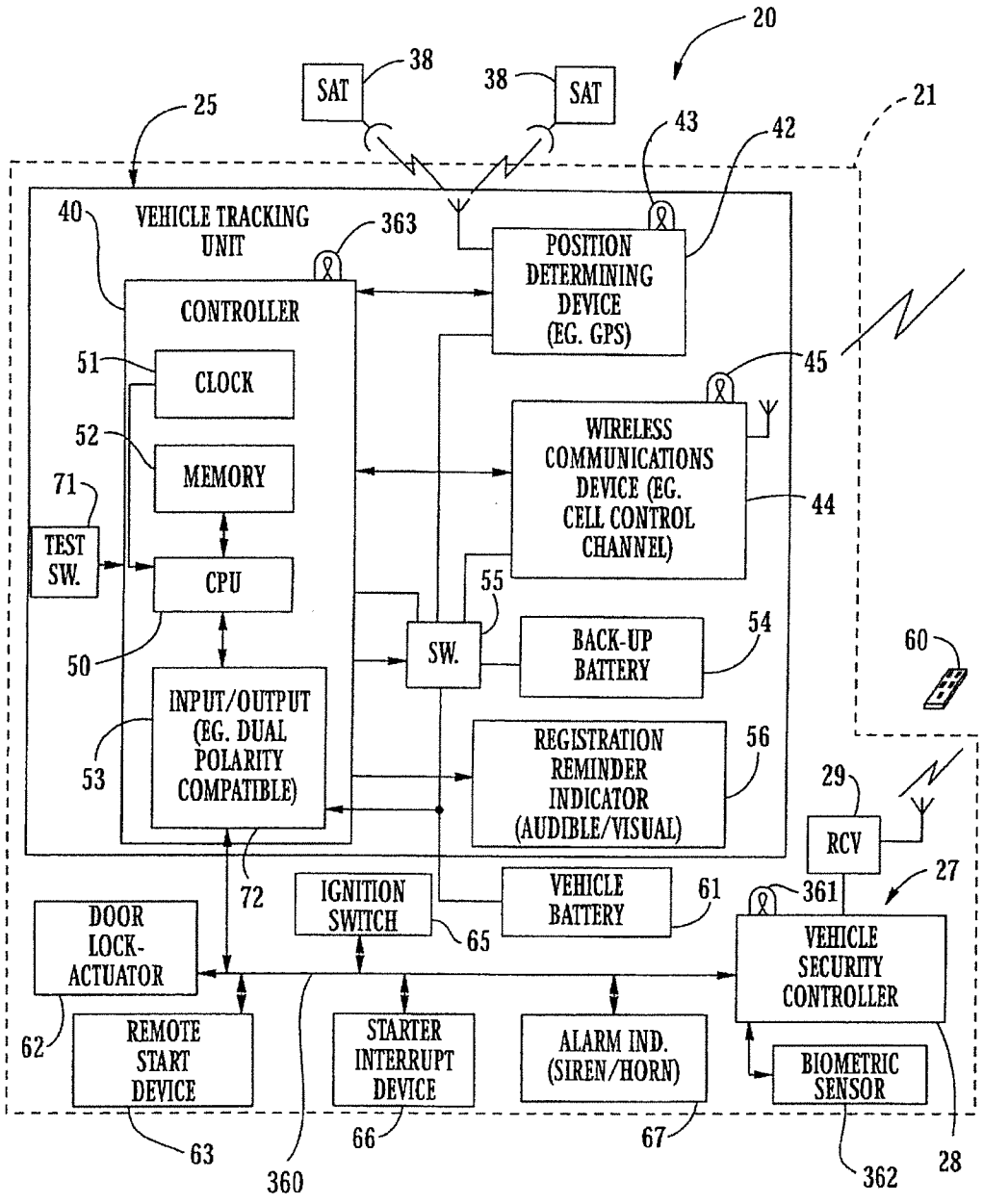

20
SAT
38
38
SAT
25
21
43
42
40
VEHICLE TRACKING UNIT
363
POSITION DETERMINING DEVICE (EG. GPS)
CONTROLLER
51
CLOCK
45
WIRELESS COMMUNICATIONS DEVICE (EG. CELL CONTROL CHANNEL)
52
MEMORY
71
44
TEST SW.
CPU
55
SW.
54
BACK-UP BATTERY
60
50
INPUT/OUTPUT (EG. DUAL POLARITY COMPATIBLE)
53
REGISTRATION REMINDER INDICATOR (AUDIBLE/VISUAL)
56
29
RCV
27
72
IGNITION SWITCH
VEHICLE BATTERY
61
361
DOOR LOCK-ACTUATOR
65
VEHICLE SECURITY CONTROLLER
62
REMOTE START DEVICE
STARTER INTERRUPT DEVICE
ALARM IND. (SIREN/HORN)
BIOMETRIC SENSOR
63
66
67
28
360
362

FIG. 36.

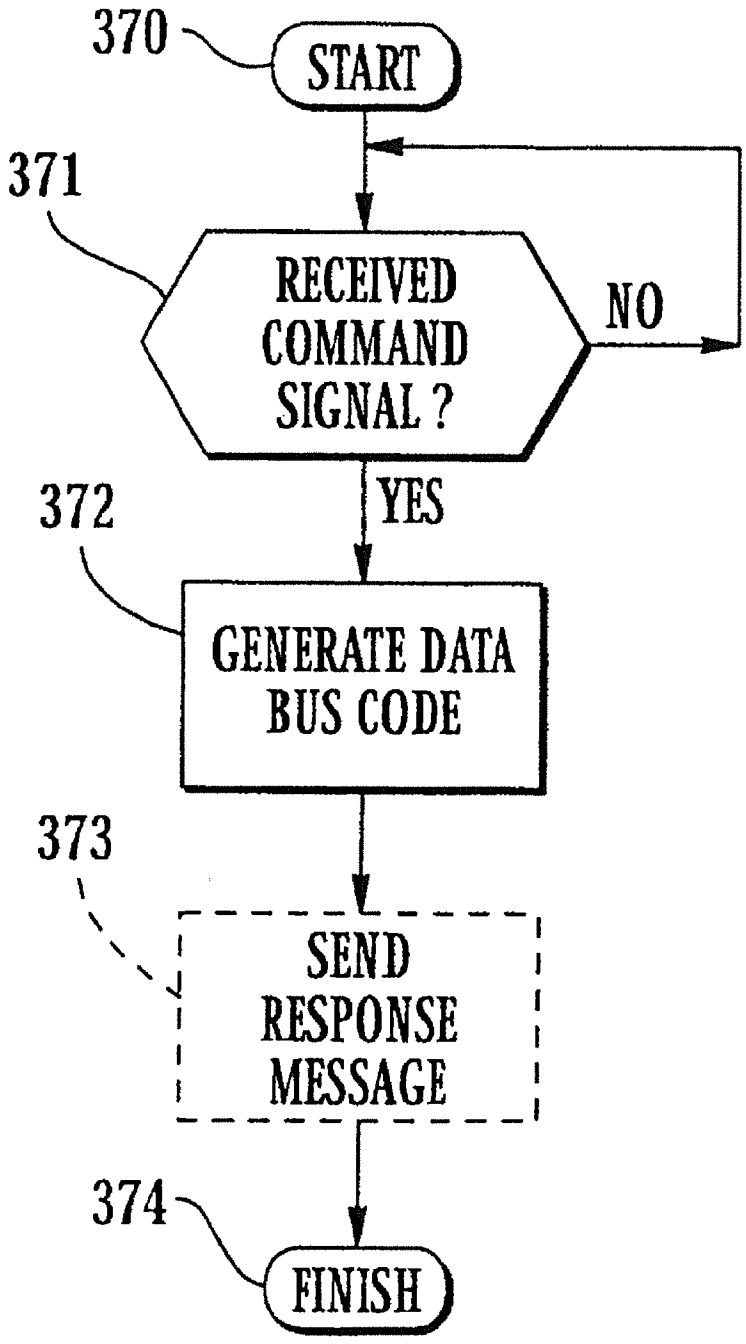

370
START
371
RECEIVED COMMAND SIGNAL ?
NO
YES
372
GENERATE DATA BUS CODE
373
SEND RESPONSE MESSAGE
374
FINISH

FIG. 37.

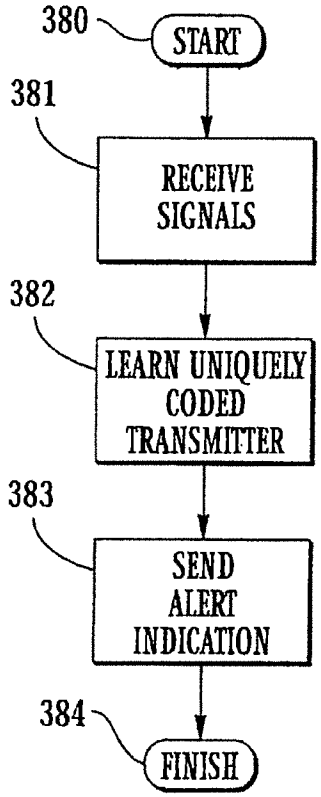

380
START
381
RECEIVE SIGNALS
382
LEARN UNIQUELY CODED TRANSMITTER
383
SEND ALERT INDICATION
384
FINISH

FIG. 38.

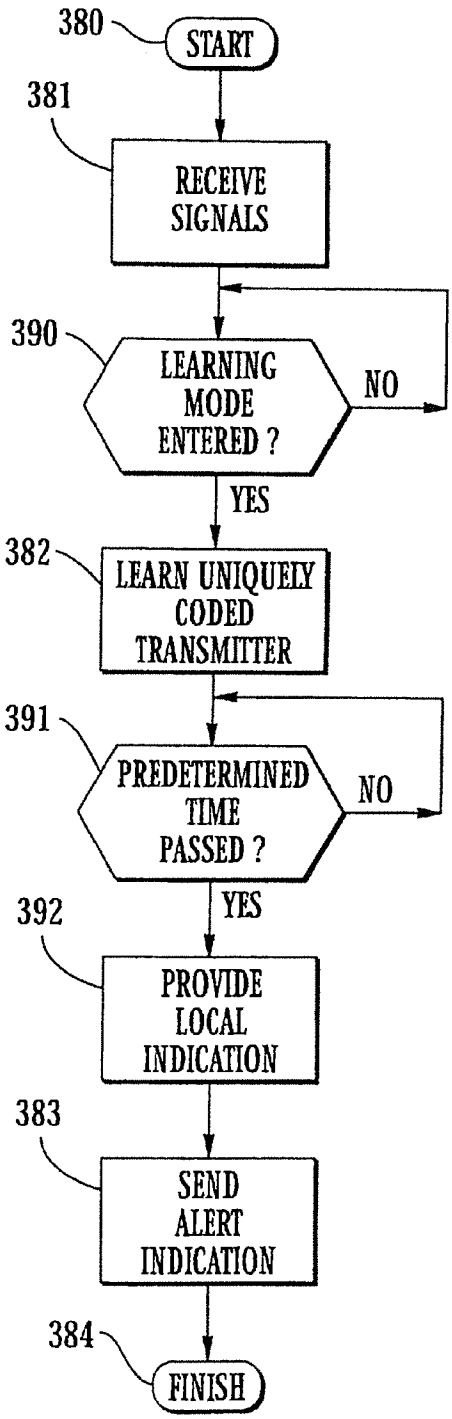

380
START
381
RECEIVE SIGNALS
390
LEARNING MODE ENTERED ?
NO
YES
382
LEARN UNIQUELY CODED TRANSMITTER
391
PREDETERMINED TIME PASSED ?
NO
YES
392
PROVIDE LOCAL INDICATION
383
SEND ALERT INDICATION
384
FINISH

FIG. 39.

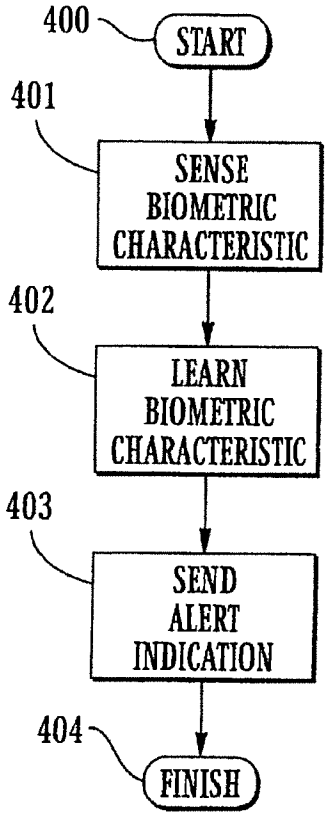

400
START
401
SENSE BIOMETRIC CHARACTERISTIC
402
LEARN BIOMETRIC CHARACTERISTIC
403
SEND ALERT INDICATION
404
FINISH

FIG. 40.

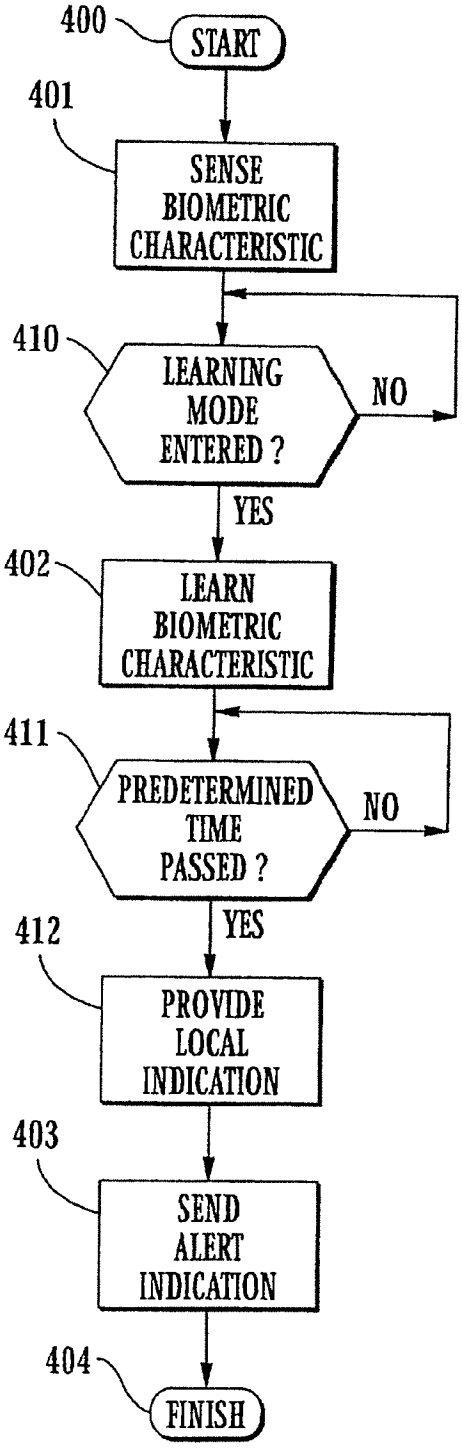

400
START
401
SENSE BIOMETRIC CHARACTERISTIC
410
LEARNING MODE ENTERED ?
NO
YES
402
LEARN BIOMETRIC CHARACTERISTIC
411
PREDETERMINED TIME PASSED ?
NO
YES
412
PROVIDE LOCAL INDICATION
403
SEND ALERT INDICATION
404
FINISH

FIG. 41.

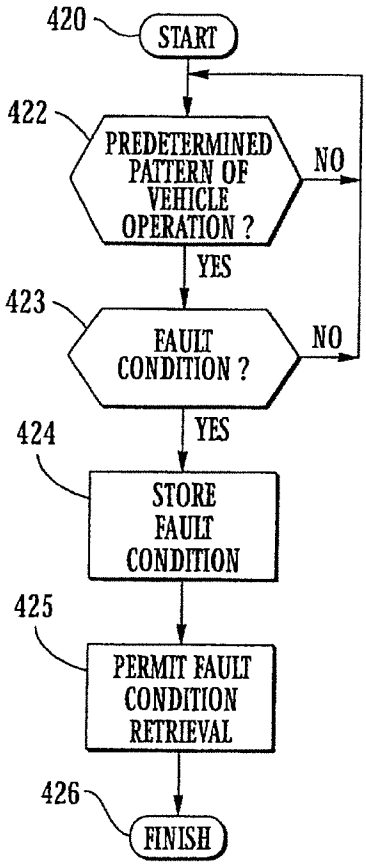

420
START
422
PREDETERMINED PATTERN OF VEHICLE OPERATION ?
NO
YES
423
FAULT CONDITION ?
NO
YES
424
STORE FAULT CONDITION
425
PERMIT FAULT CONDITION RETRIEVAL
426
FINISH

FIG. 42.

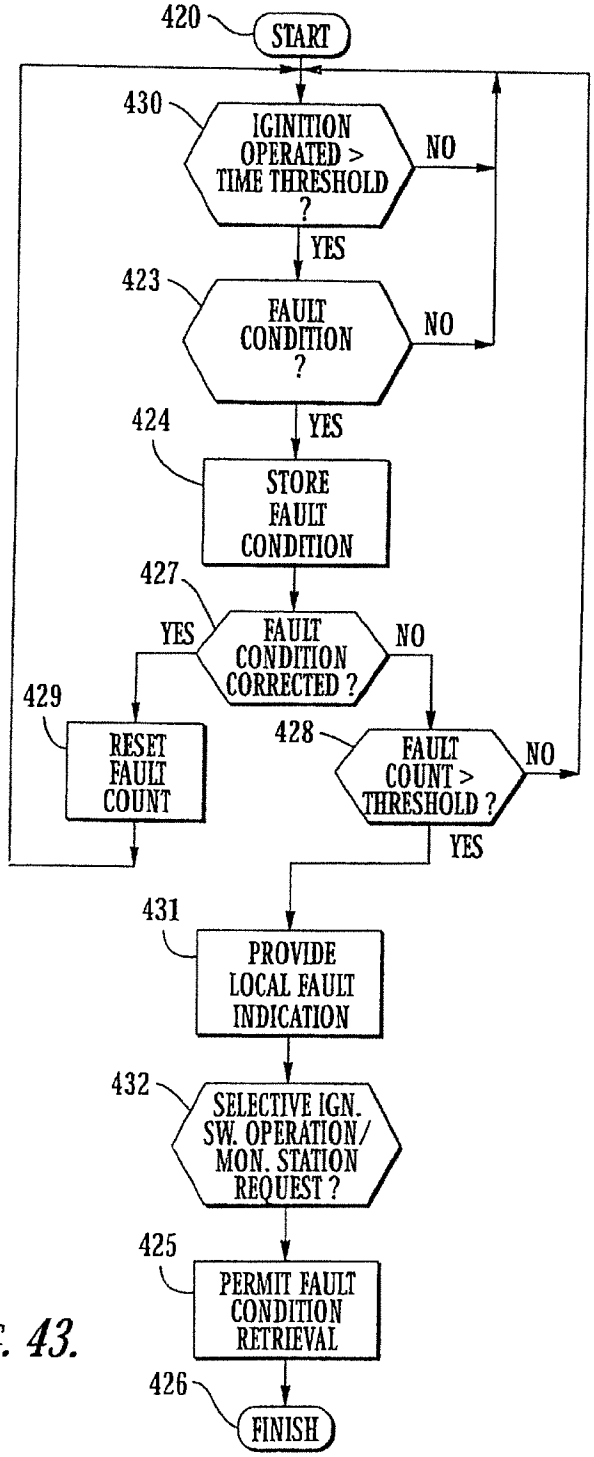

420
START
430
IGINITION OPERATED > TIME THRESHOLD ?
NO
YES
423
FAULT CONDITION ?
NO
YES
424
STORE FAULT CONDITION
427
FAULT CONDITION CORRECTED ?
YES
NO
429
RESET FAULT COUNT
428
FAULT COUNT > THRESHOLD ?
NO
YES
431
PROVIDE LOCAL FAULT INDICATION
432
SELECTIVE IGN. SW. OPERATION/ MON. STATION REQUEST ?
425
PERMIT FAULT CONDITION RETRIEVAL
426
FINISH

FIG. 43.

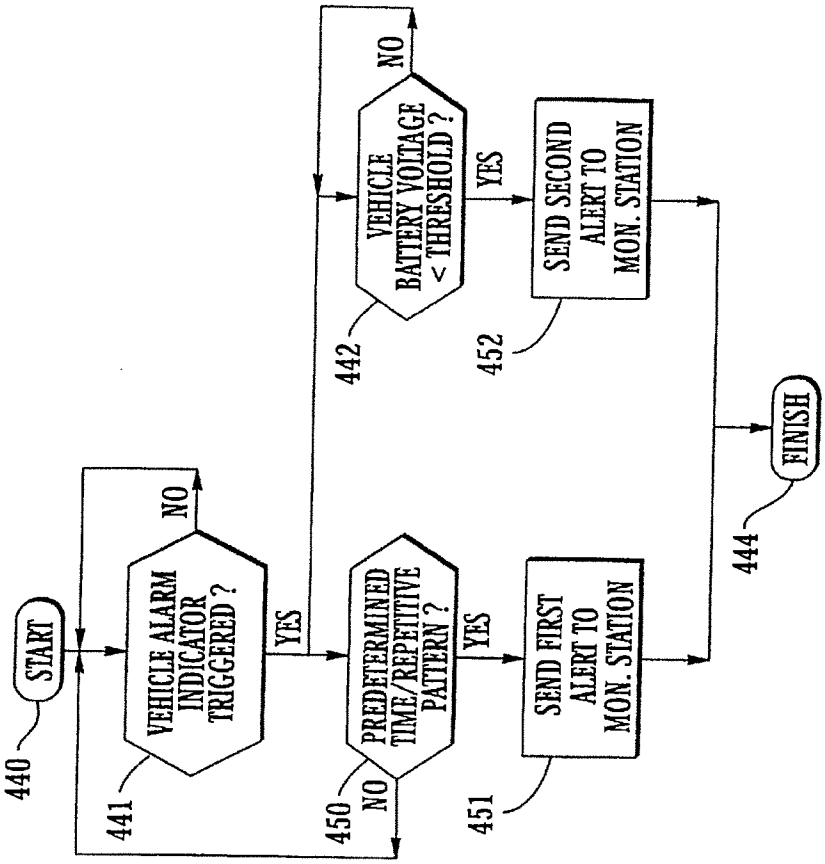

START
440
VEHICLE ALARM INDICATOR TRIGGERED ?
441
NO
YES
PREDETERMINED TIME/REPETITIVE PATTERN ?
450
NO
YES
SEND FIRST ALERT TO MON. STATION
451
VEHICLE BATTERY VOLTAGE < THRESHOLD ?
442
NO
YES
SEND SECOND ALERT TO MON. STATION
452
FINISH
444

FIG. 45.

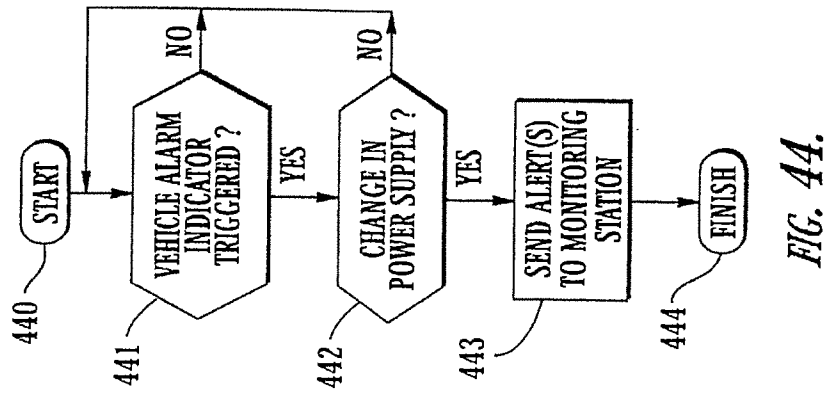

START
440
VEHICLE ALARM INDICATOR TRIGGERED ?
441
NO
YES
CHANGE IN POWER SUPPLY ?
442
NO
YES
SEND ALERT(S) TO MONITORING STATION
443
FINISH
444

FIG. 44.

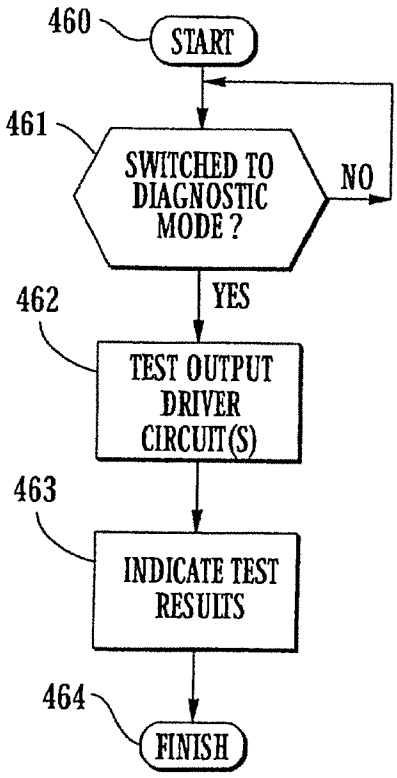

460
START
461
SWITCHED TO DIAGNOSTIC MODE ?
NO
YES
462
TEST OUTPUT DRIVER CIRCUIT(S)
463
INDICATE TEST RESULTS
464
FINISH

FIG. 46.

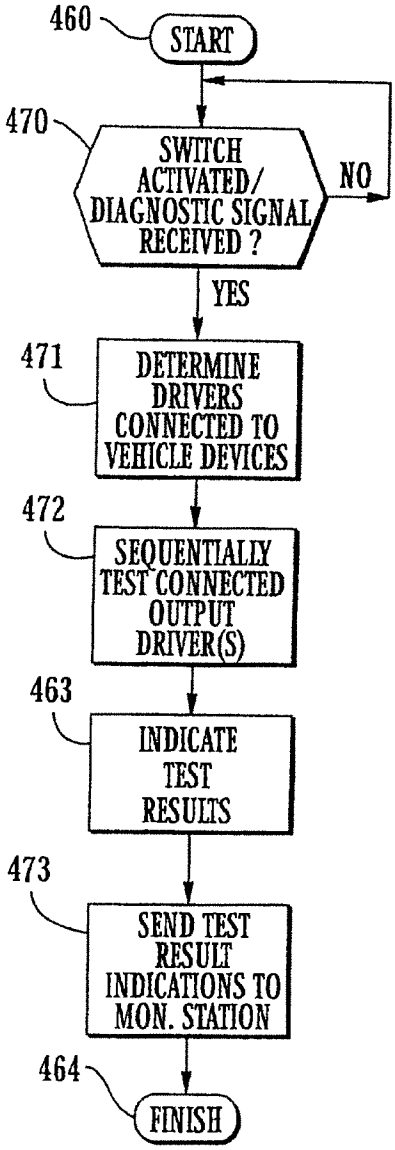

460
START
470
SWITCH ACTIVATED/ DIAGNOSTIC SIGNAL RECEIVED ?
NO
YES
471
DETERMINE DRIVERS CONNECTED TO VEHICLE DEVICES
472
SEQUENTIALLY TEST CONNECTED OUTPUT DRIVER(S)
463
INDICATE TEST RESULTS
473
SEND TEST RESULT INDICATIONS TO MON. STATION
464
FINISH

FIG. 47.

VEHICLE TRACKER INCLUDING VARIABLE FREQUENCY TRANSMISSION AND RELATED METHODS

RELATED APPLICATIONS

The present application is a continuation-in-part of U.S. patent application Ser. No. 09/859,727 filed May 17, 2001, which, in turn, is based upon copending provisional application Serial No. 60/264,811 filed on Jan. 29, 2001; Ser. No. 60/258,005, filed Dec. 22, 2000; Ser. No. 60/251,552, filed Dec. 6, 2000; Ser. No. 60/252,125, filed Nov. 20, 2000; Ser. No. 60/236,890, filed Sep. 29, 2000; Ser. No. 60/246,463, filed Nov. 7, 2000; Ser. No. 60/222,777, filed Aug. 3, 2000; and Ser. No. 60/205,178, filed May 17, 2000, the entire contents of each of which are incorporated herein by reference.

FIELD OF THE INVENTION

The present invention relates to the field of vehicle devices, and, more particularly, to a tracking and alerting system for a vehicle.

BACKGROUND OF THE INVENTION

Motor vehicles, such as passenger cars, trucks, busses, fleet vehicles, etc. are widely used and knowing the locations of such vehicles is often desired. For example, should a vehicle be stolen, it would be beneficial to know the vehicle's location so that authorities could be promptly and accurately directed to retrieve the vehicle. Indeed, the tracking system could plot the getaway path of the thief.

For a company with hired drivers, it may desirable to know the driver's whereabouts during the course of the day. Similarly, a rental car agency or other fleet operator, for example, may wish to know the whereabouts of its fleet of vehicles.

It may also be desirable to track the location of a vehicle as it is used throughout the course of a normal day. For parents of younger or older drivers, for example, knowledge of the vehicle's location may provide some assurance that the driver is at designated locations and following a prescribed route.

A number of patents disclose various systems and approaches to tracking vehicles. For example, U.S. Pat. No. 5,223,844 discloses a tracking system including a control center and a mobile unit installed in the vehicle. The mobile unit may send security warnings to the command center via a wireless transceiver. Position information for the vehicle is determined using a GPS receiver at the vehicle.

U.S. Pat. No. 5,515,043 discloses a similar system which may send one or more preprogrammed telephone messages to a user when away from the vehicle. The user may remotely access location information or cause certain commands to be carried out by entering a personal identification number (PIN).

The widespread availability and use of the Internet has prompted a number of vehicle tracking systems to also make use of the Internet. For example, TelEvoke, Inc. proposed such a system in combination with Clifford Electronics. The system was to provide notification, control and tracking services via the telephone or the Internet. Users could be notified via phone, e-mail, or pager of events such as a car alarm being triggered. Users could control the vehicle remote devices via phone, web, or PDA such as unlocking car doors. Additionally, users could track TelEvoke-enabled vehicles on the Internet or via the telephone. An Internet map could be viewed by the user showing the actual and prior vehicle locations. TelEvoke offered its services via a centralized fully automated Network Operations Center. To reduce the communications costs, it was proposed to use the control channel of the cellular telephone network.

Many conventional vehicle tracking units include many input and output connections. Accordingly, such units may be difficult to install in a vehicle. This is especially so since the space available to access and connect to vehicle wires is likely to be restricted. Accordingly, errors in the initial installation may occur. Accurate diagnosis of any such errors may be time consuming and add further to the installation costs. Maintenance of an installed system may also be complicated if each connection must be individually checked and rechecked.

One application for which vehicle tracking units are presently being used is as electronic tethers. For example, a vehicle tracking unit may be used for determining whether vehicles have been removed from a car dealership's lot. In such applications, the vehicle tracking units are typically programmed with a predetermined area, which is sometimes referred to as a "G.O. fence," and if the vehicle travels outside thereof it is considered stolen. Yet, this approach may be problematic because the predetermined area is typically defined to be overly large because false alarms may otherwise result during test drives. If the predetermined area becomes too large, this may delay response times.

Furthermore, such predetermined areas are typically defined by one or more rectangular boundaries. An example of one such vehicle tracking system using rectangular boundaries is disclosed in U.S. Pat. No. 6,313,791 to Klanke. However, such rectangular boundaries may potentially be cumbersome to properly define and program.

SUMMARY OF THE INVENTION

In view of the foregoing background, it is therefore an object of the present invention to provide a vehicle tracking unit which may be relatively easily programmed and used for determining whether a vehicle has been removed from a predetermined area.

This and other objects, features, and advantages in accordance with the present invention are provided by a tracking unit for a vehicle which may include a vehicle position determining device, a wireless communications device, and a controller cooperating with the wireless communications device and the vehicle position determining device to determine and send vehicle position information to a monitoring station. The controller may store a user selected reference location and send the vehicle position information based upon the vehicle moving beyond a radial threshold distance from the user selected reference location.

More particularly, the vehicle position information may be sent a threshold time after the vehicle moves beyond the radial threshold distance from the user selected reference location if the vehicle has not moved back within the radial threshold distance. By so doing, the area defined by the user selected reference location and the radial threshold distance may be made smaller than with prior art approaches while still reducing unwanted false alarms, such as from test drives at a dealership during which the vehicle travels briefly outside of the bounded area.

The vehicle tracking unit may further include at least one input device to be positioned within the vehicle for setting the user selected reference location. The at least one input device may also permit user setting of the threshold time. By way of example, the at least one input device may include

at least one of a switch, a keyboard, and a keypad. The at least one input device may also cooperate with the vehicle position determining device and the controller to set a current vehicle position as the user selected reference location. Accordingly, a user may advantageously set the user selected reference location (and/or the threshold time) to correspond to any desired position of the vehicle.

Moreover, the threshold time may also be set by the monitoring station. Further, the controller may set the user selected reference location based upon at least one signal provided by the monitoring station. For example, the controller may also cooperate with the vehicle position determining device to set a current vehicle position as the user selected reference location based upon the at least one signal provided by the monitoring station. In addition, the at least one signal may include the user selected reference location.

By way of example, the radial threshold distance may be less than about five miles, and the threshold time may be less than about thirty minutes, although other values may also be used. Additionally, the controller may include at least one memory for storing the user selected reference location and vehicle position information therein, and the vehicle position determining device may be a Global Positioning System (GPS) device, for example.

A method aspect of the invention is for tracking a vehicle using a vehicle tracking unit, such as the one briefly described above, to be carried by the vehicle. The method may include storing a user selected reference location for the vehicle tracking unit and determining vehicle position information using the vehicle tracking unit. Furthermore, vehicle position information may be sent from the vehicle tracking unit to a monitoring station based upon the vehicle moving beyond a radial threshold distance from the user selected reference location.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is a simplified block diagram of a vehicle tracking system in accordance with the present invention.

FIG. **2** is a more detailed block diagram of the vehicle tracking unit as shown in FIG. **1**.

FIG. **3** is more detailed block diagram of the monitoring station as shown in FIG. **1**.

FIG. **4** is a flowchart for operation of the vehicle tracking system as shown in FIG. **1** illustrating a vehicle stolen alert.

FIGS. **5A–5C** are a flowchart for operation of the vehicle tracking system as shown in FIG. **1** illustrating a vehicle alarm sounding alert.

FIG. **6** is a flowchart for operation of the vehicle tracking system as shown in FIG. **1** illustrating a vehicle speeding alert.

FIG. **7** is a flowchart for operation of the vehicle tracking system as shown in FIG. **1** illustrating an unauthorized transmitter learned alert.

FIG. **8** is a flowchart for operation of the vehicle tracking system as shown in FIG. **1** illustrating a low battery alert.

FIG. **9** is a flowchart for operation of the vehicle tracking system as shown in FIG. **1** illustrating a GPS or cellular unit failure alert.

FIG. **10** is a flowchart illustrating operation of the vehicle tracking unit as shown in FIG. **1** for direction deviation tracking.

FIG. **11** is a flowchart illustrating the direction deviation tracking operation of FIG. **10** in further detail.

FIG. **12** is a schematic block diagram illustrating a pair of switchable polarity output terminals, as generally illustrated in FIG. **2**, connected to a dual-motor vehicle device operable based upon output polarity.

FIGS. **13** and **14** are schematic block diagrams similar to FIG. **12** and both illustrating alternate connection arrangements in which the vehicle device is connected to a vehicle battery.

FIG. **15** is a schematic diagram illustrating the pair of switchable polarity output terminals of FIG. **12** in greater detail.

FIGS. **16** and **17** are flowcharts illustrating yet another aspect of the present invention for varying a frequency at which the vehicle tracking unit of FIG. **1** sends vehicle position information to the monitoring station.

FIGS. **18A** and **18B** are flowcharts illustrating yet another aspect of the invention for using the vehicle tracking unit as shown in FIG. **1** to determine and send vehicle position information based upon the vehicle moving outside a radial threshold distance from a user selected reference location.

FIG. **19** is a schematic block diagram illustrating the vehicle tracking unit of FIG. **1** including a user input device for setting the user selected reference location and/or a threshold time.

FIG. **20** is a schematic diagram illustrating the user selected radial threshold and a radial threshold distance therefrom.

FIG. **21** is a flowchart illustrating another aspect of the invention for using the vehicle tracking unit of FIG. **1** to provide an alarm indication for locating a vehicle and cease providing the alarm indication based upon a user input.

FIGS. **22** and **23** are flowcharts illustrating yet another aspect of the invention for sending alarm indication alerts based upon vehicle sensor activation.

FIGS. **24** and **25** are flowcharts illustrating a further aspect of the invention for selectively sending alert messages to a user.

FIG. **26** is a schematic block diagram of the vehicle tracking circuit of FIG. **1** further including a security device detection circuit.

FIGS. **27** and **28** are flowcharts illustrating another aspect of the invention for bypassing sending security signals while performing certain vehicle functions.

FIG. **29** is a schematic block diagram of the vehicle tracking unit of FIG. **1** also including the security device detection circuit and a battery sensing circuit.

FIGS. **30** and **31** are flowcharts illustrating a still further aspect of the invention for reducing excessive power drain on the vehicle battery and/or the back-up battery.

FIG. **32** is a perspective view of the vehicle tracking unit of FIG. **1** and further including a housing with an upgrade connector for an upgrade device.

FIG. **33** is a schematic block diagram of the vehicle tracking unit of FIG. **32**.

FIGS. **34** and **35** are flowcharts illustrating missed activation signal retrieval features of the present invention.

FIG. **36** is a schematic block diagram of an alternate embodiment of the vehicle as shown in FIG. **2** including a vehicle data bus.

FIG. **37** is a flowchart illustrating a method for controlling operable vehicle devices using the vehicle tracking unit and vehicle data bus shown in FIG. **36**.

FIGS. **38** and **39** are flowcharts illustrating a method according to the invention for sending alert indications based upon learning uniquely coded transmitters.

FIGS. **40** and **41** are flowcharts illustrating a related method according to the invention for sending alert indications based upon learning unique biometric characteristics.

FIGS. **42** and **43** are flowcharts illustrating another aspect according to the present invention for determining fault conditions of the vehicle tracking unit of FIG. **1**.

FIGS. **44** and **45** are flowcharts illustrating still another advantageous aspect of the invention for providing theft alerts based upon vehicle alarm indicator activation and a drop in vehicle battery voltage.

FIGS. **46** and **47** are flowcharts illustrating a further aspect of the invention for testing output drivers of the vehicle tracking unit of FIG. **1**.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

The present invention will now be described more fully hereinafter with reference to the accompanying drawings in which preferred embodiments of the invention are shown. This invention may, however, be embodied in many different forms and should not be construed as limited to the illustrated embodiments set forth herein. Rather, these embodiments are provided so that this disclosure will be thorough and complete, and will fully convey the scope of the invention to those skilled in the art. Like numbers refer to like elements throughout.

Referring to FIGS. **1–3**, the vehicle tracking system **20** in accordance with the invention is now initially described. The vehicle system **20** illustratively includes a vehicle tracking unit **25** to be mounted in the vehicle **21** and a monitoring station **30** which is remote from the vehicle and which is typically in a fixed location. In the illustrated embodiment, the vehicle tracking unit **25** interfaces with various vehicle devices, such as may include security sensors, door locks, etc. as will be appreciated by those skilled in the art.

The vehicle tracking unit **25** is also illustratively connected to a separate vehicle security system **27** as may already be installed in the vehicle **21**, from the factory or installed as an aftermarket product. Those of skill in the art will appreciate that in some embodiments of the vehicle tracking system **20** a separate vehicle security system **27** may not be needed, and/or various features thereof can be readily incorporated in the vehicle tracking unit **25**.

The monitoring station **30** may typically service a number of subscribers **31**. As shown perhaps best in FIG. **3**, the monitoring station **30** may include a user interface, such as the schematically illustrated telephone network interface **33** and the internet interface **34** which are schematically coupled to a telephone **35**, and a computer **36**, respectively. Of course in other embodiments, other interfaces may be used and only one of the illustrated interfaces may be needed. Those of skill in the art will also recognize that messages may be sent to a subscriber or user via preprogrammed voice messages, e-mail messages, facsimile messages, pager alerts, etc. In addition commands or instructions from the subscriber can also be input to the monitoring station **30** via the telephone network interface **33** and/or the internet interface **34**, from the subscribers telephone **35** or computer **36**.

The monitoring station **30** is illustrated connected to a cellular telephone tower **32** which, in turn, may communicate with the vehicle tracking unit **25** in some embodiments. Of course, in other embodiments other communications approaches are also contemplated, such as, for example, including satellite communications.

The monitoring station **30** may typically include the necessary modems, and other communications electronics, and computers for its functions which are described in greater detail below. The configuration of such components and their details will be readily apparent to those skilled in the art. Accordingly, no further discussion of these details is needed.

Referring now more specifically to FIG. **2**, additional details of the vehicle tracking unit **25** and devices at the vehicle are now further described. The vehicle tracking unit **25** illustratively includes a controller **40**, a vehicle position determining device **42**, and a wireless communications device **44** connected together. The vehicle position determining device **42** may be provided by a GPS receiver, for example. The GPS receiver typically operates by receiving multiple signals from spaced apart satellites **38** as will be appreciated by those skilled in the art.

In other embodiments, the vehicle position determining device **42** may be provided based upon communications with the cellular telephone network, or based upon other satellite transmissions, for example. As a particular example, time of arrival techniques are available based upon multiple reception paths to determine position via the cellular telephone network as will be appreciated by those skilled in the art. The vehicle position determining device **42** also illustratively includes an indicator **43** associated therewith, such as for indicating an operating mode, or proper operation of the device as will be addressed in greater detail below.

The wireless communications device **44** may be provided by a cellular telephone transceiver configured to operate on a control channel of the cellular network. Such a control channel may provide nearly universal coverage for the tracking system **20** as will be appreciated by those skilled in the art. In addition, the control channel may offer relatively inexpensive communications between the monitoring station **30** and the vehicle tracking unit **25** as will be appreciated by those skilled in the art. The wireless communications device **44** also illustratively includes an optional status indicator **45** with a similar function as the indicator **43** for the vehicle position determining device.

The wireless communications device **44** in other embodiments, may transmit in the voiceband of the cellular network. Alternately, the wireless communications device may communicate over other networks, such as over satellite, or via wireless internet services, as will be appreciated by those skilled in the art.

The controller **40** illustratively includes a central processing unit (CPU) **50** or other logic circuitry which is connected to a clock signal generator **51** and a memory **52**. In other embodiments, the memory **52** may be an embedded memory in the CPU **50**. The controller **40** also includes schematically illustrated input/output circuitry **53** to interface with various vehicle devices. In particular the input/output circuitry **53** may provide dual polarity compatibility for one or more inputs or outputs as will described in greater detail below. One or more of the terminals of the input/output circuitry **53** may also provide both input and output functions as will also be described in greater detail below. This may significantly simplify and accelerate installation of the vehicle tracking unit **25** in the vehicle **21**.

Also illustratively shown as part of the vehicle tracking unit **25** are a back-up battery **54**, and switch **55** connected thereto for selectively powering certain of the components based upon the controller **40**. Of course, the vehicle **21** also includes an electrical system including the vehicle battery **61**. Powering of the vehicle tracking unit **25** is described in greater detail below.

The vehicle **21** also includes a number of other components that may relate to vehicle tracking, security, and/or convenience features provided by the vehicle tracking sys-

tem **20**. For example, the vehicle **21** may include one or more door lock actuators **62**, an optional remote starting device **63**, a starter interrupt device **66** and an alarm indicator **67**. For example, the alarm indicator may be provided by a vehicle horn or vehicle siren, and/or flashing of the lights.

The optional separate security system **27** illustratively includes a vehicle security controller **28** and a receiver **29** connected thereto. As is conventional, the vehicle security system **27** may be switched between armed and disarmed modes, for example, by one or more uniquely coded remote transmitters **60**. The vehicle security controller **28** may also be capable of learning a new uniquely coded remote transmitter **60** as will be appreciated by those skilled in the art. The vehicle security controller **28** also illustratively is connected to the starter interrupt device **66** and the alarm indicator **67**.

For ease of explanation, a number of the features of the vehicle tracking system **20** are now described. The vehicle tracking system **20** includes a number of features that may simplify installation and maintenance. For example, as shown in FIG. **2**, the vehicle tracking unit **25** may have a test switch **71** connected to the controller **40**.

In normal operation, the controller **40** may be called upon to operate at least one vehicle device. Of course, the controller **40** also cooperates with the wireless communications device **44** and the vehicle position determining device **42** to determine and send vehicle position information to the monitoring station **30**. Moreover, the controller **40** may be switchable to a test mode for test operation of the at least one vehicle device responsive to activation of the test switch **71**.

In some embodiments, the at least one vehicle device may be a plurality of vehicle devices that are tested by operation in sequence. For example, the at least one vehicle device may comprise at least one door lock actuator **62**. The at least one vehicle device may also comprise the starter interrupt device **66**, or the engine remote starter **63** if remote starting is an implemented feature. The at least one vehicle device which is tested, may also be the alarm indicator **67**. Accordingly, an installer, for example, can quickly check that the tracking unit has been properly installed.

To further provide for ready determination of proper operation of the vehicle tracking unit **25**, one or both of the position determining and wireless communications devices **42**, **44** may include associated indicators **43**, **45** as mentioned briefly above, and which provide an indication relating to proper operation. Each indicator **43**, **45** may indicate a mode of operation of the device, its proper operation, or a partial or complete failure of the device.

Another aspect of the invention is that the controller **40** may provide a selectable polarity for the at least one vehicle device based upon sensing thereof. Accordingly, a predetermined activation of the test switch **71** may cause the controller **40** to sense and select the proper polarity. Pressing the test switch **71** for a predetermined time or in a predetermined pattern may sense and set the polarity.

Another feature of the vehicle tracking unit **25** and vehicle tracking system **20** relates to conservation of the number of codes or messages that need to be sent to the vehicle tracking unit. In particular, the controller **40** may have a plurality of different controller states and respond differently to a same message from the monitoring station **30** at different times depending upon the controller state at a given time. Accordingly, a number of codes or messages used by the system can be conserved. Various messages are described in greater detail below.

A controller state may change based upon several different occurrences or events. For example the controller may change states in response to a change in at least one vehicle device, or based upon a message received by the wireless communications device **44** from the monitoring station **30**, and/or based upon elapsed time. The controller states, for example, may include an alert sent state based upon an alert message being sent from the wireless communications device **44**. Thereafter, receipt of a predetermined message by the wireless communications device **44** when the controller **40** is in the alert sent state may confirm receipt of the alert message by the monitoring station.

Receipt of the predetermined message by the wireless communications device **44** when the controller **40** is in another state different than the alert sent state may thus cause a different response by the controller. The alert sent state may comprise at least one of a vehicle stolen alert sent state, a vehicle alarm sounding alert sent state, a vehicle speeding alert sent state, an unauthorized remote transmitter alert sent state, a low vehicle battery alert sent state, and a device malfunction alert sent state. The various alert messages and confirmation thereof are described in greater detail below.

The code or message conservation aspects of the vehicle tracking system **20** also permit sending a sequence of codes or messages within a predetermined time to also cause a different response at the vehicle tracking unit **25**. In other words, the plurality of controller states may comprise a received first message state based upon a first message being received by the wireless communications device **44** from the monitoring station **30**. Receipt of a second message by the wireless communications device **44** when the controller **40** is in the received first message state, such as within a predetermined time window, for example, may thus cause a different response by the controller than does receipt of the second message when the controller is in another state than the received first message state.

The plurality of controller states may comprise a vehicle finder state sounding an audible signal via the alarm indicator **67** at the vehicle **21**. In this state the controller **40** would bypass sending a vehicle alarm sounding alert to the monitoring station **30**.

Another aspect of the vehicle tracking system **20** is the provision of certain power conservation and management techniques, such as to permit extended periods where the vehicle **21** is not operation. During such extended periods, the vehicle battery **61** provides power to the vehicle tracking unit **25** as well as other vehicle devices. Accordingly, the voltage of the vehicle battery **61** drops over time. The vehicle tracking unit **25** may provide a significant drain on the vehicle battery **61** because of the power consumed by the wireless communications device **44** during transmission as will be appreciated by those skilled in the art.

The vehicle position determining device **42**, the wireless communications device **44** and the controller **40** may be considered as defining a power load of the vehicle tracking unit **25**. The controller **40** may operate the schematically illustrated power switch **55** to isolate the back-up battery **54** from the power load as a voltage of the vehicle battery **61** drops until reaching a threshold. After or below the threshold the controller **40** may cause the back-up battery **54** to selectively power only a first portion of the power load while a second portion of the power load remains powered by the vehicle battery.

For example, the wireless communications device **44** may have a higher operating voltage than the vehicle position determining device **42**. The first portion of the power load

that is selectively powered despite the low vehicle battery voltage may thus be the wireless communications device **44**. In particular, the wireless communications device **44** may be powered for transmission. Accordingly, the back-up battery **54** can be saved for limited communication using the higher voltage wireless communications device **44**. This provides useful features even after an extended period during which the vehicle **21** is left unattended and the vehicle battery **61** gradually discharges.

To further conserve power, the controller **40** may reduce operation of the power load as vehicle battery voltage falls. Conversely, the controller **40** may restore operation of the power load based upon the voltage of the vehicle battery **61** rising again, such as upon being recharged.

Also relating to power consumption, the controller **40** further causes transmission of a low vehicle battery voltage alert to the monitoring station **30** based upon the voltage of the vehicle battery **61** falling below the threshold. The user or subscriber may cause the monitoring station **30** to issue a remote start command. The controller **40** may then generate a remote start output to the remote start device **63** to thereby start the engine and recharge the vehicle battery.

Another feature of the vehicle tracking system **20** is that the vehicle tracking unit **25** may be readily installed and connected to a vehicle **21**, such as in the illustrated embodiment where the vehicle includes a starter interrupt device **66** and a separate vehicle security controller **28**. More particularly, the controller **40** may switch between an armed mode and a disarmed mode based upon operation of the engine starter interrupt device **66**. The controller **40** when in the armed mode may cooperate with the wireless communications device **44** to send an alert message to the monitoring station **30** and including vehicle position information, for example, based upon the vehicle position determining device **42**. The controller **40** is also for selectively operating the engine starter interrupt device **66** to provide additional security features.

In one advantageous embodiment, the controller **40** preferably comprises a combination input and output terminal for connection to the engine starter interrupt device. This terminal is at the input/output circuitry **53** and is schematically illustrated by reference numeral **72**. The controller **40** may switch to the armed mode when in the disarmed mode and based upon the engine starter interrupt device **66** being operated to disable engine starting. Conversely, the controller **40** may switch to the disarmed mode based upon the engine starter interrupt device **66** being operated to enable engine starting. In other words, the vehicle tracking unit **25** can piggyback its arming and disarming off the existing vehicle security system **27**, for example.

The controller **40** may also selectively operate the engine starter interrupt device **66** based upon a command message from the monitoring station **30**. The controller **40** may selectively operate the engine starter interrupt device **66** based upon a command message from the monitoring station **30**. Alternately, or in addition thereto, the controller **40** may selectively operate the engine starter interrupt device **66** based upon the ignition switch **65**.

The following descriptive portions relate to various user or subscriber notifications and features provided by the vehicle tracking system **20**. Of course, the controller **40** preferably cooperates with the wireless communications device **44** to send an alert message. The monitoring station **30** may comprise a user interface, such as one or both of the telephone network or internet interfaces **33**, **34**, respectively (FIG. **3**), for generating a sequence of alert message notifications based upon receiving the alert message sent from the vehicle tracking unit **25**. More particularly, the monitoring station interface permits canceling any remaining alert message notification based upon a cancellation command response from a user or subscriber having already received the alert message notification. The user may send the cancellation response via the telephone **35** or computer **36** (FIG. **3**), for example. Thus, if the user may be reached at different telephone numbers or different users are desirably notified of the alert, this aspect of the vehicle tracking system **20** can make the notifications efficiently and without making unnecessary notifications.

The vehicle tracking system **20** may provide any of a number of very useful alerts, as discussed herein. For example, the alert message sent from the vehicle tracking unit may comprise at least one of a vehicle stolen alert message, and a vehicle alarm sounding alert message. The alert message may be one of a vehicle speeding alert message, and a vehicle acceleration alert message. In addition, the alert message may comprise an unauthorized remote transmitter alert message. Also, the alert message may be at least one of a low vehicle battery alert message, and a device malfunction alert message.

The speeding alert may be based upon exceeding a speed threshold for greater than a certain time, which may be user selectable. The acceleration alert may also be useful as such is also indicative of aggressive driving along with the speeding alert. The unauthorized remote transmitter alert increases overall security since a user will be notified if a would-be thief learns an unauthorized transmitter to operate the controller. These alerts are described in greater detail below.

The vehicle tracking system **20** may be implemented as a service to a subscriber. In other words, the subscriber pays a monthly fee for the service. Accordingly, it may be important to encourage a user to register. Similar subscriber or registrations systems in the past have suffered revenue losses since some users would wait to activate the system until the vehicle was stolen. In other words, the user would only subscribe or register and pay a single month's fee.

In accordance with this aspect of the vehicle tracking system **20** prompt user registration is encouraged. In particular, the vehicle tracking unit **25** may include the user registration reminder indicator **56** and the controller **40** may be switchable from an unregistered mode to a registered mode. In the registered mode, the controller **40** may cooperate with the wireless communications device **44** and the vehicle position determining device **42** to determine and send vehicle position information to the monitoring station **30**. In the unregistered mode, the controller **40** may activate the user registration reminder indicator **56** to encourage registration by the user.

The controller **40** may be switchable to the registered mode based upon an activation message from the monitoring station **30**. For example, when the registration payment has been received, the monitoring station can send one or more messages to the vehicle tracking unit **25** to stop activation of the registration reminder indicator **56**. The indicator **56** may be audible, visual or both. For example, the registration reminder indicator **56** could be a beeping sound generated by a small piezoelectric transducer every ten minutes or so when the ignition **65** is on.

In other words, the user registration reminder indicator **56** may provide a minor but irritating annoyance to the user to encourage registration. Upon successfully registering, the annoyance is abated. Accordingly, a relatively straightforward approach is provided to encourage user registration.

Along these lines, the controller **40** when in the unregistered mode may have reduced features compared to the registered mode. For example, the controller **40** when in the unregistered mode may be restricted or limited in sending messages with the wireless communications device **44**. Accordingly, usage of the wireless communications network may be reduced. Transmissions from the vehicle tracking unit **25** may also be beneficially suppressed during original installation, for example.

Returning again to features of the vehicle tracking unit **25** which facilitate installation, the controller **40** may send an alarm indication alert responsive to a continuous activation of the alarm indicator **67** for greater than a predetermined time. Alternately, or in addition thereto, the controller **40** may send an alarm indication alert responsive to a repetitive pattern of alarm indicator **67** activations. In other words, the controller may be configured to distinguish between normal operation of a vehicle horn by the driver, and activation of the horn by the security system **27**. As mentioned above, the controller **40** may also monitor signals of at least one of a first and second polarity. The controller **40** thus advantageously piggybacks off the alarm indication generated by the vehicle security system **27** to determine and send a vehicle alarm sounding alert to the monitoring station **30**.

In one variation, the controller **40** may monitor signals delivered directly to the vehicle alarm indicator by the vehicle security controller **28**. In another variation, the controller **40** monitors signals of voltage dips of the vehicle battery **61**. Circuitry is conventionally and readily available for both such functions, as will be readily appreciated by those skilled in the art.

The controller **40** may also include a dual polarity compatible output in the input/output circuitry **53** for a vehicle device, such as the vehicle alarm indicator **67**. The controller **40** may further monitor signals relating to activation of the vehicle alarm indicator **67** and send an alarm indication alert with position information from the vehicle position determining device and using the wireless communication device.

For the dual polarity output compatibility, the controller **40** may generate a first polarity output pulse followed by a second polarity output pulse. The controller **40** may also generate a repeating pattern of a first polarity output pulse followed by a second polarity output pulse on the dual polarity compatible output. In yet other embodiments, the controller **40** may sense an actual polarity of the device and thereafter use the actual polarity for the dual polarity compatible output.

Where the vehicle device is a vehicle horn, the controller **40** may typically be configured to generate a negative polarity output on the dual polarity compatible output. Conversely, wherein the vehicle device is a vehicle alarm indicator siren, the controller **40** may be configured to generate a positive polarity output on the dual polarity compatible output.

Another aspect of the vehicle tracking system **20** relates to conserving memory space and/or reducing transmission time over the communications network. In accordance with this advantageous feature, the controller **40** may determine the vehicle position information including a vehicle location and an associated stationary period for each occurrence of the vehicle remaining stationary for greater than a predetermined period. In one embodiment, the controller **40** may cooperate with the wireless transmission device **44** to send the vehicle position information to the monitoring station based upon each occurrence of the vehicle remaining stationary for greater than the predetermined period. In this embodiment, the monitoring station **30** may associate a time with each occurrence of the vehicle remaining stationary for greater than the predetermined period. In other words, the monitoring station **30** may time stamp the received information.

In another embodiment, the controller **40** cooperates with the wireless transmission device **44** to send the vehicle position information to the monitoring station **30** for a plurality of occurrences of the vehicle remaining stationary for greater than the predetermined period. In this embodiment, the controller **40** may associate a time with each occurrence of the vehicle remaining stationary for greater than the predetermined period. In other words, the controller time stamps the position and stationary period information.

As an example, the predetermined time which determines whether the vehicle **21** is stationary and the position should be determined, may be less than about three minutes. This time may filter out vehicle stops in normal traffic, but which will keep track of stops where the driver likely leaves the vehicle **21**. Accordingly, only the important information necessary to track the vehicle need be stored and/or transmitted thereby reducing the system costs. If the vehicle **21** is stationary overnight, for example, unnecessary position information need not be determined, stored, and/or transmitted to the monitoring station **30**.

The controller **40** may comprise the memory **52** for storing the vehicle position information therein. In one configuration, the controller **40** downloads the vehicle position information from the memory **52** to the monitoring station **30** based upon a predetermined schedule. In another configuration, the controller **40** downloads the vehicle position information from the memory **52** to the monitoring station **30** based upon a predetermined event. In yet another configuration, the controller **40** downloads the vehicle position information from the memory **52** to the monitoring station **30** based upon a predetermined percentage of memory usage.

Having now described certain general features and advantages of the vehicle tracking system **20**, this description now turns to additional specific details which are provided as examples. In particular, vehicle tracking system **20** preferably implements one or more of the following features:

1. Detects the vehicle being stolen and transmits a signal to the monitoring station to contact up to 3 people, for example, predetermined by the user, of theft of the vehicle and then starts tracking the vehicle. The contact may be by one or more of the following: an e-mail message, a pager alert, a cellular telephone call, or other telephone call.

2. Detects an optional vehicle security or alarm system activation and transmits a signal to the monitoring station to contact up to 3 predetermined people to inform them the vehicle's alarm is being activated.

3. Detects an optional vehicle alarm system's remote PANIC activation and transmits a signal to the monitoring station to contact up to 3 predetermined people to inform them of the vehicle's PANIC being activated.

4. Detects a vehicle being programmed to operate from an unauthorized remote transmitter, key transponder, other transponder, or other device that has a unique coding, and the vehicle unit transmits a signal to the monitoring station to contact up to 3 predetermined people to inform them of this occurrence. The system can also make available information relating to a number of such coded devices, or a change therein, or when a change occurred. A message can

be sent to the user or the information can be available to the user on the WEB site. The vehicle would be equipped with a security system as disclosed in U.S. Pat. No. 5,654,688, for example, which determines an unauthorized transmitter and provides an alert feature. This patent is incorporated herein in its entirety by reference.

5. Detects the vehicle traveling over a predetermined speed, such as for a predetermined time, and transmits a signal to the monitoring station to send a message, such as an e-mail informing the user (and/or others) of this occurrence. Of course, the message could also be sent via a telephone call or page, should additional urgency be required. The vehicle's predetermined maximum speed limit and duration thereof can be selected by the user.

6. Detects a low battery voltage such as for a predetermined time and transmits a signal to the monitoring station to contact up to 3 predetermined people to inform them of vehicle's low battery voltage. This is especially advantageous during winter so that the vehicle could be started, for example, to prevent a problem before it happens). The time setting is preferably selectable by the user.

7. Detects the vehicle not moving for a predetermined time and transmits a signal to the monitoring station to send, for example, a nightly e-mail informing the user of all the vehicle's location and stationary time occurrences. The stationary time length is also selectable. This may be advantageous to encourage patrolling personnel not to remain for a long time in a same location.

8. The vehicle unit preferably includes a back-up battery system making it more reliable.

The vehicle unit may be relatively inexpensive. In addition, the monitoring fee that includes sending up to 60 e-mails and making up to 6 phone calls per month, may also be relatively low. The relatively low monitoring fee is based, at least in part, on the current relatively low rates charged for use of the control channel of the cellular telephone network. It is also noted that access to the control channel provides coverage for almost the entire U.S., for example.

The user or subscriber also preferably has access to an Internet site that will display a map and silently contact the vehicle to acquire it's current location, speed, direction of travel, and previous multiple locations with speeds, for example, the user's personal identification number (PIN) can be quickly activated by a telephone call. No additional installation may be required.

Certain annual pre-pay package arrangements may be available. For example, up to 10 access entries per month can be provided on a low monthly billing. Up to 30 access entries could be provided also for a relatively low monthly fee.

The present invention provides a number of other significant advantages including optional access from any phone or from any computer to access the monitoring station internet site. The user may control various vehicle functions remotely via the telephone or the internet site. The only charge may be for additional equipment and installation.

Additional features can also be included with the system and subscribed to by the user in accordance with the invention. For example, these include Hijack, Car Finding, Unlock Doors and Unauthorized Transmitter Alert Features. The equipment and installation is relatively inexpensive. For the hijack feature: from any phone or computer, the user may activate vehicle starter interrupt and sound the horn until the vehicle is retrieved (Command **4**).

For the Car Finding feature: from any phone or computer, the user may activate the vehicle's horn, or siren and sound same for 30 seconds. This allows the user to find his vehicle in a crowded parking lot (Command **5**).

For the Lock/Unlock vehicle doors feature: from any phone or computer a predetermined command (Command **7**) activates unlocking of vehicle doors to retrieve keys, for example, that may have been accidentally locked inside the vehicle. Of course, the system can also be used to lock vehicle doors if this was forgotten (Command **6**). The unauthorized transmitter alert feature is similarly selected as described above.

In addition, a remote vehicle start feature may also be provided, such as to start the vehicle's engine to heat or cool the vehicle prior to entry. The equipment and installation for remote starting may be relatively low. Some further details of a specific embodiment of the vehicle tracking unit **25** are provided below as relating to use of red and green LED indicators as may be coupled to the controller **40** and operated thereby. Also various representative wires, designated by color, are provided as an example embodiment.

The red LED verifies the GPS receiving signal. With a yellow wire having positive 12 volts, the red LED blinking indicates searching GPS location, constant indicates found location, and off indicates no GPS signal found. With the yellow wire not having positive 12 volts, if the red LED is off, the LED is not functioning.

The green LED verifies receiving the cell tower signal. With the yellow wire having positive 12 volts, blinking indicates the cell control channel signal is detected, constant indicates sending a micro burst signal (LED stays on 5 seconds after each transmission, and off indicates no cell tower signal received. With the yellow wire not having positive 12 volts, off indicates the green LED is not functioning.

An example of representative DIP switch feature selection is as follows. A first switch may be used for adding the orange wire for controlling arm/disarming of system. When on, the orange wire controls arm/disarm as follows: to arm, the orange wire is grounded and the yellow wire does not have 12 volts positive. To disarm, the orange wire is not grounded. When the first switch is off, then only the yellow wire controls arm/disarm as follows: to arm, the yellow wire is without 12 volts positive, and 30 seconds after continued arm mode then the orange wire activates a constant 500 ma grounded output to operate an external starter interrupt relay until the system is disarmed. To disarm, the yellow wire is connected to 12 volts positive.

A main 5-pin plug may be provided on the vehicle unit and connected as follows:

1. The Red Wire is connected to the 12 vdc power. An alert warning "E" is given if the system is armed and the battery voltage becomes lower than 11 volts for longer than ## minutes. This alert feature "E" will not operate again until the voltage is above 12 volts to re-set this feature.
2. The black wire is connected to ground.
3. The yellow wire is connected to the ignition 12 volts so that if the key is on, 12 volts is supplied thereto and if the key is off, the yellow wire is connected to ground. Further: if the system is in an armed mode and the Lat/Long changes, then Alert "A" is given. If the system is disarmed and within 2.5 seconds after the yellow wire receives 12 volts and the gray wire detects 3 or more positive pulses the system activates Alert "D". If the first DIP switch is in the off position then: if 12 volts is on yellow wire, the system is disarmed and the orange wire discontinues from the 500 ma ground,

and if the yellow wire sees ground or neutral, then the system is armed and 30 seconds after the continued arm mode the orange wire activates a constant 500 ma grounded output to operate an external starter interrupt relay until the system is disarmed

4. The gray wire is for input and output, and can be connected to an alarm siren or horn positive terminal. In addition:

a. With the system armed and if the gray wire detects +12 v pulsing on/off or on constant for more than 10 seconds from an alarm siren or horn honking activation, then alert warning "B" alarm activation is given.

b. With system disarmed and if the gray wire detects +12 v pulsing on/off or on constant for more than 10 seconds from an alarm siren or horn honking activation, then alert warning "C" panic activation is given.

c. With system disarmed and if the Gray wire detects 3 or more 12 volt positive pulses within 2.5 seconds of yellow wire receiving 12 v+ and the gray wire by-pass not being activated, then alert warning "D" is given.

d. The gray wire bypass operates as follows:

i. After alert warning "B" bypass all future alert "B" signals until system is disarmed.

ii. After alert warning "C" bypass all future Alert "C" signals until system is armed.

iii. After alert warning "D" bypass all future alert "D" signals until no 12 volt pulses are detected on the gray wire within 3 seconds of the yellow wire having 12 volts.

e. With the system armed or disarmed. The Output: Internal +12 v, 1 amp transistor with pulses 1 second on and 1 seconds off to activate siren or honk car horn or flashing light relay.

i. Non-stop activation from Command "4")

ii. 30-second activation from (Command "5")

f. Turn off the above alert "A" from (Command "1").

5. The orange wire is for the starter interrupt and arm/disarm system, and operates as follows:

a. If first DIP switch is in the:

i. On position and: the orange wire has 12 volts or neutral, the system switches to the disarmed mode; the orange wire is grounded, then the system is switched to the armed mode; and the starter interrupt output will not automatically operate. It can only be activated from "Command #4"

ii. Off position and the orange wire does not effect the arming or disarming of the system; 30 seconds after system arms the orange wire will automatically activate constant 500 ma ground until the system is disarmed. And from "command #4". Connect to Starter interrupt relay output.

b. Command 4 activates Orange wire to have 500 ma. negative until Command 1 is received.

c. After Alert warning "B" is activated the first time it is thereafter bypassed while the orange wire remains grounded. Alert warning "B" is re-set to operate again 3 seconds after orange wire becomes ungrounded.

The vehicle unit may also include a Door Lock Plug configured as follows, for example. A green wire provides a 250 ma, negative 1 second pulse for Lock Doors. (Command "6"). A red wire provides a constant 12 v output from the red power wire. A blue wire provides a 250 ma., negative 1 second pulse for Unlock Doors (Command "7"). A pink wire provides a 250 ma., negative 1 second pulse for remote Car Starter (Command "2").

An installation test button may also be provided to work as follows. Pressing the button activates the orange wire for 10-seconds (starter interrupt), with these circuits in sequence. First, it activates the gray wire for 1-second (siren/horn). After the first stops, it activates the green wire for 1 second to lock the doors. After the second stops, it activates the blue wire for 1 second to unlock the doors. After the third stops, it activates the pink wire for 1 second to activate an optional item.

Representative warning alerts are as follows:

1. Alert Warning "A" (FIG. 4): Automatic activation of "Command 8" and the vehicle unit contacts monitoring station to instantly call 3 phone numbers with the message "Your Vehicle is stolen please confirm then call 911 to advise police of web site and your pin # so police can locate the vehicle". This is detected with the system armed and the GPS indicating movement. Bypasses all future alert warning "A" signals until the system is re-armed.

2. Alert Warning "B" (FIGS. 5A–5C): the vehicle unit contacts the monitoring station to instantly call 3 phone numbers with the following message "Vehicle alarm activated please confirm". This is with the system armed and detecting gray wire having 12 volts pulsing or on constant for longer than 10-seconds. After alert warning "B" is activated the first time, it is thereafter bypassed while the orange wire remains grounded. Alert warning "B" is re-set to operate again 3 seconds after orange wire becomes ungrounded.

3. Alert Warning "C" (FIG. 6): the vehicle unit contacts the monitoring station to instantly send e-mail message "vehicle was traveling faster than your preset amount of "###" and time limit of "##" seconds. Indicates the vehicle speed and location that the speeding started and how long speeding accrued" (Detected from GPS). This aspect is further understood with reference to the enclosed flowchart **84** of FIG. **6**.

4. Alert Warning "D" (FIG. 7): the vehicle unit contacts the monitoring station to instantly call 3 phone numbers with the message "Unauthorized remote transmitter was just programmed to operate your vehicle." This is with the system disarmed and the Gray wire detecting three or more 12 volt pulses within 2.5 seconds of the yellow wire having seen 12 volts positive. All future alerts "D" are bypassed until no 12 volt pulses are detected on the gray wire within 3 seconds of the yellow wire seeing 12 volts. This aspect is further understood with reference to the enclosed flowchart **85** of FIG. **7**.

5. Alert Warning "E" (FIG. 8): the vehicle unit contacts the monitoring station to instantly call 3 phone numbers with the message "Vehicle has low battery voltage and system has changed to low voltage mode". This is with the system armed and detecting the Red wire with lower than 11 volts for ## minutes. All future alerts "E" are bypassed until, first, more than 13.5 volts are detected on the red wire and, second, after the yellow wire stops having positive voltage the red wire then must detect more than 12 volts.

The following are representative commands for use in the system:

Command 1: Reset all circuits and system remains asleep until the ignition key is turned on. Resets the triggered mode and unit is asleep to prevent power drain on vehicle battery.

Command 2: (Accessory activation) monitoring station Command to the system to activate Pink wire to pulse 250 ma negative for 1 second.

Command 3: (Vehicle Location) Web site to indicate present location and past events in memory.

Command 4: (Hijack or Stolen) monitoring station Command to vehicle system to activate:

a. Gray wire to pulse 1 sec on/1 sec off with 1 amp positive output and which continues until receive command #1.

b. Orange wire to have 500 ma ground and which continues until receive command #1.

Command 5: (Car Find) monitoring station Command to system activating Gray wire for 30 seconds pulsing 1 sec on/1 sec off with 1 amp positive output.

Command 6: (Lock Doors) monitoring station Command to system activating Green wire to pulse 1 second with 250 ma. negative.

Command 7: (Unlock Doors) monitoring station Command to system to activate Blue wire to pulse 1 second with 250 ma. negative.

Command 8: (Start Constant Vehicle Tracking) sends previous 2 events in memory and then every 120 seconds get update of location information sent to the Web site.

The system is also operable in a battery saver mode which operates as follows:

1. With the ignition key off, if the battery voltage drops below 11.5 volts for more than 5 seconds, the GPS verification wakes up to look:
   a. Once instantly.
   b. Once in 1 hour if at the same location.
   c. Once in 6 hours if at the same location.
   d. Once in 12 hours if at the same location.
   e. Once every 24 hours if at the same location.
   f. Activate alert "E" when the battery saver mode is activated, and bypass sending all future Alert "E" until the battery voltage goes above 13 volts for 10 minutes to reset this feature.

Another aspect of the invention relates to automatic vehicle alert e-mails sent containing some or all of the previous system events. This sending can be triggered as follows:

a) At a user selected predetermined time ## (01–24) of each day, or

b) At a predetermined memory fill level, such as full or near full.

In addition, each system event may contains one or more of the following:

a) Vehicle Location

b) Vehicle total time at location

c) Time of day

d) Mph traveling

e) Total time traveling above MPH

f) Direction traveling

g) Delta

h) Special Alert messages, if any, including:

i) GPS signal not received for longer than 5 minutes.

ii) Traveling above ###MPH for ## minutes.

iii) Vehicle is stolen.

iv) Alarm activated.

v) Unauthorized remote transmitter alert.

vi) Battery saver mode activated

vii) Command 1: Reset all circuits and system remains asleep until the ignition key is turned on.

viii) Command 2: (Accessory activation)

ix) Command 3: (Vehicle Location was retrieved)

x) Command 4: (Hijack or Stolen mode activated)

xi) Command 5: (Car Find mode activated)

xii) Command 6: (Locked Doors)

xiii) Command 7: (Unlocked Doors)

xiv) Command 8: (Started 2-second incremental Vehicle Tracking)

Another feature of the invention relates to the selectable threshold conditions causing an event to be recorded into the memory of the vehicle unit. For example, this may include: while the yellow wire has 12 volts, record events every "??" default 15 minutes time if the GPS location has changed. If the GPS location is the same then only update stationary total time. If the GPS antenna is not receiving any signal then enter last known GPS location and with an indication that this was the last known GPS location before the GPS signal stopped, how long no GPS signal was received, and the GPS location in the on-hold file, when the vehicle is traveling above ### MPH for ##-minutes.

The monitoring station may also provide a number of automated phone calls as described above. These may include:

1. The user's vehicle has issued a stolen alert:
   a. If vehicle is stolen, after receiving the phone message the user then calls 911 to advise police of the theft, and gives the police the Web site address and an identification number, such as the user's PIN, to allow the police to locate where your vehicle has been, where it is now and keep tracking it until the police can retrieve the vehicle.
   b. If this is a false alert due to vehicle being towed away for service, for example, then the user may press "1" to put the vehicle in an off mode. Once the ignition key is turned on again the system will reset back to its normal operation mode.
2. The user's vehicle has issued an alarm activated for more than 10 seconds alert. The system will not respond to this alert again until ignition key is turned on again to reset this feature.
3. The vehicle battery voltage is low or has been disconnected. The tracking system is in low voltage mode. The system will not respond to this alert again until the battery voltage goes above 13 volts for 10 minutes to reset this feature.

The backup battery may be sized according to the GPS receiver and processing power draw. In addition, the battery may also be sized based upon estimated micro burst transmitting power draw. Such transmission are typically at about 3 watts power to the antenna.

The system according to the invention including the vehicle unit and monitoring station provides a number of significant advantages and features. For example, the police may be directly contacted by the user when the vehicle is stolen. The user receives the telephone message from the monitoring station **30**, and this is done without requiring the intervention of a manual security monitoring operator, such as an ADT operator, for example. In addition, once in the stolen mode, the vehicle unit will periodically continue to send out its location, so that the police may track the vehicle via the WEB, for example. This location sending feature may begin immediately, that is, without requiring the user to contact the vehicle to begin tracking. Having the vehicle contacting the monitoring station **30** is considerably less expensive than other schemes where the vehicle is periodically polled via the cellular network, for example.

The system may also be interfaced to a breath alcohol sensor at the vehicle, for example, and this information recorded in memory. The information could be passed along to the monitoring station **30**, which, in turn, could send out a notification message (e-mail or telephone) that the vehicle

is being operated by a driver who may be impaired by alcohol. The vehicle's location could then be tracked to permit the police to detain the driver.

Another aspect of the unit is that it may be able to recognize the desirability to bypass certain security breach triggers or other events. For example, a car finding feature can be provided that will allow the user to sound the horn or siren when near the vehicle to help locate the vehicle, as in a crowded parking area. Without the bypass feature, the unit could recognize the horn or siren as a security breach and transmit such information to the monitoring center. In accordance with this aspect of the invention, the unit would recognize the car finding feature was activated and thereby bypass sending a security breach transmission, for example. Again, false alarms and unneeded usage and expense of the communications infrastructure would be avoided.

Yet another aspect of the invention relates to thwarting a would-be thief who attempts to disable the alarm by cutting the battery cable or power supplied to the system. The unit preferably includes a back-up battery. More particularly, upon being in an armed mode and sensing a breach of security, such as the hood opening, for example, the unit will send out a signal indicating the alarm or security breach and while the alarm is indicated, if the battery is disconnected then the unit will send out a message indicating the vehicle is stolen, and also providing the vehicle's current position. Accordingly, the would-be thief is not able to defeat the security system by quickly disrupting power to the unit during an alarm indication or security breach. Also, to prevent additional alerts, this message is prevented from being transmitting again until the user returns to the vehicle to disarm the system and/or turn on the ignition so that the unit sees a voltage above 13 volts, indicating the vehicle has started using the owner's ignition key. This aspect is further understood with reference to the enclosed flowchart **80** (FIG. **4**).

Still another aspect of the invention relates to how the unit can discriminate between ordinary usage or honking of the horn as compared to a security system triggered alarm. Most vehicle security systems will provide a pattern of horn soundings as an alarm indication, and this can be determined and used to reduce false alarm transmissions from the unit. For example, the unit can look at the number of leading and trailing edges of the power pulse used to sound the horn. A single pressing of the horn switch by the user will cause two edges within a predetermined time, such as about 10 to 12 seconds. Accordingly, the unit can be configured to not send a security breach transmission to the control center based upon detecting two transitions. Since a number of vehicle security systems may have a continuous sounding of the horn within the predetermined time, the unit can send the transmission upon detecting only a single transition.

A number of other vehicle security systems provide a series of pulses or horn soundings within the predetermined time. Accordingly, the unit may also be configured to send a security breach transmission upon detecting greater than a predetermined number of transitions, such as greater than nine, for example. This number is also typically higher than a user would generate honking the horn several times within the predetermined time. In other terms, the number of transitions of the horn pulses can be counted, and if equal to one, or greater than nine, for example, the transmission is triggered, and otherwise the sounding of the horn is ignored. Also, to prevent additional alerts, this message is prevented from being transmitted again until the user returns to the vehicle to disarm the system and/or turn on the ignition so that the unit sees a voltage above 13 volts, indicating the vehicle has started using the owner's ignition key. This aspect is further understood with reference to the enclosed flowcharts **81–83** (FIGS. **5A–5C**).

Yet another feature of the invention relates to a low vehicle battery alert. For example, the unit may monitor the battery voltage over a predetermined time such as ten minutes. The ten minute window prevents false tripping, for example, when the voltage dips during engine cranking. In particular, the voltage can be sensed and it can be determined whether it is greater than zero (e.g. greater than six volts) and less than a high value (e.g. eleven or twelve volts), and, if so, a low battery voltage transmission can be communicated to the monitoring station **30**, and ultimately to the vehicle user when away from the vehicle **21**. If the vehicle is being serviced and the battery **61** is disconnected, this will cause the battery voltage to be equal to zero. Then, the low battery voltage transmission will not be communicated to the monitoring station **30**. Also, to prevent additional alerts, this message is prevented from being transmitted again until the user returns to the vehicle to disarm the system and/or turn on the ignition so that the unit sees a voltage above 13 volts, indicating the vehicle has started using the owner's ignition key. Again, false triggerings are reduced. This aspect is further understood with reference to the enclosed flowchart **86** (FIG. **8**).

Yet another advantageous feature of some embodiments of the invention relates to the ability to conserve electrical power. More particularly, when the vehicle is stopped and in the armed mode, the GPS receiver may be periodically operated to determine the vehicle position. If the vehicle position changes, this is indicative that the vehicle is being moved or stolen. For example, the GPS receiver may be operated to generate new vehicle position information every 29 seconds. These relatively quick successive position determinations or readings are generally termed hot start. These are relatively less complicated than a cold start position determination which takes longer, since the cold start position determination requires greater time to acquire and receive data from multiple satellites, as will be appreciated by those skilled in the art.

Unfortunately, this relatively high repeated usage of the GPS receiver may cause unnecessary battery drain, especially when the vehicle is left armed and unattended by the user for an extended period. Accordingly, the power conserving feature of the invention permits the GPS receiver to be turned off when the vehicle is in the armed mode, and the GPS receiver is turned on only when needed. For example, a vehicle sensor, such as a shock sensor, motion sensor, ignition sensor, door sensor, or other sensor, or combinations thereof could be used to start the GPS receiver. This sensor could also be used to trigger an alarm if desired; however it need not be so used in all embodiments. The GPS receiver, once turned on, could operate in the normal periodic fashion as described above, or for a fixed period of time. The GPS receiver could also be turned off again after some predetermined time if no further sensor signal is received, or if the position fails to change on subsequent position readings or determinations.

Yet another feature relates to permitting more colorful audible alert messages to be generated for the user. The user can, in some embodiments, access an internet site to type or enter the text for a message to be sent, such as to alert the user that his vehicle is being stolen. The audible message then communicated by a telephone call to the user is generated by a speech message synthesizer based upon the entered text. In accordance with this aspect of the invention, the user could type in phonetically spelled words or phrases,

such as to create more colorful messages including slang terms, various accents, and/or to mimic various dialects, for example. The speech synthesizer would then generate the desired message customized for the user. Of course, the system could also permit the user to test or preview the pronunciation generated by the speech message synthesizer based on the entered text message prior to its adoption.

Another aspect relates to requesting GPS position information from a vehicle. If a command is sent downstream to the vehicle requesting that GPS information in turn be sent upstream from the vehicle, and the GPS information is not received within a predetermined time, such as about four minutes, then another command may be sent to the vehicle requesting the GPS information. This may keep repeating until GPS information is received, for a predetermined number of tries, or until a user instructs stopping of the requests. This helps to ensure and confirm the activation and reception of GPS tracking coordinates from the vehicle.

Yet another aspect relates to reducing a frequency with which GPS information is sent from the vehicle. More particularly, the unit may be configured to activate GPS information transmission upstream every 2 minutes. To reduce system usage expense and power consumption at the vehicle, this rate of transmission of GPS information could be progressively decreased over time. For example, in one embodiment, upon activation the GPS location signals could be sent every 2 minutes during the first hour, then once an hour for the next 23 hours, after which only one signal would be sent per day.

Turning now to the flowchart **87** of FIG. **9**, still another aspect relates to warning the user of an inoperable or malfunctioning GPS or cellular telephone section. More particularly, if the GPS or cellular telephone antenna wire is cut or the mounting position of either is changed causing the antenna to stop receiving the signal the user would not ordinarily know of this problem quickly. In accordance with one embodiment, if the ignition is turned on a predetermined number of times, such as about three, and each time ignition turns on if no GPS or no cell signal is received for a minimum time, such as about 15 to 30 minutes or longer, an audible warning beeper may be activated in the vehicle. This beeper may be sounded once ever 15-minutes. At anytime if the GPS or cell signal is received properly then the system re-sets automatically stopping the beeper sound.

As an example, if the ignition key is turned on and no GPS or no Cell signal is being received for 15-minutes, and the vehicle ignition stays on for 45-minutes and there is still no GPS or no cell signal, the unit counts one. Thereafter, if the ignition key is turned on and no GPS or no cell signal is being received for 15-minutes, and the vehicle ignition stays on for 60-minutes and there is still no GPS or no cell signal, a second count is determined. Thereafter, if the ignition is turned on and no GPS or no cell signal is received for 10-minutes, and the vehicle ignition stays on for only 10-minutes and there is still no GPS or no cell signal, no count is determined. Thereafter, if the ignition is turned on and no GPS or no cell signal is being received for 15-minutes, a third count is determined and the beeper is activated as described above. This beeping may continue every 15-minutes while the vehicle ignition stays on as long as the vehicle ignition stays on for 16-minutes and still no GPS or no Cell signal is being received. If thereafter, the ignition is turned on and no GPS or no cell signal is being received, the beeper beeps once and again beeps once every 15-minutes while vehicle ignition stays on. If in 10-minutes both GPS or cell signal is being received, the beeper system is turned off and the warning count is reset.

By way of example, if the ignition key is turned on and no GPS or no cell signal is being received for only 5, 10 or 12 minutes (with the threshold set at 15 minutes), then no count is determined.

In certain circumstances, the GPS signal may fail, but the cell signal may still be working. Accordingly, it may be desirable to send an indication of the failure of the GPS signal to the central monitoring station **30** to thereby alert the user as described above. If the cell signal also failed, or if the cell signal failed by itself, in other embodiments a separate paging device would transmit the failure or loss of the cell signal information to the central monitoring station **30**, to thereby alert the user.

Yet another feature is directed to efficient use of a relatively small number of codes available to communicate with the tracking unit from the cellular network and central station. More particularly, a typical arrangement may provide eight basic codes and two "wildcard" codes. The two wildcard codes are reserved for future or other uses. A particular tracking device will respond directly to any of the eight basic codes. For example, the doors could be locked or unlocked, a present location downloaded from the vehicle, etc.

In accordance with this feature, the tracking device may respond differently to the same code or command depending upon the state or condition of the tracking device. For example, if an alarm is triggered at the vehicle, it may be desired that the tracking device continue to send the alarm signal until confirmation is received that the central monitoring station **30** has received the alarm signal. This confirmation can be sent using the same code as may provide another function if the device were not indicating an alarm. Any of a number of such tracking device conditions may trigger a different message to be interpreted from the received code. For example, if any of the above Alerts A-E were triggered, the receipt of a predetermined code, such as code eight, would confirm receipt of the alert by the central station, and this receipt of code eight would not cause the other response (no alarm triggered) in the tracking device. Of course this concept can be extended to other features as will be appreciated by those skilled in the art.

In accordance with another feature, the rate of sending the location or position data (or change in position data) from the vehicle may be varied to reduce system usage and thereby reduce expenses. More particularly, in one embodiment, the rate of sending may be based upon how long the vehicle has remained stationary. This time period may be selected by the user. For example, the selected time may be in the range of 15 minutes to six hours. If the vehicle has been stationary for the selected time period, then the rate of transmission may be reduced. This reduces or eliminates the need to send home position data and send all the over 15-minute stops made that day. Otherwise, that is when the vehicle is moving, the device may send data at a faster rate. Of course, a system user would not likely be interested in quick updates, especially where the position information is not changing. Conversely, if the vehicle is being moved, it may be desirable to receive more frequent position updates.

Another variation of this transmission rate conservation feature, bases the rate of transmission on the vehicle position. For example, a reduced rate of transmission may be selected if the vehicle is in a predetermined area where the user has a lesser interest in quickly updated position information. The user may also have a reduced interest in an area that can be defined outside of a predetermined distance from a reference point.

Yet another variation of the vehicle position transmission rate conservation feature is based upon the vehicle's speed,

such as the vehicle's average or maximum speed, for example. Accordingly, if the vehicle is traveling above a preset speed, the rate of transmission may be increased.

In accordance with another aspect of the invention, the tracking device may send the alert indication a predetermined number of times without receiving an acknowledgment as described above, and then wait until the vehicle position has changed before trying again or the cell re-registers or its RSS (received signal strength) changes. Thus, power is conserved. When the vehicle has moved to a new position, any obstructions may no longer be present thereby increasing the likelihood of a successful communication. In addition, the change in position may be determined when the vehicle is sensed to be moving about a predetermined relatively small speed, such as greater than 1 mph, for example.

In all of the embodiments and variations described herein, the tracking device may communicate with one or more other vehicle devices via a vehicle data communications bus. Further aspects of interfacing with a vehicle data communications bus are described in U.S. Pat. Nos. 5,719,551 and 6,011,460 assigned to the assignee of the present invention.

Yet another aspect relates to efficient use of available codes on the cellular telephone control channel. In one particular example, ten codes may be available to be transmitted from the monitoring station **30** to the vehicle trackers. The first eight or nine codes are command codes that will cause a specific action by the tracking device at the vehicle. The other one or two codes may be wildcard codes as mentioned above, that may set a stand-by mode for one or a group of vehicles, for example.

It may be desirable to provide more than eight commands at the vehicle responsive to the corresponding eight available codes. For example, it may be desirable to set a feature on or off, or to set a different feature setting or threshold. In accordance with this aspect of the invention, the commands at the tracker are determined based upon a series of different command codes being received within a predetermined time window.

For example, the monitoring station **30** may send code **9** that switches the tracker in the car into a stand-by mode for a predetermined time and which causes the tracker to respond with an upstream confirmation code **7** or **9** indicating receiving code **9**. During the predetermined time of the stand-by mode another code follows that causes a system programmable feature or setting to change. Note that the second code would otherwise cause a different function at the vehicle. Note that system might operate a function **9** if another code **1–9** is not received in the predetermined time. The following list is exemplary for features resulting from second codes **1–9**:

(1) Code **1**—Tracker will turn off feature of upstream code caused by vehicle alert being detected.

(2) Code **2**—Tracker will turn on feature of upstream code caused by vehicle alert being detected.

(3) Code **3**—Tracker deactivates cell receiver from operating due to a non-paying customer for monitoring service. That phone number can then be allocated to another customer.

(4) Code **4**—Turn on audio buzzer feature that will sound once each 10 minutes. The monitoring station **30** need only send the command to activate the feature, as the tracker will time the period and drive the buzzer thereafter. The monitoring station **30** will normally not need to send this command because the tracker will be configured out of the box with this feature activated to sound the buzzer every 10 minutes until the next command is received.

(5) Code **5**—Turn off the audio buzzer. This is to be sent by the monitoring station **30** after a user has successfully activated his account.

(6) Code **6**—Turn on the 80 mph speed limit reporting. This will normally not be sent as this feature will be the default setting of the tracker.

(7) Code **7**—Turn off the 80 mph speed limit reporting.

(8) Code **8**—Increase speed limit 5 mph and increase the time 5 minutes.

(9) Code **9**—Decrease speed limit 5 mph and decrease the time 5 minutes, and wait 5 minutes if another code number follows. It could operate this way to allow another set of codes to change more features.

In this example, in response to the tracker receiving the system code **1–9**, the tracker sends an upstream code **7** to acknowledge receipt of the system code **1–9**. Upon receipt of code **9** the tracker waits up to 5 minutes to determine if another system code is received. If no code is received, then the tracker performs the code **9** operation. Of course, in other embodiments other features or settings can be selected.

In general, it may be preferred that the first code sent in a series of two codes, for example, be a code that causes only a minor function to be performed at the vehicle. This so because if the second code is sent from the monitoring station **30**, but not received at the tracker, only a minor function is performed. For example, the first code may switch between armed and disarmed modes. This is in contrast to using a remote engine starting code or engine shutdown code as the first code. The vehicle may be moving or positioned in a marginal reception area, and the second command may not be received by the tracker within the predetermined time window. As will be appreciated by those skilled in the art, this concept of multiple digit codes, can be extended beyond two digits to three or more.

To further conserve cellular transmissions and as described above, the tracker may be set to record a position based upon a determined event. Only this recorded position information may be downloaded either by user request or at set times. It is desired that such events be relatively few, but that the information still be helpful to the user.

For example, an event for recording of position may be determined based upon the vehicle being stopped for greater than a first time and less than a second time. For example, the first time may be 15 minutes and the second time may be 6 hours. Determination of the vehicle being stopped can be made based upon one or both of the GPS position or the vehicle ignition being turned off. The second time prevents the recording of position information when the vehicle is stopped at the owner's home during the evening, for example. Accordingly, the important information of the vehicle stops being made is recorded and made available to the user, while system communications resources are conserved.

In another example, if the mode is selected to send the vehicles location every 10 min and the vehicle is in the same location for greater than a set time, then no more vehicle locations are sent until the vehicle location has changed to start the every 10 min reporting again.

Turning now additionally to FIG. **10**, operation of the vehicle tracking unit **25** for providing direction deviation tracking will now generally be described. More particularly, beginning at Block **100**, when the vehicle tracking unit **25** is placed in an armed or tracking mode (Block **101**) to provide constant tracking, the vehicle tracking unit may determine

and send the vehicle position information at predetermined intervals, for example, as described above. For example, the vehicle tracking unit **25** may be placed in the armed mode when the vehicle **21** is stolen to allow the police and/or a user to maintain current vehicle position information, such as by overlaying the vehicle position information on a map using a mapping program.

Yet, one difficulty which may be encountered with prior art tracking approaches which transmit vehicle position information based solely upon a predetermined schedule is that it may take a relatively long time for direction changes of the vehicle **21** to be determined. That is, if a car thief turned at a stop light shortly after vehicle position information was sent, the change in direction would not be discovered until then next time vehicle position information was sent. If the intervals between sendings of vehicle position information are relatively long, the police may pursue the vehicle **25** in the wrong direction.

Thus, in accordance with the present invention, the controller **40** may cooperate with the vehicle position determining device **42** to determine vehicle position information based upon the vehicle **21** changing a direction of travel by greater than a threshold, at Blocks **102** and **103**. This may preferably be done in addition to sending vehicle position information at predetermined intervals, for example, as will be described further below. Of course, in some embodiments the vehicle position information may simply be determined and stored for later retrieval by the user based upon the direction changes, for example, or this may be done in addition to sending the vehicle position information to the monitoring station **30**.

The threshold may advantageously used to distinguish slight deviations in direction (e.g., from small bends in the road) from significant directional changes (e.g., turning at an intersection) which will actually be important to the police and/or user. By way of example, the threshold may be greater than about 45 degrees, although other thresholds may also be used.

Thus, in addition to regularly updating the vehicle position information at predetermined intervals, the police and/or user are also updated when the vehicle **25** changes direction. That is, the controller **40** may also cooperate with the wireless communications device **44** to send the vehicle position information to the monitoring station **30** based upon each occurrence of the vehicle **21** changing the direction of travel by greater than the threshold, at Block **104**. It will be appreciated by those of skill in the art that the vehicle position information may include direction or heading information in some embodiments, although in other embodiments basic GPS coordinate information (i.e., latitude and longitude coordinates) could be sent and the heading information determined at the monitoring station **30**.

Of course, in some embodiments the controller **40** may advantageously not send the vehicle position information to the monitoring station **30** unless the vehicle **25** changes the direction of travel by greater than the threshold. That is, vehicle position information will not be sent at predetermined intervals, but only when the direction of the vehicle **21** changes.

As a result, wireless communications charges (e.g., cellular phone charges) may be held to a minimum in those applications where continuous vehicle position updates are not required. By way of example, when tracking trucks, busses, etc. traveling on interstates, it may only be necessary to know when and where drivers get off of the interstate. As such, a significant amount of cellular phone charges may be saved by not continuously updating vehicle position information while such vehicles are traveling along a known route, (i.e., an interstate).

Referring more particularly to FIG. **11**, further details of the direction deviation tracking operation according to the invention will now be described. The controller **40** may determine the vehicle position information based not only upon the vehicle **21** changing the direction of travel by greater than the threshold (Block **102**), but this determination may also optionally be based upon the vehicle then continuing in the changed direction for greater than a predetermined period, at Block **110**. By way of example, the predetermined period may be greater than about five seconds and, more preferably, between about five and seven seconds, although other periods may also be used, as will be appreciated by those of skill in the art.

Similarly, the controller **40** may, in addition to determining the vehicle position information based upon the vehicle **21** changing the direction of travel by greater than the threshold, also optionally base this determination upon the vehicle then continuing in the changed direction at greater than a predetermined speed, at Block **111**. Preferably, the predetermined speed may be greater than about five miles per hour (MPH), but other speeds may also be used.

As a result of the steps illustrated at Blocks **110**, **111**, unwanted downloading of vehicle position information may advantageously be avoided. For example, when a vehicle makes only a temporary change in direction, such as to stop briefly at a gas station or go around something in the road, the above conditions may be used to limit the determination of vehicle position information. Again, this may result in further wireless communications charge savings.

In accordance with another advantageous aspect of the invention, the controller **40** may also determine a value of deviation in direction, at Block **112**. For example, this value of deviation may be an angular speed, such as in degrees per second. As such, the controller **40** may advantageously determine the vehicle position information based upon the value of deviation, at Block **103**.

Thus, yet another option is provided for determining whether a directional deviation is significant and requires vehicle position information to be determined or not. For example, determining angular speed may help discriminate between the vehicle **21** taking a curved on-ramp to a highway and simply turning slowly into a gas station for a brief stop. Of course, those of skill in the art will appreciate that any one or all of the steps illustrated at Blocks **110–112** may be used, or combinations thereof, to adjust the frequency with which the vehicle position information may be determined and sent for different applications.

As noted above, the controller **40** may include the memory **52** which may store the vehicle position information therein (Block **113**). The controller **40** may download the vehicle position information from the memory **52** to the monitoring station **30** based upon at least one of a predetermined schedule, a predetermined event, and the memory reaching a predetermined capacity, as noted above, at Blocks **114** and **115**.

Turning now additionally to FIG. **12**, the multiple polarity outputs **53**, which were generally illustrated in FIG. **2**, will now be described in further detail. More particularly, the controller **40** may include one or more pairs **53***a*, **53***b* of switchable polarity output terminals which may be used for controlling various vehicle devices. By way of example, such vehicle devices may include an actuator **121**, such as the door lock actuator **62** or a window actuator, for example, which may be used for performing at least one of door locking and unlocking functions or at least one of a roll up

and a roll down function, respectively. In particular, the vehicle device may include one or more pairs of input terminals, each pair being connected to a respective pair of output terminals **53***a*, **53***b*. In certain embodiments the controller **40** may advantageously include a learning mode in which it detects respective operating polarities of the input terminals of the vehicle device, as will be appreciated by those of skill in the art. Accordingly, the controller **40** may switch the pair of output terminals **53***a*, **53***b* based upon the detected operating polarities of the pair of input terminals. This learning mode may therefore save installers valuable time which might otherwise be required to manually match the polarities of the outputs **53***a*, **53***b* with vehicle device inputs.

The controller **30**, and more particularly the CPU **50**, may switch the pair of switchable polarity output terminals **53***a*, **53***b* based upon a command received by the remote transmitter **60** or by the wireless communications device **44**, for example. That is, the CPU **50** provides respective activation signals to a first output stage **122***a* of the output terminal **53***a* and a second output stage **122***b* of the output terminal **53***b* In particular, the CPU **50** may provide the activation signals substantially simultaneously, with the two activation signals having opposite polarities.

The CPU **50** may preferably activate the pair of output terminals **53***a*, **53***b* for a predetermined period, such as a few seconds to roll a window up or down, for example. On the other hand, the activation signals need only be a few seconds in duration to allow the door lock actuator **62** to perform a door locking/unlocking function. Of course, those of skill in the art will appreciate that any predetermined period may be used in accordance with the present invention.

Upon applying the activation signals to the output stages **122***a*, **122***b*, the activation signals are then passed to respective negative and positive switches **123***a*, **124***a*, and **123***b*, **124***b* of the output terminals **53***a*, **53***b*. Accordingly, only one of the switches **123***a*, **124***a* which corresponds in polarity to the activation signal applied to the output terminal **53***a* will provide an output. The same is also true with the switches **123***b*, **124***b*.

Thus, for example, if positive and negative activation signals are provided to the first and second output stages **122***a*, **122***b*, the positive output switch **124***a* will provide an output on a first output connector **125***a*, and the negative output switch **123***b* will provide an output on a second output connector **125***b*. In the embodiment illustrated in FIG. **12**, the window actuator **121** includes a first motor **126***a* for rolling a window down, and a second motor **126***b* for rolling the window up, both of which are activated based upon the polarity of signals provided thereto. Of course, in some embodiments an actuator **121** with a single motor could be used, as will be appreciated by those of skill in the art.

Accordingly, using the above example, the first motor **126***a* would receive a negative polarity signal from the first output connector **125***a* at its negative polarity terminal, and a positive polarity signal from the second output connector **125***b* at its positive polarity terminal. The first motor **126***a* will therefore be actuated, and the window will be rolled down. To the contrary, the second motor **126***b* will receive the negative polarity signal from the first output connector **125***a* at its positive polarity terminal and the positive polarity signal from the second output connector **125***b* at its negative polarity terminal, and it will therefore not be actuated.

Referring additionally to FIG. **13**, an alternate configuration is illustratively shown in which the first and second motors **126***a'*, **126***b'* are connected to the positive terminal of the vehicle battery **61'** so that they are both activated by a negative polarity signal. As previously described above, if opposite polarity activation signals are provided by the CPU **50** to the first and second output stages **122***a'*, **122***b'*, then only one of the first and second output connectors **125***a'*, **125***b'* will provide a negative polarity signal at a time. Thus, only one or the other of the first and second motors **126***a'*, **126***b'* will be actuated at a time. The case in which the first and second motors **126***a"* and **126***b"* are connected to the battery **61"** to be actuated by positive polarity signals is illustratively shown in FIG. **14**.

A more detailed schematic diagram illustrating the pair of output terminals **53***a*, **53***b* is shown in the schematic diagram of FIG. **15**. The output stages **122***a* and **122***b* may each include a resistor, and the switches **123***a*, **124***a*, **123***b*, and **124***b* may all be transistors (e.g., bi-polar transistors). The output terminals may also include resistors **150–153**, and diodes **154–157**, as illustratively shown. In the illustrated embodiment, a three-pin connector is used which includes the connectors **125***a*, **125***b*, and an additional connector **125***c* which may be used to provide power, for example, as will be appreciated by those of skill in the art. By way of example, the resistors **122***a*, **122***b*, **150**, and **152** may be 4.7 KΩ resistors, and the resistors **151**, **153** may be 47 KΩ resistors though other values may also be used.

Accordingly, it will also be appreciated that the vehicle tracking unit **25** of the present invention may advantageously require less output terminal circuitry than in prior art vehicle tracking units, since a separate positive and negative terminal does not have to be provided for each motor, etc. Further, installation of the vehicle tracking unit **25** of the present invention may be simplified since the amount of wires that have to be connected to various vehicle devices is reduced.

Another advantageous aspect of the invention will now be described with reference to the flowchart shown in FIG. **16**. Beginning at Block **160**, as noted above, the vehicle tracking unit **25** may periodically determine (Block **161**) and send (Block **162**) vehicle position information to the monitoring station **30**. Again, this may be the case when the controller **40** is in the armed or tracking mode and such information has been requested or a predetermined event has occurred, as described above. The controller **40** may detect whether a triggering event has occurred, at Block **163**, and, if so, vary a period between successive sendings of vehicle position information based upon the triggering event (Block **164**).

By using a triggering event to increase the period between successive sendings of the vehicle position information, wireless (e.g., cellular) communications charges may advantageously be reduced by sending the vehicle position information less frequently. This may also result in significantly less drain on the vehicle battery **61** and/or back-up battery **54**. On the other hand, the period between successive sendings may also be decreased based upon a triggering event, which may be particularly beneficial when police are tracking the vehicle **25** after it has been stolen, for example.

Turning more particularly to FIG. **17**, the step of determining the triggering event (Block **163** in FIG. **16**) will now be described in further detail. By way of example, the triggering event may include a vehicle speed exceeding a threshold (Block **163***a*), receiving a period change signal from the monitoring station **30** (Block **163***b*), the passing of time (Block **163***c*), and/or the memory **52** reaching a predetermined capacity (Block **163***d*).

With respect to the passage of time, a message may be sent from the monitoring station **30** to the vehicle tracking

unit to prompt the sending of vehicle position information, as previously described above. By way of example, the initial period between sendings of vehicle position information may be about two minutes. After an hour, the period between sendings may be decreased to every fifteen minutes, and after six hours the period decreased to every hour. Further, after twenty four hours have passed, the controller **40** may then increase the period between sendings to once a day. Of course, the above periods and triggering events are merely exemplary, and others may be used as well, as will be appreciated by those skilled in the art.

It should be noted here that in some embodiments the visual indicator(s) **43** may advantageously cooperate with the vehicle position determining device **42** (e.g., a GPS device) for indicating a number of GPS satellites currently accessible. Similarly, the visual indicator(s) **45** may cooperate with the wireless (e.g., cellular) telephone communications device **44** for indicating communications with a cellular base station, for example.

Turning now additionally to FIGS. **18–20**, another aspect of the present invention for using the vehicle tracking unit **25** to notify a user when the vehicle **21** has been removed from a predetermined area (i.e., a G.O. fence) will now be described. Beginning at Block **160**, the controller **40** may store a user selected reference location **180**, at Block **161**, and determine vehicle position information (Block **162**) as previously described above. For example, the user selected reference location **180** may be stored in the memory **52** (FIG. **2**).

The user selected reference location **180** may advantageously be set in several ways according to the present invention. For example, the vehicle tracking unit **25** may include one or more input devices **170** to be positioned within the vehicle **21** for setting the user selected reference location **180**. By way of example, the input device **170** may be a switch, a keyboard, a keypad, or other suitable input device known to those skilled in the art.

If a keyboard or keypad is used, for example, the user could enter desired coordinates (e.g., in latitude and longitude) of the user selected reference location **180**. The input device **170** may also cooperate with the vehicle position determining device **42** and the controller **40** to set a current vehicle position as the user selected reference location. Accordingly, a user may advantageously set the user selected reference location **180** to correspond to any desired position of the vehicle **21** simply by driving the vehicle to that position and using the input device **170**.

This may be particularly advantageous when the user allows someone to use the vehicle **21** within a limited area (e.g., as with valet parking), but wants to be notified if the vehicle **21** is removed from this area. In such situations, the user will not want to be notified of any movement of the vehicle, as these may occur frequently if the vehicle **21** is moved around, such as in a valet parking lot. Thus, the user may use the input device **170** to set the user selectable reference location **180** at the position where possession of the vehicle **21** is transferred, e.g., at the valet parking drop-off location. The user may then advantageously only be notified if the vehicle moves beyond a radial threshold distance **181** from the user selectable reference location, if desired, as will be described further below.

The controller **40** may also set the user selected reference location **180** based upon one or more signals provided by the monitoring station **30**. For example, the controller **40** may also cooperate with the vehicle position determining device **42** to set a current vehicle position as the user selected reference location **180** based upon the signal(s) provided by the monitoring station **30**. In addition, the at least one signal may simply include the user selected reference location **180**.

As illustratively shown at Block **163**, based upon the vehicle position information determined as noted above with reference to Block **162**, the controller **40** determines whether the vehicle **21** has moved beyond a radial threshold distance **181** from the user selected reference location **180**. If this is the case, the controller **40** may then cause the vehicle position information to be sent to indicate to the user that the vehicle **21** has moved beyond the radial threshold distance **181**.

In some embodiments, the vehicle position information may be sent a threshold time after (Block **164**) the vehicle **21** moves beyond the radial threshold distance **181** from the user selected reference location **180** if the vehicle has not moved back within the radial threshold distance. By so doing, a bounded area **182** defined by the user selected reference location **180** and the radial threshold distance **181** may be made smaller than with prior art approaches while still reducing unwanted false alarms. This feature may be particularly useful in the case of car dealerships, where vehicles may occasionally be driven beyond the radial threshold distance **181** for test drives, but will return to the dealership (i.e., within the bounded area **182**) within a short time.

In accordance with the invention, the input device **170** may also permit user setting of the threshold time, or this may be done by the monitoring station **30**. The radial threshold distance **181** may also be set via the input device **170** and/or the monitoring station **30**. By way of example, the radial threshold distance **181** may be less than about five miles, and the threshold time may be less than about thirty minutes, although other values may also be used in accordance with the present invention.

Another particularly useful aspect of the present invention will now be described with reference to FIG. **21**. As noted above, the vehicle **21** may include the vehicle alarm indicator **67**, which may include one or more of a vehicle horn, a vehicle siren, a vehicle parking light, a vehicle headlight, a vehicle turning direction indicator, a vehicle hazard light, and a strobe light, for example. In accordance with this aspect of the invention, beginning at Block **190**, if a user is unable to find the vehicle **21**, such as when the vehicle is parked in a crowded parking lot, the user (or monitoring station **30**) may send a vehicle finder activation signal to the vehicle tracking unit **25**, as previously described above.

Similar to some prior art vehicle tracking systems, the controller **40** may then cause the vehicle alarm indicator **67** to provide an alarm indication lasting for a predetermined time (e.g., about 60 seconds or less), at Block **193**, based upon the wireless communications device **44** receiving the vehicle finder activation signal. As such, the vehicle tracking unit **25** may therefore be used to provide an alarm indication when the vehicle security controller **28** is otherwise out of range for the uniquely coded remote transmitter **60**.

Yet, one problem which may arise with prior art tracking systems is that once the user locates the vehicle **21**, there may still be a significant amount of time left before alert indication ceases. This may be particularly true where the predetermined time is set to be relatively large. Thus, if a user finds the vehicle **21** quickly, she may have to listen to the horn sounding for a relatively long period, or start driving away with a strobe light flashing, for example.

In accordance with the present invention, the controller **40** may also determine not only whether the predetermined time has expired before ceasing providing the alarm indication, but it may also determine whether a user input has been

received, at Block **194**. Thus, the controller **40** may advantageously cause the vehicle alarm indicator **67** to cease providing the alarm indication, at Block **195**, prior to expiration of the predetermined time based upon the user input.

As noted above, the controller **40** may be switchable between armed and disarmed modes, and the user input may include switching the controller from the armed mode to the disarmed mode. By way of example, this may be done based upon the ignition switch **65**, the remote transmitter **60**, a signal received from the monitoring station **30**, and/or the security controller **28**. Alternately, the controller **40** may switch the alarm indication off based upon the ignition switch **65**, etc., irrespective of the current operating mode of the controller.

As discussed above with reference to FIG. **5A**, the controller **40** may cooperate with the wireless communications device **44** to send an alarm indication alert to the monitoring station **30** based upon at least one vehicle sensor. More particularly, referring now to FIG. **22**, beginning at Block **200** the controller **40** may determine if the vehicle sensor has been activated, for example, at Block **201**. By way of example, the sensor may include at least one of the alarm indicator **67** (i.e., vehicle horn, vehicle siren, etc.), a vehicle parking light, a vehicle headlight, a vehicle turning direction indicator, a vehicle hazard light, a vehicle door switch, and a vehicle dome light. Of course, other sensors may also be used as will be appreciated by those of skill in the art.

Once the alarm indication alert has been sent, at Block **202**, the controller **203** may then determine whether a predetermined number of alarm indication alerts have already been sent, at Block **203**. If so, the controller **40** may stop the sending of further alarm indication alerts, at Block **204**. By so doing, if the vehicle sensor has been falsely activated (e.g., the alarm indicator **67** is repeatedly activated by thunder), the user need not receive numerous alarm indication alerts and may save the wireless communications charges associated therewith. By way of example, the predetermined number of alarm indication alerts may be in a range of one to five, although other numbers may also be used.

Another flowchart illustrating yet further details in accordance with this aspect of the present invention is shown in FIG. **23**. In addition to the above described steps, after determining that the predetermined number of alarm indication alerts have been sent, the controller **40** may then determine whether the predetermined number thereof occurred within a predetermined time, at Block **210**. If so, the controller **40** may stop sending further alarm indications until the controller is reset, at Block **211**.

More particularly, the controller **40** may be switchable between armed and disarmed modes, as discussed above, and the controller **40** may be reset upon being switched between armed and disarmed modes. By way of example, the controller **40** may be switchable between armed and disarmed modes based upon the ignition switch **65**, based upon the vehicle sensor being controlled by the remote transmitter **60**, and/or based upon a signal from the monitoring station **30**. Of course, other suitable ways of switching the controller **40** between armed and disarmed modes may also be used, as will be appreciated by those of skill in the art.

Referring now to FIGS. **24** and **25**, according to another related aspect of the present invention, beginning at Block **240** the controller **40** may cooperate with the vehicle position determining device **42** and the wireless communications device **44** to send an alert message to the monitoring station **30** based upon at least one vehicle sensor, at Blocks **244**, as discussed previously above. More particularly, the at least one vehicle sensor may include the ignition switch **65**, the uniquely coded remote transmitter **60**, or other suitable vehicle sensors noted above, for example, which may be used for switching the controller **40** between armed and disarmed modes.

Thus, during normal operation, the controller **40** may cause the alert message to be sent when the vehicle tracking unit **25** (i.e., the controller **40**) is in the active mode (e.g., the ignition switch **65** is in the off position) and a triggering event occurs (e.g., the vehicle **21** is moved), at Blocks **252–254**. The normal operation is illustratively shown as concluding at Block **255** for clarity of illustration, but those of skill in the art will appreciate that additional alert messages may be sent in some embodiments. It should also be noted that in some embodiments the alert message may also be sent when the controller **40** is in the disarmed mode (as opposed to the armed mode).

By way of example, if the vehicle **21** was broken down on the side of the road and the user had to leave the vehicle until a tow truck arrived, the user could accordingly place the controller **40** in the armed mode so he will be alerted if the vehicle is moved. Yet, the user would not want to receive alert messages resulting from the tow truck moving the vehicle **21**, which may not only be an inconvenience but may also result in significant wireless (e.g., cellular) communications charges for the user.

In accordance with this aspect of the invention, the vehicle tracking unit **25** (i.e., controller **40**) may also be switchable to an override mode, at Block **242**, to prevent sending of the alert message, as illustratively shown by the conclusion step at Block **245**, based upon receiving an alert override message from the monitoring station **30**. This switching may be performed irrespective of whether the controller **40** is in the armed mode or the disarmed mode. Using the above example, the user may therefore cause the controller **40** to be switched to the override mode once the tow truck has picked up the vehicle **21** so that he will no longer receive the alert indication.

Of course, the override mode may be disengaged, at Block **256**, once the user wants to start receiving alert messages again. By way of example, the controller **40** may disengage the override mode based upon the vehicle ignition switch **65** being switched between on and off positions, and more particularly from the off to the on position (i.e., the next time the user starts the vehicle **21**). Additionally, an override disengage message may also be sent from the monitoring station **30** to the vehicle tracking unit **25**, and the controller **40** may cooperate with the wireless communications device **44** to receive the override disengage message and disengage the override mode based thereon.

Also, the controller **40** may disengage the override mode based upon an operable vehicle device being controlled by the remote transmitter **60**, as discussed previously above. Again, the operable vehicle device may include at least one of a vehicle alarm device (e.g., the security controller **28**), a keyless entry device and/or the door lock actuator **62**, the engine starter interrupt device **66**, and the remote starter device **63**, for example. If the override mode is not disengaged, no further alert messages may be sent (Block **257**), but if it is then normal operation may resume as described above.

As previously noted, the monitoring station **30** may include a user interface for accepting at least one command from a user and sending at least one alert to the user, such as the Internet interface **34** and/or the telephone network

interface **33**, for example (FIG. **3**). Of course, in some embodiments the monitoring station **30** may also be a user's computer, telephone, personal data assistant (PDA), or other suitable device which may send/receive signals directly to/from the vehicle tracking unit **25** via a wireless communications network, for example.

Referring now to FIGS. **26–28**, in accordance with yet another aspect of the present invention the vehicle tracking unit **25** may further include a security device detection circuit **260** for at least one vehicle security device, such as the alarm indicator **67**, for example. As illustrative shown, the security device detection circuit **260** may be connected to the controller **40**, and the controller may cooperate with the wireless communications device **44** and the security device detection circuit for sending security signals to the monitoring station **30** based upon the security device detection circuit, at Block **271**.

By way of example, the controller **40** may cause the security signals to be sent to the monitoring station **30** based upon the security device detection circuit **260** detecting that the alarm indicator **67** has been activated. It should be noted that although the security device detection circuit **260** is illustratively shown as being separate from the controller **40** in FIG. **26**, this circuitry may well be included within the controller in some embodiments, or even implemented in software to be run on the CPU **50**, for example, as will be appreciated by those of skill in the art.

As previously noted above, the vehicle tracking unit **25** in accordance with the present invention may advantageously receive one or more command signals (Block **272**) (e.g., from the remote transmitter **60** and/or the monitoring station **30**) and perform corresponding vehicle functions based thereon. For example, the command signals may include car find command signals for causing the vehicle security controller **28** to activate the alarm indicator **67** and/or remote start command signals for causing the remote start device **63** to start the vehicle **21**.

Yet, one problem which may be encountered when the controller **40** causes such functions to be implemented is that by causing the alarm indicator **67** to be turned on so that the user can locate the vehicle **21**, the security device detection circuit **260** will detect the activation thereof. Thus, the controller **40** will be prompted to send a security signal to the user, even though the user was the one who sent the car find command signal. The same may also be the case with a remote start command signal, which may otherwise cause the security controller **28** to determine that the vehicle **21** is being stolen and trigger the alarm indicator **67**.

As such, in accordance with this aspect of the present invention, the controller **40** may perform the at least one predetermined vehicle function while bypassing sending the security signals, i.e., bypassing the security device detection circuit **260**, at Block **273**. Once the function has been performed, at Block **274**, then the normal sending of security signals may resume. Accordingly, even though performing the at least one vehicle function may otherwise activate the alarm indicator **67**, for example, the vehicle tracking unit **25** may advantageously avoid sending unwanted security signals to the user, which may result in a significant savings in wireless communications costs.

Once again, the controller **40** may be switchable between armed and disarmed modes, and the controller may perform the at least one predetermined vehicle function based upon receiving the corresponding command signal via the wireless communications device while in the armed mode, at Block **280**. The controller **40** may also cease bypassing the security device detection circuit **260** based upon a predetermined input, or after a predetermined period, at Block **281**. More particularly, the predetermined period could be measured from the time when the corresponding command signal is received, or from the time the corresponding vehicle function is completed, for example.

By way of example, the predetermined input may include switching the ignition switch **65** between on and off positions, or a deactivation of the at least one security device (i.e., the alarm indicator **67**). Use of the predetermined period may be particularly advantageous in the case of remote starting the vehicle **21**, in which case the function of starting the vehicle may last a relatively short time but the alarm indicator **67**, if activated, could continue to provide an alert for much longer. Accordingly, the predetermined period could be set to be slightly longer than the time which the security controller **28** is programmed to activate the alarm indicator **67**.

Turning now additionally to FIGS. **29–31**, another aspect of the invention for a battery power saving mode will now be described. By way of example, the power saving mode may be particularly applicable when the vehicle tracking unit **25** is switched to the armed mode based upon the ignition switch **65** being switched off, as previously discussed above.

As will be appreciated by those of skill in the art, the wireless communications device **44** may include a receiver **291**, and a transmitter **292** for communicating with the monitoring station **30**. As noted above, the vehicle tracking unit **25** may include the security device detection circuit **260**, and it may also include a battery sensing circuit **290** for sensing a voltage of at least one of the back-up battery **54** and the vehicle battery **61**.

Beginning at Block **300**, the controller **40** may cooperate with the battery sensing circuit **290** to determine whether a voltage of the battery supplying power to the vehicle tracing unit **25** (which could be either the vehicle battery **61** or the back-up battery **54**, for example) has fallen below a threshold, at Block **301**. In the case of the vehicle battery **61**, the threshold may advantageously be set to a voltage level required to start the vehicle (e.g., greater than about 11.5 Volts). For the back-up battery **54**, the threshold may correspond to a voltage level sufficient to allow the transmitter **292** to continue sending security and/or position signals.

If the sensed battery voltage is below the threshold, the controller **40** may then disable operation of the receiver **291**, at Block **303**. In some embodiments, the controller **40** may wait a predetermined period before disabling the operation of the receiver **291**. The controller **40** may preferably enable operation of the transmitter **292** irrespective of the sensed battery voltage (i.e., even when the sensed voltage falls below the threshold), at Block **304**, thus concluding the power saving mode (Block **305**).

As such, the controller **40** may advantageously allow the receiver **291**, which may consume a significant amount of battery power, to remain on as long as possible while preserving enough battery power to allow the vehicle **21** to be started (i.e., when the vehicle battery **61** is supplying power) and/or to allow other components of the vehicle tracking unit **25** to function properly. Accordingly, the controller **40** may still cooperate with the wireless communications device **44** to send security and/or position signals to the monitoring station **30**.

In particular, the controller **40** may enable operation of the receiver **291** based upon the sensed battery voltage being above the threshold for a predetermined duration, at Block **312**. Accordingly, if the sensed voltage only momentarily falls below the threshold, the receiver **291** will not unnec-

essarily be disabled and incoming signals potentially missed. To this end, the receiver **291** when enabled may operate substantially continuously, and the transmitter **292** when enabled may operate substantially intermittently based upon the security device detector circuit **260** to send security signals, as previously discussed above.

To provide even further power savings, the controller **40** may also enable operation of the vehicle position determining device **42** based upon the sensed battery voltage being above the threshold, at Block **313**, and disable operation of the vehicle position determining device **42** based upon the sensed battery voltage being below the threshold, at Block **310**. Again, the controller **40** may enable operation of the vehicle position determining device based upon the sensed battery voltage being above the threshold for the predetermined duration (Block **312**).

Of course, those of skill in the art will appreciate that while a single duration has been illustrative shown in FIG. **31** for clarity of illustration, separate durations (or even separate voltage thresholds) could be used for enabling the receiver **291** and the vehicle position determining device **42**. Moreover, if the vehicle tracking unit **25** includes additional components (e.g., an upgrade device, as will be discussed further below), such components may also be similarly disabled to further conserve power, as will be appreciated by those of skill in the art. It should be noted that the controller **40** may also advantageously cooperate with the wireless communications device **44** in some embodiments to send a low power message to the monitoring station **30** based upon the sensed battery voltage being below the threshold, at Block **311**. Here again, the controller **40** may delay a predetermined time before so doing in some embodiments.

Referring now to FIGS. **32** and **33**, the vehicle tracking unit **25** may also include a housing **320** for carrying the various components thereof (i.e., the vehicle position determining device **42**, the wireless communications device **44**, the controller **40**, etc.). Additionally, an upgrade connector **321** may be carried by the housing **320** and coupled to the controller **40**. As such, in accordance with another advantageous aspect of the invention, an upgrade device **322** may be removably coupled to the upgrade connector **321**, as illustratively shown in FIG. **32**, for causing the controller **40** to perform at least one vehicle function.

More particularly, the vehicle tracking unit **25** may further include one or more remote transmitters **60** to be carried by a user, and the upgrade device **322** may include a receiver **330** for causing the controller **40** to perform the at least one vehicle function based upon signals from the remote transmitter. The remote transmitter **60** may generate pseudorandomly coded signals, for example, to provide enhanced security, as will be appreciated by those of skill in the art.

Numerous vehicle functions may be performed based upon the type of upgrade device **322** that is used. By way of example, such vehicle functions may include either locking or unlocking vehicle doors via the door lock actuator **62**, remote starting the vehicle's engine via the remote start device **63**, and/or activating the alarm indicator **67**. Other vehicle functions may also be performed, as will be appreciated by those of skill in the art. Moreover, a given upgrade device **322** may provide one or more of such functions. Accordingly, a user may install the vehicle tracking unit **25** and at a later time relatively easily upgrade the vehicle tracking unit to provide such additional functionality. Furthermore, the upgrade device **322** may utilize some of the control circuitry already provided in the controller **40**, so both space and cost savings may potentially be realized.

The upgrade device **322** may be powered by the vehicle battery **61** via the upgrade connector **321**. More particularly, the vehicle tracking unit **25** may further include a voltage regulator **331** carried by the housing **320** and coupled to the vehicle battery **61**, and the upgrade device **322** may be powered by the voltage regulator via the upgrade connector **321**. More particularly, the voltage regulator **331** may provide a voltage to the upgrade device **322** that is lower than a voltage of the vehicle battery **61**.

By way of example, the vehicle battery **61** may provide about twelve Volts, while the upgrade device **322** may preferably operate off about five Volts. Of course, other voltages may also be used. Further, the back-up battery **54** may also be carried by the housing **320**, as illustratively shown in FIG. **33**, and the upgrade device **322** may be selectively powered by the back-up battery **54** via the upgrade connector **321**.

A serial communications link **332** may be used to connect the controller **40** and the upgrade device **322** via the upgrade connector **321**. In some embodiments, the upgrade device **322** may also include one or more connectors **323** to be connected to at least one vehicle device. Thus, instead of controlling the various vehicle devices via the controller **40**, the upgrade device may directly control vehicle devices via the connector **323**.

By way of example, for an alarm/keyless entry upgrade device embodiment, connectors **323** may be included for a valet switch, an LED light (or lights), shock sensors, door and hood trigger wires, and for flashing vehicle lights, as will be appreciated by those of skill in the art. In another embodiment for a remote start upgrade device, connectors **323** may be included for the car starter relays to be connected thereto, for example. Of course, other connector types known to those of skill in the art may also be used.

Another advantageous aspect of the invention will now be described with reference to FIGS. **34** and **35**. As noted above, the controller **40** may cooperate with the vehicle position determining device **42** and the wireless communications device **44** to send vehicle position information to the monitoring station **30** based upon receiving an activation signal via a communications network.

In accordance with this aspect of the invention, beginning at Block **340** the controller **40** may selectively cause the vehicle tracking unit **25** to be in a low power mode, at Block **341**, to conserve power, as discussed previously above. The controller **40** may also cooperate with the wireless communications device **44** to intermittently awaken the vehicle tracking unit **25** from the low power mode to poll the communications network (Block **342**) to thereby determine whether the activation signal has been directed to the vehicle tracking unit, at Block **343**. The polling may advantageously be relatively short (e.g., less than a minute) to reduce both power consumption and wireless communications charges.

The vehicle position information may then be sent to the monitoring station **30** one or more times, at Block **344**, as previously described above, concluding this aspect (Block **345**). As such, the monitoring station **30** need not be synchronized with the vehicle tracking unit **25** because the user does not have to send the activation during a brief window when the unit is active, as is the case with some prior art vehicle tracking units.

In particular, the controller **40** may selectively cause the vehicle tracking unit **25** to be in the low power mode based upon the vehicle's engine being off. Moreover, the controller **40** may detect the engine being off based upon the vehicle ignition switch **65** being switched to an off position. Also, the controller **40** may selectively cause the vehicle tracking unit **25** to be in the low power mode responsive to the passage of a predetermined time since the engine was turned

off, and/or responsive to a voltage of the vehicle battery **61** dropping below a threshold.

The communications network may be a cellular communications network, for example. The cellular communications network may store indications of missed calls, and the activation signal may be stored as at least one missed call by the cellular communications network, as will be appreciated by those skilled in the art. Alternately, the cellular communications network may store voice mail messages, and the activation signal may be stored as a voice mail message by the cellular communications network. Further, the cellular communications network may transmit data packets and/or voice data, as will also be appreciated by those skilled in the art.

The controller **40** may also cooperate with the wireless communications device **44** for determining when the communications network is out of range, at Block **350**, and for determining when the communications network is back in range after being out of range, at Block **351**. The communications network may then be polled as discussed above when back in range of the vehicle tracking unit **25** to determine whether the activation signal has been directed to the vehicle tracking unit while the communications network was out of range. Thus, both missed activation signals sent while the vehicle tracking unit **25** is in the low power mode and/or out of range may still be received. It should be noted that either one or both of these options may be used in various embodiments.

The communications network may also provide a notification to the monitoring station **30** upon being polled by the wireless communications device, at Block **352**. The controller **40** may also wait a predetermined time after receiving the activation signal before selectively causing the vehicle tracking unit **25** to return to the low power mode. For example, the predetermined time may be on the order of a few minutes. In addition, the wireless communications device may include a receiver **291**, as noted above, and the controller **40** may cause the receiver to be turned off when the vehicle tracking unit **25** is in the low power mode. Intervals of awakening the vehicle tracking unit **25** from the low power mode may be in a range of about 12 to 48 hours, for example, though other intervals may also be used.

In an alternate embodiment of the invention illustratively shown in FIG. **36**, the vehicle **21** may include a vehicle data bus **360** extending throughout the vehicle and which is connected to one or more operable vehicle devices. As illustratively shown, such operable vehicle devices may include the vehicle alarm indicator **67** (e.g., horn, siren, etc.), a keyless entry device, the engine starter interrupt device **66**, the remote start device **63**, the door lock actuator **62**, and the vehicle security controller **28**, although others may also be included as will be appreciated by those of skill in the art. Furthermore, other devices to be monitored, such as the ignition switch **65**, may also be connected to the vehicle data bus **360**, for example.

Furthermore, one or more of the operable vehicle devices may be responsive to at least one data bus code received on the vehicle data bus **360**. More particularly, each of the above listed operable vehicle devices may have one or more unique data bus codes assigned thereto which, when received, cause a respective operable vehicle device to perform a particular function, as will be understood by those skilled in the art.

As such, a method according to the present invention is illustratively shown in FIG. **37** in which, beginning at Block **370**, the controller **40** generates at least one data bus code on the vehicle data bus **360** to control at least one operable vehicle device based upon a command signal received by the wireless communications device **44**, at Blocks **371** and **372**. Accordingly, the user may not only use the vehicle tracking unit **25** to control numerous vehicle devices, but separate connections between such devices and the controller **40** need not be made. Instead, each of the operable vehicle devices may conveniently be connected to the vehicle data bus **360**, which may make the installation thereof easier.

In some embodiments, the command signal received by the wireless communications device **44** may include the at least one data bus code. Alternately, the command signal may relate to the at least one data bus code, and the controller **40** may process the command signal to generate the at least one data bus code on the vehicle data bus **360**, as will be understood by those skilled in the art.

Further, the command signal may be provided by the monitoring station **30**, and the controller **40** may optionally cooperate with the wireless communications device **44** to send a response message to the monitoring station based upon receiving the command signal, at Block **373**, thus ending the method (Block **374**). By way of example, the wireless communications device **44** may receive the vehicle data bus device code via a wireless pager network, although other suitable communications formats may also be used.

Another advantageous aspect of the invention if for a vehicle control system including the vehicle tracking unit **25** and a function controller, which may cooperate to alert a user that uniquely coded transmitters have been learned by the vehicle function unit, will now be described with reference to FIGS. **38** and **39**. By way of example, the function unit may be the vehicle security system **27**, and the functions performed thereby may include security and/or door locking/unlocking functions, as previously described above.

Of course, in some embodiments the function unit may be the door lock actuator **62** itself responsive to a remote transmitter **60** for performing door lock/unlock functions. Another example of a function unit is the remote start device **63** for starting the vehicle's engine, also described above. Of course, other function units may also be used, as will be appreciated by those of skill in the art. It should be noted that while the various function units noted above are illustratively shown as being separate devices from the vehicle tracking unit **25**, in some embodiments these units may be included within a single device, as will be understood by those of skill in the art. In particular, as described above, a remote start device and/or security controller may be embodied in an upgrade device **322** to be connected or plugged into the upgrade connector **321**, for example.

Using the example of the vehicle security system **27** as the function unit, as illustratively shown in FIG. **36**, the function unit may include one (or more) uniquely coded transmitter **60** to be carried by a user, and a receiver **29** at the vehicle **21** for receiving signals from the uniquely coded transmitter, at Blocks **380–381**. The function unit **27** may also include a function controller (the vehicle security controller **28** in the present example) at the vehicle **21** and connected to the receiver **29**. The function controller **28** cooperates with the receiver **29** to learn the uniquely coded transmitter **60** to permit control of one or more vehicle functions (here, security and/or door locking/unlocking functions) by the user, at Block **382**.

In accordance with this aspect of the invention, the function controller **28** may advantageously cooperate with the wireless communications device **44** of the vehicle tracking unit **25** for sending an alert indication of whether one or more new uniquely coded transmitters have been learned, at Block **383**, thus concluding the method (Block **384**).

Accordingly, if the uniquely coded transmitter **60** learned by the function controller **28** is an unauthorized transmitter, such as one a would-be thief may use to attempt to gain access to the vehicle **21**, the user will advantageously be notified of this fact and may alert the proper authorities.

The vehicle control system may further include a local indicator (a vehicle security system indicator **361** in the illustrated example of FIG. **36**) connected to the function controller **28** for providing a local indication of whether one or more uniquely coded transmitters **60** have been learned. Thus, if the user for some reason does not receive the alert indication to this effect, he will still be notified of this fact upon returning to the vehicle **21**.

In addition, the function controller **28** may be switchable to a learning mode to permit learning of the at least one uniquely coded transmitter, at Block **390**, and the function controller may cooperate with the wireless communications device **44** for sending the alert indication when the learning mode has been entered, for example, as may be seen in FIG. **39**. Moreover, the function controller **28** may cooperate with the wireless communications device **44** for sending the alert indication when the learning mode has last been entered.

Additionally, the function controller **28** may cooperate with the wireless communications device **44** for sending the alert indication for a passage of time since the learning mode has last been entered, at Block **391**. Similarly, the function controller **28** may cooperate with the wireless communications device **44** for sending the alert indication for a number of learned uniquely coded transmitters, as well as for sending the alert indication for a change in a number of learned uniquely coded transmitters **60**, and/or for sending the alert indication for a change in a code of at least one learned uniquely coded transmitter. The uniquely coded transmitter (s) **60** may be at least one of a uniquely coded remote transmitter and a uniquely coded transponder transmitter, for example, as will be appreciated by those skilled in the art.

In accordance with a similar aspect of the invention, the function unit **28** may instead of, or in addition to, the uniquely coded transmitter **60** also include a biometric characteristic sensor **362** for sensing a unique biometric characteristic of a user, at Block **401**. In this embodiment, the function controller **28** may similarly learn the unique biometric characteristic, at Block **402**, to permit control of a vehicle function by the user.

Again, the function controller **28** may cooperate with the wireless communications device **44** for sending (Block **403**) an alert indication of whether at least one new unique biometric characteristic has been learned, thus concluding the method (Block **404**). Of course, the learning mode, time-delayed sending, and location indication steps described above may similarly be performed with respect to learning biometric characteristics, as illustratively shown at Blocks **410–412**, respectively.

Turning now to FIGS. **42** and **43**, another advantageous aspect of the invention for determining fault conditions of the vehicle tracking unit **25** will now be described. More particularly, beginning at Block **420**, the controller **40** may monitor operation of the vehicle **21** and determine a fault condition of at least one of the vehicle position determining device **42** and the wireless communications device **44** based upon a failure thereof over a predetermined pattern of vehicle operation, at Blocks **422–423**. By way of example, the fault condition may be based upon a received signal strength, although other faults may also be indicated.

Moreover, the controller **40** may also store the fault condition, at Block **424**, and permit retrieval of the stored fault condition, at Block **425**, thus concluding the fault sensing operation (Block **426**). In particular, the controller **40** may monitor the operation of the vehicle **21** by monitoring the vehicle's ignition (e.g., via the ignition switch **65**), for example, to determine whether the ignition has been operational for greater than a time threshold (e.g., fifteen minutes), at Block **430**. Thus, occurrences of determining momentary operational errors (e.g., failure of the wireless communications device **44** to communicate with a communications network due to interference) as significant fault conditions may be reduced.

The predetermined pattern of vehicle operation may include a series of successive operations of the ignition. That is, a predetermined number of faults (e.g., two) will need to occur, at Block **428**, before the local fault indication is provided (Block **431**). Here again, this also helps to increase the likelihood that only a true fault condition will result in a fault indication being provided.

Further, if, at any time after the fault condition has been determined but before the fault indication is provided, the fault condition is corrected (e.g., the wireless communications device **44** comes back in range of a communications network after being out of range for an extended period), at Block **427**, the controller **40** may determine that the device in question is in fact working. In such event, the fault count may be reset, at Block **429**, and the fault monitoring process may begin again.

The controller **40** may permit user retrieval of the stored fault condition based upon selective operation of the ignition switch and/or remotely by the monitoring station **30** upon request. Regarding the former, an indicator **363** (FIG. **36**) may also be connected to the controller **40** to provide a local fault indication based upon retrieval of the stored fault condition. By way of example, the indicator **363** may include at least one of an audible and a visual indicator, such as a tone generator or an LED. Of course, one or more of the other indicators noted above may also be used for this purpose.

It should be noted that the controller **40** may determine and store fault conditions of one or both the vehicle position determining device **42** and the wireless communications device **44** in various embodiments. Similarly, the local fault indication may correspond to either the vehicle position determining device **42**, the wireless communications device **44**, or both.

In accordance with another aspect of the invention described now with reference to FIGS. **44** and **45**, beginning at Block **440** the controller **40** may also monitor the vehicle alarm indicator **67** to determine triggering thereof, at Block **441**, and monitor at least one power supply to determine a change therein, at Block **442**. More particularly, the at least one power supply may be the vehicle battery **61** or the back-up battery **54**. By way of example, the controller may monitor the vehicle battery **61**/back-up battery **54** via the battery sensing circuit **290** (FIG. **29**), which may be connected to one or both of these batteries. Further, the controller **40** in cooperation with the wireless communications device **44** may cause at least one alert to be sent to the monitoring station **30** based upon both triggering of the vehicle alarm indicator **67** and a change in the at least one power supply, at Block **443**, to conclude notification to the user (Block **444**).

More particularly, the at least one alert may include a first alert (Block **451**) based upon the alarm indicator **67** being triggered, and a second alert (Block **452**) based upon the voltage of the at least one power supply (e.g., the vehicle battery **61**) being below a threshold, as illustratively shown in FIG. **45**. By way of example, the threshold may be less

than about 4 Volts, although other thresholds may also be used. To this end, the vehicle tracking unit **25** in such embodiments will preferably include the back-up battery **54** for providing back-up power to the controller **40** and the wireless communications device **44** upon such a drop in voltage of the vehicle battery **61**.

Accordingly, the vehicle tracking unit **25** of the present invention will advantageously send the second alert even if the first alert is not sent. For example, in some embodiments the controller **40** may monitor the vehicle alarm indicator **67** to determine triggering thereof continuously for greater than a predetermined time (e.g., a few seconds), at Block **450**, before sending the first alert, at Block **451**. This may be done to allow a user time to deactivate an errantly generated alarm condition before the first alert is sent and wireless communications charges unnecessarily incurred.

Yet, because of this delay period, a would-be thief could potentially cut the battery cable quickly enough to prevent the first alert from ever being sent. Nonetheless, by so doing, in accordance with the present invention the second alert will still be sent, and the user will therefore still be notified of the attempted theft of the vehicle **21**. It should be noted that the controller **40** may also monitor the vehicle alarm indicator **67** to determine triggering in a repetitive pattern (Block **450**), either in addition to or instead of monitoring for continuous triggering for a predetermined time, before sending the first alert. Further, instead of monitoring the vehicle battery **61** for a drop in voltage provided thereby to determine that the battery cables have been cut, this could also be done based upon detecting a sudden power drain on the back-up battery **54**, which would also provide an indication that the cables to the vehicle battery had be severed.

Turning now to FIGS. **46** and **47**, an additional aspect of the invention will now be described for performing diagnostics of output driver circuits (i.e., the outputs **53** described above) for various vehicle devices and, correspondingly, whether the CPU **50** is providing correct output signals thereto. In accordance with this aspect of the invention, beginning at Block **461** the controller **40** may be switchable to a diagnostic mode, at Block **461**, wherein at least one output driver circuit **53** is tested, at Block **462**. Results of the testing may be indicated by one or more local diagnostic indicators, at Block **463**, such as the previously noted indicators **363**, **43**, **45**, for example, concluding the diagnostic operations (Block **464**).

More particularly, the input device **170** (e.g., a switch) and/or a diagnostic signal received from the monitoring station **30** via the controller **40** and the wireless communications device **44** may be used for switching the controller to the diagnostic mode, at Block **470**. In some embodiments, the controller **40** when in the diagnostic mode may determine whether each driver circuit **53** is connected to respective vehicle devices, at Block **471**, to define one or more respective connected output driver circuits **53**. Thus, the controller **40**, when in the diagnostic mode, may advantageously test only the output driver circuit or circuits **53** which are connected, if desired. Of course, this need not be the case, and it will be appreciated by those skilled in the art that the output driver circuits **53** may advantageously be tested without being connected, so that the vehicle tracking unit **25** of the present invention can be tested prior to installation, for example.

By way of example, the controller **40** when in the diagnostic mode may sequentially test a plurality (or all) of the output driver circuits **53** (Block **472**). Thus, by knowing which output driver circuits **53** will be tested in the diagnostic mode (e.g., which ones are connected to vehicle devices), the user may relatively easily determine which of the output driver circuits, if any, are not functioning correctly when a corresponding indication is not provided in the sequence of indications, as will be understood by those of skill in the art.

As illustratively shown in FIGS. **46** and **47**, the controller **40** may cooperate with the diagnostic indicator(s) **363**, for example, so that it is only operable when the controller is in the diagnostic mode. This feature may be particularly beneficial when an output driver circuit **53** is connected to a particular vehicle device, as the local diagnostic indicator **363** may otherwise provide an unwanted indication each time the vehicle device is activated during normal use, as will be appreciated by those of skill in the art.

As noted above, the local diagnostic indicator **363** may include an audible indicator and/or a visual indicator. In some embodiments, a respective diagnostic indicator **363** may be included for each output driver circuit **53**, although this is not required. The controller **40** may also cooperate with the wireless communications device **44** to send test result indications to the monitoring station **30**, at Block **473**. As such, the user and/or a monitoring service may remotely determine whether the vehicle tracking unit **25** is functioning correctly.

Other features relating to vehicle tracking units and systems are disclosed in co-pending patent applications entitled VEHICLE TRACKER CONSERVING CODES AND RELATED METHODS, application Ser. No. 09/859,673; VEHICLE TRACKER WITH POWER SAVING FEATURES AND RELATED METHODS, application Ser. No. 09/859,728; VEHICLE TRACKER COOPERATING WITH A STARTER INTERRUPT AND RELATED METHODS, application Ser. No. 09/859,973; VEHICLE TRACKER WITH USER NOTIFICATIONS AND ASSOCIATED METHODS, application Ser. No. 09/859,733; VEHICLE TRACKER WITH USER REGISTRATION REMINDER AND RELATED METHODS, application Ser. No. 09/859,971; VEHICLE TRACKER INCLUDING INPUT/OUTPUT FEATURES AND RELATED METHODS, application Ser. No. 09/859,972; and VEHICLE TRACKER WITH TEST FEATURES AND RELATED METHODS, application Ser. No. 09/859,729; VEHICLE TRACKING UNIT PROVIDING DIRECTION DEVIATION TRACKING AND RELATED METHODS, attorney docket no. 58113; VEHICLE TRACKER HAVING SWITCAHABLE POLARITY OUTPUT TERMINALS AND RELATED METHODS, attorney docket no. 58114; VEHICLE TRACKING OUT PROVIDING VARIABLE FREQUENCY TRANSMISSION AND RELATED METHODS, attorney docket no. 58115; VEHICLE TRACKER HAVING FIND ALERT FEATURES AND RELATED METHODS, attorney docket no. 58116; VEHICLE TRACKER PROVIDING VEHICLE ALARM ALERT FEATURES AND RELATED METHODS, attorney docket no. 58117; VEHICLE TRACKER INCLUDING OVERRIDE FEATURE AND RELATED METHODS, attorney docket no. 58118; VEHICLE TRACKER INCLUDING SECURITY DEVICE MONITORING BYPASS FEATURE AND RELATED METHODS, attorney docket no. 58119; VEHICLE TRACKER INCLUDING BATTERY MONITORING FEATURE AND RELATED METHODS, attorney docket no. 58120; VEHICLE TRACKER INCLUDING A CONNECTOR FOR AN UPGRADE DEVICE AND RELATED METHODS, attorney docket no. 58125; VEHICLE TRACKER INCLUDING MISSED CALL FEATURE AND RELATED METHODS, attorney docket no. 58126; VEHICLE TRACKING UNIT

FOR CONTROLING OPERABLE VEHICLE DEVICES USING A VEHICLE DATA BUS AND RELATED METHODS, attorney docket no. 58127; VEHICLE CONTROL SYSTEM FOR CONTROLLING A VEHICLE FUNCTION INCLUDING A VEHICLE TRACKING UNIT AND RELATED METHODS, attorney docket no. 58135; VEHICLE TRACKING UNIT WITH FAULT CONDITION DIAGNOSIS AND RELATED METHODS, attorney docket no. 58138; VEHICLE TRACKING UNIT PROVIDING THEFT ALERT NOTIFICATIONS AND RELATED METHODS, attorney docket no. 58139; and VEHICLE TRACKING UNIT HAVING A SELF DIAGNOSTIC MODE AND RELATED METHODS, attorney docket no. 58140, the entire disclosures of which are hereby incorporated herein by reference.

Many modifications and other embodiments of the invention will come to the mind of one skilled in the art having the benefit of the teachings presented in the foregoing descriptions and the associated drawings. Therefore, it is understood that the invention is not to be limited to the specific embodiments disclosed, and that modifications and embodiments are intended to be included within the scope of the appended claims.

That which is claimed is:

1. A tracking unit for a vehicle comprising:

a vehicle position determining device;

a wireless communications device;

a controller cooperating with said wireless communications device and said vehicle position determining device to determine and send vehicle position information to a monitoring station, said controller storing a user selected reference location; and

at least one input device to be positioned within the vehicle for setting the user selected reference location;

said controller sending the vehicle position information based upon the vehicle moving beyond a radial threshold distance from the user selected reference location.

2. The vehicle tracking unit according to claim 1 wherein the radial threshold distance is less than about five miles.

3. The vehicle tracking unit according to claim 1 wherein the vehicle position information is sent a threshold time after the vehicle moves beyond the radial threshold distance from the user selected reference location if the vehicle has not moved back within the radial threshold distance; and wherein said at least one input device also permits user setting of the threshold time, and the threshold time is set by at least one of said monitoring station and said at least one input device.

4. The vehicle tracking unit according to claim 3 wherein the threshold time is less than about thirty minutes.

5. The vehicle tracking unit according to claim 1 wherein said at least one input device comprises at least one of a switch, a keyboard, and a keypad.

6. The vehicle tracking unit according to claim 1 wherein said controller comprises at least one memory for storing the user selected reference location and vehicle position information therein.

7. The vehicle tracking unit according to claim 1 wherein said at least one input device cooperates with said vehicle position determining device and said controller to set a current vehicle position as the user selected reference location.

8. The vehicle tracking unit according to claim 1 wherein said controller also sets the user selected reference location based upon at least one signal provided by the monitoring station.

9. The vehicle tracking unit according to claim 8 wherein said controller cooperates with said vehicle position determining device to set a current vehicle position as the user selected reference location based upon the at least one signal provided by the monitoring station.

10. The vehicle tracking unit according to claim 8 wherein the at least one signal includes the user selected reference location.

11. The vehicle tracking unit according to claim 1 wherein said vehicle position determining device comprises a Global Positioning System (GPS) device.

12. A tracking unit for a vehicle comprising:

a vehicle position determining device, a wireless communications device, and a controller cooperating with said wireless communications device and said vehicle position determining device to determine and send vehicle position information to a monitoring station;

said controller storing a user selected reference location;

said controller also sending the vehicle position information a threshold time after the vehicle moves beyond a radial threshold distance from the user selected reference location if the vehicle has not moved back within the radial threshold distance.

13. The vehicle tracking unit according to claim 12 wherein the radial threshold distance is less than about five miles.

14. The vehicle tracking unit according to claim 12 wherein the threshold time is less than about thirty minutes.

15. The vehicle tracking unit according to claim 12 wherein the vehicle tracking unit further comprises at least one input device to be positioned within the vehicle for permitting user setting of the threshold time.

16. The vehicle tracking unit according to claim 15 wherein said at least one input device comprises at least one of a switch, a keyboard, and a keypad.

17. The vehicle tracking unit according to claim 12 wherein the threshold time is set by the monitoring station.

18. The vehicle tracking unit according to claim 12 wherein said controller comprises at least one memory for storing the user selected reference location and vehicle position information therein.

19. The vehicle tracking unit according to claim 12 wherein said controller sets the user selected reference location based upon at least one signal provided by the monitoring station.

20. The vehicle tracking unit according to claim 19 wherein said controller cooperates with said vehicle position determining device to set a current vehicle position as the user selected reference location based upon the at least one signal provided by the monitoring station.

21. The vehicle tracking unit according to claim 19 wherein the at least one signal includes the user selected reference location.

22. The vehicle tracking unit according to claim 12 wherein said vehicle position determining device comprises a Global Positioning System (GPS) device.

23. A tracking unit for a vehicle comprising:

a vehicle position determining device, a wireless communication device, and a controller cooperating with said wireless communications device and said vehicle position determining device to determine and send vehicle position information to a monitoring station;

said controller storing a user selected reference location;

said controller also sending the vehicle position information based upon the vehicle moving beyond a radial threshold distance from the user selected reference location.

24. The vehicle tracking unit according to claim 23 wherein the radial threshold distance is less than about five miles.

25. The vehicle tracking unit according to claim 23 wherein the vehicle position information is sent a threshold time after the vehicle moves beyond the radial threshold distance from the user selected reference location if the vehicle has not moved back within the radial threshold distance; and further comprising at least one input device to be positioned within the vehicle for setting the user selected reference location.

26. The vehicle tracking unit according to claim 25 wherein the threshold time is less than about thirty minutes.

27. The vehicle tracking unit according to claim 25 wherein said at least one input device also permits user setting of the threshold time.

28. The vehicle tracking unit according to claim 25 wherein said at least one input device comprises at least one of a switch, a keyboard, and a keypad.

29. The vehicle tracking unit according to claim 25 wherein the threshold time is set by the monitoring station.

30. The vehicle tracking unit according to claim 25 wherein said at least one input device cooperates with said vehicle position determining device and said controller to set a current vehicle position as the user selected reference location.

31. The vehicle tracking unit according to claim 23 wherein said controller comprises at least one memory for storing the user selected reference location and vehicle position information therein.

32. The vehicle tracking unit according to claim 23 wherein said controller sets the user selected reference location based upon at least one signal provided by the monitoring station.

33. The vehicle tracking unit according to claim 32 wherein said controller cooperates with said vehicle position determining device to set a current vehicle position as the user selected reference location based upon the at least one signal provided by the monitoring station.

34. The vehicle tracking unit according to claim 32 wherein the at least one signal includes the user selected reference location.

35. The vehicle tracking unit according to claim 23 wherein said vehicle position determining device comprises a Global Positioning System (GPS) device.

36. A method for tracking a vehicle using a vehicle tracking unit to be carried by the vehicle, the method comprising:

storing a user selected reference location for the vehicle tracking unit;

determining vehicle position information using the vehicle tracking unit; and

sending vehicle position information from the vehicle tracking unit to a monitoring station based upon the vehicle moving beyond a radial threshold distance from the user selected reference location.

37. The method according to claim 36 wherein the radial threshold distance is less than about five miles.

38. The method according to claim 36 wherein sending comprises sending vehicle position information a threshold time after the vehicle moves beyond the radial threshold distance from the user selected reference location if the vehicle has not moved back within the radial threshold distance.

39. The method according to claim 38 wherein the threshold time is less than about thirty minutes.

40. The method according to claim 38 further comprising setting the threshold time using at least one input device positioned within the vehicle.

41. The method according to claim 40 wherein the at least one input device comprises at least one of a switch, a keyboard, and a keypad.

42. The method according to claim 38 further comprising receiving a signal from the monitoring station and setting the threshold time based thereon.

43. The method according to claim 36 further comprising setting the user selected reference location based upon at least one input device positioned within the vehicle.

44. The method according to claim 43 wherein setting further comprises setting a current vehicle position as the user selected reference location based upon the at least one input device.

45. The method according to claim 44 wherein the at least one input device comprises at least one of a switch, a keyboard, and a keypad.

46. The method according to claim 36 further comprising setting the user selected reference location based upon at least one signal provided by the monitoring station.

47. The method according to claim 46 wherein setting further comprises setting a current vehicle position as the user selected reference location based upon the at least one signal provided by the monitoring station.

48. The method according to claim 46 wherein the at least one signal includes the user selected reference location.

* * * * *

EXHIBIT D

US006756885B1

(12) **United States Patent**
Flick

(10) **Patent No.: US 6,756,885 B1**
(45) **Date of Patent: Jun. 29, 2004**

(54) **MULTI-VEHICLE COMPATIBLE CONTROL SYSTEM FOR READING FROM A DATA BUS AND ASSOCIATED METHODS**

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(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) bydays.days.

(21) Appl. No.: **09/583,257**

(22) Filed: **May 31, 2000**

Related U.S. Application Data

(63) Continuation-in-part of application No. 09/382,245, filed on Aug. 25, 1999, now Pat. No. 6,275,147, which is a continuation of application No. 09/023,838, filed on Feb. 13, 1998, now Pat. No. 6,011,460, which is a continuation-in-part of application No. 08/701,356, filed on Aug. 22, 1996, now Pat. No. 5,719,551.

(51) **Int. Cl.**[7] **B60R 25/10**

(52) **U.S. Cl.** **340/426.1**; 340/426.13; 340/426.14; 340/426.17; 307/10.3; 307/10.6; 180/287

(58) **Field of Search** 340/426.1, 425.5, 340/439, 825.36, 825.37, 825.69, 426.13, 426.14, 426.16, 426.17; 307/10.2, 10.3, 10.4, 10.5, 10.6; 180/167, 287

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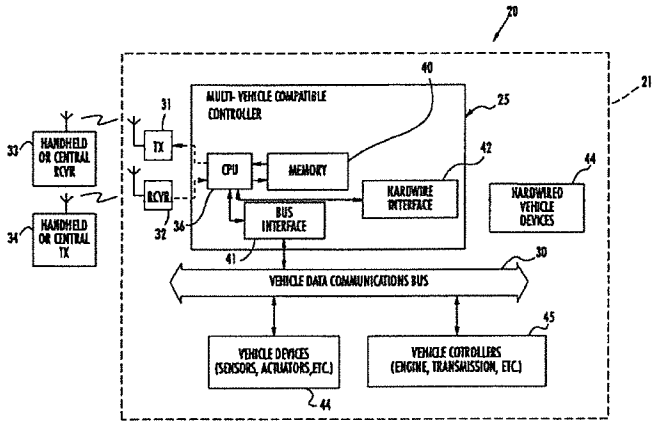
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(74) *Attorney, Agent, or Firm*—Allen, Dyer, Doppelt, Milbrath & Gilchrist, P.A.

(57) **ABSTRACT**

A control system includes a transmitter, a receiver for receiving signals from the transmitter, and a multi-vehicle compatible controller cooperating with the transmitter and receiver. The multi-vehicle compatible controller is for storing a set of device codes for a given vehicle device for a plurality of different vehicles, for reading a device code from a data communications bus, and for determining a match between a read device code and the stored device codes to thereby provide compatibility with a plurality of different vehicles. Such an arrangement provides for a relatively simple and straightforward approach to interface with a vehicle having a data communications bus. The multi-vehicle compatible controller may include a memory for the stored device codes, and a processor cooperating with the memory for determining the match between the read device code and the stored device codes. The approach is useful for a number of vehicle remote control functions including vehicle security, remote keyless entry and remote starting. The multi-vehicle compatibility concept is also extended to an adaptor device which can be used in combination with a conventional remote function controller.

44 Claims, 8 Drawing Sheets



OMEGA EXHIBIT 2035

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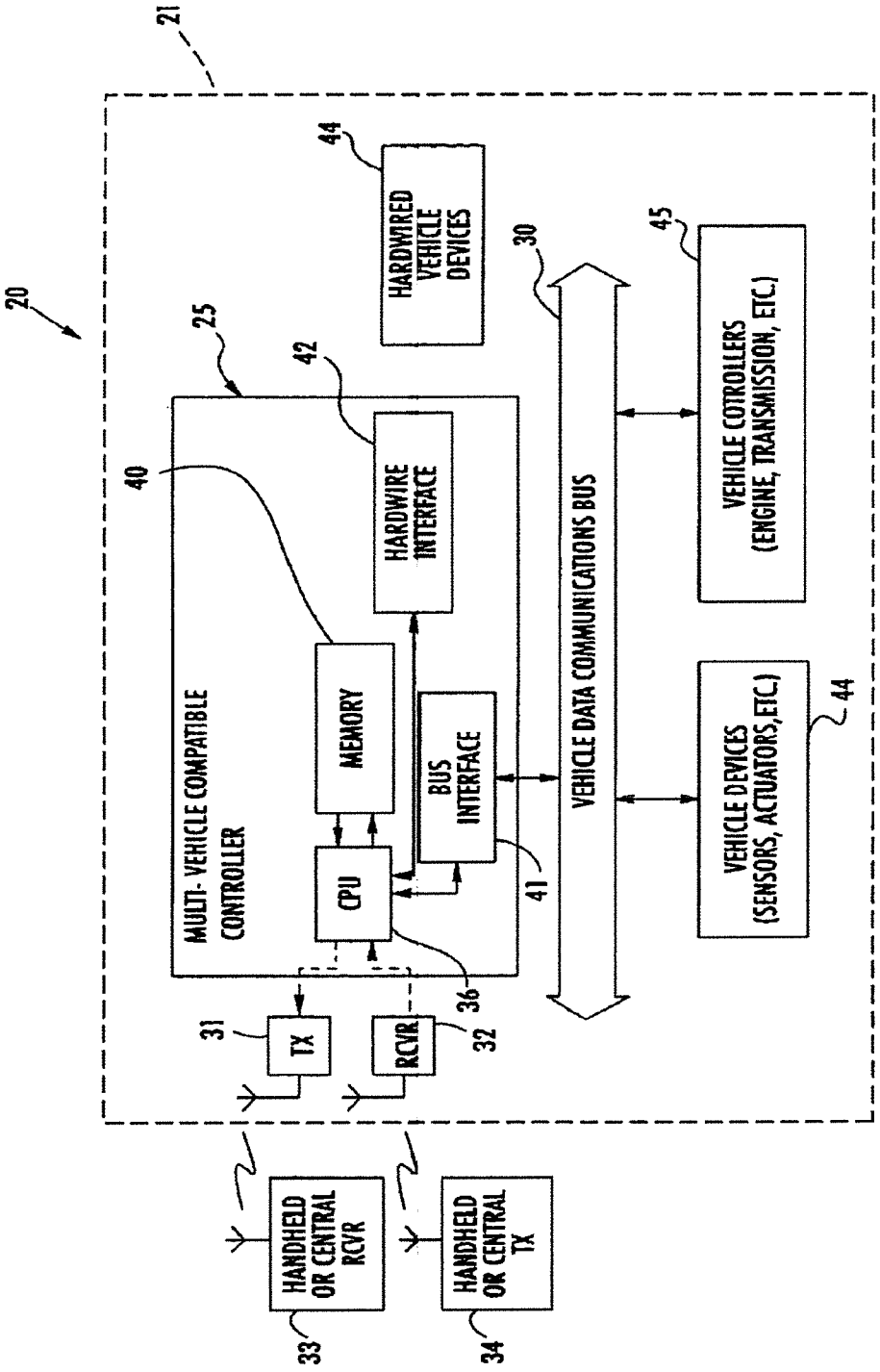

20
21
25
40
42
44
HARDWIRED VEHICLE DEVICES
HARDWIRE INTERFACE
MULTI-VEHICLE COMPATIBLE CONTROLLER
MEMORY
CPU
BUS INTERFACE
41
30
VEHICLE DATA COMMUNICATIONS BUS
45
VEHICLE CONTROLLERS (ENGINE, TRANSMISSION, ETC.)
VEHICLE DEVICES (SENSORS, ACTUATORS, ETC.)
44
31
TX
RCVR
32
36
HANDHELD OR CENTRAL RCVR
33
HANDHELD OR CENTRAL TX
34

FIG. 1

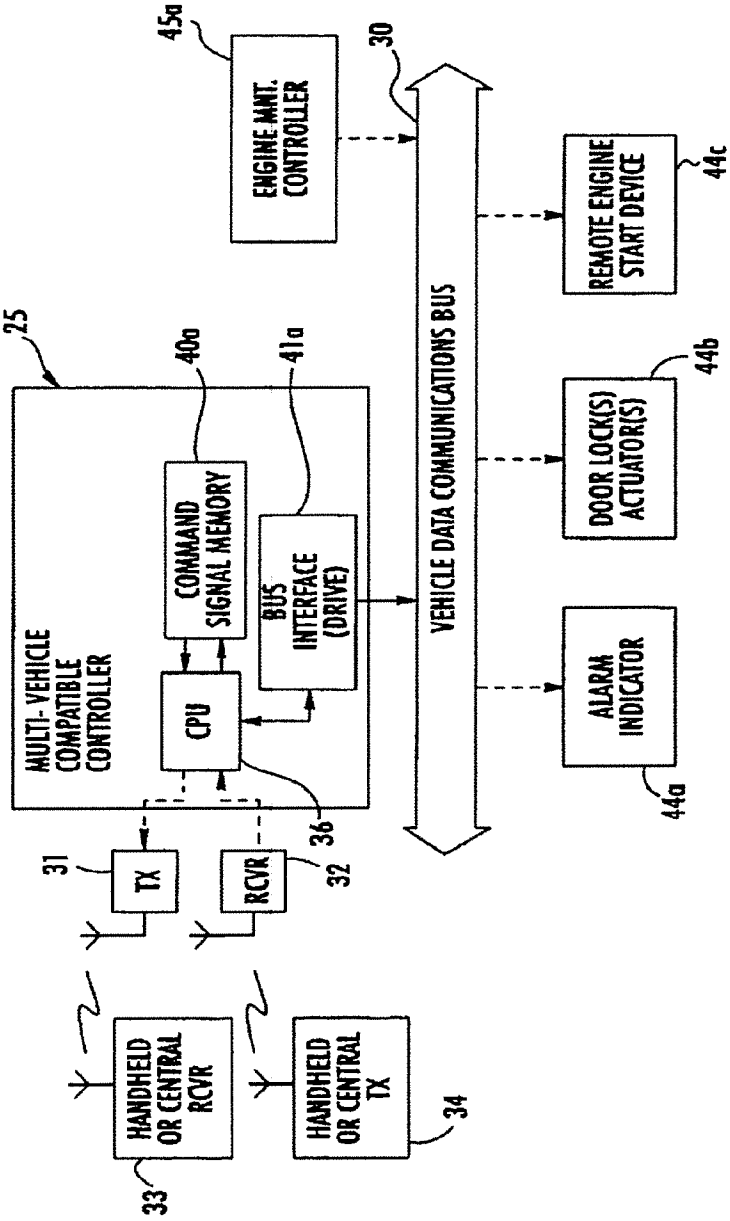
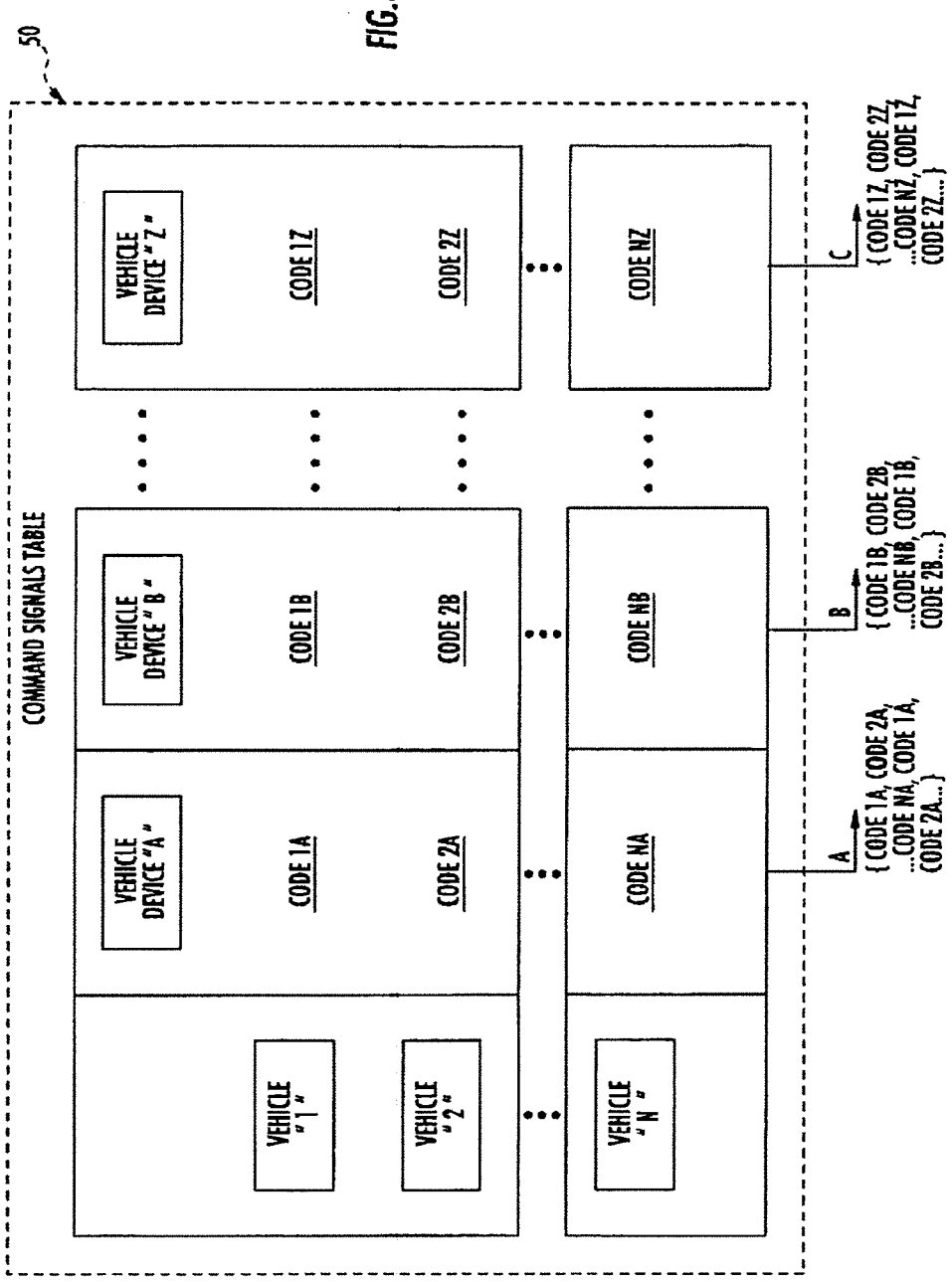

45a
ENGINE MNT. CONTROLLER
30
REMOTE ENGINE START DEVICE
44c
25
40a
41a
COMMAND SIGNAL MEMORY
BUS INTERFACE (DRIVE)
VEHICLE DATA COMMUNICATIONS BUS
DOOR LOCK(S) ACTUATOR(S)
44b
MULTI-VEHICLE COMPATIBLE CONTROLLER
CPU
ALARM INDICATOR
44a
36
31
TX
RCVR
32
HANDHELD OR CENTRAL RCVR
HANDHELD OR CENTRAL TX
34
33

FIG. 2

FIG.3


50
COMMAND SIGNALS TABLE
VEHICLE "1"
VEHICLE "2"
VEHICLE "N"
VEHICLE DEVICE "A"
VEHICLE DEVICE "B"
VEHICLE DEVICE "Z"
CODE 1A
CODE 2A
CODE NA
CODE 1B
CODE 2B
CODE NB
CODE 1Z
CODE 2Z
CODE NZ
A
{CODE 1A, CODE 2A, ...CODE NA, CODE 1A, CODE 2A...}
B
{CODE 1B, CODE 2B, ...CODE NB, CODE 1B, CODE 2B...}
C
{CODE 1Z, CODE 2Z, ...CODE NZ, CODE 1Z, CODE 2Z...}

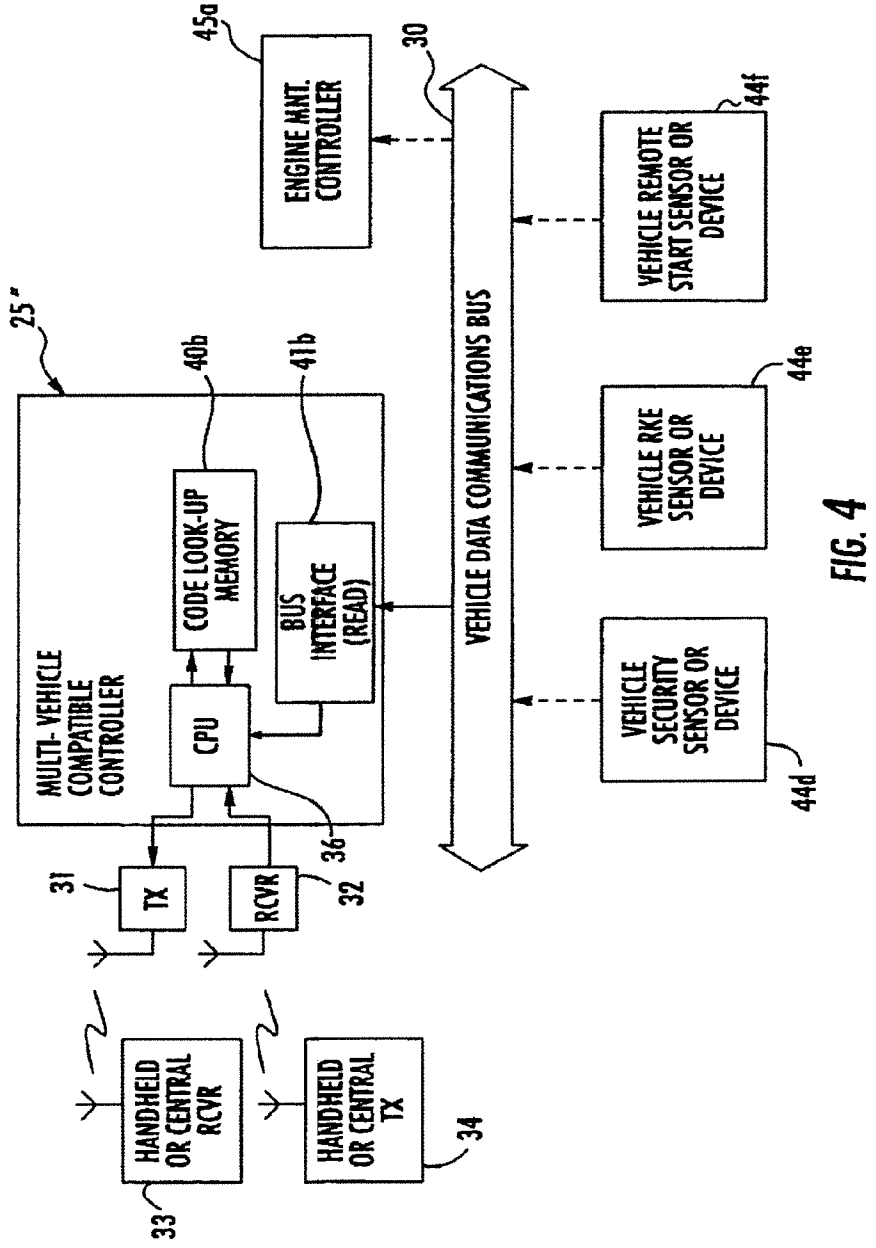

45a
ENGINE MNT. CONTROLLER
30
VEHICLE REMOTE START SENSOR OR DEVICE
44f
25''
40b
41b
VEHICLE RKE SENSOR OR DEVICE
44e
CODE LOOK-UP MEMORY
BUS INTERFACE (READ)
VEHICLE DATA COMMUNICATIONS BUS
MULTI-VEHICLE COMPATIBLE CONTROLLER
CPU
VEHICLE SECURITY SENSOR OR DEVICE
44d
36
31
TX
RCVR
32
HANDHELD OR CENTRAL RCVR
HANDHELD OR CENTRAL TX
34
33

FIG. 4

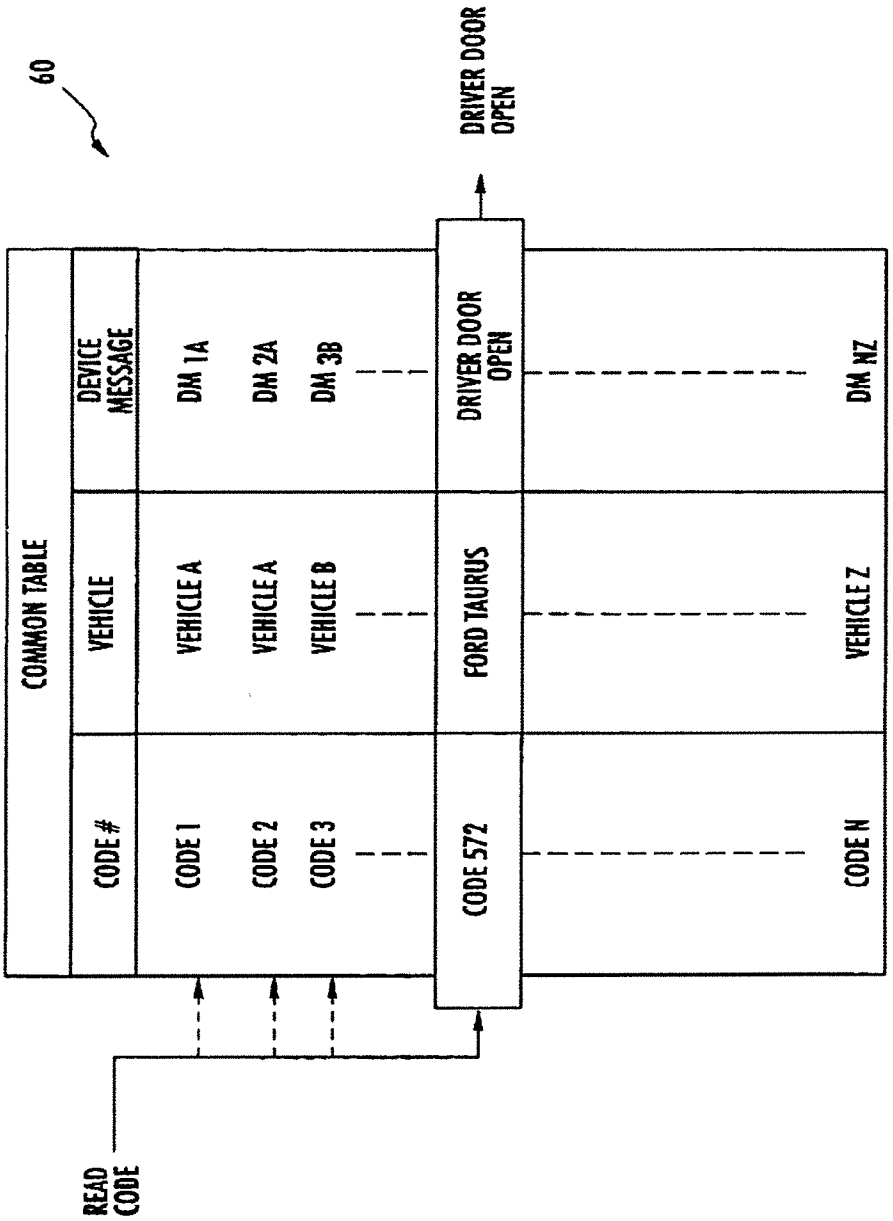

60
DRIVER DOOR OPEN
COMMON TABLE
CODE #
VEHICLE
DEVICE MESSAGE
CODE 1
CODE 2
CODE 3
CODE 572
CODE N
VEHICLE A
VEHICLE A
VEHICLE B
FORD TAURUS
VEHICLE Z
DM 1A
DM 2A
DM 3B
DRIVER DOOR OPEN
DM NZ
READ CODE

FIG. 5

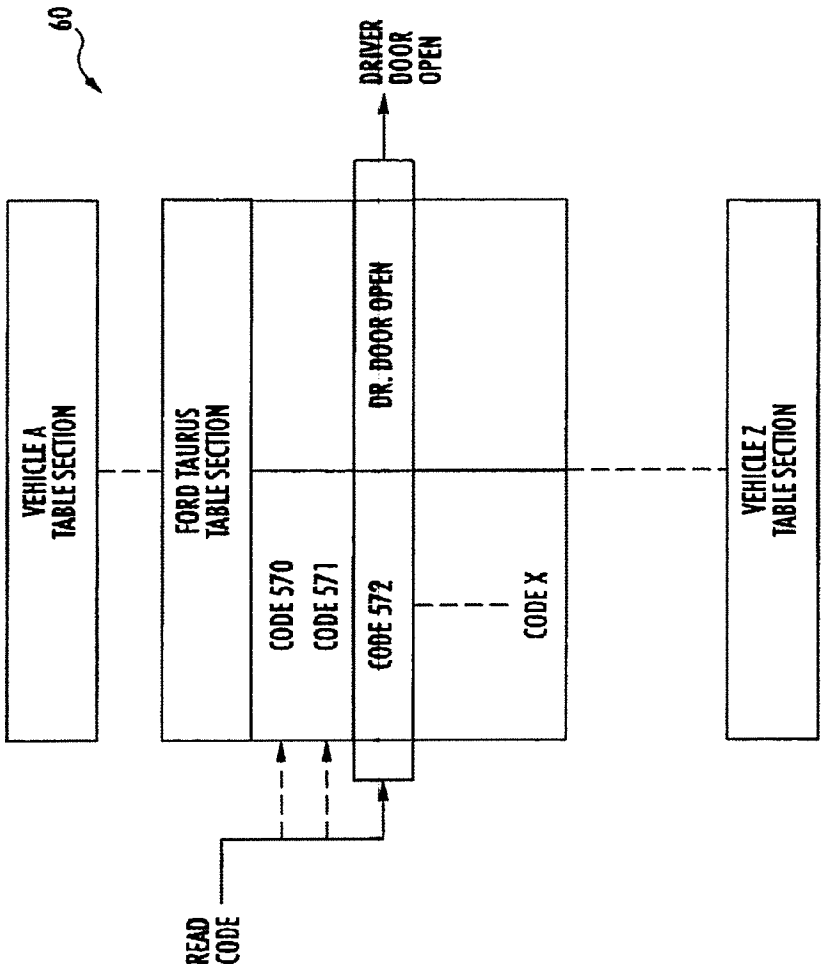

60
DRIVER DOOR OPEN
VEHICLE A TABLE SECTION
FORD TAURUS TABLE SECTION
DR. DOOR OPEN
CODE 570
CODE 571
CODE 572
CODE X
VEHICLE Z TABLE SECTION
READ CODE

FIG. 6

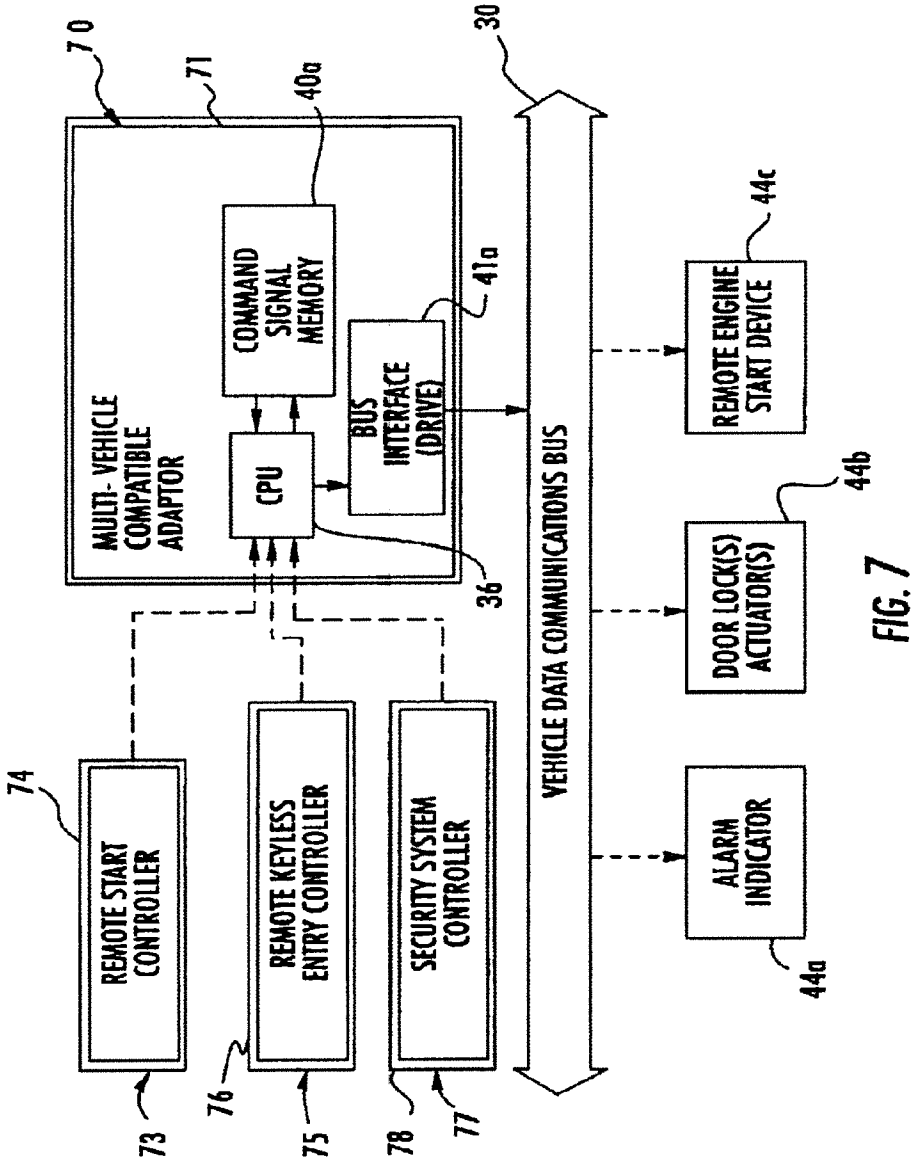

70
71
40a
30
COMMAND SIGNAL MEMORY
41a
BUS INTERFACE (DRIVE)
CPU
MULTI-VEHICLE COMPATIBLE ADAPTOR
36
REMOTE ENGINE START DEVICE
44c
DOOR LOCK(S) ACTUATOR(S)
44b
ALARM INDICATOR
44a
VEHICLE DATA COMMUNICATIONS BUS
74
REMOTE START CONTROLLER
REMOTE KEYLESS ENTRY CONTROLLER
SECURITY SYSTEM CONTROLLER
73
76
75
78
77

FIG. 7

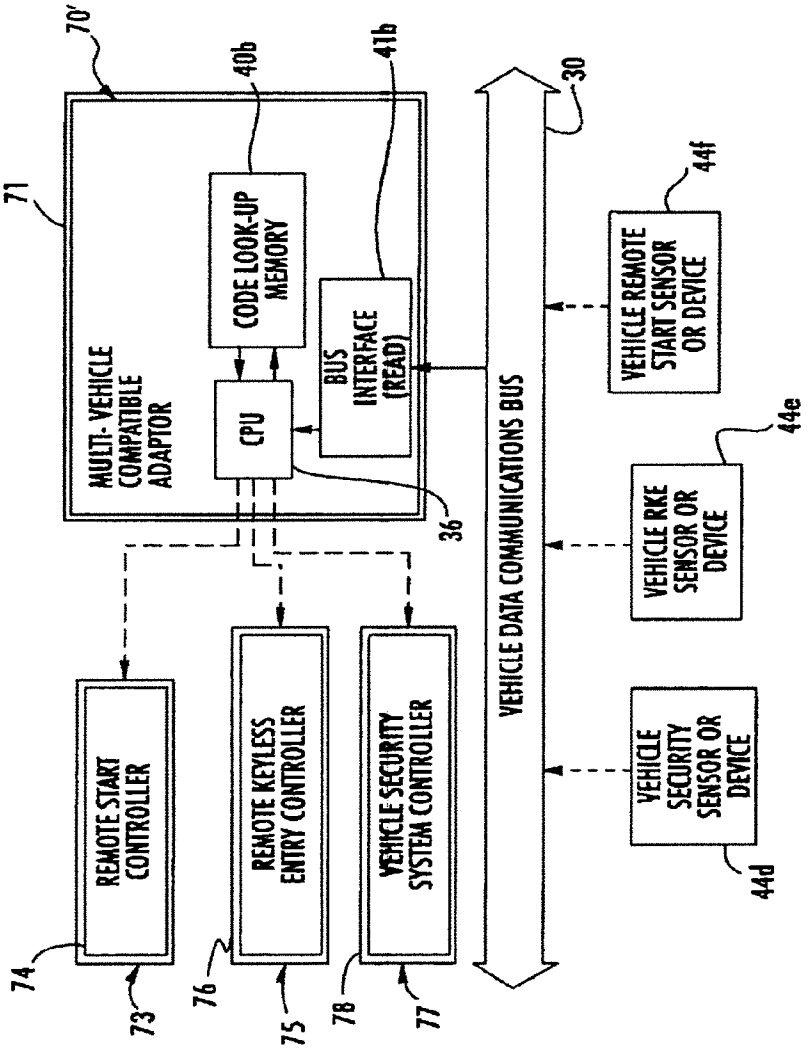

70'
40b
41b
30
71
MULTI- VEHICLE COMPATIBLE ADAPTOR
CODE LOOK-UP MEMORY
CPU
BUS INTERFACE (READ)
36
VEHICLE DATA COMMUNICATIONS BUS
VEHICLE REMOTE START SENSOR OR DEVICE
44f
VEHICLE RKE SENSOR OR DEVICE
44e
VEHICLE SECURITY SENSOR OR DEVICE
44d
REMOTE START CONTROLLER
REMOTE KEYLESS ENTRY CONTROLLER
VEHICLE SECURITY SYSTEM CONTROLLER
74
73
76
75
78
77

FIG. 8

MULTI-VEHICLE COMPATIBLE CONTROL SYSTEM FOR READING FROM A DATA BUS AND ASSOCIATED METHODS

RELATED APPLICATIONS

The present application is a continuation-in-part of U.S. patent application Ser. No. 09/382,245 filed Aug. 25, 1999 now U.S. Pat. No. 6,275,147, which in turn, is a continuation of Ser. No. 09/023,838 filed on Feb. 13, 1998 now U.S. Pat. No. 6,011,460, which in turn, is a continuation-in-part of Ser. No. 08,701,356 filed on Aug. 22, 1996, now U.S. Pat. No. 5,719,551.

FIELD OF THE INVENTION

This application is related to the field of control systems and, more particularly, to a remote control system and related methods for vehicles.

BACKGROUND OF THE INVENTION

Vehicle security systems are widely used to deter vehicle theft, prevent theft of valuables from a vehicle, deter vandalism, and to protect vehicle owners and occupants. A typical automobile security system, for example, includes a central processor or controller connected to a plurality of vehicle sensors. The sensors, for example, may detect opening of the trunk, hood, doors, windows, and also movement of the vehicle or within the vehicle. Ultrasonic and microwave motion detectors, vibration sensors, sound discriminators, differential pressure sensors, and switches may be used as sensors. In addition, radar sensors may be used to monitor the area proximate the vehicle.

The controller typically operates to give an alarm indication in the event of triggering of a vehicle sensor. The alarm indication may typically be a flashing of the lights and/or the sounding of the vehicle horn or a siren. In addition, the vehicle fuel supply and/or ignition power may be selectively disabled based upon an alarm condition.

A typical security system also includes a receiver associated with the controller that cooperates with one or more remote transmitters typically carried by the user as disclosed, for example, in U.S. Pat. No. 4,383,242 to Sassover et al. and U.S. Pat. No. 5,146,215 to Drori. The remote transmitter may be used to arm and disarm the vehicle security system or provide other remote control features from a predetermined range away from the vehicle. Also related to remote control of a vehicle function U.S. Pat. No. 5,252,966 to Lambropoulous et al. discloses a remote keyless entry system for a vehicle. The keyless entry system permits the user to remotely open the vehicle doors or open the vehicle trunk using a small handheld transmitter.

Unfortunately, the majority of vehicle security systems need to be directly connected by wires to individual vehicle devices, such as the vehicle horn or door switches of the vehicle. In other words, a conventional vehicle security system is hardwired to various vehicle components, typically by splicing into vehicle wiring harnesses or via interposing T-harnesses and connectors. The number of electrical devices in a vehicle has increased so that the size and complexity of wiring harnesses has also increased. For example, the steering wheel may include horn switches, an airbag, turn-signal and headlight switches, wiper controls, cruise control switches, ignition wiring, an emergency flasher switch, and/or radio controls. Likewise, a door of a vehicle, for example, may include window controls, locks, outside mirror switches, and/or door-panel light switches.

In response to the increased wiring complexity and costs, vehicle manufacturers have begun attempts to reduce the amount of wiring within vehicles to reduce weight, reduce wire routing problems, decrease costs, and reduce complications which may arise when troubleshooting the electrical system. For example, some manufacturers have adopted multiplexing schemes to reduce cables to three or four wires and to simplify the exchange of data among the various onboard electronic systems as disclosed, for example, in "The Thick and Thin of Car Cabling" by Thompson appearing in the IEEE Spectrum, February 1996, pp. 42–45.

Implementing multiplexing concepts in vehicles in a cost-effective and reliable manner may not be easy. Successful implementation, for example, may require the development of low or error-free communications in what can be harsh vehicle environments. With multiplexing technology, the various electronic modules or devices may be linked by a single signal wire in a bus also containing a power wire, and one or more ground wires. Digital messages are communicated to all modules over the data communications bus. Each message may have one or more addresses associated with it so that the devices can recognize which messages to ignore and which messages to respond to or read.

The Thompson article describes a number of multiplexed networks for vehicles. In particular, the Grand Cherokee made by Chrysler is described as having five multiplex nodes or controllers: the engine controller, the temperature controller, the airbag controller, the theft alarm, and the overhead console. Other nodes for different vehicles may include a transmission controller, a trip computer, an instrument cluster controller, an antilock braking controller, an active suspension controller, and a body controller for devices in the passenger compartment.

A number of patent references are also directed to digital or multiplex communications networks or circuits, such as may be used in a vehicle. For example, U.S. Pat. No. 4,538,262 Sinniger et al. discloses a multiplex bus system including a master control unit and a plurality of receiver-transmitter units connected thereto. Similarly, U.S. Pat. No. 4,055,772 to Leung discloses a power bus in a vehicle controlled by a low current digitally coded communications system. Other references disclosing various vehicle multiplex control systems include, for example, U.S. Pat. No. 4,760,275 to Sato et al.; U.S. Pat. No. 4,697,092 to Roggendorf et al.; and U.S. Pat. No. 4,792,783 to Burgess et al.

Several standards have been proposed for vehicle multiplex networks including, for example, the Society of Automotive Engineers "Surface Vehicle Standard, Class B Data Communications Network Interface", SAE J1850, July 1995. Another report by the SAE is the "Surface Vehicle Information Report, Chrysler Sensor and Control (CSC) Bus Multiplexing Network for Class 'A' Applications", SAE J2058, July 1990. Many other networks are also being implemented or proposed for communications between vehicle devices and nodes or controllers.

Unfortunately, conventional vehicle control systems, such as aftermarket vehicle security systems, are for hardwired connection to vehicle devices and are not readily adaptable to a vehicle including a data communications bus. Moreover, a vehicle security system if adapted for a communications bus and devices for one particular model, model year, and manufacturer, may not be compatible with any other models, model years, or manufacturers. Other systems for the control of vehicle functions may also suffer from such shortcomings.

SUMMARY OF THE INVENTION

In view of the foregoing background it is therefore an object of the invention to provide a remote control system

and related method for a vehicle comprising a data communications bus and at least one vehicle device connected to the data communications bus, and wherein the system is adapted to operate with different vehicles.

This and other objects, features and advantages in accordance with the present invention are provided by a control system including a transmitter and a receiver for receiving signals from the transmitter, and a multi-vehicle compatible controller cooperating with the transmitter and receiver. Moreover, the multi-vehicle compatible controller is also for storing a set of device codes for a given vehicle device for a plurality of different vehicles, for reading a device code from the data communications bus, and for determining a match between a read device code and the stored device codes to thereby provide compatibility with a plurality of different vehicles. Such an arrangement provides for a relatively simple and straightforward approach to interface with a vehicle having a data communications bus.

The multi-vehicle compatible controller may comprise a memory for the stored device codes, and a processor cooperating with the memory for determining the match between the read device code and the stored device codes. The at least one vehicle device may include a plurality of vehicle devices, and, accordingly, the multi-vehicle compatible controller stores a respective set of device codes for each of the vehicle devices.

The invention is useful for a number of vehicle remote control functions. For example, the stored device codes may relate to vehicle security. In other words, the multi-vehicle compatible controller may be an alarm or security system controller. The stored vehicle codes may also relate to keyless entry for the vehicle. By way of further example, the stored device codes may relate to remote starting a vehicle engine.

The multi-vehicle compatibility concept may be extended to an adaptor device for after-market installation, and be especially advantageous when used in combination with a conventional remote function controller. In other words, the multi-vehicle compatible controller may comprise a multi-vehicle compatible adaptor connected to the data communications bus for determining the match between the read device code and the stored device codes and generating an output signal responsive thereto, and a controller connected to the multi-vehicle compatible adaptor and being responsive to output signals therefrom. Of course, the controller and adaptor may be positioned in respective different housings.

The control system can be operated directly by the user, or via an intervening communications network. In other words, in some embodiments, the transmitter may be a remote handheld transmitter to be carried by a user when away from the vehicle, and the receiver is at the vehicle. In other embodiments, the transmitter may include at least a central station transmitter, and the receiver is at the vehicle. The central station transmitter may be part of a satellite or cellular telephone network.

In yet other embodiments, the receiver may be a handheld unit carried by the user or a central station receiver, such as to notify the user or others of a vehicle security breach, for example. In these embodiments, the transmitter is then located at the vehicle.

Another aspect of the invention relates to a control method for a vehicle comprising a data communications bus and at least one vehicle device connected thereto. The method preferably comprises storing a set of device codes for a given vehicle device for a plurality of different vehicles, reading a device code from the data communications bus, and determining a match between a read device code and the stored device codes and performing a function based thereon to thereby provide compatibility with a plurality of different vehicles. The method may further include receiving a signal from a transmitter, and wherein performing the function is also based upon receiving the signal from the transmitter.

Another method aspect of the invention is for adapting a control system for a vehicle to be compatible with a plurality of different vehicles, with each vehicle comprising a data communications bus and at least one vehicle device connected thereto. The control system preferably comprises a transmitter, a receiver for receiving signals from the transmitter, and a controller cooperating with the transmitter and the receiver. More particularly, the method for adapting preferably comprises storing a set of device codes for a given vehicle device for a plurality of different vehicles, reading a device code from the data communications bus, and determining a match between a read device code and the stored device codes for performing at least one vehicle function and to thereby provide compatibility with a plurality of different vehicles.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is a schematic block diagram of a vehicle control system including the multi-vehicle compatible controller connected to a data communications bus and other hard-wired devices in accordance with the invention.

FIG. **2** is a more detailed schematic block diagram of an embodiment of the multi-vehicle compatible controller illustrating the command signal generation in accordance with the invention.

FIG. **3** is a schematic diagram illustrating processing of command signals by the multi-vehicle compatible controller of FIG. **2**.

FIG. **4** is a more detailed schematic block diagram of an embodiment of the multi-vehicle compatible controller illustrating the code signal look-up in accordance with the invention.

FIG. **5** is a schematic diagram illustrating processing of a code read from the data communications bus in accordance with a first embodiment of the multi-vehicle compatible controller of FIG. **4**.

FIG. **6** is a schematic diagram illustrating processing of a code read from the data communications bus in accordance with a second embodiment of the multi-vehicle compatible controller of FIG. **4**.

FIG. **7** is a schematic block diagram of a multi-vehicle compatible adaptor in accordance with the present invention and illustrating the command signal processing portion.

FIG. **8** is a schematic block diagram of a multi-vehicle compatible adaptor in accordance with the present invention and illustrating the read code processing.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

The present invention will now be described more fully hereinafter with reference to the accompanying drawings in which preferred embodiments of the invention are shown. This invention may, however, be embodied in many different forms and should not be construed as limited to the illustrated embodiments set forth herein. Rather, these embodiments are provided so that this disclosure will be thorough and complete, and will fully convey the scope of the

invention to those skilled in the art. Like numbers refer to like elements throughout. Prime and multiple prime notation are used in alternate embodiments to indicate similar elements.

Referring initially to FIG. **1**, a control system **20** for a vehicle **21** is now described. The control system **20** includes a multi-vehicle compatible controller **25** connected to a data communications bus **30** in the vehicle **21**. The data communications bus **30** may be any of several types, such as compatible with the J1850 or CAN standards, or other type of bus as will be appreciated by those skilled in the art. The multi-vehicle compatible controller **25**, as its name suggests, provides compatibility with different codes used on the data bus and which may vary by vehicle as described in greater detail below.

The control system **20** preferably includes a transmitter, and a receiver for receiving signals from the transmitter. As shown in the illustrated embodiment, both a transmitter **31** and a receiver **32** are provided at the vehicle **21**. In addition, both a receiver **33** and a transmitter **34** are provided remotely or away from the vehicle. The first transmitter/receiver pair **31, 33** may be used, for example, to provide a remote alert or page to a user when away from the vehicle of a security breach at the vehicle, for example. The second transmitter/receiver pair **32, 34** may be used to cause a desired function to be performed at the vehicle, such as remote starting the engine, remotely unlocking the vehicle doors, or changing the mode of a security system between armed and disarmed modes, for example. Many other similar applications are contemplated by the present invention as will be appreciated by those skilled in the art. As will also be appreciated by those skilled in the art, in other embodiments, only one of these pairs of transmitters and receivers may be provided in the control system.

The remote transmitter **34** may be a small portable unit including a housing, function control switches carried by the housing, a battery within the housing, and the associated transmitter circuitry. This type of remote handheld transmitter is commonly used in conventional vehicle security systems, remote start systems, and remote keyless entry systems. The communications from the remote transmitter **34** to the receiver **32** at the vehicle is typically a direct radio frequency link, that is, there is no intervening communications links. However, in other embodiments, the remote transmitter **34** may indirectly communicate with the receiver **32** via other communications infrastructure, such as via satellite, or cellular communications, via the public switched telephone network (PSTN) and/or over the world wide web or Internet, as will be appreciated by those skilled in the art.

The remote transmitter **34** may also be a passive transponder type device, that takes power from an associated transponder reader as will be appreciated by those skilled in the art, and automatically transmits a signal to the reader. For example, the transponder may be of the type carried in conjunction with the vehicle keys, or may be embedded in the key as will be readily appreciated by those skilled in the art.

The remote transmitter **34** may also include one or more central station transmitters, such as may be provided by a satellite transmitter or cellular telephone transmitter, for example. Such a central station transmitter may also be connected to other communications infrastructure.

The remote receiver **33** may also be a small portable unit including a housing, one or more indicators carried by the housing, a battery within the housing, and the associated receiver circuitry. This type of remote receiver may also directly communicate with the vehicle transmitter **31**, or there may be intervening communications links as will be appreciated by those skilled in the art. In some embodiments, the remote transmitter **34** and remote receiver **33** may be packaged together in a common handheld housing. Of course the remote receiver **33** may also include one or more central stations along the lines as described above for the central station remote transmitter.

The multi-vehicle compatible controller **25** may also include a central processing unit (CPU) **36** and one or more memories **40** connected thereto. Although the memory **40** is illustrated as a separate device, those of skill in the art will recognize that the memory may alternately be embedded on the same integrated circuit as the processing circuitry of the CPU.

The multi-vehicle compatible controller **25** also may optionally include a hardwire interface **42** which may be directly connected to one or more vehicle devices **44**. For example, in some embodiments for a security system, direct connections may be made to one or more vehicle sensors, an indicator LED, a siren, or the headlight relay. For a remote start system, hardwire connections may be made to a starter motor relay, for example. Those of skill in the art will recognize other devices **44** that may be directly connected to the multi-vehicle compatible controller **25** via the hardwire interface **42**. The hardwire interface **42** may included circuitry for sending signals to or reading signals from the vehicle devices **44** as will be appreciated by those skilled in the art. In some embodiments, the hardwire interface **42** may not be needed or incorporated in the multi-vehicle compatible controller **25**.

The multi-vehicle compatible controller **25** also illustratively includes a bus interface **41** cooperating with the CPU **36** to perform at least one of reading signals from the data communications bus **30**, or generating signals on the data bus. The bus interface **41** includes circuitry for interfacing to the proper signal levels and formats on the data communications bus **30** as will be appreciated by those skilled in the art without further discussion herein.

As will also be readily appreciated by those skilled in the art, the vehicle **21** includes a number of electrical/electronic devices that can be controlled and/or the status thereof read via the data communications bus **30**. For simplicity of explanation, these devices are schematically illustrated by the two blocks **44, 45**, respectively labeled "vehicle devices (sensors, actuators, etc.)," and "vehicle controllers (engine controller, transmission controller, etc.)." In other words, the vehicle devices connected to the data bus **30** may be considered to be relatively simple devices, such as sensors, or more complicated devices with some internal processing, such as may generally be considered as controllers.

The multi-vehicle compatibility controller **25** may provide its multi-vehicle compatibility in one or both directions of communications via the data communications bus **30**. Referring now additionally to FIGS. **2** and **3**, the drive or generation of signals on the data bus portion of communication is now further described. In this embodiment, the multi-vehicle compatible controller **25'** illustratively includes a command signal memory **40*a***, and a bus interface **41*a*** only for the drive direction for simplicity of explanation.

The devices connected to the data communications bus **30** illustratively include an alarm indicator **44*a***, such as can be provided by a separate siren or the vehicle horn, for example. The alarm indicator **44*a*** would likely be included for a security system. The vehicle devices may also include one or more door lock actuators **44*b*** as would be likely used

by a security system or remote keyless entry system, for example, as would be readily appreciated by those skilled in the art.

For a remote start system, one or more remote starting device **44***c* may be connected to the data communications bus **30** as shown in the illustrated embodiment. Such a remote starting device **44***c* may be a starter relay, for example, controlled by signals from the data communications bus. The remote starting device **44***c* could also be a device or circuit to bypass an engine immobilizer circuit as will be appreciated by those skilled in the art.

The vehicle device to which signals are to be sent by the multi-vehicle controller **25'** may also include another controller, such as the schematically illustrated engine management controller **45***a*. The engine management controller **45***a* could be sent signals such as to prevent or enable starting for security or remote start applications as will be appreciated by those skilled in the art.

The multi-vehicle compatible controller **25'** may also include an optional hardwire interface and other components as mentioned above. For clarity and simplicity of explanation, these components need no further description.

In accordance with this aspect of the invention, the multi-vehicle compatible controller **25'** preferably generates at least one set of command signals on the data communications bus **30** for the at least one vehicle device. The at least one set of command signals preferably comprises at least one working command signal and at least one non-working command signal for a given vehicle to thereby provide compatibility with the plurality of different vehicles. In other words, multiple signals or codes can be generated on the data communications bus **30**, and only that code for the given vehicle and device will cause an operation or response from the vehicle device. This provides for a relatively simple and straightforward approach to interface or cooperate with a vehicle having a data communications bus **30**, and wherein the controller is advantageously compatible with a number of different vehicles. Since typically it may be desired to interface to a plurality of vehicle devices, the multi-vehicle compatible controller **25'** may generate a respective set of command signals for each of the vehicle devices.

Such multi-vehicle compatibility provided by the controller **25'** is especially advantageous in after-market systems, such as for security, remote keyless entry, or remote starting for example. The ability to interface through the data communications bus **30** also significantly reduces the wiring complexity needed to interface to the associated vehicle devices.

The multi-vehicle compatible controller **25'** may sequentially generate the different command signals (working and non-working) for an intended vehicle device. To ensure effective communications even in the presence of noise, for example, the multi-vehicle compatible controller **25'** may generate the set of command signals a plurality of times, such as, for example, two to five times. The need to effectively communicate should be balanced against possible traffic congestion on the data bus **30** as will be appreciated by those skilled in the art.

Referring now more specifically to the diagram of FIG. **3**, the operation of the multi-vehicle controller **25'** is further described. The controller **25'** may operate by arranging in the command signals memory **40***a* a common table **50** as shown. The CPU **36** upon determining that an action needs to be performed, such as unlocking the driver's door, for example, would identify the appropriate column from the table **50** from among the columns labeled "vehicle device A" to "vehicle device Z". For example, the appropriate column may be "vehicle device B", in which case the CPU would then read the memory locations in this column to generate on the bus **30** the appropriate set of codes to lock the driver's door for each of the N vehicles with which the multi-vehicle compatible controller **25'** is compatible. Of course, only one of the codes would be a working code, and the other codes would cause no vehicle function to be performed. For example, if vehicle **2** was the vehicle in which the multi-vehicle compatible controller **25'** were installed, only the code **2B** would cause the driver's door to unlock.

The actual coded signals would be compatible with the particular data communications bus **30** as will be appreciated by those skilled in the art. The codes may be binary codes, which for convenience can be represented more simply by corresponding hexadecimal codes as would also be appreciated by those skilled in the art. For example, for an unlock all vehicle doors to be commanded in a 1995 Jeep Grand Cherokee, the code may be 03868004, for a 2000 Jeep Grand Cherokee, the code may be 0422A00400. As will be readily appreciated by those skilled in the art, such codes can be obtained from the manufacturers directly, or may be read from the data bus **30** using any one of a number of commercially available diagnostic tools for reading the data bus **30**, for example.

The set of command signals may be repeated as mentioned above, and as schematically illustrated at the lower portion of the table **50**. Of course, the memory **40***a* may store the actual codes, but may also store data enabling generation of the set of command signals by the CPU **36**. This may be particularly so where certain portions of the code, e.g. preamble, or some other portion, are common across either multiple vehicles, and/or over multiple vehicle devices.

The number of vehicles and number of devices to be controlled using the multi-vehicle compatible controller **25'** can both be relatively large to cover a substantial portion of the vehicle marketplace. Alternatively, the multiple command signal concept may also be advantageously used to provide compatibility for as few as two vehicles, and even a single vehicle device.

Turning now to FIGS. **4–6**, the other direction of communication is now described. In particular, the reverse direction or reading of signals from the data communications bus **30** is now described. Many of the components are the same as those described above, and, hence, need no further description. In the illustrated embodiment, the CPU **36** is connected to a code look-up memory **40***b*. In addition, only the read or receive side of the bus interface **41***b* is schematically illustrated. The data bus **30** also illustratively connects one or more of vehicle security sensors or devices **44***d*, vehicle remote keyless entry sensors or devices, and vehicle remote start sensors or devices **44***f* to the multi-vehicle compatible controller **25"**. An engine management controller **45***a* is also illustratively connected to the data communications bus **30** as may be used for vehicle security or remote starting as mentioned above. Considered in somewhat different terms, the multi-vehicle compatible controller **25"** may be for one or more of the conventional vehicle remote control functions broadly considered as vehicle security, remote keyless entry, or remote starting. Other similar control functions for a vehicle are also contemplated by the present invention.

The compatibility to read a code and determine the message or content thereof for a vehicle device from among a plurality of vehicles can be used alone or in combination with the compatibility for writing or generating signals on

the bus described above. More particularly, the multi-vehicle compatible controller **25"** is for storing a set of device codes for a given vehicle device for a plurality of different vehicles, for reading a device code from the data communications bus **30**, and for determining a match between a read device code and the stored device codes to thereby provide compatibility with a plurality of different vehicles. Such an arrangement provides for a relatively simple and straightforward approach to interface with a vehicle having a data communications bus **30**.

As noted briefly above, the multi-vehicle compatible controller **25"** may comprise the code look-up memory **40***b* for the stored device codes, and a processor or CPU **36** cooperating with the memory for determining the match between the read device code and the stored device codes. The at least one vehicle device may include a plurality of vehicle devices, and, accordingly, the memory **40***b* of the multi-vehicle compatible controller **25"** preferably stores a respective set of device codes for each of the plurality of vehicle devices.

Referring now more specifically to FIG. **5**, the look-up table feature of the multi-vehicle compatible controller **25"** is now described. A common table **60** may be created which contains a column for the vehicle codes in some predefined sequence, such as in a numerical order beginning with a first code, Code 1, and ending with a last code, Code N, as illustrated. The central column in the illustrated embodiment includes the corresponding vehicle identification with the vehicles extending from a first vehicle, Vehicle A, to a last vehicle, Vehicle Z. The number of codes and vehicles may be selected so that a given multi-vehicle compatible controller **25"** is useable across an economically large number of vehicles as will be appreciated by those skilled in the art.

The last or rightmost column in the illustrated table **60** is the device data or message corresponding to the associated vehicle and code. These device messages extend from a first message, DM_{1A}, to a last device message, DM_{NZ}. The messages may be of many different types, such as driver door open or closed, hood open or closed, shock sensor triggered, brake pressure indicated, gearshift selector in Park, etc. as will be appreciated by those skilled in the art.

By way of example, the common table **60** includes a blocked row schematically illustrating a match for a Code **572**. This code is for a Ford Taurus and indicates that the driver's door is open. This type of data may be useful in any of the illustrated implementations including vehicle security, remote keyless entry, or remote starting. The CPU **36** would read the code on the data bus **30** and compare the code against the stored codes to determine a match. The CPU **36** is likely to buffer some or all of a code when received to subsequently be compared using the table **60** as will be understood by those skilled in the art. In other embodiments, individual bits or blocks thereof may be compared as they are received.

An alternate embodiment of the common table **60** is now explained with reference to FIG. **6**. In this case the overall or common table **60'**, may be considered parsed or divided into a plurality of vehicle table sections. The first table section is for vehicle A, and the last for vehicle Z in the illustrated embodiment. This embodiment also illustrates the driver door for the Ford Taurus as being matched from the read signal from the data communications bus **30**. What is of interest in this embodiment, is that upon initial set-up or an initial learning period, only the codes for the learned vehicle need then later be compared to the read code. Accordingly, a time savings may be realized.

Those of skill in the art will recognize that the tables **60** and **60'** of FIGS. **5** and **6** are exemplary illustrations from among many possible configurations of look-up tables that may be used in accordance with the present invention. Other configurations are also contemplated by the present invention.

Since it may also be desirable to re-install the multi-vehicle compatible controller **25"** in another vehicle, the controller may be reset and another vehicle learned or configured during an initial set-up. This concept is generally described as an embodiment of a desired signal enabling function or feature in related parent U.S. patent application Ser. No. 09/382,245 filed Aug. 25, 1999, which in turn, is a continuation of U.S. Pat. No. 6,011,460, which in turn, is a continuation-in-part of U.S. Pat. No. 5,719,551, and the disclosure of each of which are incorporated herein by reference in its entirety.

Turning now to FIG. **7**, we again revisit the command signal concept for driving the communications bus **30** with a plurality of signal codes to provide the multi-vehicle compatibility. In this variation, the multi-vehicle controller is divided into two sections or portions. More particularly, the multi-vehicle compatibility is provided by the illustrated multi-vehicle compatible adaptor **70**. The adaptor **70** illustratively includes the CPU **36**, the command signal memory **40***a*, and the bus interface **41***a*. The adaptor **70** also includes its own housing **71**. The adaptor **70**, may include a hardwire interface as discussed above, or such could already be provided with any of the controllers **73**, **75** or **77** as would more typically be the case.

The adaptor **70** is fed signals from one or more of the illustrated conventional controllers, that is, one or more of the remote start controller **73**, the remote keyless entry controller **75** or the security system controller **77**. Each of the these controllers **73**, **75** and **77** may also include its own respective housing **74**, **76** and **78**.

As will be appreciated by those skilled in the art, one scenario where the adaptor **70** may be especially useful is to adapt a conventional security or other system controller to operate via the data communications bus **30**. Since the data bus technology is being slowly phased in by automobile manufacturers, suppliers may provide their conventional systems for conventional vehicles, and add the adaptor **70** with the conventional controller when the vehicle requires interface to the data communications bus **30**.

Turning now to FIG. **8**, it can be seen that similar concepts can be extended to the multi-vehicle compatible adaptor **70'** for the other direction of communication, that is, from the data communications bus **30** to one or more of the controllers **73**, **75** and **77**. The adaptor **70'** illustratively includes the CPU **36**, bus interface circuit **41***b* for reading the bus, and the code look-up memory **40***b* as described above with reference to FIG. **4**.

The operation of the multi-vehicle compatible adaptor **70'** will be readily understood by those of skill in the art based upon the above provided descriptions relating to FIGS. **4–6** without requiring further discussion herein. Of course, as will be appreciated by those skilled in the art, the adaptors **70**, **70'** may be used independently, may be used together, or may be combined into a single unit.

Other features relating to vehicle control systems are disclosed in copending patent applications entitled "REMOTE START SYSTEM FOR A VEHICLE HAVING A DATA COMMUNICATIONS BUS AND RELATED METHODS" (attorney docket no. 16635E) and "MULTI-VEHICLE COMPATIBLE CONTROL SYSTEM GENER-

ATING COMMAND SIGNALS ON A DATA BUS AND ASSOCIATED METHODS" (attorney docket no. 16635G), the entire disclosures of which are incorporated herein by reference.

Many modifications and other embodiments of the invention will come to the mind of one skilled in the art having the benefit of the teachings presented in the foregoing descriptions and the associated drawings. Accordingly, it is understood that the invention is not to be limited to the illustrated embodiments disclosed, and that other modifications and embodiments are intended to be included within the spirit and scope of the appended claims.

That which is claimed:

1. A control system for a vehicle comprising a data communications bus and at least one vehicle device connected thereto, the control system comprising:

a transmitter and a receiver for receiving signals from said transmitter; and

a multi-vehicle compatible controller cooperating with said transmitter and said receiver and for storing a set of device codes for a given vehicle device for a plurality of different vehicles, for reading a device code from the data communications bus, and for determining a match between a read device code and the stored device codes to thereby provide compatibility with a plurality of different vehicles.

2. A control system according to claim **1** wherein said multi-vehicle compatible controller comprises a memory for the stored device codes.

3. A control system according to claim **2** wherein said multi-vehicle compatible controller comprises a processor cooperating with said memory for determining the match between the read device code and the stored device codes.

4. A control system according to claim **1** wherein the at least one vehicle device comprises a plurality of vehicle devices; and wherein said multi-vehicle compatible controller stores a respective set of device codes for each of the plurality of vehicle devices.

5. A control system according to claim **1** wherein the at least one vehicle device comprises a vehicle sensor; and wherein the stored device codes relate to the vehicle sensor.

6. A control system according to claim **5** wherein the stored device codes relate to vehicle security.

7. A control system according to claim **5** wherein the stored vehicle codes relate to keyless entry for the vehicle.

8. A control system according to claim **5** wherein the stored device codes relate to remote starting a vehicle engine.

9. A control system according to claim **1** wherein said multi-vehicle compatible controller comprises:

a multi-vehicle compatible adaptor connected to the data communications bus for determining the match between the read device code and the stored device codes and generating an output signal responsive thereto; and

a controller connected to said multi-vehicle compatible adaptor and being responsive to output signals therefrom.

10. A control system according to claim **9** wherein said controller further comprises a first housing; and said multi-vehicle adaptor comprises a second housing.

11. A control system according to claim **1** wherein said transmitter comprises a remote handheld transmitter to be carried by a user when away from the vehicle; and wherein said receiver is at the vehicle.

12. A control system according to claim **1** wherein said transmitter comprises at least a central station transmitter; and wherein said receiver is at the vehicle.

13. A control system according to claim **1** wherein said receiver comprises a remote receiver to be carried by a user when away from the vehicle; and wherein said transmitter is at the vehicle.

14. A control system according to claim **1** wherein said receiver comprises at least a central station transmitter; and wherein said transmitter is at the vehicle.

15. A control system according to claim **1** wherein said transmitter comprises a transponder transmitter to be carried by a user; and wherein said receiver is at the vehicle.

16. An adaptor for adapting a control system for a vehicle to be compatible with a plurality of different vehicles, each vehicle comprising a data communications bus and at least one vehicle device connected thereto, the control system comprising a transmitter and a receiver for receiving signals from the transmitter, and a controller cooperating with the transmitter and receiver, the adaptor comprising:

a housing; and

a multi-vehicle compatible adaptor circuit mounted in said housing for storing a set of device codes for a given vehicle device for a plurality of different vehicles, for reading a device code from the data communications bus, and for determining a match between a read device code and the stored device codes to thereby provide compatibility with a plurality of different vehicles.

17. An adaptor according to claim **16** wherein said multi-vehicle compatible adaptor circuit comprises a memory for the stored device codes.

18. An adaptor according to claim **17** wherein said multi-vehicle compatible adaptor circuit comprises a processor cooperating with said memory for determining the match between the read device code and the stored device codes.

19. An adaptor according to claim **16** wherein the at least one vehicle device comprises a plurality of vehicle devices; and wherein said multi-vehicle compatible adaptor circuit stores a respective set of device codes for each of the plurality of vehicle devices.

20. An adaptor according to claim **16** wherein the at least one vehicle device comprises a vehicle sensor; and wherein the stored device codes relate to the vehicle sensor.

21. An adaptor according to claim **16** wherein the stored vehicle codes relate to vehicle security.

22. An adaptor according to claim **16** wherein the stored vehicle codes relate to keyless entry for the vehicle.

23. An adaptor according to claim **16** wherein the stored vehicle codes relate to remote starting a vehicle engine.

24. A control method for a vehicle comprising a data communications bus and at least one vehicle device connected thereto, the method comprising:

storing a set of device codes for a given vehicle device for a plurality of different vehicles;

reading a device code from the data communications bus; and

determining a match between a read device code and the stored device codes and performing a function based thereon to thereby provide compatibility with a plurality of different vehicles.

25. A method according to claim **24** further comprising receiving a signal from a transmitter; and wherein performing the function is also based upon receiving the signal from the transmitter.

26. A method according to claim **25** wherein the transmitter comprises a handheld remote transmitter to be carried by a user when away from the vehicle.

27. A method according to claim **25** wherein the transmitter comprises at least a central station transmitter.

28. A method according to claim 25 wherein the transmitter comprises a handheld transponder to be carried by a user when away from the vehicle.

29. A method according to claim 24 wherein the function comprises transmitting a signal from the vehicle to a remote receiver.

30. A method according to claim 29 wherein the remote receiver comprises a handheld receiver to be carried by the user when away from the vehicle.

31. A method according to claim 29 wherein the remote receiver comprises at least one central station remote receiver.

32. A method according to claim 24 wherein the at least one vehicle device comprises a plurality of vehicle devices; and wherein storing comprises storing a respective set of device codes for each of the plurality of vehicle devices.

33. A method according to claim 24 wherein the at least one vehicle device comprises a vehicle sensor; and wherein the stored device codes relate to the vehicle sensor.

34. A method according to claim 24 wherein the stored vehicle codes relate to vehicle security.

35. A method according to claim 24 wherein the stored vehicle codes relate to keyless entry for the vehicle.

36. A method according to claim 24 wherein the stored vehicle codes relate to remote starting a vehicle engine.

37. A method for adapting a control system for a vehicle to be compatible with a plurality of different vehicles, each vehicle comprising a data communications bus and at least one vehicle device connected thereto, the control system comprising a transmitter and a receiver for receiving signals from the transmitter, and a controller at the vehicle and cooperating with the transmitter and receiver, the method comprising:

storing a set of device codes for a given vehicle device for a plurality of different vehicles;

reading a device code from the data communications bus; and

determining a match between a read device code and the stored device codes and performing a function based thereon to thereby provide compatibility with a plurality of different vehicles.

38. A method according to claim 37 wherein the receiver is at the vehicle and the transmitter is remote therefrom; and further comprising receiving a signal from the transmitter and performing the function further based thereon.

39. A method according to claim 37 wherein the transmitter is at the vehicle and the receiver is remote therefrom; and wherein the function comprises transmitting a signal from the vehicle to the remote receiver.

40. A method according to claim 37 wherein the at least one vehicle device comprises a plurality of vehicle devices; and wherein storing comprises storing a respective set of device codes for each of the plurality of vehicle devices.

41. A method according to claim 37 wherein the at least one vehicle device comprises a vehicle sensor; and wherein the stored device codes relate to the vehicle sensor.

42. A method according to claim 37 wherein the stored vehicle codes relate to vehicle security.

43. A method according to claim 37 wherein the stored vehicle codes relate to keyless entry for the vehicle.

44. A method according to claim 37 wherein the stored vehicle codes relate to remote starting a vehicle engine.

* * * * *

EXHIBIT E

US007671727B2

(12) **United States Patent**
Flick

(10) **Patent No.: US 7,671,727 B2**
(45) **Date of Patent: Mar. 2, 2010**

(54) **SPEED EXCEEDED NOTIFICATION DEVICE FOR VEHICLE HAVING A DATA BUS AND ASSOCIATED METHODS**

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(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 340 days.

(21) Appl. No.: **11/844,703**

(22) Filed: **Aug. 24, 2007**

(65) **Prior Publication Data**

US 2008/0030316 A1 Feb. 7, 2008

Related U.S. Application Data

(63) Continuation-in-part of application No. 11/076,259, filed on Mar. 9, 2005, which is a continuation of application No. 10/383,496, filed on Mar. 7, 2003, now Pat. No. 7,149,623, which is a continuation of application No. 09/859,972, filed on May 17, 2001, now Pat. No. 6,606,561.

(60) Provisional application No. 60/264,811, filed on Jan. 29, 2001, provisional application No. 60/258,005, filed on Dec. 22, 2000, provisional application No. 60/251,552, filed on Dec. 6, 2000, provisional application No. 60/252,125, filed on Nov. 20, 2000, provisional application No. 60/236,890, filed on Sep. 29, 2000, provisional application No. 60/246,463, filed on Nov. 7, 2000, provisional application No. 60/222,777, filed on Aug. 3, 2000, provisional application No. 60/205,178, filed on May 17, 2000.

(51) **Int. Cl.**
B60Q 1/54 (2006.01)

(52) **U.S. Cl.** **340/466**; 340/441; 340/936; 340/426.19; 340/988; 701/213

(58) **Field of Classification Search** 340/441, 340/936, 989, 426.19, 466, 988, 901, 902, 340/992, 993; 701/213, 207, 209, 24, 33, 701/35, 36

See application file for complete search history.

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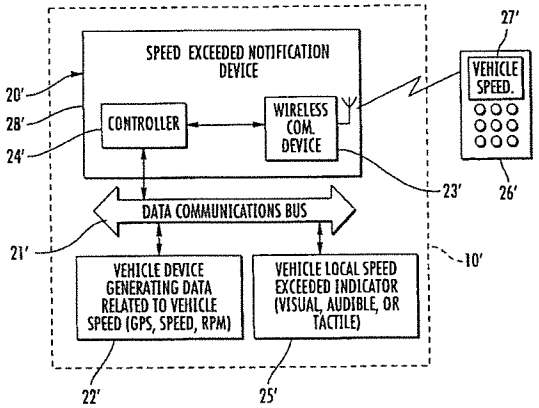
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(57) **ABSTRACT**

A speed exceeded notification device is for a vehicle of a type including a vehicle data communications bus extending throughout the vehicle, and at least one vehicle device generating data related to vehicle speed on the vehicle data communications bus. The speed exceeded notification device may include a wireless communications device, and a controller to be coupled to the vehicle data communications bus. The controller may be for reading the data related to vehicle speed from the vehicle data communications bus, and determining when a vehicle speed exceeds a speed threshold for a first time period. Based thereon, the controller may cooperate with the wireless communications device to send a remote vehicle speed exceeded notification.

25 Claims, 6 Drawing Sheets



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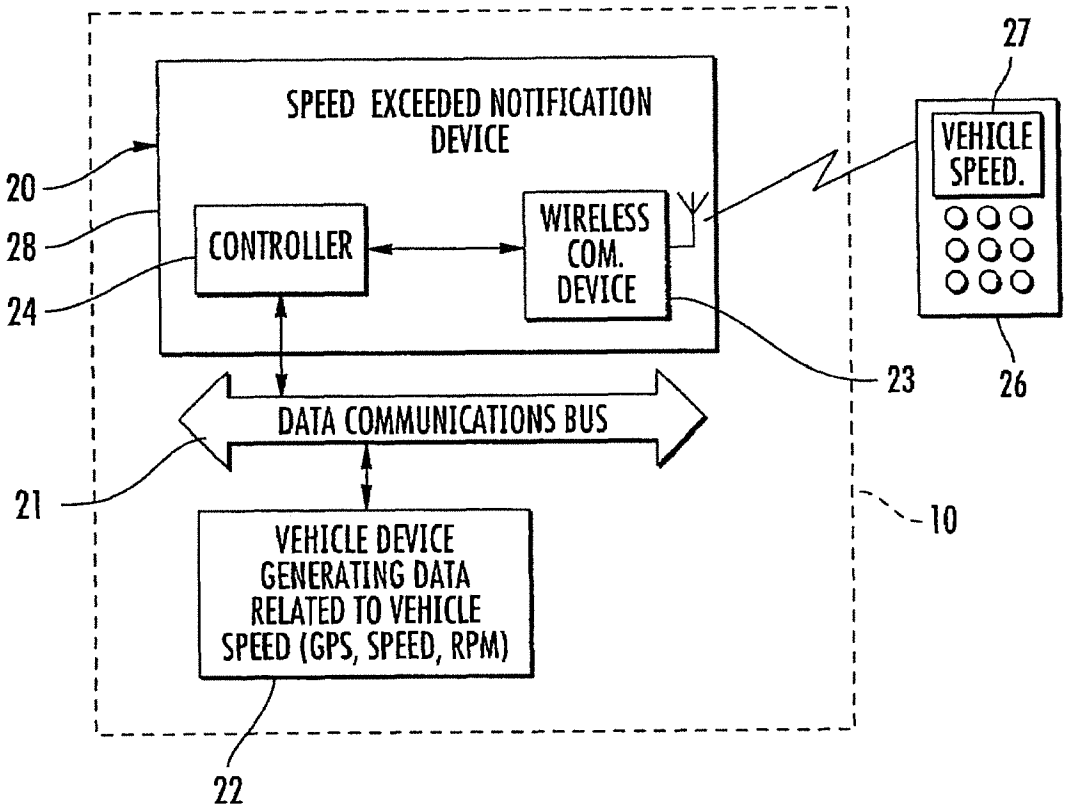

SPEED EXCEEDED NOTIFICATION DEVICE
CONTROLLER
WIRELESS COM. DEVICE
DATA COMMUNICATIONS BUS
VEHICLE DEVICE GENERATING DATA RELATED TO VEHICLE SPEED (GPS, SPEED, RPM)
VEHICLE SPEED.
20
28
24
21
22
23
26
27
10

FIG. 1

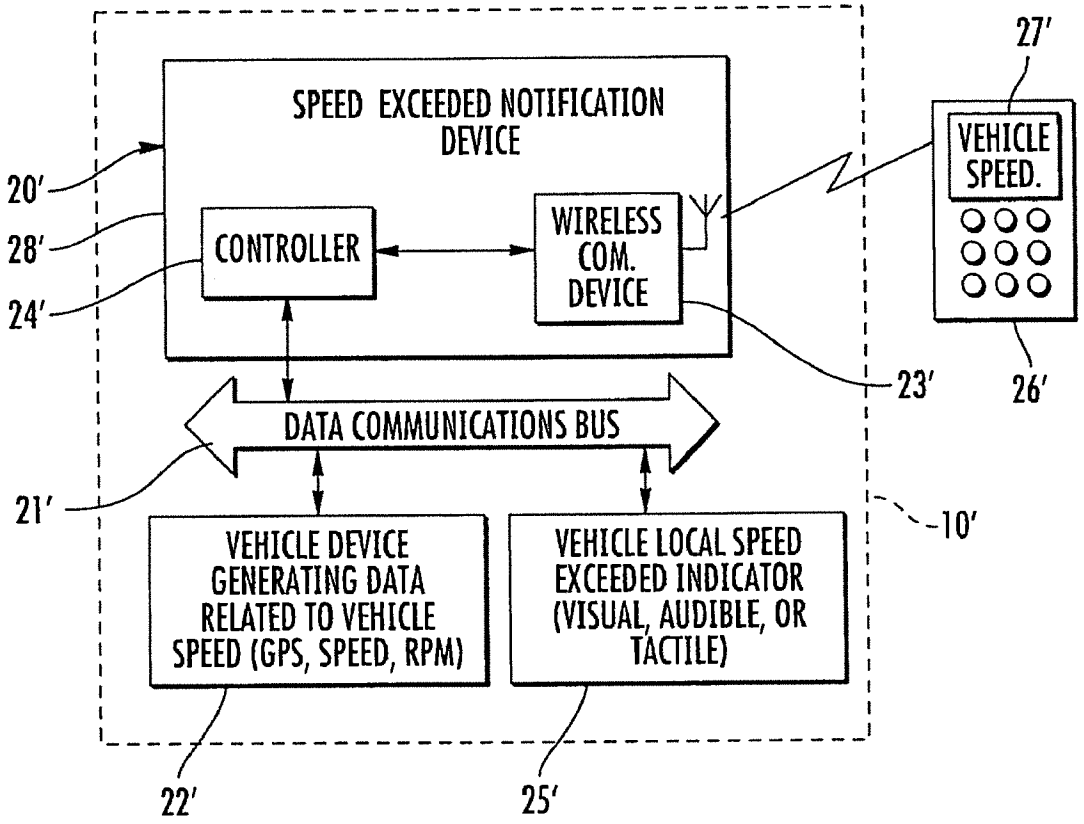

SPEED EXCEEDED NOTIFICATION DEVICE
CONTROLLER
WIRELESS COM. DEVICE
DATA COMMUNICATIONS BUS
VEHICLE DEVICE GENERATING DATA RELATED TO VEHICLE SPEED (GPS, SPEED, RPM)
VEHICLE LOCAL SPEED EXCEEDED INDICATOR (VISUAL, AUDIBLE, OR TACTILE)
VEHICLE SPEED.
20'
28'
24'
21'
22'
25'
23'
26'
27'
10'

FIG. 2

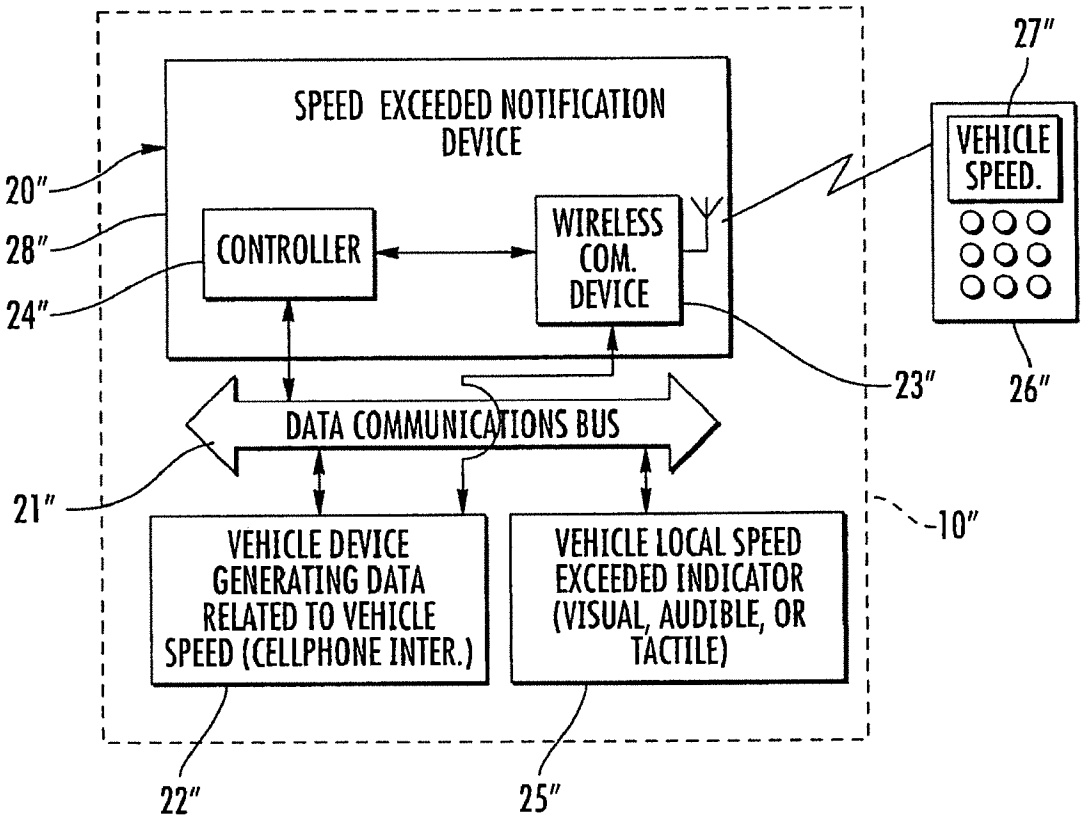

SPEED EXCEEDED NOTIFICATION DEVICE
CONTROLLER
WIRELESS COM. DEVICE
DATA COMMUNICATIONS BUS
VEHICLE DEVICE GENERATING DATA RELATED TO VEHICLE SPEED (CELLPHONE INTER.)
VEHICLE LOCAL SPEED EXCEEDED INDICATOR (VISUAL, AUDIBLE, OR TACTILE)
VEHICLE SPEED.
20″
28″
24″
21″
22″
25″
23″
26″
27″
10″

FIG. 3

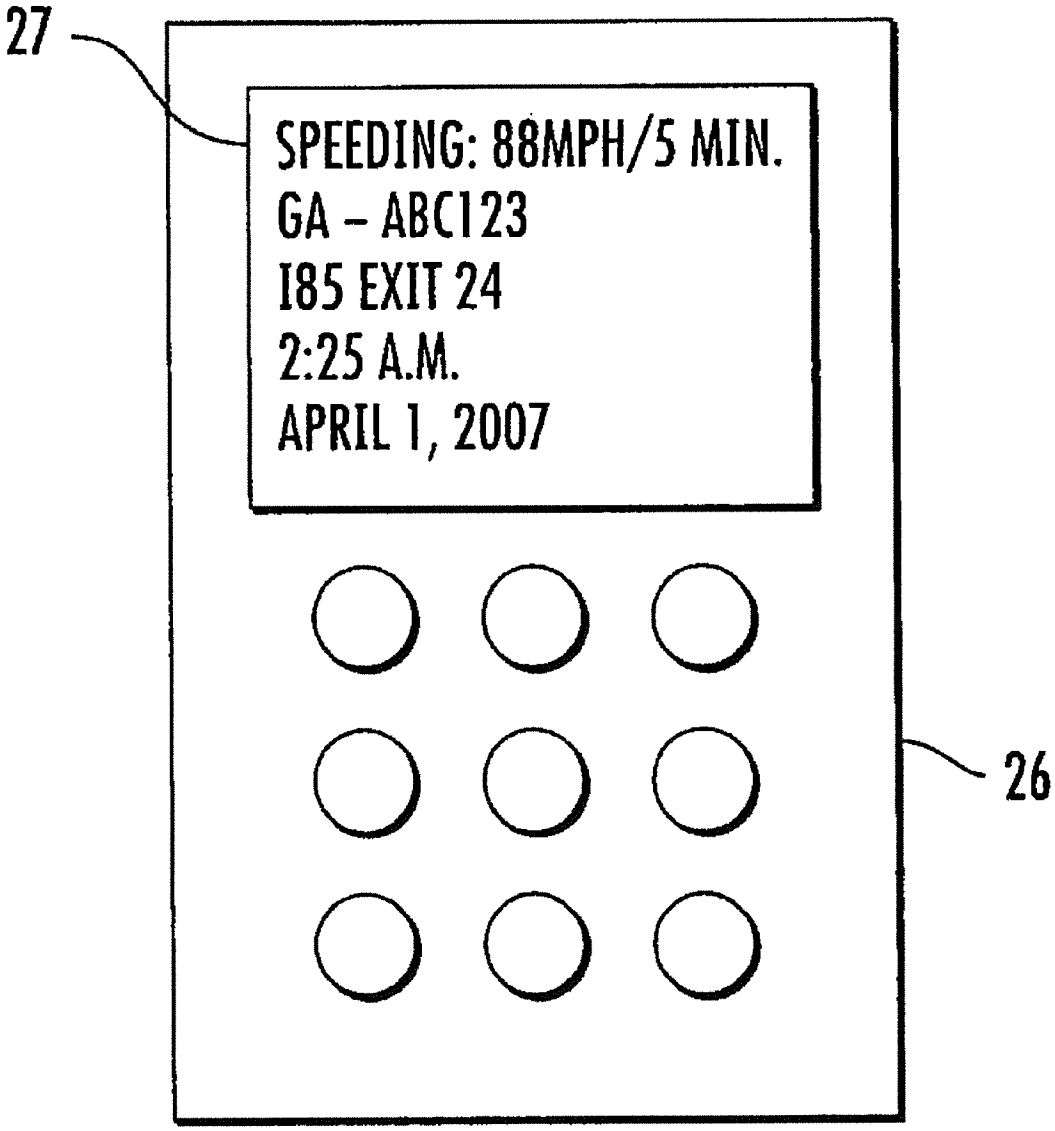

27
SPEEDING: 88MPH/5 MIN.
GA – ABC123
I85 EXIT 24
2:25 A.M.
APRIL 1, 2007
26

FIG. 4

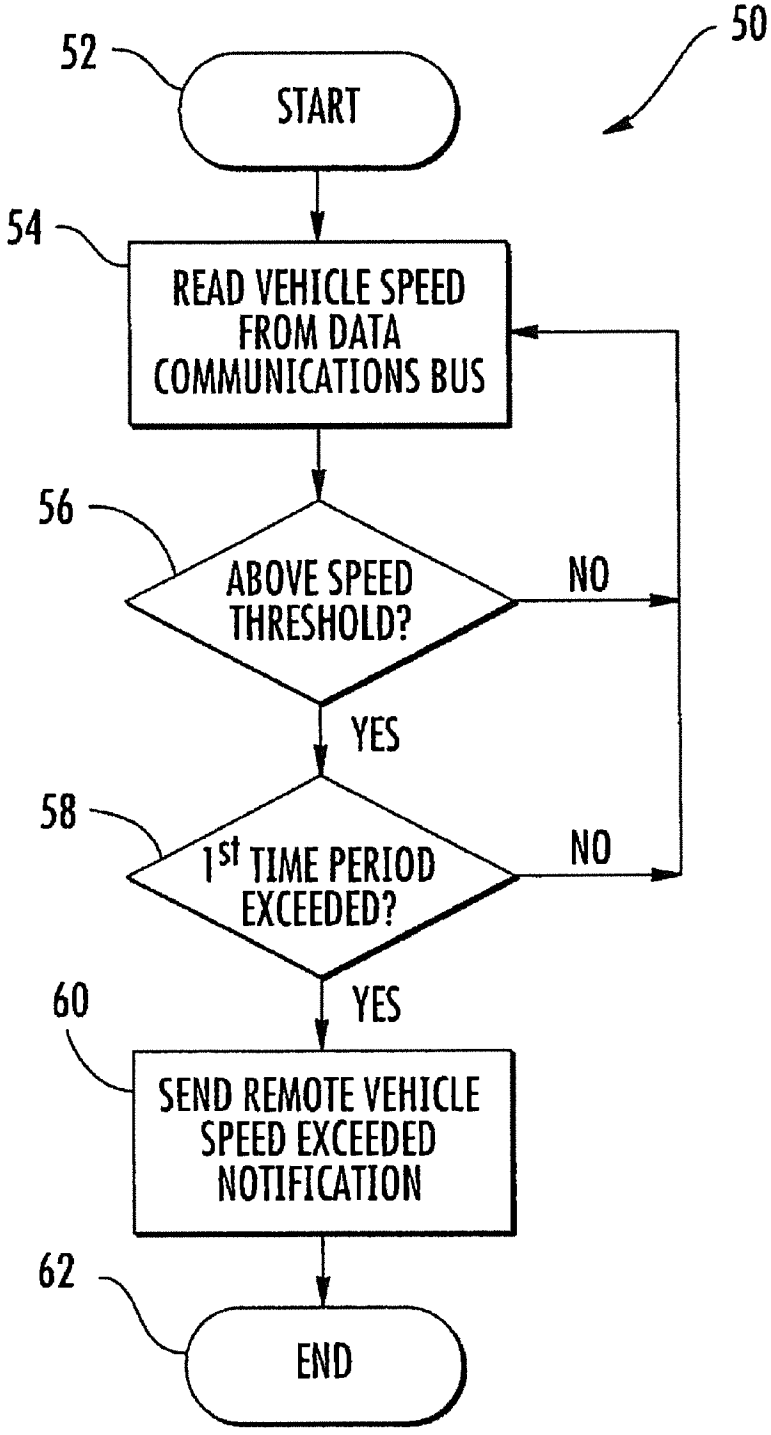

50
52
START
54
READ VEHICLE SPEED FROM DATA COMMUNICATIONS BUS
56
ABOVE SPEED THRESHOLD?
NO
YES
58
1st TIME PERIOD EXCEEDED?
NO
YES
60
SEND REMOTE VEHICLE SPEED EXCEEDED NOTIFICATION
62
END

FIG. 5

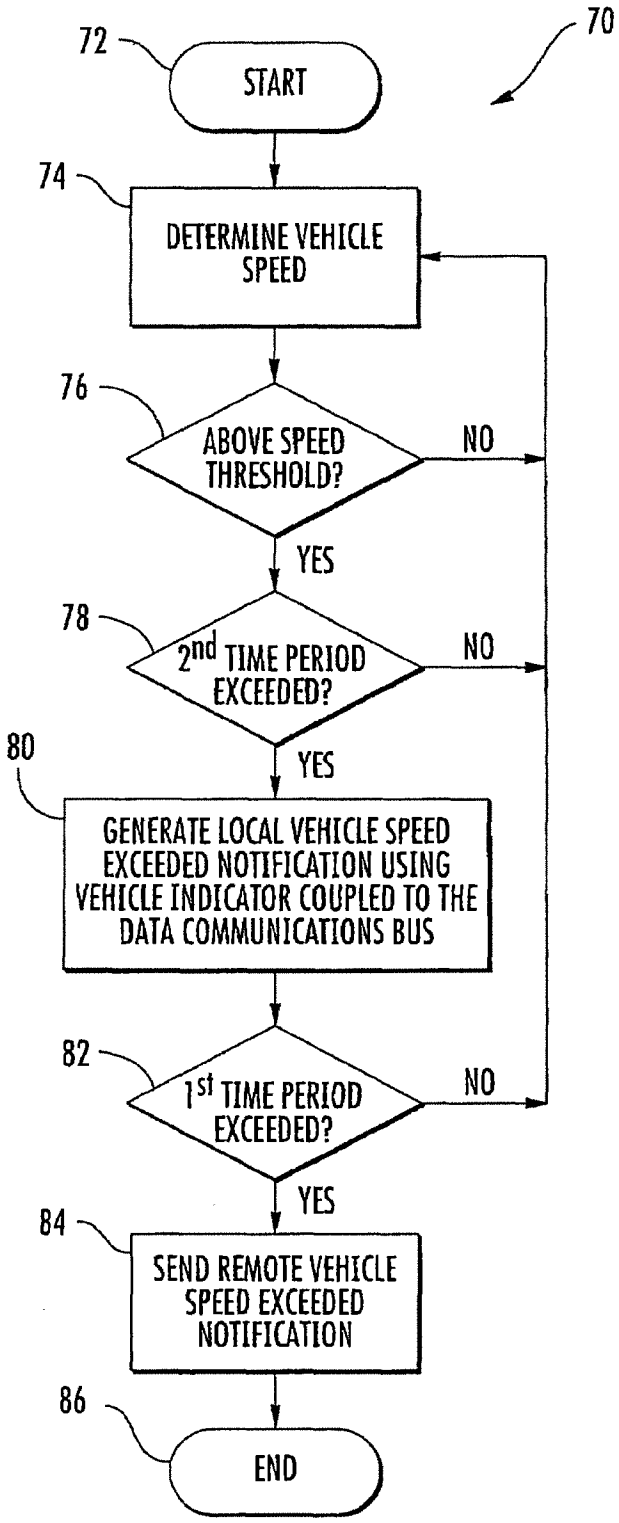

70
72
START
74
DETERMINE VEHICLE SPEED
76
ABOVE SPEED THRESHOLD?
NO
YES
78
2nd TIME PERIOD EXCEEDED?
NO
YES
80
GENERATE LOCAL VEHICLE SPEED EXCEEDED NOTIFICATION USING VEHICLE INDICATOR COUPLED TO THE DATA COMMUNICATIONS BUS
82
1st TIME PERIOD EXCEEDED?
NO
YES
84
SEND REMOTE VEHICLE SPEED EXCEEDED NOTIFICATION
86
END

FIG. 6

SPEED EXCEEDED NOTIFICATION DEVICE FOR VEHICLE HAVING A DATA BUS AND ASSOCIATED METHODS

RELATED APPLICATIONS

The present application is a continuation-in-part of U.S. patent application Ser. No. 11/076,259 filed Mar. 9, 2005; which a continuation of U.S. patent application Ser. No. 10/383,496 filed Mar. 7, 2003, now U.S. Pat. No. 7,149,623; which is a continuation of U.S. patent application Ser. No. 09/859,972 filed May 17, 2001 now U.S. Pat. No. 6,606,561; which, in turn, was based upon provisional patent application Ser. Nos. 60/264,811 filed on Jan. 29, 2001; 60/258,005, filed Dec. 22, 2000; 60/251,552, filed Dec. 6, 2000; 60/252,125, filed Nov. 20, 2000; 60/236,890, filed Sep. 29, 2000; 60/246,463, filed Nov. 7, 2000; 60/222,777, filed Aug. 3, 2000; 60/205,178, filed May 17, 2000, the entire contents of each of which are incorporated herein by reference.

FIELD OF THE INVENTION

The present invention relates to the field of vehicle devices, and, more particularly, to a vehicle speed exceeded notification device, and related methods.

BACKGROUND OF THE INVENTION

Motor vehicles, such as passenger cars, trucks, busses, fleet vehicles, etc. are widely used, and knowing the locations of such vehicles is often desired. For example, should a vehicle be stolen it would be beneficial to know the vehicle's location so that authorities could be promptly and accurately directed to retrieve the vehicle. Indeed, the tracking system could plot the getaway path of the thief.

For a company with hired drivers, it may be desirable to know the driver's whereabouts during the course of the day. Similarly, a rental car agency or other fleet operator, for example, may wish to know the whereabouts of its fleet of vehicles.

It may also be desirable to track the location of a vehicle as it is used throughout the course of a normal day. For parents of younger or older drivers, for example, knowledge of the vehicle's location may provide some assurance that the driver is at designated locations and following a prescribed route.

The widespread availability and use of the Internet has prompted a number of vehicle tracking systems to also make use of the Internet. For example, TelEvoke, Inc. proposed such a system in combination with Clifford Electronics. The system was to provide notification, control and tracking services via the telephone or the Internet. Users could be notified via phone, e-mail, or a pager of events such as a car alarm being triggered. Users could control the vehicle remote devices via the phone, the web, or a PDA, such as unlocking car doors. Additionally, users could track TelEvoke-enabled vehicles on the Internet or via the telephone. An Internet map could be viewed by the user showing the actual and prior vehicle locations. TelEvoke offered its services via a centralized fully automated Network Operations Center. To reduce the communications costs, it was proposed to use the control channel of the cellular telephone network.

A number of significance advances in vehicle tracking technology are disclosed, for example, in U.S. Pat. No. 7,015,830 to Flick, and assigned to the assignee of the present invention. This patent discloses a vehicle tracking unit for a vehicle of a type including a vehicle data bus extending throughout the vehicle and at least one operable vehicle device connected thereto. The at least one operable vehicle device may be responsive to at least one data bus code on the vehicle data bus. The vehicle tracking unit may include a vehicle position determining device, a wireless communications device, and a controller cooperating with the vehicle position determining device and the wireless communications device to send vehicle position information to a user. Moreover, the controller may generate the at least one data bus code on the vehicle data bus to control the at least one operable vehicle device based upon a command signal received by the wireless communications device.

Another significant advance in vehicle tracking relates to speed exceeded notifications and is disclosed in U.S. Pat. No. 6,888,495 to Flick and assigned to the assignee of the present invention. The patent discloses a tracking system controller being switchable to be in an armed mode for cooperating with a vehicle position determining device and a wireless communications device to generate, and send a speeding alert message based upon the vehicle exceeding a speed threshold for longer than a predetermined time indicative of aggressive driving of the vehicle. A monitoring station may generate a series of speeding alert message notifications for a user based upon receiving the speeding alert message from the vehicle tracking unit. The monitoring station may cancel any remaining speeding alert message notifications of the series based upon a cancellation command response from an entity already having received the speeding alert message notification. Accordingly, if the user may be reached at different telephone numbers or different users are desirably notified of the alert, then unnecessary notifications are avoided. Of course, other approaches for using a vehicle tracker to influence/monitor a vehicle regarding excessive speed may also be desirable.

SUMMARY OF THE INVENTION

In view of the foregoing background, it is therefore an object of the present invention to provide a speed exceeded notification device which may be readily used in a vehicle including a data communications bus and related methods.

This and other objects, features, and advantages in accordance with the present invention are provided by a speed exceeded notification device to be installed in a vehicle of a type comprising a vehicle data communications bus extending throughout the vehicle. The vehicle may have at least one vehicle device generating data related to vehicle speed on the vehicle data communications bus, for example. The speed exceeded notification device may comprise a wireless communications device, and a controller to be coupled to the vehicle data communications bus. In addition, the controller may be for reading the data related to vehicle speed from the vehicle data communications bus and determining when a vehicle speed exceeds a speed threshold for a first time period. Based on the exceeding of the speed threshold, the controller may cooperate with the wireless communications device to send a remote vehicle speed exceeded notification, for example. Accordingly, the speed exceeded notification device is readily integrated in a vehicle having a data communications bus, and this may be especially useful in vehicle aftermarket applications, where such functionality is desirably added to a vehicle after its manufacture.

The controller may also be for determining when the vehicle speed exceeds the speed threshold for a second time period less than the first time period and, in response thereto, generating a local vehicle speed exceeded notification. In other words, the device may provide a pre-warning in the form of the local speed exceeded notification so that the driver

is encouraged to slow down before a full speeding notification will be sent from the vehicle, such as to an employer or authority figure.

The local vehicle speed exceeded notification may comprise at least one of an audible notification, a visual notification, and a tactile notification, for example. At least one of the speed threshold, the first time period, and the second time period may be user selectable.

The at least one vehicle device generating data related to vehicle speed on the vehicle data communications bus may include a vehicle position determining device. For example, the vehicle position determining device may include a Global Positioning System (GPS) receiver. Alternatively, the positioning determining device may cooperate with the wireless communications device, particularly where the wireless communications device comprises a cellular communications device, for example.

The remote vehicle speed exceeded notification may further comprise an identity of the vehicle, a speed of the vehicle, and/or a vehicle position, for example. The remote vehicle speed exceeded notification may further comprise a time the vehicle exceeded the speed threshold.

A method aspect is for generating a speed exceeded notification in a vehicle of a type comprising a vehicle data communications bus extending throughout the vehicle, and at least one vehicle device generating data related to vehicle speed on the vehicle data communications bus. The method may comprise using a controller coupled to the vehicle data communications bus for reading the data related to vehicle speed from the vehicle data communications bus. The method may also comprise using the controller for determining when a vehicle speed exceeds a speed threshold for a first time period, and based thereon, cooperating with a wireless communications device to send a remote vehicle speed exceeded notification.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is a schematic block diagram of a speed exceeded notification device in accordance with the invention.

FIG. **2** is schematic block diagram of another embodiment of a speed exceeded notification device in accordance with the invention.

FIG. **3** is schematic block diagram of yet another embodiment of a speed exceeded notification device in accordance with the invention.

FIG. **4** is an enlarged schematic front view of the cellular telephone as in the system of FIG. **1** illustrating a remote speed exceeded notification.

FIG. **5** is a flowchart of operation of a speed exceeded notification device in accordance with the present invention.

FIG. **6** is another flowchart of operation of another embodiment of a speed exceeded notification device in accordance with the present invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

The present invention will now be described more fully hereinafter with reference to the accompanying drawings, in which preferred embodiments of the invention are shown. This invention may, however, be embodied in many different forms and should not be construed as limited to the embodiments set forth herein. Rather, these embodiments are provided so that this disclosure will be thorough and complete, and will fully convey the scope of the invention to those skilled in the art. Like numbers refer to like elements throughout, and prime and multiple prime notation are used to indicate similar elements in alternative embodiments.

Referring initially to FIG. **1**, a first embodiment of a speed exceeded notification device **20** is now described. The speed exceeded notification device **20** is illustratively installed in a vehicle **10** of a type comprising a vehicle data communications bus **21** extending throughout the vehicle. Illustratively, a vehicle device **22** generates data related to vehicle speed on the vehicle data communications bus **21**. Of course, in other embodiments, more than one vehicle device may generate data related to the vehicle speed. The data related to the vehicle speed may include a vehicle speed signal that includes a digital vehicle speed code. Alternatively or additionally, the data related to vehicle speed may be geographical position data, such as based upon GPS position data; or engine RPM in combination with transmission gearing, for example, that may be used to calculate the vehicle speed.

The speed exceeded notification device **20** includes a wireless communications device **23** and a controller **24** coupled to the vehicle data communications bus **21**. The controller **24** is for reading the data related to vehicle speed from the vehicle data communications bus **21**, and for determining when a vehicle speed exceeds a speed threshold for a first time period. The speed threshold may be user selectable and may be in a range of about 55 to 80 miles per hour, for example. The speed threshold may also be determined based upon the vehicle's location, and a look-up table having the speeds for various roads, as will be appreciated by those skilled in the art.

The first time period may also be user selectable and may be in a range of about 30 seconds to 5 minutes. Of course, other speed ranges, and time durations may also be used. If the speed threshold is exceeded for the first time period, the controller **24** cooperates with the wireless communications device **23** to send a remote vehicle speed exceeded notification.

The controller **24** may be provided by a processor operating under stored program control, and/or may include discrete analog and digital circuits as will be appreciated by those skilled in the art. The controller **24**, in some embodiments, may be a multi-vehicle compatible controller such as described in U.S. Pat. Nos. 6,346,876; 6,756,885; 6,756,886; 6,812,829; 7,010,402; 7,046,126; 7,068,153; 7,091,822 and 7,224,083 all assigned to the assignee of the present invention and incorporated herein by reference. In other embodiments, the controller **24** may be a single vehicle or single vehicle platform controller as will also be appreciated by those skilled in the art.

The wireless communications device **23** may be a cellular telephone communication device that sends the remote vehicle speed exceeded notification as a text message, for example. In another embodiment, the wireless communications device **23** may be another type of wireless communications device using another protocol, for example, and may send the notification in another format, such as an email, or voice message, for example, as will be appreciated by those skilled in the art. Of course, the wireless communications device **23** may be included within a common housing **28** of the device **20**, or may be a separate and removable device, such as the user's personal cellular telephone.

A remote wireless device, such as the illustrated cellphone **26**, is for receiving the remote vehicle speed exceeded signal from the wireless device **23** at the vehicle. The remote wireless device may be a PDA, pager, etc. or other wireless device capable of receiving messages from the wireless communications device **23**. The remote wireless device **26** may also be a fixed central monitoring station that may act upon the speeding notification, or that may forward the speeding notification

onto a subscriber, such as an employer, parent or relative, or other authority figure as will be appreciated by those skilled in the art. The remote wireless device in the form of the cellphone **26** illustratively includes a display **27** that may be used to display a speeding notification. The remote wireless device **26** may communicate directly with the wireless communications device **23** in the vehicle **10**, or may communicate via intervening cellular communications infrastructure, and/or Internet infrastructure as will also be appreciated by those skilled in the art.

Referring now to the embodiment shown in FIG. **2**, the illustrated controller **24'** of the speed exceeded notification device **20'** may also determine when the vehicle speed exceeds the speed threshold for a second time period less than the first time period. If the vehicle speed exceeds the speed threshold for a second time period less than the first time period, the controller **24'** generates a local vehicle speed exceeded notification on a vehicle indicator **25'**. The second time period may also be user selectable and may be in a range of about 2 seconds to 1 minute, for example. In other words, this local vehicle speed notification may serve as a warning to the driver to slow down before the remote speed exceeded notification is sent.

The vehicle local speed exceeded indicator **25'** may produce an audible notification, such as a door chime, a horn honk, a radio volume adjustment, or an automated voice message for example. Alternatively or additionally, the vehicle local speed exceeded indicator **25'** may produce a visual notification, such as a flash of the dome light, illumination or flashing of a dashboard light, or operation of any other visual indicator, for example. In addition, the vehicle local speed exceeded indicator **25'** may be a tactile notification indicator, such as a causing steering wheel vibration, seat vibration, etc. The local indication may be repetitive and increasing in urgency as the full first time period is approached. For example, the repetition frequency. audible pitch, or volume may be progressively increasing. The local speed notification on the vehicle indicator **25'** allows the driver of the vehicle to reduce the speed of the vehicle and avoid sending of the remote vehicle speed exceeded notification to the remote wireless device **26'**.

Moreover, in the illustrated embodiment, this vehicle local speed exceeded indicator **25'** is connected to the vehicle data bus **21'** and may be an existing vehicle device as installed during vehicle manufacture, or may be added as an aftermarket item as will be appreciated by those skilled in the art. In some other embodiments, the local speed exceeded indicator **25'** may be hardwired to the controller **24'**, and may even be contained within the housing **28'** of the speed exceeded notification device **20'** as will also be appreciated by those skilled in the art. Those other elements shown in FIG. **2**, and not discussed in detail, are indicated by prime notation and are similar to those elements discussed above with respect to FIG. **1**.

Referring now additionally to the embodiment shown in FIG. **3**, another variation is now described as relating to generating the vehicle speed data. In this embodiment of the speed exceeded notification device **20"**, the data related to the vehicle speed is generated based upon cooperation with the wireless communications device **23"**. For example, the wireless communications device **23"** may be a cellular telephone based device that generates position data either based upon an internal GPS receiver, or based upon triangulation or other cellular telephone-based position determining approaches. In other words, the vehicle device generating data related to vehicle speed **22"**, on the vehicle data communications bus **21"** may be an interface circuit between the wireless communications device **23"** and the data communications bus as will be appreciated by those skilled in the art. Those other elements shown in FIG. **3**, and not discussed in detail, are indicated by double prime notation and are similar to those elements discussed above with respect to FIGS. **1** and **2**.

Referring additionally to FIG. **4**, an exemplary remote vehicle speed exceeded notification is shown on the display **27** of the remote wireless device **26** and includes an identity of the vehicle by its license plate number, GA-ABC123. The remote vehicle speed exceeded notification also includes a speed of the vehicle, 88 mph for a time of 5 minutes; a vehicle position, I85 at Exit 24; and the time and date the vehicle exceeded the speed threshold, 2:25 AM, Apr. 1, 2007. Of course, additional or alternative vehicle information may be sent by the controller **24** to the remote vehicle speed exceeded display device **26**, as will be appreciated by those having ordinary skill in the art. For example, a speed versus time profile could be generated on the display **27**. Additionally, the controller **24** can advantageously send the remote vehicle speed exceeded notifications to the remote wireless device **26** in real time when the speed and time thresholds are exceeded, on a regular schedule, or based on any other triggering event, such as a collision indicated by an airbag deployment, for example.

Referring now additionally to the flowchart **50** of FIG. **5**, a method for speed exceeded notification in a vehicle of a type comprising a vehicle data communications bus extending throughout the vehicle is now described. After the start at Block **52**, the method includes using a controller **24** coupled to the vehicle data communications bus **21** for reading the data related to vehicle speed from the vehicle data communications bus (Block **54**). From the vehicle data it is determined when a vehicle speed exceeds a speed threshold (Block **56**) for a first time period (Block **58**). The method further includes using the controller **24** cooperating with the wireless communications device **23** to send a remote vehicle speed exceeded notification to the remote wireless device **26** (Block **60**) if both the speed threshold (Block **56**) and time threshold (Block **58**) have been exceeded, before ending at Block **62**.

Referring now additionally to the flowchart **70** of FIG. **6**, another method is described for speed exceeded notification in a vehicle of a type comprising a vehicle data communications bus **21** extending throughout the vehicle, and at least one vehicle indicator **25** coupled to the vehicle data communications bus **21**. Beginning at Block **72**, the method includes using a controller **24** coupled to the vehicle data communications bus **21** for determining a vehicle speed (Block **74**). The controller **24** determines if the vehicle exceeds the speed threshold (Block **76**), and if for a second time period (Block **78**). If the speed threshold is exceeded for the second time period, the controller **24** generates a local vehicle speed exceeded notification using a vehicle indicator **25** coupled to the vehicle data communications bus (Block **80**). The controller **24** then determines when the vehicle speed exceeds a speed threshold for a first time period (Block **82**) longer than the second time period, and based thereon cooperates with the wireless communications device **23** to send a remote vehicle speed exceeded notification (Block **84**) before stopping at Block **86**.

This application is related to copending patent applications entitled, VEHICLE DEVICE TO ACTIVATE A VISUAL OR AUDIBLE ALERT AND ASSOCIATED METHODS, and SPEED EXCEEDED NOTIFICATION DEVICE FOR VEHICLE HAVING A DATA BUS AND ASSOCIATED METHODS, which are filed on the same date and by the same assignee and inventor, the disclosures of which are hereby incorporated by reference in their entirety. Many modifications and other embodiments of the invention will come to the mind of one skilled in the art having the benefit of the teachings presented in the foregoing descriptions and the associated drawings. Therefore, it is understood that the invention is not to be limited to the specific embodiments disclosed, and

that other modifications and embodiments are intended to be included within the scope of the appended claims.

That which is claimed is:

1. A speed exceeded notification device for a vehicle of a type comprising a vehicle data communications bus extending throughout the vehicle, and at least one vehicle device generating data related to vehicle speed on the vehicle data communications bus, the speed exceeded notification device comprising:

a wireless communications device; and

a controller to be coupled to the vehicle data communications bus for

reading the data related to vehicle speed from the vehicle data communications bus, and

determining when a vehicle speed exceeds a speed threshold for a first time period and based thereon cooperating with said wireless communications device to send a remote vehicle speed exceeded notification.

2. The speed exceeded notification device according to claim 1 wherein said controller is also for determining when the vehicle speed exceeds the speed threshold for a second time period less than the first time period and generating a local vehicle speed exceeded notification.

3. The speed exceeded notification device according to claim 2 wherein the local vehicle speed exceeded notification comprises at least one of an audible notification, a visual notification, and a tactile notification.

4. The speed exceeded notification device according to claim 2 wherein at least one of the speed threshold, the first time period, and the second time period is user selectable.

5. The speed exceeded notification device according to claim 1 wherein the at least one vehicle device generating data related to vehicle speed on the vehicle data communications bus comprises a vehicle position determining device.

6. The speed exceeded notification device according to claim 5 wherein said vehicle position determining device comprises a Global Positioning System (GPS) receiver.

7. The speed exceeded notification device according to claim 5 wherein the vehicle position determining device cooperates with said wireless communications device.

8. The speed exceeded notification device according to claim 7 wherein said wireless communications device comprises a cellular communications device.

9. The speed exceeded notification device according to claim 1 wherein the remote vehicle speed exceeded notification further comprises an identity of the vehicle.

10. The speed exceeded notification device according to claim 1 wherein the remote vehicle speed exceeded notification further comprises a speed of the vehicle.

11. The speed exceeded notification device according to claim 1 wherein the remote vehicle speed exceeded notification further comprises a vehicle position.

12. The speed exceeded notification device according to claim 1 wherein the remote vehicle speed exceeded notification further comprises a time the vehicle exceeded the speed threshold.

13. A speed exceeded notification device for a vehicle of a type comprising a vehicle data communications bus extending throughout the vehicle, and at least one vehicle device generating data related to vehicle speed on the vehicle data communications bus, the speed exceeded notification device comprising:

a wireless communications device; and

a controller to be coupled to the vehicle data communications bus for

reading the data related to vehicle speed from the vehicle data communications bus,

determining when a vehicle speed exceeds a speed threshold for a first time period and based thereon cooperating with said wireless communications device to send a remote vehicle speed exceeded notification, and

determining when the vehicle speed exceeds the speed threshold for a second time period less than the first time period and generating a local vehicle speed exceeded notification so that a driver of the vehicle can reduce the speed of the vehicle and avoid sending of the remote vehicle speed exceeded notification.

14. The speed exceeded notification device according to claim 13 wherein the local vehicle speed exceeded notification comprises at least one of an audible notification, a visual notification, and a tactile notification.

15. The speed exceeded notification device according to claim 13 wherein at least one of the speed threshold, the first time period, and the second time period is user selectable.

16. The speed exceeded notification device according to claim 13 wherein the at least one vehicle device generating data related to vehicle speed on the vehicle data communications bus comprises a vehicle position determining device.

17. The speed exceeded notification device according to claim 16 wherein the vehicle position determining device cooperates with said wireless communications device.

18. The speed exceeded notification device according to claim 13 wherein the remote vehicle speed exceeded notification further comprises at least one of an identity of the vehicle, a speed of the vehicle, a vehicle position, and a time the vehicle exceeded the speed threshold.

19. A method for speed exceeded notification in a vehicle of a type comprising a vehicle data communications bus extending throughout the vehicle, and at least one vehicle device generating data related to vehicle speed on the vehicle data communications bus, the method comprising:

using a controller coupled to the vehicle data communications bus for

reading the data related to vehicle speed from the vehicle data communications bus, and

determining when a vehicle speed exceeds a speed threshold for a first time period and based thereon cooperating with a wireless communications device to send a remote vehicle speed exceeded notification.

20. The method according to claim 19 further comprising also using the controller for determining when the vehicle speed exceeds the speed threshold for a second time period less than the first time period and generating a local vehicle speed exceeded notification.

21. The method according to claim 20 wherein the local vehicle speed exceeded notification comprises at least one of an audible notification, a visual notification, and a tactile notification.

22. The method according to claim 20 wherein at least one of the speed threshold, the first time period, and the second time period is user selectable.

23. The method according to claim 19 wherein the at least one vehicle device generating data related to vehicle speed on the vehicle data communications bus comprises a vehicle position determining device.

24. The method according to claim 23 wherein the vehicle position determining device cooperates with the wireless communications device.

25. The method according to claim 19 wherein the remote vehicle speed exceeded notification further comprises at least one of an identity of the vehicle, a speed of the vehicle, a vehicle position, and a time the vehicle exceeded the speed threshold.

* * * * *

UNITED STATES PATENT AND TRADEMARK OFFICE

CERTIFICATE OF CORRECTION

PATENT NO. : 7,671,727 B2
APPLICATION NO. : 11/844703
DATED : March 2, 2010
INVENTOR(S) : Flick et al.

It is certified that error appears in the above-identified patent and that said Letters Patent is hereby corrected as shown below:

Column 3, Line 41	Delete: "is schematic" Insert: --is a schematic--
Column 3, Line 44	Delete: "is schematic" Insert: --is a schematic--
Column 5, Line 33	Delete: "such as a causing" Insert: --such as causing a--

Signed and Sealed this

Seventeenth Day of August, 2010

David J. Kappos

David J. Kappos
Director of the United States Patent and Trademark Office

EXHIBIT F

US008032278B2

(12) **United States Patent**
Flick

(10) **Patent No.: US 8,032,278 B2**
(45) **Date of Patent: Oct. 4, 2011**

(54) **VEHICLE TRACKING UNIT WITH DOWNLOADABLE CODES AND ASSOCIATED METHODS**

(75) Inventor: **Kenneth E. Flick**, Douglasville, GA (US)

(73) Assignee: **Omega Patents, L.L.C.**, Douglasville, GA (US)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 840 days.

(21) Appl. No.: **11/773,272**

(22) Filed: **Jul. 3, 2007**

(65) **Prior Publication Data**

US 2007/0279283 A1 Dec. 6, 2007

Related U.S. Application Data

(63) Continuation-in-part of application No. 11/076,259, filed on Mar. 9, 2005, now Pat. No. 7,720,597, which is a continuation of application No. 10/383,496, filed on Mar. 7, 2003, now Pat. No. 7,149,623, which is a continuation of application No. 09/859,972, filed on May 17, 2001, now Pat. No. 6,606,561.

(60) Provisional application No. 60/264,811, filed on Jan. 29, 2001, provisional application No. 60/258,005, filed on Dec. 22, 2000, provisional application No. 60/251,552, filed on Dec. 6, 2000, provisional application No. 60/252,125, filed on Nov. 20, 2000, provisional application No. 60/236,890, filed on Sep. 29, 2000, provisional application No. 60/246,463, filed on Nov. 7, 2000, provisional application No. 60/222,777, filed on Aug. 3, 2000, provisional application No. 60/205,178, filed on May 17, 2000.

(51) **Int. Cl.**
G01C 21/00 (2006.01)

(52) **U.S. Cl.** **701/36**; 701/33; 382/104; 382/988; 455/575.9

(58) **Field of Classification Search** 701/36, 701/207–209; 340/500, 506, 515, 531, 533–534
See application file for complete search history.

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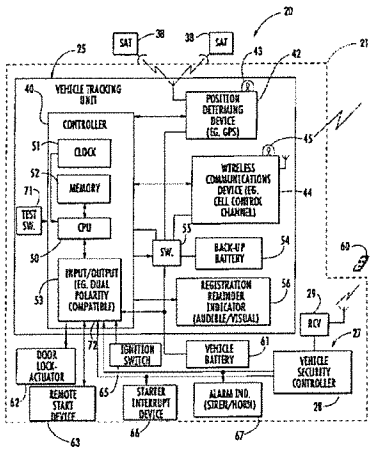
(Continued)

Primary Examiner — Cuong H Nguyen
(74) *Attorney, Agent, or Firm* — Allen, Dyer, Doppelt, Milbrath & Gilchrist, P.A.

(57) **ABSTRACT**

A multi-vehicle compatible tracking unit is for a vehicle including a vehicle data bus extending throughout the vehicle. The vehicle tracking unit may include a vehicle position determining device, a wireless communications device, and a multi-vehicle compatible controller for cooperating with the vehicle position determining device and the wireless communications device to send vehicle position information. The multi-vehicle compatible controller may be coupled to the vehicle data bus for communication thereover with at least one vehicle device using at least one corresponding vehicle device code from among a plurality thereof for different vehicles. A downloading interface may be included for permitting downloading of enabling data related to the at least one corresponding vehicle device code for use by the multi-vehicle compatible controller.

22 Claims, 13 Drawing Sheets



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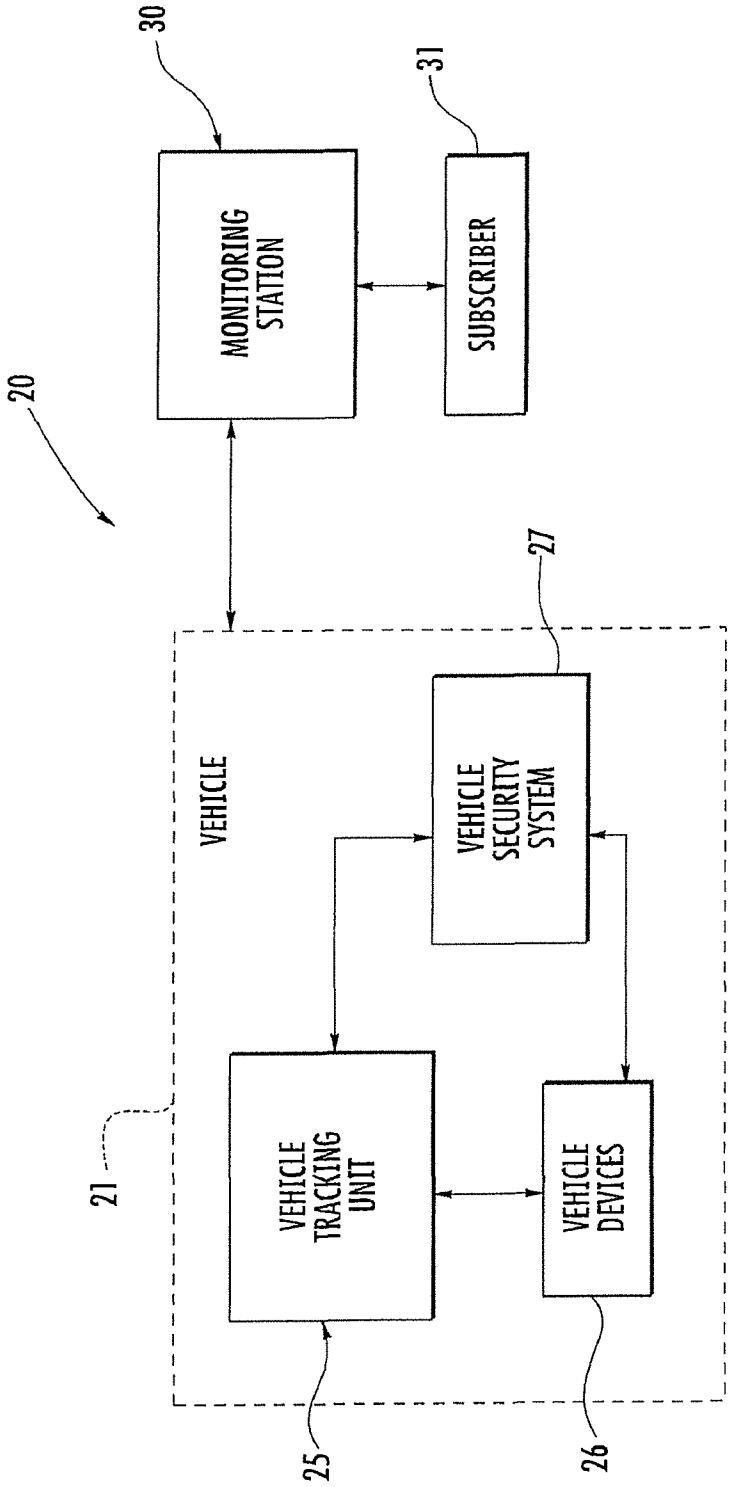

30
31
MONITORING STATION
SUBSCRIBER
20
27
VEHICLE
VEHICLE SECURITY SYSTEM
21
VEHICLE TRACKING UNIT
VEHICLE DEVICES
25
26

FIG. 1

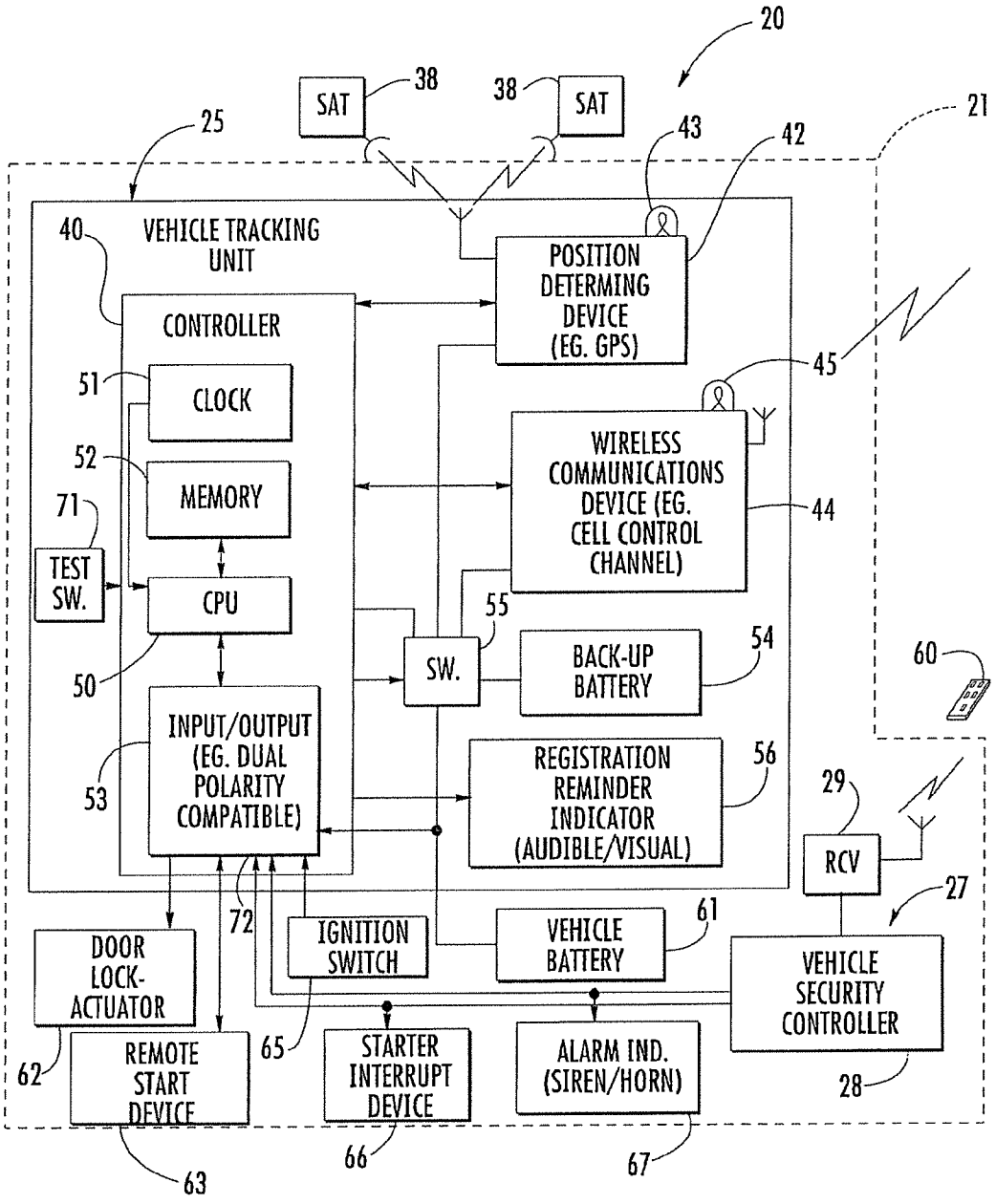

20
SAT
38
38
SAT
25
21
43
42
40
VEHICLE TRACKING UNIT
POSITION DETERMING DEVICE (EG. GPS)
CONTROLLER
45
51
CLOCK
WIRELESS COMMUNICATIONS DEVICE (EG. CELL CONTROL CHANNEL)
52
MEMORY
44
71
TEST SW.
CPU
55
60
SW.
BACK-UP BATTERY
54
50
INPUT/OUTPUT (EG. DUAL POLARITY COMPATIBLE)
53
REGISTRATION REMINDER INDICATOR (AUDIBLE/VISUAL)
56
29
RCV
27
72
IGNITION SWITCH
VEHICLE BATTERY
61
DOOR LOCK-ACTUATOR
VEHICLE SECURITY CONTROLLER
62
REMOTE START DEVICE
65
STARTER INTERRUPT DEVICE
ALARM IND. (SIREN/HORN)
28
63
66
67

FIG. 2

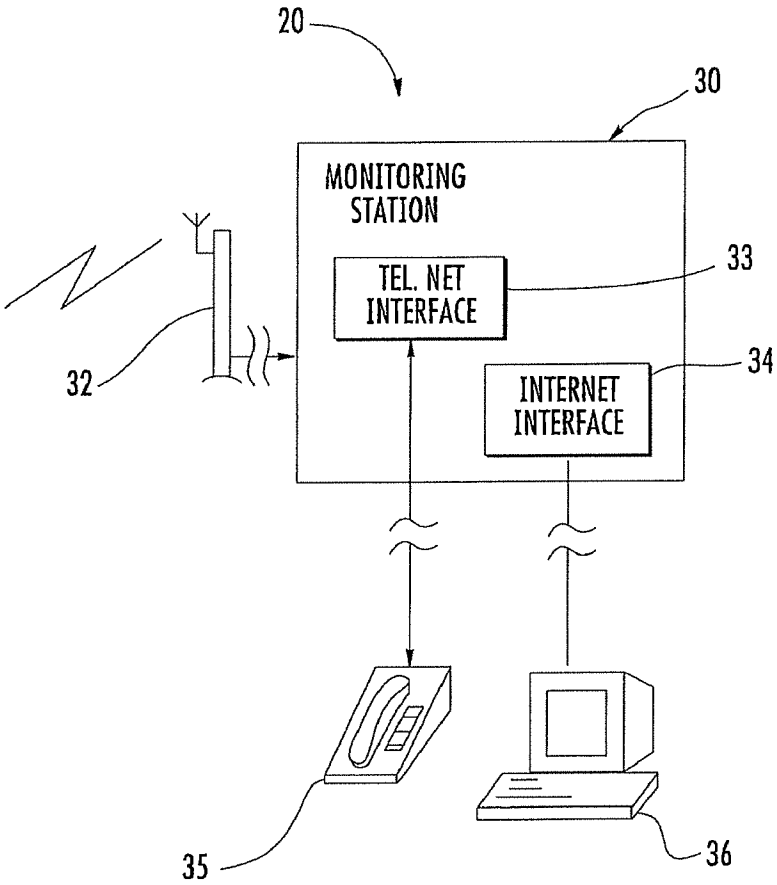

20
30
MONITORING STATION
TEL. NET INTERFACE
33
INTERNET INTERFACE
34
32
35
36

FIG. 3

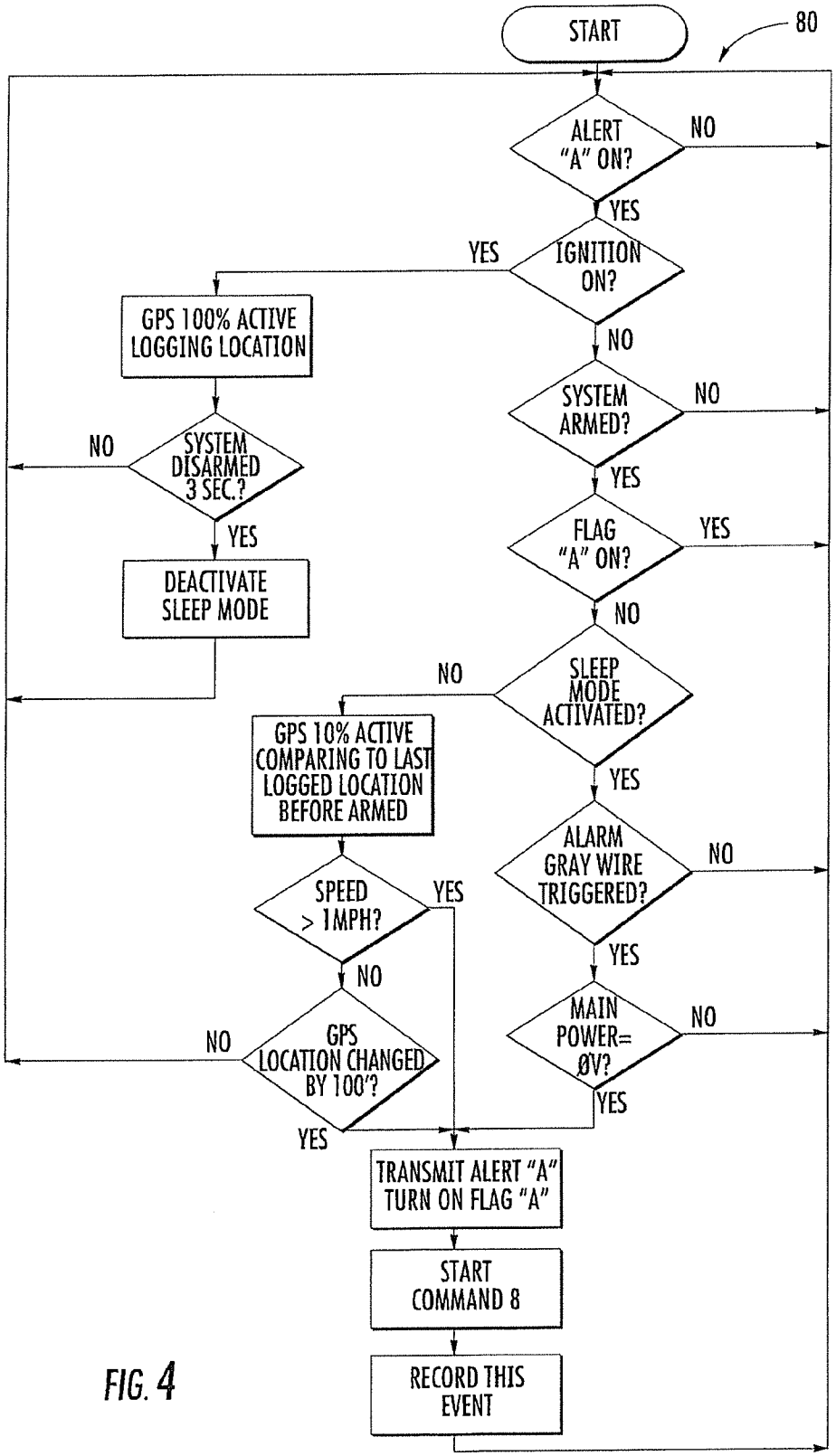

START
80
ALERT "A" ON?
NO
YES
IGNITION ON?
YES
GPS 100% ACTIVE LOGGING LOCATION
NO
SYSTEM ARMED?
NO
YES
SYSTEM DISARMED 3 SEC.?
NO
YES
DEACTIVATE SLEEP MODE
FLAG "A" ON?
YES
NO
SLEEP MODE ACTIVATED?
NO
YES
GPS 10% ACTIVE COMPARING TO LAST LOGGED LOCATION BEFORE ARMED
ALARM GRAY WIRE TRIGGERED?
NO
YES
SPEED > 1MPH?
YES
NO
MAIN POWER= ØV?
NO
YES
GPS LOCATION CHANGED BY 100'?
NO
YES
TRANSMIT ALERT "A" TURN ON FLAG "A"
START COMMAND 8
RECORD THIS EVENT

FIG. 4

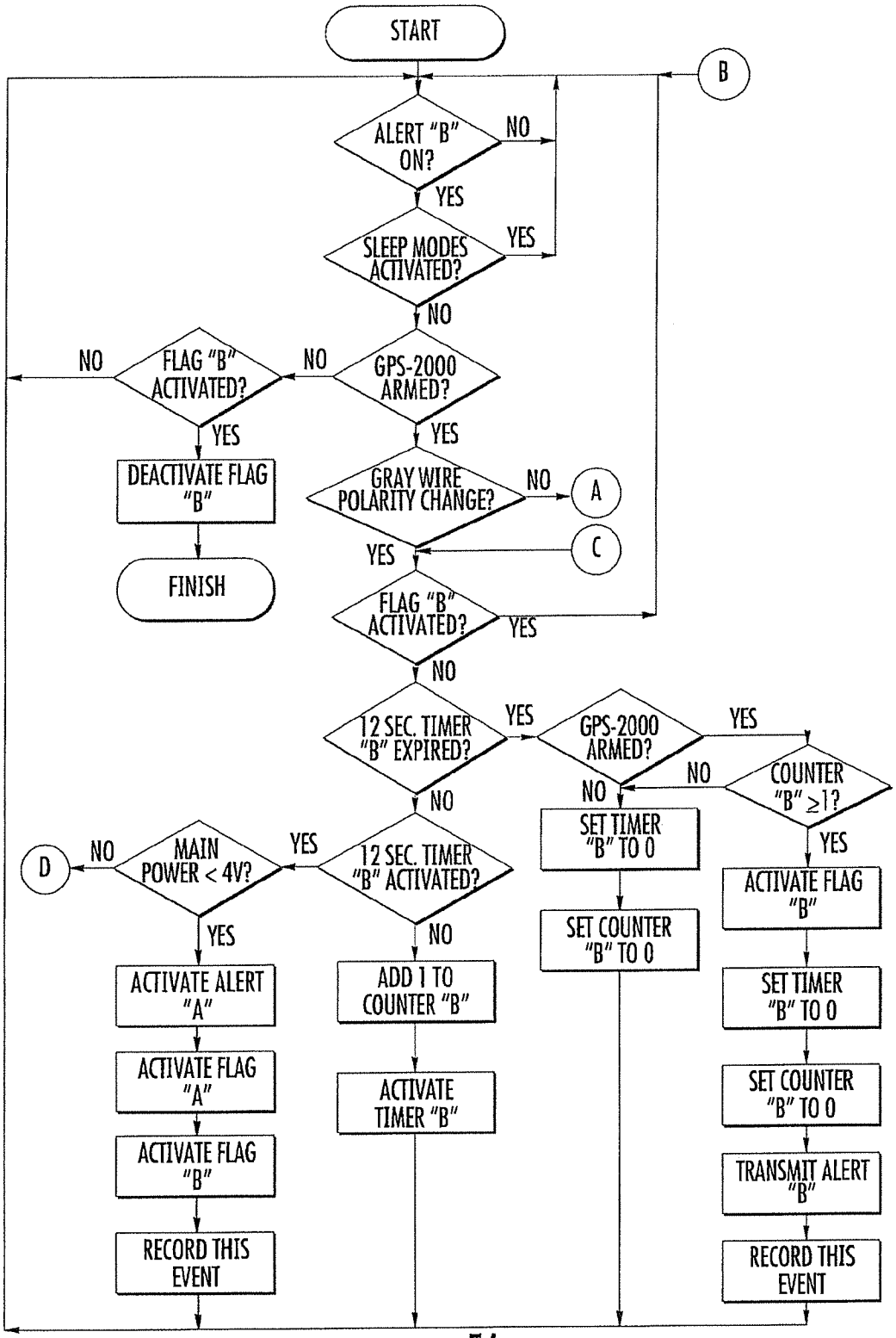

START
B
ALERT "B" ON?
NO
YES
SLEEP MODES ACTIVATED?
YES
NO
NO
FLAG "B" ACTIVATED?
NO
GPS-2000 ARMED?
YES
YES
DEACTIVATE FLAG "B"
GRAY WIRE POLARITY CHANGE?
NO
A
C
YES
FINISH
FLAG "B" ACTIVATED?
YES
NO
12 SEC. TIMER "B" EXPIRED?
YES
GPS-2000 ARMED?
YES
NO
NO
COUNTER "B" ≥1?
NO
SET TIMER "B" TO 0
YES
D
NO
MAIN POWER < 4V?
YES
12 SEC. TIMER "B" ACTIVATED?
SET COUNTER "B" TO 0
ACTIVATE FLAG "B"
YES
NO
ACTIVATE ALERT "A"
ADD 1 TO COUNTER "B"
SET TIMER "B" TO 0
ACTIVATE FLAG "A"
ACTIVATE TIMER "B"
SET COUNTER "B" TO 0
ACTIVATE FLAG "B"
TRANSMIT ALERT "B"
RECORD THIS EVENT
RECORD THIS EVENT

FIG. 5A

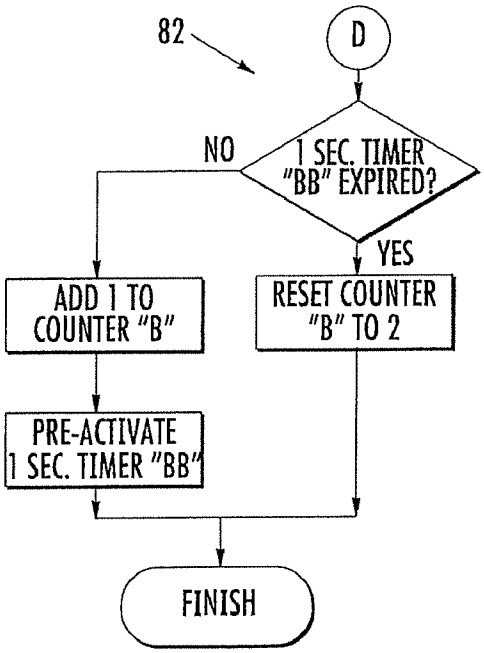

82
D
1 SEC. TIMER "BB" EXPIRED?
NO
YES
ADD 1 TO COUNTER "B"
RESET COUNTER "B" TO 2
PRE-ACTIVATE 1 SEC. TIMER "BB"
FINISH

FIG. 5B

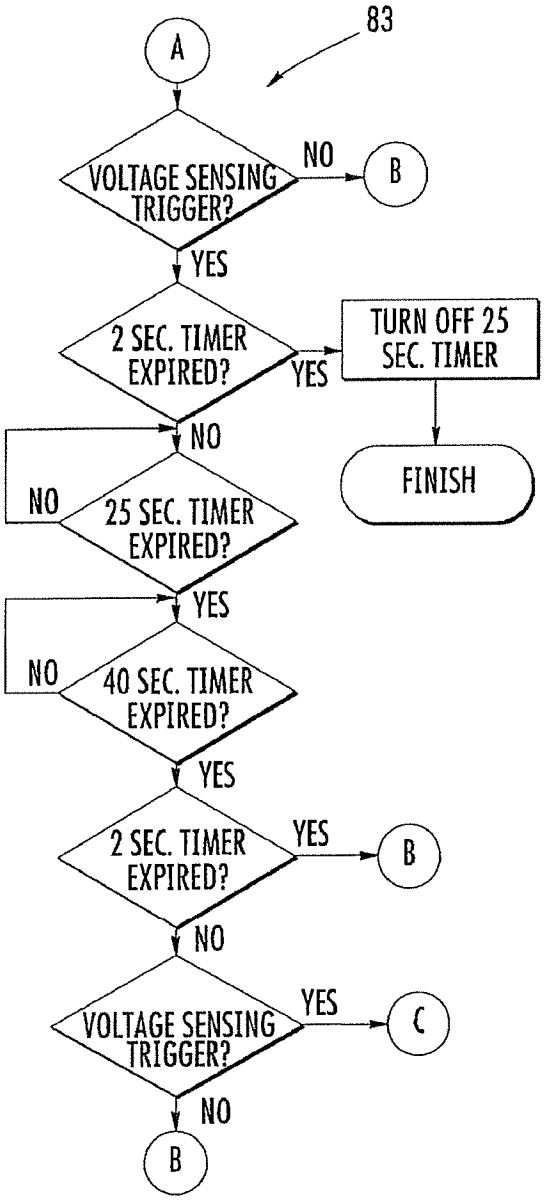

83
A
VOLTAGE SENSING TRIGGER?
NO
B
YES
2 SEC. TIMER EXPIRED?
YES
TURN OFF 25 SEC. TIMER
FINISH
NO
NO
25 SEC. TIMER EXPIRED?
YES
NO
40 SEC. TIMER EXPIRED?
YES
2 SEC. TIMER EXPIRED?
YES
B
NO
VOLTAGE SENSING TRIGGER?
YES
C
NO
B

FIG. 5C

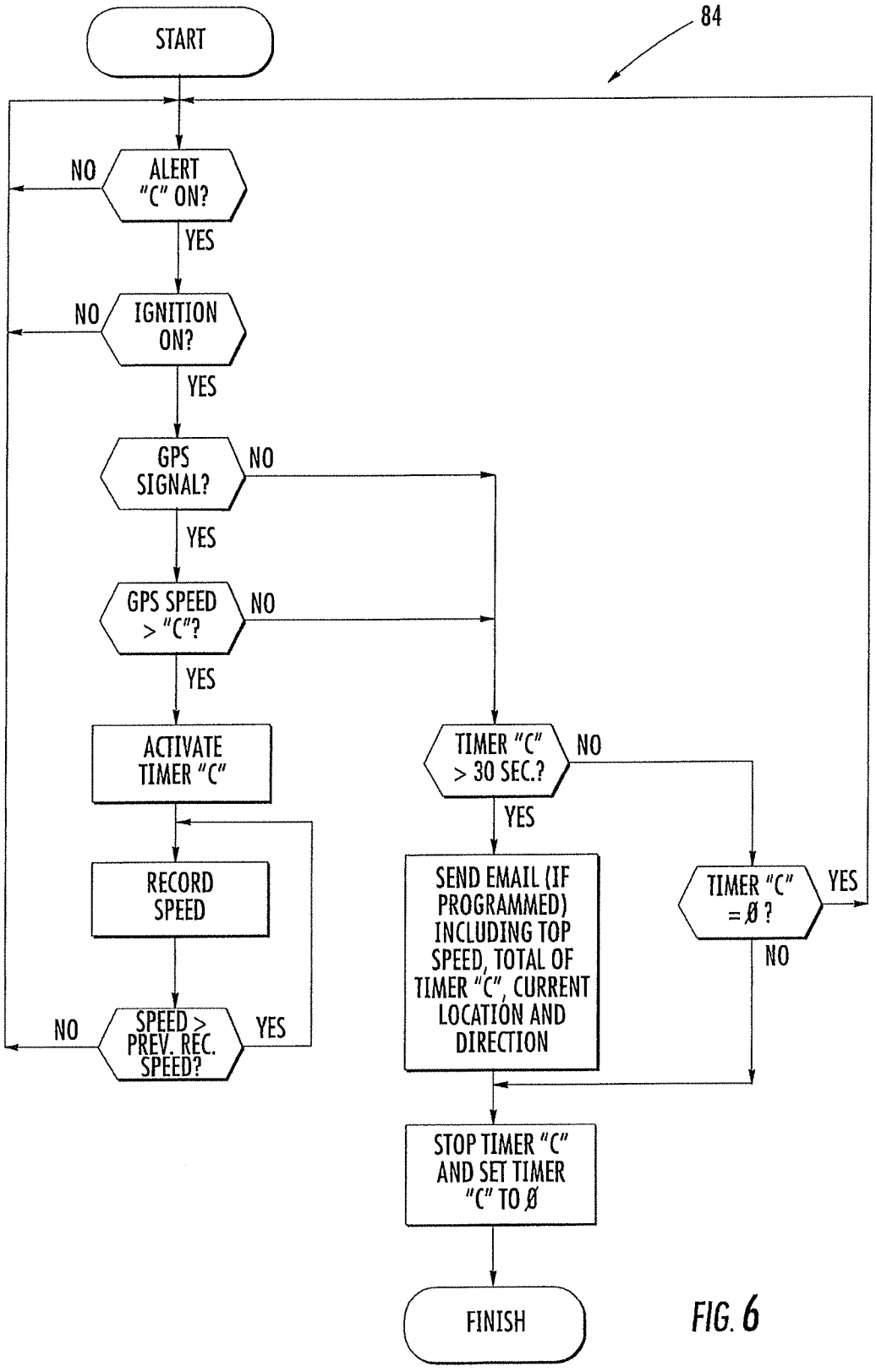

84
START
ALERT "C" ON?
NO
YES
IGNITION ON?
NO
YES
GPS SIGNAL?
NO
YES
GPS SPEED > "C"?
NO
YES
ACTIVATE TIMER "C"
RECORD SPEED
SPEED > PREV. REC. SPEED?
NO
YES
TIMER "C" > 30 SEC.?
NO
YES
SEND EMAIL (IF PROGRAMMED) INCLUDING TOP SPEED, TOTAL OF TIMER "C", CURRENT LOCATION AND DIRECTION
TIMER "C" = Ø ?
YES
NO
STOP TIMER "C" AND SET TIMER "C" TO Ø
FINISH

FIG. 6

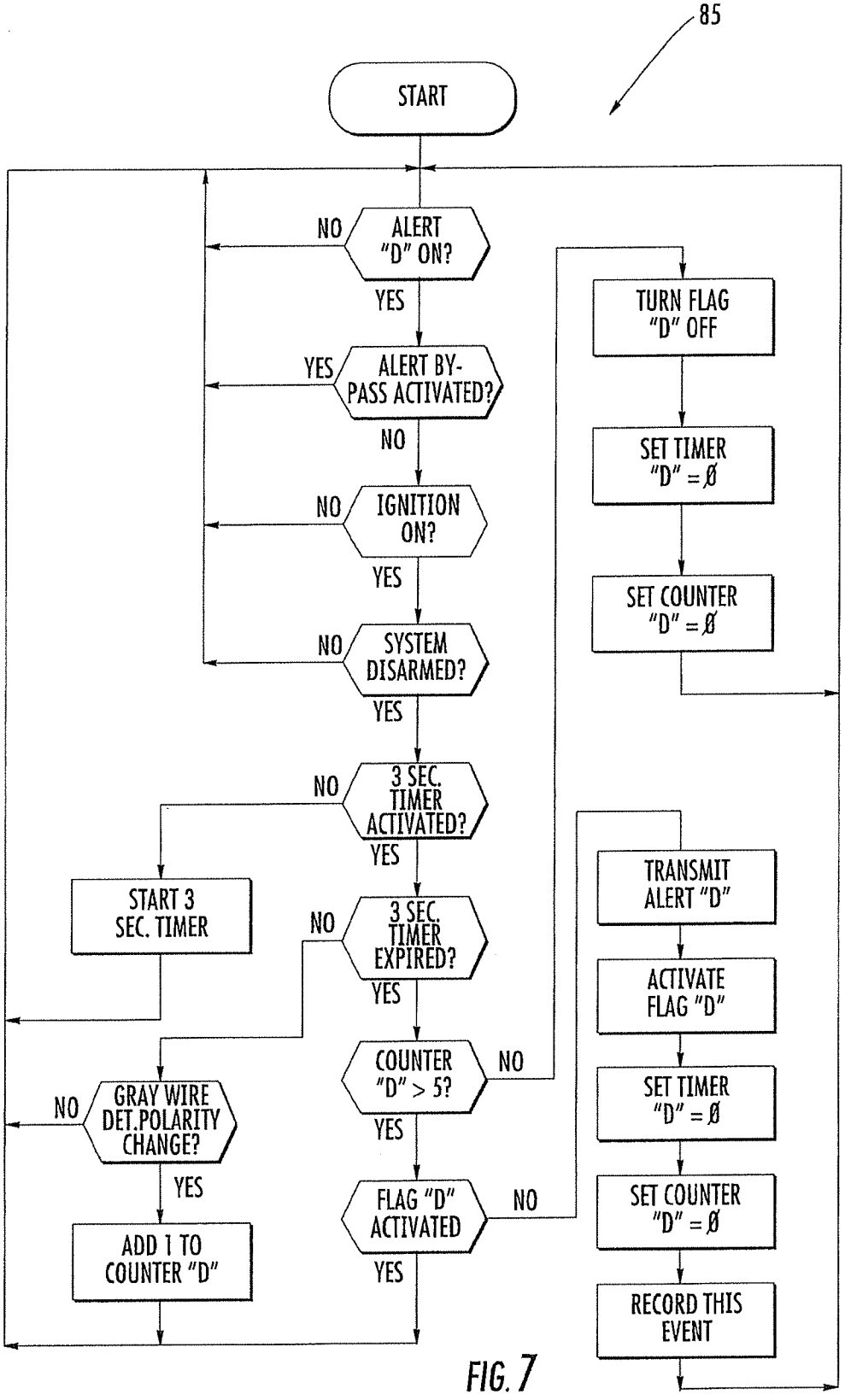

85
START
NO
ALERT "D" ON?
YES
YES
ALERT BY-PASS ACTIVATED?
NO
NO
IGNITION ON?
YES
NO
SYSTEM DISARMED?
YES
NO
3 SEC. TIMER ACTIVATED?
YES
START 3 SEC. TIMER
NO
3 SEC. TIMER EXPIRED?
YES
COUNTER "D" > 5?
NO
YES
NO
GRAY WIRE DET.POLARITY CHANGE?
YES
ADD 1 TO COUNTER "D"
FLAG "D" ACTIVATED
NO
YES
TURN FLAG "D" OFF
SET TIMER "D" = Ø
SET COUNTER "D" = Ø
TRANSMIT ALERT "D"
ACTIVATE FLAG "D"
SET TIMER "D" = Ø
SET COUNTER "D" = Ø
RECORD THIS EVENT

FIG. 7

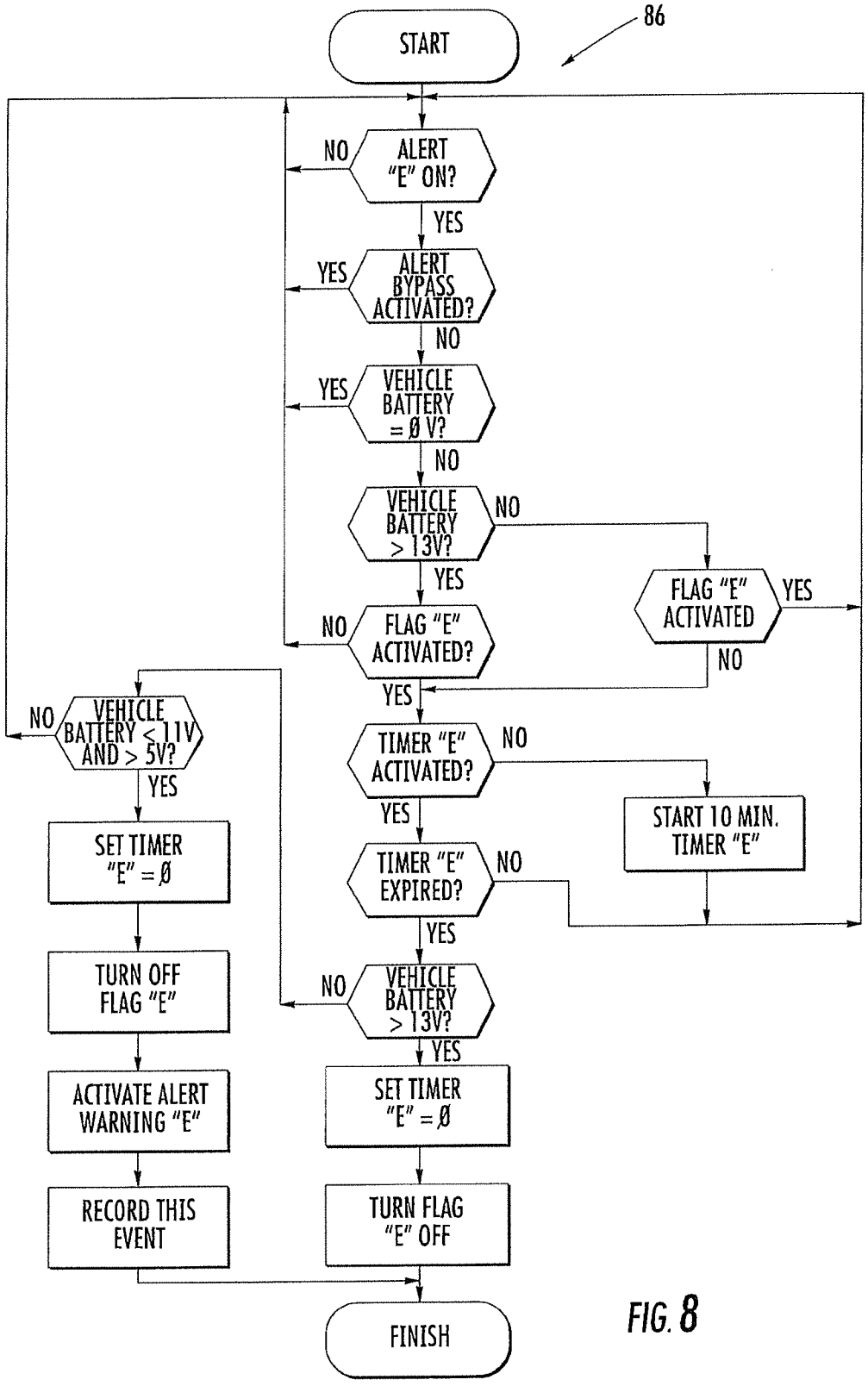

86
START
ALERT "E" ON?
NO
YES
ALERT BYPASS ACTIVATED?
YES
NO
VEHICLE BATTERY = Ø V?
YES
NO
VEHICLE BATTERY > 13V?
NO
YES
FLAG "E" ACTIVATED
YES
NO
FLAG "E" ACTIVATED?
NO
YES
VEHICLE BATTERY < 11V AND > 5V?
NO
YES
TIMER "E" ACTIVATED?
NO
YES
START 10 MIN. TIMER "E"
SET TIMER "E" = Ø
TIMER "E" EXPIRED?
NO
YES
TURN OFF FLAG "E"
VEHICLE BATTERY > 13V?
NO
YES
ACTIVATE ALERT WARNING "E"
SET TIMER "E" = Ø
RECORD THIS EVENT
TURN FLAG "E" OFF
FINISH

FIG. 8

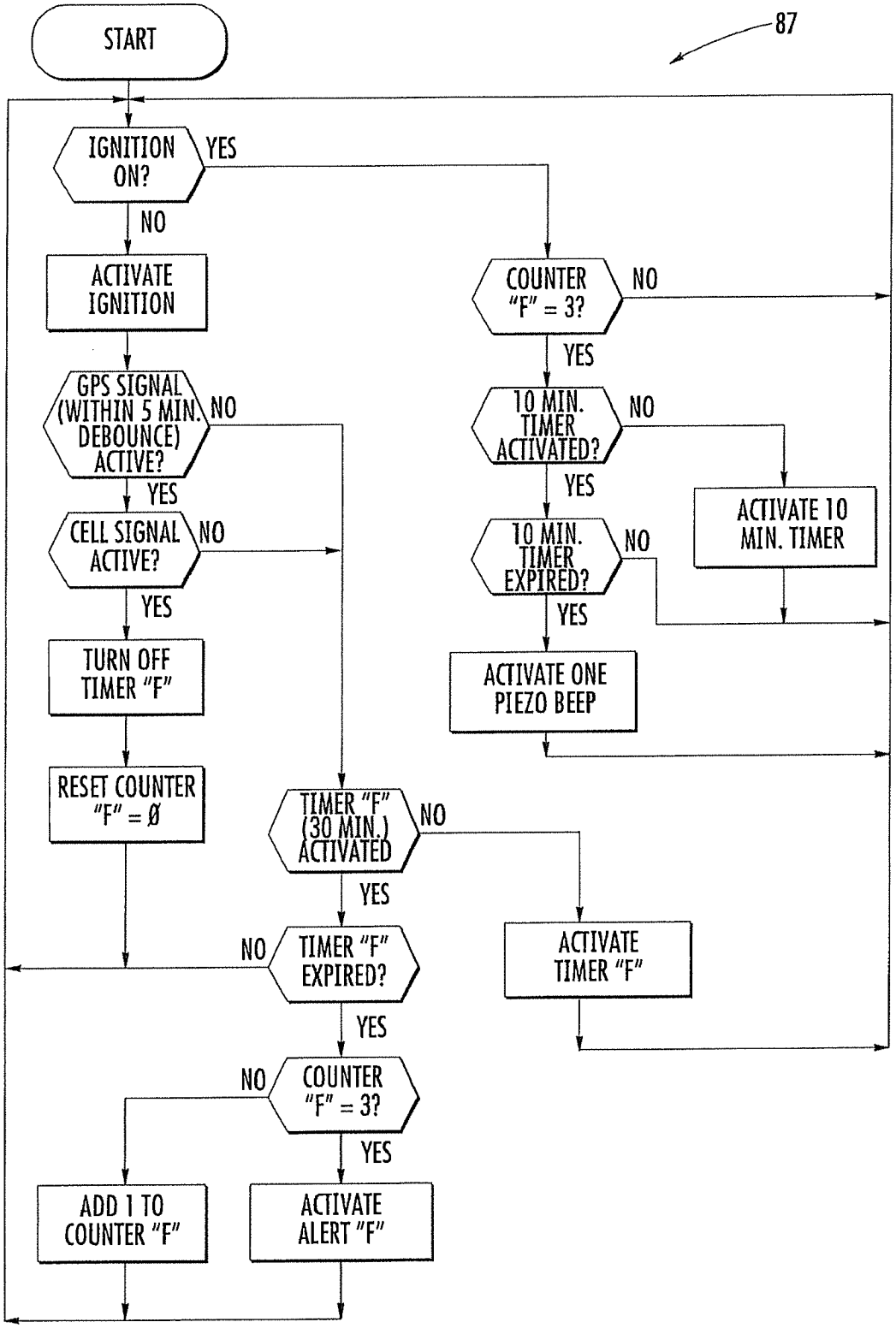

87
START
IGNITION ON?
YES
NO
ACTIVATE IGNITION
GPS SIGNAL (WITHIN 5 MIN. DEBOUNCE) ACTIVE?
NO
YES
CELL SIGNAL ACTIVE?
NO
YES
TURN OFF TIMER "F"
RESET COUNTER "F" = Ø
TIMER "F" (30 MIN.) ACTIVATED
NO
YES
NO
TIMER "F" EXPIRED?
YES
NO
COUNTER "F" = 3?
YES
ADD 1 TO COUNTER "F"
ACTIVATE ALERT "F"
COUNTER "F" = 3?
NO
YES
10 MIN. TIMER ACTIVATED?
NO
YES
ACTIVATE 10 MIN. TIMER
10 MIN. TIMER EXPIRED?
NO
YES
ACTIVATE ONE PIEZO BEEP
ACTIVATE TIMER "F"

FIG. 9

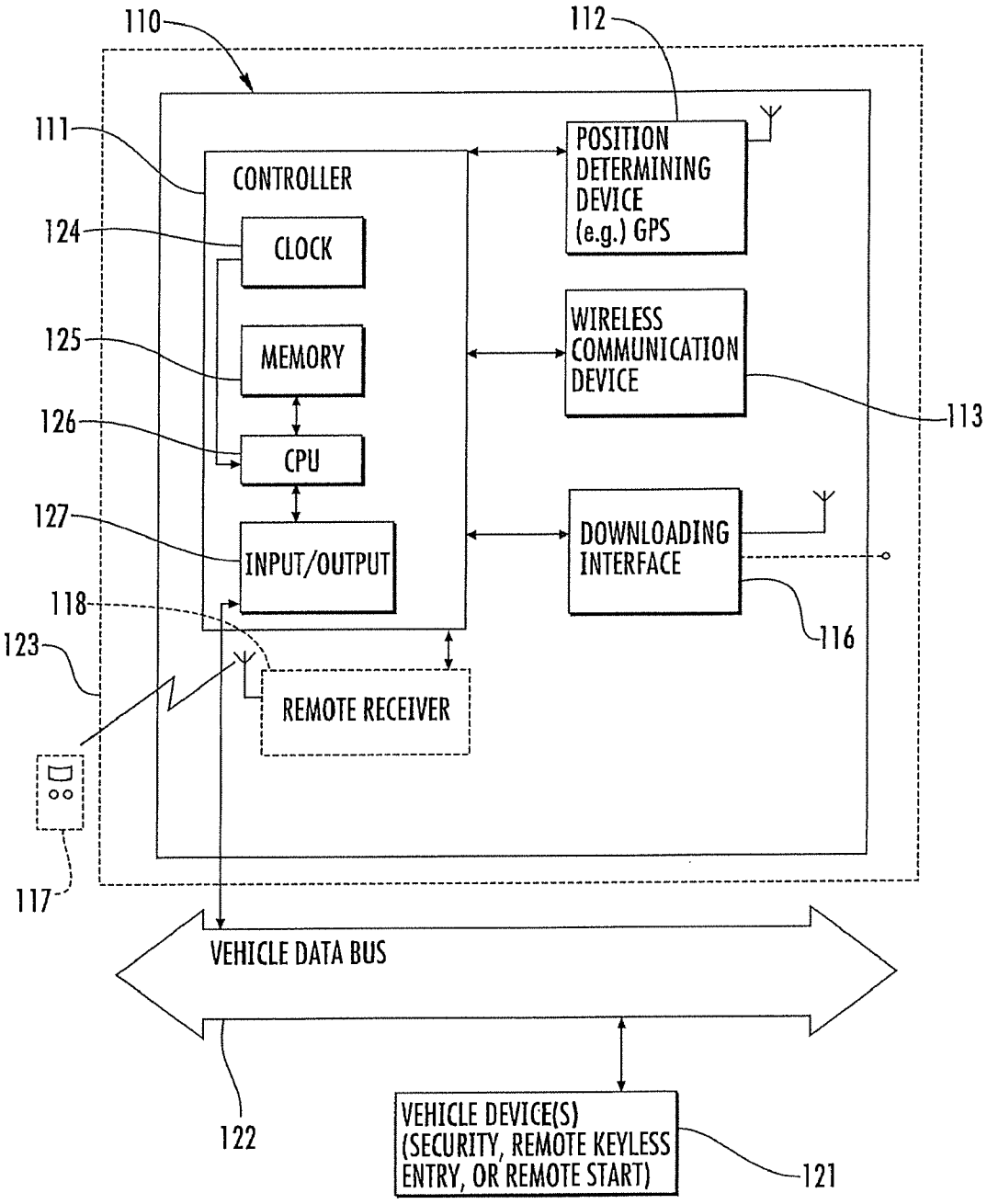

110
112
111
CONTROLLER
POSITION DETERMINING DEVICE (e.g.) GPS
124
CLOCK
125
MEMORY
WIRELESS COMMUNICATION DEVICE
113
126
CPU
127
INPUT/OUTPUT
DOWNLOADING INTERFACE
118
116
123
REMOTE RECEIVER
117
VEHICLE DATA BUS
122
VEHICLE DEVICE(S) (SECURITY, REMOTE KEYLESS ENTRY, OR REMOTE START)
121

FIG. 10

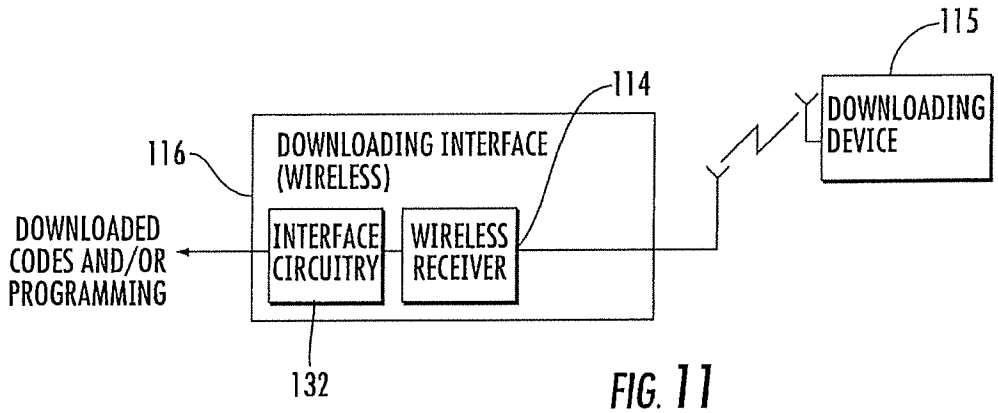


FIG. 11

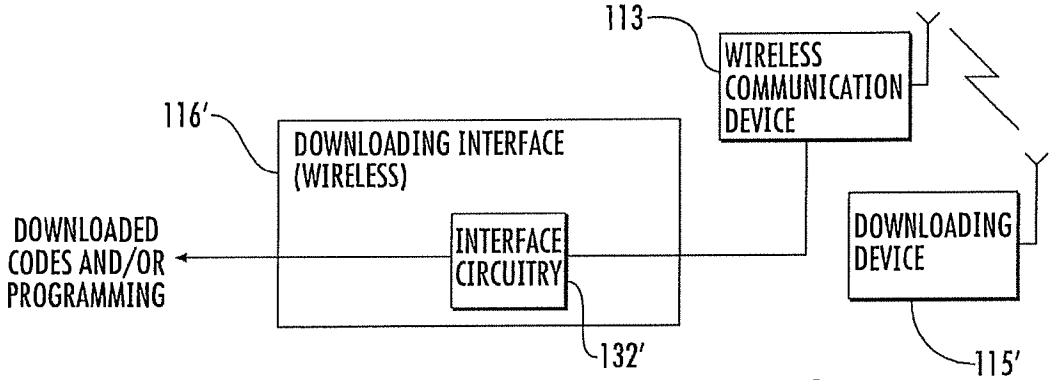


FIG. 12

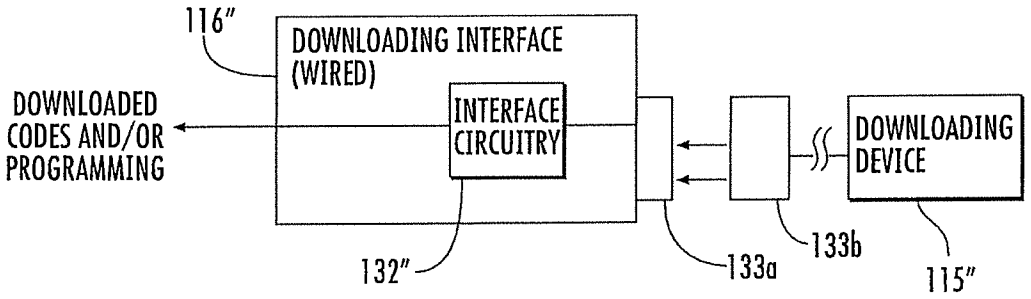


FIG. 13

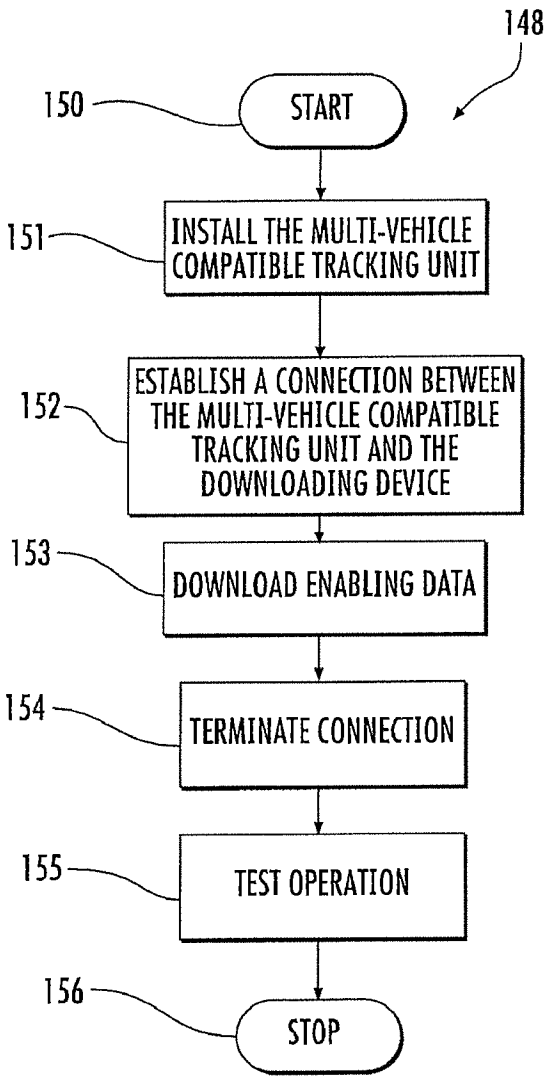

148
150
START
151
INSTALL THE MULTI-VEHICLE COMPATIBLE TRACKING UNIT
152
ESTABLISH A CONNECTION BETWEEN THE MULTI-VEHICLE COMPATIBLE TRACKING UNIT AND THE DOWNLOADING DEVICE
153
DOWNLOAD ENABLING DATA
154
TERMINATE CONNECTION
155
TEST OPERATION
156
STOP

FIG. 14

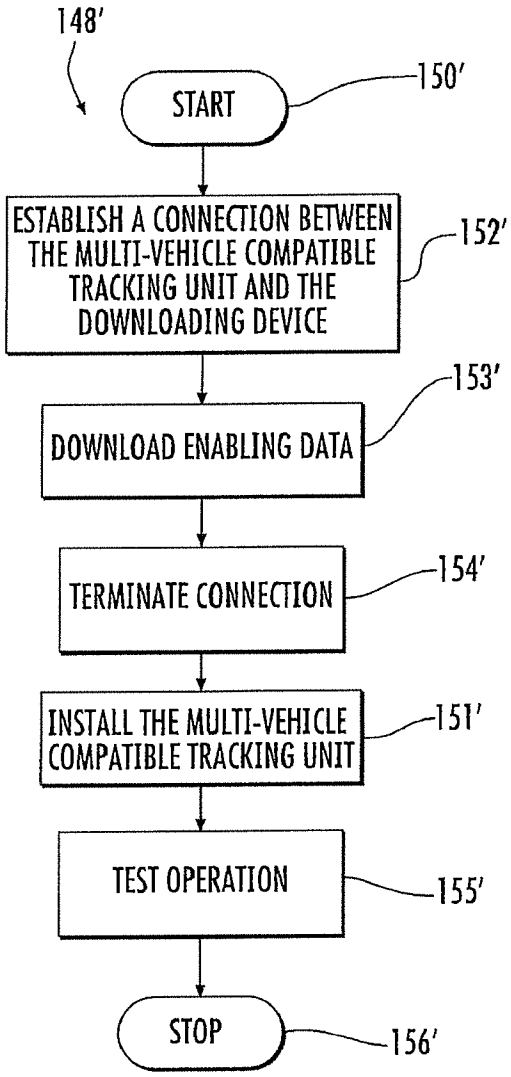

148'
150'
START
ESTABLISH A CONNECTION BETWEEN THE MULTI-VEHICLE COMPATIBLE TRACKING UNIT AND THE DOWNLOADING DEVICE
152'
DOWNLOAD ENABLING DATA
153'
TERMINATE CONNECTION
154'
INSTALL THE MULTI-VEHICLE COMPATIBLE TRACKING UNIT
151'
TEST OPERATION
155'
STOP
156'

FIG. 15

VEHICLE TRACKING UNIT WITH DOWNLOADABLE CODES AND ASSOCIATED METHODS

RELATED APPLICATIONS

The present application is a continuation-in-part of U.S. patent application Ser. No. 11/076,259 filed Mar. 9, 2005 now U.S. Pat. No. 7,720,597, which is a continuation of U.S. patent application Ser. No. 10/383,496 filed Mar. 7, 2003 now U.S. Pat. No. 7,149,623, which is a continuation of U.S. patent application Ser. No. 09/859,972 filed on May 17, 2001 now U.S. Pat. No. 6,606,561 which, in turn, was based upon provisional patent application Ser. Nos. 60/264,811 filed on Jan. 29, 2001; 60/258,005, filed Dec. 22, 2000; 60/251,552, filed Dec. 6, 2000; 60/252,125, filed Nov. 20, 2000; 60/236,890, filed Sep. 29, 2000; 60/246,463, filed Nov. 7, 2000; 60/222,777, filed Aug. 3, 2000; and 60/205,178, filed May 17, 2000, the entire contents of each of which are incorporated herein by reference.

FIELD OF THE INVENTION

The present invention relates to the field of vehicle devices, and, more particularly, to a tracking system for vehicles, and related methods.

BACKGROUND OF THE INVENTION

Motor vehicles, such as passenger cars, trucks, busses, fleet vehicles, etc. are widely used and knowing the locations of such vehicles is often desired. For example, should a vehicle be stolen, it would be beneficial to know the vehicle's location so that authorities could be promptly and accurately directed to retrieve the vehicle. Indeed, the tracking system could plot the getaway path of the thief.

For a company with hired drivers, it may be desirable to know the driver's whereabouts during the course of the day. Similarly, a rental car agency or other fleet operator, for example, may wish to know the whereabouts of its fleet of vehicles.

It may also be desirable to track the location of a vehicle as it is used throughout the course of a normal day. For parents of younger or older drivers, for example, knowledge of the vehicle's location may provide some assurance that the driver is at designated locations and following a prescribed route.

A number of patents disclose various systems and approaches to tracking vehicles. For example, U.S. Pat. No. 5,223,844 discloses a tracking system including a control center and a mobile unit installed in the vehicle. The mobile unit may send security warnings to the command center via a wireless transceiver. Position information for the vehicle is determined using a GPS receiver at the vehicle.

U.S. Pat. No. 5,515,043 discloses a similar system which may send one or more preprogrammed telephone messages to a user when away from the vehicle. The user may remotely access location information or cause certain commands to be carried out by entering a personal identification number (PIN).

The widespread availability and use of the Internet has prompted a number of vehicle tracking systems to also make use of the Internet. For example, TelEvoke, Inc. proposed such a system in combination with Clifford Electronics. The system was to provide notification, control and tracking services via the telephone or the Internet. Users could be notified via phone, e-mail, or pager of events such as a car alarm being triggered. Users could control the vehicle remote devices via

phone, web, or PDA such as unlocking car doors. Additionally, users could track TelEvoke-enabled vehicles on the Internet or via the telephone. An Internet map could be viewed by the user showing the actual and prior vehicle locations. TelEvoke offered its services via a centralized fully automated Network Operations Center. To reduce the communications costs, it was proposed to use the control channel of the cellular telephone network.

There are, of course, a number of vehicles which come from the manufacturer with some form of security system already installed. In addition, a number of vehicles are also equipped with aftermarket security systems. Many conventional vehicle tracking units may not be readily installed in vehicles, particularly those vehicles already including a vehicle security system. In addition, complexity of installation may significantly increase the system costs.

A number of patents disclose various security and control systems that address data bus interoperability. For example, U.S. Pat. No. 5,719,551, assigned to Omega Patents, LLC, the assignee of the present invention, discloses a vehicle security system for a vehicle including a data bus connecting a plurality of vehicle devices. A signal enabling circuit enables the alarm controller to operate using a set of desired signals selected from a plurality of possible sets for different vehicles. U.S. Pat. No. 6,011,460, assigned to Omega Patents, LLC, discloses a similar system where the set of desired signals from the plurality of different sets of signals for different vehicles is obtained, such as by connection and communication with a downloading device. Additionally, U.S. Pat. No. 6,756,885, also assigned to Omega Patents, LLC, discloses a multi-vehicle control system whereby a multi-vehicle compatible controller stores a set of device codes for a given vehicle device for a plurality of different vehicles. Device codes are read from the data communications bus, and a match between a read device code and the stored device codes is determined to provide compatibility with different vehicles.

Unfortunately, such advanced techniques for dealing with multiple device codes for a vehicle having a data communications bus have not yet been developed for vehicle tracking units.

SUMMARY OF THE INVENTION

In view of the foregoing background, it is therefore an object of the present invention to provide a multi-vehicle compatible tracking unit which may be used to control operable vehicle devices, and/or read information therefrom via the vehicle data communications bus and related methods.

This and other objects, features, and advantages in accordance with the present invention are provided by a multi-vehicle compatible tracking unit for a vehicle comprising a vehicle data bus extending throughout the vehicle. The multi-vehicle compatible tracking unit may include a vehicle position determining device, a wireless communications device, and a multi-vehicle compatible controller for cooperating with the vehicle position determining device and the wireless communications device to send vehicle position information. The multi-vehicle compatible controller may be coupled to the vehicle data bus for communication thereover with at least one vehicle device. The at least one vehicle device may use at least one corresponding vehicle device code from among a plurality thereof for different vehicles. The tracking unit may also include a downloading interface for permitting downloading of enabling data related to the at least one corresponding vehicle device code for use by the multi-vehicle compatible controller. Accordingly, the multi-vehicle compatible

tracking unit may be used to control operable vehicle devices, and/or read information therefrom via the vehicle data communications bus.

The downloading interface may comprise either a wired or wireless signal downloading interface. The wired signal downloading interface may comprise a connector for temporary connection to a downloading device, for example. The wireless signal downloading interface may include a wireless receiver for temporary connection to a downloading device. The wireless signal downloading interface may also be in the form of a connection to the wireless communications device used for sending position information. The downloading interface may also be for permitting downloading of at least one programming instruction for the multi-vehicle compatible controller, in some embodiments.

The corresponding at least one vehicle code may be for reading from the at least one vehicle device, and/or for writing to the at least one vehicle device. Further, the multi-vehicle compatible tracking unit may comprise a remote transmitter. At least one vehicle remote control function responsive to the remote transmitter may be performed by the multi-vehicle compatible controller. For example, the at least one vehicle remote control function may include at least one of a vehicle security function, a remote keyless entry function, and a remote engine starting function. Also, the wireless position determining device may comprise a Global Positioning System (GPS) receiver. A tracking unit may also include a common housing for its various components.

A method aspect is for using a multi-vehicle compatible tracking unit for a vehicle comprising a vehicle data bus extending throughout the vehicle. The multi-vehicle compatible tracking unit may include a vehicle position determining device, a wireless communications device, and a multi-vehicle compatible controller for cooperating with the vehicle position determining device and the wireless communications device to send vehicle position information. The multi-vehicle compatible controller may be coupled to the vehicle data bus for connection thereover with at least one vehicle device using at least one corresponding vehicle device code from among a plurality of thereof for different vehicles. The method may include downloading the enabling data related to at least one corresponding vehicle device code for use by the multi-vehicle compatible controller via a downloading interface.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is a simplified block diagram of a vehicle tracking system in accordance with the present invention.

FIG. **2** is a more detailed block diagram of the vehicle tracking unit as shown in FIG. **1**.

FIG. **3** is a more detailed block diagram of the monitoring station as shown in FIG. **1**.

FIG. **4** is a flowchart for operation of the vehicle tracking system as shown in FIG. **1** illustrating a vehicle stolen alert.

FIGS. **5**A-**5**C are a flowchart for operation of the vehicle tracking system as shown in FIG. **1** illustrating a vehicle alarm sounding alert.

FIG. **6** is a flowchart for operation of the vehicle tracking system as shown in FIG. **1** illustrating a vehicle speeding alert.

FIG. **7** is a flowchart for operation of the vehicle tracking system as shown in FIG. **1** illustrating an unauthorized transmitter learned alert.

FIG. **8** is a flowchart for operation of the vehicle tracking system as shown in FIG. **1** illustrating a low battery alert.

FIG. **9** is a flowchart for operation of the vehicle tracking system as shown in FIG. **1** illustrating a GPS or cellular unit failure alert.

FIG. **10** is a simplified block diagram of a multi-vehicle compatible tracking unit in accordance with the invention.

FIG. **11** is a more detailed block diagram of an embodiment of the downloading interface as shown in FIG. **10**.

FIG. **12** is a more detailed block diagram of another embodiment of a downloading interface as shown in FIG. **10**.

FIG. **13** is a more detailed block diagram of yet another embodiment of the downloading interface as shown in FIG. **10**.

FIG. **14** is a flowchart showing a method in accordance with the invention.

FIG. **15** is a flowchart showing another embodiment of a method in accordance with the invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

The present invention will now be described more fully hereinafter with reference to the accompanying drawings in which preferred embodiments of the invention are shown. This invention may, however, be embodied in many different forms and should not be construed as limited to the illustrated embodiments set forth herein. Rather, these embodiments are provided so that this disclosure will be thorough and complete, and will fully convey the scope of the invention to those skilled in the art. Like numbers refer to like elements throughout, and prime notation and multiple prime notation are used to indicate similar elements in alternate embodiments.

Referring to FIGS. **1-3**, the vehicle tracking system **20** in accordance with the invention is now initially described. The vehicle system **20** illustratively includes a vehicle tracking unit **25** to be mounted in the vehicle **21** and a monitoring station **30** which is remote from the vehicle and which is typically in a fixed location. In the illustrated embodiment, the vehicle tracking unit **25** interfaces with various vehicle devices, such as may include security sensors, door locks, etc. as will be appreciated by those skilled in the art.

The vehicle tracking unit **25** is also illustratively connected to a separate vehicle security system **27** as may already be installed in the vehicle **21**, from the factory or installed as an aftermarket product. Those of skill in the art will appreciate that in some embodiments of the vehicle tracking system **20** a separate vehicle security system **27** may not be needed, and/or various features thereof can be readily incorporated in the vehicle tracking unit **25**.

The monitoring station **30** may typically service a number of subscribers **31**. As shown perhaps best in FIG. **3**, the monitoring station **30** may include a user interface, such as the schematically illustrated telephone network interface **33** and the internet interface **34** which are schematically coupled to a telephone **35**, and a computer **36**, respectively. Of course in other embodiments, other interfaces may be used and only one of the illustrated interfaces may be needed. Those of skill in the art will also recognize that messages may be sent to a subscriber or user via preprogrammed voice messages, e-mail messages, facsimile messages, pager alerts, etc. In addition commands or instructions from the subscriber can also be input to the monitoring station **30** via the telephone network interface **33** and/or the internet interface **34**, from the subscribers telephone **35** or computer **36**.

The monitoring station **30** is illustratively connected to a cellular telephone tower **32** which, in turn, may communicate with the vehicle tracking unit **25** in some embodiments. Of course, in other embodiments other communications

approaches are also contemplated, such as, for example, including satellite communications.

The monitoring station **30** may typically include the necessary modems, and other communications electronics, and computers for its functions which are described in greater detail below. The configuration of such components and their details will be readily apparent to those skilled in the art. Accordingly, no further discussion of these details is needed.

Referring now more specifically to FIG. **2**, additional details of the vehicle tracking unit **25** and devices at the vehicle are now further described. The vehicle tracking unit **25** illustratively includes a controller **40**, a vehicle position determining device **42**, and a wireless communications device **44** connected together. The vehicle position determining device **42** may be provided by a GPS receiver, for example. The GPS receiver typically operates by receiving multiple signals from spaced apart satellites **38** as will be appreciated by those skilled in the art.

In other embodiments, the vehicle position determining device **42** may be provided based upon communications with the cellular telephone network, or based upon other satellite transmissions, for example. As a particular example, time of arrival techniques are available based upon multiple reception paths to determine position via the cellular telephone network as will be appreciated by those skilled in the art. The vehicle position determining device **42** also illustratively includes an indicator **43** associated therewith, such as for indicating an operating mode, or proper operation of the device as will be addressed in greater detail below.

The wireless communications device **44** may be provided by a cellular telephone transceiver configured to operate on a control channel of the cellular network. Such a control channel may provide nearly universal coverage for the tracking system **20** as will be appreciated by those skilled in the art. In addition, the control channel may offer relatively inexpensive communications between the monitoring station **30** and the vehicle tracking unit **25** as will be appreciated by those skilled in the art. The wireless communications device **44** also illustratively includes an optional status indicator **45** with a similar function as the indicator **43** for the vehicle position determining device.

The wireless communications device **44** in other embodiments, may transmit in the voiceband of the cellular network. Alternately, the wireless communications device may communicate over other networks, such as over satellite, or via wireless internet services, as will be appreciated by those skilled in the art.

The controller **40** illustratively includes a central processing unit (CPU) **50** or other logic circuitry which is connected to a clock signal generator **51** and a memory **52**. In other embodiments, the memory **52** may be an embedded memory in the CPU **50**. The controller **40** also includes schematically illustrated input/output circuitry **53** to interface with various vehicle devices. In particular the input/output circuitry **53** may provide dual polarity compatibility for one or more inputs or outputs as will be described in greater detail below. One or more of the terminals of the input/output circuitry **53** may also provide both input and output functions as will also be described in greater detail below. This may significantly simplify and accelerate installation of the vehicle tracking unit **25** in the vehicle **21**.

Also illustratively shown as part of the vehicle tracking unit **25** are a back-up battery **54**, and switch **55** connected thereto for selectively powering certain of the components based upon the controller **40**. Of course, the vehicle **21** also includes an electrical system including the vehicle battery **61**. Powering of the vehicle tracking unit **25** is described in greater detail below.

The vehicle **21** also includes a number of other components that may relate to vehicle tracking, security, and/or convenience features provided by the vehicle tracking system **20**. For example, the vehicle **21** may include one or more door lock actuators **62**, an optional remote starting device **63**, a starter interrupt device **66** and an alarm indicator **67**. For example, the alarm indicator may be provided by a vehicle horn or vehicle siren, and/or flashing of the lights.

The optional separate security system **27** illustratively includes a vehicle security controller **28** and a receiver **29** connected thereto. As is conventional, the vehicle security system **27** may be switched between armed and disarmed modes, for example, by one or more uniquely coded remote transmitters **60**. The vehicle security controller **28** may also be capable of learning a new uniquely coded remote transmitter **60** as will be appreciated by those skilled in the art. The vehicle security controller **28** also illustratively is connected to the starter interrupt device **66** and the alarm indicator **67**.

For ease of explanation, a number of the features of the vehicle tracking system **20** are now described. The vehicle tracking system **20** includes a number of features that may simplify installation and maintenance. For example, as shown in FIG. **2**, the vehicle tracking unit **25** may have a test switch **71** connected to the controller **40**.

In normal operation, the controller **40** may be called upon to operate at least one vehicle device. Of course, the controller **40** also cooperates with the wireless communications device **44** and the vehicle position determining device **42** to determine and send vehicle position information to the monitoring station **30**. Moreover, the controller **40** may be switchable to a test mode for test operation of the at least one vehicle device responsive to activation of the test switch **71**.

In some embodiments, the at least one vehicle device may be a plurality of vehicle devices that are tested by operation in sequence. For example, the at least one vehicle device may comprise at least one door lock actuator **62**. The at least one vehicle device may also comprise the starter interrupt device **66**, or the engine remote starter **63** if remote starting is an implemented feature. The at least one vehicle device which is tested, may also be the alarm indicator **67**. Accordingly, an installer, for example, can quickly check that the tracking unit has been properly installed.

To further provide for ready determination of proper operation of the vehicle tracking unit **25**, one or both of the position determining and wireless communications devices **42**, **44** may include associated indicators **43**, **45** as mentioned briefly above, and which provide an indication relating to proper operation. Each indicator **43**, **45** may indicate a mode of operation of the device, its proper operation, or a partial or complete failure of the device.

Another aspect of the invention is that the controller **40** may provide a selectable polarity for the at least one vehicle device based upon sensing thereof. Accordingly, a predetermined activation of the test switch **71** may cause the controller **40** to sense and select the proper polarity. Pressing the test switch **71** for a predetermined time or in a predetermined pattern may sense and set the polarity.

Another feature of the vehicle tracking unit **25** and vehicle tracking system **20** relates to conservation of the number of codes or messages that need to be sent to the vehicle tracking unit. In particular, the controller **40** may have a plurality of different controller states and respond differently to a same message from the monitoring station **30** at different times depending upon the controller state at a given time. Accord-

ingly, a number of codes or messages used by the system can be conserved. Various messages are described in greater detail below.

A controller state may change based upon several different occurrences or events. For example the controller may change states in response to a change in at least one vehicle device, or based upon a message received by the wireless communications device **44** from the monitoring station **30**, and/or based upon elapsed time. The controller states, for example, may include an alert sent state based upon an alert message being sent from the wireless communications device **44**. Thereafter, receipt of a predetermined message by the wireless communications device **44** when the controller **40** is in the alert sent state may confirm receipt of the alert message by the monitoring station.

Receipt of the predetermined message by the wireless communications device **44** when the controller **40** is in another state different than the alert sent state may thus cause a different response by the controller. The alert sent state may comprise at least one of a vehicle stolen alert sent state, a vehicle alarm sounding alert sent state, a vehicle speeding alert sent state, an unauthorized remote transmitter alert sent state, a low vehicle battery alert sent state, and a device malfunction alert sent state. The various alert messages and confirmation thereof are described in greater detail below.

The code or message conservation aspects of the vehicle tracking system **20** also permit sending a sequence of codes or messages within a predetermined time to also cause a different response at the vehicle tracking unit **25**. In other words, the plurality of controller states may comprise a received first message state based upon a first message being received by the wireless communications device **44** from the monitoring station **30**. Receipt of a second message by the wireless communications device **44** when the controller **40** is in the received first message state, such as within a predetermined time window, for example, may thus cause a different response by the controller than does receipt of the second message when the controller is in another state than the received first message state.

The plurality of controller states may comprise a vehicle finder state sounding an audible signal via the alarm indicator **67** at the vehicle **21**. In this state the controller **40** would bypass sending a vehicle alarm sounding alert to the monitoring station **30**.

Another aspect of the vehicle tracking system **20** is the provision of certain power conservation and management techniques, such as to permit extended periods where the vehicle **21** is not in operation. During such extended periods, the vehicle battery **61** provides power to the vehicle tracking unit **25** as well as other vehicle devices. Accordingly, the voltage of the vehicle battery **61** drops over time. The vehicle tracking unit **25** may provide a significant drain on the vehicle battery **61** because of the power consumed by the wireless communications device **44** during transmission as will be appreciated by those skilled in the art.

The vehicle position determining device **42**, the wireless communications device **44** and the controller **40** may be considered as defining a power load of the vehicle tracking unit **25**. The controller **40** may operate the schematically illustrated power switch **55** to isolate the back-up battery **54** from the power load as a voltage of the vehicle battery **61** drops until reaching a threshold. After or below the threshold the controller **40** may cause the back-up battery **54** to selectively power only a first portion of the power load while a second portion of the power load remains powered by the vehicle battery.

For example, the wireless communications device **44** may have a higher operating voltage than the vehicle position determining device **42**. The first portion of the power load that is selectively powered despite the low vehicle battery voltage may thus be the wireless communications device **44**. In particular, the wireless communications device **44** may be powered for transmission. Accordingly, the back-up battery **54** can be saved for limited communication using the higher voltage wireless communications device **44**. This provides useful features even after an extended period during which the vehicle **21** is left unattended and the vehicle battery **61** gradually discharges.

To further conserve power, the controller **40** may reduce operation of the power load as vehicle battery voltage falls. Conversely, the controller **40** may restore operation of the power load based upon the voltage of the vehicle battery **61** rising again, such as upon being recharged.

Also relating to power consumption, the controller **40** further causes transmission of a low vehicle battery voltage alert to the monitoring station **30** based upon the voltage of the vehicle battery **61** falling below the threshold. The user or subscriber may cause the monitoring station **30** to issue a remote start command. The controller **40** may then generate a remote start output to the remote start device **63** to thereby start the engine and recharge the vehicle battery.

Another feature of the vehicle tracking system **20** is that the vehicle tracking unit **25** may be readily installed and connected to a vehicle **21**, such as in the illustrated embodiment where the vehicle includes a starter interrupt device **66** and a separate vehicle security controller **28**. More particularly, the controller **40** may switch between an armed mode and a disarmed mode based upon operation of the engine starter interrupt device **66**. The controller **40** when in the armed mode may cooperate with the wireless communications device **44** to send an alert message to the monitoring station **30** and including vehicle position information, for example, based upon the vehicle position determining device **42**. The controller **40** is also for selectively operating the engine starter interrupt device **66** to provide additional security features.

In one advantageous embodiment, the controller **40** preferably comprises a combination input and output terminal for connection to the engine starter interrupt device. This terminal is at the input/output circuitry **53** and is schematically illustrated by reference numeral **72**. The controller **40** may switch to the armed mode when in the disarmed mode and based upon the engine starter interrupt device **66** being operated to disable engine starting. Conversely, the controller **40** may switch to the disarmed mode based upon the engine starter interrupt device **66** being operated to enable engine starting. In other words, the vehicle tracking unit **25** can piggyback its arming and disarming off the existing vehicle security system **27**, for example.

The controller **40** may also selectively operate the engine starter interrupt device **66** based upon a command message from the monitoring station **30**. The controller **40** may selectively operate the engine starter interrupt device **66** based upon a command message from the monitoring station **30**. Alternately, or in addition thereto, the controller **40** may selectively operate the engine starter interrupt device **66** based upon the ignition switch **65**.

The following descriptive portions relate to various user or subscriber notifications and features provided by the vehicle tracking system **20**. Of course, the controller **40** preferably cooperates with the wireless communications device **44** to send an alert message. The monitoring station **30** may comprise a user interface, such as one or both of the telephone

network or internet interfaces **33**, **34**, respectively (FIG. **3**), for generating a sequence of alert message notifications based upon receiving the alert message sent from the vehicle tracking unit **25**. More particularly, the monitoring station interface permits canceling any remaining alert message notification based upon a cancellation command response from a user or subscriber having already received the alert message notification. The user may send the cancellation response via the telephone **35** or computer **36** (FIG. **3**), for example. Thus, if the user may be reached at different telephone numbers or different users are desirably notified of the alert, this aspect of the vehicle tracking system **20** can make the notifications efficiently and without making unnecessary notifications.

The vehicle tracking system **20** may provide any of a number of very useful alerts, as discussed herein. For example, the alert message sent from the vehicle tracking unit may comprise at least one of a vehicle stolen alert message, and a vehicle alarm sounding alert message. The alert message may be one of a vehicle speeding alert message, and a vehicle acceleration alert message. In addition, the alert message may comprise an unauthorized remote transmitter alert message. Also, the alert message may be at least one of a low vehicle battery alert message, and a device malfunction alert message.

The speeding alert may be based upon exceeding a speed threshold for greater than a certain time, which may be user selectable. The acceleration alert may also be useful as such is also indicative of aggressive driving along with the speeding alert. The unauthorized remote transmitter alert increases overall security since a user will be notified if a would-be thief learns an unauthorized transmitter to operate the controller. These alerts are described in greater detail below.

The vehicle tracking system **20** may be implemented as a service to a subscriber. In other words, the subscriber pays a monthly fee for the service. Accordingly, it may be important to encourage a user to register. Similar subscriber or registrations systems in the past have suffered revenue losses since some users would wait to activate the system until the vehicle was stolen. In other words, the user would only subscribe or register and pay a single month's fee.

In accordance with this aspect of the vehicle tracking system **20** prompt user registration is encouraged. In particular, the vehicle tracking unit **25** may include the user registration reminder indicator **56** and the controller **40** may be switchable from an unregistered mode to a registered mode. In the registered mode, the controller **40** may cooperate with the wireless communications device **44** and the vehicle position determining device **42** to determine and send vehicle position information to the monitoring station **30**. In the unregistered mode, the controller **40** may activate the user registration reminder indicator **56** to encourage registration by the user.

The controller **40** may be switchable to the registered mode based upon an activation message from the monitoring station **30**. For example, when the registration payment has been received, the monitoring station can send one or more messages to the vehicle tracking unit **25** to stop activation of the registration reminder indicator **56**. The indicator **56** may be audible, visual or both. For example, the registration reminder indicator **56** could be a beeping sound generated by a small piezoelectric transducer every ten minutes or so when the ignition **65** is on.

In other words, the user registration reminder indicator **56** may provide a minor but irritating annoyance to the user to encourage registration. Upon successfully registering, the annoyance is abated. Accordingly, a relatively straightforward approach is provided to encourage user registration.

Along these lines, the controller **40** when in the unregistered mode may have reduced features compared to the registered mode. For example, the controller **40** when in the unregistered mode may be restricted or limited in sending messages with the wireless communications device **44**. Accordingly, usage of the wireless communications network may be reduced. Transmissions from the vehicle tracking unit **25** may also be beneficially suppressed during original installation, for example.

Returning again to features of the vehicle tracking unit **25** which facilitate installation, the controller **40** may send an alarm indication alert responsive to a continuous activation of the alarm indicator **67** for greater than a predetermined time. Alternately, or in addition thereto, the controller **40** may send an alarm indication alert responsive to a repetitive pattern of alarm indicator **67** activations. In other words, the controller may be configured to distinguish between normal operation of a vehicle horn by the driver, and activation of the horn by the security system **27**. As mentioned above, the controller **40** may also monitor signals of at least one of a first and second polarity. The controller **40** thus advantageously piggybacks off the alarm indication generated by the vehicle security system **27** to determine and send a vehicle alarm sounding alert to the monitoring station **30**.

In one variation, the controller **40** may monitor signals delivered directly to the vehicle alarm indicator by the vehicle security controller **28**. In another variation, the controller **40** monitors signals of voltage dips of the vehicle battery **61**. Circuitry is conventionally and readily available for both such functions, as will be readily appreciated by those skilled in the art.

The controller **40** may also include a dual polarity compatible output in the input/output circuitry **53** for a vehicle device, such as the vehicle alarm indicator **67**. The controller **40** may further monitor signals relating to activation of the vehicle alarm indicator **67** and send an alarm indication alert with position information from the vehicle position determining device and using the wireless communication device.

For the dual polarity output compatibility, the controller **40** may generate a first polarity output pulse followed by a second polarity output pulse. The controller **40** may also generate a repeating pattern of a first polarity output pulse followed by a second polarity output pulse on the dual polarity compatible output. In yet other embodiments, the controller **40** may sense an actual polarity of the device and thereafter use the actual polarity for the dual polarity compatible output.

Where the vehicle device is a vehicle horn, the controller **40** may typically be configured to generate a negative polarity output on the dual polarity compatible output. Conversely, wherein the vehicle device is a vehicle alarm indicator siren, the controller **40** may be configured to generate a positive polarity output on the dual polarity compatible output.

Another aspect of the vehicle tracking system **20** relates to conserving memory space and/or reducing transmission time over the communications network. In accordance with this advantageous feature, the controller **40** may determine the vehicle position information including a vehicle location and an associated stationary period for each occurrence of the vehicle remaining stationary for greater than a predetermined period. In one embodiment, the controller **40** may cooperate with the wireless transmission device **44** to send the vehicle position information to the monitoring station based upon each occurrence of the vehicle remaining stationary for greater than the predetermined period. In this embodiment, the monitoring station **30** may associate a time with each occurrence of the vehicle remaining stationary for greater

than the predetermined period. In other words, the monitoring station **30** may time stamp the received information.

In another embodiment, the controller **40** cooperates with the wireless transmission device **44** to send the vehicle position information to the monitoring station **30** for a plurality of occurrences of the vehicle remaining stationary for greater than the predetermined period. In this embodiment, the controller **40** may associate a time with each occurrence of the vehicle remaining stationary for greater than the predetermined period. In other words, the controller time stamps the position and stationary period information.

As an example, the predetermined time which determines whether the vehicle **21** is stationary and the position should be determined, may be less than about three minutes. This time may filter out vehicle stops in normal traffic, but which will keep track of stops where the driver likely leaves the vehicle **21**. Accordingly, only the important information necessary to track the vehicle need be stored and/or transmitted thereby reducing the system costs. If the vehicle **21** is stationary overnight, for example, unnecessary position information need not be determined, stored, and/or transmitted to the monitoring station **30**.

The controller **40** may comprise the memory **52** for storing the vehicle position information therein. In one configuration, the controller **40** downloads the vehicle position information from the memory **52** to the monitoring station **30** based upon a predetermined schedule. In another configuration, the controller **40** downloads the vehicle position information from the memory **52** to the monitoring station **30** based upon a predetermined event. In yet another configuration, the controller **40** downloads the vehicle position information from the memory **52** to the monitoring station **30** based upon a predetermined percentage of memory usage.

Having now described certain general features and advantages of the vehicle tracking system **20**, this description now turns to additional specific details which are provided as examples. In particular, vehicle tracking system **20** preferably implements one or more of the following features:

a. Detects the vehicle being stolen and transmits a signal to the monitoring station to contact up to 3 people, for example, predetermined by the user, of theft of the vehicle and then starts tracking the vehicle. The contact may be by one or more of the following: an e-mail message, a pager alert, a cellular telephone call, or other telephone call.

b. Detects an optional vehicle security or alarm system activation and transmits a signal to the monitoring station to contact up to 3 predetermined people to inform them the vehicle's alarm is being activated.

c. Detects an optional vehicle alarm system's remote PANIC activation and transmits a signal to the monitoring station to contact up to 3 predetermined people to inform them of the vehicle's PANIC being activated.

d. Detects a vehicle being programmed to operate from an unauthorized remote transmitter, key transponder, other transponder, or other device that has a unique coding, and the vehicle unit transmits a signal to the monitoring station to contact up to 3 predetermined people to inform them of this occurrence. The system can also make available information relating to a number of such coded devices, or a change therein, or when a change occurred. A message can be sent to the user or the information can be available to the user on the website. The vehicle would be equipped with a security system as disclosed in U.S. Pat. No. 5,654,688, for example, which determines an unauthorized transmitter and provides an alert feature. This patent is incorporated herein in its entirety by reference.

e. Detects the vehicle traveling over a predetermined speed, such as for a predetermined time, and transmits a signal to the monitoring station to send a message, such as an e-mail informing the user (and/or others) of this occurrence. Of course, the message could also be sent via a telephone call or page, should additional urgency be required. The vehicle's predetermined maximum speed limit and duration thereof can be selected by the user.

f. Detects a low battery voltage such as for a predetermined time and transmits a signal to the monitoring station to contact up to 3 predetermined people to inform them of vehicle's low battery voltage. This is especially advantageous during winter so that the vehicle could be started, for example, to prevent a problem before it happens. The time setting is preferably selectable by the user.

g. Detects the vehicle not moving for a predetermined time and transmits a signal to the monitoring station to send, for example, a nightly e-mail informing the user of all the vehicle's location and stationary time occurrences. The stationary time length is also selectable. This may be advantageous to encourage patrolling personnel not to remain for a long time in a same location.

h. The vehicle unit preferably includes a back-up battery system making it more reliable.

The vehicle unit may be relatively inexpensive. In addition, the monitoring fee that includes sending up to 60 e-mails and making up to 6 phone calls per month, may also be relatively low. The relatively low monitoring fee is based, at least in part, on the current relatively low rates charged for use of the control channel of the cellular telephone network. It is also noted that access to the control channel provides coverage for almost the entire U.S., for example.

The user or subscriber also preferably has access to an Internet site that will display a map and silently contact the vehicle to acquire its current location, speed, direction of travel, and previous multiple locations with speeds, for example, the user's personal identification number (PIN) can be quickly activated by a telephone call. No additional installation may be required.

Certain annual pre-pay package arrangements may be available. For example, up to 10 access entries per month can be provided on a low monthly billing. Up to 30 access entries could be provided also for a relatively low monthly fee.

The present invention provides a number of other significant advantages including optional access from any phone or from any computer to access the monitoring station internet site. The user may control various vehicle functions remotely via the telephone or the internet site. The only charge may be for additional equipment and installation.

Additional features can also be included with the system and subscribed to by the user in accordance with the invention. For example, these include Hijack, Car Finding, Unlock Doors and Unauthorized Transmitter Alert Features. The equipment and installation is relatively inexpensive. For the hijack feature: from any phone or computer, the user may activate vehicle starter interrupt and sound the horn until the vehicle is retrieved (Command 4).

For the Car Finding feature: from any phone or computer, the user may activate the vehicle's horn, or siren and sound same for 30 seconds. This allows the user to find his vehicle in a crowded parking lot (Command 5).

For the Lock/Unlock vehicle doors feature: from any phone or computer a predetermined command (Command 7)

activates unlocking of vehicle doors to retrieve keys, for example, that may have been accidentally locked inside the vehicle. Of course, the system can also be used to lock vehicle doors if this was forgotten (Command 6). The unauthorized transmitter alert feature is similarly selected as described above.

In addition, a remote vehicle start feature may also be provided, such as to start the vehicle's engine to heat or cool the vehicle prior to entry. The equipment and installation for remote starting may be relatively low. Some further details of a specific embodiment of the vehicle tracking unit **25** are provided below as relating to use of red and green LED indicators as may be coupled to the controller **40** and operated thereby. Also various representative wires, designated by color, are provided as an example embodiment.

The red LED verifies the GPS receiving signal. With a yellow wire having positive 12 volts, the red LED blinking indicates searching GPS location, constant indicates found location, and off indicates no GPS signal found. With the yellow wire not having positive 12 volts, if the red LED is off, the LED is not functioning.

The green LED verifies receiving the cell tower signal. With the yellow wire having positive 12 volts, blinking indicates the cell control channel signal is detected, constant indicates sending a micro burst signal (LED stays on 5 seconds after each transmission), and off indicates no cell tower signal received. With the yellow wire not having positive 12 volts, off indicates the green LED is not functioning.

An example of representative DIP switch feature selection is as follows. A first switch may be used for adding the orange wire for controlling arm/disarming of the system. When on, the orange wire controls arm/disarm as follows: to arm, the orange wire is grounded and the yellow wire does not have 12 volts positive. To disarm, the orange wire is not grounded. When the first switch is off, then only the yellow wire controls arm/disarm as follows: to arm, the yellow wire is without 12 volts positive, and 30 seconds after continued arm mode then the orange wire activates a constant 500 ma grounded output to operate an external starter interrupt relay until the system is disarmed. To disarm, the yellow wire is connected to 12 volts positive.

A main 5-pin plug may be provided on the vehicle unit and connected as follows:

a. The Red Wire is connected to the 12 vdc power. An alert warning "E" is given if the system is armed and the battery voltage becomes lower than 11 volts for longer than ## minutes. This alert feature "E" will not operate again until the voltage is above 12 volts to re-set this feature.

b. The black wire is connected to ground.

c. The yellow wire is connected to the ignition 12 volts so that if the key is on, 12 volts is supplied thereto and if the key is off, the yellow wire is connected to ground. Further: if the system is in an armed mode and the Lat/Long changes, then Alert "A" is given. If the system is disarmed and within 2.5 seconds after the yellow wire receives 12 volts and the gray wire detects 3 or more positive pulses the system activates Alert "D". If the first DIP switch is in the off position then: if 12 volts is on yellow wire, the system is disarmed and the orange wire discontinues from the 500 ma ground, and if the yellow wire sees ground or neutral, then the system is armed and 30 seconds after the continued arm mode the orange wire activates a constant 500 ma grounded output to operate an external starter interrupt relay until the system is disarmed.

d. The gray wire is for input and output, and can be connected to an alarm siren or horn positive terminal. In addition:

i. With the system armed and if the gray wire detects +12 v pulsing on/off or on constant for more than 10 seconds from an alarm siren or horn honking activation, then alert warning "T" alarm activation is given.

ii. With system disarmed and if the gray wire detects +12 v pulsing on/off or on constant for more than 10 seconds from an alarm siren or horn honking activation, then alert warning "C" panic activation is given.

iii. With system disarmed and if the Gray wire detects 3 or more 12 volt positive pulses within 2.5 seconds of yellow wire receiving +12 v and the gray wire by-pass not being activated, then alert warning "D" is given.

iv. The gray wire bypass operates as follows:

1. After alert warning "B" bypass all future alert "B" signals until system is disarmed.
2. After alert warning "C" bypass all future alert "C" signals until system is armed.
3. After alert warning "D" bypass all future alert "D" signals until no 12 volt pulses are detected on the gray wire within 3 seconds of the yellow wire having 12 volts.

v. With the system armed or disarmed. The Output: Internal +12 v, 1 amp transistor with pulses 1 second on and 1 seconds off to activate siren or honk car horn or flashing light relay.

1. Non-stop activation from (Command "4")
2. 30-second activation from (Command "5")

vi. Turn off the above alert "A" from (Command "1").

i. The orange wire is for the starter interrupt and arm/disarm system, and operates as follows:

i. If first DIP switch is in the:

1. On position and: the orange wire has 12 volts or neutral, the system switches to the disarmed mode; the orange wire is grounded, then the system is switched to the armed mode; and the starter interrupt output will not automatically operate. It can only be activated from "Command 4"
2. Off position and the orange wire does not effect the arming or disarming of the system; 30 seconds after system arms the orange wire will automatically activate constant 500 ma ground until the system is disarmed. And from "command #4". Connect to Starter interrupt relay output.

ii. Command 4 activates Orange wire to have 500 ma. negative until Command 1 is received.

iii. After alert warning "B" is activated the first time it is thereafter bypassed while the orange wire remains grounded. Alert warning "B" is re-set to operate again 3 seconds after orange wire becomes ungrounded.

The vehicle unit may also include a Door Lock Plug configured as follows, for example. A green wire provides a 250 ma, negative 1 second pulse for Lock Doors. (Command "6"). A red wire provides a constant 12 v output from the red power wire. A blue wire provides a 250 ma., negative 1 second pulse for Unlock Doors (Command "7"). A pink wire provides a 250 ma., negative 1 second pulse for remote Car Starter (Command "2").

An installation test button may also be provided to work as follows. Pressing the button activates the orange wire for 10-seconds (starter interrupt), with these circuits in sequence. First, it activates the gray wire for 1-second (siren/horn). After the first stops, it activates the green wire for 1 second to lock the doors. After the second stops, it activates the blue

wire for 1 second to unlock the doors. After the third stops, it activates the pink wire for 1 second to activate an optional item.

Representative warning alerts are as follows:

a. Alert Warning "A" (FIG. **4**): Automatic activation of "Command 8" and the vehicle unit contacts monitoring station to instantly call 3 phone numbers with the message "Your vehicle is stolen please confirm then call 911 to advise police of website and your pin # so police can locate the vehicle". This is detected with the system armed and the GPS indicating movement. Bypasses all future alert warning "A" signals until the system is re-armed.

b. Alert Warning "B" (FIGS. **5**A-**5**C): the vehicle unit contacts the monitoring station to instantly call 3 phone numbers with the following message "Vehicle alarm activated please confirm". This is with the system armed and detecting gray wire having 12 volts pulsing or on constant for longer than 10-seconds. After alert warning "B" is activated the first time, it is thereafter bypassed while the orange wire remains grounded. Alert warning "B" is re-set to operate again 3 seconds after orange wire becomes ungrounded.

c. Alert Warning "C" (FIG. **6**): the vehicle unit contacts the monitoring station to instantly send e-mail message "vehicle was traveling faster than your preset amount of "###" and time limit of "##" seconds. Indicates the vehicle speed and location that the speeding started and how long speeding accrued" (Detected from GPS). This aspect is further understood with reference to the enclosed flowchart **84** of FIG. **6**.

d. Alert Warning "D" (FIG. **7**): the vehicle unit contacts the monitoring station to instantly call 3 phone numbers with the message "Unauthorized remote transmitter was just programmed to operate your vehicle." This is with the system disarmed and the Gray wire detecting three or more 12 volt pulses within 2.5 seconds of the yellow wire having seen 12 volts positive. All future alerts "D" are bypassed until no 12 volt pulses are detected on the gray wire within 3 seconds of the yellow wire seeing 12 volts. This aspect is further understood with reference to the enclosed flowchart **85** of FIG. **7**.

e. Alert Warning "E" (FIG. **8**): the vehicle unit contacts the monitoring station to instantly call 3 phone numbers with the message "Vehicle has low battery voltage and system has changed to low voltage mode". This is with the system armed and detecting the red wire with lower than 11 volts for ## minutes. All future alerts "E" are bypassed until, first, more than 13.5 volts are detected on the red wire and, second, after the yellow wire stops having positive voltage the red wire then must detect more than 12 volts.

The following are representative commands for use in the system:

Command 1: Reset all circuits and system remains asleep until the ignition key is turned on. Resets the triggered mode and unit is asleep to prevent power drain on vehicle battery.

Command 2: (Accessory activation) monitoring station Command to the system to activate Pink wire to pulse 250 ma negative for 1 second.

Command 3: (Vehicle Location) website to indicate present location and past events in memory.

Command 4: (Hijack or Stolen) monitoring station Command to vehicle system to activate:

iv. Gray wire to pulse 1 sec on/1 sec off with 1 amp positive output and which continues until receive command # 1.

v. Orange wire to have 500 ma ground and which continues until receive command # 1.

Command 5: (Car Find) monitoring station Command to system activating Gray wire for 30 seconds pulsing 1 sec on/1 sec off with 1 amp positive output.

Command 6: (Lock Doors) monitoring station Command to system activating Green wire to pulse 1 second with 250 ma negative.

Command 7: (Unlock Doors) monitoring station Command to system to activate Blue wire to pulse 1 second with 250 ma negative.

Command 8: (Start Constant Vehicle Tracking) sends previous 2 events in memory and then every 120 seconds get update of location information sent to the Web site.

The system is also operable in a battery saver mode which operates as follows:

i. With the ignition key off, if the battery voltage drops below 11.5 volts for more than 5 seconds, the GPS verification wakes up to look:

ii. Once instantly.

iii. Once in 1 hour if at the same location.

iv. Once in 6 hours if at the same location.

v. Once in 12 hours if at the same location.

vi. Once every 24 hours if at the same location.

vii. Activate alert "E" when the battery saver mode is activated, and bypass sending all future Alert "E" until the battery voltage goes above 13 volts for 10 minutes to reset this feature.

Another aspect of the invention relates to automatic vehicle alert e-mails sent containing some or all of the previous system events. This sending can be triggered as follows:

a. At a user selected predetermined time ## (01-24) of each day, or

b. At a predetermined memory fill level, such as full or near full.

In addition, each system event may contain one or more of the following:

a. Vehicle Location

b. Vehicle total time at location

c. Time of day

d. Mph traveling

e. Total time traveling above MPH

f. Direction traveling

g. Delta

h. Special Alert messages, if any, including:

i. GPS signal not received for longer than 5 minutes.

ii) Traveling above ###MPH for ## minutes.

iii) Vehicle is stolen.

iv) Alarm activated.

v) Unauthorized remote transmitter alert.

vi) Battery saver mode activated

vii) Command 1: Reset all circuits and system remains asleep until the ignition key is turned on.

viii) Command 2: (Accessory activation)

ix) Command 3: (Vehicle Location was retrieved)

x) Command 4: (Hijack or Stolen mode activated)

xi) Command 5: (Car Find mode activated)

xii) Command 6: (Locked Doors)

xiii) Command 7: (Unlocked Doors)

xiv) Command 8: (Started 2-second incremental Vehicle Tracking)

Another feature of the invention relates to the selectable threshold conditions causing an event to be recorded into the memory of the vehicle unit. For example, this may include: while the yellow wire has 12 volts, record events every "??" default 15 minutes time if the GPS location has changed. If the GPS location is the same then only update stationary total

time. If the GPS antenna is not receiving any signal then enter last known GPS location and with an indication that this was the last known GPS location before the GPS signal stopped, how long no GPS signal was received, and the GPS location in the on-hold file, when the vehicle is traveling above ### MPH for ##-minutes.

The monitoring station may also provide a number of automated phone calls as described above. These may include:

The user's vehicle has issued a stolen alert:

If vehicle is stolen, after receiving the phone message the user then calls 911 to advise police of the theft, and gives the police the website address and an identification number, such as the user's PIN, to allow the police to locate where your vehicle has been, where it is now and keep tracking it until the police can retrieve the vehicle.

If this is a false alert due to vehicle being towed away for service, for example, then the user may press "1" to put the vehicle in an off mode. Once the ignition key is turned on again the system will reset back to its normal operation mode.

The user's vehicle has issued an alarm activated for more than 10 seconds alert. The system will not respond to this alert again until ignition key is turned on again to reset this feature.

The vehicle battery voltage is low or has been disconnected. The tracking system is in low voltage mode. The system will not respond to this alert again until the battery voltage goes above 13 volts for 10 minutes to reset this feature.

The backup battery may be sized according to the GPS receiver and processing power draw. In addition, the battery may also be sized based upon estimated micro burst transmitting power draw. Such transmissions are typically at about 3 watts power to the antenna.

The system according to the invention including the vehicle unit and monitoring station provides a number of significant advantages and features. For example, the police may be directly contacted by the user when the vehicle is stolen. The user receives the telephone message from the monitoring station, and this is done without requiring the intervention of a manual security monitoring operator, such as an ADT operator, for example. In addition, once in the stolen mode, the vehicle unit will periodically continue to send out its location, so that the police may track the vehicle via the WEB, for example. This location sending feature may begin immediately, that is, without requiring the user to contact the vehicle to begin tracking. Having the vehicle contacting the monitoring station is considerably less expensive than other schemes where the vehicle is periodically polled via the cellular network, for example.

The system may also be interfaced to a breath alcohol sensor at the vehicle, for example, and this information recorded in memory. The information could be passed along to the monitoring station, which, in turn, could send out a notification message (e-mail or telephone) that the vehicle is being operated by a driver who may be impaired by alcohol. The vehicle's location could then be tracked to permit the police to detain the driver.

Another aspect of the unit is that it may be able to recognize the desirability to bypass certain security breach triggers or other events. For example, a car finding feature can be provided that will allow the user to sound the horn or siren when near the vehicle to help locate the vehicle, as in a crowded parking area. Without the bypass feature, the unit could recognize the horn or siren as a security breach and transmit such information to the monitoring center. In accordance with this aspect of the invention, the unit would recognize the car finding feature was activated and thereby bypass sending a security breach transmission, for example. Again, false alarms and unneeded usage and expense of the communications infrastructure would be avoided.

Yet another aspect of the invention relates to thwarting a would-be thief who attempts to disable the alarm by cutting the battery cable or power supplied to the system. The unit preferably includes a back-up battery. More particularly, upon being in an armed mode and sensing a breach of security, such as the hood opening, for example, the unit will send out a signal indicating the alarm or security breach and while the alarm is indicated, if the battery is disconnected then the unit will send out a message indicating the vehicle is stolen, and also providing the vehicle's current position. Accordingly, the would-be thief is not able to defeat the security system by quickly disrupting power to the unit during an alarm indication or security breach. Also, to prevent additional alerts, this message is prevented from being transmitted again until the user returns to the vehicle to disarm the system and/or turn on the ignition so that the unit sees a voltage above 13 volts, indicating the vehicle has started using the owner's ignition key. This aspect is further understood with reference to the enclosed flowchart **80** (FIG. **4**).

Still another aspect of the invention relates to how the unit can discriminate between ordinary usage or honking of the horn as compared to a security system triggered alarm. Most vehicle security systems will provide a pattern of horn soundings as an alarm indication, and this can be determined and used to reduce false alarm transmissions from the unit. For example, the unit can look at the number of leading and trailing edges of the power pulse used to sound the horn. A single pressing of the horn switch by the user will cause two edges within a predetermined time, such as about 10 to 12 seconds. Accordingly, the unit can be configured to not send a security breach transmission to the control center based upon detecting two transitions. Since a number of vehicle security systems may have a continuous sounding of the horn within the predetermined time, the unit can send the transmission upon detecting only a single transition.

A number of other vehicle security systems provide a series of pulses or horn soundings within the predetermined time. Accordingly, the unit may also be configured to send a security breach transmission upon detecting greater than a predetermined number of transitions, such as greater than nine, for example. This number is also typically higher than a user would generate honking the horn several times within the predetermined time. In other terms, the number of transitions of the horn pulses can be counted, and if equal to one, or greater than nine, for example, the transmission is triggered, and otherwise the sounding of the horn is ignored. Also, to prevent additional alerts, this message is prevented from being transmitted again until the user returns to the vehicle to disarm the system and/or turn on the ignition so that the unit sees a voltage above 13 volts, indicating the vehicle has started using the owner's ignition key. This aspect is further understood with reference to the enclosed flowcharts **81-83** (FIGS. **5A-5C**).

Yet another feature of the invention relates to a low vehicle battery alert. For example, the unit may monitor the battery voltage over a predetermined time such as ten minutes. The ten minute window prevents false tripping, for example, when the voltage dips during engine cranking. In particular, the voltage can be sensed and it can be determined whether it is greater than zero (e.g. greater than six volts) and less than a high value (e.g. eleven or twelve volts), and, if so, a low battery voltage transmission can be communicated to the monitoring station, and ultimately to the vehicle user when away from the vehicle. If the vehicle is being serviced and the battery is disconnected, this will cause the battery voltage to

be equal to zero. Then, the low battery voltage transmission will not be communicated to the monitoring station. Also, to prevent additional alerts, this message is prevented from being transmitted again until the user returns to the vehicle to disarm the system and/or turn on the ignition so that the unit sees a voltage above 13 volts, indicating the vehicle has started using the owner's ignition key. Again, false triggerings are reduced. This aspect is further understood with reference to the enclosed flowchart **86** (FIG. **8**).

Yet another advantageous feature of some embodiments of the invention relates to the ability to conserve electrical power. More particularly, when the vehicle is stopped and in the armed mode, the GPS receiver may be periodically operated to determine the vehicle position. If the vehicle position changes, this is indicative that the vehicle is being moved or stolen. For example, the GPS receiver may be operated to generate new vehicle position information every 29 seconds. These relatively quick successive position determinations or readings are generally termed hot start. These are relatively less complicated than a cold start position determination which takes longer, since the cold start position determination requires greater time to acquire and receive data from multiple satellites, as will be appreciated by those skilled in the art.

Unfortunately, this relatively high repeated usage of the GPS receiver may cause unnecessary battery drain, especially when the vehicle is left armed and unattended by the user for an extended period. Accordingly, the power conserving feature of the invention permits the GPS receiver to be turned off when the vehicle is in the armed mode, and the GPS receiver is turned on only when needed. For example, a vehicle sensor, such as a shock sensor, motion sensor, ignition sensor, door sensor, or other sensor, or combinations thereof could be used to start the GPS receiver. This sensor could also be used to trigger an alarm if desired; however it need not be so used in all embodiments. The GPS receiver, once turned on, could operate in the normal periodic fashion as described above, or for a fixed period of time. The GPS receiver could also be turned off again after some predetermined time if no further sensor signal is received, or if the position fails to change on subsequent position readings or determinations.

Yet another feature relates to permitting more colorful audible alert messages to be generated for the user. The user can, in some embodiments, access an internet site to type or enter the text for a message to be sent, such as to alert the user that his vehicle is being stolen. The audible message then communicated by a telephone call to the user is generated by a speech message synthesizer based upon the entered text. In accordance with this aspect of the invention, the user could type in phonetically spelled words or phrases, such as to create more colorful messages including slang terms, various accents, and/or to mimic various dialects, for example. The speech synthesizer would then generate the desired message customized for the user. Of course, the system could also permit the user to test or preview the pronunciation generated by the speech message synthesizer based on the entered text message prior to its adoption.

Another aspect relates to requesting GPS position information from a vehicle. If a command is sent downstream to the vehicle requesting that GPS information in turn be sent upstream from the vehicle, and the GPS information is not received within a predetermined time, such as about four minutes, then another command may be sent to the vehicle requesting the GPS information. This may keep repeating until GPS information is received, for a predetermined number of tries, or until a user instructs stopping of the requests. This helps to ensure and confirm the activation and reception of GPS tracking coordinates from the vehicle.

Yet another aspect relates to reducing a frequency with which GPS information is sent from the vehicle. More particularly, the unit may be configured to activate GPS information transmission upstream every 2 minutes. To reduce system usage expense and power consumption at the vehicle, this rate of transmission of GPS information could be progressively decreased over time. For example, in one embodiment, upon activation the GPS location signals could be sent every 2 minutes during the first hour, then once an hour for the next 23 hours, after which only one signal would be sent per day.

Turning now to the flowchart **87** of FIG. **9**, still another aspect relates to warning the user of an inoperable or malfunctioning GPS or cellular telephone section. More particularly, if the GPS or cellular telephone antenna wire is cut or the mounting position of either is changed causing the antenna to stop receiving the signal the user would not ordinarily know of this problem quickly. In accordance with one embodiment, if the ignition is turned on a predetermined number of times, such as about three, and each time ignition turns on if no GPS or no cell signal is received for a minimum time, such as about 15 to 30 minutes or longer, an audible warning beeper may be activated in the vehicle. This beeper may be sounded once every 15-minutes. At anytime if the GPS or cell signal is received properly then the system re-sets automatically stopping the beeper sound.

As an example, if the ignition key is turned on and no GPS or no Cell signal is being received for 15-minutes, and the vehicle ignition stays on for 45-minutes and there is still no GPS or no cell signal, the unit counts one. Thereafter, if the ignition key is turned on and no GPS or no cell signal is being received for 15-minutes, and the vehicle ignition stays on for 60-minutes and there is still no GPS or no cell signal, a second count is determined. Thereafter, if the ignition is turned on and no GPS or no cell signal is received for 10-minutes, and the vehicle ignition stays on for only 10-minutes and there is still no GPS or no cell signal, no count is determined. Thereafter, if the ignition is turned on and no GPS or no cell signal is being received for 15-minutes, a third count is determined and the beeper is activated as described above. This beeping may continue every 15-minutes while the vehicle ignition stays on as long as the vehicle ignition stays on for 16-minutes and still no GPS or no Cell signal is being received. If thereafter, the ignition is turned on and no GPS or no cell signal is being received, the beeper beeps once and again beeps once every 15-minutes while vehicle ignition stays on. If in 10-minutes both GPS or cell signal is being received, the beeper system is turned off and the warning count is reset.

By way of example, if the ignition key is turned on and no GPS or no cell signal is being received for only 5, 10 or 12 minutes (with the threshold set at 15 minutes), then no count is determined.

In certain circumstances, the GPS signal may fail, but the cell signal may still be working. Accordingly, it may be desirable to send an indication of the failure of the GPS signal to the central monitoring station to thereby alert the user as described above. If the cell signal also failed, or if the cell signal failed by itself, in other embodiments a separate paging device would transmit the failure or loss of the cell signal information to the central monitoring station, to thereby alert the user.

Yet another feature is directed to efficient use of a relatively small number of codes available to communicate with the tracking unit from the cellular network and central station.

More particularly, a typical arrangement may provide eight basic codes and two Awildcard@ codes. The two wildcard codes are reserved for future or other uses. A particular tracking device will respond directly to any of the eight basic codes. For example, the doors could be locked or unlocked, a present location downloaded from the vehicle, etc.

In accordance with this feature, the tracking device may respond differently to the same code or command depending upon the state or condition of the tracking device. For example, if an alarm is triggered at the vehicle, it may be desired that the tracking device continue to send the alarm signal until confirmation is received that the central monitoring station has received the alarm signal. This confirmation can be sent using the same code as may provide another function if the device were not indicating an alarm. Any of a number of such tracking device conditions may trigger a different message to be interpreted from the received code. For example, if any of the above Alerts A-E were triggered, the receipt of a predetermined code, such as code eight, would confirm receipt of the alert by the central station, and this receipt of code eight would not cause the other response (no alarm triggered) in the tracking device. Of course this concept can be extended to other features as will be appreciated by those skilled in the art.

In accordance with another feature, the rate of sending the location or position data (or change in position data) from the vehicle may be varied to reduce system usage and thereby reduce expenses. More particularly, in one embodiment, the rate of sending may be based upon how long the vehicle has remained stationary. This time period may be selected by the user. For example, the selected time may be in the range of 15 minutes to six hours. If the vehicle has been stationary for the selected time period, then the rate of transmission may be reduced. This reduces or eliminates the need to send home position data and send all the over 15-minute stops made that day. Otherwise, that is when the vehicle is moving, the device may send data at a faster rate. Of course, a system user would not likely be interested in quick updates, especially where the position information is not changing. Conversely, if the vehicle is being moved, it may be desirable to receive more frequent position updates.

Another variation of this transmission rate conservation feature bases the rate of transmission on the vehicle position. For example, a reduced rate of transmission may be selected if the vehicle is in a predetermined area where the user has a lesser interest in quickly updated position information. The user may also have a reduced interest in an area that can be defined outside of a predetermined distance from a reference point.

Yet another variation of the vehicle position transmission rate conservation feature is based upon the vehicle's speed, such as the vehicle's average or maximum speed, for example. Accordingly, if the vehicle is traveling above a preset speed, the rate of transmission may be increased.

In accordance with another aspect of the invention, the tracking device may send the alert indication a predetermined number of times without receiving an acknowledgment as described above, and then wait until the vehicle position has changed before trying again or the cell re-registers or its RSS (received signal strength) changes. Thus, power is conserved. When the vehicle has moved to a new position, any obstructions may no longer be present thereby increasing the likelihood of a successful communication. In addition, the change in position may be determined when the vehicle is sensed to be moving about a predetermined relatively small speed, such as greater than 1 mph, for example.

In all of the embodiments and variations described herein, the tracking device may communicate with one or more other vehicle devices via a vehicle data communications bus. Further aspects of interfacing with a vehicle data communications bus are described in U.S. Pat. Nos. 5,719,551 and 6,011,460 assigned to the assignee of the present invention, the entire contents of which are incorporated herein by reference.

Yet another aspect relates to efficient use of available codes on the cellular telephone control channel. In one particular example, ten codes may be available to be transmitted from the monitoring station to the vehicle trackers. The first eight or nine codes are command codes that will cause a specific action by the tracking device at the vehicle. The other one or two codes may be wildcard codes as mentioned above, that may set a stand-by mode for one or a group of vehicles, for example.

It may be desirable to provide more than eight commands at the vehicle responsive to the corresponding eight available codes. For example, it may be desirable to set a feature on or off, or to set a different feature setting or threshold. In accordance with this aspect of the invention, the commands at the tracker are determined based upon a series of different command codes being received within a predetermined time window.

For example, the monitoring station may send code 9 that switches the tracker in the car into a stand-by mode for a predetermined time and which causes the tracker to respond with an upstream confirmation code 7 or 9 indicating receiving code 9. During the predetermined time of the stand-by mode another code follows that causes a system programmable feature or setting to change. Note that the second code would otherwise cause a different function at the vehicle. Note that system might operate a function 9 if another code 1-9 is not received in the predetermined time. The following list is exemplary for features resulting from second codes 1-9:

Code 1—Tracker will turn off feature of upstream code caused by vehicle alert being detected.

Code 2—Tracker will turn on feature of upstream code caused by vehicle alert being detected.

Code 3—Tracker deactivates cell receiver from operating due to a non-paying customer for monitoring service. That phone number can then be allocated to another customer.

Code 4—Turn on audio buzzer feature that will sound once each 10 minutes. The monitoring station need only send the command to activate the feature, as the tracker will time the period and drive the buzzer thereafter. The monitoring station will normally not need to send this command because the tracker will be configured out of the box with this feature activated to sound the buzzer every 10 minutes until the next command is received.

Code 5—Turn off the audio buzzer. This is to be sent by the monitoring station after a user has successfully activated his account.

Code 6—Turn on the 80 mph speed limit reporting. This will normally not be sent as this feature will be the default setting of the tracker.

Code 7—a Turn off the 80 mph speed limit reporting.

Code 8—Increase speed limit 5 mph and increase the time 5 minutes.

Code 9—Decrease speed limit 5 mph and decrease the time 5 minutes, and wait 5 minutes if another code number follows. It could operate this way to allow another set of codes to change more features.

In this example, in response to the tracker receiving the system code 1-9, the tracker sends an upstream code 7 to acknowledge receipt of the system code 1-9. Upon receipt of code 9 the tracker waits up to 5 minutes to determine if

another system code is received. If no code is received, then the tracker performs the code 9 operation. Of course, in other embodiments other features or settings can be selected. In general, it may be preferred that the first code sent in a series of two codes, for example, be a code that causes only a minor function to be performed at the vehicle. This is so because if the second code is sent from the monitoring station, but not received at the tracker, only a minor function is performed. For example, the first code may switch between armed and disarmed modes. This is in contrast to using a remote engine starting code or engine shutdown code as the first code. The vehicle may be moving or positioned in a marginal reception area, and the second command may not be received by the tracker within the predetermined time window. As will be appreciated by those skilled in the art, this concept of multiple digit codes, can be extended beyond two digits to three or more.

To further conserve cellular transmissions and as described above, the tracker may be set to record a position based upon a determined event. Only this recorded position information may be downloaded either by user request or at set times. It is desired that such events be relatively few, but that the information still be helpful to the user.

For example, an event for recording of position may be determined based upon the vehicle being stopped for greater than a first time and less than a second time. For example, the first time may be 15 minutes and the second time may be 6 hours. Determination of the vehicle being stopped can be made based upon one or both of the GPS position or the vehicle ignition being turned off. The second time prevents the recording of position information when the vehicle is stopped at the owner's home during the evening, for example. Accordingly, the important information of the vehicle stops being made is recorded and made available to the user, while system communications resources are conserved.

In another example, if the mode is selected to send the vehicle's location every 10 min and the vehicle is in the same location for greater than a set time, then no more vehicle locations are sent until the vehicle location has changed to start the every 10 min reporting again.

Now referring to FIGS. **10** and **11**, in yet another embodiment the potential difficulties of interfacing to a vehicle data bus and devices connected thereto are further discussed. The multi-vehicle compatible tracking unit **110** is for a vehicle comprising a vehicle data bus **122** extending throughout the vehicle. The multi-vehicle compatible tracking unit **110** includes a vehicle position determining device **112**, a wireless communications device **113**, and a multi-vehicle compatible controller **111** for cooperating with the vehicle position determining device and the wireless communications device to send vehicle position information. The vehicle position determining device **112** may be provided by a GPS receiver, for example, or any of the other such devices described in detail above.

The wireless communications device **113** may be provided by a cellular telephone transceiver configured to operate on a control channel of the cellular network, or any of the other such devices described in detail above.

The multi-vehicle compatible controller **111** is coupled to the vehicle data bus **122** for communication thereover with a vehicle device **121**. The controller **111** illustratively includes a central processing unit (CPU) **126** or other logic circuitry which is connected to a clock signal generator **124**, a memory **125**, and input/output circuitry **127** to interface with the vehicle device **121** using at least one corresponding vehicle device code from among a plurality thereof for different vehicles. The corresponding vehicle code may be for reading from the vehicle device **121**. Similarly, the corresponding vehicle code may be additionally or alternatively for writing to the vehicle device **121**.

The multi-vehicle compatible tracking unit **110** also illustratively includes a downloading interface **116** for permitting downloading of enabling data related to the at least one corresponding vehicle device code for use by the multi-vehicle compatible controller **111**. The enabling data may be the vehicle device code or codes, an instruction to select a code or codes from among those already stored, or the data or sequence to allow the controller **111** to generate the vehicle device code or codes, for example.

In the embodiment as shown in FIG. **11**, the downloading interface **116** is a category of wireless signal downloading interfaces that illustratively include a wireless receiver **114**, such as for temporary connection to the downloading device **115**. The wireless downloading interface **116** may communicate with the downloading device **115** via any one or more of a number of wireless technologies, such as cellular, satellite, IR, Bluetooth or WiFi technologies for example, as will also be appreciated by those skilled in the art. Interface circuitry **132** is included in the wireless signal downloading interface **116** for controlling communication with the downloading device **115**. The interface circuitry **132** may be logic circuitry or other control circuitry along with switching components.

In other embodiments, for example as shown in FIG. **12**, the wireless downloading interface **116'** does not include the wireless receiver **114**, as a temporary wireless communication link is instead provided by sharing the wireless communications device **113** that sends position data as described above.

The downloading interface may also be in the form of a wired signal downloading interface **116"** as shown in FIG. **13**. The wired signal downloading interface **116"** comprises a connector **133***a* for temporary connection to a downloading device **115"** with a mating connector **133***b*. Interface circuitry **132"** is provided for controlling communication with the downloading device **115"**. The wired downloading interface **116"** may connect directly to a downloading device **115"**, such as a laptop computer, via RS232/429 protocol, USB, FireWire, TCP/IP (Internet), or any other wired protocol as will be appreciated by those skilled in the art. The connector **133***a* of the wired downloading interface **116"** may alternatively be in the form of a socket to accept a memory card or other data storage medium capable of transferring data. The downloading interfaces **116**, **116'** and **116"**, may also advantageously be for permitting downloading of programming instructions for the multi-vehicle compatible controller **111**, to allow remote programming, for example, as will also be appreciated by those skilled in the art.

Referring again briefly to FIG. **10**, the multi-vehicle compatible tracking unit **110** further comprises a remote transmitter **117**, such as typically in the form of a small handheld device to be carried by a user when away from the vehicle. The multi-vehicle compatible controller **111** also performs at least one vehicle remote control function responsive to the remote transmitter **117**. The remote transmitter **117** illustratively communicates with the remote receiver **118**, which is coupled to the multi-vehicle compatible controller **111**. The vehicle remote control functions may include a vehicle security function, a remote keyless entry function, and a remote engine starting function, for example, implemented via the data bus **122** using one or more vehicle devices **121**. Such a vehicle device **121** may also include another vehicle controller, as well as a sensor, or actuator as will be appreciated by those skilled in the art.

The multi-vehicle compatible tracking unit **110** illustratively includes a common housing **123** for its various components. In other embodiments, more than one housing may be used for the various components.

Referring additionally to FIGS. **14** and **15**, several methods for using a multi-vehicle compatible tracking unit **110** for a vehicle comprising a vehicle data bus **122** extending throughout the vehicle are described with reference to the respective flowcharts **148**, **148'**. Beginning at Block **150**, the multi-vehicle compatible tracking unit **110** is installed in vehicle (Block **151**). At Block **152** a connection is then established between the multi-vehicle compatible tracking unit **110** and a downloading device **115** using a downloading interface **116**. Enabling data related to at least one corresponding vehicle device code for use by the multi-vehicle compatible controller **111** is downloaded via a downloading interface **116** (Block **153**). Once the enabling data is downloaded, the connection between the multi-vehicle tracking unit **110** and the downloading device **115** is terminated at Block **154**. Of course the multi-vehicle compatible tracking unit **110** may be optionally programmed via the downloading interface while the connection is established. The operation of the tracking unit may be tested at Block **155** before stopping at Block **156**. With particular reference to the flowchart **148'** of FIG. **15**, the multi-vehicle compatible tracking unit **110** may be connected to the downloading device **115** (Block **152'**), etc., before installation in the vehicle (Block **151'**) and testing (Block **155'**).

Other features relating to vehicle control systems are disclosed in copending patent applications entitled VEHICLE TRACKER INCLUDING STATIONARY TIME DETERMINATION AND ASSOCIATED METHODS, Ser. No. 09/859,727 filed May 17, 2001, now U.S. Pat. No. 6,512,465; VEHICLE TRACKER CONSERVING CODES AND RELATED METHODS, Ser. No. 09/859,673 filed May 17, 2001, now U.S. Pat. No. 6,522,267; VEHICLE TRACKER WITH POWER SAVING FEATURES AND RELATED METHODS, Ser. No. 09/859,728 filed May 17, 2001, now U.S. Pat. No. 6,512,466; VEHICLE TRACKER COOPERATING WITH A STARTER INTERRUPT AND RELATED METHODS, Ser. No. 09/859,973 filed May 17, 2001; VEHICLE TRACKER WITH USER NOTIFICATIONS AND ASSOCIATED METHODS, Ser. No. 09/859,733 filed May 17, 2001, now U.S. Pat. No. 6,509,868; VEHICLE TRACKER WITH USER REGISTRATION REMINDER AND RELATED METHODS, Ser. No. 09/859,971 filed May 17, 2001, now U.S. Pat. No. 6,507,786; VEHICLE TRACKER INCLUDING INPUT/OUTPUT FEATURES AND RELATED METHODS, Ser. No. 09/859,972 filed May 17, 2001, now U.S. Pat. No. 6,606,561; and VEHICLE TRACKER WITH TEST FEATURES AND RELATED METHODS, Ser. No. 09/859,729 filed May 17, 2001, now U.S. Pat. No. 6,809,659, the entire disclosures of which are incorporated herein by reference.

Many modifications and other embodiments of the invention will come to the mind of one skilled in the art having the benefit of the teachings presented in the foregoing descriptions and the associated drawings. Accordingly, it is understood that the invention is not to be limited to the embodiments disclosed, and that other modifications and embodiments are intended to be included within the spirit and scope of the appended claims.

That which is claimed is:

1. A multi-vehicle compatible tracking unit for a vehicle comprising a vehicle data bus extending throughout the vehicle, the multi-vehicle compatible tracking unit comprising:

a vehicle position determining device;

a wireless communications device;

a multi-vehicle compatible controller for cooperating with said vehicle position determining device and said wireless communications device to send vehicle position information;

said multi-vehicle compatible controller to be coupled to the vehicle data bus for communication thereover with at least one vehicle device using at least one corresponding vehicle device code from among a plurality thereof for different vehicles; and

a downloading interface for permitting downloading of enabling data related to the at least one corresponding vehicle device code for use by said multi-vehicle compatible controller.

2. The multi-vehicle compatible tracking unit according to claim **1** wherein said downloading interface comprises a wired signal downloading interface.

3. The multi-vehicle compatible tracking unit according to claim **2** wherein said wired signal downloading interface comprises a connector for temporary connection to a downloading device.

4. The multi-vehicle compatible tracking unit according to claim **1** wherein said downloading interface comprises a wireless signal downloading interface.

5. The multi-vehicle compatible tracking unit according to claim **4** wherein said wireless signal downloading interface comprises a wireless receiver for temporary connection to a downloading device.

6. The multi-vehicle compatible tracking unit according to claim **1** wherein the corresponding at least one vehicle code is for reading from the at least one vehicle device.

7. The multi-vehicle compatible tracking unit according to claim **1** wherein the corresponding at least one vehicle code is for writing to the at least one vehicle device.

8. The multi-vehicle compatible tracking unit according to claim **1** wherein said downloading interface is also for permitting downloading of at least one programming instruction for said multi-vehicle compatible controller.

9. The multi-vehicle compatible tracking unit according to claim **1** further comprising a remote transmitter; and wherein said multi-vehicle compatible controller also performs at least one vehicle remote control function responsive to said remote transmitter.

10. The multi-vehicle compatible tracking unit according to claim **9** wherein the at least one vehicle remote control function comprises at least one of a vehicle security function, a remote keyless entry function, and a remote engine starting function.

11. The multi-vehicle compatible tracking unit according to claim **1** wherein said wireless position determining device comprises a Global Positioning System (GPS) receiver.

12. The multi-vehicle compatible tracking unit according to claim **1** further comprising a housing containing said vehicle position determining device, said wireless communications device, said multi-vehicle compatible controller, and said downloading interface.

13. A multi-vehicle compatible tracking unit for a vehicle comprising a vehicle data bus extending throughout the vehicle, the multi-vehicle compatible vehicle tracking unit comprising:

a vehicle position determining device;

a wireless communications device;

a multi-vehicle compatible controller for cooperating with said vehicle position determining device and said wireless communications device to send vehicle position information;

said multi-vehicle compatible controller to be coupled to the vehicle data bus for communication thereover with at least one vehicle device using at least one corresponding vehicle device code from among a plurality thereof for different vehicles; and

a downloading interface for permitting downloading of enabling data related to the at least one corresponding vehicle device code for use by said multi-vehicle compatible controller;

said downloading interface comprising a connector for temporary connection to a downloading device.

14. The multi-vehicle compatible tracking unit according to claim **13** wherein the corresponding at least one vehicle code is for reading from the at least one vehicle device.

15. The multi-vehicle compatible tracking unit according to claim **13** wherein the corresponding at least one vehicle code is for writing to the at least one vehicle device.

16. The multi-vehicle compatible tracking unit according to claim **13** wherein said downloading interface is also for permitting downloading of at least one programming instruction for said multi-vehicle compatible controller.

17. The multi-vehicle compatible tracking unit according to claim **13** further comprising a remote transmitter; and wherein said multi-vehicle compatible controller also performs at least one vehicle remote control function responsive to said remote transmitter.

18. A multi-vehicle compatible tracking unit for a vehicle comprising a vehicle data bus extending throughout the vehicle, the multi-vehicle compatible vehicle tracking unit comprising:

a vehicle position determining device;

a wireless communications device;

a multi-vehicle compatible controller for cooperating with said vehicle position determining device and said wireless communications device to send vehicle position information;

said multi-vehicle compatible controller to be coupled to the vehicle data bus for communication thereover with at least one vehicle device using at least one corresponding vehicle device code from among a plurality thereof for different vehicles; and

a downloading interface for permitting downloading of enabling data related to the at least one corresponding vehicle device code for use by said multi-vehicle compatible controller;

said downloading interface comprising a wireless receiver for temporary connection to a downloading device.

19. The multi-vehicle compatible tracking unit according to claim **18** wherein the corresponding at least one vehicle code is for reading from the at least one vehicle device.

20. The multi-vehicle compatible tracking unit according to claim **18** wherein the corresponding at least one vehicle code is for writing to the at least one vehicle device.

21. The multi-vehicle compatible tracking unit according to claim **18** wherein said downloading interface is also for permitting downloading of at least one programming instruction for said multi-vehicle compatible controller.

22. The multi-vehicle compatible tracking unit according to claim **18** further comprising a remote transmitter; and wherein said multi-vehicle compatible controller also performs at least one vehicle remote control function responsive to said remote transmitter.

* * * * *

EXHIBIT B

UNITED STATES DISTRICT COURT
MIDDLE DISTRICT OF FLORIDA
ORLANDO DIVISION

CASE NO. 6:13-cv-1950-GAP-DAB

OMEGA PATENTS, LLC,
a Georgia limited liability company,

Plaintiff/Counterdefendant,

v.

CALAMP CORP.,
a Delaware corporation,

Defendant/Counterplaintiff.
_____/

CALAMP CORP.'S FIRST AMENDED COUNTERCLAIM

This is a civil action for declaratory judgment of non-infringement, invalidity and unenforceability of a patent arising under the Declaratory Judgment Act, specifically, 28 U.S.C. §§ 2201 and 2002. For its counterclaims against Plaintiff/Counterdefendant Omega Patents LLC ("Omega"), Defendant/Counterclaimant CalAmp, Corp. ("CalAmp") alleges as follows:

PARTIES

1. CalAmp is incorporated under the laws of the state of Delaware and has its principal place of business at 1404 N. Rice Avenue, Oxnard, California 93030.

2. On information and belief, Omega is a Georgia Limited Liability Company with a principal place of business at 5326 Presley Pl., Douglasville, Georgia 30135.

JURISDICTION AND VENUE

3. This Court has subject matter jurisdiction pursuant to 28 U.S.C. §§ 1331, 1338, and 2201 and 35 U.S.C. § 282.

4. This Court has personal jurisdiction over Omega due to the fact that Omega sought the benefits of this forum in this litigation, and, on information and belief, continues to have substantial and continuous contacts with this forum.

5. Venue is proper in this forum pursuant to 28 U.S.C. §§ 1391(b) and the applicable law of this Court.

CASE OR CONTROVERSY

6. An immediate, real, and justiciable controversy exists between Counterclaimant CalAmp and Counterdefendant Omega pertaining to U.S. Patent Nos. 6,346,876 B1; 6,737,989 B2; 6,756,885 B1; 7,671,727 B2; and 8,032,278 B2 ("Patents-in-Suit"), which have been asserted by Omega.

FACTS

The Patents-in-Suit

7. On December 20, 2013, Plaintiff/Counterdefendant Omega filed a Complaint in this Court alleging that Defendant CalAmp infringes the Patents-in-Suit, and that Omega is the owner of the Patents-in-Suit and has standing to sue for infringement of the Patents-in-Suit.

8. One of the Patents-in-Suit, U.S. Pat. No. 6,346,876, includes new matter added in as of the filing date of May 31, 2000, and also claims priority to a continuation-in-part application adding new matter which was filed February 13, 1998.

9. One of the Patents-in-Suit, U.S. Pat. No. 6,737,989, includes new matter added in as of the filing date of March 25, 2002.

10. One of the Patents-in-Suit, U.S. Pat. No. 6,756,885, includes new matter added in as of the filing date of May 31, 2000, and also claims priority to a continuation-in-part application adding new matter which was filed February 13, 1998.

11. One of the Patents-in-Suit, U.S. Pat. No. 7,671,727, includes new matter added in as of the filing date of August 24, 2007.

12. One of the Patents-in-Suit, U.S. Pat. No. 8,032,278, includes new matter added in as of the filing date of July 3, 2007.

Attorneys of Record for Patents-in-Suit

13. For U.S. Pat. No. 6,346,876, the U.S. Patent & Trademark Office ("USPTO") lists Christopher Regan ("Regan") as attorney of record.

14. Regan was an individual associated with the filing and prosecution of U.S. Pat. No. 6,346,876.

15. For U.S. Pat. No. 6,737,989, the USPTO lists multiple attorneys of record, including both Regan and Richard Warther ("Warther").

16. Regan was an individual associated with the filing and prosecution of U.S. Pat. No. 6,737,989.

17. Warther was an individual associated with the filing and prosecution of U.S. Pat. No. 6,737,989.

18. For U.S. Pat. No. 6,756,885, the USPTO lists multiple attorneys of record, including both Regan and Warther.

19. Regan was an individual associated with the filing and prosecution of U.S. Pat. No. 6,756,885.

20. Warther was an individual associated with the filing and prosecution of U.S. Pat. No. 6,756,885.

21. For U.S. Pat. No. 7,671,727, the USPTO lists multiple attorneys of record, including both Regan and Warther.

22. Regan was an individual associated with the filing and prosecution of U.S. Pat. No. 7,671,727.

23. Warther was an individual associated with the filing and prosecution of U.S. Pat. No. 7,671,727.

24. For U.S. Pat. No. 8,032,278, the USPTO lists multiple attorneys of record, including both Regan and Warther.

25. Regan was an individual associated with the filing and prosecution of U.S. Pat. No. 8,032,278.

26. Warther was an individual associated with the filing and prosecution of U.S. Pat. No. 8,032,278.

Attorneys of Record Failed to Disclose Materially Relevant Prior Art

27. During the prosecution of the Patents-in-Suit, at least Omega's prosecuting attorneys Regan and Warther were aware of publication U.S. 2004/0249557, Serial No. 10/855,871.

28. Regan was an individual associated with the filing and prosecution of publication U.S. 2004/0249557, application Serial No. 10/855,871.

29. The original transmittal for publication U.S. 2004/0249557, application Serial No. 10/855,871 dated May 27, 2004 notes: "PLEASE ADDRESS ALL CORRESPONDENCE TO ATTORNEY OF RECORD CHRISTOPHER F. REGAN."

30. Warther was an individual associated with the filing and prosecution of publication U.S. 2004/0249557 application Serial No. 10/855,871.

31. The original transmittal for publication U.S. 2004/0249557 application Serial No. 10/855,871 dated May 27, 2004 is signed by Warther.

32. Publication U.S. 2004/0249557 is materially relevant to the patentability of the Patents-in-Suit, as it discloses connecting to the on-board diagnostic system of a vehicle, obtaining data from this bus, and transmitting such data.

33. Publication U.S. 2004/0249557 specifically discloses that the on-board diagnostic system can be the OBD-II bus.

34. Publication U.S. 2004/0249557 specifically discloses obtaining a vehicle identification number (VIN) from the OBD-II bus and generating command signals based on the VIN.

35. Publication U.S. 2004/0249557 specifically discloses obtaining telemetry data from the OBD-II bus, including vehicle speed.

36. Publication U.S. 2004/0249557 specifically discloses a vehicle database, and the ability to operate on various protocols and on various vehicles, providing command compatibility with a plurality of different vehicles.

37. Publication U.S. 2004/0249557 specifically discloses a downloading interface and the ability to download enabling data and/or device codes.

38. Regan and Warther were aware that publication U.S. 2004/0249557 disclosed the above-described features.

39. The filing date of Publication U.S. 2004/0249557 Serial No. 10/855,871 is May 27, 2004, and it was published on December 9, 2004.

40. Publication U.S. 2004/0249557 Serial No. 10/855,871 is prior art to any new matter that was added to U.S. Pat. No. 7,671,727 on or after the filing date of August 24, 2007.

41. Publication U.S. 2004/0249557 Serial No. 10/855,871 is prior art to any new matter that was added to U.S. Pat. No. 8,032,278 on or after the filing date of July 3, 2007.

42. Publication U.S. 2004/0249557 Serial No. 10/855,871 is materially relevant to the patentability of all claims of U.S. Pat. No. 7,671,727 and, more specifically, at least those limitations relating to coupling a controller to the vehicle data bus, reading data related to vehicle speed from the vehicle data bus, and transmitting such data wirelessly, and configuring alerts.

43. Publication U.S. 2004/0249557 Serial No. 10/855,871 is materially relevant to the patentability of all claims of U.S. Pat. No. 8,032,278 and, more specifically, at least those limitations relating to a downloading interface, downloading specific data, at least one vehicle device and at least one corresponding vehicle device code, and a multi-vehicle compatible tracking unit.

44. Because publication U.S. 2004/024557 was not disclosed to the USPTO, the above-identified claims were granted which include the above-identified features disclosed by publication U.S. 2004/024557.

45. Neither Regan nor Warther disclosed publication U.S. 2004/0249557 to the USPTO during prosecution of the U.S. Pat. No. 7,671,727.

46. Neither Regan nor Warther disclosed publication U.S. 2004/0249557 to the USPTO during prosecution of the U.S. Pat. No. 8,032,278.

47. Publication U.S. 2004/0249557 is assigned to Wherenet Corp.

48. On information and belief, Regan and Warther were also aware of additional relevant prior art owned by Wherenet Corp., including additional prior art patents and publications, which they did not disclose to the USPTO during prosecution of the Patents-in-Suit.

Named Inventor of Patents-in-Suit Failed to Disclose Materially Relevant Prior Art

49. Kenneth E. Flick ("Flick") is the named inventor on all of the Patents-in-Suit.

50. Flick was an individual associated with the filing and prosecution of each of the Patents-in-Suit.

51. During the prosecution of U.S. Pat. No. 6,756,885, a prior art publication from the Society of Automotive Engineers, Inc. entitled "Surface Vehicle Standard SAE J1850 (rev'd July 1995)" was cited.

52. This publication was not cited in any of the other Patents-in-Suit.

53. Flick was aware of the Society of Automotive Engineers, Inc., and its periodic publications, including the publication entitled "Surface Vehicle Standard SAE J1850 (rev'd July 1995)."

54. The SAE publication "Surface Vehicle Standard SAE J1850 (rev'd July 1995)" which was cited during the prosecution U.S. Pat. No. 6,756,885, expressly identified the publication "E/E DIAGNOSTIC TEST MODES SAE J1979."

55. On information and belief, Flick was aware of an additional Society of Automotive Engineers, Inc. publication entitled "OBD II SCAN TOOL SAE J1978 (Issued 1992-03, Revised 1994-06)."

56. On information and belief, Flick was aware of an additional Society of Automotive Engineers, Inc. publication entitled "E/E DIAGNOSTIC TEST MODES SAE J1979 (Issued 1991-12, Revised 1994-06-10)."

57. On information and belief, Flick was aware of an additional Society of Automotive Engineers, Inc. publication entitled "UNIVERSAL INTERFACE FOR OBD II SCAN SAE J2201 (Issued 1993-06-30)."

58. On information and belief, Flick was aware of the above-referenced SAE prior art references more than one year before the earliest claimed priority date of any of the Patents-in-Suit.

59. The above-referenced prior art SAE publications relating to the use of OBD-II in vehicles, and associated OBD-II commands and tools are materially relevant to the patentability of the Patents-in-Suit, as they disclose the command signals and

protocols used on the OBD-II bus, and prior art devices which were used to control vehicle functions through the OBD-II bus.

60. On information and belief, Flick was aware that the above-referenced SAE prior art publications disclosed the above-described features.

61. The above-referenced SAE prior art publications (J1978, J1979 and J2201) are materially relevant to the patentability of at least claims 28-36 and 40 of U.S. Pat. No. 6,346,876 and, more specifically, at least those limitations relating to generating at least one set of command signals on the data communications bus for at least one vehicle device, at least one working command signal, at least one non-working command signal for a given vehicle, providing command compatibility with a plurality of different vehicles, receiving a signal from a transmitter, a set of command signals responsive to the signal, a handheld remote transmitter, sequentially generated signals, signals representing digitally coded information, storing data related to at least one set of command signals, and generating signals a plurality of times.

62. The above-referenced SAE prior art publications (J1978, J1979 and J2201) are materially relevant to the patentability of at least claims 24-33 of U.S. Pat. No. 6,756,885 and, more specifically, at least those limitations relating to storing a set of device codes for a given vehicle device for a plurality of different vehicles, reading a device code from a data communications bus, determining a match between a read device code and the stored device codes and performing a function based thereon to provide compatibility with a plurality of different vehicles, receiving a signal from a transmitter,

performing a function based on receiving a signal, a handheld remote transmitter, transmitting a signal to a remote receiver, and device codes for vehicle sensors.

63. Because the above-referenced prior art SAE publications were not disclosed to the USPTO, the claims identified above were granted which include the above features disclosed in the prior art SAE publications.

64. Flick did not disclose the prior art SAE publication "OBD II SCAN TOOL SAE J1978 (Issued 1992-03, Revised 1994-06)" to the USPTO during the Prosecution of U.S. Pat. No. 6,346,876.

65. Flick did not disclose the prior art SAE publication "E/E DIAGNOSTIC TEST MODES SAE J1979 (Issued 1991-12, Revised 1994-06-10)" to the USPTO during the Prosecution of U.S. Pat. No. 6,346,876.

66. Flick did not disclose the prior art SAE publication "UNIVERSAL INTERFACE FOR OBD II SCAN SAE J2201 (Issued 1993-06-30)" to the USPTO during the Prosecution of U.S. Pat. No. 6,346,876.

67. Flick did not disclose the prior art SAE publication "OBD II SCAN TOOL SAE J1978 (Issued 1992-03, Revised 1994-06)" to the USPTO during the Prosecution of U.S. Pat. No. 6,756,885.

68. Flick did not disclose the prior art SAE publication "E/E DIAGNOSTIC TEST MODES SAE J1979 (Issued 1991-12, Revised 1994-06-10)" to the USPTO during the Prosecution of U.S. Pat. No. 6,756,885.

69. Flick did not disclose the prior art SAE publication "UNIVERSAL INTERFACE FOR OBD II SCAN SAE J2201 (Issued 1993-06-30)" to the USPTO during the Prosecution of U.S. Pat. No. 6,756,885.

Materially Relevant Prior Art Was Intentionally Withheld from the USPTO

70. On information and belief, named inventor Flick, and patent prosecution counsel Regan and Warther intentionally withheld and did not disclose the above-referenced materially relevant prior art to the USPTO.

71. As shown in detail above, the relevant prior art of which Flick, Regan, and Warther were aware and did not disclose included information material to the patentability of the Patents-in-Suit.

72. But for the failure to disclose such materially relevant prior, the Patents-in-Suit would not have been allowed.

73. On information and belief, Flick, Regan, and Warther intended to deceive the USPTO by not disclosing such prior art.

74. On information and belief, Flick, Regan, and Warther chose not to disclose such prior art for fear that such disclosure would result in the claims of the Patents-in-Suit not being allowed.

COUNT I

(Declaratory Judgment of Noninfringement of the Patents-in-Suit)

75. Counterclaimant CalAmp repeats and realleges the allegations of paragraphs 1 through 74 as though set forth fully herein.

76. This is an action for declaratory judgment of noninfringement of any and all valid claims of the Patents-in-Suit.

77. Omega has alleged that CalAmp has in the past, and is currently infringing, either directly and/or by inducing or contributing to the infringement of one or more claims of the Patents-in-Suit, that such alleged infringement has thereby damaged Omega, and unless enjoined, will continue to damage Omega.

78. Counterclaimant CalAmp is not infringing, and has not infringed, contributed to the infringement of, or induced the infringement of any valid and enforceable claim of any of the Patents-in-Suit, either literally or under the doctrine of equivalents.

79. There is an actual controversy, within the meaning of 28 U.S.C. §§ 2201 and 2202, between CalAmp and Omega as to whether CalAmp has infringed or infringes, or is inducing infringement, or contributorily infringing, any valid claim of the Patents-in-Suit.

80. CalAmp requests a judicial determination and declaration of the respective rights and duties of the parties on the disputes recited in paragraphs 76 through 79 above. Such a determination and declaration are necessary and appropriate at this time so that the parties may ascertain their respective rights and duties in this regard.

COUNT II

(Declaratory Judgment of Invalidity of the Patents-in-Suit)

81. Counterclaimant CalAmp repeats and realleges the allegations of paragraphs 1 through 74 as though set forth fully herein.

82. This is an action for declaratory judgment of invalidity of any and all claims of the Patents-in-Suit.

83. The Patents-in-Suit, and each claim thereof, are invalid, for failure to comply with one or more of the provisions of 35 U.S.C. §§ 101 *et seq.*, including without limitation 35 U.S.C. §§ 101, 102, 103, and 112.

84. There is an actual controversy, within the meaning of 28 U.S.C. §§ 2201 and 2202, between CalAmp and Omega as to whether CalAmp has infringed or infringes, or is inducing infringement, or contributorily infringing, any valid claim of the Patents-in-Suit.

85. CalAmp requests a judicial determination and declaration of the respective rights and duties of the parties on the disputes recited in paragraphs 82 through 84 above. Such a determination and declaration are necessary and appropriate at this time so that the parties may ascertain their respective rights and duties in this regard.

COUNT III

(Declaratory Judgment of Unenforceability of the Patents-in-Suit Due to Inequitable Conduct)

86. Counterclaimant CalAmp repeats and realleges the allegations of paragraphs 1 through 74 as though set forth fully herein.

87. This is an action for declaratory judgment of unenforceability of any and all claims of the Patents-in-Suit.

88. There is an actual controversy, within the meaning of 28 U.S.C. §§ 2201 and 2202, between CalAmp and Omega as to whether Messrs. Flick, Regan and Warther properly disclosed all material information regarding prior art vehicle tracking systems

and methods, prior art vehicle bus and control systems, and prior public use of the claimed inventions during prosecution of the Patents-in-Suit.

89. On information and belief, the Patents-in-Suit, and each claim thereof, are unenforceable, for failure to comply with the duty of candor to the USPTO during prosecution and reexamination of the Patents-in-Suit.

90. On information and belief, Flick, Regan, and Warther were aware of at least the above-referenced publications which disclosed features claimed by Omega in the Patents-in-Suit.

91. Such publications were dated prior to the relevant priority dates of the Patents-in-Suit.

92. On information and belief, Flick, Regan, and Warther were also aware of prior public use of the inventions claimed in the Patents-in-Suit.

93. In addition, on information and belief, Flick, Regan, and Warther failed to disclose relevant prior art of which they were aware which was dated prior to the filing dates of several continuation-in-part applications.

94. These continuation-in-part applications, which led to the Patents-in-Suit, as detailed above, added in new matter.

95. On information and belief, the new matter was disclosed in the prior art, of which Flick, Regan, and Warther were aware, during the intervening period between the original claimed priority date, and the date of filing of the continuation-in-part applications.

96. But for Flick, Regan, and Warther's violation of the duty of candor, and failure to disclose the above-referenced prior art publications that were materially relevant to the patentability of the Patents-in-Suit, the USPTO would not have granted the claims that it did.

97. On information and belief, Flick, Regan, and Warther withheld such material prior art and public use during the prosecution of the Patents-in-Suit in order to deceive the USPTO and obtain allowance of the claims.

98. CalAmp requests a judicial determination and declaration of the respective rights and duties of the parties on the disputes recited in paragraphs 86 through 97 above. Such a determination and declaration are necessary and appropriate at this time so that the parties may ascertain their respective rights and duties in this regard.

COUNT IV

(Exceptional Case)

99. Counterclaimant repeats and realleges the allegations 1 through 74 as though set forth fully herein.

100. This case is exceptional under 35 U.S.C. § 285, and as a result, Counterclaimant CalAmp is entitled to an award of its reasonable attorneys' fees incurred in the prosecution and defense of this action.

PRAYER FOR RELIEF

WHEREFORE, CalAmp, Corp. prays for relief as follows:

A. That the Court enter judgment in favor of Defendant CalAmp, and against Plaintiff Omega;

B. That the Court declare the Patents-in-Suit not infringed by Defendant;

C. That the Court declare the Patents-in-Suit invalid;

D. That the Court declare the Patents-in-Suit unenforceable;

E. That the Court find Omega's enforcement of the Patents-in-Suit against CalAmp constitutes unfair competition, and award CalAmp damages sufficient to compensate CalAmp for the harm caused by Omega;

F. That Plaintiff take nothing by its Complaint against Defendant CalAmp;

G. That the Court deny any and all requests for injunctive relief by Plaintiff;

H. That the Court deny any and all requests for equitable relief by Plaintiff;

I. That the Court dismiss Plaintiff's Complaint in its entirety, with prejudice;

J. That the Court find this case exceptional under 35 U.S.C. § 285, and award Defendant CalAmp its costs and fees in this action, including attorneys' fees; and

K. That the Court grant Defendant CalAmp such other and further relief as the Court deems just and proper.

Respectfully submitted,

Date: February 24, 2014

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CERTIFICATE OF SERVICE

I HEREBY CERTIFY, that I electronically filed a true and correct copy of *CalAmp Corp.'s First Amended Counterclaim* with the Clerk of Court using CM/ECF. I also certify that the foregoing document is being served this day on parties as listed (through counsel or those reflected as appearing without counsel) in the below Service List via transmission of Notices of Electronic Filing generated by CM/ECF or in some other authorized manner for those counsel or parties who are not authorized to receive electronically Notices of Electronic Filing.

s/ Christopher S. Carver
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SERVICE LIST

Omega Patents, LLC v. CalAmp Corp.
Case No. 6:13-cv-1950-GAP-DAB
United States District Court, Middle District of Florida

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EXHIBIT C

UNITED STATES DISTRICT COURT
MIDDLE DISTRICT OF FLORIDA
ORLANDO DIVISION

OMEGA PATENTS, LLC,
a Georgia limited liability company,

Plaintiff,

v. Case No: 6:13-cv-1950-Orl-40DAB

CALAMP CORP.,
a Delaware corporation,

Defendant.

ORDER

This cause comes before the Court on the following:

1. Plaintiff's Motion for Claim Construction (Doc. 38), filed September 5, 2014;
2. Defendant Calamp Corp.'s Opening Claim Construction Brief (Doc. 39), filed September 5, 2014;
3. Plaintiff's Opposition to Calamp's Motion for Claim Construction (Doc. 40), filed October 3, 2014; and
4. Calamp Corp.'s Responsive Claim Construction Brief (Doc. 41), filed October 3, 2014.

The Court heard oral argument from the parties on November 24, 2014 (Doc. 46). At the conclusion of the hearing, the Court requested the parties to submit briefs addressing the issue of when and under what circumstances a claim should be construed by the Court. The parties filed briefs on this issue on December 12, 2014. (Docs. 48, 49). In total, the parties request the Court to construe eleven terms across five patents.[1]

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[1] The patents-in-suit include U.S. Patent Nos. 6,346,876 (the "'876 Patent"); 6,737,989

I. BACKGROUND

Plaintiff, Omega Patents, LLC ("Omega"), initiated this patent infringement lawsuit on December 20, 2013 (Doc. 1). Omega then filed a Motion for Claim Construction requesting the Court to construe two claims. (Doc. 38). Defendant Calamp Corp. ("Calamp") filed a claim construction brief requesting the Court to construe nine claims. (Doc. 39). The parties have reached agreement on the construction of the following claim terms: "Controller" and "Multi-vehicle compatible controller." (Doc. 38, p. 1). All of the patents-in-suit were invented by Mr. Kenneth E. Flick, and the technologies at issue involve control systems for vehicles with a data communications bus, which is a computer network within a vehicle, and various codes, signals, and data which monitor particular vehicle characteristics and conditions and which perform or command certain functions, including the operation of certain vehicle devices.

II. LEGAL STANDARDS FOR CLAIM CONSTRUCTION

The Court construes a patent claim as a matter of law. *Markman v. Westview Instruments, Inc.*, 517 U.S. 370, 372 (1996). To construe a claim, the Court begins with the words of the claim itself. *Vitronics Corp. v. Conceptronic, Inc.*, 90 F.3d 1576, 1582 (Fed. Cir. 1996). Generally, the Court accords the words of a claim "their ordinary and customary meaning," which is "the meaning that the term would have to a person of ordinary skill in the art in question at the time of the invention." *Phillips v. AWH Corp.*, 415 F.3d 1303, 1312–13 (Fed. Cir. 2005) (internal quotation marks omitted). Persons of ordinary skill in the art do not read the claim term in isolation, but in the context of the

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(the "'989 Patent"); 6,756,885 (the "'885 Patent"); 7,671,727 (the "'727 Patent"); and 8,032,278 (the "'278 Patent"). (Doc. 38, p. 2).

entire patent. *Id.* at 1313. If the ordinary meaning of claim language is "readily apparent even to lay judges," then claim construction requires "little more than the application of the widely accepted meaning of commonly understood words." *Id.* at 1314. But because the meaning of a claim term as understood by a person skilled in the art is often not immediately apparent, the Court looks to both intrinsic evidence (the words of the claims themselves, the specification, and the prosecution history) and extrinsic evidence (sources such as dictionaries and expert testimony). *Id.*; *Finisar Corp. v. DirecTV Grp., Inc.*, 523 F.3d 1323, 1328 (Fed. Cir. 2008).

The patent's specification is "the single best guide to the meaning of a disputed term," as it may reveal that the patentee intended a special definition to apply to a claim term that differs from its ordinary meaning or that the patentee intentionally disclaimed or disavowed the claim's scope. *Phillips*, 415 F.3d at 1315–16 (internal quotation marks omitted). The Court also considers the prosecution history, which is created by the patentee in an attempt to explain and obtain the patent. *Id.* at 1317. The prosecution history consists of the complete record of proceedings before the Patent and Trademark Office ("PTO") and the prior art cited during the examination of the patent. *Id.* Unlike the specification, which is a final product, the prosecution history is less useful in claim construction because it represents the ongoing negotiations between the PTO and applicant. *Id.*

The Court also looks at the prosecution history "to determine whether the applicant clearly and unambiguously 'disclaimed or disavowed'" an interpretation of claim scope in order to obtain the patent grant. *Middleton, Inc. v. Minn. Mining and Mfg. Co.*, 311 F.3d 1384, 1388 (Fed. Cir. 2002) (quoting *Standard Oil Co. v. Am. Cyanamid Co.*, 774 F.2d

448, 452 (Fed. Cir. 1985)). A patentee disclaims an interpretation by "clearly characterizing the invention in a way to try to overcome rejections based on prior art," as opposed to simply describing features of the prior art without distinguishing the claimed invention based on those features. *Computer Docking Station Corp. v. Dell, Inc.*, 519 F.3d 1366, 1374–75 (Fed. Cir. 2008). Thus, the Court protects the public's reliance on the definitive statements made during the prosecution by precluding the patentee from "recapturing" through claim construction an interpretation disclaimed during prosecution. *Id.* at 1374 (quoting *Omega Eng'g, Inc. v. Raytek Corp.*, 334 F.3d 1314, 1323 (Fed. Cir. 2003)). However,

> [I]f the specification expressly defines a claim term and remarks made to distinguish claims from the prior art are broader than necessary to distinguish the prior art, the full breadth of the remark is not a clear and unambiguous disavowal of claim scope as required to depart from the meaning of the term provided in the written description.

Id. at 1375 (internal quotation marks omitted) (quoting *3M Innovative Props. Co. v. Avery Dennison Corp.*, 350 F.3d 1365, 1373 (Fed. Cir. 2003)).

Extrinsic evidence, such as expert testimony and dictionary definitions, is helpful but "less significant than the intrinsic record." *Phillips*, 415 F.3d at 1317 (internal quotation marks omitted). However, expert testimony about claim terms that is conclusory, unsupported or "clearly at odds" with the intrinsic evidence is not useful. *Id.* at 1318 (internal quotation marks omitted). Moreover, while dictionaries and treatises are relevant, the Court must ensure that the dictionary definition does not contradict a definition "found in or ascertained by a reading of the patent documents." *Id.* at 1322–23 (quoting *Vitronics*, 90 F.3d at 1584 n.6). "In sum, extrinsic evidence may be useful to the court, but it is unlikely to result in a reliable interpretation of patent claim scope unless considered in the

context of the intrinsic evidence." *Phillips*, 415 F.3d at 1319. In the instant case, the parties agree that the Court need not consider extrinsic evidence to construe the claim terms in dispute, and neither party has presented extrinsic for the Court's consideration.

Several other principles guide the Court's construction of claim terms. First, the Court presumes that the same terms appearing in different portions of the claims have the same meaning, unless the specification and prosecution history clearly demonstrate otherwise. *Fin Control Sys. Pty, Ltd. v. OAM, Inc.*, 265 F.3d 1311, 1318 (Fed. Cir. 2001). While the "[i]nterpretation of a disputed claim term requires reference to the other claims," *Georgia-Pacific Corp. v. U.S. Gypsum Co.*, 195 F.3d 1322, 1331 (Fed. Cir. 1999), "the presence of a dependent claim that adds a particular limitation raises a presumption that the limitation in question is not found in the independent claim." *Liebel-Flarsheim Co. v. Medrad, Inc.*, 358 F.3d 898, 910 (Fed. Cir. 2004). Courts are further cautioned that "a construction that renders the claimed invention inoperable should be viewed with extreme skepticism." *Talbert Fuel Sys. Patents Co. v. Unocal Corp.*, 275 F.3d 1371, 1376 (Fed. Cir. 2002) (citation omitted), *vacated and remanded on other grounds*, 537 U.S. 802 (2002).

Finally, district courts have an obligation to construe terms when it is necessary to resolve a genuine and material legal dispute between the parties. *See O2 Micro Int'l Ltd. v. Beyond Innovation Tech. Co., Ltd.*, 521 F.3d 1351, 1361–62 (Fed. Cir. 2008); *E-Pass Techs., Inc. v. 3Com Corp.*, 473 F.3d 1213, 1219 (Fed. Cir. 2007) ("[A]ny articulated definition of a claim term ultimately must relate to the infringement questions that it is intended to answer."). The party requesting the Court to construe a claim term must demonstrate that the construction is both necessary and correct; that is, construction of

the claim term must be fundamental to issues of infringement or invalidity, and the Court may not issue an advisory opinion. *IP Cleaning S.p.A. v. Annovi Reverberi S.p.A.*, No. 08-cv-147-bbc, 2008 U.S. Dist. LEXIS 102312, at *3 (W.D. Wisc. Dec. 17, 2008).

III. AGREED TERMS

As previously noted, the parties have reached an agreement as to the proper construction of the following two terms:

Claim Term	Agreed Construction
Controller	Electronic circuitry that performs one or more control functions.
Multi-vehicle compatible controller	Electronic circuitry that performs one or more control functions, and can operate with more than one vehicle.

IV. DISPUTED TERMS

Omega filed the initial Motion for Claim Construction, requesting the Court to construe two terms: "transmitter" and "receiver." (Doc. 38). Accordingly, the Court will construe these two claims prior to addressing Calamp's request for construction of nine additional terms.

A. The '876 and '885 Patent Terms: "Transmitter" and "Receiver"

Claim Term	Omega's Construction	Calamp's Construction
Transmitter	Radio frequency transmitter.	Device that sends signals.
Receiver	Radio frequency receiver.	Device that receives signals.

The terms "transmitter" and "receiver" are used in asserted claims of the '876 Patent (Doc. 39-1) and the '885 Patent (Doc. 39-2). Turning first to the construction of "transmitter," Calamp contends that the patents describe the transmitter as sending

signals without restricting the specific type of signals being sent—that is, without limiting the construction to require "radio frequency." (Doc. 39, p. 21). Calamp submits that the '876 and '885 Patents do not specifically define transmitter to limit the meaning of that term as commonly understood by individuals skilled in the art.[2] (*Id.* at p. 22). Similarly, Calamp contends that "receiver" is described in the patents as receiving signals and is not restricted to radio frequency signals. (*Id.* at p. 23).[3]

Omega submits that Calamp's construction and citation to the specifications of the '876 and '885 patents fail to place the terms "transmitter" and "receiver" into the context of the invention which Omega argues envisions remote control systems for a vehicle. (Doc. 38, p. 6). Omega proposes that the Court need only consider the claims, read in light of the specification, to comprehend that the invention focuses upon a remote control system for cars. (*Id.*). Omega directs the Court to the '551 Patent, noting that both the '876 and '885 Patents claim priority back to the '551 Patent. The Court agrees with Omega that both the '876 and '885 Patents are continuations-in-part and claim priority back to the '551 Patent. (*Id.* at p. 7). The background to the '551 Patent provides:

> The concepts and features of the invention may also be desirably incorporated in a remote control system for a vehicle, such as a vehicle security system, a remote engine starter system, or a remote keyless entry system, for example. The remote control system preferably comprises a remote transmitter and a receiver within the vehicle for receiving a signal from the remote transmitter.[4]

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[2] Calamp directs the Court to the '876 Patent at 3:5–12; 3:63–4:9; 4:14–28; 4:33–36; 5:35–54; 5:55–6:2; 6:3–16; 6:17–27, and cites the '885 Patent at 3:5–12; 3:49–62; 4:5–8 4:9–24; 5:16–24; 5:35–62; 5:64–6:8. (Doc. 39, p. 22).

[3] Calamp cites the same specification language as was relied upon for its proposed construction of "transmitter."

[4] References to the column and lines within a given specification shall be denoted by the column number and line numbers. For example, column 1, lines 2–10 are denoted as 1:2–10.

(Doc. 38-3, 4:12–18).

As noted by counsel for Omega at the *Markman* hearing, Figure 1 of the '551 Patent depicts a remote transmitter/receiver, denoted as TX/RX (13), with an antenna (13a). (*Id.* at Fig. 1; 5:12–15). Similarly, Figure 2 of the '551 Patent also depicts a remote transmitter (57, 57a). (*Id.*, Fig. 2; 5:51–6:21). Figures 7, 8, and 9 of the '551 Patent also illustrate a radio frequency ("RF") transmitter and receiver and an antenna for communicating with various devices. [5] (*Id.*, Figs. 7–9, 8:1–35).

Omega next directs the Court to the abstract of the '876 Patent which describes "[a] control system [that] includes a transmitter and a receiver for receiving signals from the remote transmitter, and a multivehicle compatible controller cooperating with the transmitter and receiver." (Doc. 39-1). Similarly, the abstract of the '885 Patent describes the invention and states "[t]he approach is useful for a number of vehicle remote control functions including vehicle security, remote keyless entry and remote starting." (Doc. 39-2). While claim 1 of the '876 and '885 Patents do not describe the transmitter or receiver as remote, wireless, or receiving a RF signal, Omega correctly notes that no dependent claim in either patent limits the transmitter or receiver to a hardwired device. To the contrary, several dependent claims in the '876 and '885 Patents describe and discuss remote transmitters and receivers, including dependent claims 13–18 and 30–32 of the '876 Patent (Doc. 39-1) and claims 8, 12–15, 22–23, and 26–31 of the '885 Patent. (Doc. 39-2).

Based on the foregoing, the Court concludes that the dependent claims in the '876 and '885 Patents do not contain limitations or language requiring the Court to limit the

[5] Figures 1, 2, 7, 8, and 9 of the '551 Patent appear in Appendix A to this Order.

scope of the independent claims. Accordingly, the independent claims may properly be construed in the context of the patent specifications and in view of the '551 Patent to provide for remote control functions. Therefore, the Court construes the terms "transmitter" as **radio frequency transmitter** and the term "receiver" as **radio frequency receiver**, adopting the construction proposed by Omega.

B. The '876, '885, '727, and '278 Patent Terms: "Data Communication Bus/ Vehicle Data Communications Bus/ Vehicle Data Bus"

Claim Term	OMEGA's Construction	CALAMP's Construction
Data communication bus	*No construction needed; alternatively, it should be defined as follows:* Wired connection for communication of digital messages among vehicle devices, with each message including one or more device addresses	Wired connection for transferring data to and from vehicle devices

The term "data communication bus" is used in the '876 (Doc. 39-1) and '885 Patents (Doc. 39-2). The term "vehicle data communications bus" is used in the '727 Patent. (Doc. 39-3). The term "vehicle data bus" is found in the '278 Patent. (Doc. 39-4). Calamp asks the Court to construe these three sets of terms appearing in patents '876, '885, '727, and '278, arguing that construction is necessary to assist the jury.

Calamp contends that in all of the patents-in-suit, the data communication bus is described as a wired connection for transferring data to and from vehicle devices. (Doc. 39, p. 11). Calamp cites the '876 Patent specification which states, "Digital messages

are communicated to all modules over the data communications bus." (Doc. 39-1, 2:18–19). Calamp further refers the Court to the '885 Patent specification language which is identical to the '876 language. (Doc. 39-2, 2:18–19). Calamp also quotes the '278 Patent, which provides, "This and other objects, features, and advantages in accordance with the present invention are provided by a multi-vehicle compatible tracking unit for a vehicle comprising a *vehicle data bus extending throughout the vehicle.*" (Doc. 39-4, 2:50–53) (emphasis added). Finally, Calamp cites to the '727 Patent which similarly provides for a "vehicle data bus extending throughout the vehicle."[6] (Doc. 39-3, 2:44–45).

Omega submits that Calamp incorrectly seeks a construction which requires data transfer both to and from vehicle devices, whereas the patents-in-suit do not require two-way commands transferred on the bus. (Doc. 40, p. 4). Omega directs the Court to the plain language of claim 1 of the '876 Patent which provides, in pertinent part:

> 1. A control system for a vehicle comprising a data communications bus and at least one vehicle device connected to the data communications bus, the control system comprising:
>
> . . . .
>
> a multi-vehicle compatible controller at the vehicle and cooperating with said transmitter and receiver, said multi-vehicle compatible controller *generating at least one set of command signals on the data communications bus* for at least one vehicle device . . . .

(Doc. 39-1, 11:30–42) (emphasis added). Omega reasons that the plain language of claim 1 of the '876 Patent instructs the reader that at least one signal is generated, or sent, to at least one vehicle device. (Doc. 40, p. 5). The use of the term "generating" indicates

[6] The Court notes that none of the language cited by Calamp contained within the various patents-in-suit requires two-way communication of messages along the bus.

sending a signal and does not require a signal to be both sent to a device and received from a device.

When one considers the background to the invention, as stated in the '876 Patent, it is clear that a signal may be generated or sent along the bus to a vehicle device without a return signal being sent from the device to the bus. For example, the background to the '876 Patent states that an "alarm indication may typically be a flashing of the lights and/or the sounding of the vehicle horn or a siren." (Doc. 39-1, 1:35–37). Such an alarm may consist of a signal being generated and sent to the device without the device sending a return signal along the bus. One skilled in the art need only read the description of preferred embodiments for the '885 Patent to understand that the data communications bus controls complex and simple functions within the vehicle. "In other words, the vehicle devices connected to the data bus may be considered to be relatively simple devices, such as sensors, or more complicated devices with some internal processing, such as may generally be considered as controllers." (Doc. 39-2, 6:48–52). The simple devices, such as sensors, receive a signal generated and sent to the device without sending a reply to the controller. Accordingly, giving the words of the claim(s) their ordinary and customary meaning that the term would have to those skilled in the art, and taking the term within the context of the entire patent, the terms "data communications bus," "vehicle data communications bus," and "vehicle data bus" do not envision or require the transference of data "to and from" vehicle devices.

Calamp next proposes that Omega's insertion of device "addresses" in their proposed definition of the above terms is not supported by the patents-in-suit. (Doc. 39, p. 12). Calamp argues that the term "address" is an optional feature in the systems

described in the '876 and '885 Patents. (*Id.*). Calamp cites the '885 Patent specification to support this interpretation, which reads, "Each message *may* have one or more addresses associated with it so that the devices can recognize which messages to ignore and which messages to respond to or read." (Doc. 39-2, 2:20–22) (emphasis added). However, the Court finds that this quote is taken out of context. The context is found in the following excerpt:

> With multiplexing technology, the various electronic modules or devices may be linked by a single signal wire in a bus also containing a power wire, and one or more ground wires. Digital messages are communicated to all modules over the data communications bus. Each message may have one or more addresses associated with it so that the devices can recognize which message to ignore and which message to respond to or read.

(*Id.* at 2:16–22). Therefore, the word "may" cannot reasonably be interpreted to suggest that associating an address with a message is optional. Rather, each message will have at least one and perhaps multiple addresses associated with it, depending on the number of electronic modules or devices linked by the command bus. The Court finds that the presence of at least one address is fundamental to the functioning of the invention.[7]

Based on the foregoing, the Court construes the term "data communications bus" as used in the '876 (Doc. 39-1) and '885 Patents (Doc. 39-2), "vehicle data communications bus" as used in the '727 Patent (Doc. 39-3), and "vehicle data bus" as found in the '278 Patent, collectively "data communication bus" as follows: **"wired connection for communication of digital messages among vehicle devices, with each message including one or more device addresses."**

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[7] While the '727 and '278 Patents do not specifically reference an address, one skilled in the art at the time of the invention would understand a vehicle data communications bus to require one or more addresses in order to control or read a device.

C. The '876, '885, '727, '278 Patent Term: "Vehicle Device"

Claim Term	OMEGA's Construction	CALAMP's Construction
Vehicle device	No construction needed	Electrical or electronic component in a vehicle that can be controlled and/or the status thereof read

Calamp contends the term "vehicle device" should be construed by the Court because the term is broad and susceptible to many meanings. (Doc. 39, p. 13). The parties agree that claim terms should be construed by the Court when it is necessary to resolve a genuine and material legal dispute between the parties or when necessary to aid the jury in understanding claim terms. Calamp's proposed construction of the term "vehicle device" is taken verbatim from the '876 and '885 Patents, with closely analogous language found in the '727 and '278 Patents. (*Id.*). Since Calamp's proposed construction of "vehicle device" is taken from the patents-in-suit, the Court need not construe the claim term. The definition is not in dispute, nor is additional construction necessary to aid the jury in understanding the claim term. Calamp's request to construe the term "vehicle device" is denied.

D. The '876 Patent Term: "Command Signal"

Claim Term	OMEGA's Construction	CALAMP's Construction
Command signal	*No construction needed; alternatively, it should be defined as follows:* Signal generated on the data communications	Signal generated on the data communications bus for operating a vehicle device to cause a desired function to be performed at the vehicle

	bus for operating a vehicle device	

The term "command signal" appears in claims of the '876 Patent. Calamp contends the '876 Patent, when read in its entirety, supports construction of the term "command signal" as requiring that the signal causes a desired function to be performed. (Doc. 39, p. 14). Calamp notes that the specifications include the following language: "will cause an operation or response from the vehicle device." (Doc. 39-1, 3:16–20). Defendant quotes portions of the specifications which state command signals may be "for operating" a specific vehicle device. (*Id.* at 3:39, 41–45; 5:45–49).

Omega submits that claim 1 of the '876 Patent clearly states that not every command signal will cause an operation or response from a vehicle device:

> 1. A control system for a vehicle comprising a data communications bus and at least one vehicle device connected to the data communications bus, the control system comprising:
>
> . . . .
>
> a multi-vehicle compatible controller at the vehicle and cooperating with said transmitter and receiver, said multi-vehicle compatible controller generating at least one set of command signals on the data communications bus for at least one vehicle device, the at least one set of command signals comprising at least *one working and at least one non-working command signal* for a given vehicle to thereby provide command compatibility with a plurality of different vehicles.

(*Id.* at 11:30–48) (emphasis added).

The claim makes it clear that the control system uses a working and non-working command signal because "multiple signals or codes can be generated on the data communications bus, and only that code for the *given vehicle and device* will cause an operation or response from the vehicle device." (*Id.* at 3:17–20) (emphasis added). Further, "an object of the invention [is] to provide a control system and related method for

a vehicle comprising a data communications bus and at least one vehicle device connected to the data communications bus, and wherein the system is *adapted to operate with different vehicles.*" (*Id.* at 2:66–3:4) (emphasis added). Since the system is designed to operate with a variety of vehicle platforms, not every signal generated on the data communications bus will cause a function to be performed. In order for a signal to cause a function to be performed, the signal must be received by a device contained within a compatible vehicle platform.[8] Accordingly, Calamp's proposed construction incorrectly includes within the definition of the "command signal" the requirement that a signal generated on the data communication bus must always cause a desired function to be performed.

Based on the foregoing, the Court construes "command signal" as follows: **"signal generated on the data communications bus for operating a vehicle device."**

E. The '876 and '885 Patent Term: "Device Code"

Claim Term	OMEGA's Construction	CALAMP's Construction
Device codes	*No construction needed; alternatively, it should be defined as follows:* Signal to or from a vehicle device	Signal from a vehicle device read on the vehicle bus. *Amended at the Markman hearing as follows:* Signal from a vehicle device read on the vehicle bus and/or stored in the controller

Calamp asserts that the '876 and '885 Patents describe "device code" as a signal from a vehicle device that is read on the vehicle bus. (Doc. 39, p. 15). Calamp's

[8] "In other words, multiple signals or codes can be generated on the data communications bus, and only that code for the given vehicle will cause an operation or response from the vehicle device." (Doc. 39-2, 7:31–34).

proposed construction is based on select language from the '876 and '885 Patents. For example, both the '876 and '885 Patents discuss "reading a device code *from* the data communications bus." (Doc. 39-1, 9:22–23; Doc. 39-2, 3:12-13) (emphasis added). The complete text of the specification is, as always, helpful in construing the claim terms:

> More particularly, the multi-vehicle compatible controller is for storing a set of device codes for a given vehicle device for a plurality of different vehicles, for reading a device code from the data communications bus, and for determining a match between a read device code and the stored device codes to thereby provide compatibility with a plurality of different vehicles.

(Doc. 39-1, 9:19–25).

The '885 Patent further elaborates upon the manner in which the multi-vehicle compatible controller functions:

> Moreover, the multi-vehicle compatible controller is also for storing a set of device codes for a given vehicle device for a plurality of different vehicles, for reading a device code from the data communications bus, and for determining a match between a read device code and the stored device codes to thereby provide compatibility with a plurality of different vehicles.

(Doc. 39-2, 3:10–16). Both of these patents clearly state that when a device code is read, it is read "from" the data communications bus and not "on" the vehicle bus. To the extent Calamp's proposed construction describes the signal from the vehicle device as being read "on" the vehicle bus, the claims and specifications of the pertinent patents contradict this interpretation.

The next issue is whether the device codes travel "from" a vehicle device, as Calamp contends, or travels "to and from" a vehicle device, as Omega suggests. As previously discussed, the relevant specifications state: "[T]he multi-vehicle compatible controller is also for storing a set of device codes for a given vehicle device for a plurality

of different vehicles, for reading a device code from the data communications bus [and determining whether a match exists] . . . ." (*Id.*). The specifications, therefore, certainly state that device codes, or signals, are stored on the multi-vehicle compatible controller, and codes received from the data communications bus can be read to determine if the stored code matches the code received from the data communications bus. The claims and specifications do not describe any scenario wherein the device code is a signal sent "to" a vehicle device, which appears to be accomplished by command signals. Omega does not direct the Court to any intrinsic evidence to support its contention that a device code, or signal, travels both to and from a vehicle device.

Based on the foregoing, the Court agrees with Calamp that the claims and specifications of the pertinent patents-in-suit describe "device codes" as **signal from a vehicle device.** The Court, however, declines to adopt Calamp's construction to the extent it describes device codes as being "read on the vehicle bus." The description proffered by Calamp is contradicted by the clear wording of the claims and specifications, which state the signal or code is read "from" the bus and not "on" the bus. Additionally, Calamps's construction focuses on the signal being "read" and fails to address the storage of device codes and the comparison of stored codes to codes received from the communications bus. The Court finds it is not necessary to include a partial description of how device codes are utilized by the multi-vehicle compatible controller, because the ordinary meaning of the claim language relative to the uses made of the device codes is readily apparent to those skilled in the art.

Thus, the term "device codes" is construed by the Court to mean: **"signal from a vehicle device."**

F. The '885 Patent Term: "Function"

Claim Term	OMEGA's Construction	CALAMP's Construction
Function	*No construction needed; alternatively, it should be defined as follows:* An operation of a vehicle device	An operation of a vehicle device, such as remote starting the engine, remotely unlocking the vehicle doors, or changing the mode of a security system between armed and disarmed

Calamp contends that the definition of the term "function" found in claim 24 of the '885 patent should be limited to the three embodiments identified in Calamp's proposed claim construction. (Doc. 39, p. 17). Omega asserts the term "function" does not require construction because the ordinary meaning of the claim language is readily apparent to persons of ordinary skill in the art and even to lay judges. (Doc. 40, pp. 9–10). The Court agrees that the claim language is sufficiently clear and unambiguous to enable an individual of ordinary skill in the art, as well as lay judges, to apply the language in the context of this litigation.

The patent states the invention may be embodied in "many different forms and should not be construed as limited to the illustrated embodiments set forth herein." (Doc. 39-2, 4:63–65). The term "function" is self-evident from the context of the list of embodiments:

> The second transmitter/receiver pair may be used to cause a *desired function* to be performed at the vehicle, such as remote starting the engine, remotely unlocking the vehicle doors, or changing the mode of a security system between armed and disarmed modes, for example. Many other similar applications are contemplated by the present invention as will be appreciated by those skilled in the art.

(*Id.* at 5:24–31) (emphasis added). Clearly, a function is the operation of one of the vehicle devices. Accordingly, the Court declines to construe this term.

G. The '727 Patent Term: "Remote Vehicle Speed Exceeded Notification"

Claim Term	OMEGA's Construction	CALAMP's Construction
Remote vehicle speed exceeded notification	*No construction needed; alternatively, it should be defined as follows:* Notification sent when a vehicle speed exceeds a speed threshold for a first time period	A message sent from a vehicle indicating that the vehicle speed has exceeded a particular speed

The term "remote vehicle speed exceeded notification" is found in the '727 Patent. Calamp proposes a construction of the term which emphasizes that the message indicating that a preset speed has been exceeded is sent "from" the vehicle. (Doc. 39, p. 18). Calamp asserts that the patent, and Omega's proposed construction, fail to state that the message originates from within the vehicle. (*Id.*). Omega argues that no construction is required because the ordinary meaning of the claim language is readily apparent. (Do. 40, p. 11). The Court agrees with Omega and finds that the term "remote vehicle speed exceeded notification" does not require construction or clarification.

Claim 1 of the '727 Patent clearly identifies that the speed exceeded notification device includes "at least one vehicle device *generating* data related to vehicle speed." (Doc. 39-3, 7:6–7) (emphasis added). Therefore, the message is clearly sent from the vehicle, where the vehicle devices reside. The claim language further states that the

device determines "when a vehicle speed exceeds a speed threshold *for the first time period*" and sends a remote vehicle speed exceeded notification. (*Id.*) (emphasis added). That is, a device internal to the vehicle sends the notification outside of the vehicle. To the extent the patent provides for multiple speed exceeded notifications being sent from the vehicle, the claim language clearly addresses the manner in which this is accomplished. (*Id.* at 7:18–22, 27–29).

Based on the foregoing, the Court declines Calamp's request for construction of the term "remote vehicle speed exceeded notification."

H. The '278 Patent Term: "Downloading Interface"

Claim Term	OMEGA's Construction	CALAMP's Construction
Downloading interface	No construction needed	Connection that can receive data

Calamp asserts that the term "downloading interface" is unclear and may result in jurors concluding the term involves a software interface for downloading or some other type of interface. (Doc. 39, p. 19). Calamp contends that the patent describes the downloading interface as "hardware" or a connection to the tracking unit. (*Id.*). However, the plain language of the patent describes downloading interface more broadly. The patent provides the following variety of methods for data to be received from the downloading interface:

> The downloading interface may comprise either a wired or wireless signal downloading interface. The wired signal downloading interface may comprise a connector for temporary connection to a downloading device, for example. The wireless signal downloading interface may include a wireless receiver for temporary connection

> to a downloading device . . . . The downloading interface may also be for permitting downloading of at least one programming instruction for the multi-vehicle compatible controller, in some embodiments.

(Doc. 39-4, 3:4–16). The summary of the invention, cited above, tracks the language found in claims 1, 2, 4, and 8. (*Id.* at 25:63–26:39).

The ordinary meaning of "download interface" is readily apparent to persons of ordinary skill in the art. To the extent one may desire additional context for the term "downloading interface," that context is found in the background and summary of the invention. The background statement provides, "For a company with hired drivers, it may be desirable to know the driver's whereabouts during the course of the day. Similarly, a rental car agency or other fleet operator, for example, may wish to know the whereabouts of its fleet of vehicles." (*Id.* at 1:37–41). To facilitate these objectives, the summary of the invention informs the reader that, "[t]he tracking unit may also include a downloading interface for permitting downloading of enabling data related to the at least one corresponding vehicle device code . . . ." (*Id.* at 2:63–66). The embodiment section of the patent further educates the reader that data received via the downloading interface may provide a number of pieces of information regarding the vehicle, including whether the vehicle is being moved by an unauthorized driver, whether the vehicle is being broken into, whether the vehicle is being driven in excess of an authorized speed, and the like. (*Id.* at 11:36–12:10).

Accordingly, the ordinary meaning of the language of the patent, including the term downloading interface, instructs the reader, including lay judges and jurors, of the type of data transmitted from the vehicle device and the manner of its transmission: wired,

wireless, and for permitting downloading of at least one programming instruction, for example. A downloading interface is, therefore, not limited to a hardwired connection.

Based on the foregoing, the Court declines to construe the term "downloading interface."

I. The '278 Patent Term: "Enabling Data"

Claim Term	OMEGA's Construction	CALAMP's Construction
Enabling data	*No construction needed; alternatively, it should be defined as follows:* Data related to the at least one corresponding vehicle device code for use by said multi-vehicle compatible controller	A vehicle device code or codes, and instruction to select a code or codes, or the data or sequence to allow the controller to generate a vehicle device code or codes

The term "enabling data" appears in the '278 Patent. (Doc. 39-4). Calamp avers that the term lacks any common meaning or specific structure to one of ordinary skill in the art and should be construed. (Doc. 39, p. 20). Calamp acknowledges the term enabling data is referenced in several places, but submits the term is not defined other than at column 24, lines 8–12 of the '278 Patent. (*Id.*) The specification provides, in pertinent part:

> The multi-vehicle compatible tracking unit also illustratively includes a downloading interface for permitting downloading of enabling data related to the at least one corresponding vehicle device code for use by the multi-vehicle compatible controller. The enabling data may be the vehicle device code or codes, an instruction to select a code or codes from among those already stored, or the data or sequence

> to allow the controller to generate the vehicle device code or codes, for example.

(Doc. 39-4, 24:4–12). Other references to "enabling data" include references to figures within the patent, stating, "Enabling data related to at least one corresponding vehicle device code for use by the multi-vehicle compatible controller is downloaded via a downloading interface." (*Id.* at 25:14–16).

Calamp suggests that any construction of enabling data should be limited to claim 1 of the '278 Patent (Doc. 39-4, 26:13–15), which provides, in part, "[E]nabling data related to the at least one corresponding vehicle device code for use by said multi-vehicle compatible controller." (Doc. 40, p. 13). Omega objects to Calamp's inclusion of some of the preferred embodiments into their proposed definition, citing *Northern Telecom Ltd. v. Samsung Elecs. Co.*, 215 F.3d 1281, 1293 (Fed. Cir. 2000) ("This court consistently declines to construe claim terms according to the preferred embodiment."). The Court agrees that Calamp's proffered construction improperly restricts or narrows the scope of this term.

Based on the foregoing, the Court construes the term "enabling data" as follows: **data related to the at least one corresponding vehicle device code for use by said multi-vehicle compatible controller.**

J. The '278 Patent Term: "Programming Instruction"

Claim Term	OMEGA's Construction	CALAMP's Construction
Programming instructions	No construction needed	Code which instructs the controller to perform an operation

The term "programming instructions" is found in the '278 Patent. (Doc. 39-4). Calamp submits that this term should be construed by the Court because the term is susceptible to multiple meanings. (Doc. 39, p. 21). Omega advised the Court during the *Markman* hearing that it does not object to Calamp's proposed construction. The Court therefore adopts Calamp's proposed construction.

V. CONCLUSION

The Court adopts the following constructions:

CLAIM TERM	AGREED CONSTRUCTION
Controller	Electronic circuitry that performs one or more control functions.
Multi-vehicle compatible controller	Electronic circuitry that performs one or more control functions, and can operate with more than one vehicle.

[ORDER CONTINUES ON FOLLOWING PAGE]

CLAIM TERM	COURT'S CONSTRUCTION
Transmitter	Radio frequency transmitter.
Receiver	Radio frequency receiver.
Data communication bus/ vehicle data communications bus/ vehicle data bus	Wired connection for communication of digital messages among vehicle devices, with each message including one or more device addresses.
Vehicle device	Plain meaning
Command signal	Signal generated on the data communications bus for operating a vehicle device.
Device codes	Signal from a vehicle device.
Function	Plain meaning
Remote vehicle speed exceeded notification	Plain meaning
Downloading interface	Plain meaning
Enabling data	Data related to the at least one corresponding vehicle device code for use by said multi-vehicle compatible controller.
Programming instructions	Code which instructs the controller to perform an operation.

DONE AND ORDERED in Orlando, Florida on February 20, 2015.

PAUL G. BYRON
UNITED STATES DISTRICT JUDGE

Copies furnished to:

Counsel of Record

APPENDIX A

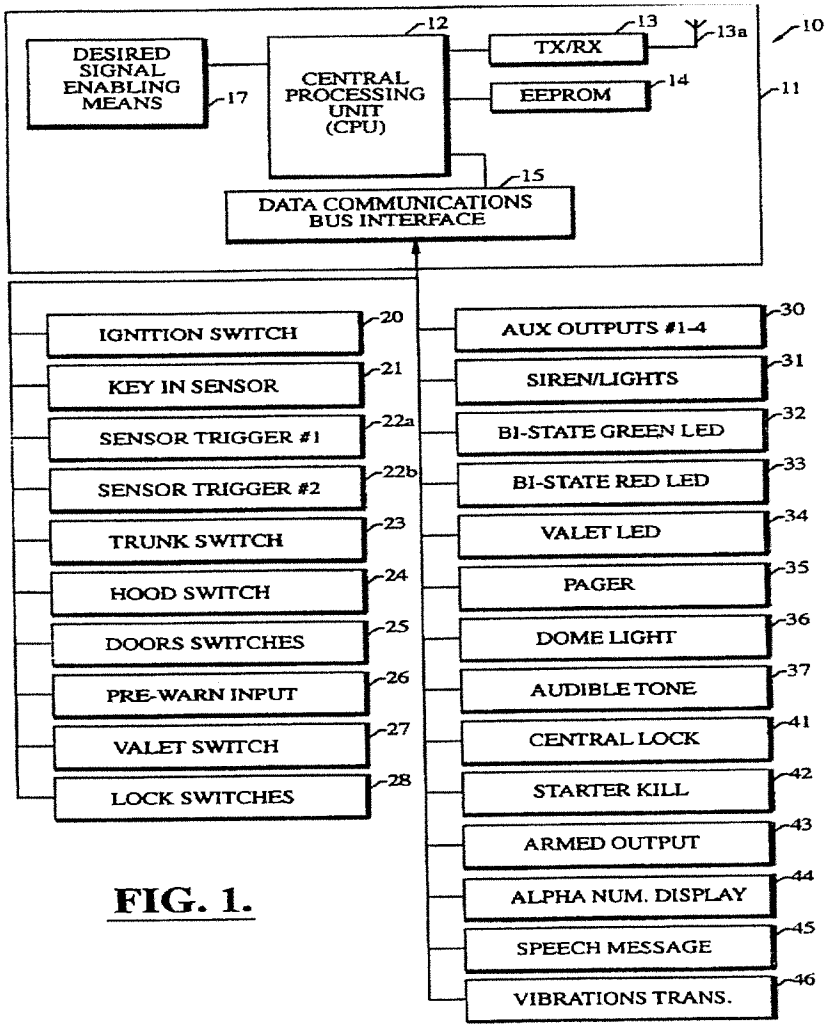


FIG. 1.

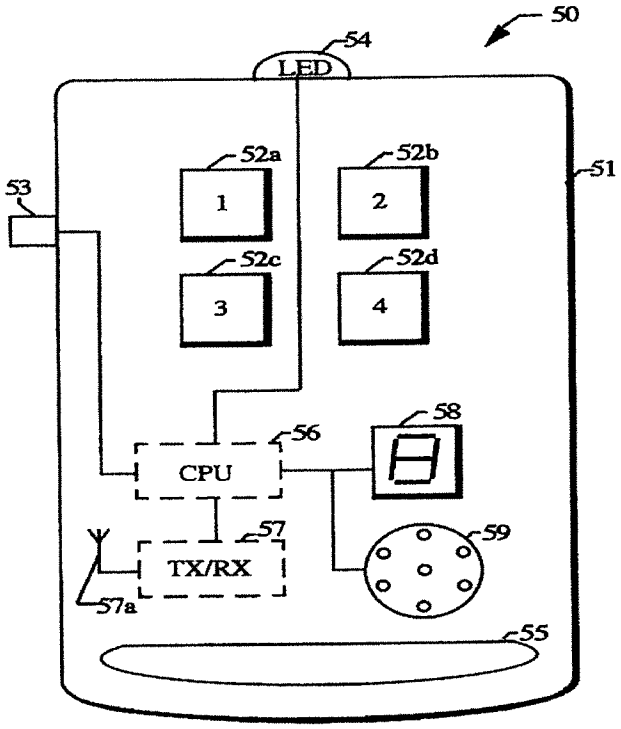

50
54
LED
52a
52b
53
51
1
2
52c
52d
3
4
58
56
CPU
57
59
TX/RX
57a
55

FIG. 2.

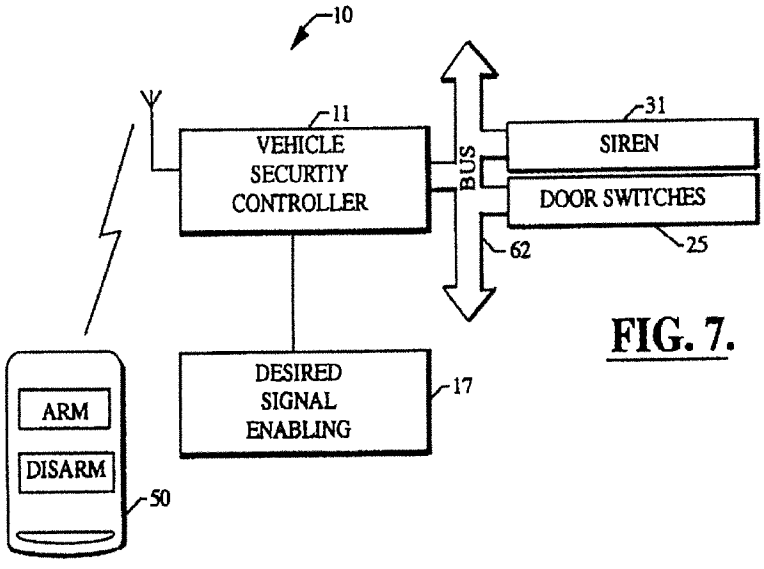

10
11
VEHICLE
SECURTIY
CONTROLLER
BUS
31
SIREN
DOOR SWITCHES
62
25
DESIRED
SIGNAL
ENABLING
17
ARM
DISARM
50

FIG. 7.

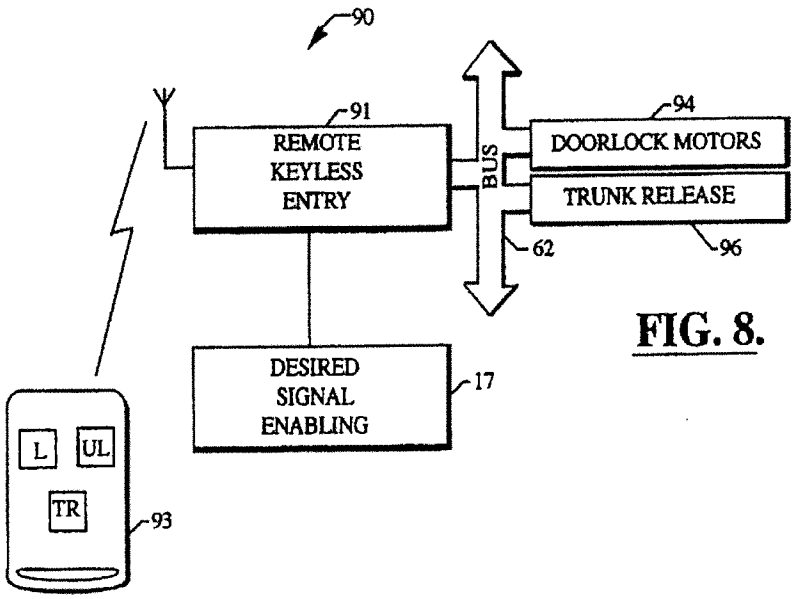

90
91
REMOTE KEYLESS ENTRY
BUS
94
DOORLOCK MOTORS
TRUNK RELEASE
96
62
DESIRED SIGNAL ENABLING
17
L
UL
TR
93

FIG. 8.

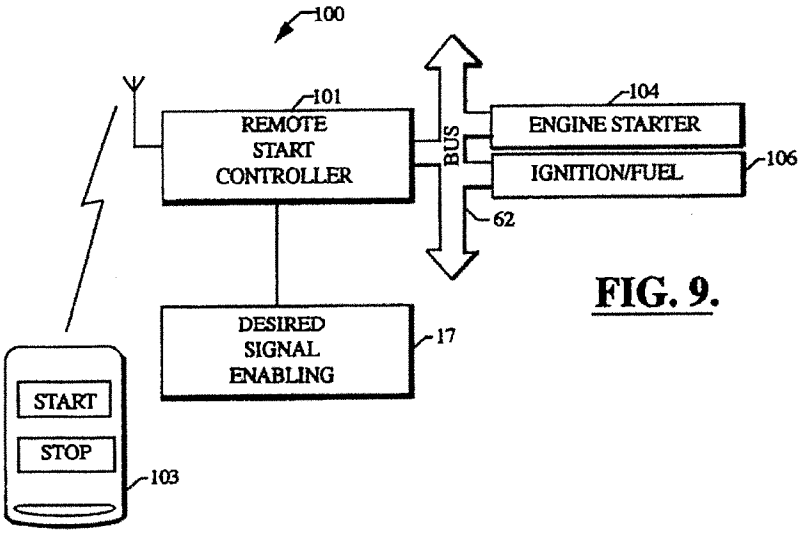

100
101
REMOTE START CONTROLLER
BUS
104
ENGINE STARTER
IGNITION/FUEL
106
62
DESIRED SIGNAL ENABLING
17
START
STOP
103

FIG. 9.

EXHIBIT D

UNITED STATES DISTRICT COURT
MIDDLE DISTRICT OF FLORIDA
ORLANDO DIVISION

OMEGA PATENTS, LLC,

Plaintiff,

v. Case No: 6:13-cv-1950-Orl-40DAB

CALAMP CORP.,

Defendant.
_____/

ORDER

This cause comes before the Court without oral argument on the following:

1. Plaintiff's Motion and Memorandum for Summary Judgment as to Validity, Infringement, Enforceability and Unfair Competition (Doc. 54), filed July 1, 2015;
2. Defendant CalAmp Corp.'s Response in Opposition to Omega['s] Motion for Summary Judgment as to Validity, Infringement, Enforceability and Unfair Competition (Doc. 76), filed July 20, 2015;
3. Plaintiff's Reply in Support of its Motion for Summary Judgment as to Validity, Infringement, Enforceability and Unfair Competition (Doc. 79), filed August 3, 2015;
4. Plaintiff's Supplement Regarding Its Motion for Summary Judgment as to a Claim of Unfair Competition (Doc. 89), filed September 17, 2015;
5. Defendant CalAmp Corp.'s Motion for Summary Judgment and Memorandum of Law Regarding Invalidity and Noninfringement (Doc. 78), filed July 27, 2015;
6. Plaintiff's Opposition to Defendant CalAmp's Motion for Summary Judgment

(Doc. 81), filed August 6, 2015; and

7. Defendant CalAmp Corp.'s Reply Brief in Support of Motion for Summary Judgment Regrading Invalidity and Noninfringement (Doc. 83), filed August 24, 2015;

I. BACKGROUND

A. The Patents-In-Suit

Omega Patents, LLC ("Omega") contends that CalAmp Corp. ("CalAmp") infringes the claims of U.S. Patent No. 6,346,876 ("the '876 Patent"), U.S. Patent No. 6,737,989 ("the '989 Patent"), U.S. Patent No. 6,756,885 ("the '885 Patent"), U.S. Patent No. 7,671,727 ("the '727 Patent"), and U.S. Patent No. 8,032,278 ("the '278 Patent") (collectively, the "patents-in-suit"). (Doc. 1). The patents-in-suit relate to control systems for vehicles with a "data communications bus." (Doc. 54, pp. 1–2).[1] Omega asserts that CalAmp's devices are used to monitor particular vehicle characteristics and conditions and report vehicle information to an end user, thus infringing on the patents-in-suit. (*Id.* at p. 2). CalAmp counterclaims and seeks a declaratory judgment of noninfringement, invalidity, and unenforceability for the patents-in-suit. (Doc. 20).

B. The Motions for Summary Judgment

Omega's motion for summary judgment focuses on the alleged infringement of two of the patents-in-suit: the '876 and the '278 Patents. The devices that Omega accuses of infringement in the instant case are CalAmp's location messaging units ("LMU"), specifically the LMU-3000, LMU-3030, and LMU-3050. Omega also moves for summary

[1] The Court has previously construed "data communications bus" to mean "wired connection for communication of digital messages among vehicle devices, with each message including one or more device addresses." (Doc. 50, p. 25).

judgment on CalAmp's counterclaims for invalidity and unenforceability.[2] CalAmp's motion for summary judgment asserts that the '876, '989, '885, and '278 Patents are all invalid in view of the prior art. Additionally, CalAmp argues that the accused devices do not infringe any claim of the '876, '885, '727, or '278 Patents.

C. The Accused Devices

As it relates to Omega's motion for summary judgment, CalAmp advertises the LMU-3000, LMU-3030, and LMU-3050 (the "Accused Devices")[3] units as GPS Tracking Units with an on-board diagnostic ("OBD-II") interface. (Doc. 54, p. 5). CalAmp describes the Accused Devices as the "ideal solution for automotive insurance, driver behavior management, auto rental and automotive applications when access to the vehicle diagnostics interface (OBD-II) is required." (Docs. 114-1, p. 2; 114-2, p. 2). Broadly speaking, the Accused Devices are full-featured tracking systems which "access vehicle diagnostic interface data, track vehicle speed and location, plus detect hard braking, cornering, or acceleration." (*Id.*). CalAmp markets the devices as easy to install, inexpensive, and reliable. (*Id.*).

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[2] Omega also moved for summary judgment on CalAmp's counterclaim for unfair competition. (Doc. 54, pp. 20–21). Subsequently, Omega realized that CalAmp no longer had a claim for unfair competition pending and filed a Supplement to the Court regarding this. (Doc. 89). Omega asserts that CalAmp withdrew its claim of unfair competition when it filed its Amended Counterclaim (Doc. 20) on February 24, 2014. CalAmp did not respond to Omega's Supplement contending otherwise. However, CalAmp asserts in its Trial Brief (Doc. 99) and in the Joint Pretrial Statement (Doc. 90) that its claim for unfair competition is still pending. Alas, a review of the Amended Counterclaim shows that a claim for unfair competition is not pleaded. CalAmp only asserts in its Prayer for Relief that the Court find that Omega's enforcement of the patents-in-suit constitutes unfair competition. However, this is not enough to assert a claim for unfair competition. Because CalAmp does not have a claim for unfair competition in its operative pleading, the portion of Omega's motion for summary judgment seeking a determination of CalAmp's counterclaim for unfair competition is denied as moot.

[3] The LMU-3030 and LMU-3050 are identical—the LMU-3050 simply has a different model number because it is sold in the United Kingdom. (Doc. 54, p. 5).

II. STANDARD OF REVIEW

"The court shall grant summary judgment if the movant shows that there is no genuine dispute as to any material fact and the movant is entitled to judgment as a matter of law." Fed. R. Civ. P. 56(a). An issue of fact is "genuine" only if "a reasonable jury could return a verdict for the nonmoving party." *Anderson v. Liberty Lobby, Inc.*, 477 U.S. 242, 248 (1986). A fact is "material" if the fact could affect the outcome of the lawsuit under the governing law. *Id.* The moving party bears the initial burden of identifying those portions of the record demonstrating a lack of genuine dispute of material fact. *Celotex Corp. v. Catrett*, 477 U.S. 317, 323 (1986); *Hickson Corp. v. N. Crossarm Co., Inc.*, 357 F.3d 1256, 1260 (11th Cir. 2004).

To defeat a motion for summary judgment, the non-movant must go beyond the pleadings and "come forward with specific facts showing that there is a genuine issue for trial." *Matsushita Elec. Indus. Co., Ltd. v. Zenith Radio Corp.*, 475 U.S. 574, 587 (1986) (emphasis and internal quotation marks omitted). In determining whether a genuine dispute of material fact exists, the Court must read the evidence and draw all factual inferences therefrom in the light most favorable to the non-moving party and must resolve any reasonable doubts in the non-movant's favor. *Skop v. City of Atlanta, Ga.*, 485 F.3d 1130, 1136 (11th Cir. 2007). Summary judgment should only be granted "[w]here the record taken as a whole could not lead a rational trier of fact to find for the non-moving party." *Matsushita*, 475 U.S. at 587.

III. DISCUSSION

A. Omega's Motion for Summary Judgment

1. Infringement by CalAmp

Pursuant to 35 U.S.C. § 271, "whoever without authority makes, uses, offers to sell, or sells any patented invention, within the United States or imports into the United States any patented invention during the term of the patent therefor, infringes the patent." 35 U.S.C. § 271(a) (2006). Direct infringement exists "when the properly construed claim reads on the accused device exactly." *Cole v. Kimberly-Clark Corp.*, 102 F.3d 524, 532 (Fed. Cir. 1996). The direct infringement analysis follows a two-step process: first, the Court interprets the claims in dispute, and second, the Court "compares the accused device to the properly construed claims to determine whether each and every limitation of a claim is present, either literally or equivalently, in the accused device." *Tate Access Floors, Inc. v. Interface Architectural Res., Inc.*, 279 F.3d 1357, 1365 (Fed. Cir. 2002).

Interpretation of a patent claim is a question of law. *Cook Biotech Inc. v. Acell, Inc.*, 460 F.3d 1365, 1372 (Fed. Cir. 2006). However, determining whether the accused device satisfies every claim limitation is a question of fact. *Id.* at 1373. The burden is on the patentee to establish a prima facie showing of infringement as to each accused device by a preponderance of the evidence. *Medtronic, Inc. v. Mirowski Family Ventures, LLC*, 134 S. Ct. 843, 849 (2014) ("It is well established that the burden of proving infringement generally rests upon the patentee.").

a. The '876 Patent

Omega argues that CalAmp has directly infringed Claims 1 and 3 of the '876 Patent by making and selling the Accused Devices. (Doc. 54, p. 9). Claim 1 of the '876 Patent provides:

> A control system for a vehicle comprising a data communications bus and at least one vehicle device connected to the data communications bus, the control system comprising:
>
> a transmitter and a receiver for receiving signals from said transmitter; and
>
> a multi-vehicle compatible controller at the vehicle and cooperating with said transmitter and receiver, said multi-vehicle compatible controller generating at least one set of command signals on the data communications bus for the at least one vehicle device, the at least one set of command signals comprising at least one working command signal and at least one non-working command signal for a given vehicle to thereby provide command compatibility with a plurality of different vehicles.

(Doc. 57-1, '876::11:30–48).

Omega asserts that the Accused Devices are part of a control system for a vehicle comprising a data communications bus and at least one vehicle device connected to the data communications bus, thus reading on the first portion of Claim 1. (Doc. 54, p. 9). A data communications bus has been interpreted by the Court to mean a wired connection for communication of digital messages among vehicle devices, with each message including one or more device addresses. (Doc. 50, p. 25). However, CalAmp responds that Omega has not provided evidence indicating that any of the Accused Devices are a "control system for a vehicle." (Doc. 76, p. 13). Omega replies that this portion of the claim is simply a preamble which provides no limitation. Preambles can serve different purposes depending on the language of the preamble. *C.R. Bard., Inc. v. M3 Sys., Inc.*,

157 F.3d 1340, 1350 (Fed. Cir. 1998). The preamble can limit the scope of the claim "when patentability depends on limitations stated in the preamble" or it can simply state "the intended use or purpose of the invention" and, thus, not limit the scope of the claim. *Id.* The latter type of preamble "usually does not limit the scope of the claim unless the preamble provides antecedents for ensuing claim terms and limits the claim accordingly." *Id.*

The preamble in Claim 1 does not set forth limitations on patentability for "a control system." It establishes that a control system for a vehicle will be comprised of (1) a data communications bus and (2) at least one vehicle device connected to the data communications bus. The preamble ends with the phrase, "the control system comprising," followed by a colon. This indicates that the necessary terms for patentability are contained not in the preamble but following the preamble. Moreover, CalAmp does not dispute that the Accused Devices contain (1) a data communications bus and (2) at least one vehicle device connected to the data communications bus. Hence, the Court concludes that the preamble does not limit the scope of the claim.

Next, Omega argues that the Accused Devices use a transmitter and a receiver for receiving signals from said transmitter because the Accused Devices include a cellular module that allows transmission to and reception from a central station, thus reading on the second portion of Claim 1. (Doc. 54, p. 9). Peter Hergesheiner, CalAmp's Senior Director of Software and Architecture, testified that the Accused Devices all have GPS units and a wireless transmitter and receiver. (Hergesheiner Depo., Doc. 66-18, 30:35–31:4). CalAmp does not dispute this testimony.

The heart of the issue lies in the third portion of Claim 1: CalAmp argues that a multi-vehicle compatible controller must perform a control function. Previously, the Court

defined "multi-vehicle compatible controller" as "an electronic circuitry that performs *one or more control functions*, and can operate with more than one vehicle." (Doc. 50, p. 24) (emphasis added). CalAmp asserts that the term "control function" within the term "multi-vehicle compatible controller" is undefined and open to further interpretation. CalAmp's expert, Eric Andrews, opines that a control function would require a physical change in a device or the system, for example, turning on a light, and would not include simply reading a data value from a register. (Andrews Report, Doc. 66-7, pp. 10–11). CalAmp argues that the Accused Devices send a Mode 1, PID 0 request which simply obtains the data value of what parameters are available, rather than causing a physical change. It is Mr. Andrew's opinion that neither of the Accused Devices performs a control function, and thus, they cannot contain multi-vehicle compatible controllers, making the Accused Devices noninfringing. The Court previously ruled that Mr. Andrews' testimony as to this issue would not be excluded at trial under *Daubert*.

Omega responds that CalAmp is essentially re-interpreting the Court's claim construction ruling. While it is improper to argue claim construction to the jury, *Cordis Corp. v. Bos. Sci. Corp.*, 561 F.3d 1319, 1337 (Fed. Cir. 2009), this is not what CalAmp seeks to do. CalAmp is permitted to introduce evidence of the plain and ordinary meaning of terms to one skilled in the art that were not construed by the Court through their expert, Mr. Andrews. *DNT, LLC v. Sprint Spectrum, LP*, No. 3:09CV21, 2010 WL 582164, at *4 (E.D. Va. Feb. 12, 2010). Mr. Andrews seeks to explain what "control function" means to a person of ordinary skill in the art and has not attempted to change or alter the Court's claim construction. Omega's definition of what constitutes a control function differs. It is an issue for the trier of fact whether the Accused Devices perform a control function and whether or not there is infringement. *Gentex Corp. v. Donnelly Corp.*, 69 F.3d 527, 530

(Fed. Cir. 1995) ("It is of course established that infringement of a patent claim is an issue of fact . . . .")

Claim 3 states, "A control system according to claim 1 wherein said multi-vehicle compatible controller generates command signals sequentially." As claim 3 is predicated on claim 1, summary judgment is also inappropriate as to claim 3. Thus, summary judgment is due to be denied as to the '876 Patent.

b. The '278 Patent

Omega argues that CalAmp has also directly infringed Claims 1 and 3 of the '278 Patent by making and selling the Accused Devices. (Doc. 54, p. 9). Claim 1 of the '278 Patent provides:

> A multi-vehicle compatible tracking unit for a vehicle comprising a vehicle data bus extending throughout the vehicle, the multi-vehicle compatible tracking unit comprising:
>
> a vehicle position determining device;
>
> a wireless communications device;
>
> a multi-vehicle compatible controller for cooperating with said vehicle position determining device and said wireless communications device to send vehicle position information; said multi-vehicle compatible controller to be coupled to the vehicle data bus for communication thereover with at least one vehicle device using at least one corresponding vehicle device code from among a plurality thereof for different vehicles, and;
>
> a downloading interface for permitting downloading of enabling data related to the at least one corresponding vehicle device code for use by said multi-vehicle compatible controller.

(Doc. 57-5, '278::25:64–26:15). Again, CalAmp asserts that a multi-vehicle compatible controller must perform a control function, and for the same reasons articulated in Section III.A.1.a, summary judgment is due to be denied as to the '278 Patent.

2. Validity of the Patents-In-Suit

Omega also moves for summary judgment on Count 2 of CalAmp's Counterclaim, which seeks a declaratory judgment that the patents-in-suit are invalid. CalAmp cross-moves, seeking to invalidate Patents '876, '885, '278, and '989. Thus, the Court will resolve these motions together. Courts begin with the presumption that a patent is valid. 35 U.S.C. § 282(a); *Lear Siegler, Inc. v. Aeroquip Corp.*, 733 F.2d 881, 885 (Fed. Cir. 1984) ("The decisionmaker is thus required to begin by accepting the proposition that the patent is valid and then look to the challenger for proof to the contrary."). However, this presumption can be overcome by clear and convincing evidence. *Iovate Health Scis., Inc. v. Bio-Engineered Supplements & Nutrition, Inc.*, 586 F.3d 1376, 1380 (Fed. Cir. 2009).

a. Invalidity Due to Anticipation

A patent is invalid for anticipation where "the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of the application for a patent in the United States." 35 U.S.C. § 102(b) (2006). "Section 102 embodies the concept of novelty—if a device or process has been previously invented (and disclosed to the public), then it is not new, and therefore the claimed invention is 'anticipated' by the prior invention." *Net MoneyIN, Inc. v. VeriSign, Inc.*, 545 F.3d 1359, 1369 (Fed. Cir. 2008). To this end, "anticipation requires all elements of a claim to be disclosed within a single reference." *Cohesive Techs., Inc. v. Waters Corp.*, 543 F.3d 1351, 1364 (Fed. Cir. 2008). Additionally, the prior art reference "must also disclose those elements 'arranged as in the claim.'"[4] *Net*

[4] "[T]he 'arranged as in the claim' requirement applies to all claims and refers to the need for an anticipatory reference to show all of the limitations of the claims arranged or combined in the same way as recited in the claims, not merely in a particular order. The test is thus more accurately understood to mean 'arranged or combined in the same way

MoneyIN, 545 F.3d at 1369. Anticipation is a question of fact but can be resolved on summary judgment if no genuine issue of material fact exists. *OSRAM Sylvania, Inc. v. Am. Induction Techs., Inc.*, 701 F.3d 698, 704 (Fed. Cir. 2012).

CalAmp argues that the '278 Patent and the '989 Patent are invalid due to anticipation. CalAmp contends that the '074 Patent to Spaur and the '392 Patent to Bambini are both instances of prior art which anticipate the '278 Patent. CalAmp asserts that the Trimble CrossCheck AMPS Product and Documentation anticipate the '989 Patent. The Court addresses each argument in turn.

CalAmp argues that the asserted claims of the '278 Patent (claims 1–6, 8, 11–14, 16, 18, 19, and 21) are anticipated by U.S. Patent 5,732,074 to Spaur. Omega responds that on June 10, 2015, three weeks prior to Mr. Andrews executing his Declaration in this case, Omega deposed Mr. Andrews who testified that he was not offering an invalidity opinion based on an anticipation theory that the '278 Patent is anticipated by the '074 Patent to Spaur. (Andrews Depo., Doc. 66-10, 115:4–22). Other than Mr. Andrews Declaration, CalAmp' relies solely on attorney argument in asserting its theory of anticipation and has not provided any other affirmative evidence in support. Without other evidence to support its theory, CalAmp's fails to carry its burden on summary judgment, and the motion is due to be denied.

CalAmp also contends that the '392 Patent to Bambini discloses each of the asserted claims of the '278 Patent and is therefore anticipated, once again relying on Mr. Andrews' opinion. However, Mr. Andrews testified during deposition that the Bambini patent does not disclose a multi-vehicle compatible controller as required by claim 1 of

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as in the claim.'" *Net MoneyIN, Inc. v. VeriSign, Inc.*, 545 F.3d 1359, 1370 (Fed. Cir. 2008).

the '278 Patent. (Andrews Depo., Doc. 66-9, 63:6–15). Thus, CalAmp's motion for summary judgment on this basis is denied.[5]

Lastly, CalAmp argues that the asserted claims of the '989 Patent (claims 23, 31, 32, 34, and 35) are anticipated by the Trimble CrossCheck AMPS Product and Documentation (the "Trimble CrossCheck"). Mr. Andrews references four separate documents: (1) CrossCheck AMPS with IQ *Event Engine* Firmware Operation Manual (Doc. 59-4); (2) CrossCheck AMPS Cellular marketing material (Doc. 59-5); (3) the IQ*EventEngine* Configuration Utility Users Guide (Doc. 59-6) and; (4) The TAIP/IQ*Event Engine* Reference (Doc. 59-7).

Claim 23 of the '989 Patent, on which claims 31, 32, 34, and 35 depend, provides for:

> A tracking unit for a vehicle comprising:
>
> A vehicle position determining device, a wireless communication device, and a controller cooperating with said wireless communications device and said vehicle position determining device to determine and send vehicle position information to a monitoring station;
>
> Said controller sorting a user selected reference location;
>
> Said controller also sending the vehicle position information based upon the vehicle moving beyond a radial threshold distance from the user selected reference location.

(Doc. 57-2, '989::44:57–67).

[5] To the extent that CalAmp argues that the '392 Patent to Bambini in combination with SAE J1978 invalidates the '278 Patent due to anticipation, that argument is rejected as contrary to case law. *Cohesive Techs., Inc. v. Waters Corp.*, 543 F.3d 1351, 1364 (Fed. Cir. 2008) ("Anticipation requires all elements of a claim to be disclosed within a *single* reference.") (emphasis added).

Omega points out that CalAmp cannot prove anticipation by combining the Trimble references because "anticipation requires all elements of a claim to be disclosed within a single reference." *Cohesive Techs.*, 543 F.3d at 1364; *King Pharms., Inc. v. Eon Labs, Inc.*, 616 F.3d 1267, 1274 (Fed. Cir. 2010). Mr. Andrews' Declaration addresses the Crosscheck references in paragraphs 50 through 59. (Doc. 59). At least as to claim 23, CalAmp relies on the combination of the CrossCheck AMPS with IQ *Event Engine* Firmware Operation Manual (Doc. 59-4) and the IQ*EventEngine* Configuration Utility Users Guide. (Doc. 59, ¶¶ 50–55). In its reply, CalAmp argues that multiple documents may be used to identify the disclosure of a single piece of prior art device citing a string of cases. However, a review of the case law does not support CalAmp's argument. Because CalAmp's theory relies on more than one document to argue that the '989 Patent is anticipated, the argument fails for that reason: all the elements of the claim are not disclosed in a single reference. Thus, summary judgment is due to be denied.

b. Invalidity Due to Obviousness

A patent is invalid for obviousness where "the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains." 35 U.S.C. § 103(a) (2006). "If a person of ordinary skill in the art can implement a predictable variation, . . . § 103 likely bars its patentability." *KSR Int'l Co. v. Teleflex Inc.*, 550 U.S. 398, 417 (2007); *Cohesive Techs.*, 543 F.3d at 1364 ("Obviousness can be proven by combining existing prior art references . . . .").

The test for obviousness is set forth as follows:

> Obviousness is a question of law based on underlying factual inquiries including: (1) the scope and content of the prior art; (2) the level of ordinary skill in the art; (3) the differences between the prior art and the claimed invention as perceived before the time of invention; and (4) the extent of any objective indicia of non-obviousness.

Rolls-Royce, PLC v. United Techs. Corp., 603 F.3d 1325, 1338 (Fed. Cir. 2010). "If a person of ordinary skill, before the time of invention and without knowledge of that invention, would have found the invention merely an easily predictable and achievable variation or combination of the prior art, then the invention likely would have been obvious." *Id.* (citing *KSR Int'l*, 550 U.S. at 421). "The Supreme Court has warned, however, that, while an analysis of any teaching, suggestion, or motivation to combine known elements is useful to an obviousness analysis, the overall obviousness inquiry must be expansive and flexible." *OSRAM*, 701 F.3d at 707 (citing *KSR Int'l*, *550* U.S. at 415). Obviousness should be assessed at the time the invention was made; thus, hindsight analysis is inappropriate. *In re Cyclobenzaprine Hydrochloride Extended-Release Capsule Patent Litig.*, 676 F.3d 1063, 1073 (Fed. Cir. 2012)

Additionally, "obviousness requires analysis of secondary considerations of nonobviousness." *Cohesive Techs.*, 543 F.3d at 1364. Such secondary considerations can include a "long-felt but unresolved need, achieved commercial success, and . . . industry acclaim from the inventor's peers." *Rolls-Royce*, 603 F.3d at 1339. The parties agree that a claim based on obviousness is a legal issue for the Court to decide "when the factual inquiries into obviousness present no genuine issue of material facts." *OSRAM*, 701 F.3d at 704.

CalAmp argues that the '876 Patent and the '885 Patent are both invalid due to obviousness. As to the '876 Patent, CalAmp contends that both the '479 Patent to Braitberg in combination with SAE J1978 and the '392 Patent to Bambini in combination with the SAE J1978 invalidate the '876 Patent. As to the '885 Patent, CalAmp contends that both the '479 Patent to Braitberg in combination with the SAE J1978 and the CellPort Labs MobileWeb Product/Publication either alone or in combination with the SAE J1978 invalidate the '885 Patent.

Turning first to the '876 Patent, CalAmp assert that the '479 Patent to Braitberg in combination with the SAE J1978 render claims 1, 3–5, 12, 14, and 16 of the '876 Patent obvious. The relevant elements of claim 1 in the '876 Patent, on which the other claims depend, are a control system comprising a multi-vehicle compatible controller generating at least one set of command signals on the data communications bus, and the at least one set of command signals comprising at least one working command signal and at least one non-working command signal for a given vehicle. (Doc. 57-1, '876::11:32–48).

CalAmp identifies U.S. Patent No. 5,479,479 to Braitberg as prior art. Omega correctly points out that each claim of the '876 Patent requires both (1) working and non-working command signals and (2) a multi-vehicle compatible controller. Omega directs the Court to CalAmp's expert, Mr. Andrews, who conceded that the Braitberg Patent (and the Bambini Patent) did not disclose a multi-vehicle compatible controller. (Andrews Depo., Doc. 66-8, 32:1–9). While CalAmp asserts that Mr. McAlexander, Omega's expert, admitted that a controller with a single bus could theoretically be multi-vehicle compatible, Omega argues that hypothetical disclosures of a multi-vehicle compatible controller do not reach the level of clear and convincing evidence required to prove obviousness. The Court

agrees that from an evidentiary standard, the evidence must be clear and convincing and a hypothetical possibility does not rise to this level.

CalAmp responds that one of ordinary skill in the art would be aware of the bus detection procedure of SAE J1978 providing multi-vehicle and multi-bus compatibility. (Doc. 78, p. 14). CalAmp goes on to argue that one skilled in the art of connecting the controller of Braitberg to the vehicle bus would have used the industry standard procedure for bus discovery. CalAmp contends that the SAE J1978, since 1994, has described how to connect a device to various types of vehicle buses, thereby making the device compatible with multiple buses and vehicles. (Doc. 78, p. 10).

On this point, Mr. Andrews opines:

> The EPA has mandated a common, low cost service tool (Scan Tool) that would allow the service technician to diagnose all vehicles at least as early as 1996. To enable the Scan Tool to communicate across all vehicles, the Society of Automotive Engineers (SAE) and automotive industry experts developed The J1978 Publication. SAE J1978, issued 1992-03, Revised 1994-06 describes the communications protocols required to support OBD II diagnostic information and the development of a common diagnostic interface for the OBD II Scan Tool. The J1978 publication is required to be supported by all vehicle and testing equipment manufactures. This standard describes connecting to the vehicle bus using one of three interfaces by sending a signal (i.e. request message) on the data communications bus. It should be noted that current versions of the J1978 spec have increased the number of supported interfaces. This allows a scan tool to be compatible with various busses, and thus a variety of vehicles.
>
> Additionally, a standard set of message formats, for both request and response messages, is defined in SAE J1979. This standard relates to the implementation of the Diagnostic Test Modes necessary to meet California On-Board Diagnostic (OBD) and Federal On-Board Diagnostic (OBD-II) requirements for emission related test data. This standard discloses the request and response messages necessary to be supported by vehicle manufacturers and test tools to meet the California and Federal regulations.

> As both SAE J1978 and J1979 were mandated in California and federally prior to the earliest priority date of the asserted patents, one of ordinary skill in the art would be intimately familiar with both the SAE J1978 and J1979 standards at least as early as the earliest priority date of the asserted patents.

(Doc. 59, ¶¶ 9–11).

Critical to the Court's determination of whether the CalAmp prevails on its obviousness argument is whether one of ordinary skill in the art would use SAE J1978 to disclose how to connect a device to various types of vehicle buses, thereby making the device compatible with multiple buses and vehicles. Omega's expert, Mr. McAlexander, opines that there would have been no reason for one of skill in the art to combine the solutions in Braitberg or Bambini with the SAE J1978 OBD II Scan Tool reference. (McAlexander Report, Doc. 66-24, ¶¶ 133, 140). Accordingly, a material issue of fact exists as to whether the prior art references would have been combined prior to the invention, and summary judgment is due to be denied as to the '876 and '885 patents.[6]

3. Enforceability of the Patents-In-Suit

Omega also moves for summary judgment on Count 3 of CalAmp's Counterclaim which seeks a declaratory judgment that the patents-in-suit are unenforceable due to inequitable conduct. "Inequitable conduct is an equitable defense to patent infringement that, if proved, bars enforcement of a patent." *Therasense, Inc. v. Becton, Dickinson & Co.*, 649 F.3d 1276, 1285 (Fed. Cir. 2011). To prevail, "the accused infringer must prove that the patentee acted with the specific intent to deceive the [Patent & Trademark Office]." *Id.* at 1290. A finding of negligence, or even gross negligence, is not enough to satisfy the intent requirement. *Id.* In this case, CalAmp must prove by clear and convincing

[6] The Court need not yet reach the issue of whether the prior art references in fact render the invention obvious, if one skilled in the art had reason to combine the prior art.

evidence that the patent applicant "*made a deliberate decision* to withhold a *known* material reference." *Id.*

There are two separate elements needed to establish a claim of inequitable conduct: intent and materiality. *Id.* at 1290. The Federal Circuit has instructed district courts to "weigh the evidence of intent to deceive independent of its analysis of materiality." *Id.* First, in demonstrating intent, it is not enough to "[p]rove that the applicant knew of a reference, should have known of its materiality, and decided not to submit it to the PTO." *Id.* While intent may be inferred, "intent to deceive must be 'the single most reasonable inference able to be drawn from the evidence.'" *Id.* (quoting *Star Sci., Inc. v. R.J. Reynolds Tobacco Co.*, 537 F.3d 1357,1366). Second, in demonstrating materiality, but-for materiality is required. *Id.* at 1291. "When an applicant fails to disclose prior art to the PTO, that prior art is but-for material if the PTO would not have allowed a claim had it been aware of the undisclosed prior art." *Id.*

Omega asserts that CalAmp has failed to disclose any evidence of inequitable conduct. (Doc. 54, p. 21). Specifically, Omega argues that CalAmp can offer no evidence that Omega had knowledge of prior art but failed to submit it to the PTO or that there existed any intent to defraud the PTO. CalAmp responds that the inventor of the patents-in-suit, Mr. Flick, knew of prior art relating to the '254 Patent but failed to disclose it to the USPTO. Mr. Flick testified that he was aware of the company, Mobile Security Communications, Inc. as relates to the '254 Patent. Further, Mr. Flick testified that he is not familiar with SAE publications. However, two of the patents-in-suit, the '876 Patent and the '885 Patent, refer to SAE J1850 in the background section. CalAmp argues that while it appears Omega never disclosed the J1850 reference to the PTO during the prosecution of these two patents, its familiarity with the publication calls into question

whether it was truly unaware of the SAE bus standards. Lastly, CalAmp argues that Omega failed to disclose U.S. Patent No. 5,555,498 during the prosecution of the '278 Patent even though it was aware of the patent because it had been cited during the '876 and '885 prosecutions.

CalAmp also attempts to cast doubt on the credibility of Mr. Flick's testimony during his deposition in this case. Mr. Flick testified during his deposition that he relies on his counsel to draft his patents. (Doc. 76-1, 23:2–4). Thus, he was not comfortable during his deposition talking about the meaning of terms or figures contained within his patents. (*See* Doc. 76-1). From this, CalAmp urges the Court to draw the conclusion that this lack of understanding of the patents-in-suit raises serious questions as to inventorship and candor to the PTO.

However, even assuming all of CalAmp's assertions are true, CalAmp has not offered *clear and convincing* evidence to prove that Omega, Mr. Flick, or their attorneys acted with specific intent to deceive the PTO. Mr. Flick testified in deposition that he does not review SAE publications. Even if Omega did fail to disclose an SAE publication in one of the patents-in-suit, Omega is correct that this is not enough evidence to conclude that Omega was also aware of the thousands of other SAE publications, that these were material to the patent prosecution, and that Omega intended not to disclose those publications to the PTO. The evidence put forth my CalAmp at this stage of the litigation is not enough to hurdle the clear and convincing threshold. And while one might expect Mr. Flick to be more articulate regarding his patents-in-suit, his inability to answer targeted questions regarding the patents-in-suit does not rise to the level of specific intent to deceive the PTO. Lastly, CalAmp does not offer any evidence or argument on but-for

materiality. Thus, summary judgment is due to be granted in favor of Omega and against CalAmp on Count 3 of CalAmp's counterclaim for unenforceability.

B. CalAmp's Motion for Summary Judgment

Remaining for the Court's consideration is CalAmp's motion for summary judgment on Count 1 of its Counterclaim which seeks a declaratory judgment that the Accused Devices do not infringe the patents-in-suit. Specifically, CalAmp moves for summary judgment of noninfringement of the '876, '885, '278, and '727 Patents under 35 U.S.C. § 271 because no Accused Device includes each and every limitation of any asserted claim of these patents, and thus, do not infringe these patents.

1. Device Code Limitations

CalAmp argues that the Accused Devices do not include device code limitations. Both the '885 and '278 Patents include device codes. The '885 Patent requires a controller "for storing a set of device codes for a given vehicle for a plurality of different vehicles, for reading a device code from the data communications bus, and for determining a match between a read device code and the stored device codes to thereby provide compatibility with a plurality of different vehicles." (Doc. 57-3). The '278 Patent requires "said multi-vehicle compatible controller to be coupled to the vehicle data bus for communication thereover with at least one vehicle device using at least one corresponding vehicle device code from among a plurality thereof for different vehicles." (Doc. 57-5). The Court has previously construed "device code" as "a signal from a vehicle device." (Doc. 50, p. 25). Omega identifies the engine control unit ("ECU") as the vehicle device.

CalAmp's argument is composed of two parts. First, CalAmp submits that the Accused Devices do not store a set of device codes for a given vehicle device for a plurality of different vehicles, do not read such a code, and do not determine a match

between them as to the '885 Patent. Specifically, CalAmp contends that Omega has not identified any set of signals from the ECU for a plurality of different vehicles that the Accused Devices store. Instead, Omega identifies SAE J1978 queries from the Accused Devices. CalAmp contends these are not signals from the ECU and thus cannot infringe.

Further, CalAmp argues that the Accused Devices do not contain a "set of device codes for a given vehicle device for a plurality of different vehicles." CalAmp argues that the VIN data received is unique to a particular vehicle. As the argument goes, because Omega does not identify any stored "set of device codes for a given vehicle device for a plurality of different vehicles," there can be no determining a match between the VIN data and a stored set of device codes. CalAmp also argues that the Accused Devices do not communicate using at least one corresponding vehicle device code from among a plurality thereof for different vehicles as to the '278 Patent. CalAmp argues that Omega relies on the SAE J1978 bus determination procedure to satisfy the device code limitation, with the additional allegation that for the LMU-3030, reading VIN data satisfies this limitation.

Omega responds that Mr. McAlexander testified that the Accused Devices read the messages from the bus during the vehicle discovery process, thus reading a device code. They then match the read device code with messages in the Accused Devices. The data are then loaded through the serial port on the Accused Devices, enabling the Accused Devices to communicate with at least one vehicle device. (Doc. 81, pp. 17–18). Omega further avers that CalAmp is simply attempting to construe the term "vehicle devices," a term for which CalAmp did not seek construction. Omega argues that CalAmp's proposed definition for vehicle device contradicts that which is described in the '279 Patent. This issue must, at this stage in the proceedings, be resolved in favor of

Omega, because Mr. McAlexander's testimony creates a material issue of fact making summary judgement inappropriate.

2. Working and Non-Working Command Signals

Next, CalAmp argues that the Accused Devices do not generate the required working and non-working command signals required by each claim of the '876 Patent. As stated previously, claim 1 of the '876 Patent provides:

> A control system . . . comprising:
>
> . . .
>
> a multi-vehicle compatible controller at the vehicle and cooperating with said transmitter and receiver, said multi-vehicle compatible controller generating *at least one set of command signals* on the data communications bus for the at least one vehicle device, *the at least one set of command signals comprising at least one working command signal and at least one non-working command signal for a given vehicle* to thereby provide command compatibility with a plurality of different vehicles.

(Doc. 57-1, '876::11:30–48).

The Court has previously construed command signal as a "signal generated on the data communications bus for operating a vehicle device." (Doc. 50, p. 25). Omega contends that the vehicle device is the ECU. CalAmp argues that Omega has not provided evidence that the Accused Devices "operate" the ECU. In response, Omega relies on the prior art bus detection procedure by which a list of parameters is obtained. CalAmp goes on to argue that even if the bus detection procedure is deemed to send command signals, if the first message sent matches the vehicle bus, there would be no non-working command signal and thus no infringement. Additionally, CalAmp argues that the signal must be compatible with the bus, and in the SAE J1978 bus detection procedure, only a single signal would be bus-compatible and, thus, there would be no non-working signal.

Omega responds that CalAmp is improperly construing the term "command signal" as argued in its motion for summary judgment on infringement. Previously, the Court determined that material issues of fact remained as to whether the term "command signal" required a physical change and thus whether the Accused Devices infringed. Omega asserts that CalAmp goes one step further in restricting the Patent to require the command signal that requires both working and non-working command signals to be compatible with a specific bus. The Court agrees with Omega's assertion that the mere possibility that a successful signal sent by the Accused Devices along the bus may not require a non-working signal and thus, this is inadequate for a finding of noninfringement. Additionally, as set forth in the Court's order on Plaintiff's *Daubert* challenge of Mr. Andrews, several issues of fact remain regarding how one skilled in the art would interpret terms including whether a single bus interface protocol is envisioned. Defendant's motion for summary judgment is, therefore, denied.

3. Speed Data

Lastly, CalAmp asserts that the Accused Devices use speed data from the GPS, not the vehicle bus, and thus do not infringe the '727 Patent. Each of the '727 Patent's claims require "reading the data related to vehicle speed from the vehicle data communications bus, and determining when a vehicle speed exceeds a speed threshold for a first time period and based thereon cooperating with said wireless communications device to send a remote vehicle speed exceeded notification." (Doc. 57-4, '727::7:13–18). CalAmp's expert, Mr. Andrews, testified that the PEG Support Guide for Vehicle Bus indicates that the Accused Devices "can use an accumulator to accumulate a variety of data from a vehicle data bus, including vehicle speed." (Doc. 61, ¶ 31). Mr. Andrews goes on to opine, however, that "none of the vehicle-speed related triggers and functionality

described [in the claim] are compatible with the vehicle data bus accumulators." (*Id.*) Mr. Andrews concludes that even though it appears that the Accused Devices are capable of reading speed data from the vehicle bus data, "it is unclear how that speed data could be utilized to 'determine when a vehicle speed exceeds a speed threshold for a first time period' and 'based thereon cooperating with said wireless communications device to send a remote vehicle speed exceeded notification' as in claim 1." (*Id.*). Thus, he asserts that the Accused Devices do not infringe on claim 1 of the '727 Patent.

Omega responds that their expert, Mr. McAlexander, testified that the programming tools provided with the Accused Devices can configure the Accused Devices to perform the claimed notification using vehicle speed from the bus. (McAlexander Report, Doc. 66-22, p. D-6). Given this testimony, further factfinding is required, because it is unclear whether the Accused Devices' ability to read vehicle speed from the data communications bus can be activated using "means that are already present in the underlying software," as opposed to whether an actual alteration must take place. *Fantasy Sports Props., Inc. v. Sportsline.com, Inc.*, 287 F.3d 1108, 1118 (Fed. Cir. 2002). Mr. Andrews agrees that the Accused Devices are capable of reading speed data from the vehicle bus, but whether this information can be used to cooperate with the wireless communication device to send the exceeded notification without some sort of alteration, rather than mere activation, is unclear. Thus, genuine issues of fact exist as to whether the Accused Devices infringe the '727 Patent.

IV. CONCLUSION

Accordingly, it is hereby **ORDERED AND ADJUDGED** that:

1. Plaintiff's Motion and Memorandum for Summary Judgment as to Validity, Infringement, Enforceability and Unfair Competition (Doc. 54) is **GRANTED**

IN PART AND DENIED IN PART as follows:

a. Summary judgment is **GRANTED** in favor of Omega and against CalAmp on Count 3 of CalAmp's counterclaim for unenforceability.

b. Summary judgment is **DENIED AS MOOT** to the extent Omega moves for summary judgment on CalAmp's counterclaim for unfair competition. As stated in this Order, CalAmp does not have a counterclaim for unfair competition pending.

c. The motion is otherwise **DENIED**.

2. Defendant CalAmp Corp.'s Motion for Summary Judgment and Memorandum of Law Regarding Invalidity and Noninfringement (Doc. 78) is **DENIED**.

DONE AND ORDERED in Orlando, Florida on December 23, 2015.

PAUL G. BYRON
UNITED STATES DISTRICT JUDGE

Copies furnished to:
Counsel of Record

EXHIBIT E

UNITED STATES DISTRICT COURT
MIDDLE DISTRICT OF FLORIDA
ORLANDO DIVISION

OMEGA PATENTS, LLC,

Plaintiff,

v. Case No: 6:13-cv-1950-Orl-40DAB

CALAMP CORP.,

Defendant.

ORDER

This cause comes before the Court on the following:

1. Plaintiff's Motion and Memorandum of Law to Exclude the Testimony of Defendant's Expert Eric Andrews (Doc. 55), filed July 1, 2015;[1]
2. Defendant CalAmp Corp.'s Response in Opposition to Plaintiff's Motion to Exclude the Testimony of Defendant's Expert Eric Andrews (Doc. 75), filed July 20, 2015;
3. Plaintiff's Motion and Memorandum of Law to Exclude the Testimony of Defendant's Expert on Damages (Doc. 56), filed July 1, 2015; and
4. Defendant CalAmp Corp.'s Response to Plaintiff's Motion to Exclude the Testimony of Defendant's Expert on Damages, (Doc. 74), filed July 20, 2015.

Upon consideration and having reviewed the pertinent pleadings and the exhibits submitted by the parties, the Court grants in part and denies in part Plaintiff's *Daubert* motion as to Eric Andrews and grants Plaintiff's *Daubert* motion as to DeForest McDuff.

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[1] Mr. Andrews' expert report on the issue of invalidity is located at Docket Entry 57-12, and his report on the issue of noninfringement is located at Docket Entry 66-7.

I. BACKGROUND

Omega Patents, LLC ("Omega") contends that CalAmp Corp. ("CalAmp") infringes the claims of U.S. Patent No. 6,346,876 ("the '876 Patent"), U.S. Patent No. 6,737,989 ("the '989 Patent"), U.S. Patent No. 6,756,885 ("the '885 Patent"), U.S. Patent No. 7,671,727 ("the '727 Patent"), and U.S. Patent No. 8,032,278 ("the '278 Patent") (collectively the "patents-in-suit"). (Doc. 1). The patents-in-suit relate to control systems for vehicles with a "data communications bus." (Doc. 54, pp. 1–2).[2] Omega asserts that CalAmp's devices are used to monitor particular vehicle characteristics and conditions and report vehicle information to an end user thus infringing on the patents-in-suit. (*Id.* at p. 2).

Defendant CalAmp advertises for sale the LMU-3000, LMU-3030, and LMU-3050 (the "Accused Devices") which are described as full featured tracking systems which "access vehicle diagnostic interface data, track vehicle speed and location, plus detect hard braking, cornering, or acceleration." (Doc. 114-1, p. 2; 114-2, p. 2). CalAmp denies that the Accused Devices infringe upon any claim of the patents-in-suit. (Doc. 10, p. 4). CalAmp further asserts that the Accused Devices do not infringe upon the patents-in-suit and that the patents-in-suit are unenforceable due to inequitable conduct, invalid due to anticipation by one or more prior art references under 35 U.S.C. § 102, and obvious in view of the prior art under 35 U.S.C. § 103. (Doc. 20).

[2] The Court has previously construed "data communications bus" to mean "wired connection for communication of digital messages among vehicle devices, with each message including one or more device addresses." (Doc. 50, p. 25).

II. STANDARD OF REVIEW

A. *Daubert*

The Federal Rules of Evidence allow a witness who is qualified as an expert because of his "knowledge, skill, expertise, training, or education" to offer opinion testimony where certain requirements are satisfied. Fed. R. Evid. 702. Under Rule 702 and the U.S. Supreme Court's ruling in *Daubert v. Merrell Dow Pharmaceuticals, Inc.*, 509 U.S. 579 (1993), district courts act as "gatekeepers" to "ensure that speculative, unreliable expert testimony does not reach the jury under the mantle of reliability that accompanies the appellation 'expert testimony.'" *Rink v. Cheminova, Inc.*, 400 F.3d 1286, 1291 (11th Cir. 2005), *cert. denied*, 546 U.S. 935 (2005). To do this, district courts must engage in a rigorous three-part inquiry, which requires the court to ask whether: "(1) the expert is qualified to testify competently regarding the matters he intends to address; (2) the methodology by which the expert reaches his conclusions is sufficiently reliable . . . ; and (3) the testimony assists the trier of fact, through the application of scientific, technical, or specialized expertise, to understand the evidence or to determine a fact in issue." *Id.* at 1291–92.

In forming the basis of his or her opinion, an expert may rely on "facts or data in the case that the expert has been made aware of or personally observed." Fed. R. Evid. 703. To that end, the facts or data on which an expert forms his opinion need not be admissible for his opinion to be admitted as long as these facts and data are of the type that experts in his field normally rely upon in forming an opinion on the subject at hand. *Id.* However, an expert witness may not disclose otherwise inadmissible facts or data to the jury unless the probative value of the information substantially outweighs any

prejudicial effect. *Id.* Finally, an expert's opinion is not inadmissible simply because the expert opines on an ultimate issue in the case. Fed. R. Evid. 704(a).

In determining the admissibility of expert evidence, "it is not the role of the district court to make ultimate conclusions as to the persuasiveness of the proffered evidence." *Rosenfield v. Oceania Cruises, Inc.*, 654 F.3d 1190, 1193 (11th Cir. 2011). Indeed, cross-examination, contrary evidence, and instruction on the burden of proof are the proper tools for challenging questionable expert evidence. *Id.* It is ultimately the burden of the party who offers the expert to show that his opinion is admissible, and the party must do so by a preponderance of the evidence. *Rink*, 400 F.3d at 1292.

B. Limitation of Expert Testimony in Patent Cases

Unique to patent cases is the role of the Court in interpreting claims contained within the patents-in-suit. *Markman v. Westview Instruments, Inc.*, 52 F.3d 967, 977 (Fed. Cir. 1995), *aff'd*, 517 U.S. 370 (1996). The Court's construction of the claims limits the scope of the opinions which an expert may present to the jury. Omega correctly notes that an expert may not offer claim definitions to the jury that are at odds with the Court's construction as claim construction is solely the Court's role. *Cordis Corp. v. Bos. Sci. Corp.*, 561 F.3d 1319, 1337 (Fed. Cir. 2009). Thus, expert opinions in patent litigation must be based on the court's claim construction in order to be considered relevant and reliable and, therefore, admissible. *See Dynetix Design Sols., Inc. v. Synopsys, Inc.*, No. C11-5973 PSG, 2013 WL 4537838, at *4 (N.D. Cal. Aug. 22, 2013) ("Any expert testimony must adhere to the court's claim constructions and must not apply alternative claim constructions."); *see also Hochstein v. Microsoft Corp.*, No. 04-73071, 2009 WL 2022815, at *1 (E.D. Mich. July 7, 2009) (granting plaintiffs' motion to exclude testimony from

defendant's expert that conflicted with court's claim construction). This limitation exists because the question of infringement is resolved by comparing the claim terms—as construed by the court—to the accused device. *Apex Inc. v. Raritan Comput., Inc.*, 325 F.3d 1364, 1370 (Fed. Cir. 2003).

However, discerning when an expert has strayed from the Court's claim construction is not always a simple task. CalAmp is correct in pointing out that "[w]hile experts must apply the court's claim construction, experts are also permitted to introduce evidence and discuss the plain and ordinary meaning of terms not construed by the Court to one skilled in the art." (Doc. 75, p. 7). "At trial, parties may introduc[e] evidence as to the plain and ordinary meaning of terms not construed by the Court to one skilled in the art, so long as the evidence does not amount to argu[ing] claim construction to the jury." *Apple, Inc. v. Samsung Elecs. Co.*, 2014 WL 660857, at *24 (N.D. Cal. Feb. 20, 2014) (internal citations and quotation marks omitted). Accordingly, while an expert may not deviate from the construction of claims already decided by the Court, the expert may explain the meaning of terms not construed by the Court by advising the jury how one skilled in the art would interpret those terms. It is within this framework that the Court evaluates admissibility of the testimony and opinions offered by Mr. Andrews.[3]

III. DISCUSSION AS TO ERIC ANDREWS

A. Control Function

Omega contends that CalAmp's expert, Eric Andrews, professes that he is using the Court's claim construction while he is actually relying on "new claim limitations added to the Court's construction in order to come up with noninfringement opinions." (Doc. 55,

[3] The Court's claim construction order is found at Docket Entry 50.

p. 5). The term "controller" is found in the claims of all five patents-in-suit, and the parties agreed to the definition of a controller which was adopted by the Court. (*Id.*). Omega contends that Mr. Andrews modifies the Court's construction of "controller" by adding a limitation that requires the controller to "enable a physical change in a device or the system, for example, locking a door, starting the engine, or turning on a light." (*Id.* at p. 6). The Court, however, construed the term "controller" as "[e]lectronic circuitry that performs one or more control functions." (Doc. 50, p. 6). In his deposition, Mr. Andrews confirms that the language "enable a physical change" is his language and was not included in the Court's construction. (Doc. 55, p. 6). Mr. Andrews also acknowledges that nothing in the patents-in-suit suggest that a controller must cause a physical change. (*Id.* at pp. 6–7). Omega contends that the inclusion of this limitation is necessary for Mr. Andrews to arrive at the opinion that the Accused Devices do not infringe. (*Id.* at pp. 7–8).

CalAmp responds that Mr. Andrews has not deviated from the Court's construction of controller. (Doc. 75, p. 4). To the contrary, CalAmp argues that Mr. Andrews' observation that "[a] controller (both as defined by this Court, and as described in the '876 patent) would have the ability to 'perform one or more control functions' to enable a physical change in a device or the system, for example locking a door, starting the engine, or turning on a light," is merely an explanation of why the Accused Devices do not infringe upon the patent. (*Id.*). Mr. Andrews states in his report that "[a] person of ordinary skill in the art would recognize that neither the LMU-3000 nor the LMU-3030 are multi-vehicle compatible controllers" because they are passive devices that request and receive data

via the bus without the ability to "perform one or more control functions."[4] (*Id.*). Mr. Andrews submits that a person of ordinary skill in the art would understand the phrase "perform one or more control functions" to include enabling a physical change in the device or the system, such as locking a door. (*Id.*). CalAmp asserts that Mr. Andrews is explaining the plain meaning of the term "control function" and is not construing the term. (*Id.*).

The parties agreed that "controller" should be defined as "[e]lectronic circuitry that performs one or more control functions." (Doc. 50, p. 6). The Court was not asked to interpret the term "control function," leaving the parties free to present evidence regarding the meaning of these words to those of ordinary skill in the art. To the extent Omega disagrees with Mr. Andrews' opinion regarding whether one of ordinary skill in the art would consider "control function" to include a physical change in a device or system, Omega may present contrary evidence. However, Mr. Andrews' interpretation of the meaning of the previously undefined term "control function" does not rise to the level of claim construction which conflicts with the Court's prior pronouncement. Omega's motion to preclude Mr. Andrews from rendering an opinion concerning the meaning of "control function" to a person of ordinary skill in the art and the significance of that term to the issue of infringement is denied. Mr. Andrews will be permitted to offer his opinion

[4]The Court "may not use the accused product or process as a form of extrinsic evidence to supply limitations for patent claim language" which prevents the Court from "tailoring a claim construction to fit the dimensions of the accused product or process"; however, the rule does not preclude "awareness of the accused product or process to supply the parameters and scope of the infringement analysis." *Wilson Sporting Goods Co. v. Hillerich & Bradsby Co.*, 442 F.3d 1322, 1330–31 (Fed. Cir. 2006). Omega suggests that Mr. Andrews has transgressed this rule, but the rule limits the Court's construction of the claim and not the expert's testimony. To the extent the same limitation should apply to an expert, Omega has failed to demonstrate how Mr. Andrews' opinions transgress this rule.

regarding how persons of ordinary skill in the art would interpret the term "control function" and whether the Accused Devices infringe upon the patents-in-suit.[5]

B. Controller Storing A User Selected Reference Location

Omega seeks to preclude Mr. Andrews from presenting testimony concerning the meaning of "controller storing a user selected reference location" in relation to his opinion that the Accused Devices do not infringe upon the '989 Patent. (Doc. 55, p. 8). Omega contends that this term was never identified by CalAmp as a disputed term subject to construction by the Court and that Mr. Andrews' testimony violates the prohibition against crafting claim limitations based on the Accused Products and contravenes the doctrine of claim differentiation. (*Id.* at p. 9). At the heart of this dispute is whether the '989 Patent requires a user to select a reference location at the controller. (*Id.*). If the '989 Patent contains this limitation, the Accused Devices do not infringe upon the patent because the Accused Devices do not permit the user to select a reference location at the controller. (*Id.*).

Mr. Andrews discusses the prosecution history before the USPTO in concluding that those skilled in the art would understand the term "controller storing a user selected reference location" to require the user to select the reference location at the controller in the vehicle. (*Id.*). Omega notes that claim 1 of the '989 Patent refers to the user selecting the location from within the vehicle, while claim 23 does not contain this limitation. (*Id.* at p. 10). According to Omega, the contrast between claim 1 and claim 23 are fatal to Mr.

[5] Omega does not challenge Mr. Andrews' testimony on any grounds other than the premise that he ignores the Court's claim construction. Moreover, to the extent Omega suggests Mr. Andrews interprets "control function" differently in his validity and infringement opinions, Omega may inquire about this on cross-examination.

Andrews' opinion that the term "controller storing a user selected reference location" requires the user to select the reference location at the controller in the vehicle. (*Id.*).

CalAmp replies with two commonsense arguments: first, neither Omega nor CalAmp submitted the term to the Court for construction, and, second, Omega's expert, Joseph McAlexander, opines that the Accused Devices infringe upon the '989 Patent, making the response by Mr. Andrews fair game. (Doc. 75, p. 7). Since neither party elected to submit this term to the Court for construction, and because both parties' experts are discussing the meaning of the term, it defies logic to allow Mr. McAlexander to testify concerning the meaning of the term to persons of ordinary skill in the art while preventing Mr. Andrews from presenting his contrary interpretation. CalAmp correctly observes that where neither party seeks construction of a term which is at issue, the "courts give those terms their ordinary and customary meaning . . . to a person of ordinary skill in the art in question at the time of the invention." *Apple*, 2014 WL 660857, at *24.

It is clear that claim 1 of the '989 Patent includes the following limiting language: "at least one input device to be positioned within the vehicle for setting the user selected reference location." (Doc. 57-2). Claim 23 of the '989 Patent is nearly identical to claim 1, but claim 23 does not include an input device within the vehicle to allow the user to select the reference location. (*Id.*). Both of these claims are independent claims, and the doctrine of claim differentiation "refers to the presumption that an independent claim should not be construed as requiring a limitation added by a dependent claim." *Curtiss-Wright Flow Control Corp. v. Velan, Inc.*, 438 F.3d 1374, 1380 (Fed. Cir. 2006). In the context of two independent claims, such as claims 1 and 23 of the '989 Patent, "claim differentiation takes on relevance in the context of a claim construction that would render additional, or

different, language in another independent claim superfluous; and . . . claim differentiation 'can not broaden claims beyond their correct scope.'" *Id.* at 1381. It appears that Mr. Andrews' interpretation of claim 23 renders the language in claim 1 regarding "at least one input device to be positioned within the vehicle for setting the user selected reference location" superfluous. However, the Federal Circuit has cautioned that "claim drafters can also use different terms to define the exact same subject matter." *Id.* at 1380.

Whether the testimony of Mr. Andrews is undermined by the embodiments contained in the patent, or by the juxtaposition of claims 1 and 23, is a matter for cross-examination. That is, Omega is free to cross-examine Mr. Andrews on the basis for his opinion that claim 23 would be understood by a person of ordinary skill in the art to require the user to select a reference location at the vehicle. Omega's motion to preclude Mr. Andrews from rendering an opinion that the term "controller storing a user selected reference location" requires the user to select the reference location at the controller in the vehicle and its significance to the issue of infringement is therefore denied. However, the Court finds the admissibility of Mr. Andrews' expert testimony on this point to be an extremely close question, and the Court may revisit this ruling during the course of the trial before Mr. Andrews testifies and may require a proffer from Mr. Andrews outside the presence of the jury, depending on the state of the evidence at that juncture.

C. Command Signal

Omega moves to exclude Mr. Andrews from testifying that the term "command signal" includes "using only a single bus interface protocol." (Doc. 55, p. 10). At the *Markman* hearing, CalAmp proposed that "command signal" be construed as "signal generated on the data communications bus for operating a vehicle device to cause a

desired function to be performed at the vehicle." (Doc. 50, p. 13). The Court adopted the construction proposed by Omega and construed "command signal" as "signal generated on the data communications bus for operating a vehicle device." (*Id.* at p. 15). Unlike the term "controller storing a user selected reference location," the term "command signal" was presented to the Court for construction. However, neither Omega nor CalAmp proposed or suggested that command signal should include a definition of the number of interface protocols used to send a non-working command signal. This issue appears for the first time in the report of Omega's expert, Mr. McAlexander.

CalAmp contends that Mr. Andrews is not construing the term "command signal" to include any new limitations. (Doc. 75, pp. 10–11). Omega's expert, Mr. McAlexander, opines in his report that "sending a Mode 1, PID 0 message using various interface protocols constitutes sending working and non-working command signals." (*Id.* at p. 10). Mr. Andrews rebuts Mr. McAlexander's opinion that various bus interface protocols are being used and opines that, in fact, the '876 Patent envisions a single bus protocol and a multitude of command signals. (*Id.*). CalAmp contends that Mr. Andrews does not construe "command signal" and is only explaining the difference between working and non-working command signals and is supporting his opinion that a Mode 1, PID 0 request incompatible with a particular bus cannot be a non-working command signal. (*Id.* at p. 11).

Omega's motion to preclude Mr. Andrews from limiting the construction of "command signal" is denied. Mr. Andrews' testimony is offered to rebut the opinion testimony of Mr. McAlexander and is not intended to construe the term "command signal."[6] It is noteworthy that CalAmp did not have the expert testimony of Mr.

[6] The relevant portion of the '876 Patent provides as follows:

McAlexander at the time of the *Markman* hearing. Therefore, it seems unlikely CalAmp would have known to anticipate the need for construction of "command signal" to include construction of the number of interface bus protocols used to send working or non-working command signals.

D. Whether Mr. Andrews' Opinions Rely on Inconsistent Claim Interpretations

Omega submits that CalAmp's expert, Mr. Andrews, inconsistently applies his opinions regarding how a person of ordinary skill in the art would interpret certain language within the above claims. (Doc. 55, p. 11). That is, Omega contends that Mr. Andrews must apply claims the same way for validity and for infringement and may not apply a different construction for each analysis. (*Id.*). By failing to apply claim terms consistently, Omega concludes that Mr. Andrews' testimony is unreliable and inadmissible. (*Id.*). Omega cites to a single question and answer contained in Mr. Andrews' deposition to support the proposition that he applies terms inconsistently. (*Id.*).

> The multi-vehicle compatible controller preferably generates at least one set of command signals on the data communications bus for the at least one vehicle device. The at least one set of command signals preferably comprises at least one working command signal and at least one non-working command signal for a given vehicle to thereby provide compatibility with a plurality of different vehicles. In other words, multiple signals or codes can be generated on the data communications bus, and only that code for the given vehicle and device will cause an operation or response from the vehicle device.

(Doc. 57-1, '876::3:9–20). Neither party directs the Court to the term "interface protocol" in the '876 Patent.

CalAmp replies that the single question and answer are taken out of context. (Doc. 75, pp. 11–12). The Court has reviewed the relevant portions of Mr. Andrews' deposition and finds the quoted exchange insufficient to demonstrate that Mr. Andrews inconsistently applies terms in his validity and infringement analyses. Omega cites *W.L. Gore & Associates., Inc. v. Garlock, Inc.*, 842 F.2d 1275, 1279 (Fed. Cir. 1988), for the proposition that inconsistent application of terms renders the expert's opinions unreliable. (Doc. 55, p. 11). However, *W.L. Gore* addresses the law of the case doctrine, which holds that once a court construes the claims one way for determining their validity, it must construe the claims the same way for infringement. *Id.* It is logical that an expert should not be permitted to use conflicting interpretations of terms in rendering validity and infringement opinions, but the record is insufficient for the Court to conclude that Mr. Andrews is, in fact, engaging in such analysis. Omega's motion to preclude Mr. Andrews from relying on inconsistent claim interpretations is therefore denied.

E. Whether Mr. Andrews Failed to Articulate Motivation to Combine or Consider Secondary Considerations of Non-Obviousness

It is undisputed that Mr. Andrews' opinions of invalidity as to all five of the patents-in-suit are based on obviousness. (Doc. 55, p. 12). With regard to the '876, '885, '727, and '278 Patents, Mr. Andrews combines several reference to prior art, including certain references to the Society of Automotive Engineers ("SAE"), in rendering his opinion of obviousness. (*Id.*). Omega identifies the patents-in-suit and the specific references to SAE standards in their motion. (*Id.* at p. 13).

"Generally, a party seeking to invalidate a patent as obvious must demonstrate by clear and convincing evidence that a skilled artisan would have had reason to combine the teaching of the prior art references to achieve the claimed invention, and that the

skilled artisan would have had a reasonable expectation of success from doing so." *In re Cyclobenzaprine Hydrochloride Extended-Release Capsule Patent Litig.*, 676 F.3d 1063, 1068–69 (Fed. Cir. 2012) (internal quotation marks omitted). Obviousness must be established by clear and convincing evidence that a combination of prior art references leads to the conclusion that the invention was obvious to one of skill in the art at the time of the invention. *In Touch Techs., Inc. v. VGO Commc'ns., Inc.*, 751 F.3d 1327, 1352 (Fed. Cir. 2014). "[H]indsight analysis is inappropriate because obviousness must be assessed at the time the invention was made." *Cyclobenzaprine Hydrochloride Litig.*, 676 F.3d at 1073. Accordingly, the failure of an expert to articulate why one of ordinary skill in the art would combine the prior art references warrants excluding the expert's opinion on invalidity. *Innogenetics, N.V. v. Abbot Labs.*, 512 F.3d 1363, 1373 (Fed. Cir. 2008).

Omega contends that Mr. Andrews improperly relied on hindsight reasoning to support his obviousness conclusions and errs by using Omega's infringement contentions and the patents as a road map to combine the prior art references. (Doc. 55, p. 13). Additionally, Omega asserts that Mr. Andrews failed to articulate a basis for combining the prior art references and that Mr. Andrews did not consider objective indicia of nonobviousness. (*Id.* at pp. 13–14). Objective indicia of nonobvious includes "evidence of unexpected results, expert skepticism, copying, commercial success, praise by others . . . , failure by others, and long-felt need." *Mintz v. Dietz & Watson, Inc.*, 679 F.3d 1372, 1379 (Fed. Cir. 2012).

CalAmp disagrees with Omega's characterization of Mr. Andrews' invalidity analysis and quotes extensively from Mr. Andrews' Invalidity Report. (Doc. 75, pp. 14–

15). Mr. Andrews identifies the proper legal standard for obviousness, including objective indicia of nonobviousness, and he attests that the principles were applied in his analysis. (*Id.* at p. 14). Furthermore, it is clear from his Invalidity Report that Mr. Andrews examines the issue of obviousness from the perspective of one skilled in the art before the date of the invention. (*Id.*). Based upon the record, including the Invalidity Report (Doc. 57-12), Mr. Andrews considered and expressed why a person skilled in the art would be motivated to use the teachings of J1978, the '479 Patent, and other prior art, prior to the date of the invention. (Doc. 75, pp. 14–15). Finally, CalAmp quotes from Mr. Andrews' deposition to demonstrate that he considered secondary indicia of nonobviousness and found it to be unpersuasive. (*Id.* at p. 18). Accordingly, the methodology employed by Mr. Andrews in rendering his invalidity (obviousness) opinions is sufficiently reliable to allow his opinions to be presented.[7] Omega's motion to exclude Mr. Andrews' opinions as to invalidity (obviousness) is denied.

F. Exclusion of Opinions Not Clearly Reported

Omega objects to and seeks exclusion of any opinions offered by Mr. Andrews as to invalidity relating to the '850, '254, '492, '106, '545, '268, '157, and '537 Patents, Japanese Pub Hei 11[1999]-62793, and OBD II to RS-232 Interface Adapter AutoTap (1998 Copyright date), which are attached to the Invalidity Report as Exhibits 24 through 33 (Doc. 57-12, p. 14; Doc. 55, p. 15). Mr. Andrews identifies these prior art references under a section of his report entitled "Additional References." (Doc. 57-12, p. 14). The prior art references are preceded by the following narrative:

[7] The Court is persuaded by CalAmp's explanation of Mr. Andrews' deposition testimony wherein he states he "ran out of time," referring to lacking time to continue his review of secondary indicia of nonobviousness.

> In addition to the references discussed above, I also considered a number of additional prior art references that also disclosed the elements claimed by Omega's patents. For reasons of brevity, they were not include in the detailed discussion which follows. However, it is my opinion that these references also disclose all of the elements of each asserted claim of the Omega patents, and could be used alone, in combination with themselves, or in combination with references disclosed above to show additional reasons why the asserted Omega patents are not valid in view of the prior art.

(*Id.*).

Mr. Andrews dedicates the balance of the Invalidity Report to explaining how the prior art references identified in Exhibits 8 through 23 relate to obviousness. (Doc. 57-12, pp. 19–221). Omega contends that the "Additional References" to ten prior art references, devoid of any analysis, fails to comply with Federal Rule of Civil Procedure 26, justifying the exclusion of this testimony. If such testimony were permitted, it could result in each of the ten prior art references individually being combined with one or more of the fifteen prior art references already discussed to produce an opinion of invalidity.

In response, CalAmp suggests that an expert may testify beyond the scope of his report in the absence of surprise or bad faith. *Bowersfield v. Suzuki Motor Corp.*, 151 F. Supp. 2d 625, 631 (E.D. Pa. 2001). CalAmp rather surprisingly concludes that "there is no possibility of surprise as Mr. Andrews identifies the prior art reference" and included the ten prior art references as exhibits. (Doc. 75, p. 20).

Federal Rule of Civil Procedure 26 requires more than a mere recitation of exhibits which may—in some undefined manner and through numerous unspecified combinations—demonstrate obviousness. Complying with Rule 26 is "'not merely an aspiration' as 'the expert witness discovery rules are designed to allow both sides in a case to prepare their cases adequately and to prevent surprise.'" *Bray & Gillespie Mgmt.*

LLC v. Lexington Ins. Co., No. 6:07-cv-222-Orl-35KRS, 2009 WL 1043974, at *3 (M.D. Fla. Apr. 17, 2009) (quoting *Reese v. Herbert,* 527 F.3d 1253, 1266 (11th Cir. 2008)). For this very reason, Rule 26 requires an expert to provide a "complete statement of all opinions the witness will express and the basis and reasons for them." Fed. R. Civ. P. 26(a)(2)(B)(i). It took Mr. Andrews 202 pages to articulate the reasons why and how the fifteen prior art references attached to the report as Exhibits 8 through 23 support a finding of invalidity. Using this as a yardstick, Omega could reasonably expect a similar analysis involving the ten "additional references" to require approximately 134 pages of analysis.[8] The fact that Mr. Andrews elected to exclude this detailed analysis "for reasons of brevity" is not an acceptable justification for deviating from Rule 26 and does not prevent Omega from being prejudiced. The omission of critical analysis from the Invalidity Report constitutes bad faith or, at a minimum, reflects an approach to litigation which runs contrary to the high standards of behavior established in the Federal Rules of Civil Procedure and which are expected to be followed by expert witnesses testifying in federal court.

The Court finds the violation of Rule 26, as it pertains to the ten prior art references identified in Mr. Andrews' report, to have resulted in substantial prejudice to Omega such that the only proper remedy at this late date is the exclusion of Exhibits 24 through 33 along with the testimony relating to how the prior art references relate to Mr. Andrews' opinions. Accordingly, Omega's motion to exclude opinions not clearly stated in the Rule 26 report is granted.

[8] If the ten additional references are combined with the existing fifteen references, the page count necessary to articulate the basis for invalidity climbs considerably.

IV. DISCUSSION AS TO DEFOREST MCDUFF

Omega moves to exclude CalAmp's expert, DeForest McDuff, Ph.D. Dr. McDuff was retained by CalAmp to opine on the amount of damages to which Omega would be entitled if CalAmp is found to have infringed Omega's asserted patents. Omega argues that Dr. McDuff utilizes improper methodologies to reach his ultimate opinion. Therefore, Omega contends that Dr. McDuff should be excluded from testifying in this case.

A. Whether Dr. McDuff is qualified to testify competently regarding the matters he intends to address.

Omega stated at the *Daubert* hearing that it does not contest that Dr. McDuff is qualified to render testimony regarding damages in this case. A review of Dr. McDuff's qualifications (McDuff Report, Doc. 66-1, p. 1) assures the Court that this prong of the analysis need not be addressed further.

B. Whether the methodology by which Dr. McDuff reaches his conclusions is sufficiently reliable.

Dr. McDuff's ultimate opinion on the amount of damages to which Omega may be entitled can be broken down into three steps. First, Dr. McDuff calculated CalAmp's incremental profits on the sales of the Accused Devices. This reduced the average sales price of an Accused Device from $101 to an incremental profit value of approximately $11.00 to $12.40. Second, Dr. McDuff utilized a word count methodology based on the Accused Devices' marketing materials. Using a calculation explained in further detail below, this reduced the $11.00 to $12.40 value range to an $0.81 to $0.90 value range. Third, Dr. McDuff employed a marketing theory with a variation of a 50/50 split to reduce the $0.81 to $0.90 value range to a final value of $0.37 to $0.41 value range. The Court addresses each step of Dr. McDuff's analysis in turn.

1. Step One: Artificial Cap

Omega first argues that Dr. McDuff's opinion should be excluded because Dr. McDuff improperly used the incremental profits of the sales of the Accused Devices as a hard cap on Omega's damages. In measuring patent infringement damages, "[a] patentee is entitled to no less than a reasonable royalty on an infringer's sales for which the patentee has not established entitlement to lost profits." *Rite-Hite Corp. v. Kelley Co.*, 56 F.3d 1538, 1554 (Fed. Cir. 1995). Lost profits are not at issue in this case; thus, Omega's damages are limited to a reasonable royalty. In determining what constitutes a reasonable royalty, the factfinder may look to either (1) an established royalty, if available, or, if not (2) "the supposed result of hypothetical negotiations between the plaintiff and defendant" at the time infringement began. *Id.* As to the hypothetical negotiation, the Federal Circuit "has sanctioned the use of the *Georgia-Pacific*[9] factors to frame the reasonable royalty inquiry." *Uniloc USA, Inc. v. Microsoft, Corp.*, 632 F.3d 1292, 1317 (Fed. Cir. 2011). "A reasonable royalty may be a lump-sum payment not calculated on a per unit basis, but it may also be, and often is, a running payment that varies with the number of infringing units. In that event, it generally has two prongs: a royalty base and a royalty rate." *VirnetX, Inc. v. Cisco Sys.*, 767 F.3d 1308, 1326 (Fed. Cir. 2014).

Dr. McDuff first calculated the incremental profits for the sales of the Accused Devices as follows:

> First, I calculate CalAmp's incremental expenses by multiplying CalAmp's average sales price by CalAmp's incremental expenses as a percent of revenue. Then, I deduct the incremental expenses from CalAmp's gross profit to determine CalAmp's incremental profit. This results in an

[9] *Georgia-Pacific Corp. v. U.S. Plywood Corp.*, 318 F. Supp. 1116, 1120 (S.D.N.Y. 1970) (setting forth a non-exhaustive list of fifteen factors).

> apportioned incremental profit per unit for the LMU-3000 ranging from $11.00 to $17.73 and for the LMU-3030 ranging from $6.31 to $21.71.

(McDuff Report, Doc. 66-1, p. 34). Omega asserts that this methodology, while not flawed in and of itself, improperly caps Omega's reasonable royalty rate at a number no larger than CalAmp's historical incremental profits.

Omega argues that such a cap is improper because an infringer's profits cannot be used as a hard cap on the reasonable royalty rate. Omega contends that this error alone necessitates the exclusion of Dr. McDuff as an expert. In *Douglas Dynamics, LLC v. Buyers Products Co.*, 717 F.3d 1336, 1346 (Fed. Cir. 2013), the Federal Circuit noted that the district court erred in limiting the royalty rate of the infringer's profit margins, stating, "This court has held that an infringer's net profit margin is not the ceiling by which a reasonable royalty is capped." *See also Powell v. Home Depot U.S.A., Inc.*, 663 F.3d 1221, 1238 (Fed. Cir. 2011). Stated differently, "There is no rule that a royalty be no higher than the infringer's net profit margin." *Golight, Inc. v. Wal-Mart Stores, Inc.*, 355 F.3d 1327, 1338 (Fed. Cir. 2004). Additionally, Omega asserts that Dr. McDuff did not look at or analyze any of the other *Georgia-Pacific* factors in reaching his starting point for calculating a reasonable royalty.

While CalAmp agrees with Omega as to the law on this issue, CalAmp responds that Dr. McDuff employed this methodology to simply determine a measure of economic value to CalAmp as a starting point that would be relevant to the hypothetical negotiation for the patents-in-suit. CalAmp explains that the figure provides a sense for the profit that would be earned from the sale of each product and a number by which CalAmp would be willing to enter into a hypothetical licensing agreement. As Dr. McDuff explains, a party

to a hypothetical negotiation would want to consider the incremental profit of each additional sale of the allegedly infringing product.

The Court agrees with CalAmp that the first step in Dr. McDuff's analysis is merely a starting point for his calculations. The methodology used by Dr. McDuff in calculating CalAmp's incremental profits is technically sound. Had this been Dr. McDuff's sole methodology used to calculate a reasonable royalty in this case, the Court's conclusion might have been different. However, because Dr. McDuff's calculation of a reasonable royalty does not stop here, the Court will not exclude Dr. McDuff's opinion in this case solely on this basis.

2. Step Two: Relative Marketing Emphasis Theory/Word Count

Omega asserts that Dr. McDuff has employed a novel and untestable approach to further reduce the royalty rate to which Omega might be entitled. "No matter what the form of the royalty, a patentee must take care to seek only those damages attributable to the infringing features." *VirnetX*, 767 F.3d at 1326. Thus, an expert must apply "principles of apportionment" in determining a reasonable royalty rate. *Id.* Here, Dr. McDuff analyzed two of CalAmp's marketing brochures (Docs. 57-6, 57-7)[10] to conduct a word count of certain key words and phrases. He describes the methodology as follows: "Next, I apportion to the contribution of the accused functionality as alleged to be commercialized within the LMU-3000 and LMU-3030 tracking units. I utilize the relatively [sic] marketing emphasis of various phrases relating to the contributions of the accused data bus and vehicle tracker functionalities." (McDuff Report., Doc. 66-1, p. 34). Explained more simply,

[10] Docket Entry 57-6 relates to the LMU-3000 and Docket Entry 57-7 relates to the LMU-3030.

Dr. McDuff counted the total words in certain sections of the marketing brochures and then selected certain words which related to the asserted patents. (McDuff Report, Doc. 66-2, Figs. 3, 4). He then counted the number of chosen words and calculated the proportion of these words to all words to assign a value to solely the patented features in the Accused Devices. For example, as to the LMU-3000, out of the 280 words selected by Dr. McDuff, 5.4% of the device is apportioned to the data bus feature and 2% to the vehicle tracker feature.

Omega contends that this word counting technique is subjective since the back side of the marketing brochures' words and the bolded bullet points' words on the front side of the marketing brochures were not counted. The backside of the marketing brochure lists "Key Features" of the products, but Dr. McDuff did not account for these. Moreover, Dr. McDuff testified in his deposition that the information in the bullet points can be to highlight the most important product features. (McDuff Depo., Doc. 66-4, 75:8–24). However, he excluded them because they were "less representative of a means of determining a relative marketing emphases." (*Id.*).

More importantly, Omega contends that Dr. McDuff did not reliably count the words he did select in apportioning them to the asserted patents. For example, as to the LMU-3000, part of the marketing brochure reads, "These features enable the LMU-3000 to access vehicle diagnostic data, track vehicle speed and location, plus detect hard braking, cornering, and acceleration." (Doc. 57-6). The phrase "track vehicle speed and location" is not apportioned to the patents despite the asserted claims to a "vehicle position detecting device" in the '989 Patent and determining "vehicle speed" in the '727 Patent.

Further, the same weighted value is given to articles such as "the" and "and" as they are to phrases like "interface data."

On a broader level, Dr. McDuff did not speak to anyone at CalAmp to determine whether his choice of words in the marketing materials was appropriate given that he is not an engineer. (McDuff Depo., Doc. 66-3, 18:5–11). Further, it is unclear to the Court who wrote the marketing materials and whether they should even be relied upon for any meaningful comparison. As discussed at the *Daubert* hearing, it is unclear whether the sophisticated buyers of the Accused Devices rely on these marketing brochures in deciding whether to purchase the products. CalAmp has not presented any evidence to tie the specific portions of the marketing brochures to the asserted patents.

Neither Dr. McDuff nor CalAmp has been able to point the Court to this type of methodology being accepted by or even utilized by other courts or experts in this field. Dr. McDuff himself acknowledged that there was no way to calculate an error rate using this methodology. (McDuff Depo., Doc. 66-4, 91:3–6). Thus, there is no way for the Court to determine reliability as to this portion of Dr. McDuff's opinion. Dr. McDuff's methodology cannot be tested, has not been subjected to peer review, has no known error rate, and, as far as the Court is aware, has not been generally accepted in the relevant scientific community. *Daubert*, 509 U.S. at 593–94. These are deficits that cannot be cured on cross-examination. Thus, Dr. McDuff's opinion is due to be excluded.

3. Step Three: Nash Bargaining Solution/Muthoo

As a final matter, Omega contends that Dr. McDuff's last step in his damages opinion uses what is, in reality, a version of the rejected "Nash Bargaining Solution." Dr. McDuff undertakes what could be considered a second round of apportionment to

determine "how much of the benefit from Omega's patented inventions was contributed by Omega, and as a corollary, how much benefit Calamp gets for incorporating functionality that infringes Omega's patents in Calamp's products." (Doc. 56, p. 12). The Nash Bargaining Solution envisions two people in a bargaining negotiation and attributes a 50/50 split of the incremental profits between the licensor and the licensee based on generic assumptions. CalAmp contends that the framework Dr. McDuff employed from economist Abhinay Muthoo utilizes discount rates specific to the parties and is not the Nash Bargaining Solution.

The Federal Circuit has previously rejected the utilization of blanket assumptions in determining a reasonable royalty rate; rather, the application of a general theory must be tied to the facts of the particular case. *Uniloc*, 632 F.3d at 1316. In *Uniloc*, the Federal Circuit rejected the 25% Rule of Thumb because it had no relation to the facts of the case such that it was "arbitrary, unreliable, and irrelevant." *Id.* at 1318. Similarly, in *VirnetX, Inc. v. Cisco Sys.*, 767 F.3d 1308 (Fed. Cir. 2014), the expert on damages modified a Nash Bargaining Solution profit split by 10% to represent a weaker bargaining position for one of the parties. The Federal Circuit rejected this use of the Nash Bargaining Solution as similar to the 25% Rule of Thumb and not tied to the particular facts of the case. *Id.* at 1331–34.

Omega asserts that the Muthoo theory put forth by Dr. McDuff is a form of the Nash Bargaining Solution in disguise. Omega asserts two reasons why Dr. McDuff's opinion on this topic is improper: (1) Dr. McDuff made six assumptions in deriving his opinion which are not specific to the facts of this specific case, and (2) the WACC derived for Omega uses unrelated company data that cannot be compared to Omega.

First, Dr. McDuff sets forth six assumptions for the Muthoo model. The assumptions are as follows: (1) gains from trade, (2) positive discount rates, (3) additional offers can be made, (3) concentration of offers at a point in time, (5) linear utility in monetary value, and (6) symmetric information regarding time preference. (McDuff Report, Doc. 66-1, pp. 41–42). Then, to distinguish his opinion from a straightforward Nash calculation, Dr. McDuff uses a weighted average costs of capital ("WACC") as follows:

> I determine the share of the apportioned incremental profits that would go to Omega based on relative discount rates according to their respective weighted average costs of capital (WACC). The companies' respective WACCs provide an economic determination of the parities' opportunity costs of capital and thus willingness to contribute to the respective negotiation over apportioned revenues. I use Calamp's WACC as reported by Bloomberg, which indicates WACCs ranging from 8.8% to 12.7% for fiscal years 2010 to 2015. I calculate Omega's WACC using Ibbotson Cost of Capital Yearbooks and the relevant SIC code for Omega, which indicates WACCs ranging from 12.1% to 14.6% for years 2011 to 2012. I utilize 12.2% for Calamp's discount rate and 14.6% for Omega's discount rate in 2011, the year when the hypothetical negotiation would occur, noting that Omega's small size and individual ownership indicate that, if anything, its discount rate would be relatively higher than the values report by Ibbotson.

(*Id.* at pp. 42–43) (citations and footnotes omitted).

WACCs measure the overall financial strength of a company. (McDuff Depo., Doc. 66-6, 145:19–146:4). Dr. McDuff utilized WACCs taken from Bloomberg for CalAmp and from Ibbotson Cost of Capital Yearbooks, using what he asserts are comparable companies, for Omega. To calculate the WACC for a company, one must know the company's cost of equity and debt, the market value of the company's debt and equity, the percentage of financing that is debt and equity, and the corporate tax rate. Dr. McDuff

testified that he did not know this information as it pertained to Omega. (McDuff Depo., Doc. 66-5 126:7–12; Doc. 66-6, 142:6–11, 143:12–13). Ultimately, Dr. McDuff determined that Omega would receive a 45.5% share of the apportioned incremental profits with the remaining share to CalAmp using the Muthoo model and WACC calculations. (McDuff Report, Doc. 66-1, p. 43).

Setting aside the six assumptions put forth by Dr. McDuff and looking only at the WACC he calculated for Omega, the Court finds that CalAmp has failed to offer sufficient evidence that the Ibbotson Cost of Capitol Yearbook provides an adequate and reliable WACC for Omega. As stated above, Dr. McDuff did not attempt to calculate the WACC for Omega using its own data. Other than the fact that Omega was not reported as an individual company in Ibbotson or on Bloomberg, the extent of the explanation for using a small subset of companies in Ibbotson for Omega's WACC is contained in a footnote which only describes Ibbotson's mission "to provide the latest and most up-to-date financial and cost of equity information possible." (McDuff Report, Doc. 66-1, p. 42 n.152). The exact companies used in the Ibbotson analysis are not specifically identified. (McDuff Depo., 66-5, 122:6–123:22). Thus, it is unclear to the Court what, if any, economic similarities these companies share with Omega. Dr. McDuff asserts that the companies within this subset are comprised of smaller companies within the patent industry (McDuff Depo., Doc. 66-5, 122:22–123:3), but other than this general proposition, no further detail is provided. Further, Dr. McDuff concedes that if the WACC calculation is excluded, the implication of the Muthoo model would result in a 50/50 split (McDuff Depo., Doc. 66-5, 137:9–13), a method that has been rejected by the Federal Circuit when the rationale for doing so is not tied to the specific facts of the case. Thus, even if the Court were not to

exclude Dr. McDuff's analysis under Step 2, Step 3 is also unreliable as being insufficiently grounded in the particular facts of this case. Dr. McDuff's opinion is due to be excluded under this step as well.

C. Whether Dr. McDuff's testimony will assist the trier of fact

As the Court has found that the methodology used by Dr. McDuff to reach his ultimate damages calculation is flawed and unreliable, the Court does not reach the issue of whether his testimony would assist the trier of fact. CalAmp has failed to prove by a preponderance of the evidence that Dr. McDuff passes the *Daubert* threshold to testifying as an expert in this case.

V. CONCLUSION

Accordingly, it is **ORDERED AND ADJUDGED** as follows:

1. Plaintiff's Motion and Memorandum of Law to Exclude the Testimony of Defendant's Expert Eric Andrews (Doc. 55) is **GRANTED IN PART AND DENIED IN PART** as follows:
    a. The Motion is **GRANTED** as provided for in Section III.F.
    b. The Motion is **DENIED** in all other respects.
2. Plaintiff's Motion and Memorandum of Law to Exclude the Testimony of Defendant's Expert on Damages (Doc. 56) is **GRANTED**.

DONE AND ORDERED in Orlando, Florida on December 23, 2015.

PAUL G. BYRON
UNITED STATES DISTRICT JUDGE

Copies furnished to:
Counsel of Record

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Patent of **KENNETH E. FLICK**	)	
	)	
Request for Reexamination of	)	
U.S. PATENT NO.8,032,278	)	
	)	
Control No. **90/013,587**	)	Attorney Docket No.:
	)	**C13-03895(0058106CIP1_REX)**
Confirmation No. **8867**	)	
	)	Examiner: **M. GRAHAM**
Filing Date: **SEPTEMBER 14, 2015**	)	
	)	Art Unit: **3993**
For: **VEHICLE TRACKING UNIT WITH DOWNLOADABLE CODES AND ASSOCIATED METHODS**	)	

PATENT OWNER'S STATEMENT

EFILE
Commissioner for Patents

Commissioner:

In response to the Order Granting a Reexamination Request of November 10, 2015, the Patent Owner respectfully submits that following statement.

REMARKS

The Examiner is thanked for the Order determining that several of the references cited in the Request for Reexamination fail to raise a substantial new question of patentability (SNQ). In particular, U.S. Patent Nos. 6,346,976 to Flick and 5,555,498 to Berra were each determined not to raise an SNQ.

The Examiner has determined, based upon representations of the Requester, that five remaining references did raise an SNQ. The Patent Owner points out that several of the remaining references were indeed already considered by the examiner during prosecution of the U.S. Patent No. 8,032,278 (Flick '278 patent). Nevertheless, the Patent Owner also offers arguments clearly pointing out why the claims are believed to be patentable over these remaining references.

I. Background

A. Litigation

Personnel of the reexamination Requester, i.e. CalAmp Corporation (CalAmp), began patent licensing discussions with Mr. Flick, President of the Patent Owner, Omega Patents L.L.C., in approximately 2005. Meetings were held in 2009 and a patent license was offered, and rejected, resulting in a lawsuit filed December 14, 2009. This suit did not involve the Flick '278 patent, and was resolved on June 9, 2010.

On November 22, 2011, the Patent Owner filed a lawsuit against SkyPatrol, L.L.C. and Enfora, Inc., and CalAmp was added to this suit on May 21, 2012. CalAmp paid a license fee and the case (as it pertained to CalAmp) was resolved on August 29, 2012. This case did not involve the Flick '278 patent.

Further licensing discussions with CalAmp failed and another lawsuit was filed against CalAmp on December 20, 2013. This suit is ongoing, and does include the Flick '278 patent, among others. Attached are copies of the Complaint (Exhibit A), the Amended Answer (Exhibit B), the Markman Order (Exhibit C), the Summary Judgment Order (Exhibit D), and the Daubert Order (Exhibit E) excluding the testimony of CalAmp's financial expert from testifying at trial.

The jury trial to resolve the current litigation with CalAmp is scheduled to begin on February 16, 2016.

B. Other PTO Proceedings Involving Patent Owner and Requester

In addition to the present Reexamination Request for the Flick '278 patent, CalAmp has just filed (on December 11, 2015) another Reexamination Request for U.S. Patent No. 6,346,876 to Flick, owned by the Patent Owner, Omega Patents L.L.C. and asserted in the current litigation against CalAmp. The serial number for this reexamination is 90/013,659.

CalAmp has also filed several Third-Party Preissuance Submissions against other patent applications of the Patent Owner as follows:

14/208,217 filed March 26, 2015;

14/208,169 filed March 20, 2015; and

14/208,267 filed April 7, 2015.

CalAmp has also filed one Protest against another patent application of the Patent Owner:

14/504,987 filed July 6, 2015.

CalAmp filed its own patent application on December 21, 2011, serial no. 13/332,848 (now U.S. Patent No. 8,812,173

to Chen et al. (Chen et al. '173 patent)) admittedly copying the drawings FIGS. 36 and 37, descriptive language, and select claim language from U.S. Patent No. 6,924,750 to Flick and assigned to the present Patent Owner, Omega Patents L.L.C.. The copied Chen et al. '173 patent claims priority to a provisional application filed December 21, 2011. CalAmp filed and obtained a continuation for the Chen et al. '173 patent, and that continuation is now issued U.S. Patent No. 9,171,460.

II. The References

A. References Determined to Raise an SNQ

The Examiner, based on the representations by the Requester, CalAmp, determined that each of the following U.S. Patents raises an SNQ, which question has not been previously raised:

6,028,537 to Suman et al. (Originally assigned to Prince Corporation, now assigned to Visteon Global Technologies, Inc.);

5,732,074 to Spaur et al. (Originally assigned to CellPort Labs, Inc., now assigned to Cellport Systems, Inc.);

5,557,254 to Johnson et al. (Originally assigned to Mobile Security Communications, Inc., now assigned to Ifleet, Inc.);

5,208,756 to Song; and

5,877,724 to Davis (Assigned to Trimble Navigation Limited)

B. Art Considered for the Flick '278 Patent Includes Art Cited in Its Parent Applications

The Flick '278 patent is a continuation-in-part of U.S. Patent No. 7,720,597 (Flick '597 patent) which, in turn, is a continuation of U.S. Patent No. 7,149,623 (Flick '623 patent), which, in turn, is a continuation of U.S. Patent No. 6,606,561 (Flick '561 patent). The Flick '561 patent claims priority back to a number of earlier-filed provisional applications.

As noted in the MPEP § 609.02 II, "[t]he examiner will consider information which has been considered by the Office in a parent application [] when examining: (A) a continuation application [], (B) a divisional application [], or (C) a continuation-in-part application." Of further interest, Primary Examiner Cuong H. Nguyen, was the same examiner for the Flick '278, '597 and '623 patents.

The Patent Owner recognizes that an SNQ may be based on art previously considered by the Office, but this is so only if the reference is presented in a new light or a different way that escaped review during earlier examination. *See* MPEP §2258.01. It is submitted that the Requester has failed to meet this burden and has potentially misled the current Examiner regarding whether references have been previously considered. Nevertheless, the Patent Owner explains below why the claims are patentable.

C. The Suman et al. '537 Patent Was Already Considered

The Request for Reexamination on page 4 provides: "[t]his reference [Suman et al. '537] was not considered during the prosecution of the Flick '278 patent."

The Suman et al. '537 patent is cited in the parent patent application, i.e. the Flick '597 patent. This Suman et

al. '537 patent is also cited in at least twenty-nine other Flick patents. Accordingly, and contrary to the Requester's contention, the prior art from the Flick '597 patent, including the Suman et al. '537 patent, was considered by the Examiner during prosecution of the Flick '278 patent. And as noted above, Primary Examiner Cuong H. Nguyen was the examiner for both the Flick '597 and '278 patents.

D. The Johnson et al. '254 Patent Disclosure Was Already Considered

Again, the Request for Reexamination on page 14 states that the Johnson et al. '254 patent was not considered during prosecution of the Flick '278 patent.

The Johnson et al. '254 patent is the parent of a continuation (i.e. U.S. Patent No. 5,682,133) which, in turn, is the parent of a continuation U.S. Patent No. 5,986,543. And, the '543 patent (having the same disclosure as the Johnson et al. '254 patent) is cited in the Flick '597 and Flick '561 patents. In other words, the Johnson et al. '254 patent disclosure was considered during prosecution of the Flick '278 patent.

E. Similar Cellport and Trimble References Were Already Considered

The Spaur et al. '074 patent is assigned to Cellport Labs, Inc. A similar reference, U.S. Patent No. 7,366,892, is also assigned to Cellport Systems, Inc. and is cited in the Flick '278 patent and was considered. Along these lines, the Davis '724 is assigned to Trimble Navigation Limited, and U.S.

Patent No. 6,611,755, also assigned to Trimble Navigation Limited, is cited in the Flick '278 patent and was considered by the Examiner.

III. The Claims Are Patentable

A. The Claims Are Patentable Over the Suman et al. '537 Patent

The Suman et al. '537 patent is directed to vehicle personalization to be remotely effected by a service provider using a radio frequency (RF) system such as a paging or cellular system. A vehicle owner, wishing to reprogram a vehicle, calls the service provider who effects reprogramming of an option control by transmitting RF control signals to the vehicle from a land-based transmitter to a receiver mounted in the vehicle. Thus, because the service provider effects vehicle personalization, the vehicle owner need not have any technical knowledge as to how to operate the vehicle programming system. Vehicle personalization may also be provided for each person who may operate the vehicle.

To achieve these aspects, the vehicle accessory control system includes a plurality of electrically-operated vehicle accessories, a receiver to be mounted in a vehicle for receiving RF signals from a land-based transmitter, and a control circuit coupled to the receiver and to the vehicle accessories for controlling the operation of the vehicle accessories in accordance with a control program. The RF signals include an address uniquely identifying the vehicle and a reprogramming signal for reprogramming the operation of at least one of the vehicle accessories. The control circuit includes an input interface for receiving information regarding

a plurality of sensed conditions, control means for controlling the operation of the vehicle accessories in accordance with the control program and in response to sensed conditions received from the input interface. The control circuit further includes reprogramming means for selectively reprogramming the control program in response to the detection of an RF signal including an address identifying the vehicle and the reprogramming signal, to selectively change the manner in which the control means controls the operation of at least one of the vehicle accessories.

The Patent Owner respectfully submits that the Suman et al. '537 patent fails to disclose, as recited in Claim 1, for example, a multi-vehicle compatible tracking unit for a vehicle comprising a vehicle data bus extending throughout the vehicle. More particularly, the Suman et al. '537 patent fails to disclose a multi-vehicle compatible controller for cooperating with a vehicle position determining device and a wireless communications device to send vehicle position information, wherein the multi-vehicle compatible controller is to be coupled to the vehicle data bus for communication thereover with at least one vehicle device using at least one corresponding vehicle device code from among a plurality thereof for different vehicles, and wherein a downloading interface permits downloading of enabling data related to the at least one corresponding vehicle device code for use by the multi-vehicle compatible controller. Along these lines, the Suman et al. '537 patent fails to disclose these features with the downloading interface comprising a connector for the temporary connection to

a downloading device as recited in independent Claim 13, or a wireless receiver as recited in independent Claim 18.

None of the other references identified by the Examiner supply the deficiencies of the Suman et al. '537 patent. Accordingly, independent Claims 1, 13 and 18 are patentable. Their dependent claims, which recite further distinguishing features, are also patentable and require no further discussion herein.

B. The Claims Are Patentable Over the Spaur et al. '074 Patent

The Spaur et al. '074 patent discloses communication to and from a controller at the vehicle. As helpfully pointed out by the Examiner, the reference discloses an interface for the controller, such as an RS-232 connection, an Ethernet connection, a Personal Computer Memory Card International Association (PCMCIA) unit, or a direct communications port. Moreover, as noted at col. 4, lines 51-57, the Spaur et al. '074 patent recites:

> "[] each vehicle device on the CAN has its own IP designation or address so that the remote user can utilize this designation or address for communication with the selected vehicle device having that designation or address. The controller uses the received IP address or designation for the particular device and acts as a link or bridge for the remote user to the particular device".

In other words, the Spaur et al. '074 patent fails to disclose, as recited in Claim 1, a multi-vehicle compatible tracking unit for a vehicle comprising a vehicle data bus extending throughout the vehicle. The Spaur et al. '074 patent

fails to disclose a multi-vehicle compatible controller for cooperating with a vehicle position determining device and a wireless communications device to send vehicle position information, wherein the multi-vehicle compatible controller is to be coupled to the vehicle data bus for communication thereover with at least one vehicle device using at least one corresponding vehicle device code from among a plurality thereof for different vehicles, and wherein a downloading interface permits downloading of enabling data related to the at least one corresponding vehicle device code for use by the multi-vehicle compatible controller. The Spaur et al. '074 patent fails to disclose these features with the downloading interface comprising a connector for the temporary connection to a downloading device, as recited in independent Claim 13, or a wireless receiver, as recited in independent Claim 18.

None of the other references identified by the Examiner supply the deficiencies of the Spaur et al. '074 patent. Accordingly, the Patent Owner submits that independent Claims 1, 13 and 18 are patentable, and the dependent claims, which recite further distinguishing features, are also patentable and require no further discussion herein.

The Patent Owner also respectfully submits that the Spaur et al. '074 patent adds nothing to the deficiencies of the Suman et al. '537 patent - its respective deficiencies being pointed out above.

C. The Claims Are Patentable Over the Johnson et al. '254 Patent

The Examiner explains that the Johnson et al. '254 patent discloses a multi-channel GPS receiver coupled to a GPS antenna. The Johnson et al. '254 patent fails to disclose, as recited in Claim 1, a multi-vehicle compatible tracking unit for a vehicle comprising a vehicle data bus extending throughout the vehicle. The Johnson et al. '254 patent also fails to disclose a multi-vehicle compatible controller for cooperating with a vehicle position determining device and a wireless communications device to send vehicle position information, wherein the multi-vehicle compatible controller is to be coupled to the vehicle data bus for communication thereover with at least one vehicle device using at least one corresponding vehicle device code from among a plurality thereof for different vehicles, and wherein a downloading interface permits downloading of enabling data related to the at least one corresponding vehicle device code for use by the multi-vehicle compatible controller. Moreover, the Johnson et al. '254 patent also fails to disclose these features with the downloading interface comprising a connector for the temporary connection to a downloading device as recited in independent Claim 13, or a wireless receiver as recited in independent Claim 18.

None of the other references identified by the Examiner supply the noted deficiencies of the Johnson et al. '254 patent. It is submitted that independent Claims 1, 13 and 18 are patentable, and that the dependent claims, which recite further distinguishing features, are also patentable, and require no further discussion herein.

The Patent Owner also respectfully submits that the Johnson et al. '254 patent adds nothing to the deficiencies of the Suman et al. '537 patent or the Spaur et al. '074 patent – their respective deficiencies being pointed out above.

D. The Claims Are Patentable Over the Song '756 Patent

The Examiner explains that the Song '756 patent, filed in 1991, discloses an inexpensive, accurate system for determining a vehicle's location using the existing base stations and signals of a cellular telephone network. Thus, the Song '756 patent fails to disclose, as recited in Claim 1, a multi-vehicle compatible tracking unit for a vehicle comprising a vehicle data bus extending throughout the vehicle. The Song '756 patent fails to disclose a multi-vehicle compatible controller for cooperating with a vehicle position determining device and a wireless communications device to send vehicle position information, wherein the multi-vehicle compatible controller is to be coupled to the vehicle data bus for communication thereover with at least one vehicle device using at least one corresponding vehicle device code from among a plurality thereof for different vehicles, and wherein a downloading interface permits downloading of enabling data related to the at least one corresponding vehicle device code for use by the multi-vehicle compatible controller. The Song '756 patent also fails to disclose these features with the downloading interface comprising a connector for the temporary connection to a downloading device, as recited in independent

Claim 13, or a wireless receiver, as recited in independent Claim 18.

None of the other references identified by the Examiner supply the deficiencies of the Song '756 patent. The Patent Owner submits that independent Claims 1, 13 and 18 are patentable, and that the dependent claims, which recite further distinguishing features, are also patentable, and require no further discussion herein.

The Patent Owner also respectfully submits that the Song '756 patent adds nothing to the deficiencies of the Suman et al. '537 patent, the Spaur et al. '074 patent, or the Johnson et al. '254 patent - these deficiencies being pointed out above.

E. The Claims Are Patentable Over the Davis '724 Patent

The Examiner helpfully clarifies that the Davis '724 patent discloses a single processor combined position locating and analog telephone system that can be used with a peripheral device, such as a vehicle alarm.

The Patent Owner submits that the Davis '724 patent fails to disclose, as recited in Claim 1, a multi-vehicle compatible tracking unit for a vehicle comprising a vehicle data bus extending throughout the vehicle. The Davis '724 patent fails to disclose a multi-vehicle compatible controller for cooperating with a vehicle position determining device and a wireless communications device to send vehicle position information, wherein the multi-vehicle compatible controller is to be coupled to the vehicle data bus for communication thereover with at least one vehicle device using at least one

corresponding vehicle device code from among a plurality thereof for different vehicles, and wherein a downloading interface permits downloading of enabling data related to the at least one corresponding vehicle device code for use by the multi-vehicle compatible controller. The Davis '724 patent also fails to disclose these features with the downloading interface comprising a connector for the temporary connection to a downloading device, as recited in independent Claim 13, or a wireless receiver, as recited in independent Claim 18.

None of the other references identified by the Examiner supply the deficiencies of the Davis '724 patent. The Patent Owner submits that independent Claims 1, 13 and 18 are patentable, and that the dependent claims, which recite further distinguishing features, are also patentable, and require no further discussion herein.

The Patent Owner also submits that the Davis '724 patent adds nothing to the deficiencies of the Suman et al. '537 patent, the Spaur et al. '074 patent, the Johnson et al. '254 patent, or the Song '756 patent - these deficiencies being pointed out above.

F. The Relevant Litigation Ruling Regarding the Flick '278 Patent

The Patent Owner directs the Examiner to page 11 of Exhibit D, including the Court's ruling on CalAmp's summary judgment motion for invalidity. The Court notes that CalAmp contended the Spaur et al. '074 patent anticipated the asserted claims, i.e. Claims 1-6, 8 and 11-14, 16, 18, 19 and 21 of the Flick '278 patent.

The Court determined that CalAmp's technical expert, Mr. Andrews, testified at his deposition that he was not offering an invalidity opinion based on an anticipation theory based upon the Spaur et al. '074 patent. Mr. Andrews submitted a later conflicting declaration along with the motion for summary judgment. Accordingly, the Court determined that CalAmp was relying solely on attorney argument to assert a theory of anticipation. The Court thus found that CalAmp failed to carry its burden on summary judgment of invalidating the Flick '278 patent based upon the Spaur et al. '074 patent.

IV. Conclusions

In view of the remarks provided above, the Examiner is respectfully requested to issue a Notice of Intent to Issue an Ex Parte Reexamination Certificate in due course.

The Commissioner is hereby authorized to charge or credit any discrepancies in fee amounts to Deposit Account No. 01-0484.

Respectfully submitted,

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CERTIFICATE OF SERVICE

Certificate of Service in compliance with 37 C.F.R. §1.530(c)

Pursuant to 37 C.F.R. §§1.530(c), 1.248, I hereby certify that on January 8, 2016, a complete copy of this Patent Owner's Statement is being served via First Class U.S. Mail upon Third Party Requester at the correspondence address as shown in PAIR:

KPPB LLP
2400 EAST KATELLA AVENUE
SUITE 1050
ANAHEIM, CA 92806

Respectfully submitted,

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Electronic Acknowledgement Receipt

EFS ID:	25029611
Application Number:	90013587
International Application Number:	
Confirmation Number:	8867
Title of Invention:	Vehicle Tracking Unit with Downloadable Codes and Associated Methods
First Named Inventor/Applicant Name:	8032278
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Filer:	Christopher F. Regan/Sherry Leonard
Filer Authorized By:	Christopher F. Regan
Attorney Docket Number:	C13-03895
Receipt Date:	26-FEB-2016
Filing Date:	14-SEP-2015
Time Stamp:	10:13:48
Application Type:	Reexam (Patent Owner)

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Reexam Notice of Court Action	0058106CIP1_REX_1565_Filing_Part1.pdf	7538634 b0d87296cfef0af70cb8c275312c9b55ebddeea2	no	115

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2	Reexam Notice of Court Action	0058106CIP1_REX_1565_Filing_Part2.pdf	7451690 2b4f1edcaaa7b437fd20578160c305ed3ff5b247	no	125

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Information:

Total Files Size (in bytes):	14990324

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Patent of **KENNETH E. FLICK**	
Request for Reexamination of **U.S. PATENT NO.8,032,278**	
Control No. **90/013,587**	Attorney Docket No.: **C13-03895(0058106CIP1_REX)**
Confirmation No. **8867**	
Filing Date: **SEPTEMBER 14, 2015**	Examiner: **M. GRAHAM**
For: **VEHICLE TRACKING UNIT WITH DOWNLOADABLE CODES AND ASSOCIATED METHODS**	Art Unit: **3993**

FILING UNDER 37 C.F.R. §1.565

EFILE
Commissioner for Patents

Commissioner:

Pursuant to 37 C.F.R. §1.565(a), the Patent Owner respectfully submits the following.

On February 24, 2016, the related seven day jury trial proceeding involving the present reexamination application parent, i.e. U.S. Patent No. 8,032,278 to Flick (Flick '278 patent) (noted in the prior Patent Owner's Statement of January 8, 2016) was concluded with a Jury Verdict (Copy attached herewith).

In the Jury Verdict, the reexamination Requester, i.e. CalAmp Corporation (CalAmp), was found to infringe the claims of the Flick '278 patent. Moreover, the Jury Verdict indicated that CalAmp acted despite an objectively high likelihood that

its actions infringed a valid patent, and that this objectively high likelihood of infringement was either known or so obvious that it should have been known to CalAmp.

Also, the Flick '278 patent was found to be not invalid in light of several prior art references, including U.S. Patent Nos.: 6,028,537 to Suman et al.; 5,732,074 to Spaur et al.; and 5,557,254 to Johnson et al., all noted in the Reexamination Order. In particular, each of these prior art references was included in the attached Expert Report of Eric Andrews Regarding Invalidity, which was submitted into evidence and considered by the jury in rendering the Jury Verdict. For the Examiner's convenience,the Expert Report notes U.S. Patent No. 6,028,537 to Suman et al. at pages 15 and 226; U.S. Patent No. 5,732,074 to Spaur et al. at page 79; and U.S. Patent No. 5,557,254 to Johnson et al. at pages 15 and 226. Also, for convenience, the exhibits for this Expert Report, which are over 1000 pages in length, were omitted. Upon the Examiner's request, the Patent Owner will submit the exhibits for the Expert Report.

Moreover, in the finding that the Flick '278 patent was not invalid, the Jury Verdict found several secondary factors indicating non-obviousness of the Flick '278 patent. In particular, the Jury Verdict indicated that the accused products covered by the Flick '278 patent were commercially successfully due to the merits of the claimed invention. The Jury Verdict also found that competitors copied the claimed invention of the Flick '278 patent. Furthermore, the Jury Verdict indicated that competitors accepted licenses under the Flick '278 patent because of the merits of the claimed invention.

_____/

The Commissioner is hereby authorized to charge or credit any discrepancies in fee amounts to Deposit Account No. 01-0484.

Respectfully submitted,

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Attorney for Patent Owner

CERTIFICATE OF SERVICE

Certificate of Service in compliance with 37 C.F.R. §1.530(c)

Pursuant to 37 C.F.R. §§1.530(c), 1.248, I hereby certify that on February 26, 2016, a complete copy of this Filing is being served via First Class U.S. Mail upon Third Party Requester at the correspondence address as shown in PAIR:

KPPB LLP
2400 EAST KATELLA AVENUE
SUITE 1050
ANAHEIM, CA 92806

Respectfully submitted,

Sherry Leonard

Sherry Leonard

UNITED STATES DISTRICT COURT
MIDDLE DISTRICT OF FLORIDA
ORLANDO DIVISION

OMEGA PATENTS, LLC,

Plaintiff,

v. Case No: 6:13-cv-1950-Orl-40DAB

CALAMP CORP.,

Defendant.
_____/

VERDICT FORM

1. Do you find Omega has proven by a preponderance of the evidence that any of the accused CalAmp devices infringed any of the asserted claims of Omega's asserted Patents?

   ✓ Yes (for Omega) _____No (for CalAmp)

If your answer to Question 1 is "No," proceed to Question 3. If your answer to Question 1 is "Yes," for any claim(s) Omega has proven by a preponderance of the evidence that any of the accused CalAmp devices infringed, indicate a finding of infringement by marking "Yes" in the corresponding space provided in Questions 2.A through 2.D. below; for any claim(s) Omega has failed to prove by a preponderance of the evidence that any of the accused CalAmp devices infringed, indicate a finding of non-infringement by marking "No" in the corresponding space provided in Questions 2.A through 2.D. below.

2.A. U.S. Patent No. 6,346,876 B1 ("the '876 patent")

Has Omega proven by a preponderance of the evidence that any of the accused CalAmp devices infringed any of the following claims of the '876 patent?

	LMU-3000	LMU-3030	LMU-3050	VPOD	VPOD2
Claim 1	☑ Yes ☐ No	☑ Yes ~~☑ No~~	☑ Yes ☐ No	☑ Yes ☐ No	☑ Yes ☐ No
Claim 3	☑ Yes ☐ No	☑ Yes ☐ No	☑ Yes ☐ No	☑ Yes ☐ No	☑ Yes ☐ No
Claim 4	☑ Yes ☐ No	☑ Yes ☐ No	☑ Yes ☐ No	☑ Yes ☐ No	☑ Yes ☐ No
Claim 5	☑ Yes ☐ No	☑ Yes ☐ No	☑ Yes ☐ No	☑ Yes ☐ No	☑ Yes ☐ No
Claim 12	☑ Yes ☐ No	☑ Yes ☐ No	☑ Yes ☐ No	☑ Yes ☐ No	☑ Yes ☐ No
Claim 14	☑ Yes ☐ No	☑ Yes ☐ No	☑ Yes ☐ No	☑ Yes ☐ No	☑ Yes ☐ No
Claim 16	☑ Yes ☐ No	☑ Yes ☐ No	☑ Yes ☐ No	☑ Yes ☐ No	☑ Yes ☐ No

2.B. U.S. Patent No. 6,756,885 B1 ("the '885 patent")

Has Omega proven by a preponderance of the evidence that any of the accused CalAmp devices infringed any of the following claims of the '885 patent?

	LMU-3000	LMU-3030	LMU-3050	VPOD	VPOD2
Claim 1	☑ Yes ☐ No	☑ Yes ☐ No	☑ Yes ☐ No	☑ Yes ☐ No	☑ Yes ☐ No
Claim 2	☑ Yes ☐ No	☑ Yes ☐ No	☑ Yes ☐ No	☑ Yes ☐ No	☑ Yes ☐ No
Claim 3	☑ Yes ☐ No	☑ Yes ☐ No	☑ Yes ☐ No	☑ Yes ☐ No	☑ Yes ☐ No
Claim 12	☑ Yes ☐ No	☑ Yes ☐ No	☑ Yes ☐ No	☑ Yes ☐ No	☑ Yes ☐ No
Claim 14	☑ Yes ☐ No	☑ Yes ☐ No	☑ Yes ☐ No	☑ Yes ☐ No	☑ Yes ☐ No

2.C. U.S. Patent No. 7,671,727 B2 ("the '727 patent")

Has Omega proven by a preponderance of the evidence that any of the accused CalAmp devices infringed any of the following claims of the '727 patent?

	LMU-3000	LMU-3030	LMU-3050	VPOD	VPOD2
Claim 1	☑ Yes ☐ No	☑ Yes ☐ No	☑ Yes ☐ No	☑ Yes ☐ No	☑ Yes ☐ No
Claim 10	☑ Yes ☐ No	☑ Yes ☐ No	☑ Yes ☐ No	☑ Yes ☐ No	☑ Yes ☐ No
Claim 11	☑ Yes ☐ No	☑ Yes ☐ No	☑ Yes ☐ No	☑ Yes ☐ No	☑ Yes ☐ No

2.D. U.S. Patent No. 8,032,278 B2 ("the '278 patent")

Has Omega proven by a preponderance of the evidence that any of the accused CalAmp devices infringed any of the following claims of the '278 patent?

	LMU-3000	LMU-3030	LMU-3050	VPOD	VPOD2
Claim 1	☑ Yes ☐ No	☑ Yes ☐ No	☑ Yes ☐ No	☑ Yes ☐ No	☑ Yes ☐ No
Claim 2	☑ Yes ☐ No	☑ Yes ☐ No	☑ Yes ☐ No	☑ Yes ☐ No	☑ Yes ☐ No
Claim 3	☑ Yes ☐ No	☑ Yes ☐ No	☑ Yes ☐ No	☑ Yes ☐ No	☑ Yes ☐ No
Claim 4	☑ Yes ☐ No	☑ Yes ☐ No	☑ Yes ☐ No	☑ Yes ☐ No	☑ Yes ☐ No
Claim 5	☑ Yes ☐ No	☑ Yes ☐ No	☑ Yes ☐ No	☑ Yes ☐ No	☑ Yes ☐ No
Claim 6	☑ Yes ☐ No	☑ Yes ☐ No	☑ Yes ☐ No	☑ Yes ☐ No	☑ Yes ☐ No
Claim 8	☑ Yes ☐ No	☑ Yes ☐ No	☑ Yes ☐ No	☑ Yes ☐ No	☑ Yes ☐ No
Claim 11	☑ Yes ☐ No	☑ Yes ☐ No	☑ Yes ☐ No	☑ Yes ☐ No	☑ Yes ☐ No

U.S. Patent No. 8,032,278 B2 ("the '278 patent") continued from previous page

	LMU-3000	LMU-3030	LMU-3050	VPOD	VPOD2
Claim 12	☑ Yes ☐ No	☑ Yes ☐ No	☑ Yes ☐ No		
Claim 13	☑ Yes ☐ No	☑ Yes ☐ No	☑ Yes ☐ No	☑ Yes ☐ No	☑ Yes ☐ No
Claim 14	☑ Yes ☐ No	☑ Yes ☐ No	☑ Yes ☐ No	☑ Yes ☐ No	☑ Yes ☐ No
Claim 16	☑ Yes ☐ No	☑ Yes ☐ No	☑ Yes ☐ No	☑ Yes ☐ No	☑ Yes ☐ No
Claim 18	☑ Yes ☐ No	☑ Yes ☐ No	☑ Yes ☐ No	☑ Yes ☐ No	☑ Yes ☐ No
Claim 19	☑ Yes ☐ No	☑ Yes ☐ No	☑ Yes ☐ No	☑ Yes ☐ No	☑ Yes ☐ No
Claim 21	☑ Yes ☐ No	☑ Yes ☐ No	☑ Yes ☐ No	☑ Yes ☐ No	☑ Yes ☐ No

After answering Questions 2.A. through 2.D., proceed to Question 3.

3. Has CalAmp proven by clear and convincing evidence that any claim of the asserted Patents is invalid?

_____ Yes (for CalAmp) ____✓____ No (for Omega)

4. If your answer to Question 3 is "No," proceed to Question 5. If your answer to Question 3 is "Yes," answer Question 4 below by indicating with an X any claim(s) you find invalid by clear and convincing evidence and indicate the reasons for invalidity, namely, identify which prior art references disclose the elements of the claim.

PATENT CLAIM	YES, INVALID	REFERENCES DISCLOSING THE ELEMENTS OF THE CLAIM
U.S. Patent No. 6,346,876		
Claim 1		
Claim 3		
Claim 4		
Claim 5		
Claim 12		
Claim 14		
Claim 16		
U.S. Patent No. 6,756,885		
Claim 1		
Claim 2		
Claim 3		
Claim 12		

PATENT CLAIM	YES, INVALID	REFERENCES DISCLOSING THE ELEMENTS OF THE CLAIM
U.S. Patent No. 6,756,885 (continued from previous page)		
Claim 14		
U.S. Patent No. 7,671,727		
Claim 1		
Claim 10		
Claim 11		
U.S. Patent No. 8,032,278		
Claim 1		
Claim 2		
Claim 3		
Claim 4		
Claim 5		
Claim 6		
Claim 8		
Claim 11		
Claim 12		
Claim 13		
Claim 14		
Claim 16		
Claim 18		
Claim 19		
Claim 21		

After answering Question 4, answer Question 5.

5. Which of the following factors that tend to indicate nonobviousness, if any, has been established by the evidence with respect to the claimed invention (write the word "yes" in the blank below to any question that you answer "yes" to):

YES	Were accused products covered by the claim commercially successful due to the merits of the claimed invention rather than due to advertising, promotion, salesmanship, or features of the product other than those found in the claim?
X	Was there long felt need for a solution to the problem facing the inventors, which was satisfied by the claimed invention?
X	Did others try, but fail, to solve the problem solved by the claimed invention?
YES	Did others copy the claimed invention?
X	Did the claimed invention achieve unexpectedly superior results over the closest prior art?
X	Did others in the field praise the claimed invention or express surprise at the making of the claimed invention?
YES	Did others accept licenses under patents because of the merits of the claimed invention?

If your answer to Question 1 is "Yes," answer Question 6.A. If your answer to Question 1 is "No," skip all remaining questions and proceed to sign and date this Verdict Form.

6.A. Has Omega proven by clear and convincing evidence that CalAmp acted despite an objectively high likelihood that its actions infringed a valid patent?

✓ Yes _____ No

If your answer to Question 6.A. is "Yes," proceed to Question 6.B. If your answer to Question 6.A. is "No," proceed to Question 7.

6.B. Has Omega proven by clear and convincing evidence that this objectively high likelihood of infringement was either known or so obvious that it should have been known to CalAmp?

✓ Yes _____ No

Proceed to Question 7.

7. What amount of damages, if any, do you find is adequate to compensate Omega for CalAmp's infringement of any claim found to be valid and not licensed?

$ 2,975,200

After answering Question 7, sign and date this Verdict Form.

SO SAY WE ALL THIS 24th DAY OF FEBRUARY, 2016.

JURY FOREPERSON

2015

Expert Report of Eric Andrews Regarding Invalidity

OMEGA PATENTS, LLC. VS CALAMP CORP.

CASE NO. 6:13-CV-01950-PGB-DAB

ERIC ANDREWS

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6.9 Invalidity of '278 over '074 Spaur 154

1. Introduction

I have been advised that there is a case pending in Orlando, Florida entitled Omega Patents, LLC v. CalAmp Corp., Case No. 6:13-cv-01950-PGB-DAB. I have been asked by CalAmp Corp. ("CalAmp") to provide an opinion regarding the validity of the patent claims that Omega Patents, LLC has asserted against CalAmp. My analysis, opinions and reasoning are detailed below.

I have been informed that Omega is asserting the following patents and claims:

Patent Number	Asserted Claims
6,346,876 B1	1, 3-5, 12, 14 and 16
6,737,989 B2	23, 31, 32, 34 and 35
6,756,885 B1	1-3, 12 and14
7,671,727 B2	1, 10, 11, 19 and 25
8,032,278 B2	1-6, 8, 11-14, 16, 18, 19 and 21

2. Background and Qualifications

2.1 Education Background

In 1983, I received my BS in Electrical and Computer Engineering from University of California, Santa Barbara. I have also obtained Training Certificates from the Society of Automotive Engineers (SAE) relating to OBD (On-Board Diagnostics) and Diesel Engine Control. Prior to my retirement, I was a member of the SAE, as well as the Institute of Electrical and Electronics Engineers (IEEE) and the American Helicopter Society (AHS).

2.2 Relevant Professional Experience

Prior to my retirement in 2013, I worked for Cummins Inc. for 22 years. Cummins is the world's largest independent supplier of diesel engines. During that time, I had a number of roles focused on the design and development of electronics for engine and vehicle applications, including work relating to communications on the vehicle bus.

In one role at Cummins, I worked closely with CARB regulators in defining OBD II requirements for diesels. I was already familiar with the OBD II requirements for gasoline-

powered vehicles, and because the OBD II requirements for those vehicle had already been established, I studied those standards, and the OBD II requirements for diesels built upon the existing OBD II standards. It was at that time that Cummins and CARB were in complete agreement to incorporate the Heavy Duty Truck data bus standard (SAE J1939) into the OBD II requirements and subsequently the SAE J1978 standard.

I also worked on integrating the engine electronics with a vehicle datalink to validate OBD II certification compliance on a consumer pickup truck.

In another role at Cummins, I supported electronic engine integration activities into numerous heavy duty truck OEMs products. These activities included testing the data bus communication protocols to make sure the OEMs adhered to the SAE specifications.

While leading the Advanced Engineering Controls organization, I lead the development of a technical white paper on future data busses and the associated electronic vehicle architectures.

Prior to working at Cummins, I was employed as a Systems Engineer at McDonnell Douglas Helicopter Company. In that role I worked with several mil spec data bus to enable communication between multiple avionics black boxes.

My complete academic background and professional experience are set forth in my Curriculum Vitae, a copy of which is attached hereto as Exhibit 1.

2.3 Prior Publications

I am the author of the following technical papers:

SAE 1994-03-01 - An Improved Temperature Sensing System for Diesel Engine Applications

I am an inventor on the following U.S. patents, as well as on over 50 international patents:

Patent	Title
5,482,013	Intake Air System and Diagnostic System for Internal Combustion Engines
5,529,041	Active Misfire Detection System
5,983,156	System for Controlling Engine Fueling According to Vehicle Location

6,151,549	System for Controlling Engine Fueling According to Vehicle Location
6,243,641	System and Method for Detecting Engine Cylinder Misfire
6,655,326	ECU Temperature Control
7,067,319	System for Diagnosing Reagent Solution Quality and Emissions Catalyst Degradation
7,192,463	Arrangement for Mounting Electrical Components to an After Treatment Filter
7,263,823	System for Measuring NOx Content of Exhaust Gas
7,389,771	Closed Loop EGR Control Method and System Using Water Content Measurement
7,571,640	Misfire Detection in Engines for On-Board Diagnostics
7,581,390	Method and System for Improving Sensor Accuracy
8,474,242	Method and System for Improving Sensor Accuracy
8,899,018	Optimized Exhaust After Treatment Integration

2.4 Compensation

My compensation for this engagement is $250 per hour. No part of my compensation depends on the outcome of this proceeding, and I have no other interest in this proceeding. I receive no other forms of compensation related to this case.

2.5 Documentation and Things Considered

All of the documents and things that I have considered in my analysis are expressly identified in my analysis below.

I have reviewed the following Omega Patents, LLC ("Omega") patents involved in or related to this lawsuit:

- **U.S. Pat. No. 6,346,876 ("the '876 patent") to Flick** ***(Exhibit 2)***
  - *Multi-Vehicle Compatible Control System Generating Command Signals on a Data Bus and Associated Methods*
- **U.S. Pat. No. 6,737,989 ("the '989 patent") to Flick** ***(Exhibit 3)***

- *Vehicle Tracker Including Variable Frequency Transmission and Related Methods*

- **U.S. Pat. No. 6,756,885 ("the '885 patent") to Flick** ***(Exhibit 4)***
  - *Multi-Vehicle Compatible Control System for Reading From a Data Bus and Associated Methods*
- **U.S. Pat. No. 7,671,727 ("the '727 patent") to Flick** ***(Exhibit 5)***
  - *Speed Exceeded Notification Device for Vehicle Having a Data Bus and Associated Methods*
- **U.S. Pat. No. 8,032,278 ("the '278 patent") to Flick** ***(Exhibit 6)***
  - *Vehicle Tracking Unit with Downloadable Codes and Associated Methods*
- **U.S. Pat. No. 5,719,551 ("the '551 patent") to Flick** ***(Exhibit 7)***
  - *Vehicle Security System for a Vehicle Having a Data Communications Bus and Related Methods*

I have also reviewed the following prior art references, which are a part of my detailed analysis:

US Pat. No. 5,479,479 (the '479 patent) to Braitberg et al. ***(Exhibit 8)***

Method and apparatus for Transmission of and Receiving Signals having Digital Information using an Airlink

The '479 patent was filed April 20, 1993, and issued Dec. 26, 1995. The '479 patent discloses wireless transmission of digital data, including data from a vehicle bus. The patent discloses a cellular telephone that is interconnected to a control unit via a cable. The cable contains both appropriate interdisciplinary connections for attachment to the telephone at one end and to the control unit at the other end via a universal connector. At least one contact of the universal connector is capable of producing a signal coded to identify the type of cellular telephone attached to the connector at the other end. A decoder at the control unit identifies the type of phone as by table look-up and establishes appropriate interfacing operational functions at its universal connector to properly operate with the telephone. Accordingly, the control unit can function with any of a wide variety of

cellular telephones having differently configured cable connections and cable connector disciplines of contact assignments.

The '479 patent further discloses that the control unit may control a number of peripheral devices coupled to the vehicle bus, allowing these vehicle devices to send and receive digital data through the cellular phone unit to and from remote devices via radio frequency signals. It discloses the controller interfacing with various components, including interfacing with a vehicle data bus, multiple vehicle devices and a wireless transmitter and receiver. The patent discloses that when a message is received, the system determines which peripheral device is supposed to receive the data/control information, and then formats the information as appropriate. The microprocessor then takes control of the bus, and transfers the data/control information to the appropriate vehicle device. The system differentiates between data signals for controlling a peripheral device, and voice signals, which do not operate to control a peripheral device, as well as determining whether data is addressed to a vehicle device, to the microprocessor, or if the data is not addressed at all. The patent discloses that the peripheral vehicle devices may include a GPS receiver, and that the system can be used to track a vehicle's location, via commands sent over the vehicle bus.

US Pat. No. 5,898,392 (the '392 patent) to Bambini et al. ***(Exhibit 9)***

System and Method for Remote Control of an In-Vehicle Voice Recorder and Other Electrical Accessories

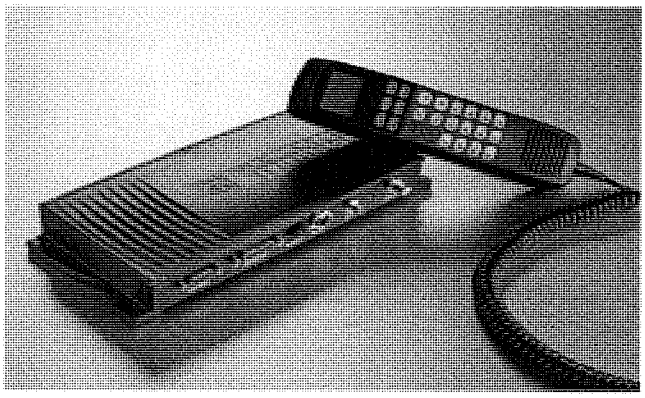
The '392 patent was filed February 10, 1998, and issued April 27, 1999. This patent discloses a system for remotely controlling vehicle devices on a vehicle bus. The disclosed system allows a user to remotely control vehicle devices using a conventional telephone. While one embodiment discloses controlling an in-vehicle voice recorder while recording therein navigational instructions formed of a plurality of navigational steps, the patent more broadly discloses remote control of vehicle devices on the bus.

The disclosed system further allows for remote control of other vehicle accessories through the manipulation of keys on a conventional telephone keypad. The '392 patent discloses that the controller interfaces with: a vehicle data bus, multiple vehicle devices, downloading codes and a wireless communication device. For example, the patent notes

that "if an individual locked their keys in their car and wished to have the system unlock the doors, the individual would call the service center to make the request." The patent discloses that the service center may have an automated system, whereby the user could select to unlock the doors, and the appropriate DTMF signals would "be subsequently transmitted to the vehicle's system to affect the unlocking of the doors." The patent further notes that when the sequence of DTMF signals represents an instruction to activate an electrical accessory (such as unlocking the doors noted previously), the microprocessors of the system cooperate to formulate and transmit a proper control signal to the electrical accessory identified in the received DTMF signals. "Such a control signal may be transmitted through vehicle bus interface 85 and vehicle bus 86 of through a discrete connection 92 to the controlled accessory." In this way, the patent discloses remotely controlling a vehicle device on the vehicle bus. The '392 patent notes alternative manners of connecting to a vehicle device – either through a bus, or through discrete connection – confirming that it would be obvious to one skilled in art that either method could be used, and that it would further be obvious to take technology for controlling discretely connected vehicle devices, and apply that technology to vehicle devices coupled by a vehicle bus (and vice versa).

CrossCheck AMPS Cellular Mobile tracking device ***(Exhibits 10-13)***

The CrossCheck AMPS Cellular Mobile product was made by Trimble Navigation Limited. The CrossCheck AMPS Cellular mobile product was developed to support mobile positioning applications. The CrossCheck unit integrates GPS, AMPS Cellular and computing power onto a single board enclosure. The CrossCheck unit has intelligent reporting and storage with its IQEvent Engine™ firmware. The IQEvent Engine allows for the setting of numerous events or alarms. A user may set a threshold for a particular value, such as speed or location, and when the CrossCheck determines that the threshold has been reached, it can take a specific action, such as sending a message, or recording specific data (or a combination). The CrossCheck disclosed sending GPS data and messages from the mobile unit to a base station, such as real-time display of conditions or alarm reporting.



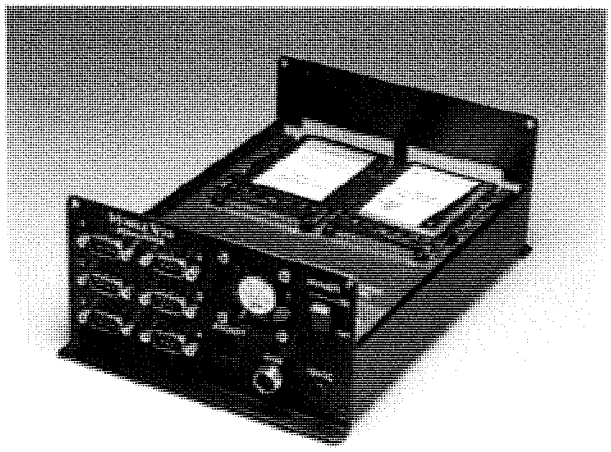
The CrossCheck AMPS was an operational device, disclosed at least as early as 1998. The following documents provide details on the functions and features of the CrossCheck AMPS:

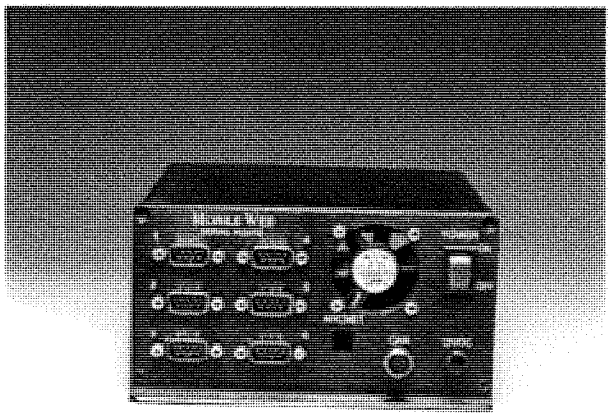
- **Operations Manual for the CrossCheck AMPS with IQEvent Engine Firmware.** Released in 1998 ***(Exhibit 10)***
- **Product Description Document – CrossCheck AMPS Cellular.** Copyright July 1998 ***(Exhibit 11)***
- **IQEventEngine Configuration Utility Users Guide.** Version A-2 dated October 1998 ***(Exhibit 12)***
- **TAIP/IQEventEngine Reference.** Revision A dated November 1998 ***(Exhibit 13)***

CellPort Labs MSC-9710 MobileWeb ***(Exhibits 14-15)***

The MSC-9710 MobileWeb was a product from CellPort Labs Inc. For this discussion it will be referred to as "**MobileWeb**". As described in the MSC-9710 online brochure;

> "CellPort Labs' MobileWeb combines universal wireless connectivity with Internet access, creating a universal data interface that turns any vehicle into an untethered "Web site". This allows information to be shared easily between fixed and mobile platforms. From checking local traffic conditions to tracking a fleet of delivery trucks, MobileWeb provides an unlimited range of bi-directional data opportunities and applications utilizing Internet/Web and intranet networks."





Two documents that describe MobileWeb are:

- **MobileWeb Changing the Face of Mobile Networking Through Universal Wireless Connectivity** ISBN# 0-7803-3277-6 (presented at NorthCon/96, Seattle, WA, Nov. 1996) ***(Exhibit 14)***
- **MSC-9710 Online Brochure** from CellPort's Website http://web.archive.org/web/19970101113926/http://www.cellport.com/MobileWeb/mobileweb1.htm (dated 1/1/1997) ***(Exhibit 15)***

MobileWeb disclosed a controller, coupled to a wireless communication device such as a cellphone, and also coupled to vehicle devices on a bus, such as a GPS unit, the air bag alarm, and the vehicle sound system. It was described as "bus neutral" meaning that it could be used with a variety of automotive busses, and thus a variety of vehicles.

CellPort described it as follows: "The CellPort Labs MSC-9710 MobileWeb Developer's Kit is a single-board computer that connects a variety of wireless interfaces to one or more vehicle buses." CellPort disclosed its system coupled to a vehicle bus extending throughout a vehicle (and specifically including engine diagnostics, GPS, security, display and sensors).

MobileWeb disclosed gathering data from a vehicle's internal network (the vehicle bus), and communicating with vehicle devices through the CellPort Controller/Server, collecting data or sending commands. MobileWeb also disclosed that the vehicle network used a standard automotive LAN protocol, which one skilled in the art would understand to be the SAE specified bus protocols. MobileWeb disclosed applications for its system including vehicle tracking, as well as monitoring of engine or component performance data.

NeoTech Products, Inc. Mobile-Trak II Model 200 ***(Exhibits 16-17)***

The Mobile-Trak II Model 200 (Mobile-Trak) was a vehicle tracking system with a speed exceeded notification, designed for vehicles having a vehicle data communications bus, and a vehicle device generating data related to vehicle speed on the data communications bus. It was disclosed by NeoTech on its website at least as early as Dec. 17, 1998. The Mobile-Trak II was compatible with a variety of busses, including J1708, J1850 and J1939. The Mobile-Trak II included processors, a GPS module, a choice of wireless radio modules (long range and short range), RS232 user communication ports, and memory.

The NeoTech Mobile Trak II is disclosed in the following documents:

- **NeoTech Website** at http://neotech.com (captured from www.web.archive.org on June 12, 2014, web.archive.org dated 1999-1-29) ***(Exhibit 16)*** *(with Copyright notice dated 1998, and last modified date of Dec. 17, 1998).*
- **Mobile-Trak: A Vehicle Tracking System for Fleet Management**, brochure (the NeoTech brochure) ***(Exhibit 17)*** *(with Copyright notice dated 1999).*

SAE J1850: Class B Data Communications Network Interface ***(Exhibit 18)***

The SAE has promulgated a number of standards relating to vehicle data busses. This standard relates to the physical connector that is used to plug in to an OBD II port on a vehicle.

SAE J1978: OBD II Scan Tool ***(Exhibit 19)***

This SAE standard relates to a "universal" tool that is compatible with a variety of bus types. The On-Board Diagnostic ("OBD") Bus was the first attempt by the SAE to standardize vehicle data bus protocols. OBD II was the successor to OBD, and was driven by the need for protocols (and equipment) that could work with the various busses in use. Much of the activity was driven by the California Air Resources Board (CARB) and its attempts to better control vehicle emissions.

As early as 1992, the SAE put out a specification governing Scan Tools, which were tools that that could be used with various busses to aid in diagnostic procedures, including emissions testing. The OBD II Scan Tool specification (SAE J1978, Issued 1992-03, Revised 1994-06) describes the functions required to be supported by vehicles and testing equipment. The EPA had mandated a common, low cost service tool (Scan Tool) that would allow the service technician to diagnose all vehicles. Rather than needing a separate tool to work on each vehicle, by using a scan tool manufactured in accordance with this specification, a technician would be able to use a single scan tool with a variety of vehicles, having a variety of different busses. To enable the Scan Tool to communicate across all vehicles, the SAE and automotive industry experts developed the SAE J1978 standard. The J1978 specification is required to be supported by all vehicle and testing equipment manufactures. The 1994 version of the J1978 standard describes connecting to the vehicle bus using one of three interfaces by sending a command signal (request message) on the data communications bus. As a result, the Standard discloses an interface method that is compatible with various busses, and thus a variety of vehicles.

I am informed that Omega is alleging infringement based mainly on the accused CalAmp devices' use of the J1978 standard. I have been further informed that Omega has argued that the request messages of the J1978 standard fulfill a variety of claim limitations, including a command signal (either working or non-working), or a set of device

codes, or reading a device code and determining a match, or a device code from a plurality of device codes for different vehicles. However, while the current J1978 standard sends six different request messages (to provide compatibility with five different bus types), the 1994 version was fundamentally the same, except that it only sent three messages, providing compatibility with the three major bus types of that time. I am also been informed that Omega argues that because there are six request messages, and only one will be successful, the other request messages are non-working command signals. However, in the 1994 J1978 implementation, there were three request messages, and only one would be successful, so to the extent Omega contends that the request message could fulfil these limitations, these limitations were also already met by the 1994 J1978 implementation.

Without taking a position as to whether a request signal sent pursuant to J1978 can be properly considered to be a command signal (working or non-working), or a set of device codes, or can properly be considered to be reading a device code from the data communications bus, or determining a match between a read device code and a stored device code, or can properly be considered to be a device code from a plurality of device codes for different vehicles, to the extent that Omega contends that following the current J1978 standard (performing the bus discovery protocol) meets any limitation of any of the asserted claims, such limitation was known at least as early as June 1994 in the earlier J1978 standard. As discussed above, Omega argues that using an identical bus discovery technique as J1978, with additional interfaces rather than the three interfaces specified in 1994, fulfills certain claim limitations. One skilled in the art at that time would recognize that the difference between the allegedly infringing bus discovery technique and the J1978 publication (from 1994) is the number of interfaces, and not the technique of bus discovery, thereby communicating with a plurality of vehicles.

SAE J1979: E/E Diagnostic Test Modes ***(Exhibit 20)***

This standard relates to the implementation of the Diagnostic Test Modes necessary to meet California On-Board Diagnostic (OBD II) and Federal On-Board Diagnostic (OBD) requirements for emission related test data. This standard discloses the request

and response messages necessary to be supported by vehicle manufacturers and test tools to meet the California and Federal regulations.

SAE J2201: Universal Interface for OBD II Scan ***(Exhibit 21)***

This standard defines the minimum requirements for the vehicle communications interface for the SAE J1978 OBD II scan tool.

ISO 9141-2 Road Vehicles – Diagnostic Systems – Part 2: CARB requirements for interchange of digital information ***(Exhibit 22)***

This standard specifies the requirements for setting up the interchange of digital information between on-board emission-related Electronic Control Units (ECUs) of road vehicles and the SAE OBD II scan tool as specified in SAE J1978.

US Pat. No. 5,732,074 (the '074 patent) by Spaur et al. ***(Exhibit 23)***

Mobile Portable Wireless Communication System

The '074 patent was filed Jan. 16, 1996, and issued March 24, 1998. This patent describes a bi-directional communication system between a vehicle and remote computer. The patent discloses that the communication can be wireless, utilizing a wireless communication device or a cellular phone.

The patent discloses a controller that is coupled to the wireless communication device, and also coupled to various vehicle devices over the vehicle bus. The patent discloses that the system can be used to locate a vehicle, to monitor vehicle parameters, such as for maintenance purposes, to detect certain "alarm" conditions, and to provide notification of the occurrence of certain events. The patent discloses a controller that communicates with the standardized vehicle network (providing a specific example of a CAN bus). The remote computer is able to receive triggered responses from the vehicle based upon vehicle parameters and user defined thresholds. In addition to the wireless communication system, the patent also discloses a number of wired connections, including RS232, PCMCIA, and Ethernet connections.

The patent also discloses a controller unit that provides "appropriate message and data handling functions associated with sending and receiving information including data

from each of a plurality of physical devices that are operatively connected to a bus of the vehicle standardized network." From the disclosure in the patent that "the vehicle standardized network is an established and previously developed network that interfaces with components in a vehicle, such as engine related components in order to provide desired or requested data concerning the operations or status of these components," one skilled in the art would understand that the vehicle bus would be in compliance with SAE standards, including J1978.

Additional References

In addition to the references discussed above, I also considered a number of additional prior art references that also disclosed the elements claimed by Omega's patents. For reasons of brevity, they were not included in the detailed discussion which follows. However, it is my opinion that these references also disclose all of the elements of each asserted claim of the Omega patents, and could be used alone, in combination with themselves, or in combination with the references disclosed above to show additional reasons why the asserted Omega patents are not valid in view of the prior art. These references included:

- U.S. Pat. No. 4,853,850 to Krass et al. ***(Exhibit 24)***
- U.S. Pat. No 5,557,254 to Johnson et al. ***(Exhibit 25)***
- U.S. Pat. No. 6,295,492 to Lang et al. ***(Exhibit 26)***
- U.S. Pat. No. 6,505,106 to Lawrence et al. ***(Exhibit 27)***
- U.S. Pat. No. 5,959,545 to Lhamon ***(Exhibit 28)***
- U.S. Pat. No. 6,263,268 to Nathanson ***(Exhibit 29)***
- U.S. Pat. No. 5,479,157 to Suman et al. ***(Exhibit 30)***
- U.S. Pat. No. 6,028,537 to Suman et al. ***(Exhibit 31)***
- Japanese Pub Hei 11[1999]-62793 ***(Exhibit 32)***
- OBD II to RS-232 Interface Adapter AutoTap (1998 Copyright date) ***(Exhibit 33)***

Additional Materials Considered

I have also considered the following additional materials in my analysis.

- Order on Claim Construction (Document 50) dated 02/20/2015 ***(Exhibit 34)***
- Defendant CalAmp Corp.'s Supplemental Invalidity Contentions ***(Exhibit 35)***

3. Summary of My Opinions

3.1 Priority Dates

I am informed that Omega claims the following priority dates for its patents:

Patent	Filing Date	Claimed Priority Date
U.S. Pat. No. 6,346,876 ("the '876 patent")	May 31, 2000	August 22, 1996
U.S. Pat. No. 6,737,989 ("the '989 patent")	March 25, 2002	May 17, 2000
U.S. Pat. No. 6,756,885 ("the '885 patent")	May 31, 2000	August 22, 1996
U.S. Pat. No. 7,671,727 ("the '727 patent")	August 24, 2007	May 17, 2000
U.S. Pat. No. 8,032,278 ("the '278 patent")	July 3, 2007	May 17, 2000

I am informed that once prior art is presented that predates the filing date of a patent, the burden shifts to the patentee to establish entitlement to an earlier priority date on a claim-by-claim basis. In the present case, I note that each of the patents asserted states on its face that it is a continuation-in-part of an earlier application. I am informed that a continuation-in-part is presumed to contain new matter that was not contained in the earlier application. I am also informed that to satisfy the written description requirement, a patent specification must describe the clamed invention in sufficient detail that one skilled in the art can reasonably conclude that the inventor had possession of the claimed invention at the time.

I have reviewed the specification of the parent application (issued as U.S. Pat. No. 5,719,551) for certain of the asserted claims, and find that the asserted claims of the '876 and '885 patent are not entitled to the claimed priority date, because the specification of the parent application does not describe the claimed invention in sufficient detail that one of ordinary skill in the art would conclude that the patentee was in possession of the claimed invention.

3.2 Invalidity

Based on my analysis, set forth in detail below, it is my opinion that each of the Omega patents in this lawsuit is unpatentable over the prior art, as discussed in detail below. More specifically, the patents are rendered invalid by at least the following prior art:

Patent	Invalidating Prior Art
U.S. Pat. No. 6,346,876 ("the '876 patent")	'479 Braitberg with SAE J1978 '392 Bambini with SAE J1978
U.S. Pat. No. 6,737,989 ("the '989 patent")	Trimble CrossCheck AMPS
U.S. Pat. No. 6,756,885 ("the '885 patent")	'479 Braitberg with SAE J1978 CellPort MobileWeb with J1978
U.S. Pat. No. 7,671,727 ("the '727 patent")	'074 Spaur with SAE J1979 NeoTech Mobile-Trak II with SAE J1979
U.S. Pat. No. 8,032,278 ("the '278 patent")	'392 Bambini with SAE J1978 '074 Spaur with SAE J1978

4. Claim Construction

I am informed that the parties have agreed on the meaning of certain terms and phrases from the asserted claims as follows:

CLAIM TERM	AGREED CONSTRUCTION
Controller	Electronic circuitry that performs one or more control functions.

Multi-vehicle compatible controller	Electronic circuitry that performs one or more control functions, and can operate with more than one vehicle.

I am informed that certain terms and phrases from the asserted claims have been construed by the Court in this case, and have the following meanings:

CLAIM TERM	COURT'S CONSTRUCTION
Transmitter	Radio frequency transmitter.
Receiver	Radio frequency receiver.
Data communication bus/ vehicle data communications bus/ vehicle data bus	Wired connection for communication of digital messages among vehicle devices, with each message including one or more device addresses.
Vehicle device	Plain meaning
Command signal	Signal generated on the data communications bus for operating a vehicle device.
Device codes	Signal from a vehicle device.
Function	Plain meaning
Remote vehicle speed exceeded notification	Plain meaning
Downloading interface	Plain meaning
Enabling data	Data related to the at least one corresponding vehicle device code for use by said multi-vehicle compatible controller.
Programming instructions	Code which instructs the controller to perform an operation.

I have incorporated these meanings into my analysis, and have interpreted the meaning of the claim language in accordance with these meanings.

4.1 Level of Ordinary Skill in the Art

The relevant field for purposes of construing the claims of the patents in this lawsuit is the vehicle telematics industry. A person of ordinary skill in the art in that field would have at least an undergraduate degree in electrical engineering, automotive engineering, or an equivalent engineering discipline, and several years' experience in designing, manufacturing, installing and/or working on vehicle telematics systems. Alternatively, additional years of practical experience may replace the engineering degree, or completion of

post-graduate engineering studies may reduce the years of practical experience necessary.

5. Rules of Law Governing Validity Analysis

5.1 Anticipation

I am informed that a patent claim is "anticipated" if every claimed element of an invention is found in a single prior art reference (or in a device, composition or method, that is sold or used by the public), and the claim is invalid.

I have also been informed that a prior art reference may anticipate a patent claim when the claim limitations not expressly found in that reference are inherent in it.

5.2 Obviousness

I have been advised that a patent claim is invalid if the differences between the claimed subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art.

I have also been advised that the following factual inquiries should be considered: (1) the scope and content of the prior art, (2) the differences between the prior art and the claims at issue, (3) the level of ordinary skill in the art, and (4) objective evidence of non-obviousness such as a strong showing of commercial success that is attributable to the merits of the claimed invention; copying by others; failure of others to achieve that which is claimed; a long-standing but unmet need for the invention; or unexpected results.

I have also been informed that the combination of familiar elements according to known methods is likely to be found obvious when it does no more than yield predictable results. Similarly, I have been advised that the fact that a combination of prior art teachings was obvious to try might show that such a combination was obvious.

I have followed these principles regarding anticipation and obviousness in my analysis below.

6. Detailed Analysis

6.1 Invalidity of '876 over '479 Braitberg and SAE J1978

Introduction

U.S. Patent No. 6,346,876 (the '876 patent) is titled "Multi-Vehicle Compatible Control System Generating Command Signals on a Data Bus and Associated Methods" and was filed on May 31, 2000. As stated on the front page of the '876 patent, the '876 patent is a "continuation-in-part of application No. 09/382,245, filed on Aug. 25, 1999, now Pat. No. 6,275,147, which is a continuation of application No. 09/023,838, filed on Feb. 13, 1998, now Pat. No. 6,011,460, which is a continuation-in-part of application No. 08/701,356, filed on Aug. 22, 1996, now Pat. No. 5,719,551." In my opinion, several prior art references along with combinations of those references render the '876 patent invalid.

The '876 Patent is Invalid in view of U.S. Patent No. 5,479,479 and J1978

One such combination includes U.S. Patent No. 5,479,479 to Braitberg et al. (the '479 patent) and SAE Publication J1978, titled "OBD II Scan Tool" (the J1978 publication). The '876 patent claims priority to U.S. Patent No. 5,719,551 having a filing date of August 22, 1996. The '479 patent has a filing date of April 20, 1993 and the J1978 publication was published June 1994. Accordingly, both the '479 patent and the J1978 publication qualify as prior art under 35 U.S.C. § 102(b) and can be utilized to invalidate a publication under 35 U.S.C. § 103(a) in view of the earliest possible priority date for the '876 patent. As is described in more detail below, the '479 patent describes all of the necessary system components and functions necessary to enable communication and data collection from remote vehicles. The '479 patent contains a variety of descriptions of the controller interfacing with; a vehicle data bus, multiple vehicle devices and a wireless transmitter and receiver. One skilled in the art would realize that everything necessary for two way transmission of data and commands between a vehicle and remote location is disclosed in the '479 patent. To avoid any potential confusion regarding the knowledge of one of ordinary skill in the art regarding vehicle data busses as of the earliest priority date of the

'876 patent, I am relying on the J1978 standard. To communicate with a plurality of vehicles the system must communicate with a plurality of existing vehicle data busses. At the time of the '479 patent, the EPA mandated a common, low cost service tool (Scan Tool) that would allow the service technician to diagnose all vehicles. To enable the Scan Tool to communication across all vehicles, the Society of Automotive Engineers (SAE) and automotive industry experts developed The J1978 Publication. SAE J1978, issued 1992-03, Revised 1994-06 describes the communications protocols required to support OBD II diagnostic information and the development of a common diagnostic interface for the OBD II Scan Tool. The J1978 publication was and is required to be supported by all vehicle and testing equipment manufactures. This standard describes connecting to the vehicle bus using one of three interfaces by sending a signal (i.e. request message) on the data communications bus. It should be noted that current versions of the J1978 spec have increased this to at least five interfaces. This allows a scan tool to be compatible with various busses, and thus a variety of vehicles. While the focus of this analysis is not the development of a OBD II Scan Tool, the J1978 standard teaches a method to read, write and communicate on a plurality of data busses and as a result a plurality of vehicles. Additionally, I have been informed that Omega has asserted in its infringement contention that the sending of the three (now six) signals (i.e. request messages) as described in the J1978 publication satisfies certain elements of the '876 patent relating to devices codes and/or command signals. Therefore, the use of the J1978 publication is proper in my analysis. As noted above, a multi-vehicle compatible controller was also taught by the J1978 publication. As discussed above, Omega uses an identical bus discovery technique as J1978, with additional interfaces rather than the three interfaces specified in 1994. One skilled in the art at that time would recognize that the difference between Omega and the J1978 publication is the number of interfaces, and not the technique of bus discovery, thereby communicating with a plurality of vehicles.

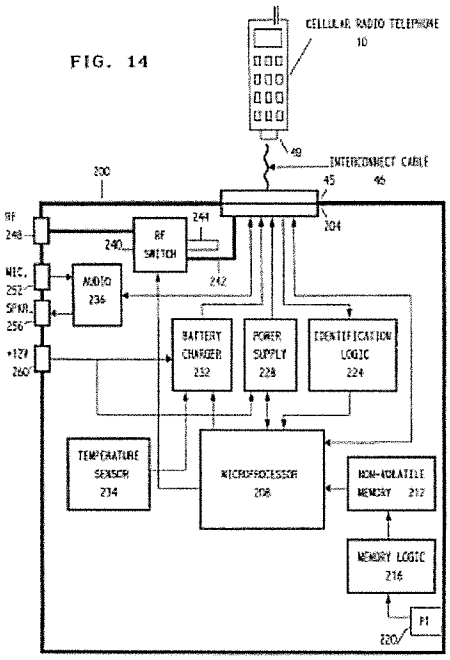
These two prior art documents teach all of the limitations of the asserted claims of the '876 patent, i.e. claims 1, 3 – 5, 12, 14, and 16.

Claim 1

Claim 1 of the '876 patent reads:

> "A control system for a vehicle comprising a data communications bus and at least one vehicle device connected to the data communications bus, the control system comprising:
>
> a transmitter and a receiver for receiving signals from said transmitter; and
>
> a multi-vehicle compatible controller at the vehicle and cooperating with said transmitter and receiver, said multi-vehicle compatible controller generating at least one set of command signals on the data communications bus for the at least one vehicle device, the at least one set of command signals comprising at least one working command signal and at least one non-working command signal for a given vehicle to thereby provide command compatibility with a plurality of different vehicles."

All aspects of claim 1 are taught by the '479 patent in view of the J1978 publication:

'876 Patent Claim 1	The '479 Patent and the J1978 Publication
A control system for a vehicle comprising a data communications bus and at least one vehicle device connected to the data communications bus, the control system comprising:	All system components, interfaces and functions can be found in the '479 patent as shown below in FIG. 14. 

	According to Figure 14 of the '479 patent, the system contains; a multiplex bus 276; a receiver and transmitter 10; and a controller 200, for communicating through bus connector 276 to the appropriate peripheral device on bus 280. In another embodiment, car kit controller 200 may also be used to control the transmission of data to and from a number of peripheral devices via an airlink provided by cellular phone 10. . ('479 patent, col. 12 lines 38-54) As illustrated in FIG. 15, car kit controller 200 is provided with bus logic 268 to control bus 280 to which a plurality of peripheral devices are connected. Bus connector 276 interconnects bus 280 to bus logic 268. ('479 patent, col 11 lines 55-62)
a transmitter and a receiver for receiving signals from said transmitter; and	Car kit controller 200 further comprises circuitry to allow this process to be reversed to allow any of the peripheral devices to send data through car kit controller 200 and cellular phone 10 and out of the car using RF signals. Accordingly, a duplex digital path is provided between bus 280 and cellular phone 10, for allowing digital information to be transmitted through car kit controller 200 in either direction. ('479 patent, col. 12, lines 38-54)
a multi-vehicle compatible controller at the vehicle and cooperating with said transmitter and receiver, said multi-vehicle compatible controller generating at least one set of	In operation, cellular telephone 10 may receive RF signals containing data addressed to one of the peripheral devices. The data is passed via interconnect cable 46 to microprocessor 208. Microprocessor 208 formats the data according to the needs of the peripheral device to which the data is addressed. The data is then either buffered or

command signals on the data communications bus for the at least one vehicle device, the at least one set of command signals comprising at least one working command signal and at least one non-working command signal for a given vehicle to thereby provide command compatibility with a plurality of different vehicles.	passed directly through bus connector 276 to the appropriate peripheral device one bus 280. ('479 patent, col. 12 lines 38-54) The J1978 publication describes connecting to the vehicle bus using one of three interface protocols by sending a command signal (request message) on the data communications bus. Three signals (request messages) are sent one at a time. If the request message is correct for that vehicle, it will trigger a response message from the vehicle devices (see J1978 at 6.5.2). If no response is received, the system will try another protocol request message. If none of the initial signals prompt a response, the standard further describes additional steps to determine a working signal. (see J1978 at 6.8)

The EPA mandated a common interface method to enable service technician diagnose all vehicles with one electronic service tool. Prior to J1978, each vehicle manufacturer had its own service tool and proprietary data bus. Since 1994, all vehicle manufactures and test equipment are required to meet the J1978 standard. The J1978 publication, originally issued 1992-03 and later revised 1994-06, describes the communications protocols and methods required to support OBD II diagnostic information and the development of a common diagnostic interface for the OBD II Scan Tool. While the focus of this analysis is not the development of a OBD II Scan Tool, the J1978 standard identifies a method to read, write and communicate on a plurality of data busses and as a result a plurality of vehicles. As a result, one skilled in the art would recognize that, using an established methodology as developed by the automotive industry and approved by the EPA, the J1978 standard would enable communication with a plurality of vehicles.

Three command signals (request messages) are sent, one of which will likely trigger a response message (making it a "working command signal") See J1978 at 6.5.2. If none of the initial command signals prompt a response, the standard further describes

additional steps to determine a working command signal. See J1978 at 6.8. As noted above, at least three command signals are initially sent, at least two of which are non-working for the particular vehicle. See J1978 at 6.5.1.(" While there are three types of communication interfaces that could be used to access the OBD II functions in a given vehicle (i.e., SAE J1850 41.6 Kbps PWM, SAE J1850 10.4 Kbps VPW and ISO 9141-2), only one is allowed to be used in any one vehicle to access all supported OBD II functions.") Thus the other two types of request messages sent are non-working command signals.

Accordingly, it is my opinion that claim 1 of the '876 patent is invalid in view of the '479 patent and the J1978 publication.

Claim 3

Claim 3 of the '876 patent reads:

> "A control system according to claim 1 wherein said multi-vehicle compatible controller generates command signals sequentially."

All aspects of claim 3 are taught by the '479 patent in view of the J1978 publication:

'876 Patent Claim 3	**The '479 Patent and the J1978 Publication**
3. A control system according to claim 1 wherein said multi-vehicle compatible controller generates command signals sequentially.	See the J1978 publication at 6.8: "a. First, retransmit the request message. b. Second, if still no response is received, transmit a mode 1 PID 0 request message, in order to determine if communication with the vehicle is currently possible, and if the data desired is available. c. Third, if a mode 1 PID 0 response is received, transmit other messages, if available, to determine if the data desired is supported by the vehicle. d. Lastly, if the previous steps fail then as appropriate indicate to the user, that communication with the vehicle, the module or for the information the user has selected cannot be performed.")"

As noted above, at least three command signals are initially sent, at least two of which are non-working for the particular vehicle. See J1978 at 6.5.1.(" While there are three types of communication interfaces that could be used to access the OBD II functions in a given vehicle (i.e., SAE J1850 41.6 Kbps PWM, SAE J1850 10.4 Kbps VPW and ISO 9141-2), only one is allowed to be used in any one vehicle to access all supported OBD II functions.") Thus the other two types of request messages sent are non-working command signals. Therefore, it is my opinion that claim 3 of the '876 patent is invalid in view of the '479 patent and the J1978 publication.

Claim 4

Claim 4 of the '876 patent reads:

"A control system according to claim 1 wherein said multi-vehicle compatible controller generates command signals each representing digitally coded information."

All aspects of claim 4 are taught by the '479 patent in view of the J1978 publication:

'876 Patent Claim 4	**The '479 Patent and the J1978 Publication**
4. A control system according to claim 1 wherein said multi-vehicle compatible controller generates command signals each representing digitally coded information.	The '479 patent discloses that the command signals from the controller represent digitally coded information: "Accordingly, a duplex digital path is provided between bus 280 and cellular phone 10, for allowing digital information to be transmitted through car kit controller 200 in either direction." ('479 patent, col. 12, lines 51-54).

Therefore, it is my opinion that claim 4 of the '876 patent is invalid in view of the '479 patent and the J1978 publication.

Claim 5

Claim 5 of the '876 patent reads:

"A control system according to claim 1 wherein said multi-vehicle compatible controller comprises a memory for storing data relating to the at least one set of command signals."

All aspects of claim 5 are taught by the '479 patent in view of the J1978 publication:

'876 Patent Claim 5	The '479 Patent and the J1978 Publication
5. A control system according to claim 1 wherein said multi-vehicle compatible controller comprises a memory for storing data relating to the at least one set of command signals.	"Non-volatile memory 212 also provides microprocessor 208 with information on how to interpret signals from and format signals to the identified cellular phone 10. ('479 patent, col. 11 lines 46 - 49).

The '479 patent also discloses storing data in memory related to command signals: "In operation, cellular telephone 10 may receive RF signals containing data addressed to one of the peripheral devices. The data is passed via interconnect cable 46 to microprocessor 208. Microprocessor 208 formats the data according to the needs of the peripheral device to which the data is addressed. The data is then either buffered or passed directly through bus connector 276 to the appropriate peripheral device one bus 280.") ('479 patent, col. 12, lines 38-46). The '479 patent also discloses checking the format and address of certain signals against stored information: "If the data is addressed to a peripheral device on bus 280, microprocessor 208 determines which device is to receive the data and checks to ensure that the data is formatted correctly for the particular peripheral device (block 324)." ('479 patent, col. 13, lines 18-21).

As the '479 patent teaches, the control system uses internal memory to store device code data. Said memory is used to communicate with vehicle devices. One skilled in the art at that time would recognize one of the many usages of the memory in the controller would be to control the data bus, interpret the incoming command signals and act on the command signals. Therefore, it is my opinion that claim 5 of the '876 patent is invalid in view of the '479 patent and the J1978 publication.

Claim 12

Claim 12 of the '876 patent reads:

> "A control system according to claim 1 wherein said multi-vehicle compatible controller is further for storing a set of device codes for a given vehicle device for a plurality of different vehicles, for reading a device code from the data communications bus, and for determining a match between a read device code and the stored device codes to thereby provide reading compatibility with a plurality of different vehicles."

All aspects of claim 12 are taught by the '479 patent in view of the J1978 publication:

'876 Patent Claim 12	The '479 Patent and the J1978 Publication
12. A control system according to claim 1 wherein said multi-vehicle compatible controller is further for storing a set of device codes for a given vehicle device for a plurality of different vehicles, for reading a device code from the data communications bus, and for determining a match between a read device code and the stored device codes to thereby provide reading compatibility with a plurality of different vehicles.	"If the data is addressed to a peripheral device on bus 280, microprocessor 208 determines which device is to receive the data and checks to ensure that the data is formatted correctly for the particular peripheral device (block 324)." ('479 patent, col. 13, lines 18-21)

As a result, if the device code is not properly formatted or properly addressed, the controller would not initiate any activity on those. If the device code is determined to be a match by the controller, the controller will take the appropriate action. The '479 patent also teaches "Once the data is present on the bus, each of the devices attached to bus

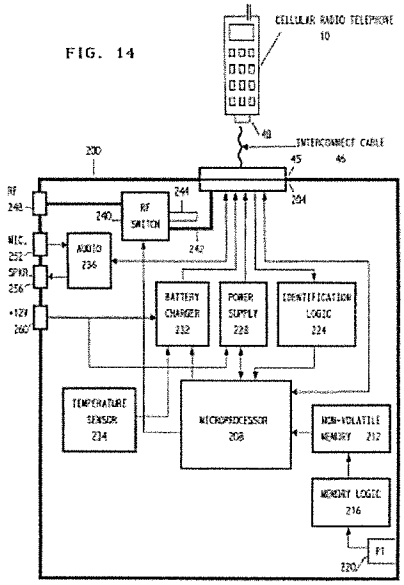
280 (including microprocessor 208) determines if the data is addressed to it (410). If so, the addressed device retrieves that data from bus 280. If the data is not addressed to one of the peripheral devices on bus 280, it is forwarded to microprocessor 208 (412). Microprocessor 208 determines (414) if the data is to be sent via an RF air-link to a remote device. If not, microprocessor 208 initiates a predetermined error routine (415)." ('479 patent, col 13, line 61 – col. 14, line 2). Therefore, it is my opinion that claim 12 of the '876 patent is invalid in view of the '479 patent and the J1978 publication.

Claim 14

Claim 14 of the '876 patent reads:

> "A control system according to claim 1 wherein said transmitter comprises at least a central station transmitter; and wherein said receiver is at the vehicle."

All aspects of claim 14 are taught by the '479 patent in view of the J1978 publication:

'876 Patent Claim 14	The '479 Patent and the J1978 Publication
14. A control system according to claim 1 wherein said transmitter comprises at least a central station transmitter; and wherein said receiver is at the vehicle.	Figure 14 of the '479 patent discloses a receiver located in the vehicle: 

	In addition, the '479 patent teaches "In operation, **cellular telephone 10 may receive RF signals containing data addressed to one of the peripheral devices. The data is passed via interconnect cable 46 to microprocessor 208. Microprocessor 208 formats the data according to the needs of the peripheral device to which the data is addressed.** The data is then either buffered or passed directly through bus connector 276 to the appropriate peripheral device one bus 280. **Car kit controller 200 further comprises circuitry to allow this process to be reversed to allow any of the peripheral devices to send data through car kit controller 200 and 50 cellular phone 10 and out of the car using RF signals.** Accordingly, a duplex digital path is provided between bus 280 and cellular phone 10, for allowing digital information to be transmitted through car kit controller 200 in either direction." ('479 patent, col. 12, lines 38-54, emphasis added)

As the text and figure clearly shows, the vehicle contains a transmitter and the receiver is located externally. Therefore, it is my opinion that claim 14 of the '876 patent is invalid in view of the '479 patent and the J1978 publication.

Claim 16

Claim 16 of the '876 patent reads:

"A control system according to claim 1 wherein said receiver comprises at least a central station transmitter; and wherein said transmitter is at the vehicle."

All aspects of claim 16 are taught by the '479 patent in view of the J1978 publication:

'876 Patent Claim 16	The '479 Patent and the J1978 Publication
16. A control system according to claim 1 wherein said receiver comprises at least a central station transmitter; and wherein said transmitter is at the vehicle.	"Car kit controller 200 further comprises circuitry to allow this process to be reversed to allow any of the peripheral devices to send data through car kit controller 200 and 50 cellular phone 10 and out of the car using RF signals. Accordingly, a duplex digital path is provided between bus 280 and cellular phone 10, for allowing digital information to be transmitted through car kit controller 200 in either direction." ('479 patent, col. 12, lines 38-54)

As the '479 patent discloses, the vehicle contains a transmitter to send vehicle device data to a remote location. Vehicle device data is transmitted from the vehicle to a remote receiver. One skilled in the art would recognize that the said wireless communication device is a cell phone. Since the cell phone is a bi-directional communication device, both the vehicle and the remote device (i.e. central station transmitter) would contain both a transmitter and receiver. Therefore, it is my opinion that claim 16 of the '876 patent is invalid in view of the '479 patent and the J1978 publication.

Conclusion

Based on my analysis, all of the components (controller, transmitter/receiver, memory, vehicle devices...), component interfaces (data bus, external (wireless) links...), functions (bus communication, bus protocol identification ...), and processes described in the '876 patent are obvious over the '479 patent in view of the J1978 publication for reasons including those described above. Accordingly, the asserted claims 1, 3 – 5, 12, 14, and 16 of the '876 patent are invalid and would have been obvious to a person of ordinary skill in the art at the time of the alleged invention.

6.2 Invalidity of '876 over '392 Bambini and SAE J1978

Introduction

U.S. Patent No. 6,346,876 (the '876 patent) is titled "Multi-Vehicle Compatible Control System Generating Command Signals on a Data Bus and Associated Methods" and was filed on May 31, 2000. As stated on the front page of the '876 patent, the '876 patent is a "continuation-in-part of application No. 09/382,245, filed on Aug. 25, 1999, now Pat. No. 6,275,147, which is a continuation of application No. 09/023,838, filed on Feb. 13, 1998, now Pat. No. 6,011,460, which is a continuation-in-part of application No. 08/701,356, filed on Aug. 22, 1996, now Pat. No. 5,719,551." In my opinion, several prior art references along with combinations of those references render the '876 patent invalid.

The '876 Patent is Invalid in view of U.S. Patent No. 5,898,392 and J1978

One such combination includes U.S. Patent No. 5,898,392 to Bambini et al. (the '392 patent) and SAE Publication J1978, titled "OBD II Scan Tool" (the J1978 publication). As stated above, it is my opinion that the '876 patent is not entitled to a priority date earlier than February 13, 1998. The '392 patent has a filing date of February 10, 1998 and the J1978 publication was published June 1994. Accordingly, the '392 patent qualifies as prior art under 35 U.S.C. § 102(e) and the J1978 publication qualifies as prior art under 35 U.S.C. § 102(b). Therefore, the '392 patent and the J1978 publication can be utilized to invalidate a publication under 35 U.S.C. § 103(a).

As is described in more detail below, the '392 patent describes all of the necessary system components and functions necessary to enable communication and data collection from remote vehicles. The '392 patent contains a variety of descriptions of the controller interfacing with; a vehicle data bus, multiple vehicle devices and a wireless transceiver. One skilled in the art would realize that everything necessary for two way transmission of data and commands between a vehicle and remote location is disclosed in the '392 patent. To avoid any potential confusion regarding the knowledge of one of ordinary skill in the art regarding vehicle data busses as of the earliest priority date of the '876 patent, I am relying on the J1978 standard. To communicate with a plurality of vehicles the system must communicate with a plurality of existing vehicle data busses. At the time

of the '392 patent, the EPA mandated a common, low cost service tool (Scan Tool) that would allow the service technician to diagnose all vehicles. To enable the Scan Tool to communication across all vehicles, the Society of Automotive Engineers (SAE) and automotive industry experts developed The J1978 Publication. SAE J1978, issued 1992-03, Revised 1994-06 describes the communications protocols required to support OBD II diagnostic information and the development of a common diagnostic interface for the OBD II Scan Tool. The J1978 publication was and is required to be supported by all vehicle and testing equipment manufactures. This standard describes connecting to the vehicle bus using one of three interfaces by sending a signal (i.e. request message) on the data communications bus. It should be noted that current versions of the J1978 spec have increased this to at least five interfaces. This allows a scan tool to be compatible with various busses, and thus a variety of vehicles. While the focus of this analysis is not the development of a OBD II Scan Tool, the J1978 standard teaches a method to read, write and communicate on a plurality of data busses and as a result a plurality of vehicles. Additionally, I have been informed that Omega has asserted in its infringement contention that the sending of the three (now six) signals (i.e. request messages) as described in the J1978 publication satisfies certain elements of the '876 patent relating to devices codes and/or command signals. Therefore, the use of the J1978 publication is proper in my analysis. As discussed above, Omega uses an identical bus discovery technique as J1978, with additional interfaces rather than the three interfaces specified in 1994. One skilled in the art at that time would recognize that the difference between Omega and the J1978 publication is the number of interfaces, and not the technique of bus discovery, thereby communicating with a plurality of vehicles.

These two prior art documents teach all of the limitations of the asserted claims of the '876 patent, i.e. claims 1, 3 – 5, 12, 14, and 16.

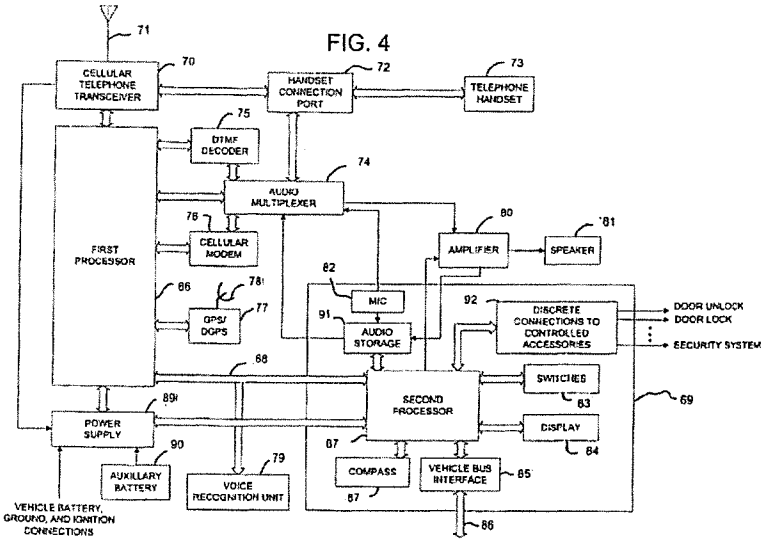
Claim 1

Claim 1 of the '876 patent reads:

> "A control system for a vehicle comprising a data communications bus and at least one vehicle device connected to the data communications bus, the control system comprising:

a transmitter and a receiver for receiving signals from said transmitter; and a multi-vehicle compatible controller at the vehicle and cooperating with said transmitter and receiver, said multi-vehicle compatible controller generating at least one set of command signals on the data communications bus for the at least one vehicle device, the at least one set of command signals comprising at least one working command signal and at least one non-working command signal for a given vehicle to thereby provide command compatibility with a plurality of different vehicles."

All aspects of claim 1 are taught by the '392 patent in view of the J1978 publication:

'876 Patent Claim 1	The '392 Patent and the J1978 Publication
A control system for a vehicle comprising a data communications bus and at least one vehicle device connected to the data communications bus, the control system comprising:	All system components, interfaces and functions can be found in the '392 patent as shown in FIG. 4 FIG. 4 
a transmitter and a receiver for receiving signals from said transmitter; and	Figure 4 of the '392 patent also discloses a cellular telephone transceiver for receiving signals from a remote location.
a multi-vehicle compatible controller at the vehicle	"Together, first and second microprocessors 66 and 67 monitor incoming messages and communications from a

and cooperating with said transmitter and receiver, said multi-vehicle compatible controller generating at least one set of command signals on the data communications bus for the at least one vehicle device, the at least one set of command signals comprising at least one working command signal and at least one non-working command signal for a given vehicle to thereby provide command compatibility with a plurality of different vehicles.	cellular telephone transceiver 70 and from various vehicle accessories and components coupled to microprocessor 67 via a vehicle bus interface 85 that is coupled to a vehicle bus 86." ('392 patent, col. 5, lines 37-42). The '392 patent further discloses that the controller is coupled to the vehicle data bus for communication with at least one vehicle device, using a corresponding vehicle device code, from among a plurality of codes for different vehicles. "Together, first and second microprocessors 66 and 67 monitor incoming messages and communications from a cellular telephone transceiver 70 and from various vehicle accessories and components coupled to microprocessor 67 via a vehicle bus interface 85 that is coupled to a vehicle bus 86." ('392 patent, col 5, lines 35-42) The J1978 publication describes connecting to the vehicle bus using one of three interface protocols by sending a command signal (request message) on the data communications bus. Three signals (request messages) are sent one at a time. If the request message is correct for that vehicle, it will trigger a response message from the vehicle devices (see J1978 at 6.5.2). If no response is received, the system will try another protocol request message. If none of the initial signals prompt a response, the standard further describes additional steps to determine a working signal. (see J1978 at 6.8)

The EPA mandated a common interface method to enable service technician diagnose all vehicles with one electronic service tool. Prior to J1978, each vehicle manu-

facturer had its own service tool and proprietary data bus. Since 1994, all vehicle manufactures and test equipment are required to meet the J1978 standard. The J1978 publication, originally issued 1992-03 and later revised 1994-06, describes the communications protocols and methods required to support OBD II diagnostic information and the development of a common diagnostic interface for the OBD II Scan Tool. While the focus of this analysis is not the development of a OBD II Scan Tool, the J1978 standard identifies a method to read, write and communicate on a plurality of data busses and as a result a plurality of vehicles. As a result, one skilled in the art would recognize that, using an established methodology as developed by the automotive industry and approved by the EPA, the J1978 standard would enable communication with a plurality of vehicles.

Three command signals (request messages) are sent, one of which will likely trigger a response message (making it a "working command signal") See J1978 at 6.5.2. If none of the initial command signals prompt a response, the standard further describes additional steps to determine a working command signal. See J1978 at 6.8. As noted above, at least three command signals are initially sent, at least two of which are non-working for the particular vehicle. See J1978 at 6.5.1.(" While there are three types of communication interfaces that could be used to access the OBD II functions in a given vehicle (i.e., SAE J1850 41.6 Kbps PWM, SAE J1850 10.4 Kbps VPW and ISO 9141-2), only one is allowed to be used in any one vehicle to access all supported OBD II functions.") Thus the other two types of request messages sent are non-working command signals.

Accordingly, it is my opinion that claim 1 of the '876 patent is invalid in view of the '392 patent and the J1978 publication.

Claim 3

Claim 3 of the '876 patent reads:

> "A control system according to claim 1 wherein said multi-vehicle compatible controller generates command signals sequentially."

All aspects of claim 3 are taught by the '392 patent in view of the J1978 publication:

'876 Patent Claim 3	The '392 Patent and the J1978 Publication

3. A control system according to claim 1 wherein said multi-vehicle compatible controller generates command signals sequentially.	The patent discloses that an operator can send multiple control signals to the vehicle, which would cause the controller to generate command signals sequentially: "As noted above, the system according to the present invention may be used to activate and/or reprogram other electrical accessories in the vehicle. **Such activation and reprogramming may be performed remotely by transmitting to the system a predetermined sequence of DTMF signals.** By allowing the system to respond to DTMF signals in this manner, **a user-friendly technique for allowing individuals or service operators to remotely activate or reprogram vehicle accessories** may be provided." ('392 patent, col. 11, lines 34-42, emphasis added)

Therefore, it is my opinion that claim 3 of the '876 patent is invalid in view of the '392 patent and the J1978 publication.

Claim 4

Claim 4 of the '876 patent reads:

> "A control system according to claim 1 wherein said multi-vehicle compatible controller generates command signals each representing digitally coded information."

All aspects of claim 4 are taught by the '392 patent in view of the J1978 publication:

'876 Patent Claim 4	**The '392 Patent and the J1978 Publication**
4. A control system according to claim 1 wherein said multi-vehicle compatible controller generates command signals each representing digitally coded information.	"As noted above, the system according to the present invention may be used to activate and/or reprogram other electrical accessories in the vehicle. **Such activation and reprogramming may be performed remotely by transmitting to the**

	system a predetermined sequence of DTMF signals. By allowing the system to respond to DTMF signals in this manner, **a user-friendly technique for allowing individuals or service operators to remotely activate or reprogram vehicle accessories** may be provided." ('392 patent, col. 11, lines 34-42, emphasis added) "If the received sequence represents an instruction to activate an electrical accessory, first and second microprocessors 66 and 67 cooperate to formulate and transmit a proper control signal to the electrical accessory identified in the received DTMF signals (step 279)." ('392 patent, col. 11, line 67 – col. 12, line 5); see also Figure 9.

The '392 patent discloses that an operator can send multiple control signals to the vehicle, which would cause the controller to generate command signals sequentially. Therefore, it is my opinion that claim 4 of the '876 patent is invalid in view of the '392 patent and the J1978 publication.

Claim 5

Claim 5 of the '876 patent reads:

> "A control system according to claim 1 wherein said multi-vehicle compatible controller comprises a memory for storing data relating to the at least one set of command signals."

All aspects of claim 5 are taught by the '392 patent in view of the J1978 publication:

'876 Patent Claim 5	The '392 Patent and the J1978 Publication

5. A control system according to claim 1 wherein said multi-vehicle compatible controller comprises a memory for storing data relating to the at least one set of command signals.	Figure 4 of the '392 patent describes memory device used for the storage of audio and DTMF command data. "Another aspect of the present invention is to provide a system that allows an operator to introduce acoustical data, such as dual-tone multi-frequency (DTMF) signals. during a voice communication" ('392 patent, col 2, lines 60-62) "If a **DTMF signal is received instructing the system to** segment the recorded audio message, second **microprocessor 67 stores the next addressable memory address of the memory** in audio storage device 91 as the starting address for the next segment to be recorded (step 267). By storing a sequential list of starting addresses in its own internal memory, second microprocessor 67 may effectively index each recorded segment for subsequent access and playback." ('392 patent, col. 10, lines 41-51, emphasis added)

DTMF's are defined as "Dual Tone Multi Frequency" signals. In practice, these represent command signals to the processor or vehicle devices. Accordingly, it is my opinion that claim 5 of the '876 patent is invalid in view of the '392 patent and the J1978 publication.

Claim 12

Claim 12 of the '876 patent reads:

> "A control system according to claim 1 wherein said multi-vehicle compatible controller is further for storing a set of device codes for a given vehicle device for a plurality of different vehicles, for reading a device code from the

data communications bus, and for determining a match between a read device code and the stored device codes to thereby provide reading compatibility with a plurality of different vehicles."

All aspects of claim 12 are taught by the '392 patent in view of the J1978 publication:

'876 Patent Claim 12	The '392 Patent and the J1978 Publication
12. A control system according to claim 1 wherein said multi-vehicle compatible controller is further for storing a set of device codes for a given vehicle device for a plurality of different vehicles, for reading a device code from the data communications bus, and for determining a match between a read device code and the stored device codes to thereby provide reading compatibility with a plurality of different vehicles.	The J1978 publication describes the functions required to be supported by vehicles and testing equipment. This standard describes connecting to the vehicle bus using one of three interfaces by sending a command signal (request message) on the data communications bus. See the J1978 publication at 6.5.2 As described in the J1978 publication, three command signals (request messages) are sent, one of which will likely trigger a response message (making it a "working command signal," and the others sent "non-working command signals") from SAE J1978 at 6.5.2. A response is read in response to a working command signal. If none of the initial command signals prompt a response, the standard further describes additional steps to determine a working command signal. See the J1978 publication at 6.8.

It was well known in the art since at least as early as 1994 that pursuant to SAE J1978, a controller could be compatible with multiple buses (and thus multiple vehicles) by following the protocol of sending a sequence of multiple bus messages to determine the bus type. Therefore, it is my opinion that claim 12 of the '876 patent is invalid in view of the '392 patent and the J1978 publication.

Claim 14

Claim 14 of the '876 patent reads:

> "A control system according to claim 1 wherein said transmitter comprises at least a central station transmitter; and wherein said receiver is at the vehicle."

All aspects of claim 14 are taught by the '392 patent in view of the J1978 publication:

'876 Patent Claim 14	The '392 Patent and the J1978 Publication
14. A control system according to claim 1 wherein said transmitter comprises at least a central station transmitter; and wherein said receiver is at the vehicle.	"FIG. 1 shows a land-based system for communicating with the vehicle communication and remote control system of the present invention as implemented in a vehicle 20. The system shown in F1G. 1 allows remote control signals and other commands to be issued to and received from a system within vehicle 20 via its antenna 22. In a preferred construction, the infrastructure that enables communications to be sent to and received from the vehicle communication system utilizes a cellular network 2, which includes a plurality of base stations that transmit and receive RF signals to/from vehicle 20." ('392 patent, col. 4, lines 28 – 38).

The two-way communication between the vehicle and the remote control system is illustrated in Figure 1 of the '392 patent:

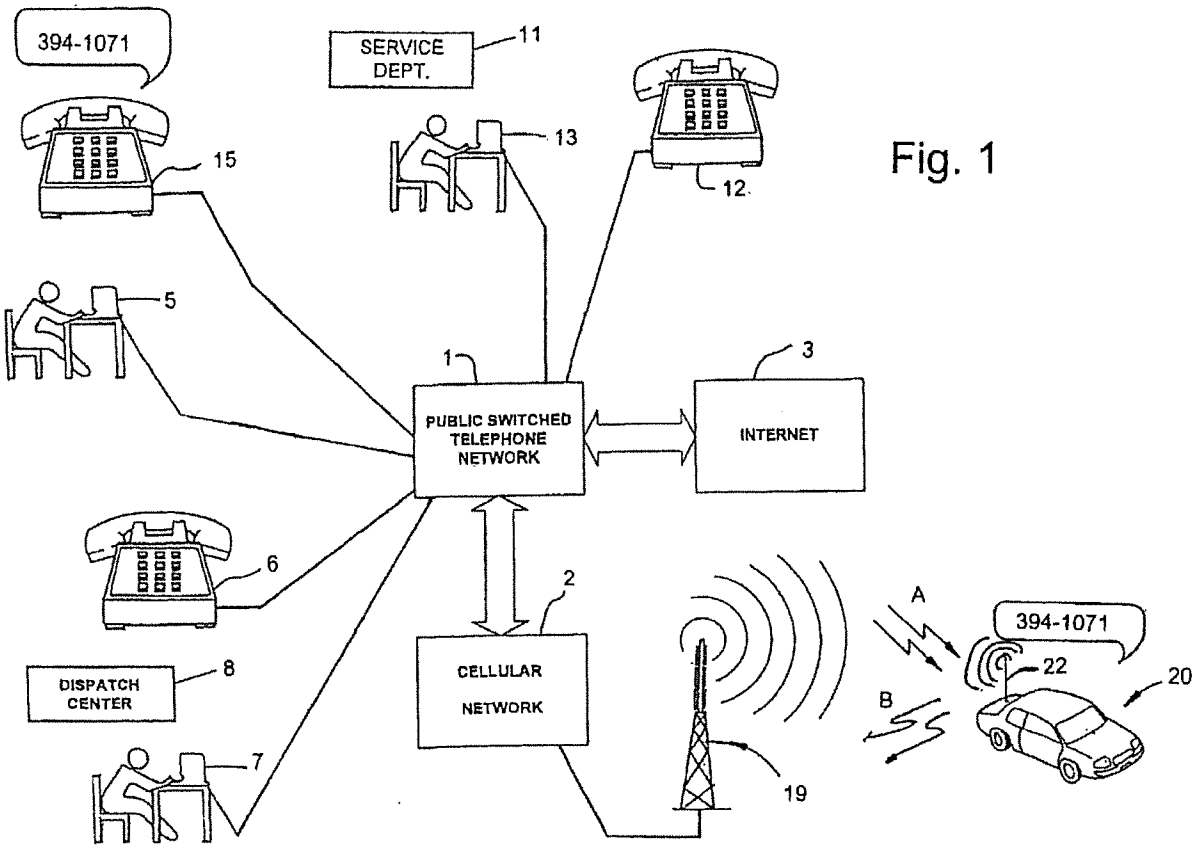


Fig. 1

Accordingly, it is my opinion that claim 14 of the '876 patent is invalid in view of the '392 patent and the J1978 publication.

Claim 16

Claim 16 of the '876 patent reads:

> "A control system according to claim 1 wherein said receiver comprises at least a central station transmitter; and wherein said transmitter is at the vehicle."

All aspects of claim 16 are taught by the '392 patent in view of the J1978 publication:

'876 Patent Claim 16	The '392 Patent and the J1978 Publication

16. A control system according to claim 1 wherein said receiver comprises at least a central station transmitter; and wherein said transmitter is at the vehicle.	"The **service center, in turn, stores the sequence of received DTMF signals that may be subsequently transmitted to the vehicle's system** to affect the unlocking of the doors. As shown in FIG. 9. when a sequence of such DTMF signals is received in an incoming call, first microprocessor 66 performs the data call processing routine 217 shown in FIG. 9. In this routine, microprocessor 66 collects and identifies the sequence of transmitted DTMF signals as identified by DTMF decoder 75 (step 275). **Once microprocessor 66 has identified the sequence of DTMF signals, microprocessor 66 preferably controls transceiver 70 to transmit a DTMF acknowledgment signal back to the remote party** (step 276). ('392 patent, col. 11, lines 52-63)

As above, Figure 1 of the '392 patent illustrates a central station with capability of two-way communication as well as a vehicle with a transceiver. Therefore, it is my opinion that claim 16 of the '876 patent is invalid in view of the '392 patent and the J1978 publication.

Conclusion

Based on my analysis, all of the components (controller, transmitter/receiver, memory, vehicle devices…), component interfaces (data bus, external (wireless) links…), functions (bus communication, bus protocol identification …), and processes described in the '876 patent are obvious over the '392 patent in view of the J1978 publication for reasons including those described above. Accordingly, the asserted claims 1, 3 – 5, 12, 14, and 16 of the '876 patent are invalid and would have been obvious to a person of ordinary skill in the art at the time of the alleged invention.

6.3 Invalidity of '989 over Trimble CrossCheck

Introduction

U.S. Patent No. 6,737,989 (the '989 patent) is titled "Vehicle Tracker including Variable Frequency Transmission and Related Methods" and was filed on March 25, 2002. As stated on the front page of the '989 patent, the '989 patent is a "continuation-in-part of application No. 09/859,727, filed on May 17, 2001, now Pat. No. 6,512,465" and claims priority to "provisional application No. 60/264,811, filed on Jan. 29, 2001, provisional application No. 60/258,005, filed on Dec. 22, 2000, provisional application No. 60/251,552, filed on Dec. 6, 2000, provisional application No. 60/252,125, filed on Nov. 20, 2000, provisional application No. 60/246,463, filed on Nov. 7, 2000, provisional application No. 60/236,890, filed on Sep. 29, 2000, provisional application No. 60/222,777, filed on Aug. 3, 2000, and provisional application No. 60/205,178, filed on May 17, 2000." In my opinion, several prior art references along with combinations of those references render the '989 patent invalid.

The '989 Patent is Invalid in view of the Trimble Prior Art

One prior art device that includes all aspects of the asserted claims of the '989 patent is the CrossCheck AMPS Mobile Unit (the CrossCheck device) produced by Trimble Navigation Limited. The CrossCheck device supports a variety of mobile positioning applications and integrates GPS, AMPS Cellular and computing power onto a single board enclosure. In addition, the CrossCheck device sends GPS data and messages from the mobile unit to a base station, can be adapted to virtually all fleet applications, and when interfaced with FleetVision which can provide total asset management solutions, such as real-time display or alarm reporting. The CrossCheck product was first introduced for commercial sale no later than November 1998. I am relying on the description of the CrossCheck device based on the following documents for my analysis: Operations Manual for the CrossCheck AMPS with IQEvent Engine Firmware (the CrossCheck manual), Product Description Document – CrossCheck AMPS Cellular (the CrossCheck document), the IQEventEngine Configuration Utility Users Guide, Version A-2 (the IQEE

guide), and the TAIP/IQEventEngine Reference, Revision A (the TAIP reference), collectively referred to as the Trimble prior art. As the Trimble prior art was available more than 12 months before the earliest possible priority date of the '989 patent, the references each qualify as prior art under 35 U.S.C. § 102(b) and can be utilized to invalidate a publication under 35 U.S.C. § 103(a) in view of the earliest possible priority date for the '989 patent.

As described in more detail below, these prior art documents teach all of the limitations of the asserted claims of the '989 patent, i.e. claims 23, 31, 32, 34, and 35.

Claim 23

Claim 23 of the '989 patent reads:

> "A tracking unit for a vehicle comprising:
> a vehicle positioning device,
> a wireless communication device, and
> a controller cooperating with said wireless communication device and said vehicle positioning device to determine and send vehicle position information to a monitoring station; said controller storing a user selected reference location; said controller also sending the vehicle position information based upon a vehicle moving beyond a radial threshold distance from the user selected reference location."

All aspects of claim 23 are taught by the Trimble prior art:

'989 Claim 23	**The Trimble Prior Art**
23. A tracking unit for a vehicle comprising:	The CrossCheck manual, p. 1-5, illustrates the CrossCheck device including the ability to track vehicle location:

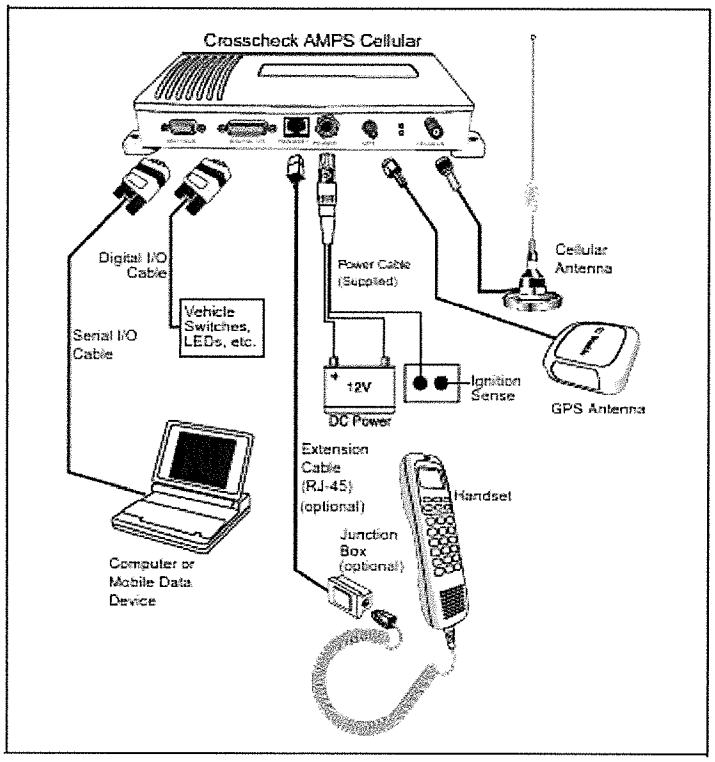
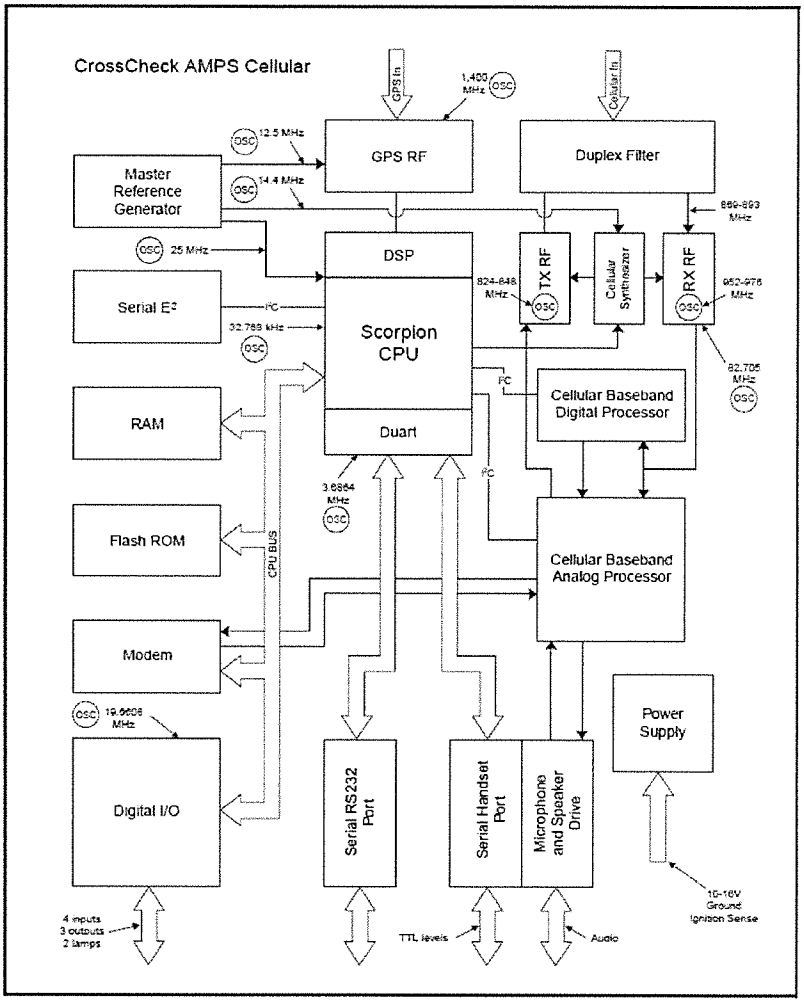


Figure 1-3 CrossCheck System Accessories

Based upon the CrossCheck reference documents, they system contains:

- A GPS antenna and software for vehicle positioning device
- A cellular antenna and software for a wireless communication device
- A Scorpion CPU in its vehicle mounted housing as the controller cooperating with said wireless communication device and said vehicle positioning device

a vehicle positioning device,	The CrossCheck manual shows a GPS receiver for vehicle positioning, as shown in Figure 1-1 on p. 1-3:



On page 1-13 of the CrossCheck manual: "the **IQ*Event Engine* uses GPS information** along with signals received from discrete inputs **to determine when it should report its position, log its position to internal memory, or even wake itself up from a 'power-save' sleep mode.** The CrossCheck unit can intelligently detect when a specified amount of time elapses or when the vehicle has traveled a specified distance since it last reported its position to the base station. **The CrossCheck unit can also detect when the vehicle enters or leaves user-defined regions,** when the vehicle stops or

exceeds a user-defined speed, or when the vehicle is operating during user-defined time periods.

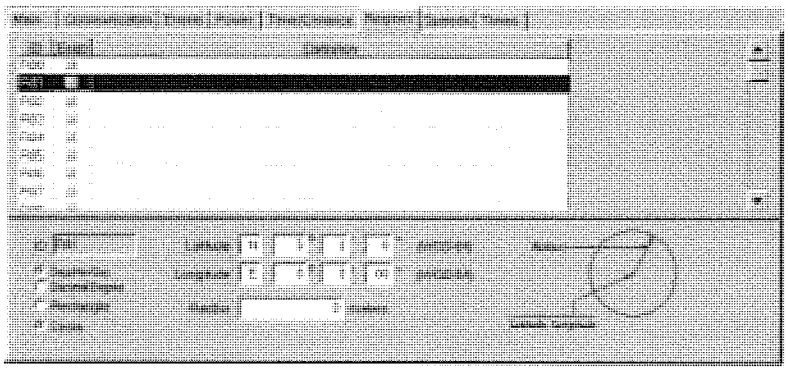
a wireless communication device,	Figure 1-1 of the CrossCheck manual illustrates the use of cellular communications via at least a Cellular Baseband Digital Processor, a Cellular Baseband Analog Processor, and a Modem.

One of ordinary skill in the art would recognize that a cellular modem constitutes a wireless communications device.

and a controller cooperating with said wireless communication device and said vehicle positioning device to determine and send vehicle position information to a monitoring station; said controller storing a user selected reference location;	Figure 1-1 of the CrossCheck manual illustrates a "Scorpion CPU" connected to the wireless communications device and the GPS receiver. "[T]he receiver's 32-bit microprocessor which provides processing power for the IQEvent Engine." (CrossCheck manual, p. 1-11). "The IQEvent Engine gives the CrossCheck unit a considerable advantage over typical GPS receivers, offering advanced capabilities such as intelligent configuration and user-defined event reporting. For example, the IQEvent Engine uses GPS information along with signals received from discrete inputs to determine when it should report its position, log its position to internal memory, or even wake itself up from a 'power-save' sleep mode." (CrossCheck manual, p. 1-13)

A person of ordinary skill in the art would know to use any arbitrary CPU or other processor as a controller for obtaining and processing data.

said controller also sending the	"The CrossCheck unit can also detect when the vehicle enters or leaves user-defined regions, when the vehicle stops or exceeds a

vehicle position information based upon a vehicle moving beyond a radial threshold distance from the user selected reference location	user-defined speed, or when the vehicle is operating during user-defined time periods. The CrossCheck unit can be configured to transmit a report to the base station when these events occur." (CrossCheck Manual, p. 1-13) The IQ Event Engine includes the ability to define "region windows." (IQEE guide, p. 38). The region windows can include circular regions. (IQEE guide, pp. 40 – 42). See also Figure 1-30 on p. 41 of the IQEE guide: 

A person of ordinary skilled in the art would recognize that the processor is sending the vehicle position information based upon a vehicle moving beyond a radial threshold distance from the user selected reference location. Therefore, it is my opinion that claim 23 of the '989 patent is invalid in view of the Trimble prior art.

Claim 31

Claim 31 from the '989 patent reads:

> "The vehicle tracking unit according to claim 23 wherein said controller comprises at least one memory for storing the user selected reference location and vehicle position information therein."

All aspects of claim 31 are taught by the Trimble prior art:

'989 Claim 31	The Trimble Prior Art
Claim 31. the vehicle tracking unit according to claim 23 wherein said controller comprises at least one memory for storing the user selected reference location and vehicle position information therein.	CrossCheck includes RAM and a Flash ROM connected to the Scorpion CPU as shown above in Figure 1-1 on p. 1-3 of the CrossCheck manual. The memory can be used to store position information: "For example, the IQEvent Engine uses GPS information along with signals received from discrete inputs to determine when it should [...], log its position to internal memory." (CrossCheck manual, p. 1-13). "The CrossCheck unit can also detect when the vehicle enters or leaves user-defined regions." (CrossCheck Manual, p. 1-13).

For reasons including those stated above, it is my opinion that claim 31 of the '989 patent is invalid in view of the Trimble prior art.

Claim 32

Claim 32 of the '989 patent reads

> "The vehicle tracking unit according to claim 23 wherein said controller sets the user selected reference location based upon at least one signal provided by the monitoring station."

All aspects of claim 32 are taught by the Trimble prior art:

'989 Claim 32	The Trimble Prior Art
Claim 32. The vehicle tracking unit according to claim 23 wherein said controller sets the user selected reference location based upon at least	"The TAIP/IQEvent Engine Reference includes all the information you need to use TAIP/IQEE messages **to communicate with and configure Trimble mobile units.**" (TAIP reference, p. 1-1, emphasis added). "We use TAIP-formatted messages to:

one signal provided by the monitoring station.	• Configure the CrossCheck units • Poll the CrossCheck unit's IQEvent Engine • Report information collected by the CrossCheck unit to the base station" (TAIP reference, p. 1-7) The Region (GR) message defines the size, shape, and location of regions that can trigger events. A region may be defined as a circular or rectangular area. (TAIP Reference, p. 2-58).

A person of ordinary skill in the art would recognize that TAIP messages could be utilized by the CrossCheck device to set user selected reference location based upon at least one signal provided by the monitoring station. Accordingly, it is my opinion that Claim 32 of the '989 patent is invalid in view of the Trimble prior art.

Claim 34

Claim 34 of the '989 patent reads:

> "The vehicle tracking unit according to claim 32 wherein the at least one signal includes the user selected reference location."

All aspects of claim 34 are taught by the Trimble prior art:

'989 Claim 34	**The Trimble Prior Art**
Claim 34. The vehicle tracking unit according to claim 32 wherein the at least one signal includes the user selected reference location.	The controller can also store a user selected (user defined) reference location using TAIP messages as described above. A message that can be used as a TAIP message includes a "GR Message" as described on p. 2-58 of the TAIP Reference. "The Region (GR) message is used to define the size, shape, and location of regions that

	can be used to trigger events. A region may be defined as a circular or rectangular area." (TAIP reference, p. 2-58).

A person of ordinary skill in the art would appreciate that the specific GR Message could be utilized to transmit user selected location data to and from the CrossCheck device. Therefore, it is my opinion that Claim 34 of the '989 patent is invalid in view of the Trimble prior art.

Claim 35

Claim 35 of the '989 patent reads:

> "The vehicle tracking unit according to claim 23 wherein said vehicle position determining device comprises a Global Positioning System (GPS) device."

All aspects of claim 35 are taught by the Trimble prior art:

'989 Claim 35	**The Trimble Prior Art**
Claim 35. The vehicle tracking unit according to claim 23 wherein said vehicle position determining device comprises a Global Positioning System (GPS) device.	As shown in Figure 1-1 and 1-3 of the CrossCheck manual, the system determines the vehicle location with a GPS device.

Therefore, it is my opinion that Claim 35 of the '989 patent is invalid in view of the Trimble prior art.

Conclusion

Based on my analysis, all aspects of the asserted claims of the '989 patent are obvious in view of the Trimble prior art for reasons including those described above. Accordingly, the asserted claims 23, 31, 32, 34, 35 of the '989 patent are invalid and would have been obvious to a person of ordinary skill in the art at the time of the alleged invention.

6.4 Invalidity of '885 over '479 Braitberg and SAE J1978

Introduction

U.S. Patent No. 6,756,885 (the '885 patent) is titled "Multi-Vehicle Compatible Control System for Reading from a Data Bus and Associated Methods" and was filed on May 31, 2000. As stated on the front page of the '885 patent, the '885 patent is a "continuation-in-part of application No. 09/382,245, filed on Aug. 25, 1999, now Pat. No. 6,275,147, which is a continuation of application No. 09/023,838, filed on Feb. 13, 1998, now Pat. No. 6,011,460, which is a continuation-in-part of application No. 08/701,356, filed on Aug. 22, 1996, now Pat. No. 5,719,551." In my opinion, several prior art references along with combinations of those references render the '885 patent invalid.

The '885 Patent is Invalid in view of U.S. Patent No. 5,479,479 and J1978

One such combination includes U.S. Patent No. 5,479,479 to Braitberg et al. (the '479 patent) and SAE Publication J1978, titled "OBD II Scan Tool" (the J1978 publication). The '885 patent claims priority to U.S. Patent No. 5,719,551 having a filing date of August 22, 1996. The '479 patent has a filing date of April 20, 1993 and the J1978 publication was published June 1994. Accordingly, both the '479 patent and the J1978 publication qualify as prior art under 35 U.S.C. § 102(b) and can be utilized to invalidate a publication under 35 U.S.C. § 103(a) in view of the earliest possible priority date for the '885 patent. As is described in more detail below, the '479 patent describes all of the necessary system components and functions necessary to enable communication and data collection from remote vehicles. The '479 patent contains a variety of descriptions of the controller interfacing with; a vehicle data bus, multiple vehicle devices and a wireless transmitter and receiver. One skilled in the art would realize that everything necessary for two way transmission of data and commands between a vehicle and remote location is disclosed in the '479 patent. To avoid any potential confusion regarding the knowledge of one of ordinary skill in the art regarding vehicle data busses as of the earliest priority date of the '885 patent, I am relying on the J1978 standard. To communicate with a plurality of vehicles the system must communicate with a plurality of existing vehicle data busses. At the time of the '479 patent, the EPA mandated a common, low cost service tool (Scan Tool)

that would allow the service technician to diagnose all vehicles. To enable the Scan Tool to communication across all vehicles, the Society of Automotive Engineers (SAE) and automotive industry experts developed the SAE J1978 standard. SAE J1978, issued 1992-03, Revised 1994-06 describes the communications protocols required to support OBD II diagnostic information and the development of a common diagnostic interface for the OBD II Scan Tool.

The J1978 publication was and is required to be supported by all vehicle and testing equipment manufactures. This standard describes connecting to the vehicle bus using one of three interfaces by sending a signal (i.e. request message) on the data communications bus. It should be noted that current versions of the J1978 spec have increased this to at least five interfaces. This allows a scan tool to be compatible with various busses, and thus a variety of vehicles. While the focus of this analysis is not the development of a OBD II Scan Tool, the J1978 standard teaches a method to read, write and communicate on a plurality of data busses and as a result a plurality of vehicles. Additionally, I have been informed that Omega has asserted in its infringement contention that the sending of the three (now six) signals (i.e. request messages) as described in the J1978 publication satisfies certain elements of the '885 patent relating to devices codes and/or command signals. Therefore, the use of the J1978 publication is proper in my analysis. As discussed above, Omega uses an identical bus discovery technique as J1978, with additional interfaces rather than the three interfaces specified in 1994. One skilled in the art at that time would recognize that the difference between Omega and the J1978 publication is the number of interfaces, and not the technique of bus discovery, thereby communicating with a plurality of vehicles.

These two prior art documents teach all of the limitations of the asserted claims of the '885 patent, i.e. claims 1, 2, 3, 12, and 14.

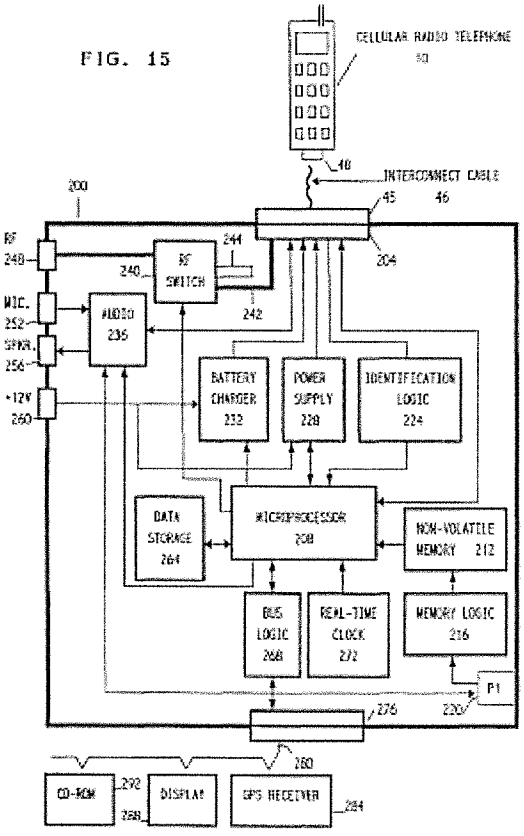
Claim 1

Claim 1 of the '885 patent reads:

> "A control system for a vehicle comprising a data communications bus and at least one vehicle device connected thereto, the control system comprising:

a transmitter and a receiver for receiving signals from said transmitter; and a multi-vehicle compatible controller cooperating with said transmitter and said receiver and for storing a set of device codes for a given vehicle device for a plurality of different vehicles, for reading a device code from the data communications bus, and for determining a match between a read device code and the stored device codes to thereby provide compatibility with a plurality of different vehicles."

All aspects of claim 1 are taught by the '479 patent in view of the J1978 publication:

'885 Patent Claim 1	The '479 Patent and the J1978 Publication
1. A control system for a vehicle comprising a data communications bus and at least one vehicle device connected thereto, the control system comprising:	As shown in Figure 15 of '479, the system contains; a multiplex bus 276; a receiver and transmitter 10; and a controller 200. 

As shown in Figure 15 of the '479 patent, the system contains; a multiplex bus 276; a receiver and transmitter 10; and a controller 200. These components are also described in more detail in column 12, lines 38-54 of the '479 patent (as shown below). One skilled in the art at that time could easily recognize the similarity in system component and architecture between the patents. As described above, the '479 patent discloses a vehicle control system for a vehicle comprising a data bus. In addition, those skilled in the art were familiar with the bus parameters proposed by the SAE, including the teachings of the J1978 publication regarding the use of a controller compatible with multiple buses and thereby multiple vehicles. As a result, all of the system components and functions in claim 1 of the '885 patent are taught by the '479 patent, alone or in combination with the J1978 publication.

The '885 Patent	The '479 Patent and the J1978 Publication
a transmitter and a receiver for receiving signals from said transmitter; and	"In another embodiment, car kit controller 200 may also be used to **control the transmission of data to and from a number of peripheral devices via an airlink provided by cellular phone 10**." ('479 patent, col. 11, lines 56-60)

The '479 patent discloses a multi-vehicle compatible controller cooperating with the transmitter and receiver. The controller stores a set of device codes for reading a device code from the data bus, and for determining a match between a read device code and a stored device code. The patent discloses a storage device to store information passing along the bus between peripheral devices and the cellular phone.

The '885 Patent	The '479 Patent and the J1978 Publication
a multi-vehicle compatible controller cooperating with said	"In another embodiment, **car kit controller 200 may also be used to control the transmission of**

transmitter and said receiver and for storing a set of device codes for a given vehicle device for a plurality of different vehicles, for reading a device code from the data communications bus, and for determining a match between a read device code and the stored device codes to thereby provide compatibility with a plurality of different vehicles.	**data** to and from a number of peripheral devices **via an airlink provided by cellular phone 10."** ('479 patent, col 11, lines 56-60) "In operation, **cellular telephone 10 may receive RF signals containing data addressed to one of the peripheral devices. The data is passed via interconnect cable 46 to microprocessor 208. Microprocessor 208 formats the data according to the needs of the peripheral device to which the data is addressed.** The data is then either buffered or passed directly through bus connector 276 to the appropriate peripheral device one bus 280. Car kit **controller 200 further comprises circuitry to allow this process to be reversed to allow any of the peripheral devices to send data through car kit controller 200 and cellular phone 10 and out of the car using RF signals.** Accordingly, a duplex digital path is provided between bus 280 and cellular phone 10, for allowing digital information to be transmitted through car kit controller 200 in either direction." ('479 12:38-54, emphasis added) The SAE standard for the OBD II Scan Tool (SAE J1978, Issued 1992-03, Revised 1994-06) describes the functions required to be supported by vehicles and testing equipment. This standard describes connecting to the vehicle bus using one of

	three interfaces by sending a signal (request message) on the data communications bus. See SAE J1978 at 6.5.2; see also ISO 9141-2. Three signals (request messages) are sent, one of which would likely trigger a response message. See SAE J1978 at 6.5.2. If none of the initial signals prompt a response, the standard further describes additional steps to determine a working signal. See SAE J1978 at 6.8.

The '479 patent describes reading data from the vehicle bus. One skilled in the art would recognize that reading data from a digital bus is not novel. For example, the SAE standard describes the functions required to be supported by vehicles and testing equipment. This standard describes connecting to the vehicle bus using one of three interfaces by sending a signal (request message) on the data communications bus. See SAE J1978 at 6.5.2; see also ISO 9141-2. This allows a controller to be compatible with various busses, and thus a variety of vehicles.

As noted above, a multi-vehicle compatible controller was also taught by SAE J1978. I have been informed that Omega relies on the current SAE bus discovery protocol with additional interfaces rather than the three interfaces specified in 1994 in its infringement contentions. It was well known in the art since at least as early as 1994 that pursuant to the J1978 publication, a controller could be compatible with multiple buses (and thus multiple vehicles) by following the protocol of sending a sequence of multiple bus messages to determine the bus type. The J1978 publication describes the functions required to be supported by vehicles and testing equipment. This standard describes connecting to the vehicle bus using one of three interfaces by sending a signal (request message) on the data communications bus. See SAE J1978 at 6.5.2; see also ISO 9141-2. Three signals (request messages) are sent, one of which would likely trigger a response message. See SAE J1978 at 6.5.2. If none of the initial signals prompt a response, the standard further describes additional steps to determine a working signal. See SAE J1978 at 6.8.

For reasons including those stated above, Claim 1 of the '885 patent is taught by the '479 patent and the J1978 publication.

Claim 2

Claim 2 of the '885 patent reads

> "A control system according to claim 1 wherein said multi-vehicle compatible controller comprises a memory for the stored device codes."

All aspects of claim 2 are taught by the '479 patent in view of the J1978 publication:

'885 Patent Claim 2	**The '479 Patent and the J1978 Publication**
2. A control system according to claim 1 wherein said multi-vehicle compatible controller comprises a memory for the stored device codes.	"**Non-volatile memory 212 also provides microprocessor 208 with information on how to interpret signals** from and format signals to the identified cellular phone 10. ('479 patent, col 11, lines 46-49). The '479 patent also discloses checking the format and address of certain signals against stored information. "If the data is addressed to a peripheral device on bus 280, microprocessor 208 determines which device is to receive the data and checks to ensure that the data is formatted correctly for the particular peripheral device (block 324)." ('479 patent col. 13, lines 18-21)

The '479 patent discloses usages of memory in the controller. "Non-volatile memory 212 also provides microprocessor 208 with information on how to interpret signals from and format signals to the identified cellular phone 10. ('479 patent col 11, lines 46-49). The '479 patent also discloses storing data in memory related to command signals: Further, the '479 patent discloses checking the format and address of certain signals against stored information.

As one skilled in the art would recognize, one of the many usages of the memory in the controller would be to control the data bus, interpret the incoming command signals and act on the command signals. Therefore, the '479 patent and the J1978 publication teach all aspects of claim 2.

Claim 3

Claim 3 in the '885 patent reads

> "A control system according to claim 2 wherein said multi-vehicle compatible controller comprises a processor cooperating with said memory for determining the match between the read device code and the stored device codes."

All aspects of claim 3 are taught by the '479 patent in view of the J1978 publication:

'885 Patent Claim 3	The '479 Patent and the J1978 Publication
3. A control system according to claim 2 wherein said multi-vehicle compatible controller comprises a processor cooperating with said memory for determining the match between the read device code and the stored device codes.	As stated in the previous section, '479 patent col. 13, lines 18-21 "If the data is addressed to a peripheral device on bus 280, **microprocessor 208 determines which device is to receive the data and checks to ensure that the data is formatted correctly** for the particular peripheral device (block 324)." As a result, if the device code data is not properly formatted or properly addressed, the controller would not initiate any activity on those. If the device code data is determined to be a match by the controller, the controller will take the appropriate action. Also in '479 col13:61 -14:2

	"Once the data is present on the bus, **each of the devices attached to bus 280 (including microprocessor 208) determines if the data is addressed to it** (410). If so, the **addressed device retrieves that data from bus** 280. If the data is not addressed to one of the peripheral devices on bus 280, it is forwarded to microprocessor 208 (412). **Microprocessor 208 determines (414) if the data is to be sent via an RF air-link to a remote device**. If not, microprocessor 208 initiates a predetermined error routine (415)."

As above with respect to claim 2, the '479 patent teaches

"If the data is addressed to a peripheral device on bus 280, microprocessor 208 determines which device is to receive the data and checks to ensure that the data is formatted correctly for the particular peripheral device (block 324)." ('479 patent, col. 13, lines 18-21)

As a result, if the device code data is not properly formatted or properly addressed, the controller would not initiate any activity on those. If the device code data is determined to be a match by the controller, the controller would take the appropriate action. Also in the '479 patent:

"Once the data is present on the bus, each of the devices attached to bus 280 (including microprocessor 208) determines if the data is addressed to it (410). If so, the addressed device retrieves that data from bus 280. If the data is not addressed to one of the peripheral devices on bus 280, it is forwarded to microprocessor 208 (412). Microprocessor 208 determines (414) if the data is to be sent via an RF air-link to a remote device. If not, microprocessor 208 initiates a predetermined error routine (415)." ('479 patent, col. 13 line 61 – col. 14 line 2)

One of ordinary skill in the art would appreciate the flexibility of the data bus and a controller's ability to either react or ignore control codes coming across the bus. How the controller would react to the control codes depends upon how the software is programmed that resides in the systems memory. This flexibility enables the system to operate with a plurality of vehicles and configurations

Additionally, it was well known in the art since at least as early as 1994 that pursuant to the J1978 publication that a controller could be compatible with multiple buses (and thus multiple vehicles) by following the protocol of sending a sequence of multiple bus messages to determine the bus type. The J1978 publication describes the functions required to be supported by vehicles and testing equipment, i.e. a scan tool utilized to interface with a variety of vehicles and vehicle busses. The J1978 publication describes a standard for connecting to the vehicle bus using one of three interfaces by sending a command signal (request message) on the data communications bus. See J1978 at 6.5.2. Three command signals (request messages) are sent, one of which would likely trigger a response message (making it a "working command signal," and the others sent "non-working command signals") See SAE J1978 at 6.5.2. If none of the initial command signals prompt a response, the standard further describes additional steps to determine a working command signal. See SAE J1978 at 6.8. Those practicing in the art at that time would recognize the SAE standards' methodology for communicating expeditiously with multiple data busses and as a result a plurality of vehicles.

For reasons including those stated above, the '479 publication and the J1978 publication teach all aspects of claim 3 of the '885 patent.

Claim 12

Claim 12 of the '885 patent reads:

> "A control system according to claim 1 wherein said transmitter comprises at least a central station transmitter; and wherein said receiver is at the vehicle."

All aspects of claim 12 are taught by the '479 patent in view of the J1978 publication:

'885 Patent Claim 12	The '479 Patent and the J1978 Publication
12. A control system according to claim 1 wherein said transmitter comprises at least a central station transmitter; and wherein said receiver is at the vehicle.	The '479 patent as described in Figure 15 (above) and col. 12:38-54 "In operation, **cellular telephone 10 may receive RF signals containing data** addressed to one of the peripheral devices. The **data is passed via interconnect cable 46 to microprocessor** 208. Microprocessor 208 formats the data according to the needs of the peripheral device to which the data is addressed. The data is then either buffered or passed directly through bus connector 276 to the appropriate peripheral device one bus 280. **Car kit controller 200 further comprises circuitry to allow this process to be reversed to allow any of the peripheral devices to send data through car kit controller 200 and 50 cellular phone 10 and out of the car using RF signals.** Accordingly, **a duplex digital path is provided between bus 280 and cellular phone 10, for allowing digital information to be transmitted through car kit controller 200 in either direction.**" ('479 patent, col. 12, lines 39-54)

Accordingly, one of the ordinary skill in the art would recognize that a duplex digital path (i.e. both a transmit and a receive) is provided between bus 280 and cellular phone 10, thereby allowing digital information to be transmitted through car kit controller 200 in either direction. As the text and figure clearly shows, the vehicle contains a transmitter and the receiver is located externally. For reasons including those stated above, the '479 publication and the J1978 publication teach all aspects of claim 12 of the '885 patent.

Claim 14

Claim 14 of the '885 patent describes

"A control system according to claim 1 wherein said receiver comprises at least a central station transmitter; and wherein said transmitter is at the vehicle."

All aspects of claim 14 are taught by the '479 patent in view of the J1978 publication:

'885 Patent Claim 14	The '479 Patent and the J1978 Publication
14. A control system according to claim 1 wherein said receiver comprises at least a central station transmitter; and wherein said transmitter is at the vehicle.	As shown in the above claim, and in Figure 15 of '479, the vehicle system is comprised of both receiver and transmitter. Conversely, the remote location also contains both receiver and transmitter: "For example, **if the dispatcher desires to know the location of one of its vehicles** which is equipped with car kit controller 200, cellular phone 10, and all of the peripheral devices shown, **he sends a digital request via RF signals to cellular telephone 10** asking for the vehicle's location." ('479 patent, col. 14 lines 25-31)

One skilled in the art would recognize that a cell phone is a bi-directional communication device. As a result, it is clear to identify that the vehicle contains both transmitter and receiver. Also to enable and maintain communication with the vehicle, the remote location, such as a central station, would also include both transmission and reception capability. Therefore, for reasons including those stated above, the '479 publication and the J1978 publication teach all aspects of claim 14 of the '885 patent.

Conclusion

Based on my analysis, all of the components (controller, transmitter/receiver, memory, vehicle devices...), component interfaces (data bus, external (wireless) links...), functions (bus communication, bus protocol identification, vehicle device command...), and processes described in '885 patent are obvious over the '479 patent in view of the

J1978 publication for reasons including those described above. Accordingly, the asserted claims 1, 2, 3, 12, and 14 of the '885 patent are invalid and would have been obvious to a person of ordinary skill in the art at the time of the alleged invention.

6.5 Invalidity of '885 over MobileWeb and SAE J1978

Introduction

U.S. Patent No. 6,756,885 (the '885 patent) is titled "Multi-Vehicle Compatible Control System for Reading from a Data Bus and Associated Methods" and was filed on May 31, 2000. As stated on the front page of the '885 patent, the '885 patent is a "continuation-in-part of application No. 09/382,245, filed on Aug. 25, 1999, now Pat. No. 6,275,147, which is a continuation of application No. 09/023,838, filed on Feb. 13, 1998, now Pat. No. 6,011,460, which is a continuation-in-part of application No. 08/701,356, filed on Aug. 22, 1996, now Pat. No. 5,719,551." In my opinion, several prior art references along with combinations of those references render the '885 patent invalid.

The '885 Patent is Invalid in view of the MobileWeb Product and J1978

A second such combination includes the CellPort Labs MSC-970 MobileWeb product and SAE Publication J1978, titled "OBD II Scan Tool" (the J1978 publication). For the purposes of my analysis, I am relying on the description of the MSC-970 product as contained in the "MSC-9710 On-Line Brochure" dated January 1, 1997 (the MobileWeb brochure), along with "MobileWeb: Changing the Face of Mobile Networking" by Pat Kennedy of CellPort Labs, Inc, dated November 1996 and having ISBN# 0-7803-3277-6 (the MobileWeb paper). The J1978 publication was published June 1994. As described above, I believe that the '885 patent is not entitled to a priority date earlier than that of U.S. Patent No. 6,011,460, filed February 13 1998. As such, the MobileWeb brochure, the MobileWeb paper, and the J1978 publication all qualify as prior art under 35 U.S.C. § 102(b) and can be utilized to invalidate a publication under 35 U.S.C. § 103(a) in view of the earliest possible priority date to which the '885 patent is entitled.

The MobileWeb paper describes "CellPort Labs' MobileWeb technology integrates a complete "mobile" Internet/Web server into appropriately equipped vehicles. Running on the CellPort Controller/Server, and coupled with its patented Universal Wireless Port technology, MobileWeb opens an unlimited range of bidirectional data networking opportunities and applications, unencumbered or restricted by a single, fixed geographic location." (MobileWeb paper, p. 89).

As described in the MobileWeb brochure:

> "CellPort Labs' MobileWeb combines universal wireless connectivity with Internet access, creating a universal data interface that turns any vehicle into an untethered "Web site". This allows information to be shared easily between fixed and mobile platforms. From checking local traffic conditions to tracking a fleet of delivery trucks, MobileWeb provides an unlimited range of bi-directional data opportunities and applications utilizing Internet/Web and intranet networks."

It is my opinion that the MobileWeb brochure and the MobileWeb paper describe all of the necessary system components and functions necessary to enable communication and data collection from remote vehicles. Furthermore, the MobileWeb paper states the MobileWeb product "incorporated internal vehicular communications, wireless and data connectivity, and Internet/Web networking, creating MobileWeb technology." MobileWeb paper, p. 90). To perform internal vehicular communications, the MobileWeb product must communicate with a plurality of existing vehicle data busses. At the time of the MobileWeb brochure and the MobileWeb paper, the EPA mandated a common, low cost service tool (Scan Tool) that would allow the service technician to diagnose all vehicles. To enable the Scan Tool to communication across all vehicles, the Society of Automotive Engineers (SAE) and automotive industry experts developed the SAE J1978 standard. SAE J1978, issued 1992-03, Revised 1994-06 describes the communications protocols required to support OBD II diagnostic information and the development of a common diagnostic interface for the OBD II Scan Tool. The J1978 specification is required to be supported by all vehicle and testing equipment manufactures. This standard describes connecting to the vehicle bus using one of three interfaces by sending a command signal (request message) on the data communications bus. This allows a scan tool to be compatible with various busses, and thus a variety of vehicles. Additionally, I have been informed that Omega has asserted in its infringement contention that the sending of the three (now six) signals (i.e. request messages) as described in the J1978 publication satisfies certain elements of the '885 patent relating to devices codes and/or command signals. Therefore, the use of the J1978 publication is proper in my analysis. As

discussed above, Omega uses an identical bus discovery technique as J1978, with additional interfaces rather than the three interfaces specified in 1994. One skilled in the art at that time would recognize that the difference between Omega and the J1978 publication is the number of interfaces, and not the technique of bus discovery, thereby communicating with a plurality of vehicles.

These three prior art documents teach all the limitations of the asserted claims of the '885 patent, i.e. claims 1, 2, 3, 12, and 14.

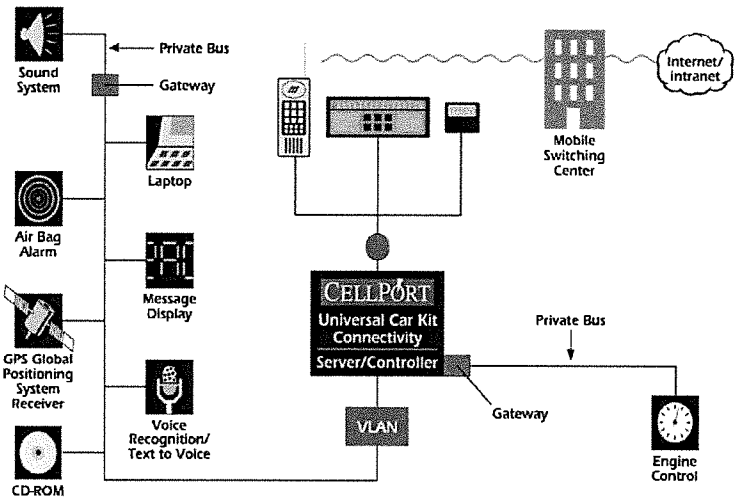
Claim 1

Claim 1 of the '885 patent reads:

> "A control system for a vehicle comprising a data communications bus and at least one vehicle device connected thereto, the control system comprising:
> a transmitter and a receiver for receiving signals from said transmitter; and
> a multi-vehicle compatible controller cooperating with said transmitter and said receiver and for storing a set of device codes for a given vehicle device for a plurality of different vehicles, for reading a device code from the data communications bus, and for determining a match between a read device code and the stored device codes to thereby provide compatibility with a plurality of different vehicles."

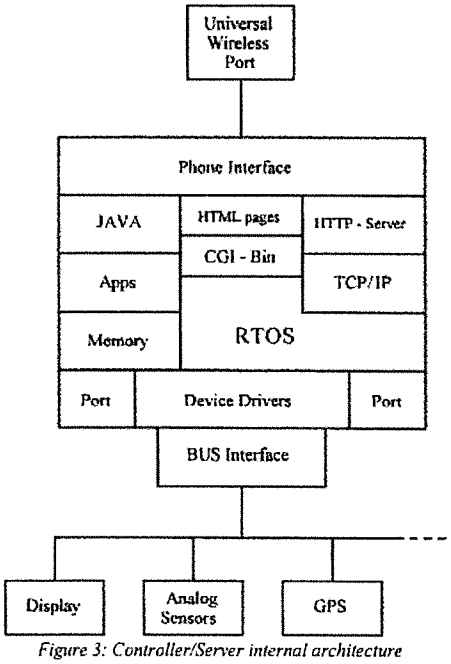
All aspects of claim 1 are taught by the MobileWeb brochure in view of the MobileWeb paper in view of the J1978 publication:

'885 Patent Claim 1	Prior Art – MobileWeb Product and J1978 Paper
1. A control system for a vehicle comprising a data communications bus and at least one vehicle device connected thereto, the	As described in the MobileWeb brochure: "CellPort Labs' MobileWeb combines universal wireless connectivity with Internet access, creating a universal data interface that turns any vehicle into an untethered "Web site". This allows information to be shared easily between fixed and mobile platforms. From checking local traffic conditions to tracking a fleet of delivery

control system comprising:	trucks, MobileWeb provides an unlimited range of bi-directional data opportunities and applications utilizing Internet/Web and intranet networks." CellPort Labs' MobileWeb  (MobileWeb Brochure, pp. 2 – 3).

From the cited diagram, the MobileWeb product uses a vehicular local area network ("VLAN") with vehicle devices connected to the VLAN. As described in the MobileWeb paper, p. 91:

> "MobileWeb pages contain information gathered from the vehicle's internal data network "vehicle local area network (VLAN), or from other Internet/Web sites. The VLAN is similar in concept to a LAN except for the fact that it consists of the vehicle's electronic devices instead of personal computers. VLAN devices could include PCs, as well as other vehicular devices such as airbag controllers, door locks, Global Positioning System (GPS) equipment, ignition controls, LCD displays..."

a transmitter and a receiver for receiving signals from said transmitter; and	The MobileWeb includes a universal wireless port having a transmitter and a receiver that is capable of controlling the sending, receiving and proper routing of data, as shown in the MobileWeb paper, p. 92:  *Figure 3: Controller/Server internal architecture* Further, the MobileWeb paper discloses "CDPD packet data is particularly well-suited to Mobile web applications. It uses the IP, eliminating the translation gateways and custom software required by other solutions. It is an encrypted, digital-packet-data overlay that talks directly to the Internet through a secure firewall connection. Using CDPD, MobileWeb is capable of a 19.2 Kbps raw-data rate with effective throughput of approximately 10 Kbps." (MobileWeb paper, p. 92)

Accordingly, the MobileWeb paper discloses a transmitter and a receiver for receiving signals from said transmitter, i.e. CDPD cellular phones/modems and other wire-

less devices for connecting to the Internet. The MobileWeb paper further illustrates a universal wireless port having a transmitter and a receiver that is capable of controlling the sending, receiving and proper routing of data

a multi-vehicle compatible controller cooperating with said transmitter; and said receiver and for storing a set of device codes for a given vehicle device for a plurality of different vehicles, for reading a device code from the data communications bus, and for determining a match between a read device code and the stored device codes to thereby provide compatibility with a plurality of different vehicles.	The MobileWeb paper discloses ""MobileWeb communicates with embedded vehicular or plug in devices through the Controller function of the CellPort Controller/Server, collecting data or sending commands... In the Client/Server architecture, the VLAN connects various internal or peripheral electronic devices using the standard automotive LAN protocol. Most manufacturers incorporate internal LANs into new vehicles..." Further, "[t]he CellPort Controller can communicate with these devices in their own language, then translates information to the Internet's standard transmission protocol (HTTP). As a multitasking processor, the CellPort Controller monitors and communicates with multiple vehicular devices simultaneously. For example, it can monitor the status of electronic devices, at the same time as it accepts wireless data packets from an external internet site. Users making data requests appear to have transparent access to vehicular devices." (MobileWeb paper, pp. 91 – 92). The SAE standard for the OBD II Scan Tool (SAE J1978, Issued 1992-03, Revised 1994-06) describes the functions required to be supported by vehicles and testing equipment. This standard describes connecting to the vehicle bus using one of three interfaces by sending a signal (request message) on the data communications bus. See SAE J1978 at 6.5.2; see also ISO 9141-2.

	Three signals (request messages) are sent, one of which will likely trigger a response message. See SAE J1978 at 6.5.2. If none of the initial signals prompt a response, the standard further describes additional steps to determine a working signal. See SAE J1978 at 6.8.

The MobileWeb paper discloses a multi-vehicle compatible controller in connection and cooperation with the transmitter and receiver as described above. Further, the MobileWeb paper discloses storing a set of device codes for a given vehicle device for a plurality of different vehicles, for reading a device code from the data communication bus, and for determining a match between a read device code and the stored device codes to thereby provide compatibility with a plurality of different vehicles. See, e.g. the MobileWeb paper, pp. 91-92.

> "MobileWeb communicates with embedded vehicular or plug in devices through the Controller function of the CellPort Controller/Server, collecting data or sending commands..."
>
> "In the Client/Server architecture, the VLAN connects various internal or peripheral electronic devices using the standard automotive LAN protocol. Most manufacturers incorporate internal LANs into new vehicles... "

Further, the MobileWeb is not limited by vehicle-specific communication protocols since the controller can utilize the OBD II standard articulated in the J1978 publication to communicate with multiple vehicle devices in a variety of vehicles. As a result, one skilled in the art could identify all of the components and functions, described in claim 1, already available in the MobileWeb product for reasons including those stated above. Accordingly, my conclusion is that claim 1 of the '885 patent is invalid in view of the MobileWeb brochure in view of the MobileWeb paper in view of the J1978 publication.

Claim 2

Claim 2 of the '885 patent reads:

"A control system according to claim 1 wherein said multi-vehicle compatible controller comprises a memory for the stored device codes."

All aspects of claim 2 are taught by the MobileWeb brochure in view of the MobileWeb paper in view of the J1978 publication:

'885 Patent Claim 2	Prior Art – MobileWeb Product and J1978 Paper
2. A control system according to claim 1 wherein said multi-vehicle compatible controller comprises a memory for the stored device codes.	"The CellPort Labs MSC-9710 MobileWeb Developer's Kit is a single-board computer that connects a variety of wireless interfaces to one or more vehicle buses. The MobileWeb server/controller contains a microprocessor, 2 Megabytes of RAM, and up to 8 Megabytes of Flash Memory to implement an in-vehicle server/controller with file system." (MobileWeb brochure, p. 4)

Accordingly, one of ordinary skilled in the art would recognize that the MobileWeb controller has memory for storing device codes. Therefore, my conclusion is that claim 2 of the '885 patent is invalid for reasons including those stated above with respect to the MobileWeb brochure in view of the MobileWeb paper in view of the J1978 publication.

Claim 3

Claim 3 of the '885 patent reads:

"A control system according to claim 2 wherein said multi-vehicle compatible controller comprises a processor cooperating with said memory for determining the match between the read device code and the stored device codes."

All aspects of claim 3 are taught by the MobileWeb brochure in view of the MobileWeb paper in view of the J1978 publication:

'885 Patent Claim 3	Prior Art – MobileWeb Product and J1978 Paper

3. A control system according to claim 2 wherein said multi-vehicle compatible controller comprises a processor cooperating with said memory for determining the match between the read device code and the stored device codes.	The MobileWeb product contains a processor that communicates with the memory and the vehicle devices: "The CellPort Controller/Server is the heart and brain of MobileWeb. The Controller function is a powerful multitasking processor/micro computer, communicating with inboard vehicle devices connected to the VLAN and a wireless-access network." (CellPort paper, p. 91)

The MobileWeb is not limited by vehicle-specific communication protocols since the controller:

> "The CellPort Controller **can communicate with these devices in their own language, then translates information to the Internet's standard transmission protocol (HTTP).** As a multitasking processor, the CellPort **Controller monitors and communicates with multiple vehicular devices simultaneously**. For example, it can monitor the status of electronic devices, at the same time as it accepts wireless data packets from an external internet site. Users making data requests appear to have transparent access to vehicular devices." "MobileWeb pages **contain information gathered from the vehicle's internal data** network "vehicle local area network (VLAN), or from other Internet/Web sites. The VLAN is similar in concept to a LAN except for the fact that it consists of the vehicle's electronic devices instead of personal computers. **VLAN devices could include PCs, as well as other vehicular devices such as airbag controllers, door locks, Global Positioning System (GPS) equipment, ignition controls, LCD displays..."**

(MobileWeb paper, p. 92) One skilled in the art can identify how MobileWeb communicates on the vehicle's data bus and determines the match between the read device code and the stored device codes. This data can be stored in the controller's memory and then

transmitted to a remote location via the wireless connection. As such, my conclusion is that claim 3 of the '885 patent is invalid for reasons including those stated above with respect to the MobileWeb brochure in view of the MobileWeb paper in view of the J1978 publication.

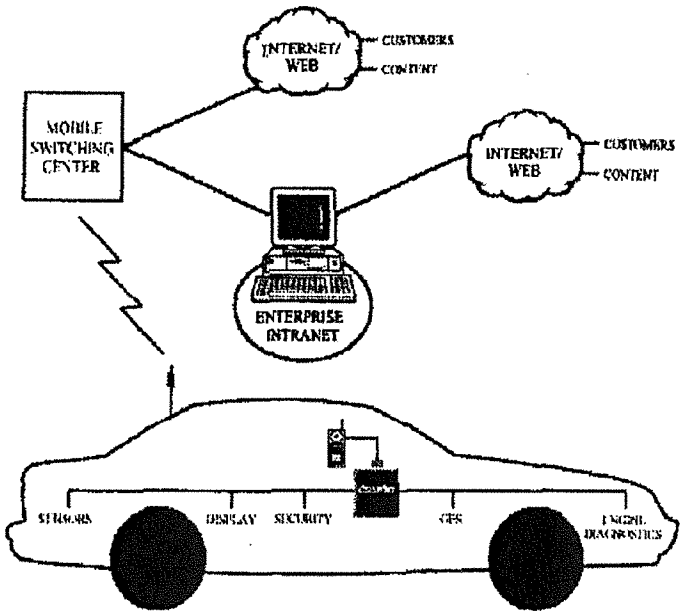
Claim 12

Claim 12 of the '885 patent reads

> "A control system according to claim 1 wherein said transmitter comprises at least a central station transmitter; and wherein said receiver is at the vehicle."

All aspects of claim 12 are taught by the MobileWeb brochure in view of the MobileWeb paper in view of the J1978 publication:

'885 Patent Claim 12	**Prior Art – MobileWeb Product and J1978 Paper**
12. A control system according to claim 1 wherein said transmitter comprises at least a central station transmitter; and wherein said receiver is at the vehicle.	The MobileWeb paper discloses duplex communication between remote systems and the MobileWeb product: "[r]unning on the CellPort Controller/Server, MobileWeb functions like any Internet web site. Its 2 way data networking capability allows the vehicle to respond to internet web data requests, or send data to other internet web sites by executing internal application programs." (MobileWeb paper, p. 90). See also Figure 2 on p. 91 of the MobileWeb paper:

	 *Figure 2: Web on Wheels*

Therefore, my conclusion is that claim 12 of the '885 patent is invalid for reasons including those stated above with respect to the MobileWeb brochure in view of the MobileWeb paper in view of the J1978 publication.

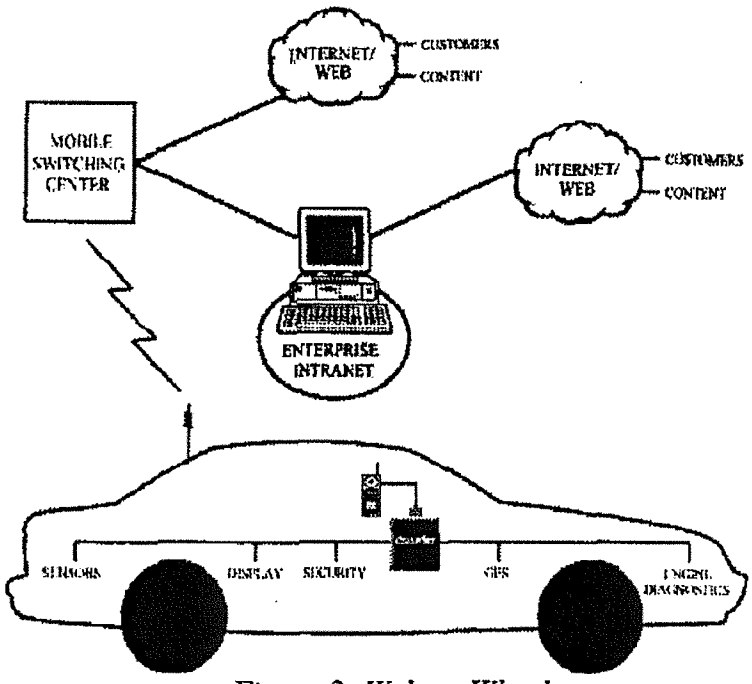
Claim 14

Claim 14 of the '885 patent reads

> "A control system according to claim 1 wherein said receiver comprises at least a central station transmitter; and wherein said transmitter is at the vehicle."

All aspects of claim 14 are taught by the MobileWeb brochure in view of the MobileWeb paper in view of the J1978 publication:

'885 Patent Claim 14	**Prior Art – MobileWeb Product and J1978 Paper**
14. A control system according to claim 1 wherein said receiver comprises at least a	The MobileWeb paper discloses duplex communication between remote systems and the MobileWeb product: "[r]unning on the CellPort Controller/Server, MobileWeb functions like

central station transmitter; and wherein said transmitter is at the vehicle.	any Internet web site. Its 2 way data networking capability allows the vehicle to respond to internet web data requests, or send data to other internet web sites by executing internal application programs." (MobileWeb paper, p. 90). See also Figure 2 on p. 91 of the MobileWeb paper:  *Figure 2: Web on Wheels*

From the teaching of the MobileWeb paper and the use of two-way communication between the remote systems and the MobileWeb product, one of ordinary skill in the art would appreciated the remote systems (i.e. the remote sites) contains both a transmitter and a receiver and the vehicle also contains a transmitter and receiver in order to facilitate the disclosed two-way communication. Therefore, my conclusion is that claim 14 of the '885 patent is invalid for reasons including those stated above with respect to the MobileWeb brochure in view of the MobileWeb paper in view of the J1978 publication.

Conclusion

Based on my analysis, all of the components (controller, transmitter/receiver, memory, vehicle devices…), component interfaces (data bus, external (wireless) links…), functions (bus communication, bus protocol identification, vehicle device command…), and processes described in '885 patent are obvious over the MobileWeb brochure, the MobileWeb paper, and the J1978 publication for reasons including those described above. Accordingly, the asserted claims 1, 2, 3, 12, and 14 of the '885 patent are invalid and would have been obvious to a person of ordinary skill in the art at the time of the alleged invention.

6.6 Invalidity of '727 over '074 Spaur and SAE J1979

Introduction

U.S. Patent No. 7,671,727 (the '727 patent) is titled "Speed Exceeded Notification Device for Vehicle Having a Data Bus and Associated Methods" and was filed on August 27, 2007. As stated on the front page of the '727 patent, the '727 patent is a "continuation-in-part of application No. 11/076,259, filed on Mar. 9, 2005, which is a continuation of application No. 10/383,496, filed on Mar. 7, 2003, now Pat. No. 7,149,623, which is a continuation of application No. 09/859,972, filed on May 17, 2001, now Pat. No. 6,606,561" and claims priority to "provisional application No. 60/264,811, filed on Jan. 29, 2001, provisional application No. 60/258,005, filed on Dec. 22, 2000, provisional application No. 60/251,552, filed on Dec. 6, 2000, provisional application No. 60/252,125, filed on Nov. 20, 2000, provisional application No. 60/236,890, filed on Sep. 29, 2000, provisional application No. 60/246,463, filed on Nov. 7, 2000, provisional application No. 60/222,777, filed on Aug. 3, 2000, provisional application No. 60/205,178, filed on May 17, 2000." In my opinion, several prior art references along with combinations of those references render the '727 patent invalid.

The '727 Patent is Invalid in view of the '074 Patent

One such combination includes U.S. Patent No. 5,732,074 to Spaur et al. (the '074 patent), titled *Mobile Portable Wireless Communication System*, and filed January 16, 1996 and SAE Publication J1979, titled "E/E Diagnostic Test Modes" and published June 10, 1994 (the J1979 publication). The '074 patent describes a bi-directional communication system between a vehicle and remote computer terminal. The remote terminal is able to receive triggered responses from the vehicle based upon vehicle parameters and user defined threshold. The J1979 publication contains a description of the vehicle data that was available from a diagnostic connector in an OBD-II compliant vehicle more than twelve months before the earliest priority date of the '727 patent.

The '727 patent has an earliest priority date of May 17, 2000, while the '074 patent has a priority date of January 16, 1996 and the J1979 paper was published June 10,

1994. As such, the '074 patent and the J1979 publication qualify as prior art under 35 U.S.C. § 102(b). Therefore the '074 patent can be utilized to invalidate the '727 patent.

The'074 patent and the J1979 publication teach all of the limitations of the asserted claims of the '727 patent, i.e. claims 1, 10, 11, 19, and 25.

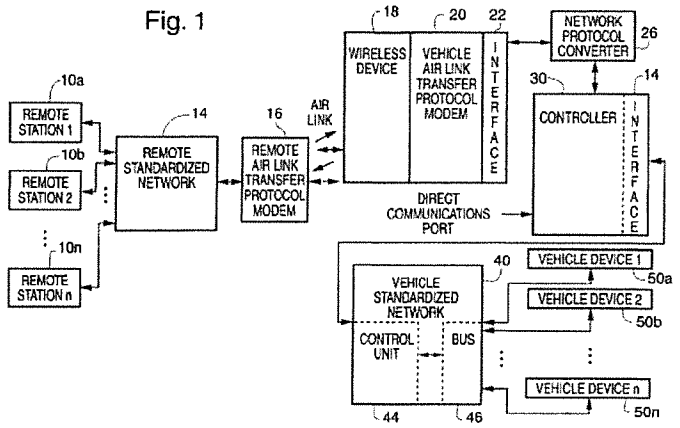
Claim 1

Claim 1 of the '727 patent reads:

> "A speed exceeded notification device for a vehicle of a type comprising a vehicle data communications bus extending throughout the vehicle, and at least one vehicle device generating data related to vehicle speed on the vehicle data communications bus, the speed exceeded notification device comprising:
> a wireless communications device; and
> a controller to be coupled to the vehicle data communications bus for reading the data related to vehicle speed from the vehicle data communications bus, and
> determining when a vehicle speed exceeds a speed threshold for a first time period and based thereon cooperating with said wireless communications device to send a remote vehicle speed exceeded notification."

All aspects of claim 1 are taught by the '074 patent in view of the J1979 publication:

'727 Patent Claim 1	**The '074 Patent and the J1979 Publication**
1. A speed exceeded notification device for a vehicle of a type comprising a vehicle data communications bus extending throughout the vehicle, and at least one vehicle device generating data related to vehicle speed on	Figure 1 from the '074 patent describes a complete system that contains; a vehicle communication bus and multiple vehicle devices attached to the said communications bus.

the vehicle data communications bus, the speed exceeded notification device comprising:	Fig. 1  The J1979 publication states that "vehicle speed" can be obtained using a Mode 01, PID 0D command using a diagnostic interface in an OBD-II compliant vehicle. (J1979 publication, p. 13, Figure 6).
a wireless communications device; and	As described in the '074 patent: "Controller 30 is able to prepare information for sending to a remote station 10, including data or other information available from one or more of the vehicle devices 50 using the vehicle standardized network 40. Such information is sent to the wireless device 18 through its interface 22 for transmission using **the vehicle airlink transfer protocol modem 20 over the airlink to the remote station 10.**" ('074 patent, col. 7, lines 13-20). See also FIG. 1 of the '074 patent.
a controller to be coupled to the vehicle data communications bus for reading the data related to vehicle speed from the vehicle data communications bus, and determining	The ' 074 patent discloses, in part: In accordance with the present invention, a system is provided in which **communication of information, including requests, commands and data**, is achieved **between vehicle** having physical vehicle devices and one or more **sites that are remote from the vehicle**. ('074 patent, col. 2, lines 11-15)

when a vehicle speed exceeds a speed threshold for a first time period and based thereon cooperating with said wireless communications device to send a remote vehicle speed exceeded notification.	With respect to **handling requests, commands and information including data transfers relative to the vehicle**, particularly involving data from vehicle devices, certain hardware and software is contained in the vehicle. ('074 patent, col. 2, lines 53-56) With regard to obtaining information or data from these vehicle devices for appropriate processing using, for example, **one or more executable programs in the program memory, the controller communicates with a second standardized network** in the form of a network that is commercially available and used in vehicles, such as the previously devised controller area network (CAN). The CAN is operatively connected to each of a plurality of vehicle devices that transmit, receive, or both transmit and receive desired data. ('074 patent, col. 3, lines 57-62) **Controller 30 is able to prepare information for sending to a remote station** 10, including data or other information available from one or more of the vehicle devices 50 using the vehicle standardized network 40. Such **information is sent to the wireless device 18 through its interface 22 for transmission** using the vehicle airlink transfer protocol modem 20 over the airlink to the remote station 10. ('074 patent, col. 7, lines 13-20)

	Such **data may be data obtained from monitoring a physical device associated with a vehicle** and/or may include data useful in running executable software that is intended to provide further information or data useful to a requestor. ('074 patent, col. 8, lines 45-53)

The '074 patent further discloses that

"Generally, such software is useful in processing, analyzing or otherwise acting on data available in the vehicle, including acting on the data in real time, such as **acting on available data in real time that is used for transmission to a remote station**, where such transmission is initiated in the vehicle. A representative listing of applications is as follows:

(a) **monitoring of vehicle locations and status**;

(b) tracking of deliveries of packages by the vehicle;

(c) monitoring cargo conditions in the vehicle, such as the temperature of the cargo and checking equipment related to maintaining a desired temperature;

(d) **vehicle parameter monitoring** for maintaining the vehicle 10 such as checking engine conditions including possibility of overheating and operating mileage (odometer reading);

(e) displaying of directions and/or dispatch instructions; and

(f) communication of short messages between a user at the remote site and the operator of the vehicle.

In addition to application software that might be involved with such functions, the short programs in the program memory 114 may include **software related to safety and security considerations**, including:

(a) monitoring a patient's vital signs who is being transported by the vehicle;

(b) providing information as to whether or not a roving security vehicle has periodically checked in with a home base; and

(c) **providing an indication of key or alarm related events**, such as when roadside assistance is required, the vehicle or the driver of the vehicle faces a threatening situation, an unauthorized vehicle door unlocking and/or initiating an automatic call for assistance in light of an airbag detonation

('074 patent, col. 9, lines 1-31). The '074 discloses remote notifications "when a sensor in the vehicle measures a value relative to a predetermined threshold value and upon the occurrence of other predetermined events or conditions." (col. 12:26-30). Thus, one of ordinary skill in the art would appreciate that the patent discloses measuring vehicle speed over the bus per the J1979 publication, and providing a remote notification if the speed exceeds a threshold value. Further, the patent discloses a programmable system for predetermined events or conditions.

Therefore, for reasons including those stated above, Claim 1 of the '727 patent is taught by the '074 patent and the J1979 publication.

Claim 10

Claim 10 of the '727 patent reads:

"The speed exceeded notification device according to claim 1 wherein the remote vehicle speed exceeded notification further comprises a speed of the vehicle."

All aspects of claim 10 are taught by the '074 patent in view of the J1979 publication:

'727 Patent Claim 10	**The '074 Patent and the J1979 Publication**
10. The speed exceeded notification device according to claim 1 wherein the remote vehicle speed exceeded notification further comprises a speed of the vehicle.	As described with respect to claim 1, the '074 patent describes reading data from the vehicle bus. The '074 patent also discloses remote notifications "when a sensor in the vehicle measures a value relative to a predetermined threshold value and upon the occurrence of other predetermined events or conditions." ('074 patent, col. 12, lines 26-30).

The '074 patent describes reading data from the vehicle bus as described above with respect to claim 1. It also discloses remote notifications "when a sensor in the vehicle measures a value relative to a predetermined threshold value and upon the occurrence of other predetermined events or conditions." ('074 patent, col. 12, lines 26-30). Thus one of ordinary skill in the art would appreciate that the patent discloses measuring vehicle speed over the bus, and providing a remote notification if the speed exceeds a threshold value.

Accordingly, for reasons including those stated above, Claim 10 of the '727 patent is taught by the '074 patent and the J1979 publication.

Claim 11

Claim 11 of the '727 patent reads:

> "The speed exceeded notification device according to claim 1 wherein the remote vehicle speed exceeded notification further comprises a vehicle position."

All aspects of claim 11 are taught by the '074 patent in view of the J1979 publication:

'727 Patent Claim 11	**The '074 Patent and the J1979 Publication**
11. The speed exceeded notification device according to claim 1 wherein the remote vehicle speed exceeded notification further comprises a vehicle position.	The '074 patent describes reading data from the vehicle bus, including "vehicle positioning data is available from one of the vehicle devices 50, which might be a GPS." ('074 patent, col. 14, lines 4-5). The '074 patent also discloses remote notifications "when a sensor in the vehicle measures a value relative to a predetermined threshold value and upon the occurrence of other predetermined events or conditions." ('074 patent, col. 12, lines 26-30).

The '074 patent describes reading data from the vehicle bus; this would include speed and vehicle position. The patent describes "a representative listing of applications is as follows: (a) monitoring of vehicle locations and status" ('074 patent, col, 9, lines 3-5). This vehicle location data is available on the data bus and the controller is able to send the data to the remote terminal: "The desired computer terminal 60 receives the vehicle positioning data from the Internet 68 at block 334. In accordance with desired embodiments, such data can be further processed by the computer terminal 60, displayed on a display unit thereof in a pre-established way, or otherwise handled to achieve the desired use of the received data." ('074 patent, col. 14, lines 25-31).

For reasons including those stated above, Claim 11 of the '727 patent is taught by the '074 patent and the J1979 publication.

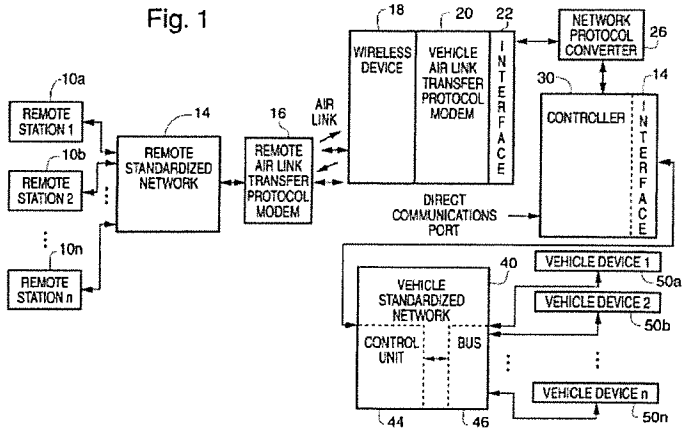
Claim 19

Claim 19 of the '727 patent reads:

> "A method for speed exceeded notification in a vehicle of a type comprising a vehicle data communications bus extending throughout the vehicle, and at least one vehicle device generating data related to vehicle speed on the vehicle data communications bus, the method comprising:
> using a controller coupled to the vehicle data communications bus for reading the data related to vehicle speed from the vehicle data communications bus, and
> determining when a vehicle speed exceeds a speed threshold for a first time period and based thereon cooperating with a wireless communications device to send a remote vehicle speed exceeded notification."

All aspects of claim 19 are taught by the '074 patent in view of the J1979 publication:

'727 Patent Claim 19	The '074 Patent and the J1979 Publication

19. A method for speed exceeded notification in a vehicle of a type comprising a vehicle data communications bus extending throughout the vehicle, and at least one vehicle device generating data related to vehicle speed on the vehicle data communications bus, the method comprising:	Figure 1 from the '074 patent describes a complete system that contains; a vehicle communication bus and multiple vehicle devices attached to the said communications bus. Fig. 1  The J1979 publication states that "vehicle speed" can be obtained using a Mode 01, PID 0D command using a diagnostic interface in an OBD-II compliant vehicle. (J1979 publication, p. 13, Figure 6).
using a controller coupled to the vehicle data communications bus for reading the data related to vehicle speed from the vehicle data communications bus, and determining when a vehicle speed exceeds a speed threshold for a first time period and	The ' 074 patent discloses, in part: In accordance with the present invention, a system is provided in which **communication of information, including requests, commands and data**, is achieved **between vehicle** having physical vehicle devices and one or more **sites that are remote from the vehicle**. ('074 patent, col. 2, lines 11-15) With respect to **handling requests, commands and information including data transfers relative to the vehicle**, particularly involving data from vehicle devices, certain hardware and software is contained in the vehicle. ('074 patent, col. 2, lines 53-56)

based thereon cooperating with a wireless communications device to send a remote vehicle speed exceeded notification.	With regard to obtaining information or data from these vehicle devices for appropriate processing using, for example, **one or more executable programs in the program memory, the controller communicates with a second standardized network** in the form of a network that is commercially available and used in vehicles, such as the previously devised controller area network (CAN). The CAN is operatively connected to each of a plurality of vehicle devices that transmit, receive, or both transmit and receive desired data. ('074 patent, col. 3, lines 57-62) **Controller 30 is able to prepare information for sending to a remote station** 10, including data or other information available from one or more of the vehicle devices 50 using the vehicle standardized network 40. Such **information is sent to the wireless device 18 through its interface 22 for transmission using the vehicle airlink transfer protocol modem 20 over the airlink to the remote station 10.** ('074 patent, col. 7, lines 13-20) Such **data may be data obtained from monitoring a physical device associated with a vehicle** and/or may include data useful in running executable software that is intended to provide further information or data useful to a requestor. ('074 patent, col. 8, lines 45-53)

A person of ordinary skill in the art would be motivated to utilize the teachings of the J1979 publication to read standard data from a CAN bus in a vehicle. Accordingly, for reasons including those stated above, Claim 19 of the '727 patent is taught by the '074 patent and the J1979 publication.

Claim 25

Claim 25 of the '727 patent reads:

> "The method according to claim 19 wherein the remote vehicle speed exceeded notification further comprises at least one of an identity of the vehicle, a speed of the vehicle, a vehicle position, and a time the vehicle exceeded the speed threshold."

All aspects of claim 25 are taught by the '074 patent in view of the J1979 publication:

'727 Patent Claim 25	**The '074 Patent and the J1979 Publication**
25. The method according to claim 19 wherein the remote vehicle speed exceeded notification further comprises at least one of an identity of the vehicle, a speed of the vehicle, a vehicle position, and a time the vehicle exceeded the speed threshold.	As described with respect to claim 19, the '074 patent describes reading data from the vehicle bus. The '074 patent also discloses remote notifications "when a sensor in the vehicle measures a value relative to a predetermined threshold value and upon the occurrence of other predetermined events or conditions." ('074 patent, col. 12, lines 26-30).

Therefore, for reasons including those stated above, Claim 25 of the '727 patent is taught by the '074 patent and the J1979 publication.

Conclusion

Based on my analysis, all aspects of the asserted claims of the '727 patent are obvious in view of the '074 patent and the J1979 publication for reasons including those

described above. Accordingly, the asserted claims 1, 10, 11, 19, and 25 of the '727 patent are invalid and would have been obvious to a person of ordinary skill in the art at the time of the alleged invention.

6.7 Invalidity of '727 over NeoTech Mobile-Trak II and SAE J1979

Introduction

U.S. Patent No. 7,671,727 (the '727 patent) is titled "Speed Exceeded Notification Device for Vehicle Having a Data Bus and Associated Methods" and was filed on August 27, 2007. As stated on the front page of the '727 patent, the '727 patent is a "continuation-in-part of application No. 11/076,259, filed on Mar. 9, 2005, which is a continuation of application No. 10/383,496, filed on Mar. 7, 2003, now Pat. No. 7,149,623, which is a continuation of application No. 09/859,972, filed on May 17, 2001, now Pat. No. 6,606,561" and claims priority to "provisional application No. 60/264,811, filed on Jan. 29, 2001, provisional application No. 60/258,005, filed on Dec. 22, 2000, provisional application No. 60/251,552, filed on Dec. 6, 2000, provisional application No. 60/252,125, filed on Nov. 20, 2000, provisional application No. 60/236,890, filed on Sep. 29, 2000, provisional application No. 60/246,463, filed on Nov. 7, 2000, provisional application No. 60/222,777, filed on Aug. 3, 2000, provisional application No. 60/205,178, filed on May 17, 2000." In my opinion, several prior art references along with combinations of those references render the '727 patent invalid.

The '727 Patent is Invalid in view of the NeoTech Prior Art and the J1979 Publication

One such combination includes the "Mobile-Trak: A Vehicle Tracking System for Fleet Management" brochure (the NeoTech brochure), copyrighted 1999, along with "Fleet Managers Dreams Come True with Mobile-Trak II" (the NeoTech article), dated January 29, 1999. In this opinion I will refer to the NeoTech brochure and the NeoTech article collectively as the NeoTech prior art. The NeoTech Mobile-Trak II (the Mobile-Trak device) is a vehicle tracking system with a speed exceeded notification, designed for vehicles having a vehicle data communications bus, and a vehicle device generating data related to vehicle speed on the data communications bus. Additionally, SAE Publication J1979, titled "E/E Diagnostic Test Modes" and published June 10, 1994 (the J1979 publication) contains a description of the vehicle data that was available from a diagnostic connector in an OBD-II compliant vehicle more than twelve months before the earliest priority date of the '727 patent.

The '727 patent has an earliest priority date of May 17, 2000. The J1979 publication was published June 1994, while the NeoTech article was published at least as early as January 29, 1999. The NeoTech brochure contains a copyright of 1999 with no month specified. As such, I am of the opinion that the J1979 publication and the NeoTech article are prior art under 35 U.S.C. § 102(b) while the NeoTech brochure may be prior art under 35 U.S.C. § 102(b) or § 102(e). Regardless, the J1979 publication and the NeoTech prior art can be utilized to invalidate a publication under 35 U.S.C. § 103(a) in view of the earliest possible priority date for the '727 patent.

The NeoTech prior art and the J1979 publication teach all of the limitations of the asserted claims of the '727 patent, i.e. claims 1, 10, 11, 19, and 25.

Claim 1

Claim 1 of the '727 patent reads:

> "A speed exceeded notification device for a vehicle of a type comprising a vehicle data communications bus extending throughout the vehicle, and at least one vehicle device generating data related to vehicle speed on the vehicle data communications bus, the speed exceeded notification device comprising:
> a wireless communications device; and
> a controller to be coupled to the vehicle data communications bus for reading the data related to vehicle speed from the vehicle data communications bus, and
> determining when a vehicle speed exceeds a speed threshold for a first time period and based thereon cooperating with said wireless communications device to send a remote vehicle speed exceeded notification."

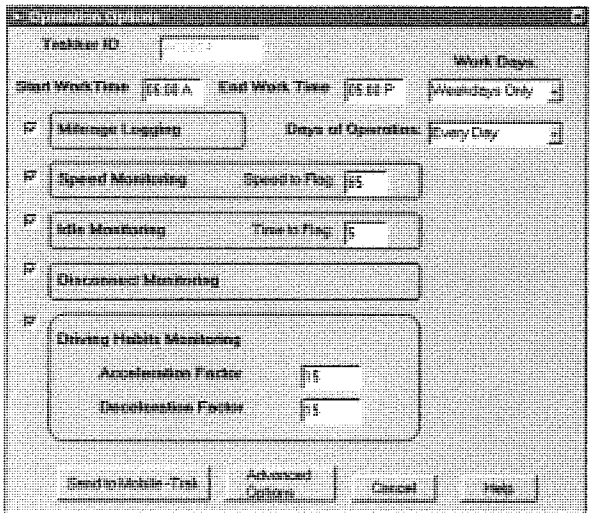
All aspects of claim 1 are taught by the NeoTech prior art in view of the J1979 publication:

'727 Patent Claim 1	The NeoTech Prior Art and the J1979 Publication
1. A speed exceeded notification device for a vehicle of a type comprising a vehicle	The Mobile-Trak device is a vehicle tracking system with a speed exceeded notification designed for vehicles having a vehicle data communications bus.

data communications bus extending throughout the vehicle, and at least one vehicle device generating data related to vehicle speed on the vehicle data communications bus, the speed exceeded notification device comprising:	The Mobile-Trak device can perform "speed monitoring" and "log violations over the user selected speed threshold." (NeoTech brochure, p. 3). As described on page 7 of the NeoTech brochure, the Mobile-Trak device "interfaces with common in-vehicle networks." Specifically, the Mobile-Trak device can communicate using a "J1708, J1850, [or] J1939 bus interface" on an OBD-II compliant vehicle (NeoTech brochure, p. 6). The J1979 publication states that "vehicle speed" can be obtained using a Mode 01, PID 0D command using a diagnostic interface in an OBD-II compliant vehicle. (J1979 publication, p. 13, Figure 6).
a wireless communications device; and	The Mobile-Trak device has two available wireless communication devices: a short range communications module, and a long range communications module using an analog cellular modem. (NeoTech brochure, p. 6).
a controller to be coupled to the vehicle data communications bus for reading the data related to vehicle speed from the vehicle data communications bus, and	The Mobile-Trak device includes a processor such as a Siemens C515C. (NeoTech article, p. 4). The Mobile-Trak device is coupled to the vehicle data bus. The Mobile-Trak supported multiple different bus connections, including SAE J1939(CAN 2.0B), SAE J1708, and SAE J1850 (OBD II). Vehicle speed data is available on these standard vehicle buses. Mobile-Trak controller can read data from the bus, including vehicle speed. See, e.g. the NeoTech brochure, pp. 5 – 6 and the J1979 publication, p. 13.

determining when a vehicle speed exceeds a speed threshold for a first time period and based thereon cooperating with said wireless communications device to send a remote vehicle speed exceeded notification.	The Mobile-Trak device can determine when the speed of a vehicle exceeds a pre-determined threshold value. See the NeoTech brochure, p. 3 ("Logs violations over the user selected speed threshold." Furthermore, the Mobile-Trak device can "[a]utomatically transmit information via Analog Cellular Network with optional modem." (NeoTech brochure, p. 5).

An illustration of setting the speed monitoring threshold is shown on p. 2 of the NeoTech brochure:



A person of ordinary skill in the art would be motivated to utilize the teachings of the J1979 publication to read standard data from an OBD-II connector in a vehicle. Specifically, the OBD-II standard indicates that any vehicle from any manufacturer can provide vehicle speed information. Accordingly, for reasons including those stated above, Claim 1 of the '727 patent is taught by the NeoTech prior art and the J1979 publication.

Claim 10

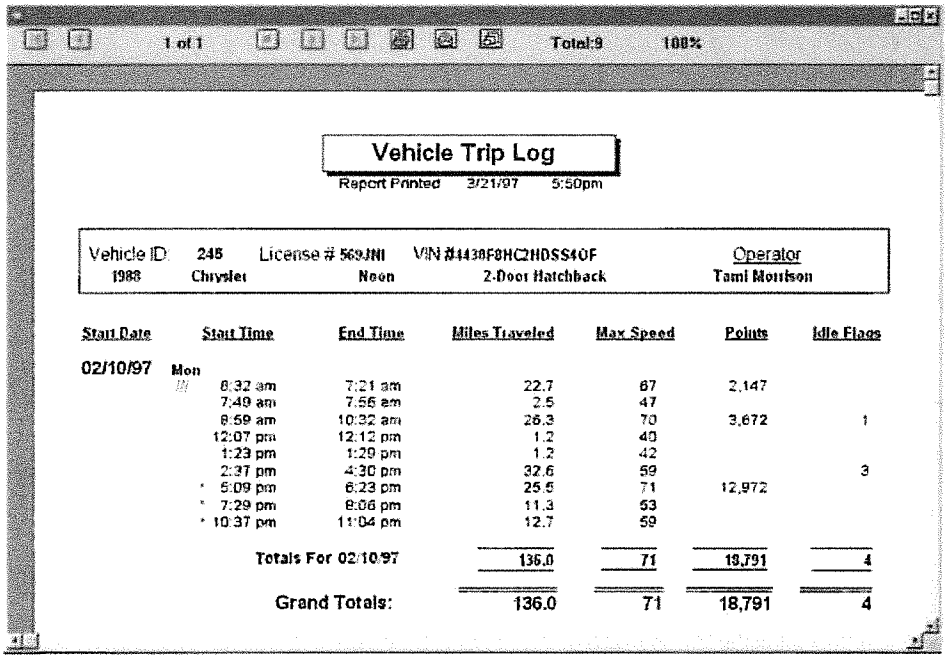
Claim 10 of the '727 patent reads:

"The speed exceeded notification device according to claim 1 wherein the remote vehicle speed exceeded notification further comprises a speed of the vehicle."

All aspects of claim 10 are taught by the NeoTech prior art in view of the J1979 publication:

'727 Patent Claim 10	The NeoTech Prior Art and the J1979 Publication
10. The speed exceeded notification device according to claim 1 wherein the remote vehicle speed exceeded notification further comprises a speed of the vehicle.	Maximum vehicle speed was logged and included in reports. (NeoTech brochure, p. 3). User was able to define maximum speed threhsold to trigger a report. (NeoTech brochure, p. 3). The maximum speed can be included in a vehicle trip log. (NeoTech brochure, p. 4). Therefore, the speed of the vehicle was included in the transmitted information.

An illustration of the maximum speed in a "Vehicle Trip Log" is shown in the NeoTech brochure, p. 3:



1 of 1 Total:9 100%

Vehicle Trip Log

Report Printed 3/21/97 5:50pm

Vehicle ID	License #	VIN	Operator
245	569JNI	#4438F8HC2HDSS40F	
1988 Chrysler	Neon	2-Door Hatchback	Tami Morrison

Start Date	Start Time	End Time	Miles Traveled	Max Speed	Points	Idle Flags
02/10/97 Mon						
	6:32 am	7:21 am	22.7	67	2,147	
	7:49 am	7:56 am	2.5	47		
	8:59 am	10:32 am	26.3	70	3,672	1
	12:07 pm	12:12 pm	1.2	40		
	1:23 pm	1:29 pm	1.2	42		
	2:37 pm	4:30 pm	32.6	59		3
*	5:09 pm	6:23 pm	25.5	71	12,972	
*	7:29 pm	8:06 pm	11.3	53		
*	10:37 pm	11:04 pm	12.7	59		
	Totals For 02/10/97		136.0	71	18,791	4
	Grand Totals:		136.0	71	18,791	4

Accordingly, for reasons including those stated above, Claim 10 of the '727 patent is taught by the NeoTech prior art and the J1979 publication.

Claim 11

Claim 11 of the '727 patent reads:

> "The speed exceeded notification device according to claim 1 wherein the remote vehicle speed exceeded notification further comprises a vehicle position."

All aspects of claim 11 are taught by the NeoTech prior art in view of the J1979 publication:

'727 Patent Claim 11	**The NeoTech Prior Art and the J1979 Publication**
11. The speed exceeded notification device according to claim 1 wherein the remote vehicle speed exceeded notification further comprises a vehicle position.	The Mobile-Trak device can utilize a "GPS Module" to "to track and report precise location of the vehicle" and give the "speed traveled on a particular street." (NeoTech article, p. 2). "When used with Mobile-Trak Locator software upgrade, users can be provided with the exact address visited by the vehicle." (NeoTech article, p. 2).

Accordingly, for reasons including those stated above, Claim 11 of the '727 patent is taught by the NeoTech prior art and the J1979 publication.

Claim 19

Claim 19 of the '727 patent reads:

> "A method for speed exceeded notification in a vehicle of a type comprising a vehicle data communications bus extending throughout the vehicle, and at least one vehicle device generating data related to vehicle speed on the vehicle data communications bus, the method comprising:
> using a controller coupled to the vehicle data communications bus for

reading the data related to vehicle speed from the vehicle data communications bus, and

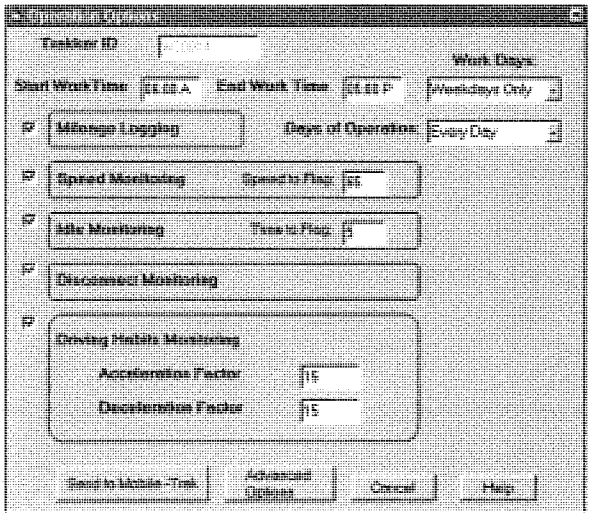
determining when a vehicle speed exceeds a speed threshold for a first time period and based thereon cooperating with a wireless communications device to send a remote vehicle speed exceeded notification."

All aspects of claim 19 are taught by the NeoTech prior art in view of the J1979 publication:

'727 Patent Claim 19	The NeoTech Prior Art and the J1979 Publication
19. A method for speed exceeded notification in a vehicle of a type comprising a vehicle data communications bus extending throughout the vehicle, and at least one vehicle device generating data related to vehicle speed on the vehicle data communications bus, the method comprising:	The NeoTech Products, Inc. Mobile-Trak II (the Mobile-Trak device) is a vehicle tracking system with a speed exceeded notification designed for vehicles having a vehicle data communications bus. The Mobile-Trak device can perform "speed monitoring" and "log violations over the user selected speed threshold." (NeoTech brochure, p. 3). As described on page 7 of the NeoTech brochure, the Mobile-Trak device "interfaces with common in-vehicle networks." Specifically, the Mobile-Trak device can communicate using a "J1708, J1850, [or] J1939 bus interface" on an OBD-II compliant vehicle (NeoTech brochure, p. 6). The J1979 publication states that "vehicle speed" can be obtained using a Mode 01, PID 0D command using a diagnostic interface in an OBD-II compliant vehicle. (J1979 publication, p. 13, Figure 6).
using a controller coupled to the vehicle data communications bus for reading the data related to vehicle speed from	The Mobile-Trak device includes a processor such as a Siemens C515C. (NeoTech article, p. 4). The Mobile-Trak device is coupled to the vehicle data bus. The Mobile-Trak supported multiple different bus connections,

the vehicle data communications bus, and	including SAE J1939(CAN 2.0B), SAE J1708, and SAE J1850 (OBD II). Vehicle speed data is available on these standard vehicle buses. Mobile-Trak controller can read data from the bus, including vehicle speed. See, e.g. the NeoTech brochure, pp. 5 – 6 and the J1979 publication, p. 13.
determining when a vehicle speed exceeds a speed threshold for a first time period and based thereon cooperating with a wireless communications device to send a remote vehicle speed exceeded notification.	The Mobile-Trak device can determine when the speed of a vehicle exceeds a pre-determined threshold value. See the NeoTech brochure, p. 3 ("Logs violations over the user selected speed threshold." Furthermore, the Mobile-Trak device can "[a]utomatically transmit information via Analog Cellular Network with optional modem." (NeoTech brochure, p. 5).

An illustration of setting the speed monitoring threshold is shown on p. 2 of the NeoTech brochure:



A person of ordinary skill in the art would be motivated to utilize the teachings of the J1979 publication to read standard data from an OBD-II connector in a vehicle. Specifically, the OBD-II standard indicates that any vehicle from any manufacturer can provide vehicle speed information.

Accordingly, for reasons including those stated above, Claim 19 of the '727 patent is taught by the NeoTech prior art and the J1979 publication.

Claim 25

Claim 25 of the '727 patent reads:

> "The method according to claim 19 wherein the remote vehicle speed exceeded notification further comprises at least one of an identity of the vehicle, a speed of the vehicle, a vehicle position, and a time the vehicle exceeded the speed threshold."

All aspects of claim 25 are taught by the NeoTech prior art in view of the J1979 publication:

'727 Patent Claim 25	**The NeoTech Prior Art and the J1979 Publication**
25. The method according to claim 19 wherein the remote vehicle speed exceeded notification further comprises at least one of an identity of the vehicle, a speed of the vehicle, a vehicle position, and a time the vehicle exceeded the speed threshold.	The Mobile-Trak device can utilize a "GPS Module" to "to track and report precise location of the vehicle" and give the "speed traveled on a particular street." (NeoTech article, p. 2). "When used with Mobile-Trak Locator software upgrade, users can be provided with the exact address visited by the vehicle." (NeoTech article, p. 2).

Accordingly, for reasons including those stated above, Claim 25 of the '727 patent is taught by the NeoTech prior art and the J1979 publication.

Conclusion

Based on my analysis, all aspects of the asserted claims of the '727 patent are obvious in view of the NeoTech prior art and the J1979 publication for reasons including those described above. Accordingly, the asserted claims 1, 10, 11, 19, and 25 of the '727

patent are invalid and would have been obvious to a person of ordinary skill in the art at the time of the alleged invention.

6.8 Invalidity of '278 over '392 Bambini and SAE J1978

Introduction

U.S. Patent No. 5,898,392 (the '392 patent) is titled "System and Method for Remote Control of an In-Vehicle voice Recorder and other Electrical Accessories", was filed on February 10, 1998. In my opinion, several prior art references along with combinations of those references render the '278 patent invalid

The '278 patent is invalid in view of US Patent 5,898,392 and J1978

One such combination includes Patent 5,989,392 to Bambini et al. (the '392 patent) and the SAE Publication J1978, titled "OBD II Scan Tool" (the J1978 publication). The '392 patent claims priority to U.S. Patent No. 8,032,278 having a filing date of July 3, 2007. The '392 patent has a filing date of February 10, 1998 and the J1978 publication date was published June 1994. Accordingly, both the '392 patent and the J1978 publication qualify as prior art under 35 U.S.C. § 102(b) and can be utilized to invalidate a publication under 35 U.S.C. § 103(a) in view of the earliest possible priority date for the '278 patent.

As is described in more detail below, the '392 patent describes all of the necessary system components and functions necessary to enable communication and data collection from remote vehicles. The '392 patent contains a variety of descriptions of the controller interfacing with; a vehicle data bus, multiple vehicle devices and a wireless transmitter and receiver. One skilled in the art would realize that everything necessary for two way transmission of data and commands between a vehicle and remote location is disclosed in the '392 patent. To avoid any potential confusion regarding the knowledge of one of ordinary skill in the art regarding vehicle data busses as of the earliest priority date of the '278 patent, I am relying on the SAE J1978 standard. To communicate with a plurality of vehicles the system must communicate with a plurality of existing vehicle data busses. At the time of the '392 patent, the EPA mandated a common, low cost service tool (Scan Tool) that would allow the service technician to diagnose all vehicles. To enable the Scan Tool to communication across all vehicles, the Society of Automotive Engineers (SAE) and automotive industry experts developed the J1978 Publication standard.

The J1978 publication, issued 1992-03, Revised 1994-06 describes the communications protocols required to support OBD II diagnostic information and the development of a common diagnostic interface for the OBD II Scan Tool. The J1978 publication was and is required to be supported by all vehicle and testing equipment manufactures. This standard describes connecting to the vehicle bus using one of three interfaces by sending a signal (i.e. request message) on the data communications bus. It should be noted that current versions of the J1978 spec have increased this to at least five interfaces. While the focus of this analysis is not the development of a OBD II Scan Tool, the J1978 publication identifies a method to read, write and communicate on a plurality of data busses and as a result a plurality of vehicles. Additionally, I have been informed that Omega has asserted in its infringement contention that the sending of the three (now six) signals (i.e. request messages) as described in the J1978 publication satisfies certain elements of the '279 patent relating to devices codes and/or command signals. Therefore, the use of the J1978 publication is proper in my analysis. As discussed above, Omega uses an identical bus discovery technique as J1978, with additional interfaces rather than the three interfaces specified in 1994. One skilled in the art at that time would recognize that the difference between Omega and the J1978 publication is the number of interfaces, and not the technique of bus discovery, thereby communicating with a plurality of vehicles.

These two prior art documents, teach all of the limitations of the asserted claims of the '278 patent, i.e. claims 1-6, 8, 11-14, 18, 19, and 21.

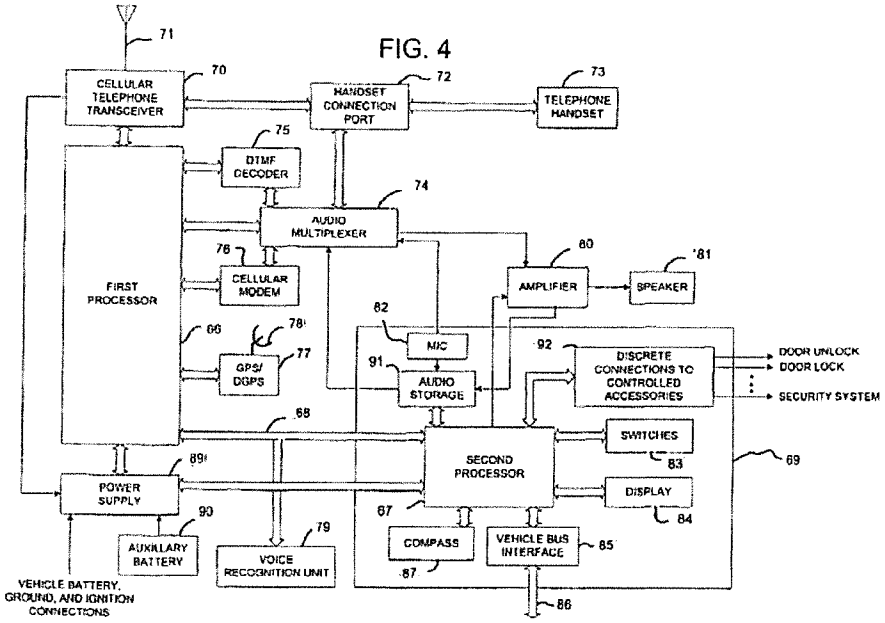
Claim 1

Claim 1 of the '278 patent reads:

> "A multi-vehicle compatible tracking unit for a vehicle comprising a vehicle data bus extending throughout the vehicle, the multi-vehicle compatible tracking unit comprising: a vehicle position determining device; a wireless communications device; a multi-vehicle compatible controller for cooperating with said vehicle position determining device and said wireless communications device to send vehicle position information; said multi-vehicle compatible controller to be coupled to the vehicle data bus for communica-

tion there over with at least one vehicle device using at least one corresponding vehicle device code from among a plurality thereof for different vehicles; and a downloading interface for permitting downloading of enabling data related to the at least one corresponding vehicle device code for use by said multi-vehicle compatible controller."

All of these components and functions can be found in the '392 patent and the J1978 publication:

'278 Patent Claim 1	The '392 Patent and the J1978 Publication
1.A multi-vehicle compatible tracking unit for a vehicle comprising a vehicle data bus extending throughout the vehicle, the multi-vehicle compatible tracking unit comprising:	Patent the '392 patent discloses a multi-vehicle compatible tracking system for a vehicle comprising a data communications bus, as shown in Figure 4 (below):  FIG. 4 The patent discloses that the controller is coupled to the vehicle data bus for communication with at least one vehicle device, using a corresponding vehicle device code, from among a plurality of codes for different vehicles.

	"Together, first and second **microprocessors 66 and 67 monitor incoming messages and communications from a cellular telephone transceiver** 70 and from various vehicle accessories and **components coupled to microprocessor 67 via a vehicle bus interface** 85 that is coupled to a vehicle bus 86." (col 5:35-42)

As shown in Figure 4 of the '392 patent, the system contains a vehicle data bus 86, processors 66 & 67, and GPS receiver 77. One skilled in the art at that time could easily recognize the similarity in system components and architecture between the two patents. As described above, the '479 patent discloses a vehicle control system for a vehicle comprising a data bus. In addition, those skilled in the art were familiar with the bus parameters proposed by the SAE, including the teachings of the J1978 publication regarding the use of a controller compatible with multiple buses and thereby multiple vehicles. As a result, all of the system components and functions in claim 1 of the '278 patent are taught by the '392 patent, alone or in combination with the J1978 publication.

a vehicle position determining device;	The '392 patent col. 4:65-67 discloses a controller that cooperates with the GPS device and the wireless communication device to send vehicle position information, "**identify the vehicle's location based upon a vehicle location signal generated by the vehicle communication system and transmitted** with the 911 distress call." Also, in col 5:57-6, "The vehicle communication and control circuit of the present invention also preferably includes a GPS or differential GPS module 77 having a GPS antenna 78. The GPS/DGPS module 77 is coupled to first 60 microprocessor 66

	to provide an indication of the vehicle's location. As described further below, **the GPS data generated by module 77 may be transmitted using cellular modem** 76 with a call request transmitted to a service department 11 (FIG. 1), such that the service department may immediately 65 know the location of the vehicle for purposes of informing an emergency dispatcher or for providing navigational instructions to the driver. This aspect of the invention is particularly advantageous since it takes into account a situation where the driver is lost and cannot articulate their current location."

The '392 patent discloses a vehicle position determining device. As shown in Figure 4, the system describes a GPS or DGPS as a vehicle position determining device.

a wireless communications device;	The '392 patent discloses a wireless communications device, as shown in col. 4, lines 28-52, "F1G. 1 shows a **land-based system for communicating with the vehicle communication and remote control system** of the present invention as implemented in a vehicle 20. The system shown in F1G. 1 **allows remote control signals and other commands to be issued to and received from a system within vehicle** 20 via its antenna 22. In a preferred construction, the infrastructure that enables communications to be sent to and received from the **vehicle communication system utilizes a cellular network** 2, which includes a plurality of base stations that transmit and receive RF signals to/from vehicle 20... Depending upon the form and nature of communication and any command signal sent to or received from the vehicle communication and control system of the present invention."

The '392 patent discloses a wireless communication device. In the preferred embodiment, the wireless device is a cellular network. One skilled in the art at that time would recognize other wireless devices that could be used for two-way communication.

a multi-vehicle compatible controller for cooperating with said vehicle position determining device and said wireless communications device to send vehicle position information;	The '392 patent col. 4:65-67 discloses a controller that cooperates with the GPS device and the wireless communication device to send vehicle position information, "**identify the vehicle's location based upon a vehicle location signal generated by the vehicle communication system and transmitted** with the 911 distress call." Also, in col 5:57-6, "The vehicle communication and control circuit of the present invention also preferably includes a GPS or differential GPS module 77 having a GPS antenna 78. The GPS/DGPS module 77 is coupled to first 60 microprocessor 66 to provide an indication of the vehicle's location. As described further below, **the GPS data generated by module 77 may be transmitted using cellular modem** 76 with a call request transmitted to a service department 11 (FIG. 1), such that the service department may immediately 65 know the location of the vehicle for purposes of informing an emergency dispatcher or for providing navigational instructions to the driver. This aspect of the invention is particularly advantageous since it takes into account a situation where the driver is lost and cannot articulate their current location."

The '392 patent describes a system that is able to determine the vehicle position and communicate the information wirelessly. As described in the patent the system contains all of the necessary components and functions to transmit the vehicle's position in case of emergency (such as a 911 call).

said multi-vehicle compatible controller to be coupled to the vehicle data bus for communication there over with at least one vehicle device using at least one corresponding vehicle device code from among a plurality thereof for different vehicles; and	The patent discloses that the controller is coupled to the vehicle data bus for communication with at least one vehicle device, using a corresponding vehicle device code, from among a plurality of codes for different vehicles. "Together, first and second **microprocessors 66 and 67 monitor incoming messages and communications from a cellular telephone transceiver** 70 and from various vehicle accessories and **components coupled to microprocessor 67 via a vehicle bus interface** 85 that is coupled to a vehicle bus 86." (col 5:35-42)

To address Omega's claims regarding the system's ability to interface with a plurality of vehicles, one needs to evaluate the available standards at the time of the patent's filing. It was well know, and common practice, to use the J1978 Publication communication standard to enable electronics to correctly interface with a plurality of data busses and vehicles. The J1978 publication, originally issued 1992-03 and later revised 1994-06, describes the communications protocols and methods required to support OBD II diagnostic information and the development of a common diagnostic interface for the OBD II Scan Tool. While the focus of this analysis is not the development of a OBD II Scan Tool, the J1978 publication identifies a method to read, write and communicate on a plurality of data busses and as a result a plurality of vehicles. The EPA mandated a common interface method to enable service technician diagnose all vehicles with one electronic

service tool. Prior to J1978, each vehicle manufacturer had its own service tool and proprietary data bus. Since 1994, all vehicle manufactures and test equipment are required to meet the J1978 publication.

The J1978 publication describes connecting to the vehicle bus using one of three interface protocols by sending a command signal (request message) on the data communications bus. Three signals (request messages) are sent one at a time. If the request message is correct for that vehicle, it will trigger a response message from the vehicle devices (see the J1978 publication at 6.5.2). If no response is received, the system will try another protocol request message. If none of the initial signals prompt a response, the standard further describes additional steps to determine a working signal. (see the J1978 publication at 6.8) .

As a result, one skilled in the art would recognize that, using an established methodology as developed by the automotive industry and approved by the EPA, the J1978 publication would enable communication with a plurality of vehicles.

a downloading interface for permitting downloading of enabling data related to the at least one corresponding vehicle device code for use by said multi-vehicle compatible controller.	The patent discloses that the controller is coupled to the vehicle data bus for communication with at least one vehicle device, using a corresponding vehicle device code, from among a plurality of codes for different vehicles. "Together, first and second **microprocessors 66 and 67 monitor incoming messages and communications from a cellular telephone transceiver** 70 and from various vehicle accessories and **components coupled to microprocessor 67 via a vehicle bus interface** 85 that is coupled to a vehicle bus 86." (col 5:35-42) The patent describes a downloading interface for permitting downloading of enabling data related to the at least one corresponding vehicle device code for use by said multi-vehicle compatible controller. The patent discloses receiving data over the wireless interface to enable a control signal.

	"As noted above, the system according to the present invention may be used to activate and/or reprogram other electrical accessories in the vehicle. Such **activation and reprogramming may be performed remotely by transmitting to the system a predetermined sequence of DTMF signals**. By allowing the system to respond to DTMF signals in this manner, a user-friendly technique for **allowing individuals or service operators to remotely activate or reprogram vehicle accessories** may be provided For example, if an individual locked their keys in their car and wished to have the system unlock the doors, the individual would call the service center to make this request. The service center may implement an automated answering system that plays back recorded options that the caller may select by pressing keys on a telephone keypad and thereby transmit DTMF tones to the service center. An example of the type of audio prompting options that may be played to a caller are disclosed in so U.S. Pat. No. 5.525.CJ77 issued on Jun. 11. 1996. The service center, in turn, stores the sequence of received DTMF signals that may be subsequently transmitted to the vehicle's system to affect the unlocking of the doors. As shown in HG. 9, when a sequence of such DTMF signals is 55 received in an incoming call, first microprocessor 66 performs the data call processing routine 217 shown in HG. 9. In this routine, **microprocessor 66 collects and identifies the sequence of transmitted DTMF signals** as identified by DTMF decoder 75 (step 275). Once microprocessor 66 has 60 identified the sequence of DTMF signals, microprocessor 66 preferably controls transceiver 70 to transmit a DTMF acknowledgment signal back to the remote party (step 276). From the sequence of DTMF signals, **first microprocessor 66 may determine whether or not the received sequence of 65 DTMF signals represents an instruction to activate or reprogram ·an electrical**

	accessory (step 277). If the received sequence represents an instruction to activate an electrical accessory, first and second microprocessors 66 and 67 cooperate to formulate and transmit a proper control signal to the electrical accessory identified in the received DTMF signals (step 279). Such a **control signal may be transmitted through vehicle bus interface 85 and vehicle bus** 86 or through a discrete connection 92 to the controlled accessory. If the received sequence of DTMF signals represents an instruction to reprogram one or more vehicle accessories, first and second microprocessors 66 and 67 cooperate to reprogram the identified accessories such that the accessories will subsequently operate in the requested manner. **The microprocessors may reprogram the accessories** in any conventional manner, such as setting flags in a flag table that is accessed while controlling the various vehicle accessories. Such a reprogramming and control technique is disclosed in allowed U.S. patent application No. 08/484.321 filed on Jun. 7, 1995, and in co-pending U.S. patent application No. 08/874,210 filed on Jun. 13. 1997. Once the requested action has been taken, first microprocessor 66 returns to the low power sleep state 201 (HG. 6) as indicated by the return step 283. " (col. 11, line 34- col. 12)

As the '392 patent discloses, the system includes a downloading interface that permits downloading of data and instructions. These instructions may come from over the wireless receiver. In the example above, a person locked out of their car is able to get it unlocked remotely requesting the door to unlock. One skilled in the art at that time could easily recognize that the system is permitting downloading of enabling data related to the at least one corresponding vehicle device code.

For reasons including those stated above, Claim 1 of the '278 patent is taught by the '392 patent and the J1978 publication.

Claim 2

Claim 2 of the '278 patent reads

> "The multi-vehicle compatible tracking unit according to claim 1 wherein said downloading interface comprises a wired signal downloading interface."

All of these components and functions can be found in the '392 patent and the J1978 publication:

'278 Patent Claim 2	The '392 Patent and the J1978 Publication
2. The multi-vehicle compatible tracking unit according to claim 1 wherein said downloading interface comprises a wired signal downloading interface."	"Although the invention has been described above as utilizing conventional telephone keypads to generate DTMF signals, it will be appreciated by those skilled in the art that a customized telephone keypad may be utilized to generate DTMF tones not normally generated by a conventional telephone keypad. In this manner, it will be more difficult for an unauthorized person to attempt to transmit DTMF signals to another person's in-vehicle system. **Further, any other device that is capable of generating and transmitting DTMF signals may be used in place of a telephone keypad.** It should be noted, however, that by utilizing DTMF tones generated by a conventional telephone keypad, a conventional DTMF decoder may be used in the system installed in the vehicle." (col. 12 23-3 5)

Figure 4 discloses the telephone handset is a wired signal interface to the controller. As the '392 patent teaches, the controller can be programmed without said handset by using other devices capable of generating commands on the telephone handset interface. One skilled in the art at that time would recognize that the existing wired handset interface could be used as a downloading interface. Therefore, removing the telephone handset from the system would allow methods of downloading signals using a wired interface.

For reasons including those stated above, Claim 2 of the '278 patent is taught by the '392 patent and the J1978 publication.

Claim 3

Claim 3 of the '278 patent reads

> "The multi-vehicle compatible tracking unit according to claim 2 wherein said wired signal downloading interface comprises a connector for temporary connection to a downloading device."

All of these components and functions can be found in the '392 patent and the J1978 publication:

'278 Patent Claim 3	The '392 Patent and the J1978 Publication
3. The multi-vehicle compatible tracking unit according to claim 2 wherein said wired signal downloading interface comprises a connector for temporary connection to a downloading device	"Although the invention has been described above as utilizing conventional telephone keypads to generate DTMF signals, it will be appreciated by those skilled in the art that a customized telephone keypad may be utilized to generate DTMF tones not normally generated by a conventional telephone keypad. In this manner, it will be more difficult for an unauthorized person to attempt to transmit DTMF signals to another person's in-vehicle system. **Further, any other device that is capable of generating and transmitting DTMF signals may be used in place of a telephone keypad.** It should be noted, however, that by utilizing DTMF tones generated by a conventional telephone keypad, a conventional DTMF decoder may be used in the system installed in the vehicle." (col. 12 23-3 5)

As illustrated in Figure 4, the telephone handset is a wired signal interface to the controller. As the '392 patent teaches, the controller can be programmed without said handset by using other devices capable of generating commands on the telephone handset interface. As a result, one skilled in the art would recognize that existing the wired

handset interface could be used as a temporarily downloading interface. Therefore, removing the removing the telephone handset temporarily from the system would allow methods of downloading signals using a wired interface.

For reasons including those stated above, Claim 3 of the '278 patent is taught by the '392 patent and the J1978 publication.

Claim 4

Claim 4 of the '278 patent reads

> "The multi-vehicle compatible tracking unit according to claim 1 wherein said downloading interface comprises a wireless signal downloading interface."

All of these components and functions can be found in the '392 patent and the J1978 publication:

'278 Patent Claim 4	**The '392 Patent and the J1978 Publication**
4. The multi-vehicle compatible tracking unit according to claim 1 wherein said downloading interface comprises a wireless signal downloading interface	As shown in the '392 patent, Figure 4 contains a cellular telephone transceiver and cellular modem. The cellular system enables downloading data related to vehicle device codes to the controller over a wireless signal downloading interface. "Together, first and second **microprocessors 66 and 67 monitor incoming messages and communications from a cellular telephone transceiver** 70 and from various vehicle accessories and **components coupled to microprocessor 67 via a vehicle bus interface** 85 that is coupled to a vehicle bus 86." (col 5:35-42) "As noted above, the system according to the present invention may be used to activate and/or reprogram other electrical accessories in the vehicle. Such **activation and reprogramming may**

	be performed remotely by transmitting to the system a pre-determined sequence of DTMF signals." (col. 11,:34-38)

As the '392 patent discloses downloading enabling data related to vehicle device codes to the controller over a wireless signal downloading interface. One skilled in the art at that time would recognize the system's capability to download data wirelessly.

For reasons including those stated above, Claim 4 of the '278 patent is taught by the '392 patent and the J1978 publication.

Claim 5

Claim 5 of the '278 patent reads:

> "The multi-vehicle compatible tracking unit according to claim 4 wherein said wireless signal downloading interface comprises a wireless receiver for temporary connection to a downloading device."

All of these components and functions can be found in the '392 patent and the J1978 publication:

'278 Patent Claim 5	**The '392 Patent and the J1978 Publication**
5. The multi-vehicle compatible tracking unit according to claim 4 wherein said wireless signal downloading interface comprises a wireless receiver for temporary connection to a downloading device	"Together, first and second **microprocessors 66 and 67 monitor incoming messages and communications from a cellular telephone transceiver** 70 and from various vehicle accessories and **components coupled to microprocessor 67 via a vehicle bus interface** 85 that is coupled to a vehicle bus 86." (col 5:35-42) "As noted above, the system according to the present invention may be used to activate and/or reprogram other electrical accessories in the vehicle. Such **activation and reprogramming may be performed remotely by transmitting to the system a pre-determined sequence of DTMF signals.**" (col. 11,:34-38)

The '392 patent discloses the downloading of enabling data related to vehicle device codes to the controller through a cellular telephone as a wireless receiver for temporary connection to a downloading device. As illustrated in Figure 4, the telephone handset is a wired signal interface to the controller. As the '392 patent teaches, the controller can be programmed with or without said handset by using other devices capable of generating commands on the telephone handset interface. As a result, one skilled in the art would recognize the wireless interface could be used temporarily as a downloading interface. Therefore, programming and then removing the removing the telephone handset would allow methods of downloading signals using a temporary wireless interface.

For reasons including those stated above, Claim 5 of the '278 patent is taught by the '392 patent and the J1978 publication.

Claim 6

Claim 6 of the '278 patent reads:

> "The multi-vehicle compatible tracking unit according to claim 1 wherein the corresponding at least one vehicle code is for reading from the at least one vehicle device."

All of these components and functions can be found in the '392 patent and the J1978 publication:

'278 Patent Claim 6	**The '392 Patent and the J1978 Publication**
6. The multi-vehicle compatible tracking unit according to claim 1 wherein the corresponding at least one vehicle code is for reading from the at least one vehicle device.	The patent discloses the controller generating a command signal upon receiving a message on the receiver. "The service center, in turn, stores the sequence of received DTMF signals that may be subsequently transmitted to the vehicle's system to affect the unlocking of the doors. As shown in HG. 9, when a sequence of such DTMF signals is 55 received in an incoming call, first microprocessor 66 performs the data call processing routine 217 shown in HG. 9. In this routine, **microprocessor 66 collects and identifies the sequence of**

	transmitted DTMF signals as identified by DTMF decoder 75 (step 275). Once microprocessor 66 has 60 identified the sequence of DTMF signals, microprocessor 66 preferably controls transceiver 70 to transmit a DTMF acknowledgment signal back to the remote party (step 276). From the sequence of DTMF signals, **first microprocessor 66 may determine whether or not the received sequence of 65 DTMF signals represents an instruction to activate or reprogram ·an electrical accessory** (step 277). If the received sequence represents an instruction to activate an electrical accessory, first and second microprocessors 66 and 67 cooperate to formulate and transmit a proper control signal to the electrical accessory identified in the received DTMF signals (step 279). Such a **control signal may be transmitted through vehicle bus interface 85 and vehicle bus** 86 or through a discrete connection 92 to the controlled accessory. If the received sequence of DTMF signals represents an instruction to reprogram one or more vehicle accessories, first and second microprocessors 66 and 67 cooperate to reprogram the identified accessories such that the accessories will subsequently operate in the requested manner. **The microprocessors may reprogram the accessories** in any conventional manner, such as setting flags in a flag table that is accessed while controlling the various vehicle accessories. Such a reprogramming and control technique is disclosed in allowed U.S. patent application No. 08/484.321 filed on Jun. 7, 1995, and in co-pending U.S. patent application No. 08/874,210 filed on Jun. 13. 1997. Once the requested action has been taken, first microprocessor 66 returns to the low power sleep state 201 (HG. 6) as indicated by the return step 283. " (col. 11, line 34- col. 12)

The '392 patent describes a system that is able to communicate with a plurality of vehicle devices through the data bus. This two way bus communication can include reading device data, writing to the device, or reprogramming the device. As a result, one skilled in the art at the time will recognize that the system is reading from at least one vehicle device.

Additionally, the J1978 publication, originally issued 1992-03 and later revised 1994-06, describes the communications protocols and methods required to support OBD II diagnostic information and the development of a common diagnostic interface for the OBD II Scan Tool. While the focus of this analysis is not the development of a OBD II Scan Tool, the J1978 publication identifies a method to read, write and communicate on a plurality of data busses and as a result a plurality of vehicles. The J1978 publication describes connecting to the vehicle bus using one of three interface protocols by sending a command signal (request message) on the data communications bus. Three signals (request messages) are sent one at a time. If the request message is correct for that vehicle, it will trigger a response message from the vehicle devices (see the J1978 publication at 6.5.2). If no response is received, the system will try another protocol request message. If none of the initial signals prompt a response, the standard further describes additional steps to determine a working signal. (see the J1978 publication at 6.8).

As a result, one skilled in the art would recognize that, using an established methodology as developed by the automotive industry and approved by the EPA, the J1978 publication would enable communication with a plurality of vehicles. Therefore, for reasons including those stated above, Claim 6 of the '278 patent is taught by the '392 patent and the J1978 publication.

Claim 8

Claim 8 of the '278 patent reads:

> "the multi-vehicle compatible tracking unit according to claim 1 wherein said downloading interface is also for permitting downloading of at least one programming instruction for said multivehicle compatible controller."

All of these components and functions can be found in the '392 patent and the J1978 publication:

'278 Patent Claim 8	The '392 Patent and the J1978 Publication
8. the multi-vehicle compatible tracking unit according to claim 1 wherein said downloading interface is also for permitting downloading of at least one programming instruction for said multivehicle compatible controller	"The service center, in turn, stores the sequence of received DTMF signals that may be subsequently transmitted to the vehicle's system to affect the unlocking of the doors. As shown in HG. 9, when a sequence of such DTMF signals is 55 received in an incoming call, first microprocessor 66 performs the data call processing routine 217 shown in HG. 9. In this routine, **microprocessor 66 collects and identifies the sequence of transmitted DTMF signals** as identified by DTMF decoder 75 (step 275). Once microprocessor 66 has 60 identified the sequence of DTMF signals, microprocessor 66 preferably controls transceiver 70 to transmit a DTMF acknowledgment signal back to the remote party (step 276). From the sequence of DTMF signals, **first microprocessor 66 may determine whether or not the received sequence of 65 DTMF signals represents an instruction to activate or reprogram ·an electrical accessory** (step 277). If the received sequence represents an instruction to activate an electrical accessory, first and second microprocessors 66 and 67 cooperate to formulate and transmit a proper control signal to the electrical accessory identified in the received DTMF signals (step 279). Such a **control signal may be transmitted through vehicle bus interface 85 and vehicle bus** 86 or through a discrete connection 92 to the controlled accessory. If the received sequence of DTMF signals represents an instruction to reprogram one or more vehicle accessories, first and second microprocessors 66 and 67 cooperate to reprogram the identified

	accessories such that the accessories will subsequently operate in the requested manner. **The microprocessors may reprogram the accessories** in any conventional manner, such as setting flags in a flag table that is accessed while controlling the various vehicle accessories. Such a reprogramming and control technique is disclosed in allowed U.S. patent application No. 08/484.321 filed on Jun. 7, 1995, and in co-pending U.S. patent application No. 08/874,210 filed on Jun. 13. 1997. Once the requested action has been taken, first microprocessor 66 returns to the low power sleep state 201 (HG. 6) as indicated by the return step 283. " (col. 11, line 34- col. 12)

The '392 patent describes a system that is able to communicate with a plurality of vehicle devices through the data bus. This two way bus communication can include reading device data, writing to the device, or programming the device. Once again, the locked door example can describe the communication with the vehicle device. In this case, the controller is actually programming (changing) the state of the door lock device. By programming the state of the door lock, the lock changes from the locked state to the unlock state and the door is unlocked. As a result, one skilled in the art at the time will recognize that the system is able to download at least one program instruction to at least one vehicle device.

For reasons including those stated above, Claim 8 of the '278 patent is taught by the '392 patent and the J1978 publication.

Claim 11

Claim 11 of the '278 patent reads:

> "The multi-vehicle compatible tracking unit according to claim 1 wherein said wireless position determining device comprises a Global Positioning System (GPS) receiver."

All of these components and functions can be found in the '392 patent and the J1978 publication:

'278 Patent Claim 11	The '392 Patent and the J1978 Publication
11. the multi-vehicle compatible tracking unit according to claim 1 wherein said wireless position determining device comprises a Global Positioning System (GPS) receiver.	As shown in Figure 4 above, the system includes a GPS receiver. Also, in the body of the patent, it describes the GPS locating unit: "The vehicle communication and control circuit of the present invention also **preferably includes a GPS or differential GPS module** 77 having a **GPS antenna 78**. The GPS/DGPS module 77 is coupled to first 60 microprocessor 66 to provide an indication of the vehicle's location. As described further below, **the GPS data generated by module 77 may be transmitted using cellular modem** 76 with a call request transmitted to a service department 11 (FIG. 1), such that the service department may immediately 65 know the location of the vehicle for purposes of informing an emergency dispatcher or for providing navigational instructions to the driver. This aspect of the invention is particularly advantageous since it takes into account a situation where the driver is lost and cannot articulate their current location."

I have been informed that this claim is indefinite as there is no antecedent basis for "said wireless position determining device." However, the '392 patent discloses a vehicle position determining device. As shown in Figure 4, the system describes a GPS or DGPS as a vehicle position determining device. The patent discloses both GPS and DGPS. For those skilled in the art would recognize the Differential Global Positioning Systems offers better positional accuracy over GPS.

For reasons including those stated above, Claim 11 of the '278 patent is taught by the '392 patent and the J1978 publication.

Claim 12

Claim 12 of the '278 patent reads:

> "the multi-vehicle compatible tracking unit according to claim 1 further comprising a housing containing said vehicle position determining device, said wireless communications device, said multi-vehicle compatible controller, and said downloading interface."

All of these components and functions can be found in the '392 patent and the J1978 publication:

'278 Patent Claim 12	The '392 Patent and the J1978 Publication
12. the multi-vehicle compatible tracking unit according to claim 1 further comprising a housing containing said vehicle position determining device, said wireless communications device, said multi-vehicle compatible controller, and said downloading interface.	"The vehicle communication and control system of the present invention may be **mounted in whole or in part in an overhead console or a rearview mirror such as those shown in FIGS. 2 and 3**, respectively. It will be appreciated by those skilled in the art that the vehicle communication and control 20 system of the present invention may be wholly or **partially mounted in other accessories or components of the vehicle, such as a visor, instrument panel, armrest, steering wheel, or door of the vehicle**. Further, the various antennas of the system as will be described below may be mounted on any 25 location in the vehicle including the vehicle's trunk." (col 5: 16:26) "As shown in FIG. 3. the present invention may be **implemented in whole or in part in a rearview mirror** 120. Rearview mirror 120 includes a mirror housing 122 and a mirror, which may be a conventional mirror or a mirror having a reflectivity that is electronically adjustable, such as an electrochromic mirror 124. To allow such a mirror to dynamically respond to varying levels of light directed onto its surface by

changing its reflectivity, a light sensor 126 is provided. A display 128 may optionally be provided on the surface of mirror 124 or provided adjacent the mirror on a rearward facing surface of housing 122. **Housing 122 may be further provided with an aperture 130 in which microphone 82** (FIG. 4) may be mounted. (col 7: 29-43)

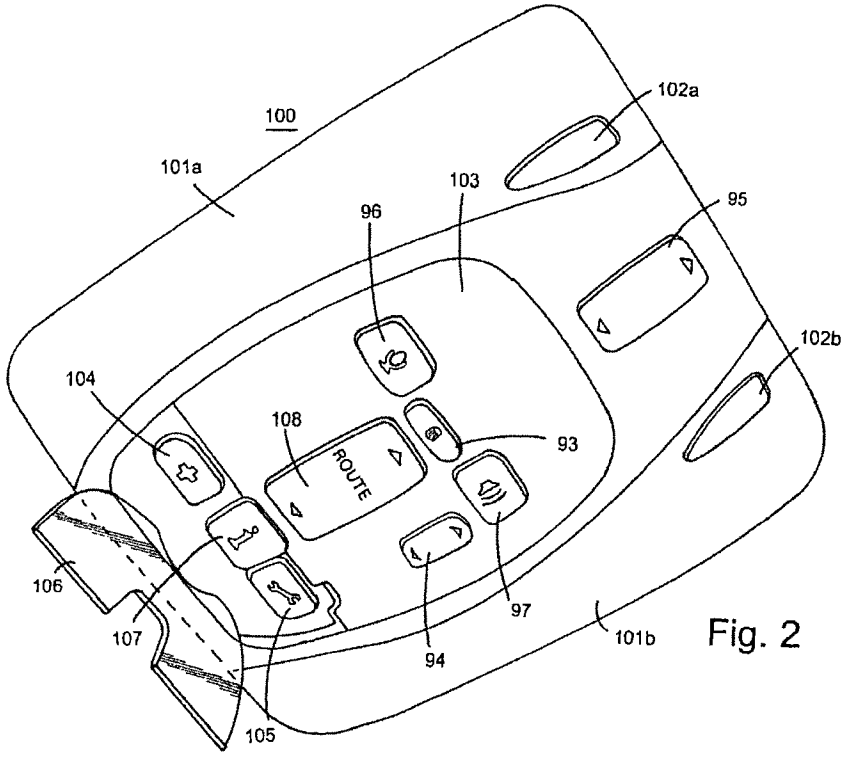
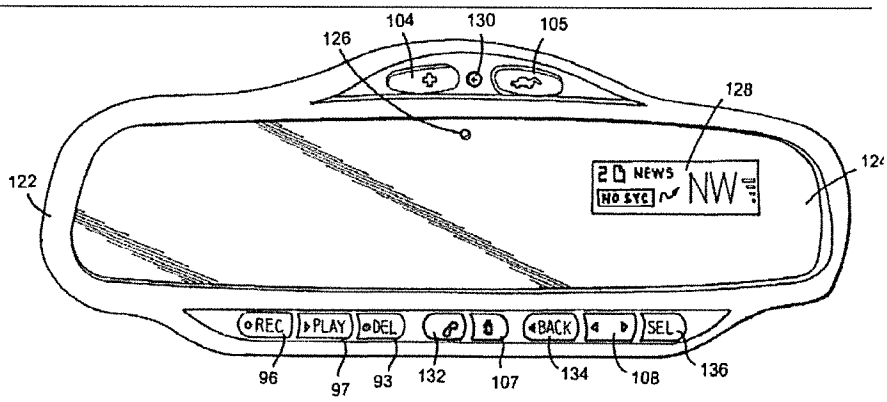


Fig. 2



In the teachings of the '392 patent, the housing and package integration are fully described. One skilled in the art at that time would recognize in figures 2 & 3 that the inventor is identifying and describing real world solutions to integrate the system into the vehicle. The housing designs considered both driver convenience and ergonomics in their location and form factor. In my opinion, this would indicate that Bambini et al were well ahead on the housing design aspects of the invention. This is even more evident when one realizes the filing date of the '392 patent is well before any claims from the '278 patent.

For reasons including those stated above, Claim 12 of the '278 patent is taught by the '392 patent and the J1978 publication.

Claim 13

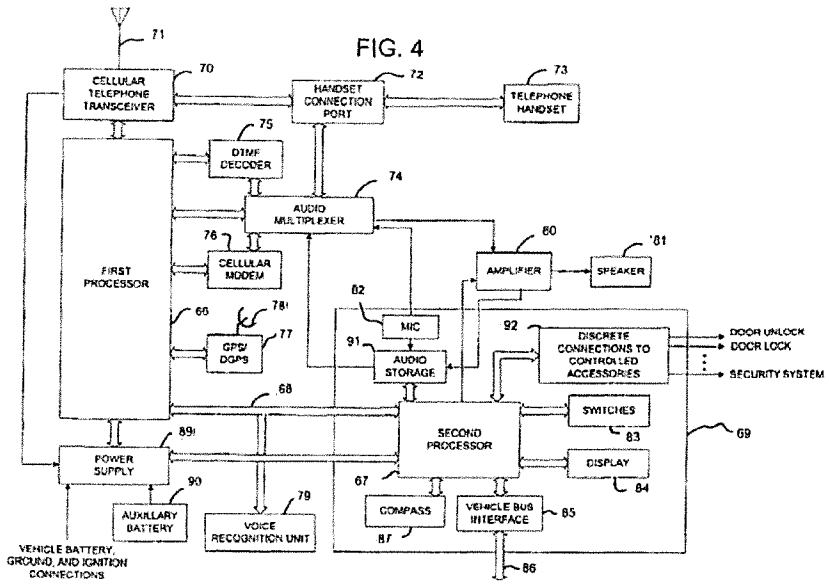
Claim 13 of the '278 patent reads:

> "A multi-vehicle compatible tracking unit for a vehicle comprising a vehicle data bus extending throughout the vehicle, the multi-vehicle compatible tracking unit comprising:
>
> a vehicle position determining device;
>
> a wireless communications device;
>
> a multi-vehicle compatible controller for cooperating with said vehicle position determining device and said wireless communications device to send vehicle position information; said multi-vehicle compatible controller to be

coupled to the vehicle data bus for communication there over with at least one vehicle device using at least one corresponding vehicle device code from among a plurality thereof for different vehicles; and

a downloading interface for permitting downloading of enabling data related to the at least one corresponding vehicle device code for use by said multi-vehicle compatible controller; said downloading interface comprising a connector for temporary connection to a downloading device."

All of these components and functions can be found in the '392 patent and the J1978 publication:

'278 Patent Claim 13	The '392 Patent and the J1978 Publication
13. A multi-vehicle compatible tracking unit for a vehicle comprising a vehicle data bus extending throughout the vehicle, the multi-vehicle compatible tracking unit comprising:	Patent the '392 patent discloses a multi-vehicle compatible tracking system for a vehicle comprising a data communications bus, as shown in Figure 4 (below):  FIG. 4 71 70 CELLULAR TELEPHONE TRANSCEIVER 72 HANDSET CONNECTION PORT 73 TELEPHONE HANDSET 75 DTMF DECODER 74 AUDIO MULTIPLEXER 76 CELLULAR MODEM FIRST PROCESSOR 60 AMPLIFIER 81 SPEAKER 82 MIC 66 78 GPS/ DGPS 77 91 AUDIO STORAGE 92 DISCRETE CONNECTIONS TO CONTROLED ACCESSORIES DOOR UNLOCK DOOR LOCK SECURITY SYSTEM 68 SWITCHES 83 89 SECOND PROCESSOR 69 POWER SUPPLY DISPLAY 84 67 90 AUXILLARY BATTERY 79 VOICE RECOGNITION UNIT COMPASS VEHICLE BUS INTERFACE 85 87 VEHICLE BATTERY, GROUND, AND IGNITION CONNECTIONS 86 The '392 patent discloses that the controller is coupled to the vehicle data bus for communication with at least one vehicle device, using a corresponding vehicle device code, from among a plurality of codes for different vehicles.

'278 Patent Claim 13	The '392 Patent and the J1978 Publication
	"Together, first and second **microprocessors 66 and 67 monitor incoming messages and communications from a cellular telephone transceiver** 70 and from various vehicle accessories and **components coupled to microprocessor 67 via a vehicle bus interface** 85 that is coupled to a vehicle bus 86." (col 5:35-42)

As shown in Figure 4 of the '392 patent, the system contains a vehicle data bus 86, processors 66 & 67, and GPS receiver 77. One skilled in the art at that time could easily recognize the similarity in system components and architecture between the two patents. As described above, the '479 patent discloses a vehicle control system for a vehicle comprising a data bus. In addition, those skilled in the art were familiar with the bus parameters proposed by the SAE, including the teachings of the J1978 publication regarding the use of a controller compatible with multiple buses and thereby multiple vehicles. As a result, all of the system components and functions in claim 13 of the '278 patent are taught by the '392 patent, alone or in combination with the J1978 publication.

a vehicle position determining device;	The '392 patent col. 4:65-67 discloses a controller that cooperates with the GPS device and the wireless communication device to send vehicle position information, **"identify the vehicle's location based upon a vehicle location signal generated by the vehicle communication system and transmitted** with the 911 distress call." Also, in col 5:57-6, "The vehicle communication and control circuit of the present invention also preferably includes a GPS or differential GPS module 77 having a GPS antenna 78. The GPS/DGPS module 77 is coupled to first 60 microprocessor 66

	to provide an indication of the vehicle's location. As described further below, **the GPS data generated by module 77 may be transmitted using cellular modem** 76 with a call request transmitted to a service department 11 (FIG. 1), such that the service department may immediately 65 know the location of the vehicle for purposes of informing an emergency dispatcher or for providing navigational instructions to the driver. This aspect of the invention is particularly advantageous since it takes into account a situation where the driver is lost and cannot articulate their current location."

The '392 patent discloses a vehicle position determining device. As shown in Figure 4, the system describes a GPS or DGPS as a vehicle position determining device.

a wireless communications device;	The '392 patent discloses a wireless communications device, as shown in col. 4, lines 28-52, "F1G. 1 shows a **land-based system for communicating with the vehicle communication and remote control system** of the present invention as implemented in a vehicle 20. The system shown in F1G. 1 **allows remote control signals and other commands to be issued to and received from a system within vehicle** 20 via its antenna 22. In a preferred construction, the infrastructure that enables communications to be sent to and received from the **vehicle communication system utilizes a cellular network** 2, which includes a plurality of base stations that transmit and receive RF signals to/from vehicle 20... Depending upon the form and nature of communication and any command signal sent to or received from the vehicle communication and control system of the present invention."

The '392 patent discloses a wireless communication device. In the preferred embodiment, the wireless device is a cellular network. One skilled in the art at that time would recognize other wireless devices that could be used for two-way communication.

a multi-vehicle compatible controller for cooperating with said vehicle position determining device and said wireless communications device to send vehicle position information;	The '392 patent col. 4:65-67 discloses a controller that cooperates with the GPS device and the wireless communication device to send vehicle position information, "**identify the vehicle's location based upon a vehicle location signal generated by the vehicle communication system and transmitted** with the 911 distress call." Also, in col 5:57-6, "The vehicle communication and control circuit of the present invention also preferably includes a GPS or differential GPS module 77 having a GPS antenna 78. The GPS/DGPS module 77 is coupled to first 60 microprocessor 66 to provide an indication of the vehicle's location. As described further below, **the GPS data generated by module 77 may be transmitted using cellular modem** 76 with a call request transmitted to a service department 11 (FIG. 1), such that the service department may immediately 65 know the location of the vehicle for purposes of informing an emergency dispatcher or for providing navigational instructions to the driver. This aspect of the invention is particularly advantageous since it takes into account a situation where the driver is lost and cannot articulate their current location."

The '392 patent describes a system that is able to determine the vehicle position and communicate the information wirelessly. As described in the patent the system contains all of the necessary components and functions to transmit the vehicle's position in case of emergency (such as a 911 call).

said multi-vehicle compatible controller to be coupled to the vehicle data bus for communication there over with at least one vehicle device using at least one corresponding vehicle device code from among a plurality thereof for different vehicles; and	The patent discloses that the controller is coupled to the vehicle data bus for communication with at least one vehicle device, using a corresponding vehicle device code, from among a plurality of codes for different vehicles. "Together, first and second **microprocessors 66 and 67 monitor incoming messages and communications from a cellular telephone transceiver** 70 and from various vehicle accessories and **components coupled to microprocessor 67 via a vehicle bus interface** 85 that is coupled to a vehicle bus 86." (col 5:35-42)

To address Omega's claims regarding the system's ability to interface with a plurality of vehicles, one needs to evaluate the available standards at the time of the patent's filing. It was well know, and common practice, to use the J1978 publication communication standard to enable electronics to correctly interface with a plurality of data busses and vehicles. The J1978 publication, originally issued 1992-03 and later revised 1994-06, describes the communications protocols and methods required to support OBD II diagnostic information and the development of a common diagnostic interface for the OBD II Scan Tool. While the focus of this analysis is not the development of a OBD II Scan Tool, the J1978 publication identifies a method to read, write and communicate on a plurality of data busses and as a result a plurality of vehicles. The EPA mandated a common interface method to enable service technician diagnose all vehicles with one electronic service tool. Prior to J1978, each vehicle manufacturer had its own service tool and proprietary data bus. Since 1994, all vehicle manufactures and test equipment are required to meet the J1978 publication.

The J1978 publication describes connecting to the vehicle bus using one of three interface protocols by sending a command signal (request message) on the data communications bus. Three signals (request messages) are sent one at a time. If the request message is correct for that vehicle, it will trigger a response message from the vehicle devices (see the J1978 publication at 6.5.2). If no response is received, the system will try another protocol request message. If none of the initial signals prompt a response, the standard further describes additional steps to determine a working signal. (see the J1978 publication at 6.8). As a result, one skilled in the art would recognize that, using an established methodology as developed by the automotive industry and approved by the EPA, the J1978 publication would enable communication with a plurality of vehicles.

a downloading interface for permitting downloading of enabling data related to the at least one corresponding vehicle device code for use by said multi-vehicle compatible controller	The patent discloses that the controller is coupled to the vehicle data bus for communication with at least one vehicle device, using a corresponding vehicle device code, from among a plurality of codes for different vehicles. "Together, first and second **microprocessors 66 and 67 monitor incoming messages and communications from a cellular telephone transceiver** 70 and from various vehicle accessories and **components coupled to microprocessor 67 via a vehicle bus interface** 85 that is coupled to a vehicle bus 86." (col 5:35-42) The patent describes a downloading interface for permitting downloading of enabling data related to the at least one corresponding vehicle device code for use by said multi-vehicle compatible controller. The patent discloses receiving data over the wireless interface to enable a control signal. "As noted above, the system according to the present invention may be used to activate and/or reprogram other electrical accessories in

	the vehicle. Such **activation and reprogramming may be performed remotely by transmitting to the system a predetermined sequence of DTMF signals**. By allowing the system to respond to DTMF signals in this manner, a user-friendly technique for **allowing individuals or service operators to remotely activate or reprogram vehicle accessories** may be provided For example, if an individual locked their keys in their car and wished to have the system unlock the doors, the individual would call the service center to make this request. The service center may implement an automated answering system that plays back recorded options that the caller may select by pressing keys on a telephone keypad and thereby transmit DTMF tones to the service center. An example of the type of audio prompting options that may be played to a caller are disclosed in so U.S. Pat. No. 5.525.CJ77 issued on Jun. 11. 1996. The service center, in turn, stores the sequence of received DTMF signals that may be subsequently transmitted to the vehicle's system to affect the unlocking of the doors. As shown in HG. 9, when a sequence of such DTMF signals is 55 received in an incoming call, first microprocessor 66 performs the data call processing routine 217 shown in HG. 9. In this routine, **microprocessor 66 collects and identifies the sequence of transmitted DTMF signals** as identified by DTMF decoder 75 (step 275). Once microprocessor 66 has 60 identified the sequence of DTMF signals, microprocessor 66 preferably controls transceiver 70 to transmit a DTMF acknowledgment signal back to the remote party (step 276). From the sequence of DTMF signals, **first microprocessor 66 may determine whether or not the received sequence of 65 DTMF signals represents an instruction to activate or reprogram ·an electrical accessory** (step 277). If the received sequence represents an instruction to activate an electrical accessory, first and second microprocessors 66 and 67 cooperate to formulate and transmit a proper control signal

	to the electrical accessory identified in the received DTMF signals (step 279). Such a **control signal may be transmitted through vehicle bus interface 85 and vehicle bus** 86 or through a discrete connection 92 to the controlled accessory. If the received sequence of DTMF signals represents an instruction to reprogram one or more vehicle accessories, first and second microprocessors 66 and 67 cooperate to reprogram the identified accessories such that the accessories will subsequently operate in the requested manner. **The microprocessors may reprogram the accessories** in any conventional manner, such as setting flags in a flag table that is accessed while controlling the various vehicle accessories. Such a reprogramming and control technique is disclosed in allowed U.S. patent application No. 08/484.321 filed on Jun. 7, 1995, and in co-pending U.S. patent application No. 08/874,210 filed on Jun. 13. 1997. Once the requested action has been taken, first microprocessor 66 returns to the low power sleep state 201 (HG. 6) as indicated by the return step 283. " (col. 11, line 34- col. 12)

As the '392 patent discloses, the system includes a downloading interface that permits downloading of data and instructions. These instructions may come from over the wireless receiver. In the example above, a person locked out of their car is able to get it unlocked remotely requesting the door to unlock. One skilled in the art at that time could easily recognize that the system is permitting downloading of enabling data related to the at least one corresponding vehicle device code.

said downloading interface comprising a connector for temporary connection to a downloading device.	"Although the invention has been described above as utilizing conventional telephone keypads to generate DTMF signals, it will be appreciated by those skilled in the art that a customized telephone keypad may be utilized to generate DTMF tones not normally generated by a conventional telephone keypad. In this

	manner, it will be more difficult for an unauthorized person to attempt to transmit DTMF signals to another person's in-vehicle system. **Further, any other device that is capable of generating and transmitting DTMF signals may be used in place of a telephone keypad.** It should be noted, however, that by utilizing DTMF tones generated by a conventional telephone keypad, a conventional DTMF decoder may be used in the system installed in the vehicle." (col. 12 23-3 5)

As illustrated in Figure 4, the telephone handset is a wired signal interface to the controller. As the '392 patent teaches, the controller can be programmed without said handset by using other devices capable of generating commands on the telephone handset interface. As a result, one skilled in the art would recognize that existing the wired handset interface could be used as a temporarily downloading interface. Therefore, removing the removing the telephone handset temporarily from the system would allow methods of downloading signals using a wired interface.

For reasons including those stated above, Claim 13 of the '278 patent is taught by the '392 patent and the J1978 publication.

Claim 14

Claim 14 of the '278 patent reads:

> "the multi-vehicle compatible tracking unit according to claim 13 wherein the corresponding at least one vehicle code is for reading from the at least one vehicle device."

All of these components and functions can be found in the '392 patent and the J1978 publication:

'278 Patent Claim 14	**The '392 Patent and the J1978 Publication**
14. the multi-vehicle compatible tracking unit according to claim	The patent discloses the controller generating a signal upon receiving a message on the receiver.

13 wherein the corresponding at least one vehicle code is for reading from the at least one vehicle device."	"The service center, in turn, stores the sequence of received DTMF signals that may be subsequently transmitted to the vehicle's system to affect the unlocking of the doors. As shown in HG. 9, when a sequence of such DTMF signals is 55 received in an incoming call, first microprocessor 66 performs the data call processing routine 217 shown in HG. 9. In this routine, **microprocessor 66 collects and identifies the sequence of transmitted DTMF signals** as identified by DTMF decoder 75 (step 275). Once microprocessor 66 has 60 identified the sequence of DTMF signals, microprocessor 66 preferably controls transceiver 70 to transmit a DTMF acknowledgment signal back to the remote party (step 276). From the sequence of DTMF signals, **first microprocessor 66 may determine whether or not the received sequence of 65 DTMF signals represents an instruction to activate or reprogram ·an electrical accessory** (step 277). If the received sequence represents an instruction to activate an electrical accessory, first and second microprocessors 66 and 67 cooperate to formulate and transmit a proper control signal to the electrical accessory identified in the received DTMF signals (step 279). Such a **control signal may be transmitted through vehicle bus interface 85 and vehicle bus** 86 or through a discrete connection 92 to the controlled accessory. If the received sequence of DTMF signals represents an instruction to reprogram one or more vehicle accessories, first and second microprocessors 66 and 67 cooperate to reprogram the identified accessories such that the accessories will subsequently operate in the requested manner. **The microprocessors may reprogram the accessories** in any conventional manner, such as setting flags in a flag table that is accessed while controlling the various vehicle accessories. Such a reprogramming and control technique is disclosed in allowed

	U.S. patent application No. 08/484.321 filed on Jun. 7, 1995, and in co-pending U.S. patent application No. 08/874,210 filed on Jun. 13. 1997. Once the requested action has been taken, first microprocessor 66 returns to the low power sleep state 201 (HG. 6) as indicated by the return step 283. " (col. 11, line 34-col. 12)

The '392 patent describes a system that is able to communicate with a plurality of vehicle devices through the data bus. This two way bus communication can include reading device data, writing to the device, or reprogramming the device. As a result, one skilled in the art at the time will recognize that the system is reading from at least one vehicle device. To address Omega's claims regarding the system's ability to interface with a plurality of vehicles, one needs to evaluate the available standards at the time of the patent's filing. It was well know, and common practice, to use the J1978 publication communication standard to enable electronics to correctly interface with a plurality of data busses and vehicles. The J1978 publication, originally issued 1992-03 and later revised 1994-06, describes the communications protocols and methods required to support OBD II diagnostic information and the development of a common diagnostic interface for the OBD II Scan Tool. While the focus of this analysis is not the development of a OBD II Scan Tool, the J1978 publication identifies a method to read, write and communicate on a plurality of data busses and as a result a plurality of vehicles.

The J1978 publication describes connecting to the vehicle bus using one of three interface protocols by sending a command signal (request message) on the data communications bus. Three signals (request messages) are sent one at a time. If the request message is correct for that vehicle, it will trigger a response message from the vehicle devices (see the J1978 publication at 6.5.2). If no response is received, the system will try another protocol request message. If none of the initial signals prompt a response, the standard further describes additional steps to determine a working signal. (see the J1978 publication at 6.8). As a result, one skilled in the art would recognize that, using an established methodology as developed by the automotive industry and approved by the EPA, the J1978 publication would enable communication with a plurality of vehicles.

For reasons including those stated above, Claim 14 of the '278 patent is taught by the '392 patent and the J1978 publication.

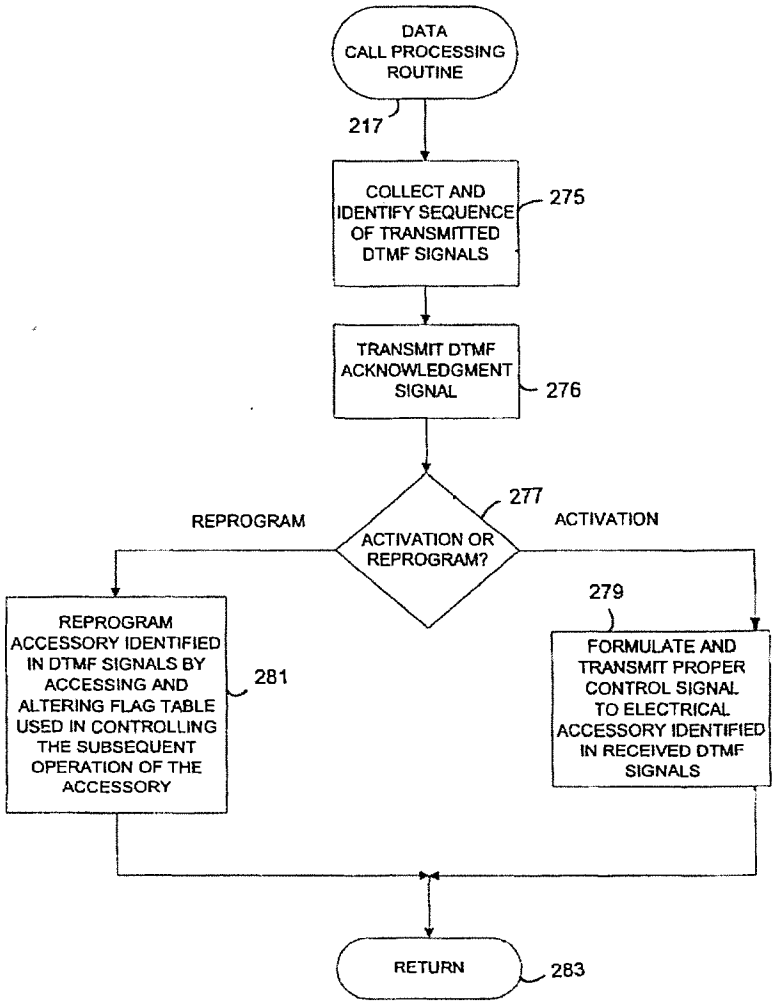
Claim 16

Claim 16 of the '278 patent reads

> "The multi-vehicle compatible tracking unit according to claim 13 wherein said downloading interface is also for permitting downloading of at least one programming instruction for said multivehicle compatible controller."

All of these components and functions can be found in the '392 patent and the J1978 publication:

'278 Patent Claim 16	**The '392 Patent and the J1978 Publication**
16. The multi-vehicle compatible tracking unit according to claim 13 wherein said downloading interface is also for permitting downloading of at least one programming instruction for said multivehicle compatible controller	Figure 9 of the '392 patent below shows how the controller makes decisions based upon the received data to determine what actions the system will take, including programming or activation of a vehicle device.



Also, in the description of the '392 patent, it describes:

The service center, in turn, stores the sequence of received DTMF signals that may be subsequently transmitted to the vehicle's system to affect the unlocking of the doors. As shown in HG. 9, when a sequence of such DTMF signals is 55 received in an incoming call, first microprocessor 66 performs the data call processing routine 217 shown in HG. 9. In this routine, **microprocessor 66 collects and identifies the sequence of**

	transmitted DTMF signals as identified by DTMF decoder 75 (step 275). Once microprocessor 66 has 60 identified the sequence of DTMF signals, microprocessor 66 preferably controls transceiver 70 to transmit a DTMF acknowledgment signal back to the remote party (step 276). From the sequence of DTMF signals, **first microprocessor 66 may determine whether or not the received sequence of 65 DTMF signals represents an instruction to activate or reprogram ·an electrical accessory** (step 277). If the received sequence represents an instruction to activate an electrical accessory, first and second microprocessors 66 and 67 cooperate to formulate and transmit a proper control signal to the electrical accessory identified in the received DTMF signals (step 279). Such a **control signal may be transmitted through vehicle bus interface 85 and vehicle bus** 86 or through a discrete connection 92 to the controlled accessory. If the received sequence of DTMF signals represents an instruction to reprogram one or more vehicle accessories, first and second microprocessors 66 and 67 cooperate to reprogram the identified accessories such that the accessories will subsequently operate in the requested manner. **The microprocessors may reprogram the accessories** in any conventional manner, such as setting flags in a flag table that is accessed while controlling the various vehicle accessories. Such a reprogramming and control technique is disclosed in allowed U.S. patent application No. 08/484.321 filed on Jun. 7, 1995, and in co-pending U.S. patent application No. 08/874,210 filed on Jun. 13. 1997. Once the requested action has been taken, first microprocessor 66 returns to the low power sleep state 201 (HG. 6) as indicated by the return step 283. " (col. 11, line 34-col. 12 22)

The '392 patent describes a system that is able to communicate with a plurality of vehicle devices through the data bus. This two way bus communication can include reading device data, writing to the device, or programming the device. Once again, the locked door example can describe the communication with the vehicle device. In this case, the controller is actually programming (changing) the state of the door lock device. By programming the state of the door lock, the lock changes from the locked state to the unlock state and the door is unlocked. As a result, one skilled in the art at the time will recognize that the system is able to download at least one program instruction to at least one vehicle device.

In another example, shown in Figure 9, the flowchart describes the decision to either activate the vehicle device or reprogram it. The decision is based upon the information from the wireless receiver. One skilled in the art at the time would realize that the downloading interface can also be used for downloading at least one programming instruction for said multivehicle compatible controller.

For reasons including those stated above, Claim 16 of the '278 patent is taught by the '392 patent and the J1978 publication.

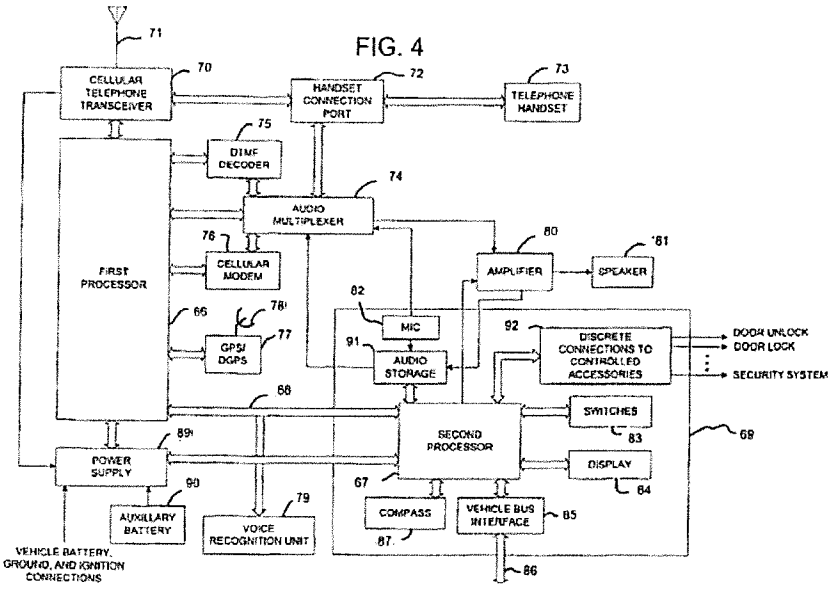
Claim 18

Claim 18 of the '278 patent reads:

> "A multi-vehicle compatible tracking unit for a vehicle comprising a vehicle data bus extending throughout the vehicle, the multi-vehicle compatible tracking unit comprising:
>
> a vehicle position determining device;
>
> a wireless communications device;
>
> a multi-vehicle compatible controller for cooperating with said vehicle position determining device and said wireless communications device to send vehicle position information;
>
> said multi-vehicle compatible controller to be coupled to the vehicle data bus for communication there over with at least one vehicle device using at least one corresponding vehicle device code from among a plurality thereof for different vehicles; and

a downloading interface for permitting downloading of enabling data related to the at least one corresponding vehicle device code for use by said multi-vehicle compatible controller; said downloading interface comprising a connector for temporary connection to a downloading device."

All of these components and functions can be found in the '392 patent and the J1978 publication:

'278 Patent Claim 18	The '392 Patent and the J1978 Publication
18. A multi-vehicle compatible tracking unit for a vehicle comprising a vehicle data bus extending throughout the vehicle, the multi-vehicle compatible tracking unit comprising:	Patent the '392 patent discloses a multi-vehicle compatible tracking system for a vehicle comprising a data communications bus, as shown in Figure 4 (below):  FIG. 4 In col. 5, lines 37-42 "Together, first and second **microprocessors 66 and 67 monitor incoming messages and communications from a cellular telephone transceiver** 70 and from various vehicle accessories and **components coupled to microprocessor 67 via a vehicle bus interface** 85 that is coupled to a vehicle bus 86."

	The patent discloses that the controller is coupled to the vehicle data bus for communication with at least one vehicle device, using a corresponding vehicle device code, from among a plurality of codes for different vehicles. "Together, first and second **microprocessors 66 and 67 monitor incoming messages and communications from a cellular telephone transceiver** 70 and from various vehicle accessories and **components coupled to microprocessor 67 via a vehicle bus interface** 85 that is coupled to a vehicle bus 86." (col 5:35-42)

Shown in Figure 4 of the '392 patent, the system contains a vehicle data bus 86, processors 66 & 67, and GPS receiver 77. One skilled in the art at that time could easily recognize the similarity in system components and architecture between the two patents. As described above, the '479 patent discloses a vehicle control system for a vehicle comprising a data bus. In addition, those skilled in the art were familiar with the bus parameters proposed by the SAE, including the teachings of the J1978 publication regarding the use of a controller compatible with multiple buses and thereby multiple vehicles. As a result, all of the system components and functions in claim 18 of the '278 patent are taught by the '392 patent, alone or in combination with the J1978 publication.

a vehicle position determining device;	Figure 4 also describes a **GPS or DGPS as a vehicle position determining device**. The '392 patent discloses a wireless communications device, as shown in col. 4, lines 28-52, "F1G. 1 shows a **land-based system for communicating with the vehicle communication and remote control system** of the present invention as implemented in a vehicle 20. The system

	shown in F1G. 1 **allows remote control signals and other commands to be issued to and received from a system within vehicle** 20 via its antenna 22. In a preferred construction, the infrastructure that enables communications to be sent to and received from the **vehicle communication system utilizes a cellular network** 2, which includes a plurality of base stations that transmit and receive RF signals to/from vehicle 20... Depending upon the form and nature of communication and any command signal sent to or received from the vehicle communication and control system of the present invention."

The '392 patent discloses a vehicle position determining device. As shown in Figure 4, the system describes a GPS or DGPS as a vehicle position determining device.

a wireless communications device;	The '392 patent discloses a wireless communications device, as shown in col. 4, lines 28-52, "F1G. 1 shows a **land-based system for communicating with the vehicle communication and remote control system** of the present invention as implemented in a vehicle 20. The system shown in F1G. 1 **allows remote control signals and other commands to be issued to and received from a system within vehicle** 20 via its antenna 22. In a preferred construction, the infrastructure that enables communications to be sent to and received from the **vehicle communication system utilizes a cellular network** 2, which includes a plurality of base stations that transmit and receive RF signals to/from vehicle 20... Depending upon the form and nature of communication and any command signal sent to or received from the vehicle communication and control system of the present invention."

The '392 patent discloses a wireless communication device. In the preferred embodiment, the wireless device is a cellular network. One skilled in the art at that time would recognize other wireless devices that could be used for two-way communication.

a multi-vehicle compatible controller for cooperating with said vehicle position determining device and said wireless communications device to send vehicle position information;	The '392 patent col. 4:65-67 discloses a controller that cooperates with the GPS device and the wireless communication device to send vehicle position information, "**identify the vehicle's location based upon a vehicle location signal generated by the vehicle communication system and transmitted** with the 911 distress call." Also, in col 5:57-6, "The vehicle communication and control circuit of the present invention also preferably includes a GPS or differential GPS module 77 having a GPS antenna 78. The GPS/DGPS module 77 is coupled to first 60 microprocessor 66 to provide an indication of the vehicle's location. As described further below, **the GPS data generated by module 77 may be transmitted using cellular modem** 76 with a call request transmitted to a service department 11 (FIG. 1), such that the service department may immediately 65 know the location of the vehicle for purposes of informing an emergency dispatcher or for providing navigational instructions to the driver. This aspect of the invention is particularly advantageous since it takes into account a situation where the driver is lost and cannot articulate their current location."

The '392 patent describes a system that is able to determine the vehicle position and communicate the information wirelessly. As described in the patent the system contains all of the necessary components and functions to transmit the vehicle's position in case of emergency (such as a 911 call).

said multi-vehicle compatible controller to be coupled to the vehicle data bus for communication there over with at least one vehicle device using at least one corresponding vehicle device code from among a plurality thereof for different vehicles; and	The patent discloses that the controller is coupled to the vehicle data bus for communication with at least one vehicle device, using a corresponding vehicle device code, from among a plurality of codes for different vehicles. "Together, first and second **microprocessors 66 and 67 monitor incoming messages and communications from a cellular telephone transceiver** 70 and from various vehicle accessories and **components coupled to microprocessor 67 via a vehicle bus interface** 85 that is coupled to a vehicle bus 86." (col 5:35-42)

To address Omega's claims regarding the system's ability to interface with a plurality of vehicles, one needs to evaluate the available standards at the time of the patent's filing. It was well know, and common practice, to use the J1978 Publication communication standard to enable electronics to correctly interface with a plurality of data busses and vehicles. The J1978 publication, originally issued 1992-03 and later revised 1994-06, describes the communications protocols and methods required to support OBD II diagnostic information and the development of a common diagnostic interface for the OBD II Scan Tool. While the focus of this analysis is not the development of a OBD II Scan Tool, the J1978 publication identifies a method to read, write and communicate on a plurality of data busses and as a result a plurality of vehicles. The EPA mandated a common interface method to enable service technician diagnose all vehicles with one electronic

service tool. Prior to J1978, each vehicle manufacturer had its own service tool and proprietary data bus. Since 1994, all vehicle manufactures and test equipment are required to meet the J1978 publication.

The J1978 publication describes connecting to the vehicle bus using one of three interface protocols by sending a command signal (request message) on the data communications bus. Three signals (request messages) are sent one at a time. If the request message is correct for that vehicle, it will trigger a response message from the vehicle devices (see the J1978 publication at 6.5.2). If no response is received, the system will try another protocol request message. If none of the initial signals prompt a response, the standard further describes additional steps to determine a working signal. (see the J1978 publication at 6.8). As a result, one skilled in the art would recognize that, using an established methodology as developed by the automotive industry and approved by the EPA, the J1978 publication would enable communication with a plurality of vehicles.

a downloading interface for permitting downloading of enabling data related to the at least one corresponding vehicle device code for use by said multi-vehicle compatible controller	The patent discloses that the controller is coupled to the vehicle data bus for communication with at least one vehicle device, using a corresponding vehicle device code, from among a plurality of codes for different vehicles. "Together, first and second **microprocessors 66 and 67 monitor incoming messages and communications from a cellular telephone transceiver** 70 and from various vehicle accessories and **components coupled to microprocessor 67 via a vehicle bus interface** 85 that is coupled to a vehicle bus 86." (col 5:35-42) The patent describes a downloading interface for permitting downloading of enabling data related to the at least one corresponding vehicle device code for use by said multi-vehicle compatible controller. The patent discloses receiving data over the wireless interface to enable a control signal.

	"As noted above, the system according to the present invention may be used to activate and/or reprogram other electrical accessories in the vehicle. Such **activation and reprogramming may be performed remotely by transmitting to the system a predetermined sequence of DTMF signals**. By allowing the system to respond to DTMF signals in this manner, a user-friendly technique for **allowing individuals or service operators to remotely activate or reprogram vehicle accessories** may be provided For example, if an individual locked their keys in their car and wished to have the system unlock the doors, the individual would call the service center to make this request. The service center may implement an automated answering system that plays back recorded options that the caller may select by pressing keys on a telephone keypad and thereby transmit DTMF tones to the service center. An example of the type of audio prompting options that may be played to a caller are disclosed in so U.S. Pat. No. 5.525.CJ77 issued on Jun. 11. 1996. The service center, in turn, stores the sequence of received DTMF signals that may be subsequently transmitted to the vehicle's system to affect the unlocking of the doors. As shown in HG. 9, when a sequence of such DTMF signals is 55 received in an incoming call, first microprocessor 66 performs the data call processing routine 217 shown in HG. 9. In this routine, **microprocessor 66 collects and identifies the sequence of transmitted DTMF signals** as identified by DTMF decoder 75 (step 275). Once microprocessor 66 has 60 identified the sequence of DTMF signals, microprocessor 66 preferably controls transceiver 70 to transmit a DTMF acknowledgment signal back to the remote party (step 276). From the sequence of DTMF signals, **first microprocessor 66 may determine whether or not the received sequence of 65 DTMF signals represents an instruction to activate or reprogram ·an**

	electrical accessory (step 277). If the received sequence represents an instruction to activate an electrical accessory, first and second microprocessors 66 and 67 cooperate to formulate and transmit a proper control signal to the electrical accessory identified in the received DTMF signals (step 279). Such a **control signal may be transmitted through vehicle bus interface 85 and vehicle bus** 86 or through a discrete connection 92 to the controlled accessory. If the received sequence of DTMF signals represents an instruction to reprogram one or more vehicle accessories, first and second microprocessors 66 and 67 cooperate to reprogram the identified accessories such that the accessories will subsequently operate in the requested manner. **The microprocessors may reprogram the accessories** in any conventional manner, such as setting flags in a flag table that is accessed while controlling the various vehicle accessories. Such a reprogramming and control technique is disclosed in allowed U.S. patent application No. 08/484.321 filed on Jun. 7, 1995, and in co-pending U.S. patent application No. 08/874,210 filed on Jun. 13. 1997. Once the requested action has been taken, first microprocessor 66 returns to the low power sleep state 201 (HG. 6) as indicated by the return step 283. " (col. 11, line 34- col. 12)

As the '392 patent discloses, the system includes a downloading interface that permits downloading of data and instructions. These instructions may come from over the wireless receiver. In the example above, a person locked out of their car is able to get it unlocked remotely requesting the door to unlock. One skilled in the art at that time could easily recognize that the system is permitting downloading of enabling data related to the at least one corresponding vehicle device code.

said downloading interface comprising a	"Although the invention has been described above as utilizing conventional telephone keypads to generate DTMF signals, it will

connector for temporary connection to a downloading device.	be appreciated by those skilled in the art that a customized telephone keypad may be utilized to generate DTMF tones not normally generated by a conventional telephone keypad. In this manner, it will be more difficult for an unauthorized person to attempt to transmit DTMF signals to another person's in-vehicle system. **Further, any other device that is capable of generating and transmitting DTMF signals may be used in place of a telephone keypad.** It should be noted, however, that by utilizing DTMF tones generated by a conventional telephone keypad, a conventional DTMF decoder may be used in the system installed in the vehicle." (col. 12 23-3 5)

As illustrated in Figure 4, the telephone handset is a wired signal interface to the controller. As the '392 patent teaches, the controller can be programmed without said handset by using other devices capable of generating commands on the telephone handset interface. As a result, one skilled in the art would recognize that existing the wired handset interface could be used as a temporarily downloading interface. Therefore, removing the removing the telephone handset temporarily from the system would allow methods of downloading signals using a wired interface.

For reasons including those stated above, Claim 18 of the '278 patent is taught by the '392 patent and the J1978 publication.

Claim 19

Claim 19 of the '278 patent reads

> "The multi-vehicle compatible tracking unit according to claim 18 wherein the corresponding at least one vehicle code is for reading from the at least one vehicle device."

All of these components and functions can be found in the '392 patent and the J1978 publication:

'278 Patent Claim 19	**The '392 Patent and the J1978 Publication**

19. The multi-vehicle compatible tracking unit according to claim 18 wherein the corresponding at least one vehicle code is for reading from the at least one vehicle device.	The patent discloses the controller generating a command signal upon receiving a message on the receiver. "The service center, in turn, stores the sequence of received DTMF signals that may be subsequently transmitted to the vehicle's system to affect the unlocking of the doors. As shown in HG. 9, when a sequence of such DTMF signals is 55 received in an incoming call, first microprocessor 66 performs the data call processing routine 217 shown in HG. 9. In this routine, **microprocessor 66 collects and identifies the sequence of transmitted DTMF signals** as identified by DTMF decoder 75 (step 275). Once microprocessor 66 has 60 identified the sequence of DTMF signals, microprocessor 66 preferably controls transceiver 70 to transmit a DTMF acknowledgment signal back to the remote party (step 276). From the sequence of DTMF signals, **first microprocessor 66 may determine whether or not the received sequence of 65 DTMF signals represents an instruction to activate or reprogram ·an electrical accessory** (step 277). If the received sequence represents an instruction to activate an electrical accessory, first and second microprocessors 66 and 67 cooperate to formulate and transmit a proper control signal to the electrical accessory identified in the received DTMF signals (step 279). Such a **control signal may be transmitted through vehicle bus interface 85 and vehicle bus** 86 or through a discrete connection 92 to the controlled accessory. If the received sequence of DTMF signals represents an instruction to reprogram one or more vehicle accessories, first and second microprocessors 66 and 67 cooperate to reprogram the identified accessories such that the ac-

	cessories will subsequently operate in the requested manner. **The microprocessors may reprogram the accessories** in any conventional manner, such as setting flags in a flag table that is accessed while controlling the various vehicle accessories. Such a reprogramming and control technique is disclosed in allowed U.S. patent application No. 08/484.321 filed on Jun. 7, 1995, and in co-pending U.S. patent application No. 08/874,210 filed on Jun. 13. 1997. Once the requested action has been taken, first microprocessor 66 returns to the low power sleep state 201 (HG. 6) as indicated by the return step 283. " (col. 11, line 34- col. 12)

The '392 patent describes a system that is able to communicate with a plurality of vehicle devices through the data bus. This two way bus communication can include reading device data, writing to the device, or reprogramming the device. As a result, one skilled in the art at the time will recognize that the system is reading from at least one vehicle device. To address Omega's claims regarding the system's ability to interface with a plurality of vehicles, one needs to evaluate the available standards at the time of the patent's filing. It was well know, and common practice, to use the J1978 Publication communication standard to enable electronics to correctly interface with a plurality of data busses and vehicles. The J1978 publication, originally issued 1992-03 and later revised 1994-06, describes the communications protocols and methods required to support OBD II diagnostic information and the development of a common diagnostic interface for the OBD II Scan Tool. While the focus of this analysis is not the development of a OBD II Scan Tool, the J1978 publication identifies a method to read, write and communicate on a plurality of data busses and as a result a plurality of vehicles.

The J1978 publication describes connecting to the vehicle bus using one of three interface protocols by sending a command signal (request message) on the data communications bus. Three signals (request messages) are sent one at a time. If the request message is correct for that vehicle, it will trigger a response message from the vehicle

devices (see the J1978 publication at 6.5.2). If no response is received, the system will try another protocol request message. If none of the initial signals prompt a response, the standard further describes additional steps to determine a working signal. (see the J1978 publication at 6.8). As a result, one skilled in the art would recognize that, using an established methodology as developed by the automotive industry and approved by the EPA, the J1978 publication would enable communication with a plurality of vehicles.

For reasons including those stated above, Claim 19 of the '278 patent is taught by the '392 patent and the J1978 publication.

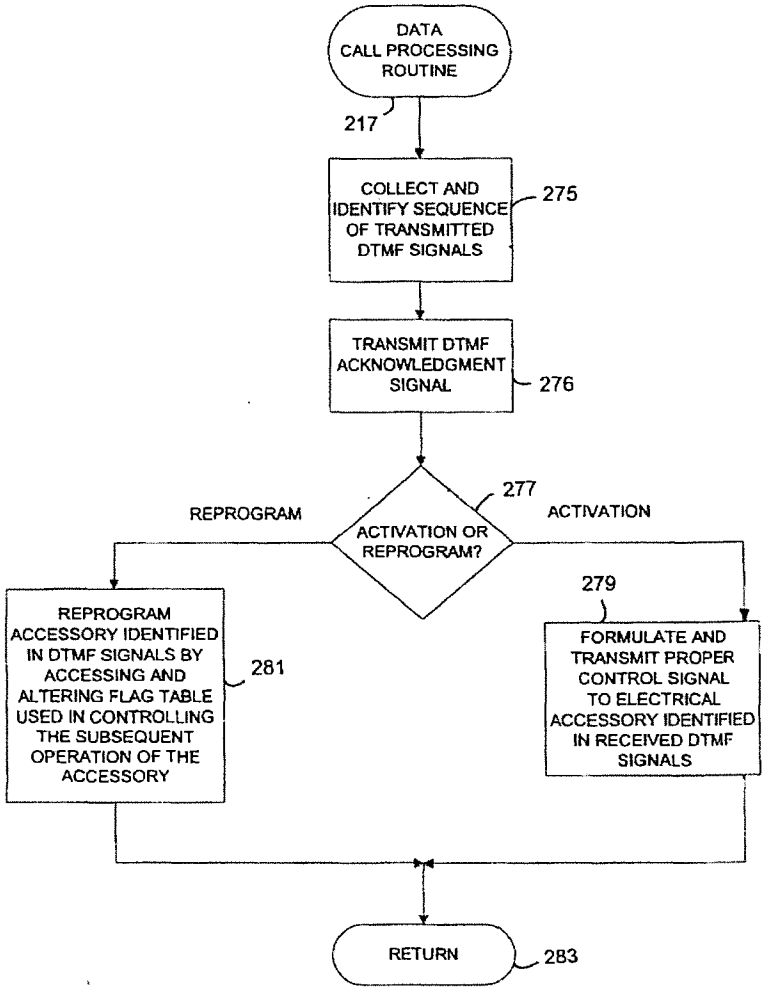
Claim 21

Claim 21 of the '278 patent reads:

> "The multi-vehicle compatible tracking unit according to claim 18 wherein said downloading interface is also for permitting downloading of at least one programming instruction for said multivehicle compatible controller."

All of these components and functions can be found in the '392 patent and the J1978 publication:

'278 Patent Claim 21	**The '392 Patent and the J1978 Publication**
21. The multi-vehicle compatible tracking unit according to claim 18 wherein said downloading interface is also for permitting downloading of at least one programming instruction for said multivehicle compatible controller.	Figure 9 of the '392 patent below shows how the controller makes decisions based upon the received data to determine what actions the system will take, including programming or activation of a vehicle device.



Also, in the description of the '392 patent, it describes:

The service center, in turn, stores the sequence of received DTMF signals that may be subsequently transmitted to the vehicle's system to affect the unlocking of the doors. As shown in HG. 9, when a sequence of such DTMF signals is 55 received in an incoming call, first microprocessor 66 performs the data call processing routine 217 shown in HG. 9. In this routine, **microprocessor 66 collects and identifies the sequence of transmitted DTMF signals** as identified

	by DTMF decoder 75 (step 275). Once microprocessor 66 has 60 identified the sequence of DTMF signals, microprocessor 66 preferably controls transceiver 70 to transmit a DTMF acknowledgment signal back to the remote party (step 276). From the sequence of DTMF signals, **first microprocessor 66 may determine whether or not the received sequence of 65 DTMF signals represents an instruction to activate or reprogram ·an electrical accessory** (step 277). If the received sequence represents an instruction to activate an electrical accessory, first and second microprocessors 66 and 67 cooperate to formulate and transmit a proper control signal to the electrical accessory identified in the received DTMF signals (step 279). Such a **control signal may be transmitted through vehicle bus interface 85 and vehicle bus** 86 or through a discrete connection 92 to the controlled accessory. If the received sequence of DTMF signals represents an instruction to reprogram one or more vehicle accessories, first and second microprocessors 66 and 67 cooperate to reprogram the identified accessories such that the accessories will subsequently operate in the requested manner. **The microprocessors may reprogram the accessories** in any conventional manner, such as setting flags in a flag table that is accessed while controlling the various vehicle accessories. Such a reprogramming and control technique is disclosed in allowed U.S. patent application No. 08/484.321 filed on Jun. 7, 1995, and in co-pending U.S. patent application No. 08/874,210 filed on Jun. 13. 1997. Once the requested action has been taken, first microprocessor 66 returns to the low power sleep state 201 (HG. 6) as indicated by the return step 283." (col. 11, line 34 - col. 12, line 22)

The '392 patent describes a system that is able to communicate with a plurality of vehicle devices through the data bus. This two way bus communication can include reading device data, writing to the device, or programming the device. Once again, the locked door example can describe the communication with the vehicle device. In this case, the controller is actually programming (changing) the state of the door lock device. By programming the state of the door lock, the lock changes from the locked state to the unlock state and the door is unlocked. As a result, one skilled in the art at the time will recognize that the system is able to download at least one program instruction to at least one vehicle device.

In another example, shown in Figure 9, the flowchart describes the decision to either activate the vehicle device or reprogram it. The decision is based upon the information from the wireless receiver. One skilled in the art at the time would realize that the downloading interface is also for permitting downloading of at least one programming instruction for said multivehicle compatible controller.

For reasons including those stated above, Claim 21 of the '278 patent is taught by the '392 patent and the J1978 publication

Conclusion

Based on my analysis, all of the components (controller, transmitter/receiver, GPS, vehicle devices,...), component interfaces (data bus, external (wireless) links, temporary connections...), functions (bus communication, bus protocol identification, vehicle device command, device programming...), and processes described in the '278 patent are obvious over the '392 patent in view of the J1978 publication for reasons including those described above. Accordingly, the asserted claims 1-6, 8, 11-14, 16, 18, 19, and 21 of the '278 patent are invalid and would have been obvious to a person of ordinary skill in the art at the time of the alleged invention. In summary, one skilled in the art would see that all of the claims described in '278 have been described years before in the '392 patent. Also, one skilled in the art will recognize in figures 2 &3 of the '392 patent that the author is identifying and describing real world solutions to integrate the system into the vehicle. The author is considering both driver convenience and ergonomics in the description of

the invention. This would indicate that the '392 were well ahead on the design aspects and production implementation of their invention.

6.9 Invalidity of '278 over '074 Spaur

Introduction

U.S. Pat. No. 8,032,278 ("the '278 patent") is titled "Vehicle Tracking Unit with Downloadable Codes and Associated Methods" and was filed on July 3, 2007. As stated on the front page of the '278 patent, the '278 patent is a "continuation-in-part of application No. 11/076,259, filed on Mar. 9, 2005, now Pat. No. 7,720,597, which is a continuation of application No. 10/383,496, filed on Mar. 7, 2003, now Pat. No. 7,149,623, which is a continuation of application No. 09/859,972, filed on May 17, 2001, now Pat. No. 6,606,561. In my opinion, several prior art references along with combinations of those references render the "278 patent invalid.

The '278 Patent is Invalid in view of U.S. Patent No. 5,732,074

U.S. Patent No. 5,732,074 to Spaur et al. (the '074 patent), titled *Mobile Portable Wireless Communication System*, was filed Jan. 16, 1996, and published March 24, 1998. This patent describes a bi-directional communication system between a vehicle and one or more remote computer terminals. The patent discloses communications between standardized communication networks, and standardized vehicle networks, such as the CAN bus. The '074 patent discloses two-way wireless communication with the vehicle, and further discloses that the vehicle can initiate communications based on the occurrence of predetermined events. Communications may also include monitoring of vehicle location and status, and monitoring of vehicle parameters, such as engine conditions and mileage, as well as providing an indication of key or alarm related events, including user defined thresholds.

As described in more detail below, each of Omega's asserted claims of the '278 patent is disclosed by the '278 patent. The '074 patent discloses a multi-vehicle compatible controller, designed to work with a standardized vehicle bus. The bus is coupled to vehicle devices, and the system includes a GPS receiver for determining vehicle position, and a wireless communications device, so that information from vehicle devices may be transmitted to remote locations, and commands to vehicle devices may be received from

remote locations. The '278 patent also disclosed the use of "device drivers" for communicating with (including obtaining data or other information) vehicle devices. Finally, the '278 patent discloses a downloading interface, through which data relating to device codes, or programming instructions for the controller may be downloaded. For these reasons, as shown in more detail below, each element of each asserted claim of the '278 patent was previously disclosed by the '074 patent.

Claim 1

Claim 1 of the '278 patent reads:

> "A multi-vehicle compatible tracking unit for a vehicle comprising a vehicle data bus extending throughout the vehicle, the multi-vehicle compatible tracking unit comprising:
>
> a vehicle position determining device;
>
> a wireless communications device;
>
> a multi-vehicle compatible controller for cooperating with said vehicle position determining device and said wireless communications device to send vehicle position information;
>
> said multi-vehicle compatible controller to be coupled to the vehicle data bus for communication there over with at least one vehicle device using at least one corresponding vehicle device code from among a plurality thereof for different vehicles; and
>
> a downloading interface for permitting downloading of enabling data related to the at least one corresponding vehicle device code for use by said multi-vehicle compatible controller."

All of these components and functions can be found in the '074 patent.

'278 Patent Claim 1	**The '074 Patent**
1. A multi-vehicle compatible tracking	As shown in Figure 1 of the '074 patent, the disclosed system includes a vehicle bus 46 extending throughout the vehicle to various vehicle devices 50n.

unit for a vehicle comprising a vehicle data bus extending throughout the vehicle, the multi-vehicle compatible tracking unit comprising:

Fig. 1

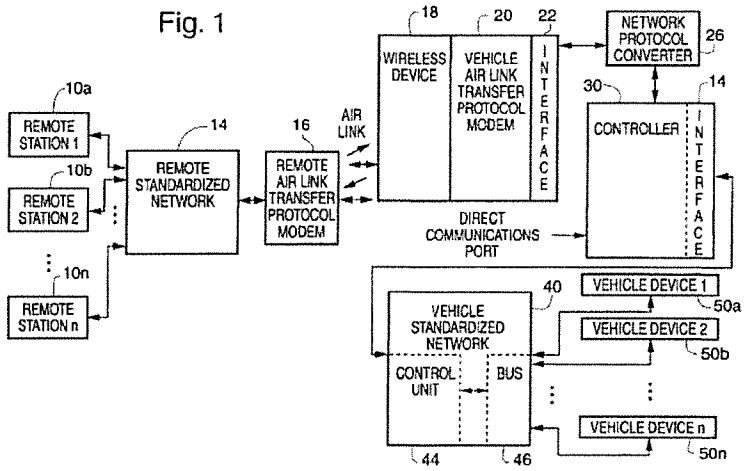
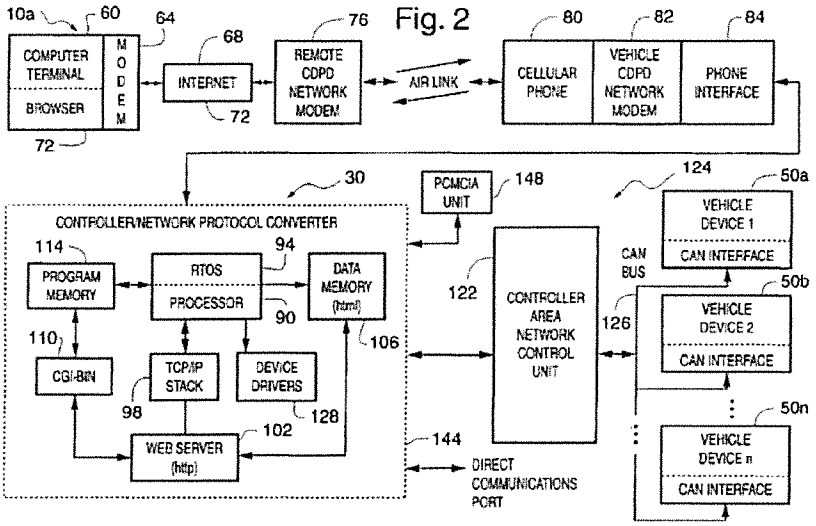


Figure 2 of the '074 patent discloses a preferred embodiment using a CAN bus 126 extending throughout the vehicle to various vehicle devices 50a-50n.

Fig. 2



As described in '074

In accordance with the present invention, a system is provided in which **communication of information, including requests, commands and data**, is achieved **between vehicle** having physical vehicle devices and

	one or more **sites that are remote from the vehicle**. (col 2:11-15) With respect to **handling requests, commands and information including data transfers relative to the vehicle**, particularly involving data from vehicle devices, certain hardware and software is contained in the vehicle. (col 2:53-56) With regard to obtaining information or data from these vehicle devices for appropriate processing using, for example, **one or more executable programs in the program memory, the controller communicates with a second standardized network** in the form of a network that is commercially available and used in vehicles, such as the previously devised controller area network (CAN). The CAN is operatively connected to each of a plurality of vehicle devices that transmit, receive, or both transmit and receive desired data. (col 3:57- col 4:7) The **controller 30 is responsible for a number of functions related to understanding and acting on information received from one or more remote stations** 10, obtaining and responding to 35 requested information and operatively functioning with information including data available from other elements in the vehicle. In that regard, **the controller 30 communicates with a controller interface 34 that electrically links the controller 30 with a vehicle standardized network** 40. The vehicle standardized network 40 includes

	a controller unit 44 that provides appropriate message and data handling functions associated with **sending and receiving information including data from each of a plurality of physical vehicle devices 50 that are operatively connected to a bus 46 of the vehicle standardized network** 40. Like the remote standardized network 14, **the vehicle standardized network 40 is an established and previously developed network that interfaces with components in a vehicle**, such as engine related components in order to provide desired or requested data concerning the operations or status of these components. (col 6:31-50) In a preferred embodiment, this further **standardized network is a network that has been previously devised and is commonly used in a number of makes and models of vehicles**. This communications network is defined as the controller area network (CAN) 124. Although the CAN 124 has previously commonly been used in operative association with automotive electronics including engine control elements, sensors, lamps, electric windows etc., the present invention also enables the CAN 124 to be used with a variety of other devices contained in the vehicle, such as the previously described devices. (col10:18-39)

As noted above, the '074 patent discloses a multi-vehicle compatible tracking unit. The controller is specifically designed to work with a standardized vehicle bus, and multiple makes and models of vehicles.

"In a preferred embodiment, this further **standardized network is a network that has been previously devised and is commonly used in a number of makes and models of vehicles**. This communications network is defined as the controller area network (CAN) 124. Although the CAN 124 has previously commonly been used in operative association with automotive electronics including engine control elements, sensors, lamps, electric windows etc., the present invention also enables the CAN 124 to be used with a variety of other devices contained in the vehicle, such as the previously described devices." ('074 patent, col 10:18-39)

And the system is specifically noted as suitable for tracking vehicles: "a representative listing of applications is as follows: (a) monitoring of vehicle locations and status." ('074 patent, col 9:3-5).

a vehicle position determining device;	The patent discloses a GPS receiver (vehicle position determining device) at column 14, lines 1-5; At block 300, **vehicle positioning data is available from one of the vehicle devices 50, which might be a GPS**. On a requested or regular input scheme, such vehicle device data is sent to the CAN bus 126 at block 304. The CAN controller 122 is responsible for controlling the receipt and transmitting of such data to the controller 30 at block 308.

As shown above, the '074 patent discloses a GPS receiver, which is a vehicle position determining device.

a wireless communications device;	The '074 patent describes several wireless communication devices. For example, the wireless device 18 and remote air link transfer protocol modem 20 in Fig. 1, or the cellular

	phone 80 and vehicle CDPD network modem 82 in Fig. 2. In addition, the '074 patent discloses: In one embodiment, the **cellular digitized packet data (CDPD) network provides the desired link** including arrangement of 45 **information being communicated and where the destination site**, namely the particular vehicle, is found in the network. If a channel is available to the particular vehicle, the CDPD link can proceed to transmit the Internet packets to the vehicle of interest. Instead of the CDPD network as the link, 50 a **communications interface could be employed that involves data only, such as a two way paging interface** with the vehicle. (col 2: 41-50) In one embodiment, the **communication information is formatted in accordance with a CDPD (cellular digitized packet data)** configuration. At the vehicle, this **information is received by a wireless device 18 that is able to transmit and receive information via the airlink**. The wireless device 18 is operatively associated with a vehicle airlink transfer protocol modem 20 for the proper handling of the airlink formatted transmission. In one embodiment, the **wireless device 18 includes a cellular phone** that is selected from a plurality of conventional or commercially available cellular phones. The wireless device 18 **bi-directionally communicates with a controller 30** contained in the vehicle through a network protocol converter 26

	using a wireless device interface 22. The wireless device interface 22 establishes the necessary signal compatibilities and connections from the wireless device 18. (col 6:1-16) The Internet 68 operatively communicates with a standardized network transmission protocol that permits information to be bi-directionally communicated over the airlink and, in one embodiment, includes a remote CDPD network modem 76 which prepares the information in a conventionally acceptable manner for **transmission and communication with a cellular phone 80** which is contained in the vehicle. The cellular phone 80 can be any selected one of a number of conventional cellular phones that have the capability of properly communicating with the desired formatted or arranged information. **In the illustrated embodiment of FIG. 2, the cellular phone 80 is operatively associated with a vehicle CDPD network modem 82** that demodulates the received information so that it is acceptable for further handling or processing. (col 7:40-54)

As noted above, as well as in Figs. 1 and 2, the '074 discloses at least two different types of wireless communication device that may be used to transmit and receive.

a multi-vehicle compatible controller for cooperating with said vehicle position	The patent discloses that the controller is designed to work on a standardized vehicle bus, and is thereby compatible with multiple vehicles.

determining device and said wireless communications device to send vehicle position information;	The **vehicle standardized network 40** includes a **controller unit 44** that provides appropriate **message and data handling functions associated with sending and receiving information including data from each of a plurality of physical vehicle devices 50 that are operatively connected to a bus 46 of the vehicle standardized network 40.** (col 2:39-45) In a preferred embodiment, this further **standardized network is a network that has been previously devised and is commonly used in a number of makes and models of vehicles**. (col 10:18-21) The patent discloses a controller that cooperates with the GPS device and the wireless communication device to send vehicle position information. In accordance with the present invention, a system is provided in which **communication of information, including requests, commands and data**, is achieved **between vehicle** having physical vehicle devices and one or more **sites that are remote from the vehicle**. (col 2:11-15) With respect to **handling requests, commands and information including data transfers relative to the vehicle**, particularly involving data from vehicle devices, certain hardware and software is contained in the vehicle. (col 2:53-56)

	At block 300, **vehicle positioning data is available from one of the vehicle devices 50, which might be a GPS**. On a requested or regular input scheme, such vehicle device data is sent to the CAN bus 126 at block 304. **The CAN controller 122 is responsible for controlling the receipt and transmitting of such data to the controller 30 at block 308**. The vehicle data that is to be transmitted over the wire link, in accordance with the predetermined or determinable procedure, is appropriately processed, analyzed or otherwise acted on using the controller 30 at block 312. In one embodiment, vehicle device data, such as GPS data, do not rely on the web server 102 but may utilize a different communications pathway, such as E-mail. **In any event, the controller 30 gates the vehicle location data to the cellular phone having the vehicle airlink transfer protocol modem 20, such as a CDPD network modem 82, at block 316. The vehicle location data is properly formatted and transmitted through the cellular phone over the airlink at block 320.** (col 14:4-21)

The '074 patent discloses a controller that cooperates with the GPS device and the wireless communication device to send vehicle position information. The controller obtains vehicle positioning data from the GPS, and then, cooperating with the wireless communications device, transmits the vehicle position information.

said multi-vehicle compatible controller to be coupled to the vehicle data bus for	The controller 30 is responsible for a number of functions related to understanding and acting on information received from one or more remote stations

communication thereover with at least one vehicle device using at least one corresponding vehicle device code from among a plurality thereof for different vehicles; and	10, obtaining and responding to 35 requested information and operatively functioning with information including data available from other elements in the vehicle. In that regard, **the controller 30 communicates with a controller interface 34 that electrically links the controller 30 with a vehicle standardized network** 40. The vehicle standardized network 40 includes a controller unit 44 that provides appropriate message and data handling functions associated with **sending and receiving information including data from each of a plurality of physical vehicle devices 50 that are operatively connected to a bus 46 of the vehicle standardized network** 40. Like the remote standardized network 14, **the vehicle standardized network 40 is an established and previously developed network that interfaces with components in a vehicle**, such as engine related components in order to provide desired or requested data concerning the operations or status of these components. (col 6:31-50) In a preferred embodiment, this further **standardized network is a network that has been previously devised and is commonly used in a number of makes and models of vehicles**. This communications network is defined as the controller area network (CAN) 124. Although the CAN 124 has previously commonly been used in operative association with automotive electronics including engine control elements, sensors, lamps, electric windows

	etc., the present invention also enables the CAN 124 to be used with a variety of other devices contained in the vehicle, such as the previously described devices. (col10:18-29) In interfacing with the CAN 124, the **controller 30 also has device drivers 128 that are useful in achieving desired communications in both directions between the CAN 124 and the controller 30**. For example, the processor 90 is able to **obtain data** or other information **from the vehicle devices 50a-50n using the device drivers 128** and which information can be used by the processor 90 including, for example, storing data in the data memory 106 for subsequent access and transmission to a remote station 10. (col10:55-64)

The example above showing transmission of vehicle position data from the GPS unit shows communication over the bus, using the appropriate device code for the GPS. The controller is provided with the vehicle device code ("device driver") in order to "obtain data or other information from the vehicle device, where the device driver is one of a plurality of device drivers for different vehicles.

a downloading interface for permitting downloading of enabling data related to the at least one corresponding vehicle device code for use by said multi-vehicle compatible controller.	With regard to obtaining information or data from these vehicle devices for appropriate processing using, for example, **one or more executable programs in the program memory, the controller communicates with a second standardized network** in the form of a network that is commercially available and used in vehicles, such as the previously devised controller area network (CAN). The

	CAN is operatively connected to each of a plurality of vehicle devices that transmit, receive, or both transmit and receive desired data. (col 3:57- col 4:7) A **combination of controller related components** are containable in a vehicle for responding to requests from remote sites, **obtaining and storing information associated with vehicle devices** and running executable software that may be available in the program memory of the controller **or downloaded from the remote site**, while handling and configuring information including data that is communicative with the remote site over an established network, such as the Internet. (col 4:64 – col 5:5) The **controller 30 is responsible for a number of functions related to understanding and acting on information received from one or more remote stations** 10, obtaining and responding to 35 requested information and operatively functioning with information including data available from other elements in the vehicle. In that regard, **the controller 30 communicates with a controller interface 34 that electrically links the controller 30 with a vehicle standardized network** 40. The vehicle standardized network 40 includes a controller unit 44 that provides appropriate message and data handling functions associated with **sending and receiving information including data from each of a plurality of physical vehicle devices 50 that are opera-**

	tively connected to a bus 46 of the vehicle standardized network 40. Like the remote standardized network 14, **the vehicle standardized network 40 is an established and previously developed network that interfaces with components in a vehicle**, such as engine related components in order to provide desired or requested data concerning the operations or status of these components. (col 6:31-50)

The '074 patent also discloses a variety of downloading interfaces for permitting downloading of data related to the vehicle device codes. The '074 patent teaches that device codes for the vehicle devices can be downloaded, and that such codes are obtained and stored.

For reasons including those stated above, Claim 1 of the '278 patent is taught by the '074 patent.

Claim 2

Claim 2 of the '278 patent reads:

> "The multi-vehicle compatible tracking unit according to claim 1 wherein said downloading interface comprises a wired signal downloading interface."

All of these components and functions can be found in the '074 patent.

'279 Patent Claim 2	**The '074 Patent**
2. The multi-vehicle compatible tracking unit according to claim 1 wherein said downloading interface comprises a wired signal downloading interface.	

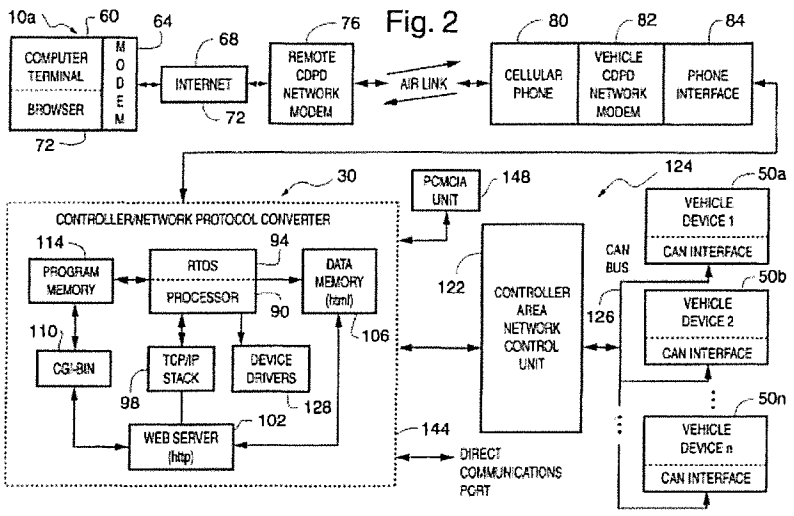


Figure 2 describes the PCMCIA unit (148). One skilled in the art would recognize that this interface is a wired interface to the controller and would enable downloading to the controller.

"Preferably, the controller in the vehicle is also associated with an interface for communication with one or more available systems, such as an RS232 connection, an Ethernet connection and/or a PCMCIA unit. In a related embodiment, the **controller includes a direct communications port for receiving and sending information without requiring the wireless device** and the Internet connection to the wireless device." (col 4:38-45)

One skilled in the art would understand that the PCMCIA unit (148) shown in Fig. 2 of the '079 patent discloses a wired interface to the unit, which provides a downloading interface.

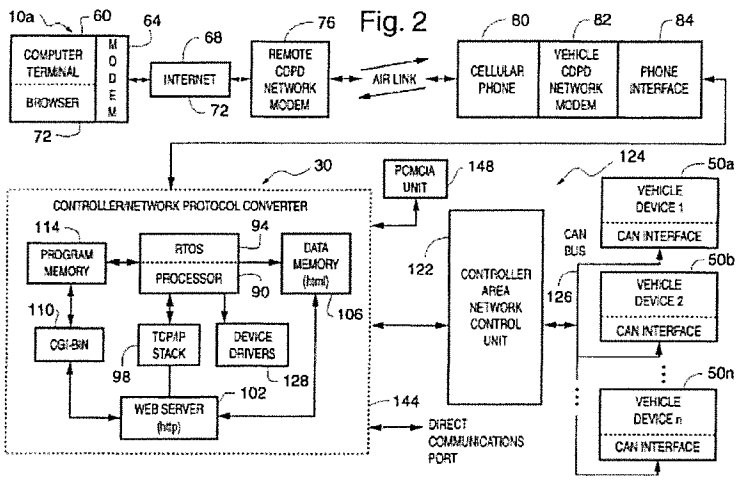
For reasons including those stated above, Claim 2 of the '278 patent is taught by the '074 patent.

Claim 3

Claim 3 of the '278 patent reads:

> "The multi-vehicle compatible tracking unit according to claim 2 wherein said wired signal downloading interface comprises a connector for temporary connection to a downloading device."

All of these components and functions can be found in the '074 patent.

'278 Patent Claim 3	The '074 Patent
3. The multi-vehicle compatible tracking unit according to claim 2 wherein said wired signal downloading interface comprises a connector for temporary connection to a downloading device.	 As shown above, figure 2 describes the PCMCIA unit (148). One skilled in the art would recognize that this interface is a wired interface to the controller and would enable downloading to the controller. "Preferably, the controller in the vehicle is also associated with an interface for communication with one or more available systems, such as an RS232 connection, an Ethernet connection and/or a PCMCIA unit. In a related embodiment, the **controller includes a direct**

	communications port for receiving and sending information without requiring the wireless device and the Internet connection to the wireless device." (col 4:38-45) One skilled in the art would understand that the wired port would be used temporarily. For example, once said downloading was complete, the device could be disconnected from the controller and the vehicle could continue back on the road.

As with Claim 2, one skilled in the art would understand that the PCMCIA unit (148) shown in Fig. 2 of the '079 patent discloses a wired interface to the unit, which provides a downloading interface. Those skilled in the art would further understand that a PCMCIA unit is typically used temporarily. For example, when downloading through this interface, once such downloading was complete, the device could be disconnected from the PCMCIA unit, so that the PCMCIA unit provided a connector for temporary connection to a downloading device.

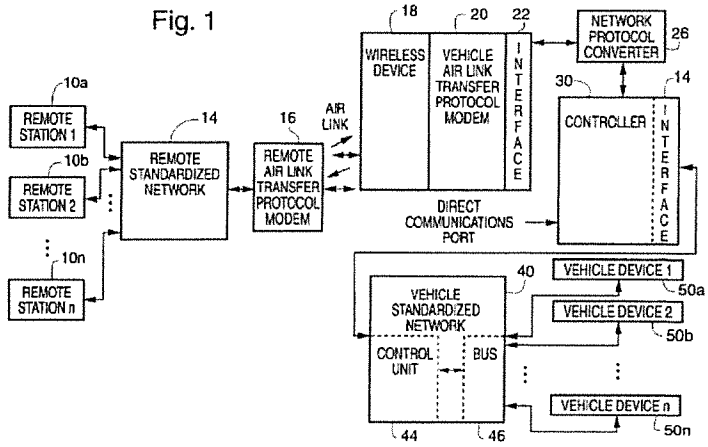
For reasons including those stated above, Claim 3 of the '278 patent is taught by the '074 patent.

Claim 4

Claim 4 of the '278 patent reads:

> "The multi-vehicle compatible tracking unit according to claim 1 wherein said downloading interface comprises a wireless signal downloading interface."

All of these components and functions can be found in the '074 patent.

'278 Patent Claim 4	The '074 Patent
4. The multi-vehicle compatible tracking unit according to claim 1 wherein said down-loading interface comprises a wireless signal downloading interface.	Fig. 1  Figure 1 includes a wireless communication interface. As noted above with respect to Claim 1, Figure 2 also includes a wireless communications interface. Also, the '074 patent describes a wireless communication device: "In one embodiment, the **cellular digitized packet data (CDPD) network provides the desired link** including arrangement of 45 information being communicated and where the destination site, namely the particular vehicle, is found in the network. If a channel is available to the particular vehicle, the **CDPD link can proceed to transmit the Internet packets to the vehicle of interest**. Instead of the CDPD network as the link, 50 a communications interface could be employed that involves data only, such as a two way paging interface with the vehicle." (col 2: 41-50) In accordance with the present invention, a system is provided in which **communication of information, including requests, commands and data**, is achieved

	between vehicle having physical vehicle devices and one or more **sites that are remote from the vehicle**. (col 2:11-15) With respect to **handling requests, commands and information including data transfers relative to the vehicle**, particularly involving data from vehicle devices, certain hardware and software is contained in the vehicle. (col 2:53-56) A **combination of controller related components** are containable in a vehicle for responding to requests from remote sites, **obtaining and storing information associated with vehicle devices** and running executable software that may be available in the program memory of the controller **or downloaded from the remote site**, while handling and configuring information including data that is communicative with the remote site over an established network, such as the Internet. (col 4:64 – col 5:5)

The '074 patent specifically discloses a wireless communications device, allowing for remote communication of, among other things, Internet packets, requests, commands, and data transfers relative to the vehicle, involving data from vehicle devices. All of this data may be downloading wirelessly over the wireless communications device.

For reasons including those stated above, Claim 4 of the '278 patent is taught by the '074 patent.

Claim 5

Claim 5 of the '278 patent reads:

> "The multi-vehicle compatible tracking unit according to claim 4 wherein said wireless signal downloading interface comprises a wireless receiver for temporary connection to a downloading device."

All of these components and functions can be found in the '074 patent.

'278 Patent Claim 5	**The '074 Patent**
5. The multi-vehicle compatible tracking unit according to claim 4 wherein said wireless signal downloading interface comprises a wireless receiver for temporary connection to a downloading device.	Figure 1 includes a wireless communication interface. As noted above with respect to Claim 1, Figure 2 also includes a wireless communications interface. Also, the '074 patent describes a wireless communication device: "In one embodiment, the **cellular digitized packet data (CDPD) network provides the desired link** including arrangement of 45 information being communicated and where the destination site, namely the particular vehicle, is found in the network. If a channel is available to the particular vehicle, the **CDPD link can proceed to transmit the Internet packets to the vehicle of interest**. Instead of the CDPD network as the link, 50 a communications interface could be employed that involves data only, such as a two way paging interface with the vehicle." (col 2: 41-50) In accordance with the present invention, a system is provided in which **communication of information, including requests, commands and data**, is achieved **between vehicle** having physical vehicle devices and one or more **sites that are remote from the vehicle**. (col 2:11-15)

	With respect to **handling requests, commands and information including data transfers relative to the vehicle**, particularly involving data from vehicle devices, certain hardware and software is contained in the vehicle. (col 2:53-56) In one embodiment, the **communication information is formatted in accordance with a CDPD (cellular digitized packet data)** configuration. At the vehicle, this **information is received by a wireless device 18 that is able to transmit and receive information via the airlink**. The wireless device 18 is operatively associated with a vehicle airlink transfer protocol modem 20 for the proper handling of the airlink formatted transmission. In one embodiment, the **wireless device 18 includes a cellular phone** that is selected from a plurality of conventional or commercially available cellular phones. The wireless device 18 **bi-directionally communicates with a controller 30** contained in the vehicle through a network protocol converter 26 using a wireless device interface 22. The wireless device interface 22 establishes the necessary signal compatibilities and connections from the wireless device 18. (col 6:1-16) The Internet 68 operatively communicates with a standardized network transmission protocol that permits information to be bi-directionally communicated over the airlink and, in one embodiment, includes a remote CDPD network modem 76 which prepares the information in a conventionally acceptable manner for

	transmission and communication with a cellular phone 80 which is contained in the vehicle. The cellular phone 80 can be any selected one of a number of conventional cellular phones that have the capability of properly communicating with the desired formatted or arranged information. **In the illustrated embodiment of FIG. 2, the cellular phone 80 is operatively associated with a vehicle CDPD network modem 82** that demodulates the received information so that it is acceptable for further handling or processing. (col 7:40-54)

As described above with respect to Claim 4, one skilled in the art would understand that the '074 patent discloses a wireless downloading interface comprising of a wireless receiver for temporary connection to a downloading device. Whether using the "wireless device" of Fig. 1, or the cellular phone of Fig. 2, one skilled in the art would understand that the remote wireless connections to the wireless receiver in the vehicle are temporary, and that connections with various remote locations may be started and stopped at various times.

For reasons including those stated above, Claim 5 of the '278 patent is taught by the '074 patent.

Claim 6

Claim 6 of the '278 patent reads:

> "The multi-vehicle compatible tracking unit according to claim 1 wherein the corresponding at least one vehicle code is for reading from the at least one vehicle device."

All of these components and functions can be found in the '074 patent.

'278 Patent Claim 6	The '074 Patent

6. The multi-vehicle compatible tracking unit according to claim 1 wherein the corresponding at least one vehicle code is for reading from the at least one vehicle device.	As described in the teachings of '074: With respect to getting information, the controller 30 further includes a data storage unit or data memory 106. Generally, the data memory 106 **stores data that has been generated and is expected to be useful in handling requests or commands**. Such **data may be data obtained from monitoring a physical device associated with a vehicle** and/or may include data useful in running executable software that is intended to provide further information or data useful to a requestor. (col 8:45-53) "Generally, such software is useful in processing, analyzing or otherwise acting on data available in the vehicle, including acting on the data in real time, such as **acting on available data in real time that is used for transmission to a remote station**, where such transmission is initiated in the vehicle. A representative listing of applications is as follows: (a) **monitoring of vehicle locations and status**; (b) tracking of deliveries of packages by the vehicle; (c) monitoring cargo conditions in the vehicle, such as the temperature of the cargo and checking equipment related to maintaining a desired temperature; (d) **vehicle parameter monitoring** for maintaining the vehicle 10 such as checking engine conditions including possibility of overheating and operating mileage (odometer reading); (e) displaying of directions and/or dispatch instructions; and

	(f) communication of short messages between a user at the remote site and the operator of the vehicle. (col 9:1-31) In a related variation of this embodiment, after processing such data, the **computer terminal 60 may initiate further actions in the way of sending information to the vehicle for adjusting or otherwise affecting the vehicle device** that provided the data for analysis. (col 14:31-36) The **vehicle standardized network 40 includes a controller unit 44 that provides appropriate message and data handling functions associated with sending and receiving information including data from each of a plurality of physical vehicle devices 50 that are operatively connected to a bus 46** of the vehicle standardized network 40. Like the remote standardized network 14, the vehicle standardized network 40 is an established and previously developed network that interfaces with components in a vehicle, such as engine related components in order to provide desired or requested data concerning the operations or status of these components. (col 10:39-50) In interfacing with the CAN 124, the **controller 30 also has device drivers 128 that are useful in**

	achieving desired communications in both directions between the CAN 124 and the controller 30. For example, the processor 90 is able to **obtain data** or other information **from the vehicle devices 50a-50n using the device drivers 128** and which information can be used by the processor 90 including, for example, storing data in the data memory 106 for subsequent access and transmission to a remote station 10. (col10:55-64) In yet a further variation of controller operation, **each vehicle device on the CAN has its own IP designation or address so that the remote user can utilize this designation or address for communication with the selected vehicle device having that designation or address**. The controller uses the received IP address or designation for the particular device and acts as a **link or bridge for the remote user to the particular device**. (col 4:50-57)

One skilled in the art would recognize that the '074 patent discloses a method where a plethora of vehicle devices can be identified and communicated with by either the vehicle mounted controller or remotely via wireless connections. Vehicle codes ("device drivers") are used to read data from vehicle devices. The controller 30 uses the device drivers 128 to achieve the desired communications in both directions between the CAN 124 and the controller 30. "For example, the processor 90 is able to **obtain data** ... **from the vehicle devices 50a-50n using the device drivers 128...."** (col 10:55-61). The '074 patent thereby discloses that the vehicle [device] code (device driver) is for reading data from at least one vehicle device.

For reasons including those stated above, Claim 6 of the '278 patent is taught by the '074 patent.

Claim 8

Claim 8 of the '278 patent reads:

> "the multi-vehicle compatible tracking unit according to claim 1 wherein said downloading interface is also for permitting downloading of at least one programming instruction for said multivehicle compatible controller."

All of these components and functions can be found in the '074 patent.

'278 Patent Claim 8	The '074 Patent
8. The multi-vehicle compatible tracking unit according to claim 1 wherein said downloading interface is also for permitting downloading of at least one programming instruction for said multivehicle compatible controller.	The '074 patent discloses downloading of programming information to the controller: In a further and related variation, information or **executable software may be downloaded from the remote station to the controller** 30 for execution as part of responding to an accompanying or future request, which software may be executed in conjunction with the operation of an applet that is stored as part of the controller 30 (col 9:45-50) "Preferably, the controller in the vehicle is also associated with an interface for communication with one or more available systems, such as an RS232 connection, an Ethernet connection and/or a PCMCIA unit. In a related embodiment, the **controller includes a direct communications port for receiving and sending information without requiring the wireless device** and the Internet connection to the wireless device." (col 4:38-45)

As one skilled in the art would clearly recognize, the controller downloading interface is also for permitting downloading programming instructions for said controller. Such programming instructions including the specifically disclosed "executable software ... downloaded from the remote station to the controller 30 for execution...."('074 patent, col, 8:45-53).

For reasons including those stated above, Claim 8 of the '278 patent is taught by the '074 patent.

Claim 11

Claim 11 of the '278 patent reads:

> "the multi-vehicle compatible tracking unit according to claim 1 wherein said wireless position determining device comprises a Global Positioning System (GPS) receiver."

All of these components and functions can be found in the '074 patent.

'278 Patent Claim 11	**The '074 Patent**
11. The multi-vehicle compatible tracking unit according to claim 1 wherein said wireless position determining device comprises a Global Positioning System (GPS) receiver.	The '074 patent discloses a GPS receiver in column 14, lines 1-5; "At block 300, **vehicle positioning data is available from one of the vehicle devices 50, which might be a GPS**. On a requested or regular input scheme, such vehicle device data is sent to the CAN bus 126 at block 304. The CAN controller 122 is responsible for controlling the receipt and transmitting of such data to the controller 30 at block 308."

This claim refers to "said wireless position determining device" which was presumably present in Claim 1. However, Claim 1 did not include a "wireless position determining device" and instead referred to a "vehicle position determining device." This claim therefore is indefinite, as the referenced phrase is first introduced in this claim. Assuming that

reference was intended to be to the "vehicle position determining device", the '074 patent discloses a GPS receiver in column 14, lines 1-5. This GPS receiver is the vehicle position determining device.

For reasons including those stated above, Claim 11 of the '278 patent is taught by the '074 patent.

Claim 12

Claim 12 of the '278 patent reads:

> "the multi-vehicle compatible tracking unit according to claim 1 further comprising a housing containing said vehicle position determining device, said wireless communications device, said multi-vehicle compatible controller, and said downloading interface."

All of these components and functions can be found in the '074 patent.

'278 Patent Claim 12	The '074 Patent
12. The multi-vehicle compatible tracking unit according to claim 1 further comprising a housing containing said vehicle position determining device, said wireless communications device, said multi-vehicle compatible controller, and said downloading interface.	The GPS receiver, the wireless communications device, the controller and the downloading interface are all electronically coupled. It would have been obvious to one skilled in the art to place them in a single housing, as was done with the actual CellPort Labs products, the C/P Connect and the CP 2100.

The GPS receiver, the wireless communications device, the controller and the downloading interface are all electronically coupled. It would have been obvious to one skilled in the art to place them in a single housing, as was done with the actual CellPort Labs products, the C/P Connect and the CP 2100 (the '074 patent is assigned to Cell-

Port). It was well known to one of ordinary skill in the art at the time that multiple components of a single device could be enclosed in a single housing, for convenience and to afford protection to the components, as well as to facilitate electrical interconnection. This was evident from numerous products in the marketplace.

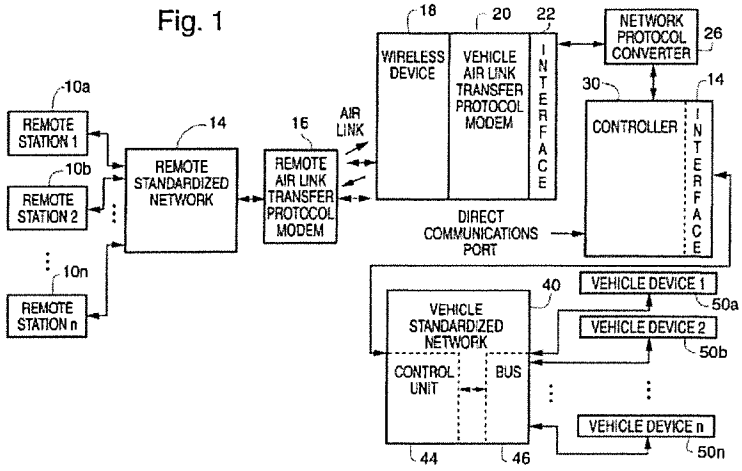
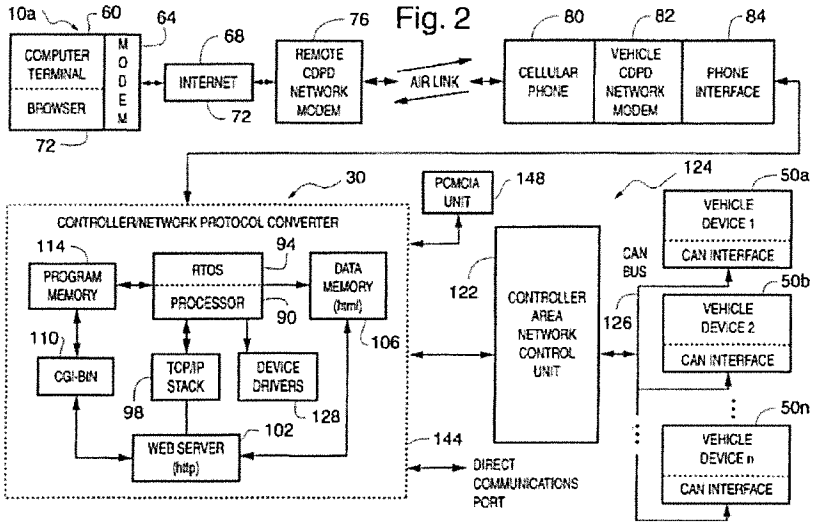
For reasons including those stated above, Claim 12 of the '278 patent is taught by the '074 patent.

Claim 13

Claim 13 of the '278 patent reads:

> "A multi-vehicle compatible tracking unit for a vehicle comprising a vehicle data bus extending throughout the vehicle, the multi-vehicle compatible tracking unit comprising:
>
> a vehicle position determining device;
>
> a wireless communications device;
>
> a multi-vehicle compatible controller for cooperating with said vehicle position determining device and said wireless communications device to send vehicle position information;
>
> said multi-vehicle compatible controller to be coupled to the vehicle data bus for communication there over with at least one vehicle device using at least one corresponding vehicle device code from among a plurality thereof for different vehicles; and
>
> a downloading interface for permitting downloading of enabling data related to the at least one corresponding vehicle device code for use by said multi-vehicle compatible controller; said downloading interface comprising a connector for temporary connection to a downloading device."

All of these components and functions can be found in the '074 patent.

'278 Patent Claim 13	The '074 Patent
13. A multi-vehicle compatible tracking unit for a vehicle comprising a vehicle data bus extending throughout the vehicle, the multi-vehicle compatible vehicle tracking unit comprising:	As shown in Figure 1 of the '074 patent, the disclosed system includes a vehicle bus 46 extending throughout the vehicle to various vehicle devices 50n. Fig. 1  Figure 2 of the '074 patent discloses a preferred embodiment using a CAN bus 126 extending throughout the vehicle to various vehicle devices 50a-50n.  As described in '074

	In accordance with the present invention, a system is provided in which **communication of information, including requests, commands and data**, is achieved **between vehicle** having physical vehicle devices and one or more **sites that are remote from the vehicle**. (col 2:11-15) With respect to **handling requests, commands and information including data transfers relative to the vehicle**, particularly involving data from vehicle devices, certain hardware and software is contained in the vehicle. (col 2:53-56) With regard to obtaining information or data from these vehicle devices for appropriate processing using, for example, **one or more executable programs in the program memory, the controller communicates with a second standardized network** in the form of a network that is commercially available and used in vehicles, such as the previously devised controller area network (CAN). The CAN is operatively connected to each of a plurality of vehicle devices that transmit, receive, or both transmit and receive desired data. (col 3:57- col 4:7) The **controller 30 is responsible for a number of functions related to understanding and acting on information received from one or more remote stations** 10, obtaining and responding to 35 requested information and operatively functioning with information

	including data available from other elements in the vehicle. In that regard, **the controller 30 communicates with a controller interface 34 that electrically links the controller 30 with a vehicle standardized network** 40. The vehicle standardized network 40 includes a controller unit 44 that provides appropriate message and data handling functions associated with **sending and receiving information including data from each of a plurality of physical vehicle devices 50 that are operatively connected to a bus 46 of the vehicle standardized network** 40. Like the remote standardized network 14, **the vehicle standardized network 40 is an established and previously developed network that interfaces with components in a vehicle**, such as engine related components in order to provide desired or requested data concerning the operations or status of these components. (col 6:31-50) In a preferred embodiment, this further **standardized network is a network that has been previously devised and is commonly used in a number of makes and models of vehicles**. This communications network is defined as the controller area network (CAN) 124. Although the CAN 124 has previously commonly been used in operative association with automotive electronics including engine control elements, sensors, lamps, electric windows etc., the present invention also enables the CAN 124 to be used with a variety of other devices contained in the vehicle, such as the previously described devices. (col10:18-39)

As noted previously, the '074 patent discloses a multi-vehicle compatible tracking unit. The controller is specifically designed to work with a standardized vehicle bus, and multiple makes and models of vehicles.

> In a preferred embodiment, this further **standardized network is a network that has been previously devised and is commonly used in a number of makes and models of vehicles**. This communications network is defined as the controller area network (CAN) 124. Although the CAN 124 has previously commonly been used in operative association with automotive electronics including engine control elements, sensors, lamps, electric windows etc., the present invention also enables the CAN 124 to be used with a variety of other devices contained in the vehicle, such as the previously described devices. ('074 patent, col. 10:18-39)

And the system is specifically noted as suitable for tracking vehicles: "a representative listing of applications is as follows: (a) monitoring of vehicle locations and status." ('074 patent, col. 9:3-5).

a vehicle position determining device;	The patent discloses a GPS receiver (vehicle position determining device) at column 14, lines 1-5; At block 300, **vehicle positioning data is available from one of the vehicle devices 50, which might be a GPS**. On a requested or regular input scheme, such vehicle device data is sent to the CAN bus 126 at block 304. The CAN controller 122 is responsible for controlling the receipt and transmitting of such data to the controller 30 at block 308.

As shown above, the '074 patent discloses a GPS receiver, which is a vehicle position determining device.

a wireless communications device;	The '074 patent describes several wireless communication devices. For example, the wireless device 18 and remote air link transfer protocol modem 20 in Fig. 1, or the cellular phone 80 and vehicle CDPD network modem 82 in Fig. 2. In addition, the '074 patent discloses: In one embodiment, the **cellular digitized packet data (CDPD) network provides the desired link** including arrangement of 45 **information being communicated and where the destination site**, namely the particular vehicle, is found in the network. If a channel is available to the particular vehicle, the CDPD link can proceed to transmit the Internet packets to the vehicle of interest. Instead of the CDPD network as the link, 50 a **communications interface could be employed that involves data only, such as a two way paging interface** with the vehicle. (col 2: 41-50) In one embodiment, the **communication information is formatted in accordance with a CDPD (cellular digitized packet data)** configuration. At the vehicle, this **information is received by a wireless device 18 that is able to transmit and receive information via the airlink**. The wireless device 18 is operatively associated with a vehicle airlink transfer protocol modem 20 for the proper handling of the airlink formatted transmission. In one embodiment, the **wireless device 18 includes a cellular phone** that is selected from a plurality of conventional or commercially available cellular phones. The wireless device 18 **bi-directionally communicates with a controller 30** contained in the vehicle through a network protocol converter 26 using a wireless device interface 22. The wireless device interface 22 establishes the necessary signal

	compatibilities and connections from the wireless device 18. (col 6:1-16) The Internet 68 operatively communicates with a standardized network transmission protocol that permits information to be bi-directionally communicated over the airlink and, in one embodiment, includes a remote CDPD network modem 76 which prepares the information in a conventionally acceptable manner for **transmission and communication with a cellular phone 80** which is contained in the vehicle. The cellular phone 80 can be any selected one of a number of conventional cellular phones that have the capability of properly communicating with the desired formatted or arranged information. **In the illustrated embodiment of FIG. 2, the cellular phone 80 is operatively associated with a vehicle CDPD network modem 82** that demodulates the received information so that it is acceptable for further handling or processing. (col 7:40-54)

As noted above, as well as in Figs. 1 and 2, the '074 discloses at least two different types of wireless communication device that may be used to transmit and receive.

a multi-vehicle compatible controller for cooperating with said vehicle position determining device and said	The patent discloses that the controller is designed to work on a standardized vehicle bus, and is thereby compatible with multiple vehicles. The **vehicle standardized network 40** includes a **controller unit 44** that provides appropriate **message and data handling functions associated with sending and receiving information including data from each of a plurality of physical vehicle devices 50 that are operatively connected to**

wireless communications device to send vehicle position information;	**a bus 46 of the vehicle standardized network 40.** (col 2:39-45) In a preferred embodiment, this further **standardized network is a network that has been previously devised and is commonly used in a number of makes and models of vehicles**. (col 10:18-21) The patent discloses a controller that cooperates with the GPS device and the wireless communication device to send vehicle position information. In accordance with the present invention, a system is provided in which **communication of information, including requests, commands and data**, is achieved **between vehicle** having physical vehicle devices and one or more **sites that are remote from the vehicle**. (col 2:11-15) With respect to **handling requests, commands and information including data transfers relative to the vehicle**, particularly involving data from vehicle devices, certain hardware and software is contained in the vehicle. (col 2:53-56) At block 300, **vehicle positioning data is available from one of the vehicle devices 50, which might be a GPS**. On a requested or regular input scheme, such vehicle device data is sent to the CAN bus 126 at block 304. **The CAN controller 122 is responsible for controlling the receipt and transmitting of such data to the controller 30 at block 308**. The vehicle data that is to be transmitted over the wire link, in accordance with the predetermined or determinable procedure,

	is appropriately processed, analyzed or otherwise acted on using the controller 30 at block 312. In one embodiment, vehicle device data, such as GPS data, do not rely on the web server 102 but may utilize a different communications pathway, such as E-mail. **In any event, the controller 30 gates the vehicle location data to the cellular phone having the vehicle airlink transfer protocol modem 20, such as a CDPD network modem 82, at block 316. The vehicle location data is properly formatted and transmitted through the cellular phone over the airlink at block 320.** (col 14:4-21)

The '074 patent discloses a controller that cooperates with the GPS device and the wireless communication device to send vehicle position information. The controller obtains vehicle positioning data from the GPS, and then, cooperating with the wireless communications device, transmits the vehicle position information.

said multi-vehicle compatible controller to be coupled to the vehicle data bus for communication thereover with at least one vehicle device using at least one corresponding vehicle device code from among a	The controller 30 is responsible for a number of functions related to understanding and acting on information received from one or more remote stations 10, obtaining and responding to 35 requested information and operatively functioning with information including data available from other elements in the vehicle. In that regard, **the controller 30 communicates with a controller interface 34 that electrically links the controller 30 with a vehicle standardized network** 40. The vehicle standardized network 40 includes a controller unit 44 that provides appropriate message and data handling functions associated with **sending and receiving information including data from each of a plurality of physical vehicle devices 50 that are operatively connected to a bus 46 of the vehicle standardized network** 40. Like the remote

plurality thereof for different vehicles;	standardized network 14**, the vehicle standardized network 40 is an established and previously developed network that interfaces with components in a vehicle**, such as engine related components in order to provide desired or requested data concerning the operations or status of these components. (col 6:31-50) In a preferred embodiment, this further **standardized network is a network that has been previously devised and is commonly used in a number of makes and models of vehicles**. This communications network is defined as the controller area network (CAN) 124. Although the CAN 124 has previously commonly been used in operative association with automotive electronics including engine control elements, sensors, lamps, electric windows etc., the present invention also enables the CAN 124 to be used with a variety of other devices contained in the vehicle, such as the previously described devices. (col10:18-29) In interfacing with the CAN 124, the **controller 30 also has device drivers 128 that are useful in achieving desired communications in both directions between the CAN 124 and the controller 30**. For example, the processor 90 is able to **obtain data** or other information **from the vehicle devices 50a-50n using the device drivers 128** and which information can be used by the processor 90 including, for example, storing data in the data memory 106 for subsequent access and transmission to a remote station 10. (col10:55-64)

The example above showing transmission of vehicle position data from the GPS unit show communication over the bus, using the appropriate device code for the GPS.

The controller is provided with the vehicle device code ("device driver") in order to "obtain data or other information from the vehicle device, where the device driver is one of a plurality of device drivers for different vehicles.

and a down-loading inter-face for permit-ting download-ing of enabling data related to the at least one corresponding vehicle device code for use by said multi-vehi-cle compatible controller;	With regard to obtaining information or data from these vehicle devices for appropriate processing using, for example, **one or more executable programs in the program memory, the controller communicates with a second standardized net-work** in the form of a network that is commercially available and used in vehicles, such as the previously devised controller area network (CAN). The CAN is operatively connected to each of a plurality of vehicle devices that transmit, receive, or both transmit and receive desired data. (col 3:57- col 4:7) A **combination of controller related components** are con-tainable in a vehicle for responding to requests from remote sites**, obtaining and storing information associated with vehicle devices** and running executable software that may be available in the program memory of the controller **or down-loaded from the remote site**, while handling and configuring information including data that is communicative with the re-mote site over an established network, such as the Internet. (col 4:64 – col 5:5) The **controller 30 is responsible for a number of functions related to understanding and acting on information re-ceived from one or more remote stations** 10, obtaining and responding to 35 requested information and operatively func-tioning with information including data available from other el-ements in the vehicle. In that regard, **the controller 30 com-municates with a controller interface 34 that electrically**

	links the controller 30 with a vehicle standardized network 40. The vehicle standardized network 40 includes a controller unit 44 that provides appropriate message and data handling functions associated with **sending and receiving information including data from each of a plurality of physical vehicle devices 50 that are operatively connected to a bus 46 of the vehicle standardized network** 40. Like the remote standardized network 14, **the vehicle standardized network 40 is an established and previously developed network that interfaces with components in a vehicle**, such as engine related components in order to provide desired or requested data concerning the operations or status of these components. (col 6:31-50)

The '074 patent also discloses a variety of downloading interfaces for permitting downloading of data related to the vehicle device codes. The '074 patent teaches that device codes for the vehicle devices can be downloaded, and that such codes are obtained and stored.

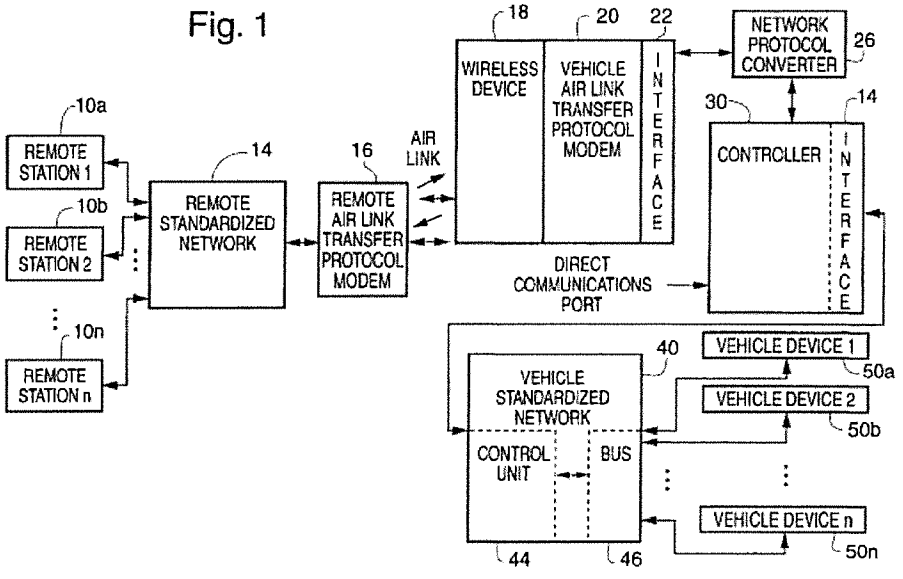
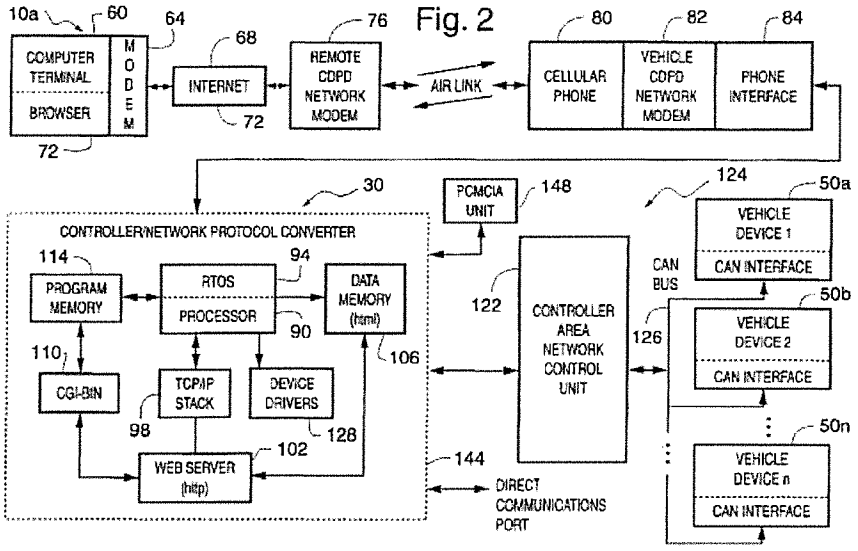
said downloading interface comprising a connector for temporary connection to a downloading device.	Fig. 1 

	Figure 1 includes a wireless communication interface. As noted above with respect to Claim 1, Figure 2 also includes a wireless communications interface. Also, the '074 patent describes a wireless communication device: "In one embodiment, the **cellular digitized packet data (CDPD) network provides the desired link** including arrangement of 45 information being communicated and where the destination site, namely the particular vehicle, is found in the network. If a channel is available to the particular vehicle, the **CDPD link can proceed to transmit the Internet packets to the vehicle of interest**. Instead of the CDPD network as the link, 50 a communications interface could be employed that involves data only, such as a two way paging interface with the vehicle." (col 2: 41-50) In accordance with the present invention, a system is provided in which **communication of information, including requests, commands and data**, is achieved **between vehicle** having physical vehicle devices and one or more **sites that are remote from the vehicle**. (col 2:11-15) With respect to **handling requests, commands and information including data transfers relative to the vehicle**, particularly involving data from vehicle devices, certain hardware and software is contained in the vehicle. (col 2:53-56) In one embodiment, the **communication information is formatted in accordance with a CDPD (cellular digitized packet data)** configuration. At the vehicle, this **information is received by a wireless device 18 that is able to transmit**

	and receive information via the airlink. The wireless device 18 is operatively associated with a vehicle airlink transfer protocol modem 20 for the proper handling of the airlink formatted transmission. In one embodiment, the **wireless device 18 includes a cellular phone** that is selected from a plurality of conventional or commercially available cellular phones. The wireless device 18 **bi-directionally communicates with a controller 30** contained in the vehicle through a network protocol converter 26 using a wireless device interface 22. The wireless device interface 22 establishes the necessary signal compatibilities and connections from the wireless device 18. (col 6:1-16) The Internet 68 operatively communicates with a standardized network transmission protocol that permits information to be bi-directionally communicated over the airlink and, in one embodiment, includes a remote CDPD network modem 76 which prepares the information in a conventionally acceptable manner for **transmission and communication with a cellular phone 80** which is contained in the vehicle. The cellular phone 80 can be any selected one of a number of conventional cellular phones that have the capability of properly communicating with the desired formatted or arranged information. **In the illustrated embodiment of FIG. 2, the cellular phone 80 is operatively associated with a vehicle CDPD network modem 82** that demodulates the received information so that it is acceptable for further handling or processing. (col 7:40-54)

In addition, the '074 patent also described a wired connector for temporary connection to a downloading device:



As shown above, figure 2 describes the PCMCIA unit (148). One skilled in the art would recognize that this interface is a wired interface to the controller and would enable downloading to the controller.

"Preferably, the controller in the vehicle is also associated with an interface for communication with one or more available systems, such as an RS232 connection, an Ethernet connection and/or a PCMCIA unit. In a related embodiment, the **controller includes a direct communications port for receiving and sending information without requiring the wireless device** and the Internet connection to the wireless device." (col 4:38-45)

One skilled in the art would understand that the wired port would be used temporarily. For example, once said downloading was complete, the device could be disconnected from the controller and the vehicle could continue back on the road.

As described above, one skilled in the art would understand that the '074 patent discloses a wireless downloading interface comprising of a wireless receiver for temporary connection to a downloading device.

As with Claim 2 above, one skilled in the art would understand that the PCMCIA unit (148) shown in Fig. 2 of the '079 patent discloses a wired interface to the unit, which provides a downloading interface. Those skilled in the art would further understand that a PCMCIA unit is typically used temporarily. For example, when downloading through this interface, once such downloading was complete, the device could be disconnected from the PCMCIA unit, so that the PCMCIA unit provided a connector for temporary connection to a downloading device.

For reasons including those stated above, Claim 13 of the '278 patent is taught by the '074 patent.

Claim 14

Claim 14 of the '278 patent reads:

> "the multi-vehicle compatible tracking unit according to claim 13 wherein the corresponding at least one vehicle code is for reading from the at least one vehicle device."

All of these components and functions can be found in the '074 patent.

'278 Patent Claim 14	**The '074 Patent**
14. The multi-vehicle compatible tracking unit according to claim 13 wherein the corresponding at least one vehicle code is for reading from the at least one vehicle device.	As disclosed in '074 patent: With respect to getting information, the controller 30 further includes a data storage unit or data memory 106. Generally, the data memory 106 **stores data that has been generated and is expected to be useful in handling requests or commands**. Such **data may be data obtained from monitoring a physical device associated with a vehicle** and/or

	may include data useful in running executable software that is intended to provide further information or data useful to a requestor. (col 8:45-53) "Generally, such software is useful in processing, analyzing or otherwise acting on data available in the vehicle, including acting on the data in real time, such as **acting on available data in real time that is used for transmission to a remote station**, where such transmission is initiated in the vehicle. A representative listing of applications is as follows: (a) **monitoring of vehicle locations and status**; (b) tracking of deliveries of packages by the vehicle; (c) monitoring cargo conditions in the vehicle, such as the temperature of the cargo and checking equipment related to maintaining a desired temperature; (d) **vehicle parameter monitoring** for maintaining the vehicle 10 such as checking engine conditions including possibility of overheating and operating mileage (odometer reading); (e) displaying of directions and/or dispatch instructions; and (f) communication of short messages between a user at the remote site and the operator of the vehicle. (col 9:1-31) In a related variation of this embodiment, after processing such data, the **computer terminal 60 may initiate further actions in the way of sending in-**

	formation to the vehicle for adjusting or otherwise affecting the vehicle device that provided the data for analysis. (col 14:31-36) The **vehicle standardized network 40 includes a controller unit 44 that provides appropriate message and data handling functions associated with sending and receiving information including data from each of a plurality of physical vehicle devices 50 that are operatively connected to a bus 46** of the vehicle standardized network 40. Like the remote standardized network 14, the vehicle standardized network 40 is an established and previously developed network that interfaces with components in a vehicle, such as engine related components in order to provide desired or requested data concerning the operations or status of these components. (col 10:39-50) In interfacing with the CAN 124, the **controller 30 also has device drivers 128 that are useful in achieving desired communications in both directions between the CAN 124 and the controller 30**. For example, the processor 90 is able to **obtain data** or other information **from the vehicle devices 50a-50n using the device drivers 128** and which information can be used by the processor 90 including, for example, storing data in the data memory 106 for subsequent access and transmission to a remote station 10. (col10:55-64)

	In yet a further variation of controller operation, **each vehicle device on the CAN has its own IP designation or address so that the remote user can utilize this designation or address for communication with the selected vehicle device having that designation or address**. The controller uses the received IP address or designation for the particular device and acts as a **link or bridge for the remote user to the particular device**. (col 4:50-57) As one skilled in the art, one will recognize that the '074 patent describes a method where a plethora of vehicle devices can be identified and communicated with by either the vehicle mounted controller or remotely via wireless connections.

One skilled in the art would recognize that the '074 patent discloses a method where a plethora of vehicle devices can be identified and communicated with by either the vehicle mounted controller or remotely via wireless connections. Vehicle codes ("device drivers") are used to read data from vehicle devices. The controller 30 uses the device drivers 128 to achieve the desired communications in both directions between the CAN 124 and the controller 30. "For example, the processor 90 is able to **obtain data** ... **from the vehicle devices 50a-50n using the device drivers 128...."** (col 10:55-61). The '074 patent thereby discloses that the vehicle [device] code (device driver) is for reading data from at least one vehicle device.

For reasons including those stated above, Claim 14 of the '278 patent is taught by the '074 patent.

Claim 16

Claim 16 of the '278 patent reads:

"The multi-vehicle compatible tracking unit according to claim 13 wherein said downloading interface is also for permitting downloading of at least one programming instruction for said multi vehicle compatible controller."

All of these components and functions can be found in the '074 patent.

'278 Patent Claim 16	The '074 Patent
16. The multi-vehicle compatible tracking unit according to claim 13 wherein said downloading interface is also for permitting downloading of at least one programming instruction for said multi-vehicle compatible controller.	The '074 patent discloses downloading of programming information to the controller: In a further and related variation, information or **executable software may be downloaded from the remote station to the controller** 30 for execution as part of responding to an accompanying or future request, which software may be executed in conjunction with the operation of an applet that is stored as part of the controller 30 (col 9:45-50) "Preferably, the controller in the vehicle is also associated with an interface for communication with one or more available systems, such as an RS232 connection, an Ethernet connection and/or a PCMCIA unit. In a related embodiment, the **controller includes a direct communications port for receiving and sending information without requiring the wireless device** and the Internet connection to the wireless device." (col 4:38-45)

As one skilled in the art would clearly recognize, the controller downloading interface is also for permitting downloading programming instructions for said controller. Such programming instructions including the specifically disclosed "executable software ...

downloaded from the remote station to the controller 30 for execution...." ('074 patent, col, 8:45-53).

For reasons including those stated above, Claim 16 of the '278 patent is taught by the '074 patent.

Claim 18

Claim 18 of the '278 patent reads:

> "A multi-vehicle compatible tracking unit for a vehicle comprising a vehicle data bus extending throughout the vehicle, the multi-vehicle compatible tracking unit comprising:
>
> a vehicle position determining device;
>
> a wireless communications device;
>
> a multi-vehicle compatible controller for cooperating with said vehicle position determining device and said wireless communications device to send vehicle position information;
>
> said multi-vehicle compatible controller to be coupled to the vehicle data bus for communication there over with at least one vehicle device using at least one corresponding vehicle device code from among a plurality thereof for different vehicles; and
>
> a downloading interface for permitting downloading of enabling data related to the at least one corresponding vehicle device code for use by said multi-vehicle compatible controller;
>
> said downloading interface comprising a connector for temporary connection to a downloading device."

All of these components and functions can be found in the '074 patent.

'278 Patent Claim 18	The '074 Patent
18. A multi-vehicle compatible tracking unit for a vehicle comprising a vehicle data bus extending	As described in the teachings of '074: With respect to getting information, the controller 30 further includes a data storage unit or data memory 106. Generally, the data memory 106 **stores data**

throughout the vehicle, the multi-vehicle compatible vehicle tracking unit comprising:	**that has been generated and is expected to be useful in handling requests or commands**. Such **data may be data obtained from monitoring a physical device associated with a vehicle** and/or may include data useful in running executable software that is intended to provide further information or data useful to a requestor. (col 8:45-53) "Generally, such software is useful in processing, analyzing or otherwise acting on data available in the vehicle, including acting on the data in real time, such as **acting on available data in real time that is used for transmission to a remote station**, where such transmission is initiated in the vehicle. A representative listing of applications is as follows: (a) **monitoring of vehicle locations and status**; (b) tracking of deliveries of packages by the vehicle; (c) monitoring cargo conditions in the vehicle, such as the temperature of the cargo and checking equipment related to maintaining a desired temperature; (d) **vehicle parameter monitoring** for maintaining the vehicle 10 such as checking engine conditions including possibility of overheating and operating mileage (odometer reading); (e) displaying of directions and/or dispatch instructions; and (f) communication of short messages between a user at the remote site and the operator of the vehicle. (col 9:1-31) In a related variation of this embodiment, after processing such data, the **computer terminal 60 may**

	initiate further actions in the way of sending information to the vehicle for adjusting or otherwise affecting the vehicle device that provided the data for analysis. (col 14:31-36) The **vehicle standardized network 40 includes a controller unit 44 that provides appropriate message and data handling functions associated with sending and receiving information including data from each of a plurality of physical vehicle devices 50 that are operatively connected to a bus 46** of the vehicle standardized network 40. Like the remote standardized network 14, the vehicle standardized network 40 is an established and previously developed network that interfaces with components in a vehicle, such as engine related components in order to provide desired or requested data concerning the operations or status of these components. (col 10:39-50) In yet a further variation of controller operation, **each vehicle device on the CAN has its own IP designation or address so that the remote user can utilize this designation or address for communication with the selected vehicle device having that designation or address**. The controller uses the received IP address or designation for the particular device and acts as a **link or bridge for the remote user to the particular device**. (col 4:50-57) Also, the '074 patent describes a wireless communication device:

	"In one embodiment, the **cellular digitized packet data (CDPD) network provides the desired link** including arrangement of 45 information being communicated and where the destination site, namely the particular vehicle, is found in the network. If a channel is available to the particular vehicle, the **CDPD link can proceed to transmit the Internet packets to the vehicle of interest**. Instead of the CDPD network as the link, 50 a communications interface could be employed that involves data only, such as a two way paging interface with the vehicle." (col 2: 41-50) In accordance with the present invention, a system is provided in which **communication of information, including requests, commands and data**, is achieved **between vehicle** having physical vehicle devices and one or more **sites that are remote from the vehicle**. (col 2:11-15) With respect to **handling requests, commands and information including data transfers relative to the vehicle**, particularly involving data from vehicle devices, certain hardware and software is contained in the vehicle. (col 2:53-56) As one skilled in the art, one will recognize that the '074 patent describes a method where vehicle devices can be identified and communicated with by either the vehicle mounted controller or remotely via wireless connections. Again, in its infringement contentions, Omega identified only the standard bus-determination protocol specified by the SAE standard. Because this was known for several years in

	the prior art, it would have been obvious to one of ordinary skill in the art to use such protocol when connecting to the vehicle bus. It was well known in the art since at least as early as 1994 that pursuant to SAE J1978, a controller could be compatible with multiple buses (and thus multiple vehicles) by following the protocol of sending a sequence of multiple bus messages to determine the bus type. The SAE standard for the OBD II Scan Tool (SAE J1978, Issued 1992-03, Revised 1994-06) describes the functions required to be supported by vehicles and testing equipment. This standard describes connecting to the vehicle bus using one of three interfaces by sending a signal (request message) on the data communications bus. See SAE J1978 at 6.5.2; see also ISO 9141-2. Three signals (request messages) are sent, one of which will likely trigger a response message. See SAE J1978 at 6.5.2. If none of the initial signals prompt a response, the standard further describes additional steps to determine a working signal. See SAE J1978 at 6.8.

As noted above, the '074 patent discloses a multi-vehicle compatible tracking unit. The controller is specifically designed to work with a standardized vehicle bus, and multiple makes and models of vehicles.

"In a preferred embodiment, this further **standardized network is a network that has been previously devised and is commonly used in a number of makes and models of vehicles**. This communications network

is defined as the controller area network (CAN) 124. Although the CAN 124 has previously commonly been used in operative association with automotive electronics including engine control elements, sensors, lamps, electric windows etc., the present invention also enables the CAN 124 to be used with a variety of other devices contained in the vehicle, such as the previously described devices." ('074 patent, col. 10:18-39)

And the system is specifically noted as suitable for tracking vehicles: "a representative listing of applications is as follows: (a) monitoring of vehicle locations and status." ('074 patent, col. 9:3-5).

a vehicle position determining device;	The patent discloses a GPS receiver (vehicle position determining device) at column 14, lines 1-5; At block 300, **vehicle positioning data is available from one of the vehicle devices 50, which might be a GPS**. On a requested or regular input scheme, such vehicle device data is sent to the CAN bus 126 at block 304. The CAN controller 122 is responsible for controlling the receipt and transmitting of such data to the controller 30 at block 308.

As shown above, the '074 patent discloses a GPS receiver, which is a vehicle position determining device.

a wireless communications device;	The '074 patent describes several wireless communication devices. For example, the wireless device 18 and remote air link transfer protocol modem 20 in Fig. 1, or the cellular phone 80 and vehicle CDPD network modem 82 in Fig. 2. In addition, the '074 patent discloses:

	In one embodiment, the **cellular digitized packet data (CDPD) network provides the desired link** including arrangement of 45 **information being communicated and where the destination site**, namely the particular vehicle, is found in the network. If a channel is available to the particular vehicle, the CDPD link can proceed to transmit the Internet packets to the vehicle of interest. Instead of the CDPD network as the link, 50 a **communications interface could be employed that involves data only, such as a two way paging interface** with the vehicle. (col 2: 41-50) In one embodiment, the **communication information is formatted in accordance with a CDPD (cellular digitized packet data)** configuration. At the vehicle, this **information is received by a wireless device 18 that is able to transmit and receive information via the airlink**. The wireless device 18 is operatively associated with a vehicle airlink transfer protocol modem 20 for the proper handling of the airlink formatted transmission. In one embodiment, the **wireless device 18 includes a cellular phone** that is selected from a plurality of conventional or commercially available cellular phones. The wireless device 18 **bi-directionally communicates with a controller 30** contained in the vehicle through a network protocol converter 26 using a wireless device interface 22. The wireless device interface 22 establishes the necessary signal compatibilities and connections from the wireless device 18. (col 6:1-16) The Internet 68 operatively communicates with a standardized network transmission protocol that permits information to

	be bi-directionally communicated over the airlink and, in one embodiment, includes a remote CDPD network modem 76 which prepares the information in a conventionally acceptable manner for **transmission and communication with a cellular phone 80** which is contained in the vehicle. The cellular phone 80 can be any selected one of a number of conventional cellular phones that have the capability of properly communicating with the desired formatted or arranged information. **In the illustrated embodiment of FIG. 2, the cellular phone 80 is operatively associated with a vehicle CDPD network modem 82** that demodulates the received information so that it is acceptable for further handling or processing. (col 7:40-54)

As noted above, as well as in Figs. 1 and 2, the '074 discloses at least two different types of wireless communication device that may be used to transmit and receive.

a multi-vehicle compatible controller for cooperating with said vehicle position determining device and said wireless communications device to send vehicle position information;	The patent discloses that the controller is designed to work on a standardized vehicle bus, and is thereby compatible with multiple vehicles. The **vehicle standardized network 40** includes a **controller unit 44** that provides appropriate **message and data handling functions associated with sending and receiving information including data from each of a plurality of physical vehicle devices 50 that are operatively connected to a bus 46 of the vehicle standardized network 40.** (col 2:39-45) In a preferred embodiment, this further **standardized network is a network that has been previously devised and is commonly used in a number of makes and models of vehicles**. (col 10:18-21)

	The patent discloses a controller that cooperates with the GPS device and the wireless communication device to send vehicle position information. In accordance with the present invention, a system is provided in which **communication of information, including requests, commands and data**, is achieved **between vehicle** having physical vehicle devices and one or more **sites that are remote from the vehicle**. (col 2:11-15) With respect to **handling requests, commands and information including data transfers relative to the vehicle**, particularly involving data from vehicle devices, certain hardware and software is contained in the vehicle. (col 2:53-56) At block 300, **vehicle positioning data is available from one of the vehicle devices 50, which might be a GPS**. On a requested or regular input scheme, such vehicle device data is sent to the CAN bus 126 at block 304. **The CAN controller 122 is responsible for controlling the receipt and transmitting of such data to the controller 30 at block 308**. The vehicle data that is to be transmitted over the wire link, in accordance with the predetermined or determinable procedure, is appropriately processed, analyzed or otherwise acted on using the controller 30 at block 312. In one embodiment, vehicle device data, such as GPS data, do not rely on the web server 102 but may utilize a different communications pathway, such as E-mail. **In any event, the controller 30 gates the vehicle location data to the cellular phone having the vehicle airlink transfer protocol modem**

	20, such as a CDPD network modem 82, at block 316. The vehicle location data is properly formatted and transmitted through the cellular phone over the airlink at block 320. (col 14:4-21)

The '074 patent discloses a controller that cooperates with the GPS device and the wireless communication device to send vehicle position information. The controller obtains vehicle positioning data from the GPS, and then, cooperating with the wireless communications device, transmits the vehicle position information.

said multi-vehicle compatible controller to be coupled to the vehicle data bus for communication thereover with at least one vehicle device using at least one corresponding vehicle device code from among a plurality thereof for different vehicles;	The controller 30 is responsible for a number of functions related to understanding and acting on information received from one or more remote stations 10, obtaining and responding to 35 requested information and operatively functioning with information including data available from other elements in the vehicle. In that regard, **the controller 30 communicates with a controller interface 34 that electrically links the controller 30 with a vehicle standardized network** 40. The vehicle standardized network 40 includes a controller unit 44 that provides appropriate message and data handling functions associated with **sending and receiving information including data from each of a plurality of physical vehicle devices 50 that are operatively connected to a bus 46 of the vehicle standardized network** 40. Like the remote standardized network 14, **the vehicle standardized network 40 is an established and previously developed network that interfaces with components in a vehicle**, such as engine related components in order to provide desired or requested data concerning the operations or status of these components. (col 6:31-50)

	In a preferred embodiment, this further **standardized network is a network that has been previously devised and is commonly used in a number of makes and models of vehicles**. This communications network is defined as the controller area network (CAN) 124. Although the CAN 124 has previously commonly been used in operative association with automotive electronics including engine control elements, sensors, lamps, electric windows etc., the present invention also enables the CAN 124 to be used with a variety of other devices contained in the vehicle, such as the previously described devices. (col10:18-29) In interfacing with the CAN 124, the **controller 30 also has device drivers 128 that are useful in achieving desired communications in both directions between the CAN 124 and the controller 30**. For example, the processor 90 is able to **obtain data** or other information **from the vehicle devices 50a-50n using the device drivers 128** and which information can be used by the processor 90 including, for example, storing data in the data memory 106 for subsequent access and transmission to a remote station 10. (col10:55-64)

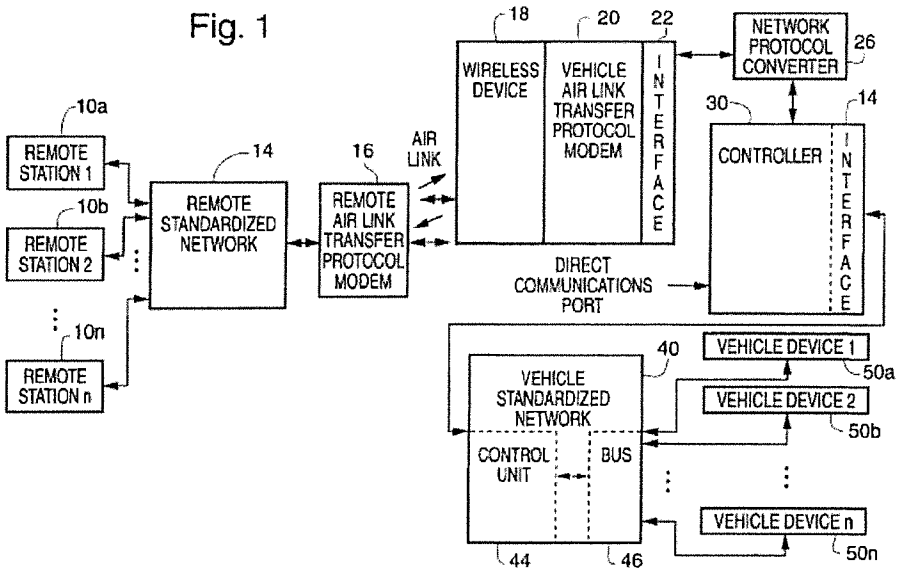
The example above showing transmission of vehicle position data from the GPS unit shows communication over the bus, using the appropriate device code for the GPS. The controller is provided with the vehicle device code ("device driver") in order to "obtain data or other information from the vehicle device, where the device driver is one of a plurality of device drivers for different vehicles.

and a downloading interface for permitting	With regard to obtaining information or data from these vehicle devices for appropriate processing using, for example, **one or more executable programs in the program**

downloading of enabling data related to the at least one corresponding vehicle device code for use by said multi-vehicle compatible controller;	**memory, the controller communicates with a second standardized network** in the form of a network that is commercially available and used in vehicles, such as the previously devised controller area network (CAN). The CAN is operatively connected to each of a plurality of vehicle devices that transmit, receive, or both transmit and receive desired data. (col 3:57- col 4:7) A **combination of controller related components** are containable in a vehicle for responding to requests from remote sites**, obtaining and storing information associated with vehicle devices** and running executable software that may be available in the program memory of the controller **or downloaded from the remote site**, while handling and configuring information including data that is communicative with the remote site over an established network, such as the Internet. (col 4:64 – col 5:5) The **controller 30 is responsible for a number of functions related to understanding and acting on information received from one or more remote stations** 10, obtaining and responding to 35 requested information and operatively functioning with information including data available from other elements in the vehicle. In that regard, **the controller 30 communicates with a controller interface 34 that electrically links the controller 30 with a vehicle standardized network** 40. The vehicle standardized network 40 includes a controller unit 44 that provides appropriate message and data handling functions associated with **sending and receiving information including data from each of a plurality of**

	physical vehicle devices 50 that are operatively connected to a bus 46 of the vehicle standardized network 40. Like the remote standardized network 14, **the vehicle standardized network 40 is an established and previously developed network that interfaces with components in a vehicle**, such as engine related components in order to provide desired or requested data concerning the operations or status of these components. (col 6:31-50)

The '074 patent also discloses a variety of downloading interfaces for permitting downloading of data related to the vehicle device codes. The '074 patent teaches that device codes for the vehicle devices can be downloaded, and that such codes are obtained and stored.

said downloading interface comprising a wireless receiver for temporary connection to a downloading device.	Fig. 1  Figure 1 includes a wireless communication interface. As noted above with respect to Claim 1, Figure 2 also includes a wireless communications interface. Also, the '074 patent describes a wireless communication device:

	"In one embodiment, the **cellular digitized packet data (CDPD) network provides the desired link** including arrangement of 45 information being communicated and where the destination site, namely the particular vehicle, is found in the network. If a channel is available to the particular vehicle, the **CDPD link can proceed to transmit the Internet packets to the vehicle of interest**. Instead of the CDPD network as the link, 50 a communications interface could be employed that involves data only, such as a two way paging interface with the vehicle." (col 2: 41-50) In accordance with the present invention, a system is provided in which **communication of information, including requests, commands and data**, is achieved **between vehicle** having physical vehicle devices and one or more **sites that are remote from the vehicle**. (col 2:11-15) With respect to **handling requests, commands and information including data transfers relative to the vehicle**, particularly involving data from vehicle devices, certain hardware and software is contained in the vehicle. (col 2:53-56) In one embodiment, the **communication information is formatted in accordance with a CDPD (cellular digitized packet data)** configuration. At the vehicle, this **information is received by a wireless device 18 that is able to transmit and receive information via the airlink**. The wireless device 18 is operatively associated with a vehicle airlink transfer protocol modem 20 for the proper handling of the airlink formatted transmission. In one embodiment, the **wireless device 18 includes a cellular phone** that is selected from a plurality of

	conventional or commercially available cellular phones. The wireless device 18 **bi-directionally communicates with a controller 30** contained in the vehicle through a network protocol converter 26 using a wireless device interface 22. The wireless device interface 22 establishes the necessary signal compatibilities and connections from the wireless device 18. (col 6:1-16) The Internet 68 operatively communicates with a standardized network transmission protocol that permits information to be bi-directionally communicated over the airlink and, in one embodiment, includes a remote CDPD network modem 76 which prepares the information in a conventionally acceptable manner for **transmission and communication with a cellular phone 80** which is contained in the vehicle. The cellular phone 80 can be any selected one of a number of conventional cellular phones that have the capability of properly communicating with the desired formatted or arranged information. **In the illustrated embodiment of FIG. 2, the cellular phone 80 is operatively associated with a vehicle CDPD network modem 82** that demodulates the received information so that it is acceptable for further handling or processing. (col 7:40-54) As described above, one skilled in the art would understand that the '074 patent discloses a wireless downloading interface comprising of a wireless receiver for temporary connection to a downloading device.

As described above with respect to Claims 4 and 5 above, one skilled in the art would understand that the '074 patent discloses a wireless downloading interface comprising of a wireless receiver for temporary connection to a downloading device. Whether using the "wireless device" of Fig. 1, or the cellular phone of Fig. 2, one skilled in the art would understand that the remote wireless connections to the wireless receiver in the vehicle are temporary, and that connections with various remote locations may be started and stopped at various times.

For reasons including those stated above, Claim 18 of the '278 patent is taught by the '074 patent.

Claim 19

Claim 19 of the '278 patent reads:

> "The multi-vehicle compatible tracking unit according to claim 18 wherein the corresponding at least one vehicle code is for reading from the at least one vehicle device."

All of these components and functions can be found in the '074 patent.

'278 Patent Claim 19	**The '074 Patent**
19. The multi-vehicle compatible tracking unit according to claim 18 wherein the corresponding at least one vehicle code is for reading from the at least one vehicle device.	As described in the '074 patent: With respect to getting information, the controller 30 further includes a data storage unit or data memory 106. Generally, the data memory 106 **stores data that has been generated and is expected to be useful in handling requests or commands**. Such **data may be data obtained from monitoring a physical device associated with a vehicle** and/or may include data useful in running executable software that is intended to provide further information or data useful to a requestor. (col 8:45-53)

	"Generally, such software is useful in processing, analyzing or otherwise acting on data available in the vehicle, including acting on the data in real time, such as **acting on available data in real time that is used for transmission to a remote station**, where such transmission is initiated in the vehicle. A representative listing of applications is as follows: (a) **monitoring of vehicle locations and status**; (b) tracking of deliveries of packages by the vehicle; (c) monitoring cargo conditions in the vehicle, such as the temperature of the cargo and checking equipment related to maintaining a desired temperature; (d) **vehicle parameter monitoring** for maintaining the vehicle 10 such as checking engine conditions including possibility of overheating and operating mileage (odometer reading); (e) displaying of directions and/or dispatch instructions; and (f) communication of short messages between a user at the remote site and the operator of the vehicle. (col 9:1-31) In a related variation of this embodiment, after processing such data, the **computer terminal 60 may initiate further actions in the way of sending information to the vehicle for adjusting or otherwise affecting the vehicle device** that provided the data for analysis. (col 14:31-36)

	The **vehicle standardized network 40 includes a controller unit 44 that provides appropriate message and data handling functions associated with sending and receiving information including data from each of a plurality of physical vehicle devices 50 that are operatively connected to a bus 46** of the vehicle standardized network 40. Like the remote standardized network 14, the vehicle standardized network 40 is an established and previously developed network that interfaces with components in a vehicle, such as engine related components in order to provide desired or requested data concerning the operations or status of these components. (col 10:39-50) In interfacing with the CAN 124, the **controller 30 also has device drivers 128 that are useful in achieving desired communications in both directions between the CAN 124 and the controller 30**. For example, the processor 90 is able to **obtain data** or other information **from the vehicle devices 50a-50n using the device drivers 128** and which information can be used by the processor 90 including, for example, storing data in the data memory 106 for subsequent access and transmission to a remote station 10. (col10:55-64) In yet a further variation of controller operation, **each vehicle device on the CAN has its own IP designation or address so that the remote user can uti-**

	lize this designation or address for communication with the selected vehicle device having that designation or address. The controller uses the received IP address or designation for the particular device and acts as a **link or bridge for the remote user to the particular device**. (col 4:50-57) As one skilled in the art, one will recognize that the '074 patent describes a method where a plethora of vehicle devices can be identified and communicated with by either the vehicle mounted controller or remotely via wireless connections.

One skilled in the art would recognize that the '074 patent discloses a method where a plethora of vehicle devices can be identified and communicated with by either the vehicle mounted controller or remotely via wireless connections. Vehicle codes ("device drivers") are used to read data from vehicle devices. The controller 30 uses the device drivers 128 to achieve the desired communications in both directions between the CAN 124 and the controller 30. "For example, the processor 90 is able to **obtain data** ... **from the vehicle devices 50a-50n using the device drivers 128...."** (col 10:55-61). The '074 patent thereby discloses that the vehicle [device] code (device driver) is for reading data from at least one vehicle device.

For reasons including those stated above, Claim 19 of the '278 patent is taught by the '074 patent.

Claim 21

Claim 21 of the '278 patent reads:

> "The multi-vehicle compatible tracking unit according to claim 18 wherein said downloading interface is also for permitting downloading of at least one programming instruction for said multi-vehicle compatible controller."

All of these components and functions can be found in the '074 patent.

'278 Patent Claim 21	The '074 Patent
21. The multi-vehicle compatible tracking unit according to claim 18 wherein said downloading interface is also for permitting downloading of at least one programming instruction for said multi-vehicle compatible controller.	The '074 patent discloses downloading of programming information to the controller: In a further and related variation, information or **executable software may be downloaded from the remote station to the controller** 30 for execution as part of responding to an accompanying or future request, which software may be executed in conjunction with the operation of an applet that is stored as part of the controller 30 (col 9:45-50) "Preferably, the controller in the vehicle is also associated with an interface for communication with one or more available systems, such as an RS232 connection, an Ethernet connection and/or a PCMCIA unit. In a related embodiment, the **controller includes a direct communications port for receiving and sending information without requiring the wireless device** and the Internet connection to the wireless device." (col 4:38-45)

As one skilled in the art would clearly recognize, the controller downloading interface is also for permitting downloading programming instructions for said controller. Such programming instructions including the specifically disclosed "executable software ... downloaded from the remote station to the controller 30 for execution...." ('074 patent, col, 8:45-53).

For reasons including those stated above, Claim 21 of the '278 patent is taught by the '074 patent.

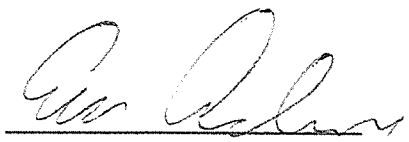
Conclusion

Based on my analysis, all of the components (controller, transmitter/receiver, GPS, vehicle devices,...), component interfaces (data bus, external (wireless) links, temporary connections...), functions (bus communication, bus protocol identification, vehicle device command, device programming...), and processes described in the '278 patent are disclosed in the '074 for reasons including those described above. Accordingly, the asserted claims 1-6, 8, 11-14, 16, 18, 19, and 21 of the '278 patent are invalid and would have been obvious to a person of ordinary skill in the art at the time of the alleged invention.

In summary, one skilled in the art would see that all of the claims described in '278 have been described years before in the '074 patent. Also, one skilled in the art will recognize in figures 2 & 3 of the '392 patent that the author is identifying and describing real world solutions to integrate the system into the vehicle. The author is considering both driver convenience and ergonomics in the description of the invention.

I declare that to the best of my knowledge, the foregoing is true and correct as to the facts stated, and my opinions as expressed.

Dated: April 15, 2015



Eric Andrews

EXHIBIT LIST

Exhibit	Description
1	Curriculum Vitae of Eric Andrews
2	U.S. Pat. No. 6,346,876 ("the '876 patent") to Flick Multi-Vehicle Compatible Control System Generating Command Signals on a Data Bus and Associated Methods
3	U.S. Pat. No. 6,737,989 ("the '989 patent") to Flick Vehicle Tracker Including Variable Frequency Transmission and Related Methods
4	U.S. Pat. No. 6,756,885 ("the '885 patent") to Flick Multi-Vehicle Compatible Control System for Reading From a Data Bus and Associated Methods
5	U.S. Pat. No. 7,671,727 ("the '727 patent") to Flick Speed Exceeded Notification Device for Vehicle Having a Data Bus and Associated Methods
6	U.S. Pat. No. 8,032,278 ("the '278 patent") to Flick Vehicle Tracking Unit with Downloadable Codes and Associated Methods
7	U.S. Pat. No. 5,719,551 ("the '551 patent") to Flick Vehicle Security System for a Vehicle Having a Data Communications Bus and Related Methods
8	U.S. Pat. No. 5,479,479 (the '479 patent) to Braitberg et al. Method and apparatus for Transmission of and Receiving Signals having Digital Information using an Airlink
9	U.S. Pat. No. 5,898,392 (the '392 patent) to Bambini et al. System and Method for Remote Control of an In-Vehicle Voice Recorder and Other Electrical Accessories

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29	U.S. Pat. No. 6,263,268 to Nathanson
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31	U.S. Pat. No. 6,028,537 to Suman et al.
32	Japanese Pub Hei 11[1999]-62793
33	OBD II to RS-232 Interface Adapter AutoTap (1998 Copyright date)
34	Order on Claim Construction (Document 50) dated 02/20/2015
35	Defendant CalAmp Corp.'s Supplemental Invalidity Contentions

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT

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Sheet 1 of 2

Complete if Known	
Application Number	90/013,587
Filing Date	September 14, 2015
First Named Inventor	Flick, Kenneth
Art Unit	3993
Examiner Name	Graham, Matthew C.
Attorney Docket Number	C13-03896.RE

U. S. PATENT DOCUMENTS

Examiner Initials*	Cite No.[1]	Document Number Number-Kind Code[2] *(if known)*	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear
		US- 5794164	1998-08-11	Microsoft Corporation	
		US- 7484008	2009-01-27	Borgia/Cummins, LLC	
		US- 6009363	1999-12-28	Microsoft Corporation	
		US- 7720597	2010-05-18	Omega Patents, L.L.C.	
		US- 7149623	2006-12-12	Omega Patents, L.L.C.	
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Sheet 2 of 2

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Application Number	90/013,587
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Examiner Name	Graham, Matthew C.
Attorney Docket Number	C13-03896.RE

NON PATENT LITERATURE DOCUMENTS

Examiner Initials*	Cite No.[1]	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.	T[2]
		FLICK, K., Non-Final Office Action for U.S. Application No. 11/773,272, Mail Date January 5, 2011	
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		FILING RECEIPT for U.S. Application No. 11/773,272, Mail Date July 31, 2007	
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		CALIFORNIA ENVIRONMENTAL PROTECTION AGENCY, Mail-Out #MSC 97-24, Dated November 17, 1997	

Examiner Signature		Date Considered	

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Electronic Acknowledgement Receipt

EFS ID:	25140410
Application Number:	90013587
International Application Number:	
Confirmation Number:	8867
Title of Invention:	Vehicle Tracking Unit with Downloadable Codes and Associated Methods
First Named Inventor/Applicant Name:	8032278
Correspondence Address:	CHRISTOPHER R. REGAN, ESQ. ALLEN, DYER, DOPPELT, MILBRATH & GILCHRIST, PA P O BOX 3791 - ORLANDO FL 32802-3791 US 407-841-2330 -
Filer:	Samuel Patrick Richey/Christina Ducksworth
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Attorney Docket Number:	C13-03895
Receipt Date:	08-MAR-2016
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Time Stamp:	18:53:17
Application Type:	Reexam (Third Party)

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File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1		03896re_reply.pdf	856142 f0f6c5f55c2641b664f2f72cd3f9759b12a6c013	yes	69
	Multipart Description/PDF files in .zip description				
	Document Description		**Start**	**End**	
	Reexam Timely Requester's Reply to an Owner's Statement		1	68	
	Reexam Certificate of Service		69	69	
Warnings:					
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2	Reexam - Info Disclosure Statement Filed by 3rd Party	03896re_sb08a.pdf	146094 bcd7d24a43b8afabf42a52f8d423b6101d152d62	no	1
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3	Reexam - Info Disclosure Statement Filed by 3rd Party	03896re_sb08b.pdf	152873 8a759b401ddfaff8a15dc61a1eec0ccab2a1bbc5	no	1
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5	Reexam Timely Requester's Reply to an Owner's Statement	03896re_exhibitsG-L.pdf	11136078 63b641ee9c609b96649d0146aac81a94d8e37b60	no	173
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National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

EXHIBIT A

US007720597B2

(12) **United States Patent**
Flick

(10) **Patent No.: US 7,720,597 B2**
(45) **Date of Patent: May 18, 2010**

(54) **VEHICLE TRACKER INCLUDING INPUT/OUTPUT FEATURES AND RELATED METHODS**

(75) Inventor: **Kenneth E. Flick**, Douglasville, GA (US)

(73) Assignee: **Omega Patents, L.L.C.**, Douglasville, GA (US)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 1430 days.

(21) Appl. No.: **11/076,259**

(22) Filed: **Mar. 9, 2005**

(65) **Prior Publication Data**

US 2005/0156716 A1 Jul. 21, 2005

Related U.S. Application Data

(63) Continuation of application No. 10/383,496, filed on Mar. 7, 2003, now Pat. No. 7,149,623, which is a continuation of application No. 09/859,972, filed on May 17, 2001, now Pat. No. 6,606,561.

(60) Provisional application No. 60/264,811, filed on Jan. 29, 2001, provisional application No. 60/258,005, filed on Dec. 22, 2000, provisional application No. 60/251,552, filed on Dec. 6, 2000, provisional application No. 60/252,125, filed on Nov. 20, 2000, provisional application No. 60/236,890, filed on Sep. 29, 2000, provisional application No. 60/246,463, filed on Nov. 7, 2000, provisional application No. 60/222,777, filed on Aug. 3, 2000, provisional application No. 60/205,178, filed on May 17, 2000.

(51) **Int. Cl.**
G01C 21/00 (2006.01)

(52) **U.S. Cl.** **701/207**; 701/213; 701/36; 340/466; 340/988; 342/357.07

(58) **Field of Classification Search** 340/989, 340/825.72, 988, 825.6, 5.2, 5.22, 5, 7, 5.23, 340/426.18, 426.19, 825.31, 425.5, 426, 340/852.72, 5.7, 5.71, 5.72, 5.3, 5.33, 466; 180/287; 455/456.5; 701/207, 213, 36; 307/10.3, 307/10.6, 9.1, 10.2; 342/357.07
See application file for complete search history.

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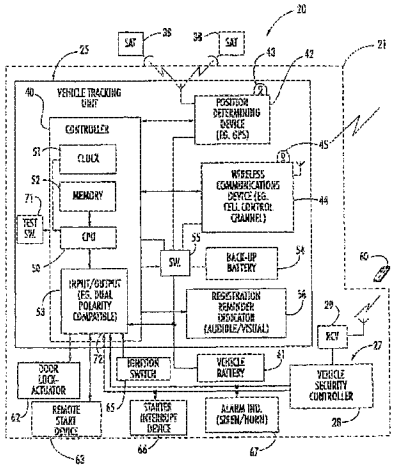
(Continued)

Primary Examiner—Cuong H Nguyen
(74) *Attorney, Agent, or Firm*—Allen, Dyer, Doppelt, Milbrath & Gilchrist, P.A.

(57) **ABSTRACT**

A vehicle control system includes a tracking unit and a function unit cooperating therewith. The tracking unit may include a vehicle position determining device, a wireless communications device, and a tracking controller cooperating with the vehicle position determining device and the wireless communications device to send vehicle position information to a user. Further, the function unit may include at least one uniquely coded transmitter to be carried by a user, a receiver at the vehicle for receiving signals from the at least one uniquely coded transmitter, and a function controller at the vehicle and connected to the receiver for learning the at least one uniquely coded transmitter to permit control of a vehicle function by the user. The function controller may advantageously cooperate with the wireless communications device of the tracking unit for sending an alert indication of whether at least one new uniquely coded transmitter has been learned.

29 Claims, 10 Drawing Sheets



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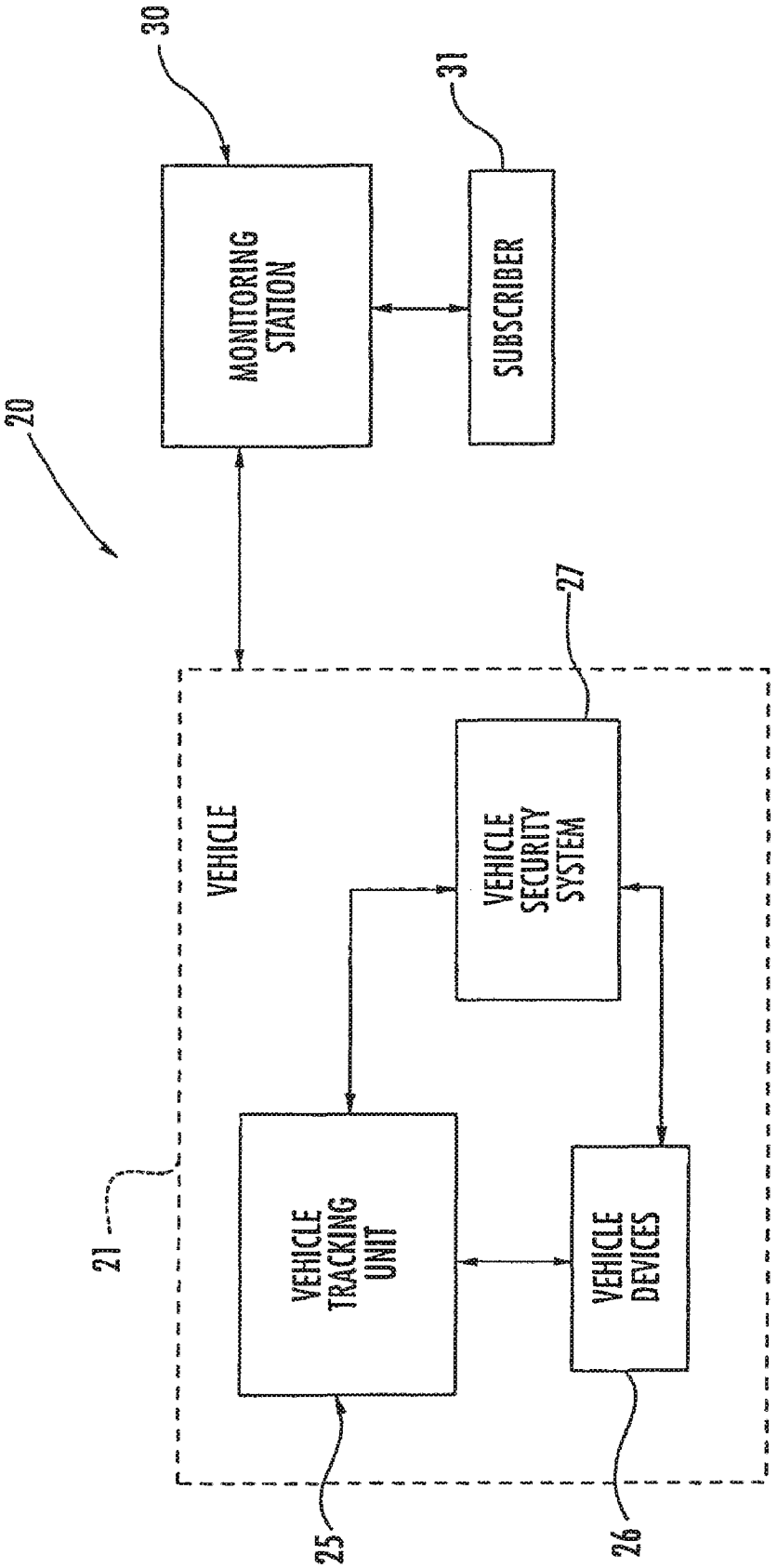

30
31
MONITORING STATION
SUBSCRIBER
20
27
VEHICLE
VEHICLE SECURITY SYSTEM
21
VEHICLE TRACKING UNIT
VEHICLE DEVICES
25
26

FIG. 1.

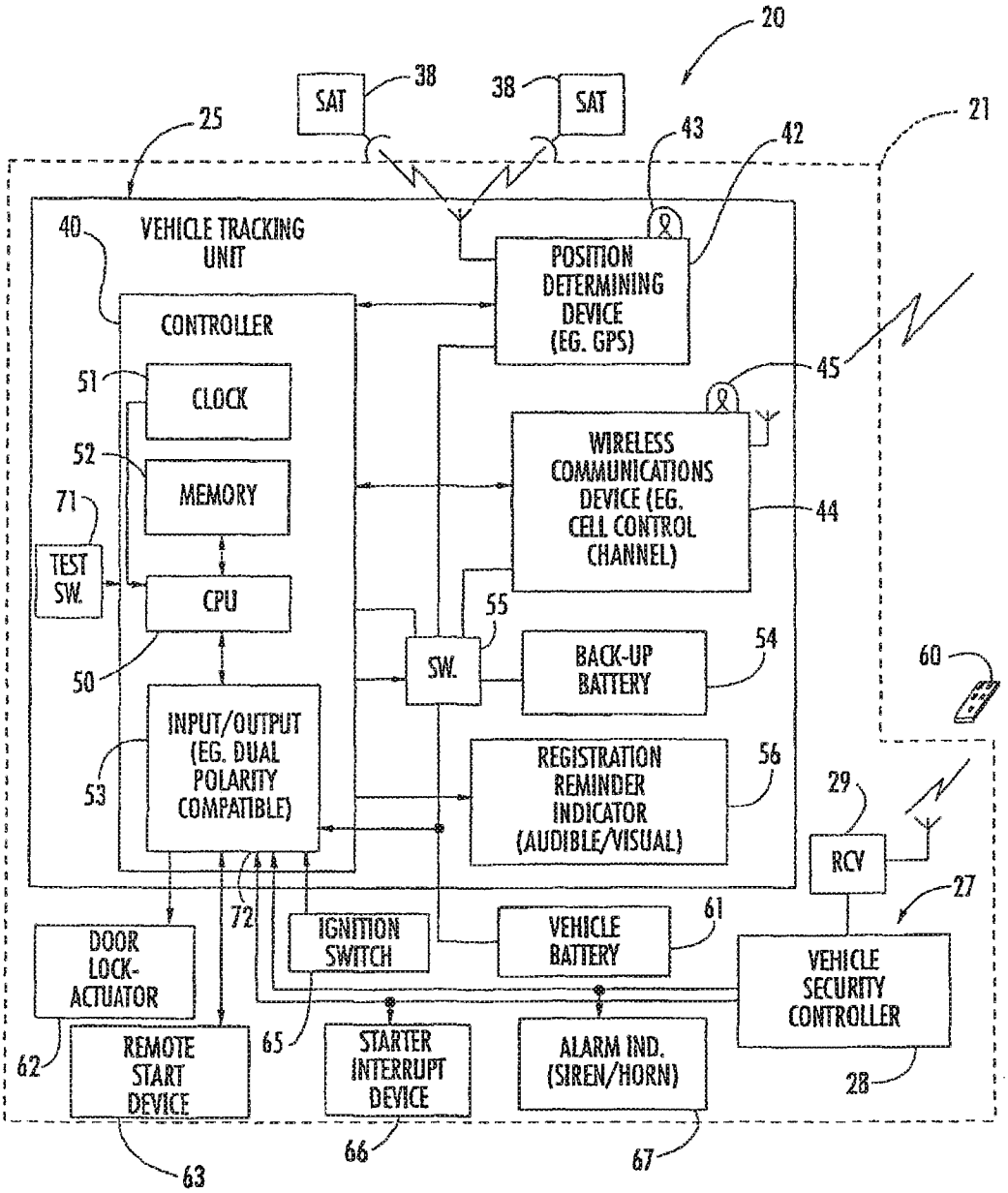

20
SAT
38
38
SAT
25
21
43
42
40
VEHICLE TRACKING UNIT
POSITION DETERMINING DEVICE (EG. GPS)
CONTROLLER
45
51
CLOCK
WIRELESS COMMUNICATIONS DEVICE (EG. CELL CONTROL CHANNEL)
52
MEMORY
71
44
TEST SW.
CPU
55
60
50
SW.
BACK-UP BATTERY
54
INPUT/OUTPUT (EG. DUAL POLARITY COMPATIBLE)
53
REGISTRATION REMINDER INDICATOR (AUDIBLE/VISUAL)
56
29
RCV
27
72
IGNITION SWITCH
VEHICLE BATTERY
61
DOOR LOCK-ACTUATOR
VEHICLE SECURITY CONTROLLER
62
REMOTE START DEVICE
65
STARTER INTERRUPT DEVICE
ALARM IND. (SIREN/HORN)
28
63
66
67

FIG. 2.

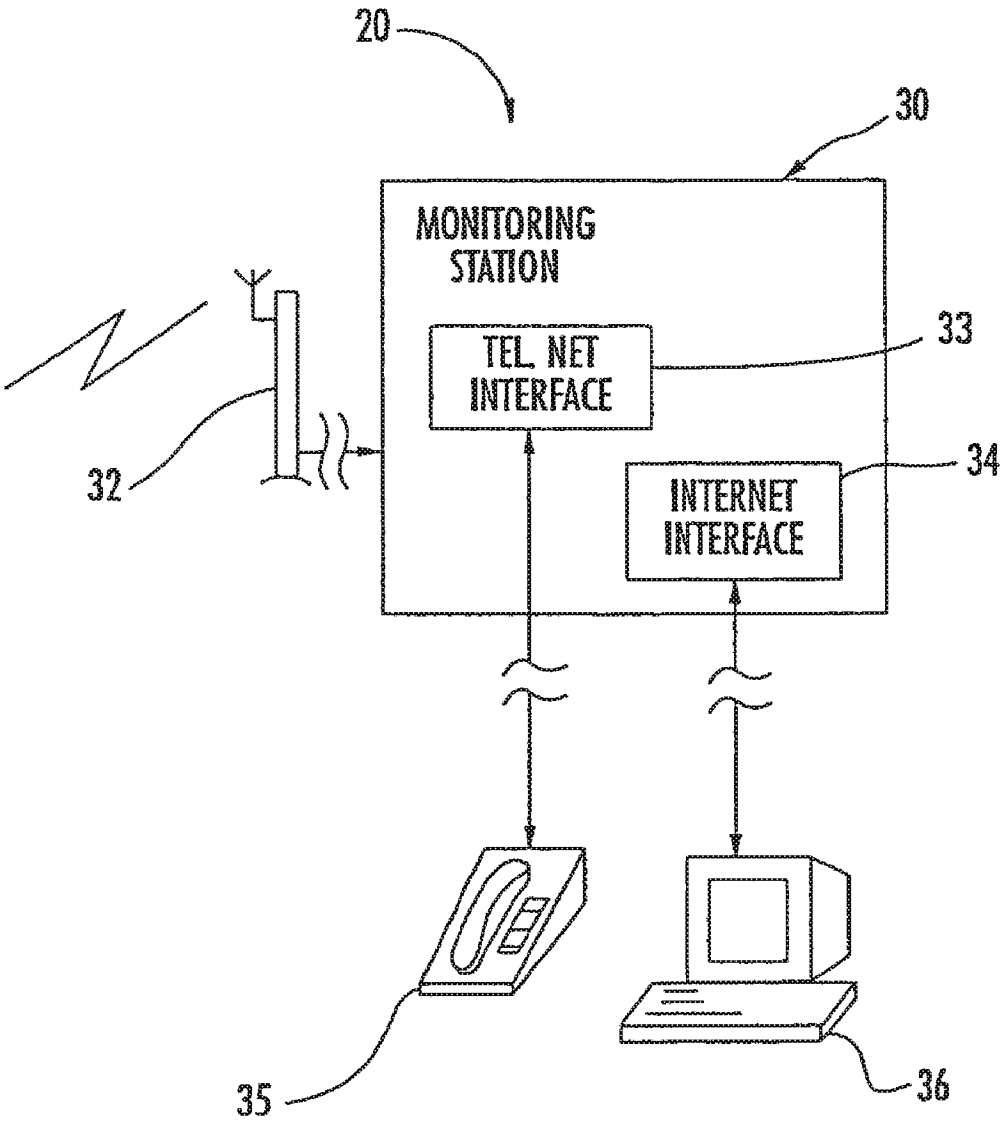

20
30
MONITORING STATION
TEL. NET INTERFACE
33
INTERNET INTERFACE
34
32
35
36

FIG. 3.

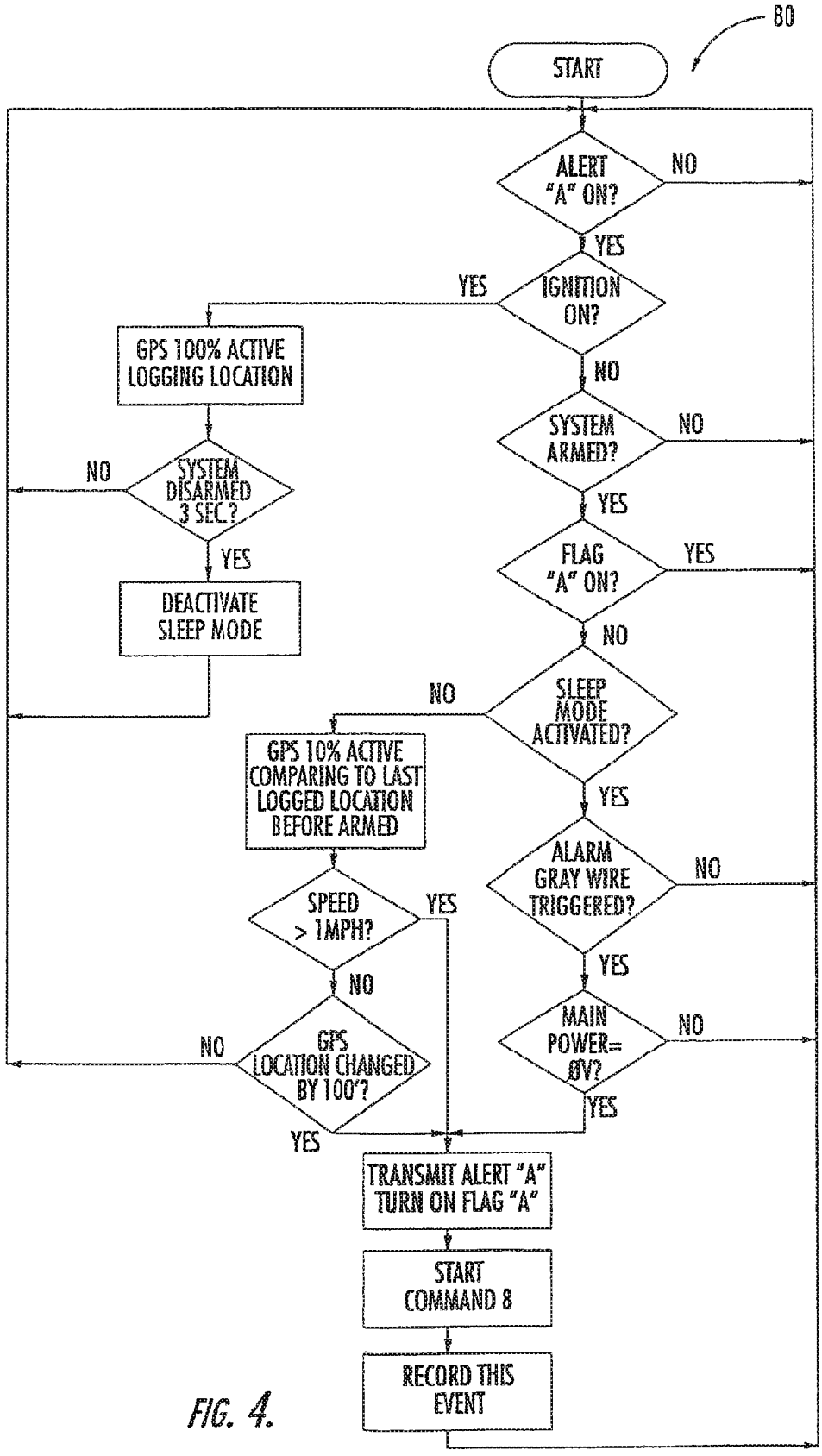

80
START
ALERT "A" ON?
NO
YES
IGNITION ON?
YES
GPS 100% ACTIVE LOGGING LOCATION
NO
SYSTEM ARMED?
NO
YES
SYSTEM DISARMED 3 SEC.?
NO
YES
DEACTIVATE SLEEP MODE
FLAG "A" ON?
YES
NO
SLEEP MODE ACTIVATED?
NO
YES
GPS 10% ACTIVE COMPARING TO LAST LOGGED LOCATION BEFORE ARMED
ALARM GRAY WIRE TRIGGERED?
NO
YES
SPEED > 1MPH?
YES
NO
MAIN POWER= ØV?
NO
YES
GPS LOCATION CHANGED BY 100'?
NO
YES
TRANSMIT ALERT "A" TURN ON FLAG "A"
START COMMAND 8
RECORD THIS EVENT

FIG. 4.

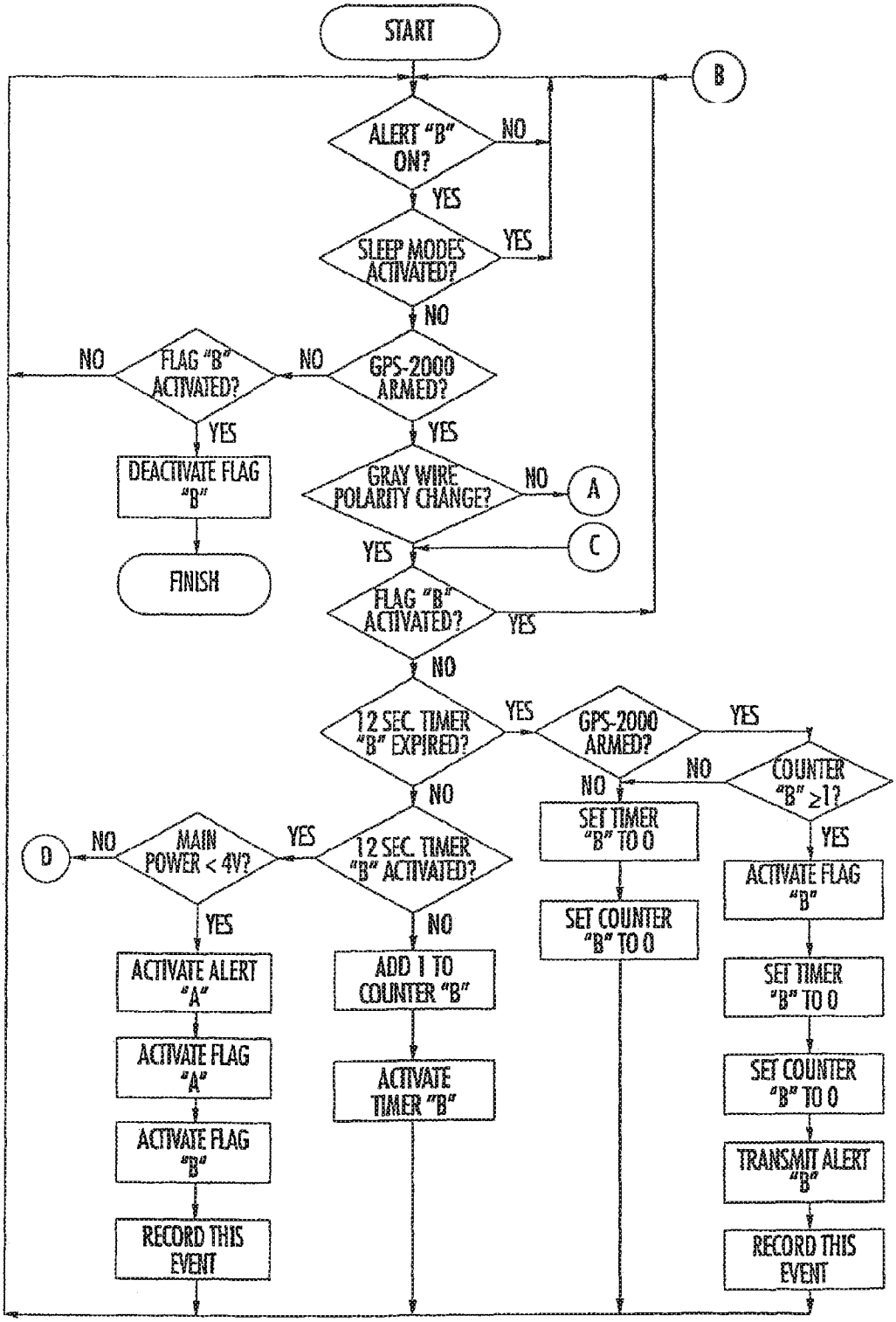

START
B
ALERT "B" ON?
NO
YES
SLEEP MODES ACTIVATED?
YES
NO
FLAG "B" ACTIVATED?
NO
GPS-2000 ARMED?
NO
YES
YES
DEACTIVATE FLAG "B"
GRAY WIRE POLARITY CHANGE?
NO
A
C
YES
FINISH
FLAG "B" ACTIVATED?
YES
NO
12 SEC. TIMER "B" EXPIRED?
YES
GPS-2000 ARMED?
YES
NO
NO
COUNTER "B" ≥1?
NO
SET TIMER "B" TO 0
YES
D
NO
MAIN POWER < 4V?
YES
12 SEC. TIMER "B" ACTIVATED?
ACTIVATE FLAG "B"
SET COUNTER "B" TO 0
YES
NO
ACTIVATE ALERT "A"
ADD 1 TO COUNTER "B"
SET TIMER "B" TO 0
ACTIVATE FLAG "A"
ACTIVATE TIMER "B"
SET COUNTER "B" TO 0
ACTIVATE FLAG "B"
TRANSMIT ALERT "B"
RECORD THIS EVENT
RECORD THIS EVENT

FIG. 5A.

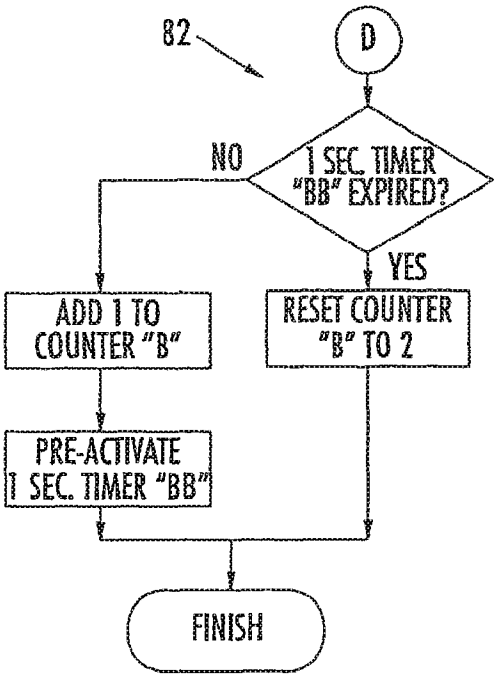

82
D
1 SEC. TIMER "BB" EXPIRED?
NO
YES
ADD 1 TO COUNTER "B"
RESET COUNTER "B" TO 2
PRE-ACTIVATE 1 SEC. TIMER "BB"
FINISH

FIG. 5B.

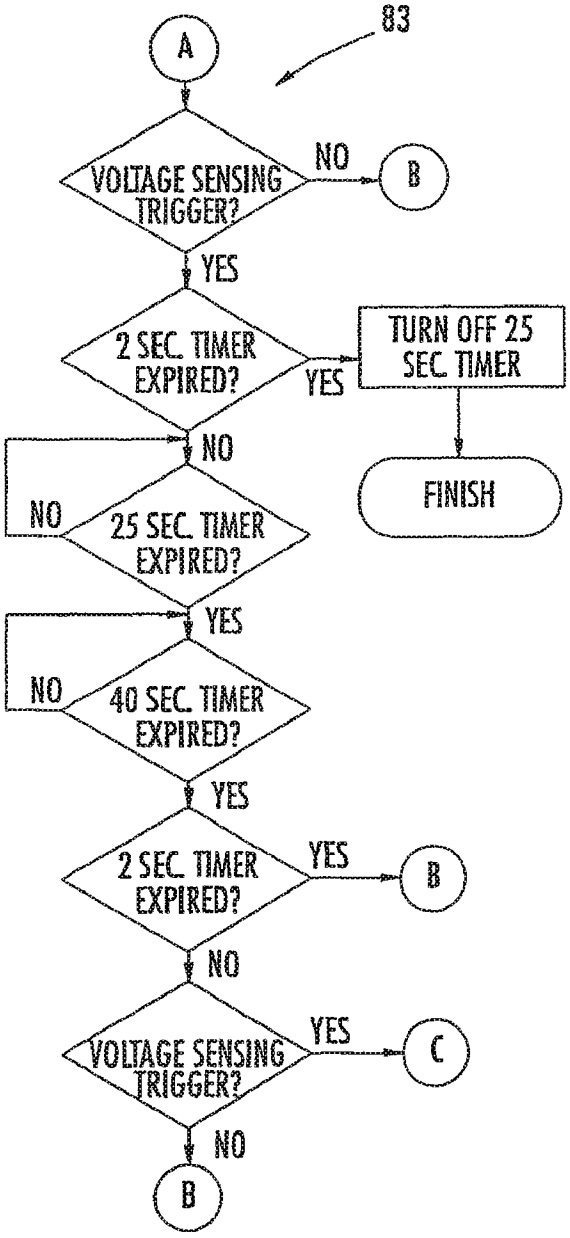

83
A
VOLTAGE SENSING TRIGGER?
NO
B
YES
2 SEC. TIMER EXPIRED?
YES
TURN OFF 25 SEC. TIMER
FINISH
NO
NO
25 SEC. TIMER EXPIRED?
YES
NO
40 SEC. TIMER EXPIRED?
YES
2 SEC. TIMER EXPIRED?
YES
B
NO
VOLTAGE SENSING TRIGGER?
YES
C
NO
B

FIG. 5C.

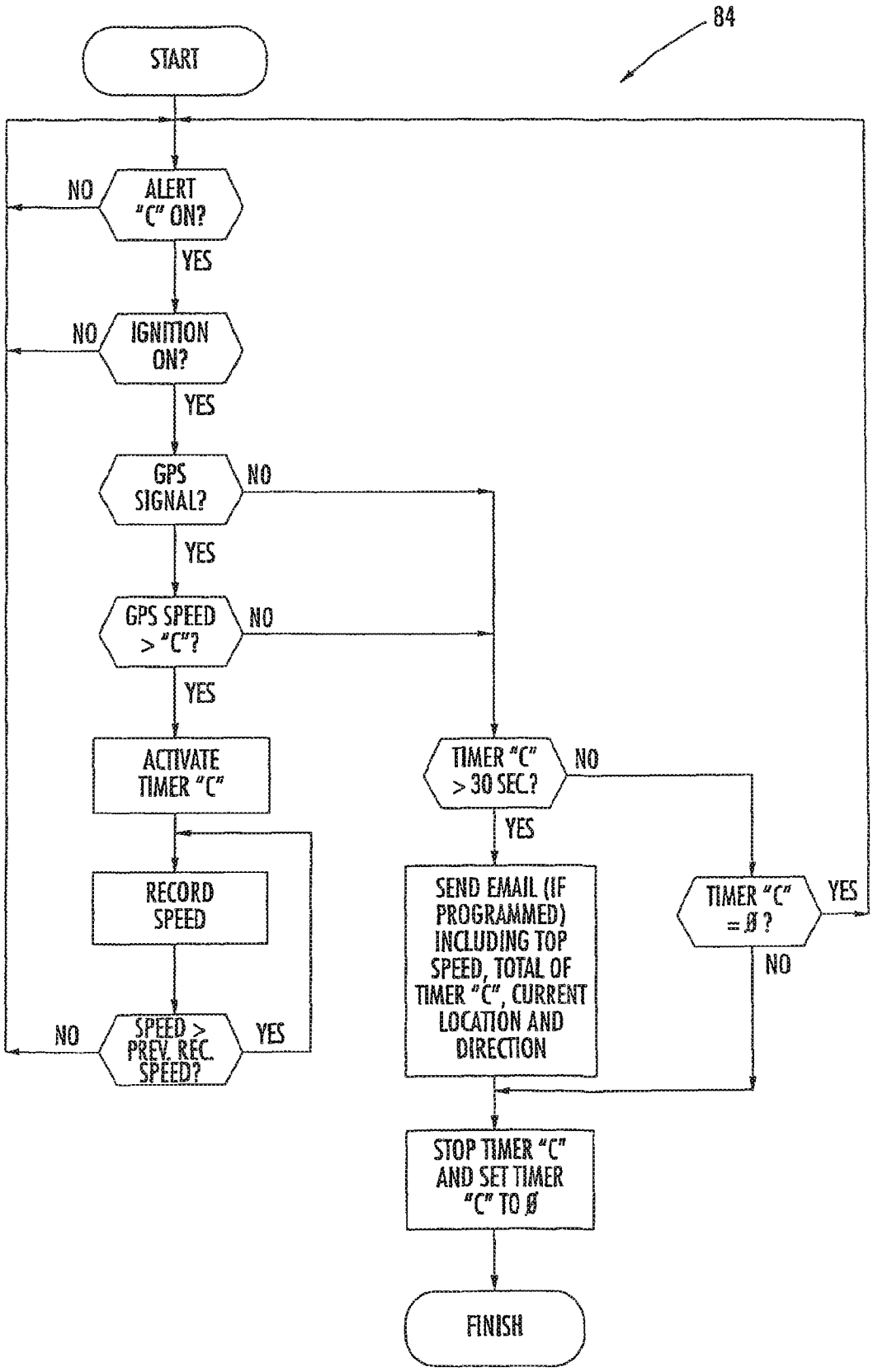

84
START
ALERT "C" ON?
NO
YES
IGNITION ON?
NO
YES
GPS SIGNAL?
NO
YES
GPS SPEED > "C"?
NO
YES
ACTIVATE TIMER "C"
RECORD SPEED
SPEED > PREV. REC. SPEED?
NO
YES
TIMER "C" > 30 SEC.?
NO
YES
SEND EMAIL (IF PROGRAMMED) INCLUDING TOP SPEED, TOTAL OF TIMER "C", CURRENT LOCATION AND DIRECTION
TIMER "C" = Ø ?
YES
NO
STOP TIMER "C" AND SET TIMER "C" TO Ø
FINISH

FIG. 6.

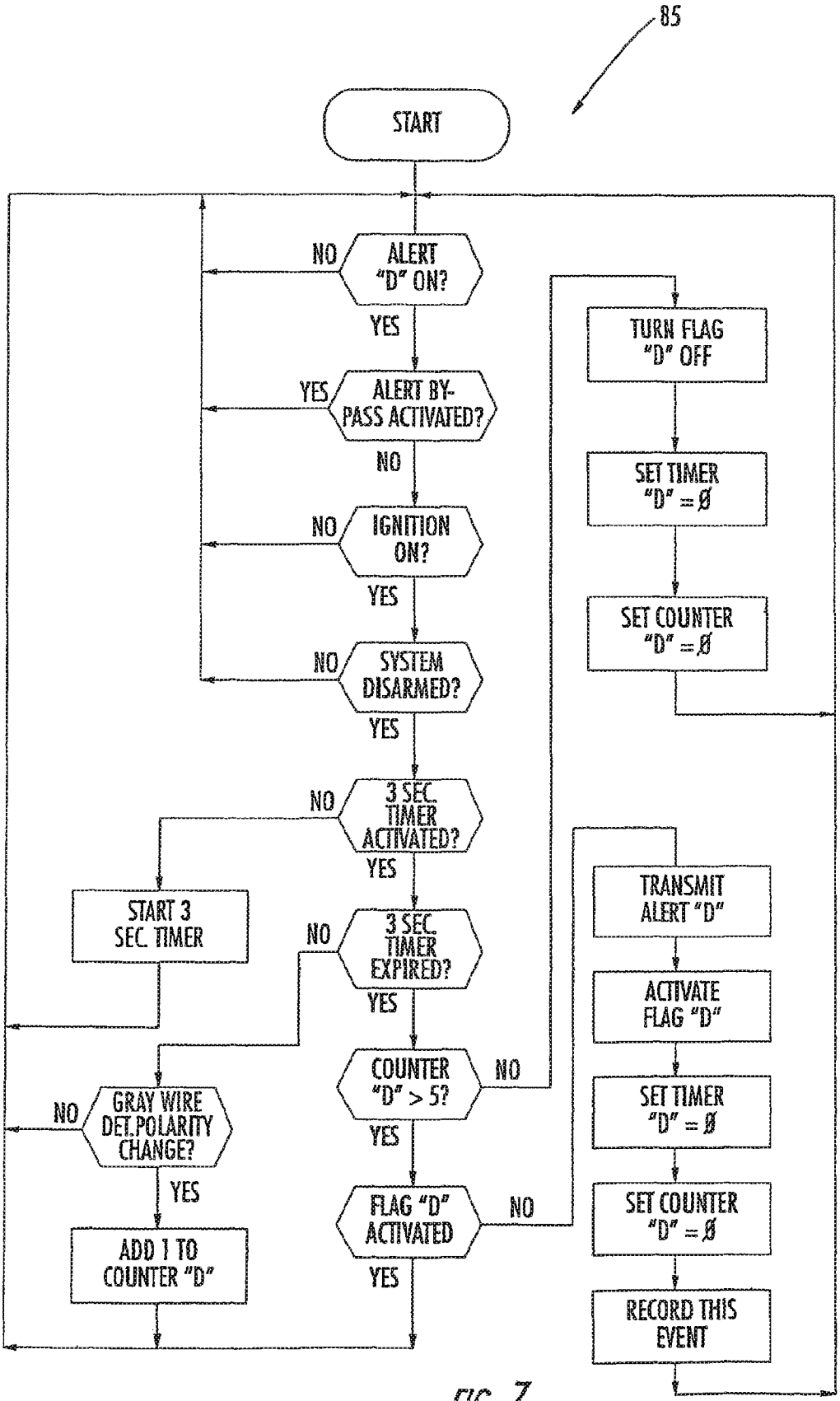

85
START
ALERT "D" ON?
NO
YES
ALERT BY-PASS ACTIVATED?
YES
NO
IGNITION ON?
NO
YES
SYSTEM DISARMED?
NO
YES
3 SEC. TIMER ACTIVATED?
NO
YES
START 3 SEC. TIMER
3 SEC. TIMER EXPIRED?
NO
YES
COUNTER "D" > 5?
NO
YES
GRAY WIRE DET.POLARITY CHANGE?
NO
YES
ADD 1 TO COUNTER "D"
FLAG "D" ACTIVATED
NO
YES
TURN FLAG "D" OFF
SET TIMER "D" = Ø
SET COUNTER "D" = Ø
TRANSMIT ALERT "D"
ACTIVATE FLAG "D"
SET TIMER "D" = Ø
SET COUNTER "D" = Ø
RECORD THIS EVENT

FIG. 7.

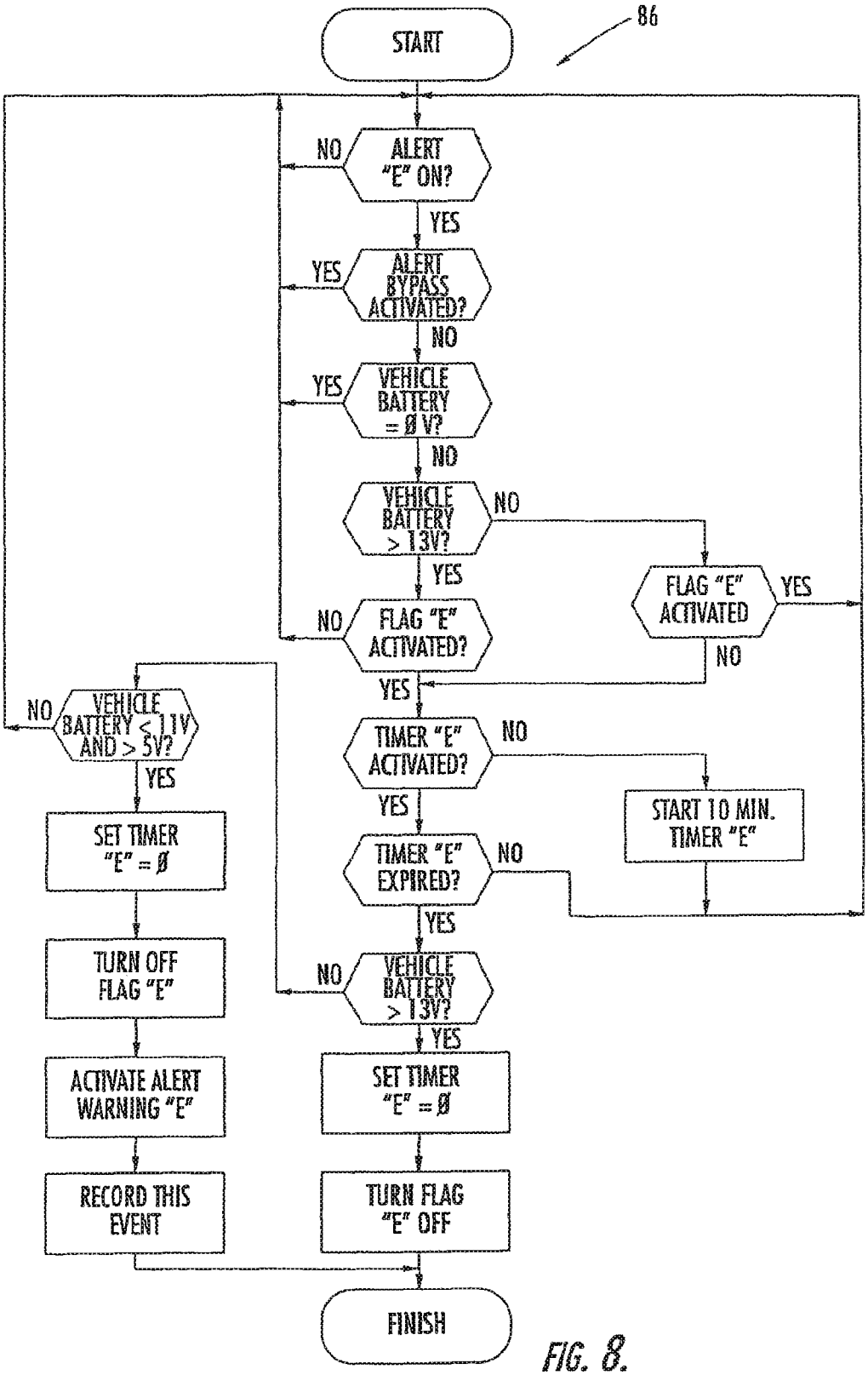

86
START
ALERT "E" ON?
NO
YES
ALERT BYPASS ACTIVATED?
YES
NO
VEHICLE BATTERY = Ø V?
YES
NO
VEHICLE BATTERY > 13V?
NO
YES
FLAG "E" ACTIVATED?
NO
FLAG "E" ACTIVATED
YES
NO
YES
TIMER "E" ACTIVATED?
NO
YES
START 10 MIN. TIMER "E"
TIMER "E" EXPIRED?
NO
YES
VEHICLE BATTERY > 13V?
NO
YES
SET TIMER "E" = Ø
TURN FLAG "E" OFF
VEHICLE BATTERY < 11V AND > 5V?
NO
YES
SET TIMER "E" = Ø
TURN OFF FLAG "E"
ACTIVATE ALERT WARNING "E"
RECORD THIS EVENT
FINISH

FIG. 8.

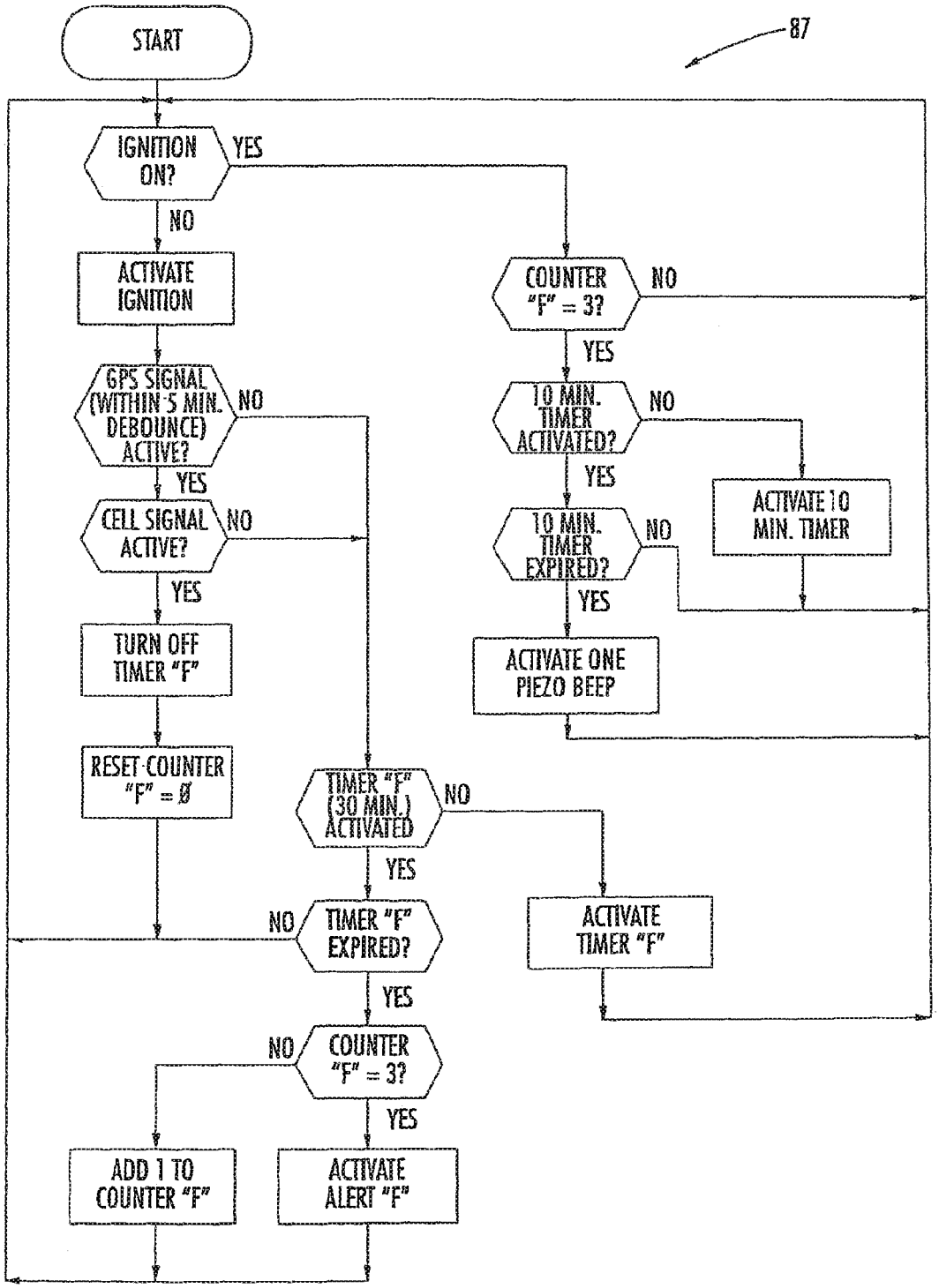

87
START
IGNITION ON?
YES
NO
ACTIVATE IGNITION
GPS SIGNAL (WITHIN 5 MIN. DEBOUNCE) ACTIVE?
NO
YES
CELL SIGNAL ACTIVE?
NO
YES
TURN OFF TIMER "F"
RESET COUNTER "F" = Ø
TIMER "F" (30 MIN.) ACTIVATED
NO
YES
TIMER "F" EXPIRED?
NO
YES
COUNTER "F" = 3?
NO
YES
ADD 1 TO COUNTER "F"
ACTIVATE ALERT "F"
ACTIVATE TIMER "F"
COUNTER "F" = 3?
NO
YES
10 MIN. TIMER ACTIVATED?
NO
YES
ACTIVATE 10 MIN. TIMER
10 MIN. TIMER EXPIRED?
NO
YES
ACTIVATE ONE PIEZO BEEP

FIG. 9.

VEHICLE TRACKER INCLUDING INPUT/OUTPUT FEATURES AND RELATED METHODS

RELATED APPLICATIONS

The present application is a continuation of U.S. patent application Ser. No. 10/383,496 filed Mar. 7, 2003 now U.S. Pat. No. 7,149,623, which is a continuation of U.S. patent application Ser. No. 09/859/972 filed on May 17, 2001 now U.S. Pat. No. 6,606,561 which, in turn, was based upon provisional patent application Ser. Nos. 60/264,811 filed on Jan. 29, 2001; 60/258,005, filed Dec. 22, 2000; 60/251,552, filed Dec. 6, 2000; 60/252,125, filed Nov. 20, 2000; 60/236,890, filed Sep. 29, 2000; 60/246,463, filed Nov. 7, 2000; 60/222,777, filed Aug. 3, 2000; 60/205,178, filed May 17, 2000; and non-provisional U.S. patent application Ser. No. 09/859,972, the entire contents of each of which are incorporated herein by reference.

FIELD OF THE INVENTION

The present invention relates to the field of vehicle devices, and, more particularly, to a tracking and alerting system for a vehicle.

BACKGROUND OF THE INVENTION

Motor vehicles, such as passenger cars, trucks, busses, fleet vehicles, etc. are widely used and knowing the locations of such vehicles is often desired. For example, should a vehicle be stolen, it would be beneficial to know the vehicle's location so that authorities could be promptly and accurately directed to retrieve the vehicle. Indeed, the tracking system could plot the getaway path of the thief.

For a company with hired drivers, it may be desirable to know the driver's whereabouts during the course of the day. Similarly, a rental car agency or other fleet operator, for example, may wish to know the whereabouts of its fleet of vehicles.

It may also be desirable to track the location of a vehicle as it is used throughout the course of a normal day. For parents of younger or older drivers, for example, knowledge of the vehicle's location may provide some assurance that the driver is at designated locations and following a prescribed route.

A number of patents disclose various systems and approaches to tracking vehicles. For example, U.S. Pat. No. 5,223,844 discloses a tracking system including a control center and a mobile unit installed in the vehicle. The mobile unit may send security warnings to the command center via a wireless transceiver. Position information for the vehicle is determined using a GPS receiver at the vehicle.

U.S. Pat. No. 5,515,043 discloses a similar system which may send one or more preprogrammed telephone messages to a user when away from the vehicle. The user may remotely access location information or cause certain commands to be carried out by entering a personal identification number (PIN).

The widespread availability and use of the Internet has prompted a number of vehicle tracking systems to also make use of the Internet. For example, TelEvoke, Inc. proposed such a system in combination with Clifford Electronics. The system was to provide notification, control and tracking services via the telephone or the Internet. Users could be notified via phone, e-mail, or pager of events such as a car alarm being triggered. Users could control the vehicle remote devices via phone, web, or PDA such as unlocking car doors. Additionally, users could track TelEvoke-enabled vehicles on the Internet or via the telephone. An Internet map could be viewed by the user showing the actual and prior vehicle locations. TelEvoke offered its services via a centralized fully automated Network Operations Center. To reduce the communications costs, it was proposed to use the control channel of the cellular telephone network.

There are, of course, a number of vehicles which come from the manufacturer with some form of security system already installed. In addition, a number of vehicles are also equipped with aftermarket security systems. Many conventional vehicle tracking units may not be readily installed in vehicles, particularly those vehicles already including a vehicle security system. In addition, complexity of installation may significantly increase the system costs.

SUMMARY OF THE INVENTION

In view of the foregoing background, it is therefore an object of the present invention to provide a vehicle control system that provides vehicle tracking and function control capabilities.

This and other objects, features, and advantages in accordance with the present invention are provided by a vehicle control system including a tracking unit and a function unit cooperating therewith. The tracking unit may include a vehicle position determining device, a wireless communications device, and a tracking controller cooperating with the vehicle position determining device and the wireless communications device to send vehicle position information to a user. Further, the function unit may include at least one uniquely coded transmitter to be carried by a user, a receiver at the vehicle for receiving signals from the at least one uniquely coded transmitter, and a function controller at the vehicle and connected to the receiver for learning the at least one uniquely coded transmitter to permit control of a vehicle function by the user. The function controller may advantageously cooperate with the wireless communications device of the tracking unit for sending an alert indication of whether at least one new uniquely coded transmitter has been learned.

More particularly, the vehicle control system may further include a local indicator connected to the function controller for providing a local indication of whether at least one uniquely coded transmitter has been learned. Also, the vehicle function may be associated with starting of a vehicle engine, vehicle door locks, and/or vehicle security.

The function controller may be switchable to a learning mode to permit learning of the at least one uniquely coded transmitter, and the function controller may cooperate with the wireless communications device for sending the alert indication when the learning mode has been entered. Moreover, the function controller may cooperate with the wireless communications device for sending the alert indication when the learning mode has last been entered.

Additionally, the function controller may cooperate with the wireless communications device for sending the alert indication for a passage of time since the learning mode has last been entered. Similarly, the function controller may cooperate with the wireless communications device for sending the alert indication for a number of learned uniquely coded transmitters, as well as for sending the alert indication for a change in a number of learned uniquely coded transmitters, and/or for sending the alert indication for a change in a code of at least one learned uniquely coded transmitter.

Further, the at least one uniquely coded transmitter may include at least one uniquely coded remote transmitter, as well as at least one uniquely coded transponder transmitter,

for example. The vehicle position determining device may be a Global Positioning System (GPS) device, and the wireless communications device may be a cellular telephone communications device, for example.

The function unit may also include a biometric characteristic sensor for sensing a unique biometric characteristic of a user, and a function controller at the vehicle and connected to the biometric characteristic sensor for learning the unique biometric characteristic to permit control of a vehicle function by the user. Moreover, the function controller may cooperate with the wireless communications device of the tracking unit for sending an alert indication of whether at least one new unique biometric characteristic has been learned.

A vehicle control method aspect of the invention for a vehicle including a vehicle tracking unit for sending vehicle position information to a user may include receiving signals from at least one uniquely coded transmitter at a receiver at the vehicle, and learning the at least one uniquely coded transmitter to permit control of a vehicle function by the user using a function controller at the vehicle and connected to the receiver. Furthermore, the method may also include sending an alert indication of whether at least one new uniquely coded transmitter has been learned using the vehicle tracking unit.

Similarly, a unique biometric characteristic of a user may be sensed using a biometric characteristic sensor at the vehicle, and the unique biometric characteristic may be learned to permit control of a vehicle function by the user using a function controller at the vehicle and connected to the biometric characteristic sensor. In addition, an alert indication may be sent of whether at least one new unique biometric characteristic has been learned using the vehicle tracking unit.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is a simplified block diagram of a vehicle tracking system in accordance with the present invention.

FIG. **2** is a more detailed block diagram of the vehicle tracking unit as shown in FIG. **1**.

FIG. **3** is a more detailed block diagram of the monitoring station as shown in FIG. **1**.

FIG. **4** is a flowchart for operation of the vehicle tracking system as shown in FIG. **1** illustrating a vehicle stolen alert.

FIGS. **5**A-**5**C are a flowchart for operation of the vehicle tracking system as shown in FIG. **1** illustrating a vehicle alarm sounding alert.

FIG. **6** is a flowchart for operation of the vehicle tracking system as shown in FIG. **1** illustrating a vehicle speeding alert.

FIG. **7** is a flowchart for operation of the vehicle tracking system as shown in FIG. **1** illustrating an unauthorized transmitter learned alert.

FIG. **8** is a flowchart for operation of the vehicle tracking system as shown in FIG. **1** illustrating a low battery alert.

FIG. **9** is a flowchart for operation of the vehicle tracking system as shown in FIG. **1** illustrating a GPS or cellular unit failure alert.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

The present invention will now be described more fully hereinafter with reference to the accompanying drawings in which preferred embodiments of the invention are shown. This invention may, however, be embodied in many different forms and should not be construed as limited to the illustrated embodiments set forth herein. Rather, these embodiments are provided so that this disclosure will be thorough and complete, and will fully convey the scope of the invention to those skilled in the art. Like numbers refer to like elements throughout.

Referring to FIGS. **1-3**, the vehicle tracking system **20** in accordance with the invention is now initially described. The vehicle system **20** illustratively includes a vehicle tracking unit **25** to be mounted in the vehicle **21** and a monitoring station **30** which is remote from the vehicle and which is typically in a fixed location. In the illustrated embodiment, the vehicle tracking unit **25** interfaces with various vehicle devices, such as may include security sensors, door locks, etc. as will be appreciated by those skilled in the art.

The vehicle tracking unit **25** is also illustratively connected to a separate vehicle security system **27** as may already be installed in the vehicle **21**, from the factory or installed as an aftermarket product. Those of skill in the art will appreciate that in some embodiments of the vehicle tracking system **20** a separate vehicle security system **27** may not be needed, and/or various features thereof can be readily incorporated in the vehicle tracking unit **25**.

The monitoring station **30** may typically service a number of subscribers **31**. As shown perhaps best in FIG. **3**, the monitoring station **30** may include a user interface, such as the schematically illustrated telephone network interface **33** and the internet interface **34** which are schematically coupled to a telephone **35**, and a computer **36**, respectively. Of course in other embodiments, other interfaces may be used and only one of the illustrated interfaces may be needed. Those of skill in the art will also recognize that messages may be sent to a subscriber or user via preprogrammed voice messages, e-mail messages, facsimile messages, pager alerts, etc. In addition commands or instructions from the subscriber can also be input to the monitoring station **30** via the telephone network interface. **33** and/or the internet interface **34**, from the subscribers telephone **35** or computer **36**.

The monitoring station **30** is illustratively connected to a cellular telephone tower **32** which, in turn, may communicate with the vehicle tracking unit **25** in some embodiments. Of course, in other embodiments other communications approaches are also contemplated, such as, for example, including satellite communications.

The monitoring station **30** may typically include the necessary modems, and other communications electronics, and computers for its functions which are described in greater detail below. The configuration of such components and their details will be readily apparent to those skilled in the art. Accordingly, no further discussion of these details is needed.

Referring now more specifically to FIG. **2**, additional details of the vehicle tracking unit **25** and devices at the vehicle are now further described. The vehicle tracking unit **25** illustratively includes a controller **40**, a vehicle position determining device **42**, and a wireless communications device **44** connected together. The vehicle position determining device **42** may be provided by a GPS receiver, for example. The GPS receiver typically operates by receiving multiple signals from spaced apart satellites **38** as will be appreciated by those skilled in the art.

In other embodiments, the vehicle position determining device **42** may be provided based upon communications with the cellular telephone network, or based upon other satellite transmissions, for example. As a particular example, time of arrival techniques are available based upon multiple reception paths to determine position via the cellular telephone network as will be appreciated by those skilled in the art. The vehicle position determining device **42** also illustratively includes an indicator **43** associated therewith, such as for indicating an

operating mode, or proper operation of the device as will be addressed in greater detail below.

The wireless communications device **44** may be provided by a cellular telephone transceiver configured to operate on a control channel of the cellular network. Such a control channel may provide nearly universal coverage for the tracking system **20** as will be appreciated by those skilled in the art. In addition, the control channel may offer relatively inexpensive communications between the monitoring station **30** and the vehicle tracking unit **25** as will be appreciated by those skilled in the art. The wireless communications device **44** also illustratively includes an optional status indicator **45** with a similar function as the indicator **43** for the vehicle position determining device.

The wireless communications device **44** in other embodiments, may transmit in the voiceband of the cellular network. Alternately, the wireless communications device may communicate over other networks, such as over satellite, or via wireless internet services, as will be appreciated by those skilled in the art.

The controller **40** illustratively includes a central processing unit (CPU) **50** or other logic circuitry which is connected to a clock signal generator **51** and a memory **52**. In other embodiments, the memory **52** may be an embedded memory in the CPU **50**. The controller **40** also includes schematically illustrated input/output circuitry **53** to interface with various vehicle devices. In particular the input/output circuitry **53** may provide dual polarity compatibility for one or more inputs or outputs as will be described in greater detail below. One or more of the terminals of the input/output circuitry **53** may also provide both input and output functions as will also be described in greater detail below. This may significantly simplify and accelerate installation of the vehicle tracking unit **25** in the vehicle **21**.

Also illustratively shown as part of the vehicle tracking unit **25** are a back-up battery **54**, and switch **55** connected thereto for selectively powering certain of the components based upon the controller **40**. Of course, the vehicle **21** also includes an electrical system including the vehicle battery **61**. Powering of the vehicle tracking unit **25** is described in greater detail below.

The vehicle **21** also includes a number of other components that may relate to vehicle tracking, security, and/or convenience features provided by the vehicle tracking system **20**. For example, the vehicle **21** may include one or more door lock actuators **62**, an optional remote starting device **63**, a starter interrupt device **66** and an alarm indicator **67**. For example, the alarm indicator may be provided by a vehicle horn or vehicle siren, and/or flashing of the lights.

The optional separate security system **27** illustratively includes a vehicle security controller **28** and a receiver **29** connected thereto. As is conventional, the vehicle security system **27** may be switched between armed and disarmed modes, for example, by one or more uniquely coded remote transmitters **60**. The vehicle security controller **28** may also be capable of learning a new uniquely coded remote transmitter **60** as will be appreciated by those skilled in the art. The vehicle security controller **28** also illustratively is connected to the starter interrupt device **66** and the alarm indicator **67**.

For ease of explanation, a number of the features of the vehicle tracking system **20** are now described. The vehicle tracking system **20** includes a number of features that may simplify installation and maintenance. For example, as shown in FIG. **2**, the vehicle tracking unit **25** may have a test switch **71** connected to the controller **40**.

In normal operation, the controller **40** may be called upon to operate at least one vehicle device. Of course, the controller **40** also cooperates with the wireless communications device **44** and the vehicle position determining device **42** to determine and send vehicle position information to the monitoring station **30**. Moreover, the controller **40** may be switchable to a test mode for test operation of the at least one vehicle device responsive to activation of the test switch **71**.

In some embodiments, the at least one vehicle device may be a plurality of vehicle devices that are tested by operation in sequence. For example, the at least one vehicle device may comprise at least one door lock actuator **62**. The at least one vehicle device may also comprise the starter interrupt device **66**, or the engine remote starter **63** if remote starting is an implemented feature. The at least one vehicle device which is tested, may also be the alarm indicator **67**. Accordingly, an installer, for example, can quickly check that the tracking unit has been properly installed.

To further provide for ready determination of proper operation of the vehicle tracking unit **25**, one or both of the position determining and wireless communications devices **42**, **44** may include associated indicators **43**, **45** as mentioned briefly above, and which provide an indication relating to proper operation. Each indicator **43**, **45** may indicate a mode of operation of the device, its proper operation, or a partial or complete failure of the device.

Another aspect of the invention is that the controller **40** may provide a selectable polarity for the at least one vehicle device based upon sensing thereof. Accordingly, a predetermined activation of the test switch **71** may cause the controller **40** to sense and select the proper polarity. Pressing the test switch **71** for a predetermined time or in a predetermined pattern may sense and set the polarity.

Another feature of the vehicle tracking unit **25** and vehicle tracking system **20** relates to conservation of the number of codes or messages that need to be sent to the vehicle tracking unit. In particular, the controller **40** may have a plurality of different controller states and respond differently to a same message from the monitoring station **30** at different times depending upon the controller state at a given time. Accordingly, a number of codes or messages used by the system can be conserved. Various messages are described in greater detail below.

A controller state may change based upon several different occurrences or events. For example the controller may change states in response to a change in at least one vehicle device, or based upon a message received by the wireless communications device **44** from the monitoring station **30**, and/or based upon elapsed time. The controller states, for example, may include an alert sent state based upon an alert message being sent from the wireless communications device **44**. Thereafter, receipt of a predetermined message by the wireless communications device **44** when the controller **40** is in the alert sent state may confirm receipt of the alert message by the monitoring station.

Receipt of the predetermined message by the wireless communications device **44** when the controller **40** is in another state different than the alert sent state may thus cause a different response by the controller. The alert sent state may comprise at least one of a vehicle stolen alert sent state, a vehicle alarm sounding alert sent state, a vehicle speeding alert sent state, an unauthorized remote transmitter alert sent state, a low vehicle battery alert sent state, and a device malfunction alert sent state. The various alert messages and confirmation thereof are described in greater detail below.

The code or message conservation aspects of the vehicle tracking system **20** also permit sending a sequence of codes or messages within a predetermined time to also cause a different response at the vehicle tracking unit **25**. In other words,

the plurality of controller states may comprise a received first message state based upon a first message being received by the wireless communications device **44** from the monitoring station **30**. Receipt of a second message by the wireless communications device **44** when the controller **40** is in the received first message state, such as within a predetermined time window, for example, may thus cause a different response by the controller than does receipt of the second message when the controller is in another state than the received first message state.

The plurality of controller states may comprise a vehicle finder state sounding an audible signal via the alarm indicator **67** at the vehicle **21**. In this state the controller **40** would bypass sending a vehicle alarm sounding alert to the monitoring station **30**.

Another aspect of the vehicle tracking system **20** is the provision of certain power conservation and management techniques, such as to permit extended periods where the vehicle **21** is not in operation. During such extended periods, the vehicle battery **61** provides power to the vehicle tracking unit **25** as well as other vehicle devices. Accordingly, the voltage of the vehicle battery **61** drops over time. The vehicle tracking unit **25** may provide a significant drain on the vehicle battery **61** because of the power consumed by the wireless communications device **44** during transmission as will be appreciated by those skilled in the art.

The vehicle position determining device **42**, the wireless communications device **44** and the controller **40** may be considered as defining a power load of the vehicle tracking unit **25**. The controller **40** may operate the schematically illustrated power switch **55** to isolate the back-up battery **54** from the power load as a voltage of the vehicle battery **61** drops until reaching a threshold. After or below the threshold the controller **40** may cause the back-up battery **54** to selectively power only a first portion of the power load while a second portion of the power load remains powered by the vehicle battery.

For example, the wireless communications device **44** may have a higher operating voltage than the vehicle position determining device **42**. The first portion of the power load that is selectively powered despite the low vehicle battery voltage may thus be the wireless communications device **44**. In particular, the wireless communications device **44** may be powered for transmission. Accordingly, the back-up battery **54** can be saved for limited communication using the higher voltage wireless communications device **44**. This provides useful features even after an extended period during which the vehicle **21** is left unattended and the vehicle battery **61** gradually discharges.

To further conserve power, the controller **40** may reduce operation of the power load as vehicle battery voltage falls. Conversely, the controller **40** may restore operation of the power load based upon the voltage of the vehicle battery **61** rising again, such as upon being recharged.

Also relating to power consumption, the controller **40** further causes transmission of a low vehicle battery voltage alert to the monitoring station **30** based upon the voltage of the vehicle battery **61** falling below the threshold. The user or subscriber may cause the monitoring station **30** to issue a remote start command. The controller **40** may then generate a remote start output to the remote start device **63** to thereby start the engine and recharge the vehicle battery.

Another feature of the vehicle tracking system **20** is that the vehicle tracking unit **25** may be readily installed and connected to a vehicle **21**, such as in the illustrated embodiment where the vehicle includes a starter interrupt device **66** and a separate vehicle security controller **28**. More particularly, the controller **40** may switch between an armed mode and a disarmed mode based upon operation of the engine starter interrupt device **66**. The controller **40** when in the armed mode may cooperate with the wireless communications device **44** to send an alert message to the monitoring station **30** and including vehicle position information, for example, based upon the vehicle position determining device **42**. The controller **40** is also for selectively operating the engine starter interrupt device **66** to provide additional security features.

In one advantageous embodiment, the controller **40** preferably comprises a combination input and output terminal for connection to the engine starter interrupt device. This terminal is at the input/output circuitry **53** and is schematically illustrated by reference numeral **72**. The controller **40** may switch to the armed mode when in the disarmed mode and based upon the engine starter interrupt device **66** being operated to disable engine starting. Conversely, the controller **40** may switch to the disarmed mode based upon the engine starter interrupt device **66** being operated to enable engine starting. In other words, the vehicle tracking unit **25** can piggyback its arming and disarming off the existing vehicle security system **27**, for example.

The controller **40** may also selectively operate the engine starter interrupt device **66** based upon a command message from the monitoring station **30**. The controller **40** may selectively operate the engine starter interrupt device **66** based upon a command message from the monitoring station **30**. Alternately, or in addition thereto, the controller **40** may selectively operate the engine starter interrupt device **66** based upon the ignition switch **65**.

The following descriptive portions relate to various user or subscriber notifications and features provided by the vehicle tracking system **20**. Of course, the controller **40** preferably cooperates with the wireless communications device **44** to send an alert message. The monitoring station **30** may comprise a user interface, such as one or both of the telephone network or internet interfaces **33**, **34**, respectively (FIG. **3**), for generating a sequence of alert message notifications based upon receiving the alert message sent from the vehicle tracking unit **25**. More particularly, the monitoring station interface permits canceling any remaining alert message notification based upon a cancellation command response from a user or subscriber having already received the alert message notification. The user may send the cancellation response via the telephone **35** or computer **36** (FIG. **3**), for example. Thus, if the user may be reached at different telephone numbers or different users are desirably notified of the alert, this aspect of the vehicle tracking system **20** can make the notifications efficiently and without making unnecessary notifications.

The vehicle tracking system **20** may provide any of a number of very useful alerts, as discussed herein. For example, the alert message sent from the vehicle tracking unit may comprise at least one of a vehicle stolen alert message, and a vehicle alarm sounding alert message. The alert message may be one of a vehicle speeding alert message, and a vehicle acceleration alert message. In addition, the alert message may comprise an unauthorized remote transmitter alert message. Also, the alert message may be at least one of a low vehicle battery alert message, and a device malfunction alert message.

The speeding alert may be based upon exceeding a speed threshold for greater than a certain time, which may be user selectable. The acceleration alert may also be useful as such is also indicative of aggressive driving along with the speeding alert. The unauthorized remote transmitter alert increases overall security since a user will be notified if a would-be thief

learns an unauthorized transmitter to operate the controller. These alerts are described in greater detail below.

The vehicle tracking system **20** may be implemented as a service to a subscriber. In other words, the subscriber pays a monthly fee for the service. Accordingly, it may be important to encourage a user to register. Similar subscriber or registrations systems in the past have suffered revenue losses since some users would wait to activate the system until the vehicle was stolen. In other words, the user would only subscribe or register and pay a single month's fee.

In accordance with this aspect of the vehicle tracking system **20** prompt user registration is encouraged. In particular, the vehicle tracking unit **25** may include the user registration reminder indicator **56** and the controller **40** may be switchable from an unregistered mode to a registered mode. In the registered mode, the controller **40** may cooperate with the wireless communications device **44** and the vehicle position determining device **42** to determine and send vehicle position information to the monitoring station **30**. In the unregistered mode, the controller **40** may activate the user registration reminder indicator **56** to encourage registration by the user.

The controller **40** may be switchable to the registered mode based upon an activation message from the monitoring station **30**. For example, when the registration payment has been received, the monitoring station can send one or more messages to the vehicle tracking unit **25** to stop activation of the registration reminder indicator **56**. The indicator **56** may be audible, visual or both. For example, the registration reminder indicator **56** could be a beeping sound generated by a small piezoelectric transducer every ten minutes or so when the ignition **65** is on.

In other words, the user registration reminder indicator **56** may provide a minor but irritating annoyance to the user to encourage registration. Upon successfully registering, the annoyance is abated. Accordingly, a relatively straightforward approach is provided to encourage user registration.

Along these lines, the controller **40** when in the unregistered mode may have reduced features compared to the registered mode. For example, the controller **40** when in the unregistered mode may be restricted or limited in sending messages with the wireless communications device **44**. Accordingly, usage of the wireless communications network may be reduced. Transmissions from the vehicle tracking unit **25** may also be beneficially suppressed during original installation, for example.

Returning again to features of the vehicle tracking unit **25** which facilitate installation, the controller **40** may send an alarm indication alert responsive to a continuous activation of the alarm indicator **67** for greater than a predetermined time. Alternately, or in addition thereto, the controller **40** may send an alarm indication alert responsive to a repetitive pattern of alarm indicator **67** activations. In other words, the controller may be configured to distinguish between normal operation of a vehicle horn by the driver, and activation of the horn by the security system **27**. As mentioned above, the controller **40** may also monitor signals of at least one of a first and second polarity. The controller **40** thus advantageously piggybacks off the alarm indication generated by the vehicle security system **27** to determine and send a vehicle alarm sounding alert to the monitoring station **30**.

In one variation, the controller **40** may monitor signals delivered directly to the vehicle alarm indicator by the vehicle security controller **28**. In another variation, the controller **40** monitors signals of voltage dips of the vehicle battery **61**. Circuitry is conventionally and readily available for both such functions, as will be readily appreciated by those skilled in the art.

The controller **40** may also include a dual polarity compatible output in the input/output circuitry **53** for a vehicle device, such as the vehicle alarm indicator **67**. The controller **40** may further monitor signals relating to activation of the vehicle alarm indicator **67** and send an alarm indication alert with position information from the vehicle position determining device and using the wireless communication device.

For the dual polarity output compatibility, the controller **40** may generate a first polarity output pulse followed by a second polarity output pulse. The controller **40** may also generate a repeating pattern of a first polarity output pulse followed by a second polarity output pulse on the dual polarity compatible output. In yet other embodiments, the controller **40** may sense an actual polarity of the device and thereafter use the actual polarity for the dual polarity compatible output.

Where the vehicle device is a vehicle horn, the controller **40** may typically be configured to generate a negative polarity output on the dual polarity compatible output. Conversely, wherein the vehicle device is a vehicle alarm indicator siren, the controller **40** may be configured to generate a positive polarity output on the dual polarity compatible output.

Another aspect of the vehicle tracking system **20** relates to conserving memory space and/or reducing transmission time over the communications network. In accordance with this advantageous feature, the controller **40** may determine the vehicle position information including a vehicle location and an associated stationary period for each occurrence of the vehicle remaining stationary for greater than a predetermined period. In one embodiment, the controller **40** may cooperate with the wireless transmission device **44** to send the vehicle position information to the monitoring station based upon each occurrence of the vehicle remaining stationary for greater than the predetermined period. In this embodiment, the monitoring station **30** may associate a time with each occurrence of the vehicle remaining stationary for greater than the predetermined period. In other words, the monitoring station **30** may time stamp the received information.

In another embodiment, the controller **40** cooperates with the wireless transmission device **44** to send the vehicle position information to the monitoring station **30** for a plurality of occurrences of the vehicle remaining stationary for greater than the predetermined period. In this embodiment, the controller **40** may associate a time with each occurrence of the vehicle remaining stationary for greater than the predetermined period. In other words, the controller time stamps the position and stationary period information.

As an example, the predetermined time which determines whether the vehicle **21** is stationary and the position should be determined, may be less than about three minutes. This time may filter out vehicle stops in normal traffic, but which will keep track of stops where the driver likely leaves the vehicle **21**. Accordingly, only the important information necessary to track the vehicle need be stored and/or transmitted thereby reducing the system costs. If the vehicle **21** is stationary overnight, for example, unnecessary position information need not be determined, stored, and/or transmitted to the monitoring station **30**.

The controller **40** may comprise the memory **52** for storing the vehicle position information therein. In one configuration, the controller **40** downloads the vehicle position information from the memory **52** to the monitoring station **30** based upon a predetermined schedule. In another configuration, the controller **40** downloads the vehicle position information from the memory **52** to the monitoring station **30** based upon a predetermined event. In yet another configuration, the controller **40** downloads the vehicle position information from

the memory **52** to the monitoring station **30** based upon a predetermined percentage of memory usage.

Having now described certain general features and advantages of the vehicle tracking system **20**, this description now turns to additional specific details which are provided as examples. In particular, vehicle tracking system **20** preferably implements one or more of the following features:

a. Detects the vehicle being stolen and transmits a signal to the monitoring station to contact up to 3 people, for example, predetermined by the user, of theft of the vehicle and then starts tracking the vehicle. The contact may be by one or more of the following: an e-mail message, a pager alert, a cellular telephone call, or other telephone call.

b. Detects an optional vehicle security or alarm system activation and transmits a signal to the monitoring station to contact up to 3 predetermined people to inform them the vehicle's alarm is being activated.

c. Detects an optional vehicle alarm system's remote PANIC activation and transmits a signal to the monitoring station to contact up to 3 predetermined people to inform them of the vehicle's PANIC being activated.

d. Detects a vehicle being programmed to operate from an unauthorized remote transmitter, key transponder, other transponder, or other device that has a unique coding, and the vehicle unit transmits a signal to the monitoring station to contact up to 3 predetermined people to inform them of this occurrence. The system can also make available information relating to a number of such coded devices, or a change therein, or when a change occurred. A message can be sent to the user or the information can be available to the user on the website. The vehicle would be equipped with a security system as disclosed in U.S. Pat. No. 5,654,688, for example, which determines an unauthorized transmitter and provides an alert feature. This patent is incorporated herein in its entirety by reference.

e. Detects the vehicle traveling over a predetermined speed, such as for a predetermined time, and transmits a signal to the monitoring station to send a message, such as an e-mail informing the user (and/or others) of this occurrence. Of course, the message could also be sent via a telephone call or page, should additional urgency be required. The vehicle's predetermined maximum speed limit and duration thereof can be selected by the user.

f. Detects a low battery voltage such as for a predetermined time and transmits a signal to the monitoring station to contact up to 3 predetermined people to inform them of vehicle's low battery voltage. This is especially advantageous during winter so that the vehicle could be started, for example, to prevent a problem before it happens. The time setting is preferably selectable by the user.

g. Detects the vehicle not moving for a predetermined time and transmits a signal to the monitoring station to send, for example, a nightly e-mail informing the user of all the vehicle's location and stationary time occurrences. The stationary time length is also selectable. This may be advantageous to encourage patrolling personnel not to remain for a long time in a same location.

h. The vehicle unit preferably includes a back-up battery system making it more reliable.

The vehicle unit may be relatively inexpensive. In addition, the monitoring fee that includes sending up to 60 e-mails and making up to 6 phone calls per month, may also be relatively low. The relatively low monitoring fee is based, at least in part, on the current relatively low rates charged for use of the control channel of the cellular telephone network. It is also noted that access to the control channel provides coverage for almost the entire U.S., for example.

The user or subscriber also preferably has access to an Internet site that will display a map and silently contact the vehicle to acquire its current location, speed, direction of travel, and previous multiple locations with speeds, for example, the user's personal identification number (PIN) can be quickly activated by a telephone call. No additional installation may be required.

Certain annual pre-pay package arrangements may be available. For example, up to 10 access entries per month can be provided on a low monthly billing. Up to 30 access entries could be provided also for a relatively low monthly fee.

The present invention provides a number of other significant advantages including optional access from any phone or from any computer to access the monitoring station internet site. The user may control various vehicle functions remotely via the telephone or the internet site. The only charge may be for additional equipment and installation.

Additional features can also be included with the system and subscribed to by the user in accordance with the invention. For example, these include Hijack, Car Finding, Unlock Doors and Unauthorized Transmitter Alert Features. The equipment and installation is relatively inexpensive. For the hijack feature: from any phone or computer, the user may activate vehicle starter interrupt and sound the horn until the vehicle is retrieved (Command 4).

For the Car Finding feature: from any phone or computer, the user may activate the vehicle's horn, or siren and sound same for 30 seconds. This allows the user to find his vehicle in a crowded parking lot (Command 5).

For the Lock/Unlock vehicle doors feature: from any phone or computer a predetermined command (Command 7) activates unlocking of vehicle doors to retrieve keys, for example, that may have been accidentally locked inside the vehicle. Of course, the system can also be used to lock vehicle doors if this was forgotten (Command 6). The unauthorized transmitter alert feature is similarly selected as described above.

In addition, a remote vehicle start feature may also be provided, such as to start the vehicle's engine to heat or cool the vehicle prior to entry. The equipment and installation for remote starting may be relatively low. Some further details of a specific embodiment of the vehicle tracking unit **25** are provided below as relating to use of red and green LED indicators as may be coupled to the controller **40** and operated thereby. Also various representative wires, designated by color, are provided as an example embodiment.

The red LED verifies the GPS receiving signal. With a yellow wire having positive 12 volts, the red LED blinking indicates searching GPS location, constant indicates found location, and off indicates no GPS signal found. With the yellow wire not having positive 12 volts, if the red LED is off, the LED is not functioning.

The green LED verifies receiving the cell tower signal. With the yellow wire having positive 12 volts, blinking indicates the cell control channel signal is detected, constant indicates sending a micro burst signal (LED stays on 5 seconds after each transmission), and off indicates no cell tower signal received. With the yellow wire not having positive 12 volts, off indicates the green LED is not functioning.

An example of representative DIP switch feature selection is as follows. A first switch may be used for adding the orange wire for controlling arm/disarming of the system. When on, the orange wire controls arm/disarm as follows: to arm, the orange wire is grounded and the yellow wire does not have 12

volts positive. To disarm, the orange wire is not grounded. When the first switch is off, then only the yellow wire controls arm/disarm as follows: to arm, the yellow wire is without 12 volts positive, and 30 seconds after continued arm mode then the orange wire activates a constant 500 ma grounded output to operate an external starter interrupt relay until the system is disarmed. To disarm, the yellow wire is connected to 12 volts positive.

A main 5-pin plug may be provided on the vehicle unit and connected as follows:

a. The Red Wire is connected to the 12 vdc power. An alert warning "E" is given if the system is armed and the battery voltage becomes lower than 11 volts for longer than ## minutes. This alert feature "E" will not operate again until the voltage is above 12 volts to re-set this feature.

b. The-black wire is connected to ground.

c. The yellow wire is connected to the ignition 12 volts so that if the key is on, 12 volts is supplied thereto and if the key is off, the yellow wire is connected to ground. Further: if the system is in an armed mode and the Lat/Long changes, then Alert "A" is given. If the system is disarmed and within 2.5 seconds after the yellow wire receives 12 volts and the gray wire detects 3 or more positive pulses the system activates Alert "D". If the first DIP switch is in the off position then: if 12 volts is on yellow wire, the system is disarmed and the orange wire discontinues from the 500 ma ground, and if the yellow wire sees ground or neutral, then the system is armed and 30 seconds after the continued arm mode the orange wire activates a constant 500 ma grounded output to operate an external starter interrupt relay until the system is disarmed.

d. The gray wire is for input and output, and can be connected to an alarm siren or horn positive terminal. In addition:

i. With the system armed and if the gray wire detects +12 v pulsing on/off or on constant for more than 10 seconds from an alarm siren or horn honking activation, then alert warning "B" alarm activation is given.

ii. With system disarmed and if the gray wire detects +12 v pulsing on/off or on constant for more than 10 seconds from an alarm siren or horn honking activation, then alert warning "C" panic activation is given.

iii. With system disarmed and if the Gray wire detects 3 or more 12 volt positive-pulses within 2.5 seconds of yellow wire receiving +12 v and the gray wire by-pass not being activated, then alert warning "D" is given.

iv. The gray wire bypass operates as follows:

1. After alert warning "B" bypass all future alert "B" signals until system is disarmed.
2. After alert warning "C" bypass all future alert "C" signals until system is armed.
3. After alert warning "D" bypass all future alert "D" signals until no 12 volt pulses are detected on the gray wire within 3 seconds of the yellow wire having 12 volts.

v. With the system armed or disarmed. The Output: Internal +12 v, 1 amp transistor with pulses 1 second on and 1 seconds off to activate siren or honk car horn or flashing light relay.

1. Non-stop activation from (Command "4")
2. 30-second activation from (Command "5")

vi. Turn off the above alert "A" from (Command "1").

e. The orange wire is for the starter interrupt and arm/disarm system, and operates as follows:

i. If first DIP switch is in the:

1. On position and: the orange wire has 12 volts or neutral, the system switches to the disarmed mode; the orange wire is grounded, then the system is switched to the armed mode; and the starter interrupt output will not automatically operate. It can only be activated from "Command 4"
2. Off position and the orange wire does not effect the arming or disarming of the system; 30 seconds after system arms the orange wire will automatically activate constant 500 ma ground until the system is disarmed. And from "command #4". Connect to Starter interrupt relay output.

ii. Command 4 activates Orange wire to have 500 ma. negative until Command 1 is received.

iii. After alert warning "B" is activated the first time it is thereafter bypassed while the orange wire remains grounded. Alert warning "B" is re-set to operate again 3 seconds after orange-wire becomes ungrounded.

The vehicle unit may also include a Door Lock Plug configured as follows, for example. A green wire provides a 250 ma, negative 1 second pulse for Lock Doors. (Command "6"). A red wire provides a constant 12 v output from the red power wire. A blue wire provides a 250 ma., negative 1 second pulse for Unlock Doors (Command "7"). A pink wire provides a 250 ma., negative 1 second pulse for remote Car Starter (Command "2").

An installation test button may also be provided to work as follows. Pressing the button activates the orange wire for 10-seconds (starter interrupt), with these circuits in sequence. First, it activates the gray wire for 1-second (siren/horn). After the first stops, it activates the green wire for 1 second to lock the doors. After the second stops, it activates the blue wire for 1 second to unlock the doors. After the third stops, it activates the pink wire for 1 second to activate an optional item.

Representative warning alerts are as follows:

a. Alert Warning "A" (FIG. **4**): Automatic activation of "Command 8" and the vehicle unit contacts monitoring station to instantly call 3 phone numbers with the message "Your vehicle is stolen please confirm then call 911 to advise police of website and your pin # so police can locate the vehicle". This is detected with the system armed and the GPS indicating movement. Bypasses all future alert warning "A" signals until the system is re-armed.

b. Alert Warning "B" (FIGS. **5**A-**5**C): the vehicle unit contacts the monitoring station to instantly call 3 phone numbers with the following message "Vehicle alarm activated please confirm". This is with the system armed and detecting gray wire having 12 volts pulsing or on constant for longer than 10-seconds. After alert warning "B" is activated the first time, it is thereafter bypassed while the orange wire remains grounded. Alert warning "B" is re-set to operate again 3 seconds after orange wire becomes ungrounded.

c. Alert Warning "C" (FIG. **6**): the vehicle unit contacts the monitoring station to instantly send e-mail message "vehicle was traveling faster than your preset amount of "###" and time limit of "##" seconds. Indicates the vehicle speed and location that the speeding started and how long speeding accrued" (Detected from GPS). This aspect is further understood with reference to the enclosed flowchart **84** of FIG. **6**.

d. Alert Warning "D" (FIG. **7**): the vehicle unit contacts the monitoring station to instantly call 3 phone numbers with the message "Unauthorized remote transmitter was

just programmed to operate your vehicle." This is with the system disarmed and the Gray wire detecting three or more 12 volt pulses within 2.5 seconds of the yellow wire having seen 12 volts positive. All future alerts "D" are bypassed until no 12 volt pulses are detected on the gray wire within 3 seconds of the yellow wire seeing 12 volts. This aspect is further understood with reference to the enclosed flowchart **85** of FIG. **7**.

e. Alert Warning "E" (FIG. **8**): the vehicle unit contacts the monitoring station to instantly call 3 phone numbers with the message "Vehicle has low battery voltage and system has changed to low voltage mode". This is with the system armed and detecting the red wire with lower than 11 volts for ## minutes. All future alerts "E" are bypassed until, first, more than 13.5 volts are detected on the red wire and, second, after the yellow wire stops having positive voltage the red wire then must detect more than 12 volts.

The following are representative commands for use in the system:

Command 1: Reset all circuits and system remains asleep until the ignition key is turned on. Resets the triggered mode and unit is asleep to prevent power drain on vehicle battery.

Command 2: (Accessory activation) monitoring station Command to the system to activate Pink wire to pulse 250 ma negative for 1 second.

Command 3: (Vehicle Location) website to indicate present location and past events in memory.

Command 4: (Hijack or Stolen) monitoring station Command to vehicle system to activate:

i. Gray wire to pulse 1 sec on/1 sec off with 1 amp positive output and which continues until receive command # 1.

ii. Orange wire to have 500 ma ground and which continues until receive command # 1.

Command 5: (Car Find) monitoring station Command to system activating Gray wire for 30 seconds pulsing 1 sec on/1 sec off with 1 amp positive output.

Command 6: (Lock Doors) monitoring station Command to system activating Green wire to pulse 1 second with 250 ma negative.

Command 7: (Unlock Doors) monitoring station Command to system to activate Blue wire to pulse 1 second with 250 ma negative.

Command 8: (Start Constant Vehicle Tracking) sends previous 2 events in memory and then every 120 seconds get update of location information sent to the Web site.

The system is also operable in a battery saver mode which operates as follows:

a. With the ignition key off, if the battery voltage drops below 11.5 volts for more than 5 seconds, the GPS verification wakes up to look:

i. Once instantly.

ii. Once in 1 hour if at the same location.

iii. Once in 6 hours if at the same location.

iv. Once in 12 hours if at the same location.

v. Once every 24 hours if at the same location.

vi. Activate alert "E" when the battery saver mode is activated, and bypass sending all future Alert "E" until the battery voltage goes above 13 volts for 10 minutes to reset this feature.

Another aspect of the invention relates to automatic vehicle alert e-mails sent containing some or all of the previous system events. This sending can be triggered as follows:

a. At a user selected predetermined time ## (01-24) of each day, or

b. At a predetermined memory fill level, such as full or near full.

In addition, each system event may contain one or more of the following:

a. Vehicle Location

b. Vehicle total time at location

c. Time of day

d. Mph traveling

e. Total time traveling above MPH

f. Direction traveling

g. Delta

h. Special Alert messages, if any, including:

i. GPS signal not received for longer than 5 minutes.

ii) Traveling above ###MPH for ## minutes.

iii) Vehicle is stolen.

iv) Alarm activated.

v) Unauthorized remote transmitter alert.

vi) Battery saver mode activated

vii) Command 1: Reset all circuits and system remains asleep until the ignition key is turned on.

viii) Command 2: (Accessory activation)

ix) Command 3: (Vehicle Location was retrieved)

x) Command 4: (Hijack or Stolen mode activated)

xi) Command 5: (Car Find mode activated)

xii) Command 6: (Locked Doors)

xiii) Command 7: (Unlocked Doors)

xiv) Command 8: (Started 2-second incremental Vehicle Tracking)

Another feature of the invention relates to the selectable threshold conditions causing an event to be recorded into the memory of the vehicle unit. For example, this may include: while the yellow wire has 12 volts, record events every "??" default 15 minutes time if the GPS location has changed. If the GPS location is the same then only update stationary total time. If the GPS antenna is not receiving any signal then enter last known GPS location and with an indication that this was the last known GPS location before the GPS signal stopped, how long no GPS signal was received, and the GPS location in the on-hold file, when the vehicle is traveling above ### MPH for ##-minutes.

The monitoring station may also provide a number of automated phone calls as described above. These may include:

The user's vehicle has issued a stolen alert:

If vehicle is stolen, after receiving the phone message the user then calls 911 to advise police of the theft, and gives the police the website address and an identification number, such as the user's PIN, to allow the police to locate where your vehicle has been, where it is now and keep tracking it until the police can retrieve the vehicle.

If this is a false alert due to vehicle being towed away for service, for example, then the user may press "1" to put the vehicle in an off mode. Once the ignition key is turned on again the system will reset back to its normal operation mode.

The user's vehicle has issued an alarm activated for more than 10 seconds alert. The system will not respond to this alert again until ignition key is turned on again to reset this feature.

The vehicle battery voltage is low or has been disconnected. The tracking system is in low voltage mode. The system will not respond to this alert again until the battery voltage goes above 13 volts for 10 minutes to reset this feature.

The backup battery may be sized according to the GPS receiver and processing power draw. In addition, the battery may also be sized based upon estimated micro burst transmitting power draw. Such transmissions are typically at about 3 watts power to the antenna.

The system according to the invention including the vehicle unit and monitoring station provides a number of significant advantages and features. For example, the police

may be directly contacted by the user when the vehicle is stolen. The user receives the telephone message from the monitoring station, and this is done without requiring the intervention of a manual security monitoring operator, such as an ADT operator, for example. In addition, once in the stolen mode, the vehicle unit will periodically continue to send out its location, so that the police may track the vehicle via the WEB, for example. This location sending feature may begin immediately, that is, without requiring the user to contact the vehicle to begin tracking. Having the vehicle contacting the monitoring station is considerably less expensive than other schemes where the vehicle is periodically polled via the cellular network, for example.

The system may also be interfaced to a breath alcohol sensor at the vehicle, for example, and this information recorded in memory. The information could be passed along to the monitoring station, which, in turn, could send out a notification message (e-mail or telephone) that the vehicle is being operated by a driver who may be impaired by alcohol. The vehicle's location could then be tracked to permit the police to detain the driver.

Another aspect of the unit is that it may be able to recognize the desirability to bypass certain security breach triggers or other events. For example, a car finding feature can be provided that will allow the user to sound the horn or siren when near the vehicle to help locate the vehicle, as in a crowded parking area. Without the bypass feature, the unit could recognize the horn or siren as a security breach and transmit such information to the monitoring center. In accordance with this aspect of the invention, the unit would recognize the car finding feature was activated and thereby bypass sending a security breach transmission, for example. Again, false alarms and unneeded usage and expense of the communications

infrastructure would be avoided.

Yet another aspect of the invention relates to thwarting a would-be thief who attempts to disable the alarm by cutting the battery cable or power supplied to the system. The unit preferably includes a back-up battery. More particularly, upon being in an armed mode and sensing a breach of security, such as the hood opening, for example, the unit will send out a signal indicating the alarm or security breach and while the alarm is indicated, if the battery is disconnected then the unit will send out a message indicating the vehicle is stolen, and also providing the vehicle's current position. Accordingly, the would-be thief is not able to defeat the security system by quickly disrupting power to the unit during an alarm indication or security breach. Also, to prevent additional alerts, this message is prevented from being transmitted again until the user returns to the vehicle to disarm the system and/or turn on the ignition so that the unit sees a voltage above 13 volts, indicating the vehicle has started using the owner's ignition key. This aspect is further understood with reference to the enclosed flowchart **80** (FIG. **4**).

Still another aspect of the invention relates to how the unit can discriminate between ordinary usage or honking of the horn as compared to a security system triggered alarm. Most vehicle security systems will provide a pattern of horn soundings as an alarm indication, and this can be determined and used to reduce false alarm transmissions from the unit. For example, the unit can look at the number of leading and trailing edges of the power pulse used to sound the horn. A single pressing of the horn switch by the user will cause two edges within a predetermined time, such as about 10 to 12 seconds. Accordingly, the unit can be configured to not send a security breach transmission to the control center based upon detecting two transitions. Since a number of vehicle security systems may have a continuous sounding of the horn within the predetermined time, the unit can send the transmission upon detecting only a single transition.

A number of other vehicle security systems provide a series of pulses or horn soundings within the predetermined time. Accordingly, the unit may also be configured to send a security breach transmission upon detecting greater than a predetermined number of transitions, such as greater than nine, for example. This number is also typically higher than a user would generate honking the horn several times within the predetermined time. In other terms, the number of transitions of the horn pulses can be counted, and if equal to one, or greater than nine, for example, the transmission is triggered, and otherwise the sounding of the horn is ignored. Also, to prevent additional alerts, this message is prevented from being transmitted again until the user returns to the vehicle to disarm the system and/or turn on the ignition so that the unit sees a voltage above 13 volts, indicating the vehicle has started using the owner's ignition key. This aspect is further understood with reference to the enclosed flowcharts **81-83** (FIGS. **5A-5C**).

Yet another feature of the invention relates to a low vehicle battery alert. For example, the unit may monitor the battery voltage over a predetermined time such as ten minutes. The ten minute window prevents false tripping, for example, when the voltage dips during engine cranking. In particular, the voltage can be sensed and it can be determined whether it is greater than zero (e.g. greater than six volts) and less than a high value (e.g. eleven or twelve volts), and, if so, a low battery voltage transmission can be communicated to the monitoring station, and ultimately to the vehicle user when away from the vehicle. If the vehicle is being serviced and the battery is disconnected, this will cause the battery voltage to be equal to zero. Then, the low battery voltage transmission will not be communicated to the monitoring station. Also, to prevent additional alerts, this message is prevented from being transmitted again until the user returns to the vehicle to disarm the system and/or turn on the ignition so that the unit sees a voltage above 13 volts, indicating the vehicle has started using the owner's ignition key. Again, false triggerings are reduced. This aspect is further understood with reference to the enclosed flowchart **86** (FIG. **8**).

Yet another advantageous feature of some embodiments of the invention relates to the ability to conserve electrical power. More particularly, when the vehicle is stopped and in the armed mode, the GPS receiver may be periodically operated to determine the vehicle position. If the vehicle position changes, this is indicative that the vehicle is being moved or stolen. For example, the GPS receiver may be operated to generate new vehicle position information every 29 seconds. These relatively quick successive position determinations or readings are generally termed hot start. These are relatively less complicated than a cold start position determination which takes longer, since the cold start position determination requires greater time to acquire and receive data from multiple satellites, as will be appreciated by those skilled in the art.

Unfortunately, this relatively high repeated usage of the GPS receiver may cause unnecessary battery drain, especially when the vehicle is left armed and unattended by the user for an extended period. Accordingly, the power conserving feature of the invention permits the GPS receiver to be turned off when the vehicle is in the armed mode, and the GPS receiver is turned on only when needed. For example, a vehicle sensor, such as a shock sensor, motion sensor, ignition sensor, door sensor, or other sensor, or combinations thereof could be used to start the GPS receiver. This sensor could also be used to

trigger an alarm if desired; however it need not be so used in all embodiments. The GPS receiver, once turned on, could operate in the normal periodic fashion as described above, or for a fixed period of time. The GPS receiver could also be turned off again after some predetermined time if no further sensor signal is received, or if the position fails to change on subsequent position readings or determinations.

Yet another feature relates to permitting more colorful audible alert messages to be generated for the user. The user can, in some embodiments, access an internet site to type or enter the text for a message to be sent, such as to alert the user that his vehicle is being stolen. The audible message then communicated by a telephone call to the user is generated by a speech message synthesizer based upon the entered text. In accordance with this aspect of the invention, the user could type in phonetically spelled words or phrases, such as to create more colorful messages including slang terms, various accents, and/or to mimic various dialects, for example. The speech synthesizer would then generate the desired message customized for the user. Of course, the system could also permit the user to test or preview the pronunciation generated by the speech message synthesizer based on the entered text message prior to its adoption.

Another aspect relates to requesting GPS position information from a vehicle. If a command is sent downstream to the vehicle requesting that GPS information in turn be sent upstream from the vehicle, and the GPS information is not received within a predetermined time, such as about four minutes, then another command may be sent to the vehicle requesting the GPS information. This may keep repeating until GPS information is received, for a predetermined number of tries, or until a user instructs stopping of the requests. This helps to ensure and confirm the activation and reception of GPS tracking coordinates from the vehicle.

Yet another aspect relates to reducing a frequency with which GPS information is sent from the vehicle. More particularly, the unit may be configured to activate GPS information transmission upstream every 2 minutes. To reduce system usage expense and power consumption at the vehicle, this rate of transmission of GPS information could be progressively decreased over time. For example, in one embodiment, upon activation the GPS location signals could be sent every 2 minutes during the first hour, then once an hour for the next 23 hours, after which only one signal would be sent per day.

Turning now to the flowchart **87** of FIG. **9**, still another aspect relates to warning the user of an inoperable or malfunctioning GPS or cellular telephone section. More particularly, if the GPS or cellular telephone antenna wire is cut or the mounting position of either is changed causing the antenna to stop receiving the signal the user would not ordinarily know of this problem quickly. In accordance with one embodiment, if the ignition is turned on a predetermined number of times, such as about three, and each time ignition turns on if no GPS or no cell signal is received for a minimum time, such as about 15 to 30 minutes or longer, an audible warning beeper may be activated in the vehicle. This beeper may be sounded once every 15-minutes. At anytime if the GPS or cell signal is received properly then the system re-sets automatically stopping the beeper sound.

As an example, if the ignition key is turned on and no GPS or no Cell signal is being received for 15-minutes, and the vehicle ignition stays on for 45-minutes and there is still no GPS or no cell signal, the unit counts one. Thereafter, if the ignition key is turned on and no GPS or no cell signal is being received for 15-minutes, and the vehicle ignition stays on for 60-minutes and there is still no GPS or no cell signal, a second count is determined. Thereafter, if the ignition is turned on and no GPS or no cell signal is received for 10-minutes, and the vehicle ignition stays on for only 10-minutes and there is still no GPS or no cell signal, no count is determined. Thereafter, if the ignition is turned on and no GPS or no cell signal is being received for 15-minutes, a third count is determined and the beeper is activated as described above. This beeping may continue every 15-minutes while the vehicle ignition stays on as long as the vehicle ignition stays on for 16-minutes and still no GPS or no Cell signal is being received. If thereafter, the ignition is turned on and no GPS or no cell signal is being received, the beeper beeps once and again beeps once every 15-minutes while vehicle ignition stays on. If in 10-minutes both GPS or cell signal is being received, the beeper system is turned off and the warning count is reset.

By way of example, if the ignition key is turned on and no GPS or no cell signal is being received for only 5, 10 or 12 minutes (with the threshold set at 15 minutes), then no count is determined.

In certain circumstances, the GPS signal may fail, but the cell signal may still be working. Accordingly, it may be desirable to send an indication of the failure of the GPS signal to the central monitoring station to thereby alert the user as described above. If the cell signal also failed, or if the cell signal failed by itself, in other embodiments a separate paging device would transmit the failure or loss of the cell signal information to the central monitoring station, to thereby alert the user.

Yet another feature is directed to efficient use of a relatively small number of codes available to communicate with the tracking unit from the cellular network and central station. More particularly, a typical arrangement may provide eight basic codes and two Awildcard@ codes. The two wildcard codes are reserved for future or other uses. A particular tracking device will respond directly to any of the eight basic codes. For example, the doors could be locked or unlocked, a present location downloaded from the vehicle, etc.

In accordance with this feature, the tracking device may respond differently to the same code or command depending upon the state or condition of the tracking device. For example, if an alarm is triggered at the vehicle, it may be desired that the tracking device continue to send the alarm signal until confirmation is received that the central monitoring station has received the alarm signal. This confirmation can be sent using the same code as may provide another function if the device were not indicating an alarm. Any of a number of such tracking device conditions may trigger a different message to be interpreted from the received code. For example, if any of the above Alerts A-E were triggered, the receipt of a predetermined code, such as code eight, would confirm receipt of the alert by the central station, and this receipt of code eight would not cause the other response (no alarm triggered) in the tracking device. Of course this concept can be extended to other features as will be appreciated by those skilled in the art.

In accordance with another feature, the rate of sending the location or position data (or change in position data) from the vehicle may be varied to reduce system usage and thereby reduce expenses. More particularly, in one embodiment, the rate of sending may be based upon how long the vehicle has remained stationary. This time period may be selected by the user. For example, the selected time may be in the range of 15 minutes to six hours. If the vehicle has been stationary for the selected time period, then the rate of transmission may be reduced. This reduces or eliminates the need to send home position data and send all the over 15-minute stops made that day. Otherwise, that is when the vehicle is moving, the device

may send data at a faster rate. Of course, a system user would not likely be interested in quick updates, especially where the position information is not changing. Conversely, if the vehicle is being moved, it may be desirable to receive more frequent position updates.

Another variation of this transmission rate conservation feature bases the rate of transmission on the vehicle position. For example, a reduced rate of transmission may be selected if the vehicle is in a predetermined area where the user has a lesser interest in quickly updated position information. The user may also have a reduced interest in an area that can be defined outside of a predetermined distance from a reference point.

Yet another variation of the vehicle position transmission rate conservation feature is based upon the vehicle's speed, such as the vehicle's average or maximum speed, for example. Accordingly, if the vehicle is traveling above a preset speed, the rate of transmission may be increased.

In accordance with another aspect of the invention, the tracking device may send the alert indication a predetermined number of times without receiving an acknowledgment as described above, and then wait until the vehicle position has changed before trying again or the cell re-registers or its RSS (received signal strength) changes. Thus, power is conserved. When the vehicle has moved to a new position, any obstructions may no longer be present thereby increasing the likelihood of a successful communication. In addition, the change in position may be determined when the vehicle is sensed to be moving about a predetermined relatively small speed, such as greater than 1 mph, for example.

In all of the embodiments and variations described herein, the tracking device may communicate with one or more other vehicle devices via a vehicle data communications bus. Further aspects of interfacing with a vehicle data communications bus are described in U.S. Pat. Nos. 5,719,551 and 6,011,460 assigned to the assignee of the present invention.

Yet another aspect relates to efficient use of available codes on the cellular telephone control channel. In one particular example, ten codes may be available to be transmitted from the monitoring station to the vehicle trackers. The first eight or nine codes are command codes that will cause a specific action by the tracking device at the vehicle. The other one or two codes may be wildcard codes as mentioned above, that may set a stand-by mode for one or a group of vehicles, for example.

It may be desirable to provide more than eight commands at the vehicle responsive to the corresponding eight available codes. For example, it may be desirable to set a feature on or off, or to set a different feature setting or threshold. In accordance with this aspect of the invention, the commands at the tracker are determined based upon a series of different command codes being received within a predetermined time window.

For example, the monitoring station may send code 9 that switches the tracker in the car into a stand-by mode for a predetermined time and which causes the tracker to respond with an upstream confirmation code 7 or 9 indicating receiving code 9. During the predetermined time of the stand-by mode another code follows that causes a system programmable feature or setting to change. Note that the second code would otherwise cause a different function at the vehicle. Note that system might operate a function 9 if another code 1-9 is not received in the predetermined time. The following list is exemplary for features resulting from second codes 1-9:

Code 1—Tracker will turn off feature of upstream code caused by vehicle alert being detected.

Code 2—Tracker will turn on feature of upstream code caused by vehicle alert being detected.

Code 3—Tracker deactivates cell receiver from operating due to a non-paying customer for monitoring service. That phone number can then be allocated to another customer.

Code 4—Turn on audio buzzer feature that will sound once each 10 minutes. The monitoring station need only send the command to activate the feature, as the tracker will time the period and drive the buzzer thereafter. The monitoring station will normally not need to send this command because the tracker will be configured out of the box with this feature activated to sound the buzzer every 10 minutes until the next command is received.

Code 5—Turn off the audio buzzer. This is to be sent by the monitoring station after a user has successfully activated his account.

Code 6—Turn on the 80 mph speed limit reporting. This will normally not be sent as this feature will be the default setting of the tracker.

Code 7—Turn off the 80 mph speed limit reporting.

Code 8—Increase speed limit 5 mph and increase the time 5 minutes.

Code 9—Decrease speed limit 5 mph and decrease the time 5 minutes, and wait 5 minutes if another code number follows. It could operate this way to allow another set of codes to change more features.

In this example, in response to the tracker receiving the system code 1-9, the tracker sends an upstream code 7 to acknowledge receipt of the system code 1-9. Upon receipt of code 9 the tracker waits up to 5 minutes to determine if another system code is received. If no code is received, then the tracker performs the code 9 operation. Of course, in other embodiments other features or settings can be selected. In general, it may be preferred that the first code sent in a series of two codes, for example, be a code that causes only a minor function to be performed at the vehicle. This is so because if the second code is sent from the monitoring station, but not received at the tracker, only a minor function is performed. For example, the first code may switch between armed and disarmed modes. This is in contrast to using a remote engine starting code or engine shutdown code as the first code. The vehicle may be moving or positioned in a marginal reception area, and the second command may not be received by the tracker within the predetermined time window. As will be appreciated by those skilled in the art, this concept of multiple digit codes, can be extended beyond two digits to three or more.

To further conserve cellular transmissions and as described above, the tracker may be set to record a position based upon a determined event. Only this recorded position information may be downloaded either by user request or at set times. It is desired that such events be relatively few, but that the information still be helpful to the user.

For example, an event for recording of position may be determined based upon the vehicle being stopped for greater than a first time and less than a second time. For example, the first time may be 15 minutes and the second time may be 6 hours. Determination of the vehicle being stopped can be made based upon one or both of the GPS position or the vehicle ignition being turned off. The second time prevents the recording of position information when the vehicle is stopped at the owner's home during the evening, for example. Accordingly, the important information of the vehicle stops being made is recorded and made available to the user, while system communications resources are conserved.

In another example, if the mode is selected to send the vehicle's location every 10 min and the vehicle is in the same

location for greater than a set time, then no more vehicle locations are sent until the vehicle location has changed to start the every 10 min reporting again.

Other features relating to vehicle control systems are disclosed in copending patent applications entitled VEHICLE TRACKER INCLUDING STATIONARY TIME DETERMINATION AND ASSOCIATED METHODS, Ser. No. 09/859,727 filed May 17, 2001, now U.S. Pat. No. 6,512,465; VEHICLE TRACKER CONSERVING CODES AND RELATED METHODS, Ser. No. 09/859,673 filed May 17, 2001, now U.S. Pat. No. 6,522,267; VEHICLE TRACKER WITH POWER SAVING FEATURES AND RELATED METHODS, Ser. No. 09/859,728 filed May 17, 2001, now U.S. Pat. No. 6,512,466; VEHICLE TRACKER COOPERATING WITH A STARTER INTERRUPT AND RELATED METHODS, Ser. No. 09/859,973 filed May 17, 2001; VEHICLE TRACKER WITH USER NOTIFICATIONS AND ASSOCIATED METHODS, Ser. No. 09/859,733 filed May 17, 2001, now U.S. Pat. No. 6,509,868; VEHICLE TRACKER WITH USER REGISTRATION REMINDER AND RELATED METHODS, Ser. No. 09/859,971 filed May 17, 2001, now U.S. Pat. No. 6,507,786; VEHICLE TRACKER INCLUDING INPUT/OUTPUT FEATURES AND RELATED METHODS, Ser. No. 09/859,972 filed May 17, 2001, now U.S. Pat. No. 6,606,561; and VEHICLE TRACKER WITH TEST FEATURES AND RELATED METHODS, Ser. No. 09/859,729 filed May 17, 2001, now U.S. Pat. No. 6,809,659, the entire disclosures of which are incorporated herein by reference.

Many modifications and other embodiments of the invention will come to the mind of one skilled in the art having the benefit of the teachings presented in the foregoing descriptions and the associated drawings. Accordingly, it is understood that the invention is not to be limited to the embodiments disclosed, and that other modifications and embodiments are intended to be included within the spirit and scope of the appended claims.

That which is claimed is:

1. A vehicle control system comprising:

a tracking unit and a function unit cooperating therewith, said tracking unit comprising a vehicle position determining device, a wireless communications device, and a tracking controller configured to cooperate with said vehicle position determining device and said wireless communications device to send vehicle position information to a user;

said function unit comprising at least one uniquely coded transmitter to be carried by a user, a receiver at the vehicle for receiving signals from said at least one uniquely coded transmitter, and a function controller at the vehicle and connected to said receiver for learning the at least one uniquely coded transmitter to permit control of a vehicle function by the user;

said function controller configured to cooperate with said wireless communications device of said tracking unit to send an alert indication of whether at least one new uniquely coded transmitter has been learned.

2. The vehicle control system according to claim **1** further comprising a local indicator connected to said function controller for providing a local indication of whether at least one uniquely coded transmitter has been learned.

3. The vehicle control system according to claim **1** wherein the vehicle function is associated with at least one of starting of a vehicle engine, vehicle door locks, and vehicle security.

4. The vehicle control system according to claim **1** wherein said function controller is configured to switch to a learning mode to permit learning of the at least one uniquely coded transmitter; and wherein said function controller is configured to cooperate with said wireless communications device for sending the alert indication when the learning mode has been entered.

5. The vehicle control system according to claim **1** wherein said function controller is configured to cooperate with said wireless communications device for sending the alert indication for a passage of time since the learning mode has last been entered.

6. The vehicle control system according to claim **1** wherein said function controller is configured to cooperate with said wireless communications device for sending the alert indication for a number of learned uniquely coded transmitters.

7. The vehicle control system according to claim **1** wherein said function controller is configured to cooperate with said wireless communications device for sending the alert indication for a change in a number of learned uniquely coded transmitters.

8. The vehicle control system according to claim **1** wherein said function controller is configured to cooperate with said wireless communications device for sending the alert indication for a change in a code of at least one learned uniquely coded transmitter.

9. The vehicle control system according to claim **1** wherein said at least one uniquely coded transmitter comprises at least one of a uniquely coded remote transmitter, and a uniquely coded transponder transmitter.

10. The vehicle control system according to claim **1** wherein said vehicle position determining device comprises a Global Positioning System (GPS) device; and wherein said wireless communications device comprises a cellular telephone communications device.

11. A vehicle control system comprising:

a tracking unit and a function unit cooperating therewith, said tracking unit comprising a vehicle position determining device, a wireless communications device, and a tracking controller configured to cooperate with said vehicle position determining device and said wireless communications device to send vehicle position information to a user;

said function unit comprising a biometric characteristic sensor for sensing a unique biometric characteristic of a user, and a function controller at the vehicle and connected to said biometric characteristic sensor for learning the unique biometric characteristic to permit control of a vehicle function by the user;

said function controller configured to cooperate with said wireless communications device of said tracking unit to send an alert indication of whether at least one new unique biometric characteristic has been learned.

12. The vehicle control system according to claim **11** further comprising a local indicator connected to said function controller for providing a local indication of whether the unique biometric characteristic has been learned.

13. The vehicle control system according to claim **11** wherein the vehicle function is associated with at least one of starting of a vehicle engine, vehicle door locks, and vehicle security.

14. The vehicle control system according to claim **11** wherein said function controller is configured to switch to a learning mode to permit learning of the unique biometric characteristic; and wherein said function controller is configured to cooperate with said wireless communications device for sending the alert indication when the learning mode has been entered.

15. The vehicle control system according to claim **11** wherein said function controller is configured to cooperate

with said wireless communications device for sending the alert indication for a passage of time since the learning mode has last been entered.

16. The vehicle control system according to claim 11 wherein said function controller is configured to cooperate with said wireless communications device for sending the alert indication for a change in a number of learned unique biometric characteristics.

17. The vehicle control system according to claim 11 wherein said vehicle position determining device comprises a Global Positioning System (GPS) device; and

wherein said wireless communications device comprises a cellular telephone communications device.

18. A vehicle control method for a vehicle comprising a vehicle tracking unit for sending vehicle position information to a user, the method comprising:

receiving signals from at least one uniquely coded transmitter at a receiver at the vehicle;

learning the at least one uniquely coded transmitter to permit control of a vehicle function by the user using a function controller at the vehicle and connected to the receiver; and

sending an alert indication of whether at least one new uniquely coded transmitter has been learned using the vehicle tracking unit.

19. The method according to claim 18 further comprising providing a local indication at the vehicle of whether at least one uniquely coded transmitter has been learned.

20. The method according to claim 18 wherein the vehicle function is associated with at least one of starting of a vehicle engine, vehicle door locks, and vehicle security.

21. The method according to claim 18 wherein the function controller is configured to switch to a learning mode to permit learning of the at least one uniquely coded transmitter; and wherein sending comprises sending the alert indication when the learning mode has been entered.

22. The method according to claim 18 wherein sending comprises sending the alert indication for a number of learned uniquely coded transmitters.

23. The method according to claim 18 wherein sending comprises sending the alert indication for a change in a number of learned uniquely coded transmitters.

24. The method according to claim 18 wherein sending comprises sending the alert indication for a change in a code of at least one learned uniquely coded transmitter.

25. A vehicle control method for a vehicle comprising a vehicle tracking unit for sending vehicle position information to a user, the method comprising:

sensing a unique biometric characteristic of a user using a biometric characteristic sensor at the vehicle;

learning the unique biometric characteristic to permit control of a vehicle function by the user using a function controller at the vehicle and connected to the biometric characteristic sensor; and

sending an alert indication of whether at least one new unique biometric characteristic has been learned using the vehicle tracking unit.

26. The method according to claim 25 further comprising providing a local indication of whether the unique biometric characteristic has been learned.

27. The method according to claim 25 wherein the vehicle function is associated with at least one of starting of a vehicle engine, vehicle door locks, and vehicle security.

28. The method according to claim 25 wherein the function controller is configured to switch to a learning mode to permit learning of the unique biometric characteristic; and wherein sending comprises sending the alert indication when the learning mode has been entered.

29. The method according to claim 25 wherein sending comprises sending the alert indication for a change in a number of learned unique biometric characteristics.

* * * * *

UNITED STATES PATENT AND TRADEMARK OFFICE

CERTIFICATE OF CORRECTION

PATENT NO. : 7,720,597 B2
APPLICATION NO. : 11/076259
DATED : May 18, 2010
INVENTOR(S) : Flick et al.

It is certified that error appears in the above-identified patent and that said Letters Patent is hereby corrected as shown below:

Column 1, Line 13	Delete: "flied" Insert: --filed--
Column 4, Line 35	Delete: ".""
Column 8, Line 22	Delete: "off" Insert: --of--
Column 19, Line 54	Delete: "time ignition" Insert: --time the ignition--

Signed and Sealed this

Seventeenth Day of August, 2010

David J. Kappos

David J. Kappos
Director of the United States Patent and Trademark Office

EXHIBIT B

US007149623B2

(12) **United States Patent**
Flick

(10) **Patent No.: US 7,149,623 B2**
(45) **Date of Patent: Dec. 12, 2006**

(54) **VEHICLE TRACKER INCLUDING INPUT/OUTPUT FEATURES AND RELATED METHODS**

(75) Inventor: **Kenneth E. Flick**, Douglasville, GA (US)

(73) Assignee: **Omega Patents, L.L.C.**, Douglasville, GA (US)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 277 days.

(21) Appl. No.: **10/383,496**

(22) Filed: **Mar. 7, 2003**

(65) **Prior Publication Data**

US 2003/0154027 A1 Aug. 14, 2003

Related U.S. Application Data

(63) Continuation of application No. 09/859,972, filed on May 17, 2001, now Pat. No. 6,606,561.

(60) Provisional application No. 60/264,811, filed on Jan. 29, 2001, provisional application No. 60/258,005, filed on Dec. 22, 2000, provisional application No. 60/251,552, filed on Dec. 6, 2000, provisional application No. 60/252,125, filed on Nov. 20, 2000, provisional application No. 60/246,463, filed on Nov. 7, 2000, provisional application No. 60/236,890, filed on Sep. 29, 2000, provisional application No. 60/222,777, filed on Aug. 3, 2000, provisional application No. 60/205,178, filed on May 17, 2000.

(51) **Int. Cl.**
G01C 21/26 (2006.01)

(52) **U.S. Cl.** **701/207**; 340/506; 340/531; 340/500; 340/515

(58) **Field of Classification Search** 701/213, 701/36, 211, 200, 207; 340/853.2, 901, 988, 340/989, 991, 992, 993, 425.5, 506, 531, 340/500, 515

See application file for complete search history.

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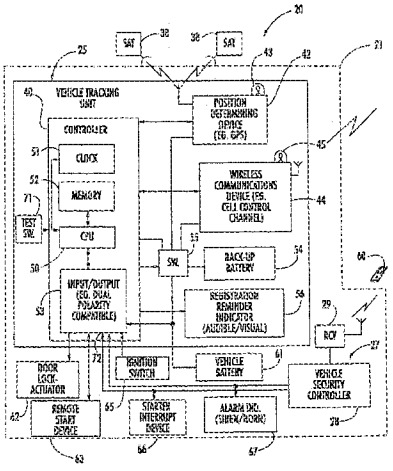
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(57) **ABSTRACT**

A tracking system includes a vehicle tracking unit for a vehicle of a type including an alarm indicator, and a monitoring station receiving the alarm indication alert from the vehicle tracking unit. The vehicle tracking unit may include a vehicle position determining device, a wireless communications device, and a controller connected to the wireless communications device and the vehicle position determining device. The controller may cooperate with the wireless communications device to send an alarm indication alert responsive to at least one of activation of the vehicle alarm indicator continuously for greater than a predetermined time and activation of the vehicle alarm indicator in a repetitive pattern. The controller may also include a dual polarity compatible output for a vehicle device, such as the vehicle alarm indicator.

34 Claims, 10 Drawing Sheets



OMEGA EXHIBIT 2035

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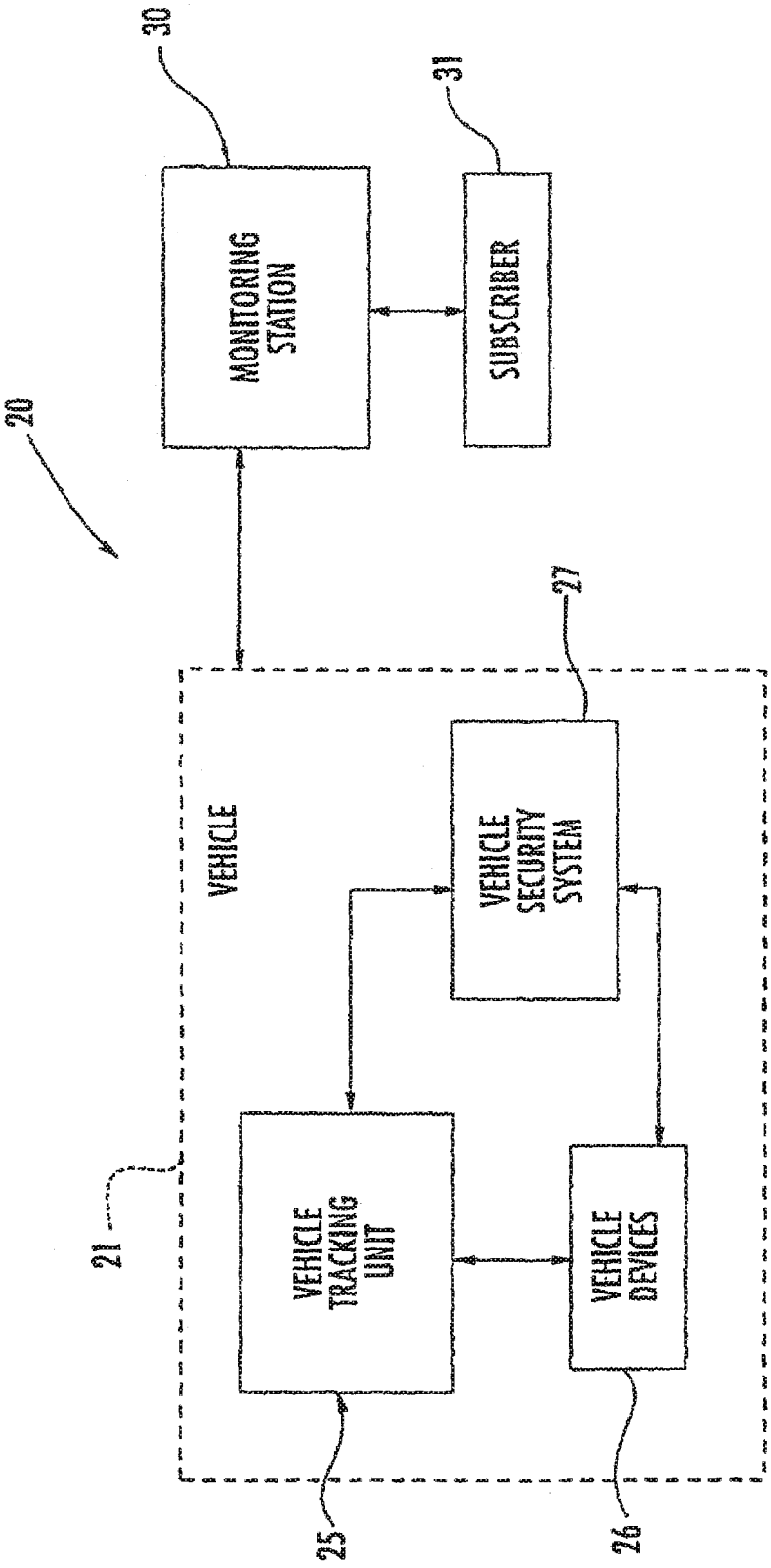

30
31
MONITORING STATION
SUBSCRIBER
20
27
VEHICLE
VEHICLE SECURITY SYSTEM
21
VEHICLE TRACKING UNIT
VEHICLE DEVICES
25
26

FIG. 1.

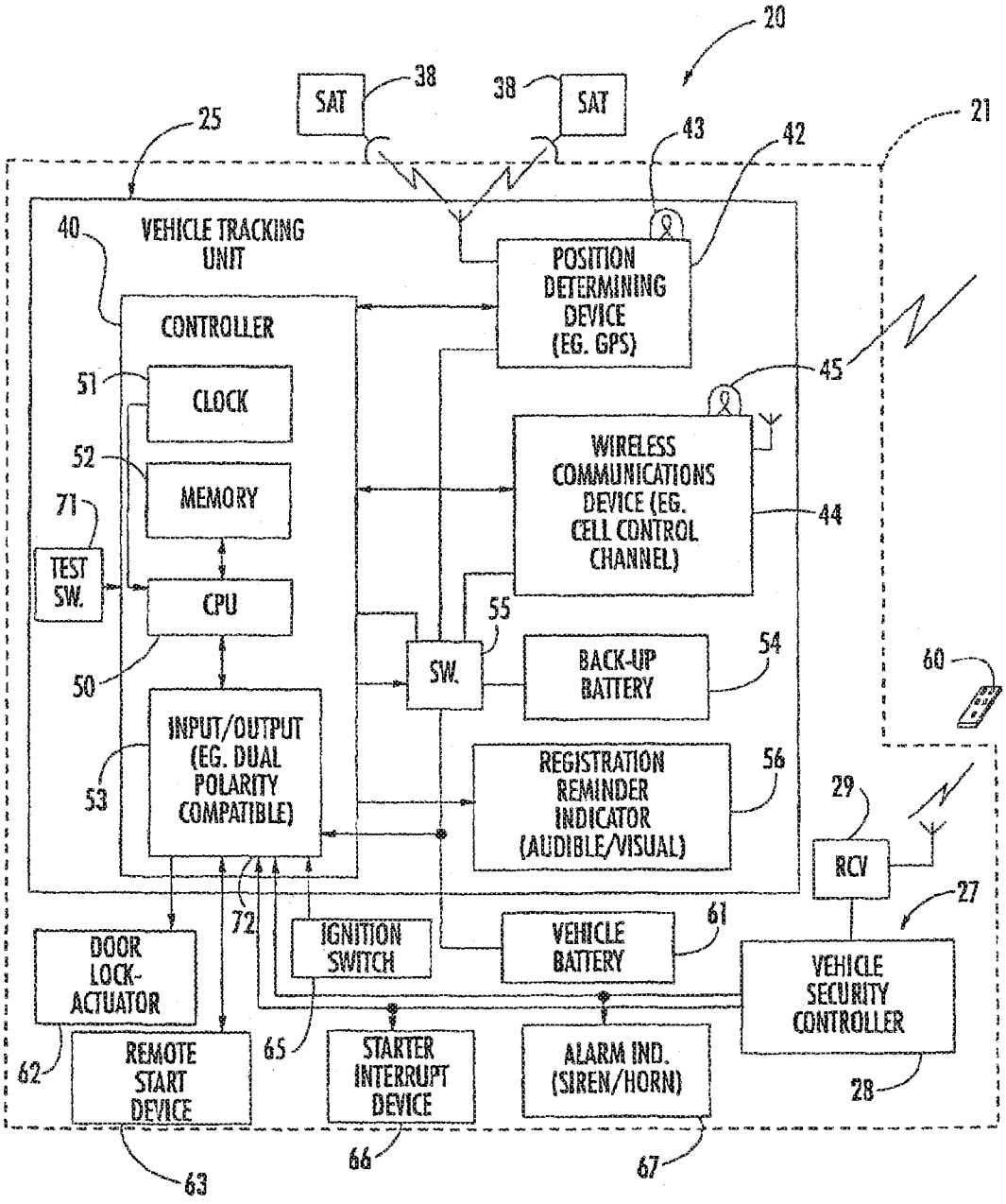

20
SAT
38
38
SAT
25
21
43
42
40
VEHICLE TRACKING UNIT
POSITION DETERMINING DEVICE (EG. GPS)
CONTROLLER
45
51
CLOCK
WIRELESS COMMUNICATIONS DEVICE (EG. CELL CONTROL CHANNEL)
52
MEMORY
44
71
TEST SW.
CPU
55
60
50
SW.
BACK-UP BATTERY
54
INPUT/OUTPUT (EG. DUAL POLARITY COMPATIBLE)
53
REGISTRATION REMINDER INDICATOR (AUDIBLE/VISUAL)
56
29
RCV
27
72
IGNITION SWITCH
VEHICLE BATTERY
61
DOOR LOCK-ACTUATOR
VEHICLE SECURITY CONTROLLER
62
REMOTE START DEVICE
65
STARTER INTERRUPT DEVICE
ALARM IND. (SIREN/HORN)
28
63
66
67

FIG. 2.

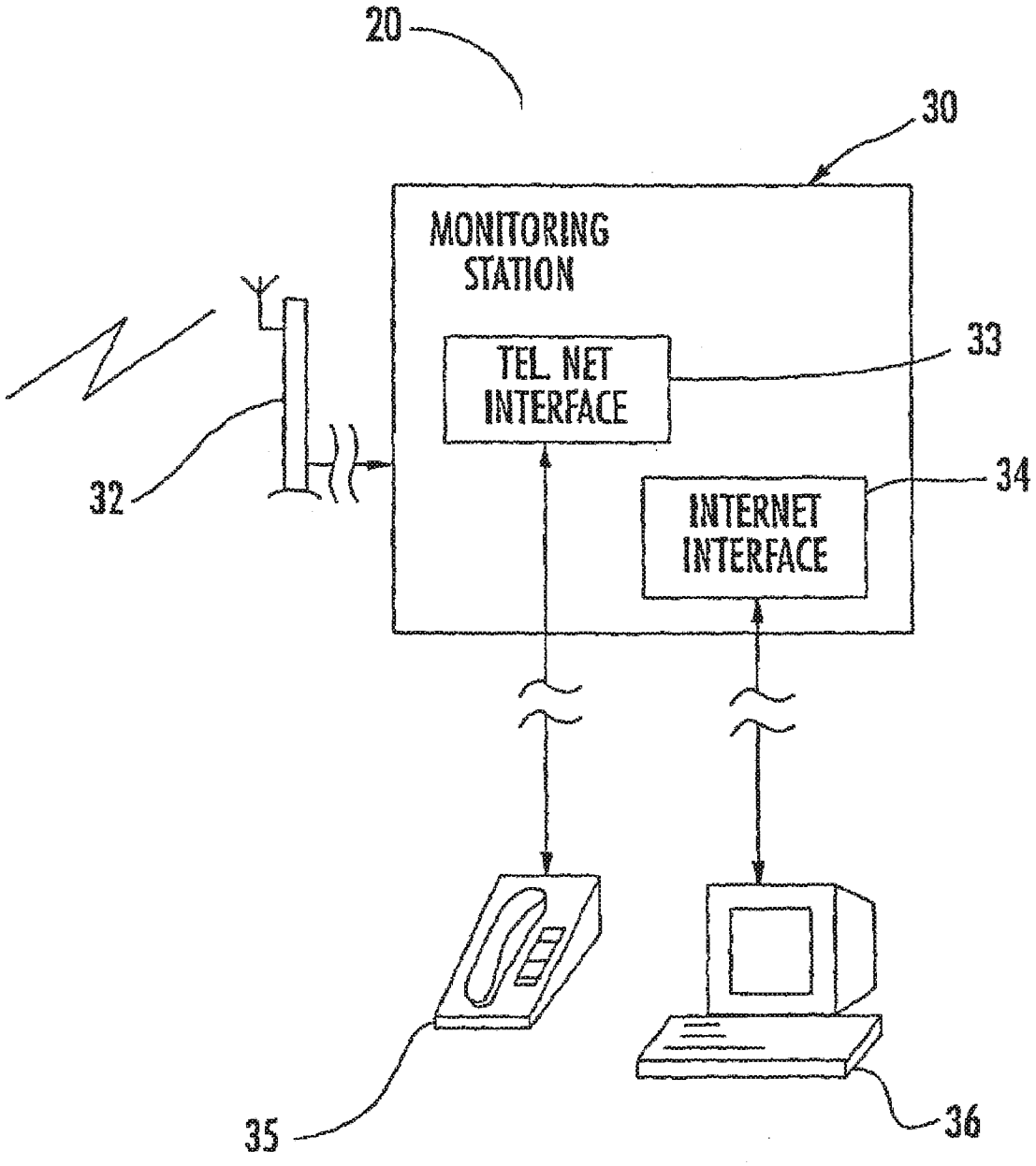

20
30
MONITORING STATION
TEL. NET INTERFACE
33
INTERNET INTERFACE
34
32
35
36

FIG. 3.

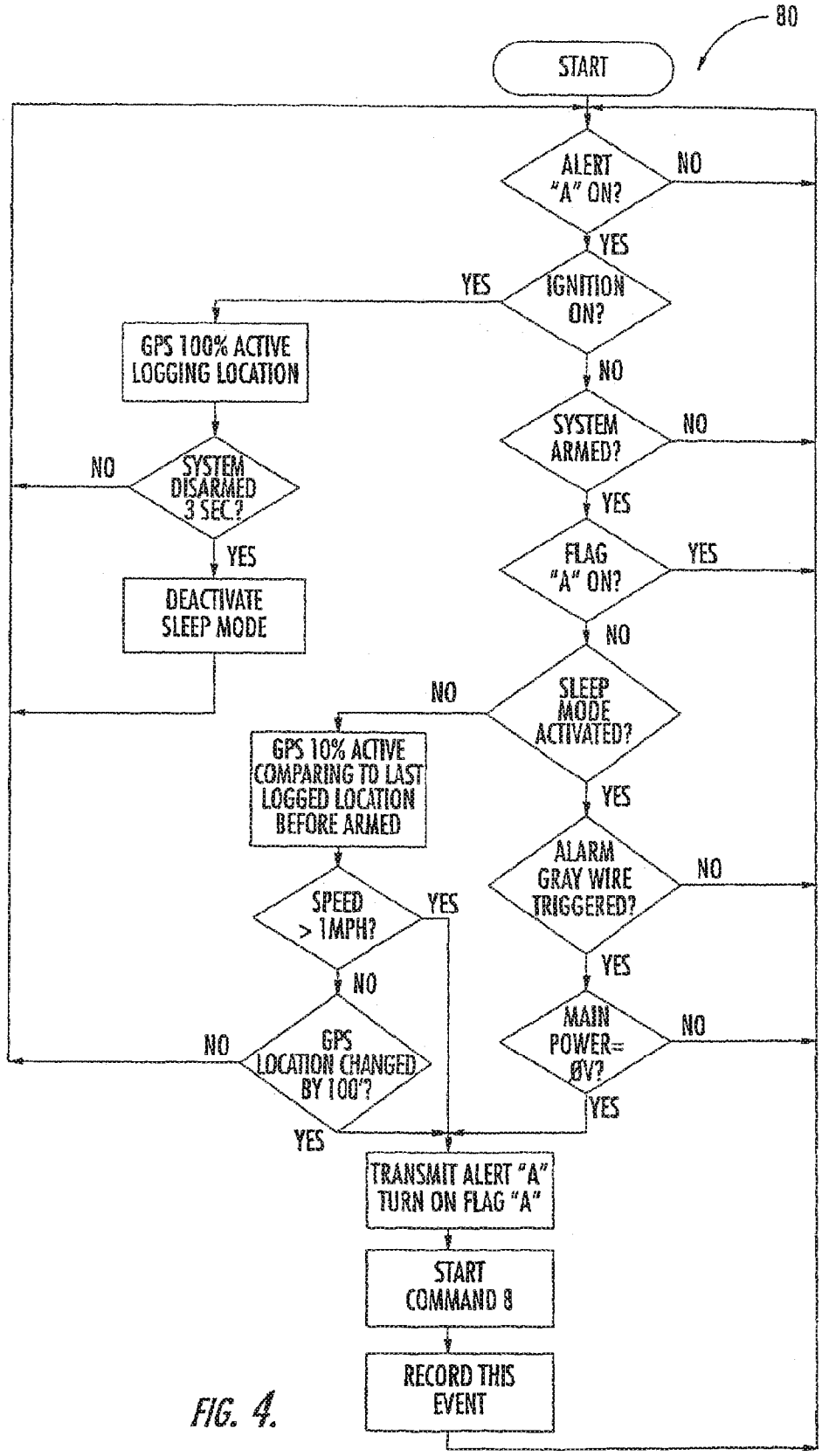

80
START
ALERT "A" ON?
NO
YES
IGNITION ON?
YES
GPS 100% ACTIVE LOGGING LOCATION
NO
SYSTEM ARMED?
NO
YES
SYSTEM DISARMED 3 SEC.?
NO
YES
DEACTIVATE SLEEP MODE
FLAG "A" ON?
YES
NO
SLEEP MODE ACTIVATED?
NO
YES
GPS 10% ACTIVE COMPARING TO LAST LOGGED LOCATION BEFORE ARMED
ALARM GRAY WIRE TRIGGERED?
NO
YES
SPEED > 1MPH?
YES
NO
MAIN POWER= ØV?
NO
YES
GPS LOCATION CHANGED BY 100'?
NO
YES
TRANSMIT ALERT "A" TURN ON FLAG "A"
START COMMAND 8
RECORD THIS EVENT

FIG. 4.

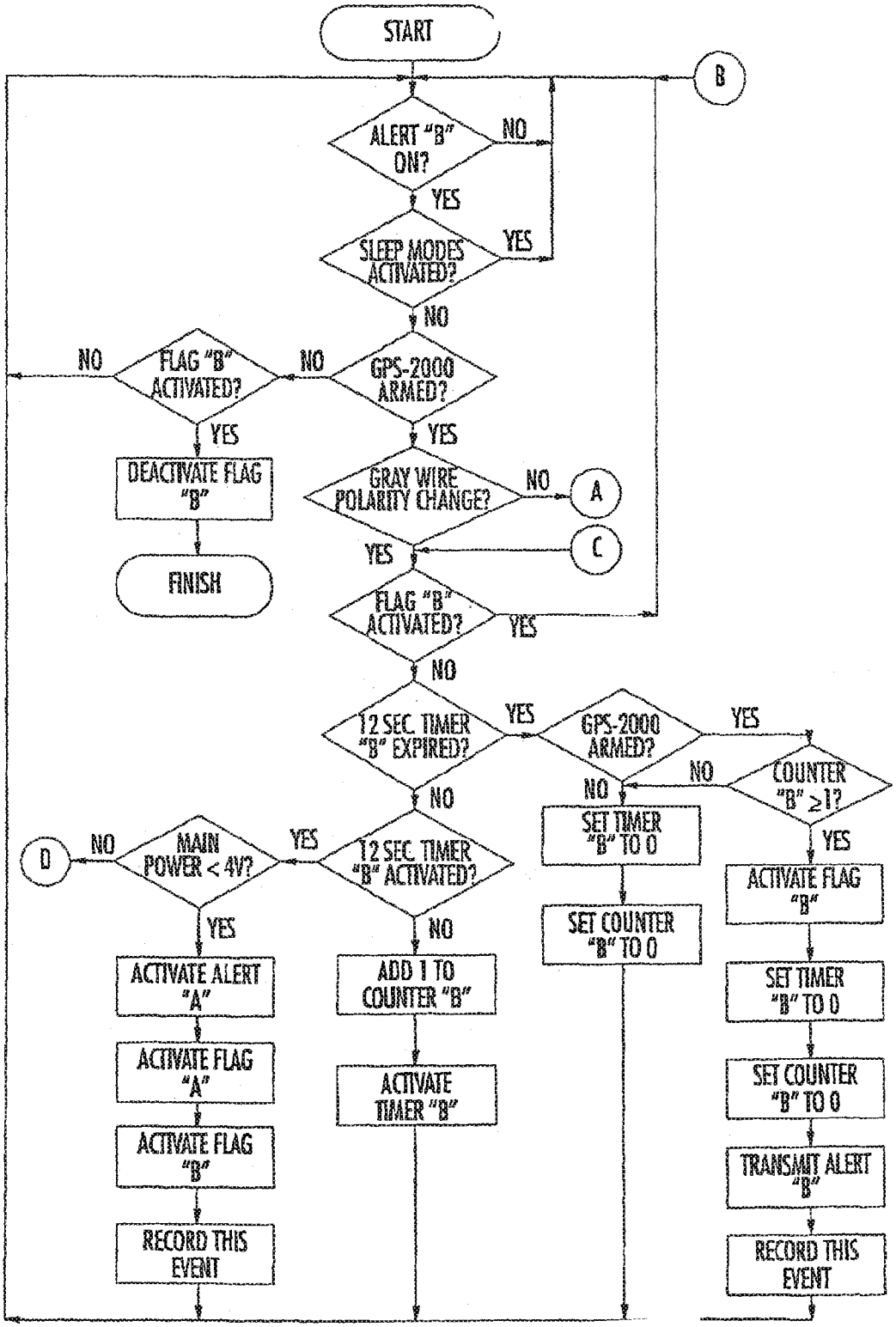

START
B
ALERT "B" ON?
NO
YES
SLEEP MODES ACTIVATED?
YES
NO
NO
FLAG "B" ACTIVATED?
NO
GPS-2000 ARMED?
YES
YES
DEACTIVATE FLAG "B"
GRAY WIRE POLARITY CHANGE?
NO
A
C
YES
FINISH
FLAG "B" ACTIVATED?
YES
NO
12 SEC. TIMER "B" EXPIRED?
YES
GPS-2000 ARMED?
YES
NO
COUNTER "B" ≥1?
NO
NO
YES
D
NO
MAIN POWER < 4V?
YES
12 SEC. TIMER "B" ACTIVATED?
SET TIMER "B" TO 0
ACTIVATE FLAG "B"
YES
NO
SET COUNTER "B" TO 0
ACTIVATE ALERT "A"
ADD 1 TO COUNTER "B"
SET TIMER "B" TO 0
ACTIVATE FLAG "A"
ACTIVATE TIMER "B"
SET COUNTER "B" TO 0
ACTIVATE FLAG "B"
TRANSMIT ALERT "B"
RECORD THIS EVENT
RECORD THIS EVENT

FIG. 5A.

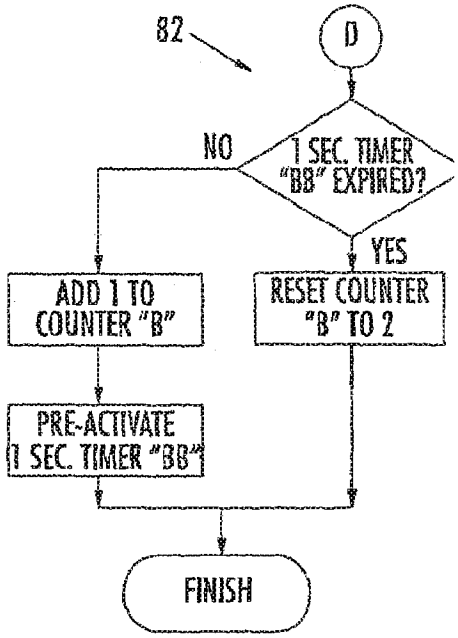

82
D
1 SEC. TIMER "BB" EXPIRED?
NO
YES
ADD 1 TO COUNTER "B"
RESET COUNTER "B" TO 2
PRE-ACTIVATE 1 SEC. TIMER "BB"
FINISH

FIG. 5B.

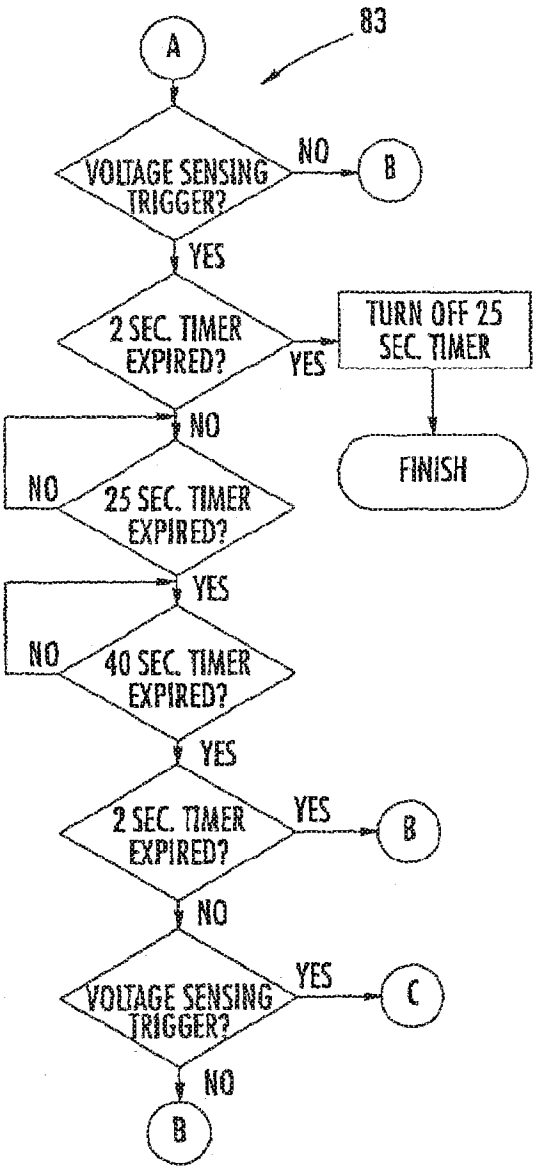

83
A
VOLTAGE SENSING TRIGGER?
NO
B
YES
2 SEC. TIMER EXPIRED?
YES
TURN OFF 25 SEC. TIMER
FINISH
NO
NO
25 SEC. TIMER EXPIRED?
YES
NO
40 SEC. TIMER EXPIRED?
YES
2 SEC. TIMER EXPIRED?
YES
B
NO
VOLTAGE SENSING TRIGGER?
YES
C
NO
B

FIG. 5C.

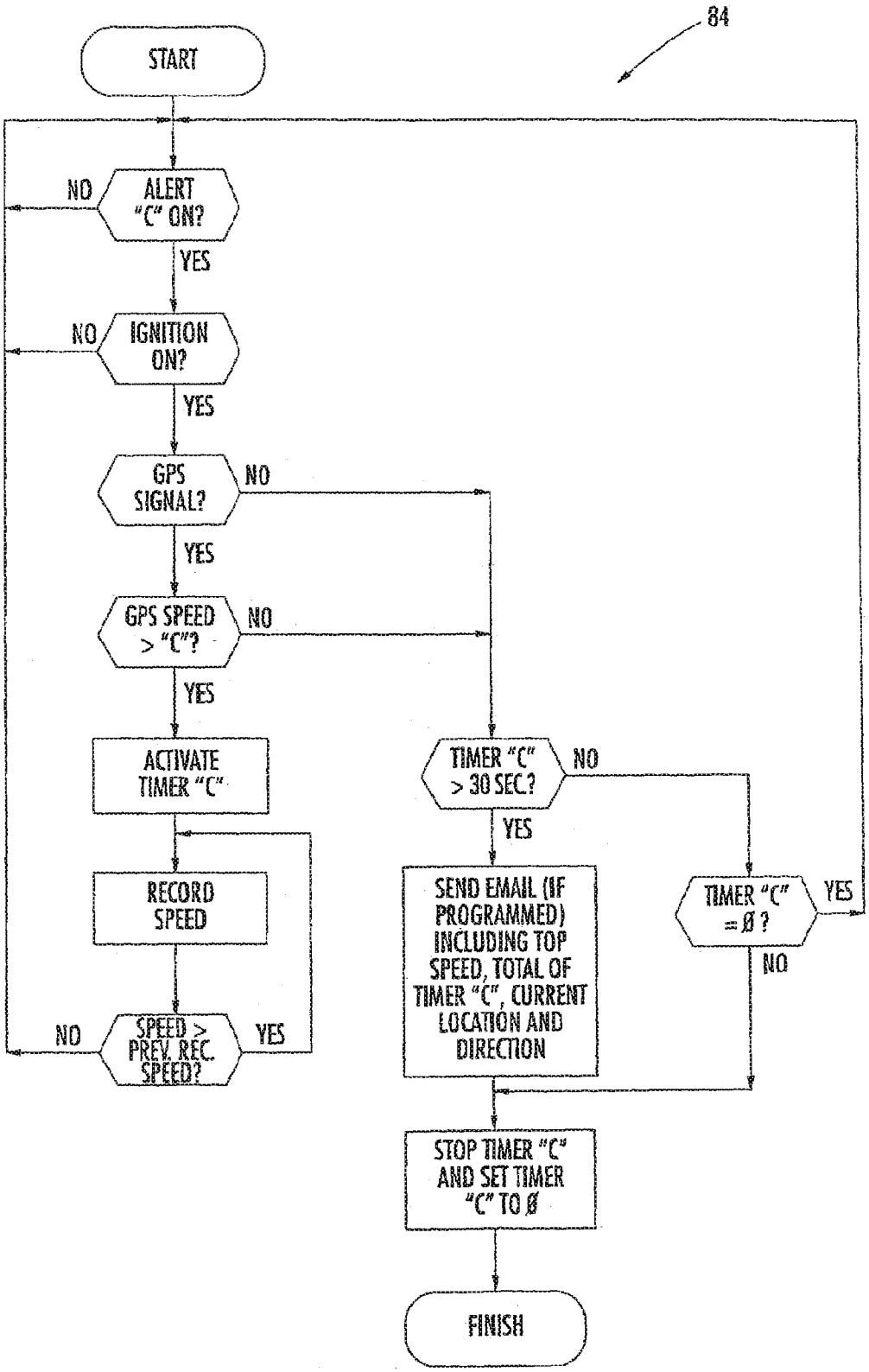

84
START
ALERT "C" ON?
NO
YES
IGNITION ON?
NO
YES
GPS SIGNAL?
NO
YES
GPS SPEED > "C"?
NO
YES
ACTIVATE TIMER "C"
RECORD SPEED
SPEED > PREV. REC. SPEED?
NO
YES
TIMER "C" > 30 SEC.?
NO
YES
SEND EMAIL (IF PROGRAMMED) INCLUDING TOP SPEED, TOTAL OF TIMER "C", CURRENT LOCATION AND DIRECTION
TIMER "C" = Ø ?
YES
NO
STOP TIMER "C" AND SET TIMER "C" TO Ø
FINISH

FIG. 6.

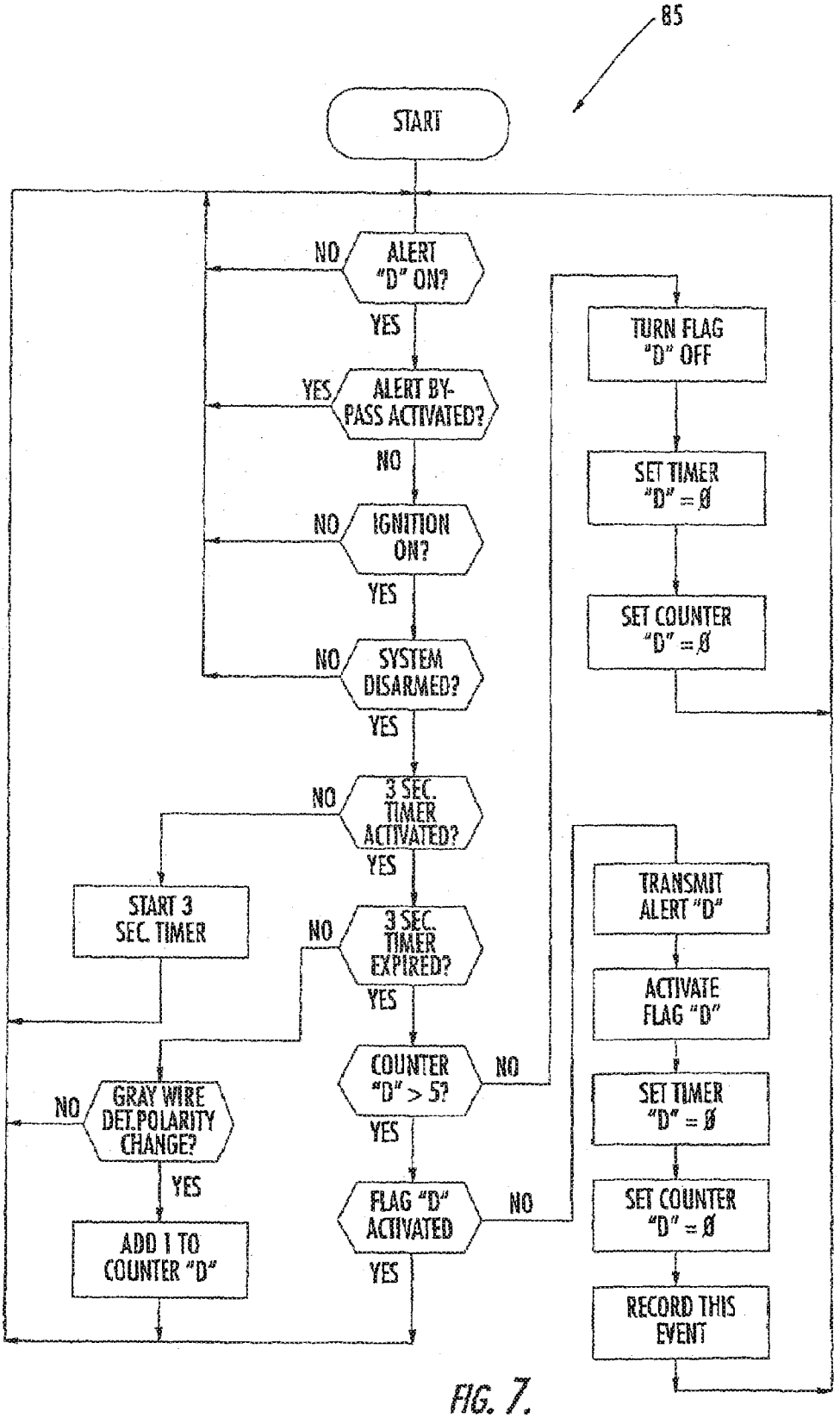

85
START
NO
ALERT "D" ON?
YES
YES
ALERT BY-PASS ACTIVATED?
NO
NO
IGNITION ON?
YES
NO
SYSTEM DISARMED?
YES
NO
3 SEC. TIMER ACTIVATED?
YES
START 3 SEC. TIMER
NO
3 SEC. TIMER EXPIRED?
YES
COUNTER "D" > 5?
NO
YES
NO
GRAY WIRE DET. POLARITY CHANGE?
YES
ADD 1 TO COUNTER "D"
FLAG "D" ACTIVATED
NO
YES
TURN FLAG "D" OFF
SET TIMER "D" = Ø
SET COUNTER "D" = Ø
TRANSMIT ALERT "D"
ACTIVATE FLAG "D"
SET TIMER "D" = Ø
SET COUNTER "D" = Ø
RECORD THIS EVENT

FIG. 7.

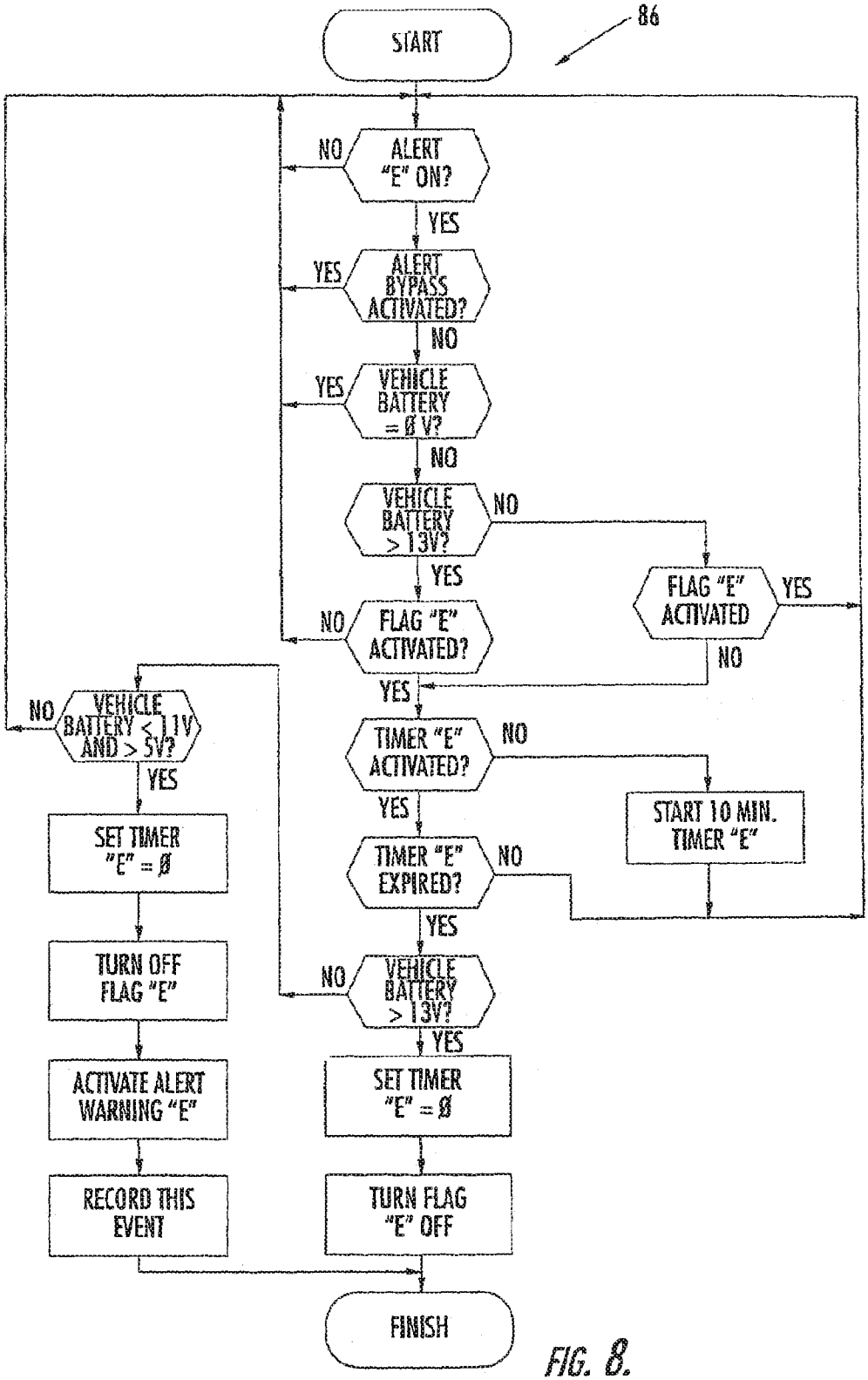

86
START
ALERT "E" ON?
NO
YES
ALERT BYPASS ACTIVATED?
YES
NO
VEHICLE BATTERY = Ø V?
YES
NO
VEHICLE BATTERY > 13V?
NO
YES
FLAG "E" ACTIVATED
YES
NO
FLAG "E" ACTIVATED?
NO
YES
VEHICLE BATTERY < 11V AND > 5V?
NO
YES
TIMER "E" ACTIVATED?
NO
YES
START 10 MIN. TIMER "E"
SET TIMER "E" = Ø
TIMER "E" EXPIRED?
NO
YES
TURN OFF FLAG "E"
VEHICLE BATTERY > 13V?
NO
YES
ACTIVATE ALERT WARNING "E"
SET TIMER "E" = Ø
RECORD THIS EVENT
TURN FLAG "E" OFF
FINISH

FIG. 8.

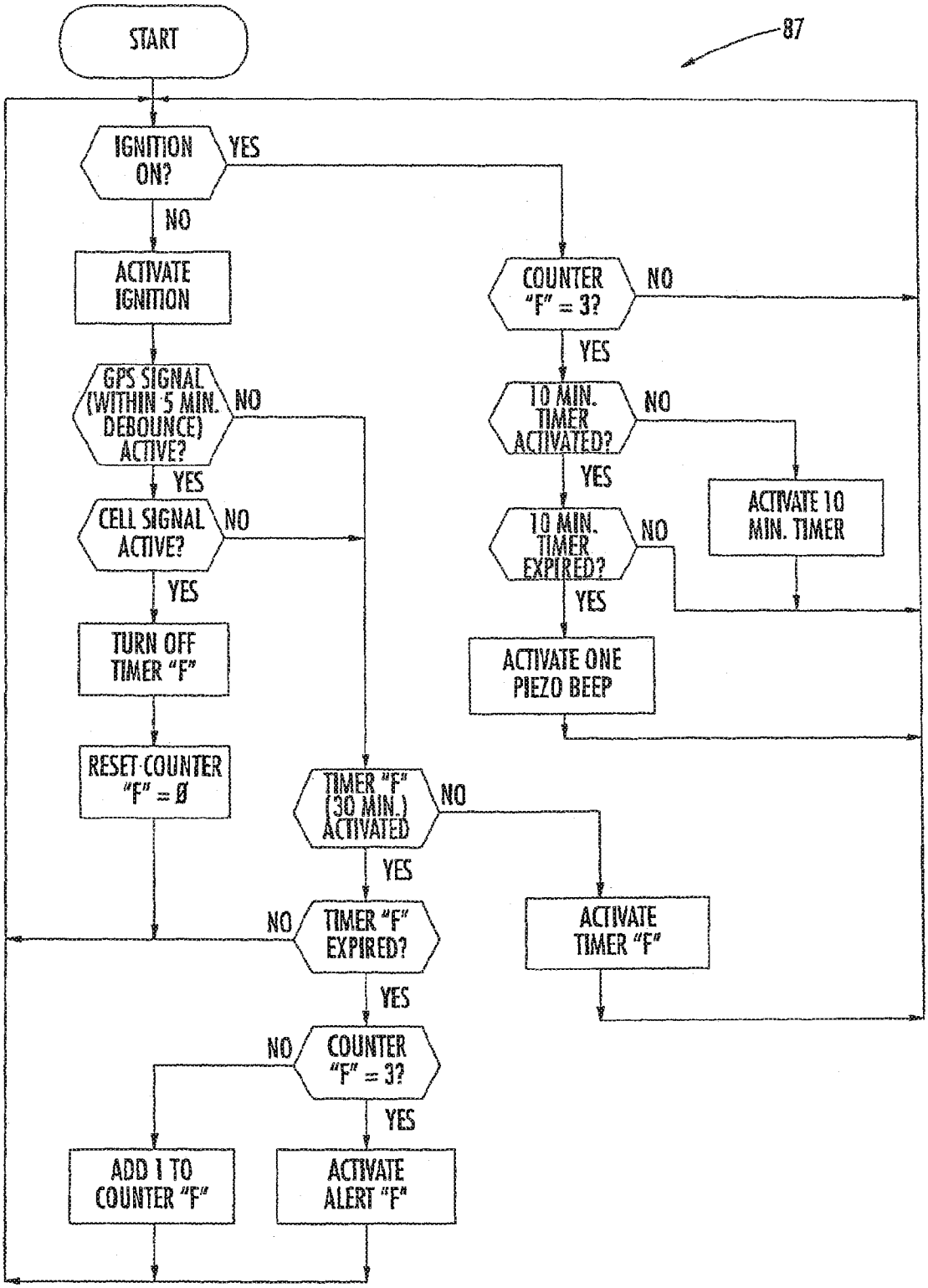

START
87
IGNITION ON?
YES
NO
ACTIVATE IGNITION
GPS SIGNAL (WITHIN 5 MIN. DEBOUNCE) ACTIVE?
NO
YES
CELL SIGNAL ACTIVE?
NO
YES
TURN OFF TIMER "F"
RESET COUNTER "F" = Ø
COUNTER "F" = 3?
NO
YES
10 MIN. TIMER ACTIVATED?
NO
YES
ACTIVATE 10 MIN. TIMER
10 MIN. TIMER EXPIRED?
NO
YES
ACTIVATE ONE PIEZO BEEP
TIMER "F" (30 MIN.) ACTIVATED
NO
YES
ACTIVATE TIMER "F"
NO
TIMER "F" EXPIRED?
YES
NO
COUNTER "F" = 3?
YES
ADD 1 TO COUNTER "F"
ACTIVATE ALERT "F"

FIG. 9.

VEHICLE TRACKER INCLUDING INPUT/OUTPUT FEATURES AND RELATED METHODS

This application is a continuation of Ser. No. 09/859,972 filed on May 17, 2001.

RELATED APPLICATIONS

The present application is based upon copending provisional application serial NOs. 60/264,811 filed on Jan. 29, 2001; 60/258,005, filed Dec. 22, 2000; 60/251,552, flied Dec. 6, 2000; 60/252,125, filed Nov. 20, 2000; 60/236,890, filed Sep. 29, 2000; 60/246,463, filed Nov. 7, 2000; 60/222,777, filed Aug. 3, 2000; and 60/205,178, filed May 17, 2000, the entire contents of each of which are incorporated herein by reference.

FIELD OF THE INVENTION

The present invention relates to the field of vehicle devices, and, more particularly, to a tracking and alerting system for a vehicle.

BACKGROUND OF THE INVENTION

Motor vehicles, such as passenger cars, trucks, busses, fleet vehicles, etc. are widely used and knowing the locations of such vehicle is often desired. For example, should a vehicle be stolen, it would be beneficial to know the vehicle's location so that authorities could be promptly and accurately directed to retrieve the vehicle. Indeed, the tracking system could plot the getaway path of the thief.

For a company with hired drivers, it may desirable to know the driver's whereabouts during the course of the day. Similarly, a rental car agency or other fleet operator, for example, may wish to know the whereabouts of its fleet of vehicles.

It may also be desirable to track the location of a vehicle as it used throughout the course of a normal day. For parents of younger or older drivers, for example, knowledge of the vehicle's location may provide some assurance that the driver is at designated locations and following a prescribed route.

A number of patents disclose various systems and approaches to tracking vehicles. For example, U.S. Pat. No. 5,223,844 discloses a tracking system including a control center and a mobile unit installed in the vehicle. The mobile unit may send security warnings to the command center via a wireless transceiver. Position information for the vehicle is determined using a GPS receiver at the vehicle.

U.S. Pat. No. 5,515,043 discloses a similar system which may send one or more preprogrammed telephone messages to a user when away from the vehicle. The user may remotely access location information or cause certain commands to be carried out by entering a personal identification number (PIN).

The widespread availability and use of the Internet has prompted a number of vehicle tracking systems to also make use of the Internet. For example, TelEvoke, Inc. proposed such a system in combination with Clifford Electronics. The system was to provide notification, control and tracking services via the telephone or the Internet. Users could be notified via phone, e-mail, or pager of events such as a car alarm being triggered. Users could control the vehicle remote devices via phone, web, or PDA such as unlocking car doors. Additionally, users could track TelEvoke-enabled vehicles on the Internet or via the telephone. An Internet map could be viewed by the user showing the actual and prior vehicle locations. TelEvoke offered its services via a centralized fully automated Network Operations Center. To reduce the communications costs, it was proposed to use the control channel of the cellular telephone network.

There are, of course, a number of vehicles which come from the manufacturer with some form of security system already installed. In addition, a number of vehicles are also equipped with aftermarket security systems. Many conventional vehicle tracking units may not be readily installed in vehicles, particularly those vehicles already including a vehicle security system. In addition, complexity of installation may significantly increase the system costs.

SUMMARY OF THE INVENTION

In view of the foregoing background, it is therefore an object of the invention to provide a vehicle tracking unit and related methods that permit ready interface to devices in the vehicle, such as those devices which may be part of an existing vehicle security system.

This and other objects, features and advantages in accordance with the present invention are provided by a vehicle tracking system comprising a vehicle tracking unit for a vehicle of a type including an alarm indicator, and a monitoring station receiving the alarm indication alert from the vehicle tracking unit. The vehicle tracking unit may include a vehicle position determining device, a wireless communications device, and a controller connected to the wireless communications device and the vehicle position determining device. The controller may monitor signals relating to activation of the vehicle alarm indicator and send an alarm indication alert, such as with position information from the vehicle position determining device, and using the wireless communication device.

More particularly, the controller may send an alarm indication alert responsive to a continuous activation of the alarm indicator for greater than a predetermined time. Alternately, or in addition thereto, the controller may send an alarm indication alert responsive to a repetitive pattern of alarm indicator activations. In other words, the controller may be configured to distinguish between normal operation of a vehicle horn by the driver, and activation of the horn by a security system. The controller may also monitor signals of at least one of a first and second polarity. Accordingly, the tracking unit may be readily interfaced to vehicles including security systems.

In one variation, the controller monitors signals to the vehicle alarm indicator. In another variation, the controller monitors signals of voltage dips of the vehicle battery. The vehicle alarm indicator may comprise a vehicle horn, and/or a vehicle siren.

The vehicle position determining device may include a Global Positioning System (GPS) device. The wireless communications device may comprise a cellular telephone communications device, such as operating over a cellular control channel.

The monitoring station may comprise a user interface for accepting at least one command from a user and sending at least one alert to the user. For example, the user interface may include an Internet interface, and/or a telephone network interface.

Another advantageous aspect of the invention relates to compatibility of the outputs of the vehicle tracking unit. More particularly, the controller may include a dual polarity compatible output for a vehicle device, such as the vehicle

alarm indicator. The controller may further monitor signals relating to activation of the vehicle alarm indicator and send an alarm indication alert with position information from the vehicle position determining device and using the wireless communication device.

The controller may generate a first polarity output pulse followed by a second polarity output pulse on the dual polarity compatible output. The controller may also generate a repeating pattern of a first polarity output pulse followed by a second polarity output pulse on the dual polarity compatible output. In yet other embodiments, the controller may sense an actual polarity of the device and thereafter use the actual polarity for the dual polarity compatible output.

Where the vehicle device is a vehicle horn, the controller may typically be configured to generate a negative polarity output on the dual polarity compatible output. Conversely, wherein the vehicle device is a vehicle alarm indicator siren, the controller may be configured to generate a positive polarity output on the dual polarity compatible output.

One method aspect of the invention is for operating a vehicle tracking unit for a vehicle of a type comprising a vehicle alarm indicator. The vehicle tracking unit may include a vehicle position determining device, and a wireless communications device. The method preferably includes determining position information of the vehicle using the vehicle position determining device, determining an alarm condition based upon at least one of activation of the vehicle alarm indicator continuously for greater than a predetermined time and activation of the vehicle alarm indicator in a repetitive pattern, and sending an alarm indication alert from the wireless communications device responsive to determining the alarm condition.

Another method aspect also relates to operating such a vehicle tracking device. The method preferably includes using the controller to generate a dual polarity compatible output for the vehicle device.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is a simplified block diagrams of a vehicle tracking system in accordance with the present invention.

FIG. **2** is a more detailed block diagram of the vehicle tracking unit as shown in FIG. **1**.

FIG. **3** is more detailed block diagram of the monitoring station as shown in FIG. **1**.

FIG. **4** is a flowchart for operation of the vehicle tracking system as shown in FIG. **1** illustrating a vehicle stolen alert.

FIG. **5** is a flowchart for operation of the vehicle tracking system as shown in FIG. **1** illustrating a vehicle alarm sounding alert.

FIG. **6** is a flowchart for operation of the vehicle tracking system as shown in FIG. **1** illustrating a vehicle speeding alert.

FIG. **7** is a flowchart for operation of the vehicle tracking system as shown in FIG. **1** illustrating an unauthorized transmitter learned alert.

FIG. **8** is a flowchart for operation of the vehicle tracking system as shown in FIG. **1** illustrating a low battery alert.

FIG. **9** is a flowchart for operation of the vehicle tracking system as shown in FIG. **1** illustrating a GPS or cellular unit failure alert.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

The present invention will now be described more fully hereinafter with reference to the accompanying drawings in which preferred embodiments of the invention are shown. This invention may, however, be embodied in many different forms and should not be construed as limited to the illustrated embodiments set forth herein. Rather, these embodiments are provided so that this disclosure will be thorough and complete, and will fully convey the scope of the invention to those skilled in the art. Like numbers refer to like elements throughout.

Referring to FIGS. **1–3**, the vehicle tracking system **20** in accordance with the invention is now initially described. The vehicle system **20** illustratively includes a vehicle tracking unit **25** to be mounted in the vehicle **21** and a monitoring station **30** which is remote from the vehicle and which is typically in a fixed location. In the illustrated embodiment, the vehicle tracking unit **25** interfaces with various vehicle devices, such as may include security sensors, door locks, etc. as will be appreciated by those skilled in the art.

The vehicle tracking unit **25** is also illustratively connected to a separate vehicle security system **27** as may already be installed in the vehicle **21**, from the factory or installed as an aftermarket product. Those of skill in the art will appreciate that in some embodiments of the vehicle tracking system **20** a separate vehicle security system **27** may not be needed, and/or various features thereof can be readily incorporated in the vehicle tracking unit **25**.

The monitoring station **30** may typically service a number of subscribers **31**. As shown perhaps best in FIG. **3**, the monitoring station **30** may include a user interface, such as the schematically illustrated telephone network interface **33** and the internet interface **34** which are schematically coupled to a telephone **35**, and a computer **36**, respectively. Of course in other embodiments, other interfaces may be used and only one of the illustrated interfaces may be needed. Those of skill in the art will also recognize that messages may be sent to a subscriber or user via preprogrammed voice messages, e-mail messages, facsimile messages, pager alerts, etc. In addition commands or instructions from the subscriber can also be input to the monitoring station **30** via the telephone network interface **33** and/or the internet interface **34**, from the subscribers telephone **35** or computer **36**.

The monitoring station **30** is illustrated connected to a cellular telephone tower **32** which, in turn, may communicate with the vehicle tracking unit **25** in some embodiments. Of course, in other embodiments other communications approaches are also contemplated, such as, for example, including satellite communications.

The monitoring station **30** may typically include the necessary modems, and other communications electronics, and computers for its functions which are described in greater detail below. The configuration of such components and their details will be readily apparent to those skilled in the art. Accordingly, no further discussion of these details is needed.

Referring now more specifically to FIG. **2**, additional details of the vehicle tracking unit **25** and devices at the vehicle are now further described. The vehicle tracking unit **25** illustratively includes a controller **40**, a vehicle position determining device **42**, and a wireless communications device **44** connected together. The vehicle position determining device **42** may be provided by a GPS receiver, for example. The GPS receiver typically operates by receiving multiple signals from spaced apart satellites **38** as will be appreciated by those skilled in the art.

In other embodiments, the vehicle position determining device **42** may be provided based upon communications with the cellular telephone network, or based upon other

satellite transmissions, for example. As a particular example, time of arrival techniques are available based upon multiple reception paths to determine position via the cellular telephone network as will be appreciated by those skilled in the art. The vehicle position determining device **42** also illustratively includes an indicator **43** associated therewith, such as for indicating an operating mode, or proper operation of the device as will be addressed in greater detail below.

The wireless communications device **44** may be provided by a cellular telephone transceiver configured to operate on a control channel of the cellular network. Such a control channel may provide nearly universal coverage for the tracking system **20** as will be appreciated by those skilled in the art. In addition, the control channel may offer relatively inexpensive communications between the monitoring station **30** and the vehicle tracking unit **25** as will be appreciated by those skilled in the art. The wireless communications device **44** also illustratively includes an optional status indicator **45** with a similar function as the indicator **43** for the vehicle position determining device.

The wireless communications device **44** in other embodiments, may transmit in the voiceband of the cellular network. Alternately, the wireless communications device may communicate over other networks, such as over satellite, or via wireless internet services, as will be appreciated by those skilled in the art.

The controller **40** illustratively includes a central processing unit (CPU) **50** or other logic circuitry which is connected to a clock signal generator **51** and a memory **52**. In other embodiments, the memory **52** may be embedded memory in the CPU **50**. The controller **40** also includes schematically illustrated input/output circuitry **53** to interface with various vehicle devices. In particular the input/output circuitry **53** may provide dual polarity compatibility for one or more inputs or outputs as will described in greater detail below. One or more of the terminals of the input/output circuitry **53** may also provide both input and output functions as will also be described in greater detail below. This may significantly simplify and accelerate installation of the vehicle tracking unit **25** in the vehicle **21**.

Also illustratively shown as part of the vehicle tracking unit **25** are a back-up battery **54**, and switch **55** connected thereto for selectively powering certain of the components based upon the controller **40**. Of course, the vehicle **21** also includes an electrical system including the vehicle battery **61**. Powering of the vehicle tracking unit **25** is described in greater detail below.

The vehicle **21** also includes a number of other components that may relate to vehicle tracking, security, and/or convenience features provided by the vehicle tracking system **20**. For example, the vehicle **21** may include one or more door lock actuators **62**, an optional remote starting device **63**, a starter interrupt device **66** and an alarm indicator **67**. For example, the alarm indicator may be provided by a vehicle horn or vehicle siren, and/or flashing of the lights.

The optional separate security system **27** illustratively includes a vehicle security controller **28** and a receiver **29** connected thereto. As is conventional, the vehicle security system **27** may be switched between armed and disarmed modes, for example, by one or more uniquely coded remote transmitters **60**. The vehicle security controller **28** may also be capable of learning a new uniquely coded remote transmitter **60** as will be appreciated by those skilled in the art. The vehicle security controller **28** also illustratively is connected to the starter interrupt device **66** and the alarm indicator **67**.

For ease of explanation, a number of the features of the vehicle tracking system **20** are now described. The vehicle tracking system **20** includes a number of features that may simplify installation and maintenance. For example, as shown in FIG. **2**, the vehicle tracking unit **25** may have a test switch **71** connected to the controller **40**.

In normal operation, the controller **40** may be called upon to operate at least one vehicle device. Of course, the controller **40** also cooperates with the wireless communications device **44** and the vehicle position determining device **42** to determine and send vehicle position information to the monitoring station **30**. Moreover, the controller **40** may be switchable to a test mode for test operation of the at least one vehicle device responsive to activation of the test switch **71**.

In some embodiments, the at least one vehicle **15** device may be a plurality of vehicle devices that are tested by operation in sequence. For example, the at least one vehicle device may comprise at least one door lock actuator **62**. The at least one vehicle device may also comprise the starter interrupt device **66**, or the engine remote starter **63** if remote starting is an implemented feature. The at least one vehicle device which is tested, may also be the alarm indicator **67**. Accordingly, an installer, for example, can quickly check that the tracking unit has been properly installed.

To further provide for ready determination of proper operation of the vehicle tracking unit **25**, one or both of the position determining and wireless communications devices **42**, **44** may include associated indicators **43**, **45** as mentioned briefly above, and which provide an indication relating to proper operation. Each indicator **43**, **45** may indicate a mode of operation of the device, its proper operation, or a partial or complete failure of the device.

Another aspect of the invention is that the controller **40** may provide a selectable polarity for the at least one vehicle device based upon sensing thereof. Accordingly, a predetermined activation of the test switch **71** may cause the controller **40** to sense and select the proper polarity. Pressing the test switch **71** for a predetermined time or in a predetermined pattern may sense and set the polarity.

Another feature of the vehicle tracking unit **25** and vehicle tracking system **20** relates to conservation of the number of codes or messages that need to sent to the vehicle tracking unit. In particular, the controller **40** may have a plurality of different controller states and respond differently to a same message from the monitoring station **30** at different times depending upon the controller state at a given time. Accordingly, a number of codes or messages used by the system can be conserved. Various messages are described in greater detail below.

A controller state may change based upon several different occurrences or events. For example the controller may change states in response to a change in at least one vehicle device, or based upon a message received by the wireless communications device **44** from the monitoring station **30**, and/or based upon elapsed time. The controller states, for example, may include an alert sent state based upon an alert message being sent from the wireless communications device **44**. Thereafter, receipt of a predetermined message by the wireless communications device **44** when the controller **40** is in the alert sent state may confirm receipt of the alert message by the monitoring station.

Receipt of the predetermined message by the wireless communications device **44** when the controller **40** is in another state different than the alert sent state may thus cause a different response by the controller. The alert sent state may comprise at least one of an vehicle stolen alert sent state, a vehicle alarm sounding alert sent state, a vehicle

speeding alert sent state, an unauthorized remote transmitter alert sent state, a low vehicle battery alert sent state, and a device malfunction alert sent state. The various alert messages and confirmation thereof are described in greater detail below.

The code or message conservation aspects of the vehicle tracking system **20** also permit sending a sequence of codes or messages within a predetermined time to also cause a different response at the vehicle tracking unit **25**. In other words, the plurality of controller states may comprise a received first message state based upon a first message being received by the wireless communications device **44** from the monitoring station **30**. Receipt of a second message by the wireless communications device **44** when the controller **40** is in the received first message state, such as within a predetermined time window, for example, may thus cause a different response by the controller than does receipt of the second message when the controller is in another state than the received first message state.

The plurality of controller states may comprise a vehicle finder state sounding an audible signal via the alarm indicator **67** at the vehicle **21**. In this state the controller **40** would bypass sending a vehicle alarm sounding alert to the monitoring station **30**.

Another aspect of the vehicle tracking system **20** is the provision of certain power conservation and management techniques, such as to permit extended periods where the vehicle **21** is not operation. During such extended periods, the vehicle battery **61** provides power to the vehicle tracking unit **25** as well as other vehicle devices. Accordingly, the voltage of the vehicle battery **61** drops over time. The vehicle tracking unit **25** may provide a significant drain on the vehicle battery **61** because of the power consumed by the wireless communications device **44** during transmission as will be appreciated by those skilled in the art.

The vehicle position determining device **42**, the wireless communications device **44** and the controller **40** may be considered as defining a power load of the vehicle tracking unit **25**. The controller **40** may operate the schematically illustrated power switch **55** to isolate the back-up battery **54** from the power load as a voltage of the vehicle battery **61** drops until reaching a threshold. After or below the threshold the controller **40** may cause the back-up battery **54** to selectively power only a first portion of the power load while a second portion of the power load remains powered by the vehicle battery.

For example, the wireless communications device **44** may have a higher operating voltage than the vehicle position determining device **42**. The first portion of the power load that is selectively powered despite the low vehicle battery voltage may thus be the wireless communications device **44**. In particular, the wireless communications device **44** may be powered for transmission. Accordingly, the back-up battery **54** can be saved for limited communication using the higher voltage wireless communications device **44**. This provides useful features even after an extended period during which the vehicle **21** is left unattended and the vehicle battery **61** gradually discharges.

To further conserve power, the controller **40** may reduce operation of the power load as vehicle battery voltage falls. Conversely, the controller **40** may restore operation of the power load based upon the voltage of the vehicle battery **61** rising again, such as upon being recharged.

Also relating to power consumption, the controller **40** further cause transmission of a low vehicle battery voltage alert to the monitoring station **30** based upon the voltage of the vehicle battery **61** falling bellow the threshold. The user or subscriber may cause the monitoring station **30** to issue a remote start command. The controller **40** may then generate a remote start output to the remote start device **63** to thereby start the engine and recharge the vehicle battery.

Another feature of the vehicle tracking system **20** is that the vehicle tracking unit **25** may be readily installed and connected to a vehicle **21**, such as in the illustrated embodiment where the vehicle includes a starter interrupt device **66** and a separate vehicle security controller **28**. More particularly, the controller **40** may switch between an armed mode and a disarmed mode based upon operation of the engine starter interrupt device **66**. The controller **40** when in the armed mode may cooperate with the wireless communications device **44** to send an alert message to the monitoring station **30** and including vehicle position information, for example, based upon the vehicle position determining device **42**. The controller **40** is also for selectively operating the engine starter interrupt device **66** to provide additional security features.

In one advantageous embodiment, the controller **40** preferably comprises a combination input and output terminal for connection to the engine starter interrupt device. This terminal is at the input/output circuitry **53** and is schematically illustrated by reference numeral **72**. The controller **40** may switch to the armed mode when in the disarmed mode and based upon the engine starter interrupt device **66** being operated to disable engine starting. Conversely, the controller **40** may switch to the disarmed mode based upon the engine starter interrupt device **66** being operated to enable engine starting. In other words, the vehicle tracking unit **25** can piggyback its arming and disarming off the existing vehicle security system **27**, for example.

The controller **40** may also selectively operate the engine starter interrupt device **66** based upon a command message from the monitoring station **30**. The controller **40** may selectively operate the engine starter interrupt device **66** based upon a command message from the monitoring station **30**. Alternately, or in addition thereto, the controller **40** may selectively operate the engine starter interrupt device **66** based upon the ignition switch **65**.

The following descriptive portions relate to various user or subscriber notifications and features provided by the vehicle tracking system **20**. Of course, the controller **40** preferably cooperates with the wireless communications device **44** to send an alert message. The monitoring station **30** may comprise a user interface, such as one or both of the telephone network or internet interfaces **33**, **34**, respectively (FIG. **3**), for generating a sequence of alert message notifications based upon receiving the alert message sent from the vehicle tracking unit **25**. More particularly, the monitoring station interface permits canceling any remaining alert message notification based upon a cancellation command response from a user or subscriber having already received the alert message notification. The user may send the cancellation response via the telephone **35** or computer **36** (FIG. **3**), for example. Thus, if the user may be reached at different telephone numbers or different users are desirably notified of the alert, this aspect of the vehicle tracking system **20** can make the notifications efficiently and without making unnecessary notifications.

The vehicle tracking system **20** may provide any of a number of very useful alerts, as discussed herein. For example, the alert message sent from the vehicle tracking unit may comprise at least one of an vehicle stolen alert message, and a vehicle alarm sounding alert message. The alert message may be one a vehicle speeding alert message, and a vehicle acceleration alert message. In addition, the

alert message may comprise an unauthorized remote transmitter alert message. Also, the alert message may be at least one of a low vehicle battery alert message, and a device malfunction alert message.

The speeding alert may be based upon exceeding a speed threshold for greater than a certain time, which may be user selectable. The acceleration alert may also be useful as such is also indicative of aggressive driving along with the speeding alert. The unauthorized remote transmitter alert increases overall security since a user will be notified if a would-be thief learns an unauthorized transmitter to operate the controller. These alerts are described in greater detail below.

The vehicle tracking system **20** may be implemented as a service to a subscriber. In other words, the subscriber pays a monthly fee for the service. Accordingly, it may be important to encourage a user to register. Similar subscriber or registrations systems in the past have suffered revenue losses since some users would wait to activate the system until the vehicle was stolen. In other words, the user would only subscriber or register and pay a single month's fee.

In accordance with this aspect of the vehicle tracking system **20** prompt user registration is encouraged. In particular, the vehicle tracking unit **25** may include the user registration reminder indicator **56** and the controller **40** may be switchable from an unregistered mode to a registered mode. In the registered mode, the controller **40** may cooperate with the wireless communications device **44** and the vehicle position determining device **42** to determine and send vehicle position information to the monitoring station **30**. In the unregistered mode, the controller **40** may activate the user registration reminder indicator **56** to encourage registration by the user.

The controller **40** may be switchable to the registered mode based upon an activation message from the monitoring station **30**. For example, when the registration payment has been received, the monitoring station can send one or more messages to the vehicle tracking unit **25** to stop activation of the registration reminder indicator **56**. The indicator **56** may be audible, visual or both. For example, the registration reminder indicator **56** could be a beeping sound generated by a small piezoelectric transducer every ten minutes or so when the ignition **65** is on.

In other words, the user registration reminder indicator **56** may provide a minor but irritating annoyance to the user to encourage registration. Upon successfully registering, the annoyance is abated. Accordingly, a relatively straightforward approach is provided to encourage user registration.

Along these lines, the controller **40** when in the unregistered mode may have reduced features compared to the registered mode. For example, the controller **40** when in the unregistered mode may be restricted or limited in sending messages with the wireless communications device **44**. Accordingly, usage of the wireless communications network may be reduced. Transmissions from the vehicle tracking unit **25** may be also be beneficially suppressed during original installation, for example.

Returning again to features of the vehicle tracking unit **25** which facilitate installation, the controller **40** may send an alarm indication alert responsive to a continuous activation of the alarm indicator **67** for greater than a predetermined time. Alternately, or in addition thereto, the controller **40** may send an alarm indication alert responsive to a repetitive pattern of alarm indicator **67** activations. In other words, the controller may be configured to distinguish between normal operation of a vehicle horn by the driver, and activation of the horn by the security system **27**. As mentioned above, the controller **40** may also monitor signals of at least one of a first and second polarity. The controller **40** thus advantageously piggybacks off the alarm indication generated by the vehicle security system **27** to determine and send a vehicle alarm sounding alert to the monitoring station **30**.

In one variation, the controller **40** may monitor signals delivered directly to the vehicle alarm indicator by the vehicle security controller **28**. In another variation, the controller **40** monitors signals of voltage dips of the vehicle battery **61**. Circuitry is conventionally and readily available for both such functions as be readily appreciated by those skilled in the art.

The controller **40** may also include a dual polarity compatible output in the input/output circuitry **53** for a vehicle device, such as the vehicle alarm indicator **67**. The controller **40** may further monitor signals relating to activation of the vehicle alarm indicator **67** and send an alarm indication alert with position information from the vehicle position determining device and using the wireless communication device.

For the dual polarity output compatibility, the controller **40** may generate a first polarity output pulse followed by a second polarity output pulse. The controller **40** may also generate a repeating pattern of a first polarity output pulse followed by a second polarity output pulse on the dual polarity compatible output. In yet other embodiments, the controller **40** may sense an actual polarity of the device and thereafter use the actual polarity for the dual polarity compatible output.

Where the vehicle device is a vehicle horn, the controller **40** may typically be configured to generate a negative polarity output on the dual polarity compatible output. Conversely, wherein the vehicle device is a vehicle alarm indicator siren, the controller **40** may be configured to generate a positive polarity output on the dual polarity compatible output.

Another aspect of the vehicle tracking system **20** relates to conserving memory space and/or reducing transmission time over the communications network. In accordance with this advantageous feature, the controller **40** may determine the vehicle position information including a vehicle location and an associated stationary period for each occurrence of the vehicle remaining stationary for greater than a predetermined period. In one embodiment, the controller **40** may cooperate with the wireless transmission device **44** to send the vehicle position information to the monitoring station based upon each occurrence of the vehicle remaining stationary for greater than the predetermined period. In this embodiment, the monitoring station **30** may associate a time with each occurrence of the vehicle remaining stationary for greater than the predetermined period. In other words, the monitoring station **30** may time stamp the received information.

In another embodiment, the controller **40** cooperates with the wireless transmission device **44** to send the vehicle position information to the monitoring station **30** for a plurality of occurrences of the vehicle remaining stationary for greater than the predetermined period. In this embodiment, the controller **40** may associate a time with each occurrence of the vehicle remaining stationary for greater than the predetermined period. In other words, the controller time stamps the position and stationary period information.

As an example, the predetermined time which determines whether the vehicle **21** is stationary and the position should be determined, may be less than about three minutes. This time may filter out vehicle stops in normal traffic, but which will keep track of stops where the driver likely leaves the

vehicle **21**. Accordingly, only the important information necessary to track the vehicle need be stored and/or transmitted thereby reducing the system costs. If the vehicle **21** is stationary overnight, for example, unnecessary position information need not be determined, stored, and/or transmitted to the monitoring station **30**.

The controller **40** may comprise the memory **52** for storing the vehicle position information therein. In one configuration, the controller **40** downloads the vehicle position information from the memory **52** to the monitoring station **30** based upon a predetermined schedule. In another configuration, the controller **40** downloads the vehicle position information from the memory **52** to the monitoring station **30** based upon a predetermined event. In yet another configuration, the controller **40** downloads the vehicle position information from the memory **52** to the monitoring station **30** based upon a predetermined percentage of memory usage.

Having now described certain general features and advantages of the vehicle tracking system **20**, this description now turns to additional specific details which are provided as examples. In particular, vehicle tracking system **20** preferably implements one or more of the following features:

1. Detects the vehicle being stolen and transmits a signal to the monitoring station to contact up to 3 people, for example, predetermined by the user, of theft of the vehicle and then starts tracking the vehicle. The contact may be by one or more of the following: an e-mail message, a pager alert, a cellular telephone call, or other telephone call.

2. Detects an optional vehicle security or alarm system activation and transmits a signal to the monitoring station to contact up to 3 predetermined people to inform them the vehicle's alarm is being activated.

3. Detects an optional vehicle alarm system's remote PANIC activation and transmits a signal to the monitoring station to contact up to 3 predetermined people to inform them of the vehicle's PANIC being activated.

4. Detects a vehicle being programmed to operate from an unauthorized remote transmitter, key transponder, other transponder, or other device that has a unique coding, and the vehicle unit transmits a signal to the monitoring station to contact up to 3 predetermined people to inform them of this occurrence. The system can also make available information relating to a number of such coded devices, or a change therein, or when a change occurred. A message can be sent to the user or the information can be available to the user on the WEB site. The vehicle would be equipped with a security system as disclosed in U.S. Pat. No. 5,654,688, for example, which determines an unauthorized transmitter and provides an alert feature. This patent is incorporated herein in its entirety by reference.

5. Detects the vehicle traveling over a predetermined speed, such as for a predetermined time, and transmits a signal to the monitoring station to send a message, such as an e-mail informing the user (and/or others) of this occurrence. Of course, the message could also be sent via a telephone call or page, should additional urgency be required. The vehicle's predetermined maximum speed limit and duration thereof can be selected by the user.

6. Detects a low battery voltage such as for a predetermined time and transmits a signal to the monitoring station to contact up to 3 predetermined people to inform them of vehicle's low battery voltage. This is especially advantageous during winter so that the vehicle could be started, for example, to prevent a problem before it happens). The time setting is preferably selectable by the user.

7. Detects the vehicle not moving for a predetermined time and transmits a signal to the monitoring station to send, for example, a nightly e-mail informing the user of all the vehicle's location and stationary time occurrences. The stationary time length is also selectable. This may be advantageous to encourage patrolling personnel not to remain for a long time in a same location.

8. The vehicle unit preferably includes a back-up battery system making it more reliable.

The vehicle unit may be relatively inexpensive. In addition, the monitoring fee that includes sending up to 60 e-mails and making up to 6 phone calls per month, may also be relatively low. The relatively low monitoring fee is based, at least in part, on the current relatively low rates charged for use of the control channel of the cellular telephone network. It is also noted that access to the control channel provides coverage for almost the entire U.S., for example.

The user or subscriber also preferably has access to an Internet site that will display a map and silently contact the vehicle to acquire it's current location, speed, direction of travel, and previous multiple locations with speeds, for example, the user's personal identification number (PIN) can be quickly activated by a telephone call. No additional installation may be required.

Certain annual pre-pay package arrangements may be available. For example, up to 10 access entries per month can be provided on a low monthly billing. Up to 30 access entries could be provided also for a relatively low monthly fee.

The present invention provides a number of other significant advantages including optional access from any phone or from any computer to access the monitoring station internet site. The user may control various vehicle functions remotely via the telephone or the internet site. The only charge may be for additional equipment and installation.

Additional features can also be included with the system and subscribed to by the user in accordance with the invention. For example, these include Hijack, Car Finding, Unlock Doors and Unauthorized Transmitter Alert Features. The equipment and installation is relatively inexpensive. For the hijack feature: from any phone or computer, the user may activate vehicle starter interrupt and sound the horn until the vehicle is retrieved (Command **4**).

For the Car Finding feature: from any phone or computer, the user may activate the vehicle's horn, or siren and sound same for 30 seconds. This allows the user to find his vehicle in a crowded parking lot (Command **5**).

For the Lock/Unlock vehicle doors feature: from any phone or computer user a predetermined command (Command **7**) activates unlocking of vehicle doors to retrieve keys, for example, that may have been accidentally locked inside the vehicle. Of course, the system can also be used to lock vehicle doors if this was forgotten (Command **6**). The unauthorized transmitter alert feature is similarly selected as described above.

In addition, a remote vehicle start feature may also be provided, such as to start the vehicle's engine to heat or cool the vehicle prior to entry. The equipment and installation for remote starting may be relatively low. Some further details of a specific embodiment of the vehicle tracking unit **25** are provided below as relating to use of red and green LED indicators as may be coupled to the controller **40** and operated thereby. Also various representative wires, designated by color, are provided as an example embodiment.

The red LED verifies the GPS receiving signal. With a yellow wire having positive 12 volts, the red LED blinking indicates searching GPS location, constant indicates found

location, and off indicates no GPS signal found. With the yellow wire not having positive 12 volts, if the red LED is off, the LED is not functioning.

The green LED verifies receiving the cell tower signal. With the yellow wire having positive 12 volts, blinking indicates the cell control channel signal is detected, constant indicates sending a micro burst signal (LED stays on 5-seconds after each transmission, and off indicates no cell tower signal received. With yellow wire not having positive 12 volts, off indicates the green LED is not functioning.

An example of representative DIP switch feature selection is as follows. A first switch may be used for the adding orange wire for controlling arm/disarming of system. When on, the orange wire controls arm/disarm as follows: to arm, the orange wire is grounded and yellow wire does not have 12 volts positive. To disarm, the orange wire is not grounded. When the first switch is off, then only the yellow wire controls arm/disarm as follows: to arm, the yellow wire is without 12 volts positive, and 30 seconds after continued arm mode then orange wire activates a constant 500 ma grounded output to operate an external starter interrupt relay until the system is disarmed. To disarm, the yellow wire is connected to 12 volts positive.

A main 5-pin plug may be provided on the vehicle unit and connected as follows:

1. The Red Wire is connected to the 12 vdc power. An alert warning "E" is given if the system is armed and the battery voltage becomes lower than 11-volts for longer than. ## minutes. This alert feature "E" will not operate again until the voltage is above 12 volts to re-set this feature.

2. The black wire is connected to ground.

3. The yellow wire is connected to the ignition 12 volts so that if the key is on, 12 volts is supplied thereto and if the key is off, the yellow wire is connected to ground. Further: if the system is in an armed mode and the Lat/Long changes, then Alert "A" is given. If the system is disarmed and within 2.5 seconds after the yellow wire receives 12 volts and the gray wire detects 3 or more positive pulses the system activates Alert "D". If the first DIP switch is in the off position then: if 12 volts is on yellow wire, the system is disarmed and the orange wire discontinues from the 500 ma ground, and if the yellow wire sees ground or neutral, then the system is armed and 30 seconds after the continued arm mode the orange wire activates a constant 500 ma grounded output to operate an external starter interrupt relay until system is disarmed

4. The gray wire is for input and output, and can be connected to an alarm siren or horn positive terminal. In addition:

a. With system armed and if the gray wire detects +12 v pulsing on/off or on constant for more than 10 seconds from an alarm siren or horn honking activation, then alert warning "B" alarm activation is given.

b. With system disarmed and if the gray wire detects +12 v pulsing on/off or on constant for more than 10 seconds from an alarm siren or horn honking activation, then alert warning "C" panic activation is given.

c. With system disarmed and if the Gray wire detects 3 or more 12 volt positive pulses within 2.5 seconds of yellow wire receiving 12 v+ and the gray wire by-pass not being activated, then alert warning "D" is given.

d. The gray wire bypass operates as follows:

i. After alert warning "B" bypass all future alert "B" signals until system is disarmed.

ii. After alert warning "C" bypass all future Alert "C" signals until system is armed.

iii. After alert warning "D" bypass all future alert "D" signals until no 12 volt pulses are detected on the gray wire within 3 seconds of the yellow wire having 12 volts.

e. With system armed or disarmed. The Output: Internal +12 v, 1 amp transistor with pulses 1 second on and 1 seconds off to activate siren or honk car horn or flashing light relay.

i. Non-stop activation from (Command "**4**")

ii. 30-second activation from (Command "**5**")

f. Turn off the above alert "A" from (Command "**1**").

5. The orange wire is for the starter interrupt and arm/disarm system, and operates as follows:

a. If first DIP switch is in the:

i. On position and: the orange wire has 12 volts or neutral, the system switches to the disarmed mode; the orange wire is grounded, then the system is switched to the armed mode; and the starter interrupt output will not automatically operate. Can only be activated from "Command #**4**"

ii. Off position and the orange wire does not effect the arming or disarming of the system; 30 seconds after system arms the orange wire will automatically activate constant 500 ma ground until the system is disarmed. And from "command #**4**". Connect to Starter interrupt relay output.

b. Command **4** activates Orange wire to have 500 ma. negative until Command 1 is received.

c. After Alert warning "B" is activated the first time it is thereafter bypassed while the orange wire remains grounded. Alert warning "B" is re-set to operate again **3** seconds after orange wire becomes ungrounded.

The vehicle unit may also include a Door Lock Plug configured as follows, for example. A green wire provides a 250 ma, negative 1 second pulse for Lock Doors. (Command "**6**"). A red wire provides a constant 12 v output from the red power wire. A blue wire provides a 250 ma., negative 1 second pulse for Unlock Doors (Command "**7**"). A pink wire provides a 250 ma., negative 1 second pulse for remote Car Starter (Command "**2**").

An installation test button may also be provided to work as follows. Pressing the button activates the orange wire for 10-seconds (starter interrupt), with these circuits in sequence. First, activates gray wire for 1-second. (siren/horn). After the first stops, activates green wire for 1 second to lock the doors. After the second stops, activate the blue wire for 1 second to unlock the doors. After the third stops, activate the pink wire for 1 second to activate optional item.

Representative warning alerts are as follows:

1. Alert Warning "A" (FIG. **4**): Automatic activation of "Command **8**" and the vehicle unit contacts monitoring station to instantly call 3 phone numbers with the message "Your Vehicle is stolen please confirm then call 911 to advise police of web site and your pin # so police can locate the vehicle". This is detected with the system armed and the GPS indicating movement. Bypasses all future alert warning "A" signals until the system is re-armed.

2. Alert Warning "B" (FIG. **5**): the vehicle unit contacts the monitoring station to instantly call 3 phone numbers with the following message "Vehicle alarm activated please confirm". This is with the system armed and detecting gray wire having 12 volts pulsing or on constant for longer than 10-seconds). After alert warning "B" is activated the first time, it is thereafter bypassed while the orange wire remains grounded. Alert warning "B" is re-set to operate again 3 seconds after orange wire becomes ungrounded.

3. Alert Warning "C" (FIG. 6): the vehicle unit contacts the monitoring station to instantly send e-mail message "vehicle was traveling faster than your preset amount of "###" and time limit of "##" seconds. Indicates the vehicle speed and location that the speeding started and how long speeding accrued" (Detected from GPS).

4. Alert Warning "D" (FIG. 7): the vehicle unit contacts the monitoring station to instantly call 3 phone numbers with the this message "Unauthorized remote transmitter was just programmed to operate your vehicle." This is with the system disarmed and the Gray wire detecting three or more 12 volt pulses within 2.5 seconds of yellow wire having seen 12 volts positive. All future alert "D" are bypassed until no 12 volt pulses are detected on the gray wire within 3 seconds of the yellow wire seeing 12 volts.

5. Alert Warning "E" (FIG. 8): the vehicle unit contacts the monitoring station to instantly call 3 phone numbers with the message "Vehicle has low battery voltage and system has changed to low voltage mode". This is with the system armed and detecting the Red wire with lower than 11 volts for ## minutes. All future alert "E" are bypassed until, first, more than 13.5 volts are detected on the red wire and, second, after the yellow wire stops having positive voltage the red wire then must detect more than 12 volts.

The following are representative commands for use in the system:

Command **1**: Reset all circuits and system remains asleep until the ignition key is turned on. Resets the triggered mode and unit is asleep to prevent power drain on vehicle battery.

Command **2**: (Accessory activation) monitoring station Command to the system to activate Pink wire to pulse 250 ma negative for 1 second.

Command **3**: (Vehicle Location) Web site to indicate present location and past events in memory.

Command **4**: (Hijack or Stolen) monitoring station Command to vehicle system to activate:

a. Gray wire to pulse 1 sec on/1 sec off with 1 amp positive output and which continues until receive command # 1.

b. Orange wire to have 500 ma ground and which continues until receive command # 1.

Command **5**: (Car Find) monitoring station Command to system activating Gray wire for 30 seconds pulsing 1 sec on/1 sec off with **1** amp positive output.

Command **6**: (Lock Doors) monitoring station Command to system activating Green wire to pulse 1 second with 250 ma. negative.

Command **7**: (Unlock Doors) monitoring station Command to system to activate Blue wire to pulse 1 second with 250 ma. negative.

Command **8**: (Start Constant Vehicle Tracking) sends previous 2 events in memory and then every 120 seconds get update of location information sent to the Web site.

The system is also operable in a battery saver mode which operates as follows:

1. With the ignition key off, if the battery voltage drops below 11.5 volts for more than 5 seconds, the GPS verification wakes up to look:

a. Once instantly.

b. Once in 1 hour if at the same location.

c. Once in 6 hours if at the same location.

d. Once in 12 hours if at the same location.

e. Once every 24 hours if at the same location.

f. Activate alert "E" when the battery saver mode is activated, and bypass sending all future Alert "E" until the battery voltage goes above 13 volts for 10 minutes to reset this feature.

Another aspect of the invention relates to automatic vehicle alert e-mails sent containing some or all of the previous system events. This sending can be triggered as follows:

a) At a user selected predetermined time ## (01–24) of each day, or

b) At a predetermined memory fill level, such as full or near full.

In addition, each system event may contains one or more of the following:

a) Vehicle Location

b) Vehicle total time at location

c) Time of day

d) Mph traveling

e) Total time traveling above MPH

f) Direction traveling

g) Delta

h) Special Alert messages, if any, including:

i) GPS signal not received for longer than 5 minutes.

ii) Traveling above ###MPH for ## minutes.

iii) Vehicle is stolen.

iv) Alarm activated.

v) Unauthorized remote transmitter alert.

vi) Battery saver mode activated

vii) Command **1**: Reset all circuits and system remains asleep until the ignition key is turned on.

viii) Command **2**: (Accessory activation)

ix) Command **3**: (Vehicle Location was retrieved)

x) Command **4**: (Hijack or Stolen mode activated)

xi) Command **5**: (Car Find mode activated)

xii) Command **6**: (Locked Doors)

xiii) Command **7**: (Unlocked Doors)

xiv) Command **8**: (Started 2-second incremental Vehicle Tracking)

Another feature of the invention relates to the selectable threshold conditions causing an event to be recorded into the memory of the vehicle unit. For example, this may include: while the yellow wire has 12 volts, record events every "??" default 15 minutes time if the GPS location has changed. If the GPS location is same then only update stationary total time. If the GPS antenna is not receiving any signal then enter last known GPS location and with indication this was the last known GPS location before GPS signal stopped and how long no GPS signal was received, and enter GPS location in the on-hold file. When vehicle is traveling above ###MPH for ##-minutes.

The monitoring station may also provide a number of automated phone calls as described above. These may include:

1. The user's vehicle has issued a stolen alert:

a. If vehicle is stolen, after receiving the phone message the user then calls 911 to advise police of the theft, and gives the police the Web site address and an identification number, such as the user's PIN, to allows the police to locate where your vehicle has been, where it is now and keep tracking it until the police can retrieve the vehicle.

b. If this is a false alert due to vehicle being towed away for service, for example, then the user may press "1" to put the vehicle in an off mode. Once the ignition key is turned on again the system will reset back to its normal operation mode.

2. The user's vehicle has issued an alarm activated for more than 10 seconds alert. The system will not respond to this alert again until ignition key is turned on again to reset this feature.

3. The vehicle battery voltage is low or has been disconnected. The tracking system is in low voltage mode. The system will not respond to this alert again until the battery voltage goes above 13 volts for 10 minutes to reset this feature.

The backup battery may be sized according to the GPS receiver and processing power draw. In addition, the battery may also be sized based upon estimated micro burst transmitting power draw. Such transmission are typically at about 3 watts power to the antenna.

The system according to the invention including the vehicle unit and monitoring station provides a number of significant advantages and features. For example, the police may be directly contacted by the user when the vehicle is stolen. The user receives the telephone message from the monitoring station, and this is done without requiring the intervention of a manual security monitoring operator, such as an ADT operator, for example. In addition, once in the stolen mode, the vehicle unit will periodically continue to send out its location, so that the police may track the vehicle via the WEB, for example. This location sending feature may begin immediately, that is, without requiring the user to contact the vehicle to begin tracking. Having the vehicle contacting the monitoring station is considerably less expensive than other schemes where the vehicle is periodically polled via the cellular network, for example.

The system may also be interfaced to a breath alcohol sensor at the vehicle, for example, and this information recorded in memory. The information could be passed along to the monitoring station, which, in turn, could send out a notification message (e-mail or telephone) that the vehicle is being operated by a driver who may be impaired by alcohol. The vehicle's location could then be tracked to permit the police to detain the driver.

Another aspect of the unit is that it may be able to recognize the desirability to bypass certain security breach triggers or other events. For example, a car finding feature can be provided that will allow the user to sound the horn or siren when near the vehicle to help locate the vehicle, as in a crowded parking area. Without the bypass feature, the unit could recognize the horn or siren as a security breach and transmit such information to the monitoring center. In accordance with this aspect of the invention, the unit would recognize the car finding feature was activated and thereby bypass sending a security breach transmission, for example. Again, false alarms and unneeded usage and expense of the communications infrastructure would be avoided.

Yet another aspect of the invention relates to thwarting a would-be thief who attempts to disable the alarm by cutting the battery cable or power supplied to the system. The unit preferably includes a back-up battery. More particularly, upon being in an armed mode and sensing a breach of security, such as the hood opening, for example, the unit will send out a signal indicating the alarm or security breach and while the alarm is indicated, if the battery is disconnected then the unit will send out a message indicating the vehicle is stolen, and also providing the vehicle's current position. Accordingly, the would be thief is not able to defeat the security system by quickly disrupting power to the unit during an alarm indication or security breach. Also to prevent additional alerts, this message is prevented from being transmitting again until user returns to the vehicle to disarm the system and/or turn on the ignition so that the unit sees a voltage above 13 volts indicating the vehicle has started using the owner's ignition key. This aspect is further understood with reference to the enclosed flowchart labeled "Alert A" (FIG. 4).

Still another aspect of the invention relates to how the unit can discriminate between ordinary usage or honking of the horn as compared to a security system triggered alarm. Most vehicle security systems will provide a pattern of horn soundings as an alarm indication, and this can be determined and used to reduce false alarm transmissions from the unit. For example, the unit can look at the number of leading and trailing edges of the power pulse used to sound the horn. A single pressing of the horn switch by the user will cause two edges within a predetermined time, such as about 10 to 12 seconds. Accordingly, the unit can be configured to not send a security breach transmission to the control center based upon detecting two transitions. Since a number of vehicle security systems may have a continuous sounding of the horn within the predetermined time, the unit can send the transmission upon detecting only a single transition.

A number of other vehicle security systems provide a series of pulses or horn soundings within the predetermined time. Accordingly, the unit may also be configured to send a security breach transmission upon detecting greater than a predetermined number of transitions, such as greater than nine, for example. This number is also typically higher than a user would generate honking the horn several times within the predetermined time. In other terms, the number of transitions of the horn pulses can be counted, and if equal to one, or greater than nine, for example, the transmission is triggered, and otherwise the sounding of the horn is ignored. Also to prevent additional alerts, this message is prevented from being transmitting again until user returns to the vehicle to disarm the system and/or turn on the ignition so that the unit sees a voltage above 13 volts indicating the vehicle has started using the owner's ignition key. This aspect is further understood with reference to the enclosed flowchart labeled "Alert B" (FIG. 5).

Yet another feature of the invention relates to a low vehicle battery alert. For example, the unit may monitor the battery voltage over a predetermined time such as ten minutes. The ten minute window prevents false tripping, for example, when the voltage dips during engine cranking. In particular, the voltage can be sensed and determined whether it is greater than zero (eg. greater than six volts)and less than a high value (eg. eleven or twelve volts), and, if so, a low battery voltage transmission can be communicated to the monitoring station, and ultimately to the vehicle user when away from the vehicle. If vehicle is being serviced and battery is disconnected this will cause the battery voltage to be equal to zero, then the low battery voltage transmission will not be communicated to the monitoring station. Also to prevent additional alerts, this message is prevented from being transmitting again until user returns to the vehicle to disarm the system and/or turn on the ignition so that the unit sees a voltage above 13 volts indicating the vehicle has started using the owner's ignition key. Again false triggerings are reduced. This aspect is further understood with reference to the enclosed flowchart labeled "Alert E".

Yet another advantageous feature of some embodiments of invention relates to the ability to conserve electrical power. More particularly, when the vehicle is stopped and in the armed mode, the GPS receiver may be periodically operated to determine the vehicle position. If the vehicle position changes, this is indicative that the vehicle is being moved or stolen. For example, the GPS receiver may be operated to generate new vehicle position information every 29 seconds. These relatively quick successive position determinations or readings are generally termed hot start. These are relatively less complicated that a cold start position determination which takes longer, since the cold start posi-

tion determination requires greater time to acquire and receive data from multiple satellites, as will be appreciated by those skilled in the art.

Unfortunately, this relatively high repeated usage of the GPS receiver may cause unnecessary battery drain, especially when the vehicle is left armed and unattended by the user for an extended period. Accordingly, the power conserving feature of the invention permits the GPS receiver to be turned off when the vehicle is in the armed mode, and the GPS receiver is turned on only when needed. For example, a vehicle sensor, such as a shock sensor, motion sensor, ignition sensor, door sensor, or other sensor, or combinations thereof could be used to start the GPS receiver. This sensor could also be used to trigger an alarm if desired; however it need not be so used in all embodiments. The GPS receiver, once turned on, could operate in the normal periodic fashion as described above, or for a fixed period of time. The GPS receiver could also be turned off again after some predetermined time if no further sensor signal is received, or if the position fails to change on subsequent position readings or determinations.

Yet another feature relates to permitting more colorful audible alert messages to be generated for the user. The user can, in some embodiments, access an internet site to type or enter the text for a message to be sent, such as to alert the user that his vehicle is being stolen. The audible message then communicated by a telephone call to the user is generated by a speech message synthesizer based upon the entered text. In accordance with this aspect of the invention, the user could type in phonetically spelled words or phrases, such as to create more colorful messages including slang terms, various accents, and/or to mimic various dialects, for example. The speech synthesizer would then generate the desired message customized for the user. Of course, the system could also permit the user to test or preview the pronunciation generated by the speech message synthesizer based on the entered text message prior to its adoption.

Another aspect relates to requesting GPS position information from a vehicle. If a command is sent downstream to the vehicle requesting that GPS information in turn be sent upstream from the vehicle, and the GPS information is not received within a predetermined time, such as about four minutes, then another command may be sent to the vehicle requesting the GPS information. This may keep repeating until GPS information is received, for a predetermined number of tries, or until a user instructs stopping of the requests. This helps to ensure and confirm the activation and reception of GPS tracking coordinates from the vehicle.

Yet another aspect relates to reducing a frequency with which GPS information is sent from the vehicle. More particularly, the unit may be configured to activate GPS information transmission upstream every 2 minutes. To reduce system usage expense and power consumption at the vehicle, this rate of transmission of GPS information could be progressively decreased over time. For example, in one embodiment, upon activation the GPS location signals could be sent every 2 minutes during the first hour, then once an hour for the next 23 hours, after which only one signal would be sent per day.

Still another aspect relates to warning the user of an inoperable or malfunctioning GPS or cellular telephone section. More particularly, if the GPS or cellular telephone antenna wire is cut or the mounting position of either is changed causing the antenna to stop receiving the signal the user would not ordinarily know of this problem quickly. In accordance with one embodiment, if the ignition is turned on a predetermined number of times, such as about three, and each time ignition turns on if no GPS or no cell signal is received for a minimum time, such as about 15 to 30 minutes or longer, an audible warning beeper may be activated in the vehicle. This beeper may be sounded once ever 15-minutes. At anytime if the GPS or cell signal is received properly then the system re-sets automatically stopping the beeper sound.

As an example, if the ignition key is turned on and no GPS or no Cell signal is being received for 15-minutes, and the vehicle ignition stays on for 45 minutes and there is still no GPS or no cell signal, the unit counts one. Thereafter, if the ignition key is turned on and no GPS or no cell signal is being received for 15-minutes, and the vehicle ignition stays on for 60-minutes and there is still no GPS or no cell signal, a second count is determined. Thereafter, if the ignition is turned on and no GPS or no cell signal is received for 10-minutes, and the vehicle ignition stays on for only 10-minutes and there is still no GPS or no cell signal, no count is determined. Thereafter, if the ignition is turned on and no GPS or no cell signal is being received for 15-minutes, a third count is determined and the beeper is activated as described above. This beeping may continue every 15-minutes while the vehicle ignition stays on as long as the vehicle ignition stays on for 16-minutes and still no GPS or no Cell signal is being received. If thereafter, the ignition is turned on and no GPS or no cell signal is being received, the beeper beeps once and again beeps once every 15-minutes while vehicle ignition stays on. If in 10-minutes both GPS or cell signal is being received, the beeper system is turned off and the warning count is reset.

In examples, if the ignition key is turned on and no GPS or no cell signal is being received for only 5, 10 or 12 minutes (with the threshold set at 15 minutes), then no count is determined.

In certain circumstances, the GPS signal may fail, but the cell signal may still be working. Accordingly, it may be desirable to send an indication of the failure of the GPS signal to the central monitoring station to thereby alert the user as described above. If the cell signal also failed, or if the cell signal failed by itself, in other embodiments a separate paging device would transmit the failure or loss of the cell signal information to the central monitoring station, to thereby alert the user.

Yet another feature is directed to efficient use of a relatively small number of codes available to communicate with the tracking unit from the cellular network and central station. More particularly, a typical arrangement may provide eight basic codes and two "wildcard" codes. The two wildcard codes are reserved for future or other uses. A particular tracking device will respond directly to any of the eight basic codes. For example, the doors could be locked or unlocked, a present location downloaded from the vehicle, etc.

In accordance with this feature, the tracking device may respond differently to the same code or command depending upon the state or condition of the tracking device. For example, if an alarm is triggered at the vehicle, it may be desired that the tracking device continue to send the alarm signal until confirmation is received that the central monitoring station has received the alarm signal. This confirmation can be sent using the same code as may provide another function if the device were not indicating an alarm. Any of a number of such tracking device conditions may trigger a different message to be interpreted from the received code. For example, if any of the above Alerts A–E were triggered, the receipt of a predetermined code, such as code eight, would confirm receipt of the alert by the central station, and this receipt of code eight would not cause the other response

(no alarm triggered) in the tracking device. Of course this concept can be extended to other features as will be appreciated by those skilled in the art.

In accordance with another feature, the rate of sending the location or position data (or change in position data) from the vehicle may be varied to reduce system usage and thereby reduce expenses. More particularly, in one embodiment, the rate of sending may be based upon how long the vehicle has remained stationary. This time period may be selected by the user. For example, the selected time may be in the range of 15 minutes to six hours. If the vehicle has been stationary for the selected time period, then the rate of transmission may be reduced. This reduces or eliminates the need to send home position data and send all the over 15-minute stops made that day. Otherwise, that is when the vehicle is moving, the device may send data at a faster rate. Of course, a system user would not likely be interested in quick updates, especially where the position information is not changing. Conversely, if the vehicle is being moved, it may be desirable to receive more frequent position updates.

Another variation of this transmission rate conservation feature, bases the rate of transmission on the vehicle position. For example, a reduced rate of transmission may be selected if the vehicle is in a predetermined area where the user has a lesser interest in quickly updated position information. The user may also have a reduced interest in an area that can be defined outside of a predetermined distance from a reference point.

Yet another variation of the vehicle position transmission rate conservation feature is based upon the vehicle's speed, such as the vehicle's average or maximum speed, for example. Accordingly, if the vehicle is traveling above a preset speed, the rate of transmission may be increased.

In accordance with another aspect of the invention, the tracking device may send the alert indication a predetermined number of times without receiving an acknowledgment as described above, and then wait until the vehicle position has changed before trying again or the cell re-registers or its RSS. (received signal strength) changes. Thus, power is conserved. When the vehicle has moved to a new position, any obstructions may no longer be present thereby increasing the likelihood of a successful communication. In addition, the change in position may be determined when the vehicle is sensed to be moving about a predetermined relatively small speed, such as greater than 1 mph, for example.

In all of the embodiments and variations described herein, the tracking device may communicate with one or more other vehicle devices via a vehicle data communications bus. Further aspects of interfacing with a vehicle data communications bus are described in U.S. Pat. Nos. 5,719,551 and 6,011,460 assigned to the assignee of the present invention.

Yet another aspect relates to efficient use of available codes on the cellular telephone control channel. In one particular example, ten codes may be available to be transmitted from the monitoring station to the vehicle trackers. The first eight or nine codes are command codes that will cause a specific action by the tracking device at the vehicle. The other one or two codes may be wildcard codes as mentioned above, that may set a stand-by mode for one or a group of vehicles, for example.

It may be desirable to provide more than eight commands at the vehicle responsive to the corresponding eight available codes. For example, it may be desirable to set a feature on or off, or to set a different feature setting or threshold. In accordance with this aspect of the invention, the commands at the tracker are determined based upon a series of different command codes being received within a predetermined time window.

For example, the monitoring station may send code **9** that switches the tracker in the car into a stand-by mode for a predetermined time and which causes the tracker to respond with an upstream confirmation code **7** or **9** indicating receiving code **9**. During the predetermined time of the stand-by mode another code follows that causes a system programmable feature or setting to change. Note that the second code would otherwise cause a different function at the vehicle. Note that system might operate a function **9** if another code **1**–**9** is not received in the predetermined time. The following list is exemplary for features resulting from second codes **1**–**9**:

(1) Code **1**—Tracker will turn off feature of upstream code caused by vehicle alert being detected.

(2) Code **2**—Tracker will turn on feature of upstream code caused by vehicle alert being detected.

(3) Code **3**—Tracker deactivates cell receiver from operating due to a non-paying customer for monitoring service. That phone number can then be allocated to another customer.

(4) Code **4**—Turn on audio buzzer feature that will sound once each 10 minutes. The monitoring station need only send the command to activate the feature, as the tracker will time the period and drive the buzzer thereafter. The monitoring station will normally not need to send this command because the tracker will be configured out of the box with this feature activated to sound the buzzer every 10 minutes until the next command is received.

(5) Code **5**—Turn off the audio buzzer. This is to be sent by the monitoring station after a user has successfully activated his account.

(6) Code **6**—Turn on the 80 mph speed limit reporting. This will normally not be sent as this feature will be the default setting of the tracker.

(7) Code **7**—Turn off the 80 mph speed limit reporting.

(8) Code **8**—Increase speed limit 5 mph and increase the time 5 minutes.

(9) Code **9**—Decrease speed limit 5 mph and decrease the time 5 minutes, and wait 5 minutes if another code number follows. It could operate this way to allow another set of codes to change more features.

In this example, in response to the tracker receiving the system code **1**–**9**, the tracker sends an upstream code **7** to acknowledge receipt of the system code **1**–**9**. Upon receipt of code **9** the tracker waits up to 5 minutes to determine if another system code is received. If no code is received, then the tracker performs the code **9** operation. Of course, in other embodiments other features or settings can be selected.

In general, it may be preferred that the first code sent in a series of two codes, for example, be a code that causes only a minor function to be performed at the vehicle. This so because if the second code is sent from the monitoring station, but not received at the tracker, only a minor function is performed. For example, the first code may switch between armed and disarmed modes. This is in contrast to using a remote engine starting code or engine shutdown code as the first code. The vehicle may be moving or positioned in a marginal reception area, and the second command may not be received by the tracker within the predetermined time window. As will be appreciated by those skilled in the art, this concept of multiple digit codes, can be extended beyond two digits to three or more.

To further conserve cellular transmissions and as described above, the tracker may be set to record a position

based upon a determined event. Only this recorded position information may be downloaded either by user request or at set times. It is desired that such events be relatively few, but that the information still be helpful to the user.

For example, an event for recording of position may be determined based upon the vehicle being stopped for greater than a first time and less than a second time. For example, the first time may be 15 minutes and the second time may be 6 hours. Determination of the vehicle being stopped can be made based upon one or both of the GPS position or the vehicle ignition being turned off. The second time prevents the recording of position information when the vehicle is stopped at the owner's home during the evening, for example. Accordingly, the important information of the vehicle stops being made is recorded and made available to the user, while system communications resources are conserved.

In another example, if the mode is selected to send the vehicles location every 10 min and the vehicle is in the same location for greater than a set time, then no more vehicle locations are sent until the vehicle location has changed to start the every 10 min reporting again.

Other features relating to vehicle control systems are disclosed in copending patent applications entitled VEHICLE TRACKER INCLUDING STATIONARY TIME DETERMINATION AND ASSOCIATED METHODS, Ser. No. 09/859727, VEHICLE TRACKER CONSERVING CODES AND RELATED METHODS, Ser. No. 09/859673; VEHICLE TRACKER WITH POWER SAVING FEATURES AND RELATED METHODS, Ser. No. 09/859728; VEHICLE TRACKER COOPERATING WITH A STARTER INTERRUPT AND RELATED METHODS, Ser. No. 09/859973; VEHICLE TRACKER WITH USER NOTIFICATIONS AND ASSOCIATED METHODS, Ser. No. 09/859733; VEHICLE TRACKER WITH USER REGISTRATION REMINDER AND RELATED METHODS, Ser. No. 09/859971; VEHICLE TRACKER INCLUDING INPUT/OUTPUT FEATURES AND RELATED METHODS, Ser. No. 09/859972; and VEHICLE TRACKER WITH TEST FEATURES AND RELATED METHODS, Ser. No. 09/859729, the entire disclosures of which are incorporated herein by reference.

Many modifications and other embodiments of the invention will come to the mind of one skilled in the art having the benefit of the teachings presented in the foregoing descriptions and the associated drawings. Accordingly, it is understood that the invention is not to be limited to the embodiments disclosed, and that other modifications and embodiments are intended to be included within the spirit and scope of the appended claims.

That which is claimed is:

1. A vehicle tracking system comprising a vehicle tracking unit for a vehicle of a type comprising a vehicle alarm indicator, said vehicle tracking unit comprising

a vehicle position determining device,

a wireless communications device, and

a controller connected to said wireless communications device and said vehicle position determining device;

said controller cooperating with said wireless communications device to send an alarm indication alert based upon at least one of an activation of the vehicle alarm indicator continuously for greater than a predetermined time and an activation of the vehicle alarm indicator in a repetitive pattern; and

a monitoring station receiving the alarm indication alert from said vehicle tracking unit.

2. A vehicle tracking system according to claim **1** wherein said controller also cooperates with said vehicle position determining device and said wireless communications device to send vehicle position messages.

3. A vehicle tracking system according to claim **1** wherein said controller monitors drive signals to the vehicle alarm indicator.

4. A vehicle tracking system according to claim **1** wherein the drive signals have at least one of a first and second polarity.

5. A vehicle tracking system according to claim **1** wherein the vehicle alarm indicator comprises at least one of a vehicle horn, and a vehicle siren.

6. A vehicle tracking system according to claim **1** wherein said vehicle position determining device comprises a Global Positioning System (GPS) device.

7. A vehicle tracking system according to claim **1** wherein said wireless communications device comprises a cellular telephone communications device.

8. A vehicle tracking system according to claim **7** wherein said cellular telephone communications device communicates over a cellular control channel.

9. A vehicle tracking system according to claim **1** wherein said monitoring station comprises a user interface for accepting at least one command from a user and sending at least one alert to the user.

10. A vehicle tracking system according to claim **9** wherein said user interface comprises an Internet interface.

11. A vehicle tracking system according to claim **9** wherein said user interface comprises a telephone network interface.

12. A vehicle tracking unit for use with a vehicle comprising a vehicle alarm indicator, the vehicle tracking unit comprising:

a vehicle position determining device;

a wireless communications device; and

a controller connected to said wireless communications device and said vehicle position determining device;

said controller cooperating with said wireless communications device to send an alarm indication alert responsive to an activation of the vehicle alarm indicator continuously for greater than a predetermined time.

13. A vehicle tracking unit according to claim **12** wherein said controller further sends an alarm indication alert responsive to activation of the vehicle alarm indicator in a repetitive pattern.

14. A vehicle tracking unit according to claim **12** wherein said controller monitors drive signals to the vehicle alarm indicator.

15. A vehicle tracking unit according to claim **14** wherein the drive signals have at least one of a first and second polarity.

16. A vehicle tracking unit according to claim **12** wherein the vehicle alarm indicator comprises at least one of a vehicle horn, and a vehicle siren.

17. A vehicle tracking unit according to claim **12** wherein said vehicle position determining device comprises a Global Positioning System (GPS) device.

18. A vehicle tracking unit according to claim **12** wherein said wireless communications device comprises a cellular telephone communications device.

19. A vehicle tracking unit according to claim **18** wherein said cellular telephone communications device communicates over a cellular control channel.

20. A vehicle tracking unit for use with a vehicle comprising a vehicle alarm indicator, the vehicle tracking unit comprising:

a vehicle position determining device;

a wireless communications device; and

a controller connected to said wireless communications device and said vehicle position determining device;

said controller cooperating with said wireless communications device to send an alarm indication alert responsive to an activation of the vehicle alarm indicator in a repetitive pattern.

21. A vehicle tracking unit according to claim **20** wherein said controller monitors drive signals to the vehicle alarm indicator.

22. A vehicle tracking unit according to claim **21** wherein the drive signals have at least one of a first and second polarity.

23. A vehicle tracking unit according to claim **20** wherein the vehicle alarm indicator comprises at least one of a vehicle horn, and a vehicle siren.

24. A vehicle tracking unit according to claim **20** wherein said vehicle position determining device comprises a Global Positioning System (GPS) device.

25. A vehicle tracking unit according to claim **20** wherein said wireless communications device comprises a cellular telephone communications device.

26. A vehicle tracking unit according to claim **25** wherein said cellular telephone communications device communicates over a cellular control channel.

27. A method for operating a vehicle tracking unit for a vehicle of a type comprising a vehicle alarm indicator, the vehicle tracking unit comprising a vehicle position determining device, and a wireless communications device, the method comprising:

determining position information of the vehicle using the vehicle position determining device;

determining an alarm condition based upon at least one of an activation of the vehicle alarm indicator continuously for greater than a predetermined time and an activation of the vehicle alarm indicator in a repetitive pattern; and

sending an alarm indication alert from the wireless communications device responsive to determining the alarm condition and including vehicle position information.

28. A method according to claim **27** wherein determining the alarm condition comprises monitoring drive signals to the vehicle alarm indicator.

29. A method according to claim **28** wherein the drive signals have at least one of a first and second polarity.

30. A method according to claim **27** wherein the vehicle includes a vehicle battery; and wherein determining the alarm condition comprises monitoring voltage dips of the vehicle battery.

31. A method according to claim **27** wherein the vehicle alarm indicator comprises at least one of a vehicle horn, and a vehicle siren.

32. A method according to claim **27** wherein the vehicle position determining device comprises a Global Positioning System (GPS) device.

33. A method according to claim **27** wherein the wireless communications device comprises a cellular telephone communications device.

34. A method according to claim **33** wherein the cellular telephone communications device communicates over a cellular control channel.

* * * * *

UNITED STATES PATENT AND TRADEMARK OFFICE

CERTIFICATE OF CORRECTION

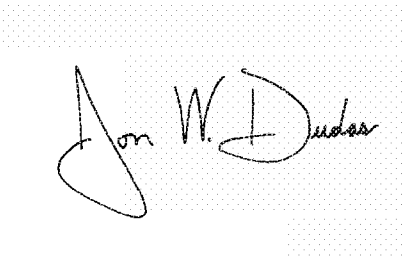
PATENT NO. : 7,149,623 B2
APPLICATION NO. : 10/383496
DATED : December 12, 2006
INVENTOR(S) : Flick

It is certified that error appears in the above-identified patent and that said Letters Patent is hereby corrected as shown below:

Column 1, Line 40	Delete: "it used" Insert: --it is used--
Column 3, Line 40	Delete: "diagrams" Insert: --diagram--
Column 4, Line 42	Delete: "illustrated" Insert: --illustratively--
Column 5, Line 35	Delete: "will described" Insert: --will be described--
Column 6, Line 66	Delete: "of an vehicle" Insert: --of a vehicle--
Column 7, Line 28	Delete: "not operation" Insert: --not in operation--
Column 7, Line 65	Delete: "cause" Insert: --causes--

Signed and Sealed this

Seventh Day of August, 2007



JON W. DUDAS
Director of the United States Patent and Trademark Office

EXHIBIT C

US006606561B2

(12) **United States Patent**
Flick

(10) **Patent No.: US 6,606,561 B2**
(45) **Date of Patent: Aug. 12, 2003**

(54) **VEHICLE TRACKER INCLUDING INPUT/OUTPUT FEATURES AND RELATED METHODS**

(75) Inventor: **Kenneth E. Flick**, Douglasville, GA (US)

(73) Assignee: **Omega Patents, L.L.C.**, Douglasville, GA (US)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 42 days.

(21) Appl. No.: **09/859,972**

(22) Filed: **May 17, 2001**

(65) **Prior Publication Data**

US 2002/0016673 A1 Feb. 7, 2002

Related U.S. Application Data

(60) Provisional application No. 60/264,811, filed on Jan. 29, 2001, provisional application No. 60/258,005, filed on Dec. 22, 2000, provisional application No. 60/251,552, filed on Dec. 6, 2000, provisional application No. 60/252,125, filed on Nov. 20, 2000, provisional application No. 60/246,463, filed on Nov. 7, 2000, provisional application No. 60/236,890, filed on Sep. 29, 2000, provisional application No. 60/222,777, filed on Aug. 3, 2000, and provisional application No. 60/205,178, filed on May 17, 2000.

(51) **Int. Cl.**[7] **G01C 21/00**
(52) **U.S. Cl.** **701/213**; 340/988
(58) **Field of Search** 701/213, 207, 701/209, 24, 33, 35, 36; 340/901, 989, 988, 991, 992, 993

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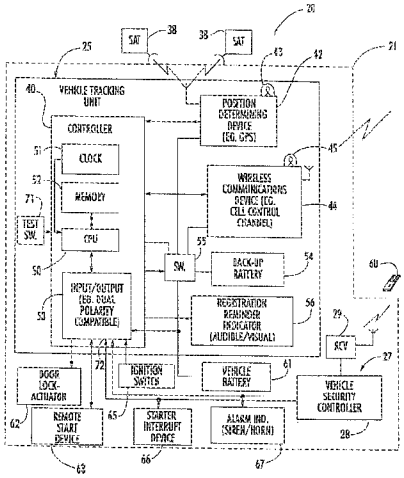
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Primary Examiner—William A. Cuchlinski, Jr.
Assistant Examiner—Olga Hernandez
(74) *Attorney, Agent, or Firm*—Allen, Dyer, Doppelt, Milbrath & Gilchrist, P.A.

(57) **ABSTRACT**

A tracking system includes a vehicle tracking unit for a vehicle of a type including an alarm indicator, and a monitoring station receiving the alarm indication alert from the vehicle tracking unit. The vehicle tracking unit may include a vehicle position determining device, a wireless communications device, and a controller connected to the wireless communications device and the vehicle position determining device. The controller may cooperate with the wireless communications device to send an alarm indication alert responsive to at least one of activation of the vehicle alarm indicator continuously for greater than a predetermined time and activation of the vehicle alarm indicator in a repetitive pattern. The controller may also include a dual polarity compatible output for a vehicle device, such as the vehicle alarm indicator.

53 Claims, 10 Drawing Sheets



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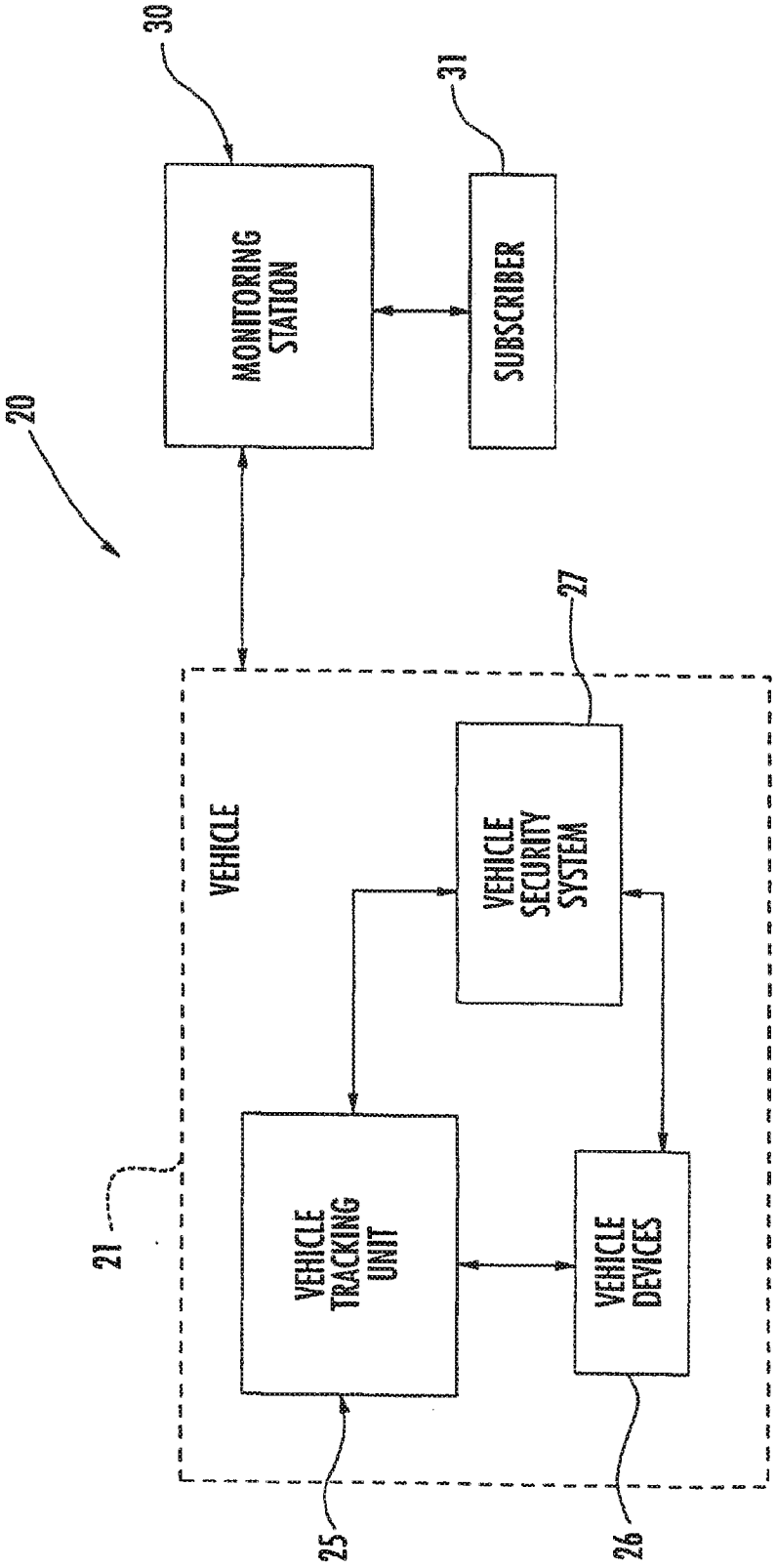

30
31
MONITORING STATION
SUBSCRIBER
20
27
VEHICLE
VEHICLE SECURITY SYSTEM
21
VEHICLE TRACKING UNIT
VEHICLE DEVICES
25
26

FIG. 1.

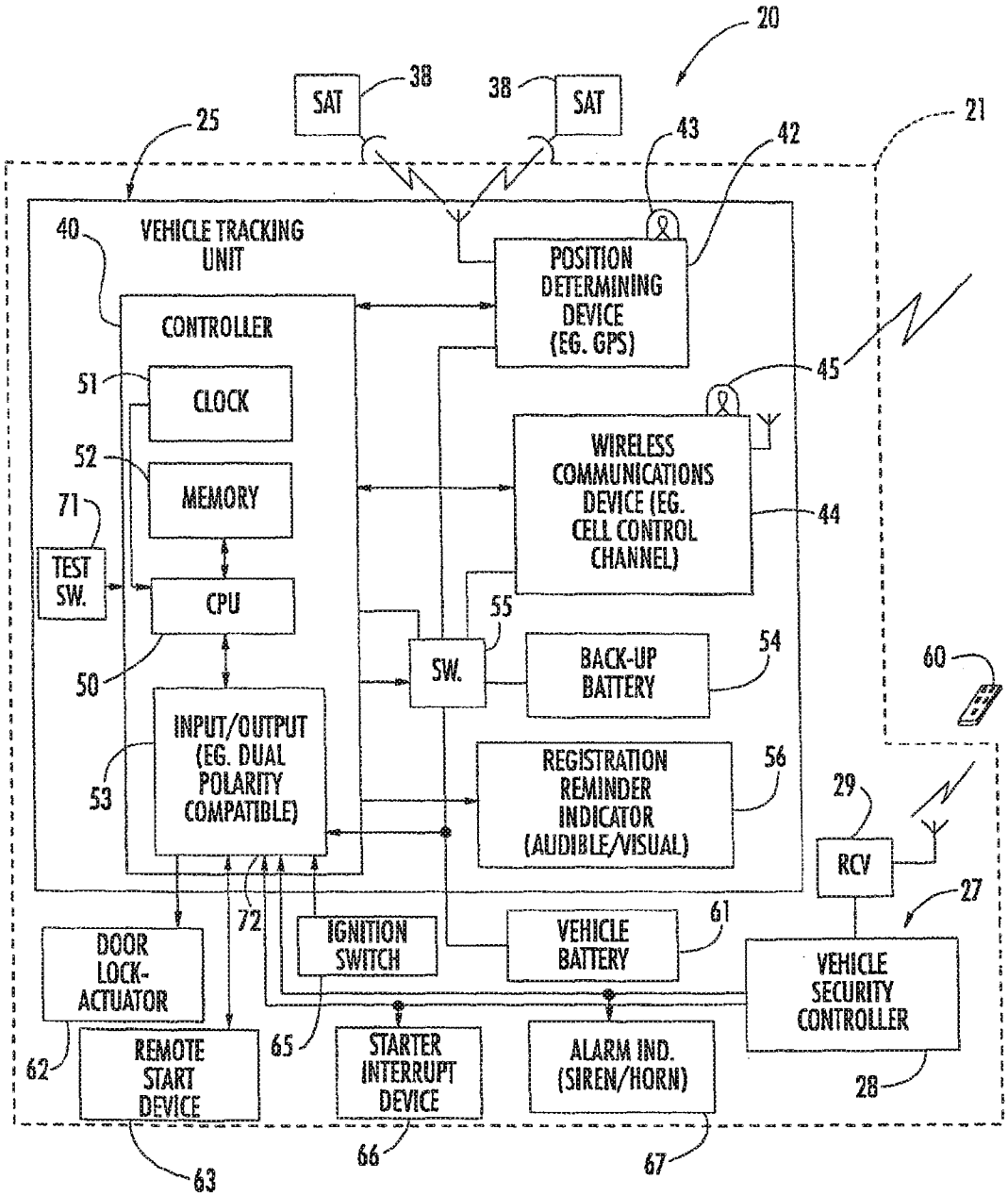

20
SAT
38
38
SAT
25
21
43
42
40
VEHICLE TRACKING UNIT
POSITION DETERMINING DEVICE (EG. GPS)
CONTROLLER
45
51
CLOCK
WIRELESS COMMUNICATIONS DEVICE (EG. CELL CONTROL CHANNEL)
52
MEMORY
44
71
TEST SW.
CPU
55
SW.
BACK-UP BATTERY
54
60
50
INPUT/OUTPUT (EG. DUAL POLARITY COMPATIBLE)
53
REGISTRATION REMINDER INDICATOR (AUDIBLE/VISUAL)
56
29
RCV
27
72
IGNITION SWITCH
VEHICLE BATTERY
61
DOOR LOCK-ACTUATOR
VEHICLE SECURITY CONTROLLER
62
REMOTE START DEVICE
65
STARTER INTERRUPT DEVICE
ALARM IND. (SIREN/HORN)
28
63
66
67

FIG. 2.

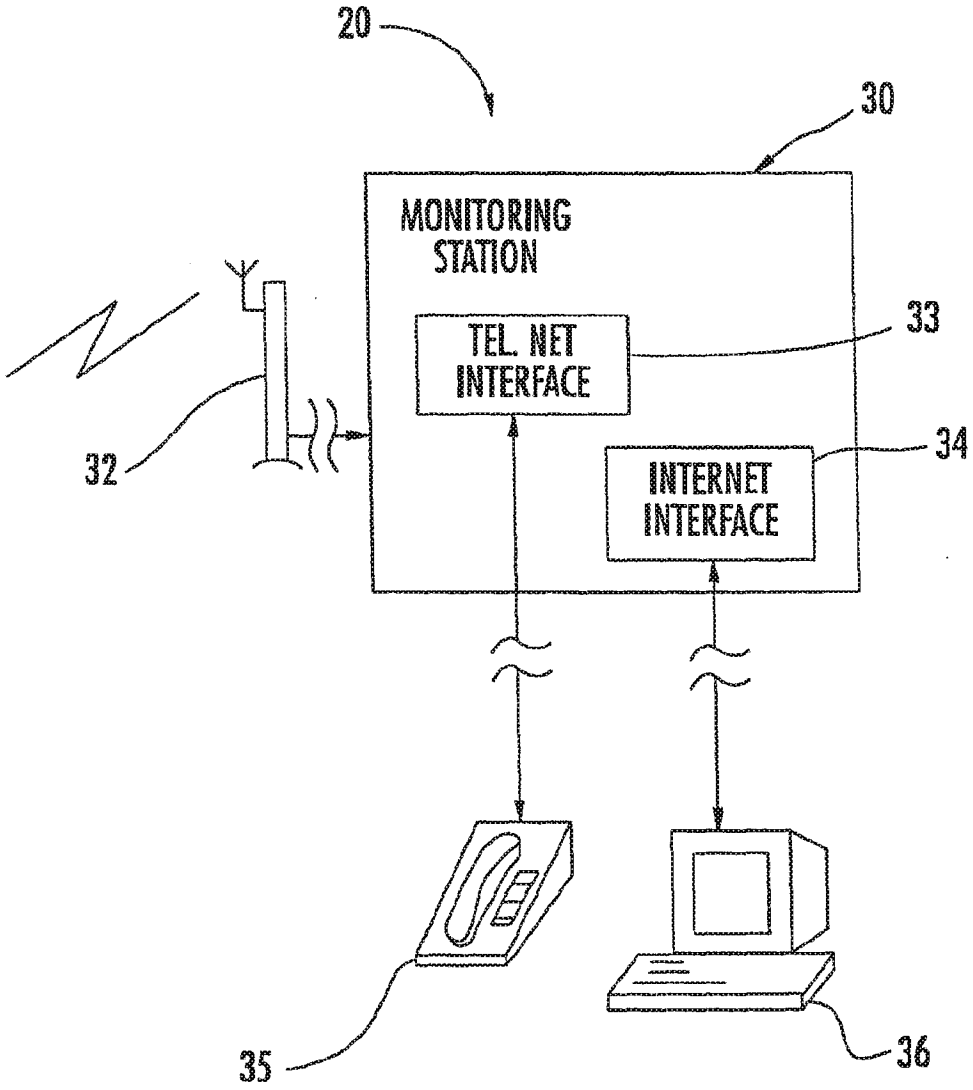

20
30
MONITORING STATION
TEL. NET INTERFACE
33
34
INTERNET INTERFACE
32
35
36

FIG. 3.

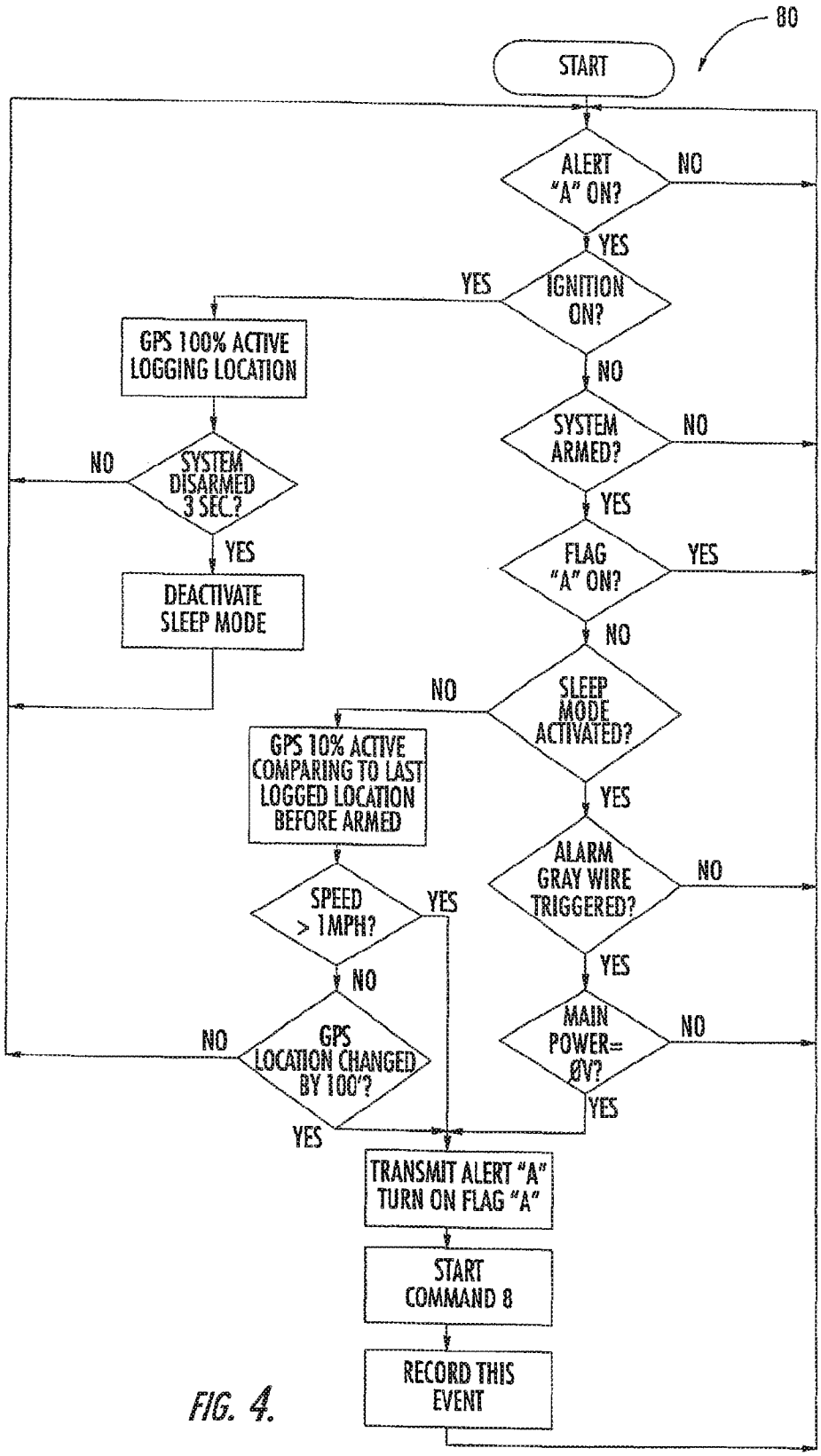

80
START
ALERT "A" ON?
NO
YES
IGNITION ON?
YES
GPS 100% ACTIVE LOGGING LOCATION
NO
SYSTEM ARMED?
NO
YES
NO
SYSTEM DISARMED 3 SEC.?
YES
DEACTIVATE SLEEP MODE
FLAG "A" ON?
YES
NO
NO
SLEEP MODE ACTIVATED?
GPS 10% ACTIVE COMPARING TO LAST LOGGED LOCATION BEFORE ARMED
YES
ALARM GRAY WIRE TRIGGERED?
NO
YES
SPEED > 1MPH?
YES
NO
MAIN POWER= ØV?
NO
NO
GPS LOCATION CHANGED BY 100'?
YES
YES
TRANSMIT ALERT "A" TURN ON FLAG "A"
START COMMAND 8
RECORD THIS EVENT

FIG. 4.

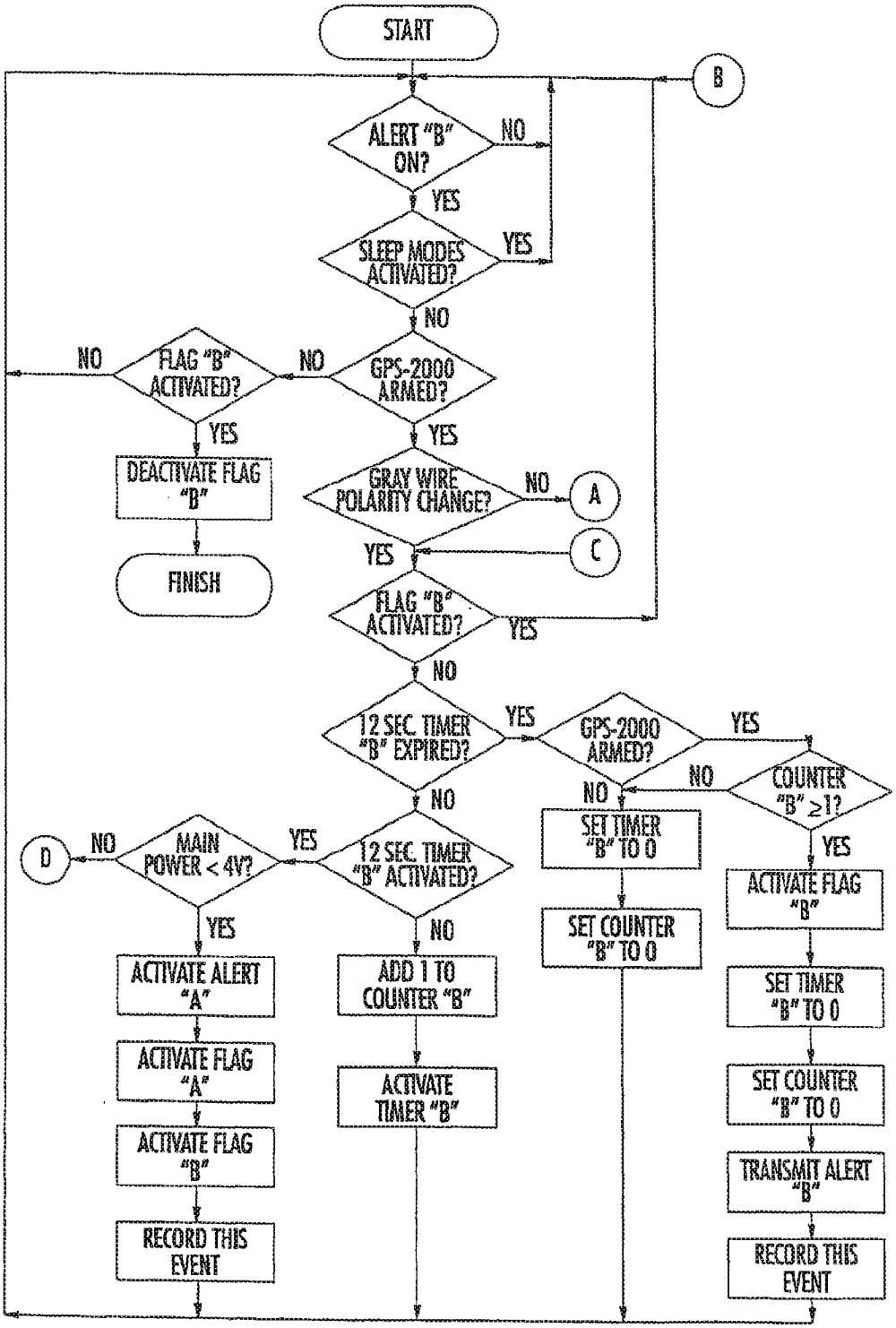

START
B
ALERT "B" ON?
NO
YES
SLEEP MODES ACTIVATED?
YES
NO
NO
FLAG "B" ACTIVATED?
NO
GPS-2000 ARMED?
YES
YES
DEACTIVATE FLAG "B"
GRAY WIRE POLARITY CHANGE?
NO
A
C
YES
FINISH
FLAG "B" ACTIVATED?
YES
NO
12 SEC. TIMER "B" EXPIRED?
YES
GPS-2000 ARMED?
YES
NO
NO
COUNTER "B" ≥1?
NO
YES
D
NO
MAIN POWER < 4V?
YES
12 SEC. TIMER "B" ACTIVATED?
SET TIMER "B" TO 0
ACTIVATE FLAG "B"
YES
NO
SET COUNTER "B" TO 0
ACTIVATE ALERT "A"
ADD 1 TO COUNTER "B"
SET TIMER "B" TO 0
ACTIVATE FLAG "A"
ACTIVATE TIMER "B"
SET COUNTER "B" TO 0
ACTIVATE FLAG "B"
TRANSMIT ALERT "B"
RECORD THIS EVENT
RECORD THIS EVENT

FIG. 5A.

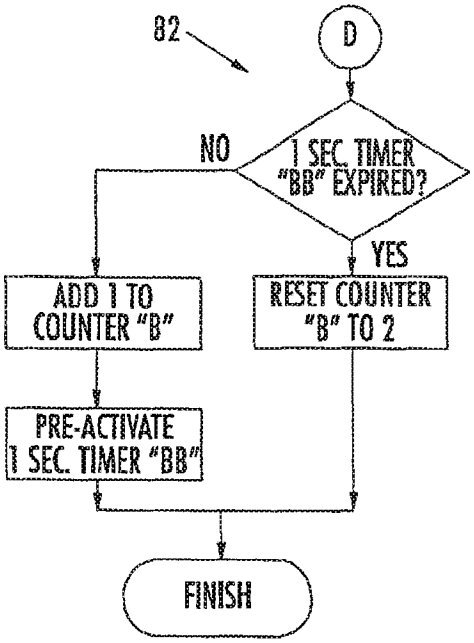

82
D
1 SEC. TIMER "BB" EXPIRED?
NO
YES
ADD 1 TO COUNTER "B"
RESET COUNTER "B" TO 2
PRE-ACTIVATE 1 SEC. TIMER "BB"
FINISH

FIG. 5B.

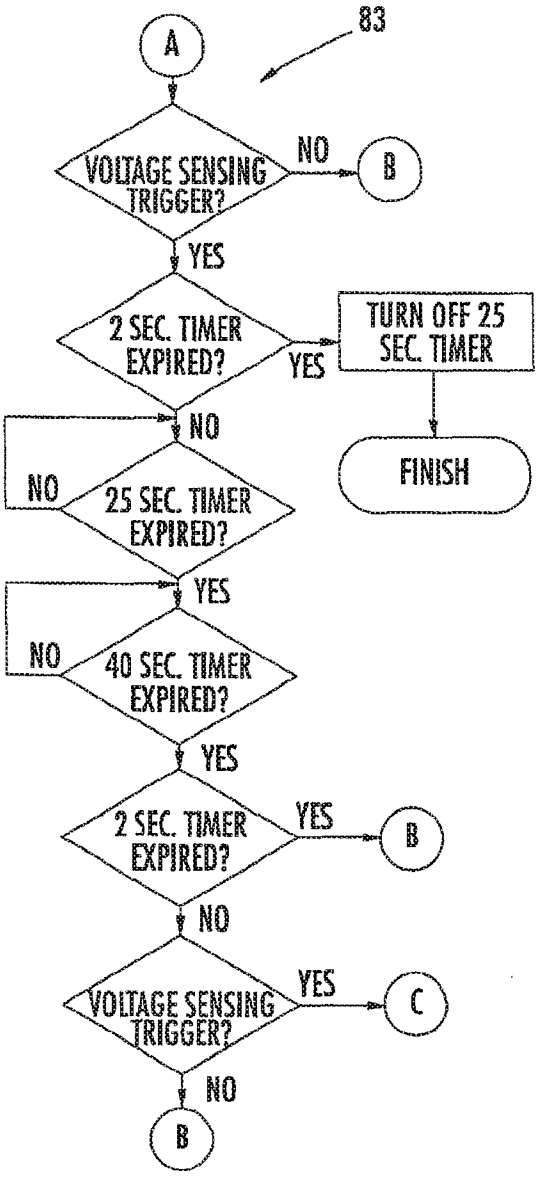

83
A
VOLTAGE SENSING TRIGGER?
NO
B
YES
2 SEC. TIMER EXPIRED?
YES
TURN OFF 25 SEC. TIMER
FINISH
NO
NO
25 SEC. TIMER EXPIRED?
YES
NO
40 SEC. TIMER EXPIRED?
YES
2 SEC. TIMER EXPIRED?
YES
B
NO
VOLTAGE SENSING TRIGGER?
YES
C
NO
B

FIG. 5C.

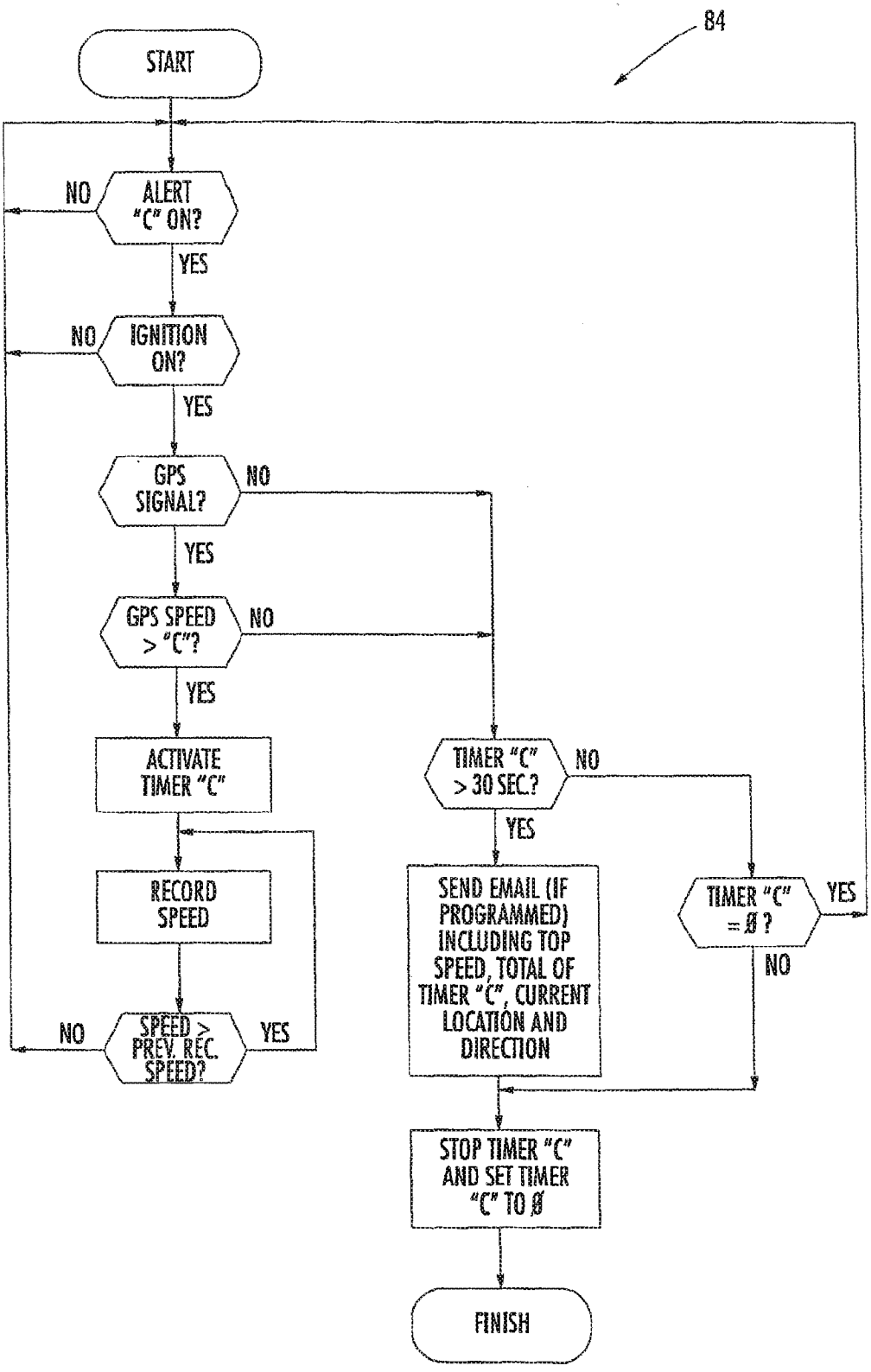

84
START
ALERT "C" ON?
NO
YES
IGNITION ON?
NO
YES
GPS SIGNAL?
NO
YES
GPS SPEED > "C"?
NO
YES
ACTIVATE TIMER "C"
RECORD SPEED
SPEED > PREV. REC. SPEED?
NO
YES
TIMER "C" > 30 SEC.?
NO
YES
SEND EMAIL (IF PROGRAMMED) INCLUDING TOP SPEED, TOTAL OF TIMER "C", CURRENT LOCATION AND DIRECTION
TIMER "C" = Ø ?
YES
NO
STOP TIMER "C" AND SET TIMER "C" TO Ø
FINISH

FIG. 6.

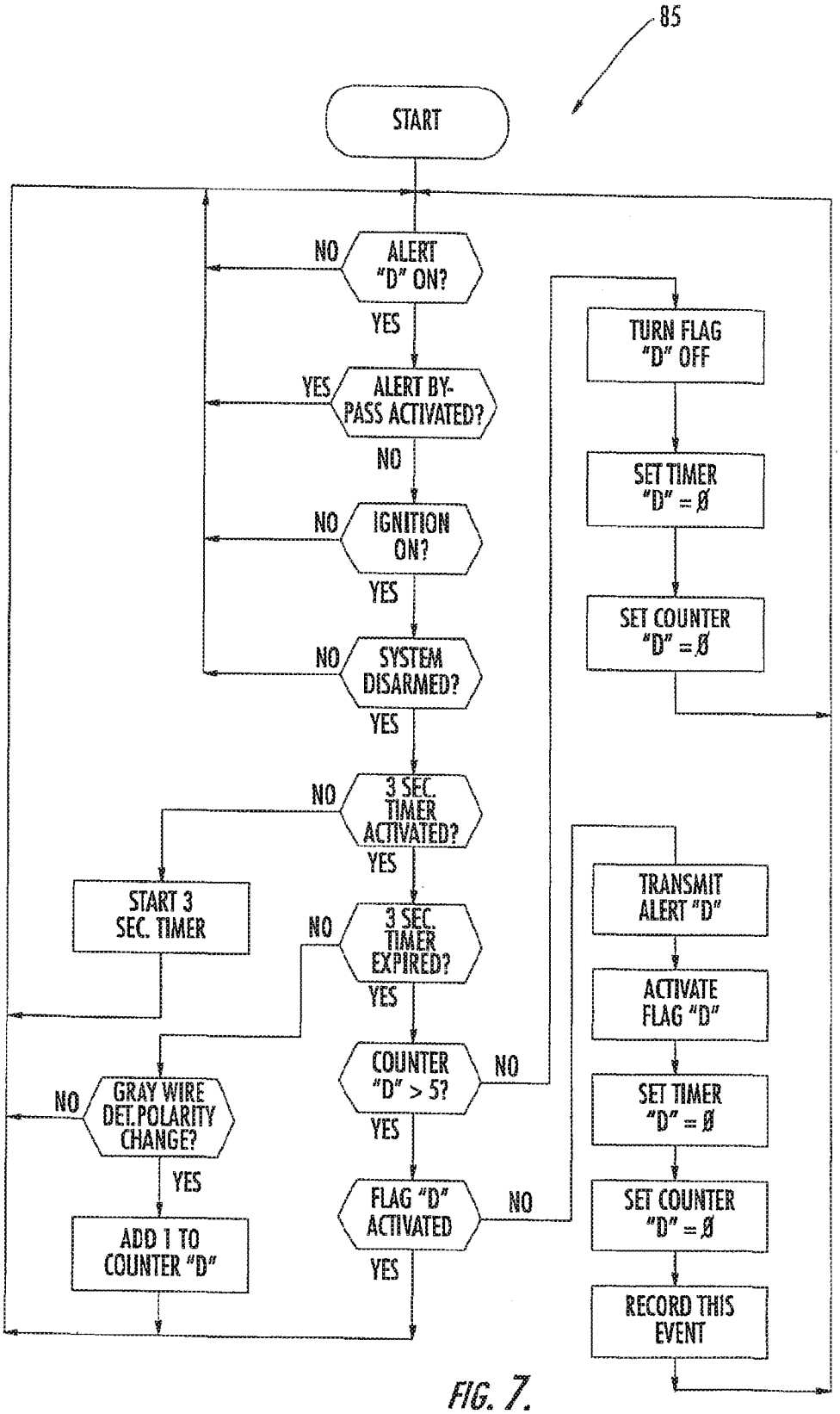

85
START
ALERT "D" ON?
NO
YES
ALERT BY-PASS ACTIVATED?
YES
NO
IGNITION ON?
NO
YES
SYSTEM DISARMED?
NO
YES
3 SEC. TIMER ACTIVATED?
NO
YES
START 3 SEC. TIMER
3 SEC. TIMER EXPIRED?
NO
YES
COUNTER "D" > 5?
NO
YES
GRAY WIRE DET. POLARITY CHANGE?
NO
YES
ADD 1 TO COUNTER "D"
FLAG "D" ACTIVATED
NO
YES
TURN FLAG "D" OFF
SET TIMER "D" = Ø
SET COUNTER "D" = Ø
TRANSMIT ALERT "D"
ACTIVATE FLAG "D"
SET TIMER "D" = Ø
SET COUNTER "D" = Ø
RECORD THIS EVENT

FIG. 7.

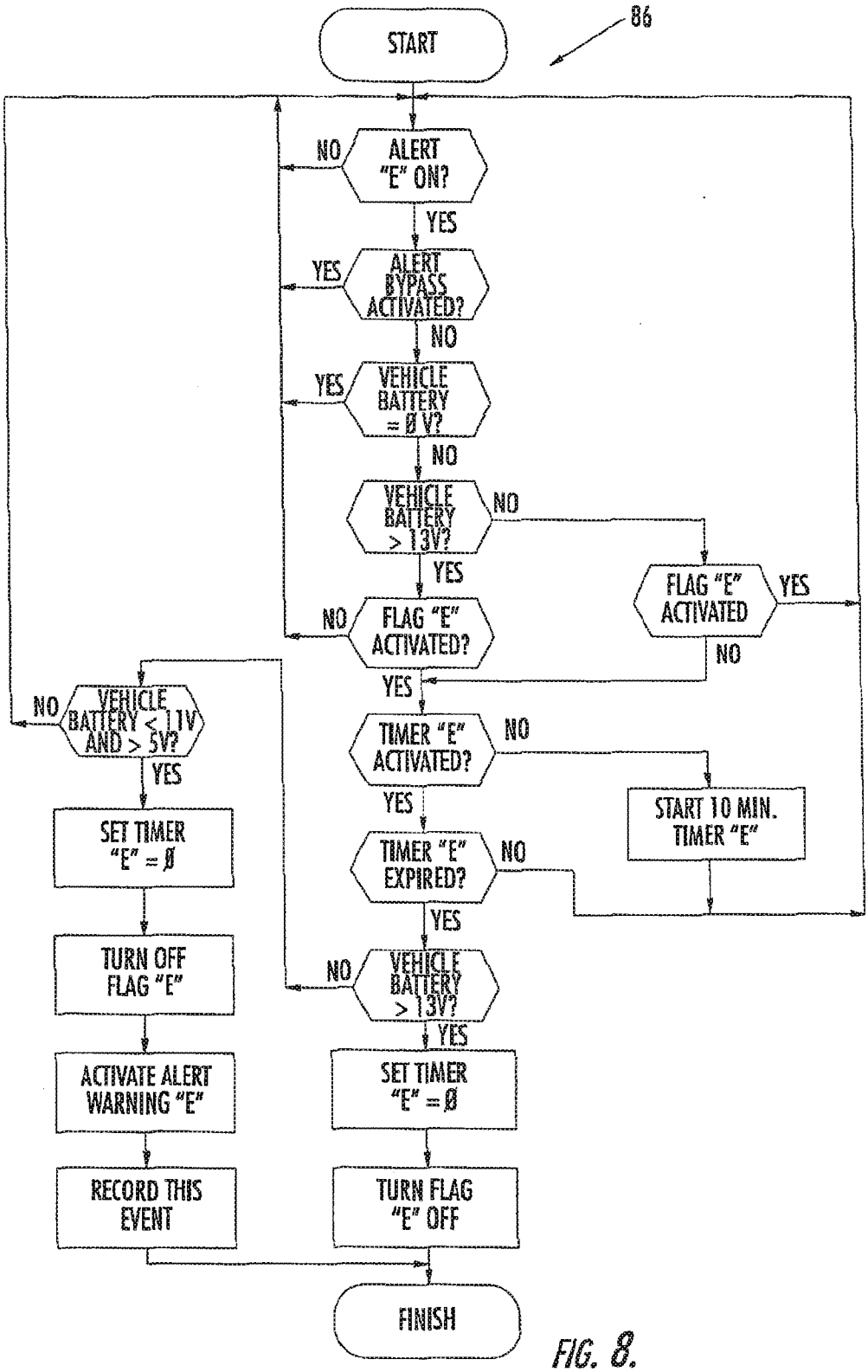

86
START
ALERT "E" ON?
NO
YES
ALERT BYPASS ACTIVATED?
YES
NO
VEHICLE BATTERY = Ø V?
YES
NO
VEHICLE BATTERY > 13V?
NO
YES
FLAG "E" ACTIVATED?
NO
YES
FLAG "E" ACTIVATED
YES
NO
VEHICLE BATTERY < 11V AND > 5V?
NO
YES
TIMER "E" ACTIVATED?
NO
YES
START 10 MIN. TIMER "E"
SET TIMER "E" = Ø
TIMER "E" EXPIRED?
NO
YES
TURN OFF FLAG "E"
VEHICLE BATTERY > 13V?
NO
YES
ACTIVATE ALERT WARNING "E"
SET TIMER "E" = Ø
RECORD THIS EVENT
TURN FLAG "E" OFF
FINISH

FIG. 8.

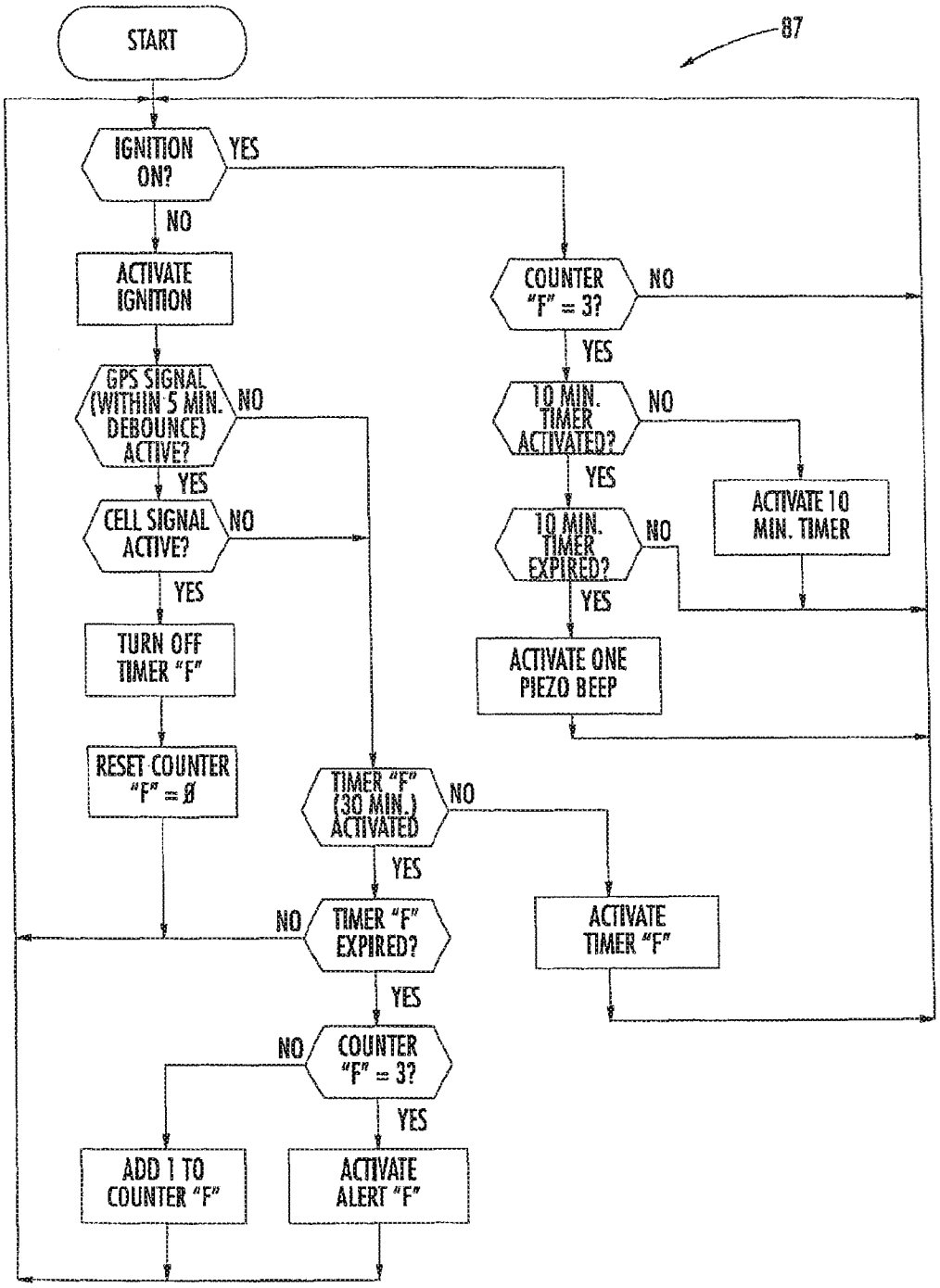

87
START
IGNITION ON?
YES
NO
ACTIVATE IGNITION
GPS SIGNAL (WITHIN 5 MIN. DEBOUNCE) ACTIVE?
NO
YES
CELL SIGNAL ACTIVE?
NO
YES
TURN OFF TIMER "F"
RESET COUNTER "F" = Ø
TIMER "F" (30 MIN.) ACTIVATED
NO
YES
TIMER "F" EXPIRED?
NO
YES
COUNTER "F" = 3?
NO
YES
ADD 1 TO COUNTER "F"
ACTIVATE ALERT "F"
COUNTER "F" = 3?
NO
YES
10 MIN. TIMER ACTIVATED?
NO
YES
ACTIVATE 10 MIN. TIMER
10 MIN. TIMER EXPIRED?
NO
YES
ACTIVATE ONE PIEZO BEEP
ACTIVATE TIMER "F"

FIG. 9.

VEHICLE TRACKER INCLUDING INPUT/OUTPUT FEATURES AND RELATED METHODS

RELATED APPLICATIONS

The present application is based upon copending provisional application serial nos. 60/264,811 filed on Jan. 29, 2001; Ser. No. 60/258,005, filed Dec. 22, 2000; Ser. No. 60/251,552, filed Dec. 6, 2000; Ser. No. 60/252,125, filed Nov. 20, 2000; Ser. No. 60/236,890, filed Sep. 29, 2000; Ser. No. 60/246,463, filed Nov. 7, 2000; Ser. No. 60/222,777, filed Aug. 3, 2000; and Ser. No. 60/205,178, filed May 17, 2000, the entire contents of each of which are incorporated herein by reference.

FIELD OF THE INVENTION

The present invention relates to the field of vehicle devices, and, more particularly, to a tracking and alerting system for a vehicle.

BACKGROUND OF THE INVENTION

Motor vehicles, such as passenger cars, trucks, busses, fleet vehicles, etc. are widely used and knowing the locations of such vehicles is often desired. For example, should a vehicle be stolen, it would be beneficial to know the vehicle's location so that authorities could be promptly and accurately directed to retrieve the vehicle. Indeed, the tracking system could plot the getaway path of the thief.

For a company with hired drivers, it may desirable to know the driver's whereabouts during the course of the day. Similarly, a rental car agency or other fleet operator, for example, may wish to know the whereabouts of its fleet of vehicles.

It may also be desirable to track the location of a vehicle as it is used throughout the course of a normal day. For parents of younger or older drivers, for example, knowledge of the vehicle's location may provide some assurance that the driver is at designated locations and following a prescribed route.

A number of patents disclose various systems and approaches to tracking vehicles. For example, U.S. Pat. No. 5,223,844 discloses a tracking system including a control center and a mobile unit installed in the vehicle. The mobile unit may send security warnings to the command center via a wireless transceiver. Position information for the vehicle is determined using a GPS receiver at the vehicle.

U.S. Pat. No. 5,515,043 discloses a similar system which may send one or more preprogrammed telephone messages to a user when away from the vehicle. The user may remotely access location information or cause certain commands to be carried out by entering a personal identification number (PIN).

The widespread availability and use of the Internet has prompted a number of vehicle tracking systems to also make use of the Internet. For example, TelEvoke, Inc. proposed such a system in combination with Clifford Electronics. The system was to provide notification, control and tracking services via the telephone or the Internet. Users could be notified via phone, e-mail, or pager of events such as a car alarm being triggered. Users could control the vehicle remote devices via phone, web, or PDA such as unlocking car doors. Additionally, users could track TelEvoke-enabled vehicles on the Internet or via the telephone. An Internet map could be viewed by the user showing the actual and prior vehicle locations. TelEvoke offered its services via a centralized fully automated Network Operations Center. To reduce the communications costs, it was proposed to use the control channel of the cellular telephone network.

There are, of course, a number of vehicles which come from the manufacturer with some form of security system already installed. In addition, a number of vehicles are also equipped with aftermarket security systems. Many conventional vehicle tracking units may not be readily installed in vehicles, particularly those vehicles already including a vehicle security system. In addition, complexity of installation may significantly increase the system costs.

SUMMARY OF THE INVENTION

In view of the foregoing background, it is therefore an object of the invention to provide a vehicle tracking unit and related methods that permit ready interface to devices in the vehicle, such as those devices which may be part of an existing vehicle security system.

This and other objects, features and advantages in accordance with the present invention are provided by a vehicle tracking system comprising a vehicle tracking unit for a vehicle of a type including an alarm indicator, and a monitoring station receiving the alarm indication alert from the vehicle tracking unit. The vehicle tracking unit may include a vehicle position determining device, a wireless communications device, and a controller connected to the wireless communications device and the vehicle position determining device. The controller may monitor signals relating to activation of the vehicle alarm indicator and send an alarm indication alert, such as with position information from the vehicle position determining device, and using the wireless communication device.

More particularly, the controller may send an alarm indication alert responsive to a continuous activation of the alarm indicator for greater than a predetermined time. Alternately, or in addition thereto, the controller may send an alarm indication alert responsive to a repetitive pattern of alarm indicator activations. In other words, the controller may be configured to distinguish between normal operation of a vehicle horn by the driver, and activation of the horn by a security system. The controller may also monitor signals of at least one of a first and second polarity. Accordingly, the tracking unit may be readily interfaced to vehicles including security systems.

In one variation, the controller monitors signals to the vehicle alarm indicator. In another variation, the controller monitors signals of voltage dips of the vehicle battery. The vehicle alarm indicator may comprise a vehicle horn, and/or a vehicle siren.

The vehicle position determining device may include a Global Positioning System (GPS) device. The wireless communications device may comprise a cellular telephone communications device, such as operating over a cellular control channel.

The monitoring station may comprise a user interface for accepting at least one command from a user and sending at least one alert to the user. For example, the user interface may include an Internet interface, and/or a telephone network interface.

Another advantageous aspect of the invention relates to compatibility of the outputs of the vehicle tracking unit. More particularly, the controller may include a dual polarity compatible output for a vehicle device, such as the vehicle alarm indicator. The controller may further monitor signals relating to activation of the vehicle alarm indicator and send an alarm indication alert with position information from the

vehicle position determining device and using the wireless communication device.

The controller may generate a first polarity output pulse followed by a second polarity output pulse on the dual polarity compatible output. The controller may also generate a repeating pattern of a first polarity output pulse followed by a second polarity output pulse on the dual polarity compatible output. In yet other embodiments, the controller may sense an actual polarity of the device and thereafter use the actual polarity for the dual polarity compatible output.

Where the vehicle device is a vehicle horn, the controller may typically be configured to generate a negative polarity output on the dual polarity compatible output. Conversely, wherein the vehicle device is a vehicle alarm indicator siren, the controller may be configured to generate a positive polarity output on the dual polarity compatible output.

One method aspect of the invention is for operating a vehicle tracking unit for a vehicle of a type comprising a vehicle alarm indicator. The vehicle tracking unit may include a vehicle position determining device, and a wireless communications device. The method preferably includes determining position information of the vehicle using the vehicle position determining device, determining an alarm condition based upon at least one of activation of the vehicle alarm indicator continuously for greater than a predetermined time and activation of the vehicle alarm indicator in a repetitive pattern, and sending an alarm indication alert from the wireless communications device responsive to determining the alarm condition.

Another method aspect also relates to operating such a vehicle tracking device. The method preferably includes using the controller to generate a dual polarity compatible output for the vehicle device.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is a simplified block diagrams of a vehicle tracking system in accordance with the present invention.

FIG. **2** is a more detailed block diagram of the vehicle tracking unit as shown in FIG. **1**.

FIG. **3** is more detailed block diagram of the monitoring station as shown in FIG. **1**.

FIG. **4** is a flowchart for operation of the vehicle tracking system as shown in FIG. **1** illustrating a vehicle stolen alert.

FIGS. **5A–5C** are a flowchart for operation of the vehicle tracking system as shown in FIG. **1** illustrating a vehicle alarm sounding alert.

FIG. **6** is a flowchart for operation of the vehicle tracking system as shown in FIG. **1** illustrating a vehicle speeding alert.

FIG. **7** is a flowchart for operation of the vehicle tracking system as shown in FIG. **1** illustrating an unauthorized transmitter learned alert.

FIG. **8** is a flowchart for operation of the vehicle tracking system as shown in FIG. **1** illustrating a low battery alert.

FIG. **9** is a flowchart for operation of the vehicle tracking system as shown in FIG. **1** illustrating a GPS or cellular unit failure alert.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

The present invention will now be described more fully hereinafter with reference to the accompanying drawings in which preferred embodiments of the invention are shown. This invention may, however, be embodied in many different forms and should not be construed as limited to the illustrated embodiments set forth herein. Rather, these embodiments are provided so that this disclosure will be thorough and complete, and will fully convey the scope of the invention to those skilled in the art. Like numbers refer to like elements throughout.

Referring to FIGS. **1–3**, the vehicle tracking system **20** in accordance with the invention is now initially described. The vehicle system **20** illustratively includes a vehicle tracking unit **25** to be mounted in the vehicle **21** and a monitoring station **30** which is remote from the vehicle and which is typically in a fixed location. In the illustrated embodiment, the vehicle tracking unit **25** interfaces with various vehicle devices, such as may include security sensors, door locks, etc. as will be appreciated by those skilled in the art.

The vehicle tracking unit **25** is also illustratively connected to a separate vehicle security system **27** as may already be installed in the vehicle **21**, from the factory or installed as an aftermarket product. Those of skill in the art will appreciate that in some embodiments of the vehicle tracking system **20** a separate vehicle security system **27** may not be needed, and/or various features thereof can be readily incorporated in the vehicle tracking unit **25**.

The monitoring station **30** may typically service a number of subscribers **31**. As shown perhaps best in FIG. **3**, the monitoring station **30** may include a user interface, such as the schematically illustrated telephone network interface **33** and the internet interface **34** which are schematically coupled to a telephone **35**, and a computer **36**, respectively. Of course in other embodiments, other interfaces may be used and only one of the illustrated interfaces may be needed. Those of skill in the art will also recognize that messages may be sent to a subscriber or user via preprogrammed voice messages, e-mail messages, facsimile messages, pager alerts, etc. In addition commands or instructions from the subscriber can also be input to the monitoring station **30** via the telephone network interface **33** and/or the internet interface **34**, from the subscribers telephone **35** or computer **36**.

The monitoring station **30** is illustrated connected to a cellular telephone tower **32** which, in turn, may communicate with the vehicle tracking unit **25** in some embodiments. Of course, in other embodiments other communications approaches are also contemplated, such as, for example, including satellite communications.

The monitoring station **30** may typically include the necessary modems, and other communications electronics, and computers for its functions which are described in greater detail below. The configuration of such components and their details will be readily apparent to those skilled in the art. Accordingly, no further discussion of these details is needed.

Referring now more specifically to FIG. **2**, additional details of the vehicle tracking unit **25** and devices at the vehicle are now further described. The vehicle tracking unit **25** illustratively includes a controller **40**, a vehicle position determining device **42**, and a wireless communications device **44** connected together. The vehicle position determining device **42** may be provided by a GPS receiver, for example. The GPS receiver typically operates by receiving multiple signals from spaced apart satellites **38** as will be appreciated by those skilled in the art.

In other embodiments, the vehicle position determining device **42** may be provided based upon communications with the cellular telephone network, or based upon other satellite transmissions, for example. As a particular example,

time of arrival techniques are available based upon multiple reception paths to determine position via the cellular telephone network as will be appreciated by those skilled in the art. The vehicle position determining device **42** also illustratively includes an indicator **43** associated therewith, such as for indicating an operating mode, or proper operation of the device as will be addressed in greater detail below.

The wireless communications device **44** may be provided by a cellular telephone transceiver configured to operate on a control channel of the cellular network. Such a control channel may provide nearly universal coverage for the tracking system **20** as will be appreciated by those skilled in the art. In addition, the control channel may offer relatively inexpensive communications between the monitoring station **30** and the vehicle tracking unit **25** as will be appreciated by those skilled in the art. The wireless communications device **44** also illustratively includes an optional status indicator **45** with a similar function as the indicator **43** for the vehicle position determining device.

The wireless communications device **44** in other embodiments, may transmit in the voiceband of the cellular network. Alternately, the wireless communications device may communicate over other networks, such as over satellite, or via wireless internet services, as will be appreciated by those skilled in the art.

The controller **40** illustratively includes a central processing unit (CPU) **50** or other logic circuitry which is connected to a clock signal generator **51** and a memory **52**. In other embodiments, the memory **52** may be an embedded memory in the CPU **50**. The controller **40** also includes schematically illustrated input/output circuitry **53** to interface with various vehicle devices. In particular the input/output circuitry **53** may provide dual polarity compatibility for one or more inputs or outputs as will described in greater detail below. One or more of the terminals of the input/output circuitry **53** may also provide both input and output functions as will also be described in greater detail below. This may significantly simplify and accelerate installation of the vehicle tracking unit **25** in the vehicle **21**.

Also illustratively shown as part of the vehicle tracking unit **25** are a back-up battery **54**, and switch **55** connected thereto for selectively powering certain of the components based upon the controller **40**. Of course, the vehicle **21** also includes an electrical system including the vehicle battery **61**. Powering of the vehicle tracking unit **25** is described in greater detail below.

The vehicle **21** also includes a number of other components that may relate to vehicle tracking, security, and/or convenience features provided by the vehicle tracking system **20**. For example, the vehicle **21** may include one or more door lock actuators **62**, an optional remote starting device **63**, a starter interrupt device **66** and an alarm indicator **67**. For example, the alarm indicator may be provided by a vehicle horn or vehicle siren, and/or flashing of the lights.

The optional separate security system **27** illustratively includes a vehicle security controller **28** and a receiver **29** connected thereto. As is conventional, the vehicle security system **27** may be switched between armed and disarmed modes, for example, by one or more uniquely coded remote transmitters **60**. The vehicle security controller **28** may also be capable of learning a new uniquely coded remote transmitter **60** as will be appreciated by those skilled in the art. The vehicle security controller **28** also illustratively is connected to the starter interrupt device **66** and the alarm indicator **67**.

For ease of explanation, a number of the features of the vehicle tracking system **20** are now described. The vehicle tracking system **20** includes a number of features that may simplify installation and maintenance. For example, as shown in FIG. **2**, the vehicle tracking unit **25** may have a test switch **71** connected to the controller **40**.

In normal operation, the controller **40** may be called upon to operate at least one vehicle device. Of course, the controller **40** also cooperates with the wireless communications device **44** and the vehicle position determining device **42** to determine and send vehicle position information to the monitoring station **30**. Moreover, the controller **40** may be switchable to a test mode for test operation of the at least one vehicle device responsive to activation of the test switch **71**.

In some embodiments, the at least one vehicle device may be a plurality of vehicle devices that are tested by operation in sequence. For example, the at least-one vehicle device may comprise at least one door lock actuator **62**. The at least one vehicle device may also comprise the starter interrupt device **66**, or the engine remote starter **63** if remote starting is an implemented feature. The at least one vehicle device which is tested, may also be the alarm indicator **67**. Accordingly, an installer, for example, can quickly check that the tracking unit has been properly installed.

To further provide for ready determination of proper operation of the vehicle tracking unit **25**, one or both of the position determining and wireless communications devices **42**, **44** may include associated indicators **43**, **45** as mentioned briefly above, and which provide an indication relating to proper operation. Each indicator **43**, **45** may indicate a mode of operation of the device, its proper operation, or a partial or complete failure of the device.

Another aspect of the invention is that the controller **40** may provide a selectable polarity for the at least one vehicle device based upon sensing thereof. Accordingly, a predetermined activation of the test switch **71** may cause the controller **40** to sense and select the proper polarity. Pressing the test switch **71** for a predetermined time or in a predetermined pattern may sense and set the polarity.

Another feature of the vehicle tracking unit **25** and vehicle tracking system **20** relates to conservation of the number of codes or messages that need to be sent to the vehicle tracking unit. In particular, the controller **40** may have a plurality of different controller states and respond differently to a same message from the monitoring station **30** at different times depending upon the controller state at a given time. Accordingly, a number of codes or messages used by the system can be conserved. Various messages are described in greater detail below.

A controller state may change based upon several different occurrences or events. For example the controller may change states in response to a change in at least one vehicle device, or based upon a message received by the wireless communications device **44** from the monitoring station **30**, and/or based upon elapsed time. The controller states, for example, may include an alert sent state based upon an alert message being sent from the wireless communications device **44**. Thereafter, receipt of a predetermined message by the wireless communications device **44** when the controller **40** is in the alert sent state may confirm receipt of the alert message by the monitoring station.

Receipt of the predetermined message by the wireless communications device **44** when the controller **40** is in another state different than the alert sent state may thus cause a different response by the controller. The alert sent state may comprise at least one of a vehicle stolen alert sent state,

a vehicle alarm sounding alert sent state, a vehicle speeding alert sent state, an unauthorized remote transmitter alert sent state, a low vehicle battery alert sent state, and a device malfunction alert sent state. The various alert messages and confirmation thereof are described in greater detail below.

The code or message conservation aspects of the vehicle tracking system **20** also permit sending a sequence of codes or messages within a predetermined time to also cause a different response at the vehicle tracking unit **25**. In other words, the plurality of controller states may comprise a received first message state based upon a first message being received by the wireless communications device **44** from the monitoring station **30**. Receipt of a second message by the wireless communications device **44** when the controller **40** is in the received first message state, such as within a predetermined time window, for example, may thus cause a different response by the controller than does receipt of the second message when the controller is in another state than the received first message state.

The plurality of controller states may comprise a vehicle finder state sounding an audible signal via the alarm indicator **67** at the vehicle **21**. In this state the controller **40** would bypass sending a vehicle alarm sounding alert to the monitoring station **30**.

Another aspect of the vehicle tracking system **20** is the provision of certain power conservation and management techniques, such as to permit extended periods where the vehicle **21** is not operation. During such extended periods, the vehicle battery **61** provides power to the vehicle tracking unit **25** as well as other vehicle devices. Accordingly, the voltage of the vehicle battery **61** drops over time. The vehicle tracking unit **25** may provide a significant drain on the vehicle battery **61** because of the power consumed by the wireless communications device **44** during transmission as will be appreciated by those skilled in the art.

The vehicle position determining device **42**, the wireless communications device **44** and the controller **40** may be considered as defining a power load of the vehicle tracking unit **25**. The controller **40** may operate the schematically illustrated power switch **55** to isolate the back-up battery **54** from the power load as a voltage of the vehicle battery **61**.drops until reaching a threshold. After or below the threshold the controller **40** may cause the back-up battery **54** to selectively power only a first portion of the power load while a second portion of the power load remains powered by the vehicle battery.

For example, the wireless communications device **44** may have a higher operating voltage than the vehicle position determining device **42**. The first portion of the power load that is selectively powered despite the low vehicle battery voltage may thus be the wireless communications device **44**. In particular, the wireless communications device **44** may be powered for transmission. Accordingly, the back-up battery **54** can be saved for limited communication using the higher voltage wireless communications device **44**. This provides useful features even after an extended period during which the vehicle **21** is left unattended and the vehicle battery **61** gradually discharges.

To further conserve power, the controller **40** may reduce operation of the power load as vehicle battery voltage falls. Conversely, the controller **40** may restore operation of the power load based upon the voltage of the vehicle battery **61** rising again, such as upon being recharged.

Also relating to power consumption, the controller **40** further causes transmission of a low vehicle battery voltage alert to the monitoring station **30** based upon the voltage of the vehicle battery **61** falling below the threshold. The user or subscriber may cause the monitoring station **30** to issue a remote start command. The controller **40** may then generate a remote start output to the remote start device **63** to thereby start the engine and recharge the vehicle battery.

Another feature of the vehicle tracking system **20** is that the vehicle tracking unit **25** may be readily installed and connected to a vehicle **21**, such as in the illustrated embodiment where the vehicle includes a starter interrupt device **66** and a separate vehicle security controller **28**. More particularly, the controller **40** may switch between an armed mode and a disarmed mode based upon operation of the engine starter interrupt device **66**. The controller **40** when in the armed mode may cooperate with the wireless communications device **44** to send an alert message to the monitoring station **30** and including vehicle position information, for example, based upon the vehicle position determining device **42**. The controller **40** is also for selectively operating the engine starter interrupt device **66** to provide additional security features.

In one advantageous embodiment, the controller **40** preferably comprises a combination input and output terminal for connection to the engine starter interrupt device. This terminal is at the input/output circuitry **53** and is schematically illustrated by reference numeral **72**. The controller **40** may switch to the armed mode when in the disarmed mode and based upon the engine starter interrupt device **66** being operated to disable engine starting. Conversely, the controller **40** may switch to the disarmed mode based upon the engine starter interrupt device **66** being operated to enable engine starting. In other words, the vehicle tracking unit **25** can piggyback its arming and disarming off the existing vehicle security system **27**, for example.

The controller **40** may also selectively operate the engine starter interrupt device **66** based upon a command message from the monitoring station **30**. The controller **40** may selectively operate the engine starter interrupt device **66** based upon a command message from the monitoring station **30**. Alternately, or in addition thereto, the controller **40** may selectively operate the engine starter interrupt device **66** based upon the ignition switch **65**.

The following descriptive portions relate to various user or subscriber notifications and features provided by the vehicle tracking system **20**. Of course, the controller **40** preferably cooperates with the wireless communications device **44** to send an alert message. The monitoring station **30** may comprise a user interface, such as one or both of the telephone network or internet interfaces **33**, **34**, respectively (FIG. **3**), for generating a sequence of alert message notifications based upon receiving the alert message sent from the vehicle tracking unit **25**. More particularly, the monitoring station interface permits canceling any remaining alert message notification based upon a cancellation command response from a user or subscriber having already received the alert message notification. The user may send the cancellation response via the telephone **35** or computer **36** (FIG. **3**), for example. Thus, if the user may be reached at different telephone numbers or different users are desirably notified of the alert, this aspect of the vehicle tracking system **20** can make the notifications efficiently and without making unnecessary notifications.

The vehicle tracking system **20** may provide any of a number of very useful alerts, as discussed herein. For example, the alert message sent from the vehicle tracking unit may comprise at least one of a vehicle stolen alert message, and a vehicle alarm sounding alert message. The

alert message may be one of a vehicle speeding alert message, and a vehicle acceleration alert message. In addition, the alert message may comprise an unauthorized remote transmitter alert message. Also, the alert message may be at least one of a low vehicle battery alert message, and a device malfunction alert message.

The speeding alert may be based upon exceeding a speed threshold for greater than a certain time, which may be user selectable. The acceleration alert may also be useful as such is also indicative of aggressive driving along with the speeding alert. The unauthorized remote transmitter alert increases overall security since a user will be notified if a would-be thief learns an unauthorized transmitter to operate the controller. These alerts are described in greater detail below.

The vehicle tracking system **20** may be implemented as a service to a subscriber. In other words, the subscriber pays a monthly fee for the service. Accordingly, it may be important to encourage a user to register. Similar subscriber or registrations systems in the past have suffered revenue losses since some users would wait to activate the system until the vehicle was stolen. In other words, the user would only subscribe or register and pay a single month's fee.

In accordance with this aspect of the vehicle tracking system **20** prompt user registration is encouraged. In particular, the vehicle tracking unit **25** may include the user registration reminder indicator **56** and the controller **40** may be switchable from an unregistered mode to a registered mode. In the registered mode, the controller **40** may cooperate with the wireless communications device **44** and the vehicle position determining device **42** to determine and send vehicle position information to the monitoring station **30**. In the unregistered mode, the controller **40** may activate the user registration reminder indicator **56** to encourage registration by the user.

The controller **40** may be switchable to the registered mode based upon an activation message from the monitoring station **30**. For example, when the registration payment has been received, the monitoring station can send one or more messages to the vehicle tracking unit **25** to stop activation of the registration reminder indicator **56**. The indicator **56** may be audible, visual or both. For example, the registration reminder indicator **56** could be a beeping sound generated by a small piezoelectric transducer every ten minutes or so when the ignition **65** is on.

In other words, the user registration reminder indicator **56** may provide a minor but irritating annoyance to the user to encourage registration. Upon successfully registering, the annoyance is abated. Accordingly, a relatively straightforward approach is provided to encourage user registration.

Along these lines, the controller **40** when in the unregistered mode may have reduced features compared to the registered mode. For example, the controller **40** when in the unregistered mode may be restricted or limited in sending messages with the wireless communications device **44**. Accordingly, usage of the wireless communications network may be reduced. Transmissions from the vehicle tracking unit **25** may also be beneficially suppressed during original installation, for example.

Returning again to features of the vehicle tracking unit **25** which facilitate installation, the controller **40** may send an alarm indication alert responsive to a continuous activation of the alarm indicator **67** for greater than a predetermined time. Alternately, or in addition thereto, the controller **40** may send an alarm indication alert responsive to a repetitive pattern of alarm indicator **67** activations. In other words, the controller may be configured to distinguish between normal operation of a vehicle horn by the driver, and activation of the horn by the security system **27**. As mentioned above, the controller **40** may also monitor signals of at least one of a first and second polarity. The controller **40** thus advantageously piggybacks off the alarm indication generated by the vehicle security system **27** to determine and send a vehicle alarm sounding alert to the monitoring station **30**.

In one variation, the controller **40** may monitor signals delivered directly to the vehicle alarm indicator by the vehicle security controller **28**. In another variation, the controller **40** monitors signals of voltage dips of the vehicle battery **61**. Circuitry is conventionally and readily available for both such functions, as will be readily appreciated by those skilled in the art.

The controller **40** may also include a dual polarity compatible output in the input/output circuitry **53** for a vehicle device, such as the vehicle alarm indicator **67**. The controller **40** may further monitor signals relating to activation of the vehicle alarm indicator **67** and send an alarm indication alert with position information from the vehicle position determining device and using the wireless communication device.

For the dual polarity output compatibility, the controller **40** may generate a first polarity output pulse followed by a second polarity output pulse. The controller **40** may also generate a repeating pattern of a first polarity output pulse followed by a second polarity output pulse on the dual polarity compatible output. In yet other embodiments, the controller **40** may sense an actual polarity of the device and thereafter use the actual polarity for the dual polarity compatible output.

Where the vehicle device is a vehicle horn, the controller **40** may typically be configured to generate a negative polarity output on the dual polarity compatible output. Conversely, wherein the vehicle device is a vehicle alarm indicator siren, the controller **40** may be configured to generate a positive polarity output on the dual polarity compatible output.

Another aspect of the vehicle tracking system **20** relates to conserving memory space and/or reducing transmission time over the communications network. In accordance with this advantageous feature, the controller **40** may determine the vehicle position information including a vehicle location and an associated stationary period for each occurrence of the vehicle remaining stationary for greater than a predetermined period. In one embodiment, the controller **40** may cooperate with the wireless transmission device **44** to send the vehicle position information to the monitoring station based upon each occurrence of the vehicle remaining stationary for greater than the predetermined period. In this embodiment, the monitoring station **30** may associate a time with each occurrence of the vehicle remaining stationary for greater than the predetermined period. In other words, the monitoring station **30** may time stamp the received information.

In another embodiment, the controller **40** cooperates with the wireless transmission device **44** to send the vehicle position information to the monitoring station **30** for a plurality of occurrences of the vehicle remaining stationary for greater than the predetermined period. In this embodiment, the controller **40** may associate a time with each occurrence of the vehicle remaining stationary for greater than the predetermined period. In other words, the controller time stamps the position and stationary period information.

As an example, the predetermined time which determines whether the vehicle **21** is stationary and the position should be determined, may be less than about three minutes. This time may filter out vehicle stops in normal traffic, but which will keep track of stops where the driver likely leaves the vehicle **21**. Accordingly, only the important information necessary to track the vehicle need be stored and/or transmitted thereby reducing the system costs. If the vehicle **21** is stationary overnight, for example, unnecessary position information need not be determined, stored, and/or transmitted to the monitoring station **30**.

The controller **40** may comprise the memory **52** for storing the vehicle position information therein. In one configuration, the controller **40** downloads the vehicle position information from the memory **52** to the monitoring station **30** based upon a predetermined schedule. In another configuration, the controller **40** downloads the vehicle position information from the memory **52** to the monitoring station **30** based upon a predetermined event. In yet another configuration, the controller **40** downloads the vehicle position information from the memory **52** to the monitoring station **30** based upon a predetermined percentage of memory usage.

Having now described certain general features and advantages of the vehicle tracking system **20**, this description now turns to additional specific details which are provided as examples. In particular, vehicle tracking system **20** preferably implements one or more of the following features:

1. Detects the vehicle being stolen and transmits a signal to the monitoring station to contact up to 3 people, for example, predetermined by the user, of theft of the vehicle and then starts tracking the vehicle. The contact may be by one or more of the following: an e-mail message, a pager alert, a cellular telephone call, or other telephone call.
2. Detects an optional vehicle security or alarm system activation and transmits a signal to the monitoring station to contact up to 3 predetermined people to inform them the vehicle's alarm is being activated.
3. Detects an optional vehicle alarm system's remote PANIC activation and transmits a signal to the monitoring station to contact up to 3 predetermined people to inform them of the vehicle's PANIC being activated.
4. Detects a vehicle being programmed to operate from an unauthorized remote transmitter, key transponder, other transponder, or other device that has a unique coding, and the vehicle unit transmits a signal to the monitoring station to contact up to 3 predetermined people to inform them of this occurrence. The system can also make available information relating to a number of such coded devices, or a change therein, or when a change occurred. A message can be sent to the user or the information can be available to the user on the WEB site. The vehicle would be equipped with a security system as disclosed in U.S. Pat. No. 5,654,688, for example, which determines an unauthorized transmitter and provides an alert feature. This patent is incorporated herein in its entirety by reference.
5. Detects the vehicle traveling over a predetermined speed, such as for a predetermined time, and transmits a signal to the monitoring station to send a message, such as an e-mail informing the user (and/or others) of this occurrence. Of course, the message could also be sent via a telephone call or page, should additional urgency be required. The vehicle's predetermined maximum speed limit and duration thereof can be selected by the user.
6. Detects a low battery voltage such as for a predetermined time and transmits a signal to the monitoring station to contact up to 3 predetermined people to inform them of vehicle's low battery voltage. This is especially advantageous during winter so that the vehicle could be started, for example, to prevent a problem before it happens). The time setting is preferably selectable by the user.
7. Detects the vehicle not moving for a predetermined time and transmits a signal to the monitoring station to send, for example, a nightly e-mail informing the user of all the vehicle's location and stationary time occurrences. The stationary time length is also selectable. This may be advantageous to encourage patrolling personnel not to remain for a long time in a same location.
8. The vehicle unit preferably includes a back-up battery system making it more reliable.

The vehicle unit may be relatively inexpensive. In addition, the monitoring fee that includes sending up to 60 e-mails and making up to 6 phone calls per month, may also be relatively low. The relatively low monitoring fee is based, at least in part, on the current relatively low rates charged for use of the control channel of the cellular telephone network. It is also noted that access to the control channel provides coverage for almost the entire U.S., for example.

The user or subscriber also preferably has access to an Internet site that will display a map and silently contact the vehicle to acquire it's current location, speed, direction of travel, and previous multiple locations with speeds, for example, the user's personal identification number (PIN) can be quickly activated by a telephone call. No additional installation may be required.

Certain annual pre-pay package arrangements may be available. For example, up to 10 access entries per month can be provided on a low monthly billing. Up to 30 access entries could be provided also for a relatively low monthly fee.

The present invention provides a number of other significant advantages including optional access from any phone or from any computer to access the monitoring station internet site. The user may control various vehicle functions remotely via the telephone or the internet site. The only charge may be for additional equipment and installation.

Additional features can also be included with the system and subscribed to by the user in accordance with the invention. For example, these include Hijack, Car Finding, Unlock Doors and Unauthorized Transmitter Alert Features. The equipment and installation is relatively inexpensive. For the hijack feature: from any phone or computer, the user may activate vehicle starter interrupt and sound the horn until the vehicle is retrieved (Command 4).

For the Car Finding feature: from any phone or computer, the user may activate the vehicle's horn, or siren and sound same for 30 seconds. This allows the user to find his vehicle in a crowded parking lot (Command 5).

For the Lock/Unlock vehicle doors feature: from any phone or computer a predetermined command (Command 7) activates unlocking of vehicle doors to retrieve keys, for example, that may have been accidentally locked inside the vehicle. Of course, the system can also be used to lock vehicle doors if this was forgotten (Command 6). The unauthorized transmitter alert feature is similarly selected as described above.

In addition, a remote vehicle start feature may also be provided, such as to start the vehicle's engine to heat or cool the vehicle prior to entry. The equipment and installation for

remote starting may be relatively low. Some further details of a specific embodiment of the vehicle tracking unit **25** are provided below as relating to use of red and green LED indicators as may be coupled to the controller **40** and operated thereby. Also various representative wires, designated by color, are provided as an example embodiment.

The red LED verifies the GPS receiving signal. With a yellow wire having positive 12 volts, the red LED blinking indicates searching GPS location, constant indicates found location, and off indicates no GPS signal found. With the yellow wire not having positive 12 volts, if the red LED is off, the LED is not functioning.

The green LED verifies receiving the cell tower signal. With the yellow wire having positive 12 volts, blinking indicates the cell control channel signal is detected, constant indicates sending a micro burst signal (LED stays on 5 seconds after each transmission, and off indicates no cell tower signal received. With the yellow wire not having positive 12 volts, off indicates the green LED is not functioning.

An example of representative DIP switch feature selection is as follows. A first switch may be used for adding the orange wire for controlling arm/disarming of system. When on, the orange wire controls arm/disarm as follows: to arm, the orange wire is grounded and the yellow wire does not have 12 volts positive. To disarm, the orange wire is not grounded. When the first switch is off, then only the yellow wire controls arm/disarm as follows: to arm, the yellow wire is without 12 volts positive, and 30 seconds after continued arm mode then the orange wire activates a constant 500 ma grounded output to operate an external starter interrupt relay until the system is disarmed. To disarm, the yellow wire is connected to 12 volts positive.

A main 5-pin plug may be provided on the vehicle unit and connected as follows:

1. The Red Wire is connected to the 12 vdc power. An alert warning "E" is given if the system is armed and the battery voltage becomes lower than 11 volts for longer than ## minutes. This alert feature "E" will not operate again until the voltage is above 12 volts to re-set this feature.
2. The black wire is connected to ground.
3. The yellow wire is connected to the ignition 12 volts so that if the key is on, 12 volts is supplied thereto and if the key is off, the yellow wire is connected to ground. Further: if the system is in an armed mode and the Lat/Long changes, then Alert "A" is given. If the system is disarmed and within 2.5 seconds after the yellow wire receives 12 volts and the gray wire detects 3 or more positive pulses the system activates Alert "D". If the first DIP switch is in the off position then: if 12 volts is on yellow wire, the system is disarmed and the orange wire discontinues from the 500 ma ground, and if the yellow wire sees ground or neutral, then the system is armed and 30 seconds after the continued arm mode the orange wire activates a constant 500 ma grounded output to operate an external starter interrupt relay until the system is disarmed
4. The gray wire is for input and output, and can be connected to an alarm siren or horn positive terminal. In addition:
   a. With the system armed and if the gray wire detects +12 v pulsing on/off or on constant for more than 10 seconds from an alarm siren or horn honking activation, then alert warning "B" alarm activation is given.
   b. With system disarmed and if the gray wire detects +12 v pulsing on/off or on constant for more than 10 seconds from an alarm siren or horn honking activation, then alert warning "C" panic activation is given.
   c. With system disarmed and if the Gray wire detects 3 or more 12 volt positive pulses within 2.5 seconds of yellow wire receiving 12 v+ and the gray wire by-pass not being activated, then alert warning "D" is given.
   d. The gray wire bypass operates as follows:
      i. After alert warning "B" bypass all future alert "B" signals until system is disarmed.
      ii. After alert warning "C" bypass all future Alert "C" signals until system is armed.
      iii. After alert warning "D" bypass all future alert "D" signals until no 12 volt pulses are detected on the gray wire within 3 seconds of the yellow wire having 12 volts.
   e. With the system armed or disarmed. The Output: Internal +12 v, 1 amp transistor with pulses 1 second on and 1 seconds off to activate siren or honk car horn or flashing light relay.
      i. Non-stop activation from (Command "4")
      ii. 30-second activation from (Command "5")
   f. Turn off the above alert "A" from (Command "1").
5. The orange wire is for the starter interrupt and arm/disarm system, and operates as follows:
   a. If first DIP switch is in the:
      i. On position and: the orange wire has 12 volts or neutral, the system switches to the disarmed mode; the orange wire is grounded, then the system is switched to the armed mode; and the starter interrupt output will not automatically operate. It can only be activated from "Command #4"
      ii. Off position and the orange wire does not effect the arming or disarming of the system; 30 seconds after system arms the orange wire will automatically activate constant 500 ma ground until the system is disarmed. And from "command #4". Connect to Starter interrupt relay output.
   b. Command 4 activates Orange wire to have 500 ma. negative until Command 1 is received.
   c. After Alert warning "B" is activated the first time it is thereafter bypassed while the orange wire remains grounded. Alert warning "B" is re-set to operate again 3 seconds after orange wire becomes ungrounded.

The vehicle unit may also include a Door Lock Plug configured as follows, for example. A green wire provides a 250 ma, negative 1 second pulse for Lock Doors. (Command "6"). A red wire provides a constant 12 v output from the red power wire. A blue wire provides a 250 ma., negative 1 second pulse for Unlock Doors (Command "7"). A pink wire provides a 250 ma., negative 1 second pulse for remote Car Starter (Command "2").

An installation test button may also be provided to work as follows. Pressing the button activates the orange wire for 10-seconds (starter interrupt), with these circuits in sequence. First, it activates the gray wire for 1-second (siren/horn). After the first stops, it activates the green wire for 1 second to lock the doors. After the second stops, it activates the blue wire for 1 second to unlock the doors. After the third stops, it activates the pink wire for 1 second to activate an optional item.

Representative warning alerts are as follows:

1. Alert Warning "A" (FIG. 4): Automatic activation of "Command 8" and the vehicle unit contacts monitoring

station to instantly call 3 phone numbers with the message "Your Vehicle is stolen please confirm then call 911 to advise police of web site and your pin # so police can locate the vehicle". This is detected with the system armed and the GPS indicating movement. Bypasses all future alert warning "A" signals until the system is re-armed.

2. Alert Warning "B" (FIGS. 5A–5C): the vehicle unit contacts the monitoring station to instantly call 3 phone numbers with the following message "Vehicle alarm activated please confirm". This is with the system armed and detecting gray wire having 12 volts pulsing or on constant for longer than 10-seconds. After alert warning "B" is activated the first time, it is thereafter bypassed while the orange wire remains grounded. Alert warning "B" is re-set to operate again 3 seconds after orange wire becomes ungrounded.
3. Alert Warning "C" (FIG. 6): the vehicle unit contacts the monitoring station to instantly send e-mail message "vehicle was traveling faster than your preset amount of "###" and time limit of "##" seconds. Indicates the vehicle speed and location that the speeding started and how long speeding accrued" (Detected from GPS). This aspect is further understood with reference to the enclosed flowchart **84** of FIG. **6**.
4. Alert Warning "D" (FIG. 7): the vehicle unit contacts the monitoring station to instantly call 3 phone numbers with the message "Unauthorized remote transmitter was just programmed to operate your vehicle." This is with the system disarmed and the Gray wire detecting three or more 12 volt pulses within 2.5 seconds of the yellow wire having seen 12 volts positive. All future alerts "D" are bypassed until no 12 volt pulses are detected on the gray wire within 3 seconds of the yellow wire seeing 12 volts. This aspect is further understood with reference to the enclosed flowchart **85** of FIG. **7**.
5. Alert Warning "E" (FIG. 8): the vehicle unit contacts the monitoring station to instantly call 3 phone numbers with the message "Vehicle has low battery voltage and system has changed to low voltage mode". This is with the system armed and detecting the Red wire with lower than 11 volts for ## minutes. All future alerts "E" are bypassed until, first, more than 13.5 volts are detected on the red wire and, second, after the yellow wire stops having positive voltage the red wire then must detect more than 12 volts.

The following are representative commands for use in the system:

Command 1: Reset all circuits and system remains asleep until the ignition key is turned on. Resets the triggered mode and unit is asleep to prevent power drain on vehicle battery.

Command 2: (Accessory activation) monitoring station Command to the system to activate Pink wire to pulse 250 ma negative for 1 second.

Command 3: (Vehicle Location) Web site to indicate present location and past events in memory.

Command 4: (Hijack or Stolen) monitoring station Command to vehicle system to activate:

a. Gray wire to pulse 1 sec on/1 sec off with 1 amp positive output and which continues until receive command #1.

b. Orange wire to have 500 ma ground and which continues until receive command #1.

Command 5: (Car Find) monitoring station Command to system activating Gray wire for 30 seconds pulsing 1 sec on/1 sec off with 1 amp positive output.

Command 6: (Lock Doors) monitoring station Command to system activating Green wire to pulse 1 second with 250 ma. negative.

Command 7: (Unlock Doors) monitoring station Command to system to activate Blue wire to pulse 1 second with 250 ma. negative.

Command 8: (Start Constant Vehicle Tracking) sends previous 2 events in memory and then every 120 seconds get update of location information sent to the Web site.

The system is also operable in a battery saver mode which operates as follows:

1. With the ignition key off, if the battery voltage drops below 11.5 volts for more than 5 seconds, the GPS verification wakes up to look:
   a. Once instantly.
   b. Once in 1 hour if at the same location.
   c. Once in 6 hours if at the same location.
   d. Once in 12 hours if at the same location.
   e. Once every 24 hours if at the same location.
   f. Activate alert "E" when the battery saver mode is activated, and bypass sending all future Alert "E" until the battery voltage goes above 13 volts for 10 minutes to reset this feature.

Another aspect of the invention relates to automatic vehicle alert e-mails sent containing some or all of the previous system events. This sending can be triggered as follows:

a) At a user selected predetermined time ## (01–24) of each day, or

b) At a predetermined memory fill level, such as full or near full.

In addition, each system event may contains one or more of the following:

a) Vehicle Location

b) Vehicle total time at location

c) Time of day

d) Mph traveling

e) Total time traveling above MPH

f) Direction traveling

g) Delta

h) Special Alert messages, if any, including:

i) GPS signal not received for longer than 5 minutes.

ii) Traveling above ###MPH for ## minutes.

iii) Vehicle is stolen.

iv) Alarm activated.

v) Unauthorized remote transmitter alert.

vi) Battery saver mode activated

vii) Command 1: Reset all circuits and system remains asleep until the ignition key is turned on.

viii) Command 2: (Accessory activation)

ix) Command 3: (Vehicle Location was retrieved)

x) Command 4: (Hijack or Stolen mode activated)

xi) Command 5: (Car Find mode activated)

xii) Command 6: (Locked Doors)

xiii) Command 7: (Unlocked Doors)

xiv) Command 8: (Started 2-second incremental Vehicle Tracking)

Another feature of the invention relates to the selectable threshold conditions causing an event to be recorded into the memory of the vehicle unit. For example, this may include: while the yellow wire has 12 volts, record events every "??" default 15 minutes time if the GPS location has changed. If the GPS location is the same then only update stationary total time. If the GPS antenna is not receiving any signal

then enter last known GPS location and with an indication that this was the last known GPS location before the GPS signal stopped, how long no GPS signal was received, and the GPS location in the on-hold file, when the vehicle is traveling above ### MPH for ##-minutes.

The monitoring station may also provide a number of automated phone calls as described above. These may include:

1. The user's vehicle has issued a stolen alert:
   a. If vehicle is stolen, after receiving the phone message the user then calls 911 to advise police of the theft, and gives the police the Web site address and an identification number, such as the user's PIN, to allow the police to locate where your vehicle has been, where it is now and keep tracking it until the police can retrieve the vehicle.
   b. If this is a false alert due to vehicle being towed away for service, for example, then the user may press "1" to put the vehicle in an off mode. Once the ignition key is turned on again the system will reset back to its normal operation mode.
2. The user's vehicle has issued an alarm activated for more than 10 seconds alert. The system will not respond to this alert again until ignition key is turned on again to reset this feature.
3. The vehicle battery voltage is low or has been disconnected. The tracking system is in low voltage mode. The system will not respond to this-alert again until the battery voltage goes above 13 volts for 10 minutes to reset this feature.

The backup battery may be sized according to the GPS receiver and processing power draw. In addition, the battery may also be sized based upon estimated micro burst transmitting power draw. Such transmission are typically at about 3 watts power to the antenna.

The system according to the invention including the vehicle unit and monitoring station provides a number of significant advantages and features. For example, the police may be directly contacted by the user when the vehicle is stolen. The user receives the telephone message from the monitoring station, and this is done without requiring the intervention of a manual security monitoring operator, such as an ADT operator, for example. In addition, once in the stolen mode, the vehicle unit will periodically continue to send out its location, so that the police may track the vehicle via the WEB, for example. This location sending feature may begin immediately, that is, without requiring the user to contact the vehicle to begin tracking. Having the vehicle contacting the monitoring station is considerably less expensive than other schemes where the vehicle is periodically polled via the cellular network, for example.

The system may also be interfaced to a breath alcohol sensor at the vehicle, for example, and this information recorded in memory. The information could be passed along to the monitoring station, which, in turn, could send out a notification message (e-mail or telephone) that the vehicle is being operated by a driver who may be impaired by alcohol. The vehicle's location could then be tracked to permit the police to detain the driver.

Another aspect of the unit is that it may be able to recognize the desirability to bypass certain security breach triggers or other events. For example, a car finding feature can be provided that will allow the user to sound the horn or siren when near the vehicle to help locate the vehicle, as in a crowded parking area. Without the bypass feature, the unit could recognize the horn or siren as a security breach and transmit such information to the monitoring center. In accordance with this aspect of the invention, the unit would recognize the car finding feature was activated and thereby bypass sending a security breach transmission, for example. Again, false alarms and unneeded usage and expense of the communications infrastructure would be avoided.

Yet another aspect of the invention relates to thwarting a would-be thief who attempts to disable the alarm by cutting the battery cable or power supplied to the system. The unit preferably includes a back-up battery. More particularly, upon being in an armed mode and sensing a breach of security, such as the hood opening, for example, the unit will send out a signal indicating the alarm or security breach and while the alarm is indicated, if the battery is disconnected then the unit will send out a message indicating the vehicle is stolen, and also providing the vehicle's current position. Accordingly, the would-be thief is not able to defeat the security system by quickly disrupting power to the unit during an alarm indication or security breach. Also, to prevent additional alerts, this message is prevented from being transmitting again until the user returns to the vehicle to disarm the system and/or turn on the ignition so that the unit sees a voltage above 13 volts, indicating the vehicle has started using the owner's ignition key. This aspect is further understood with reference to the enclosed flowchart **80** (FIG. **4**).

Still another aspect of the invention relates to how the unit can discriminate between ordinary usage or honking of the horn as compared to a security system triggered alarm. Most vehicle security systems will provide a pattern of horn soundings as an alarm indication, and this can be determined and used to reduce false alarm transmissions from the unit. For example, the unit can look at the number of leading and trailing edges of the power pulse used to sound the horn. A single pressing of the horn switch by the user will cause two edges within a predetermined time, such as about 10 to 12 seconds. Accordingly, the unit can be configured to not send a security breach transmission to the control center based upon detecting two transitions. Since a number of vehicle security systems may have a continuous sounding of the horn within the predetermined time, the unit can send the transmission upon detecting only a single transition.

A number of other vehicle security systems provide a series of pulses or horn soundings within the predetermined time. Accordingly, the unit may also be configured to send a security breach transmission upon detecting greater than a predetermined number of transitions, such as greater than nine, for example. This number is also typically higher than a user would generate honking the horn several times within the predetermined time. In other terms, the number of transitions of the horn pulses can be counted, and if equal to one, or greater than nine, for example, the transmission is triggered, and otherwise the sounding of the horn is ignored. Also, to prevent additional alerts, this message is prevented from being transmitted again until the user returns to the vehicle to disarm the system and/or turn on the ignition so that the unit sees a voltage above 13 volts, indicating the vehicle has started using the owner's ignition key.

This aspect is further understood with reference to the enclosed flowcharts **81–83** (FIGS. **5A–5C**).

Yet another feature of the invention relates to a low vehicle battery alert. For example, the unit may monitor the battery voltage over a predetermined time such as ten minutes. The ten minute window prevents false tripping, for example, when the voltage dips during engine cranking. In particular, the voltage can be sensed and it can be determined whether it is greater than zero (e.g. greater than six volts) and less than a high value (e.g. eleven or twelve volts),

and, if so, a low battery voltage transmission can be communicated to the monitoring station, and ultimately to the vehicle user when away from the vehicle. If the vehicle is being serviced and the battery is disconnected, this will cause the battery voltage to be equal to zero. Then, the low battery voltage transmission will not be communicated to the monitoring station. Also, to prevent additional alerts, this message is prevented from being transmitted again until the user returns to the vehicle to disarm the system and/or turn on the ignition so that the unit sees a voltage above 13 volts, indicating the vehicle has started using the owner's ignition key. Again, false triggerings are reduced. This aspect is further understood with reference to the enclosed flowchart **86** (FIG. **8**).

Yet another advantageous feature of some embodiments of the invention relates to the ability to conserve electrical power. More particularly, when the vehicle is stopped and in the armed mode, the GPS receiver may be periodically operated to determine the vehicle position. If the vehicle position changes, this is indicative that the vehicle is being moved or stolen. For example, the GPS receiver may be operated to generate new vehicle position information every 29 seconds. These relatively quick successive position determinations or readings are generally termed hot start. These are relatively less complicated than a cold start position determination which takes longer, since the cold start position determination requires greater time to acquire and receive data from multiple satellites, as will be appreciated by those skilled in the art.

Unfortunately, this relatively high repeated usage of the GPS receiver may cause unnecessary battery drain, especially when the vehicle is left armed and unattended by the user for an extended period. Accordingly, the power conserving feature of the invention permits the GPS receiver to be turned off when the vehicle is in the armed mode, and the GPS receiver is turned on only when needed. For example, a vehicle sensor, such as a shock sensor, motion sensor, ignition sensor, door sensor, or other sensor, or combinations thereof could be used to start the GPS receiver. This sensor could also be used to trigger an alarm if desired; however it need not be so used in all embodiments. The GPS receiver, once turned on, could operate in the normal periodic fashion as described above, or for a fixed period of time. The GPS receiver could also be turned off again after some predetermined time if no further sensor signal is received, or if the position fails to change on subsequent position readings or determinations.

Yet another feature relates to permitting ore colorful audible alert messages to be generated for the user. The user can, in some embodiments, access an internet site to type or enter the text for a message to be sent, such as to alert the user that his vehicle is being stolen. The audible message then communicated by a telephone call to the user is generated by a speech message synthesizer based upon the entered text. In accordance with this aspect of the invention, the user could type in phonetically spelled words or phrases, such as to create more colorful messages including slang terms, various accents, and/or to mimic various dialects, for example. The speech synthesizer would then generate the desired message customized for the user. Of course, the system could also permit the user to test or preview the pronunciation generated by the speech message synthesizer based on the entered text message prior to its adoption.

Another aspect relates to requesting GPS position information from a vehicle. If a command is sent downstream to the vehicle requesting that GPS information in turn be sent upstream from the vehicle, and the GPS information is not received within a predetermined time, such as about four minutes, then another command may be sent to the vehicle requesting the GPS information. This may keep repeating until GPS information is received, for a predetermined number of tries, or until a user instructs stopping of the requests. This helps to ensure and confirm the activation and reception of GPS tracking coordinates from the vehicle.

Yet another aspect relates to reducing a frequency with which GPS information is sent from the vehicle. More particularly, the unit may be configured to activate GPS information transmission upstream every 2 minutes. To reduce system usage expense and power consumption at the vehicle, this rate of transmission of GPS information could be progressively decreased over time. For example, in one embodiment, upon activation the GPS location signals could be sent every 2 minutes during the first hour, then once an hour for the next 23 hours, after which only one signal would be sent per day.

Turning now to the flowchart **87** of FIG. **9**, still another aspect relates to warning the user of an inoperable or malfunctioning GPS or cellular telephone section. More particularly, if the GPS or cellular telephone antenna wire is cut or the mounting position of either is changed causing the antenna to stop receiving the signal the user would not ordinarily know of this problem quickly. In accordance with one embodiment, if the ignition is turned on a predetermined number of times, such as about three, and each time ignition turns on if no GPS or no cell signal is received for a minimum time, such as about 15 to 30 minutes or longer, an audible warning beeper may be activated in the vehicle. This beeper may be sounded once ever 15-minutes. At anytime if the GPS or cell signal is received properly then the system re-sets automatically stopping the beeper sound.

As an example, if the ignition key is turned on and no GPS or no Cell signal is being received for 15-minutes, and the vehicle ignition stays on for 45-minutes and there is still no GPS or no cell signal, the unit counts one. Thereafter, if the ignition key is turned on and no GPS or no cell signal is being received for 15-minutes, and the vehicle ignition stays on for 60-minutes and there is still no GPS or no cell signal, a second count is determined. Thereafter, if the ignition is turned on and no GPS or no cell signal is received for 10-minutes, and the vehicle ignition stays on for only 10-minutes and there is still no GPS or no cell signal, no count is determined. Thereafter, if the ignition is turned on and no GPS or no cell signal is being received for 15-minutes, a third count is determined and the beeper is activated as described above. This beeping may continue every 15-minutes while the vehicle ignition stays on as long as the vehicle ignition stays on for 16-minutes and still no GPS or no Cell signal is being received. If thereafter, the ignition is turned on and no GPS or no cell signal is being received, the beeper beeps once and again beeps once every 15-minutes while vehicle ignition stays on. If in 10-minutes both GPS or cell signal is being received, the beeper system is turned off and the warning count is reset.

By way of example, if the ignition key is turned on and no GPS or no cell signal is being received for only 5, 10 or 12 minutes (with the threshold set at 15 minutes), then no count is determined.

In certain circumstances, the GPS signal may fail, but the cell signal may still be working. Accordingly, it may be desirable to send an indication of the failure of the GPS signal to the central monitoring station to thereby alert the user as described above. If the cell signal also failed, or if the cell signal failed by itself, in other embodiments a separate paging device would transmit the failure or loss of the cell

signal information to the central monitoring station, to thereby alert the user.

Yet another feature is directed to efficient use of a relatively small number of codes available to communicate with the tracking unit from the cellular network and central station. More particularly, a typical arrangement may provide eight basic codes and two "wildcard" codes. The two wildcard codes are reserved for future or other uses. A particular tracking device will respond directly to any of the eight basic codes. For example, the doors could be locked or unlocked, a present location downloaded from the vehicle, etc.

In accordance with this feature, the tracking device may respond differently to the same code or command depending upon the state or condition of the tracking device. For example, if an alarm is triggered at the vehicle, it may be desired that the tracking device continue to send the alarm signal until confirmation is received that the central monitoring station has received the alarm signal. This confirmation can be sent using the same code as may provide another function if the device were not indicating an alarm. Any of a number of such tracking device conditions may trigger a different message to be interpreted from the received code. For example, if any of the above Alerts A--E were triggered, the receipt of a predetermined code, such as code eight, would confirm receipt of the alert by the central station, and this receipt of code eight would not cause the other response (no alarm triggered) in the tracking device. Of course this concept can be extended to other features as will be appreciated by those skilled in the art.

In accordance with another feature, the rate of sending the location or position data (or change in position data) from the vehicle may be varied to reduce system usage and thereby reduce expenses. More particularly, in one embodiment, the rate of sending may be based upon how long the vehicle has remained stationary. This time period may be selected by the user. For example, the selected time may be in the range of 15 minutes to six hours. If the vehicle has been stationary for the selected time period, then the rate of transmission may be reduced. This reduces or eliminates the need to send home position data and send all the over 15-minute stops made that day. Otherwise, that is when the vehicle is moving, the device may send data at a faster rate. Of course, a system user would not likely be interested in quick updates, especially where the position information is not changing. Conversely, if the vehicle is being moved, it may be desirable to receive more frequent position updates.

Another variation of this transmission rate conservation feature, bases the rate of transmission on the vehicle position. For example, a reduced rate of transmission may be selected if the vehicle is in a predetermined area where the user has a lesser interest in quickly updated position information. The user may also have a reduced interest in an area that can be defined outside of a predetermined distance from a reference point.

Yet another variation of the vehicle position transmission rate conservation feature is based upon the vehicle's speed, such as the vehicle's average or maximum speed, for example. Accordingly, if the vehicle is traveling above a preset speed, the rate of transmission may be increased.

In accordance with another aspect of the invention, the tracking device may send the alert indication a predetermined number of times without receiving an acknowledgment as described above, and hen wait until the vehicle position has changed before trying again or the cell re-registers or its RSS (received signal strength) changes. Thus, power is conserved. When the vehicle has moved to a new position, any obstructions may no longer be present thereby increasing the likelihood of a successful communication. In addition, the change in position may be determined when the vehicle is sensed to be moving about a predetermined relatively small speed, such as greater than 1 mph, for example.

In all of the embodiments and variations described herein, the tracking device may communicate with one or more other vehicle devices via a vehicle data communications bus. Further aspects of interfacing with a vehicle data communications bus are described in U.S. Pat. Nos. 5,719,551 and 6,011,460 assigned to the assignee of the present invention.

Yet another aspect relates to efficient use of available codes on the cellular telephone control channel. In one particular example, ten codes may be available to be transmitted from the monitoring station to the vehicle trackers. The first eight or nine codes are command codes that will cause a specific action by the tracking device at the vehicle. The other one or two codes may be wildcard codes as mentioned above, that may set a stand-by mode for one or a group of vehicles, for example.

It may be desirable to provide more than eight commands at the vehicle responsive to the corresponding eight available codes. For example, it may be desirable to set a feature on or off, or to set a different feature setting or threshold. In accordance with this aspect of the invention, the commands at the tracker are determined based upon a series of different command codes being received within a predetermined time window.

For example, the monitoring station may send code 9 that switches the tracker in the car into a stand-by mode for a predetermined time and which causes the tracker to respond with an upstream confirmation code 7 or 9 indicating receiving code 9. During the predetermined time of the stand-by mode another code follows that causes a system programmable feature or setting to change. Note that the second code would otherwise cause a different function at the vehicle. Note that system might operate a function 9 if another code 1--9 is not received in the predetermined time. The following list is exemplary for features resulting from second codes 1--9:

(1) Code 1—Tracker will turn off feature of upstream code caused by vehicle alert being detected.

(2) Code 2—Tracker will turn on feature of upstream code caused by vehicle alert being detected.

(3) Code 3—Tracker deactivates cell receiver from operating due to a non-paying customer for monitoring service. That phone number can then be allocated to another customer.

(4) Code 4—Turn on audio buzzer feature that will sound once each 10 minutes. The monitoring station need only send the command to activate the feature, as the tracker will time the period and drive the buzzer thereafter. The monitoring station will normally not need to send this command because the tracker will be configured out of the box with this feature activated to sound the buzzer every 10 minutes until the next command is received.

(5) Code 5—Turn off the audio buzzer. This is to be sent by the monitoring station after a user has successfully activated his account.

(6) Code 6—Turn on the 80 mph speed limit reporting. This will normally not be sent as this feature will be the default setting of the tracker.

(7) Code 7—Turn off the 80 mph speed limit reporting.

(8) Code 8—Increase speed limit 5 mph and increase the time 5 minutes.

(9) Code 9—Decrease speed limit 5 mph and decrease the time 5 minutes, and wait 5 minutes if another code number follows. it could operate this way to allow another set of codes to change more features.

In this example, in response to the tracker receiving the system code 1–9, the tracker sends an upstream code 7 to acknowledge receipt of the system code 1–9. Upon receipt of code 9 the tracker waits up to 5 minutes to determine if another system code is received. If no code is received, then the tracker performs the code 9 operation. Of course, in other embodiments other features or settings can be selected.

In general, it may be preferred that the first code sent in a series of two codes; for example, be a code that causes only a minor function to be performed at the vehicle. This so because if the second code is sent from the monitoring station, but not received at the tracker, only a minor function is performed. For example, the first code may switch between armed and disarmed modes. This is in contrast to using a remote engine starting code or engine shutdown code as the first code. The vehicle may be moving or positioned in a marginal reception area, and the second command may not be received by the tracker within the predetermined time window. As will be appreciated by those skilled in the art, this concept of multiple digit codes, can be extended beyond two digits to three or more.

To further conserve cellular transmissions and as described above, the tracker may be set to record a position based upon a determined event. Only this recorded position information may be downloaded either by user request or at set times. It is desired that such events be relatively few, but that the information still be helpful to the user.

For example, an event for recording of position may be determined based upon the vehicle being stopped for greater than a first time and less than a second time. For example, the first time may be 15 minutes and the second time may be 6 hours. Determination of the vehicle being stopped can be made based upon one or both of the GPS position or the vehicle ignition being turned off. The second time prevents the recording of position information when the vehicle is stopped at the owner's home during the evening, for example. Accordingly, the important information of the vehicle stops being made is recorded and made available to the user, while system communications resources are conserved.

In another example, if the mode is selected to send the vehicles location every 10 min and the vehicle is in the same location for greater than a set time, then no more vehicle locations are sent until the vehicle location has changed to start the every 10 min reporting again.

Other features relating to vehicle control systems are disclosed in copending patent applications entitled VEHICLE TRACKER INCLUDING STATIONARY TIME DETERMINATION AND ASSOCIATED METHODS, application Ser. No. 09/859,727; VEHICLE TRACKER CONSERVING CODES AND RELATED METHODS, application Ser. No. 09/859,673; VEHICLE TRACKER WITH POWER SAVING FEATURES AND RELATED METHODS, application Ser. No. 09/859,728; VEHICLE TRACKER COOPERATING WITH A STARTER INTERRUPT AND RELATED METHODS, application Ser. No. 09/859,973; VEHICLE TRACKER WITH USER NOTIFICATIONS AND ASSOCIATED METHODS, application Ser. No. 09/859,733; VEHICLE TRACKER WITH USER REGISTRATION REMINDER AND RELATED METHODS, application Ser. No. 09/859,971; and VEHICLE TRACKER WITH TEST FEATURES AND RELATED METHODS, application Ser. No. 09/859,729, the entire disclosures of which are incorporated herein by reference.

Many modifications and other embodiments of the invention will come to the mind of one skilled in the art having the benefit of the teachings presented in the foregoing descriptions and the associated drawings. Accordingly, it is understood that the invention is not to be limited to the embodiments disclosed, and that other modifications and embodiments are intended to be included within the spirit and scope of the appended claims.

That which is claimed is:

1. A vehicle tracking system comprising:

a vehicle tracking unit for a vehicle of a type comprising a vehicle alarm indicator, said vehicle tracking unit comprising

a vehicle position determining device,

a wireless communications device, and

a controller connected to said wireless communications device and said vehicle position determining device;

said controller cooperating with said wireless communications device to send an alarm indication alert based upon at least one of an activation of the vehicle alarm indicator continuously for greater than a predetermined time and an activation of the vehicle alarm indicator in a repetitive pattern; and

a monitoring station receiving the alarm indication alert from said vehicle tracking unit.

2. A vehicle tracking system according to claim 1 wherein said controller also cooperates with said vehicle position determining device and said wireless communications device to send vehicle position messages.

3. A vehicle tracking system according to claim 1 wherein said controller monitors drive signals to the vehicle alarm indicator.

4. A vehicle tracking system according to claim 3 wherein the drive signals have at least one of a first and second polarity.

5. A vehicle tracking system according to claim 1 wherein the vehicle alarm indicator comprises at least one of a vehicle horn, and a vehicle siren.

6. A vehicle tracking system according to claim 1 wherein said vehicle position determining device comprises a Global Positioning System (GPS) device.

7. A vehicle tracking system according to claim 1 wherein said wireless communications device comprises a cellular telephone communications device.

8. A vehicle tracking system according to claim 7 wherein said cellular telephone communications device communicates over a cellular control channel.

9. A vehicle tracking system according to claim 1 wherein said monitoring station comprises a user interface for accepting at least one command from a user and sending at least one alert to the user.

10. A vehicle tracking system according to claim 9 wherein said user interface comprises an Internet interface.

11. A vehicle tracking system according to claim 9 wherein said user interface comprises a telephone network interface.

12. A vehicle tracking unit for use with a vehicle comprising a vehicle alarm indicator, the vehicle tracking unit comprising:

a vehicle position determining device;

a wireless communications device; and

a controller connected to said wireless communications device and said vehicle position determining device;

said controller cooperating with said wireless communications device to send an alarm indication alert responsive to an activation of the vehicle alarm indicator continuously for greater than a predetermined time.

13. A vehicle tracking unit according to claim 12 wherein said controller further sends an alarm indication alert responsive to activation of the vehicle alarm indicator in a repetitive pattern.

14. A vehicle tracking unit according to claim 12 wherein said controller monitors drive signals to the vehicle alarm indicator.

15. A vehicle tracking unit according to claim 14 wherein the drive signals have at least one of a first and second polarity.

16. A vehicle tracking unit according to claim 12 wherein the vehicle alarm indicator comprises at least one of a vehicle horn, and a vehicle siren.

17. A vehicle tracking unit according to claim 12 wherein said vehicle position determining device comprises a Global Positioning System (GPS) device.

18. A vehicle tracking unit according to claim 12 wherein said wireless communications device comprises a cellular telephone communications device.

19. A vehicle tracking unit according to claim 18 wherein said cellular telephone communications device communicates over a cellular control channel.

20. A vehicle tracking unit for use with a vehicle comprising a vehicle alarm indicator, the vehicle tracking unit comprising:

a vehicle position determining device;

a wireless communications device; and

a controller connected to said wireless communications device and said vehicle position determining device;

said controller cooperating with said wireless communications device to send an alarm indication alert responsive to an activation of the vehicle alarm indicator in a repetitive pattern.

21. A vehicle tracking unit according to claim 20 wherein said controller monitors drive signals to the vehicle alarm indicator.

22. A vehicle tracking unit according to claim 21 wherein the drive signals have at least one of a first and second polarity.

23. A vehicle tracking unit according to claim 20 wherein the vehicle alarm indicator comprises at least a vehicle horn, and a vehicle siren.

24. A vehicle tracking unit according to claim 20 wherein said vehicle position determining device comprises a Global Positioning System (GPS) device.

25. A vehicle tracking unit according to claim 20 wherein said wireless communications device comprises a cellular telephone communications device.

26. A vehicle tracking unit according to claim 25 wherein said cellular telephone communications device communicates over a cellular control channel.

27. A vehicle tracking system comprising:

a vehicle tracking unit for a vehicle of a type comprising a vehicle device, said vehicle tracking unit comprising:

a vehicle position determining device,

a wireless communications device, and

a controller connected to said wireless communications device and said vehicle position determining device for sending messages relating to vehicle position;

said controller comprising a dual polarity compatible output for the vehicle device; and

a monitoring station communicating with said vehicle tracking unit.

28. A vehicle tracking system according to claim 27 wherein the vehicle device comprises a vehicle alarm indicator; and wherein said controller further monitors signals relating to activation of the vehicle alarm indicator and sends an alarm indication alert with position information from said vehicle position determining device and using said wireless communication device.

29. A vehicle tracking system according to claim 27 wherein said controller generates a first polarity output pulse followed by a second polarity output pulse on said dual polarity compatible output.

30. A vehicle tracking system according to claim 27 wherein said controller generates a repeating pattern of a first polarity output pulse followed by a second polarity output pulse on said dual polarity compatible output.

31. A vehicle tracking system according to claim 27 wherein said controller senses an actual polarity of the device and uses the actual polarity for the dual polarity compatible output.

32. A vehicle tracking system according to claim 27 wherein the vehicle device comprises a vehicle horn; and wherein said controller generates a negative polarity output on said dual polarity compatible output.

33. A vehicle tracking system according to claim 27 wherein the vehicle device comprises a vehicle alarm indicator siren; and wherein said controller generates a positive polarity output on said dual polarity compatible output.

34. A vehicle tracking system according to claim 27 wherein said vehicle position determining device comprises a Global Positioning System (GPS) device.

35. A vehicle tracking system according to claim 27 wherein said wireless communications device comprises a cellular telephone communications device.

36. A vehicle tracking system according to claim 35 wherein said cellular telephone communications device communicates over a cellular control channel.

37. A vehicle tracking system according to claim 27 wherein said monitoring station comprises a user interface for accepting at least one command from a user and sending at least one alert to the user.

38. A vehicle tracking system according to claim 37 wherein said user interface comprises an Internet interface.

39. A vehicle tracking system according to claim 27 wherein said user interface comprises a telephone network interface.

40. A vehicle tracking unit for a vehicle of a type comprising a vehicle device, the vehicle tracking unit comprising:

a vehicle position determining device;

a wireless communications device; and

a controller connected to said wireless communications device and said vehicle position determining device for sending messages relating to vehicle position;

said controller comprising a dual polarity compatible output for the vehicle device.

41. A vehicle tracking unit according to claim 40 wherein the vehicle device comprises a vehicle alarm indicator; and wherein said controller further monitors signals relating to activation of the vehicle alarm indicator and sends an alarm indication alert with position information from said vehicle position determining device and using said wireless communication device.

42. A vehicle tracking unit according to claim 40 wherein said controller generates a first polarity output pulse followed by a second polarity output pulse on said dual polarity compatible output.

43. A vehicle tracking unit according to claim 40 wherein said controller generates a repeating pattern of a first polarity output pulse followed by a second polarity output pulse on said dual polarity compatible output.

44. A vehicle tracking unit according to claim 40 wherein said controller senses an actual polarity of the device and uses the actual polarity for the dual polarity compatible output.

45. A vehicle tracking unit according to claim 40 wherein the vehicle device comprises a vehicle horn; and wherein said controller generates a negative polarity output on said dual polarity compatible output.

46. A vehicle tracking unit according to claim 40 wherein the vehicle device comprises a vehicle alarm indicator siren; and wherein said controller generates a positive polarity output on said dual polarity compatible output.

47. A method for operating a vehicle tracking-unit for a vehicle of a type comprising a vehicle device, the vehicle tracking unit comprising a vehicle position determining device, a wireless communications device, and a controller connected to the wireless communications device and the vehicle position determining device, the method comprising:

using the controller to generate a dual polarity compatible output for the vehicle device.

48. A method according to claim 47 wherein the vehicle device comprises a vehicle alarm indicator; and wherein using the controller comprises using the controller to monitor signals relating to an activation of the vehicle alarm indicator and to send an alarm indication alert with position information from the vehicle position determining device and using the wireless communication device.

49. A method according to claim 47 wherein using the controller comprises using the controller to generate a first polarity output pulse followed by a second polarity output pulse as the dual polarity compatible output.

50. A method according to claim 47 wherein using the controller comprises using the controller to generate a repeating pattern of a first polarity output pulse followed by a second polarity output pulse as the dual polarity compatible output.

51. A method according to claim 47 wherein using the controller comprises using the controller to sense an actual polarity of the device and to use the actual polarity as the dual polarity compatible output.

52. A method according to claim 47 wherein the vehicle device comprises a vehicle horn; and wherein using the controller comprises using the controller to generate a negative polarity output as the dual polarity compatible output.

53. A method according to claim 47 wherein the vehicle device comprises a vehicle alarm indicator siren; and wherein using the controller comprises using the controller to generate a positive polarity output as the dual polarity compatible output.

* * * * *

UNITED STATES PATENT AND TRADEMARK OFFICE

CERTIFICATE OF CORRECTION

PATENT NO. : 6,606,561 B2
DATED : August 12, 2003
INVENTOR(S) : Kenneth E. Flick

It is certified that error appears in the above-identified patent and that said Letters Patent is hereby corrected as shown below:

Title page,
Item [56], **References Cited**, OTHER PUBLICATIONS, insert -- * -- between "2002" and "This"

Column 3,
Line 37, delete "diagrams" insert -- diagram --
Line 41, insert -- a -- between "is" and "more"

Column 4,
Line 41, delete "illustrated" insert -- illustratively --

Column 5,
Line 35, insert -- be -- between "will" and "described"

Column 7,
Line 28, insert -- in -- between "not" and "operation"
Line 43, delete "61." insert -- 61 --

Column 16,
Line 34, delete "contains" insert -- contain --

Column 17,
Line 28, delete "this-alert" insert -- this alert --
Line 34, delete "transmission" insert -- transmissions --

Column 18,
Line 20, delete "transmitting" insert -- transmitted --
Line 58, delete "This aspect is further understood with reference to the enclosed flowcharts **81-83**(FIGS. 5A-5C)." insert at the end of line 57 -- This aspect is further understood with reference to the enclosed flowcharts **81-83**(FIGS. 5A-5C). --

Column 19,
Line 35, delete "ore" insert -- more --

Column 20,
Line 31, delete "ever" insert -- every --

UNITED STATES PATENT AND TRADEMARK OFFICE

CERTIFICATE OF CORRECTION

PATENT NO. : 6,606,561 B2
DATED : August 12, 2003
INVENTOR(S) : Kenneth E. Flick

It is certified that error appears in the above-identified patent and that said Letters Patent is hereby corrected as shown below:

Column 24,
Line 12, insert -- and a vehicle battery -- after "indicator"
Line 23, insert -- said controller monitoring voltage dips of the vehicle battery; and -- after "and"
Line 58, insert -- and a vehicle battery -- after "indicator"
Line 67, delete "time." insert -- time, and for monitoring voltage dips of the vehicle battery. --

Column 25,
Line 24, insert -- and a vehicle battery -- after "indicator"
Line 33, delete "pattern." insert -- pattern, and for monitoring voltage dips the vehicle battery. --
Line 42, insert -- one of -- between "least" and "a"
Line 55, delete ":"
Line 57, delete "and"

Column 27,
Line 13, delete "tracking-unit" insert -- tracking unit --

Signed and Sealed this

Twenty-third Day of December, 2003



JAMES E. ROGAN
Director of the United States Patent and Trademark Office

UNITED STATES PATENT AND TRADEMARK OFFICE

CERTIFICATE OF CORRECTION

PATENT NO. : 6,606,561 B2
DATED : August 12, 2003
INVENTOR(S) : Kenneth E. Flick

It is certified that error appears in the above-identified patent and that said Letters Patent is hereby corrected as shown below:

Title page,
Item [56], **References Cited**, OTHER PUBLICATIONS, insert -- * -- between "2002" and "This"

Column 3,
Line 37, delete "diagrams" insert -- diagram --
Line 41, insert -- a -- between "is" and "more"

Column 4,
Line 41, delete "illustrated" insert -- illustratively --

Column 5,
Line 35, insert -- be -- between "will" and "described"

Column 7,
Line 28, insert -- in -- between "not" and "operation"
Line 43, delete "61." insert -- 61 --

Column 16,
Line 34, delete "contains" insert -- contain --

Column 17,
Line 28, delete "this-alert" insert -- this alert --
Line 34, delete "transmission" insert -- transmissions --

Column 18,
Line 20, delete "transmitting" insert -- transmitted --
Line 58, delete "This aspect is further understood with reference to the enclosed flowcharts **81-83**(FIGS. 5A-5C)." insert at the end of line 57 -- This aspect is further understood with reference to the enclosed flowcharts **81-83**(FIGS. 5A-5C). --

Column 19,
Line 35, delete "ore" insert -- more --

Column 20,
Line 31, delete "ever" insert -- every --

Column 21,
Line 64, delete "hen" and insert -- then --.

UNITED STATES PATENT AND TRADEMARK OFFICE

CERTIFICATE OF CORRECTION

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Column 24,
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Line 23, insert -- said controller monitoring voltage dips of the vehicle battery; and -- after "and"
Line 58, insert -- and a vehicle battery -- after "indicator"
Line 67, delete "time." insert -- time, and for monitoring voltage dips of the vehicle battery. --

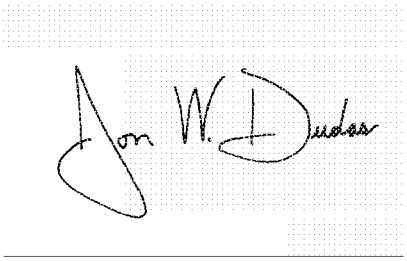
Column 25,
Line 24, insert -- and a vehicle battery -- after "indicator"
Line 33, delete "pattern." insert -- pattern, and for monitoring voltage dips of the vehicle battery. --
Line 42, insert -- one of -- between "least" and "a"
Line 55, delete ":"
Line 57, delete "and"

Column 27,
Line 13, delete "tracking-unit" insert -- tracking unit --

This certificate supersedes Certificate of Correction issued December 23, 2003.

Signed and Sealed this

Thirteenth Day of July, 2004



JON W. DUDAS
Acting Director of the United States Patent and Trademark Office

EXHIBIT D

01-30-01 Approv

01/29/01 jc944 U.S. PTO

PROVISIONAL APPLICATION COVER SHEET

This is a request for filing a PROVISIONAL APPLICATION under 37 CFR 1.53(b)(2)

01/29/01 jc713 U.S. PTO 60/264811

Docket No.	58092	Type (+) --- [+]

INVENTOR(s)/APPLICANT(s)

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TITLE OF THE INVENTION (280 Characters Max)

VEHICLE TRACKING SYSTEM WITH THEFT NOTIFICATION

CORRESPONDENCE ADDRESS

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ENCLOSED APPLICATION PARTS *(check all that apply)*

✓	Specification	*Number of Pages*	38	✓	Applicant qualifies as a Small Entity under 35 CFR under §§1.19 and 1.27
✓	Drawing(s)	*Number of Sheets*	6		Other (specify) _____

METHOD OF PAYMENT

	A check or money order is enclosed to cover the Provisional Filing Fees		PROVISIONAL FILING FEE AMOUNT ($)	$75.00
✓	The Commissioner is hereby authorized to charge the Provisional Filing Fee and/or charge or credit any discrepancies in fee amounts to Deposit Account No.:	01-0484		

[ ] Additional inventors are being named on separately numbered sheets attached hereto.

The invention was made by an agency of the United States Government or under a contract with an agency of the United States Government.
[✓] No. [ ] Yes

Respectfully Submitted,

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Date: January 29, 2001

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(SIGNATURE OF PERSON MAILING PAPER OR FEE)

VEHICLE TRACKING SYSTEM WITH THEFT NOTIFICATION

Field of the Invention

The present invention relates to the field of vehicle devices, and, more particularly, to a tracking and alerting system for a vehicle.

Description of the Invention

The invention includes a unit to be mounted in the vehicle and a monitoring station. The unit in the vehicle includes a GPS receiver, and a transmitter which may transmit on the control band of the cellular telephone network, or, via a voice or other data channel of the cellular network, or other wireless communications network. For example, the transmitter could also be a satellite transmitter.

The GPS receiver determines the vehicle location. In addition, the GPS receiver may be connected to a controller which controls and/or performs a number of vehicle tracking and/or security functions. Wireless vehicle location determining devices and approaches other than GPS may also be used in some embodiments of the invention. For example, vehicle location systems based upon multiple receptions from adjacent cellular receivers can also be used.

The monitoring station is interfaced to the cellular telephone network, or other communications

network, to thereby communicate with the vehicle unit. In addition, the monitoring station is also connected to the Internet to provide a number of advantageous features including updating the user or other authority when away from the vehicle of the vehicle's position. These features and advantages are described in further detail below. The monitoring station may also be connected to the telephone network in order to provide various preprogrammed communications, such as to the user or other authority.

The system preferably implements one or more of the following features:

1. Detects the vehicle being stolen and transmits a signal to the monitoring station to contact up to 3 people, for example, predetermined by the user, of theft of the vehicle and starts tracking the vehicle. The contact may be by one or more of the following: an e-mail message, a pager alert, a cellular telephone call, or other telephone call.
2. Detects an optional vehicle alarm system activation and transmits a signal to the monitoring station to contact up to 3 predetermined people to inform them the vehicle's alarm is being activated.
3. Detects an optional vehicle alarm systems remote PANIC activation and transmits a signal to the monitoring station to contact up to 3 predetermined people to inform them of the vehicle's PANIC being activated.
4. Detects a vehicle being programmed to operate from an unauthorized remote transmitter, key transponder, other transponder, or other device that has a unique coding, and the

vehicle unit transmits a signal to the monitoring station to contact up to 3 predetermined people to inform them of this occurrence. The system can also make available information relating to a number of such coded devices, or a change therein, or when a change occurred. A message can be sent to the user or the information can be available to the user on the WEB site. The vehicle would be equipped with a security system as disclosed in U.S. Patent No. 5,654,688, for example, which determines an unauthorized transmitter and provides an alert feature. This patent is incorporated herein in its entirety by reference.

5. Detects the vehicle traveling over a predetermined speed, such as for a predetermined time, and transmits a signal to the monitoring station to send a message, such as an e-mail informing the user (and/or others) of this occurrence. Of course, the message could also be sent via a telephone call or page, should additional urgency be required. The vehicle's predetermined max speed limit and duration thereof can be selected by the user.

6. Detects a low battery voltage such as for a predetermined time and transmits a signal to the monitoring station to contact up to 3 predetermined people to inform them of vehicle's low battery voltage. This is especially advantageous during winter so that the vehicle could be started, for example, to prevent a problem before it happens). The time setting is selectable by the user.

7. Detects vehicle not moving for a predetermined time and transmits a signal to the monitoring station to send, for example, a nightly e-mail informing the user of all the vehicle's location and stationary time occurrences. The stationary time length is also selectable. This may be advantageous to encourage patrolling personnel not to remain for a long time in a same location.

8. The vehicle unit preferably includes a back-up battery system making it more reliable.

The vehicle unit may be relatively inexpensive. In addition, the monitoring fee that includes sending up to 60 e-mails and making up to 6 phone calls per month, may also be relatively low. The relatively low monitoring fee is based, at least in part, on the current relatively low rates charged for use of the control channel of the cellular telephone network. It is also noted that access to the control channel provides coverage for almost the entire U.S., for example.

The user also preferably has access to a WEB or Internet site that will display a map and silently contact the vehicle to acquire it's current location, speed, direction of travel, and previous multiple locations with speeds, for example, the user's personal identification number (PIN) can be instantly activated by just a phone call. No additional installation is required.

Certain annual pre-pay package arrangement may be available. For example, up to 10 access entries per month can be provided on a low monthly billing of $4.90. Up to 30 access entries could be provided for $8.25 per month.

The present invention provides a number of other significant advantages including optional access from any phone or from any computer to access the WEB site. The user may control various vehicle functions remotely via the telephone or WEB site. The only charge may be for additional equipment and installation.

Additional features can also be included with the system and subscribed to by the user in accordance with the invention. For example, these include Hijack, Car Finding, Unlock Doors and Unauthorized Transmitter Alert Features. The equipment & installation is relatively inexpensive, and is on the order of about $190.00. For the hijack feature: from any phone or computer, the user may activate vehicle starter interrupt and sound the horn until the vehicle is retrieved (Command 4). For the Car Finding feature: from any phone or computer, the user may activate the vehicle's horn, or siren and sound same for 30 seconds. This allows the user to find his vehicle in a crowded parking lot (Command 5). For the Lock/Unlock vehicle doors feature: from any phone or computer user a predetermined command (Command 7) activates unlocking of vehicle doors to retrieve keys, for example, that may have been accidentally locked inside the vehicle. Of course, the system can also be used to lock vehicle doors if this was forgotten (Command 6). The unauthorized transmitter alert feature is similarly selected as described above.

In addition, a remote vehicle start feature may also be provided, such as to start the vehicle's engine to heat or cool the vehicle prior to entry. The equipment and installation for remote starting may be relatively low.

Some further details of an embodiment of the vehicle unit are provided below as relating to use of red and green LED indicators operated by the system controller.

Red LED verification of GPS receiving signal, using the LED built into the system controller:

With yellow wire having positive 12 volts:

Blinking = when searching GPS location.

Constant = found location.

Off = no GPS signal found.

With yellow wire not having positive 12 volts:

Off = LED not functioning.

Green LED verification of receiving the cell tower signal, using the LED built into the system controller:

With yellow wire having positive 12 volts:

Blinking = Cell control channel signal is detected.

Constant = sending micro burst signal. Stays on 5-seconds after each time system is transmitting.

Off = no cell tower signal received.

With yellow wire not having positive 12 volts:

Off = LED not functioning.

An example of representative DIP switch feature selection is as follows. Switch 1 may be used for adding orange wire for controlling arm/disarming of system. When On, the orange wire controls arm/disarm as follows: to arm, Orange wire is grounded and Yellow wire does not have 12 volts positive. To disarm, the Orange wire is not grounded. When switch 1 is Off, then only the Yellow wire controls arm /disarm as follows: to arm, the Yellow wire is without 12 volts

positive, and 30 seconds after continued arm mode then orange wire activates a constant 500 ma grounded output to operate an external starter interrupt relay until system is disarmed. To disarm the Yellow wire is connected to 12 volts positive.

A main 5-pin plug may be provided on the vehicle unit and connected as follows:

The Red Wire is connected to 12 vdc Power. An alert warning "E" is given if the system is armed and the battery voltage becomes lower than 11-volts for longer than ## minutes. This alert feature "E" will not operate again until the voltage is above 12 volts to re-set this feature.

The Black Wire is connected to Ground.

The Yellow Wire is connected to the ignition 12 volts so that if the key is on, 12 volts is supplied thereto and if the key is off, the yellow wire is connected to ground. Further:

1. If the system is in an armed mode and Lat/Long changes, then Alert "A" is given.
2. If the system is disarmed and within 2.5 seconds after the yellow wire receives 12 volts and the gray wire detects 3 or more positive pulses the system activates Alert "D".
3. If the DIP switch 1 is in the Off position then:
   a. if 12 volts is on yellow wire, the system is disarmed and the orange wire discontinues the 500 ma ground.
   b. if the yellow wire sees grounded or neutral, then the system is

armed and 30 seconds after the continued arm mode the orange wire activates a constant 500 ma grounded output to operate an external starter interrupt relay until system is disarmed

The Gray Wire is for Input and Output, and can be connected to an alarm siren or horn positive terminal. In addition:

1. With system armed and if the Gray wire detects +12 v pulsing on/off or on constant for more than 10 seconds from an alarm siren or horn honking activation, then alert warning "B" alarm activation is given.
2. With system disarmed and if the Gray wire detects +12 v pulsing on/off or on constant for more than 10 seconds from an alarm siren or horn honking activation, then alert warning "C" panic activation is given.
3. With system disarmed and if the Gray wire detects 3 or more 12 volt positive pulses within 2.5 seconds of yellow wire receiving 12 v+ and the gray wire by-pass not being activated, then alert warning "D" is given.
4. The Gray wire bypass operates as follows:

a. After Alert warning "B" bypass all future Alert "B" until system is disarmed.

b. After Alert warning "C" bypass all future Alert "C" until system is armed.

c. After Alert warning "D" bypass all future Alert "D" until no 12 volt pulses are detected on the gray wire within 3 seconds of yellow wire having 12 volts.

5. With system armed or disarmed. The Output: Internal + 12v, 1 amp transistor with pulses 1 second on & 1 sec off to activate siren or honk car horn or flashing light relay.

a. Non-stop activation from (Command "4")

b. 30-second activation from (Command "5")

6. Turn off the above Alert "A" from (Command "1")

The Orange Wire is for the starter interrupt and arm/disarm system, and operates as follows:

1. If dip switch 1 is in the:

a. On position and:

i. the Orange wire has 12 volts or neutral, the system switches to the disarmed mode

ii. the Orange wire is grounded, then the system is switched to the armed mode

iii. and the starter interrupt output will not automatically

operate. Can only be activated from "Command #4"

b. Off position and:

i. the Orange wire does not effect the arming or disarming of the system.

ii. 30 seconds after system arms the Orange wire will automatically activate constant 500 ma ground until the system is disarmed. And from "command #4". Connect to Starter interrupt relay output.

2. Command 4 activates Orange wire to have 500 ma. negative until Command 1 is received.

3. After Alert warning "B" is activated the first time it is thereafter bypassed while the orange wire remains grounded. Alert warning "B" is re-set to operate again 3 seconds after orange wire becomes ungrounded.

The vehicle unit may also include a Door Lock Plug configured as follows, for example:

Green wire provides a 250 ma, negative 1 second pulse for Lock Doors. (Command "6").

Red Wire provides a constant 12v output from the Red power wire.

Blue wire provides a 250 ma., negative 1 second pulse for Unlock Doors (Command "7")

Pink wire provides a 250ma., negative 1 second pulse for remote Car Starter (Command "2").

An installation Test Button may also be provided to work as follows. Pressing the button activates Orange wire for 10-seconds (starter interrupt), with these circuits in sequence:

First: Activates Gray wire for 1-second. (siren/horn)

After first stops: Activates Green wire for 1 second to lock the doors.

After second stops: Activate Blue wire for 1 second to unlock the doors.

After third stops: Activate Pink wire for 1 second to activate optional item.

Representative warning alerts are as follows:

Alert Warning "A": Automatic activation of "Command 8" and the vehicle unit contacts monitor station to instantly call 3 phone numbers with the message "Your Vehicle is stolen please confirm then call 911 to advise police of web site and your pin # so police can locate the vehicle". This is detected with the system armed and the GPS indicating movement. Bypasses all future alert warning "A" until the system is re-armed.

Alert Warning "B": the vehicle unit contacts the monitoring station to instantly call 3 phone numbers with the following message "Vehicle alarm activated please confirm". This is with the system armed and detecting Gray wire having 12 volts pulsing or on constant for longer than 10-seconds). After Alert warning "B" is activated the first time, it is thereafter bypassed while the orange wire remains grounded. Alert warning "B" is re-set to operate again 3 seconds after orange wire becomes ungrounded.

Alert Warning "C": the vehicle unit contacts the monitoring station to instantly call 3 phone numbers with the message "Vehicle PANIC activated

please confirm". This is with system disarmed and detecting the Gray wire having 12 volts pulsing or on constant for longer than 10-seconds. After the first activation then this is bypassed until the ignition turns on again.

Alert Warning "D": the vehicle unit contacts the monitoring station to instantly call 3 phone numbers with the this message "Unauthorized remote transmitter was just programmed to operate your vehicle." This is with the system disarmed and the Gray wire detecting three or more 12 volt pulses within 2.5 seconds of yellow wire having seen 12 volts positive. All future alert "D" are bypassed until no 12 volt pulses are detected on the gray wire within 3 seconds of the yellow wire seeing 12 volts.

Alert Warning "E": the vehicle unit contacts the monitoring station to instantly call 3 phone numbers with the message "Vehicle has low battery voltage and system has changed to low voltage mode". This is with the system armed and detecting the Red wire with lower than 11 volts for ## minutes. All future alert "E" are bypassed until:

1. First: More than 13.5 volts are detected on the red wire and
2. Second: After yellow wire stops having positive voltage the red wire then must detects more than 12 volts.

Alert Warning "F": the vehicle unit contacts the monitoring station to instantly send e-mail message "vehicle was traveling faster than your preset amount of "###"and time limit of "##"seconds. Indicates the vehicle speed and location that the speeding started and how long speeding accrued" (Detected from GPS)

The following are representative commands for use in the system:

Command 1: Reset all circuits and system remains asleep until the ignition key is turned on. Resets the triggered mode and unit is asleep to prevent power drain on vehicle battery.

Command 2: (Accessory activation) monitoring station Command to the system to activate Pink wire to pulse 250 ma negative for 1 second.

Command 3: (Vehicle Location) Web site to indicate present location and past events in memory.

Command 4: (Hijack or Stolen) monitoring station Command to vehicle system to activate:

a. Gray wire to pulse 1sec on/1 sec off with 1 amp positive output and which continues until receive command # 1.

b. Orange wire to have 500 ma ground and which continues until receive command # 1.

Command 5: (Car Find) monitoring station Command to system activating Gray wire for 30 seconds pulsing 1 sec on/1 sec off with 1 amp positive output.

Command 6: (Lock Doors) monitoring station Command to system activating Green wire to pulse 1 second with 250 ma. negative.

Command 7: (Unlock Doors) monitoring station Command to system to activate Blue wire to pulse 1 second with 250ma. negative.

Command 8: (Start Constant Vehicle Tracking) sends previous 2 events in memory and then every 120 seconds get update of location information sent to the Web site.

The system is also operable in a battery saver mode which operates as follows:

a) With the ignition key off, if the battery voltage drops below 11.5 volts for more than 5 seconds, the GPS verification wakes up to look:

i) Once instantly.

ii) Once in 1 hour if at the same location.

iii) Once in 6 hours if at the same location.

iv) Once in 12 hours if at the same location.

v) Once every 24 hours if at the same location.

b) Activate alert "E" when the battery saver mode is activated, and bypass sending all future Alert "E" until the battery voltage goes above 13 volts for 10 minutes to reset this feature.

Another aspect of the invention relates to automatic vehicle alert e-mails sent containing some or all of the previous system events. This sending can be triggered as follows:

a) At a user selected predetermined time ## (01-24) of each day, or

b) At a predetermined memory fill level, such as full or near full.

In addition, each system event may contains one or more of the following:

a) Vehicle Location

b) Vehicle total time at location

c) Time of day

d) Mph traveling

e) Total time traveling above MPH

f) Direction traveling

g) Delta

h) Special Alert messages, if any, including:

i) GPS signal not received for longer than 5 minutes.

ii) Traveling above ###MPH for ## minutes.

iii) Vehicle is stolen.

iv) Alarm activated.

v) Unauthorized remote transmitter alert.

vi) Battery saver mode activated

vii) Command 1: Reset all circuits and system remains asleep until the ignition key is turned on.

viii) Command 2: (Accessory activation)

ix) Command 3: (Vehicle Location was retrieved)

x) Command 4: (Hijack or Stolen mode activated)

xi) Command 5: (Car Find mode activated)

xii) Command 6: (Locked Doors)

xiii) Command 7: (Unlocked Doors)

xiv) Command 8: (Started 2-second incremental Vehicle Tracking)

Another feature of the invention relates to the selectable threshold conditions causing an event to be recorded into the memory of the vehicle unit. For example, this may include:

a) While the yellow wire has 12 volts, record events every "??" default 15 minutes time if the GPS location has changed. If the GPS location is same then only update stationary total time.

b) If the GPS antenna is not receiving any signal:

i) Then enter last known GPS location and with indication this was the last known GPS location before GPS signal stopped and how long no GPS signal was received. And enter GPS location in the on-hold file.

c) When vehicle is traveling above ###MPH for ##-minutes.

The monitoring station may also provide a number of automated phone calls as described above. These include

a) The user's vehicle has issued a stolen alert:

i) If vehicle is stolen, after receiving the phone message the user then calls 911 to advise police of the theft, and gives the police the Web site address and an identification number, such as the user's PIN, to allows the police to locate where your vehicle has been, where it is now and keep tracking it

until the police can retrieve the vehicle.

ii) If this is a false alert due to vehicle being towed away for service, for example, then the user may press "1" to put the vehicle in an off mode. Once the ignition key is turned on again the system will reset back to its normal operation mode.

b) The user's vehicle has issued an alarm activated for more than 10 seconds alert. The system will not respond to this alert again until ignition key is turned on again to reset this feature.

c) The vehicle battery voltage is low or has been disconnected. The tracking system is in low voltage mode. The system will not respond to this alert again until the battery voltage goes above 13 volts for 10 minutes to reset this feature.

The backup battery may be sized according to the GPS receiver and processing power draw. In addition, the battery may also be sized based upon estimated micro burst transmitting power draw. Such transmission are typically at about 3 watts power to the antenna.

The system according to the invention including the vehicle unit and monitoring station provides a number of significant advantages and features. For example, the police may be directly contacted by the user when the vehicle is stolen. The user receives the telephone message from the monitoring station, and this is done without requiring the intervention of a manual security monitoring operator,

such as an ADT operator, for example. In addition, once in the stolen mode, the vehicle unit will periodically continue to send out its location, so that the police may track the vehicle via the WEB, for example. This location sending feature begins immediately, that is, without requiring the user to contact the vehicle to begin tracking. Having the vehicle contacting the monitoring station is considerably less expensive than other schemes where the vehicle is periodically polled via the cellular network, for example.

The system may also be interfaced to a breath alcohol sensor at the vehicle, for example, and this information recorded in memory. The information could be passed along to the monitoring station, which, in turn, could send out a notification message (e-mail or telephone) that the vehicle is being operated by a driver who may be impaired by alcohol. The vehicle's location could then be tracked to permit the police to detain the driver.

The device or unit may be initially manufactured and shipped without all of the features being fully functional. One advantage of this is to prevent the unit at will from sending messages when being initially installed and tested in the vehicle, thereby reducing potential false alarms and burdens on the communications system, as well as potential charges to the user. After the unit is fully installed, a communication or transmission from the monitoring center may be sent to the unit enabling one or more selected features, such as during registration during which information is conveyed to the monitoring center and payment is made or authorized by the user.

Another aspect of the unit is that it may be able to recognize the desirability to bypass certain

security breach triggers or other events. For example, a car finding feature can be provided that will allow the user to sound the horn or siren when near the vehicle to help locate the vehicle, as in a crowded parking area. Without the bypass feature, the unit could recognize the horn or siren as a security breach and transmit such information to the monitoring center. In accordance with this aspect of the invention, the unit would recognize the car finding feature was activated and thereby bypass sending a security breach transmission, for example. Again, false alarms and unneeded usage and expense of the communications infrastructure would be avoided.

Yet another aspect of the invention relates to thwarting a would-be thief who attempts to disable the alarm by cutting the battery cable or power supplied to the system. The unit preferably includes a back-up battery. More particularly, upon being in an armed mode and sensing a breach of security, such as the hood opening, for example, the unit will send out a signal indicating the alarm or security breach and while the alarm is indicated, if the battery is disconnected then the unit will send out a message indicating the vehicle is stolen, and also providing the vehicle's current position. Accordingly, the would-be thief is not able to defeat the security system by quickly disrupting power to the unit during an alarm indication or security breach. Also to prevent additional alerts, this message is prevented from being transmitting again until user returns to the vehicle to disarm the system and/or turn on the ignition so that the unit sees a voltage above 13.volts indicating the vehicle has started using the owner's ignition key.

This aspect is further understood with reference to the enclosed flowchart labeled "Alert A".

Still another aspect of the invention relates to how the unit can discriminate between ordinary usage or honking of the horn as compared to a security system triggered alarm. Most vehicle security systems will provide a pattern of horn soundings as an alarm indication, and this can be determined and used to reduce false alarm transmissions from the unit. For example, the unit can look at the number of leading and trailing edges of the power pulse used to sound the horn. A single pressing of the horn switch by the user will cause two edges within a predetermined time, such as about 10 to 12 seconds. Accordingly, the unit can be configured to not send a security breach transmission to the control center based upon detecting two transitions. Since a number of vehicle security systems may have a continuous sounding of the horn within the predetermined time, the unit can send the transmission upon detecting only a single transition. A number of other vehicle security systems provide a series of pulses or horn soundings within the predetermined time. Accordingly, the unit may also be configured to send a security breach transmission upon detecting greater than a predetermined number of transitions, such as greater than nine, for example. This number is also typically higher than a user would generate honking the horn several times within the predetermined time. In other terms, the number of transitions of the horn pulses can be counted, and if equal to one, or greater than nine, for example, the transmission is triggered, and otherwise the sounding of the horn is ignored. Also to prevent additional alerts, this message is prevented from being transmitting again until user returns to the vehicle to disarm the system and/or turn on the

ignition so that the unit sees a voltage above 13.volts indicating the vehicle has started using the owner's ignition key. This aspect is further understood with reference to the enclosed flowchart labeled "Alert B".

Yet another feature of the invention relates to a low vehicle battery alert. For example, the unit may monitor the battery voltage over a predetermined time such as ten minutes. The ten minute window prevents false tripping, for example, when the voltage dips during engine cranking. In particular, the voltage can be sensed and determined whether it is greater than zero (eg. greater than six volts)and less than a high value (eg. eleven or twelve volts), and, if so, a low battery voltage transmission can be communicated to the monitoring station, and ultimately to the vehicle user when away from the vehicle. If vehicle is being serviced and battery is disconnected this will cause the battery voltage to be equal to zero, then the low battery voltage transmission will not be communicated to the monitoring station. Also to prevent additional alerts, this message is prevented from being transmitting again until user returns to the vehicle to disarm the system and/or turn on the ignition so that the unit sees a voltage above 13.volts indicating the vehicle has started using the owner's ignition key. Again false triggerings are reduced. This aspect is further understood with reference to the enclosed flowchart labeled "Alert E".

Yet another advantageous feature of some embodiments of invention relates to the ability to conserve electrical power. More particularly, when the vehicle is stopped and in the armed mode, the GPS receiver may be periodically operated to determine the vehicle position. If the vehicle position changes,

this is indicative that the vehicle is being moved or stolen. For example, the GPS receiver may be operated to generate new vehicle position information every 29 seconds. These relatively quick successive position determinations or readings are generally termed hot start. These are relatively less complicated that a cold start position determination which takes longer, since the cold start position determination requires greater time to acquire and receive data from multiple satellites, as will be appreciated by those skilled in the art.

Unfortunately, this relatively high repeated usage of the GPS receiver may cause unnecessary battery drain, especially when the vehicle is left armed and unattended by the user for an extended period. Accordingly, the power conserving feature of the invention permits the GPS receiver to be turned off when the vehicle is in the armed mode, and the GPS receiver is turned on only when needed. For example, a vehicle sensor, such as a shock sensor, motion sensor, ignition sensor, door sensor, or other sensor, or combinations thereof could be used to start the GPS receiver. This sensor could also be used to trigger an alarm if desired; however it need not be so used in all embodiments. The GPS receiver, once turned on, could operate in the normal periodic fashion as described above, or for a fixed period of time. The GPS receiver could also be turned off again after some predetermined time if no further sensor signal is received, or if the position fails to change on subsequent position readings or determinations.

Yet another feature of the invention relates to permitting more colorful audible alert messages to be generated for the user. The user can, in some

embodiments, access an internet site to type or enter the text for a message to be sent, such as to alert the user that his vehicle is being stolen. The audible message then communicated by a telephone call to the user is generated by a speech message synthesizer based upon the entered text. In accordance with this aspect of the invention, the user could type in phonetically spelled words or phrases, such as to create more colorful messages including slang terms, various accents, and/or to mimic various dialects, for example. The speech synthesizer would then generate the desired message customized for the user. Of course, the system could also permit the user to test or preview the pronunciation generated by the speech message synthesizer based on the entered text message prior to its adoption.

Yet another advantageous feature of the invention relates to interfacing with a factory-installed security system. In accordance with this aspect of the invention, the purpose is to detect when the factory security or alarm system is triggered so that the user can be notified when away from the vehicle using the capabilities of the tracking and security system described herein. The tracking system would include a voltage and/or current sensing circuit connected to detect repetitive battery spikes based upon an electrical item being turned on and off at the vehicle.

More particularly, with the with the GPS-2000 tracking system armed and the ignition key in the off condition, if the vehicle factory alarm becomes triggered, it causes the car horn and lights to flash and/or the horn to honk. Accordingly, the detector circuit can detect these indications as either dips in

the voltage or increases in current flow from the vehicle battery. If these electrical events are detected for a predetermined minimum time of about 30 seconds, for example, and not longer than a predetermined maximum time of about 63 seconds, for example, the GPS-2000 tracker will send the vehicle alarm activated message.

The circuitry for detecting a voltage dip, for example, is of a type commonly included in other conventional vehicle security systems for other purposes, such as detecting tampering, for example. This detection circuitry needs no further description herein.

As will be readily appreciated by those skilled in the art, the reason for the minimum and maximum times is to avoid false alarms. For example, a similar electrical condition can be generated as the car radiator fan cycles on and off after the engine is turned off. By waiting the predetermined minimum time of about 30 seconds, the tracker would not falsely determine this to be operation of the factory security system. Opening and closing of the car doors could also create a similar electrical system drain, but would be unlikely to extend for 30 seconds. Accordingly, the minimum time would also avoid a false alarm in this instance of opening and closing the vehicle doors.

The maximum predetermined time could be implemented to avoid flashing operation of the hazard lights, for example, from causing a false alarm. A typical factory alarm would flash the lights and/or honk the horn for about 60 seconds before stopping. Flashing of the hazard lights would likely be for more than about 63 seconds, for example. Accordingly, a

false alarm indication based on operation of the hazard lights would also be avoided by the invention.

As will also be appreciated by those skilled in the art, different values for the minimum and maximum times are contemplated by the invention. In addition, in some embodiments only one of the minimum or maximum times may be used.

Another aspect of the invention relates to a user's ability to cancel further sequential notifications. More particularly, in response to an alarm alert, sequential notifications are typically given by sequentially calling a series of telephone numbers. In accordance with this aspect of the invention, the user who receives the call, may cancel any further notifications. In other words, the user can be prompted by voice messages to make a certain keypad entry to thereby cancel further notifications if desired. This can avoid additional telephone or system usage charges, and also reduces the possible nuisance of unnecessary calls to other persons.

Stopping further notifications upon merely determining that the telephone has been answered may be ineffective, since oftentimes an answering machine may receive the call. Accordingly, it may be preferred to have the user actively cancel further notifications, in contrast to merely stopping further calls upon determining that the telephone call has been completed.

Another aspect of the invention relates to requesting GPS position information from a vehicle. If a command is sent downstream to the vehicle requesting that GPS information in turn be sent upstream from the vehicle, and the GPS information is not received within a predetermined time, such as about four minutes, then another command may be sent to the vehicle requesting

the GPS information. This may keep repeating until GPS information is received, for a predetermined number of tries, or until a user instructs stopping of the requests. This helps to ensure and confirm the activation and reception of GPS tracking coordinates from the vehicle.

Yet another aspect of the invention relates to reducing a frequency with which GPS information is sent from the vehicle. More particularly, the unit may be configured to activate GPS information transmission upstream every 2 minutes. To reduce system usage expense and power consumption at the vehicle, this rate of transmission of GPS information could be progressively decreased over time. For example, in one embodiment, upon activation the GPS location signals could be sent every 2 minutes during the first hour, then once an hour for the next 23 hours, after which only one signal would be sent per day.

Still another aspect of the invention relates to warning the user of an inoperable or malfunctioning GPS or cellular telephone section. More particularly, if the GPS or cellular telephone antenna wire is cut or the mounting position of either is changed causing the antenna to stop receiving the signal the user would not ordinarily know of this problem quickly. In accordance with one embodiment, if the ignition is turned on a predetermined number of times, such as about three, and each time ignition turns on if no GPS or no cell signal is received for a minimum time, such as about 15 to 30 minutes or longer, an audible warning beeper may be activated in the vehicle. This beeper may be sounded once ever 15-minutes. At anytime if the GPS or cell signal is received properly then the system re-sets automatically stopping the beeper sound.

As an example, if the ignition key is turned on and no GPS or no Cell signal is being received for 15-minutes, and the vehicle ignition stays on for 45-minutes and there is still no GPS or no cell signal, the unit counts one. Thereafter, if the ignition key is turned on and no GPS or no cell signal is being received for 15-minutes, and the vehicle ignition stays on for 60-minutes and there is still no GPS or no cell signal, a second count is determined. Thereafter, if the ignition is turned on and no GPS or no cell signal is received for 10-minutes, and the vehicle ignition stays on for only 10-minutes and there is still no GPS or no cell signal, no count is determined. Thereafter, if the ignition is turned on and no GPS or no cell signal is being received for 15-minutes, a third count is determined and the beeper is activated as described above. This beeping may continue every 15-minutes while the vehicle ignition stays on as long as the vehicle ignition stays on for 16-minutes and still no GPS or no Cell signal is being received. If thereafter, the ignition is turned on and no GPS or no cell signal is being received, the beeper beeps once and again beeps once every 15-minutes while vehicle ignition stays on. If in 10-minutes both GPS or cell signal is being received, the beeper system is turned off and the warning count is reset.

In examples, if the ignition key is turned on and no GPS or no cell signal is being received for only 5, 10 or 12 minutes (with the threshold set at 15 minutes), then no count is determined.

In certain circumstances, the GPS signal may fail, but the cell signal may still be working. Accordingly, it may be desirable to send an indication of the failure of the GPS signal to the central

monitoring station to thereby alert the user as described above. If the cell signal also failed, or if the cell signal failed by itself, in other embodiments a separate paging device would transmit the failure or loss of the cell signal information to the central monitoring station, to thereby alert the user.

Another aspect of the invention relates to having the capability to interface the tracker device with a siren and/or the vehicle horn. Typically the siren is locally connected to ground, such as in the engine compartment, and the output of the tracker unit would provide a positive supply voltage, eg. 12 volts, to drive the siren. Also typically, the vehicle horn is connected to the positive voltage supply, and pressing the horn switch connects the horn to the vehicle ground to thereby complete the circuit and sound the horn. In accordance with this aspect of the invention, the output drive of the tracker unit can be a single wire with pulses of alternating polarity.

More particularly, the output terminal or wire, eg. the gray wire as described above, supplies pulses of alternating polarity. For example, a first pulse can be at the positive supply voltage, and a second pulse can be at the vehicle ground. Each pulse can be about one-half to one second long. The pulses can alternate in a series and with a slight spacing between adjacent pulses. In other security type systems, an intervening relay may be provided to provide for dual polarity capability. However, the tracker unit desirably monitors activation of the horn wire to determine whether the factory or aftermarket security controller is sounding an alarm. The intervening relay would prevent such a determination. Accordingly, the circuitry for providing the

alternating polarity pulses of the invention provides the dual compatibility and also permits sensing of the horn activation as described above. Thus, the invention provides the dual compatibility with a single output wire or terminal, and requires no special installation.

Yet another aspect of the invention relates to power conservation and extending the protection period provided by the tracking device when the vehicle is not being used. The GPS receiver of the device may operate down to a supply voltage of about 3 volts, while the cellular radio portion may require a voltage of at least about 11 volts or 11.2 volts. The device will also typically include a back-up battery. The back-up battery may provide power when the vehicle battery is disconnected, such as by a would-be thief, or otherwise.

Typical vehicle security systems, for example, connect the back-up battery in parallel with the vehicle electrical system. Of course when the vehicle is operating, the vehicle battery and back-up battery are being charged by the alternator, which, in turn, is driven by the vehicle engine. When the vehicle is not used for a relatively long period of time, the voltage of both the back-up battery and the vehicle battery will gradually decay, such as based upon the receiver in the security system continuing to operate. Fortunately, however, the conventional vehicle security system may operate down to a voltage of about 6 volts. Accordingly, although the back-up battery voltage has decayed (along with the parallel connected vehicle battery), the relatively low operating voltage fo the security system is still

typically sufficient to permit proper operation for a relatively long period of time.

The tracking device in accordance with the invention will typically include the cellular radio portion which requires a relatively high 11 volts or so to continue to operate. The tracking unit, despite various other power conserving features discussed herein, will still draw current. Accordingly, the voltage of the vehicle battery will also decay over time as the user is away from the vehicle. In accordance with this aspect of the invention, the back-up battery, however, is not continuously connected in parallel with the vehicle battery. Instead, the back-up battery is connected in parallel when the ignition key is on, for example, which will provide for charging of the back-up battery. Initially, when the vehicle is turned off, and the system armed, the back-up battery is not connected. Rather, the vehicle battery alone supplies the device initially. The back-up battery thus remains fully charged as it is not being drained by the load of the tracking device.

In one embodiment, if sufficient time passes, then the voltage of the battery will decay below a predetermined value, such as about 11.5 or 11.2 volts, for example. At this point, the back-up battery will be connected to the tracking device, and the vehicle battery will be disconnected. These voltage sensing and switching functions can be readily implemented using conventional circuits in the tracking device as will be appreciated by those skilled in the art. Accordingly, the tracking device can continue to operate normally for an additional period and at a sufficiently high voltage to permit the cellular radio to operate. Of course, as will be appreciated by those

skilled in the art, this feature can be extended to other areas as well, especially where a vehicle device or circuit may require a relatively high operating voltage.

In other embodiments, if sufficient time passes, then the voltage of the battery will decay below a predetermined value, such as about 11.5 to 4-volts, for example. At this point, the back-up battery will stay disconnected from the tracking device, and the vehicle battery will stay connected. This allows the cellular radio to sleep at 11.5 volts and the GPS and other circuits to still operate from the vehicle battery to as low as 3-volts. Once an alert is detected from GPS or other circuits then the cellular radio is awakened and operates from the back-up battery, still at about 12-volts. These voltage sensing and switching functions can be readily implemented using conventional circuits in the tracking device as will be appreciated by those skilled in the art. Accordingly, the tracking device can continue to operate normally for alerts to be sent to the monitoring station for an additional period and at a sufficiently high voltage to permit the cellular radio to operate. Of course, as will be appreciated by those skilled in the art, this feature can be extended to other areas as well, especially where a vehicle device or circuit may require a relatively high operating voltage.

Yet another feature of the invention is directed to efficient use of a relatively small number of codes available to communicate with the tracking unit from the cellular network and central station. More particularly, a typical arrangement may provide eight basic codes and two "wildcard" codes. The two wildcard codes are reserved for future or other uses.

A particular tracking device will respond directly to any of the eight basic codes. For example, the doors could be locked or unlocked, a present location downloaded from the vehicle, etc.

In accordance with this feature of the invention, the tracking device may respond differently to the same code or command depending upon the state or condition of the tracking device. For example, if an alarm is triggered at the vehicle, it may be desired that the tracking device continue to send the alarm signal until confirmation is received that the central monitoring station has received the alarm signal. This confirmation can be sent using the same code as may provide another function if the device were not indicating an alarm. Any of a number of such tracking device conditions may trigger a different message to be interpreted from the received code. For example, if any of the above Alerts A-E were triggered, the receipt of a predetermined code, such as code eight, would confirm receipt of the alert by the central station, and this receipt of code eight would not cause the other response (no alarm triggered) in the tracking device. Of course this concept can be extended to other features as will be appreciated by those skilled in the art.

In accordance with another feature of the invention, the rate of sending the location or position data (or change in position data) from the vehicle may be varied to reduce system usage and thereby reduce expenses. More particularly, in one embodiment, the rate of sending may be based upon how long the vehicle has remained stationary. This time period may be selected by the user. For example, the selected time may be in the range of 15 minutes to six hours. If the

vehicle has been stationary for the selected time period, then the rate of transmission may be reduced. This reduces or eliminates the need to send home position data and send all the over 15-minute stops made that day. Otherwise, that is when the vehicle is moving, the device may send data at a faster rate. Of course, a system user would not likely be interested in quick updates, especially where the position information is not changing. Conversely, if the vehicle is being moved, it may be desirable to receive more frequent position updates.

Another variation of this transmission rate conservation feature, bases the rate of transmission on the vehicle position. For example, a reduced rate of transmission may be selected if the vehicle is in a predetermined area where the user has a lesser interest in quickly updated position information. The user may also have a reduced interest in an area that can be defined outside of a predetermined distance from a reference point.

Yet another variation of the vehicle position transmission rate conservation feature is based upon the vehicle's speed, such as the vehicle's average or maximum speed, for example. Accordingly, if the vehicle is traveling above a preset speed, the rate of transmission may be increased.

In accordance with another aspect of the invention, an alert may be generated based upon the vehicle detecting an acceleration beyond a predetermined level. The vehicle acceleration could readily be determined by a relatively inexpensive acceleration sensor as will be appreciated by those skilled in the art. The acceleration could also be calculated by speedometer information. Decelerations,

or negative accelerations, could also be used to trigger an alert. The acceleration generated alert could be used to reduce wear and tear on the vehicle or to discourage aggressive driving and especially Drag Racing . The acceleration alert need not be generated and sent immediately, but could be sent with position information, since a user may not need realtime notification of the acceleration limit being exceeded.

Yet another aspect of the invention is directed to ensuring that car owners will activate the monitoring service from the beginning and not wait months or years until the vehicle is stolen, for example, to then activation the system in an attempt to avoid monthly service charges. When power is initially connected to the device it will communicate with the cellular equipment. Unfortunately, it may be virtually impossible to sort out all of the communications traffic to determine when someone has obtained a vehicle with the unit, but has not fully registered or subscribed to the service. In accordance with this aspect of the invention, a driver annoyance may be triggered to encourage the driver or owner to register the unit and begin paying the monthly service fees. For example, an annoying chirp could be generated every ten minutes when the vehicle ignition is on. Alternately or additionally a visual annoyance could also be provided. The audio chirp could be readily provided by a small piezoelectric indicator carried by the device.

In accordance with another aspect of the invention, the tracking device may send the alert indication a predetermined number of times without receiving an acknowledgment as described above, and then wait until the vehicle position has changed before

trying again or the cell re-registers or its RSS (received signal strength) changes. Thus, power is conserved. When the vehicle has moved to a new position, any obstructions may no longer be present thereby increasing the likelihood of a successful communication. In addition, the change in position may be determined when the vehicle is sensed to be moving about a predetermined relatively small speed, such as greater than 1 mph, for example.

In all of the embodiments and variations described herein, the tracking device may communicate with one or more other vehicle devices via a vehicle data communications bus. Further aspects of interfacing with a vehicle data communications bus are described in U.S. Patent Nos. 5,719,551 and 6,011,460 assigned to the assignee of the present invention.

Yet another aspect of the invention relates to efficient use of available codes on the cellular telephone control channel. In one particular example, ten codes may be available to be transmitted from the monitoring station to the vehicle trackers. The first eight or nine codes are command codes that will cause a specific action by the tracking device at the vehicle. The other one or two codes may be wildcard codes as mentioned above, that may set a stand-by mode for one or a group of vehicles, for example.

It may be desirable to provide more than eight commands at the vehicle responsive to the corresponding eight available codes. For example, it may be desirable to set a feature on or off, or to set a different feature setting or threshold. In accordance with this aspect of the invention, the commands at the tracker are determined based upon a

series of different command codes being received within a predetermined time window.

For example, the monitoring station may send code 9 that switches the tracker in the car into a stand-by mode for a predetermined time and which causes the tracker to respond with an upstream confirmation code 7 or 9 indicating receiving code 9. During the predetermined time of the stand-by mode another code follows that causes a system programmable feature or setting to change. Note that the second code would otherwise cause a different function at the vehicle. Note that system might operate a function 9 if another code 1-9 is not received in the predetermined time. The following list is exemplary for features resulting from second codes 1-9:

(1) Code 1 -- Tracker will turn off feature of upstream code caused by vehicle alert being detected.

(2) Code 2 -- Tracker will turn on feature of upstream code caused by vehicle alert being detected.

(3) Code 3 -- Tracker deactivates cell receiver from operating due to a non-paying customer for monitoring service. That phone number can then be allocated to another customer.

(4) Code 4 -- Turn on audio buzzer feature that will sound once each 10 minutes. The monitoring station need only send the command to activate the feature, as the tracker will time the period and drive the buzzer thereafter. The monitoring station will normally not need to send this command because the tracker will be configured out of the box with this feature activated to sound the buzzer every 10 minutes until the next command is received.

(5) Code 5 -- Turn off the audio buzzer. This is to be sent by the monitoring station after a user has successfully activated his account.

(6) Code 6 -- Turn on the 80 mph speed limit reporting. This will normally not be sent as this feature will be the default setting of the tracker.

(7) Code 7 -- Turn off the 80 mph speed limit reporting.

(8) Code 8 -- Increase speed limit 5mph and increase the time 5 minutes.

(9) Code 9 -- Decrease speed limit 5 mph and decrease the time 5 minutes, and wait 5 minutes if another code number follows. It could operate this way to allow another set of codes to change more features.

In this example, in response to the tracker receiving the system code 1-9, the tracker sends an upstream code 7 to acknowledge receipt of the system code 1-9. Upon receipt of code 9 the tracker waits up to 5 minutes to determine if another system code is received. If no code is received, then the tracker performs the code 9 operation. Of course, in other embodiments other features or settings can be selected.

In general, it may be preferred that the first code sent in a series of two codes, for example, be a code that causes only a minor function to be performed at the vehicle. This so because if the second code is sent from the monitoring station, but not received at the tracker, only a minor function is performed. For example, the first code may switch between armed and disarmed modes. This is in contrast to using a remote engine starting code or engine shutdown code as the first code. The vehicle may be moving or positioned in a marginal reception area, and the second command may not be received by the tracker within the predetermined time window. As will be appreciated by those skilled in the art, this concept

of multiple digit codes, can be extended beyond two digits to three or more.

To further conserve cellular transmissions and as described above, the tracker may be set to record a position based upon a determined event. Only this recorded position information may be downloaded either by user request or at set times. It is desired that such events be relatively few, but that the information still be helpful to the user.

For example, an event for recording of position may be determined based upon the vehicle being stopped for greater than a first time and less than a second time. For example, the first time may be 15 minutes and the second time may be 6 hours. Determination of the vehicle being stopped can be made based upon one or both of the GPS position or the vehicle ignition being turned off. The second time prevents the recording of position information when the vehicle is stopped at the owner's home during the evening, for example. Accordingly, the important information of the vehicle stops being made is recorded and made available to the user, while system communications resources are conserved.

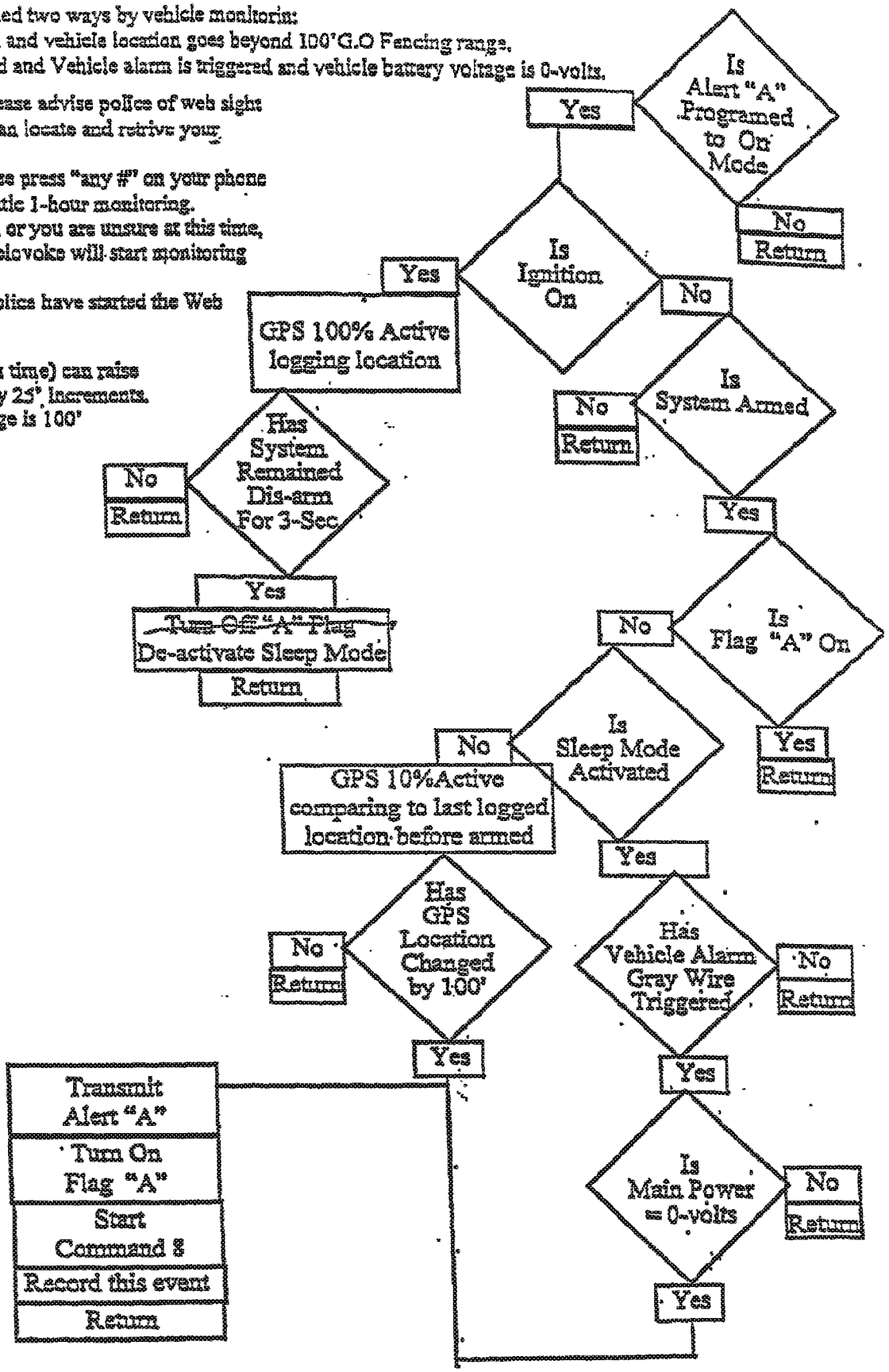
In another example, if the mode is selected to send the vehicles location every 10 min and the vehicle is in the same location for greater than a set time, then no more vehicle locations are sent until the vehicle location has changed to start the every 10 min reporting again.

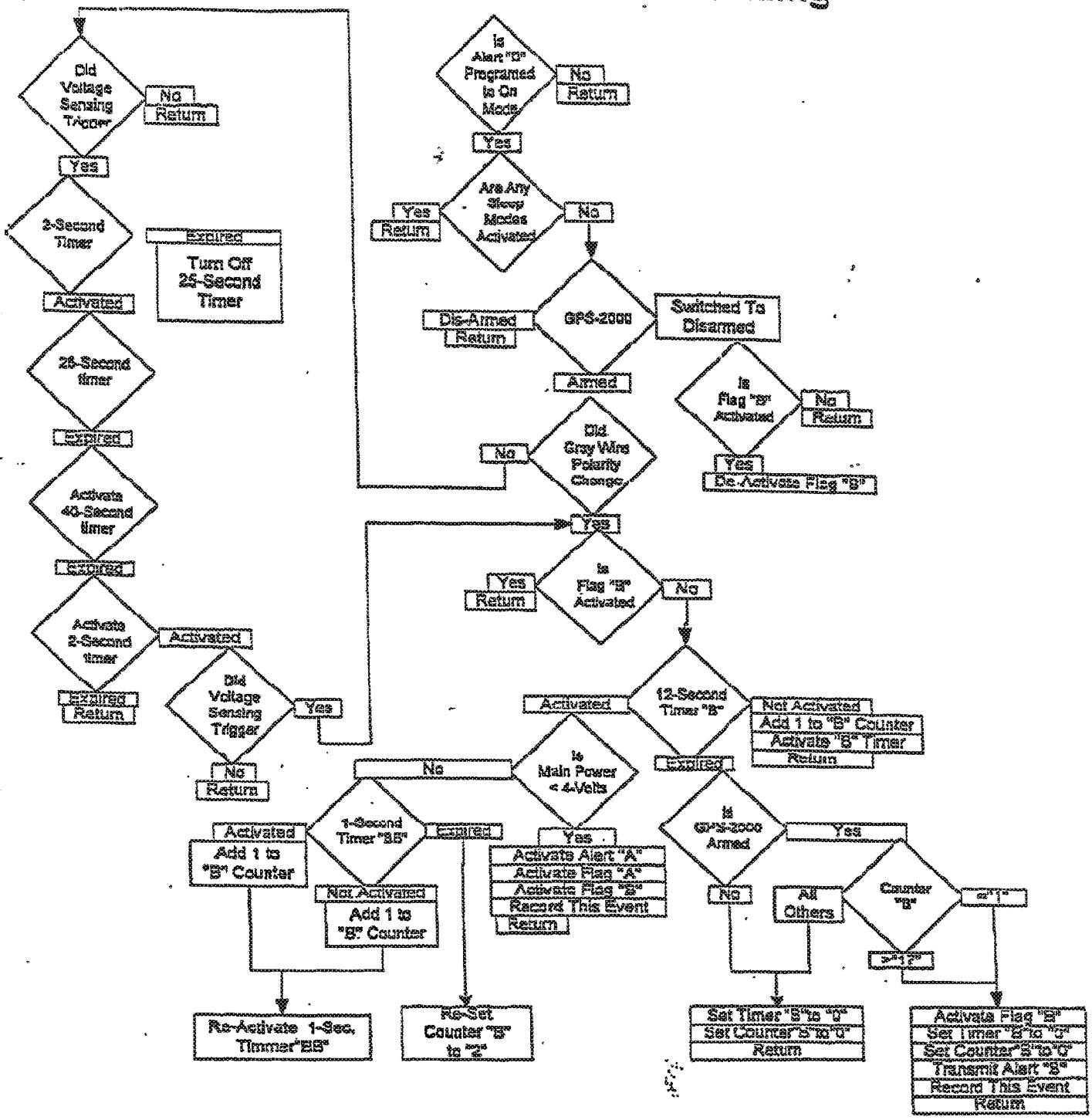
Alert "A" = Vehicle Stolen Alert

Vehicle stolen is determined two ways by vehicle monitorin:
1. Tracking system armed and vehicle location goes beyond 100'G.O Fencing range.
2. Tracking system Armed and Vehicle alarm is triggered and vehicle battery voltage is 0-volts.

Your vehicle is stolen, please advise police of web sight and your pin# so police can locate and retrive your vehicle.
If this is a false alert please press "any #" on your phone now to deactivate automatic 1-hour monitoring.
If vehicle has been stolen or you are unsure at this time, hang up an call police. Televoke will start monitoring for upto
1-hour vehicle or until police have started the Web monitoring.

Televoke (not user at this time) can raise or lower G.O.Fencing by 25' increments.
G.O Fencing default range is 100'





Your vehicle alarm activated is detected by counting the pularity changes within a set time.

One change = a siren was latched on for the set time of 12 seconds.

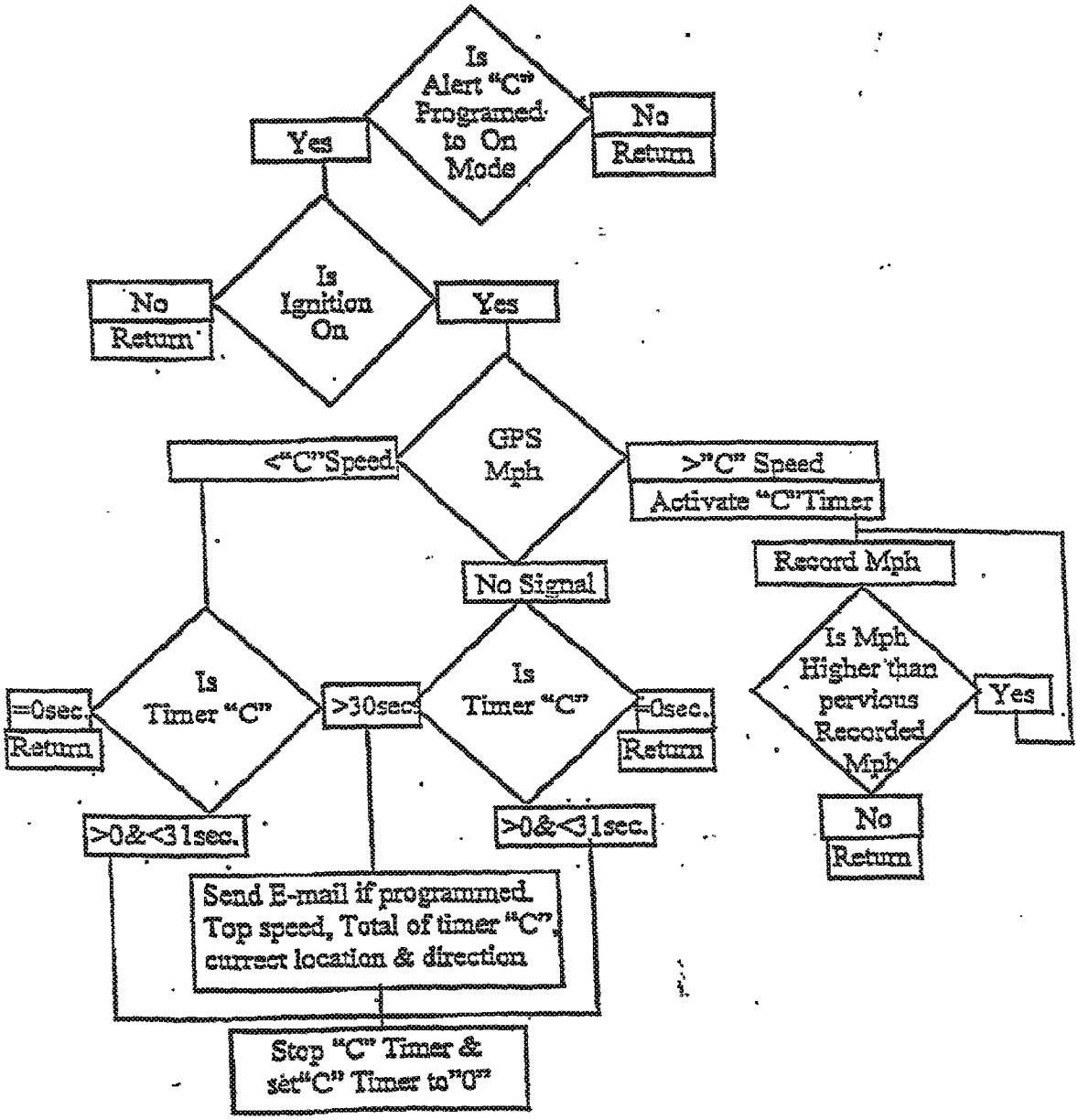
>17 changes = a car horn was pulsing on/off each time in less than one-second and after 12-seconds continues honking of 18 times = 9 horn hons no more than 1-second apart.

If the car batery power is removed during the 12-seconds then alert "A" is sent to inform the vehicle is being stolen.

One alert B is transmitted then GPS-200 will not send another alert till the GPS-2000 is disarmed and rearmed.

Alert "C" = Speeding Too Long Of Time

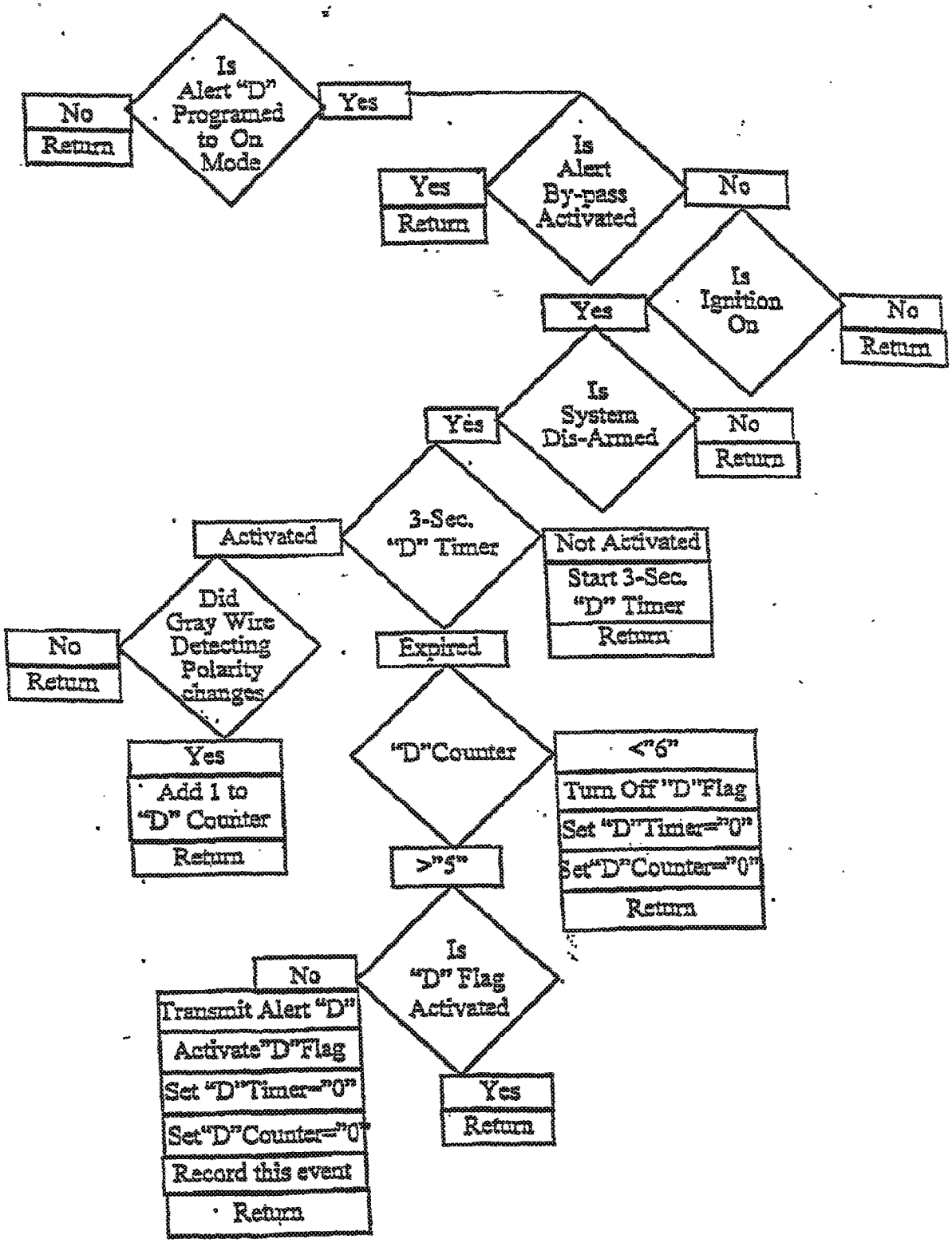
Vehicle was traveling faster than 80 m.p.h. for a longer time than 30 seconds. GPS indicates the speed.
If pre-programed to do so, records this as an event and will send e-mail instantly of Top speed, total time, direction and location speeding had stopped.
Alert "C" operation an be turned on or off by user
80 M.p.h. is default speed. Televoke (not user at this time) can raise or lower the speed by 5 m.p.h. increments.
30-seconds time is default. Televoke (not user at this time) can raise or lower the time by 5 minutes increments.



Alert "D" = Unauthorized Transmitter Alert

Your vehicle was programmed to operate from a new ignition key or remote transmitter. Please take proper action. This alert will not be sent again till the vehicles alert signal stops.

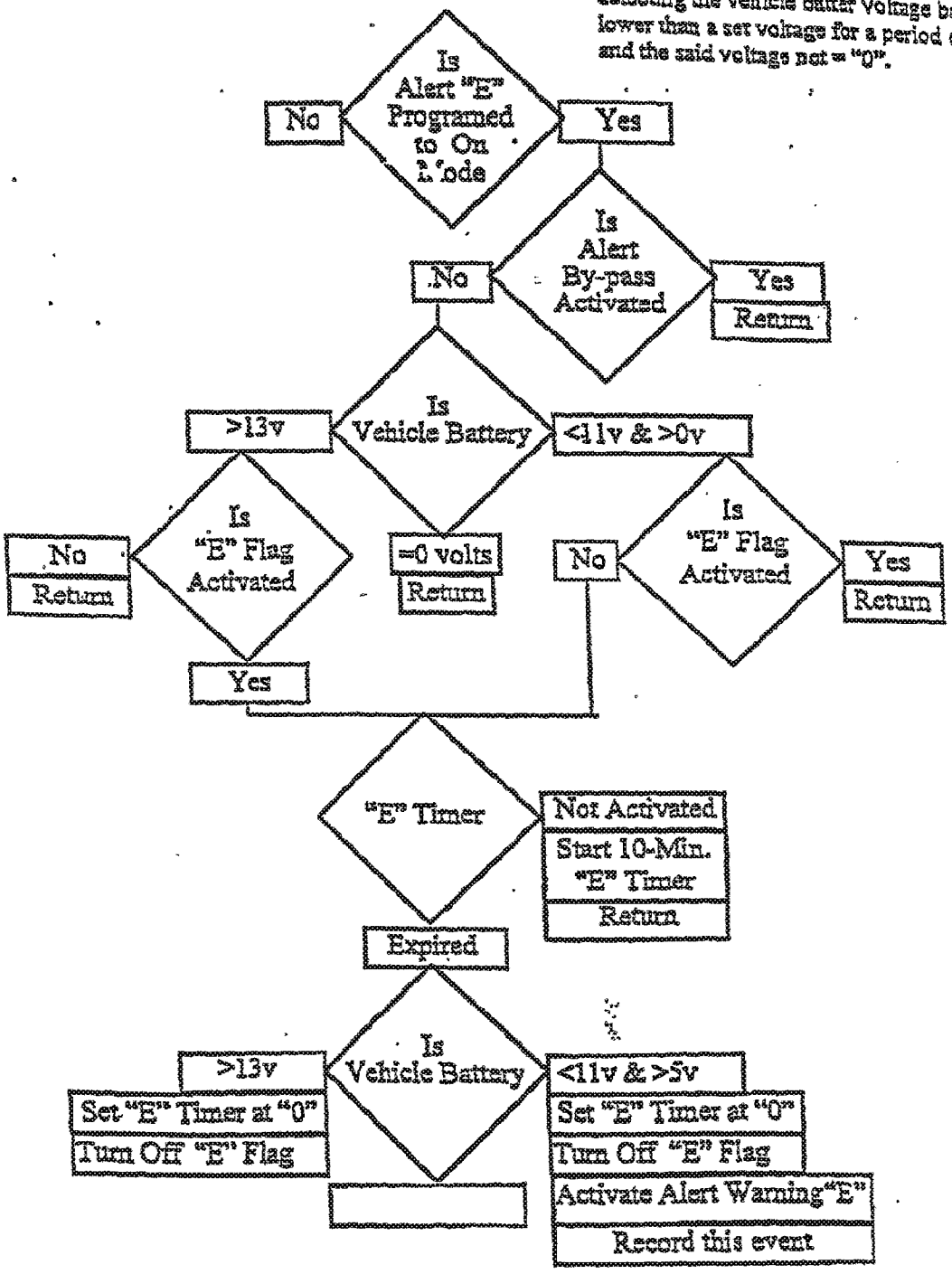
Unauthorized Transmitter Alert is activated when ignition key is turned on and detects a plurality of polarity changes on Gray wire within a set time. This Alert is prevented from activated again until said circuit returns to normal.



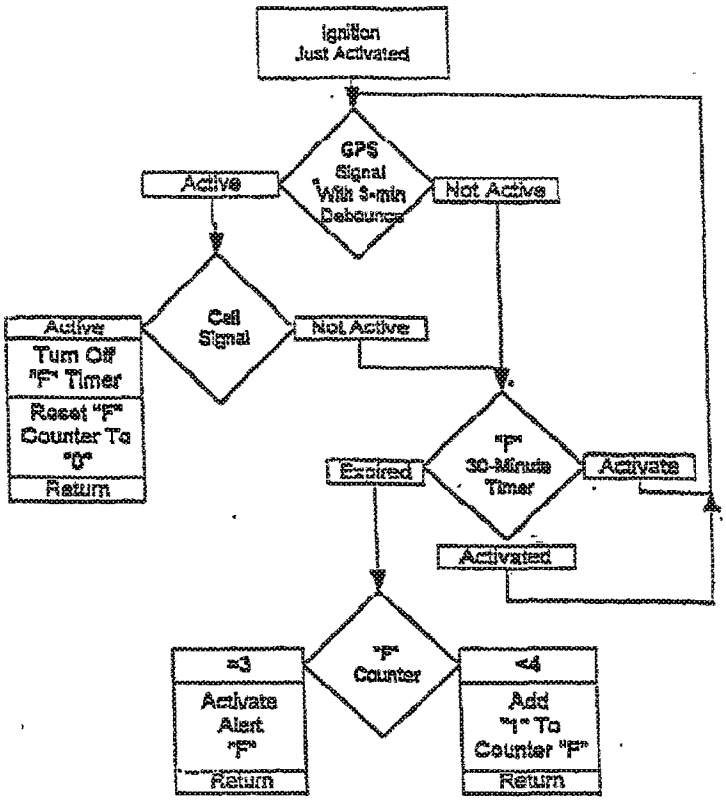
Alert "E" = Low Car Battery Power

Your vehicle has a low battery voltage indication. Please take proper action. This alert will not be sent again until your vehicles battery has retained the proper voltage.

Low battery power Alert is activated by detecting the vehicle batter voltage being lower than a set voltage for a period of time and the said voltage not = "0".



Alert "F" = GPS / Cell not active Alert



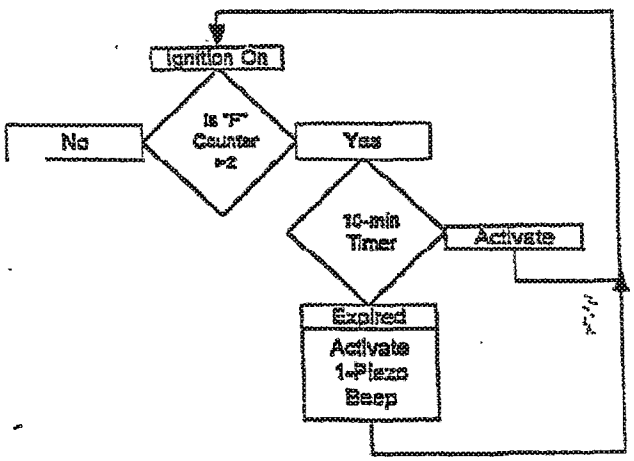


EXHIBIT E

12-27-00 A/Prov

PROVISIONAL APPLICATION COVER SHEET

This is a request for filing a PROVISIONAL APPLICATION under 37 CFR 1.53(b)(2)

Docket No.	58089	Type (+) --- [+]

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TITLE OF THE INVENTION (280 Characters Max)

VEHICLE TRACKING SYSTEM WITH THEFT NOTIFICATION

CORRESPONDENCE ADDRESS

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ENCLOSED APPLICATION PARTS *(check all that apply)*

✓	Specification	*Number of Pages*	35		✓	Applicant qualifies as a Small Entity under 35 CFR under §§1.19 and 1.27
✓	Drawing(s)	*Number of Sheets*	6			Other (specify) _____

METHOD OF PAYMENT

	A check or money order is enclosed to cover the Provisional Filing Fees		PROVISIONAL FILING FEE AMOUNT ($)	$75.00
✓	The Commissioner is hereby authorized to charge the Provisional Filing Fee and/or charge or credit any discrepancies in fee amounts to Deposit Account No.:	01-0484		

[ ] Additional inventors are being named on separately numbered sheets attached hereto.

The invention was made by an agency of the United States Government or under a contract with an agency of the United States Government.
[✓] No. [ ] Yes

Respectfully Submitted,

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