Evaluation of the Moleculotor Fuel Energizer Under Section 511 of the Motor Vehicle Information and Cost Savings Act

by

Gary T. Jones

May, 1981

Test and Evaluation Branch
Emission Control Technology Division
Office of Mobile Source Air Pollution Control
Environmental Protection Agency
This document announces the conclusions of the EPA evaluation of the "Molecutor Fuel Energizer" under provisions of Section 511 of the Motor Vehicle Information and Cost Savings Act.

On March 24, 1980, the EPA received a request from Energy Efficiencies, Inc. for evaluation of a fuel saving device known as the "Fuel Energizer Molecutor". This device is designed to be installed in the fuel line between the fuel tank and fuel pump. The Applicant claims that as the fuel passes through the device, it becomes energized, burns more efficiently and therefore, provides improved fuel economy.
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Environmental Protection Agency

[40 CFR Part 610]

[FRL ____________]

Fuel Economy Retrofit Devices

Announcement of Fuel Economy Retrofit Device Evaluation
for "Moleculator Fuel Energizer"

Agency: Environmental Protection Agency (EPA).


Summary: This document announces the conclusions of the EPA evaluation of the "Moleculator Fuel Energizer" 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)) require 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 March 24, 1980, the EPA received a request from Energy Efficiencies, Inc. for evaluation of a fuel saving device known as the "Fuel Energizer Moleculator". This device is designed to be installed in the fuel line between the fuel tank and fuel pump. The Applicant claims that as the fuel passes through the device, it becomes energized, burns more efficiently and therefore, provides improved fuel economy.


EPA also tested the Fuel Energizer Moleculator device. The EPA testing is described completely in the report "The Effects of the Moleculator Fuel Energizer on Emissions and Fuel Economy", EPA-AA-TEB-81-18, consisting of 21 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 Center by using the above report numbers. Address requests to:
Summary of Evaluation

EPA fully considered all of the information submitted by the device manufacturer in his Application. The evaluation of the "Moleculator Fuel Energizer" device was based on that information and the results of the EPA test program.

The results of this test program did not show consistent effects attributable to the Moleculator on the fuel economy and emission levels of the test vehicles. There were slight improvements in some cases and slight losses in others. The changes in all cases were quite small and were consistent with changes observed by EPA in other tests with vehicles in which fuel economy measurements were made before and after mileage accumulation. The claims of 10% to 23% fuel economy increases were not substantiated by the findings of this EPA program.

FOR FURTHER INFORMATION, CONTACT: Merrill W. North, Emission Control Technology Division, Office of Mobile Source Air Pollution Control, Environmental Protection Agency, 2565 Plymouth Road, Ann Arbor, Michigan 48105, (313) 668-4299.
EPA Evaluation of "Moleculor Fuel Energizer" 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:

"Moleculor Fuel Energizer" or "Fuel Energizer Moleculor" are the two identifiers which are used interchangeably in the application. The Device is also referred to simply as the "Moleculor". Various models of this Device are manufactured for different types of vehicles or other applications.

2. Inventor of the Device and Patents:

The inventor of the Device is specified as:

Leonard M. Pickford
83-13 Southwest Freeway
Suite 116
Houston, Texas  77074

While no patent number has yet been granted, an application for a patent has been made. The following information applies:

Serial #114,758; Filing Date: 1/24/80.
Title: Energizing Process and Apparatus, Products Thereof and Processors for Using the Products continuation in Part of Serial #852,003, Filing Date: 11/16/79. Continuation of Serial #633,106, Filing Date: 1/28/76

3. Manufacturer of the Device:

Dotcel Associates
83-13 Southwest Freeway Suite 116
Houston, Texas  77074
Leonard M. Pickford

4. Manufacturing Organization Principals:

Dotcel Associates
Leonard M. Pickford

5. Marketing Organization in U.S. Marketing Application:

Energy Efficiencies Inc. (currently known as E.E. Industries, Inc.)
P.O. Box 676
Rye, New York  10580

6. Identification of Applying Organization Principals:

Richard Hess - President
Robert Rich - Financial Administrator
Carol Hess - Vice President
7. **Description of the Device (as supplied by the Applicant):**

"**Theory of Operation:** The Moleculetor serves as a container for an induced energy field. It is attached to the fuel line between the fuel tank and the fuel pump. As fuel passes through the Moleculetor, it is activated. The result is that as the fuel molecules pass through the carburetor, the vapor mist is more efficiently utilized. The increased combustion efficiency results in major fuel savings and reduces pollution.

Because the effect of the Moleculetor is to further refine the fuel, regular gasoline may be substituted for premium and the average savings are even more dramatic on diesel than on gasoline vehicles. In addition to fuel savings, because the fuel is more efficiently burned, the engine burns cooler and lower emissions are produced."

"**Description of Construction and Operation:** The Moleculetor is an aluminum cylinder with a hollowed core to permit normal fuel passage. Threading at both ends of the Moleculetor permits a fitting to be attached and then connected to the fuel line of the vehicle. It is manufactured in four standard sizes. The size is dependent upon the weight of the vehicle, engine displacement and whether it uses gasoline or diesel fuel.

The Moleculetor works on any make, year or model car or truck. There are no moving parts and there is no recharging. The Moleculetor can be removed from one vehicle and used again."

8. **Claimed Applicability of the Device:**

Moleculetor Fuel Energizer #1 is for all motorcycles.

Moleculetor Fuel Energizer #3 may be used on all domestic or foreign automobiles and light duty trucks up to 6,000 lbs. GVW, regardless of year or model with 4 cylinder, 6 cylinder or 8 cylinder engines using regular, premium or no-lead gasoline.

Moleculetor Fuel Energizer #5 may be used on all motor homes, medium trucks up to 12,000 lbs. GVW, and all diesel cars or light duty trucks with diesel engines.

Moleculetor Fuel Energizer #12 may be used on all heavy duty trucks, both gasoline and diesel powered.

Moleculetor Fuel Energizer is effective on any combustion engine using gasoline or diesel fuel.

9. **Device Installation, Tools Required, Expertise Required (claimed):**

"**Gasoline Vehicles:** The Moleculetor must be installed in the main fuel supply line between the fuel tank and fuel pump (diagram is supplied). On those vehicles with an Electric Fuel Pump sealed in the gasoline tank, install Moleculetor in return line and not in main
fuel supply line. Install fittings into the threading and tighten securely. Use Teflon tape or any other approved sealant. Type of fittings will depend upon size of fuel line (installation kits will be sold separately). Locate convenient place to install Molecutor (in most cases this will be near fuel tank or fuel pump). Avoid being too close to muffler or catalytic converter. Cut section out of fuel line the same length as Molecutor fuel Energizer with fittings and install using two short sections of fuel line (same type and size as in vehicle now) and four clamps. Tighten clamps securely and start car; examine closely for leaks. Support Molecutor to frame by using high resistant plastic straps.

"Diesel Engines: The Molecutor must be installed in the fuel supply line between the main tank and primary fuel filter (diagram provided). Use proper fittings, depending upon size of fuel line. Use Teflon tape or any other approved sealant on fittings installed on the Molecutor. Tighten all fittings and connections and start engine; examine closely for leaks. The Molecutor must be supported properly with metal or high resistant plastic clamps.

The Molecutor is easily installed by an auto mechanic or a home auto mechanic. Once the proper location has been found, the device is installed in 15 or 20 minutes."

10. Device Maintenance (claimed):

"There are no operating costs, no maintenance, no moving parts and no recharging."

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

Applicant did not provide any information concerning the effect on non-regulated emissions.

12. Effects on Vehicle Safety (claimed):

"None"

13. Test Results - Regulated Emissions and Fuel Economy (supplied by Applicant):

a) Automotive Exhaust Emission and Fuel Economy Test Report
   Olson Engineering, Inc.
   Huntington Beach, CA (Attachments A and B)

b) An article entitled "Miracle Mileage" by Chuck Nerpel and Peter Frey in the July, 1980 issue of Motor Trend Magazine (Attachment C).

c) An article entitled "The Molecutor, Is This the First Genuine Mileage 'Miracle'?" by Bill Estes in the September, 1980 issue of Trailer Life Magazine (Attachment D).
d) An article entitled "Moleculator", by Bill Estes, in the September, 1980 issue of Motorhome Life (Attachment F). The text of this article is identical to that in "13C".

e) Statements by individuals relating actual experience with the Moleculator (Attachment F).

14. Information Gathered by EPA

A total of four vehicles were obtained and tested by EPA. They were chosen to represent typical in-use passenger cars. Each was inspected to ensure it was operating properly. In some cases, minor adjustment was necessary to restore the test vehicle to manufacturer's specifications.

A brief description of the testing is provided below:

a) A 1979 Chevrolet Chevette (VIN 1B66E9Y306318) was tested in the following sequence:

1) Three baseline Federal Test Procedures and three baseline Highway Fuel Economy Tests were performed.

2) A Moleculator #3 was installed.

3) Mileage accumulation was performed (591 miles were accumulated).

4) Three Federal Test Procedures and two Highway Fuel Economy Tests were performed on the Moleculator-equipped test vehicle.

Test data is supplied in Attachment G.

b) A 1980 Chevrolet Citation (VIN 1X117AW122438) was tested in the following sequence:

1) Two baseline Federal Test Procedures and two baseline Highway Fuel Economy Tests were performed.

2) A Moleculator #5 was installed.

3) Mileage accumulation was performed (632 miles were accumulated).

4) Two Federal Test Procedures and three Highway Fuel Economy Tests were performed on the Moleculator-equipped test vehicle.

Test data is supplied in Attachment G.

c) A 1980 Ford Fairmont (VIN OB91B104395) was tested in the following sequence:

1) Two baseline Federal Test Procedures and two baseline Highway Fuel Economy Tests were performed.

2) A Moleculator #5 was installed.
3) Mileage accumulation was performed (591 miles were accumulated).

4) Four Federal Test Procedures and four Highway Fuel Economy Tests were performed on the Moleculator-equipped test vehicle.

5) Five Federal Test Procedures and five Highway Fuel Economy Tests were performed at increasing time intervals after removal of the Moleculator.

Test data is supplied in Attachment C. The results from this vehicle were not included in the summary averages or the general conclusions for the following reasons:

1) There were intermittent problems evident in the electrical system during baseline testing which culminated in a complete system failure during mileage accumulation on the Moleculator equipped test vehicle. The problem was traced to the voltage regulator which allowed either full or no charge. This indicated that non-typical engine loading was occurring during the baseline testing. The vehicle was impossible to rebaseline because the Moleculator had been installed, which, according to the manufacturer's claims, "energizes" the fuel system and takes 56 days to "de-energize" after removal of the Moleculator.

2) The NOx values, which averaged .50 grams per mile during the Federal Test Procedure baseline testing, were atypical and approximately one third of the values generated by that particular engine family during Certification testing. These values tripled from the baseline testing to the first test with the Moleculator installed.

3) The average fuel economy results obtained during the baseline testing were atypical. The value for the Federal Test Procedure was 78% of the EPA Gas Mileage Guide value while the baseline fuel economy for the Highway Fuel Economy Test was only 70% of the corresponding Guide value.

4) Another Ford Fairmont (VIN 0E918104396), obtained as a substitute for the Ford Fairmont described in 14c, was tested in the following sequence:

1) Six baseline Federal Test Procedures and six baseline Highway Fuel Economy Tests were performed.

2) A Moleculator #5 was installed.

3) Mileage accumulation was performed (622 miles were accumulated).

4) Five Federal Test Procedures and five Highway Fuel Economy Tests were performed on the Moleculator equipped test vehicle.

Test data is supplied in Attachment C.
15. Analysis

a) Description of Device: The description given in the application of the physical dimensions of the device appear correct. However, the theory of operation does not identify the induced "energy field".

b) Applicability of the Device: The applicability requirements stated in the application have changed in relation to which Moleculetor model is to be used on six and eight cylinder engines. The application states that a Moleculetor Fuel Energizer #3 is to be used on the six cylinder vehicles. At the request of the Applicant, the #5 unit was used on the Citation and Fairmont. A statement was signed by the Moleculetor representative which stated that all instructions and advertising will be amended to provide that the #5 unit shall be used on six and eight cylinder engines.

c) Device Installation: The installation is straightforward and does not require any special tools. The instructions given in the application are adequate enough to enable the average auto mechanic to install the device in less than an hour. However, the instructions did not state that the device should be installed as close to the fuel tank as possible, as we were instructed to do by the Moleculetor Representative.

d) Device Maintenance: The statement in the application that no maintenance is required appears to be correct and reasonable.

e) Effects on Vehicle Emissions (non-regulated): Non-regulated emission levels were not assessed as part of this evaluation.

f) Safety of the Device: As long as the device is installed properly and no gasoline leaks are evident, the statements on safety in the application appear to be correct.

g) Test Results Supplied by the Applicant: 1) Vehicle exhaust emissions and fuel economy data obtained according to EPA test procedures were collected at Olson Engineering, Inc. (OEI) and submitted by the Applicant. Four vehicles were tested with and without the device installed. Following is a vehicle by vehicle analysis.

1978 Chevrolet Caprice
305 CID, 8 Cylinder
2 barrel carburetor
Automatic Transmission
Odometer: 888 miles

Only one baseline test sequence was performed on this vehicle. The baseline FTP fuel economy was 2 mpg (15%) below the corresponding Gas Mileage Guide number, and the HFET number was 3 mpg (16%) below the Guide value. After the baseline test sequence, the device was installed and it appeared that
approximately 60 miles were accumulated. Only one test sequence was then performed which showed a 5% increase in fuel economy on the FTP and an 11% increase on the HFET. Another test sequence was run after an additional 1000 miles were accumulated. Because of the low odometer reading, this additional mileage may have had an influence on the engine functions because of the breaking-in effect of the "green" engine. However, this test sequence produced approximately the same numbers as the preceding test. Because of the low odometer reading of the vehicle and the fact that duplicate baseline tests were not conducted, these data are deemed insufficient.

1974 Fiat X 1/9
1300 cc, 4 cylinder
2 barrel carburetor
Manual Transmission
Odometer: 65,933

This vehicle received one baseline test sequence and one test sequence after installation of the device. 54 miles were accumulated after installation of the device. The FTP fuel economy showed a 7% increase while the HFET showed a 2% increase. The HFET increase is within OEX's claimed tolerance of ±2% (Attachment A). Again, because of the lack of duplicate tests, these data are deemed insufficient.

1979 Chevrolet Malibu
231 CID, 6 Cylinder
2 Barrel Carburetor
Automatic Transmission
Odometer: 1,508 miles

This vehicle received one baseline test sequence and one device test sequence. 159 miles were accumulated after installation of the device. The FTP fuel economy showed a 5% increase and the HFET showed a 1% increase. The HFET increase is within OEX's ±2% tolerances. Again, because of the lack of duplicate tests, these data are deemed insufficient.

1978 Ford Thunderbird
400 CID, 8 Cylinder
2 Barrel Carburetor
Automatic Transmission
Odometer: 16,782

This vehicle received one baseline test sequence and one device test sequence. 159 miles were accumulated after installation of the device. The FTP fuel economy showed a 5% increase and the HFET showed a 1% increase. All gas mileages generated were below the corresponding values found in the Gas Mileage Guide. These data are deemed insufficient because of the lack of duplicate tests.

Summary comments on the Olson Engineering reports supplied by the Applicant:
a) No duplicate tests were performed at any single test point. For this reason alone, the data supplied is insufficient to determine a statistically significant increase in fuel economy.

b) Of the four test vehicles, only one (the Ford Thunderbird) had an odometer reading in a reasonable mileage interval for a test vehicle. The other vehicles were at extreme ends of the spectrum, one being beyond its "useful life" and the other two in the "green engine" category.

c) Except for the first HFET test on the Chevrolet Caprice, none of the increases were within the 10% to 23% claimed by the Applicant.

2) The tests run by "Motor Trend Magazine" cannot be realistically considered as test data since they were all "on the road" evaluations which involve many uncontrollable variables.

3) The tests run on the "Trailer Life Magazine" were similar to those run by "Motor Trend Magazine" and the same analysis applies.

4) The article in "Motorhome Life Magazine" is identical to the article in "Trailer Life Magazine" (the former is published by the latter).

b) The Information Gathered by EPA: Testing by EPA is discussed in detail in Attachment C.

16) Conclusions

The results of this test program did not show consistent effects attributable to the Moleculator on the fuel economy and emission levels of the test vehicles. There were slight improvements in some cases and slight losses in others. The changes in all cases were quite small and were consistent with changes observed by EPA in other tests with vehicles in which fuel economy measurements were made before and after mileage accumulation. The claims of 10% to 23% fuel economy increases were not substantiated by the findings of this EPA program.
List of Attachments

Attachment A  Olson Engineering Report (June 1, 1978).
Attachment C  Motor Trend Article.
Attachment D  Trailer Life Article.
Attachment E  Motorhome Life Article
Attachment F  Statements by Individuals.
Attachment A

Olson Engineering, Inc.
Report Dated June 1, 1978
AUTOMOTIVE EXHAUST EMISSION
AND FUEL ECONOMY TEST REPORT

PREPARED FOR

I.B.M. CORPORATION

June 1, 1979

By

Olson Engineering Inc.
INTRODUCTION

This report summarizes a vehicle testing program conducted at Olsen Engineering, Inc. in Huntington Beach, California. The program was designed to measure and compare exhaust emissions and fuel economy with and without the moleculator fuel energy device.

TEST VEHICLE

One test vehicle was selected and supplied by the client for these comparisons.

Test Vehicle: 1978 Chevrolet Caprice 305 CID V-8 with 2 BBZ carburetion and automatic transmission

The test vehicle was adjusted to MAN. Specifications for idle speed and ignition timing prior to the baseline and device measurements. The odometer mileage prior to the baseline test was 0889 miles.

VEHICLE PREPARATION

After baseline measurements the test vehicle was equipped with the moleculator fuel energy device by the clients representative and the tune-up parameters were re-established or verified by OBI personnel.

TEST FUEL

The test fuel was an indolene clear (unleaded) fuel which conforms to the Federal specifications for exhaust and evaporative emissions testing.
TEST CONDITIONS AND PROCEDURES

Currently regulated gaseous emissions are unburned hydrocarbons (HC), carbon monoxide (CO) and oxides of nitrogen (NOx).

Unburned HC and NOx react in the atmosphere to form photochemical smog. Smog, which is highly oxidizing in nature, causes eye and throat irritation, odor, plant damage and decreased visibility. Certain oxides of nitrogen are also toxic in their effect on man.

CO impairs the ability of the blood to carry oxygen. Excessive exposure to CO during periods of high concentrations (such as rush-hour traffic) can decrease the supply of oxygen to the brain, resulting in slower reaction times and impaired judgement.

Particulate and other emissions include such things as sulfate emissions, aldehyde emissions, and smoke emissions from diesel-powered vehicles. These emissions are generally not measured as part of a routine device evaluation. They may be measured if the control system or engine being tested could potentially contribute to particulate or other emissions.

The test procedure used by Olsen Engineering, Inc. to measure exhaust emissions from passenger cars, light trucks, and motorcycles is the 1975 Federal Test Procedure (FTP). This procedure may also be referred to as the Federal Driving Schedule, CVS C/H Test, or the Cold Start CVS Test.
TEST CONDITIONS AND PROCEDURES (Continued)

On the day before the scheduled 1975 FTP, the vehicle must be parked for at least 12 hours in an area where the temperature is maintained between 68°F and 86°F. This period is referred to as the "cold" soak.

The 1975 FTP is a cold start test, so the test vehicle is pushed onto the dynamometer without starting the engine. After placement of the vehicle on the dynamometer, the emission collection system is attached to the tailpipe, and a cooling fan is placed in front of the vehicle. The emission test is run with the engine compartment hood open.

The emission sampling system and test vehicle are started simultaneously, so that emissions are collected during engine cranking. After starting the engine, the driver follows a controlled driving schedule known as the Urban Dynamometer Driving Schedule (RDDS) or LA-4, which is patterned to represent average urban driving. The driving schedule is displayed to the driver of the test vehicle, who matches the vehicle speed to that displayed on the schedule. The LA-4 driving cycle is 1372 seconds long and covers a distance of 7.5 miles.

At the end of the driving cycle, the engine is stopped, the cooling fan and sample collection system shut off and the hood closed. The vehicle remains on the dynamometer and soaks for 10 minutes. This is the "hot" soak preceding the hot start portion of the test. At the end of ten minutes, the vehicle and CVS are again restarted and the vehicle is driven through the first 505 seconds (3.59 miles) of the LA-4 cycle.
TEST CONDITIONS AND PROCEDURES (Continued)

The 1975 FTP is the procedure used in the certification tests of new cars beginning with the 1975 model year. It is also the procedure EPA has been using since 1971 to evaluate prototype engines and emission control systems. The 1975 FTP provides the most representative characterization available of exhaust emissions and urban fuel economy.

The test is run in a controlled ambient cell where temperature and other conditions can be maintained within specified limits. During the 1975 FTP, the vehicle is driven on a chassis dynamometer over a stop-and-go driving schedule having an average speed of 21.6 m.p.h. Through the use of flywheels and a water brake, the loads that the vehicle would actually see on the road are reproduced. The vehicle's exhaust is collected, diluted and thoroughly mixed with filtered background air, to a known constant volume flow, using a positive displacement pump. This procedure is known as Constant Volume Sampling (CVS). The 1975 FTP captures the emissions generated during a "cold" start and includes a "Hot" start after a ten minute shut-down following the first 7.5 miles of driving.

A chassis dynamometer reproduces vehicle inertia with flywheels and road load with a water brake. Inertia is available in 250 lb. increments between 1750 lbs. and 3000 lbs. and in 500 lb. increments between 3000 lbs. and 5500 lbs. For each inertia weight class, a road load is specified which takes into account rolling resistance and aerodynamic drag for an average vehicle in each class.
TEST CONDITIONS AND PROCEDURES (Continued)

Exhaust emissions measured during the 1975 FTP cover 3 regimes of engine operation. The exhaust emissions during the first 505 seconds of the test are the "cold transient" emissions. During this time period, the vehicle gradually warms up as it is driven over the LA-4 cycle. The emissions during this period will show the effects of choke operation and vehicle warm-up characteristics. When the vehicle enters into the remaining 567 seconds of the LA-4 cycle, it is considered to be fully warmed up. The emissions during this portion of the test are the "stabilized" emissions. The final period of the test, following the hot soak, is the "hot transient" section, and shows the effect of the hot start. The emissions from each of the three portions of the test are collected in separate bags. Laboratory accuracy is normally maintained within ± 2% tolerance.

Fuel economy is measured on a chassis dynamometer reproducing typical urban and highway driving speeds and loads. The fuel economy of the test vehicle is calculated from the exhaust emission data using the carbon balance method. Urban fuel economy is measured during the 1975 Federal Test Procedure, and highway fuel economy is measured over the EPA Highway Fuel Economy Test. The average speed during the 1975 Federal Test Procedure is 21.6 miles per hour. The average speed of the Highway Fuel Economy Test is 48.2 miles per hour.
TEST CONDITIONS AND PROCEDURES (Continued)

A complete description of the procedures (Vol. 37 No. 221, Part II, Nov. 25, 1972) that are followed during a 1975 FTP can be found in the Federal Register. Evaluation tests usually do not include measurement of evaporative emissions.

TEST RESULTS

Test results of this program are summarized in Table I.
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**SPAN CALIBRATION**

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**OLSON END NEERING, INC.**

**AUTOMOTIVE RESEARCH CENTER**

**HUNTINGTON BEACH, CA. 92649**

**UNIT # 1**

**DATE: 05/28/75**  **TIME: 14:21:48**

**TEST # 7843**

**CHASSIS # IN69USC12015**

**ENGINE # /**

**CLASS 75**

**DISP 350**

**WEIGHT 4000**

**TRAN 0**

**AXEL /**

**CARB 1X4**

**ODOM 58974**

**TEMP 75**

**BAR 29.65**

**HUMID 40**

**GOLD START CUS 11/WITH DEVICE/10 E.M. DEVICE**

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**FUEL CONSUMPTION**

11.63 MPG
**SYSTEM START-UP**

**ZERO CALIBRATION**

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OLSON ENGINEERING, INC.
AUTOMOTIVE RESEARCH CENTER
HUNTINGTON BEACH, CA 92649

**UNIT # 1**

**DATE**: 05/24/75  **TIME**: 05:39:39

**TEST # 7829**

**CHASSIS # IN69UBC12815**

**ENGINE # /**

**CLASS 75**

**DISP 3.05**

**WEIGHT 4000**

**TRAN 0**

**AKL /**

**CARD 80**

**OCDM 00000**

**TEM 80**

**BAR 29.36**

**HUMID 30**

**HOT START HF5 AT BASELINE**

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**FUEL CONSUMPTION 16.83 MPG**
### CHEVROLET START-UP

**DATE:** 05/25/78  **TIME:** 14:49:55

**ENTER FUNCTION?**

**BA**

**ZERO CALIBRATION**

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### OLSKON ENG NERING, INC.

**AUTOMOTIVE RESEARCH CENTER**

**HUNTINGTON BEACH, CA 92649**

**UNIT # 1**

**DATE:** 05/25/78  **TIME:** 14:49:56

**TEST # 7544**

**CHASSIS # IN69USC12015**

**ENGINE # /**

**CLASS 75**

**DISP 350**

**HEIGHT 4800**

**TRAN 8**

**AXEL /**

**CABS 1X4**

**ODOM 88985**

**TEMP 83**

**BAR 89.87**

**HUMID 29**

**HPET/ W/I.E.N. DEVICE**

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**TOD GRAMS/HRAFT**

**FUEL CONSUMPTION** 17.88 MPG
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OLSON ENGINEERING, INC.
AUTOMOTIVE RESEARCH CENTER
HUNTINGTON BEACH, CA 92649

UNIT #1
DATE: 06/31/78
TIME: 09:43:36
TEST #7869
CHASSIS # ING9USC12015
ENGINE # /
CLASS 73
DISP 395
WEIGHT 4800
TRAN 0
AXEL /
CABLE 1X2
ODOM 699228
TEMP 72
BAR 89.85
HUMID 42

COLD START CSV 11/4/AFK 1800 MS/ACM-AFTER 1.8 F.M.
BAR# REL NO CO NO CO2 HC CO NO CO2
AND1 5.3 0.2 0.0 0.03 0.41 0.37 0.933333.68
EXH1 11942 85.7 659.6 34.1 8.34 0.63 6.66 0.32 417.86
AND2 7.9 0.0 0.0 0.03 0.41 0.37 0.933333.68
EXH2 19289 10.5 0.0 21.4 1.63 0.63 0.66 0.58 417.86
AND3 9.6 0.0 0.0 0.03 0.41 0.37 0.933333.68
EXH3 11240 15.3 0.0 35.9 2.14 0.63 0.66 0.58 302.68
VTE GRAMS/MILF 0.24 2.75 1.03 753.23
FUEL CONSUMPTION 11.69 MPG
**ALERT**

**DATE:** 05/31/73  **TIME:** 09:19:35

**SYSTEM START-UP**

**DATE:** 05/31/73  **TIME:** 09:19:51

**ENTER FUNCTION**

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**SPAN CALIBRATION**

| COP| 2 | 472 | 4742 | 0.997 |
| CO | 2 | 2846| 4575 | 1.002 |
| HC | 1 | 4665| 4770 | 1.004 |
| NOX| 1 | 4640| 4547 | 0.973 |

**ZERO CALIBRATION**

| COP| 2 | 0   | 0    | -3   |
| CO | 2 | 0   | 0    | 5    |
| HC | 1 | 0   | 0    | 2    |
| NOX| 1 | 0   | 0    | -10  |

---

**OLSON ENGINEERING, INC.**
**AUTOMOTIVE RESEARCH CENTER**
**HUNTINGTON BEACH, CA. 92649**

**UNIT # 1**

**DATE:** 05/31/73  **TIME:** 09:21:53

**TEST # 7344**

**CHASSIS # INTERC18015**

**ENGINE # /**

**CLASS 73**

**LIS 305**

**WEIGHT 4035**

**THAN 0**

**AXIL 1**

**CARL 122**

**OCON P039**

**TIME 76**

**BAF 25.35**

**HUMIL 41**

**VEH START 4187/04 HANDLE COMPUTER AS TEST NO. 7367**

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**FUEL CONSUMPTION** 17.47 MPG
Attachment B

Olson Engineering, Inc.
Report dated August 7, 1979
INTRODUCTION
This report summarizes a vehicle testing program conducted at Olson Engineering, Inc. in Huntington Beach, California. The program was designed to measure and compare exhaust emissions and fuel economy with and without the moleculator fuel energy device.

TEST VEHICLES
Three test vehicles were selected and supplied by OEI for these comparisons.

Test Vehicle No. 1: 1974 Fiat X-19
1300 cc 4 cylinder
2 barrel carburetion
Manual transmission
Odometer: 65,933 miles
Basic timing: TDC
Idle RPM: 850
Idle CO: 1.25%

Test Vehicle No. 2: 1979 Chevrolet Malibu
231 CID V-6
2 barrel carburetion
Automatic transmission
Odometer: 1,508 miles
Basic timing: 15° BTC
Idle RPM: 600 (D)

Test Vehicle No. 3: 1978 Ford Thunderbird
400 CID V-8
2 barrel carburetion
Automatic transmission
Basic timing: 12° BTC
Idle RPM: 600 (D)
TEST VEHICLES (Continued)
The test vehicles were adjusted to manufacturer's specifications prior to baseline measurements and reconfirmed prior to device measurements.

VEHICLE PREPARATION
After baseline measurements the test vehicles were equipped with the moleculator fuel energy device by OEI Technicians and the tuneup parameters were reestablished or verified by OEI Personnel. (Installation instructions attached.)

TEST FUEL
The test fuel was an indolene clear (unleaded) fuel which conforms to the Federal specifications for exhaust and evaporative emissions testing. The test vehicle's fuel tanks were filled prior to baseline measurements, and the same fuel was used for all tests and mileage accumulation.

TEST CONDITIONS AND PROCEDURES
Currently regulated gaseous emissions are unburned hydrocarbons (HC), carbon monoxide (CO) and oxides of nitrogen (NOx).

Unburned HC and NOx react in the atmosphere to form photochemical smog. Smog, which is highly oxidizing in nature, causes eye and throat irritation, odor, plant damage and decreased visibility.
TEST CONDITIONS AND PROCEDURES (Continued)

Certain oxides of nitrogen are also toxic in their effect on man.

CO impairs the ability of the blood to carry oxygen. Excessive exposure to CO during periods of high concentrations (such as rush-hour traffic) can decrease the supply of oxygen to the brain, resulting in slower reaction times and impaired judgment.

Particulate and other emissions include such things as sulfate emissions, aldehyde emissions, and smoke emissions from diesel-powered vehicles. These emissions are generally not measured as part of a routine device evaluation. They may be measured if the control system or engine being tested could potentially contribute to particulate or other emissions.

The test procedure used by Olson Engineering, Inc. to measure exhaust emissions from passenger cars, light trucks and motorcycles is the 1975 Federal Test Procedure (FTP). This procedure may also be referred to as the Federal Driving Schedule, CVS C/H Test, or the Cold Start CVS Test.

The 1975 FTP is the procedure used in the certification tests of new cars beginning with the 1975 model year. It is also the
TEST CONDITIONS AND PROCEDURES (Continued)

procedure EPA has been using since 1971 to evaluate prototype engines and emission control systems. The 1975 FTP provides the most representative characterization available of exhaust emissions and urban fuel economy.

The test is run in a controlled ambient cell where temperature and other conditions can be maintained within specified limits. During the 1975 FTP the vehicle is driven on a chassis dynamometer over a stop-and-go driving schedule having an average speed of 21.6 mph. Through the use of flywheels and a water brake, the loads that the vehicle would actually see on the road are reproduced. The vehicle's exhaust is collected, diluted and thoroughly mixed with filtered background air, to a known constant volume flow, using a positive displacement pump. This procedure is known as Constant Volume Sampling (CVS). The 1975 FTP captures the emissions generated during a "cold" start and includes a "hot" start after a ten minute shutdown following the first 7.5 miles of driving.

A chassis dynamometer reproduces vehicle inertia with flywheels and road load with a water brake. Inertia is available in 250 lb. increments between 1750 lbs. and 3000 lbs. and in 500 lb. increments between 3000 lbs. and 5500 lbs. For each
TEST CONDITIONS AND PROCEDURES (Continued)
inertia weight class, a road load is specified which takes into account rolling resistance and aerodynamic drag for an average vehicle in each class.

On the day before the scheduled 1975 FTP, the vehicle must be parked for at least 12 hours in an area where the temperature is maintained between 68°F and 86°F. This period is referred to as the "cold" soak.

The 1975 FTP is a cold start test, so the test vehicle is pushed onto the dynamometer without starting the engine. After placement of the vehicle on the dynamometer, the emission collection system is attached to the tailpipe and a cooling fan is placed in front of the vehicle. The emission test is run with the engine compartment hood open.

The emission sampling system and test vehicle are started simultaneously so that emissions are collected during engine cranking. After starting the engine the driver follows a controlled driving schedule known as the Urban Dynamometer Driving Schedule (RDDS) or the LA-4 which is patterned to represent average urban driving. The driving schedule is displayed to the driver of the test vehicle who matches the vehicle speed...
TEST CONDITIONS AND PROCEDURES (Continued)

to that displayed on the schedule. The LA-4 driving cycle is 1372 seconds long and covers a distance of 7.5 miles.

At the end of the driving cycle the engine is stopped, the cooling fan and sample collection system shut off and the hood closed. The vehicle remains on the dynamometer and soaks for 10 minutes. This is the "hot" soak preceding the hot start portion of the test. At the end of 10 minutes the vehicle and CVS are again restarted and the vehicle is driven through the first 305 seconds (3.59 miles) of the LA-4 cycle.

Exhaust emissions measured during the 1975 FTP cover three regimes of engine operation. The exhaust emissions during the first 305 seconds of the test are the "cold transient" emissions. During this time period the vehicle gradually warms up as it is driven over the LA-4 cycle. The emissions during this period will show the effects of choke operation and vehicle warm-up characteristics. When the vehicle enters into the remaining 867 seconds of the LA-4 cycle it is considered to be fully warmed up. The emissions during this portion of the test are the "stabilized" emissions. The final period of the test following the hot soak is the "hot transient" section and shows
TEST CONDITIONS AND PROCEDURES (Continued)

the effect of the hot start. The emissions from each of the three portions of the test are collected in separate bags. Laboratory accuracy is normally maintained within ± 2% tolerance.

Fuel economy is measured on a chassis dynamometer reproducing typical urban and highway driving speeds and loads. The fuel economy of the test vehicle is calculated from the exhaust emission data using the carbon balance method. Urban fuel economy is measured during the 1975 Federal Test Procedure, and highway fuel economy is measured over the EPA Highway Fuel Economy Test. The average speed during the 1975 Federal Test Procedure is 21.6 miles per hour. The average speed of the Highway Fuel Economy Test is 48.2 miles per hour.

A complete description of the procedures that are followed during a 1975 FTP can be found in the Federal Register (Vol. 37 No. 221, Part II, Nov. 15, 1972). Evaluation tests usually do not include measurement of evaporative emissions.

TEST RESULTS

Test results of this program are summarized in Tables I - III. Mileage was accumulated by OERI drivers after device installation to "condition" the moleculator device as requested by the client.
TEST RESULTS (Continued)

These test data and results pertain to the referenced vehicles only and are not necessarily representative of the vehicle population in general.

* * * * * * * * *
### TABLE I

**COMPOSITE SUMMARY OF RESULTS**

**TEST VEHICLE NO. 1**

1974 Fiat X-19  
1300 cc

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*After 54 highway miles of device conditioning*
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COMPOSITE SUMMARY OF RESULTS
TEST VEHICLE NO. 2

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231 CID

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*After 195 miles of device conditioning*
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COMPOSITE SUMMARY OF RESULTS
TEST VEHICLE NO. 3

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400 CID

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TRAN: 456 PD
AXEL: /
CARR: 2PFL
ODOM: 65955
TPMP: 78
RPR: 89.98
HUMID: 30
HPFT:
RMP: REV: HC CO NO COR HC CO NO COR
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## Test Data Summary

### Test Details
- **Unit:** 47
- **Date:** 05/04/79
- **Time:** 16:59:19
- **Test No.:** 9946
- **Chassis No.:** 68268561
- **Engine No.:** I68A-5
- **Class:** 74
- **Disp.:** 79
- **Weight:** 2850
- **Trans.:** 4SPD
- **Axel:** /
- **Carb.:** SEML
- **Odom.:** 68996
- **Temp.:** 78
- **Bar.:** 89.94
- **Humid.:** 49

### Test Conditions
- **Hot Start CUS H/FET / Baseline Test / W/Moleculator**

### Emission and Fuel Consumption

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**Fuel Consumption:** 31.06 MPG
**OLSON ENGINEERING, INC.**  
AUTOMOTIVE RESEARCH CENTER  
HUNTINGTON BEACH, CA. 92649

UNIT # 1  
DATE: 06/06/79  
TIME: 13:19:07  
TEST # 10154  
CHASSIS # 1787A9R48839  
ENGINE # 79  
CLASS 79  
DISP 931  
WEIGHT 3500  
TRAN AUTO  
AKEL /  
CARP 1XPP  
ODON 61866  
TEMP HC  
PAR 29.86  
HUMID 44  
COLD START CV3II-BASELINE

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WTD GRAMS/MILE  
FUEL CONSUMPTION 17.05 MPG

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WEIGHT 3580
TRAN AUTO
AXEL /
CAR 1X6-V
ODOM 01819
TEMP 86
RPM 29.81
HUMID 44

HOT START HPET / BASELINE TEST
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OLSON ENGINEERING, INC.
AUTOMOTIVE RESEARCH CENTER
HUNTINGTON BEACH, CA 92649

UNIT # 1
DATA: 06/13/79 TIME: 16:19:21
TEST # 191879
CHASSIS # R458398
ENGINE # / 
CLASS 79
DISP 339
WEIGHT 3500
TRAN AUTO
AXEL / 
CARB RPP
ODM 0163
TEMP RF
PAR 98.8R
HUMID 33

COLD START GAS11/1979 MALIBU W/DEV ICE
PAM 9.54 0.8 0.9 0.94
PKH 1141 7.4 830.6 44.1 1.89 0.35 0.71 0.79 41.43
AMP 9.9 0.8 1.9 0.74
PKH 1411 11.7 0.9 15.1 0.94 0.99 0.39 55.49
AMP 8.8 0.9 1.8 0.74
PKH 1141 12.9 0.9 85.7 1.32 0.8 0.9 0.4 9.11 41.43
1 Mph CHANCE MILE
MILE CONSUMPTION 18.23 MPG

CO 0.8 0.84 4130 1.034
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OLSON ENGINEERING, INC.  
AUTOMOTIVE RESEARCH CENTER  
HUNTINGTON BEACH, CA  92649

UNIT 1  
PUSH 12/12/79  
TIM 16:48:132  
TFR 1311  
CHASSIS # K453300P  
ENGINE # /  
CLASS 79  
DISP 131  
WIDTH 3550  
TRAN AUTO  
AXEL /  
CARG PPM  
ODM 8474  
TMP H#  
PAR 9900  
41MIN 33  
MFF1/1979 MALIBU W/DRIVE  
MARCH KEL KG CO NO CAR HC CO NO COP  
AUTH 4.3 0.6 1.6 9.05  
PX1 17576 19.7 0.0 1.0P 1.0R 0.6 0.99 9.91 349.65  
WTR CLAMS/MILE  
HUM. CONSUMPTION PA PP MPR
VEHICLE EMISSION TEST DATA

TEST NO. 10183 DATE 6-12-79 PROJ NO. C139
VEHICLE Chevrolet YEAR 1979 MODEL Malibu

LIC NO. None VEH I.D. R458592 ENG I.D. 
TRANS Automatic CARB 1 Rochester BBL 2
ENG TYPE V-6 DISPLACEMENT 2.31 AXLE 
ODD START 01/01/78 ODD FINISH 
TYPE TEST HOT COLD
BARO 29.96 "HG 29.80 "HG WET BULB 66 °F DRY BULB 81
DYNOMETER INERTIA 3500 ACT RLHP 11.3 IND. MLHP 8.0
CVS INLET PRESS. 56.1 CVS Δ P. 66.5
TEST DRIVER Esquivel OPERATOR Riggoio

IGN. TIM ___________ IDLE RPM ___________ IDLE CO% ___________
CONVERTER/YES NO ___________ EVAP. SYS ___________
IGN TYPE ___________ LOCATION ___________
EGR/YES NO ___________ DELAY VALVE/YES NO ___________ 
VAC ADV/YES NO ___________ SIZE ___________
P/A ___________ SILencers/YES NO ___________ 
CARB. I.D. NO. ___________ PRI. JET SIZE ___________

OTHER ___________

COMMENT: u/Device
**VEHICLE EMISSION TEST DATA**

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**VEHICLE** Chevrolet  
**YEAR** 1979  
**MODEL** M10160

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**TRAN.** Automatic  
**CARB.** Rochester  
**AXLE.** 2

**ODO START** 01653  
**ODO FINISH**

**TYPE TEST** C/S/E  
**COLD**  
**HOT**

**BARO** 29.98" Hg.  
29.82" CORR.

**DYNO INERTIA** 8500  
**ACT. RLHP** 11.3  
**IND. RLHP** 8.0

**CVS INLET PRESS.** 5.6  
**CVS Δ P.** 6.0  
**OPERATOR** Riegel

**TEST DRIVER** Esquivel

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**CONVERTER/YES** NO  
**IGN. TYPE**

**EGR/YES** NO  
**EGR LOCATION**

**VAC ADV./YES** NO  
**DELAY VALVE/YES** NO

**P/A SIZE**

**SILENCERS/YES** NO

**CARB. I.D. NO.**  
**PRI. JET SIZE**

**OTHER**

**COMMENT:** N/A

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**COMM. ID.** Device
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**OLSON ENGINEERING, INC.**  
**AUTOMOTIVE RESEARCH CENTER**  
**HUNTINGTON BEACH, CA. 92649**

UNIT # 1  
DATE: 07/12/79  
TIME: 18:45:31  
TEST # 16986  
CHASSIS # 070878187489  
ENGINE # /  
CLASS 78  
DISP 4500  
WEIGHT 4500  
TRAN AUTO  
AXEL /  
CARB E82V  
ODON 16782  
TEMP 54  
BAR 89.66  
HUMID 43  
COLD START OUS II  
RAGF REV HC NC CO NO CO2 HC CO NO CO2  
AMBI 0.2 0.2 0.6 0.6 0.83  
EXH 11946 1555.0 37.5 2.77 0.65 15.64 0.61 432.85  
AMBI 9.6 4.6 0.6 0.83  
EXH 19486 13.8 1.9 12.9 1.68 0.85 -0.84 0.35 485.89  
AMBI 7.4 0.2 0.3 0.65  
EXH 11936 44.5 745.6 22.3 2.65 0.19 7.46 0.33 357.15  
VTG GEARSMILE  
FUEL CONSUMPTION 18.61 Mls
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OLSON ENGINEERING, INC.
AUTOMOTIVE RESEARCH CENTER
HUNTINGTON BEACH, CA 92649

UNIT 01
DATE 07/18/79 TIME: 10:11:58
TEST 01 06637
CHASSIS 05J07187488
ENGINE 01
CLASS 78
DISP 466
WEIGHT 4506
TRAN AUTO
AXEL / CARB 1XBU
ODOM 16798
TEMP 2°C
BAR 99.46
HUMID 39
HOT START HPET
BARO REV HC CO NO CO2 HC CO NO CO2
MNH1 6.6 4.9 0.2 0.06 8.57 1.04 0.69 564.47
ENH1 17.0 17.3 142.0 33.3 3.07 0.57 1.54 0.69 564.47
VTD GRAMS/MILE
FUEL CONSUMPTION 15.64 MPG
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**Olson Engineering, Inc.**  
**AUTOMOTIVE RESEARCH CENTER**  
**Huntington Beach, CA 92649**

**Unit #1**

**Date:** 07/17/79  
**Time:** 08:44:40

**Test #1645**

**Chassis:** 6J876TH87485  
**Engine:** T-BIRD  
**Class:** 78  
**Disp:** 468  
**Weight:** 4990  
**Tran:** Auto  
**Axle:**  
**Cap:** 102V  
**Odometer:** 16941  
**Temp:** 88  
**Bar:** 89.95  
**Humidity:** 84

**Cold Start CVS II w/Decel.**

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**Fuel Consumption:** 11.11 MPG
### System Start-Up

**Date:** 07/17/79  **Time:** 09:41:27

#### Zero Calibration

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<td>3</td>
<td>5</td>
<td></td>
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</tr>
</tbody>
</table>

---

**Olson Engineering, Inc.**

**Automotive Research Center**

**Huntington Beach, CA 92649**

**Unit:** 1  
**Date:** 07/17/79  **Time:** 09:41:27

**Test:** 89410

**Chassis:** 6JN7157428

**Engine:** 7-BIRD

**Class:** 75

**Disf:** 400

**Weight:** 4500

**Tran:** AUTO

**Axel:**

**Gears:** 1K9U

**ODM:** 16951

**Temp:** 74

**Bar:** 89.96

**Humid:** 58

**HOT START:** HPET w/ Dev.

<table>
<thead>
<tr>
<th>RPM</th>
<th>REV</th>
<th>HC</th>
<th>CO</th>
<th>NO</th>
<th>CO2</th>
<th>HC</th>
<th>CO</th>
<th>NO</th>
<th>CO2</th>
</tr>
</thead>
<tbody>
<tr>
<td>700</td>
<td>8.0</td>
<td>9.0</td>
<td>8.6</td>
<td>9.03</td>
<td></td>
<td></td>
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<td>1710</td>
<td>16.0</td>
<td>47.0</td>
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<td>5.31</td>
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</tbody>
</table>

**VTD:** 162

**Fuel Consumption:** 15.66 MPG

---

#### Zero Calibration
Attachment C

"Motor Trend" Article
GM X-CAR OWNERS SURVEY
THE COMPLETE AUTOMOTIVE MAGAZINE
JULY 1980

ROAD TESTS:
Audi 5000 Turbo
Plymouth Turismo
Renault Le Car

INFLATION FIGHTERS:
15 Econo Coupes Under $4500
5 Economy RVs
3 Alternative Fuels
& a Gas-Saving Device That Really Works

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COVER Photograph: by Don Reckner, Ford Photo/Edo
When we were approached by representatives of the Internal Energy Management Corporation with a device they called the Molecular Fuel Energizer Unit, we were openly skeptical.

The device appears to be a solid piece of aluminum rod an inch-and-a-half in diameter and 6 inches long, with a hole drilled down the center. (The device comes in three lengths—longer for larger engines—and has a 45-day money-back warranty, with one year free replacement. Prices range from $139.95 for the smallest unit to $395 for a diesel truck unit. However, at the outset of our talks with I.E.M., the devices sold for only $97.45, $137.50 and $302.50, respectively.) It is installed in the main fuel supply line, as close to the tank as possible, so that fuel runs through it on its way to the engine. A secret "energy field," supposedly stored in the aluminum, reportedly restructures the normal "clumped" structure of the molecules in the fuel into a more "linear" form. This is supposed to turn them into "smaller, more burnable units," and raise the BTU (British Thermal Unit) content.

The manufacturer's claim is that the Moleculator will improve the efficiency of an internal combustion engine, whether gasoline or diesel. According to the claim, after a break-in period of 500-1200 miles, large trucks should show a fuel-economy improvement of up to 40%, and a passenger car should improve up to 25%.

This all sounded very unlikely, but I.E.M. spooked our interest when they produced a folderful of the results of tests run by the California Air Resources Board and Olson Engineering (a government-approved testing laboratory), and what appeared to be testimonial letters from a state director of the Good Sam Club (a recreational vehicle organization), several large trucking firms, a diesel engine manufacturer, a law-enforcement organization, and an international company that services oil drilling rigs.

We agreed to run our own tests. A program involving five cars was set up, and while they were being run over a period of several weeks, we began digesting the information the Moleculator people supplied us.

The section of the Olson Engineering report that contained the hard data from the laboratory-controlled tests they ran seemed to validate a fuel mileage increase in every case. Tests on four cars were included, but three of them showed only the highway-cycle results, and the fourth only the city-cycle test. All the tests were run on a chassis dynamometer that reproduces typical urban and highway speeds and loads under completely controlled atmospheric conditions, according to the approved Federal Test Procedure.

When we showed a copy of the report to a representative of Olson Engineering, he confirmed that the data indicating a highway-cycle fuel mileage increase from 15.08 to 17.82 mpg for a 1978 Chevrolet Caprice with a 305cid V-8 and automatic transmission was correct, but that it was only one of many tests they had run. When we pressed him for a conclusion, he answered with an engineer's typical caution: "The number of tests we ran was not sufficient to produce a statistically defensible conclusion. The data they present here, which is not complete, is representative of the test vehicles only, and may not necessarily be applicable to all cars."

The California Air Resources Board came to a more pointed conclusion. Portions of the Olson Engineering report, selected by the I.E.M. people, were presented to the ARB as part of the process of getting an exemption from the provisions of Section 37156 of the California Vehicle Code, which prohibits the sale of any automotive aftermarket device that alters vehicle emissions for use on 1979 or later cars. Their comments on the evidence presented indicated seven cars had been tested, not just the four on which we had seen data. They state that of the seven cars, only three had been tested according to the full ARB-specified
procedure. These cars showed average gains of 3-7% in urban-cycle fuel economy, and 1-2% in highway-cycle economy, both of which were considered to be within the bounds of test variability. The remaining four cars showed 6-25% increases, but the tests did not comply with ARB specifications and, therefore, could not be considered valid.

The ARB then ran its own tests on the remaining two cars, measuring the fuel economy with both the carbon-balance analysis of exhaust gases, and with a flow-meter placed in the fuel supply line. These tests showed no increase in mileage with the Moleculator, and their report ended with that conclusion.

Suddenly, we were faced with a problem. The first two items of evidence we examined, both from laboratories where the tests are completely controlled and results are calculated down to the nth degree, seem to have torn the credibility of the Moleculator completely to shreds. We probably would have dropped the project right then and there for two reasons: these tests are the same kind that produce the EPA new-car mileage figures, and we know how they vary according to real-world driving; and we got back the results from our first field test, showing a significant improvement in fuel economy.

The test vehicle was a 1979 Ford Escort, a 4-door sedan with a 3.8-litre V-8 and automatic transmission. It has dual fuel tanks, so we installed a Moleculator in the line from the main tank only, which would allow us to switch back and forth between the "energized" and "un-energized" fuel. Tests were run over our 75-mile loop and on an all-highway cruise at 55 mph.

<table>
<thead>
<tr>
<th>Test No. 1: 1979 Ford Escort, 4-door sedan (3.8-litre V-8, automatic)</th>
<th>Test course—MT 75-mile fuel loop</th>
</tr>
</thead>
<tbody>
<tr>
<td>Distance: 75 miles</td>
<td>Time: 1 hour 15 minutes</td>
</tr>
<tr>
<td>Fuel used: 6.3 gallons</td>
<td>MPG: 18.4</td>
</tr>
<tr>
<td>Acceleration: 10%</td>
<td>Braking: 15%</td>
</tr>
</tbody>
</table>

Test course—highway (constant 55 mph)

| Distance: 100 miles      | Time: 10 hours 45 minutes       |
| Fuel used: 7.6 gallons   | MPG: 18.6                       |
| Acceleration: 20%        | Braking: 18%                     |

We also put the V-8 through instrumented acceleration testing, with fuel supplied from one tank, then the other, and noted no difference. We used a chassis dynamometer to measure the rear-wheel horsepower, and an exhaust-gas analyzer to check the emissions. The "energized" and "un-energized" fuel produced exactly the same readings.

We couldn't see how only the fuel economy could be affected, so we contacted the diesel engine manufacturer that had tested the device on an engine dynamometer, which produces much more accurate horsepower readings. Their test engine was also equipped...
Miracle Mileage

with sensors to measure manifold pressure and exhaust-gas temperature. The man who supervised the tests said there had been no difference in any of the readings; they had taken. They did, however, notice a 14.3% decrease in fuel consumption.

The deeper we dug into this thing, the more tangled the information was getting. We decided it would be a good idea to talk to someone who knew more about the chemistry of gasoline, so we contacted a scientist at the research division of a major oil company. We explained what the device was supposed to do and what information we'd gathered so far, including the positive test results on the van. His responses did nothing to reassure us.

He said the process of changing the molecular structure of the fuel in the way the manufacturer of the device describes is called "isomerization," and that with the best technology currently available, the process requires a catalyst capable of enabling and a catalytic agent, neither of which aluminum has. If the device actually did raise the BTU content of the fuel, it would show up as an increase in horsepower and in exhaust-gas temperature. And, in response to our own testing, he simply added, "there are so many variables in a field test that it is exceedingly difficult to get accurate results."

Once again we wavered on the edge of killing the project, but two more of our tests had been completed, and both showed improved fuel economy with the Moleculator.

Test No. 2: 1979 Honda Accord
Test course—MT 73-mile fuel loop

(Notes: Moleculator was installed in engine compartment, courtesy to performance enhancement)

| Distance | 23 miles | 25 miles | 27 miles | 29 miles | 32 miles | 35 miles | 37 miles | 40 miles | 42 miles | 45 miles | 47 miles | 49 miles | 52 miles | 55 miles | 57 miles | 60 miles | 62 miles |
|----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| Time     | 1.6 hours | 1.6 hours | 1.6 hours | 1.6 hours | 1.6 hours | 1.6 hours | 1.6 hours | 1.6 hours | 1.6 hours | 1.6 hours | 1.6 hours | 1.6 hours | 1.6 hours | 1.6 hours | 1.6 hours | 1.6 hours |
| Fuel used| 1.8 gallons | 2.0 gallons | 2.2 gallons | 2.4 gallons | 2.6 gallons | 2.8 gallons | 3.0 gallons | 3.2 gallons | 3.4 gallons | 3.6 gallons | 3.8 gallons | 4.0 gallons | 4.2 gallons | 4.4 gallons | 4.6 gallons | 4.8 gallons |
| Mpg      | 34.5 mpg  | 34.2 mpg  | 34.0 mpg  | 33.8 mpg  | 33.6 mpg  | 33.4 mpg  | 33.2 mpg  | 33.0 mpg  | 32.8 mpg  | 32.6 mpg  | 32.4 mpg  | 32.2 mpg  | 32.0 mpg  | 31.8 mpg  | 31.6 mpg  | 31.4 mpg  |
| Accelerate | 9.5      | 9.5      | 9.5      | 9.5      | 9.5      | 9.5      | 9.5      | 9.5      | 9.5      | 9.5      | 9.5      | 9.5      | 9.5      | 9.5      | 9.5      | 9.5      |

Test No. 3: 1979 Honda Civic
(1.5L 4-cylinder, 5-speed manual)

Test course—MT 73-mile fuel loop

| Distance | 27 miles | 29 miles | 31 miles | 33 miles | 35 miles | 37 miles | 39 miles | 41 miles | 43 miles | 45 miles | 47 miles | 49 miles | 51 miles | 53 miles | 55 miles | 57 miles | 60 miles |
|----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| Time     | 1.6 hours | 1.6 hours | 1.6 hours | 1.6 hours | 1.6 hours | 1.6 hours | 1.6 hours | 1.6 hours | 1.6 hours | 1.6 hours | 1.6 hours | 1.6 hours | 1.6 hours | 1.6 hours | 1.6 hours | 1.6 hours |
| Fuel used| 1.7 gallons | 1.9 gallons | 2.1 gallons | 2.3 gallons | 2.5 gallons | 2.7 gallons | 2.9 gallons | 3.1 gallons | 3.3 gallons | 3.5 gallons | 3.7 gallons | 3.9 gallons | 4.1 gallons | 4.3 gallons | 4.5 gallons | 4.7 gallons |
| Mpg      | 34.8 mpg  | 34.5 mpg  | 34.2 mpg  | 34.0 mpg  | 33.8 mpg  | 33.6 mpg  | 33.4 mpg  | 33.2 mpg  | 33.0 mpg  | 32.8 mpg  | 32.6 mpg  | 32.4 mpg  | 32.2 mpg  | 32.0 mpg  | 31.8 mpg  | 31.6 mpg  |
| Accelerate | 18.8%     | 18.8%     | 18.8%     | 18.8%     | 18.8%     | 18.8%     | 18.8%     | 18.8%     | 18.8%     | 18.8%     | 18.8%     | 18.8%     | 18.8%     | 18.8%     | 18.8%     | 18.8%     |

Certainly there were variables, but we went on to considerable lengths to make sure the tests were as accurate as possible. In each test, the baseline and with-device tests were done by the same driver, over the same route, at the same time of day, and under as nearly identical conditions and circumstances as possible. We were satisfied that our test results were accurate.

Our next contact was the law-enforcement organization whose captain had written a letter to the I.E.M. people, stating that in tests his organization had run on two patrol cars, they recorded a 13.9% and 17.4% increase in fuel economy. We spoke to an officer who himself had been involved in the testing, and he told us the letter referred to a relatively casual initial test. Later tests, run out of headquarters, involved 20 vehicles, six months, and several hundred thousand miles. The conclusion was that the Moleculator "... was found to have no appreciable effect on fuel economy."

Next, we got in touch with the state director of a branch of The Good Sam Club, whose letter stated that, in tests on a motorhome with a Dodge 440 CID engine, mpg had gone from 5.9 to 7.5 when members installed a Moleculator. He confirmed the results and said that several other club members had gotten similar results from their own tests. He also said that The Good Sam Club viewed the Moleculator as a possible salvation of the RV concept.

When we contacted the club's official technical representative at their national headquarters, he said he was aware of the tests run by the state chapter, but that they were purely uncontrolled, individual tests and should not be considered as the official position taken by The Good Sam Club. He admitted that the club was officially testing the device, but had not yet been able to draw any conclusions.

We were beginning to feel that the people from I.E.M. had presented us with information that was, to put it charitably, open to question. Predictably, just as we were getting good and suspicious, everyone else we contacted confirmed our tests of the Moleculator. A large trucking company reported an average increase in fuel economy on the order of 19% for a test involving 10 diesel trucks over a six-month period. A company that services oil well drilling rigs tested the Moleculator on two diesel-engine generators and confirmed a 19.3% and a 21.1% decrease in fuel consumption. The chief mechanic of a fleet of mortuary vehicles told us of a 25% fuel economy improvement on a 1979 Cadillac limousine.

All of these results agreed with the results of our own final series of tests.

Test No. 4: 1979 Toyota Land Cruiser
(2.8L 4-cylinder, 3-speed manual)

Test course—highway (constant 55 mph)

<table>
<thead>
<tr>
<th>Distance</th>
<th>250 miles</th>
<th>250 miles</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time</td>
<td>4.3 hours</td>
<td>4.3 hours</td>
</tr>
<tr>
<td>Fuel used</td>
<td>13.0 gallons</td>
<td>13.5 gallons</td>
</tr>
<tr>
<td>Mpg</td>
<td>16.6 mpg</td>
<td>16.5 mpg</td>
</tr>
<tr>
<td>Accelerate</td>
<td>28.8%</td>
<td>28.8%</td>
</tr>
</tbody>
</table>

(Note: Tests were run four times, each time under the same conditions, with the same driver. The tests showed a gradual increase. Results above are from the final test.)

Test No. 5: 1979 Dodge D200
(2.4L 4-cylinder, 5-speed manual)

Test course—highway (constant 55 mph)

<table>
<thead>
<tr>
<th>Distance</th>
<th>300 miles</th>
<th>300 miles</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time</td>
<td>3.8 hours</td>
<td>3.8 hours</td>
</tr>
<tr>
<td>Fuel used</td>
<td>23.4 gallons</td>
<td>23.7 gallons</td>
</tr>
<tr>
<td>Mpg</td>
<td>39.2 mpg</td>
<td>39.6 mpg</td>
</tr>
</tbody>
</table>

At this point, since the story of the Moleculator has so many conflicting elements, let's summarize the major points:

1) The I.E.M. Corporation has offered no acceptable explanation of exactly how the Moleculator operates, or exactly what it does.

2) Within the bounds of currently recognized technology, we can find no proven way to induce a permanent energy field in aluminum that will alter the molecular structure of fluids passing through it.

3) Tests conducted by the California Air Resources Board indicate that the Moleculator does not significantly affect emissions or fuel economy.

4) Tests conducted by Olson Engineering according to ARB specifications and submitted to the ARB by the I.E.M. Corporation show no improvement in fuel economy. Other tests, also conducted by Olson but not according to ARB specifications, show an increase but are not considered valid by the ARB.

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Miracle Mileage

5) Field tests conducted by companies and organizations on various kinds of engines in various applications produced conflicting results.
6) Field tests conducted by the Motor Trend staff consistently indicated improved fuel economy.

All of these considerations make any absolute conclusion about the Moleculator impossible. The important point to note, however, is the final one. We ran our tests most carefully, and in a field experiment with many variables, we would expect results on a fuel-saving device that didn’t work to fall on both sides of the baseline data. In each of our tests, the results came up positive by a significant degree. We even fabricated our own “Moleculator,” compared it to the baseline test and the tests run with the I.E.M. version, and we got a substantial increase in mileage (baseline mpg, 43.51; with I.E.M. Moleculator, 48.6; with our “Moleculator,” 36.6). Although we don’t know why, the vehicles in which we installed an I.E.M. Moleculator went farther on every gallon of fuel that passed through it.

Adding to the data...

We have tried to present as balanced a view of the information concerning the Moleculator as possible. If you have decided to purchase one (Internal Energy Management Corporation, P.O. Box 1429, Del Rio, TX 78840) and try it out, we would appreciate if you would keep a record of the results and drop us a line after you’ve reached your own conclusions. If we get enough responses, we’ll do a follow-up story a couple of months from now, based on your results.

Test Procedure
1. Baseline:
   - Note temperature, barometric pressure, and humidity.
   - Note the beginning and end time of test, and the miles traveled, so that you can calculate average speed.
   - Top off fuel tank (shake car to eliminate air pockets in tank).
   - Drive car 80-100 miles.
   - Refill tank.
   - Divide miles traveled by gallons of fuel used to obtain mpg.
2. Install Moleculator as per instructions. Follow specified break-in procedure.
3. Re-test car as in section 1. Try to duplicate conditions as accurately as possible.
4. Factors that affect fuel mileage
   1) Air temperature
   2) Headwinds
   3) Wet roads
   4) Engine’s state of tune
   5) Tire inflation
   6) Hilly terrain
   7) Driving technique
Attachment D

"Trailer Life" Article
The Moleculetor
Is this the first genuine mileage "miracle?"
by Bill Estes

WHAT WOULD YOUR REACTION BE IF someone were to show you a round aluminum cylinder 1½ inches in diameter and 8 inches long, with a hole through the center, and claim that you could increase fuel economy up to 23% simply by running the fuel through this device before it reaches the carburetor?

Your initial reaction probably would be the same as ours: "Come on ... you don't expect me to believe that?" You're Insulted that the guy would have the nerve to lay such a fairy tale on you. You're thinking, "How can I get rid of this bum?"

But before you're able to call for help (he's bigger than you are), he pulls out a rather exhaustive fuel economy test performed by a major automotive testing laboratory (Olson Engineering of Huntington Beach, California) and mentions that a couple of other magazines are involved in testing the device.

On closer examination, the Olson report shows fuel economy increases ranging from 10.8% to 20.3% for two Chevrolet passenger cars and a Dodge half-ton truck.

The device, called the Moleculetor, is described by the company as a simple cylinder of aluminum which contains a special energy field (secret) that supposedly changes the molecular structure of the fuel, for more efficient combustion. The energy is supposedly distributed throughout the vehicle by the Moleculetor.

The energy is said to last the lifetime of the vehicle, or maybe longer. It wouldn't have surprised us if they also claimed it removed warts.

But Doug Lovegrove, the Moleculetor representative who called on us, is not the usual gas-gimmick huckster. He knows automotive theory. Most people selling worthless gimmicks don't even have a clear understanding of how an internal combustion engine operates. Lovegrove has been in the automotive field for more than 20 years, having worked in Chrysler Corporation's racing program several years ago. He does seem quite sincere in his belief that the Moleculetor does work. Lovegrove handles Nevada and Hawaii for the Moleculetor distributor, Internal Energy Management of Las Vegas. He became interested in Trailer Life through Etha Mae Wilson, Nevada state director of the Good Sam Club, who installed a Moleculetor on her motorhome and reported a fuel economy increase from 6.8 to 8.5 mpg. Etha Mae's fuel economy results are her own, and not connected with any test performed by the club or by TL personnel, but she is quite enthusiastic about the benefits of the device.

Of course, most marketers of gas-saving devices are able to come up with a variety of testimonials. Sponsors of the Moleculetor are substantial in number. They don't prove anything conclusively for a broad range of vehicles.

Does the Moleculetor actually work? It seems to ... and it's rather uncomfortable to say so in absence of a logical explanation. That business about the secret energy field is a bit too much for one's sense of practicality.

In any case, we tested the unit on two vehicles over a period of two months and 3,000 miles. Results were an 18% improvement in a 1978 Oldsmobile station wagon with a 305 V-8 engine, and a 10% improvement in a 1978 Chevrolet Blazer with 400 V-8 engine. We're not alone in suggesting that the system may actually work. Motor Trend magazine planned an article to appear in their July issue describing their five tests: Ford Econoline Van, 16.7% improvement; Honda Accord, 9% improvement; Honda Civic, 13.2% improvement; Toyota Land Cruiser, 20.4% improvement; and Datsun 240Z, 9.8% improvement.

Our tests produced interesting results. First, we tested the Blazer by running fuel economy tests, then driving the vehicle 600 miles and performing the tests again. We used a separate fuel container so we could accurately measure the amount of gasoline used. We performed repeat tests to establish margin of error, which usually was around two-tenths of one mile per gallon.

At the end of the 600-mile trip (the company recommends at least two tanks of fuel be used before the Moleculetor has its effect) we tested again and the results showed no fuel economy improvement. The news was phoned to Lovegrove. Initially he couldn't come up with a reason for the poor results, but after consulting with company directors it was their opinion that use of the separate fuel container was the reason. The separate container was not "energized" by the Moleculetor since it was not permanently carried in the vehicle.

Back to the drawing board.

Next, the 1978 Olds was evaluated during initial fuel economy tests in which we simply filled up at a service station—a practice we don't like because the margin of error increases. The procedure was the one recommended in last month's article on gas-savers. We filled up at the same pump, parked in the same position, under the same weather conditions and set the pump's automatic shut-off nozzle on slow feed. When it shut off automatically, we hung it up. Repeat tests showed a mileage margin of error of around ½ mpg ... larger than we normally tolerate.

The plan was to drive about 800 miles to get a feel for on-the-road fuel economy, install the Moleculetor and drive an additional 800 miles back to the departure point, which should be enough distance for the unit to do its "energization" number. Initial mileage figures were in the 10-11 range. Then, at about the 600-mile mark, the figures mysteriously increased to the 12-13 mpg range. The Moleculetor was installed at the 800-mile mark and the good fuel economy figures continued through the remainder of the trip.

Upon return, the original series of mileage tests was performed and the result was a 3 mpg increase.

"Why," we asked Lovegrove, "did the more on page 63"
Moleculetron from page 81

mileage increase before we even installed the Moleculetron? His reply was a question: “Where did you carry the Moleculetron on the first leg of the trip?” “In the rear storage compartment,” was our reply . . . and it was obvious what he would say next—that whatever it is the Moleculetron produces would affect the “energization” of the vehicle even if the fuel is not routed through the device. The Moleculetron, he said, will affect fuel economy simply by being close to the fuel tank.

At this point it became apparent that the device not only will remove warts, it will cure sexual impotency.

Then we went back to the Blazer which showed no improvement in our first test. Initial tests were conducted, the vehicle was driven on a 1,200-mile trip, and comparisons tests were conducted immediately afterward. The result was a 10% improvement, from 13.2 to 14.6 mpg (solo).

Installation on most vehicles is simple. The device is spliced into the fuel line between tank and fuel pump. The company says it should be as close to the tank as possible but our installations were at the fuel pump.

The price of the Moleculetron for RVs was $129.95 when we first discussed testing the device in March. At presstime in May it had been increased to $214.95. The unit for passenger cars was $99.95 and was increased to $139.95. A money-back guarantee is offered within 45 days. The unit may be returned to the dealer for replacement up to one year, if the buyer is unsatisfied with results.

More important than the actual price is how long the device will take to pay for itself. In the case of the Oldsmobile, the 2 mpg improvement would save $182 every 10,000 miles with fuel at $1.30 a gallon. With the Blazer, the savings would be $94 for each 10,000 miles at the same fuel cost, assuming the mileage improvement would occur the same way it did during our tests.

Do our tests and those conducted by Motor Trend mean the Moleculetron works? Your interpretation of the results is about as good as ours. While the results appear to be uniformly positive, the idea that a simple little aluminum tube can produce enough magic to improve fuel economy in vehicles weighing several thousand pounds is not logical.

Possibly we’re looking at the first genuine mileage “miracle.” If so, the volume of test data will have to increase substantially before it’s strong enough to make believers out of us skeptics who have seen too many worthless gas gimmicks. TL.

(Company address: Internal Energy Management Corporation, Box 1425, Del Rio, Texas 78840, or circle Reader Service No. 317; Phone 800/551-1750 except in Oklahoma; phone 800/722-3500 in Oklahoma.)
Attachment E

"Motorhome Life" Article
The Gas Savers: Gimmicks or Godsend?
Although no hard scientific data can be used to explain why the Moleculator is successful, MHL tests reported a substantial increase in mileage.

A rather exhaustive fuel economy test performed by a major automotive testing laboratory (Olson Engineering of Huntington Beach, California) and mentions that a couple of other magazines are involved in testing the device.

On closer examination, the Olson report shows fuel economy increases ranging from 10.32% to 20.30% for two Chevrolet passenger cars and a Dodge half-ton truck.

The device, called the Moleculator, is described by the company as a simple cylinder of aluminum which contains a special energy field (secret) that supposedly changes the molecular structure of the fuel, for more efficient combustion. The energy supposedly is distributed throughout the vehicle by the Moleculator.

The energy supposedly lasts the lifetime of the vehicle, or maybe longer. It wouldn't have surprised us if they also claimed it removed varnish.

But Doug Lovegrove, the Moleculator representative who called on us, is not the usual gadget huckster. He knows automotive theory. Most people selling worthless gimmicks don't even have a clear understanding of how an internal combustion engine operates. Lovegrove has been in the automotive field for more than 30 years, having worked in Chrysler Corporation's racing program several years ago. And he seems quite sincere in his belief that the Moleculator does work.

Lovegrove handles Nevada and Hawaii for the Moleculator distributor, InternaI Energy Management Corporation of Del Rio, Texas. He became interested in Motorhome Life® through Elva Mae Wilson, Nevada state director of the Good Sam Club®, who installed a Moleculator on her motorhome and reported a fuel economy increase from 6.8 to 8.5 mpg.

Elva Mae's fuel economy results are her own, and not connected with any test performed by the club or by TL, or MHL personnel, but she is quite enthusiastic about the benefits of the device.

Of course, most marketers of gas-saving devices are able to come up with a variety of testimonials. Sponsors of the Moleculator have a substantial number. They don't prove anything conclusively for a broad range of vehicles.

Does the Moleculator actually work? It seems to ... and it's rather uncomfortable to say so in absence of a logical explanation. That business about the secret energy field is a bit too much for one's sense of practicality.

In any case, we tested the unit on two vehicles over a period of two months and 3,000 miles. The results were an 18% improvement in a 1978 Oldsmobile station wagon with 350 V-8 engine, and a 10% improvement in a 1978 Chevrolet Blazer with 400 V-8 engine. We're not alone in suggesting that the system may actually work. Motor Trend magazine planned an article to appear in their July issue describing their five tests: Ford Econoline Van, 16.7% improvement; Honda Accord, 5% improvement; Honda Civic, 13.28% improvement; Toyota Land Cruiser, 20.4% improvement; and Datsun 240Z, 7.58% improvement.

Our tests produced interesting results. First, we tested the Blazer by running fuel economy tests, then driving the vehicle 600 miles and performing the tests again. We used a separate fuel container so we could accurately measure the amount of gasoline used. We performed repeat tests to establish margin of error, which usually was around two-tenths of one mile per gallon.

At the end of the 600-mile trip (the company recommends at least two tanks of fuel be used before the Moleculator has its effect), we tested again and the results showed no fuel economy improvement. The news was phoned to Lovegrove. Initially he couldn't come up with a reason for the poor results, but after consulting with company directors it was their opinion that use of the separate fuel container was the reason. The separate container was not "energized" by the Moleculator since it was not permanently carried in the vehicle. Back to the drawing board.

Next, the 1978 Olds was evaluated during initial fuel economy tests in which we simply filled up at a service station — a practice we don't like because the margin of error increases.

The procedure is the one recommended in the beginning article. In this issue — Gas Savers: Chimichanga or Concoction? We fill up at the same pump, park more on page 63.
GADGETS from page 37

In the same position, under the same weather conditions and set the pump’s automatic shut-off nozzle on slow feed. When it shuts off automatically, we hang it up. Repeat tests showed a mileage margin of error of around 1/8 mpg... larger than we normally tolerate.

The plan was to drive about 800 miles to get a feel for on-the-road fuel economy. Install the Moleculator and drive an additional 800 miles back to the departure point, which should be enough distance for the unit to do its “energization” number. Initial mileage figures were in the 10.11 range. Then, at about the 600-mile mark, the figures mysteriously increased to the 12.13 mpg range. The Moleculator was installed at the 800-mile mark and the good fuel economy figures continued through the remainder of the trip.

Upon return, the original series of mileage tests was performed and the result was a 2 mpg increase.

“Why,” we asked Lovegrove, “did the mileage increase before we even installed the Moleculator?” His reply was a question: “Where did you carry the Moleculator on the first leg of the trip?” “In the rear storage compartment,” was our reply... and it was obvious what he would say next—that whatever it is the Moleculator produces would affect the “energization” of the vehicle even if the fuel is not routed through the device. The Moleculator, he said, will affect fuel economy simply by being close to the fuel tank.

At this point it became apparent that the device not only will reduce waste, it will cure sexual impotency.

Then we went back to the Blazer which showed no improvement in our first test. Initial tests were conducted, the vehicle was driven on a 1,200-mile trip, and comparison tests were conducted immediately afterward. The result was a 10% improvement, from 13.2 to 14.6 mpg (real).

Installation on most vehicles is simple. The device is spliced into the fuel line between tank and fuel pump. The company says it should be as close to the tank as possible but our installations were at the fuel pump. Both vehicles utilized vapor return systems so part of the fuel drawn through the device was returned to the tank.

The price of the Moleculator for RVs was $139.95 when we first discussed test...
Attachment F

Statements by Individuals
March 25, 1980

Moleculotor Sales of Nevada
3715 West Twain Avenue
Las Vegas, Nevada 89103

Dear Mr. Lovegrove:

Thank you for conducting a test on our 1978 Winnebago 26ft motor home equipped with a 440 Dodge engine. The results of the test showed an increase from 6.8 miles per gallon to 8.3 miles per gallon, the total amount of increase is 25%.

The fuel crises has become such a problem with RV owners and automobile owners across the country and with these kind of results I am more than satisfied with the product. As Nevada State Director of the Good Sam Club and personally I would recommend this product to any RV or automobile owner.

I look forward to using this product as an instrument to help keep our present status of RV life. This may possibly be the very thing that will keep us rolling into the future.

Best of RVing to Everyone,

With Love,

Nevada State Director

Etha Mae Wilson

Nevada State Director
STATE OF ARIZONA
COUNTY OR PARISH OF MARICOPA

AFFIDAVIT OF

KENNETH M. TAYLOR, having been duly sworn, avers and states as follows:

My name is KENNETH M. TAYLOR, and I am a citizen of the United States of America, domiciled in the State of ARIZONA. I am an employee of the CUMMINS ARIZONA DIESEL INC., which I presently serve in the capacity of SERVICE MANAGER. During the time period indicated by the attached exhibits, I was employed by the same employer as SERVICE MANAGER, my continuous service began on October 19, 1968.

The date set forth in the attached Exhibits I through II inclusive were obtained through standard runs and test runs (i.e., after installation of MOLECULETORS in the fuel lines of the described engines and vehicles) conducted under my supervision and under my control, and such data were obtained and kept in the records of my employer in the usual course of its business. They represent the facts they purport to disclose and summarize. To the best of my knowledge, information and belief, all such data are accurate and trustworthy, and for the vehicles described in the exhibits show an average increase of 14.4% in the mileage performance of such vehicles.

If my initials appear in the following blank (but otherwise I have crossed out the blank), some of the "standard" data of the attached exhibits were obtained otherwise than under my supervision and control, as they extend retroactively to include a period preceding my present employment, but such data were taken from records of my employer made and maintained by my employers in the usual course of its business and to the best of my knowledge, information and belief such data are accurate and trustworthy, and accurately state the facts they purport to set forth:

Kenneth M. Taylor

SUBSCRIBED AND SWORN TO before me, the undersigned officer duly authorized to administer oaths and verify statements by the above named Kenneth M. Taylor.

This 30th day of January, 1968.

My Commission Expires July 31, 1991
July 6, 1979

Mr. Larry Wilkinson
Internal Energy Management Inc.
P.O. Box 1259
League City, Texas 77573

Dear Larry:

Please accept my sincere apology for being so slow in getting this letter to you, but with union contract negotiations and the normal every day "B.S.", time slipped away very rapidly.

Cummins Arizona Diesel, Inc. was very happy to have the opportunity to run the fuel moleculator tests with your company. I have enclosed several copies of the dyno report which shows the fuel rate with and without the fuel moleculator involved. As you can see from the report, none of the readings varied a great amount except for the fuel rate which dropped an average of 24 lbs. per hour or approximately 14.4%.

As per our agreement, the dyno report shows the tests exactly as they were performed but, please remember that this is not an endorsement of the product by Cummins Engine Company or Cummins Arizona Diesel, Inc.

Again, it was our pleasure to be involved in the tests and if we can be of any further assistance, please don’t hesitate to call at any time.

Very truly yours,

CUMMINS ARIZONA DIESEL, INC.

Kenneth M. Taylor
General Service Manager

KMT/ck
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STATE OF ARIZONA
COUNTY OR PARISH OF MARICOPA

AFFIDAVIT OF ERNEST H. McINTYRE

, having been duly sworn, avers and states as follows:

My name is ERNEST H. McINTYRE, and I am a citizen of the United States of America, domiciled in the State of ARIZONA. I am an employee of The TANNER COMPANIES, which I presently serve in the capacity of ASS'N VICE PRESIDENT. During the time period indicated by the attached exhibits, I was employed by the same employer as Fleet Supervisor, my continuous service began on December 1, 1949.

The date set forth in the attached Exhibits 1 through 18 inclusive were obtained through standard runs and test runs (i.e., after installation of MOLECULETOR energizers in the fuel lines of the described engines and vehicles) conducted under my supervision and control, and such data were obtained and kept in the records of my employer in the usual course of its business. They represent the facts they purport to disclose and summarize. To the best of my knowledge, information and belief, all such data are accurate and trustworthy, and for the 18 vehicles described in the exhibits show an average increase of 13.5 % in the mileage performance of such vehicles.

If my initials appear in the following blank (but otherwise I have crossed out the blank), some of the "standard" data of the attached exhibits were obtained otherwise than under my supervision and control, as they extend retroactively to include a period preceding my present employment, but such data were taken from records of my employer made and maintained by my employers in the usual course of its business and to the best of my knowledge, information and belief such data are accurate and trustworthy, and accurately state the facts they purport to set forth.

[Signature]

SUBSCRIBED AND SWORN TO before me, the undersigned officer duly authorized to administer oaths and verify statements by the above named , at this 19th day of January, 1980.

[Signature]

My Commission Expires Sept. 12, 1982
1. Run Used for Standard
   
   1. Basic Vehicle Description (Mfg., year, model, VIN, total miles, weight including engine, etc.) TRUCK NO. 43-581
   TOTAL MILES - 168,173, WEIGHT - 16,300

   2. Engine Description (Mfg., year, model, S.N., original or replacement and year if a replacement, total mileage, type, fuel, etc.)
   MFG. - Cum., YEAR - 1978, MODEL - NTB290.
   S.N. - 10068576, TOTAL MILES - 168,173.
   FUEL - NO. 2 DIESEL

   3. Load Description:
   A. If carried in above vehicle (no trailer), general description plus gross weight (vehicle plus load):

   B. (1) If load is a towed vehicle, description of trailer (Mfg., model, year, number of wheels, weight without cargo, etc.)
   MFG. - Challenger.
   MODEL - BODON 'DUNP, YEAR - 1977, NO. WHEELS - 13,
   EMPTY WEIGHT - 11,500

   B. (2) For towed vehicle, gross weight of trailer plus pulling vehicle, with cargo:
   AVERAGE GW - 86,000

   4. General Description of Standard Run
   (Starting point, finish point, general weather conditions, general traffic conditions, etc.)
   STARTING POINT - PHOENIX TO YUMA AND ENDING IN
   PHOENIX, GENERAL WEATHER - FAIR, GENERAL TRAFFIC LIGHT TO MEDIUM

   5. Miles for Standard Run
   Final odometer reading 100674 miles
   Starting odometer reading 90031 miles
   Net Travel 10,633 miles
6. Inclusive Dates of Standard Run
   Starting date: 11-1 1978
   Finish date: 11-30 1978

7. Fuel Consumption For Standard Run
   (Number of gallons used, plus statement of how measured, whether by filling pump meter at start and finish, or other)
   2411.8 gallons
   by FILLED BY PUMP METER AT SAME LOCATION DURING TEST PERIOD

8. Calculated Rate of Consumption for Standard Run
   Net miles traveled (5 above) 4.5 miles
   Gal fuel used (7 above) 4.5 gal.

II. Test Run After Installation of MOLECULETOR Energizer in Fuel Line of Engine Vehicle (as described in Part I. above)
   1. Basic Vehicle, changes (any significant differences, including increase, in total miles, from Standard Run; if none, please so state)
      NONE

   2. Engine description changes (any significant difference, including miles; Please state "none" if there are none.)  NONE

   3. Load description, changes:
      A. No Trailer: (Any significant difference in type, load and gross weight. State gross weight regardless, plus "none" if there are no significant differences)
         NONE
      B. (1) Towed Vehicle (Any significant differences other than weight, stating "none" if applicable)
         NONE
      B. (2) Gross weight of trailer with cargo and pulling vehicle
         56,000 GVW
4. General description of Test Run (Can state "Same as Standard Run" if this is correct. Otherwise include starting point, finish point, general weather conditions, general traffic conditions, etc.)

SAME

5. Miles for Test Run:
Final odometer reading: 111,639 miles
Starting odometer reading: 101,317 miles
Net Travel: 10,322 miles

6. Inclusive Dates of Test Run:
Starting date: 12-1 1978
Finish date: 12-30 1978

7. Fuel Consumption for Test Run:
(Number of gallons, plus statement of how measured, whether by filling pump meter at start and finish, or other method):

GALLONS USED = 1,892.2
FILLED WITH PUMP METER AT SAME LOCATION DURING TEST PERIOD

8. Calculated Rate of Consumption for Test Run:
Net miles traveled (5 above) = 5.4 miles
Gal. fuel used (7 above) = 6.4 gal.

9. Calculated Benefit Obtained by Adding MOLLELCULTOR to Engine:
5.4 Miles with energizer (P IX, S 8) Miles standard (P I, S 8)
Benefit = 

4.6 Miles gal.

5.4 Miles increase
4.6 Miles standard = 0.9 = 0.20 gal.

Exh. 8, P. 3 of 3
EXHIBIT 1 TO 10

AFFIDAVIT OF BEST-WAY TRANSPORTATION INC.

1. Run Used for Standard
   1. Basic Vehicle Description (Mfg., year, model, VIN, total miles, weight including engine, etc.) TRUCK NO. 501
      MFG. - I.H.C., YEAR - 1978, MODEL - CD4070
      VIN. - E2317GA18110, MILES - 142,361, WEIGHT - 10,000

   2. Engine Description (Mfg., year, model, S.N., original or replacement and year if a replacement, total mileage, type, fuel, etc.)
      MFG. - DETROIT, YEAR - 1978, MODEL - 6V92TTA
      MILEAGE - 142,361, FUEL TYPE - DIESEL

3. Load Description:
   A. If carried in above vehicle (no trailer), general description plus gross weight (vehicle plus load):

   B. (1) If load is a towed vehicle, description of trailer (Mfg., model, year, number of wheels, weight without cargo, etc.)
      MFG. - TRAILMOBILE
      MODEL - 27 FT. DRY VAN, YEAR - 1978, NO. WHEELS -
      WEIGHT - 7,000

   B. (2) For towed vehicle, gross weight of trailer plus pulling vehicle, with cargo: 78,000 GVW

4. General Description of Standard Run
   (Starting point, finish point, general weather conditions, general traffic conditions, etc.)
   PHOENIX TO LOS ANGELES, BACK TO PHOENIX, WEATHER - GOOD, TRAFFIC - MEDIUM

5. Miles for Standard Run
   Final odometer reading 102611 miles
   Starting odometer reading 92361 miles
   Net Travel 20250 miles

P. 1 of 1
6. Inclusive Dates of Standard Run
Starting Date: 7 - 1 1979
Finish date: 8 - 30 1979

7. Fuel Consumption For Standard Run
(Number of gallons used, plus statement of how measured, whether by filling pump meter at start and finish, or other): 3,894.2 gallons
by FILLED IN YARD BY METERED PUMP

8. Calculated Rate of Consumption for Standard Run
Net miles traveled (5 above) = 5.2 miles
gal fuel used (7 above) gal.

II. Test Run After Installation of MOLECULETOR Energizer in Fuel Line of Engine Vehicle (as described in Part I above)

1. Basic Vehicle, changes (any significant differences, including increase, in total miles, from Standard Run; if none, please so state)
   NONE

2. Engine description changes (any significant difference, including miles; Please state "none" if there are none.) NONE

3. Load description, changes:
   A. No Trailer (Any significant difference in type, load and gross weight. State gross weight regardless, plus "none" if there are no significant differences)
      NONE
   B. (1) Towed Vehicle (Any significant differences other than weight, stating "none" if applicable)
      NONE
   B. (2) Gross weight of trailer with cargo and pulling vehicle 78,000 GVW
4. General description of Test Run (Can state "Same as Standard Run" if this is correct. Otherwise include starting point, finish point, general weather conditions, general traffic conditions, etc.) ____________

SAME

5. Miles for Test Run:

Final odometer reading: 121066 miles
Starting odometer reading: 102618 miles
Net Travel 18350 miles

6. Inclusive Dates of Test Run:

Starting date: 9-1 1979
Finish date: 10-30 1979

7. Fuel Consumption for Test Run:

(Number of gallons, plus statement of how measured, whether by filling pump meter at start and finish, or other method): NO. GALLONS 3,071.4

FILLED SAME AS BASE TEST

8. Calculated Rate of Consumption for Test Run:

Net miles traveled (5 above) = 6.3 miles
Gal. fuel used (7 above) = 6.3 gal.

III. Calculated Benefit Obtained by Adding MOLECULTOR
to Engine:

6.3 Miles with energizer (P II, S 8) 5.2 Miles standard (P I, S 8)
gal.

Benefit = ---------------

6.3 Miles increase
5.2 Miles standard

Exh. 1, P. 3 of 3
EXHIBIT 1 TO 10

AFFIDAVIT OF BEST-WAY TRANSPORTATION INC.

I. Run Used for Standard

1. Basic Vehicle Description (Mfg., year, model, VIN, total miles, weight including engine, etc.) TRUCK NO. 501
   MFG. - I.H.C., YEAR - 1978, MODEL - C04070
   VIN. - E2317HGA18110, MILES - 142,361, WEIGHT - 10,000

2. Engine Description (Mfg., year, model, S.N., original or replacement and year if a replacement, total mileage, type, fuel, etc.)
   MFG. - DETROIT, YEAR - 1978, MODEL - 8V92TTA
   MILEAGE - 142,361, FUEL TYPE - DIESEL

3. Load Description:
   A. If carried in above vehicle (no trailer), general description plus gross weight (vehicle plus load):

   B. (1) If load is a towed vehicle, description of trailer (Mfg., model, year, number of wheels, weight without cargo, etc.)
   MFG. - TRAILMOBILE
   MODEL - 27 FT. DRY VAN, YEAR - 1978, NO. WHEELS - 4
   WEIGHT - 7,000

B. (2) For towed vehicle, gross weight of trailer plus pulling vehicle, with cargo: 38,000 G.W.

4. General Description of Standard Run
   (Starting point, finish point, general weather conditions, general traffic conditions, etc.)
   PHOENIX TO LOS ANGELES, BACK TO PHOENIX, WEATHER - GOOD, TRAFFIC - MEDIUM

5. Miles for Standard Run
   Final odometer reading 102611 miles
   Starting odometer reading 82361 miles
   Net Travel 20250 miles
6. Inclusive Dates of Standard Run

Starting Date: 85 7-1
Finish Date: 8-30

7. Fuel Consumption For Standard Run

(Number of gallons used, plus statement of how measured, whether by filling pump meter at start and finish, or other)

3,604.2 gallons

by Filled in Yard By Metered Pump

8. Calculated Rate of Consumption for Standard Run

Not miles traveled (5 above) = 8.2 miles
gal fuel used (7 above) = 8.2 gal.

II. Test Run After Installation of MOLECULATOR Energizer in Fuel Line of Engine Vehicle (as described in Part I above)

1. Basic Vehicle changes (any significant differences, including increase, in total miles, from Standard Run; if none, please so state)

NONE

2. Engine description changes (any significant difference, including miles; Please state "none" if there are none.)

NONE

3. Load description, changes:

A. No Trailer: (Any significant difference in type, load and gross weight. State gross weight regardless, plus "none" if there are no significant differences)

NONE

B. (1) Towed Vehicle (Any significant differences other than weight, stating "none" if applicable)

NONE

B. (2) Gross weight of trailer with cargo and pulling vehicle: 78,000 GVWR
4. General description of Test Run (Can state "Same as Standard Run" if this is correct. Otherwise include starting point, finish point, general weather conditions, general traffic conditions, etc.)

SAME

5. Miles for Test Run:

Final odometer reading: 121668 miles
Starting odometer reading: 102618 miles
Net Travel: 19350 miles

6. Inclusive Dates of Test Run:

Starting date: 9-1, 1979
Finish date: 10-30, 1979

7. Fuel Consumption for Test Run:

(Number of gallons, plus statement of how measured, whether by filling pump meter at start and finish, or other method) NO. GALLONS = 3.0714

FILLED SAME AS BASE TEST

8. Calculated Rate of Consumption for Test Run:

Net miles traveled (5 above) = 6.3 miles
Gal. Fuel used (7 above) = 6.3 gal.

III. Calculated Benefit Obtained by Adding MOLECULTOR to Engine:

6.3 Miles with energizer (P II, § 8) miles standard (P I, § 8

Benefit = 5.2

5.2 Miles standard = 6.3

Miles Increase = 1.1
5.2 Gal. standard = 0. = 21.1

Exh. 3. P. 3 of 3
STATE OF ARIZONA
COUNTY OR PARISH OF MARICOPA

AFFIDAVIT OF

CARL ETTER, having been duly sworn, avers and states as follows:

My name is CARL ETTER, and I am a citizen of the United States of America, domiciled in the State of ARIZONA. I am an employee of the BEST-WAY TRANSPORTATION Co., which I presently serve in the capacity of MAINTENANCE SUPERVISOR. During the time period indicated by the attached exhibits, I was employed by the same employer as MAINTENANCE SUPERVISOR, my continuous service began on September 1974.

The dates set forth in the attached exhibits through inclusive were obtained through standard runs and test runs (i.e., after installation of MOLECULETOR energizers in the fuel lines of the described engines and vehicles) conducted under my supervision and under my control, and such data were obtained and kept in the records of my employer in the usual course of its business. They represent the facts they purport to disclose and summarize. To the best of my knowledge, information and belief, all such data are accurate and trustworthy, and for the vehicles described in the exhibits show an average increase of 19.3% in the mileage performance of such vehicles.

If my initials appear in the following blank, (but otherwise I have crossed out the blank), some of the "standard" data of the attached exhibits were obtained otherwise than under my supervision and control, as they extend retroactively to include a period preceding my present employment, but such data were taken from records of my employer made and maintained by my employers in the usual course of its business and to the best of my knowledge, information and belief such data are accurate and trustworthy, and accurately state the facts they purport to set forth:

[Signature]

SUBSCRIBED AND SWORN TO before me, the undersigned officer duly authorized to administer oaths and verify statements by the above named CARL ETTER, at this 27 day of January, 1978.

[Signature]

My Commission Expires Aug 20, 1982
EXHIBIT 2 to 10

AFFIDAVIT OF BEST-WAY TRANSPORTATION INC.

1. Run Used for Standard

1. Basic Vehicle Description (Mfg., year, model, VIN, total miles, weight including engine, etc.) TRUCK NO. 603
MFG. - I.H.C., YEAR - 1978, MODEL - C04070, VIN.
E2317HGA18113, MILES - 137088, WEIGHT - 10,000

2. Engine Description (Mfg., year, model, S.N., original or replacement and year if a replacement, total mileage, type, fuel) etc.)
MFG. - DETROIT, YEAR - 1978, MODEL, SVDRTA
MILEAGE - 137088, FUEL TYPE - DIESEL

3. Load Description:

A. If carried in above vehicle (no trailer), general description plus gross weight (vehicle plus load):

B. (1) If load is a towed vehicle, description of trailer (Mfg., model, year, number of wheels, weight without cargo, etc.) MFG. - TRAILMOBILE, MODEL - 27 FT. DRY VAN, YEAR - 1979, NO. WHEELS - 4, WEIGHT - 7,000

B. (2) For towed vehicle, gross weight of trailer plus pulling vehicle, with cargo: 48,600 GWM

4. General Description of Standard Run (Starting point, finish point, general weather conditions, general traffic conditions, etc.)
PHOENIX TO LOS ANGELES, BACK TO PHOENIX, WEATHER - GOOD, TRAFFIC - MEDIUM

5. Miles for Standard Run
Final odometer reading 55555 miles
Starting odometer reading 74572 miles
Net Travel 20686 miles

P. 1 of 3
6. Inclusive Dates of Standard Run
Starting Date: 7-1-1979
Finish Date: 8-30-1979

7. Fuel Consumption for Standard Run
(Number of gallons used, plus statement of how measured, whether by filling pump meter at start and finish, or other):

4,221.6 gallons
by Filled in Yard by Metered Pump

8. Calculated Rate of Consumption for Standard Run
Net miles traveled (5 above) = 4.5 miles
gal fuel used (7 above) = 4.8 gal.

II. Test Run After Installation of MOLECULATOR
Energizer in Fuel Line of Engine Vehicle (as described in Part I above)

1. Basic Vehicle changes (any significant differences, including increase, in total miles, from Standard Run; if none, please so state)
NONE

2. Engine description changes (any significant difference, including miles; please state “none” if there are none)
NONE

3. Load description changes:
A. No Trailer: (Any significant difference in type, load and gross weight. State gross weight regardless, plus “none” if there are no significant differences)
NONE

B. (1) Towed Vehicle (Any significant differences other than weight, stating “none” if applicable)
NONE

B. (2) Gross weight of trailer with cargo and pulling vehicle: 78,000 GW
4. General description of Test Run (Can state "Same as Standard Run" if this is correct. Otherwise include starting point, finish point, general weather conditions, general traffic conditions, etc.)

SAME

5. Miles for Test Run:
Final odometer reading: 116655 miles
Starting odometer reading: 95569 miles
Net Travel 21086 miles

6. Inclusive Dates of Test Run:
Starting Date: 9-1 1979
Finish Date: 10-30 1979

7. Fuel Consumption for Test Run:
(Number of gallons, plus statement of how measured, whether by filling pump meter at start and finish, or other method) NO. GALLONS = 3,573.9

8. Calculated Rate of Consumption for Test Run:
Net miles traveled (5 above) 116655 miles
Gal. fuel used (7 above) 5.9 gal.

III. Calculated Benefit Obtained by Adding MOLECULOR to Engine:

5.9 Miles with energizer (P II, S 8) 4.9 Miles standard (P I, S 8)

\[
\text{Benefit} = \frac{5.9 \text{ miles}}{4.9 \text{ gal.}} = \frac{4.9 \text{ miles}}{4.9 \text{ gal.}} = 1.0 \quad \text{increase} = 0.1 \times 20.4
\]

Exh. 3 of 3
EXHIBIT 7 TO 10

AFFIDAVIT OF BEST-WAY TRANSPORTATION INC.

I. Run Used for Standard

1. Basic Vehicle Description (Mfg., year, model, VIN, total miles, weight including engine, etc.) TRUCK NO. 183
   MFG. - I.H.C., YEAR - 1972, MODEL - CO4070, VIN - 224714034515, MILES - 300789, WEIGHT - 10,000

2. Engine Description (Mfg., year, model, S.N., original or replacement and year if a replacement, total mileage, type, fuel, etc.)
   MFG. - CAT., YEAR - 1972, MODEL - 1874
   MILEAGE 300789, FUEL TYPE - DIESEL

3. Load Description:
   A. If carried in above vehicle (no trailer), general description plus gross weight (vehicle plus load):

   B. (1) If load is a towed vehicle, description of trailer (Mfg., model, year, number of wheels, weight without cargo, etc.)
       MFG. - TRAILMOBILE, MODEL - 27 FT. DRY VAN, YEAR - 1979, NO. WHEELS - 4, WEIGHT - 7,000

   B. (2) For towed vehicle, gross weight of trailer plus pulling vehicle, with cargo: 78,000 GVW

4. General Description of Standard Run
   (Starting point, finish point, general, weather conditions, general traffic conditions, etc.)
   GENERAL LOCAL ROUTE IN PHOENIX

5. Miles for Standard Run
   Final odometer reading 285331 miles
   Starting odometer reading 260380 miles
   Net Travel 5841 miles
6. Inclusive Dates of Standard Run

Starting Date: 7-1 1979
Finish date: 8-30 1979

7. Fuel Consumption for Standard Run
(Number of gallons used, plus statement of how measured, whether by filling pump meter at start and finish, or other):

1,381.5 gallons
by Filled in yard by metered pump

8. Calculated Rate of Consumption for Standard Run

Net miles traveled (6 above) 41 miles
Gal fuel used (7 above) 4.1 gal.

9. Test Run After Installation of Moleculestor

Energizer in fuel line of engine vehicle (as described in Part I above)

1. Basic vehicle changes (any significant differences, including increase, in total miles, from standard run; if none, please so state):
NONE

2. Engine description changes (any significant difference, including miles; please state "none" if there are none):
NONE

3. Load description changes:
A. No trailer: (Any significant difference in type, load and gross weight. State gross weight regardless, plus "none" if there are no significant differences)
NONE

B. (1) Towed vehicle (Any significant differences other than weight, stating "none" if applicable)
NONE

B. (2) Gross weight of trailer with cargo and pulling vehicle: 78,000 GVW

Exh. 7-2 of 3
4. General description of Test Run (can state "Same as Standard Run" if this is correct. Otherwise include starting point, finish point, general weather conditions, general traffic conditions, etc.)

SAME

5. Miles for Test Run:
Final odometer reading: 291682 miles
Starting odometer reading: 288044 miles
Net Travel: 3718 miles

6. Inclusive Dates of Test Run:
Starting date: 9-1 1979
Finish date: 10-30 1979

7. Fuel Consumption for Test Run:
(Number of gallons, plus statement of how measured, whether by filling pump meter at start and finish, or other method):
NO. GALLONS = 1,058.9
FILLED SAME AS BASE TEST

8. Calculated Rate of Consumption for Test Run:
Net miles traveled (5 above) = 5,464 miles
Gal. fuel used (7 above) = 5.4 gal.

IX. Calculated Benefit Obtained by Adding NOLLCEUTOR to Engine:

5.4 Miles /gal. with energizer (P X, 8 8) Miles /gal. standard (P X, 8 8)
Benefit =

4.1 Miles /gal. Standard

5.4 Miles /gal. Increase

4.1 Miles /gal. standard = 1.3 = 0.0 = 31.7

Exh. 7, p. 3 of 3
Exhibit 5 to 10

Affidavit of Best-Way Transportation Inc.

1. Run Used for Standard

   1. Basic Vehicle Description (Mfg., year, model, VIN, total miles, weight including engine, etc.) TRUCK NO. 507
   
   MFG. - I.H.C., YEAR - 1978, MODEL - CO470, VIN - E2317JGA10483, MILES 87189, WEIGHT - 10,000

   2. Engine Description (Mfg., year, model, S.N., original or replacement and year if a replacement, total mileage, type, fuel, etc.)
   
   MFG. - CUM., YEAR - 1978, MODEL - FORMULA 350, MILEAGE - 87189, FUEL TYPE - DIESEL

2. Load Description:

   A. If carried in above vehicle (no trailer), general description plus gross weight (vehicle plus load):

   B. (1) If load is a towed vehicle, description of trailer (Mfg., model, year, number of wheels, weight without cargo, etc.) MFG. - TRAILMOBILE, MODEL - 27 FT. DRY VAN, YEAR - 1979, NO. WHEELS -

   4. WEIGHT - 7,000

   B. (2) For towed vehicle, gross weight of trailer plus pulling vehicle, with cargo: 78,000 GVW

3. General Description of Standard Run

(Starting point, finish point, general weather conditions, general traffic conditions, etc.)

PHOENIX TO LOS ANGELES, BACK TO PHOENIX, WEATHER - GOOD, TRAFFIC - MEDIUM

4. Miles for Standard Run

Final odometer reading 32730 miles
Starting odometer reading 22874 miles
Not Travel 19856 miles
6. Inclusive Dates of Standard Run
Starting Date: 7-1-79
Finish Date: 8-30-79

7. Fuel Consumption For Standard Run
(Number of gallons used, plus statement of how measured, whether by filling pump meter at start and finish, or other):

4,316.5 gallons
by Filled in yard at metered pump

8. Calculated Rate of Consumption for Standard Run

Not miles traveled (5 above) 4.6 miles
Gal fuel used (7 above) 4.6 gal.

X. Test Run After Installation of MOLECULETOR Energizer in Fuel Line of Engine Vehicle (as described in Part I above)

1. Basic Vehicle, changes (any significant differences, including increase, in total miles, from Standard Run; if none, please so state)

NONE

2. Engine description changes (any significant difference, including miles; please state "none" if there are none.)

NONE

3. Load description, changes:
A. No Trailer: (Any significant difference in type, load and gross weight. State gross weight in place, plus "none" if there are no significant differences)

NONE

B. (1) Towed Vehicle: (Any significant differences other than weight, stating "none" if applicable)

NONE

B. (2) Gross weight of trailer with cargo and pulling vehicle: 78,000 GWW
4. General description of Test Run (Can state "Same as Standard Run" if this is correct. Otherwise include starting point, finish point, general weather conditions, general traffic conditions, etc.)

SAME

5. Miles for Test Run:
Final odometer reading: 79536 miles
Starting odometer reading: 53180 miles
Net Travel 20356 miles

6. Inclusive Dates of Test Run:
Starting date: 5-1 19 79
Finish date: 10-30 19 79

7. Fuel Consumption for Test Run:
(Number of gallons, plus statement of how measured, whether by filling pump meter at start and finish, or other method): NO. GALLONS = 3,450.1

FILLED SAME AS BASE TEST

8. Calculated Rate of Consumption for Test Run:
Net miles traveled (5 above) 5.9 miles
Gal. fuel used (7 above) 5.9 gal.

III. Calculated Benefit Obtained by Adding NO-DECULATOR to Engine:
5.9 Miles with energizer (P II, S 6) 4.6 Miles Standard (P I, S 6)
Benefit = 1.3

5.9 Miles increase
4.6 Miles standard 1.3 0 28.3

Exh. 5, P. 3 of 3
Attachment G

TEB Report
"The Effects of the Moleculotor Fuel Energizer on Emissions and Fuel Economy"
The Effects of the Moleculetor
Fuel Energizer on Emissions
and Fuel Economy

by
Gary T. Jones

May 1981

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

This paper describes a program designed to evaluate the effects of the Moleculotor Fuel Energizer on exhaust emissions and fuel economy. Three late model passenger cars were subjected to a series of test sequences both before and after installation of the device. Each test sequence included the current Federal Test Procedure (for exhaust emissions only) and the Highway Fuel Economy Test. Test vehicles were selected on the basis of high sales volume and were set to manufacturer's specifications before entering the program.

Based on the results of this testing, there is no reason to believe that the Moleculotor conclusively had an effect on the fuel economy and emission levels of the test vehicles. The changes that were shown were quite small and were not inconsistent with trends found by EPA on other fleets of test vehicles which were subjected to mileage accumulation.
Background

The Environmental Protection Agency receives information about many devices which appear to offer potential for emissions reduction and/or fuel economy improvement on conventional engines and vehicles. EPA invites developers of such devices to apply for a "Section 511 Evaluation". Section 511 of the Motor Vehicle Information and Cost Savings Act (15 U.S.C. 2011) requires EPA to evaluate fuel economy retrofit devices with regard to both emissions and fuel economy, and to publish the results in the Federal Register. The applicant must provide complete technical data on the device, principles of operation, and results of emissions and fuel economy tests. Should the application indicate that the device shows promise, confirmatory testing will be conducted by the EPA at its Motor Vehicle Emission Laboratory in Ann Arbor, Michigan. The results of such test projects are set forth in a series of reports by the Test and Evaluation Branch.

EPA received a 511 application, dated March 24, 1980, from Energy Efficiencies, Inc. (EEI) to perform an evaluation of their Fuel Energizer Moleculeator (hereafter referred to as Moleculeator). The Moleculeator is a cylinder of aluminum approximately 1.5 inches in diameter. Several models in different lengths are offered for various applications. There is a hole drilled length-wise through the center with a brass fitting on each end. The Moleculeator is installed into the fuel line between the fuel tank and fuel pump. According to the instructions, the installation takes 15 to 20 minutes once the proper location has been found. The manufacturer claims that the aluminum serves as a container for an induced "energy field". The energy field supposedly changes the molecular structure of the fuel as it passes through the device and causes it to burn more efficiently. According to the manufacturer, maximum efficiency is reached after 500 miles of driving. According to advertisements for the Moleculeator, fuel economy improvements from 10% to 23% can be expected. In the 511 application, it was stated that significant emission reductions were displayed by all cars that were tested for their support data. No claims were made on changes in driveability. EEI supplied two reports by Olson Engineering, Inc. as the main body of their support data. Also supplied were three magazine articles, and testimonials by individuals describing their experience with the Moleculeator.

Purpose of EPA Program

The purpose of this program was to evaluate the effects of the Moleculeator on fuel economy and regulated emissions. Judging from the preliminary examination of the device itself, the claims concerning the ease of installation and the lack of required maintenance seem to be correct. The claim that vehicle safety would not be affected also seems correct as long as the device was installed properly. Thus, these aspects of the device were not part of the EPA test program.
Test Plan

The following test plan was developed to address the claims made for the Moleculetor.

1. Identify and obtain three test vehicles - Typical, current in-use passenger cars were sought. Only vehicles with between 10,000 and 20,000 miles were to be obtained. The original candidates were Chavette, Citation, Fairmont, Cutlass, and Omni.

2. Conduct underhood inspection and perform minor adjustments - These checks and adjustments were to ensure that the cars were operating in accordance with the manufacturer's tune-up specifications.

3. Perform first Road Route sequence - The first sequence was to consist of a mileage accumulation route, approximately 130 miles in length. Since the test vehicle would be a rental car of unknown prior use, this sequence would assure that each vehicle was reasonably preconditioned.

4. Perform dynamometer test sequences - This sequence was to include the Federal Test Procedure (exhaust emissions only) and the Highway Fuel Economy Test. They were to be performed at least twice at each test point or as many times as necessary to obtain stable results. Values for HC, CO, CO₂, NOx and fuel economy were to be measured.

5. Install Moleculetor - This was to be performed once all baseline testing was complete.

6. Perform second Road Route sequence - This sequence was to consist of four mileage accumulation routes, totaling over 500 miles. This amount of mileage was specified by the Applicant to be necessary for full "energization" of the vehicle.

7. Perform dynamometer test sequence with Moleculetor - This was to be performed in the same manner as that in Step 4.

8. Assemble results and complete report.

This test plan was submitted to and approved by HEI. At this time, they also appointed a representative to oversee the test program and provide technical assistance. The test vehicles were then procured from local rental agencies. They were as follows:

A 1979 Chevrolet Chavette with a 1.6 liter four cylinder engine, two barrel carburetor, and an automatic transmission.

A 1980 Chevrolet Citation with a 2.8 liter six cylinder engine, two barrel carburetor, and an automatic transmission.
A 1980 Ford Fairmont with a 3.3 liter six cylinder engine, one barrel carburetor, and an automatic transmission.

These test vehicles were selected on the basis of sales. They represented the top three domestic nameplates in registrations for 1980. Even though the Chevrolet Chevette was a 1979 model, its ranking in sales was similar to the 1980 models.

There were four mileage accumulation road routes used in this program that ranged from 127 miles to 153 miles in length. Each required 3 to 3 1/2 hours for an average speed of approximately 45 mph. They were developed and used in earlier EPA programs. They consist of mostly two lane rural roads, but all have some highway and city type driving. A description of the road routes is attached in Appendix A.

The dynamometer testing was conducted according to the Federal Test Procedure (FTP) described in the Federal Register of June 28, 1977 and the Highway Fuel Economy Test (HFET) described in the Federal Register of September 10, 1977.

Conduct of the Test Program

The time interval for the dynamometer testing portion of this program ran from November, 1980 to March, 1981. This was longer than originally planned because numerous delays prolonged the program. After successful underhood inspections were performed on the test vehicles the first road route sequence was performed without incident. Following this the baseline testing began. Although the Chevette and Citation completed this phase without problems, the Fairmont displayed an apparent erratic malfunction in the charging system. The alternator warning light would blink off and on intermittently during the baseline tests. Nothing was done to correct the problem at that time. Finally, after installation of the Moleculator, the charging system completely failed during the second road route mileage accumulation sequence. The Fairmont was towed back to the laboratory and the malfunction was traced to the voltage regulator. After the installation of a new regulator, the Fairmont continued mileage accumulation. The decision at this time was to continue testing on the Fairmont even though changes to the vehicle had been made. The vehicle could not be re-baselined because the Moleculator had already been installed. According to the manufacturer's claim, this energizes the entire fuel system and takes 56 days to de-energize after removal. The other two vehicles completed the road route sequences without incident.

Upon beginning the second series of dynamometer tests, the Fairmont began to display erratic test results. After the dynamometer testing was completed, the decision was made to acquire an identical Fairmont to replace the original one. A replacement Fairmont was obtained, but proved to be somewhat erratic in its baseline data. Six sequences were run before an acceptable baseline was established. The replacement Fairmont then completed the rest of the test procedure. Because of the problems encountered with the original Fairmont, it was decided to perform further testing after the removal of the Moleculator. The results obtained from this vehicle are not included in the averages. However, all individual data generated from this and the other test vehicles can be found in Appendix B.
There was one additional change in the original test plan. Rather than conducting the program using commercial fuel, Indolene Clear was used. This fuel is used throughout EPA and the automotive industry as the standard for emissions and fuel economy testing. Its specifications are well established and tightly controlled. The use of commercial gasoline would have required drum storage or frequent purchases from local gas stations. The former situation was discouraged on the basis of safety while the latter was unacceptable because of the variability in fuel properties and quality. These reasons for the fuel change in the original test plan were approved by EHI. Most other test variables were also minimized through the use of the same driver for each car and the same test cell throughout the program.

**Test Results**

Shown in Table 1 are the average baseline and "Moleculotor installed" FTP emission and fuel economy results for the test vehicles.

<table>
<thead>
<tr>
<th>Vehicle</th>
<th>Test</th>
<th>Number of Tests</th>
<th>HC</th>
<th>CO</th>
<th>CO₂</th>
<th>NOₓ</th>
<th>MFG</th>
</tr>
</thead>
<tbody>
<tr>
<td>Citation</td>
<td>Baseline</td>
<td>2</td>
<td>.47</td>
<td>4.00</td>
<td>427</td>
<td>1.55</td>
<td>20.40</td>
</tr>
<tr>
<td></td>
<td>Moleculotor</td>
<td>2</td>
<td>.44</td>
<td>3.64</td>
<td>417</td>
<td>1.74</td>
<td>20.95</td>
</tr>
<tr>
<td>Chevette</td>
<td>Baseline</td>
<td>3</td>
<td>.60</td>
<td>6.20</td>
<td>348</td>
<td>1.50</td>
<td>24.70</td>
</tr>
<tr>
<td></td>
<td>Moleculotor</td>
<td>3</td>
<td>.66</td>
<td>7.17</td>
<td>352</td>
<td>1.48</td>
<td>24.27</td>
</tr>
<tr>
<td>Fairmont</td>
<td>Baseline</td>
<td>6</td>
<td>.59</td>
<td>6.23</td>
<td>460</td>
<td>1.73</td>
<td>18.80</td>
</tr>
<tr>
<td></td>
<td>Moleculotor</td>
<td>5</td>
<td>.61</td>
<td>6.42</td>
<td>443</td>
<td>2.02</td>
<td>19.50</td>
</tr>
</tbody>
</table>

As these results show, there were slight variances in the fuel economy data. The Citation displayed a 3% increase, the Chevette a 2% decrease, and the Fairmont a 4% increase. Overall, this amounts to approximately a 2% average improvement. Typically, test-to-test variability in fuel economy measurements for "back-to-back" testing is in the range of 1-3%. This range can be expected to expand slightly due to equipment and vehicle changes if time or mileage occurs between the tests as required in this evaluation program. Thus, when test variability is taken into account, these changes are negligible. The emission levels also remained fairly stable with the exception of NOₓ on the Fairmont which increased 17%.
Table 2 displays the average HFET emission and fuel economy results.

Table 2
Average HFET Emissions and Fuel Economy
(Emission values in grams/mile)

<table>
<thead>
<tr>
<th>Vehicle</th>
<th>Test</th>
<th>Number of Tests</th>
<th>HC</th>
<th>CO</th>
<th>CO2</th>
<th>NOx</th>
<th>MPG</th>
</tr>
</thead>
<tbody>
<tr>
<td>Citation</td>
<td>Baseline</td>
<td>2</td>
<td>.11</td>
<td>.49</td>
<td>299</td>
<td>1.50</td>
<td>29.55</td>
</tr>
<tr>
<td></td>
<td>Moleculet</td>
<td>3</td>
<td>.10</td>
<td>.56</td>
<td>284</td>
<td>1.49</td>
<td>31.10</td>
</tr>
<tr>
<td>Chevette</td>
<td>Baseline</td>
<td>3</td>
<td>.13</td>
<td>.57</td>
<td>274</td>
<td>1.75</td>
<td>32.20</td>
</tr>
<tr>
<td></td>
<td>Moleculet</td>
<td>2</td>
<td>.12</td>
<td>.50</td>
<td>278</td>
<td>1.75</td>
<td>31.85</td>
</tr>
<tr>
<td>Fairmont</td>
<td>Baseline</td>
<td>6</td>
<td>.13</td>
<td>.06</td>
<td>366</td>
<td>1.50</td>
<td>24.18</td>
</tr>
<tr>
<td></td>
<td>Moleculet</td>
<td>5</td>
<td>.15</td>
<td>.03</td>
<td>348</td>
<td>1.57</td>
<td>25.48</td>
</tr>
</tbody>
</table>

As with the FTP, the HFET fuel economy varied on both the plus and minus side. The Citation and the Fairmont both displayed a 3% increase, while the Chevette decreased 1%. Overall, a 3% improvement was measured. The emission values displayed very little variances between the baseline and Moleculet tests.

The original Fairmont which was subsequently disqualified showed marked increases in the FTP and HFET test numbers after the Moleculet was installed and 500 miles of on-the-road driving was performed. Both fuel economy and emissions had changed significantly from the baseline tests. Further testing after removal of the Moleculet showed the same trend continuing. In fact, the final test (seven weeks after removal) displayed the highest fuel economy of any of the preceding tests performed on it. Complete test data can be found in Appendix B.

Analysis of Results

After assembling the results, two statistical tests were performed. The first was the one-sided t-test at a 95% confidence level. This test was performed on individual vehicles. It showed a statistically significant increase in fuel economy for the Fairmont over both the FTP and HFET. The HFET fuel economy increase for the Citation was also found to be significant. Using this same technique, no statistically significant changes were observed for either test on the Chevette, or for the FTP on the Citation. The other statistical test was the univariate 1-way ANOVA. In this test, results from all three cars were standardized and grouped. The increases in NOx emissions and the HFET fuel economy for the fleet were deemed statistically significant by this method.
As these tests show, even statistically speaking the results are somewhat inconsistent. The questionable nature of the data is evident upon the observance of the changes in the simple before and after averages of the individual vehicles. Discounting the variability of the test, two vehicles displayed increases on both the FTP and HPET, while the third displayed a decrease on each test. Even if some level of test variability is acknowledged, these changes may be attributed to the 500 miles of "on the road" driving between the "before and after" tests.

Other EPA programs have demonstrated that minor improvements in fuel economy are possible throughout the course of test program which includes mileage accumulation.

**Conclusion**

The results of this test program did not show consistent effects attributable to the Moleculator on the fuel economy and emission levels of the test vehicles. There were slight improvements in some cases and slight losses in others. The changes in all cases were quite small and were consistent with changes observed by EPA in other tests with vehicles in which emissions and fuel economy measurements were made before and after mileage accumulation. The claims of 10% to 23% fuel economy increases were not substantiated by the findings of this EPA program.
Appendix A

Description of Road Routes Used for Mileage Accumulation
<table>
<thead>
<tr>
<th>Location</th>
<th>Route</th>
<th>Miles</th>
<th>Approx. Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>EPA</td>
<td>Start at EPA Parking Area</td>
<td>0.0</td>
<td>0:00</td>
</tr>
<tr>
<td></td>
<td>EPA to Plymouth Road (turn left)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Plymouth Road to US-23 (North) (turn left onto ramp)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>US-23 to M-14 (West) (follow expressway to left twice)</td>
<td>10.1</td>
<td>0:17</td>
</tr>
<tr>
<td></td>
<td>M-14 to I-94 (West) (merge)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Jackson</td>
<td>I-94 to US-127 (South) (exit right, cloverleaf)</td>
<td>38.8</td>
<td>0:50</td>
</tr>
<tr>
<td></td>
<td>continue on US-127 when expressway ends</td>
<td>45.2</td>
<td>1:00</td>
</tr>
<tr>
<td>Hudson</td>
<td>US-127 to M-34 (East) (turn left)</td>
<td>69.0</td>
<td>1:28</td>
</tr>
<tr>
<td>Adrian</td>
<td>M-34 to M-52 (North) (turn left)</td>
<td>86.2</td>
<td>1:50</td>
</tr>
<tr>
<td></td>
<td>Follow M-52 through Adrian (3 to 4 turns)</td>
<td>100.8</td>
<td>2:12</td>
</tr>
<tr>
<td></td>
<td>M-52 to M-12 (turn right)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Saline</td>
<td>M-12 to Ann Arbor-Saline Road (turn left)</td>
<td>115.0</td>
<td>2:30</td>
</tr>
<tr>
<td></td>
<td>At Wagner Road, continue on Ann Arbor-Saline Road at STOP sign (veer right)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ann Arbor</td>
<td>Ann Arbor-Saline Road turns into Main Street (straight)</td>
<td>122.8</td>
<td>2:43</td>
</tr>
<tr>
<td></td>
<td>Main Street to Stadium Blvd. (turn right)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Stadium runs into Washtenaw (merge)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Washtenaw to Huron Parkway (turn left)</td>
<td>125.6</td>
<td>2:51</td>
</tr>
<tr>
<td></td>
<td>Huron Parkway to Plymouth Road (turn left)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Plymouth Road to EPA</td>
<td></td>
<td></td>
</tr>
<tr>
<td>EPA</td>
<td>Finish at EPA Parking Area</td>
<td>129.5</td>
<td>3:00</td>
</tr>
</tbody>
</table>
## §2 - Ohio Road Route

(133 miles, about 3 hours)

<table>
<thead>
<tr>
<th>Location</th>
<th>Route</th>
<th>Miles</th>
</tr>
</thead>
<tbody>
<tr>
<td>EPA</td>
<td>Start at EPA Parking Lot</td>
<td>0.0</td>
</tr>
<tr>
<td></td>
<td>EPA to Plymouth Road (turn left)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Plymouth Road to US-23 (South) (turn right, enter ramp)</td>
<td></td>
</tr>
<tr>
<td>Toledo, Ohio</td>
<td>US-23 to SR-2 in Ohio (West) (exit right)</td>
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</tr>
<tr>
<td></td>
<td>SR-2 (West) to SR-109 (North) (turn right)</td>
<td>66.7</td>
</tr>
<tr>
<td>Ann Arbor, MI</td>
<td>SR-109 turns into M-52 at Michigan border (straight)</td>
<td>76.3</td>
</tr>
<tr>
<td></td>
<td>M-52, through Adrian, to M-50 (East) (turn right)</td>
<td>96.8</td>
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<tr>
<td></td>
<td>M-50 to Ridge Highway (turn left)</td>
<td>104.1</td>
</tr>
<tr>
<td></td>
<td>Ridge Highway to Mooreville Road (turn right)</td>
<td>113.7</td>
</tr>
<tr>
<td></td>
<td>Mooreville Road to Stony Creek (turn left)</td>
<td>114.2</td>
</tr>
<tr>
<td></td>
<td>Stony Creek to Carpenter Road (turn left)</td>
<td>117.7</td>
</tr>
<tr>
<td></td>
<td>Carpenter Road turns to Hogback at Washtenaw (straight)</td>
<td>125.8</td>
</tr>
<tr>
<td></td>
<td>Hogback Road turns into Huron River Drive (straight)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Huron River Drive to Dixboro Road (turn left)</td>
<td>127.0</td>
</tr>
<tr>
<td></td>
<td>Dixboro to Plymouth Road (turn left)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Plymouth Road to EPA (turn right)</td>
<td></td>
</tr>
<tr>
<td>EPA</td>
<td>Finish at EPA Parking Lot</td>
<td>132.7</td>
</tr>
<tr>
<td>Location</td>
<td>Route</td>
<td>Miles</td>
</tr>
<tr>
<td>------------</td>
<td>------------------------------------------------------------------------</td>
<td>-------</td>
</tr>
<tr>
<td>EPA</td>
<td>Start at EPA Parking Lot</td>
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<tr>
<td></td>
<td>EPA to Plymouth Road (left turn)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Plymouth Road to Ford Road (right turn)</td>
<td>6.0</td>
</tr>
<tr>
<td></td>
<td>Ford Road to Prospect (right turn)</td>
<td></td>
</tr>
<tr>
<td>Ypsilanti</td>
<td>Prospect to Forest (right turn)</td>
<td>11.0</td>
</tr>
<tr>
<td></td>
<td>Forest to Hamilton (left turn)</td>
<td>12.0</td>
</tr>
<tr>
<td></td>
<td>Hamilton through Ypsilanti &amp; over I-94</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Hamilton changes to Whittaker</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Whittaker to Milan-Oakville Road (right turn)</td>
<td>23.0</td>
</tr>
<tr>
<td>Milan</td>
<td>Milan-Oakville Road to Main (veer right)</td>
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<tr>
<td></td>
<td>Main, through Milan, to Saline-Milan Road (right turn)</td>
<td>30.0</td>
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<tr>
<td>Saline</td>
<td>Saline-Milan Road to Michigan Ave. (left turn)</td>
<td>35.0</td>
</tr>
<tr>
<td></td>
<td>Michigan Ave., through Saline, to Austin Road (right turn)</td>
<td>36.0</td>
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<tr>
<td>Manchester</td>
<td>Austin changes to M-22 in Manchester</td>
<td>50.0</td>
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<td></td>
<td>M-22 to Main (left turn)</td>
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<td></td>
<td>Main changes back to Austin Road</td>
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<tr>
<td>Napoleon</td>
<td>Austin Road to M-50 (straight at STOP sign)</td>
<td>62.0</td>
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<tr>
<td></td>
<td>M-50 to Napoleon Road (right turn)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Napoleon changes to Broad Street (straight at STOP sign on Lee)</td>
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<tr>
<td>Michigan Center</td>
<td>Broad to Fifth (right turn)</td>
<td>68.0</td>
</tr>
<tr>
<td></td>
<td>Fifth to Page Ave. (right turn)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Page to Ballard Road at TRICO Industries before RR tracks (see map on next page) (left turn)</td>
<td>69.0</td>
</tr>
<tr>
<td></td>
<td>Ballard to Michigan Road (right turn)</td>
<td>70.0</td>
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<tr>
<td>Grass Lake</td>
<td>Michigan to Mt. Hope (left turn)</td>
<td>76.0</td>
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<tr>
<td></td>
<td>NOTE: Mt. Hope is Union Street on the right side of Michigan Road in Grass Lake</td>
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</tr>
<tr>
<td></td>
<td>Mt. Hope over I-94 to Seymour (right turn)</td>
<td>81.0</td>
</tr>
<tr>
<td></td>
<td>Seymour turns into Trast (no noticeable turns)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Trast to Clear Lake (left turn)</td>
<td>84.0</td>
</tr>
<tr>
<td></td>
<td>Clear Lake to Waterloo Road (turn right)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Waterloo to M-22 (turn right)</td>
<td>91.0</td>
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### #3 - Ann Arbor Road Route cont.

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<tr>
<th>Location</th>
<th>Route</th>
<th>Miles</th>
<th>Time</th>
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</thead>
<tbody>
<tr>
<td>Chelsea</td>
<td>M-52 to Middle Street at light (left turn)</td>
<td>94.0</td>
<td>2:15</td>
</tr>
<tr>
<td></td>
<td>Middle Street to McKinley (left turn)</td>
<td>94.0</td>
<td>2:16</td>
</tr>
<tr>
<td></td>
<td>McKinley over RR tracks to Dexter-Chelsea Road (right turn)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dexter</td>
<td>Dexter-Chelsea Road to Main in Dexter (left turn)</td>
<td>101.0</td>
<td>2:24</td>
</tr>
<tr>
<td></td>
<td>Main, under viaduct, to Dexter-Pinckney (veer right)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>NOTE: Main changes to Island Lake Road at Dexter-Pinckney Road</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pinckney</td>
<td>Dexter-Pinckney Road to M-36 (right turn)</td>
<td>110.0</td>
<td>2:38</td>
</tr>
<tr>
<td></td>
<td>M-36 to US-73 (North) (left turn)</td>
<td>127.0</td>
<td>3:01</td>
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<tr>
<td></td>
<td>US-23 to I-96 (East) (exit right)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>I-96 to Milford-New Hudson, Exit 155, to Pontiac Trail (also Milford Road)</td>
<td>134.0</td>
<td>3:09</td>
</tr>
<tr>
<td></td>
<td>(exit right, then turn right)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>New Hudson</td>
<td>Pontiac Trail across Grand River (veer right)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>continue on Pontiac Trail (see map below)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Pontiac Trail turns left at Silver Lake Road (left turn)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>South Lyon</td>
<td>Pontiac Trail through South Lyon</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Pontiac Trail to Dibbord Road (left turn)</td>
<td>147.0</td>
<td>3:27</td>
</tr>
<tr>
<td></td>
<td>Dibbord Road to Plymouth Road (right turn)</td>
<td>151.0</td>
<td>3:33</td>
</tr>
<tr>
<td></td>
<td>Plymouth Road to EPA (right turn)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>EPA</td>
<td>Finish at EPA Parking Lot</td>
<td>153.0</td>
<td>3:37</td>
</tr>
<tr>
<td>Location</td>
<td>Route</td>
<td>Miles</td>
<td>Time (hr:min)</td>
</tr>
<tr>
<td>------------</td>
<td>-----------------------------------------------------------------------</td>
<td>-------</td>
<td>---------------</td>
</tr>
</tbody>
</table>
| EPA        | Start at EPA Parking Lot
EPA to Plymouth Road (turn left)
Plymouth Road to Ford Road (detour) (turn right)
Ford Road to M-153 (West) (turn right, then 160° left turn at island) | 0.0   | 0:00          |
| Plymouth   | M-153 to Plymouth (finish detour) (right turn)
Plymouth Road turns to Ann Arbor Road in Plymouth, also called M-14
M-14 (East) to Y-275 (North) (right turn onto cloverleaf) | 16.2  | 0:00          |
<p>|            | Y-275 to Y-96 (West) (follow left lane of Y-275 straight)             |       |               |
|            | Y-96 to Novi Exit (Walled Lake) (right turn off exit ramp)             | 27.0  |               |
|            | Novi Road to East Lake Drive (right turn)                             | 30.8  | 0:45          |
|            | E. Lake Drive to Pontiac Trail (right turn)                           | 31.6  |               |
|            | Pontiac Trail to South Commerce Road (left turn)                      | 33.7  |               |
|            | S. Commerce to Oakley Park Road (right turn)                          | 34.2  |               |
|            | Oakley Park to Newton (left turn)                                     | 34.5  | 0:52          |
|            | Newton to Richardson (right turn)                                     | 35.7  |               |
|            | Richardson to Union Lake Road (left turn)                             | 34.5  |               |
|            | Union Lake to Elizabeth Lake (left turn)                              | 40.5  |               |
|            | Elizabeth Lake to M-59 (Highland Park) (left turn) (veer left at fork) | 42.3  |               |
|            | M-59, over US-23, past Howell, to Y-96 (West) (right turn on ramp)    | 67.5  |               |
|            | Y-96 to M-52 (South) (exit right, turn left off of ramp)              | 78.9  | 1:40          |
| Chelsea    | M-52 through Stockbridge to Chelsea                                  | 106.6 | 2:25          |
|            | M-52 to Middle Road in Chelsea (left turn)                           |       |               |
|            | Middle Road to McKinley Street (turn left)                            |       |               |
|            | McKinley, over RR tracks, to Dexter-Chelsea Rd. (right turn)          |       |               |
| Dexter     | Dexter-Chelsea to Main (right turn)                                   | 114.0 |               |
|            | Main to Central (veer left)                                           |       |               |
|            | Central to Huron River Drive (turn right)                             | 114.7 |               |
| Ann Arbor  | Huron River Drive to N. Main Street (turn right)                      | 123.8 |               |
|            | Main to Depot Street (left turn)                                      |       |               |
|            | Depot goes under Broadway Bridge then up to Broadway on right lane    |       |               |
|            | (right turn, circle 270° right)                                       |       |               |</p>
<table>
<thead>
<tr>
<th>Location</th>
<th>Route</th>
<th>Miles</th>
<th>Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>A2 cont.</td>
<td>Broadway to Plymouth (veer left at fork) Plymouth Road to Exit</td>
<td>125.7</td>
<td></td>
</tr>
<tr>
<td>EPA</td>
<td>Finish at EPA Parking Lot</td>
<td>127.1</td>
<td>3:15</td>
</tr>
</tbody>
</table>
Appendix B

Individual Test Results
### FTP Results - Emission values are expressed in grams per mile.

<table>
<thead>
<tr>
<th>Test Number</th>
<th>Date</th>
<th>Condition</th>
<th>HC</th>
<th>CO</th>
<th>CO₂</th>
<th>NOₓ</th>
<th>MPG</th>
</tr>
</thead>
<tbody>
<tr>
<td>80-6781</td>
<td>11/19/80</td>
<td>Baseline</td>
<td>.62</td>
<td>6.9</td>
<td>351</td>
<td>1.42</td>
<td>24.4</td>
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<tr>
<td>80-6783</td>
<td>11/20/80</td>
<td>Baseline</td>
<td>.57</td>
<td>5.4</td>
<td>346</td>
<td>1.54</td>
<td>24.9</td>
</tr>
<tr>
<td>80-6785</td>
<td>11/21/80</td>
<td>Baseline</td>
<td>.61</td>
<td>6.3</td>
<td>346</td>
<td>1.53</td>
<td>24.8</td>
</tr>
<tr>
<td>80-6936</td>
<td>12/2/80</td>
<td>Moleculator</td>
<td>.76</td>
<td>7.8</td>
<td>348</td>
<td>1.39</td>
<td>24.5</td>
</tr>
<tr>
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<td>12/3/80</td>
<td>Moleculator</td>
<td>.61</td>
<td>6.8</td>
<td>354</td>
<td>1.48</td>
<td>24.2</td>
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<tr>
<td>80-6956</td>
<td>12/4/80</td>
<td>Moleculator</td>
<td>.60</td>
<td>6.9</td>
<td>355</td>
<td>1.56</td>
<td>24.1</td>
</tr>
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</table>

### HFET Results - Emission values are expressed in grams per mile.

<table>
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<th>Test Number</th>
<th>Date</th>
<th>Condition</th>
<th>HC</th>
<th>CO</th>
<th>CO₂</th>
<th>NOₓ</th>
<th>MPG</th>
</tr>
</thead>
<tbody>
<tr>
<td>80-6782</td>
<td>11/19/80</td>
<td>Baseline</td>
<td>.13</td>
<td>0.8</td>
<td>280</td>
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<td>80-6784</td>
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<td>0.3</td>
<td>272</td>
<td>1.68</td>
<td>32.5</td>
</tr>
<tr>
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<td>11/21/80</td>
<td>Baseline</td>
<td>.13</td>
<td>0.6</td>
<td>271</td>
<td>1.78</td>
<td>32.6</td>
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<td>12/2/80</td>
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<td>1.80</td>
<td>31.7</td>
</tr>
</tbody>
</table>

*Test voided - results not averaged into summary.*
Moleculator Fuel Energizer Evaluation
1980 Chevrolet Citation

FTP Results - Emission values are expressed in grams per mile.

<table>
<thead>
<tr>
<th>Test Number</th>
<th>Date</th>
<th>Condition</th>
<th>HC</th>
<th>CO</th>
<th>CO₂</th>
<th>NOₓ</th>
<th>MPG</th>
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<tbody>
<tr>
<td>80-6786</td>
<td>11/18/80</td>
<td>Baseline</td>
<td>.50</td>
<td>3.9</td>
<td>420</td>
<td>1.52</td>
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<tr>
<td>80-6804</td>
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<td>Baseline</td>
<td>.43</td>
<td>4.1</td>
<td>434</td>
<td>1.58</td>
<td>20.1</td>
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<tr>
<td>80-6786</td>
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<td>Moleculator</td>
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<td>1.64</td>
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<td>4.0</td>
<td>417</td>
<td>1.72</td>
<td>20.9</td>
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</table>

*Test voided - results not averaged into summary.*

EPET Results - Emission Values are expressed in grams per mile.

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<th>Date</th>
<th>Condition</th>
<th>HC</th>
<th>CO</th>
<th>CO₂</th>
<th>NOₓ</th>
<th>MPG</th>
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<tbody>
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<td>1.53</td>
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</table>
Moleculon Fuel Energizer Evaluation
1980 Ford Fairmont

FTP Results – Emission values are expressed in grams per mile.

<table>
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<tr>
<th>Test Number</th>
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<th>Condition</th>
<th>NO</th>
<th>CO</th>
<th>CO₂</th>
<th>NOₓ</th>
<th>MPG</th>
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<tbody>
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<td>460</td>
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<td>18.8</td>
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<td>Baseline</td>
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<td>5.7</td>
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<td>.56</td>
<td>4.6</td>
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<td>7.8</td>
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<tr>
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<tr>
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*Test voided – results not averaged into summary.

HFET Results – Emission values are expressed in grams per mile.

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80-7879  3/4/81  Moleculator  .14  .02  345  1.49  25.7

*Test voided - results are not averaged into summary.

Moleculator Fuel Energizer Evaluation
1980 Ford Fairmont (Disqualified)

FTP Results - Emission values are expressed in grams per mile.

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HFET Results - Emission values are expressed in grams per mile.

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