EPA-AA-TEB-511-82-1

EPA Evaluation of Fuel Maximiser™ Under Section 511 of the Motor Vehicle Information and Cost Savings Act

by

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Test and Evaluation Branch
Emission Control Technology Division
Office of Mobile Source Air Pollution Control
U.S. Environmental Protection Agency

6560-26

ENVIRONMENTAL PROTECTION AGENCY

[40 CFR Part 610]

[FRL _____]

FUEL ECONOMY RETROFIT DEVICES

Announcement of Fuel Economy Retrofit Device Evaluation for "Fuel Maximiser™"

AGENCY: Environmental Protection Agency (EPA).

ACTION: Notice of Fuel Economy Retrofit Device Evaluation.

SUMMARY: This document announces the conclusions of the EPA evaluation of the "Fuel Maximiser™" device under provisions of Section 511 of the Motor Vehicle Information and Cost Savings Act.

BACKGROUND INFORMATION: Section 511(b)(1) and Section 511(c) of the Motor Vehicle Information and Cost Savings Act (15 U.S.C. 2011(b)) requires that:

(b)(1) "Upon application of any manufacturer of a retrofit device (or prototype thereof), upon the request of the Federal Trade Commission pursuant to subsection (a), or upon his own motion, the EPA Administrator shall evaluate, in accordance with rules prescribed under subsection (d), any retrofit device to determine whether the retrofit device increases fuel economy and to determine whether the representations (if any) made with respect to such retrofit devices are accurate."

(c) "The EPA Administrator shall publish in the Federal Register a summary of the results of all tests conducted under this section, together with the EPA Administrator's conclusions as to -

(1) the effect of any retrofit device on fuel economy;

(2) the effect of any such device on emissions of air pollutants; and

(3) any other information which the Administrator determines to be relevant in evaluating such device."

EPA published final regulations establishing procedures for conducting fuel economy retrofit device evaluations on March 23, 1979 [44 FR 17946].

ORIGIN OF REQUEST FOR EVALUATION: On February 11, 1981, the EPA received a request from the U.S. Postal Service for evaluation of a fuel saving device termed "Fuel Maximiser™". This device consists of a small coil of copper wire in a plastic enclosure which is positioned over the negative terminal of the vehicle battery. The device allegedly creates an ion charge in the vehicle which modifies the molecular structure of the fuel, thus increasing vehicle fuel economy.

Availability of Evaluation Report: An evaluation has been made and the results are described completely in a report entitled: "EPA Evaluation of the Fuel Maximiser™ device Under Section 511 of the Motor Vehicle Information and Cost Savings Act," report number EPA-AA-TEB-511-82-1 consisting of 91 pages including all attachments.

EPA also tested the Fuel Maximizer™ device. The EPA testing is described completely in the report "EPA Testing Evaluation of the Fuel Maximiser™ - A Retrofit Fuel Economy Device." EPA-AA-TEB-81-4, consisting of 41 pages. This report is contained in the preceding 511 evaluation as an attachment.

Copies of these reports may be obtained from the National Technical Information Service by using the above report numbers. Address requests to:

National Technical Information Service
U.S. Department of Commerce
Springfield, VA 22161
Phone: Federal Telecommunications System (FTS) 737-4650
Commercial 703-487-4650

Summary of Evaluation

The results of the EPA testing demonstrate that with either road or dynamometer testing procedures, the Fuel Maximiser™ failed to improve vehicle fuel economy. The two test vehicles tested are representative of domestic manufactured vehicles and should have noted an improvement if the device performed as it was claimed to do. It is concluded that the Fuel Maximiser™ has no effect on vehicle fuel economy.

FOR FURTHER INFORMATION CONTACT: Merrill W. Korth, Emission Control Technology Division, Office of Mobile Source Air Pollution Control, Environmental Protection Agency, 2565 Plymouth Road, Ann Arbor, Michigan 48105, 313-668-4299.

Date

Kathleen Bennett
Assistant Administrator
for Air, Noise, and Radiation

EPA Evaluation of the Fuel Maximiser™ Device Under Section 511 of the Motor Vehicle Information and Cost Savings Act

The following is a summary of the information on the device as supplied by the Applicant and the resulting EPA analysis and conclusions.

1. Marketing Identification of the Device:

   Fuel Maximiser™

2. Inventor of the Device and Patents:

   A. Inventor

      Charles G. Roberts and Ernest DeMichele
      Farmington Hills, MI

   B. Patent

      #4158346 and #4074670

3. Companies Representing the Device

Mectronic Inc. 22025 Grand River Ave. Detroit, MI 48219	and	Energy Dynamics Inc. 4049 Reduth Ct. Birmingham, MI 48010

4. Representing Companies Organization Principals:

Charles Roberts	Chief Executive Office - Metronics, Inc. Technical Director - Energy Dynamics Inc.
Edward D. Spicer	Chm. Bd. of Directors - Energy Dynamics Inc. Chief Engineer - Energy Dynamics Inc. Chief Exec. Officer - Energy Dynamics, Inc.

5. Description of Device (as supplied by the device representative):

   A. Purpose of the Device:

      "... increases engine efficiency and consequently increases the miles per gallon obtainable by the internal combustion engine for given speed and loading conditions."

B. Theory of Operation:

"Inherent in any electric process is the formation of ions. The ions are attached to the battery terminals (electrode). The ions move through the battery solution toward the electrode opposite in charge of the charge in the ion. An ion is a charged particle. There are two kinds of ions, positive ions (cations) and negative ions (anions). The Fuel Maximiser™ works with the ions attracted to the negative battery terminal. The oscillator in the Fuel Maximiser™ attracts the ions (cations) into the fiber block. Iron is the best known conductor for ions. Therefore the iron wire lead provides a natural path for the ions to travel from the Fuel Maximiser™ block into the car or truck body. The ions formed at the battery terminal actually form a small field at the tip of the terminal whether it is a top mounted terminal or a side mounted terminal. This field is about 3/4" in diameter. That is why the Fuel Maximiser™ is secured firmly to the battery terminal, so that it is in the center of the ion field.

"Over the period of time it takes to use three to five tanks of fuel, an ion field is formed throughout the vehicle body. This field also surrounds the fuel tank. The presence of the ions causes disturbance in the molecular charge for the fuel. This means that the molecules of fuel move slightly further apart. When the fuel is mixed with air, to make the fuel air ratio necessary for combustion, it takes less fuel (because of the separation of molecules or expansion) to provide the volumetric efficiency that the engine had, and must have, to provide power and to present a leaning of the mixture, which would result in burned valves. The molecules being further apart more readily admit oxygen to the point of carburation. The end result is the use of less fuel. For the average driver (13,000 miles per year), an improvement will be 1 to 4 miles per gallon increase in mileage. For a fleet application, the total cost of fueling will be reduced by a minimum of 10%."

A second version was supplied with the patent. It reads

"The precise mode of operation and the underlying scientific principles upon which the device of the present invention operates are unclear and not entirely understood at this time. One theory, however, is that the efficiency unit reacts to magnetic fields surrounding it to generate a beneficial ion transfer, for reasons unknow at this time, increases the efficiency of the internal combustion engine to which the battery is conected."

C. Detailed Description of Construction:

"The present invention comprises a pair of closely adjacent, preferably oppositely wound electrically conductive coils which are encapsulated in a suitable insulating material and form an efficiency unit. The coils have their ends connected to each other and are preferably wound about an iron core such that the number of windings on one coil is three times the number of windings on the other coil.

The encapsulated efficiency unit is positioned closely adjacent the positive pole of the battery for the engine while an electrical wire extends from the encapsulated coils at one end and is electrically connected to the negative terminal of the battery at its other end. The first mentioned end of the wire is preferably electrically connected to the coils, either directly or indirectly by connection with the iron core."

NOTE: Installation instruction provided with the device directs installation to be made on the negative terminal.

6. Applicability of the Device (as described by the device representative):

"The Fuel Maximiser^{TM} works on any liquid fueled, rubber tired vehicle. It works with gasoline, diesel, propane, or gasohol."

7. Costs (as supplied by device representative):

The cost given for various test fleets was $25.00 each with a fleet discount price of $18.00

8. Device Installation - Tools and Expertise Required (as described in the inventor supplied literature):

"1. Put the Fuel Maximiser^{TM} on the negative pole of the vehicle starting battery.

2. Use the strap provided to secure the lead wire of the Fuel Maximiser^{TM} securely on the negative battery cable. The Fuel Maximiser^{TM} should center over the negative pole of the battery and be positioned as closely as possible to it.

3. Carefully bend the lead wire of the Fuel Maximiser^{TM} in the direction of the nearest vehicle body ground. Do not use any existing wire ground from other devise. Make a small hole in the body under the hood with a drill or punch. A drop of paint or nail polish may be put over the new hole, if desired. Use the screw (provided) to secure the lead wire terminal to the metal body.

CAUTION: SOME VEHICLES (MOSTLY FOREIGN) HAVE POSITIVE POLE GROUND. IN THIS CASE, PUT THE FUEL MAXIMISER^{TM} ON THE POSITIVE POLES AND CONNECT SAME (AS IN DRAWINGS)."

A copy of the complete installation instructions is attached (see Attachment B). The only tools required are a drill, punch, and a small wrench.

9. Device Operation (as described in literature supplied by the device representative):

"The Fuel Maximiser™ has no moving parts and will last the life of the vehicle, if it is used according to the instructions."

No further operational instructions were included in the literature. However, verbal communications with the inventor indicated the following two additional operational instructions.

a) It takes two to three tankfuls of gasoline before the maximum effect of the device will be noticed.

b) Grounding the vehicle body by attaching chains, cables, exhaust collection systems negate the desired effect of the Fuel Maximiser™.

10. Maintenance (as supplied by the device inventor):

"The Fuel Maximiser™ has no moving parts and will last the life of the vehicle if it is used according to the instructions."

11. Effects on Vehicle Emissions (non-regulated) (as supplied by the device inventor):

"There are no adverse effects regarding air pollution nor is there any "tampering" with engine components."

12. Effects on Vehicle Safety (as supplied by the device inventor):

No statements or data supplied.

13. Test Results (Regulated Emissions and Fuel Economy) (as submitted by the device inventor):

A. Fuel Maximiser™ On-Highway Tests

The test procedure used was a constant 55 mph speed maintained for a 225 mile trip on Interstate highway. No details as to how the fuel used was measured, or vehicle checkouts were given. The results for 12 vehicles are given in Attachment C. A summary is given below:

Vehicle No.	MPG % Improvement	Vehicle No.	MPG % Improvement
2	10.0%	8	0
3	20.9%	9	(-) 2.5%
4	24.1%	10	(-) .1%
5	5.1%	11	18%
6	24.5%	12	0%
7	9.2%	13	24%

Average = 9.5% improvement in fuel economy.

B. Postal Service Fuel Consumption

1. A letter from the inventor to a member of the Birmingham Michigan Postal Service documenting improvements of 2 mpg, 4 mpg, and 2.3 mpg.

2. Two letters from the inventor to a member of the U.S. Postal Service documenting fuel consumption tests with 21 U.S. Postal vehicles with an average fuel economy improvement of 9.1%. The attached data was not well documented and difficult to understand. There are 4 pages, apparently from the Rochester, Michigan Post Office which document fleet fuel consumption for December, 1977 and January, 1978. Both months are labeled "w/o unit". The two month fleet average fuel economies are 7.33-mpg December 1977, and 7.67-mpg January, 1978.

   These documents are followed by 9 pages of records recording the weekly vehicle usage and fuel consumption for the weeks of 2/9 thru 2/15, 1978, 2/23 thru 3/1, 1979, 3/9 thru 3/15, 1978, and for the month of June, 1978. These 9 pages also included 4 pages describing the usage of 29 additional vehicles.

   The prefacing letter indicates that the devices were installed at the end of January 1978. The "with device" records for February, March, and April used a different type of recording procedure. The following summary covers the data which can be learned from the P.O. records. A copy of those records is attached (see Attachment D).

Time Period	Average MPG Without Device	Average MPG With Device
December	7.33	
January	7.67	
2/9 thru 2/15	9.571 *	6.73
2/16 thru 2/22	not included	
2/23 thru 3/1	7.433 *	7.825
3/2 thru 3/8	not included	
3/9 thru 3/15	8.1633 *	8.0437

*Control Vehicles

C. Ethyl Corporation Data

This data was taken using the Federal Test Procedure (FTP) and Highway Fuel Economy Procedure (HFET) on a 1979 Chrysler New Yorker. One set of FTP/HFET tests was made without the device installed and one with the device installed. A summary of the Ethyl test data is given below. Attachment E presents the Ethyl data as supplied by the inventor.

	FTP (grams/mile)				HFET (grams/mile)			
	HC	CO	NOx	MPG*	HC	CO	NOx	MPG*
Baseline	1.31	22.29	.58	15.01	.85	12.79	.66	21.36
With Device after accumulating 100 miles	1.29	20.62	.68	14._8**	.60	10.28	.70	20.95

*Fuel economy given in miles/gallon.
**Middle digit was indistinguishable.

It must be noted that the inventor claims that the device will not work with the FTP and HFET because tailpipe connection - exhaust collection systems and the vehcle restraining cable ground out the device created ion field.

D. A letter from Energy Dynamic's Inc. documenting testing performed by the city of Akron on police and bailiff vehicle . A summary of the test data is given below:

	Without Fuel Maximiser™ (mpg)	With Fuel Maximiser™ (mpg)	Percent Increase
Police cars	8.66	10.91	26%
Baliff cars	10.94	11.22	2.5%
Total	9.88	11.00	11.4%

Several comments on the data were supplied by Energy Dynamics. They commented that the bailiff's cars were used in shorter trips with increased choke operations. The change from summer to winter grade fuels was also noted as reducing the improvement noted with the Fuel Maximiser™.

E. A letter from Energy Dynamics to the Means Service Inc. in Akron, Ohio which documented testing of 14 vehicles with and without the device. No details as to the types of testing, driving routes, or fuel measurement techniques were included. A summary of the test data is given below:

	With Device	With Device	Percent Increase
5 cars	16.97	20.42	20.33%
8 trucks	6.33	7.09	12.01%
Total	9.68	11.34	17.19%

A note is made that several of the trucks showed a negative or minimal increase in fuel economy. This was attributed to improper installation and aluminum bodies in which "the improvement in mileage sometimes takes longer to become apparent."

F. A testimonial from Waterford Dial-A-Ride which noted a 8.65% increase in fuel economy. No documentation on test procedure or fuel measurement methods was attached.

G. A letter from Mectronics Inc. to the City of Woodhaven documenting the testing of 5 test vehicles. No testing method or fuel measurement method was noted. A summary of the test results is given below.

	Without Device	With Device	Percent Improvement	Comments
Vehicle #1	13.90	16.78	20.72%	
Vehicle #2	10.47	12.95	23.69%	
Vehicle #3	13.04	No records	-	
Vehicle #4	9.6	No records		
Vehicle #5	13.5	13.5	0.0%	Suspected defective unit

H. A report written by Metronics Corporation on improvements in fuel economy found by installing the Fuel Maximiser™ on 10 Birmingham School Buses. No records or documentation were supplied. A summary of the results is given below:

	Without Device	With Device	Percent Improvement
Total Miles	6957	16253	
Total Gallons	1284	2767	
MPG	5.42	5.87	8.30%

I. Two pages of fuel consumption records from Thrifty Acres, a supermarket chain, with miles per gallon figures on 42 vehicles with and without the devices. The records also present weekly fuel economy figures for 13 vehicles. No documentation of measurement or test procedures was included. THe average fuel economy improvement was 10.97%.

J. A report written by Metronics Corporation for the sheriff of Lapeer County. The report documents the fuel economy improvements noted on 10 police cars. An average of 12.12% percent fuel economy improvement was noted.

K. Several testimonials from satisfied customers.

14. TEB Test Results (EPA Confirmatory Testing Data):

The EPA testing of the Fuel Maximizer™ is covered in a separate report, EPA-AA-TEB-82-1, which is enclosed as Attachment F.

15. Analysis

A. Description of the Device:

The theory of operation as explained in the literature presented by the inventor is in conflict with molecular theory. While the description uses many "buzz-words", the theory is not correct. As stated, ions are formed in the fluid of the battery, these ions due to their positive charge are attracted to the negative pole of the battery. As stated the metal pole of the battery has a high (+)ion density. However, ions do not flow through metals. Metals are composed of atoms held in a crystaline lattice. The atoms can donate or receive electrons and become ions. However, these ions do not leave the crystaline lattice. The concept of attracting cations into the fiber block and then conducting them down an iron wire is false. An ion cannot jump from one material to another. The "oscillator" spoken of is a copper wire wound around an iron U-shaped wire. The described concept would require an ion to change its nuclear make-up from lead (Pb) (common battery pole material), to fiber, to copper (Cu), to iron (Fe). Ions do not change the number of protons or neutrons in non-nuclear reactions. Only the number of electrons can change. The complete concept of ion-flow in a solid material is incorrect. Even given that ions do flow through solids, the concept of charging a vehicle with an ion charge and thereby causing a disturbance in the molecular charge in the fuel is in disagreement with all commonly held theories of atomic and molecular activity. An ion charge is an electrical charge as ions have either extra or less than the number of electrons required. Therefore, ion charge is no different than electricity. Why the device works differently than electricity is not explained. How the ion charge changes the density of the fuel is also not explained. The theory of operation simply does not explain why the device works.

The second explanation given is that the inventor is not sure of why the device works but believes it may involve ion flow. It is possible that the theory of operation is not understood. However, the ion flow theory is not correct.

B. Applicability of the Device:

The applicability of the device to any liquid fueled, rubber tired vehicle is judged to be correct as long as the vehicle has a battery.

C. Device Installation - Tools and Expertise Required:

The installation instructions are straight forward. The device installation can be complete within 5 to 10 minutes with a minimal mechanical expertise.

D. Device Operation:

No operational instructions were supplied or appear to be required.

E. Effects on Vehicle Emissions (non-regulated):

The applicant submitted no test data on non-regulated emissions. However, since the device does not appreciably modify the vehicle's emission control system or power train, it appears reasonable to assume that the device would not significantly affect a vehicle's non-regulated emissions.

G. Effects on Vehicle Safety:

The device is judged to not adversely affect vehicle safety.

H. Test Results (Regulated Emissions and Fuel Economy) Supplied by the Inventor:

The majority of the data submitted was correspondence from the Fuel Maximiser™ representing companies to various governmental agencies and private firms. The correspondence documented the fuel savings noted in the "before and after" fleet tests. There are several problems with this data which make its usage questionable. They are:

1. Only one set of data, the Ethyl Laboratory data, was measured by an independent laboratory. All other reports are written by Energy Dynamics or Metronics.

2. Very little documentation on the test fleet, the mileage accumulation, the fuel measurement method, fuel variations, test procedures, and reduction of data methods. There were fleet fuel consumption records attached to several pieces of correspondence but accurate analysis of these forms is difficult due to missing information, poor copies, and poor labeling.

3. All but the Ethyl test data was composed of fleet testing over several months of operation. Such fleet tests can have large errors due to testing variables. Often noted variables are:

    1) Fuel changes from winter grade to summer grade fuel which will increase fuel economy in warmer months.

    2) Changing ambient conditions due to seasonal changes.

    3) Changes in vehicle condition of repair.

    4) Changes in vehicle usage.

    5) Changes in vehicle operators.

Any introduction of variables will increase the uncertainty of the results. An analysis of the individual data is given below:

1. Fuel Maximiser™ On Highway Tests

   The problems with this data set are:

   i) The data is not presented by an independent laboratory but by the device representatives.

   ii) No details as to vehicle conditions, ambient conditions, driver instructions, measurement methods, vehicle preconditioning, or test procedures was presented.

   iii) The data presents no information on the effect of the device on urban driving.

   The results are impressive but require authentication.

2. Postal Service Fuel Consumption

   The letters submitted by Metronics again do not have independent verification and present no documentation as to how the test procedures were carried out. The Postal Records as noted above were difficult to understand. Several weeks were not included with the "with device" data. The data itself when properly analyzed showed no significant fuel economy improvements over the control cars tested. The results of this testing do not imply that the device works or does not work, just that the documentation was very poor.

3. The Ethyl Corporation Data

   This data is presented by an independent laboratory using well documented laboratory procedures. The device showed no significant improvement in emissions or fuel economy. However the inventor claims concerning dynamometer testing must be noted. If one refutes the "ion-grounding" theory then the Ethyl data shows the device does nothing for emissions or fuel economy.

4. City of Akron Police and Bailiff's Vehicles

   This data is presented by the inventor and lacks independent verification. It is stated to be based on information sent by the City of Akron. No testing procedures or documentation are supplied.

5. Means Service Inc. - Test Vehicles

   This data also is presented by the inventor and lacks independent verification. The results showed vehicle to vehicle variability as one car increased 4.26 mpg and others lost 1.38 mpg. No testing procedures or documentation were supplied.

6. Waterford Dial-A-Ride

   (See Number 11)

7. City of Woodhaven Data

   The inventor presents fuel economy measurements for 5 vehicles. Records for two of the vehicles showed an improvement while two others were missing data. This data is not supplied by an independent laboratory and lacks documentation and test procedure descriptions.

8. The Birmingham Public School Data

   This data is not submitted by an independent laboratory and gives no documentation as to test procedures, controls, etc.

9. The Thrifty Acres Test Data

   This data set is sizable but does not describe test procedures, test vehicles, and fuels used. Different times of the year are compared-3/1/thru 5/26 and 2/9 thru 3/1 without the device and 3/8 thru 10/11 with the device. Many pieces of data are missing. The data is not presented by an independent laboratory or by Thrifty Acres.

10. Lapeer County Sheriff's Office

    The data is presented by Mectronics Corporation and does not document procedures, vehicles, or actual raw test data.

11. Various Testimonials

    These testimonials do not document testing methods or procedures.

An analysis of the supplied testing demonstrates that the only data which is well documented and presented by a recognized independent testing laboratory shows that the device does not work. All of the other test results are presented by the device representatives and lack technical validity. The data while voluminous, consists only of the device representatives writing to others how well their device works. This type of data is insufficient to prove that the device works as advertised.

H. Analysis of EPA Test Results:

The EPA laboratory testing showed for both vehicles in both test procedures that the Fuel Maximiser™ had an insignificant effect on fuel economy or emissions. The changes noted on HC, CO, and NOx for the HFET cycle are not significant when one looks at the magnitude of the numbers and realizes that there are no standards for HC, CO, and NOx for the highway cycle. There will normally be some variation in fuel economy noted during extended mileage accumulation. Therefore the shifts noted in CO and FE for the Citation are not unusual. It is proper to average the baseline values on either side of the "with Fuel Maximiser™" tests because no "residual type effect" claims are made for the device. Such an average compensates for gradual changes in the test vehicles performance. The road testing confirms the dynamometer testing. The dynamometer testing also confirmed the applicability of the Ethyl test data, which indicated no improvement.

I Conclusions

EPA fully considered all of the information submitted by the device representatives. The EPA evaluation of the Fuel Maximiser™ was based on that information and the results of the EPA testing performed on the device. The inventor submitted no documented test data that proved the "Fuel Maximiser™" would improve fuel economy. The only independent test data submitted indicated that the device did not work. The EPA testing while taking into account precautions suggested by the inventor, also showed that the device had no effect on vehicle fuel economy. Therefore, it is concluded that the Fuel Maximiser™ has no effect on vehicle fuel economy.

List of Attachments

Attachment A	Patent Application (provided with 511 Application)
Attachment B	Copy of installation instructions
Attachment C	On-highway Test Results
Attachemnt D	Post Office Records
Attachment E	Ethyl Test Data
Attachment F	EPA Report # AA-TEB-82-2

Attachment A

United States Patent [19]

Roberts et al.

[11] **4,158,346**

[45] **Jun. 19, 1979**

[54] **ENGINE EFFICIENCY UNIT**

[75] Inventors: **Charles G. Roberts**, Pontiac; **Ernest DeMichele**, Farmington Hills, both of Mich.

[73] Assignee: **Mectronic, Inc.**, Detroit, Mich.

[21] Appl. No.: **867,920**

[22] Filed: **Jan. 9, 1978**

Related U.S. Application Data

[63] Continuation-in-part of Ser. No. 604,792, Aug. 14, 1975, Pat. No. 4,074,670.

[51] **Int. Cl.**[2] **F02N 7/00; F02B 77/00**

[52] **U.S. Cl.** ..... **123/1 R**; 123/119 E; 123/195 R; 123/195 A; 123/198 R; 123/3

[58] **Field of Search** ..... 123/1 R, 119 E, 195 R, 123/195 A, 198 R, 3

[56] **References Cited**

U.S. PATENT DOCUMENTS

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4,050,426	9/1977	Sanderson	123/119 E
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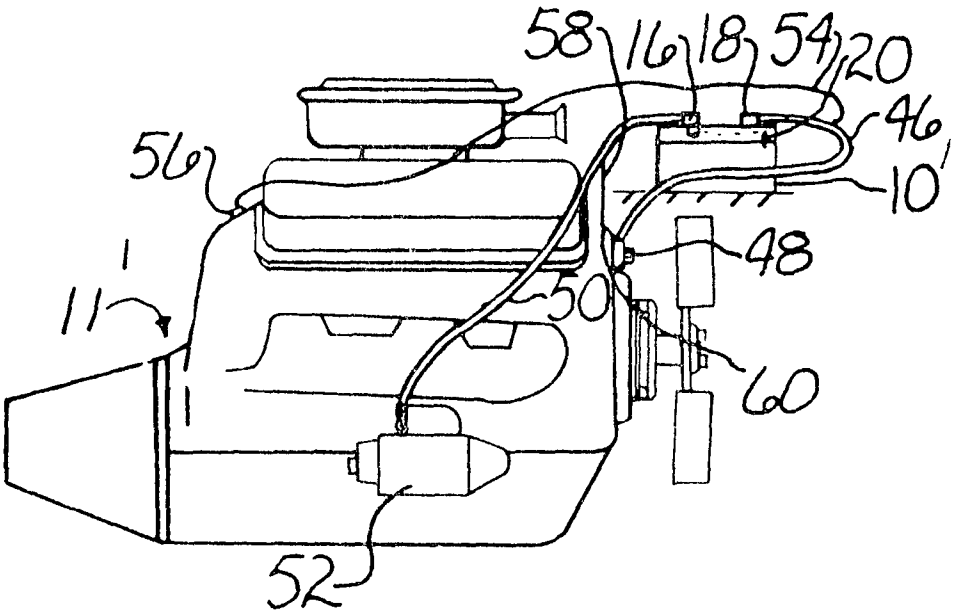
4,074,670	2/1978	Roberts et al.	123/119 E
4,091,779	5/1978	Saufferer et al.	123/119 E

Primary Examiner—Wendell E. Burns
Attorney, Agent, or Firm—Gifford, Chandler, VanOphem, Sheridan & Sprinkle

[57] **ABSTRACT**

A pair of closely adjacent electrically conductive coils, suitably encapsulated, are secured to or retained closely adjacent the positive terminal of a battery of an internal combustion engine. An electrical wire extends from the coils and is electrically connected to the negative terminal of the battery.

13 Claims, 8 Drawing Figures



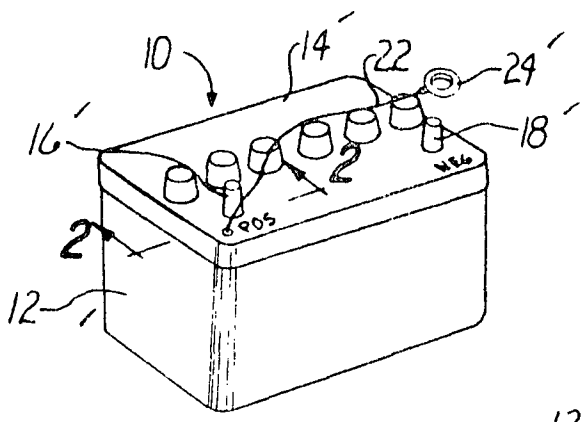


Fig-1

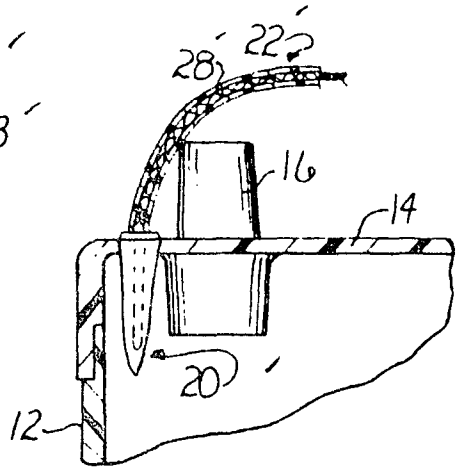


Fig-2

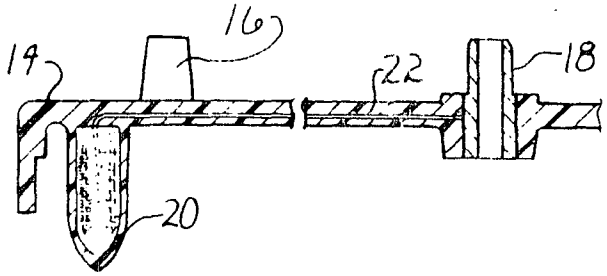


Fig-3

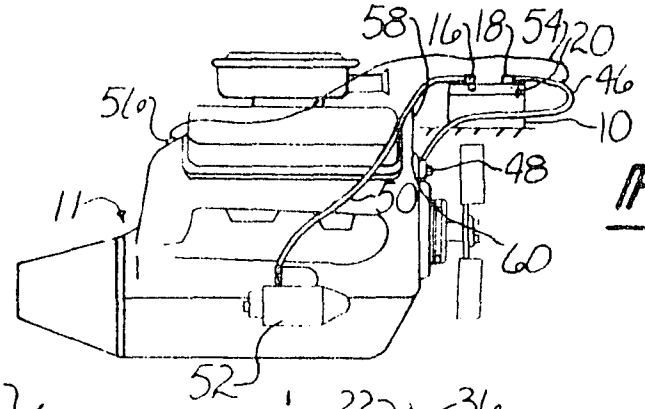


Fig-4

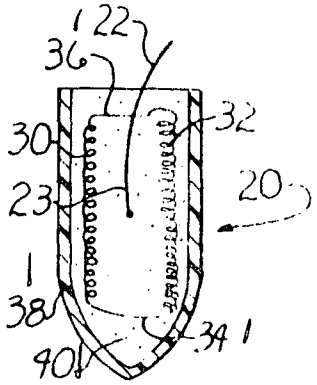


Fig-5

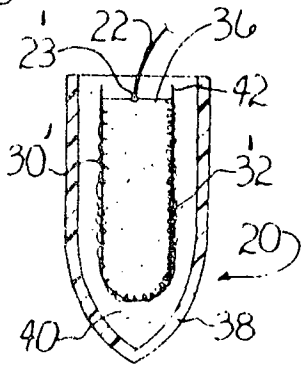


Fig-6

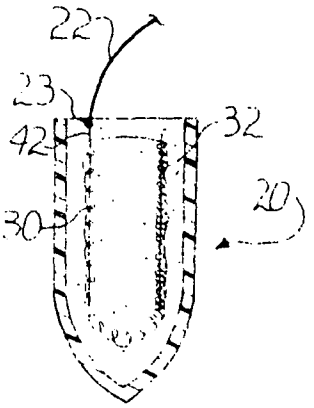


Fig-7

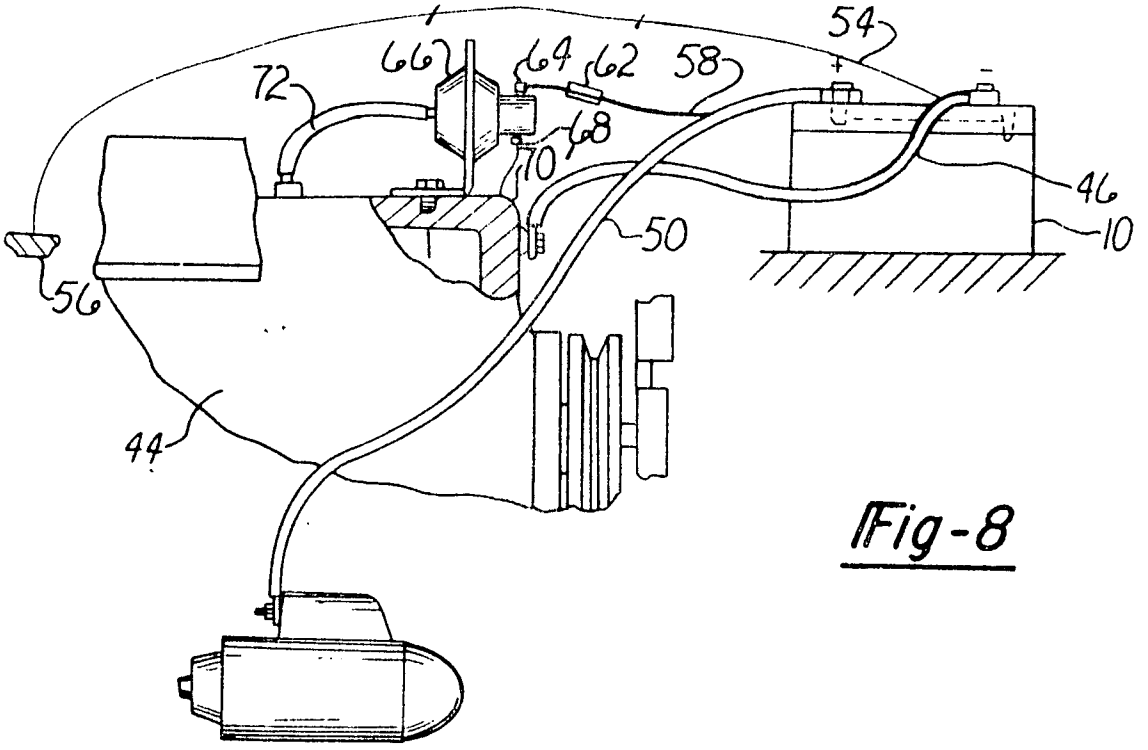


Fig-8

ENGINE EFFICIENCY UNIT

CROSS-REFERENCE TO RELATED APPLICATIONS

The present application is a continuation-in-part of the U.S. Pat. application Ser. No. 604,792, filed Aug. 14, 1975, and now U.S. Pat. No. 4,074,670 issued on Feb. 21, 1978.

BACKGROUND OF THE INVENTION

I. Field of the Invention

The present invention relates to a device connected to a battery of an internal combustion engine to improve the efficiency of the engine.

II. Description of the Prior Art

To our knowledge no attempt has heretofore been made to provide a device coupled to a battery for an engine which utilizes magnetic fields to produce ion transfer and increase the efficiency of the engine.

SUMMARY OF THE INVENTION

The present invention comprises a pair of closely adjacent, preferably oppositely wound, electrically conductive coils which are encapsulated in a suitable insulating material and form an efficiency unit. The coils have their ends connected to each other and are preferably wound about an iron core such that the number of windings on one coil is three times the number of windings on the other coil.

The encapsulated efficiency unit is positioned closely adjacent the positive pole of the battery for the engine while an electrical wire extends from the encapsulated coils at one end and is electrically connected to the negative terminal of the battery at its other end. The first mentioned end of the wire is preferably electrically connected to the coils, either directly, or indirectly by connection with the iron core.

The precise mode of operation and the underlying scientific principles upon which the device of the present invention operates are unclear and not entirely understood at this time. One theory, however, is that the efficiency unit reacts to magnetic fields surrounding it to generate a beneficial ion transfer. This ion transfer, for reasons unknown at this time, increases the efficiency of the internal combustion engine to which the battery is connected.

BRIEF DESCRIPTION OF THE DRAWINGS

A better understanding of the present invention will be had upon reference to the following detailed description when read in conjunction with the accompanying drawings, wherein like reference characters refer to like parts throughout the several views, and in which:

FIG. 1 is a perspective view showing the efficiency unit of the present invention coupled to a battery;

FIG. 2 is a fragmentary sectional view illustrating the efficiency unit of the present invention installed in the battery;

FIG. 3 is a fragmentary sectional view similar to FIG. 2 but showing a modification thereof;

FIG. 4 is a partial diagrammatic view showing the battery coupled to an internal combustion engine and illustrating a still further improvement thereof;

FIG. 5 is a cross-sectional view illustrating a preferred form of the efficiency unit of the present invention and enlarged for clarity,

FIG. 6 is a sectional view similar to FIG. 5 but showing a modification thereof;

FIG. 7 is a sectional view similar to both FIGS. 5 and 6 but showing a still further modification thereof; and

FIG. 8 is a diagrammatic view similar to FIG. 4 but showing a modification thereof.

DETAILED DESCRIPTION OF THE PRESENT INVENTION

With reference first to FIGS. 1 and 2, a battery 10 is thereshown of the type employed with an internal combustion engine 11 (FIG. 4) for automobiles and similar vehicles. As is conventional with such batteries, the battery 10 includes a housing 12 covered across its top by a lid 14. A positive pole 16 and a negative pole 18 extend outwardly and upwardly from the lid 14 for connection with the electrical system for the engine. Alternatively, however, the terminal 16 and 18 can be positioned on any portion of the battery 10.

An efficiency unit 20 according to the present invention and which will subsequently be described in greater detail is installed in the battery lid 14 closely adjacent the positive terminal 16. An electrically conductive wire 22 preferably made of iron extends outwardly from the efficiency unit and is electrically connected with the negative battery terminal 18 by suitable connector means 24. The wire 22 includes an electrically insulating casing 28 and the unit 20 itself is electrically insulated from the positive terminal 16 as will be shortly more fully described.

Although the wire 22 from the efficiency unit 20 is shown extending exteriorly of the battery lid 14 in FIGS. 1 and 2, the wire 22 alternatively can be molded directly within the battery lid 14 along with the efficiency unit 20 as best shown in FIG. 3. FIG. 3 depicts the preferred mode of construction when the efficiency unit 20 is connected to the battery lid 14 at the time of manufacture of the battery lid 14. Conversely, FIGS. 1 and 2 depict the preferred form of the invention when the efficiency unit 20 is installed within the battery 10 subsequent to the manufacture of the battery 10.

FIG. 5 illustrates the efficiency unit 20 in greater detail as including a pair of spaced but closely adjacent electrically conductive coils 30 and 32 disposed about substantially parallel axes and preferably wound in opposite directions. The coils 30 and 32 may include any number of fine wire windings but it is preferred that the number of windings of one coil be approximately three times the number of windings of the other coil. For example, the coil 32 may have ninety windings while the coil 30 has thirty windings.

Still referring to FIG. 5, the ends of the coils 30 and 32 are electrically connected together by leads 34 and 36. The coils 30 and 32 in turn are contained within an insulating body 38 which is filled with a suitable electrically insulating encapsulating material 40. As shown in FIG. 5, one end 23 of the wire 22 is disposed closely adjacent to, but is not electrically connected with, both of the coils 30 and 32.

With reference now to FIG. 6, a modification of the efficiency unit is thereshown similar to that shown in FIG. 5 except that the coils 30 and 32 are wound about opposite legs of a U-shaped iron core 42. In addition, the end 23 of the wire 22 is directly electrically connected to the coils 30 and 32 by connection with the lead 36.

With reference now to FIG. 7, a still further modification of the efficiency unit 20 is thereshown which is

similar to the unit 20 shown in FIG. 6. In FIG. 7, however, the end 23 of the lead 22 is indirectly electrically connected with the coils 30 and 32 by connection with one end of the iron core 42.

With reference now to FIG. 4, the battery 10 containing the efficiency unit 20 is electrically connected to the internal combustion engine 11 of the type used in automobiles and similar vehicles. As is conventional, battery cable 46 is connected between the negative battery terminal 18 and the engine housing at 48. Similarly, a second battery cable 50 is connected between the positive battery terminal 16 and the engine starting motor 52.

Still referring to FIG. 4, a still further engine efficiency improvement can be achieved by branching an iron wire 54 from the negative battery cable 46 and connecting the other end of the wire 54 to the rear of the engine 11. The wire 54, however, is covered or coated with a suitable electrical insulating material so that the wire 54 is electrically insulated from the battery cable 46 although at least a portion of the wire 54 lies closely adjacent the wires in the battery cable 46. Similarly, a second wire 58 branches outwardly from the positive battery cable 50 and is connected at 60 to the front of the internal combustion engine 11. The wire 58, like the wire 54, is electrically insulated from the battery cable 50 although at least a portion thereof is closely adjacent the wires within the battery cable 50.

FIG. 8 is similar to FIG. 4 except that the wires 54 and 58 branch out from and are electrically connected with their respective battery cables 46 and 50. However, to prevent battery drain when the engine 11 is not running, the wire 58 is coupled through a resistor 62 to one lead 64 of a diaphragm switch 66. The second lead 68 of the switch is connected at 70 to the front of the engine. The diaphragm switch 66 is a normally open switch and is activated or closed by the engine manifold vacuum via a tube 72. Thus, when the engine 44 is started, the manifold vacuum closes the switch 66 and completes the electrical circuit between the switch terminals 64 and 68.

As previously set forth, the precise mode of operation and the underlying scientific principles for the efficiency device 20 of the present invention are not entirely understood at this time. However, tests have shown that the efficiency unit 20 increases engine efficiency and consequently, increases the miles per gallon obtainable by the internal combustion engine for given speed and load conditions.

Having described our invention, however, many modifications thereto will become apparent to those skilled in the art to which it pertains without deviation from the spirit of the invention as defined by the scope of the appended claims.

We claim:

1. In combination with an internal combustion engine having an electrical system and a battery having a negative and a positive terminal connected to the engine electrical system, an energy efficiency device comprising:

a pair of closely adjacent electrically conductive coils disposed on substantially parallel axes;

means for mounting said coils adjacent one terminal of the battery; and

a wire having one end adjacent said coils and its other end electrically connected to the other battery terminal.

2. The invention as defined in claim 1 wherein the ends of the coils are connected together.

3. The invention as defined in claim 1 and including an iron core disposed through each coil.

4. The invention as defined in claim 1 wherein one coil has substantially three times as many windings as the other coil.

5. The invention as defined in claim 2 wherein said wire is electrically connected to at least one coil.

6. The invention as defined in claim 3 wherein said wire is connected to at least one iron core.

7. The invention as defined in claim 6 wherein said core is U-shaped with one coil being wound about each free leg of the U-shaped core.

8. The invention as defined in claim 1 wherein said coils are encapsulated in an electrically insulating material.

9. The invention as defined in claim 1 wherein said battery has a housing and wherein said wire is molded into said housing.

10. The invention as defined in claim 1 wherein each battery terminal is connected to the engine electrical system via a battery cable, said device further comprising a first iron wire extending outwardly from the positive terminal battery cable and secured at its free end to the front of the engine and a second iron wire extending outwardly from the negative terminal battery cable and connected to the rear of the engine, said iron wires being electrically insulated from the battery cables.

11. The invention as defined in claim 1 wherein each battery terminal is connected to the engine electrical system via a battery cable, said device further comprising a first iron wire extending outwardly from the negative terminal battery cable and connected at its free end to the rear of the engine and a second iron wire extending outwardly from the positive terminal battery cable and connected at its free end to one terminal of a switch means, the other terminal of the switch being electrically connected to the front of the engine.

12. The invention as defined in claim 11 wherein said switch means is a normally open manifold vacuum actuated switch.

13. The invention as defined in claim 1 wherein said wire is made of iron.

* * * * *

United States Patent [19]

Roberts et al.

[11] **4,074,670**

[45] **Feb. 21, 1978**

[54] **ENGINE EFFICIENCY SYSTEM**

[75] Inventors: **Charles Roberts**, Howell; **Ernest DeMichele**, Farmington Hills, both of Mich.

[73] Assignee: **Mectronic Inc.**, Detroit, Mich.

[21] Appl. No.: **604,792**

[22] Filed: **Aug. 14, 1975**

[51] **Int. Cl.**[2] **F02N 7/00**; F02B 77/00

[52] **U.S. Cl.** ..... **123/119 E**; 123/1 R; 123/139 AV; 123/198 R

[58] **Field of Search** ..... 123/119 E, 139 AV, 1, 123/198 R

[56] **References Cited**

PUBLICATIONS

Ford, 1974 vol. II, Car Shop Manual, title page and pp. 21-24-2.

Dodge, 1973, Passenger Car Chasis Service Manual, title page and pp. 8-128.

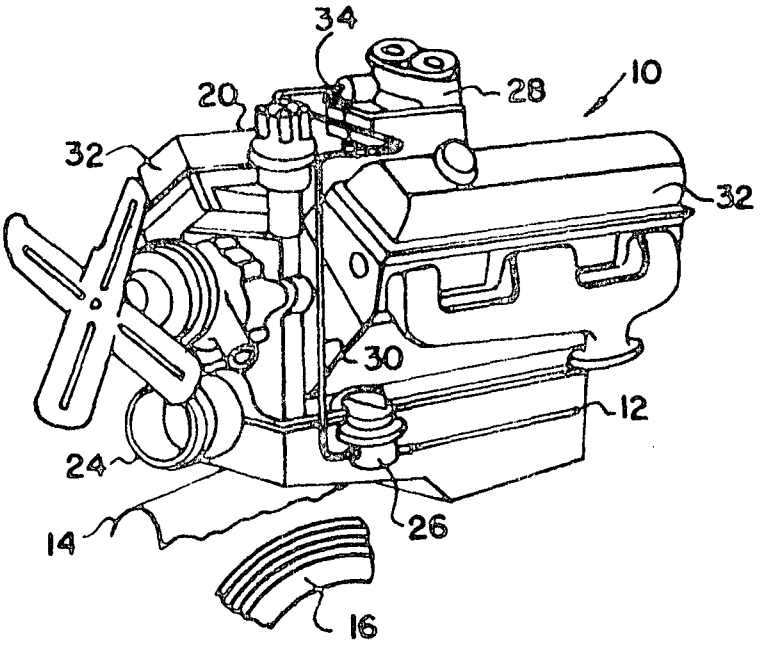
Primary Examiner—Wendell E. Burns

Attorney, Agent, or Firm—Gifford, Chandler, Sheridan & Sprinkle

[57] **ABSTRACT**

A pair of closely adjacent electrically conductive coils, suitably encapsulated, are secured to or retained closely adjacent an electrical accessory and a fuel line of an internal combustion engine. When the engine is utilized to drive a rubber-tired motor vehicle a ground strap is provided to provide an electrical connection around the insulation produced by the rubber tires and the rubber motor mounts of the engine.

6 Claims, 5 Drawing Figures



ENGINE EFFICIENCY SYSTEM

BACKGROUND OF THE INVENTION

I. Field of the Invention

The present invention relates to devices connected to internal combustion engines to improve the efficiency thereof.

II. Description of the Prior Art

While devices of many kinds have been heretofore utilized to increase engine efficiency, to our knowledge no attempt has heretofore been made to provide a device which utilizes the magnetic fields produced during ordinary engine operation to produce electrical energy to ionize the gasoline or other fuel to thereby improve its combustion characteristics.

SUMMARY OF THE INVENTION

The present invention comprises a pair of closely adjacent, oppositely wound, electrically conductive coils, preferably encapsulated and mounted closely adjacent a fuel line of an internal combustion engine and within the induction field produced by operation of an electrical component of the engine. The coils have their ends connected to each other and respectively enclose iron core members. The number of windings on one coil are preferably three times the number of windings on the other coil member.

While we are not certain of the scientific principles upon which the device operates it is clear that when constructed and mounted as described above, the above increases the efficiency of an internal combustion engine.

One theory is that the magnetic fields produced by the electrical components induces an electrical current in the coils which in turn produces a magnetic field around the device. The fuel flowing through the fuel line passes through the magnetic field and is ionized, thereby enhancing its combustion characteristics.

It has been found that when the device of the invention is mounted to a rubber tired vehicle it is necessary to connect a grounding wire between a component of the drive train and the body of the vehicle. Without this, experience has demonstrated that the device will lose its effectiveness over a period of time. It is felt that this results from a build up of electrical energy and the ground wire dissipates this electrical energy through the drive train, around the rubber tires, to the body of the vehicle.

DESCRIPTION OF THE DRAWINGS

A better understanding of the present invention will be achieved upon reference to the following drawings in which like reference characters refer to like parts throughout the several views and in which:

FIG. 1 is a fragmentary, exploded perspective view of a portion of a motor vehicle utilizing the device of the present invention;

FIG. 2 is an enlarged perspective view of a portion of the structure shown in FIG. 1 illustrating the coil device mounted to the fuel line of the engine;

FIG. 3 is a fragmentary perspective view of a portion of a motor vehicle illustrating a preferred connection of one end of the ground wire;

FIG. 4 is a view similar to FIG 3 but illustrating a preferred connection of the other end of the ground wire; and

FIG. 5 is an elevational view of the device of the present invention enlarged for purposes of clarity and illustrating portions in phantom.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Now referring to the drawings for a more detailed description of the present invention a portion of a motor vehicle 10 is illustrated in FIG. 1 as including an internal combustion engine 12, a body 14 and rubber tires 16 (only a portion of one of which is shown).

Still referring to FIG. 1 the engine 12, as is common, includes a number of electrical components including a distributor 20, spark plugs (not shown), an alternator 24 and ignition wires (not shown) connecting the spark plugs to the distributor 20. A fuel system is also provided and includes a fuel pump 26, a carburetor 28 and fuel lines 30 connecting the fuel pump 26 to the carburetor 28.

The engine 12 illustrated in FIG. 1 includes a pair of cylinder heads 32 commonly recognized as being a V-8 engine. It should be understood, of course, that other engine designs can be used with the fuel efficiency device of the present invention.

In FIGS. 1 and 2, an efficiency unit 34 is illustrated as being mounted to the fuel line 30 preferably intermediate the fuel pump 26 and the carburetor 28 within a field produced by one of the electrical components, such as the distributor 20, of the engine 12. The unit 34 has a pair of wires 36 which as can best be seen in FIG. 2 are preferably wrapped around the fuel line 30 to hold the unit 34 in place. The wires 36 function only as means to hold the unit 34 in place and it should be understood that other means could be used as well to perform this function. The unit 34 is preferably mounted high on the engine 12 as shown in FIG. 1 near the forward portion thereof.

Although it has been preferred to illustrate the unit 34 as being within the induction field generated around the distributor 20, in practice any other induction field generating accessory of the internal combustion engine can be used as well

FIG. 5 illustrates the unit 34 in greater detail as including a pair of spaced but adjacent electrically conductive coils 40 and 42 disposed about substantially parallel axes and preferably wound in opposite directions. The coils 40 and 42 may be of any preferred number of fine wire windings but it is preferred that the number of windings of one coil be approximately three times the number of windings of the other coil. Thus in the device as actually manufactured the coil 42 has 90 windings and the coil 40 has 30 windings. The ends of the coils 40 and 42 are connected by leads 41 and 43 which extend through an insulating body 44 which encapsulates the coils 40 and 42. Iron cores 45 and 47 are disposed within the coils 40 and 42, respectively.

Still referring to FIG. 5 the fastening means 36 is seen to be a single wire extending from the body 44 and separated from the coils 40 and 42 by the body 44.

The unit 34 is preferably disposed on the fuel line 30 such that the axes of the coils 40 and 42 are disposed parallel to the axis of the induction field surrounding the distributor 20.

The unit 34 mounted as shown in FIGS. 1 and 2 has been found to provide improved fuel mileage. As indicated above it is thought that the reason for this is that field induced around the coils 40 and 42 by the induction field of the distributor 20 or other electrical compo-

FIG. 1

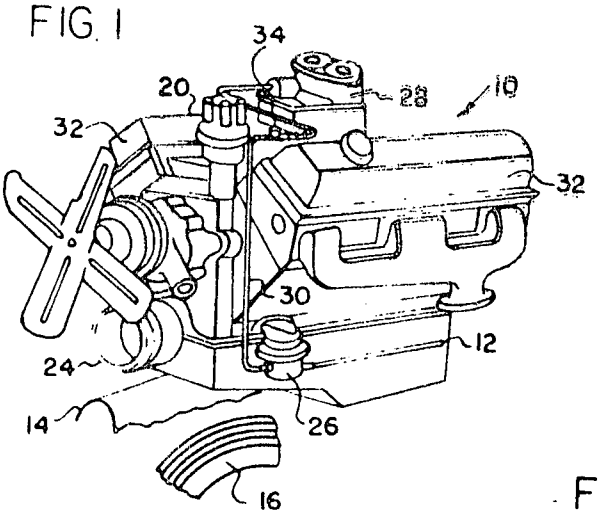


FIG. 2

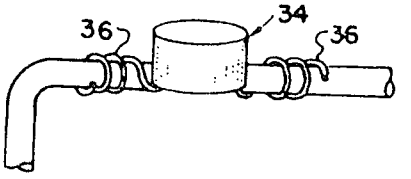


FIG. 3

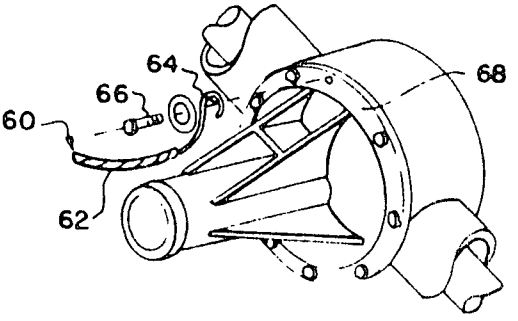
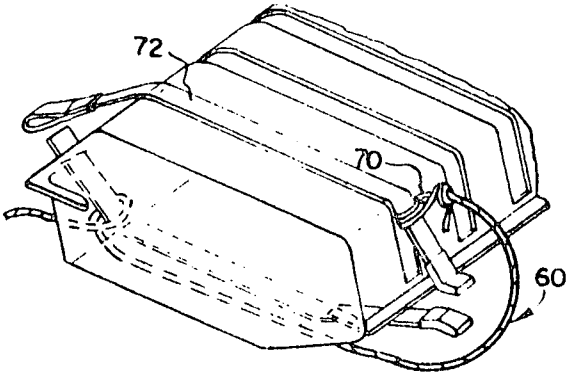


FIG. 4



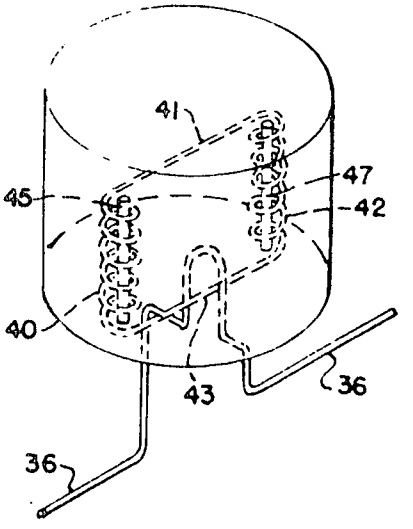


FIG. 5

nent ionizes the gasoline flowing through the line 30 and thereby enhances its combustion characteristics.

It has been found, however, that while initial results with the unit 34 are very satisfactory there is a gradual drop in the results achieved as the unit is used for a period of time. It is thought that this is due to a build up in electrical energy around the unit 34 and the engine 12 itself which somehow affects the operation of the unit 34. Rubber motor mounts (not shown) and the rubber tires 16 prevent a discharge of the electrical energy and cause the buildup. To overcome this the ground wire 60 shown in FIGS. 3 and 4 is provided and is connected between members electrically conductively connected to the engine 12 and to the body 14 so that there is an electrical path therebetween.

In FIG. 3 the ground wire 60 is shown as having an insulating cover 62 and an end 64 connected to one of the bolts 66 on the differential housing 68. The differential is of course a part of the drive train of the vehicle and is connected directly to the engine 12.

As can best be seen in FIG. 4 the other end 70 of the ground wire 60 is preferably wrapped around one of the mounting straps 72 for the gas tank 74. The straps 72 are connected to the body 14 so that the ground wire 60 provides an electrical connection between the engine 12 and the body 14 to thereby provide an electrical discharge path which prevents a buildup of electrical energy in the coils 40 and 42.

Although we have described a single embodiment of the present invention many changes and modifications can be made therein without departing from the spirit of the invention as expessed by the scope of the appended claims.

We claim:

1. In combination with an internal combustion engine having a fuel line and an electrical system including means generating an electrical induction field, an engine efficiency device comprising:

a pair of closely adjacent electrically conductive coils disposed on substantially parallel axes and located within said induction field, said coils comprising windings having their ends connected with each other, and

means mounting said device adjacent said fuel line, said means comprising a wire member electrically insulated from said coils.

2. The combination as defined in claim 1 and in which said coils are encapsulated in a non-electrical conducting body.

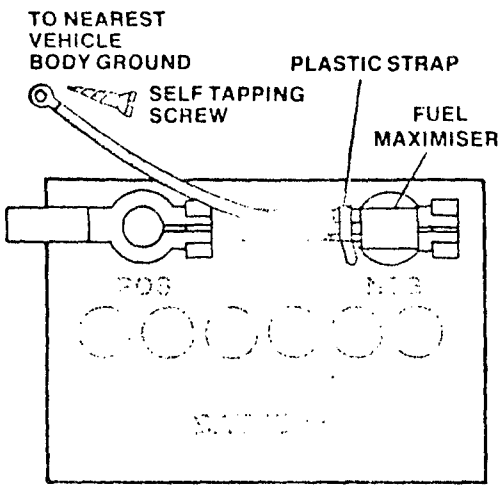
3. The combination as defined in claim 1 and in which said internal combustion engine is mounted in a motor vehicle, said vehicle having rubber tires and further including a differential connected with said engine, and also a body, a gasoline tank and straps mounting said tank to said body, said invention further comprising an electrical conducting member connected between said differential and one of said gasoline tank straps.

4. The combination as defined in claim 1 and in which said generating means includes the distributor for said engine.

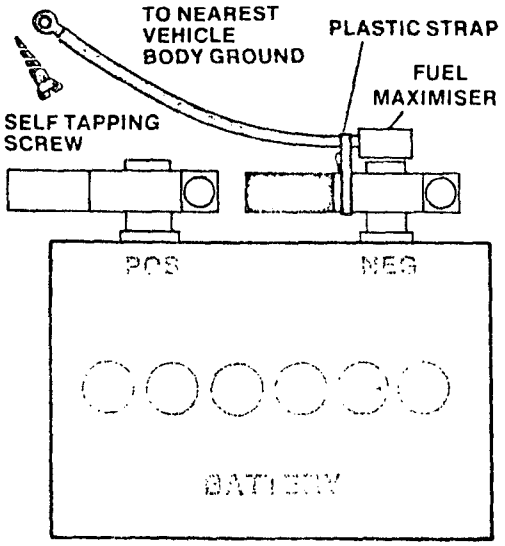
5. The invention as defined in claim 1 and including core members disposed within said coils.

6. The invention as defined in claim 1 and in which one of said coils has approximately three times the number of windings as the other of said coils.

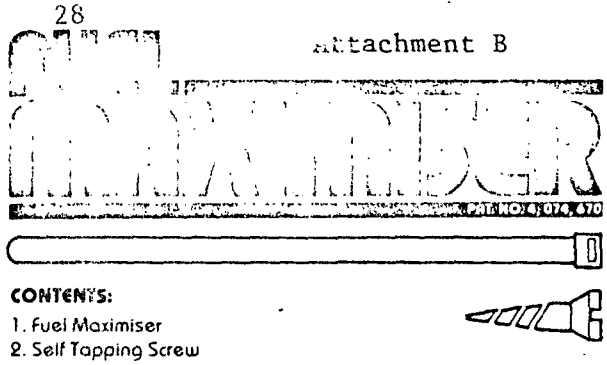
* * * * *



VERTICAL POST INSTALLATION



SIDE POST INSTALLATION



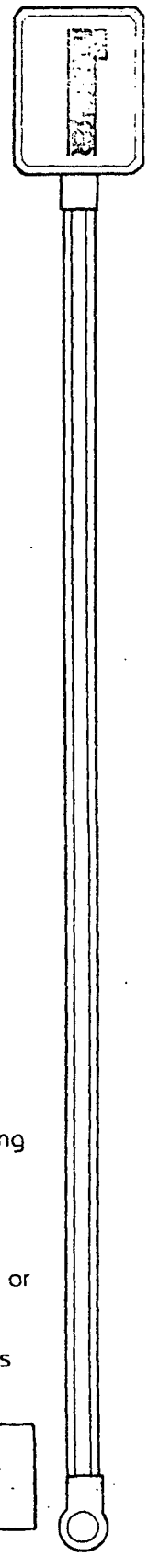
CONTENTS:

1. Fuel Maximiser
2. Self Tapping Screw
3. Plastic Strap

TO INSTALL:

1. Put the Fuel Maximiser on the negative pole of the vehicle starting battery.
2. Use the strap provided to secure the lead wire of the Fuel Maximiser securely on the negative battery cable.
   The Fuel Maximiser should center over the negative pole of the battery and be positioned as close as possible to it.
3. Carefully bend the lead wire of the Fuel Maximiser in the direction of the nearest vehicle body ground. Do not use any existing wire ground from other devise. Make a small hole in the body under the hood with a drill or punch. A drop of paint or nail polish may be put over the new hole, if desired. Use the screw (provided) to secure the lead wire terminal to the metal body.
4. The completed installation should look like either of the drawings.

CAUTION: SOME VEHICLES (MOSTLY FOREIGN) HAVE POSITIVE POLE GROUND. IN THIS CASE, PUT THE FUEL MAXIMISER ON THE POSITIVE POLES AND CONNECT SAME (AS IN DRAWINGS).



TO CONSUMER:

The Fuel Maximiser has no moving parts and will last the life of the vehicle, if it is used according to the instructions.

Experience in use has shown that the Fuel Maximiser improves engine performance. Records indicate that because of better performance, an increase in miles per gallon is observed — depending on the condition of the engine before installing the Fuel Maximiser. After one, two, or three tanks of fuel, an increase in M.P.G. should be seen.

The manufacturer is proud to present this product. You will save fuel and money with its use as others have. The smoother the engine performs, by itself, is worth the cost of the product.

CAUTION: DO NOT PUT LEAD WIRE OF THE FUEL MAXIMISER NEAR MOVING ENGINE PARTS (SUCH AS THE FAN OR BELTS). DO NOT INSTALL THE FUEL MAXIMISER UNLESS ENGINE IS OFF.

A1 C

MECTRONIC CORPORATION

22025 Grand River Ave.

Detroit, Mi. 48219

SUMMARY RESULTS FUEL MAXIMISER (TM)
ON-HIGHWAY TEST OCT.30, 1975

Course : From Interchange M-59/M-150 in Oakland County to Pinconning exit of I-75 and return at controlled speed approximatly 55 mph.

	Vehicle Description	Trip #1 W/O Unit			Trip #2 W/ Unit					
		Gals	Miles	MPG.	Gals	Miles	MPG	Plus	Min.-	%
#2	'76' PONTIAC TRANS AM.	13	222.9	17.15	11.8	222.8	18.88	1.73		10
#3	'73' FORD V8	12.7	216.8	17.07	10.5	216.6	20.63	3.56		20
#4	'74' PLYMOUTH COUPE	12.3	220	18.63	9.0	220	23.13	4.5		24
#5	'75' PONTIAC STA. W.	13.5	226.9	16.87	12.8	226.9	17.73	.9		5.
#6	'76' FORD LTD	13.5	228.5	16.99	10.8	228.4	21.15	4.16		24
#7	'75' PONTIAC	13.0	225.3	17.33	11.9	225.2	18.92	1.59		9.
#9	'75' CHRYSLER CORDOBA	11.5	227.2	19.76	11.8	227.1	19.25		(.51)	(2
#11	'75' FORD T BIRD	13.8	221	16.01	11.7	221	18.89	2.88		18
#12	'73' FORD T BIRD	13.1	221.2	16.89	13.1	221.2	16.89	0		0
#13	'75' CHEV. CAPRICE	13.2	220.3	17.37	10.7	220.1	21.41	4.04		24
	FLEET TOTALS	120.6	2248.2	17.35	115.	2247.3	19.54	2.10		12
#10	'73' DODGE MOTOR/ H	28.7	230.9	8.05	28.2	230.7	8.04		(.01)	.
#8	'75' FORD PANEL V8	15	217.2	14.48	15.	217.2	14.48	0		
	TRUCK TOTALS	43.7	448.1	10.25	43.2	447.9	10.37	.12		1.
	ALL VEHICLE TOTALS	173.3	2696.3	15.56	158.2	2695.2	17.04	1.48		9.

The above data extracted from filed affidavits signed by owners (or drivers of vehicles and counter-signed by Mectronic Corporation monitors on file at Mectronic Corporation.

Attachment D

Mectronic[30] Corporation

22025 GRAND RIVER AVENUE
DETROIT, MICHIGAN 48219
(313) 537-2111

February 27, 1976

Mr. Clarence Mercer
2330 Cole Street
Birmingham, Michigan 48008

Dear Mr. Mercer:

Some time ago, we installed our Fuelmaximiser System on one of your vehicles. The purpose of the installation was to show you that we could save considerable fuel for the Post Office Department, which has approximately 227,000 moving rubber-tired vehicles.

As a United States citizen interested in economy and the welfare of your country, you furnished a 1975 pickup truck 360, and we installed the Fuelmaximiser. The increase in miles per gallon as observed by you was 2 (two) miles per gallon.

Further, you stated that you took the Fuelmaximiser off the engine and the mileage decreased 2 (two) miles to the gallon, and that you put the Fuelmaximiser back on the engine and the mileage increased 2 (two) miles per gallon. You observed also that we did not adjust or tamper with any part of the engine.

Also, you have observed the results of up to 4 (four) miles per gallon increase on 10 (ten) other vehicles owned by postal employees and friends. You and Mr. Hargrove also saw the results of two public tests on expressway courses which averaged an increase of over 2.3 (two point three) miles per gallon.

If all of the above is correct, we would appreciate your signature here: Clarence Mercer.

Respectfully,

Charles G. Roberts

Richard C. Shubert.

RS/hbs

U.S. POST OFFICE

January 5, 1980

William Fleming
Michigan District
U.S. Postal Service
Detroit, Michigan 48299

Dear Mr. Fleming:

Mr. Keyhole recommended this letter to you. Enclosed find a report on fuel economy improvement using the "FUEL MAXIMISER" system. Twenty-one U.S. Postal Service vehicles were tested. Jeeps and ½ ton trucks were the vehicles tested. Postal Service mileage and fuel usage records were given to us and are the basis for the report.

We have records of fuel economy improvement of from 8.30% for large school buses to 24% for "in duty" police patrol vehicles.

The 21 Postal Service vehicles averaged 9.10% improvement in fuel economy. I should project this as average to expect on the entire Postal Service fleet.

Mr. Fleming, I am sure you realize the difficulty in attempts at fuel economy. It took several years of record accumulation to provide evidence of the savings obtained when using the "FUEL MAXIMISER" system. In 1973, for instance, persons at the State of Michigan Transportation office met with me to discuss the use of our product. The product was highly recommended by several persons there who had obtained three miles to the gallon benefit from it's use. The end comment was, "Well, fuel is cheap. If everyone saved that much fuel the state revenue would suffer". Conditions today are considerably different.

I wish this letter to preface an appointment with you to discuss the use of the "FUEL MAXIMISER" system.

* The "FUEL MAXIMISER" installs in five minutes.

* There are no adverse effects regarding air pollution nor is there any "tampering" with engine components.

* There is no violation of manufacturers warranty.

* The "FUEL MAXIMISER" does not wear out and may be taken from a retired vehicle and installed on its replacement.

Respectfully,

Charles G. Roberts

Charles G. Roberts
Designer

Mectronic Corporation
3001 West Big Beaver Road - Suite 508
Troy, Michigan 48084 Phone: 1-313-649-6770

U.S. POSTAL SERVICE
SUMMARY OF VEHICLE USE

INSTALLATION, STATE AND ZIP CODE	FINANCE NO.	AUTH NO	FY	LOCATION CODE	DISPATCH POINT
Secretary MI 48063	35 [illegible] 20	3	81	2221	[illegible]

MAKE AND MODEL DESCRIPTION	WOOC	USED VEHICLE DAYS (1)	INACTIVE VEHICLE DAYS (2)	ASSIGNED VEHICLE DAYS (3)	MILES OPERATED TOTAL (4)	MILES OPERATED DAY AVG. (5)	HOURS OPERATED TOTAL (6)	HOURS OPERATED DAY AVG. (7)	TARGET (8)
1/4 TON AMGENERAL 70 RHD	01								
1/4 TON AMGENERAL 70 LHD	02								
1/4 TON AMGENERAL 71 74 RHD	03								
1/4 TON AMGENERAL 71 74 LHD	04	115	0	115	1936	13.7	666	5.5	
1/4 TON AMGENERAL 73 74 LHD	05	115	0	115	1072	9.3	661	5.7	5.7
1/4 TON AMGENERAL 75 78 RHD	06	331	0	331	4347	13.0	1561	5.5	
1/4 TON AMGENERAL 70 71 LHD	07								
1/4 TON AMGENERAL 70 71 RHD	08								
ALL OTHER 1/4 TON VEHICLES	09								
1/2 TON AMC 71 RHD	11					10.3		6.8	
1/2 TON AMC 73 74 RHD	12	43	3	46	1177	27.0	317	2.5	
1/2 TON FORD 70 RHD	13								
1/2 TON DODGE 87 RHD	17								
1/2 TON INC 60 RHD	18								
ALL OTHER 1/2 TON RHD VEHICLES	19								
1/4 TON AMC 75 77 LHD	23								
1/2 TON AMC 70 LHD	27								
ALL OTHER 1/2 TON LHD VEHICLES	29								
1 TON DODGE 6349 LHD	31								
1 TON DODGE 70 LHD	32								
1 TON DODGE 6544 LHD 4x4	36								
1 TON DODGE 67 LHD	37								
1 TON CHEVROLET LHD	38								
ALL OTHER 3/4 AND 1 TON LHD TRUCKS	39								
2 TON 500 CHEV A445 AA LHD	43								
2 TON 500 CHEV 67 LHD	44								
2½ TON CHEV 6B 69 LHD	45								
2½ TON CHEV 70 LHD	46								
ALL OTHER 2 – 2½ TON VEHICLES	49								
5 TON INC 73 LHD	81								
5 TON INC 67 LHD	84								
5 TON INC 67 69 LHD	85								
5 TON INC 70 LHD	86								
ALL OTHER 5 TON VEHICLES	89								
TRACTOR MACK 71 (TANDEM)	61								
TRACTOR MACK 74 (TANDEM)	62								
TRACTOR MACK 74	63								
TRACTOR MACK 75 (TANDEM)	64								
TRACTOR SPOTTER ALL	66								
TRACTOR MACK 6969	67								
TRACTOR MACK 70	69								
ALL OTHER TRACTORS	69								
ALL MAIL HANDLING TRAILERS	71								
ARMORED TRACTORS	73								
EXPERIMENTAL VEHICLES	80								
VEHICLE MAINTENANCE SERVICE	81								
BORROWED OTHER AGENCIES	82								
STORAGE	83								
PLANT AND EQUIPMENT SVC VEHICLES	84								
ADMINISTRATIVE VEHICLES	87								
INSPECTION/SECURITY VEHICLES	88								
LAW ENFORCEMENT VEHICLES	89								
TOTAL POSTAL OWNED	99	545	3	548	13734	25.3	7564	5.7	

NOT FOR POD USE

CONTRACT VEHICLES		CHRISTIAN [illegible]		[illegible]			211	
DRIVE OUT AGREEMENTS								
POA								
RURAL ROUTE								
STAR ROUTE								
TOTAL NON POSTAL OWNED								
GRAND TOTAL →								

Total Fleet Used
Wk Week
23
1.5
avg 2 hrs

INSTRUCTIONS

1. Used Vehicle Days – Obtain from Form 4570. (For postal owned only)
2. Inactive Vehicle Days – Obtain from Form 4570 (Includes inoperable & non used days). DO NOT COUNT SUNDAYS AND HOLIDAYS FOR USED OR INACTIVE DAYS. (For postal owned only)
3. Assigned Vehicle Days – Columns 1 + 2. (For postal owned only)
4 & 6. Total Miles and Hours – Obtain from 4570. Enter totals for all vehicles in each make/model category, and record by whole numbers only, rounded to nearest whole number.
5 & 7. Daily Average Miles and Hours – Columns 4 and 6 divided by Column 3. Compute to nearest tenth. (For postal owned only)
8. Target – Optional (as Determined by Regional Instructions)

NAME OF POST OFFICE | 34 | ISSUANCE NO | CITY | LOCATION CODE

PART ONE – COST ANALYSIS OF MINOR REPAIRS AND SERVICES BY MAKE/MODEL

MAKE – MODEL – DESCRIPTION	CODE	COST	MAKE – MODEL – DESCRIPTION	CODE	COST
¼ TON AMC LHD 75 76	01		2½ TON CHEV 70 LHD	46	
¼ TON KAISER JEEP RHD 68 69	02		ALL OTHER 2 2½ TON VEHICLES	49	
¼ TON KAISER JEEP LHD 68 69	03				
¼ TON AM GENERAL RHD 73 74	04	32 50	5 TON IHC (Auto Trans.) 73	51	
¼ TON AM GENERAL LHD 73 74	05				
¼ TON AM GENERAL RHD 75 76	06	56 10	5 TON IHC 67	54	
¼ TON KAISER JEEP LHD 70 71	07		5 TON IHC 68 69	55	
¼ TON KAISER JEEP RHD 70 71	08		5 TON IHC 70	56	
ALL OTHER ¼ TON VEHICLES	09		ALL OTHER 5 TON VEHICLES	59	
¼ TON AM GENERAL RHD 71	11		TRACTOR MACK 71 TANDEM	61	
¼ TON AM GENERAL RHD 73 74	12	37 25	TRACTOR MACK 74 TANDEM	62	
¼ TON FORD RHD 70	13		TRACTOR MACK 74	63	
			TRACTOR MACK 75 TANDEM	64	
¼ TON DODGE RHD 67	17				
¼ TON IHC RHD 69	18		TRACTOR SPOTTER (All)	66	
ALL OTHER ¼ TON RHD VEHICLES	19		TRACTOR MACK 68 69	67	
			TRACTOR MACK 70	68	
¼ TON AM GENERAL RHD 75 ELECTRIC	23		ALL OTHER TRACTORS	69	
¼ TON AM MOTORS 70	27				
ALL OTHER ¼ TON LHD VEHICLES	29		ALL TRAILERS	71	
			ARMORED TRACTOR	78	
1 TON DODGE LHD 68 69	31				
1 TON DODGE 70	32		EXPERIMENTAL VEHICLES	80	
			VEHICLE MAINT. SERVICE VEHICLES	81	
1 TON DODGE LHD 65 66	36		BORROWED VEHICLES	82	
1 TON DODGE LHD 67	37		STORAGE VEHICLES	83	
1 TON CHEV LHD 68	38		PLANT & EQUIP. SERVICE VEHICLES	84	
ALL OTHER ¼ & 1 TON LHD VEHICLES	39		ADMINISTRATIVE VEHICLES	87	
			INSP SERVICE SECURITY VEHICLES	88	
2 TON CHEV 64 66	43		LAW ENFORCEMENT VEHICLES	89	
2 TON CHEV 67	44				
2½ TON CHEV 68 69 LHD	45		TOTALS ▶	99	115.85

PART TWO – ANALYSIS BY VENDER

VENDOR NO (Finance Use Only)	VENDOR (Show Oil Company not Individual Dealer)	LINE NO	GASOLINE GALLONS	GASOLINE TENTHS	QUARTS OF OIL	COST OF GASO (32) LINE	COST OF OIL (34)	COST OF MINOR PARTS, REPAIRS AND (21) SERVICES
	Mobil Oil Co.	50	1902	2	1	$1,349 06	$ .90	$ 115 85
		51				$	$	$
		52						
		53						
		54						
		55						
		56						
		57						
		58						
		59						
	TOTALS ▶	99				$	$	$

PART THREE

ISSUES TO CONTRACT VEHICLES SUMMARIZED BY CONTRACTOR	CONTRACT NO	GASOLINE GALLONS	GASOLINE TENTHS	OIL QUARTS
TOTALS ▶				

PART FOUR – CERTIFICATION

I certify that the above items were purchased and received from authorized dealers through the use of credit cards and Defense Supply Schedules where applicable. Amounts are correct and proper. (Attach Chg. or Exh. (s))

SIGNATURE OF POSTMASTER

DATE

PS Form 4547 Jan 1975

SUMMARY OF PURCHASES FROM COMMERCIAL SERVICE STATIONS

7.32

U.S. POSTAL SERVICE
SUMMARY OF VEHICLE USE

INSTALLATION, STATE AND ZIP CODE	FINANCE NO.	A/C NO	FY	LOCATION CODE	DISPATCH POINT
ROCHESTER NY 48623	25-50-70	1	78	231	1215

MAKE, MODEL, DESCRIPTION	USE CODE	USED VEHICLE DAYS (1)	INACTIVE VEHICLE DAYS (2)	ASSIGNED VEHICLE DAYS (3)	MILES OPERATED TOTAL (4)	MILES OPERATED DAY AVG. (5)	HOURS OPERATED TOTAL (6)	HOURS OPERATED DAY AVG. (7)	TARGET (8)
1/4 TON AMC GENERAL 73 76 LHD	01								
1/4 TON AMC GENERAL 73 76 RHD	02								
1/4 TON AMC GENERAL JEEP RHD	03								
1/4 TON AMC GENERAL 73 76 RHD	06	120	6	126	1343	10.7	66.1	5.5	5.1
1/4 TON AMC GENERAL 73 76 LHD	08	126	0	126	1061	8.5	695.6	5.5	5.1
1/4 TON AMC GENERAL 75 78 RHD	08	336	3	339	4578	13.5	1846	5.4	5.1
1/4 TON AMC GENERAL 70 71 LHD	01								
1/4 TON AMC GENERAL 70 71 RHD	01								
ALL OTHER 1/4 TON VEHICLES	09								
1/2 TON AMC 71 RHD	11								
1/2 TON AMC 73 76 RHD	12	48	0	48	1667	34.7	304	6.3	5.5
1/2 TON FORD 70 RHD	13								
1/2 TON DODGE 67 RHD	17								
1/2 TON INC 68 RHD	18								
ALL OTHER 1/2 TON RHD VEHICLES	19								
1/4 TON AMC 75 ELECTRIC RHD	23								
1/2 TON AMC 70 LHD	27								
ALL OTHER 1/2 TON LHD VEHICLES	29								
1 TON DODGE 67 69 LHD	31								
1 TON DODGE 70 LHD	32								
1 TON DODGE 6546 LHD**	36								
1 TON DODGE 67 LHD	37								
1 TON CHEV AS LHD	38								
ALL OTHER 3/4 AND 1 TON LHD TRUCKS	39								
2 TON 500 CHEV 4445 AM LHD	43								
2 TON 500 CHEV 67 LHD	44								
2½ TON CHEV C969 LHD	45								
2½ TON CHEV 70 LHD	46								
ALL OTHER 2 – 2½ TON VEHICLES	49								
5 TON INC 73 LHD	81								
5 TON INC 67 LHD	84								
5 TON INC 6549 LHD	85								
5 TON INC 70 LHD	86								
ALL OTHER 5 TON VEHICLES	89								
TRACTOR MACK 71 (TANDEM)	61								
TRACTOR MACK 74 (TANDEM)	62								
TRACTOR MACK 76	63								
TRACTOR MACK 75 (TANDEM)	66								
TRACTOR SPOTTER ALL	68								
TRACTOR MACK C969	67								
TRACTOR MACK 70	65								
ALL OTHER TRACTORS	69								
ALL MAIL HANDLING TRAILERS	71								
ARTICULATED TRACTORS	78								
EXPERIMENTAL VEHICLES	50								
VEHICLE MAINTENANCE SERVICE	81								
BORROWED OTHER AGENCIES	82								
STORAGE	83								
PLANT AND EQUIPMENT SVC VEHICLES	84								
ADMINISTRATIVE VEHICLES	87								
INSPECTION/SECURITY VEHICLES	88								
LAW ENFORCEMENT VEHICLES	89								
TOTAL POSTAL OWNED	99	624	3	627	15524	24.6	3467	5.5	

NOT FOR PDC USE

CONTRACT VEHICLES								
DRIVE OUT AGREEMENTS								
P.D.A.								
RURAL ROUTE								
STAR ROUTE								
TOTAL NON POSTAL OWNED								
GRAND TOTAL →								

INSTRUCTIONS

1. Used Vehicle Days – Obtain from Form 4570. (For postal owned only)
2. Inactive Vehicle Days – Obtain from Form 4570 (Includes unserviceable & non-used days). DO NOT COUNT SUNDAYS AND HOLIDAYS FOR USED OR INACTIVE DAYS. (For postal owned only)
3. Assigned Vehicle Days – Column 1 + 2. (For postal owned only)
4 & 6. Total Miles and Hours – Obtain from 4570. Enter totals for all vehicles in each make/model category, and record in whole numbers only, round to nearest whole number.
5 & 7. Daily Average Miles and Hours – Column 4 or Col. 6 ÷ Col. 1, col. 3 or Col. 1. Compute to nearest tenth. (For postal owned only)
8. Target – Optional per District for Record Purposes.

DATE 6/23/78 | PREPARED BY [illegible] | APPROVED BY [illegible]

27508
3620

PART ONE – COST ANALYSIS OF MINOR REPAIRS AND SERVICES

MAKE, MODEL, DESCRIPTION	CODE	COST	MAKE, MODEL, DESCRIPTION	CODE	COST
½ TON AMC LHD 75 76	01		2½ TON CHEV 70 LHD	46	
½ TON KAISER JEEP RHD 68 69	02		ALL OTHER 2 2½ TON VEHICLES	49	
½ TON KAISER JEEP LHD 68 69	03				
½ TON AM GENERAL RHD 73 74	04	5 75	5 TON IHC (Auto Trans) 73	51	
½ TON AM GENERAL LHD 73 74	05				
½ TON AM GENERAL RHD 75 76	06	136 45	5 TON IHC 67	54	
½ TON KAISER JEEP LHD 70 71	07		5 TON IHC 68 69	55	
½ TON KAISER JEEP RHD 70 71	08		5 TON IHC 70	56	
ALL OTHER ½ TON VEHICLES	09		ALL OTHER 5 TON VEHICLES	59	
½ TON AM GENERAL RHD 71	11		TRACTOR MACK 71 TANDEM	61	
½ TON AM GENERAL RHD 73 74	12	42 50	TRACTOR MACK 76 TANDEM	62	
½ TON FORD RHD 70	13		TRACTOR MACK 76	63	
			TRACTOR MACK 75 TANDEM	64	
½ TON DODGE RHD 67	17				
½ TON IHC RHD 69	18		TRACTOR SPOTTER (All)	66	
ALL OTHER ½ TON RHD VEHICLES	19		TRACTOR MACK 68 69	67	
			TRACTOR MACK 70	68	
½ TON AM GENERAL RHD 75 ELECTRIC	23		ALL OTHER TRACTORS	69	
½ TON AM MOTORS 78	27				
ALL OTHER ½ TON LHD VEHICLES	29		ALL TRAILERS	71	
			ARMORED TRACTOR	78	
1 TON DODGE LHD 68 69	31				
1 TON DODGE 70 77	32		EXPERIMENTAL VEHICLES	80	
			VEHICLE MAINT SERVICE VEHICLES	81	
1 TON DODGE LHD 65 66	36		BORROWED VEHICLES	82	
1 TON DODGE LHD 67	37		STORAGE VEHICLES	83	
1 TON CHEV LHD 68	38		PLANT & EQUIP SERVICE VEHICLES	84	
ALL OTHER ½ & 1 TON LHD VEHICLES	39		ADMINISTRATIVE VEHICLES	87	
			INSP SERVICE SECURITY VEHICLES	88	
2 TON CHEV 64 66	43		LAW ENFORCEMENT VEHICLES	89	
2 TON CHEV 67	44				
2½ TON CHEV 68 69 LHD	45		TOTALS ▷	99	$ 18 70

PART TWO – ANALYSIS BY VENDOR

VENDOR NO. (Finance Div Use Only)	VENDOR (Show Oil Company not Individual Dealer)	LINE NO	GASOLINE GALLONS	GASOLINE TENTHS	QUARTS OF OIL	COST OF GASO LINE (32)	COST OF OIL (34)	COST OF MINOR PARTS, REPAIRS AND (23) SERVICES
	Amoco Oil Co.	50	1768	8	3	$ 1245 87	$ 2.70	$ 184 70
		51				$	$	$
		52						
		53						
		54						
		55						
		56						
		57						
		58						
		59						
	TOTALS ▷	99	1768	8	3	$ 1245 87	$ 2.70	$ 184 70

PART THREE

ISSUES TO CONTRACT VEHICLES SUMMARIZED BY CONTRACTOR	CONTRACT NO.	GASOLINE GALLONS	GASOLINE TENTHS	OIL QUARTS
TOTALS ▷				

PART FOUR – CERTIFICATION

I certify that the above items were purchased and received from authorized dealers through the use of credit cards or Defense Supply Schedules where applicable
Amounts are correct and proper (Attach Charge Tickets)

SIGNATURE OF POSTMASTER
[illegible]

DATE
01/30/78

PS Form 4547 Jan 1975 SUMMARY OF PURCHASES FROM COMMERCIAL SERVICE STATIONS 7.67

Date-5/--Thur--5/---

Truck number	Ending Mileage	Beginning Mileage	Miles	Gals	Ending Mileage	Beginning Mileage	Miles
X 302385	16686	16625	61	13.1	16747	16686	61
X 302482	10347	10307	40	8.8	10385	10347	38
X 302501	10531	10476	55	5.9	10579	10531	48
X 302520	9832	9789	43	10.7	9875	9832	43
X 302583	17386	17326	60	18.1	17437	17386	51
X 313256	19628	19471	157	30.6	19677	19628	49
X 314351	18569	18526	43	4.5	18621	18569	52
X 314359	18461	18372	89	14.3	18516	18461	55
X 314387	17034	16947	87	8.8	17133	17034	99
~~324630~~	32765	32559	206	38.1	33013	32765	248
~~324890~~	22907	22472	435	22.3	23004	22907	97
~~416863~~	10845	10771 UMF			10930	10845	85
X 6116817	3951	3808	143	15.8	4072	3951	121
X 6116822	11497	11266	231	25.4	11724	11497	227
X 6116826	10175	9968	207	28.5	10398	10175	223
X 6116832	4147	4060	87	10.6	4228	4147	81
X 6116833	7630	7486	144	25.4	7761	7630	131
X 6116835	9275	9070	205	30.6	9485	9275	210
X 6116839	9598	9420	178	21.2	9772	9598	174
~~6116844~~	9294	9210 TRANS	76	10.4	9452	9294	158
X 6117170	11132	10872	260	26.7	11262	11132	130
X 6117175	8785	8624	161	22.6	8922	8785	137
~~6117176~~	8102	8038	64	10.8	8224	8102	122
X 6117184	8521	8365	156	23.8	8689	8521	168
X 6117191	7865	7689	176	22.5	8019	7865	154
X 6117196	13902	13701	201	25.5	14134	13902	232
			3565	495.0			3194
			7814	14	175.2		

.96

Control = 9.571

Date 3/15 Thur 3/22 — 38 — 3/23 thru 3/31

Truck number	Ending Mileage	Beginning Mileage	Miles	Gals	Ending Mileage	Begin Mileage	Miles
302385	16802	16747	55	5.9	16862	16802	60
302482	10432	10385	47	6.3	10496	10432	64
302501	10624	10579	45	6.9	10675	10624	51
302520	9907	9875	32	12.6	9943	9907	36
302583	17477	17437	40	8.0	17533	17477	56
313256	19725	19677	48	8.6	19787	19725	62
314351	18680	18621	59		18719	18680	39
314359	18567	18516	51	7.4	18623	18567	56
314387	17199	17133	66	8.5	17281	17199	82
324630	33186	33013	173	24.2	33390	33186	204
324890	23255	23004	251	25.8	23467	23255	212
416863	10954	10930	24	6.9	10987	10954	33
6116817	4230	4072	158	18.4	4345	4230	115
6116822	11881	11724	157	15.6	12113	11881	232
6116826	10568	10398	170	23.1	10779	10568	211
6116832	4290	4228	62	8.0	4364	4290	74
6116833	7873	7761	112	17.0	8014	7873	141
6116835	9653	9485	168	21.5	9858	9653	205
6116839	9917	9772	145	19.5	10086	9917	169
6116844	9580	9452	128	16.9	9746	9580	166
6117170	11465	11262	203	22.8	11547	11465	82
6117175	9035	8922	113	11.7	9173	9035	138
6117176	8349	8224	125	20.5	8503	8349	154
6117184	8863	8659	174	22.3	9016	8863	153
6117191	8165	8019	146	13.6	8328	8165	163
6117196	14327	14134	193	21.5	14591	14327	264
		7.9	2945	373.5			

Date 2/2 Thur 3/8 — Date — thru —

Truck number	Ending Mileage	Beginning Mileage	Miles	Gals	Ending Mileage	Begin Mileage	Miles
302385	16922	16862	60	9.1	16980	16922	58
302482	10551	10496	55	7.8	10621	10551	70
302501	10725	10675	50	7.4	10774	10725	49
302520	9987	9943	44	6.8	10029	9987	42
302583	17596	17533	63	7.0	17651	17596	55
313256	19851	14787	64	9.6	19912	19851	61
314351	18762	18719	43	5.9	18800	18762	38
314359	18678	18623	55	7.2	18739	18678	61
314387	17383	17281	102	16.5	17465	17353	82
324638	33553	33390	163	24.2	33739	33553	186
324896		23467		30.6	23911		
416863	11016	10987	29		11046	11016	30
6116817	4493	4345	148	10.0	4635	4493	142
6116822	12346	12113	233	23.6	12574	12346	228
6116826	10982	10779	203	24.5	11083	10982	101
6116832	4436	4364	72	13.6	4513	4436	77
6116833	8148	8014	134	24.1	8291	8148	143
6116835	10072	9858	214	26.6	10276	10072	204
6116839	10284	10086	198	25.5	10454	10284	170
6116844	9911	9746	165	13.8	10061	9911	150
6117170	11753	11547	206	15.1	11918	11753	165
6117175	9313	9173	140	16.3	9447	9313	134
6117176	8655	8503	152	20.8	8800	8655	145
6117184	9169	9016	153	22.6		9169	
6117191	8480	8328	152	22.3	8624	8480	144
6117196	14850	14591	259	27.7	15071	14850	221
			2648	331.2	mpg = 8.0437		
			480	439.8	mpg = 8.1633		
				58.8			
				381.0			

CONSOLIDATED [illegible] 7-3

Vehicle Time Rec[illegible]

A/P 4 FY 78

Rochester, MI. 48063

OFFICE Postal Service FINANCE NO. 40 DATE

PREPARED BY Wm W. Theut TITLE VOMA PHONE 651-8551

Transaction No. 8	2 - 5	6 - 7	1 - 3	4 - 5	6 - 7
VEHICLE NUMBER	END ODOMETER READING Last 4 Digits NO 10th	ASSIGNED VEHICLE DAYS	HOURS USED	USED VEHICLE DAYS	IN-OPERATIVE VEHICLE DAYS
822	2764	24	124	24	0
839	0602	24	144	24	0
351	8835	24	138	24	0
359	8783	24	138	24	0
630	3894	24	174	23	1
583	7703	24	145	24	0
482	0676	24	139	24	0
611620	7518	22	110	22	0
176	8924	24	139	23	1
184	9433	24	121	22	2
191	8776	24	110	24	0
835	0408	24	121	24	0
826	1259	24	119	24	0
844	0143	24	115	22	2
832	4577	24	125	24	0
501	0855	24	[illegible]	24	0
833	8400	24	125	24	0
520	0059	24	126	24	0
817	4727	24	155	24	0
890	4134	24	117	24	0
175	9558	24	126	24	0
395	7036	24	133	24	0

FORM T8 - Apr 77

CONSOLIDATED PS FORMS 4570 7..

Vehicle Time Record

A/P ___ F/Y 77

41

OFFICE _____ FINANCE NO. _____ DATE _____

PREPARED BY _____ TITLE _____ PHONE _____

Transaction No. 8	2 - 5	6 - 7	1 - 3	4 - 5	6 - 7
VEHICLE NUMBER	END ODOMETER READING Last 4 Digits NO 10ths	ASSIGNED VEHICLE DAYS	HOURS USED	USED VEHICLE DAYS	IN-OPERATIVE VEHICLE DAYS
170 ✓	2141	24	92	17	7
387 ✓	7547	24	122	24	0
356 ✓	9962	24	163	24	0
863 ✓	1673	24	140	24	0
196 ✓	5181	24	135	24	0
7161329 ✓	3678	8	46	8	0

FORM 78 - Apr 77

CONSOLIDATED PS FORMS 4570

Vehicle Time Record

A/P 07 F/Y 78

42

OFFICE _____ FINANCE NO. _____ DATE 04/20/78

PREPARED BY J. Hunt TITLE _____ PHONE _____

Transaction No. 8	2 - 5	6 - 7	1 - 3	4 - 5	6 - 7
VEHICLE NUMBER	END ODOMETER READING Last 4 Digits NO 10th's	ASSIGNED VEHICLE DAYS	HOURS USED	USED VEHICLE DAYS	IN-OPERATIVE VEHICLE DAYS
395	7302	24	135	24	0
482	6936	24	134	24	0
501	1059	24	120	24	0
520	0232	24	117	24	0
583	7956	24	141	24	0
256	0224	24	140	24	0
351	9019	24	138	24	0
359	9081	24	144	24	0
387	7915	24	137	24	0
630	4744	24	176	24	0
890	5316	24	151	24	0
863	1196	24	136	24	0
817	5204	24	120	24	0
822	3688	24	130	24	0
826	2140	24	140	24	0
832	4891	24	134	24	0
833	8950	24	121	24	0
835	1272	24	124	24	0
839	1380	24	142	24	0
844	0756	24	127	24	0
170	3114	24	127	24	0
175	0194	24	126	24	0

FORM T8 - Apr 77

CONSOLIDATED FS FORMS &

Vehicle Time Record

A/P 07 F/Y 78

43

OFFICE _____ FINANCE NO. _____ DATE 04/20/78

PREPARED BY Hunt TITLE _____ PHONE _____

Transaction No. 8	2 - 5	6 - 7	1 - 3	4 - 5	6 - 7
VEHICLE NUMBER	END ODOMETER READING Last 4 Digits NO 10ths	ASSIGNED VEHICLE DAYS	HOURS USED	USED VEHICLE DAYS	IN-OPERATIVE VEHICLE DAYS
176	9479	24	103	20	4
184	0088	24	125		
191	9422	24	103	24	0
196	6136	24	130	24	0
401	3620	10	36	10	0

FORM FS - Apr 77

Fuel and Oil
Rochester, Mi. 48063

44

Prepared By----------

Vehicle #	Vender	1-week Fuel	1-week Cost	2-week Fuel	2-week Cost	3-week Fuel	3-week Cost	4-week Fuel	4-week Cost	Oil	Cost	T-Fuel	T-Cost
302395	✓	15 9	11 75	9 1	6 15	7 8	5 30	5 5	3 75			38.3 43.8	26
302482	✓	7 0	4 75	7 8	5 30	5 1	3 66	6 7	4 40			26.6	18
302501	✓	6 5	4 40	7 4	5 00	7 5	5 80	8 5	5 80			30.9	21
302520	✓	12 3	8 00	6 8	4 65	13 0	9 50	7 2	4 90			41.3	27
302583	✓	11 6	7 90	7 0	4 75	10 2	6 95	10 3	7 00			39.1	26
313256	✓	8 3	5 65	9 6	6 50	12 9	8 75					30.8	20
314351	✓	4 7	3 20	5 9	4 00	10 5	7 10	5 9	4 00			27.0	18
314359	✓	6 5	4 40	7 2	4 90	6 12	4 20	6 9	4 70			26.8	18
314387	✓	8 4	5 70	16 5	11 25	7 2	4 90	16 0	10 85			48.1	32
324630	✓	32 8	21 75	24 2	16 45	24 7	16 80	23 1	15 78			104.9	70
324890	✓	28 3	19 25	30 6	20 75	26 9	18 20	27 7	18 60			113.1	76
416863	✓	7 0	4 75			8 1	6 50	8 1	5 50			33.9	16
6116817	✓	11 3	8 10	10 0	7 15	14 4	10 35	5 4	4 00			41.1	29
6116822	✓	22 9	16 56	23 6	17 00	22 8	16 35	23 2	16 60			91.5	66
6116826	✓	25 9	18 80	24 5	18 20	17 2	12 70	28 7	20 75			96.9	70
6116832	✓	16 2	11 60	13 6 9 65		9 3	6 45	13 4	9 50			52.2	37
6116833	✓	16 2	11 60	24 1	17 79	20 2	14 80	19 4	14 00			80.5	58
6116835	✓	24 7	17 80	26 6	19 45	25 1	18 15	21 6	15 55			98.0	70
6116839	✓	22 9	16 30	25 5	18 30	22 1	15 88	23 3	15 98			93.8	66
6116844	✓	23 7	16 97	13 9	10 00	28 8	20 50	18 9	13 60			84.4	61
6117170	✓	9 3	6 60	15 1	11 00	17 7	12 70	35 4	25 65	11	1.80	77.5	55
6117175	✓	21 9	15 65	16 3	11 70	15 4	11 10	15 3	11 00			68.9	49
6117176	✓	22 3	16 05	20 8	14 95	20 7	14 90	21 1	15 15	1	.90	84.9	61
6117184	✓	22 9	16 36	22 6	16 10	21 3	15 30	11 2	8 00			78.0	55
6117191	✓	20 3	14 65	22 3	16 00	12 4	9 21	18 4	13 05	111	2.70	73.9	52
6117196	✓	37 5	26 85	27 7	20 40	27 8	19 90	20 4	14 56			113.4	81
6117620	✓	17 5	12 70	18 3	12 45	20 5	14 68	13 2	9 45			69.5	49
7101362	✓	4 2	3 00									4.2	3
7101329	✓			2 9	2 10	2 2	15 35	19 4	14 10			44.7	31
		469 0	331 09	439 8	311 64	435 5	295 98	434 5	306 22				

Rochester, MI. 48063

45

Prep'd By---

Vehicle #	Vender	1-week Fuel	1-week Cost	2-week Fuel	2-week Cost	3-week Fuel	3-week Cost	4-week Fuel	4-week Cost	Oil	Cost	T-Fuel	T-Cost
302395	√	17	7 35		5 70		3 50		5 00		√	21.9	21
302482		8	5 76		4 50				6 50		√	24.7	16
302501		7	5 00		5 00		4 64		3 50		√	26.7	18
302520			4 10				4 75		5 40		√	21.0	14
302583		15	10 20		4 50		4 50		7 55		√	37.5	26
313256		8	6 10		5 40		4 60		6 20		√	33.3	22
314351			4 50		3 70		3 15		6 05		√	25.5	17
314359		5	3 70		4 55		5 00		4 50		√	27.5	17
314387		8	5 45		9 25		5 70		7 85		√	41.2	28
324630		16	17 10		19 20		22.10		17 00		√	104.7	77
324890		35	24 20		20 80		25 46		24 05	1	90	133.7	94
416863					5 65				5 50		√	16.4	11
6116817		13	9 30		9 35		6 70		7 15		√	45.0	32
6116822		26	19 00		15 85		14 10		17 83		√	92.5	66
6116826		28	20 45		20 05		20 20		21 45 17 90		√	116.7	82
6116832			9 40		5 40		5 70		5 30		√	34.0	25
6116833		19	14 20		13 85		12 40		13 55	11	180	75.5	54
6116835		27	20 05		15 80		17 85		22 05		√	104.4	75
6116839		24	17 90		15 85		16 05		15 90	1	90	91.1	65
6116844		17	13 10		17 10		14 00		14 15		√	80.9	58
6117170		18	13 61		22 50		22 60		20 76		√	109.7	79
6117175		18	13 25		13 00		9 90		10 45		√	65.7	46
6117176		20	14 45		10 25		14 65		14 80		√	75.5	54
6117184		20	15 81		14 06		14 71		14 20		√	79.9	58
6117191		15	11 06		11 00		15 10		9 75	1	90	65.1	46
6117196		35	25 15		17 90		14 30		16 60		√	102.6	73
7191		4	3 30		8 50						VNF	16.4	11
12							11 65		10 35		√	32.5	22
		433	7	421	9		393	51	315	34		1,721.0	1221

U.S. POSTAL SERVICE
SUMMARY OF VEHICLE USE

POST OFFICE, STATE AND ZIP CODE	FINANCE NO	A/P NO	FY	LOCATION CODE	DISPATCH POINT
Rochester, MI 48063	25-[illegible]	3	[illegible]	331	[illegible]

MAKE MODEL DESCRIPTION	CODE	USED VEHICLE DAYS (1)	INACTIVE VEHICLE DAYS (2)	ASSIGNED VEHICLE DAYS (3)	MILES OPERATED TOTAL (4)	MILES OPERATED DAY AVG (5)	HOURS OPERATED TOTAL (6)	HOURS OPERATED DAY AVG (7)	TARGET (8)
1/4 TON AM GENERAL 75-76 LHD	01								
1/4 TON KAISER JEEP 68-69 RHD	02								
1/4 TON KAISER JEEP 68-69 LHD	03								
1/4 TON AM GENERAL 73-74 RHD	04	115	0	115	1536	13.3	666	5.8	
1/4 TON AM GENERAL 73-74 LHD	05	115	0	115	1022	9.3	660	[illegible]	5.7
1/4 TON AM GENERAL 75-78 RHD	06	332	0	332	9347	28.0	1561	[illegible]	
1/4 TON AM GENERAL 70-71 LHD	07								
1/4 TON AM GENERAL 70-71 RHD	08								
ALL OTHER 1/4 TON VEHICLES	09								
1/2 TON AMG 71 RHD	11					23.3		6.4	
1/2 TON AMG 73-74 RHD	12	43	3	46	1122	26.4	317	7.8	
1/2 TON FORD 70 RHD	13								
1/2 TON DODGE 67 RHD	17								
1/2 TON IHC 69 RHD	18								
ALL OTHER 1/2 TON RHD VEHICLES	19								
1/4 TON AMG 75 ELECTRIC RHD	23								
1/2 TON AMC 70 LHD	27								
ALL OTHER 1/2 TON LHD VEHICLES	29								
1 TON DODGE 63-69 LHD	31								
1 TON DODGE 70 LHD	32								
1 TON DODGE 65-68 LHD	36								
1 TON DODGE 67 LHD	37								
1 TON CHEV 66 LHD	38								
ALL OTHER 3/4 AND 1 TON LHD TRUCKS	39								
2 TON 500 CHEV 64-65-66 LHD	43								
2 TON 500 CHEV 67 LHD	44								
2½ TON CHEV 68-69 LHD	45								
2½ TON CHEV 70 LHD	46								
ALL OTHER 2 - 2½ TON VEHICLES	49								
5 TON IHC 73 LHD	51								
6 TON IHC 67 LHD	54								
6 TON IHC 68-69 LHD	55								
6 TON IHC 70 LHD	56								
ALL OTHER 6 TON VEHICLES	59								
TRACTOR MACK 71 (TANDEM)	61								
TRACTOR MACK 74 (TANDEM)	62								
TRACTOR MACK 74	63								
TRACTOR MACK 75 (TANDEM)	64								
TRACTOR SPOTTER ALL	66								
TRACTOR MACK 65-69	67								
TRACTOR MACK 70	65								
ALL OTHER TRACTORS	69								
ALL MAIL HANDLING TRAILERS	71								
ARMORED TRACTORS	73								
EXPERIMENTAL VEHICLES	80								
VEHICLE MAINTENANCE SERVICE	81								
BORROWED OTHER AGENCIES	82								
STORAGE	83								
PLANT AND EQUIPMENT SVC VEHICLES	84								
ADMINISTRATIVE VEHICLES	87								
INSPECTION SVC SECURITY VEHICLES	88								
LAW ENFORCEMENT VEHICLES	89								
				545					
TOTAL POSTAL OWNED	99	545	3	548	13734	23.3	3574	6.4	

NOT FOR POC USE

CONTRACT VEHICLES		CHRISTENS 22	[illegible]		216	
DRIVE OUT AGREEMENTS						
POA						
RURAL ROUTE						
STAR ROUTE						
TOTAL NON POSTAL OWNED						
GRAND TOTAL →						

total fleet avg w/o unit 7.23

avg 2 MO 7.5

INSTRUCTIONS

1. Used Vehicle Days – Obtain from Form 4570 (For postal owned only)
2. Inactive Vehicle Days – Obtain from Form 4570 (Includes inoperable & non used days). DO NOT COUNT SUNDAYS AND HOLIDAYS FOR USED OR INACTIVE DAYS (For postal owned only)
3. Assigned Vehicle Days – Column 1 + 2 (For postal owned only)
4 & 6. Total Miles and Hours – Obtain from 4570. Enter totals for all vehicles in each make/model category, and record in whole numbers only, round to nearest whole number
5 & 7. Daily Average Miles and Hours – Columns 4 and 6 divided by column 1. Compute to nearest tenth (For postal owned only)
8. Target – Optional per District or Regional Instructions

[illegible] [illegible] [illegible]

PART ONE - COST ANALYSIS BY MAKE/MODEL/DESCRIPTION

MAKE - MODEL - DESCRIPTION	CODE	COST
¼ TON AMC LHD 75 76	01	
¼ TON KAISER JEEP RHD 68 69	02	
¼ TON KAISER JEEP LHD 68 69	03	
¼ TON AM GENERAL RHD 73 74	04	32 150
¼ TON AM GENERAL LHD 73 74	05	
¼ TON AM GENERAL RHD 75 76	06	56 170
¼ TON KAISER JEEP LHD 70 71	07	
¼ TON KAISER JEEP RHD 70 71	08	
ALL OTHER ¼ TON VEHICLES	09	
½ TON AM GENERAL RHD 71	11	
½ TON AM GENERAL RHD 73 74	12	37 125
½ TON FORD RHD 70	13	
½ TON DODGE RHD 67	17	
½ TON INC RHD 69	18	
ALL OTHER ½ TON RHD VEHICLES	19	
½ TON AM GENERAL RHD 76 ELECTRIC	23	
½ TON AM MOTORS 70	27	
ALL OTHER ½ TON LHD VEHICLES	29	
1 TON DODGE LHD 68 69	31	
1 TON DODGE 70	32	
1 TON DODGE LHD 65 66	36	
1 TON DODGE LHD 67	37	
1 TON CHEV LHD 68	38	
ALL OTHER ½ & 1 TON LHD VEHICLES	39	
2 TON CHEV 64 66	43	
2 TON CHEV 67	44	
2½ TON CHEV 68 69 LHD	45	

NO SERVICES BY MAKE/MODEL

MAKE - MODEL - DESCRIPTION	CODE	COST
2½ TON CHEV 70 LHD	46	
ALL OTHER 2 2½ TON VEHICLES	49	
5 TON INC (Auto Trans.) 73	51	
5 TON INC 67	54	
5 TON INC 68 69	55	
5 TON INC 70	56	
ALL OTHER 5 TON VEHICLES	59	
TRACTOR MACK 71 TANDEM	61	
TRACTOR MACK 74 TANDEM	62	
TRACTOR MACK 74	63	
TRACTOR MACK 75 TANDEM	64	
TRACTOR SPOTTER (All)	66	
TRACTOR MACK 68 69	67	
TRACTOR MACK 70	68	
ALL OTHER TRACTORS	69	
ALL TRAILERS	71	
ARMORED TRACTOR	70	
EXPERIMENTAL VEHICLES	80	
VEHICLE MAINT SERVICE VEHICLES	81	
BORROWED VEHICLES	82	
STORAGE VEHICLES	83	
PLANT & EQUIP SERVICE VEHICLES	84	
ADMINISTRATIVE VEHICLES	87	
INSP SERVICE SECURITY VEHICLES	88	
LAW ENFORCEMENT VEHICLES	89	
TOTALS ——▶	99	115.85

PART TWO - ANALYSIS BY VENDOR

VENDOR NO (Finance Use Use Only)	VENDOR (Show Oil Company not Individual Dealer)	LINE NO	GASOLINE GALLONS	GASOLINE TENTHS	QUARTS OF OIL	COST OF GASO (32) LINE	COST OF OIL (34)	COST OF MINOR PARTS, REPAIRS AND (21) SERVICES
111660	C.T. Co.	50	1902	2	1	$1,349.06	$ .90	$ 115.85
		51				$	$	$
		52						
		53						
		54						
		55						
		56						
		57						
		58						
		59						
	TOTALS ——▶	99				$	$	$

PART THREE

ISSUES TO CONTRACT VEHICLES SUMMARIZED BY CONTRACTOR	CONTRACT NO	GASOLINE GALLONS	GASOLINE TENTHS	OIL QUARTS
TOTALS ——▶				

PART FOUR - CERTIFICATION

I certify that the above items were purchased and received from authorized dealers through the use of credit cards and Defense Supply Schedules where applicable. Amounts are correct and proper. (Attach Check or Tab Here)

SIGNATURE OF POSTMASTER

DATE

PS Form 4547 Jan 1973 — SUMMARY OF PURCHASES FROM COMMERCIAL SERVICE STATIONS

7.32

U.S. POSTAL SERVICE
SUMMARY OF VEHICLE USE

POST OFFICE, STATE AND ZIP CODE	FINANCE NO.	AIP NO	FY	LOCATION CODE	DISPATCH POINT
ROCHESTER MI. 48063	25-8070	1	78	23	MAIL

MAKE MODEL DESCRIPTION	MOCU	USED VEHICLE DAYS (1)	INACTIVE VEHICLE DAYS (2)	ASSIGNED VEHICLE DAYS (3)	MILES OPERATED TOTAL (4)	MILES OPERATED DAY AVG. (5)	HOURS OPERATED TOTAL (6)	HOURS OPERATED DAY AVG. (7)	TARGET (8)
1/4 TON AM GENERAL 75 78 LHD	01								
1/4 TON KAISER JEEP M 715 RHD	02								
1/4 TON KAISER JEEP M 715 LHD	03								
1/4 TON AM GENERAL 75 78 RHD	04	120	0	120	1243	10.4	661	5.5	5.1
1/4 TON AM GENERAL 75 78 LHD	05	120	0	120	1061	8.8	656	5.5	5.1
1/4 TON AM GENERAL 75 78 RHD	06	336	3	339	3522	10.3	1846	5.4	5.1
1/4 TON AM GENERAL 70 71 LHD	07								
1/4 TON AM GENERAL 70 71 RHD	08								
ALL OTHER 1/4 TON VEHICLES	09								
1/2 TON AMC 71 RHD	11								
1/2 TON AMC 73 74 RHD	12	48	0	48	1667	34.1	304	6.3	5.5
1/2 TON FORD 70 RHD	13								
1/2 TON DODGE 67 RHD	17								
1/2 TON IHC 69 RHD	18								
ALL OTHER 1/2 TON RHD VEHICLES	19								
1/4 TON AMC 75 77 LHD	21								
1/2 TON AMC 70 LHD	27								
ALL OTHER 1/2 TON LHD VEHICLES	29								
1 TON DODGE 6749 LHD	31								
1 TON DODGE 70 LHD	32								
1 TON DODGE 6546 LHD	36								
1 TON DODGE 67 LHD	33								
1 TON CHEVROLET LHD	38								
ALL OTHER 3/4 AND 1 TON LHD TRUCKS	39								
2 TON 500 CHEV 4445 AM LHD	43								
2 TON 500 CHEV 67 LHD	44								
2½ TON CHEV C60 LHD	45								
2½ TON CHEV 70 LHD	46								
ALL OTHER 2 – 2½ TON VEHICLES	49								
5 TON IHC 73 LHD	81								
5 TON IHC 67 LHD	84								
5 TON IHC 6549 LHD	85								
5 TON IHC 70 LHD	80								
ALL OTHER 5 TON VEHICLES	89								
TRACTOR MACK 71 (TANDEM)	61								
TRACTOR MACK 74 (TANDEM)	62								
TRACTOR MACK 74	63								
TRACTOR MACK 75 (TANDEM)	64								
TRACTOR SPOTTER ALL	68								
TRACTOR MACK C660	67								
TRACTOR MACK 70	65								
ALL OTHER TRACTORS	69								
ALL MAIL HANDLING TRAILERS	71								
ARMORED TRACTORS	78								
EXPERIMENTAL VEHICLES	80								
VEHICLE MAINTENANCE SERVICE	81								
BORROWED OTHER AGENCIES	82								
STORAGE	83								
PLANT AND EQUIPMENT SVC VEHICLES	84								
ADMINISTRATIVE VEHICLES	87								
INSPECTION/SECURITY VEHICLES	88								
LAW ENFORCEMENT VEHICLES	89								
TOTAL POSTAL OWNED	99	624	3	627	15324	24.6	3467	5.5	

NOT FOR PDC USE

CONTRACT VEHICLES									
DRIVE OUT AGREEMENTS									
FOA									
RURAL ROUTE									
STAR ROUTE									
TOTAL NON POSTAL OWNED									
GRAND TOTAL →									

INSTRUCTIONS

1. Used Vehicle Days – Obtain from Form 4570. (For postal owned only)
2. Inactive Vehicle Days – Obtain from Form 4570 (Includes unprogrammable & unassigned days). DO NOT COUNT SUNDAYS AND HOLIDAYS FOR USED OR INACTIVE DAYS. (For postal owned only)
3. Assigned Vehicle Days – Column 1 + 2. (For postal owned only)
4. & 6. Total Miles and Hours – Obtain from 4570. Enter totals for all vehicles in each make/model category, and record in whole numbers only, rounded to nearest whole number.
5. & 7. Daily Average Miles and Hours – Column 4 or Column 6 ÷ Column 3. Compute to nearest tenth. (For postal owned only)
8. Target – Obtain Target per District or Region Guidelines.

PREPARED BY | DATE | APPROVED BY | DATE | RECEIVED

10/31/78

27508
3670

Rochester, Mi. 48063

	79-8070		78	221

PART ONE – COST ANALYSIS OF MINOR REPAIRS AND SERVICES BY MAKE/MODEL

MAKE MODEL DESCRIPTION	CODE	COST	MAKE MODEL DESCRIPTION	CODE	COST
¼ TON AMG LHD 75 76	01		2½ TON CHEV 70 LHD	46	
¼ TON KAISER JEEP RHD 68-69	02		ALL OTHER 2 2½ TON VEHICLES	49	
¼ TON KAISER JEEP LHD 68 69	03				
¼ TON AM GENERAL RHD 73 74	04	5 75	5 TON IHC (Auto Trans) 73	51	
¼ TON AM GENERAL LHD 73 74	05				
¼ TON AM GENERAL RHD 76 76	06	136 45	5 TON IHC 67	54	
¼ TON KAISER JEEP LHD 70 71	07		5 TON IHC 68 69	55	
¼ TON KAISER JEEP RHD 70 71	08		5 TON IHC 70	56	
ALL OTHER ¼ TON VEHICLES	09		ALL OTHER 5 TON VEHICLES	59	
½ TON AM GENERAL RHD 71	11		TRACTOR MACK 71 TANDEM	61	
½ TON AM GENERAL RHD 73 74	12	42 50	TRACTOR MACK 74 TANDEM	62	
½ TON FORD RHD 70	13		TRACTOR MACK 74	63	
			TRACTOR MACK 75 TANDEM	64	
½ TON DODGE RHD 67	17				
½ TON IHC RHD 69	18		TRACTOR SPOTTER (AB)	66	
ALL OTHER ½ TON RHD VEHICLES	19		TRACTOR MACK 68 69	67	
			TRACTOR MACK 70	68	
½ TON AM GENERAL RHD 75 ELECTRIC	23		ALL OTHER TRACTORS	69	
½ TON AM MOTORS 70	27				
ALL OTHER ½ TON LHD VEHICLES	29		ALL TRAILERS	71	
			ARMORED TRACTOR	78	
1 TON DODGE LHD 68 69	31				
1 TON DODGE 70-72	32		EXPERIMENTAL VEHICLES	80	
			VEHICLE MAINT SERVICE VEHICLES	81	
1 TON DODGE LHD 65 66	36		BORROWED VEHICLES	82	
1 TON DODGE LHD 67	37		STORAGE VEHICLES	83	
1 TON CHEV LHD 68	38		PLANT & EQUIP SERVICE VEHICLES	84	
ALL OTHER ¾ & 1 TON LHD VEHICLES	39		ADMINISTRATIVE VEHICLES	87	
			INSP SERVICE SECURITY VEHICLES	88	
2 TON CHEV 64 66	43		LAW ENFORCEMENT VEHICLES	89	
2 TON CHEV 67	44				
2½ TON CHEV 68 69 LHD	45				
			TOTALS	99	$ 18..70

PART TWO – ANALYSIS BY VENDOR

VENDOR NO. (Finance Div Use Only)	VENDOR (Show Oil Company not Individual Dealer)	LINE NO	GASOLINE GALLONS	GASOLINE THS	QUARTS OF OIL	COST OF GASOLINE (32)	COST OF OIL (34)	COST OF MINOR PARTS, REPAIRS AND SERVICES (21)
	Amoco Oil Co.	50	1768	18	3	$1245 87	$ 2,70	$ 184 70
		51				$	$	$
		52						
		53						
		54						
		55						
		56						
		57						
		58						
		59						
TOTALS		99	1768	18	3	$1245 87	$ 2,70	$ 184 70

PART THREE

ISSUES TO CONTRACT VEHICLES SUMMARIZED BY CONTRACTOR	CONTRACT NO.	GASOLINE GALLONS	GASOLINE TENTHS	OIL QUARTS
TOTALS				

PART FOUR - CERTIFICATION

I certify that the above items were purchased and received from authorized dealers through the use of credit cards and Defense Supply Schedules where applicable. Amounts are correct and proper. (Attach Charge Tickets)

SIGNATURE OF POSTMASTER: [signature]

DATE: 01/30/78

PS Form 4547 Jan. 1975 — SUMMARY OF PURCHASES FROM COMMERCIAL SERVICE STATIONS 7.67

ETHYL CORPORATION 50
RESEARCH AND DEVELOPMENT DEPARTMENT · RESEARCH LABORATORIES
1600 WEST EIGHT MILE ROAD · FERNDALE, MICHIGAN 48220 · (313) 399-9600

January 15, 1981

Mr. Ed Spicer
Energy Dynamics, Inc.
4049 Reduth Ct.
Birmingham, Michigan 48010

Dear Mr. Spicer:

We have completed exhaust emissions testing on a 1979 Chrysler New Yorker (Michigan License #LCM-341) both with and without your Fuel Maximizer device. These tests were performed in accordance with Federal Procedure as published in the Federal Register (42FR 32906; June 28, 1977). Results for the cold-start city ('75 CVS C-H) and highway (HWFET) tests are shown below:

	'75 CVS C-H Emissions, g/mile			HWFET Emissions, g/mile		
	HC	CO	NOx	HC	CO	NOx
Baseline (w/o device)	1.31	22.29	0.58	0.85	12.79	0.66
With device (after accumulating 100 miles)	1.29	20.62	0.68	0.60	10.28	0.70

It is my observation that this device does not adversely affect exhaust emissions. Any increases or decreases noted in the data are within the limits of test repeatability for a single car/single test program.

Per your request, I observed the installation of the device. The time required for installation was less than five minutes.

Copies of the data sheets are enclosed. If you have any questions, please call me.

Sincerely,

John P. Sunne
Project Engineer
Automotive Research Div.

JPS:mew

ETHYL CORPORATION RESEARCH LABORATORIES, ARNDALE, MICHIGAN

MASS VEHICLE EMISSION DATA SHEET

AMI CVS Sampler # 1 Driver EH Oper. BA Test Cycle: 1972 HEW Schedule ☐ 1975 HEW Schedule ☑ Other ☐

Vehicle No. LCM-341 Odometer 32363 Date 1-13-81

Vehicle Make CHRYSLER 79' Engine Displacement 318 Inertia Wt. 4000

Test Conditions 75' CVS — BASELINE HP at 50 mph 10.7

Fuel Type TANK (CAL. IND.) Duration of Soak 16 HR Soak Temp. 75°

Lbs. Fuel at Start — Barometer 29.15 Dry Bulb 68 °F Wet Bulb 49 °F

Lbs. Fuel at End — Lbs. Fuel Consumed —

FID Calibration: Atten (1) 23.8 = 1462 ppmc; Atten (2) / = ppmc; Atten (3) 23.4 = ppmc; Atten (4) / = ppmc

CO Calibration: (1) 0-3200; (2); (3); (4)

Bag 3 (Background)

	1 Scale	2 PPM	3
HC	2.0	1.6	.6
CO	—	=	.4
CO_2	2.1	2.1 = .064	1.7
NO_x	.1	.1 =	.2

	Bag 1 Scale	Bag 1 ppm	Bag 2 Scale	Bag 2 ppm	Bag 4 Scale	Bag 4 ppm		A/F Ratio
HC	38		10.2		17.5			
CO	82.6	2406	22.8	359	43.8	777		
CO_2	49.6	1.809	32.2	1.070	42	1.463		
NO_x		18		11.6		23.3		
NO		20.5		13.3		26.6		
NO_2								

A/F =

Total Volume = Bag 1: 2402 FT^3, Bag 2: 4694 FT^3, Bag 3: 2445 FT^3, = V mix

HC mass = Vmix (16.33) (HCppmc) (10^{-6}) = 8.81 g(1) 3.52 g(2) 4.24 g(4)

CO mass = Vmix (32.97) (COppm) (10^{-6}) = 190.54 g(1) 48.46 g(2) 62.28 g(4)

NO_x mass = Vmix (54.16) (NO + NO_2) (10^{-6}) = 1.88 g(1) 2.07 g(2) 2.48 g(4)

CO_2 = 2183.93 2145.10 1795.02

1972 HEW Schedule g/mi = $\frac{\text{Bag 1} + \text{Bag 2}}{7.5}$

Cold ____ Drive ____ Neutral

HC mass ____ g/mi

CO mass ____ g/mi

NO_x mass ____ g/mi

1975 HEW Schedule g/mi = $\frac{.43 \text{ Bag 1} + \text{Bag 2} + .57 \text{ Bag 4}}{7.5}$

Hot ____ Drive ____ Neutral

HC mass 1.31 g/mi

CO mass 22.29 g/mi

NO_x mass 0.58 g/mi

CB = 15.01 MPG CO_2 = 552.13

Roll CTS. Bag 1 = 8365 = 3.59 mi

" " " 2 = 17359 = 3.86 "

" " " 3 = 25671 = 3.57 "

ETHYL CORPORATION RESEARCH LABORATORIES - FERNDALE, MICHIGAN

MASS VEHICLE EMISSION DATA SHEET

AMI CVS Sampler # 1 Driver EH Oper. BA Test Cycle: 1972 HEW Schedule ☐ 1975 HEW Schedule ☑ Other ☐

Vehicle No. LCM-341 Odometer 32534 Date 1-15-81

Vehicle Make CHRYSLER 79' Engine Displacement 318 Inertia Wt. 4000

Test Conditions 75' CVS With Dunes HP at 50 mph 10.7

Fuel Type TANK (CL. IND.) Duration of Soak 16 HR Soak Temp. 75°

Lbs. Fuel at Start — Barometer 29.31 Dry Bulb 72 °F Wet Bulb 52

Lbs. Fuel at End — Lbs. Fuel Consumed —

HC Atten (1) 23.7 = 146.2 ppmc CO (1) 0-3200

Prior Atten (2) / = ppmc Calibration (2)

Atten (3) 23.8 = ppmc (3)

Atten (4) / = ppmc (4)

	1 Bag 1 (Background) Scale	PPM	2 Scale	PPM	3 Scale	PPM
HC	.7	7				
CO	.6-7.6	7				
CO_2	2.0.6	2.0		.661		1.7
NO_x	.4	.3				

Bag 1 Scale	Bag 1 ppm	Bag 2 Scale	Bag 2 ppm	Bag 4 Scale	Bag 4 ppm		A/F Ratio
40		7.4		19.1			
81.7	2331	17.5	264	45.8	829		HC
2.51	1.873	33.5	1.120	43	1.507		CO
	25.3		13.3		24.8		CO_2
	27.4		14.4		27.8		O_2
							A/F =

Total Volume = Bag 1: 2417 FT^3, Bag 2: 4100 FT^3, Bag 3: 2427 FT^3, = V mix

HC mass = Vmix (16.33) (HCppm) (10^{-6}) = 9.60 g(1) 2.79 g(2) 4.52 g(4)

CO mass = Vmix (32.97) (COppm)(10^{-6}) = 185.28 g(1) 34.82 g(2) 66.12 g(4)

NO_x mass = Vmix (54.16) (NO + NO_2)(10^{-6}) = 2.67 g(1) 2.38 g(2) 2.63 g(4)

CO_2 = 2281.22 HC mass 2260.67 g/mi 1837.37

1972 HEW Schedule g/mi = $\frac{\text{Bag 1} + \text{Bag 2}}{7.5}$ CO mass g/mi

Cold

Drive

Neutral

NO_x mass g/mi

HC mass .89 g/mi

1975 HEW Schedule g/mi = $\frac{.43 \text{ Bag 1} + \text{Bag 2} + .57 \text{ Bag 4}}{7.5}$ CO mass g/mi

Hot

Drive

Neutral

NO_x mass g/mi

CB = MPG CO_2 =

ROLL CTS BAG 1 =

" " " 2 =

" " " 3 =

ETHYL CORPORATION RESEARCH LABORATORIES - FERNDALE, MICHIGAN

MASS VEHICLE EMISSION DATA SHEET

AMI CVS Sampler # 1 Driver EM Oper. BA Test Cycle: 1972 HEW Schedule ☐ 1975 HEW Schedule ☐ Other ☑

Vehicle No. LCM-341 Odometer 32385 Date 1-13-81

Vehicle Make CHRYSLER 79' Engine Displacement 318 Inertia Wt. 4000

Test Conditions HIGHWAY - BASELINE HP at 50 mph 10.7

Fuel Type TANK (CL. IND.) Duration of Soak HOT Soak Temp. 75°

Lbs. Fuel at Start — Barometer 29.14 Dry Bulb 68 °F Wet Bulb 49 °F

Lbs. Fuel at End — Lbs. Fuel Consumed —

FID Calibration: Atten (1) 23.9 = 146.2 ppmc; Atten (2) ___ = ___ ppmc; Atten (3) ___ = ___ ppmc; Atten (4) ___ = ___ ppmc

CO Calibration: (1) 0-3200; (2) ___; (3) ___; (4) ___

Bag 3 (Background)

	Scale	PPM
HC	.8	
CO	.7	8
CO_2	1.8	.055
NO_x	.5	

	Bag 1 Scale	Bag 1 ppm	Bag 2 Scale	Bag 2 ppm	Bag 4 Scale	Bag 4 ppm		A/F Ratio
HC	25.2							
CO	56	1127						HC
CO_2	59	2.235						CO
NO_x		43.7						CO_2
NO		46.8						O_2
NO_2								
								A/F =

Total Volume = Bag 1 3508 FT^3, Bag 2 ___ FT^3, Bag 3 ___ FT^3, = V mix

HC mass = Vmix (16.33) (HCppmc) (10^{-6}) = 8.60 g(1) ___ g(2) ___ g(4)

CO mass = Vmix (32.97) (COppm) (10^{-6}) = 129.59 g(1) ___ g(2) ___ g(4)

NO_x mass = Vmix (54.16) (NO + NO_2) (10^{-6}) = 6.67 g(1) ___ g(2) ___ g(4)

CO_2 397.77

HIGHWAY

1~~972 HEW~~ Schedule g/mi = Bag 1 + Bag 2 / ~~7.5~~ 10.134

Cold ___ Drive ___ Neutral

HC mass .85 g/mi

CO mass 12.79 g/mi

NO_x mass 0.66 g/mi

1975 HEW Schedule g/mi = .43 Bag 1 + Bag 2 + .57 Bag 4 / 7.5

Hot ___ Drive ___ Neutral

HC mass ___ g/mi

CO mass ___ g/mi

NO_x mass ___ g/mi

CB = 21.36 MPG CO_2 = 392.72

Rec CB = 23622 = 10,~~458~~ 134 mi.

ETHYL CORPORATION RESEARCH LABORATORIES - FERNDALE, MICHIGAN

MASS VEHICLE EMISSION DATA SHEET

AMI CVS Sampler # 1 Driver EH Oper. BA

Test Cycle: 1972 HEW Schedule ☐ 1975 HEW Schedule ☐ Other ☑

Vehicle No. LCM-341 Odometer 32556 Date 1-15-81

Vehicle Make CHRYSLER 79' Engine Displacement 318 Inertia Wt. 4000

Test Conditions HIGHWAY - W/DEVICE HP at 50 mph 10.7

Fuel Type TANK (CL. IND.) Duration of Soak 46T Soak Temp. 75°

Lbs. Fuel at Start — Barometer 29.31 Dry Bulb 75 °F Wet Bulb 55 °

Lbs. Fuel at End — Lbs. Fuel Consumed —

ID	Atten (1) 23.6	= 146.2 ppmc	CO	(1) 0-3200	Bag 3 (Background)	Scale	PPM
ration	Atten (2)	= ppmc	Calibration	(2)	HC	.7	=
	Atten (3)	= ppmc		(3)	CO	.8	= 9
	Atten (4)	= ppmc		(4)	CO_2	1.8	= .055
					NO_x	.2	=

	Bag 1		Bag 2		Bag 4			
	Scale	ppm	Scale	ppm	Scale	ppm		A/F Ratio
C	17.8							HC
O	49.5	906						CO
O_2	60.5	2.302						CO_2
NO_x		46						O_2
O		47.9						
O_2								A/F =

Total Volume = Bag 1 35.0 FT^3, Bag 2 ____ FT^3, Bag 3 ____ FT^3, = V mix

C mass = Vmix (16.33) (HCppmc) (10^{-6}) = 6.13 g(1) ____ g(2) ____ g(4

O mass = Vmix (32.97) (COppm) (10^{-6}) = 104.26 g(1) ____ g(2) ____ g(4

O_x mass = Vmix (54.16) (NO + NO_2) (10^{-6}) = 7.13 g(1) ____ g(2) ____ g(4

CO_2 = 4114.70

HIGHWAY

~~1972~~ HEW Schedule g/mi = Bag 1 + ~~Bag 2~~ / ~~7.5~~

Cold ____ Drive ____ Neutral

HC mass 0.60 g/mi

CO mass [illegible] g/mi

NO_x mass [illegible] g/mi

1975 HEW Schedule g/mi = .43 Bag 1 + Bag 2 + .57 Bag 4 / 7.5

Hot ____ Drive ____ Neutral

HC mass ____ g/mi

CO mass ____ g/mi

NO_x mass ____ g/mi

CB = 20.95 MPG CO_2 = 405.62

ROLL ATS = 2646 = 10.14 HP

Attachment F
EPA-AA-TEB-82-2

Evaluation of the Fuel Maximiser™ - A Retrofit Fuel Economy Device

By

Thomas J. Penninga

November 1981

Test and Evaluation Branch
Emission Control Technology Division
Office of Mobile Source Air Pollution Control
U.S. Environmental Protection Agency

Background

The U.S Postal Service investigates items advertised through the mail, for possible prosecution if mail-fraud is suspected. The U.S. Postal service requested that EPA evaluate the Fuel Maximiser™, a fuel economy retrofit device. The purpose of the evaluation was to determine if the device in question did perform as it was claimed. A meeting was held with the U.S. Postal Service representative and with representatives of the device. The device representatives explained the theory by which the device works and presented substantiating test data. An evaluation of the theory and data presented is made in EPA Report EPA-AA-TEB-511-82-1.

Description of Device:

The following description of the device was included in the supporting data supplied by the device manufacturer. Figures 1A and 1B show the actual device.

"The present invention comprises a pair of closely adjacent, preferably oppositely wound electrically conductive coils which are encapsulated in a suitable insulating material and form an efficiency unit. The coils have their ends connected to each other and are preferably wound about an iron core such that the number of windings on one coil is three times the number of windings on the other coil.

"The encapsulated efficiency unit is positioned closely adjacent the positive pole of the battery for the engine while an electrical wire extends from the encapsulated coils at one end and is electrically connected to the negative terminal of the battery at its other end. The first mentioned end of the wire is preferably electrically connected to the coils, either directly or indirectly by connection with the iron core."

Test Procedure - Road Testing

A two-phase test plan was devised which took into account the device inventors concerns about testing. The first phase involved on-road testing as suggested by the device inventors. The second phase involved chassis dynamometer testing.

The inventor supplied two proposed test plans to the EPA. A copy of his instructions are attached (see Attachment A). The Alternate Test Plan for fuel economy was run. The requirements were:

(1) "two vehicles required

(2) conduct test on an oval track or a measured section of highway of 50 miles or more one way and return to the starting point. Ambients should be observed. Both vehicle tests must be conducted the same day.

(3) In all tests no instrumentation can be used other than topping of the fuel tank. Bounce car to remove all air from the tank.

Note: Do not use fifth wheel for measurement.

The inventor was contacted as to the feasibility of installing in-vehicle volumetric fuel measurement systems. He stated that such instrumentation would not negate the effectiveness of his device. Two vehicles, a 1979 Pinto and a 1980 Citation were checked to manufacturers specifications. A detailed description of the test vehicles is attached (see Attachment B). Two Fluidyne volumetric fuel measurement devices were sent to the GM Proving Ground for calibration and cleaning. Both instruments calibrated within 1% over the useful flow rates. Several additional procedures were followed. They were:

i) The vehicles were warmed for 1/2 hour prior to beginning the test.

ii) The fuel measurement did not begin until the vehicle had stabilized at 50 mph.

iii) The two cars were driven in tandem with the same driver-vehicle combination during each phase of the test.

iv) The first day of testing after both vehicles completed the first run, the device was installed only on the Pinto, after which a second run was made. The second day the same procedure was followed but the device was installed only on the Citation.

v) After the first two days of testing, it was noted that the second run of 100 miles consistently demonstrated higher fuel economy from the first run. This was probably due to engine temperature considerations and increased ambient temperatures during the test day. To determine the effect of the device, two additional test days were run where the first run was made with the device installed and the second run made without the device. Any reduction in the fuel economy gains noted during the second run could then be attributed to the device. On the third day of testing, the device was initially installed on the Pinto. On the fourth day, the device was initially installed on the Citation.

vi) On the first day of testing, the Pinto demonstrated unrepresentative fuel economy (low) for the first leg of the run. This data was considered an outlier and not used in analysis. Comparative results were based only on the down leg of the two runs.

Results - Road Testing

A Summary of the test data is given below:

Fuel Maximiser™ On Road Test Data

			Pinto		Citation	
Date	Run No.	Leg	Fuel Economy	Composite	Fuel Economy	Composite
10/7/81	#1	Up	25.07	26.61	19.68**	23.72
10/7/81	#1	Down	28.35		29.85	
10/7/81	#2	Up	*26.13	*27.34	27.92	29.59
10/7/81	#2	Down	*28.66		31.48	
10/16/81	#1	Up	26.33	27.54	27.14	29.10
10/16/81	#1	Down	28.88		31.36	
10/16/81	#2	Up	27.71	28.31	*29.23	*30.27
10/16/81	#2	Down	28.94		*31.39	
10/28/81	#1	Up	*27.06	*27.66	27.98	29.05
10/28/81	#1	Down	*28.29		30.20	
10/28/81	#2	Up	27.11	27.89	28.37	29.42
10/28/81	#2	Down	28.72		30.55	
10/29/81	#1	Up	27.63	27.27	*29.88	*29.46
10/29/81	#1	Down	26.92		29.06	
10/29/81	#2	Up	28.26	27.73	30.70	29.93
10/29/81	#2	Down	27.21		29.20	

*with device
**questionable data

There are several ways to analyze this test data

A. Car to Car Comparison

1. This method assumes that each vehicle would see the same improvement from run #1 to run #2.

2. Any difference noted when the device was added would be attributed to the device.

3. The (Run #2 - Run #1)/((Run #1 + Run #2)/2) X 100 percentages were calculated. The results are given below:

Date	Vehicle with Device	Vehicle without Device	Device Contribution
10/7/81	2.70%	5.23%*	(-) 2.62%
10/16/81	3.94%	2.76%	(+) 1.18%
10/28/81**	.83%	1.27%	(+) .44%
10/29/81**	1.58%	1.67%	(+) .09%
			Ave = (-) .22%

*based only on down run comparison.

**since device was tested first, this is a positive value.

B. Individual Car Comparison

1. This method assumes that a vehicle would see the same improvement from run #1 to run #2 each day.

2. Any difference between the amount of improvement could be attributed to the device.

3. Average (non-device improvements) were calculated and are presented below.

Vehicle without Device (Average)		Vehicle with Device	Device Contribution
Pinto	2.22%	2.70%	(+) .49%
Pinto	2.22%	.83%	(+) 1.39%
Citation	3.30%*	3.94%	(-) .64%
Citation	3.30%*	1.58%	(+) 1.72%
*uses only the down leg of the 10-7 data			Ave = (+) .74%

C. A third method of analysis is to average all of the tests for each vehicle without the device and compare it to the average of the data with the device.

1. This method assumes that the variables induced by ambient conditions and day-to-day testing are cancelled out during the test project.

2. This method assumes that the Run #1 - Run #2 difference will also cancel out.

Vehicle without Device (mpg)		Vehicle with Device (mpg)	Device Contribution (%)
Pinto	27.56	27.50	(-) .22%
Citation	29.37	29.86	(+) 1.69%
			Ave = (+) .74%

All three methods of analysis show that the Fuel Maximiser™ has negligible effect on fuel economy. The (+) .74% improvement is well within the test-to-test variability of the road test. The data does demonstrate the problems with running a simple without/with test. Such a test would not account for the changes in vehicle and ambient conditions and would demonstrate a false gain in fuel economy attributed to the device.

Test Procedure - Dynamometer Testing

A second set of tests were run at EPA in which the test vehicles were tested on a vehicle dynamometer. However once the Fuel Maximiser™ was installed, the vehicle was not touched by tie down straps or exhaust collection system. This was due to the inventor's concerns that grounding of the vehicle negates the effectiveness of the Fuel Maximiser™ by rerouting the ion flow generated by the device. The procedure was performed by not using a restraining cable, only wheel chocks. Similarly an exhaust collection cone was placed around the vehicle exhaust system. The negative pressure of the collection system takes in all of the vehicle exhaust without touching the exhaust system. No other instrumentation such as fans, drivers aides, etc., were allowed to touch the vehicles. The actual testing sequence was as follows:

a. The test vehicles were set to manufacturer's specifications.

b. Baseline testing which included two FTP and two HFET test sequences was run with the vehicle restrained by a tie-down cable and without the device installed.

c. The device was then installed according to the installation instructions in the device package.

d. The vehicles then were fueled from fuel cans and driven on an average urban driving cycle until three tanks of fuel each were consumed. Each night the vehicles were parked in a fenced off area to avoid accidental grounding of the vehicles.

e. The vehicles were pushed by hand onto a vehicle dynamometer where the wheel chocks and exhaust collection cone were used. Two "with device" FTP/HFET sequences were performed on each vehicle.

f. The device was then removed and the vehicle grounded with the metal tie-down strap. The regular exhaust collection system was attached to the vehicle exhaust. One or two FTP/HFET sequences were performed on each vehicle.

A summary of the results is given below:

Table I

A. Pinto Test #	Date	FTP Results HC	CO	NOx	FE	Comments
81-0287	7-29-81	1.187	9.481	1.5620	22.47	Baseline
81-0312	7-30-81	1.184	8.923	1.7296	21.91	Baseline
81-0488	8-13-81	1.210	9.148	1.7493	21.94	with Fuel Maximiser™
81-0490	8-14-81	1.183	9.068	1.7243	21.84	with Fuel Maximiser™
81-0492	8-21-81	1.155	8.930	1.9259	21.97	without Fuel Maximiser™
B. Citation						
81-0494	8-25-81	.380	3.227	1.054	19.43	Baseline
81-0496	8-27-81	.416	3.615	1.044	19.93	Baseline
81-0498	9-16-81	.373	4.036	1.054	19.81	with Fuel Maximiser™
81-0852	9-17-81	.377	3.080	1.121	20.02	with Fuel Maximiser™
81-0856	9-18-81	.416	3.133	1.117	20.10	without Fuel Maximiser™
81-0858	9-22-81	.411	4.593	1.086	20.04	without Fuel Maximiser™

Table II

A. Pinto Test #	Date	HFET Results HC	CO	NOx	FE	Comments
81-0286	7-29-81	.4896	.947	1.6798	29.96	Baseline
81-0313	7-30-81	.5130	.961	1.7179	29.84	Baseline
81-0489	8-13-81	.4747	.959	1.9023	30.16	with Fuel Maximiser™
81-0491	8-14-81	.4258	.866	1.8184	29.88	with Fuel Maximiser™
81-0493	8-19-81	.4841	.868	1.2457	30.38	without Fuel Maximiser™
81-0616	8-21-81	.4770	.898	2.183	30.17	without Fuel Maximiser™
B. Citation						
81-0380	8-5-81	.04579	.1285	1.0879	29.14	previous Baseline
81-0409	8-6-81	.04622	.2480	1.0251	29.02	previous Baseline
81-0410	8-6-81	.05293	.4863	.9181	28.99	previous Baseline
81-0495	8-25-81	.0504	1.1361	.8417	27.63*	Baseline
81-0497	8-27-81	.0513	.4576	.9196	28.34	Baseline
81-0499	9-16-81	.0590	.6025	.8545	28.69	with Fuel Maximiser™
81-0853	9-17-81	.0560	.5404	.9733	28.98	with Fuel Maximiser™
81-0857	9-18-81	.0506	.2854	1.0053	29.11	without Fuel Maximiser™
81-0859	9-22-81	.0512	.1925	.9791	28.94	without Fuel Maximiser™

*Questionable data. Three previous baseline tests (shown) gave fuel economy much higher than the 27.63. Therefore, for analysis an average of all 5 baseline tests will be used.

Table III
Comparison Summary

A. Pinto	FTP (in gms/mile) # of tests	HC	CO	NOx	FE-mpg	HFET (in gms/mile) # of tests	HC	CO	NOx	FE-mpg
Without Device	3	1.18	9.11	1.74	22.12	4	.49	.92	1.96	30.08
With Device	2	1.20	9.11	1.74	21.89	2	.45	.91	1.86	30.02
% Difference		+1.83	0.0	0.0	-1.04		-8.3	-.6	-4.92	-.2
B. Citation										
Without Device	4	.41	3.64	1.08	19.88	7	.05	.42	.97	28.74
With Device	2	.38	3.56	1.09	19.91	2	.06	.57	.91	28.84
% Difference		-7.6	-2.31	+1.14	+.18		+15.5	+36.32	-5.6	+.32

A copy of the actual EPA test data sheets for these tests is attached (see Attachment C).

Analysis of EPA Dynamometer Testing:

The EPA laboratory testing showed that for both vehicles the Fuel Maximiser™ had an insignificant effect on fuel economy or emissions. The changes noted on HC, CO, and NOx for the HFET cycle are not significant when one looks at the magnitude of the numbers. There will normally be some variation in fuel economy noted during extended mileage accumulation. Therefore the shifts noted in CO and FE for the Citation are not unusual. It is proper to average the baseline values on either side of the "with Fuel Maximiser™" tests because no "residual type effect" claims are made for the device. Such an average compensates for gradual chages in the test vehicles performance.

Conclusions

The results of the EPA testing demonstrate that with either road or dynamometer testing procedures, the Fuel Maximiser™ failed to improve vehicle fuel economy. The two test vehicles tested are representative of domestic manufactured vehicles and should have noted an improvement if the device performed as it was claimed. Since both test programs found no change in fuel consumption attributable to the device, it is concluded that the Fuel Maximiser™ has no effect on fuel economy.

Figure 1A

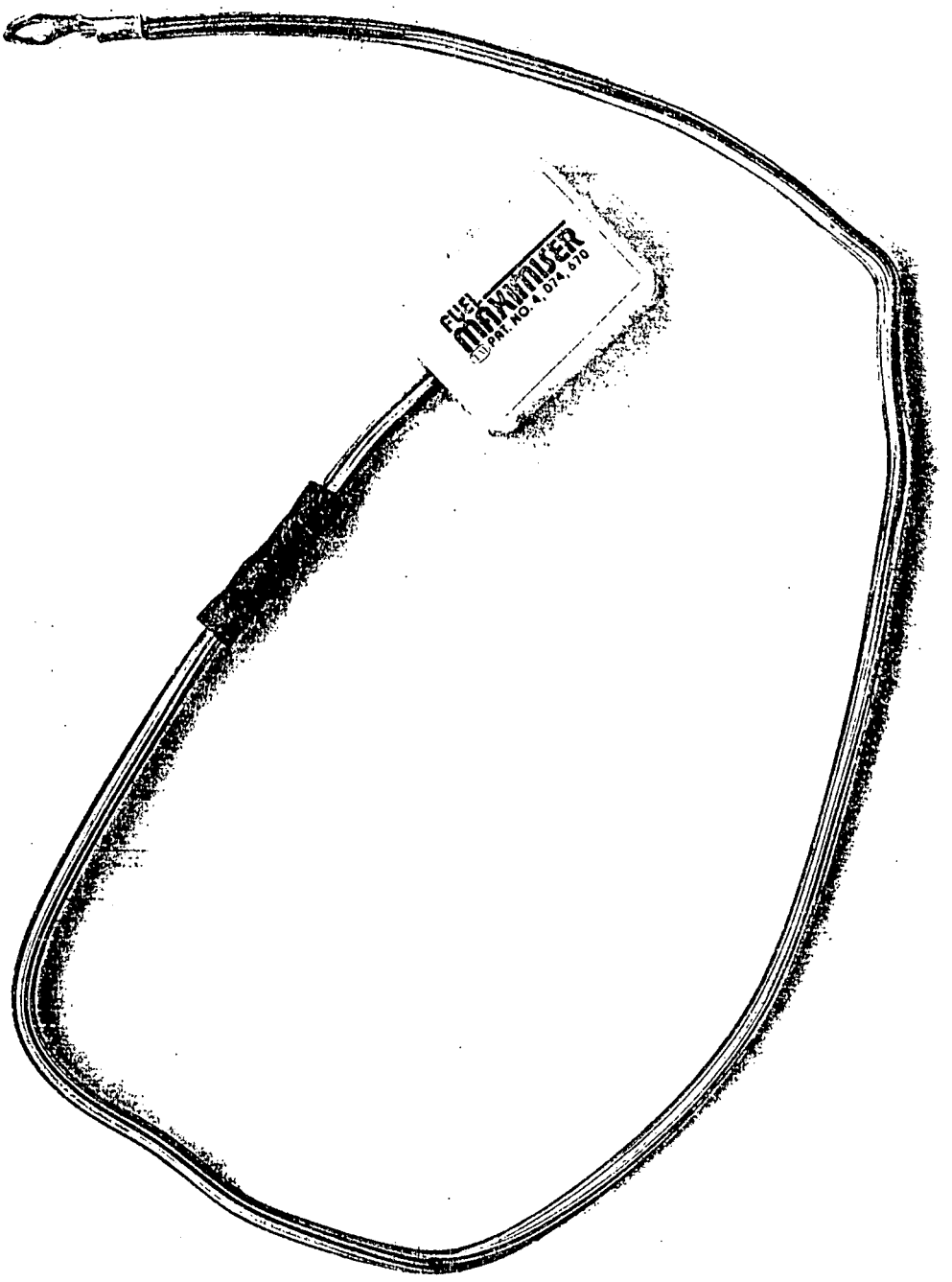
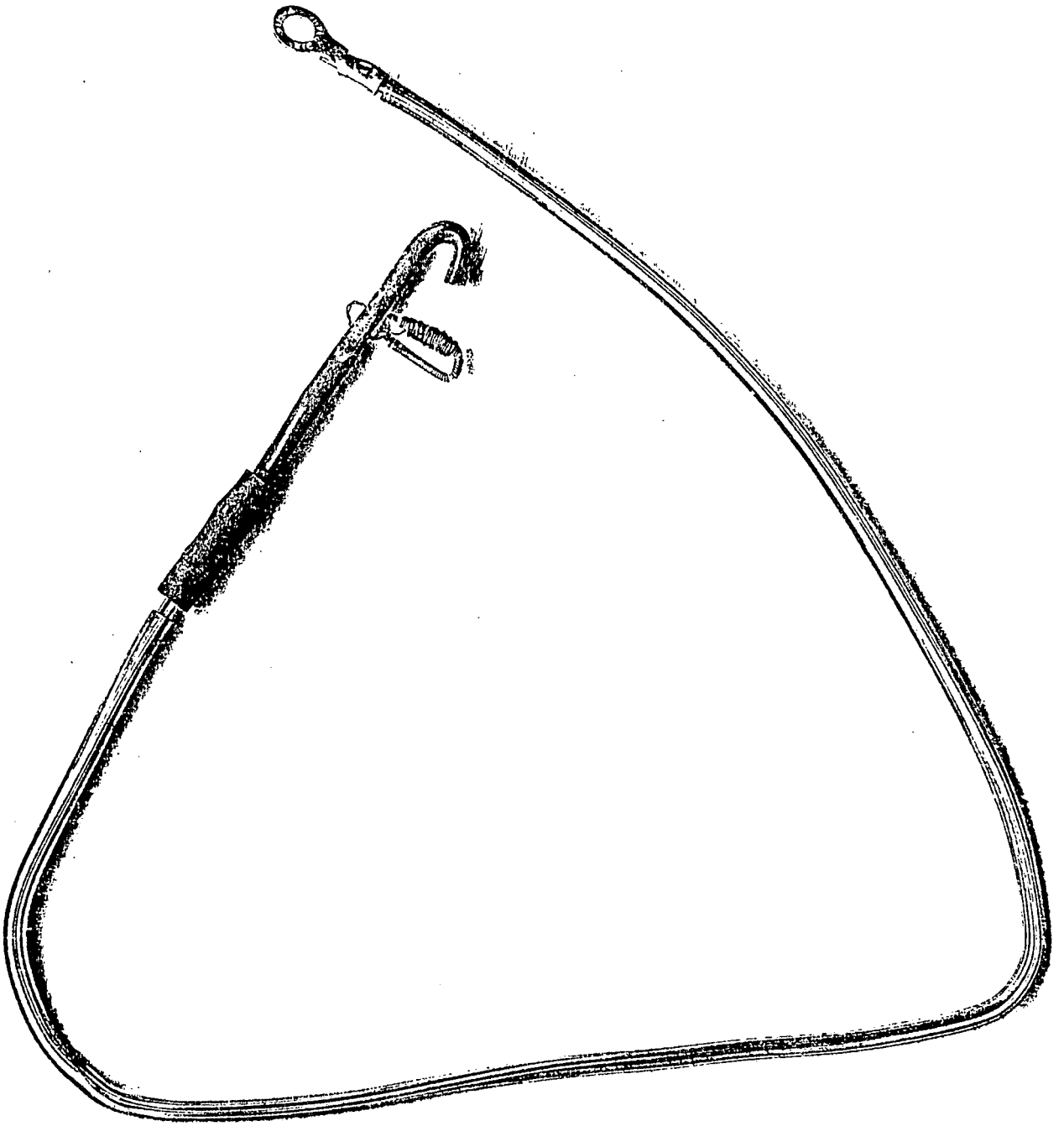


Figure 1B



Attachment A

66

Energy Dynamics Inc.

313 - 644-3747 - 693-4196

4049 REDUTH CT. BIRMINGHAM, MI. 48010

FUELMAXIMISER MANUFACTURER TEST REQUIREMENTS

It has been our experience that the Fuelmaximiser System cannot be tested for fuel economy according to FTP on a dynamometer because the tie-down straps and the electrical equipment receiving the exhaust emissions negate the desired effe of the Fuelmaximiser.. In fact, the fuel economy may worsen as a consequence of the machinery involved. This is because the ion field generated by the Fuelmaximiser is dissipated to "earth ground".

TEST PROCEEDURE FOR EMISSIONS

FTP as published in the Federal Register (42 FR-32906, June 28, 1977.) No composite carbon test for fuel economy will be accepted.

PREFERRED TEST PROCEDURE FOR FUEL ECONOMY

1. This test must be conducted on-the-road.

2. A minimum of ten vehicles are required.

3. Three full tanks of fuel driven before the device is installed. The driving should represent both city and highway experience.

4. Install the device according to the manufacturere instructions and duplicate step three (3).

ALTERNATIVE TEST FOR FUEL ECONOMY

1. Two vehicles rquired.

2. Conduct test on an oval track or a measured section of highway of 50 miles or more one way and return to starting point. Ambients should be observed. Both vehic tests must be conducted the same day.

3. In all tests no instrumentation can be used other than topping of the fuel tank. Bounce car to remove all air from the tank.

Note: Do not use fifth wheel for measurement.

VEHICLE SPECIFICATION REPORT -(LD TESTING)- DATE OF ENTRY : 7/30/81

VEHICLE SPECIFICATIONS

MANUFACTURER	VEHICLE ID / VER	REPRESENTED CARLINE	MODEL CODE	DRIVE CODE	SOURCE
GENERAL MOTORS	1A867AR149507 2		SEDAN	FRONT DRIVE STR. LEFT	MANUFACTURER

VEHICLE TYPE	ACTUAL VEHICLE MODEL	MODEL YEAR	ACTIVE YEAR	DRIVE AXL WTS FULL TANK	DRIVE AXL WTS EMPTY TANK	CURB WEIGHT	INERTIA CLASS	EQUIV. TEST WEIGHT	O/D CODE	ACTUAL DYNO HP	RUNNING CHG NUMBER
NON-CFC	CITATION	80	80				3000	3000		7.3	

PRIMARY DURABILITY VEHICLE ID OR ASSIGNED DF | ALT. MANUFACTURER

TIRE - SPECIFICATIONS

TIRE & RIM SIZES	MFR	CONSTR	SWL N	SWL M	HLT N	HLT M	PSI FT	PSI RR
P185/80R13	UNIROYAL							

ENGINE SPECIFICATIONS

DISPLACEMENT	BORE	STROKE	SYSTEM HP	ENGINE TYPE	ENGINE CONFIGURATION	NO. CYL.	NO. CARBS	TOTAL # BBLS	FUEL SYSTEM MFR/MODEL	FUEL INJCT?	TURBO?	COMP. RATIO	COAST-DOWN TM
2300. 1	.	.		OTTO SPARK	V-BLOCK	6	1	1		NO	NO	.	

IGNITION TIMING 1	IGNITION TIMING 2	TIM. TOL.	TIMING RPM	RPM TOL.	TIP. GEAR	% CO LEFT	% CO RIGHT	% CO COMB.	CO TOL.	IDLE RPM	IDLE TOL.	IDLE GEAR	ENGINE FAMILY	ENGINE CODE
AM			650									DRIVE	01C2EY 2.4L	

DRIVE TRAIN AND CONTROL SYSTEM SPECIFICATIONS

AXLE RATIO	T/M RATIO	ODOMETER	A/C INSTALLED	EXHAUST TYPE	CRANKCASE SYSTEM	TRANSMISSION CONFIGURATION	CODE	EVAPORATION SYSTEM	FUEL TYPE
.	.	MILES		SINGLE RIGHT REAR	CLOSED			CANISTER	UNLEADED (AT EPA-IND HO)

MAIN-TANK CAPACITY	MAIN-TANK VOLUME	AUX.-TANK CAPACITY	AUX.-TANK VOLUME	SHIFT SPEED	EVAPORATIVE EMISSION FAMILY	CODE	SALES CLASS
14.0+	5.50			DO NOT SHIFT MANUALLY			49 STATE LIGHT DUTY VEH

CONTROL SYSTEM TYPES

PULSATING AIR SYSTEM | OXIDATION CATALYST

VEHICLE SPECIFICATION COMMENTS

FUEL MAXIMIZER DEVICE TESTED - T. PONTIAC

Attachment B