UNITED STATES PATENT AND TRADEMARK OFFICE

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

APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
90/013,587	09/14/2015	8032278	C13-03895

CONFIRMATION NO. 8867

POA ACCEPTANCE LETTER

27975
ADD+G - 27975
1135 East State Road 434, Suite 3001
Winter Springs, FL 32708

OC000000122674993

Date Mailed: 01/15/2021

NOTICE OF ACCEPTANCE OF POWER OF ATTORNEY

This is in response to the Power of Attorney filed 01/13/2021.

The Power of Attorney in this application is accepted. Correspondence in this application will be mailed to the above address as provided by 37 CFR 1.33.

Questions about the contents of this notice and the requirements it sets forth should be directed to the Office of Data Management, Application Assistance Unit, at **(571) 272-4000** or **(571) 272-4200** or **1-888-786-0101**.

/rbell/

Geotab Exhibit 1005
Geotab v. Omega

UNITED STATES PATENT AND TRADEMARK OFFICE

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

APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
90/013,587	09/14/2015	8032278	C13-03895

CONFIRMATION NO. 8867

POWER OF ATTORNEY NOTICE

23643
Barnes & Thornburg LLP (IN)
11 S. Meridian Street
Indianapolis, IN 46204

OC000000122674968

Date Mailed: 01/15/2021

NOTICE REGARDING CHANGE OF POWER OF ATTORNEY

This is in response to the Power of Attorney filed 01/13/2021.

- The Power of Attorney to you in this application has been revoked by the applicant. Future correspondence will be mailed to the new address of record(37 CFR 1.33).

Questions about the contents of this notice and the requirements it sets forth should be directed to the Office of Data Management, Application Assistance Unit, at **(571) 272-4000** or **(571) 272-4200** or **1-888-786-0101**.

/rbell/

UNITED STATES PATENT AND TRADEMARK OFFICE

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

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

AIA (First Inventor to File): YES

INVENTORS

8032278, Residence Not Provided;
OMEGA PATENTS, LLC, DOUGLASVILLE, GA;
SAMUEL P. RICHEY (3RD PTY REQ.), ANAHEIM, CA;

APPLICANTS

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 *********************

** SMALL ENTITY **

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

ADDRESS
27975

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) ❑ Other _____ ❑ Credit

PTO/AIA/82A (07-13)
Approved for use through 03/31/2021. OMB 0651-0035
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

TRANSMITTAL FOR POWER OF ATTORNEY TO ONE OR MORE REGISTERED PRACTITIONERS

NOTE: This form is to be submitted with the Power of Attorney by Applicant form (PTO/AIA/82B) to identify the application to which the Power of Attorney is directed, in accordance with 37 CFR 1.5, unless the application number and filing date are identified in the Power of Attorney by Applicant form. If neither form PTO/AIA/82A nor form PTO/AIA82B identifies the application to which the Power of Attorney is directed, the Power of Attorney will not be recognized in the application.

Application Number	90/013,587
Filing Date	September 14, 2015
First Named Inventor	
Title	Vehicle Tracking Unit with Downloadable Codes and Associated Methods
Art Unit	3993
Examiner Name	GRAHAM, MATTHEW C.
Attorney Docket Number	C13-03895/324719

SIGNATURE of Applicant or Patent Practitioner

Signature	/GLEN M. KELLETT/	Date (Optional)	2020-12-09
Name	GLEN M. KELLETT	Registration Number	60202
Title (if Applicant is a juristic entity)	Attorney of Record		
Applicant Name (if Applicant is a juristic entity)			

NOTE: This form must be signed in accordance with 37 CFR 1.33. See 37 CFR 1.4(d) for signature requirements and certifications. If more than one applicant, use multiple forms.

☑ *Total of 1 forms are submitted.

This collection of information is required by 37 CFR 1.131, 1.32, and 1.33. 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 1.11 and 1.14. This collection is estimated to take 3 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: 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.

Doc Code: PA..
Document Description: Power of Attorney

PTO/AIA/82B (07-13)
Approved for use through 03/31/2021. OMB 0651-0035
U.S. Patent and Trademark Office: U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number

POWER OF ATTORNEY BY APPLICANT

I hereby revoke all previous powers of attorney given in the application identified in either the attached transmittal letter or the boxes below.

Application Number	Filing Date

(Note: The boxes above may be left blank if information is provided on form PTO/AIA/82A.)

☑ I hereby appoint the Patent Practitioner(s) associated with the following Customer Number as my/our attorney(s) or agent(s), and to transact all business in the United States Patent and Trademark Office connected therewith for the application referenced in the attached transmittal letter (form PTO/AIA/82A) or identified above: 23643

OR

☐ I hereby appoint Practitioner(s) named in the attached list (form PTO/AIA/82C) as my/our attorney(s) or agent(s), and to transact all business in the United States Patent and Trademark Office connected therewith for the patent application referenced in the attached transmittal letter (form PTO/AIA/82A) or identified above. (Note: Complete form PTO/AIA/82C.)

Please recognize or change the correspondence address for the application identified in the attached transmittal letter or the boxes above to:

☑ The address associated with the above-mentioned Customer Number

OR

☐ The address associated with Customer Number:

OR

☐ Firm or Individual Name					
Address					
City		State		Zip	
Country					
Telephone		Email			

I am the Applicant (if the Applicant is a juristic entity, list the Applicant name in the box):

CALAMP CORP.

☐ Inventor or Joint Inventor (title not required below)

☐ Legal Representative of a Deceased or Legally Incapacitated Inventor (title not required below)

☑ Assignee or Person to Whom the Inventor is Under an Obligation to Assign (provide signer's title if applicant is a juristic entity)

☐ Person Who Otherwise Shows Sufficient Proprietary Interest (e.g., a petition under 37 CFR 1.46(b)(2) was granted in the application or is concurrently being filed with this document) (provide signer's title if applicant is a juristic entity)

SIGNATURE of Applicant for Patent

The undersigned (whose title is supplied below) is authorized to act on behalf of the applicant (e.g., where the applicant is a juristic entity).

Signature		Date (Optional)	
Name	Stephen M. Moran, Esq.		
Title	Senior Vice President, General Counsel & Secretary		

NOTE: Signature - This form must be signed by the applicant in accordance with 37 CFR 1.33. See 37 CFR 1.4 for signature requirements and certifications. If more than one applicant, use multiple forms.

☑ Total of 1 forms are submitted.

This collection of information is required by 37 CFR 1.131, 1.32, and 1.33. 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 1.11 and 1.14. This collection is estimated to take 3 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: 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.

Electronic Acknowledgement Receipt

EFS ID:	41342946
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:	Glen Madison Kellett/Stacy Tebo
Filer Authorized By:	Glen Madison Kellett
Attorney Docket Number:	C13-03895
Receipt Date:	09-DEC-2020
Filing Date:	14-SEP-2015
Time Stamp:	20:05:09
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	Power of Attorney	324719_POA.pdf	733957 d69b42682ac901ca026d06320b109a7889d5c72c	no	2
Warnings:					
Information:					
		Total Files Size (in bytes):	733957		

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.

US008032278C1

(12) EX PARTE REEXAMINATION CERTIFICATE (11018th)

United States Patent
Flick

(10) Number: US 8,032,278 C1
(45) Certificate Issued: Dec. 28, 2016

(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)

Reexamination Request:
No. 90/013,587, Sep. 14, 2015

Reexamination Certificate for:

Patent No.:	**8,032,278**
Issued:	**Oct. 4, 2011**
Appl. No.:	**11/773,272**
Filed:	**Jul. 3, 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)
B60R 25/04	(2013.01)
G07C 5/00	(2006.01)
B60R 25/102	(2013.01)
B60R 25/104	(2013.01)
G08G 1/00	(2006.01)
B60R 25/045	(2013.01)
G08G 1/127	(2006.01)
B60R 25/33	(2013.01)

(52) **U.S. Cl.**
CPC ***B60R 25/04*** (2013.01); ***B60R 25/045*** (2013.01); ***B60R 25/102*** (2013.01); ***B60R 25/104*** (2013.01); ***B60R 25/33*** (2013.01); ***G07C 5/008*** (2013.01); ***G08G 1/127*** (2013.01); ***G08G 1/20*** (2013.01); ***G08G 1/205*** (2013.01); *B60R 2325/202* (2013.01); *B60R 2325/205* (2013.01); *B60W 2550/402* (2013.01)

(58) **Field of Classification Search**
CPC B60R 25/04
See application file for complete search history.

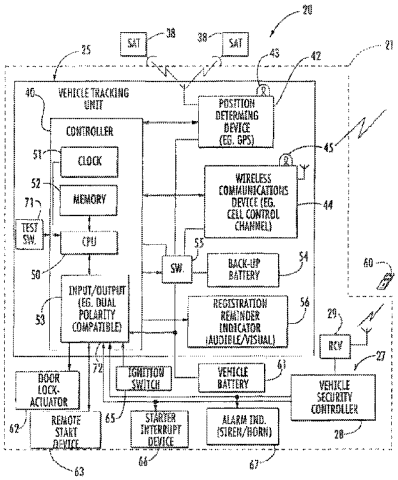
(56) **References Cited**

To view the complete listing of prior art documents cited during the proceedings for Reexamination Control Numbers 90/013,587, please refer to the USPTO's public Patent Application Information Retrieval (PAIR) system under the Display References tab.

Primary Examiner — Matthew C Graham

(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.



EX PARTE REEXAMINATION CERTIFICATE

NO AMENDMENTS HAVE BEEN MADE TO THE PATENT

AS A RESULT OF REEXAMINATION, IT HAS BEEN DETERMINED THAT:

The patentability of claims **1-22** is confirmed.

* * * * *

UNITED STATES PATENT AND TRADEMARK OFFICE

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

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

7590 12/01/2016

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

EXAMINER
GRAHAM, MATTHEW C

ART UNIT	PAPER NUMBER
3993	

MAIL DATE	DELIVERY MODE
12/01/2016	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.

UNITED STATES PATENT AND TRADEMARK OFFICE

Commissioner for Patents
United States Patent and Trademark Office
P.O. Box 1450
Alexandria, VA 22313-1450
www.uspto.gov

DO NOT USE IN PALM PRINTER

(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)).

Notice of Intent to Issue Ex Parte Reexamination Certificate	Control No.	Patent Under Reexamination	
	90/013,587	8032278	
	Examiner	Art Unit	AIA (First Inventor to File) Status
	MATTHEW C. GRAHAM	3993	No

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

1. ☒ Prosecution on the merits is (or remains) closed in this *ex parte* reexamination proceeding. This proceeding is subject to reopening at the initiative of the Office or upon petition. *Cf.* 37 CFR 1.313(a). A Certificate will be issued in view of
   (a) ☒ Patent owner's communication(s) filed: *7/6/2016*.
   (b) ☐ Patent owner's failure to file an appropriate timely response to the Office action mailed: _____.
   (c) ☐ Patent owner's failure to timely file an Appeal Brief (37 CFR 41.31).
   (d) ☐ The decision on appeal by the ☐ Board of Patent Appeals and Interferences ☐ Court dated _____
   (e) ☐ Other: _____.
2. The Reexamination Certificate will indicate the following:
   (a) Change in the Specification: ☐ Yes ☒ No
   (b) Change in the Drawing(s): ☐ Yes ☒ No
   (c) Status of the Claim(s):
      (1) Patent claim(s) confirmed: *1-22*.
      (2) Patent claim(s) amended (including dependent on amended claim(s)): _____
      (3) Patent claim(s) canceled: _____.
      (4) Newly presented claim(s) patentable: _____.
      (5) Newly presented canceled claims: _____.
      (6) Patent claim(s) ☐ previously ☐ currently disclaimed: _____
      (7) Patent claim(s) not subject to reexamination: _____.
3. ☐ A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on _____.
4. ☒ Note the attached statement of reasons for patentability and/or confirmation. Any comments considered necessary by patent owner regarding reasons for patentability and/or confirmation must be submitted promptly to avoid processing delays. Such submission(s) should be labeled: "Comments On Statement of Reasons for Patentability and/or Confirmation."
5. ☐ Note attached NOTICE OF REFERENCES CITED (PTO-892).
6. ☐ Note attached LIST OF REFERENCES CITED (PTO/SB/08 or PTO/SB/08 substitute).
7. ☐ The drawing correction request filed on _____ is: ☐ approved ☐ disapproved.
8. ☐ Acknowledgment is made of the priority claim under 35 U.S.C. § 119(a)-(d) or (f).
   a)☐ All b)☐ Some* c)☐ None of the certified copies have
   ☐ been received.
   ☐ not been received.
   ☐ been filed in Application No. _____.
   ☐ been filed in reexamination Control No. _____.
   ☐ been received by the International Bureau in PCT Application No. _____.

   * Certified copies not received: _____.
9. ☐ Note attached Examiner's Amendment.
10. ☐ Note attached Interview Summary (PTO-474).
11. ☐ Other: _____.

All correspondence relating to this reexamination proceeding should be directed to the **Central Reexamination Unit** at the mail, FAX, or hand-carry addresses given at the end of this Office action.

cc: Requester (if third party requester)

NIRC

STATEMENT OF REASONS FOR PATENTABILITY AND/OR CONFIRMATION

1. The following is an examiner's statement of reasons for patentability and/or confirmation of the claims found patentable in this reexamination proceeding: the Examiner agrees that the declarations by Suman and McAlexander provide sufficient evidence that Suman and Spaur each fail to disclose the multi-vehicle compatible controller as recited in independent claims 1, 13 and 18. Claims 2-12, 14-17 and 19-22 are considered to be patentable due to their dependency on claims 1, 13 and 18, respectively.

Any comments considered necessary by PATENT OWNER regarding the above statement must be submitted promptly to avoid processing delays. Such submission by the patent owner should be labeled: "Comments on Statement of Reasons for Patentability and/or Confirmation" and will be placed in the reexamination file.

2. 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
3993
(571) 272-7116

Conferees: /GAS/
/PCE/

Index of Claims	Application/Control No.	Applicant(s)/Patent Under Reexamination
	90013587	8032278
	Examiner	Art Unit
	MATTHEW C GRAHAM	3993

✓	Rejected	-	Cancelled	N	Non-Elected	A	Appeal
=	Allowed	÷	Restricted	I	Interference	O	Objected

☒ Claims renumbered in the same order as presented by applicant ☐ CPA ☐ T.D. ☐ R.1.47

CLAIM		DATE								
Final	Original	11/22/2016								
	1	=								
	2	=								
	3	=								
	4	=								
	5	=								
	6	=								
	7	=								
	8	=								
	9	=								
	10	=								
	11	=								
	12	=								
	13	=								
	14	=								
	15	=								
	16	=								
	17	=								
	18	=								
	19	=								
	20	=								
	21	=								
	22	=								

Issue Classification	Application/Control No.	Applicant(s)/Patent Under Reexamination
	90013587	8032278
	Examiner	**Art Unit**
	MATTHEW C GRAHAM	3993

CPC						
Symbol					**Type**	**Version**
B60R		25	/	04	F	2013-01-01
G07C		5	/	008	I	2013-01-01
B60R		25	/	102	I	2013-01-01
B60R		25	/	104	I	2013-01-01
G08G		1	/	20	I	2013-01-01
B60R		2325	/	202	A	2013-01-01
B60W		2550	/	402	A	2013-01-01
B60R		25	/	045	I	2013-01-01
G08G		1	/	205	I	2013-01-01
G08G		1	/	127	I	2013-01-01
B60R		25	/	33	I	2013-01-01
B60R		2325	/	205	A	2013-01-01
			/			
			/			
			/			

CPC Combination Sets							
Symbol					**Type**	**Set**	**Ranking**	**Version**
			/					
			/					

NONE		Total Claims Allowed:	
(Assistant Examiner)	(Date)	22	
/MATTHEW C GRAHAM/ Primary Examiner.Art Unit 3993	11/22/2016	O.G. Print Claim(s)	O.G. Print Figure
(Primary Examiner)	(Date)	1	2

Issue Classification	Application/Control No.	Applicant(s)/Patent Under Reexamination
	90013587	8032278
	Examiner	Art Unit
	MATTHEW C GRAHAM	3993

US ORIGINAL CLASSIFICATION						INTERNATIONAL CLASSIFICATION										
CLASS			SUBCLASS			CLAIMED						NON-CLAIMED				
701			36			G	0	1	C	21 / 00 (2006.0)						
CROSS REFERENCE(S)																
CLASS	SUBCLASS (ONE SUBCLASS PER BLOCK)															
382	104															
455	575.9															
701	29.3	29.6														

NONE		Total Claims Allowed:	
(Assistant Examiner)	(Date)	22	
/MATTHEW C GRAHAM/ Primary Examiner.Art Unit 3993	11/22/2016	O.G. Print Claim(s)	O.G. Print Figure
(Primary Examiner)	(Date)	1	2

Issue Classification	Application/Control No.	Applicant(s)/Patent Under Reexamination
	90013587	8032278
	Examiner	**Art Unit**
	MATTHEW C GRAHAM	3993

☒ **Claims renumbered in the same order as presented by applicant** ☐ **CPA** ☐ **T.D.** ☐ **R.1.47**

Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original

NONE (Assistant Examiner)	(Date)	**Total Claims Allowed:** 22	
/MATTHEW C GRAHAM/ Primary Examiner.Art Unit 3993 (Primary Examiner)	11/22/2016 (Date)	O.G. Print Claim(s) 1	O.G. Print Figure 2

Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	90013587	8032278
	Examiner	Art Unit
	MATTHEW C GRAHAM	3993

CPC- SEARCHED		
Symbol	Date	Examiner
B60R 25/04	5/6/2016	MCG

CPC COMBINATION SETS - SEARCHED		
Symbol	Date	Examiner

US CLASSIFICATION SEARCHED			
Class	Subclass	Date	Examiner

SEARCH NOTES		
Search Notes	Date	Examiner
see EAST Search history of 5/6/2016	11/22/2016	mcg

INTERFERENCE SEARCH			
US Class/ CPC Symbol	US Subclass / CPC Group	Date	Examiner
NONE		11/22/2016	MCG

Reexamination	Application/Control No. 90013587	Applicant(s)/Patent Under Reexamination 8032278
	Certificate Date	Certificate Number C1

Requester Correspondence Address:	☐ Patent Owner	☒ Third Party

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

LITIGATION REVIEW ☒	mcg (examiner initials)	11/22/2016 (date)
Case Name		Director Initials
none		

COPENDING OFFICE PROCEEDINGS	
TYPE OF PROCEEDING	NUMBER

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**

INTERVIEW SUMMARY FOR IN-PERSON INTERVIEW OF JUNE 16, 2016

EFILE
Commissioner for Patents

The Patent Owner thanks the U.S. Patent and Trademark Office and the Examiners for extending all courtesies to the Patent Owner's Representatives during the in-person interview of June 16, 2016.

During the in-person interview, Examiner Matthew C. Graham, Examiner Gay A. Spahn, and Examiner Peter C. English were present on behalf of the U.S. Patent and Trademark Office, and Attorney Christopher F. Regan (Reg. No. 34,906), Attorney Jack G. Abid (Reg. No. 58,237), and Mr. Joseph C. McAlexander, III, a technical consultant, were present on behalf of the Patent Owner.

The Patent Owner discussed the attached agenda with the Examiners. In particular, the Patent Owner discussed the

background of the invention, and the problems addressed by the claimed invention.

While discussing Suman et al., the Patent Owner contended that Suman et al. failed to disclose: "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", as recited in independent Claim 1, for example.

In reply, the Examiners cited Col. 2, lines 3-11 of Suman et al. as teaching the "multi-vehicle compatible controller" of the claimed invention. The Patent Owner contended that this was a mischaracterization of the teachings of Suman et al. The Examiner's invited the Patent Owner to submit evidence supporting this contention.

The Patent Owner also contended that Suman et al. fails to disclose: "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", as recited by independent Claim 1, for example.

The Examiners noted that Col. 24, lines 8-13 of the present application recite: "[t]he 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". The Examiners also correctly noted that Suman et al. fails to disclose the

downloading interface for permitting downloading of *vehicle device codes*.

While discussing Spaur et al., the Patent Owner contended that Spaur et al. failed to disclose: "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", as recited in independent Claim 1, for example.

In reply, the Examiners contended similarly that since Spaur et al. discusses potential application in different vehicles, therefore Spaur et al. discloses the multi-vehicle compatible controller of the claims. The Patent Owner contended that this was a mischaracterization of the teachings of Spaur et al. The Examiner's invited the Patent Owner to submit evidence supporting this contention. The Examiners also correctly noted that Spaur et al. fails to disclose the downloading interface for permitting downloading of *vehicle device codes*.

Additionally, while discussing Spaur et al., the Patent Owner noted that Spaur et al. discloses a vehicle position determining device. Accordingly, for purposes of clarity, the Patent Owner agreed to also discuss the Spaur et al. patent with regards to its failure to anticipate the claimed invention.

The Examiners determined that the rejection over Beckert et al. was withdrawn.

Respectfully submitted,

JACK GEORGE ABID
Reg. No. 58,237
Allen, Dyer, Doppelt, Milbrath
& Gilchrist, P.A.
255 S. Orange Avenue, Suite 1401
Post Office Box 3791
Orlando, Florida 32802
407-841-2330
407-841-2343 fax
Attorney for the Patent Owner

In re Patent of
Kenneth E. FLICK
Reexamination Control No. **90/013,587**
Filed: **SEPTEMBER 14, 2015**
_____/

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 July 6, 2016, a complete copy of this Amendment 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,

JACK GEORGE ABID
Reg. No. 58,237
Allen, Dyer, Doppelt, Milbrath
& Gilchrist, P.A.
255 S. Orange Avenue, Suite 1401
Post Office Box 3791
Orlando, Florida 32802
407-841-2330
407-841-2343 fax
Attorney for Patent Owner

REEXAMINATION 90/013,587 (8,032,278)
Interview Outline (June 16, 2016)

I. Participants

Examiners:
(1) Matthew Graham
(2)
(3)

Patent Owner Attendees:
Chris Regan (34,906)
Jack Abid (58,237)
Joseph McAlexander (P.E./President/CEO of McAlexander Sound; expert witness in Omega v. Calamp)

II. Background

Patent Owner:
Omega Patents LLC – Ken Flick
150+ patents
Omega Research & Development sold to Audiovox

Omega v. Calamp Litigation:
Filed – 12/20/13
Originally scheduled trial date: 11/2/15 **(Reexamination filed 9/14/15)**
Actual trial date: 2/16/16 to 2/24/16
Verdict: all asserted claims valid, infringed, secondary considerations found

Calamp's Litigation Expert:
Admitted in depo no anticipation theory for '278 patent
Report specifically considered: Spaur '074; Suman '537; Johnson '254

III. The '278 Patent

'278 Patent Background:

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. (Col. 2, lines 17-37)

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. (Col. 2, lines 38-41).

'278 Patent Detailed Description:

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. (Col. 23, lines 59-67).

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. (Col. 22, lines 3-7).

From '551:

> The security system 10 further preferably comprises desired signal enabling means 17 for enabling the alarm controller 10 to operate using a desired set of signals for a desired vehicle from among a plurality of possible sets of signals for different vehicles. As would be readily understood by those skilled in the art, the term different vehicles may include vehicles from different manufacturers, different models, or even different trim levels of the same make and model. (Col. 6, lines 33-43).

'278 Patent Claim 1:

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.

IV. Anticipation Rejection over Suman:

Suman provides:

Preferably, the vehicle electrical control system for performing the above functions is that described above and shown in FIGS. 3 or 5. An alternative vehicle electrical control system 730, is shown in FIGS. 44 and 45, and include, as shown in FIG. 44, a microcontroller 735 such as a Motorola MC68HC05, which receives demodulated signals from the receiver 724 shown enclosed within dotted lines in FIG. 44 via a data bus 727. The receiver 724 may be the receiving portion of the two-way pager module described above or the receiving portion of cellular transceiver 70 (FIG. 5), but may alternatively be a typical duo-conversion receiver having first and second local oscillators 721 and 723, appropriate bandpass filters and amplifiers, and a demodulator circuit 725 which provides digital data output on a data bus 727 to an input of microcontroller 735. 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 J1850 and is universally used in the automotive industry.** (Col. 36, line 53 to col. 37, line 17).

SAE foreword provides:

> This SAE Recommended Practice constitutes the requirements for a vehicle data communications network. These requirements are related to the lowest two layers of the ISO Open System Interconnect (OSI) model (see ISO 7498). These layers are the Data Link Layer and the Physical Layer.

Requestor's trial expert, despite having considered Suman per his report, was unable to present an anticipation argument.

No multi-vehicle compatible controller and no downloading interface.

V. Obviousness Rejection over Spaur in view of Johnson:

Spaur provides:

Generally, the CAN124 is definable as being comprised of an object layer and a transfer layer that constitute a CAN control unit 122, and a physical layer. The object layer is responsible for message filtering, and message and status handling. The transfer layer is responsible for confinement of faults, error detection and signaling, message validation, acknowledgements, bus contention, arbitration among information, message framing and transfer rate and timing. The physical layer is the transmission medium itself as well as the signal level and bit representations that are transmitted along the transmission medium. The transmission medium is essentially a

multi-conductor bus 126 that has electrical conductors electrically connected to each of the vehicle devices 50 that are on the CAN 124. In operatively connecting the CAN bus 126 to each vehicle device 50a-50n, each of these vehicle devices is operatively associated with a CAN interface. In one embodiment, each of the CAN interfaces is connected in "daisy-chain" fashion as part of the bus 126 configuration. 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. (Col. 10, lines 37-64).

Johnson adds nothing to the deficiencies of Spaur.

Although having considered both Spaur and Johnson per his expert report, Requestor's trial expert did not fashion a rejection based on this combination.

No multi-vehicle compatible controller and no downloading interface.

VI. Obviousness Rejection over Spaur in view of Song:

Same deficiencies as Spaur and Johnson combination.

No multi-vehicle compatible controller and no downloading interface.

VII. Anticipation Rejection over Beckert et al. :

Cited Beckert et al. provides:

In FIG. 2, the support module 62 is also connected to a universal serial bus (USB) hub 70 via a multi-bit connector 72 (e.g., 8 bits). The USB hub 70 provides connections to many peripheral devices (e.g., 128 devices). Example peripheral devices include the OBD (On Board Diagnostic) system 28, the security system 26, navigation system 74, a wireless link 76 to the Internet, a CD-ROM changer 78, a TV tuner 80, and user I/O devices such as a joystick, keyboard or a mouse 82. This USB hub could be separate as shown in FIG. 2 or it could be integrated into one or more of the USB peripherals.

Incorporated by reference Beckert et al. '164 provides:

An OBD (On Board Diagnostic) interpreter 116 is provided in the computer module to communicate with the OBD system built into the vehicle by the manufacturer. The OBD interpreter 116 interprets the status data received and provides performance related information from the vehicle's OBD system to the microprocessor 100. Also, commands can be provided to the interpreter which allows non-critical car systems to be controlled.

No multi-vehicle compatible controller and no downloading interface.

Electronic Acknowledgement Receipt

EFS ID:	26272354
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:	06-JUL-2016
Filing Date:	14-SEP-2015
Time Stamp:	16:35:24
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 Miscellaneous Incoming Letter	0058106CIP1_REX_Interview_Summary.pdf	781539 98572e3369505236a382e5ead806f83ad11d69f5	no	9

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:

Total Files Size (in bytes):	781539

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

RULE 132 DECLARATION
BY JOSEPH C. McALEXANDER, III

I, the undersigned, hereby declare that:

Background

1. I am the Founder and President of McAlexander Sound, formerly IP Director of CCI and VP of EPI Technologies, Inc., and have 43 years of experience in microcircuit and semiconductor technologies, including: device design, fabrication, assembly, testing, and marketing, and control system design, analysis, quality, reliability, and defect/failure analysis at Texas Instruments.

2. I am Registered Professional Engineer (#79454) in the State of Texas and hold a Bachelor of Science degree in Electrical Engineering from North Carolina State University.

3. I am an inventor on 31 U.S. patents and a number of foreign patents, and I am familiar with the patent process.

4. I have been an expert witness and technical consultant for the past 26 years in IP matters related to product/process analysis and investigation.

5. I prepared expert reports and provided trial testimony in the case of Omega Patents, LLC (the '278 Patent Owner) v. Calamp Corp. (the Requester) that recently concluded in the Middle District of Florida. In that Calamp litigation the '278 patent was asserted and determined by the jury to be not invalid, to be infringed by Calamp, and 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.

6. I have been retained by the Patent Owner to provide technical consultation in the present reexamination of the '278 patent, particularly with respect to addressing rejections based upon U.S. Patent No. 5,732,074 to Spaur et al.

The '278 Patent

7. I have extensively reviewed the '278 patent, along with its file history, and arguments advanced by Requester's trial expert, Mr. Andrews, as part of my work on behalf of the Patent Owner during the course of the Calamp

litigation. I also reviewed the materials again for the analysis provided herein.

8. I have reviewed the Official Action dated May 6, 2016 for the reexamination of the '278 patent.

9. I have reviewed Exhibits 14 and 15 from the expert report of Requester's trial expert, Mr. Andrews, (attached hereto for the convenience of the Examiner) that were asserted to describe the actual CellPort Labs products of the Spaur et al. patent.

10. I have also reviewed the Rule 132 Declaration being submitted concurrently herewith by Michael J. Suman, the lead inventor on U.S. Patent No. 6,028,537, i.e., another reference being cited in the Official Action. In that Declaration, Mr. Suman confirms my understanding that at the time of the Spaur et al. patent (filed about six months before the filing of the provisional application leading to the Suman et al. patent), the vehicle device codes were proprietary to different manufacturers, and even different model lines offered by manufacturers; and that the device codes were not made freely available, and were quite difficult to obtain.

11. I understand that the '278 patent includes three independent claims and twenty-two claims total. Representative Claim 1 is directed to a multi-vehicle compatible tracking unit for a vehicle comprising a vehicle data bus extending throughout

the vehicle. The multi-vehicle compatible tracking unit includes 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 communicates over the vehicle data bus 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 is 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.

12. I understand that the specification of the '278 patent at column 24, lines 8-12, provides that "[t]he 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."

13. I further understand that independent Claim 13 of the '278 patent recites that the downloading interface includes a connector for temporary connection to a downloading device, and that independent Claim 18 recites that the downloading interface includes a wireless receiver for temporary connection to a downloading device.

Analysis of Spaur et al.

14. I attended the in-person interview kindly granted to Patent Owner's legal representatives and me on June 16, 2016, during which the Spaur et al. reference, among other things, was discussed.

15. I understand that during the in-person interview, Patent Owner's legal representatives clarified to the Examiners that Spaur et al. discloses sending position data from a GPS receiver via the cellular phone (col. 14, lines 4-25). In other words, the addition of Johnson et al. with Spaur et al. was not needed in view of the contentions with respect to Spaur et al., since Johnson et al. was cited only for its teaching of a GPS receiver sending position information. Accordingly, I have limited my analysis to the teachings of Spaur et al.

16. As noted in the Ex Parte Reexamination Interview Summary dated 6/21/16, the Examiners helpfully suggested that Patent Owner "provide evidence relating to the use of device codes in vehicles at the time of the invention in relation to their inherent use in Suman and Spaur."

17. I understand that, to rely upon the theory of inherency, the examiner must provide a basis in fact and/or technical reasoning to reasonably support the determination that the allegedly inherent characteristic necessarily flows from the teachings of the applied prior art.

18. I confirm and reproduce below the portion of my analysis relating to Spaur et al. and the '278 patent from my expert report in the Calamp litigation:

> Spaur is directed to enhancing communication between a remote site and vehicle, especially involving information transfer and storage, including data and control, using standard communication protocol and hardware network features. Specifically, Spaur contemplates communication with a vehicle via modem (72/76, 82) from a browser terminal via the internet to a cellular based vehicle network (82). A protocol controller and converter (3) translates the information transferred and communicates that information via a Controller Area Network (CAN) interface via the CN bus to the different vehicle devices. The flow of communication is bi-directional.
>
> Mr. Andrews [Calamp's trial expert] argues that Spaur discloses a multi-vehicle compatible controller. I disagree. The CAN controller described in Spaur does not specify, in fact is silent, that it communicates with a vehicle device "using at least one corresponding vehicle device code from among a plurality thereof for different vehicles," as required by independent claims 1 and 13. Further, Spaur fails to specify that it has a download interface for "downloading of enabling data… for use by said multi-vehicle compatible controller," also required by both independent claims 1 and 13. Spaur fails to disclose device codes.

19. The Official Action incorporates by reference a listing of how Spaur et al. (and Johnson et al.) relates to the claims of the '278 patent from Requester's Exhibit F. From Exhibit F, the following sections of Spaur et al. are asserted

as disclosing a multi-vehicle controller using at least one corresponding 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 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, 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. (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. (Col. 10, lines 55-64.

Based upon my knowledge, experience and analysis, I do not believe that these cited portions of Spaur et al. disclose the multi-vehicle compatible controller as in the claims of the '278 patent. In addition, I also believe that, based upon these portions of Spaur et al., or any other portions of Spaur et al., there is no inherent teaching of the multi-vehicle compatible controller as in the '278 patent claims. In other words, it does not necessarily flow that Spaur et al. would have a multi-vehicle compatible controller using the device codes as in the '278 patent claims.

20. I also point out that Exhibits 14 and 15 from Requester's technical trial expert, Mr. Andrews, and describing the actual CellPort Labs products as disclosed in Spaur et al.,

also fail to have any express or inherent teaching of the multi-vehicle compatible controller as in the '278 patent claims. Indeed, Mr. Andrews cited the CellPort Labs products disclosed in Exhibits 14 and 15 for the teaching of a common housing as follows:

> 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 [Spaur et al.] patent is assigned to Cell-Port). (Andrews' Expert Report, page 181).

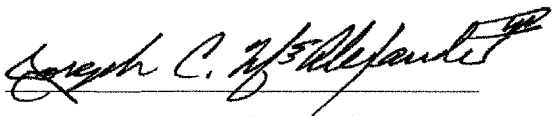
21. The Official Action also cites to the following language from col. 4, lines 38-45 of Spaur et al. for the alleged teaching of the downloading interface as recited in the '278 patent claims:

> 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.

Again, based upon my knowledge, experience and analysis, I do not believe that these cited portions of Spaur et al., or any other portions of Spaur et al., disclose (either directly or through inherency) 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 as found in the claims of the '278 patent. Spaur et al. does disclose an interface in combination with a controller; however, Spaur et al. fails to disclose the multi-vehicle compatible controller and the downloading interface as recited in the claims of the '278 patent. In addition, there is nothing in the description of the corresponding CellPort Labs actual products (Exhibits 14 and 15) that discloses the multi-vehicle compatible controller and the downloading interface as recited in the claims of the '278 patent.

22. I hereby declare further that all statements made herein are of our own knowledge and are true, and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code, and that such willful and false statements may jeopardize the validity of the application or any patent issued thereon.



Joseph C. McAlexander, III

July 6, 2016
Date

EXHIBIT 14

MOBILEWEB™
CHANGING THE FACE OF MOBILE NETWORKING THROUGH UNIVERSAL WIRELESS CONNECTIVITY

Pat Kennedy
CellPort Labs, Inc.
885 Arapahoe Avenue
Boulder, CO 80303

The world is going wireless. The U.S. alone claims over 32 million of the world's 100+ million cellular and Personal Cellular Service (PCS) subscribers. The annual global growth rate still exceeds 35 percent. And 80 percent of users worldwide rely on handheld, pocket-sized phones.

The Internet's World Wide Web connectivity phenomenon is happening even faster. Enabled by CERN HTTP server development in 1991 and the NCSA Mosaic web browser 1992, the ease of establishing Home Pages and utilizing the "Net" has lured everyone from business professionals to home users to investigate its wares. It now boasts 20 million users in the U.S., exponential growth and increasingly innovative new application offerings.

Internet and World Wide Web application development tools and standards simplify networking opportunities. This opens avenues for new business and personal applications. CellPort Labs extends this ever-expanding networking paradigm by combining the power of the Internet and World Wide Web with the flexibility of wireless connectivity, changing the face of mobile networking.

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.

This vehicular connectivity is unprecedented in its power and potential. It solves the problem of cost-effective, bidirectional wireless data connectivity. As an integrated mobile server it offers complete Internet/Web functionality. Supporting ongoing browser Plug-In innovations such as Java™, MobileWeb embraces the Internet/Web's dynamic environment.

The MobileWeb looks and functions like any other TCP/IP and HTTP-based Internet/Web site. Using standardized applications development tools, it enables unprecedented mobile networking capability by reducing development complexity. Requirements for customized application development are more easily accommodated, lowering economic barriers and opening mobile networking opportunities to businesses and consumers.

ISBN# 0-7803-3277-6

Affordable applications will touch every mobile industry. One-to-one networking or broadcast capability from vehicle to Internet/Web or vice versa can simplify business and operating procedures. Whether providing real-time, ambulance/emergency room connectivity, routing and redirecting delivery services or simply sending vehicle status information, MobileWeb revolutionizes mobile networking.

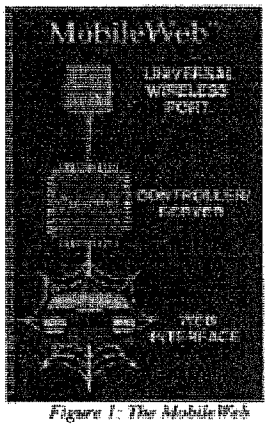


Figure 1: The MobileWeb

Vehicular Data Communications

Many businesses provide some or all of their daily services and transactions from mobile platforms. Incorporating these vehicles into an expanding data networking world previously required extensive custom software application and hardware development. Correspondingly high price tags eliminated all but the largest companies, placing potential applications out of reach for the majority of business and public service organizations.

The World Wide Web has become an applications enabler. Its development tools hide TCP/IP networking complexities, offering simplified communications with HTTP and HTML formatting. This has forged an industry unto itself and will transform the way businesses communicate and transact. Until now, the component missing from this communications revolution was the ability to effectively combine wireless communications with mobile networking.

CellPort Labs, recognizing the need for vehicle-based, mobile data networking, understood the simplicity and precedent-setting significance of the World Wide Web. The company incorporated internal vehicular communications, wireless and data connectivity, and Internet/Web networking, creating MobileWeb technology. The data networking and Internet paradigm is enhanced, enabling a heretofore impossible range of mobile applications.

Web-On-Wheels

Running on the CellPort Controller/Server, MobileWeb functions like any Internet/Web site. Its two-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.

For example, remote clients can access the vehicle's "pages" or, equipped with special client applications, download data to the vehicle. Similarly, MobileWeb can run stored or downloaded programs, combining vehicular data with Internet-accessed, environmental or geographic information. These "on-the-fly" applications further extend the intelligent networking opportunities.

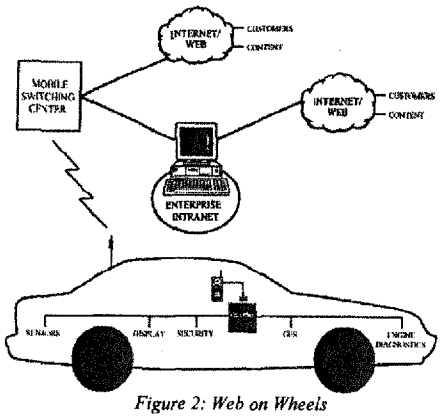


Figure 2: Web on Wheels

The CellPort Controller/Server is an Internet Protocol (IP) addressable node within the Internet's TCP/IP network of networks. Because Internet addresses define physical nodes rather than geographic locations, the server's "mobility" is virtually transparent.

As long as it is connected to the Internet "cloud", MobileWeb can be accessed transparently (like any other Internet/Web server) regardless of location. The MobileWeb server can store and dispense real-time data, varying or correlated, with its geographic location and physical status.

MobileWeb pages contain information gathered from the vehicle's internal data network "vehicular 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 air bag controllers, door locks, Global Positioning System (GPS) equipment, ignition controls, LCD displays, medical equipment and temperature sensors/equipment.

MobileWeb communicates with embedded vehicular or Plug-In devices through the Controller function of the CellPort Controller/Server, collecting data or sending commands. Although they appear to, remote Web clients cannot access these devices directly. This is accomplished by pages that present device interfaces and intranet with the vehicle devices using CGI-Bin.

Architecture

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.

MobileWeb is dependent upon - but independent of - specific wireless technology. It requires a wireless connection in order to provide a link to the Internet cloud. But by incorporating CellPort Labs' Universal Wireless Port, it enables any cellular, PCS or wireless handheld device to interface with the vehicle. This universal interfacing capability provides significant cost and application benefits over other available proprietary, non-universal or embedded mobile wireless solutions.

In the Client/Server architecture, the VLAN connects various internal or peripheral electronic devices using a standard automotive LAN protocol. Most manufacturers incorporate internal LANs into new vehicles, but thus far applications and uses have been limited by vehicle-specific control problems.

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, but are actually communicating through the CellPort Controller/Server.

CDPD packet data is particularly well-suited to MobileWeb 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.

Wireless communication to the Internet is handled through the Server function of the CellPort Controller/Server. It has a standard twelve-digit IP address and incorporates the complete TCP/IP protocol stack, controlling the sending, receiving and proper routing of Internet data packets. As an addressable Internet node, the server provides the required intelligence and messaging for advanced networking and application opportunities.

The Server stores applications in RAM or ROM, and can incorporate flash memory or PCMCIA storage for dynamic additions or changes. Not requiring disk drives, the Server relies on its processing and memory power to parse application data. But its software architecture places no limits on functionality, offering a complete Internet Web server package.

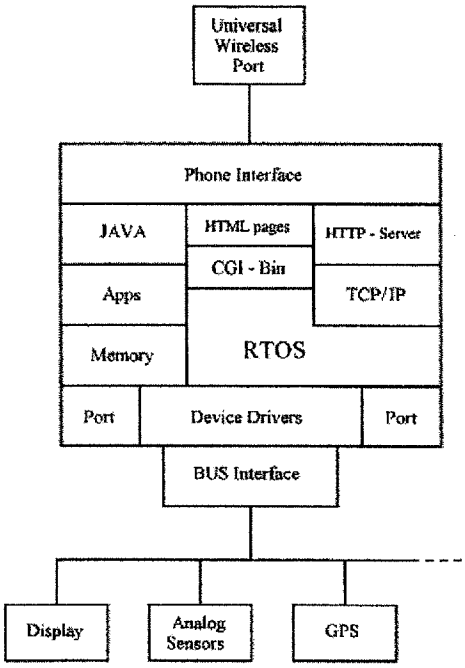


Figure 3: Controller/Server internal architecture

CellPort Server capability includes complete support for ongoing Internet/Web browser Plug-In developments, including Java applets, RealAudio™ and others. Plug-Ins extend Web capabilities to other dimensions by adding interactivity, sound and other features. The wealth of Web developer talent addressing Plug-Ins will keep the Internet/Web a dynamic environment. CellPort's complete Plug-In support extends this evolving capability to the mobile environment.

Applications

Extending World Wide Web connectivity to mobile vehicles expands the concept of an Internet server. It eliminates its tethered connection and opens up a host of new application development.

Vertical applications will dominate near-term development. Using CellPort development kits, businesses can conceptualize, create and implement wireless connectivity solutions in a fraction of the time required for typical customized developments. The range of mobile Internet uses is limited only by application developers' imaginations.

Delivery services become two-way active nodes on a data communications network. Internet-savvy customers can request a service pick-up or monitor delivery status by accessing the Web. Interacting directly with the system provides instant service gratification, eliminating the aggravation of customer service systems.

Within the vehicle, GPS systems can continuously monitor positions, communicate with the CellPort Controller/Server and post or send data through the Web. Dispatchers can monitor vehicle locations and re-route nearby vehicles to incorporate additional pickups and eliminate secondary dispatches.

Other vehicle data tracking examples include: monitoring temperature sensors for damaging deviations in environmental conditions; checking engine or component performance data to anticipate breakdowns/failures; and notifying dock personnel of approaching vehicles for quicker loading or unloading.

One of MobileWeb's compelling application capabilities lies in a vehicle's ability communicate bidirectionally through the Internet to any connected client or server worldwide. By bringing in a MobileWeb-equipped vehicle, oil companies could monitor instruments in remote land or sea locations without having to invest in proprietary systems.

A whole host of telemedicine and emergency-care applications are also possible. Ambulances can connect and send patient data ahead to hospital emergency rooms. Remote specialists and experts can access the same MobileWeb provided pages, resulting in enhanced medical diagnostics. Connecting mobile-care units with stationary-care facilities or other remote locations provides a diagnostic and treatment link not previously possible.

Embedded server applications can analyze data, warn of trouble ahead and provide alternate directions. Vehicle-based interactions can incorporate readily available voice recognition, touch screen displays and text-to-speech technologies, addressing driver interference concerns.

Consumers can also use CellPort Labs' vehicle-based technologies to access a host of horizontal market applications, including restaurant information and reviews, travel or route guidance, automated vehicle maintenance reporting or emergency vehicle dispatch.

Extending the Internet

MobileWeb takes advantage of the Internet/Web's development simplicity, adding additional functionality by enabling mobile server environments. Devices talk to a standard API and therefore require less custom software development, resulting in lower applications costs.

With MobileWeb, incorporating wireless connectivity requires less specialized developer expertise. Working with data services like CDPD, the Server/Controller and Universal Wireless Port keep the connection transparent.

Developers do not need to know or understand protocols for communicating with engine controllers, air bag sensors or GPS devices. The CellPort Controller/Server handles it all. Extensive applications can be written more quickly and cost-effectively.

Customized wireless applications do exist. Many rely on private wireless networking capability and proprietary software developments, which require specialized programming expertise. Depending on the scale of the application, development can cost anywhere from several hundred thousand to millions of dollars in infrastructure and software. These systems require ongoing maintenance, updates and changes, which necessitate additional customized development and added expense.

Because of the cost, vehicle-based wireless data connectivity applications were limited to large organizations, with corresponding budgets. Small users, such as 50-truck delivery fleets, could not cost justify the prohibitive development and ongoing expenses.

In contrast, the Internet/Web relies on open systems and standards. It uses TCP/IP for data-packet routing and control. HTTP is the transmission protocol describing what to do with messages. HTML handles "page formatting." As an open standard, anyone can develop Internet applications if they incorporate and conform to the published protocols.

Available Internet/Web application development tools incorporate standard Internet protocols. Developers need not worry about TCP/IP connections and data networking. These high-level tools sit "above" the Internet's embedded protocols, reducing much of the application development to simple HTML formatting. By slashing development costs from 30% to 80%, this offers a significant implementation savings.

In contrast to proprietary and embedded single-solution wireless architectures, CellPort Labs' open architectural solution borrows the s successful formula of winning technologies in the '90s. Open systems and standards continually result in the most robust, innovative, flexible and cost-effective solutions.

CellPort Labs MobileWeb enables an unlimited number of mobile-market application opportunities. Its ties to the Internet and World Wide Web lower the economic barriers of mobile connectivity solutions, eliminates the need for complex proprietary developments and makes it available to all.

EXHIBIT 15

)1.htm Go DEC JAN FEB Close
1996 1997 1998 Help

MSC-9710 On-Line Brochure

- Introduction
  - Developer's Kit
  - MobileWeb: The Mobile Server/Controller
  - Unlimited Application Potential
  - CellPort's MobileWeb
- Software
  - C/P Connect
  - Core Features
  - Using the Developer's Kit
  - Developer's Kit Requirements
- Hardware
  - Design Concepts
  - Hardware Implementation
  - Developer's Kit Block Diagram
  - Front and Back Panel Illustrations
  - Product Photos
- Purchasing a MSC-9710 and Software Development Kit
- How to obtain a MobileWeb
- Back to the CellPort Labs Homepage

Introduction

Developer's Kit

The CellPort Labs MSC-9710 MobileWeb Developer's Kit is a hardware/software platform designed to facilitate the efficient development of wireless data solutions based upon CellPort Labs' universal wireless connectivity and mobile networking technologies. The Kit provides:

- Hardware development platform
- Software development tools
- Developer's environment

MobileWeb: The Mobile Server/Controller

CellPort Labs' MobileWeb combines universal wireles 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.

This advancement is made possible through a combination of internal vehicular communications; wireless, voice and data connectivity, and Internet/Web networking, all handled by MobileWeb. Utilizing an embedded server/controller based on a

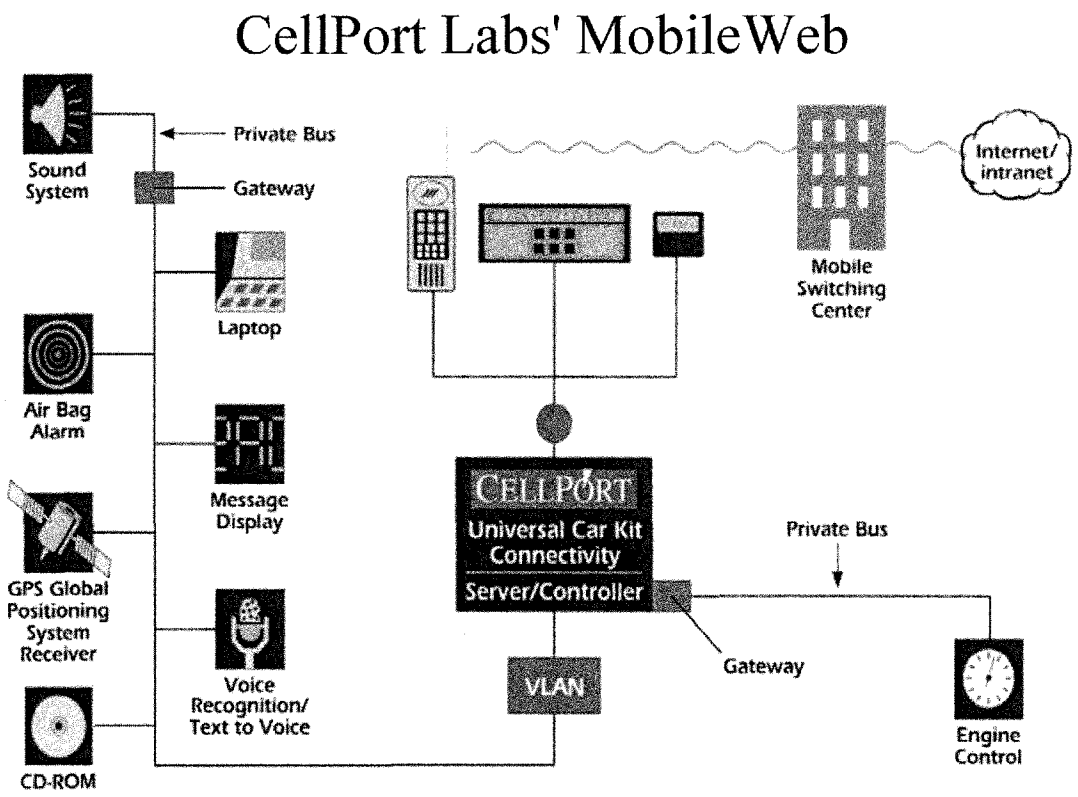
powerful pre-emptive multi-tasking operating system, MobileWeb links cellular, satellite, or PCS phones, independent of brand or airlink standard used, to the vehicle's multiple digital electronic devices. A variety of vehicular local area networks (VLANs) allows for bi-directional data communications between the vehicle and any public or private network.

Most importantly, by using TCP/IP and HTTP protocols, both standard Internet/Web protocols, MobileWeb drastically cuts application development time and costs, and opens a host of new mobile networking opportunities and applications. And since most business and government intranets take advantage of these same protocols, MobileWeb can add capabilities to their existing infrastructures, offering a viable way to enhance intranet functionality and efficiency without requiring large investments in hardware and applications development.

Unlimited Application Potential

Using the developer's kit, organizations can explore MobileWeb's unlimited application potential and create cost-effective prototypes. The kit provides multiple bus and multiple PC card interfaces to enhance development opportunities.

In addition to the many vehicular applications utilizing Internet connectivity and bidirectional data transmission, a wealth of portable applications requiring remote data acquisition and control are also possible, such as environmental monitoring, industrial processes and control, vending machine monitoring and agricultural applications.



- Airlink and Communication Device Independent
- Internet and Intranet Capable
- Bus Neutral
- Embedded or Non-Embedded Device Independent

Back to the top

Software

C/P Connect

C/P Connect is CellPort Labs' MobileWeb server/controller operating system. C/P Connect contains a set of core software features which come with the system. It can also be extended ot specific applications by programming the system using the CellPort Labs MSC-9710 MobileWeb Developer's Kit. The MSC-9710 is constantly undergoing performance enhancements and improvements.

Core Features

- C/P Connect is a real-time, multi-tasking, embedded operating system.
- For full connectivity to the Internet, a TCP/IP networking stack is provided.
- Supports CDPD cellular phones/modems and other wireless devices in connecting to the Internet. UDP is also available
- Supports the SLIP and PPP link layer services for connectivity to different Internet providers.
- Contains a HTTP 1.0 compatible Web Server including support for HTML FORMS for user input and server side include functions for specialized output processing.
- A FTP server is provided to download/upload new web pages and applications.
- A FTL file system is implemented in Flash memory for easy access to HTML web pages and for extension of the system.
- Supports PCMCIA flash memory cards.
- Different levels of security denies unauthorized access to system configuration and other sensitive pages.
- System management and configuration is accomplished through user-friendly FORMS based web pages.
- System management and configuration can be either accomplished through the Internet or via a directly attached laptop computer.
- A laptop computer can access the Internet via MobileWeb's universal wireless connectivity.
- Updates of the system software can easily be accomplished by uploading the new software and reprogramming the flash memory.

Using the Developer's Kit

The developer's kit is designed to allow easy customization. Developers can easily add new applications which are accessed through the Internet via web browsers. These applications might contain:

- New web pages.
- New server functions to process FORMS and server side include functions.
- New application tasks which monitor devices attached to MobileWeb.
- New device drivers.

In order to facilitate quick development of customer applications, CellPort Labs provides several libraries:

- APIs which help create new web-based applications.
- Common run time C functions (such as sprintf, memcpy, and strcpy).
- Pre-packaged serial device drivers and Controller Area Network device drivers.
- Card and Socket services are provided for development of PCMCIA drivers.

Development of new web pages can be done through one of the many commercially available web development tools, or with an ordinary text editor. Application development uses the commonly avalilable MicroSoft Visual C++ compiler.

Newly developed code is easily uploaded to MobileWeb through a directly connected serial line.

Developer's Kit Requirements

There are three levels of developers for the C/P connect software. Each level requires more technical sophistication and development tools. All levels require the following:

- C/P Connect from CellPort Labs.
- MicroSoft Visual C++ Professional (Version 4 or higher).
- A PC capable of running Windows 95 (a Pentium/100 or better is recommended).
- A web browser (such as Navigatior or Explorer).
- A connection from the development PC to MobileWeb.

The three levels of developers and their specific requirements are:

Web Page Developer
This is the developer who wants to create web pages. This developer needs to be well-versed in HTML, CGI, and URI.
Application Developer
This is the developer who wants to communicate with a locally attached device, and control the device, or display the status of the device, through web pages. The locally attached device is attached via a CellPort Labs supplied driver (serial or CAN). This developer should be a systems programmer comfortable in programming multi-tasking systems in the C programming language. In addition to the tools listed above, this developer would need:

- Debugging version of C/P Connect.
- SoftScope debugger from Concurrent Sciences.
- MASM Assembler from MicroSoft.

Driver Developer
In addition to the applications, this developer wants to interface to a specialized PCMCIA card, CAN or ARCNET device. This developer should be a system programmer comfortable in programming systems in C, as well as in assembly language. In addition, the driver developer should have some background working with hardware devices, and should be familiar with PCMCIA hardware/software structure. The following development tools are helpful(in addition to the Application Developer's tools):

- promICE in-circuit ROM emulator (optional).
- C/P Connect Driver Developers Guide and libraries.

Back to the top

Hardware

Design Concepts

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. It has six serial ports and two PCMCIA slots for connection to a wide variety of devices, both vehicular and wireless. There are also native CAN and ARCNET interfaces for device-specific connections. It is powered by unconditioned automobile voltage (10.5V to 16V DC).

Hardware Implementation

The MobileWeb server/controller is based on on Intel 386EX CPU and has the following features:

- 2 Megabytes Dynamic RAM. The interrupt vectors, any variables, and the stack are stored in RAM.
- 512 Kilobytes (512K x 8) FLASH EPROM. This is the Boot FLASH. On Power Up, the processor accesses the reset vector in the top word of this device. This is where the operational code and unique device I.D. are stored. A 32 pin PLCC socket is provided for this device, so that code updates, or an In Circuit ROM Emulator, can be place here.
- 2 Megabytes(1Mx16) of FLASH FILE EPROM. This is one of two Flash File devices. The Flash file is used to store records and applications. Optionally, a 2Mx16 FLASH can be inserted to give 4 Megabytes of Flash File EPROM.
- 2 Megabytes (1Mx16) of FLASH FILE EPROM. This is the other Flash File device. Optionally a 2Mx16 FLASH EPROM can be inserted to give 4 Megabytes of Flash File EPROM.
- Two Type 3 PCMCIA Slots with one socket per slot. The PCMCIA Controller is the Cirrus Logic CPLD6720. One slot is 5V only and the other has intelligence to detect low voltage cards.
- Six RS-232 serial ports, with speeds up to 120K baud. Two of the serial ports are embedded in the 386EX. The other four are implemented with the Texas Instruments TL16C554 Quad UART. The TL16C554 consists of four improved 16C550 UARTs with 16 Byte FIFOs on the receivers. The serial ports are connected to Dsub9 connectors on the back panel. The pinout is as follows:

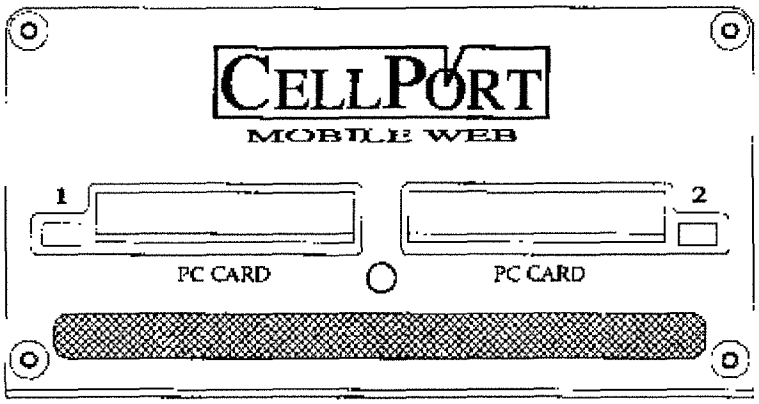
Data Carrier Detect	DCD	input	Pin 1
Receive Data	RXD	input	Pin 2
Trasmit Data	TXD	output	Pin 3
Data Terminal Ready	DTR	output	Pin 4
Ground	GND	--	Pin 5
Request to Send	RTS	output	Pin 7
Clear to Send	CTS	input	Pin 8

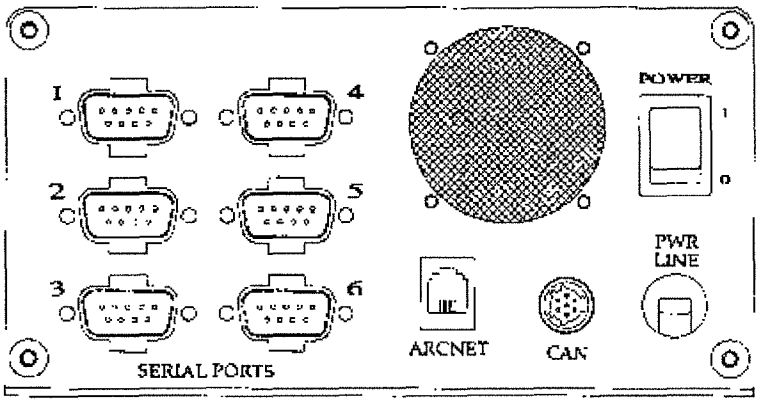
- A battery backed-up Real Time Clock (RTC) with 50 bytes of NVRAM utilizing the Dallas Semicondutor DS1286 RTC. It is interfaced as 64 RAM locations with 14 Bytes of clock and control registers, and 50 Bytes of general purpose Non-Volatile RAM.
- A CAN interface utilizing the Intel 82527 CAN Controller. The 82527 supports the standard and extended message frames in CAN Specification 2.0 Part B.
- An ARCNET interface utilizing the SMC COM20020 Universal Local Area Network Controller. The physical interface is an R5-485 tranceiver on an RJ11 connector.
- User selectable DIP Switch for custom setup.
- A Power On Reset generator and Power Fail interrupt based on the Maxim MAX707. The MAX707 generates an active low RESET-to the 386EX and peripherals when VCC drops below 4.7 Volts, and generates a 200 Msec RESET-on Power Up when VCC rises above 4.6 Volts. It also generates a Non Maskable Interrupt (NMI), when it detect the unregulated DC Power has dropped below 10.5 Volts, to provide an early warning of imminent power failure. The software then suspends all activity until power is restored. The 386EX also contains a Watch-Dog Timer that requires software toggling every 1.2 seconds. If the WDT is not toggled, the processor is Reset.
- A Three Ampere DC-DC switching power supply to convert from 10.6-20 Volts unregulated DC to 5.0 Volts for logic.
- A 300mA DC-DC switching power booster ot onvert from 5.0 Volts to 12V ± 5% for the PCMCIA slots and optionally the Flash Memory.
- The case is 6061 extruded aluminum with a black anodized finish. Its dimensions are:

Length	Width	Depth
6.15"	3.09"	8.0"
156.21mm	78.54mm	203.20mm

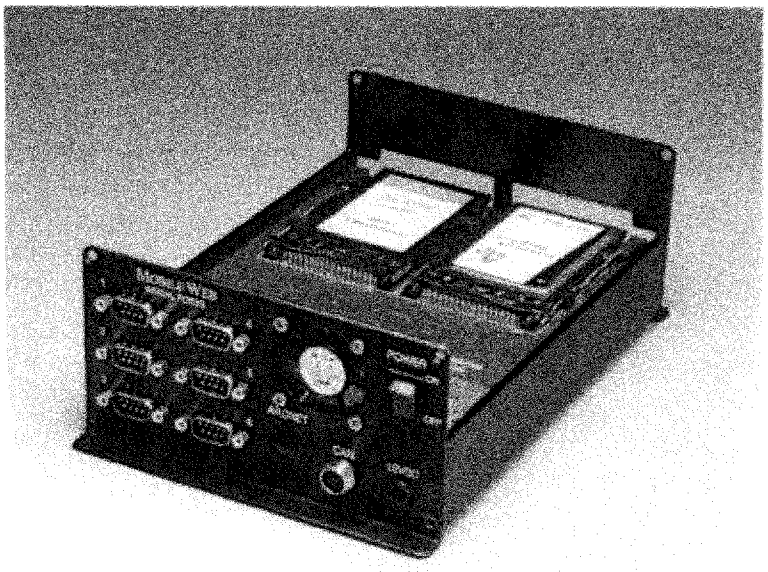
Developer's Kit Block Diagram

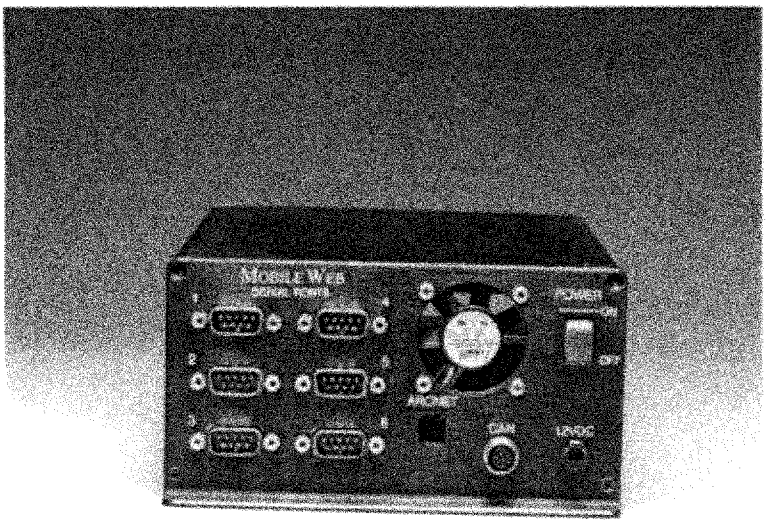
Front And Rear Panel Illustrations





Product Photos





Back to the top

Purchasing a MSC-9710 and Software Development Kit

Item	Price
MSC-9710	$695.00
SDK	$3000.00

Back to the top

How to Obtain a MobileWeb

CellPort Labs Contact Information:



CellPort Labs, Inc.
885 Arapahoe Avenue
Boulder, CO 80302
Tel (303)541-0722
Fax (303)541-0731
Email: patk@cellport.com

© 1996 CellPort Labs, Inc.

CellPort ® is a registered trademark of CellPort Labs, Inc.
MobileWeb™ and C/P Connect™ and trademarks of CellPort Labs, Inc.
MicroSoft®, Windows®, Windows 95®, and Explorer® are registered trademarks of MicroSoft Corporation.
Intel® is a registered trademark of Intel Corportion.
Navigator® is a registered trademark of Netscape, Inc.
TI® is a registered trademark of Texas Instruments, Inc.
Cirrus Logic® is a registered trademark of Cirrus Logic, Inc.
SoftScope® and CSiLocate® are registered trademarks of Concurrent Sciences Inc.
promICE® is a registered trademark of Grammer Engine, Inc.
Maxim™ is a registered trademark of Maxim, Inc.

Back to the top

Back to the CellPort Labs Homepage

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

RULE 132 DECLARATION
BY MICHAEL J. SUMAN

I, the undersigned, hereby declare that:

Background

1. I am currently the owner of a consulting company, Product and Market Development L.L.C., located in Caledonia, Michigan. Prior to that, from 1996 until 2002, I was the Group Vice President at Johnson Controls Automotive. And prior to that, from 1979 to 1996, I was at Prince Corporation, and my last position was Vice President of Sales and Marketing.

2. I received a BS degree in Business and Marketing from Ferris State University in 1974.

3. I am a listed inventor on over 50 U.S. patents and I am familiar with the patent process.

4. I have been retained by the Patent Owner to provide technical assistance in the present reexamination of the '278 patent, particularly with respect to assisting with the proper understanding of the teachings of my cited U.S. Patent No. 6,028,537, and to also assist the with the correct understanding of the relevant technology at the time of my '537 patent.

The '278 Patent

5. I have reviewed the '278 patent which is the subject of the present reexamination.

6. I have reviewed the Official Action dated May 6, 2016 for the reexamination of the '278 patent.

7. I understand that the '278 patent includes three independent claims and twenty-two claims total. Representative Claim 1 is directed to a multi-vehicle compatible tracking unit for a vehicle comprising a vehicle data bus extending throughout the vehicle. The multi-vehicle compatible tracking unit includes 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 communicates over the vehicle data bus 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 is 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.

8. I understand that the specification of the '278 patent at column 24, lines 8-12, provides that "[t]he 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."

9. I further understand that independent Claim 13 of the '278 patent recites that the downloading interface includes a connector for temporary connection to a downloading device, and that independent Claim 18 recites that the downloading interface includes a wireless receiver for temporary connection to a downloading device.

10. Based upon my study of the '278 patent, and my knowledge of the relevant technology, I understand that the '278 patent is directed to a multi-vehicle compatible tracking unit that may be used to write to and/or read from vehicle devices via the vehicle data communications bus, and do so despite the fact that different vehicles have different device codes.

Teachings of My '537 Patent & Relevant Technology

11. I have reviewed my cited '537 patent and the provisional application No. 60/019,773 filed June 14, 1996, from which my '537 patent claims priority.

12. Section 5 of the Official Action characterizes the teachings of my '537 patent as follows:

> Suman 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. As the device uses different vehicle codes for different vehicles it is thus multi-vehicle compatible. The devices include sensors and controls for doors, windows, ignition, speedometer, RPMs, fuel level, turn signals, lights, gears, temperature, oil pressure, defroster, headlights, etc.). See Figs. 3, 5, 44, 45, 47; see also col. 43, lines 27-47. As noted in 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 also inherent 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.

Based upon my knowledge and experience, I respectfully disagree with these contentions with respect to the characterization of a multi-vehicle compatible controller. The embodiments contemplated by me at the time of my '537 patent, the disclosure in my '537 patent, and the related commercial developments within my work responsibilities were not directed to a multi-vehicle compatible controller and downloading interface as in the '278 patent claims. The embodiments contemplated by me at the time of my '537 patent did not include multi-vehicle compatibility, and at the time I left Johnson Controls in 2002 I had never contemplated or worked with any multi-vehicle compatible controller as described in the '278 patent. I point out that at the time of my '537 patent, the vehicle device codes were proprietary to different manufacturers, and even different

model lines offered by manufacturers. Moreover, the device codes were not made freely available, and were quite difficult to obtain.

13. The Official Action also cited to my '537 patent in col. 36, lines 31-52, as follows:

> 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.

Based upon my knowledge and experience, the reprogramming means is not related to vehicle codes or to providing 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, as in the '278 patent claims. Instead, the reprogramming means is for vehicle personalization and was not capable of making communications level changes that would be necessary to provide multi-vehicle compatibility.

14. I would also like to clarify that the following passage from my '537 patent does not support the contention that my patent discloses a multi-vehicle compatible controller and downloading interface as in the '278 patent claims:

> Yet another aspect of the present invention is to provide a vehicle locating system that allows the vehicle owner to determine the location of the vehicle when the vehicle has been loaned to a friend or family member. In this regard, the present invention may also be used by the manager of a fleet of commercial vehicles, such as taxis, police cars, trucks, or other delivery vehicles, to track the location of each vehicle in the fleet. (Col. 2, lines 3-10).

It was expected that the vehicles in a given fleet would be the same type vehicle having the same device codes.

15. I have also carefully considered the contentions in the Official Action, that my '537 patent discloses: a downloading interface in the form of a connector for temporary connection to a downloading device (as relates to Claim 13 of the '278 patent); and a downloading interface in the form of a wireless receiver for temporary connection to a downloading device (as relates to Claim 18 of the '278 patent). In particular, the Official Action provides 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. It is my position, based upon my knowledge and experience, that none of the cited portions of my '537 patent supply these teachings relating to a wired or wireless interface. Indeed, I was simply not working on the problem of multi-vehicle compatibility, and there was no project to develop any software to give the connector the functions as contended in the Official Action. Moreover, the embodiments conceived and described in the '537 patent were not capable of modifying the communications level to allow for multi-vehicle compatibility. Along these lines, there is also no disclosure in my '537 patent of using the telephone to provide a wireless interface as in the '278 patent.

16. I hereby declare further that all statements made herein are of our own knowledge and are true, and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code, and that such willful and false statements may jeopardize the validity of the application or any patent issued thereon.



Michael J. Suman

July 5, 2016

Date

Electronic Acknowledgement Receipt

EFS ID:	26272789
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:	06-JUL-2016
Filing Date:	14-SEP-2015
Time Stamp:	16:48:38
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		0058106CIP1_REX_OA_Response.pdf	5648618 54d99f3f5ddeca0cd0d0c7083a09879314e82b31	yes	59

Multipart Description/PDF files in .zip description		
Document Description	**Start**	**End**
Response after non-final action-owner timely	1	1
Claims	2	7
Applicant Arguments/Remarks Made in an Amendment	8	26
Affidavit-traversing rejectns or objectns rule 132	27	52
Affidavit-traversing rejectns or objectns rule 132	53	59

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:

Total Files Size (in bytes):	5648618

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**

RESPONSE TO THE OFFICE ACTION MAILED MAY 6, 2016 IN EX-PARTE REEXAMINATION

EFILE
Commissioner for Patents

Commissioner:

Responsive to the Official Action of May 6, 2016, please enter and consider the remarks set out below.

In the Claims:

This listing of claims replaces all prior versions and listings of claims in the application.

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

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

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

12. (Pending) 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. (Pending) 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. (Pending) 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. (Pending) 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. (Pending) 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. (Pending) 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. (Pending) 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. (Pending) 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. (Pending) 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. (Pending) 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. (Pending) 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.

REMARKS

The Patent Owner thanks the Examiner for the careful and thorough reexamination of the present application, and thanks the U.S. Patent and Trademark Office and the Examiners for extending all courtesies to the Patent Owner's Representatives during the in-person interview of June 16, 2016.

The Patent Owner files herewith under separate cover an Interview Summary. The Examiners determined during the in-person interview that the rejection over Beckert et al. is withdrawn, and this was confirmed in the Ex Parte Reexamination Interview Summary dated June 21, 2016.

Additionally, as helpfully suggested by the Examiners during the in-person interview, the Patent Owner submits herewith Rule 132 Declarations from Michael J. Suman (i.e. first named lead inventor of the Suman et al. prior art reference) and Joseph C. McAlexander, III (the technical consultant in attendance at the interview and the technical consultant during the related litigation with the Requester), to support the below arguments for patentability.

The Patent Owner submits that all of the claims are patentable, presents arguments herein supporting such patentability, and respectfully requests that the Examiner withdraw all pending rejections and issue a Reexamination Certificate confirming all claims as patentable.

I. The Claimed Invention

The claimed invention, as recited in independent Claim 1, for example, is directed to a multi-vehicle compatible tracking unit for a vehicle comprising a vehicle data bus

extending throughout the vehicle. The multi-vehicle compatible tracking unit comprises 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 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. The multi-vehicle compatible tracking unit comprises 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.

Independent Claims 13 and 18 are directed to related multi-vehicle compatible tracking units. Independent Claim 13 recites that the downloading interface includes a connector for temporary connection to a downloading device. Independent Claim 18 recites that the downloading interface includes a wireless receiver for temporary connection to a downloading device.

II. The Rejections Are In Error And The Claims Are Patentable

A. The Rejection Over Suman et al.

1. Suman et al.

The Examiner rejected all of the claims as being anticipated by Suman et al. Suman et al. discloses 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. (Figure 1a, reproduced below).

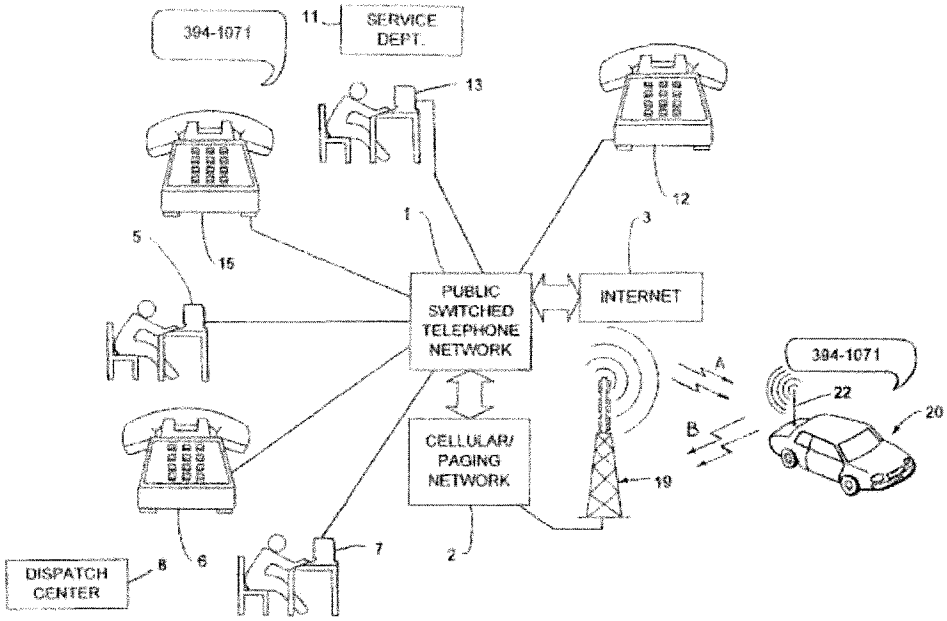


Figure 1a of Suman et al.

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.

2. Suman et al. fails to disclose the multi-vehicle compatible controller of the claimed invention

The Patent Owner respectfully submits that the rejection of the '278 patent claims is in error since Suman et al. fails to disclose expressly, or inherently, each and every claim feature.

Firstly, the Patent Owner respectfully submits that Suman et al. fails to disclose the 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*, as recited by independent Claim 1, for example.

The Official Action characterizes the teachings of Suman et al as follows:

> Suman 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. As the device uses different vehicle codes for different vehicles it is thus multi-vehicle compatible. The devices include sensors and controls for doors, windows, ignition, speedometer, RPMs, fuel level, turn signals, lights, gears, temperature, oil pressure, defroster, headlights, etc.). See Figs. 3, 5, 44, 45, 47; see also col. 43, lines 27-47. As noted in 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 also inherent 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. (Official Action, Pages 6-7).

As noted by Mr. Michael Suman, the first named lead inventor of Suman et al., in his attached Rule 132 Declaration, "I respectfully disagree with these contentions with respect to the characterization of a multi-vehicle compatible controller[,] [and] [t]he embodiments contemplated by me at the time of my '537 patent, the disclosure in my '537 patent, and the related commercial developments within my work responsibilities were not directed to a multi-vehicle compatible controller and downloading interface as in the '278 patent claims." (Rule 132 Declaration by Michael J. Suman at 4). Indeed, Mr. Suman notes that: "[t]he embodiments contemplated by me at the time of my '537 patent did not include multi-vehicle compatibility, and at the time I left Johnson Controls in 2002 I had never

contemplated or worked with any multi-vehicle compatible controller as described in the '278 patent." *Id.* Moreover, the Suman Declaration recites that "the vehicle device codes were proprietary to different manufacturers, and even different model lines offered by manufacturers ... the device codes were not made freely available, and were quite difficult to obtain". *Id.* at 4-5.

At Col. 2, lines 3-10, Suman et al. recites:

> [y]et another aspect of the present invention is to provide a vehicle locating system that allows the vehicle owner to determine the location of the vehicle when the vehicle has been loaned to a friend or family member. In this regard, the present invention may also be used by the manager of a fleet of commercial vehicles, such as taxis, police cars, trucks, or other delivery vehicles, to track the location of each vehicle in the fleet.

As further noted by Mr. Suman in his Rule 132 Declaration, "the [] passage from my '537 patent does not support the contention that my patent discloses a multi-vehicle compatible controller and downloading interface ... [i]t was expected that the vehicles in a given fleet would be the same type vehicle having the same device codes". *Id.* at 6.

3. Suman et al. fails to disclose the downloading interface of the claimed invention

Secondly, the Patent Owner respectfully submits that Suman et al. fails to disclose 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, as also recited by independent Claim 1, for example. In the Official Action, the Examiner relied on the personalization features of Suman et al. to provide this claim feature. In particular, the Official Action cited to col. 36, lines 31-52 of Suman et al., which recites:

> [t]o 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.

Rather, as stated by Mr. Suman in his attached Rule 132 Declaration, "the reprogramming means is not related to vehicle codes or to providing 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 ... [i]nstead, the reprogramming means is for vehicle personalization." *Id.* at 5-6.

4. Suman et al. fails to disclose the wired and wireless downloading interface of the claimed invention

Thirdly, the Patent Owner respectfully submits that the rejections of independent Claims 13 and 18 are in error for the additional reasons that Suman et al. fails to respectively disclose the downloading interface comprising a connector for temporary connection to a downloading device, and the downloading interface including a wireless receiver for temporary connection to a downloading device. Mr. Suman provides in his Rule 132 Declaration:

> the Official Action provides 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. It is my position, based upon my knowledge and experience, that none of the cited portions of my '537 patent supply these teachings relating to a wired or wireless interface. Indeed, I was simply not working on the problem of multi-vehicle compatibility, and there was no project to develop any software to give the connector the functions as contended in the Official Action. Along these lines, there is also no disclosure in my '537 patent of using the telephone to provide a wireless interface as in the '278 patent. *Id.* at 6-7.

5. The multi-vehicle compatible controller of the claimed invention is not inherent to Suman et al.

Fourthly, during the in-person interview, the Examiners helpfully raised the position that the above noted claim features were inherent features of Suman et al. In particular, the Examiners took the position since Suman et al. could potentially support the claimed features, the claimed features were inherently disclosed. As noted above, the claimed features could not be potentially derived from the deficient teachings of Suman et al.

Nevertheless, assuming *arguendo* that the Examiners maintain this contention, the Patent Owner respectfully submits that this is a mischaracterization of inherency. Indeed, if a claim element is not expressly disclosed by the prior art, the prior art reference must inherently disclose the claim element to anticipate it. (*See In re Robertson*, 169 F.3d 743, 745 (Fed. Cir. 1999)). The court went on to state that:

> [t]o establish inherency, the extrinsic evidence "must make clear that the missing descriptive matter is necessarily present in the thing described in the reference, and that it would be so recognized by persons of ordinary skill." Continental Can Co. v. Monsanto Co., 948 F.2d 1264, 1268, 20 U.S.P.Q.2D (BNA) 1746, 1749 (Fed. Cir. 1991). "Inherency, however, may not be established by probabilities or possibilities. The mere fact that a certain thing may result from a given set of circumstances is not sufficient." Id. at 1269, 20 U.S.P.Q.2D (BNA) at 1749 (quoting In re Oelrich, 666 F.2d 578, 581, 212 U.S.P.Q. 323, 326 (C.C.P.A. 1981).
> Id. at 745. (emphasis added)

The Manual of Patent Examining Procedure (MPEP) also states: "[t]he fact that a certain result or characteristic may occur or be present in the prior art is not sufficient to establish the inherency of that result or characteristic." (MPEP §2112, *citing In re Rijckaert*, 9 F.3d 1531, 1534 (Fed. Cir. 1993); *In re Oelrich*, 666 F.2d 578, 581-82, (CCPA 1981); and *Metabolite Labs., Inc. v. Lab.Corp. of Am. Holdings*, 370 F.3d 1354, 1367 (Fed. Cir. 2004)).

In a related alternative argument, the Examiners raised the point that the above noted claim features were merely functional language, and therefore not entitled to patentable weight. In essence, the Examiners contended that functional language in the claimed invention should be graded to a lower standard of inherency. The Patent Owner respectfully disagrees and notes that the standard for inherency requires more than a mere possibility.

Accordingly, it is submitted that independent Claims 1, 13, and 18 are patentable over Suman et al. Their respective dependent claims, which recite yet further distinguishing features, are also patentable over Suman et al. and require no further discussion herein.

B. The Rejections Over Spaur et al. and Johnson et al. or Song

1. Spaur et al.

The Examiner rejected all of the claims under §103 and over Suman et al. in view of Johnson et al. or Song. Spaur et al. discloses a communication system comprising a plurality of remote stations 10a-10n, a remote network 14 coupled to the remote stations, and a controller 30 in a vehicle and

communicating with the remote standardized network over a wireless link. The vehicle includes a vehicle standardized network 40, and a plurality of vehicle devices 50a-50n coupled to the vehicle standardized network. The controller is coupled to the vehicle network. (Figure 1, reproduced below).

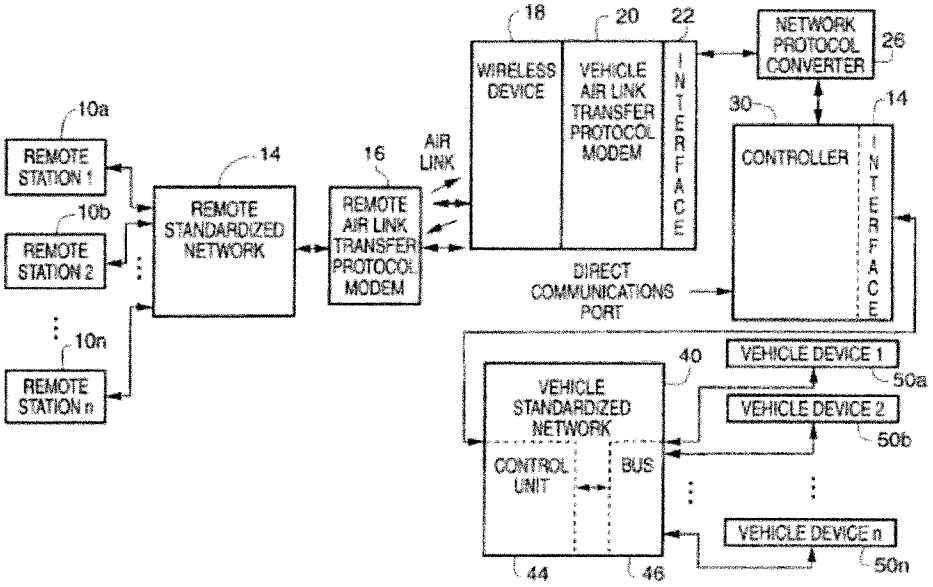


Figure 1 of Spaur et al.

The Examiner in the Official Action noted that Spaur et al. fails to disclose location detection features. In the Official Action, the Examiner looked to either Johnson et al. or Song for this teaching. During the in-person interview, the Patent Owner's legal representatives clarified to the Examiners that Spaur et al. discloses sending position data from a GPS receiver via the cellular phone. (See Col. 14, lines 4-25). In other words, it did not appear that Johnson et al. or Song is needed in combination with Spaur et al., since Johnson et al. and Song were cited only for the teaching of a GPS receiver sending position information. Nevertheless, Johnson et al.

discloses a vehicle monitoring system comprising a GPS antenna; and Song discloses a vehicle monitoring system comprising a location determining transceiver for determining a location based upon triangulation with nearby base stations.

2. Spaur et al. fails to disclose the multi-vehicle compatible controller of the claimed invention

The Patent Owner respectfully submits that the rejections are in error since Spaur et al., alone or in combination with Johnson et al. or Song, fails to disclose or fairly suggest each and every feature of the claimed invention. Firstly, the Patent Owner submits that the applied prior art references fail to disclose or fairly suggest the 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*, as recited by independent Claim 1, for example. In the Official Action, the Examiner contended that the controller and vehicle standardized network 40 provided the multi-vehicle compatible controller of the claimed invention. Moreover, in the in-person interview, the Examiners detailed their contention and noted that this claimed feature was at least inherent to Spaur et al.

a. Vehicle codes were proprietary

The Patent Owner asserts that similar to the deficiency of the Suman et al. patent and noted in Section A above, "at the time of the Spaur et al. patent [], the vehicle device codes were proprietary to different manufacturers, and

even different model lines offered by manufacturers; and that the device codes were not made freely available, and were quite difficult to obtain." (Rule 132 Declaration by Joseph C. McAlexander, III at 3). In other words, the person of ordinary skill in the art would appreciate that vehicle codes were closely guarded proprietary technical features, which would necessitate laborious modifications and research to switch the system of Spaur et al. between vehicles.

b. The commercial embodiments of Spaur et al. were also similarly deficient

Additionally, the commercial CellPort Labs embodiments of Spaur et al. were involved in the prior judicial proceedings. Mr. McAlexander's Rule 132 Declaration provides: "Requester's technical trial expert, Mr. Andrews, [] describ[ed] the actual CellPort Labs products as disclosed in Spaur et al., [as] fail[ing] to have any express or inherent teaching of the multi-vehicle compatible controller as in the '278 patent claims." *Id.* at 8-9. Indeed, the Requester's own technical expert cited to these commercial embodiments solely for a teaching of a housing. *Id.* at 9.

c. Spaur et al. does not disclose the multi-vehicle compatible controller

Moreover, as noted in the attached Rule 132 Declaration by Mr. McAlexander:

> Spaur is directed to enhancing communication between a remote site and vehicle, especially involving information transfer and storage, including data and control, using standard communication protocol and

> hardware network features. Specifically, Spaur contemplates communication with a vehicle via modem (72/76, 82) from a browser terminal via the internet to a cellular based vehicle network (82). A protocol controller and converter (3) translates the information transferred and communicates that information via a Controller Area Network (CAN) interface via the CN bus to the different vehicle devices. The flow of communication is bi-directional.
>
> Mr. Andrews [Calamp's trial expert] argues that Spaur discloses a multi-vehicle compatible controller. I disagree. The CAN controller described in Spaur does not specify, in fact is silent, that it communicates with a vehicle device "using at least one corresponding vehicle device code from among a plurality thereof for different vehicles," as required by independent claims 1 and 13. *Id.* at 6.

In the Official Action, the Examiner cited to the following passages of Spaur et al. for providing the above noted claim feature:

> [t]he 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 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, lines 31-50);
>
> [t]his 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. (Col. 10, lines 15-29); and
>
> [i]n 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. (Col. 10, lines 55-64).

As noted in the Rule 132 Declaration by Mr. McAlexander:

> I do not believe that these cited portions of Spaur et al. disclose the multi-vehicle compatible controller as in the claims of the '278 patent. In addition, I also believe that based upon these portions of Spaur et al., or any other portions of Spaur et al., there is no inherent teaching of the multi-vehicle compatible controller as in the '278 patent claims. In other words, it does not necessarily flow that Spaur et al. would have a multi-vehicle compatible controller using the device codes as in the '278 patent claims. *Id.* at 8.

3. Spaur et al. fails to disclose the downloading interface of the claimed invention

Secondly, the Patent Owner submits that Spaur et al. fails to disclose or fairly suggest 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, as also recited by independent Claim 1, for example.

In the Official Action, the Examiner cited to col. 4, lines 38-45 of Spaur et al. for the above noted feature of the claimed invention. The cited portion of Spaur et al. recites:

> [p]referably, 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.

As noted in the Rule 132 Declaration by Mr. McAlexander:

> I do not believe that these cited portions of Spaur et al., or any other portions of Spaur et al., disclose (either directly or through inherency) 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 as found in the claims of the '278 patent. Spaur et al. does disclose an interface in combination with a controller; however, Spaur et al. fails to disclose the multi-vehicle compatible controller and the downloading interface as recited in the claims of the '278 patent. In addition, there is nothing in the description of the corresponding CellPort Labs actual products (Exhibits 14 and 15) that discloses the multi-vehicle compatible controller and the downloading interface as recited in the claims of the '278 patent. *Id.* at 9-10.

Spaur et al. fails to disclose expressly or inherently the multi-vehicle compatible controller and associated downloading interface as in the claimed invention. Neither Johnson et al. nor Song supply the noted deficiencies of Spaur et al. Accordingly, it is submitted that independent Claims 1, 13, and 18 are patentable over Spaur et al. Their respective dependent claims, which recite yet further distinguishing features, are also patentable over the Spaur et al. and require no further discussion herein.

CONCLUSIONS

In view of the arguments presented above, and the evidence submitted in the attached Rule 132 Declarations, it is submitted that all of the claims are patentable. Accordingly, a Reexamination Certificate confirming all claims as patentable is respectfully requested in due course. Should any minor informalities need to be addressed, the Examiner is encouraged to contact the undersigned at the telephone number listed below.

The Commissioner is hereby authorized to charge or credit any discrepancies in fee amounts to Deposit Account No. 01-0484.

Respectfully submitted,

JACK GEORGE ABID
Reg. No. 58,237
Allen, Dyer, Doppelt, Milbrath
& Gilchrist, P.A.
255 S. Orange Avenue, Suite 1401
Post Office Box 3791
Orlando, Florida 32802
407-841-2330
407-841-2343 fax
Attorney for the Patent Owner

In re Patent of
Kenneth E. FLICK
Reexamination Control No. **90/013,587**
Filed: **SEPTEMBER 14, 2015**
_____/

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 July 6, 2016, a complete copy of this Amendment 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,

JACK GEORGE ABID
Reg. No. 58,237
Allen, Dyer, Doppelt, Milbrath
& Gilchrist, P.A.
255 S. Orange Avenue, Suite 1401
Post Office Box 3791
Orlando, Florida 32802
407-841-2330
407-841-2343 fax
Attorney for the Patent Owner

UNITED STATES PATENT AND TRADEMARK OFFICE

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

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

7590 06/21/2016

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

EXAMINER
GRAHAM, MATTHEW C

ART UNIT	PAPER NUMBER
3993	

MAIL DATE	DELIVERY MODE
06/21/2016	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.

UNITED STATES PATENT AND TRADEMARK OFFICE

Commissioner for Patents
United States Patent and Trademark Office
P.O. Box 1450
Alexandria, VA 22313-1450
www.uspto.gov

DO NOT USE IN PALM PRINTER

(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)).

Ex Parte Reexamination Interview Summary	**Control No.**	**Patent Under Reexamination**
	90/013,587	8032278
	Examiner	**Art Unit**
	MATTHEW C. GRAHAM	3993

All participants (USPTO personnel, patent owner, patent owner's representative):

(1) *MATTHEW C. GRAHAM*	(3) *Gay Ann Spahn and Peter C. English*
(2) *Jack Abid and Christopher Regan*	(4) *Joseph C. McAlexander*

Date of Interview: *16 June 2016*

Type: a)☐ Telephonic b)☐ Video Conference
c)☒ Personal (copy given to: 1)☐ patent owner 2)☒ patent owner's representative)

Exhibit shown or demonstration conducted: d)☐ Yes e)☒ No.
If Yes, brief description: _____

Agreement with respect to the claims f)☐ was reached. g)☒ was not reached. h)☐ N/A.
Any other agreement(s) are set forth below under "Description of the general nature of what was agreed to…"

Claim(s) discussed: *1-22*.

Identification of prior art discussed: *Art or Record*.

Description of the general nature of what was agreed to if an agreement was reached, or any other comments:
Spaur and Suman references were discussed. Examiner agreed to drop the 102 rejection based upon Beckert. Examiner suggested that the Patent Owner provide evidence relating to the use of device codes in vehicles at the time of the invention in relation to their inherent use in Suman and Spaur. The scope of the claims was also discussed. Patent Owner's representative provided the attached agenda and various documents pertaining to related court proceedings.

(A fuller description, if necessary, and a copy of the amendments which the examiner agreed would render the claims patentable, if available, must be attached. Also, where no copy of the amendments that would render the claims patentable is available, a summary thereof must be attached.)

A FORMAL WRITTEN RESPONSE TO THE LAST OFFICE ACTION MUST INCLUDE PATENT OWNER'S STATEMENT OF THE SUBSTANCE OF THE INTERVIEW. (See MPEP § 2281). IF A RESPONSE TO THE LAST OFFICE ACTION HAS ALREADY BEEN FILED, THEN PATENT OWNER IS GIVEN **ONE MONTH** FROM THIS INTERVIEW DATE TO PROVIDE THE MANDATORY STATEMENT OF THE SUBSTANCE OF THE INTERVIEW (37 CFR 1.560(b)). THE REQUIREMENT FOR PATENT OWNER'S STATEMENT CAN NOT BE WAIVED. **EXTENSIONS OF TIME ARE GOVERNED BY 37 CFR 1.550(c).**

/Matthew C. Graham/ Primary Examiner, AU 3993	Conferees: /PCE/ and /GAS/	Attachments: Interview Agenda; Order; Verdict Form; 2-pages of transcript; and "Calamp's Response . . ."

cc: Requester (if third party requester)

UNITED STATES PATENT AND TRADEMARK OFFICE

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

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

7590 05/06/2016

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

EXAMINER
GRAHAM, MATTHEW C

ART UNIT	PAPER NUMBER
3993	

MAIL DATE	DELIVERY MODE
05/06/2016	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.

UNITED STATES PATENT AND TRADEMARK OFFICE

Commissioner for Patents
United States Patent and Trademark Office
P.O. Box 1450
Alexandria, VA 22313-1450
www.uspto.gov

DO NOT USE IN PALM PRINTER

(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)).

Office Action in Ex Parte Reexamination	Control No. 90/013,587	Patent Under Reexamination 8032278	
	Examiner MATTHEW C. GRAHAM	Art Unit 3993	AIA (First Inventor to File) Status No

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

a. ☒ Responsive to the communication(s) filed on *1/8/2016, 2/26/2016 and 3/8/2016* .
☐ A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on _____.

b. ☐ This action is made FINAL.

c. ☐ A statement under 37 CFR 1.530 has not been received from the patent owner.

A shortened statutory period for response to this action is set to expire *2* month(s) from the mailing date of this letter. Failure to respond within the period for response will result in termination of the proceeding and issuance of an *ex parte* reexamination certificate in accordance with this action. 37 CFR 1.550(d). **EXTENSIONS OF TIME ARE GOVERNED BY 37 CFR 1.550(c).** If the period for response specified above is less than thirty (30) days, a response within the statutory minimum of thirty (30) days will be considered timely.

Part I THE FOLLOWING ATTACHMENT(S) ARE PART OF THIS ACTION:

1. ☐ Notice of References Cited by Examiner, PTO-892.
2. ☒ Information Disclosure Statement, PTO/SB/08.
3. ☐ Interview Summary, PTO-474.
4. ☐ _____.

Part II SUMMARY OF ACTION

1a. ☒ Claims *1-22* are subject to reexamination.
1b. ☐ Claims _____ are not subject to reexamination.
2. ☐ Claims _____ have been canceled in the present reexamination proceeding.
3. ☐ Claims _____ are patentable and/or confirmed.
4. ☒ Claims *1-22* are rejected.
5. ☐ Claims _____ are objected to.
6. ☐ The drawings, filed on _____ are acceptable.
7. ☐ The proposed drawing correction, filed on _____ has been (7a) ☐ approved (7b) ☐ disapproved.
8. ☐ Acknowledgment is made of the priority claim under 35 U.S.C. § 119(a)-(d) or (f).
   a) ☐ All b) ☐ Some* c) ☐ None of the certified copies have
   1 ☐ been received.
   2 ☐ not been received.
   3 ☐ been filed in Application No. _____ .
   4 ☐ been filed in reexamination Control No. _____.
   5 ☐ been received by the International Bureau in PCT application No. _____.
   * See the attached detailed Office action for a list of the certified copies not received.
9. ☐ Since the proceeding appears to be in condition for issuance of an *ex parte* reexamination certificate except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte* Quayle, 1935 C.D. 11, 453 O.G. 213.
10. ☐ Other: _____

cc: Requester (if third party requester)

NON-FINAL REJECTION

1. Receipt is acknowledged of the Patent Owner's Statement on 1/08/2016 and the Third Party Requester's Response on 3/8/2016.

2. The Flick '278 Patent is a continuation in part of application 11/076,259. This parent application did not disclose nor claim the multi-vehicle capability and the bus extending throughout the vehicle as described and claimed in Flick '278. Accordingly, the earliest effective filing date for Flick '278 is July, 3, 2007.

3. A substantial new question of patentability affecting claims 1-22 of United States Patent Number 8,032,278 to Flick is raised by the requester in the response of 3/8/2016 for *ex parte* reexamination.

In light of the Patent Owner's Response of 1/8/2016, the requester contends that the following US Patents and Patent Publication raise a substantial new question of patentability:

A. U.S. Patent No. 6,009,363 to Beckert et al. (Beckert);

B. U.S. Patent No. 7,484,008 to Gelvin et al. (Gelvin);

C. U.S. Publication No. 2001/0033225 to Razavi et al. (Razavi).

a.) Beckert teaches a multi-vehicle compatible tracking unit in the form of a vehicle computer system (see col. 2, lines 10-17), which is for a vehicle comprising a vehicle data bus extending throughout the vehicle (see col. 1, lines 32 – 38);

a vehicle position determining device in the form of a GPS chipset (see col. 6, lines 50-53, and FIG. 3); a wireless communications device in the form of a wireless Internet link 76 (see col. 5, lines 9 - 12, and FIGS. 1 and 3);

a multi-vehicle compatible controller in the form of the computer module 65 for cooperating with said vehicle position determining device and said wireless communications device to send vehicle position information (see col. 5, lines 9 - 12);

said multi-vehicle compatible controller to be coupled to the vehicle data bus for communication with at least one vehicle device using at least one corresponding vehicle device code from among a plurality thereof for different vehicles (see col. 1, lines 32 – 35); and

multiple different types of downloading interfaces (see col. 5, lines 1 - 12) for permitting downloading of enabling data related to the at least one corresponding vehicle device code for use by said multi-vehicle compatible controller (see col. 2, lines 15-17).

b.) Gelvin teaches a multi-vehicle compatible tracking unit in the form of the WINS vehicle internetwork architecture (see FIG 30), which is for a vehicle comprising a vehicle data bus extending throughout the vehicle (see Fig. 3; col. 1, lines 49 - 54; col. 8, lines 51 - 53 and col. 8, lines 63 - 67 – col. 9, lines 1 - 7);

a vehicle position determining device in the form of a GPS device a wireless communications device in the form of cellular modems (see Fig. 3; col. 9, lines 1 -4);

a multi-vehicle compatible controller in the form of the gateway 302 for cooperating with said vehicle position determining device (see Fig. 3; col. 8, lines 46-48; col. 8- lines 51 -53; col. 18, lines 23- 31; col. 18, lines 57 - 60) and said wireless

communications device to send vehicle position information (see col. 9, lines 1 - 4, col. 18, lines 57 - 60, and col~ 31, lines 43 - 47);

said multi-vehicle compatible controller to be coupled to the vehicle data bus for communication see with at least one vehicle device using at least one corresponding vehicle device code from among a plurality thereof for different vehicles (see Fig. 3; col. 8, lines 63 - 67- col. 9, lines 1 -7); and

multiple different types of downloading interfaces (see col. 7, lines 1 - 4) for permitting downloading of enabling data related to the at least one corresponding vehicle device code for use by said multivehicle compatible controller (see col. 23, line 64 - col. 24, line 4).

c.) Razavi teaches a multi-vehicle compatible tracking unit in the form of an in-car sub-network (see the Abstract and Fig. 2) which is for a vehicle comprising a vehicle data bus extending throughout the vehicle and interfaced via OBD and/or SAE standard J1979 and/or J1850 buses (see paragraph [0024]); a vehicle position determining device in the form of a GPS receiver (see paragraph [0031]);

a wireless communications device in the form of a wireless modem, a cellular phone, and/or wireless Ethernet; a multi-vehicle compatible controller in the form of a computer platform within the in- car sub-network for cooperating with said vehicle position determining device (see paragraph [0033]) 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 with at least one vehicle device using at least one corresponding vehicle device code from among a plurality thereof for different vehicles (see paragraph [0037]); and

multiple different types of downloading interfaces (see paragraph [0060]) for permitting downloading of enabling data related to the at least one corresponding vehicle device code for use by said multi-vehicle compatible controller (see the disclosure regarding downloading vehicle upgrades that result in different device codes being received via devices including a wireless modem in paragraph [0060]).

Accordingly Beckert, Gelvin and Razavi each teach a vehicle computer system including a wireless communications device, a vehicle location determination device, a downloading interface, and a controller capable of communicating with a variety of vehicle devices.

There is a substantial likelihood that a reasonable examiner would have considered these teachings in Beckert, Gelvin and Razavi to be important in the determination of patentability of claims 1-22 of Flick '278. Accordingly, Beckert, Gelvin and Razavi each raises a substantial new question of patentability, which question has not been previously raised.

4. The following is a quotation of the appropriate paragraphs of pre-AIA 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

> (b) 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 application for patent in the United States.

5. Claims 1-22 are rejected under pre-AIA 35 U.S.C. 102(b) as being anticipated by Suman.

Suman discloses a multi-vehicle compatible tracking unit for a vehicle comprising a data bus, such as a multiplex bus. See col. 8, line 58-col. 9, line 16; Figs. 3, 5, 44, 45; see also col. 36, line 53-col. 37, line 17. This bus extends throughout the vehicle to the broad degree claimed. Suman notes that the multiplexing scheme for such a bus is set forth in SAE J1850. Suman further discloses a GPS or DGPS as a vehicle position determining device. See, Figs. 3, 5. Suman also discloses a transmitter (see Figs. 1a, 1b, 2; col. 3, lines 1-3; col. 7, lines 26-30) and a receiver (see Figs. 1b, 3, 44; col. 3, lines 1-3; col. 7, lines 31-34) for wirelessly receiving signals from the transmitter. In one embodiment the receiver is a cell phone (and thus also includes a transmitter) coupled to the vehicle bus. See Figs. 5, 45; col. 36, line 53- col. 37, line 17. Suman also shows a controller that cooperates with the GPS device and the wireless communication device to send vehicle position information. See 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. Suman 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. As the device uses different vehicle codes for different vehicles it is thus multi-vehicle compatible. The devices include sensors and controls for doors, windows, ignition, speedometer, RPMs, fuel level, turn signals, lights, gears,

temperature, oil pressure, defroster, headlights, etc.). See Figs. 3, 5, 44, 45, 47; see also col. 43, lines 27-47. As noted in 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 also inherent 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.

Suman notes in 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."

Regarding claim 2, Suman 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. See col. 42, line 52 - col. 43, line 6,

Regarding claim 3, it is inherent that a cellular telephone connected to a RS-232 serial port can be connected and disconnected.

Regarding claim 4, Suman teaches a wireless signal download interface-- see col. 36, lines 31-52.

Regarding claim 5, cellular and paging systems can inherently temporarily connect to the network to connect to a "downloadinq device".

Regarding claim 6, Suman teaches at 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."

Regarding claim 7, Suman teaches that the vehicle code is for writing to the vehicle in that the system allows for personalization.

Regarding claim 8, Suman teaches reprogramming. See 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." Suman also notes that 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." See col. 36, lines 31-52.

Regarding claims 9-10, Suman teaches a remote control function that includes a security function. "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." See col. 2, lines 24 -32.

Regarding claim 11,Suman teaches at 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."

Regarding claim 12, the various components are housed within the vehicle.

Regarding claim 13, note the above discussions of claim 1, 3 and 5.

Regarding claims 14-15, note the above discussions of claims 6 and 7.

Regarding claims 16-17, note the above discussion of claims 8 and 9.

Regarding claim 18-22, note the previous discussion of claims 1-8.

6. The following is a quotation of pre-AIA 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if 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. Patentability shall not be negatived by the manner in which the invention was made.

7. Claims 1-22 are rejected under pre-AIA 35 U.S.C. 103(a) as being unpatentable over Spaur in view of Johnson.

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).

The claimed invention differs only in the use of the location detection.

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).

It would have been obvious to one of ordinary skill in the art to have incorporated the global positioning system receiver in the system of Spaur in view of the teachings of Johnson in order to incorporate location determination capabilities into the controller of Spaur in those vehicles that do not have a global positioning system receiver incorporated into the vehicle.

A complete listing of how Spaur and Johnson relates to claims 1-22 is included in the request (Exhibit F) and is hereby incorporated by reference.

8. Claims 1-22 are rejected under pre-AIA 35 U.S.C. 103(a) as being unpatentable over Spaur in view of Song.

Note the previous discussion of Spaur.

The claimed invention differs only in the use of the location detection.

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).

It would have been obvious to one of ordinary skill in the art to have incorporated the global positioning system receiver in the system of Spaur in view of the teachings of Song in order to incorporate location determination capabilities into the controller of Spaur using cellular capabilities as taught by Song.

A complete listing of how Spaur and Johnson relates to claims 1-22 is included in the request (Exhibit E) and is hereby incorporated by reference.

9. Claims 1-22 are rejected under pre-AIA 35 U.S.C. 102(b) as being anticipated by Beckert.

Note the above discussion of Beckert in paragraph 3.

A complete listing of how Beckert relates to claims 1-22 is included in the response by the Third Party Requester on 3/8/2016 and is hereby incorporated by reference.

10. The background litigation supplied by the Patent Owner is noted. Patent Owner contends that Suman was considered by the examiner in the patent at hand. However, this is incorrect. Suman was not cited or considered in the '278 patent even

though it was cited in previous and copending patent applications. The comments filed by the third party requester on 3/8/2016 are correct. There is no record that the examiner considered Suman. As to Johnson, again the Patent Owner contends that it was considered by the examiner during the original prosecution. Again, this is incorrect. A family member of Johnson was cited in a family member of the '278 patent. Johnson was never cited in the application that became the '278 patent. As to Spaur, the Patent Owner contends that a similar reference was cited during the original prosecution. The examiner fails to see the significance of the citation of an alleged similar reference. Again, Spaur was not cited during the original prosecution of the '278 patent.

The Patent Owner further broadly contends that the references cited in the Order do not show the claimed features. However, there are no specific arguments as to how the features of the cited references fail to show the claimed features. The claimed features are clearly shown as discussed in the above rejection of the claims and as noted in the 3/8/2016 response by the Third Party Requester on pages 13-18.

11. 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.

12. 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).

13. In order to ensure full consideration of any amendments, affidavits or declarations, or other documents as evidence of patentability, such documents must be submitted in response to this Office action. Submissions after the next Office action, which is intended to be a final action, will be governed by the requirements of 37 CFR 1.116, after final rejection and 37 CFR 41.33 after appeal, which will be strictly enforced.

14. 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
3993
(571) 272-7116

Conferees: /PCE/
/GAS/

Search Notes	Application/Control No.	Applicant(s)/Patent under Reexamination	
	90/013,587	8032278	
	Examiner	Art Unit	
	MATTHEW C. GRAHAM	3993	

SEARCHED			
Class	Subclass	Date	Examiner
b60r	25/04	5/4/2016	MCG

INTERFERENCE SEARCHED			
Class	Subclass	Date	Examiner

SEARCH NOTES (INCLUDING SEARCH STRATEGY)		
	DATE	EXMR
See attached EAST Search History	5/4/2016	MCG

PTO/SB/08a (07-09)
Approved for use through 07/31/2016. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

Substitute for form 1449/PTO

INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Use as many sheets as necessary)

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.	
		US- 6606561	2003-08-12	Omega Patents, L.L.C.	
		US- 20010033225	2001-10-25	Razavi, B. et al.	
		US- 60264811	2001-01-29	Flick, K.	
		US- 60258005	2000-12-22	Flick, K.	
		US- 60251552	2000-12-06	Flick, K.	
		US- 60252125	2000-11-20	Flick, K.	
		US- 60236890	2000-09-29	Flick, K.	
		US- 60246463	2000-11-07	Witham, K. et al.	
		US- 60222777	2000-08-03	Flick, K.	
		US- 60205178	2000-05-17	Flick, K.	
		US- 5719551	1998-02-17	Flick, K.	
		US- 6011460	2000-01-04	Flick, K.	
		US-			
		US-			

FOREIGN PATENT DOCUMENTS

Examiner Initials*	Cite No.[1]	Foreign Patent Document Country Code[3]-Number[4]-Kind Code[5] (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	T[6]

Examiner Signature	/Matthew Graham/ (05/04/2016)	Date Considered	

*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant. [1] Applicant's unique citation designation number (optional). [2] See Kinds Codes of USPTO Patent Documents at www.uspto.gov or MPEP 901.04. [3] Enter Office that issued the document, by the two-letter code (WIPO Standard ST.3). [4] For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. [5] Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST.16 if possible. [6] Applicant is to place a check mark here if English language Translation is attached.

This collection of information is required by 37 CFR 1.97 and 1.98. 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, 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 (1-800-786-9199) and select option 2.

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /M.G./

PTO/SB/08b (07-09)
Approved for use through 07/31/2012. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

Substitute for form 1449/PTO

INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Use as many sheets as necessary)

Sheet 2 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

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	
		FLICK, K., Office Action Response, Filed April 2, 2011	
		FILING RECEIPT for U.S. Application No. 11/773,272, Mail Date July 31, 2007	
		FLICK, K., Information Disclosure Statement for U.S. Application No. 11/076,259 filed March 9, 2005	
		CALIFORNIA ENVIRONMENTAL PROTECTION AGENCY, Mail-Out #MSC 97-24, Dated November 17, 1997	

Examiner Signature	/Matthew Graham/ (05/04/2016)	Date Considered	

*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

1 Applicant's unique citation designation number (optional). 2 Applicant is to place a check mark here if English language Translation is attached.

This collection of information is required by 37 CFR 1.98. 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, 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 (1-800-786-9199) and select option 2.

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /M.G./

UNITED STATES PATENT AND TRADEMARK OFFICE

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

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	STATE OR COUNTRY	SHEETS DRAWINGS	TOTAL CLAIMS	INDEPENDENT CLAIMS
☐ Yes ☑ No			22	3
35 USC 119(a-d) conditions met ☐ Yes ☐ No ☐ Met after Allowance				
Verified and Acknowledged /MATTHEW C GRAHAM/ Examiner's Signature Initials				

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).

EAST Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
L1	1	"8032278".pn.	USPAT	OR	OFF	2016/05/04 15:35
L2	45	("20020152053" | "20020188702" | "20040066330" | "20040073440" | "20060173601" | "20060187026" | "20080051957" | "20080221752" | "20090240397" | "20100010706" | "20100222963" | "20110029196" | "5223844" | "5515043" | "5635693" | "5654688" | "5719551" | "5940007" | "6011460" | "6253064" | "6611755" | "6628233" | "6657587" | "6756885" | "6859831" | "6888495" | "7015830" | "7085775" | "7149623" | "7196621" | "7305293" | "7308341" | "7343244" | "7366892" | "7502687" | "7526367" | "7725253" | "7734392" | "7873593").PN. OR ("8032278").URPN.	US-PGPUB; USPAT; USOCR	OR	OFF	2016/05/04 15:35
L3	1874	b60r25/04.cpc.	USPAT	OR	OFF	2016/05/04 15:38
L4	1035	3 and @ad<"20070704"	USPAT	OR	OFF	2016/05/04 15:38

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

CERTIFICATE OF EFS-WEB TRANSMISSION

I hereby certify that this correspondence is being electronically filed with the United States Patent and Trademark Office on March 8, 2016 at or before 11:59 p.m. Pacific Time under the Rules of 37 CFR § 1.8.

/ Christina Ducksworth /
Christina Ducksworth

Issued:	October 4, 2011
Filed:	July 3, 2007
Control No.:	90/013,587
Confirmation No.:	8867
Examiner:	Matthew C Graham
Applicant:	Kenneth Flick
Art Unit:	3993
Title:	VEHICLE TRACKING UNIT WITH DOWNLOADABLE CODES AND ASSOCIATED METHODS
Docket No.:	C13-03896.RE

Mail Stop "Ex Parte Re Examination"
Office of Patent Legal Affairs
ATTN: Central Reexamination Unit
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

2400 E. Katella Avenue, Suite 1050
Anaheim, CA 92806
March 8, 2016

Requester's Reply in *Ex Parte* Reexamination of U.S. Patent 8,032,278

Commissioner:

In response to the Patent Owner's Statements dated January 8, 2016 and February 26, 2016, please consider the following:

Requester would like to thank the Examiner for issuing the Order Granting Request for *Ex Parte* Reexamination of U.S. Patent No. 8,032,278 (the Flick '278 patent). The following response contains comments in response to the Patent Owner's Statements filed January 8, 2016 and February 26, 2016 and related to the Order Granting Request for *Ex Parte* Reexamination of the Flick '278 patent. Furthermore, Requester reiterates its original submission that claims 1 – 22 of the Flick '278 patent are not patentable over the prior art of record for at least the reasons discussed below. Finally, section VI identifies an additional three prior art references that anticipate claims 1 – 22 of the Flick '278 patent (bringing the total of anticipatory references to five references).

I. Patent Owner's Submission of Extraneous Background Materials

A. Litigation Documents Not Binding on the Patent Office

Patent Owner's submission of over 250 pages of litigation documents does little to help advance the above referenced *ex parte* reexamination proceeding. Until a final ruling of invalidity or unenforceability is issued by a federal court, the Patent Office has independent judgment over reexamination proceedings. MPEP § 2286 III describes when a reexamination is ordered prior to the federal court decision in concurrent litigation: "[i]t is not realistic to attempt to determine what issues will be treated by the federal court prior to the court decision. Accordingly, the determination on the request will be made without considering the issues allegedly before the court." (MPEP § 2286 III). While there is a jury decision in the related trial, there is no final judgment and any judgment entered is subject to both post-trial motions and appeal.

Generally, federal court decisions are not binding on the Patent Office: "[a] *non-final* federal court decision concerning a patent under reexamination shall have no binding effect on a reexamination proceeding. The issuance of a *final* federal court decision upholding validity during an *ex parte* reexamination will also have no binding effect on the examination of the reexamination." (MPEP § 2286 IV). Only in the specific case of a *final ruling of invalidity or unenforceability* is the Patent Office bound by the court's decision: "a *final* federal court holding of invalidity or unenforceability (after all appeals), is binding on the Office. Upon the issuance of a final holding of invalidity or

unenforceability, the claims being examined which are held invalid or unenforceable will be withdrawn from consideration in the reexamination." (MPEP § 2286 IV).

None of the attached exhibits submitted by the Patent Owner in the Patent Owner's Statement are a final ruling of invalidity or unenforceability, and as such have no bearing on the pending reexamination of the Flick '278 patent. Requester would additionally like to note the outcome of the jury trial as submitted in the Patent Owner's Filing Under 37 C.F.R. § 1.565 dated February 26, 2016, is also not a final ruling of invalidity or unenforceability. While the jury found the Requester to be willfully infringing, Requester can and intends to appeal this decision. Moreover, any jury findings of secondary indicia of non-obvious are still not a final ruling of invalidity of unenforceability and thus have no bearing of questions of patentability raised in an *ex parte* reexamination. Requester notes an inability to present information related to anticipation of the Flick '278 patent at trial. Additionally, Requester continues to discover new references that anticipate the Flick '278 patent. The submission of additional prior art patents and printed publications in the third party Requester's reply is specifically described in MPEP § 2251: "If the patent owner files a statement in a timely manner, the third party requester is given a period of 2 months from the date of service to reply. Since the statute, 35 U.S.C. § 304, provides this time period, there will be no extensions. The reply need not be limited to issues raised in the statement. *The reply may include additional prior art patents and printed publications and may raise any issue appropriate for reexamination.*" (MPEP § 2251, emphasis added). As such, Requester has provided additional prior art references as discussed further below.

Obviousness combinations as discussed in the Request for Reexamination and as discussed below, still raise a substantial new question of patentability. Although Patent Owner has not yet identified any evidence of such, Requester anticipates Patent Owner to submit secondary indicia of nonobviousness evidence. Requester respectfully submits comments based on secondary indicia of nonobviousness the Patent Owner has submitted in prior proceedings.

Requester respectfully submits the litigation documents have no relevance on the pending reexamination of the Flick '278 patent and urges the Examiner to carefully evaluate all submissions of "evidence" made by Requester to establish a nexus

between any submitted evidence (including declaration evidence) and the specific claims for which questions of patentability have been raised in the instant *ex parte* reexamination.

B. Other Irrelevant PTO Proceedings

The function of the Patent Office is greatly enhanced by access to the most relevant prior art during the examination of patent applications. Accordingly, Requester has used mechanisms provided by statute in providing relevant prior art to the United States Patent Office to assist with evaluating the novelty and non-obviousness of submitted claims.

Specifically, Requester would like to respond to the Patent Owner's disparaging comments regarding an unrelated patent filing: "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.." (Patent Owner's Statement, pages 3 – 4). As shown below, figures reproduced were clearly labeled as prior art in the Chen et al. '173 patent and were attributed to the Patent Owner's patent: "FIG. 1 illustrates the vehicle tracking unit illustrated in FIG. 36 of U.S. Pat. No. 6,924,750. FIG. 2 illustrates the method shown in FIG. 37 of U.S. Pat. No. 6,924,750." (Chen et al. '173 patent, col. 2, lines 56 – 58). The disclosure of the Chen et al. '173 patent states: "[s]ome of the disclosure that was added to U.S. Pat. No. 6,924,750 is as follows (col. 37, lines 1 – 49) ..." and then quotes several paragraphs from U.S. Pat. No. 6,924,750. (Chen et al. '173 patent, col. 2, lines 3 – 55). The claims in the Chen et al. '173 patent recite a patentably distinct invention.

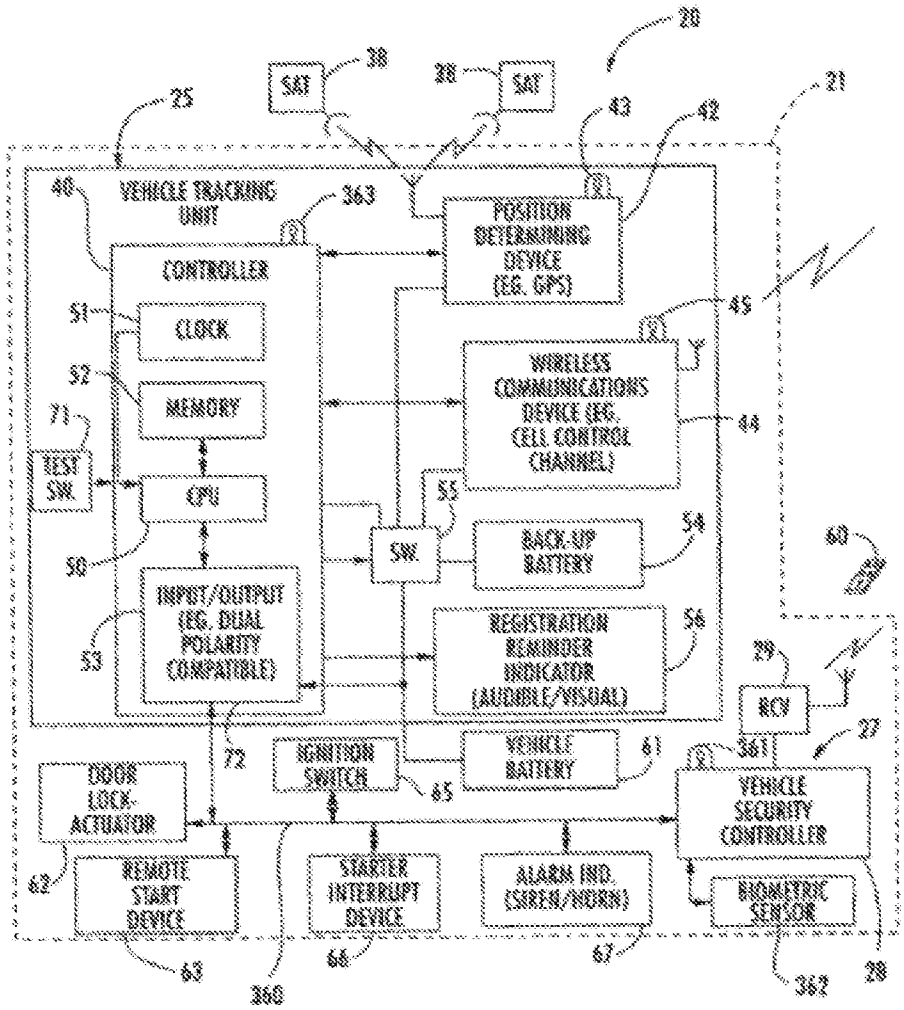


FIG. 1
(Prior Art)

FIG. 1 of the Chen et al. '173 patent

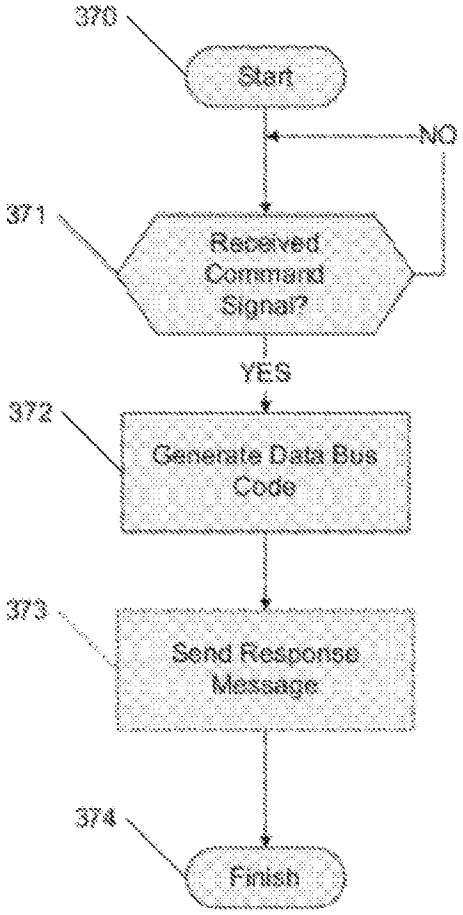


FIG. 2
(Prior Art)

FIG. 2 of the Chen et al. '173 patent

Furthermore, unlike the Patent Owner has implied, there is nothing nefarious in properly citing prior art in a patent disclosure. The existence of the Chen et al. '173

patent has no bearing on the pending reexamination of the Flick '278 patent and the Patent Owner's submission regarding the Chen et al. '173 patent further highlights the clear need to scrutinize all submissions made by Patent Owner to ascertain a clear nexus between the submitted assertions/evidence and the claims of the Flick '278 patent.

II. The Prior Art References Determined by the Patent Office to Raise a Substantial New Question of Patentability

Referring again to the Order Granting *Ex* Parte Reexamination, the Examiner determined several patents submitted in the Request for *Ex Parte* Reexamination of U.S. Patent 8,032,278 raise substantial new questions of patentability of claims 1 – 22: U.S. Patent No. 6,028,537 to Suman et al. (the Suman et al. '537 patent); U.S. Patent No. 5,732,074 to Spaur et al. (the Spaur et al. '074 patent); U.S. Patent No. 5,557,254 to Johnson et al. (the Johnson et al. '254 patent); U.S. Patent No. 5,208,756 to Song (the Song '756 patent); and U.S. Patent No. 5,877,724 to Davis (the Davis '724 patent) (Order Granting Request for *Ex Parte* Reexamination, pages 5 – 7). The Patent Owner disputes these patents raise substantial new questions of patentability on a variety of bases that are addressed in detail below.

A. The Spaur et al. '074 Patent and the Davis '724 Patent Raise Substantial New Questions of Patentability

The Spaur et al. '074 patent and the Davis '724 patent were not previously considered by the Examiner in the prosecution of the Flick '278 patent. The Patent Owner's Statement contends "[t]he 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 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." (Patent Owner's Statement, p. 6 – 7).

The disclosure of U.S. Patent No 7,366,893 is not the same as that of the Spaur et al. '074 patent nor is the disclosure of U.S. Patent No. 6,611,755 the same as Davis

'724 patent. Additionally, the Patent Owner fails to identify within these references considered during prosecution the relevant teachings from the Spaur et al. '074 patent and the Davis '724 patent that raise new questions of patentability with respect to the Flick '278 patent. The mere fact that a patent is assigned to the same entity as another patent considered during prosecution is irrelevant to the analysis of whether the reference raises a substantial new question of patentability. Furthermore, MPEP § 2216 allows the use of previously considered art to find a substantial new question of patentability in an *ex parte* reexamination if the previously considered reference is presented in a new light or a different way: "The legal standard for ordering *ex parte* reexamination, as set forth in 35 U.S.C. 303(a), requires a substantial new question of patentability. The substantial new question of patentability may be based on art previously considered by the Office if the reference is presented in a new light or a different way that escaped review during earlier examination." (MPEP § 2216). Accordingly, Patent Owner's submissions are inadequate to establish that the questions of patentability raised by the Spaur et al. '074 patent and the Davis '724 patent were questions clearly considered during the prosecution of the Flick '278 patent.

B. The Suman et al. '537 Patent Raises a Substantial New Question of Patentability

The Suman et al. '537 patent was not previously considered by the Examiner during the prosecution of the Flick '278 patent. The Patent Office requires the submission of an Information Disclosure Statement (MPEP § 609). As illustrated below in FIG. 3, the Suman et al. '537 patent was not submitted to the USPTO in an Information Disclosure Statement during the prosecution of the Flick '278 patent.

Receipt date: 07/03/2007 11773272 - GAU: 3661

Sheet 1 of 1

SUBSTITUTE FORM PTO-1449A LIST OF PATENTS AND APPLICANT'S INFORMATION DISCLOSURE STATEMENT	Atty Docket:	56106CIP1
	Serial No.:	Not Yet Assigned
	Applicant:	FLICK
	Filing Date:	Herewith
	Group:	

U.S. PATENT DOCUMENTS

Examiner Initials		Document Number	Date	Name	Class	Sub Class	Filing Date
/CHN/	AA	6,756,885	6/29/04	Flick	340	426.1	
/CHN/	AB	6,011,460	1/4/00	Flick	340	426	
/CHN/	AC	5,719,551	2/17/98	Flick	340	426	
/CHN/	AD	5,854,588	8/5/97	Flick	340	426	
/CHN/	AE	5,515,043	5/7/96	~~Flick~~ Berard et al.	340	988	
/CHN/	AF	5,223,844	6/29/93	~~Flick~~ Mansell et al.	342	357	
	AG						
	AH						
	AI						
	AJ						
	AK						
	AL						

Change(s) applied to document. /S.R.R./ 7/29/2011

FOREIGN PATENT DOCUMENTS

		Document Number	Date	Country	Class	Sub Class	Translation
	AM						
	AN						
	AO						
	AP						

OTHER ART (Including Author, Title, Date, Pertinent Pages, etc.)

	AQ	
	AR	
	AS	

EXAMINER: /Cuong Nguyen/ (12/21/2009)	DATE CONSIDERED:

*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609; Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

FIG. 3 Information Disclosure Statement for the Fick '278 patent

The Patent Owner explains the failure to submit the Suman et al. '537 patent in an Information Disclosure Statement in compliance with 37 C.F.R. §§ 1.97 and 1.98 on the basis that the submission of the Suman et al. '537 patent was not required based

upon MPEP § 609.02 II(A) "IDS That Has Been Considered (1) in the Parent Application" (Patent Owner's Statement, page 5). Requestor respectfully submits, that the Information Disclosure Statement in which the Suman et al. '537 patent was disclosed in the parent application, U.S. Patent No. 7,720,597 (the Flick '597 patent), was not considered prior to the filing of the Flick '278 patent. Accordingly, MPEP § 609.02 does not apply. MPEP § 609.02 II(B) "IDS That Has Not Been Considered (1) in the Parent Application" governs the treatment of a previously submitted IDS that had not been considered when a continuation application is filed under 37 CFR 1.53(b) and directs that an Information Disclosure Statement should be filed in the continuation application to ensure consideration of the prior art reference.

At the time of filing the application that gave rise to the Flick '278 patent under 37 CFR § 1.53(b) on July 3, 2007, the IDS in the parent application of the Flick '278 patent that referenced the Suman et al. '537 patent had not yet been considered by the Examiner (See Exhibit P, the Flick '278 patent Filing Receipt). This did not occur until almost a year later on May 4, 2008 (see, Exhibit Q, the Flick '579 Information Disclosure Statement). MPEP § 609.02 II(B) "IDS That Has Not Been Considered (1) in the Parent Application" states in relevant part:

> "2. Continuation Applications, Divisional Applications, or Continuation-In-Part Applications Filed Under 37 CFR 1.53(b)
>
> For these types of applications, in order *to ensure consideration of information previously submitted, but not otherwise considered, in a parent application, applicant must resubmit the information in the continuing application in compliance with 37 CFR 1.97 and 37 CFR 1.98.* Pursuant to 37 CFR 1.98(d), if the IDS submitted in the parent application complies with 37 CFR 1.98(a) to (c), copies of the patents, publications, pending U.S. applications, or other information submitted in the parent application need not be resubmitted in the continuing application." MPEP § 609.02 II(B)(2) (emphasis added).

At the time of the filing of the application giving rise to the Flick '278 patent in accordance with 37 CFR § 1.53(b), Patent Owner did file an Information Disclosure Statement that does not reference the Suman et al. '537 patent or make any reference to its parent application. When the Flick '278 patent was filed, MPEP § 609.02 II(B) directs that the Suman et al. '537 patent should have been listed in the accompanying Information Disclosure Statement to ensure that it was considered. No additional

Information Disclosure Statements were made by Patent Owner prior to the close of prosecution in the Flick '278 patent.

Furthermore, Patent Owner's misplaced reliance on MPEP § 609.02 II(A) as evidence that the Suman et al. '537 patent was considered during the prosecution of the Flick '278 patent ignores the requirement in MPEP § 2001.06(b) "Information Relating to or From Copending United Sates Patent Applications" that "[T]he examiner must indicate in the first Office action whether the prior art in a related earlier application has been reviewed." Requestor respectfully submits that the first Office action issued during the prosecution of the Flick '278 patent does not contain any indication that any prior art of record in the Flick '597 patent was considered prior to the issuance of the first Office action in the Flick '278 patent.

In view of the above, Applicant respectfully submits that Patent Owner's assertion that the Suman et al. '537 patent was considered by the Examiner during the prosecution of the Flick '278 patent appears to be based upon an incorrect understanding of the relevant provisions of the MPEP. The absence of an indication that the Suman et al. '537 patent was considered by the Examiner in the first Office action of the Flick '278 patent or on the patent as issued is clear evidence that the Suman et al. '537 patent was not considered during the prosecution of the Flick '278 patent. If the Patent Owner had wished to ensure that the USPTO considered the Suman et al. '537 patent in the Examination of the Flick '278 patent, the MPEP clearly directs that the Patent Owner should have resubmitted the Suman et al. '537 patent in an Information Disclosure Statement. Requester also reiterates the comment above that prior art considered in a new light or a different way can raise substantial new questions of patentability.

In view of the above, Applicant respectfully submits that the Examiner's conclusion that the Suman '537 patent raises a substantial new question of patentability is clearly correct.

C. The Johnson et al. '254 Patent Raises a Substantial New Question of Patentability

The Johnson et al. '254 patent was not previously considered by the Examiner during the prosecution of the Flick '278 patent. The Patent Owner sates: "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. 5,986,54. And, the '543 patent (having the same disclosure as the Johnson et al. '245 patent) is cited in the Flick '597 and Flick '561 patents." (Patent Owner's Statement, p. 6).

The Patent Owner states the Johnson et al. patent family (i.e. U.S. Patent No. 5,986,543 to Johnson (the Johnson '543 patent)) was considered during the prosecution of U.S. Patent No. 6,606,561 to Flick (the Flick '561 patent). Requester reviewed the prosecution history of the Flick '561 patent, and must confess an inability to locate a reference the Johnson '543 patent (or to locate the other Johnson et al. patents referenced by the Patent Owner). Neither the Johnson '254 patent nor any member of the Johnson '254 patent family (e.g. the Johnson '543 patent) is listed on the Flick '597 patent, or in any Information Disclosure Statement or listings of search results contained within the prosecution history of the Flick '597 patent. Accordingly, Requester finds no evidence the Johnson et al. '543 patent was considered during the prosecution of the Flick '561 patent.

The Patent Owner also makes the argument that its failure to submit the Johnson et al. '254 patent is based upon the submission of a related Johnson patent in an Information Disclosure Statement during the prosecution of the parent application of the Flick '278 patent (see discussion of the Suman et al. '537 patent above). As discussed above with respect to the Suman et al. '537 patent, the Information Disclosure Statement of the parent application had not yet been considered at the time of filing the Flick '278 patent. Additionally, the first Office action issued during the prosecution of the Flick '278 patent provides no indication that the Johnson et al. '254 patent nor any other member of the Johnson et al. '254 patent family was considered during the prosecution of the Flick '278 patent. MPEP § 2001.06(b) requires that the first Office action provide an indication that prior art references cited in a related application were considered during the examination. Accordingly, the prosecution history of the Flick '278 patent clearly establishes that neither the Johnson et al. '254 patent nor any other

member of the Johnson et al. '254 patent family was considered during the prosecution of the Flick '278 patent.

Furthermore, prior art considered in a new light or a different way can raise substantial new questions of patentability. For at least the reasons discussed above, the Johnson et al. '254 patent raises a substantial new question of patentability.

III. The Claims Are Not Patentable in View of the Prior Art References

A. The Claims are Not Patentable over the Suman et al. '537 Patent

The Request for *Ex* Parte Reexamination of U.S. Patent 8,032,278 asserts that the Suman et al. '537 patent anticipates claims 1 – 22 of the Flick '278 patent and the Order Granting Request for *Ex Parte* Reexamination of U.S. Patent 8,032,278 agrees that the Suman et al. '537 patent raises substantial new questions of patentability claims 1 – 22 of the Flick '278 patent. Patent Owner's Statement simply makes conclusory assertions that specific limitations of the claims of the Flick '278 patent are not disclosed by the Suman et al. '537 patent. Furthermore, the Patent Owner's Statement provides no explanation as to why the portions of the Suman et al. '537 patent identified in the Request for *Ex Parte* Reexamination of U.S. Patent 8,032,278 fail to disclose the relevant claim limitations. Accordingly, the Patent Owner's Statement is insufficient to call into question the conclusions of the Order Granting Request for *Ex Parte* Reexamination that the Suman et al. '537 patent raises a new question of patentability, or that the Suman et al. '537 patent renders claims 1 – 22 of the Flick '278 patent invalid, because Patent Owner's Statement fails to address the merits of the analysis underlying these conclusions.

In addition, the Patent Owner's Statement describes the Suman et al. '537 patent as teaching a vehicle accessory control system: "[t]o 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 the control program." (Patent Owner's Statement, page 7). This is a mischaracterization of the teachings of the Suman et al. '537 patent, which describes a

vehicle control system which, in addition to controlling accessories, communicates via a bus with vehicular components: "The vehicle 20 includes a data bus line 42 which is coupled to a vehicle bus interface circuit 36, which is a multiplex circuit coupled to a variety of system sensors and provides signals to a bus 24 coupling the circuits of the present invention. The bus interface circuit 36, therefore, receives signals from, for example, the vehicle's fuel gauge, the speedometer input, the air bags, and other vehicle operating parameters." (Suman et al. '537 patent, column1, lines 47 – 48, column 8, lines 60 – 65).

In addition, the term "vehicle device" as recited in claims 1 – 22 of the Flick '278 patent, when given its broadest reasonable interpretation, clearly encompasses any device connected to the vehicle bus and that a technical distinction between devices connected by the original manufacturer and devices connected aftermarket (e.g. an accessory) must be incorporated within the claim for such a distinction to be a valid factor in evaluating the validity of the claims.

Furthermore, under the broadest reasonable interpretation, a multi-vehicle compatible tracking unit as recited in claims 1 – 22 of the Flick '278 patent could be compatible with ***multiple vehicles of the same year, make, and/or model***. If the Patent Owner disagrees with this interpretation, the Requester urges the Examiner to require the Patent Owner to clarify the meaning of the claim term "multi-vehicle" unambiguously so that the patent claims adequately provide public notice as to the meaning of the claims.

The above need for clarification aside, the SAE standard J1850 bus referenced in the Suman et al. '537 patent is "universally used in the automotive industry" (Suman et al. publication, column 37 lines 15 – 17) and therefore is used in many different vehicle year, makes, and models. Thus, narrowing claim amendments requiring that the multi-vehicle compatible controller control different types of vehicle devices in different years, makes, and models of vehicles does not cure the invalidity of claims 1 – 22 of the Flick '278 patent.

Furthermore, the Patent Owner's Statement provides no explanation as to why the portions of the Suman et al. '537 patent identified in the Request for *Ex Parte* Reexamination of U.S. Patent 8,032,278 fail to disclose the relevant claim limitations.

Accordingly, the Patent Owner's Statement is insufficient to call into question the conclusions of the Order Granting Request for *Ex Parte* Reexamination that the Suman et al. '537 patent raises a new question of patentability, and renders claims 1 – 22 of the Flick '278 patent invalid, because Patent Owner's Statement fails to address the merits of the analysis underlying these conclusions.

B. The Claims are Not Patentable over the Spaur et al. '074 Patent

Requester respectfully states that the Spaur et al. '074 patent anticipates claims 1 – 22 in the Flick '278 patent. The Patent Owner's Statement includes the following discussion of the Spaur et al. '074 patent:

"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." (Patent Owner's Statement, page 9).

The Requester is confused by this statement. The above referenced portion of the Spaur et al. '074 teaches connecting the disclosed multi-vehicle compatible controller to a CAN bus. However the Spaur et al. '074 reference is not limited to disclosing CAN buses and teaches that the multi-vehicle compatible controller can connect with any of a variety of standardized buses: "[o]ther available networks could be utilized instead of the CAN, such as Arcnet, which has a protocol similar to CAN". (Spaur et al. '074 patent, column 4, lines 5 – 7). Standardized vehicle data buses include the CAN bus standard published by the CAN in Automation group. Standardized vehicle data buses also include the SAE J1850 bus standard published by the Society of Automotive Engineers.

If the Patent Owner is suggesting "an IP address or designation" means that a CAN bus is not a vehicle data bus, such a distinction appears to be inconsistent with the

broadest reasonable interpretation of the claim term "vehicle data bus" as wiring within a vehicle that can be shared by multiple vehicle devices to send data without conflict. If Patent Owner disagrees with this construction, then it should amend the claims to clearly and unambiguously identify what is intended.

Of specific concern is the fact that the Patent Owner's proposed claim construction for the term "vehicle data bus" (see Exhibit C of the Patent Owner's Statement dated January 8, 2016) is a "wired connection for communication of digital messages among vehicle devices, with each message including one or more device addresses" (Patent Owner's Statement, page 198). Accordingly, Requester submits that Patent Owner requires a vehicle data bus to use an address. Requester further notes that an IP address as described in the Spaur '074 patent constitutes an address that is utilized to identify and communicate with vehicle devices connected to a vehicle data bus extending throughout the vehicle. The lack of specificity in the claim language is affording Patent Owner the potential to take differing positions regarding the meaning of the claims before the USPTO and in litigation.

In the event that Patent Owner does not believe that communication with vehicle devices via a CAN bus satisfies the requirements of the claim or the term "vehicle data bus" or it variants as used in the many related and commonly assigned patent applications of the Patent Owner, Requester asks that the Examiner require the Patent Owner to clearly and unambiguously state in the record that a multi-vehicle compatible controller that communicates with one or more vehicle devices via a CAN bus cannot satisfy the requirements of "a multi-vehicle compatible controller... coupled to the vehicle data bus for communication" as recited in claim 1 of the Flick '278 patent or similar requirements in the claims of the other patents that it owns. In the absence of such a disclaimer, Requester respectfully submits that the technical distinction between communicating via a CAN bus in the manner disclosed in the Spaur et al. '074 patent and the vehicle data bus recited in the claims be explicitly incorporated within the claims so as to serve a public notice as to the true scope of the claims.

In considering this issue, Requester further notes that, since 1991, the CAN specification has required support for two message formats that can be present on any given vehicle's CAN bus (i.e. the CAN 11-bit message format and CAN 29-bit message

format). Therefore, communication via the CAN bus requires support for a plurality of different message formats for the different vehicle devices that may be present on any of the myriad of year, make, and model of vehicles that support the CAN bus, which includes a significant percentage of the vehicles sold in the U.S. dating back to 1991 and almost every passenger vehicle sold in the U.S. since 2008 due to Federal mandate.

Furthermore, the Patent Owner's Statement provides no explanation as to why the portions of the Spaur et al. '074 patent identified in the Request for *Ex Parte* Reexamination of U.S. Patent 8,032,278 fail to disclose the relevant claim limitations. Accordingly, the Patent Owner's Statement is insufficient to call into question the conclusions of the Order Granting Request for *Ex Parte* Reexamination that the Spaur et al. '074 patent raises a new question of patentability, and renders claims 1 – 22 of the Flick '278 patent invalid, because Patent Owner's Statement fails to address the merits of the analysis underlying these conclusions.

C. The Claims are Not Patentable over the Prior Art of Record in Combination with the Johnson et al. '254 Patent

The Request for *Ex Parte* Reexamination of U.S. Patent 8,032,278 asserts that the Johnson et al. '254 patent in combination with other references renders obvious claims 1 – 22 of the Flick '278 patent and the Order Granting Request for *Ex Parte* Reexamination agrees that the Jonson et al. '254 patent raises substantial new questions of patentability. Patent Owner's Statement simply makes conclusory assertions that specific limitations of the claims of the Flick '278 patent are not disclosed by the Johnson '254 et al. patent. Furthermore, the Patent Owner's Statement provides no explanation as to why the portions of the Johnson '254 patent identified in the Request for *Ex Parte* Reexamination of U.S. Patent 8,032,278 fail to disclose the relevant claim limitations. Accordingly, the Patent Owner's Statement is insufficient to call into question the conclusions of the Order Granting Request for *Ex Parte* Reexamination that the Johnson et al. '254 patent raises a new question of patentability, and renders claims 1 – 22 of the Flick '278 patent invalid, because Patent Owner's Statement fails to address the merits of the analysis underlying these conclusions.

D. The Claims are Not Patentable over the Prior Art of Record in Combination with the Song '756 Patent

The Request for *Ex Parte* Reexamination of U.S. Patent 8,032,278 asserts that the Song '756 patent in combination with other references renders obvious claims 1 – 22 of the Flick '278 and the Order Granting Request for *Ex Parte* Reexamination agrees that the Song '756 patent raises substantial new questions of patentability. Patent Owner's Statement simply makes conclusory assertions that specific limitations of the claims of the Flick '278 patent are not disclosed by the Song '756 patent. Furthermore, the Patent Owner's Statement provides no explanation as to why the portions of the Song '756 patent identified in the Request for *Ex Parte* Reexamination of U.S. Patent 8,032,278 fail to disclose the relevant claim limitations. Accordingly, the Patent Owner's Statement is insufficient to call into question the conclusions of the Order Granting Request for *Ex Parte* Reexamination that the Song '756 patent raises a new question of patentability, and renders claims 1 – 22 of the Flick '278 patent invalid, because Patent Owner's Statement fails to address the merits of the analysis underlying these conclusions.

E. The Claims are Not Patentable over the Prior Art of Record in Combination with the Davis '724 Patent

The Request for *Ex Parte* Reexamination of U.S. Patent 8,032,278 asserts that the Davis '724 patent in combination with other references renders obvious claims 1 – 22 of the Flick '278 and the Order Granting Request for *Ex Parte* Reexamination agrees that the Davis '724 patent raises substantial new questions of patentability. Patent Owner's Statement simply makes conclusory assertions that specific limitations of the claims of the Flick '278 patent are not disclosed by the Davis '724 patent. Furthermore, the Patent Owner's Statement provides no explanation as to why the portions of the Song '756 patent identified in the Request for *Ex Parte* Reexamination of U.S. Patent 8,032,278 fail to disclose the relevant claim limitations. Accordingly, the Patent Owner's Statement is insufficient to call into question the conclusions of the Order Granting Request for *Ex Parte* Reexamination that the Davis '724 patent raises a new question of

patentability, and renders claims 1 – 22 of the Flick '278 patent invalid, because Patent Owner's Statement fails to address the merits of the analysis underlying these conclusions.

F. Evidence Regarding Litigation Proceedings

The Patent Owner's Statement recites: "[t]he Patent Owner directs the Examiner to page 11 of Exhibit D, including the Court's ruling on CalAmp's summary judgment motion for invalidity." (Patent Owner's Statement, page 14). The Patent Owner's Statement goes on to make comments regarding Mr. Andrews, a technical expert for CalAmp (Patent Owner's Statement, page 15). As discussed above, only a final court ruling of invalidity or unenforceability is binding on the Patent Office. (MPEP § 2286 IV). The documents referenced by Patent Owner simply indicate that the district court did not rule that the Flick '278 patent is invalid on summary judgment. Furthermore, Patent Owner's selective submission of documents regarding the litigation proceedings highlights the reason that consideration of such materials is inappropriate. Requester respectfully submits that the basis of the Request for *Ex* Parte Reexamination of the Flick '278 patent is entirely set out in the request and that any information related to concurrent litigation proceedings that is not a final ruling of invalidity or unenforceability must be disregarded.

IV. The Claims of the Flick '278 patent are not Entitled to the Benefit of Earlier Priority Dates

Before discussing newly identified prior art references that raise additional substantial new questions of patentability with respect to claims 1 – 22 of the Flick '278 patent, Requester observes that claims 1 – 22 of the Flick '278 patent are not entitled to the benefit of the priority dates of any of the applications to which the Flick '278 claims priority. MPEP § 201.08 states "[a] continuation-in-part is an application filed during the lifetime of an earlier nonprovisional application, repeating some substantial portion or all of the earlier nonprovisional application and adding matter not disclosed in the said earlier nonprovisional application." MPEP § 211.05(B) states "[o]nly the claims of the continuation-in-part application that are disclosed in the manner provided by 35 U.S.C.

§ 112(a) in the prior-filed application are entitled to the benefit of the filing date of the prior-filed application. If there is a continuous chain of copending nonprovisional applications, each copending application must disclose the claimed invention of the later-filed application in the manner provided by 35 U.S.C. § 112(a) in order for the later-filed application to be entitled to the benefit of the earliest filing date." Priority is claimed in the Flick '278 patent as follows (notations added in parenthesis):

> "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 (the Flick '597 patent, Exhibit A), 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 (the Flick '623 patent, Exhibit B), 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 (the Flick '561 patent, Exhibit C) which, in turn, was based upon provisional patent application Ser. Nos. 60/264,811 filed on Jan. 29, 2001 (the Flick '811 provisional, Exhibit D); 60/258,005, filed Dec. 22, 2000 (the Flick '005 provisional, Exhibit E); 60/251,552, filed Dec. 6, 2000 (the Flick '552 provisional, Exhibit F); 60/252,125, filed Nov. 20, 2000 (the Flick '125 provisional, Exhibit G); 60/236,890, filed Sep. 29, 2000 (the Flick '890 provisional, Exhibit H); 60/246,463, filed Nov. 7, 2000 (the Witham provisional, Exhibit I); 60/222,777, filed Aug. 3, 2000 (the Flick '777 provisional, Exhibit J); and 60/205,178, filed May 17, 2000 (the Flick '178 provisional, Exhibit K), the entire contents of each of which are incorporated herein by reference."

The failure of each of the applications referenced above to disclose the subject matter claimed in the Flick '278 patent is detailed below.

A. New Material Added and Claimed in the Flick '278 Patent

It is respectfully submitted that none of the claims of the Flick '278 patent are entitled to the priority date of any of the prior-filed applications. Requester notes that FIGS. 10 – 15 and the accompanying discussion beginning on col. 23, line 41 first appears in the Flick '278 patent.

Claim 1 of the Flick '278 patent requires a "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 further requires "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." (emphasis added) Similar language appears in independent claims 13 and 18 of the Flick '278 patent. Requester notes that support for the cited aspects of claim 1 first appear in FIGS. 10 – 15 and col. 24, lines 4 – 13 of the Flick '278 patent. None of the figures or the associated disclosure appears in any of the applications to which the Flick '278 patent claims priority.

B. Failure of Flick '178 and Flick '777 Provisionals to Disclose Claims 1 – 22

Turning first to the priority claims to the provisional applications, neither the Flick '178 provisional (filed May 17, 2000) nor the Flick '777 provisional (filed August 3, 2000), disclose "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" or a "vehicle data bus" as required in claims 1 – 22 of the Flick '278 patent. Accordingly, Requester respectfully submits that the Flick '278 patent is not entitled to the priority date of these provisionals.

C. Failure of the Witham '463 Provisional to Disclose Claims 1 – 22

Turning now to the Witham '463 provisional (filed November 7, 2000), Requester notes that there appears to be an error in the priority claim of the Flick '278 patent. The Witham '463 provisional is titled "Slide Apparatus for Machine Tools" to Kurt Witham, Scott Meyers, and Dale Kennedy. As this application is wholly unrelated to the claimed subject matter of the Flick '278 patent, Requester respectfully submits that the Flick '278 patent is not entitled to the priority date of the Witham '463 provisional. To the extent that Patent Owner may wish to correct this error, Requester respectfully notes that this cannot be corrected as the time period for correction under 35 U.S.C. § 1.78 (later of four months from the actual filing date of the application or 16 months from the filing date of the prior-filed application) has long since passed.

D. Failure of Flick '890, Flick '125 and Flick '552 Provisionals to Disclose Claims 1 - 22

Neither the Flick '890 provisional (filed Sep. 29, 2000), the Flick '125 provisional (filed Nov. 20, 2000), nor the Flick '552 provisional (filed Dec. 6, 2000) disclose "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" or a "vehicle data bus" as required in claims 1 – 22 of the Flick '278 patent. Accordingly, Requester respectfully submits that the Flick '278 patent is not entitled to the priority date of these provisionals.

E. Failure of Flick '005 Provisional to Disclose Claims 1 – 22

The Flick '005 provisional (filed Dec. 22, 2000) contains the following disclosure (notations added in parenthesis):

> "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." (Flick '005 provisional, p. 35, lines 22 – 29).

Requester is unable to locate any teaching in U.S. Patent 5,719,551 (the Flick '551 patent, Exhibit L) or U.S. Patent 6,011,460 (the Flick '460 patent, Exhibit M) patent with respect to "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" as in claim 1. Specifically, Requester cannot locate any disclosure with the Flick '551 patent or the Flick '460 patent with respect to "downloading of enabling data related to the at least one corresponding vehicle device code" used by the multi-vehicle compatible controller for communication over the vehicle data bus with at least one vehicle device as in claim 1. Accordingly, Requester respectfully submits that the Flick '551 patent and the Flick '460 patent fail to provide written description support for the cited claim language in accordance with 35 U.S.C. § 112. To the extent Patent Owner may attempt to utilize the disclosure of the Flick '551 patent or the Flick '460 patent to support the cited claim language, Requester respectfully notes that MPEP § 608.01 states:

> "Mere reference to another application, patent, or publication is not an incorporation of anything therein into the application containing such reference for the purpose of the disclosure required by 35 U.S.C. 112. *In re de Seversky*, 474 F.2d 671, 177 USPQ 144 (CCPA 1973). 37 CFR 1.57(c)(1) limits a proper incorporation by reference (except as provided in

> 37 CFR 1.57(b)) to instances only where the perfecting words "incorporated by reference" or the root of the words "incorporate" (e.g., incorporating, incorporated) and "reference" (e.g., referencing) appear."

Accordingly, the disclosures of the Flick '551 patent and the Flick '460 patent do not form part of the disclosure of the Flick '005 provisional. The Flick '005 provisional does not make any statements attempting to incorporate the disclosure of either the Flick '551 patent or the Flick '460 patent by reference in a manner satisfying the requirements of 37 CFR § 1.57.

Despite generally referencing that "the tracking device may communicate with one or more other vehicle devices via a vehicle data communications bus", Applicant respectfully submits that the Flick '005 provisional does not provide written description support for claims 1 – 22 of the Flick '278 patent. Specifically, the Flick '005 provisional fails to disclose a "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." Accordingly, claims 1 – 22 of the Flick '278 patent are not entitled to the benefit of the filing date of the Flick '005 provisional.

F. Failure of Flick '811 Provisional to Disclose Claims 1 – 22

The Flick '811 provisional (filed Jan. 29, 2001) makes the following statement regarding communicating via a vehicle data communication bus, similar to that made in the Flick '005 provisional:

> "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 15 described in U.S. Patent Nos. 5,719,551 and 6,011,460 assigned to the assignee of the present invention." (Flick '811 provisional, p. 35, lines 10 – 16).

For reasons including those stated above with respect to the Flick '005 provisional, Requester respectfully submits that the '811 provisional fails to provide written description support for claims 1 – 22 of the Flick '278 patent for reasons

including that the Flick '811 provisional does not disclose a "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***" or "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." Accordingly, claims 1 – 22 of the Flick '278 patent are not entitled to the benefit of the filing date of the Flick '811 provisional.

G. Failure of Flick '597, Flick '623, and/or Flick '561 Patents to Disclose Claims 1 – 22

As outlined above, claims 1 – 22 of the Flick '278 patent are not entitled to the benefit of the priority dates of any of the provisional applications to which the Flick '278 patent claims priority. Requester is also unable to locate any language or support in any of the Flick '597 patent, Flick '623 patent, and/or Flick '561 patent for the language of claims 1 – 22 of the Flick '278 patent. Additionally, Applicant respectfully notes that no attempt to incorporate the Flick '551 or Flick '460 patents by reference is made in the Flick '597 patent, the Flick '623 patent, or the Flick '561 patent.

As noted above, claims 1 – 22 of the Flick '278 patent rely upon new figures and disclosure first added to the Flick '278 patent for support. None of the Flick '597, Flick '623, or Flick '561 patents disclose a "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***" or "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." Accordingly, Requester respectfully submits that claims 1 - 22 of the Flick '278 patent are not entitled to claim priority to the filing dates of the Flick '597 patent, the Flick '623 patent, or the Flick '561 patent. Furthermore, Requester submits that the earliest priority date to which any of claims 1 – 22 of the Flick '278 patent are entitled to is July 3, 2007 (i.e. the filing date of the Flick '278 patent).

V. Flick '551, Flick '460, and Flick '885 Patents are Applicant-Admitted Prior Art

The Flick '278 patent contains the following disclosure regarding the Flick '551 and Flick '460 patent along with U.S. Patent No. 6,756,885 (the Flick '885 patent) in a section titled "Background of the Invention":

> "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." (Flick '278 patent, col. 2, lines 17 – 41).

Accordingly, the Flick '551 patent, the Flick '460 patent, and the Flick '885 patent are applicant-admitted prior art in accordance with MPEP § 2129 ("A statement by an applicant in the specification or made during prosecution identifying the work of another as "prior art" is an admission which can be relied upon for both anticipation and obviousness determinations, regardless of whether the admitted prior art would otherwise qualify as prior art under the statutory categories of 35 U.S.C. 102."). In the event that Patent Owner attempts to rely upon the disclosures of the Flick '551, Flick '460, or Flick '885 patents as providing written description support and/or establishing evidence of a constructive reduction to practice of claims 1 – 22 of the Flick '278 patent, Requester notes that such reliance on applicant-admitted prior art is an admission of the invalidity of claims 1 – 22.

While the Flick '551, Flick '460, and Flick '885 patents do not disclose a "vehicle position determining device," the addition of a "vehicle position determining device" to the prior art was deemed insufficient to render claims 1 – 22 patentable during the prosecution of the Flick '278 patent. See the Office Action dated January 5, 2011, p. 2-3, along with Patent Owner's response filed April 5, 2011 (See Exhibit N, the January 5, 2011 Office Action for the Flick '278 patent and see Exhibit O, Patent Owner's April 2, 2011, Office Action Response). Specifically, Patent Owner's response states that the Monroe reference teaches the use of GPS (i.e. a vehicle position determining device) to determine vehicle position information (p. 9) and only disputes the teachings of the Brinkmeyer and Monroe references with respect to a "multi-vehicle compatible controller 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." (p. 10). Accordingly, reliance on the Flick '551, Flick '460, or Flick '885 patents as disclosing a "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" is an admission that the claims of the Flick '278 patent simply involve the obvious addition of a "vehicle position determining device" to applicant-admitted prior art.

VI. Additional References that Raise a Substantial New Question of Patentability

As discussed above, the present Request was filed to enable evaluation of the validity of the Flick '278 patent in large part due to an inability to present information related to anticipation of the Flick '278 patent at trial. Requester continues to locate prior art references relevant to the validity of the Flick '278 patent including three additional references discussed below that anticipate all claims of the Flick '278 patent.

A. Citation of Pertinent and Applicable Additional Prior Art Believed to have Bearing on Patentability

The following additional prior art references, as they would have been understood by one of ordinary skill in the art at the time of invention of the Flick '278 patent, raise substantial new questions of patentability with respect to claims 1 – 22. The following additional prior art references raise substantial new questions of patentability and were not previously considered during the prosecution of the Flick '278 patent:

Title	Hereinafter
U.S. Patent No. 6,009,363 to Beckert et al.	"Beckert et al. '363 patent"
U.S. Patent No. 7,484,008 to Gelvin et al.	"Gelvin et al. '008 patent"
U.S. Publication No. 2001/0033225 to Razavi et al.	"Razavi et al. publication"

A different patent to Gelvin et al. (U.S. Patent 6,859,831) was considered during the prosecution of the Flick '278 patent. Requester respectfully submits that the Gelvin et al. '831 patent does not disclose the system shown in FIG. 3 of the Gelvin et al. '008 patent, which includes significant disclosure regarding connectivity to the vehicle data bus via the OBD-II port (see below).

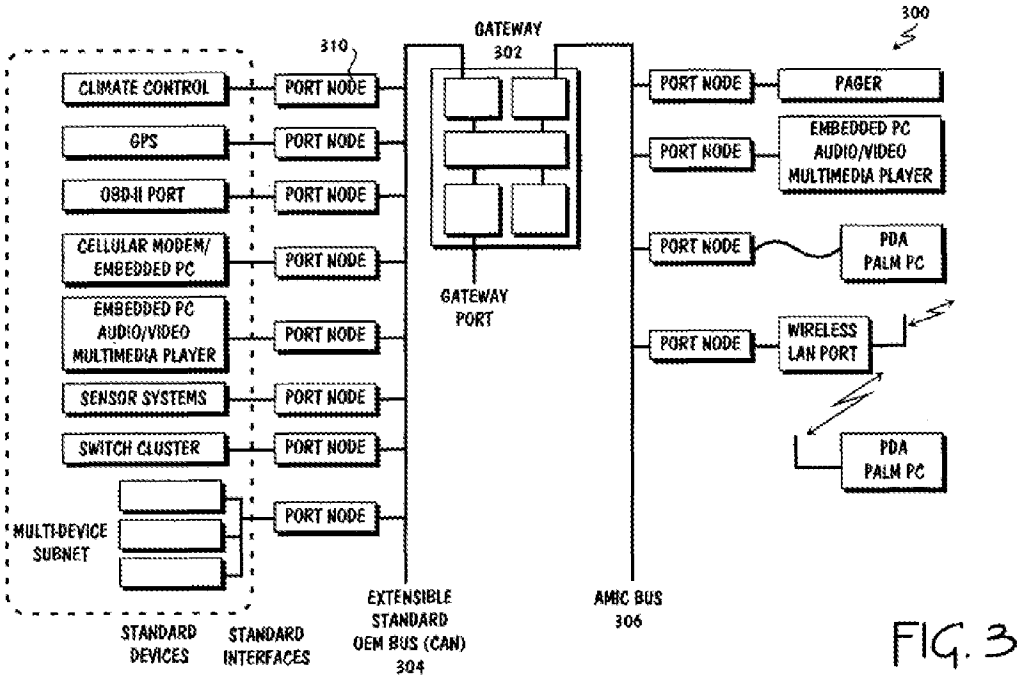


FIG. 3

Accordingly, Requester submits that the disclosure of the Gelvin et al. '008 patent is not cumulative of the disclosure of the Gelvin et al. '831 patent.

B. Statement Pointing Out Each Substantial New Question of Patentability

As explained in greater detail below, 1) the Beckert '363 patent; 2) the Gelvin '008 patent; and 3) the Razavi et al. publication, raise substantial new questions of patentability based on new teachings not previously considered or addressed in the prior examination of the Flick '278 patent.

1. U.S. Patent No. 5,794,164

The Beckert et al. '363 patent issued August 11, 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 the prosecution of the Flick '278 patent. This reference provides a new technological teaching that raises a substantial new question of patentability.

a) Technological Teaching: Transmitting Location Data, Communicating Via One of the OBD II Vehicle Data Bus Protocols, and Downloading Means Downloading Enabling Data

The Beckert et al. '363 patent teaches a vehicle computer system including a wireless communications device, a vehicle location determination device, a downloading interface, and a controller capable of communicating with a variety of vehicle devices via the OBD II standardized vehicle data bus mandated for inclusion in 1996 or later model vehicles. By way of background, at the time of the filing of the Beckert et al. '363 patent, federal mandate required all vehicles to conform to California Code of Regulations (CCR) 1968.1. CCR 1968.1 permitted vehicles to implement three different on-board to off-board network communications protocols:

(1.0) Either SAE Recommended Practice J1850, "Class B Data Communication Network Interface", July, 1995, or ISO 9141-2, "Road vehicles - Diagnostic Systems - CARB Requirements for Interchange of Digital Information," February, 1994, or ISO 14230-4, "Road vehicles - Diagnostic systems - KWP 2000 requirements for Emission-related systems," April, 1996, which are incorporated by reference, shall be used as the on-board to off-board network communications protocol. All SAE J1979 emission related messages sent to the J1978 scan tool over a J1850 data link shall use the Cyclic Redundancy Check and the three byte header, and shall not use inter-byte separation or checksums.

(1968.1 Malfunction and Diagnostic System Requirements—1994 and Subsequent Model-Year Passenger Cars, Light-Duty Trucks, and Medium Duty Vehicles and Engines, p. 36, Exhibit U).

An illustration of the components of the Beckert et al. '363 patent is conceptually shown in FIG. 3:

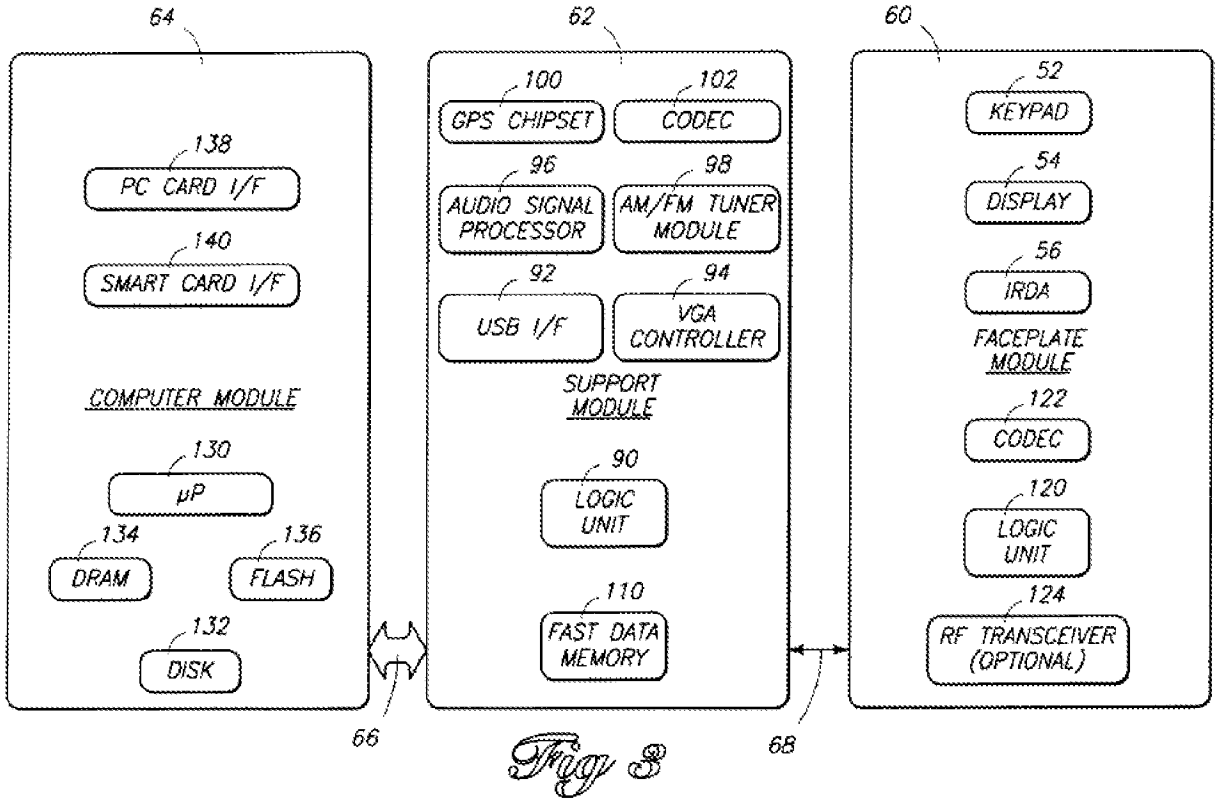


Fig 3

The Beckert et al. '363 patent also incorporates by reference the disclosure of U.S. Patent 5,794,164 to Beckert et al. (the Beckert et al. '164 patent) in its entirety at col. 7, lines 44-51. The Beckert et al. '164 patent provides additional detail concerning the modules of the vehicle computer system disclosed in the Beckert et al. '363 patent and specific detail concerning the OBD interpreter and APIs that are exposed to remote

devices by the vehicle computer system, which include a diagnostic API (amongst others). Thus, the Beckert et al. '363 patent discloses technological teachings that the Examiner previously found to be missing from the prior art of record disclosed in the Flick '278 patent.

b) The Beckert et al. '363 Patent is Analogous Art to the Flick '278 Patent

The Beckert et al. '363 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 data 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...").

c) Substantial New Question of Patentability as to Claims 1 – 22 because the Beckert et al. '363 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 R, the Beckert et al. '363 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 Beckert et al. '363 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 Beckert et al. '363 patent raises a substantial new question of patentability as to claims 1 – 22.

2. U.S. Patent No. 7,484,008

The Gelvin et al. '008 patent issued January 27, 2009 and claims priority to provisional applications filed as early as October 6, 1999. Therefore, the Gelvin et al. '008 patent is prior art to the Flick '278 patent under 35 U.S.C. § 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.

a) Technological Teaching: Transmitting Location Data, Communicating Via One of the OBD II Vehicle Data Bus Protocols, and Downloading Means Downloading Enabling Data

The Gelvin et al. '008 patent teaches a vehicle computer system including a wireless communications device, a vehicle location determination device, a downloading interface, and a controller capable of communicating with a variety of vehicle devices via the OBD II standardized vehicle data bus mandated for inclusion in 1996 or later model vehicles.

At the time of the filing of the Gelvin et al. '008 patent, the specific mandate permitted vehicles to implement the three different on-board to off-board network communications protocols:

> (1.0) Either SAE Recommended Practice J1850, "Class B Data Communication Network Interface", July, 1995, or ISO 9141-2, "Road vehicles - Diagnostic Systems - CARB Requirements for Interchange of Digital Information," February, 1994, or ISO 14230-4, "Road vehicles - Diagnostic systems - KWP 2000 requirements for Emission-related systems," April, 1996, which are incorporated by reference, shall be used as the on-board to off-board network communications protocol. All SAE J1979 emission related messages sent to the J1978 scan tool over a J1850 data link shall use the Cyclic Redundancy Check and the three byte header, and shall not use inter-byte separation or checksums.

(1968.1 Malfunction and Diagnostic System Requirements—1994 and Subsequent Model-Year Passenger Cars, Light-Duty Trucks, and Medium Duty Vehicles and Engines, p. 36, submitted herewith via Information Disclosure Statement).

An illustration of the components of the Gelvin et al. '008 patent is conceptually shown in FIG. 3:

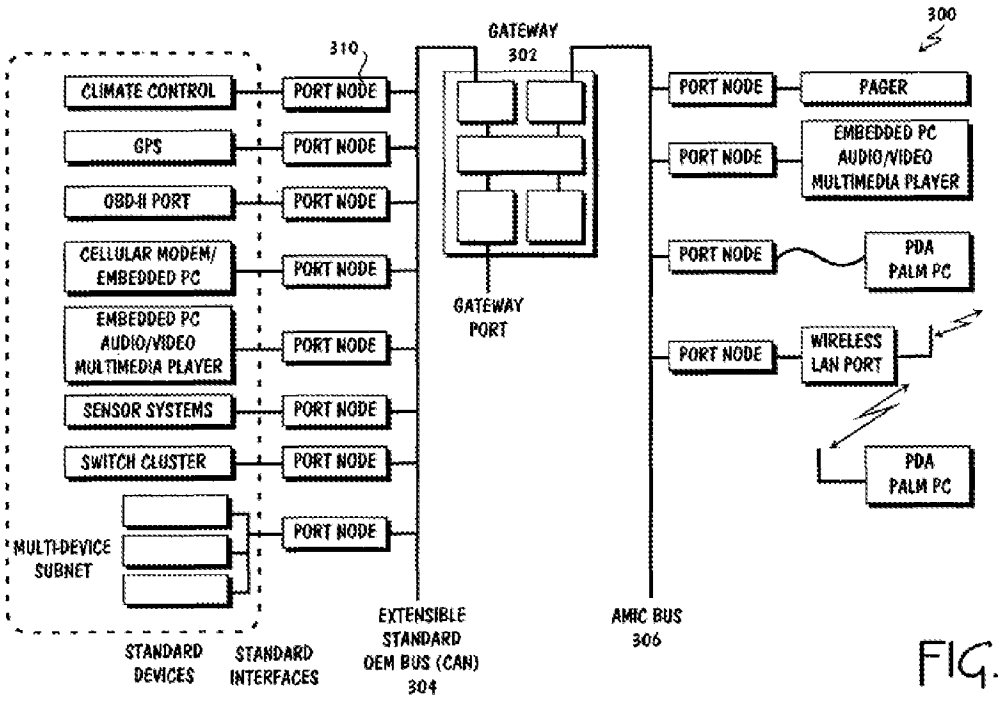


FIG. 3

Thus, the Gelvin et al. '008 patent discloses technological teachings that the Examiner previously found to be missing from the prior art of record disclosed in the Flick '278 patent.

b) The Gelvin et al. '008 Patent is Analogous Art to the Flick '278 Patent

The Gelvin et al. '008 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 data 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...").

c) Substantial New Question of Patentability as to Claims 1 – 22 because the Gelvin et al. '008 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 S, the Gelvin et

al. '008 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 Gelvin et al. '008 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 Gelvin et al. '008 patent raises a substantial new question of patentability as to claims 1 – 22.

3 U.S. Patent Publication No. 2001/0033225

The Razavi et al. publication was published on October 25, 2001 and based upon an application filed on June 14, 1999. Therefore, the Razavi et al. publication 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 the prosecution of the Flick '278 patent. This reference provides a new technological teaching that raises a substantial new question of patentability.

a) Technological Teaching: Transmitting Location Data, Communicating Via One of the OBD II Vehicle Data Bus Protocols, and Downloading Means Downloading Enabling Data

The Razavi et al. publication teaches a system and method for collecting vehicle information including a wireless communications device, a vehicle location determination device, a downloading interface, and a controller capable of communicating with a variety of vehicle devices via the OBD II standardized vehicle data bus mandated for inclusion in 1996 or later model vehicles.

At the time of the filing of the Razavi et al. publication, the specific mandate permitted vehicles to implement the three different on-board to off-board network communications protocols:

(1.0) Either SAE Recommended Practice J1850, "Class B Data Communication Network Interface", July, 1995, or ISO 9141-2, "Road vehicles - Diagnostic Systems - CARB Requirements for Interchange of Digital Information," February, 1994, or ISO 14230-4, "Road vehicles - Diagnostic systems - KWP 2000 requirements for Emission-related systems," April, 1996, which are incorporated by reference, shall be used as the on-board to off-board network communications protocol. All SAE J1979 emission related messages sent to the J1978 scan tool over a J1850 data link shall use the Cyclic Redundancy Check and the three byte header, and shall not use inter-byte separation or checksums.

(1968.1 Malfunction and Diagnostic System Requirements—1994 and Subsequent Model-Year Passenger Cars, Light-Duty Trucks, and Medium Duty Vehicles and Engines, p. 36, submitted herewith via Information Disclosure Statement).

An illustration of the components of the Razavi et al. publication is conceptually shown in FIG. 2:

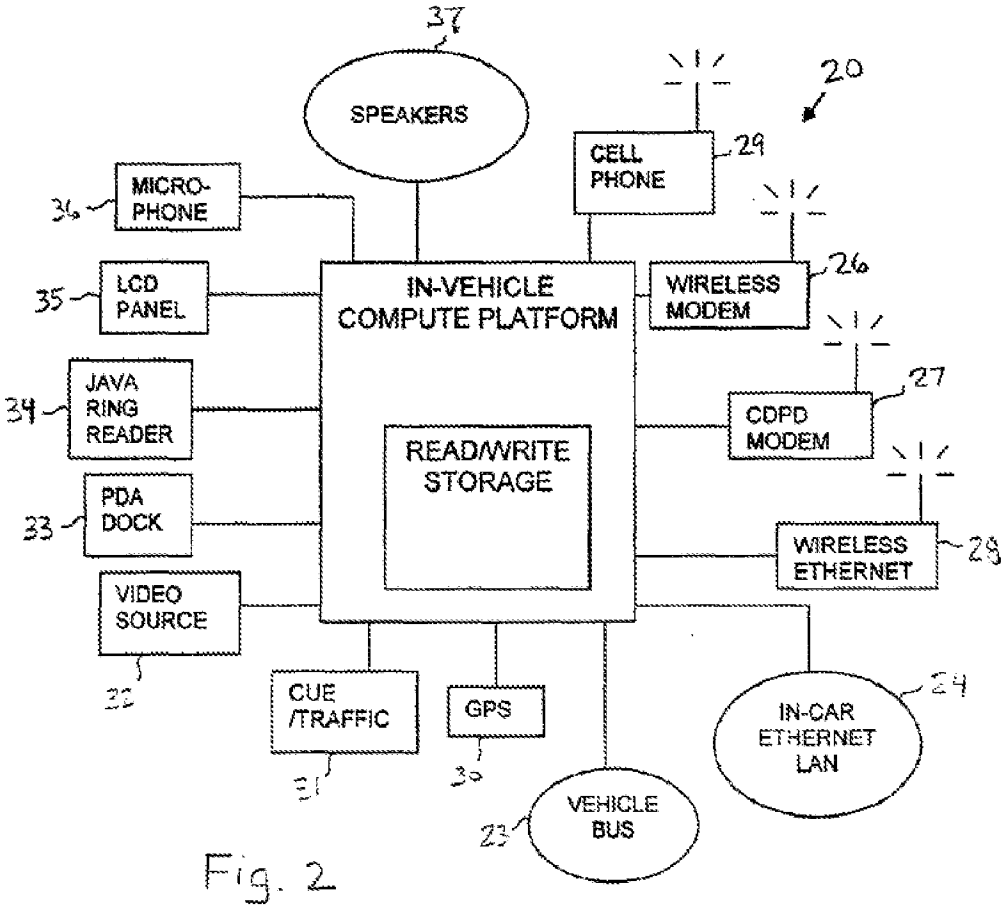


Fig. 2

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

b) The Razavi et al. Publication is Analogous Art to the Flick '278 Patent

The Razavi et al. publication 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 data 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...").

c) Substantial New Question of Patentability as to Claims 1 – 22 because the Razavi et al. publication 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 T, the Razavi et al. publication 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 Razavi et al. publication 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 Razavi et al. publication raises a substantial new question of patentability as to claims 1 – 22.

C. Proposed Rejections and Detailed Explanations of the Pertinency and Manner of Applying the Cited Prior Art to Every Claim of the Flick '278 Patent

As explained in greater detail below, 1) The Beckert et al. '363 patent, 2) the Gelvin et al. '008 patent, and 3) the Razavi et al publication, either alone or in combination with a variety of references published prior to the effective filing date of the Flick '278 patent (see discussion above), raise substantial new questions of patentability

based on new teachings not previously considered or addressed in the prior examination of the Flick '278 patent.

The above-referenced prior art raises a substantial new question 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 § 211, 228; *in re Morris*, 127 F.3d 1048, 154-55 (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 Beckert et al. '363 patent.	Exhibit R
Claims 1 – 22 are rejected under 35 U.S.C. § 102 as anticipated by the Gelvin et al. '008 patent.	Exhibit S
Claims 1 – 22 are rejected under 35 U.S.C. § 102 as anticipated by the Razavi et al. publication	Exhibit T

1. Claims 1 – 22 are Anticipated by the Beckert et al. '363 Patent

Each and every limitation of claims 1 – 22 is disclosed by the Beckert et al. '363 patent as shown in detail in the claim chart attached as Exhibit R. Accordingly, the following proposed rejections are appropriate.

Claims 1 – 22 are rejected under 35 U.S.C. § 102(a), (b) and (e) as being unpatentable over the Beckert et al. '363 patent.

With regard to claim 1, as set out in detail in Exhibit R, the Beckert et al. '363 patent discloses all limitations of claim 1. Specifically, the Beckert et al. '363 patent discloses:

- a multi-vehicle compatible tracking unit in the form of a vehicle computer system (see e.g. Beckert et al. '363 patent, col. 2, lines 10-17), which is for a vehicle comprising a vehicle data bus extending throughout the vehicle ("Most late model (1996 or later for OBD II, 1993 or later for OBD I) vehicles are also constructed with

a diagnostic system that analyzes performance of the vehicle's engine transmission and fuel system, and other components. The diagnostic system can be coupled to an external computer to download or monitor diagnostic information that is useful to a vehicle mechanic during servicing of the vehicle." Beckert et al. '363 patent, col. 1, lines 32 – 38);

- a vehicle position determining device in the form of a GPS chipset (see Beckert et al. '363 patent, col. 6, lines 50–53, and FIG. 3);
- a wireless communications device in the form of a wireless Internet link 76 (see Beckert et al. '363 patent, col. 5, lines 9 – 12, and FIGS. 1 and 3);
- a multi-vehicle compatible controller in the form of the computer module 65 for cooperating with said vehicle position determining device (see Beckert et al. '363 patent, col. 9, lines 6 – 9) and said wireless communications device to send vehicle position information (see Beckert et al. '363 patent, col. 5, lines 9 – 12 and disclosure from Beckert et al. '164 patent col. 12, lines 25 - 30, which is incorporated by reference at col. 7, lines 44-51);
- said multi-vehicle compatible controller to be coupled to the vehicle data bus for communication thereover (see e.g. Beckert et al. '363 patent, col. 6, line 63 – col. 7, line 1, and disclosure from Beckert et al. '164 patent, col. 9, lines 29 – 31, which is incorporated by reference at col. 7, lines 44-51) with at least one vehicle device using at least one corresponding vehicle device code from among a plurality thereof for different vehicles (see discussion of OBD interpreter interpreting status data received via any of the three OBD signaling protocols, Beckert et al. '363 patent, col. 1, lines 32 – 35, and disclosure from Beckert et al. '164 patent, col. 9, lines 31 – 35, which is incorporated by reference at col. 7, lines 44-51); and
- multiple different types of downloading interfaces (see e.g. Beckert et al. '363 patent, col. 5, lines 1 – 12, and disclosure from Beckert et al. '164 patent, col. 12, lines 5 – 11, which is incorporated by reference at col. 7, lines 44-51) for permitting downloading of enabling data related to the at least one corresponding vehicle device code for use by said multi-vehicle compatible controller (see e.g. Beckert et al. '363 patent, col. 2, lines 15-17, col. 5, lines 36-41, col. 7, lines 20-33, and

disclosure from Beckert et al. '164 patent, col. 12, lines 12 – 40, which is incorporated by reference at col. 7, lines 44-51).

With regard to claim 2, as set out in detail in Exhibit R, the Beckert et al. '363 patent discloses the limitations of claim 2. Specifically, the Beckert et al. '363 patent additionally discloses multiple downloading interfaces including wired signal downloading interfaces (see e.g. Beckert et al. '363 patent, col. 5, lines 1 – 12, and disclosure from Beckert et al. '164 patent, col. 12, lines 5 - 11, which is incorporated by reference at col. 7, lines 44-51).

With regard to claim 3, as set out in detail in Exhibit R, the Beckert et al. '363 patent discloses the limitations of claim 3. Specifically, the Beckert et al. '363 patent additionally discloses that the wired signal downloading interface comprises a connector for temporary connection to a downloading device (see e.g. Beckert et al. '164 patent, col. 12, lines 5 – 11, which is incorporated by reference at col. 7, lines 44-51).

With regard to claim 4, as set out in detail in Exhibit R, the Beckert et al. '363 patent discloses the limitations of claim 4. Specifically, the Beckert et al. '363 patent additionally discloses that said downloading interface comprises a wireless signal downloading interface in the form of a wireless Internet link (see e.g. Beckert et al. '363 patent, col. 5, lines 1 – 12).

With regard to claim 5, as set out in detail in Exhibit R, the Beckert et al. '363 patent discloses the limitations of claim 5. Specifically, the Beckert et al. '363 patent additionally discloses that said wireless signal downloading interface comprises a wireless receiver for temporary connection to a downloading device (see e.g. Beckert et al. '363 patent, col. 7, lines 10-13).

With regard to claim 6, as set out in detail in Exhibit R, the Beckert et al. '363 patent discloses the limitations of claim 6. Specifically, the Beckert et al. '363 patent additionally discloses that wherein the corresponding at least one vehicle code is for reading from the at least one vehicle device by describing reading status data from the vehicle's OBD system (see e.g. Beckert et al. '363 patent, col. 1, lines 32 – 38 and disclosure from Beckert et al. '164 patent, col. 9, lines 31 – 35, which is incorporated by reference at col. 7, lines 44-51).

With regard to claim 7, as set out in detail in Exhibit R, the Beckert et al. '363 patent discloses the limitations of claim 7. Specifically, the Beckert et al. '363 patent additionally discloses writing to the at least one vehicle device via an OBD-II interface by disclosing providing commands that allow non-critical car systems to be controlled (see e.g. Beckert et al. '363 patent, col. 1, lines 32 – 38 and disclosure from Beckert et al. '164 patent, col. 9, lines 31 – 35, which is incorporated by reference at col. 7, lines 44-51).

With regard to claim 8, as set out in detail in Exhibit R, the Beckert et al. '363 patent discloses the limitations of claim 8. Specifically, the Beckert et al. '363 patent additionally discloses that said downloading interface is also for permitting downloading of at least one programming instruction for said multi-vehicle compatible controller (see e.g. Beckert et al. '363 patent, col. 2, lines 15-17, col. 5, lines 36-41, col. 7, lines 20-33, and disclosure from Beckert et al. '164 patent, col. 12, lines 12 – 40, which is incorporated by reference at col. 7, lines 44-51).

With regard to claim 9, as set out in detail in Exhibit R, the Beckert et al. '363 patent discloses the limitations of claim 9. Specifically, the Beckert et al. '363 patent additionally discloses a remote transmitter in the form of other computing devices that communicate with the vehicle computer system via the wireless Internet link (see e.g. Beckert et al. '363 patent, col. 5, lines 9 – 12); and performing at least one vehicle remote control function responsive to the remote transmitter by incorporating U.S. Patent No. 5,794,164 (Beckert et al. '164 patent) by reference to disclose the full capabilities of the vehicle computer system that include a number of APIs that can be accessed by the remote computing devices including a diagnostic API that can be used to control the functions of the vehicle ("Example APIs include... a diagnostics API" Beckert et al. '164 patent, col. 12, lines 25 – 30; "The OBD interpreter 116 interprets the status data received and provides performance related information from the vehicle's OBD system to the microprocessor 100. Also, commands can be provided to the interpreter which allows non-critical car systems to be controlled." Beckert et al. '164 patent, col. 9, lines 31 – 35, which is incorporated by reference at col. 7, lines 44-51).

With regard to claim 10, as set out in detail in Exhibit R, the Beckert et al. '363 patent discloses the limitations of claim 10. Specifically, the Beckert et al. '363 patent

additionally discloses that security systems control actuators to lock/unlock doors or windows, and an alarm or siren and the controlling of the security system via the wireless Internet link (see e.g. Beckert et al. '363 patent, col. 1, lines 35 – 31, col. 2, lines 13–18, and col. 14, lines 6-9).

With regard to claim 11, as set out in detail in Exhibit R, the Beckert et al. '363 patent discloses the limitations of claim 11. Specifically, the Beckert et al. '363 patent additionally discloses that said wireless position determining device comprises a Global Positioning System (GPS) receiver (see e.g. Beckert et al. '363 patent, col. 6, lines 50–53).

With regard to claim 12, as set out in detail in Exhibit R, the Beckert et al. '363 patent discloses the limitations of claim 12. Specifically, the Beckert et al. '363 patent additionally discloses a housing containing said vehicle position determining device, said wireless communications device, said multi-vehicle compatible controller, and said downloading interface (see e.g. Beckert et al. 363 patent, col. 2, lines 9 – 11, and col. 4, lines 4-9).

With regard to claim 13, as set out in detail in Exhibit R, the Beckert et al. '363 patent discloses all limitations of claim 13. Specifically, the Beckert et al. '363 patent discloses:

- a multi-vehicle compatible tracking unit in the form of a vehicle computer system (see e.g. Beckert et al. '363 patent, col. 2, lines 10-17), which is for a vehicle comprising a vehicle data bus extending throughout the vehicle ("Most late model (1996 or later for OBD II, 1993 or later for OBD I) vehicles are also constructed with a diagnostic system that analyzes performance of the vehicle's engine transmission and fuel system, and other components. The diagnostic system can be coupled to an external computer to download or monitor diagnostic information that is useful to a vehicle mechanic during servicing of the vehicle." Beckert et al. '363 patent, col. 1, lines 32 – 38);
- a vehicle position determining device in the form of a GPS chipset (see Beckert et al. '363 patent, col. 6, lines 50–53, and FIG. 3);
- a wireless communications device in the form of a wireless Internet link 76 (see Beckert et al. '363 patent, col. 5, lines 9 – 12, and FIGS. 1 and 3);

- a multi-vehicle compatible controller in the form of the computer module 65 for cooperating with said vehicle position determining device (see Beckert et al. '363 patent, col. 9, lines 6 – 9) and said wireless communications device to send vehicle position information (see Beckert et al. '363 patent, col. 5, lines 9 – 12 and disclosure from Beckert et al. '164 patent col. 12, lines 25 - 30, which is incorporated by reference at col. 7, lines 44-51);
- said multi-vehicle compatible controller to be coupled to the vehicle data bus for communication thereover (see e.g. Beckert et al. '363 patent, col. 6, line 63 – col. 7, line 1, and disclosure from Beckert et al. '164 patent, col. 9, lines 29 – 31, which is incorporated by reference at col. 7, lines 44-51) with at least one vehicle device using at least one corresponding vehicle device code from among a plurality thereof for different vehicles (see discussion of OBD interpreter interpreting status data received via any of the three OBD signaling protocols, Beckert et al. '363 patent, col. 1, lines 32 – 35, and disclosure from Beckert et al. '164 patent, col. 9, lines 31 – 35, which is incorporated by reference at col. 7, lines 44-51); and
- multiple different types of downloading interfaces (see e.g. Beckert et al. '363 patent, col. 5, lines 1 – 12, and disclosure from Beckert et al. '164 patent, col. 12, lines 5 – 11, which is incorporated by reference at col. 7, lines 44-51) for permitting downloading of enabling data related to the at least one corresponding vehicle device code for use by said multi-vehicle compatible controller (see e.g. Beckert et al. '363 patent, col. 2, lines 15-17, col. 5, lines 36-41, col. 7, lines 20-33, and disclosure from Beckert et al. '164 patent, col. 12, lines 12 – 40, which is incorporated by reference at col. 7, lines 44-51); and
- the wired signal downloading interface comprising a connector for temporary connection to a downloading device (see e.g. Beckert et al. '164 patent, col. 12, lines 5 – 11, which is incorporated by reference at col. 7, lines 44-51).

With regard to claim 14, as set out in detail in Exhibit R, the Beckert et al. '363 patent discloses the limitations of claim 14. Specifically, the Beckert et al. '363 patent additionally discloses that wherein the corresponding at least one vehicle code is for reading from the at least one vehicle device by describing reading status data from the

vehicle's OBD system (see e.g. Beckert et al. '363 patent, col. 1, lines 32 – 38 and disclosure from Beckert et al. '164 patent, col. 9, lines 31 – 35 incorporated by reference at col. 7, lines 44-51).

With regard to claim 15, as set out in detail in Exhibit R, the Beckert et al. '363 patent discloses the limitations of claim 15. Specifically, the Beckert et al. '363 patent additionally discloses writing to the at least one vehicle device via an OBD-II interface by disclosing providing commands that allow non-critical car systems to be controlled (see e.g. Beckert et al. '363 patent, col. 1, lines 32 – 38 and disclosure from Beckert et al. '164 patent, col. 9, lines 31 – 35 incorporated by reference at col. 7, lines 44-51).

With regard to claim 16, as set out in detail in Exhibit R, the Beckert et al. '363 patent discloses the limitations of claim 16. Specifically, the Beckert et al. '363 patent additionally discloses writing to the at least one vehicle device via an OBD-II port by disclosing providing commands that allow non-critical car systems to be controlled (see e.g. Beckert et al. '363 patent, col. 1, lines 32 – 38 and disclosure from Beckert et al. '164 patent, col. 9, lines 31 – 35, which is incorporated by reference at col. 7, lines 44-51).

With regard to claim 17, as set out in detail in Exhibit R, the Beckert et al. '363 patent discloses the limitations of claim 17. Specifically, the Beckert et al. '363 patent additionally discloses a remote transmitter in the form of other computing devices that communicate with the vehicle computer system via the wireless Internet link (see e.g. Beckert et al. '363 patent, col. 5, lines 9 – 12); and performing at least one vehicle remote control function responsive to the remote transmitter by incorporating U.S. Patent No. 5,794,164 (Beckert et al. '164 patent) by reference to disclose the full capabilities of the vehicle computer system that include a number of APIs that can be accessed by the remote computing devices including a diagnostic API that can be used to control the functions of the vehicle ("Example APIs include... a diagnostics API" Beckert et al. '164 patent, col. 12, lines 25 – 30; "The OBD interpreter 116 interprets the status data received and provides performance related information from the vehicle's OBD system to the microprocessor 100. Also, commands can be provided to the interpreter which allows non-critical car systems to be controlled." Beckert et al. '164 patent, col. 9, lines 31 – 35, which is incorporated by reference at col. 7, lines 44-51).

With regard to claim 18, as set out in detail in Exhibit R, the Beckert et al. '363 patent. Specifically, the Beckert et al. '363 patent discloses:

- a multi-vehicle compatible tracking unit in the form of a vehicle computer system (see e.g. Beckert et al. '363 patent, col. 2, lines 10-17), which is for a vehicle comprising a vehicle data bus extending throughout the vehicle ("Most late model (1996 or later for OBD II, 1993 or later for OBD I) vehicles are also constructed with a diagnostic system that analyzes performance of the vehicle's engine transmission and fuel system, and other components. The diagnostic system can be coupled to an external computer to download or monitor diagnostic information that is useful to a vehicle mechanic during servicing of the vehicle." Beckert et al. '363 patent, col. 1, lines 32 – 38);
- a vehicle position determining device in the form of a GPS chipset (see Beckert et al. '363 patent, col. 6, lines 50–53, and FIG. 3);
- a wireless communications device in the form of a wireless Internet link 76 (see Beckert et al. '363 patent, col. 5, lines 9 – 12, and FIGS. 1 and 3);
- a multi-vehicle compatible controller in the form of the computer module 65 for cooperating with said vehicle position determining device (see Beckert et al. '363 patent, col. 9, lines 6 – 9) and said wireless communications device to send vehicle position information (see Beckert et al. '363 patent, col. 5, lines 9 – 12 and disclosure from Beckert et al. '164 patent col. 12, lines 25 - 30, which is incorporated by reference at col. 7, lines 44-51);
- said multi-vehicle compatible controller to be coupled to the vehicle data bus for communication thereover (see e.g. Beckert et al. '363 patent, col. 6, line 63 – col. 7, line 1, and disclosure from Beckert et al. '164 patent, col. 9, lines 29 – 31, which is incorporated by reference at col. 7, lines 44-51) with at least one vehicle device using at least one corresponding vehicle device code from among a plurality thereof for different vehicles (see discussion of OBD interpreter interpreting status data received via any of the three OBD signaling protocols, Beckert et al. '363 patent, col. 1, lines 32 – 35, and disclosure from Beckert et al. '164 patent, col. 9, lines 31 – 35, which is incorporated by reference at col. 7, lines 44-51); and

- multiple different types of downloading interfaces (see e.g. Beckert et al. '363 patent, col. 5, lines 1 – 12, and disclosure from Beckert et al. '164 patent, col. 12, lines 5 – 11, which is incorporated by reference at col. 7, lines 44-51) for permitting downloading of enabling data related to the at least one corresponding vehicle device code for use by said multi-vehicle compatible controller (see e.g. Beckert et al. '363 patent, col. 2, lines 15-17, col. 5, lines 36-41, col. 7, lines 20-33, and disclosure from Beckert et al. '164 patent, col. 12, lines 12 – 40, which is incorporated by reference at col. 7, lines 44-51); and
- said wireless signal downloading interface comprises a wireless receiver for temporary connection to a downloading device (see e.g. Beckert et al. '363 patent, col. 7, lines 10-13).

With regard to claim 19, as set out in detail in Exhibit R, the Beckert et al. '363 patent discloses the limitations of claim 19. Specifically, the Beckert et al. '363 patent additionally discloses that wherein the corresponding at least one vehicle code is for reading from the at least one vehicle device by describing reading status data from the vehicle's OBD system (see e.g. Beckert et al. '363 patent, col. 1, lines 32 – 38 and disclosure from Beckert et al. '164 patent, col. 9, lines 31 – 35, which is incorporated by reference at col. 7, lines 44-51).

With regard to claim 20, as set out in detail in Exhibit R, the Beckert et al. '363 patent discloses the limitations of claim 20. Specifically, the Beckert et al. '363 patent additionally discloses writing to the at least one vehicle device via an OBD-II interface by disclosing providing commands that allow non-critical car systems to be controlled (see e.g. Beckert et al. '363 patent, col. 1, lines 32 – 38 and disclosure from Beckert et al. '164 patent, col. 9, lines 31 – 35, which is incorporated by reference at col. 7, lines 44-51).

With regard to claim 21, as set out in detail in Exhibit R, the Beckert et al. '363 patent discloses the limitations of claim 21. Specifically, the Beckert et al. '363 patent additionally discloses that said downloading interface is also for permitting downloading of at least one programming instruction for said multi-vehicle compatible controller (see e.g. Beckert et al. '363 patent, col. 2, lines 15-17, col. 5, lines 36-41, and col. 7, lines

20-33, and disclosure from Beckert et al. '164 patent, col. 12, lines 12 – 40, which is incorporated by reference at col. 7, lines 44-51).

With regard to claim 22, as set out in detail in Exhibit R, the Beckert et al. '363 patent discloses the limitations of claim 22. Specifically, the Beckert et al. '363 patent additionally discloses a remote transmitter in the form of other computing devices that communicate with the vehicle computer system via the wireless Internet link (see e.g. Beckert et al. '363 patent, col. 5, lines 9 – 12); and performing at least one vehicle remote control function responsive to the remote transmitter by incorporating U.S. Patent No. 5,794,164 (Beckert et al. '164 patent) by reference to disclose the full capabilities of the vehicle computer system that include a number of APIs that can be accessed by the remote computing devices including a diagnostic API that can be used to control the functions of the vehicle ("Example APIs include... a diagnostics API" Beckert et al. '164 patent, col. 12, lines 25 – 30; "The OBD interpreter 116 interprets the status data received and provides performance related information from the vehicle's OBD system to the microprocessor 100. Also, commands can be provided to the interpreter which allows non-critical car systems to be controlled." Beckert et al. '164 patent, col. 9, lines 31 – 35, which is incorporated by reference at col. 7, lines 44-51).

2. Claims 1 – 22 are Anticipated by the Gelvin et al. '008 Patent

Each and every limitation of claims 1 – 22 is disclosed by the Gelvin et al. '008 patent as shown in detail in the claim chart attached as Exhibit S. Accordingly, the following proposed rejections are appropriate.

Claims 1 – 22 are rejected under 35 U.S.C. §102(e) as being unpatentable over the Gelvin et al. '008 patent.

With regard to claim 1, as set out in detail in Exhibit S, the Gelvin et al. '008 patent discloses all limitations of claim 1. Specifically, the Gelvin et al. '008 patent discloses:

- a multi-vehicle compatible tracking unit in the form of the WINS vehicle internetwork architecture (see e.g. Gelvin et al. '008 patent; FIG. 3;col, 2, lines 6 – 6; col. 2, lines 9 – 14; col. 8, lines 46 – 48), which is for a vehicle comprising a vehicle data bus extending throughout the vehicle and interfaced via an OBD-II port (see e.g. Gelvin

et al. '008 patent; Fig. 3; col. 1, lines 49 – 54; col. 8, lines 51 – 53 and col. 8, lines 63 – 67 – col. 9, lines 1 – 7);

- a vehicle position determining device in the form of a GPS device (see e.g. Gelvin et al. '008 patent; FIG. 3; col. 9, lines 1 – 4);
- a wireless communications device in the form of cellular modems (see e.g. Gelvin et al. '008 patent; Fig. 3; col. 9, lines 1 – 4);
- a multi-vehicle compatible controller in the form of the gateway 302 for cooperating with said vehicle position determining device (see e.g. Gelvin et al. '008 patent; Fig. 3; col. 8, lines 46 – 48; col. 8 – lines 51 – 53; col. 18, lines 23 – 31; col. 18, lines 57 – 60) and said wireless communications device to send vehicle position information (see e.g. Gelvin et al. '008 patent; Abstract; col. 9, lines 1 – 4, col. 18, lines 57 – 60, and col. 31, lines 43 – 47);
- said multi-vehicle compatible controller to be coupled to the vehicle data bus for communication thereover (see e.g. Gelvin et al. '008 patent; Fig. 3; col. 8, lines 51 – 53) with at least one vehicle device using at least one corresponding vehicle device code from among a plurality thereof for different vehicles (see discussion of communication via the OBD-II port, Gelvin et al. '008 patent; Fig. 3; col. 8, lines 63 – 67 – col. 9, lines 1 – 7); and
- multiple different types of downloading interfaces (see e.g. Gelvin et al. '008 patent; col. 7, lines 1 – 4) for permitting downloading of enabling data related to the at least one corresponding vehicle device code for use by said multi-vehicle compatible controller (see e.g. disclosure regarding downloading instructions for individual port nodes such as the OBD-II port, Gelvin et al. '008 patent; col. 23, line 64 – col. 24, line 4).

With regard to claim 2, as set out in detail in Exhibit S, the Gelvin et al. '008 patent discloses "wherein said downloading interface comprises a wired signal downloading interface". Specifically, the Gelvin et al. '008 patent discloses proxy with upgradeable software that has a wired connection to 100 base TX 506 (see e.g. Gelvin et al. '008 patent; Fig. 5; col. 6, lines 12 – 16; col. 14, lines 53 – 55).

With regard to claim 3, as set out in detail in Exhibit S, the Gelvin et al. '008 patent discloses "wherein said wired signal downloading interface comprises a connector for temporary connection to a downloading device". Specifically, the Gelvin et al. '008 patent discloses a proxy which can be moved anywhere in the network. A movable unit is inherently a temporary connection (see e.g. Gelvin et al. '008 patent; Fig. 5; col. 6, lines 12 – 16; col. 14, lines 53 – 55).

With regard to claim 4, as set out in detail in Exhibit S, the Gelvin et al. '008 patent discloses "wherein said downloading interface comprises a wireless signal downloading interface". Specifically, the Gelvin et al. '008 patent discloses a proxy device with upgradeable software can connect to the internet through a variety of devices including a Bluetooth modem and a phone (see e.g. Gelvin et al. '008 patent; Fig. 5; col. 6, lines 12 – 16; col. 14, lines 53 – 55).

With regard to claim 5, as set out in detail in Exhibit S, the Gelvin et al. '008 patent discloses "wherein said wireless signal downloading interface comprises a wireless receiver for temporary connection to a downloading device". Specifically, the Gelvin et al. '008 patent discloses a proxy which can be moved anywhere in the network. Elements which can be moved inherently disclose a temporary connection (see e.g. Gelvin et al. '008 patent; Fig. 5; col. 6, lines 12 – 16; col. 14, lines 53 – 55).

With regard to claim 6, as set out in detail in Exhibit S, the Gelvin et al. '008 patent "wherein the corresponding at least one vehicle code is for reading from the at least one vehicle device". Specifically, the Gelvin et al. '008 patent discloses reading from devices connected via the OBD-II port. The identification number of the device is read by the system (see e.g. Gelvin et al. '008 patent; col. 16, lines 3 – 6).

With regard to claim 7, as set out in detail in Exhibit S, the Gelvin et al. '008 patent discloses "wherein the corresponding at least one vehicle code is for writing to the at least one vehicle device". Specifically, the Gelvin et al. '008 patent discloses connecting a variety of vehicle devices through the OBD-II port. A variety of devices can remotely be operated (e.g. commanding engine shutdown), which involves writing information to the remote devices (see e.g. Gelvin et al. '008 patent; col. 31, lines 43 – 54).

With regard to claim 8, as set out in detail in Exhibit S, the Gelvin et al. '008 patent discloses "wherein said downloading interface is also for permitting downloading of at least one programming instruction for said multi-vehicle compatible controller". Specifically, the Gelvin et al. '008 patent discloses a proxy which can accept software upgrades. Software upgrades contain programming instructions for the vehicle architecture (see e.g. Gelvin et al. '008 patent; col. 14, lines 53 – 55, and col. 23, line 64 – col. 24, line 4).

With regard to claim 9, as set out in detail in Exhibit S, the Gelvin et al. '008 patent discloses "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". Specifically, the Gelvin et al. '008 patent discloses using a remote transmitter to initiate tracking and disablement of a vehicle via the wireless data connection (see e.g. Gelvin et al. '008 patent; col. 31, lines 43 – 54).

With regard to claim 10, as set out in detail in Exhibit S, the Gelvin et al. '008 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, the Gelvin et al. '008 patent discloses a vehicle with a remote transmitter to initiate tracking and disablement of a vehicle which are vehicle security features as disclosed in claim 10 of the Flick '278 patent (see e.g. Gelvin et al. '008 patent; col. 31, lines 43 – 54).

With regard to claim 11, as set out in detail in Exhibit S, the Gelvin et al. '008 patent discloses "wherein said wireless position determining device comprises a Global Positioning System (GPS) receiver". Specifically, the Gelvin et al. '008 patent discloses a vehicle architecture with a Global Positioning System (GPS) device (see e.g. Gelvin et al. '008 patent; FIG. 3; col. 9, lines 1 – 4).

With regard to claim 12, as set out in detail in Exhibit S, the Gelvin et al. '008 patent discloses "a housing containing said vehicle position determining device, said wireless communications device, said multi-vehicle compatible controller, and said downloading interface". The specific manner of arranging and housing different components is a design choice, and the Gelvin et al. '008 patent clearly contemplates

using any appropriate housing configuration for the components of the disclosed system.

With regard to claim 13, as set out in detail in Exhibit S, the Gelvin et al. '008 patent teaches all limitations of claim 13. Specifically, the Gelvin et al. '008 patent discloses:

- a multi-vehicle compatible tracking unit in the form of the WINS vehicle internetwork architecture (see e.g. Gelvin et al. '008 patent; FIG. 3; col, 2, lines 6 – 6; col. 2, lines 9 – 14; col. 8, lines 46 – 48), which is for a vehicle comprising a vehicle data bus extending throughout the vehicle and interfaced via an OBD-II port (see e.g. Gelvin et al. '008 patent; Fig. 3; col. 1, lines 49 – 54; col. 8, lines 51 – 53 and col. 8, lines 63 – 67 – col. 9, lines 1 – 7);
- a vehicle position determining device in the form of a GPS device (see e.g. Gelvin et al. '008 patent; FIG. 3; col. 9, lines 1 – 4);
- a wireless communications device in the form of cellular modems (see e.g. Gelvin et al. '008 patent; Fig. 3; col. 9, lines 1 – 4);
- a multi-vehicle compatible controller in the form of the gateway 302 for cooperating with said vehicle position determining device (see e.g. Gelvin et al. '008 patent; Fig. 3; col. 8, lines 46 – 48; col. 8 – lines 51 – 53; col. 18, lines 23 – 31; col. 18, lines 57 – 60) and said wireless communications device to send vehicle position information (see e.g. Gelvin et al. '008 patent; Abstract; col. 9, lines 1 – 4, col. 18, lines 57 – 60, and col. 31, lines 43 – 47);
- said multi-vehicle compatible controller to be coupled to the vehicle data bus for communication thereover (see e.g. Gelvin et al. '008 patent; Fig. 3; col. 8, lines 51 – 53) with at least one vehicle device using at least one corresponding vehicle device code from among a plurality thereof for different vehicles (see discussion of communication via the OBD-II port, Gelvin et al. '008 patent; Fig. 3; col. 8, lines 63 – 67 – col. 9, lines 1 – 7); and
- multiple different types of downloading interfaces (see e.g. Gelvin et al. '008 patent; col. 7, lines 1 – 4) for permitting downloading of enabling data related to the at least one corresponding vehicle device code for use by said multi-vehicle compatible controller (see e.g. disclosure regarding downloading instructions for individual port

nodes such as the OBD-II port, Gelvin et al. '008 patent; col. 23, line 64 – col. 24, line 4);

- said wired signal downloading interface comprises a connector for temporary connection to a downloading device (see e.g. Gelvin et al. '008 patent; Fig. 5; col. 6, lines 12 – 16; col. 14, lines 53 – 55).

With regard to claim 14, as set out in detail in Exhibit S, the Gelvin et al. '008 patent discloses "wherein the corresponding at least one vehicle code is for reading from the at least one vehicle device". Specifically, the Gelvin et al. '008 patent discloses reading from devices connected via the OBD-II port. The identification number of the device is read by the system (see e.g. Gelvin et al. '008 patent; col. 16, lines 3 – 6).

With regard to claim 15, as set out in detail in Exhibit S, the Gelvin et al. '008 patent discloses "wherein the corresponding at least one vehicle code is for writing to the at least one vehicle device". Specifically, the Gelvin et al. '008 patent discloses connecting a variety of vehicle devices through the OBD-II port. A variety of devices can remotely be operated, which involves writing information to the remote devices (see e.g. Gelvin et al. '008 patent; col. 31, lines 43 – 54).

With regard to claim 16, as set out in detail in Exhibit S, the Gelvin et al. '008 patent "wherein said downloading interface is also for permitting downloading of at least one programming instruction for said multi-vehicle compatible controller". Specifically, the Gelvin et al. '008 patent discloses a proxy which can accept software upgrades. Software upgrades contain programming instructions for the vehicle architecture (see e.g. Gelvin et al. '008 patent; col. 14, lines 53 – 55, and col. 23, line 64 – col. 24, line 4).

With regard to claim 17, as set out in detail in Exhibit S, the Gelvin et al. '008 patent discloses "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". Specifically, the Gelvin et al. '008 patent discloses using a remote transmitter to initiate tracking and disablement of a vehicle via the wireless data connection (see e.g. Gelvin et al. '008 patent; col. 31, lines 43 – 54).

With regard to claim 18, as set out in detail in Exhibit S, the Gelvin et al. '008 patent teaches all limitations of claim 18. Specifically, the Gelvin et al. '008 patent discloses:

- a multi-vehicle compatible tracking unit in the form of the WINS vehicle internetwork architecture (see e.g. Gelvin et al. '008 patent; FIG. 3; col, 2, lines 6 – 6; col. 2, lines 9 – 14; col. 8, lines 46 – 48), which is for a vehicle comprising a vehicle data bus extending throughout the vehicle and interfaced via an OBD-II port (see e.g. Gelvin et al. '008 patent; Fig. 3; col. 1, lines 49 – 54; col. 8, lines 51 – 53 and col. 8, lines 63 – 67 – col. 9, lines 1 – 7);
- a vehicle position determining device in the form of a GPS device (see e.g. Gelvin et al. '008 patent; FIG. 3; col. 9, lines 1 – 4);
- a wireless communications device in the form of cellular modems (see e.g. Gelvin et al. '008 patent; Fig. 3; col. 9, lines 1 – 4);
- a multi-vehicle compatible controller in the form of the gateway 302 for cooperating with said vehicle position determining device (see e.g. Gelvin et al. '008 patent; Fig. 3; col. 8, lines 46 – 48; col. 8 – lines 51 – 53; col. 18, lines 23 – 31; col. 18, lines 57 – 60) and said wireless communications device to send vehicle position information (see e.g. Gelvin et al. '008 patent; Abstract; col. 9, lines 1 – 4, col. 18, lines 57 – 60, and col. 31, lines 43 – 47);
- said multi-vehicle compatible controller to be coupled to the vehicle data bus for communication thereover (see e.g. Gelvin et al. '008 patent; Fig. 3; col. 8, lines 51 – 53) with at least one vehicle device using at least one corresponding vehicle device code from among a plurality thereof for different vehicles (see discussion of communication via the OBD-II port, Gelvin et al. '008 patent; Fig. 3; col. 8, lines 63 – 67 – col. 9, lines 1 – 7); and
- multiple different types of downloading interfaces (see e.g. Gelvin et al. '008 patent; col. 7, lines 1 – 4) for permitting downloading of enabling data related to the at least one corresponding vehicle device code for use by said multi-vehicle compatible controller (see e.g. disclosure regarding downloading instructions for individual port nodes such as the OBD-II port, Gelvin et al. '008 patent; col. 23, line 64 – col. 24, line 4);

- said wireless signal downloading interface comprises a wireless receiver for temporary connection to a downloading device (see e.g. Gelvin et al. '008 patent; Fig. 5; col. 6, lines 12 – 16; col. 14, lines 53 – 55).

With regard to claim 19, as set out in detail in Exhibit S, the Gelvin et al. '008 patent discloses "wherein the corresponding at least one vehicle code is for reading from the at least one vehicle device". Specifically, the Gelvin et al. '008 patent discloses reading from devices connected via the OBD-II port. The identification number of the device is read by the system (see e.g. Gelvin et al. '008 patent; col. 16, lines 3 – 6).

With regard to claim 20, as set out in detail in Exhibit S, the Gelvin et al. '008 patent "wherein the corresponding at least one vehicle code is for writing to the at least one vehicle device". Specifically, the Gelvin et al. '008 patent discloses connecting a variety of vehicle devices through the OBD-II port. A variety of devices can remotely be operated, thus writing information to the remote devices (see e.g. Gelvin et al. '008 patent; col. 31, lines 43 – 54).

With regard to claim 21, as set out in detail in Exhibit S, the Gelvin et al. '008 patent discloses "wherein said downloading interface is also for permitting downloading of at least one programming instruction for said multi-vehicle compatible controller". Specifically, the Gelvin et al. '008 patent discloses a proxy which can accept software upgrades. Software upgrades contain programming instructions for the vehicle architecture (see e.g. Gelvin et al. '008 patent; col. 23, line 64 – col. 24, line 4).

With regard to claim 22, as set out in detail in Exhibit S, the Gelvin et al. '008 patent discloses "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". Specifically, the Gelvin et al. '008 patent discloses using a remote transmitter to initiate tracking and disablement of a vehicle via the wireless data connection (see e.g. Gelvin et al. '008 patent; col. 31, lines 43 – 54).

3. Claims 1 – 22 are Anticipated by the Razavi et al. Publication

Each and every limitation of claims 1 – 22 is disclosed by the Razavi et al. publication as shown in detail in the claim chart attached as Exhibit T. Accordingly, the following proposed rejections are appropriate.

Claims 1 – 22 are rejected under 35 U.S.C. § 102(a), § 102(b), and §102(e) as being unpatentable over the Razavi et al. publication.

With regard to claim 1, as set out in detail in Exhibit T, the Razavi et al. publication discloses all limitations of claim 1. Specifically the Razavi et al. publication discloses:

- a multi-vehicle compatible tracking unit in the form of an in-car sub-network (see e.g. Razavi et al. publication; Abstract; Fig. 2; [0031]), which is for a vehicle comprising a vehicle data bus extending throughout the vehicle and interfaced via OBD and/or SAE standard J1979 and/or J1850 buses (see e.g. Razavi et al. publication; [0024]);
- a vehicle position determining device in the form of a GPS receiver (see e.g. Razavi et al. publication; Fig. 2; [0031]);
- a wireless communications device in the form of a wireless modem, a cellular phone, and/or wireless Ethernet (see e.g. Razavi et al. publication; Fig. 2, [0031]);
- a multi-vehicle compatible controller in the form of a compute platform within the in-car sub-network for cooperating with said vehicle position determining device (see e.g. Razavi et al. publication; Fig. 2; [0033]) and said wireless communications device to send vehicle position information (see e.g. Razavi et al. publication; Fig. 2; [0031], [0033]);
- said multi-vehicle compatible controller to be coupled to the vehicle data bus for communication thereover (see e.g. Razavi et al. publication; [0031]) with at least one vehicle device using at least one corresponding vehicle device code from among a plurality thereof for different vehicles (see e.g. Razavi et al. publication; see discussion of communication via the OBD, SAE J1979, and SAE J1850; see e.g. Razavi et al. publication; [0037]); and
- multiple different types of downloading interfaces (see e.g. Razavi et al. publication; [0060] for permitting downloading of enabling data related to the at least one corresponding vehicle device code for use by said multi-vehicle compatible controller (see e.g. disclosure regarding downloading vehicle upgrades that result in different

device codes being received via devices including a wireless modem; see e.g. Razavi et al. publication; [0060]).

With regard to claim 2, as set out in detail in Exhibit T, the Razavi et al. publication discloses "wherein said downloading interface comprises a wired signal downloading interface". Specifically, the Razavi et al. publication discloses updating software externally to the car sub-network and a PDA dock, i.e. a wired connection, connected to the in-car sub-network (see e.g. Razavi et al. publication; Fig. 2; [0035], [0060]).

With regard to claim 3, as set out in detail in Exhibit T, the Razavi et al. publication discloses "wherein said wired signal downloading interface comprises a connector for temporary connection to a downloading device." Specifically the Razavi et al. publication discloses a PDA dock for passengers to connect devices to the car sub-network (see e.g. Razavi et al. publication; Fig. 2; [0035]).

With regard to claim 4, as set out in detail in Exhibit T, the Razavi et al. publication discloses "wherein said downloading interface comprises a wireless signal downloading interface." Specifically, the Razavi et al. publication discloses retrieval of software via a wireless modem (see e.g. Razavi et al. publication; [0060]).

With regard to claim 5, as set out in detail in Exhibit T, the Razavi et al. publication discloses "wherein said wireless signal downloading interface comprises a wireless receiver for temporary connection to a downloading device". Specifically the Razavi et al. publication discloses wireless modems that form temporary connections such as a cellular packet data (CDPD) modem (Razavi et al. publication; [0025]).

With regard to claim 6, as set out in detail in Exhibit T, the Razavi et al. publication discloses "wherein the corresponding at least one vehicle code is for reading from the at least one vehicle device". Specifically, the Razavi et al. publication discloses and on board diagnostic system (OBD) connected to an interface in the system where other devices on the network can query the OBD system for diagnostic information (see e.g. Razavi et al. publication; [0037]).

With regard to claim 7, as set out in detail in Exhibit T, the Razavi et al. publication discloses "wherein the corresponding at least one vehicle code is for writing

to the at least one vehicle device". Specifically, the Razavi et al. publication discloses an OBD system connected to the network, where other devices on the network can provide information to the OBD system (see e.g. Razavi et al. publication; [0037]).

With regard to claim 8, as set out in detail in Exhibit T, the Razavi et al. publication discloses "wherein said downloading interface is also for permitting downloading of at least one programming instruction for said multi-vehicle compatible controller". Specifically, the Razavi et al. publication discloses downloading executable instructions within software retrieved from external sources (see e.g. Razavi et al. publication; [0060]).

With regard to claim 9, as set out in detail in Exhibit T, the Razavi et al. publication discloses "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". Specifically, the Razavi et al. publication discloses using the OBD system to perform remote control functions (see e.g. Razavi et al. publication; Fig. 1; [0028], [0035], and [0037]).

With regard to claim 10, as set out in detail in Exhibit T, the Razavi et al. publication 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, the Razavi et al. publication discloses a vehicle security function (see e.g. Razavi et al. publication; [0035]).

With regard to claim 11, as set out in detail in Exhibit T, the Razavi et al. publication discloses "wherein said wireless position determining device comprises a Global Positioning System (GPS) receiver". Specifically, the Razavi et al. publication discloses a GPS receiver coupled to the in-car sub-network (see e.g. Razavi et al. publication; Fig. 2; [0033]).

With regard to claim 12, as set out in detail in Exhibit T, the Razavi et al. publication discloses "further comprising a housing containing said vehicle position determining device, said wireless communications device, said multi-vehicle compatible controller, and said downloading interface". Specifically, the Razavi et al. publication discloses an in-car sub-network as illustrated in Fig. 1 (see e.g. Razavi et al. publication; Figs 1 and 2; [0028], [0031], [0033]).

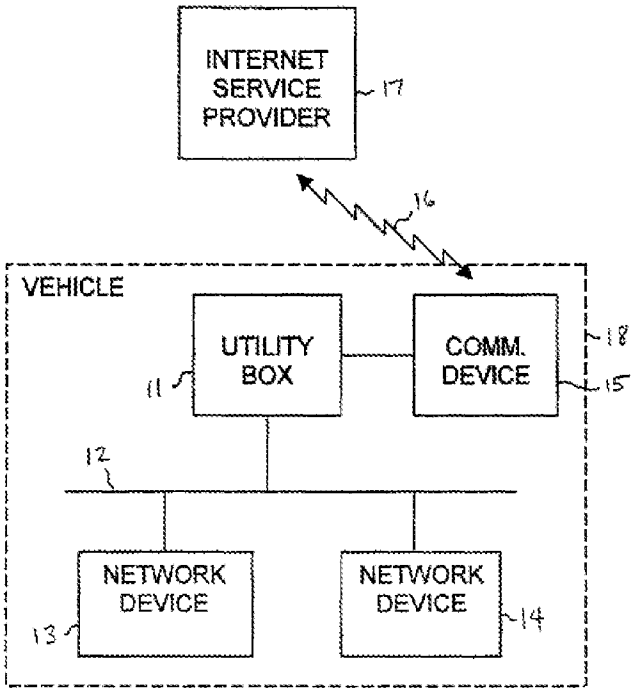


Fig. 1

With regard to claim 13, as set out in detail in Exhibit T, the Razavi et al. publication discloses all limitations of claim 13. Specifically the Razavi et al. publication discloses:

- a multi-vehicle compatible tracking unit in the form of an in-car sub-network (see e.g. Razavi et al. publication; Abstract; Fig. 2; [0031]), which is for a vehicle comprising a vehicle data bus extending throughout the vehicle and interfaced via OBD and/or SAE standard J1979 and/or J1850 buses (see e.g. Razavi et al. publication; [0024]);
- a vehicle position determining device in the form of a GPS receiver (see e.g. Razavi et al. publication; Fig. 2; [0031]);
- a wireless communications device in the form of a wireless modem, a cellular phone, and/or wireless Ethernet (see e.g. Razavi et al. publication; Fig. 2, [0031]);
- a multi-vehicle compatible controller in the form of a compute platform within the in-car sub-network for cooperating with said vehicle position determining device (see e.g. Razavi et al. publication; Fig. 2; [0033]) and said wireless communications device to send vehicle position information (see e.g. Razavi et al. publication; Fig. 2; [0031], [0033]);

- said multi-vehicle compatible controller to be coupled to the vehicle data bus for communication thereover (see e.g. Razavi et al. publication; [0031]) with at least one vehicle device using at least one corresponding vehicle device code from among a plurality thereof for different vehicles (see e.g. Razavi et al. publication; see discussion of communication via the OBD, SAE J1979, and SAE J1850; see e.g. Razavi et al. publication; [0037]); and
- multiple different types of downloading interfaces (see e.g. Razavi et al. publication; [0060] for permitting downloading of enabling data related to the at least one corresponding vehicle device code for use by said multi-vehicle compatible controller (see e.g. disclosure regarding downloading vehicle upgrades that result in different device codes being received via devices including a wireless modem; see e.g. Razavi et al. publication; [0060]);
- said downloading interface comprising a PDA connector for a temporary connection to a downloading interface (see e.g. Razavi et al. publication; Fig. 2; [0035]).

With regard to claim 14, as set out in detail in Exhibit T, the Razavi et al. publication discloses "wherein the corresponding at least one vehicle code is for reading from the at least one vehicle device". Specifically, the Razavi et al. publication discloses and on board diagnostic system (OBD) connected to an interface in the system where other devices on the network can query the OBD system for diagnostic information (see. e.g. Razavi et al. publication; [0037]).

With regard to claim 15, as set out in detail in Exhibit T, the Razavi et al. publication discloses "wherein the corresponding at least one vehicle code is for writing to the at least one vehicle device". Specifically, the Razavi et al. publication discloses an OBD system connected to the network, where other devices on the network can provide information to the OBD system (see. e.g. Razavi et al. publication; Fig. 2; [0037].

With regard to claim 16, as set out in detail in Exhibit T, the Razavi et al. publication discloses "wherein said downloading interface is also for permitting downloading of at least one programming instruction for said multi-vehicle compatible controller". Specifically, the Razavi et al. publication discloses downloading executable

instructions within software retrieved from external sources (see. e.g. Razavi et al. publication; [0060]).

With regard to claim 17, as set out in detail in Exhibit T, the Razavi et al. publication discloses "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". Specifically, the Razavi et al. publication discloses using the OBD system to perform remote control functions (see. e.g. Razavi et al. publication; [0035]).

With regard to claim 18, as set out in detail in Exhibit T, the Razavi et al. publication discloses all limitations of claim 18. Specifically the Razavi et al. publication discloses:

- a multi-vehicle compatible tracking unit in the form of an in-car sub-network (see e.g. Razavi et al. publication; Abstract; Fig. 2; [0031]), which is for a vehicle comprising a vehicle data bus extending throughout the vehicle and interfaced via OBD and/or SAE standard J1979 and/or J1850 buses (see e.g. Razavi et al. publication; [0024]);
- a vehicle position determining device in the form of a GPS receiver (see e.g. Razavi et al. publication; Fig. 2; [0031]);
- a wireless communications device in the form of a wireless modem, a cellular phone, and/or wireless Ethernet (see e.g. Razavi et al. publication; Fig. 2, [0031]);
- a multi-vehicle compatible controller in the form of a compute platform within the in-car sub-network for cooperating with said vehicle position determining device (see e.g. Razavi et al. publication; Fig. 2; [0033]) and said wireless communications device to send vehicle position information (see e.g. Razavi et al. publication; Fig. 2; [0031], [0033]);
- said multi-vehicle compatible controller to be coupled to the vehicle data bus for communication thereover (see e.g. Razavi et al. publication; [0031]) with at least one vehicle device using at least one corresponding vehicle device code from among a plurality thereof for different vehicles (see e.g. Razavi et al. publication; see discussion of communication via the OBD, SAE J1979, and SAE J1850; see e.g. Razavi et al. publication; [0037]); and

- multiple different types of downloading interfaces (see e.g. Razavi et al. publication; [0060] for permitting downloading of enabling data related to the at least one corresponding vehicle device code for use by said multi-vehicle compatible controller (see e.g. disclosure regarding downloading vehicle upgrades that result in different device codes being received via devices including a wireless modem; see e.g. Razavi et al. publication; [0060]);
- said wireless signal downloading interface comprising a for a temporary connection to a downloading interface such as a web page (see e.g. Razavi et al. publication; [0025]).

With regard to claim 19, as set out in detail in Exhibit T, the Razavi et al. publication discloses "wherein the corresponding at least one vehicle code is for reading from the at least one vehicle device". Specifically, the Razavi et al. publication discloses and on board diagnostic system (OBD) connected to an interface in the system where other devices on the network can query the OBD system for diagnostic information (see e.g. Razavi et al. publication; [0037]).

With regard to claim 20, as set out in detail in Exhibit T, the Razavi et al. publication discloses "wherein the corresponding at least one vehicle code is for writing to the at least one vehicle device". Specifically, the Razavi et al. publication discloses an OBD system connected to the network, where other devices on the network can provide information to the OBD system (see e.g. Razavi et al. publication; [0037]).

With regard to claim 21, as set out in detail in Exhibit T, the Razavi et al. publication discloses "wherein said downloading interface is also for permitting downloading of at least one programming instruction for said multi-vehicle compatible controller". Specifically, the Razavi et al. publication discloses downloading executable instructions within software retrieved from external sources (see e.g. the Razavi et al. publication; [0060]).

With regard to claim 22, as set out in detail in Exhibit T, the Razavi et al. publication discloses "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". Specifically, the Razavi et al. publication

discloses using the OBD system to perform remote control functions (see e.g. the Razavi et al. publication; Fig. 1; [0028], [0035]).

VII. Consideration of Secondary Indicia

Patent Owner has filed two patent owner's statements, the first on January 8, 2016 and the second on February 26, 2016 (the Second Patent Owner's Statement). In these statements, Patent Owner provides a variety of statements allegedly constituting evidence of consideration of prior art references and secondary considerations sufficient to overcome the determination ordering a reexamination of the Flick '278 patent dated November 10, 2015 (the Order). Requester has previously provided five grounds for rejecting claims 1 – 22 of the Flick '278 patent, two grounds under 35 U.S.C. § 102(b) based on the Suman '537 patent and the Spaur '074 patent, and three grounds under 35 U.S.C. § 103(a) based on additional teachings of the Johnson '254 patent, the Song '756 patent, and the Davis '724 patent. It is noted that all of these prior art references are prior art under 35 U.S.C. § 102(b), particularly in view of the fact that the Flick '278 patent is not entitled to a priority date earlier than its filing date of July 3, 2007. For the following reasons, Requester respectfully notes that all materials presented by Patent Owner are irrelevant to the instant proceedings, and are insufficient to overcome the proposed rejections of claims 1 – 22 of the Flick '278 patent.

A. Provided Rejections of the Flick '278 Patent

Requester respectfully notes that the primary rejections of claims 1 – 22 provided by Requester and ordered in the Order are based on 35 U.S.C. § 102(b). Evidence of secondary considerations cannot be utilized to overcome the statutory bar to patentability presented by 35 U.S.C. § 102(b). Additionally, Requester continues to discover highly relevant prior art and has included three additional references in this communication supporting the rejection of claims 1 – 22 of the Flick '278 patent under 35 U.S.C. §§ 102(a), 102(b) and 102(e). Requester also notes that it is highly likely, given that the Flick '278 patent is not entitled to a priority date earlier than its filing date of July 3, 2007, that many more prior art references anticipate all claims of the Flick '278 patent.

B. Issues Raised in the Second Patent Owner's Statement

In the Second Patent Owner's Statement, Patent Owner alleges that a jury has held that the Flick '278 patent is valid in view of a report prepared by Requester's technical expert and that several secondary factors have been proven, thereby negating any obviousness-based rejections of the Flick '278 patent. (Second Patent Owner's Statement, p. 2). As described in more detail below, these assertions misrepresent the jury verdict and introduce misleading and irrelevant documents into this proceeding.

C. Consideration of Expert Report

In the Second Patent Owner's Statement, Patent Owner asserts that the Suman '537 patent and the Spaur '074 patent were considered by the jury in reaching a verdict. (Second Patent Owner's Statement, p. 2). To this end, Patent Owner has submitted the Expert Report of Eric Andrews Regarding Invalidity (the Expert Report) to support this contention. However, Patent Owner's statements are misleading as the Expert Report does not consider any of the rejections of claims 1 – 22 of the Flick '278 patent presented in this proceeding. First, the Expert Report, p. 14, presents no discussion of the Suman '537 patent as asserted by Patent Owner. Rather, the Expert Report states that any discussion of the Suman '537 patent (along with many other references) was "not included in the detailed discussion which follows." (Expert Report, p. 14). Furthermore, the analysis provided in the Expert Report based on the Spaur '074 is different than was provided by Requester, only applies to claims 1 – 6, 8, 11 – 14, 16, 18, 19, and 21 as asserted by Patent Owner. Additionally, the Expert Report does not reference the Song '756 patent or the Davis '724 patent. Therefore, Requester respectfully notes that none of the grounds of rejection of the Flick '278 patent have been considered by a jury as asserted by Patent Owner.

D. Evidence of Secondary Factors

The Second Patent Owner's Statement states "[m]oreover, 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. Requester respectfully notes that

the jury verdict is not a final decision and Requester anticipates appealing the jury verdict. Accordingly, Requester respectfully submits the jury verdict is irrelevant to the instant proceeding as no final judgment has been entered.

E. Rebutting a Rejection based on Obviousness

As Patent Owner has attempted to raise issues related to secondary considerations, Requester would like to take this opportunity to reiterate the standards articulated by the MPEP and the case law with respect to the consideration of rebuttal arguments to rejections under 35 U.S.C. § 103, the requirements for copying of a claimed invention, and consideration of licensing activity.

MPEP § 2145 describes the framework for consideration of rebuttal arguments to a *prima facie* case of obviousness. "If a prima facie case of obviousness is established, the burden shifts to the applicant to come forward with arguments and/or evidence to rebut the *prima facie* case. See, e.g., *In re Dillon*, 919 F.2d 688, 692, 16 USPQ2d 1897, 1901 (Fed. Cir. 1990)." (MPEP § 2145). "However, arguments of counsel cannot take the place of factually supported objective evidence. See, e.g., *In re Huang*, 100 F.3d 135, 139-40, 40 USPQ2d 1685, 1689 (Fed. Cir. 1996); *In re De Blauwe*, 736 F.2d 699, 705, 222 USPQ 191, 196 (Fed. Cir. 1984)." (*Id.*)

"Rebuttal evidence may include evidence of "secondary considerations," such as "commercial success, long felt but unsolved needs, [and] failure of others." *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 4459, 467. See also, e.g., *In re Piasecki*, 745 F.2d 1468, 1473, 223 USPQ 785, 788 (Fed. Cir. 1984) (commercial success)." (*Id.*) "Rebuttal evidence may also include evidence that the claimed invention yields unexpectedly improved properties or properties not present in the prior art. Rebuttal evidence may consist of a showing that the claimed compound possesses unexpected properties. *Dillon*, 919 F.2d at 692-93, 16 USPQ2d at 1901. A showing of unexpected results must be based on evidence, not argument or speculation. *In re Mayne*, 104 F.3d 1339, 1343-44, 41 USPQ2d 1451, 1455-56 (Fed. Cir. 1997)." (*Id.*) "Rebuttal evidence may include evidence that the claimed invention was copied by others. See, e.g., *In re GPAC*, 57 F.3d 1573, 1580, 35 USPQ2d 1116, 1121 (Fed. Cir. 1995); *Hybritech Inc.v. Monoclonal Antibodies*, 802 F.2d 1367, 1380, 231 USPQ 81, 90 (Fed. Cir. 1986). It may

also include evidence of the state of the art, the level of skill in the art, and the beliefs of those skilled in the art." (*Id.*) "The Hoeksema court further noted that once a prima facie case of obviousness is made by the PTO through citation of references, the burden is on the applicant to produce contrary evidence establishing that the reference being relied on would not enable a skilled artisan to produce the different compounds claimed. Id. at 274-75, 158 USPQ at 601." (*Id.*)

"Consideration of rebuttal evidence and arguments requires Office personnel to weigh the proffered evidence and arguments. Office personnel should avoid giving evidence no weight, except in rare circumstances. *Id.* See also *In re Alton*, 76 F.3d 1168, 1174-75, 37 USPQ2d 1578, 1582-83 (Fed. Cir. 1996). **However, to be entitled to substantial weight, the applicant should establish a nexus between the rebuttal evidence and the claimed invention, i.e., objective evidence of nonobviousness must be attributable to the claimed invention.** The Federal Circuit has acknowledged that applicant bears the burden of establishing nexus, stating:

> In the ex parte process of examining a patent application, however, the PTO lacks the means or resources to gather evidence which supports or refutes the applicant's assertion that the sales constitute commercial success. C.f. Ex parte Remark, 15 USPQ2d 1498, 1503 ([BPAI] 1990) (evidentiary routine of shifting burdens in civil proceedings inappropriate in ex parte prosecution proceedings because examiner has no available means for adducing evidence). Consequently, the PTO must rely upon the applicant to provide hard evidence of commercial success.

In re Huang, 100 F.3d 135, 139-40, 40 USPQ2d 1685, 1689 (Fed. Cir. 1996). See also *GPAC*, 57 F.3d at 1580, 35 USPQ2d at 1121; *In re Paulsen*, 30 F.3d 1475, 1482, 31 USPQ2d 1671, 1676 (Fed. Cir. 1994) (**Evidence of commercial success of articles not covered by the claims subject to the 35 U.S.C. 103 rejection was not probative of nonobviousness.**)." (*Id.*, emphasis added). "**Evidence pertaining to secondary considerations must be taken into account whenever present; however, it does not necessarily control the obviousness conclusion**. See, e.g., *Pfizer, Inc. v.*

Apotex, Inc., 480 F.3d 1348, 1372, 82 USPQ2d 1321, 1339 (Fed. Cir. 2007) ("the record establish [ed] such a strong case of obviousness" that allegedly unexpectedly superior results were ultimately insufficient to overcome obviousness conclusion); *Leapfrog Enterprises Inc. v. Fisher-Price Inc.*, 485 F.3d 1157, 1162, 82 USPQ2d 1687, 1692 (Fed. Cir. 2007) ("given the strength of the prima facie obviousness showing, the evidence on secondary considerations was inadequate to overcome a final conclusion" of obviousness); and *Newell Cos., Inc. v. Kenney Mfg. Co.*, 864 F.2d 757, 768, 9 USPQ2d 1417, 1426 (Fed. Cir. 1988)." (*Id.*, emphasis added). "Since it is now clear that a strict teaching-suggestion-motivation approach is not the only way to establish a prima facie case of obviousness, it is true that practitioners have been required to shift the emphasis of their nonobviousness arguments to a certain degree. However, familiar lines of argument still apply, including teaching away from the claimed invention by the prior art, lack of a reasonable expectation of success, and unexpected results. Indeed, they may have even taken on added importance in view of the recognition in *KSR* of a variety of possible rationales." (*Id.*)

"**In determining the relative weight to accord to rebuttal evidence, considerations such as whether a nexus exists between the claimed invention and the proffered evidence, and whether the evidence is commensurate in scope with the claimed invention, are appropriate.** The mere presence of some credible rebuttal evidence does not dictate that an obviousness rejection must always be withdrawn." (*Id.*, emphasis added) "Attorney argument is not evidence unless it is an admission, in which case, an examiner may use the admission in making a rejection." (*Id.*) "One cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co., Inc.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986)." (*Id.*) "Although the claims are interpreted in light of the specification, limitations from the specification are not read into the claims. *In re Van Geuns*, 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993)." (*Id.*)

"Applicants may argue that the examiner's conclusion of obviousness is based on improper hindsight reasoning. However, "[a]ny judgment on obviousness is in a sense necessarily a reconstruction based on hindsight reasoning, but so long as it takes

into account only knowledge which was within the level of ordinary skill in the art at the time the claimed invention was made and does not include knowledge gleaned only from applicant's disclosure, such a reconstruction is proper." *In re McLaughlin*, 443 F.2d 1392, 1395, 170 USPQ 209, 212 (CCPA 1971). **Applicants may also argue that the combination of two or more references is "hindsight" because "express" motivation to combine the references is lacking. However, there is no requirement that an "express, written motivation to combine must appear in prior art references before a finding of obviousness.**" See Ruiz v. A.B. Chance Co., 357 F.3d 1270, 1276, 69 USPQ2d 1686, 1690 (Fed. Cir. 2004)." (*Id.*, emphasis added). Further, "**[a] suggestion or motivation to combine references is an appropriate method for determining obviousness, however it is just one of a number of valid rationales for doing so. The Court in *KSR* identified several exemplary rationales to support a conclusion of obviousness which are consistent with the proper "functional approach" to the determination of obviousness as laid down in *Graham*.** *KSR*, 550 U.S. at 415-21, 82 USPQ2d at 1395-97." (*Id.*, emphasis added).

"A prior art reference that "teaches away" from the claimed invention is a significant factor to be considered in determining obviousness; however, "the nature of the teaching is highly relevant and must be weighed in substance. A known or obvious composition does not become patentable simply because it has been described as somewhat inferior to some other product for the same use." *In re Gurley*, 27 F.3d 551, 554, 31 USPQ2d 1130, 1132 (Fed. Cir. 1994)." (*Id.*) "Furthermore, "the prior art's mere disclosure of more than one alternative does not constitute a teaching away from any of these alternatives because such disclosure does not criticize, discredit, or otherwise discourage the solution claimed...." In re Fulton, 391 F.3d 1195, 1201, 73 USPQ2d 1141, 1146 (Fed. Cir. 2004)." (*Id.*)

F. Evidence of Copying

Requester respectfully notes that copying, while capable of providing evidence of secondary considerations of nonobviousness as described in MPEP § 2145, must be of a claimed product, not of a patent. A finding of infringement or willful infringement is not evidence of copying a product. MPEP § 716.06 states (emphasis added):

> "Another form of secondary evidence which may be presented by applicants during prosecution of an application, but which is more often presented during litigation, is evidence that competitors in the marketplace are copying the invention instead of using the prior art. **However, more than the mere fact of copying is necessary to make that action significant because copying may be attributable to other factors such as a lack of concern for patent property or contempt for the patentee's ability to enforce the patent.** Cable Electric Products, Inc. v. Genmark, Inc., 770 F.2d 1015, 226 USPQ 881 (Fed. Cir. 1985). Evidence of copying was persuasive of nonobviousness when an alleged infringer tried for a substantial length of time to design a product or process similar to the claimed invention, but failed and then copied the claimed invention instead. Dow Chem. Co. v. American Cyanamid Co., 816 F.2d 617, 2 USPQ2d 1350 (Fed. Cir. 1987). **Alleged copying is not persuasive of nonobviousness when the copy is not identical to the claimed product, and the other manufacturer had not expended great effort to develop its own solution.** Pentec, Inc. v. Graphic Controls Corp., 776 F.2d 309, 227 USPQ 766 (Fed. Cir. 1985). See also Vandenberg v. Dairy Equipment Co., 740 F.2d 1560, 1568, 224 USPQ 195, 199 (Fed. Cir. 1984) (evidence of copying not found persuasive of nonobviousness) and Panduit Corp. v. Dennison Manufacturing Co., 774 F.2d 1082, 1098-99, 227 USPQ 337, 348, 349 (Fed. Cir. 1985), vacated on other grounds, 475 U.S. 809, 229 USPQ 478 (1986), on remand, 810 F.2d 1561, 1 USPQ2d 1593 (Fed. Cir. 1987) (evidence of copying found persuasive of nonobviousness where admitted infringer failed to satisfactorily produce a solution after 10 years of effort and expense)."

G. Evidence of Licensing

Requester respectfully notes that evidence of licensing, while capable of providing evidence of secondary considerations of nonobviousness as described in MPEP § 2145, is of itself not sufficient to overcome a *prima facie* obviousness rejection. Rather, ***Requester respectfully notes that any evidence of licensing must establish a nexus between the license agreement itself and the invention claimed.*** Unless licensees can be shown to be manufacturing products incorporating the claimed inventions, the existence of licenses provides no probative evidence regarding the secondary indicia. Accordingly, as stated in the MPEP § 2145 and case law, Patent Owner must establish a nexus between the rebuttal evidence and the claimed invention (i.e., objective evidence of nonobviousness must be attributable to the claimed

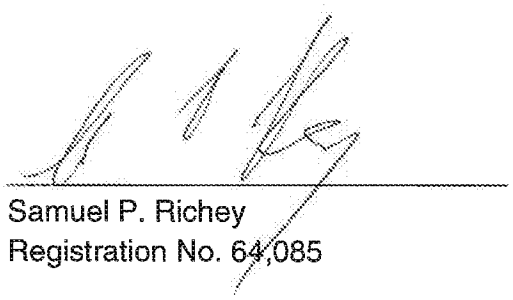
invention) in order to provide meaningful weight to the secondary considerations. Requester respectfully submits no nexus can exist between a license agreement and a later issued patent as no rights exist prior to the issuance of the patent. Said another way, there is no right granted in a claimed invention in a patent application or a patent publication as required by the MPEP and the case law that can be granted in a license agreement sufficient to establish the required nexus. Requester respectfully notes that the Flick '278 patent was filed July 3, 2007 and issued October 4, 2011. As such, any evidence of license agreements entered into before July 3, 2007 cannot be demonstrated to be tied to the invention claimed in claims 1 – 22 of the Flick '278 patent as the licenses existed prior to the filing of the Flick '278 patent. Similarly, any license agreements entered into before October 4, 2011 cannot be based on the merits claims of the Flick '278 patent as no claims had issued as part of a patent.

VIII. Conclusion

For at least the reasons stated above, Requester respectfully agrees with the Examiner that the Suman et al. '537 patent, the Spaur et al. '074 patent, the Johnson et al. '254 patent, the Song '756 patent, and the Davis '724 patent each raises substantial new questions of patentability which have not been previously raised. Furthermore, Requester contends the Flick '278 patent is not patentable in view of the prior art of record, which has been supplemented to include the Beckert et al. '363 patent, the Gelvin et al. '008 patent, and the Razavi et al publication. Requester respectfully submit that these references, in combination with a lack of relevant evidence provided by Patent Owner, provides sufficient grounds to invalidate all claims of the Flick '278 patent in this *ex parte* reexamination proceeding.

Dated: March 8, 2016

Respectfully submitted,



Samuel P. Richey
Registration No. 64,085

KPPB LLP
2400 East Katella Ave, Suite 1050
Anaheim, California 92806
pair@kppb.com
(949) 852-0000
(949) 852-0004 (fax)

ATTORNEY FOR REQUESTER
CALAMP CORP.

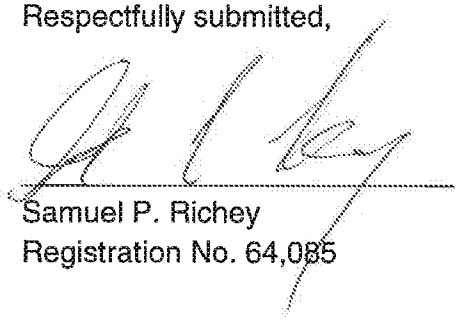
CERTIFICATE OF SERVICE

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 March 8, 2016, a complete copy of this Requester's Response, is being served via First Class U.S. Mail upon Applicant at the correspondence address as shown in PAIR:

CHRISTOPHER F. REGAN, ESQUIRE
ALLEN, DYER, DOPPELT, MILBRATH & GILCHRIST, P.A.
P.O. Box 3791
Orlando FL 32802-3791

Respectfully submitted,



Samuel P. Richey
Registration No. 64,085

KPPB LLP
2400 East Katella Ave, Suite 105
Anaheim, California 92806
pair@kppb.com
(949) 852-0000
(949) 852-0004 (fax)

ATTORNEY FOR REQUESTER
CALAMP CORP.

PTO/SB/08a (07-09)
Approved for use through 07/31/2016. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

Substitute for form 1449/PTO

INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Use as many sheets as necessary)

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.	
		US- 6606561	2003-08-12	Omega Patents, L.L.C.	
		US- 20010033225	2001-10-25	Razavi, B. et al.	
		US- 60264811	2001-01-29	Flick, K.	
		US- 60258005	2000-12-22	Flick, K.	
		US- 60251552	2000-12-06	Flick, K.	
		US- 60252125	2000-11-20	Flick, K.	
		US- 60236890	2000-09-29	Flick, K.	
		US- 60246463	2000-11-07	Witham, K. et al.	
		US- 60222777	2000-08-03	Flick, K.	
		US- 60205178	2000-05-17	Flick, K.	
		US- 5719551	1998-02-17	Flick, K.	
		US- 6011460	2000-01-04	Flick, K.	
		US-			
		US-			

FOREIGN PATENT DOCUMENTS

Examiner Initials*	Cite No.[1]	Foreign Patent Document Country Code[3]–Number[4]–Kind Code[5] *(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	T[6]

Examiner Signature		Date Considered	

*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant. [1]Applicant's unique citation designation number (optional). [2]See Kinds Codes of USPTO Patent Documents at www.uspto.gov or MPEP 901.04. [3] Enter Office that issued the document, by the two-letter code (WIPO Standard ST.3). [4] For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. [5]Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST.16 if possible. [6]Applicant is to place a check mark here if English language Translation is attached.

This collection of information is required by 37 CFR 1.97 and 1.98. 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, 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 (1-800-786-9199) and select option 2.

PTO/SB/08b (07-09)
Approved for use through 07/31/2012. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

Substitute for form 1449/PTO

INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Use as many sheets as necessary)

Sheet 2 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

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	
		FLICK, K., Office Action Response, Filed April 2, 2011	
		FILING RECEIPT for U.S. Application No. 11/773,272, Mail Date July 31, 2007	
		FLICK, K., Information Disclosure Statement for U.S. Application No. 11/076,259 filed March 9, 2005	
		CALIFORNIA ENVIRONMENTAL PROTECTION AGENCY, Mail-Out #MSC 97-24, Dated November 17, 1997	

Examiner Signature		Date Considered	

*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

1 Applicant's unique citation designation number (optional). 2 Applicant is to place a check mark here if English language Translation is attached.

This collection of information is required by 37 CFR 1.98. 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, 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 (1-800-786-9199) and select option 2.

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.

(56) **References Cited**

U.S. PATENT DOCUMENTS

3,886,553 A * 5/1975 Bates 342/465

(Continued)

FOREIGN PATENT DOCUMENTS

CA 2133673 4/1996

(Continued)

OTHER PUBLICATIONS

Motion tracking: no silver bullet, but a respectable arsenal; Welch, G.; Foxlin, E.; Computer Graphics and Applications, IEEE vol. 22, Issue 6, Nov.-Dec. 2002 pp. 24-38; Digital Object Identifier 10.1109/MCG.2002.1046626.*

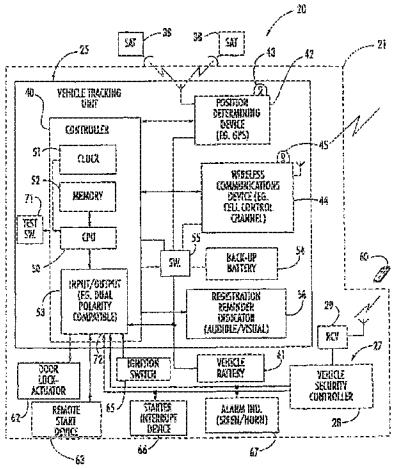
(Continued)

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



U.S. PATENT DOCUMENTS

4,837,700	A		6/1989	Ando et al. 364/449
4,843,377	A	*	6/1989	Fuller et al. 340/573.4
4,901,058	A	*	2/1990	Comeau et al. 340/576
4,902,628	A	*	2/1990	Blair 436/132
4,912,458	A	*	3/1990	Comeau et al. 340/576
4,914,038	A	*	4/1990	Jewitt 436/132
4,996,161	A	*	2/1991	Conners et al. 436/132
5,024,186	A		6/1991	Long et al. ..... 123/179 B
5,043,736	A		8/1991	Darnell et al. 342/357
5,055,851	A		10/1991	Sheffer 342/457
5,177,490	A		1/1993	Ando et al. 342/357
5,223,844	A		6/1993	Mansell et al. 342/357
5,262,774	A		11/1993	Kuwahara et al. 340/988
5,334,986	A		8/1994	Fernhout 342/357
5,365,450	A		11/1994	Schuchman et al. 364/449
5,398,190	A		3/1995	Wortham 364/460
5,483,455	A		1/1996	Lay et al. 364/448
5,515,043	A		5/1996	Berard et al. 340/988
5,515,285	A		5/1996	Garrett, Sr. et al. 364/460
5,570,087	A		10/1996	Lemelson 340/870.05
5,572,204	A		11/1996	Timm et al. 340/988
5,587,715	A		12/1996	Lewis 342/357
5,588,038	A		12/1996	Snyder 379/57
5,650,774	A		7/1997	Drori 340/825.32
5,673,305	A		9/1997	Ross 379/58
5,682,133	A		10/1997	Johnson et al. 340/426
5,686,904	A	*	11/1997	Bruwer 340/5.23
5,777,580	A		7/1998	Janky et al. 342/457
5,825,283	A	*	10/1998	Camhi 340/438
5,895,436	A		4/1999	Savoie et al. 701/214
5,939,975	A		8/1999	Tsuria et al. 340/426
5,940,007	A	*	8/1999	Brinkmeyer et al. ... 340/825.69
5,944,768	A		8/1999	Ito et al. 701/200
5,952,933	A		9/1999	Issa et al. 340/825.31
5,969,433	A		10/1999	Maggiora et al. 307/10.5
5,983,161	A		11/1999	Lemelson et al. 701/301
5,986,543	A		11/1999	Johnson 340/426
6,018,657	A		1/2000	Kennedy, III et al. 455/426
6,021,319	A		2/2000	Tigwell 455/151.2
6,025,744	A		2/2000	Bertolet et al. 340/426
6,028,537	A		2/2000	Suman et al. 340/988
6,049,269	A		4/2000	Byrd et al. 340/426
6,055,426	A		4/2000	Beasley 455/432
6,067,007	A		5/2000	Gioia 340/426
6,069,570	A		5/2000	Herring 340/825.49
6,075,458	A		6/2000	Ladner et al. 340/825.49
6,101,443	A		8/2000	Kato et al. 701/210
6,116,639	A		9/2000	Breed et al. 280/735
6,128,571	A		10/2000	Ito et al. 701/201
6,131,067	A		10/2000	Girerd et al. 701/213
6,133,855	A		10/2000	Kim 340/932.2
6,140,938	A	*	10/2000	Flick 340/825.69
6,140,939	A	*	10/2000	Flick 340/825.69
6,140,956	A		10/2000	Hillman et al. 342/357.07
6,144,315	A	*	11/2000	Flick 340/825.69
6,148,212	A		11/2000	Park et al. 455/456
6,151,551	A		11/2000	Geier et al. 701/207
6,154,648	A		11/2000	Comer 455/426
6,166,626	A		12/2000	Janky et al. 340/426
6,166,650	A	*	12/2000	Bruwer 340/5.26
6,167,255	A		12/2000	Kennedy, III et al. 455/414
6,169,497	B1		1/2001	Robert 340/988
6,191,701	B1	*	2/2001	Bruwer 340/5.22
6,195,597	B1		2/2001	Yamada 701/1
6,211,818	B1		4/2001	Zach, Sr. 342/357.07
6,236,365	B1		5/2001	LeBlanc et al. 342/457
6,240,365	B1		5/2001	Bunn et al. 701/213
6,259,381	B1		7/2001	Small 340/988
6,275,773	B1		8/2001	Lemelson et al. 701/301
6,298,306	B1		10/2001	Suarez et al. 701/213
6,313,791	B1		11/2001	Klanke 342/357.17
6,314,366	B1		11/2001	Farmakis et al. 701/201
6,320,514	B1	*	11/2001	Flick 340/825.69
6,320,535	B1		11/2001	Hillman et al. 342/357.1
6,321,091	B1		11/2001	Holland 455/456
6,330,499	B1		12/2001	Chou et al. 701/33
6,331,825	B1		12/2001	Ladner et al. 340/988
6,339,745	B1		1/2002	Novik 701/208
6,400,996	B1	*	6/2002	Hoffberg et al. 700/83
6,411,217	B1	*	6/2002	Gabbard 340/5.1
6,452,483	B2		9/2002	Chen et al. 340/425.5
6,473,794	B1	*	10/2002	Guheen et al. 709/223
6,474,683	B1	*	11/2002	Breed et al. 280/735
6,512,461	B1		1/2003	Benzie et al. 340/825.22
6,519,571	B1	*	2/2003	Guheen et al. 705/14
6,536,037	B1	*	3/2003	Guheen et al. 717/151
6,567,012	B1		5/2003	Matsubara et al. 340/825.72
6,615,166	B1	*	9/2003	Guheen et al. 703/27
6,629,081	B1	*	9/2003	Cornelius et al. 705/30
6,771,188	B2	*	8/2004	Flick 340/989
6,992,562	B2	*	1/2006	Fuks et al. 340/5.52
7,069,234	B1	*	6/2006	Cornelius et al. 705/26
7,138,904	B1	*	11/2006	Dutu 340/5.72
7,139,999	B2	*	11/2006	Bowman-Amuah 717/101
7,165,041	B1	*	1/2007	Guheen et al. 705/26
7,167,844	B1	*	1/2007	Leong et al. 705/80
7,312,696	B2	*	12/2007	Flick 340/426.18
7,315,826	B1	*	1/2008	Guheen et al. 705/7
7,343,244	B2	*	3/2008	Flick 701/207
7,451,005	B2	*	11/2008	Hoffberg et al. 700/83
7,502,687	B2	*	3/2009	Flick 701/213
2001/0045886	A1		11/2001	Minowa 340/7.45
2003/0154027	A1	*	8/2003	Flick 701/213
2004/0121756	A1	*	6/2004	Griffin et al. 455/404.2
2005/0156716	A1	*	7/2005	Flick 340/426.19
2005/0156717	A1	*	7/2005	Flick 340/426.19
2005/0156718	A1	*	7/2005	Flick 340/426.19
2005/0156719	A1	*	7/2005	Flick 340/426.19
2005/0174220	A1	*	8/2005	Flick 340/426.18
2005/0179526	A1	*	8/2005	Flick 340/426.19
2005/0255033	A1	*	11/2005	Shimoji et al. 423/447.3
2007/0279283	A1	*	12/2007	Flick 342/357.07
2008/0030316	A1	*	2/2008	Flick 340/466

FOREIGN PATENT DOCUMENTS

EP	1640727	A1 *	3/2006
JP	2006148842	A *	6/2006
KR	2006011267	A *	2/2006
KR	2007011035	A *	1/2007
WO	WO 2004001550	A2 *	12/2003
WO	WO 2009122290	A2 *	10/2009

OTHER PUBLICATIONS

Data Fusion Architectures for Sensor Platforms; Mirza, Atif R.; Aerospace Conference, 2008 IEEE; Mar. 1-8, 2008 pp. 1-13; Digital Object Identifier 10.1109/AERO.2008.4526434.*

Security Challenges of Location-Aware Mobile Business; Tatly, E.I.; Stegemann, D.; Lucks, S.; Mobile Commerce and Services, 2005. WMCS '05. The Second IEEE International Workshop on; 19-19 Jul. 2005 pp. 84-95; Digital Object Identifier 10.1109/WMCS.2005.23.*

Submarine cable infrastructure defense against terrorist aggression; Bannon, R.; Burnett, D.; Oceans 2003. Proceedings vol. 4, Sep. 22-26, 2003 pp. 1850-1861 vol. 4; Digital Object Identifier 10.1109/Oceans.2003.1282710.*

A Study on Predicting Hazard Factors for Safe Driving; Takahashi, H.; Ukishima, D.; Kawamoto, K.; Hirota, K.; Industrial Electronics, IEEE Transactions on; vol. 54, Issue 2, Apr. 2007 pp. 781-789; Digital Object Identifier 10.1109/TIE.2007.891651.*

A self-organizing hybrid sensor system with distributed data fusion for intruder tracking and surveillance; Palaniappan, R.; Clarke, T.;

Wahid, P.; Behdad, N.; Kincaid, P.; Antennas and Propagation Society International Symposium, 2008. AP-S 2008. IEEE; Jul. 5-11, 2008 pp. 1-4; Digital Object Identifier 10.1109/APS.2008.4619564.*
Localization of ahead vehicles with on-board stereo cameras; Zanin, M.; Image Analysis and Processing, 2007. ICIAP 2007. 14th International Conference on; Sep. 10-14, 2007 pp. 111-116; Digital Object Identifier 10.1109/ICIAP.2007.4362766.*
On distributed fault-tolerant detection in wireless sensor networks; Luo, X.; Dong, M.; Huang, Y.;Computers, IEEE Transactions on; vol. 55, Issue 1, Jan. 2006 pp. 58-70; Digital Object Identifier 10.1109/TC.2006.13.*
Omega Research and Development, Inc., "GPS 2000", distributed at Consumer Electronics Show in Las Vegas, NV, Jan. 2001, pp. 1-4. cited by other.*
Omega Research and Development, Inc., "GPS 2000", distributed at Consumer Electronics Show in Las Vegas, NV, Jan. 2001, pp. 1-4.
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.

* cited by examiner

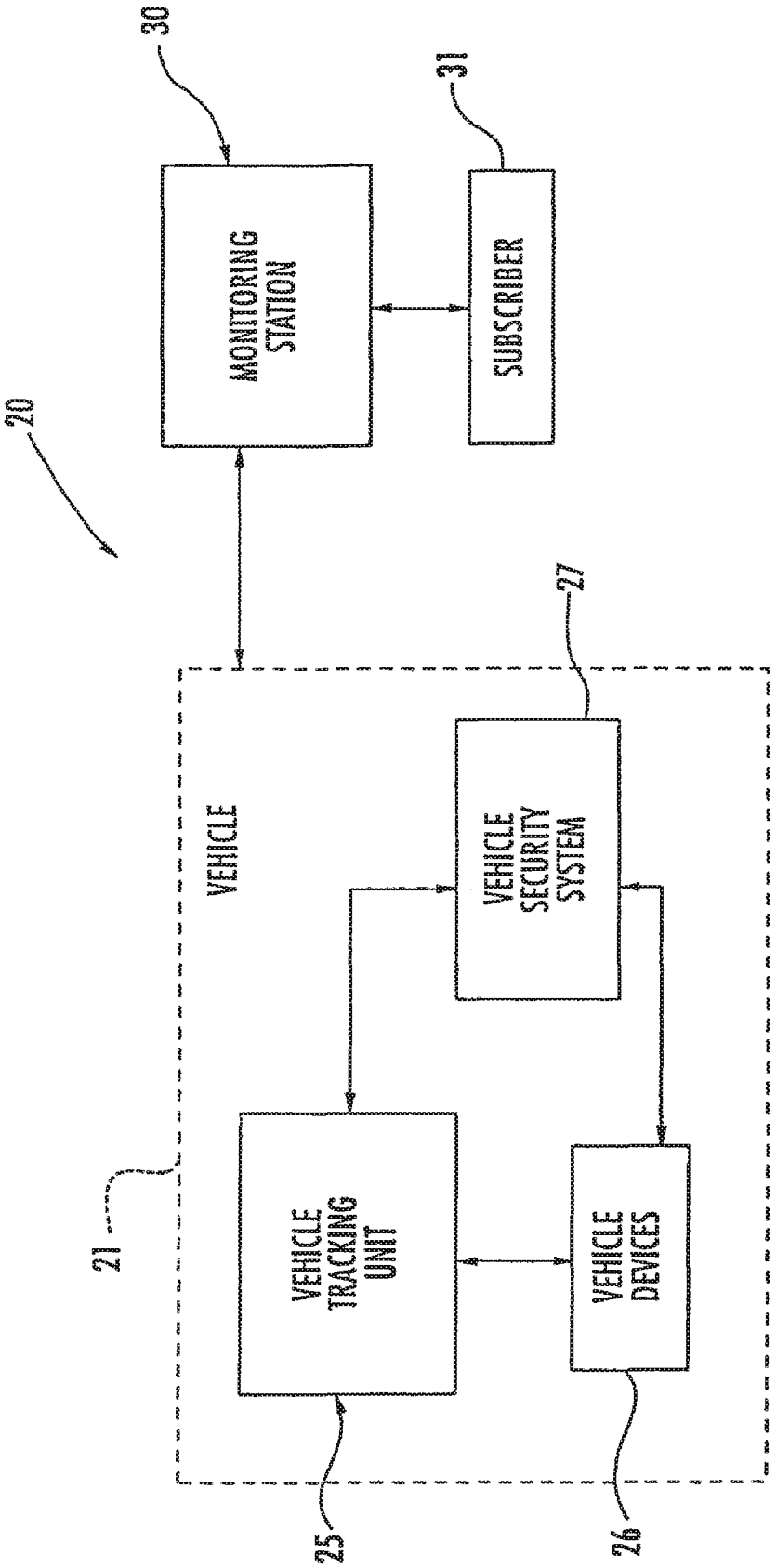


FIG. 1.

Ex. 1005 - Page 195

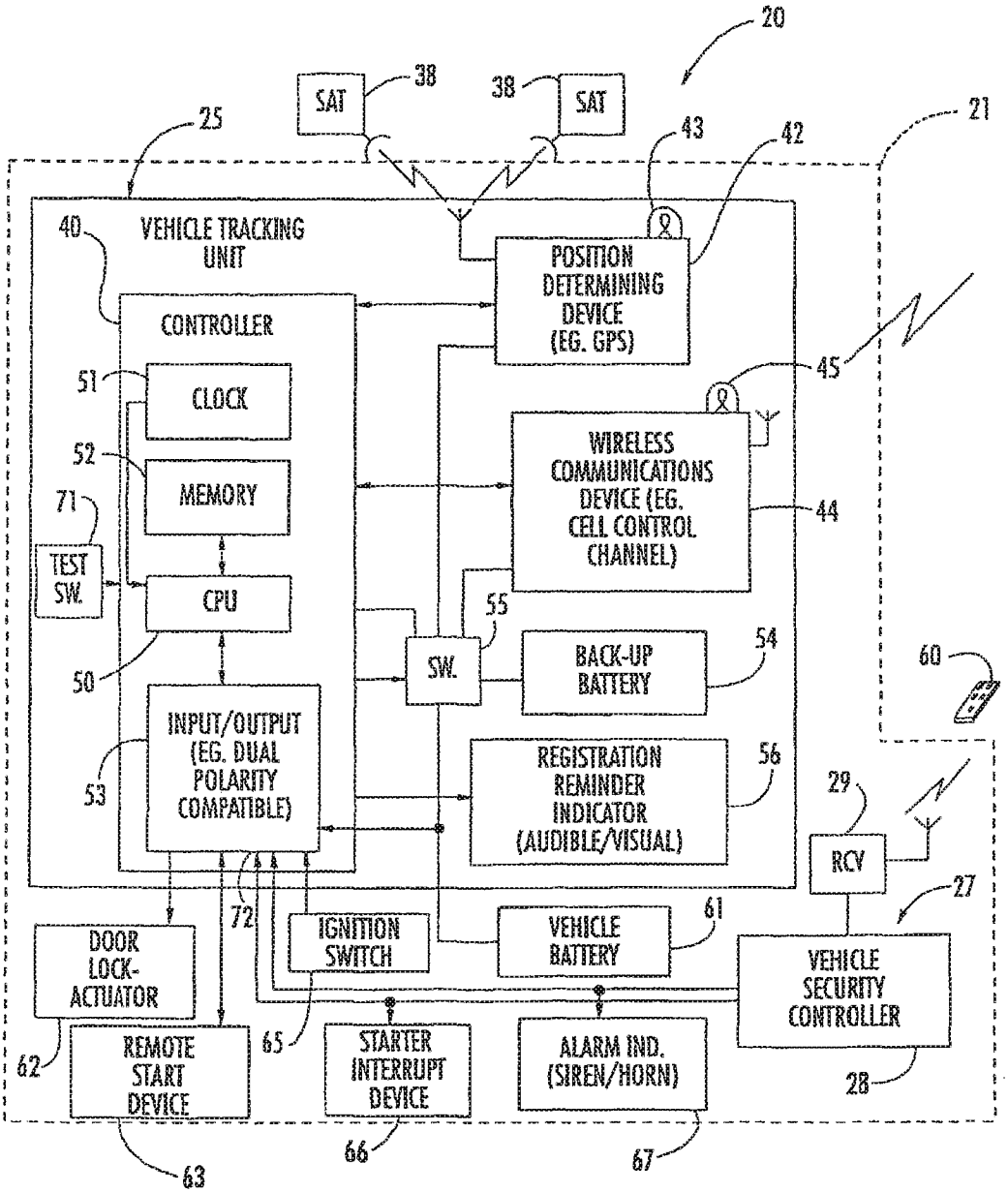

20
SAT
38
38
SAT
25
21
43
42
40
VEHICLE TRACKING UNIT
POSITION DETERMINING DEVICE (EG. GPS)
CONTROLLER
45
51
CLOCK
WIRELESS COMMUNICATIONS DEVICE (EG. CELL CONTROL CHANNEL)
52
MEMORY
71
44
TEST SW.
CPU
55
60
50
SW.
BACK-UP BATTERY
54
INPUT/OUTPUT (EG. DUAL POLARITY COMPATIBLE)
53
REGISTRATION REMINDER 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.

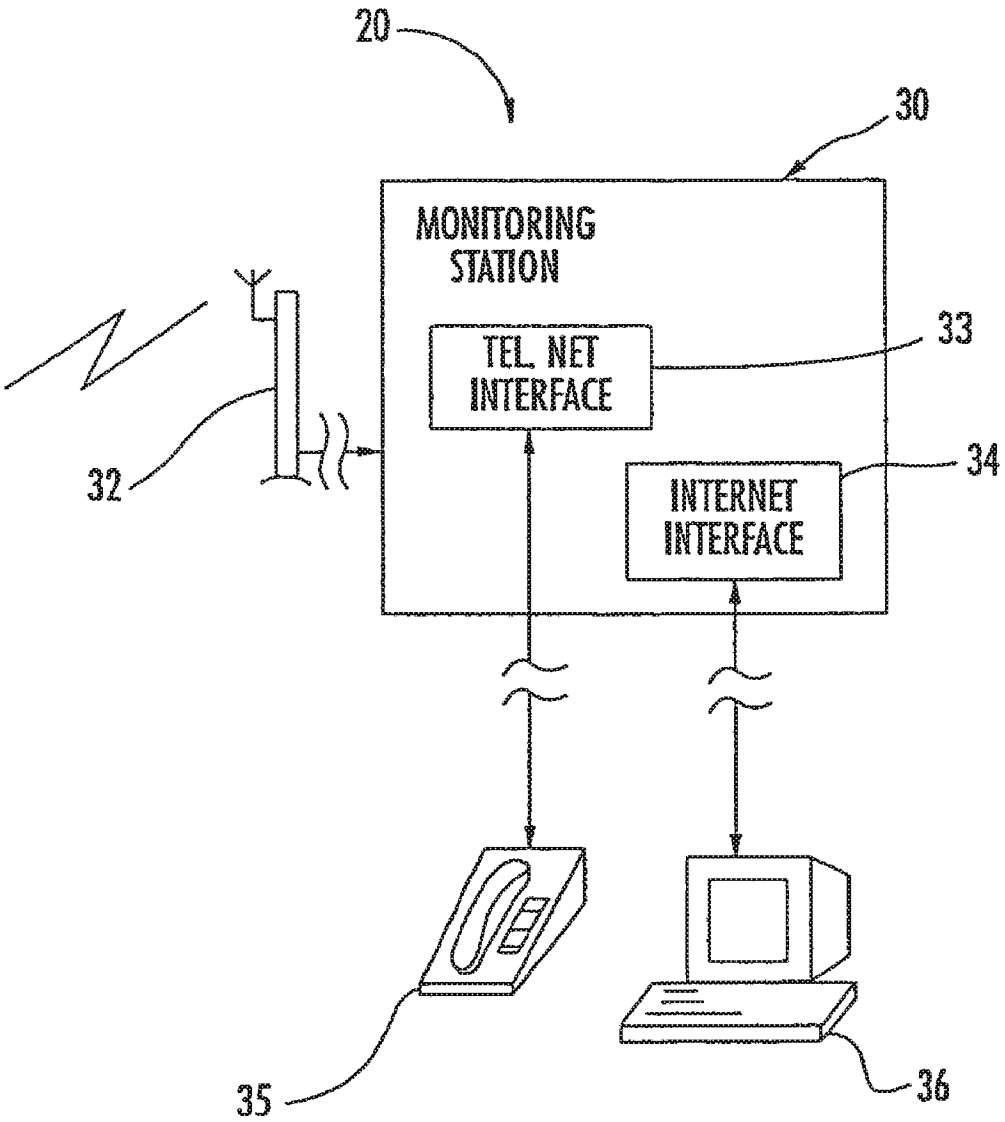

20
30
MONITORING STATION
TEL. NET INTERFACE
33
INTERNET INTERFACE
34
32
35
36

FIG. 3.

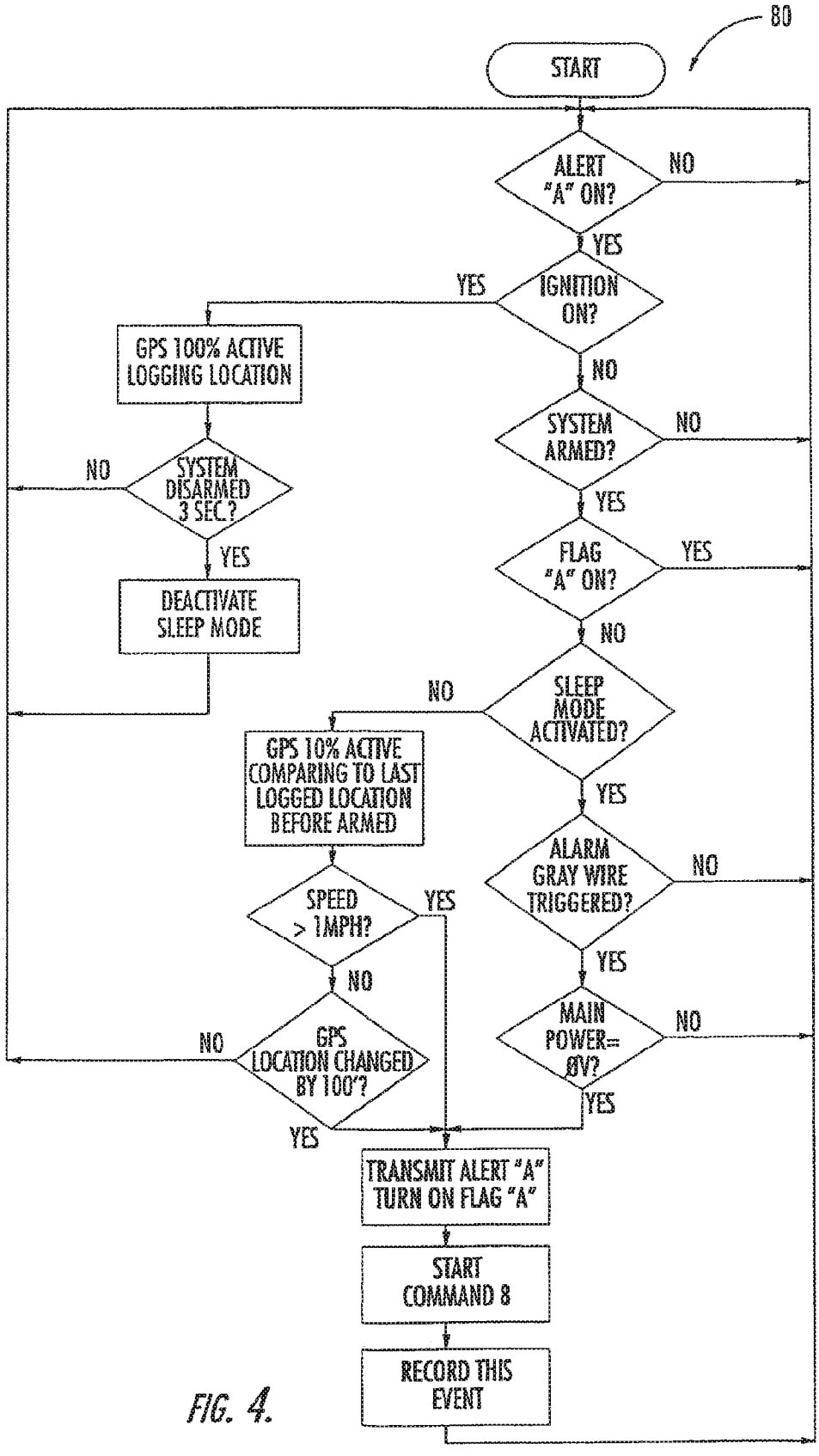

80
START
ALERT "A" ON?
NO
YES
IGNITION ON?
YES
GPS 100% ACTIVE LOGGING LOCATION
NO
SYSTEM ARMED?
NO
YES
SYSTEM DISARMED 3 SEC.?
NO
YES
DEACTIVATE SLEEP MODE
FLAG "A" ON?
YES
NO
SLEEP MODE ACTIVATED?
NO
GPS 10% ACTIVE COMPARING TO LAST LOGGED LOCATION BEFORE ARMED
YES
ALARM GRAY WIRE TRIGGERED?
NO
YES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

FIG. 4.

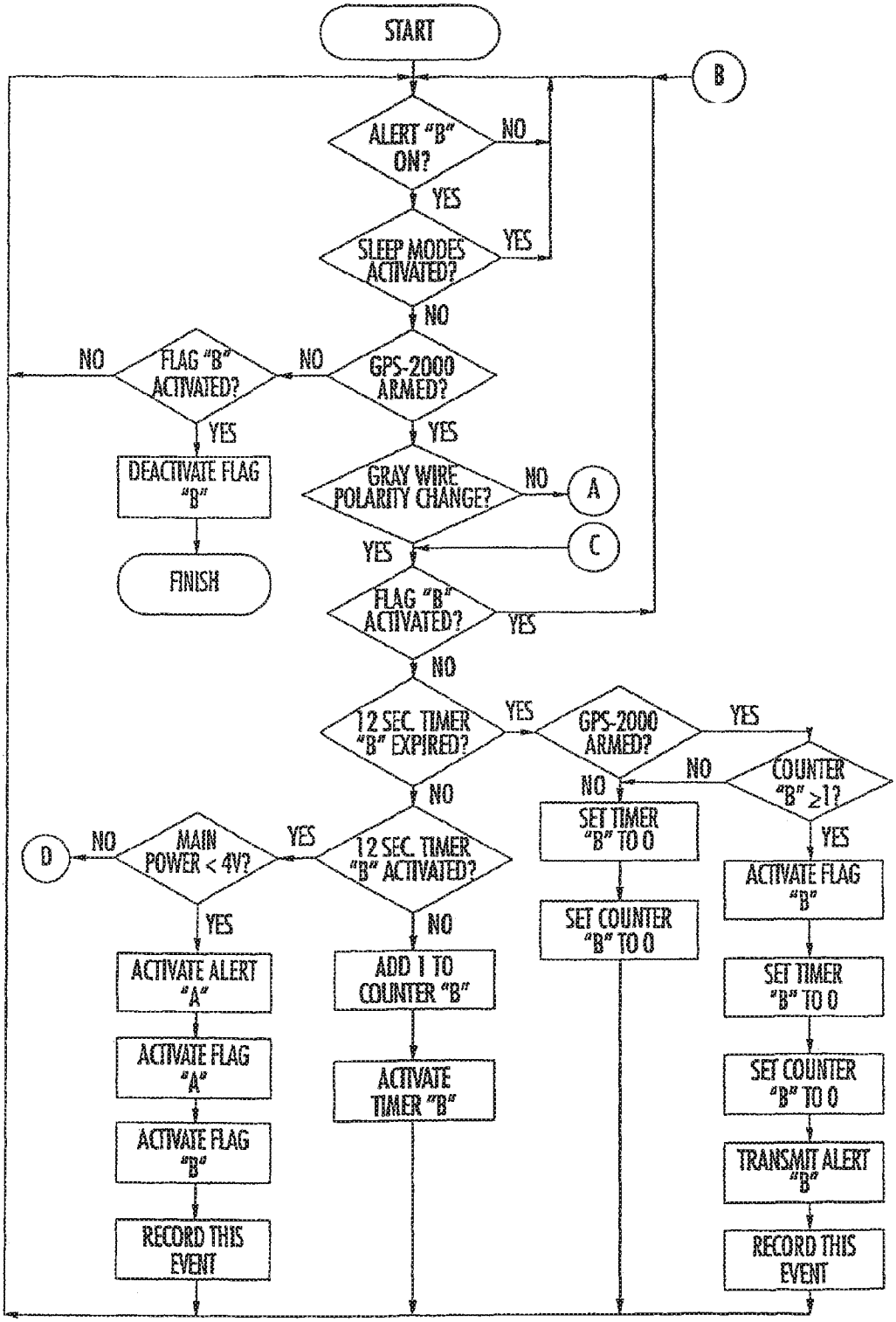

START
B
ALERT "B" ON?
NO
YES
SLEEP MODES ACTIVATED?
YES
NO
NO
FLAG "B" ACTIVATED?
NO
GPS-2000 ARMED?
YES
YES
DEACTIVATE FLAG "B"
GRAY WIRE POLARITY CHANGE?
NO
A
C
YES
FINISH
FLAG "B" ACTIVATED?
YES
NO
12 SEC. TIMER "B" EXPIRED?
YES
GPS-2000 ARMED?
YES
NO
NO
COUNTER "B" ≥1?
NO
SET TIMER "B" TO 0
YES
D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

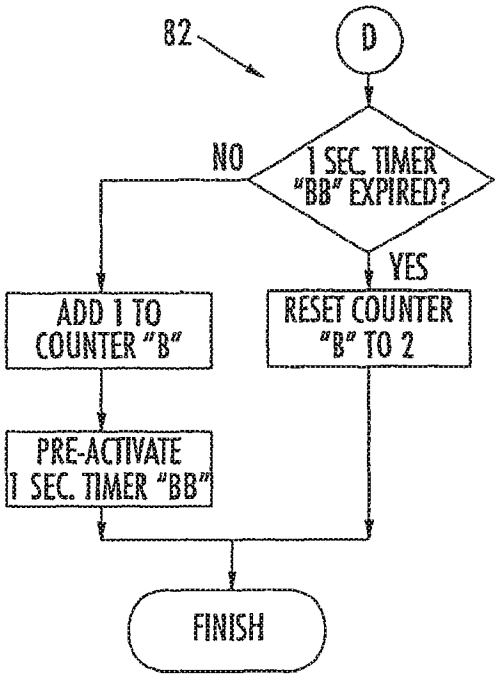

82
D
1 SEC. TIMER "BB" EXPIRED?
NO
YES
ADD 1 TO COUNTER "B"
RESET COUNTER "B" TO 2
PRE-ACTIVATE 1 SEC. TIMER "BB"
FINISH

FIG. 5B.

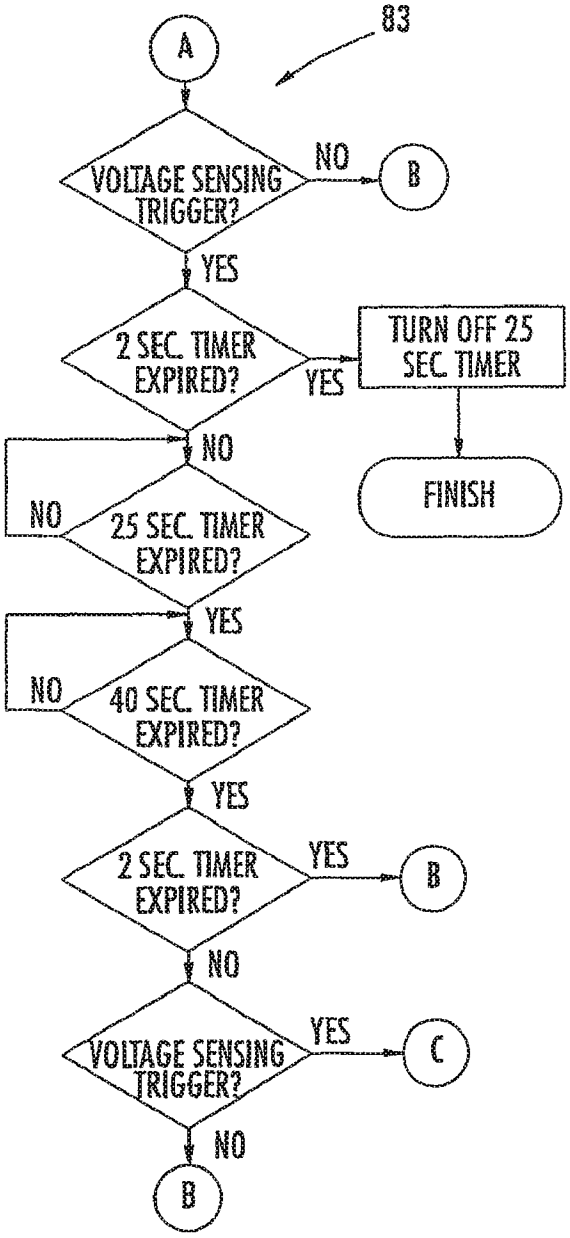

83
A
VOLTAGE SENSING TRIGGER?
NO
B
YES
2 SEC. TIMER EXPIRED?
YES
TURN OFF 25 SEC. TIMER
FINISH
NO
NO
25 SEC. TIMER EXPIRED?
YES
NO
40 SEC. TIMER EXPIRED?
YES
2 SEC. TIMER EXPIRED?
YES
B
NO
VOLTAGE SENSING TRIGGER?
YES
C
NO
B

FIG. 5C.

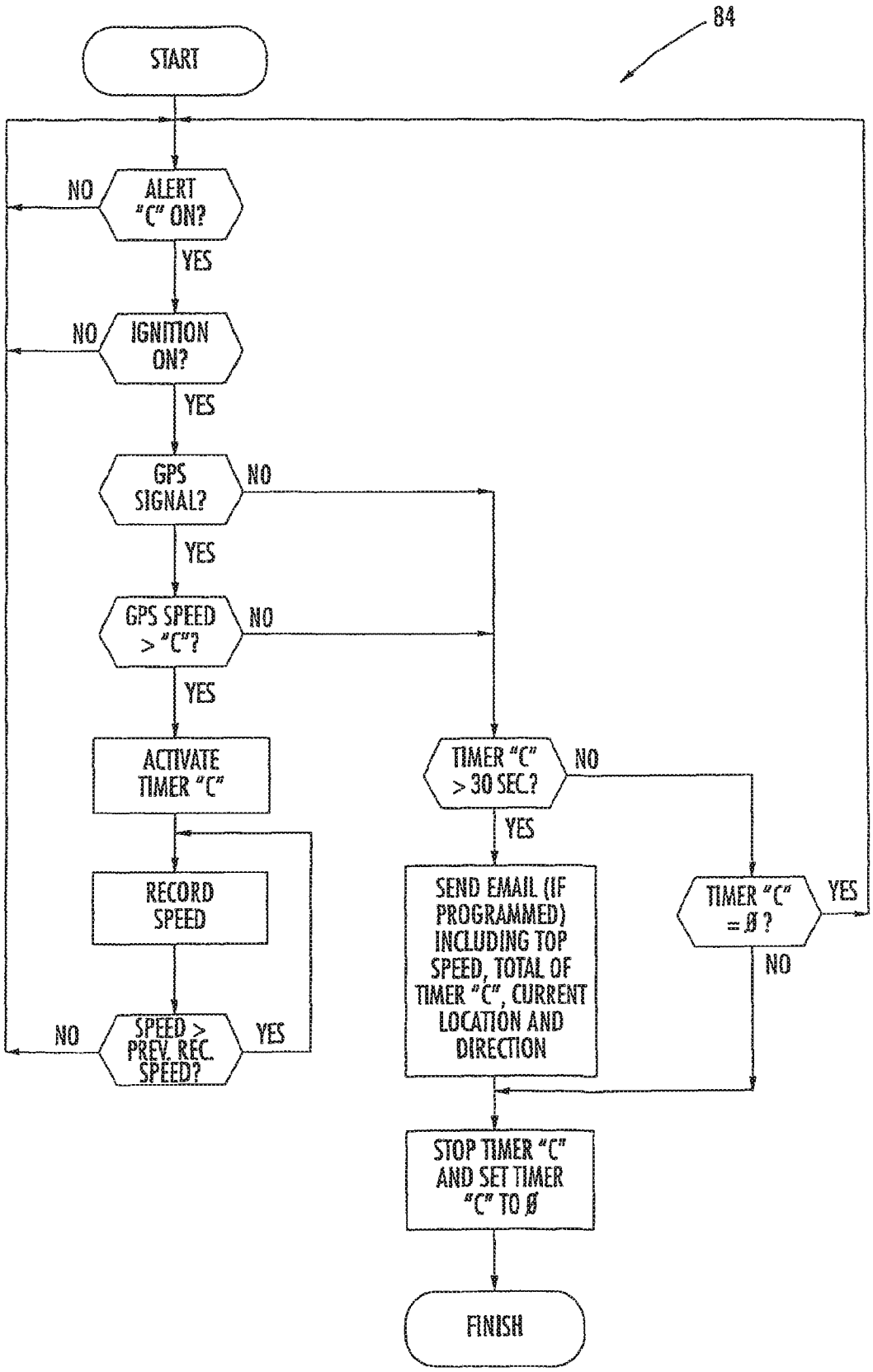

84
START
ALERT "C" ON?
NO
YES
IGNITION ON?
NO
YES
GPS SIGNAL?
NO
YES
GPS SPEED > "C"?
NO
YES
ACTIVATE TIMER "C"
RECORD SPEED
SPEED > PREV. REC. SPEED?
NO
YES
TIMER "C" > 30 SEC.?
NO
YES
SEND EMAIL (IF PROGRAMMED) INCLUDING TOP SPEED, TOTAL OF TIMER "C", CURRENT LOCATION AND DIRECTION
TIMER "C" = Ø ?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

FIG. 6.

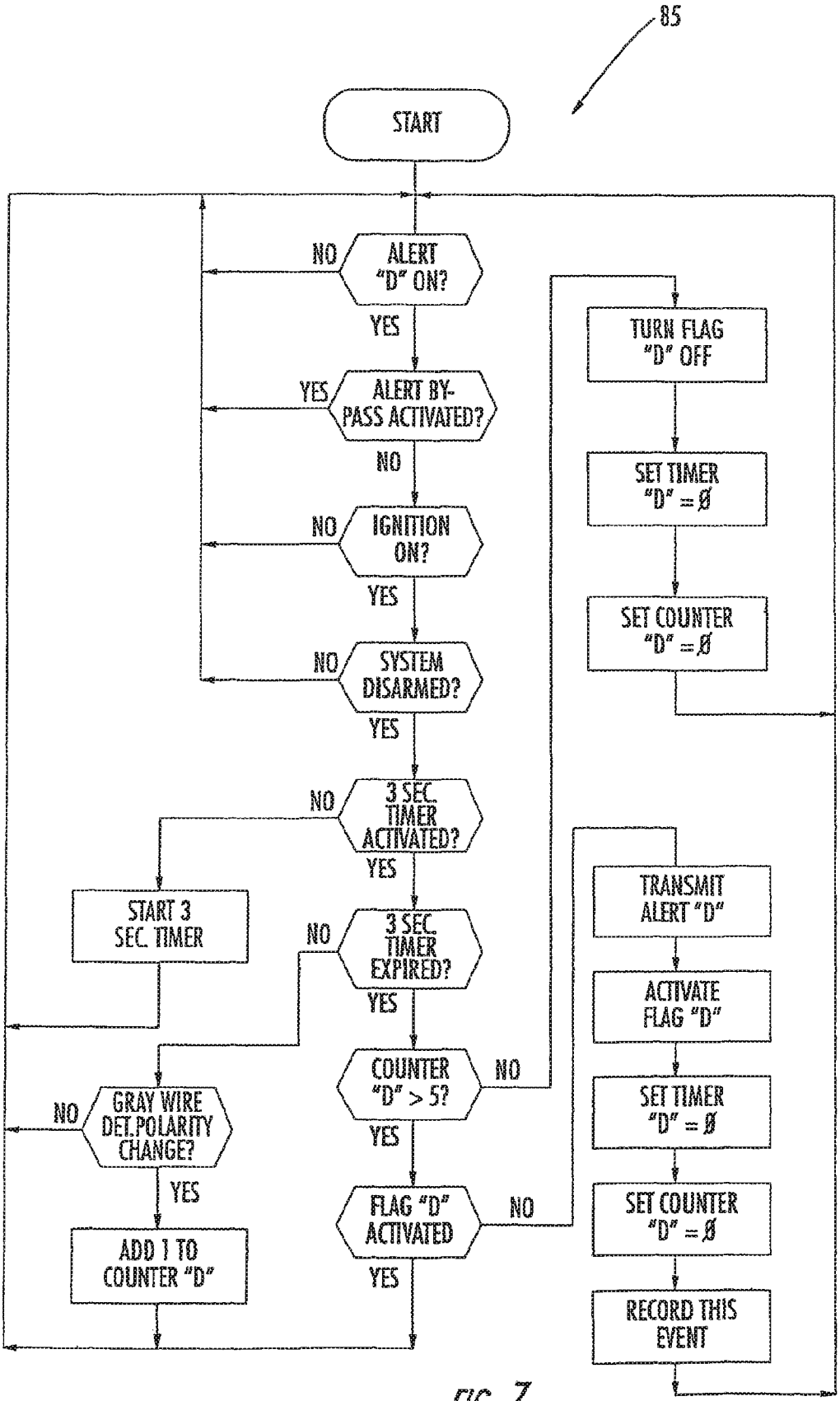

85
START
NO
ALERT "D" ON?
YES
YES
ALERT BY-PASS ACTIVATED?
NO
NO
IGNITION ON?
YES
NO
SYSTEM DISARMED?
YES
NO
3 SEC. TIMER ACTIVATED?
YES
START 3 SEC. TIMER
NO
3 SEC. TIMER EXPIRED?
YES
COUNTER "D" > 5?
NO
YES
NO
GRAY WIRE DET.POLARITY CHANGE?
YES
ADD 1 TO COUNTER "D"
FLAG "D" ACTIVATED
NO
YES
TURN FLAG "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.

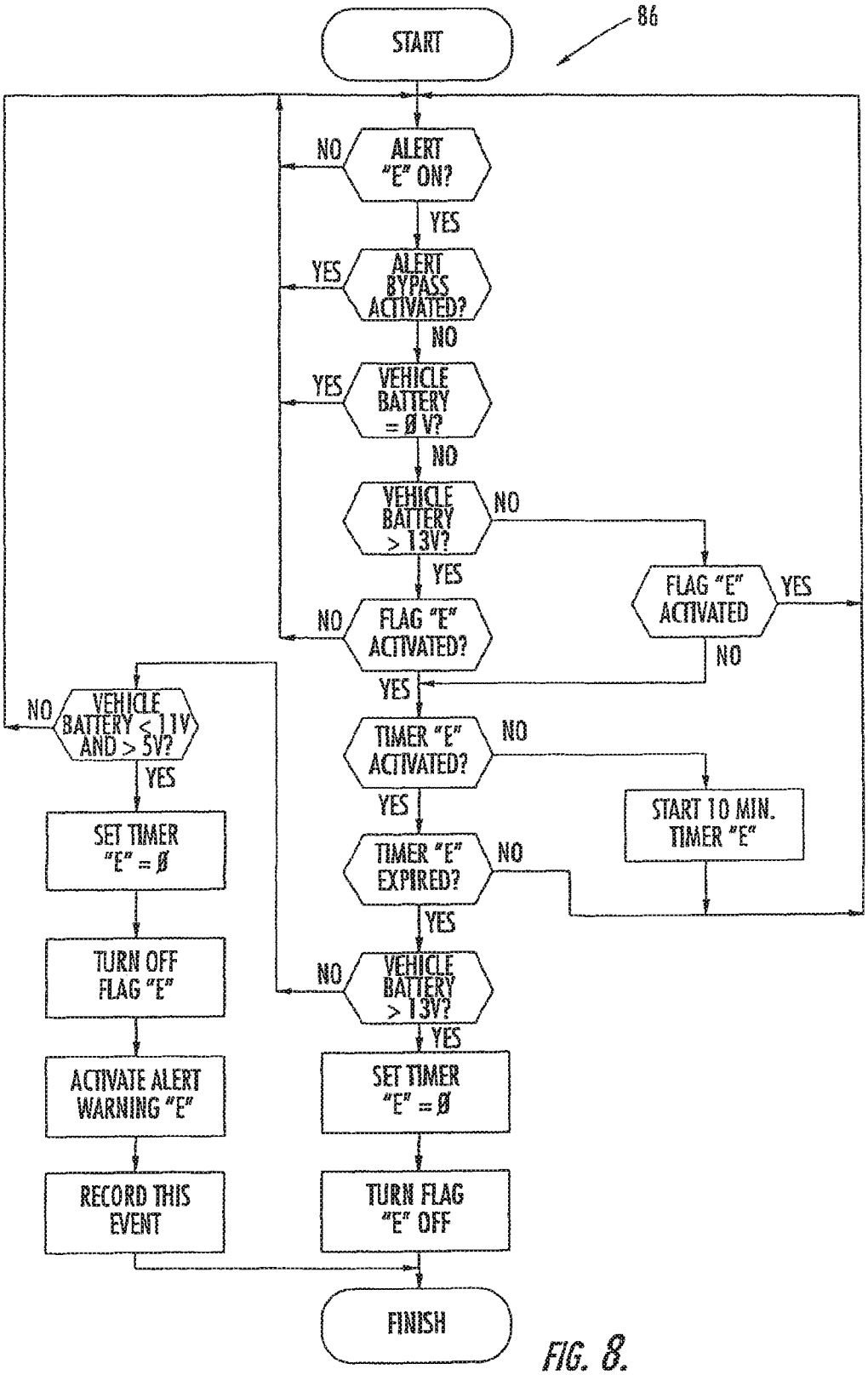

86
START
ALERT "E" ON?
NO
YES
ALERT BYPASS ACTIVATED?
YES
NO
VEHICLE BATTERY = Ø V?
YES
NO
VEHICLE BATTERY > 13V?
NO
YES
FLAG "E" ACTIVATED
YES
NO
FLAG "E" ACTIVATED?
NO
YES
VEHICLE BATTERY < 11V AND > 5V?
NO
YES
TIMER "E" ACTIVATED?
NO
YES
START 10 MIN. TIMER "E"
SET TIMER "E" = Ø
TIMER "E" EXPIRED?
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.

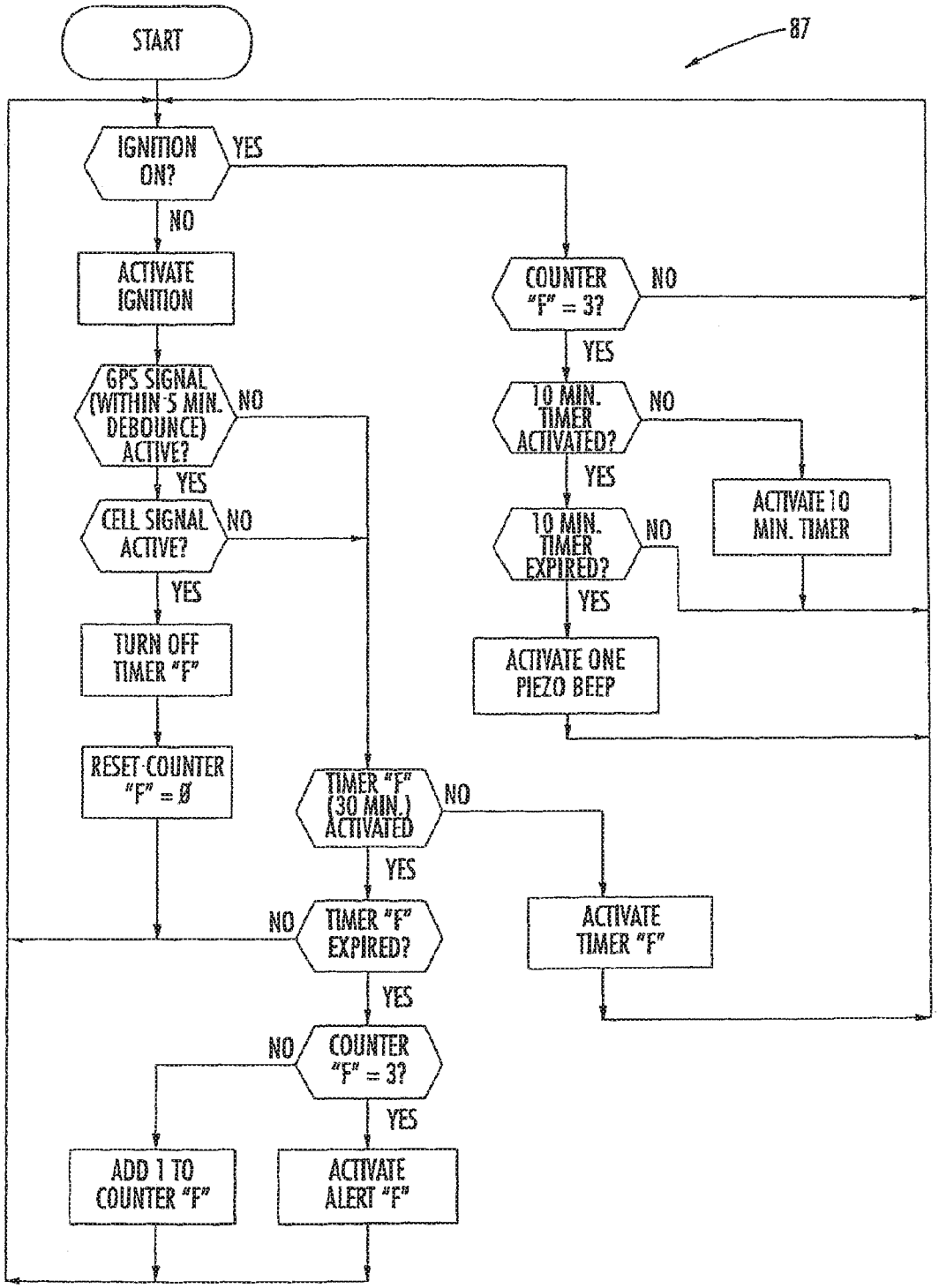

87
START
IGNITION ON?
YES
NO
ACTIVATE IGNITION
GPS SIGNAL (WITHIN 5 MIN. DEBOUNCE) ACTIVE?
NO
YES
CELL SIGNAL ACTIVE?
NO
YES
TURN OFF TIMER "F"
RESET COUNTER "F" = Ø
TIMER "F" (30 MIN.) ACTIVATED
NO
YES
TIMER "F" EXPIRED?
NO
YES
COUNTER "F" = 3?
NO
YES
ADD 1 TO COUNTER "F"
ACTIVATE ALERT "F"
COUNTER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

(56) **References Cited**

U.S. PATENT DOCUMENTS

3,868,497	A *	2/1975	Vietor	701/121
3,875,379	A *	4/1975	Vietor	701/121
4,591,823	A *	5/1986	Horvat	340/396
4,754,255	A *	6/1988	Sanders et al.	307/10.4
4,884,055	A *	11/1989	Memmola	340/426.28
5,043,736	A	8/1991	Darnell et al.	342/357
5,055,851	A	10/1991	Sheffer	342/457
5,081,667	A *	1/1992	Drori et al.	455/404.1
5,177,490	A	1/1993	Ando et al.	342/357

(Continued)

OTHER PUBLICATIONS

P Kronborg, "Highway Helpers"—Field trials with traffic inside Stockholm, Proc. of 6th world congress on intelligent journal, 1999 (from DialogEclassic Web(tm) file 63, acc. No. 00819154).*

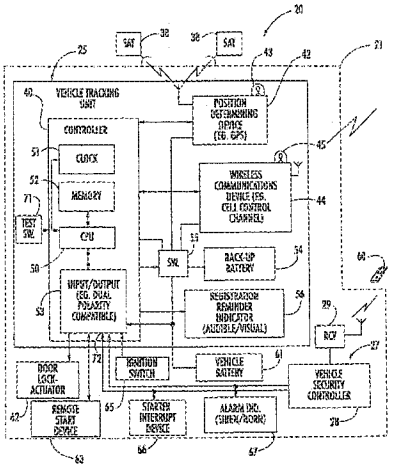
(Continued)

Primary Examiner—Cuong Nguyen
(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.

34 Claims, 10 Drawing Sheets



U.S. PATENT DOCUMENTS

5,195,126	A *	3/1993	Carrier et al.	379/45
5,223,844	A *	6/1993	Mansell et al.	342/357.07
5,247,564	A *	9/1993	Zicker	379/40
5,262,774	A	11/1993	Kuwahara et al.	340/988
5,334,986	A	8/1994	Fernhout	342/357
5,365,450	A	11/1994	Schuchman	364/449
5,513,244	A *	4/1996	Joao et al.	455/404.1
5,515,043	A	5/1996	Berard et al.	340/988
5,559,491	A *	9/1996	Stadler	340/426.25
5,559,520	A *	9/1996	Barzegar et al.	342/357.1
5,673,305	A *	9/1997	Ross	455/517
5,677,666	A *	10/1997	Stallbohm	340/426.27
5,740,047	A *	4/1998	Pilley et al.	701/120
5,777,580	A	7/1998	Janky et al.	342/457
5,857,986	A *	1/1999	Moriyasu	601/49
5,939,975	A	8/1999	Tsuria et al.	307/10.5
5,944,768	A	8/1999	Ito	340/990
5,969,433	A *	10/1999	Maggiora et al.	307/10.5
5,983,161	A *	11/1999	Lemelson et al.	701/301
6,018,657	A	1/2000	Kennedy, III et al.	455/426
6,025,774	A	2/2000	Forbes	340/426
6,049,269	A	4/2000	Byrd et al.	340/426
6,055,426	A	4/2000	Beasley	455/432
6,069,570	A	5/2000	Herring	340/825.49
6,075,458	A	6/2000	Ladner et al.	340/825.49
6,087,942	A *	7/2000	Sleichter et al.	340/576
6,133,855	A	10/2000	Kim	340/932.2
6,148,212	A	11/2000	Park et al.	455/456
6,151,551	A	11/2000	Geier et al.	701/207
6,154,648	A	11/2000	Comer	455/426
6,166,626	A	12/2000	Janky et al.	340/426
6,169,497	B1	1/2001	Robert	340/988
6,195,597	B1	2/2001	Yamada	701/1
6,240,365	B1	5/2001	Bunn	340/988
6,275,773	B1	8/2001	Lemelson et al.	340/436
6,320,535	B1	11/2001	Hillman et al.	342/357
6,330,499	B1	12/2001	Chou et al.	701/32
6,507,786	B1 *	1/2003	Flick	701/213
6,509,833	B1 *	1/2003	Tate	340/539.1
6,509,868	B1 *	1/2003	Flick	342/357.07
6,512,465	B1 *	1/2003	Flick	340/989
6,522,267	B1 *	2/2003	Flick	340/989
6,542,077	B1 *	4/2003	Joao	340/426.16
6,581,961	B1 *	6/2003	Bowers	280/735
6,611,229	B1 *	8/2003	Muramatsu et al.	342/357.07
6,661,340	B1 *	12/2003	Saylor et al.	340/517
6,703,946	B1 *	3/2004	Flick	340/989
6,744,370	B1 *	6/2004	Sleichter et al.	340/576

OTHER PUBLICATIONS

Unknown author, 2003 Chevy Express and GMC Savana build for work new full-major strong, smart and surprising features, General Motors—Press Release, Mar. 6, 2002 (from DialogClassic Web(tm) file 81, acc. No. 184143).*

Z Juda, In-vehicle networking for intelligent vehicle, ISATA 2000—Body Structures/Chassis Engineering, Sep. 25, 2000 (from DialogClassic Web(tm) file 81, acc. No. 163956).*

SK Gehrig et al., System architecture for an intersection assistant fusing in GPS information, IEEE Intelligent Vehicles Symp., 2003 (from DialogClassic Web(tm) file 95, acc. No. 01839210).*

Omega Research and Development, Inc., Installation Instructions for ATV-1000 Model Car Alarm, 2002. This product has been sold in the U.S. for approximately five years.

* cited by examiner

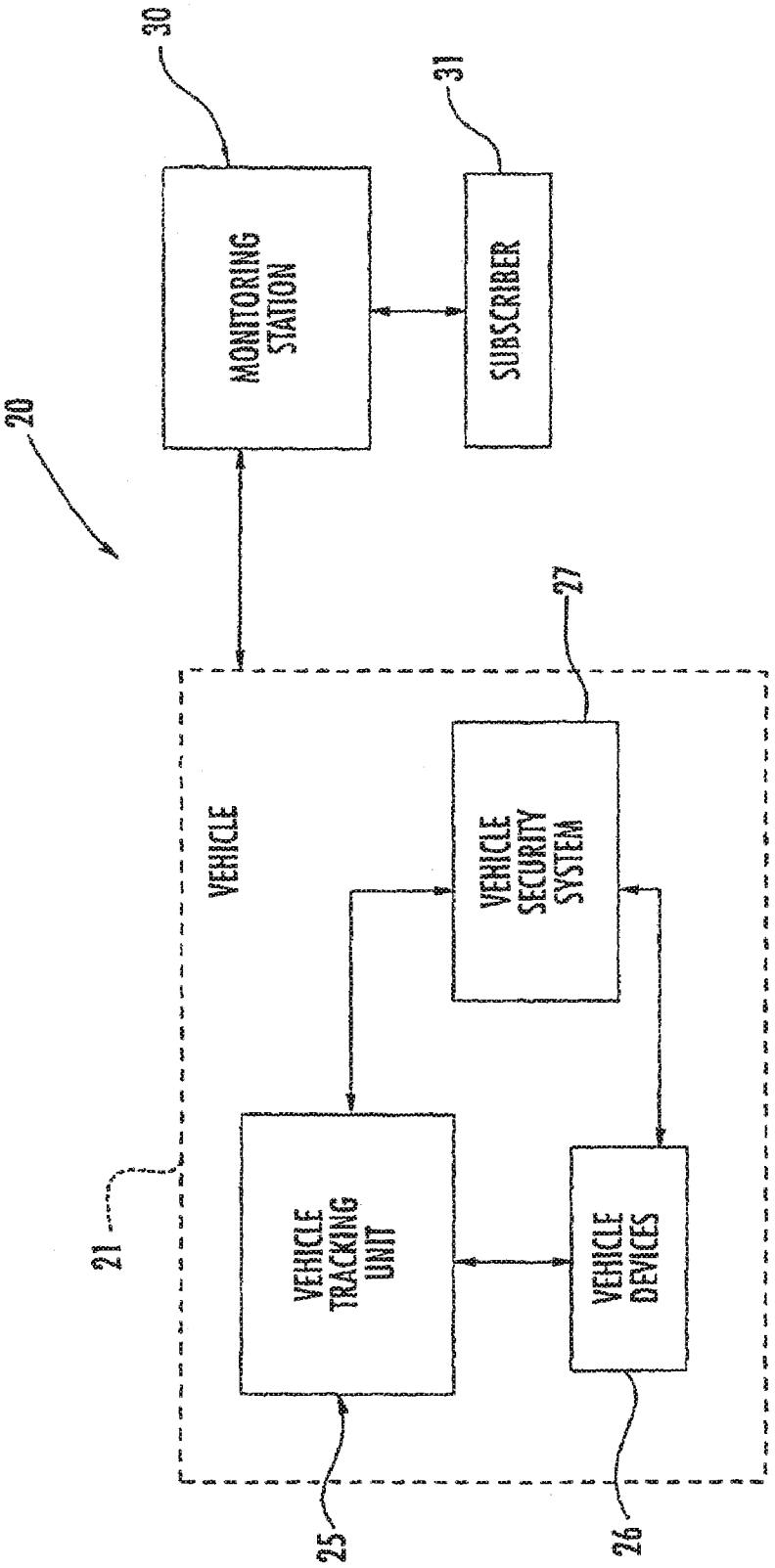


FIG. 1.

Ex. 1005 - Page 222

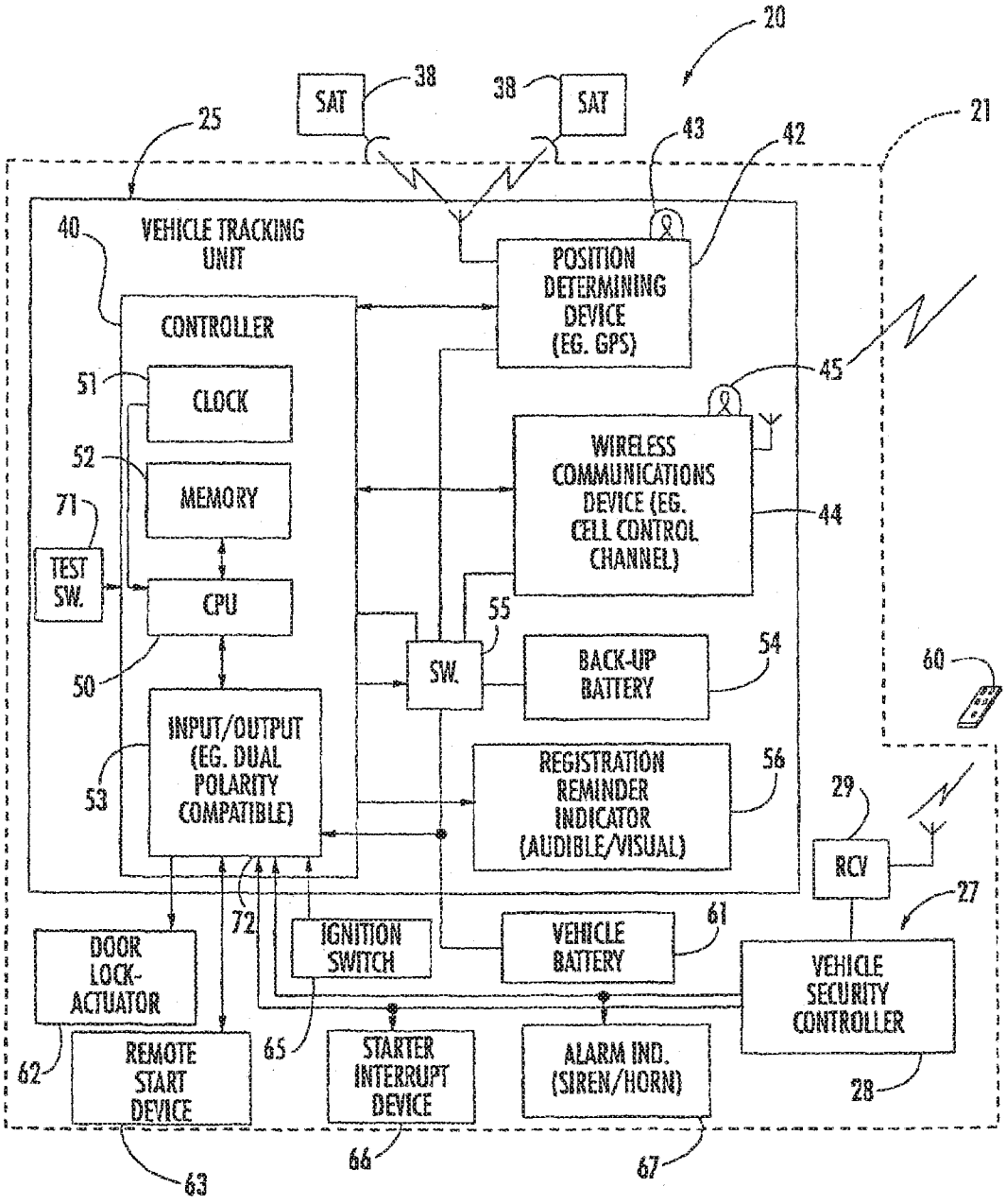

20
SAT
38
38
SAT
25
21
43
42
40
VEHICLE TRACKING UNIT
POSITION DETERMINING DEVICE (EG. GPS)
CONTROLLER
45
51
CLOCK
WIRELESS COMMUNICATIONS DEVICE (EG. CELL CONTROL CHANNEL)
52
MEMORY
71
44
TEST SW.
CPU
55
60
SW.
BACK-UP BATTERY
54
50
INPUT/OUTPUT (EG. DUAL POLARITY COMPATIBLE)
REGISTRATION REMINDER INDICATOR (AUDIBLE/VISUAL)
56
53
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.

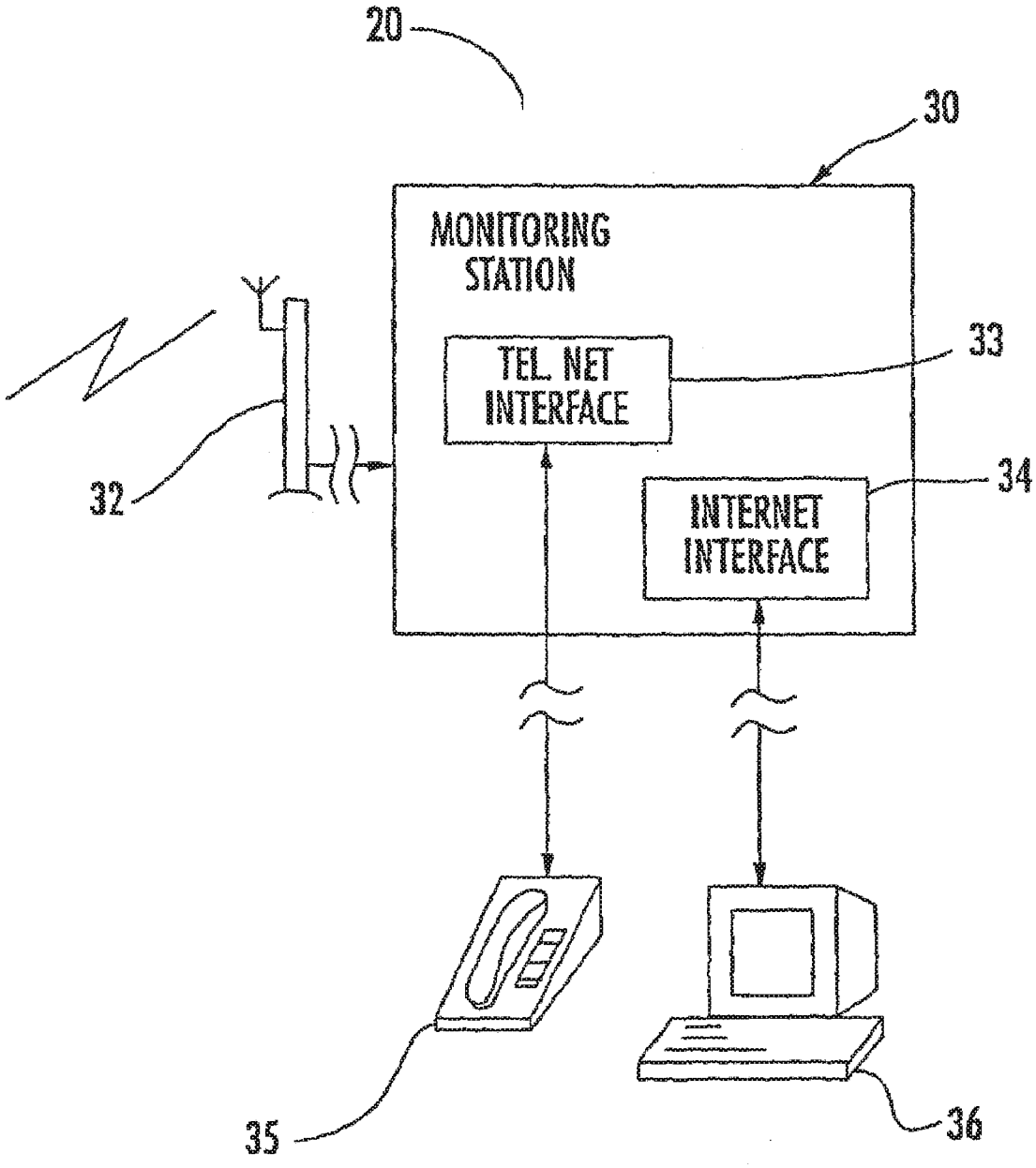

20
30
MONITORING STATION
TEL. NET INTERFACE
33
INTERNET INTERFACE
34
32
35
36

FIG. 3.

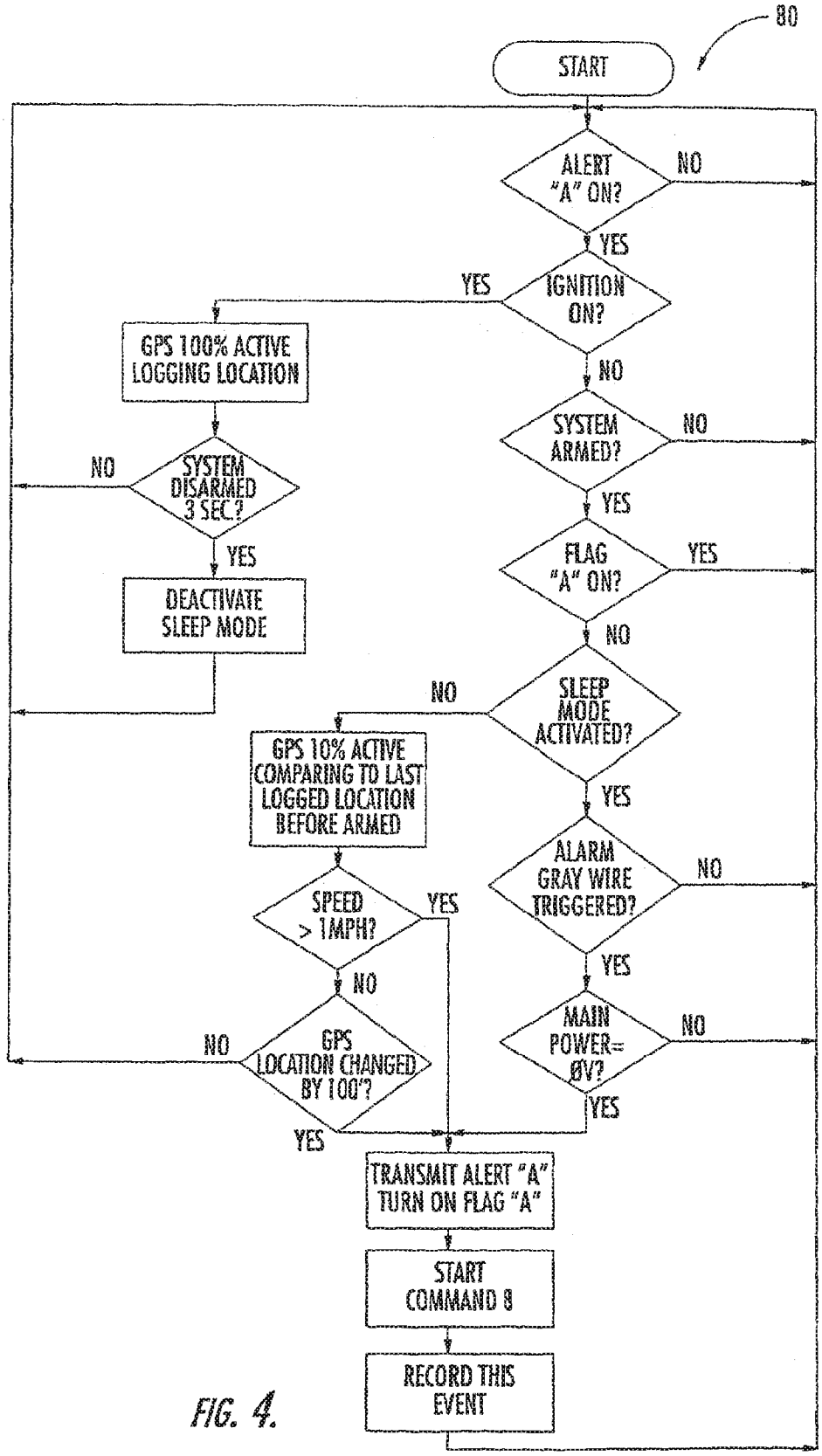

80
START
ALERT "A" ON?
NO
YES
IGNITION ON?
YES
GPS 100% ACTIVE LOGGING LOCATION
NO
SYSTEM ARMED?
NO
YES
SYSTEM DISARMED 3 SEC.?
NO
YES
DEACTIVATE SLEEP MODE
FLAG "A" ON?
YES
NO
SLEEP MODE ACTIVATED?
NO
YES
GPS 10% ACTIVE COMPARING TO LAST LOGGED LOCATION BEFORE ARMED
ALARM GRAY WIRE TRIGGERED?
NO
YES
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.

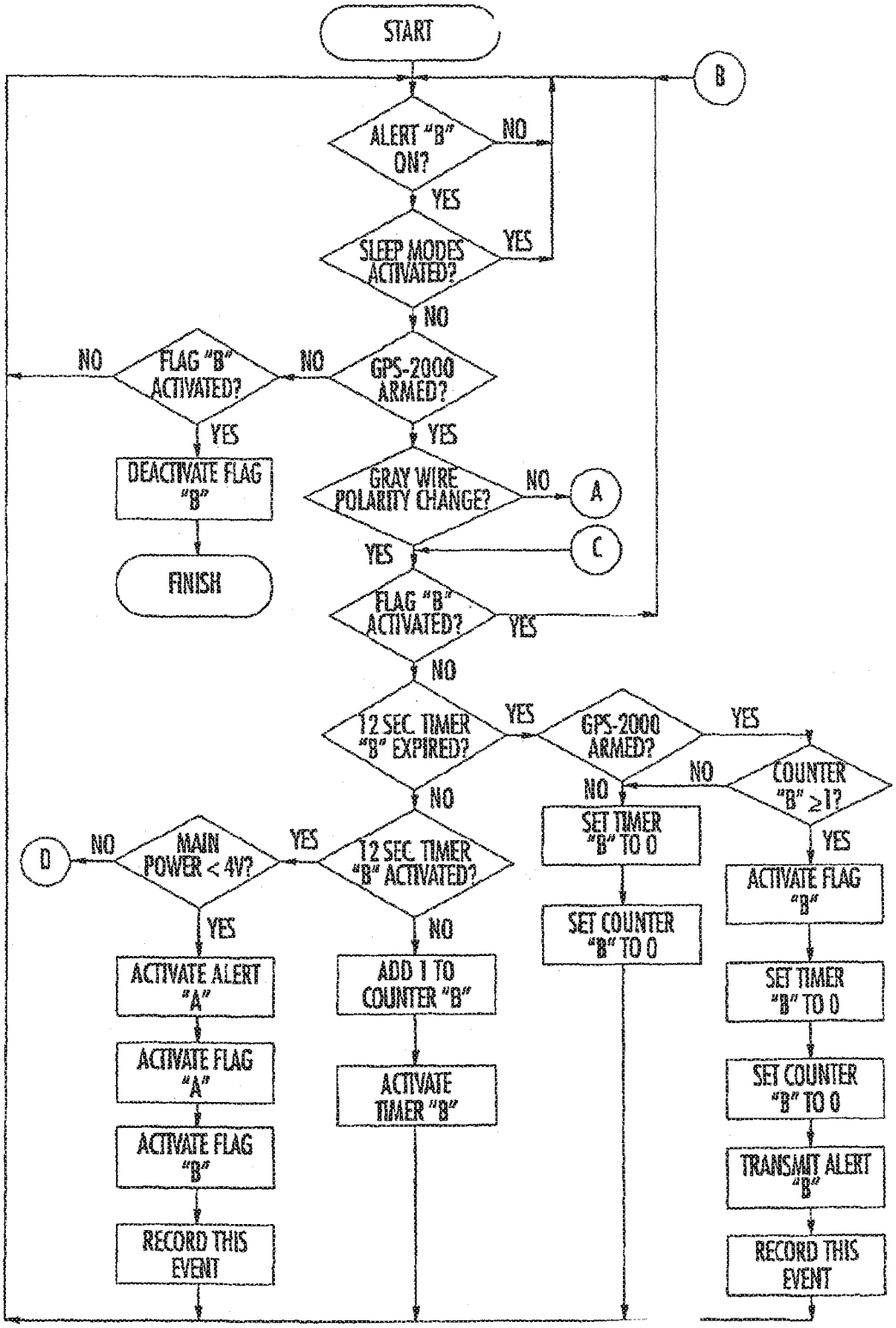

START
B
ALERT "B" ON?
NO
YES
SLEEP MODES ACTIVATED?
YES
NO
NO
FLAG "B" ACTIVATED?
NO
GPS-2000 ARMED?
YES
YES
DEACTIVATE FLAG "B"
GRAY WIRE POLARITY CHANGE?
NO
A
C
YES
FINISH
FLAG "B" ACTIVATED?
YES
NO
12 SEC. TIMER "B" EXPIRED?
YES
GPS-2000 ARMED?
YES
NO
COUNTER "B" ≥1?
NO
NO
YES
D
NO
MAIN POWER < 4V?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

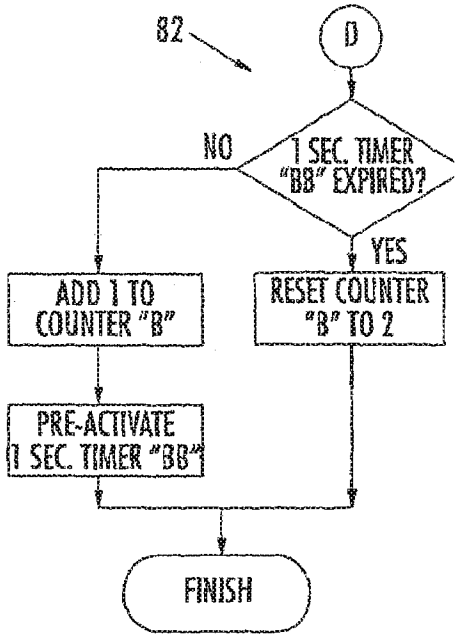

82
D
1 SEC. TIMER "BB" EXPIRED?
NO
YES
ADD 1 TO COUNTER "B"
RESET COUNTER "B" TO 2
PRE-ACTIVATE 1 SEC. TIMER "BB"
FINISH

FIG. 5B.

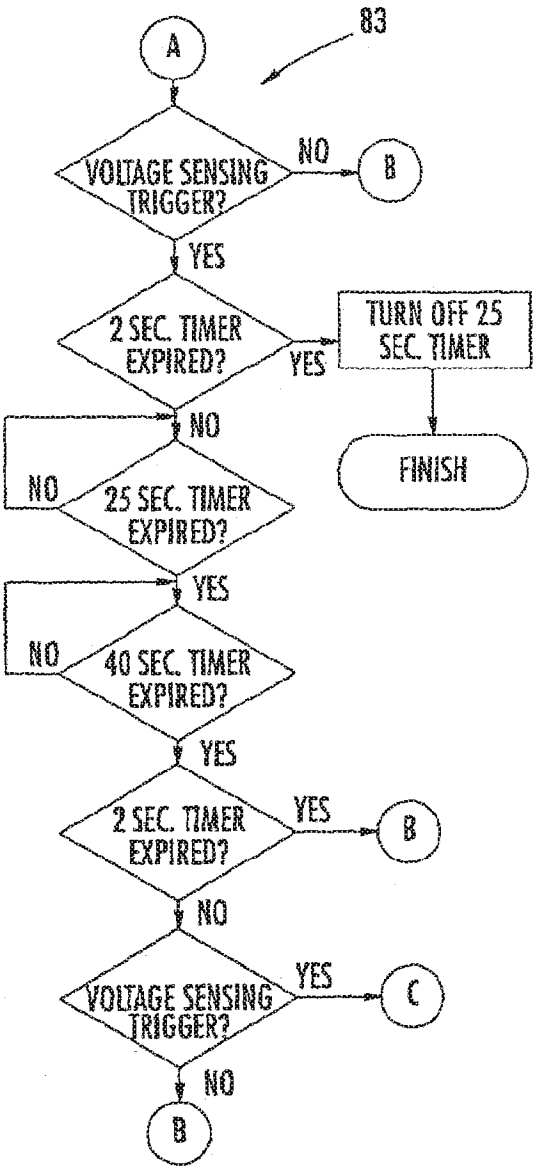

83
A
VOLTAGE SENSING TRIGGER?
NO
B
YES
2 SEC. TIMER EXPIRED?
YES
TURN OFF 25 SEC. TIMER
FINISH
NO
NO
25 SEC. TIMER EXPIRED?
YES
NO
40 SEC. TIMER EXPIRED?
YES
2 SEC. TIMER EXPIRED?
YES
B
NO
VOLTAGE SENSING TRIGGER?
YES
C
NO
B

FIG. 5C.

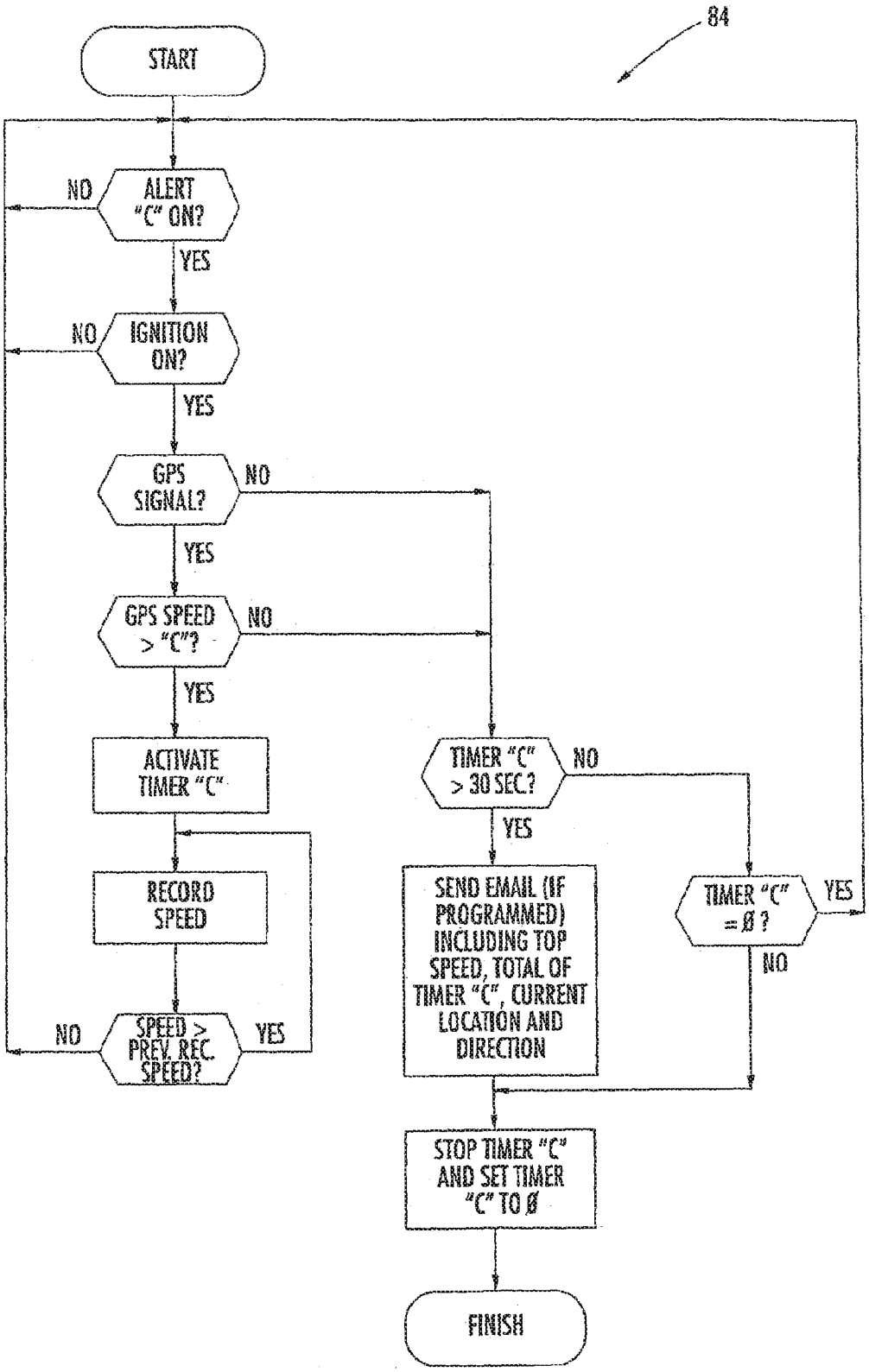

84
START
ALERT "C" ON?
NO
YES
IGNITION ON?
NO
YES
GPS SIGNAL?
NO
YES
GPS SPEED > "C"?
NO
YES
ACTIVATE TIMER "C"
RECORD SPEED
SPEED > PREV. REC. SPEED?
NO
YES
TIMER "C" > 30 SEC.?
NO
YES
SEND EMAIL (IF PROGRAMMED) INCLUDING TOP SPEED, TOTAL OF TIMER "C", CURRENT LOCATION AND DIRECTION
TIMER "C" = Ø ?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

FIG. 6.

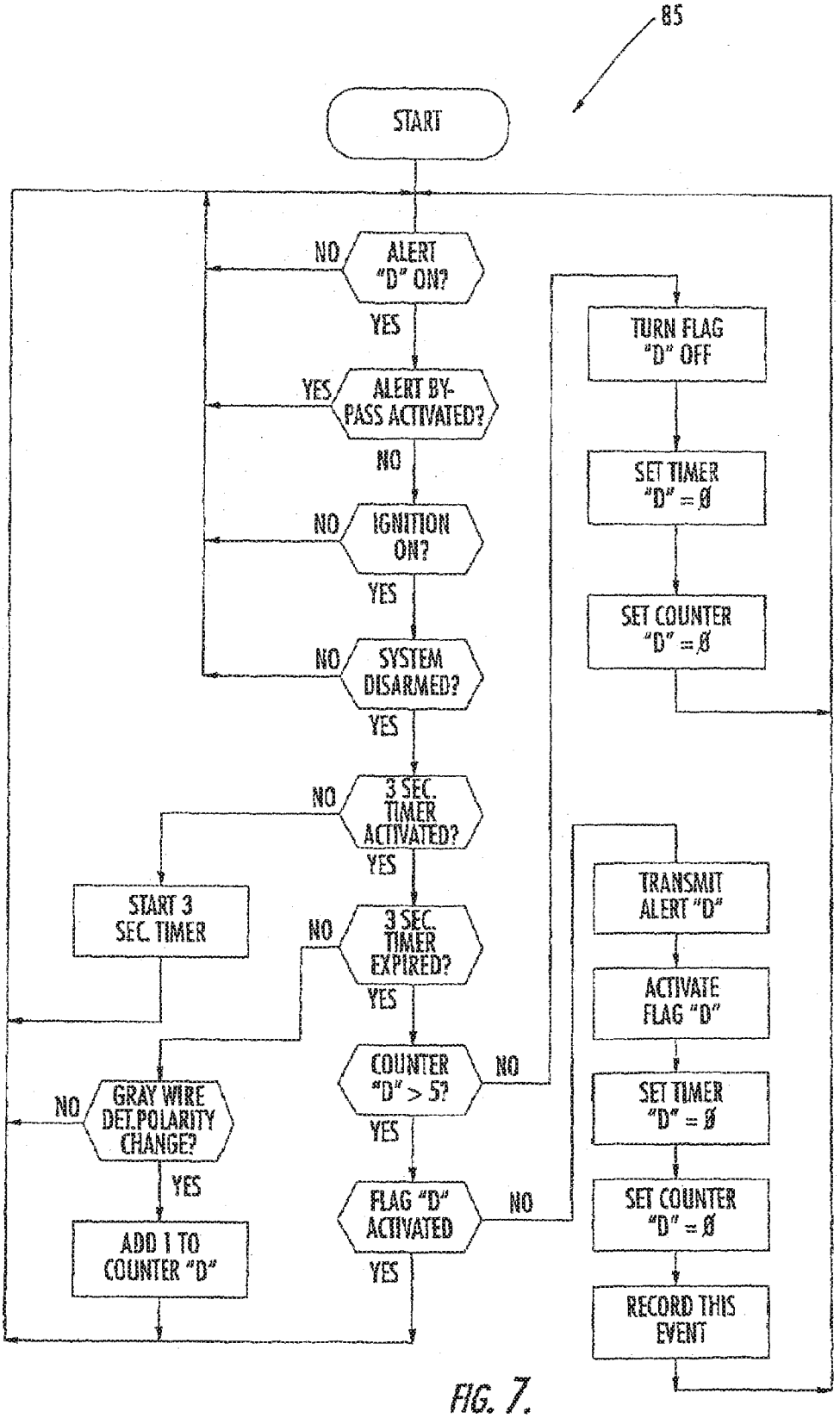

85
START
NO
ALERT "D" ON?
YES
YES
ALERT BY-PASS ACTIVATED?
NO
NO
IGNITION ON?
YES
NO
SYSTEM DISARMED?
YES
NO
3 SEC. TIMER ACTIVATED?
YES
START 3 SEC. TIMER
NO
3 SEC. TIMER EXPIRED?
YES
COUNTER "D" > 5?
NO
YES
NO
GRAY WIRE DET. POLARITY CHANGE?
YES
ADD 1 TO COUNTER "D"
FLAG "D" ACTIVATED
NO
YES
TURN FLAG "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.

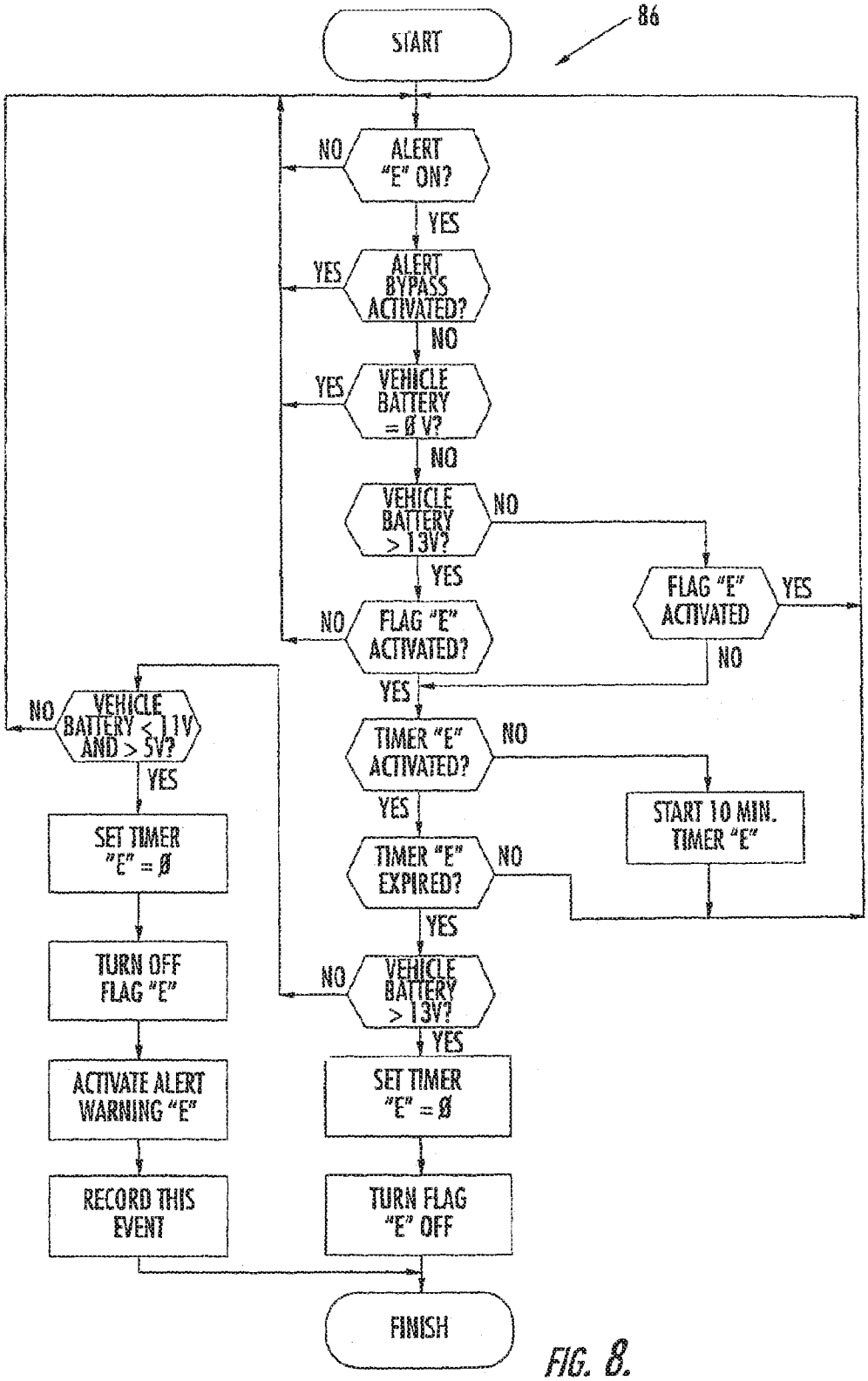

86
START
ALERT "E" ON?
NO
YES
ALERT BYPASS ACTIVATED?
YES
NO
VEHICLE BATTERY = Ø V?
YES
NO
VEHICLE BATTERY > 13V?
NO
YES
FLAG "E" ACTIVATED
YES
NO
FLAG "E" ACTIVATED?
NO
YES
VEHICLE BATTERY < 11V AND > 5V?
NO
YES
TIMER "E" ACTIVATED?
NO
YES
START 10 MIN. TIMER "E"
SET TIMER "E" = Ø
TIMER "E" EXPIRED?
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.

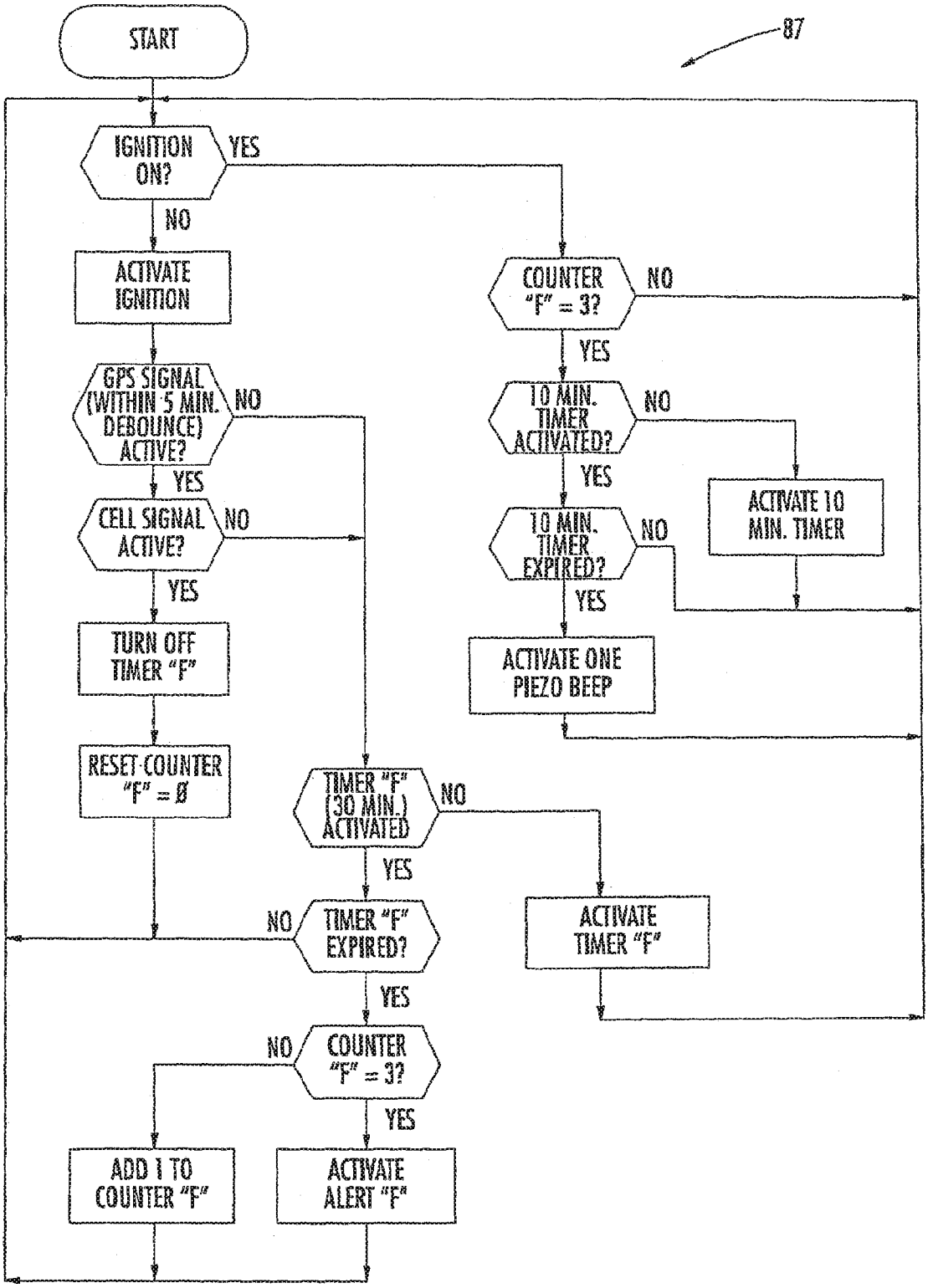

START
87
IGNITION ON?
YES
NO
ACTIVATE IGNITION
GPS SIGNAL (WITHIN 5 MIN. DEBOUNCE) ACTIVE?
NO
YES
CELL SIGNAL ACTIVE?
NO
YES
TURN OFF TIMER "F"
RESET COUNTER "F" = Ø
COUNTER "F" = 3?
NO
YES
10 MIN. TIMER ACTIVATED?
NO
YES
ACTIVATE 10 MIN. TIMER
10 MIN. TIMER EXPIRED?
NO
YES
ACTIVATE ONE PIEZO BEEP
TIMER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

(56) **References Cited**

U.S. PATENT DOCUMENTS

5,043,736	A		8/1991	Darnell et al. 342/357
5,055,851	A		10/1991	Sheffer 342/457
5,177,490	A		1/1993	Ando et al. 342/357
5,223,844	A		6/1993	Mansell et al. 342/357
5,262,774	A		11/1993	Kuwahara et al. 340/988
5,334,986	A		8/1994	Fernhout 342/357
5,365,450	A		11/1994	Schuchman et al. 364/449
5,515,043	A		5/1996	Berard et al. 340/988
5,673,305	A		9/1997	Ross 379/58
5,777,580	A		7/1998	Janky et al. 342/457
5,939,975	A	*	8/1999	Tsuria et al. 307/10.5
5,944,768	A	*	8/1999	Ito et al. 340/990
5,969,433	A		10/1999	Maggiora et al. 307/10.5
5,983,161	A	*	11/1999	Lemelson et al. 340/436
6,018,657	A		1/2000	Kennedy, III et al. 455/426
6,025,774	A		2/2000	Forbes 340/426
6,049,269	A		4/2000	Byrd et al. 340/426
6,055,426	A		4/2000	Beasley 455/432

(List continued on next page.)

OTHER PUBLICATIONS

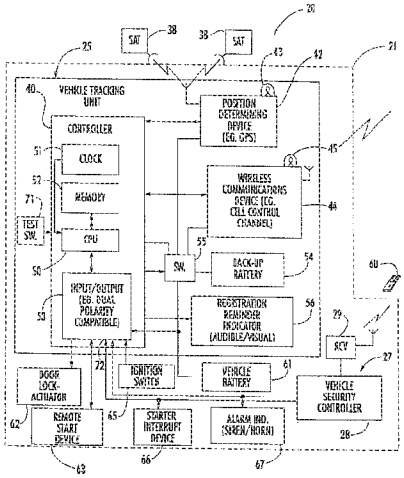
Omega Research and Development, Inc., Installation Instructions for ATV-1000 Model Car Alarm, 2002 This patent has been sold in U.S. for approximately five years.

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



U.S. PATENT DOCUMENTS

6,069,570	A	5/2000	Herring	340/825.49
6,075,458	A	6/2000	Ladner et al.	340/825.49
6,133,855	A	10/2000	Kim	340/932.2
6,148,212	A	11/2000	Park et al.	455/456
6,151,551	A	11/2000	Geier et al.	701/207
6,154,648	A	11/2000	Comer	455/426
6,166,626	A	12/2000	Janky et al.	340/426
6,169,497	B1	1/2001	Robert	340/988
6,195,597	B1	2/2001	Yamada	701/1
6,240,365	B1 *	5/2001	Bunn	340/988
6,275,773	B1 *	8/2001	Lemelson et al.	340/436
6,320,535	B1 *	11/2001	Hillman et al.	342/357.06
6,330,499	B1 *	12/2001	Chou et al.	701/32

* cited by examiner

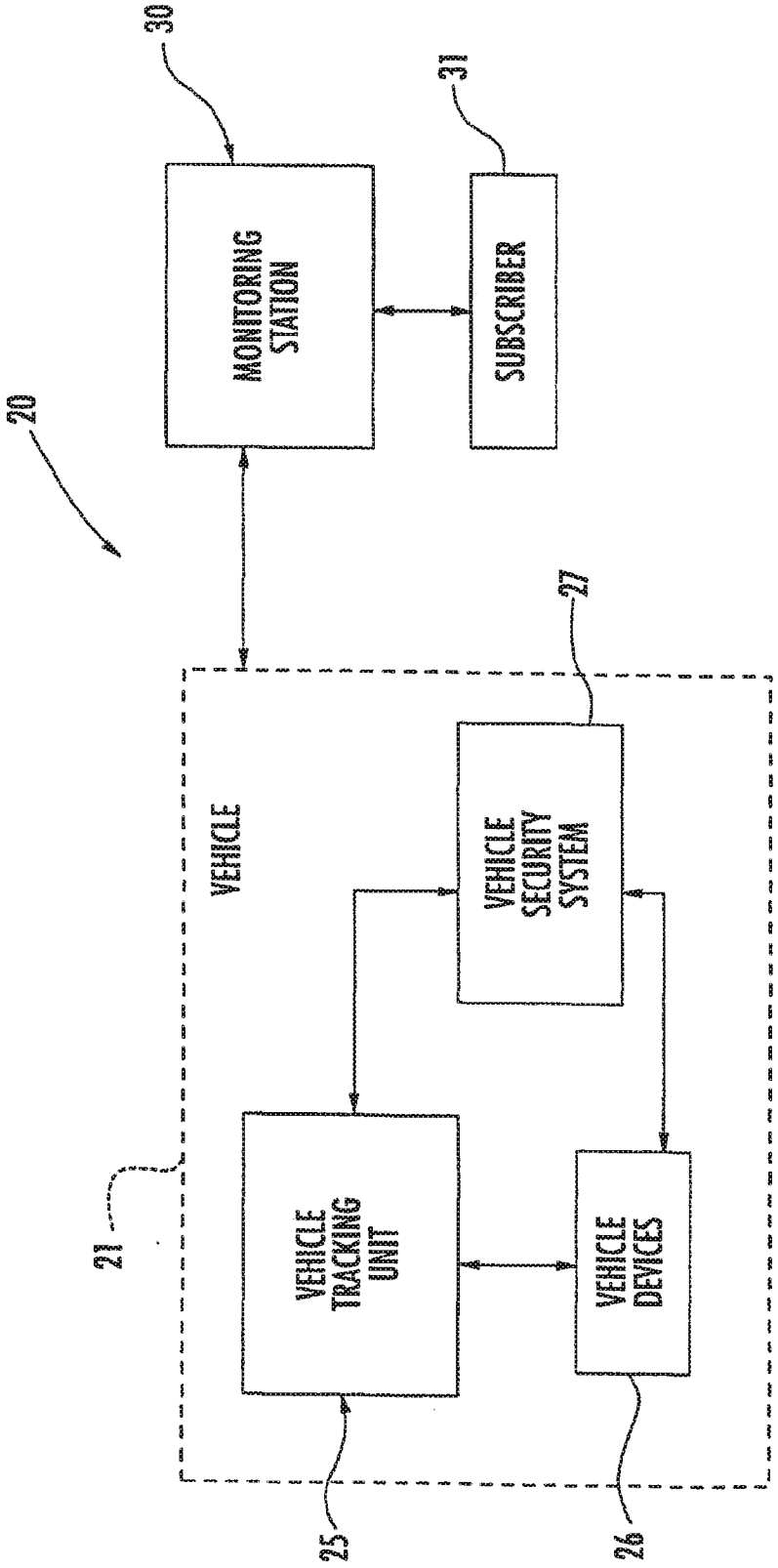


FIG. 1.

Ex. 1005 - Page 249

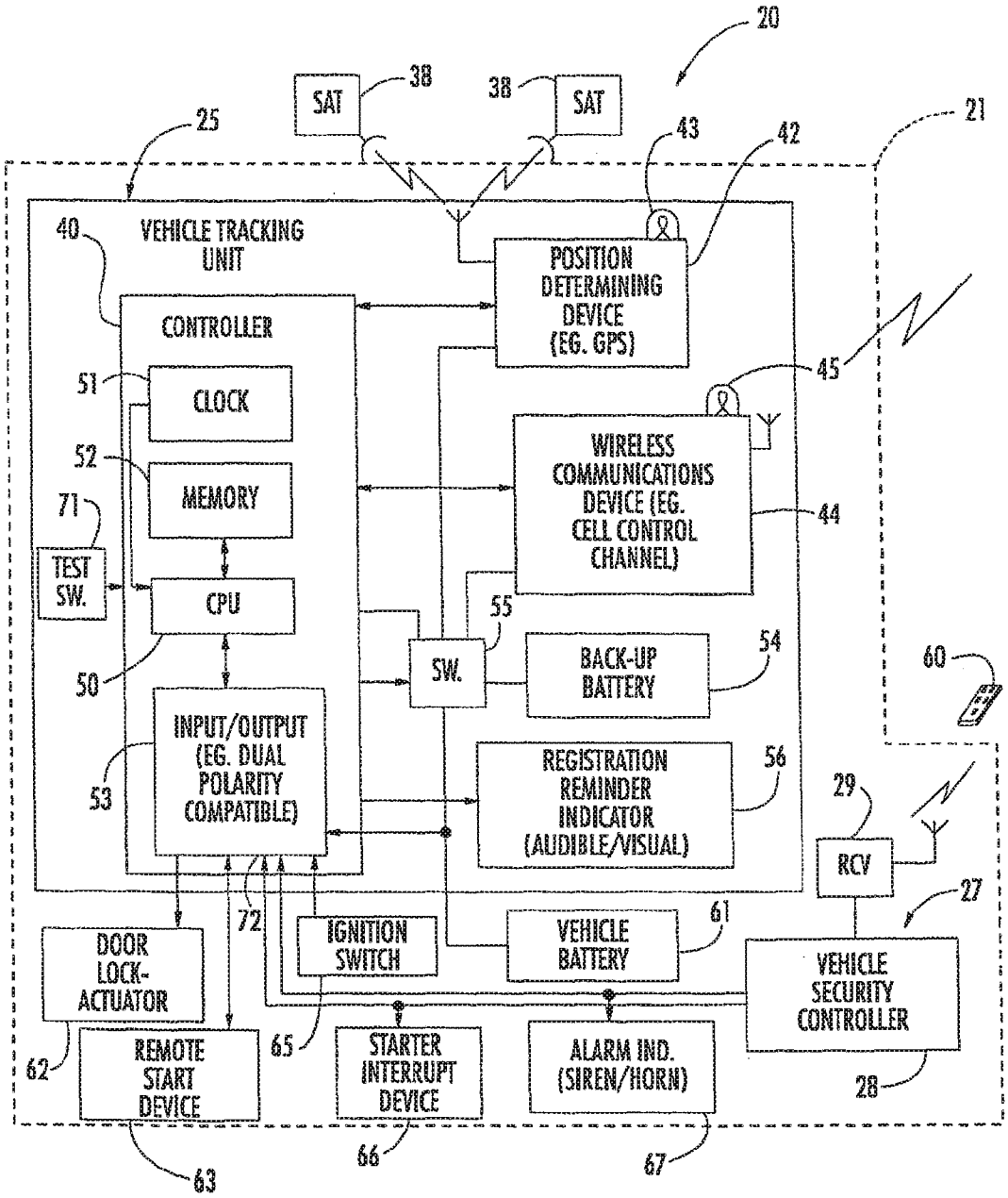

20
SAT
38
38
SAT
25
21
43
42
40
VEHICLE TRACKING UNIT
POSITION DETERMINING DEVICE (EG. GPS)
CONTROLLER
45
51
CLOCK
WIRELESS COMMUNICATIONS DEVICE (EG. CELL CONTROL CHANNEL)
52
MEMORY
44
71
TEST SW.
CPU
55
SW.
BACK-UP BATTERY
54
60
50
INPUT/OUTPUT (EG. DUAL POLARITY COMPATIBLE)
53
REGISTRATION REMINDER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

FIG. 2.

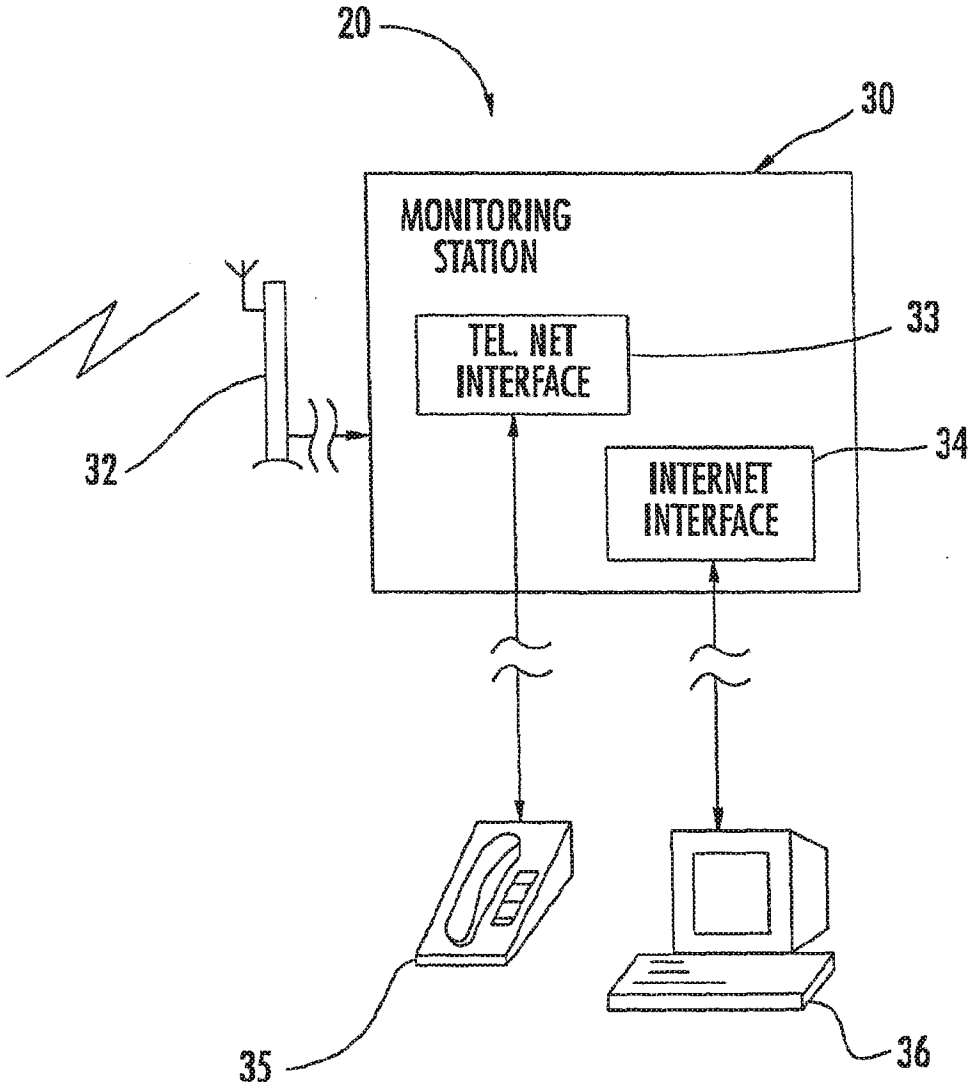

20
30
MONITORING STATION
TEL. NET INTERFACE
33
INTERNET INTERFACE
34
32
35
36

FIG. 3.

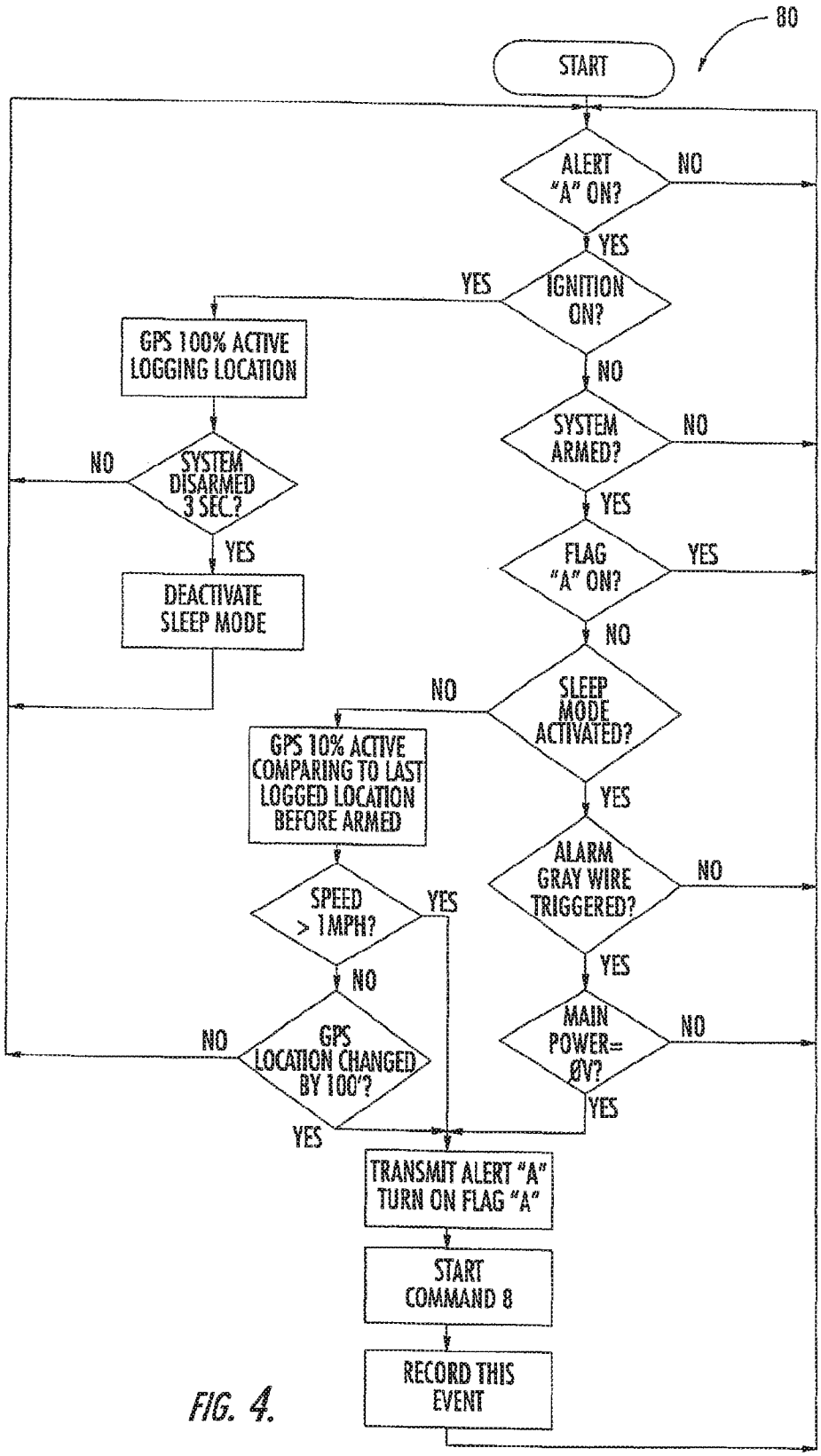

80
START
ALERT "A" ON?
NO
YES
IGNITION ON?
YES
GPS 100% ACTIVE LOGGING LOCATION
NO
SYSTEM ARMED?
NO
YES
NO
SYSTEM DISARMED 3 SEC.?
YES
DEACTIVATE SLEEP MODE
FLAG "A" ON?
YES
NO
NO
SLEEP MODE ACTIVATED?
GPS 10% ACTIVE COMPARING TO LAST LOGGED LOCATION BEFORE ARMED
YES
ALARM GRAY WIRE TRIGGERED?
NO
SPEED > 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.

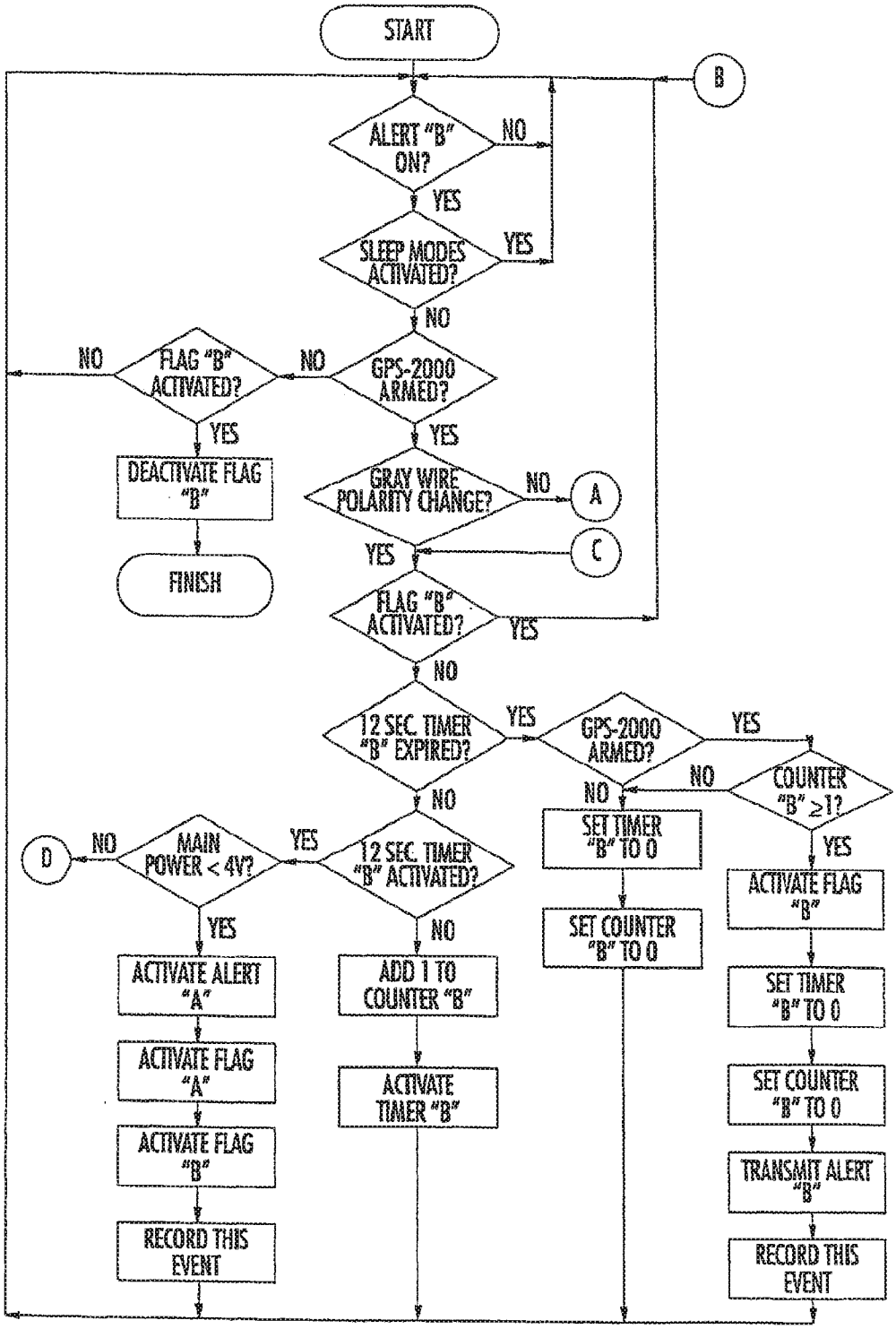

START
B
ALERT "B" ON?
NO
YES
SLEEP MODES ACTIVATED?
YES
NO
NO
FLAG "B" ACTIVATED?
NO
GPS-2000 ARMED?
YES
YES
DEACTIVATE FLAG "B"
GRAY WIRE POLARITY CHANGE?
NO
A
C
YES
FINISH
FLAG "B" ACTIVATED?
YES
NO
12 SEC. TIMER "B" EXPIRED?
YES
GPS-2000 ARMED?
YES
NO
NO
COUNTER "B" ≥1?
NO
YES
D
NO
MAIN POWER < 4V?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

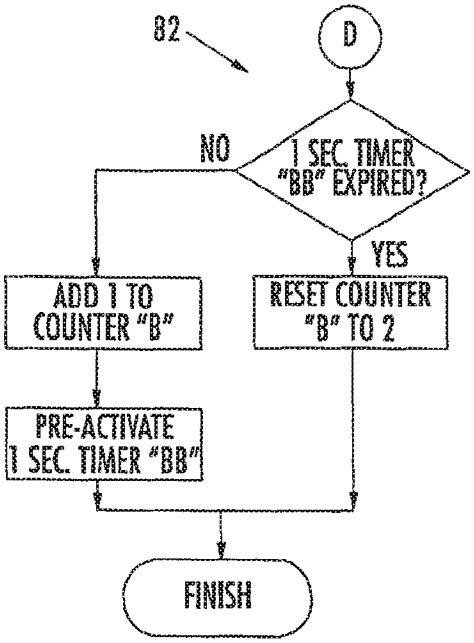

82
D
1 SEC. TIMER "BB" EXPIRED?
NO
YES
ADD 1 TO COUNTER "B"
RESET COUNTER "B" TO 2
PRE-ACTIVATE 1 SEC. TIMER "BB"
FINISH

FIG. 5B.

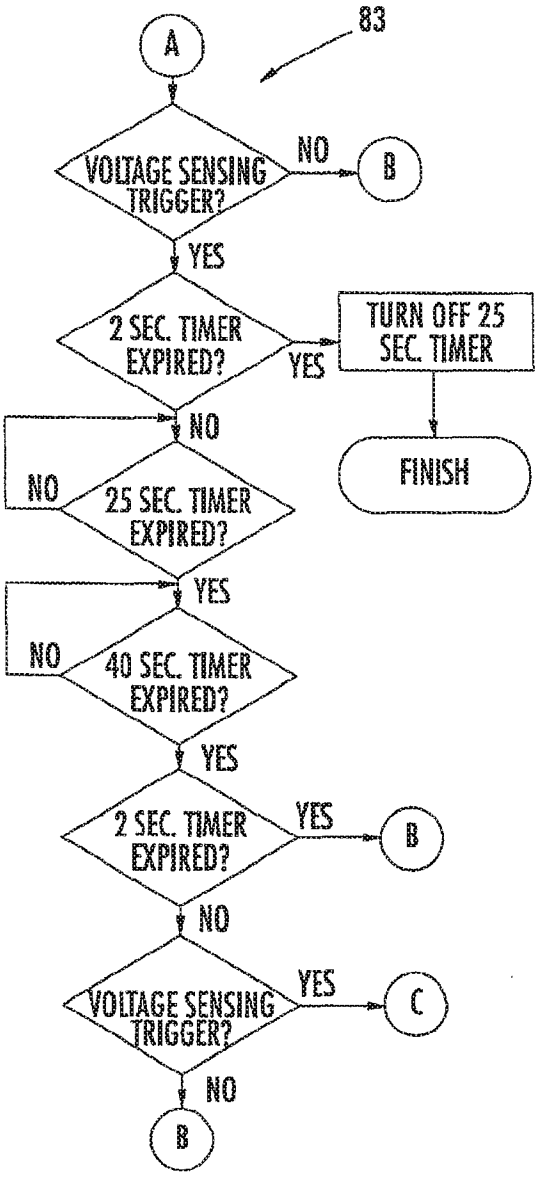

83
A
VOLTAGE SENSING TRIGGER?
NO
B
YES
2 SEC. TIMER EXPIRED?
YES
TURN OFF 25 SEC. TIMER
FINISH
NO
NO
25 SEC. TIMER EXPIRED?
YES
NO
40 SEC. TIMER EXPIRED?
YES
2 SEC. TIMER EXPIRED?
YES
B
NO
VOLTAGE SENSING TRIGGER?
YES
C
NO
B

FIG. 5C.

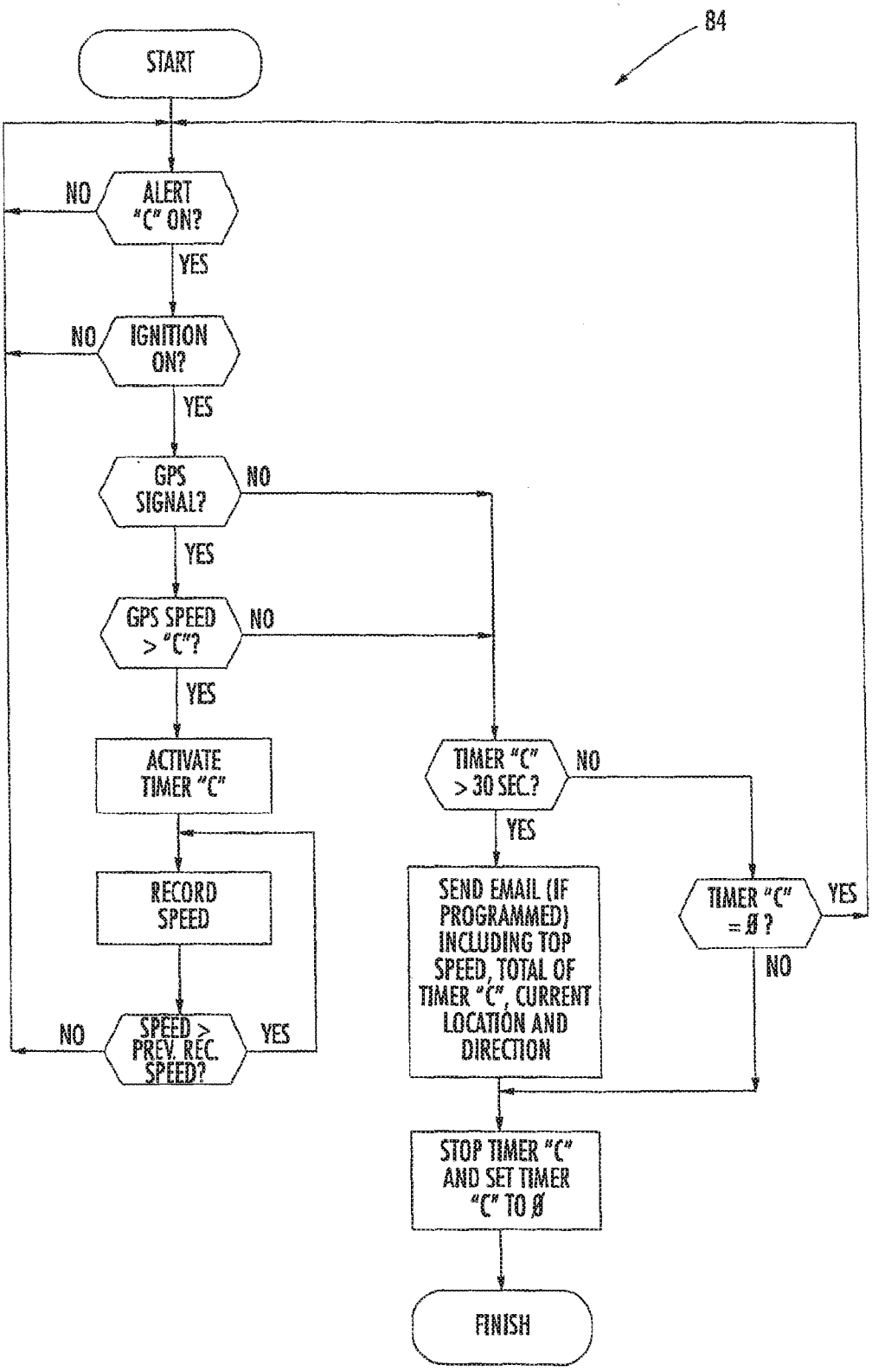

84
START
ALERT "C" ON?
NO
YES
IGNITION ON?
NO
YES
GPS SIGNAL?
NO
YES
GPS SPEED > "C"?
NO
YES
ACTIVATE TIMER "C"
RECORD SPEED
SPEED > PREV. REC. SPEED?
NO
YES
TIMER "C" > 30 SEC.?
NO
YES
SEND EMAIL (IF PROGRAMMED) INCLUDING TOP SPEED, TOTAL OF TIMER "C", CURRENT LOCATION AND DIRECTION
TIMER "C" = Ø ?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

FIG. 6.

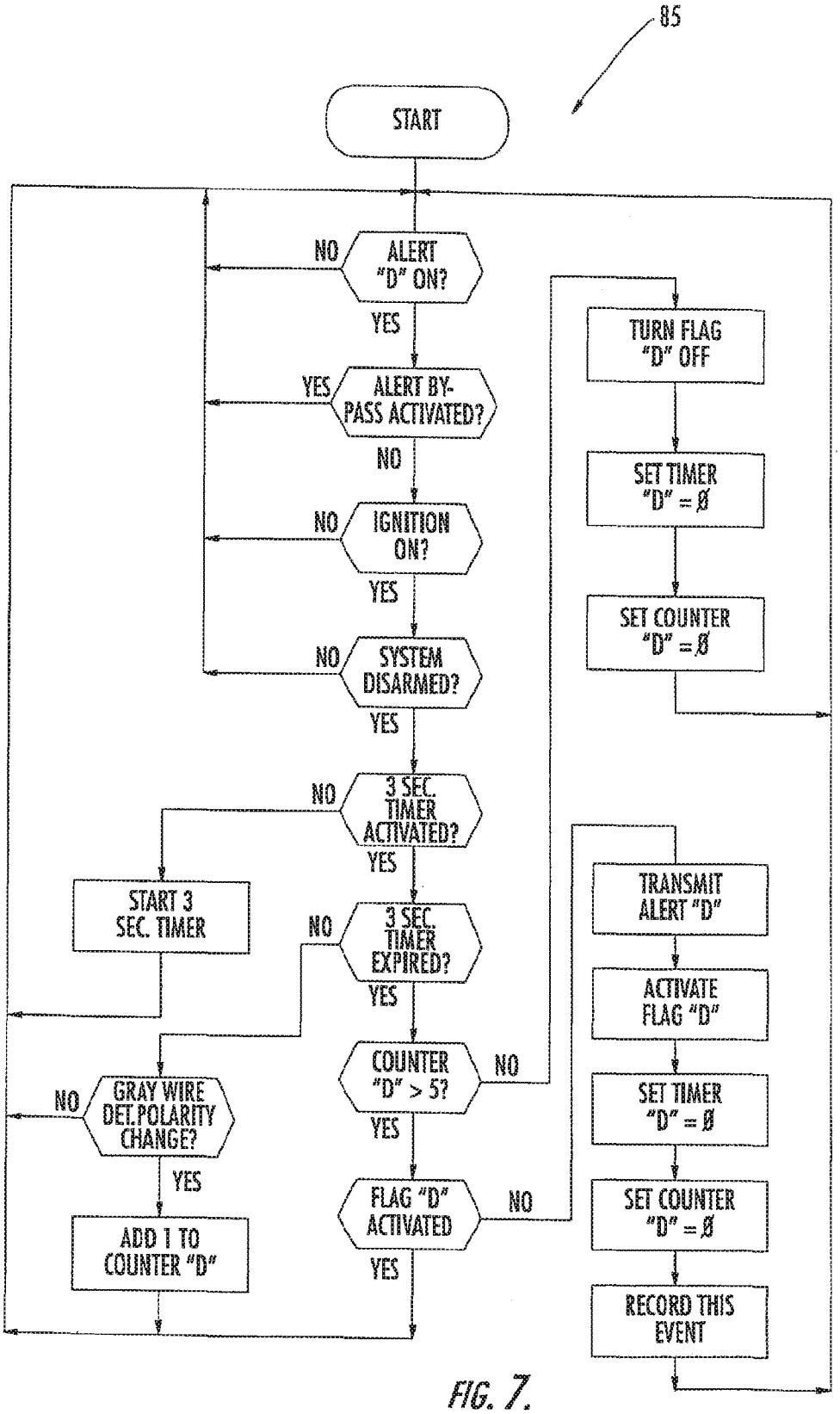

85
START
NO
ALERT "D" ON?
YES
YES
ALERT BY-PASS ACTIVATED?
NO
NO
IGNITION ON?
YES
NO
SYSTEM DISARMED?
YES
NO
3 SEC. TIMER ACTIVATED?
YES
START 3 SEC. TIMER
NO
3 SEC. TIMER EXPIRED?
YES
COUNTER "D" > 5?
NO
YES
NO
GRAY WIRE DET. POLARITY CHANGE?
YES
ADD 1 TO COUNTER "D"
FLAG "D" ACTIVATED
NO
YES
TURN FLAG "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.

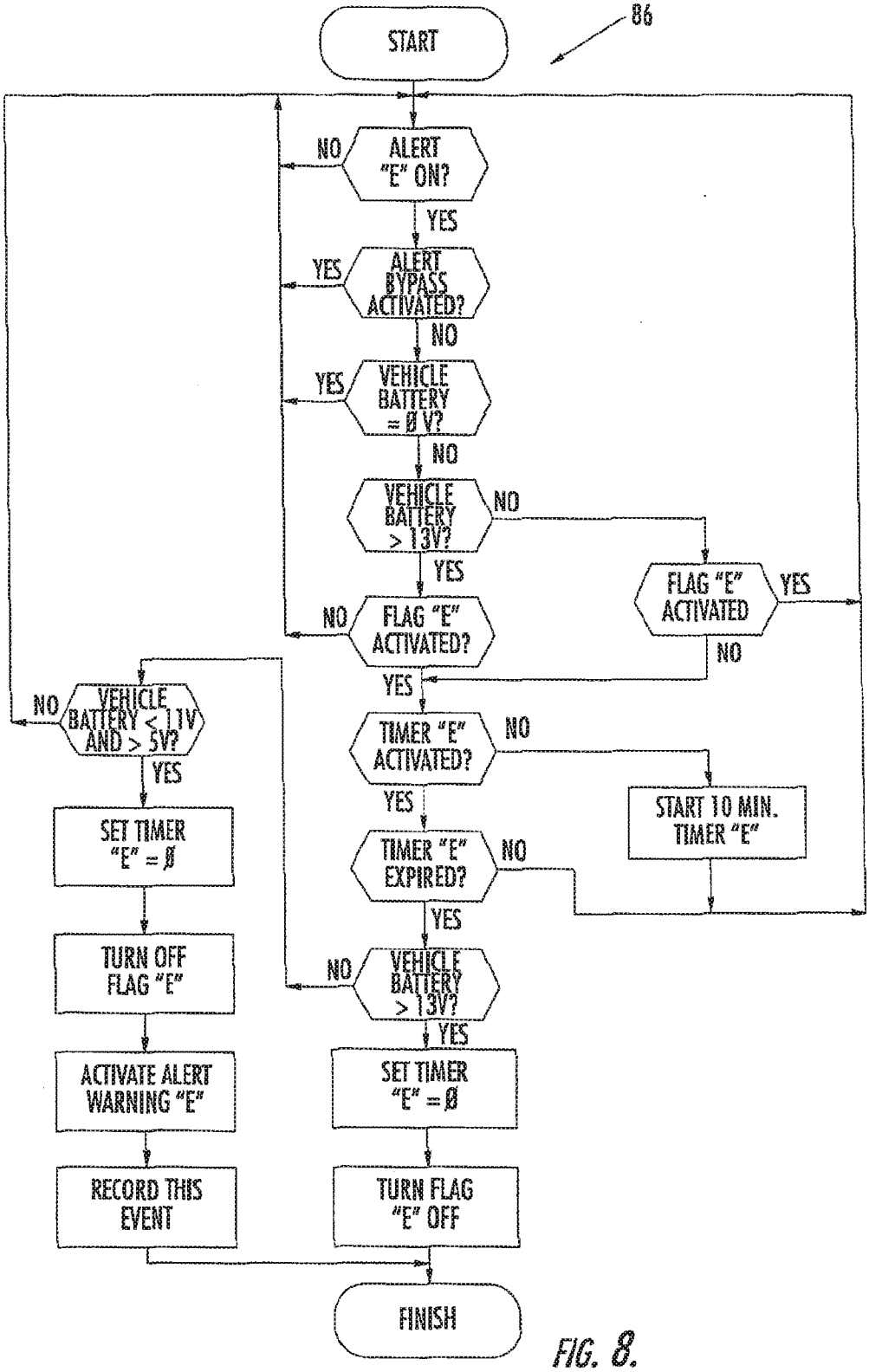

86
START
ALERT "E" ON?
NO
YES
ALERT BYPASS ACTIVATED?
YES
NO
VEHICLE BATTERY = Ø V?
YES
NO
VEHICLE BATTERY > 13V?
NO
YES
FLAG "E" ACTIVATED
YES
NO
FLAG "E" ACTIVATED?
NO
YES
VEHICLE BATTERY < 11V AND > 5V?
NO
YES
TIMER "E" ACTIVATED?
NO
YES
START 10 MIN. TIMER "E"
SET TIMER "E" = Ø
TIMER "E" EXPIRED?
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.

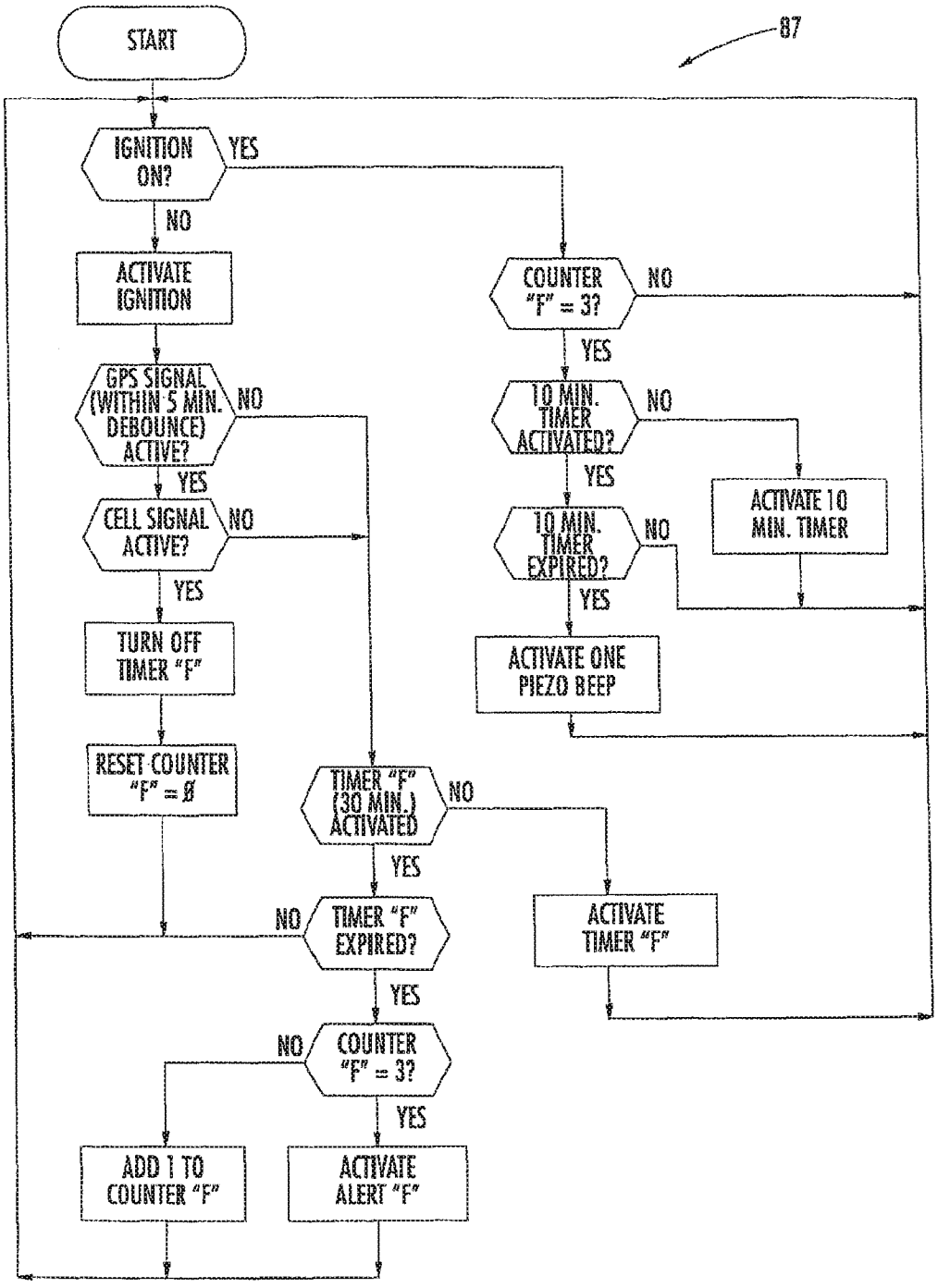

87
START
IGNITION ON?
YES
NO
ACTIVATE IGNITION
GPS SIGNAL (WITHIN 5 MIN. DEBOUNCE) ACTIVE?
NO
YES
CELL SIGNAL ACTIVE?
NO
YES
TURN OFF TIMER "F"
RESET COUNTER "F" = 0
TIMER "F" (30 MIN.) ACTIVATED
NO
YES
ACTIVATE TIMER "F"
NO
TIMER "F" EXPIRED?
YES
NO
COUNTER "F" = 3?
YES
ADD 1 TO COUNTER "F"
ACTIVATE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

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

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. --

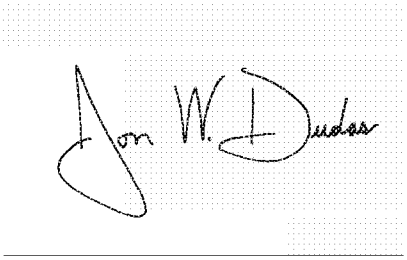
Column 25,
Line 24, insert -- and a vehicle battery -- after "indicator"
Line 33, delete "pattern." insert -- pattern, and for monitoring voltage dips of the vehicle battery. --
Line 42, insert -- one of -- between "least" and "a"
Line 55, delete ":"
Line 57, delete "and"

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

PROVISIONAL APPLICATION COVER SHEET

This is a request for filing a PROVISIONAL APPLICATION under 37 CFR 1.53(b)(2)

Docket No.	58092	Type (+) --- [+]

INVENTOR(s)/APPLICANT(s)

LAST NAME	FIRST NAME	MID. INIT.	RESIDENCE (CITY/STATE OR COUNTRY)
FLICK	Kenneth	E.	981 Burnt Hickory Road Douglasville, GA 30134

TITLE OF THE INVENTION (280 Characters Max)

VEHICLE TRACKING SYSTEM WITH THEFT NOTIFICATION

CORRESPONDENCE ADDRESS

CHRISTOPHER F. REGAN, Reg. No. 34,906
Allen, Dyer, Doppelt, Milbrath & Gilchrist, P.A.
P. O. Box 3791

STATE	Florida	ZIP CODE	32802-3791	COUNTRY	U.S.

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,

CHRISTOPHER F. REGAN
Reg. No. 34,906
Allen, Dyer, Doppelt, Milbrath & Gilchrist, P.A.
255 South Orange Avenue - Suite 1401
Post Office Box 3791
Orlando, Florida 32802-3791
PHONE: (407) 841-2330

Date: January 29, 2001

CERTIFICATE OF MAILING BY "EXPRESS MAIL"

"EXPRESS MAIL" MAILING LABEL NUMBER EL541921233US

DATE OF DEPOSIT January 29, 2001

I HEREBY CERTIFY THAT THIS PAPER OR FEE IS BEING DEPOSITED WITH THE UNITED STATES POSTAL SERVICE "EXPRESS MAIL POST OFFICE TO ADDRESSEE" SERVICE UNDER 37 CFR 1.10 ON THE DATE INDICATED ABOVE AND IS ADDRESSED TO THE COMMISSIONER OF PATENTS AND TRADEMARKS, WASHINGTON, D.C. 20231

Eric Link
(TYPED OR PRINTED NAME OF PERSON MAKING PAPER OR FEE)

(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.

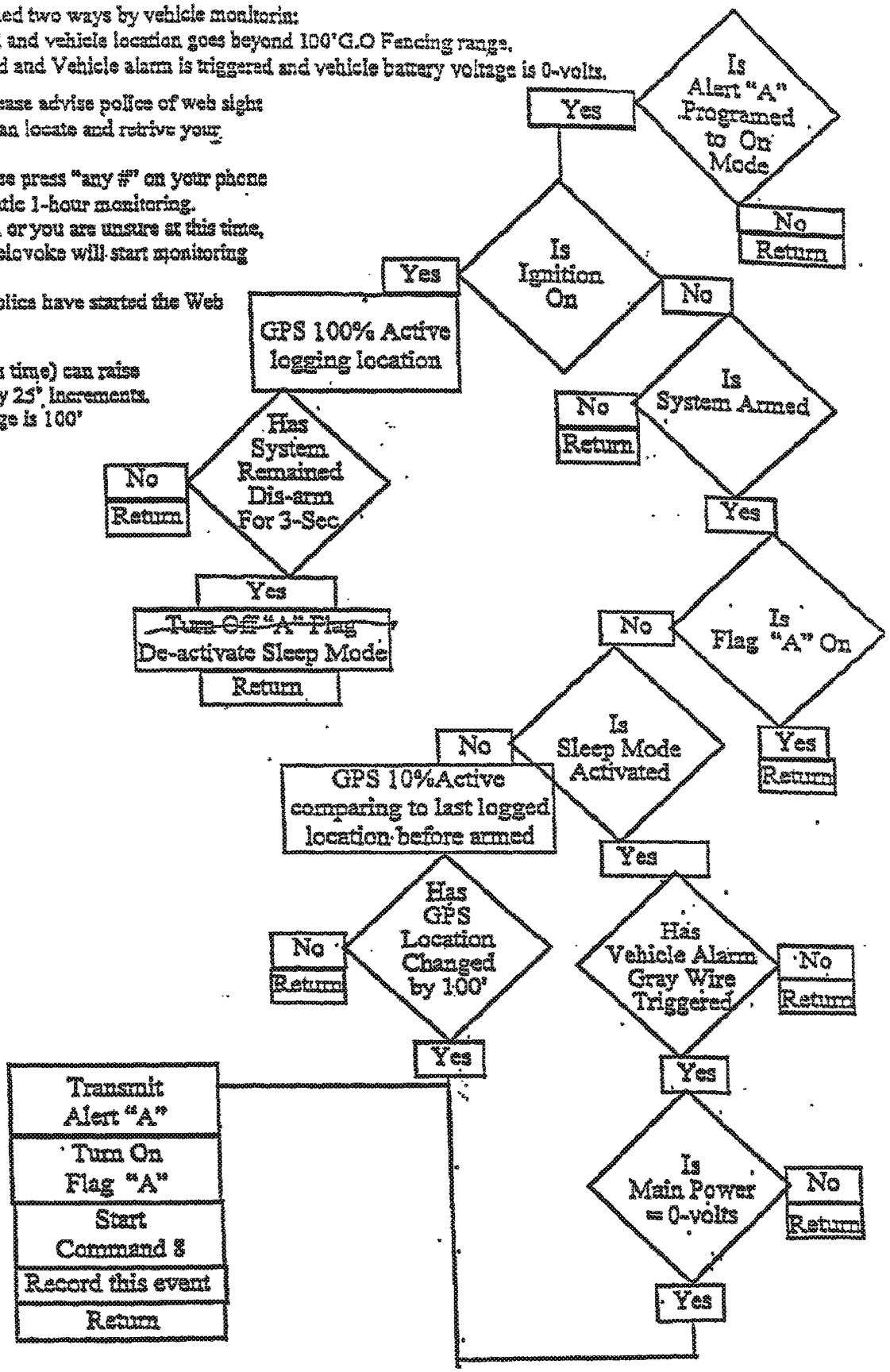
In another example, if the mode is selected to send the vehicles location every 10 min and the vehicle is in the same location for greater than a set time, then no more vehicle locations are sent until the vehicle location has changed to start the every 10 min reporting again.

Alert "A" = Vehicle Stolen Alert

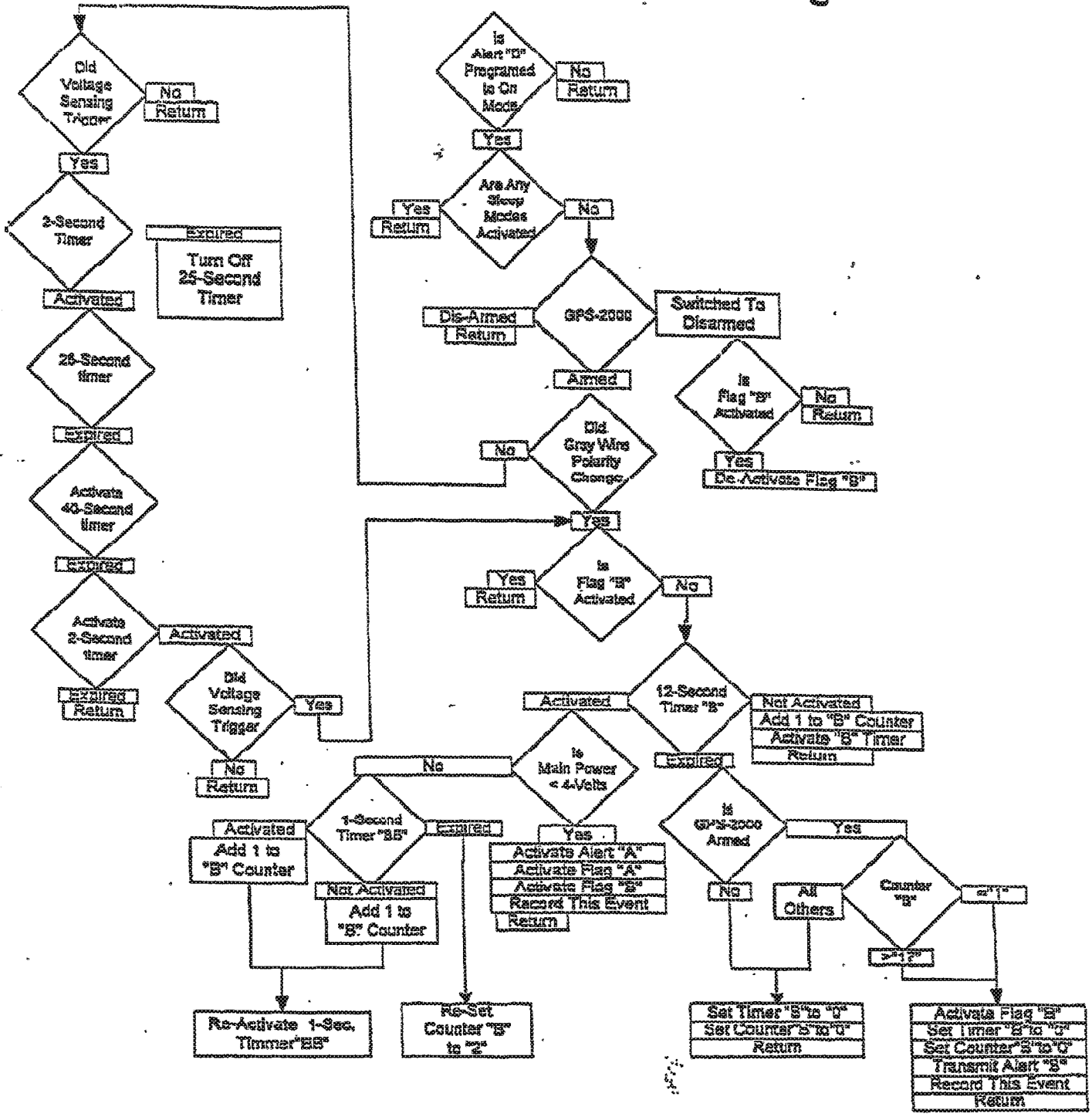
Vehicle stolen is determined two ways by vehicle monitorin:
1. Tracking system armed and vehicle location goes beyond 100'G.O Fencing range.
2. Tracking system Armed and Vehicle alarm is triggered and vehicle battery voltage is 0-volts.

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'



Alert "B" = Vehicle's Alarm Sounding



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.

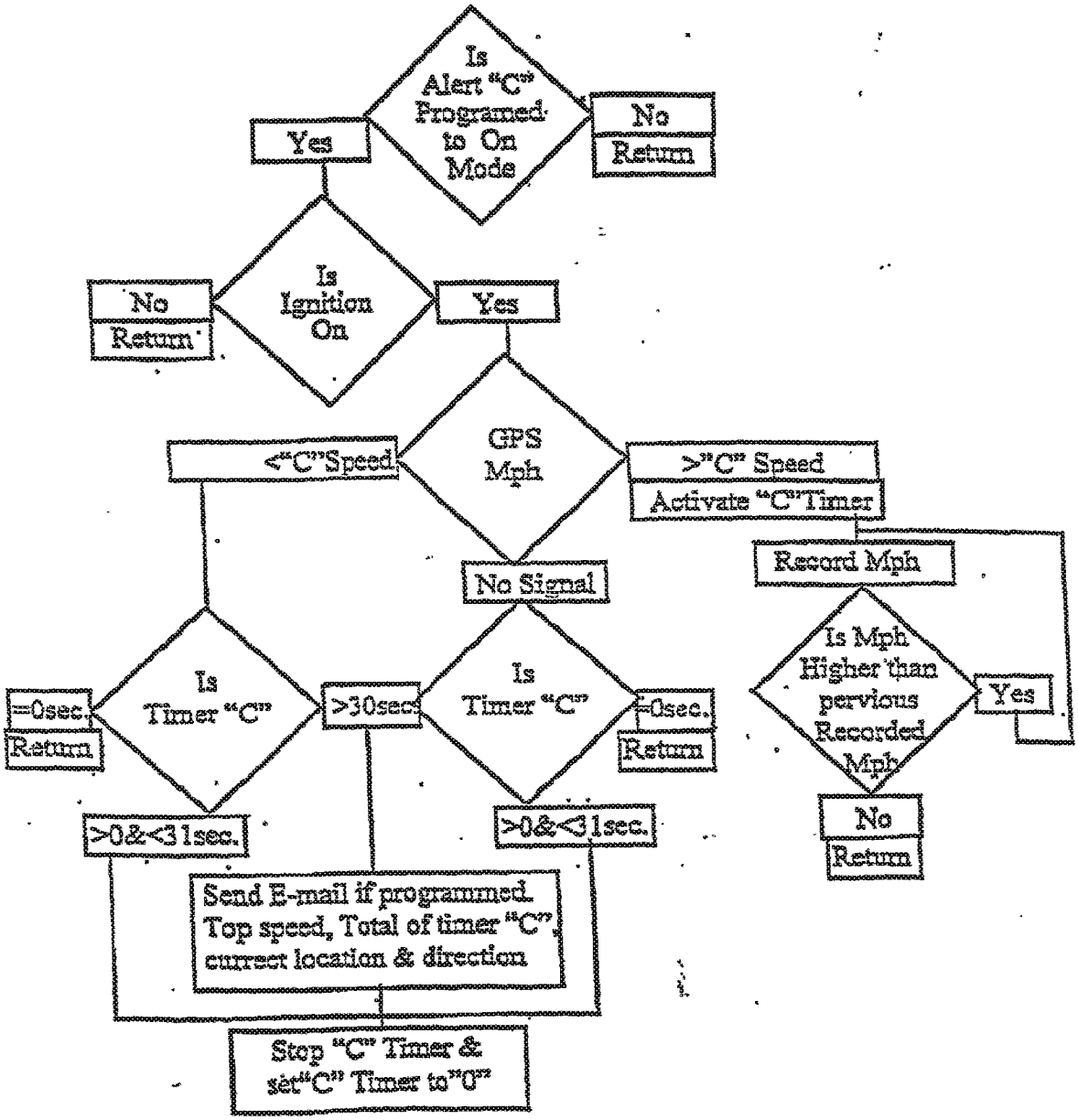
>17 changes = a car horn was pulsing on/off each time in less than one-second and after 12-seconds continues honking of 18 times = 9 horn hons no more than 1-second apart.

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

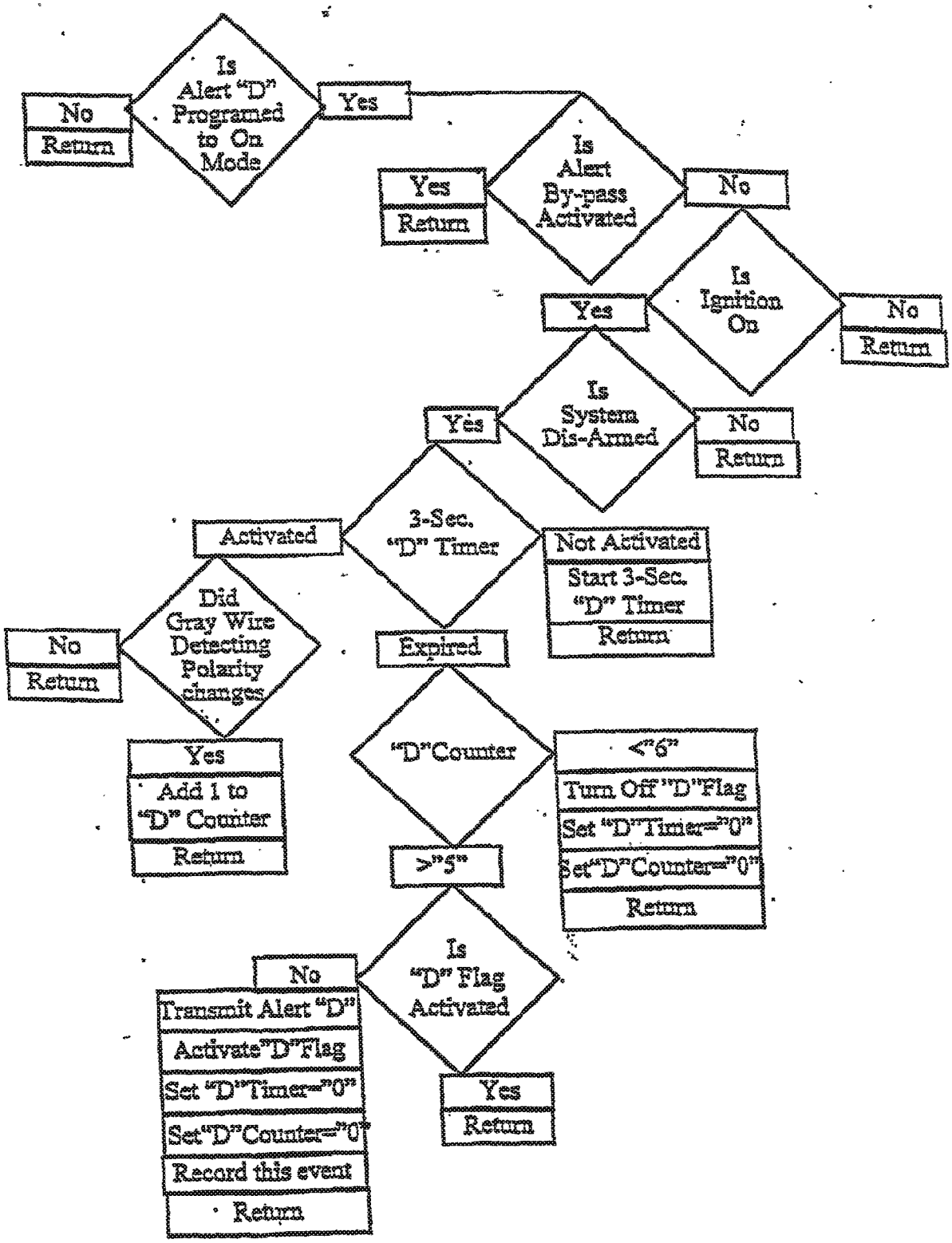
Vehicle was traveling faster than 80 m.p.h. for a longer time than 30 seconds. GPS indicates the speed.
If pre-programed to do so, records this as an event and will send e-mail instantly of Top speed, total time,direction and location speeding had stopped.
Alert "C" operation an be turned on or off by 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.

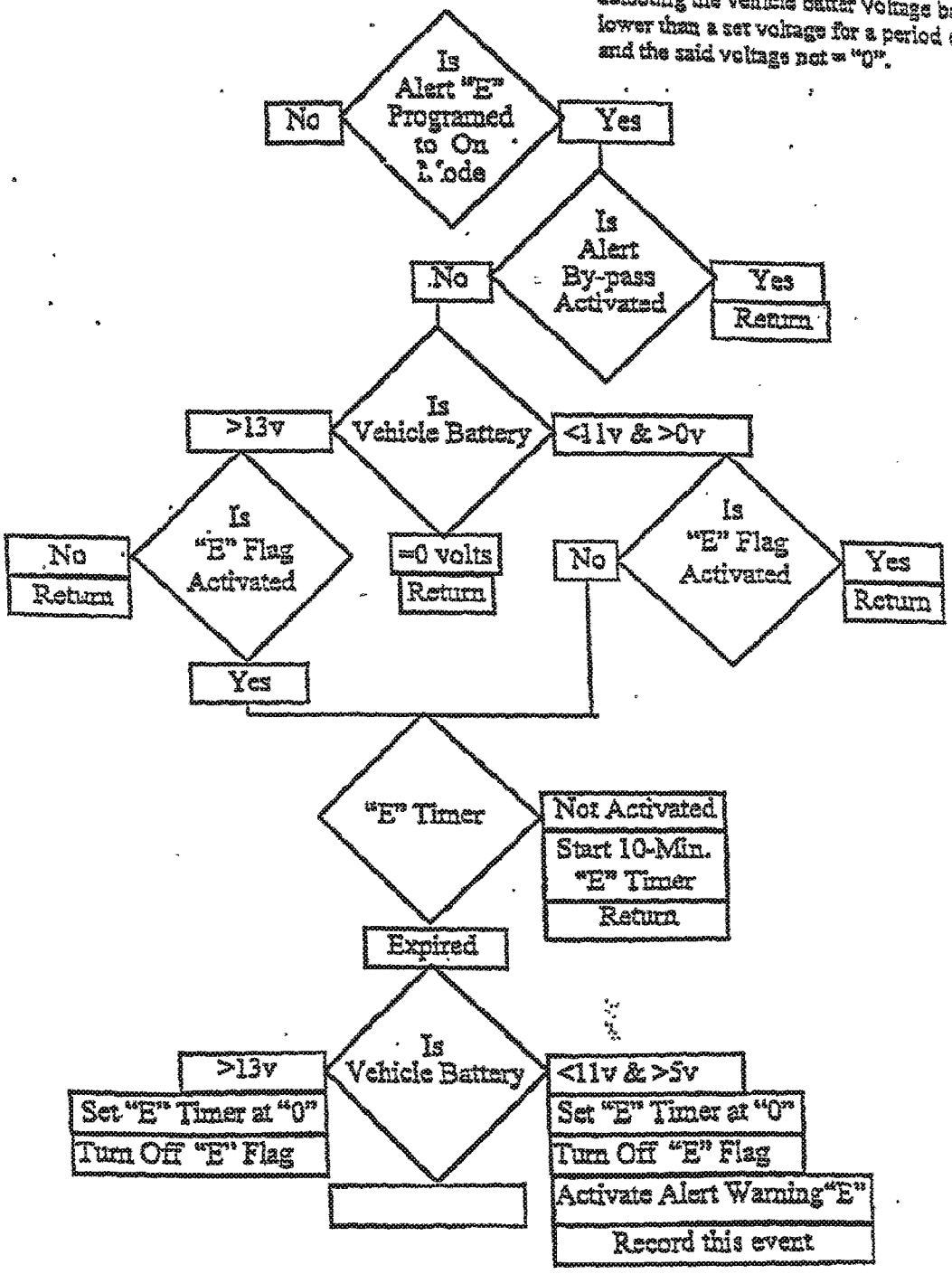
Unauthorized Transmitter Alert is activated when ignition key is turned on and detects a plurality of polarity changes on Gray wire within a set time. This Alert is prevented from activated again until said circuit returns to normal.



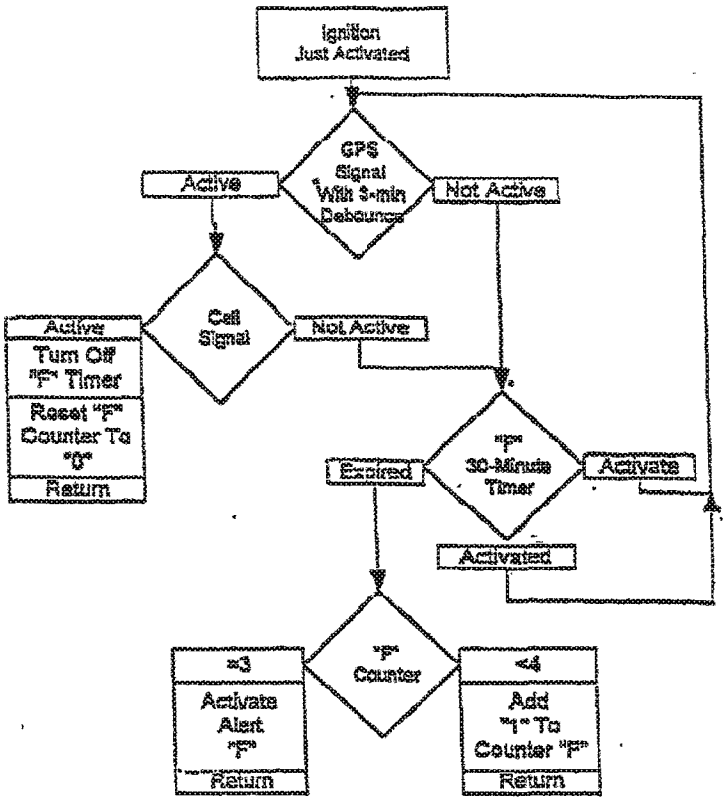
Alert "E" = Low Car Battery Power

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



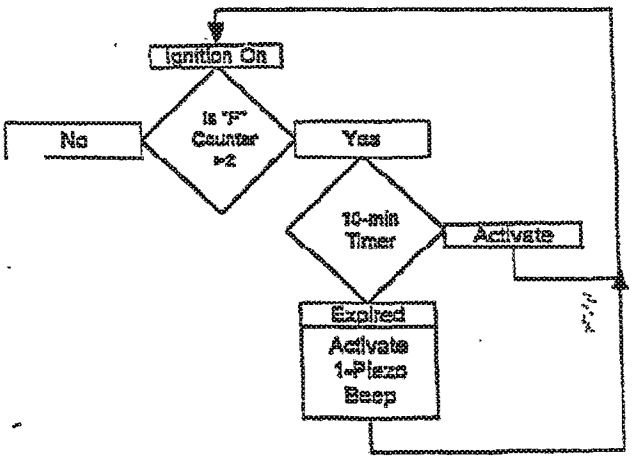


EXHIBIT E

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 (+) --- [+]

INVENTOR(s)/APPLICANT(s)			
LAST NAME	FIRST NAME	MID. INIT.	RESIDENCE (CITY/STATE OR COUNTRY)
FLICK	Kenneth	E.	981 Burnt Hickory Road Douglasville, GA 30134

TITLE OF THE INVENTION (280 Characters Max)

VEHICLE TRACKING SYSTEM WITH THEFT NOTIFICATION

CORRESPONDENCE ADDRESS

CHRISTOPHER F. REGAN, Reg. No. 34,906
Allen, Dyer, Doppelt, Milbrath & Gilchrist, P.A.
P. O. Box 3791

STATE	Florida	ZIP CODE	32802-3791	COUNTRY	U.S.

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,

CHRISTOPHER F. REGAN
Reg. No. 34,906
Allen, Dyer, Doppelt, Milbrath & Gilchrist, P.A.
255 South Orange Avenue - Suite 1401
Post Office Box 3791
Orlando, Florida 32802-3791
PHONE: (407) 841-2330

Date: December 22, 2000

CERTIFICATE OF MAILING BY "EXPRESS MAIL"

"EXPRESS MAIL" MAILING LABEL NUMBER EL547921218US

DATE OF DEPOSIT DECEMBER 22, 2000

I HEREBY CERTIFY THAT THIS PAPER OR FEE IS BEING DEPOSITED WITH THE UNITED STATES POSTAL SERVICE "EXPRESS MAIL POST OFFICE TO ADDRESSEE" SERVICE UNDER 37 CFR 1.10 ON THE DATE INDICATED ABOVE AND IS ADDRESSED TO THE COMMISSIONER OF PATENTS AND TRADEMARKS, WASHINGTON, D.C. 20031

ERIC LINK
(TYPED OR PRINTED NAME OF PERSON MAILING PAPER OR FEE)

(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.

Get a Free Trial at GlobalSpec.com

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.

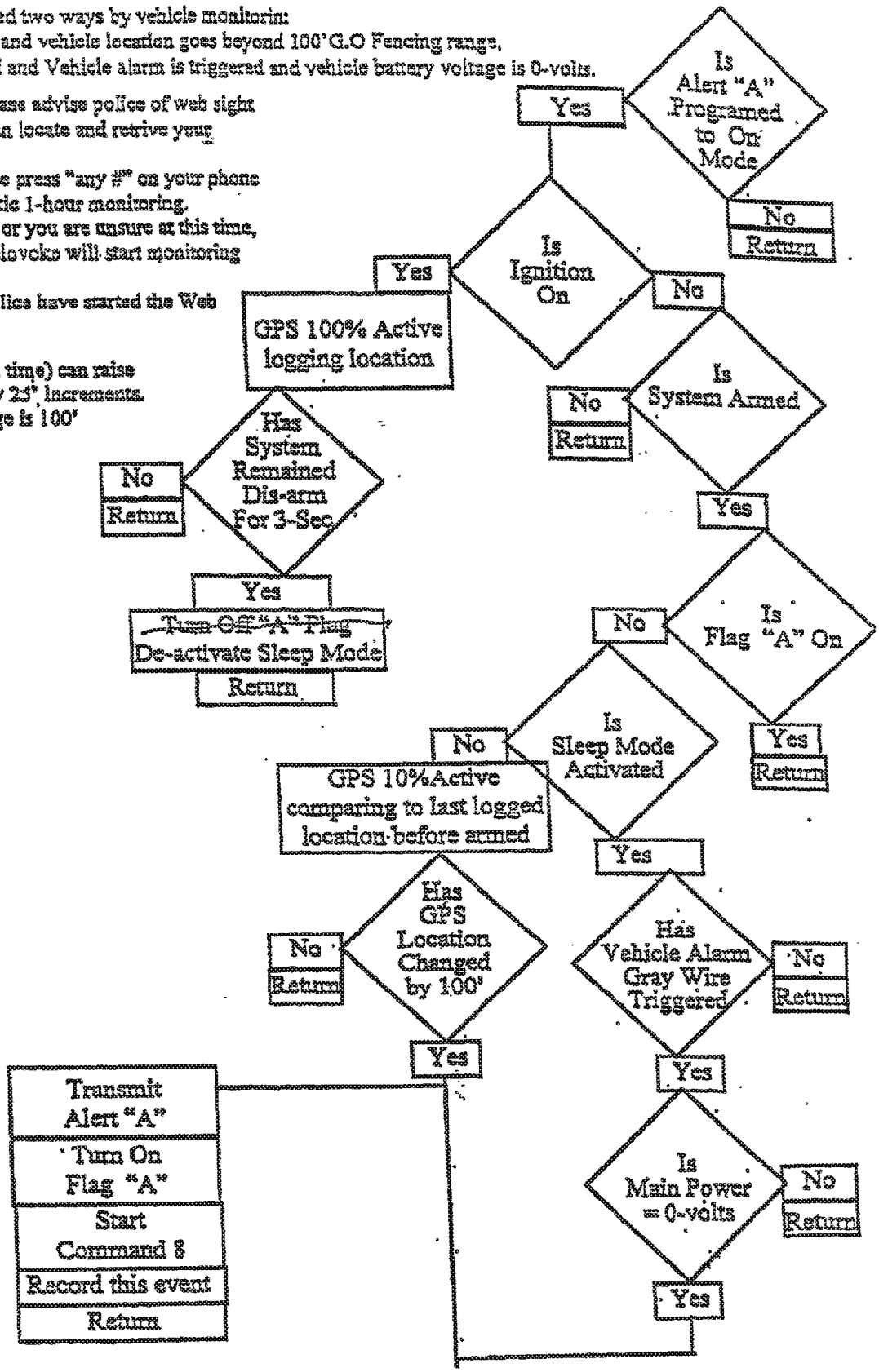
In all of the embodiments and variations described herein, the tracking device may communicate with one or more other vehicle devices via a vehicle data communications bus. Further aspects of interfacing with a vehicle data communications bus are described in U.S. Patent Nos. 5,719,551 and 6,011,460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

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.

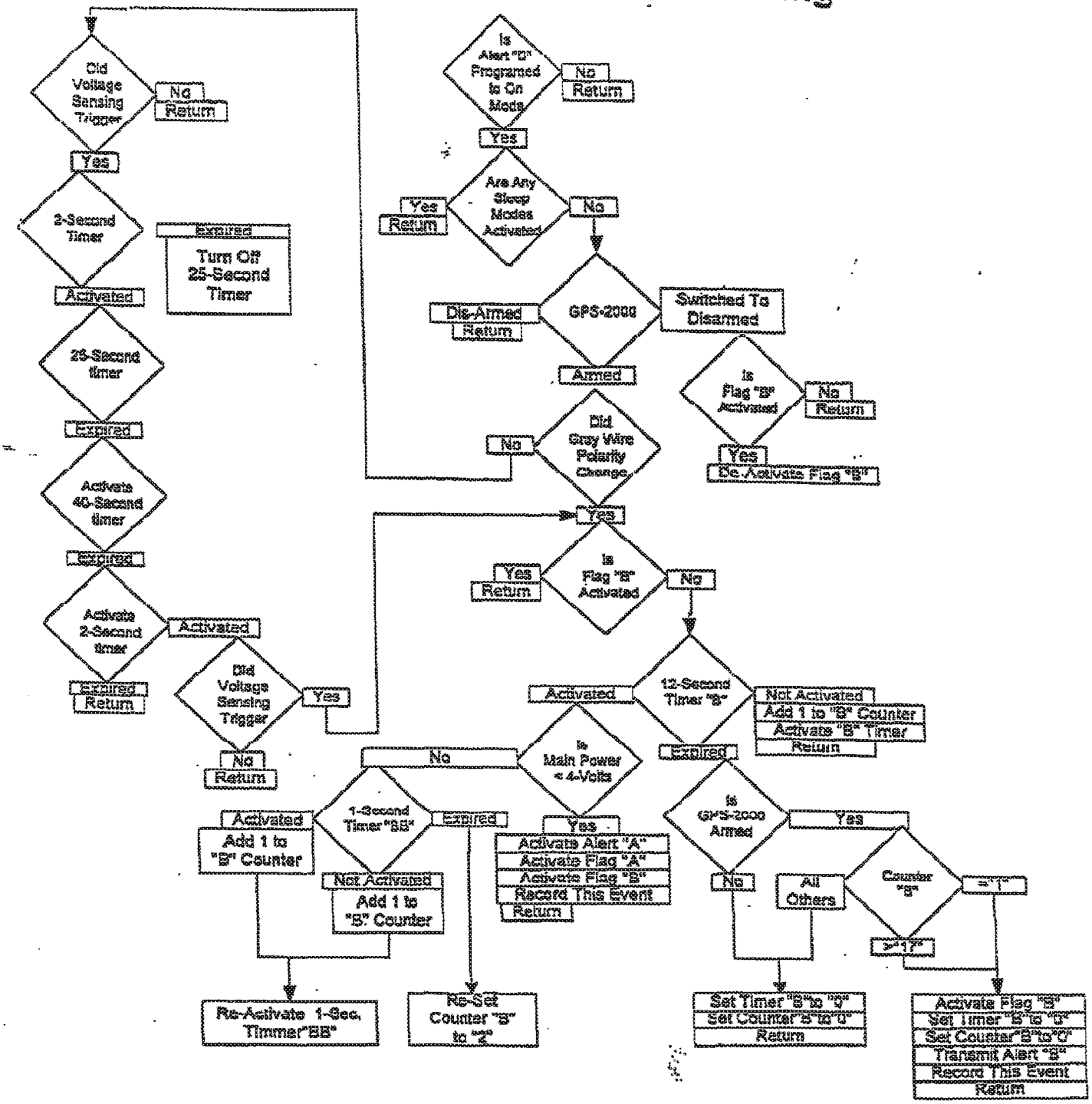
Your vehicle is stolen, please advise police of web sight and your pin# so police can locate and retrive your vehicle.
If this is a false alert please press "any #" on your phone now to deactivate automatic 1-hour monitoring.
If vehicle has been stolen or you are unsure at this time, hang up an call police. Televoks 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'



Document 1 - Page 360

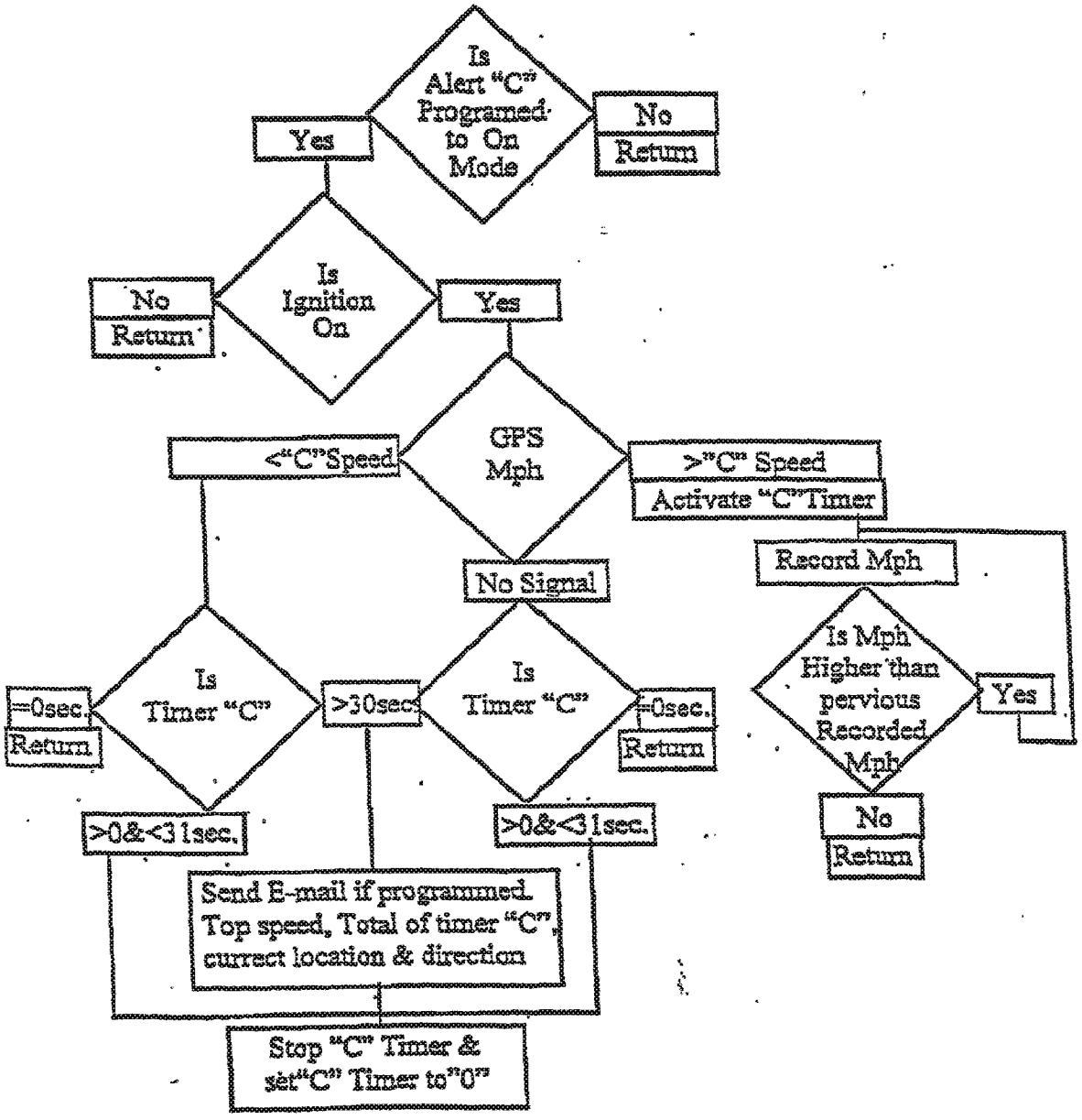
Alert "B" = Vehicle's Alarm Sounding



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

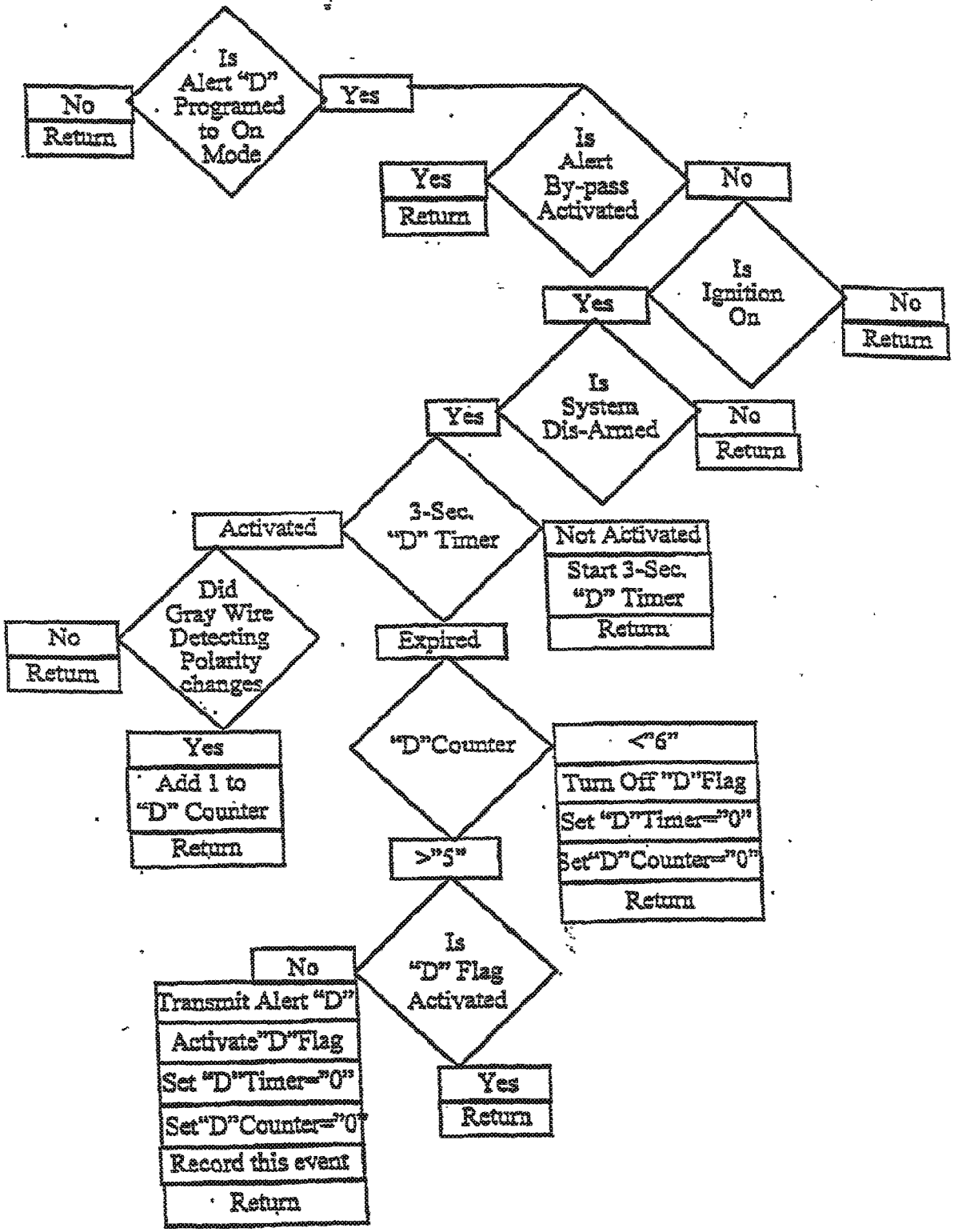
Vehicle was traveling faster than 80 m.p.h. for a longer time than 30 seconds. GPS indicates the speed.
If pre-programed to do so, records this as an event and will send e-mail instantly of Top speed, total time,direction and location speeding had stopped.
Alert "C" operation an be turned on or off by 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.

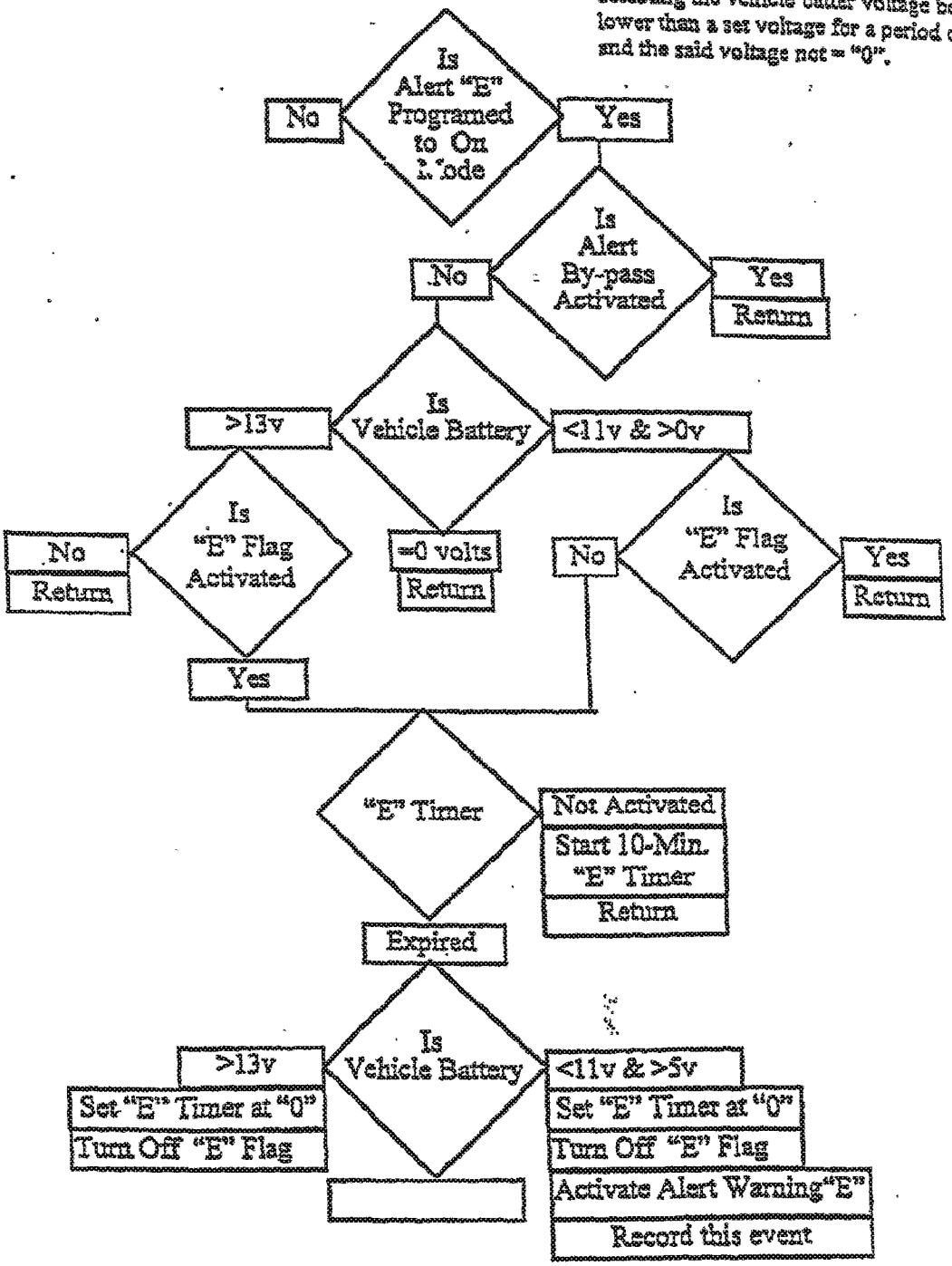
Unauthorized Transmitter Alert is activated when ignition key is turned on and detects a plurality of polarity changes on Gray wire within a set time. This Alert is prevented from activated again until said circuit returns to normal.



Alert "E" = Low Car Battery Power

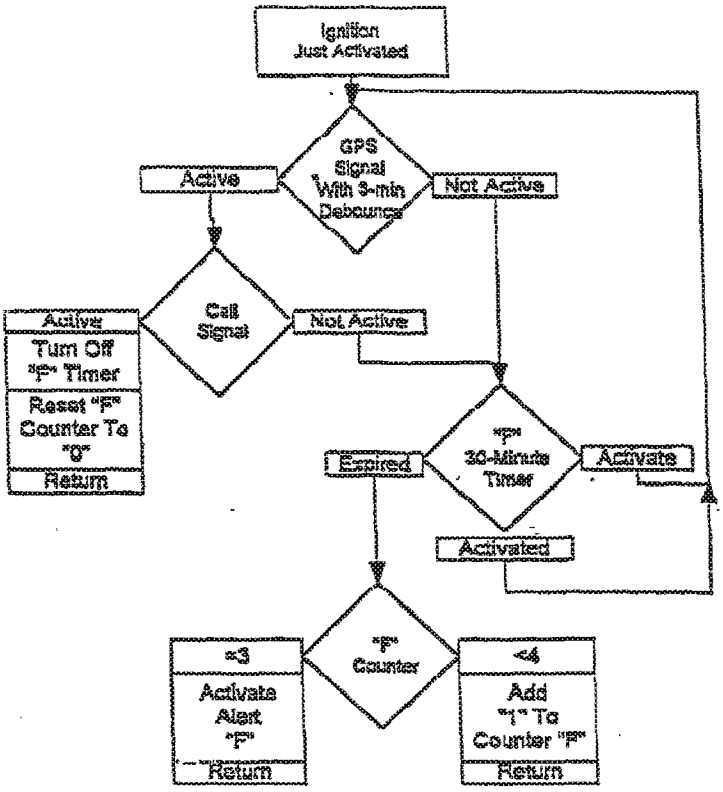
Your vehicle has a low battery voltage indication. Please take proper action. This alert will not be sent again until your vehicles battery has retained the proper voltage.

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".



Confidential

Alert "F" = GPS / Cell not active Alert



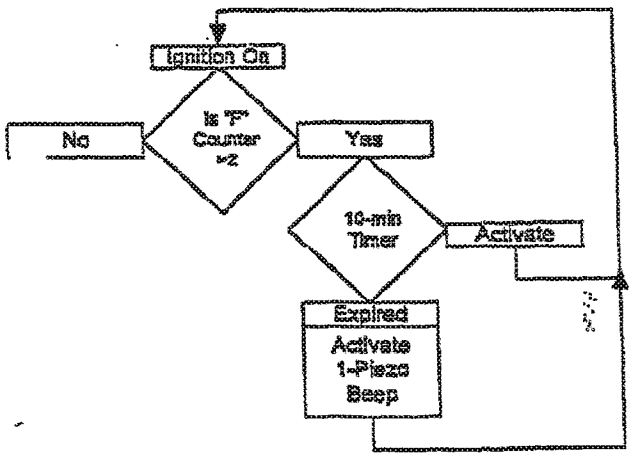


EXHIBIT F

12-07-00

A/prov

PROVISIONAL APPLICATION COVER SHEET

This is a request for filing a PROVISIONAL APPLICATION under 37 CFR 1.53(b)(2)

09/714 U.S. PTO
12/06/00
09/731553
12/06/00 U.S. PTO

Docket No.	58082	Type (+) --- [+]

INVENTOR(s)/APPLICANT(s)

LAST NAME	FIRST NAME	MID. INIT.	RESIDENCE (CITY/STATE OR COUNTRY)
FLICK	Kenneth	E.	981 Burnt Hickory Road Douglasville, GA 30134

TITLE OF THE INVENTION (280 Characters Max)

VEHICLE TRACKING SYSTEM WITH THEFT NOTIFICATION

CORRESPONDENCE ADDRESS

CHRISTOPHER F. REGAN, Reg. No. 34,906
Allen, Dyer, Doppelt, Milbrath & Gilchrist, P.A.
P. O. Box 3791

STATE	Florida	ZIP CODE	32802-3791	COUNTRY	U.S.

ENCLOSED APPLICATION PARTS *(check all that apply)*

✓	Specification	*Number of Pages*	33		✓	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,

CHRISTOPHER F. REGAN
Reg. No. 34,906
Allen, Dyer, Doppelt, Milbrath & Gilchrist, P.A.
255 South Orange Avenue - Suite 1401
Post Office Box 3791
Orlando, Florida 32802-3791
PHONE: (407) 841-2330

Date: December 6, 2000

CERTIFICATE OF MAILING BY "EXPRESS MAIL"

"EXPRESS MAIL" MAILING LABEL NUMBER EL547921425US

DATE OF DEPOSIT DECEMBER 6, 2000

I HEREBY CERTIFY THAT THIS PAPER OR FEE IS BEING DEPOSITED WITH THE UNITED STATES POSTAL SERVICE "EXPRESS MAIL POST OFFICE TO ADDRESSEE" SERVICE UNDER 37 CFR 1.10 ON THE DATE INDICATED ABOVE AND IS ADDRESSED TO THE COMMISSIONER OF PATENTS AND TRADEMARKS, WASHINGTON, D.C. 20231

ERIC LINK

(TYPED OR PRINTED NAME OF PERSON MAILING PAPER OR FEE)

(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

Document Retrieved from Patent Arcade

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.

DOCKET ALARM

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

Copyright Legal Images, Inc. All Rights Reserved

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

Ex. 1005 - Page 372

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.

Privacy - Page 373 of 2009

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

Confidential - Attorneys' Eyes Only

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.

Protect Plus - Protect

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

Docket #1552 - Page 00012

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.

Document Produced Natively

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.

Patent Application Publication

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.

Document 2554629

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.

Ex. 1005 - Page 385

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

Document 1 - Page 20

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

Exhibit 1005

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

Ex. 1005 - Page 389

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

Ex. 1005 - Page 390

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

Ex. 1005 - Page 391

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.

09/06/2001 - 35671-209

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

Case 1:15-cv-00662-TSE Document 1-5 Filed 06/05/15

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

Confidential - Subject to Protective Order

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

Document 2255169.1

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.

Document 1 - Page 397

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

Confidential - Attorneys Only

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

Declaration - Page 399

device. Of course this concept can be extended to other features as will be appreciated by those skilled in the art.

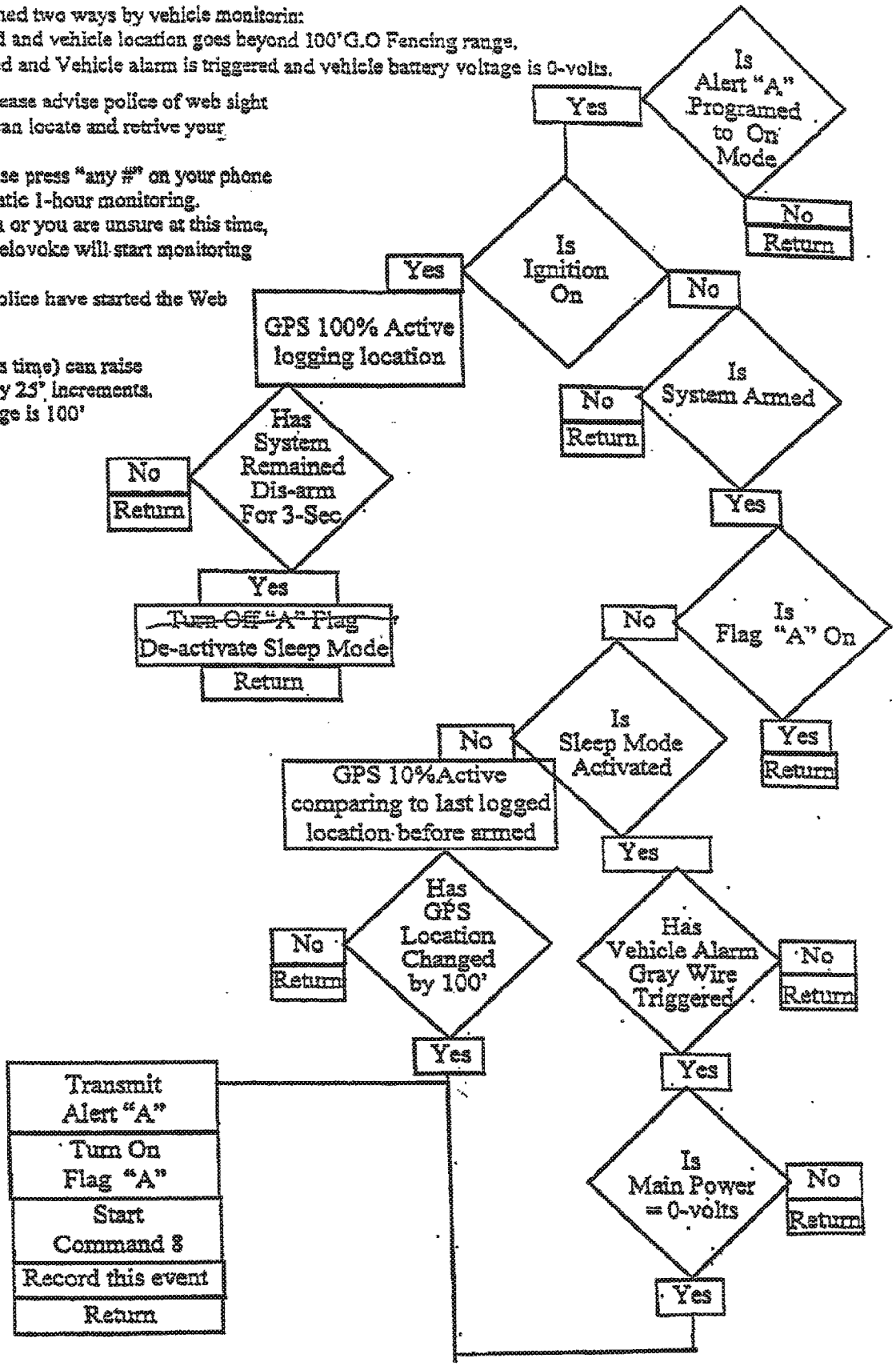
0025454 - 1990-05-22 09:57:47

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.

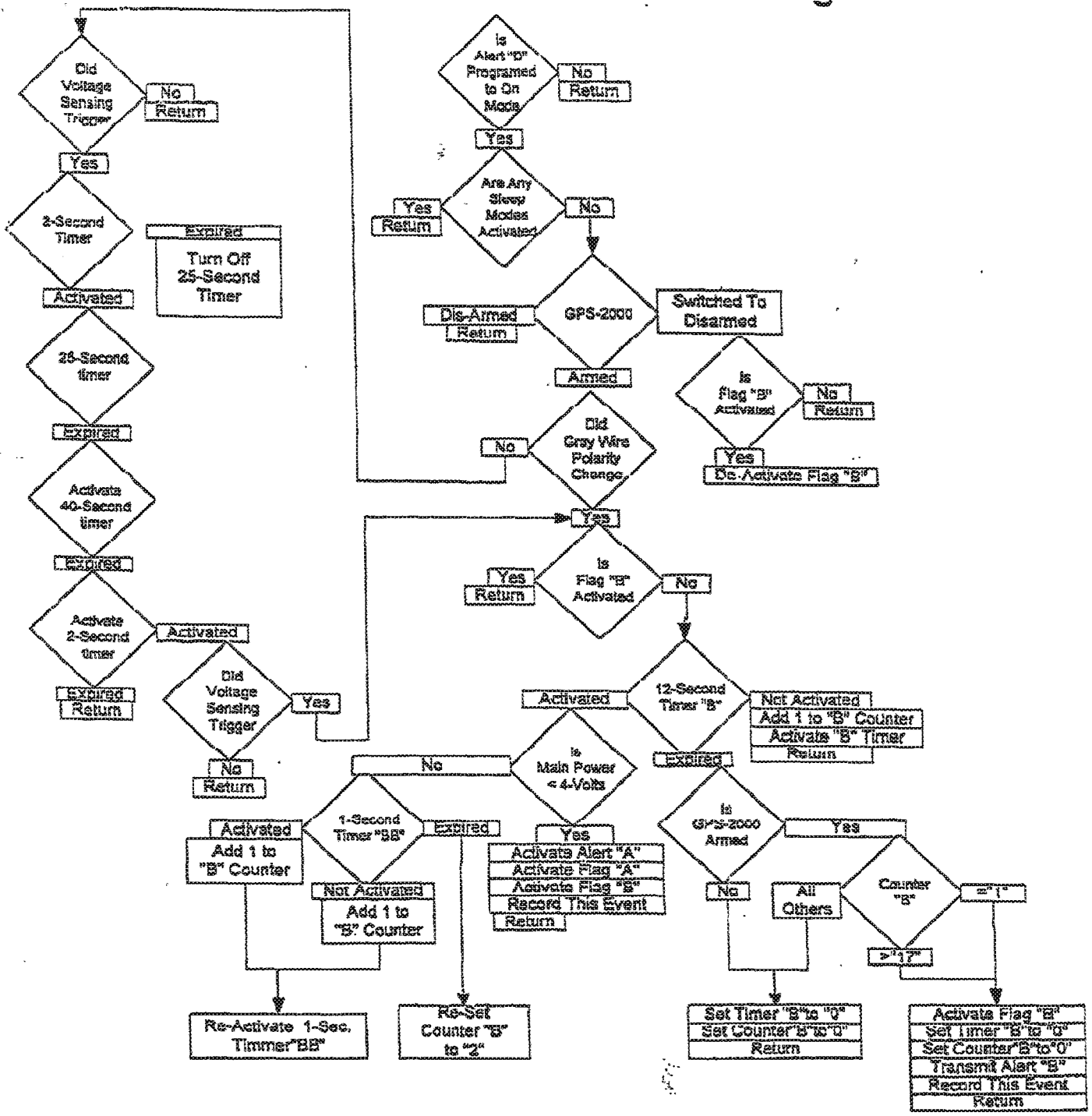
Your vehicle is stolen, please advise police of web sight and your pin# so police can locate and retrive your vehicle.
If this is a false alert please press "any #" on your phone now to deactivate automatic 1-hour monitoring.
If vehicle has been stolen or you are unsure at this time, hang up an call 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'



DO NOT ERASE

Alert "B" = Vehicle's Alarm Sounding



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.

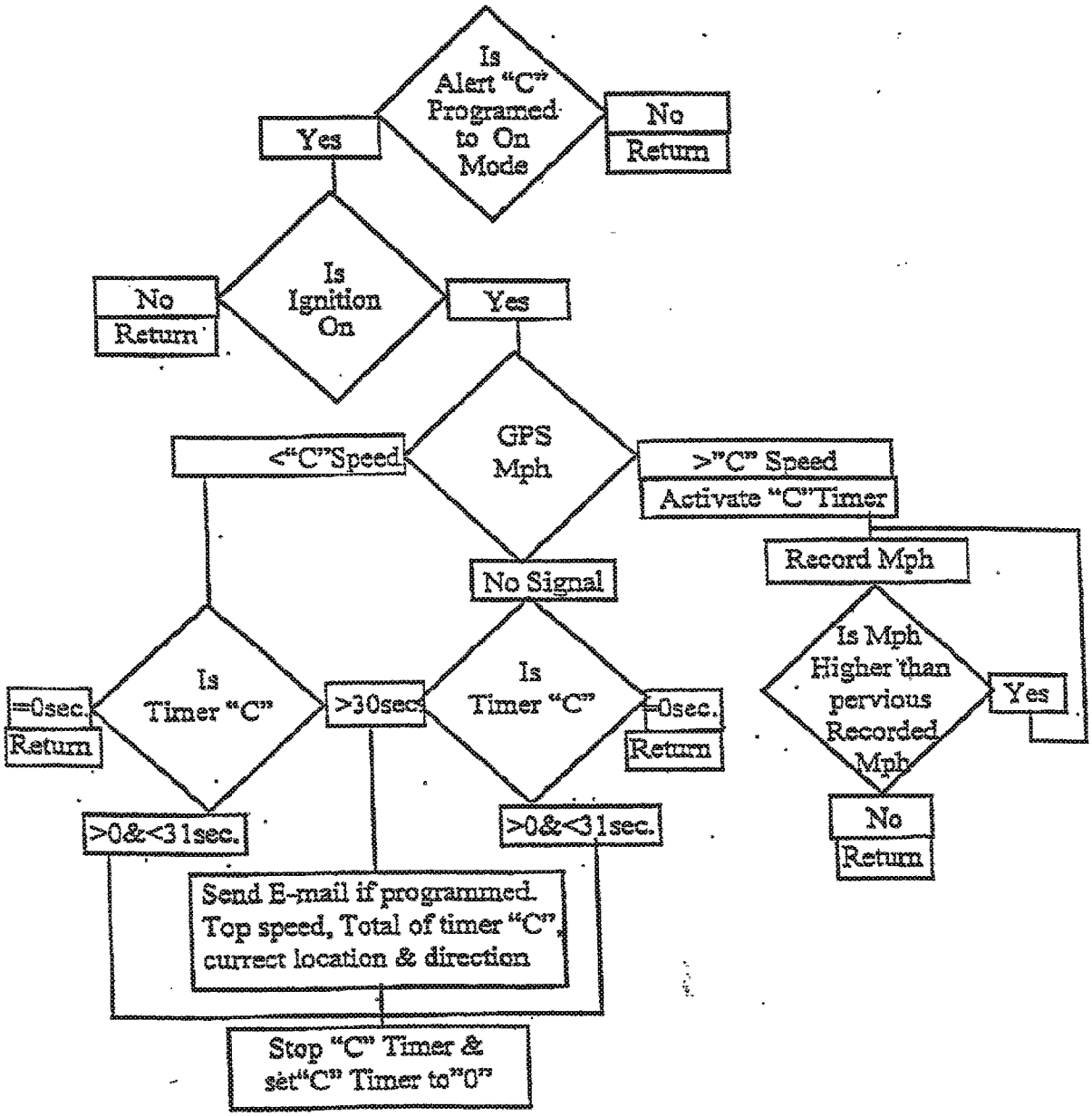
If the car batery power is removed during the 12-seconds then alert "A" is sent to inform the vehicle is being stolen.

One alert B is transmitted then GPS-200 will not send another alert till the GPS-2000 is disarmed and rearmed.

0013021" 2557509

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.

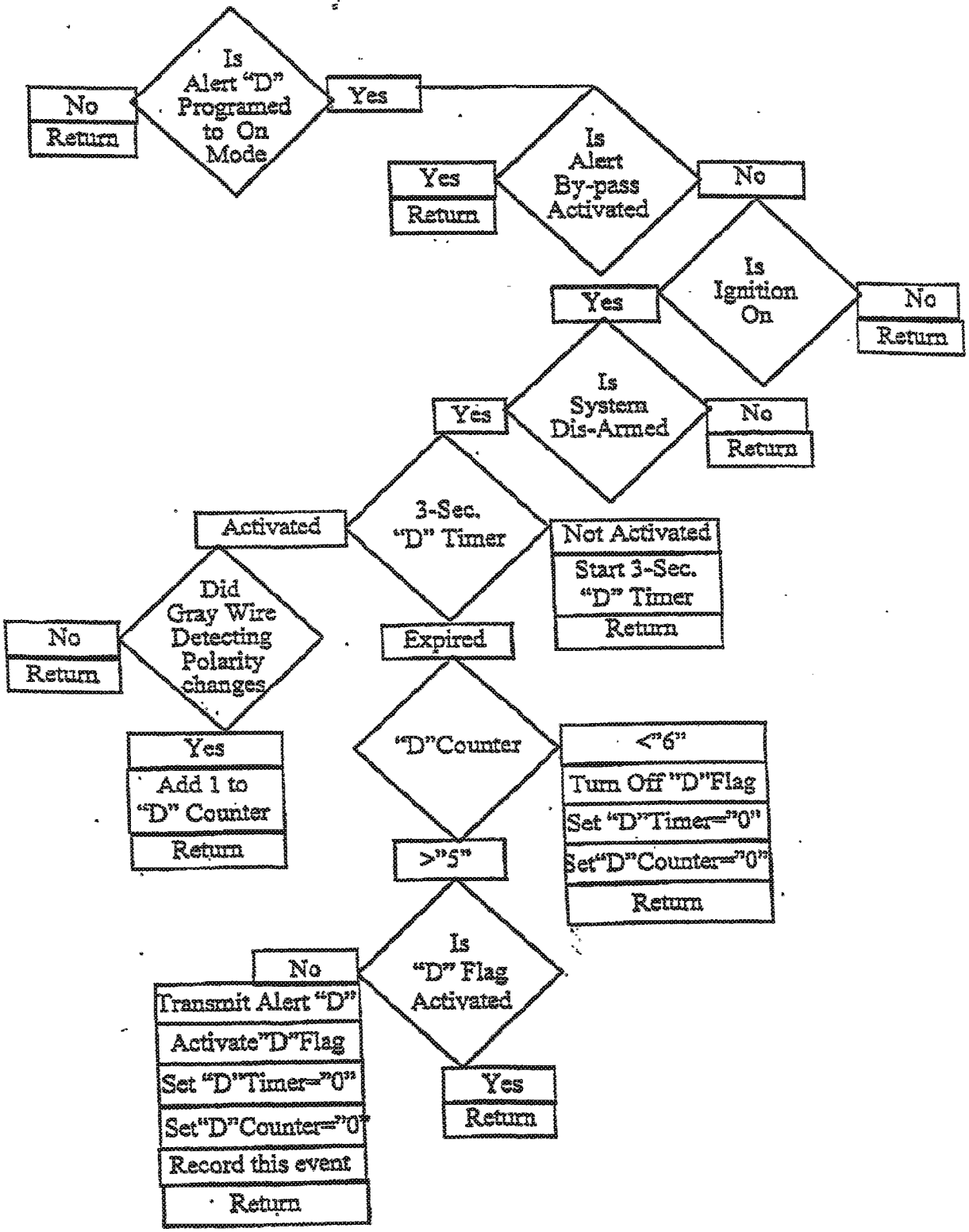


00027 - 355713203

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.

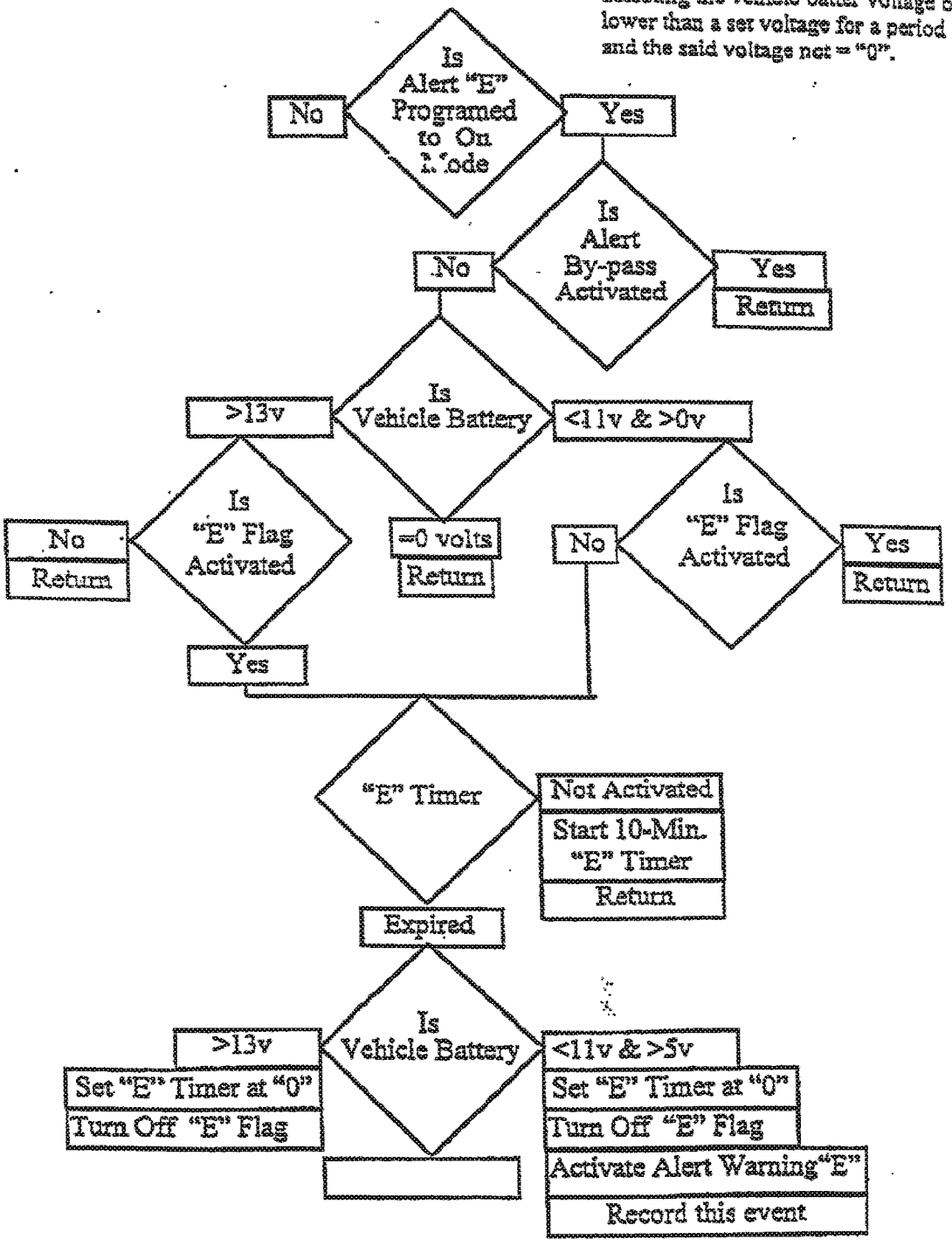


DOCKET • 2554209

Alert "E" = Low Car Battery Power

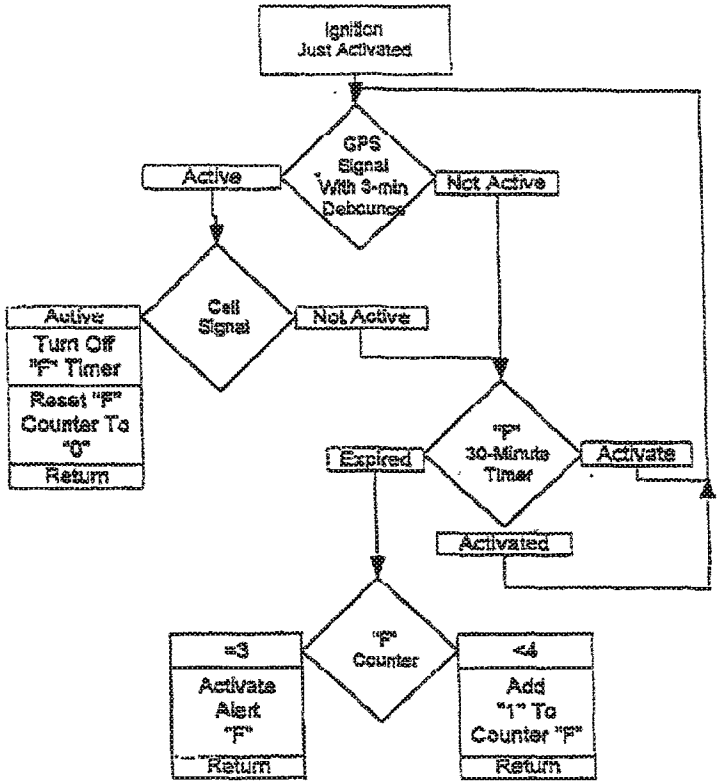
Your vehicle has a low battery voltage indication. Please take proper action. This alert will not be sent again until your vehicles battery has retained the proper voltage.

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".



0090271 "2557209

Alert "F" = GPS / Cell not active Alert



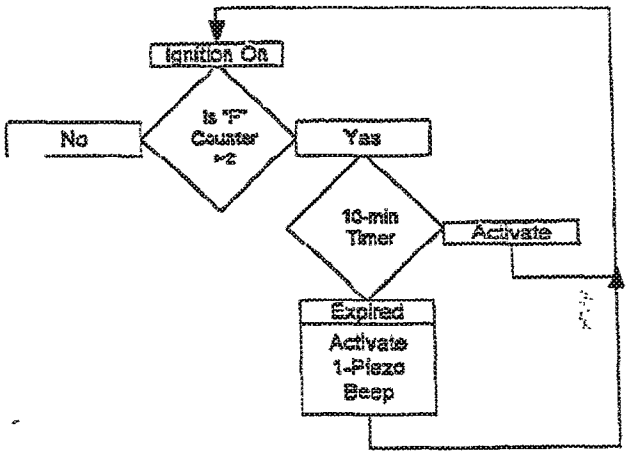


EXHIBIT G

11-21-00 A/PROV

PROVISIONAL APPLICATION COVER SHEET

This is a request for filing a PROVISIONAL APPLICATION under 37 CFR 1.53(b)(2)

Docket No.	58080	Type (+) --→ [+]

INVENTOR(s)/APPLICANT(s)

LAST NAME	FIRST NAME	MID. INIT.	RESIDENCE (CITY/STATE OR COUNTRY)
FLICK	Kenneth	E.	981 Burnt Hickory Road Douglasville, GA 30134

TITLE OF THE INVENTION (280 Characters Max)

VEHICLE TRACKING SYSTEM WITH THEFT NOTIFICATION

CORRESPONDENCE ADDRESS

CHRISTOPHER F. REGAN, Reg. No. 34,906
Allen, Dyer, Doppelt, Milbrath & Gilchrist, P.A.
P. O. Box 3791

STATE	Florida	ZIP CODE	32802-3791	COUNTRY	U.S.

ENCLOSED APPLICATION PARTS *(check all that apply)*

✓	Specification	*Number of Pages*	29		✓	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 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,

CHRISTOPHER F. REGAN
Reg. No. 34,906
Allen, Dyer, Doppelt, Milbrath & Gilchrist, P.A.
255 South Orange Avenue - Suite 1401
Post Office Box 3791
Orlando, Florida 32802-3791
PHONE: (407) 841-2330

Date: November 20, 2000

CERTIFICATE OF MAILING BY "EXPRESS MAIL"

"EXPRESS MAIL" MAILING LABEL NUMBER EL547921751US

DATE OF DEPOSIT Nov. 20, 2000

I HEREBY CERTIFY THAT THIS PAPER OR FEE IS BEING DEPOSITED WITH THE UNITED STATES POSTAL SERVICE "EXPRESS MAIL POST OFFICE TO ADDRESSEE" SERVICE UNDER 37 CFR 1.10 ON THE DATE INDICATED ABOVE AND IS ADDRESSED TO THE COMMISSIONER OF PATENTS AND TRADEMARKS, WASHINGTON, D.C. 20231

ERIC LINK
(TYPED OR PRINTED NAME OF PERSON MAILING PAPER OR FEE)

(SIGNATURE OF PERSON MAILING PAPER OR FEE)

Ex. 1005 - Page 408

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

Petitioner's Exhibit 1005 - Page 409

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.

DEFENDANT'S EXHIBIT

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

Ex. 1005 - Page 411

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

09252425.1420

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

Ex. 1005 - Page 413

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.

SECTION 1 1000

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

DRAFT 5-14-2000

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.

DS2534-1400

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:

D05544.P05 - 4/20/00

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:

EXHIBIT 1005

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

Ex. 1005 - Page 419

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

8005251.4000

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.

DOCKET A L A R M

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.

DEFENDANT'S EXHIBIT

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.

SECTION 1000

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.

0050-1426-0000

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.

Exhibit 1005 - Page 426

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

DOCKET ALARM

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

09525.1200

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

09525425.1200

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

Docket #4000

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

Ex. 1005 - Page 431

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

Declaration - Page 000

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.

DOCKET ALARM

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

9625294.1

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

SPS-P25-44200

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.

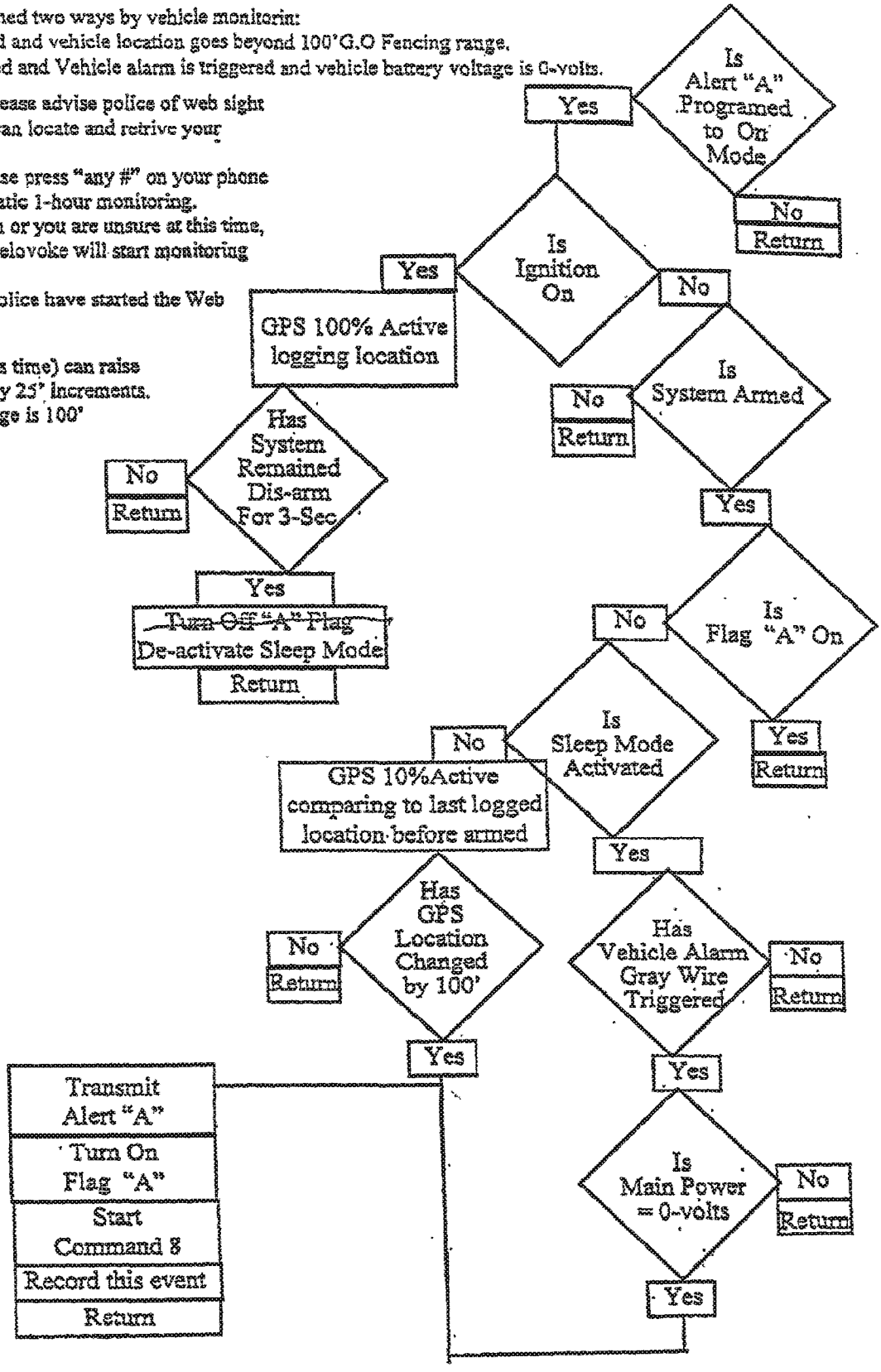
Clifford Exhibit 2005

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.

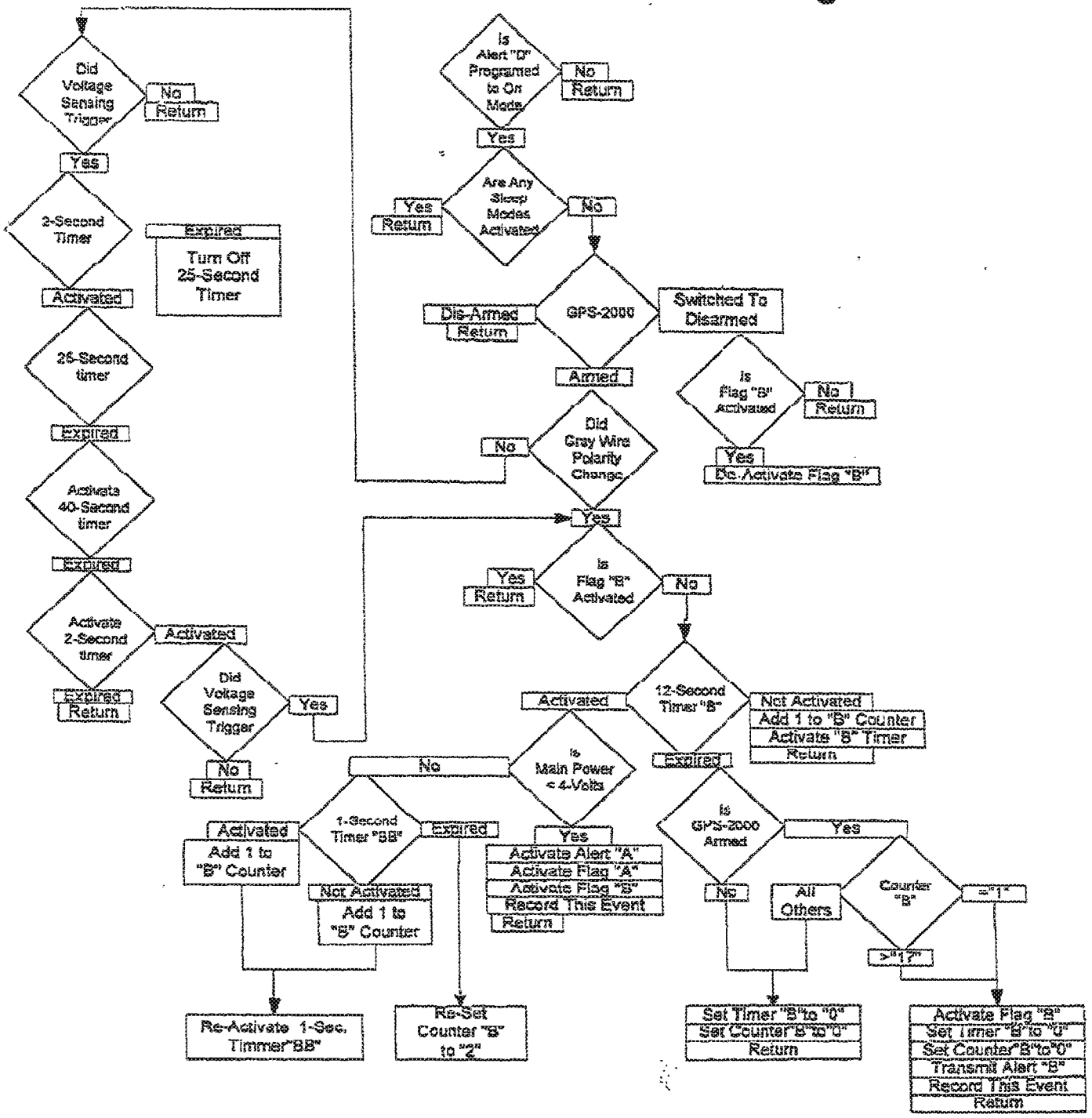
Your vehicle is stolen, please advise police of web sight and your pin# so police can locate and retrive your vehicle.
If this is a false alert please press "any #" on your phone now to deactivate automatic 1-hour monitoring.
If vehicle has been stolen or you are unsure at this time, hang up an call police. Telovoke will start monitoring for upto
1-hour vehicle or until police have started the Web monitoring.

Telovoke (not user at this time) can raise or lower G.O.Fencing by 25' Increments.
G.O Fencing default range is 100'



6252445 14 2008

Alert "b" = Vehicle's Alarm Sounding

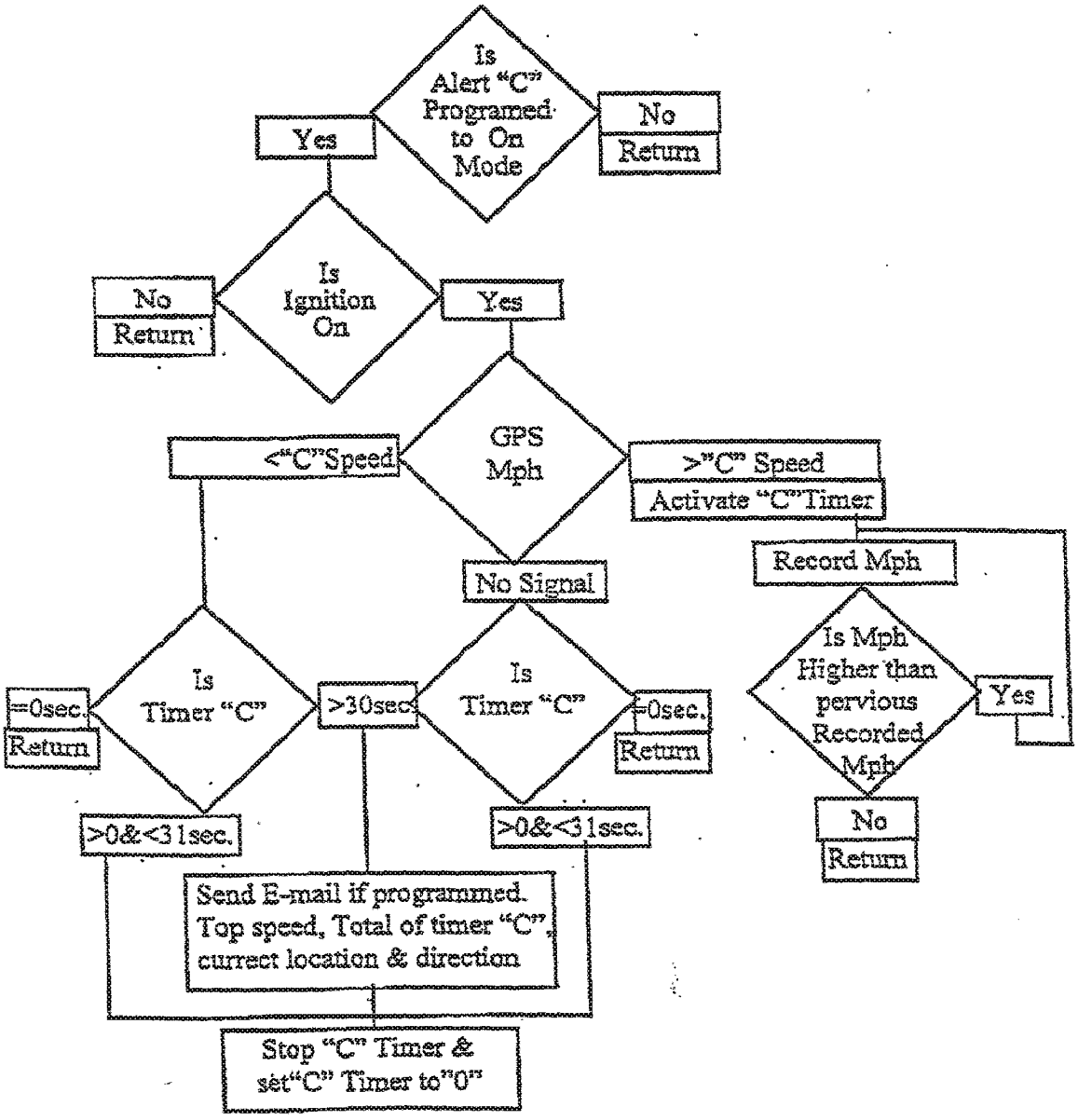


Your vehicle alarm activated is detected by counting the pularity changes within a set time.
One change = a siren was latched on for the set time of 12 seconds.
>17 changes = a car horn was pulsing on/off each time in less than one-second and after 12-seconds continues honking of 18 times = 9 horn hons 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.

9025414256 - 14 2008

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.

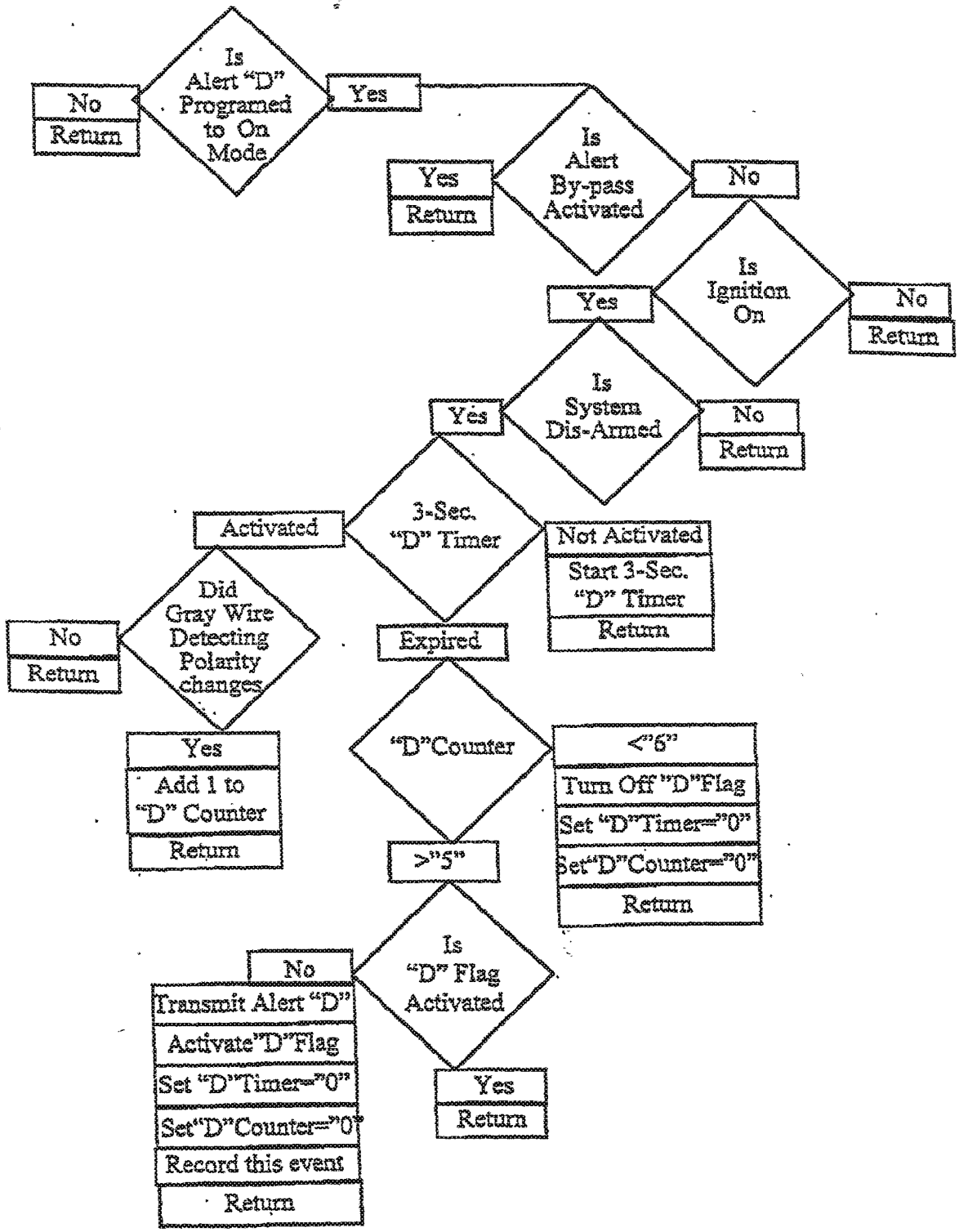


DOCKET ALARM

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.

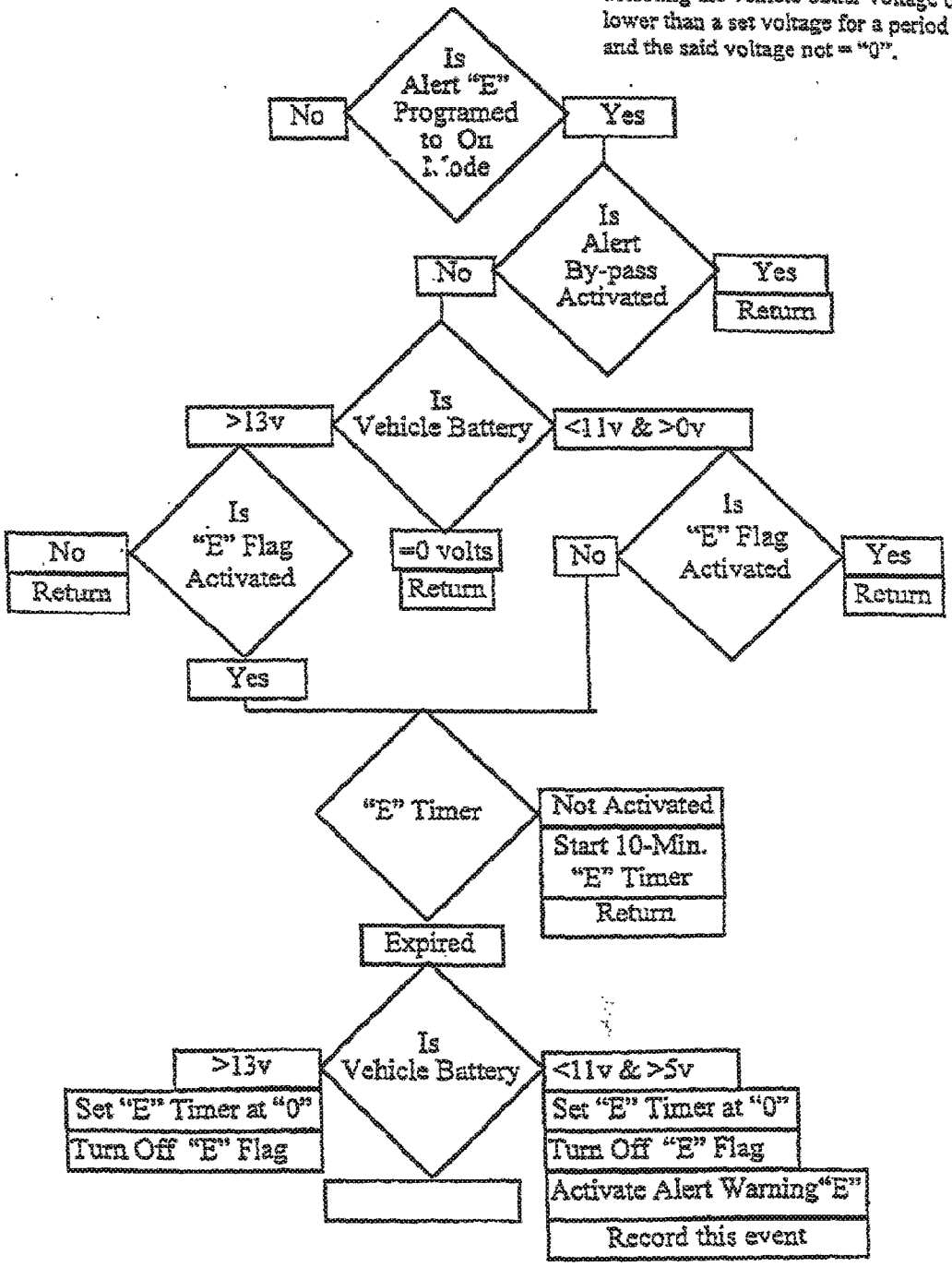


5025125 12/2005

Alert "E" = Low Car Battery Power

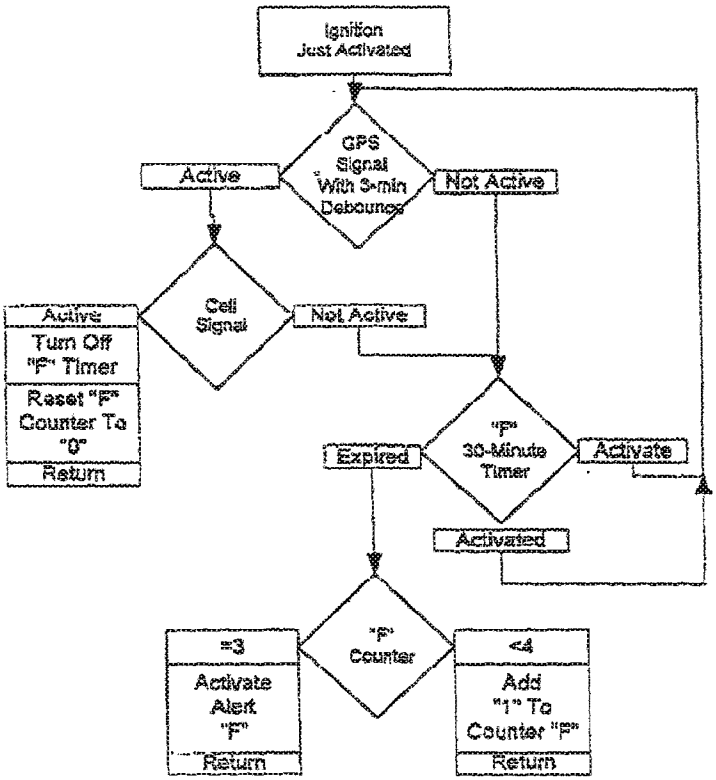
Your vehicle has a low battery voltage indication. Please take proper action. This alert will not be sent again until your vehicles battery has retained the proper voltage.

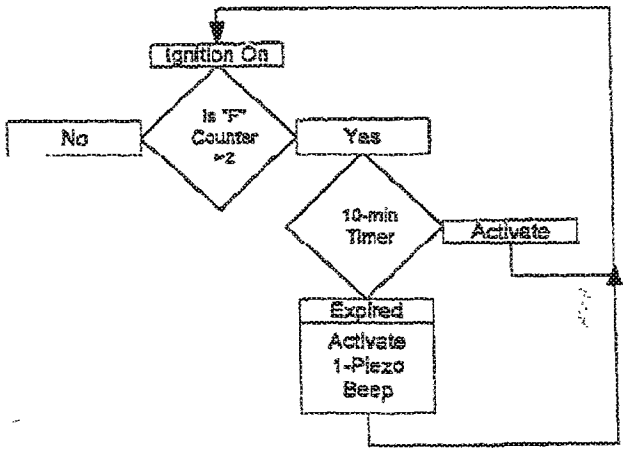
Low battery power Alert is activated by detecting the vehicle batter voltage being lower than a set voltage for a period of time and the said voltage not = "0".



6025425-142005

Alert "F" = GPS / Cell not active Alert





09/25/2015 - 9:20:09

EXHIBIT H

10-02-00 Approv

PROVISIONAL APPLICATION COVER SHEET

This is a request for filing a PROVISIONAL APPLICATION under 37 CFR 1.53(b)(2)

Docket No.	58076	Type (+) --- [+]

INVENTOR(s)/APPLICANT(s)

LAST NAME	FIRST NAME	MID. INIT.	RESIDENCE (CITY/STATE OR COUNTRY)
FLICK	Kenneth	E.	Douglasville, GA

TITLE OF THE INVENTION (280 Characters Max)

VEHICLE TRACKING SYSTEM WITH THEFT NOTIFICATION

CORRESPONDENCE ADDRESS

CHRISTOPHER F. REGAN, Reg. No. 34,906
Allen, Dyer, Doppelt, Milbrath & Gilchrist, P.A.
P. O. Box 3791

STATE	Florida	ZIP CODE	32802-3791	COUNTRY	U.S.

ENCLOSED APPLICATION PARTS *(check all that apply)*

✓	Specification	*Number of Pages*	24			Small Entity Statement
✓	Drawing(s)	*Number of Sheets*	5			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 filing fee and/or any discrepancies 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,

CHRISTOPHER F. REGAN
Reg. No. 34,906
Allen, Dyer, Doppelt, Milbrath & Gilchrist, P.A.
255 South Orange Avenue - Suite 1401
Post Office Box 3791
Orlando, Florida 32802-3791
PHONE: (407) 841-2330

Date: September 29, 2000

CERTIFICATE OF MAILING BY "EXPRESS MAIL"

"EXPRESS MAIL" MAILING LABEL NUMBER EL547921460US

DATE OF DEPOSIT SEPTEMBER 29, 2000

I HEREBY CERTIFY THAT THIS PAPER OR FEE IS BEING DEPOSITED WITH THE UNITED STATES POSTAL SERVICE "EXPRESS MAIL POST OFFICE TO ADDRESSEE" SERVICE UNDER 37 CFR 1.10 ON THE DATE INDICATED ABOVE AND IS ADDRESSED TO THE COMMISSIONER OF PATENTS AND TRADEMARKS, WASHINGTON, D.C. 20031

ERIC LINK
(TYPED OR PRINTED NAME OF PERSON MAILING PAPER OR FEE)

(SIGNATURE OF PERSON MAILING PAPER OR FEE)

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant:	Kenneth E. FLICK
Serial:	Not Yet Assigned
Attorney's Docket No.:	58076
Filed:	Herewith
For:	**VEHICLE TRACKING SYSTEM WITH THEFT NOTIFICATION**

VERIFIED STATEMENT (DECLARATION) CLAIMING SMALL ENTITY STATUS (37 CFR 1.9(f) and 1.27(b)) - INDEPENDENT INVENTOR

As a below named inventor, I hereby declare that I qualify as an independent inventor as defined in 37 CFR 1.9(c) for purposes of paying reduced fees under section 41(a) and (b) of Title 35, United States Code, to the Patent and Trademark Office with regard to the invention entitled: **VEHICLE TRACKING SYSTEM WITH THEFT NOTIFICATION** described in:

(x) the specification filed herewith
( ) application serial no. _____ filed _____
( ) patent no. _____ issued _____

I have not assigned, granted, conveyed or licensed and am under no obligation under contract or law to assign, grant, convey or license, any rights in the invention to any person who could not be classified as an independent inventor under 37 CFR 1.9(c) if that person had made the invention, or to any concern which would not qualify as a small business concern under 37 CFR 1.9(d) or a nonprofit organization under 37 CFR 1.9(e).

Each person, concern, or organization to which I have assigned, granted, conveyed or licensed or am under an obligation under contract or law to assign, grant, convey, or license any rights in the invention is listed below:

(x) no such person, concern, or organization
( ) persons, concerns or organizations listed below*

*NOTE: Separate verified statements are required from each named person, concern or organization having rights to the invention averring to their status as small entities. (37 CFR 1.27)

FULL NAME Kenneth E Flick

ADDRESS 5326 Presley Place

( ) INDIVIDUAL ( ) SMALL BUSINESS CONCERN ( ) NONPROFIT ORGANIZATION

I acknowledge the duty to file, in this application or patent, notification of any change in status resulting in loss of entitlement to small entity status prior to paying, or at the time of paying, the earliest of the issue fee or any maintenance fee due after the date on which status as a small entity is no longer appropriate. (37 CFR 1.28(b))

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both under section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application, any patent issuing thereon, or any patent to which this verified statement is directed.

Kenneth E. Flick
NAME OF INVENTOR

SIGNATURE OF INVENTOR

9-28-00
DATE

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

Exhibit 1005 - Page 465

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.

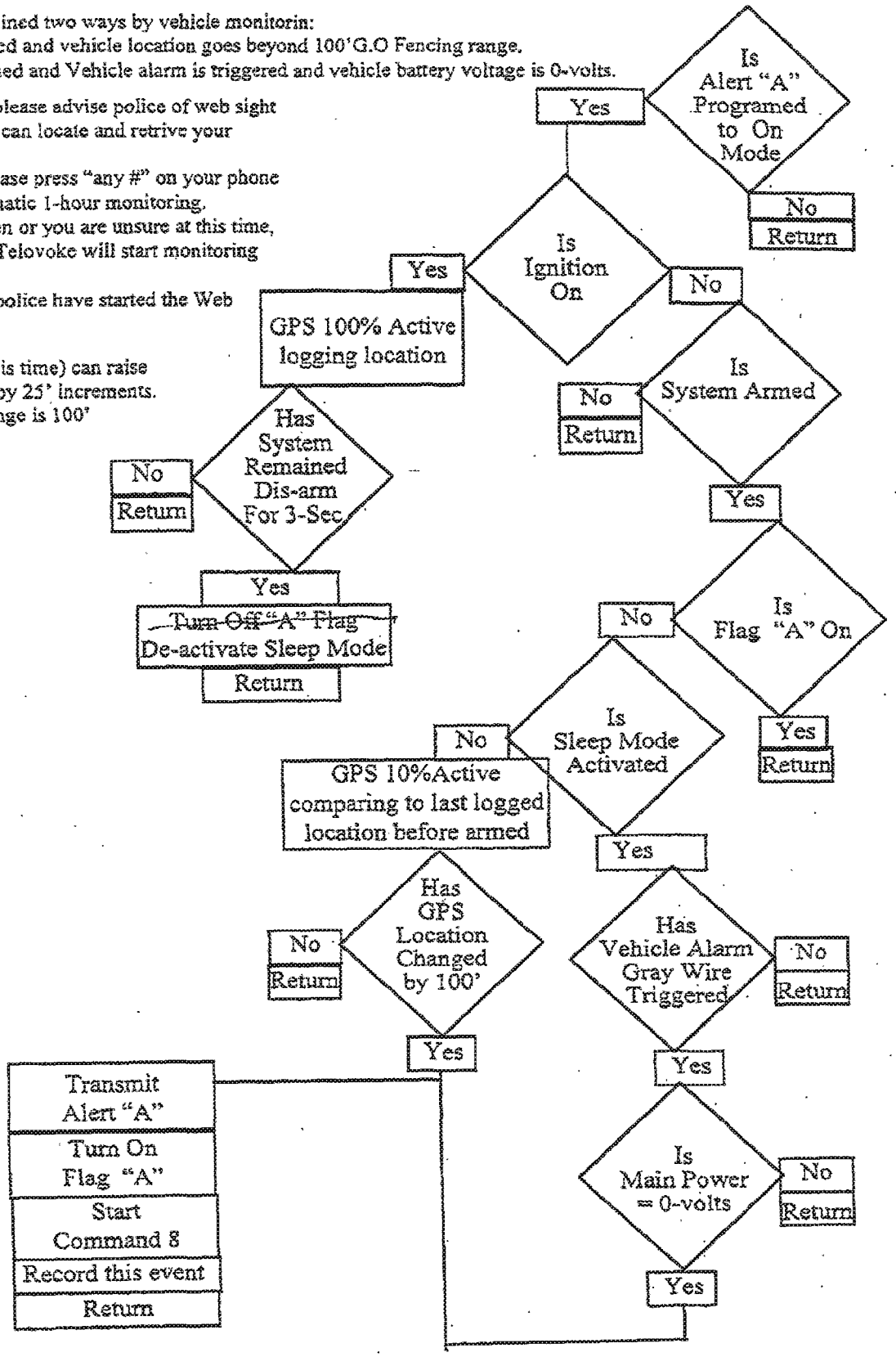
Yet another feature of the invention relates to permitting more colorful audible alert messages to be generated for the user. The user can, in some embodiments, access an internet site to type or enter the text for a message to be sent, such as to alert the user that his vehicle is being stolen. The 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.

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. Telovoke 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'

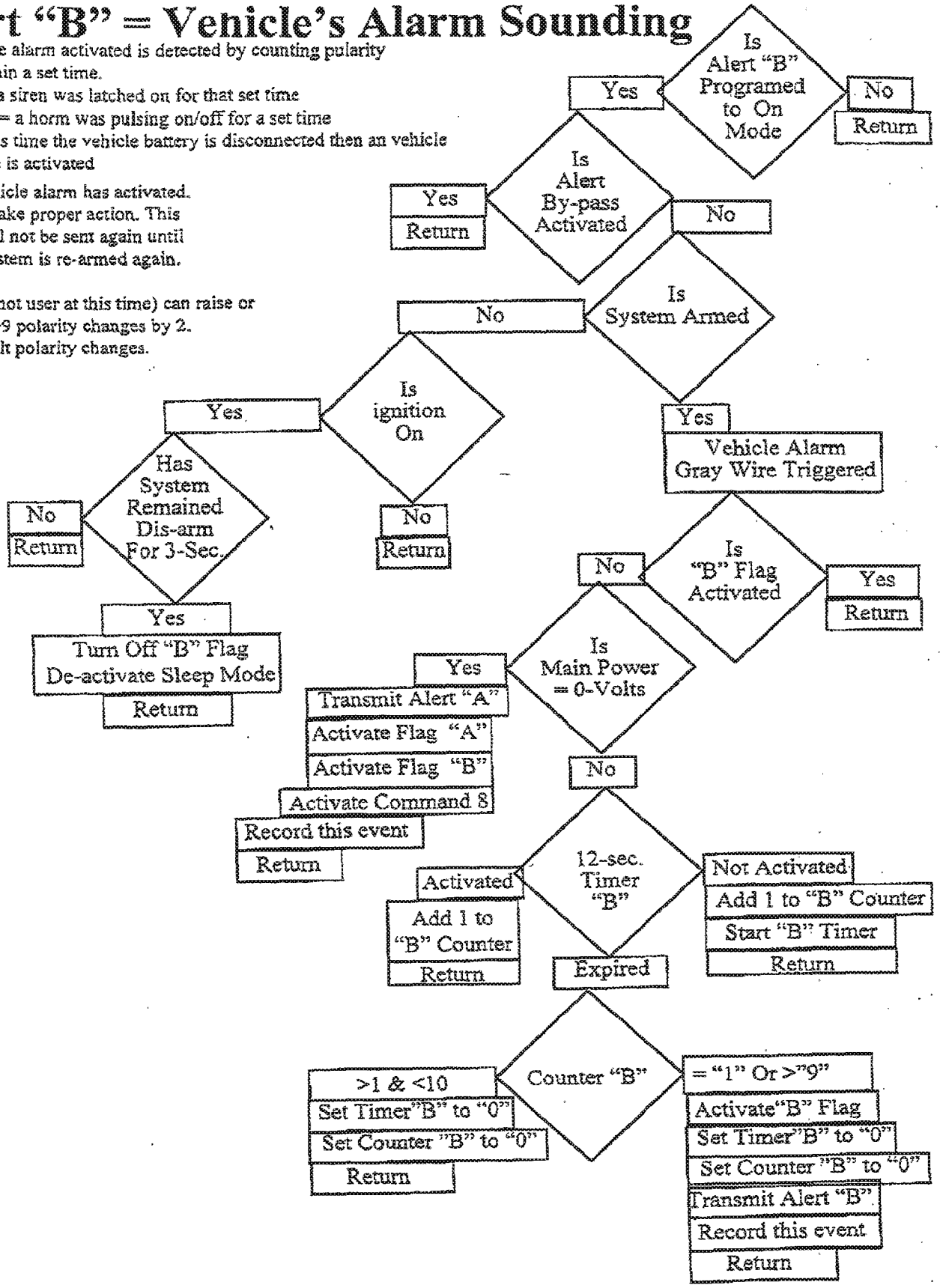


Alert "B" = Venicle's Alarm Sounding

Your vehicle alarm activated is detected by counting pularity changeswithin a set time.
1 change = a siren was latched on for that set time
>9 changes = a horn was pulsing on/off for a set time
If during this time the vehicle battery is disconnected then an vehicle stolen mode is activated

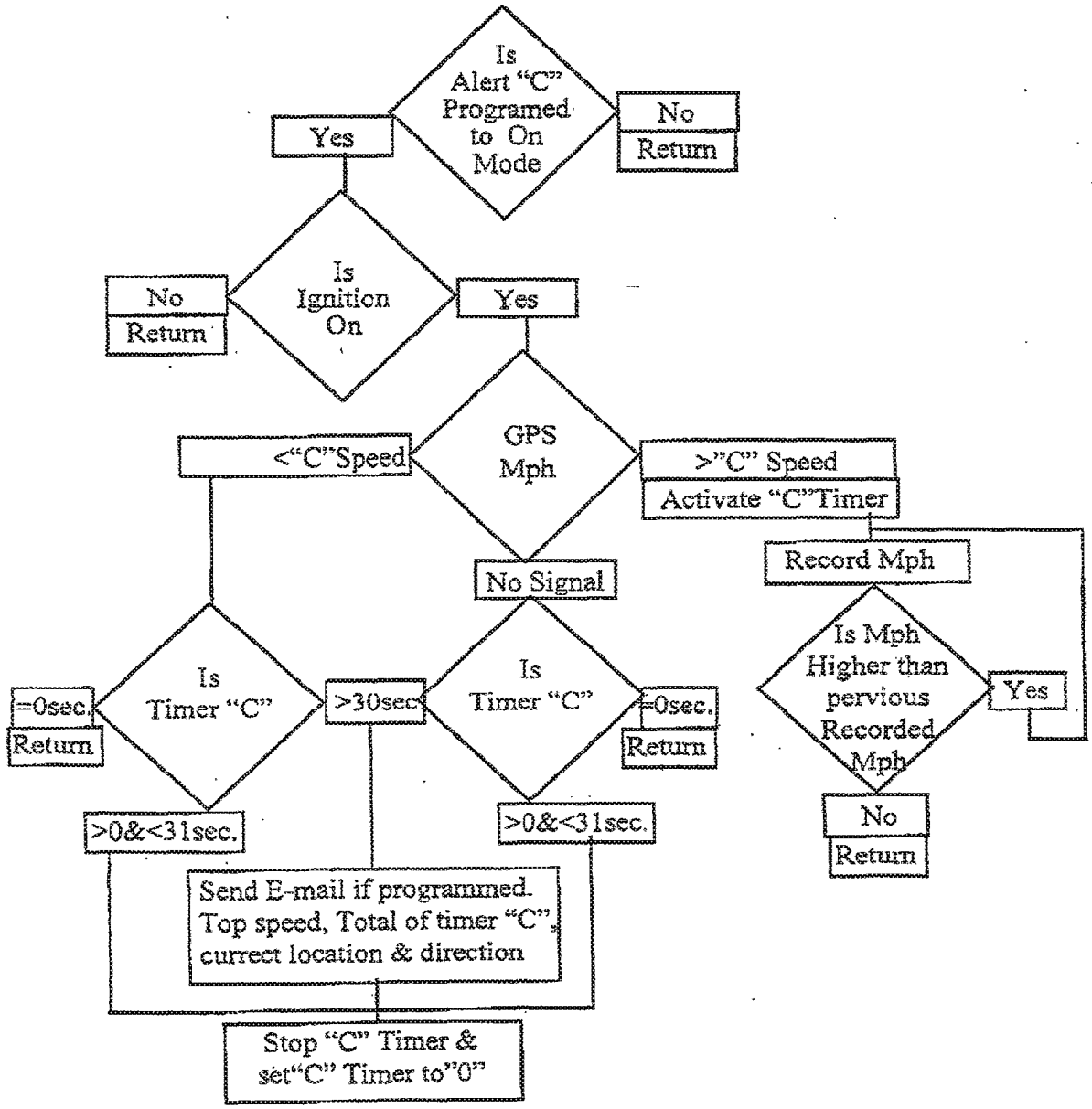
Your vehicle alarm has activated. Please take proper action. This alert will not be sent again until your system is re-armed again.

Televoke (not user at this time) can raise or lower the >9 polarity changes by 2.
>9 is default polarity changes.



Alert "C" = Speeding Too Long Of Time

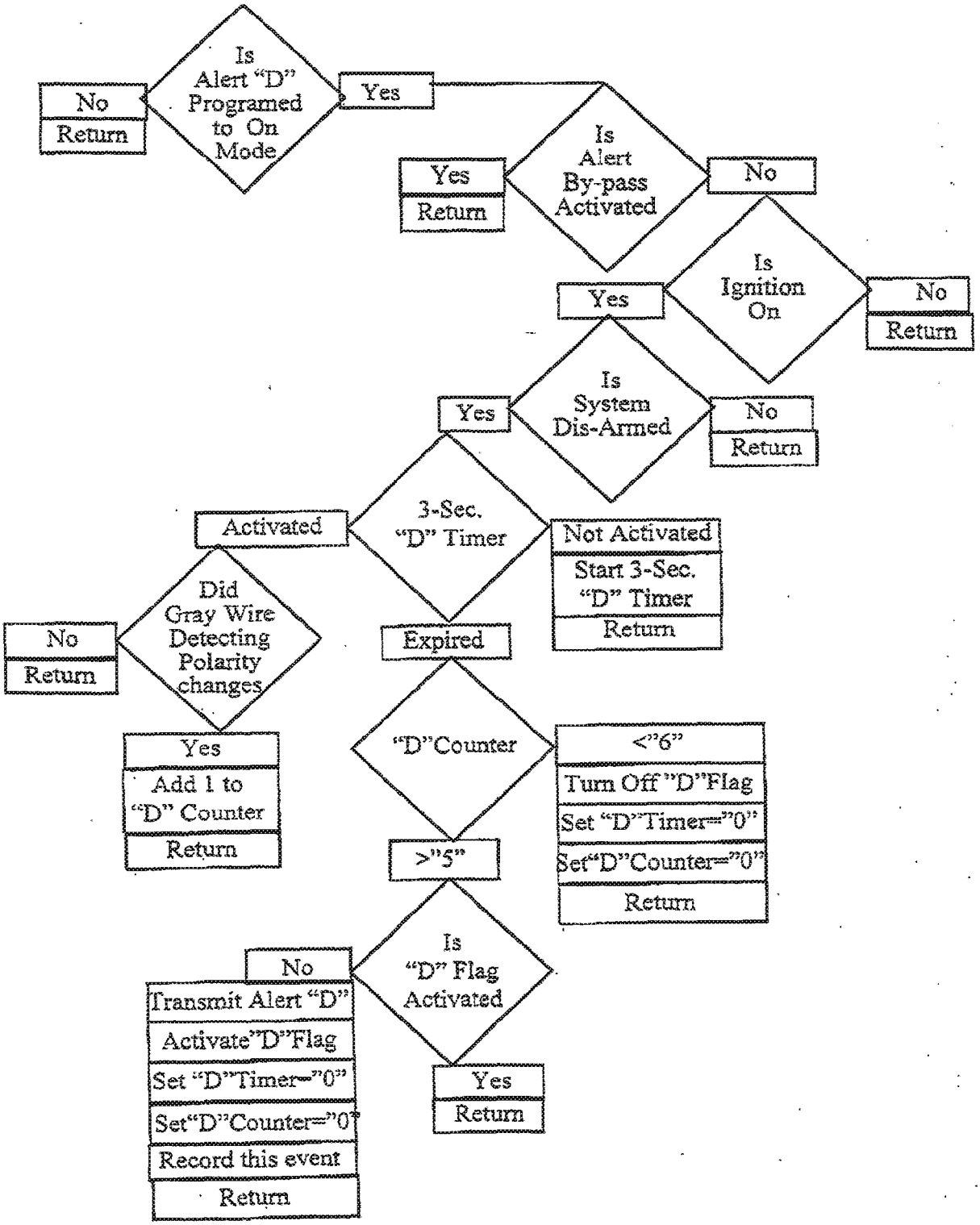
Vehicle was traveling faster than 80 m.p.h. for a longer time than 30 seconds. GPS indicates the speed.
If pre-programed to do so, records this as an event and will send e-mail instantly of Top speed, total time,direction and location speeding had stopped.
Alert "C" operation an be turned on or off by 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.

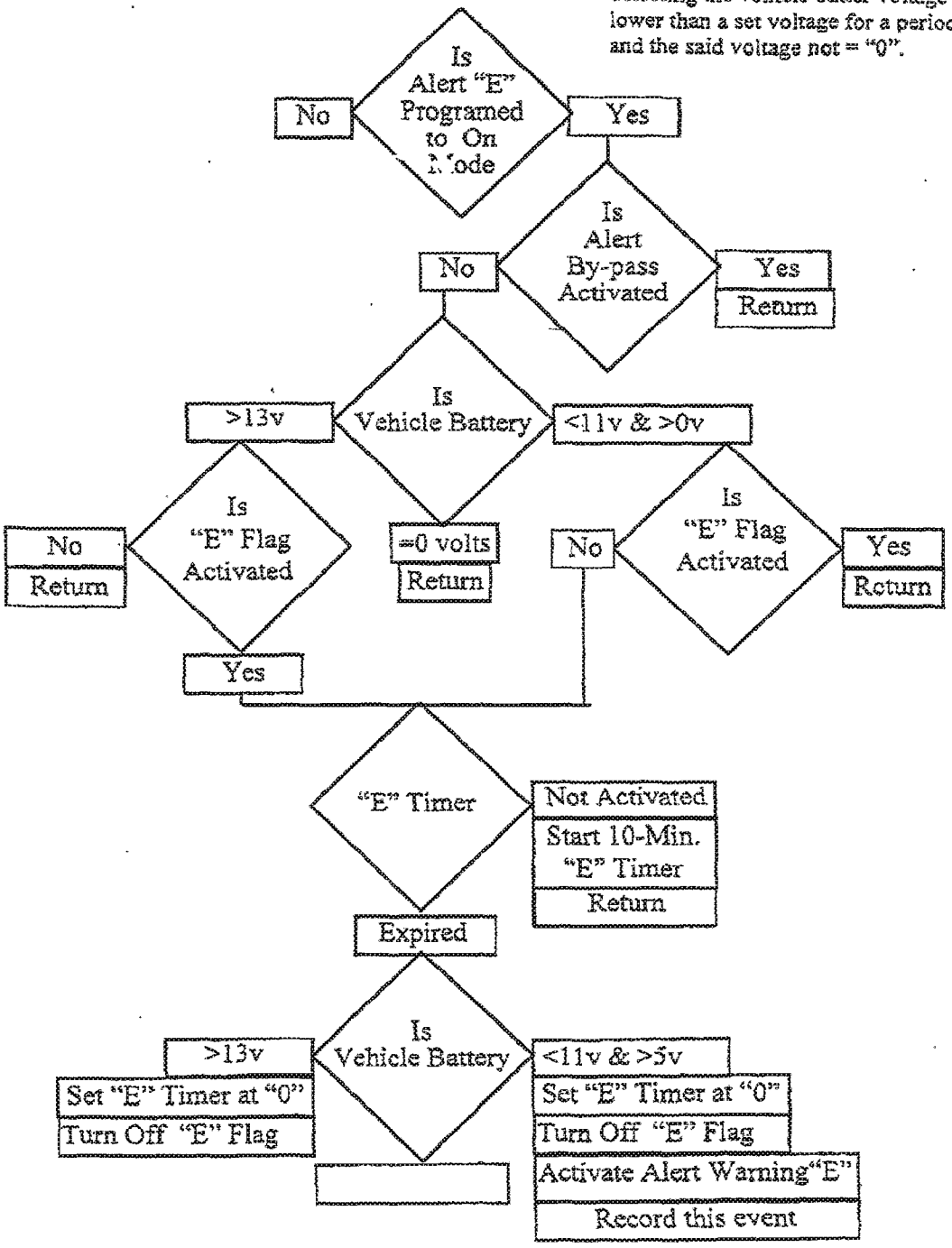
Unauthorized Transmitter Alert is activated when ignition key is turned on and detects a plurality of polarity changes on Gray wire within a set time. This Alert is prevented from activated again until said circuit returns to normal.



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".



Ex. 1005 - Page 476

EXHIBIT I

11-08-00

Approved

Please type a plus sign (+) inside this box → ⊞

(MODIFIED) PTO/SB/16 (12-97)
Approved for use through 1/31/98. OMB 0651-0037
Patent and Trademark Office, U.S. DEPARTMENT OF COMMERCE

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number

PROVISIONAL APPLICATION FOR PATENT COVER SHEET

This is a request for filing a PROVISIONAL APPLICATION FOR PATENT under 37 CFR 1.53 (c).

INVENTOR(S)		
Given Name (first and middle [if any])	Family Name or Surname	Residence (City and either State or Foreign Country)
Kurt	WITHAM	North Muskegon, Michigan
Scott	MEYERS	Grand Haven, Michigan
Dale	KENNEDY	New Era, Michigan

☐ *Additional inventors are being named on the ___ separately numbered sheets attached hereto*

TITLE OF THE INVENTION (280 characters max)

SLIDE APPARATUS FOR MACHINE TOOLS

CORRESPONDENCE ADDRESS

Direct all Correspondence to:

☐ Customer Number [ ]

OR *Type Customer Number here*

Place Customer Number Bar Code Label here

X Firm or Individual Name	Douglas H. Pauley				
Address	Pauley Petersen Kinne & Fejer				
Address	2800 West Higgins Road, Suite 365				
City	Hoffman Estates	State	Illinois	ZIP	60195
Country	USA	Telephone	847-490 1400	Fax	847-490 1403

ENCLOSED APPLICATION PARTS (check all that apply)

[X] Specification *Number of Pages* 26 [X] Small Entity Statement

☐ Drawing(s) Number of Sheets [ ] ☐ Other (specify) [ ]

METHOD OF PAYMENT OF FILING FEES FOR THIS PROVISIONAL APPLICATION FOR PATENT (check one)

[X] A check or money order is enclosed to cover the filing fees — FILING FEE AMOUNT ($): $75.00

[X] The Commissioner is hereby authorized to charge *any deficiency in* filing fees or credit any overpayment to Deposit Acount Number: 19-3550

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, the name of the U.S. Government agency and the Government contract number are: _____

Respectfully submitted,

SIGNATURE [signature] Date 11/07/00

TYPED or PRINTED NAME Douglas H. Pauley REGISTRATION NO. 33,295

TELEPHONE 847-490 1400 (If appropriate) Docket Number: AIM-101-P

USE ONLY FOR FILING A PROVISIONAL APPLICATION FOR PATENT

SEND TO: Box Provisional Application, Assistant Comissioner for Patents, Washington, DC 20231

AIM-101-P

jc914 U.S. PTO
60/246463
11/07/00

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicants: Kurt WITHAM
Scott MEYERS
Dale KENNEDY

Title: SLIDE APPARATUS FOR MACHINE TOOLS

Express Mail No.: EL686797339US

Date of Deposit: 07 November 2000

CERTIFICATE OF MAILING BY EXPRESS MAIL

60246463 - 110700

Box PROVISIONAL APPLICATION
Assistant Commissioner for Patents
Washington, D.C. 20231

Dear Sir:

I hereby certify that the subject provisional patent application is being deposited with the United States Postal Service as Express Mail Post Office to Addressee No. EL686797339US, on 07 November 2000, and is addressed to Box PROVISIONAL APPLICATION, Assistant Commissioner for Patents, Washington, D.C. 20231, together with the items listed below.

- Provisional Application for Patent Cover Sheet, one (1) page, in duplicate
- Twenty-six (26) pages of specification
- Executed Claim for Small Entity Status document
- A check in the amount of $75.00 to cover the filing fee

Express Mail No.: EL686797339US

- Return Receipt Postcard

Respectfully submitted,

Douglas H. Pauley
Regis. No. 33,295

Pauley Petersen Kinne & Fejer
2800 West Higgins Road
Suite 365
Hoffman Estates, Illinois 60195
(847) 490-1400
FAX (847) 490-1403

06/07/04 * 847 490 1403

PTO/SB/10 (10-92)

VERIFIED STATEMENT CLAIMING SMALL ENTITY STATUS (37 CFR 1.9(f) & 1.27(d))-SMALL BUSINESS CONCERN	Docket Number AIM-101-P

Applicant or Patentee: Kurt WITHAM et al.
Serial or Patent No.:
Filed or Issued:
Title: SLIDE APPARATUS FOR MACHINE TOOLS

I hereby declare that I am

- ☐ the owner of the small business concern identified below:
- ☒ an official of the small business concern empowered to act on behalf of the concern identified below:

NAME OF SMALL BUSINESS CONCERN: Automated Industrial Motion, Inc.
ADDRESS OF SMALL BUSINESS CONCERN: 1818 East Sherman Boulevard
Muskegon, Michigan 49444

I hereby declare that the above identified small business concern qualifies as a small business concern as defined in 13 CFR 121.12, and reproduced in 37 CFR 1.9(d), for purposes of paying reduced fees to the United States Patent and Trademark Office, in that the number of employees of the concern, including those of its affiliates, does not exceed 500 persons. For purposes of this statement, (1) the number of employees of the business concern is the average over the previous fiscal year of the concern of the persons employed on a full-time, part-time or temporary basis during each of the pay periods of the fiscal year, and (2) concerns are affiliates of each other when either, directly or indirectly, one concern controls or has the power to control the other, or a third party or parties controls or has the power to control both.

I hereby declare that rights under contract or law have been conveyed to and remain with the small business concern identified above with regard to the invention described in:

- ☒ the specification filed herewith with title as listed above.
- ☐ the application identified above.
- ☐ the patent identified above.

If the rights held by the above identified small business concern are not exclusive, each individual, concern or organization having rights in the invention must file separate verified statements averring to their status as small entities and that no rights to the invention are held by any person, other than the inventor, who would not qualify as an independent inventor under 37 CFR 1.9(c) if that person made the invention, or by any concern which would not qualify as a small business concern under 37 CFR 1.9(d) or a nonprofit organization under 37 CFR 1.9(e).

Each person, concern or organization having any rights in the invention is listed below:

- ☒ no such person, concern or organization exists.
- ☐ each such person, concern or organization is listed below:

Separate verified statements are required from each named person, concern or organization having rights to the invention averring to their status as small entities. (37 CFR 1.27)

I acknowledge the duty to file, in this application or patent, notification of any change in status resulting in loss of entitlement to small entity status prior to paying, or at the time of paying, the earliest of the issue fee or any maintenance fee due after the date on which status as a small entity is no longer appropriate. (37 CFR 1.28(b)).

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application, any patent issuing thereon, or any patent to which this verified statement is directed.

NAME OF PERSON SIGNING: Kurt Witham
TITLE OF PERSON IF OTHER THAN OWNER: PRESIDENT / OWNER
ADDRESS OF PERSON SIGNING: 1818 East Sherman Boulevard, Muskegon, Michigan 49444
SIGNATURE: [signature] DATE: 11/7/00

09/984,965 - 11/07/00

AIM AUTOMATED INDUSTRIAL MOTION

AIM-101-P

History of AIM Coated Square Gib Slides

Slides first employed on AIM CNC Spring Coilers in 1991. Today the slides are used on six different models of AIM Coilers.

Replacement slides for mechanical spring coilers introduced to the public in October 1994.

Coated square gib slides used on a variety of custom wire forming equipment since 1991.

DuraBond Slides introduced to public on July 9, 1999.

Product Description

AIM square gib slides are an alternative to the original bronze dovetail slides on Torin mechanical spring coilers. Our square gib design incorporates a Rulon coated surface, which provides high load capacity, is resistant to contaminants and can be run without lubrication. Mating surfaces are fabricated from hardened and ground A2 tool steel. The maintenance free slides are extremely durable and provide high accuracy.

Changes in 2000

Using Thompson Rod material for tool post rather than drill rod or tool steel

Hardening A2 slide to 58-62 Rc rather than 48-52 Rc.

Revised CNC machining process to minimize setups.

Converted to HRS material from gauge stock on gibs and bottom plates

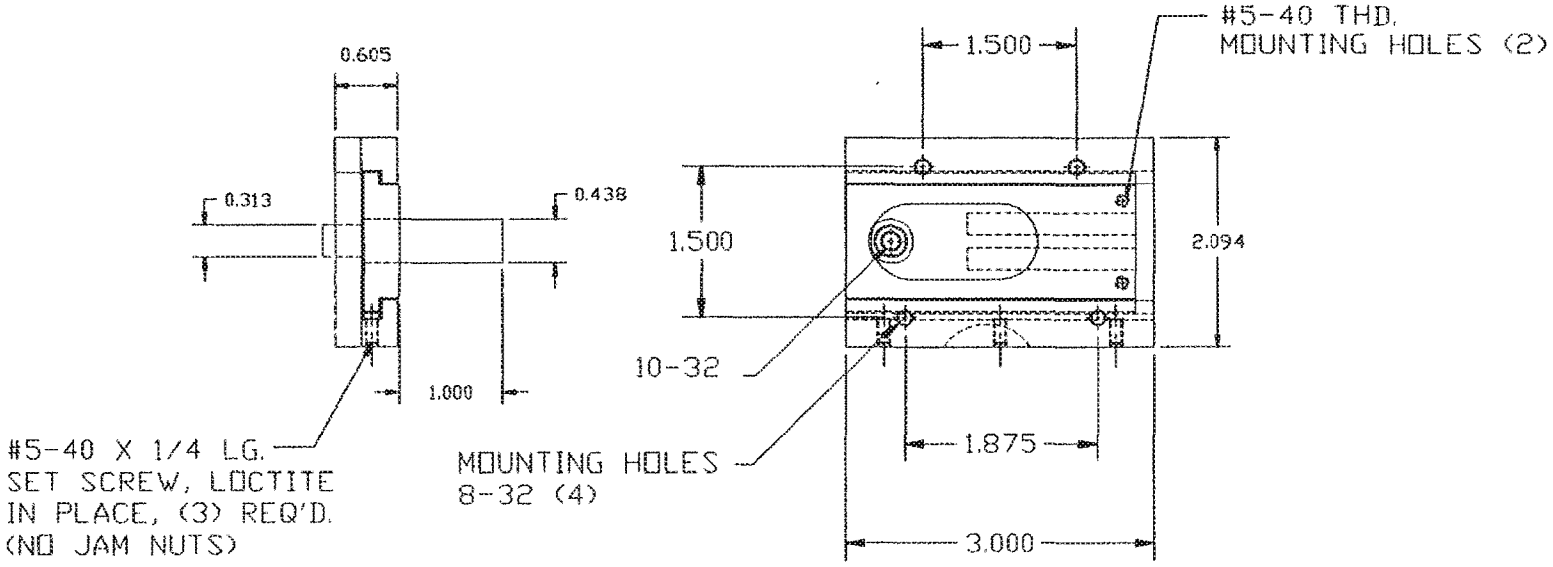
Engraving DuraBond Logo on face of slide

Future changes

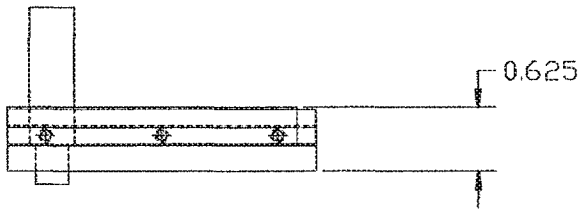
Considering a change from 0.040" Rulon to 0.031" which will provide higher rigidity.

1818 E. Sherman Blvd. • Muskegon, Michigan 49444 • Telephone (231) 739-5525 • Fax (231) 733-4981 • www.aimcoil.com

00/0EE"E9h9h209



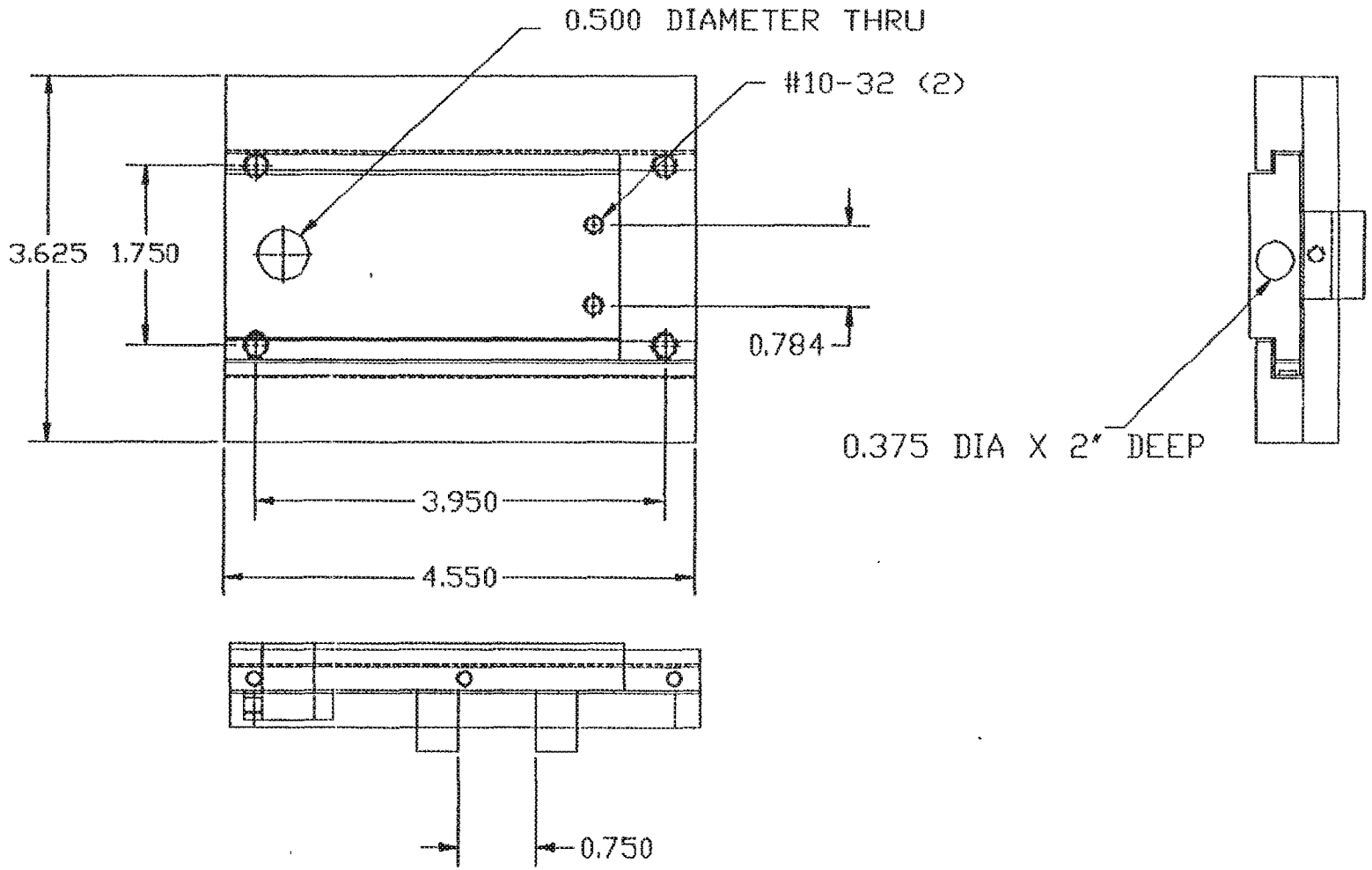
MOUNTING HARDWARE: (2) REQ'D ~ 5-40 X 3/8 LG. S.H.C.S.
(4) REQ'D. ~ 8-32 X 1/2 LG. S.H.C.S.



W100A CUSTOMER APPROVAL

2

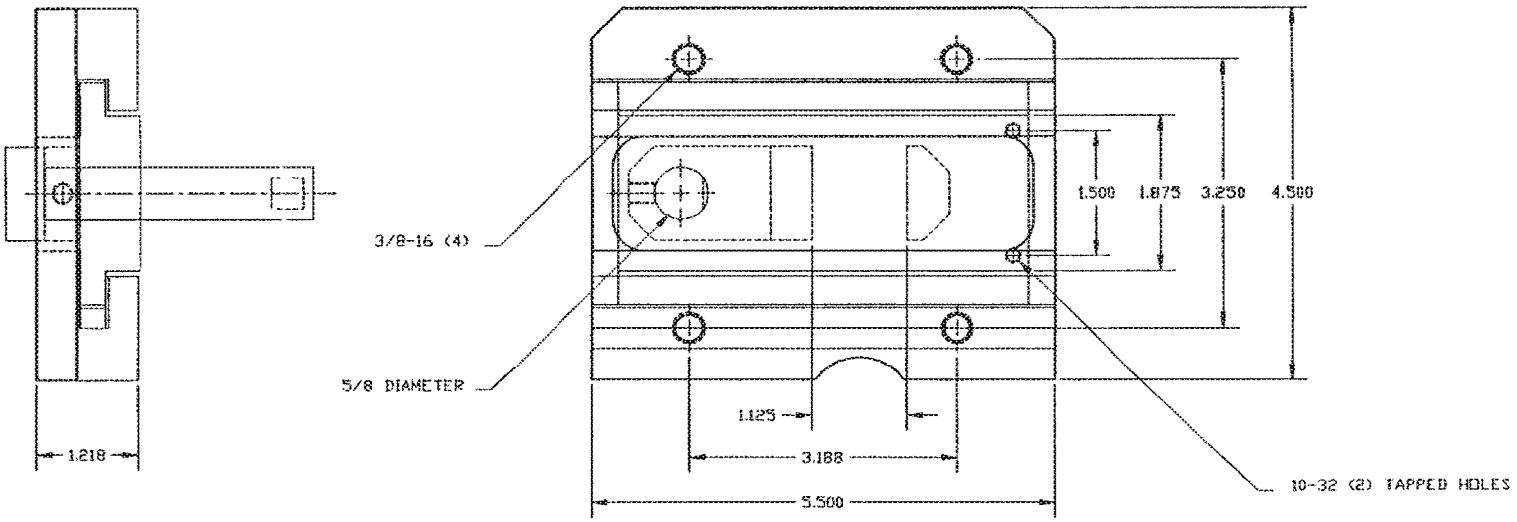
DO/DTT'E9t9t209

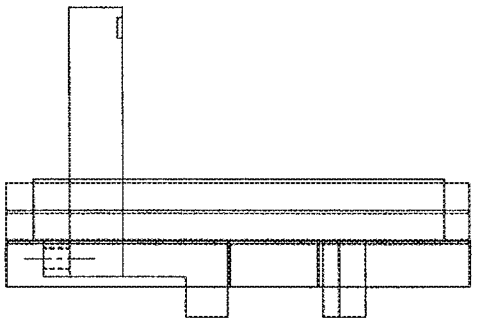


FASTENERS
1/4-20 X 5/8 (4)
10-32 X 3/8 (2)

W10A SLIDE ASSEMBLY

DRAFT 5/4/2009

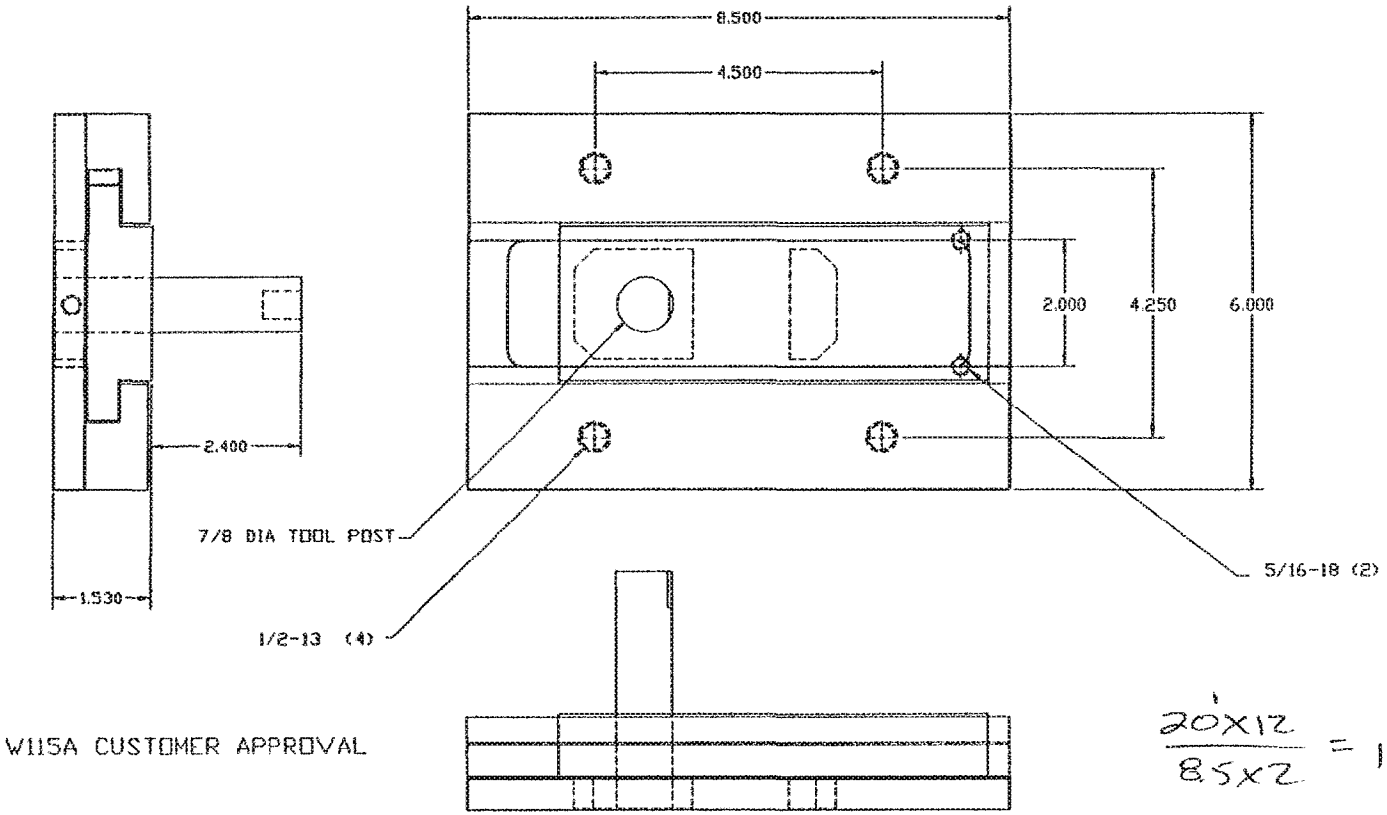




W11A CUSTOMER APPROVAL

DOCUTT: 2934209

ZONE	REV	DESCRIPTION	DATE	APPROVED
ALL	1	BOTTOM 12" DRIVE LUG MOVED UP .125	5/22/98	S. PETERS



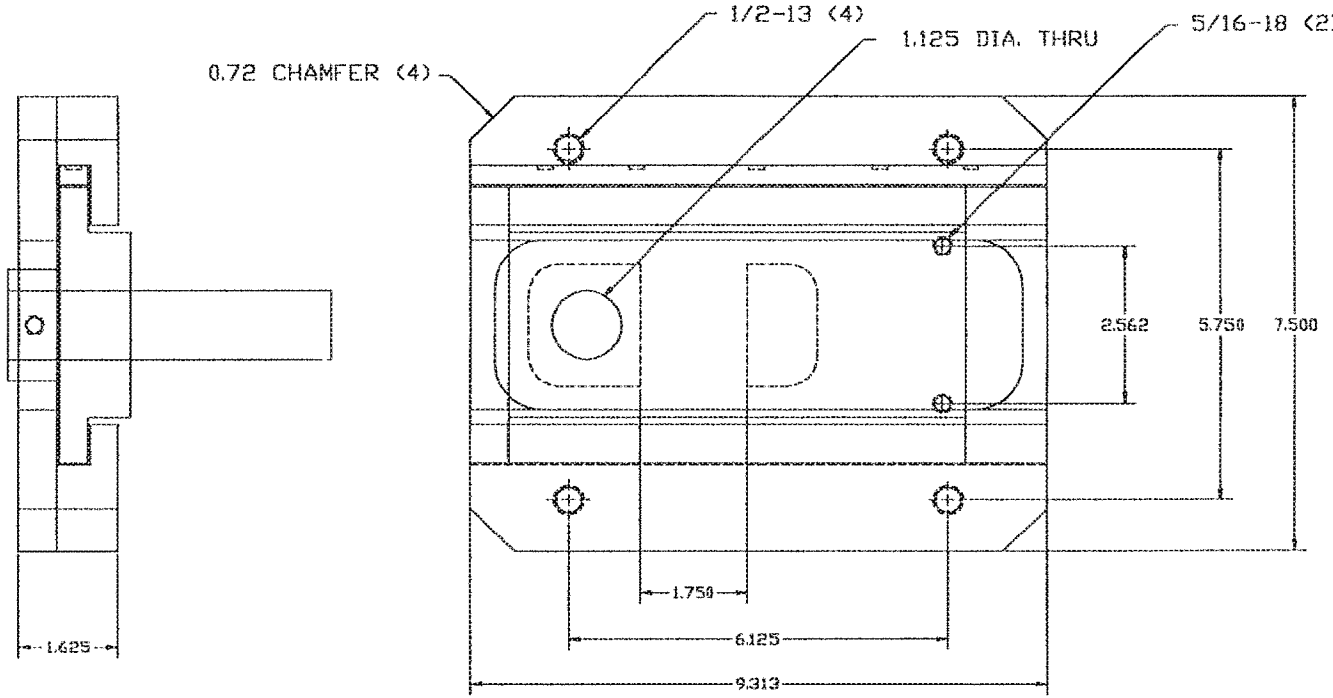
W115A CUSTOMER APPROVAL

$\frac{20 \times 12}{85 \times 2} = 14$ SIDES

57

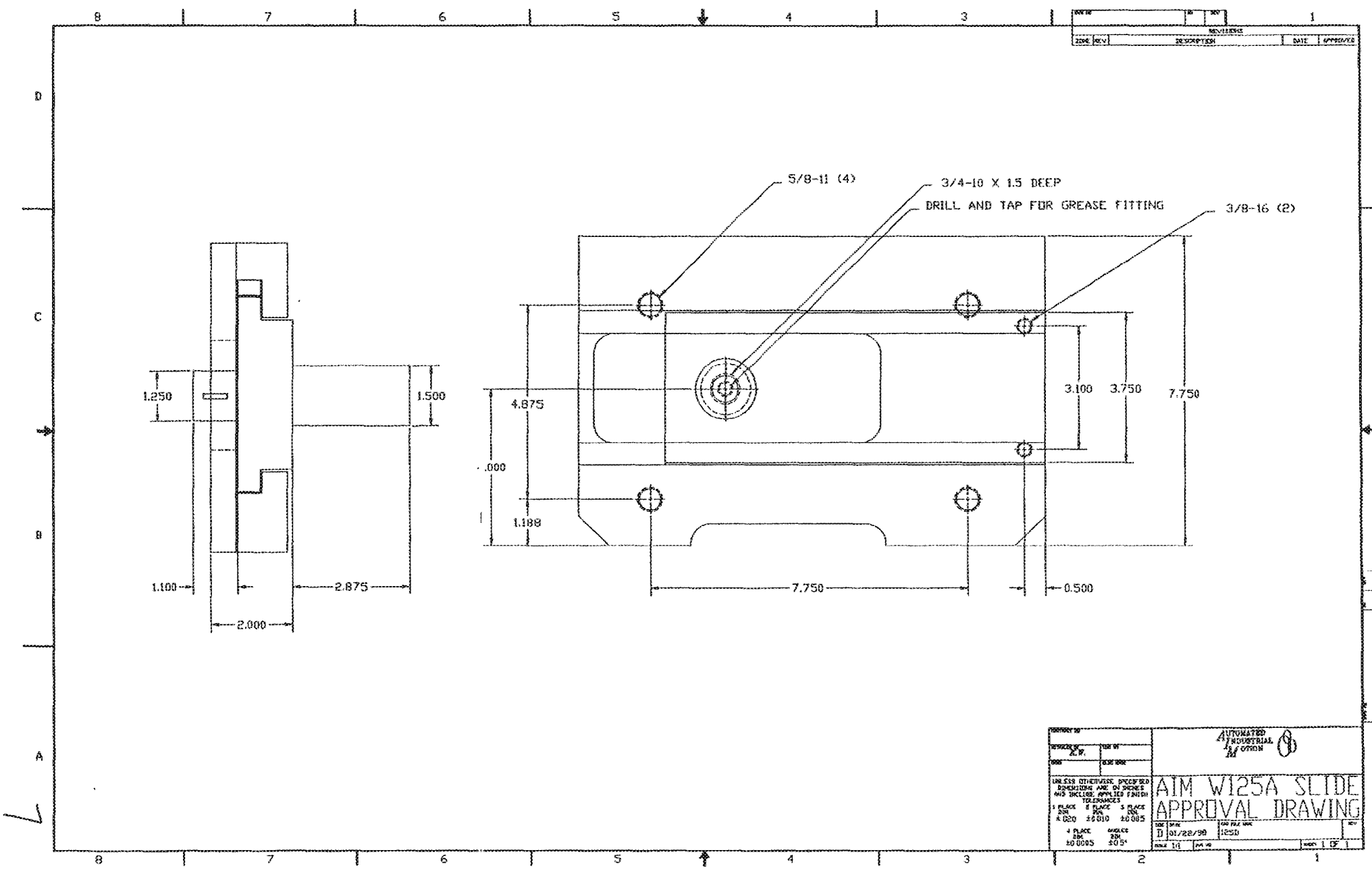
UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES AND INCLUDE APPLICABLE FINISH	AUTOMATED INDUSTRIAL MOTION
TOLERANCES: 1 PLACE DEC ±.020; 2 PLACE DEC ±.010; 3 PLACE DEC ±.005; 4 PLACE DEC ±.0005; ANGLES ±.5°	AIM 115A SLIDE CUSTOMER APPROVAL
	D 5/21/98 · 115A · SHEET 1 OF 1

ZONE	REV	DESCRIPTION	DATE	APPROVED
ALL	1	MOVED SIDE TO TOP	11/21/97	K.W.
ALL	2	CHAMFERED CORNERS 0.72	11/21/97	K.W.
ALL	3	MOVED ADJUST SCWS IN TO CLEAR CHAMFER	11/25/97	K.W.
ALL	4	ELONGATED BOTTOM PLATE SLOT	11/25/97	K.W.
ALL	5	[illegible]	12/15/97	K. PETERSEN



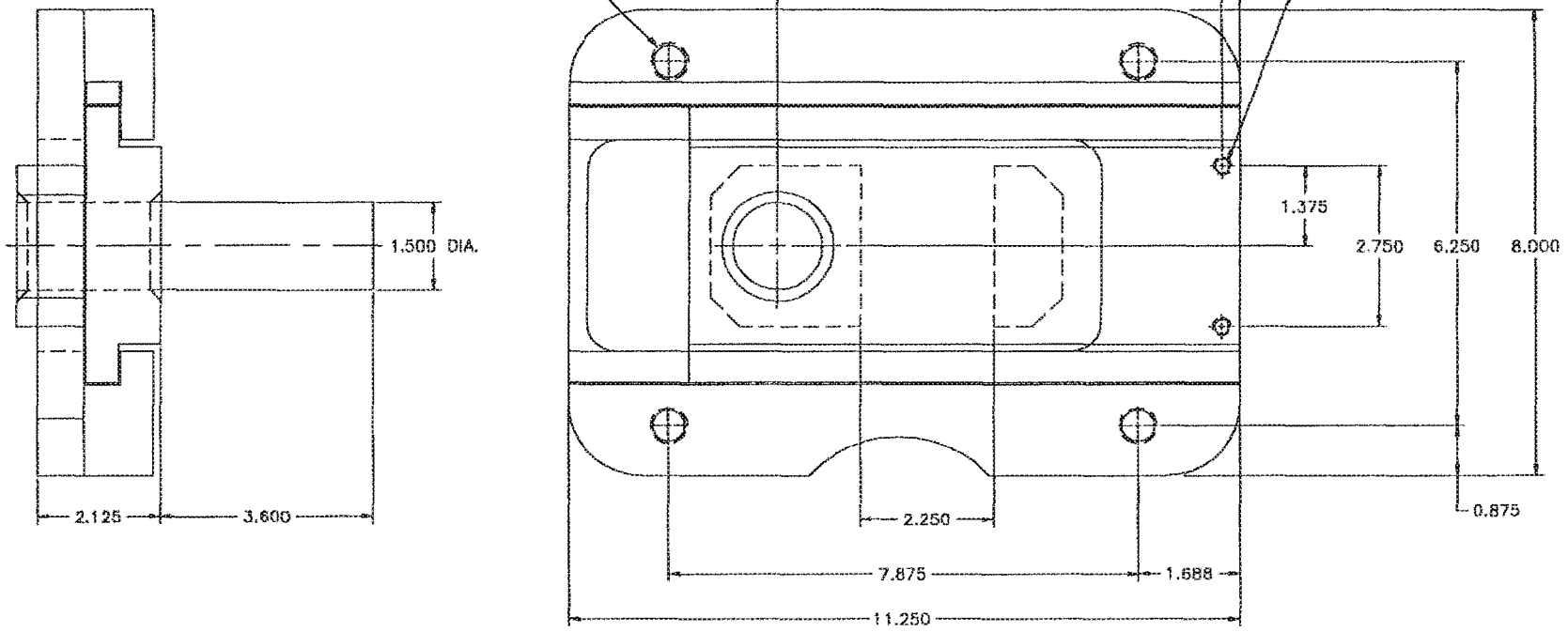
W12A SQUARE GIB SLIDE
CUSTOMER APPROVAL

DRAWN K.W.		AUTOMATED INDUSTRIAL MOTION
UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES AXIS TOLERANCE: 1 PLACE DEC ±.020, 2 PLACE DEC ±.010, 3 PLACE DEC ±.002, 4 PLACE DEC ±.0005, ANGLES DEC ±.5°		AIM 12A SLIDE CUSTOMER APPROVAL
		REV D, DATE 12/15/97, SIZE ISA, SHEET 1 OF 1


5/8-11 (4)
3/4-10 X 1.5 DEEP
DRILL AND TAP FOR GREASE FITTING
3/8-16 (2)
1.250
1.500
4.875
3.100
3.750
7.750
.000
1.188
1.100
2.875
2.000
7.750
0.500
AIM W125A SLIDE
APPROVAL DRAWING

00201T "E9h9h209

REVISIONS				
ZONE	REV	DESCRIPTION	DATE	APPROVED
ALL	1	OUTER PROFILE DECREASED FOR MORE CASTING CLEAR.	08/02/00	S. MEYERS



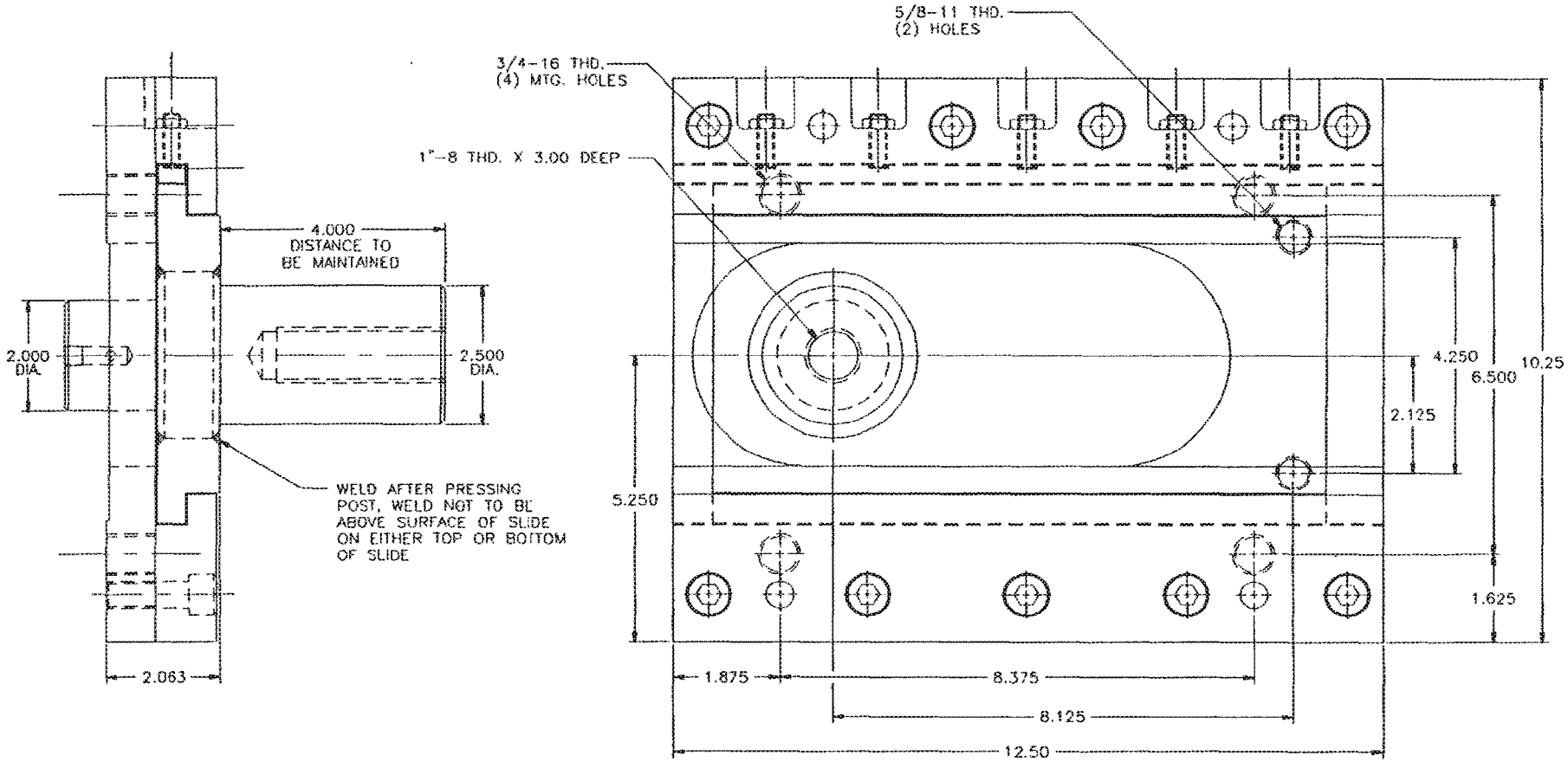
W125SA SQUARE GIB REPLACEMENT SLIDE

8

AIM W125A SLIDE APPROVAL DRAWING

D | 02/11/98 | 125A

SCALE 1:1 | SHEET 1 OF 1



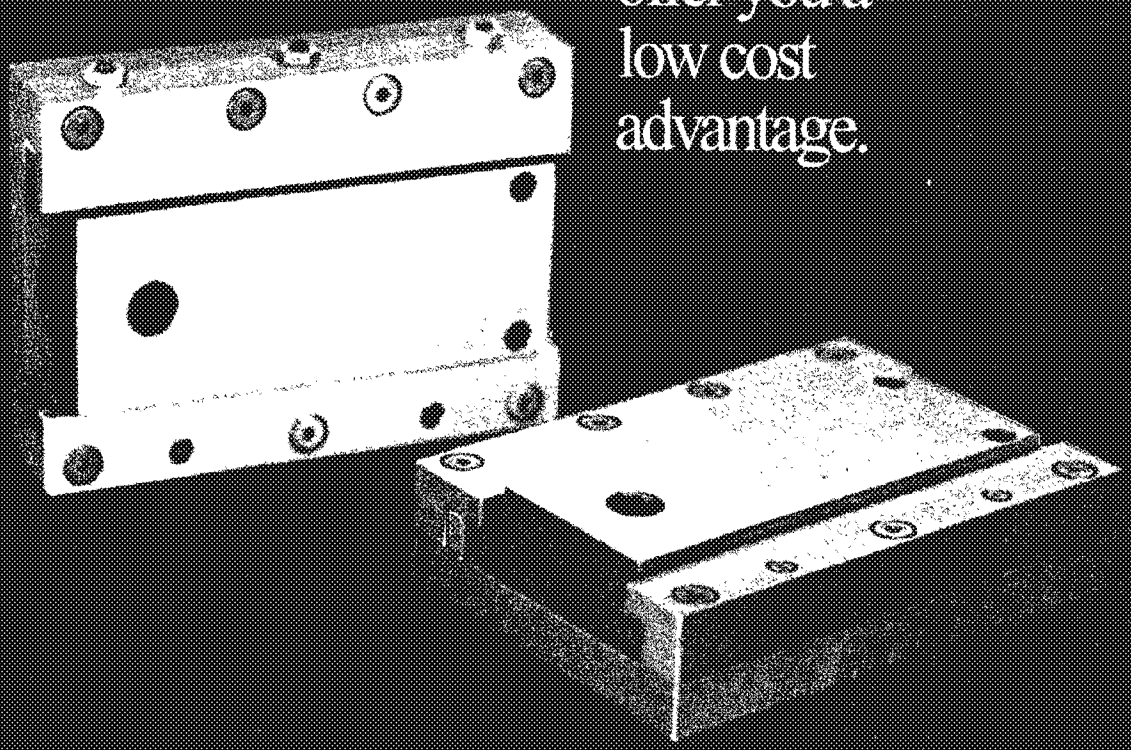
DRAWN: S. MEYERS		AIM AUTOMATED INDUSTRIAL MOTION	
UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES AND INCLUDE APPLIED FINISH TOLERANCES: 1 PLACE DEC ± .020; 2 PLACE DEC ± 0.010; 3 PLACE DEC ± 0.005; 4 PLACE DEC ± 0.0005; ANGLES DEC ± 0.5°		AIM 13A SLIDE CUSTOMER APPROVAL	
SIZE C	DATE 1-18-99	WO FILE NAME 13AASSY	DWG NO
DWG NONE	REV		SHEET

AIM for every production advantage you need!

Replacement Slide Assemblies

10

Designed to improve the production quality of your mechanical coilers and offer you a low cost advantage.



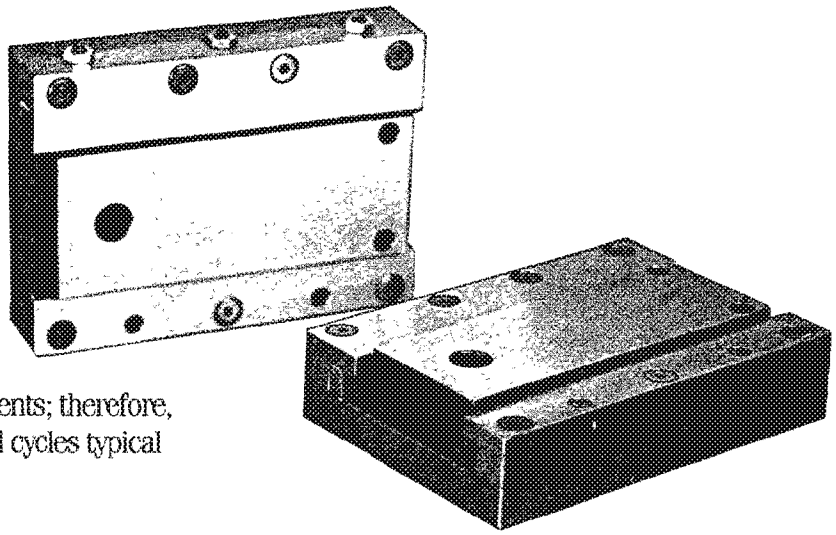
AIM

Automated Industrial Motion

The Leader In Production Advantages

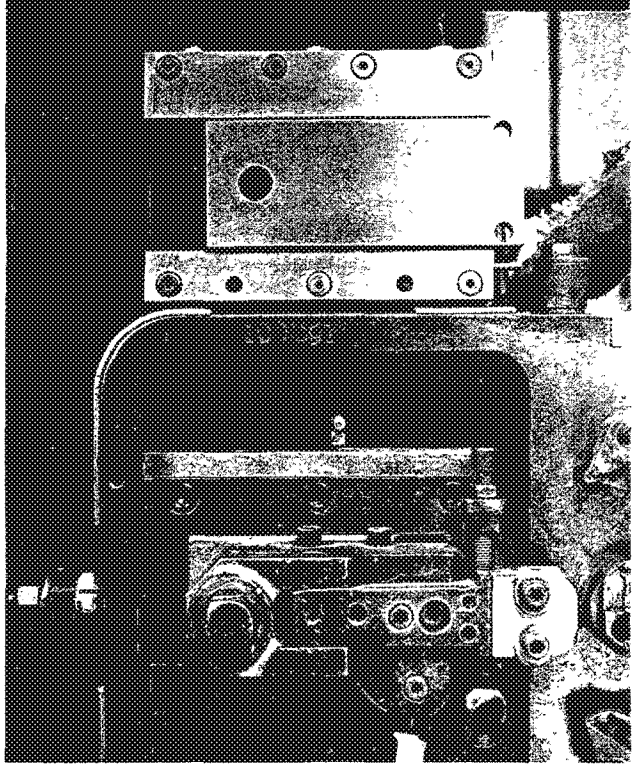
The Maintenance-Free Advantage

from Automated Industrial Motion AIM



AIM square gib replacement slides for mechanical coilers eliminate the need for constant lubrication that ball slides and bronze gibs require. The square gib features an innovative surface providing both strength and resistance to foreign particles. AIM square gib replacement slides contain no rolling elements; therefore, they are ideally suited for the short travel cycles typical in most coiling applications.

AIM slides offer a directly interchangeable low cost quality production advantage



- ❑ Designed for easy replacement
- ❑ Permanent "built-in" lubrication
- ❑ Grinding dust and metal particals do not adversely affect performance
- ❑ Can operate dry or wet
- ❑ Available for most sizes and configurations
- ❑ High load capacity
- ❑ Square gib slides perform well in difficult environments
- ❑ Self-lubricating surface reduces maintenance
- ❑ Long lasting accuracy and repeatability
- ❑ Noise and vibration dampening
- ❑ Quick delivery on standard sizes
- ❑ Custom design available

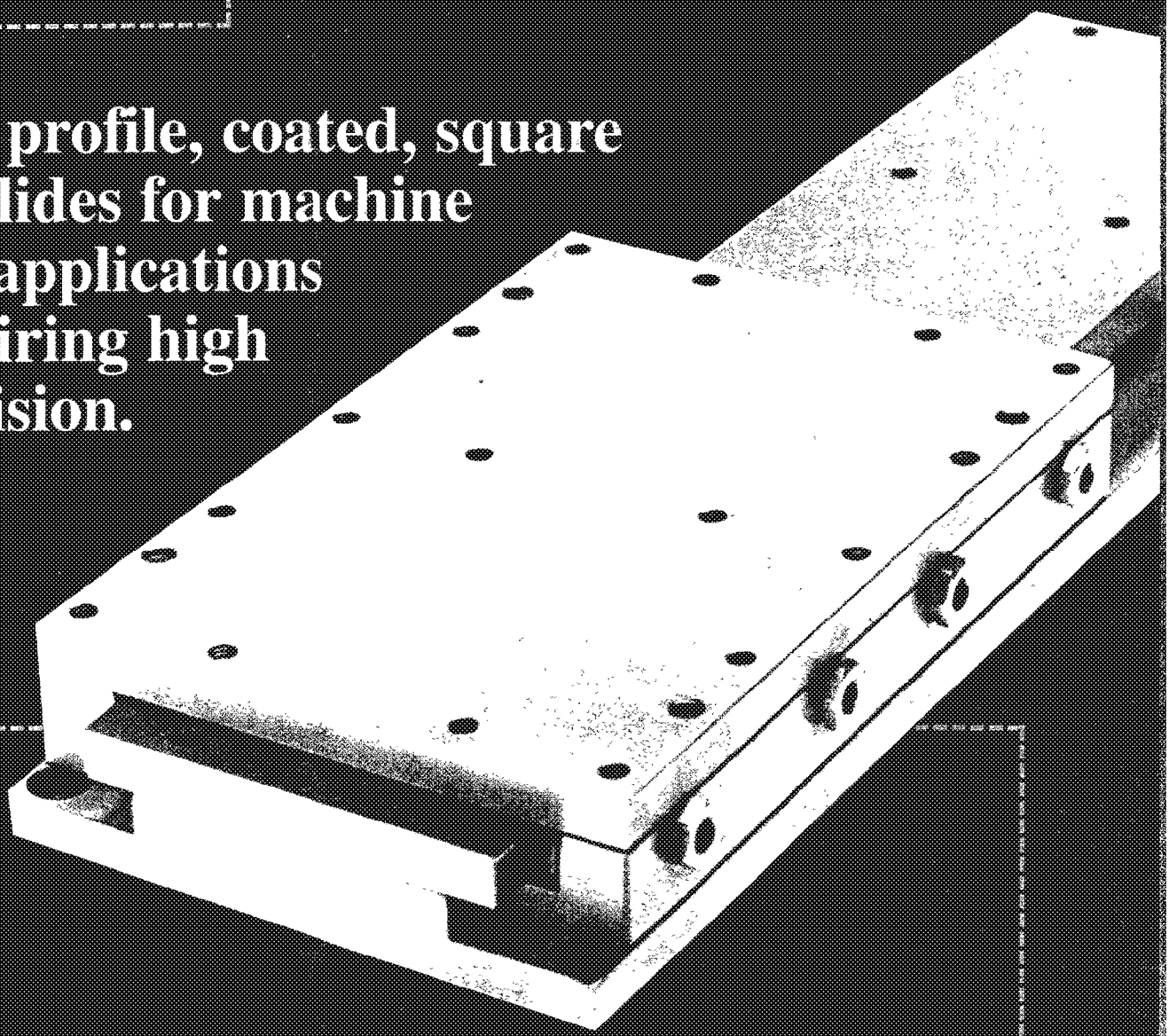
AIM The Leader In Production Advantages

1818 Sherman Blvd., Muskegon, Michigan 49444

Phone (616) 739-5525 FAX (616) 733-4981

AUTOMATED INDUSTRIAL MOTION

Low profile, coated, square gib slides for machine tool applications requiring high precision.



DURABOND™ SLIDE

BASIC COMPONENTS

1. Base
Stationary member of the slide system. Manufactured from high quality tool steel, hardened to 58-62 Rc and finish ground.

2. Saddle
Moving member of the slide system. Manufactured from high quality steel, bonded with Rulon® bearing material and finish ground.

3. Way
Saddle tracking member. Manufactured from high quality steel, bonded with Rulon® bearing material and finish ground.

4. Adjustment Way
Saddle retaining member. Manufactured from high quality steel, bonded with Rulon® bearing material and finish ground.

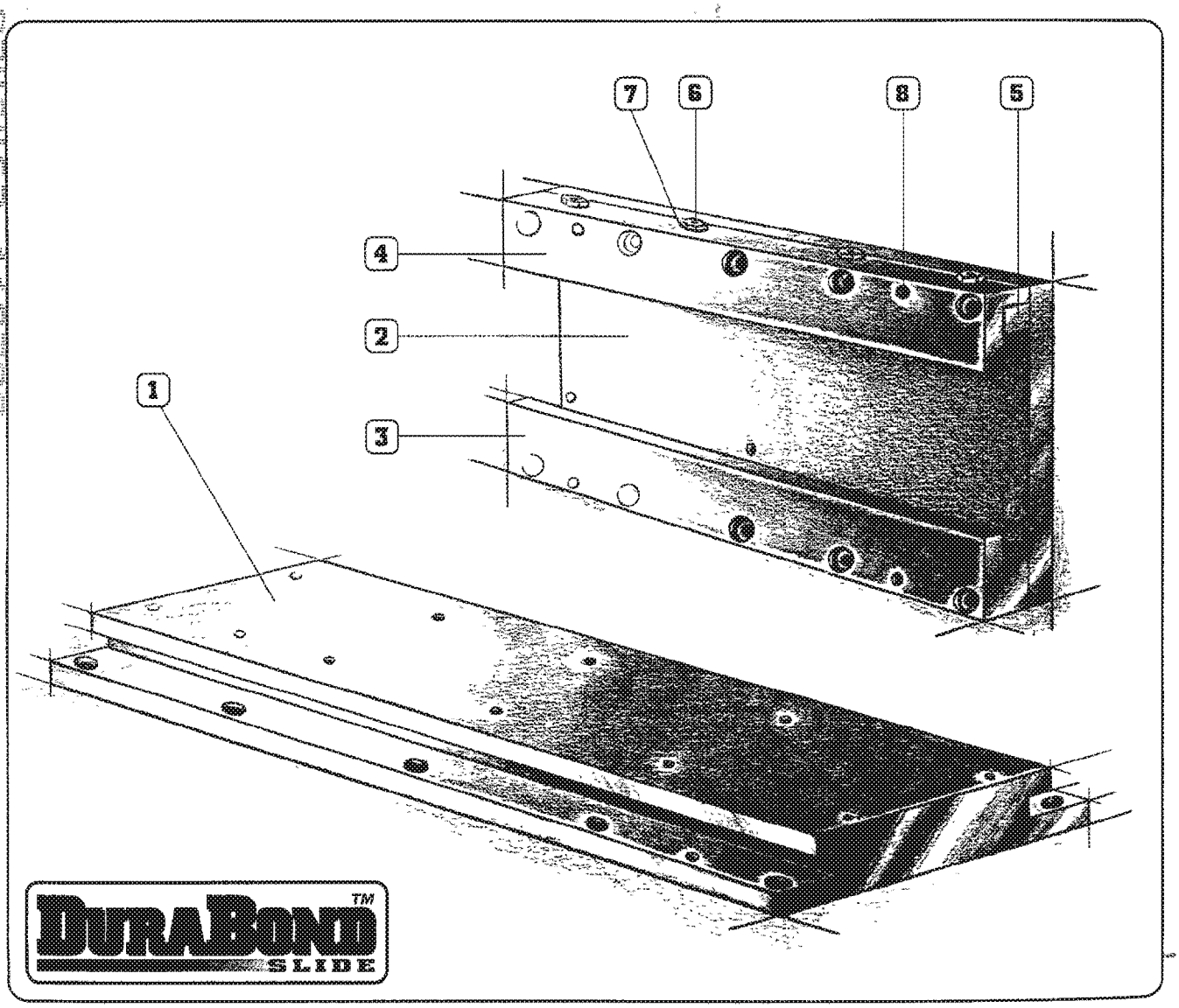
5. Adjustment Gib
Adjustable member of the slide system for setting clearance between the saddle and base. This member is bonded with Rulon® bearing material and finish ground.

6. Gib Screw
High quality, fine thread Allen head set screws strategically oriented along one side of the saddle for positioning the adjustment gib.

7. Gib Screw Nut
Locks the gib screw in place to maintain gib adjustment.

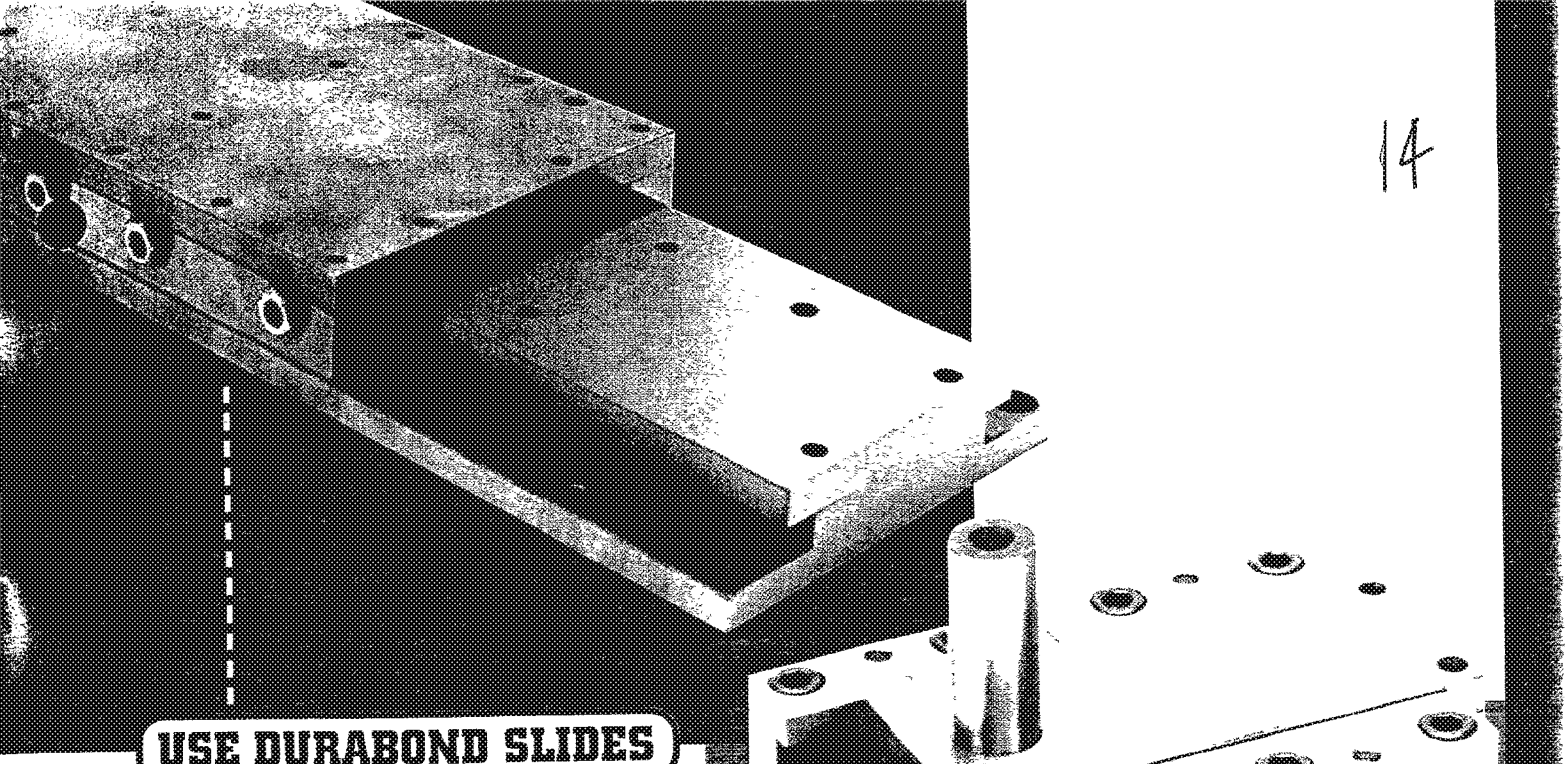
8. Dowel Pins
Dowel pins are incorporated for definitive alignment of the ways and saddle plate.

Each slide is assembled and individually fitted by qualified toolmakers prior to shipment.



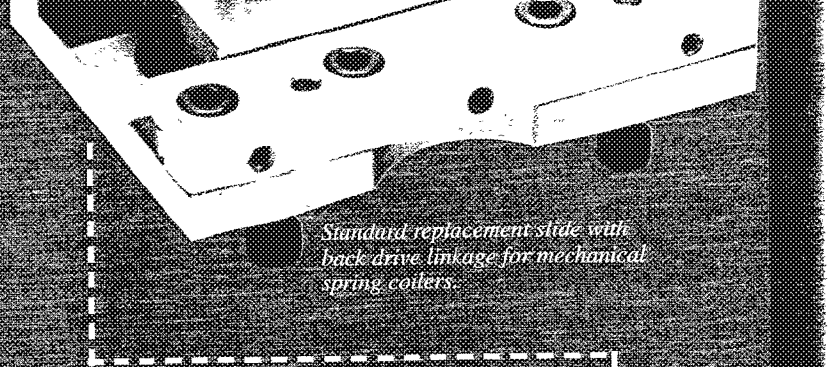
DuraBond™ SLIDE

14

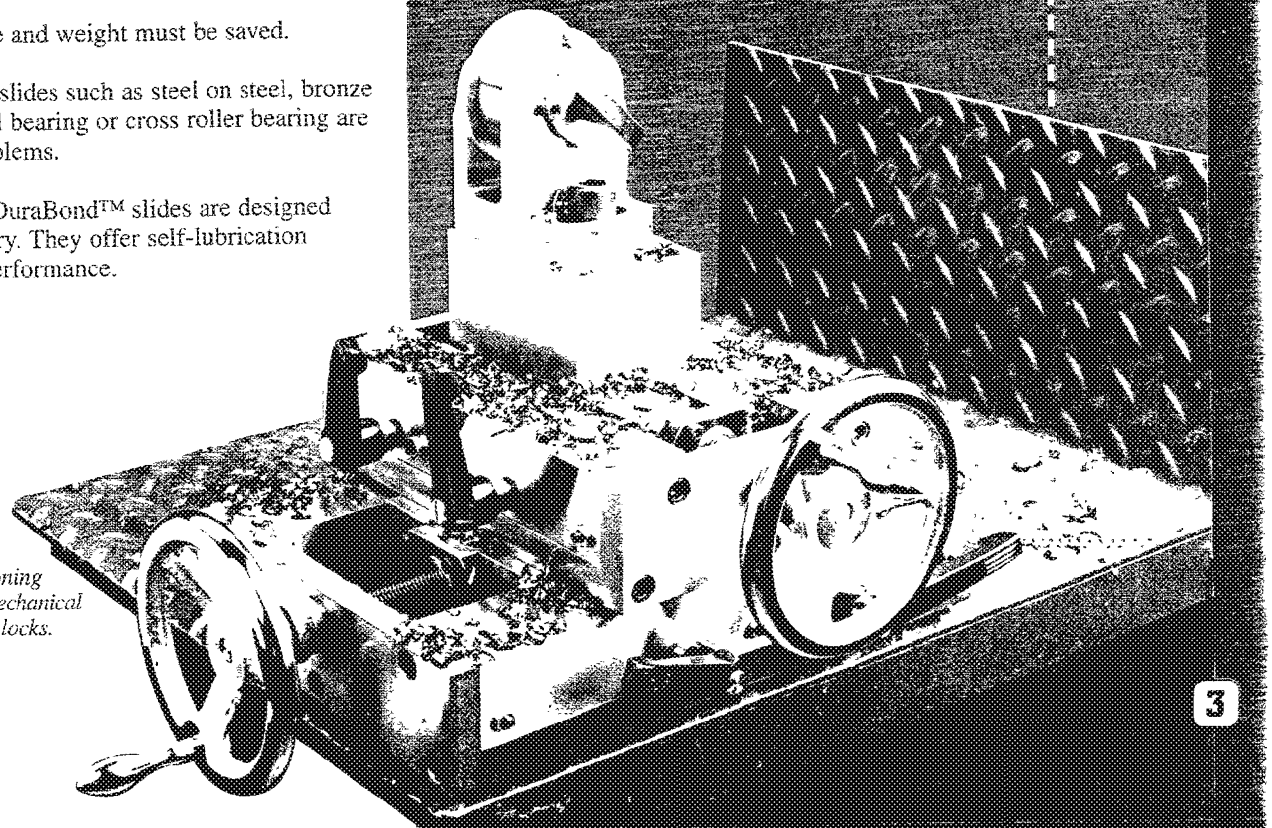


USE DURABOND SLIDES

- Wherever high quality, high precision slides are required.
- Where lubrication is undesirable or impossible.
- In corrosive environments, with non-lubricating liquids, or under conditions of high or low humidity, where high vacuums are present.
- In lubricated applications where friction and wear rates are unacceptable during starting and stopping, or where stick/slip is a problem.
- Where the electrical and insulative properties are important.
- Where space and weight must be saved.
- When other slides such as steel on steel, bronze on steel, ball bearing or cross roller bearing are causing problems.
- In general, DuraBond™ slides are designed to operate dry. They offer self-lubrication with high performance.



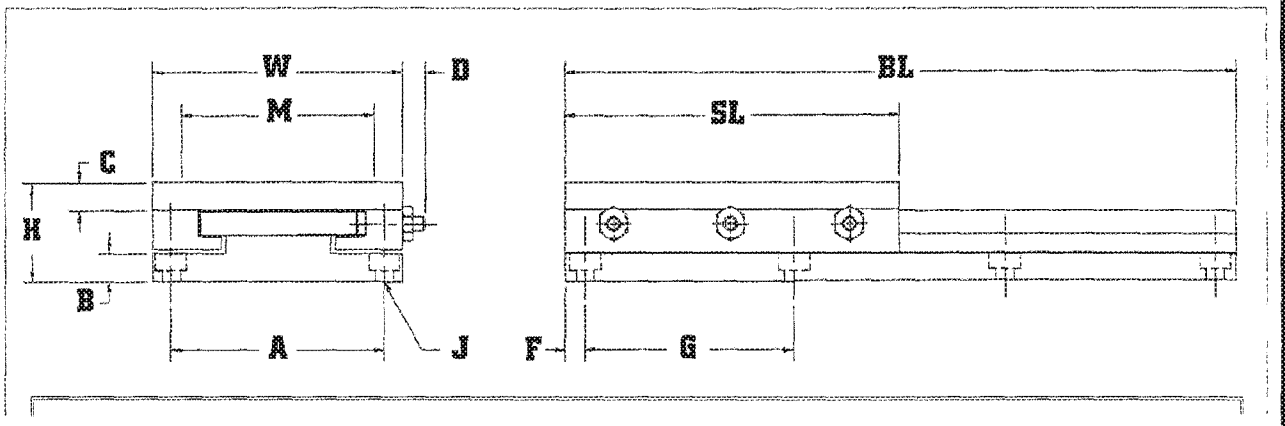
Standard replacement slide with back drive linkage for mechanical spring coilers.



Two-Axis positioning slide featuring mechanical screw drive and locks.

STANDARD LOW PROFILE SLIDE ASSEMBLIES IN WIDTHS FROM 2" TO 12"

DURABOND™ SLIDE



SADDLE DIMENSIONS

Series	W Saddle Width	H Overall Height	SL Saddle Lengths	M Mounting Area	A Hole Width	B Flange Thick	C Plate Thick	D Gib Adj.	E Screw Size
AS02	2.00	.938	3.00, 6.00, 8.00	1.38	1.625	.25	.25	.21	#8 SHCS
AS03	3.00	1.125	4.00, 6.00, 8.00	2.31	2.563	.31	.31	.27	#10 SHCS
AS04	4.00	1.375	6.00, 8.00, 10.00	3.19	3.500	.38	.38	.27	¼ SHCS
AS06	6.00	1.875	9.00, 12.00, 14.00	5.00	5.344	.47	.47	.30	⅜ SHCS
AS08	8.00	2.250	12.00, 14.00, 16.00	6.81	7.250	.56	.56	.44	⅜ SHCS
AS010	10.00	2.500	15.00, 18.00, 24.00	8.81	9.250	.62	.62	.44	⅜ SHCS
AS012	12.00	2.625	18.00, 24.00, 26.00	10.81	11.250	.62	.62	.44	⅜ SHCS

STATIC LOAD CAPACITY PER INCH OF ENGAGEMENT

Series	Vertical Plane	Horizontal Plane	Inverted Plane
AS02	1030	250	380
AS03	1870	260	500
AS04	2660	315	625
AS06	4220	470	940
AS08	5900	625	1250
AS010	7900	625	1250
AS012	9900	750	1500

DESIGN NOTES

1. Load capacity chart to be used as a guideline only.
2. Capacities shown based on static load limits of Rulon® LR at 1000 P.S.I.
3. Minimum saddle engagement not to exceed half of saddle length.
4. Lever arms not to exceed (2) times width of saddle from any direction.
5. Load capacities shown are for weights evenly distributed over saddle length.
6. All loads shown are in pounds per square inch of base/saddle contact length.
7. All dimensions are in inches.

15

Ex. 1005 - Page 496

ORDER NUMBER INFORMATION — MOUNTING NOTES

Saddle Width (2" Wide) — *Saddle Length* (6" Long) — *Base Length* (12" Long)

AS02-SL06-BL12

1. (2) Location dowels are provided in each base.
2. Metric mounting holes available on request.
3. Tooling hole patterns in saddle, machined to customer specs. Available on request.

16

AS02 BASE CONFIGURATIONS

BL *Base Lengths*	4.00	6.00	8.00	10.00	12.00
F *From Edge*	.25	.38	.50	.62	.75
G *Hole Spacing*	1.750	1.750	1.750	1.750	1.750
No. of Mounting Holes	6	8	10	12	14

AS03 BASE CONFIGURATIONS

BL *Base Lengths*	6.00	8.00	12.00	16.00	18.00
F *From Edge*	.50	.25	1.00	.50	.25
G *Hole Spacing*	2.500	2.500	2.500	2.500	2.500
No. of Mounting Holes	6	8	10	14	16

AS04 BASE CONFIGURATIONS

BL *Base Lengths*	12.00	14.00	16.00	18.00	20.00
F *From Edge*	.50	1.50	1.12	.75	.38
G *Hole Spacing*	2.750	2.750	2.750	2.750	2.750
No. of Mounting Holes	10	10	12	14	16

AS06 BASE CONFIGURATIONS

BL *Base Lengths*	12.00	14.00	16.00	18.00	20.00
F *From Edge*	1.12	.50	1.50	.88	1.88
G *Hole Spacing*	3.250	3.250	3.250	3.250	3.250
No. of Mounting Holes	8	10	10	12	12

AS08 BASE CONFIGURATIONS

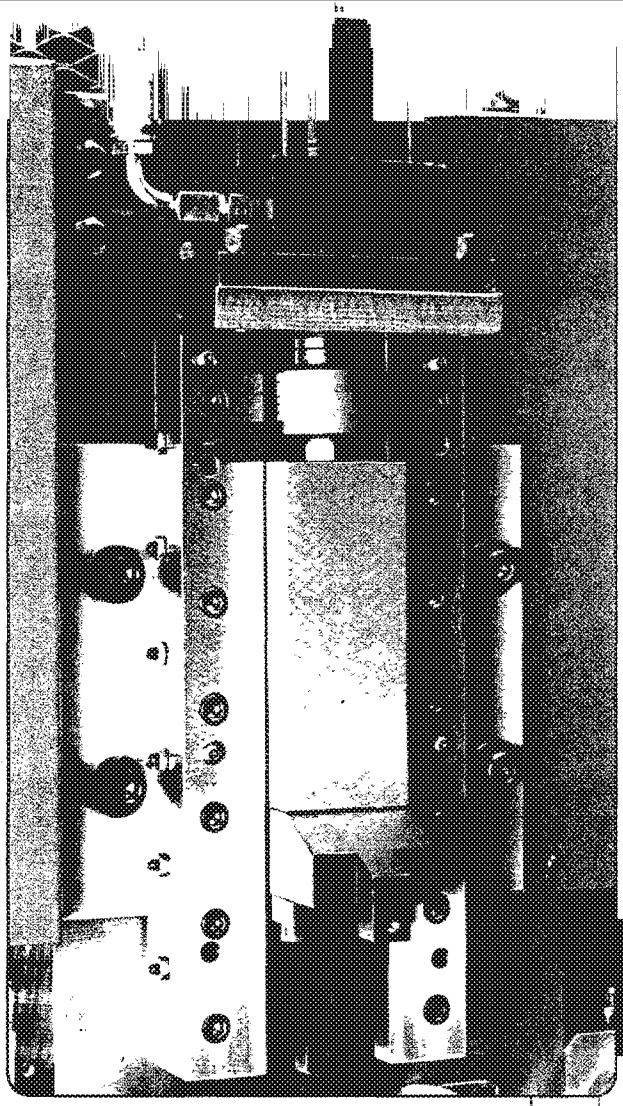
BL *Base Lengths*	14.00	16.00	18.00	20.00	24.00
F *From Edge*	1.38	.50	1.50	.62	.75
G *Hole Spacing*	3.750	3.750	3.750	3.750	3.750
No. of Mounting Holes	8	10	10	12	14

AS010 BASE CONFIGURATIONS

BL *Base Lengths*	18.00	22.00	26.00	28.00	32.00
F *From Edge*	.75	.69	.62	1.62	1.56
G *Hole Spacing*	4.125	4.125	4.125	4.125	4.125
No. of Mounting Holes	10	12	14	14	16

AS012 BASE CONFIGURATIONS

BL *Base Lengths*	22.00	24.00	28.00	30.00	32.00
F *From Edge*	.69	1.69	1.62	.56	1.56
G *Hole Spacing*	4.125	4.125	4.125	4.125	4.125
No. of Mounting Holes	12	12	14	16	16



Hydraulically actuated DuraBond™ slide with adjustable stroke.

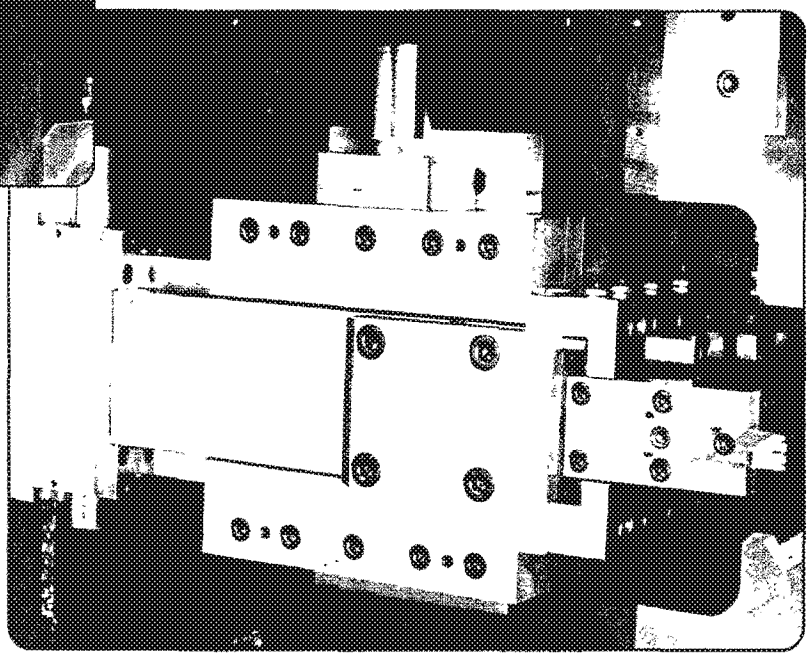
DURABOND™ CUSTOM SLIDES

DuraBond™ custom slides are designed for specific applications where standard slides are not commercially available.

DuraBond™ slides are ideal for upgrading original slide systems on worn out manufacturing equipment. The slides are engineered to duplicates exact dimensional characteristics including cross section, stroke, mounting holes and tooling bolt patterns.

DuraBond™ slides can be built from prints, electronic file data, or existing slides can be sent to us directly for duplication. In most cases, slides are documented and returned on the day of receipt.

Contact our sales engineering staff to discuss the method best suited for you.



Servo actuated, three axes DuraBond™ slide system.

SPECIFICATIONS

Saddle Width . . . . . 2" to 12"
Base Length . . . . . 4" to 32"
Stroke . . . . . 0" to 18"
Load . . . . . Up to 260,000 pounds

•Single and multi axis slides are available.

•Actuation systems include mechanical screw, pneumatic, hydraulic, stepper and servo.

17

Ex. 1005 - Page 498

DURABOND SLIDES

PERFORMANCE CONSIDERATIONS

LOAD

DuraBond™ slides are generally limited to 1000 psi, however; load limits can be increased by using thinner Rulon® cross sections.

SPEED

DuraBond™ slides are generally limited to 400 feet per minute under dry, low load operation. Higher speeds are possible with lubricants or liquid coolants.

FRICTION

Friction decreases rapidly with increases in load. Figure 1 shows the effect of surface velocity on friction. Because friction at start up and very low speeds is extremely low, stick/slip is virtually non-existent, making DuraBond™ slides ideal for start/stop applications.

MATING SURFACES

Performance is optimized when the hardest possible mating member is used. DuraBond™ bases are fabricated from A2 tool steel and hardened to 58-62 Rc.

CORROSION RESISTANCE

Rulon® material is practically inert to all acids, bases and solvents.

CONTAMINATION

Although Rulon® material embeds foreign particles to prevent wear; shielding or covering is suggested in areas of heavy contamination. Where practical, the saddle should maintain complete engagement with the base to produce a self-wiping action.

FIGURE 1
COEFFICIENT OF FRICTION VS. LOAD

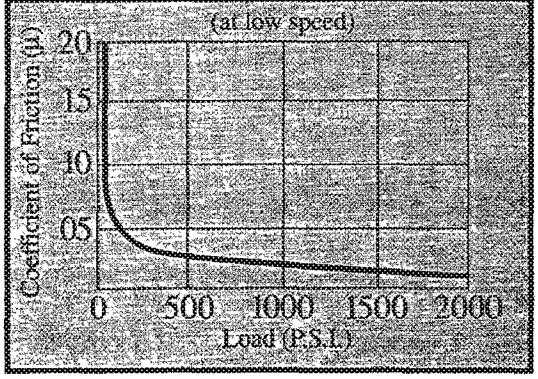
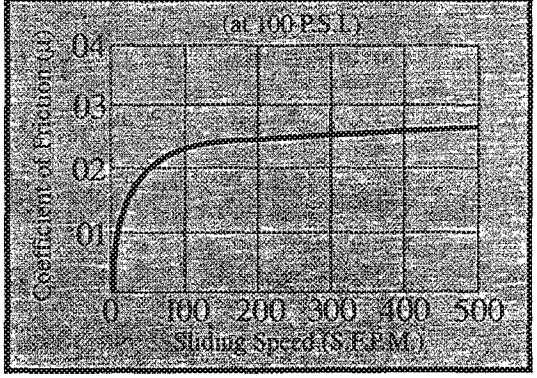


FIGURE 2
COEFFICIENT OF FRICTION VS. SPEED



18

DURABOND™ SLIDE

THE ONLY PRECISION SLIDE YOU WILL EVER NEED!

AIM AUTOMATED INDUSTRIAL MOTION

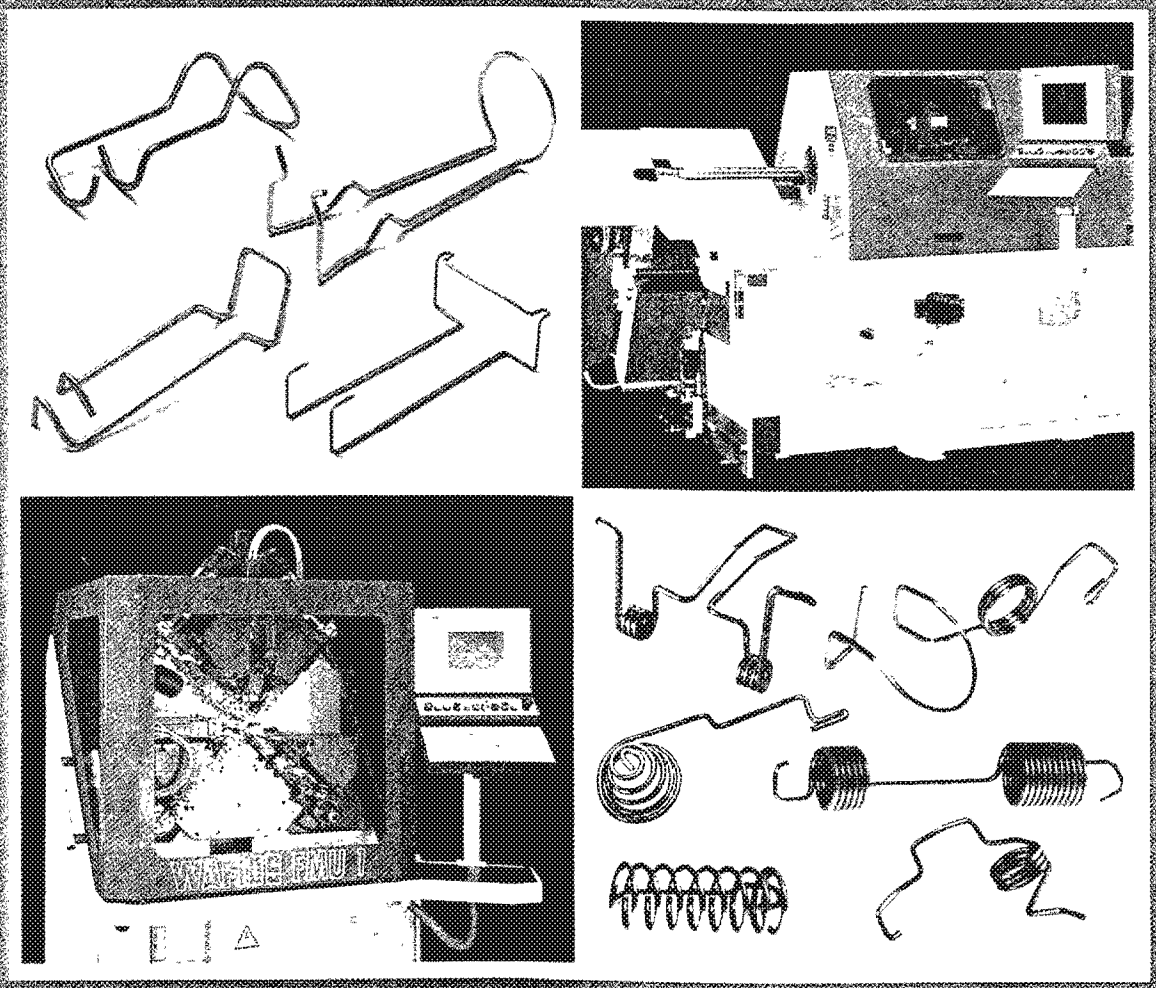
1818 E. Sherman Blvd. • Muskegon, Michigan 49444
Phone: 231-739-5525 • Toll Free: 800-933-0404
Fax: 231-733-4981
Website: www.aimcoil.com • E-mail: aim@aimcoil.com

SEPTEMBER 1998

Wire Forming Technology

International

Serving Manufacturers of Springs and Wire Formed Products



Inside ... Spring Making, Wire Forming, Welded Assembly of Wires, CASMI All Springs 98 Preview

Ex. 1005 - Page 501

Which Slide is Best?

by:
Kelly Dausey
AIM Automated Industrial Motion
1818 E. Sherman Blvd.
Muskegon, MI 49444 USA

Slides used in forming and springmaking machines require precision, stability, reliability, high load capacity, good wear characteristics and reduced maintenance. Only one type of slide meets all of these requirements.

No matter what type of wire bending or springmaking equipment you use, the repeatability and long term effectiveness of your equipment is highly dependent on the linear motion system that guides the tooling axes. This system, which serves as an integral part of the forming process, generally consists of a driving mechanism (either servo or cam actuated) and a slide.

Because of the rigorous requirements of wire forming and springmaking applications, the slide must be rigid and durable, and it must operate with as little maintenance as possible. Advances in linear motion technology have brought about many different slide configurations that offer improved features over what was once the standard on most wire forming and springmaking machines. With so many choices available, it can be difficult to determine which type of slide is best for each application.

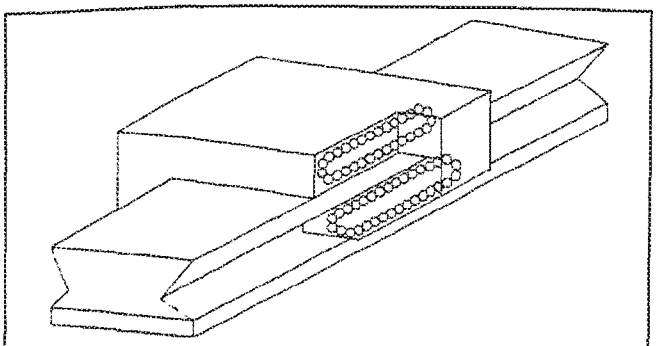


Fig. 1 — Recirculating ball slide has spherical rollers.

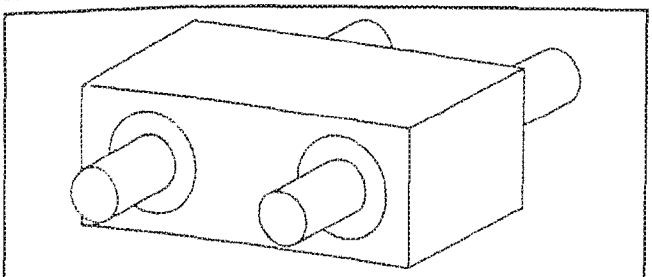


Fig. 2 — Linear ball bearing slide also has spherical rollers.

Rolling Element Slides

Many slides on the market today operate through the circulation of rolling bearing elements which may be either spherical or cylindrical in shape. Three commonly used slide types in this category are the recirculating ball slide (**Figure 1**), linear ball bearing slide (**Figure 2**) and roller bearing slide (**Figure 3**). Recirculating ball and linear ball bearing slides contain spherical rollers and roller bearing slides use cylindrical rollers.

As the moving part of the slide translates over the stationary part of the slide, these elements in turn circulate through a channel or track whose profile complements that of the rolling element, being either radiused or linear. The geometry of the track thus distributes the load on each element over as much surface as possible.

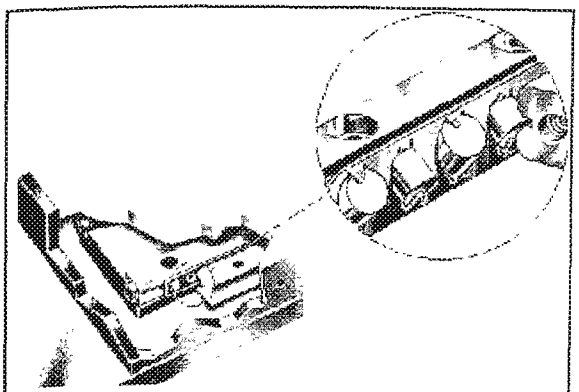


Fig. 3 — Roller bearing slide uses cylindrical rollers.

Because there is minimal surface contact, the frictional force is quite low and thus the efficiency is higher for rolling element slides when compared to nonrolling element slides. These slides work optimally where the application offers long strokes or travel distances which allow the bearing elements to completely recirculate and distribute both load and lubricant over as many elements as possible. Applications characterized by short repetitive cycles, however, can be somewhat problematic for rolling element slides. Localized wear can result because there is no opportunity for complete circulation and contact is repeatedly made over just a fraction of the total bearing element surface available.

Because forces are distributed over a limited surface area, these slides are not well suited for impact or shock loading such as would occur in wire cutting or even in repetitive, short stroke high accel/decel applications. *Brinelling*, or the permanent indentation of the slide surface by the rolling element due to dynamic loading, can result under these conditions.

Because there is steel-on-steel contact in rolling element slides, lubrication is critical in minimizing wear and optimizing performance. Care should be taken to avoid contamination of the recirculating tracks with wire shavings or grinding dust common in spring manufacturing environments. Contaminants can aggravate conditions known as counterrotation and stick-slip (see **Figure 4**).

Shields, wipers and periodic cleaning can help to minimize the effects of adhesion of any airborne metallic or dust particles which could otherwise lead to premature failure.

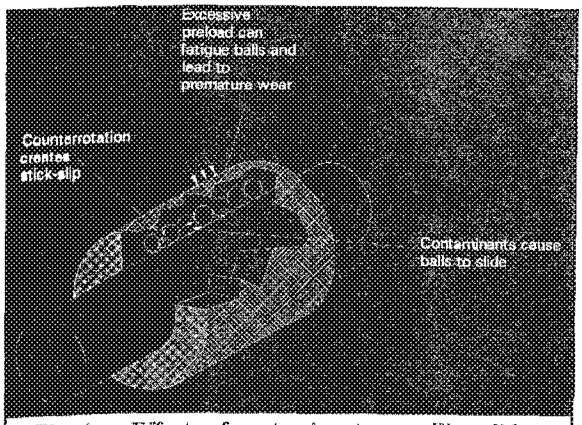


Fig. 4 — Effects of contaminants on rolling slides.

Ex. 1005 - Page 502

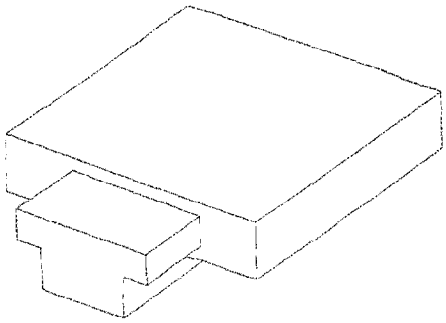


Fig. 5 — Square gib slide offers good rigidity, high load capacity and resistance to impact and shock, but needs high lubrication.

Square Gib & Dovetail Slides

In contrast to the rolling element slides, many machines use square gib, sometimes called box gib (see **Figure 5**), or dovetail slide configurations (see **Figure 6**), which do not contain rolling bearing elements. Although these slides have a higher coefficient of friction as previously discussed, the large amount of surface contact also means that these slides offer excellent rigidity, high load capacity and are better suited to withstand impact and shock loads.

Traditionally these slides also require significant lubrication due to the metal-to-metal contact.

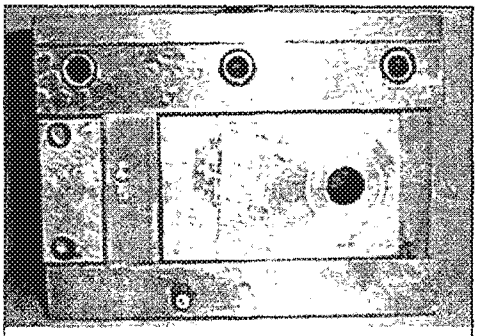


Fig. 6 — Dovetail slide also requires significant lubrication.

The Bonded Square Gib Slide

A significant improvement to the original design however is in the application of a bonded surface to the traditional square gib style slide (see **Figure 7**). This new technology results in a slide that offers high load capacity and excellent rigidity in addition to many other interesting features. The bonded surface provides excellent wear characteristics and eliminates the need for re-lubrication. Although an initial coating of oil is recommended to facilitate break-in, no further lubrication is required throughout the life of the slide.

It is also interesting to note that the coefficient of friction, and therefore losses due to friction, actually decreases as load increases (see **Figure 8**). The bonded surface is also ideal for operation in tough manufacturing environments characterized by airborne debris or grinding dust. The coating allows contaminants to embed into the surface eliminating the need for seals and maintenance normally required for cleaning slide surfaces.

Although bonded square gib slides do provide gib adjustment, because there is no metal-to-metal contact, wear is minimal and the need for adjustment is greatly reduced. These slides are particularly well suited for start/stop or reversing applications such as those common in spring production because of the excellent properties offered relative to stick-slip and start-up.

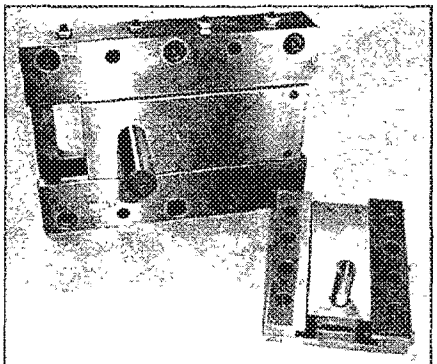


Fig. 7 — Square gib slide with bonded surface provides best combination of characteristics for forming and springmaking equipment.

Best Slide for Forming & Springmaking Machines

Certainly the rolling bearing element type slides can offer excellent precision and good reliability, particularly in longer stroke, high-speed applications. However, their sensitivity to shock loads and contamination as well as their need for constant lubrication make them less desirable for some forming and spring manufacturing applications.

The steel-on-steel square gib or steel-on-bronze dovetail slide configurations offer increased load capacity and good rigidity, but do not possess the excellent wear characteristics, vibration dampening capability and high tolerance to contamination of the bonded square gib slide.

Bonded slide technology, the optimum slide technology for forming and springmaking applications, has been applied in both new equipment and in replacement slides with great success. Bonded square gib slides offer long term operation with reduced maintenance and improved process control due to less wear and fewer adjustments.

To receive additional information on bonded square gib slide technology, and to obtain technical specifications on AIM's wire forming and springmaking equipment, contact the author

WFTI

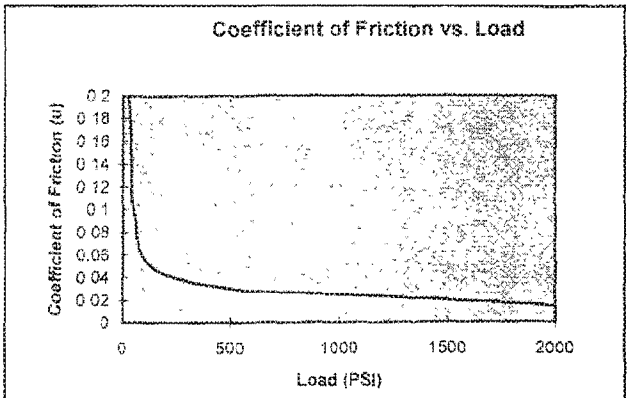


Fig. 8 — For bonded surface slides, coefficient of friction actually decreases as the load increases.

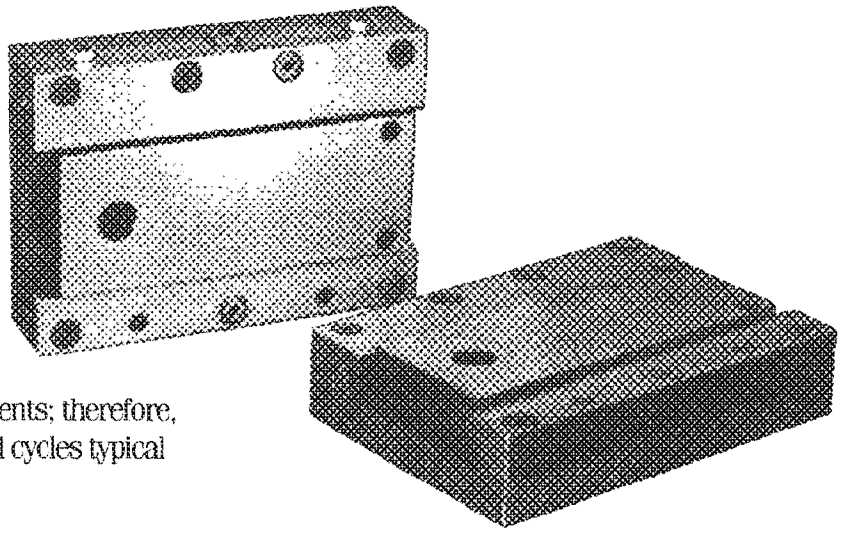
Company Profile...

AIM Automated Industrial Motion, *manufactures spring and wire forming equipment and components. The company also offers services such as process development and spring prototyping.*

Ex. 1005 - Page 503

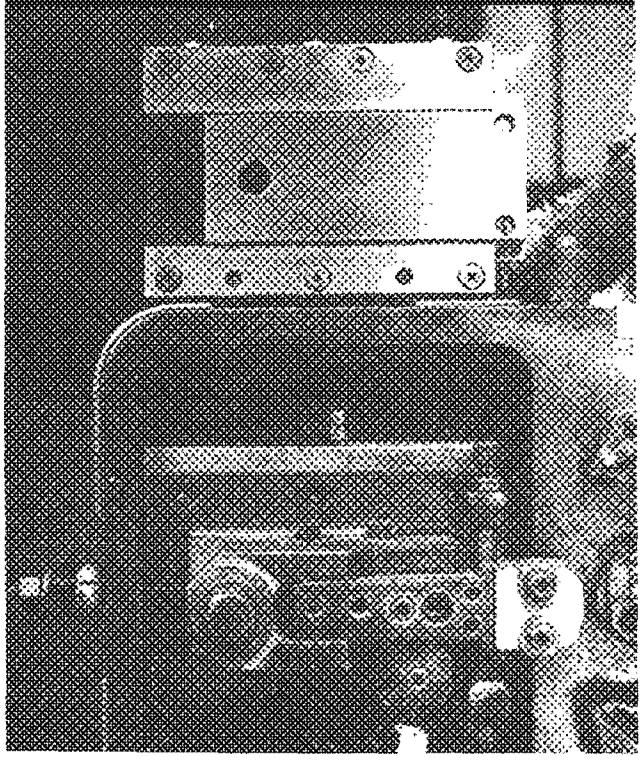
The Maintenance-Free Advantage

from Automated Industrial Motion AIM



AIM square gib replacement slides for mechanical coilers eliminate the need for constant lubrication that ball slides and bronze gibs require. The square gib features an innovative surface providing both strength and resistance to foreign particles. AIM square gib replacement slides contain no rolling elements; therefore, they are ideally suited for the short travel cycles typical in most coiling applications.

AIM slides offer a directly interchangeable low cost quality production advantage



- ❑ Designed for easy replacement
- ❑ Permanent "built-in" lubrication
- ❑ Grinding dust and metal particals do not adversely affect performance
- ❑ Can operate dry or wet
- ❑ Available for most sizes and configurations
- ❑ High load capacity
- ❑ Square gib slides perform well in difficult environments
- ❑ Self-lubricating surface reduces maintenance
- ❑ Long lasting accuracy and repeatability
- ❑ Noise and vibration dampening
- ❑ Quick delivery on standard sizes
- ❑ Custom design available

AIM The Leader In Production Advantages

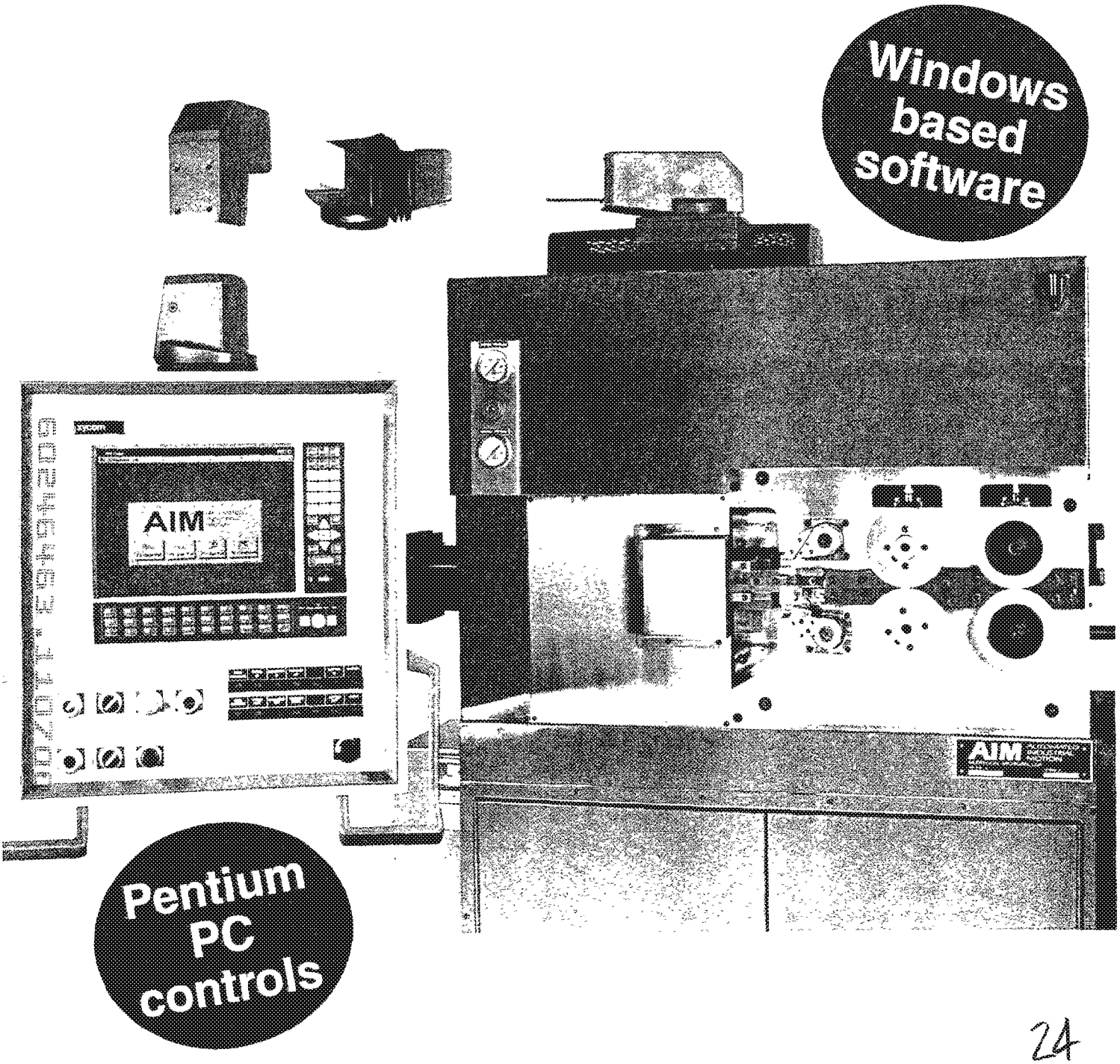
1818 Sherman Blvd., Muskegon, Michigan 49444

Phone (616) 739-5525 FAX (616) 733-4981

23

AIM AUTOMATED INDUSTRIAL MOTION

Computerized Spring Coiling Systems



24

Specializing in custom equipment and turnkey automation systems.

Designed and engineered from concept to [illegible] by springmakers to provide you with every [illegible] controlled production advantage.

AIM AUTOMATED INDUSTRIAL MOTION

Computerized Spring Coiling Systems

The Leader In Production Advantages

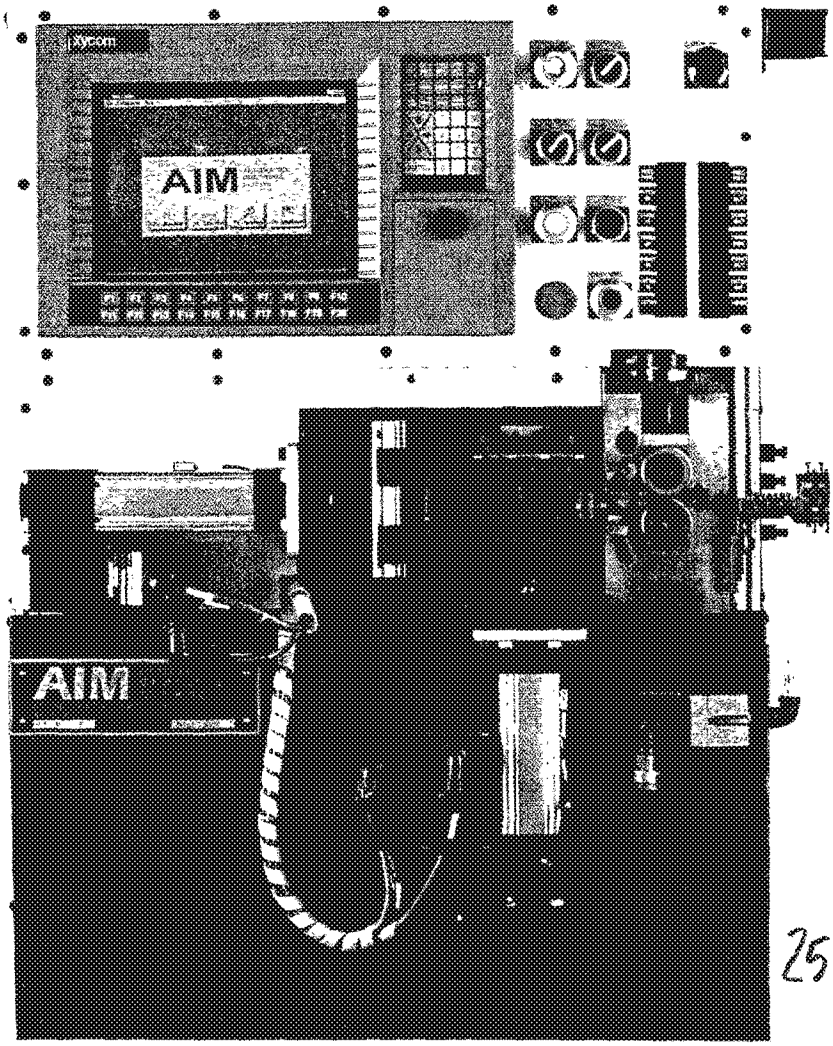
Control Features

- Pentium PC based
- Windows based software
- 8-axis capability
- Unlimited steps
- Maximum memory
- On-the-fly tool adjustments
- Controls housed in air conditioned base
- Pendant mounted operator interface
- On screen machine diagnostics
- Auxiliary inputs and outputs
- RS 232 port & modem communications
- Stores detailed part information
- Total parts counter and countdown production counter
- Diameter and free length gauging
- External equipment fault input for machine shutdown

Proven Service and support

Mechanical Features

- Coated Square Gib Slides
- AC Brushless servo motors
- High precision linear actuators
- True x-y linear motion eliminates pivot points
- Flush mount tooling
- Square chuck design for cassette tooling capability
- Separate locking of chuck and arbor
- Industry standard tooling
- Remote pitch clamp and feedroll pressure switch
- Adaptable to commercially available spring gauges



The advantages you demand as a leading springmaker

AIM AUTOMATED INDUSTRIAL MOTION
1818 East Sherman Blvd.
Phone (231) 739-5[illegible] FAX
www.aimcoil.com

Computerized Coiler Specifications:

	Micro Coiler	AIM 100	AIM 1000
Wire Feed Speed	75"/sec	75"/sec	75"/sec
Maximum Wire Size	0.010"	0.040"	0.080"
Minimum Wire Size	0.0015"	0.008"	0.026"
Feed Length	Unlimited	Unlimited	Unlimited
Coil Diameter Range	3x wire DIA to 0.325"	3x wire DIA to 1"	3x wire DIA to 1.75"
Power	240 volt, 3 phase	240 volt, 3 phase	240 volt, 3 phase
Wire Line	48"	48"	48"
Machine Dimensions			
Length	20"	28"	48"
Width	18"	34"	29"
Height	Tabletop	70"	80"
Gross Weight	600 lbs.	2,800 lbs.	3,600 lbs.

	AIM 2000	AIM 3000	AIM 4000
Wire Feed Speed	40"/sec	50"/sec	40"/sec
Maximum Wire Size	0.180"	0.313"	0.625"
Minimum Wire Size	0.047"	0.080"	0.250
Feed Length	Unlimited	Unlimited	Unlimited
Coil Diameter Range	3x wire DIA to 3"	5x wire DIA to 5"	5x wire DIA to 8"
Power	240 volt, 3 phase	240 volt, 3 phase	240 volt, 3 phase
Wire Line	48"	48"	48"
Machine Dimensions			
Length	67"	86"	140"
Width	40"	71"	108"
Height	80"	96"	96"
Gross Weight	6,700 lbs.	16,000 lbs.	45,000 lbs.

Confidential - Attorneys Eyes Only

AIM AUTOMATED INDUSTRIAL MOTION
1810 East Sherman Blvd., Muskegon, MI 49444
Phone (616) 733-5525 FAX (616) 733-4381
www.aimsoll.com

EXHIBIT J

08-08-00

Approv

PROVISIONAL APPLICATION COVER SHEET

This is a request for filing a PROVISIONAL APPLICATION under 37 CFR 1.53(b)(2)

Docket No.	58068	Type (+) --> [+]

INVENTOR(s)/APPLICANT(s)			
LAST NAME	FIRST NAME	MID. INIT.	RESIDENCE (CITY/STATE OR COUNTRY)
FLICK	Kenneth	E.	Douglasville, GA

TITLE OF THE INVENTION (280 Characters Max)

VEHICLE TRACKING SYSTEM WITH THEFT NOTIFICATION

CORRESPONDENCE ADDRESS

CHRISTOPHER F. REGAN, Reg. No. 34,906
Allen, Dyer, Doppelt, Milbrath & Gilchrist, P.A.
P. O. Box 3791

STATE	Florida	ZIP CODE	32802-3791	COUNTRY	U.S.

ENCLOSED APPLICATION PARTS *(check all that apply)*

✓	Specification	*Number of Pages*	24		Small Entity Statement
✓	Drawing(s)	*Number of Sheets*	5		Other (specify) _____

METHOD OF PAYMENT

✓	A check or money order is enclosed to cover the Provisional Filing Fees		PROVISIONAL FILING FEE AMOUNT ($)	**$150.00**
✓	The Commissioner is hereby authorized to 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,

CHRISTOPHER F. REGAN
Reg. No. 34,906
Allen, Dyer, Doppelt, Milbrath & Gilchrist, P.A.
255 South Orange Avenue - Suite 1401
Post Office Box 3791
Orlando, Florida 32802-3791
PHONE: (407) 841-2330

CERTIFICATE OF MAILING BY "EXPRESS MAIL"

Date: August 3, 2000

"EXPRESS MAIL" MAILING LABEL NUMBER EL547921589US

DATE OF DEPOSIT August 3 2000

I HEREBY CERTIFY THAT THIS PAPER OR FEE IS BEING DEPOSITED WITH THE UNITED STATES POSTAL SERVICE "EXPRESS MAIL POST OFFICE TO ADDRESSEE" SERVICE UNDER 37 CFR 1.10 ON THE DATE INDICATED ABOVE AND IS ADDRESSED TO THE COMMISSIONER OF PATENTS AND TRADEMARKS, WASHINGTON, D.C. 20231

ERIC LINK
(TYPED OR PRINTED NAME OF PERSON MAILING PAPER OR FEE)

(SIGNATURE OF PERSON MAILING PAPER OR FEE)

JC839 U.S. PTO 08/03/00
JC839 U.S. PTO 60/222777 08/03/00

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.

08502.2/2/2003

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.

Declaration - 2/2/2005

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

Ex. 1005 - Page 518

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

Code-Alarm, Inc.

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:

Exhibit 1005 - Page 520

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)

Ex. 1005 - Page 522

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.

Declaration - Version 2.0

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

Exhibit 1005 - Page 527

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

Ex. 1005 - Page 531

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".

0000000-0000000

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'

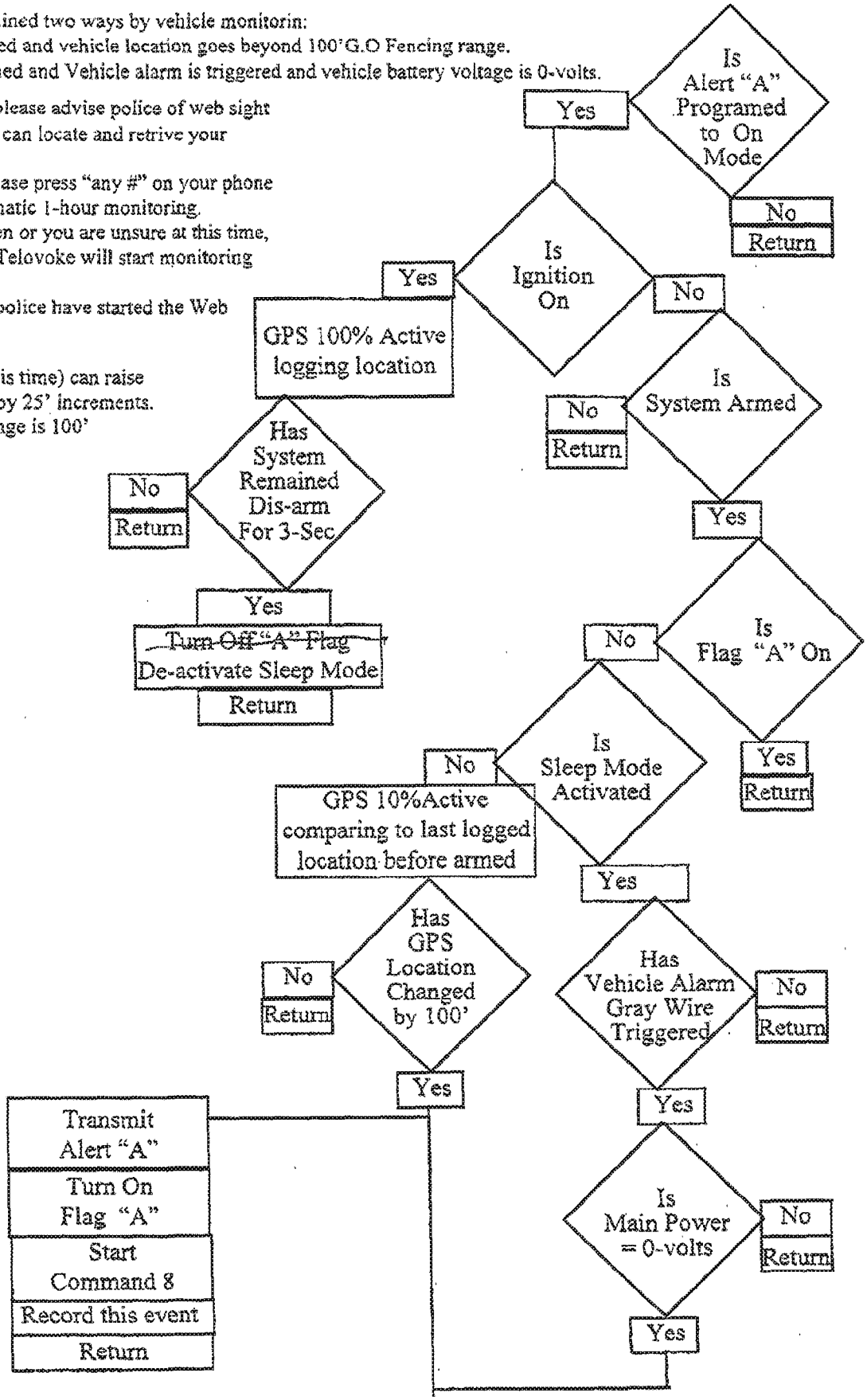


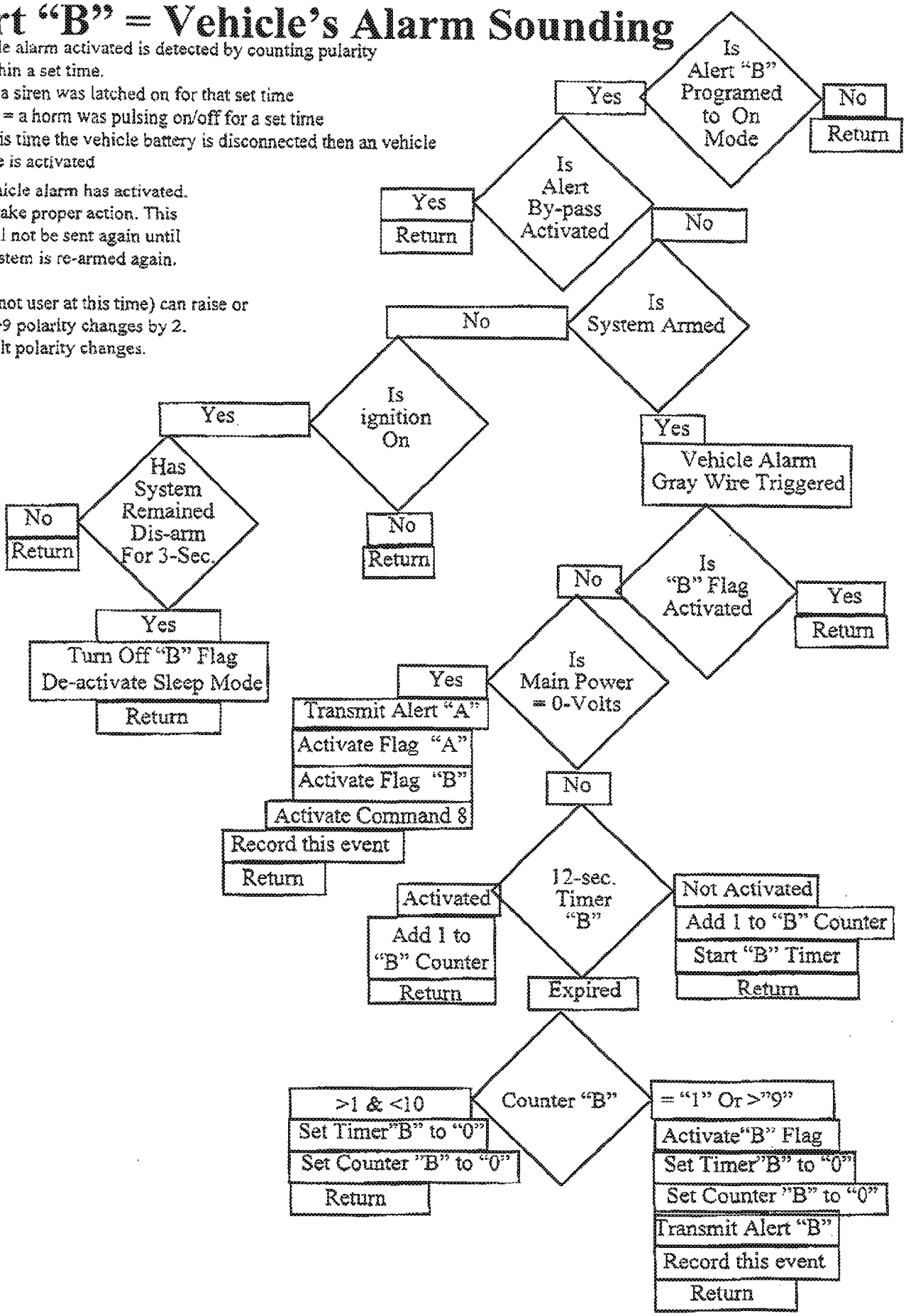
Exhibit 1005 - Page 533 of 2136

Alert "B" = Vehicle's Alarm Sounding

Your vehicle alarm activated is detected by counting pularity changeswithin a set time.
1 change = a siren was latched on for that set time
>9 changes = a horm was pulsing on/off for a set time
If during this time the vehicle battery is disconnected then an vehicle stolen mode is activated

Your vehicle alarm has activated. Please take proper action. This alert will not be sent again until your system is re-armed again.

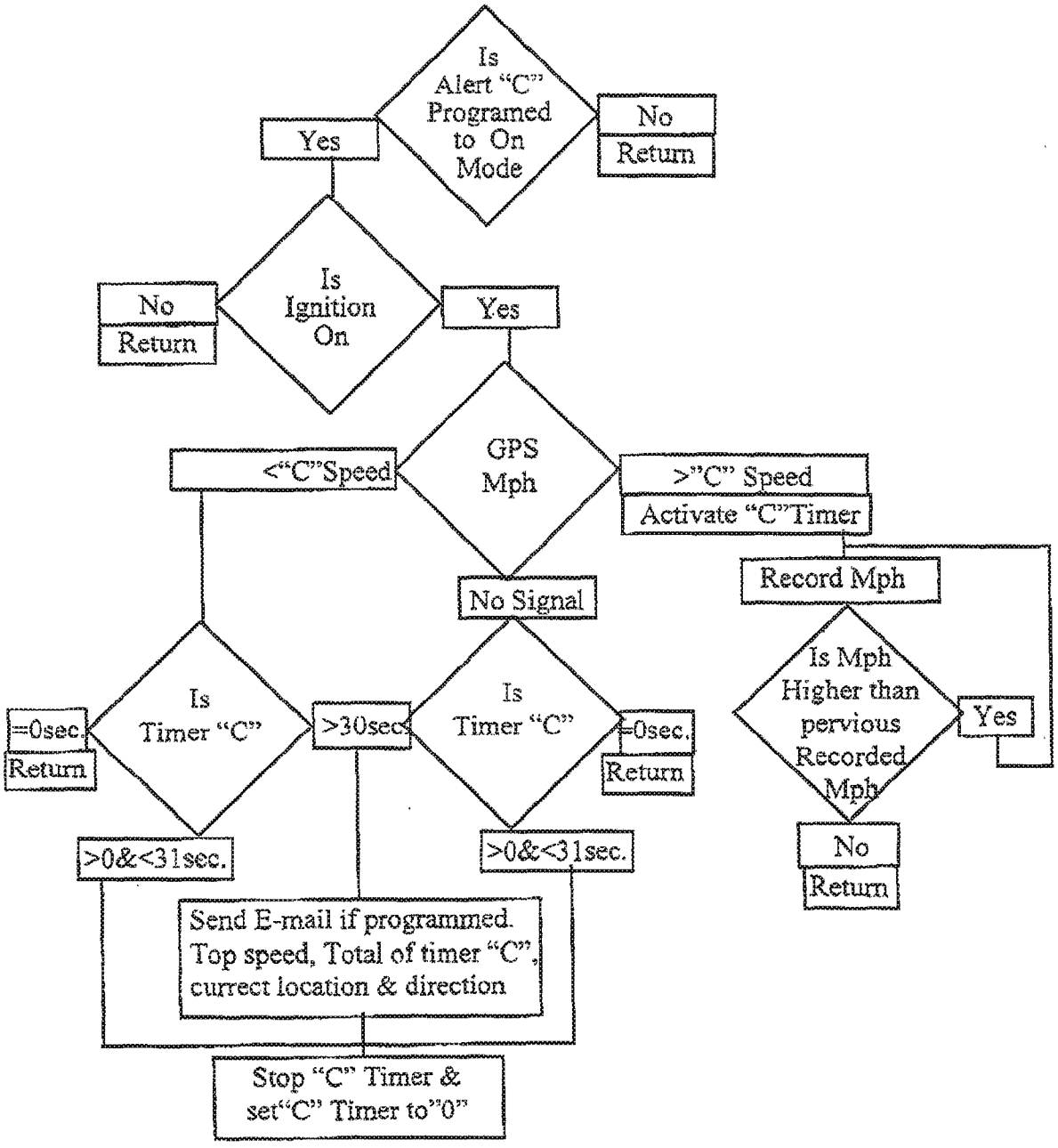
Televoke (not user at this time) can raise or lower the >9 polarity changes by 2.
>9 is default polarity changes.



DSC-PC5020-NV2-GE-0

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.

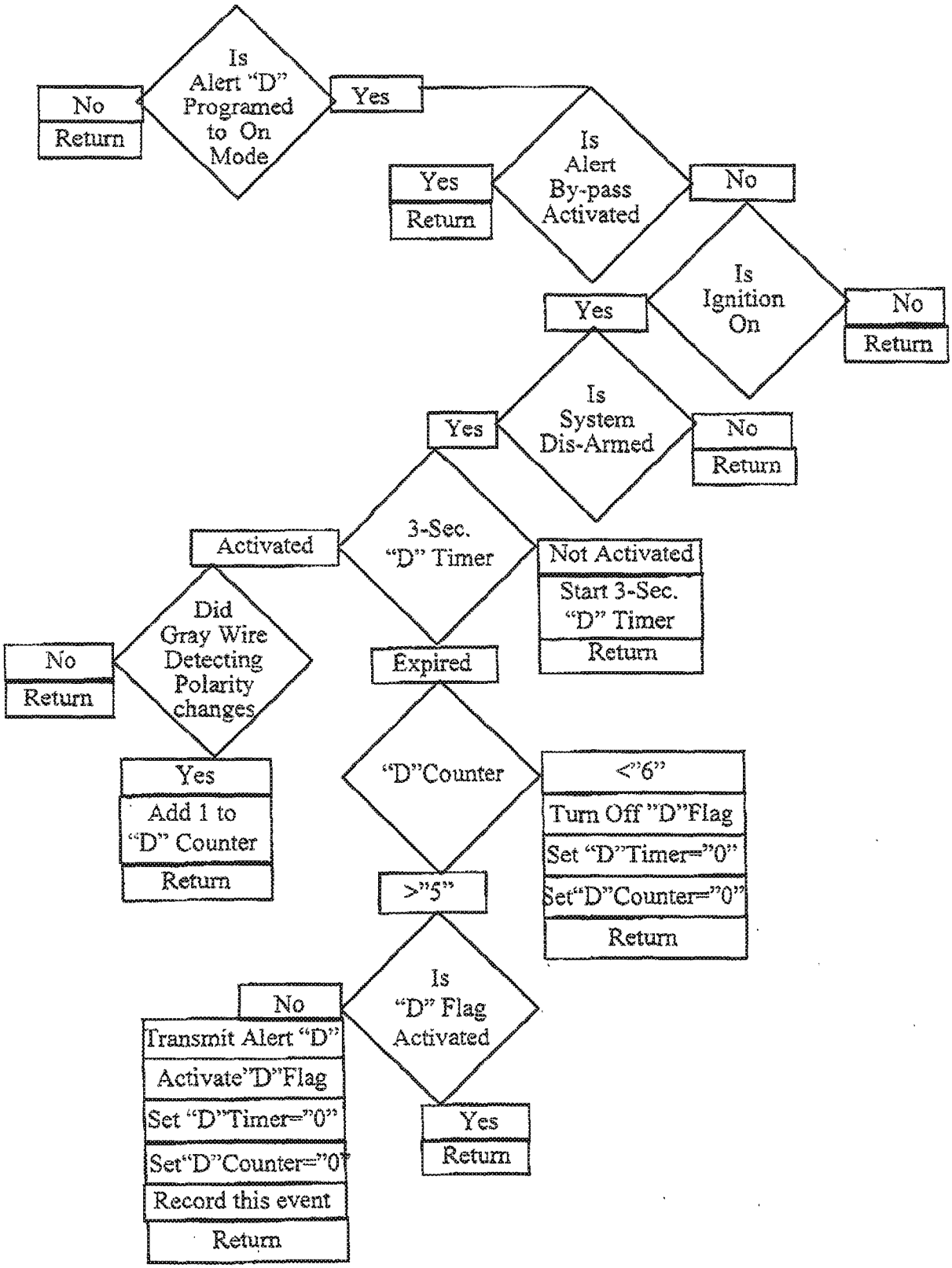


DocuSign Envelope ID: 4A2E2B6B-

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.

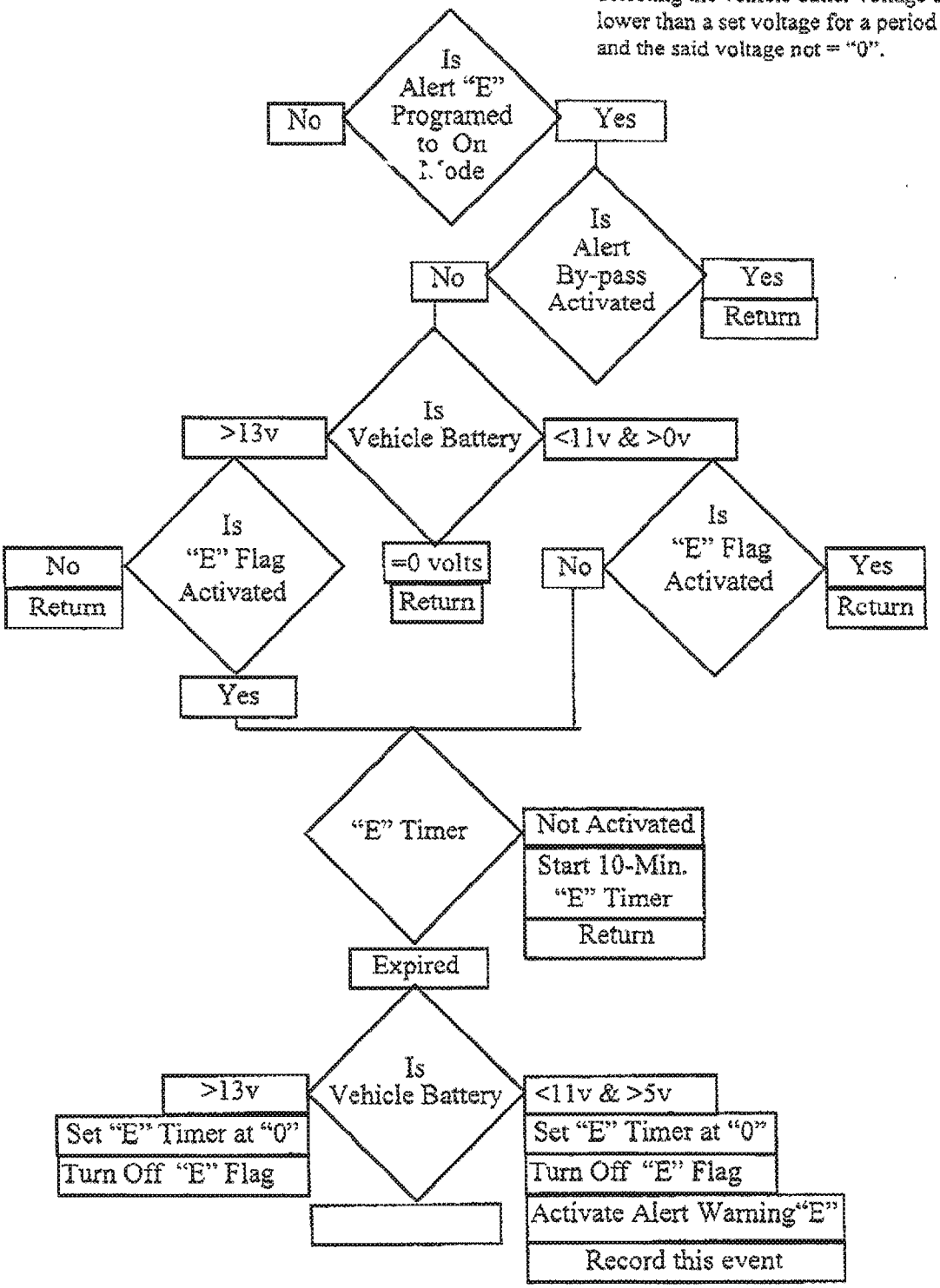
Unauthorized Transmitter Alert is activated when ignition key is turned on and detects a plurality of polarity changes on Gray wire within a set time. This Alert is prevented from activated again until said circuit returns to normal.



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".



Ex. 1005 - Page 537

EXHIBIT K

05/18-00

APPROV

PROVISIONAL APPLICATION COVER SHEET

This is a request for filing a PROVISIONAL APPLICATION under 37 CFR 1.53(b)(2)

Docket No.	58066	Type (+) → [+]

INVENTOR(s)/APPLICANT(s)

LAST NAME	FIRST NAME	MID. INIT.	RESIDENCE (CITY/STATE OR COUNTRY)
FLICK	Kenneth	E.	Douglasville, GA

TITLE OF THE INVENTION (280 Characters Max)

VEHICLE TRACKING SYSTEM WITH THEFT NOTIFICATION

CORRESPONDENCE ADDRESS

CHRISTOPHER F. REGAN, Reg. No. 34,906
Allen, Dyer, Doppelt, Milbrath & Gilchrist, P.A.
P. O. Box 3791

STATE	Florida	ZIP CODE	32802-3791	COUNTRY	U.S.

ENCLOSED APPLICATION PARTS *(check all that apply)*

✓	Specification	*Number of Pages*	20	✓	Small Entity Statement	
	Drawing(s)	*Number of Sheets*			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 Fees and/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, The name of the U.S. Government agency and the Government contract number are _____

CERTIFICATE OF MAILING BY "EXPRESS MAIL"

"EXPRESS MAIL" MAILING LABEL NUMBER EL547921969US

DATE OF DEPOSIT MAY 17, 2000

I HEREBY CERTIFY THAT THIS PAPER OR FEE IS BEING DEPOSITED WITH THE UNITED STATES POSTAL SERVICE "EXPRESS MAIL POST OFFICE TO ADDRESSEE" SERVICE UNDER 37 CFR 1.10 ON THE DATE INDICATED ABOVE AND IS ADDRESSED TO THE COMMISSIONER OF PATENTS AND TRADEMARKS, WASHINGTON, D.C. 20231

ERIC LINK

(TYPED OR PRINTED NAME OF PERSON MAILING PAPER OR FEE)

Eric Link

(SIGNATURE OF PERSON MAILING PAPER OR FEE)

Respectfully Submitted,

Christopher F. Regan
Reg. No. 34,906
Allen, Dyer, Doppelt, Milbrath & Gilchrist, P.A.
255 South Orange Avenue - Suite 1401
Post Office Box 3791
Orlando, Florida 32802-3791
PHONE: (407) 841-2330

Date: May 17, 2000

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant: Kenneth E. FLICK

Serial: Not Yet Assigned

Attorney's Docket No.: 88066

Filed: Herewith

For: VEHICLE TRACKING SYSTEM WITH THEFT NOTIFICATION

VERIFIED STATEMENT (DECLARATION) CLAIMING SMALL ENTITY STATUS (37 CFR 1.9(f) and 1.27(b)) - INDEPENDENT INVENTOR

As a below named inventor, I hereby declare that I qualify as an independent inventor as defined in 37 CFR 1.9(c) for purposes of paying reduced fees under section 41(a) and (b) of Title 25, United States Code, to the Patent and Trademark Office with regard to the invention entitled: VEHICLE TRACKING SYSTEM WITH THEFT NOTIFICATION described in:

(x) the specification filed herewith
( ) application serial no. _____ filed _____
( ) patent no. _____ issued _____

I have not assigned, granted, conveyed or licensed and am under no obligation under contract or law to assign, grant, convey or license, any rights in the invention to any person who could not be classified as an independent inventor under 37 CFR 1.9(c) if that person had made the invention, or to any concern which would not qualify as a small business concern under 37 CFR 1.9(d) or a nonprofit organization under 37 CFR 1.9(e).

Each person, concern, or organization to which I have assigned, granted, conveyed or licensed or am under an obligation under contract or law to assign, grant, convey, or license any rights in the invention is listed below:

(x) no such person, concern, or organization
( ) persons, concerns or organizations listed below*

*NOTE: Separate verified statements are required from each named person, concern or organization having rights to the invention averring to their status as small entities. (37 CFR 1.27)

FULL NAME _____

ADDRESS _____

( ) INDIVIDUAL ( ) SMALL BUSINESS CONCERN ( ) NONPROFIT ORGANIZATION

I acknowledge the duty to file, in this application or patent, notification of any change in status resulting in loss of entitlement to small entity status prior to paying, or at the time of paying, the earliest of the issue fee or any maintenance fee due after the date on which status as a small entity is no longer appropriate. (37 CFR 1.28(b))

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both under section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application, any patent issuing thereon, or any patent to which this verified statement is directed.

Kenneth E. Flick
NAME OF INVENTOR

SIGNATURE OF INVENTOR

5-17-00
DATE

05/17/2000 09:17:00 01

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.

DRAFT 08/15/2005

EXHIBIT L

US005719551A

United States Patent [19]

Flick

[11] Patent Number: 5,719,551

[45] Date of Patent: Feb. 17, 1998

[54] **VEHICLE SECURITY SYSTEM FOR A VEHICLE HAVING A DATA COMMUNICATIONS BUS AND RELATED METHODS**

[76] Inventor: **Kenneth E. Flick**, 5236 Presley Pl., Douglasville, Ga. 30135

[21] Appl. No.: **701,356**

[22] Filed: **Aug. 22, 1996**

[51] **Int. Cl.**[6] **B60R 25/10**

[52] **U.S. Cl.** **340/426**; 340/531; 340/533; 340/825.31; 340/825.32; 340/825.69; 180/287; 307/10.2

[58] **Field of Search** 340/426, 427, 340/428, 429, 531, 532, 533, 534, 825.31, 825.32, 825.69, 825.72; 180/173, 287; 307/10.2, 10.3; 395/200.12, 200.05, 309, 310, 830–33

[56] **References Cited**

U.S. PATENT DOCUMENTS

4,055,772	10/1977	Leung	307/10 R
4,288,778	9/1981	Zucker	340/64
4,538,262	8/1985	Sinniger et al.	370/85
4,697,092	9/1987	Roggendorf et al.	307/10 R
4,754,255	6/1988	Saunders et al.	340/64
4,760,275	7/1988	Sato et al.	307/10 R
4,792,783	12/1988	Burgess et al.	340/22
4,841,159	6/1989	Evans et al.	307/38
4,926,332	5/1990	Komuro et al.	364/424.05
5,006,843	4/1991	Hauer	340/825.31
5,040,990	8/1991	Suman et al.	439/34
5,046,041	9/1991	Lecocq et al.	364/900
5,049,867	9/1991	Stouffer	340/426
5,054,569	10/1991	Scott et al.	180/167
5,081,667	1/1992	Drori et al.	379/59
5,142,278	8/1992	Moallemi et al.	340/825.06
5,146,215	9/1992	Drori	340/825.32
5,243,322	9/1993	Thompson et al.	340/429
5,252,966	10/1993	Lambropoulos et al.	340/825.69
5,406,270	4/1995	Van Lente	340/825.34
5,475,818	12/1995	Molyneaux et al.	395/200.05
5,555,498	9/1996	Berra et al.	364/424.03
5,606,306	2/1997	Mutoh et al.	340/426

OTHER PUBLICATIONS

Society of Automotive Engineers, Inc., "Surface Vehicle Information Report", SAE J2058 (Jun. 21, 1990).

Society of Automotive Engineers, Inc., "Surface Vehicle Standard", SAE J1850 (rev'd Jul. 1995).

Mark Thompson, "The Thick and Thin of Car Cabling", *IEEE Spectrum*, pp. 42–45 (Feb. 1996).

Primary Examiner—Thomas Mullen

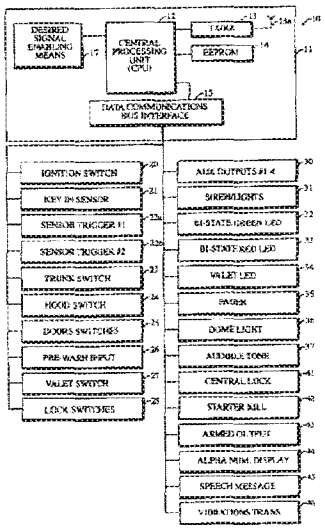
Assistant Examiner—Ashok Mannava

Attorney, Agent, or Firm—Allen, Dyer, Doppelt, Milbrath & Gilchrist, P.A.

[57] **ABSTRACT**

A vehicle security system includes a vehicle security sensor and associated sensor bus interface, an alarm indicator and associated alarm indicator bus interface, and an alarm controller and associated alarm controller bus interface for interfacing the alarm controller. The vehicle security system is for a vehicle of a type including a data communications bus connecting a plurality of vehicle devices. The security system preferably further includes a desired signal enabling circuit for enabling the alarm controller to operate using a set of desired signals for a desired vehicle from among a plurality of possible sets of signals for different vehicles. Accordingly, the desired signal enabling circuit permits the alarm controller to communicate with the vehicle security sensor and the alarm indicator via the data communications bus so that the alarm controller is capable of operating the alarm indicator responsive to the vehicle security sensor. The desired signal enabling circuit may preferably include a memory for storing a plurality of respective sets of signals for different vehicles, and a selecting circuit for selecting the desired set of signals from the plurality of different sets of signals for different vehicles. The desired signal enabling circuit may also be included in other vehicle remote control systems. Method aspects of the invention are also disclosed.

59 Claims, 8 Drawing Sheets



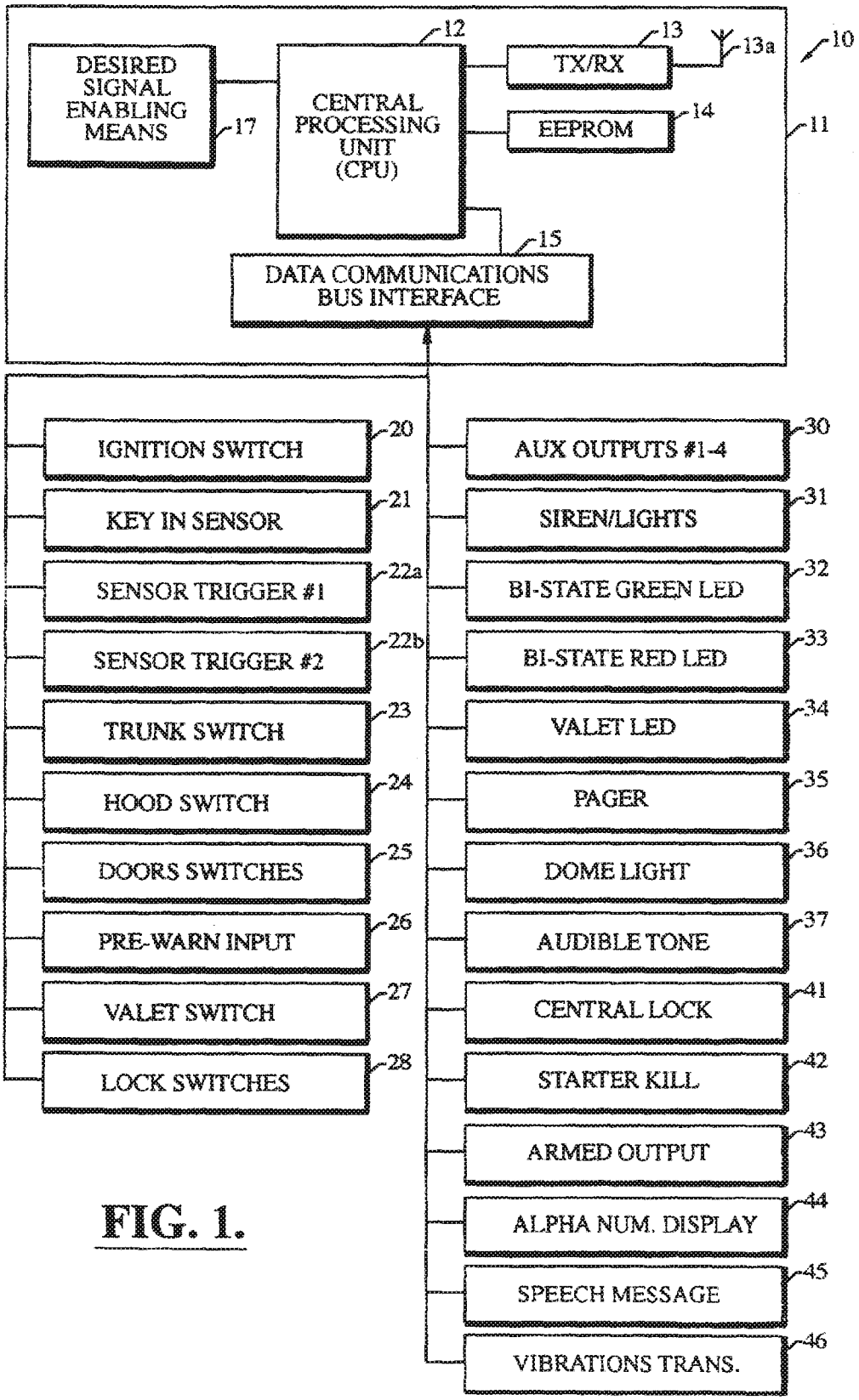

DESIRED SIGNAL ENABLING MEANS
17
CENTRAL PROCESSING UNIT (CPU)
12
TX/RX
13
13a
EEPROM
14
10
11
DATA COMMUNICATIONS BUS INTERFACE
15
IGNITION SWITCH
20
KEY IN SENSOR
21
SENSOR TRIGGER #1
22a
SENSOR TRIGGER #2
22b
TRUNK SWITCH
23
HOOD SWITCH
24
DOORS SWITCHES
25
PRE-WARN INPUT
26
VALET SWITCH
27
LOCK SWITCHES
28
AUX OUTPUTS #1-4
30
SIREN/LIGHTS
31
BI-STATE GREEN LED
32
BI-STATE RED LED
33
VALET LED
34
PAGER
35
DOME LIGHT
36
AUDIBLE TONE
37
CENTRAL LOCK
41
STARTER KILL
42
ARMED OUTPUT
43
ALPHA NUM. DISPLAY
44
SPEECH MESSAGE
45
VIBRATIONS TRANS.
46

FIG. 1.

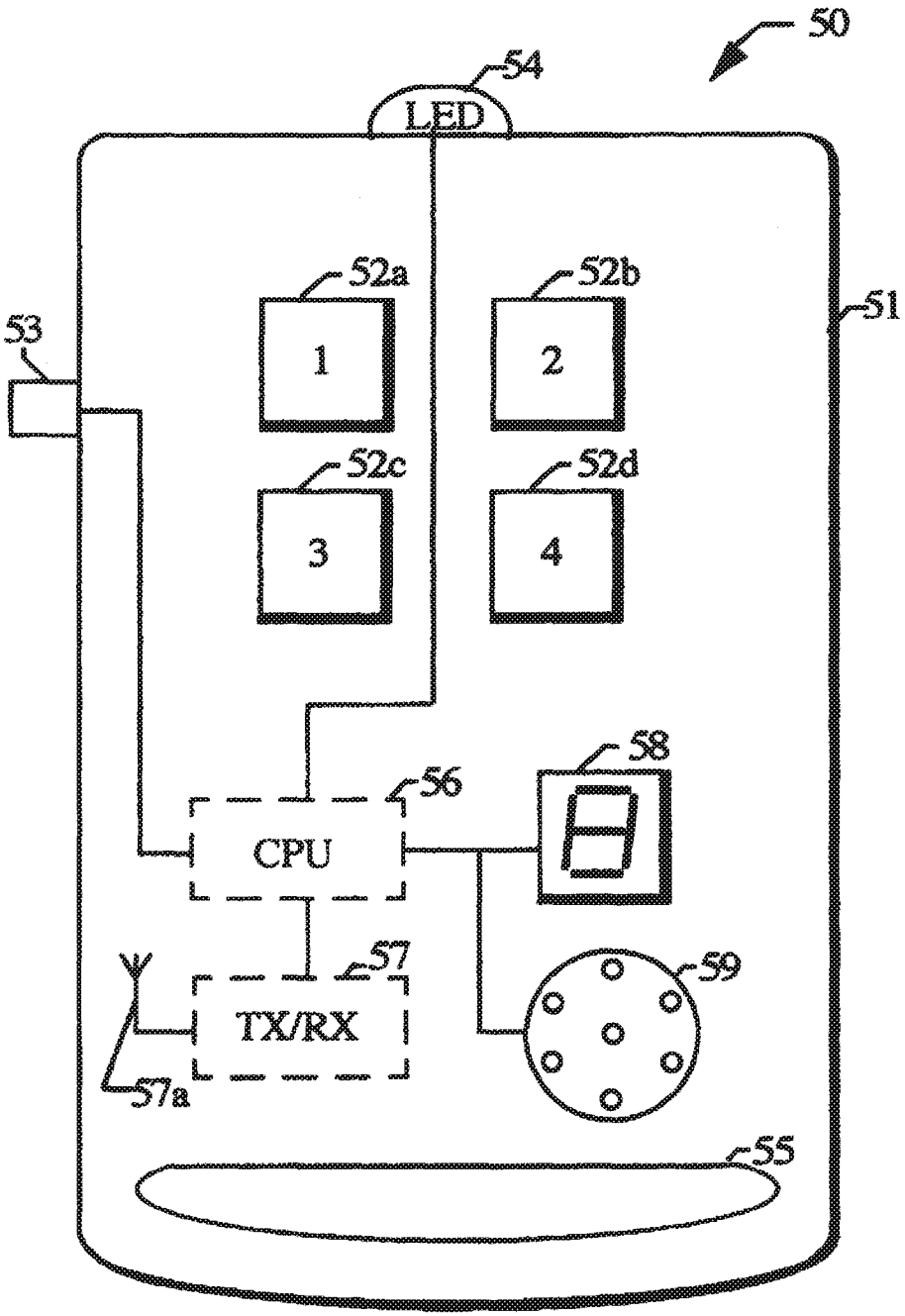


FIG. 2.

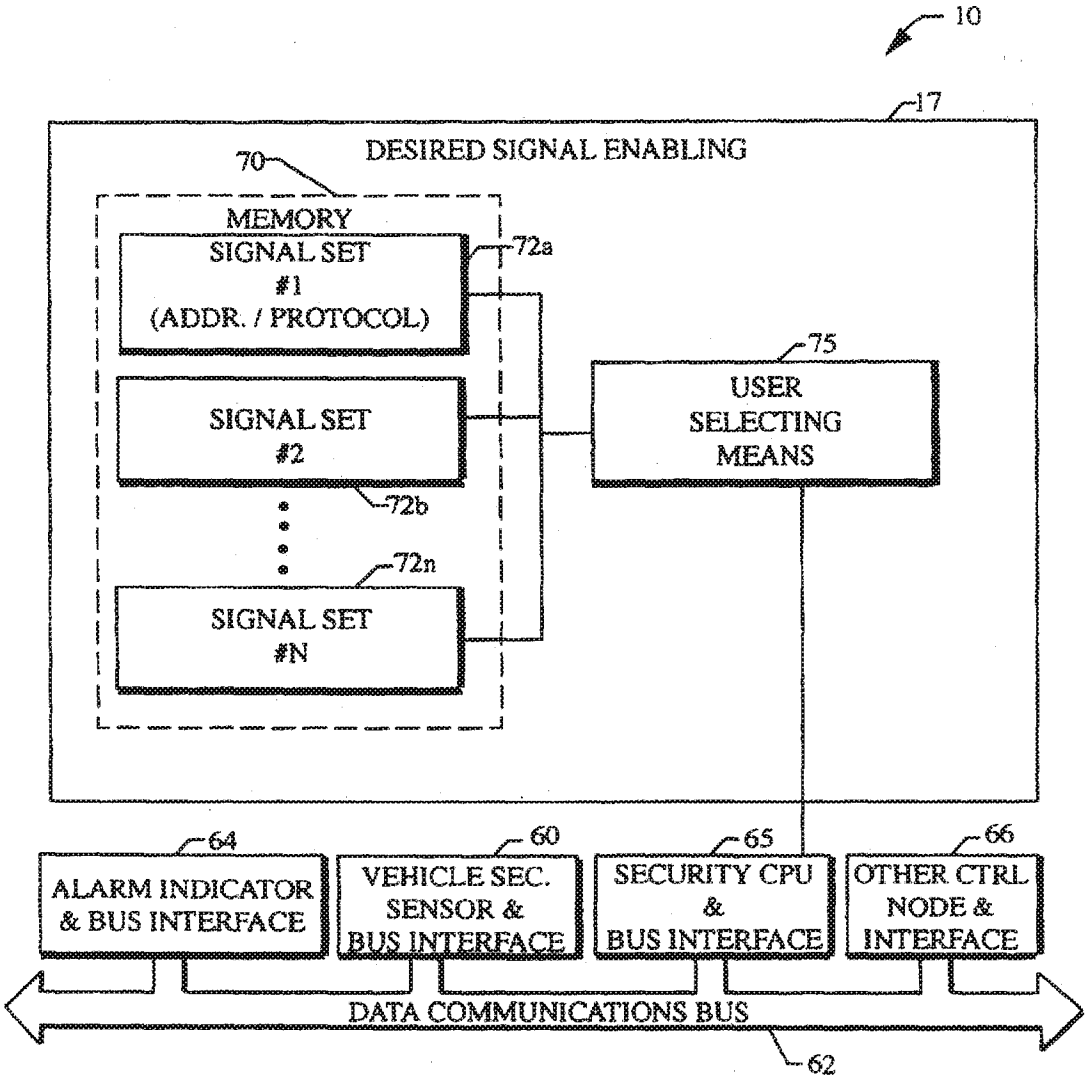

10
17
DESIRED SIGNAL ENABLING
70
MEMORY
SIGNAL SET #1 (ADDR. / PROTOCOL)
72a
SIGNAL SET #2
72b
72n
SIGNAL SET #N
75
USER SELECTING MEANS
64
ALARM INDICATOR & BUS INTERFACE
60
VEHICLE SEC. SENSOR & BUS INTERFACE
65
SECURITY CPU & BUS INTERFACE
66
OTHER CTRL NODE & INTERFACE
DATA COMMUNICATIONS BUS
62

FIG. 3.

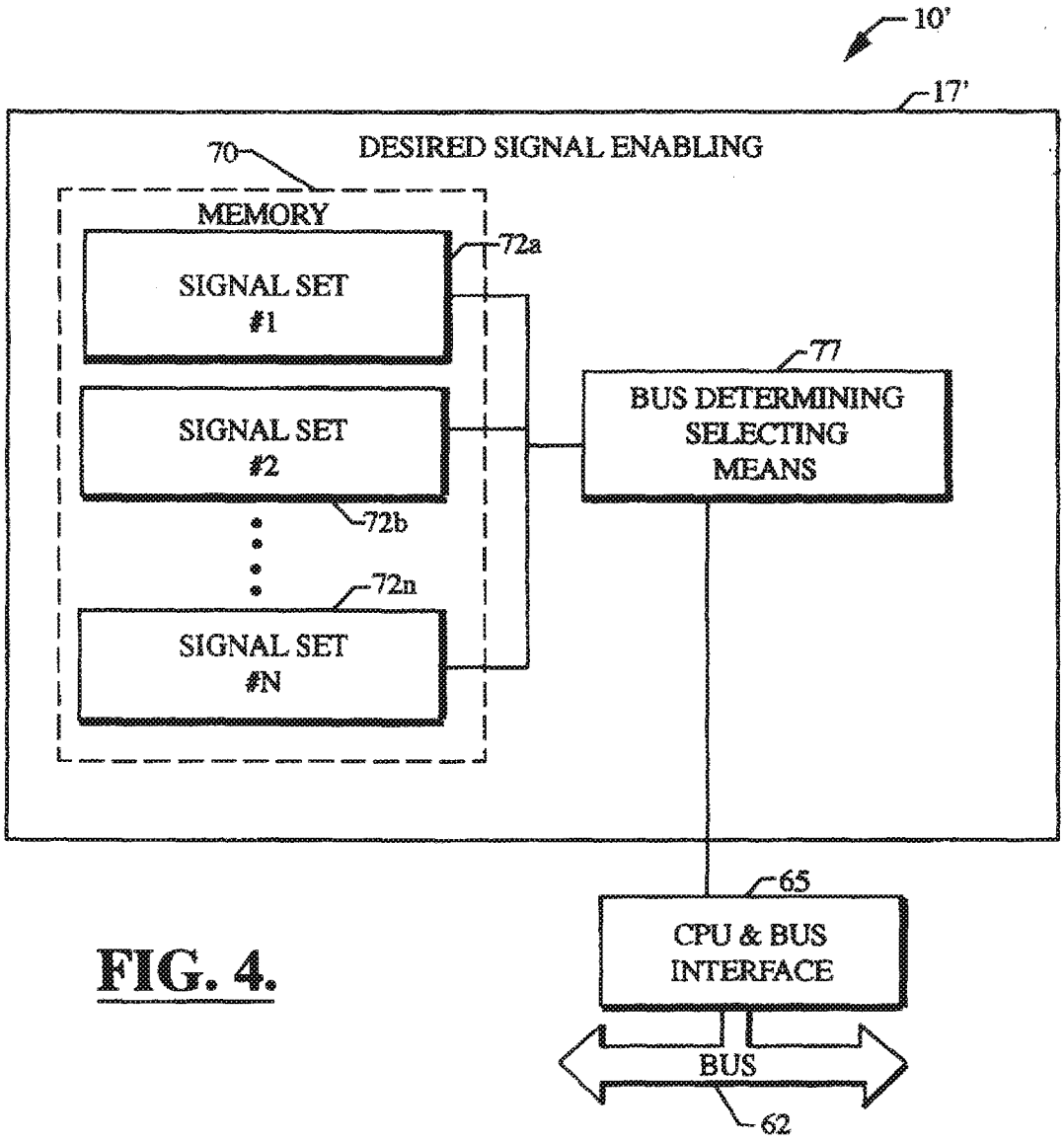

10'
17'
70
DESIRED SIGNAL ENABLING
MEMORY
72a
SIGNAL SET #1
77
BUS DETERMINING SELECTING MEANS
SIGNAL SET #2
72b
72n
SIGNAL SET #N
65
CPU & BUS INTERFACE
BUS
62

FIG. 4.

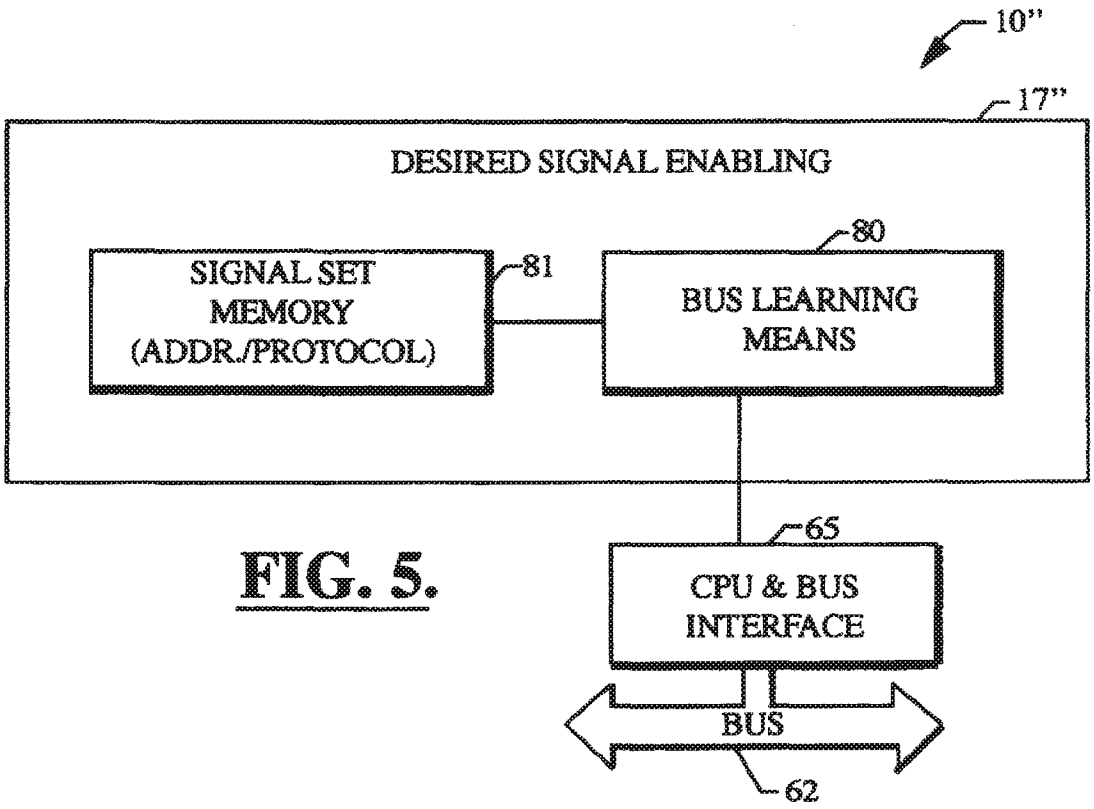

10''
17''
DESIRED SIGNAL ENABLING
SIGNAL SET MEMORY (ADDR./PROTOCOL)
81
80
BUS LEARNING MEANS
65
CPU & BUS INTERFACE
BUS
62

FIG. 5.

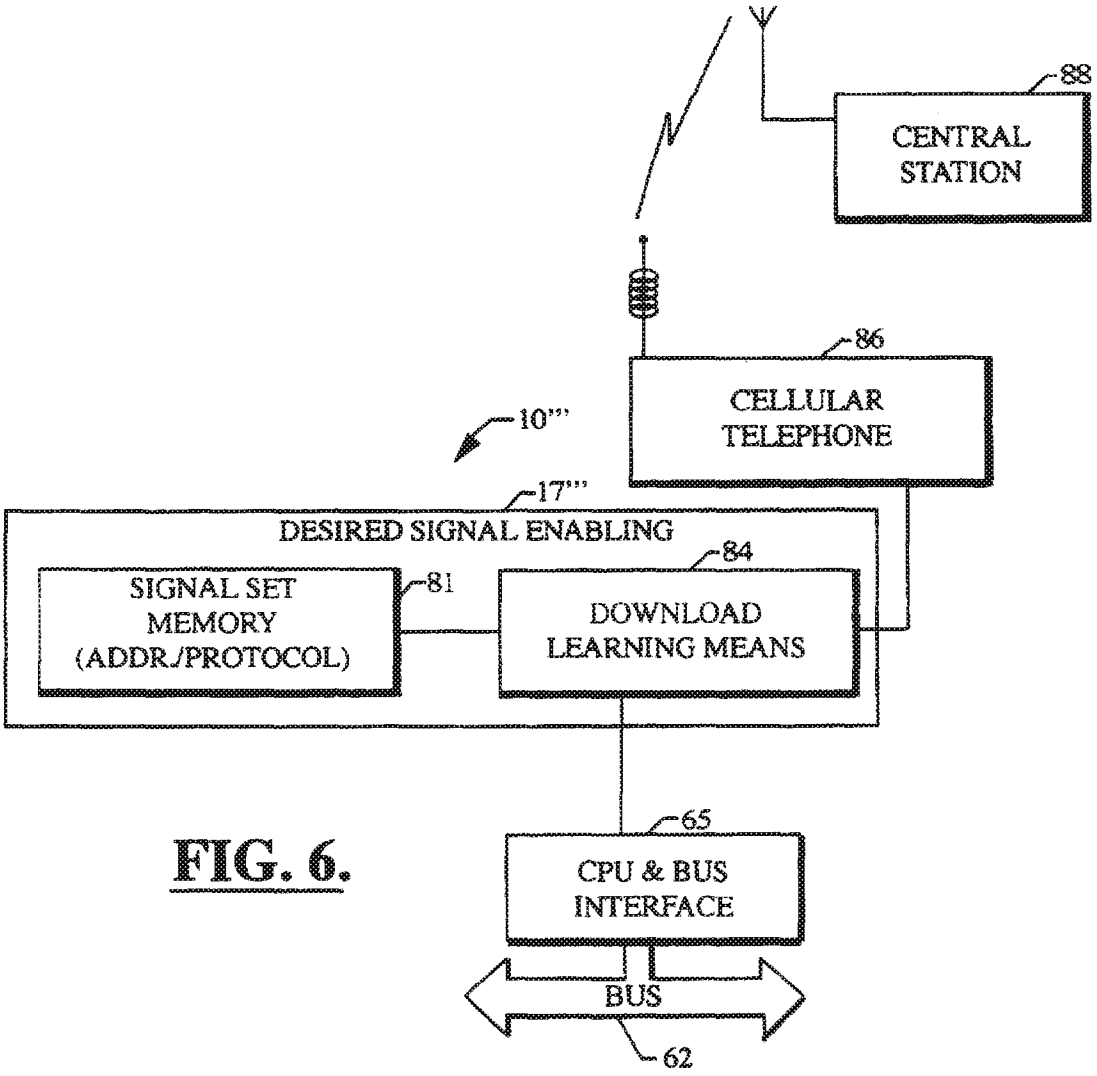

88
CENTRAL STATION
86
CELLULAR TELEPHONE
10'''
17'''
DESIRED SIGNAL ENABLING
84
SIGNAL SET MEMORY (ADDR/PROTOCOL)
81
DOWNLOAD LEARNING MEANS
65
CPU & BUS INTERFACE
BUS
62

FIG. 6.

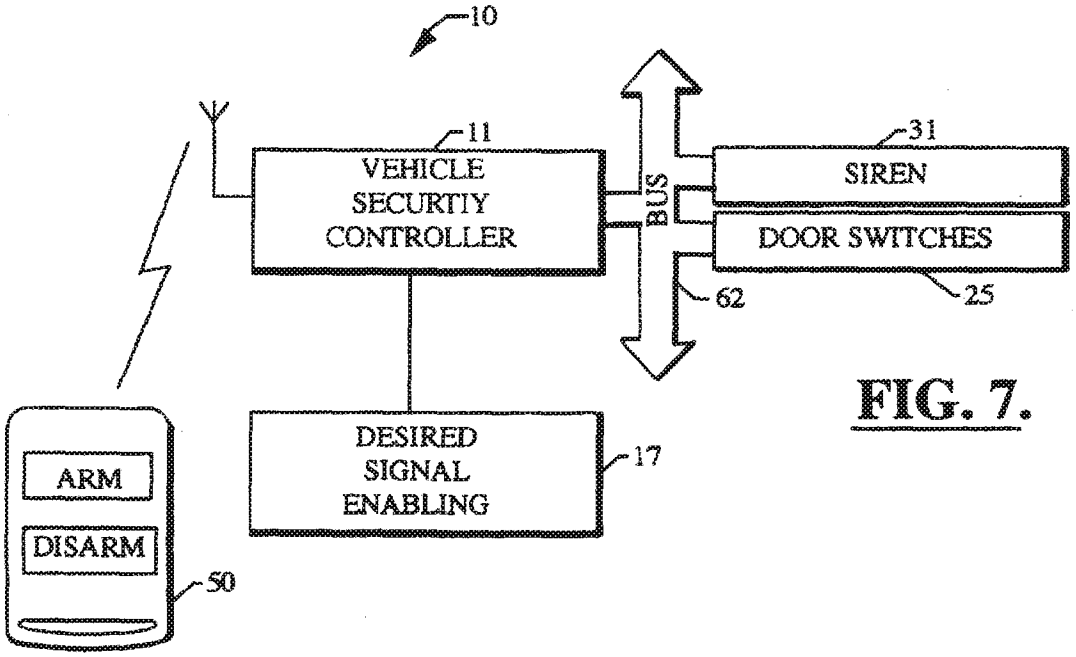

10
11
VEHICLE SECURTIY CONTROLLER
BUS
31
SIREN
DOOR SWITCHES
25
62
DESIRED SIGNAL ENABLING
17
ARM
DISARM
50

FIG. 7.

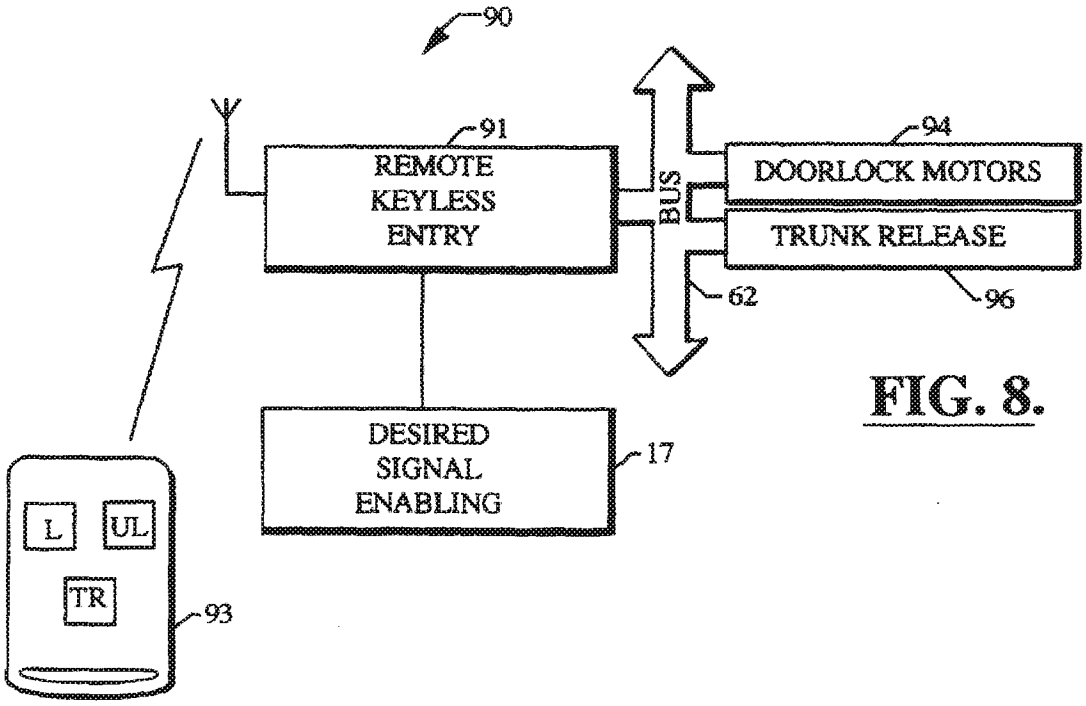

90
91
REMOTE KEYLESS ENTRY
BUS
94
DOORLOCK MOTORS
TRUNK RELEASE
96
62
DESIRED SIGNAL ENABLING
17
L
UL
TR
93

FIG. 8.

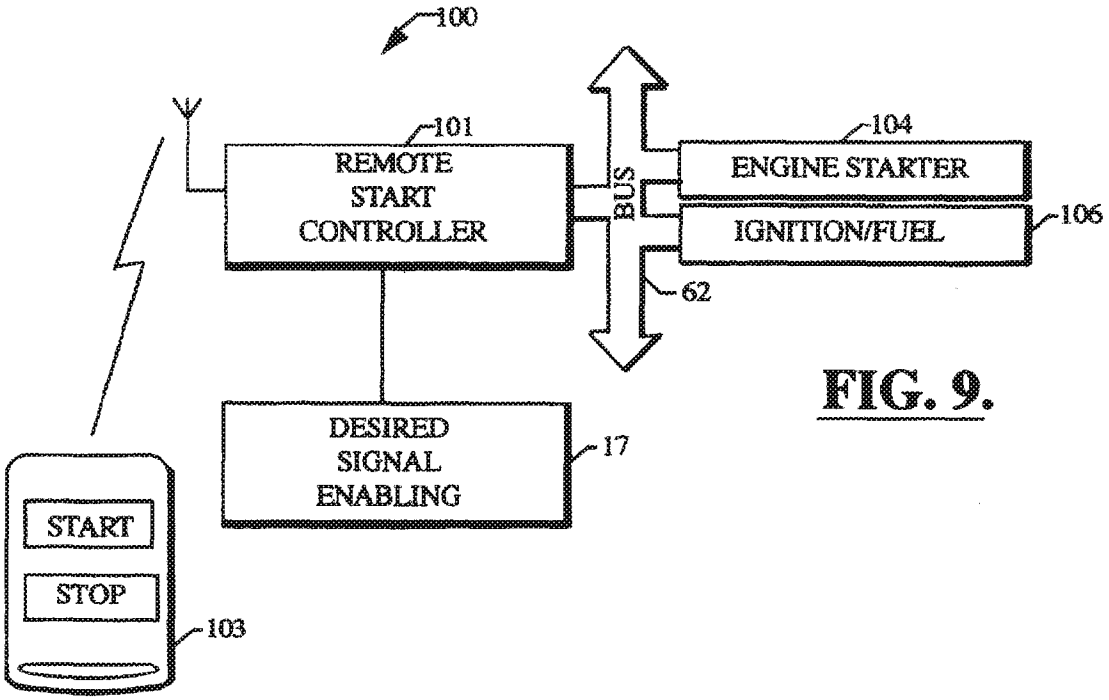

100
101
REMOTE START CONTROLLER
BUS
104
ENGINE STARTER
IGNITION/FUEL
106
62
DESIRED SIGNAL ENABLING
17
START
STOP
103

FIG. 9.

VEHICLE SECURITY SYSTEM FOR A VEHICLE HAVING A DATA COMMUNICATIONS BUS AND RELATED METHODS

FIELD OF THE INVENTION

This application is related to the field of security systems and, more particularly, to a security 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, Feb. 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 security systems for hardwired connection to vehicle devices, such as aftermarket vehicle security systems, 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 remote 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 present invention to provide a vehicle security system and associated method which is readily adapted or adaptable for installation in a vehicle having a data communications bus.

It is another object of the present invention to provide a security system or other remote control function systems and associated methods for installation in a vehicle having a data

communications bus, and wherein the vehicle is one from among a plurality of different vehicles with different device addresses and/or signal protocols for communicating with the vehicle devices.

These and other objects, advantages and features of the present invention are provided by a vehicle security system for a vehicle of a type including a data communications bus connecting a plurality of vehicle devices. In particular, the vehicle security system preferably comprises a vehicle security sensor and associated sensor bus interface means for interfacing the vehicle security sensor to the data communications bus. The vehicle security system also preferably includes an alarm indicator and associated alarm indicator bus interface means for interfacing the alarm indicator to the data communications bus. An alarm controller and associated alarm controller bus interface means are also preferably included. The security system further preferably comprises desired signal enabling means for enabling the alarm controller to operate using a desired set of signals for a desired vehicle from among a plurality of possible sets of signals for different vehicles. Accordingly, the desired signal enabling means permits the alarm controller to communicate with the vehicle security sensor and the alarm indicator via the data communications bus so that the alarm controller is capable of operating the alarm indicator responsive to the vehicle security sensor. The security system is thus advantageously compatible with many different types of vehicle data communications formats or protocols.

The data communications bus may preferably be a multiplexed data bus. Accordingly, the sensor bus interface means, the alarm bus interface means, and the alarm controller bus interface means may each comprise multiplexing means for interfacing with the multiplexed data bus of the vehicle.

The desired signal enabling means may preferably include memory means for storing a plurality of sets of signals for different vehicles, and selecting means for selecting the desired set of signals from the plurality of different sets of signals. In one embodiment, the selecting means may comprise user selecting means for permitting a user to select the desired set of signals. In another embodiment, the selecting means may comprise determining means for determining the desired set of signals based upon signals on the data communications bus.

The memory means may include device address memory means for storing a plurality of different sets of signals representative of different device addresses for different vehicles. Alternatively, or in addition thereto, the memory means may comprise protocol memory means for storing a plurality of different protocols for different vehicles.

In yet another embodiment, the desired signal enabling means may comprise learning means for learning the desired set of signals. For example, the learning means may comprise downloading learning means for learning the desired set of signals from another device or central station. In particular, the security system may interface to a cellular telephone and the desired set of signals may be downloaded or received and stored via the cellular telephone. In another variation, the learning means may comprise bus learning means for learning the desired set of signals based upon signals on the data communications bus. The security system, according to another aspect of the invention, may also interface with an existing vehicle controller or a communications bus node which is operatively connected to the data communications bus.

A method aspect of the invention is for operating a vehicle security system for a vehicle of a type including a data communications bus connecting a plurality of vehicle devices. The method preferably comprises the steps of interfacing an alarm controller to the data communications bus, and enabling the alarm controller to operate using a desired set of digital signals for a desired vehicle from a plurality of sets of signals for different vehicles to thereby permit the alarm controller to communicate with at least one of a vehicle security sensor and an alarm indicator via the data communications bus. Accordingly, the alarm controller is capable of operating the alarm indicator responsive to the vehicle security sensor and via the data communication bus.

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. A vehicle function controller is provided along with an associated vehicle function controller bus interface means for interfacing the vehicle function controller to the data communications bus. The remote control system also includes desired signal enabling means for causing the vehicle function controller to operate using a desired set of signals for a desired vehicle from a plurality of possible sets of digital signals for different vehicles. Accordingly, the vehicle function controller can communicate with a vehicle device via the data communications bus so that the vehicle function controller is capable of operating the vehicle device responsive to the remote transmitter. Method aspects of this embodiment of the invention are also disclosed.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a schematic block diagram of the vehicle security system in accordance with the invention.

FIG. 2 is a schematic diagram of a remote transmitter of the vehicle security system in accordance with the invention.

FIG. 3 is a schematic block diagram of a portion of a first embodiment of the vehicle security system in accordance with the present invention.

FIG. 4 is a schematic block diagram of a portion of a second embodiment of the vehicle security system in accordance with the present invention.

FIG. 5 is a schematic block diagram of a portion of a third embodiment of the vehicle security system in accordance with the present invention.

FIG. 6 is a schematic block diagram of a portion of a fourth embodiment of the vehicle security system in accordance with the present invention.

FIG. 7 is a schematic block diagram of the vehicle security system in accordance with the present invention.

FIG. 8 is a schematic block diagram of a remote keyless entry system in accordance with the present invention.

FIG. 9 is a schematic block diagram of a remote engine starting system 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 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 now to the schematic block diagram of FIG. 1, a vehicle security system 10 according to one aspect of the invention is first described. The security system includes a controller 11 which, in turn, in the illustrated embodiment includes a central processing unit (CPU) or microprocessor 12 operating under stored program control.

In the illustrated embodiment, 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, as will be described in greater detail below. As would be readily understood by those skilled in the art, the transmitter portion of the controller 11 may not be needed in some embodiments of the invention. An antenna 13a is illustratively connected to the transmitter and receiver 13.

In the illustrated embodiment, the CPU 12 is also operatively connected to a memory (EEPROM) 14 and a data communications bus interface 15 which provides both input and output interfaces to various vehicle devices. As would be readily understood by those skilled in the art, the CPU 12 may alternately or additionally have its own on-board memory.

The data communications bus interface 15 is illustratively connected to various vehicle input devices including: an ignition switch 20; a key in the ignition sensor 21; two zone sensors 22a, 22b; conventional trunk hood and door pin sensors or switches 23, 24, and 25, respectively; and door lock switches 28. In addition, a pre-warn sensor 26 and valet switch 27 also provide inputs to the controller 11 in the illustrated embodiment. As would be readily understood by those skilled in the art, other inputs are also contemplated by the present invention and are generally described herein by the term sensor. In addition, an input signal may also be received from a remote transmitter 50 (FIG. 2).

The data communications bus interface 15 of the controller 11 may also preferably be connected to a plurality of output devices. The outputs may include auxiliary relay outputs 30, such as for window control, remote starting, or a remote alarm indication, as would be readily understood by those skilled in the art. A siren and/or lights 31, and green and red light emitting diodes (LEDs) 32, 33 for dashboard mounting are also illustratively connected to the controller 11. Other outputs may be directed to a valet LED 34, a dome light 36, a central lock relay or lock control unit 41, a starter kill circuit 42, and an armed relay output 43. In addition, other outputs may be directed to one or more of an audible tone generator 37, an alphanumeric display 44, a speech message annunciator 45, and a vibration transducer 46, as will be readily appreciated by those skilled in the art. Other similar indicating devices are also contemplated by the present invention, as would be readily understood by those skilled in the art. Some of the illustrated devices may be hardwired to various control nodes as would be readily understood by those skilled in the art. The control nodes may be connected by the data communications bus as would also be known to those skilled in the art.

Referring now more particularly to FIG. 2, a remote transmitter 50 in accordance with the invention is described. The remote transmitter 50 illustratively includes a housing 51 and a plurality of first momentary contact switches 52a–52d carried by the housing. A second momentary contact switch 53 and an indicating light, such as the illustrated LED 54 are also carried by or mounted on the housing 51. As would be readily understood by those skilled in the art, the remote transmitter 50 is typically relatively small and includes an opening 55 for facilitating connection to a vehicle key ring, for example. In addition, the remote transmitter 50 includes a central processing unit or microprocessor 56 operatively connected to the plurality of first switches 52a–52d, the second switch 53, and the LED 54. The microprocessor is also connected to a transmitter and/or receiver circuit 57 and its associated antenna 57a for transmitting and/or receiving signals to and from the controller 11 of the vehicle security system 10. Accordingly, the term "remote transmitter" is used broadly herein to describe the embodiment also including receiver means.

The remote transmitter 50 may also include a numeric or alphanumeric display 58, and a speaker 59 coupled to an audible tone generator or a speech message generator, as may be provided by the microprocessor 56. A vibration transducer, not shown, may also be incorporated into the remote transmitter 50 for communicating to the user as would be readily understood by those skilled in the art.

Turning now additionally to FIG. 3 a first embodiment of the desired signal enabling means 17 is described. The vehicle security system 10 preferably comprises a vehicle security sensor and associated sensor bus interface means 60 for interfacing the vehicle security sensor to the data communications bus 62. The vehicle security system 10 also preferably includes an alarm indicator and associated alarm indicator bus interface means 64 for interfacing the alarm indicator to the data communications bus. Examples of vehicle security sensors and alarm indicators are described above in greater detail with reference to FIG. 1.

The security system 10 further preferably comprises desired signal enabling means 17 for enabling the alarm controller 10 to operate using a desired set of signals for a desired vehicle from among a plurality of possible sets of signals for different vehicles. As would be readily understood by those skilled in the art, the term different vehicles may include vehicles from different manufacturers, different models, or even different trim levels of the same make and model. Accordingly, the desired signal enabling means 17 permits the alarm controller, that is, the security CPU and bus interface 65, to communicate with the vehicle security sensor and the alarm indicator via the data communications bus 62 so that the CPU is capable of operating the alarm indicator responsive to the vehicle security sensor.

The data communications bus 62 may preferably be a multiplexed data bus as would be readily understood by those skilled in the art. Accordingly, the sensor bus interface means, the alarm bus interface means, and the alarm controller bus interface means may each comprise multiplexing means for interfacing with the multiplexed data bus of the vehicle. For example, any of the various multiplexing schemes as disclosed in "The Thick and Thin of Car Cabling" by Thompson appearing in the IEEE Spectrum, February 1996, pp. 42–45 may be used. Other data bus connection schemes are also contemplated by the present invention.

As illustrated in FIG. 3, one embodiment of the desired signal enabling means 17 may preferably include a memory 70 for storing a plurality of sets 72a, 72b and 72n of signals for different vehicles, and selecting means for selecting the desired set of signals from the plurality of different sets of signals for different vehicles. By storing sets of signals is meant storing information or data necessary to generate the desired signals on the data bus 62 as would be readily

understood by those skilled in the art. The memory **70** may include device address memory means for storing a plurality of different sets of signals representative of different device addresses for different vehicles. Alternatively, or in addition thereto, the memory means may comprise protocol memory means for storing a plurality of different protocols for different vehicles. One or more other control nodes and associated bus interfaces **66** may also be connected to the data communications bus **62** as would also be readily understood by those skilled in the art. For example, other control nodes may include an engine controller thereby permitting the alarm controller to disable the engine, or the body controller thereby permitting the alarm controller to control the vehicle door locks as would be readily understood by those skilled in the art.

In the illustrated embodiment of FIG. **3**, the selecting means may comprise user selecting means **75** for permitting a user to select the desired set of signals. A keypad or other input means may be used to permit the user to select the desired signal set for his vehicle. The valet switch **27** (FIG. **1**), for example, may also be operated by the user to select the desired signal set. The user may select the desired set of signals by entering a unique digital code similar to the selection of signals for a home electronics universal remote control. Other techniques for permitting the user to select the desired signal set from a plurality of stored sets are also contemplated by the invention as would be readily appreciated by those skilled in the art.

Referring now additionally to FIG. **4** another embodiment of the desired signal enabling means **17'** is described in accordance with the security system **10'** of the present invention. In this embodiment, the selecting means may comprise bus determining means **77** for determining the desired set of signals based upon signals on the data communications bus. For example, the bus determining means could determine the desired set of signals based upon sensed voltage levels or based upon the timing of signal pulses on the data communications bus **62**. The other components of this embodiment of the desired signal enabling means **17'** are similar to those described above with reference to FIG. **3** and need no further description.

Yet another embodiment of the security system **10"** according to the invention is explained with reference to FIG. **5**. In this illustrated embodiment, the desired signal enabling means **17"** includes a desired signal set memory **81** operatively connected to the illustrated bus learning means **80**. The bus learning means **80** may determine and store in the signal set memory **81** the protocol and/or device addresses for the vehicle devices. For example, the bus learning means **80** may permit the user to operate various vehicle devices and store a desired signal set based thereon as would be readily understood by those skilled in the art. The other components of the desired signal enabling means **17"** are similar to those described above with reference to FIG. **3** and need no further description.

Still another embodiment of the desired signal enabling means **17'"** is explained with reference to FIG. **6**. 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**, for example. As would be readily understood by those skilled in the art, the download learning means as well as the other desired signal enabling means may be implemented by software in the CPU **12** of the controller **11** or in a separate microprocessor or circuits.

One implementation of the security system **10** is shown in FIG. **7** and includes the vehicle security controller **11**. The remote transmitter **50** can switch the controller **11** between the armed and disarmed modes. The controller **11** in the armed mode is capable of generating an alarm indication via the siren **31** (FIG. **1**) and based upon the door switches **25** (FIG. **1**), for example. The communications are via the data communications bus **62** and, are based upon the desired signal set from the desired signal enabling means **17**.

The features and aspects described above may also be readily implemented into other vehicle related systems, such as for performing remote control functions. As shown in FIG. **8**, the invention may be embodied in a remote keyless entry system **90** including a remote keyless entry controller **91** operated by a remote handheld transmitter **93**. The controller **91** communicates with the door lock motors **94** and illustrated trunk release **96** via the data communications bus **62**. The remote keyless entry system **90** also includes the desired signal enabling means **17** which permits the controller **91** to perform the desired door locking and trunk release remote control functions or operations as would also be readily understood by those skilled in the art. As would be readily appreciated by those skilled in the art, any of the desired signal enabling means described herein and equivalent thereto may be used for the remote keyless entry system **90** in accordance with the present invention.

Turning now to FIG. **9**, yet another vehicle associated remote control function is illustrated and now explained. The remote engine starting system **100** includes a remote start controller **101** operable by a remote transmitter **103**. The remote controller **101** may communicate via the data communications bus **62** to enable the ignition and fuel systems **106** and crank the engine starter **104**. Various sensors may also be monitored as would be readily understood by those skilled in the art.

A method aspect of the invention is for operating a vehicle security system **10** for a vehicle of a type including a data communications bus **62** connecting a plurality of vehicle devices. The method preferably comprises the steps of interfacing an alarm controller **11** to the data communications bus **62**, and enabling the alarm controller to operate using a desired set of digital signals for a desired vehicle from a plurality of possible sets of signals for different vehicles to thereby permit the alarm controller to communicate with at least one of a vehicle security sensor **60** and an alarm indicator **64** via the data communications bus **62** (FIG. **3**). Accordingly, the alarm controller is capable of operating the alarm indicator responsive to the vehicle security sensor and via the data communication bus.

Another method of the invention is for remotely controlling a vehicle function for a vehicle of a type including a data communications bus **62** connecting a plurality of vehicle devices, and a vehicle function controller and associated bus interface means for interfacing the vehicle function controller to the data communications bus. The method comprising the steps of: enabling the vehicle function controller to operate using a desired set of signals for a desired vehicle from a plurality of sets of signals for different vehicles for permitting the vehicle function controller to communicate via the data communications bus with at least one of the vehicle devices; and receiving a signal at the vehicle from a remote transmitter so that the vehicle function controller remotely controls a vehicle function responsive to the remote transmitter.

Those of skill in the art will readily recognize the benefits and advantages of the present invention for aftermarket

security systems and other aftermarket systems for implementing remote control functions wherein compatibility with a potentially large number of different protocols and/or device addresses is desired. Of course, 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 the 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 security system for a vehicle of a type including a data communications bus connecting a plurality of vehicle devices, said vehicle security system comprising:

a vehicle security sensor and associated sensor bus interface means for interfacing said vehicle security sensor to the data communications bus;

an alarm indicator and associated alarm indicator bus interface means for interfacing said alarm indicator to the data communications bus;

an alarm controller and associated alarm controller bus interface means for interfacing said alarm controller to the data communications bus; and

desired signal enabling means for enabling said alarm controller to operate using a desired set of signals for a corresponding desired vehicle from a plurality of sets of signals for different vehicles for permitting said alarm controller to communicate with said vehicle security sensor and said alarm indicator via the data communications bus so that said alarm controller is capable of operating said alarm indicator responsive to said vehicle security sensor.

2. A vehicle security system according to claim 1 wherein said desired signal enabling means comprises:

memory means for storing a plurality of sets of signals for different vehicles; and

selecting means for selecting the desired set of signals from the plurality of different sets of signals for different vehicles.

3. A vehicle security system according to claim 2 wherein said selecting means comprises user selecting means for permitting a user to select the desired set of signals.

4. A vehicle security system according to claim 2 wherein said selecting means comprises bus determining means for determining the desired set of signals based upon signals on the data communications bus.

5. A vehicle security system according to claim 2 wherein said memory means comprises device address memory means for storing a plurality of different sets of signals for different device addresses.

6. A vehicle security system according to claim 2 wherein said memory means comprises protocol memory means for storing a plurality of different sets of signals for different protocols.

7. A vehicle security system according to claim 1 wherein said desired signal enabling means comprises bus learning means for learning the desired set of signals based upon signals on the data communications bus.

8. A vehicle security system according to claim 1 wherein said desired signal enabling means comprises download learning means for leaving the desired set of signals from a downloading device.

9. A vehicle security system according to claim 1 wherein said desired signal enabling means comprises protocol providing means for providing a protocol for the desired vehicle.

10. A vehicle security system according to claim 1 wherein said desired signal enabling means comprises device address providing means for providing device addresses for the desired vehicle.

11. A vehicle security system according to claim 1 further comprising a vehicle controller and associated vehicle controller bus interface means for connecting the vehicle controller to the data communications bus; and wherein said alarm controller is operatively connected to said vehicle controller.

12. A vehicle security system according to claim 1 wherein the data communications bus is a multiplexed data bus; and wherein the sensor bus interface means, the alarm bus interface means, and the alarm controller bus interface means each comprises multiplex interface means for interfacing with the multiplexed data bus.

13. A vehicle security system according to claim 1 wherein said vehicle security sensor comprises one of a door switch, a trunk switch, a proximity sensor, and a motion sensor.

14. A vehicle security system according to claim 1 wherein said alarm indicator comprises one of a vehicle light, a vehicle horn, a siren, a speech message generator, and a remote pager.

15. A vehicle security system for a vehicle of a type including a data communications bus connecting a plurality of vehicle devices, the vehicle devices comprising at least one of a vehicle security sensor and an alarm indicator, said vehicle security system comprising:

an alarm controller and associated alarm controller bus interface means for interfacing said alarm controller to the data communications bus;

memory means for storing a plurality of sets of signals for different vehicles; and

selecting means for selecting a desired set of signals for a desired vehicle from the plurality of sets of signals for different vehicles, the desired set of signals for enabling said alarm controller to communicate via the data communications bus with at least one of the vehicle security sensor and the alarm indicator.

16. A vehicle security system according to claim 15 wherein said selecting means comprises user selecting means for permitting a user to select the desired set of signals.

17. A vehicle security system according to claim 15 wherein said selecting means comprises bus determining means for determining the desired set of signals based upon signals on the data communications bus.

18. A vehicle security system according to claim 15 wherein said memory means comprises device address memory means for storing a plurality of different sets of signals for different device addresses.

19. A vehicle security system according to claim 15 wherein said memory means comprises protocol memory means for storing a plurality of different sets of signals for different protocols.

20. A vehicle security system according to claim 15 wherein the data communications bus is a multiplexed data bus; and wherein the alarm controller bus interface means comprises multiplex interface means for interfacing with the multiplexed data bus.

21. A vehicle security system for a vehicle of a type including a data communications bus connecting a plurality of vehicle devices, the vehicle devices comprising at least one of a vehicle security sensor and an alarm indicator, said vehicle security system comprising:

an alarm controller and associated alarm controller bus interface means for interfacing said alarm controller to the data communications bus; and

desired signal enabling means for enabling said alarm controller to operate using a desired set of signals for a corresponding desired vehicle from a plurality of sets of signals for different vehicles for permitting said alarm controller to communicate via the data communications bus with at least one of the vehicle security sensor and the alarm indicator, said desired signal enabling means comprising learning means for learning the desired set of signals.

22. A vehicle security system according to claim 21 wherein said learning means comprises bus learning means for learning the desired set of signals based upon signals on the data communications bus.

23. A vehicle security system according to claim 21 wherein said learning means comprises download learning means for learning the desired set of signals from a downloading device.

24. A vehicle security system according to claim 23 further comprising cellular telephone means cooperating with said download learning means for receiving signals from a remote downloading device.

25. A vehicle security system according to claim 21 wherein said signal desired enabling means comprises protocol providing means for providing a protocol for the desired vehicle.

26. A vehicle security system according to claim 21 wherein said desired signal enabling means comprises device address providing means for providing desired addresses for the desired vehicle.

27. A vehicle security system according to claim 21 wherein the data communications bus is a multiplexed data bus; and wherein the alarm controller bus interface means comprises multiplex interface means for interfacing with the multiplexed data bus.

28. A method for operating a vehicle security system for a vehicle of a type including a data communications bus connecting a plurality of vehicle devices, the method comprising the steps of:

interfacing an alarm controller to the data communications bus; and

enabling said alarm controller to operate using a set of desired signals for a corresponding desired vehicle from a plurality of sets of signals for different vehicles for permitting said alarm controller to communicate via the data communications bus with at least one of a vehicle security sensor and an alarm indicator.

29. A method according to claim 28 wherein the step of enabling the alarm controller to operate using a set of desired signals comprises the steps of:

storing in a memory a plurality of sets of signals for different vehicles; and

selecting the desired set of signals from the plurality of different sets of signals for different vehicles.

30. A method according to claim 29 wherein the step of selecting comprises permitting user selection of the desired set of signals.

31. A method according to claim 28 wherein the step of selecting comprises determining the desired set of signals based upon signals on the data communications bus.

32. A method according to claim 29 wherein the step of storing in memory comprises storing a plurality of different sets of signals representative of different device addresses.

33. A method according to claim 29 wherein the step of storing in memory comprises storing a plurality of different sets of signals representative of different protocols.

34. A method according to claim 28 wherein the step of enabling the alarm controller to operate using a set of desired signals comprises the step of learning the desired set of signals based upon signals on the data communications bus.

35. A method according to claim 28 wherein the step of enabling the alarm controller to operate using a set of desired signals comprises the step of downloading the desired signals from a downloading device.

36. A remote control system for a vehicle of a type including a data communications bus connecting a plurality of vehicle devices, said remote control system comprising:

a remote transmitter;

a receiver within the vehicle for receiving a signal from said remote transmitter;

a vehicle function controller, operatively connected to said receiver, and associated vehicle function controller bus interface means for interfacing said vehicle function controller to the data communications bus; and

desired signal enabling means for enabling said vehicle function controller to operate using a desired set of signals for a corresponding desired vehicle from a plurality of sets of signals for different vehicles for permitting said vehicle function controller to communicate via the data communications bus with a vehicle device so that said vehicle function controller is capable of operating the vehicle device responsive to said remote transmitter.

37. A remote control system for a vehicle according to claim 36 wherein the plurality of vehicle devices comprises a vehicle security sensor and associated sensor bus interface means for interfacing said vehicle security sensor to the data communications bus; and wherein said vehicle function controller comprises an alarm controller being capable of generating an alarm responsive to the vehicle security sensor.

38. A remote control system for a vehicle according to claim 36 wherein the plurality of vehicle devices comprises a plurality of vehicle door locks movable between locked and unlocked positions and associated bus interface means for interfacing said door locks to the data communications bus; and wherein said vehicle function controller comprises a door lock controller for moving the vehicle door locks between locked and unlocked positions responsive to said remote transmitter.

39. A remote control system for a vehicle according to claim 36 wherein said plurality of vehicle devices comprises vehicle engine starting means and associated bus interface means for interfacing said vehicle engine starting means to the data communications bus; and wherein said vehicle function controller comprises a remote start controller for operating the vehicle engine starting means responsive to said remote transmitter.

40. A remote control system for a vehicle according to claim 36 wherein said desired signal enabling means comprises:

memory means for storing a plurality of sets of signals for different vehicles; and

selecting means for selecting the desired set of signals from the plurality of different sets of signals for different vehicles.

41. A remote control system for a vehicle according to claim 40 wherein said selecting means comprises user selecting means for permitting a user to select the desired set of signals.

42. A remote control system for a vehicle according to claim 40 wherein said selecting means comprises determining means for determining the desired set of signals based upon signals on the data communications bus.

43. A remote control system for a vehicle according to claim 40 wherein said memory means comprises address memory means for storing a plurality of different sets of digital signals for different device addresses.

44. A remote control system for a vehicle according to claim 40 wherein said memory means comprises protocol memory means for storing a plurality of different sets of signals for different protocols.

45. A remote control system for a vehicle according to claim 36 wherein said desired signal enabling means comprises learning means for learning the desired set of signals.

46. A remote control system for a vehicle according to claim 36 wherein said desired signal enabling means comprises protocol providing means for providing a protocol for the desired vehicle.

47. A remote control system for a vehicle according to claim 36 wherein said desired signal enabling means comprises device address providing means for providing device addresses for the desired vehicle.

48. A remote control system for a vehicle according to claim 36 further comprising a second vehicle controller and associated vehicle controller bus interface means for connecting to the data communications bus; and wherein said vehicle function controller is operatively connected to said second vehicle controller.

49. A remote control system for a vehicle according to claim 36 wherein the data communications bus is a multiplexed data bus; and wherein the vehicle function controller bus interface means comprises multiplexing means for interfacing with the multiplexed data bus.

50. A method for remotely controlling a vehicle function for a vehicle of a type including a data communications bus connecting a plurality of vehicle devices, and a vehicle function controller and associated bus interface means for interfacing the vehicle function controller to the data communications bus; the method comprising the steps of:

enabling the vehicle function controller to operate using a desired set of signals for a corresponding desired vehicle from a plurality of sets of signals for different vehicles for permitting the vehicle function controller to communicate via the data communications bus with at least one of the vehicle devices; and

receiving a signal at the vehicle from a remote transmitter so that the vehicle function controller remotely controls a vehicle function responsive to the remote transmitter.

51. A method according to claim 50 wherein the plurality of vehicle devices comprises a vehicle security sensor and associated sensor bus interface means for interfacing the vehicle security sensor to the data communications bus; wherein the vehicle function controller comprises an alarm controller movable between armed and disarmed modes, the alarm controller when in the armed mode being capable of generating an alarm indication responsive to the vehicle security sensor; and wherein the step of receiving comprises receiving a signal so that the vehicle function controller is moved to one of the armed and disarmed modes.

52. A method according to claim 50 wherein the plurality of vehicle devices comprises a plurality of vehicle door locks movable between locked and unlocked positions and associated bus interface means for interfacing the door locks to the data communications bus; and wherein the step of receiving comprises moving the vehicle door locks to one of locked and unlocked positions responsive to the remote transmitter.

53. A method according to claim 50 wherein the plurality of vehicle devices comprises vehicle engine starting means and associated bus interface means for interfacing the vehicle engine starting means to the data communications bus; and wherein the step of receiving comprises operating the vehicle engine starting means responsive to the remote transmitter.

54. A method according to claim 50 wherein the step of enabling the alarm controller to operate using a set of desired signals comprises the steps of:

storing in a memory a plurality of sets of signals for different vehicles; and

selecting the desired set of signals from the plurality of different sets of signals for different vehicles.

55. A method according to claim 54 wherein the step of selecting comprises permitting user selection of the desired set of signals.

56. A method according to claim 54 wherein the step of selecting comprises determining the desired set of signals based upon signals on the data communications bus.

57. A method according to claim 54 wherein the step of storing in memory comprises storing a plurality of different sets of signals representative of different device addresses.

58. A method according to claim 54 wherein the step of storing in memory comprises storing a plurality of different sets of signals representative of different protocols.

59. A method according to claim 50 wherein the step of enabling the alarm controller to operate using a set of desired signals comprises the step of learning the desired set of signals.

* * * * *

UNITED STATES PATENT AND TRADEMARK OFFICE

CERTIFICATE OF CORRECTION

PATENT NO. : 5,719,551
DATED : February 17, 1998
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 9, Line 62 Strike::

"leaving"

Insert::

- - learning - -

Signed and Sealed this

Twelfth Day of May, 1998

Attest:

BRUCE LEHMAN

Attesting Officer

Commissioner of Patents and Trademarks

EXHIBIT M

US006011460A

United States Patent [19]

Flick

[11] Patent Number: 6,011,460

[45] Date of Patent: *Jan. 4, 2000

[54] **VEHICLE SECURITY SYSTEM FOR A VEHICLE HAVING A DATA COMMUNICATIONS BUS AND RELATED METHODS**

[76] Inventor: **Kenneth E. Flick**, 5236 Presley Pl., Douglasville, Ga. 30135

[*] Notice: This patent is subject to a terminal disclaimer.

[21] Appl. No.: **09/023,838**

[22] Filed: **Feb. 13, 1998**

Related U.S. Application Data

[63] Continuation-in-part of application No. 08/701,356, Aug. 22, 1996, Pat. No. 5,719,551.

[51] **Int. Cl.**[7] **B60R 25/10**

[52] **U.S. Cl.** **340/426**; 340/531; 340/533; 340/825.31; 340/825.69; 180/287; 307/10.2

[58] **Field of Search** 340/426, 427, 340/428, 429, 531–34, 825.31, 825.32, 825.69, 825.72; 180/173, 287; 307/10.2, 10.3; 395/309–10, 830–33; 701/32, 33, 36

[56] **References Cited**

U.S. PATENT DOCUMENTS

4,055,772	10/1977	Leung	307/10 R
4,288,778	9/1981	Zucker	340/64
4,538,262	8/1985	Sinniger et al.	370/85
4,697,092	9/1987	Roggendorf et al.	307/10 R
4,754,255	6/1988	Saunders et al.	340/64
4,760,275	7/1988	Sato et al.	307/10 R
4,792,783	12/1988	Burgess et al.	340/22
4,841,159	6/1989	Evans et al.	307/38
4,926,332	5/1990	Komuro et al.	364/424.05
5,006,843	4/1991	Hauer	340/825.31
5,040,990	8/1991	Suman et al.	439/34
5,046,041	9/1991	Lecocq et al.	364/900
5,049,867	9/1991	Stouffer	340/426
5,054,569	10/1991	Scott et al.	180/167

(List continued on next page.)

FOREIGN PATENT DOCUMENTS

0 699 562 A2	7/1995	European Pat. Off.	B60R 16/02
195 30 721 A1	2/1997	Germany	H02J 9/04
WO 97/28988	8/1997	WIPO	B60R 16/02

OTHER PUBLICATIONS

Society of Automotive Engineers, Inc., "Surface Vehicle Information Report," SAE J2058 (Jun. 21, 1990).

Society of Automotive Engineers, Inc., "Surface Vehicle Standard," SAE J1850 (rev'd Jul. 1995).

Mark Thompson, "The Thick and Thin of Car Cabling," *IEEE Spectrum*, pp. 42–45 (Feb. 1996).

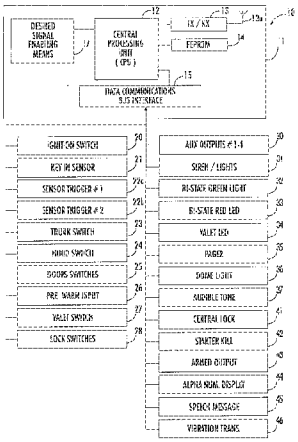
Primary Examiner—Daniel J. Wu

Attorney, Agent, or Firm—Allen, Dyer, Doppelt, Milbrath & Gilchrist, P.A. Attorneys at Law

[57] **ABSTRACT**

A vehicle security system includes a vehicle security sensor and associated sensor bus interface, an alarm indicator and associated alarm indicator bus interface, and an alarm controller and associated alarm controller bus interface for interfacing the alarm controller. The vehicle security system is for a vehicle of a type including a data communications bus connecting a plurality of vehicle devices. The security system preferably further includes a desired signal enabling circuit for enabling the alarm controller to operate using a set of desired signals for a desired vehicle from among a plurality of possible sets of signals for different vehicles. Accordingly, the desired signal enabling circuit permits the alarm controller to communicate with the vehicle security sensor and the alarm indicator via the data communications bus so that the alarm controller is capable of operating the alarm indicator responsive to the vehicle security sensor. The desired signal enabling circuit may preferably learn the desired set of signals from the plurality of different sets of signals for different vehicles by connection and communications with a downloading device, such as a portable or laptop computer. The desired signal enabling circuit may also be included in other vehicle remote control systems. Method aspects of the invention are also disclosed.

30 Claims, 9 Drawing Sheets



U.S. PATENT DOCUMENTS

5,081,667	1/1992	Drori et al.	379/59
5,142,278	8/1992	Moallemi et al.	340/825.06
5,146,215	9/1992	Drori	340/825.32
5,243,322	9/1993	Thompson et al.	340/429
5,252,966	10/1993	Lambropoulos et al.	340/825.69
5,406,270	4/1995	Van Lente	340/34
5,473,540	12/1995	Schmitz	701/1
5,475,818	12/1995	Molyneaux et al.	395/200.05
5,521,588	5/1996	Kuhner et al.	340/825.22
5,523,948	6/1996	Adrain	701/99
5,555,498	9/1996	Berra et al.	364/424.03
5,606,306	2/1997	Mutoh et al.	340/426
5,719,551	2/1998	Flick	340/426
5,832,397	11/1998	Yoshida et al.	701/29

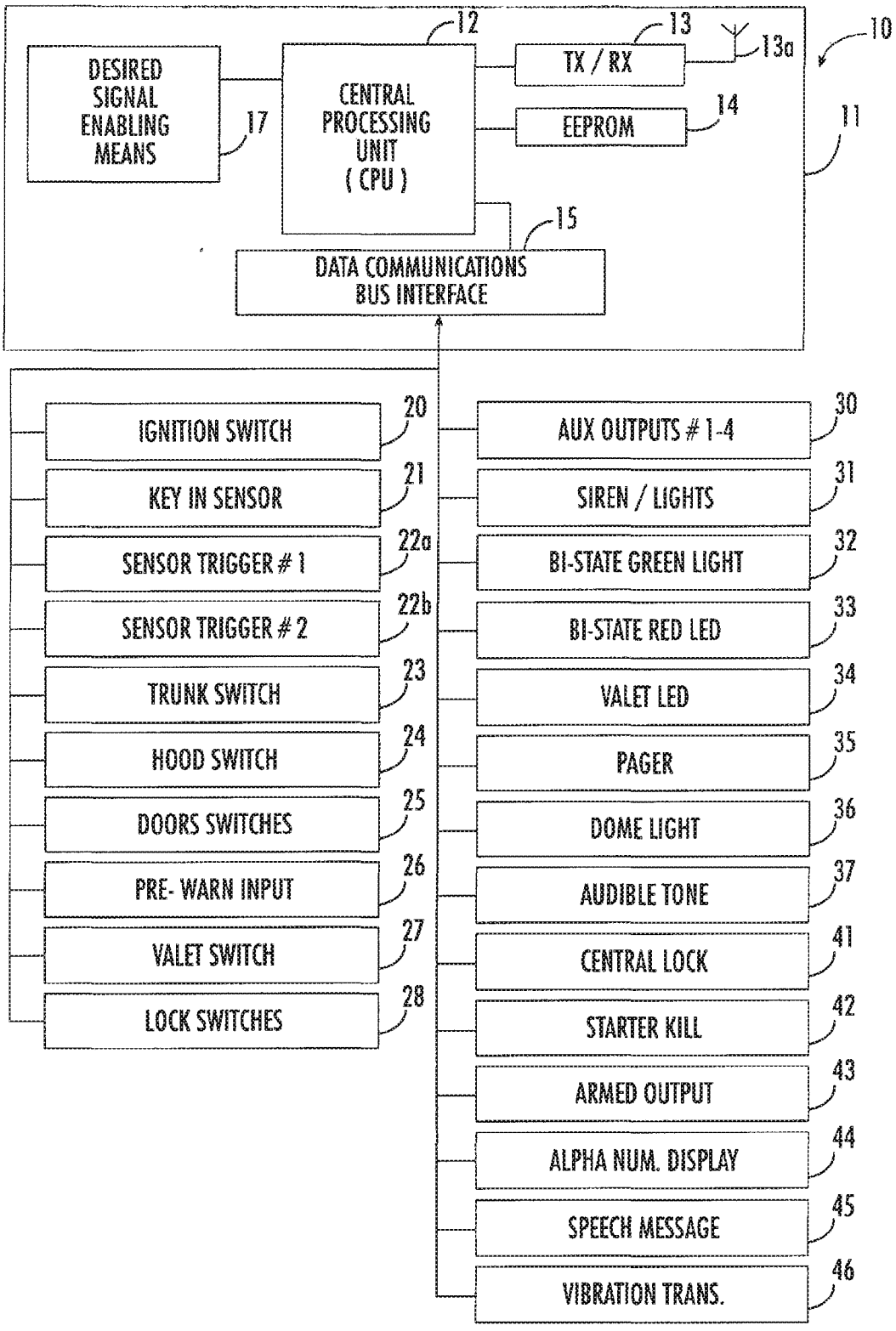

DESIRED SIGNAL ENABLING MEANS
17
CENTRAL PROCESSING UNIT (CPU)
12
TX / RX
13
13a
EEPROM
14
10
11
DATA COMMUNICATIONS BUS INTERFACE
15
IGNITION SWITCH
20
KEY IN SENSOR
21
SENSOR TRIGGER # 1
22a
SENSOR TRIGGER # 2
22b
TRUNK SWITCH
23
HOOD SWITCH
24
DOORS SWITCHES
25
PRE- WARN INPUT
26
VALET SWITCH
27
LOCK SWITCHES
28
AUX OUTPUTS # 1-4
30
SIREN / LIGHTS
31
BI-STATE GREEN LIGHT
32
BI-STATE RED LED
33
VALET LED
34
PAGER
35
DOME LIGHT
36
AUDIBLE TONE
37
CENTRAL LOCK
41
STARTER KILL
42
ARMED OUTPUT
43
ALPHA NUM. DISPLAY
44
SPEECH MESSAGE
45
VIBRATION TRANS.
46

FIG. 1.

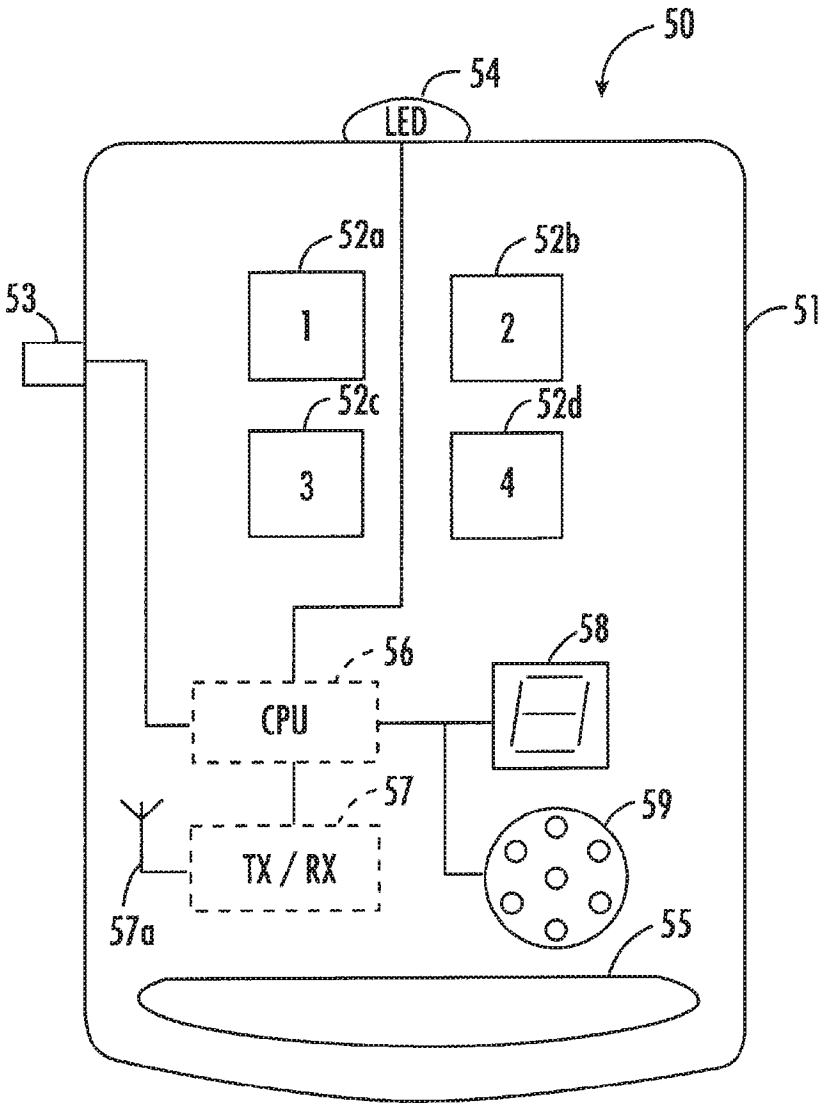


FIG. 2.

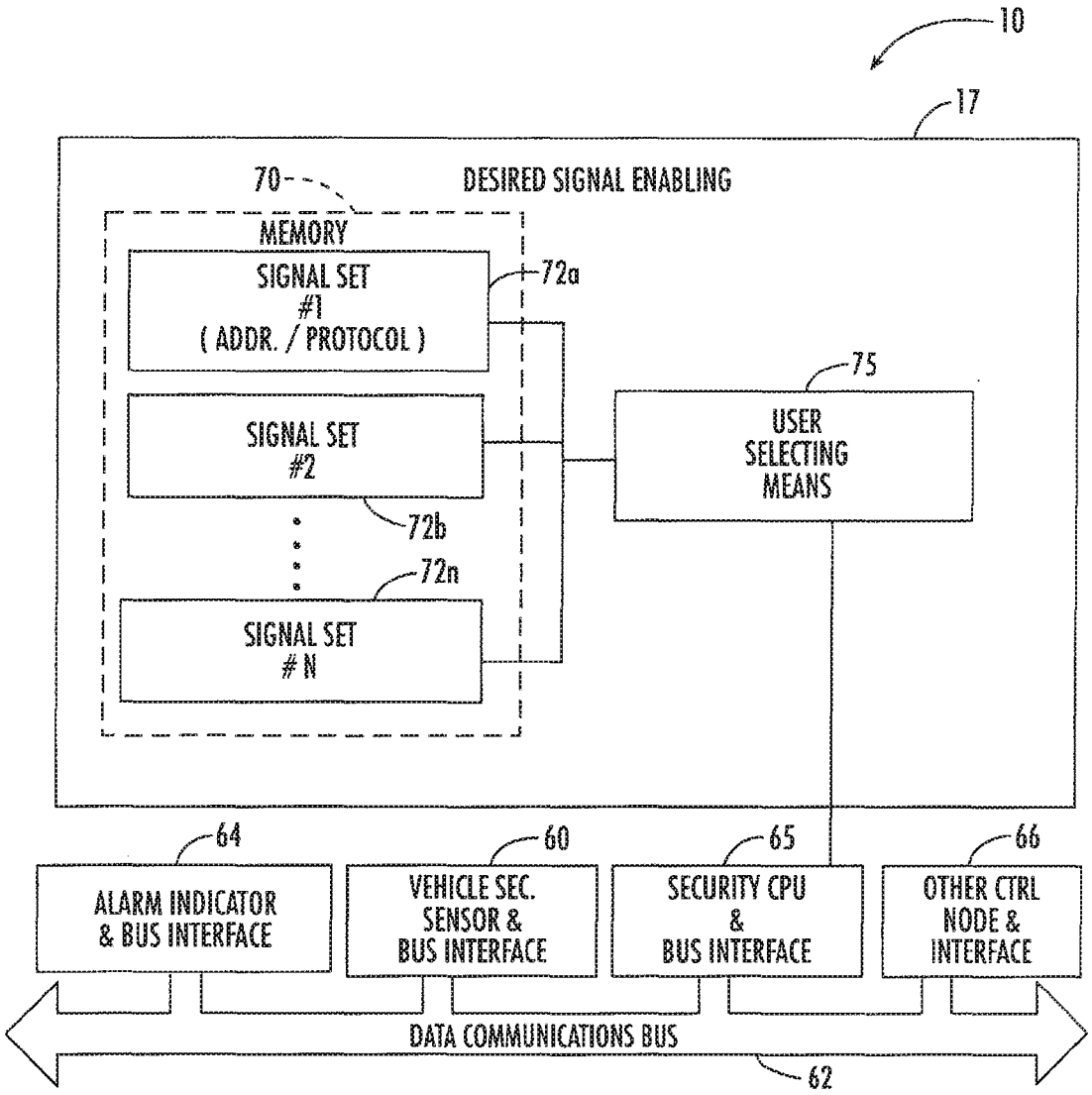

10
17
70
DESIRED SIGNAL ENABLING
MEMORY
SIGNAL SET #1 (ADDR. / PROTOCOL)
72a
SIGNAL SET #2
72b
72n
SIGNAL SET # N
75
USER SELECTING MEANS
64
60
65
66
ALARM INDICATOR & BUS INTERFACE
VEHICLE SEC. SENSOR & BUS INTERFACE
SECURITY CPU & BUS INTERFACE
OTHER CTRL NODE & INTERFACE
DATA COMMUNICATIONS BUS
62

FIG. 3.

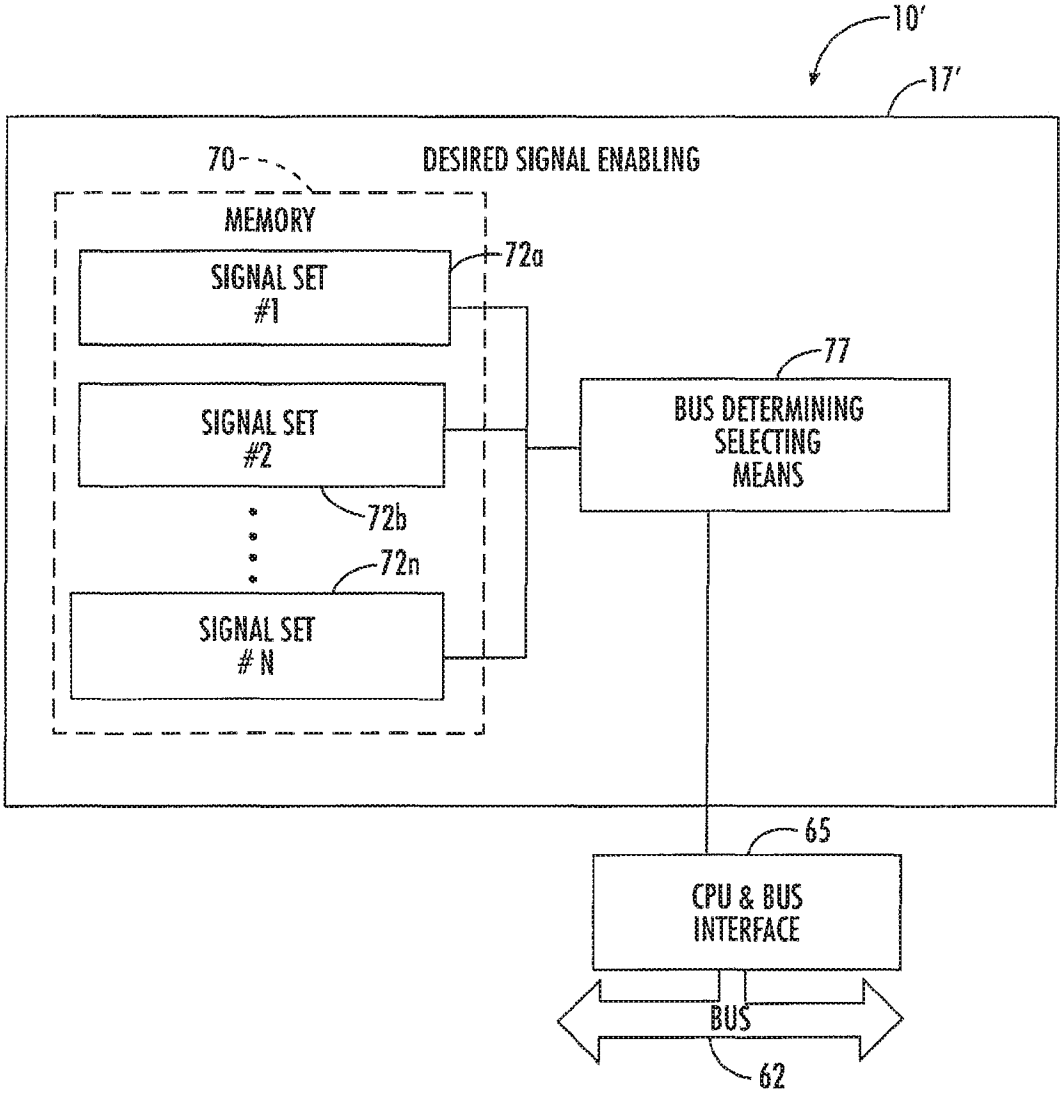

10'
17'
70
DESIRED SIGNAL ENABLING
MEMORY
SIGNAL SET #1
72a
SIGNAL SET #2
72b
72n
SIGNAL SET # N
77
BUS DETERMINING SELECTING MEANS
65
CPU & BUS INTERFACE
BUS
62

FIG. 4.

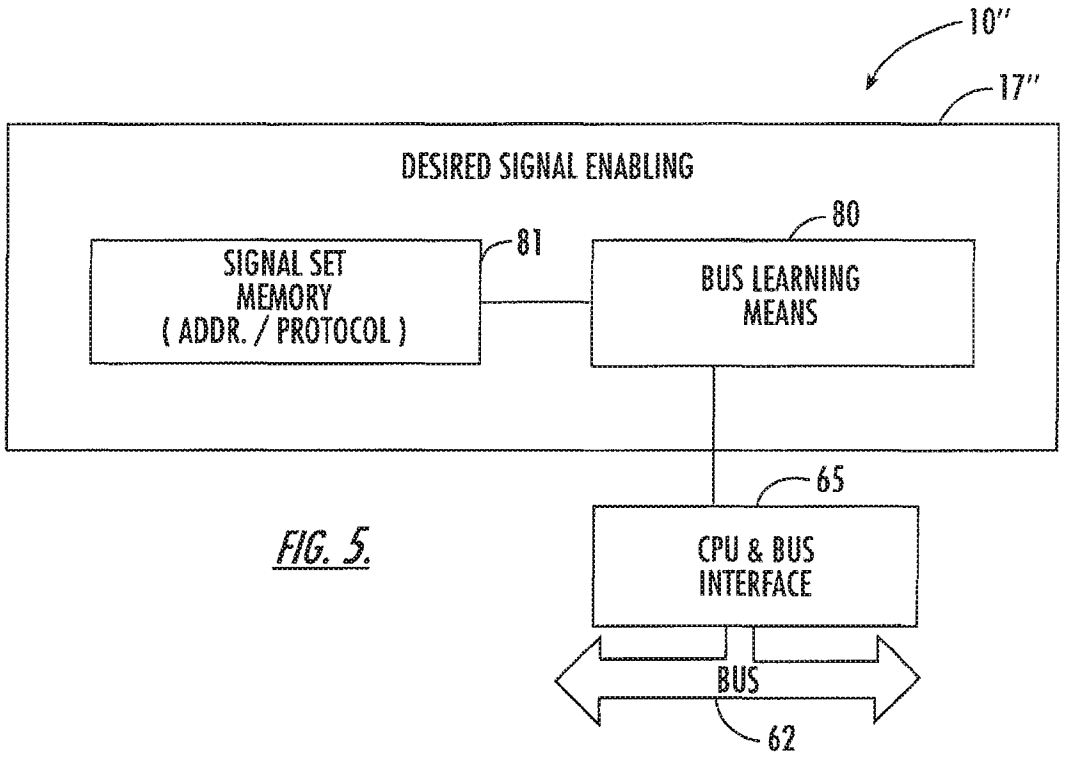

10''
17''
DESIRED SIGNAL ENABLING
80
81
SIGNAL SET MEMORY (ADDR. / PROTOCOL)
BUS LEARNING MEANS
65
CPU & BUS INTERFACE
BUS
62

FIG. 5.

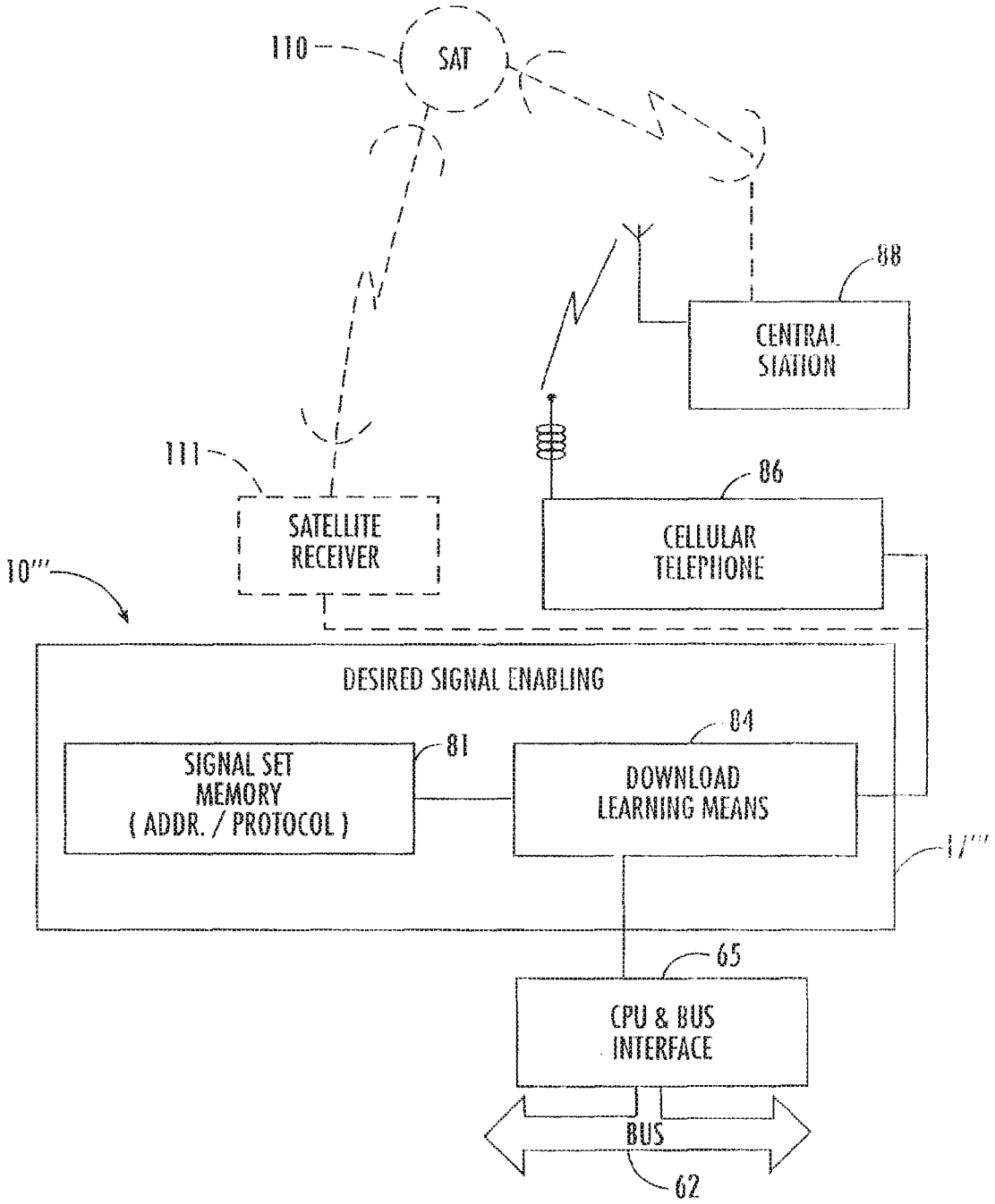

110
SAT
88
CENTRAL STATION
111
86
SATELLITE RECEIVER
CELLULAR TELEPHONE
10'''
DESIRED SIGNAL ENABLING
84
81
SIGNAL SET MEMORY (ADDR. / PROTOCOL)
DOWNLOAD LEARNING MEANS
17'''
65
CPU & BUS INTERFACE
BUS
62

FIG. 6A.

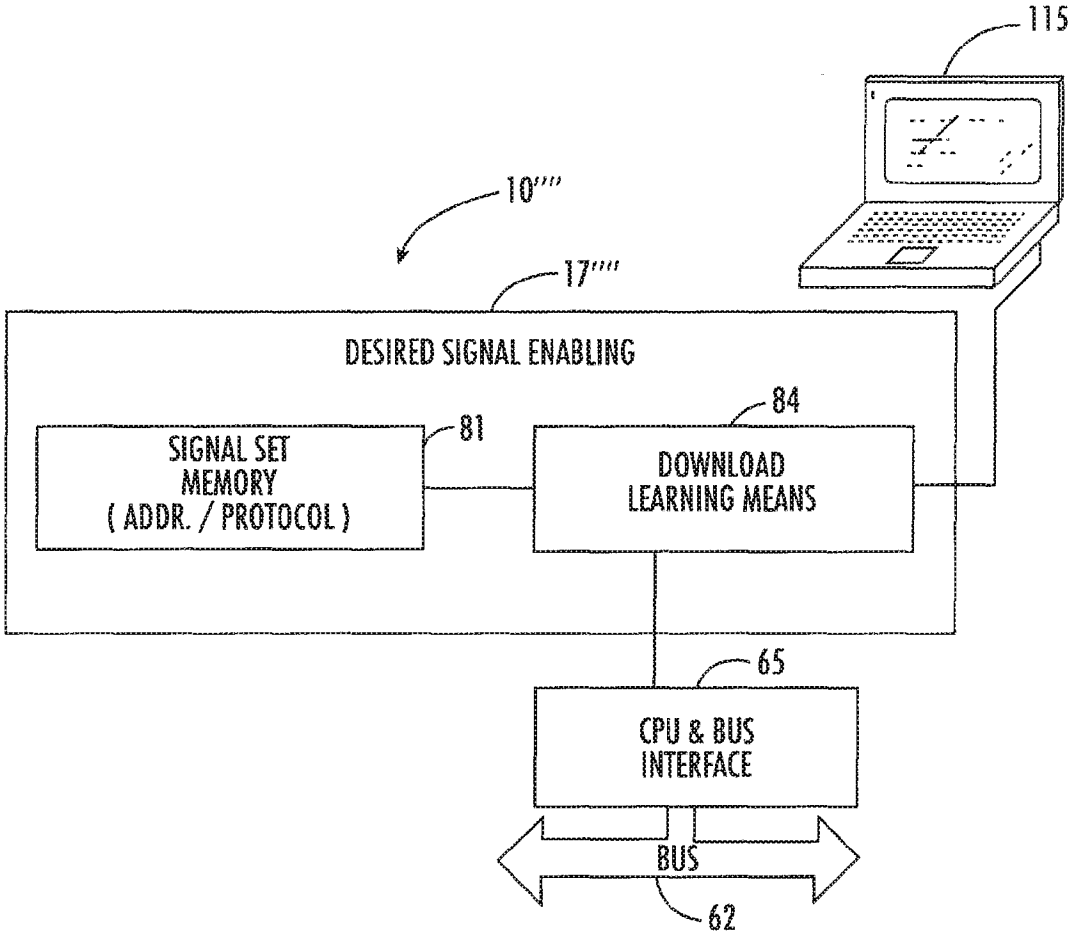

115
10''''
17''''
DESIRED SIGNAL ENABLING
81
SIGNAL SET
MEMORY
(ADDR. / PROTOCOL)
84
DOWNLOAD
LEARNING MEANS
65
CPU & BUS
INTERFACE
BUS
62

FIG. 6B.

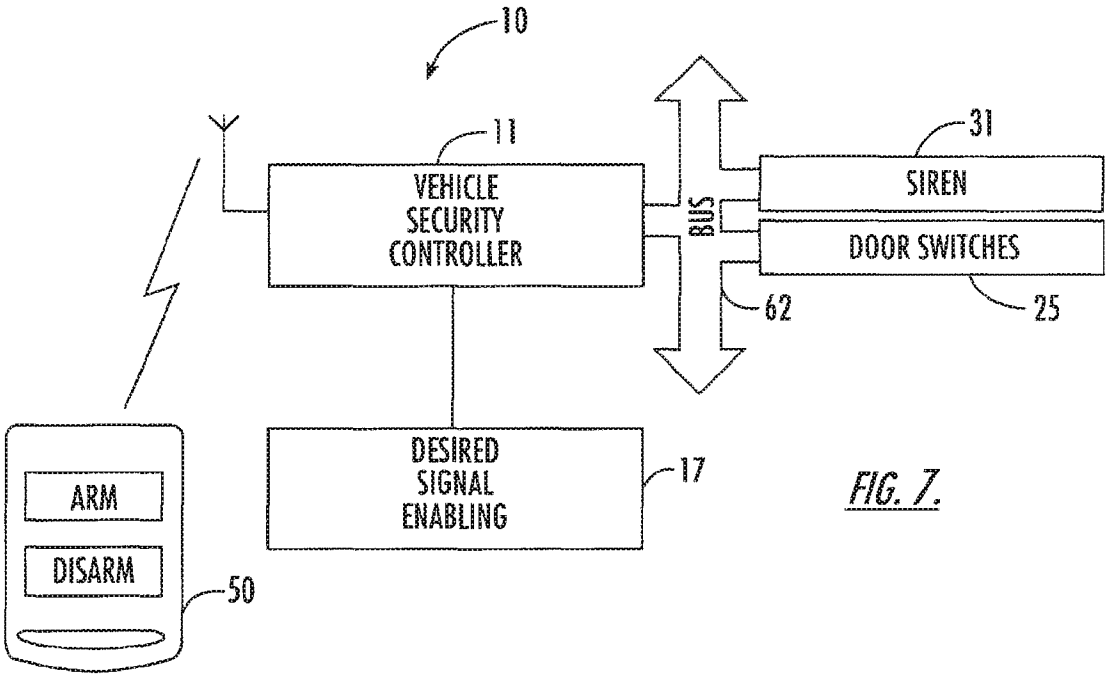

10
11
VEHICLE SECURITY CONTROLLER
BUS
31
SIREN
DOOR SWITCHES
25
62
DESIRED SIGNAL ENABLING
17
ARM
DISARM
50

FIG. 7.

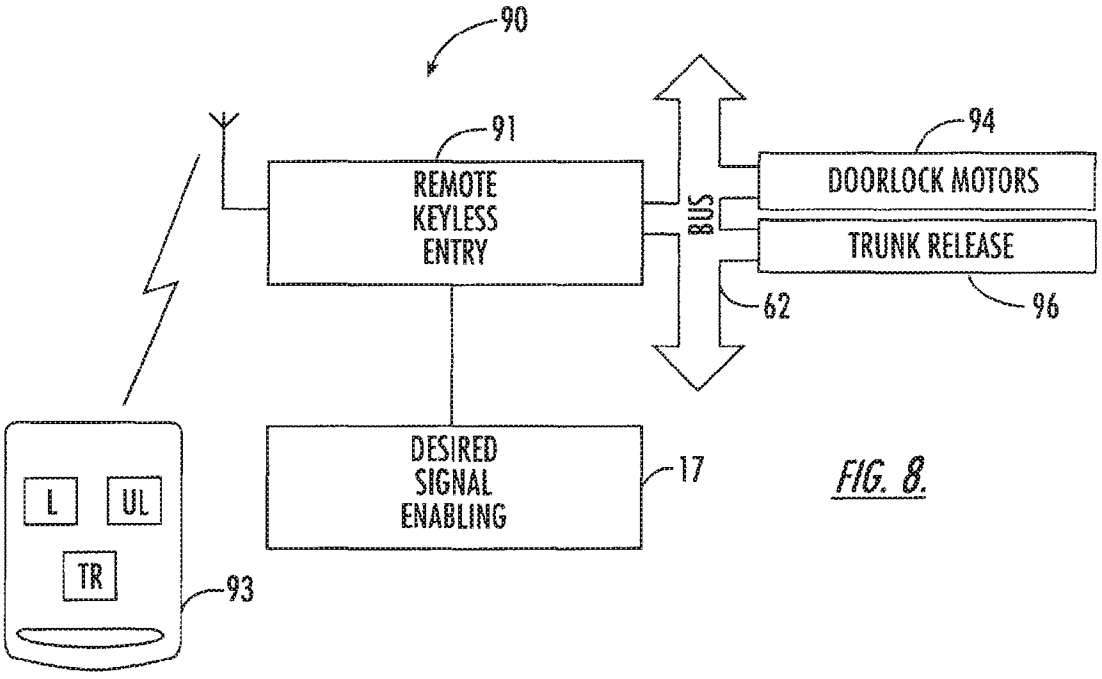

90
91
REMOTE KEYLESS ENTRY
BUS
94
DOORLOCK MOTORS
TRUNK RELEASE
96
62
DESIRED SIGNAL ENABLING
17
L
UL
TR
93

FIG. 8.

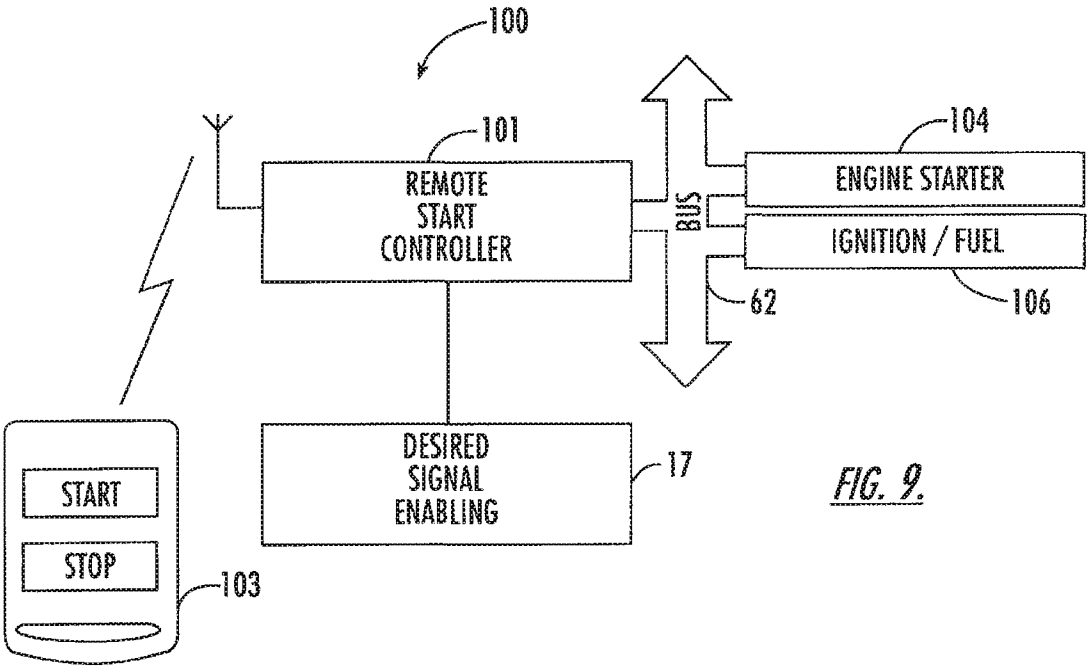

100
101
REMOTE START CONTROLLER
BUS
104
ENGINE STARTER
IGNITION / FUEL
106
62
DESIRED SIGNAL ENABLING
17
START
STOP
103

FIG. 9.

VEHICLE SECURITY SYSTEM FOR A VEHICLE HAVING A DATA COMMUNICATIONS BUS AND RELATED METHODS

RELATED APPLICATION

The present application is a continuation-in-part of U.S. patent application Ser. No. 08/701,356 filed Aug. 22, 1996 now U.S. Pat. No. 5,719,551.

FIELD OF THE INVENTION

This application is related to the field of security systems and, more particularly, to a security 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. ikewise, 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 seduce 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 security systems for hardwired connection to vehicle devices, such as aftermarket vehicle security systems, 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 remote 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 present invention to provide a vehicle security

system and associated method which is readily adapted or adaptable for installation in a vehicle having a data communications bus.

It is another object of the present invention to provide a security system or other remote control function systems and associated methods for installation in a vehicle having a data communications bus, and wherein the vehicle is one from among a plurality of different vehicles with different device addresses and/or signal protocols for communicating with the vehicle devices.

These and other objects, advantages and features of the present invention are provided by a vehicle security system for a vehicle of a type including a data communications bus connecting a plurality of vehicle devices. In particular, the vehicle security system preferably comprises a vehicle security sensor and associated sensor bus interface means for interfacing the vehicle security sensor to the data communications bus. The vehicle security system also preferably includes an alarm indicator and associated alarm indicator bus interface means for interfacing the alarm indicator to the data communications bus. An alarm controller and associated alarm controller bus interface means are also preferably included. The security system further preferably comprises desired signal enabling means for enabling the alarm controller to operate using a desired set of signals for a desired vehicle from among a plurality of possible sets of signals for different vehicles. Accordingly, the desired signal enabling means permits the alarm controller to communicate with the vehicle security sensor and the alarm indicator via the data communications bus so that the alarm controller is capable of operating the alarm indicator responsive to the vehicle security sensor. The security system is thus advantageously compatible with many different types of vehicle data communications formats or protocols.

The data communications bus may preferably be a multiplexed data bus. Accordingly, the sensor bus interface means, the alarm bus interface means, and the alarm controller bus interface means may each comprise multiplexing means for interfacing with the multiplexed data bus of the vehicle.

The desired signal enabling means may comprise learning means for learning the desired set of signals. Moreover, the learning means may comprise downloading learning means for learning the desired set of signals from another device which is temporarily connected thereto, such as a portable or laptop computer or other downloading device.

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. A vehicle function controller is provided along with an associated vehicle function controller bus interface means for interfacing the vehicle function controller to the data communications bus. The remote control system also includes desired signal enabling means for causing the vehicle function controller to operate using a desired set of signals for a desired vehicle from a plurality of possible sets of digital signals for different vehicles, as may be downloaded from a downloading device temporarily connected thereto. Accordingly, the vehicle function controller can communicate with a vehicle device via the data communications bus so that the vehicle function controller is capable of operating the vehicle device responsive to the remote transmitter. Method aspects of this embodiment of the invention are also disclosed.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is a schematic block diagram of the vehicle security system in accordance with the invention.

FIG. **2** is a schematic diagram of a remote transmitter of the vehicle security system in accordance with the invention.

FIG. **3** is a schematic block diagram of a portion of a first embodiment of the vehicle security system in accordance with the present invention.

FIG. **4** is a schematic block diagram of a portion of a second embodiment of the vehicle security system in accordance with the present invention.

FIG. **5** is a schematic block diagram of a portion of a third embodiment of the vehicle security system in accordance with the present invention.

FIG. **6A** is a schematic block diagram of a portion of a fourth embodiment of the vehicle security system in accordance with the present invention.

FIG. **6B** is a schematic block diagram of a portion of a variation of the fourth embodiment of the vehicle security system in accordance with the present invention.

FIG. **7** is a schematic block diagram of the vehicle security system in accordance with the present invention.

FIG. **8** is a schematic block diagram of a remote keyless entry system in accordance with the present invention.

FIG. **9** is a schematic block diagram of a remote engine starting system 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 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 now to the schematic block diagram of FIG. **1**, a vehicle security system **10** according to one aspect of the invention is first described. The security system includes a controller **11** which, in turn, in the illustrated embodiment includes a central processing unit (CPU) or microprocessor **12** operating under stored program control.

In the illustrated embodiment, 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, as will be described in greater detail below. As would be readily understood by those skilled in the art, the transmitter portion of the controller **11** may not be needed in some embodiments of the invention. An antenna **13***a* is illustratively connected to the transmitter and receiver **13**.

In the illustrated embodiment, the CPU **12** is also operatively connected to a memory (EEPROM) **14** and a data communications bus interface **15** which provides both input and output interfaces to various vehicle devices. As would be readily understood by those skilled in the art, the CPU **12** may alternately or additionally have its own on-board memory.

The data communications bus interface **15** is illustratively connected to various vehicle input devices including: an

ignition switch **20**; a key in the ignition sensor **21**; two zone sensors *22a*, *22b*; conventional trunk hood and door pin sensors or switches **23**, **24**, and **25**, respectively; and door lock switches **28**. In addition, a pre-warn sensor **26** and valet switch **27** also provide inputs to the controller **11** in the illustrated embodiment. As would be readily understood by those skilled in the art, other inputs are also contemplated by the present invention and are generally described herein by the term sensor. In addition, an input signal may also be received from a remote transmitter **50** (FIG. **2**).

The data communications bus interface **15** of the controller **11** may also preferably be connected to a plurality of output devices. The outputs may include auxiliary relay outputs **30**, such as for window control, remote starting, or a remote alarm indication, as would be readily understood by those skilled in the art. A siren and/or lights **31**, and green and red light emitting diodes (LEDs) **32**, **33** for dashboard mounting are also illustratively connected to the controller **11**. Other outputs may be directed to a valet LED **34**, a dome light **36**, a central lock relay or lock control unit **41**, a starter kill circuit **42**, and an armed relay output **43**. In addition, other outputs may be directed to one or more of an audible tone generator **37**, an alphanumeric display **44**, a speech message annunciator **45**, and a vibration transducer **46**, as will be readily appreciated by those skilled in the art. Other similar indicating devices are also contemplated by the present invention, as would be readily understood by those skilled in the art. Some of the illustrated devices may be hardwired to various control nodes as would be readily understood by those skilled in the art. The control nodes may be connected by the data communications bus as would also be known to those skilled in the art.

Referring now more particularly to FIG. **2**, a remote transmitter **50** in accordance with the invention is described. The remote transmitter **50** illustratively includes a housing **51** and a plurality of first momentary contact switches *52a*–*52d* carried by the housing. A second momentary contact switch **53** and an indicating light, such as the illustrated LED **54** are also carried by or mounted on the housing **51**. As would be readily understood by those skilled in the art, the remote transmitter **50** is typically relatively small and includes an opening **55** for facilitating connection to a vehicle key ring, for example. In addition, the remote transmitter **50** includes a central processing unit or microprocessor **56** operatively connected to the plurality of first switches *52a*–*52d*, the second switch **53**, and the LED **54**. The microprocessor is also connected to a transmitter and/or receiver circuit **57** and its associated antenna *57a* for transmitting and/or receiving signals to and from the controller **11** of the vehicle security system **10**. Accordingly, the term "remote transmitter" is used broadly herein to describe the embodiment also including receiver means.

The remote transmitter **50** may also include a numeric or alphanumeric display **58**, and a speaker **59** coupled to an audible tone generator or a speech message generator, as may be provided by the microprocessor **56**. A vibration transducer, not shown, may also be incorporated into the remote transmitter **50** for communicating to the user as would be readily understood by those skilled in the art.

Of course, as will be readily appreciated by those skilled in the art, the remote transmitter may be a central station, for example, rather than a handheld unit **50** as shown in FIG. **2**. Also the remote transmitter may include a handheld unit that communicates first to a central station. Other forms of remote transmitters are also contemplated by the invention as will be understood by those skilled in the art.

Turning now additionally to FIG. **3** a first embodiment of the desired signal enabling means **17** is described. The vehicle security system **10** preferably comprises a vehicle security sensor and associated sensor bus interface means **60** for interfacing the vehicle security sensor to the data communications bus **62**. The vehicle security system **10** also preferably includes an alarm indicator and associated alarm indicator bus interface means **64** for interfacing the alarm indicator to the data communications bus. Examples of vehicle security sensors and alarm indicators are described above in greater detail with reference to FIG. **1**.

The security system **10** further preferably comprises desired signal enabling means **17** for enabling the alarm controller **10** to operate using a desired set of signals for a desired vehicle from among a plurality of possible sets of signals for different vehicles. As would be readily understood by those skilled in the art, the term different vehicles may include vehicles from different manufacturers, different models, or even different trim levels of the same make and model. Accordingly, the desired signal enabling means **17** permits the alarm controller, that is, the security CPU and bus interface **65**, to communicate with the vehicle security sensor and the alarm indicator via the data communications bus **62** so that the CPU is capable of operating the alarm indicator responsive to the vehicle security sensor.

The data communications bus **62** may preferably be a multiplexed data bus as would be readily understood by those skilled in the art. Accordingly, the sensor bus interface means, the alarm bus interface means, and the alarm controller bus interface means may each comprise multiplexing means for interfacing with the multiplexed data bus of the vehicle. For example, any of the various multiplexing schemes as disclosed in "The Thick and Thin of Car Cabling" by Thompson appearing in the IEEE Spectrum, February 1996, pp. 42–45 may be used. Other data bus connection schemes are also contemplated by the present invention.

As illustrated in FIG. **3**, one embodiment of the desired signal enabling means **17** may preferably include a memory **70** for storing a plurality of sets *72a*, *72b* and *72n* of signals for different vehicles, and selecting means for selecting the desired set of signals from the plurality of different sets of signals for different vehicles. By storing sets of signals is meant storing information or data necessary to generate the desired signals on the data bus **62** as would be readily understood by those skilled in the art. The memory **70** may include device address memory means for storing a plurality of different sets of signals representative of different device addresses for different vehicles. Alternatively, or in addition thereto, the memory means may comprise protocol memory means for storing a plurality of different protocols for different vehicles. One or more other control nodes and associated bus interfaces **66** may also be connected to the data communications bus **62** as would also be readily understood by those skilled in the art. For example, other control nodes may include an engine controller thereby permitting the alarm controller to disable the engine, or the body controller thereby permitting the alarm controller to control the vehicle door locks as would be readily understood by those skilled in the art.

In the illustrated embodiment of FIG. **3**, the selecting means may comprise user selecting means **75** for permitting a user to select the desired set of signals. A keypad or other input means may be used to permit the user to select the desired signal set for his vehicle. The valet switch **27** (FIG. **1**), for example, may also be operated by the user to select the desired signal set. The user may select the desired set of signals by entering a unique digital code similar to the selection of signals for a home electronics universal remote

control. Other techniques for permitting the user to select the desired signal set from a plurality of stored sets are also contemplated by the invention as would be readily appreciated by those Skilled in the art.

Referring now additionally to FIG. **4** another embodiment of the desired signal enabling means **17'** is described in accordance with the security system **10'** of the present invention. In this embodiment, the selecting means may comprise bus determining means **77** for determining the desired set of signals based upon signals on the data communications bus. For example, the bus determining means could determine the desired set of signals based upon sensed voltage levels or based upon the timing of signal pulses on the data communications bus **62**. The other components of this embodiment of the desired signal enabling means **17'** are similar to those described above with reference to FIG. **3** and need no further description.

Yet another embodiment of the security system **10"** according to the invention is explained with reference to FIG. **5**. In this illustrated embodiment the desired signal enabling means **17"** includes a desired signal set memory **81** operatively connected to the illustrated bus learning means **80**. The bus learning means **80** may determine and store in the signal set memory **81** the protocol and/or device addresses for the vehicle devices. For example, the bus learning means **80** may permit the user to operate various vehicle devices and store a desired signal set based thereon as would be readily understood by those skilled in the art. The other components of the desired signal enabling means **17"** are similar to those described above with reference to FIG. **3** and need no further description.

Still another embodiment of the desired signal enabling means **17'"** is explained with reference to FIG. **6A**. 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**, for example. The desired signal set may also alternately be learned from the central station **88** through the satellite link provided by the satellite **110** and vehicle mounted satellite receiver **111** and associated antennas. As would be readily understood by those skilled in the art, the download learning means, as well as the other desired signal enabling leans may be implemented by software in the CPU **12** of the controller **11** or in a separate microprocessor or circuits.

Turning now additionally to FIG. **6B**, another variation of programming, learning or downloading of the download learning means **84** is explained. In this variation the download learning means **84** is temporarily connected to a computer, such as the illustrated portable laptop computer **115**. The connection, may be via a wire cable or wireless communications link as will be readily understood by those skilled in the art. Of course, the desired signal enabling means **17'"'** in this embodiment may be programmed in the vehicle or prior to installation in the vehicle.

One implementation of the security system **10** is shown in FIG. **7** and includes the vehicle security controller **11**. The remote transmitter **50** can switch the controller **11** between the armed and disarmed modes. The controller **11** in the armed mode is capable of generating an alarm indication via the siren **31** (FIG. **1**) and based upon the door switches **25** (FIG. **1**), for example. The communications are via the data communications bus **62**, and are based upon the desired signal set from the desired signal enabling means **17**.

The features and aspects described above may also be readily implemented into other vehicle related systems, such as for performing remote control functions. As shown in FIG. **8**, the invention may be embodied in a remote keyless entry system **90** including a remote keyless entry controller **91** operated by a remote handheld transmitter **93**. The controller **91** communicates with the door lock motors **94** and illustrated trunk release **96** via the data communications bus **62**. The remote keyless entry system **90** also includes the desired signal enabling means **17** which permits the controller **91** to perform the desired door locking and trunk release remote control functions or operations as would also be readily understood by those skilled in the art. As would be readily appreciated by those skilled in the art, any of the desired signal enabling means described herein and equivalent thereto may be used for the remote keyless entry system **90** in accordance with the present invention.

Turning now to FIG. **9**, yet another vehicle associated remote control function is illustrated and now explained. The remote engine starting system **100** includes a remote start controller **101** operable by a remote transmitter **103**. The remote controller **101** may communicate via the data communications bus **62** to enable the ignition and fuel systems **106** and crank the engine starter **104**. Various sensors may also be monitored as would be readily understood by those skilled in the art.

A method aspect of the invention is for operating a vehicle security system **10** for a vehicle of a type including a data communications bus **62** connecting a plurality of vehicle devices The method preferably comprises the steps of interfacing an alarm controller **11** to the data communications bus **62**, and enabling the alarm controller to operate using a desired set of digital signals for a desired vehicle from a plurality of possible sets of signals for different vehicles to thereby permit the alarm controller to communicate with at least one of a vehicle security sensor **60** and an alarm indicator **64** via the data communications bus **62** (FIG. **3**). Accordingly, the alarm controller is capable of operating the alarm indicator responsive to the vehicle security sensor and via the data communication bus.

Another method of the invention is for remotely controlling a vehicle function for a vehicle of a type including a data communications bus **62** connecting a plurality of vehicle devices, and a vehicle function controller and associated bus interface means for interfacing the vehicle function controller to the data communications bus. The method comprising the steps of: enabling the vehicle function controller to operate using a desired set of signals for a desired vehicle from a plurality of sets of signals for different vehicles for permitting the vehicle function controller to communicate via the data communications bus with at least one of the vehicle devices; and receiving a signal at the vehicle from a remote transmitter so that the vehicle function controller remotely controls a vehicle function responsive to the remote transmitter.

Those of skill in the art will readily recognize the benefits and advantages of the present invention for aftermarket security systems and other aftermarket systems for implementing remote control functions wherein compatibility with a potentially large number of different protocols and/or device addresses is desired. Of course, 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 the 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 security system for a vehicle of a type including a data communications bus connecting a plurality of vehicle devices, said vehicle security system comprising:

a vehicle security sensor and associated sensor bus interface means for interfacing said vehicle security sensor to the data communications bus;

an alarm indicator and associated alarm indicator bus interface means for interfacing said alarm indicator to the data communications bus;

an alarm controller and associated alarm controller bus interface means for interfacing said alarm controller to the data communications bus; and

desired signal enabling means for enabling said alarm controller to operate using a desired set of signals for a corresponding desired vehicle from a plurality of sets of signals for different vehicles for permitting said alarm controller to communicate with said vehicle security sensor and said alarm indicator via the data communications bus so that said alarm controller is capable of operating said alarm indicator responsive to said vehicle security sensor, said desired signal enabling means comprising download learning means for learning the desired set of signals from a downloading device temporarily connected thereto.

2. A vehicle security system according to claim 1 wherein said download learning means comprises means for learning the desired set of signals from a computer temporarily connected thereto.

3. A vehicle security system according to claim 1 wherein said desired signal enabling means comprises protocol providing means for providing a protocol for the desired vehicle.

4. A vehicle security system according to claim 1 wherein said desired signal enabling means comprises device address providing means for providing device addresses for the desired vehicle.

5. A vehicle security system according to claim 1 further comprising a vehicle controller and associated vehicle controller bus interface means for connecting the vehicle controller to the data communications bus; and wherein said alarm controller is operatively connected to said vehicle controller.

6. A vehicle security system according to claim 1 wherein the data communications bus is a multiplexed data bus; and wherein the sensor bus interface means, the alarm bus interface means, and the alarm controller bus interface means each comprises multiplex interface means for interfacing with the multiplexed data bus.

7. A vehicle security system according to claim 1 wherein said vehicle security sensor comprises one of a door switch, a trunk switch, a proximity sensor, and a motion sensor.

8. A vehicle security system according to claim 1 wherein said alarm indicator comprises one of a vehicle light, a vehicle horn, a siren, a speech message generator, and a remote pager.

9. A vehicle security system for a vehicle of a type including a data communications bus connecting a plurality of vehicle devices, the vehicle devices comprising at least one of a vehicle security sensor and an alarm indicator, said vehicle security system comprising:

an alarm controller and associated alarm controller bus interface means for interfacing said alarm controller to the data communications bus; and

desired signal enabling means for enabling said alarm controller to operate using a desired set of signals for a corresponding desired vehicle from a plurality of sets of signals for different vehicles for permitting said alarm controller to communicate via the data communications bus with at least one of the vehicle security sensor and the alarm indicator, said desired signal enabling means comprising download learning means for learning the desired set of signals from a downloading device temporarily connected thereto.

10. A vehicle security system according to claim 9 wherein said download learning means comprises means for learning the desired set of signals from a computer temporarily connected thereto.

11. A vehicle security system according to claim 9 further comprising wireless communications means cooperating with said download learning means for receiving signals from a remote downloading device.

12. A vehicle security system according to claim 9 wherein said signal desired enabling means comprises protocol providing means for providing a protocol for the desired vehicle.

13. A vehicle security system according to claim 9 wherein said desired signal enabling means comprises device address providing means for providing desired addresses for the desired vehicle.

14. A vehicle security system according to claim 9 wherein the data communications bus is a multiplexed data bus; and wherein the alarm controller bus interface means comprises multiplex interface means for interfacing with the multiplexed data bus.

15. A method for operating a vehicle security system for a vehicle of a type including a data communications bus connecting a plurality of vehicle devices, the method comprising the steps of:

interfacing an alarm controller to the data communications bus; and

enabling said alarm controller to operate using a set of desired signals for a corresponding desired vehicle from a plurality of sets of signals for different vehicles for permitting said alarm controller to communicate via the data communications bus with at least one of a vehicle security sensor and an alarm indicator, the enabling step comprising learning the desired set of signals from a downloading device temporarily connected to the alarm controller.

16. A method according to claim 15 wherein the learning step comprises learning the desired set of signals from a computer temporarily connected to the alarm controller.

17. A remote control system for a vehicle of a type including a data communications bus connecting a plurality of vehicle devices, said remote control system comprising:

a remote transmitter;

a receiver within the vehicle for receiving a signal from said remote transmitter;

a vehicle function controller, operatively connected to said receiver, and associated vehicle function controller bus interface means for interfacing said vehicle function controller to the data communications bus; and

desired signal enabling means for enabling said vehicle function controller to operate using a desired set of signals for a corresponding desired vehicle from a plurality of sets of signals for different vehicles for permitting said vehicle function controller to communicate via the data communications bus with a vehicle device so that said vehicle function controller is

capable of operating the vehicle device responsive to said remote transmitter, said desired signal enabling means comprising download learning means for learning the desired set of signals from a downloading device temporarily connected thereto.

18. A remote control system for a vehicle according to claim **17** wherein said download learning means comprises means for learning the desired set of signals from a computer temporarily connected thereto.

19. A remote control system for a vehicle according to claim **17** wherein the plurality of vehicle devices comprises a vehicle security sensor and associated sensor bus interface means for interfacing said vehicle security sensor to the data communications bus; and wherein said vehicle function controller comprises an alarm controller being capable of generating an alarm responsive to the vehicle security sensor.

20. A remote control system for a vehicle according to claim **17** wherein the plurality of vehicle devices comprises a plurality of vehicle door locks movable between locked and unlocked positions and associated bus interface means for interfacing said door locks to the data communications bus; and wherein said vehicle function controller comprises a door lock controller for moving the vehicle door locks between locked and unlocked positions responsive to said remote transmitter.

21. A remote control system for a vehicle according to claim **17** where said plurality of vehicle devices comprises vehicle engine starting means and associated bus interface means for interfacing said vehicle engine starting means to the data communications bus; and wherein said vehicle function controller comprises a remote start controller for operating the vehicle engine starting means responsive to said remote transmitter.

22. A remote control system for a vehicle according to claim **17** wherein said desired signal enabling means comprises protocol providing means for providing a protocol for the desired vehicle.

23. A remote control system for a vehicle according to claim **17** wherein said desired signal enabling means comprises device address providing means for providing device addresses for the desired vehicle.

24. A remote control system for a vehicle according to claim **17** further comprising a second vehicle controller and associated vehicle controller bus interface means for connecting to the data communications bus; and wherein said vehicle function controller is operatively connected to said second vehicle controller.

25. A remote control system for a vehicle according to claim **17** wherein the data communications bus is a multiplexed data bus; and wherein the vehicle function controller bus interface means comprises multiplexing means for interfacing with the multiplexed data bus.

26. A method for remotely controlling a vehicle function for a vehicle of a type including a data communications bus connecting a plurality of vehicle devices, and a vehicle function controller and associated bus interface means for interfacing the vehicle function controller to the data communications bus; the method comprising the steps of:

enabling the vehicle function controller to operate using a desired set of signals for a corresponding desired vehicle from a plurality of sets of signals for different vehicles for permitting the vehicle function controller to communicate via the data communications bus with at least one of the vehicle devices, the enabling step comprising learning the desired set of signals from a downloading device temporarily connected to the vehicle function controller; and

receiving a signal at the vehicle from a remote transmitter so that the vehicle function controller remotely controls a vehicle function responsive to the remote transmitter.

27. A method according to claim **26** wherein the learning step comprises learning the desired set of signals from a computer temporarily connected to the vehicle function controller.

28. A method according to claim **26** wherein the plurality of vehicle devices comprises a vehicle security sensor and associated sensor bus interface means for interfacing the vehicle security sensor to the data communications bus; wherein the vehicle function controller comprises an alarm controller movable between armed and disarmed modes, the alarm controller when in the armed mode being capable of generating an alarm indication responsive to the vehicle security sensor; and wherein the step of receiving comprises receiving a signal so that the vehicle function controller is moved to one of the armed and disarmed modes.

29. A method according to claim **26** wherein the plurality of vehicle devices comprises a plurality of vehicle door locks movable between locked and unlocked positions and associated bus interface means for interfacing the door locks to the data communications bus; and wherein the step of receiving comprises moving the vehicle door locks to one of locked and unlocked positions responsive to the remote transmitter.

30. A method according to claim **26** wherein the plurality of vehicle devices comprises vehicle engine starting means and associated bus interface means for interfacing the vehicle engine starting means to the data communications bus; and wherein the step of receiving comprises operating the vehicle engine starting means responsive to the remote transmitter.

* * * * *

EXHIBIT N

UNITED STATES PATENT AND TRADEMARK OFFICE

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

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
11/773,272	07/03/2007	Kenneth E. Flick	58106CIP1	1046

7590 01/05/2011

CHRISTOPHER F. REGAN, ESQUIRE
ALLEN, DYER, DOPPELT, MILBRATH & GILCHRIST, P.A.
P.O. Box 3791
Orlando, FL 32802-3791

EXAMINER	
NGUYEN, CUONG H	
ART UNIT	PAPER NUMBER
3661	

MAIL DATE	DELIVERY MODE
01/05/2011	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.

Office Action Summary	Application No.	Applicant(s)	
	11/773,272	FLICK, KENNETH E.	
	Examiner	Art Unit	
	CUONG H. NGUYEN	3661	

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

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *22 October 2010*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-22* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-22* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on _____ is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

1. This Office Action is the answer to a communication received on 10/22/2010.

2. Claims 1-22 are pending.

Response

3. Previous objections and rejections are withdrawn. New grounds of obvious rejections are submitted herein.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office Action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if 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. Patentability shall not be negatived by the manner in which the invention was made.

4. Claims 1-21, are rejected under 35 U.S.C. 103(a) as being unpatentable over Monroe (US Pat. 6,253,064 B1), in view of Brinkmeyer et al. (US Pat. 5,940,007).

A. As to independent claims 1, 4-10, 14-16, and 18-21: Monroe suggests a system to tracking and monitoring different kinds of vehicles (see Monroe, Fig. 1, refs. 10, 10a, and 10b).

Brinkmeyer et al., also teach a vehicle control system comprising:

- a tracking unit and a function unit cooperating therewith, said tracking unit comprising a vehicle position determining device (see Monroe, Fig. 4a-4b; see also Brinkmeyer et al, col. 5, lines 6-16) "... vehicle is equipped with an antitheft system having a car telephone *and a locating system, such as the Global Positioning System").*

- a wireless communications device, and a tracking controller configured cooperate with said vehicle position determining device and said wireless communications device (see

Monroe, Fig. 4a-4b; see Brinkmeyer et al., Fig. 1); said function unit comprising at least one uniquely coded transmitter to be carried by a user (see Monroe, Fig. 4a-4b "wireless transceiver"; this is also taught in this prior art since remote controlling a car requires a uniquely coded command in order for that command to be received and executed).

Monroe and Brinkmeyer et al., teach that a device can read/write/program/download from/to another device by remotely using proper codes/instructions/ID (see Monroe, Fig. 4a-4b with "transceivers"' capabilities; as in pending claims 6-9 and 19-22, see Brinkmeyer et al, Fig.1).

Brinkmeyer et al., (col. 4, lines 22-39, and lines 52-65) clearly disclose: "The transmitter/receiver 4a in the vehicle 4 is connected with the other components of the electric system of the vehicle, via a data bus system ", and "the vehicle-side transmitter/receiver 4a transmits the corresponding control commands via the data bus system to the respective vehicle target component "; i.e. a vehicle data bus has been taught by Brinkmeyer et al.

Brinkmeyer et al., do not disclose that a receiver at the vehicle for receiving signals from said a uniquely coded transmitter, and a function controller at the vehicle and connected to said receiver for learning (i.e., pending claim is about signal transmitting/receiving between vehicles).

However, similar functions as claimed are taught by Monroe, and Brinkmeyer et al., with a wireless receiver I/F - (not necessary disclosing that a receiver and a transmitter must be from different vehicles).

Since the pending claims are physical structures/units, Monroe and Brinkmeyer et al., system obviously performs claimed devices/components.

As for accepting a command – a particular definition for "learning" a uniquely coded transmitter to permit control of a vehicle function by the user (see Brinkmeyer et al., Figs. 4A, 4C, col. 2 lines 23-42, "... *activating a* learn mode, in which they can receive the new authorization code from the newly programmed remote control unit by way of a special antenna, if the remote control unit is brought into the direct vicinity and is caused to send the new authorization code.. ".

Brinkmeyer et al., also do not disclose that an alert function would acknowledge a user for accepting a new unique code in "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".*

However, this action is obvious for a remote device to acknowledge a user/operator wirelessly that it starts to accept a new unique code (e.g., from a control tower) – also this is a clear example of wirelessly programming a garage door to accept a specific code (as taught by Brinkmeyer et al).

It would have been obvious to one of ordinary in the art at the time this invention was made to combine both Monroe and Brinkmeyer et al.'s systems by clearly disclosing that a communication between related vehicles, an extra feature to alert/drawing attentions of a user (by available voice/sound/image/text generator) that a new unique code would be effective from now on as a reminder to that user.

B. As per claims 2-3, and 13: The rationales and reference for a rejection of claim 1 are incorporated.

It is submitted that downloading/(sending signals) by using a (temporary) directed wire (connecting directly to an I/F) has been quite well-known.

C. As per claim 10: The rationales and reference for a rejection of claim 1 are incorporated.

It is submitted that Brinkmeyer et al., taught about a garage door opener (e.g., a claimed "remote keyless entry function").

D. As per claim 11: The rationales and reference for a rejection of claim 1 are incorporated.

It is submitted that Monroe Figs. 4a-4b, and Brinkmeyer et al., taught about using a GPS receiver (see Brinkmeyer et al., col. 5 line 9).

E. As per claim 12: The rationales and reference for a rejection of claim 1 are incorporated.

It is submitted that Monroe and Brinkmeyer et al., taught about a housing to contain a GPS, a wireless communication device, a controller, and communication I/F (see Brinkmeyer et al., Figs. 1-2).

F. As per claim 17: The rationales and reference for a rejection of claim 1 are incorporated.

It is submitted that Monroe and Brinkmeyer et al., taught about wireless communication devices: a remote transmitter, and communication I/F to remotely control a device/component (see Brinkmeyer et al., Fig. 3 "the garage door opener").

Conclusion

5. Pending claims are rejected.

6. Any inquiry concerning this communication or earlier communications from the examiner should be directed to CUONG H. NGUYEN whose telephone number is 571-272-6759. (email address is cuong.nguyen@uspto.gov). The examiner can normally be

reached on 9:30 am – 5:30 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, THOMAS G. BLACK can be reached on 571-272-6956. The Rightfax number for the organization where this application is assigned is 571-273-6956.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Please provide support, with page and line numbers, for any amended or new claim in an effort to help advance prosecution; otherwise any new claim language that is introduced in an amended or new claim may be considered as new matter, especially if the Application is a Jumbo Application.

/CUONG H. NGUYEN/
Primary Examiner
Art Unit 3661

Notice of References Cited	Application/Control No. 11/773,272	Applicant(s)/Patent Under Reexamination FLICK, KENNETH E.	
	Examiner CUONG H. NGUYEN	Art Unit 3661	Page 1 of 1

U.S. PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	Classification
*	A	US-2006/0187026	08-2006	Kochis, Gary	340/539.13
*	B	US-7,196,621	03-2007	Kochis, Gary	340/539.13
*	C	US-7,366,892	04-2008	Spaur et al.	713/151
*	D	US-7,085,775	08-2006	Short et al.	1/1
*	E	US-2002/0188702	12-2002	Short et al.	709/220
*	F	US-6,611,755	08-2003	Coffee et al.	701/213
*	G	US-6,657,587	12-2003	Mohan, Paul L.	342/357.75
*	H	US-6,859,831	02-2005	Gelvin et al.	709/224
*	I	US-2004/0073440	04-2004	Garbers et al.	705/001
*	J	US-2004/0066330	04-2004	Knockeart et al.	342/357.07
*	K	US-6,628,233	09-2003	Knockeart et al.	342/357.31
*	L	US-6,253,064	06-2001	Monroe, David A.	455/66.1
*	M	US-2002/0152053	10-2002	Roy et al.	702/185

FOREIGN PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Country	Name	Classification
	N					
	O					
	P					
	Q					
	R					
	S					
	T					

NON-PATENT DOCUMENTS

*		Include as applicable: Author, Title Date, Publisher, Edition or Volume, Pertinent Pages)
	U	
	V	
	W	
	X	

*A copy of this reference is not being furnished with this Office action. (See MPEP § 707.05(a).)
Dates in MM-YYYY format are publication dates. Classifications may be US or foreign.

Search Notes	Application/Control No.	Applicant(s)/Patent under Reexamination	
11773272	11/773,272	FLICK, KENNETH E.	
	Examiner	Art Unit	
	CUONG H. NGUYEN	3661	

SEARCHED			
Class	Subclass	Date	Examiner

INTERFERENCE SEARCHED			
Class	Subclass	Date	Examiner

SEARCH NOTES (INCLUDING SEARCH STRATEGY)		
	DATE	EXMR
Updated west/derwent	1/2/2010	CHN

Index of Claims

11773272

Application/Control No.	Applicant(s)/Patent under Reexamination
11/773,272	FLICK, KENNETH E.
Examiner	**Art Unit**
CUONG H. NGUYEN	3661

√	Rejected	–	(Through numeral) Cancelled	N	Non-Elected	A	Appeal
=	Allowed	÷	Restricted	I	Interference	O	Objected

Claim		Date
Final	Original	1/2/10
	1	v
	2	
	3	
	4	
	5	
	6	
	7	
	8	
	9	
	10	
	11	
	12	
	13	v
	14	
	15	
	16	
	17	
	18	v
	19	
	20	
	21	
	22	
	23	
	24	
	25	
	26	
	27	
	28	
	29	
	30	
	31	
	32	
	33	
	34	
	35	
	36	
	37	
	38	
	39	
	40	
	41	
	42	
	43	
	44	
	45	
	46	
	47	
	48	
	49	
	50	

Claim		Date
Final	Original	
	51	
	52	
	53	
	54	
	55	
	56	
	57	
	58	
	59	
	60	
	61	
	62	
	63	
	64	
	65	
	66	
	67	
	68	
	69	
	70	
	71	
	72	
	73	
	74	
	75	
	76	
	77	
	78	
	79	
	80	
	81	
	82	
	83	
	84	
	85	
	86	
	87	
	88	
	89	
	90	
	91	
	92	
	93	
	94	
	95	
	96	
	97	
	98	
	99	
	100	

Claim		Date
Final	Original	
	101	
	102	
	103	
	104	
	105	
	106	
	107	
	108	
	109	
	110	
	111	
	112	
	113	
	114	
	115	
	116	
	117	
	118	
	119	
	120	
	121	
	122	
	123	
	124	
	125	
	126	
	127	
	128	
	129	
	130	
	131	
	132	
	133	
	134	
	135	
	136	
	137	
	138	
	139	
	140	
	141	
	142	
	143	
	144	
	145	
	146	
	147	
	148	
	149	
	150	

Refine Search

Search Results

Terms	Documents
L4 and (databus or "can bus" or "data bus")	3

Database: US Pre-Grant Publication Full-Text Database; US Patents Full-Text Database; US Patents OCR Backfile; EPO Abstracts Database; JPO Abstracts Database; Derwent World Patents Index; IBM Technical Disclosure Bulletin Database

Search Type: (•) Prior Art ( ) Interference

Search: L7

Refine Search

Recall Text Clear Interrupt

Search History

DATE: Sunday, January 02, 2011 Purge Queries Printable Copy Create Case

Set Name Side by Side	Query	Hit Count	Set Name Result Set	Set Name Grid
Prior Art Searches				
	DB=PGPB,USPT,USOC,EPAB,JPAB,DWPI,TDBD; THES=ASSIGNEE; PLUR=YES; OP=OR			
L7	L4 and (databus or "can bus" or "data bus")	3	L7	L7
L6	L5 and l4	5	L6	L6
L5	L3 and (vehicles with controller with (multi$ or many))	24	L5	L5
L4	L3 and (download$ with (code$ or id$))	12	L4	L4
L3	L2 or l1	113	L3	L3
L2	@pd<=20050309 and (track$ with (multi$ or many$) with "vehicles") and ("can" with "bus") and (id$ or code)	66	L2	L2
L1	@ad<=20050309 and (track$ with (multi$ or many$) with "vehicles") and ("can" with "bus") and (id$ or code)	110	L1	L1

END OF SEARCH HISTORY

EXHIBIT O

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Patent Application of: **FLICK**	)	
Serial No. **11/773,272**	)	
Filing Date: **July 3, 2007**	)	
Confirmation No. **1046**	)	Examiner: **C. NGUYEN**
For: **VEHICLE TRACKING UNIT WITH DOWNLOADABLE CODES AND ASSOCIATED METHODS**	)	Attorney Docket No: **58106_CIP1**

AMENDMENT

Mail Stop Amendment
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

Responsive to the Official Action of January 5, 2011, please enter and consider the remarks set out below.

In the Claims:

This listing of claims replaces all prior versions and listings of claims in the application.

1. (Original) 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. (Original) The multi-vehicle compatible tracking unit according to Claim 1 wherein said downloading interface comprises a wired signal downloading interface.

3. (Original) 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. (Original) The multi-vehicle compatible tracking unit according to Claim 1 wherein said downloading interface comprises a wireless signal downloading interface.

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

12. (Original) 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. (Previously presented) 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. (Original) 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. (Original) 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. (Original) 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. (Original) 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. (Previously presented) 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. (Original) 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. (Original) 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. (Original) 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. (Original) 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.

Claims 23-30 (Canceled).

REMARKS

Applicant thanks the Examiner for the careful and thorough examination of the present application, and for correctly withdrawing the previous rejections of the claims.

Applicant submits that all claims are patentable, presents arguments herein supporting such patentability, and respectfully requests that the Examiner withdraw all pending rejections and allow all claims.

I. The Claimed Invention

Independent Claim 1 is directed to 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 comprise 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. The multi-vehicle compatible tracking unit may comprise 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.

Independent Claims 13 and 18 are directed to multi-vehicle compatible tracking units similar to that of Claim 1, but further recite the downloading interface comprising a

connector for temporary connection to a downloading device and a wireless receiver for temporary connection to a downloading device, respectively.

II. The Claims Are Patentable

The Examiner has rejected all of the claims over Monroe in view of Brinkmeyer et al. Monroe discloses a system for tracking aircraft as they taxi in and out of an airport terminal. The system includes a receiver, and a plurality of transceivers on the respective tracked aircraft for communicating with the receiver. The transceivers in the tracked aircraft transmit GPS data for the aircraft to the receiver. The system also includes a plurality of cameras, which also are in communication with the receiver, for visual monitoring of tracked aircraft. As shown in Figures 4a and 4b, each aircraft includes a camera, and a WLAN for coupling together the camera to the aircraft transceiver.

Brinkmeyer et al. discloses a wireless key fob that can learn the codes to operate other devices, such as garage doors, vehicle convenience functions, and automated home door locks. (Col. 4, lines 1-7). The wireless key fob learns new codes in the typical fashion, i.e. the user executes the needed command on an existing remote while the wireless key fob is in a learning mode. While in the learning mode, the wireless key fob listens for the wireless code to be learned. Once learned, the wireless key fob can operate the learned function. (Col. 6, line 65 through Col. 7, line 37).

The wireless key fob can control certain devices within the car, such as an auxiliary heater, by communicating

with a separate wireless transceiver of the car. Of course, the wireless key fob must first learn the codes for this function. The wireless transceiver of the car communicates with the device using a data communications bus. (Col. 4, lines 53-66).

Applicant respectfully notes that the proposed prior art combination fails to disclose or fairly suggest each and every feature of the claimed invention. For example, the proposed prior art combination fails to disclose the multi-vehicle compatible controller 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, as recited by independent Claim 1, for example. Although Brinkmeyer et al. discloses the wireless key fob that can learn wireless codes for controlling certain feature of a vehicle, the wireless key fob is unrelated to the data communications bus of the vehicle. Indeed, as noted above, the wireless key fob must first communicate with the vehicle wireless transceiver, which then communicates with the data communications bus. Moreover, Monroe does not appear to make up for this deficiency of Brinkmeyer et al.

Furthermore, none of the applied prior art references discloses the multi-vehicle compatible tracking unit including a connector for temporary connection to a downloading device and a wireless receiver for temporary connection to a downloading device, as recited by the independent claims. Applicant notes that this claim feature enables a user to quickly download new vehicle codes into the

multi-vehicle compatible tracking unit without removing and reinstalling the unit.

Accordingly, it is submitted that independent Claims 1, 13, and 18 are patentable over the prior art. Their respective dependent claims, which recite yet further distinguishing features, are also patentable over the prior art and require no further discussion herein.

CONCLUSIONS

In view of the claims and the arguments presented above, it is submitted that all of the claims are patentable. Accordingly, a Notice of Allowance is respectfully requested in due course. Should any minor informalities need to be addressed, the Examiner is encouraged to contact the undersigned at the telephone number listed below.

Respectfully submitted,

JACK GEORGE ABID
Reg. No. 58,237
Allen, Dyer, Doppelt, Milbrath
& Gilchrist, P.A.
255 S. Orange Avenue, Suite 1401
Post Office Box 3791
Orlando, Florida 32802
407-841-2330
407-841-2343 fax
Attorney for Applicant

Electronic Acknowledgement Receipt

EFS ID:	9809841
Application Number:	11773272
International Application Number:	
Confirmation Number:	1046
Title of Invention:	VEHICLE TRACKING UNIT WITH DOWNLOADABLE CODES AND ASSOCIATED METHODS
First Named Inventor/Applicant Name:	Kenneth E. Flick
Correspondence Address:	CHRISTOPHER F. REGAN, ESQUIRE ALLEN, DYER, DOPPELT, MILBRATH & GILCHRIST, P.A. P.O. Box 3791 - Orlando FL 32802-3791 US 4078412330 -
Filer:	Christopher F. Regan/Sherry Leonard
Filer Authorized By:	Christopher F. Regan
Attorney Docket Number:	58106CIP1
Receipt Date:	05-APR-2011
Filing Date:	03-JUL-2007
Time Stamp:	11:49:20
Application Type:	Utility under 35 USC 111(a)

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		58106_CIP1_Amendment_4_5_11.pdf	366071 5456220740db06e81768934a410ab023417ed822	yes	13

Multipart Description/PDF files in .zip description		
Document Description	**Start**	**End**
Miscellaneous Incoming Letter	1	1
Amendment/Req. Reconsideration-After Non-Final Reject	2	2
Claims	3	8
Applicant Arguments/Remarks Made in an Amendment	9	13

Warnings:	
Information:	
Total Files Size (in bytes):	366071

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.

Case No. 58106 CIP1

Commissioner For Patents
P.O. Box 1450
Alexandria, VA 22313-1450

In re Application of: **FLICK**

Serial No.: **11/773,272**

Filed: **July 3, 2007**

For: **VEHICLE TRACKING UNIT WITH DOWNLOADABLE CODES AND ASSOCIATED METHODS**

Sir:

Transmitted herewith is an amendment in the above-identified application.

[ ] Applicant qualifies as a small entity under 37 CFR § 1.27.

[X] No additional fee is required.

[X] The Commissioner is hereby authorized to charge or credit any discrepancies in fee amounts to Deposit Account No. 01-0484.

[X] **PLEASE ADDRESS ALL CORRESPONDENCE TO ATTORNEY OF RECORD: CHRISTOPHER F. REGAN**

[X] This application is associated with Customer No. **27975**.

April 5, 2011
DATE

JACK GEORGE ABID
Reg. No. 58,237

PTO/SB/06 (07-06)
Approved for use through 1/31/2007. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

PATENT APPLICATION FEE DETERMINATION RECORD

Substitute for Form PTO-875

Application or Docket Number	Filing Date	☐ To be Mailed
11/773,272	07/03/2007	

APPLICATION AS FILED – PART I

	(Column 1)	(Column 2)	SMALL ENTITY ☐		OR	OTHER THAN SMALL ENTITY	
FOR	NUMBER FILED	NUMBER EXTRA	RATE ($)	FEE ($)		RATE ($)	FEE ($)
☐ BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A	N/A			N/A	
☐ SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A	N/A			N/A	
☐ EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A	N/A			N/A	
TOTAL CLAIMS (37 CFR 1.16(i))	minus 20 =	*	X $ =		OR	X $ =	
INDEPENDENT CLAIMS (37 CFR 1.16(h))	minus 3 =	*	X $ =			X $ =	
☐ APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is $250 ($125 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).						
☐ MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))							
* If the difference in column 1 is less than zero, enter "0" in column 2.			TOTAL			TOTAL	

APPLICATION AS AMENDED – PART II

AMENDMENT 04/05/2011

	(Column 1)		(Column 2)	(Column 3)	SMALL ENTITY		OR	OTHER THAN SMALL ENTITY	
	CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	RATE ($)	ADDITIONAL FEE ($)		RATE ($)	ADDITIONAL FEE ($)
Total (37 CFR 1.16(i))	* 22	Minus	** 30	= 0	X $ =		OR	X $52=	0
Independent (37 CFR 1.16(h))	* 3	Minus	***4	= 0	X $ =		OR	X $220=	0
☐ Application Size Fee (37 CFR 1.16(s))									
☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							OR		
					TOTAL ADD'L FEE		OR	TOTAL ADD'L FEE	0

AMENDMENT

	(Column 1)		(Column 2)	(Column 3)					
	CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	RATE ($)	ADDITIONAL FEE ($)		RATE ($)	ADDITIONAL FEE ($)
Total (37 CFR 1.16(i))	*	Minus	**	=	X $ =		OR	X $ =	
Independent (37 CFR 1.16(h))	*	Minus	***	=	X $ =		OR	X $ =	
☐ Application Size Fee (37 CFR 1.16(s))									
☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							OR		
					TOTAL ADD'L FEE		OR	TOTAL ADD'L FEE	

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.

** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".

*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".

The "Highest Number Previously Paid For" (Total or Independent) is the highest number found in the appropriate box in column 1.

Legal Instrument Examiner:
/BURNELL L. ROSS/

This collection of information is required by 37 CFR 1.16. 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 12 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: 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.

EXHIBIT P

UNITED STATES PATENT AND TRADEMARK OFFICE

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

APPLICATION NUMBER	FILING or 371(c) DATE	GRP ART UNIT	FIL FEE REC'D	ATTY.DOCKET.NO	TOT CLAIMS	IND CLAIMS
11/773,272	07/03/2007		1700	58106CIP1	30	4

CONFIRMATION NO. 1046

CHRISTOPHER F. REGAN, ESQUIRE
ALLEN, DYER, DOPPELT, MILBRATH & GILCHRIST, P.A.
P.O. Box 3791
Orlando, FL32802-3791

FILING RECEIPT

Date Mailed: 07/31/2007

Receipt is acknowledged of this non-provisional patent application. The application will be taken up for examination in due course. Applicant will be notified as to the results of the examination. Any correspondence concerning the application must include the following identification information: the U.S. APPLICATION NUMBER, FILING DATE, NAME OF APPLICANT, and TITLE OF INVENTION. Fees transmitted by check or draft are subject to collection. Please verify the accuracy of the data presented on this receipt. **If an error is noted on this Filing Receipt, please write to the Office of Initial Patent Examination's Filing Receipt Corrections. Please provide a copy of this Filing Receipt with the changes noted thereon. If you received a "Notice to File Missing Parts" for this application, please submit any corrections to this Filing Receipt with your reply to the Notice. When the USPTO processes the reply to the Notice, the USPTO will generate another Filing Receipt incorporating the requested corrections**

Applicant(s)

Kenneth E. Flick, Douglasville, GA;

Assignment For Published Patent Application

Omega Patents, L.L.C., State of Incorporation: Georgia, Douglasville, GA

Power of Attorney: The patent practitioners associated with Customer Number 27975

Domestic Priority data as claimed by applicant

This application is a CIP of 11/076,259 03/09/2005
which is a CON of 10/383,496 03/07/2003 PAT 7,149,623
which is a CON of 09/859,972 05/17/2001 PAT 6,606,561
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: 07/30/2007

The country code and number of your priority application, to be used for filing abroad under the Paris Convention, is **US11/773,272**

Projected Publication Date: To Be Determined - pending completion of Corrected Papers

Non-Publication Request: No

Early Publication Request: No

Title

VEHICLE TRACKING UNIT WITH DOWNLOADABLE CODES AND ASSOCIATED METHODS

Preliminary Class

PROTECTING YOUR INVENTION OUTSIDE THE UNITED STATES

Since the rights granted by a U.S. patent extend only throughout the territory of the United States and have no effect in a foreign country, an inventor who wishes patent protection in another country must apply for a patent in a specific country or in regional patent offices. Applicants may wish to consider the filing of an international application under the Patent Cooperation Treaty (PCT). An international (PCT) application generally has the same effect as a regular national patent application in each PCT-member country. The PCT process **simplifies** the filing of patent applications on the same invention in member countries, but **does not result** in a grant of "an international patent" and does not eliminate the need of applicants to file additional documents and fees in countries where patent protection is desired.

Almost every country has its own patent law, and a person desiring a patent in a particular country must make an application for patent in that country in accordance with its particular laws. Since the laws of many countries differ in various respects from the patent law of the United States, applicants are advised to seek guidance from specific foreign countries to ensure that patent rights are not lost prematurely.

Applicants also are advised that in the case of inventions made in the United States, the Director of the USPTO must issue a license before applicants can apply for a patent in a foreign country. The filing of a U.S. patent application serves as a request for a foreign filing license. The application's filing receipt contains further information and guidance as to the status of applicant's license for foreign filing.

Applicants may wish to consult the USPTO booklet, "General Information Concerning Patents" (specifically, the section entitled "Treaties and Foreign Patents") for more information on timeframes and deadlines for filing foreign patent applications. The guide is available either by contacting the USPTO Contact Center at 800-786-9199, or it can be viewed on the USPTO website at http://www.uspto.gov/web/offices/pac/doc/general/index.html.

For information on preventing theft of your intellectual property (patents, trademarks and copyrights), you may wish to consult the U.S. Government website, http://www.stopfakes.gov. Part of a Department of Commerce initiative, this website includes self-help "toolkits" giving innovators guidance on how to protect intellectual property in specific countries such as China, Korea and Mexico. For questions regarding patent enforcement issues, applicants may call the U.S. Government hotline at 1-866-999-HALT (1-866-999-4158).

LICENSE FOR FOREIGN FILING UNDER

Title 35, United States Code, Section 184

Title 37, Code of Federal Regulations, 5.11 & 5.15

GRANTED

The applicant has been granted a license under 35 U.S.C. 184, if the phrase "IF REQUIRED, FOREIGN FILING LICENSE GRANTED" followed by a date appears on this form. Such licenses are issued in all applications where the conditions for issuance of a license have been met, regardless of whether or not a license may be required as set forth in 37 CFR 5.15. The scope and limitations of this license are set forth in

37 CFR 5.15(a) unless an earlier license has been issued under 37 CFR 5.15(b). The license is subject to revocation upon written notification. The date indicated is the effective date of the license, unless an earlier license of similar scope has been granted under 37 CFR 5.13 or 5.14.

This license is to be retained by the licensee and may be used at any time on or after the effective date thereof unless it is revoked. This license is automatically transferred to any related applications(s) filed under 37 CFR 1.53(d). This license is not retroactive.

The grant of a license does not in any way lessen the responsibility of a licensee for the security of the subject matter as imposed by any Government contract or the provisions of existing laws relating to espionage and the national security or the export of technical data. Licensees should apprise themselves of current regulations especially with respect to certain countries, of other agencies, particularly the Office of Defense Trade Controls, Department of State (with respect to Arms, Munitions and Implements of War (22 CFR 121-128)); the Bureau of Industry and Security, Department of Commerce (15 CFR parts 730-774); the Office of Foreign AssetsControl, Department of Treasury (31 CFR Parts 500+) and the Department of Energy.

NOT GRANTED

No license under 35 U.S.C. 184 has been granted at this time, if the phrase "IF REQUIRED, FOREIGN FILING LICENSE GRANTED" DOES NOT appear on this form. Applicant may still petition for a license under 37 CFR 5.12, if a license is desired before the expiration of 6 months from the filing date of the application. If 6 months has lapsed from the filing date of this application and the licensee has not received any indication of a secrecy order under 35 U.S.C. 181, the licensee may foreign file the application pursuant to 37 CFR 5.15(b).

EXHIBIT Q

INFORMATION DISCLOSURE STATEMENT	Atty Docket:	58106_CON6
	Serial No.:	not yet assigned
	Applicant:	Flick
	Filing Date:	herewith
	Group:	

U.S. PATENT DOCUMENTS

Examiner Initials		Document Number	Date	Name	Class	Sub Class	Filing Date
/CHN/	AA	5,043,736	8/27/91	Darnell et al.	342	357	
/CHN/	AB	5,055,851	10/8/91	Sheffer	342	457	
/CHN/	AC	5,177,490	1/05/93	Ando et al.	342	357	
/CHN/	AD	5,223,844	6/29/93	Mansell et al.	342	357	
/CHN/	AE	5,262,774	12/16/93	Kuwahara et al.	340	988	
/CHN/	AF	5,334,986	8/2/94	Fernhout	342	357	
/CHN/	AG	5,365,450	11/15/94	Schuchman	364	449	
/CHN/	AH	5,515,043	5/7/96	Berard et al.	340	988	
/CHN/	AI	5,673,305	9/30/97	Ross	379	58	
/CHN/	AJ	5,777,580	7/7/98	Janky et al.	342	457	
/CHN/	AK	5,969,433	10/19/99	Maggiora et al.	307	10.5	
/CHN/	AL	6,018,657	1/25/00	Kennedy, III et al.	455	426	
/CHN/	AM	6,025,744	2/15/00	Bertolet et al.	340	426	
/CHN/	AN	6,049,269	4/11/00	Byrd et al.	340	426	
/CHN/	AO	6,055,426	4/25/00	Beasley	455	432	
/CHN/	AP	6,069,570	5/30/00	Herring	340	825.49	
/CHN/	AQ	6,075,458	6/13/00	Ladner et al.	340	825.49	
/CHN/	AR	6,133,855	10/17/00	Kim	340	932.2	
/CHN/	AS	6,148,212	11/14/00	Park et al.	455	456	
/CHN/	AT	6,151,551	11/21/00	Geier et al.	701	207	
/CHN/	AU	6,154,648	11/28/00	Comer	455	426	
/CHN/	AV	6,166,626	12/26/00	Janky et al.	340	426	
/CHN/	AW	6,169,497	6/2/01	Robert	340	988	
/CHN/	AX	6,195,597	2/27/01	Yamada	701	1	
/CHN/	AY	4,837,700	6/6/89	Ando et al.	364	449	
/CHN/	AZ	5,024,186	6/18/91	Long et al.	123	179B	
/CHN/	BA	5,398,190	3/14/95	Wortham	364	460	

INFORMATION DISCLOSURE STATEMENT	Atty Docket:	58106_CON6
	Serial No.:	not yet assigned
	Applicant:	Flick
	Filing Date:	herewith
	Group:	

U.S. PATENT DOCUMENTS

Examiner Initials		Document Number	Date	Name	Class	Sub Class	Filing Date
/CHN/	BB	5,483,455	1/9/96	Lay et al.	364	448	
	BC	5,515,285	5/7/96	Garrett, Sr. et al.	364	460	
	BD	5,570,087	10/29/96	Lemelson	340	870.05	
	BE	5,572,204	11/5/96	Timm et al.	340	988	
	BF	5,825,283	10/20/98	Camhi	340	438	
	BG	5,587,715	12/24/96	Lewis	342	357	
	BH	5,588,038	12/24/96	Snyder	379	57	
	BI	5,682,133	10/28/97	Johnson et al.	340	426	
	BJ	5,895,436	4/20/99	Savoie et al.	701	214	
	BK	5,939,975	8/19/99	Tsuria et al.	340	426	
	BL	5,944,768	8/31/99	Ito et al.	701	200	
	BM	5,983,161	11/9/99	Lemelson et al.	701	301	
	BN	5,986,543	11/16/99	Johnson	340	426	
	BO	6,028,537	2/22/00	Suman et al.	340	988	
	BP	6,049,269	4/11/00	Byrd et al.	340	426	
	BQ	6,067,007	5/23/00	Gioia	340	426	
	BR	6,101,443	8/8/00	Kato et al.	701	210	
	BS	6,116,639	9/12/00	Breed et al.	280	735	
	BT	6,131,067	10/10/00	Girerd et al.	701	213	
	BU	6,140,956	10/31/00	Hillman et al.	342	357.07	
	BV	6,128,571	10/3/00	Ito et al.	701	201	
	BW	6,167,255	12/26/00	Kennedy, III et al.	455	414	
	BX	6,211,818	4/3/01	Zach, Sr.	342	357.07	
	BY	6,236,365	5/22/01	LeBlanc et al.	342	457	
	BZ	6,240,365	5/29/01	Bunn et al.	701	213	
	CA	6,275,773	8/14/01	Lemelson et al.	701	301	
	CB	6,298,306	10/2/01	Suarez et al.	701	213	
	CC	6,259,381	7/10/01	Small	340	988	
	CD	6,313,791	11/6/01	Klanke	342	357.17	

INFORMATION DISCLOSURE STATEMENT	Atty Docket:	58106_CON6
	Serial No.:	not yet assigned
	Applicant:	Flick
	Filing Date:	herewith
	Group:	

U.S. PATENT DOCUMENTS

Examiner Initials		Document Number	Date	Name	Class	Sub Class	Filing Date
/CHN/	CD	6,314,366	11/6/01	Farmakis et al.	701	201	
	CE	6,320,535	11/20/01	Hillman et al.	342	357.1	
	CF	6,321,091	11/20/01	Holland	455	456	
	CG	6,339,745	1/15/02	Novik	701	208	
	CH	20010045886	11/29/01	Minowa	340	7.45	6/29/98
	CI	6,330,499	12/11/01	Chou et al.	701	33	
	CJ	6,331,825	12/18/01	Ladner et al.	340	988	
	CK	5,650,774	7/22/97	Drori	340	825.32	
	CL	5,952,933	9/14/99	Issa et al.	340	825.31	
	CM	6,021,319	2/1/00	Tigwell	455	151.2	
	CN	6,452,483	9/17/02	Chen et al.	340	425.5	
	CO	6,512,461	1/28/03	Benzie et al.	340	825.22	
	CP	6,567,012	5/20/03	Matsubara et al.	340	825.72	

FOREIGN PATENT DOCUMENTS

		Document Number	Date	Country	Class	Sub Class	Translation
/CHN/	CQ	2,133,673	4/6/96	Canada	H04B7	185	

OTHER ART (Including Author, Title, Date, Pertinent Pages, etc.)

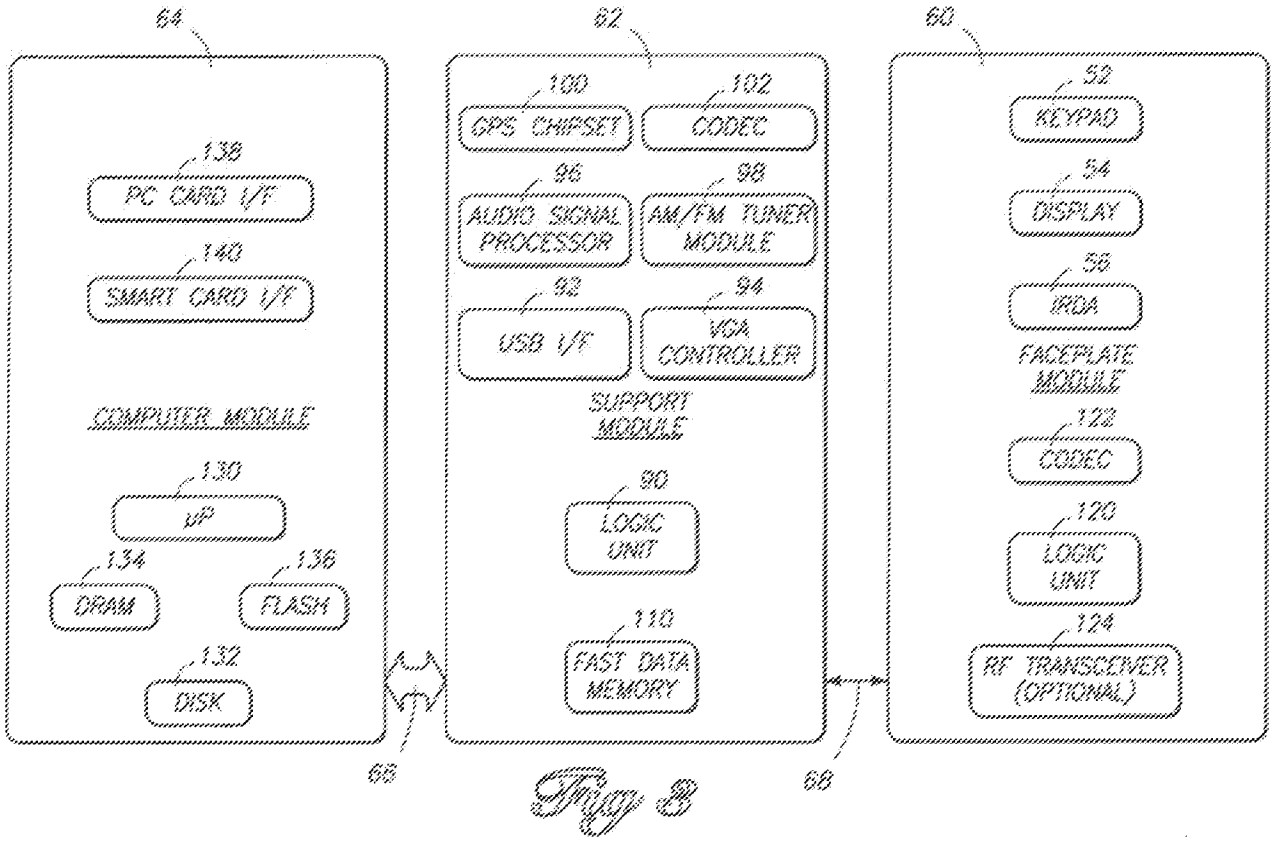
/CHN/	CR	Omega Research and Development, Inc., "GPS 2000", distributed at Consumer Electronics Show in Las Vegas, NV, January 2001, pages 1-4
/CHN/	CS	Omega Research and Development, Inc., "Omega Thinks Customers Don't Know Jack!", distributed at Consumer Electronics Show in Las Vegas, NV, January 2001, one page

EXAMINER: /Cuong Nguyen/ (06/04/2008)	DATE CONSIDERED: 06/04/2008

*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609; Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

EXHIBIT R

The '278 Patent	PRIOR ART – U.S. Patent 6,009,363 to Beckert et al. (incorporates disclosure of U.S. Patent 5,794,164 to Beckert et al. by reference)
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 Beckert et al. '363 patent discloses a multi-vehicle compatible tracking unit in the form of a vehicle computer system** ("The vehicle computer system has a housing sized to be mounted in a vehicle dashboard or other convenient location. This system provides an open hardware architecture and supports an open platform operating system. The open platform operating system supports multiple different applications that can be supplied by a software vendor. For instance, the operating system can support applications pertaining to entertainment, navigation, communications, security, diagnostics, and others." Beckert et al. '363 patent, col. 2, lines 10-17) **for a vehicle comprising a vehicle data bus extending throughout the vehicle** ("Most late model (1996 or later for OBD II, 1993 or later for OBD I) vehicles are also constructed with a diagnostic system that analyzes performance of the vehicle's engine transmission and fuel system, and other components. The diagnostic system can be coupled to an external computer download or monitor diagnostic information that is useful to a vehicle mechanic during servicing of the vehicle." Beckert et al. '363 patent, col. 1, lines 32 – 38) **the multi-vehicle compatible tracking unit comprising:**
a vehicle position determining device;	**The Beckert et al. '363 patent discloses a vehicle position determining device** in the form of a GPS chipset ("a GPS (global positioning system) chipset 100 to provide for satellite navigation such that the longitude, latitude, and altitude of the vehicle may be readily determined" Beckert et al. '363 patent, col. 6, lines 50–53). A block diagram of the vehicle computer system showing the GPS chipset 110 is included in the Beckert et al. '363 patent as FIG. 3 (reproduced below).

	 Fig. 3
a wireless communications device;	**The Beckert et al. '363 patent discloses a wireless communications device** in the form of a wireless Internet link 76 ("Another technique to load data or applications or transfer data with other computing devices is through … the wireless Internet link 76." Beckert et al. '363 patent, col. 5, lines 9 – 12, and FIGS. 1 and 3).

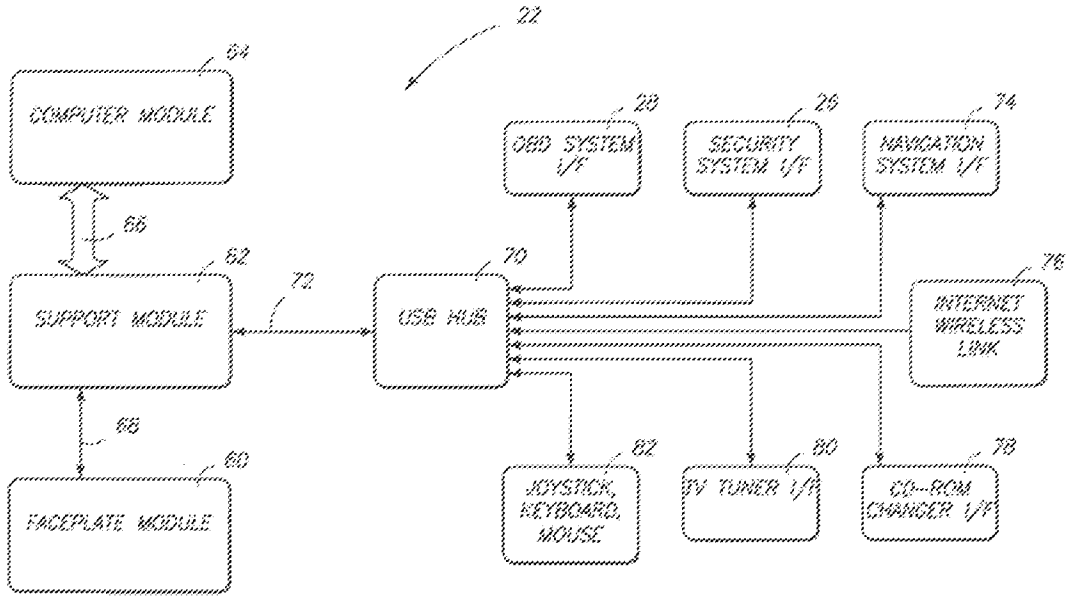


Fig 2

a multi-vehicle compatible controller for cooperating with said vehicle position determining device and said wireless communications device to send vehicle position information;	**The Beckert et al. '363 patent discloses a multi-vehicle compatible controller** in the form of the computer module 64 **for cooperating with said vehicle position determining device** ("The address/data bus structure 140 will also be driven for transfers between the host processor and peripheral registers such as the computer module reading the GPS receive registers." Beckert et al. '363 patent, col. 9, lines 6 – 9) **and said wireless communications device to send vehicle position information** ("Another technique to… transfer data with other computing devices is through… the wireless Internet link 76" Beckert et al. '363 patent, col. 5, lines 9 - 12; U.S. Patent No. 5,794,164 (Beckert et al. '164 patent) is incorporated by reference in the Beckert et al. '363 patent at col. 7, lines 44-51; The Beckert et al. '164 patent further discloses that vehicle computer system implements several application program interfaces (APIs) that can be accessed by remote computers. "Example APIs include a position and navigation API…" Beckert et al. '164 patent, col. 12, lines 25 - 30).

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 Beckert et al. '363 patent discloses that said multi-vehicle compatible controller is coupled to the vehicle data bus for communication thereover** ("In FIG. 2, the support module 62 is also connected to a universal serial bus (USB) hub 70 via a multi-bit connector 72 (e.g., 8 bits). The USB hub 70 provides connections to… the OBD (On Board Diagnostic) system 28…" Beckert et al. '363 patent, col. 6, line 63 – col. 7, line 1); U.S. Patent No. 5,794,164 (Beckert et al. '164 patent) is incorporated by reference in the Beckert et al. '363 patent at col. 7, lines 44-51; The Beckert et al. '164 patent further discloses that the computer module includes an OBD interpreter; "An OBD (On Board Diagnostic) interpreter 116 is provided in the computer module to communicate with the OBD system built into the vehicle by the manufacturer." Beckert et al. '164 patent, col. 9, lines 29 - 31) **with at least one vehicle device using at least one corresponding vehicle device code from among a plurality thereof for different vehicles** ("Most late model vehicles are also constructed with a diagnostic system that analyzes performance of the vehicle's engine, transmission and fuel system, and other components (1996 or later for OBD II, 1993 or later for OBD I)" Beckert et al. '363 patent, col. 1, lines 32 – 35; At the time of the filing of the Beckert et al. '363 patent three signaling protocols were permitted with the OBD II interface; "The OBD interpreter 116 interprets the status data received and provides performance related information from the vehicle's OBD system to the microprocessor 100. Also, commands can be provided to the interpreter which allows non-critical car systems to be controlled." Beckert et al. '164 patent, col. 9, lines 31 – 35; The status data interpreted by the OBD interpreter is transmitted using one of the three signaling protocols permitted by the OBD II interface).
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 Beckert et al. '363 patent discloses multiple downloading interfaces** ("To load an application or data onto the computer 22, the vehicle user inserts a CD or other media (if the application is not already contained on the hard disk) into the appropriate drive and the operating system downloads the application or data therefrom. The installation process can be automatically handled by the operating system, or with the assistance of commands input from the user in the form of keyed sequences on the keypad 52 or verbal instructions using the voice recognition device. Another technique to load data or applications or transfer data with other computing devices is through the use of the IrDA transceiver port 56, or the wireless Internet link 76." Beckert et al. '363 patent, col. 5, lines 1 – 12; U.S. Patent No. 5,794,164 (Beckert et al. '164 patent) is incorporated by reference in the Beckert

	et al. '363 patent at col. 7, lines 44-51; "It is further noted that the complete vehicle system can be removed from the base unit for security reasons, or to plug the computer into a docking station at the user's residence or office. With a docking station, the user can install or configure various programs for vehicle usage…" Beckert et al. '164 patent, col. 12, lines 5 - 11) **for permitting downloading of enabling data related to the at least one corresponding vehicle device code for use by said multi-vehicle compatible controller in the form of vehicle diagnostics applications downloaded via a wireless Internet connection** ("The microprocessor runs an open platform operating system, such as Windows 95® or Windows NT™, or Windows® derivative operating systems from Microsoft Corporation… The computer module 64 supports any variety of applications that the vehicle user might desire. These applications can… downloaded from an optional wireless Internet connection." Beckert et al. '363 patent, col. 7, lines 20-33; "… the operating system can support applications pertaining to… diagnostics" Beckert et al. '363 patent, col. 2, lines 15-17; "For instance, the vehicle computer system 20 can serve as… a diagnostic system" Beckert et al. '363 patent, col. 5, lines 36-41; U.S. Patent No. 5,794,164 (Beckert et al. '164 patent) is incorporated by reference in the Beckert et al. '363 patent at col. 7, lines 44-51; The Beckert et al. '164 patent further discloses that "[T]here are several applications that are supported by the operating system… The vehicle computer system also implements several application program interfaces (APIs) that offer specific functionality to support the various applications. Example APIs include… a diagnostics API… These applications and APIs are vehicle related… Essentially, the vehicle computer system can support any applications that run on the open platform operating system, which are many and varied" Beckert et al. '164 patent, col. 12, lines 12 – 40).
2. The multi-vehicle compatible tracking unit according to claim 1 wherein said downloading interface comprises a wired signal downloading interface.	**The Beckert et al. '363 patent discloses multiple downloading interfaces including wired signal downloading interfaces** ("To load an application or data onto the computer 22, the vehicle user inserts a CD or other media (if the application is not already contained on the hard disk) into the appropriate drive and the operating system downloads the application or data therefrom. The installation process can be automatically handled by the operating system, or with the assistance of commands input from the user in the form of keyed sequences on the keypad 52 or verbal instructions using the voice recognition device. Another technique to load data or applications or transfer data with other computing devices is through the use of the IrDA transceiver port 56, or the wireless Internet link 76." Beckert et

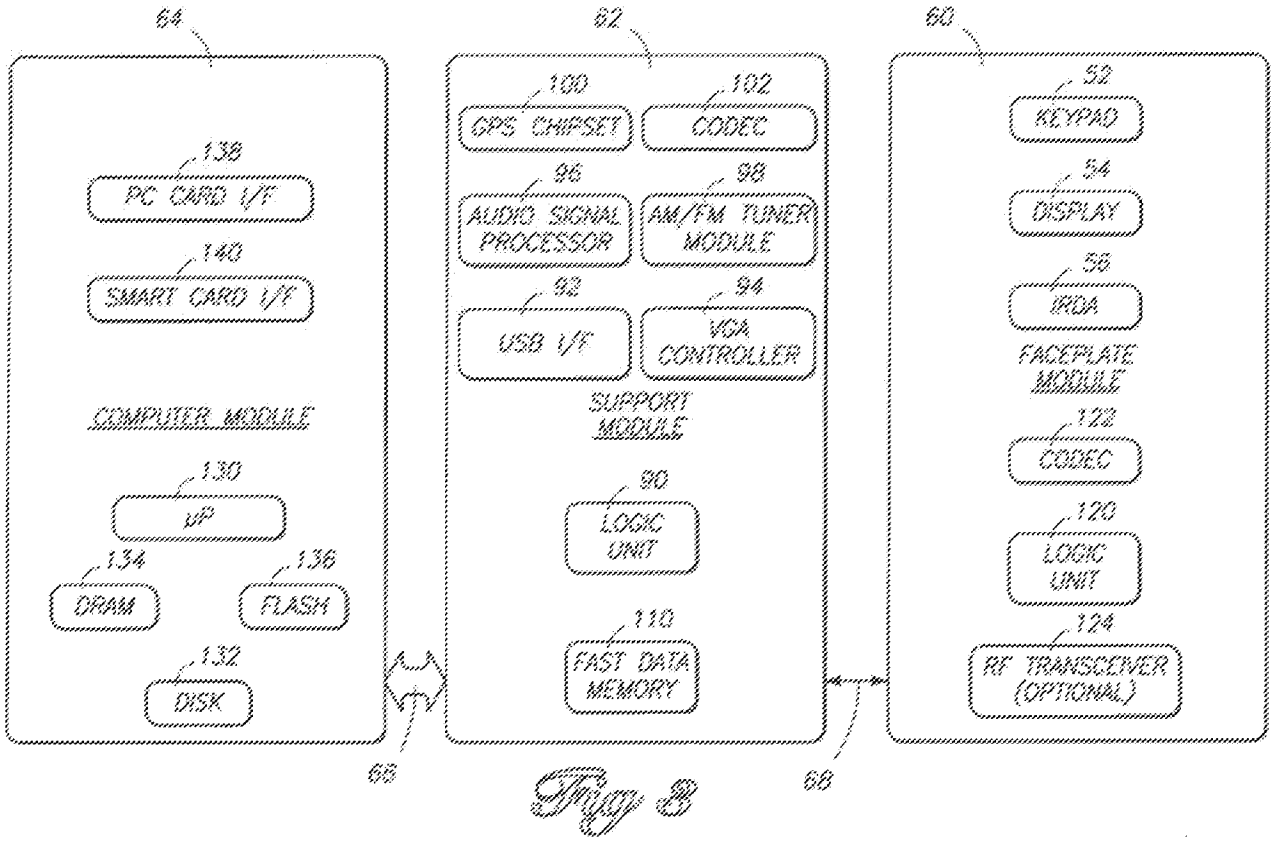
	al. '363 patent, col. 5, lines 1 – 12; U.S. Patent No. 5,794,164 (Beckert et al. '164 patent) is incorporated by reference in the Beckert et al. '363 patent at col. 7, lines 44-51; "It is further noted that the complete vehicle system can be removed from the base unit for security reasons, or to plug the computer into a docking station at the user's residence or office. With a docking station, the user can install or configure various programs for vehicle usage…" Beckert et al. '164 patent, col. 12, lines 5 - 11).
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.	**The Beckert et al. '363 patent discloses that the wired signal downloading interface comprises a connector for temporary connection to a downloading device** ("It is further noted that the complete vehicle system can be removed from the base unit for security reasons, or to plug the computer into a docking station at the user's residence or office. With a docking station, the user can install or configure various programs for vehicle usage…" Beckert et al. '164 patent, col. 12, lines 5 - 11).
4. The multi-vehicle compatible tracking unit according to claim 1 wherein said downloading interface comprises a wireless signal downloading interface.	**The Beckert et al. '363 patent discloses that said downloading interface comprises a wireless signal downloading interface in the form of a wireless Internet link** ("To load an application or data onto the computer 22, the vehicle user inserts a CD or other media (if the application is not already contained on the hard disk) into the appropriate drive and the operating system downloads the application or data therefrom. The installation process can be automatically handled by the operating system, or with the assistance of commands input from the user in the form of keyed sequences on the keypad 52 or verbal instructions using the voice recognition device. Another technique to load data or applications or transfer data with other computing devices is through the use of the IrDA transceiver port 56, or the wireless Internet link 76." Beckert et al. '363 patent, col. 5, lines 1 – 12).
5. The multi-vehicle compatible tracking unit according to claim 4 wherein said wireless signal downloading interface comprises a	**The Beckert et al. '363 patent discloses that said wireless signal downloading interface comprises a wireless receiver for temporary connection to a downloading device** ("Additionally, the faceplate module contains a slot for an optional plug-in RF transceiver 124 such as a cellphone, two-way pager, or point-to-point spread spectrum transceiver", Beckert et al. '363 patent, col. 7, lines 10-13).

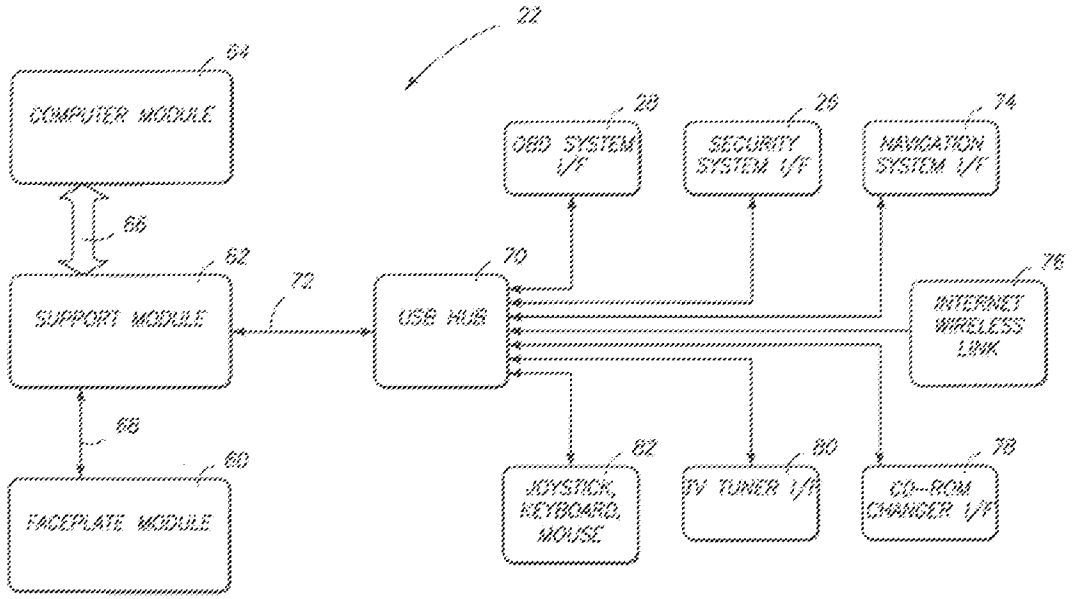
wireless receiver for temporary connection to a downloading device.	
6. The multi-vehicle compatible tracking unit according to claim 1 wherein the corresponding at least one vehicle code is for reading from the at least one vehicle device.	**The Beckert et al. '363 patent discloses that wherein the corresponding at least one vehicle code is for reading from the at least one vehicle device by describing reading status data from the vehicle's OBD system** ("Most late model (1996 or later for OBD II, 1993 or later for OBD I) vehicles are also constructed with a diagnostic system that analyzes performance of the vehicle's engine transmission and fuel system, and other components. The diagnostic system can be coupled to an external computer download or monitor diagnostic information that is useful to a vehicle mechanic during servicing of the vehicle." Beckert et al. '363 patent, col. 1, lines 32 – 38; U.S. Patent No. 5,794,164 (Beckert et al. '164 patent) is incorporated by reference in the Beckert et al. '363 patent at col. 7, lines 44-51; "The OBD interpreter 116 interprets the status data received and provides performance related information from the vehicle's OBD system to the microprocessor 100. Also, commands can be provided to the interpreter which allows non-critical car systems to be controlled." Beckert et al. '164 patent, col. 9, lines 31 – 35)
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 Beckert et al. '363 patent discloses writing to the at least one vehicle device via an OBD-II port by disclosing providing commands that allow non-critical car systems to be controlled** ("Most late model (1996 or later for OBD II, 1993 or later for OBD I) vehicles are also constructed with a diagnostic system that analyzes performance of the vehicle's engine transmission and fuel system, and other components. The diagnostic system can be coupled to an external computer download or monitor diagnostic information that is useful to a vehicle mechanic during servicing of the vehicle." Beckert et al. '363 patent, col. 1, lines 32 – 38; U.S. Patent No. 5,794,164 (Beckert et al. '164 patent) is incorporated by reference in the Beckert et al. '363 patent at col. 7, lines 44-51; "The OBD interpreter 116 interprets the status data received and provides performance related information from the vehicle's OBD system to the microprocessor 100. Also, commands can be provided to the interpreter which allows non-critical car systems to be controlled." Beckert et al. '164 patent, col. 9, lines 31 – 35)

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 Beckert et al. '363 patent discloses that said downloading interface is also for permitting downloading of at least one programming instruction for said multi-vehicle compatible controller** ("The microprocessor runs an open platform operating system, such as Windows 95® or Windows NT™, or Windows® derivative operating systems from Microsoft Corporation… The computer module 64 supports any variety of applications that the vehicle user might desire. These applications can… downloaded from an optional wireless Internet connection." Beckert et al. '363 patent, col. 7, lines 20-33; "… the operating system can support applications pertaining to… diagnostics" Beckert et al. '363 patent, col. 2, lines 15-17; "For instance, the vehicle computer system 20 can serve as… a diagnostic system" Beckert et al. '363 patent, col. 5, lines 36-41; U.S. Patent No. 5,794,164 (Beckert et al. '164 patent) is incorporated by reference in the Beckert et al. '363 patent at col. 7, lines 44-51; The Beckert et al. '164 patent further discloses that "[T]here are several applications that are supported by the operating system… The vehicle computer system also implements several application program interfaces (APIs) that offer specific functionality to support the various applications. Example APIs include… a diagnostics API… These applications and APIs are vehicle related… Essentially, the vehicle computer system can support any applications that run on the open platform operating system, which are many and varied" Beckert et al. '164 patent, col. 12, lines 12 – 40)
9. The multi-vehicle compatible tracking unit according to claim 1 further comprising a remote transmitter;	**The Beckert et al. '363 patent discloses a remote transmitter in the form of other computing devices that communicate with the vehicle computer system via the wireless Internet link** ("Another technique to… transfer data with other computing devices is through… the wireless Internet link 76" Beckert et al. '363 patent, col. 5, lines 9 – 12).
and wherein said multi-vehicle compatible controller also performs at least one vehicle remote control function responsive to said remote transmitter.	**The Beckert et al. '363 patent discloses performing at least one vehicle remote control function responsive to the remote transmitter by incorporating U.S. Patent No. 5,794,164 (Beckert et al. '164 patent) by reference to disclose the full capabilities of the vehicle computer system that include a number of APIs that can be accessed by the remote computing devices including a diagnostic API that can be used to control the functions of the vehicle** ("Example APIs include… a diagnostics API" Beckert et al. '164 patent, col. 12, lines 25 – 30; "The OBD interpreter 116 interprets the status data received and provides performance related information from the vehicle's OBD system to the microprocessor 100. Also, commands can be provided to the interpreter which allows

	non-critical car systems to be controlled." Beckert et al. '164 patent, col. 9, lines 31 – 35).
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 Beckert et al. '363 patent discloses that security systems control actuators to lock/unlock doors or windows, and an alarm or siren and the controlling of the security system via the wireless Internet link** ("Security System also controls actuators to lock/unlock doors or windows, and an alarm or siren" Beckert et al. '363 patent, col. 1, lines 35 – 31; "The open platform operating system supports multiple different applications that can be supplied by a software vendor. For instance, the operating system can support applications pertaining to entertainment, navigation, communications, security, diagnostics, and others." Beckert et al. '363 patent, col. 2, lines 13–18; "It is desirable that the computer system remain operative to maintain security and communication features even though the system can no longer draw power from the vehicle battery." Beckert et al. '363 patent, col. 14, lines 6-9)
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 Beckert et al. '363 patent discloses that said wireless position determining device comprises a Global Positioning System (GPS) receiver** ("a GPS (global positioning system) chipset 100 to provide for satellite navigation such that the longitude, latitude, and altitude of the vehicle may be readily determined" Beckert et al. '363 patent, col. 6, lines 50–53).
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	**The Beckert et al. '363 patent discloses a housing containing said vehicle position determining device, said wireless communications device, said multi-vehicle compatible controller, and said downloading interface** ("The vehicle computer system has a housing sized to be mounted in a vehicle dashboard or other convenient location." Beckert et al. 363 patent, col. 2, lines 9 – 11; "The computer 22 is assembled in a housing 36 that is sized to be mounted in a vehicle dashboard, similar to a conventional automobile stereo. Preferably, the housing 36 has a form factor of a single DIN (Deutsche Industry Normen). But, it possibly could be housed in a 2 DIN unit or other special form factor for an OEM." Beckert et al. patent, col. 4, lines 4-9).

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:	**The Beckert et al. '363 patent discloses a multi-vehicle compatible tracking unit in the form of a vehicle computer system** ("The vehicle computer system has a housing sized to be mounted in a vehicle dashboard or other convenient location. This system provides an open hardware architecture and supports an open platform operating system. The open platform operating system supports multiple different applications that can be supplied by a software vendor. For instance, the operating system can support applications pertaining to entertainment, navigation, communications, security, diagnostics, and others." Beckert et al. '363 patent, col. 2, lines 10-17) **for a vehicle comprising a vehicle data bus extending throughout the vehicle** ("Most late model (1996 or later for OBD II, 1993 or later for OBD I) vehicles are also constructed with a diagnostic system that analyzes performance of the vehicle's engine transmission and fuel system, and other components. The diagnostic system can be coupled to an external computer download or monitor diagnostic information that is useful to a vehicle mechanic during servicing of the vehicle." Beckert et al. '363 patent, col. 1, lines 32 – 38) **the multi-vehicle compatible tracking unit comprising:**
a vehicle position determining device;	**The Beckert et al. '363 patent discloses a vehicle position determining device** in the form of a GPS chipset ("a GPS (global positioning system) chipset 100 to provide for satellite navigation such that the longitude, latitude, and altitude of the vehicle may be readily determined" Beckert et al. '363 patent, col. 6, lines 50–53). A block diagram of the vehicle computer system showing the GPS chipset 110 is included in the Beckert et al. '363 patent as FIG. 3 (reproduced below).

	 Fig. 3
a wireless communications device;	**The Beckert et al. '363 patent discloses a wireless communications device** in the form of a wireless Internet link 76 ("Another technique to load data or applications or transfer data with other computing devices is through … the wireless Internet link 76." Beckert et al. '363 patent, col. 5, lines 9 – 12, and FIGS. 1 and 3).

	 Fig 2
a multi-vehicle compatible controller for cooperating with said vehicle position determining device and said wireless communications device to send vehicle position information;	**The Beckert et al. '363 patent discloses a multi-vehicle compatible controller** in the form of the computer module 64 **for cooperating with said vehicle position determining device** ("The address/data bus structure 140 will also be driven for transfers between the host processor and peripheral registers such as the computer module reading the GPS receive registers." Beckert et al. '363 patent, col. 9, lines 6 – 9) **and said wireless communications device to send vehicle position information** ("Another technique to… transfer data with other computing devices is through… the wireless Internet link 76" Beckert et al. '363 patent, col. 5, lines 9 - 12; U.S. Patent No. 5,794,164 (Beckert et al. '164 patent) is incorporated by reference in the Beckert et al. '363 patent at col. 7, lines 44-51; The Beckert et al. '164 patent further discloses that vehicle computer system implements several application program interfaces (APIs) that can be accessed by remote computers. "Example APIs include a position and navigation API…" Beckert et al. '164 patent, col. 12, lines 25 - 30).

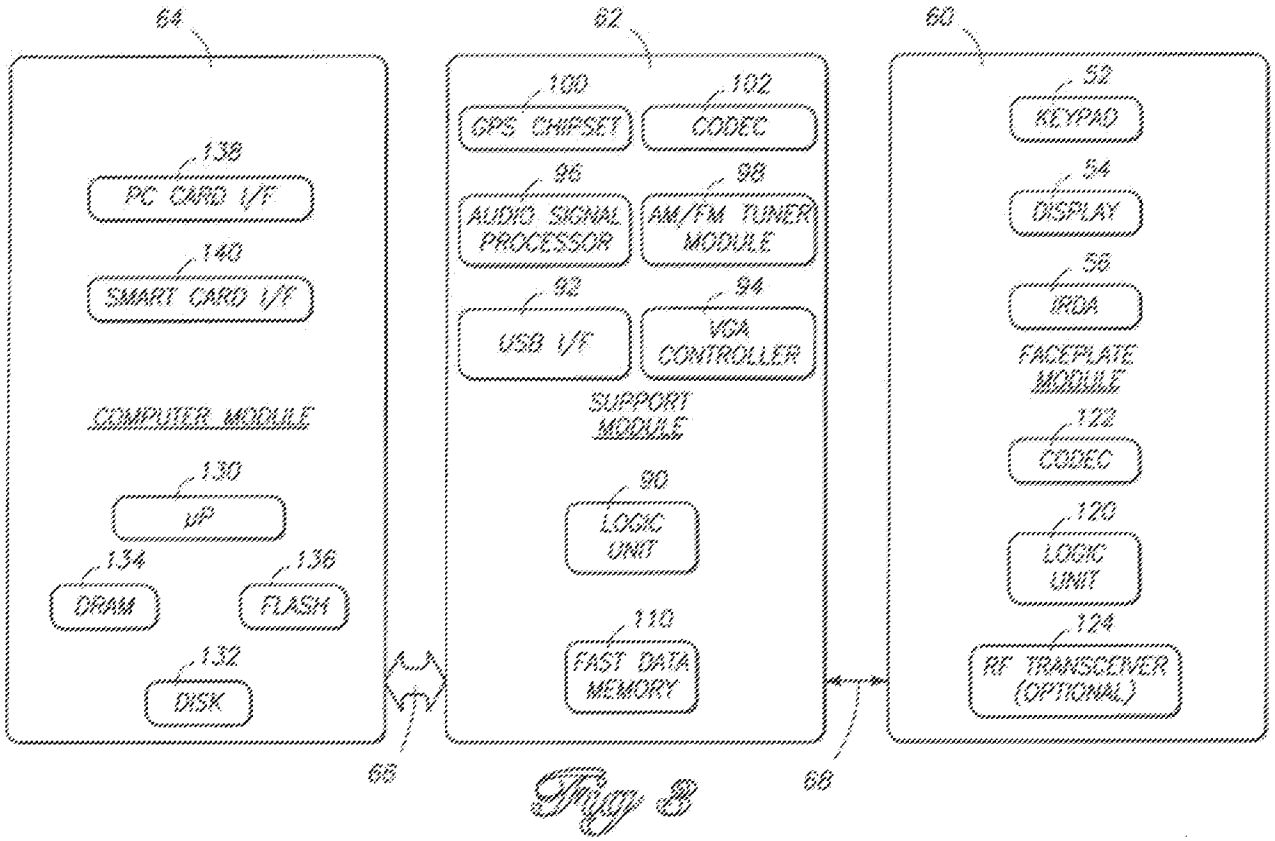
said multi-vehicle compatible controller to be coupled to the vehicle data bus for communication thereover with at least one vehicle device using at least one corresponding vehicle device code from among a plurality thereof for different vehicles; and	**The Beckert et al. '363 patent discloses that said multi-vehicle compatible controller is coupled to the vehicle data bus for communication thereover** ("In FIG. 2, the support module 62 is also connected to a universal serial bus (USB) hub 70 via a multi-bit connector 72 (e.g., 8 bits). The USB hub 70 provides connections to… the OBD (On Board Diagnostic) system 28…" Beckert et al. '363 patent, col. 6, line 63 – col. 7, line 1); U.S. Patent No. 5,794,164 (Beckert et al. '164 patent) is incorporated by reference in the Beckert et al. '363 patent at col. 7, lines 44-51; The Beckert et al. '164 patent further discloses that the computer module includes an OBD interpreter; "An OBD (On Board Diagnostic) interpreter 116 is provided in the computer module to communicate with the OBD system built into the vehicle by the manufacturer." Beckert et al. '164 patent, col. 9, lines 29 - 31) **with at least one vehicle device using at least one corresponding vehicle device code from among a plurality thereof for different vehicles** ("Most late model vehicles are also constructed with a diagnostic system that analyzes performance of the vehicle's engine, transmission and fuel system, and other components (1996 or later for OBD II, 1993 or later for OBD I)" Beckert et al. '363 patent, col. 1, lines 32 – 35; At the time of the filing of the Beckert et al. '363 patent three signaling protocols were permitted with the OBD II interface; "The OBD interpreter 116 interprets the status data received and provides performance related information from the vehicle's OBD system to the microprocessor 100. Also, commands can be provided to the interpreter which allows non-critical car systems to be controlled." Beckert et al. '164 patent, col. 9, lines 31 – 35; The status data interpreted by the OBD interpreter is transmitted using one of the three signaling protocols permitted by the OBD II interface).
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 Beckert et al. '363 patent discloses multiple downloading interfaces** ("To load an application or data onto the computer 22, the vehicle user inserts a CD or other media (if the application is not already contained on the hard disk) into the appropriate drive and the operating system downloads the application or data therefrom. The installation process can be automatically handled by the operating system, or with the assistance of commands input from the user in the form of keyed sequences on the keypad 52 or verbal instructions using the voice recognition device. Another technique to load data or applications or transfer data with other computing devices is through the use of the IrDA transceiver port 56, or the wireless Internet link 76." Beckert et al. '363 patent, col. 5, lines 1 – 12; U.S. Patent No. 5,794,164 (Beckert et al. '164 patent) is incorporated by reference in the Beckert

	et al. '363 patent at col. 7, lines 44-51; "It is further noted that the complete vehicle system can be removed from the base unit for security reasons, or to plug the computer into a docking station at the user's residence or office. With a docking station, the user can install or configure various programs for vehicle usage…" Beckert et al. '164 patent, col. 12, lines 5 - 11) **for permitting downloading of enabling data related to the at least one corresponding vehicle device code for use by said multi-vehicle compatible controller in the form of vehicle diagnostics applications downloaded via a wireless Internet connection** ("The microprocessor runs an open platform operating system, such as Windows 95® or Windows NT™, or Windows® derivative operating systems from Microsoft Corporation… The computer module 64 supports any variety of applications that the vehicle user might desire. These applications can… downloaded from an optional wireless Internet connection." Beckert et al. '363 patent, col. 7, lines 20-33; "… the operating system can support applications pertaining to… diagnostics" Beckert et al. '363 patent, col. 2, lines 15-17; "For instance, the vehicle computer system 20 can serve as… a diagnostic system" Beckert et al. '363 patent, col. 5, lines 36-41; U.S. Patent No. 5,794,164 (Beckert et al. '164 patent) is incorporated by reference in the Beckert et al. '363 patent at col. 7, lines 44-51; The Beckert et al. '164 patent further discloses that "[T]here are several applications that are supported by the operating system… The vehicle computer system also implements several application program interfaces (APIs) that offer specific functionality to support the various applications. Example APIs include… a diagnostics API… These applications and APIs are vehicle related… Essentially, the vehicle computer system can support any applications that run on the open platform operating system, which are many and varied" Beckert et al. '164 patent, col. 12, lines 12 – 40)
said downloading interface comprising a connector for temporary connection to a downloading device.	**The Beckert et al. '363 patent discloses that the wired signal downloading interface comprises a connector for temporary connection to a downloading device** ("It is further noted that the complete vehicle system can be removed from the base unit for security reasons, or to plug the computer into a docking station at the user's residence or office. With a docking station, the user can install or configure various programs for vehicle usage…" Beckert et al. '164 patent, col. 12, lines 5 - 11) **The Beckert et al. '363 patent also discloses a wireless signal downloading interface for temporary connection to a downloading device** ("Additionally, the faceplate module

	contains a slot for an optional plug-in RF transceiver 124 such as a cellphone, two-way pager, or point-to-point spread spectrum transceiver", Beckert et al. '363 patent, col. 7, lines 10-13).
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 Beckert et al. '363 patent discloses that wherein the corresponding at least one vehicle code is for reading from the at least one vehicle device by describing reading status data from the vehicle's OBD system** ("Most late model (1996 or later for OBD II, 1993 or later for OBD I) vehicles are also constructed with a diagnostic system that analyzes performance of the vehicle's engine transmission and fuel system, and other components. The diagnostic system can be coupled to an external computer download or monitor diagnostic information that is useful to a vehicle mechanic during servicing of the vehicle." Beckert et al. '363 patent, col. 1, lines 32 – 38; U.S. Patent No. 5,794,164 (Beckert et al. '164 patent) is incorporated by reference in the Beckert et al. '363 patent at col. 7, lines 44-51; "The OBD interpreter 116 interprets the status data received and provides performance related information from the vehicle's OBD system to the microprocessor 100. Also, commands can be provided to the interpreter which allows non-critical car systems to be controlled." Beckert et al. '164 patent, col. 9, lines 31 – 35)
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 Beckert et al. '363 patent discloses writing to the at least one vehicle device via an OBD-II port by disclosing providing commands that allow non-critical car systems to be controlled** ("Most late model (1996 or later for OBD II, 1993 or later for OBD I) vehicles are also constructed with a diagnostic system that analyzes performance of the vehicle's engine transmission and fuel system, and other components. The diagnostic system can be coupled to an external computer download or monitor diagnostic information that is useful to a vehicle mechanic during servicing of the vehicle." Beckert et al. '363 patent, col. 1, lines 32 – 38; U.S. Patent No. 5,794,164 (Beckert et al. '164 patent) is incorporated by reference in the Beckert et al. '363 patent at col. 7, lines 44-51; "The OBD interpreter 116 interprets the status data received and provides performance related information from the vehicle's OBD system to the microprocessor 100. Also, commands can be provided to the interpreter which allows non-critical car systems to be controlled." Beckert et al. '164 patent, col. 9, lines 31 – 35)

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 Beckert et al. '363 patent discloses that said downloading interface is also for permitting downloading of at least one programming instruction for said multi-vehicle compatible controller** ("The microprocessor runs an open platform operating system, such as Windows 95® or Windows NT™, or Windows® derivative operating systems from Microsoft Corporation… The computer module 64 supports any variety of applications that the vehicle user might desire. These applications can… downloaded from an optional wireless Internet connection." Beckert et al. '363 patent, col. 7, lines 20-33; "… the operating system can support applications pertaining to… diagnostics" Beckert et al. '363 patent, col. 2, lines 15-17; "For instance, the vehicle computer system 20 can serve as… a diagnostic system" Beckert et al. '363 patent, col. 5, lines 36-41; U.S. Patent No. 5,794,164 (Beckert et al. '164 patent) is incorporated by reference in the Beckert et al. '363 patent at col. 7, lines 44-51; The Beckert et al. '164 patent further discloses that "[T]here are several applications that are supported by the operating system… The vehicle computer system also implements several application program interfaces (APIs) that offer specific functionality to support the various applications. Example APIs include… a diagnostics API… These applications and APIs are vehicle related… Essentially, the vehicle computer system can support any applications that run on the open platform operating system, which are many and varied" Beckert et al. '164 patent, col. 12, lines 12 – 40)
17. The multi-vehicle compatible tracking unit according to claim 13 further comprising a remote transmitter;	**The Beckert et al. '363 patent discloses a remote transmitter in the form of other computing devices that communicate with the vehicle computer system via the wireless Internet link** ("Another technique to… transfer data with other computing devices is through… the wireless Internet link 76" Beckert et al. '363 patent, col. 5, lines 9 – 12).
and wherein said multi-vehicle compatible controller also performs at least one vehicle remote control function responsive to said remote transmitter.	**The Beckert et al. '363 patent discloses performing at least one vehicle remote control function responsive to the remote transmitter by incorporating U.S. Patent No. 5,794,164 (Beckert et al. '164 patent) by reference to disclose the full capabilities of the vehicle computer system that include a number of APIs that can be accessed by the remote computing devices including a diagnostic API that can be used to control the functions of the vehicle** ("Example APIs include… a diagnostics API" Beckert et al. '164 patent, col. 12, lines 25 – 30; "The OBD interpreter 116 interprets the status data

	received and provides performance related information from the vehicle's OBD system to the microprocessor 100. Also, commands can be provided to the interpreter which allows non-critical car systems to be controlled." Beckert et al. '164 patent, col. 9, lines 31 – 35).
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 Beckert et al. '363 patent discloses a multi-vehicle compatible tracking unit in the form of a vehicle computer system** ("The vehicle computer system has a housing sized to be mounted in a vehicle dashboard or other convenient location. This system provides an open hardware architecture and supports an open platform operating system. The open platform operating system supports multiple different applications that can be supplied by a software vendor. For instance, the operating system can support applications pertaining to entertainment, navigation, communications, security, diagnostics, and others." Beckert et al. '363 patent, col. 2, lines 10-17) **for a vehicle comprising a vehicle data bus extending throughout the vehicle** ("Most late model (1996 or later for OBD II, 1993 or later for OBD I) vehicles are also constructed with a diagnostic system that analyzes performance of the vehicle's engine transmission and fuel system, and other components. The diagnostic system can be coupled to an external computer download or monitor diagnostic information that is useful to a vehicle mechanic during servicing of the vehicle." Beckert et al. '363 patent, col. 1, lines 32 – 38) **the multi-vehicle compatible tracking unit comprising:**
a vehicle position determining device;	**The Beckert et al. '363 patent discloses a vehicle position determining device** in the form of a GPS chipset ("a GPS (global positioning system) chipset 100 to provide for satellite navigation such that the longitude, latitude, and altitude of the vehicle may be readily determined" Beckert et al. '363 patent, col. 6, lines 50–53). A block diagram of the vehicle computer system showing the GPS chipset 110 is included in the Beckert et al. '363 patent as FIG. 3 (reproduced below).

	 Fig. 8
a wireless communications device;	**The Beckert et al. '363 patent discloses a wireless communications device** in the form of a wireless Internet link 76 ("Another technique to load data or applications or transfer data with other computing devices is through … the wireless Internet link 76." Beckert et al. '363 patent, col. 5, lines 9 – 12, and FIGS. 1 and 3).

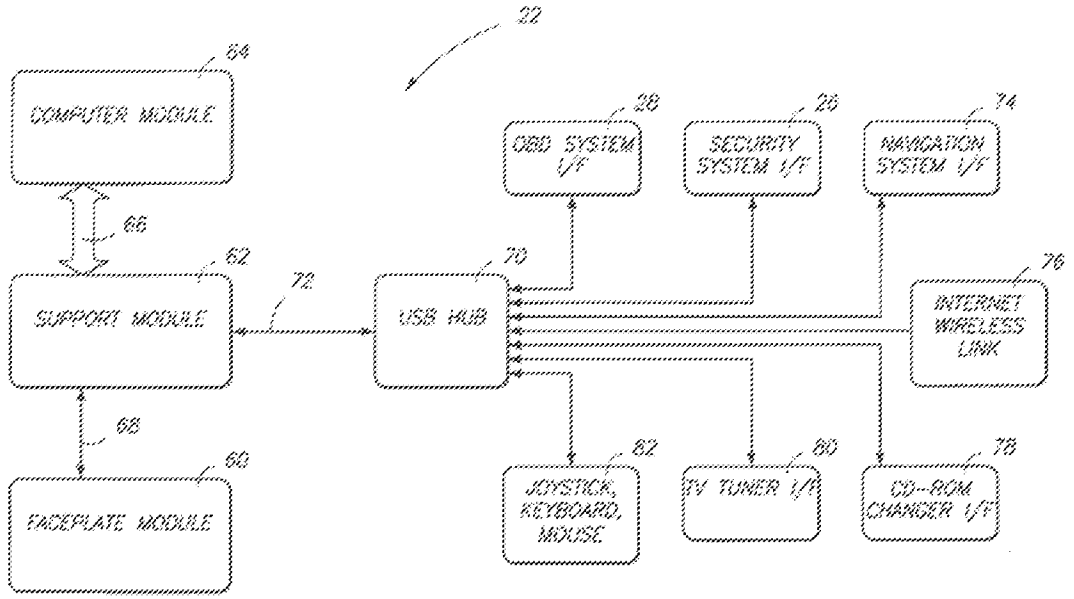


Fig 2

a multi-vehicle compatible controller for cooperating with said vehicle position determining device and said wireless communications device to send vehicle position information;	**The Beckert et al. '363 patent discloses a multi-vehicle compatible controller** in the form of the computer module 64 **for cooperating with said vehicle position determining device** ("The address/data bus structure 140 will also be driven for transfers between the host processor and peripheral registers such as the computer module reading the GPS receive registers." Beckert et al. '363 patent, col. 9, lines 6 – 9) **and said wireless communications device to send vehicle position information** ("Another technique to… transfer data with other computing devices is through… the wireless Internet link 76" Beckert et al. '363 patent, col. 5, lines 9 - 12; U.S. Patent No. 5,794,164 (Beckert et al. '164 patent) is incorporated by reference in the Beckert et al. '363 patent at col. 7, lines 44-51; The Beckert et al. '164 patent further discloses that vehicle computer system implements several application program interfaces (APIs) that can be accessed by remote computers. "Example APIs include a position and navigation API…" Beckert et al. '164 patent, col. 12, lines 25 - 30).

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 Beckert et al. '363 patent discloses that said multi-vehicle compatible controller is coupled to the vehicle data bus for communication thereover** ("In FIG. 2, the support module 62 is also connected to a universal serial bus (USB) hub 70 via a multi-bit connector 72 (e.g., 8 bits). The USB hub 70 provides connections to… the OBD (On Board Diagnostic) system 28…" Beckert et al. '363 patent, col. 6, line 63 – col. 7, line 1); U.S. Patent No. 5,794,164 (Beckert et al. '164 patent) is incorporated by reference in the Beckert et al. '363 patent at col. 7, lines 44-51; The Beckert et al. '164 patent further discloses that the computer module includes an OBD interpreter; "An OBD (On Board Diagnostic) interpreter 116 is provided in the computer module to communicate with the OBD system built into the vehicle by the manufacturer." Beckert et al. '164 patent, col. 9, lines 29 - 31) **with at least one vehicle device using at least one corresponding vehicle device code from among a plurality thereof for different vehicles** ("Most late model vehicles are also constructed with a diagnostic system that analyzes performance of the vehicle's engine, transmission and fuel system, and other components (1996 or later for OBD II, 1993 or later for OBD I)" Beckert et al. '363 patent, col. 1, lines 32 – 35; At the time of the filing of the Beckert et al. '363 patent three signaling protocols were permitted with the OBD II interface; "The OBD interpreter 116 interprets the status data received and provides performance related information from the vehicle's OBD system to the microprocessor 100. Also, commands can be provided to the interpreter which allows non-critical car systems to be controlled." Beckert et al. '164 patent, col. 9, lines 31 – 35; The status data interpreted by the OBD interpreter is transmitted using one of the three signaling protocols permitted by the OBD II interface).
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 Beckert et al. '363 patent discloses multiple downloading interfaces** ("To load an application or data onto the computer 22, the vehicle user inserts a CD or other media (if the application is not already contained on the hard disk) into the appropriate drive and the operating system downloads the application or data therefrom. The installation process can be automatically handled by the operating system, or with the assistance of commands input from the user in the form of keyed sequences on the keypad 52 or verbal instructions using the voice recognition device. Another technique to load data or applications or transfer data with other computing devices is through the use of the IrDA transceiver port 56, or the wireless Internet link 76." Beckert et al. '363 patent, col. 5, lines 1 – 12; U.S. Patent No. 5,794,164 (Beckert et al. '164 patent) is incorporated by reference in the Beckert

	et al. '363 patent at col. 7, lines 44-51; "It is further noted that the complete vehicle system can be removed from the base unit for security reasons, or to plug the computer into a docking station at the user's residence or office. With a docking station, the user can install or configure various programs for vehicle usage…" Beckert et al. '164 patent, col. 12, lines 5 - 11) **for permitting downloading of enabling data related to the at least one corresponding vehicle device code for use by said multi-vehicle compatible controller in the form of vehicle diagnostics applications downloaded via a wireless Internet connection** ("The microprocessor runs an open platform operating system, such as Windows 95® or Windows NT™, or Windows® derivative operating systems from Microsoft Corporation… The computer module 64 supports any variety of applications that the vehicle user might desire. These applications can… downloaded from an optional wireless Internet connection." Beckert et al. '363 patent, col. 7, lines 20-33; "… the operating system can support applications pertaining to… diagnostics" Beckert et al. '363 patent, col. 2, lines 15-17; "For instance, the vehicle computer system 20 can serve as… a diagnostic system" Beckert et al. '363 patent, col. 5, lines 36-41; U.S. Patent No. 5,794,164 (Beckert et al. '164 patent) is incorporated by reference in the Beckert et al. '363 patent at col. 7, lines 44-51; The Beckert et al. '164 patent further discloses that "[T]here are several applications that are supported by the operating system… The vehicle computer system also implements several application program interfaces (APIs) that offer specific functionality to support the various applications. Example APIs include… a diagnostics API… These applications and APIs are vehicle related… Essentially, the vehicle computer system can support any applications that run on the open platform operating system, which are many and varied" Beckert et al. '164 patent, col. 12, lines 12 – 40)
said downloading interface comprising a wireless receiver for temporary connection to a downloading device.	**The Beckert et al. '363 patent discloses that said downloading interface comprises a wireless signal downloading interface in the form of a wireless Internet link** ("To load an application or data onto the computer 22, the vehicle user inserts a CD or other media (if the application is not already contained on the hard disk) into the appropriate drive and the operating system downloads the application or data therefrom. The installation process can be automatically handled by the operating system, or with the assistance of commands input from the user in the form of keyed sequences on the keypad 52 or verbal instructions using the voice recognition device. Another technique to load data or applications or transfer data with other computing devices is through the use of the IrDA transceiver port 56, or the wireless Internet link 76." Beckert et al. '363 patent, col. 5, lines 1 – 12)

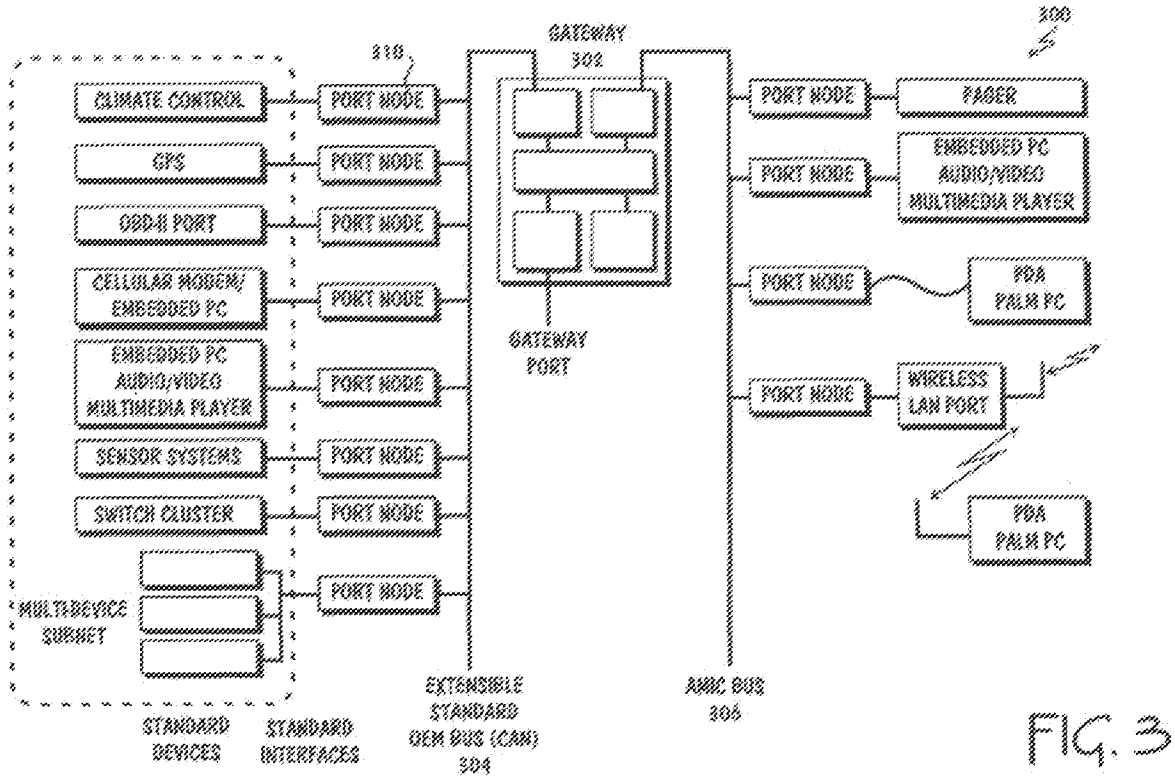
	The Beckert et al. '363 patent discloses that said wireless signal downloading interface comprises a wireless receiver for temporary connection to a downloading device in the form of a plug-in RF transceiver that can be a cellphone or a two-way pager ("Additionally, the faceplate module contains a slot for an optional plug-in RF transceiver 124 such as a cellphone, two-way pager, or point-to-point spread spectrum transceiver", Beckert et al. '363 patent, col. 7, lines 10-13).
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 Beckert et al. '363 patent discloses that wherein the corresponding at least one vehicle code is for reading from the at least one vehicle device by describing reading status data from the vehicle's OBD system** ("Most late model (1996 or later for OBD II, 1993 or later for OBD I) vehicles are also constructed with a diagnostic system that analyzes performance of the vehicle's engine transmission and fuel system, and other components. The diagnostic system can be coupled to an external computer download or monitor diagnostic information that is useful to a vehicle mechanic during servicing of the vehicle." Beckert et al. '363 patent, col. 1, lines 32 – 38; U.S. Patent No. 5,794,164 (Beckert et al. '164 patent) is incorporated by reference in the Beckert et al. '363 patent at col. 7, lines 44-51; "The OBD interpreter 116 interprets the status data received and provides performance related information from the vehicle's OBD system to the microprocessor 100. Also, commands can be provided to the interpreter which allows non-critical car systems to be controlled." Beckert et al. '164 patent, col. 9, lines 31 – 35)
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 Beckert et al. '363 patent discloses writing to the at least one vehicle device via an OBD-II port by disclosing providing commands that allow non-critical car systems to be controlled** ("Most late model (1996 or later for OBD II, 1993 or later for OBD I) vehicles are also constructed with a diagnostic system that analyzes performance of the vehicle's engine transmission and fuel system, and other components. The diagnostic system can be coupled to an external computer download or monitor diagnostic information that is useful to a vehicle mechanic during servicing of the vehicle." Beckert et al. '363 patent, col. 1, lines 32 – 38; U.S. Patent No. 5,794,164 (Beckert et al. '164 patent) is incorporated by reference in the Beckert et al. '363 patent at col. 7, lines 44-51; "The OBD

	interpreter 116 interprets the status data received and provides performance related information from the vehicle's OBD system to the microprocessor 100. Also, commands can be provided to the interpreter which allows non-critical car systems to be controlled." Beckert et al. '164 patent, col. 9, lines 31 – 35)
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 Beckert et al. '363 patent discloses that said downloading interface is also for permitting downloading of at least one programming instruction for said multi-vehicle compatible controller** ("The microprocessor runs an open platform operating system, such as Windows 95® or Windows NT™, or Windows® derivative operating systems from Microsoft Corporation… The computer module 64 supports any variety of applications that the vehicle user might desire. These applications can… downloaded from an optional wireless Internet connection." Beckert et al. '363 patent, col. 7, lines 20-33; "… the operating system can support applications pertaining to… diagnostics" Beckert et al. '363 patent, col. 2, lines 15-17; "For instance, the vehicle computer system 20 can serve as… a diagnostic system" Beckert et al. '363 patent, col. 5, lines 36-41; U.S. Patent No. 5,794,164 (Beckert et al. '164 patent) is incorporated by reference in the Beckert et al. '363 patent at col. 7, lines 44-51; The Beckert et al. '164 patent further discloses that "[T]here are several applications that are supported by the operating system… The vehicle computer system also implements several application program interfaces (APIs) that offer specific functionality to support the various applications. Example APIs include… a diagnostics API… These applications and APIs are vehicle related… Essentially, the vehicle computer system can support any applications that run on the open platform operating system, which are many and varied" Beckert et al. '164 patent, col. 12, lines 12 – 40)53 – 55).
22. The multi-vehicle compatible tracking unit according to claim 18 further comprising a remote transmitter;	**The Beckert et al. '363 patent discloses a remote transmitter in the form of other computing devices that communicate with the vehicle computer system via the wireless Internet link** ("Another technique to… transfer data with other computing devices is through… the wireless Internet link 76" Beckert et al. '363 patent, col. 5, lines 9 – 12).
and wherein said multi-vehicle compatible controller also performs at	**The Beckert et al. '363 patent discloses performing at least one vehicle remote control function responsive to the remote transmitter by incorporating U.S. Patent No. 5,794,164 (Beckert et al. '164 patent) by reference to disclose the full capabilities**

least one vehicle remote control function responsive to said remote transmitter.	**of the vehicle computer system that include a number of APIs that can be accessed by the remote computing devices including a diagnostic API that can be used to control the functions of the vehicle** ("Example APIs include… a diagnostics API" Beckert et al. '164 patent, col. 12, lines 25 – 30; "The OBD interpreter 116 interprets the status data received and provides performance related information from the vehicle's OBD system to the microprocessor 100. Also, commands can be provided to the interpreter which allows non-critical car systems to be controlled." Beckert et al. '164 patent, col. 9, lines 31 – 35).

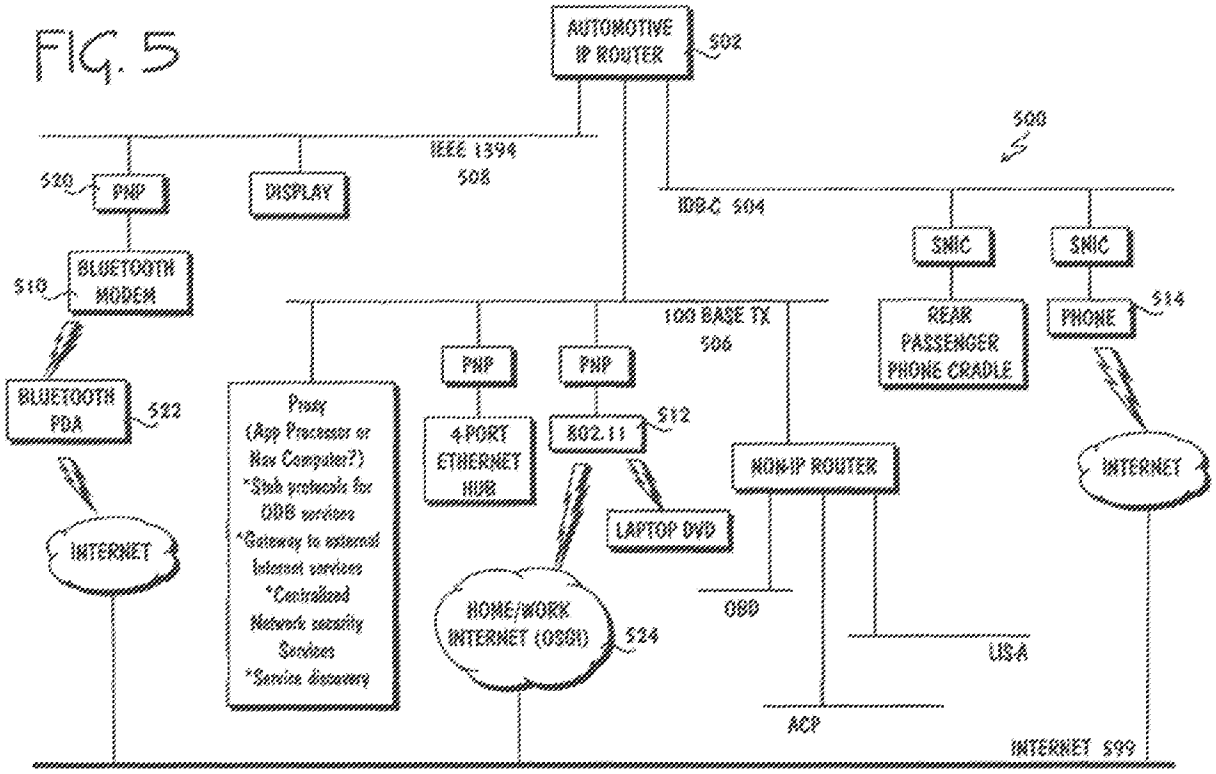
EXHIBIT S

The '278 Patent	PRIOR ART – U.S. Patent 7,484,008 to Gelvin et al. (the Gelvin et al. '008 patent)
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 Gelvin et al. '008 patent discloses a multi-vehicle compatible tracking unit for a vehicle** (The WINS vehicle internetwork architecture utilizes the AMI-C specifications, which are adopted by nearly all automobile manufacturers worldwide and therefore are compatible with multiple vehicles: "FIG. 3 is a WINS vehicle internetwork architecture 300 of an embodiment that provides scalable, flexible, and low cost networking." "In order to address some of the limitations of present-day vehicle information networks, the Automotive Multimedia Interface Consortium (AMI-C) has developed a set of common specifications for multimedia interface to motor vehicle electronic systems." "The AMI-C standard network architecture, adopted by nearly all automobile manufacturers worldwide, reduces time to market and facilitates upgrades of vehicle electronics, supports development by providing standard interfaces, and reduces relative costs of electronic components."; Gelvin et al. '008 patent; FIG. 3;col, 2, lines 6 – 6; col. 2, lines 9 – 14; col. 8, lines 46 – 48) **comprising a vehicle data bus extending throughout the vehicle** (The CAN protocol OEM bus and an AMIC-bus are utilized in the WINS vehicle internetwork architecture: "In the near future it is expected that some of these functions will be consolidated so that a diverse set of applications will use a common Original Equipment Manufacturer (OEM) bus. The Control Area Network (CAN) is a typical protocol used for such networks in the automotive industry." "The WINS vehicle internetwork includes a gateway 302 that links external networks and the Original Equipment Manufacturer (OEM) 304 and AMI-C buses 306."; Gelvin et al. '008 patent; Fig. 3; col. 1, lines 49 – 54; col. 8, lines 51 – 53)**, the multi-vehicle compatible tracking unit comprising:**

	 FIG. 3
a vehicle position determining device;	**The Gelvin et al. '008 patent discloses a vehicle position determining device** (GPS devices are utilized: "Devices and functions supported on the OEM bus 304 through port nodes 310 include … Global Positioning System (GPS) devices…"; Gelvin et al. '008 patent; FIG. 3; col. 9, lines 1 – 4);
a wireless communications device;	**The Gelvin et al. '008 patent discloses a wireless communications device** (Cellular modems are utilized: "Devices and functions supported on the OEM bus 304 through port nodes 310 include …cellular modems/embedded processors…"; Gelvin et al. '008 patent; Fig. 3; col. 9, lines 1 – 4);
a multi-vehicle compatible controller for cooperating with	**The Gelvin et al. '008 patent discloses a multi-vehicle compatible controller** (The gateway 302 links buses and devices within the WINS vehicle internetwork architecture.

said vehicle position determining device and said wireless communications device to send vehicle position information;	"FIG. 3 is a WINS vehicle internetwork architecture 300 of an embodiment that provides scalable, secure, flexible, and low cost networking." "The WINS vehicle internetwork includes a gateway 302 that links external networks and the Original Equipment Manufacturer (OEM) 304 and AMIC-C buses 306" "The gateway 1000 comprises, but is not limited to the following components: a real-Time Interface Processor 1002, at least one interface port 1006-1010, and an application processor 1004. The application processor 1004 can host parts or all of the proxy. The RTIP 1002 together with the interface components 1006-1010 represents a specialized preprocessor that omits sensing/actuation control functions, while the applications processor 1004 handles higher level processing functions." "The application processor 1004 can host applications associated with either the AMI-C or OEM buses, such as dealing with passenger conveniences or vehicle operations."; Gelvin et al. '008 patent; Fig. 3; col. 8, lines 46 – 48; col. 8 – lines 51 – 53; col. 18, lines 23 – 31; col. 18, lines 57 – 60) **for cooperating with said vehicle position determining device and said wireless communications device** (The gateway 302 links the GPS device and the cellular modem device: "Vehicle internetworks provide for communications among diverse electronic devices within a vehicle, and for communications among these devices and networks external to the vehicle." These devices can include Global Positioning System (GPS) devices and cellular modems/embedded processors.; Gelvin et al. '008 patent; Abstract; col. 9, lines 1 – 4) **to send vehicle position information** (The gateway node manipulates vehicle position data: "The mobile internetwork of claim 1, wherein the gateway node manipulates at least one of … vehicle position data …" "The application processor 1004 can host applications associated with either the AMI-C or OEM buses, such as dealing with passenger conveniences or vehicle operations."; Gelvin et al. '008 patent; claim 61; col. 18, lines 57 – 60. One of the manipulations disclosed is "In the event of the theft of the vehicle or other unauthorized vehicle operation, the owner can report its loss and initiate any of a sequence of procedures to enable its recovery via the WINS vehicle internetwork. For example, the proxy can be paged to interface with the vehicle navigation system to continuously report location to law enforcement agencies."; Gelvin et al. '008 patent; col. 31, lines 43 – 47);
said multi-vehicle compatible controller to be coupled to the vehicle data bus for	**The Gelvin et al. '008 patent discloses that said multi-vehicle compatible controller is coupled to the vehicle data bus for communication thereover** (The vehicle internetwork gateway as shown in Fig. 3 is connected to OEM bus 304 and the

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	AMIC-buses 306. Specifically: "The WINS vehicle internetwork includes a gateway 302 that links external networks and the Original Equipment Manufacturer (OEM) 304 and the AMIC-C 306 buses."; Gelvin et al. '008 patent; Fig. 3; col. 8, lines 51 – 53) **with at least one vehicle device using at least one corresponding vehicle device code from among a plurality thereof for different vehicles** (The OEM bus 304 connects to a variety of devices which are controlled by the gateway 304. At the time of the filing of the Gelvin et al. '008 patent, three signaling protocols were permitted with the OBD II port. "The port nodes 310 provide protocol translation for devices and networks connected to either bus 304 or 306, and additionally enable security functions to prevent unauthorized or misbehaving devices from disrupting the network. Devices and functions supported on the OEM bus 304 through port nodes 310 include, but are not limited to, climate control, position location devices, Global Positioning System (GPS) devices, ***OBD-II port***, cellular modems/embedded processor, video/audio, multimedia players/embedded processors, sensor systems, switch clusters, and multiple device subnetworks."; Gelvin et al. '008 patent; Fig. 3; col. 8, lines 63 – 67 – col. 9, lines 1 – 7, emphasis added. The device codes received via the OBD II port for a specific vehicle device depend upon which one of the three signaling protocols permitted by the OBD II port is being utilized by the vehicle device);
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 Gelvin et al. '008 patent discloses a downloading interface** ("The sensor nodes of an embodiment are remotely programmable. Furthermore, software is downloadable from storage locations in the sensor node network, or via the Internet from remote user locations or databases" Gelvin et al. '008 patent; col. 7, lines 1 – 4) **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 proxy 802 also can accept software upgrades or even convenient hardware upgrades, as it can reside anywhere on the network."; Gelvin et al. '008 patent, col. 14, lines 53 – 55; Furthermore, the Gelvin et al. '008 patent discloses downloading of instructions for individual port nodes such as the OBD-II port "The gateway maintains a database for both policies (e.g., security, service configurations) and data, with permanent and transient entries. The policy database enables port nodes to download instructions in support of particular services. Consequently, not all services need to permanently reside on the port nodes. Port nodes can request participation, or respond to invitations, for particular services by exchanging codes that index the services of

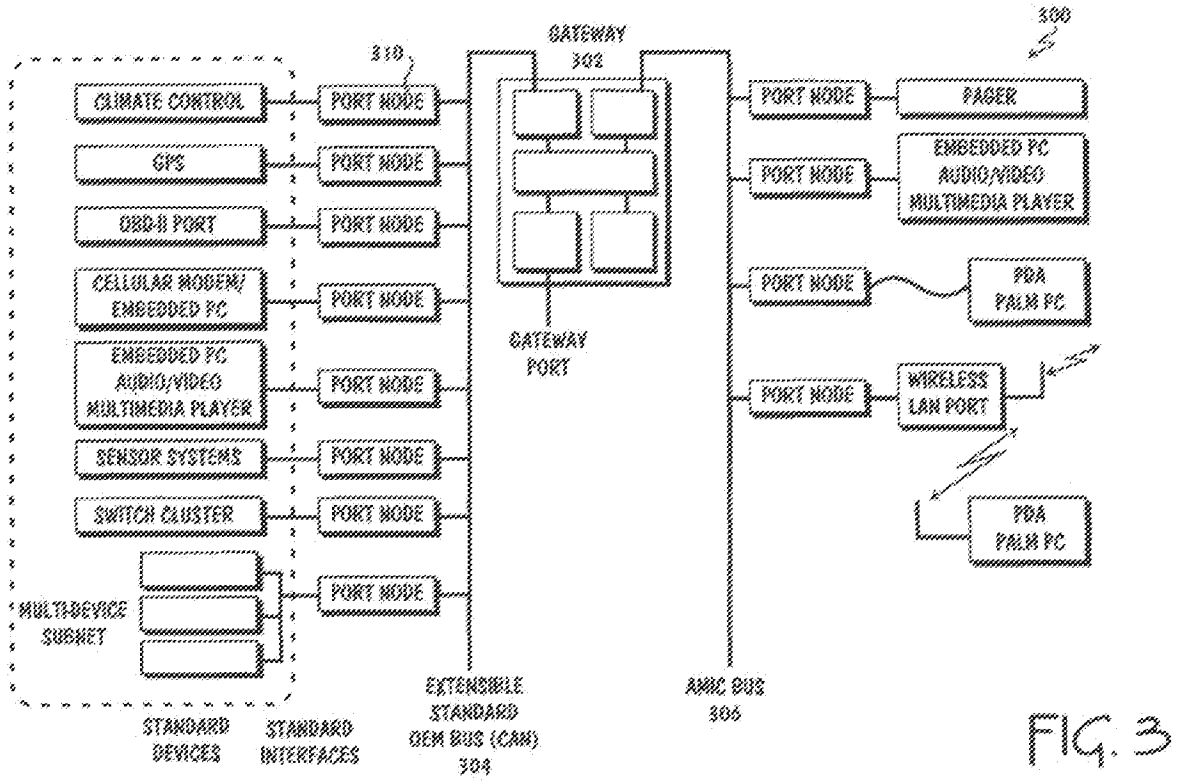
	interest."; Gelvin et al. '008 patent; col. 23, line 64 – col. 24, line 4).
2. The multi-vehicle compatible tracking unit according to claim 1 wherein said downloading interface comprises a wired signal downloading interface.	**The Gelvin et al. '008 patent discloses that the downloading interface comprises a wired signal downloading interface** ("The network includes both wireless and wired communications capability, using a common protocol and automatically choosing the more secure or lower power mode when it is available, providing more robust and long-lived operation in potentially hostile environments." "The proxy 802 can also accept software upgrades or even convenient hardware upgrades, as it can reside anywhere on the network." A wired connection with the proxy is illustrated in Fig. 5, where the proxy can be seen connecting to 100 base TX 506.; Gelvin et al. '008 patent; Fig. 5; col. 6, lines 12 – 16; col. 14, lines 53 – 55). 

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.	**The Gelvin et al. '008 patent discloses that the wired signal downloading interface comprises a connector for temporary connection to a downloading device** (Utilizing the wired communication as described above, the proxy can be moved anywhere in the network which indicates a temporary connection.; Gelvin et al. '008 patent; Fig. 5; col. 6, lines 12 – 16; col. 14, lines 53 – 55).
4. The multi-vehicle compatible tracking unit according to claim 1 wherein said downloading interface comprises a wireless signal downloading interface.	**The Gelvin et al. '008 patent discloses that said downloading interface comprises a wireless signal downloading interface** ("The network includes both wireless and wired communications capability, using a common protocol and automatically choosing the more secure or lower power mode when it is available, providing more robust and long-lived operation in potentially hostile environments." "The proxy 802 can also accept software upgrades or even convenient hardware upgrades, as it can reside anywhere on the network." As illustrated in Fig. 5, the proxy can connect to the Internet through a variety of devices including Bluetooth Modem 510, and Phone 514.; Gelvin et al. '008 patent; Fig. 5; col. 6, lines 12 – 16; col. 14, lines 53 – 55).
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.	**The Gelvin et al. '008 patent discloses that said wireless signal downloading interface comprises a wireless receiver for temporary connection to a downloading device** (Utilizing the wireless communication as described above, the proxy can be moved anywhere in the network which indicates a temporary connection to the Internet.; Gelvin et al. '008 patent; Fig. 5; col. 6, lines 12 – 16; col. 14, lines 53 – 55).
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 Gelvin et al. '008 patent discloses that wherein the corresponding at least one vehicle code is for reading from the at least one vehicle device** (The WINS vehicle architecture reads from devices connected to them via the OBD-II port. "At this point, the ports on the network will now accept devices being attached, with the identification number of the devices being read and added to the library of authorized devices."; Gelvin et al. '008 patent; col. 16, lines 3 – 6).

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 Gelvin et al. '008 patent discloses writing to the at least one vehicle device via an OBD-II port** (The Gelvin et al. '008 patent discloses controlling a variety of vehicle devices via the OBD-II port; "In the event of the theft of the vehicle or other unauthorized vehicle operation, the owner can report its loss and initiate any of a sequence of procedures to enable its recovery via the WINS vehicle internetwork. For example, the proxy can be paged to interface with the vehicle navigation system to continuously report location to law enforcement agencies. In a complementary measure, when the vehicle comes to a halt, the computer controlling the engine can be commanded to shut down so that the vehicle cannot be operated. In a refinement, the vehicle slowly comes to a halt when law enforcement enters its vicinity. In yet another measure, alarms, loud speakers, and other devices can be commanded to operate to render unobtrusive vehicle operation impractical."; Gelvin et al. '008 patent; col. 31, lines 43 – 54).
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 Gelvin et al. '008 patent discloses that said downloading interface is also for permitting downloading of at least one programming instruction for said multi-vehicle compatible controller** (The proxy can accept software upgrades which contain programming instructions for the WINS vehicle architecture which includes the gateway and the port nodes, such as the OBD-II port. "The proxy 802 also can accept software upgrades or even convenient hardware upgrades, as it can reside anywhere on the network."; Gelvin et al. '008 patent; col. 14, lines 53 – 55. "The gateway maintains a database for both policies (e.g., security, service configurations) and data, with permanent and transient entries. The policy database enables port nodes to download instructions in support of particular services. Consequently, not all services need to permanently reside on the port nodes. Port nodes can request participation, or respond to invitations, for particular services by exchanging codes that index the services of interest."; Gelvin et al. '008 patent; col. 23, line 64 – col. 24, line 4).
9. The multi-vehicle compatible tracking unit according to claim 1 further comprising a remote transmitter; and wherein said	**The Gelvin et al. '008 patent discloses 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 Gelvin et al. '008 patent discloses a user using a remote transmitter to initiate tracking and

multi-vehicle compatible controller also performs at least one vehicle remote control function responsive to said remote transmitter.	disablement of a vehicle via the wireless data connection; "In the event of the theft of the vehicle or other unauthorized vehicle operation, the owner can report its loss and initiate any of a sequence of procedures to enable its recovery via the WINS vehicle internetwork. For example, the proxy can be paged to interface with the vehicle navigation system to continuously report location to law enforcement agencies. In a complementary measure, when the vehicle comes to a halt, the computer controlling the engine can be commanded to shut down so that the vehicle cannot be operated. In a refinement, the vehicle slowly comes to a halt when law enforcement enters its vicinity. In yet another measure, alarms, loud speakers, and other devices can be commanded to operate to render unobtrusive vehicle operation impractical."; Gelvin et al. '008 patent; col. 31, lines 43 – 54).
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 Gelvin et al. '008 patent teaches vehicle security functions and remote engine starting functions.** (The Gelvin et al. '008 patent discloses a user using a remote transmitter to initiate tracking and disablement of a vehicle via the wireless data connection; "In the event of the theft of the vehicle or other unauthorized vehicle operation, the owner can report its loss and initiate any of a sequence of procedures to enable its recovery via the WINS vehicle internetwork. For example, the proxy can be paged to interface with the vehicle navigation system to continuously report location to law enforcement agencies. In a complementary measure, when the vehicle comes to a halt, the computer controlling the engine can be commanded to shut down so that the vehicle cannot be operated. In a refinement, the vehicle slowly comes to a halt when law enforcement enters its vicinity. In yet another measure, alarms, loud speakers, and other devices can be commanded to operate to render unobtrusive vehicle operation impractical."; Gelvin et al. '008 patent; col. 31, lines 43 – 54).
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 Gelvin et al. '008 patent discloses that said wireless position determining device comprises a Global Positioning System (GPS) receiver** (The WINS vehicle architecture includes a GPS device: "Devices and functions supported on the OEM bus 304 through port nodes 310 include … Global Positioning System (GPS) devices…"; Gelvin et al. '008 patent; FIG. 3; col. 9, lines 1 – 4).

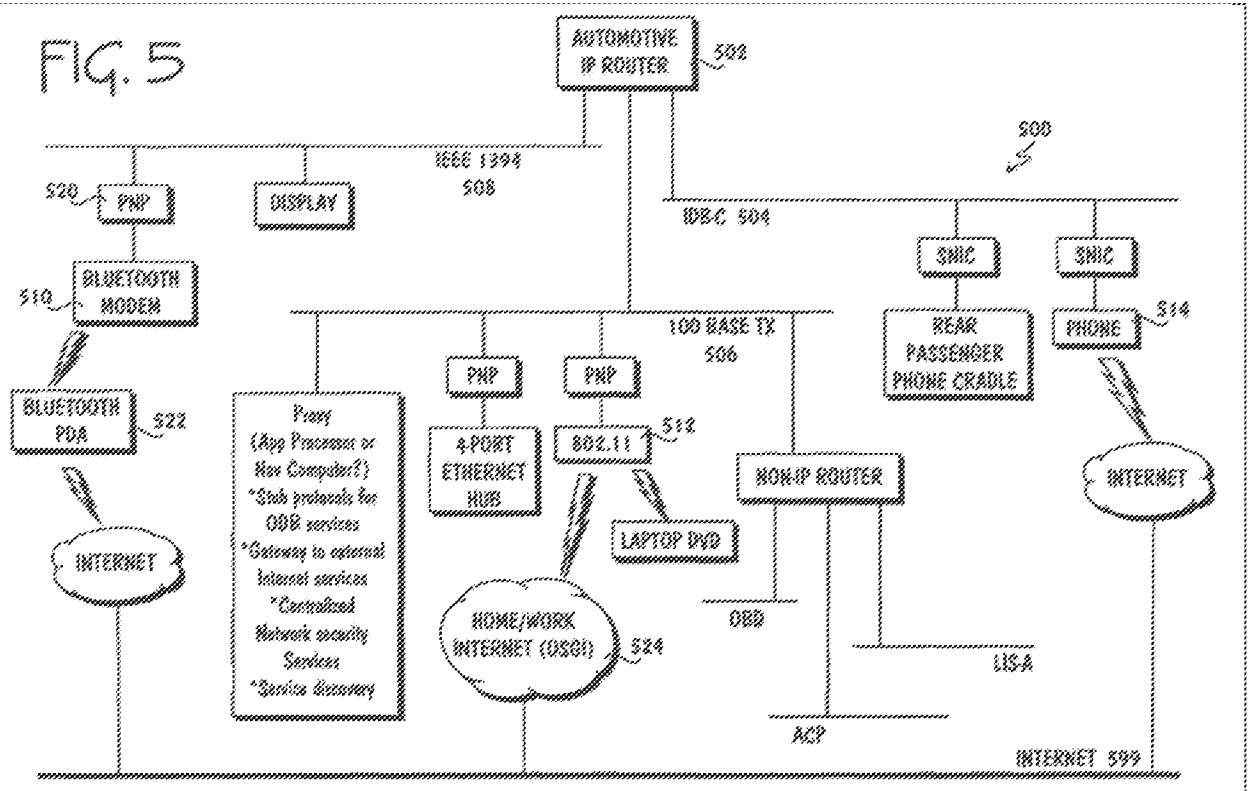
12. The multi-vehicle compatible tracking unit according to claim 1 further comprising a housing containing said vehicle position determining device, said wireless communications device, said multi-vehicle compatible controller, and said downloading interface.	The specific manner of arranging and housing different components is an obvious matter of design choice and the Gelvin et al. '008 patent clearly contemplates using any appropriate housing configuration for the components of the disclosed systems. Indeed, the Gelvin et al. '008 patent clearly illustrates that all elements of the system can be enclosed in the vehicle (see e.g. FIG. 22) so that the vehicle serves as the 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 Gelvin et al. '008 patent discloses a multi-vehicle compatible tracking unit for a vehicle** (The WINS vehicle internetwork architecture utilizes the AMI-C specifications, which are adopted by nearly all automobile manufacturers worldwide and therefore are compatible with multiple vehicles: "FIG. 3 is a WINS vehicle internetwork architecture 300 of an embodiment that provides scalable, flexible, and low cost networking." "In order to address some of the limitations of present-day vehicle information networks, the Automotive Multimedia Interface Consortium (AMI-C) has developed a set of common specifications for multimedia interface to motor vehicle electronic systems." "The AMI-C standard network architecture, adopted by nearly all automobile manufacturers worldwide, reduces time to market and facilitates upgrades of vehicle electronics, supports development by providing standard interfaces, and reduces relative costs of electronic components."; Gelvin et al. '008 patent; FIG. 3;col. 2, lines 6 – 6; col. 2, lines 9 – 14; col. 8, lines 46 – 48) **comprising a vehicle data bus extending throughout the vehicle** (The CAN protocol OEM bus and an AMIC-bus are utilized in the WINS vehicle internetwork architecture: "In the near future it is expected that some of these functions will be consolidated so that a diverse set of applications will use a common Original Equipment Manufacturer (OEM) bus. The Control Area Network (CAN) is a typical protocol used for such networks in the automotive industry." "The WINS vehicle internetwork includes a gateway 302 that links external networks and the Original Equipment Manufacturer (OEM) 304 and AMI-C buses 306."; Gelvin et al. '008 patent; Fig. 3; col. 1, lines 49 – 54; col. 8, lines 51 – 53)**, the multi-vehicle**

	compatible tracking unit comprising:  FIG. 3
a vehicle position determining device;	**The Gelvin et al. '008 patent discloses a vehicle position determining device** (GPS devices are utilized: "Devices and functions supported on the OEM bus 304 through port nodes 310 include … Global Positioning System (GPS) devices…"; Gelvin et al. '008 patent; FIG. 3; col. 9, lines 1 – 4);
a wireless communications device;	**The Gelvin et al. '008 patent discloses a wireless communications device** (Cellular modems are utilized: "Devices and functions supported on the OEM bus 304 through port nodes 310 include …cellular modems/embedded processors…"; Gelvin et al. '008 patent; Fig. 3; col. 9, lines 1 – 4);
a multi-vehicle compatible	**The Gelvin et al. '008 patent discloses a multi-vehicle compatible controller** (The

controller for cooperating with said vehicle position determining device and said wireless communications device to send vehicle position information;	gateway 302 links buses and devices within the WINS vehicle internetwork architecture. "FIG. 3 is a WINS vehicle internetwork architecture 300 of an embodiment that provides scalable, secure, flexible, and low cost networking." "The WINS vehicle internetwork includes a gateway 302 that links external networks and the Original Equipment Manufacturer (OEM) 304 and AMIC-C buses 306" "The gateway 1000 comprises, but is not limited to the following components: a real-Time Interface Processor 1002, at least one interface port 1006-1010, and an application processor 1004. The application processor 1004 can host parts or all of the proxy. The RTIP 1002 together with the interface components 1006-1010 represents a specialized preprocessor that omits sensing/actuation control functions, while the applications processor 1004 handles higher level processing functions." "The application processor 1004 can host applications associated with either the AMI-C or OEM buses, such as dealing with passenger conveniences or vehicle operations."; Gelvin et al. '008 patent; Fig. 3; col. 8, lines 46 – 48; col. 8 – lines 51 – 53; col. 18, lines 23 – 31; col. 18, lines 57 – 60) **for cooperating with said vehicle position determining device and said wireless communications device** (The gateway 302 links the GPS device and the cellular modem device: "Vehicle internetworks provide for communications among diverse electronic devices within a vehicle, and for communications among these devices and networks external to the vehicle." These devices can include Global Positioning System (GPS) devices and cellular modems/embedded processors.; Gelvin et al. '008 patent; Abstract; col. 9, lines 1 – 4) **to send vehicle position information** (The gateway node manipulates vehicle position data: "The mobile internetwork of claim 1, wherein the gateway node manipulates at least one of … vehicle position data …" "The application processor 1004 can host applications associated with either the AMI-C or OEM buses, such as dealing with passenger conveniences or vehicle operations."; Gelvin et al. '008 patent; claim 61; col. 18, lines 57 – 60. One of the manipulations disclosed is "In the event of the theft of the vehicle or other unauthorized vehicle operation, the owner can report its loss and initiate any of a sequence of procedures to enable its recovery via the WINS vehicle internetwork. For example, the proxy can be paged to interface with the vehicle navigation system to continuously report location to law enforcement agencies."; Gelvin et al. '008 patent; col. 31, lines 43 – 47);
said multi-vehicle compatible	**The Gelvin et al. '008 patent discloses that said multi-vehicle compatible**

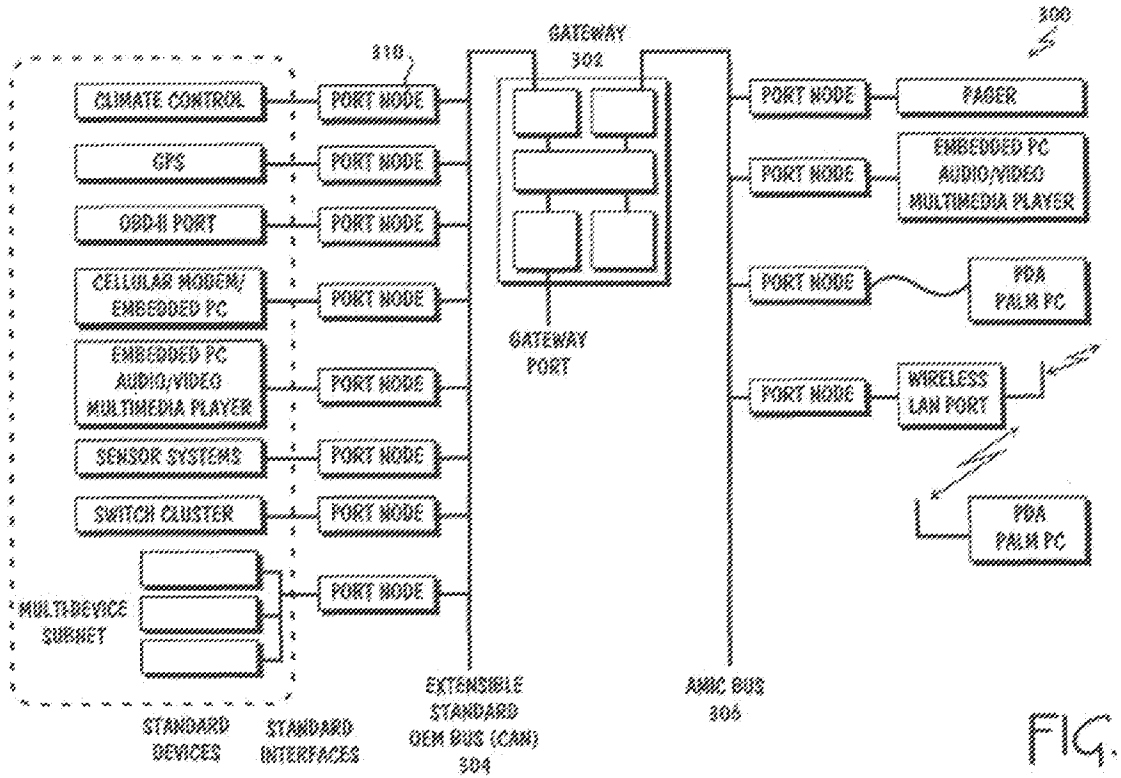
controller to be coupled to the vehicle data bus for communication thereover with at least one vehicle device using at least one corresponding vehicle device code from among a plurality thereof for different vehicles; and	**controller is coupled to the vehicle data bus for communication thereover** (The vehicle internetwork gateway as shown in Fig. 3 is connected to OEM bus 304 and the AMIC-buses 306. Specifically: "The WINS vehicle internetwork includes a gateway 302 that links external networks and the Original Equipment Manufacturer (OEM) 304 and the AMIC-C 306 buses."; Gelvin et al. '008 patent; Fig. 3; col. 8, lines 51 – 53) **with at least one vehicle device using at least one corresponding vehicle device code from among a plurality thereof for different vehicles** (The OEM bus 304 connects to a variety of devices which are controlled by the gateway 304. At the time of the filing of the Gelvin et al. '008 patent, three signaling protocols were permitted with the OBD II port. "The port nodes 310 provide protocol translation for devices and networks connected to either bus 304 or 306, and additionally enable security functions to prevent unauthorized or misbehaving devices from disrupting the network. Devices and functions supported on the OEM bus 304 through port nodes 310 include, but are not limited to, climate control, position location devices, Global Positioning System (GPS) devices, ***OBD-II port***, cellular modems/embedded processor, video/audio, multimedia players/embedded processors, sensor systems, switch clusters, and multiple device subnetworks."; Gelvin et al. '008 patent; Fig. 3; col. 8, lines 63 – 67 – col. 9, lines 1 – 7, emphasis added. The device codes received via the OBD II port for a specific vehicle device depend upon which one of the three signaling protocols permitted by the OBD II port is being utilized by the vehicle device);
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 Gelvin et al. '008 patent discloses a downloading interface** ("The sensor nodes of an embodiment are remotely programmable. Furthermore, software is downloadable from storage locations in the sensor node network, or via the Internet from remote user locations or databases" Gelvin et al. '008 patent; col. 7, lines 1 – 4) **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 proxy 802 also can accept software upgrades or even convenient hardware upgrades, as it can reside anywhere on the network."; Gelvin et al. '008 patent; col. 14, lines 53 – 55; Furthermore, the Gelvin et al. '008 patent discloses downloading of instructions for individual port nodes such as the OBD II port "The gateway maintains a database for both policies (e.g., security, service configurations) and data, with permanent and transient entries. The policy database enables port nodes to download instructions in support of particular services. Consequently, not all services need to permanently

	reside on the port nodes. Port nodes can request participation, or respond to invitations, for particular services by exchanging codes that index the services of interest."; Gelvin et al. '008 patent; col. 23, line 64 – col. 24, line 4).
said downloading interface comprising a connector for temporary connection to a downloading device.	**The Gelvin et al. '008 patent discloses said downloading interface comprising a connector for temporary connection to a downloading device** (As illustrated in Fig. 5, the proxy can connect to the Internet through a variety of devices including Bluetooth Modem 510, and Phone 514. Utilizing the wired communication, the proxy can be moved anywhere in the network which indicates a temporary connection: "The network includes both wireless and wired communications capability, using a common protocol and automatically choosing the more secure or lower power mode when it is available, providing more robust and long-lived operation in potentially hostile environments." "The proxy 802 can also accept software upgrades or even convenient hardware upgrades, as it can reside anywhere on the network." ; Gelvin et al. '008 patent; Fig. 5; col. 6, lines 12 – 16; col. 14, lines 53 – 55).

	
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 Gelvin et al. patent discloses that wherein the corresponding at least one vehicle code is for reading from the at least one vehicle device** (The WINS vehicle architecture reads from devices connected to them via the OBD-II port: "At this point, the ports on the network will now accept devices being attached, with the identification number of the devices being read and added to the library of authorized devices."; Gelvin et al. '008 patent; col. 16, lines 3 – 6).
15. The multi-vehicle compatible tracking unit according to claim 13 wherein	**The Gelvin et al. patent discloses writing to the at least one vehicle device via an OBD-II port** (The Gelvin et al. '008 patent discloses controlling a variety of vehicle devices via the OBD-II port; "In the event of the theft of the vehicle or other

the corresponding at least one vehicle code is for writing to the at least one vehicle device.	unauthorized vehicle operation, the owner can report its loss and initiate any of a sequence of procedures to enable its recovery via the WINS vehicle internetwork. For example, the proxy can be paged to interface with the vehicle navigation system to continuously report location to law enforcement agencies. In a complementary measure, when the vehicle comes to a halt, the computer controlling the engine can be commanded to shut down so that the vehicle cannot be operated. In a refinement, the vehicle slowly comes to a halt when law enforcement enters its vicinity. In yet another measure, alarms, loud speakers, and other devices can be commanded to operate to render unobtrusive vehicle operation impractical."; Gelvin et al. '008 patent; col. 31, lines 43 – 54).
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 Gelvin et al. patent discloses that said downloading interface is also for permitting downloading of at least one programming instruction for said multi-vehicle compatible controller** (The proxy can accept software upgrades which contain programming instructions for the WINS vehicle architecture which includes the gateway and the port nodes, such as the OBD-II port. "The proxy 802 also can accept software upgrades or even convenient hardware upgrades, as it can reside anywhere on the network."; Gelvin et al. '008 patent; col. 14, lines 53 – 55. "The gateway maintains a database for both policies (e.g., security, service configurations) and data, with permanent and transient entries. The policy database enables port nodes to download instructions in support of particular services. Consequently, not all services need to permanently reside on the port nodes. Port nodes can request participation, or respond to invitations, for particular services by exchanging codes that index the services of interest."; Gelvin et al. '008 patent; col. 23, line 64 – col. 24, line 4).
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	**The Gelvin et al. patent discloses 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 Gelvin et al. '008 patent discloses a user using a remote transmitter to initiate tracking and disablement of a vehicle via the wireless data connection, "In the event of the theft of the vehicle or other unauthorized vehicle operation, the owner can report its loss and initiate any of a sequence of procedures to enable its recovery via the WINS vehicle internetwork. For example, the proxy can be paged to interface with the vehicle

function responsive to said remote transmitter.	navigation system to continuously report location to law enforcement agencies. In a complementary measure, when the vehicle comes to a halt, the computer controlling the engine can be commanded to shut down so that the vehicle cannot be operated. In a refinement, the vehicle slowly comes to a halt when law enforcement enters its vicinity. In yet another measure, alarms, loud speakers, and other devices can be commanded to operate to render unobtrusive vehicle operation impractical."; Gelvin et al. '008 patent; col. 31, lines 43 – 54).
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 Gelvin et al. patent discloses a multi-vehicle compatible tracking unit for a vehicle** (The WINS vehicle internetwork architecture utilizes the AMI-C specifications, which are adopted by nearly all automobile manufacturers worldwide and therefore are compatible with multiple vehicles: "FIG. 3 is a WINS vehicle internetwork architecture 300 of an embodiment that provides scalable, flexible, and low cost networking." "In order to address some of the limitations of present-day vehicle information networks, the Automotive Multimedia Interface Consortium (AMI-C) has developed a set of common specifications for multimedia interface to motor vehicle electronic systems." "The AMI-C standard network architecture, adopted by nearly all automobile manufacturers worldwide, reduces time to market and facilitates upgrades of vehicle electronics, supports development by providing standard interfaces, and reduces relative costs of electronic components."; Gelvin et al. '008 patent; FIG. 3;col. 2, lines 6 – 6; col. 2, lines 9 – 14; col. 8, lines 46 – 48) **comprising a vehicle data bus extending throughout the vehicle** (The CAN protocol OEM bus and an AMIC-bus are utilized in the WINS vehicle internetwork architecture: "In the near future it is expected that some of these functions will be consolidated so that a diverse set of applications will use a common Original Equipment Manufacturer (OEM) bus. The Control Area Network (CAN) is a typical protocol used for such networks in the automotive industry." "The WINS vehicle internetwork includes a gateway 302 that links external networks and the Original Equipment Manufacturer (OEM) 304 and AMI-C buses 306."; Gelvin et al. '008 patent; Fig. 3; col. 1, lines 49 – 54; col. 8, lines 51 – 53), **the multi-vehicle compatible tracking unit comprising:**

	 FIG. 3
a vehicle position determining device;	**The Gelvin et al. patent discloses a vehicle position determining device** (GPS devices are utilized: "Devices and functions supported on the OEM bus 304 through port nodes 310 include … Global Positioning System (GPS) devices…"; Gelvin et al. '008 patent; FIG. 3; col. 9, lines 1 – 4);
a wireless communications device;	**The Gelvin et al. patent discloses a wireless communications device** (Cellular modems are utilized: "Devices and functions supported on the OEM bus 304 through port nodes 310 include …cellular modems/embedded processors…"; Gelvin et al. '008 patent; Fig. 3; col. 9, lines 1 – 4);
a multi-vehicle compatible controller for cooperating with	**The Gelvin et al. patent discloses a multi-vehicle compatible controller** (The gateway 302 links buses and devices within the WINS vehicle internetwork architecture.

said vehicle position determining device and said wireless communications device to send vehicle position information;	"FIG. 3 is a WINS vehicle internetwork architecture 300 of an embodiment that provides scalable, secure, flexible, and low cost networking." "The WINS vehicle internetwork includes a gateway 302 that links external networks and the Original Equipment Manufacturer (OEM) 304 and AMIC-C buses 306" "The gateway 1000 comprises, but is not limited to the following components: a real-Time Interface Processor 1002, at least one interface port 1006-1010, and an application processor 1004. The application processor 1004 can host parts or all of the proxy. The RTIP 1002 together with the interface components 1006-1010 represents a specialized preprocessor that omits sensing/actuation control functions, while the applications processor 1004 handles higher level processing functions." "The application processor 1004 can host applications associated with either the AMI-C or OEM buses, such as dealing with passenger conveniences or vehicle operations."; Gelvin et al. '008 patent; Fig. 3; col. 8, lines 46 – 48; col. 8 – lines 51 – 53; col. 18, lines 23 – 31; col. 18, lines 57 – 60) **for cooperating with said vehicle position determining device and said wireless communications device** (The gateway 302 links the GPS device and the cellular modem device: "Vehicle internetworks provide for communications among diverse electronic devices within a vehicle, and for communications among these devices and networks external to the vehicle." These devices can include Global Positioning System (GPS) devices and cellular modems/embedded processors.; Gelvin et al. '008 patent; Abstract; col. 9, lines 1 – 4) **to send vehicle position information** (The gateway node manipulates vehicle position data: "The mobile internetwork of claim 1, wherein the gateway node manipulates at least one of … vehicle position data …" "The application processor 1004 can host applications associated with either the AMI-C or OEM buses, such as dealing with passenger conveniences or vehicle operations."; Gelvin et al. '008 patent; claim 61; col. 18, lines 57 – 60. One of the manipulations disclosed is "In the event of the theft of the vehicle or other unauthorized vehicle operation, the owner can report its loss and initiate any of a sequence of procedures to enable its recovery via the WINS vehicle internetwork. For example, the proxy can be paged to interface with the vehicle navigation system to continuously report location to law enforcement agencies."; Gelvin et al. '008 patent; col. 31, lines 43 – 47);
said multi-vehicle compatible controller to be coupled to the vehicle data bus for	**The Gelvin et al. patent discloses that said multi-vehicle compatible controller is coupled to the vehicle data bus for communication thereover** (The vehicle internetwork gateway as shown in Fig. 3 is connected to OEM bus 304 and the AMIC-

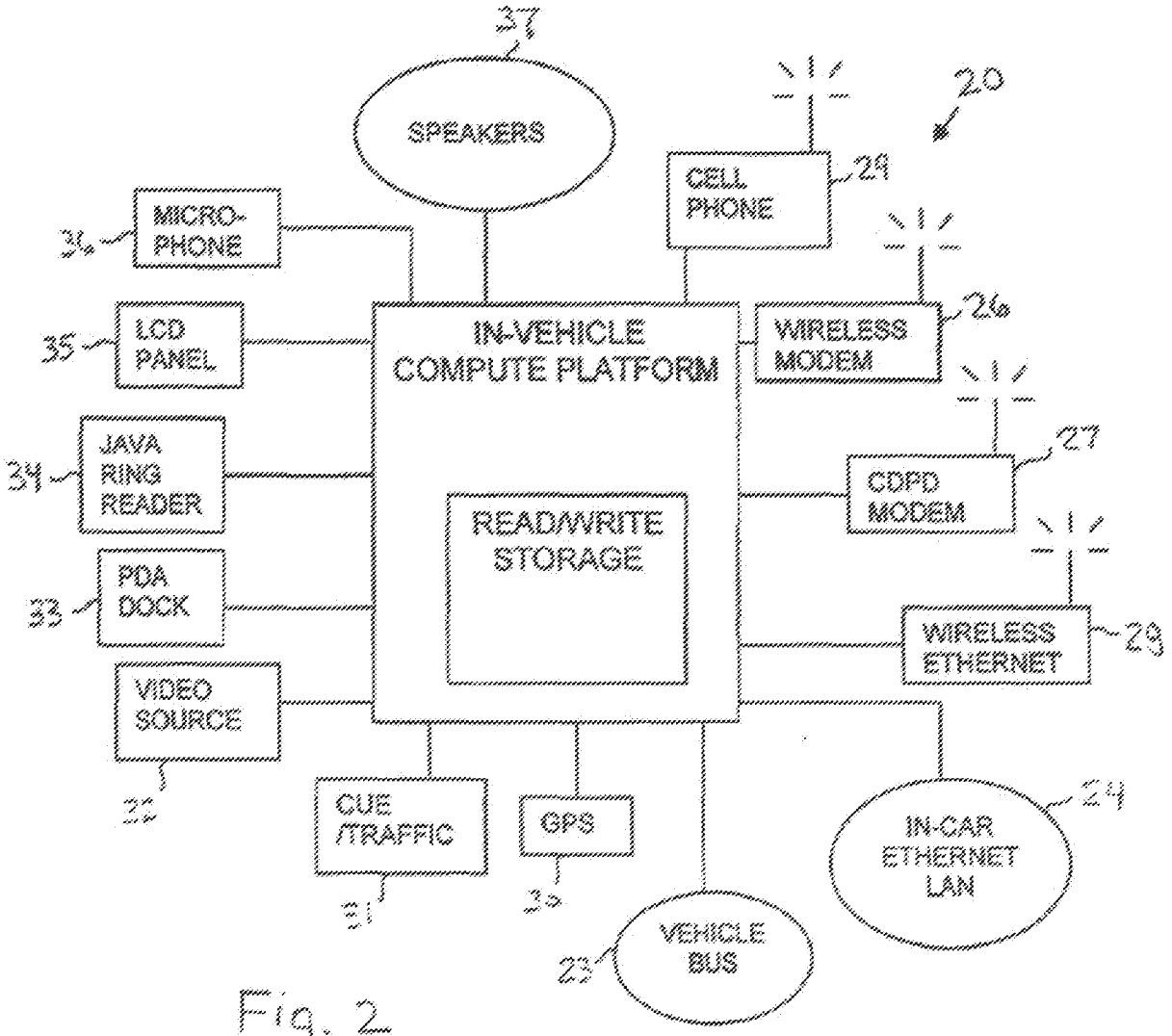
communication thereover with at least one vehicle device using at least one corresponding vehicle device code from among a plurality thereof for different vehicles; and	buses 306. Specifically: "The WINS vehicle internetwork includes a gateway 302 that links external networks and the Original Equipment Manufacturer (OEM) 304 and the AMIC-C 306 buses."; Gelvin et al. '008 patent; Fig. 3, col. 8, lines 51 – 53) **with at least one vehicle device using at least one corresponding vehicle device code from among a plurality thereof for different vehicles** (The OEM bus 304 connects to a variety of devices which are controlled by the gateway 304. At the time of the filing of the Gelvin et al. '008 patent, three signaling protocols were permitted with the OBD II port. "The port nodes 310 provide protocol translation for devices and networks connected to either bus 304 or 306, and additionally enable security functions to prevent unauthorized or misbehaving devices from disrupting the network. Devices and functions supported on the OEM bus 304 through port nodes 310 include, but are not limited to, climate control, position location devices, Global Positioning System (GPS) devices, ***OBD-II port***, cellular modems/embedded processor, video/audio, multimedia players/embedded processors, sensor systems, switch clusters, and multiple device subnetworks."; Gelvin et al. '008 patent; Fig. 3; col. 8, lines 63 – 67 – col. 9, lines 1 – 7, emphasis added. The device codes received via the OBD II port for a specific vehicle device depend upon which one of the three signaling protocols permitted by the OBD II port is being utilized by the vehicle device);
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 Gelvin et al. patent discloses a downloading interface** ("The sensor nodes of an embodiment are remotely programmable. Furthermore, software is downloadable from storage locations in the sensor node network, or via the Internet from remote user locations or databases" Gelvin et al. '008 patent; col. 7, lines 1 – 4) **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 proxy 802 also can accept software upgrades or even convenient hardware upgrades, as it can reside anywhere on the network."; Gelvin et al. '008 patent, col. 14, lines 53 – 55; Furthermore, the Gelvin et al. '008 patent discloses downloading of instructions for individual port nodes such as the OBD II port "The gateway maintains a database for both policies (e.g., security, service configurations) and data, with permanent and transient entries. The policy database enables port nodes to download instructions in support of particular services. Consequently, not all services need to permanently reside on the port nodes. Port nodes can request participation, or respond to invitations, for particular services by exchanging codes that index the services of

	interest."; Gelvin et al. '008 patent; col. 23, line 64 – col. 24, line 4).
said downloading interface comprising a wireless receiver for temporary connection to a downloading device.	**said downloading interface comprising a wireless receiver for temporary connection to a downloading device.** ("The network includes both wireless and wired communications capability, using a common protocol and automatically choosing the more secure or lower power mode when it is available, providing more robust and long-lived operation in potentially hostile environments." "The proxy 802 can also accept software upgrades or even convenient hardware upgrades, as it can reside anywhere on the network." As illustrated in Fig. 5, the proxy can connect to the Internet through a variety of devices including Bluetooth Modem 510, and Phone 514. Utilizing the wireless communication, the proxy can be moved anywhere in the network which indicates a temporary connection; Gelvin et al. '008 patent; Fig. 5; col. 6, lines 12 – 16; col. 14, lines 53 – 55).
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 Gelvin et al. patent discloses that wherein the corresponding at least one vehicle code is for reading from the at least one vehicle device** (The WINS vehicle architecture reads from devices connected to them via the OBD-II port: "At this point, the ports on the network will now accept devices being attached, with the identification number of the devices being read and added to the library of authorized devices."; Gelvin et al. '008 patent; col. 16, lines 3 – 6).
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 Gelvin et al. patent discloses writing to the at least one vehicle device via an OBD-II port** (The Gelvin et al. '008 patent discloses controlling a variety of vehicle devices via the OBD-II port; "In the event of the theft of the vehicle or other unauthorized vehicle operation, the owner can report its loss and initiate any of a sequence of procedures to enable its recovery via the WINS vehicle internetwork. For example, the proxy can be paged to interface with the vehicle navigation system to continuously report location to law enforcement agencies. In a complementary measure, when the vehicle comes to a halt, the computer controlling the engine can be commanded to shut down so that the vehicle cannot be operated. In a refinement, the vehicle slowly comes to a halt when law enforcement enters its vicinity. In yet another measure, alarms, loud speakers, and other devices can be commanded to operate to render unobtrusive vehicle operation impractical."; Gelvin et al. '008 patent; col. 31, lines 43 – 54).

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 Gelvin et al. patent discloses that said downloading interface is also for permitting downloading of at least one programming instruction for said multi-vehicle compatible controller** (The proxy can accept software upgrades which contain programming instructions for the WINS vehicle architecture which includes the gateway and the port nodes, such as the OBD-II port. "The proxy 802 also can accept software upgrades or even convenient hardware upgrades, as it can reside anywhere on the network."; Gelvin et al. '008 patent; col. 14, lines 53 – 55. "The gateway maintains a database for both policies (e.g., security, service configurations) and data, with permanent and transient entries. The policy database enables port nodes to download instructions in support of particular services. Consequently, not all services need to permanently reside on the port nodes. Port nodes can request participation, or respond to invitations, for particular services by exchanging codes that index the services of interest."; Gelvin et al. '008 patent; col. 23, line 64 – col. 24, line 4).
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 Gelvin et al. patent discloses 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 Gelvin et al. '008 patent discloses a user using a remote transmitter to initiate tracking and disablement of a vehicle via the wireless data connection; "In the event of the theft of the vehicle or other unauthorized vehicle operation, the owner can report its loss and initiate any of a sequence of procedures to enable its recovery via the WINS vehicle internetwork. For example, the proxy can be paged to interface with the vehicle navigation system to continuously report location to law enforcement agencies. In a complementary measure, when the vehicle comes to a halt, the computer controlling the engine can be commanded to shut down so that the vehicle cannot be operated. In a refinement, the vehicle slowly comes to a halt when law enforcement enters its vicinity. In yet another measure, alarms, loud speakers, and other devices can be commanded to operate to render unobtrusive vehicle operation impractical."; Gelvin et al. '008 patent; col. 31, lines 43 – 54).

EXHIBIT T

The '278 Patent	PRIOR ART – U.S. 2001/0033225 to Razavi et al. (the Razavi et al. 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:	**The Razavi et al. publication discloses a multi-vehicle compatible tracking unit for a vehicle comprising a vehicle data bus extending throughout the vehicle** (The components installed in a vehicle as disclosed in the Razavi et al. publication utilize buses complying with SAE standards J1979 and J1850 (one having ordinary skill in the art would readily appreciate the typographical error in the names of the standards) that can be used in a variety of vehicles. These components further include an on-board diagnostic system bus. "A system and method for collecting information from a vehicle wherein the vehicle incorporates an internal network having a device coupled thereto for collecting or generating vehicle information to an external receiver. In one embodiment, the devices coupled to the network are addressable using corresponding IP addresses. In another embodiment, the devices are addressable using object terminology which references their respective services. The vehicle information may include location, traffic, diagnostic or other types of information." "[A] network is distinct from the various buses which may monitor the functions of an automobile and provide diagnostic information, but which can be coupled only to specific monitoring devices. These buses may be referred to as "on-board diagnostic" OBD systems. Because the Environmental Protection Agency has adopted standards for such systems from the standards of the society of automotive engineers (SAE), most of the diagnostic buses use command sets and protocols defined by SAE standards (e.g. SAE J[1]979 and SAE J. [1]850 PWPWM.)" "… [t]he manufacturer's on-board diagnostic system bus 23 can be coupled to the in-car sub-network. On-board diagnostic system bus 23 is connected to computer platform 22 via an RS-232 connector."; Razavi et al. publication; Abstract; Fig. 2; [0024], [0031]), **the multi-vehicle compatible tracking unit comprising:**

	 Fig. 2
a vehicle position determining device;	**The Razavi et al. publication discloses a vehicle position determining device** (GPS receivers are utilized: "A GPS receiver 30 is coupled to in-car sub-networks 20 for

	providing automobile location information." Razavi et al. publication; Fig. 2; [0033]);
a wireless communications device;	**The Razavi et al. publication discloses a wireless communications device** (A variety of wireless communication devices are utilized including a wireless modem, a cellular phone, and wireless Ethernet: "The in-car sub-network can also be connected to external networks via a set of communication devices. These communication devices include wireless modem 26, CDPD modem 27, cellular phone 29 and wireless Ethernet 28."; Razavi et al. publication; Fig. 2; [0031]);
a multi-vehicle compatible controller for cooperating with said vehicle position determining device and said wireless communications device to send vehicle position information;	**The Razavi et al. publication discloses a multi-vehicle compatible controller for cooperating with said vehicle position determining device and said wireless communications device to send vehicle position information** (The compute platform 22 within in-car sub-network 20 controls various wireless communication systems and GPS receiver 30: "A system and method for collecting information from a vehicle wherein the vehicle incorporates an internal network having a device coupled thereto for collecting or generating the vehicle information and a communication device coupled thereto for transmitting the vehicle information to an external receiver… The vehicle information may include location, traffic, diagnostic or other types of information". Razavi et al. publication, Abstract; "On-board diagnostic system bus 23 is connected to compute platform 22 via a RS-232 connector. The in-car sub-network can also be connected to external networks via a set of communication devices. These communication devices include wireless modem 26, CDPD modem 27, cellular phone 29 and wireless Ethernet 28." In-car sub-network 20 can also communicate with external systems such as a global positioning system (GPS)…" Razavi et al. publication; Fig. 2; [0031], [0033]);
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 Razavi et al. publication discloses 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** (At the time of the filing of the Razavi et al. publication, three signaling protocols were permitted by the OBD standards. The Razavi et al. publication discloses the SAE standards that specify the different device codes that are used with these signaling protocols. "On-board diagnostic system bus 23 is connected to computer platform 22 via an RS-232 connector." Razavi et al. publication; [0031], "These buses may be referred to as "on-board diagnostic" OBD systems. Because the Environmental Protection Agency has adopted standards for

	such systems from the standards of the society of automotive engineers (SAE), most of the diagnostic buses use command sets and protocols defined by SAE standards (e.g. SAE J[1]979 and SAE J. [1]850 PWPWM.)." Razavi et al. publication; [0024]. "It is contemplated that the vehicle's OBD (on-board diagnostic) system (e.g., item 23 in FIG. 2) will be connected to in-car sub-network 20. The OBD system, as indicated above, is typically of a proprietary design which was not originally intended to be connected to a network. The OBD system may therefore be connected to the network by an interface which is designed as a network device. With the OBD system coupled to the network via the interface device, other devices on the network can query the OBD system for diagnostic information and/or provide information to the OBD system." Razavi et al. publication; [0037]); 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 Razavi et al. publication discloses 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 Razavi et al. publication describes that upgrades to the vehicle that result in different device codes being received from vehicle devices can be handled through software upgrades downloaded via devices including the wireless modem: "This system thereby makes it possible to remove outdated components and replace them with new components, even though the new components may have different features or require different data or other signals from the vehicle or its components. Similarly, components which execute associated software, display data or provide services can be upgraded by downloading new software, data or services ("upgrade data") to the components through the in-car sub-network. This software may be quickly and easily retrieved from sources external to the in-car sub-network, such as web pages or LANs which can be accessed through the communication devices on the in-car sub-network. The software can be retrieved by one device (e.g., a wireless modem,) conveyed through the network and installed in a second device (e.g., a GPS locator) as easily as downloading a web page." Razavi et al. publication; [0060]).
2. The multi-vehicle compatible tracking unit according to claim 1 wherein said downloading interface comprises a wired	**The Razavi et al. publication discloses wherein said downloading interface comprises a wired signal downloading interface** ("The software may be quickly and easily retrieved from sources external to the in-car sub-network, such as web pages or LANs, which can be accessed through communication devices on the in-car sub-

signal downloading interface.	network. The software can be retrieved by one device (e.g. a wireless modem,) conveyed through the network and installed on a second device (e.g., a GPS locator) as easily as downloading a webpage." "In one embodiment, in-car subnetwork 20 also includes PDA dock (personal digital assistant) dock 33 …. PDA dock 33 provides means for passengers in the automobile to connect a PDA to the in-car sub-network. Other embodiments of the invention may include a dock for a laptop computer instead of or in addition to, PDA dock 33."; Razavi et al. publication; Fig. 2; [0035], [0060]).
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.	**The Razavi et al. publication discloses wherein said wired signal downloading interface comprises a connector for temporary connection to a downloading device** ("PDA dock 33 provides means for passengers in the automobile to connect a PDA to the in-car sub-network. Other embodiments of the invention may include a dock for a laptop computer instead of or in addition to, PDA dock 33."; Razavi et al. publication; Fig. 2; [0035]).
4. The multi-vehicle compatible tracking unit according to claim 1 wherein said downloading interface comprises a wireless signal downloading interface.	**The Razavi et al. publication discloses wherein said downloading interface comprises a wireless signal downloading interface** ("The software may be quickly and easily retrieved from sources external to the in-car sub-network, such as web pages or LANs, which can be accessed through communication devices on the in-car sub-network. The software can be retrieved by one device (e.g. a wireless modem,) conveyed through the network and installed on a second device (e.g., a GPS locator) as easily as downloading a webpage."; Razavi et al. publication; [0060]).
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.	**The Razavi et al. publication discloses wherein said wireless signal downloading interface comprises a wireless receiver for temporary connection to a downloading device** ("The software may be quickly and easily retrieved from sources external to the in-car sub-network, such as web pages or LANs, which can be accessed through communication devices on the in-car sub-network."; Razavi et al. publication; [0060]. "The automobile sub-network may include a variety of communication devices through which it may be coupled to the primary network. These devices may include a wireless modem, a cellular packet data (CDPD) modem, a pager or other communication devices" Razavi et al. publication; [0025]).

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 Razavi et al. publication discloses wherein the corresponding at least one vehicle code is for reading from the at least one vehicle device** ("It is contemplated that the vehicle's OBD (on-board diagnostic) system (e.g., item 23 in FIG. 2) will be connected to in-car sub-network 20. The OBD system, as indicated above, is typically of a proprietary design which was not originally intended to be connected to a network. The OBD system may therefore be connected to the network by an interface which is designed as a network device. With the OBD system coupled to the network via the interface device, *other devices on the network can query the OBD system for diagnostic information* and/or provide information to the OBD system." Razavi et al. publication; [0037], emphasis added).
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 Razavi et al. publication discloses wherein the corresponding at least one vehicle code is for writing to the at least one vehicle device** ("It is contemplated that the vehicle's OBD (on-board diagnostic) system (e.g., item 23 in FIG. 2) will be connected to in-car sub-network 20. The OBD system, as indicated above, is typically of a proprietary design which was not originally intended to be connected to a network. The OBD system may therefore be connected to the network by an interface which is designed as a network device. With the OBD system coupled to the network via the interface device, *other devices on the network can* query the OBD system for diagnostic information and/or *provide information to the OBD system*." Razavi et al. publication; [0037], emphasis added).
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 Razavi et al. publication discloses wherein said downloading interface is also for permitting downloading of at least one programming instruction for said multi-vehicle compatible controller** (The Razavi et al. publication discloses downloading executable instructions for the components of the in-car sub-network: "The software may be quickly and easily retrieved from sources external to the in-car sub-network, such as web pages or LANs, which can be accessed through communication devices on the in-car sub-network. The software can be retrieved by one device (e.g. a wireless modem,) conveyed through the network and installed on a second device (e.g., a GPS locator) as easily as downloading a webpage."; Razavi et al. publication; [0060]).

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 Razavi et al. publication discloses further comprising a remote transmitter;** (The in-car sub-network contains wireless communication devices that couple to the Internet by a remote signal, wireless transmission 16: "Referring to FIG. 1, an in-car sub-network 10 in one embodiment of the invention is shown." "In the embodiment depicted in FIG. 1, communication device 15 is a wireless device and is coupled to internet service provider 17 by wireless transmission 16."; Razavi et al. publication; Fig. 1; [0028]) **and wherein said multi-vehicle compatible controller also performs at least one vehicle remote control function responsive to said remote transmitter.** ("It is contemplated that the vehicle's OBD (on-board diagnostic) system (e.g., item 23 in FIG. 2) will be connected to in-car sub-network 20. The OBD system, as indicated above, is typically of a proprietary design which was not originally intended to be connected to a network. The OBD system may therefore be connected to the network by an interface which is designed as a network device. With the OBD system coupled to the network via the interface device, other devices on the network can query the OBD system for diagnostic information and/or provide information to the OBD system." Razavi et al. publication; [0037]. The Razavi et al. publication discloses using the OBD system to perform a remote control function: "For example, the owner of the automobile may be allowed to access substantially all of the components and functions of the in-car sub-network except for detailed vehicle diagnostic information. A mechanic, on the other hand, may be allowed to access this detailed diagnostic information, but may only be allowed to drive the automobile a limited distance. This mechanism may also be used to personalize the operation of the automobile, adjusting seat positions, radio stations and the like according to the preferences of different drivers. The extent to which this mechanism controls the various functions of the automobile depends, of course, upon the coupling of the related automobile components to the in-car sub-network." Razavi et al. publication; [0035]).
10. The multi-vehicle compatible tracking unit according to claim 9 wherein the at least one vehicle remote control function comprises at	**The Razavi et al. publication discloses 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 Razavi et al. publication discloses a vehicle security function: "For example, the owner of the automobile may be allowed to access substantially all of the components and functions of the in-car sub-

least one of a vehicle security function, a remote keyless entry function, and a remote engine starting function.	network except for detailed vehicle diagnostic information. A mechanic, on the other hand, may be allowed to access this detailed diagnostic information, but may only be allowed to drive the automobile a limited distance. This mechanism may also be used to personalize the operation of the automobile, adjusting seat positions, radio stations and the like according to the preferences of different drivers. The extent to which this mechanism controls the various functions of the automobile depends, of course, upon the coupling of the related automobile components to the in-car sub-network." Razavi et al. publication; [0035]).
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 Razavi et al. publication discloses wherein said wireless position determining device comprises a Global Positioning System (GPS) receiver** ("A GPS receiver 30 is coupled to in-car sub-networks 20 for providing automobile location information." Razavi et al. publication; Fig. 2; [0033]).
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 Razavi et al. publication discloses further comprising a housing containing said vehicle position determining device, said wireless communications device, said multi-vehicle compatible controller, and said downloading interface** ("Referring to FIG. 1, an in-car sub-network 10 in one embodiment of the invention is shown. In-car sub-network 10 comprises a utility box 11, network devices 13 and 14, communication device 15 and network cabling 12." "These communication devices include wireless modem 26, CDPD modem 27, cellular phone 29 and wireless Ethernet 28." "A GPS receiver 30 is coupled to in-car sub-networks 20 for providing automobile location information."; Razavi et al. publication; Figs 1 and 2; [0028], [0031], [0033]).

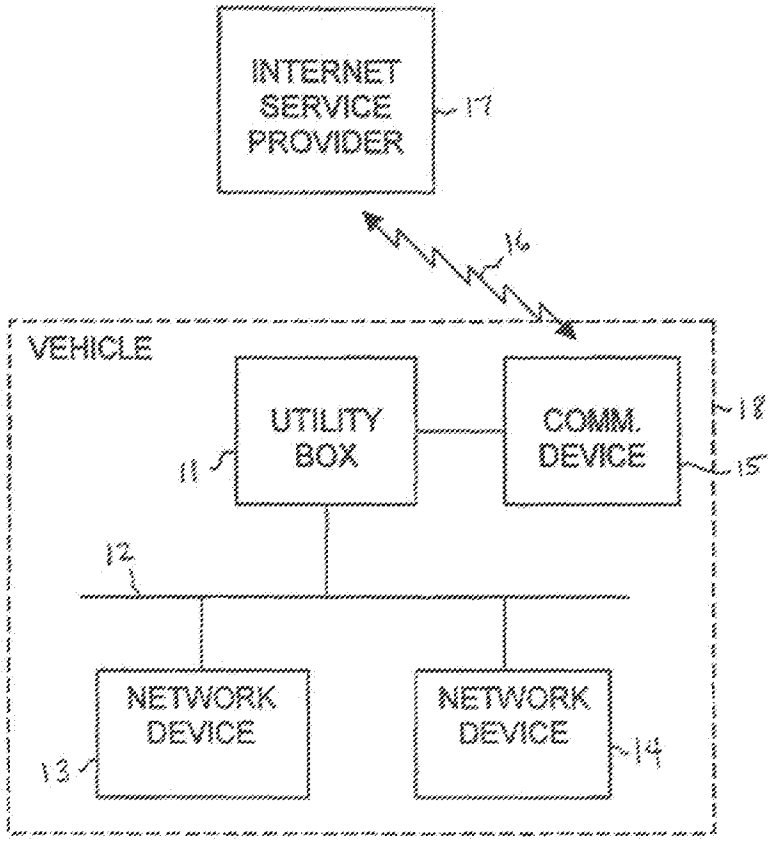


Fig. 1

13. A multi-vehicle compatible tracking unit for a vehicle comprising a vehicle data bus extending throughout the	**The Razavi et al. publication discloses a multi-vehicle compatible tracking unit for a vehicle comprising a vehicle data bus extending throughout the vehicle** (The components installed in a vehicle as disclosed in the Razavi et al. publication utilize buses complying with SAE standards J1979 and J1850 (one having ordinary skill in the

vehicle, the multi-vehicle compatible vehicle tracking unit comprising:	art would readily appreciate the typographical error in the names of the standards) that can be used in a variety of vehicles. These components further include an on-board diagnostic system bus. "A system and method for collecting information from a vehicle wherein the vehicle incorporates an internal network having a device coupled thereto for collecting or generating vehicle information to an external receiver. In one embodiment, the devices coupled to the network are addressable using corresponding IP addresses. In another embodiment, the devices are addressable using object terminology which references their respective services. The vehicle information may include location, traffic, diagnostic or other types of information." "[A] network is distinct from the various buses which may monitor the functions of an automobile and provide diagnostic information, but which can be coupled only to specific monitoring devices. These buses may be referred to as "on-board diagnostic" OBD systems. Because the Environmental Protection Agency has adopted standards for such systems from the standards of the society of automotive engineers (SAE), most of the diagnostic buses use command sets and protocols defined by SAE standards (e.g. SAE J[1]979 and SAE J. [1]850 PWPWM.)" "… [t]he manufacturer's on-board diagnostic system bus 23 can be coupled to the in-car sub-network. On-board diagnostic system bus 23 is connected to computer platform 22 via an RS-232 connector."; Razavi et al. publication; Abstract; Fig. 2; [0024], [0031]), **the multi-vehicle compatible vehicle tracking unit comprising:**
a vehicle position determining device;	**The Razavi et al. publication discloses a vehicle position determining device** (GPS receivers are utilized: "A GPS receiver 30 is coupled to in-car sub-networks 20 for providing automobile location information." Razavi et al. publication; Fig. 2; [0033]);
a wireless communications device;	**The Razavi et al. publication discloses a wireless communications device** (A variety of wireless communication devices are utilized including a wireless modem, a cellular phone, and wireless Ethernet: "The in-car sub-network can also be connected to external networks via a set of communication devices. These communication devices include wireless modem 26, CDPD modem 27, cellular phone 29 and wireless Ethernet 28."; Razavi et al. publication; Fig. 2; [0031]);
a multi-vehicle compatible controller for cooperating with said vehicle position determining device and said wireless communications	**The Razavi et al. publication discloses a multi-vehicle compatible controller for cooperating with said vehicle position determining device and said wireless communications device to send vehicle position information** (The compute platform 22 within in-car sub-network 20 controls various wireless communication systems and GPS receiver 30: "A system and method for collecting information from a

device to send vehicle position information;	vehicle wherein the vehicle incorporates an internal network having a device coupled thereto for collecting or generating the vehicle information and a communication device coupled thereto for transmitting the vehicle information to an external receiver… The vehicle information may include location, traffic, diagnostic or other types of information". Razavi et al. publication, Abstract; "On-board diagnostic system bus 23 is connected to compute platform 22 via a RS-232 connector. The in-car sub-network can also be connected to external networks via a set of communication devices. These communication devices include wireless modem 26, CDPD modem 27, cellular phone 29 and wireless Ethernet 28." In-car sub-network 20 can also communicate with external systems such as a global positioning system (GPS)…" Razavi et al. publication; Fig. 2; [0031], [0033]);
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 Razavi et al. publication discloses 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 compute platform 22 connects with vehicle bus 23 and various devices. Disclosed SAE diagnostic bus and command sets and protocols J197 and J1850 are compatible with a variety of vehicles and inherently disclose many vehicle device codes. Utilizing these busses as the OBD system to communicate with specific devices further inherently uses a specific device code form the available device codes in the standard: "These buses may be referred to as "on-board diagnostic" OBD systems. Because the Environmental Protection Agency has adopted standards for such systems from the standards of the society of automotive engineers (SAE), most of the diagnostic buses use command sets and protocols defined by SAE standards (e.g. SAE J[1]979 and SAE J. [1]850 PW/PWM.)." "On-board diagnostic system bus 23 is connected to computer platform 22 via an RS-232 connector." "The in-car sub-network can also be connected to external networks via a set of communication devices. These communication devices include wireless modem 26, CDPD modem 27, cellular phone 29 and wireless Ethernet 28." "A GPS receiver 30 is coupled to in-car sub-networks 20 for providing automobile location information."; Razavi et al. publication; Fig. 2; [0024], [0031], and [0033])); and
a downloading interface for permitting downloading of enabling data related to the at	**The Razavi et al. publication discloses 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 Razavi et al.

least one corresponding vehicle device code for use by said multi-vehicle compatible controller;	publication describes that upgrades to the vehicle that result in different device codes being received from vehicle devices can be handled through software upgrades downloaded via devices including the wireless modem: "This system thereby makes it possible to remove outdated components and replace them with new components, even though the new components may have different features or require different data or other signals from the vehicle or its components. Similarly, components which execute associated software, display data or provide services can be upgraded by downloading new software, data or services ("upgrade data") to the components through the in-car sub-network. This software may be quickly and easily retrieved from sources external to the in-car sub-network, such as web pages or LANs which can be accessed through the communication devices on the in-car sub-network. The software can be retrieved by one device (e.g., a wireless modem,) conveyed through the network and installed in a second device (e.g., a GPS locator) as easily as downloading a web page." Razavi et al. publication; [0060]).
said downloading interface comprising a connector for temporary connection to a downloading device.	**The Razavi et al. publication discloses said downloading interface comprising a connector for temporary connection to a downloading device** ("PDA dock 33 provides means for passengers in the automobile to connect a PDA to the in-car sub-network. Other embodiments of the invention may include a dock for a laptop computer instead of or in addition to, PDA dock 33."; Razavi et al. publication; Fig. 2; [0035]).
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 Razavi et al. publication discloses wherein the corresponding at least one vehicle code is for reading from the at least one vehicle device** ("It is contemplated that the vehicle's OBD (on-board diagnostic) system (e.g., item 23 in FIG. 2) will be connected to in-car sub-network 20. The OBD system, as indicated above, is typically of a proprietary design which was not originally intended to be connected to a network. The OBD system may therefore be connected to the network by an interface which is designed as a network device. With the OBD system coupled to the network via the interface device, *other devices on the network can query the OBD system for diagnostic information* and/or provide information to the OBD system." Razavi et al. publication; [0037], emphasis added).
15. The multi-vehicle compatible tracking unit	**The Razavi et al. publication discloses wherein the corresponding at least one vehicle code is for writing to the at least one vehicle device** ("It is contemplated that

according to claim 13 wherein the corresponding at least one vehicle code is for writing to the at least one vehicle device.	the vehicle's OBD (on-board diagnostic) system (e.g., item 23 in FIG. 2) will be connected to in-car sub-network 20. The OBD system, as indicated above, is typically of a proprietary design which was not originally intended to be connected to a network. The OBD system may therefore be connected to the network by an interface which is designed as a network device. With the OBD system coupled to the network via the interface device, *other devices on the network can* query the OBD system for diagnostic information and/or *provide information to the OBD system*." Razavi et al. publication, [0037], emphasis added).
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 Razavi et al. publication discloses wherein said downloading interface is also for permitting downloading of at least one programming instruction for said multi-vehicle compatible controller** ("The software may be quickly and easily retrieved from sources external to the in-car sub-network, such as web pages or LANs, which can be accessed through communication devices on the in-car sub-network. The software can be retrieved by one device (e.g. a wireless modem,) conveyed through the network and installed on a second device (e.g., a GPS locator) as easily as downloading a webpage."; Razavi et al. publication, [0060]).
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 Razavi et al. publication discloses further comprising a remote transmitter;** (The in-car sub-network contains wireless communication devices that couple to the Internet by a remote signal, wireless transmission 16: "Referring to FIG. 1, an in-car sub-network 10 in one embodiment of the invention is shown." "In the embodiment depicted in FIG. 1, communication device 15 is a wireless device and is coupled to internet service provider 17 by wireless transmission 16."; Razavi et al. publication; Fig. 1; [0028]) **and wherein said multi-vehicle compatible controller also performs at least one vehicle remote control function responsive to said remote transmitter.** ("It is contemplated that the vehicle's OBD (on-board diagnostic) system (e.g., item 23 in FIG. 2) will be connected to in-car sub-network 20. The OBD system, as indicated above, is typically of a proprietary design which was not originally intended to be connected to a network. The OBD system may therefore be connected to the network by an interface which is designed as a network device. With the OBD system coupled to the network via the interface device, other devices on the network can query the OBD system for diagnostic information and/or provide information to the OBD

	system." Razavi et al. publication; [0037]. The Razavi et al. publication discloses using the OBD system to perform a remote control function: "For example, the owner of the automobile may be allowed to access substantially all of the components and functions of the in-car sub-network except for detailed vehicle diagnostic information. A mechanic, on the other hand, may be allowed to access this detailed diagnostic information, but may only be allowed to drive the automobile a limited distance. This mechanism may also be used to personalize the operation of the automobile, adjusting seat positions, radio stations and the like according to the preferences of different drivers. The extent to which this mechanism controls the various functions of the automobile depends, of course, upon the coupling of the related automobile components to the in-car sub-network." Razavi et al. publication; [0035]).
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 Razavi et al. publication discloses a multi-vehicle compatible tracking unit for a vehicle comprising a vehicle data bus extending throughout the vehicle** (The components installed in a vehicle as disclosed in the Razavi et al. publication utilize buses complying with SAE standards J1979 and J1850 (one having ordinary skill in the art would readily appreciate the typographical error in the names of the standards) that can be used in a variety of vehicles. These components further include an on-board diagnostic system bus. "A system and method for collecting information from a vehicle wherein the vehicle incorporates an internal network having a device coupled thereto for collecting or generating vehicle information to an external receiver. In one embodiment, the devices coupled to the network are addressable using corresponding IP addresses. In another embodiment, the devices are addressable using object terminology which references their respective services. The vehicle information may include location, traffic, diagnostic or other types of information." "[A] network is distinct from the various buses which may monitor the functions of an automobile and provide diagnostic information, but which can be coupled only to specific monitoring devices. These buses may be referred to as "on-board diagnostic" OBD systems. Because the Environmental Protection Agency has adopted standards for such systems from the standards of the society of automotive engineers (SAE), most of the diagnostic buses use command sets and protocols defined by SAE standards (e.g. SAE J[1]979 and SAE J. [1]850 PWPWM.)" "… [t]he manufacturer's on-board diagnostic system bus 23 can be coupled to the in-car sub-network. On-board diagnostic system bus 23 is connected to

	computer platform 22 via an RS-232 connector."; Razavi et al. publication; Abstract; Fig. 2; [0024], [0031]), **the multi-vehicle compatible vehicle tracking unit comprising:**
a vehicle position determining device;	**The Razavi et al. publication discloses a vehicle position determining device** (GPS receivers are utilized: "A GPS receiver 30 is coupled to in-car sub-networks 20 for providing automobile location information." Razavi et al. publication; Fig. 2; [0033]);
a wireless communications device;	**The Razavi et al. publication discloses a wireless communications device** (A variety of wireless communication devices are utilized including a wireless modem, a cellular phone, and wireless Ethernet: "The in-car sub-network can also be connected to external networks via a set of communication devices. These communication devices include wireless modem 26, CDPD modem 27, cellular phone 29 and wireless Ethernet 28."; Razavi et al. publication; Fig. 2; [0031]);
a multi-vehicle compatible controller for cooperating with said vehicle position determining device and said wireless communications device to send vehicle position information;	**The Razavi et al. publication discloses a multi-vehicle compatible controller for cooperating with said vehicle position determining device and said wireless communications device to send vehicle position information** (The compute platform 22 within in-car sub-network 20 controls various wireless communication systems and GPS receiver 30: "A system and method for collecting information from a vehicle wherein the vehicle incorporates an internal network having a device coupled thereto for collecting or generating the vehicle information and a communication device coupled thereto for transmitting the vehicle information to an external receiver… The vehicle information may include location, traffic, diagnostic or other types of information". Razavi et al. publication, Abstract; "On-board diagnostic system bus 23 is connected to compute platform 22 via a RS-232 connector. The in-car sub-network can also be connected to external networks via a set of communication devices. These communication devices include wireless modem 26, CDPD modem 27, cellular phone 29 and wireless Ethernet 28." In-car sub-network 20 can also communicate with external systems such as a global positioning system (GPS)…" Razavi et al. publication; Fig. 2; [0031], [0033]);
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 Razavi et al. publication discloses 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 compute platform 22 connects with vehicle bus 23 and various devices. Disclosed SAE diagnostic bus and command sets and protocols J197 and J1850 are compatible with a variety of vehicles and inherently

corresponding vehicle device code from among a plurality thereof for different vehicles; and	disclose many vehicle device codes. Utilizing these busses as the OBD system to communicate with specific devices further inherently uses a specific device code form the available device codes in the standard: "These buses may be referred to as "on-board diagnostic" OBD systems. Because the Environmental Protection Agency has adopted standards for such systems from the standards of the society of automotive engineers (SAE), most of the diagnostic buses use command sets and protocols defined by SAE standards (e.g. SAE J[1]979 and SAE J. [1]850 PWPWM.)." "On-board diagnostic system bus 23 is connected to computer platform 22 via an RS-232 connector." "The in-car sub-network can also be connected to external networks via a set of communication devices. These communication devices include wireless modem 26, CDPD modem 27, cellular phone 29 and wireless Ethernet 28." "A GPS receiver 30 is coupled to in-car sub-networks 20 for providing automobile location information."; Razavi et al. publication; Fig. 2; [0024], [0031], and [0033]); 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 Razavi et al. publication discloses 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 Razavi et al. publication describes that upgrades to the vehicle that result in different device codes being received from vehicle devices can be handled through software upgrades downloaded via devices including the wireless modem: "This system thereby makes it possible to remove outdated components and replace them with new components, even though the new components may have different features or require different data or other signals from the vehicle or its components. Similarly, components which execute associated software, display data or provide services can be upgraded by downloading new software, data or services ("upgrade data") to the components through the in-car sub-network. This software may be quickly and easily retrieved from sources external to the in-car sub-network, such as web pages or LANs which can be accessed through the communication devices on the in-car sub-network. The software can be retrieved by one device (e.g., a wireless modem,) conveyed through the network and installed in a second device (e.g., a GPS locator) as easily as downloading a web page." Razavi et al. publication; [0060]);
said downloading interface comprising a wireless receiver for temporary connection to a	**The Razavi et al. publication discloses said downloading interface comprising a wireless receiver for temporary connection to a downloading device** ("The software may be quickly and easily retrieved from sources external to the in-car sub-

downloading device.	network, such as web pages or LANs, which can be accessed through communication devices on the in-car sub-network."; Razavi et al. publication; [0060]. "The automobile sub-network may include a variety of communication devices through which it may be coupled to the primary network. These devices may include a wireless modem, a cellular packet data (CDPD) modem, a pater or other communication devices" Razavi et al. publication; [0025]).
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 Razavi et al. publication discloses wherein the corresponding at least one vehicle code is for reading from the at least one vehicle device** ("It is contemplated that the vehicle's OBD (on-board diagnostic) system (e.g., item 23 in FIG. 2) will be connected to in-car sub-network 20. The OBD system, as indicated above, is typically of a proprietary design which was not originally intended to be connected to a network. The OBD system may therefore be connected to the network by an interface which is designed as a network device. With the OBD system coupled to the network via the interface device, *other devices on the network can query the OBD system for diagnostic information* and/or provide information to the OBD system." Razavi et al. publication; [0037], emphasis added).
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 Razavi et al. publication discloses wherein the corresponding at least one vehicle code is for writing to the at least one vehicle device** ("It is contemplated that the vehicle's OBD (on-board diagnostic) system (e.g., item 23 in FIG. 2) will be connected to in-car sub-network 20. The OBD system, as indicated above, is typically of a proprietary design which was not originally intended to be connected to a network. The OBD system may therefore be connected to the network by an interface which is designed as a network device. With the OBD system coupled to the network via the interface device, *other devices on the network can* query the OBD system for diagnostic information and/or *provide information to the OBD system*." Razavi et al. publication; [0037], emphasis added).
21. The multi-vehicle compatible tracking unit according to claim 18 wherein said downloading interface is	**The Razavi et al. publication discloses wherein said downloading interface is also for permitting downloading of at least one programming instruction for said multi-vehicle compatible controller** ("The software may be quickly and easily retrieved from sources external to the in-car sub-network, such as web pages or LANs,

also for permitting downloading of at least one programming instruction for said multi-vehicle compatible controller.	which can be accessed through communication devices on the in-car sub-network. The software can be retrieved by one device (e.g. a wireless modem,) conveyed through the network and installed on a second device (e.g., a GPS locator) as easily as downloading a webpage."; Razavi et al. publication; [0060]).
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 Razavi et al. publication discloses further comprising a remote transmitter;** (The in-car sub-network contains wireless communication devices that couple to the Internet by a remote signal, wireless transmission 16: "Referring to FIG. 1, an in-car sub-network 10 in one embodiment of the invention is shown." "In the embodiment depicted in FIG. 1, communication device 15 is a wireless device and is coupled to internet service provider 17 by wireless transmission 16."; Razavi et al. publication; Fig. 1; [0028]) **and wherein said multi-vehicle compatible controller also performs at least one vehicle remote control function responsive to said remote transmitter.** ("It is contemplated that the vehicle's OBD (on-board diagnostic) system (e.g., item 23 in FIG. 2) will be connected to in-car sub-network 20. The OBD system, as indicated above, is typically of a proprietary design which was not originally intended to be connected to a network. The OBD system may therefore be connected to the network by an interface which is designed as a network device. With the OBD system coupled to the network via the interface device, other devices on the network can query the OBD system for diagnostic information and/or provide information to the OBD system." Razavi et al. publication; [0037]. The Razavi et al. publication discloses using the OBD system to perform a remote control function: "For example, the owner of the automobile may be allowed to access substantially all of the components and functions of the in-car sub-network except for detailed vehicle diagnostic information. A mechanic, on the other hand, may be allowed to access this detailed diagnostic information, but may only be allowed to drive the automobile a limited distance. This mechanism may also be used to personalize the operation of the automobile, adjusting seat positions, radio stations and the like according to the preferences of different drivers. The extent to which this mechanism controls the various functions of the automobile depends, of course, upon the coupling of the related automobile components to the in-car sub-network." Razavi et al. publication; [0035]).

EXHIBIT U

Cal/EPA
California
Environmental
Protection
Agency

Air Resources Board

HAAGEN-SMIT
LABORATORY
P.O. Box 8001
9528 Telstar Avenue
El Monte, CA
91734-8001

Pete Wilson
Governor

Peter M. Rooney
Secretary for
Environmental
Protection

Mail-Out #MSC 97-24

November 17, 1997

TO: ALL PASSENGER CAR MANUFACTURERS
ALL LIGHT-DUTY/MEDIUM-DUTY VEHICLE MANUFACTURERS
ALL OTHER INTERESTED PARTIES

On December 12, 1996, the Air Resources Board (ARB or Board) conducted a public hearing to consider amendments to section 1968.1 of Title 13, California Code of Regulations (CCR), entitled "Malfunction and Diagnostic System Requirements--1994 and Subsequent Model-Year Passenger Cars, Light-Duty Trucks, and Medium-Duty Vehicles and Engines" (OBD II). At the hearing, the Board approved for adoption the proposed modifications to the regulation. The regulation as modified is effective as of September 25, 1997.

Enclosed are copies of the approval by the Office of Administrative Law (OAL) and the text of the OBD II regulation. The text of the OBD II regulation is also available in electronic format on the ARB's world wide web site at http://www.arb.ca.gov (search for keyword "obd").

Any questions regarding the regulation may be directed to Allen Lyons, Manager, Advanced Engineering Section, at (626) 575-6833.

Sincerely,

Robert H. Cross, Chief
Mobile Source Control Division

Enclosures

1968.1 Malfunction and Diagnostic System Requirements--1994 and Subsequent Model-Year Passenger Cars, Light-Duty Trucks, and Medium-Duty Vehicles and Engines

(a) GENERAL REQUIREMENTS

(1.0) All 1994 and subsequent model-year passenger cars, light-duty trucks, and medium-duty vehicles shall be equipped with a malfunction indicator light (MIL) located on the instrument panel that will automatically inform the vehicle operator in the event of a malfunction of any powertrain components which can affect emissions and which provide input to, or receive output from, the on-board computer(s) or of the malfunction of the on-board computer(s) itself. The MIL shall not be used for any other purpose.

(1.1) The MIL shall be of sufficient illumination and location to be readily visible under all lighting conditions. The MIL shall illuminate in the engine-run key position before engine cranking to indicate that the MIL is functional and shall, when illuminated, display the phrase "Check Engine" or "Service Engine Soon". The word "Powertrain" may be substituted for "Engine" in the previous phrases. Alternatively, the International Standards Organization (ISO) engine symbol may be substituted for the word "Engine," or for the entire phrase.

(1.2) All 1994 and subsequent model-year passenger cars, light-duty trucks, and medium-duty vehicles required to have MIL pursuant to (1.0) above shall also be equipped with an on-board diagnostic system capable of identifying the likely area of the malfunction by means of fault codes stored in computer memory. These vehicles shall be equipped with a standardized electrical connector to provide access to the stored fault codes. Specific performance requirements are listed below. A glossary of terms is contained in section (n). Unless otherwise noted, all section references refer to section 1968.1 of Title 13, CCR.

(1.3) Any reference to vehicles in this regulation shall also include medium-duty vehicles with engines certified on an engine dynamometer.

(1.4) For Low Emission Vehicles (LEV), the Executive Officer shall revise the emission threshold for a malfunction on any check if the most reliable monitoring method developed requires a higher threshold to prevent significant errors of commission in detecting a malfunction.

(1.5) For every case in which a malfunction is to be noted when an emission threshold is exceeded (e.g., emissions in excess of 1.5 times the standard), the manufacturer may perform only a functional check (defined in section (n)(16.0)) of a specific component or system if deterioration or failure of such would not cause the vehicle's emissions to exceed the emission threshold.

(1.6) After the 1998 model year, for Non-LEVs, fulfillment of federal On-Board Diagnostic (OBD) requirements shall be deemed to be an acceptable option for the manufacturer for the purpose of meeting these requirements.

(1.7) For 1994 and 1995 model years only, illumination of the malfunction indicator light upon

detection of a malfunction shall be optional for catalyst, misfire, and complete evaporative system monitoring. MIL illumination for such vehicles shall be optional for other monitoring requirements, subject to Executive Officer approval, on the basis of use of a new monitoring strategy which is significantly different than that used previously by the manufacturer and/or which entails a high degree of sophistication in its application. Irrespective of the preceding the MIL shall illuminate on these vehicles in accordance with section 1968.1 for lack of function (see section (n)(16.0)) for electronic components/systems otherwise approved for not illuminating the MIL. Furthermore, setting fault codes for all malfunctions shall continue to conform with requirements of section 1968.1. For components/systems not requiring illumination of the MIL, manufacturers shall provide a plan for approval by the Executive Officer for reporting on the correct performance of the monitoring systems in customer use at 6 month intervals beginning from the start of production each year for at least the first three years after production. Approval of the plan shall be based on obtaining a statistically valid sample size, assuring that adequate resources are available to investigate the potential problems, and assuring that a wide variety of vehicles, operating modes, and mileage accumulation will be included in the evaluation. Should incorrect performance of the diagnostic system be determined by the Executive Officer on the basis of these reports or through other means, manufacturers shall recall the vehicles for correction of the OBD II system in accordance with Article 2.2, Title 13 CCR, or they shall submit an alternate plan for remedying the problem for approval by the Executive Officer on the basis of achieving comparable capture rates and timeliness as an official recall plan.

(1.8) Manufacturers may employ alternate statistical MIL illumination and fault code storage protocols to those specified in these requirements, subject to Executive Officer approval based on comparable timeliness in detecting a malfunction and evaluating system performance. For strategies requiring on average between three and six driving cycles for MIL illumination, the manufacturer shall provide data and/or an engineering evaluation which adequately demonstrate that the monitoring system is equally effective and timely in detecting component deterioration. Strategies requiring on average more than six driving cycles for MIL illumination shall not be accepted.

(1.9) Regarding diagnostic system monitoring conditions and MIL illumination requirements, manufacturers are generally required to define appropriate operating conditions for monitoring, subject to the limitation that the monitoring conditions shall be encountered at least once during the first engine start portion of the applicable Federal Test Procedure (FTP) test. Alternatively, manufacturers may request, subject to Executive Officer approval, use of monitoring conditions encountered during the Unified Cycle (see section (n)). In approval of the request, the Executive Officer shall consider the extent to which use of the cycle provides for more effective monitoring. Upon detection of a malfunction, the MIL is to be illuminated and a fault code stored no later than the end of the next driving cycle during which monitoring occurs provided the malfunction is again detected. Until the 1997 model year, diagnostic strategies that illuminate the MIL on the basis of

completing a trip (trip is defined in section (n)(5.0) of these requirements) shall be accepted. The Executive Officer shall accept trip based diagnostic systems until the 1998 model year, provided the manufacturer adequately demonstrates that the diagnostic strategies run with reasonable frequency during normal driving conditions. When a trip criterion is employed, upon detection of a malfunction, the diagnostic system shall store a fault code and the MIL shall be illuminated no later than the end of the next trip if the malfunction is again present.

(1.10) For other emission control devices not identified or addressed in sections (b)(1) through (b)(12) (e.g., hydrocarbon adsorbers), manufacturers shall submit a plan for Executive Officer approval of the monitoring strategy and fault thresholds prior to introduction on a production vehicle. Executive Officer approval shall be based on the effectiveness of the monitoring strategy, the malfunction criteria utilized, and the monitoring conditions required by the diagnostic.

(2.0) Manufacturers may request Executive Officer approval to disable a diagnostic system designed to meet the requirements of section (b) at ambient engine starting temperatures below twenty degrees Fahrenheit (low ambient temperature conditions may be determined based on intake air or engine coolant temperature at engine starting), and at elevations above eight thousand feet above sea level provided the manufacturer submits data and/or an engineering evaluation which adequately demonstrate that monitoring would be unreliable when such conditions exist. Notwithstanding, diagnostic system disablement may be requested at other ambient engine starting temperatures if the manufacturer adequately demonstrates with data and/or an engineering evaluation that misdiagnosis would occur due to the impact of such ambient temperatures on the performance of the component itself (e.g., component freezing).

(2.1) Manufacturers may disable monitoring systems that can be affected by running out of fuel (e.g., misfire detection) when the fuel level is low, provided disablement will not occur when the fuel level is above 15 percent of the nominal capacity of the fuel tank.

(2.2) For vehicles designed to accommodate the installation of Power Take-Off (PTO) units (defined in section (n)(19.0)), disablement of affected monitoring systems is permitted provided disablement occurs only while the PTO unit is active, and provided the OBD II readiness code (specified in section (e)) is cleared by the on-board computer (i.e., all bits shall be set to "test not complete") while the PTO unit is activated. The code may be restored to its state prior to PTO activation upon PTO de-activation.

(b) MONITORING REQUIREMENTS

(1.0) CATALYST MONITORING

(1.1) Requirement:

(1.1.1) The diagnostic system shall monitor the catalyst system for proper performance.

(1.1.2) Manufacturers are not required to implement these catalyst monitoring requirements on diesel vehicles and engines. Further, manufacturers of spark-ignited lean-burn vehicles and engines may request that the Executive Officer exempt such applications from these catalyst monitoring requirements if it can be demonstrated that a reliable monitoring technology is not available. The Executive Officer shall approve such a request upon determining that all reasonable monitoring technologies have been considered to the extent possible.

(1.2) Malfunction Criteria:

(1.2.1) Low Emission Vehicles (see section (n)(14.0)): The catalyst system shall be considered malfunctioning when its conversion capability decreases to the point that either of the following occurs: 1) Hydrocarbon (HC) emissions exceed the applicable emission threshold specified in section (b)(1.2.2) below, or 2) the average Federal Test Procedure (FTP) Non-Methane Hydrocarbon (NMHC) conversion efficiency of the monitored portion of the catalyst system falls below 50 percent. Regarding the first criterion, the malfunction threshold shall be based on the emission standards to which the vehicle is certified. For low emission vehicle applications, hydrocarbon emissions shall be multiplied by the certification reactivity adjustment factor for the vehicle. Regarding the second criterion, the efficiency determination shall be based on an FTP test wherein a malfunction is noted when the cumulative NMHC emissions measured at the outlet of the monitored catalyst(s) are more than 50 percent of the cumulative engine-out emissions measured at the inlet of the catalyst(s).

(1.2.2) TLEV applications shall employ an emission threshold malfunction criterion of 2.0 times the applicable FTP HC standard plus the emissions from a test run with a representative 4000 mile catalyst system (125 hours of operation for medium-duty vehicles with engines certified on an engine dynamometer). The emission threshold criterion for LEV and ULEV applications shall be 2.5 and 3.0 times the applicable FTP HC standard, respectively, plus the emission level with a representative 4000 mile catalyst system. Notwithstanding, beginning with the 1998 model year, manufacturers shall phase in an emission threshold of 1.75 times the applicable FTP HC standard for all categories of low emission vehicles, which shall not include the emission level with a 4000 mile catalyst system. The phase in percentages (based on

the manufacturer's projected sales volume for low emission vehicle applications) shall equal or exceed 20 percent in the 1998 model year, 40 percent in the 1999 model year, 60 percent in the 2000 model year, 80 percent in the 2001 model year, with 100 percent implementation for the 2002 model year. Alternate phase-in schedules that provide for equivalent emission reduction and timeliness overall as defined in section (n)(21.0) shall be accepted. Small volume manufacturers shall not be required to meet the phase-in percentages; however, such manufacturers shall achieve 100 percent compliance by the 2002 model year.

(1.2.3) Non-Low Emission Vehicles. The catalyst system shall be considered malfunctioning when its conversion capability decreases to the point that HC emissions increase by more than 1.5 times the standard over an FTP test from a test run with a representative 4000 mile catalyst system.

(1.2.4) For 1994 and 1995 model year vehicles and engines as an option to monitoring the catalyst during FTP driving conditions, manufacturers may monitor the front catalyst independently of, or in combination with, the next catalyst downstream. Each monitored catalyst or catalyst combination shall be considered malfunctioning when total HC conversion efficiency falls below 60 percent while in normal closed loop operation. As a guideline, the catalyst(s) should not be considered malfunctioning when its efficiency is greater than 80 percent. The efficiency determination shall be based on a steady state test wherein a malfunction is noted when the total HC emission concentration measured at the outlet of the monitored catalyst(s) is more than 20 to 40 percent of the cumulative total engine-out emissions measured at the inlet of the catalyst(s). Alternatively, if correlation with FTP emissions can be demonstrated, manufacturers may use the malfunction criteria specified in (b)(1.2.1) or (b)(1.2.3). 1994 and 1995 model year vehicles certified to this option shall incorporate FTP based monitoring no later than the 1997 model year (vehicles initially complying with section 1968.1 in the 1996 model year shall utilize an FTP based catalyst monitoring system).

(1.3) Monitoring Conditions:

(1.3.1) The manufacturer shall define appropriate operating conditions during which monitoring shall occur, subject to the limitation that the monitoring conditions shall be encountered at least once during the first engine start portion of the applicable FTP test. However, vehicles utilizing steady state monitoring (as permitted by section (1.2.4) above), may alternatively comply with the monitoring conditions specified in section (1.3.2). The monitoring system shall operate at least once per driving cycle during which the manufacturer-defined monitoring conditions are met.

(1.3.2) If steady state efficiency is being monitored (see section (b) (1.2.4)), the manufacturer shall choose a non-closed throttle, reasonably steady speed condition for monitoring

the catalyst with the constraints that the check shall (i) occur between 20 mph and 50 mph, or within an engine rpm and torque range determined by the manufacturer to be representative of medium-duty vehicle operating conditions between 20 and 50 mph steady speed conditions with a load equivalent to 50 percent of the maximum load carrying capacity, (ii) take no more than a 20 second interval to determine both that the vehicle is operating in a proper window to perform the check and to actually perform the check, and (iii) be conducted at the earliest such condition encountered after the beginning of closed-loop operation for each driving cycle. Performance of the check may be delayed after engine startup until stabilized coolant temperature is achieved and/or a suitable cumulative time interval of non-closed throttle vehicle operation has elapsed to ensure the catalyst is warmed-up for properly performing the monitoring check. The specified cumulative time interval shall begin from the first non-closed throttle operation either after achieving a stabilized coolant temperature or after engine starting and shall not exceed 180 seconds. These monitoring constraints and conditions may be altered, subject to Executive Officer approval. Such approval shall be granted if the manufacturer submits data and an engineering evaluation justifying the need for the exception and demonstrates that the requested alteration would yield improved catalyst monitoring. "Reasonably steady" speed interval in this instance means a 20 second period where all accelerations and decelerations are of an average magnitude equivalent to 0.5 mph/second or less over any two second interval during this period. The manufacturer may abort the check if the engine operating conditions change during the check so that the vehicle exceeds the speed or acceleration/deceleration tolerances before the end of the checking interval. The manufacturer may base performance of the catalyst check upon engine RPM and load conditions equivalent to the above monitoring conditions. If a manufacturer develops a means of monitoring catalyst efficiency which cannot utilize a steady state monitoring period (e.g., examining time vs. temperature during catalyst warmup), it may present a monitoring proposal to the Executive Officer for approval based on equivalent accuracy and timeliness as the steady state monitoring protocol in detecting a malfunctioning catalyst.

(1.4) MIL Illumination and Fault Code Storage:

(1.4.1) Except as noted below, upon detection of a catalyst malfunction, the MIL shall illuminate and a fault code stored no later than the end of the next driving cycle during which monitoring occurs provided the malfunction is again present.

(1.4.2) For steady state catalyst efficiency checks, upon detection of catalyst efficiency below 60 percent, the diagnostic system may perform up to two successive monitoring checks prior to informing the vehicle operator of a malfunction. These monitoring checks need not occur on the same driving cycle, but shall be performed as soon as proper monitoring conditions occur. If catalyst efficiency remains below 60 percent for the three sequential checks, a fault code shall be stored and the MIL shall then be

activated.

(1.4.3) The diagnostic system shall temporarily disable catalyst monitoring when a malfunction exists which could affect the proper evaluation of catalyst efficiency.

(1.4.4) The monitoring method for the catalyst(s) shall be capable of detecting when a catalyst trouble code has been cleared (except diagnostic system self-clearing), but the catalyst has not been replaced (e.g., catalyst overtemperature approaches may not be acceptable).

(2.0) HEATED CATALYST MONITORING

(2.1) Requirement:

(2.1.1) The diagnostic system shall monitor all heated catalyst systems for proper heating.

(2.1.2) The efficiency of heated catalysts shall be monitored in conjunction with the requirements of section (b)(1).

(2.2) Malfunction Criteria:

(2.2.1) The catalyst heating system shall be considered malfunctioning when the catalyst does not reach its designated heating temperature within a requisite time period after engine starting. The time period is to be determined by the manufacturer subject to the requirement that the system shall detect a heating system malfunction causing emissions from a vehicle equipped with the heated catalyst system to exceed 1.5 times any of the applicable FTP standards.

(2.2.2) Manufacturers using other heating or monitoring strategies may submit an alternate plan for approval by the Executive Officer to monitor heated catalyst systems based on comparable reliability and timeliness to these requirements in detecting a catalyst heating malfunction.

(2.3) Monitoring Conditions: Manufacturers shall define appropriate operating conditions for monitoring of the catalyst heating system, subject to the limitation that the monitoring conditions shall be encountered at least once during the first engine start portion of the applicable FTP test. The monitoring system shall operate at least once per driving cycle during which the manufacturer-defined monitoring conditions are met.

(2.4) MIL Illumination and Fault Code Storage. Upon detection of a catalyst heating malfunction, the MIL shall illuminate and a fault code stored no later than the end of the next driving cycle during which monitoring occurs provided the malfunction is again present.

(3.0) MISFIRE MONITORING

(3.1) Requirement: The diagnostic system shall monitor engine misfire and shall identify the specific cylinder experiencing misfire. Manufacturers may request Executive Officer approval to store a general misfire fault code instead of a cylinder specific code under certain operating conditions provided the manufacturer submits data and/or an engineering evaluation which adequately demonstrate that the misfiring cylinder cannot be reliably identified when such conditions occur. If more than one cylinder is misfiring, a separate code shall indicate that multiple cylinders are misfiring (specifying the individual misfiring cylinders under this condition is optional, however, identifying only one misfiring cylinder shall not occur when a multiple misfire code is stored).

(3.2) Malfunction Criteria: The manufacturer shall specify in the documentation provided for certification (see subsection (g) and (h) infra.) a percentage of misfires out of the total number of firing events necessary for determining a malfunction for each of the conditions listed below.

(A) The percent misfire evaluated in 200 revolution increments for each engine speed and load condition which would result in catalyst damage. Subject to Executive Officer approval, a longer interval may be employed (but only for determining, on a given driving cycle, the first misfire exceedance in section (3.4.1)(A) below) provided the manufacturer submits data and/or an engineering evaluation which adequately demonstrate that catalyst damage would not occur due to unacceptably high catalyst temperatures before the interval has elapsed. The manufacturer shall submit in the certification documentation catalyst temperature data versus percent misfire over the full range of engine speed and load conditions. The data shall be obtained from a representative cross section of a manufacturer's engine offerings from small to large displacements. Up to three such engine evaluations shall be documented per manufacturer, though a manufacturer may submit more data if desired. An engineering evaluation shall be provided for establishing malfunction criteria for the remainder of engine families in the manufacturer's product line. The Executive Officer shall waive the evaluation requirement each year if, in the judgment of the Executive Officer, technological changes do not affect the previously determined malfunction criteria;

(B) The percent misfire evaluated in 1000 revolution increments which would cause

emissions from a durability demonstration vehicle to exceed 1.5 times any of the applicable FTP standards if the degree of misfire were present from the beginning of the test. Subject to Executive Officer approval, a manufacturer may employ other revolution increments if the manufacturer adequately demonstrates that the strategy is equally effective and timely in detecting misfire. For the purpose of establishing the percent misfire, the manufacturer shall conduct the demonstration test(s) with the misfire events occurring at equally spaced complete engine cycle intervals, across randomly selected cylinders throughout each 1000 revolution increment. However, the percent misfire established shall be applicable for any misfire condition (e.g. random, continuous, equally spaced, etc.) for the purpose of identifying a malfunction. This criterion may be used for all vehicles with engines containing the same number of cylinders as the demonstration vehicle. The number of misfires in 1000 revolution increments which was determined for the durability demonstration vehicle malfunction criterion may be used to establish the corresponding percent misfire malfunction criteria for engines with other numbers of cylinders. The malfunction criteria for a manufacturer's product line shall be updated when a new durability demonstration vehicle is tested which indicates more stringent criteria are necessary than previously established to remain within the above emission limit.

(3.3) Monitoring Conditions:

(3.3.1) Pre-1997 Model Year Vehicles: misfire shall be monitored continuously during, at a minimum, positive torque operating conditions within the range of engine speed and load condition combinations encountered during an FTP test; nonetheless, subject to Executive Officer approval, manufacturers may employ higher misfire percentage malfunction criteria under specific conditions within the range of operating conditions encountered during an FTP test if the manufacturer provides data and/or an engineering evaluation which adequately demonstrate that the detection of lower levels of misfire would not be reliable for the vehicle model in question when such conditions are encountered without making fundamental engine or control unit design modifications. If the manufacturer can so demonstrate that even the detection of higher misfire percentages is not feasible under specific FTP operating conditions, the manufacturer may request Executive Officer approval to disable the monitoring system when such conditions are encountered.

(3.3.2) 1997 and Later Model Year Vehicles: Manufacturers shall phase in expanded misfire monitoring conditions beginning with the 1997 model year. The phase in percentages (based on the manufacturer's projected sales volume for all vehicles and engines) shall equal or exceed 50 percent in the 1997 through 1999 model years, 75 percent in the 2000 model year, 90 percent in the 2001 model year, with 100 percent implementation for the 2002 model year. Alternate phase-in schedules that provide for equivalent emission reduction and timeliness overall shall be accepted. Small volume manufacturers shall not be required to meet the phase-in percentages;

however, 100 percent implementation of these monitoring conditions shall be required beginning with the 2002 model year. On vehicles meeting these phase-in percentages, except as provided for in section (3.3.3) below, monitoring for misfire shall be continuous from engine starting (see section (n)) and under all positive torque engine speeds and load conditions. Vehicles not meeting the monitoring conditions of this section shall meet the monitoring conditions specified in section (b)(3.3.1) above.

(3.3.3) As an exception to monitoring misfire during all positive torque operating conditions, manufacturers may disable misfire monitoring in the engine operating region bound by the positive torque line (i.e., engine load with the transmission in neutral), and the two following engine operating points: an engine speed of 3000 rpm with the engine load at the positive torque line, and the redline engine speed (defined in section (n)(18.0)) with the engine's manifold vacuum at four inches of mercury lower than that at the positive torque line. Misfire detection systems unable to detect all misfire patterns under all required conditions shall be evaluated for compliance by the Executive Officer based on, but not limited to, the following factors: the magnitude of the region(s) in which misfire detection is limited, the degree to which misfire detection is limited in the region(s) (i.e., the probability of detection of misfire events), the frequency with which said region(s) are expected to be encountered in-use, the type of misfire patterns for which misfire detection is troublesome, and demonstration that the monitoring technology employed is not inherently incapable of detecting misfire under required conditions (i.e., compliance can be achieved on other engines). The evaluation shall be based on the following misfire patterns: equally spaced misfire occurring on randomly selected cylinders, single cylinder continuous misfire, and paired cylinder (cylinders firing at the same crank angle) continuous misfire. Further, with Executive Officer approval, the manufacturer may disable misfire monitoring or employ higher malfunction criteria when misfire cannot be distinguished from other effects (e.g., rough roads, transmission shifts, etc.) when using the best available monitoring technology. The manufacturer shall present data and/or an engineering evaluation to the Executive Officer to justify the proposed action. Executive Officer approval shall be based on the extent to which monitoring is expected to be disabled in relation to the capabilities of the best available monitoring technologies as applied to other engines. However, through the 2000 model year, any such disablement occurring within the first 5 seconds after engine starting shall not require Executive Officer approval. Additionally, for engines with greater than eight cylinders, the Executive Officer shall waive the requirements of this section provided the manufacturer submits data and/or an engineering evaluation which adequately demonstrates that misfire detection throughout the required operating region cannot be achieved when employing proven monitoring technology (i.e., a technology that provides for compliance with these requirements on other engines) and provided misfire is detected to the fullest extent permitted by the technology, but under no circumstances shall acceptance be granted for misfire

detection systems not meeting the requirements of section (b)(3.3.1) above.

(3.4) MIL Illumination and Fault Code Storage:

(3.4.1) Upon detection of the level of misfire specified in subsection (3.2) (A), the following criteria shall apply for MIL illumination and fault code storage:

(A) A temporary fault code shall be stored and the MIL shall blink once per second during actual misfire conditions no later than after the third exceedance of the specified misfire level when operating in the region bound by the maximum engine speed and load conditions encountered during the FTP cycle and no later than after the first exceedance of the specified misfire level when operating at any other engine speed and load condition during a single driving cycle. While a temporary fault code is stored, the MIL shall blink during every subsequent exceedance during the driving cycle but may remain extinguished when misfire is not present. If the level of misfire is exceeded again (a single exceedance) during the following driving cycle or the next driving cycle in which similar conditions are encountered (as defined in section (3.4.3)) or while a temporary fault code for the level of misfire specified in subsection (3.2)(B) is present, the MIL shall blink as specified above, a fault code shall be stored, and the MIL shall remain continuously illuminated, even if the misfire ceases. The initial temporary code and stored conditions may be erased if misfire is not detected during the following driving cycle and similar conditions have been encountered without an exceedance of the specified misfire level. The code and conditions may also be erased if similar driving conditions are not encountered during 80 driving cycles subsequent to the initial detection of a malfunction.

(B) Notwithstanding, in vehicles which provide fuel shutoff and default fuel control to prevent over fueling during misfire conditions, the MIL need not blink. Instead, the MIL may illuminate continuously in accordance with the requirements for continuous MIL illumination in section (3.4.1)(A) above upon detection of misfire provided that the fuel shutoff and default control shall be activated as soon as misfire is detected. Fuel shutoff and default fuel control may be deactivated only to permit fueling outside of the misfire range.

(3.4.2) Upon detection of the misfire level specified in subsection (3.2) (B), the following criteria shall apply for MIL illumination and fault code storage:

(A) A temporary fault code shall be stored no later than after the fourth exceedance of the specified misfire level during a single driving cycle and the MIL shall be illuminated and a fault code stored no later than the end of the following driving cycle or the next driving cycle in which similar conditions are encountered (as defined in section (3.4.3)) if the level of misfire is again exceeded four times.

The initial temporary code and stored conditions may be erased if misfire is not detected during the following driving cycle and similar conditions have been encountered without an exceedance of the specified misfire level. The code and conditions may also be erased if similar driving conditions are not encountered during 80 driving cycles subsequent to the initial detection of a malfunction.

(B) Notwithstanding, a temporary fault code shall be stored no later than after the first exceedance of the specified misfire level during a single driving cycle if the exceedance occurs within the first 1000 revolutions from engine start (defined in section (n)(20.0)) during which misfire detection is active. The MIL shall be illuminated and a fault code stored no later than the end of any subsequent driving cycle if misfire is again detected in the first 1000 revolutions. If similar conditions are encountered during a subsequent driving cycle without an exceedance of the specified misfire level, the initial temporary code and stored conditions may be erased. Furthermore, if similar driving conditions are not encountered during 80 driving cycles subsequent to the initial detection of a malfunction, the initial temporary code and stored conditions may be erased.

(3.4.3) Upon detection of misfire, manufacturers shall store the engine speed, load, and warm-up status (i.e., cold or warmed-up) under which the first misfire event which resulted in the storage of a temporary fault code was detected. A driving cycle shall be considered to have similar conditions if the stored engine speed conditions are encountered within 375 rpm, load conditions within 20 percent, and the same warm-up status is present. With Executive Officer approval, other strategies for determining if similar conditions have been encountered may be employed. Approval shall be based on comparable timeliness and reliability in detecting similar conditions.

(3.5) MISFIRE MONITORING FOR DIESELS

(3.5.1) Requirement: Beginning with the 1998 model year, the diagnostic system on a diesel engine shall be capable of detecting the lack of combustion in one or more cylinders. To the extent possible without adding hardware for this specific purpose, the diagnostic system shall also identify the specific cylinder for which combustion cannot be detected. If the lack of combustion is present in more than one cylinder, a separate code shall indicate that multiple cylinders are malfunctioning (specifying the individual malfunctioning cylinders under this condition is optional, however, identifying one malfunctioning cylinder shall not occur when a multiple cylinder code is stored).

(3.5.2) Malfunction Criteria: A cylinder shall be considered malfunctioning when combustion cannot be detected.

(3.5.3) Monitoring Conditions: Manufacturers shall define appropriate operating conditions for monitoring, subject to the limitation that the monitoring conditions shall be

encountered at least once during the first engine start portion of the applicable FTP test. The monitoring system shall operate at least once per driving cycle during which the manufacturer-defined monitoring conditions are met.

(3.5.4) MIL Illumination and Fault Code Storage: The MIL shall illuminate and a fault code shall be stored no later than the end of the next driving cycle during which monitoring occurs provided the malfunction is again present.

(4.0) EVAPORATIVE SYSTEM MONITORING

(4.1) Requirement:

(4.1.1) The diagnostic system shall verify air flow from the complete evaporative system. In addition, the diagnostic system shall also monitor the evaporative system for the loss of HC vapor into the atmosphere by performing a pressure or vacuum check of the complete evaporative system.

(4.1.2) Manufacturers may temporarily disable the evaporative purge system to perform a check.

(4.1.3) Manufacturers may request Executive Officer approval to abort an evaporative system check under specific conditions (e.g., when the fuel tank level is over 85 percent of nominal tank capacity) if data and/or an engineering evaluation are provided which adequately demonstrate that a reliable check cannot be made when these conditions exist.

(4.1.4) Subject to Executive Officer approval, other monitoring strategies may be used provided the manufacturer provides a description of the strategy and supporting data showing equivalent monitoring reliability and timeliness in detecting an evaporative system malfunction or leak.

(4.1.5) Implementation of this requirement is mandatory only for 1996 and later model year vehicles designed to comply with the requirements of Title 13, California Code of Regulations, Section 1976, "Standards and Test Procedures for Motor Vehicle Fuel Evaporative Emissions," for 1995 and subsequent model year vehicles.

(4.2) Malfunction Criteria:

(4.2.1) An evaporative system shall be considered malfunctioning when no air flow from the system can be detected, or when a system leak is detected that is greater than or equal in magnitude to a leak caused by a 0.040 inch diameter orifice in any portion of the evaporative system excluding the tubing and connections between the purge valve

and the intake manifold.

(4.2.2) Beginning with the 2000 model year, manufacturers shall phase-in diagnostic strategies to detect system leaks greater than or equal in magnitude to a leak caused by a 0.020 inch diameter orifice. The phase-in percentages (based on the manufacturer's projected sales volume for all vehicles) shall equal or exceed 20 percent for the 2000 model year, 40 percent for the 2001 model year, 70 percent for the 2002 model year, and 100 percent implementation for the 2003 model year. Alternate phase-in schedules that provide for equivalent emission reduction and timeliness overall shall be accepted. Small volume manufacturers shall not be subject to the phase-in requirements; however, 100 percent implementation shall be required for the 2003 model year.

(4.2.3) On vehicles with fuel tank capacity greater than 25 gallons, the Executive Officer shall revise the size of the orifice if the most reliable monitoring method available cannot reliably detect a system leak of the magnitudes indicated above. Further, on vehicles with fuel tank capacity from 18 to 25 gallons, the Executive Officer may allow a larger size orifice (e.g., 0.050 inch diameter rather than 0.040 inch diameter) to be detected at low fuel levels (e.g., less than 50 percent of capacity) through the 1999 model year if the manufacturer demonstrates that it is necessary to avoid false MILs for a particular application due to a unique fuel tank configuration that would require hardware modifications to facilitate reliable monitoring.

(4.2.4) Upon request by the manufacturer and submission of data and/or engineering evaluation which adequately support the request, the Executive Officer shall revise the orifice size upward to exclude detection of leaks that cannot cause evaporative or running loss emissions to exceed 1.5 times the applicable standards.

(4.3) Monitoring Conditions: Manufacturers shall define appropriate operating conditions for monitoring, subject to the limitation that the monitoring conditions shall be encountered at least once during the first engine start portion of the applicable FTP test. The monitoring system shall operate at least once per driving cycle during which the manufacturer-defined monitoring conditions are met. However, monitoring conditions may be further limited with respect to detecting leaks equivalent to a 0.020 inch diameter orifice, subject to Executive Officer approval, on the basis that the monitoring conditions will be reasonably-occurring in-use, and provided that a check for leaks equal or greater in magnitude than a 0.040 inch orifice will continue to be conducted at least once per driving cycle as indicated above. Subject to Executive Officer approval, if performance of the check causes vehicles to exceed applicable emission standards when using the best available technology, manufacturers may perform evaporative system monitoring during a steady-speed condition, as defined in section (b) (1.3.2), between 20 and 50 mph.

(4.4) MIL Illumination and Fault Code Storage:

(4.4.1) Upon detection of an evaporative system malfunction or a malfunction that prevents completion of an evaporative system check, the MIL shall illuminate and a fault code shall be stored no later than the end of the next driving cycle during which monitoring occurs provided the malfunction is again present.

(4.4.2) If the diagnostic system is capable of discerning that a system leak is being caused by a missing or improperly secured fuel cap, the manufacturer may notify the vehicle operator through the use of an indicator light other than the MIL. The manufacturer is not required to store a fault code in this case. The indicator light shall conform to the requirements outlined in section (a) (1.1) for location and illumination. As another option, the manufacturer may extinguish the MIL, provided no other malfunctions have been detected, and may erase the fault code corresponding to the problem once the on-board diagnostic system has verified that the fuel cap specifically has been securely fastened. Other equivalent strategies shall be considered by the Executive Officer.

(5.0) SECONDARY AIR SYSTEM MONITORING

(5.1) Requirement: Any vehicle equipped with any form of secondary air delivery system shall have the diagnostic system monitor the proper functioning of (1) the secondary air delivery system and (2) any air switching valve.

(5.2) Malfunction Criteria:

(5.2.1) The diagnostic system shall indicate secondary air delivery system malfunction when the flow rate falls below the manufacturer's specified low flow limit such that a vehicle would exceed 1.5 times any of the applicable FTP emission standards.

(5.2.2) Manufacturers adequately demonstrating that deterioration of the flow distribution system is unlikely may request Executive Officer approval to perform only a functional check of the system. As part of this demonstration, manufacturers shall demonstrate that the materials used for the secondary air system (e.g., air hoses, and tubing) are inherently resistant to corrosion or other deterioration. If a functional check is approved, the diagnostic system shall indicate a malfunction when some degree of secondary airflow is not detectable in the exhaust system during a check.

(5.3) Monitoring Conditions: Manufacturers shall define appropriate operating conditions for monitoring of the secondary air system, subject to the limitation that the monitoring conditions shall be encountered at least once during the first engine start portion of the applicable FTP test. The monitoring system shall operate at least once per driving cycle during which the manufacturer-defined monitoring conditions are met.

(5.4) MIL Illumination and Fault Code Storage. The diagnostic system shall store a fault code and the MIL shall illuminate no later than the end of the next driving cycle during which monitoring occurs provided the malfunction is again present.

(6.0) AIR CONDITIONING SYSTEM REFRIGERANT MONITORING

(6.1) Requirement:

(6.1.1) The diagnostic system shall monitor air conditioning systems for loss of refrigerants which could harm the stratospheric ozone layer or are reactive in forming atmospheric ozone. Any sensor used for such monitoring shall itself be monitored for proper circuit continuity and proper range of operation. A provision for ensuring that a leak has been corrected before extinguishing the MIL shall be provided.

(6.1.2) Manufacturers of a model vehicle which will phase out the use of chlorofluorocarbons in its air conditioning systems by the 1996 model-year or which will use federally-approved refrigerants with substantially less atmospheric ozone depleting potential than CFC-12 need not comply with this requirement for that model.

(6.2) Malfunction Criteria: Manufacturers shall provide a monitoring strategy for approval by the Executive Officer for monitoring a refrigerant leak. The approval shall be based on timeliness and reliability in detecting a leak.

(6.3) Monitoring Conditions: Manufacturers shall define appropriate operating conditions for monitoring, subject to the limitation that the monitoring conditions shall be encountered at least once during the first engine start portion of the applicable FTP test. The monitoring system shall operate at least once per driving cycle during which the manufacturer-defined monitoring conditions are met.

(6.4) MIL Illumination and Fault Code Storage: The diagnostic system shall store a fault code and the MIL shall illuminate no later than the end of the next driving cycle during which monitoring occurs provided the malfunction is again present. The diagnostic system shall not clear a fault code and the MIL shall not turn off unless the leak has been corrected.

(7.0) FUEL SYSTEM MONITORING

(7.1) Requirement: The diagnostic system shall monitor the fuel delivery system for its ability to provide compliance with emission standards. For diesel vehicles and engines, the manufacturer shall monitor the performance of all electronic fuel system components to the extent feasible with respect to the malfunction criteria specified in section (7.2) below.

(7.2) Malfunction Criteria: The manufacturer shall establish malfunction criteria to monitor the fuel delivery system such that a vehicle's emissions would not exceed 1.5 times any of the applicable FTP standards before a fault is detected. If the vehicle is equipped with fuel trim circuitry, the manufacturer shall include as one of the malfunction criteria the condition where the trim circuitry has used up all of the trim adjustment allowed within the manufacturer's selected limit(s). Manufacturers may compensate the criteria limit(s) appropriately for changes in altitude or for temporary introduction of large amounts of purge vapor or for other similar identifiable operating conditions when they occur.

(7.3) Monitoring Conditions: The fuel system shall be monitored continuously for the presence of a malfunction.

(7.4) MIL Illumination and Fault Code Storage.

(7.4.1) For fuel systems with short-term trim only capability, the diagnostic system shall store a fault code after the fuel system has attained the criteria limit for a manufacturer-defined time interval sufficient to determine a malfunction. If the malfunction criteria limit and time interval are exceeded, the MIL shall be illuminated and a fault code stored no later than the end of the next driving cycle in which the criteria and interval are again exceeded, unless driving conditions similar to those under which the problem was originally detected have been encountered (see section (7.4.3)) without such an exceedance, in which case the initial temporary code and stored conditions may be erased. Furthermore, if similar driving conditions are not encountered during 80 driving cycles subsequent to the initial detection of a malfunction, the initial temporary code and stored conditions may be erased.

(7.4.2) For fuel systems with long-term fuel trim capability, upon attaining a long-term based malfunction criteria limit independent of, or in combination with, the short-term trim system status, the MIL shall be illuminated and a fault code stored no later than the end of the next driving cycle if the malfunction is again detected. If the malfunction is not detected during the second driving cycle, the MIL shall be illuminated and a fault code stored no later than the next driving cycle in which the malfunction is again detected, unless driving conditions similar to those under which the problem was originally detected have been encountered (see section (7.4.3)) without an indication of a malfunction, in which case the initial temporary code and stored conditions may be erased. Furthermore, if similar driving conditions are not encountered during 80 driving cycles subsequent to the initial detection of a malfunction, the initial temporary code and stored conditions may be erased.

(7.4.3) Upon detection of a fuel system malfunction, manufacturers shall store the engine speed, load and warm-up status (i.e., cold or warmed-up) under which the malfunction was detected. A driving cycle shall be considered to have similar

conditions if the stored engine speed is encountered within 375 rpm, load conditions within 20 percent, and the same warm-up status is present. With Executive Officer approval, other strategies for determining if similar conditions have been encountered may be employed. Approval shall be based on comparable timeliness and reliability in detecting similar conditions.

(8.0) OXYGEN SENSOR MONITORING

(8.1) Requirement:

(8.1.1) The diagnostic system shall monitor the output voltage, response rate, and any other parameter which can affect emissions, of all primary (fuel control) oxygen (lambda) sensors for malfunction. It shall also monitor all secondary oxygen sensors (fuel trim control or use as a monitoring device) for proper output voltage and/or response rate. Response rate is the time required for the oxygen sensor to switch from lean-to-rich once it is exposed to a richer than stoichiometric exhaust gas or vice versa (measuring oxygen sensor switching frequency may not be an adequate indicator of oxygen sensor response rate, particularly at low speeds).

(8.1.2) Either the lean-to-rich or both the lean-to-rich and rich- to-lean response rates shall be checked. Response rate checks shall evaluate the portions of the sensor's dynamic signal that are most affected by sensor malfunctions such as aging or poisoning.

Manufacturers may observe the voltage envelope of the sensor when cycled at a frequency of 1.5 Hertz or greater, as determined by the manufacturer, to evaluate a slow response rate sensor (i.e. a slow sensor cannot achieve maximum and/or minimum voltage as will a good sensor given a properly chosen switching frequency and fuel step change for the check). With Executive Officer approval, manufacturers may use other voltage requirements/fuel-air switching frequencies or monitoring strategies based on a determination of accurate and timely evaluation of the sensor.

(8.1.3) For sensors with different characteristics, the manufacturer shall submit data and an engineering evaluation to the Executive Officer for approval based on showing equivalent evaluation of the sensor.

(8.1.4) For vehicles equipped with heated oxygen sensors, the heater circuit shall be monitored for proper current and voltage drop (note: a continuity check of oxygen sensors is not required). Other heater circuit monitoring strategies would require approval by the Executive Officer based on equally reliable and timely indication of malfunction as current or voltage-based monitoring.

(8.2) Malfunction Criteria:

(8.2.1) An oxygen sensor shall be considered malfunctioning when the voltage, response rate, or other criteria are exceeded and causes emissions from a vehicle equipped with the sensor(s) to exceed 1.5 times any of the applicable FTP standards, or when the sensor output characteristics are no longer sufficient (e.g., lack of sensor switching) for use as a diagnostic system monitoring device (e.g., for catalyst efficiency monitoring).

(8.2.2) For heated oxygen sensors, the heater circuit shall be considered malfunctioning when the current or voltage drop in the circuit is no longer within the manufacturer's specified limits for normal operation (i.e., within the criteria required to be met by the component vendor for heater circuit performance at high mileage). Subject to Executive Officer approval, other monitoring strategy malfunction criteria for detection of heater circuit malfunctions may be used provided the manufacturer submits data and/or an engineering evaluation adequately showing monitoring reliability and timeliness to be equivalent to the stated criteria in this paragraph.

(8.3) Monitoring Conditions:

(8.3.1) For primary oxygen sensor(s) used for fuel control, the response rate and output voltage shall be monitored for malfunction before the end of the first idle period after the vehicle has commenced closed-loop operation, if the necessary checking condition for acceptable oxygen sensor(s) performance has been encountered. The performance of the sensor can only be judged acceptable by one or more of the following means: within any 20 second reasonably steady speed condition as defined in (b) (1.3.2), within any deceleration of 3 seconds or more, or during the first idle period of at least 20 seconds after closed loop operation begins (i.e., not during an acceleration condition); not withstanding, unacceptable performance can be determined at any time. Other monitoring conditions may be used provided the manufacturer provides a monitoring strategy and supporting data showing equivalent monitoring reliability and timeliness in detecting a malfunctioning sensor compared to the above monitoring conditions and the Executive Officer approves.

(8.3.2) For secondary oxygen sensors used for catalyst monitoring and/or fuel system trim, the manufacturer shall define appropriate operating conditions for response rate and/or output voltage malfunction monitoring, subject to the limitation that the monitoring conditions shall be encountered at least once during the first engine start portion of the applicable FTP test. The monitoring system shall operate at least once per driving cycle during which the manufacturer-defined monitoring conditions are met.

(8.3.3) For heated oxygen sensors, the manufacturer shall define appropriate operating conditions for malfunction monitoring of the heater circuit, subject to the limitation that the monitoring conditions shall be encountered at least once during the first

engine start portion of the applicable FTP test. The monitoring system shall operate at least once per driving cycle during which the manufacturer-defined monitoring conditions are met.

(8.4) MIL Illumination and Fault Code Storage: Upon detection of any oxygen sensor malfunction, the diagnostic system shall store a fault code and the MIL shall illuminate no later than the end of the next driving cycle during which monitoring occurs provided the malfunction is again present.

(8.5) Other (non-lambda) Oxygen Sensors:

(8.5.1) For vehicles equipped with universal exhaust gas oxygen sensors (i.e. sensors which provide an output proportional to exhaust gas oxygen concentration), the manufacturer shall define appropriate operating conditions for the diagnostic system to perform a response rate check (the time required to respond to a specific change in fuel/air ratio), subject to the limitation that the monitoring conditions shall be encountered at least once during the first engine start portion of the applicable FTP test. The monitoring system shall operate at least once per driving cycle during which the manufacturer-defined monitoring conditions are met. The diagnostic system shall also perform an out-of-range check for which monitoring shall be continuous. For malfunctions, MIL illumination and fault code storage shall be as in (8.4).

(8.5.2) If a manufacturer utilizes other types of oxygen sensors, the manufacturer shall submit a monitoring plan to the Executive Officer for approval based on equivalent monitoring with conventional sensors.

(9.0) EXHAUST GAS RECIRCULATION (EGR) SYSTEM MONITORING

(9.1) Requirement:

(9.1.1) The diagnostic system shall monitor the EGR system on vehicles so-equipped for low and high flow rate malfunctions.

(9.1.2) Manufacturers may request Executive Officer approval to temporarily disable the EGR system check under specific conditions provided the manufacturer submits data and/or an engineering evaluation which adequately demonstrate that a reliable check cannot be made when these conditions exist.

(9.2) Malfunction Criteria: The EGR system shall be considered malfunctioning when one or both of the following occurs: (1) any component of the system fails to perform within manufacturer specifications, or (2) the EGR flow rate exceeds the manufacturer's specified low or high flow limits such that a vehicle would exceed 1.5 times any of the applicable

FTP emission standards.

(9.3) Monitoring Conditions: Manufacturers shall define appropriate operating conditions for monitoring the EGR system, subject to the limitation that the monitoring conditions shall be encountered at least once during the first engine start portion of the applicable FTP test. The monitoring system shall operate at least once per driving cycle during which the manufacturer-defined monitoring conditions are met.

(9.4) MIL Illumination and Fault Code Storage: The diagnostic system shall store a fault code and the MIL shall illuminate no later than the end of the next driving cycle during which monitoring occurs provided the malfunction is again present.

(10.0) POSITIVE CRANKCASE VENTILATION (PCV) SYSTEM MONITORING

(10.1) Requirement: Beginning with the 2002 model year, manufacturers shall phase-in diagnostic strategies to monitor the PCV system on vehicles so-equipped for system integrity. The phase-in percentages (based on the manufacturer's projected sales volume for all vehicles and engines subject to this section) shall equal or exceed 30 percent in the 2002 model year, 60 percent in the 2003 model year, with 100 percent implementation for the 2004 model year. Small volume manufacturers are not required to meet the phase-in percentages; however, 100 percent implementation of these monitoring requirements shall be required beginning with the 2004 model year. Alternate phase-in percentages that provide for equivalent emission reduction and timeliness overall in implementing these requirements shall be accepted.

(10.2) Malfunction Criteria:

(10.2.1) Except as provided below, the PCV system shall be considered malfunctioning when disconnection occurs between either the crankcase and the PCV valve, or between the PCV valve and the intake manifold.

(10.2.2) If the PCV system is designed such that the PCV valve is fastened directly to the crankcase in a manner which makes it significantly more difficult to remove the valve from the crankcase rather than disconnect the line between the valve and the intake manifold (taking aging effects into consideration), the Executive Officer shall exempt the manufacturer from detection of disconnection between the crankcase and the PCV valve. Subject to Executive Officer approval, system designs that utilize tubing between the valve and the crankcase shall also be exempted from this portion of the monitoring requirement provided the manufacturer submits data and/or engineering evaluation which adequately demonstrate that the connections between the valve and the crankcase are resistant to deterioration or accidental disconnection, are significantly more

difficult to disconnect than the line between the valve and the intake manifold, and are not subject to disconnection per manufacturer's repair procedures for non-PCV system repair work.

(10.2.3) Manufacturers shall not be required to detect disconnections between the PCV valve and the intake manifold if said disconnection (1) causes the vehicle to stall immediately during idle operation; or (2) is unlikely due to a PCV system design that is integral to the induction system (e.g., machined passages rather than tubing or hoses).

(10.3) Monitoring Conditions: Manufacturers shall define appropriate operating conditions for monitoring the PCV system, subject to the limitation that the monitoring conditions shall be encountered at least once during the first engine start portion of the applicable FTP test. The monitoring system shall operate at least once per driving cycle during which the manufacturer-defined monitoring conditions are met.

(10.4) MIL Illumination and Fault Code Storage: The diagnostic system shall store a fault code and the MIL shall illuminate no later than the end of the next driving cycle during which monitoring occurs provided the malfunction is again present. The fault code need not specifically identify the PCV system (e.g., a fault code for idle speed control or fuel system monitoring can be stored) if the manufacturer demonstrates that additional monitoring hardware would be necessary to make this identification, and provided the manufacturer's diagnostic and repair procedures for the indicated fault include directions to check the integrity of the PCV system.

(11.0) THERMOSTAT MONITORING

(11.1) Requirement: Beginning with the 2000 model year, manufacturers shall phase-in diagnostic strategies to monitor the thermostat on vehicles so-equipped for proper operation. The phase-in percentages (based on the manufacturer's projected sales volume for all vehicles and engines) shall equal or exceed 30 percent in the 2000 model year, 60 percent in the 2001 model year, with 100 percent implementation for the 2002 model year. Small volume manufacturers are not required to meet the phase-in percentages; however, 100 percent implementation of these monitoring requirements shall be required beginning with the 2002 model year. Alternate phase-in percentages that provide for equivalent emission reduction and timeliness overall in implementing these requirements shall be accepted.

(11.2) Malfunction Criteria: The thermostat shall be considered malfunctioning if within a manufacturer-specified time interval after starting the engine, (a) the coolant temperature does not reach the highest temperature required by the manufacturer to enable other diagnostics; or (b) the coolant temperature does not reach a warmed-up

temperature within 20 degrees Fahrenheit of the manufacturer's thermostat regulating temperature. Manufacturers shall provide data and/or engineering evaluation to support specified times. Subject to Executive Officer approval, manufacturers may utilize lower temperatures for criterion (b) above if they adequately demonstrate that the fuel, spark timing, and/or other coolant temperature-based modifications to the engine control strategies would not cause an emission increase of 50 or more percent of any of the applicable standards (e.g., 50 degree Fahrenheit emission test, etc.). With Executive Officer approval, manufacturers may omit this monitor provided the manufacturer adequately demonstrates that a malfunctioning thermostat cannot cause a measurable increase in emissions during any reasonable driving condition nor cause any disablement of other monitors.

(11.3) Monitoring Conditions: Manufacturers shall define appropriate operating conditions for monitoring the thermostat; however, manufacturers may disable monitoring at ambient engine starting temperatures below 20 degrees Fahrenheit.

(11.4) MIL Illumination and Fault Code Storage: The diagnostic system shall store a fault code and the MIL shall illuminate no later than the end of the next driving cycle during which monitoring occurs provided the malfunction is again present.

(12.0) COMPREHENSIVE COMPONENT MONITORING

(12.1) Requirement: The diagnostic system shall monitor for malfunction any electronic powertrain component/system not otherwise described above which either provides input to (directly or indirectly), or receives commands from the on-board computer, and which: (1) can affect emissions during any reasonable in-use driving condition, or (2) is used as part of the diagnostic strategy for any other monitored system or component.

(12.1.1) Input Components:

(A) The monitoring system shall have the capability of detecting, at a minimum, lack of circuit continuity and out of range values to ensure proper operation of the input device. The determination of out of range values shall include logic evaluation of available information to determine if a component is operating within its normal range (e.g., a low throttle position sensor voltage would not be reasonable at a high engine speed with a high mass airflow sensor reading). To the extent feasible, said logic evaluation shall be "two-sided" (i.e., verify a sensor output is not inappropriately high or low).

(B) Input components may include, but are not limited to, the vehicle speed sensor, crank angle sensor, knock sensor, throttle position sensor, coolant temperature sensor, cam position sensor, fuel composition sensor (e.g. methanol flexible fuel vehicles), transmission electronic components such as sensors, modules, and solenoids which

provide signals to the powertrain control system (see section (b) (12.5)).

(C) The coolant temperature sensor shall be monitored for achieving a stabilized minimum temperature level which is needed to achieve closed-loop operation (or for diesel applications, the minimum temperature needed for warmed-up fuel control to begin) within a manufacturer-specified time interval after starting the engine. The time interval shall be a function of starting engine coolant temperature and/or a function of intake air temperature and, except as noted below, shall not exceed two minutes for engine start temperatures at or above 50 degrees Fahrenheit and five minutes for engine start temperatures at or above 20 degrees and below 50 degrees Fahrenheit. Manufacturers may suspend or delay the diagnostic if the vehicle is subjected to conditions which could lead to false diagnosis (e.g., vehicle operation at idle for more than 50 to 75 percent of the warm-up time). Manufacturers shall provide data to support specified times. The Executive Officer shall allow longer time intervals provided a manufacturer submits data and/or an engineering evaluation which adequately demonstrate that the vehicle requires a longer time to warm up under normal conditions. The Executive Officer shall allow disablement of this check under extremely low ambient temperature conditions (below 20 degrees Fahrenheit) provided a manufacturer submits data and/or an engineering evaluation which adequately demonstrate non-attainment of a stabilized minimum temperature.

(12.1.2) Output Components:

(A) The diagnostic system shall monitor output components for proper functional response to computer commands.

(B) Components for which functional monitoring is not feasible shall be monitored, at a minimum, for proper circuit continuity and out of range values, if applicable.

(C) Output components may include, but are not limited to, the automatic idle speed motor, emission-related electronic only transmission controls, heated fuel preparation systems, the wait-to-start lamp on diesel applications, and a warmup catalyst bypass valve (see section (b) (12.5)).

(12.2) Malfunction Criteria:

(12.2.1) Input Components: Input components/systems shall be considered malfunctioning when, at a minimum, lack of circuit continuity or manufacturer-specified out-of-range values occur.

(12.2.2) Output Components:

(A) Output components/systems shall be considered malfunctioning when proper functional

response to computer commands does not occur. Should a functional check for malfunction not be feasible, then an output component/system shall be considered malfunctioning when, at a minimum, lack of circuit continuity or manufacturer-specified out-of-range values occur.

(B) The idle speed control motor/valve shall be monitored for proper functional response to computer commands. For strategies based on deviation from target idle speed, a fault shall be indicated when the idle speed control system cannot achieve the target idle speed within a manufacturer specified time and engine speed tolerance. In general, the engine speed tolerances shall not exceed 200 revolutions per minute (rpm) above the target speed or 100 rpm below the target speed. The Executive Officer shall allow larger engine speed tolerances provided a manufacturer submits data and/or an engineering evaluation which adequately demonstrate that the tolerances can be exceeded without a malfunction present.

(C) Glow plugs shall be monitored for proper functional response to computer commands. The glow plug circuit(s) shall be monitored for proper current and voltage drop. The Executive Officer shall approve other monitoring strategies based on manufacturer's data and/or engineering analysis demonstrating equally reliable and timely indication of malfunctions. Manufacturers shall indicate a malfunction when a single glow plug no longer operates within the manufacturer's specified limits for normal operation. If a manufacturer demonstrates that a single glow plug failure cannot cause a measurable increase in emissions during any reasonable driving condition, the manufacturer shall indicate a malfunction for the minimum number of glow plugs needed to cause an emission increase. Further, to the extent feasible (without adding additional hardware for this purpose), the stored fault code shall identify the specific malfunctioning glow plug(s).

(12.3) Monitoring Conditions:

(12.3.1) Input Components: Input components shall be monitored continuously for proper range of values and circuit continuity. For rationality monitoring (where applicable), manufacturers shall define appropriate operating conditions during which monitoring shall occur, subject to the limitation that the monitoring conditions shall be encountered at least once during the first engine start portion of the applicable FTP test. Rationality monitoring shall occur at least once per driving cycle during which the manufacturer-defined monitoring conditions are met.

(12.3.2) Output Components: Monitoring for circuit continuity and proper range of values (if applicable) shall be conducted continuously. For functional monitoring, manufacturers shall define appropriate operating conditions during which monitoring shall occur, subject to the limitation that the monitoring conditions shall be encountered at least once during the first engine start portion of the applicable FTP test. However, functional monitoring may be conducted during non-FTP driving conditions, subject to Executive Officer approval, if the manufacturer provides data and/or an engineering evaluation which adequately demonstrate that the component does not normally function, or monitoring is otherwise not feasible, during applicable FTP test driving conditions. Functional monitoring shall occur at least once per driving cycle during which the manufacturer-defined monitoring conditions are met.

(12.4) MIL Illumination and Fault Code Storage:

(12.4.1) Upon detecting a malfunction, the diagnostic system shall store a fault code no later than the end of the next driving cycle during which monitoring occurs provided the malfunction is again detected.

(12.4.2) In conjunction with storing a fault code, manufacturers shall illuminate the MIL for malfunctions of components/systems for which either of the following occurs: 1) When malfunctioning, the component or system could cause vehicle emissions to increase by 15 percent or more of the FTP standard, or 2) The component/system is used as part of the diagnostic strategy for any other monitored system or component.

(12.5) Component Determination: The manufacturer shall determine whether a powertrain input or output component not otherwise covered can affect emissions. If the Executive Officer reasonably believes that a manufacturer has incorrectly determined that a component cannot affect emissions, the Executive Officer shall require the manufacturer to provide emission data showing that such a component, when faulty and installed in a suitable test vehicle, does not have an emission effect. Emission data may be requested for any reasonable driving condition.

(c) ADDITIONAL MIL ILLUMINATION AND FAULT CODE STORAGE PROTOCOL

(1.0) MIL ILLUMINATION For all emission-related components/systems, upon final determination of malfunction, the MIL shall remain continuously illuminated (except that it shall blink as indicated previously for misfire detection). If any malfunctions are identified in addition to misfire, the misfire condition shall take precedence, and the MIL shall blink accordingly. The diagnostic system shall store a fault code for MIL illumination whenever the MIL is illuminated. The diagnostic system shall illuminate the MIL and shall store a

code whenever the powertrain enters a default or "limp home" mode of operation. The diagnostic system shall illuminate the MIL and shall store a code whenever the engine control system fails to enter closed-loop operation (if employed) within a manufacturer specified minimum time interval.

(2.0) EXTINGUISHING THE MIL

(2.1) Misfire and Fuel System Malfunctions: For misfire or fuel system malfunctions, the MIL may be extinguished if the fault does not recur when monitored during three subsequent sequential driving cycles in which conditions are similar to those under which the malfunction was first determined (see sections (b) (3.4.3) and (b)(7.4.3)).

(2.2) All Other Malfunctions: Except as noted in section (b) (6.4), for all other faults, the MIL may be extinguished after three subsequent sequential driving cycles during which the monitoring system responsible for illuminating the MIL functions without detecting the malfunction and if no other malfunction has been identified that would independently illuminate the MIL according to the requirements outlined above.

(3.0) ERASING A FAULT CODE The diagnostic system may erase a fault code if the same fault is not re-registered in at least 40 engine warm-up cycles, and the MIL is not illuminated for that fault code.

(d) TAMPERING PROTECTION Computer-coded engine operating parameters shall not be changeable without the use of specialized tools and procedures (e.g. soldered or potted computer components or sealed (or soldered) computer enclosures). Subject to Executive Officer approval, manufacturers may exempt from this requirement those product lines which are unlikely to require protection. Criteria to be evaluated in making an exemption include, but are not limited to, current availability of performance chips, high performance capability of the vehicle, and sales volume.

(e) READINESS/FUNCTION CODE The on-board computer shall store a code upon first completing a full diagnostic check (i.e., the minimum number of checks necessary for MIL illumination) of all monitored components and systems (except as noted below) since the computer memory was last cleared (i.e., through the use of a scan tool or battery disconnect). The code shall be stored in the format specified by Society of Automotive Engineers' (SAE) J1979 or SAE J1939, whichever applies. Both documents are incorporated by reference in sections (k)(2.0) and (k)(5.0). The diagnostic system check for comprehensive component monitoring and continuous monitoring of misfire and fuel system faults shall be considered complete for purposes of determining the readiness indication if malfunctions are not detected

in these areas by the time all other diagnostic system checks are complete. Subject to Executive Officer approval, if monitoring is disabled for a multiple number of driving cycles due to the continued presence of extreme operating conditions (e.g., cold ambient temperatures, high altitudes, etc.), readiness for the subject monitoring system may be set without monitoring having been completed. Executive Officer approval shall be based on the conditions for monitoring system disablement and the number of driving cycles specified without completion of monitoring before readiness is indicated. For evaporative system monitoring, the readiness indication shall be set when a full diagnostic check has been completed with respect to the 0.040 inch orifice malfunction criteria if the monitoring conditions are constrained with respect to detection of a 0.020 inch leak (see sections (b)(4.2.2) and (4.3)).

(f) STORED ENGINE CONDITIONS Upon detection of the first malfunction of any component or system, "freeze frame" engine conditions present at the time shall be stored in computer memory. Should a subsequent fuel system or misfire malfunction occur, any previously stored freeze frame conditions shall be replaced by the fuel system or misfire conditions (whichever occurs first). Stored engine conditions shall include, but are not limited to, calculated load value, engine RPM, fuel trim value(s) (if available), fuel pressure (if available), vehicle speed (if available), coolant temperature, intake manifold pressure (if available), closed- or open-loop operation (if available), and the fault code which caused the data to be stored. The manufacturer shall choose the most appropriate set of conditions facilitating effective repairs for freeze frame storage. Only one frame of data is required. Manufacturers may at their discretion choose to store additional frames provided that at least the required frame can be read by a generic scan tool meeting SAE specifications established in SAE Recommended Practices on "OBD II Scan Tool" (J1978), June, 1994, and "E/E Diagnostic Test Modes" (J1979), June, 1994, which are incorporated by reference herein. If approval is granted to use the SAE J1939 communication protocol according to section (k)(5.0), the data shall be accessible using a scan tool meeting the J1939 specifications. If the fault code causing the conditions to be stored is erased in accordance with section (c)(3.0), the stored engine conditions may be cleared as well.

(g) MONITORING SYSTEM DEMONSTRATION REQUIREMENTS

(1.0) REQUIREMENT Each year a manufacturer shall provide emission test data obtained from a certification durability vehicle for one engine family that has not been used previously for purposes of this section. If a manufacturer does not have a certification durability vehicle available which is suitable for the engine family designated for testing, the Executive Officer shall permit a manufacturer to satisfy this requirement with data from a representative high mileage vehicle or vehicles (or a representative high operating-hour engine or engines) acceptable to the Executive Officer to demonstrate that malfunction criteria are based on emission performance. The Air Resources Board (ARB) shall

determine the engine family to be demonstrated. Each manufacturer shall notify the Executive Officer prior to applying for certification of the engine families planned for a particular model year in order to allow selection of the engine family to be demonstrated. Demonstration tests shall be conducted on the certification durability vehicle or engine at the end of the required mileage or operating-hour accumulation. For non-LEVs, until a NOx standard applicable for more than 50,000 miles is established in California, the federal 50,000 to 100,000 mile NOx standard shall be used for demonstration purposes.

(1.1) Flexible fuel vehicles shall perform each demonstration test using 85 percent methanol and 15 percent gasoline, and gasoline only. For vehicles capable of operating on other fuel combinations, the manufacturer shall submit a plan for performing demonstration testing for approval by the Executive Officer on the basis of providing accurate and timely evaluation of the monitored systems.

(2.0) APPLICABILITY: The manufacturer shall perform single-fault testing based on the applicable FTP test cycle with the following components/systems at their malfunction criteria limits as determined by the manufacturer:

(2.1) Oxygen Sensors. The manufacturer shall conduct the following demonstration tests. The first test involves testing all primary and secondary (if equipped) oxygen sensors used for fuel control simultaneously possessing normal output voltage but response rate deteriorated to the malfunction criteria limit (secondary oxygen sensors for which response rate is not monitored shall be with normal response characteristics). The second test shall include testing with all primary and secondary (if equipped) oxygen sensors used for fuel control simultaneously possessing output voltage at the malfunction criteria limit. Manufacturers shall also conduct a malfunction criteria demonstration test for any other oxygen sensor parameter that can cause vehicle emissions to exceed 1.5 times the applicable standards (e.g., shift in air/fuel ratio at which oxygen sensor switches). When performing additional test(s), all primary and secondary (if equipped) oxygen sensors used for fuel control shall be operating at the malfunction criteria limit for the applicable parameter only. All other primary and secondary oxygen sensor parameters shall be with normal characteristics.

(2.2) EGR System: The manufacturer shall conduct only one flow rate demonstration test at the low flow limit.

(2.3) Fuel Metering System:

(2.3.1) For vehicles with short-term or long-term fuel trim circuitry, the manufacturer shall conduct one demonstration test at the border of the rich limit and one demonstration test at the border of the lean limit established by the manufacturer for emission compliance.

(2.3.2) For other systems, the manufacturer shall conduct a demonstration test at the criteria limit(s).

(2.3.3) For purposes of the demonstration, the fault(s) induced may result in a uniform distribution of fuel and air among the cylinders. Non-uniform distribution of fuel and air used to induce a fault shall not cause an indication of misfire. The manufacturer shall describe the fault(s) induced in the fuel system causing it to operate at the criteria limit(s) for the demonstration test (e g., restricted or increased flow fuel injectors, an altered output signal airflow meter, etc.). Computer modifications to cause the fuel system to operate at the adaptive limit for malfunction shall be allowed for the demonstration tests if the manufacturer demonstrates that the computer modification produces equivalent test results.

(2.4) Misfire: The manufacturer shall conduct one FTP demonstration test at the criteria limit specified in (b)(3.2)(B) for malfunction. This demonstration is not required for diesel applications.

(2.5) Secondary Air System: The manufacturer shall conduct a flow rate demonstration test at the low flow limit, unless only a functional check is permitted according to section (b)(5.2.2).

(2.6) Catalyst Efficiency:

(2.6.1) Non-Low Emission Vehicles: The manufacturer shall conduct a baseline FTP test with a representative 4000 mile catalyst system followed by one FTP demonstration test using a catalyst system deteriorated to its malfunction limit. If a manufacturer is employing a steady state catalyst efficiency check in accordance with section (b) (1.2.4), demonstration of the catalyst monitoring system is not required.

(2.6.2) Low Emission Vehicles: The manufacturer shall conduct a catalyst efficiency demonstration using a catalyst system deteriorated to the malfunction criteria.

(2.7) Heated Catalyst Systems: The manufacturer shall conduct a demonstration test where the designated heating temperature is reached at the time limit for malfunction after engine starting.

(2.8) Manufacturers may electronically simulate deteriorated components, but may not make any vehicle control unit modifications (unless otherwise excepted above) when performing demonstration tests. All equipment necessary to duplicate the demonstration test must be made available to the ARB upon request.

(3.0) PRECONDITIONING The manufacturer shall use the first engine start portion of one applicable FTP cycle (or Unified Cycle, if approved) for preconditioning before each of the above emission tests. If a manufacturer provides data and/or an engineering evaluation which adequately demonstrate that additional preconditioning is necessary to stabilize the emission control system, the Executive Officer shall allow an additional identical preconditioning cycle, or a Federal Highway Fuel Economy Driving Cycle, following a ten-minute (or 20 minutes for medium duty engines certified on an engine dynamometer) hot soak after the initial preconditioning cycle. The manufacturer shall not require the demonstration vehicle to be cold soaked prior to conducting preconditioning cycles in order for the monitoring system demonstration to be successful.

(4.0) EVALUATION PROTOCOL

(4.1) The manufacturer shall set the system or component for which detection is to be demonstrated at the criteria limit(s) prior to conducting the applicable preconditioning cycle(s). (For misfire demonstration, misfire shall be set at its criteria limit as specified pursuant to section (b)(3.2)(B)). If a second preconditioning cycle is permitted in accordance with section (3.0) above, the manufacturer may adjust the demonstrated system or component before conducting the second preconditioning cycle, however, the demonstrated system or component shall not be replaced, modified or adjusted after preconditioning has taken place.

(4.2) After preconditioning, the vehicle shall be operated over the first engine start portion of the applicable FTP test (or Unified Cycle, if approved) to allow for the initial detection of the malfunction. This driving cycle may be omitted from the evaluation protocol if it is unnecessary. If required by the demonstrated monitoring strategy, a cold soak may be performed prior to conducting this driving cycle.

(4.3) The vehicle shall then be operated over a full applicable FTP test. If monitoring during the Unified Cycle is approved, a second Unified Cycle may be conducted prior to the FTP test.

(4.4) For all demonstrations, the MIL shall be illuminated before the hot start portion of the full FTP test (or before the hot start portion of the last Unified Cycle, if applicable) in accordance with requirements of subsection (b):

(4.4.1) If the MIL does not illuminate when the systems or components are set at their limit(s), the criteria limit or the OBD system is not acceptable.

(4.4.2) Except for catalyst efficiency demonstration, if the MIL illuminates and emissions do not exceed 1.5 times any of the applicable FTP emission standards, no further demonstration shall be required.

(4.4.3) Except for catalyst efficiency demonstration, if the MIL illuminates and emissions exceed 1.5 times any of the applicable FTP emission standards, the vehicle shall be retested with the component's malfunction criteria limit value reset such that vehicle emissions are reduced by no more than 30 percent. Limit value at a minimum includes, in the case of oxygen sensors, response rate and voltage; for EGR systems, EGR flow rate; for secondary air systems, air flow rate; for short-term fuel trim- only systems, time interval at the fuel system range of authority limit; for long-term fuel trim systems, shift in the base fuel calibration; for heated catalyst systems, the time limit between engine starting and attaining the designated heating temperature (if an after-start heating strategy is used); and for misfire, percent misfire. For the OBD system to be approved, the vehicle must then meet the above emission levels when tested with the faulty components. The MIL shall not illuminate during this demonstration.

(4.4.4) For Non-LEV catalyst efficiency demonstration, if HC emissions do not increase by more than 1.5 times the standard from the baseline FTP test and the MIL is illuminated, no further demonstration shall be required. However, if HC emissions increase by more than 1.5 times the standard from the baseline FTP test and the MIL is illuminated, the vehicle shall be retested with the average FTP HC conversion capability of the catalyst system increased by no more than 10 percent (i.e., 10 percent more engine out hydrocarbons are converted). For the OBD system to be approved, the vehicle must then meet the above emission levels when re-tested. The MIL shall not illuminate during this demonstration.

(4.4.5) For Low Emission Vehicle catalyst efficiency demonstration, if HC emissions do not exceed the applicable emission threshold specified in section (b)(1.2.2) and the MIL is illuminated, no further demonstration shall be required. However, if HC emissions exceed the threshold and the MIL is illuminated, the vehicle shall be retested with average FTP HC conversion capability of the catalyst system increased by no more than 5 percent (i.e., 5 percent more engine out hydrocarbons are converted). For the OBD II system to be approved, the vehicle must then meet the above emission levels when re-tested. The MIL shall not illuminate during this demonstration.

(4.5) If an OBD system is determined unacceptable by the above criteria, the manufacturer may re-calibrate and re-test the system on the same vehicle. Any affected monitoring systems demonstrated prior to the re-calibration shall be re-verified.

(4.6) The Executive Officer may approve other demonstration protocols if the manufacturer can adequately show comparable assurance that the malfunction criteria are chosen based on meeting emission requirements and that the timeliness of malfunction detections are within the constraints of the applicable monitoring requirements.

(h) CERTIFICATION DOCUMENTATION: The manufacturer shall submit the following documentation for each engine family at the time of certification. With Executive Officer approval, one or more of the documentation requirements specified in this section may be waived or altered if the information required would be redundant or unnecessarily burdensome to generate:

(1) A written description of the functional operation of the diagnostic system to be included in section 8 of manufacturers' certification applications.

(2) A table providing the following information for each monitored component or system (either computer-sensed or -controlled) of the emission control system.

(A) corresponding fault code
(B) monitoring method or procedure for malfunction detection
(C) primary malfunction detection parameter and its type of output signal
(D) fault criteria limits used to evaluate output signal of primary parameter
(E) other monitored secondary parameters and conditions (in engineering units) necessary for malfunction detection
(F) monitoring time length and frequency of checks
(G) criteria for storing fault code
(H) criteria for illuminating malfunction indicator light
(I) criteria used for determining out of range values and input component rationality checks

(3) A logic flowchart describing the general method of detecting malfunctions for each monitored emission-related component or system. To the extent possible, abbreviations in Society of Automotive Engineers' (SAE) J1930 "Electrical/Electronic Systems Diagnostic Terms, Definitions, Abbreviations, and Acronyms", September, 1995, shall be used. J1930 is incorporated by reference herein. The information required in the chart under (2) above may instead be included in this flow chart, provided all of the information required in (2) is included.

(4) A listing and block diagram of the input parameters used to calculate or determine calculated load values and the input parameters used to calculate or determine fuel trim values.

(5) A scale drawing of the MIL and the fuel cap indicator light, if present, which specifies location in the instrument panel, wording, color, and intensity.

(6) Emission test data specified in subsection (g).

(7) Data supporting the selected degree of misfire which can be tolerated without damaging

the catalyst. For vehicles designed to meet the expanded misfire monitoring conditions (section (b)(3.3.2) or (b)(3.3.3)), representative data demonstrating the capability of the misfire monitoring system (i.e., probability of detection of misfire events) to detect misfire over the full engine speed and load operating range for selected misfire patterns (i.e., random cylinders, one cylinder out, paired cylinders out).

(8) Data supporting the limit for the time between engine starting and attaining the designated heating temperature for after-start heated catalyst systems.

(9) For Low Emission Vehicles, data supporting the criteria used to indicate a malfunction when catalyst deterioration causes emissions to exceed the applicable threshold specified in section (b)(1.2.2).

(10) For Non-Low Emission Vehicles, data supporting the criteria used to indicate a malfunction when catalyst deterioration leads to a 1.5 times the standard increase in HC emissions. If a steady state catalyst efficiency check is employed in accordance with section (b)(1.2.4), data supporting the criteria used by the diagnostic system for establishing a 60 to 80 percent catalyst efficiency level shall be provided instead.

(11) Data supporting the criteria used to detect evaporative purge system leaks.

(12) A description of the modified or deteriorated components used for fault simulation with respect to the demonstration tests specified in section (g).

(13) A listing of all electronic powertrain input and output signals.

(14) Any other information determined by the Executive Officer to be necessary to demonstrate compliance with the requirements of this section.

(i) IN-USE RECALL TESTING PROTOCOL. The manufacturer shall adhere to the following procedures for vehicles subject to in-use recall testing required by the ARB:

(1) If the MIL illuminates during a test cycle or during a preconditioning cycle, the fault causing the illumination may be identified and repaired following published procedures readily available to the public including the independent service sector.

(2) The test may be rerun, and the results from the repaired vehicle may be used for emission reporting purposes.

(3) If a vehicle contains a part which is operating outside of design specifications with no MIL illumination, the part shall not be replaced prior to emission testing unless it is determined that the part has been tampered with or abused in such a way that the diagnostic system

cannot reasonably be expected to detect the resulting malfunction.

(4) Failure of a vehicle, or vehicles on average, to meet applicable emission standards with no illumination of the MIL shall not by itself be grounds for requiring the OBD system to be recalled for recalibration or repair since the OBD system cannot predict precisely when vehicles exceed emission standards.

(5) A decision to recall the OBD system for recalibration or repair will depend on factors including, but not limited to, level of emissions above applicable standards, presence of identifiable faulty or deteriorated components which affect emissions with no MIL illumination, and systematic erroneous activation of the MIL. With respect to erroneous activation of the MIL, the manufacturer may request Executive Officer approval to take action apart from a formal recall (e.g., extended warranty or a service campaign) to correct the performance of the diagnostic strategy on in-use vehicles. In considering a manufacturer's request, the Executive Officer shall consider the estimated frequency of false MIL activation in-use, and the expected effectiveness in relation to a formal recall of the manufacturer's proposed corrective action in capturing vehicles in the field. For 1994 through 1997 model years, on-board diagnostic system recall shall not be considered for excessive emissions without MIL illumination (if required) and fault code storage until emissions exceed 2.0 times any of the applicable standards in those instances where the malfunction criterion is based on exceeding 1.5 times (or 1.75 times for LEV catalyst monitoring) any of the applicable standards. This higher emission threshold for recall shall extend through the 1998 model year for TLEV applications (except for catalyst monitoring, for which the threshold shall extend through the 2003 model year), and through the 2003 model year for all applicable monitoring requirements on LEV and ULEV applications.

(6) Regarding catalyst system monitoring, unmonitored catalysts shall be normally aged.

(j) CONFIRMATORY TESTING. The ARB may perform confirmatory testing of manufacturers' diagnostic systems for compliance with requirements of this section in accordance with malfunction criteria submitted in the manufacturer's approved certification documentation. The ARB or its designee may install appropriately deteriorated or malfunctioning components in an otherwise properly functioning test vehicle of an engine family represented by the demonstration test vehicle(s) (or simulate a deteriorated or malfunctioning component response) in order to test the fuel system, misfire detection system, oxygen sensor, secondary air system, catalyst efficiency monitoring system, heated catalyst system, and EGR system malfunction criteria for compliance with the applicable emission constraints in this section. Confirmatory testing to verify that malfunction criteria are set for compliance with emission requirements of this section shall be limited to vehicles in engine families derived from the demonstration vehicle(s). Diagnostic systems of a representative sample of vehicles which uniformly fail to meet the requirements of this section may be recalled for correction.

(k) STANDARDIZATION Standardized access to emission-related fault codes, emission-related powertrain test information (i.e., parameter values) as outlined in subsection (l), emission related diagnostic procedures, and stored freeze frame data shall be incorporated based on the industry specifications referenced in this regulation.

(1.0) Either SAE Recommended Practice J1850, "Class B Data Communication Network Interface", July, 1995, or ISO 9141-2, "Road vehicles - Diagnostic Systems - CARB Requirements for Interchange of Digital Information," February, 1994, or ISO 14230-4, "Road vehicles - Diagnostic systems - KWP 2000 requirements for Emission-related systems," April, 1996, which are incorporated by reference, shall be used as the on-board to off-board network communications protocol. All SAE J1979 emission related messages sent to the J1978 scan tool over a J1850 data link shall use the Cyclic Redundancy Check and the three byte header, and shall not use inter-byte separation or checksums.

(2.0) J1978 & J1979 Standardization of the message content (including test modes and test messages) as well as standardization of the downloading protocol for fault codes, parameter values and their units, and freeze frame data are set forth in SAE Recommended Practices on "OBD II Scan Tool" (J1978), June, 1994, and "E/E Diagnostic Test Modes" (J1979), July, 1996, which have been incorporated by reference. Fault codes, parameter values, and freeze frame data shall be capable of being downloaded to a generic scan tool meeting these SAE specifications.

(2.1) Manufacturers shall make readily available at a fair and reasonable price to the automotive repair industry vehicle repair procedures which allow effective emission related diagnosis and repairs to be performed using only the J1978 generic scan tool and commonly available, non-microprocessor based tools. As an alternative to publishing repair procedures using only the J1978 generic scan tool, manufacturers may make available manufacturer-specific commands needed to perform the same emission-related diagnosis and repair procedures (excluding any reprogramming) in a comparable manner as the manufacturer-specific diagnostic scan tool. In addition to these procedures, manufacturers may publish repair procedures referencing the use of manufacturer specific or enhanced equipment. Vehicle manufacturers shall provide for same day availability (e.g., via facsimile transmission) at a fair and reasonable cost of emission-related technical service bulletins less than 20 pages in length.

(2.2) The J1978 scan tool shall be capable of notifying the user when one or more of the required monitoring systems are not included as part of the OBD system.

(3.0) J2012 Part C Uniform fault codes based on SAE specifications shall be employed. SAE "Recommended Format and Messages for Diagnostic Trouble Codes" (J2012), October, 1994, is incorporated by reference.

(4.0) J1962 A standard data link connector in a standard location in each vehicle based on SAE specifications shall be incorporated. The location of the connector shall be easily identified by a technician entering the vehicle from the driver's side. Any pins in the standard connector that provide any electrical power shall be properly fused to protect the integrity and usefulness of the diagnostic connector for diagnostic purposes. The SAE Recommended Practice "Diagnostic Connector" (J1962), January, 1995, is incorporated by reference.

(5.0) With Executive Officer approval, medium-duty vehicles may alternatively employ the communication protocols established in SAE J1939 Committee Draft, "Recommended Practice for a Serial Controlled Communications Vehicle Network", January 1994, to satisfy the standardization requirements specified in sections (k)(1) through (k)(4) above. The Executive Officer's decision shall be based on the effectiveness of the SAE J1939 protocol in satisfying the diagnostic information requirements of Section 1968.1 in comparison with the above referenced documents.

(6.0) J2008 Beginning January 1, 2002, manufacturers shall make available at a fair and reasonable price, all 2002 and newer model year vehicle emission-related diagnosis and repair information provided to the manufacturer's franchised dealers (e.g., service manuals, technical service bulletins, etc.) in the electronic format specified in SAE J2008 Draft Technical Report, "Recommended Organization of Service Information", November, 1995. The information shall be made available within 30 days of its availability to franchised dealers. Small volume manufacturers shall be exempted indefinitely from the J2008 formatting requirement.

(l) SIGNAL ACCESS

(1.0) The following signals in addition to the required freeze frame information shall be made available on demand through the serial port on the standardized data link connector: calculated load value, diagnostic trouble codes, engine coolant temperature, fuel control system status (open loop, closed loop, other; if equipped with closed loop fuel control), fuel trim (if equipped), fuel pressure (if available), ignition timing advance (if equipped), intake air temperature (if equipped), manifold air pressure (if equipped), air flow rate from mass air flow meter (if equipped), engine RPM, throttle position sensor output value (if equipped), secondary air status (upstream, downstream, or atmosphere; if equipped), and vehicle speed (if equipped). The signals shall be provided in standard units based on the SAE specifications incorporated by reference in this regulation, and actual signals shall be clearly identified separately from default value or limp home signals. Additionally, beginning with a phase-in of 30 percent in the 2000 model year, 60 percent in the 2001 model year, and with full implementation by the 2002 model year, the software calibration identification number shall be made available through the serial port on the standardized

data link connector. The phase-in percentages shall be based on the manufacturer's projected sales volume for all vehicles and engines. Small volume manufacturers shall not be required to meet the phase-in percentages; however, such manufacturers shall achieve 100 percent compliance by the 2002 model year. The software calibration identification number shall be provided in a standardized format. Alternate phase-in percentages that provide for equivalent timeliness overall in implementing these requirements shall be accepted.

(2.0) The manufacturer shall publish in factory service manuals a normal range for the calculated load value and mass air flow rate (if available) at idle, and at 2500 RPM (no load, in neutral or park). If 2500 RPM is outside of the operating range of the engine, the corresponding data may be omitted. If the total fuel command trim is made up by more than one source (e.g. short-term trim and long-term trim), all fuel trim signals shall be available. The signals shall be provided in standard units based on the incorporated SAE specifications, and actual signals shall be clearly identified separately from default value or limp home signals. Diesel vehicles shall be exempt from this requirement.

(3.0) Oxygen sensor data (including current oxygen sensor output voltages) that will allow diagnosis of malfunctioning oxygen sensors shall be provided through serial data port on the standardized data link. In addition, beginning with the 1996 model year (with full compliance required by the 1997 model year), for all monitored components and systems, except misfire detection, fuel system monitoring, and comprehensive component monitoring, results of the most recent test performed by the vehicle, and the limits to which the system is compared shall be available through the data link. For the monitored components and systems excepted above, a pass/fail indication for the most recent test results shall be available through the data link. Such data shall be transmitted in accordance with SAE J1979 (or SAE J1939, whichever applies). Manufacturers shall report the test results such that properly functioning systems do not indicate a failure (e.g., a test value which is outside of the test limits). Alternative methods shall be approved by the Executive Officer if, in the judgment of the Executive Officer, they provide for equivalent off-board evaluation.

(4.0) Beginning with a phase-in of 30 percent in the 2000 model year, 60 percent in the 2001 model year, and with full implementation by the 2002 model year, manufacturers shall provide for verification of the on-board computer software integrity in electronically reprogrammable control units through the standardized vehicle data connector in a standardized format to be adopted by SAE. The phase-in percentages shall be based on the manufacturer's projected sales volume for all vehicles and engines. Small volume manufacturers shall not be required to meet the phase-in percentages; however, such manufacturers shall achieve 100 percent compliance by the 2002 model year. Such verification shall be capable of being used to determine if the emission-related software and/or calibration data are valid and applicable for that vehicle. Alternate phase-in percentages that provide for equivalent timeliness overall in implementing these

requirements shall be accepted.

(m) IMPLEMENTATION SCHEDULE

(1.0) These OBD II requirements, unless otherwise specified, shall be implemented beginning with the 1994 model year.

(2.0) The Executive Officer shall grant an extension for compliance with the requirements of these subsections with respect to a specific vehicle model or engine family if the vehicle model or engine family meets previously applicable on-board diagnostic system requirements and a manufacturer demonstrates that it cannot modify a present electronic control system by the 1994 model-year because major design system changes not consistent with the manufacturer's projected changeover schedule would be needed to comply with provisions of these subsections.

(2.1) The manufacturer which has received an extension from the Executive Officer shall comply with these regulations when modification of the electronic system occurs in accordance with the manufacturer's projected changeover schedule or in the 1996 model year, whichever first occurs.

(2.2) Any manufacturer requesting an extension shall, no later than October 15, 1991, submit to the Executive Officer an application specifying the period for which the extension is required.

(3.0) Small volume manufacturers as defined in (n) (13.0) shall meet these requirements by the 1996 model year.

(4.0) Manufacturers may at their discretion implement a portion of these regulations prior to the required implementation date provided that the system complies with previously applicable on-board diagnostic system requirements.

(5.0) Diesel vehicles shall meet these requirements by the 1996 model year. Manufacturers may request a delay in the implementation of these requirements for diesel vehicles until 1997, subject to Executive Officer approval, if it is adequately demonstrated that the delay will allow for the development of significantly more effective monitoring systems.

(5.1) Vehicles and engines certified to run on alternate fuels shall meet these requirements by the 1996 model year. However, manufacturers may request the Executive Officer to waive specific monitoring requirements for which monitoring may not be reliable with respect to the use of alternate fuels until the 2005 model year.

(5.2) Medium-duty vehicles with engines certified on an engine dynamometer may comply with

these requirements on an engine model year certification basis rather than on a vehicle model basis.

(6.0) The Executive Officer may waive one or more of the requirements of these subsections with respect to a specific vehicle or engine family for which production commences prior to April 1, 1994, and which is not otherwise exempted from compliance in accordance with sections (2.0) and (2.1) above. In granting a waiver, the Executive Officer shall consider the following factors: the extent to which these requirements are satisfied overall on the vehicle applications in question, the extent to which the resultant diagnostic system design will be more effective than systems developed according to section 1968, Title 13, and a demonstrated good-faith effort to meet these requirements in full by evaluating and considering the best available monitoring technology.

(6.1) For 1995 and 1996 model year vehicles for which production is to commence subsequent to March 31, 1994, and which are not exempted from compliance in accordance with sections (2.0) and (2.1) above, the Executive Officer, upon receipt of an application from the manufacturer, may certify the vehicles in question even though said vehicles may not comply with one or more of the requirements of these subsections. Such certification is contingent upon the manufacturer meeting the criteria set forth in section (6.0) above. Manufacturers of non-complying systems shall be subject to fines pursuant to section 43016 of the California Health and Safety Code for each deficiency identified, after the second, in a vehicle model. For the third deficiency and every deficiency thereafter identified in a vehicle model, the fines shall be in the amount of $50 per deficiency per vehicle for non-compliance with any of the monitoring requirements specified in subsections (b)(1) through (b)(11), and $25 per deficiency per vehicle for non-compliance with any other requirement of section 1968.1. In determining the identified order of deficiencies, deficiencies of subsections (b)(1) through (b)(11) shall be identified first. Total fines per vehicle under this section shall not exceed $500 per vehicle and shall be payable to the State Treasurer for deposit in the Air Pollution Control Fund. Engine families in receipt of a waiver granted under section (6.0) above shall be exempt from these fines. Further, small volume manufacturers choosing to comply with these requirements in the 1995 model year shall also be exempt from these fines. For 1996 model year vehicles and engines only, failure to properly monitor multiple electronic transmission components shall be considered a single monitoring system deficiency.

(6.2) Beginning with the 1997 model year and through the 2003 model year, the certification provisions set forth in section (m)(6.1) above shall continue to apply subject to the following limitations: 1) The specified fines shall apply to the third and subsequently identified deficiencies, with the exception that fines shall apply to all monitoring system deficiencies wherein a required monitoring strategy is completely absent from the OBD system, and 2) Manufacturers may not carry over monitoring system deficiencies for more than two model years unless it can be adequately demonstrated that substantial vehicle hardware modifications and additional lead time beyond two years would be necessary to

correct the deficiency, in which case the deficiency may be carried over for three model years.

(6.3) Beginning with the 2004 model year, the certification provisions set forth in section (m)(6.1) and (m)(6.2) above shall continue to apply subject to the following limitations: 1) The specified fines shall apply to the second and subsequently identified deficiencies, and 2) Manufacturers may not carry over monitoring system deficiencies to future model years.

(n) GLOSSARY For purposes of this section.

(1.0) "Malfunction" means the inability of an emission-related component or system to remain within design specifications. Further, malfunction refers to the deterioration of any of the above components or systems to a degree that would likely cause the emissions of an average certification durability vehicle with the deteriorated components or systems present at the beginning of the applicable certification emission test to exceed by more than 1.5 times any of the emission standards (both with respect to the certification and useful life standards), unless otherwise specified, applicable pursuant to Subchapter 1 (commencing with Section 1900), Chapter 3 of Title 13. Notwithstanding, for catalyst monitoring (section (b)(1.0)), applicable HC emission standard shall refer only to the useful life standards.

(2.0) "Secondary air" refers to air introduced into the exhaust system by means of a pump or aspirator valve or other means that is intended to aid in the oxidation of HC and CO contained in the exhaust gas stream.

(3.0) "Engine misfire" means lack of combustion in the cylinder due to absence of spark, poor fuel metering, poor compression, or any other cause.

(4.0) Oxygen sensor "response rate" refers to the delay (measured in milliseconds) between a switch of the sensor from lean to rich or vice versa in response to a change in fuel/air ratio above and below stoichiometric.

(5.0) A "trip" means vehicle operation (following an engine-off period) of duration and driving mode such that all components and systems are monitored at least once by the diagnostic system except catalyst efficiency or evaporative system monitoring when a steady-speed check is used, subject to the limitation that the manufacturer-defined trip monitoring conditions shall all be encountered at least once during the first engine start portion of the applicable FTP cycle.

(6.0) A "warm-up cycle" means sufficient vehicle operation such that the coolant temperature has risen by at least 40 degrees Fahrenheit from engine starting and reaches a minimum temperature of at least 160 degrees Fahrenheit (140 degrees Fahrenheit for diesel

applications).

(7.0) A "driving cycle" consists of engine startup, and engine shutoff.

(8.0) "Continuous monitoring" means sampling at a rate no less than two samples per second. If for engine control purposes, a computer input component is sampled less frequently, the value of the component may instead be evaluated each time sampling occurs.

(9.0) "Fuel trim" refers to feedback adjustments to the base fuel schedule. Short-term fuel trim refers to dynamic or instantaneous adjustments. Long-term fuel trim refers to much more gradual adjustments to the fuel calibration schedule than short-term trim adjustments. These long term adjustments compensate for vehicle differences and gradual changes that occur over time.

(10.0) "Base Fuel Schedule" refers to the fuel calibration schedule programmed into the Powertrain Control Module or PROM when manufactured or when updated by some off-board source, prior to any learned on-board correction.

(11.0) "Calculated load value" refers to an indication of the current airflow divided by peak airflow, where peak airflow is corrected for altitude, if available. This definition provides a unitless number that is not engine specific, and provides the service technician with an indication of the percent engine capacity that is being used (with wide open throttle as 100%).

$$CLV = \frac{\text{Current Airflow}}{\text{Peak airflow (@ sea level)}} \times \frac{\text{Atm Pressure (@ sea level)}}{\text{Barometric pressure}}$$

For diesel applications, the calculated load value shall be determined by the ratio of current output torque to maximum output torque at current engine speed.

(12.0) "Medium-duty vehicle" is defined in Title 13, Section 1900 (b)(9).

(13.0) "Small volume manufacturer" shall mean any vehicle manufacturer with sales less than or equal to 3000 new light-duty vehicles and medium-duty vehicles per model year based on the average number of vehicles sold by the manufacturer each model year from 1989 to 1991, except as noted below. For manufacturers certifying for the first time in California, model year sales shall be based on projected California sales. If a manufacturer's average California sales exceeds 3000 units of new light-duty and medium-duty vehicles based on the average number of vehicles sold for any three consecutive model years, the manufacturer shall no longer be treated as a small volume manufacturer and shall comply with the requirements applicable for larger manufacturers beginning with the fourth model year after the last of the three consecutive model years. If a manufacturer's average California sales falls below 3000 units of new light-duty and medium-duty vehicles based on the average number of vehicles sold for any three consecutive model years, the manufacturer shall be treated as a small volume manufacturer and shall be subject to the requirements for small volume manufacturers beginning with the next model year.

(14.0) "Low Emission Vehicle" refers to a vehicle certified in California as a Transitional Low Emission Vehicle (TLEV), a Low Emission Vehicle (LEV), or an Ultra Low Emission Vehicle (ULEV). These vehicle categories are further defined in Title 13, sections 1956.8 and 1960.1.

(15.0) "Diesel engines" refers to engines using a compression ignition thermodynamic cycle.

(16.0) "Functional check" for an output component means verification of proper response to a computer command. For an input component, functional check means verification of the input signal being in the range of normal operation, including evaluation of the signal's rationality in comparison to all available information.

(17.0) "Federal Test Procedure" (FTP) cycle or test refers to, for passenger vehicles, light-duty trucks, and medium-duty vehicles certified on a chassis dynamometer, the driving schedule in Code of Federal Regulations (CFR) 40, Appendix 1, Part 86, section (a) entitled, "EPA Urban Dynamometer Driving Schedule for Light- Duty Vehicles and Light-Duty Trucks." For medium-duty engines certified on an engine dynamometer, FTP cycle or test refers to the engine dynamometer schedule in CFR 40, Appendix 1, Part 86, section (f)(1), entitled, "EPA Engine Dynamometer Schedule for Heavy-Duty Otto-Cycle Engines," or section (f)(2), entitled, "EPA Engine Dynamometer Schedule for Heavy-Duty Diesel Engines."

(18.0) "Redline engine speed" means the manufacturer recommended maximum engine speed as normally displayed on instrument panel tachometers, or the engine speed at which fuel shutoff occurs.

(19.0) "Power Take-Off unit" refers to an engine driven output provision for the purposes of powering auxiliary equipment (e.g., a dump-truck bed, aerial bucket, or tow-truck winch).

(20.0) "Engine Start" is defined as the point at which normal, synchronized spark and fuel control is obtained or when the engine reaches a speed 150 rpm below the normal, warmed-up idle speed (as determined in the drive position for vehicles equipped with an automatic transmission).

(21.0) An "Alternate or Equivalent Phase-in" is one that achieves equivalent emission reductions by the end of the last year of the scheduled phase-in. The emission reductions shall be calculated by multiplying the percent of vehicles (based on the manufacturer's projected sales volume of all vehicles and engines) meeting the new requirements per year by the number of years implemented prior to and including the last year of the scheduled phase-in and then summing these yearly results to determine a cumulative total (e.g., a three year, 30/60/100 percent scheduled phase-in would be calculated as (30%*3 years) + (60%*2 years) + (100%*1 year) = 310). Manufacturers shall be allowed to include vehicles introduced before the first year of the scheduled phase-in (e.g., in the previous example, 10 percent introduced one year before the scheduled phase-in begins would be calculated as (10%*4 years) and added to the cumulative total). Any alternate phase-in which results in an equal or larger cumulative total by the end of the last year of the scheduled phase-in shall be considered acceptable by the Executive Officer; however, all vehicles shall comply with the respective requirements subject to the phase-in within one model year following the last year of the phase-in schedule.

(22.0) "Unified Cycle" is defined in "Speed Versus Time Data for California's Unified Driving Cycle", dated December 12, 1996, incorporated by reference.

Note: Authority cited: Sections 39515, 39600, 39601, 43006, 43013, 43018, 43104, and 44036.2, Health and Safety Code; and Sections 27156 and 38395, Vehicle Code. Reference: Sections 39002, 39003, 39667, 43000, 43004, 43006, 43008.6, 43013, 43018, 43100, 43101, 43101.5, 43102, 43104, 43105, 43106, 43204, and 44036.2, Health and Safety Code; and Sections 27156, 38391, and 38395, Vehicle Code.

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
Filer Authorized By:	Samuel Patrick Richey
Attorney Docket Number:	C13-03895
Receipt Date:	08-MAR-2016
Filing Date:	14-SEP-2015
Time Stamp:	18:53:17
Application Type:	Reexam (Third Party)

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		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:					
Information:					
2	Reexam - Info Disclosure Statement Filed by 3rd Party	03896re_sb08a.pdf	146094 bcd7d24a43b8afabf42a52f8d423b6101d152d62	no	1
Warnings:					
Information:					
3	Reexam - Info Disclosure Statement Filed by 3rd Party	03896re_sb08b.pdf	152873 8a759b401ddfaff8a15dc61a1eec0ccab2a1bbc5	no	1
Warnings:					
Information:					
4	Reexam Timely Requester's Reply to an Owner's Statement	03896re_exhibitsA-F.pdf	11632982 d670094c4ce09afbd4b80f5046528e382c1e26ac	no	216
Warnings:					
Information:					
5	Reexam Timely Requester's Reply to an Owner's Statement	03896re_exhibitsG-L.pdf	11136078 63b641ee9c609b96649d0146aac81a94d8e37b60	no	173
Warnings:					
Information:					
6	Reexam Timely Requester's Reply to an Owner's Statement	03896re_exhibitsM-R.pdf	2446876 9196e6a13aaac45839d283648eaeadb2e17e0239	no	80
Warnings:					
Information:					
7	Reexam Timely Requester's Reply to an Owner's Statement	03896re_exhibitsS-U.pdf	1324169 3ab9f480715e66ed80c4195f1a217ae68ad21ab1	no	87
Warnings:					
Information:					
		Total Files Size (in bytes):	27695214		

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**	)	
	)	Examiner: **M. GRAHAM**
Filing Date: **SEPTEMBER 14, 2015**	)	
	)	Art Unit: **3993**
For: **VEHICLE TRACKING UNIT WITH DOWNLOADABLE CODES AND ASSOCIATED METHODS**	)	

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,

JACK GEORGE ABID
Reg. No. 58,237
Allen, Dyer, Doppelt, Milbrath & Gilchrist, P.A.
255 S. Orange Avenue, Suite 1401
Post Office Box 3791
Orlando, Florida 32802
407-841-2330
407-841-2343 fax
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