

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

GEOTAB USA, INC. AND GEOTAB, INC.,
Petitioners,

v.

OMEGA PATENTS, LLC,
Patent Owner.

Case No. IPR2023-00504
Patent No. 8,032,278

**DECLARATION OF JEFFREY MILLER, Ph.D.
IN SUPPORT OF PETITION FOR
INTER PARTES REVIEW OF U.S. PATENT NO. 8,032,278**

Geotab Exhibit 1003 Geotab v. Omega
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I, Jeffrey Miller, declare:

I. INTRODUCTION

A. Engagement

1. I have been retained on behalf of Geotab USA, Inc. and Geotab, Inc. (“Geotab” or “Petitioners”) as an independent technical expert in the above-captioned IPR proceeding (“the IPR”). This document provides certain of my opinions concerning the patentability of claims in U.S. Patent No. 8,032,278 (Ex. 1001, “the ’278 patent”), specifically claims 1-22 (the “Challenged Claims”). I make this Declaration in support of Geotab’s Petition in the IPR.

2. For my work as an expert in this matter, I am being compensated for my services at my standard rate, plus actual expenses. My hourly compensation is based solely on the amount of time that I devote to activity related to this case and is in no way contingent on the nature of my findings, the presentation of my findings in testimony, or the outcome of this or any other proceeding. I have no other personal or financial stake or interest in the outcome of the present proceeding. I do not have any expectation or promise of additional business with the Petitioners in exchange for the positions explained herein.

3. I make this Declaration based on my personal knowledge, including my education, training, research, and professional experience.

B. Background and Qualifications

4. My curriculum vitae (“CV”) detailing my educational background, professional experience, and list of publications is provided as Exhibit 1004. Some of my background and experience that qualifies me to offer the opinions in this Declaration as an expert in the technical issues in this case are as follows.

5. I am currently a Professor of Computer Science and the Dean of the College of Engineering and Computational Sciences at Southern Utah University with oversight for the departments of Computer Science and Cybersecurity, Engineering (Civil Engineering, Mechanical Engineering, Construction Management, Engineering Technology), Mathematics, and Aviation. These departments have over 50 full-time faculty, 1,500 major students, and 12 undergraduate and graduate degree programs.

6. I previously served as a Professor of Computer Science and Information Technology Practice, and Department Chair of the Information Technology Program, in the Viterbi School of Engineering at the University of Southern California in Los Angeles, where I taught courses on programming, software development, design and construction of large software systems, and analysis of algorithms.

7. As Department Chair of the Information Technology Program, I oversaw more than 50 professors and lecturers teaching over 75 different courses

focused on computer programming, applied analytics, cloud computing, computer and digital forensics, 3D computer graphics and modeling, applied computer security, blockchain, connected devices, computing education, enterprise information systems, mobile app development, video game programming, design and management, web technologies and applications, and digital entrepreneurship.

8. Prior to joining the University of Southern California, I served as an Associate Professor of Computer Science and Computer Systems Engineering at the University of Alaska Anchorage, where I taught courses on electrical engineering, computer systems and design, computer programming, systems administration, VLSI circuit design, computer networking, and network security.

9. I earned a Bachelor of Science degree in Computer Engineering and Computer Science, a Master of Science degree in Computer Science, and a Ph.D. degree in Computer Science from the University of Southern California in 2002, 2002, and 2007, respectively.

10. Since 2002, I have conducted research on software and network architectures and algorithms used in mobile and wireless communication, with a specific application in vehicular networking and data gathering. My dissertation concerned real-time traffic data processing. It focused on gathering traffic data in a distributed fashion over cellular links, with individual vehicles transmitting speed—retrieved from a host vehicle computer system through the on-board

diagnostics port (“OBD-II” as required by federal regulation) —and location—as a latitude/longitude pair determined by GPS to a central system, rather than gathering data through expensive hardware embedded in roads at discrete locations. The system maintained in real-time the fastest path of each vehicle from its current location to its destination.

11. I continued my work in vehicle tracking after receiving my Ph.D., specifically gathering data from an OBD port in different host vehicles and transmitting it to a central server over the cellular network. My research involved creating hardware devices that included a central processing unit (CPU), GPS receiver, cellular transceiver, and OBD connector. I wrote firmware to run on the CPU to retrieve data from the vehicle’s electronic control unit through the OBD port, to determine the location of the vehicle from the GPS receiver, and to transmit this data to a central server over the cellular network. These devices were installed in over 100 vehicles of different makes and models, including vehicles manufactured by Toyota, Honda, Mercedes, Ford, and Subaru.

12. I developed the devices for gathering vehicular data and location as the Principal Investigator (PI) on two grants provided by the United States Department of Transportation, administered by the Alaska University Transportation Center. One of the grants specifically consisted of designing, creating, and installing vehicle tracking devices in OBD ports in over 100 vehicles

to gather location and diagnostic data from each vehicle, send this data to a central server, and analyze the data to draw multiple conclusions. One application of this involved working with the Municipality of Anchorage to identify the locations of vehicle slippage on the roads to aid in dispatching sand trucks. The data was also used to determine the average speed of traffic on roadways for routing vehicles along fastest and, in conjunction with snowplow and sand truck location data, safest routes.

13. I have secured over \$8,200,000 for projects concerning Intelligent Transportation Systems applications and Science, Technology, Engineering, and Mathematics (STEM) education at the K12, undergraduate, and graduate levels.

14. As set forth in more detail in my CV, I have authored numerous publications, including a book supplement, on vehicular technology, networking and security, and intelligent transportation systems applications. Some publications include applications for determining fastest paths of vehicles through tracking of distributed vehicles in a transportation network utilizing OBD data, GPS receivers, and cellular transceivers. Other publications include descriptions of devices used for tracking vehicles, including cars, snowplows, and heavy-duty trucks. I have given many presentations, including several on all the topics described above.

15. I assisted in developing curricula in circuit design, software engineering, computer networking, networking security, capstone classes in

computer engineering and computer science that revolve around custom projects for groups of students, and many others. These classes exist in the Computer Science and Computer Engineering programs at California State University at Los Angeles, the University of Southern California, the University of Alaska Anchorage, and Southern Utah University. I am an inventor on U.S. Patent No. 9,715,369, “Vehicle accessory engagement tracking,” related to data collection from snowplows for use in intelligent transportation applications.

16. I am a Senior Member of the Institute of Electrical and Electronics Engineers (IEEE) and the Association of Computing Machinery (ACM). I was the General Chair for the IEEE 69th Vehicular Technology Conference in fall 2009, the IEEE 15th Intelligent Transportation Systems Conference in fall 2012, and the IEEE 77th Vehicular Technology Conference in fall 2013. I was also a Program Co-Chair and Technical Program Chair for the IEEE 73rd Vehicular Technology Conference in fall 2011. I was on the IEEE Intelligent Transportation Systems Society Board of Governors for the term from January 2009-December 2011 and January 2017-December 2019, and I was elected as Vice President for Administrative Activities in the same society from January 2011-December 2012. I was also on the IEEE Vehicular Technology Society Board of Governors for the term from September 2011- December 2013. From October 2011-December 2013, I was the Editor-in-Chief of the IEEE ITS Magazine. Within the IEEE Intelligent

Transportation Systems Society (“ITSS”), I have been an Associate Editor for the IEEE Transactions on Intelligent Transportation Systems. In 2010, I was the treasurer for the Alaska section of the IEEE and was the chair of the section from January 2011-December 2011. During my time as chair of the IEEE Alaska Section, the section won the 2011 Outstanding Section Award for the Region 6 Northwest Area. In addition to being a member of the Intelligent Transportation Society of Alaska, I was also the president from January 2010-December 2011.

17. A more detailed description of my qualifications, experience, publications, awards, and patents is included in my Curriculum Vitae, provided as Ex. 1004.

C. Bases of My Opinions and Materials Considered

18. I have reviewed the ’278 patent, its prosecution history, and the prior art and other documents and materials cited herein. For ease of reference, the full list of documents that I have considered is included in Appendix A. I have also considered the documents cited and referenced herein, even if not included in Appendix A. Each of these materials is a type of document that experts in my field would have reasonably relied upon when forming their opinions and would have had access to either through the applicable patent office and/or well-known libraries, conferences, publications, organizations, and websites in the field as further discussed herein.

19. My opinions in this Declaration are based on my review of these documents, as well as upon my education, training, research, knowledge, and experience. When developing the opinions set forth in this declaration, I assumed the perspective of a person having ordinary skill in the art, as set forth in Section III below.

20. The opinions and comments formulated during this assessment are based on observations and information available at the time of this investigation.

D. My Understanding of Patent Law

21. In developing my opinions, I discussed various relevant legal principles with Petitioners' attorneys. I have relied upon such legal principles, as explained to me, while forming the opinions set forth in this declaration. My understanding in this respect is as follows:

22. I understand that *inter partes* review ("IPR") is a proceeding before the United States Patent & Trademark Office ("USPTO") for evaluating the patentability of an issued patent's claims based on prior-art patents and printed publications.

23. I understand that, in this proceeding, Geotab has the burden of proving that the challenged claims of the '278 patent are unpatentable by a preponderance of the evidence. I understand that a "preponderance of the

evidence” means that the evidence establishes that a fact or conclusion is more likely true than not true.

24. I understand that patent claims can be independent or dependent. I understand that a dependent claim must reference a claim previously set forth, and then must specify a further limitation of the claimed subject matter. I also understand that a dependent claim is treated as incorporating by reference all limitations of the previously recited claim that it references. I understand that an independent claim does not reference or incorporate limitations from a previously disclosed claim.

25. I understand that, in IPR proceedings, claim terms in a patent are given their ordinary and customary meaning as understood by a person of ordinary skill in the art (“POSA”) in the context of the entire patent and the prosecution history pertaining to the patent. I discuss the qualifications of the POSA relevant to the ’278 patent below, *infra* § III. If the specification provides a special definition for a claim term that differs from the meaning the term would otherwise possess, the specification’s special definition takes precedence. I have applied these standards in preparing the opinions in this declaration.

26. I understand that for an invention claimed in a patent to be patentable, it must be, among other things, new (and consequently not anticipated) and not

obvious from the prior art. My understanding of these two legal standards is set forth below.

1. Anticipation

27. I understand that, for a patent claim to be “anticipated” by the prior art (and therefore not novel), each and every claim limitation must be disclosed, expressly or inherently, in the subject matter provided by a single prior-art reference. I understand that anticipation requires that all of the elements of a claim have to be arranged in the same manner as in the claims or can be immediately envisaged. I understand that a claim limitation is disclosed for the purpose of anticipation if a POSA would have understood the reference to disclose the limitation based on inferences that a POSA would reasonably be expected to draw from the explicit teachings in the reference when read in the context provided by the POSA’s knowledge and experience.

28. I understand that a claim limitation is inherent in a prior art reference if that limitation is necessarily present when practicing the teachings of the reference, regardless of whether a POSA recognized the presence of that limitation in the prior art.

2. Obviousness

29. I understand that a patent claim may be unpatentable if it would have been obvious to a POSA in view of a single prior-art reference or a combination of

prior-art references. I have been informed that obviousness is determined from the perspective of a hypothetical person of ordinary skill in the art and that the asserted claims of the patent should be read from the point of view of such a person at the time the alleged invention was made. I have been informed that a hypothetical person of ordinary skill in the art is assumed to know and to have all relevant prior art in the field of endeavor covered by the '278 patent and would thus have been familiar with each of the references cited herein, as well as the background knowledge in the art discussed and the full range of teachings they contain.

30. I have been informed that there are two criteria for determining whether prior art is analogous and thus can be considered prior art: (1) whether the art is from the same field of endeavor, regardless of the problem addressed, and (2) if the reference is not within the field of the patentee's endeavor, whether the reference still is reasonably pertinent to the particular problem with which the patentee is involved. I have also been informed that the field of endeavor of a patent is not limited to the specific point of novelty, the narrowest possible conception of the field, or the particular focus within a given field. I have also been informed that a reference is reasonably pertinent if, even though it may be in a different field from that of the patentee's endeavor, it is one which, because of the matter with which it deals, logically would have commended itself to a patentee's attention in considering his problem.

31. I understand that a patent claim is obvious if the differences between the subject matter of the claim and the prior art are such that the claimed subject matter, as a whole, would have been obvious to a POSA at the time the invention was made. I have been informed as well that a prior art reference should be viewed as a whole. Specifically, I understand that the obviousness question involves a consideration of: the scope and content of the prior art; the differences between the prior art and the claims at issue; the knowledge of a POSA; and any “secondary considerations” of non-obviousness.

32. I have been informed that certain factors called “secondary considerations” can include (1) the invention’s commercial success, (2) long felt but unresolved needs, (3) the failure of others, (4) skepticism by experts, (5) praise by others, (6) teaching away by others, (7) recognition of a problem, (8) copying of the invention by competitors, and (9) other relevant factors. I have been informed, however, that for such objective evidence to be relevant to the obviousness of a claim, there must be a causal relationship (called a “nexus”) between the claim and the evidence and that this nexus must be based on what is claimed and novel in the claim rather than something in the prior art. I also have been informed that even when they are present, secondary considerations may be unable to overcome primary evidence of obviousness (*e.g.*, motivation to combine with predictable results) that is sufficiently strong.

33. I understand that in various *ex parte* reexaminations the Patent Owner (“PO”) alleged various secondary considerations overcame the examiner’s clear obviousness findings. I understand that the Petition identifies several evidentiary and legal flaws in PO’s reexamination arguments. At this stage, however, I have not formed an opinion on the sufficiency of any of PO’s previous secondary consideration evidence to overcome any obviousness analysis described in this Declaration because in this case the PO has not presented any underlying evidence nor explained how such evidence could possibly overcome the *prima facie* obviousness shown below.

34. Should the PO introduce and attempt to rely on any secondary considerations as part of an effort to rebut the clear *prima facie* obviousness shown below on any claim, then I reserve the right to respond addressing how that unknown evidence affects the relevant obviousness analysis shown below.

35. I understand that for a claimed invention to be considered obvious, a POSA must have had a reason for combining teachings from multiple prior-art references (or for altering a single prior-art reference, in the case of obviousness in view of a single reference) in the fashion proposed.

36. I have also been informed that in considering whether an invention for a claimed combination would have been obvious, I may assess whether there are apparent reasons to combine known elements in the prior art in the manner claimed

in view of interrelated teachings of multiple prior art references, the effects of demands known to the design community or present in the marketplace, and/or the background knowledge possessed by a person having ordinary skill in the art. I have been informed that other principles may be relied on in evaluating whether an alleged invention would have been obvious, and that these principles include the following:

- A combination of familiar elements according to known methods is likely to be obvious when it does no more than yield predictable results;
- When a device or technology is available in one field of endeavor, design incentives and other market forces can prompt variations of it, either in the same field or in a different one, so that if a person of ordinary skill in the art can implement a predictable variation, the variation is likely obvious;
- If a technique has been used to improve one device, and a person of ordinary skill in the art would recognize that it would improve similar devices in the same way, using the technique is obvious unless its actual application is beyond his or her skill;
- An explicit or implicit teaching, suggestion, or motivation to combine two prior art references to form the claimed combination may

demonstrate obviousness, but proof of obviousness does not depend on, or require, showing a teaching, suggestion, or motivation to combine;

- Market demand, rather than scientific literature, can drive design trends and may show obviousness;
- In determining whether the subject matter of a patent claim would have been obvious, neither the particular motivation nor the avowed purpose of the named inventor controls;
- One of the ways in which a patent's subject can be proved obvious is by noting that there existed at the time of invention a known problem for which there was an obvious solution encompassed by the patent's claims;
- Any need or problem known in the field of endeavor at the time of invention and addressed by the patent can provide a reason for combining the elements in the manner claimed;
- "Common sense" teaches that familiar items may have obvious uses beyond their primary purposes, and in many cases a person of ordinary skill in the art will be able to fit the teachings of multiple patents together like pieces of a puzzle;

- A person of ordinary skill in the art is also a person of ordinary creativity, and is not an automaton;
- A patent claim can be proved obvious by showing that the claimed combination of elements was “obvious to try,” particularly when there is a design need or market pressure to solve a problem and there are a finite number of identified, predictable solutions such that a person of ordinary skill in the art would have had good reason to pursue the known options within his or her technical grasp; and
- One should be cautious of using hindsight in evaluating whether an alleged invention would have been obvious.

37. I understand that a POSA must have a reasonable expectation of success in combining the references. I understand that a reasonable expectation of success refers to the likelihood of success in combining references to meet the limitations of the claimed invention. I understand that in evaluating a combination, a predictable result means not only that the prior art elements are capable of being physically combined, but also that the combination would have worked for its intended purpose.

38. I have been asked to consider the patentability of the Challenged Claims. I have been informed that for *inter partes* reviews (“IPR”), unpatentability must be shown under a preponderance of the evidence standard. I have been

informed that to establish something by a preponderance of the evidence one needs to prove it is more likely true than not true. I have concluded that the Challenged Claims are unpatentable at least as obvious based on the references described below and as explained herein.

3. Claim Interpretation

39. I understand that determining whether a claimed invention is novel and non-obvious requires comparing the prior art to the challenged claim. In this Section, I discuss the interpretations that I applied to certain claim terms in my analysis.

40. I have been informed that patent claims are construed from the viewpoint of a person of ordinary skill in the art at the time of the alleged invention. I have been informed that patent claims generally should be interpreted consistent with their plain and ordinary meaning as understood by a person of ordinary skill in the art in the relevant time period (i.e., at the time of the purported invention, or the so called “effective filing date” of the patent application), after reviewing the patent claim language, the specification and the prosecution history (i.e., the intrinsic record).

41. I have further been informed that a person of ordinary skill in the art must read the claim terms in the context of the claim itself, as well as in the context of the entire patent specification. I understand that in the specification and

prosecution history, the patentee may specifically define a claim term in a way that differs from the plain and ordinary meaning. I understand that the prosecution history of the patent is a record of the proceedings before the U.S. Patent and Trademark Office, and may contain explicit representations or definitions made during prosecution that affect the scope of the patent claims. I understand that an applicant may, during the course of prosecuting the patent application, limit the scope of the claims to overcome prior art or to overcome an examiner's rejection, by clearly and unambiguously arguing to overcome or distinguish a prior art reference, or to clearly and unambiguously disavow claim coverage.

42. In interpreting the meaning of the claim language, I understand that a person of ordinary skill in the art may also consider "extrinsic" evidence, including expert testimony, inventor testimony, dictionaries, technical treatises, other patents, and scholarly publications. I understand this evidence is considered to ensure that a claim is construed in a way that is consistent with the understanding of those of skill in the art at the time of the alleged invention. This can be useful for technical terms whose meaning may differ from its ordinary English meaning. I understand that extrinsic evidence may not be relied on if it contradicts or varies the meaning of claim language provided by the intrinsic evidence, particularly if the applicant has explicitly defined a term in the intrinsic record.

43. I understand that determining whether a claimed invention is novel and non-obvious requires comparing the prior art to the challenged claim. In this Declaration, I apply the above standards to the terms in the challenged claims. The meanings of specific terms are discussed below in connection with evaluating the disclosure in the priority documents.

II. DESCRIPTION OF THE RELEVANT FIELD AND THE RELEVANT TIME FRAME

44. I have reviewed the '278 patent (Ex. 1001) and its prosecution history (Ex. 1002).

45. I understand that the '278 patent issued from U.S. Patent Application Ser. No. 11/773,272 ("the '272 application"), a continuation-in-part application filed on July 3, 2007. Ex. 1001 (Fields 21 & 22). I understand that a continuation-in-part application adds new disclosures to earlier applications, whereas a continuation application does not.

46. In this case, the '278 patent claims to be a continuation-in-part from No. 11/076,259, filed on March 9, 2005, which was a continuation of No. 10/383,496, filed on March 7, 2003, which was a continuation of No. 09/859,972, which was filed on May 17, 2001. Ex. 1001, Field 63.

47. I understand that while the Patent Office never evaluated the effective filing date for any '272 application claims, in subsequent reexaminations the

Office determined that the effective filing date for all claims in the '278 patent was July 3, 2007. Ex. 1010, 2, ¶2; 1011, 5, 18; Ex. 1013, 6.

48. I understand that if PO argues it is entitled to an earlier effective filing date or “date of invention” for any claim, then PO has a burden to show this entitlement by establishing for each claim at issue that each limitation in the claim is supported by the written description in an earlier application related to the application for '278 patent. I reserve a right to respond if PO attempts any such showing.

49. I have been instructed by counsel to assume the relevant timeframe for my analysis of the prior art in this Declaration is on or before July 3, 2007.

50. Based on my review of the '278 patent and its file history, I believe that the relevant general fields for the purposes of the '278 patent are telematics, networking, vehicle communication networks, and vehicle control systems.

III. PERSON HAVING ORDINARY SKILL IN THE ART

51. My opinions are based on what a POSA in the technical field of the alleged invention would have understood on July 3, 2007. I have been informed and understand that the content of a patent and prior art should be interpreted the way a POSA would have interpreted those references at the time of the alleged invention using the ordinary and customary meanings of the claim terms. I understand that a POSA is a hypothetical concept referring to one who thinks along

the lines of conventional wisdom at the time. I have applied this standard throughout my declaration.

52. I was asked to provide an opinion as to the level of skill for a person of ordinary skill in the art pertinent to the subject matter set forth in the Challenged Claims of the '278 patent on July 3, 2007.

53. The '278 patent claims to have solved an alleged problem of providing tracking units for multi-vehicle compatible controllers. Ex. 1001, 2:38-41. The alleged invention combined known position determining devices, like known commodity GPS receivers, with known controllers. *Id.*, 1:47-53, 1:60-2:8, 2:17-37. The controllers can read diagnostic data from devices on different host vehicles using a vehicle network, and location from the GPS receiver, and transmit this information wirelessly.

54. In the context of the '278 patent and the prior art, it is my opinion that the POSA to whom the patent is addressed would have had a Bachelor's degree in electrical engineering, computer engineering, computer science, automotive engineering, or a related discipline, and at least two years of experience in networking or automotive engineering. POSAs would have understood networking electronics, e.g., how to connect electronic devices so data can be accessed from and communicated to those devices over a wired or wireless link. A POSA would also have been familiar with vehicle data buses, regulations and

industry standards involving OBD-II, and at least one underlying network protocol used by OBD-II.

55. In reaching this opinion as to the hypothetical person of ordinary skill in the art, I have considered the types of problems encountered in the art, the prior art solutions to those problems, the rapidity with which innovations are made, the sophistication of the technology, and the educational level and professional capabilities of workers in the field.

56. The basis for my familiarity with the level of ordinary skill is my own technical experience as described above, as well as my interaction with students and professionals in the field of Electrical and Computer Engineering, as well as the prior solutions to tracking units with multi-vehicle compatible controllers.

57. For example, a POSA with the level of skill set forth above would have been able to design, build, and operate the vehicle trackers that I described above in connection with research for the United States Department of Transportation, administered by the Alaska University Transportation Center, used in over 100 vehicles of different makes and models, including vehicles manufactured by Toyota, Honda, Mercedes, Ford, and Subaru.

58. My POSA definition is further supported by the disclosure in the '278 patent, as well as in the prior art references U.S. Patent No. 6,957,133 (Ex. 1023, "Hunt") and U.S. Patent 6,756,885 (Ex. 1024, "Flick-885") discussed below, other

prior art, and applicable standards and regulations discussed below. These concern networking and connecting networked electronics in vehicles, and clearly involve networking standards used in OBD-II like SAE J1850 or Controller Area Networks (“CAN”). They involve reading data or “diagnostics” from devices using the OBD-II bus, and wirelessly transmitting data over cellular or other networks. In my opinion a Bachelor’s degree in electrical engineering, computer engineering, computer science, automotive engineering, or a related discipline, and at least two years of experience in networking or automotive engineering, would have provided the ordinary skill in this subject matter to work with, design and implement tracking units and work with networked electronics in vehicles as discussed in these references. With this experience POSAs would have understood networking electronics, e.g., how to connect electronic devices so data can be accessed from and communicated to those devices over a wired or wireless link.

59. The ’278 patent tracking unit is discussed in the context of reading data from host vehicle electronics over vehicle data buses. The prior art, including Flick-885 discussed below, and Flick-460, which the ’278 patent incorporated, cite industry standards on networking protocols as background.

60. POSAs would have been familiar with vehicle data buses, regulations and industry standards involving OBD-II, and at least one underlying network protocol used by OBD-II because anyone designing OBD-II scan tools, controllers,

appliances, and tracking units as described in these references—and the ’278 patent—would have had to meet the requirements of the regulations or industry standards defining the networking protocols and used in the vehicles that would host these tracking units. POSAs would have understood that the standards and regulations would have explained the networking protocols needed to communicate with host vehicles. Any POSA designing commercial products would have understood that any devices they designed and built would also have to comply with applicable regulations and standards before they could sell them. POSAs familiar with at least one underlying networking protocol, such as used by a given manufacturer as described in Ex. 1023, would have had the skill to digest, understand, and apply other standards as needed, or as cross-referenced among the industry standards and regulations.

61. I understand that in an earlier civil litigation captioned *Omega Patents, L.L.C. v. CalAmp Corp.*, No. 6:13-cv-1950 (M.D. Fla. April 15, 2015) (“*CalAmp* Litigation”) the Patent Owner (“PO”) argued a different POSA definition as (Ex. 1065, 40-41, ¶116):

A person of ordinary skill in the art in that field would have at least an undergraduate degree in electrical engineering, automotive engineering, or an equivalent engineering discipline, and several years’ experience in designing, manufacturing, installing and/or working on or with telematics systems such as those used in vehicles.

Alternatively, additional years of practical experience may replace the engineering degree, or completion of post-graduate engineering studies may reduce the years of practical experience necessary.

62. While this definition differs from the one I proposed, I also meet this POSA definition.

63. My Bachelor's degree from the University of Southern California is in Computer Engineering and Computer Science, which is a degree jointly offered by the department of Electrical Engineering and the department of Computer Science, qualifying as "an equivalent engineering discipline." During my time as an undergraduate and graduate student, I took classes in many engineering topics that are used in telematics systems, such as networking (both hardware and software), very large scale integrated (VLSI) circuit design, complementary metal-oxide semiconductor (CMOS) design, and the design of microprocessors and memory.

64. I continued this work professionally through multiple jobs involving the hardware and software of computer and embedded networking, including starting a company that created handheld point-of-sale systems that utilized wireless networking for transmitting orders and transactions. My academic research, as explained in the Background and Qualifications section above, has involved designing, manufacturing, installing, and working on devices for obtaining data from a vehicle's OBD port, coupling that with a GPS receiver, and transmitting the data over the cellular network to a central server for further

analysis. These activities included “several years’ experience in designing, manufacturing, installing and/or working on or with telematics systems such as those used in vehicles.” Ex. 1065, 40-41, ¶116. Further, I obtained a Master’s degree in 2002 and a Ph.D. in 2007 from the Viterbi School of Engineering at the University of Southern California, meeting the alternative of “completion of post-graduate engineering studies may reduce the years of practical experience necessary.” *Id.*

65. As summarized above with regards to my qualifications and experience, under either definition I possessed at least the level of skill of a POSA at the time of the alleged invention of the ’278 patent.

66. I have worked with many people who fit the characteristics of the POSA, and I am familiar with their level of skill in and around July 2007.

67. When developing the opinions set forth in this declaration, I assumed the perspective of a POSA under my proposed definition above. My opinions would not change if I applied the Patent Owner’s definition in the *CalAmp* Litigation, as set forth above.

68. Except as noted below whenever I offer an opinion in this declaration about the knowledge of a POSA, the manner in which a POSA would have understood the claims of the ’278 patent or its description, the manner in which a POSA would have understood the prior art, or what a POSA would have been led

to do based on the prior art, I am referencing the July 2007 timeframe, even if I do not say so specifically in each case.

IV. REGULATORY BACKGROUND

69. The '278 patent concerned communicating with electronic devices on host vehicles. As shown below all claims require “multi-vehicle compatibility.”

70. Throughout this Declaration, the bold and italicized emphasis in quoted language is added unless otherwise indicated.

A. OBD-II

71. By July 3, 2007, when PO filed the continuation-in-part application for the '278 patent, federal Environmental Protection Agency (“EPA”) regulations ***required*** standardized communications with vehicle electronics through an OBD-II system:

Except as provided by paragraph (a)(2) of this section, ***all*** light-duty vehicles, light-duty trucks and complete heavy-duty vehicles weighing 14,000 pounds GVWR or less (including MDPVs) ***must be equipped with an onboard diagnostic (OBD) system capable of monitoring all emission-related powertrain systems or components*** during the applicable useful life of the vehicle.

Ex. 1046, 369 (40 C.F.R. §86.1806-05(a)(1)); *see also id.*, 374 (40 C.F.R. §86.1806-05(h), 86.1806-05(h)(1)(vi)); Ex. 1070, 68 Fed. Reg. 35798-35800. Exhibit 1046 provides the July 1, 2007 version of EPA regulations governing the OBD-II system that would have been in effect on July 3, 2007, the effective filing date of the '278

patent. Exhibit 1070 provides June 17, 2003 revisions to the EPA's OBD-II regulations including those codified in Ex. 1046 at 40 C.F.R. §86.1806-05 that remained in effect on July 3, 2007 when the PO filed the continuation-in-part application for the '278 patent.

72. In 2007 the OBD-II regulations were codified in the Code of Federal Regulations as follows, by reference to Title 40, Chapter I, Subchapter C, Part 86 in Ex. 1046. Title 40 concerns Protection of the Environment (Ex. 1046, title and 1); Chapter I concerns the Environmental Protection Agency (*id.*, 1); Subchapter C concerns Air Programs (*id.*, 3); Part 86 (*id.*, 5-10) concerns "Control of Emissions from New and In-use Highway Vehicles and Engines"; and Subpart S (*id.*, 8-9) concerns "General Compliance Provisions for Control of Air Pollution From New and In-Use Light-Duty Vehicles, Light-Duty Trucks, and Complete Otto-Cycle Heavy-Duty Vehicles." Within Subpart S, Section 86.1801-01 provides applicability and Sections 86.1806-01, -04, and -05 concern "On-board diagnostics," including OBD-II. The codification in different years is available at <https://www.govinfo.gov/app/collection/cfr>. The regulations themselves are promulgated in the Federal Register.

73. The EPA regulations require compliance with various industry standards governing data communication:

The OBD system shall provide for standardized access and conform with the following Society of Automotive Engineers (SAE) standards and/or the following International Standards Organization (ISO) standards.

Ex. 1046, 374 (40 C.F.R. §86.1806-05(h)), 374-375 (listing industry standards).

74. The EPA regulations specify network protocols for vehicular communication among vehicle electronics and external devices. On July 3, 2007, the OBD-II regulations required “SAE J1850 ‘Class B Data Communication Network Interface,’ (Revised, May 2001) shall be used as the on-board to off-board communications protocol.” Ex. 1046, 374 (40 C.F.R. §86.1806-05(h)(1)(i)).

75. Exhibit 1071 is SAE J1850 ‘Class B Data Communication Network Interface,’ (Revised, May 2001).

76. Framed in terms of the “Open Stack Interface” or “OSI” model generally used to describe functionality in network communications, J1850 specified a physical layer, data link layer, and application layer. The J1850 network stack allowed two physical layer communication protocols: variable pulse width (“VPW”) encoding at 10.4 Kbps bit rate, or pulse width modulation (“PWM”) at 41.6 Kbps bit rate. Ex. 1071, 8, Fig. 1. VPW is sometimes referred to as VPWM for variable pulse width modulation. “Kbps” refers to kilobits per second. This is 1024 or 2^{10} bits (referenced as “kilo” because it is approximately 1000) bits per second. A bit is a binary digit, 0 or 1.

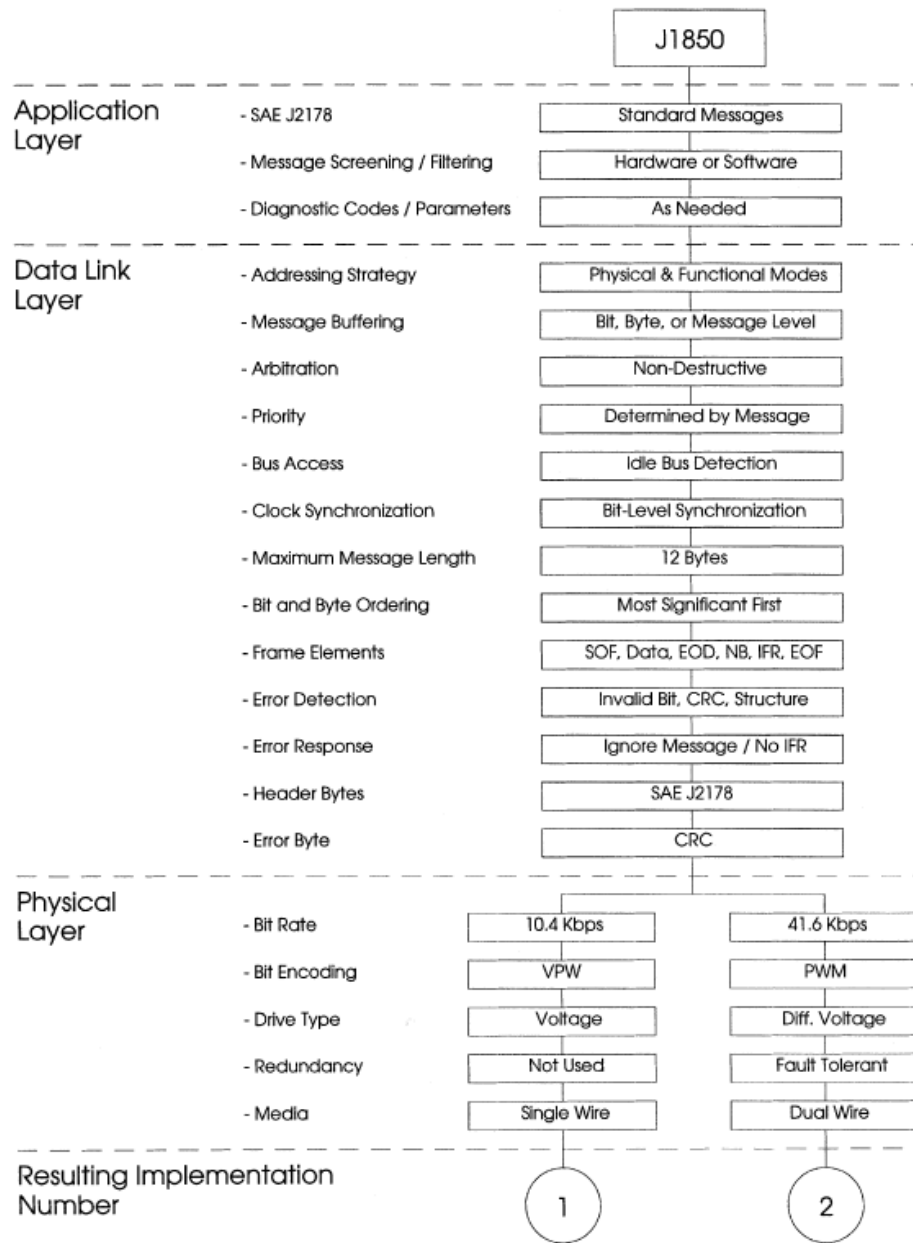


FIGURE 1—MAP OF SAE J1850 TO THE ISO OSI MODEL

77. Different manufacturers might use different communication protocols at the physical layer. For example, Hunt—a patent filed May 8, 2003—explains that (as of 2003) Ford used J1850 PWM, while GM used J1850 VPW, to exchange standardized messages using the data and application layers. Ex. 1023, 2:48-57,

Figs. 1B, 5. While this patent, Hunt, refers to “VPWM,” POSAs would have understood that this meant VPW.

78. While industry standards on networking protocols already existed, the EPA regulations compelled industry compliance with them by incorporating the standards in federal regulations. Regulations ensured that any OBD-II compliant device could communicate with different vehicles because they adhered to known standards.

79. The EPA regulations also allowed industry to support OBD-II with alternative networking protocols like:

- ISO 9141-2 used by Toyota (Ex. 1046, 374 (§86.1806-05(h)(2)(i)));
- ISO 14230–4 Keyword Protocol 2000 (“KWP2000”), used by Hyundai and Mercedes (*id.* (§86.1806-05(h)(2)(ii)); Ex. 1074);
- or ISO 15765-4 Controller Area Network (“CAN”) (Ex. 1046, 374 (§86.1806-05(h)(2)(iii))).

80. Some associations between a particular protocol, and a particular manufacturer, in 2003, can be found, for example, in the disclosure in Ex. 1023, 2:48-57, Fig. 5.

81. Ex. 1046, 374 (40 C.F.R. § 86.1806-05(h)(2)(iii) refers to “ISO 15765–4.3:2001 ‘Road Vehicles-Diagnostics on Controller Area Network (CAN)—Part 4: Requirements for emission-related systems’, (December 14, 2001)

may also be used as an alternative to SAE J1850.” By 2005 the standard having that title was identified as ISO 15765-4 “Road vehicles-Diagnostics on Controller Area Network (CAN)—Part 4: Requirements for emission-related systems.” Ex. 1072.

82. Hunt, a patent filed May 8, 2003, describes the communication protocols authorized by EPA regulation that various manufacturers used in their vehicle networks. See Ex. 1023, 2:48-57, Figs. 1B, 5. By the time Hunt was filed, the industry standards listed in Hunt (e.g., J1850, KWP2000, CAN, and others) were also incorporated in California regulations—effective April 18, 2003—for on-board diagnostics and scanners like Hunt’s appliance. Ex. 1066, 13 Cal. Code Reg. §1968.02 (2004).

83. The OBD-II regulations had to accommodate compliance with legacy industry standards while also mandating new standards for future vehicles meeting certain specifications. For example, at 40 C.F.R. §86.1806-05(h)(3) the 2007 regulations provided:

Beginning with the 2008 model year and beyond, ISO 15765–4.3: 2001 “Road Vehicles-Diagnostics on Controller Area Network (CAN)—Part 4: Requirements for emission-related systems”, (December 14, 2001) shall be the only acceptable protocol used for standardized on-board to off-board communications for vehicles below 8500 pounds. For vehicles 8500 to 14000 pounds ISO 15765–4.3 or the SAE J1939 series of standards (SAE J1939–11, J1939–13, J1939–21, J1939–31,

J1939–71, J1939–73, J1939–81). All other standardized on-board to off-board communications protocols: SAE J1850 “Class B Data Communication Network Interface,” (Revised, May 2001) in paragraph (h)(1)(i), ISO 9141–2 “Road vehicles—Diagnostic systems—Part 2: CARB requirements for interchange of digital information,” (February 1, 1994) in (h)(2)(i), and ISO 14230–4 “Road vehicles—Diagnostic systems—KWP 2000 requirements for Emission-related systems”, (June 1, 2000) in paragraph (h)(2)(ii) of this section will at that time no longer be accepted.

Ex. 1046, 374-375.

84. Keyword 2000 is shorthand for “Keyword Protocol 2000”, which is sometimes abbreviated as “KWP 2000” as in 40 C.F.R. §86.1806-05(h)(3). Ex. 1074, 1; Ex. 1046, 374.

85. As the EPA’s 2003 final rule for on-board diagnostics explained, referring to the Controller Area Network (“CAN”) defined in ISO 15765-4.3, “The standardized communication protocols ***provide a uniform language structure that facilitates compatibility between OBD II equipped vehicles and OBD II-related equipment.***” Ex. 1070, 68 Fed. Reg. 35794. As I explained above, by 2005 the CAN standard was ISO 15765-4. Ex. 1072. Current regulations at 40 C.F.R. §86.1806-05(h)(1)(i) compel compliance with Exhibit 1072:

(i) Starting in model year 2008, light-duty vehicles and light-duty trucks must comply with ISO 15765-4:2005(E), “Road Vehicles-

Diagnostics on Controller Area Network (CAN) - Part 4: Requirements for emission-related systems”, January 15, 2005.

86. As the J1850 application layer reference to using standardized messages defined in SAE J2187 suggests, and as explained further below, the industry standards adopted by OBD-II regulations specified standard messages that facilitated communication with devices on different vehicles adhering to that particular standard and using the network provided in that particular standard. OBD-II also standardized diagnostic trouble codes. Ex. 1046, 374, 40 C.F.R. §86.1806-05(h)(1)(iii) (“Diagnostic trouble codes shall be consistent with SAE J2012 ‘Diagnostic Trouble Code Definitions—Equivalent to ISO/DIS 15031–6: April 30, 2002,’ (Revised, April 2002).”).

B. Automatic Determination Of Communication Interface

87. By 2007, 40 C.F.R. §86.1806-05(h)(1)(vi), the federal OBD-II regulations, provided “All equipment used to interface, extract and display OBD-related information *shall meet SAE J1978 ‘OBD II Scan Tool Equivalent to ISO 15031–4:December 14, 2001’, (Revised, April 2002).*” Ex. 1046, 374. Exhibit 1052 is the SAE J1978 document cited at 40 C.F.R. §86.1806-05(h)(1)(vi) in Ex. 1046, 374. This means that any device that interfaced and extracted OBD-II related-information, like engine controller data, had to comply with the requirements in SAE J1978 (“J1978”).

88. POSAs would have understood that the '278 patent tracking unit was an OBD-II scan tool as described in 40 C.F.R. §86.1806-05(h)(1)(vi) and SAE J1978 because it was used to interface and extract information from devices on an OBD-II system. For the same reasons, POSAs would have understood that the multi-vehicle compatible controller in Exhibit 1024 (Flick-885), and the wireless appliance in Exhibit 1023 (Hunt), both discussed further below, were also OBD-II scan tools within the meaning of 40 C.F.R. §86.1806-05(h)(1)(vi) and SAE J1978. On July 3, 2007, federal regulations required that each of these devices complied with SAE J1978 ("J1978").

89. J1978 **required** that **any device** intended to communicate with an OBD-compliant vehicle to retrieve OBD information—like the tracking unit in the '278 patent, the multi-vehicle controller in Flick-885 (prior art discussed below), or the appliance in Hunt (prior art discussed below)—could automatically determine a host vehicle communication protocol by broadcasting request messages to vehicle electronics under the different industry standards. Ex. 1052, 5-6.

90. J1978 "describes the minimum capabilities that must be supported by test equipment (e.g., handheld scan tools, PC based diagnostic computers, etc.) that are intended to communicate with an OBD-compliant vehicle to retrieve the OBD information." Ex. 1052, 1. J1978 specifies "a. A means of establishing

communications between an OBD-equipped vehicle and external test equipment, b. A set of diagnostic services to be provided by the external test equipment in order to exercise the services defined in SAE J1979, c. Conformance criteria for the external test equipment.” *Id.*, 3.

91. As I explained above, POSAs would have understood that the ’278 patent tracking unit, the multi-vehicle compatible controller in Flick-885, and the wireless appliance in Hunt, were each considered scan tools for purposes of J1978. They would each alternatively have been described as external test equipment under J1978, and SAE J1979, because they were capable of querying diagnostic data from devices on OBD-II networks.

92. SAE J1979 is a standard on “E/E Diagnostic Test Modes – Equivalent to ISO/DIS 15031-5:April 30, 2002.” The April 2002 revision is provided at Ex. 1075. It “specifies diagnostic services and functionally addressed request / response messages ***required to be supported by motor vehicles and external test equipment for diagnostic purposes*** which pertain to motor vehicle emission-related data. These messages ***are intended to be used by any external test equipment meeting the requirements of SAE J1978 for retrieval of OBD information from a vehicle.***” Ex. 1075, 1.

93. Returning to J1978 on “OBD II Scan Tool,” it provided “The following are the basic functions that the external test equipment is ***required to***

support or provide: — Automatic hands-off determination of the communication interface used to provide OBD services on the vehicle[.]” Ex. 1052, 4, §4

Required Functions of the External Test Equipment.

94. J1978 explains that “external test equipment shall have an ‘Automatic hands-off determination of the communication interface’ built in to determine the communication protocol used in a given vehicle.” *Id.*, 5, §7.1 (Automatic Determination of Communication Interface).

95. The automatic determination of communication interface tests communications by sending request messages using J1850 PWM, J1850 VPW, ISO 9141-2, ISO 14230-4, and ISO 15765-4 standards. *Id.* “The tests to determine the communication interface and protocol ***may be performed in any order*** and, where possible, ***may be performed simultaneously***.” *Id.*

96. The J1978 automatic determination tests are as follows (Ex. 1052, 5-6):

1. Test for SAE J1850 41,6 kbps (kilobits per second) PWM (pulse width modulation):

- enable the SAE J1850 41,6 kbps PWM interface;
- send a service \$01 PID \$00 request message;
- if a service \$01 PID \$00 response message is received then SAE J1850 41,6 kbps PWM is the vehicle's OBD protocol.

2. Test for SAE J1850 10,4 kbps VPW (variable pulse width):

- enable the SAE J1850 10,4 kbps VPW interface;
- send a service \$01 PID \$00 request message;
- if a service \$01 PID \$00 response message is received then SAE J1850 10,4 kbps VPW is the vehicle's OBD protocol.

3. Test for ISO 9141-2:

- enable the ISO 9141-2 interface;
- if the initialization sequence specified in ISO 9141-2 is completed successfully, then ISO 9141-2 is the vehicle's OBD protocol.

4. Test for ISO 14230-4:

- enable the ISO 14230-4 interface;
- if the initialization sequence specified in ISO 14230-4 is completed successfully, then ISO 14230-4 is the vehicle's OBD protocol.

5. Test for ISO 15765-4:

- legacy vehicles previously were allowed to use the contacts now defined for CAN communication as manufacturer discretionary. The external test equipment shall ensure adequate protection from these legacy signals,

- perform the “External Test Equipment Initialization Sequence” defined in ISO 15765-4,
- if the initialization sequence specified in ISO 15765-4 is completed successfully, then ISO 15765-4 is the vehicle's OBD protocol.

97. In other words, by 2007 federal regulations required that every OBD-II compliant scan tool “used to interface, extract and display OBD-related information” comply with SAE J1978. Compliance with J1978 required each such scan tool to provide this automatic communication interface determination functionality, meaning that every such tool would be capable of sending and receiving messages to vehicle electronics communicating on the OBD-II bus on any OBD-II compliant vehicle. Even without the mandate from federal regulations, the industry expected scan tool / external test equipment compliance with J1978 to ensure interoperability of devices using the OBD-II system.

98. Unpacking the automatic determination still further using the J1850 tests as an example, J1978 explains that “[t]he service \$01 PID \$00 request and response messages are specified in SAE J1979.” Ex. 1052, 6. J1978 incorporates SAE J1979—E/E Diagnostic Test Modes - Equivalent to ISO/DIS 15031-5:April 30, 2002. Ex. 1052, 3. This is the same version of SAE J1979 incorporated in 40 C.F.R. §86.1806-05(h)(1)(ii). Ex. 1046, 374.

99. Exhibit 1075 is SAE J1979—E/E Diagnostic Test Modes - Equivalent to ISO/DIS 15031-5:April 30, 2002, as cited in Exhibits 1046 and 1052. Ex. 1075, 1.

100. SAE J1979 explains that “PID” referred to a parameter identification. Ex. 1075, 24, §5.1.1 (“The request for information includes a parameter identification (PID) value that indicates to the on-board system the specific information requested. PID specifications, scaling information, and display formats are included in Appendix B.”).

101. The “service \$01” request is a “request for current powertrain diagnostic data. *Id.*, §§ 5.1, 5.1.1 (“The purpose of this service is to allow access to current emission-related data values, including analogue inputs and outputs, digital inputs and outputs, and system status information.”).

102. Under J1979, an electronic control unit (“ECU”) responds to a service \$01 request “by transmitting the requested data value last determined by the system. All data values returned for sensor readings will be actual readings, not default or substitute values used by the system because of a fault with that sensor.” *Id.*, § 5.1.1.

103. Under J1979, “PID \$00 is a bit-encoded PID that indicates, for each ECU, which PIDs that ECU supports. PID \$00 shall be supported by all ECUs that respond to a service \$01 request, because the external test equipment that conforms

to SAE J1978 use the presence of a response message by the vehicle to this request message to determine which protocol is supported for diagnostic communications. Appendix A defines how to encode supported PIDs.” *Id.*

C. Standardized Messages

104. As will become relevant in the analysis below, the relevant standards specify standardized request messages—including those used in automated determination of communication interface.

105. In particular, I understand that in the CalAmp Litigation, PO argued that certain accused products—the CalAmp LMU-3000 and LMU-3030—met limitations in claim 1 (element [1.d] as identified in the Claim List appendix and discussed below) because “[o]n initial installation, the multi-vehicle compatible controller generates a sequence of device codes to determine compatibility with different vehicles, including CAN 11 Bit 7DF message, CAN 29 Bit 18DB33F1 message, J1850 VPW 68 6A F1 message, J1850 PWM message, K-Line messages and J1850 VPW 6C 10 F1 message.” Ex. 1065, 100 (Expert Report of Joseph C. McAlexander Regarding Infringement, at E-7). POSAs would have understood that each of these “messages” refers to a data frame containing a sequence of hexadecimal as set forth in the respective networking standards. As explained below, the particular hexadecimal cited for particular “messages” in PO’s infringement argument are bytes in message headers defined by the respective

standards. PO’s own infringement analysis treats the messages having these headers—and other standards-compliant messages—as “device codes” meeting the “vehicle device code” limitation in claim language that the Claim List maps to claim 1, element [1.d].

U.S. PATENT 8,032,278	
OMEGA PATENT CLAIMS	LMU-3000/LMU-3030 ⁵
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 LMU-3000 includes a 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 at least one vehicle device is the vehicle’s ECM. On initial installation, the multi-vehicle compatible controller generates a sequence of device codes to determine compatibility with different vehicles, including CAN 11 Bit 7DF message, CAN 29 Bit 18DB33F1 message, J1850 VPW 68 6A F1 message, J1850 PWM message, K-Line messages and J1850 VPW 6C 10 F1 message. (PX 13.)

106. Exhibit 1065 is dated April 15, 2015. Ex. 1065, 1, 48.

107. POSAs would have understood that this PO infringement allegation comports with the OBD-II automatic communication interface determination tests for ISO 15765-4 (CAN), J1850 PWM, and J1850 VPW, as described above and specified in J1979, while as explained below the final **6C 10 F1** message is a standardized query to a host vehicle engine controller in a vehicle using J1850 VPW. In other words, the identified messages—which PO characterized as device codes—correspond to standardized or standards-compliant messages, and further these messages were governed by standards adopted by the OBD-II regulations.

1. Terminology

108. I add a note on ECU terminology. In earlier litigation the PO, and the Federal Circuit, referred to an “**engine** control unit” as an “ECU”. Ex. 1020, *Omega Patents, LLC v. CalAmp Corp.*, 920 F.3d 1337, 1341-1342 (Fed. Cir. 2019) (“The LMU connects to a vehicle’s data communication bus via the onboard diagnostics port and can retrieve information (for example, battery health or vehicle speed) from the vehicle’s **engine control unit (‘ECU’)** via the vehicle’s data bus.”), *id.*, 920 F.3d at 1346 n.5 (“At trial, *Omega* relied on the *ECU* as the **claimed ‘vehicle device’** in the various claims. See, e.g., J.A. 16065. It is not contested on appeal that *the ECU constitutes a ‘vehicle device.’*”). Other patents, as well as some of the prior art references like Hunt discussed below, do the same. *E.g.*, Ex. 1023, 1:26 (“a vehicle’s **engine control unit (ECU)**”).

109. In the Controller Area Networks or CAN standard, an “ECU” is an “**electronic** control unit.” Ex. 1072, 2, ISO 15764-4, § 3 Terms, definitions, symbols, and abbreviated terms (2005). This “ECU” refers to a generic set that includes an engine controller—or engine control module—and other electronics as a subset. In CAN, an engine controller is an “ECM” for “engine control module.” *Id.*, 12 (recommended 11-bit CAN identifier assignment is “7E0/7E8 for ECM (engine control module)”). So in CAN, the ECM is a subset of the ECU.

110. The engine controller (ECM) in the ISO 15765-4 Controller Area Network or CAN standard, is an “engine control unit” or “ECU” in the sense used in prior art Hunt and by Omega in prior litigation, as I described above.

111. In this declaration, unless I state otherwise, I will use “ECU” to mean an “engine control unit” consistent with how Omega, the courts, and the prior art have used the phrase. I will treat this as interchangeable with the ECM as used in CAN.

2. CAN 11 Bit 7DF

112. In the *CalAmp* Litigation the PO’s expert argued that accused devices met claim 1, element [1.d] (discussed below) because they sent a “CAN 11 bit 7DF message.” Ex. 1065, 100 (Expert Report of Joseph C. McAlexander Regarding Infringement, at E-7).

U.S. PATENT 8,032,278	
OMEGA PATENT CLAIMS	LMU-3000/LMU-3030 ⁵
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 LMU-3000 includes a 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 at least one vehicle device is the vehicle’s ECM. On initial installation, the multi-vehicle compatible controller generates a sequence of device codes to determine compatibility with different vehicles, including CAN 11 Bit 7DF message, CAN 29 Bit 18DB33F1 message, J1850 VPW 68 6A F1 message, J1850 PWM message, K-Line messages and J1850 VPW 6C 10 F1 message. (PX 13.)

113. To test for ISO 15765-4, the OBD-II automatic determination in J1978 “perform[s] the ‘External Test Equipment Initialization Sequence’ defined in ISO 15765-4.” Ex. 1052, 6.

114. J1978 incorporates “ISO 15765-4:2001—Road vehicles — Diagnostics on Controller Area Network (CAN) – Part 4: Requirements for emissions-related systems.” Ex. 1052, 4, §2.1.2.

115. When PO’s expert undertook his infringement analysis in the CalAmp Litigation (and still today) the federal regulations required compliance with ISO 15765-4:2005(E), “Road Vehicles-Diagnostics on Controller Area Network (CAN) - Part 4: Requirements for emission-related systems”, January 15, 2005. 40 C.F.R. §86.1806-05(h)(1)(i). Exhibit 1072 is ISO 15765-4:2005(E). Ex. 1072, 1.

116. Section 4 describes the ISO 15765-4 “External test equipment initialization sequence.” Ex. 1072, §4 at 2-9. There are two parts: one for an 11 bit CAN (*id.*, §4.2 at 4-7) and another for a 29 bit CAN (*id.*, §4.3 at 7-9). This is shown in Ex. 1072, Fig. 1 at 3:

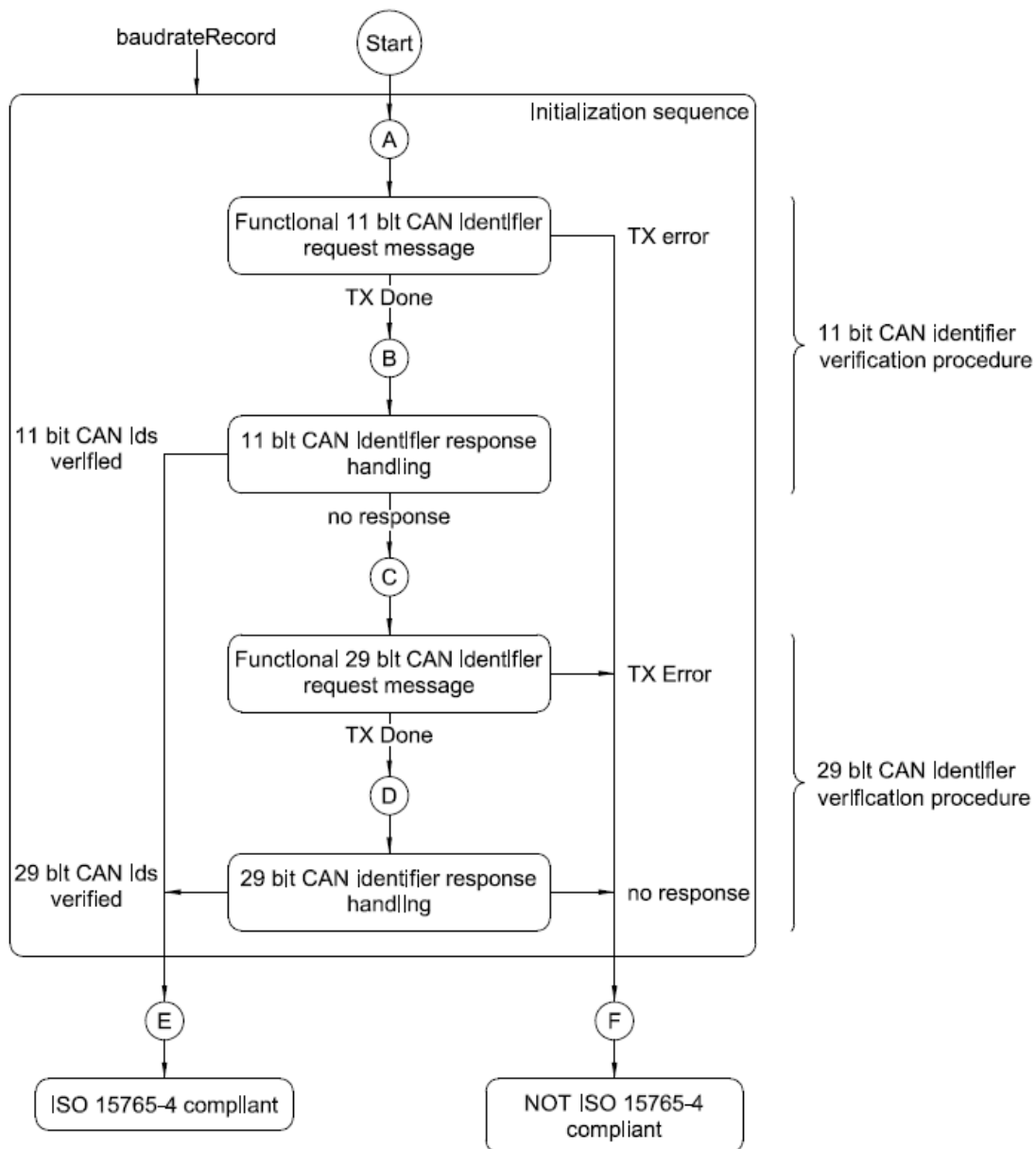


Figure 1 — Initialization sequence — Overview

**a. CAN use of ISO 15031-5 Road vehicles—
Communication between vehicle and external
equipment for emissions-related diagnostics—Part 5:
Emissions-related diagnostic services**

117. At Ex. 1072, 4, §4.2.1.b, the CAN standard explains:

b) The external test equipment shall transmit a functionally addressed service 01 hex request message (read-supported PIDs)²⁾ using the

legislated-OBd 11 bit functional request CAN identifier according to 6.3.2.2.

118. Footnote 2 reads, “***See ISO 15031-5 for the request message definition*** of service 01 hex to read the supported PIDs.” Ex. 1072, 4. Exhibit 1073 is ISO 15031-5 as referenced in this footnote 2. A “PID” is a parameter identifier, meaning, *e.g.*, the particular data being queried or reported.

119. In ISO 15031-5, a “service \$01” request (the “service 01 hex request message” in CAN, Ex. 1072, 4, §4.2.1.b) is a “Request for current powertrain diagnostic data.” Ex. 1073, 31. As the standard explains, *id.*:

The purpose of this service is to allow access to current emission-related data values, including analogue inputs and outputs, digital inputs and outputs, and system status information. The request for information includes a parameter identification (PID) value that indicates to the on-board system the specific information requested. PID specifications, scaling information, and display formats are included in Annex B.

IMPORTANT — All emissions-related OBD ECUs which at least support one of the services defined in this part of ISO 15031 shall support Service \$01 and PID \$00. Service \$01 with PID \$00 is defined as the universal “initialization/keep alive/ping” message for all emissions-related OBD ECUs.

120. The ISO 15031-5 standard specifies the hexadecimal (PID) for particular parameters. For example, under ISO 15031-5, the hexadecimal code for engine RPM is 0C. Ex. 1073, 123, Table B.13 – PID \$0C definition, in Annex B: PIDs (Parameter ID) for Services \$01 and \$02 scaling and definition:

Table B.13 — PID \$0C definition

PID (hex)	Description	Data byte	Min. value	Max. Value	Scaling/bit	External test equipment SI (Metric) / English display
0C	Engine RPM	A, B	0 min ⁻¹	16383,75 min ⁻¹	1/4 rpm per bit	RPM: xxxxx min ⁻¹
Engine RPM shall display revolutions per minute of the engine crankshaft.						

121. Thus, as will become relevant later, an OBD-II standards-compliant request for engine RPM ends with the hexadecimal 01 0C.

b. Hexadecimal encoding

122. POSAs would have understood that in connection with CAN network communications—and with all network protocols used in OBD-II as discussed further below—“hex” was a shorthand for hexadecimal, a numbering system with base 16 (instead of a decimal system with base 10).

123. Because base 16 requires additional digits, hexadecimal numbering uses A-F for base 10 digits 10-15. Hexadecimals are written as alphanumerics with an alphabet 0-9 and A-F. Lower case letters can also be used. Hexadecimals are often identified by a preceding dollar sign or “0x”, such as \$10 or “0x10” for hexadecimal 16, or \$A or “0xA” for hexadecimal 10, in order to distinguish them

from base 10 numbers. The dollar sign or “0x” prefix is often omitted when context makes clear that hexadecimal are indicated.

124. The term “legislated” in “legislated-OBD 11 bit functional request” means standardized, e.g., a message specified by standard. Ex. 1072, 1, §1 (“This part of ISO 15765 specifies requirements for the emissions-related systems of **legislated**-OBD-compliant controller area networks (CAN), such communications networks consisting of a road vehicle equipped with a single or multiple emissions-related ECUs and external test equipment.... **Legislated**-OBD-compliant vehicles are to comply with external test equipment requirements.”).

125. Section 6.3.2.2 provides the “11 bit **legislated**-OBD CAN identifiers.” It defines the hexadecimal 7DF as “CAN identifier for functionally addressed request messages sent by external test equipment.” Ex. 1072, §6.3.2.2 at 12.

Table 3 — 11 bit legislated-OBD CAN identifiers

CAN identifier (hex)	Description
7DF	CAN identifier for functionally addressed request messages sent by external test equipment

126. In other words, a “CAN 11 bit 7DF message” is **any 11 bit message** using a “legislated-OBD CAN identifier” **that complies with the CAN standard**.

127. Under ISO 15765-4 the CAN 11 bit 7DF message would be sent as the first part of the external test equipment initialization sequence, as specified in the OBD-II automatic determination of communication interface defined in J1978. Ex. 1052, 5-6.

128. In practical terms this 7DF message is a message from external equipment, connected to a host vehicle OBD-II, sending a message to determine if the vehicle will respond to a CAN 11 bit message.

3. CAN 29 Bit 18DB33F1

129. In the CalAmp Litigation the PO's expert argued that accused devices met claim 1, element [1.d] (discussed below) because they sent a "CAN 29 bit 18DB33F1 message." Ex. 1065, 100 (Expert Report of Joseph C. McAlexander Regarding Infringement, at E-7).

U.S. PATENT 8,032,278	
OMEGA PATENT CLAIMS	LMU-3000/LMU-3030 ⁵
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 LMU-3000 includes a 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 at least one vehicle device is the vehicle's ECM. On initial installation, the multi-vehicle compatible controller generates a sequence of device codes to determine compatibility with different vehicles, including CAN 11 Bit 7DF message, CAN 29 Bit 18DB33F1 message, J1850 VPW 68 6A F1 message, J1850 PWM message, K-Line messages and J1850 VPW 6C 10 F1 message. (PX 13.)

130. As the CAN standard Ex. 1072, Figure 1 explains, if the device does not receive a response to the CAN 11 bit 7DF message, the external test equipment initialization sequence tests for CAN 29 bit. This sequential testing is consistent with J1978, which does not require any particular sequence for the protocol testing and provides that the different protocol messages could be sent simultaneously.

Ex. 1072, Fig. 1 at 3:

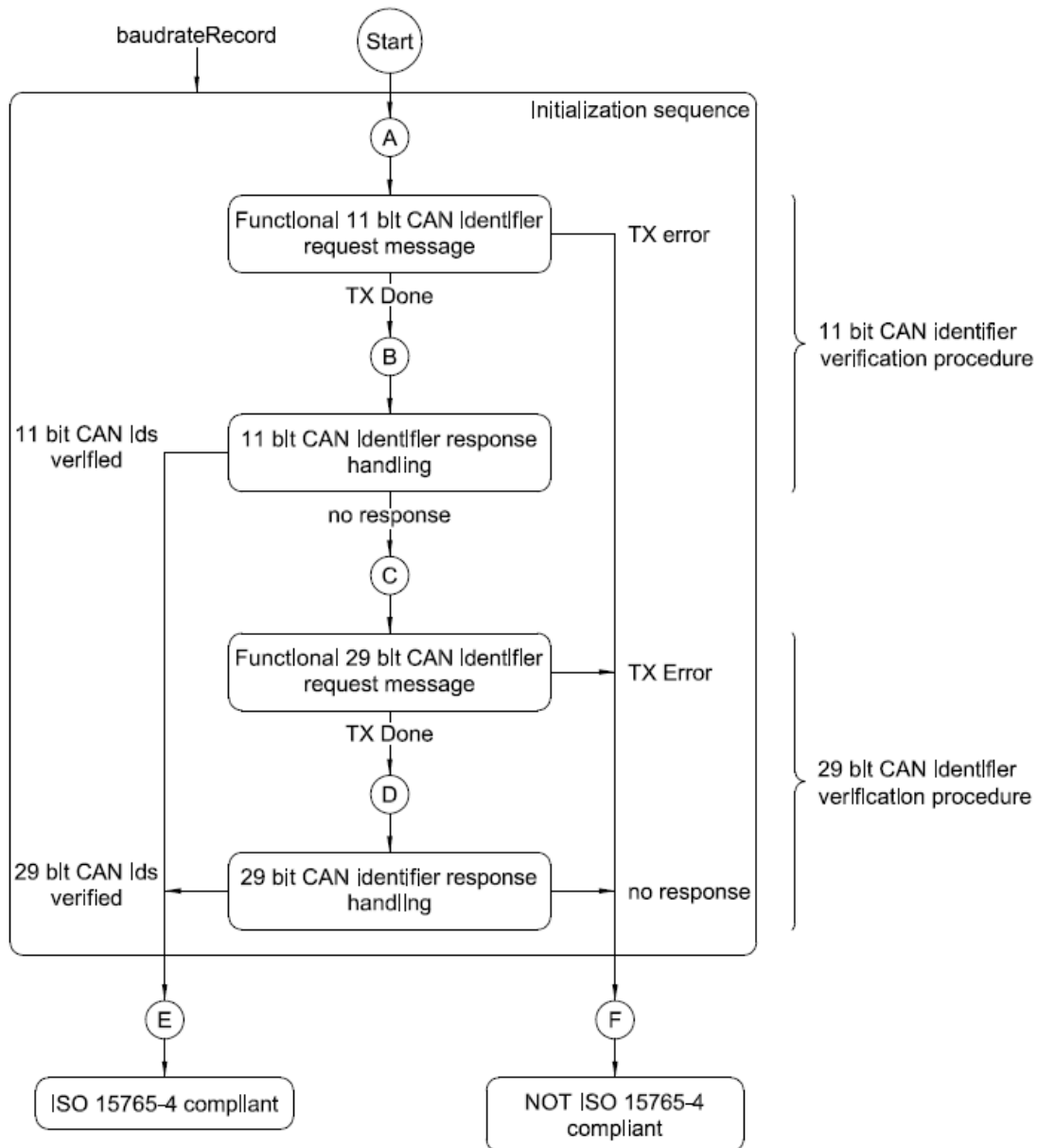


Figure 1 — Initialization sequence — Overview

131. The CAN standard, Section 4.3.1(a) provides,

If the external test equipment reaches this point in the initialization sequence, this means that the CAN baudrate is already configured based on the previously performed 11 bit CAN identifier verification procedure. The external test equipment shall transmit a functionally addressed service 01 hex request message (read-supported PIDs — see

ISO 15031-5) using the legislated-OBD 29 bit functional request CAN identifier according to 6.3.2.3.

Ex. 1072, 8.

132. Section 6.3.2.3 provides the “29 bit CAN identifiers for legislated OBD.” *Id.*, 12. It defines the hexadecimal 18 DB 33 F1 as “CAN identifier for functionally addressed request messages sent by external test equipment.” Ex. 1072, §6.3.2.3 at 13, Table 5.

Table 5 — 29 bit legislated-OBD CAN identifiers

CAN identifier (hex)	Description
18 DB 33 F1	CAN identifier for functionally address request messages sent by external test equipment.

133. In other words, a “CAN 29 Bit 18DB33F1 message” is any “functionally addressed request messages sent by external test equipment” using a “29 bit legislated-OBD CAN identifier” that complies with the ISO 15765-4 standard. The conventional approach of representing hexadecimal values on a network was as a stream of 8-bit values (a byte or octet) with spaces added between each 8-bit value as a matter of notational clarity in the ISO standard. Thus, PO’s reference to “18DB33F1” is equivalent to “18 DB 33 F1” as recited in ISO 15765-4.

134. Under ISO 15765-4 the CAN 29 bit 18 DB 33 F1 message would be sent as the second part of the ISO 15765-4 external test equipment initialization

sequence, as specified in the OBD-II automatic determination of communication interface.

135. In practical terms this 18 DB 33 F1 message is a message from external equipment, connected to a host vehicle OBD-II, sending a message to determine if the vehicle will respond to a CAN 29 bit message.

4. J1850 VPW 68 6A F1

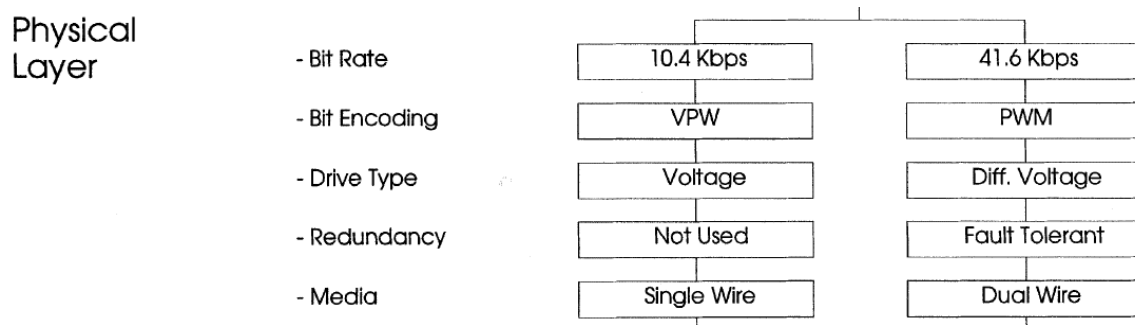
136. In the CalAmp Litigation the PO's expert argued that accused devices met claim 1, element [1.d] (discussed below) because they sent a "J1850 VPW 68 6A F1 message." Ex. 1065, 100 (Expert Report of Joseph C. McAlexander Regarding Infringement, at E-7).

U.S. PATENT 8,032,278	
OMEGA PATENT CLAIMS	LMU-3000/LMU-3030 ⁵
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 LMU-3000 includes a 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 at least one vehicle device is the vehicle's ECM. On initial installation, the multi-vehicle compatible controller generates a sequence of device codes to determine compatibility with different vehicles, including CAN 11 Bit 7DF message, CAN 29 Bit 18DB33F1 message, J1850 VPW 68 6A F1 message, J1850 PWM message, K-Line messages and J1850 VPW 6C 10 F1 message. (PX 13.)

137. As noted above, the automatic communication interface determination for J1850 VPW provides (Ex. 1052, 5):

2. Test for SAE J1850 10,4 kbps VPW (variable pulse width):
 - enable the SAE J1850 10,4 kbps VPW interface;
 - send a service \$01 PID \$00 request message;
 - if a service \$01 PID \$00 response message is received then SAE J1850 10,4 kbps VPW is the vehicle's OBD protocol.

138. The bit rate for J1850 VPW is 10.4 kbps. Ex. 1071, 8, Fig. 1:



139. J1979 §4.2.5 defines the header bytes for SAE J1850. Ex. 1075, 22.

“For SAE J1850 and ISO 9141-2 interfaces the value of the first header byte is dependent on the bit rate of the data link and the type of message, refer to SAE J1850 and ISO 9141-2. The second header byte has a value that depends on the type of message, either a request or a response.” *Id.*

140. At Table 11, J1979 defines the header for a J1850 VPW request (at 10.4 kbps) as 68 6A F1. *Id.* As J1979 explains, “The third header byte for all interfaces is the physical address of the sender of the message. The external test equipment has the address \$F1.” *Id.* POSAs would have known that a byte is 8 bits, meaning a unit of data with a length of 8 binary (base 2) digits, meaning a base 10 or decimal value between 0 and 255. The base 2 digit is a bit (0 or 1).

TABLE 11—DIAGNOSTIC MESSAGE FORMAT FOR ISO 9141-2, ISO 14230-4, SAE J1850

Header bytes (Hex)			Data bytes								
Priority/Type	Target address (hex)	Source address (hex)	#1	#2	#3	#4	#5	#6	#7	ERR	RESP
Diagnostic request at 10.4 kbit/s: SAE J1850 and ISO 9141-2											
68	6A	F1	Maximum 7 data bytes							Yes	No

141. POSAs would have known that kbps stands for kilo bits per second, or a 1000 bits per second. The abbreviation kbps is equivalent to “kbits/s” where “bits/s” means bits per second.

142. In short, a “J1850 VPW 68 6A F1 message” refers to the header bytes for a diagnostic J1850 message at 10.4 kbps as shown in Table 11. *Id.* This would have been the header for the corresponding test in the automatic determination of communication interface in J1979. Ex. 1052, 5.

143. The Service \$01 PID \$00 message in the interface determination set forth in SAE J1978, Ex. 1052, 5-6, is an example of a “J1850 VPW 68 6A F1 message.” In other words, when undertaking the J1850 VPW interface determination described in SAE J1978, the scan tool would send the hexadecimal 68 6A F1 01 00, which in PO’s argument and terminology would be a “J1850 VPW 68 6A F1 message.”

144. Thus, any OBD-II compliant device that followed the OBD-II automatic interface determination would send a “J1850 VPW 68 6A F1 message” as part of the determination.

5. J1850 PWM

145. In the CalAmp Litigation the PO's expert argued that accused devices met claim 1, element [1.d] (discussed below) because they sent a "J1850 PWM message." Ex. 1065, 100 (Expert Report of Joseph C. McAlexander Regarding Infringement, at E-7). PO did not qualify the "PWM message" with hexadecimals like it did for CAN 11 and 29 bit messages, or J1850 VPW messages.

U.S. PATENT 8,032,278	
OMEGA PATENT CLAIMS	LMU-3000/LMU-3030 ⁵
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 LMU-3000 includes a 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 at least one vehicle device is the vehicle's ECM. On initial installation, the multi-vehicle compatible controller generates a sequence of device codes to determine compatibility with different vehicles, including CAN 11 Bit 7DF message, CAN 29 Bit 18DB33F1 message, J1850 VPW 68 6A F1 message, J1850 PWM message, K-Line messages and J1850 VPW 6C 10 F1 message. (PX 13.)

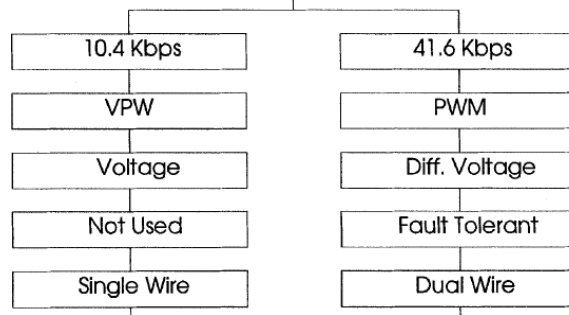
146. As noted above, the automatic communication interface determination for J1850 PWM provides (Ex. 1052, 5):

1. Test for SAE J1850 41,6 kbps (kilobits per second) PWM (pulse width modulation):
 - enable the SAE J1850 41,6 kbps PWM interface;
 - send a service \$01 PID \$00 request message;
 - if a service \$01 PID \$00 response message is received then SAE J1850 41,6 kbps PWM is the vehicle's OBD protocol.

147. The bit rate for J1850 PWM is 41.6 kbps. Ex. 1071, 8, Fig. 1:

Physical Layer

- Bit Rate
- Bit Encoding
- Drive Type
- Redundancy
- Media



148. POSAs would have understood that the service request message sent according to the J1978 test for SAE J1850 41.6 kbps was a “J1850 PWM message.”

149. Similar to the “J1850 VPW 68 6A F1 message” above, Ex. 1075, 22, Table 11 also defines the diagnostic message format for a J1850 PWM message at 41.6 kbps. The standardized hexadecimal header is 61 6A F1.

TABLE 11—DIAGNOSTIC MESSAGE FORMAT FOR ISO 9141-2, ISO 14230-4, SAE J1850

Header bytes (Hex)			Data bytes								
Priority/Type	Target address (hex)	Source address (hex)	#1	#2	#3	#4	#5	#6	#7	ERR	RESP
Diagnostic request at 10.4 kbit/s: SAE J1850 and ISO 9141-2											
68	6A	F1	Maximum 7 data bytes							Yes	No
Diagnostic response at 10.4 kbit/s: SAE J1850 and ISO 9141-2											
48	6B	ECU addr	Maximum 7 data bytes							Yes	No
Diagnostic request at 10.4 kbit/s (ISO 14230-4)											
11LL LLLb	33	F1	Maximum 7 data bytes							Yes	No
Diagnostic response at 10.4 kbit/s (ISO 14230-4)											
10LL LLLb	F1	addr	Maximum 7 data bytes							Yes	No
Diagnostic request at 41.6 kbit/s (SAE J1850)											
61	6A	F1	Maximum 7 data bytes							Yes	Yes

150. Putting this together with the J1978 automatic communication protocol determination procedure, the hexadecimal query on a J1850 PWM network for the protocol determination under J1978 would be 61 6A F1 01 00.

151. In the language of PO’s infringement argument in the CalAmp Litigation, the standardized diagnostic query from a scan tool on a J1850 PWM network would be a “J1850 PWM 61 6A F1 message” and the automated, standards-compliant 61 6A F1 01 00 protocol discovery query would be an example of such a message.

6. K-Line

152. In the CalAmp Litigation the PO’s expert argued that accused devices met claim 1, element [1.d] (discussed below) because they sent “K-Line messages.” Ex. 1065, 100 (Expert Report of Joseph C. McAlexander Regarding Infringement, at E-7). PO did not qualify the “K-Line messages” with hexadecimals like it did for CAN 11 and 29 bit messages, or J1850 VPW messages.

U.S. PATENT 8,032,278	
OMEGA PATENT CLAIMS	LMU-3000/LMU-3030 ⁵
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 LMU-3000 includes a 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 at least one vehicle device is the vehicle’s ECM. On initial installation, the multi-vehicle compatible controller generates a sequence of device codes to determine compatibility with different vehicles, including CAN 11 Bit 7DF message, CAN 29 Bit 18DB33F1 message, J1850 VPW 68 6A F1 message, J1850 PWM message, K-Line messages and J1850 VPW 6C 10 F1 message. (PX 13.)

153. As noted above, the J1978 automatic communication interface determination for ISO 9141-2 and ISO 14230-4 provided (Ex. 1052, 6):

3. Test for ISO 9141-2:
 - enable the ISO 9141-2 interface;
 - if the initialization sequence specified in ISO 9141-2 is completed successfully, then ISO 9141-2 is the vehicle's OBD protocol.
4. Test for ISO 14230-4:
 - enable the ISO 14230-4 interface;
 - if the initialization sequence specified in ISO 14230-4 is completed successfully, then ISO 14230-4 is the vehicle's OBD protocol.

154. ISO 14230-4 is the Keyword Protocol 2000 (“KWP2000”). Ex. 1074, 1.

155. POSAs would have known that ISO 9141-2 and ISO 14230-4 were sometimes referred to as “K-line.” For example, ISO 15031-5 Road vehicles — Communication between vehicle and external equipment for emissions-related diagnostics — Part 5: Emissions-related diagnostic services (1st ed. January 15, 2006) provides this usage: “Figure 1 shows the client and two (2) initialized servers connected *via K-line (either ISO 9141-2 or ISO 14230-4 protocol)*.” Ex. 1073, 1, 7.

156. POSAs would have understood that “K-line message” could be used to describe any message sent using ISO 9141-2 or ISO 14230-4.

157. Thus, POSAs would have understood that the messages sent to implement the J1979 test for ISO 9141-2 or ISO 14230-4 were “K-line messages.” J1978 identifies such messages as part of the interface test (Ex. 1052 at 6):

For vehicles using ISO 9141-2 service \$01 PID \$00 request shall be used as the idle message.

For vehicles using ISO 14230-4 the service TesterPresent is the recommended way to satisfy the idle message requirement as specified in ISO 14230-4. Alternatively, the service \$01 PID \$00 as specified in SAE J1979 may be used.

158. In other words, the PO's reference to sending K-Line messages as demonstrating compliance with claim 1, element [1.d], would be met by any OBD-II compliant scan tool that was necessarily capable of doing the automated protocol discovery required in J1978.

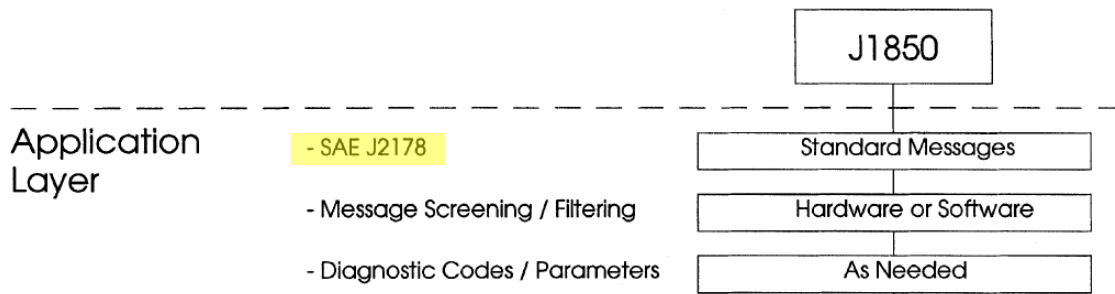
7. J1850 VPW 6C 10 F1

159. In the CalAmp Litigation the PO's expert argued that accused devices met claim 1, element [1.d] (discussed below) because they sent a "J1850 VPW 6C 10 F1 message." Ex. 1065, 100 (Expert Report of Joseph C. McAlexander Regarding Infringement, at E-7).

U.S. PATENT 8,032,278	
OMEGA PATENT CLAIMS	LMU-3000/LMU-3030 ⁵
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 LMU-3000 includes a 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 at least one vehicle device is the vehicle's ECM. On initial installation, the multi-vehicle compatible controller generates a sequence of device codes to determine compatibility with different vehicles, including CAN 11 Bit 7DF message, CAN 29 Bit 18DB33F1 message, J1850 VPW 68 6A F1 message, J1850 PWM message, K-Line messages and J1850 VPW 6C 10 F1 message. (PX 13.)

160. The "6C 10 F1 message" is an example of a standardized J1850 VPW query message to an engine control module that would work on an OBD-II complaint vehicle using a J1850 VPW network, as follows.

161. J1850 uses SAE J2178 to define standard messages in the application layer. Ex. 1071, 8.



162. As J1850 explains, Ex. 1071, §5.4 at 9:

5.4. Network Implementation—The network implementations based on this document have been reduced to commonize hardware, software, messages, and tools. ***The consolidation of messages has been documented in SAE J2178.*** The first byte or the first three bytes of these messages are called the “Header” byte(s). These header bytes fully define the associated requirements of this network interface, which previously had been optional. Figure 2 shows the general format for single byte header forms. Figure 3 shows the three byte header form. Figure 4 shows the specific bit assignments for priority, In-Frame Response, and Functional/Physical Address mapping in the three byte header format. For a complete description of the “KYZZ” bits shown in Figure 4 refer to SAE J2178/1.

163. J1850 Figure 4 explains the first byte of the three byte form of the consolidated header, or the “6C” in 6C 10 F1. Ex. 1071, 10:

Byte 1 of Three Byte Form of Consolidated Header:

Bit 7	6	5	4	3	2	1	0
P	P	P	0	K	Y	Z	Z
Priority (0 to 7)			H=0	Message Type (see below)			
Bit	Meaning			Value	Meaning		
K	In-Frame Response (IFR)			0	IFR Required		
				1	IFR Not Allowed		
Y	Addressing Mode			0	Functional Addressing		
				1	Physical Addressing		
ZZ	Specific Message Type			0 0	The meaning for these values are dependent on K & Y above. These meanings can be found in J2178/1.		
				0 1			
				1 0			
				1 1			

FIGURE 4—FIRST BYTE OF THREE BYTE FORM OF CONSOLIDATED HEADER

164. In “6C”, the “6” is 0110 in binary. This maps to bits 4-7 in J1850

Figure 4 as follows:

0	1	1	0
Bit 7	6	5	4
P	P	P	0
Priority (0-7)			H=0

165. The 011 is binary for 3, meaning that this request (6C 10 F1) is priority 3 of 7. This can be described as “moderate priority.”

166. The 0 for bit 4 corresponds to H=0 which indicates a three byte message header (as opposed to H=1 for one byte message header). Ex. 1071, 9 (Fig. 2).

167. The “C” in “6C” comes from bits 0-3 in J1850 Figure 4, as follows:

1	1	0	0
Bit 3	2	1	0
K	Y	Z	Z
Message type			

168. Binary 1100 is decimal 12 or hexadecimal C. Together the 6 for bits 4-7 and C for bits 0-3 provides the header “6C”.

169. J1850 Figure 4 explains that K=1 means “In Frame Response Not Allowed.” Ex. 1071, 10.

170. J1850 Figure 4 explains that Y=1 means the message is using physical addressing. *Id.*

171. J1850 refers to SAE J2718/1 for the meaning of ZZ = 00. *Id.* Exhibit 1076 is SAE J2178-1 Class B Data Communication Network Messages—Detailed Header Formats and Physical Address Assignments (reaffirmed July 2004). Ex. 1076, 1. J2718-1 explains that the “type modifier (ZZ Bits)” 00, with KYZZ 1100, means a “Node-to-Node” message type. Ex. 1076, 10, Table 6.

172. In short, the “6C” in J1850 “6C 10 F1” message is a standardized code meaning the first byte of a three byte header that marks the message priority 3 of 7, no in frame response allowed, physical node-to-node addressing.

173. Note that the “68” first header byte from J1979 as described for the J1850 VPW 68 6A F1 diagnostic query above (*supra* § IV.C.4, ¶¶135-143) is different from the “6C” in the first header byte for the J1850 VPW query that I just described. The difference between the two is the scan tool or external test equipment query addressing mode or the “Y” bit in J1850 Fig. 4. Ex. 1071, 10.

Byte 1 of Three Byte Form of Consolidated Header:

Bit 7	6	5	4	3	2	1	0
P	P	P	0	K	Y	Z	Z
Priority (0 to 7)			H=0	Message Type (see below)			
Bit	Meaning			Value	Meaning		
K	In-Frame Response (IFR)			0	IFR Required		
				1	IFR Not Allowed		
Y	Addressing Mode			0	Functional Addressing		
				1	Physical Addressing		
ZZ	Specific Message Type			0 0	The meaning for these values are dependent on K & Y above. These meanings can be found in J2178/1.		
				0 1			
				1 0			
				1 1			

FIGURE 4—FIRST BYTE OF THREE BYTE FORM OF CONSOLIDATED HEADER

174. Y=0 is **functional addressing**, meaning the query is broadcast. The standard OBD-II diagnostic query in J1979 uses **functional addressing**. This means that the query is sent to one or more nodes on the network that are interested in that function. This corresponds to first byte 68. By contrast Y=1 indicates **physical addressing** in J1850 and J2178, meaning that the query is sent to a particular vehicle device. This corresponds to first byte 6C.

175. The second byte “10” in “6C 10 F1” is a node physical address for an engine controller. Ex. 1076, 11, §7.2.2 (Target Address-Byte 2), 17, §9 (Physical Address Assignments), Table 11. A hex address of 10-17 is reserved for engine controllers.

TABLE 11—NODE PHYSICAL ADDRESS ASSIGNMENTS

Node Category	Address (hex)	# of Nodes
Powertrain Controllers:	00 - 1F	32
Integration/Manufacturer Expansion	00 - 0F	16
Engine Controllers	10 - 17	8
Transmission Controllers	18 - 1F	8
Chassis Controllers:	20 - 3F	32
Integration/Manufacturer Expansion	20 - 27	8
Brake Controllers	28 - 2F	8
Steering Controllers	30 - 37	8
Suspension Controllers	38 - 3F	8
Body Controllers:	40 - C7	136
Integration/Manufacturer Expansion	40 - 57	24
Restraints	58 - 5F	8
Driver Information/Displays	60 - 6F	16
Lighting	70 - 7F	16
Entertainment/Audio	80 - 8F	16
Personal Communications	90 - 97	8
Climate Control (HVAC)	98 - 9F	8
Convenience (Doors, Seats, Windows, etc.)	A0 - BF	32
Security	C0 - C7	8
Electric Vehicle Energy Transfer System (EV-ETS)	C8 - CB	4
Utility Connection Services (FN#1)	C8	1
AC to AC Conversion (FN#2)	C9	1
AC to DC Conversion (FN#3)	CA	1
Energy Storage Management (FN#4)	CB	1
Future Expansion:	CC - CF	4
Manufacturer Specific:	D0 - FF	32
Off-Board Testers/Diagnostic Tools:	F0 - FD	14
All Nodes:	FE	1
Null Node:	FF	1

176. The third byte F1 in “6C 10 F1” is the “physical address of the source of the message.” Ex. 1076, 11, §7.2.3 (Source Address-Byte 3). F1 is in the range

(F0-FD) for “Off-Board Testers/Diagnostic Tools,” meaning that it will be the third byte in a three byte header for any message sent by an off-board tester/ diagnostic tool like an OBD-II reader. *Id.*, 17, §9, Table 11. In this terminology, POSAs understood that the ’278 patent tracking unit, Flick-885 multi-vehicle compatible controller, and Hunt’s wireless appliance, were each “off-board testers / diagnostic tools” for the same reasons that POSAs would have classified them as scan tools or external diagnostic equipment. The F1 byte for physical address is the same F1 used in the third byte for the external test equipment source address in the standardized J1850 VPW 68 6A F1 message described above.

177. Thus a “J1850 VPW 6C 10 F1 message” is a standardized message from a diagnostic scan tool or OBD-II reader to an engine controller and would be used by any OBD-II compliant device to read parameters or codes from an engine controller on any host vehicle using J1850 VPW. This standards-compliant J1850 VPW message is a more general request than the diagnostic request using the J1979 diagnostic message format 68 6A F1 described above §IV.C.4 and in Ex. 1075, 22, Table 11.

178. So to summarize, a “J1850 VPW 6C 10 F1 message” is a generic example of a standards-compliant message sent on a J1850 VPW network using the standard definition for the three byte message header. It means a query:

- **6C:** message priority 3 of 7, no in frame response allowed, physical node-to-node addressing
- **10:** to an engine controller
- **F1:** from an “off board tester / diagnostic tool”

179. Thus, PO argued that a device met claim 1, element [1.d], because it sent a standard-compliant message using this standard-compliant header on a J1850 VPW network.

V. The '278 patent

180. The '278 patent, “Vehicle Tracking Unit With Downloadable Codes and Associated Methods,” solved an alleged problem of reporting vehicle location. 1:30-32.¹

181. One emphasis was security. “[S]hould a vehicle be stolen, it would be beneficial to know the vehicle’s location” in order to retrieve it. 1:32-35.

182. The patent admits GPS was known for determining position information. 1:52-53.

183. The patent admitted other PO patents (2:17-33) disclosed “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 vehicles,” 2:29-33,

¹ Unless otherwise indicated all Section V citations refer to Ex. 1001.

then lamented that similar control systems had “not yet been developed for vehicle tracking units.” 2:38-41.

184. The patent’s solution added GPS to PO’s prior art control systems, and claimed this as a “vehicle tracking unit.”

A. ’278 Patent Embodiments

185. The vehicle tracking unit 110 includes a “multi-vehicle compatible controller” (“MVCC”) 111, a “vehicle position determining device” that “may be provided by a GPS receiver” identified as GPS 112 in Fig. 10, wireless communication device 113, and downloading interface 116. 23:41-24:51; Fig. 10. The MVCC includes a central processing unit (“CPU”) 126 and memory 125. 23:61-67, Fig. 10. The communication device can be a cellular transceiver. 23:55-58.

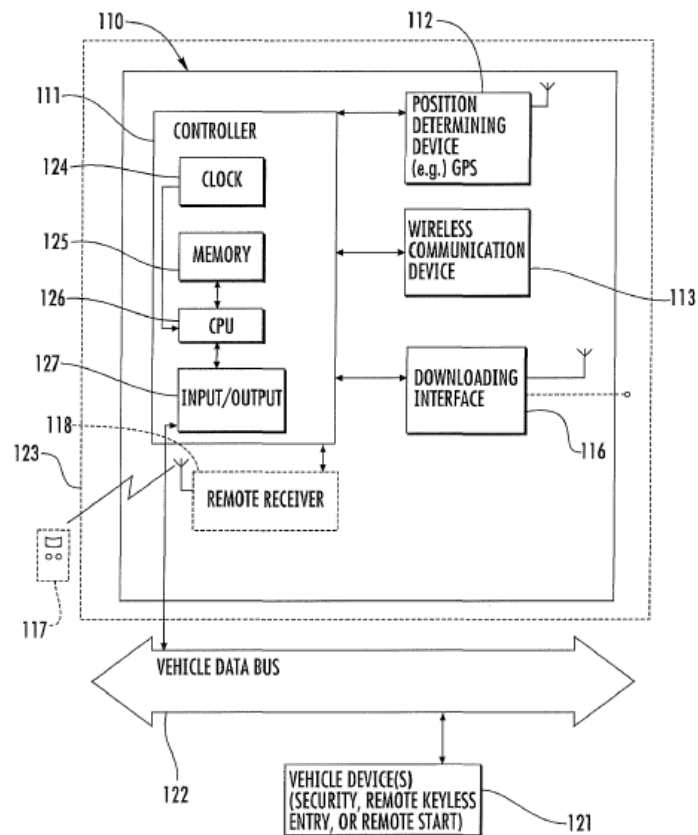


FIG. 10

186. The controller (MVCC) electrically connects (“for cooperating with”) the GPS, the downloading interface, and the communication device. 23:46-51; Fig. 10.

187. The GPS determines vehicle position, and the MVCC sends the position over the wireless communication device. 23:41-54.

188. The MVCC includes “input/output circuitry 127 to interface with... vehicle device 121” via “vehicle data bus 122.” 23:59-67, Fig. 10. The patent does not explain circuitry 127 or how it works.

189. The MVCC communication is “using at least one corresponding vehicle device code from among a plurality thereof for different vehicles.” 23:61-67.

190. The term “vehicle device code” appears in the claims. As discussed below, the court construed “vehicle device” as “electrical or electronic component in a vehicle that can be controlled and/or the status thereof read.” Ex. 1018, 25. I understand that in reexamination the Central Reexamination Unit at the Patent Office construed “vehicle device code” as “a signal to or from a vehicle device.” Ex. 1013, 4-5. POSAs would agree with that construction. *Infra* §VII.B.5.b.ii(2).

191. While the patent does not explain how it deals with different communication protocols or communicates with vehicles using different networking protocols, POSAs would have expected the unexplained interface circuitry 127 to provide this functionality.

192. Identifying the relevant communication protocol on different vehicles, and reading diagnostic data from different vehicle devices on different vehicles, was well-known and indeed required by standards.

193. The patent explains that downloading interface 116 could be wireless (24:14:-32) or wired (24:33-51). Figs. 10-11.

194. Either way the downloading interface comprises “interface circuitry” that “may be logic circuitry or other control circuitry along with switching

components” that is “for controlling communication with a downloading device.” 24:22-26.

195. “The enabling data may be the vehicle device code or codes, an instruction to select a code or codes from among those already stored, or the data or sequence to allow the controller 111 to generate the vehicle device code or codes, for example.” 24:8-12.

196. The downloading device is a computer that downloads “enabling data” that is “related to the at least one corresponding vehicle device code for use by the” MVCC 111, which may be the vehicle device code(s), an instruction to select the code(s) from those already stored, or data “to allow the controller 111 to generate” the vehicle device code(s). 24:4-17, 41.

B. Challenged Claims

197. The ’278 patent has 22 device claims. Claims 1, 13, and 18 are independent. A Claim List is provided at Appendix B.

198. Claim 1 recites a “tracking unit” with a vehicle-position determining device, wireless communication, a multi-vehicle compatible controller, and a downloading interface.

199. Dependent claims 2-12 add details concerning the downloading interface, reading and writing “device codes” in relation to “vehicle devices,” downloading software, “vehicle remote control functions,” and a device housing.

200. Remaining claims repeat these limitations. Ex. 1044. Claim 13 combines language from claims 1 and 3, while claim 18 combines language from claims 1 and 5. Claims 14-17 and 19-22 repeat the language in claims 6-9.

C. Prosecution History

201. PO filed the '278 patent as a continuation-in-part application on July 3, 2007.

202. There is no indication that the Examiner ever evaluated the effective filing date. For example, there is no record of the Examiner evaluating the written description in any parent application for support for the limitations in the application claims.

203. In response to rejections on January 5, 2011 (Ex. 1002, 223-230), PO argued that claim 1 (element [1.d])—reciting “multi-vehicle compatible controller to be coupled to a vehicle communication bus...”—was missing in a prior art combination that failed to disclose “the multi-vehicle compatible controller coupled to the vehicle data bus...” Ex. 1002, 216. Thereafter the Examiner allowed all claims without meaningful explanation. *Id.*, 197.

D. Reexaminations

204. The Office found substantial new questions of patentability in four *ex parte* reexaminations: Nos. 90/013,587 (“RX1”), 90/013,851 (“RX2”), 90/014,309 (“RX3”), and 90/014,675 (“RX5”). The Office denied *ex parte* reexamination

request No. 90/014,419 (“RX4”). In RX2, the Examiner rejected all claims and the Board reversed. Ex. 1012. In RX5, the Examiner rejected claims 1, 4-11, 18-22 as obvious, and the Board reversed relying entirely on alleged secondary considerations. Ex. 1017.

VI. CLAIM INTERPRETATION

205. I am told that at least two district courts construed terms in challenged claims: Ex. 1018, D.I. 50, *Omega Patents, LLC v. CalAmp Corp.*, No. 6:13-cv-1950 (M.D. Fla. Feb. 20, 2015) (“*CalAmp-CC*”), and Ex. 1019, D.I. 34, *Omega Patents, LLC v. Firstech*, No. 2:20-cv-01344-TSZ (W.D. Wash. Nov. 22, 2021) (“*Firstech-CC*”). I am also told that the Federal Circuit, the appellate court that reviews appeals from patent litigations, issued opinions on two appeals from the *CalAmp* Litigation: Ex. 1020, 920 F.3d 1337 (Fed. Cir. 2019) (“*CalAmp-I*”) and Ex. 1021, 13 F.4th 1361 (Fed. Cir. 2021) (“*CalAmp-II*”).

206. I apply relevant claim constructions below in relation to the claim elements in which they appear. Where I do not discuss a particular claim construction, I apply the ordinary meaning that the claim term would have had to a POSA at the time of invention.

VII. GROUND 1: HUNT ANTICIPATES AND/OR RENDERS OBVIOUS CLAIMS 1, 4-6, 8, 11-12, 18-19, 21.

207. As explained below U.S. Patent No. 6,957,133, “Small-Scale, Integrated Vehicle Telematics Device” (Ex. 1023, “*Hunt*”) discloses each

limitation in claims 1, 4-6, 8, 11-12, 18-19, 21 and thus anticipates those claims, rendering them invalid. Hunt issued October 18, 2005. I am asked to assume that Hunt is prior art to all claims.

208. POSAs would also have found the claims obvious in view of Hunt, using no more than the predictable use of prior art elements according to their established functions. Thus, if PO contends that Hunt somehow fails to meet a particular claim limitation, *e.g.*, that there is any difference between a challenged claim and Hunt's disclosure, then as shown below the claims as a whole would nonetheless have been obvious to the POSA using no more than the predictable use of prior art elements according to their established functions.

A. Hunt

209. Hunt describes a wireless appliance (10 in Fig. 1A, 13 in Fig. 1B) for vehicle monitoring (the "appliance"). Hunt, Abstract. The appliance provides "wireless, real-time transmission and analysis of GPS and diagnostic data" that is analyzed and displayed "using an Internet-hosted web site[.]" Hunt, 4:11-18, Fig. 2. The appliance includes a microprocessor, a vehicle-communication circuit, a GPS module, and a wireless transmitter. *Id.*, Abstract, 3:50-54. The GPS provides vehicle position. *Id.*, Abstract, 3:22-32, 4:12-28. Hunt's appliance has different vehicle-communication modules that manage different communication protocols used by different vehicles. *Id.*, Abstract, 4:1-5, 5:61-6:17, Figs. 1A-1B.

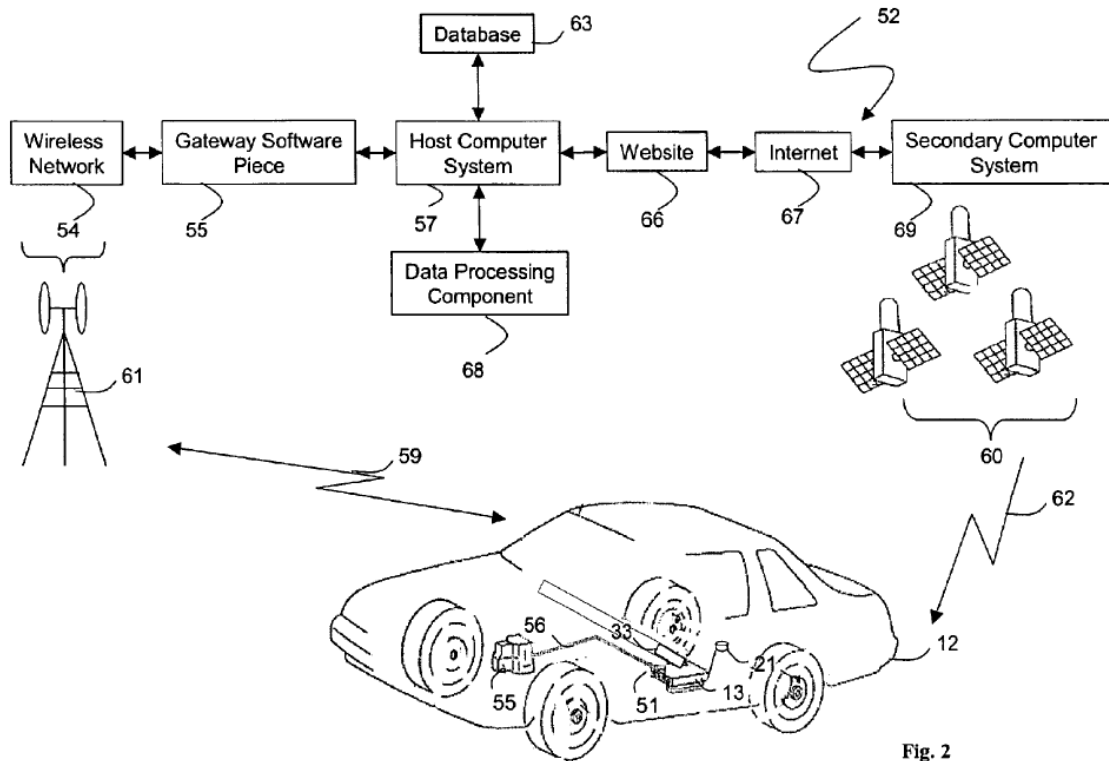


Fig. 2

210. Hunt's appliance works with different make, model, and type vehicles, from different manufacturers. *Id.*, Abstract, 2:48-56, 4:56-62, 5:8-18, 5:61-65, 6:9-25, Figs. 1B, 5, claim 1.

211. "The architecture features an application-specific integrated circuit ('ASIC') for communicating with multiple types of OBD-II systems." Hunt, 2:6-11, 2:28-30, Figs. 6-7, claim 1. This is Hunt's vehicle-communication circuit with different modules for communicating using different network protocols governed by different standards. *E.g.*, Hunt, claim 1. POSAs understood that OBD-II referred to on-board diagnostic systems. Hunt, 1:21-46.

212. Hunt’s microprocessor runs firmware that determines a host vehicle’s communication protocol, then selects and uses the vehicle-communication circuit supporting the particular host vehicle bus communications. Hunt, 2:66-3:3, 9:3-8, *generally id.*, 8:66-9:17.

213. Thereafter Hunt’s appliance collects host vehicle position and host vehicle diagnostic data, then wirelessly sends the data to a host computer that makes the information Internet accessible. *Id.*, 2:42-48, 5:7-29, Fig. 2.

B. Claim 1

1. Preamble 1.pre

1.pre	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:
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214. If PO argues the preamble is limiting, then as shown below Hunt discloses a multi-vehicle compatible tracking unit meeting the preamble. *Id.*, Abstract, claim 1.

215. Hunt also explains that “a monitorable vehicle is provided” including an “on-board diagnostic system[.]” Hunt, 3:58-62. The diagnostic system comprises a “vehicle data bus extending throughout the vehicle” because Hunt describes it querying data from vehicle components like the engine, transmission, brakes, and electrical system, which are distributed throughout the vehicle. *Id.*, 3:62-65.

216. POSAs would also have understood that the data bus extends throughout the vehicle because Hunt describes using OBD-II. *Id.*, 5:55-65, Fig. 5.

2. Element 1.a

1.a	a vehicle position determining device;
-----	--

217. A GPS receiver is a “position determining device.” Ex. 1001, 3:26-28, 5:15-17, Fig. 2 (GPS 42); Ex. 1022, 3.

218. Hunt meets [1.a] because its vehicle-mounted “wireless appliance” includes a GPS system that “generates location-based data.” *Id.*, 5:7; *id.*, Abstract, 1:8-11, 1:39-47, 2:42-48, 3:26-28, 5:43-54, 7:30-33, Figs. 1A (GPS Module 2), 1B (“Chipset-Based GPS Module” 20 and antenna 21), 2 (GPS antenna 21 receives GPS signals 62), claim 1.

219. Hunt’s GPS module comprises a GPS receiver. E.g., Hunt, 3:26-27 (“GPS module receives GPS signals from an antenna and generates data in response.”), 5:7 (“GPS module 2 generates location-based data.”), Figs. 1A, 1B, 2.

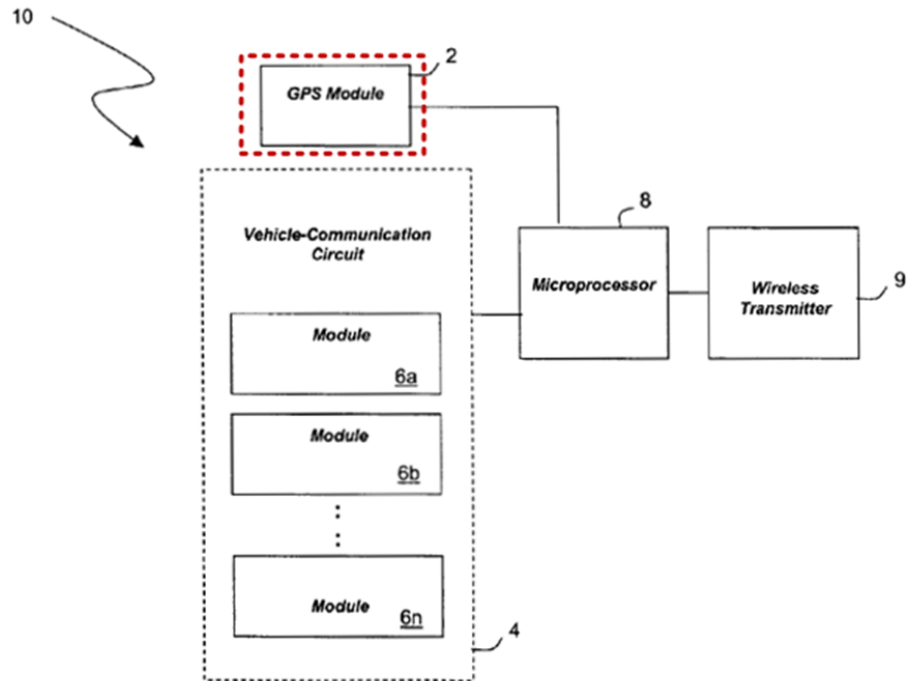


Fig. 1A

220. In one embodiment, Hunt's GPS module includes an integrated antenna "within the [wireless] appliance." Hunt, 2:30-32, 5:43-45 ("[A] chipset-based GPS module 20... receives wireless signals from orbiting GPS satellites through an integrated GPS antenna.").

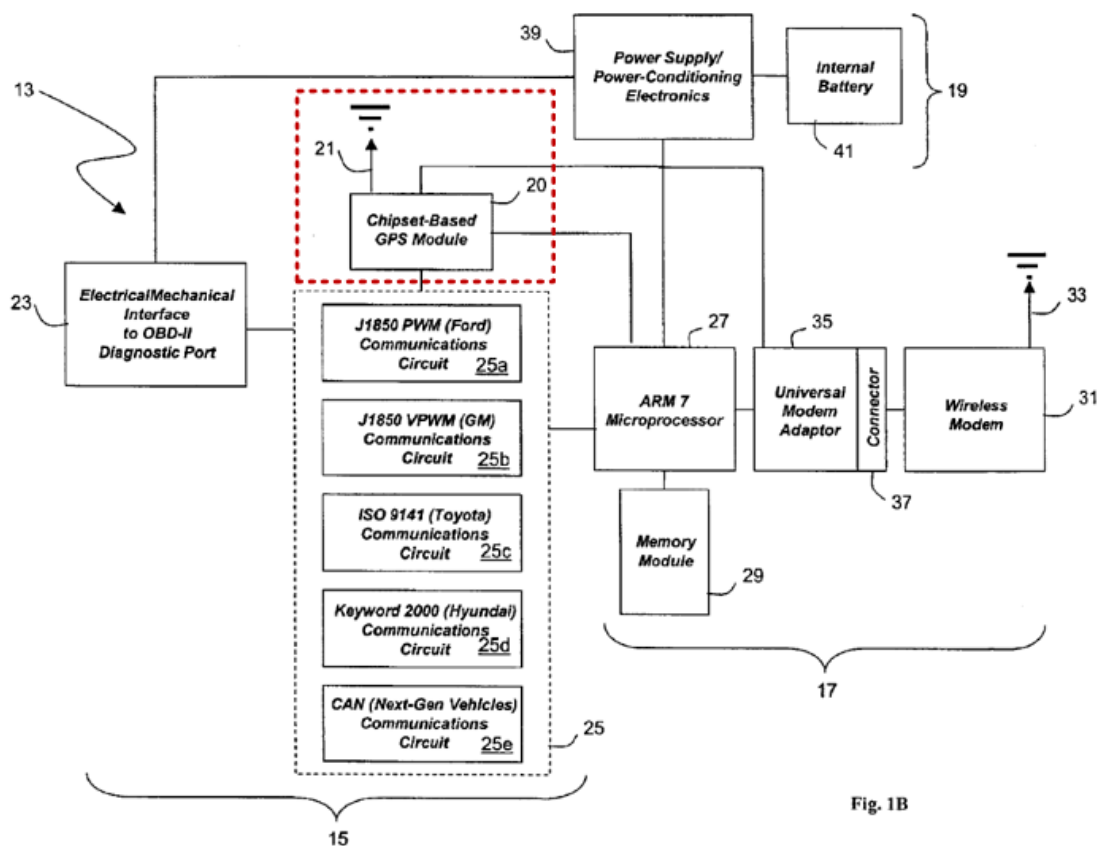


Fig. 1B

3. Element 1.b

1.b	a wireless communications device;
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221. Hunt meets [1.b] because Hunt's appliance includes a wireless transmitter, or a wireless modem, that communicates with wireless network 54. Hunt, Fig. 1A (wireless transmitter 9), Fig. 1B (wireless modem 31 and antenna 33), Fig. 2 (bidirectional link 59), Abstract, 2:42-48, 3:34-49, 6:35-65, 7:34-38, claim 1. The bidirectional wireless communication in Hunt Fig. 2 plainly contrasts with the unidirectional signal 62 received at the GPS antenna. GPS receives

receive the GPS position signals 62 from the GPS satellite constellation 60, as suggested by the unidirectional signal arrow 62.

222. The wireless modem provides bidirectional communication because it modulates and demodulates signals. Ex. 1051, 67, 164.

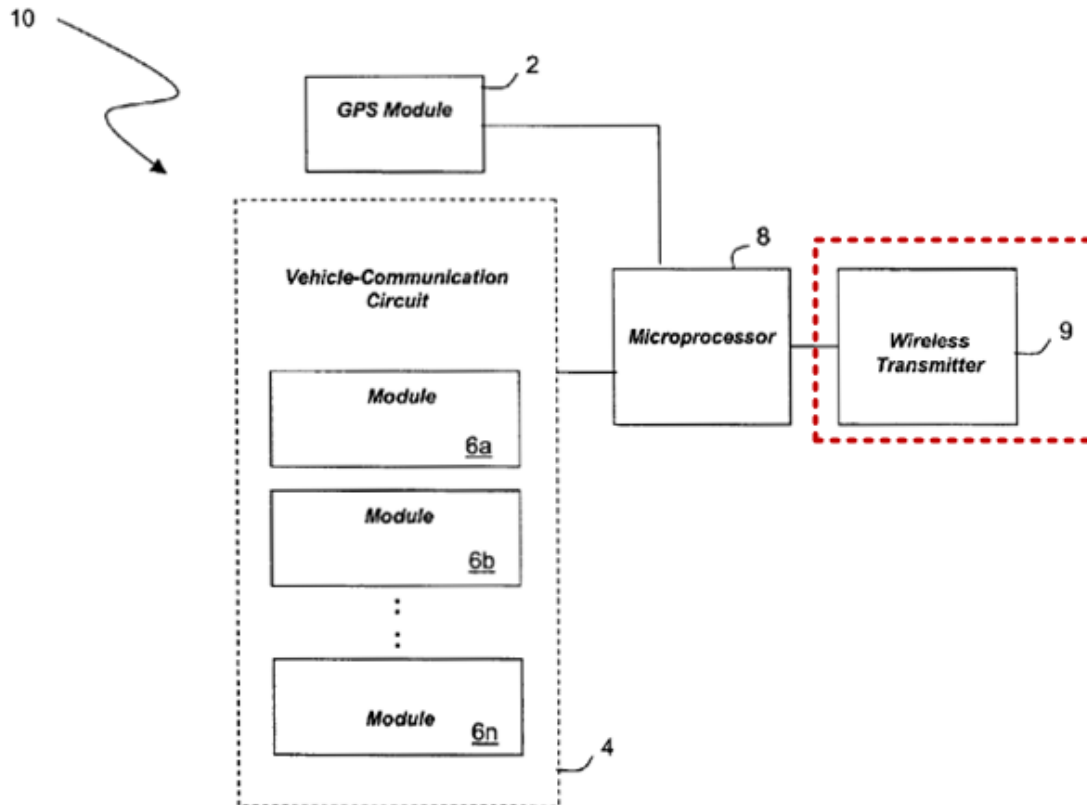


Fig. 1A

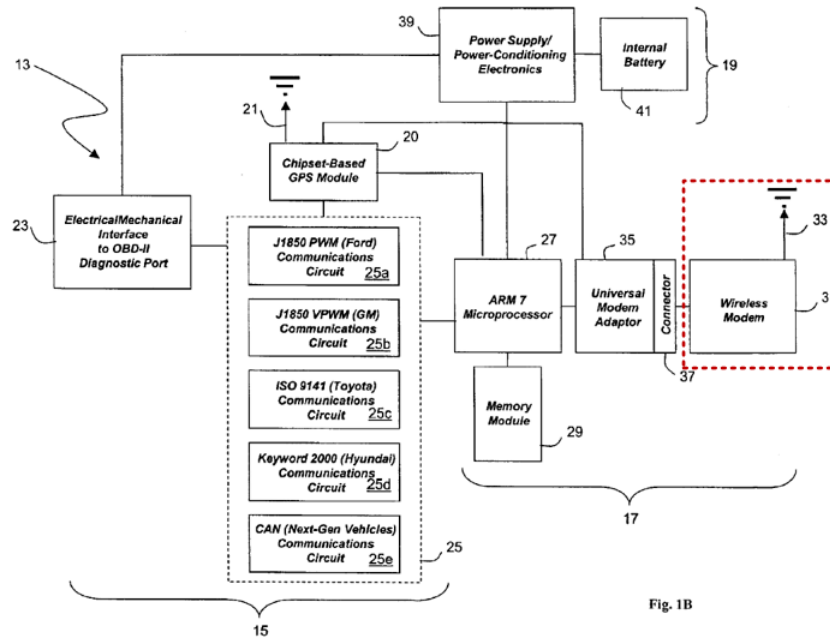


Fig. 1B

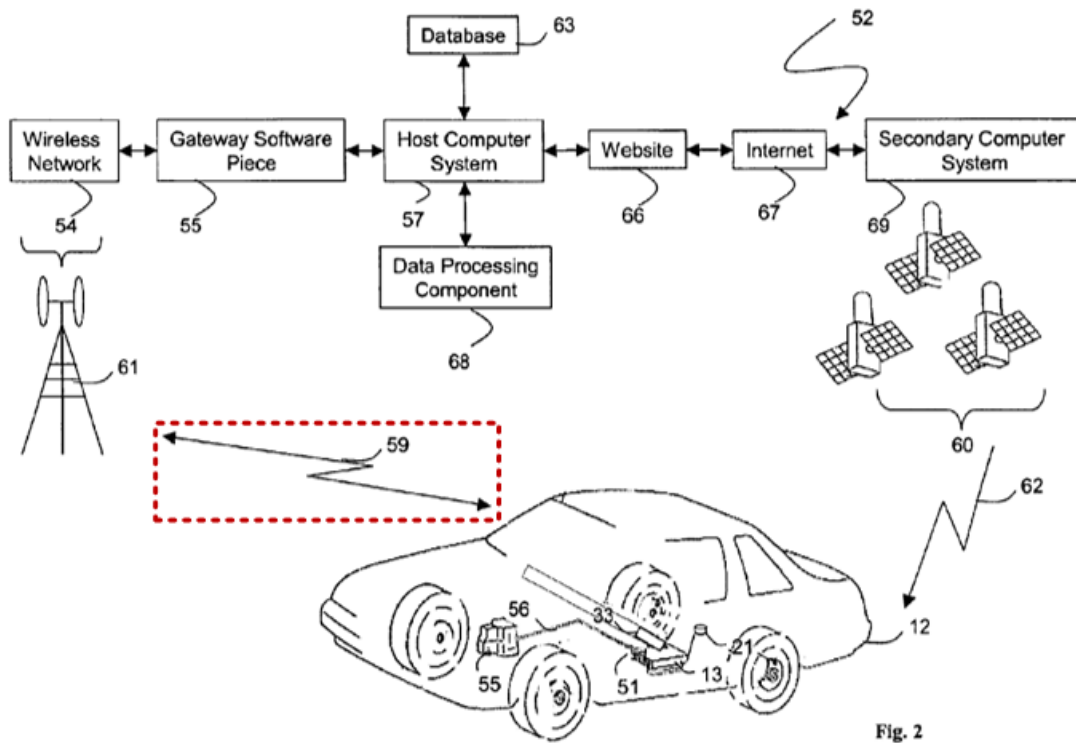


Fig. 2

223. Hunt also describes implementing the wireless appliance in “programmable equipment, such as computers” including “a wireless... microcomputer, laptop, personal data assistant (PDA), wireless e-mail device (*e.g.*, Blackberry), cellular phone... ***or any other programmable device, which devices may be capable of configuration for transmitting and receiving data over a network.***” Hunt, 11:5-7, 11:34-40.

4. Element 1.c

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

224. I understand that in the CalAmp Litigation, PO agreed (and a jury was instructed) that “multi-vehicle compatible controller” meant “electronic circuitry that performs one or more control functions, and can operate with more than one vehicle.” *CalAmp-CC*, 6; Ex. 1029, 11; Ex. 1030, 11; *see also* Ex. 1022, 6 (Omega argued that tracking unit “must be capable of operating in a plurality of different vehicles (i.e. multi-vehicle compatibility).”) (emphasis original). This comports with the ’278 patent specification, *e.g.*, Ex. 1001, 5:50-56, 6:28-35, 8:13-25, 8:30-40, 23:59-67, and plain meaning. Ex. 1081, 215.

225. The controller definition also comports with OBD-II standards on road vehicle diagnostics such as the ISO 15765-4 Controller Area Network

(“CAN”), which explains that a CAN controller—like the claimed MVCC—shall be able to transmit and receive 11-bit and 29-bit CAN identifiers, meaning coded messages complying with the ISO standard. Ex. 1072, 14.

226. Omega agreed that transmitting messages is a “control function” because the messages include queries or commands to vehicle devices. Ex. 1033, 73:1-22, 75:1-5 (Omega’s expert testified that sending a query over a bus is a control function).

b. MVCC

227. Hunt’s appliance includes a microprocessor, vehicle-communication circuit, and memory, collectively comprising a controller (“Hunt’s controller”). Hunt, Figs. 1A, 1B, 5.

228. I understand that in *Firstech* a district court clarified that “controller” meant a “single control system” that “need not be a single device.” *Firstech-CC*, 10-12.

229. Hunt’s controller is a single control system comprising electronic circuitry that performs control functions and can operate with more than one vehicle. Hunt, Figs. 1A, 1B, 5.

230. Hunt describes the microprocessor and vehicle-communication circuit providing an MVCC with a single control system comprising electronic circuitry that performs one or more control functions and can operate with more than one

vehicle. *Id.*; cf. Ex. 1001, 5:50-63, 23:61-67 (MVCC 111 “illustratively” comprises CPU, memory, and input/output circuitry), Figs. 2 (controller 40), 10 (controller 111).

231. Thus, Hunt’s controller is the MVCC in [1.c].

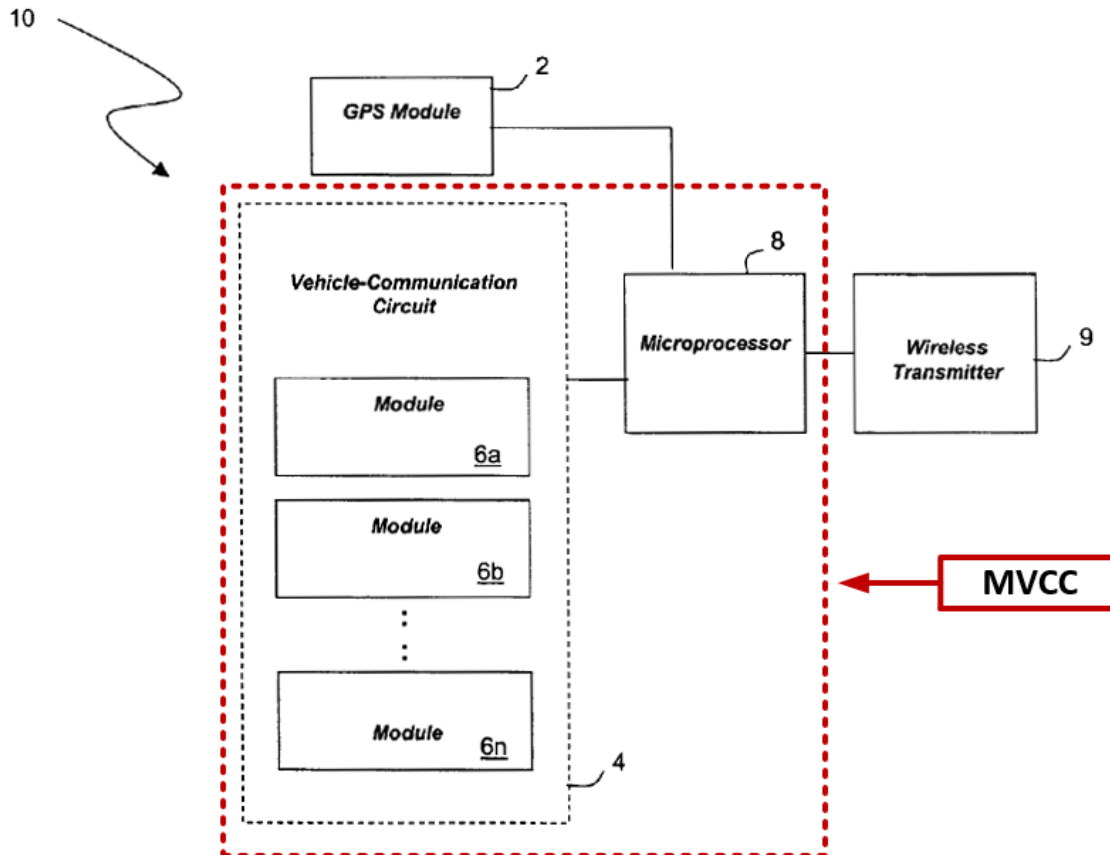
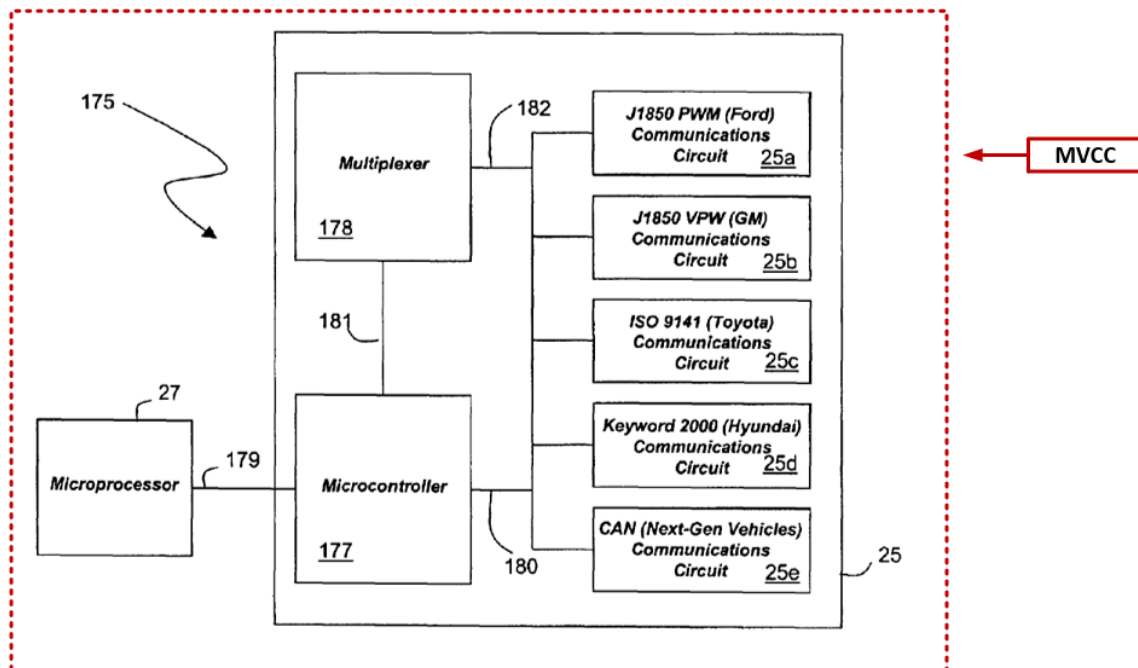
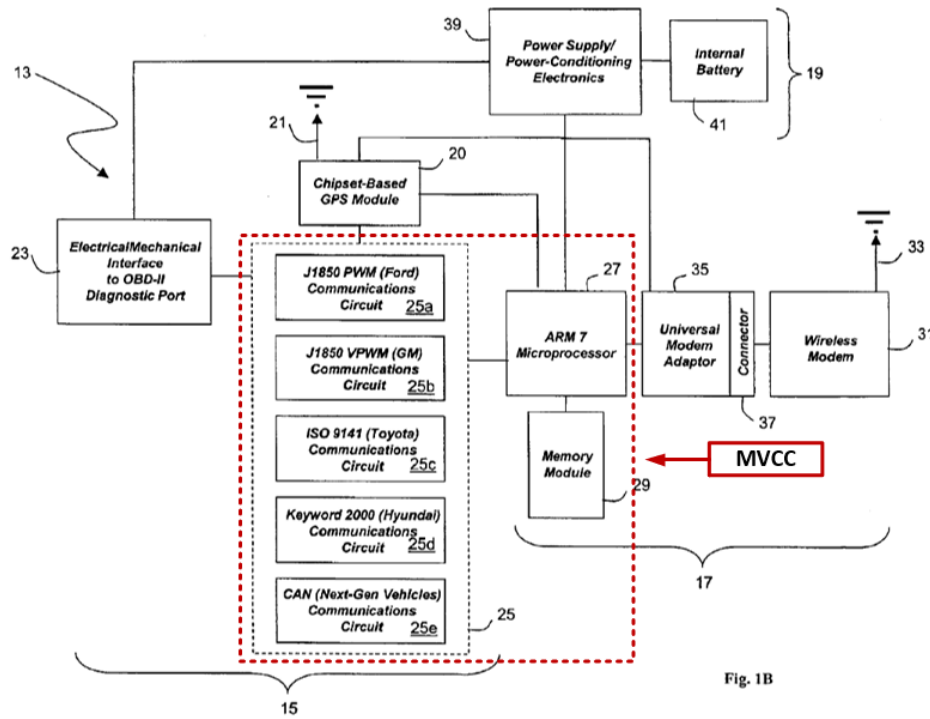


Fig. 1A



232. Hunt's controller performs "one or more control functions."

233. First, Hunt's microprocessor runs firmware "that determines the vehicle-communication protocol of a host vehicle," then "selects the appropriate module in the vehicle-communication circuit that supports the vehicle communication protocol." Hunt, 2:66-3:3, 8:66-9:27, claim 1.

234. Second, Hunt's appliance "collects diagnostic data by querying the vehicle's ECU [engine control unit] 55.... [which] retrieves data stored in its memory and sends it... to the wireless appliance[.]" *Id.*, 7:20-26.

235. POSAs understood that Hunt's reference to the "appliance" collecting data meant Hunt's controller because through the vehicle-communication circuit Hunt's microprocessor 27 receives and processes vehicle diagnostic data like speed, mass air flow that POSAs would have understood are vehicle device responses to data queries using standard protocols such as those in Hunt Table 1. Hunt, 8:14-9:35.

236. Omega agrees theses are "control functions." Ex. 1033, 73:10-11, 75:1-5 (Omega's expert testified that sending a query over a bus is a control function).

237. **Third**, the protocol determination **process** by Hunt's controller is a "control function" that queries vehicle devices on the bus.

238. Hunt uses standard communication protocols. Hunt, 1:21-46, 1:51-55, 2:28-30, 2:42-57, 4:28-32, 5:8-18, 7:20-26, 8:14-44; *e.g.*, Ex. 1071 (SAE J1850); Ex. 1072 (ISO 15675-4 (CAN)); Ex. 1074 (ISO 14230-4 Keyword Protocol 2000 (“KWP2000”)); Ex. 1070, 68 Fed. Reg. 35799-35800; Ex. 1046, 374 (40 C.F.R. §86.1806-05(h) (July 1, 2007)).

239. “[T]he microprocessor determines the communication protocol of the host vehicle **by testing each protocol** in an effort to establish communication. The microprocessor **then selects the protocol that successfully communicated with the vehicle.**” Hunt, 9:3-8. Omega’s expert testified that this “bus discovery” process is done by an MVCC. Ex. 1033, 68:1-25.

240. Hunt’s controller “send[s] out information, expecting responses,” which Omega agrees is a control function. In the CalAmp Litigation, PO’s expert testified that “performing control functions in an electronic world is basically controlling the bus, sending information on the bus. And that could be done in terms of sending out information, expecting responses. Sometimes we refer to it as a query.” Ex. 1033, 75:1-5. Hunt does the same thing because Hunt’s system “collects diagnostic data by querying the vehicle’s ECU 55.... In response to a query, the ECU 55 retrieves data stored in its memory and sends it... to the wireless appliance[.]” Hunt, 7:20-26. Hunt’s MVCC therefore performs a “control function” under PO’s analysis.

241. PO's expert also testified that with a "CAN bus system" as "the vehicular bus system" there is "an area network, and it's a controller.... There has to be some bus arbitration as to who's controlling the bus....[T]here is one and only one unit... that's connected to the bus that's allowed to control the bus.... The master is the controller.... [T]he one who is generating the bus... is the controller." Ex. 1033, 73:25-74:25. Hunt's MVCC can communicate as the controller on a CAN bus. Hunt, 5:8-18. By PO's admission, Hunt's components meet the [1.c] controller.

c. "multi-vehicle compatible"

242. Hunt's appliance is "multi-vehicle compatible" because it can communicate with devices on different manufacturer, make, model, and type of vehicles.

243. The vehicle-communication circuit manages communication with "different vehicle-communication protocols" for Ford, General Motors, Toyota and other Japanese makes, Hyundai, Mercedes, and medium and heavy-duty trucks, including trucks from Volvo, Kenworth, CAT, and Hino. Hunt, 5:9-13; *id.*, 2:42-57, 5:61-65, Figs. 1B, 5.

244. Hunt's appliance works with "automobiles and trucks, as well as commercial equipment, heavy trucks, power sport vehicles (*e.g.*, motorboats, motorcycles, all-terrain vehicles, snowmobiles, jet skis, and other powered sport

vehicles), collision repair vehicles, marine vehicles, and recreational vehicles.”

Id., 4:56-62.

245. Hunt’s appliance “may collect data from any vehicle that utilizes a protocol among those supported” by the vehicle-communication circuit. Hunt, 5:8-18.

246. Once Hunt’s MVCC selects the host vehicle communication protocol and associated circuit, the microprocessor 27 receives “diagnostic data” such as “host vehicle’s speed, mass air flow, and malfunction indicator light” from the vehicle via the vehicle communication circuit 25. Hunt, 6:9-25.

d. “for cooperating... to send vehicle position information”

247. Hunt’s microprocessor “receives and processes diagnostic data... and location-based data from the GPS module 20.... [T]he microprocessor 27 formats the diagnostic **and location-based data** into separate packets and serially transfers these packets through a universal modem adaptor 35 to a wireless modem 31.... The wireless modem 31 operates on a wireless network... and transmits the packets through an antenna 33 to the network.” Hunt, 6:18-44, Figs. 1A, 1B.

248. Hunt Figure 1A shows a data link from GPS Module 2 to microprocessor 8, and from microprocessor 8 to wireless transmitter 9. Hunt Figure 1B shows a data link from chipset-based GPS module 20 to ARM 7 microprocessor 27, and from microprocessor 27 to wireless modem 31 via

universal modem adapter 35. POSAs would have understood that Hunt’s microprocessor cooperated with the GPS for position information and the wireless communications for sending position information.

249. Therefore, Hunt’s MVCC meets [1.c].

5. Element [1.d]

1.d	said [MVCC] 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
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250. Hunt meets [1.d] at least two ways.

a. **Hunt’s MVCC Is Coupled to a Vehicle Bus For Communication Thereover and [1.d] Requires Nothing More Because “Using... [a] Vehicle Device Code” Is Non-Limiting**

251. Omega’s argument that [1.d] limits the MVCC to being “capable of communication... using a vehicle device code” (Ex. 1022, 7) finds no support in the claim language. POSAs would have read the prior clause ([1.c])—not [1.d]—as purporting to describe the MVCC’s capabilities.

252. Element [1.d] and its “for communication thereover...” describe how the MVCC is to be coupled to the bus—it requires coupling in a manner allowing communication over the bus with at least one vehicle device and excludes other types of coupling. POSAs would have understood that there are many types of data buses. For example as I explained above SAE J1850 itself provides two types

of physical layer encoding: pulse width modulation and variable pulse width. These have different data rates (10.4 Kbps for VPW, and 41.6 Kbps for PWM). They also use different drive types: single voltage for VPW and differential voltage for PWM. This is summarized, for example, at Ex. 1071, 8, Fig. 1. POSAs understood that these require different circuitry to connect to the bus. A circuit for one voltage drive or data rate will not communicate on a bus using different voltage drive or data rate.

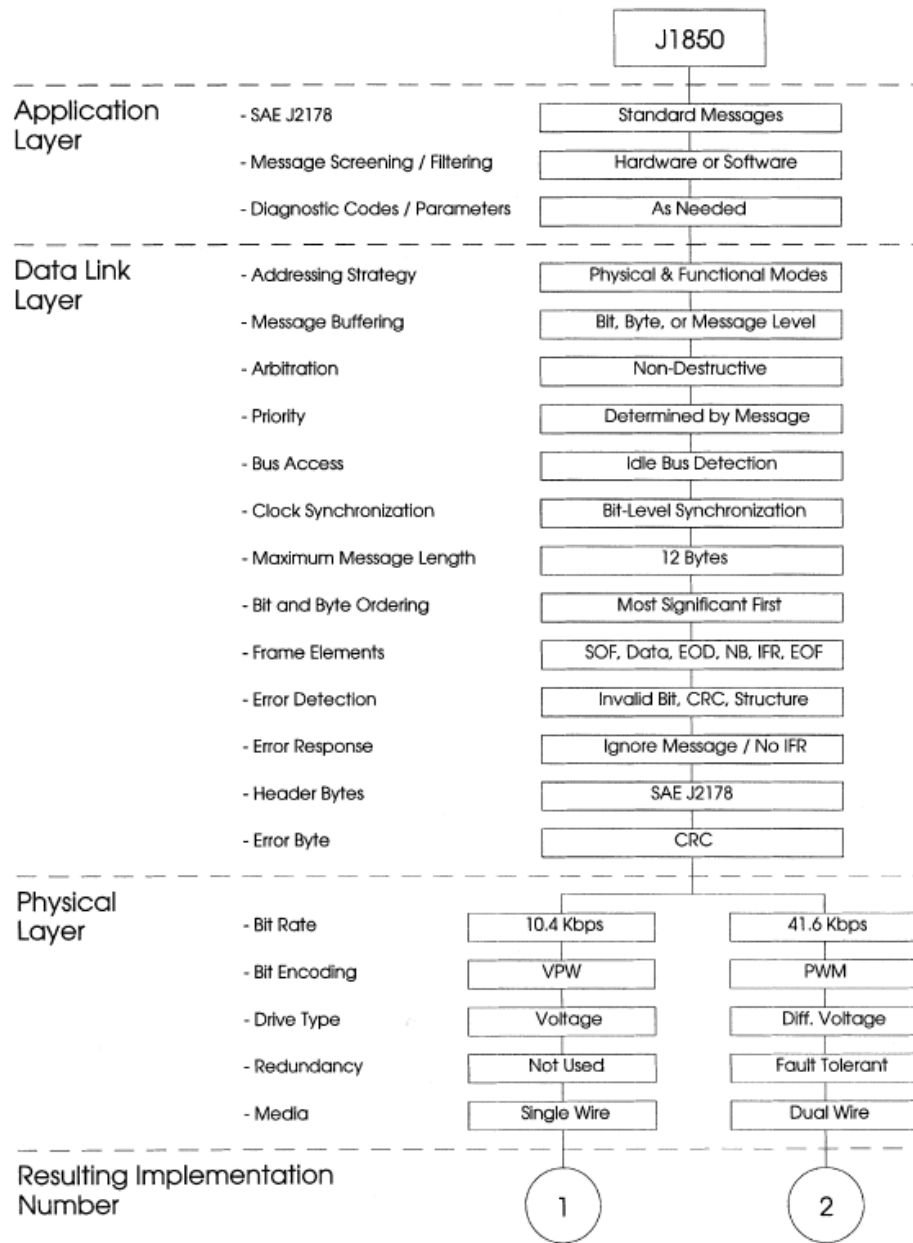


FIGURE 1—MAP OF SAE J1850 TO THE ISO OSI MODEL

253. A “vehicle device code” is specific data content that may (or may not) be communicated over the bus. The particular data content communicated over the bus does not limit **how** the MVCC is coupled to the bus. I am told that

under a legal doctrine known as printed matter doctrine Element [1.d]’s reference to “using” a device code does not limit [1.d] or apparatus claim 1 in any way.

254. In that case, Hunt meets [1.d] for the reasons explained above because Hunt describes an MVCC coupled to a bus for communication thereover with a vehicle device (*infra* §VII.B.5.b.ii) and [1.d]’s remaining language is not limiting.

b. Hunt Meets Element [1.d] Even If Every Term is Limiting

i. Hunt’s MVCC is Coupled to a Vehicle Data Bus For Communication Thereover With At Least One Vehicle Device

255. Hunt’s controller (MVCC) “manages communication through the electrical/mechanical interface 23 with separate modules 25a-25e for different **vehicle buses** (e.g., those featured in Ford, GM, Toyota),” which POSAs understood are vehicle data buses. Hunt, 5:55-65, Fig. 5.

256. Hunt’s MVCC is capable of communicating with vehicle devices on different vehicles using those vehicles’ data buses. Hunt, 2:42-57, 5:14-17, 5:55-6:34, 8:14-65, Figs. 1B, 5, claim 13, claim 30; *supra* §VII.B.4 ([1.c]).

257. Hunt describes three ways of coupling the MVCC to a “vehicle data bus”: (1) “electro/mechanical interface” to an OBD-II diagnostic port (Hunt, 5:55-61, Fig. 1B, claims 28, 30); (2) a “wiring harness” (Hunt, 9:58-62); or (3) “directly to a vehicle’s electrical system” without using “an OBD-II connector” (Hunt, 4:47-55).

258. The OBD-II system provides a vehicle data bus. Hunt, 1:21-39, 3:62-65; *e.g.*, Ex. 1052, 13 (diagnostic communication on SAE J1850 bus); Ex. 1071, 7 (J1850 data bus topology); 1072, 4-5, 7, 19 (CAN bus).

259. Hunt's ECU is an exemplary vehicle device, and Hunt's MVCC communicates with the ECU through the OBD-II system to retrieve diagnostic status data. *Supra* §VII.B.4 ([1.c]); Hunt, 1:21-33, 5:55-61, 7:20-26, 7:50-53, claim 19.

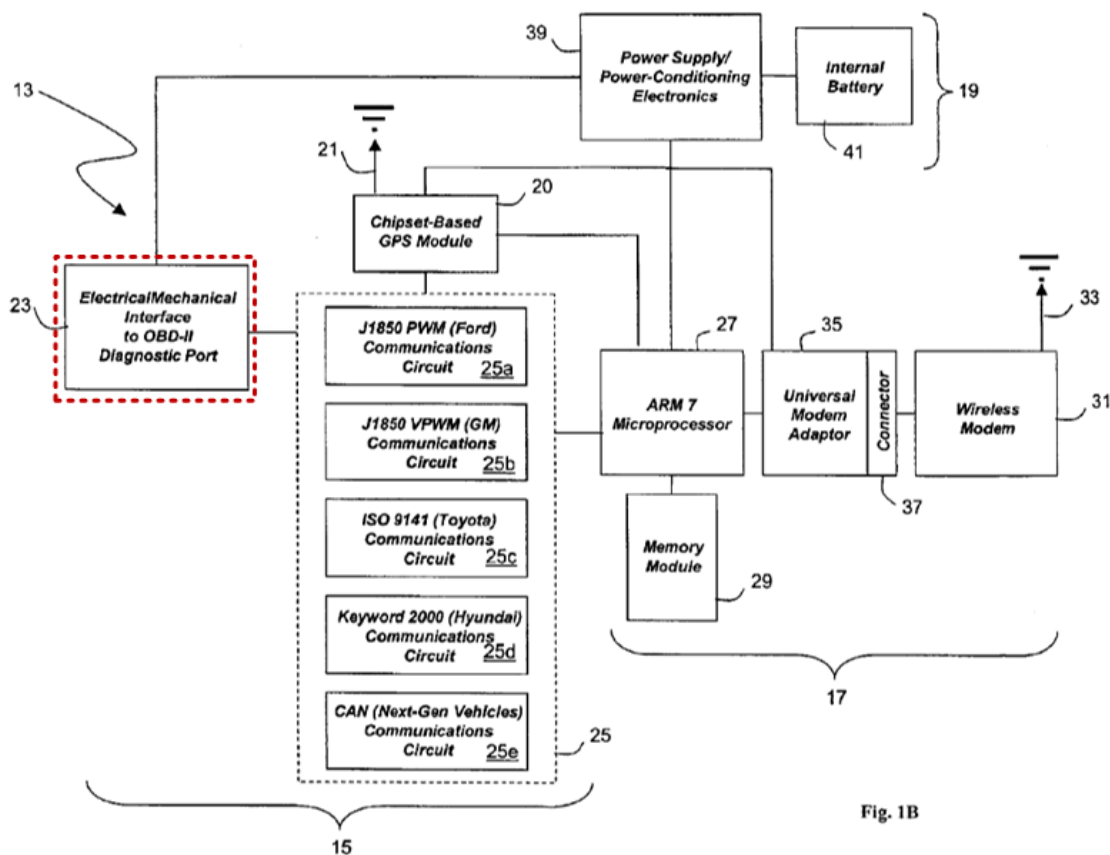


Fig. 1B

260. The '278 patent incorporates Ex. 1025 ("Flick-460") and makes clear that electronic components in the vehicle in general, and an engine controller in

particular, are “vehicle devices” as claimed. Ex. 1001, 22:3-7, 24:60-67, Fig. 10; Flick-460, 2:9-30, 4:66-5:4, 5:11-30, 6:53-58, claims 9, 19, 21. I understand that this incorporation makes the Flick-460 disclosure part of the ’278 patent disclosure as if it were recited in full in the ’278 patent.

261. I understand that the Federal Circuit construed “vehicle device” as “electrical or electronic component in a vehicle that can be controlled and/or the status thereof read” (*CalAmp-I*, 920 F.3d at 1347, 1349), and confirmed an ECU—meaning an engine control unit as used in the *CalAmp* Litigation—is a “vehicle device” (*Id.*, at 1342, 1346 n.5, 1347).

ii. Hunt’s MVCC Uses a Vehicle Device Code From Among a Plurality for Different Vehicles

(1) Hunt communicates with the ECU and other devices on different vehicles

262. “Different vehicles” includes “vehicles from different manufacturers” or “different models.” Flick-460, 6:14-18; Ex. 1006, 1479-1480. Hunt’s MVCC can communicate with different vehicles, from different manufacturers, and its microprocessor 27 determines the communication circuit 25a-e (Fig. 1B) compatible with the protocol used by a particular host vehicle by “testing *each* protocol [e.g., 25a: ***J1850 PWM*** (Ford); 25b: ***J1850 VPWM*** (GM); 25c: ***ISO 9141*** (Toyota); 25d: ***Keyword 2000*** (Hyundai); 25e: ***CAN***] in an effort to establish communication.” Hunt, 9:3-8; *id.*, 1:39-46, 2:42-57, 5:8-19, Figs. 1B, 5.

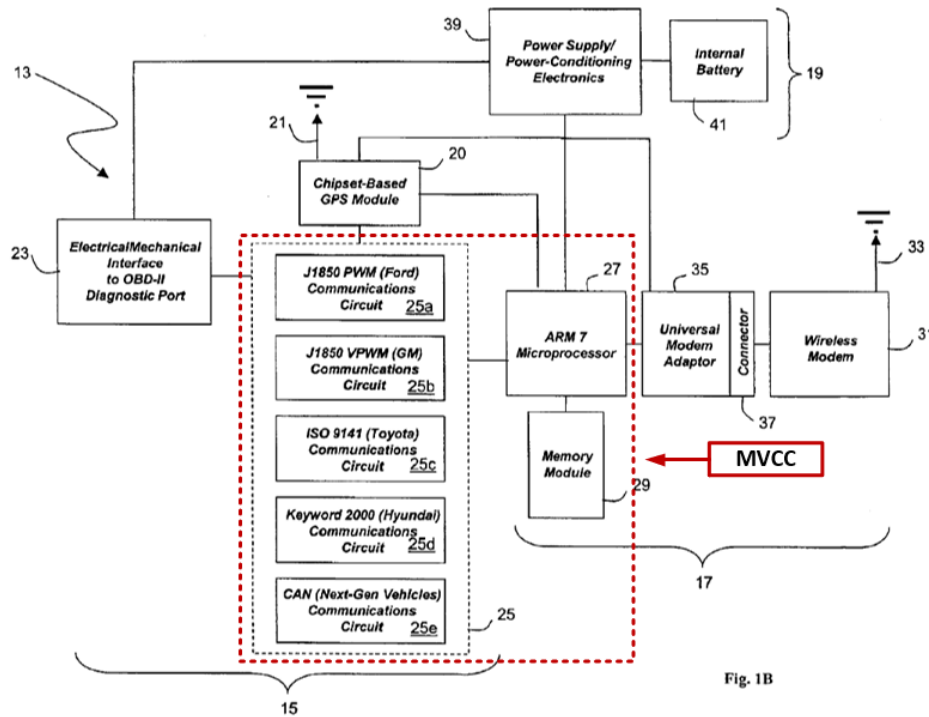
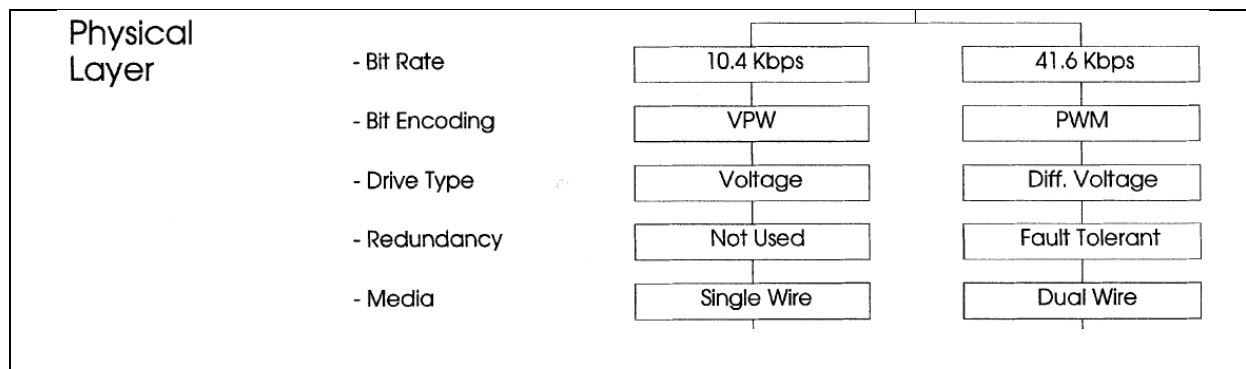


Fig. 1B

263. POSAs would have understood that while Hunt refers to Toyota using ISO 9141 (e.g., Fig. 5, module 25c), the full protocol name was ISO 9141-2. *E.g.*, Ex. 1046, 368-369, 40 C.F.R. §86.1806-04(h)(2)(i) “**ISO 9141-2** ‘Road vehicles—Diagnostic systems—Part 2: CARB requirements for interchange of digital information,’ (February 1, 1994) may be used as an alternative to SAE J1850 as the on-board to off-board communications protocol.”). POSAs would also have understood Hunt’s reference to VPWM in J1850 (e.g., Fig. 5, module 25b) as a shorthand for variable pulse width modulation, which is also referred to as VPW. J1850 itself refers to “VPW” bit encoding. Ex. 1071, 8, Fig. 1:



(2) Vehicle device code meaning

264. The '278 patent does not define vehicle device codes, but refers to Flick-885 as using vehicle device codes. Ex. 1001, 2:29-37. Flick-885 explains vehicle device codes can be “binary codes” (represented as hexadecimal codes) used to communicate with vehicle devices. Flick-885, 7:23-42, 8:12-25, 8:42-9:10; *see also* Flick-460, 2:44-53 (networking standards like SAE J1850 govern communication between vehicle devices and controllers); Ex. 1080, 311. I understand that the courts construed a “device code” as a “signal from a vehicle device.” *CalAmp I*, 920 F.3d at 1346, 1349; *CalAmp-CC*, 15-17; Ex. 1029, 11; Ex. 1030, 11.

265. Because the code may be “**for writing to** the... vehicle device” (Ex. 1001, 23:67-24:3, claim 7), POSAs would have understood the “vehicle device code” should be construed as a “signal **to or** from a vehicle device.” I understand that the Patent Office Central Reexamination Unit or CRU agreed. Ex. 1013, 4-5.

(3) Hunt’s ECU query uses one from a plurality of vehicle device codes

266. Hunt’s MVCC can query data from the ECU in different vehicles, from different manufacturers, through the OBD-II system. That data may include multiple “parameters” encoded according to a particular protocol, and 5-digit “diagnostic trouble codes (DTCs) (e.g., ‘P0001’) indicating electrical/mechanical problems with the vehicle. Hunt, 1:28-33 (“parameters” include “vehicle speed (VSS), engine speed (RPM), engine load (LOAD), and mass air flow (MAF)”), 5:14-17, 5:55-61, 7:20-26, 7:50-53, Fig. 3, claim 19; *supra* §VII.B.4.b ([1.c]).

267. Thus, the messages between the MVCC and ECU—querying and reporting ECU’s diagnostic data (including DTCs)—use a “corresponding vehicle device code” corresponding to the vehicle device (ECU). *See also CalAmp-I*, 920 F.3d at 1347, 1349 (Omega conceded a signal from an ECU is a “device code”).

(4) Hunt’s communication with ECUs in different vehicles with different networking protocols uses codes “from among a plurality for different vehicles”

268. Hunt’s MVCC therefore communicates over a host “vehicle data bus” (OBD-II bus) “with at least one vehicle device” (ECU) “using at least one corresponding vehicle device code.”

269. The ECU “device code” is “from among a plurality thereof for different vehicles” because any particular ECU “device code” Hunt’s MVCC uses

is “from among a plurality” for the ECU, and because Hunt can read device codes from ECUs on different vehicles (from different manufacturers).

270. Element [1.d] requires nothing more.

c. Any Suggestion That [1.d] Requires Using Different Codes on Different Vehicles Fails To Avoid Hunt

271. During reexamination, Omega alleged that an MVCC using standard code sets with multiple vehicles could not meet the claim because [1.d] required using different codes on different vehicles. Ex. 1006, 108-109 (6:14-21, 6:26-7:4), 116 (14:11-19), 117 (15:18-25), 120 (18:6-22), 617-619, 625. This argument fails to avoid anticipation by Hunt for three independent reasons below.

i. Omega Improperly Injects Limitations Into [1.d]

272. Hunt’s multiple device codes are a “plurality of [device codes] for different vehicles” because they are used for different vehicles by different manufacturers. As explained *supra* §VII.B.5.b, nothing in element [1.d] requires anything more than this functionality disclosed in Hunt.

ii. Omega Is Estopped From Arguing That Using Standard Codes on Different Vehicles Cannot Meet [1.d]

273. In the CalAmp Litigation, Omega argued that accused products met [1.d] because:

On initial installation, the [MVCC] generates a sequence of device codes to determine compatibility with different vehicles, including CAN 11 Bit **7DF**

message, CAN 29 Bit **18DB33F1** message, J1850 VPW **68 6A F1** message, J1850 PWM message, K-Line messages and J1850 VPW **6C 10 F1** message.

Ex. 1065, 100. This argues that each listed “message” is a “vehicle device code.”

This means that *every message Omega cited as meeting Element [1.d] is a standards-compliant query*. The reference to messages being “device codes,” and the context in which Omega makes this argument as meeting element [1.d], which refers to using “at least one vehicle device code from among a plurality thereof for different vehicles,” means that each message plainly qualifies as a “vehicle device code” as used in claim 1.

274. I explained the standards-compliant basis for this conclusion in detail for each message in the above regulatory background sections as follows:

Message	Analysis
CAN 11 bit 7DF message	§ IV.C.2
CAN 29 bit 18DB33F1 message	§ IV.C.3
J1850 VPW 68 6A F1 message	§ IV.C.4
J1850 PWM message	§ IV.C.5
K-Line messages	§ IV.C.6
J1850 VPW 6C 10 F1 message	§ IV.C.7

275. For brevity I refer to the preceding analysis rather than needlessly repeating each standards document analysis again here. Hunt’s MVCC sends the same messages that Omega calls vehicle device codes meeting [1.d] when it tests each protocol to establish communication, (Hunt, 9:3-6), or sends standards-

compliant diagnostic queries using J1850 PWM, J1850 VPW, CAN, or Keyword Protocol 2000 (Hunt, 5:8-19, 6:9-25, 7:20-26, 8:46-9:17).

iii. Hunt's MVCC Uses Different Device Codes on Different Vehicles

276. Even if the Board construed [1.d] as requiring that the MVCC be capable of using different device codes on different vehicles, Hunt still meets [1.d].

277. The different communication protocols used in Hunt's circuits 25a-e (Fig. 1B) encode messages differently. While I discuss this in detail below for J1850 and KWP2000 (Keyword Protocol 2000), it is also evident from the standards themselves. *E.g.*, Ex. 1071 (SAE J1850); Ex. 1052 (SAE J1978, cited in J1850); Ex. 1075 (SAE J1979, cited in SAE J1978); Ex. 1074 (ISO 14230-4 for Keyword 2000 ("KWP2000")); Ex. 1072 (ISO 15765-4 for CAN); Ex. 1073 (ISO 15031-5, cited in CAN).

278. Hunt's MVCC queries on different vehicles from different manufacturers (using different networking protocols) use different coded messages—device codes—even for the same ECU data requests. This is true even ignoring any cyclic redundancy check (CRC) codes appended to the message.

279. For example, Hunt's MVCC uses different communication circuits (25a-b and 25d) supporting different protocols for Ford (J1850 PWM), GM (J1850 VPW), and Hyundai (KWP2000). Hunt, 2:42-57, 5:61-65, 8:14-65, Figs. 3, 5, claim 19.

280. Hunt's MVCC queries ECU RPM, for example², via the OBD-II interface Hunt describes, using different vehicle codes depending on the communication protocol used by the host vehicle (Hunt, 1:28-33, 7:20-26, Figs. 3, 5):

J1850 PWM (Ford)	J1850 VPW (GM)	Keyword 2000 (Hyundai)
61 6A F1 01 0C	68 6A F1 01 0C	C2 33 F1 01 0C

(1) Three-byte headers

281. The bolded hexadecimals comport with Exhibit 1075, 22, SAE J1979, Table 11 standardized three-byte header for the network standards used by the manufacturers identified in Hunt (*e.g.*, 61 6A F1 for Ford), while 01 0C is the standard OBD-II diagnostic query for engine RPM. The data frames or messages listed in the table above do not include the cyclic redundancy check (CRC) or other error detection byte that different standards would further append to the message. For example, section 4.2.8 of the SAE J1979 standard refers to section 7.4.1 of the SAE J1850 standard for specifying a CRC as the error detection byte. Ex. 1075,

² RPM is just one of a plurality of ECU parameters reported on OBD-II. Hunt, 1:28-33, 7:20-26, Fig. 3.

23. I left the error detection byte out of the messages listed above because it makes no difference to the point that the *same engine RPM query*, in *different network protocols*, set forth in *different standards*, used by *different manufacturers*, in *different vehicles*, would use *different vehicle device* codes, e.g., messages. At a minimum, the CRC code would provide *further differences* between the hexadecimal sequences in the generated messages. This focus on the other data frame or message hexadecimals is also consistent with how the Patent Owner identified “messages” meeting the “vehicle device code” limitation in element [1.d] by at most identifying the three-byte header of a data frame or message. Ex. 1065, 100.

282. Exhibit 1075 SAE J1979 is a standard on “E/E Diagnostic Test Modes – Equivalent to ISO/DIS 15031-5:April 30, 2002.” It “specifies diagnostic services and functionally addressed request / response messages required to be supported by motor vehicles and external test equipment for diagnostic purposes which pertain to motor vehicle emission-related data. These messages are intended to be used by any external test equipment meeting the requirements of SAE J1978 for retrieval of OBD information from a vehicle.” Ex. 1075, 1. This would have applied to Hunt’s device on May 8, 2003.

283. By 2007, federal regulations required a device like Hunt’s appliance (and the tracking unit in the ’278 patent) to comply with Ex. 1075. Ex. 1046, 374,

40 C.F.R. §86.1806-05(h)(1)(ii) (“Basic diagnostic data (as specified in §§ 86.094–17(e) and (f)) shall be provided in the format and units in SAE J1979 ‘E/E Diagnostic Test Modes—Equivalent to ISO/DIS 15031–5:April 30, 2002’, (Revised, April 2002).”). Table 11 provides, Ex. 1075, 22:

TABLE 11—DIAGNOSTIC MESSAGE FORMAT FOR ISO 9141-2, ISO 14230-4, SAE J1850

Header bytes (Hex)			Data bytes								
Priority/Type	Target address (hex)	Source address (hex)	#1	#2	#3	#4	#5	#6	#7	ERR	RESP
Diagnostic request at 10.4 kbit/s: SAE J1850 and ISO 9141-2											
68	6A	F1	Maximum 7 data bytes							Yes	No
Diagnostic response at 10.4 kbit/s: SAE J1850 and ISO 9141-2											
48	6B	ECU addr	Maximum 7 data bytes							Yes	No
Diagnostic request at 10.4 kbit/s (ISO 14230-4)											
11LL LLLLb	33	F1	Maximum 7 data bytes							Yes	No
Diagnostic response at 10.4 kbit/s (ISO 14230-4)											
10LL LLLLb	F1	addr	Maximum 7 data bytes							Yes	No
Diagnostic request at 41.6 kbit/s (SAE J1850)											
61	6A	F1	Maximum 7 data bytes							Yes	Yes
Diagnostic response at 41.6 kbit/s (SAE J1850)											
41	6B	addr	Maximum 7 data bytes							Yes	Yes

NOTE— LL LLLL = Length of data bytes; RSP = In-frame response; ERR = Error Detection

284. SAE J1850 diagnostic request at 10.4 kbits/s refers to a SAE J1850 VPW message because SAE J1850 VPW has a data rate of 10.4 kbps. The three-byte header for this request is 68 6A F1. *Supra* §IV.C.4.

285. SAE J1850 diagnostic request at 41.6 kbits/s refers to a SAE J1850 PWM message because SAE J1850 PWM has a data rate of 41.6 kbps. The three-byte header for this request is 61 6A F1. *Supra* §IV.C.5

286. ISO 14230-4 is Keyword Protocol 2000 (KWP2000). Ex. 1074; *supra* §IV.C.6. The first byte “11LL LLLLb” translates to hexadecimal C2 as follows. The "b" at the end of the characters indicates that the eight characters are bits and not hexadecimal values as specified in the column title and shown in the other cells in that column.

287. ISO 14230-4 at §4.2, Exhibit 1074 at 2, specifies the message structure for use with OBD-II. In particular, it provides:

4.2 Message structure

The header shall always consist of three bytes.

An optional length byte shall not be used. Data length shall be limited to 7 bytes for compatibility with ISO 15031-5.

Bits A1A0 of format byte = 11, with address information and functional addressing shall be used for request messages.

Bits A1A0 of format byte = 10, with address information and physical addressing shall be used for response messages.

Functional address 33H shall be used as target address for messages sent to the vehicle.

Target address of the responses shall be the source address included in the request.

Source address of the responses shall be the physical address of the ECUs.

288. Exhibit 1082 is ISO 14230-2 Road vehicles—Diagnostic systems—Keyword Protocol 2000 – Part 2: Data link layer (1st ed. Mar. 15, 1999). This is chapter 2 of the Keyword Protocol 2000 specification and defines the data link layer.

289. Ex. 1082 at 3, § 4.2.1 Format byte, defines the first byte in the three-byte header as follows:

4.2.1 Format byte

The format byte contains 6 bit length information and 2 bit address mode information. The tester is informed about use of header bytes by key bytes (see 4.2.2).

A1	A0	L5	L4	L3	L2	L1	L0
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where

- A1 and A0 define the form of header which will be used by the message in accordance with table 1;
- L5...L0 define the length of a message from the beginning of the data fields (ServiceIdentification byte included) to checksum byte (not included). A message length of 1 to 63 bytes is possible. If L0 to L5 = 0 then the additional length byte is included (see 4.2.5).

290. As noted above, from ISO 14230-4 at §4.2, Exhibit 1074 at 2, the A1A0 is 11 for a request.

291. Since the message will have two bytes (service request and PID), bits L5 to L0 are 000010 to indicate the two-byte message length.

292. Putting this together, the bit sequence is 1100 0010. Binary 1100 is decimal 12 or hexadecimal C. Binary 0010 is decimal 2 and hexadecimal 2. The header byte is therefore hexadecimal C2 as indicated above.

293. In the three-byte header for Keyword Protocol 2000, Exhibit 1075, 22, SAE J1979, Table 11 makes clear that the second and third bytes are 33 F1. Putting this together, the three-byte header for the KWP2000 query is C2 33 F1. This is followed by the service request byte and parameter identifier byte as explained below.

(2) Engine RPM bytes

294. The fourth byte is the 01 service request meaning an external test equipment query for a diagnostic parameter. Ex. 1075, 63.

295. The fifth byte is the engine speed parameter 0C, referred to as PID \$0C for parameter identifier hexadecimal 0C. *E.g.*, Ex. 1075, 67.

296. The SAE J1979 message bytes are consistent with the 2006 ISO 15031-5 standard discussed above. The ISO 15031-5 standard specifies the hexadecimal (PID) for particular parameters. For example, under ISO 15031-5, the hexadecimal code for engine RPM is 0C. Ex. 1073, 123, Table B.13 – PID \$0C definition, in Annex B: PIDs (Parameter ID) for Services \$01 and \$02 scaling and definition:

Table B.13 — PID \$0C definition

PID (hex)	Description	Data byte	Min. value	Max. Value	Scaling/bit	External test equipment SI (Metric) / English display
0C	Engine RPM	A, B	0 min ⁻¹	16383,75 min ⁻¹	1/4 rpm per bit	RPM: xxxxx min ⁻¹
Engine RPM shall display revolutions per minute of the engine crankshaft.						

297. Thus, an OBD-II standards-compliant request for engine RPM ends with the hexadecimal 01 0C, and this was true before and after Hunt was filed.

298. Putting the header, service request, and PID together,

J1850 PWM (Ford)	J1850 VPW (GM)	Keyword 2000 (Hyundai)
61 6A F1 01 0C	68 6A F1 01 0C	C2 33 F1 01 0C

299. This means that when Hunt’s MVCC queries engine RPM on a J1850 PWM network (Ford), J1850 VPW network (GM), and Keyword 2000 network (Hyundai), the codes (“messages”) for the same query are different for different vehicles because the different vehicles from different manufacturers used different network protocols governed by different standards. As I noted above, the query would have further differences with the CRC code appended to the end of the message.

300. Thus, Hunt expressly discloses that its MVCC is capable of using different device codes on different vehicles from different manufacturers (Ford, GM, Hyundai) because Hunt’s messages querying the ECU for RPM use different vehicle device codes on different vehicles (with different communication protocols). Hunt, 2:42-57, 5:61-65, 8:14-65, Figs. 3, 5, claim 19.

301. This meets [1.d]’s “using at least one corresponding vehicle device code from among a plurality thereof for different vehicles” under any interpretation.

(3) Multiple alternative vehicles

302. Hunt's MVCC alternatively meets [1.d] because it is compatible with automobiles, heavy trucks, motorcycles, jet skis, and marine vehicles. Hunt, 4:56-63.

303. POSAs understood these disparate vehicle types had different vehicle devices that communicate using different vehicle codes inapplicable in other vehicle types. For example, Exhibit 1047 SAE J1939-71 concerns networks on heavy-duty vehicles. Ex. 1046, 374, 40 C.F.R. §86.1806-05(h)(1)(vii). J1939-71 describes parameters that are only present when the host vehicle has particular equipment, such as cruise control (Ex. 1047, 21-22, describing "SPN" 86-88), or a trailer with ABS (*id.*, 255, describing "SPN 1836"). The "SPN" in J1939-71 stands for "suspect parameter number" and serves a similar purpose as the parameter identifier or PID as described above with J1850 and ISO 14230-4. POSAs understood that different vehicles with different equipment used different parameter identifiers (or SPNs) in messages querying or reporting parameter data. Thus, POSAs would have understood that the disparate types of vehicles in Hunt's disclosure would have had different equipment that would have been associated with different parameters. The different parameters would have meant Hunt's MVCC used different hexadecimal codes (messages) when communicating with such devices. This also meets [1.d].

6. Element [1.e]

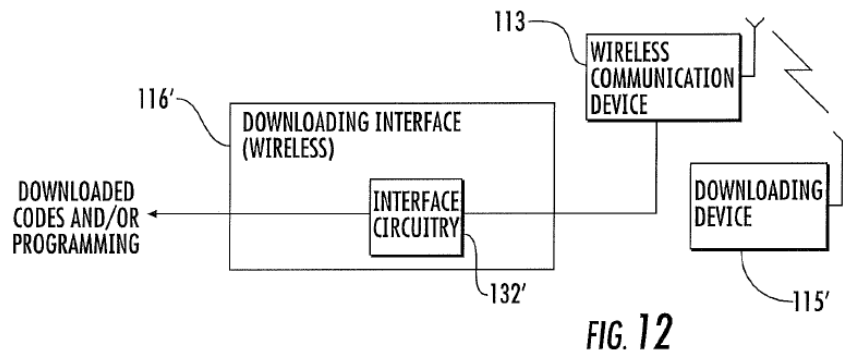
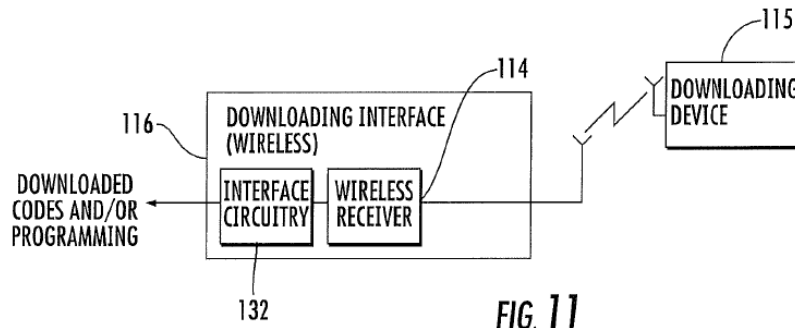
1.e	a downloading interface for permitting downloading of enabling data related to the at least one corresponding vehicle device code for use by said [MVCC].
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304. “Download” means to transfer data. Ex. 1051, 75.

305. The ’278 patent says the “downloading interface” is circuitry that allows downloading MVCC “programming instructions” (*e.g.*, firmware or software) “to allow remote programming[.]” Ex. 1001, 24:46-51.

306. The “interface circuitry” “may” comprise “logic circuitry” and “switching components” for “controlling communication” with a “downloading device” such as a laptop or other computer. *Id.*, 24:22-26, 39-41, Figs. 11-13.

307. A wireless downloading interface may communicate over a cellular, satellite, or Wi-Fi receiver. *Id.*, 4:64-66; 5:31-33, 5:44-49, 23:55-58, 24:14-22, Figs. 11-12.



a. Hunt Has a Downloading Interface To Program its MVCC

308. Microprocessor 27 in Hunt’s controller runs firmware that identifies host vehicle communication protocols and controls communication with vehicle devices. Hunt, 2:66-3:3.

309. Hunt’s MVCC can be implemented “as a firmware program loaded into non-volatile storage, or a software program loaded from or into a data storage medium as machine-readable code.” Hunt, 10:46-54.

310. The computer system may be programmed when “manufactured or *via a computer-readable medium at a later date.*” Hunt, 11:5-18.

311. Transferring firmware and/or software onto the MVCC “at a later date” constitutes downloading data, and POSAs understood this downloading occurs via a downloading interface on the MVCC.

312. Hunt describes examples of specific downloading interfaces as explained below.

313. Hunt can download programming data wirelessly, and explains that the “computer-readable medium” for conveying the “machine-readable code” may include “a carrier wave modulated, or otherwise manipulated, to convey instructions that can be read, demodulated/decoded and executed by a computer,” Hunt, 11:14-32.

314. Hunt describes wireless communication using bidirectional cellular or satellite technologies. Hunt, 6:41-46 (“wireless modem 31 operates on a wireless network (*e.g.*, CDMA, GSM, GPRS, Mobitex, ORBCOMM)[.]”); 6:50-65 (satellite modem), Fig. 1B (universal modem adapter 35 and wireless modem 31), Fig. 2 (showing bidirectional airlink 59 and cell tower or base station 61).

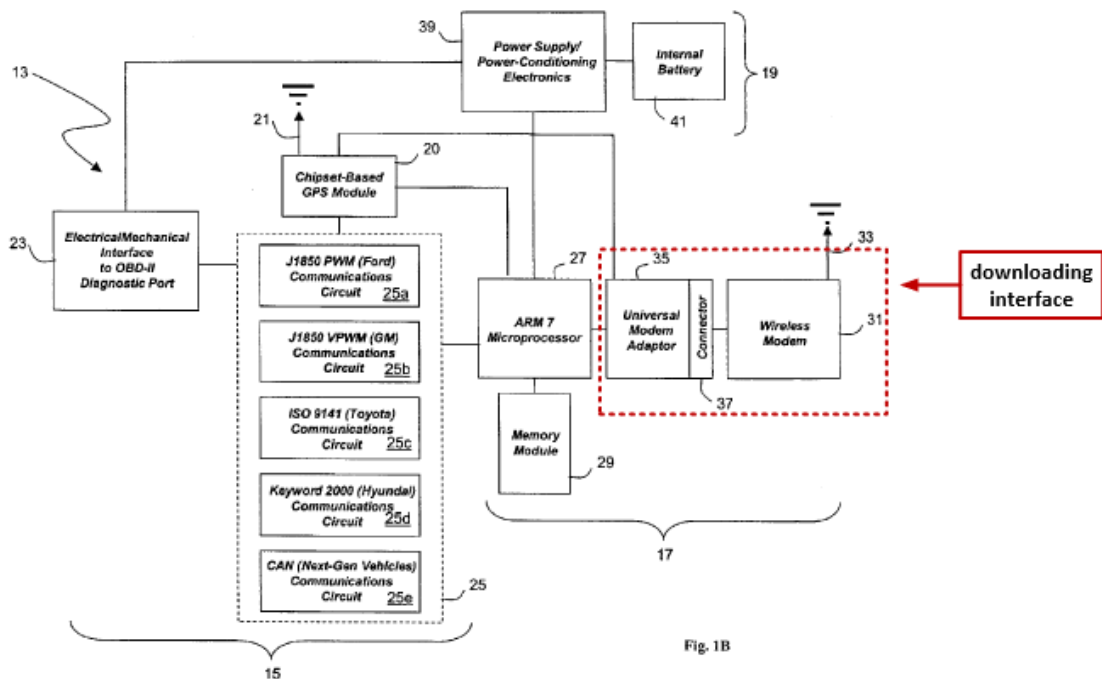
315. GSM is Global System for Mobile Communication, used in cellular communication standards. Ex. 1031, 1-2, 9; Ex. 1032, 47-51.

316. CDMA is Code Division Multiple Access, another communication protocol used in cellular communications. Ex. 1031, 1-2, 10-11.

317. GPRS is General Packet Radio Service, which is part of a network that allows mobile networks to transmit IP packets to the Internet. Ex. 1031, 1-2, 10-11, 178.

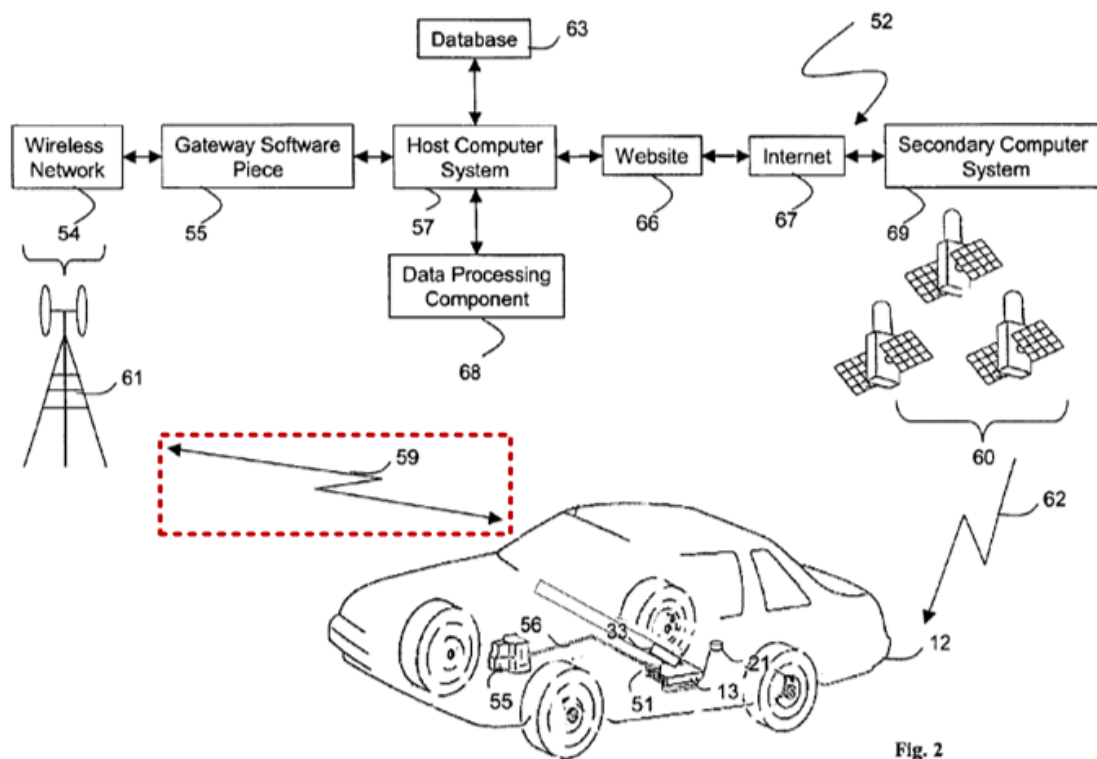
318. ORBCOMM refers to a commercial satellite communication network. Ex. 1032, 47-50.

319. POSAs understood that wireless devices using CDMA, GSM, GPRS in cellular networks, or ORBCOMM were capable of transmitting and receiving data. Ex. 1031, 1-2, 9-11, 178; Ex. 1032, 47-50.



320. Microprocessor 27 runs software that controls communication through the modem. Hunt, 6:26-65.

321. Universal modem adapter 35 and wireless modem 31 control communication on the wireless link. Hunt, 6:50-65.



322. As noted above Hunt’s appliance may be implemented on any “programmable device... *capable of configuration for transmitting and receiving data over a network*,” including a cellphone. Hunt, 11:5-7, 11:34-40; *supra* §VII.B.3 ([1.b]).

b. Hunt’s Interface to Download Programming Data Meets [1.e]

i. “Enabling Data” Imparts No Patentable Weight

323. The content of the downloaded data does not limit the “downloading interface.” Nothing in the ’278 patent alleges otherwise.

324. POSAs would have understood that the capability to download “enabling data” is no different than a capability to download any **other** kind of data. Nothing in the **nature** of the downloaded data affects the downloading process or anything in device claim 1. It is simply data that is downloaded like any other data.

325. Nothing in the ’278 patent suggests the “downloading interface” would have a structural difference, or its downloading capability would need to be performed any differently if non-enabling data were downloaded instead of “enabling data.”

326. Hunt meets [1.e] because it discloses a downloading interface capable of downloading data and [1.e] requires nothing more.

ii. Hunt Meets [1.e] Even If Enabling Data is Limiting

327. If [1.e] requires downloading a particular **type** of data, then Hunt still meets it because Hunt describes updating the firmware on the MVCC’s microprocessor 27, and that firmware identifies the host vehicle communication protocol and processes device codes (*supra* §VII.B.5.b.ii) read from a vehicle device. Hunt, 6:9-12, 6:18-25.

328. Firmware that identifies the host vehicle communication protocol “by testing each protocol in an effort to establish communications,” (Hunt 9:3-6), and processes device codes, is enabling data (Ex. 1001, 24:9-12 (“The enabling data

may be the vehicle device code or codes, an *instruction to select a code or codes from among those already stored, or the data or sequence to allow the controller 111 to generate the vehicle device code or codes, for example.*”)), and the MVCC’s firmware instructions that select and read vehicle device codes are “related to the at least one corresponding vehicle device code for use by said [MVCC].”

329. Thus, Hunt meets [1.e].

330. Furthermore, Hunt’s disclosure that its wireless appliance can be implemented on a cell phone (Hunt, 11:5-7, 11:34-40; *supra* §VII.B.3 ([1.b])) discloses that software (e.g., an application) is downloaded (e.g., wirelessly) onto the phone to implement Hunt’s above-discussed appliance functionality. This was well-known functionality. *E.g.*, Ex. 1056, Abstract; *accord* Ex. 1057, Abstract; Ex. 1058, [0026], [0092]; Ex. 1060, Abstract.

331. The downloaded software implementing the appliance functionality includes instructions to retrieve and process device codes and is thus also “enabling data related to at least one corresponding vehicle device code for use by said [MVCC]” in [1.e].

332. Thus, Hunt anticipates claim 1.

C. Claim 4

4	The... claim 1 [unit] wherein said downloading interface comprises a wireless signal downloading interface.
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333. Hunt anticipates claim 4 because it discloses embodiments where the downloading interface is a wireless signal downloading interface. *Supra* §VII.B.6 ([1.e]).

D. Claim 5

5	The... claim 4 [unit] wherein said wireless signal downloading interface comprises a wireless receiver for temporary connection to a downloading device.
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334. Hunt anticipates claim 5 because it describes wirelessly programming Hunt's MVCC after manufacturing. Hunt, 11:11-18; *supra* §VII.B.6 ([1.e]). POSAs would have known that remote programming or firmware downloads would conventionally have been done using a computer – such as the Hunt host computer system 57 – as a “downloading device.” Ex. 1001, 24:39-41; Hunt, 7:40-49, Fig. 2.

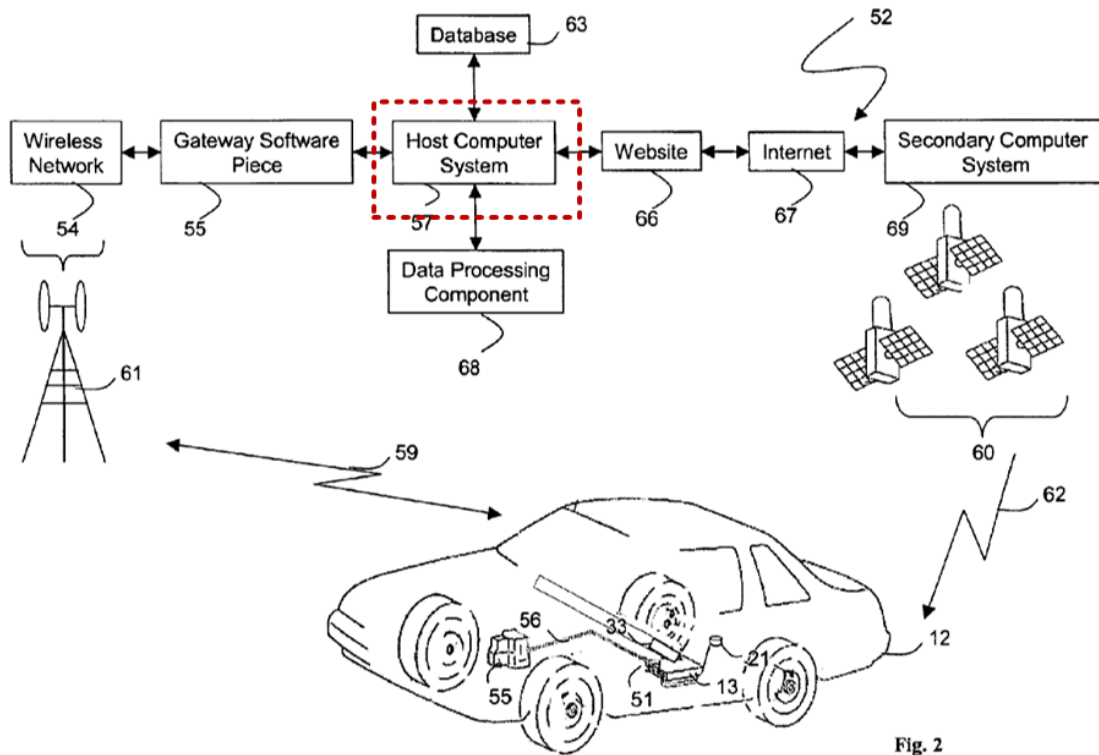


Fig. 2

335. As Omega’s expert testified in the CalAmp Litigation, connections using “standard wireless communication protocols” of the type Hunt uses are “temporary” as claimed. Ex. 1033, 99:19-24, 103:13-19. The connection only lasts when Hunt’s appliance is within range of a remote receiver or transmitter, or when Hunt’s appliance elects to form a wireless connection.

E. Claim 6

6	The... claim 1 [unit] wherein the corresponding at least one vehicle code is for reading from the at least one vehicle device.
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336. As explained with [1.d], Hunt’s MVCC reads at least one vehicle device code (*e.g.*, response to a particular query) from at least one vehicle device (*e.g.*, the ECU). *Supra* §VII.B.5.

F. Claim 8

8	The... claim 1 [unit] wherein said downloading interface is also for permitting downloading of at least one programming instruction for said multi-vehicle compatible controller.
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337. Claim 1 refers to permitting downloading of “enabling data” which can be other things in addition to an “instruction” (Ex. 1001, 24:9-12), and claim 8 purports to narrow claim 1 by more specifically “permitting” downloading of a programming instruction. The content of the downloaded data is not limiting. *Supra* §VII.B.6 ([1.e]). Regardless, Hunt’s downloading interface downloads MVCC “programming instructions.” *Id.*

G. Claim 11

11	The... claim 1 [unit] wherein said wireless position determining device comprises a... (GPS) receiver.
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338. Hunt’s wireless positioning device comprises a GPS module that POSAs understood comprised a GPS “receiver.” *Supra* §VII.B.2 (discussing GPS and [1.a]); Hunt, Abstract, 1:39-47, 2:31, 3:26-27, 5:7, 5:43-54, 7:30-33, Figs. 1A-1B, 2, claim 1; Ex. 1065, 105.

H. Claim 12

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

339. Hunt discloses “***a single housing that houses*** the GPS antenna, the radio antenna, and ***all the other components*** in the wireless appliance.” Hunt, 3:4-

9; *id.*, claim 1 (“a single housing... houses the GPS antenna, the radio antenna, the microprocessor, the vehicle communication circuit, the GPS module, and the wireless transmitter”), 4:34-36, 5:43-45, 6:41-46. Components can be implemented on a single circuit board (*id.*, 3:17-33), chip set (*id.*, 5:39-42), or ASIC (*id.*, 3:50-57) in a single housing.

340. Thus, Hunt’s housing contains said vehicle position determining device [GPS, *supra* § VII.B.2], said wireless communications device [transmitter or modem with embedded antenna, *supra* § VII.B.3], said multi-vehicle compatible controller [appliance, *supra* § VII.B.4], and said downloading interface [appliance, *id.*].

I. Claims 18-19, 21

341. Elements [18.pre]-[18.f] are identical to elements [1.pre]-[1.e] and limitations in claim 5. Ex. 1044.

342. Hunt meets elements [18.pre]-[18.f] for the same reasons it meets elements [1.pre]-[1.e] and claim 5, as follows.

Element	Corresponding	Analysis
[18.pre]	[1.p]	§VII.B.1
[18.a]	[1.a]	§VII.B.2
[18.b]	[1.b]	§VII.B.3
[18.c]	[1.c]	§VII.B.4
[18.d]	[1.d]	§VII.B.5
[18.e]	[1.e]	§VII.B.6
[18.f]	Claim 5	§VII.D

343. Claims 19 and 21 depend from claim 18 and repeat the limitations from claims 6 and 8, respectively. Hunt meets claims 19 and 21 for the same reasons Hunt meets claim 6 (*supra* §VII.E) and claim 8 (*supra* §VII.F), respectively.

VIII. GROUND 2: HUNT RENDERS OBVIOUS CLAIMS 1, 4-6, 8, 11-12, 18-19, 21.

344. Ground 2 relies on three obvious implementations of Hunt that provide alternative bases for meeting Elements [1.d] and/or [1.e]. It would have been obvious to use any of these three implementations individually or together in any combination. Hunt implemented in each of the ways discussed in Ground 2 meets the remainder of claim 1, and the other claims challenged in Ground 2, for the same reasons explained in Ground 1.

A. Element [1.d]

345. Hunt's MVCC determines which communication circuit (25a-e, Fig. 1B) to use by determining which protocol the host vehicle supports. Hunt, 2:66-3:3, 9:3-8.

346. SAE J1978 standardized this process as a "basic function...[required of] external test equipment" as part of OBD-II's "Automatic Determination of Communication Interface," (Ex. 1052, 1, 4-6), and federal regulations ***required*** compliance with J1978 for "[a]ll equipment used to interface, extract and display

OBD-related information[.]” Ex. 1046, 374 (40 C.F.R. §86.1806-05(h)(1)(vi)); Ex. 1079, 630 (§86.1806-05(h)(1)(v)); Ex. 1052, 5-6.

347. Hunt’s MVCC interfaces and extracts OBD-II related information, and by 2007 federal regulation thus required it to provide the J1978 automatic determination functionality. Hunt, 5:55-6:12, 7:16-26.

348. POSAs would have found it obvious to implement Hunt’s protocol determination in a manner compliant with OBD-II regulations and standards.

349. Omega’s allegation in the CalAmp Litigation that [1.d] is met by “determin[ing] compatibility” on “initial installation” (*supra* §VII.B.5.c.ii) comports with OBD-II’s automatic determination, and the communication protocols Omega identified were incorporated into OBD-II (Ex. 1079, 630 (40 C.F.R. §§86.1806-05(h)(1)(i) (**CAN**), 86.1806-05(h)(1)(iii) (**J1850**, ISO 14230-4 (**KWP2000**))); *cf.* Ex. 1046, 374-375. Thus, Omega alleged any **OBD-II compliant device** meets [1.d].

350. The OBD-II compliant implementation of Hunt’s protocol determination would send the same “CAN 11 Bit 7DF,” “CAN 29 Bit 18DB33F1,” and “J1850 VPW 68 6A F1” messages Omega identified in *CalAmp* as meeting [1.d], for the reasons discussed *supra* §VII.B.5.c.ii. As noted above, Hunt describes its MVCC communicating with vehicle devices using CAN, J1850

PWM, and J1850 VPW, and would therefore send these messages when communicating with devices on host vehicles using those standards.

351. I explained the standards-compliant basis for this conclusion in detail for each message in the above regulatory background sections as follows:

Message	Analysis
CAN 11 bit 7DF message	§ IV.C.2
CAN 29 bit 18DB33F1 message	§ IV.C.3
J1850 VPW 68 6A F1 message	§ IV.C.4
J1850 PWM message	§ IV.C.5
K-Line messages	§ IV.C.6
J1850 VPW 6C 10 F1 message	§ IV.C.7

352. Furthermore, a conventional and obvious way to implement the multi-vehicle compatibility Hunt describes (Hunt, 5:8-18, 6:9-25, 7:20-26), with a reasonable expectation of success, would have been to pre-install manufacturer-specific codes for **all** supported vehicles as taught by Flick-885. *Infra* §IX.C.5 (Ground 3, element [1.d], discussing Flick-885).

353. That would have been a desirable design choice because it would have allowed the unit's manufacturer to produce, stock and sell a single unit model capable of use in all vehicles, rather than many vehicle-specific unit models each loaded with manufacturer-specific codes for a single vehicle.

354. While nothing in [1.d] requires the MVCC be capable of communicating using manufacturer-specific device codes for one vehicle, selected from a plurality of codes including manufacturer-specific codes for different

vehicles, an obvious implementation of Hunt would meet that overly-narrow interpretation.

B. Element [1.e]

355. To the extent Hunt’s disclosure of programming the system “later” than manufacture (Hunt, 11:5-18) is considered to not expressly disclose programming the firmware, updating Hunt’s *firmware* through its wireless modem and/or wired connection would have been the conventional and obvious way to implement the post-manufacture programming Hunt describes with a reasonable expectation of success.

356. Firmware updates download enabling data as discussed *supra* §VII.B.6 (Ground 1, [1.e]).

357. The three Hunt implementations discussed *supra* §§VIII.A-VIII.B are each no more than the predictable use of prior art elements according to their established functions.

IX. GROUND 3: FLICK-885+HUNT RENDERS OBVIOUS CLAIMS 1-22

A. Flick-885

358. U.S. Patent 6,756,885 (Ex. 1024, “Flick-885”) was published more than a year before July 3, 2007. I am asked to assume that Flick-885 is prior art to all challenged claims.

359. Flick-885 describes a multi-vehicle control system “for reading from a data bus” with a MVCC and bidirectional wireless interface. Flick-885, Abstract. The MVCC stores “a set of device codes for a given vehicle device for a plurality of different vehicles,” reads “a device code from a data communications bus,” and determines “a match between a read device code and the stored device codes to thereby provide compatibility with a plurality of different vehicles.” *Id.* The vehicle control system also provides remote vehicle control functionality like remote keyless entry or engine start. *Id.*

360. Flick-885 discloses everything in the challenged claims except GPS (vehicle position determining device) and a single housing.

361. The '278 patent acknowledges GPS was known for vehicle tracking (Ex. 1001, 1:47-53) and alleges that using GPS distinguished the alleged invention from Flick-885 (*Id.*, 2:29-41).

B. Flick-885+Hunt

362. POSAs would have combined Flick-885 with Hunt (“Flick-885+Hunt”) by modifying Flick-885’s vehicle control system to (1) obtain vehicle position information from a GPS and transmit it using a wireless communication system and (2) house its components and GPS in a housing, both of which are taught by Hunt.

1. Reasons to Add Hunt's Location Services To Flick-885

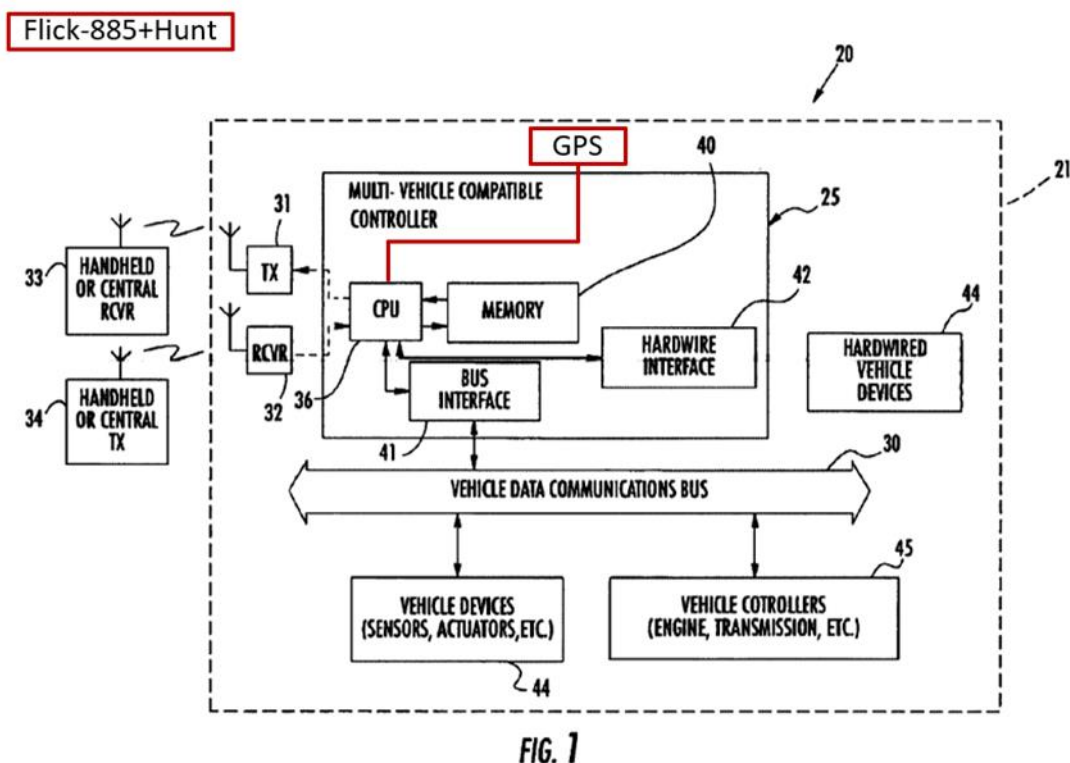
363. Flick-885's system has a controller that monitors vehicle devices using device codes to access diagnostic data, and provides vehicle security services like remote monitoring (*e.g.*, whether a door is open) and remote start. Flick-885, 3:27-35, 3:58-62, 6:62-7:3, 7:43-49, 8:50-63, 9:43-55, 10:31-36; *id.*, 1:21-39 (discussing vehicle security systems).

364. Hunt discloses the same type of system with an MVCC that monitors vehicle devices using device codes (*supra* §VII.B.4 ([1.c])) and explains there are “many advantages” to adding GPS and location services to such systems. Hunt, 2:35-41 (“The wireless appliance monitors ***location and diagnostic data*** to provide services such as ***roadside assistance*** to a disabled vehicle ***or recovery of a stolen vehicle***.... [T]he appliance provides a GPS-based system for ***alerting a vehicle's owner that someone other than the owner has moved the vehicle (e.g., the vehicle is stolen or towed)***.”), 4:18-22 (“The invention has ***many advantages***. ... [W]ireless, real-time transmission and analysis of GPS and diagnostic data... makes it possible to... determine [a vehicle's] location in real-time... [and] ***improve conventional services such as roadside assistance, vehicle theft notification and recovery, and remote diagnostics***.”).

365. POSAs would have added Hunt's location services to Flick-885 for at least two reasons.

366. **First**, a POSA would have been motivated by Hunt to add location services to Flick-885 to achieve any or all of the “advantages” Hunt describes to adding location services to a system like Flick-885, including “roadside assistance,” “alerting” the owner when the vehicle is moved, vehicle “recovery” and “remote diagnostics.” Hunt, 2:35-41, 4:18-22.

367. **Second**, this combination is no more than the predictable use of prior art elements according to their established functions.



2. Reasons to Add Hunt’s Housing To Flick-885

368. A POSA had at least two reasons to implement Flick-885’s vehicle control system – modified to use GPS location services – by, as taught by Hunt,

using “***a single housing that houses*** the GPS antenna, the radio antenna, the microprocessor, the vehicle communication circuit, the GPS module, and the wireless transmitter[.]” Hunt, claim 1; *id.*, 4:28-37; *Supra* §VII.B.

369. **First**, a POSA would have understood that housing these vehicle control system components in a single housing as a stand-alone unit “reduces installation costs,” makes the system easier to hide in the vehicle and “makes it more difficult to disable when stealing a vehicle.” Hunt, 4:34-38.

370. **Second**, this combination is no more than the predictable use of prior art elements according to their established functions.

3. Reasonable Expectation of Success

371. POSAs would have had a reasonable expectation of success adding Hunt’s GPS system and position-reporting to Flick-885 because GPS systems were known and Hunt uses GPS in a vehicle control system like Flick-885’s system. Ex. 1001, 1:52-53.

372. By integrating Hunt’s GPS system and position-reporting in Flick-885, Flick-885’s MVCC would determine the vehicle’s position using GPS and transmit the position using Flick-885’s wireless transmitter just like Hunt’s MVCC.

373. Similarly, POSAs would have had a reasonable expectation of success in integrating the components of the Flick-885+Hunt vehicle monitor system in a

single housing because Hunt discloses that a system with all the same components can be integrated in a single housing. *Supra* §VII.H (Ground 1, claim 12).

374. Flick-885+Hunt uses the GPS system and housing for their normal functionality, in the same manner used in Hunt, and thus the combination is nothing more than a predictable use of prior art elements according to their established functions.

375. Ascertaining vehicle position was a known problem for which GPS was a known solution.

376. Adding Hunt’s GPS module and housing to Flick-885 would improve Flick-885 in the same way they improved Hunt.

C. Claim 1

1. Element [1.pre]

1.pre	A multi-vehicle compatible tracking unit for a vehicle comprising a vehicle data bus ..., the ... unit comprising:
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377. Flick-885+Hunt is a “multi-vehicle compatible tracking unit” as described in §§IX.C.4-IX.C.6 below.

378. Flick-885-Hunt’s unit is for using with Flick-885’s “vehicle data communications bus” that extends through the vehicle to allow communication with the “engine, transmission, etc.” and other “sensors, actuators, etc.” Flick-885, Abstract, 5:5-15, Fig. 1.

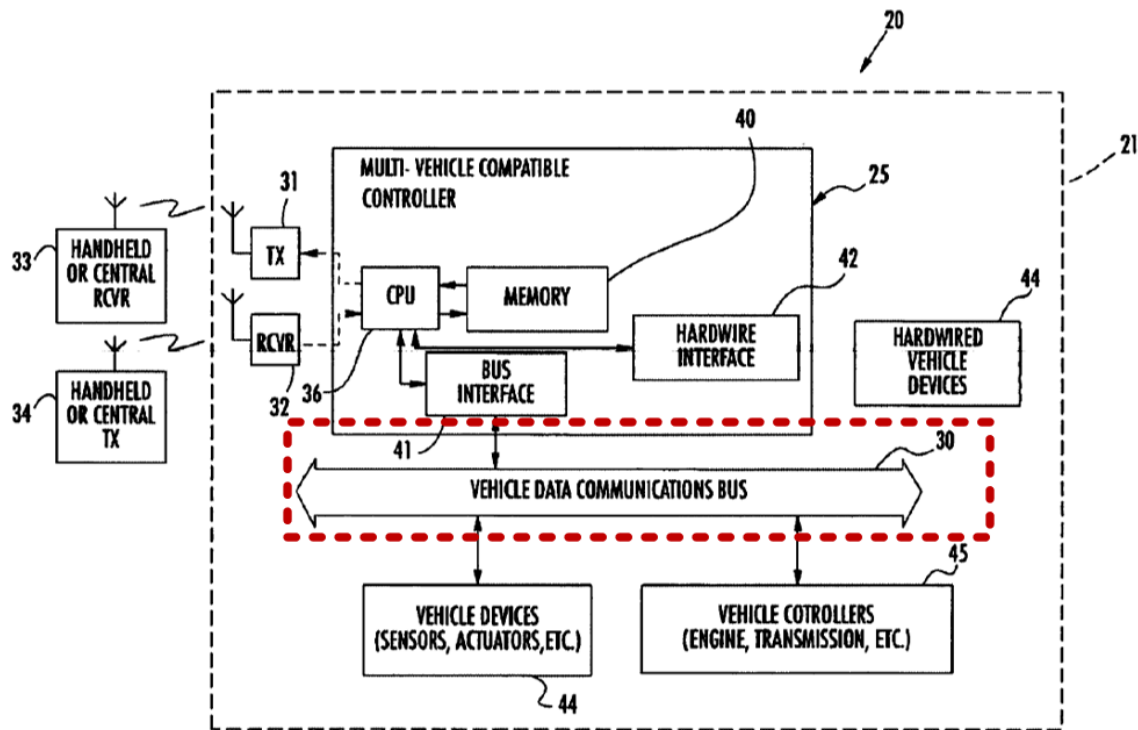


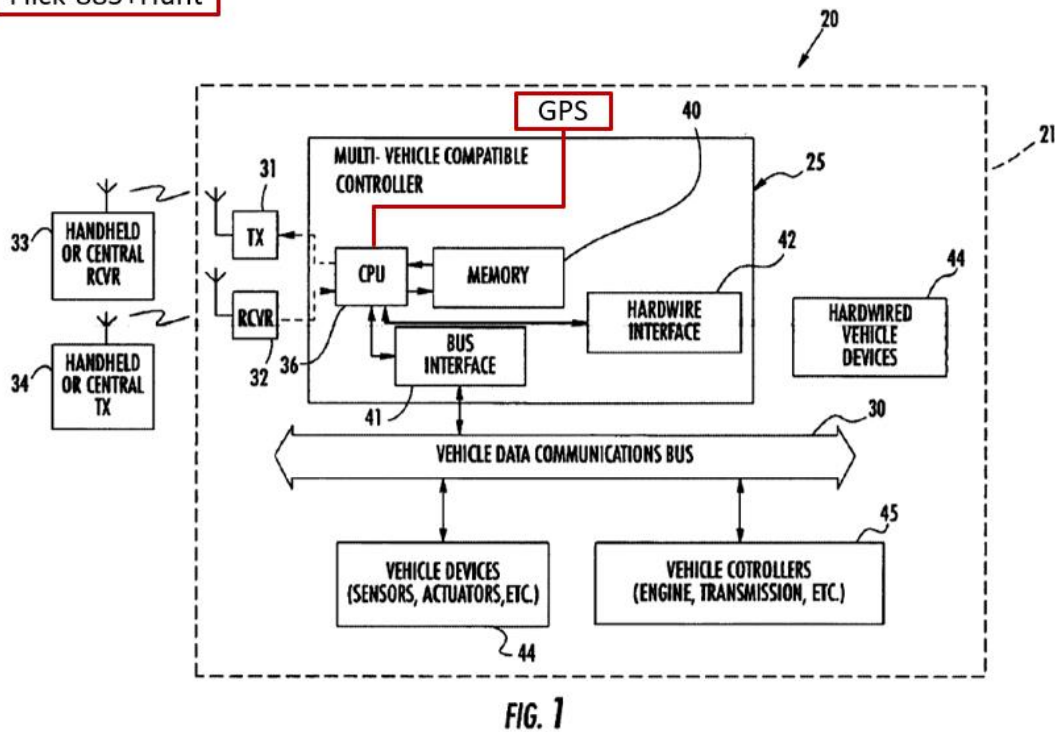
FIG. 1

2. Element [1.a]

1.a	a vehicle position determining device;
-----	--

379. A GPS receiver is a “position determining device.” Ex. 1001, 3:26-28, Fig. 2.

380. Flick-885+Hunt includes Hunt’s GPS system and meets [1.a] for the same reasons that Hunt meets [1.a]. *Supra* §VII.B.2 (Ground 1, element [1.a]); Hunt, Abstract, 1:39-47, 2:31, 3:26-27, 5:7, 5:43-45, Figs. 1A-1B, 2, claim 1.



3. Element [1.b]

1.b	a wireless communications device;
-----	-----------------------------------

381. Flick-885+Hunt includes Flick-885's transmitter 31 and receiver 32, which together comprise a wireless communication device. Flick-885, Abstract, 5:16-35, Figs. 1, 2, 4.

382. The '278 patent describes wireless communication embodiments using cellular, satellite, or "wireless internet services." Ex. 1001, 5:31-49. Flick-885 discloses the same. Flick-885, 5:45-50 (describing wireless communication over satellite, cellular communications, PSTN, or the Internet).

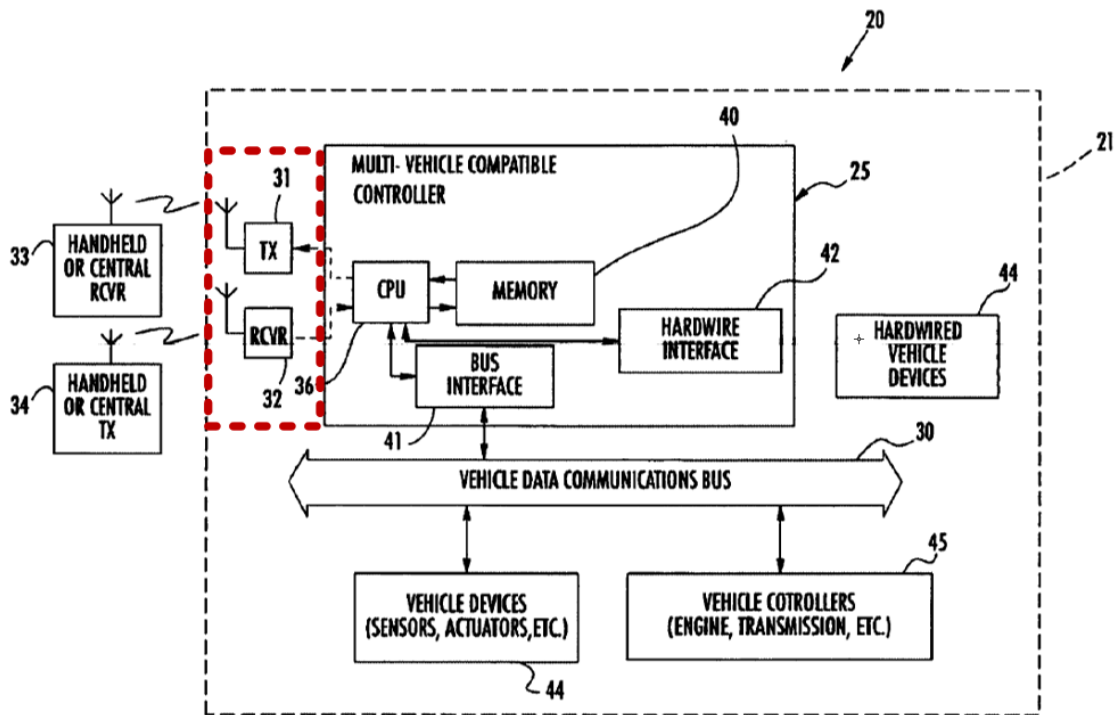


FIG. 1

4. Element [1.c]

1.c	a [MVCC] for cooperating with said vehicle position determining device and said wireless communications device to send vehicle position information;
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383. Flick-885+Hunt includes Flick-885's MVCC 25. Flick-885, 3:5-36, 5:5-15, 6:9-40, 6:53-61, 7:12-8:11, 9:1-67, Figs. 1-2, 4, claim 1.

a. MVCC

384. Flick-885's MVCC "provide[s] compatibility with a plurality of different vehicles." Flick-885, 3:5-18, 8:34-40; *id.*, Abstract, claim 1.

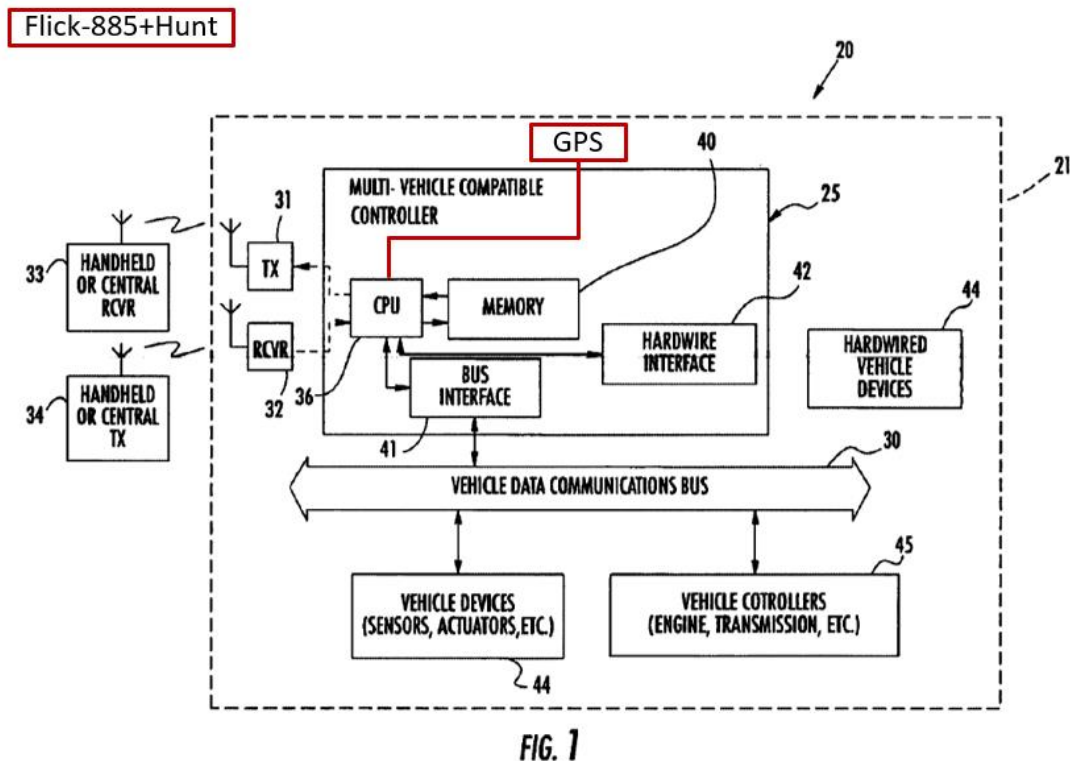
385. The MVCC stores "a set of device codes for a given vehicle device for a plurality of different vehicles," reads a device code from the data communications bus, and determines "a match between a read device code and the

stored device codes to thereby provide compatibility with a plurality of different vehicles.” Flick-885, Abstract, 8:64-9:10.

386. MVCC 25 includes CPU 36, bus interface 41 and memory 40. Flick-885, Figure 1.

387. CPU 36 connects to the wireless communications device (transmitter 31 and receiver 32). Flick-885, Figure 1.

388. In Flick-885+Hunt, CPU 36 also connects to the GPS. *Supra*, §IX.C.2 (Ground 3, [1.a]).



389. Flick-885 describes sending signals *from* the MVCC *to* “vehicle devices” and/or “vehicle controllers” using Figures 2-3, adding labelling to some

Figure 1 components by referring to Figure 1's MVCC 25 as 25', bus interface 41 as "bus interface (drive) 41a," and memory 40 as "command signal memory 40a." Flick-885, 6:56-61 (MVCC 25'), 7:12-8:11, 10:18-30, Fig. 2 (MVCC 25).

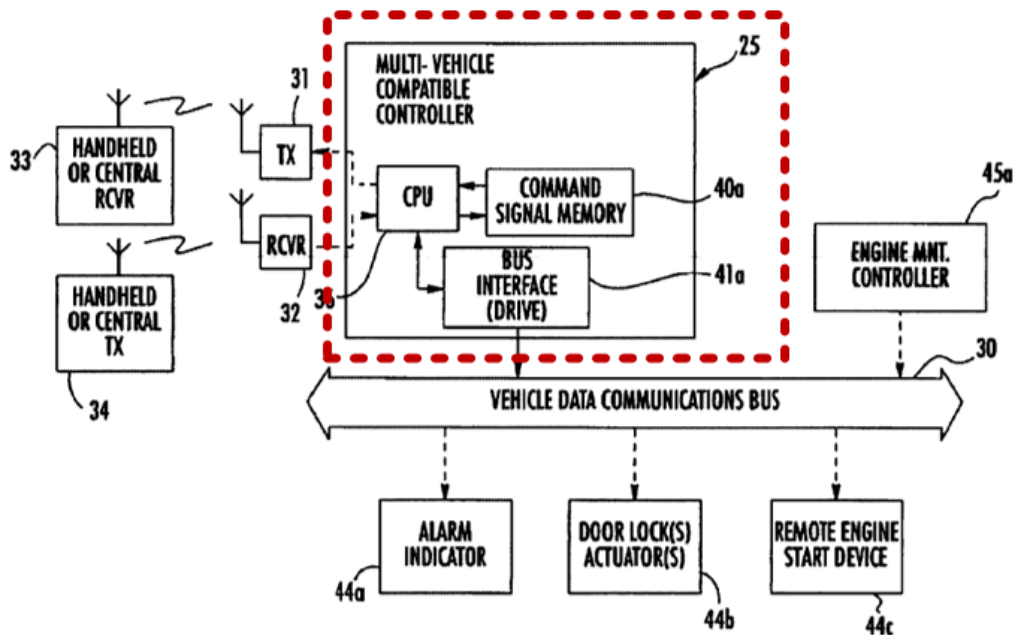


FIG. 2

390. Flick-885 describes communication reading signals *at* the MVCC *from* "vehicle devices" and/or "vehicle controllers" using Figures 4-5, adding labelling to some Figure 1 components, referring to Figure 1's MVCC 25 as MVCC 25'', bus interface 41 as "bus interface (read) 41b" and memory 40 as "code look-up memory 40b." Flick-885, 8:64-9:20, Fig. 4.

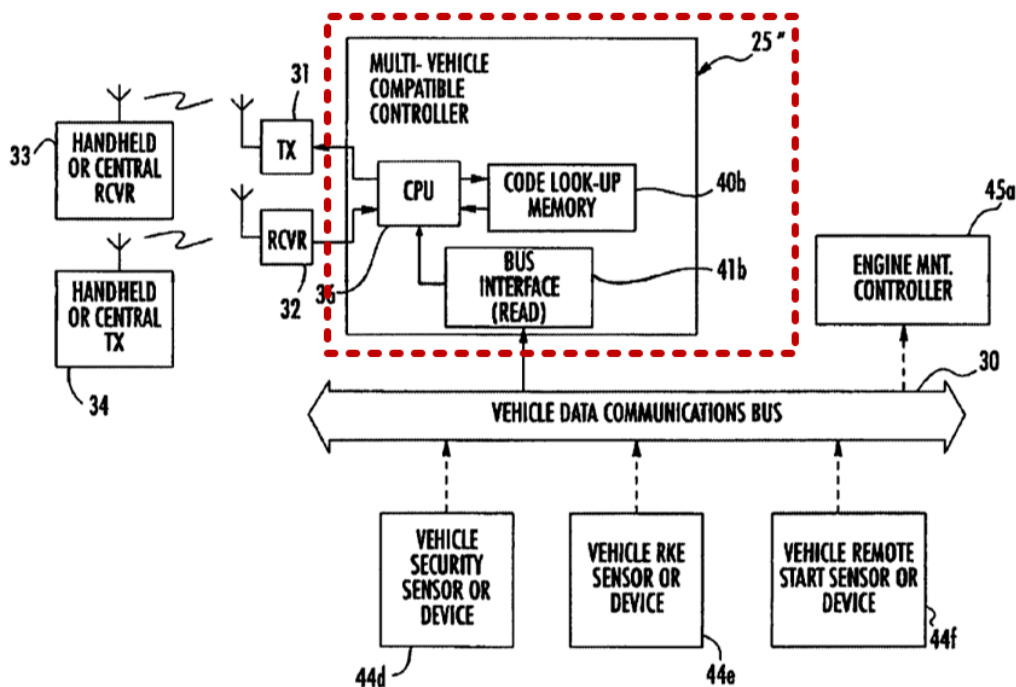


FIG. 4

391. Flick-885+Hunt uses Flick-885’s MVCC that provides “multi-vehicle compatibility” in “**both** directions of communications via the data communications bus 30” (Flick-885, 6:53-55), which a POSA understood has all the communication functionality described in connection with Figures 2-5.

b. position information

392. Flick-885’s MVCC sends vehicle information via transmitter 31. Flick-885, Abstract (the MVCC “cooperat[es] with the transmitter[.]”), 5:16-24 (control system provides “a remote alert” to a user “away from the vehicle”), Figs. 1-2, 4, claim 1.

393. In Flick-885+Hunt, the MVCC is also coupled to the GPS and the vehicle information sent via wireless transmitter 31 includes vehicle position as

taught by Hunt. *Supra* §IX.C.4 (discussing Hunt and [1.c]); Hunt, 6:18-44, Figs. 1A-1B.

394. Flick-885+Hunt thus meets [1.c].

Flick-885+Hunt

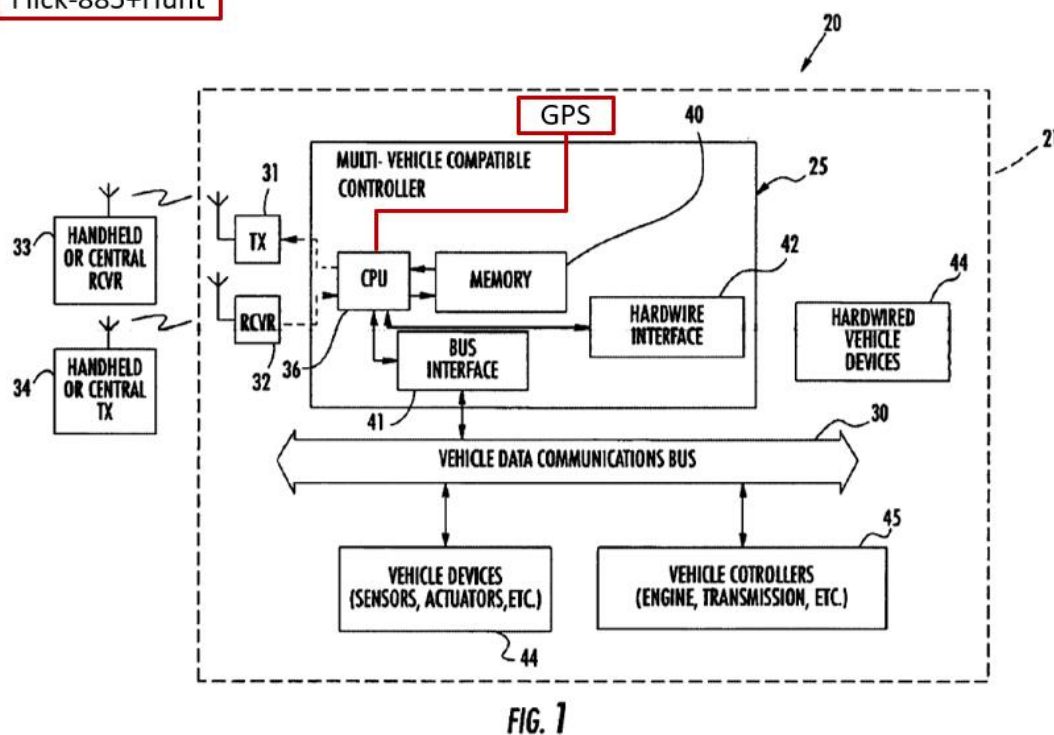


FIG. 1

5. Element [1.d]

1.d	said [MVCC] 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
-----	--

395. Flick-885+Hunt meets [1.d] at least two ways.

a. Non-limiting Language

396. Flick-885+Hunt meets [1.d] if the Board agrees either that (1) “to be coupled to the vehicle data bus” is a non-limiting statement of intended use (*supra*

§VII.B.5 (Ground 1, element [1.d])), or (2) [1.d] only requires that the MVCC be capable of being coupled to the bus for communication thereover—*i.e.*, the device code language is non-limiting in [1.d] under the printed matter doctrine (*supra* §VII.B.6.b.i)—because Flick-885+Hunt MVCC has that capability.

b. Element [1.d] Is Met Even If Every Term is Limiting

397. The Flick-885+Hunt MVCC connects to the vehicle data bus through the bus interface 41 (Flick-885, Fig. 1), 41a (Figs. 2, 7), or 41b (Figs. 4, 8). Flick-885, 5:5-15, 6:32-40.

398. As discussed *supra* §VII.B.5.b.i (Ground 1, [1.d]), I understand that the Federal Circuit construed “vehicle device” as “electrical or electronic component in a vehicle that can be controlled and/or the status thereof read” (*CalAmp-I*, 920 F.3d at 1347, 1349) and found that the ECU is a “vehicle device” (*Id.*, at 1342, 1346 n.5, 1347). As I explained above, in this context “ECU” means engine control unit or engine controller (and not electronic control unit). *Supra*, §IV.C.1, ¶¶108-111.

399. Flick-885’s “vehicle devices 44” and “vehicle controllers 45” are ***both*** “vehicle devices” under the court’s construction. Flick-885’s MVCC communicates with at least one vehicle device by sending or receiving device codes over the vehicle data bus. Flick-885, 6:40-52 (“[V]ehicle 21 includes ... electrical/electronic devices that can be controlled and/or the status thereof read via

the data communications bus 30. ... [T]hese devices are... labeled ‘vehicle devices (sensors, actuators...)’ and ‘vehicle controllers (engine controller, transmission controller...).’”; *id.*, 3:34-36, 4:9-23, 5:5-15, 6:32-36 (MVCC reads or generates signals on the data bus), 9:21-55, Fig. 1 (vehicle device 44 and vehicle controllers 45), Figs. 2, 4, 7-8, *generally id.*, 6:32-8:25; *CalAmp I*, 920 F.3d at 1341 (discussing Flick-885 MVCC communication with vehicle devices over vehicle data bus).

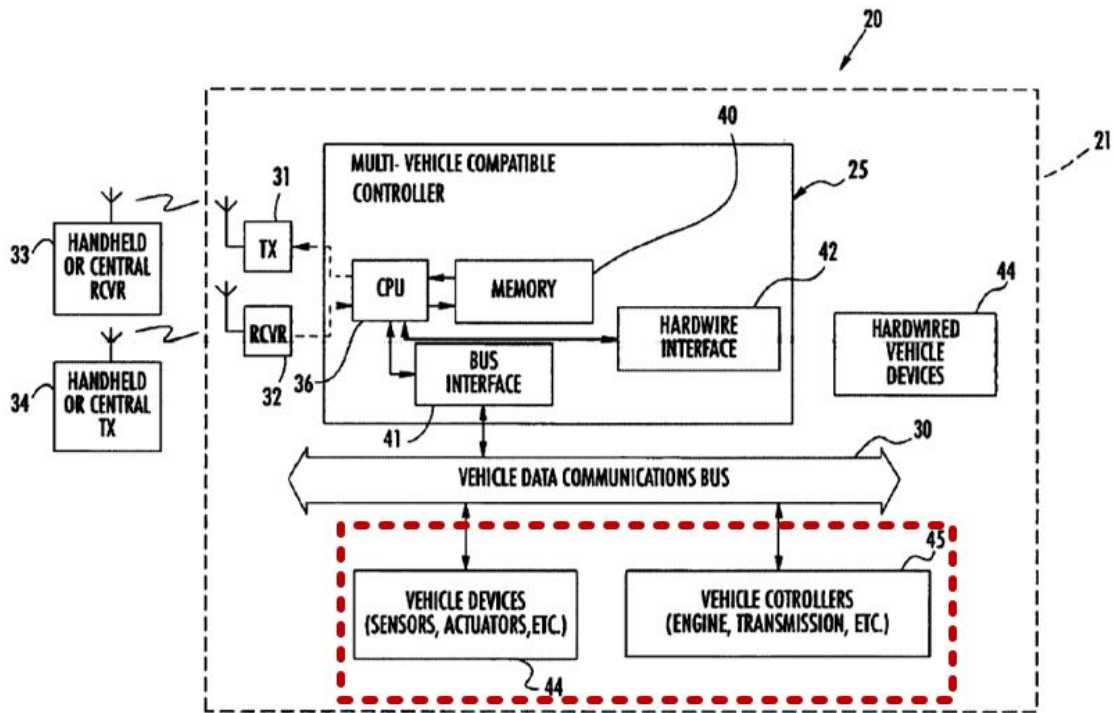


FIG. 1

400. The MVCC communicates with a vehicle device via bus 30 and bus interface 41. Flick-885, Abstract, 2:66-3:4, 3:10-26, 3:63-4:5, 4:35-37, 7:60-8:40, 9:1-20, Figs. 1-5, claims 1, 4; *CalAmp I*, 920 F.3d at 1346-1347.

401. Flick-885's MVCC communicates bidirectionally with "vehicle devices" over the vehicle data communication bus using a vehicle device "code." Flick-885, 7:30-32-34 (sending a "**code** for the given vehicle and device"), 8:64-9:10 (reading a "code" for a "vehicle device").

402. This meets the construction of "device code" as a "signal to or from a vehicle device." *Supra* §VII.B.5.b.ii (Ground 1, [1.d]).

403. Flick-885+Hunt's MVCC communicates using vehicle device codes "from among a plurality thereof for different vehicles," even if that clause is construed to require using different vehicle codes for different vehicles. Flick-885, Abstract, *supra* §VII.B.5.b.ii (Ground 1, element [1.d], discussing "different vehicles").

404. Flick-885's MVCC reads a device code from a vehicle device and compares it to "stored device codes" for a "plurality of different vehicles." Flick-885, 3:5-26, Figs. 4-6. The comparison "uses" the "read device code" and the matching "stored device code" to identify the particular vehicle "to thereby provide compatibility with a plurality of different vehicles." Flick-885, Abstract, 2:66-3:4, 3:10-26, 3:63-4:5, 8:42-9:10, Figs. 4-6, claims 1-8; Ex. 1033, 67:5-68:5, 86:11-19; Ex. 1018, 16-17.

405. Similarly, Flick-885's MVCC sends signals to vehicle devices by generating "multiple signals or codes... on the data communication bus 30, and

only that code for the **given vehicle** and device will cause an operation or response from the vehicle device.” Flick-885, 7:24-42; *id.*, 6:53-58, 7:60-8:41, 9:11-10:6, 10:18-21, Figs. 2-3, 5, 7.

406. Flick-885’s MVCC read and send functionality independently and separately meet [1.d].

6. Element [1.e]

1.e	a downloading interface for permitting downloading of enabling data related to the at least one corresponding vehicle device code for use by said [MVCC].
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a. downloading interface for downloading data

407. I understand that Flick-885 incorporates Flick-460, (Flick-885, 10:10-17), and references its “desired signal enabling function” to learn a vehicle in which the system is installed, so Flick-460’s disclosure is part of Flick-885.

408. As detailed below, the “signal enabling function” in Flick-460 (and thus Flick-885) has a wireless and a wired “downloading interface.”

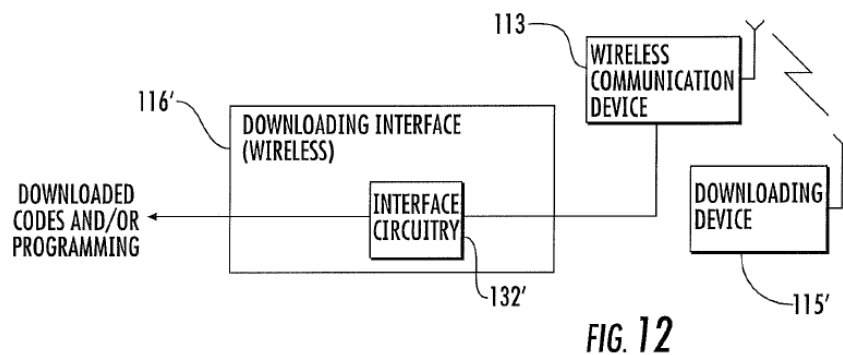
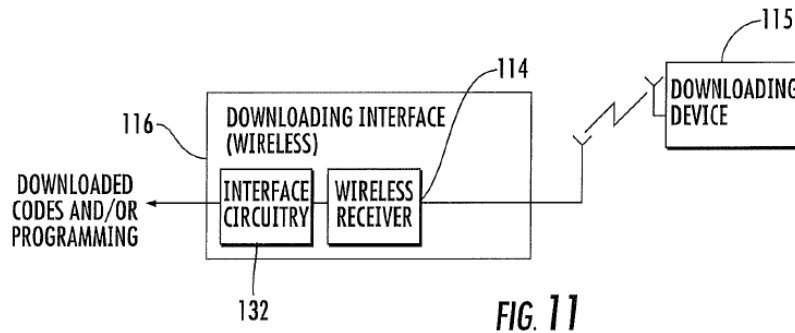
409. Flick-885+Hunt uses each alternative; each separately meets [1.e]’s “downloading interface.”

410. Indeed, the same Flick-460 disclosure meeting [1.e] is present in the ’278 patent. Ex. 1001, 22:3-7.

i. wireless

411. The ’278 patent Figures 11-12 show a wireless “downloading interface” that can communicate using any “wireless technology” including

cellular, satellite, Bluetooth, or Wi-Fi. Ex. 1001, 24:14-22. Its “interface circuitry” is for “controlling communication” with a “downloading device.” *Id.*, 24:22-26.



412. Flick-460’s satellite receiver 111 and cellular telephone 86 are connected to “download learning means 84” in “desired signal enabling” block 10” (Fig. 6A) and a “wireless communications link” is described between the “download learning means” and a laptop. Flick-460, 7:31-56.

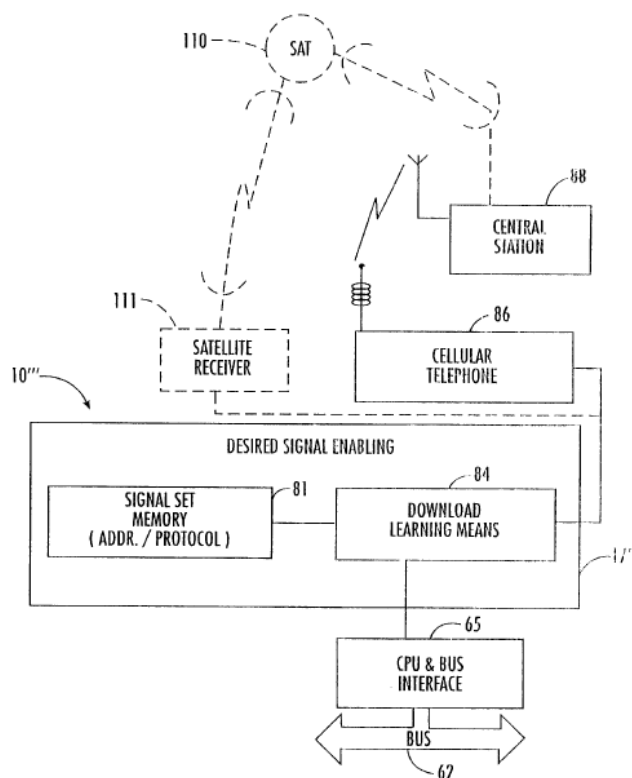


FIG. 6A.

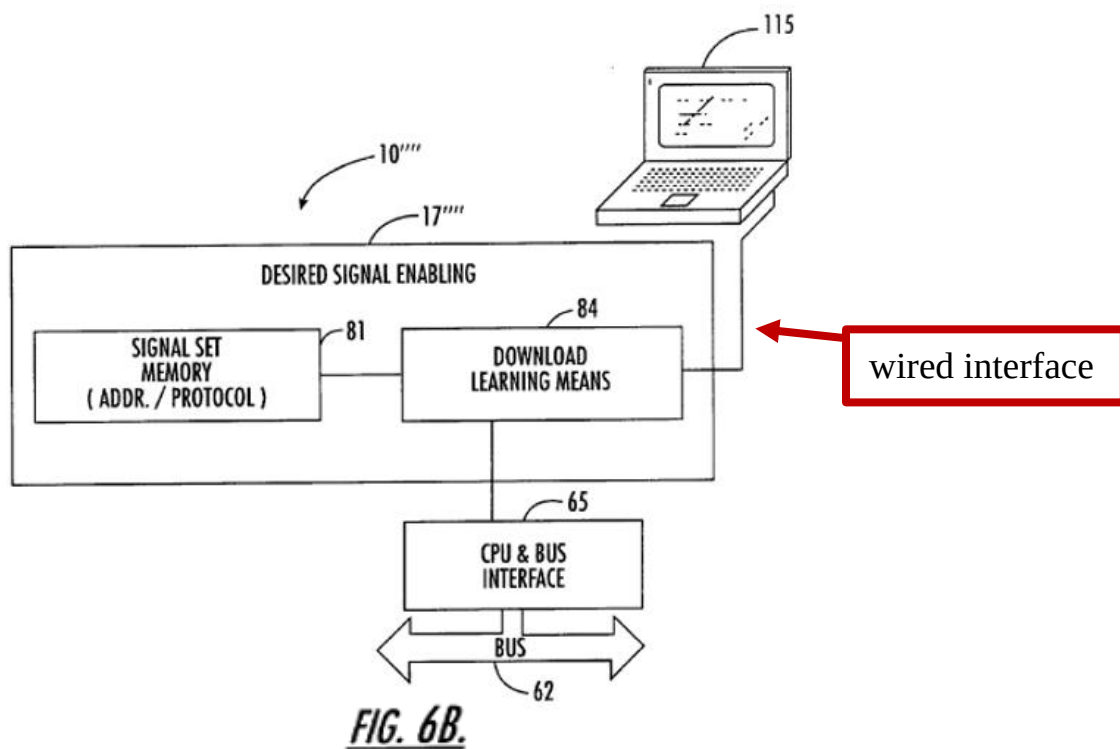
413. POSAs understood that the satellite receiver, cellular telephone, and circuitry implementing the “wireless communication link” each includes logic that controls communication with a remote device (e.g., on the Internet).

414. Flick-460’s download learning means can be implemented by software in a CPU or in “a separate microprocessor or circuits.” Flick-460, 7:31-48.

415. Downloading learning means 84 together with either satellite receiver 111, cellular telephone 86, or the wireless link, each is a “downloading interface” as claimed.

ii. wired

416. The '278 patent says the downloading interface can be “a connector 133a for temporary connection to a downloading device” (e.g., a laptop), may be “a socket to accept a memory card or other data storage medium capable of transferring data,” and can use “RS232/429 protocol, USB, FireWire, TCP/IP (Internet), or any other wired protocol.” Ex. 1001, 24:33-46.



417. Flick-460 says “download learning means 84” may be “*temporarily* connected to a computer” via “a wire cable.” Flick-460, 7:49-56, Fig. 6B, claims 1-2. The wire cable and download learning means 84 together are a wired “downloading interface.”

iii. for permitting downloading

418. Because both its wireless and wired downloading interfaces are “for permitting” downloading data, and assuming the data’s content (“enabling”) imparts no patentable weight, Flick-885+Hunt meets [1.e]. *Supra* §VII.B.6 (Ground 1, [1.e]).

b. Flick-885+Hunt Meets [1.e] Even If “Enabling” Data is Limiting

419. Flick-885+Hunt’s “download learning means” is for downloading a ***“desired set of signals from the plurality of different sets of signals for different vehicles”*** (Flick-460, Abstract; *see also Id.*, claim 1, 7:40-43), which Flick-885 explains can be used for (1) allowing the MVCC to be reinstalled in another vehicle and reset to learn “another vehicle” or (2) for “initial step-up.” Flick-885, 10:7-17.

420. Flick-885 explains that the set of signals for a vehicle includes the vehicle device codes for that vehicle. Flick-885, 7:24-42, 7:50-8:34.

421. Thus, the downloaded data in Flick-885+Hunt is “enabling data related to the at least one corresponding vehicle device code for use by said [MVCC]” as in [1.e]. *See also CalAmp-CC*, 22-23; Ex. 1026, 3.

D. Claim 2

422. Flick-885+Hunt meets claim 2 because it comprises a wired signal downloading interface. *Supra* §IX.C.6.a.ii ([1.e]).

E. Claim 3

3	The... claim 2 [unit] wherein said wired signal downloading interface comprises a connector for temporary connection to a downloading device.
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423. The '278 patent describes “connector 133a for a temporary connection to a downloading device 115” with a mating connector 133b.” Ex. 1001, 24:35-37. “Connector” means a physical connector, like a standard RS232 connector, USB connector, FireWire connector, or RJ45 plug for Ethernet connection. Ex. 1053, 221.

424. Several examples are shown in Exhibit 1067, an Internet Archive capture of the product catalog for network cables at startech.com, and should be familiar to most people who have used personal computers. While each connector worked with its own particular protocol, as relevant to the invalidity analysis the point is that each of these connectors was made to mate and detach from the corresponding receiver on a device like the tracking unit claimed here. They were designed to provide “temporary connection” between devices.

425. RS232 stands for “Recommended Standard 232” and is a type of serial communication for data transmission over moderate distance. The connector is 9 pin D-sub connectors like that shown in Ex. 1067 at 2:



426. USB stands for Universal Serial Bus. In July 2007, there were two types of connectors in common use, USB-A and USB-B. An example of USB-A is in Ex. 1067 at 1:



USB Cables

USB cables for all your USB peripheral connections.

427. FireWire is defined in IEEE 1394 and used specific connectors. An example is shown in Ex. 1067 at 2:



IEEE-1394 FireWire Cables

Various combinations of 4-pin and 6-pin IEEE-1394 interconnect cables for your iLink and FireWire peripherals.

428. The RJ45 plug is a standard Ethernet connector. An example is shown in Ex. 1067 at 1:



Networking Cables

High-quality network cables, backed up by StarTech.com's lifetime warranty

429. Flick-885+Hunt's above-discussed wired downloading interface temporarily connects to a "downloading device, such as a portable or laptop computer" (Flick-460, Abstract). *Supra* §IX.C.6.a.ii ([1.e]).

430. The conventional and obvious way to implement in Flick-885+Hunt the wired downloading interface Flick-460 describes would have been to use a known connector (e.g., RS232, USB, or FireWire) for temporarily connecting to a downloading computer. Ex. 1067.

431. That renders obvious claim 3.

F. Claim 4

432. Flick-885+Hunt meets claim 4 because it comprises a wireless signal downloading interface. *Supra* §IX.C.6.a.i ([1.e]).

G. Claim 5

5	The ... claim 4 [unit] wherein said wireless signal downloading interface comprises a wireless receiver for temporary connection to a downloading device.
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433. Each Flick-460 wireless signal downloading interface in Flick-885+Hunt has a wireless receiver for temporary connection to a downloading device. *Supra* §IX.C.6.a.i ([1.e]).

434. As PO’s expert testified in the CalAmp Litigation, connections using “standard wireless communication protocols” are “temporary.” Ex. 1033, 99:19-24, 103:13-19.

435. To the extent Flick-460 is not considered to expressly teach a wireless receiver for temporary connection, an obvious and conventional way to implement what Flick-460 describes with a reasonable expectation of success is via a wireless interface having a receiver that forms a “temporary connection to a downloading device” when it is desired to download the “desired signal set” or update the device software, or when a cellular, satellite, or other wireless connection is available to support the data download.

H. Claims 6-7

6	The ... claim 1 [unit] wherein the corresponding at least one vehicle code is for reading from the at least one vehicle device.
7	The ... claim 1 [unit] wherein the corresponding at least one vehicle code is for writing to the at least one vehicle device.

436. The “vehicle code” in claims 6-7 is non-limiting for the same reasons Element [1.d]’s “vehicle device code” is non-limiting. *Supra* §VII.B.5.a. Thus, Flick-885+Hunt meets claim 6-7 because it meets claim 1.

437. Alternatively, even if every term is limiting, Flick-885+Hunt meets claim 6 because Flick-885 describes **reading** vehicle device codes from a vehicle device (*supra* §§IX.C.4.a, IX.C.5; Flick-885, 3:10-18, 8:42-45, Figs. 5-7, claim 24), and meets claim 7 because Flick-885 describes **writing** device codes to a vehicle device (*supra* §IX.C.4.a; Flick-885, 8:64-9:1; *id.*, 7:12-27).

I. Claim 8

8	The ... claim 1 [unit] wherein said downloading interface is also for permitting downloading of at least one programming instruction for said [MVCC].
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438. Hunt teaches that a controller can be implemented by running firmware or software that controls communication with vehicle devices. Hunt, 1:39-46; 6:26-38, 10:49-54.

439. Omega agrees. Ex. 1040, 98:22-99:4 (McAndrews testimony).

440. Such a controller can be “programmed when the computer system is manufactured or... at a later date.” Hunt, 11:11-14.

441. It was well-known to update a controller's firmware and/or software through a wired or wireless interface of the type in Flick-885+Hunt (*supra* §IX.C.6.a.i (discussing [1.e])).

442. Hunt would have motivated a POSA to implement Flick-885+Hunt so its downloading interface(s) permitted downloading programming instructions to the MVCC to allow programming and/or programming updates post-manufacture, and a POSA would have had a reasonable expectation of success because this is the predictable use of prior art elements according to their established functions.

443. This renders claim 8 obvious over Flick-885+Hunt.

J. Claims 9-10

9	The... claim 1 [unit] further comprising a remote transmitter; and wherein said [MVCC] also performs at least one vehicle remote control function responsive to said remote transmitter.
10	The... claim 9 [unit] 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.

444. Flick-885 has a remote transmitter. Flick-885, 5:16-63, Figs. 1-2, 4, claim 11. Its “control system” provides “vehicle remote control functions” including “an alarm or security system controller,” “keyless entry for a vehicle,” and “remote starting a vehicle engine.” Flick-885, 3:27-35; *id.*, 5:38-41.

445. The “vehicle remote control functions” are “responsive” to signals from the “remote transmitter.” Flick-885, 3:49-53, 4:5-8, 6:56-7:49, 10:18-36, claim 25. Thus, Flick-885+Hunt renders obvious claims 9-10.

K. Claim 11

446. Flick-885+Hunt's wireless position determining device comprises a GPS receiver. *Supra* §IX.C.2; Hunt, 3:26-27, 5:43-45.

L. Claim 12

12	The... claim 1 [unit] further comprising a housing containing said vehicle position determining device, said wireless communications device, said [MVCC], and said downloading interface.
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447. Flick-885+Hunt comprises a housing containing the vehicle position determining device (GPS module and GPS antenna), the wireless communications device (radio antenna, wireless transmitter) the MVCC and the downloading interface as taught by Hunt. *Supra* §§IX.B (combination), VII.H (discussing Hunt).

M. Claim 13

448. Elements [13.pre]-[13.e] recite limitations identical to elements [1.pre]-[1.e], respectively, while Element [13.f] adds the same limitations as claim 3. Ex. 1044.

449. Flick-885+Hunt meets elements [13.pre]-[13.f] for the same reasons it meets elements [1.pre]-[1.e] and claim 3 (section cites below).

Element	Corresponding	Analysis
[13.pre]	[1.pre]	§IX.C.1
[13.a]	[1.a]	§IX.C.2
[13.b]	[1.b]	§IX.C.3
[13.c]	[1.c]	§IX.C.4
[13.d]	[1.d]	§IX.C.5
[13.e]	[1.e]	§IX.C.6
[13.f]	3	§IX.E

N. Claims 14-17

450. Claims 14-17 depend from claim 13 and add limitations identical to those in dependent claims 6-9, respectively. Ex. 1044.

451. Flick-885+Hunt meets claims 14-17 for the reasons it meets claims 6-9 (section cites below).

Claim	Corresponding claim	Analysis
14	6	§IX.H
15	7	§IX.H
16	8	§IX.I
17	9	§IX.J

O. Claim 18

452. Elements [18.pre]-[18.e] recite limitations identical to elements [1.pre]-[1.e], respectively. Ex. 1044.

453. Element [18.f] requires [18.e]’s downloading interface comprises a wireless receiver for temporary connection to a downloading device. Flick-885+Hunt meets elements [18.pre]-[18.f] for the same reasons (section cites below) discussed for elements [1.pre]-[1.e] and claim 5.

Element	Corresponding	Analysis
[18.pre]	[1.pre]	§IX.C.1
[18.a]	[1.a]	§IX.C.2
[18.b]	[1.b]	§IX.C.3
[18.c]	[1.c]	§IX.C.4
[18.d]	[1.d]	§IX.C.5
[18.e]	[1.e]	§IX.C.6
[18.f]	5	§IX.G

P. Claims 19-22

454. Claims 19-22 depend from claim 18 and add additional limitations identical to those in dependent claims 6-9, respectively. Ex. 1044.

455. Flick-885+Hunt meets claims 19-22 for the same reasons discussed for claims 6-9.

Claim	Corresponding claim	Analysis
19	6	§IX.H
20	7	§IX.H
21	8	§IX.I
22	9	§IX.J

X. CONCLUSION

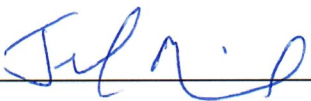
456. I reserve the right to supplement my opinions in the future to respond to any arguments that Patent Owner or its expert(s) may raise and to account for new information as it becomes available to me.

* * *

I declare that all statements made herein of my own knowledge are true, that all statements made on information and belief are believed to be true, and that these statements were made with the knowledge that willful false statements and the like are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code.

I declare under penalty of perjury that the foregoing is true and correct.

Dated: 1/27/2023



Jeffrey Miller, Ph.D.

APPENDIX A: MATERIALS CONSIDERED

Exhibit	Description
1001	U.S. Patent No. 8,032,278
1002	Prosecution History of U.S. Patent No. 8,032,278
1003	<i>RESERVED</i>
1004	Curriculum Vitae of Jeffrey Miller, Ph.D.
1005	Prosecution History of Ser. No. 90/013,587 (RX1)
1006	Prosecution History of Ser. No. 90/013,851 (RX2)
1007	Prosecution History of Ser. No. 90/014,309 (RX3)
1008	Prosecution History of Ser. No. 90/014,419 (RX4)
1009	Prosecution History of Ser. No. 90/014,675 (RX5)
1010	Claim Rejection, mailed May 6, 2016 in No. 90/013,587 (RX1)
1011	Decision granting <i>ex parte</i> reexamination request, mailed December 15, 2016 in No. 90/013,851 (RX2)
1012	<i>Ex parte Omega Patents, LLC</i> , No. 2018-008119 (Nov. 3, 2018)
1013	Decision granting <i>ex parte</i> reexamination request, mailed March 25, 2021 in No. 90/014,675 (RX5)
1014	Non-Final Rejection, mailed October 5, 2021 in No. 90/014,675 (RX5)
1015	Patent Owner’s Appeal Brief, No. 90/014,675 (April 1, 2022)
1016	Transcript of oral argument in <i>Ex parte Omega Patents, LLC</i> , No. 2022-003758, Reexamination No. 90/014,675 (Oct. 28, 2022)
1017	<i>Ex parte Omega Patents, L.L.C.</i> , No. 2022-003758 (Nov. 30, 2022)
1018	D.I. 50, Claim Construction Order, <i>Omega Patents, LLC v. CalAmp Corp.</i> , No. 6:13-cv-1950-Orl-40DAB (M.D. Fla. Feb. 20, 2015) (“ <i>CalAmp-CC</i> ”).
1019	D.I. 34, Claim Construction Order, <i>Omega Patents, LLC v. Firstech, LLC</i> , No. 2:20-cv-01344-TSZ (W.D. Wash. Nov. 22, 2021) (“ <i>Firstech-CC</i> ”).
1020	<i>Omega Patents, LLC v. CalAmp Corp.</i> , 920 F.3d 1337 (Fed. Cir. 2019) (“ <i>CalAmp-I</i> ”)
1021	<i>Omega Patents, LLC v. CalAmp Corp.</i> , 13 F.4th 1361 (Fed. Cir. 2021) (“ <i>CalAmp-II</i> ”)
1022	D.I. 14, Omega Patents Answering Brief In Opposition to Geotab USA, Inc.’s Motion to Dismiss, <i>Omega Patents, LLC v. Geotab USA, Inc. and Geotab, Inc.</i> , No. 1:22-cv-01044-CFC (D. Del. Nov. 16, 2022)
1023	U.S. Patent No. 6,957,133 (“ <i>Hunt</i> ”)
1024	U.S. Patent No. 6,756,885 (“ <i>Flick-885</i> ”)

Exhibit	Description
1025	U.S. Patent No. 6,011,460 (“Flick-460”)
1026	D.I. 040, Omega Patents Opposition to CalAmp Motion For Claim Construction, <i>Omega Patents, LLC v. CalAmp Corp.</i> , No. 6:13-cv-1950-Orl-40DAB (M.D. Fla. Oct. 3, 2014)
1027	<i>RESERVED</i>
1028	<i>RESERVED</i>
1029	D.I. 143, Jury Instructions, <i>Omega Patents, LLC v. CalAmp Corp.</i> , No. 6:13-cv-1950-Orl-40DAB (M.D. Fla. Nov. 24, 2016)
1030	D.I. 309, Jury Instructions, <i>Omega Patents, LLC v. CalAmp Corp.</i> , No. 6:13-cv-1950-Orl-40DAB (M.D. Fla. Sep. 30, 2019)
1031	Y. Park and A. Fumiyuki, eds. <i>Enhanced Radio Access Technologies For Next Generation Mobile Communication</i> . Dordrecht: Springer, 2007.
1032	F. Delli Priscoli and M. Neri, “Integration of the ORBCOMM satellite network with the GSM Short Message Service.” <i>Space Communications</i> , Vol. 19, no. 1, pp. 47-57, 2003.
1033	D.I. 180, Transcript, Civil Jury Trial–Day 3, <i>Omega Patents, LLC v. CalAmp Corp.</i> , No. 6:13-cv-1950 (M.D. Fla. Feb. 18, 2016)
1034	<i>RESERVED</i>
1035	<i>RESERVED</i>
1036	<i>RESERVED</i>
1037	<i>RESERVED</i>
1038	<i>RESERVED</i>
1039	<i>RESERVED</i>
1040	Pages from D.I. 339, Transcript, Civil Jury Trial–Day 3, <i>Omega Patents, LLC v. CalAmp Corp.</i> , No. 6:13-cv-1950 (M.D. Fla. Sep. 25, 2019)
1041	<i>RESERVED</i>
1042	<i>RESERVED</i>
1043	<i>RESERVED</i>
1044	Comparison of limitations in ’278 patent claims 13-22 with limitations in ’278 patent claims 1-12
1045	<i>RESERVED</i>
1046	Title 40 Code of Federal Regulations, Part 86, Subpart S—General Compliance Provisions for Control of Air Pollution From New and In-Use Light Duty Vehicles, Light-Duty Trucks, and Complete Otto-Cycle Heavy-Duty Vehicles (July 1, 2007)
1047	SAE J1939-71 Vehicle Application Layer (rev. DEC2004)

Exhibit	Description
1048	<i>RESERVED</i>
1049	<i>RESERVED</i>
1050	International Standard ISO 15031-4 Road Vehicles—Communication between vehicle and external equipment for emissions related diagnostics—Part 4: External test equipment (1st ed. June 15, 2005) (“ISO 15031-4:2005”)
1051	Pages from Microsoft Internet & Networking Dictionary (2003)
1052	SAE J1978 OBD-II Scan Tool – Equivalent to ISO/DIS 15031-4: December 14, 2001 (revised 2002-04)
1053	Pages from IEEE 100 The Authoritative Dictionary of IEEE Standard Terms (7th Ed. 2000)
1054	<i>RESERVED</i>
1055	<i>RESERVED</i>
1056	U.S. Patent No. 8,856,266
1057	U.S. Patent Application Publication No. US 2005/0032511 A1
1058	U.S. Patent Application Publication No. US 2004/0138790 A1
1059	<i>RESERVED</i>
1060	U.S. Patent No. 7,209,813
1061	<i>RESERVED</i>
1062	<i>RESERVED</i>
1063	<i>RESERVED</i>
1064	U.S. Patent No. 7,617,727
1065	D.I. 145-85, PL104, 4/15/2015 Expert Report of Joseph C. McAlexander, <i>Omega Patents, LLC v. CalAmp Corp.</i> , No. 6:13-cv-1950 (M.D. Fla. Feb 25, 2016)
1066	13 Cal. Code Reg. §1968.2 Malfunction and Diagnostic System Requirements—2004 and Subsequent Model-Year Passenger Cars, Light-Duty Trucks, and Medium-Duty Vehicles and Engines (2004)
1067	February 19, 2007 Internet Archive capture of startech.com webpage on computer cables at https://web.archive.org/web/20070219050320/http://www.startech.com/Product/Category.aspx?WCID=7&WCLID=2&MLID=2&menu=1&from=more&c=US
1068	<i>RESERVED</i>
1069	<i>RESERVED</i>
1070	Control of Air Pollution From New Motor Vehicles and New Motor Vehicle Engines; Modification of Federal On-Board Diagnostic Regulations for: Light-Duty Vehicles, Light-Duty Trucks, Medium

Exhibit	Description
	Duty Passenger Vehicles, Complete Heavy Duty Vehicles and Engines Intended for Use in Heavy Duty Vehicles Weighing 14,000 Pounds GVWR or Less; Extension of Acceptance of California OBD II Requirements, 68 Fed. Reg. 35792 (June 17, 2003)
1071	SAE J1850 Class B Data Communications Network Interface, (revised May 2001)
1072	ISO 15765-4:2005(E) Road vehicles – Diagnostics on Controller Area Networks (CAN) – Part 4: Requirements for emissions-related systems (1st ed. ISO January 15, 2005)
1073	ISO 15031-5:2006(E) Road vehicles — Communication between vehicle and external equipment for emissions-related diagnostics — Part 5: Emissions-related diagnostic services (ISO 1st ed. January 15, 2006)
1074	ISO 14230-4 Road vehicles — Diagnostic systems — Keyword Protocol 2000 —Part 4: Requirements for emission-related systems (ISO 1st ed. June 1, 2000)
1075	SAE J1979 (R) E/E Diagnostic Test Modes – Equivalent to ISO/DIS 15031-5:April 30, 2002 (revised April 2002)
1076	SAE J2178-1 Class B Data Communication Network Messages— Detailed Header Formats and Physical Address Assignments (reaffirmed July 2004).
1077	<i>RESERVED</i>
1078	SAE J2178-4 Class B Data Communication Network Messages— Message Definitions for Three Byte Headers (reaffirmed July 2004).
1079	Pages from Title 40 Code of Federal Regulations, Part 86, Subpart S— General Compliance Provisions for Control of Air Pollution From New and In-Use Light Duty Vehicles, Light-Duty Trucks, and Complete Otto-Cycle Heavy-Duty Vehicles (July 1, 2014)
1080	Pages from Collins English Dictionary (5th ed. 2000)
1081	Pages from Newton’s Telecom Dictionary (2005)
1082	ISO 14230-2 Road vehicles—Diagnostic systems—Keyword Protocol 2000 – Part 2: data link layer (1st ed. Mar. 15, 1999)

APPENDIX B: U.S. PATENT NO. 8,032,278 CLAIM LIST

Ref	Claim
1.pre	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:
1.a	a vehicle position determining device;
1.b	a wireless communications device;
1.c	a multi-vehicle compatible controller for cooperating with said vehicle position determining device and said wireless communications device to send vehicle position information;
1.d	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
1.e	a downloading interface for permitting downloading of enabling data related to the at least one corresponding vehicle device code for use by said multi-vehicle compatible controller.
2	The multi-vehicle compatible tracking unit according to claim 1 wherein said downloading interface comprises a wired signal downloading interface.
3	The multi-vehicle compatible tracking unit according to claim 2 wherein said wired signal downloading interface comprises a connector for temporary connection to a downloading device.
4	The multi-vehicle compatible tracking unit according to claim 1 wherein said downloading interface comprises a wireless signal downloading interface.
5	The multi-vehicle compatible tracking unit according to claim 4 wherein said wireless signal downloading interface comprises a wireless receiver for temporary connection to a downloading device.
6	The multi-vehicle compatible tracking unit according to claim 1 wherein the corresponding at least one vehicle code is for reading from the at least one vehicle device.
7	The multi-vehicle compatible tracking unit according to claim 1 wherein the corresponding at least one vehicle code is for writing to the at least one vehicle device.
8	The multi-vehicle compatible tracking unit according to claim 1 wherein said downloading interface is also for permitting downloading of at least one programming instruction for said multi-vehicle compatible controller.

Ref	Claim
9	The multi-vehicle compatible tracking unit according to claim 1 further comprising a remote transmitter; and wherein said multi-vehicle compatible controller also performs at least one vehicle remote control function responsive to said remote transmitter.
10	The multi-vehicle compatible tracking unit according to claim 9 wherein the at least one vehicle remote control function comprises at least one of a vehicle security function, a remote keyless entry function, and a remote engine starting function.
11	The multi-vehicle compatible tracking unit according to claim 1 wherein said wireless position determining device comprises a Global Positioning System (GPS) receiver.
12	The multi-vehicle compatible tracking unit according to claim 1 further comprising a housing containing said vehicle position determining device, said wireless communications device, said multi-vehicle compatible controller, and said downloading interface.
13.pre	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:
13.a	a vehicle position determining device;
13.b	a wireless communications device;
13.c	a multi-vehicle compatible controller for cooperating with said vehicle position determining device and said wireless communications device to send vehicle position information;
13.d	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
13.e	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;
13.f	said downloading interface comprising a connector for temporary connection to a downloading device.
14	The multi-vehicle compatible tracking unit according to claim 13 wherein the corresponding at least one vehicle code is for reading from the at least one vehicle device.
15	The multi-vehicle compatible tracking unit according to claim 13 wherein the corresponding at least one vehicle code is for writing to the at least one vehicle device.

Ref	Claim
16	The multi-vehicle compatible tracking unit according to claim 13 wherein said downloading interface is also for permitting downloading of at least one programming instruction for said multi-vehicle compatible controller.
17	The multi-vehicle compatible tracking unit according to claim 13 further comprising a remote transmitter; and wherein said multi-vehicle compatible controller also performs at least one vehicle remote control function responsive to said remote transmitter.
18.pre	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:
18.a	a vehicle position determining device;
18.b	a wireless communications device;
18.c	a multi-vehicle compatible controller for cooperating with said vehicle position determining device and said wireless communications device to send vehicle position information;
18.d	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
18.e	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;
18.f	said downloading interface comprising a wireless receiver for temporary connection to a downloading device.
19	The multi-vehicle compatible tracking unit according to claim 18 wherein the corresponding at least one vehicle code is for reading from the at least one vehicle device.
20	The multi-vehicle compatible tracking unit according to claim 18 wherein the corresponding at least one vehicle code is for writing to the at least one vehicle device.
21	The multi-vehicle compatible tracking unit according to claim 18 wherein said downloading interface is also for permitting downloading of at least one programming instruction for said multi-vehicle compatible controller.
22	The multi-vehicle compatible tracking unit according to claim 18 further comprising a remote transmitter; and wherein said multi-vehicle compatible controller also performs at least one vehicle remote control function responsive to said remote transmitter.