(12) **INTER PARTES REVIEW CERTIFICATE** (133rd)
United States Patent
Slepian et al.

(10) **Number: US 5,954,781 K1**
(45) **Certificate Issued: May 13, 2016**

(54) **METHOD AND APPARATUS FOR OPTIMIZING VEHICLE OPERATION**

(75) Inventors: **Harvey Slepian**; **Loran Sutton**

(73) Assignee: **VELOCITY PATENT LLC**

Trial Number:

IPR2014-01247 filed Aug. 4, 2014

Petitioners: Mercedes-Benz USA, LLC;
Mercedes-Benz U.S. International, Inc.

Patent Owner: Velocity Patent, LCC

Inter Partes Review Certificate for:

Patent No.:	**5,954,781**
Issued:	**Sep. 21, 1999**
Appl. No.:	**08/813,270**
Filed:	**Mar. 10, 1997**

The results of IPR2014-01247 are reflected in this inter partes review certificate under 35 U.S.C. 318(b).

INTER PARTES REVIEW CERTIFICATE
U.S. Patent 5,954,781 K1
Trial No. IPR2014-01247
Certificate Issued May 13, 2016

AS A RESULT OF THE INTER PARTES REVIEW PROCEEDING, IT HAS BEEN DETERMINED THAT:

Claims **31** and **32** are disclaimed.

* * * * *

Disclaimer

5,954,781—Harvey Slepian, Peoria, IL (US); Loran Sutton, East Peoria, IL (US). METHOD AND APPARATUS FOR OPTIMIZING VEHICLE OPERATION. Patent dated September 21, 1999. Disclaimer filed December 10, 2014, by the inventors.

Hereby disclaim complete claims 31 and 32, of said patent.

(*Official Gazette, February 24, 2015*)

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Control No. :	90013252	**Confirmation No. :**	9999
Patent No. :	5,954,781		
Applicant :	Harvey Slepian		
Reexam Filed:	May 22, 2014		
Art Unit. :	3992		
Examiner :	David E. England		
Customer No.:	88360		

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

STATUTORY DISCLAIMER IN PATENT UNDER 37 C.F.R. 1.321(a)

Sir:

The Applicant hereby disclaims all of Applicant's rights in entirety of Claims 31 and 32 in the above-identified patent.

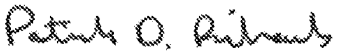
The present Statutory Disclaimer does not constitute any acquiescence by the Applicant with regard to the outstanding rejections in the pending Reexamination of the above-identified patent (Control No. 90/013252). Rather, the Applicant respectfully disagrees with all of the outstanding rejections and makes the present disclaimer without prejudice to Applicant's positions regarding the cited art references cited in those rejections.

The undersigned is the attorney of record in the above-identified Reexamination and is thus authorized to sign the Statutory Disclaimer.

Please charge the fee for this Disclaimer and any additional fees or credit to Deposit Account No. 505178.

Respectfully submitted,

RICHARDS PATENT LAW PC



Patrick D. Richards
Registration. No. 48,905

Please recognize Customer No. 88360 as the correspondence address.

Richards Patent Law P.C.
233 S. Wacker Dr., 84th Floor
Chicago, IL 60606
Phone: (312) 283-8555
Date: December 10, 2014

Electronic Acknowledgement Receipt	
EFS ID:	20919583
Application Number:	08813270
International Application Number:	
Confirmation Number:	3242
Title of Invention:	METHOD AND APPARATUS FOR OPTIMIZING VEHICLE OPERATION
First Named Inventor/Applicant Name:	HARVEY SLEPIAN
Customer Number:	88360
Filer:	Patrick Duffy Richards
Filer Authorized By:	
Attorney Docket Number:	TASD-B8542
Receipt Date:	10-DEC-2014
Filing Date:	10-MAR-1997
Time Stamp:	13:55:53
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Statutory disclaimers per MPEP 1490.	1089-001StatutoryDisclaimer.pdf	61655 bc0a49b24b2bba58557e2008f6a9d0fdd80a047d	no	2
Warnings:					
Information:					

Total Files Size (in bytes):	61655

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111
If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

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

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

AO 121 (6/90)

TO:	
COMMISSIONER OF PATENTS AND TRADEMARKS (USPTO) P.O. Box 1450 Alexandria, VA 22313-1450	REPORT ON THE FILING OF DETERMINATION OF AN ACTION OR APPEAL REGARDING A COPYRIGHT

In compliance with the Act of July 19, 1952 (66 Stat. 814; 35 U.S.C. 290) you are hereby advised that a court action has been filed on the following patent(s) in the U.S. District Court:

DOCKET	DATE FILED	UNITED STATES DISTRICT COURT, NORTHERN DISTRICT OF ILLINOIS, EASTERN DIVISION
13-cv-08416	11/21/2013	

PLAINTIFF	DEFENDANT
Velocity Patent LLC	BMW of North America, LLC et al.

PATENT NO.	DATE OF PATENT	PATENTEE
5,954,781	Sept. 21,1999	Harvey Slepian and Loran Sutton

In the above-entitled case, the following patent(s) have been included:

DATE INCLUDED	INCLUDED BY [ ] Amendment [ ] Answer [ ] Cross Bill [ ] Other Pleading	
PATENT NO.	DATE OF PATENT	PATENT

In the above-entitled case, the following decision has been rendered or judgment issued:

DECISION/JUDGMENT:

CLERK	DEPUTY CLERK:	DATE:
Thomas G. Bruton	Maria G. Hernandez	October 21, 2014

AO 121 (6/90)

TO:	
COMMISSIONER OF PATENTS AND TRADEMARKS (USPTO) P.O. Box 1450 Alexandria, VA 22313-1450	REPORT ON THE FILING OF DETERMINATION OF AN ACTION OR APPEAL REGARDING A COPYRIGHT

In compliance with the Act of July 19, 1952 (66 Stat. 814; 35 U.S.C. 290) you are hereby advised that a court action has been filed on the following patent(s) in the U.S. District Court:

DOCKET NO.	DATE FILED	UNITED STATES DISTRICT COURT, NORTHERN DISTRICT OF ILLINOIS, EASTERN DIVISION
13 C 8421	11/21/2013	
PLAINTIFFS **Velocity Patent LLC**		DEFENDANTS **Jaguar Land Rover North America, LLC**

PATENT NUMBER	DATE OF PATENT	HOLDER OF PATENT OR TRADEMARK
5,954,781	9/21/1999	Harvey Slepian

In the above-entitled case, the following trademarks(s) have been included:

DATE INCLUDED	INCLUDED BY [ ] Amendment [ ] Answer [ ] Cross Bill [ ] Other Pleading	
PATENT NUMBER	DATE OF PATENT	HOLDER OF PATENT OR TRADEMARK
1.		
2.		
3.		

In the above-entitled case, the following decision has been rendered or judgment issued:

DECISION/JUDGMENT		
CLERK THOMAS G. BRUTON	(BY) DEPUTY CLERK /s/ Thelma Murry-Sykes	DATE 11/22/2013

A TRUE COPY-ATTEST
THOMAS G. BRUTON, CLERK
By: s/ THELMA MURRY-SYKES
DEPUTY CLERK
U.S. DISTRICT COURT, NORTHERN DISTRICT OF ILLINOIS
November 22, 2013

1

PTO/AIA/83B (07-13)
Approved for use through 11/30/2014. OMB 0651-0035
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995 no persons are required to respond to a collection of information unless it displays a valid OMB control number

REEXAMINATION OR SUPPLEMENTAL EXAMINATION – PATENT OWNER POWER OF ATTORNEY OR REVOCATION OF POWER OF ATTORNEY WITH A NEW POWER OF ATTORNEY AND CHANGE OF CORRESPONDENCE ADDRESS FOR REEXAMINATION OR SUPPLEMENTAL EXAMINATION AND PATENT		
	Control Number(s)	90013252
	Filing Date(s)	05-22-2014
	First Named Inventor	Harvey Slepian
	Title	Method and Apparatus for Optimizing Vehicle Operation
	Patent Number	5,954,781
	Examiner Name	David E. England
	Attorney Docket No(s)	1089-001

I. **Power of Attorney.** This form may be used to change the Power of Attorney in a reexamination or supplemental examination proceeding (or multiple proceedings where merged). This form may also be used to change the Power of Attorney in the patent file; in such a case, a copy of this form will be placed in both the patent file and the reexamination or supplemental examination proceeding.

A. Revocation of Previous Power of Attorney. I hereby revoke all previous patent owner powers of attorney, if any, given:

☒ in the above-identified reexamination or supplemental examination proceeding control number(s) (more than one may be changed only if the proceedings are merged).

☒ in the file of the above-identified patent.

(check BOTH boxes if change in BOTH the patent file and the reexamination or supplemental examination proceeding is requested).

B. Designation of Power of Attorney.

☐ A Power of Attorney is submitted herewith.

OR

☒ I hereby appoint Practitioner(s) associated with the Customer Number identified in the box at right as my/our attorney(s) or agent(s) to prosecute the proceeding(s)/patent identified above and selected in section I(A), and to transact all business in the United States Patent and Trademark Office connected therewith: 88360

OR

☐ I hereby appoint Practitioner(s) named below as my/our attorney(s) or agent(s) to prosecute the proceeding(s) identified above, and to transact all business in the United States Patent and Trademark Office connected therewith:

Practitioner(s) Name	Registration Number

Authorization for the Power of Attorney is provided by the signature on page 2 of this form.

This collection of information is required by 37 CFR 1.31, 1.32, and 1.33. The information is required to obtain or retain a benefit by the public, which is to update (and by the USPTO to process) the file of a patent or reexamination proceeding. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 3 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

PTO/AIA/813 (07-13)
Approved for use through 11/30/2014. OMB 0651-0035
U.S. Patent and Trademark Office: U.S. DEPARTMENT OF COMMERCE

II. Change of Correspondence Address

Please recognize or change the correspondence address for the above-identified reexamination or supplemental examination proceeding control number(s) (more than one may be changed **only** if they are merged proceedings) **and for the file of the above-identified patent** to be:

☒ The address associated with the above-identified Customer Number.
OR
☐ The address associated with the Customer Number identified in the box at right:
OR

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

NOTE: THE CORRESPONDENCE ADDRESS FOR THE REEXAMINATION OR SUPPLEMENTAL EXAMINATION PROCEEDING CONTROL NUMBER(S) MUST BE THE SAME AS THAT FOR THE PATENT. SEE 37 CFR 1.33.

III. Authorization for Power of Attorney and (if selected) Change of Correspondence Address

I am the:
☐ Inventor, having ownership of the patent being reexamined.
OR
☒ Patent owner.
Statement under 37 CFR 3.73(c) (Form PTO/AIA/96) submitted herewith or filed on _____.

Signature of Inventor or Patent Owner		Date	6/6/14
Name	Tom Mavrakakis	Telephone	
Title and Company	Managing Member of Velocity Patent LLC		

NOTE: Signatures of all the inventors or patent owners of the entire interest or their representative(s) are required. If more than one signature is required, submit multiple forms, check the box below, and identify the total number of forms submitted in the blank below.

☒ A total of 1 forms are submitted. *If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.*

Privacy Act Statement

The **Privacy Act of 1974 (P.L. 93-579)** requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether disclosure of these records is required by the Freedom of Information Act.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (*i.e.*, GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspection or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

Electronic Acknowledgement Receipt	
EFS ID:	19499100
Application Number:	08813270
International Application Number:	
Confirmation Number:	3242
Title of Invention:	METHOD AND APPARATUS FOR OPTIMIZING VEHICLE OPERATION
First Named Inventor/Applicant Name:	HARVEY SLEPIAN
Customer Number:	88360
Filer:	Patrick Duffy Richards
Filer Authorized By:	
Attorney Docket Number:	TASD-B8542
Receipt Date:	07-JUL-2014
Filing Date:	10-MAR-1997
Time Stamp:	08:54:14
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Assignee showing of ownership per 37 CFR 3.73.	Statement.pdf	121575 f486680a0cf9a85be8c081da5bc7a4959f04d7ce	no	3

Warnings:
Information:

2	Power of Attorney	POA.pdf	890967 bc293de050037b6d05053dcc47fce937ecf9f8c1	no	3

Warnings:	
Information:	
Total Files Size (in bytes):	1012542

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111
If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371
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New International Application Filed with the USPTO as a Receiving Office
If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

PTO/AIA/96 (08-12)
Approved for use through 01/31/2013. OMB 0651-0031
U.S. Patent and Trademark Office;U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of1995, no persons arerequired to respond to a collection of information unless it displays a valid OMB control number.

STATEMENT UNDER 37 CFR 3.73(c)

Applicant/Patent Owner: Velocity Patent LLC

Application No./Patent No.: 5,954,781 Filed/Issue Date: September 21, 1999

Titled: Method and Apparatus for Optimizing Vehicle Operation

Velocity Patent LLC, a limited liability company

(Name of Assignee) (Type of Assignee, e.g., corporation, partnership, university, government agency, etc.)

states that, for the patent application/patent identified above, it is (choose **one** of options 1, 2, 3 or 4 below):

1. ☑ The assignee of the entire right, title, and interest.

2. ☐ An assignee of less than the entire right, title, and interest (check applicable box):

   ☐ The extent (by percentage) of its ownership interest is _____%. Additional Statement(s) by the owners holding the balance of the interest must be submitted to account for 100% of the ownership interest.

   ☐ There are unspecified percentages of ownership. The other parties, including inventors, who together own the entire right, title and interest are:

   Additional Statement(s) by the owner(s) holding the balance of the interest must be submitted to account for the entire right, title, and interest.

3. ☐ The assignee of an undivided interest in the entirety (a complete assignment from one of the joint inventors was made). The other parties, including inventors, who together own the entire right, title, and interest are:

   Additional Statement(s) by the owner(s) holding the balance of the interest must be submitted to account for the entire right, title, and interest.

4. ☐ The recipient, via a court proceeding or the like (*e.g.*, bankruptcy, probate), of an undivided interest in the entirety (a complete transfer of ownership interest was made). The certified document(s) showing the transfer is attached.

The interest identified in option 1, 2 or 3 above (not option 4) is evidenced by either (choose **one** of options A or B below):

A. ☐ An assignment from the inventor(s) of the patent application/patent identified above. The assignment was recorded in the United States Patent and Trademark Office at Reel _____, Frame _____, or for which a copy thereof is attached.

B. ☑ A chain of title from the inventor(s), of the patent application/patent identified above, to the current assignee as follows:

1. From: Harvey Slepian and Loran Sutton To: TAS Distributing Co., Inc.

   The document was recorded in the United States Patent and Trademark Office at
   Reel 008435, Frame 0064, or for which a copy thereof is attached.

2. From: TAS Distributing Co., Inc. To: Velocity Patents LLC

   The document was recorded in the United States Patent and Trademark Office at
   Reel 031635, Frame 0364, or for which a copy thereof is attached.

STATEMENT UNDER 37 CFR 3.73(c)

3. From: Velocity Patents LLC To: Velocity Patent LLC

The document was recorded in the United States Patent and Trademark Office at
Reel 031635, Frame 0376, or for which a copy thereof is attached.

4. From: _____ To: _____

The document was recorded in the United States Patent and Trademark Office at
Reel _____, Frame _____, or for which a copy thereof is attached.

5. From: _____ To: _____

The document was recorded in the United States Patent and Trademark Office at
Reel _____, Frame _____, or for which a copy thereof is attached.

6. From: _____ To: _____

The document was recorded in the United States Patent and Trademark Office at
Reel _____, Frame _____, or for which a copy thereof is attached.

☐ Additional documents in the chain of title are listed on a supplemental sheet(s).

☐ As required by 37 CFR 3.73(c)(1)(i), the documentary evidence of the chain of title from the original owner to the assignee was, or concurrently is being, submitted for recordation pursuant to 37 CFR 3.11.

[NOTE: A separate copy (i.e., a true copy of the original assignment document(s)) must be submitted to Assignment Division in accordance with 37 CFR Part 3, to record the assignment in the records of the USPTO. See MPEP 302.08]

The undersigned (whose title is supplied below) is authorized to act on behalf of the assignee.

/Patrick D. Richards/	June 26, 2014
Signature	Date
Patrick Richards	48905
Printed or Typed Name	Title or Registration Number

[Page 2 of 2]

Privacy Act Statement

The **Privacy Act of 1974 (P.L. 93-579)** requires that yoube given certain informationin connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, pleasebe advised that: (1) the general authority forthe collection of thisinformation is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and(3) the principal purpose forwhich the information isused by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent applicationor patent. If you do not furnish the requested information,the U.S. Patent and Trademark Office may not be able to process and/or examineyour submission,which may result in termination of proceedings or abandonment of the applicationor expiration of the patent.

The informationprovided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether disclosure of these records is required by the Freedom of Information Act.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the informationin order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an InternationalApplication filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (*i.e.*, GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, arecord may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspection or an issued patent.
9. A record from thissystem of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

UNITED STATES PATENT AND TRADEMARK OFFICE

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

APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
08/813,270	03/10/1997	HARVEY SLEPIAN	TASD-B8542

CONFIRMATION NO. 3242

88360
Richards Patent Law P.C.
233 S. Wacker Dr., 84th Floor
Chicago, IL 60606

POA ACCEPTANCE LETTER

OC000000069364302

Date Mailed: 07/02/2014

NOTICE OF ACCEPTANCE OF POWER OF ATTORNEY

This is in response to the Power of Attorney filed 06/27/2014.

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

/jawhitfield/

Office of Data Management, Application Assistance Unit (571) 272-4000, or (571) 272-4200, or 1-888-786-0101

UNITED STATES PATENT AND TRADEMARK OFFICE

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

APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
08/813,270	03/10/1997	HARVEY SLEPIAN	TASD-B8542

CONFIRMATION NO. 3242

MICHAEL S BUSH
HAYNES AND BOONE LLP
3100 NATIONSBANK PLAZA
901 MAIN STREET
DALLAS, TX 752023789

POWER OF ATTORNEY NOTICE

OC000000069364277

Date Mailed: 07/02/2014

NOTICE REGARDING CHANGE OF POWER OF ATTORNEY

This is in response to the Power of Attorney filed 06/27/2014.

- The Power of Attorney to you in this application has been revoked by the assignee who has intervened as provided by 37 CFR 3.71. Future correspondence will be mailed to the new address of record(37 CFR 1.33).

/jawhitfield/

Office of Data Management, Application Assistance Unit (571) 272-4000, or (571) 272-4200, or 1-888-786-0101

PTO/AIA/83B (07-13)
Approved for use through 11/30/2014. OMB 0651-0035
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995 no persons are required to respond to a collection of information unless it displays a valid OMB control number

REEXAMINATION OR SUPPLEMENTAL EXAMINATION – PATENT OWNER POWER OF ATTORNEY OR REVOCATION OF POWER OF ATTORNEY WITH A NEW POWER OF ATTORNEY AND CHANGE OF CORRESPONDENCE ADDRESS FOR REEXAMINATION OR SUPPLEMENTAL EXAMINATION AND PATENT		
	Control Number(s)	90013252
	Filing Date(s)	05-22-2014
	First Named Inventor	Harvey Slepian
	Title	Method and Apparatus for Optimizing Vehicle Operation
	Patent Number	5,954,781
	Examiner Name	David E. England
	Attorney Docket No(s)	1089-001

I. **Power of Attorney.** This form may be used to change the Power of Attorney in a reexamination or supplemental examination proceeding (or multiple proceedings where merged). This form may also be used to change the Power of Attorney in the patent file; in such a case, a copy of this form will be placed in both the patent file and the reexamination or supplemental examination proceeding.

A. Revocation of Previous Power of Attorney. I hereby revoke all previous patent owner powers of attorney, if any, given:

☒ in the above-identified reexamination or supplemental examination proceeding control number(s) (more than one may be changed only if the proceedings are merged).

☒ in the file of the above-identified patent.

(check BOTH boxes if change in BOTH the patent file and the reexamination or supplemental examination proceeding is requested).

B. Designation of Power of Attorney.

☐ A Power of Attorney is submitted herewith.

OR

☒ I hereby appoint Practitioner(s) associated with the Customer Number identified in the box at right as my/our attorney(s) or agent(s) to prosecute the proceeding(s)/patent identified above and selected in section I(A), and to transact all business in the United States Patent and Trademark Office connected therewith: 88360

OR

☐ I hereby appoint Practitioner(s) named below as my/our attorney(s) or agent(s) to prosecute the proceeding(s) identified above, and to transact all business in the United States Patent and Trademark Office connected therewith:

Practitioner(s) Name	Registration Number

Authorization for the Power of Attorney is provided by the signature on page 2 of this form.

This collection of information is required by 37 CFR 1.31, 1.32, and 1.33. The information is required to obtain or retain a benefit by the public, which is to update (and by the USPTO to process) the file of a patent or reexamination proceeding. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 3 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

PTO/AIA/818 (07-13)
Approved for use through 11/30/2014. OMB 0651-0035
U.S. Patent and Trademark Office: U.S. DEPARTMENT OF COMMERCE

II. Change of Correspondence Address

Please recognize or change the correspondence address for the above-identified reexamination or supplemental examination proceeding control number(s) (more than one may be changed **only** if they are merged proceedings) **and for the file of the above-identified patent** to be:

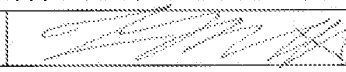
☒ The address associated with the above-identified Customer Number.
OR
☐ The address associated with the Customer Number identified in the box at right:
OR

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

NOTE: THE CORRESPONDENCE ADDRESS FOR THE REEXAMINATION OR SUPPLEMENTAL EXAMINATION PROCEEDING CONTROL NUMBER(S) MUST BE THE SAME AS THAT FOR THE PATENT. SEE 37 CFR 1.33.

III. Authorization for Power of Attorney and (if selected) Change of Correspondence Address

I am the:
☐ Inventor, having ownership of the patent being reexamined.
OR
☒ Patent owner.
Statement under 37 CFR 3.73(c) (Form PTO/AIA/96) submitted herewith or filed on _____.

Signature of Inventor or Patent Owner		Date	
Name	Tom Mavrakakis	Telephone	
Title and Company	Managing Member of Velocity Patent LLC		

NOTE: Signatures of all the inventors or patent owners of the entire interest or their representative(s) are required. If more than one signature is required, submit multiple forms, check the box below, and identify the total number of forms submitted in the blank below.

☒ A total of 1 forms are submitted. *If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.*

Privacy Act Statement

The **Privacy Act of 1974 (P.L. 93-579)** requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether disclosure of these records is required by the Freedom of Information Act.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (*i.e.*, GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspection or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

Electronic Acknowledgement Receipt	
EFS ID:	19437543
Application Number:	90013252
International Application Number:	
Confirmation Number:	9999
Title of Invention:	Method and Apparatus for Optimizing Vehicle Operation
First Named Inventor/Applicant Name:	5,954,781
Correspondence Address:	MICHAEL S. BUSH HAYNES AND BOONE LLP 3100 NATIONSBANK PLAZA 901 MAIN STREET DALLAS TX 75202-3789 US 2146515589 -
Filer:	Patrick Duffy Richards
Filer Authorized By:	
Attorney Docket Number:	
Receipt Date:	27-JUN-2014
Filing Date:	22-MAY-2014
Time Stamp:	15:05:14
Application Type:	Reexam (Third Party)

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Assignee showing of ownership per 37 CFR 3.73.	Statement.pdf	121575 f486680a0cf9a85be8c081da5bc7a4959f04d7ce	no	3
Warnings:					
Information:					
2	Power of Attorney	POA.pdf	890969 3621ad656b72041e58a38f2cbf9d636b6b66fad6	no	3
Warnings:					
Information:					
		Total Files Size (in bytes):	1012544		

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111
If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

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

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

PTO/AIA/96 (08-12)
Approved for use through 01/31/2013. OMB 0651-0031
U.S. Patent and Trademark Office;U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of1995, no persons arerequired to respond to a collection of information unless it displays a valid OMB control number.

STATEMENT UNDER 37 CFR 3.73(c)

Applicant/Patent Owner: Velocity Patent LLC

Application No./Patent No.: 5,954,781 Filed/Issue Date: September 21, 1999

Titled: Method and Apparatus for Optimizing Vehicle Operation

Velocity Patent LLC, a limited liability company

(Name of Assignee) (Type of Assignee, e.g., corporation, partnership, university, government agency, etc.)

states that, for the patent application/patent identified above, it is (choose **one** of options 1, 2, 3 or 4 below):

1. ☑ The assignee of the entire right, title, and interest.

2. ☐ An assignee of less than the entire right, title, and interest (check applicable box):

   ☐ The extent (by percentage) of its ownership interest is _____%. Additional Statement(s) by the owners holding the balance of the interest must be submitted to account for 100% of the ownership interest.

   ☐ There are unspecified percentages of ownership. The other parties, including inventors, who together own the entire right, title and interest are:

   Additional Statement(s) by the owner(s) holding the balance of the interest must be submitted to account for the entire right, title, and interest.

3. ☐ The assignee of an undivided interest in the entirety (a complete assignment from one of the joint inventors was made). The other parties, including inventors, who together own the entire right, title, and interest are:

   Additional Statement(s) by the owner(s) holding the balance of the interest must be submitted to account for the entire right, title, and interest.

4. ☐ The recipient, via a court proceeding or the like (*e.g.*, bankruptcy, probate), of an undivided interest in the entirety (a complete transfer of ownership interest was made). The certified document(s) showing the transfer is attached.

The interest identified in option 1, 2 or 3 above (not option 4) is evidenced by either (choose **one** of options A or B below):

A. ☐ An assignment from the inventor(s) of the patent application/patent identified above. The assignment was recorded in the United States Patent and Trademark Office at Reel _____, Frame _____, or for which a copy thereof is attached.

B. ☑ A chain of title from the inventor(s), of the patent application/patent identified above, to the current assignee as follows:

1. From: Harvey Slepian and Loran Sutton To: TAS Distributing Co., Inc.

   The document was recorded in the United States Patent and Trademark Office at

   Reel 008435, Frame 0064, or for which a copy thereof is attached.

2. From: TAS Distributing Co., Inc. To: Velocity Patents LLC

   The document was recorded in the United States Patent and Trademark Office at

   Reel 031635, Frame 0364, or for which a copy thereof is attached.

PTO/AIA/96 (08-12)
Approved for use through 01/31/2013. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

STATEMENT UNDER 37 CFR 3.73(c)

3. From: Velocity Patents LLC To: Velocity Patent LLC

The document was recorded in the United States Patent and Trademark Office at
Reel 031635, Frame 0376, or for which a copy thereof is attached.

4. From: _____ To: _____

The document was recorded in the United States Patent and Trademark Office at
Reel _____, Frame _____, or for which a copy thereof is attached.

5. From: _____ To: _____

The document was recorded in the United States Patent and Trademark Office at
Reel _____, Frame _____, or for which a copy thereof is attached.

6. From: _____ To: _____

The document was recorded in the United States Patent and Trademark Office at
Reel _____, Frame _____, or for which a copy thereof is attached.

☐ Additional documents in the chain of title are listed on a supplemental sheet(s).

☐ As required by 37 CFR 3.73(c)(1)(i), the documentary evidence of the chain of title from the original owner to the assignee was, or concurrently is being, submitted for recordation pursuant to 37 CFR 3.11.

[NOTE: A separate copy (i.e., a true copy of the original assignment document(s)) must be submitted to Assignment Division in accordance with 37 CFR Part 3, to record the assignment in the records of the USPTO. See MPEP 302.08]

The undersigned (whose title is supplied below) is authorized to act on behalf of the assignee.

/Patrick D. Richards/	June 26, 2014
Signature	Date
Patrick Richards	48905
Printed or Typed Name	Title or Registration Number

Privacy Act Statement

The **Privacy Act of 1974 (P.L. 93-579)** requires that yoube given certain informationin connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, pleasebe advised that: (1) the general authority forthe collection of thisinformation is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and(3) the principal purpose forwhich the information isused by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent applicationor patent. If you do not furnish the requested information,the U.S. Patent and Trademark Office may not be able to process and/or examineyour submission,which may result in termination of proceedings or abandonment of the applicationor expiration of the patent.

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4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the informationin order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
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6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (*i.e.*, GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
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9. A record from thissystem of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

UNITED STATES PATENT AND TRADEMARK OFFICE

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

Bib Data Sheet

CONFIRMATION NO. 3242

SERIAL NUMBER	FILING OR 371(c) DATE	CLASS	GROUP ART UNIT	ATTORNEY DOCKET NO.
08/813,270	03/10/1997 RULE 1.47	701	3661	TASD-B8542

AIA (First Inventor to File): NO

INVENTORS

HARVEY SLEPIAN, PEORIA, IL;
LORAN SUTTON, EAST PEORIA, IL;

APPLICANTS

HARVEY SLEPIAN, PEORIA, IL;
LORAN SUTTON, EAST PEORIA, IL;

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

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

IF REQUIRED, FOREIGN FILING LICENSE GRANTED ** SMALL ENTITY **
06/09/1997

Foreign Priority claimed	STATE OR COUNTRY	SHEETS DRAWING	TOTAL CLAIMS	INDEPENDENT CLAIMS
☐ yes ☐ no	IL	3	32	4
35 USC 119 (a-d) conditions met ☐ yes ☐ no ☐ Met after Allowance				
Verified and Acknowledged Examiner's Signature Initials				

ADDRESS
88360

TITLE

METHOD AND APPARATUS FOR OPTIMIZING VEHICLE OPERATION

FILING FEE RECEIVED		
713	FEES: Authority has been given in Paper No. _____ to charge/credit DEPOSIT ACCOUNT No. _____ for following:	☐ All Fees ☐ 1.16 Fees (Filing) ☐ 1.17 Fees (Processing Ext. of time) ☐ 1.18 Fees (Issue) ☐ Other _____ ☐ Credit

United States Patent and Trademark Office

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

Patent No.___5,954,781_____

NOTICE OF *EX PARTE* REEXAMINATION

Notice is hereby given that a request for *ex parte* reexamination of U.S. Patent No. __5,954,781___ was filed on ___05/22/14_____ under 35 U.S.C. § 302 and 37 C.F.R. § 1.510(a).

The reexamination proceeding has been assigned Control No. 90/013,252

This Notice incorporates by reference into the patent file, all papers entered into the reexamination file.

Note: This Notice should be entered into the patent file. – 08/813,270

ARTIFACT SHEET

Enter artifact number below. Artifact number is application number + artifact type code (see list below) + sequential letter (A, B, C …). The first artifact folder for an artifact type receives the letter A, the second B, etc.. Examples: 59123456PA, 59123456PB, 59123456ZA, 59123456ZB

08813270ZA

Indicate quantity of a single type of artifact received but not scanned. Create individual artifact folder/box and artifact number for each Artifact Type.

☐ CD(s) containing:
- computer program listing ☐
  Doc Code: Computer Artifact Type Code: P
- pages of specification and/or sequence listing and/or table ☐
  Doc Code: Artifact Artifact Type Code: S
- content unspecified or combined ☐
  Doc Code: Artifact Artifact Type Code: U

☐ Stapled Set(s) Color Documents or B/W Photographs
Doc Code: Artifact Artifact Type Code: C

☐ Microfilm(s)
Doc Code: Artifact Artifact Type Code: F

☐ Video tape(s)
Doc Code: Artifact Artifact Type Code: V

☐ Model(s)
Doc Code: Artifact Artifact Type Code: M

☐ Bound Document(s)
Doc Code: Artifact Artifact Type Code: B

☐ Confidential Information Disclosure Statement or Other Documents marked Proprietary, Trade Secrets, Subject to Protective Order, Material Submitted under MPEP 724.02, etc.
Doc Code: Artifact Artifact Type Code X

1 Other, description: **FLOPPY DISK**
Doc Code: Artifact Artifact Type Code: Z

March 8, 2004

TO:	
COMMISSIONER OF PATENTS AND TRADEMARKS (USPTO) P.O. Box 1450 Alexandria, VA 22313-1450	REPORT ON THE FILING OF DETERMINATION OF AN ACTION REGARDING A PATENT OR TRADEMARK

In compliance with 35 U.S.C. 290 and/or 15 U.S.C. 1116 you are hereby advised that a court action has been filed on the following patent(s)/trademark(s) in the U.S. District Court:

DOCKET NO. 13-cv-08419	DATE FILED: 11/21/2013	UNITED STATES DISTRICT COURT, NORTHERN DISTRICT OF ILLINOIS, EASTERN DIVISION
Plaintiff(s): **Velocity Patent LLC**	**Defendant(s):** **Chrysler Group, LLC**	

TRADEMARK NUMBER	DATE OF TRADEMARK	HOLDER OF TRADEMARK
1.		
2.		
3.		

In the above-entitled case, the following trademarks(s) have been included:

DATE INCLUDED	INCLUDED BY [ ] Amendment [ ] Answer [ ] Cross Bill [ ] Other Pleading	
PATENT NUMBER	DATE OF PATENT	HOLDER OF PATENT
1. 5,954,781	Sep. 21, 1999	Harvey Slepian, Peoria; Loran Sutton, East Peoria, both of Ill.

In the above-entitled case, the following decision has been rendered or judgment issued:

DECISION/JUDGMENT		
CLERK - Thomas G. Bruton	**DEPUTY CLERK:** /s/ Travis Grammer	**DATE: November 22, 2013**

AO 121 (6/90)

TO:	
COMMISSIONER OF PATENTS AND TRADEMARKS (USPTO) P.O. Box 1450 Alexandria, VA 22313-1450	REPORT ON THE FILING OF DETERMINATION OF AN ACTION OR APPEAL REGARDING A COPYRIGHT

In compliance with the Act of July 19, 1952 (66 Stat. 814; 35 U.S.C. 290) you are hereby advised that a court action has been filed on the following patent(s) in the U.S. District Court:

DOCKET NO.	DATE FILED	UNITED STATES DISTRICT COURT, NORTHERN DISTRICT OF ILLINOIS, EASTERN DIVISION
13 C 8421	11/21/2013	
PLAINTIFFS **Velocity Patent LLC**	DEFENDANTS **Jaguar Land Rover North America, LLC**	

PATENT NUMBER	DATE OF PATENT	HOLDER OF PATENT OR TRADEMARK
5,954,781	9/21/1999	Harvey Slepian

In the above-entitled case, the following trademarks(s) have been included:

DATE INCLUDED	INCLUDED BY [ ] Amendment [ ] Answer [ ] Cross Bill [ ] Other Pleading	
PATENT NUMBER	DATE OF PATENT	HOLDER OF PATENT OR TRADEMARK
1.		
2.		
3.		

In the above-entitled case, the following decision has been rendered or judgment entered:

DECISION/JUDGMENT		
CLERK THOMAS G. BRUTON	(BY) DEPUTY CLERK /s/ Thelma Murry-Sykes	DATE 11/22/2013

A TRUE COPY-ATTEST
THOMAS G. BRUTON, CLERK
By: s/ THELMA MURRY-SYKES
DEPUTY CLERK
U.S. DISTRICT COURT, NORTHERN
DISTRICT OF ILLINOIS
November 22, 2013

1

AO 121 (6/90)

TO:	
COMMISSIONER OF PATENTS AND TRADEMARKS (USPTO) P.O. Box 1450 Alexandria, VA 22313-1450	REPORT ON THE FILING OF DETERMINATION OF AN ACTION OR APPEAL REGARDING A COPYRIGHT

In compliance with the Act of July 19, 1952 (66 Stat. 814; 35 U.S.C. 290) you are hereby advised that a court action has been filed on the following patent(s) in the U.S. District Court:

DOCKET	DATE FILED	UNITED STATES DISTRICT COURT, NORTHERN DISTRICT OF ILLINOIS, EASTERN DIVISION
13-cv-08416	11/21/2013	

PLAINTIFF	DEFENDANT
Wolf Run Hollow	Bank of America Corporation

PATENT NO.	DATE OF PATENT	PATENTEE
5,954,781	Sept. 21,1999	Harvey Slepian and Loran Sutton

In the above-entitled case, the following patent(s) have been included:

DATE INCLUDED	INCLUDED BY [ ] Amendment [ ] Answer [ ] Cross Bill [ ] Other Pleading	
PATENT NO.	**DATE OF PATENT**	**PATENT**

In the above-entitled case, the following decision has been rendered or judgment issued:

DECISION/JUDGMENT:

CLERK	DEPUTY CLERK:	DATE:
Thomas G. Bruton	Maria G. Hernandez	November 27, 2013

TO:	
COMMISSIONER OF PATENTS AND TRADEMARKS (USPTO) P.O. Box 1450 Alexandria, VA 22313-1450	REPORT ON THE FILING OF DETERMINATION OF AN ACTION REGARDING A PATENT OR TRADEMARK

In compliance with 35 U.S.C. 290 and/or 15 U.S.C. 1116 you are hereby advised that a court action has been filed on the following patent(s)/trademark(s) in the U.S. District Court:

DOCKET NO.	DATE FILED:	UNITED STATES DISTRICT COURT, NORTHERN DISTRICT OF ILLINOIS, EASTERN DIVISION
13cv8413	11/21/13	

Plaintiff(s):	Defendant(s): .
Velocity Patent LLC	Mercedes-Benz USA, LLC, et a.

PATENT NUMBER	DATE OF PATENT	HOLDER OF PATENT
5,954,781	9/21/1999	Velocity Patent LLC

In the above-entitled case, the following trademarks(s) have been included:

DATE INCLUDED	INCLUDED BY [ ] Amendment [ ] Answer [ ] Cross Bill [ ] Other Pleading	
TRADEMARK NUMBER	DATE OF TRADEMARK	HOLDER OF PATENT OR TRADEMARK
1.		
2.		
3.		

In the above-entitled case, the following decision has been rendered or judgment issued:

DECISION/JUDGMENT		
CLERK - Thomas G. Bruton	DEPUTY CLERK: Maya Burke	DATE: 11/25/13

AO 121 (6/90)

TO:	
COMMISSIONER OF PATENTS AND TRADEMARKS (USPTO) P.O. Box 1450 Alexandria, VA 22313-1450	REPORT ON THE FILING OF DETERMINATION OF AN ACTION OR APPEAL REGARDING A COPYRIGHT

In compliance with the Act of July 19, 1952 (66 Stat. 814; 35 U.S.C. 290) you are hereby advised that a court action has been filed on the following patent(s) in the U.S. District Court:

DOCKET NO.	DATE FILED	UNITED STATES DISTRICT COURT, NORTHERN DISTRICT OF ILLINOIS, EASTERN DIVISION
13 C 8421	11/21/2013	
PLAINTIFFS **Velocity Patent LLC**		DEFENDANTS **Jaguar Land Rover North America, LLC**

PATENT NUMBER	DATE OF PATENT	HOLDER OF PATENT OR TRADEMARK
5,954,781	9/21/1999	Harvey Slepian

In the above-entitled case, the following trademarks(s) have been included:

DATE INCLUDED	INCLUDED BY [ ] Amendment [ ] Answer [ ] Cross Bill [ ] Other Pleading	
PATENT NUMBER	DATE OF PATENT	HOLDER OF PATENT OR TRADEMARK
1.		
2.		
3.		

In the above-entitled case, the following decision has been rendered or judgment asserted:

DECISION/JUDGMENT		
CLERK THOMAS G. BRUTON	(BY) DEPUTY CLERK /s/ Thelma Murry-Sykes	DATE 11/22/2013

A TRUE COPY-ATTEST
THOMAS G. BRUTON, CLERK
By: s/ THELMA MURRY-SYKES
DEPUTY CLERK
U.S. DISTRICT COURT, NORTHERN DISTRICT OF ILLINOIS
November 22, 2013

1

AO 121 (6/90)

TO:	
COMMISSIONER OF PATENTS AND TRADEMARKS (USPTO) P.O. Box 1450 Alexandria, VA 22313-1450	REPORT ON THE FILING OF DETERMINATION OF AN ACTION OR APPEAL REGARDING A COPYRIGHT

In compliance with the Act of July 19, 1952 (66 Stat. 814; 35 U.S.C. 290) you are hereby advised that a court action has been filed on the following patent(s) in the U.S. District Court:

DOCKET	DATE FILED	UNITED STATES DISTRICT COURT, NORTHERN DISTRICT OF ILLINOIS, EASTERN DIVISION
13-cv-08416	11/21/2013	

PLAINTIFF	DEFENDANT
Velocity Patent LLC	BMW of North America, LLC et al.

PATENT NO.	DATE OF PATENT	PATENTEE
5,954,781	Sept. 21,1999	Harvey Slepian and Loran Sutton

In the above-entitled case, the following patent(s) have been included:

DATE INCLUDED	INCLUDED BY [ ] Amendment [ ] Answer [ ] Cross Bill [ ] Other Pleading	
PATENT NO.	**DATE OF PATENT**	**PATENT**

In the above-entitled case, the following decision has been rendered or judgment issued:

DECISION/JUDGMENT:

CLERK	DEPUTY CLERK:	DATE:
Thomas G. Bruton	Maria G. Hernandez	December 2, 2013

PATENT ASSIGNMENT COVER SHEET

Electronic Version v1.1
Stylesheet Version v1.2

EPAS ID: PAT2621265

SUBMISSION TYPE:	NEW ASSIGNMENT
NATURE OF CONVEYANCE:	ASSIGNMENT

CONVEYING PARTY DATA

Name	Execution Date
TAS DISTRIBUTING CO., INC	08/20/2013

RECEIVING PARTY DATA

Name:	VELOCITY PATENTS LLC
Street Address:	350 N. ST. PAUL STREET
Internal Address:	SUITE 2900
City:	DALLAS
State/Country:	TEXAS
Postal Code:	75201

PROPERTY NUMBERS Total: 1

Property Type	Number
Patent Number:	5954781

CH $40.00 5954781

CORRESPONDENCE DATA

Fax Number:
Phone: 312-283-8555
Email: patrick@richardspatentlaw.com
Correspondence will be sent via US Mail when the email attempt is unsuccessful.
Correspondent Name: RICHARDS PATENT LAW P.C.
Address Line 1: 233 S. WACKER DR.
Address Line 2: 84TH FL
Address Line 4: CHICAGO, ILLINOIS 60622

ATTORNEY DOCKET NUMBER:	1089-001
NAME OF SUBMITTER:	PATRICK RICHARDS
Signature:	/Patrick D. Richards/
Date:	11/20/2013

	This document serves as an Oath/Declaration (37 CFR 1.63).

Total Attachments: 3
source=TAS to Velocity Patents Assignment#page1.tif
source=TAS to Velocity Patents Assignment#page2.tif
source=TAS to Velocity Patents Assignment#page3.tif

EXHIBIT B -- ASSIGNMENT OF PATENT RIGHTS

This patent assignment ("Assignment") is entered into as of August 20, 2013 by and between TAS Distributing Co., Inc., a company organized under the laws of Illinois with a principal place of business at 1519 W. Altorfer Drive, Suite A, Peoria, IL 61615 ("Assignor"), and Velocity Patents LLC, a company organized under the laws of Texas ("Assignee").

For good and valuable consideration, the receipt of which is hereby acknowledged, Assignor"), does hereby irrevocably sell, assign, transfer, and convey unto Assignee, or its designees all right, title, and interest that exist today and may exist in the future in and to all of the following (collectively, the "Patent Rights"):

(a) the invention disclosures, provisional patent applications, patent applications and patents listed below (the "Patents");

(b) all provisional patent applications, patent applications, patents or other governmental grants or issuances (i) to which any of the Patents directly or indirectly claims priority, and/or (ii) for which any of the Patents directly or indirectly forms a basis for priority, and/or (iii) to which any of the Patents is terminally disclaimed;

(c) reissues, reexaminations, extensions, continuations, continuations in part, continuing prosecution applications, requests for continuing examinations, and divisions of any item in the foregoing categories (a) and (b);

(d) foreign patents, patent applications, and counterparts relating to any item in the foregoing categories (a) through (c), including, without limitation, certificates of invention, utility models, industrial design protection, design patent protection, and other governmental grants or issuances;

(e) items in any of the foregoing in categories (a) through (d), whether or not expressly listed as Patents below and whether or not claims in any of the foregoing have been rejected, withdrawn, cancelled, or the like;

(f) rights to all inventions, invention disclosures, and discoveries described in any item in the foregoing categories (a) through (e) and all other rights arising out of such inventions, invention disclosures, and discoveries;

(g) rights to apply in any or all countries of the world for patents, certificates of invention, utility models, industrial design protections, design patent protections, or other governmental grants or issuances of any type related to any item in the foregoing categories (a) through (f), including, without limitation, under the Paris Convention for the Protection of Industrial Property, the International Patent Cooperation Treaty, or any other convention, treaty, agreement, or understanding;

(h) causes of action (whether currently pending, filed, or otherwise) and other enforcement rights under, or on account of, any of the Patents and/or any item in any of the foregoing categories (a) through (g), including, without limitation, all causes of action and other enforcement rights for

(i) damages, (ii) injunctive relief, and (iii) other remedies of any kind for past, current, and future infringement; and

(i) all rights to collect royalties and other payments under or on account of any of the Patents and/or any item in the foregoing categories (b) through (h).

Patent No.	Country	Issue Date	Title
5,954,781	United States	September 21, 1999	Method and Apparatus for Optimizing Vehicle Operation

Assignor hereby authorizes the respective patent office or governmental agency in each jurisdiction to issue any and all patents, certificates of invention, utility models or other governmental grants or issuances that may be granted upon any of the Patent Rights in the name of Assignee, as the assignee to the entire interest therein.

Assignor will, at the reasonable request of Assignee, do all things reasonably necessary, proper, or advisable, including without limitation, the execution, acknowledgment, and recordation of specific assignments, oaths, declarations, and other documents on a country-by-country basis, to assist Assignee in obtaining, perfecting, sustaining, and/or enforcing the Patent Rights. Such assistance will include providing, and obtaining from the respective inventors, prompt production of pertinent facts and documents, giving of testimony, execution of petitions, oaths, powers of attorney, specifications, declarations or other papers, and other assistance reasonably necessary for filing patent applications, complying with any duty of disclosure, and conducting prosecution, reexamination, reissue, interference or other priority proceedings, opposition proceedings, cancellation proceedings, public use proceedings, infringement or other court actions and the like with respect to the Patent Rights. Assignee will pay Assignor's reasonable out-of-pocket costs and expenses associated with the foregoing activities within (45) forty-five days of when they were incurred.

The terms and conditions of this Assignment of Patent Rights will inure to the benefit of Assignee, its successors, assigns, and other legal representatives and will be binding upon Assignor, its successors, assigns, and other legal representatives.

Peoria County, Illinois on 8-26-2013.

ASSIGNOR

By: TAS Distributing Co., Inc.

Name: Harvey Slepian
Title: President

(Signature MUST be notarized)

STATE OF ILLINOIS

COUNTY OF PEORIA

On 8/26/13, before me, Brandi E.L Genge, Notary Public in and for said State, personally appeared _____, personally known to me (or proved to me on the basis of satisfactory evidence) to be the person whose name is subscribed to the within instrument and acknowledged to me that he/she executed the same in his/her authorized capacity, and that by his/her signature on the instrument the person, or the entity upon behalf of which the person acted, executed the instrument.

WITNESS my hand and official seal.

Signature Brandi E L Genge (Seal)

"OFFICIAL SEAL"
BRANDI E. L. GENGE
NOTARY PUBLIC, STATE OF ILLINOIS
MY COMMISSION EXPIRES 11/29/2016

PATENT ASSIGNMENT COVER SHEET

Electronic Version v1.1
Stylesheet Version v1.2

EPAS ID: PAT2621269

SUBMISSION TYPE:	NEW ASSIGNMENT
NATURE OF CONVEYANCE:	ASSIGNMENT

CONVEYING PARTY DATA

Name	Execution Date
VELOCITY PATENTS LLC	11/15/2013

RECEIVING PARTY DATA

Name:	VELOCITY PATENT LLC
Street Address:	335 LLOYDEN PARK LANE
City:	ATHERTON
State/Country:	CALIFORNIA
Postal Code:	94027

PROPERTY NUMBERS Total: 1

Property Type	Number
Patent Number:	5954781

CH $40.00 5954781

CORRESPONDENCE DATA

Fax Number:
Phone: 312-283-8555
Email: patrick@richardspatentlaw.com
Correspondence will be sent via US Mail when the email attempt is unsuccessful.
Correspondent Name: RICHARDS PATENT LAW P.C.
Address Line 1: 233 S. WACKER DR.
Address Line 2: 84TH FL
Address Line 4: CHICAGO, ILLINOIS 60606

ATTORNEY DOCKET NUMBER:	1089-001
NAME OF SUBMITTER:	PATRICK RICHARDS
Signature:	/Patrick D. Richards/
Date:	11/20/2013

	This document serves as an Oath/Declaration (37 CFR 1.63).

Total Attachments: 2
source=Velocity Patents to Velocity Patent.2013-11-15 Assignment of Patent Rights#page1.tif
source=Velocity Patents to Velocity Patent.2013-11-15 Assignment of Patent Rights#page2.tif

ASSIGNMENT OF PATENT RIGHTS

This patent assignment ("Assignment") is entered into as of November 15, 2013 by and between Velocity Patents LLC, a company organized under the laws of Texas ("Assignor"), and Velocity Patent LLC, a company organized under the laws of Illinois with principal place of business at 335 Lloyden Park Lane, Atherton, CA 94027 ("Assignee").

For good and valuable consideration, the receipt of which is hereby acknowledged, Assignor"), does hereby irrevocably sell, assign, transfer, and convey unto Assignee, or its designees all right, title, and interest that exist today and may exist in the future in and to all of the following (collectively, the "Patent Rights"):

(a) the invention disclosures, provisional patent applications, patent applications and patents listed below (the "Patents");

(b) all provisional patent applications, patent applications, patents or other governmental grants or issuances (i) to which any of the Patents directly or indirectly claims priority and/or (ii) for which any of the Patents directly or indirectly forms a basis for priority;

(c) reissues, reexaminations, extensions, continuations, continuations in part, continuing prosecution applications, requests for continuing examinations, and divisions of any item in the foregoing categories (a) and (b);

(d) foreign patents, patent applications, and counterparts relating to any item in the foregoing categories (a) through (c), including, without limitation, certificates of invention, utility models, industrial design protection, design patent protection, and other governmental grants or issuances;

(e) items in any of the foregoing in categories (a) through (d), whether or not expressly listed as Patents below and whether or not claims in any of the foregoing have been rejected, withdrawn, cancelled, or the like;

(f) rights to all inventions, invention disclosures, and discoveries described in any item in the foregoing categories (a) through (e) and all other rights arising out of such inventions, invention disclosures, and discoveries;

(g) rights to apply in any or all countries of the world for patents, certificates of invention, utility models, industrial design protections, design patent protections, or other governmental grants or issuances of any type related to any item in the foregoing categories (a) through (f), including, without limitation, under the Paris Convention for the Protection of Industrial Property, the International Patent Cooperation Treaty, or any other convention, treaty, agreement, or understanding;

(h) causes of action (whether currently pending, filed, or otherwise) and other enforcement rights under, or on account of, any of the Patents and/or any item in any of the foregoing categories (a) through (g), including, without limitation, all causes of action and other enforcement rights for

(i) damages, (ii) injunctive relief, and (iii) other remedies of any kind for past, current, and future infringement; and

(i) all rights to collect royalties and other payments under or on account of any of the Patents and/or any item in the foregoing categories (b) through (h).

5,954,781	United States	September 21, 1999	"Method and Apparatus for Optimizing Vehicle Operation"

Assignor hereby authorizes the respective patent office or governmental agency in each jurisdiction to issue any and all patents, certificates of invention, utility models or other governmental grants or issuances that may be granted upon any of the Patent Rights in the name of Assignee, as the assignee to the entire interest therein.

Assignor will, at the reasonable request of Assignee, do all things reasonably necessary, proper, or advisable, including without limitation, the execution, acknowledgment, and recordation of specific assignments, oaths, declarations, and other documents on a country-by-country basis, to assist Assignee in obtaining, perfecting, sustaining, and/or enforcing the Patent Rights. Such assistance will include providing, and obtaining from the respective inventors, prompt production of pertinent facts and documents, giving of testimony, execution of petitions, oaths, powers of attorney, specifications, declarations or other papers, and other assistance reasonably necessary for filing patent applications, complying with any duty of disclosure, and conducting prosecution, reexamination, reissue, interference or other priority proceedings, opposition proceedings, cancellation proceedings, public use proceedings, infringement or other court actions and the like with respect to the Patent Rights. Assignee will pay Assignor's reasonable out-of-pocket costs and expenses associated with the foregoing activities within (45) forty-five days of when they were incurred.

The terms and conditions of this Assignment of Patent Rights will inure to the benefit of Assignee, its successors, assigns, and other legal representatives and will be binding upon Assignor, its successors, assigns, and other legal representatives.

ASSIGNOR

By: Velocity Patents LLC

On: 11-15-2013

Name: Thomas C. Mavrakakis
Title: Member

UNITED STATES PATENT AND TRADEMARK OFFICE

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

PAYOR NUMBER
28449

P75M

BUSH PATENT & LAW GROUP
6850 NORTH SHILOH ROAD
SUITE K - PMB 139
GARLAND TX 75044

DATE PRINTED
04/11/07

MAINTENANCE FEE REMINDER

According to the records of the U.S. Patent and Trademark Office (USPTO) the maintenance fee for the patent(s) listed below (for which the above address is on record as the fee address under 37 CFR 1.363) has not been paid within the six-month period set forth in 37 CFR 1.362(d). THE MAINTENANCE FEE MAY STILL BE PAID WITH THE APPLICABLE SURCHARGE SET FORTH IN 37 CFR 1.20(h), WITHIN THE SIX-MONTH GRACE PERIOD SET FORTH IN 37 CFR 1.362(e).

Unless payment of the maintenance fee and the applicable surcharge is received in the USPTO within the six-month grace period, THE PATENT WILL EXPIRE AS OF THE END OF THE GRACE PERIOD. 35 U.S.C. 41(b).

The total payment due is the amount required on the date the fee is paid (and not necessarily the amount indicated below). All USPTO fees (including maintenance fees) are subject to change. Customers should refer to the USPTO Web site (www.uspto.gov) or call the Maintenance Fee Branch at 571-272-6500 for the most current fee amounts for the correct entity status before submitting payment. The total payment due indicated below is based on the entity status according to current Office records (shown below).

Timely payment of the total payment due is required in order to avoid expiration of the patent. A maintenance fee payment can be timely made using the certificate of mailing or transmission procedure set forth in 37 CFR 1.8.

PATENT NUMBER	FEE AMT	MAINT. SURCHG	U.S. APPL NUMBER	PATENT ISSUE DATE	APPL. FILING DATE	PAY-MENT YEAR	SMALL ENTITY?	TOTAL PYMT DUE	ATTORNEY DOCKET NUMBER
5954781	1150	65	08813270	09/21/99	03/10/97	8	YES	1215	TASD-B8542

The maintenance fee and the applicable surcharge can be paid quickly and easily over the Internet at www.uspto.gov by electronic funds transfer (EFT), credit card, or USPTO deposit account payment methods. The mailing address for all maintenance fee payments not electronically submitted over the Internet is: United States Patent and Trademark Office, P.O. Box 371611, Pittsburgh, PA 15250-1611.

Direct any questions about this notice to: Mail Stop M Correspondence, Director of the United States Patent and Trademark Office, P.O. Box 1450, Alexandria, VA 22313-1450.

NOTE: This notice was automatically generated based on the amount of time that elapsed since the date a patent was granted. It is possible that the patent term may have ended or been shortened due to a terminal disclaimer that was filed in the application. Also, for any patent that issued from an application filed on or after June 8, 1995 containing a specific reference to an earlier filed application or applications under 35 U.S.C. 120, 121, or 365(c), the patent term ends 20 years from the date on which the earliest such application was filed, unless the term was adjusted or extended under 35 U.S.C. 154 or 156. Patentee should determine the relevant patent term for a patent before paying the maintenance fee.

MF440H (3/2006)

PART B—ISSUE FEE TRANSMITTAL

Complete and mail this form, together with applicable fees, to: **Box ISSUE FEE**
Assistant Commissioner for Patents
Washington, D.C. 20231

MAILING INSTRUCTIONS: This form should be used for transmitting the ISSUE FEE. Blocks 1 through 4 should be completed where appropriate. All further correspondence including the Issue Fee Receipt, the Patent, advance orders and notification of maintenance fees will be mailed to the current correspondence address as indicated unless corrected below or directed otherwise in Block 1, by (a) specifying a new correspondence address; and/or (b) indicating a separate "FEE ADDRESS" for maintenance fee notifications.

CURRENT CORRESPONDENCE ADDRESS (Note: Legibly mark-up with any corrections or use Block 1)

CORRECTED COPY

PM51/0422

MICHAEL S BUSH
HAYNES AND BOONE LLP
3100 NATIONSBANK PLAZA
901 MAIN STREET
DALLAS TX 75202-3789

Note: The certificate of mailing below can only be used for domestic mailings of the Issue Fee Transmittal. This certificate cannot be used for any other accompanying papers. Each additional paper, such as an assignment or formal drawing, must have its own certificate of mailing.

Certificate of Mailing

I hereby certify that this Issue Fee Transmittal is being deposited with the United States Postal Service with sufficient postage for first class mail in an envelope addressed to the Box Issue Fee address above on the date indicated below.

LADY LEE (Depositor's name)
Lady Lee (Signature)
7-21-99 (Date)

APPLICATION NO.	FILING DATE	TOTAL CLAIMS	EXAMINER AND GROUP ART UNIT		DATE MAILED
08/813,270	03/10/97	032	ARTHUR, G	3661	04/22/99

First Named Applicant: SLEPIAN, HARVEY

TITLE OF INVENTION: METHOD AND APPARATUS FOR OPTIMIZING VEHICLE OPERATION

ATTY'S DOCKET NO.	CLASS-SUBCLASS	BATCH NO.	APPLN. TYPE	SMALL ENTITY	FEE DUE	DATE DUE
2 TASD-B8542	701-096.000	S07	UTILITY	YES	$605.00	07/22/99

1. Change of correspondence address or indication of " Fee Address" (37 CFR 1.363). Use of PTO form(s) and Customer Number are recommended, but not required.
   - ☐ Change of correspondence address (or Change of Correspondence Address form PTO/SB/122) attached.
   - ☐ "Fee Address" Indication (or "Fee Address" Indication form PTO/SB/47) attached.

2. For printing on the patent front page, list (1) the names of up to 3 registered patent attorneys or agents OR, alternatively, (2) the name of a single firm (having as a member a registered attorney or agent) and the names of up to 2 registered patent attorneys or agents. If no name is listed, no name will be printed.
   1 Haynes and Boone, LLP
   2 _____
   3 _____

3. ASSIGNEE NAME AND RESIDENCE DATA TO BE PRINTED ON THE PATENT (print or type)
   PLEASE NOTE: Unless an assignee is identified below, no assignee data will appear on the patent. Inclusion of assignee data is only appropiate when an assignment has been previously submitted to the PTO or is being submitted under separate cover. Completion of this form is NOT a subsititue for filing an assignment.
   (A) NAME OF ASSIGNEE: TAS Distributing Co., Inc.
   (B) RESIDENCE: (CITY & STATE OR COUNTRY) Peoria, Illinois
   Please check the appropriate assignee category indicated below (will not be printed on the patent)
   ☐ Individual ☒ corporation or other private group entity ☐ government

4a. The following fees are enclosed (make check payable to Commissioner of Patents and Trademarks):
   ☒ Issue Fee
   ☒ Advance Order - # of Copies 5

4b: The following fees or deficiency in these fees should be charged to:
   DEPOSIT ACCOUNT NUMBER _____
   (ENCLOSE AN EXTRA COPY OF THIS FORM)
   ☐ Issue Fee
   ☐ Advance Order - # of Copies _____

The COMMISSIONER OF PATENTS AND TRADEMARKS IS requested to apply the Issue Fee to the application identified above.

(Authorized Signature) (Date) 7-21-99
Michael S. Bush, Reg. No. 31,745

NOTE; The Issue Fee will not be accepted from anyone other than the applicant; a registered attorney or agent; or the assignee or other party in interest as shown by the records of the Patent and Trademark Office.

Burden Hour Statement: This form is estimated to take 0.2 hours to complete. Time will vary depending on the needs of the individual case. Any comments on the amount of time required to complete this form should be sent to the Chief Information Officer, Patent and Trademark Office, Washington, D.C. 20231. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND FEES AND THIS FORM TO: Box Issue Fee, Assistant Commissioner for Patents, Washington D.C. 20231

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

TRANSMIT THIS FORM WITH FEE

B $

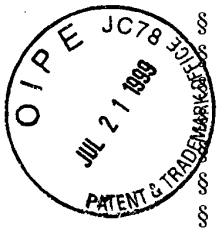
IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re application of:
Harvey Slepian

Serial No.: 08/813,270

Filed: March 10, 1997

For: METHOD AND APPARATUS FOR OPTIMIZING VEHICLE OPERATION



Batch No.: S07

Group Art Unit: 3661

Examiner: G. Arthur

RECEIVED
JUL 27 1999
Publishing Division
13

Box Issue Fee
Assistant Commissioner For Patents
Washington, D.C. 20321

TRANSMITTAL

Dear Sir:

In response to the Notice of Allowance and Issue Fee Due mailed on April 22, 1999, enclosed are the following:

1. Part B - Issue Fee Transmittal;
2. Check in the amount of $620.00 ($605.00 for the issue fee and $15.00 for five (5) soft copies);
3. This Transmittal sheet in duplicate; and
4. Return postcard.

The Commissioner is hereby authorized to charge Deposit Account No. 08-1394 for any deficiencies in the enclosed fees.

Respectfully submitted,

Michael S. Bush
Registration No. 31,745

Date: July 21, 1999

HAYNES AND BOONE, L.L.P.
3100 NationsBank Plaza
901 Main Street
Dallas, Texas 75202-3789
Telephone: 214/651-5589
Facsimile: 214/651-5940
File: 23630.4
d-670432.1

EXPRESS MAIL NO.: EM444688346US
DATE OF DEPOSIT: 7-21-99

This paper and fee are being deposited with the U.S. Postal Service Express Mail Post Office to Addressee service under 37 CFR §1.10 on the date indicated above and is addressed to the Assistant Commissioner for Patents, Washington, D.C. 20231

LADY LEE
Name of person mailing paper and fee

Lady Lee
Signature of person mailing paper and fee

7560 5/5/99 B #10 KS
93

PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re application of: Harvey Slepian et al.	§	
	§	Batch No.: S07
Serial No.: 08/813,270	§	
	§	Group Art Unit: 3661
Filed: March 10, 1997	§	
	§	Examiner: Arthur, G.
For: METHOD AND APPARATUS FOR OPTIMIZING VEHICLE OPERATION	§	

Box Issue Fee
Assistant Commissioner For Patents
Washington, D.C. 20321

TRANSMITTAL

Dear Sir:

In response to the Notice of Allowance and Issue Fee Due mailed on April 22, 1998, enclosed are the following:

1. Letter to Official Draftsman;
2. Three (3) sheets of formal drawings; and
3. Return postcard.

The Commissioner is hereby authorized to charge payment of any fees associated with any of the papers submitted herewith or to credit any overpayment to Deposit Account No. 08-1394.

Respectfully submitted,

Michael S. Bush
Registration No. 31,745

Date: May 21, 1999

HAYNES AND BOONE, L.L.P.
3100 NationsBank Plaza
901 Main Street
Dallas, Texas 75202-3789
Telephone: 214/651-5589
Facsimile: 214/651-5940
File: 23630.3
d-649162.1

I hereby certify that this correspondence is being deposited with the United States Postal Service as first class mail in an envelope addressed to: Assistant Commissioner For Patents, Washington, D.C. 20231
on May 21, 1999
Cynthia Reasoner

PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re application of:
Harvey Slepian et al.

Serial No.: 08/813,270

Filed: March 10, 1997

For: METHOD AND APPARATUS FOR OPTIMIZING VEHICLE OPERATION

Batch No.: S07

Group Art Unit: 3661

Examiner: Arthur, G.

Box Issue Fee
Assistant Commissioner For Patents
Washington, D.C. 20321

LETTER TO THE OFFICIAL DRAFTSPERSON

Dear Sir:

In response to the Notice of Allowance mailed on April 22, 1999, enclosed are three (3) sheets of formal drawings to replace the informal drawings as originally filed in connection with the above-identified patent application.

Respectfully submitted,

Michael S. Bush
Registration No. 31,745

Date: May 21, 1999

HAYNES AND BOONE, L.L.P.
3100 NationsBank Plaza
901 Main Street
Dallas, Texas 75202-3789
Telephone: 214/651-5589
Facsimile: 214/651-5940
File: 23630.4
d-650128.1

I hereby certify that this correspondence is being deposited with the United States Postal Service as first class mail in an envelope addressed to: Assistant Commissioner For Patents, Washington, D.C. 20231
on May 21, 1999
Cyndi Reasoner

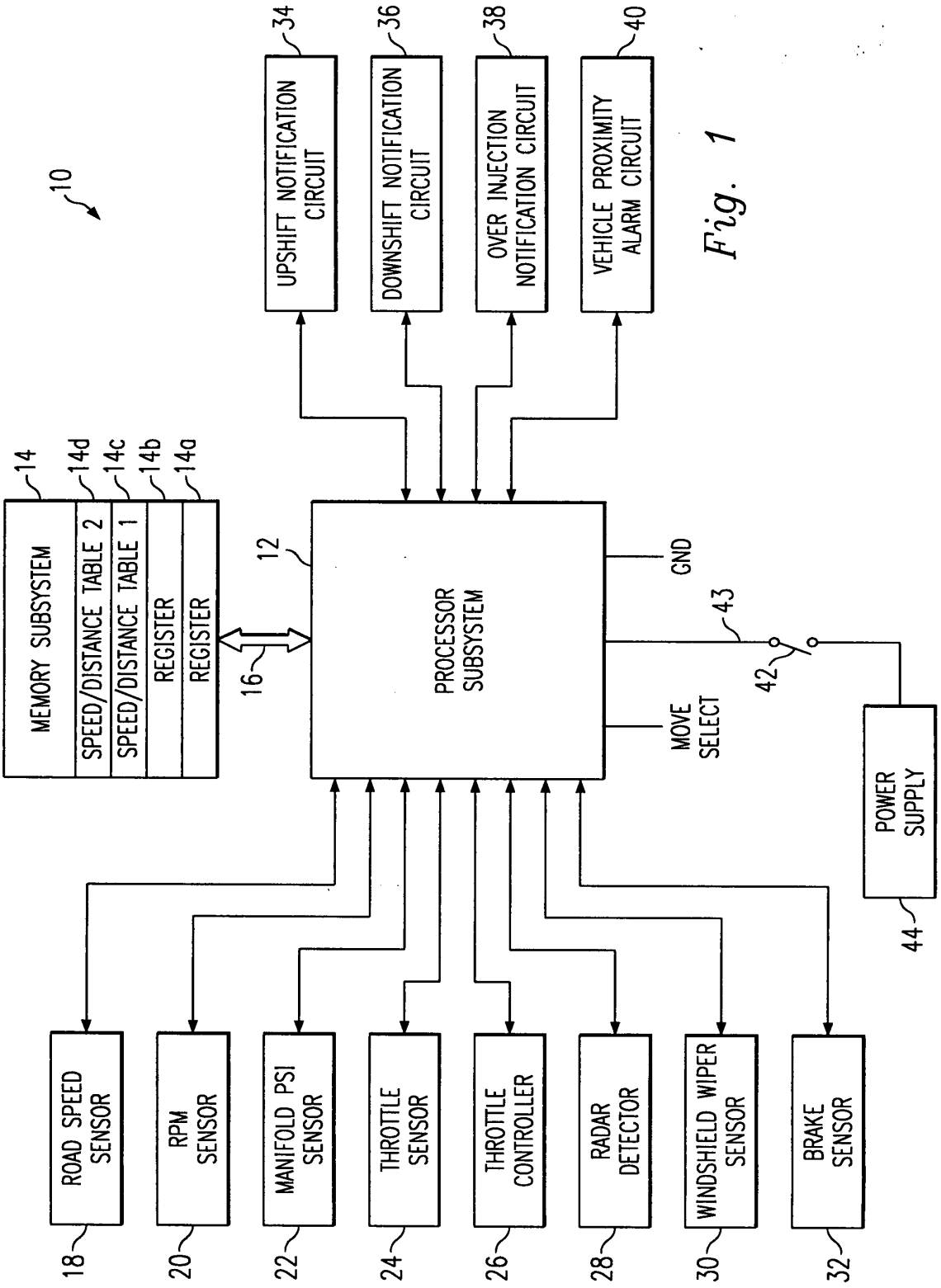

10
UPSHIFT NOTIFICATION CIRCUIT
34
DOWNSHIFT NOTIFICATION CIRCUIT
36
OVER INJECTION NOTIFICATION CIRCUIT
38
VEHICLE PROXIMITY ALARM CIRCUIT
40
MEMORY SUBSYSTEM
14
SPEED/DISTANCE TABLE 2
14d
SPEED/DISTANCE TABLE 1
14c
REGISTER
14b
REGISTER
14a
16
12
PROCESSOR SUBSYSTEM
GND
43
42
MOVE SELECT
POWER SUPPLY
44
ROAD SPEED SENSOR
18
RPM SENSOR
20
MANIFOLD PSI SENSOR
22
THROTTLE SENSOR
24
THROTTLE CONTROLLER
26
RADAR DETECTOR
28
WINDSHIELD WIPER SENSOR
30
BRAKE SENSOR
32

Fig. 1

Fig. 2A

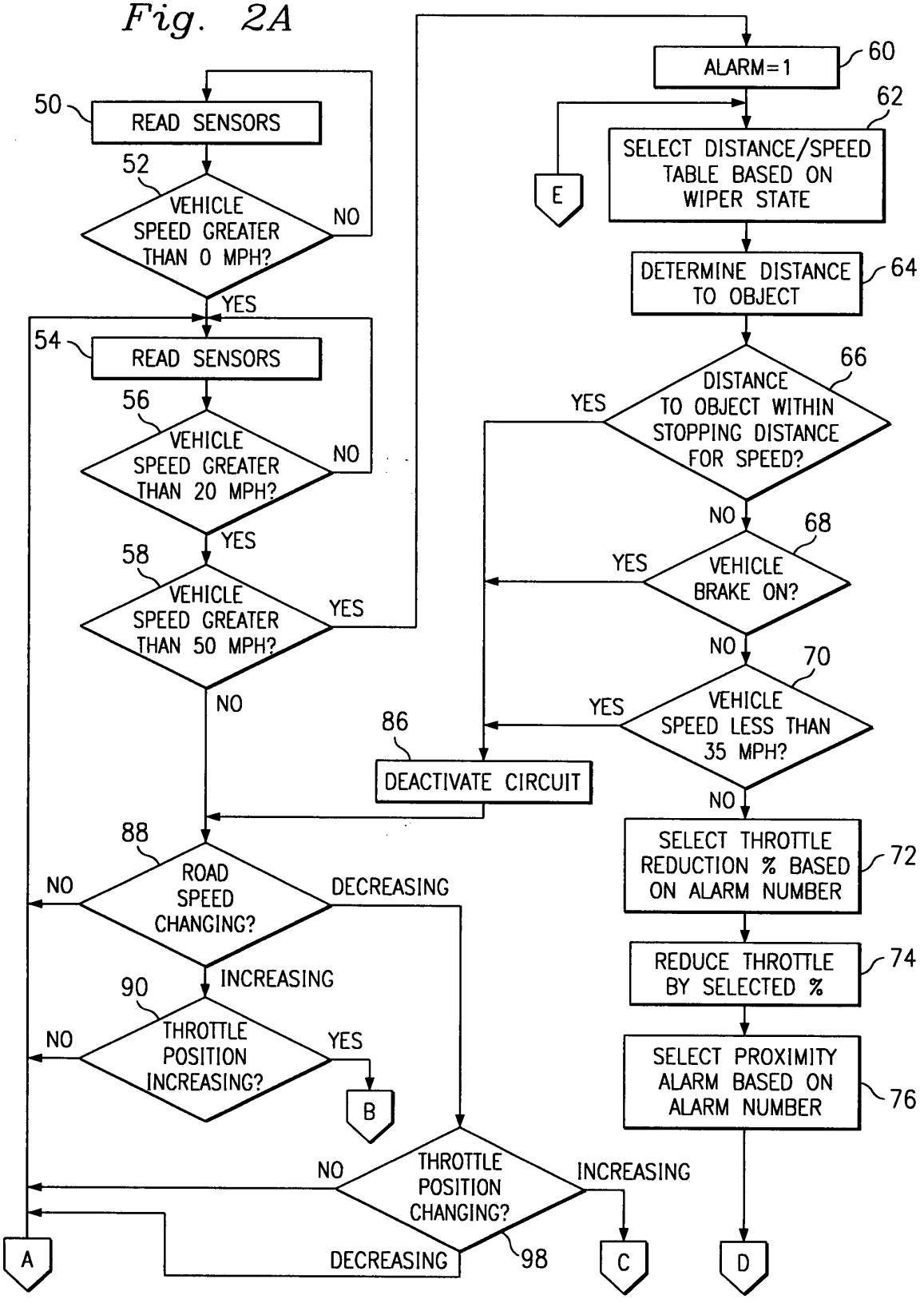
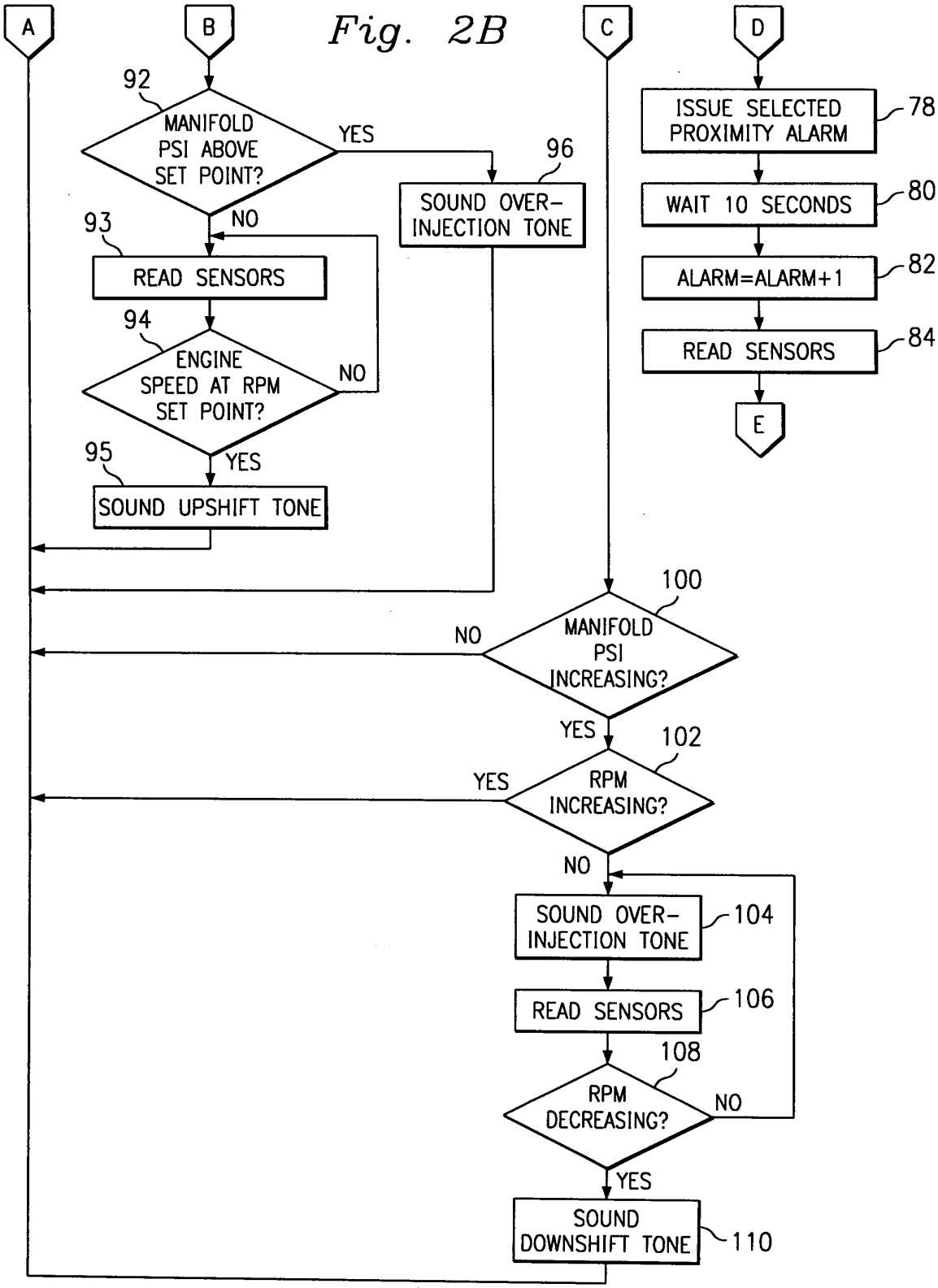

50
READ SENSORS
52
VEHICLE SPEED GREATER THAN 0 MPH?
NO
YES
54
READ SENSORS
56
VEHICLE SPEED GREATER THAN 20 MPH?
NO
YES
58
VEHICLE SPEED GREATER THAN 50 MPH?
YES
NO
88
ROAD SPEED CHANGING?
NO
DECREASING
INCREASING
90
THROTTLE POSITION INCREASING?
NO
YES
B
A
THROTTLE POSITION CHANGING?
NO
INCREASING
DECREASING
98
C
ALARM=1
60
62
SELECT DISTANCE/SPEED TABLE BASED ON WIPER STATE
E
DETERMINE DISTANCE TO OBJECT
64
66
DISTANCE TO OBJECT WITHIN STOPPING DISTANCE FOR SPEED?
YES
NO
68
VEHICLE BRAKE ON?
YES
NO
70
VEHICLE SPEED LESS THAN 35 MPH?
YES
NO
86
DEACTIVATE CIRCUIT
SELECT THROTTLE REDUCTION % BASED ON ALARM NUMBER
72
REDUCE THROTTLE BY SELECTED %
74
SELECT PROXIMITY ALARM BASED ON ALARM NUMBER
76
D

Fig. 2B


A
B
C
D
92
MANIFOLD PSI ABOVE SET POINT?
YES
96
SOUND OVER-INJECTION TONE
NO
93
READ SENSORS
94
ENGINE SPEED AT RPM SET POINT?
NO
YES
95
SOUND UPSHIFT TONE
ISSUE SELECTED PROXIMITY ALARM
78
WAIT 10 SECONDS
80
ALARM=ALARM+1
82
READ SENSORS
84
E
100
MANIFOLD PSI INCREASING?
NO
YES
102
RPM INCREASING?
YES
NO
SOUND OVER-INJECTION TONE
104
READ SENSORS
106
108
RPM DECREASING?
NO
YES
SOUND DOWNSHIFT TONE
110

UNITED STATES DEPARTMENT OF COMMERCE
Patent and Trademark Office

NOTICE OF ALLOWANCE AND ISSUE FEE DUE

CORRECTED COPY

PM51/0422

MICHAEL S BUSH
HAYNES AND BOONE LLP
3100 NATIONSBANK PLAZA
901 MAIN STREET
DALLAS TX 75202-3789

APPLICATION NO.	FILING DATE	TOTAL CLAIMS	EXAMINER AND GROUP ART UNIT	DATE MAILED
08/813,270	03/10/97	032	ARTHUR, G 3661	04/22/99
First Named Applicant	SLEPIAN,	HARVEY		

TITLE OF INVENTION METHOD AND APPARATUS FOR OPTIMIZING VEHICLE OPERATION

ATTY'S DOCKET NO.	CLASS-SUBCLASS	BATCH NO.	APPLN. TYPE	SMALL ENTITY	FEE DUE	DATE DUE
2 TASD-B8542	701-096.000	S07	UTILITY	YES	$605.00	07/22/99

THE APPLICATION IDENTIFIED ABOVE HAS BEEN EXAMINED AND IS ALLOWED FOR ISSUANCE AS A PATENT. PROSECUTION ON THE MERITS IS CLOSED.

THE ISSUE FEE MUST BE PAID WITHIN THREE MONTHS FROM THE MAILING DATE OF THIS NOTICE OR THIS APPLICATION SHALL BE REGARDED AS ABANDONED. THIS STATUTORY PERIOD CANNOT BE EXTENDED.

HOW TO RESPOND TO THIS NOTICE:

I. Review the SMALL ENTITY status shown above.
If the SMALL ENTITY is shown as YES, verify your current SMALL ENTITY status:

A. If the status is changed, pay twice the amount of the FEE DUE shown above and notify the Patent and Trademark Office of the change in status, or
B. If the status is the same, pay the FEE DUE shown above.

If the SMALL ENTITY is shown as NO:

A. Pay FEE DUE shown above, or

B. File verified statement of Small Entity Status before, or with, payment of 1/2 the FEE DUE shown above.

II. Part B-Issue Fee Transmittal should be completed and returned to the Patent and Trademark Office (PTO) with your ISSUE FEE. Even if the ISSUE FEE has already been paid by charge to deposit account, Part B Issue Fee Transmittal should be completed and returned. If you are charging the ISSUE FEE to your deposit account, section "4b" of Part B-Issue Fee Transmittal should be completed and an extra copy of the form should be submitted.

III. All communications regarding this application must give application number and batch number.
Please direct all communications prior to issuance to Box ISSUE FEE unless advised to the contrary.

IMPORTANT REMINDER: Utility patents issuing on applications filed on or after Dec. 12, 1980 may require payment of maintenance fees. It is patentee's responsibility to ensure timely payment of maintenance fees when due.

PATENT AND TRADEMARK OFFICE COPY

PTOL-85 (REV. 10-96) Approved for use through 06/30/99. (0651-0033)

Notice of Allowability

Application No.	Applicant(s)
08/813,270	Harvey Slepian et al.
Examiner	**Group Art Unit**
Gertrude Arthur	3661

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance and Issue Fee Due or other appropriate communication will be mailed in due course.

[X] This communication is responsive to *the amendment filed 2/16/99*

[X] The allowed claim(s) is/are *1-3, 5-7, 9-22, 26-28, and 30-38*

[ ] The drawings filed on _____ are acceptable.

[ ] Acknowledgement is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d).

[ ] All [ ] Some* [ ] None of the CERTIFIED copies of the priority documents have been

[ ] received.

[ ] received in Application No. (Series Code/Serial Number) _____ .

[ ] received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

*Certified copies not received: _____

[ ] Acknowledgement is made of a claim for domestic priority under 35 U.S.C. § 119(e).

A SHORTENED STATUTORY PERIOD FOR RESPONSE to comply with the requirements noted below is set to EXPIRE THREE MONTHS FROM THE "DATE MAILED" of this Office action. Failure to timely comply will result in ABANDONMENT of this application. Extensions of time may be obtained under the provisions of 37 CFR 1.136(a).

[ ] Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL APPLICATION, PTO-152, which discloses that the oath or declaration is deficient. A SUBSTITUTE OATH OR DECLARATION IS REQUIRED.

[X] Applicant MUST submit NEW FORMAL DRAWINGS

[X] because the originally filed drawings were declared by applicant to be informal.

[ ] including changes required by the Notice of Draftsperson's Patent Drawing Review, PTO-948, attached hereto or to Paper No. _____ .

[ ] including changes required by the proposed drawing correction filed on _____ , which has been approved by the examiner.

[ ] including changes required by the attached Examiner's Amendment/Comment.

Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the reverse side of the drawings. The drawings should be filed as a separate paper with a transmittal lettter addressed to the Official Draftsperson.

[ ] Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Any response to this letter should include, in the upper right hand corner, the APPLICATION NUMBER (SERIES CODE/SERIAL NUMBER). If applicant has received a Notice of Allowance and Issue Fee Due, the ISSUE BATCH NUMBER and DATE of the NOTICE OF ALLOWANCE should also be included.

Attachment(s)

[ ] Notice of References Cited, PTO-892

[ ] Information Disclosure Statement(s), PTO-1449, Paper No(s). _____

[ ] Notice of Draftsperson's Patent Drawing Review, PTO-948

[ ] Notice of Informal Patent Application, PTO-152

[X] Interview Summary, PTO-413

[X] Examiner's Amendment/Comment

[ ] Examiner's Comment Regarding Requirement for Deposit of Biological Material

[X] Examiner's Statement of Reasons for Allowance

WILLIAM A. CUCHLINSKI, JR.
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 3600

EXAMINER'S AMENDMENT

1. An examiner's amendment to the record appears below. Should the changes and/or additions be unacceptable to applicant, an amendment may be filed as provided by 37 CFR 1.312. To ensure consideration of such an amendment, it MUST be submitted no later than the payment of the issue fee.

Authorization for this examiner's amendment was given in a telephone interview with Michael S. Bush (Reg # 31,745) on April 13, 1999.

2. The application has been amended as follows: In claim 34, line 11, the word "sensor" after notification has been changed to --circuit--

REASONS FOR ALLOWANCE

3. The following is an examiner's statement of reasons for allowance: The prior art fails to disclose an apparatus for optimizing operation of a vehicle and comprising an upshift notification circuit coupled to the processor subsystem, the upshift notification circuit issuing a notification that the engine of the vehicle is being operated at an excessive engine speed and the processor

determines when to activate the upshift notification circuit ; and a downshift notification circuit coupled to the processor subsystem, the downshift notification circuit issuing a notification that the engine of the vehicle is being operated at an insufficient engine speed and the processor determines when to activate the downshift notification circuit. Nor does the prior art discloses a fuel overinjection notification circuit coupled to the processor subsystem, wherein the fuel overinjection notification circuit issuing a notification that excessive fuel is being supplied to the engine of the vehicle and the processor subsystem determining whether to activate the fuel overinjection notification circuit based upon data received from the road speed sensor, the throttle position sensor and the manifold sensor. Nor does the prior art discloses that the processor subsystem determines whether to activate the vehicle proximity alarm circuit based upon separation distance data received from the radar detector, vehicle speed/stopping distance table stored in the memory subsystem. These limitations are neither taught nor obvious by the prior art.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Conclusion

4. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Gertrude Arthur whose telephone number is (703) 308-7564. The examiner can normally be reached on Tuesday-Friday from 8:30 a.m to 6:00 p.m and every first Monday of the bi-week from 8:30 a.m to 6:00 p.m.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, William Cuchlinski, can be reached on (703) 308-3873. The appropriate fax phone number for the organization where this application or proceeding is assigned is (703) 305-7687.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-1113.

GA

GA

April 13, 1999

WILLIAM A. CUCHLINSKI, JR.
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 3600

Interview Summary

Application No.	Applicant(s)
08/813,270	Harvey Sleplan et al.
Examiner	**Group Art Unit**
Gertrude Arthur	3661

All participants (applicant, applicant's representative, PTO personnel):

(1) *Gertrude Arthur* (3) _____

(2) *Michael S. Bush (Reg 3 31,745)* (4) _____

Date of Interview *Apr 13, 1999*

Type: [X] Telephonic [ ] Personal (copy is given to [ ] applicant [ ] applicant's representative).

Exhibit shown or demonstration conducted: [ ] Yes [X] No. If yes, brief description:

Agreement [X] was reached. [ ] was not reached.

Claim(s) discussed: *34*

Identification of prior art discussed:

None

Description of the general nature of what was agreed to if an agreement was reached, or any other comments:

To change the word "sensor" after notification to --circuit-- in line 11.

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

1. [X] It is not necessary for applicant to provide a separate record of the substance of the interview.

Unless the paragraph above has been checked to indicate to the contrary, A FORMAL WRITTEN RESPONSE TO THE LAST OFFICE ACTION IS NOT WAIVED AND MUST INCLUDE THE SUBSTANCE OF THE INTERVIEW. (See MPEP Section 713.04). If a response to the last Office action has already been filed, APPLICANT IS GIVEN ONE MONTH FROM THIS INTERVIEW DATE TO FILE A STATEMENT OF THE SUBSTANCE OF THE INTERVIEW.

2. [ ] Since the Examiner's interview summary above (including any attachments) reflects a complete response to each of the objections, rejections and requirements that may be present in the last Office action, and since the claims are now allowable, this completed form is considered to fulfill the response requirements of the last Office action. Applicant is not relieved from providing a separate record of the interview unless box 1 above is also checked.

Examiner Note: You must sign and stamp this form unless it is an attachment to a signed Office action.

PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re application of: Harvey Slepian et al.	§	
Serial No.: 08/813,270	§	Examiner: G. Arthur
Filed: March 10, 1997	§	Group Art Unit: 3614
For: METHOD AND APPARATUS FOR OPTIMIZING VEHICLE OPERATION	§	

AMENDMENT

Assistant Commissioner for Patents
Washington, DC 20231

Dear Sir:

In response to the office action mailed August 6, 1998, having a shortened statutory period for response which expired on November 6, 1998, and extended by Petition enclosed herewith until February 8, 1998, February 6 being a Saturday and February 7 being a Sunday, please amend the above-identified patent application as follows:

In the Claims:

1. (Amended) Apparatus for optimizing operation of a vehicle, comprising:

a plurality of sensors coupled to a vehicle having an engine, said plurality of sensors, which collectively monitor operation of said vehicle, including a road speed sensor, an engine speed sensor, a manifold pressure sensor and a throttle position sensor;

a processor subsystem, coupled to each one of said plurality of sensors, to receive data therefrom;

a memory subsystem, coupled to said processor subsystem, said memory subsystem storing therein a manifold pressure set point, an RPM set point, and present and prior levels for each one of said plurality of sensors;

a fuel overinjection notification circuit coupled to said processor subsystem, said fuel overinjection notification circuit issuing a notification that excessive fuel is being supplied to said engine of said vehicle;

an upshift notification circuit coupled to said processor subsystem, said upshift notification circuit issuing a notification that said engine of said vehicle is being operated at an excessive speed;

said processor subsystem determining, based upon data received from said plurality of sensors, when to activate said fuel overinjection circuit and when to activate said upshift notification circuit.

Please cancel Claim 4 without prejudice or disclaimer.

Claim 5, line 1, delete "4" and substitute –1– therefor.

Claim 6, line 1, delete "5" and substitute –11– therefor.

Claim 7, line 1, delete "6" and substitute –11– therefor.

Please cancel Claim 8 without prejudice or disclaimer.

Claim 9, line 1, delete "8" and substitute –1– therefor.

Claim 10, line 1, delete "9" and substitute –1– therefor.

11. (Amended) Apparatus for optimizing operation of a vehicle, [according to claim 4 and further] comprising:

a plurality of sensors coupled to a vehicle having an engine, said plurality of sensors, which collectively monitor operation of said vehicle, including a road speed sensor, a manifold pressure sensor and a throttle position sensor;

a processor subsystem, coupled to each one of said plurality of sensors, to receive data therefrom;

a memory subsystem, coupled to said processor subsystem, said memory subsystem storing therein a manifold pressure set point and present and prior levels for each one of said plurality of sensors;

a fuel overinjection notification circuit coupled to said processor subsystem, said fuel overinjection notification circuit issuing a notification that excessive fuel is being supplied to said engine of said vehicle;

a downshift notification circuit coupled to said processor subsystem, said downshift notification circuit issuing a notification that said engine of said vehicle is being operated at an insufficient engine speed; and

said processor subsystem determining, based upon data received from said plurality of sensors, when to activate said fuel overinjection circuit and when to activate said downshift notification circuit.

Claim 13, line 1, delete "11" and substitute –11– therefor.

17 18. (Amended) Apparatus for optimizing operation of a vehicle, comprising:

a radar detector, said radar detector determining a distance separating a vehicle having an engine and an object in front of said vehicle;

at least one sensor coupled to said vehicle for monitoring operation thereof, said at least one sensor including a road speed sensor, a manifold pressure sensor, a throttle position sensor and an engine speed sensor;

a processor subsystem, coupled to said radar detector and said at least one sensor, to receive data therefrom;

a memory subsystem, coupled to said processor subsystem, said memory subsystem storing a first vehicle speed/stopping distance table, a manifold pressure set point, an RPM set point, a [and] present level[s] for each one of said at least one sensor and a prior level for each one of said at least one sensor;

a vehicle proximity alarm circuit coupled to said processor subsystem, said vehicle proximity alarm circuit issuing an alarm that said vehicle is too close to said object;

a fuel overinjection circuit coupled to said processor subsystem, said fuel overinjection circuit issuing a notification that excessive fuel is being supplied to said engine of said vehicle;

an upshift notification circuit coupled to said processor subsystem, said upshift notification circuit issuing a notification that said engine of said vehicle is being operated at an excessive speed;

said processor subsystem determining, based upon data received from said radar detector, said at least one sensor and said memory subsystem, when to activate said vehicle proximity alarm circuit, when to activate said fuel overinjection circuit, and when to activate said upshift notification circuit.

Please cancel Claims 23, 24 and 25 without prejudice or disclaimer.

Claim 26, line 1, delete "25" and substitute –18– therefor.

27. (Amended) Apparatus for optimizing operation of a vehicle, comprising:

a radar detector, said radar detector determining a distance separating a vehicle having an engine and an object in front of said vehicle;

a plurality of sensors coupled to a vehicle having an engine, said plurality of sensors, which collectively monitor operation of said vehicle, including a road speed sensor, and engine speed sensor, a manifold pressure sensor and a throttle position sensor;

a processor subsystem, coupled to said radar detector and each one of said plurality of sensors, to receive data therefrom;

a memory subsystem, coupled to said processor subsystem, said memory subsystem storing therein a first vehicle speed/stopping distance table, a manifold pressure set point, an RPM set point, and present and prior levels for each one of said plurality of sensors;

a fuel overinjection notification circuit coupled to said processor subsystem, said fuel overinjection notification circuit issuing a notification that excessive fuel is being supplied to said engine of said vehicle;

an upshift notification circuit coupled to said processor subsystem, said upshift notification circuit issuing a notification that said engine of said vehicle is being operated at an excessive engine speed;

said processor subsystem determining, based upon data received from said plurality of sensors, when to activate said fuel overinjection circuit and when to activate said upshift notification circuit;

a vehicle proximity alarm circuit coupled to said processor subsystem, said vehicle proximity alarm circuit issuing an alarm that said vehicle is too close to said object;

said processor subsystem determining, based upon data received from said radar detector, said at least one sensor and said memory subsystem, when to activate said vehicle proximity alarm circuit.

Please cancel claim 29 without prejudice or disclaimer.

Claim 30, line 1, delete "29" and substitute –27– therefor.

31. (Amended) Apparatus for optimizing operation of a vehicle, [according to claim 27 and further] comprising:

a radar detector, said radar detector determining a distance separating a vehicle having an engine and an object in front of said vehicle;

a plurality of sensors coupled to a vehicle having an engine, said plurality of sensors, which collectively monitor operation of said vehicle, including a road speed sensor, and engine speed sensor, a manifold pressure sensor and a throttle position sensor;

a processor subsystem, coupled to said radar detector and each one of said plurality of sensors, to receive data therefrom;

a memory subsystem, coupled to said processor subsystem, said memory subsystem storing therein a first vehicle speed/stopping distance table, a manifold pressure set point, RPM set point, and present and prior levels for each one of said plurality of sensors;

a fuel overinjection notification circuit coupled to said processor subsystem, said fuel overinjection notification circuit issuing a notification that excessive fuel is being supplied to said engine of said vehicle;

a downshift notification circuit coupled to said processor subsystem, said downshift notification circuit issuing a notification that said engine of said vehicle is being operated at an insufficient engine speed;

said processor subsystem determining, based upon data received from said plurality of sensors, when to activate said fuel overinjection circuit and when to activate said downshift notification circuit;

a vehicle proximity alarm circuit coupled to said processor subsystem, said vehicle proximity alarm circuit issuing an alarm that said vehicle is too close to said object;

said processor subsystem determining, based upon data received from said radar detector, said at least one sensor and said memory subsystem, when to activate said vehicle proximity alarm circuit.

Please add new Claims 33-38 as follows:

12--38. Apparatus for optimizing operation of a vehicle according to claim 17 wherein said processor subsystem further comprises:

means for determining when road speed for said vehicle is decreasing;

means for determining when throttle position for said vehicle is increasing;

means for determining when manifold pressure for said vehicle is increasing; and

means for determining when engine speed for said vehicle is decreasing;

said processor subsystem activating said fuel overinjection notification circuit if both throttle position and manifold pressure for said vehicle are increasing and road speed and engine speed for said vehicle are decreasing.--

28--34. Apparatus for optimizing operation of a vehicle, comprising:

a plurality of sensors coupled to a vehicle having an engine, said plurality of sensors, which collectively monitor operation of said vehicle, including a road speed sensor, a manifold pressure sensor and a throttle position sensor;

a processor subsystem, coupled to each one of said plurality of sensors, to receive data therefrom;

a fuel overinjection notification circuit coupled to said processor subsystem, said fuel overinjection notification circuit issuing a notification that excessive fuel is being supplied to said engine of said vehicle;

said processor subsystem determining whether to activate said fuel overinjection notification sensor based upon data received from said road speed sensor, said throttle position sensor and said manifold pressure sensor.--

29--35. Apparatus according to Claim 34 (28) and further comprising:

a memory subsystem, coupled to said processor subsystem, said memory subsystem maintaining a manifold pressure set point;

said processor subsystem activating said fuel overinjection notification circuit upon determining that:

(1) based upon data received from said road speed sensor, road speed of said vehicle is increasing;

(2) based upon data received from said throttle position sensor, throttle position for said vehicle is increasing; and

(3) based upon data received from said manifold pressure sensor, manifold pressure for said vehicle exceeds said manifold pressure set point.--

30--36. Apparatus according to Claim 34 (28), wherein:

said plurality of sensors coupled to said vehicle further include an engine speed sensor;

said processor subsystem activating said fuel overinjection notification circuit upon determining that:

(1) based upon data received from said road speed sensor, road speed of said vehicle is decreasing;

(2) based upon data received from said throttle position sensor, throttle position for said vehicle is increasing;

(3) based upon data received from said manifold pressure sensor, manifold pressure for said vehicle is increasing; and

(4) based upon data received from said engine speed sensor, engine speed for said vehicle is decreasing.--

31 --37. Apparatus for optimizing operation of a vehicle, comprising:

a radar detector, said radar detector determining a distance separating a vehicle having an engine and an object in front of said vehicle;

at least one sensor coupled to said vehicle for monitoring operation thereof, said at least one sensor including a road speed sensor;

a processor subsystem, coupled to said radar detector and said at least one sensor, to receive data therefrom;

a memory subsystem, coupled to said processor subsystem, said memory subsystem storing a first vehicle speed/stopping distance table;

a vehicle proximity alarm circuit coupled to said processor subsystem, said vehicle proximity alarm circuit issuing an alarm that said vehicle is too close to said object;

said processor subsystem determining whether to activate said vehicle proximity alarm circuit based upon separation distance data received from said radar detector, vehicle speed data received from said road speed sensor and said first vehicle speed/stopping distance table stored in said memory subsystem.--

32--38. Apparatus for optimizing operation of a vehicle according to claim 37 31 wherein:

said at least one sensor further includes a windshield wiper sensor for indicating whether a windshield wiper of said vehicle is activated; and

said memory subsystem further storing a second vehicle speed/stopping distance table;

if said windshield wiper sensor indicates that said windshield wiper is deactivated, said processor subsystem determining whether to activate said vehicle proximity alarm circuit based upon data received from said radar detector, said road speed sensor and said first vehicle speed/stopping distance table stored in said memory subsystem;

if said windshield wiper sensor indicates that said windshield wiper is activated, said processor subsystem determining whether to activate said vehicle proximity alarm circuit based upon data received from said radar detector, said road speed sensor and said second vehicle speed/stopping distance table stored in said memory subsystem.--

REMARKS

This application has been carefully considered in connection with the Examiner's Action. Reconsideration and allowance are respectfully requested in view of the following.

Claims 1, 5-7, 9-11, 13, 18, 27 and 30-31 have been amended. Claims 4, 8, 23-25 and 29 have been canceled without prejudice or disclaimer. New Claims 33-38 have been added.

The Applicants kindly thank the Examiner for allowing Claims 14-17 and for courteously indicating that Claims 8-13, 25, 26 and 29-32 stand objected to as being dependent on a rejected base claim but which would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. By this Amendment, Claims 4 and 8 have been canceled, the subject matter thereof being incorporated into Claim 1. Further by this Amendment, Claim 11 has been rewritten into independent form, incorporating all of the limitations of Claims 1 and 4 therein. Still further by this Amendment, Claims 23, 24 and 25 have been canceled, the subject matter thereof being incorporated into Claim

18. Further by this Amendment, Claim 29 has been canceled, the subject matter thereof being incorporated into Claim 27. Finally, Claim 31 has been rewritten in independent form, incorporating all of the limitations of base claim 27 and new Claim 32, which depends on newly independent Claim 11 has been added. In view of the Amendments detailed above and further in view of the Examiner's prior indication of allowable subject matter, Claims 1-3, 5-22 and 26-33 are all now in condition for allowance.

In the initial Examiner's Action, Claims 1-2 and 4-6 were rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. 4,901,701 to Chasteen, Claim 3 was rejected under 35 U.S.C. § 103(a) as being unpatentable over Chasteen in view of U.S. 4,631,515 to Blee et al. and Claims 7, 18-24 and 27-28 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Chasteen in view of U.S. 5,708,584 to Doi et al. While the Applicants' amendment to Claims 1, 5-7, 9-11, 13, 18, 27 and 30-31 rendered the Examiner's various art rejections moot with respect to Claims 1-3, 5-22 and 26-32, the Applicants respectfully submit that they are entitled to broader claim coverage than that granted by the Examiner in the initial Examiner's Action. Accordingly, further by this Amendment, the Applicants have added new Claims 34-38 and respectfully submit that these claims are patentably distinguishable over the art of record.

New Claims 34-36 are closely related to the apparatus for optimizing vehicle performance originally presented by the Applicants as Claim 1 and initially rejected by the Examiner as unpatentable over Chasteen. The Applicants respectfully submit that new Claims 34-36, as presented herein, are neither taught nor suggested by Chasteen. With respect to Chasteen, the Applicants first note the Chasteen discloses a system where, in response to certain detected conditions, a CPU issues control commands which modify the operation of an engine. In contrast, Applicants' system merely issues notifications of the determination of a fuel overinjection condition. No corrective action is taken by the system. Applicants' system is superior in that it

enables the vehicle to be operated outside of the preferred operating conditions when the vehicle operator deems it necessary. For example, it may be necessary to operate the vehicle in a fuel overinjection mode when performing emergency actions such as rapid accelerations to avoid collisions.

The Applicants further note that, in rejecting prior Claim 1 as unpatentable over Chasteen, the Examiner acknowledged that Chasteen "fails to specifically disclose a road speed sensor" and asserted that "it would have been obvious...to have a road speed sensor in the system since the speed sensor would help to monitor the operation of the vehicle." Again, the Applicants respectfully disagree. Specifically, as presented in new Claims 34-36, Applicants' claimed apparatus for optimizing operation of a vehicle includes a fuel overinjection notification circuit and a processor subsystem which determines when to activate the fuel overinjection notification circuit. The processor makes that determination based upon data received from specifically recited sensors, including the road speed sensor. Thus, not only does Chasteen fail to teach an apparatus for optimizing vehicle operation which includes a road speed sensor, Chasteen is equally deficient in teaching a processor configured to determine a fuel overinjection condition by analyzing, in combination, road speed, throttle position and manifold pressure level. As Chasteen lacks both a specific sensor and a processor configured to determine a fuel overinjection condition from data collected from that specific sensor in combination with other sensors, the Applicants respectfully submit that Chasteen cannot teach or suggest the apparatus defined by new Claims 34-36.

New Claims 37-38 are closely related to the apparatus for optimizing vehicle performance originally presented by the Applicants as Claims 18-19 and initially rejected by the Examiner as unpatentable over Chasteen in view of Doi et al. The Applicants respectfully submit that new Claims 37-38, as presented herein, are neither taught nor suggested by the proposed combination of Chasteen and Doi et al. The Examiner properly cited Doi et al. as disclosing a vehicle running mode detection

system equipped with a radar detector and an alarm circuit. The Applicants respectfully note, however, that the system disclosed in Doi et al. determines alert conditions relative to the proximity between a vehicle and a forward object based upon changes in the distance separating the vehicle and the forward object. In contrast, Applicants' apparatus for optimizing vehicle operation set forth in Claim 37 includes a processor subsystem configured to activate a vehicle proximity alarm circuit based upon road speed (as determined by a road speed sensor), separation (as determined by a radar detector) and a vehicle speed/stopping distance table stored in a memory subsystem.

Applicants' new Claim 38 is closely related to original Claim 19. As to Claim 19, the Examiner cited Chasteen as disclosing a plurality of sensors for controlling the operation of the fuel injection and suggested that it would have been obvious to use a windshield wiper sensor in order to provide a complete performance operation of the vehicle. However, as recited in newly presented Claim 38, the windshield wiper sensor is not used to inform the operator as to whether the windshield wipers are on or off. Rather, the sensor is used by the processor subsystem to classify road conditions as either "dry" or "wet". If the road is dry, the processor subsystem uses a first vehicle speed/stopping distance table to determine if an object is too close to the vehicle. If the road is wet, however, the processor subsystem uses a second vehicle speed/stopping distance table to determine if the object is too close to the vehicle. Applicants' determination of a object proximity alert condition based upon a combination of vehicle speed, separation between vehicle and the object and road conditions is neither taught nor suggested by the proposed combination of Chasteen and Doi et al.

For all the above reasons, the Applicant respectfully requests the reconsideration and withdrawal of the various objections to and/or rejections of Claims 1-13 and 18-32, the allowance of Claims 1-3, 5-22 and 26-38 and the passing of this application to issue.

This application is now considered to be in condition for allowance. A prompt Notice to that effect is, therefore, earnestly solicited.

Respectfully Submitted,

Michael S. Bush
Registration No. 31,745

Date: February 8, 1999

HAYNES AND BOONE, L.L.P.
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Phone: [214] 651.5589
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File: 23630.4
d-614172.1

I hereby certify that this correspondence is being deposited with the United States Postal Service as first class mail in an envelope addressed to: Commissioner of Patents and Trademarks, Washington, D.C. 20231
on February 8, 1999

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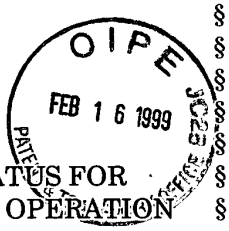
IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re application of: Harvey Slepian et al. §
§
Serial No.: 08/813,270 § Group Art Unit: 3614
§
Filed: March 10, 1997 § Examiner: G. Arthur
§
For: METHOD AND APPARATUS FOR §
OPTIMIZING VEHICLE OPERATION §



PETITION FOR EXTENSION OF TIME

Assistant Commissioner For Patents
Washington, D. C. 20231

Sir:

Applicants petition for a three-month extension of time in which to respond to the Office Action mailed August 6, 1998. The Office Action provided for a shortened period for response which expired on November 6, 1998. This petition, if granted, will extend the period for response until February 8, 1999, February 6 being a Saturday and February 7 being a Sunday, which does not exceed the six-month statutory period.

The Commissioner is hereby authorized to charge Deposit Account No. 08-1394 for the fee due of $435.00 or any additional fees associated with this communication or credit any overpayment.

In view of the foregoing it is requested that this petition be granted.

Respectfully submitted,

Michael S. Bush
Registration No. 31,745

02/23/1999 COFFEE: 00000001 081394 08813270 February 8, 1999
01 FC:217 435.00 CH

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on February 8, 1999

Case Docket No. 23630.4

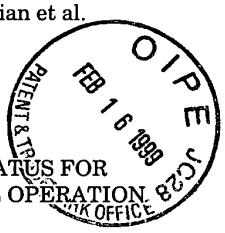
IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re application of: Harvey Slepian et al. §

Serial No: 08/813,270 § Group Art Unit: 3614 ~~3614~~ 3661

Filed: March 10, 1997 § Examiner: G. Arthur

For: METHOD AND APPARATUS FOR OPTIMIZING VEHICLE OPERATION §



Assistant Commissioner For Patents
Washington, D.C. 20231

Sir:

Enclosed for filing is an Amendment in the above-identified application.

The fee has been calculated as shown below:

	(Col. 1)		(Col. 2)	(Col. 3)	SMALL ENTITY			OTHER THAN A SMALL ENTITY	
	CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NO. PREVIOUSLY PAID FOR	PRESENT EXTRA	RATE	ADDIT. FEE	OR	RATE	ADDIT. FEE
TOTAL	*32	minus	**32	=0	x9	$____	OR	x18	$____
INDEP	*8	minus	***4	=4	x39	$156.00	OR	x78	$____
[ ]	FIRST PRESENTATION OF MULTIPLE DEP. CLAIM				+130	$____	OR	+260	$____
					TOTAL	$156.00	OR	TOTAL	$____

* If the entry in Col. 1 is less than the entry in Col. 2, write "0" in Col. 3.
** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, write "20" in this space.
*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, write "3" in this space.
The "Highest Number Previously Paid For" (Total or Independent) is the highest number found from the equivalent box in Col. 1 of a prior amendment or the number of claims originally filed.

[X] A Petition for Extension of Time is attached.
[X] The Commissioner is hereby authorized to charge payment of $591.00 ($156 for the amendment fee and $435 for the Petition fee) or any of the following fees associated with this communication or credit any overpayment to Deposit Account No. 08-1394 H&B.

[X] Any additional filing fees under 37 C.F.R. § 1.16 for the presentation of extra claims.
[X] Any patent application processing fees under 37 C.F.R. § 1.17.
[X] A copy of this sheet is enclosed.

Respectfully submitted,

Michael S. Bush
Registration No. 31,745

Date: February 8, 1999

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d-605048.1

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on February 8, 1999

UNITED STATES DEPARTMENT OF COMMERCE
Patent and Trademark Office
Address: COMMISSIONER OF PATENTS AND TRADEMARKS
Washington, D.C. 20231

SERIAL NUMBER	FILING DATE	FIRST NAMED APPLICANT	ATTORNEY DOCKET NO.
08/813,270	03/10/97	SLEPIAN H	TASD-B8542

PM21/0806

MICHAEL S BUSH
HAYNES AND BOONE LLP
3100 NATIONSBANK PLAZA
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DALLAS TX 75202-3789

EXAMINER	
ARTHUR, G	
ART UNIT	PAPER NUMBER
3614	5

DATE MAILED: 08/06/98

Please find below a communication from the EXAMINER in charge of this application.

Commissioner of Patents

See attached

Office Action Summary

Application No.	Applicant(s)
08/813,270	Harvey Sleplan et al.
Examiner	**Group Art Unit**
Gertrude Arthur	3614

☒ Responsive to communication(s) filed on *Mar 10, 1997*

☐ This action is **FINAL.**

☐ Since this application is in condition for allowance except for formal matters, **prosecution as to the merits is closed** in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11; 453 O.G. 213.

A shortened statutory period for response to this action is set to expire *3* month(s), or thirty days, whichever is longer, from the mailing date of this communication. Failure to respond within the period for response will cause the application to become abandoned. (35 U.S.C. § 133). Extensions of time may be obtained under the provisions of 37 CFR 1.136(a).

Disposition of Claim

☒ Claim(s) *1-32* is/are pending in the applicat

Of the above, claim(s) _____ is/are withdrawn from consideration

☒ Claim(s) *14-17* is/are allowed.

☒ Claim(s) *1-7, 18-24, 27, and 28* is/are rejected.

☒ Claim(s) *8-13, 25, 26, and 29-32* is/are objected to.

☐ Claims _____ are subject to restriction or election requirement.

Application Papers

☒ See the attached Notice of Draftsperson's Patent Drawing Review, PTO-948.

☐ The drawing(s) filed on _____ is/are objected to by the Examiner.

☐ The proposed drawing correction, filed on _____ is ☐ approved ☐ disapproved.

☐ The specification is objected to by the Examiner.

☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. § 119

☐ Acknowledgement is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d).

☐ All ☐ Some* ☒ None of the CERTIFIED copies of the priority documents have been

☐ received.

☐ received in Application No. (Series Code/Serial Number) _____ .

☐ received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

*Certified copies not received: _____

☐ Acknowledgement is made of a claim for domestic priority under 35 U.S.C. § 119(e).

Attachment(s)

☒ Notice of References Cited, PTO-892

☒ Information Disclosure Statement(s), PTO-1449, Paper No(s). *2*

☐ Interview Summary, PTO-413

☒ Notice of Draftsperson's Patent Drawing Review, PTO-948

☐ Notice of Informal Patent Application, PTO-152

--- SEE OFFICE ACTION ON THE FOLLOWING PAGES ---

DETAILED ACTION

Claim Rejections - 35 USC § 103

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

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. Claims 1-2, 4-6 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chasteen (U.S. Patent No. 4,901,701).

As to claim 1, Chasteen discloses a fuel injection system for an engine that comprises a plurality of sensors such as an engine speed sensor, a throttle position sensor, a barometric pressure sensor. Chasteen also discloses a processor subsystem to receive data considered as CPU 130 that receives the outputs from the sensors (See column 9, lines 1-8). Chasteen discloses that the processor (CPU) comprises a conventional memory chip and also discloses that an injector provides a proper amount of fuel injection in the manifold as determined by the CPU (See column 9, lines 58-60) considered as a memory coupled to the processor wherein the memory subsystem stores therein a manifold pressure set point and present and prior levels for each one of the plurality of sensors. Chasteen discloses an electronic control circuit considered as the overinjection notification electronic circuit for notifying the supply of fuel to the engine and

wherein the processor actuates or activates the fuel injection based upon data received from the plurality of sensors (See column 13, lines 50-55). Though Chasteen discloses many types of sensors, it fails to specifically disclose a road speed sensor however, it would have been obvious to one of ordinary skill in the art at the time of the invention to have a road speed sensor in the system since the speed sensor would help to monitor the operation of the vehicle

As to claims 2, 5-6, Chasteen discloses the sensors as discussed for sensing the signals and a processor and compare manifold pressure for activating the fuel injection. Chasteen discloses the speed (RPM) and throttle position are determined to be greater than 0 (increasing)and the CPU provides a control command to the engine fuel injector to prime the engine (See column 11, lines 22-33) therefore on would consider increasing and decreasing the speed and throttle for adjusting the fuel injector for supplying fuel to the engine.

As to claim 4, Chasteen discloses a plurality of sensors as discussed and further discloses an engine speed sensor 140 (See column 9, lines 3-6).

3. Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over Chasteen in view of Blee et al. (U.S. Patent No. 4,631,515).

As to claim 3, Chasteen does not specifically disclose the overinjection circuit has a horn issuing a tone for a preselected time period. In an analogous art, Blee et al. disclose a vehicle gear shift indicator wherein the change-up speeds to which the system responds are pre-set so as to be the optimum speeds for increased fuel efficiency (See abstract, lines 14-16). Moreover, the when the engine speed begins to exceed the optimum change-up speed the next LED illuminated

produces red light to the driver and also an audible warning (horn) may be produced (See abstract, lines 8-11). It is considered that a horn or audible warning is issued for a preselected time. It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the system of Chasteen with that of Blee et al. by having an a horn in the overinjection fuel circuit in order to notify the driver of the operation of the vehicle.

4. Claims 7, 18-24, 27-28, are rejected under 35 U.S.C. 103(a) as being unpatentable over Chasteen in view of Doi et al. (U.S. Patent No. 5,708,584) .

As to claim 7, Chasteen does not specifically disclose a horn for issuing a tone for a preselected time period in the fuel overinjection circuit. In an analogous art, Doi et al. disclose a vehicle running mode detecting system that comprises an alarm in Fig. 2 considered as a means for issuing a tone for a preselected time period. It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the circuit system of Chasteen with the tone or alarm issuing of Doi et al. in order to alert the user of the operation of the vehicle.

As to claims 18, 27, Chasteen discloses a fuel injection system for an engine that comprises a plurality of sensors such as an engine speed sensor, a throttle position sensor, a barometric pressure sensor but does not specifically disclose a road speed sensor however, it is conventional to have a road speed sensor for monitoring the operation of the vehicle. Chasteen also discloses a processor subsystem to receive data considered as CPU 130 that receives the outputs from the sensors (See column 9, lines 1-8). Chasteen discloses that the processor (CPU) comprises a conventional memory chip and also discloses that an injector provides a proper

amount of fuel injection in the manifold as determined by the CPU (See column 9, lines 58-60) considered as a memory coupled to the processor wherein the memory subsystem stores therein a manifold pressure set point and present and prior levels for each one of the plurality of sensors. Chasteen discloses an electronic control circuit considered as the overinjection notification electronic circuit for notifying the supply of fuel to the engine and wherein the processor actuates or activates the fuel injection (See column 13, lines 50-55). However, Chasteen does not specifically disclose a radar detector for determining a distance separating a vehicle and an object in front of the vehicle and an alarm circuit coupled to the processor. In an analogous art, Doi et al. disclose a vehicle running mode detecting system that comprises a radar detector 3 and an alarm circuit 7 coupled to the processor 4 (See column 2, lines 58-62; column 3, lines 1-6). It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the system of Chasteen with the radar detector and the alarm circuit as taught by Doi et al. in order to further detect the operation of the vehicle and to inform the user of the operating conditions.

As to claim 19, Chasteen discloses a plurality of sensors for controlling the operation of the fuel injection wherein it would have been obvious to use a windshield wiper sensor in order to provide a complete performance operation of the vehicle.

As to claim 20, the limitations have been discussed in the previous claims.

As to claim 21, Chasteen et al. disclose the RPM ranges or speed (See column 13, lines 61-66) therefore it is considered that a brake sensor can also be used in the system.

As to claim 22, it has been discussed that Doi et al. disclose an alarm therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to count a total number of alarms associated with the system.

As to claims 23-24, the limitations have been discussed in the previous claims and are rejected for the same reasons.

As to claim 28, Chasteen discloses the sensors as discussed for sensing the signals and a processor and compare manifold pressure for activating the fuel injection. Chasteen discloses the speed (RPM) and throttle position are determined to be greater than 0 (increasing)and the CPU provides a control command to the engine fuel injector to prime the engine (See column 11, lines 22-33) therefore on would consider increasing and decreasing the speed and throttle for adjusting the fuel injector for supplying fuel to the engine.

Allowable Subject Matter

5. Claims 8-13, 25, 26, 29-32, are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

In claims 8, 25, 29, the prior art fails to disclose an upshift notification circuit coupled to the processor subsystem, the upshift notification circuit issuing a notification that the engine of the vehicle is being operated at an excessive engine speed and the processor determines when to activate the upshift notification circuit.

In claim 11, 26, 31, the prior art fails to disclose a downshift notification circuit coupled to the processor subsystem, the downshift notification circuit issuing a notification that the engine of the vehicle is being operated at an insufficient engine speed and the processor determines when to activate the downshift notification circuit.

6. Claims 14-17 are allowable over the prior art of record.

As to claim 14, the prior art fails to disclose an upshift notification circuit coupled to the processor subsystem, the upshift notification circuit issuing a notification that the engine of the vehicle is being operated at an excessive engine speed and the processor determines when to activate the upshift notification circuit and a downshift notification circuit coupled to the processor subsystem, the downshift notification circuit issuing a notification that the engine of the vehicle is being operated at an insufficient engine speed and the processor determines when to activate the downshift notification circuit.

Conclusion

7. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Yamamoto et al. (U.S. Patent No. 5,745,870) disclose a traveling-path prediction apparatus and method for vehicles.

Butsuen et al. (U.S. Patent No. 5,420,792) disclose an automatic brake control system.

8. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Gertrude Arthur whose telephone number is (703) 308-7564. The examiner can normally be reached on Tuesday-Friday from 8:30 a.m to 6:00 p.m and every first Monday of the bi-week from 8:30 a.m to 6:00 p.m.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, William Cuchlinski, can be reached on (703) 308-3873. The appropriate fax phone number for the organization where this application or proceeding is assigned is (703) 305-7687.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-1113.

GA

July 30, 1998

JACQUES H. LOUIS-JACQUES
PRIMARY EXAMINER

Notice of References Cited

Application No.	Applicant(s)		
08/813,270	Harvey Slepian et al.		
Examiner		Group Art Unit	Page 1 of 1
Gertrude Arthur		3614	

U.S. PATENT DOCUMENTS

		DOCUMENT NO.	DATE	NAME	CLASS	SUBCLASS
	A	4,901,701	2/20/90	Chasteen	123	478
	B	5,420,792	5/30/95	Butsuen et al.	701	96
	C	5,708,584	1/13/98	Doi et al.	701	96
	D	5,745,870	4/28/98	Yamamoto et al.	701	96
	E					
	F					
	G					
	H					
	I					
	J					
	K					
	L					
	M					

FOREIGN PATENT DOCUMENTS

		DOCUMENT NO.	DATE	COUNTRY	NAME	CLASS	SUBCLASS
	N						
	O						
	P						
	Q						
	R						
	S						
	T						

NON-PATENT DOCUMENTS

		DOCUMENT (Including Author, Title, Source, and Pertinent Pages)	DATE
	U		
	V		
	W		
	X		

FORM PTO-1449 (REV. 7.80) U.S. DEPARTMENT OF COMMERCE PATENT AND TRADEMARK OFFICE	ATTY. DOCKET NO. TASD B8542	SERIAL NO. 08/813,270
LIST OF REFERENCES CITED BY APPLICANT (Use several sheets if necessary)	APPLICANT Harvey Slepian and Loran Sutton	
	FILING DATE 3/10/97	GROUP 3614

U. S. PATENT DOCUMENTS

*EXAMINER INITIAL		DOCUMENT NUMBER	DATE	NAME	CLASS	SUBCLASS	FILING DATE (If appropriate)
GA	AA	4,542,460	09/17/85	Weber	364	424	02/16/82
GA	AB	4,492,112	01/08/85	Igarashi et al.	73	117.3	07/30/82
GA	AC	4,631,515	12/23/86	Blee et al.	340	62	12/22/82
GA	AD	4,701,852	10/20/87	Ulveland	364	424.1	
GA	AE	4,752,883	06/21/88	Asakura et al.	364	424.1	09/27/85
GA	AF	4,853,673	08/01/89	Kido et al.	340	439	07/29/86
GA	AG	4,868,756	09/19/89	Kawanabe et al.	364	442	02/09/87
	AH						
	AI						
	AJ						
	AK						

FOREIGN PATENT DOCUMENTS

		DOCUMENT NUMBER	DATE	COUNTRY	CLASS	SUBCLASS	TRANSLATION YES	TRANSLATION NO
	AL							
	AM							
	AN							
	AO							
	AP							

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

	AR	
	AS	
	AT	

EXAMINER	DATE CONSIDERED
Gertrude Arthur	7/28/98

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

f:\forms\pto\pto-1449.doc

70116

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SERIAL NUMBER	FILING DATE	FIRST NAMED APPLICANT	ATTORNEY DOCKET NO.
08/813270	03/10/97	SLEPIAN	TASD-B8542

EXAMINER
WALDER, STEPHAN

ART UNIT	PAPER NUMBER
2304	4

DATE MAILED: 08/19/97

~~MICHAEL S BUSH~~
HARRIS TUCKER AND HARDIN
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13355 NOEL ROAD
DALLAS TX 75240-6604

This is in response to the Power of Attorney filed 07/28/97.

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

☐ 2. The Power of Attorney to you in this application **has been revoked** by the assignee who has intervened as provided by 37 CFR 3.71. Future correspondence will be mailed to the new address of record. (37 CFR 1.33).

☐ 3. The withdrawal as attorney in this application **has been accepted**. Future correspondence will be mailed to the new address of record. 37 CFR 1.33.

Kim Slaton-703306139
This is a communication from the
Patent and Trademark Office

☒ 4. The Power of Attorney in this application **is accepted**. Correspondence in this application will be mailed to the below-noted address as provided by 37 CFR 1.33.

☐ 5. The Power of Attorney in this application **is not accepted** for the reason(s) checked below:

☐ a. The Power of Attorney is from an assignee and the Certificate required by 37 CFR 3.73 (b) has not been received.

☐ b. The person signing for the assignee has omitted their empowerment to sign on behalf of the assignee.

☐ c. The inventor(s) is without authority to appoint attorneys since the assignee has intervened as provided by 37 CFR 3.71.

☐ d. The signature of _____, a co-inventor in this application, has been omitted. The Power of Attorney will be entered upon receipt of confirmation signed by said co-inventor.

☐ e. The person(s) appointed in the Power of Attorney is not registered to practice before the U. S. Patent & Trademark Office.

☐ f. The revocation is not signed by the applicant, the assignee of the entire interest, or **one** particular principal attorney having the authority to revoke.

MICHAEL S BUSH
HAYNES AND BOONE LLP
3100 NATIONSBANK PLAZA
901 MAIN STREET
DALLAS TX 75202-3789

Kim Slaton
This is a communication from the
Patent and Trademark Office

FORM PTOL-305 (REV. 7/89) RETAIN THIS COPY IN THE APPLICATION FILE COPY

TASD-B8542

GAU 2304
#3
KW
8-18-97

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re application of Harvey A. Slepian, et al.

Serial No.: 08/813,270

Filing Date: March 10, 1997

For: METHOD AND APPARATUS FOR OPTIMIZING VEHICLE OPERATION

Assistant Commissioner for Patents
Washington, D.C. 20231

Sir:

REVOCATION OF PREVIOUS POWERS OF ATTORNEY BY INVENTOR AND APPOINTMENT OF NEW ATTORNEYS

As joint inventors named in the above-identified patent application, we hereby revoke all previous powers of attorney previously given and we hereby appoint the following attorneys, and/or agents to prosecute this application and transact all business with the Patent and Trademark Office connected therewith:

Jeffrey M. Becker, Registration No. 35,442
J. R. Bell, Registration No. 26,528
Michael S. Bush, Registration No. 31,745
Randali E. Colson, Registration No. P-40,566
Jubin Dana, Registration No. P-41,400
Timothy Headley, Registration No. 31,765
Warren B. Kice, Registration No. 22,732
Joseph W. King, Jr., Registration No. 35,768
H. Dale Langley, Registration No. 35,927
David L. McCombs, Registration No. 32,271
John Moetteli, Registration No. 35,289
Phillip B. Philbin, Registration No. 35,979
Brandi W. Sarfatis, Registration No. 37,713

all of the firm of HAYNES AND BOONE, L.L.P.

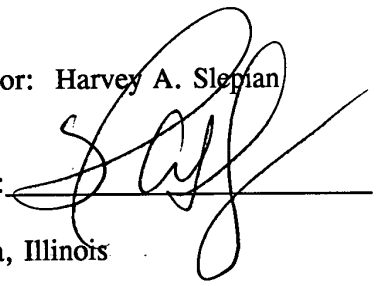
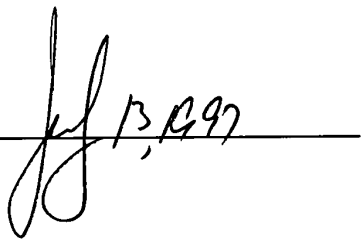
Send correspondence to:

Michael S. Bush
HAYNES AND BOONE, L.L.P.
3100 NationsBank Plaza
901 Main Street
Dallas, Texas 75202-3789

and direct all telephone calls to:

Michael S. Bush
214/651-5589

Full Name of Inventor: Harvey A. Slepian

Inventor's Signature:  Date: 

Residence: Peoria, Illinois

Citizenship: United States of America

Post Office Address: 1426 West Daytona
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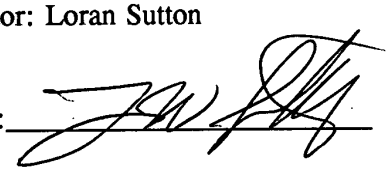
Inventor's Signature:  Date: 7/14/97

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TASI-8542

PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re application of: Harvey Slepian and Loran Sutton

Serial Number: 08/813,270

Filing Date: March 10, 1997

Title: METHOD AND APPARATUS FOR OPTIMIZING VEHICLE OPERATION

Group Art Unit: Not Yet Assigned

Examiner: Not Yet Assigned

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INFORMATION DISCLOSURE STATEMENT

As listed on the accompanying form PTO-1449, the Applicant submits herewith copies of the following U.S. patents of which she is aware, which may be material to the examination of this application, and in respect of which there may be a duty to disclose in accordance with 37 C.F.R. § 1.56.

	U.S. Patent No.
Weber	4,542,460
Igarashi et al.	4,492,112
Blee et al.	4,631,515
Ulveland	4,701,852
Asakura et al.	4,752,883
Kido et al.	4,853,673
Kawanabe et al.	4,868,756

This Information Disclosure Statement is being filed under the provisions of 37 C.F.R. 1.97(b)(1) which provides for the timely filing of an Information Disclosure Statement within three months of the filing of the national application.

The filing of this Information Disclosure Statement shall not be construed as a representation that a search has been made, an admission that the information cited is, or is considered to be, material to patentability, or that no other material information exists. Further, the filing of this Information Disclosure Statement shall not be construed as an admission against interest in any manner.

Written notification that the enclosed references have been considered in their entirety by return of a copy of the enclosed form PTO-1449, completed by the Examiner, is respectfully requested.

Respectfully submitted,

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70119

Docket No.: TASD-B8542

PATENT

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Assistant Commissioner for Patents
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NEW APPLICATION TRANSMITTAL

Transmitted herewith for filing is the patent application of

Inventors: Harvey Slepian and Loran Sutton

For: METHOD AND APPARATUS FOR OPTIMIZING VEHICLE OPERATION

Enclosed are the following papers:

- X A check in the amount of $557.00 for patent application filing fee.
- X A check in the amount of $40.00 for assignment recordation fee.
- X This New Application Transmittal with Certificate of Express Mailing and attached fee sheet
- 26 Pages of specification
- 17 Pages of claims
- 1 Page(s) of Abstract
- 3 Sheets of informal drawing (Figs. 1 - 2B)
- X Assignment
- X Assignment Transmittal Letter
- X Verified Statement Claiming Small Entity Status
- X Declaration and Power of Attorney
- X Postcard acknowledgment.

CERTIFICATION UNDER 37 CFR 1.10

I hereby certify that this New Application Transmittal and the documents referred to as enclosed therein are being deposited with the United States Postal Service on this date, March 10, 1997, in an envelope as "Express Mail Post Office to Addressee" Mailing Label Number EM475197470US addressed to: Box Patent Application, Assistant Commissioner for Patents, Washington, DC 20231.

Janet K. Pruitt

(Signature of person mailing paper)
Printed Name: Janet K. Pruitt

The filing fee has been calculated as shown below:

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FOR:	NO. FILED	NO. EXTRA	RATE	FEE
BASIC FEE				$ 385.00
TOTAL CLAIMS	32 - 20 =	12	$ 11.00	$ 132.00
INDEP. CLAIMS	4 - 3 =	1	$ 40.00	$ 40.00
MULTIPLE DEPENDENT CLAIM PRESENTED			$130.00	$ 0.00

TOTAL $ **557.00**

A check in the amount of $ 557.00 for the filing fee is enclosed.

The Commissioner is hereby authorized to charge payment of the following fees associated with this communication or credit any overpayment to Deposit Account No. 08-3105. A duplicate copy of this sheet is enclosed.

Any additional fees required under 37 C.F.R. 1.16.

Date: March 10, 1997

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PATENT

METHOD AND APPARATUS FOR OPTIMIZING VEHICLE OPERATION

Background of the Invention

Field of the Invention

The present invention generally relates to an apparatus for optimizing vehicle operation and, more particularly, relates to a system which both notifies the driver of recommended corrections in vehicle operation and, under certain conditions, automatically initiates selected corrective action.

Description of Related Art

It has long been recognized that the improper operation of a vehicle may have many adverse effects. For example, the fuel efficiency of a vehicle may vary dramatically based upon how the vehicle is operated. More specifically, operating a vehicle at excessive speed, excessive RPM and/or excessive manifold pressure will result in both reduced fuel economy and increased operating costs. The aforementioned increased operating costs can be quite considerable, particularly for an owner or operator of a fleet of vehicles. To correct these types of improper vehicle operations are often surprisingly simple. For example, upshifting the drive gear will typically eliminate an excessive RPM condition. However, even when the solution is quite simple, oftentimes, the driver will be unaware of the need to take corrective action.

A variety of patents have disclosed systems, commonly referred to as "shift prompters", which monitor the operation of a vehicle and advises the operator of the vehicle when to take certain actions. Numerous ones of these devices include sensors which measure

engine speed and vehicle speed. See, for example, USPNs 4,492,112 to Igarashi et al., 4,631,515 to Blee et al. and 4,701,852 to Ulveland. Certain ones, however, disclose the use of other types of sensors as well. For example, USPN 4,524,460 to Weber is directed to a driving aid indicator which includes vehicle speed, manifold pressure, throttle position and engine speed sensors. USPNs 4,752,883 to Asakura et al. and 4,868,756 to Kawanabe et al. are directed to upshift notification devices which include sensors for measuring engine speed, vehicle speed, manifold pressure and cooling water temperature. Finally, USPN 4,853,673 to Kido et al. discloses a shift indicator system which includes sensors for measuring engine speed and throttle position. Generally, the above-listed patents all provide displays intended to enable the driver to operate the vehicle in a manner leading to uniform performance and maximum fuel economy. However, Blee et al. discloses the use of audible warnings as well as a speed controller to prevent further increases in engine speed if the driver ignores previously issued warnings.

Improper vehicle operation has other adverse effects as well. It is well known that the faster a vehicle travels, the longer it takes to stop. Thus, what may be a safe separation distance between successive vehicles when a vehicle is traveling at 35 mph may be unsafe if that vehicle is traveling at 50 mph. Road conditions also play a role in determining the safe separation distance between vehicles. For example, greater separation distances are generally recommended when roads are wet. As a result, therefore, based on the combination of a vehicle's speed, the distance separating the vehicle from a second vehicle in front of it and road conditions, many vehicles are operated unsafely. To correct this situation, a reduction in operating speed, an increase in vehicle separation or some combination thereof, is required.

It may be readily seen from the foregoing that it would be desirable to provide a system which integrates the ability to issue audible warnings which advise the driver to correct operation of the vehicle in a manner which will enhance the efficient operation thereof with the ability to automatically take corrective action if the vehicle is being operated unsafely. It is, therefore, the object of the invention to provide such a system.

SUMMARY OF THE INVENTION

In one embodiment, the present invention is directed to an apparatus for optimizing operation of an engine-driven vehicle. The apparatus includes a processor subsystem, a memory subsystem, plural sensors, including road speed, manifold pressure and throttle position sensors, for collectively monitoring operation of the vehicle and a fuel overinjection notification circuit for issuing notifications that excessive fuel is being supplied to the engine of the vehicle. The processor subsystem receives data from the sensors and, from the received data, determines when to activate the fuel overinjection circuit. In one aspect thereof, the processor subsystem determines when road speed for the vehicle is increasing, determines when throttle position for the vehicle is increasing, compares manifold pressure and a manifold pressure set point stored in the memory subsystem and activates the fuel overinjection notification circuit if both road speed and throttle position for the vehicle are increasing and manifold pressure for the vehicle is above the manifold pressure set point.

In further aspects thereof, the sensors may include an engine speed sensor and the processor subsystem may determine when road speed for the vehicle is decreasing, when throttle position for the vehicle is increasing, when manifold pressure for the vehicle is increasing, when engine speed for the vehicle is decreasing and may activate the fuel

overinjection notification circuit if both throttle position and manifold pressure for the vehicle are increasing and road speed and engine speed for the vehicle are decreasing.

In still further aspects thereof, the apparatus may also include an upshift notification circuit, activated by the processor subsystem based upon data received from the sensors, which issues notifications that the engine of the vehicle is being operated at excessive engine speeds. In this aspect, the processor subsystem determines when road speed for the vehicle is increasing, when throttle position for the vehicle is increasing, compares manifold pressure to a manifold pressure set point stored in the memory subsystem, compares engine speed to an RPM set point stored in the memory subsystem and activates the upshift notification circuit if both road speed and throttle position for the vehicle are increasing, manifold pressure for the vehicle is at or below the manifold pressure set point and engine speed for the vehicle is at or above the RPM set point.

In still yet further aspects thereof, the apparatus may also include a downshift notification circuit, activated by the processor subsystem based upon data received from the sensors, which issues a notification that the engine of the vehicle is being operated at an insufficient engine speed. The processor subsystem may determine when road speed for the vehicle is decreasing, when throttle position for the vehicle is increasing, when manifold pressure for the vehicle is increasing, when engine speed for the vehicle is decreasing and may activate the downshift notification circuit if both road speed and engine speed are decreasing and both throttle position and manifold pressure for the vehicle are increasing.

In still further aspects thereof, the fuel overinjection circuit, the upshift notification circuit or the downshift notification circuit may include a horn for issuing a tone for a preselected time period.

In another embodiment, the present invention is of an apparatus for optimizing operation of a vehicle. The apparatus includes road speed, engine speed, manifold pressure and throttle position sensors, a processor subsystem coupled to each of the sensors to receive data therefrom and a memory subsystem, coupled to the processor subsystem, for storing a manifold pressure set point, an engine speed set point and present and prior levels for each one of the sensors. The apparatus further includes a fuel overinjection notification circuit, an upshift notification circuit and a downshift notification circuit, all of which are coupled to the processor subsystem. The fuel overinjection notification circuit issues notifications that excessive fuel is being supplied to the engine of the vehicle, the upshift notification circuit issues notifications that the engine of the vehicle is being operated at an excessive engine speed and the downshift notification circuit issues notifications that the engine of the vehicle is being operated at an insufficient engine speed. Based upon data received from the sensors, the processor subsystem determines when to activate the fuel overinjection circuit, the upshift notification circuit and the downshift notification circuit. In one aspect thereof, the fuel overinjection circuit includes a first horn for issuing a first tone for a first preselected time period, the upshift notification circuit includes a second horn for issuing a second tone for a second preselected time period and the downshift notification circuit includes a third horn for issuing a third tone for a third preselected time period.

In another aspect thereof, the processor subsystem may determine when road speed for the vehicle is increasing or decreasing, engine speed is increasing or decreasing, throttle

position for the vehicle is increasing and manifold pressure is increasing; may compare manifold pressure to the manifold pressure set point and engine speed to the RPM set point; and may activate the fuel overinjection notification circuit if both road speed and throttle position for the vehicle are increasing and manifold pressure for the vehicle is above the manifold pressure set point or if both throttle position and manifold pressure for the vehicle are increasing and road speed and engine speed for the vehicle are decreasing, the upshift notification circuit if both road speed and throttle position for the vehicle are increasing, manifold pressure for the vehicle is at or below the manifold pressure set point and engine speed for the vehicle is at or above the RPM set point and the downshift notification circuit if both road speed and engine speed are decreasing and both throttle position and manifold pressure for the vehicle are increasing.

In another aspect, the present invention is of an apparatus for optimizing operation of a vehicle which includes a radar detector for determining a distance separating a vehicle having an engine and an object in front of the vehicle and at least one sensor for monitoring operation of the vehicle. The apparatus further includes a processor subsystem, a memory subsystem and a vehicle proximity alarm circuit. The processor subsystem is coupled to the radar detector and the at least one sensor to receive data therefrom while the memory subsystem, in which a first vehicle speed/stopping distance table and present levels for each one of the at least one sensor are stored, and the vehicle proximity alarm circuit are coupled to the processor subsystem. Based on data received from the radar detector, the at least one sensor and the contents of the memory subsystem, the processor determines when to instruct the vehicle proximity alarm circuit to issue an alarm that the vehicle is too close to the object.

In one aspect thereof, the at least one sensor further includes a windshield wiper sensor for indicating whether a windshield wiper of the vehicle is activated and a second vehicle speed/stopping distance table is stored in the memory subsystem. In another aspect thereof, the apparatus further includes a throttle controller for controlling a throttle of the engine of the vehicle. The processor subsystem may selectively reduce the throttle based upon data received from the radar detector, the at least one sensor and the memory subsystem or may also count a total number of vehicle proximity alarms determined by the processor subsystem and selectively reduce the throttle based upon the total number of vehicle proximity alarms, as well. In yet another aspect thereof, the at least one sensor further includes a brake sensor for indicating whether a brake system of the vehicle is activated.

In other aspects thereof, the apparatus may be further provided with a fuel overinjection notification circuit for issuing a notification that excessive fuel is being supplied to the engine of the vehicle, an upshift notification circuit for issuing a notification that the engine of the vehicle is being operated at an excessive engine speed or a downshift notification circuit for issuing a notification that the engine of the vehicle is being operated at an insufficient engine speed. If a fuel overinjection notification circuit is provided, the apparatus includes a manifold pressure sensor and a throttle position sensor which also provide the processor subsystem with data used, together with a manifold pressure set point and prior levels for the sensors stored in the memory subsystem, to determine when to activate the fuel overinjection circuit. If an upshift notification circuit is provided, the apparatus includes an engine speed sensor which also provides the processor subsystem with data used, together with an RPM set point stored in the memory subsystem, to determine

when to activate the upshift notification circuit. Finally, if a downshift notification circuit is provided, the processor subsystem determines when to activate the downshift notification circuit based upon the data received from the plurality of sensors.

In still another embodiment, the present invention is of an apparatus for optimizing operation of a vehicle which includes a radar detector for determining a distance separating the vehicle from an object in front of it, a plurality of sensors, including a road speed sensor, an engine speed sensor, a manifold pressure sensor and a throttle position sensor, which collectively monitor the operation of the vehicle, a processor subsystem, a memory subsystem, a fuel overinjection notification circuit for issuing notification that excessive fuel is being supplied to the engine of the vehicle and a vehicle proximity alarm circuit for issuing alarms if the vehicle is too close to the object. Based upon data received from the sensors, the processor subsystem determines when to activate the fuel overinjection circuit. Based upon data received from the radar detector, the sensors and the memory subsystem, the processor subsystem also determines when to activate the vehicle proximity alarm circuit.

In one aspect of this embodiment of the invention, the processor subsystem determines when road speed for the vehicle is increasing or decreasing, when throttle position for the vehicle is increasing or decreasing, compares manifold pressure to a manifold pressure set point stored in the memory subsystem, determines when manifold pressure for the vehicle is increasing or decreasing and determines when engine speed for the vehicle is increasing or decreasing. In this aspect, the processor subsystem activates the fuel overinjection notification circuit if both road speed and throttle position for the vehicle are increasing and manifold pressure for the vehicle is above the manifold pressure set point

or if both throttle position and manifold pressure for the vehicle are increasing and road speed and engine speed for the vehicle are decreasing.

In a further aspect thereof, the apparatus may also include an upshift notification circuit for issuing notifications that the engine of the vehicle is being operated at an excessive engine speed, the processor subsystem determining when to activate the upshift notification circuit based upon data received from the sensors. In a related aspect thereof, the processor subsystem determines when road speed for the vehicle is increasing, determines when throttle position for the vehicle is increasing, compares manifold pressure to a manifold pressure set point stored in the memory subsystem and compares engine speed to an RPM set point stored in the memory subsystem. In this aspect, the processor subsystem activates the upshift notification circuit if both road speed and throttle position for the vehicle are increasing, manifold pressure for the vehicle is at or below the manifold pressure set point and engine speed for the vehicle is at or above the RPM set point.

In still another aspect thereof, the apparatus may also include a downshift notification circuit for issuing a notification that the engine of the vehicle is being operated at an insufficient engine speed. In this aspect, the processor subsystem determines when to activate the downshift notification circuit based upon data received from the sensors. In a related aspect thereof, the processor subsystem determines when road speed for the vehicle is decreasing, determines when throttle position for the vehicle is increasing, determines when manifold pressure for the vehicle is increasing and determines when engine speed for the vehicle is decreasing. In this aspect, the processor subsystem activates the downshift notification circuit if both road speed and engine speed are decreasing and both throttle position and manifold pressure for the vehicle are increasing.

BRIEF DESCRIPTION OF THE DRAWINGS

The present invention may be better understood, and its numerous objects, features and advantages will become apparent to those skilled in the art by reference to the accompanying drawing, in which:

FIG. 1 is a block diagram of an apparatus for optimizing vehicle performance constructed in accordance with the teachings of the present invention; and

FIGS. 2A-B is a flow chart of a method for optimizing vehicle performance in accordance with the teachings of the present invention.

DETAILED DESCRIPTION

Referring first to Fig. 1, a system 10 for optimizing vehicle performance constructed in accordance with the teachings of the present invention will now be described in greater detail. The system 10 includes a processor subsystem 12, for example, a microprocessor, and a memory subsystem 14, for example, the memory subsystem 14 may include a nonvolatile random access memory (or "NVRAM"), coupled together by a bus 16 for bi-directional exchanges of address, data and control signals therebetween. The system 10 is installed in a vehicle (not shown) for which optimized performance and driver assist capabilities are desired. Although it is contemplated that the system 10 is suitable for use with any type vehicle, most commonly, the system 10 shall be installed in a truck.

Also coupled to the processor subsystem 12 are a series of sensors, each of which are periodically polled by the processor subsystem 12, to determine the respective states or levels thereof. The sensors include a road speed sensor 18, an RPM sensor 20, a manifold pressure sensor 22, a throttle sensor 24, a windshield wiper sensor 30 and a brake sensor 32. The sensors are selected to be either state or level sensors, depending on whether the

information to be collected thereby is a state, i.e., on/off or a level, for example, 35 mph. The road speed sensor 18 and the RPM sensor 20 are level sensors which respectively provide the processor subsystem 12 with signals which indicate the operating speed and engine speed for the vehicle. The road speed sensor 18 and the RPM sensor 20 may derive such information from any one of a variety of sources. For example, the road speed sensor 18 may be connected to receive the speed input signal transmitted to the vehicle's speedometer while the RPM sensor 20 may be connected to receive the RPM input signal to the vehicle's tachometer.

The manifold pressure sensor 22 is a level sensor which is positioned downstream of the throttle valve in the intake manifold of the vehicle to measure manifold pressure thereat. The throttle sensor 24 is a level sensor, attached to the throttle, which measures the extent to which the throttle is opened. The windshield wiper sensor 30 is a state sensor which determines whether the vehicle's windshield wipers are on or off. In alternate embodiments thereof, the windshield wiper sensor 30 may be electrically coupled to the on/off switch for the windshield wiper or to an output of the windshield wiper motor. Finally, the brake sensor 32 is a state sensor which determines whether the brakes of the vehicle have been engaged. For example, the brake sensor 32 may be electrically coupled to the brake system to detect the activation thereof.

Preferably, the memory subsystem 14 should include first and second registers 14a and 14b, each having sufficient bits for holding the state/level of each of the sensors 18, 20, 22, 24, 30 and 32. The first register 14a is used to hold the present state or level of each of the sensors 18, 20, 22, 24, 30 and 32 while the second register 14b is used to hold the prior state or level for each of the sensors 18, 20, 22, 24, 30 and 32. Each time the

processor subsystem 12 writes the present state or level of the sensors 18, 20, 22, 24, 30 and 32 to the first register 14a, the prior contents of the first register 14a is written to the second register 14b which, in turn, discards the prior content thereof. The memory subsystem 14 is also used to hold information to be utilized by the processor subsystem 12 to determining whether to take corrective actions and/or issue notifications. Typically, such information is placed in the memory subsystem 14 while the system 10 is being initialized. The information includes one or more speed/distance tables which, when used in a manner which will be more fully described below in combination with data collected by the system 10, enable the processor subsystem 12 to determine if the vehicle is being operated unsafely and if corrective action is necessary. speed/stopping distance table. The information also includes two pre-set threshold values--a manifold psi set point and an engine RPM set point. As will also be more fully described below, the processor subsystem 12 uses these threshold values to determine when to issue notifications as to recommended changes in vehicle operation which, when executed by the driver, will optimize vehicle operation. The speed/stopping distance table(s) are based upon National Safety Council guidelines, vary according to the class of the vehicle and provide the relationship between the speed at which a vehicle is travelling and the distance which the vehicle will require to come to a complete stop if travelling at that speed. The manifold psi set point and RPM set point are selected based upon the manufacturer's guidelines for proper operation of the vehicle, vary based upon horsepower and engine size for the vehicle and represent thresholds above which the manifold pressure and engine rotation speed, respectively, for the vehicle should never exceed.

The system 10 also includes a throttle controller 26 capable of opening and/or closing the throttle, a radar detector 28 positioned to determine the distance separating the vehicle and an object in front of the vehicle, for example, a second vehicle travelling in the same direction, a series of circuits 34, 36, 38 and 40 for notifying the driver of the vehicle of recommended corrections in vehicle operation and alerting the driver to unsafe operating conditions and a power supply, for example a +12v battery, for providing power to the energy- demanding components of the system 10. The circuits 34, 36, 38 and 40 include an upshift notification circuit 34 for notifying the driver that an upshift is recommended, a downshift notification circuit 36 for notifying the driver that a downshift is recommended, an overinjection notification circuit 38 for notifying the driver that too much fuel is being supplied to the vehicle and a vehicle proximity alarm circuit 40 for alerting the driver when an object in front of the vehicle is too close. The circuits 34, 36 and 38 may be configured to provide visual and/or audible notifications, for example, using lights and/or horns. For example, the upshift circuit 34, the downshift notification circuit 36 and the overinjection notification circuit 38 may each include a horn, or other tone generating device, from which an audible notification may be generated at a selected pitch. Preferably, each of the notification circuits 34, 36 and 38 may be configured to provide distinct audible notifications, for example, tones at distinct pitches, so that the driver may readily distinguish which of the notification circuits 34, 36 and 38 have been activated by the processor subsystem 12. The proximity alarm circuit 40 may include one or more visual and/or audible warning devices such as lights and/or horns. For example, the proximity alarm circuit 40 may include a warning light and a warning horn. If desired, the proximity alarm circuit may also include a display for displaying the speed of the object in the vehicle's path and/or the stopping

distance in feet. The proximity alarm circuit 40 may be further equipped to provide audible indications of the speed of the object in the vehicle's path and/or the stopping distance in feed as well as selector circuitry for selecting both the information to be provided as well as the manner in which the information is to be conveyed.

Finally, the processor subsystem 12 is further provided with one or more mode select input lines which enable operator configuration of the operation of the system 10. For example, as described herein, the corrective operations consist of the combination of an automatic reduction of throttle and audio/visual alerts that the vehicle is being operated unsafely. It is specifically contemplated, however, that the system 10 include a mode select line for switching the system 10 between an "active" mode where both automatic throttle reduction and audio/visual alerts are generated and an "inactive" mode where only audio/visual alerts are generated.

Referring next to FIGS. 2A-B, a method for optimizing vehicle performance in accordance with the teachings of the present invention will now be described in greater detail. The method commences by powering up the processor subsystem 12, for example, by closing switch 42, thereby coupling the processor subsystem 12 to the power source 44 via line 43. Alternately, the processor subsystem 12 may be connected to the electrical system of the vehicle such that it will automatically power up when the vehicle is started. Of course, any of the other devices which also form part of the system 10 and require power may also be coupled to the line 43. Appropriate voltage levels for the processor subsystem 12, as well as any additional power-demanding devices coupled to the power source 44, would be provided by voltage divider circuitry (not shown).

Once the system 10 is powered up, the method begins at step 50 by the processor subsystem 12 polling the road speed sensor 18, the RPM sensor 20, the manifold pressure sensor 22, the throttle sensor 24, the windshield wiper sensor 30 and the brake sensor 32 to determine their respective levels or states and places the acquired information in the first data register 14a. Of course, it should be noted, however, that polling of the sensors by the processor subsystem 12 is but one technique by which the processor subsystem 12 may acquire the requisite information. Alternately, each sensor 20, 22, 24, 30 and 32 may periodically place its level or state in one or more bits of the first data register 14a. The processor subsystem 12 would then acquire information by checking the contents of the first data register 14a at selected time intervals.

Proceeding to step 52, the processor subsystem 12 examines the contents of the first data register 14a to determine the operating speed of the vehicle. If the processor subsystem 12 determines that the vehicle is stationary, i.e., the operating speed of the vehicle is zero, the processor subsystem 12 will return to step 50 where the road speed sensor 18, the RPM sensor 20, the manifold pressure sensor 22, the throttle sensor 24, the windshield wiper sensor 30 and the brake sensor 32 will be repeatedly polled until an operating speed greater than zero is detected at step 52. While polling may be conducted at a variety of time intervals, a polling period of one second appears suitable for the uses contemplated herein.

Returning to step 52, once an operating speed greater than zero is detected by the processor subsystem 12, the method proceeds to step 54 where the processor subsystem 12 again polls the operating speed sensor 18, the RPM sensor 20, the manifold pressure sensor 22, the throttle sensor 24, the windshield wiper sensor 30 and the brake sensor 32, to determine their respective levels or states and places the acquired information in the first data

register 14a. In turn, the contents of the first data register 14a is placed in the second data register 14b.

Proceeding now to step 56, from the polled value of the road speed sensor 18, the processor subsystem 12 determines whether the vehicle is travelling faster than 20 mph. If the operating speed of the vehicle is less than 20 mph, the method returns to step 54 where the sensors 18, 20, 22, 24, 30 and 32 will be repeatedly polled and the value of the road speed sensor examined until the processor subsystem 12 determines that the vehicle is travelling faster than 20 mph. If, however, the processor subsystem 12 determines that the vehicle is travelling faster than 20 mph, the method proceeds to step 58 where the processor subsystem 12 then determines if the vehicle is travelling faster than 50 mph, again by checking the contents of the first data register 14a.

Past this juncture, the method of the present invention will proceed through a series of steps designed to optimize vehicle operation. However, prior to optimizing vehicle operation, the processor subsystem 12 will determine if the vehicle is being operated unsafely. If so, the processor subsystem 12 will initiate corrective operations before commencing vehicle operation optimization. More specifically, if the processor subsystem 12 determines at step 58 that the vehicle is travelling at a speed greater than 50 mph, the processor subsystem 12 will initiate a process by which it will determine whether the vehicle is being operated unsafely.

The processor subsystem 12 determines that the vehicle is being operated unsafely if the speed of the vehicle is such that the stopping distance for the vehicle d is greater than the distance separating the vehicle from an object, for example, a second vehicle, in its path. In order to make this determination, the processor subsystem 12 is provided access to at least

one speed/distance table. For example, stored at location 14c within the memory subsystem 14 is a first speed/stopping distance table. The speed/stopping distance table contains the relationship between vehicle speed and stopping distance. Thus, for any given speed, the processor subsystem 12 may look-up the stopping distance for that speed. Preferably, the memory subsystem 14 should contain multiple speed/stopping distance tables so that differences in road conditions and/or vehicle class may be taken into account. For example, the speed/stopping distance table stored at location 14c may be a speed/stopping distance table for dry roads while a speed/stopping distance table for wet roads may be stored at location 14d. If desired, the memory subsystem 14 may also contain additional speed/stopping distance tables for other vehicle classes. If such additional tables were provided, however, the disclosed method would need to be modified to include additional steps in which the operator provides the vehicle's class and the processor subsystem 12 selects the appropriate speed/stopping distance tables for the indicated class of vehicle.

To make the aforementioned determination of unsafe vehicle operation, the method proceeds to step 60 where the processor subsystem 12 sets the value of the expression ALARM to 1. The method then proceeds to step 62 where the processor subsystem 12 examines the state of the wiper sensor 32 and selects a speed/stopping distance table based upon the state of the wiper sensor 32. If the state of the wiper sensor 32 indicates that the windshield wiper is off, the processor subsystem 12 concludes that the vehicle is being operated in dry conditions and selects the speed/stopping distance table stored at the location 14c of the memory subsystem 14. If, however, the state of the wiper sensor 32 indicates that the windshield wiper is on, the processor subsystem 12 concludes that the vehicle is being operated in wet conditions and selects the speed/stopping distance table stored at the

location 14d of the memory subsystem 14. From the selected speed/stopping distance table 14c or 14d, the processor subsystem 12 then retrieves the stopping distance for the speed at which the vehicle is travelling.

Continuing on to step 64, the processor subsystem 12 determines the distance of the vehicle to an object in its path, i.e., a second vehicle travelling in front of the vehicle and in the same direction. To do so, the processor subsystem 12 instructs the radar device 28 to determine the distance between the vehicle and the second vehicle in front of it. Upon determining the distance separating the two vehicles, the radar device 28 transmits the determined separation distance to the processor subsystem 12. At step 66, the processor subsystem 12 determines if the two vehicles are separated by a safe distance. To do so, the processor subsystem 12 compares the distance separating the two vehicles to the retrieved stopping distance for the vehicle. If the determined distance separating the two vehicles is greater than the retrieved stopping distance for the vehicle, the processor subsystem 12 determines that the vehicle is being operated safely. If, however, the determined distance separating the two vehicles is less than the retrieved stopping distance, the processor subsystem 12 determines that the vehicle is being operated unsafely.

If the processor subsystem 12 determines at step 66 that the vehicle is being operated unsafely, the processor subsystem 12 initiates appropriate corrective action. At step 68, the processor subsystem 12 determines whether the vehicle brake is on by examining the state of the brake sensor 32. If the brake is on, the processor subsystem 12 concludes that the driver is taking corrective action and that further corrective action is not necessary. If, however, the processor subsystem 12 determines that the vehicle brake is off, the method proceeds to step 70 where the processor subsystem examines the level of the vehicle speed

sensor to determine if the speed of the vehicle is less than 35 mph. If the speed of the vehicle is less than 30 mph, the processor subsystem 12 concludes that no further corrective action will be taken.

If, however, the processor subsystem 12 determines that the speed of the vehicle is greater than 35 mph, the method proceeds to step 72 where the processor subsystem 12 selects a throttle reduction value based upon the value of the expression ALARM. Generally, the severity of the corrective action to be initiated by the processor subsystem 12 is varied depending on the number of times that corrective action has been taken and, more specifically, the severity of the selective corrective action increases with the value of the expression ALARM. For example, in the embodiment of the invention disclosed herein, if ALARM = 1, a 25% throttle reduction is selected, if ALARM = 2, a 50 throttle reduction is selected and, if ALARM $\geq$ 3, a 100% throttle reduction is selected. By reducing the throttle, the transport of fuel to the engine is retarded and the vehicle will begin to decelerate.

Continuing on to step 74, the processor subsystem 12 determines the extent to which the throttle is open using the throttle level provided by the throttle sensor 24 and, using throttle control 26, reduces the throttle by the selected percentage. At step 76, the processor subsystem 12 selects an alert mode, again based upon the value of the expression ALARM. As before, the severity of the alert mode may increase with the value of ALARM. For example, when ALARM = 1, a warning light may be activated in a flash mode while, when $2 \leq$ ALARM ≤ 3, an audible alert which lasts for a first selected time period, for example, two seconds, may be activated in combination with the flashing warning light and when

ALARM ≥ 4, an audible alert which lasts for a second, longer, time period, for example, six seconds, may be activated in combination with the flashing light.

Proceeding to step 78, the processor subsystem 12 issues an alert to the operator of the vehicle in accordance with the selected alert mode. To do so, the processor subsystem 12 activates vehicle proximity alarm circuit 40 in accordance with the selected alert mode. After issuing the alert at step 78, the method proceeds to step 80 where the processor subsystem 12 waits a selected period before taking any further action. The wait period is intended to provide sufficient time to see if the previously initiated corrective action eliminates the hazardous condition. As disclosed herein, a wait period of 10 seconds is suitable. However, wait periods of various lengths should be equally suitable for the uses contemplated herein.

Upon expiration of the wait period, the value of the expression ALARM is incremented by one at step 82 and, at step 84, the processor subsystem 12 again polls the operating speed sensor 18, the RPM sensor 20, the manifold pressure sensor 22, the throttle sensor 24, the windshield wiper sensor 30 and the brake sensor 32, to determine their respective levels or states and places the acquired information in the first data register 14a. The method returns to step 64 where the distance between the vehicle and the object in its path is re-determined. The processor subsystem 12 continues to take corrective action until it determines that the vehicle is no longer being operated in a hazardous manner. More specifically, the processor subsystem 12 will conclude that the hazardous condition has been corrected when it either: determines at step 66 that the distance separating the vehicle and the object is within the stopping distance for the vehicle, determines at step 68 that the vehicle brake is on or determines at step 70 that the speed of the vehicle is less than 35 mph.

Upon making such a determination, the method proceeds to step 86 where the processor subsystem 12 deactivated the vehicle proximity alarm circuit 40 to turn off the flashing light.

The method of optimizing vehicle operation in accordance with the teachings of the present invention will now be described in greater detail. Returning now to step 58, if the processor subsystem 12 determines that the vehicle is travelling slower than 50 mph, or if the processor subsystem 12 determines at step 66 that the distance separating the vehicle and the object is within the stopping distance for the vehicle or if the processor subsystem 12 determines at step 68 that the vehicle brake is on or if the processor subsystem 12 determines at step 70 that the speed of the vehicle is less than 35 mph, the method proceeds, after deactivation of the vehicle proximity alarm circuit 40, to step 88 where the processor subsystem 12 determines if the road speed of the vehicle is changing. To do so, the processor subsystem 12 compares the speed of the vehicle maintained in the first register 14a to the speed of the vehicle maintained in the second register 14b.

If the vehicle speed maintained in the first register 14a is greater than the vehicle speed maintained in the second register 14b, the vehicle is accelerating. If so, the method continues to step 90 where the processor subsystem 12 determines if the throttle position is increasing. To do so, the processor subsystem 12 compares the throttle level, i.e., the extent to which the throttled is opened, maintained in the first register 14a to the throttle level maintained in the second register 14b. If the throttle position has not increased, the processor subsystem 12 determines that, since the vehicle is accelerating but fuel consumption is not increasing, no modification of vehicle operation is necessary. Accordingly, the method returns to step 54 for a next polling of the sensors 18, 20, 22 24, 30 and 32.

If, however, the processor subsystem 12 determines at step 90 that the throttle position has increased, the method proceeds to step 92 where the processor subsystem 12 determines if the manifold pressure level maintained in the first register 14a has exceeded the manifold pressure set point for the vehicle. If the vehicle's road speed and throttle position are increasing and the manifold pressure for the vehicle is at or below the manifold pressure set point, the processor subsystem 12 proceeds to step 93 where the sensors 18, 20, 22, 24, 30 and 32 are again polled and on to step 94 where the processor subsystem 12 compares the engine speed level maintained in the first register 14a to the RPM set point stored in the memory subsystem 14 to determine if the engine speed has reached the RPM set point. If the engine speed has not reached the RPM set point, the method returns to step 93 where the sensors 18, 20, 22, 24, 30 and 32 are repeatedly polled until the processor subsystem 12 determines that the engine speed has reached the RPM set point. Once the engine speed has reached the RPM set point, the processor subsystem 12 determines that the vehicle needs to be upshifted and, proceeding to step 95, the processor subsystem 12 will activate the upshift notification circuit 34 to issue an audible alert for a selected time period, for example, 6 seconds, thereby notifying the driver that, in order to optimize vehicle operation, an upshift should be performed. The method then returns to step 54 for a next polling of the sensors 18, 20, 22 24, 30 and 32.

Returning to step 92, if the vehicle's road speed and throttle position are increasing and the manifold pressure for the vehicle is above the manifold pressure set point, the processor subsystem 12 determines that too much fuel is being provided to the engine and proceeding to step 96, the processor subsystem 12 will activate the overinjection notification circuit 38 to issue an audible alert for a selected time period, for example, 6 seconds,

thereby notifying the driver that, in order to optimize vehicle operation, the amount of fuel being supplied to the engine should be reduced. The method then returns to step 54 for a next polling of the sensors 18, 20, 22 24, 30 and 32.

Returning to step 88, if the processor subsystem 12 determines, when comparing the speed of the vehicle maintained in the first register 14a to the speed of the vehicle maintained in the second register 14b, that the speed of the vehicle is decreasing, the method proceeds to step 98 where the processor subsystem 12 determines if the throttle position is changing. To do so, the processor subsystem 12 compares the throttle level, i.e., the extent to which the throttled is opened, maintained in the first register 14a to the throttle level maintained in the second register 14b. If the throttle position has either remained constant or decreased, the processor subsystem 12 determines that, since fuel consumption is either constant or reduced, no modification of vehicle operation is necessary. Accordingly, the method returns to step 54 for a next polling of the sensors 18, 20, 22 24, 30 and 32.

If, however, the processor subsystem 12 determines at step 98 that the throttle position has increased, the method proceeds to step 100 where the processor subsystem 12 determines if the manifold pressure is increasing. To do so, the processor subsystem 12 compares the manifold pressure level maintained in the first register 14a to the manifold pressure level maintained in the second register 14b. If the manifold pressure level maintained in the first register 14a is less than the manifold pressure level maintained in the second register 14b, the processor subsystem 12 determines that, since manifold pressure is decreasing, no modification of vehicle operation is necessary. Accordingly, the method returns to step 54 for a next polling of the sensors 18, 20, 22 24, 30 and 32.

If, however, the manifold pressure level maintained in the first register 14a is greater than the manifold pressure level maintained in the second register 14b, the processor subsystem 12 determines that the manifold pressure for the vehicle is increasing and the method proceeds to step 102 where the processor subsystem 12 determines if the engine speed is increasing. To do so, the processor subsystem 12 compares the engine speed level maintained in the first register 14a to the engine speed level maintained in the second register 14b. If the engine speed level maintained in the first register 14a is less than the engine speed level maintained in the second register 14b, the processor subsystem 12 determines that, since engine speed is increasing, no modification of vehicle operation is necessary. Accordingly, the method returns to step 54 for a next polling of the sensors 18, 20, 22 24, 30 and 32.

If, however, the engine speed level maintained in the first register 14a is less than the engine speed level maintained in the second register 14b, the processor subsystem 12 determines that, since the manifold pressure is increasing while the engine speed is decreasing, too much fuel is being supplied to the engine. Accordingly, at step 104, the processor subsystem 12 activates the overinjection notification circuit 38 to issue an audible alert for a selected time period, for example, 6 seconds, thereby notifying the driver that, in order to optimize vehicle operation, the amount of fuel being supplied to the engine should be reduced.

Proceeding on to step 106, the sensors 18, 20, 22 24, 30 and 32 are again polled and, at step 108, the processor subsystem 12 determines if the engine speed is decreasing, again by comparing the engine speed level maintained in the first and second registers 14a and 14b. If the engine speed has not decreased, the method returns to step 104 where the

processor subsystem 12 again activates the overinjection notification circuit 38 to issue another audible alert notifying the driver that, in order to optimize vehicle operation, the amount of fuel being supplied to the engine should be reduced. Thus, the driver will be repeatedly notified of the overinjection condition until the processor subsystem 12 determines, at step 108, that the engine speed is decreasing. The method will then proceed to step 110 where, since the processor subsystem 12 has determined that, since the engine speed is decreasing, the vehicle should be downshifted. Accordingly, at step 110, the processor subsystem 12 activates the downshift notification circuit 36 to issue an audible alert for a selected time period, for example, 6 seconds, thereby notifying the driver that, in order to optimize vehicle operation, the vehicle should be downshifted. The method then returns to step 54 for a next polling of the sensors 18, 20, 22 24, 30 and 32. The method will repeatedly loop through the aforementioned process to continuously determine if the vehicle is being operated unsafely, take appropriate corrective action and to provide notifications to the driver as to how operation of the vehicle may be optimized until the processor subsystem 12 is powered down or the vehicle is turned off.

Thus, there has been described and illustrated herein, an apparatus for optimizing vehicle operation which combines both operator notifications of recommended corrections in vehicle operation with automatic modification of vehicle operation under certain circumstances. By incorporating the disclosed apparatus in a vehicle, not only will certain hazardous operations of the vehicle be prevented but also the driver will be advised of certain actions which will enable the vehicle to be operated with greater fuel efficiency. However, those skilled in the art will recognize that many modifications and variations besides those specifically mentioned herein may be made without departing substantially from

the concept of the present invention. Accordingly, it should be clearly understood that the form of the invention described herein is exemplary only and is not intended as a limitation on the scope of the invention.

WHAT IS CLAIMED IS:

1. Apparatus for optimizing operation of a vehicle, comprising:

a plurality of sensors coupled to a vehicle having an engine, said plurality of sensors, which collectively monitor operation of said vehicle, including a road speed sensor, a manifold pressure sensor and a throttle position sensor;

a processor subsystem, coupled to each one of said plurality of sensors, to receive data therefrom;

a memory subsystem, coupled to said processor subsystem, said memory subsystem storing therein a manifold pressure set point and present and prior levels for each one of said plurality of sensors;

a fuel overinjection notification circuit coupled to said processor subsystem, said fuel overinjection notification circuit issuing a notification that excessive fuel is being supplied to said engine of said vehicle;

said processor subsystem determining, based upon data received from said plurality of sensors, when to activate said fuel overinjection circuit.

2. Apparatus for optimizing operation of a vehicle according to claim 1 wherein said processor subsystem further comprises:

means for determining when road speed for said vehicle is increasing;

means for determining when throttle position for said vehicle is increasing; and

means for comparing manifold pressure to said manifold pressure set point;

said processor subsystem activating said fuel overinjection notification circuit if both road speed and throttle position for said vehicle are increasing and manifold pressure for said vehicle is above said manifold pressure set point.

3. Apparatus for optimizing operation of a vehicle according to claim 1 wherein said fuel overinjection circuit further comprises a horn for issuing a tone for a preselected time period.

4. Apparatus for optimizing operation of a vehicle according to claim 1 wherein said plurality of sensors coupled to said vehicle further include an engine speed sensor.

5. Apparatus for optimizing operation of a vehicle according to claim 4 wherein said processor subsystem further comprises:

means for determining when road speed for said vehicle is decreasing;

means for determining when throttle position for said vehicle is increasing;

means for determining when manifold pressure for said vehicle is increasing; and

means for determining when engine speed for said vehicle is decreasing;

said processor subsystem activating said fuel overinjection notification circuit if both throttle position and manifold pressure for said vehicle are increasing and road speed and engine speed for said vehicle are decreasing.

6. Apparatus for optimizing operation of a vehicle according to claim 5 wherein said processor subsystem further comprises:

means for determining when road speed for said vehicle is increasing;

means for determining when throttle position for said vehicle is increasing; and

means for comparing manifold pressure to said manifold pressure set point;

said processor subsystem activating said fuel overinjection notification circuit if both road speed and throttle position for said vehicle are increasing and manifold pressure for said vehicle is above said manifold pressure set point.

7. Apparatus for optimizing operation of a vehicle according to claim 6 wherein said fuel overinjection circuit further comprises a horn for issuing a tone for a preselected time period.

8. Apparatus for optimizing operation of a vehicle according to claim 4 and further comprising:

an upshift notification circuit coupled to said processor subsystem, said upshift notification circuit issuing a notification that said engine of said vehicle is being operated at an excessive engine speed;

said memory subsystem further storing an RPM set point; and

said processor subsystem determining, based upon data received from said plurality of sensors, when to activate said upshift notification circuit.

9. Apparatus for optimizing operation of a vehicle according to claim 8 wherein said processor subsystem further comprises:

means for determining when road speed for said vehicle is increasing;

means for determining when throttle position for said vehicle is increasing;

means for comparing manifold pressure to said manifold pressure set point; and

means for comparing engine speed to said RPM set point;

said processor subsystem activating said upshift notification circuit if both road speed and throttle position for said vehicle are increasing, manifold pressure for said vehicle is at or below said manifold pressure set point and engine speed for said vehicle is at or above said RPM set point.

10. Apparatus for optimizing operation of a vehicle according to claim 9 wherein said upshift notification circuit further comprises a horn for issuing a tone for a preselected time period.

11. Apparatus for optimizing operation of a vehicle according to claim 4 and further comprising:

a downshift notification circuit coupled to said processor subsystem, said downshift notification circuit issuing a notification that said engine of said vehicle is being operated at an insufficient engine speed; and

said processor subsystem determining, based upon data received from said plurality of sensors, when to activate said downshift notification circuit.

12. Apparatus for optimizing operation of a vehicle according to claim 11 wherein said processor subsystem further comprises:

means for determining when road speed for said vehicle is decreasing;

means for determining when throttle position for said vehicle is increasing;

means for determining when manifold pressure for said vehicle is increasing; and

means for determining when engine speed for said vehicle is decreasing;

said processor subsystem activating said downshift notification circuit if both road speed and engine speed are decreasing and both throttle position and manifold pressure for said vehicle are increasing.

13. Apparatus for optimizing operation of a vehicle according to claim 12 wherein said downshift notification circuit further comprises a horn for issuing a tone for a preselected time period.

14. Apparatus for optimizing operation of a vehicle, comprising:

a plurality of sensors coupled to a vehicle having an engine, said plurality of sensors, which collectively monitor operation of said vehicle, including a road speed sensor, an engine speed sensor, a manifold pressure sensor and a throttle position sensor;

a processor subsystem, coupled to each one of said plurality of sensors, to receive data therefrom;

a memory subsystem, coupled to said processor subsystem, said memory subsystem storing therein a manifold pressure set point, an engine speed set point and present and prior levels for each one of said plurality of sensors;

a fuel overinjection notification circuit coupled to said processor subsystem, said fuel overinjection notification circuit issuing a notification that excessive fuel is being supplied to said engine of said vehicle;

an upshift notification circuit coupled to said processor subsystem, said upshift notification circuit issuing a notification that said engine of said vehicle is being operated at an excessive engine speed;

a downshift notification circuit coupled to said processor subsystem, said downshift notification circuit issuing a notification that said engine of said vehicle is being operated at an insufficient engine speed;

said processor subsystem determining, based upon data received from said plurality of sensors, when to activate said fuel overinjection circuit, said upshift notification circuit and said downshift notification circuit.

15. Apparatus for optimizing operation of a vehicle according to claim 14 wherein:

said fuel overinjection circuit further comprises a first horn for issuing a first tone for a first preselected time period;

said upshift notification circuit further comprises a second horn for issuing a second tone for a second preselected time period; and

said downshift notification circuit further comprises a third horn for issuing a third tone for a third preselected time period.

16. Apparatus for optimizing vehicle performance according to claim 14 wherein said processor subsystem further comprises:

means for determining when road speed for said vehicle is increasing or decreasing

means for determining when throttle position for said vehicle is increasing;

means for comparing manifold pressure to said manifold pressure set point;

means for comparing engine speed to said RPM set point;

means for determining when manifold pressure is increasing; and

means for determining when engine speed is increasing or decreasing;

said processor subsystem activating said fuel overinjection notification circuit if both road speed and throttle position for said vehicle are increasing and manifold pressure for said vehicle is above said manifold pressure set or if both throttle position and manifold pressure for said vehicle are increasing and road speed and engine speed for said vehicle are decreasing;

said processor subsystem activating said upshift notification circuit if both road speed and throttle position for said vehicle are increasing, manifold pressure for said vehicle is at

or below said manifold pressure set point and engine speed for said vehicle is at or above said RPM set point; and

said processor subsystem activating said downshift notification circuit if both road speed and engine speed are decreasing and both throttle position and manifold pressure for said vehicle are increasing.

17. Apparatus for optimizing operation of a vehicle according to claim 16 wherein:

said fuel overinjection circuit further comprises a first horn for issuing a first tone for a first preselected time period;

said upshift notification circuit further comprises a second horn for issuing a second tone for a second preselected time period; and

said downshift notification circuit further comprises a third horn for issuing a third tone for a third preselected time period.

18. Apparatus for optimizing operation of a vehicle, comprising:

a radar detector, said radar detector determining a distance separating a vehicle having an engine and an object in front of said vehicle;

at least one sensor coupled to said vehicle for monitoring operation thereof, said at least one sensor including a road speed sensor;

a processor subsystem, coupled to said radar detector and said at least one sensor, to receive data therefrom;

a memory subsystem, coupled to said processor subsystem, said memory subsystem storing a first vehicle speed/stopping distance table and present levels for each one of said at least one sensor;

a vehicle proximity alarm circuit coupled to said processor subsystem, said vehicle proximity alarm circuit issuing an alarm that said vehicle is too close to said object;

said processor subsystem determining, based upon data received from said radar detector, said at least one sensor and said memory subsystem, when to activate said vehicle proximity alarm circuit.

19. Apparatus for optimizing operation of a vehicle according to claim 18 wherein:

said at least one sensor further includes a windshield wiper sensor for indicating whether a windshield wiper of said vehicle is activated; and

said memory subsystem further storing a second vehicle speed/stopping distance table.

20. Apparatus for optimizing operation of a vehicle according to claim 18 and further comprising:

a throttle controller for controlling a throttle of said engine of said vehicle; and

said processor subsystem selectively reducing said throttle based upon data received from said radar detector, said at least one sensor and said memory subsystem.

21. Apparatus for optimizing operation of a vehicle according to claim 20 wherein said at least one sensor further includes a brake sensor for indicating whether a brake system of said vehicle is activated.

22. Apparatus for optimizing operation of a vehicle according to claim 20 wherein said processor subsystem further comprises:

means for counting a total number of vehicle proximity alarms determined by said processor subsystem;

means for selectively reducing said throttle based upon said total number of vehicle proximity alarms.

23. Apparatus for optimizing vehicle operation according to claim 18 wherein:

said plurality of sensors further include a manifold pressure sensor and a throttle position sensor;

said memory subsystem further storing therein a manifold pressure set point and prior levels for each one of said plurality of sensors;

a fuel overinjection notification circuit coupled to said processor subsystem, said fuel overinjection notification circuit issuing a notification that excessive fuel is being supplied to said engine of said vehicle;

said processor subsystem determining, based upon data received from said plurality of sensors, when to activate said fuel overinjection circuit.

24. Apparatus for optimizing operation of a vehicle according to claim 23 wherein said plurality of sensors coupled to said vehicle further include an engine speed sensor.

25. Apparatus for optimizing operation of a vehicle according to claim 24 and further comprising:

an upshift notification circuit coupled to said processor subsystem, said upshift notification circuit issuing a notification that said engine of said vehicle is being operated at an excessive engine speed;

said memory subsystem further storing an RPM set point; and

said processor subsystem determining, based upon data received from said plurality of sensors, when to activate said upshift notification circuit.

26. Apparatus for optimizing operation of a vehicle according to claim 25 and further comprising:

a downshift notification circuit coupled to said processor subsystem, said downshift notification circuit issuing a notification that said engine of said vehicle is being operated at an insufficient engine speed; and

said processor subsystem determining, based upon data received from said plurality of sensors, when to activate said downshift notification circuit.

27. Apparatus for optimizing operation of a vehicle, comprising:

a radar detector, said radar detector determining a distance separating a vehicle having an engine and an object in front of said vehicle;

a plurality of sensors coupled to a vehicle having an engine, said plurality of sensors, which collectively monitor operation of said vehicle, including a road speed sensor, an engine speed sensor, a manifold pressure sensor and a throttle position sensor;

a processor subsystem, coupled to said radar detector and each one of said plurality of sensors, to receive data therefrom;

a memory subsystem, coupled to said processor subsystem, said memory subsystem storing therein a first vehicle speed/stopping distance table, a manifold pressure set point and present and prior levels for each one of said plurality of sensors;

a fuel overinjection notification circuit coupled to said processor subsystem, said fuel overinjection notification circuit issuing a notification that excessive fuel is being supplied to said engine of said vehicle;

said processor subsystem determining, based upon data received from said plurality of sensors, when to activate said fuel overinjection circuit

a vehicle proximity alarm circuit coupled to said processor subsystem, said vehicle proximity alarm circuit issuing an alarm that said vehicle is too close to said object;

said processor subsystem determining, based upon data received from said radar detector, said at least one sensor and said memory subsystem, when to activate said vehicle proximity alarm circuit.

28. Apparatus for optimizing operation of a vehicle according to claim 27 wherein said processor subsystem further comprises:

means for determining when road speed for said vehicle is increasing or decreasing;

means for determining when throttle position for said vehicle is increasing or decreasing; and

means for comparing manifold pressure to said manifold pressure set point;

means for determining when manifold pressure for said vehicle is increasing or decreasing; and

means for determining when engine speed for said vehicle is increasing or decreasing;

said processor subsystem activating said fuel overinjection notification circuit if both road speed and throttle position for said vehicle are increasing and manifold pressure for said vehicle is above said manifold pressure set point or if both throttle position and manifold pressure for said vehicle are increasing and road speed and engine speed for said vehicle are decreasing.

29. Apparatus for optimizing operation of a vehicle according to claim 27 and further comprising:

an upshift notification circuit coupled to said processor subsystem, said upshift notification circuit issuing a notification that said engine of said vehicle is being operated at an excessive engine speed;

said memory subsystem further storing an RPM set point; and

said processor subsystem determining, based upon data received from said plurality of sensors, when to activate said upshift notification circuit.

30. Apparatus for optimizing operation of a vehicle according to claim 29 wherein said processor subsystem further comprises:

means for determining when road speed for said vehicle is increasing;

means for determining when throttle position for said vehicle is increasing;

means for comparing manifold pressure to said manifold pressure set point; and

means for comparing engine speed to said RPM set point;

said processor subsystem activating said upshift notification circuit if both road speed and throttle position for said vehicle are increasing, manifold pressure for said vehicle is at or below said manifold pressure set point and engine speed for said vehicle is at or above said RPM set point.

31. Apparatus for optimizing operation of a vehicle according to claim 27 and further comprising:

a downshift notification circuit coupled to said processor subsystem, said downshift notification circuit issuing a notification that said engine of said vehicle is being operated at an insufficient engine speed; and

said processor subsystem determining, based upon data received from said plurality of sensors, when to activate said downshift notification circuit.

32. Apparatus for optimizing operation of a vehicle according to claim 31 wherein said processor subsystem further comprises:

means for determining when road speed for said vehicle is decreasing;

means for determining when throttle position for said vehicle is increasing;

means for determining when manifold pressure for said vehicle is increasing; and

means for determining when engine speed for said vehicle is decreasing;

said processor subsystem activating said downshift notification circuit if both road speed and engine speed are decreasing and both throttle position and manifold pressure for said vehicle are increasing.

APPARATUS FOR OPTIMIZING VEHICLE OPERATION

Abstract of the Disclosure

Apparatus for optimizing operation of an engine-driven vehicle. The apparatus includes a processor subsystem, a memory subsystem, a road speed sensor, an engine speed sensor, a manifold pressure sensor, a throttle position sensor, a radar detector for determining the distance separating the vehicle from an object in front of it, a windshield wiper sensor for indicating whether a windshield wiper of the vehicle is activated, a brake sensor for determining whether the brakes of the vehicle have been activated, a fuel overinjection notification circuit for issuing notifications that excessive fuel is being supplied to the engine of the vehicle, an upshift notification circuit for issuing notifications that the engine of the vehicle is being operated at an excessive engine speed, a downshift notification circuit for issuing notifications that the engine of the vehicle is being operated at an insufficient engine speed, a vehicle proximity alarm circuit for issuing an alarm that the vehicle is too close to an object in front of the vehicle and a throttle controller for automatically reducing the amount of fuel supplied to the engine if the vehicle is too close to the object in front of it. Based upon data received from the sensors and data stored in the memory subsystem, the processor determines whether to activate the fuel overinjection notification circuit, the upshift notification circuit, the downshift notification circuit, the vehicle proximity alarm circuit or the throttle controller.

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PATENT

DECLARATION AND POWER OF ATTORNEY

As a below-named joint inventor, I hereby declare that:

My residence, post office address, and citizenship are as stated below next to my name.

I believe I am an original, first, and joint inventor of the subject matter which is claimed and for which a patent is sought on the invention, design, or discovery entitled:

"METHOD AND APPARATUS FOR OPTIMIZING VEHICLE OPERATION"

the specification of which is attached hereto.

I have reviewed and understand the contents of the above-identified specification, including the claims, as amended by any amendment referred to above;

I acknowledge the duty to disclose to the Office all information known to me to be material to the patentability of this application as defined by Title 37, Code of Federal Regulations, § 1.56.

I hereby claim foreign priority benefits under Title 35 U.S.C. § 119 of any foreign application(s) for patent or inventor's certificate listed below and have also identified below any foreign application for patent or inventor's certificate having a filing date before that of the application on which priority is claimed.

NONE

I hereby claim the benefit under Title 35, United States Code, § 120 of any United States application(s) listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States application(s) in the manner provided by

the first paragraph of Title 35, United States Code, § 112, I acknowledge the duty to disclose to the Office all information known to me to be material to patentability as defined in § 1.56 which became available between the filing date of any prior application(s) and the national or PCT international filing date of this application.

NONE

I hereby appoint:

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all of the firm of HARRIS, TUCKER & HARDIN, P.C., my attorneys with full power of substitution and revocation, to prosecute this application and to transact all business in the United States Patent and Trademark Office connected therewith, and to file and prosecute any international patent applications filed thereon before any international authorities under the Patent Cooperation Treaty.

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Atty. Docket No.:	TASD B8542

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

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TASD
B8542

PATENT

VERIFIED STATEMENT (DECLARATION) CLAIMING SMALL ENTITY STATUS [37 CFR 1.9(f) and 1.27(c) - SMALL BUSINESS CONCERN

I hereby declare that I am:

[ ] the owner of the small business concern identified below:
[X] an officer of the small business concern empowered to act on behalf of the concern identified below:

NAME OF CONCERN: Tas Distributing Co., Inc.
ADDRESS OF CONCERN: 806 W. Pioneer Pkwy
Peoria, Illinois 61615

I hereby declare that the above-identified concern qualifies as a small business concern as defined in 13 CFR 121.3-18, and reproduced in 37 CFR 1.9(d), for purposes of paying reduced fees under §41(a) and (b) of Title 35, United States Code, in that the number of employees of the concern, including those of its affiliates, does not exceed 500 persons. For purposes of this statement, (1) the number of employees of the business concern is averaged over the previous fiscal year of the concern of the persons employed on a full-time, part-time or temporary basis during each of the pay periods of the fiscal year, and (2) concerns are affiliates of each other when either, directly or indirectly, one concern controls or has the power to control the other, or a third party or parties controls or has the power to control both.

I hereby declare that rights under contract or law have been conveyed to and remain with the small business concern identified above with regard to the invention, entitled:

"METHOD AND APPARATUS FOR OPTIMIZING VEHICLE OPERATION"

by inventors:

Harvey Slepian and Loran Sutton

described in

[X] the specification filed herewith.
[ ] application serial no. 07/_____, filed _____, 19_____
[ ] patent no. _____, issued _____.

If the rights held by the above identified small business concern are not exclusive, each individual, concern or organization having rights to the invention is listed below* and no rights to the invention are held by any person, other than the inventor, who could not qualify as a small business concern under 37 CFR 1.9(d) or by any concern which would not qualify as a small business concern under 37 CFR 1.9(d) or a nonprofit organization under 37 CFR 1.9(e). ***NOTE:** Separate verified statements are required from each named person, concern or organization having rights to the invention averring to their status as small entities (37 CFR 1.27)

None

I acknowledge the duty to file, in this application or patent, notification of any change in status resulting in loss of entitlement to small entity status prior to paying, or at the time of paying, the earliest of the issue fee or any maintenance fee due after the date on which status as a small entity is no longer appropriate. [37 CFR 1.28(b)]

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

NAME OF PERSON SIGNING
TITLE OF PERSON OTHER THAN OWNER
ADDRESS OF PERSON SIGNING

Harvey Slepian
President
1426 W. Daytona
Peoria, Illinois 61614

Harvey Slepian, President
Tas Distributing Co., Inc.

March 3 1997
Date

67737

08/813270

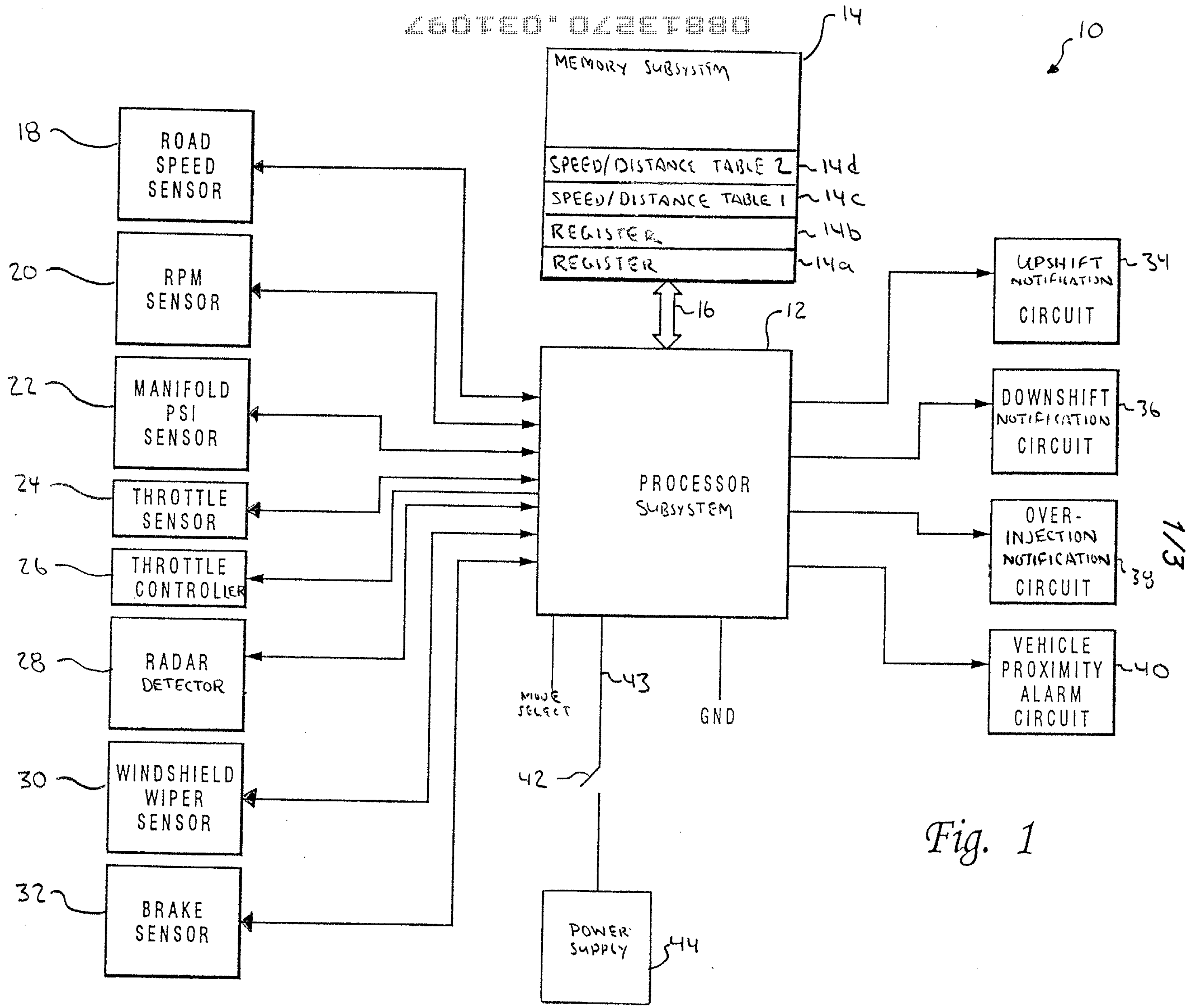
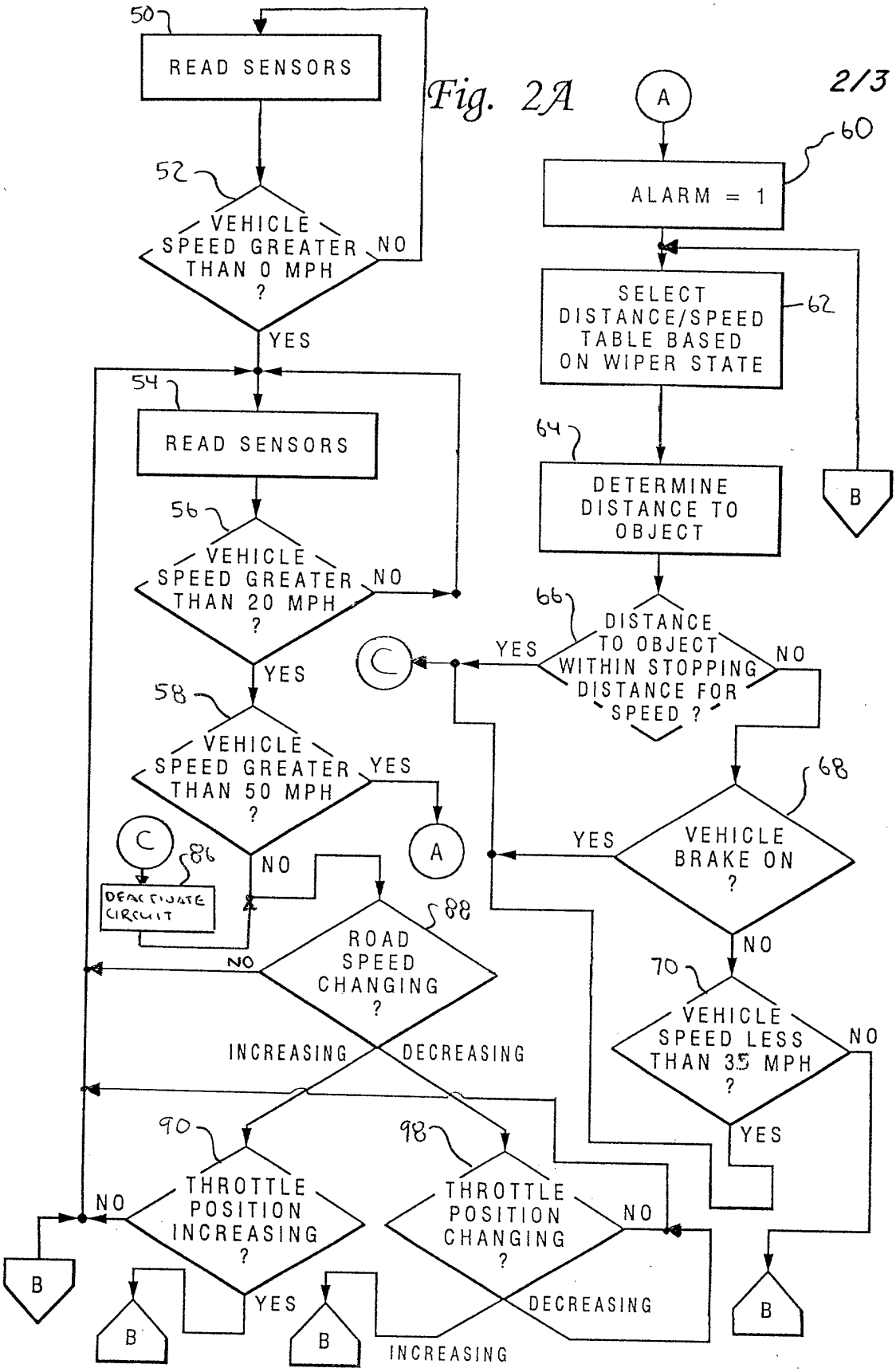


Fig. 1

Fig. 2A



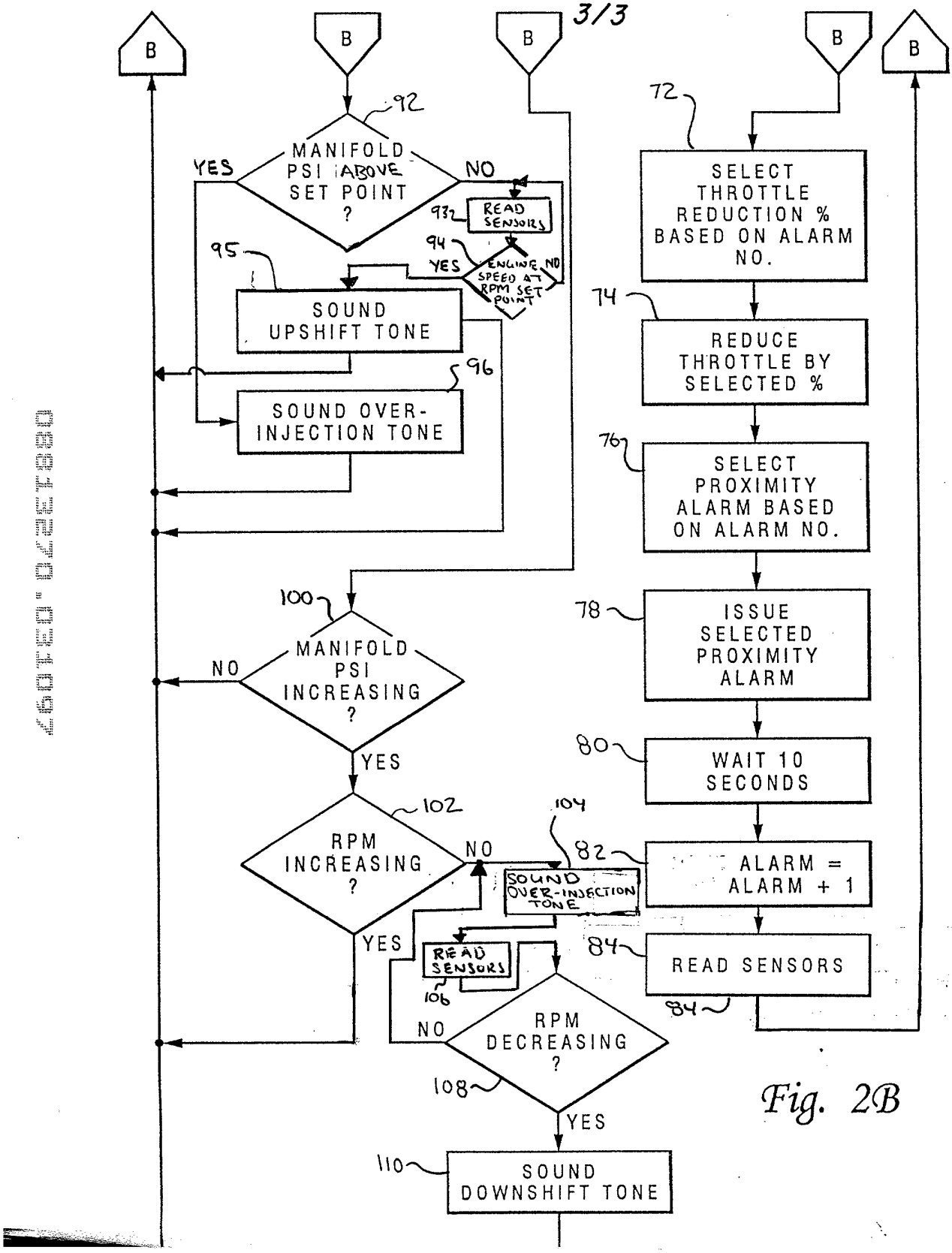

B
B
B
B
B
92
MANIFOLD PSI ABOVE SET POINT ?
YES
NO
93
READ SENSORS
94
ENGINE SPEED AT RPM SET POINT
YES
NO
95
SOUND UPSHIFT TONE
96
SOUND OVER-INJECTION TONE
100
MANIFOLD PSI INCREASING ?
NO
YES
102
RPM INCREASING ?
NO
104
SOUND OVER-INJECTION TONE
YES
READ SENSORS
106
RPM DECREASING ?
NO
108
YES
110
SOUND DOWNSHIFT TONE
72
SELECT THROTTLE REDUCTION % BASED ON ALARM NO.
74
REDUCE THROTTLE BY SELECTED %
76
SELECT PROXIMITY ALARM BASED ON ALARM NO.
78
ISSUE SELECTED PROXIMITY ALARM
80
WAIT 10 SECONDS
82
ALARM = ALARM + 1
84
READ SENSORS
84

Fig. 2B

Docket No.: TASD-B8542

PATENT

Box Patent Application
Assistant Commissioner for Patents
Washington, D.C. 20231

NEW APPLICATION TRANSMITTAL

Transmitted herewith for filing is the patent application of

Inventors: Harvey Slepian and Loran Sutton

For: METHOD AND APPARATUS FOR OPTIMIZING VEHICLE OPERATION

Enclosed are the following papers:

- X A check in the amount of $557.00 for patent application filing fee.
- X A check in the amount of $40.00 for assignment recordation fee.
- X This New Application Transmittal with Certificate of Express Mailing and attached fee sheet
- 26 Pages of specification
- 17 Pages of claims
- 1 Page(s) of Abstract
- 3 Sheets of informal drawing (Figs. 1 - 2B)
- X Assignment
- X Assignment Transmittal Letter
- X Verified Statement Claiming Small Entity Status
- X Declaration and Power of Attorney
- X Postcard acknowledgment.

CERTIFICATION UNDER 37 CFR 1.10

I hereby certify that this New Application Transmittal and the documents referred to as enclosed therein are being deposited with the United States Postal Service on this date, March 10, 1997, in an envelope as "Express Mail Post Office to Addressee" Mailing Label Number EM475197470US addressed to: Box Patent Application, Assistant Commissioner for Patents, Washington, DC 20231.

Janet K. Pruitt
(Signature of person mailing paper)
Printed Name: Janet K. Pruitt

The filing fee has been calculated as shown below:

SMALL ENTITY

FOR:	NO. FILED	NO. EXTRA	RATE	FEE
BASIC FEE				$ 385.00
TOTAL CLAIMS	32 - 20 =	12	$ 11.00	$ 132.00
INDEP. CLAIMS	4 - 3 =	1	$ 40.00	$ 40.00
MULTIPLE DEPENDENT CLAIM PRESENTED			$130.00	$ 0.00

TOTAL $ **557.00**

A check in the amount of $ 557.00 for the filing fee is enclosed.

The Commissioner is hereby authorized to charge payment of the following fees associated with this communication or credit any overpayment to Deposit Account No. 08-3105. A duplicate copy of this sheet is enclosed.

Any additional fees required under 37 C.F.R. 1.16.

Date: March 10, 1997

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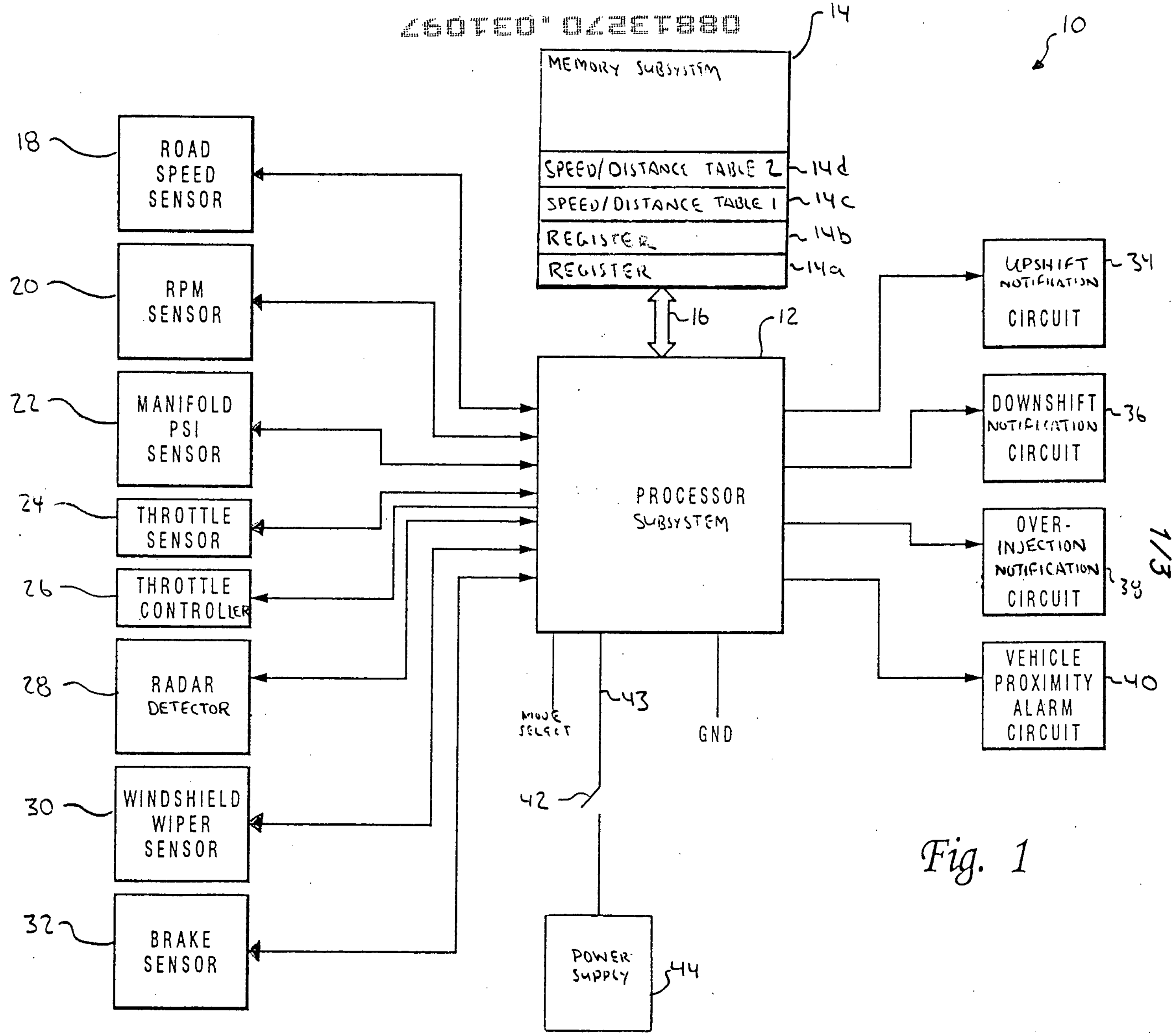

Fig. 1

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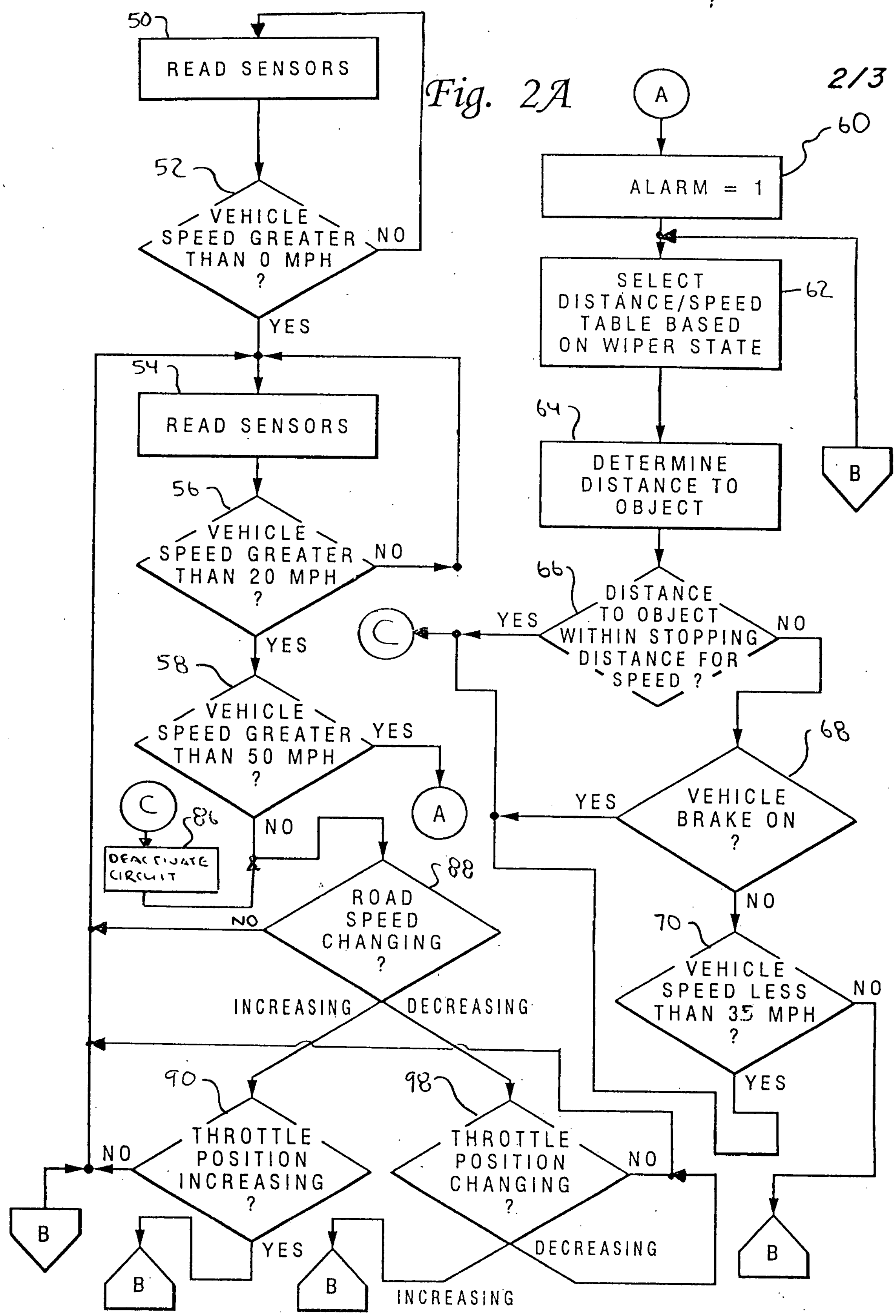

Fig. 2A

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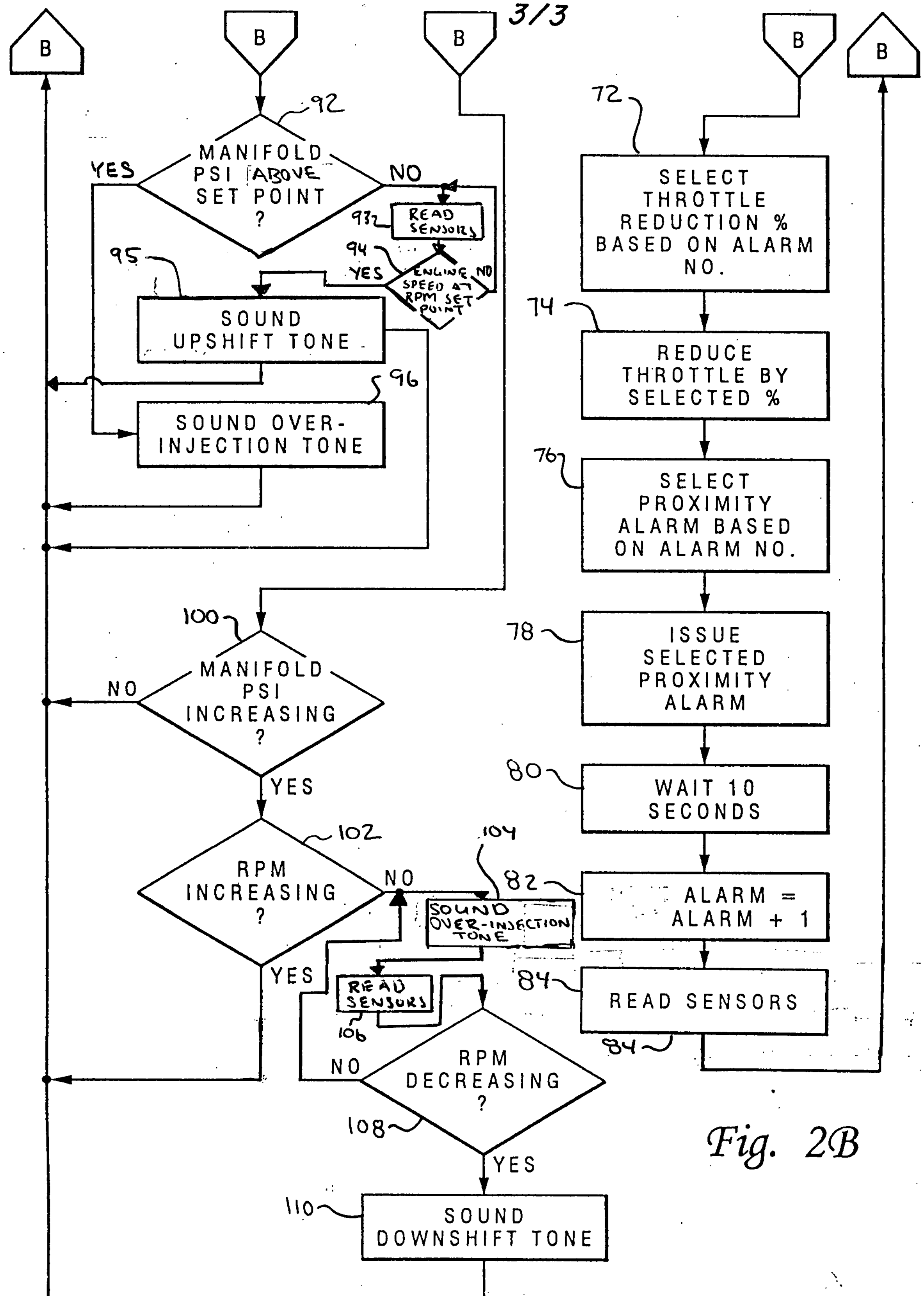

Fig. 2B

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3 DAYS

557.00-201 08/813270

PATENT

METHOD AND APPARATUS FOR OPTIMIZING VEHICLE OPERATION

Background of the Invention

Field of the Invention

The present invention generally relates to an apparatus for optimizing vehicle operation and, more particularly, relates to a system which both notifies the driver of recommended corrections in vehicle operation and, under certain conditions, automatically initiates selected corrective action.

Description of Related Art

It has long been recognized that the improper operation of a vehicle may have many adverse effects. For example, the fuel efficiency of a vehicle may vary dramatically based upon how the vehicle is operated. More specifically, operating a vehicle at excessive speed, excessive RPM and/or excessive manifold pressure will result in both reduced fuel economy and increased operating costs. The aforementioned increased operating costs can be quite considerable, particularly for an owner or operator of a fleet of vehicles. To correct these types of improper vehicle operations are often surprisingly simple. For example, upshifting the drive gear will typically eliminate an excessive RPM condition. However, even when the solution is quite simple, oftentimes, the driver will be unaware of the need to take corrective action.

A variety of patents have disclosed systems, commonly referred to as "shift prompters", which monitor the operation of a vehicle and advises the operator of the vehicle when to take certain actions. Numerous ones of these devices include sensors which measure

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engine speed and vehicle speed. See, for example, USPNs 4,492,112 to Igarashi et al., 4,631,515 to Blee et al. and 4,701,852 to Ulveland. Certain ones, however, disclose the use of other types of sensors as well. For example, USPN 4,524,460 to Weber is directed to a driving aid indicator which includes vehicle speed, manifold pressure, throttle position and engine speed sensors. USPNs 4,752,883 to Asakura et al. and 4,868,756 to Kawanabe et al. are directed to upshift notification devices which include sensors for measuring engine speed, vehicle speed, manifold pressure and cooling water temperature. Finally, USPN 4,853,673 to Kido et al. discloses a shift indicator system which includes sensors for measuring engine speed and throttle position. Generally, the above-listed patents all provide displays intended to enable the driver to operate the vehicle in a manner leading to uniform performance and maximum fuel economy. However, Blee et al. discloses the use of audible warnings as well as a speed controller to prevent further increases in engine speed if the driver ignores previously issued warnings.

Improper vehicle operation has other adverse effects as well. It is well known that the faster a vehicle travels, the longer it takes to stop. Thus, what may be a safe separation distance between successive vehicles when a vehicle is traveling at 35 mph may be unsafe if that vehicle is traveling at 50 mph. Road conditions also play a role in determining the safe separation distance between vehicles. For example, greater separation distances are generally recommended when roads are wet. As a result, therefore, based on the combination of a vehicle's speed, the distance separating the vehicle from a second vehicle in front of it and road conditions, many vehicles are operated unsafely. To correct this situation, a reduction in operating speed, an increase in vehicle separation or some combination thereof, is required.

It may be readily seen from the foregoing that it would be desirable to provide a system which integrates the ability to issue audible warnings which advise the driver to correct operation of the vehicle in a manner which will enhance the efficient operation thereof with the ability to automatically take corrective action if the vehicle is being operated unsafely. It is, therefore, the object of the invention to provide such a system.

SUMMARY OF THE INVENTION

In one embodiment, the present invention is directed to an apparatus for optimizing operation of an engine-driven vehicle. The apparatus includes a processor subsystem, a memory subsystem, plural sensors, including road speed, manifold pressure and throttle position sensors, for collectively monitoring operation of the vehicle and a fuel overinjection notification circuit for issuing notifications that excessive fuel is being supplied to the engine of the vehicle. The processor subsystem receives data from the sensors and, from the received data, determines when to activate the fuel overinjection circuit. In one aspect thereof, the processor subsystem determines when road speed for the vehicle is increasing, determines when throttle position for the vehicle is increasing, compares manifold pressure and a manifold pressure set point stored in the memory subsystem and activates the fuel overinjection notification circuit if both road speed and throttle position for the vehicle are increasing and manifold pressure for the vehicle is above the manifold pressure set point.

In further aspects thereof, the sensors may include an engine speed sensor and the processor subsystem may determine when road speed for the vehicle is decreasing, when throttle position for the vehicle is increasing, when manifold pressure for the vehicle is increasing, when engine speed for the vehicle is decreasing and may activate the fuel

overinjection notification circuit if both throttle position and manifold pressure for the vehicle are increasing and road speed and engine speed for the vehicle are decreasing.

In still further aspects thereof, the apparatus may also include an upshift notification circuit, activated by the processor subsystem based upon data received from the sensors, which issues notifications that the engine of the vehicle is being operated at excessive engine speeds. In this aspect, the processor subsystem determines when road speed for the vehicle is increasing, when throttle position for the vehicle is increasing, compares manifold pressure to a manifold pressure set point stored in the memory subsystem, compares engine speed to an RPM set point stored in the memory subsystem and activates the upshift notification circuit if both road speed and throttle position for the vehicle are increasing, manifold pressure for the vehicle is at or below the manifold pressure set point and engine speed for the vehicle is at or above the RPM set point.

In still yet further aspects thereof, the apparatus may also include a downshift notification circuit, activated by the processor subsystem based upon data received from the sensors, which issues a notification that the engine of the vehicle is being operated at an insufficient engine speed. The processor subsystem may determine when road speed for the vehicle is decreasing, when throttle position for the vehicle is increasing, when manifold pressure for the vehicle is increasing, when engine speed for the vehicle is decreasing and may activate the downshift notification circuit if both road speed and engine speed are decreasing and both throttle position and manifold pressure for the vehicle are increasing.

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In still further aspects thereof, the fuel overinjection circuit, the upshift notification circuit or the downshift notification circuit may include a horn for issuing a tone for a preselected time period.

In another embodiment, the present invention is of an apparatus for optimizing operation of a vehicle. The apparatus includes road speed, engine speed, manifold pressure and throttle position sensors, a processor subsystem coupled to each of the sensors to receive data therefrom and a memory subsystem, coupled to the processor subsystem, for storing a manifold pressure set point, an engine speed set point and present and prior levels for each one of the sensors. The apparatus further includes a fuel overinjection notification circuit, an upshift notification circuit and a downshift notification circuit, all of which are coupled to the processor subsystem. The fuel overinjection notification circuit issues notifications that excessive fuel is being supplied to the engine of the vehicle, the upshift notification circuit issues notifications that the engine of the vehicle is being operated at an excessive engine speed and the downshift notification circuit issues notifications that the engine of the vehicle is being operated at an insufficient engine speed. Based upon data received from the sensors, the processor subsystem determines when to activate the fuel overinjection circuit, the upshift notification circuit and the downshift notification circuit. In one aspect thereof, the fuel overinjection circuit includes a first horn for issuing a first tone for a first preselected time period, the upshift notification circuit includes a second horn for issuing a second tone for a second preselected time period and the downshift notification circuit includes a third horn for issuing a third tone for a third preselected time period.

In another aspect thereof, the processor subsystem may determine when road speed for the vehicle is increasing or decreasing, engine speed is increasing or decreasing, throttle

position for the vehicle is increasing and manifold pressure is increasing; may compare manifold pressure to the manifold pressure set point and engine speed to the RPM set point; and may activate the fuel overinjection notification circuit if both road speed and throttle position for the vehicle are increasing and manifold pressure for the vehicle is above the manifold pressure set point or if both throttle position and manifold pressure for the vehicle are increasing and road speed and engine speed for the vehicle are decreasing, the upshift notification circuit if both road speed and throttle position for the vehicle are increasing, manifold pressure for the vehicle is at or below the manifold pressure set point and engine speed for the vehicle is at or above the RPM set point and the downshift notification circuit if both road speed and engine speed are decreasing and both throttle position and manifold pressure for the vehicle are increasing.

In another aspect, the present invention is of an apparatus for optimizing operation of a vehicle which includes a radar detector for determining a distance separating a vehicle having an engine and an object in front of the vehicle and at least one sensor for monitoring operation of the vehicle. The apparatus further includes a processor subsystem, a memory subsystem and a vehicle proximity alarm circuit. The processor subsystem is coupled to the radar detector and the at least one sensor to receive data therefrom while the memory subsystem, in which a first vehicle speed/stopping distance table and present levels for each one of the at least one sensor are stored, and the vehicle proximity alarm circuit are coupled to the processor subsystem. Based on data received from the radar detector, the at least one sensor and the contents of the memory subsystem, the processor determines when to instruct the vehicle proximity alarm circuit to issue an alarm that the vehicle is too close to the object.

In one aspect thereof, the at least one sensor further includes a windshield wiper sensor for indicating whether a windshield wiper of the vehicle is activated and a second vehicle speed/stopping distance table is stored in the memory subsystem. In another aspect thereof, the apparatus further includes a throttle controller for controlling a throttle of the engine of the vehicle. The processor subsystem may selectively reduce the throttle based upon data received from the radar detector, the at least one sensor and the memory subsystem or may also count a total number of vehicle proximity alarms determined by the processor subsystem and selectively reduce the throttle based upon the total number of vehicle proximity alarms, as well. In yet another aspect thereof, the at least one sensor further includes a brake sensor for indicating whether a brake system of the vehicle is activated.

In other aspects thereof, the apparatus may be further provided with a fuel overinjection notification circuit for issuing a notification that excessive fuel is being supplied to the engine of the vehicle, an upshift notification circuit for issuing a notification that the engine of the vehicle is being operated at an excessive engine speed or a downshift notification circuit for issuing a notification that the engine of the vehicle is being operated at an insufficient engine speed. If a fuel overinjection notification circuit is provided, the apparatus includes a manifold pressure sensor and a throttle position sensor which also provide the processor subsystem with data used, together with a manifold pressure set point and prior levels for the sensors stored in the memory subsystem, to determine when to activate the fuel overinjection circuit. If an upshift notification circuit is provided, the apparatus includes an engine speed sensor which also provides the processor subsystem with data used, together with an RPM set point stored in the memory subsystem, to determine

when to activate the upshift notification circuit. Finally, if a downshift notification circuit is provided, the processor subsystem determines when to activate the downshift notification circuit based upon the data received from the plurality of sensors.

In still another embodiment, the present invention is of an apparatus for optimizing operation of a vehicle which includes a radar detector for determining a distance separating the vehicle from an object in front of it, a plurality of sensors, including a road speed sensor, an engine speed sensor, a manifold pressure sensor and a throttle position sensor, which collectively monitor the operation of the vehicle, a processor subsystem, a memory subsystem, a fuel overinjection notification circuit for issuing notification that excessive fuel is being supplied to the engine of the vehicle and a vehicle proximity alarm circuit for issuing alarms if the vehicle is too close to the object. Based upon data received from the sensors, the processor subsystem determines when to activate the fuel overinjection circuit. Based upon data received from the radar detector, the sensors and the memory subsystem, the processor subsystem also determines when to activate the vehicle proximity alarm circuit.

In one aspect of this embodiment of the invention, the processor subsystem determines when road speed for the vehicle is increasing or decreasing, when throttle position for the vehicle is increasing or decreasing, compares manifold pressure to a manifold pressure set point stored in the memory subsystem, determines when manifold pressure for the vehicle is increasing or decreasing and determines when engine speed for the vehicle is increasing or decreasing. In this aspect, the processor subsystem activates the fuel overinjection notification circuit if both road speed and throttle position for the vehicle are increasing and manifold pressure for the vehicle is above the manifold pressure set point

or if both throttle position and manifold pressure for the vehicle are increasing and road speed and engine speed for the vehicle are decreasing.

In a further aspect thereof, the apparatus may also include an upshift notification circuit for issuing notifications that the engine of the vehicle is being operated at an excessive engine speed, the processor subsystem determining when to activate the upshift notification circuit based upon data received from the sensors. In a related aspect thereof, the processor subsystem determines when road speed for the vehicle is increasing, determines when throttle position for the vehicle is increasing, compares manifold pressure to a manifold pressure set point stored in the memory subsystem and compares engine speed to an RPM set point stored in the memory subsystem. In this aspect, the processor subsystem activates the upshift notification circuit if both road speed and throttle position for the vehicle are increasing, manifold pressure for the vehicle is at or below the manifold pressure set point and engine speed for the vehicle is at or above the RPM set point.

In still another aspect thereof, the apparatus may also include a downshift notification circuit for issuing a notification that the engine of the vehicle is being operated at an insufficient engine speed. In this aspect, the processor subsystem determines when to activate the downshift notification circuit based upon data received from the sensors. In a related aspect thereof, the processor subsystem determines when road speed for the vehicle is decreasing, determines when throttle position for the vehicle is increasing, determines when manifold pressure for the vehicle is increasing and determines when engine speed for the vehicle is decreasing. In this aspect, the processor subsystem activates the downshift notification circuit if both road speed and engine speed are decreasing and both throttle position and manifold pressure for the vehicle are increasing.

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BRIEF DESCRIPTION OF THE DRAWINGS

The present invention may be better understood, and its numerous objects, features and advantages will become apparent to those skilled in the art by reference to the accompanying drawing, in which:

FIG. 1 is a block diagram of an apparatus for optimizing vehicle performance constructed in accordance with the teachings of the present invention; and

FIGS. 2A-B is a flow chart of a method for optimizing vehicle performance in accordance with the teachings of the present invention.

DETAILED DESCRIPTION

Referring first to Fig. 1, a system 10 for optimizing vehicle performance constructed in accordance with the teachings of the present invention will now be described in greater detail. The system 10 includes a processor subsystem 12, for example, a microprocessor, and a memory subsystem 14, for example, the memory subsystem 14 may include a nonvolatile random access memory (or "NVRAM"), coupled together by a bus 16 for bi-directional exchanges of address, data and control signals therebetween. The system 10 is installed in a vehicle (not shown) for which optimized performance and driver assist capabilities are desired. Although it is contemplated that the system 10 is suitable for use with any type vehicle, most commonly, the system 10 shall be installed in a truck.

Also coupled to the processor subsystem 12 are a series of sensors, each of which are periodically polled by the processor subsystem 12, to determine the respective states or levels thereof. The sensors include a road speed sensor 18, an RPM sensor 20, a manifold pressure sensor 22, a throttle sensor 24, a windshield wiper sensor 30 and a brake sensor 32. The sensors are selected to be either state or level sensors, depending on whether the

information to be collected thereby is a state, i.e., on/off or a level, for example, 35 mph. The road speed sensor 18 and the RPM sensor 20 are level sensors which respectively provide the processor subsystem 12 with signals which indicate the operating speed and engine speed for the vehicle. The road speed sensor 18 and the RPM sensor 20 may derive such information from any one of a variety of sources. For example, the road speed sensor 18 may be connected to receive the speed input signal transmitted to the vehicle's speedometer while the RPM sensor 20 may be connected to receive the RPM input signal to the vehicle's tachometer.

The manifold pressure sensor 22 is a level sensor which is positioned downstream of the throttle valve in the intake manifold of the vehicle to measure manifold pressure thereat. The throttle sensor 24 is a level sensor, attached to the throttle, which measures the extent to which the throttle is opened. The windshield wiper sensor 30 is a state sensor which determines whether the vehicle's windshield wipers are on or off. In alternate embodiments thereof, the windshield wiper sensor 30 may be electrically coupled to the on/off switch for the windshield wiper or to an output of the windshield wiper motor. Finally, the brake sensor 32 is a state sensor which determines whether the brakes of the vehicle have been engaged. For example, the brake sensor 32 may be electrically coupled to the brake system to detect the activation thereof.

Preferably, the memory subsystem 14 should include first and second registers 14a and 14b, each having sufficient bits for holding the state/level of each of the sensors 18, 20, 22, 24, 30 and 32. The first register 14a is used to hold the present state or level of each of the sensors 18, 20, 22, 24, 30 and 32 while the second register 14b is used to hold the prior state or level for each of the sensors 18, 20, 22, 24, 30 and 32. Each time the

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processor subsystem 12 writes the present state or level of the sensors 18, 20, 22, 24, 30 and 32 to the first register 14a, the prior contents of the first register 14a is written to the second register 14b which, in turn, discards the prior content thereof. The memory subsystem 14 is also used to hold information to be utilized by the processor subsystem 12 to determining whether to take corrective actions and/or issue notifications. Typically, such information is placed in the memory subsystem 14 while the system 10 is being initialized. The information includes one or more speed/distance tables which, when used in a manner which will be more fully described below in combination with data collected by the system 10, enable the processor subsystem 12 to determine if the vehicle is being operated unsafely and if corrective action is necessary. speed/stopping distance table. The information also includes two pre-set threshold values--a manifold psi set point and an engine RPM set point. As will also be more fully described below, the processor subsystem 12 uses these threshold values to determine when to issue notifications as to recommended changes in vehicle operation which, when executed by the driver, will optimize vehicle operation. The speed/stopping distance table(s) are based upon National Safety Council guidelines, vary according to the class of the vehicle and provide the relationship between the speed at which a vehicle is travelling and the distance which the vehicle will require to come to a complete stop if travelling at that speed. The manifold psi set point and RPM set point are selected based upon the manufacturer's guidelines for proper operation of the vehicle, vary based upon horsepower and engine size for the vehicle and represent thresholds above which the manifold pressure and engine rotation speed, respectively, for the vehicle should never exceed.

The system 10 also includes a throttle controller 26 capable of opening and/or closing the throttle, a radar detector 28 positioned to determine the distance separating the vehicle and an object in front of the vehicle, for example, a second vehicle travelling in the same direction, a series of circuits 34, 36, 38 and 40 for notifying the driver of the vehicle of recommended corrections in vehicle operation and alerting the driver to unsafe operating conditions and a power supply, for example a +12v battery, for providing power to the energy- demanding components of the system 10. The circuits 34, 36, 38 and 40 include an upshift notification circuit 34 for notifying the driver that an upshift is recommended, a downshift notification circuit 36 for notifying the driver that a downshift is recommended, an overinjection notification circuit 38 for notifying the driver that too much fuel is being supplied to the vehicle and a vehicle proximity alarm circuit 40 for alerting the driver when an object in front of the vehicle is too close. The circuits 34, 36 and 38 may be configured to provide visual and/or audible notifications, for example, using lights and/or horns. For example, the upshift circuit 34, the downshift notification circuit 36 and the overinjection notification circuit 38 may each include a horn, or other tone generating device, from which an audible notification may be generated at a selected pitch. Preferably, each of the notification circuits 34, 36 and 38 may be configured to provide distinct audible notifications, for example, tones at distinct pitches, so that the driver may readily distinguish which of the notification circuits 34, 36 and 38 have been activated by the processor subsystem 12. The proximity alarm circuit 40 may include one or more visual and/or audible warning devices such as lights and/or horns. For example, the proximity alarm circuit 40 may include a warning light and a warning horn. If desired, the proximity alarm circuit may also include a display for displaying the speed of the object in the vehicle's path and/or the stopping

distance in feet. The proximity alarm circuit 40 may be further equipped to provide audible indications of the speed of the object in the vehicle's path and/or the stopping distance in feed as well as selector circuitry for selecting both the information to be provided as well as the manner in which the information is to be conveyed.

Finally, the processor subsystem 12 is further provided with one or more mode select input lines which enable operator configuration of the operation of the system 10. For example, as described herein, the corrective operations consist of the combination of an automatic reduction of throttle and audio/visual alerts that the vehicle is being operated unsafely. It is specifically contemplated, however, that the system 10 include a mode select line for switching the system 10 between an "active" mode where both automatic throttle reduction and audio/visual alerts are generated and an "inactive" mode where only audio/visual alerts are generated.

Referring next to FIGS. 2A-B, a method for optimizing vehicle performance in accordance with the teachings of the present invention will now be described in greater detail. The method commences by powering up the processor subsystem 12, for example, by closing switch 42, thereby coupling the processor subsystem 12 to the power source 44 via line 43. Alternately, the processor subsystem 12 may be connected to the electrical system of the vehicle such that it will automatically power up when the vehicle is started. Of course, any of the other devices which also form part of the system 10 and require power may also be coupled to the line 43. Appropriate voltage levels for the processor subsystem 12, as well as any additional power-demanding devices coupled to the power source 44, would be provided by voltage divider circuitry (not shown).

Once the system 10 is powered up, the method begins at step 50 by the processor subsystem 12 polling the road speed sensor 18, the RPM sensor 20, the manifold pressure sensor 22, the throttle sensor 24, the windshield wiper sensor 30 and the brake sensor 32 to determine their respective levels or states and places the acquired information in the first data register 14a. Of course, it should be noted, however, that polling of the sensors by the processor subsystem 12 is but one technique by which the processor subsystem 12 may acquire the requisite information. Alternately, each sensor 20, 22, 24, 30 and 32 may periodically place its level or state in one or more bits of the first data register 14a. The processor subsystem 12 would then acquire information by checking the contents of the first data register 14a at selected time intervals.

Proceeding to step 52, the processor subsystem 12 examines the contents of the first data register 14a to determine the operating speed of the vehicle. If the processor subsystem 12 determines that the vehicle is stationary, i.e., the operating speed of the vehicle is zero, the processor subsystem 12 will return to step 50 where the road speed sensor 18, the RPM sensor 20, the manifold pressure sensor 22, the throttle sensor 24, the windshield wiper sensor 30 and the brake sensor 32 will be repeatedly polled until an operating speed greater than zero is detected at step 52. While polling may be conducted at a variety of time intervals, a polling period of one second appears suitable for the uses contemplated herein.

Returning to step 52, once an operating speed greater than zero is detected by the processor subsystem 12, the method proceeds to step 54 where the processor subsystem 12 again polls the operating speed sensor 18, the RPM sensor 20, the manifold pressure sensor 22, the throttle sensor 24, the windshield wiper sensor 30 and the brake sensor 32, to determine their respective levels or states and places the acquired information in the first data

register 14a. In turn, the contents of the first data register 14a is placed in the second data register 14b.

Proceeding now to step 56, from the polled value of the road speed sensor 18, the processor subsystem 12 determines whether the vehicle is travelling faster than 20 mph. If the operating speed of the vehicle is less than 20 mph, the method returns to step 54 where the sensors 18, 20, 22, 24, 30 and 32 will be repeatedly polled and the value of the road speed sensor examined until the processor subsystem 12 determines that the vehicle is travelling faster than 20 mph. If, however, the processor subsystem 12 determines that the vehicle is travelling faster than 20 mph, the method proceeds to step 58 where the processor subsystem 12 then determines if the vehicle is travelling faster than 50 mph, again by checking the contents of the first data register 14a.

Past this juncture, the method of the present invention will proceed through a series of steps designed to optimize vehicle operation. However, prior to optimizing vehicle operation, the processor subsystem 12 will determine if the vehicle is being operated unsafely. If so, the processor subsystem 12 will initiate corrective operations before commencing vehicle operation optimization. More specifically, if the processor subsystem 12 determines at step 58 that the vehicle is travelling at a speed greater than 50 mph, the processor subsystem 12 will initiate a process by which it will determine whether the vehicle is being operated unsafely.

The processor subsystem 12 determines that the vehicle is being operated unsafely if the speed of the vehicle is such that the stopping distance for the vehicle d is greater than the distance separating the vehicle from an object, for example, a second vehicle, in its path. In order to make this determination, the processor subsystem 12 is provided access to at least

one speed/distance table. For example, stored at location 14c within the memory subsystem 14 is a first speed/stopping distance table. The speed/stopping distance table contains the relationship between vehicle speed and stopping distance. Thus, for any given speed, the processor subsystem 12 may look-up the stopping distance for that speed. Preferably, the memory subsystem 14 should contain multiple speed/stopping distance tables so that differences in road conditions and/or vehicle class may be taken into account. For example, the speed/stopping distance table stored at location 14c may be a speed/stopping distance table for dry roads while a speed/stopping distance table for wet roads may be stored at location 14d. If desired, the memory subsystem 14 may also contain additional speed/stopping distance tables for other vehicle classes. If such additional tables were provided, however, the disclosed method would need to be modified to include additional steps in which the operator provides the vehicle's class and the processor subsystem 12 selects the appropriate speed/stopping distance tables for the indicated class of vehicle.

To make the aforementioned determination of unsafe vehicle operation, the method proceeds to step 60 where the processor subsystem 12 sets the value of the expression ALARM to 1. The method then proceeds to step 62 where the processor subsystem 12 examines the state of the wiper sensor 32 and selects a speed/stopping distance table based upon the state of the wiper sensor 32. If the state of the wiper sensor 32 indicates that the windshield wiper is off, the processor subsystem 12 concludes that the vehicle is being operated in dry conditions and selects the speed/stopping distance table stored at the location 14c of the memory subsystem 14. If, however, the state of the wiper sensor 32 indicates that the windshield wiper is on, the processor subsystem 12 concludes that the vehicle is being operated in wet conditions and selects the speed/stopping distance table stored at the

location 14d of the memory subsystem 14. From the selected speed/stopping distance table 14c or 14d, the processor subsystem 12 then retrieves the stopping distance for the speed at which the vehicle is travelling.

Continuing on to step 64, the processor subsystem 12 determines the distance of the vehicle to an object in its path, i.e., a second vehicle travelling in front of the vehicle and in the same direction. To do so, the processor subsystem 12 instructs the radar device 28 to determine the distance between the vehicle and the second vehicle in front of it. Upon determining the distance separating the two vehicles, the radar device 28 transmits the determined separation distance to the processor subsystem 12. At step 66, the processor subsystem 12 determines if the two vehicles are separated by a safe distance. To do so, the processor subsystem 12 compares the distance separating the two vehicles to the retrieved stopping distance for the vehicle. If the determined distance separating the two vehicles is greater than the retrieved stopping distance for the vehicle, the processor subsystem 12 determines that the vehicle is being operated safely. If, however, the determined distance separating the two vehicles is less than the retrieved stopping distance, the processor subsystem 12 determines that the vehicle is being operated unsafely.

If the processor subsystem 12 determines at step 66 that the vehicle is being operated unsafely, the processor subsystem 12 initiates appropriate corrective action. At step 68, the processor subsystem 12 determines whether the vehicle brake is on by examining the state of the brake sensor 32. If the brake is on, the processor subsystem 12 concludes that the driver is taking corrective action and that further corrective action is not necessary. If, however, the processor subsystem 12 determines that the vehicle brake is off, the method proceeds to step 70 where the processor subsystem examines the level of the vehicle speed

sensor to determine if the speed of the vehicle is less than 35 mph. If the speed of the vehicle is less than 30 mph, the processor subsystem 12 concludes that no further corrective action will be taken.

If, however, the processor subsystem 12 determines that the speed of the vehicle is greater than 35 mph, the method proceeds to step 72 where the processor subsystem 12 selects a throttle reduction value based upon the value of the expression ALARM. Generally, the severity of the corrective action to be initiated by the processor subsystem 12 is varied depending on the number of times that corrective action has been taken and, more specifically, the severity of the selective corrective action increases with the value of the expression ALARM. For example, in the embodiment of the invention disclosed herein, if ALARM = 1, a 25% throttle reduction is selected, if ALARM = 2, a 50 throttle reduction is selected and, if ALARM $\geq$ 3, a 100% throttle reduction is selected. By reducing the throttle, the transport of fuel to the engine is retarded and the vehicle will begin to decelerate.

Continuing on to step 74, the processor subsystem 12 determines the extent to which the throttle is open using the throttle level provided by the throttle sensor 24 and, using throttle control 26, reduces the throttle by the selected percentage. At step 76, the processor subsystem 12 selects an alert mode, again based upon the value of the expression ALARM. As before, the severity of the alert mode may increase with the value of ALARM. For example, when ALARM = 1, a warning light may be activated in a flash mode while, when $2 \leq$ ALARM ≤ 3, an audible alert which lasts for a first selected time period, for example, two seconds, may be activated in combination with the flashing warning light and when

ALARM $\geq$ 4, an audible alert which lasts for a second, longer, time period, for example, six seconds, may be activated in combination with the flashing light.

Proceeding to step 78, the processor subsystem 12 issues an alert to the operator of the vehicle in accordance with the selected alert mode. To do so, the processor subsystem 12 activates vehicle proximity alarm circuit 40 in accordance with the selected alert mode. After issuing the alert at step 78, the method proceeds to step 80 where the processor subsystem 12 waits a selected period before taking any further action. The wait period is intended to provide sufficient time to see if the previously initiated corrective action eliminates the hazardous condition. As disclosed herein, a wait period of 10 seconds is suitable. However, wait periods of various lengths should be equally suitable for the uses contemplated herein.

Upon expiration of the wait period, the value of the expression ALARM is incremented by one at step 82 and, at step 84, the processor subsystem 12 again polls the operating speed sensor 18, the RPM sensor 20, the manifold pressure sensor 22, the throttle sensor 24, the windshield wiper sensor 30 and the brake sensor 32, to determine their respective levels or states and places the acquired information in the first data register 14a. The method returns to step 64 where the distance between the vehicle and the object in its path is re-determined. The processor subsystem 12 continues to take corrective action until it determines that the vehicle is no longer being operated in a hazardous manner. More specifically, the processor subsystem 12 will conclude that the hazardous condition has been corrected when it either: determines at step 66 that the distance separating the vehicle and the object is within the stopping distance for the vehicle, determines at step 68 that the vehicle brake is on or determines at step 70 that the speed of the vehicle is less than 35 mph.

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Upon making such a determination, the method proceeds to step 86 where the processor subsystem 12 deactivated the vehicle proximity alarm circuit 40 to turn off the flashing light.

The method of optimizing vehicle operation in accordance with the teachings of the present invention will now be described in greater detail. Returning now to step 58, if the processor subsystem 12 determines that the vehicle is travelling slower than 50 mph, or if the processor subsystem 12 determines at step 66 that the distance separating the vehicle and the object is within the stopping distance for the vehicle or if the processor subsystem 12 determines at step 68 that the vehicle brake is on or if the processor subsystem 12 determines at step 70 that the speed of the vehicle is less than 35 mph, the method proceeds, after deactivation of the vehicle proximity alarm circuit 40, to step 88 where the processor subsystem 12 determines if the road speed of the vehicle is changing. To do so, the processor subsystem 12 compares the speed of the vehicle maintained in the first register 14a to the speed of the vehicle maintained in the second register 14b.

If the vehicle speed maintained in the first register 14a is greater than the vehicle speed maintained in the second register 14b, the vehicle is accelerating. If so, the method continues to step 90 where the processor subsystem 12 determines if the throttle position is increasing. To do so, the processor subsystem 12 compares the throttle level, i.e., the extent to which the throttled is opened, maintained in the first register 14a to the throttle level maintained in the second register 14b. If the throttle position has not increased, the processor subsystem 12 determines that, since the vehicle is accelerating but fuel consumption is not increasing, no modification of vehicle operation is necessary. Accordingly, the method returns to step 54 for a next polling of the sensors 18, 20, 22 24, 30 and 32.

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If, however, the processor subsystem 12 determines at step 90 that the throttle position has increased, the method proceeds to step 92 where the processor subsystem 12 determines if the manifold pressure level maintained in the first register 14a has exceeded the manifold pressure set point for the vehicle. If the vehicle's road speed and throttle position are increasing and the manifold pressure for the vehicle is at or below the manifold pressure set point, the processor subsystem 12 proceeds to step 93 where the sensors 18, 20, 22, 24, 30 and 32 are again polled and on to step 94 where the processor subsystem 12 compares the engine speed level maintained in the first register 14a to the RPM set point stored in the memory subsystem 14 to determine if the engine speed has reached the RPM set point. If the engine speed has not reached the RPM set point, the method returns to step 93 where the sensors 18, 20, 22, 24, 30 and 32 are repeatedly polled until the processor subsystem 12 determines that the engine speed has reached the RPM set point. Once the engine speed has reached the RPM set point, the processor subsystem 12 determines that the vehicle needs to be upshifted and, proceeding to step 95, the processor subsystem 12 will activate the upshift notification circuit 34 to issue an audible alert for a selected time period, for example, 6 seconds, thereby notifying the driver that, in order to optimize vehicle operation, an upshift should be performed. The method then returns to step 54 for a next polling of the sensors 18, 20, 22 24, 30 and 32.

Returning to step 92, if the vehicle's road speed and throttle position are increasing and the manifold pressure for the vehicle is above the manifold pressure set point, the processor subsystem 12 determines that too much fuel is being provided to the engine and proceeding to step 96, the processor subsystem 12 will activate the overinjection notification circuit 38 to issue an audible alert for a selected time period, for example, 6 seconds,

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thereby notifying the driver that, in order to optimize vehicle operation, the amount of fuel being supplied to the engine should be reduced. The method then returns to step 54 for a next polling of the sensors 18, 20, 22 24, 30 and 32.

Returning to step 88, if the processor subsystem 12 determines, when comparing the speed of the vehicle maintained in the first register 14a to the speed of the vehicle maintained in the second register 14b, that the speed of the vehicle is decreasing, the method proceeds to step 98 where the processor subsystem 12 determines if the throttle position is changing. To do so, the processor subsystem 12 compares the throttle level, i.e., the extent to which the throttled is opened, maintained in the first register 14a to the throttle level maintained in the second register 14b. If the throttle position has either remained constant or decreased, the processor subsystem 12 determines that, since fuel consumption is either constant or reduced, no modification of vehicle operation is necessary. Accordingly, the method returns to step 54 for a next polling of the sensors 18, 20, 22 24, 30 and 32.

If, however, the processor subsystem 12 determines at step 98 that the throttle position has increased, the method proceeds to step 100 where the processor subsystem 12 determines if the manifold pressure is increasing. To do so, the processor subsystem 12 compares the manifold pressure level maintained in the first register 14a to the manifold pressure level maintained in the second register 14b. If the manifold pressure level maintained in the first register 14a is less than the manifold pressure level maintained in the second register 14b, the processor subsystem 12 determines that, since manifold pressure is decreasing, no modification of vehicle operation is necessary. Accordingly, the method returns to step 54 for a next polling of the sensors 18, 20, 22 24, 30 and 32.

If, however, the manifold pressure level maintained in the first register 14a is greater than the manifold pressure level maintained in the second register 14b, the processor subsystem 12 determines that the manifold pressure for the vehicle is increasing and the method proceeds to step 102 where the processor subsystem 12 determines if the engine speed is increasing. To do so, the processor subsystem 12 compares the engine speed level maintained in the first register 14a to the engine speed level maintained in the second register 14b. If the engine speed level maintained in the first register 14a is less than the engine speed level maintained in the second register 14b, the processor subsystem 12 determines that, since engine speed is increasing, no modification of vehicle operation is necessary. Accordingly, the method returns to step 54 for a next polling of the sensors 18, 20, 22 24, 30 and 32.

If, however, the engine speed level maintained in the first register 14a is less than the engine speed level maintained in the second register 14b, the processor subsystem 12 determines that, since the manifold pressure is increasing while the engine speed is decreasing, too much fuel is being supplied to the engine. Accordingly, at step 104, the processor subsystem 12 activates the overinjection notification circuit 38 to issue an audible alert for a selected time period, for example, 6 seconds, thereby notifying the driver that, in order to optimize vehicle operation, the amount of fuel being supplied to the engine should be reduced.

Proceeding on to step 106, the sensors 18, 20, 22 24, 30 and 32 are again polled and, at step 108, the processor subsystem 12 determines if the engine speed is decreasing, again by comparing the engine speed level maintained in the first and second registers 14a and 14b. If the engine speed has not decreased, the method returns to step 104 where the

processor subsystem 12 again activates the overinjection notification circuit 38 to issue another audible alert notifying the driver that, in order to optimize vehicle operation, the amount of fuel being supplied to the engine should be reduced. Thus, the driver will be repeatedly notified of the overinjection condition until the processor subsystem 12 determines, at step 108, that the engine speed is decreasing. The method will then proceed to step 110 where, since the processor subsystem 12 has determined that, since the engine speed is decreasing, the vehicle should be downshifted. Accordingly, at step 110, the processor subsystem 12 activates the downshift notification circuit 36 to issue an audible alert for a selected time period, for example, 6 seconds, thereby notifying the driver that, in order to optimize vehicle operation, the vehicle should be downshifted. The method then returns to step 54 for a next polling of the sensors 18, 20, 22 24, 30 and 32. The method will repeatedly loop through the aforementioned process to continuously determine if the vehicle is being operated unsafely, take appropriate corrective action and to provide notifications to the driver as to how operation of the vehicle may be optimized until the processor subsystem 12 is powered down or the vehicle is turned off.

Thus, there has been described and illustrated herein, an apparatus for optimizing vehicle operation which combines both operator notifications of recommended corrections in vehicle operation with automatic modification of vehicle operation under certain circumstances. By incorporating the disclosed apparatus in a vehicle, not only will certain hazardous operations of the vehicle be prevented but also the driver will be advised of certain actions which will enable the vehicle to be operated with greater fuel efficiency. However, those skilled in the art will recognize that many modifications and variations besides those specifically mentioned herein may be made without departing substantially from

the concept of the present invention. Accordingly, it should be clearly understood that the form of the invention described herein is exemplary only and is not intended as a limitation on the scope of the invention.

WHAT IS CLAIMED IS:

1. Apparatus for optimizing operation of a vehicle, comprising:

a plurality of sensors coupled to a vehicle having an engine, said plurality of sensors, which collectively monitor operation of said vehicle, including a road speed sensor, a manifold pressure sensor and a throttle position sensor;

a processor subsystem, coupled to each one of said plurality of sensors, to receive data therefrom;

a memory subsystem, coupled to said processor subsystem, said memory subsystem storing therein a manifold pressure set point and present and prior levels for each one of said plurality of sensors;

a fuel overinjection notification circuit coupled to said processor subsystem, said fuel overinjection notification circuit issuing a notification that excessive fuel is being supplied to said engine of said vehicle;

said processor subsystem determining, based upon data received from said plurality of sensors, when to activate said fuel overinjection circuit.

2. Apparatus for optimizing operation of a vehicle according to claim 1 wherein said processor subsystem further comprises:

means for determining when road speed for said vehicle is increasing;

means for determining when throttle position for said vehicle is increasing; and

means for comparing manifold pressure to said manifold pressure set point;

said processor subsystem activating said fuel overinjection notification circuit if both road speed and throttle position for said vehicle are increasing and manifold pressure for said vehicle is above said manifold pressure set point.

3. Apparatus for optimizing operation of a vehicle according to claim 1 wherein said fuel overinjection circuit further comprises a horn for issuing a tone for a preselected time period.

4. Apparatus for optimizing operation of a vehicle according to claim 1 wherein said plurality of sensors coupled to said vehicle further include an engine speed sensor.

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1 4 5. Apparatus for optimizing operation of a vehicle according to claim 4 wherein said
2 processor subsystem further comprises:
3 means for determining when road speed for said vehicle is decreasing;
4 means for determining when throttle position for said vehicle is increasing;
5 means for determining when manifold pressure for said vehicle is increasing; and
6 means for determining when engine speed for said vehicle is decreasing;
7 said processor subsystem activating said fuel overinjection notification circuit if both
8 throttle position and manifold pressure for said vehicle are increasing and road speed and
9 engine speed for said vehicle are decreasing.

a

1 8 6. Apparatus for optimizing operation of a vehicle according to claim 5 wherein said
2 processor subsystem further comprises:
3 means for determining when road speed for said vehicle is increasing;
4 means for determining when throttle position for said vehicle is increasing; and
5 means for comparing manifold pressure to said manifold pressure set point;
6 said processor subsystem activating said fuel overinjection notification circuit if both
7 road speed and throttle position for said vehicle are increasing and manifold pressure for said
8 vehicle is above said manifold pressure set point.

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1 9 7. Apparatus for optimizing operation of a vehicle according to claim 6 wherein
2 said fuel overinjection circuit further comprises a horn for issuing a tone for a preselected
3 time period.

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8. Apparatus for optimizing operation of a vehicle according to claim 4 and further comprising:

an upshift notification circuit coupled to said processor subsystem, said upshift notification circuit issuing a notification that said engine of said vehicle is being operated at an excessive engine speed;

said memory subsystem further storing an RPM set point; and

said processor subsystem determining, based upon data received from said plurality of sensors, when to activate said upshift notification circuit.

5 9. Apparatus for optimizing operation of a vehicle according to claim 8 wherein said processor subsystem further comprises:

means for determining when road speed for said vehicle is increasing;

means for determining when throttle position for said vehicle is increasing;

means for comparing manifold pressure to said manifold pressure set point; and

means for comparing engine speed to said RPM set point;

said processor subsystem activating said upshift notification circuit if both road speed and throttle position for said vehicle are increasing, manifold pressure for said vehicle is at or below said manifold pressure set point and engine speed for said vehicle is at or above said RPM set point.

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10. Apparatus for optimizing operation of a vehicle according to claim 9 wherein said upshift notification circuit further comprises a horn for issuing a tone for a preselected time period.

11. Apparatus for optimizing operation of a vehicle according to claim 4 and further comprising:

a downshift notification circuit coupled to said processor subsystem, said downshift notification circuit issuing a notification that said engine of said vehicle is being operated at an insufficient engine speed; and

said processor subsystem determining, based upon data received from said plurality of sensors, when to activate said downshift notification circuit.

12. Apparatus for optimizing operation of a vehicle according to claim 11 wherein said processor subsystem further comprises:

means for determining when road speed for said vehicle is decreasing;

means for determining when throttle position for said vehicle is increasing;

means for determining when manifold pressure for said vehicle is increasing; and

means for determining when engine speed for said vehicle is decreasing;

said processor subsystem activating said downshift notification circuit if both road speed and engine speed are decreasing and both throttle position and manifold pressure for said vehicle are increasing.

13. Apparatus for optimizing operation of a vehicle according to claim 12 wherein said downshift notification circuit further comprises a horn for issuing a tone for a preselected time period.

13 ~~14~~. Apparatus for optimizing operation of a vehicle, comprising:

a plurality of sensors coupled to a vehicle having an engine, said plurality of sensors, which collectively monitor operation of said vehicle, including a road speed sensor, an engine speed sensor, a manifold pressure sensor and a throttle position sensor;

a processor subsystem, coupled to each one of said plurality of sensors, to receive data therefrom;

a memory subsystem, coupled to said processor subsystem, said memory subsystem storing therein a manifold pressure set point, an engine speed set point and present and prior levels for each one of said plurality of sensors;

a fuel overinjection notification circuit coupled to said processor subsystem, said fuel overinjection notification circuit issuing a notification that excessive fuel is being supplied to said engine of said vehicle;

an upshift notification circuit coupled to said processor subsystem, said upshift notification circuit issuing a notification that said engine of said vehicle is being operated at an excessive engine speed;

a downshift notification circuit coupled to said processor subsystem, said downshift notification circuit issuing a notification that said engine of said vehicle is being operated at an insufficient engine speed;

said processor subsystem determining, based upon data received from said plurality of sensors, when to activate said fuel overinjection circuit, said upshift notification circuit and said downshift notification circuit.

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14 ~~15~~. Apparatus for optimizing operation of a vehicle according to claim 13 ~~14~~ wherein: said fuel overinjection circuit further comprises a first horn for issuing a first tone for a first preselected time period;

said upshift notification circuit further comprises a second horn for issuing a second tone for a second preselected time period; and

said downshift notification circuit further comprises a third horn for issuing a third tone for a third preselected time period.

15 ~~16~~. Apparatus for optimizing vehicle performance according to claim 13 ~~14~~ wherein said processor subsystem further comprises:

means for determining when road speed for said vehicle is increasing or decreasing

means for determining when throttle position for said vehicle is increasing;

means for comparing manifold pressure to said manifold pressure set point;

means for comparing engine speed to said RPM set point;

means for determining when manifold pressure is increasing; and

means for determining when engine speed is increasing or decreasing;

said processor subsystem activating said fuel overinjection notification circuit if both road speed and throttle position for said vehicle are increasing and manifold pressure for said vehicle is above said manifold pressure set or if both throttle position and manifold pressure for said vehicle are increasing and road speed and engine speed for said vehicle are decreasing;

said processor subsystem activating said upshift notification circuit if both road speed and throttle position for said vehicle are increasing, manifold pressure for said vehicle is at

or below said manifold pressure set point and engine speed for said vehicle is at or above said RPM set point; and

said processor subsystem activating said downshift notification circuit if both road speed and engine speed are decreasing and both throttle position and manifold pressure for said vehicle are increasing.

16 ~~17~~. Apparatus for optimizing operation of a vehicle according to claim ~~16~~ 15 wherein:

said fuel overinjection circuit further comprises a first horn for issuing a first tone for a first preselected time period;

said upshift notification circuit further comprises a second horn for issuing a second tone for a second preselected time period; and

said downshift notification circuit further comprises a third horn for issuing a third tone for a third preselected time period.

18. Apparatus for optimizing operation of a vehicle, comprising:

a radar detector, said radar detector determining a distance separating a vehicle having an engine and an object in front of said vehicle;

at least one sensor coupled to said vehicle for monitoring operation thereof, said at least one sensor including a road speed sensor;

a processor subsystem, coupled to said radar detector and said at least one sensor, to receive data therefrom;

a memory subsystem, coupled to said processor subsystem, said memory subsystem storing a first vehicle speed/stopping distance table and present levels for each one of said at least one sensor;

a vehicle proximity alarm circuit coupled to said processor subsystem, said vehicle proximity alarm circuit issuing an alarm that said vehicle is too close to said object;

said processor subsystem determining, based upon data received from said radar detector, said at least one sensor and said memory subsystem, when to activate said vehicle proximity alarm circuit.

19. Apparatus for optimizing operation of a vehicle according to claim 18 wherein:

said at least one sensor further includes a windshield wiper sensor for indicating whether a windshield wiper of said vehicle is activated; and

said memory subsystem further storing a second vehicle speed/stopping distance table.

19 ~~20~~. Apparatus for optimizing operation of a vehicle according to claim 17 ~~18~~ and further comprising:

a throttle controller for controlling a throttle of said engine of said vehicle; and

said processor subsystem selectively reducing said throttle based upon data received from said radar detector, said at least one sensor and said memory subsystem.

20 ~~21~~. Apparatus for optimizing operation of a vehicle according to claim 19 ~~20~~ wherein said at least one sensor further includes a brake sensor for indicating whether a brake system of said vehicle is activated.

21 ~~22~~. Apparatus for optimizing operation of a vehicle according to claim 19 ~~20~~ wherein said processor subsystem further comprises:

means for counting a total number of vehicle proximity alarms determined by said processor subsystem;

means for selectively reducing said throttle based upon said total number of vehicle proximity alarms.

23. Apparatus for optimizing vehicle operation according to claim 18 wherein:

said plurality of sensors further include a manifold pressure sensor and a throttle position sensor;

said memory subsystem further storing therein a manifold pressure set point and prior levels for each one of said plurality of sensors;

a fuel overinjection notification circuit coupled to said processor subsystem, said fuel overinjection notification circuit issuing a notification that excessive fuel is being supplied to said engine of said vehicle;

said processor subsystem determining, based upon data received from said plurality of sensors, when to activate said fuel overinjection circuit.

24. Apparatus for optimizing operation of a vehicle according to claim 23 wherein said plurality of sensors coupled to said vehicle further include an engine speed sensor.

25. Apparatus for optimizing operation of a vehicle according to claim 24 and further comprising:

an upshift notification circuit coupled to said processor subsystem, said upshift notification circuit issuing a notification that said engine of said vehicle is being operated at an excessive engine speed;

said memory subsystem further storing an RPM set point; and

said processor subsystem determining, based upon data received from said plurality of sensors, when to activate said upshift notification circuit.

26. Apparatus for optimizing operation of a vehicle according to claim 25 and further comprising:

a downshift notification circuit coupled to said processor subsystem, said downshift notification circuit issuing a notification that said engine of said vehicle is being operated at an insufficient engine speed; and

said processor subsystem determining, based upon data received from said plurality of sensors, when to activate said downshift notification circuit.

27. Apparatus for optimizing operation of a vehicle, comprising:

a radar detector, said radar detector determining a distance separating a vehicle having an engine and an object in front of said vehicle;

a plurality of sensors coupled to a vehicle having an engine, said plurality of sensors, which collectively monitor operation of said vehicle, including a road speed sensor, an engine speed sensor, a manifold pressure sensor and a throttle position sensor;

a processor subsystem, coupled to said radar detector and each one of said plurality of sensors, to receive data therefrom;

a memory subsystem, coupled to said processor subsystem, said memory subsystem storing therein a first vehicle speed/stopping distance table, a manifold pressure set point and present and prior levels for each one of said plurality of sensors;

a fuel overinjection notification circuit coupled to said processor subsystem, said fuel overinjection notification circuit issuing a notification that excessive fuel is being supplied to said engine of said vehicle;

said processor subsystem determining, based upon data received from said plurality of sensors, when to activate said fuel overinjection circuit

a vehicle proximity alarm circuit coupled to said processor subsystem, said vehicle proximity alarm circuit issuing an alarm that said vehicle is too close to said object;

said processor subsystem determining, based upon data received from said radar detector, said at least one sensor and said memory subsystem, when to activate said vehicle proximity alarm circuit.

24 ~~28~~. Apparatus for optimizing operation of a vehicle according to claim 23 ~~27~~ wherein said processor subsystem further comprises:

means for determining when road speed for said vehicle is increasing or decreasing;

means for determining when throttle position for said vehicle is increasing or decreasing; and

means for comparing manifold pressure to said manifold pressure set point;

means for determining when manifold pressure for said vehicle is increasing or decreasing; and

means for determining when engine speed for said vehicle is increasing or decreasing;

said processor subsystem activating said fuel overinjection notification circuit if both road speed and throttle position for said vehicle are increasing and manifold pressure for said vehicle is above said manifold pressure set point or if both throttle position and manifold pressure for said vehicle are increasing and road speed and engine speed for said vehicle are decreasing.

29. Apparatus for optimizing operation of a vehicle according to claim 27 and further comprising:

an upshift notification circuit coupled to said processor subsystem, said upshift notification circuit issuing a notification that said engine of said vehicle is being operated at an excessive engine speed;

said memory subsystem further storing an RPM set point; and

said processor subsystem determining, based upon data received from said plurality of sensors, when to activate said upshift notification circuit.

30. Apparatus for optimizing operation of a vehicle according to claim 29 wherein said processor subsystem further comprises:

means for determining when road speed for said vehicle is increasing;

means for determining when throttle position for said vehicle is increasing;

means for comparing manifold pressure to said manifold pressure set point; and

means for comparing engine speed to said RPM set point;

said processor subsystem activating said upshift notification circuit if both road speed and throttle position for said vehicle are increasing, manifold pressure for said vehicle is at or below said manifold pressure set point and engine speed for said vehicle is at or above said RPM set point.

31. Apparatus for optimizing operation of a vehicle according to claim 27 and further comprising:

a downshift notification circuit coupled to said processor subsystem, said downshift notification circuit issuing a notification that said engine of said vehicle is being operated at an insufficient engine speed; and

said processor subsystem determining, based upon data received from said plurality of sensors, when to activate said downshift notification circuit.

32. Apparatus for optimizing operation of a vehicle according to claim 31 wherein said processor subsystem further comprises:

means for determining when road speed for said vehicle is decreasing;

means for determining when throttle position for said vehicle is increasing;

means for determining when manifold pressure for said vehicle is increasing; and

means for determining when engine speed for said vehicle is decreasing;

said processor subsystem activating said downshift notification circuit if both road speed and engine speed are decreasing and both throttle position and manifold pressure for said vehicle are increasing.

APPARATUS FOR OPTIMIZING VEHICLE OPERATION

Abstract of the Disclosure

Apparatus for optimizing operation of an engine-driven vehicle. The apparatus includes a processor subsystem, a memory subsystem, a road speed sensor, an engine speed sensor, a manifold pressure sensor, a throttle position sensor, a radar detector for determining the distance separating the vehicle from an object in front of it, a windshield wiper sensor for indicating whether a windshield wiper of the vehicle is activated, a brake sensor for determining whether the brakes of the vehicle have been activated, a fuel overinjection notification circuit for issuing notifications that excessive fuel is being supplied to the engine of the vehicle, an upshift notification circuit for issuing notifications that the engine of the vehicle is being operated at an excessive engine speed, a downshift notification circuit for issuing notifications that the engine of the vehicle is being operated at an insufficient engine speed, a vehicle proximity alarm circuit for issuing an alarm that the vehicle is too close to an object in front of the vehicle and a throttle controller for automatically reducing the amount of fuel supplied to the engine if the vehicle is too close to the object in front of it. Based upon data received from the sensors and data stored in the memory subsystem, the processor determines whether to activate the fuel overinjection notification circuit, the upshift notification circuit, the downshift notification circuit, the vehicle proximity alarm circuit or the throttle controller.

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DECLARATION AND POWER OF ATTORNEY

As a below-named joint inventor, I hereby declare that:

My residence, post office address, and citizenship are as stated below next to my name.

I believe I am an original, first, and joint inventor of the subject matter which is claimed and for which a patent is sought on the invention, design, or discovery entitled:

"METHOD AND APPARATUS FOR OPTIMIZING VEHICLE OPERATION"

the specification of which is attached hereto.

I have reviewed and understand the contents of the above-identified specification, including the claims, as amended by any amendment referred to above;

I acknowledge the duty to disclose to the Office all information known to me to be material to the patentability of this application as defined by Title 37, Code of Federal Regulations, § 1.56.

I hereby claim foreign priority benefits under Title 35 U.S.C. § 119 of any foreign application(s) for patent or inventor's certificate listed below and have also identified below any foreign application for patent or inventor's certificate having a filing date before that of the application on which priority is claimed.

NONE

I hereby claim the benefit under Title 35, United States Code, § 120 of any United States application(s) listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States application(s) in the manner provided by

the first paragraph of Title 35, United States Code, § 112, I acknowledge the duty to disclose to the Office all information known to me to be material to patentability as defined in § 1.56 which became available between the filing date of any prior application(s) and the national or PCT international filing date of this application.

NONE

I hereby appoint:

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all of the firm of HARRIS, TUCKER & HARDIN, P.C., my attorneys with full power of substitution and revocation, to prosecute this application and to transact all business in the United States Patent and Trademark Office connected therewith, and to file and prosecute any international patent applications filed thereon before any international authorities under the Patent Cooperation Treaty.

Send correspondence to:	Michael S. Bush Harris, Tucker & Hardin, P.C. 13355 Noel Road, Suite 2100 Dallas, Texas 75240-6604
Direct telephone calls to:	Michael S. Bush at (972) 233-5712
Atty. Docket No.:	TASD B8542

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

Full name of first inventor: Harvey Slepian

Inventor's signature: _____

Date: March 3, 1997

Residence (City, County, State):

1426 W. Daytona
Peoria, Illinois 61614 IL

Citizenship: United States

Post Office Address:

Full name of second inventor: Loran Sutton

Inventor's signature: _____

Date: March 3, 1997

Residence (City, County, State):

1135 N. Nancy Street
East Peoria, Illinois 61611 IL

Citizenship: United States

Post Office Address:

67735

TASD
B8542

PATENT

VERIFIED STATEMENT (DECLARATION) CLAIMING SMALL ENTITY STATUS
[37 CFR 1.9(f) and 1.27(c) - SMALL BUSINESS CONCERN

I hereby declare that I am:

[ ] the owner of the small business concern identified below:
[X] an officer of the small business concern empowered to act on behalf of the concern identified below:

NAME OF CONCERN: Tas Distributing Co., Inc.
ADDRESS OF CONCERN: 806 W. Pioneer Pkwy
Peoria, Illinois 61615

I hereby declare that the above-identified concern qualifies as a small business concern as defined in 13 CFR 121.3-18, and reproduced in 37 CFR 1.9(d), for purposes of paying reduced fees under §41(a) and (b) of Title 35, United States Code, in that the number of employees of the concern, including those of its affiliates, does not exceed 500 persons. For purposes of this statement, (1) the number of employees of the business concern is averaged over the previous fiscal year of the concern of the persons employed on a full-time, part-time or temporary basis during each of the pay periods of the fiscal year, and (2) concerns are affiliates of each other when either, directly or indirectly, one concern controls or has the power to control the other, or a third party or parties controls or has the power to control both.

I hereby declare that rights under contract or law have been conveyed to and remain with the small business concern identified above with regard to the invention, entitled:

"METHOD AND APPARATUS FOR OPTIMIZING VEHICLE OPERATION"

by inventors:

Harvey Slepian and Loran Sutton

described in

[X] the specification filed herewith.
[ ] application serial no. 07/_____, filed _____, 19_____
[ ] patent no. _____, issued _____.

If the rights held by the above identified small business concern are not exclusive, each individual, concern or organization having rights to the invention is listed below* and no rights to the invention are held by any person, other than the inventor, who could not qualify as a small business concern under 37 CFR 1.9(d) or by any concern which would not qualify as a small business concern under 37 CFR 1.9(d) or a nonprofit organization under 37 CFR 1.9(e). ***NOTE:** Separate verified statements are required from each named person, concern or organization having rights to the invention averring to their status as small entities (37 CFR 1.27)

None

I acknowledge the duty to file, in this application or patent, notification of any change in status resulting in loss of entitlement to small entity status prior to paying, or at the time of paying, the earliest of the issue fee or any maintenance fee due after the date on which status as a small entity is no longer appropriate. [37 CFR 1.28(b)]

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

NAME OF PERSON SIGNING
TITLE OF PERSON OTHER THAN OWNER
ADDRESS OF PERSON SIGNING

Harvey Slepian
President
1426 W. Daytona
Peoria, Illinois 61614

Harvey Slepian, President
Tas Distributing Co., Inc.

March 3 1997
Date

67737

PATENT APPLICATION SERIAL NO. 08/813270

U.S. DEPARTMENT OF COMMERCE
PATENT AND TRADEMARK OFFICE
FEE RECORD SHEET

PTO-1556
(5/87)

PATENT APPLICATION FEE DETERMINATION RECORD

Effective October 1, 1996

Application or Docket Number: 08/813 270

CLAIMS AS FILED - PART I

FOR	(Column 1) NUMBER FILED	(Column 2) NUMBER EXTRA
BASIC FEE		
TOTAL CLAIMS	32 minus 20 =	* 12
INDEPENDENT CLAIMS	4 minus 3 =	* 1
MULTIPLE DEPENDENT CLAIM PRESENT		

* If the difference in column 1 is less than zero, enter "0" in column 2

SMALL ENTITY RATE	SMALL ENTITY FEE	OR	OTHER THAN SMALL ENTITY RATE	OTHER THAN SMALL ENTITY FEE
	385.00	OR		770.00
x$11=	132	OR	x$22=	
x40=	40	OR	x80=	
+130=		OR	+260=	
TOTAL	557	OR	TOTAL	

CLAIMS AS AMENDED - PART II

AMENDMENT A

	(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA
Total	* 32	Minus	** 32	=
Independent	* 8	Minus	*** 4	= 4
FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM				

SMALL ENTITY RATE	SMALL ENTITY ADDITIONAL FEE	OR	OTHER THAN SMALL ENTITY RATE	OTHER THAN SMALL ENTITY ADDITIONAL FEE
x$11=		OR	x$22=	
x40= 39	156.00	OR	x80=	
+130=		OR	+260=	
TOTAL ADDIT. FEE	156.00	OR	TOTAL ADDIT. FEE	

AMENDMENT B

	(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA
Total	*	Minus	**	=
Independent	*	Minus	***	=
FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM				

SMALL ENTITY RATE	SMALL ENTITY ADDITIONAL FEE	OR	OTHER THAN SMALL ENTITY RATE	OTHER THAN SMALL ENTITY ADDITIONAL FEE
x$11=		OR	x$22=	
x40=		OR	x80=	
+130=		OR	+260=	
TOTAL ADDIT. FEE		OR	TOTAL ADDIT. FEE	

AMENDMENT C

	(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA
Total	*	Minus	**	=
Independent	*	Minus	***	=
FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM				

SMALL ENTITY RATE	SMALL ENTITY ADDITIONAL FEE	OR	OTHER THAN SMALL ENTITY RATE	OTHER THAN SMALL ENTITY ADDITIONAL FEE
x$11=		OR	x$22=	
x40=		OR	x80=	
+130=		OR	+260=	
TOTAL ADDIT. FEE		OR	TOTAL ADDIT. FEE	

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.
** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20."
*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3."
The "Highest Number Previously Paid For" (Total or Independent) is the highest number found in the appropriate box in column 1.

ISSUE CLASSIFICATION

Class	Subclass
701	96

08/813270

UTILITY SERIAL NUMBER	PATENT DATE	PATENT NUMBER
08/813270	SEP 21 1999	5954781

SERIAL NUMBER	FILING DATE	CLASS	SUBCLASS	GROUP ART UNIT	EXAMINER
08/813,270	03/10/97 ~~RULE 47~~	~~364~~	96	~~2304~~ 61	ARTHUR

APPLICANTS: HARVEY SLEPIAN, PEORIA, IL; LORAN SUTTON, EAST PEORIA, IL.

CONTINUING DATA*******************
VERIFIED

None/GA

FOREIGN/PCT APPLICATIONS**********
VERIFIED

None/GA

FOREIGN FILING LICENSE GRANTED 06/09/97 ***** SMALL ENTITY *****

Foreign priority claimed / 35 USC 119 conditions met / Verified and Acknowledged (Examiner's Initials)	AS FILED	STATE OR COUNTRY	SHEETS DRWGS.	TOTAL CLAIMS	INDEP. CLAIMS	FILING FEE RECEIVED	ATTORNEY'S DOCKET NO.
☐ yes ☑ no / ☐ yes ☑ no GA	→	IL	3	32	4	$557.00	TASD-B8542

ADDRESS:
~~MICHAEL S BUSH~~
~~HARRIS TUCKER AND HARDIN~~
~~SUITE 2100~~
~~13355 NOEL ROAD~~
DALLAS TX 752~~40-6604~~ 02 3789

Haynes & Boone LLP
3100 NationsBank Plaza
901 Main Street

TITLE: METHOD AND APPARATUS FOR OPTIMIZING VEHICLE OPERATION.

U.S. DEPT. OF COMM./PAT. & TM—PTO-436L (Rev.12-94)

PARTS OF APPLICATION FILED SEPARATELY

53-55 Applications Examiner

NOTICE OF ALLOWANCE MAILED: 4-22-99

GERTRUDE ARTHUR
PATENT EXAMINER
Assistant Examiner

CLAIMS ALLOWED

Total Claims	Print Claim
32	1

ISSUE FEE

Amount Due	Date Paid
$605	7-22-99

WILLIAM A. CUCHLINSKI, JR.
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 3600
Primary Examiner

DRAWING

Sheets Drwg.	Figs. Drwg.	Print Fig.
3	3	1

ISSUE BATCH NUMBER 507

Label Area

PREPARED FOR ISSUE

WARNING: The information disclosed herein may be restricted. Unauthorized disclosure may be prohibited by the United States Code Title 35, Sections 122, 181 and 368. Possession outside the U.S. Patent & Trademark Office is restricted to authorized employees and contractors only.

Form PTO-436A (Rev. 6/98)

Formal Drawings (___ shts) set ___ KOB

ISSUE FEE IN FILE

(FACE)

PATENT NUMBER

APPLICATION SERIAL NUMBER
08/813270

APPLICANT'S NAME (PLEASE PRINT)
SLEPIAN et al.

IF REISSUE, ORIGINAL PATENT NUMBER

ORIGINAL CLASSIFICATION

CLASS	SUBCLASS
701	96

CROSS REFERENCE(S)

CLASS	SUBCLASS (ONE SUBCLASS PER BLOCK)			
701	103			
340	425.5	438		

INTERNATIONAL CLASSIFICATION

G	06	F		7	00

GROUP ART UNIT: 3661

ASSISTANT EXAMINER (PLEASE STAMP OR PRINT FULL NAME)
GERTRUDE ARTHUR

PRIMARY EXAMINER (PLEASE STAMP OR PRINT FULL NAME)
WILLIAM A. CUCHLINSKI, Jr.

PTO 270
(REV. 5-91)

ISSUE CLASSIFICATION SLIP

U.S. DEPARTMENT OF COMMERCE
PATENT AND TRADEMARK OFFICE

Staple Issue Slip Here

POSITION		ID NO.	DATE
CLASSIFIER		[illegible]7	4-14-97
EXAMINER		Diane Russell	6/8/97
TYPIST			
VERIFIER			
CORPS CORR.			
SPEC. HAND			
FILE MAINT.			
DRAFTING			

INDEX OF CLAIMS

Claim Final	Claim Original	7/30/97	4/13/98A	Date
1	(1)	✓	=	
2	2	✓	=	
3	3	✓	=	
	4	✓		
4	5	✓	=	
5	6	✓	=	
6	7	✓	=	
	8	O		
5	9	—	=	
6	10			
7	(11)			
10	12			
11	13	O		
13	(14)	=		
14	15	=		
15	16	=		
16	17	=		
17	(18)	✓		
18	19	✓		
19	20	✓		
20	21	✓		
21	22	✓	=	
	23	✓		
	24	✓		
	25	O		
22	26	O	=	
23	(27)	✓	=	
24	28	✓	=	
	29	O		
25	30	O	=	
26	(31)	O	=	
27	32	O	=	
12	33		=	
28	(34)		=	
29	35		=	
30	36		=	
31	(37)		=	
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SYMBOLS

- ✓ ..... Rejected
- = ... Allowed
- - (Through numberal) Canceled
- + ... Restricted
- N ..... Non-elected
- I ..... Interference
- A ..... Appeal
- O ..... Objected

Claim Final	Claim Original	Date
	51	
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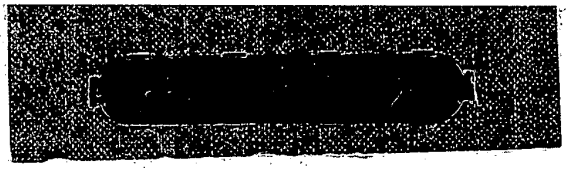

SEARCHED

Class	Sub.	Date	Exmr.
701	1 121 123	7/28/98	GA
123	478 480 351 481	7/28/98	GA
701	96 300	7/31/98	GA
340	903	〃	〃
updated above		4/13/99	GA
701	101 102 103 104	4/13/99	GA
340	425.5 426 436 438	4/13/99	GA

INTERFERENCE SEARCHED

Class	Sub.	Date	Exmr.
701	96 101 102 103	4/13/99	GA
340	425.5 438	4/13/99	GA

SEARCH NOTES

	Date	Exmr.
Search assistant (Maya)	7/28/98	GA

(RIGHT OUTSIDE)