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EPA-AA-TEB-511-81-11

Evaluation of the Moleculator 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

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16. ABSTRACT

This document announces the conclusions of the EPA evaluation of the "Moleculetor 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 Moleculetor". 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.

17. KEY WORDS AND DOCUMENT ANALYSIS

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ATTENTION

EPA-AA-TEB-511-81-11

ENVIRONMENTAL PROTECTION AGENCY

[40 CFR Part 610]

[FRL ____________]

FUEL ECONOMY RETROFIT DEVICES

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

AGENCY: Environmental Protection Agency (EPA).

ACTION: Notice of Fuel Economy Retrofit Device Evaluation.

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

<u>BACKGROUND INFORMATION:</u> 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 <u>Federal Register</u> 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 Moleculetor". 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.

Availability of Evaluation Report: An evaluation has been made and the results are described completely in a report entitled: "EPA Evaluation of the Fuel Energizer Moleculetor Device Under Section 511 of the Motor Vehicle Information and Cost Savings Act," report number EPA-AA-TEB-511-81-11 consisting of 113 pages including all attachments.

EPA also tested the Fuel Energizer Moleculetor device. The EPA testing is described completely in the report "The Effects of the Moleculetor 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:

National Technical Information Center
U.S. Department of Commerce
Springfield, VA 22161
Phone: (703) 487-4650 or (FTS) 737-4650

Summary of Evaluation

EPA fully considered all of the information submitted by the device manufacturer in his Application. The evaluation of the "Moleculetor 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 Moleculetor 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. Korth, Emission Control Technology Division, Office of Mobile Source Air Pollution Control, Environmental Protection Agency, 2565 Plymouth Road, Ann Arbor, Michigan 48105, (313) 668-4299.

Date

Edward F. Tuerk
Acting Assistant Administrator
for Air, Noise, and Radiation

EPA Evaluation of "Moleculetor 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:

"Moleculetor Fuel Energizer" or "Fuel Energizer Molaculetor" are the two identifiers which are used interchangeably in the application. The Device is also referred to simply as the "Moleculetor". 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 #852,005, Filing Date: 11/16/79. Continuation of Serial #653,106, 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 manufacturered 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 Moleculetor (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 Moleculetor 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 Moleculetor to frame by using high resistant plastic straps."

"Diesel Engines: The Moleculetor 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 Moleculetor. Tighten all fittings and connections and start engine; examine closely for leaks. The Moleculetor must be supported properly with metal or high resistant plastic clamps.

The Moleculetor 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 Moleculetor, 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 "Moleculetor", by Bill Estes, in the September, 1980 issue of Motorhome Life (Attachment E). The text of this article is identical to that in "13C".

e) Statements by individuals relating actual experience with the Moleculetor (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 1B68E9Y3^8318) was tested in the following sequence:

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

2) A Moleculetor #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 Moleculetor-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 Moleculetor #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 Moleculetor-equipped test vehicle.

Test data is supplied in Attachment G.

c) A 1980 Ford Fairmont (VIN 0E91B104395) was tested in the following sequence:

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

2) A Moleculetor #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 Moleculetor-equipped test vehicle.

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

Test data is supplied in Attachment G. 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 Moleculetor 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 Moleculetor 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 Moleculetor.

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 Moleculetor 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 <u>EPA Gas Mileage Guide</u> value while the baseline fuel economy for the Highway Fuel Economy Test was only 70% of the corresponding Guide value.

d) Another Ford Fairmont (VIN OE91B104396), 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 Moleculetor #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 Moleculetor equipped test vehicle.

Test data is supplied in Attachment G.

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 6% 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 OEI'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 OEI'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).

h) The Information Gathered by EPA: Testing by EPA is discussed in detail in Attachment G.

16) Conclusions

The results of this test program did not show consistent effects attributable to the Moleculetor 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 B	Olson Engineering Report (August 7, 1979).
Attachment C	Motor Trend Article.
Attachment D	Trailer Life Article.
Attachment E	Motorhome Life Article
Attachment F	Statements by Individuals.
Attachment G	TEB Report: "The Effects of The Moleculetor Fuel Energizer on Emissions and Fuel Economy".

Attachment A

Olson Engineering, Inc.
Report Dated June 1, 1978

AUTOMOTIVE EXHAUST EMISSION AND FUEL ECONOMY TEST REPORT

PREPARED FOR

I.E.M. CORPORATION

June 1, 1978

By

Olson Engineering Inc.
Vehicle Test Facility
[illegible] Commerce Lane
Huntington Beach, California [illegible] · (714) [illegible]

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 moleculetor 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 BBL 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 0888 miles.

VEHICLE PREPARATION

After baseline measurements the test vehicle was equipped with the moleculetor fuel energy device by the clients representative and the tune-up parameters were re-established or verified by OEI 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 emission are unburned hydrocarbons (HC), carbon monoxide (CO) and oxides of nitrogen (NO_x).

Unburned HC and NO_x 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 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.

TEST CONDITIONS AND PROCEDURES (Continued)

On the day before the scheduled 1975 FTP, the vehicle must be parked for at least 12 hours in a 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 (UDDS) 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 inters 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 "stabilised" emissibns. 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 $\mp$ 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 date 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. 15, 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.

TABLE I

COMPOSITE SUMMARY OF RESULTS

Test Date	Test Number	Description	HC	CO	NOX	MPG
5/24/78	7828	Baseline	0.22	4.02	1.14	11.02
5/25/78	7843	with I.E.M. Device	0.26	3.41	1.08	11.63
5/31/78	7868	with I.E.M. Device after 1000 miles accumulation	0.24	2.75	1.03	11.69
5/24/78	7829	Highway fuel economy test Baseline				16.08
5/25/78	7844	Highway fuel economy test with I.E.M. Device				17.82
5/31/78	7869	Highway fuel economy test with I.E.M. Device after 1000 miles accumulation				17.58

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INSTR	RANGE	VALUE	CMVTS	MVTS	ERR
CO2	2	0	0	15	
CO	2	0	0	17	
HC	1	0	-5	5	
NOX	1	0	0	2	

SPAN CALIBRATION

INSTR	RANGE	VALUE	CMVTS	GAIN	ERR
CO2	2	471	4740	0.999	
CO	2	2348	4577	1.002	
HC	1	4672	4775	1.007	
NOX	1	2257	4542	0.990	

ZERO CALIBRATION

INSTR	RANGE	VALUE	CMVTS	MVTS	ERR
CO2	2	0	-5	2	
CO	2	0	-5	17	
HC	1	0	-5	5	
NOX	1	0	0	-5	

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

UNIT # 1
DATE: 05/24/78 TIME: 07:56:42
TEST # 7823
CHASSIS # 1N69U3C12015
ENGINE # /
CLASS 78
DISP 305
WEIGHT 4000
TRAN A
AXEL 2/
CARB 2B
ODOM 00333
TEMP 68
BAR 29.88
HUMID 36
COLD START CVS II FTP/BASELINE

BAG	REV	HC	CO	NO	CO2	
AMB1		7.0	0.0	0.7	0.05	[illegible]
EXH1	11297	84.6	919.0	41.5	2.59	[illegible]
AMB2		5.8	0.0	0.6	0.05	[illegible]
EXH2	19357	11.0	0.0	23.5	1.69	[illegible]
AMB3		6.3	0.0	0.3	0.05	[illegible]
EXH3	11263	15.6	0.0	39.5	2.23	[illegible]

WTD GRAMS/MILE [illegible]
FUEL CONSUMPTION 11.02 MPG

INSTR	RANGE	VALUE	CMVTS	MVTS	ERR
CO2	2	Ø	Ø	12	
CO	2	Ø	Ø	Ø	
HC	1	Ø	-5	7	
NOX	1	Ø	Ø	-13	

SPAN CALIBRATION

INSTR	RANGE	VALUE	CMVTS	GAIN	ERR
CO2	2	472	4742	Ø.993	
CO	2	2846	4575	1.ØØ3	
HC	1	4674	4772	1.ØØ7	
NOX	1	2260	4547	1.ØØ1	

ZERO CALIBRATION

INSTR	RANGE	VALUE	CMVTS	MVTS	ERR
CO2	2	Ø	Ø	-13	
CO	2	Ø	Ø	Ø	
HC	1	2	2	5	
NOX	1	Ø	Ø	-1Ø	

OLSON ENG NEERING, INC.
AUTOMOTIVE RESEARCH CENTER
HUNTINGTON BEACH, CA. 92649

UNIT # 1
DATE: Ø5/25/78 TIME: 14:21:48
TEST # 7843
CHASSIS # IN69U8C12Ø15
ENGINE # /
CLASS 78
DISP 35Ø
WEIGHT 4ØØØ
TRAN Ø
AXEL /
CARB 1X4
ODOM ØØ974
TEMP 75
BAR 29.55
HUMID 45
COLD START CVS II/WITH DEVICE/I.E.M. DEVICE

BAG#	REV	HC	CO	NO	CO2	HC	CO	NO	CO2
AMB1		4.6	Ø.Ø	Ø.1	Ø.Ø4				
EXH1	11254	96.4	517.Ø	39.6	2.43	Ø.44	7.92	Ø.57	364.96
AMB2		7.Ø	Ø.Ø	Ø.Ø	Ø.Ø4				
EXH2	19385	9.5	Ø.Ø	21.4	1.63	Ø.Ø3	Ø.ØØ	Ø.53	416.46
AMB3		4.4	1.Ø	Ø.3	Ø.Ø5				
EXH3	11247	2Ø.Ø	2.Ø	37.7	2.15	Ø.Ø5	Ø.Ø1	Ø.54	32Ø.69
WTD GRAMS/MILE						Ø.26	3.41	1.Ø5	756.19

FUEL CONSUMPTION 11.63 MPG

**ABORT
DATE: 05/24/78 TIME: 08:29:15

SYSTEM START-UP
DATE: 05/24/78 TIME: 08:29:35
ENTER FUNCTION
?BA
ZERO CALIBRATION

INSTR	RANGE	VALUE	CMVTS	MVTS	ERR
CO2	2	0	0	-13	
CO	2	0	0	5	
HC	1	0	-5	5	
NOX	1	0	0	-5	

SPAN CALIBRATION

INSTR	RANGE	VALUE	CMVTS	GAIN	ERR
CO2	2	472	4745	0.999	
CO	2	2850	4580	0.970	
HC	1	4672	4775	1.011	
NOX	1	2261	4550	0.989	

ZERO CALIBRATION

INSTR	RANGE	VALUE	CMVTS	MVTS	ERR
CO2	2	0	-3	7	
CO	2	0	-3	5	
HC	1	0	-5	7	
NOX	1	0	0	-13	

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

UNIT # 1
DATE: 05/24/78 TIME: 08:32:32
TEST # 7529
CHASSIS # IN69U8C120015
ENGINE # /
CLASS 78
DISP 305
WEIGHT 4000
TRAN 0
AXEL /
CARB 2B
ODOM 00900
TEMP 82
BAR 29.86
HUMID 30
HOT START HFET/AT BASELINE

BAG#	REV	HC	CO	NO	CO2	HC	CO	NO	CO2
AMB1		6.3	0.0	0.1	0.05				
EXH1	17844	9.5	5.0	52.2	3.25	0.03	0.09	1.30	551.83
WTD GRAMS/MILE						0.03	0.09	1.30	551.83

FUEL CONSUMPTION 16.03 MPG

```
**!:GHZVZUCSFSTART-UP
 DATE: 05/25/75   TIME: 14:49:55
ENTER FUNCTION
? BA
 ZERO CALIBRATION
 INSTR RANGE VALUE CMVTS  MVTS ERR
 CO2      2     0     0    -5
 CO       2     0     2     2
 HC       1     2     2     2
 NOX      1     0     0   -23
 SPAN CALIBRATION
INSTR RANGE VALUE CMVTS  GAIN ERR
 CO2      2   473  4747 0.996
 CO       2  2545  4577 0.998
 HC       1  4671  4770 0.964
 NOX      1  2257  4542 1.010
ZERO CALIBRATION
INSTR RANGE VALUE CMVTS  MVTS ERR
 CO2      2     0     0    10
 CO       2     0     0     2
 HC       1     0    -3     0
 NOX      1     1     2   -23
```

```
                  OLSON ENG  NEERING, INC.
                AUTOMOTIVE RESEARCH CENTER
                HUNTINGTON BEACH, CA. 92649
UNIT # 1
 DATE: 05/25/75   TIME: 14:52:56
TEST # 7844
 CHASSIS # 1N69U5C12015
ENGINE # /
 CLASS 75
 DISP 350
WEIGHT 4500
 TRAN 0
AXEL /
 CARB 1X4
ODOM 08955
TEMP 83
BAR 29.87
HUMID 29
 HFET/ W/I.E.M. DEVICE
BAG#  REV     HC     CO     NO     CO2    HC     CO     NO    CO2
AMBI          5.5    0.0    0.5    0.05
HWHI 17114   11.0    0.0   74.3    2.97   0.02   0.00   1.16 497.45
WTD GRAMS/MILE                            0.02   0.00   1.16 497.45
FUEL CONSUMPTION    17.82 MPG
```

ZERO CALIBRATION

INSTR	RANGE	VALUE	CMVTS	MVTS	ERR
CO2	2	0	-5	10	
CO	2	0	-3	5	
HC	1	0	0	2	
NOX	1	0	0	-13	

SPAN CALIBRATION

INSTR	RANGE	VALUE	CMVTS	GAIN	ERR
CO2	2	472	4745	1.000	
CO	2	2850	4530	1.000	
HC	1	4667	4772	1.000	
NOX	1	2262	4552	0.935	

ZERO CALIBRATION

INSTR	RANGE	VALUE	CMVTS	MVTS	ERR
CO2	2	0	-3	-3	
CO	2	0	0	2	
HC	1	0	0	-3	
NOX	1	0	0	-10	

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

UNIT # 1
DATE: 05/31/78 TIME: 08:43:36
TEST # 7869
CHASSIS # IN69U3C12015
ENGINE # /
CLASS 73
DISP 305
WEIGHT 4000
TRAN 0
AXEL /
CARB 1X2
ODOM 62028
TEMP 72
BAR 29.55
HUMID 42
COLD START CVS II/W/APRX 1000 MI/ACM-AFTER I.F.M.

BAG#	REV	HC	CO	NO	CO2	HC	CO	NO	CO2
AMB1		5.3	0.0	0.0	0.05				
EXH1	11242	53.7	652.0	36.1	2.34	0.41	6.37	0.52	353.00
AMB2		7.3	0.0	0.2	0.05				
EXH2	19289	10.5	0.0	21.4	1.63	0.03	0.00	0.52	417.86
AMB3		5.6	0.0	0.3	0.05				
EXH3	11240	15.3	9.0	35.9	2.14	0.05	0.02	0.51	322.05
WTD GRAMS/MILE						0.24	2.75	1.03	753.23

FUEL CONSUMPTION 11.69 MPG

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

 SYSTEM START-UP
DATE: 05/31/73    TIME: 09:19:51
ENTER FUNCTION
? BA
 ZERO CALIBRATION
INSTR RANGE VALUE CMVTS  MVTS ERR
 CO2       2     0    -3     0
 CO        2     0    -5     7
 HC        1     0     0     0
 NOX       1     0     0    -5
SPAN CALIBRATION
INSTR RANGE VALUE CMVTS  GAIN ERR
 CO2       2   472  4742 0.997
 CO        2  2346  4575 1.002
 HC        1  4665  4770 1.004
 NOX       1  2260  4547 0.973
ZERO CALIBRATION
INSTR RANGE VALUE CMVTS  MVTS ERR
 CO2       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: 09:22:53
TEST # 7369
CHASSIS # IN69U3C120015
ENGINE # /
CLASS 73
DISP 305
WEIGHT 4000
TRAN 0
AXEL /
CARB 1X2
ODOM 00039
TEMP  76
BAR 29.35
HUMID 41
HOT START HEET/SAME COMMENTS AS TEST NO. 7367
BAG# LFL     HC      CO      NO      CO2     HC      CO      NO      CO2
AMB1          8.1     0.0     0.1     0.05
EXH1 17019   10.0     0.0    70.7     3.01    0.03    0.00    1.14804.37
WTD GRAMS/MILE                                0.03    0.00    1.14804.37
FUEL CONSUMPTION    17.07 MPG
```

Attachment B

Olson Engineering, Inc.
Report dated August 7, 1979

AUTOMOTIVE EXHAUST EMISSION AND FUEL ECONOMY TEST REPORT

Prepared for

I.E.M. CORPORATION
5030 Paradise Road
Las Vegas, Nevada 89119

August 7, 1979

By

Olson Engineering Inc.
Automotive Research Center
15442 Chemical Lane
Huntington Beach, California 92649 • (714) 891-4821

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 505 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 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 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 OEI 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

Test Date	Test Description	HC	CO (grams/mile)	NOx	MPG
5/3/79	Baseline CVS-II	3.83	34.61	1.07	20.21
5/3/79	Baseline HFET				30.38
5/4/79	*Moleculator CVS-II	3.86	31.90	1.09	21.59
5/4/79	Moleculator HFET				31.06

*After 54 highway miles of device conditioning

TABLE II

COMPOSITE SUMMARY OF RESULTS

TEST VEHICLE NO. 2

1979 Chevrolet Malibu
231 CID

		(grams/mile)			
Test Date	Test Description	HC	CO	NOx	MPG
6/8/79	Baseline CVS-II	0.19	3.72	1.19	17.38
6/8/79	Baseline HFET				25.70
6/12/79	*Moleculator CVS-II	0.19	3.74	1.01	18.23
6/12/79	Moleculator HFET				26.02

*After 155 miles of device conditioning

TABLE III

COMPOSITE SUMMARY OF RESULTS

TEST VEHICLE NO. 3

1978 Ford Thunderbird
400 CID

		(grams/mile)			
Test Date	Test Description	HC	CO	NOx	MPG
7/12/79	Baseline CVS-II	0.42	12.22	0.80	10.61
7/12/79	Baseline HFET				15.64
7/17/79	*Moleculator CVS-II	0.35	10.11	0.84	11.11
7/17/79	Moleculator HFET				15.86

*After 159 miles of device conditioning

ZERO CALIBRATION

INSTR	RANGE	VALUE	CMVTS	MVTS ERR
CO2	C	C	-3	C
CO	P	0	P	-5
HC	1	4	P	8P
NOX	1	P	-5	-25

SPAN CALIBRATION

INSTR	RANGE	VALUE	CMVTS	GAIN ERR
CO2	C	4PP	4445	C.999
CO	C	25CP	4137	C.994
HC	1	4957	459P	1.PP3
NOX	1	PEB4	4555	1.PC5

ZERO CALIBRATION

INSTR	RANGE	VALUE	CMVTS	MVTS ERR
CO2	P	C	C	-9
CO	P	C	C	-5
HC	1	4	P	3P
NOX	1	1	P	-15

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

UNIT # 1
DATE: 05/C3/79 TIME: 1P:P4:55
TEST # 9933
CHASSIS # FIAT
ENGINE # /
CLASS 74
DISP 79
WEIGHT 225P
TRAN 4 SPD
AXEL /
CALC PPM.
ODOM C5933
TEMP 7C
BAR 29.93
HUMID 44
COLD START CVS Baseline

BAG #	REV	HC	CO	NO	CO2	HC	CO	NO	CO2
AMB1		17.1	C.C	C.7	C.C5				
EXH1	1143C	CCA.7	1HCC.C	4A.3	1.17	P.34	11.74	C.71	194.95
AMB2		7.8	C.C	C.7	C.C5				
EXH2	19CC3	CCC.9	95P.C	14.5	C.7A	1.41	17.47	C.39	199.41
AMB3		17.C	P.C	C.C	C.C5				
EXH3	114C3	3AA.4	14C7.C	4C.C	1.CC	1.7A	15.C3	C.CC	1CC.1A
WTD GRAMS/MILE						2.43	3A.C1	1.C7	27C.3A

FUEL CONSUMPTION PC.P1 MPG

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

UNIT # 1
DATE: 05/03/79 TIME: 16:32:05
TEST # 9937
CHASSIS # FIAT
ENGINE # /
CLASS 74
DISP 79
WEIGHT 2250
TRAN 4SPD
AXEL /
CARB 2BBL
ODOM 65955
TEMP 78
BAR 29.92
HUMID 39
HFET

BAG#	REV	HC	CO	NO	CO2	HC	CO	NO	CO2
AMB1		8.5	0.0	2.1	0.05				
EXH1	17250	152.0	1511.0	50.4	1.44	1.03	17.95	1.40	260.48
WTD GRAMS/MILE						1.03	17.95	1.40	260.48

FUEL CONSUMPTION 30.38 MPG

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

UNIT # 1
DATE: 05/04/79   TIME: 16:25:03
TEST # 9945
CHASSIS # 0020361
ENGINE # 105A-5
CLASS 74
DISP 79
WEIGHT 2250
TRAN 4 SPD
AXEL /
CARB 2BBL
ODOM 65987
TEMP 78
BAR 29.94
HUMID 49
COLD START CVS II / [redacted]/W/MOLECULATOR

BAG#	REV	HC	CO	NO	CO2	HC	CO	NO	CO2
AMB1		12.6	0.0	1.5	0.05				
EXH1	11423	461.2	2002.0	44.2	1.09	2.48	21.34	0.73	175.02
AMB2		5.3	0.0	2.0	0.05				
EXH2	19614	286.6	833.0	15.1	0.7[illegible]	1.83	15.25	0.39	187.80
AMB3		7.5	0.0	1.3	0.05				
EXH3	11416	328.2	1231.0	41.1	0.94	1.69	13.12	0.68	149.65
WTD GRAMS/MILE						3.56	31.90	1.09	348.38

FUEL CONSUMPTION   21.59 MPG

ZERO CALIBRATION

INSTR	RANGE	VALUE	CMVTS	MVTS	ERR
CO2	2	0	0	-5	
CO	2	0	0	15	
HC	1	0	0	35	
NOX	1	0	0	-15	

SPAN CALIBRATION

INSTR	RANGE	VALUE	CMVTS	GAIN	ERR
CO2	2	420	4445	0.997	
CO	2	2496	4132	0.998	
HC	1	8973	4592	1.000	
NOX	1	2289	4565	0.998	

ZERO CALIBRATION

INSTR	RANGE	VALUE	CMVTS	MVTS	ERR
CO2	2	0	0	-5	
CO	2	0	-3	17	
HC	1	0	0	5	
NOX	1	0	0	-5	

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

UNIT # 1
DATE: 05/04/79 TIME: 16:59:19
TEST # 9946
CHASSIS # 0020361
ENGINE # 128A-5
CLASS 74
DISP 79
WEIGHT 2250
TRAN 4 SPD
AXEL /
CARB 2BBL
ODOM 65998
TEMP 78
BAR 29.94
HUMID 49
HOT START CVS HFET / BASELINE TEST / W/MOLECULATOR

BAG#	REV	HC	CO	NO	CO2	HC	CO	NO	CO2
AMB1		7.8	0.0	2.5	0.05				
EXH1	17288	179.2	1349.0	89.5	1.43	1.01	15.94	1.65	257.25
WTD GRAMS/MILE						1.01	15.94	1.65	257.25

FUEL CONSUMPTION 31.06 MPG

OLSON ENGINFERING, INC.
AUTOMOTIVE RFSEARCH CENTFR
HUNTINGTON PEACH, CA. 92649

UNIT # 1
DATE: 06/08/79 TIME: 13:19:07
TFST # 10154
CHASSIS # 1T27A9R45539
ENGINE # /
CLASS 79
DISP 231
WEIGHT 3500
TRAN AUTO
AXEL /
CARP 1XPP
ODOM 01508
TEMP 86
PAR 29.80
HUMID 44
COLD START CVSII-PASELINE

PAG#	RFV	HC	CO	NO	COP	HC	CO	NO	CO2
AMP1		7.8	0.2	1.5	0.05				
FXH1	11398	74.9	818.0	45.7	1.55	0.35	8.61	0.85	249.14
AMPP		9.3	0.0	1.5	0.05				
FXH2	19579	11.2	1.0	15.8	0.99	0.02	0.0P	0.44	267.88
AMP3		7.0	0.2	1.3	0.05				
EXH3	11389	18.7	0.0	38.9	1.41	0.03	0.00	0.67	PP5.F6
WTD GPAMS/MILF						0.19	3.7P	1.19	503.64

FUEL CONSUMPTION 17.38 MPG

ZFRO CALIPRATION

INSTR	RANGE	VALUE	CMVTS	MVTS	FRR
COP	2	0	0	PP	
CO	P	0	0	1P	
HC	1	0	-5	17	
NOX	1	2	5	5	

SPAN CALIPRATION

INSTR	RANGF	VALUF	CMVTS	GAIN	FRR
COP	P	4P0	4445	1.00F	
CO	P	P49P	41P7	0.999	
HC	1	45PP	4597	1.006	
NOX	1	PPHF	4560	0.999	

ZFRO CALIPRATION

INSTR	RANGF	VALUF	CMVTS	MVTS	FRR
COP	P	0	0	17	
CO	P	0	0	10	
HC	1	0	-8	1P	
NOX	1	0	0	15	

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

UNIT # 1
DATE: 06/05/79 TIME: 13:59:30
TEST # 10155
CHASSIS # 1T27A9R45539
ENGINE # /
CLASS 79
DISP 231
WEIGHT 3500
TRAN AUTO
AXEL /
CARB 1X2-V
ODOM 01519
TEMP 86
BAR 29.81
HUMID 44
HOT START HFET / BASELINE TEST

BAG#	REV	HC	CO	NO	CO2	HC	CO	NO	CO2
AMB1		7.5	0.0	1.6	0.05				
EXH1	17277	11.5	0.0	46.0	1.92	0.03	0.00	0.89	344.98
WTD GRAMS/MILE						0.03	0.00	0.89	344.98

FUEL CONSUMPTION 25.70 MPG

?
ENTER FUNCTION
?PA

ZERO CALIBRATION

INSTR	RANGE	VALUE	CMVTS	MVTS	ERR
CO2	2	0	0	-13	
CO	2	0	-3	5	
HC	1	0	0	-8	
NOX	1	0	0	0	

SPAN CALIBRATION

INSTR	RANGE	VALUE	CMVTS	GAIN	ERR
CO2	2	481	4447	0.994	
CO	2	2496	4132	0.999	
HC	1	4560	4642	0.999	
NOX	1	2289	4565	0.969	

ZERO CALIBRATION

INSTR	RANGE	VALUE	CMVTS	MVTS	ERR
CO2	2	0	-5	-13	
CO	2	0	-3	5	
HC	1	0	0	-8	
NOX	1	0	0	-3	

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

UNIT # 1
DATE: 06/12/79 TIME: 16:19:21
TEST # 10182
CHASSIS # R458392
ENGINE # /
CLASS 79
DISP 231
WEIGHT 3500
TRAN AUTO
AXLE /
CARB 2BBL
ODOM 01663
TEMP 86
BAR 29.82
HUMID 33
COLD START CVSII/1979 MALIBU/ W/DEVICE

BAG#	KM	HC	CO	NO	CO2	HC	CO	NO	CO2
AMB1		8.8	0.0	0.9	0.04				
EXH1	11410	74.4	830.0	44.1	1.50	0.35	8.71	0.70	241.43
AMB2		9.8	0.0	1.2	0.04				
EXH2	19[illegible]	11.7	0.0	15.1	0.94	0.02	0.06	0.39	255.62
AMB3		8.5	0.0	1.5	0.04				
EXH3	11410	13.9	0.0	35.7	1.32	0.03	0.06	0.56	211.62
WTD GRAMS/MILE						0.19	3.74	1.01	480.27

FUEL CONSUMPTION 18.23 MPG

CO	2	2494	4130	1.000
HC	1	4557	4640	0.995
NOX	1	2289	4565	0.997

ZERO CALIBRATION

INSTR	RANGE	VALUE	CMVTS	MVTS	ERR
CO2	2	0	-5	-38	

ZERO CALIBRATION

INSTR	RANGE	VALUE	CMVTS	MVTS	ERR
CO2	2	0	-5	-23	
CO	2	0	0	7	
HC	1	0	0	0	
NOX	1	0	-5	5	

SPAN CALIBRATION

INSTR	RANGE	VALUE	CMVTS	GAIN	ERR
CO2	2	420	4445	0.994	
CO	2	8494	4130	0.999	
HC	1	4560	4642	1.003	
NOX	1	2258	4562	0.990	

ZERO CALIBRATION

INSTR	RANGE	VALUE	CMVTS	MVTS	ERR
CO2	2	0	-3	-25	
CO	2	0	0	7	
HC	1	4	5	-3	
NOX	1	0	0	0	

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

UNIT # 1
DATE: 06/12/79 TIME: 16:42:32
TEST # 10183
CHASSIS # 2458392
ENGINE # /
CLASS 79
DISP 231
WEIGHT 3500
TRAN AUTO
AXLE /
CARB 2BBL
ODOM 21674
TEMP 86
BAR 29.80
HUMID 33
HEET/1979 MALIBU W/DEVICE

BAG#	REV	HC	CO	NO	CO2	HC	CO	NO	CO2
AMB1		6.3	0.0	1.5	0.05				
EXH1	17534	15.7	0.0	51.2	1.88	0.06	0.00	0.91	340.65
WT GRAMS/MILE						0.06	0.00	0.91	340.65

FUEL CONSUMPTION 26.02 MPG

51

Olson Engineering Inc.
Vehicle Test Facility
15612 Commerce Lane
Huntington Beach, California 92649 (714) 894-9878

VEHICLE EMISSION TEST DATA

TEST NO. 10183 DATE 6-12-79 PROJ NO. 6139
VEHICLE Chevrolet YEAR 1979 MODEL Malibu

LIC NO. NONE VEH I.D. R458392 ENG I.D. ______
TRANS Automatic CARB 1 Rochester BBL. 2
ENG TYPE V-6 DISPLACEMENT 231 AXLE ______
ODO START 01674 ODO FINISH ______
TYPE TEST HFET COLD ______ HOT ✓
BARO 29.96 "Hg. 29.80 "HG Corr. 23% WET BULB 66 °F DRY BULB 8(
DYNO INERTIA 3500 ACT RLHP 11.3 IND. RLHP 8.0
CVS INLET PRESS. 56.1 CVS Δ P 66.5
TEST DRIVER Esquivel OPERATOR Rigojio

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

OTHER ______

COMMENTS: w/ Device

CI ______ CS ______ HT ______

Olson Engineering Inc.

52

[illegible] Test Facility
15513 Commerce Lane
Huntington Beach, California 92649 (714) 894-9676

VEHICLE EMISSION TEST DATA

TEST NO. 10182 DATE 6-12-79 PROJ NO. 6137

VEHICLE Chevrolet YEAR 1979 MODEL Malibu

LIC NO. NONE VEH I.D. R458392 ENG I.D. ____

TRANS Automatic CARB 1 Rochester BBL. 2

ENG TYPE V-6 DISPLACEMENT 231 AXLE ____

ODO START 01663 ODO FINISH ____

TYPE TEST CVS II COLD ✓ HOT ____

BARO 29.98 "Hg. 29.82 "HG Corr. WET BULB 66 °F DRY BULB 86

DYNO INERTIA 3500 ACT RLHP 11.3 IND. RLHP 8.0

CVS INLET PRESS. 56.2 CVS Δ P 66.6

TEST DRIVER Esquivel OPERATOR Riggio

IGN. TIM ____ IDLE RPM ____ IDLE CO% ____

CONVERTER/YES ____ NO ____

IGN TYPE ____ EVAP. SYS ____

EGR/YES ____ NO ____ ____ LOCATION ____

VAC ADV /YES ____ NO ____ DELAY VALVE/YES ____ NO ____

P/A ____ SIZE ____

SILENCERS/YES ____ NO ____

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

OTHER ____

____

COMMENTS: W/ Device

____

C1 ____ C3 ____ HT ____

ZERO CALIBRATION

INSTR	RANGE	VALUE	CHVTS	MVTS	ERR
CO2	2	0	-3	-15	
CO	2	0	-3	7	
HC	1	0	0	-13	
NOX	1	0	-5	10	

SPAN CALIBRATION

INSTR	RANGE	VALUE	CHVTS	GAIN	ERR
CO2	2	422	4462	0.995	
CO	2	2493	4075	0.984	
HC	1	4446	4495	0.996	
NOX	1	2300	4555	1.001	

ZERO CALIBRATION

INSTR	RANGE	VALUE	CHVTS	MVTS	ERR
CO2	2	0	0	-5	
CO	2	0	0	7	
HC	1	0	-3	-15	
NOX	1	0	-5	7	

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

UNIT # 1
DATE 07/12/79 TIME: 15:45:01
TEST # 10356
CHASSIS # 0J87H187425
ENGINE # /
CLASS 78
DISP 400
WEIGHT 4500
TRAN AUTO
AXEL /
CARB 1X2V
ODOM 16752
TEMP 64
BAR 29.66
HUMID 43
COLD START CVS II

BAG#	REV	HC	CO	NO	CO2	HC	CO	NO	CO2
AMB1		8.4	0.0	0.6	0.03				
EXH1	11046	130.6	1855.0	37.5	2.77	0.62	18.64	0.61	432.65
AMB2		9.6	4.0	0.6	0.03				
EXH2	19456	13.6	1.0	12.9	1.60	0.05	-0.04	0.35	425.89
AMB3		7.4	0.0	0.3	0.02				
EXH3	11360	44.5	743.0	20.5	2.25	0.19	7.46	0.33	357.15
WTD GRAMS/MILE						0.42	12.22	0.50	815.59

FUEL CONSUMPTION 10.61 MPG

ZERO CALIBRATION

INSTR	RANGE	VALUE	CMVTS	MVTS	ERR
CO2	2	0	-3	-5	
CO	2	0	0	-10	
HC	1	0	0	0	
NOX	1	1	0	0	

SPAN CALIBRATION

INSTR	RANGE	VALUE	CMVTS	GAIN	ERR
CO2	2	421	4457	1.001	
CO	2	2493	4075	0.982	
HC	1	4459	4497	1.005	
NOX	1	2298	4560	1.003	

ZERO CALIBRATION

INSTR	RANGE	VALUE	CMVTS	MVTS	ERR
CO2	2	0	2	-26	
CO	2	0	0	-13	
HC	1	4	5	0	
NOX	1	0	-5	7	

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

UNIT # 1
DATE: 07/12/79 TIME: 10:11:52
TEST # 10387
CHASSIS # 5J87H107485
ENGINE # /
CLASS 78
DISP 400
WEIGHT 4500
TRAN AUTO
AXEL /
CARB 1X2V
ODOM 16792
TEMP 86
BAR 29.66
HUMID 39
HOT START HFET

BAG#	REV	HC	CO	NO	CO2	HC	CO	NO	CO2
AMB1		6.6	4.0	0.2	0.05				
EXH1	17170	17.3	142.0	33.4	3.27	0.07	1.54	0.60	564.47
WTD GRAMS/MILE						0.07	1.54	0.60	564.47

FUEL CONSUMPTION 15.64 MPG

6

ZERO CALIBRATION

INSTR	RANGE	VALUE	CHVTS	MVTS	ERR
CO2	2	0	2	-23	
CO	2	0	2	-3	
HC	1	0	0	22	
NOX	1	1	0	17	

SPAN CALIBRATION

INSTR	RANGE	VALUE	CHVTS	GAIN	ERR
CO2	2	422	4462	0.993	
CO	2	2497	4155	0.953	
HC	1	4470	4542	1.012	
NOX	1	2894	4572	1.002	

ZERO CALIBRATION

INSTR	RANGE	VALUE	CHVTS	MVTS	ERR
CO2	2	0	-3	-5	
CO	2	0	0	-3	
HC	1	0	-10	2	
NOX	1	0	-8	25	

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

UNIT # 1
DATE 07/17/79 TIME 08:44:40
TEST # 10409
CHASSIS # 8J87H187425
ENGINE # T-BIRD
CLASS 78
DISP 400
WEIGHT 4500
TRAN AUTO
AXEL #
CARB 1X2V
ODOM 16941
TEMP 80
BAR 29.95
HUMID 84
COLD START CVS II W/DEV.

BAG#	REV	HC	CO	NO	CO2	HC	CO	NO	CO2
AMB1		8.8	0.0	0.5	0.04				
EXH1	11305	126.7	2060.0	30.9	2.50	0.60	20.72	0.52	390.08
AMB2		9.3	0.0	0.0	0.05				
EXH2	19495	13.0	1.0	11.9	1.57	0.04	0.02	0.35	413.67
AMB3		6.8	0.0	0.2	0.03				
EXH3	11344	22.8	287.0	27.4	2.25	0.09	2.08	0.47	351.02
WTD GRAMS/MILE						0.35	10.11	0.54	751.48

FUEL CONSUMPTION 11.11 MPG

SYSTEM START-UP
DATE: 07/17/79   TIME: 09:05:07
ENTER FUNCTION
23A

ZERO CALIBRATION

INSTR	RANGE	VALUE	CMVTS	MVTS	ERR
CO2	2	0	2	-5	
CO	2	0	0	-3	
HC	1	9	10	-13	
NOX	1	1	2	7	

SPAN CALIBRATION

INSTR	RANGE	VALUE	CMVTS	GAIN	ERR
CO2	2	421	4457	0.997	
CO	2	2497	4155	0.952	
HC	1	4475	4547	1.012	
NOX	1	2300	4600	1.017	

ZERO CALIBRATION

INSTR	RANGE	VALUE	CMVTS	MVTS	ERR
CO2	2	0	-5	-10	
CO	2	0	0	0	
HC	1	0	0	0	
NOX	1	0	0	5	

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

UNIT # 1
DATE: 07/17/79   TIME: 09:11:27
TEST # 10410
CHASSIS # 6J57H157425
ENGINE # T-BIRD
CLASS 75
DISP 400
WEIGHT 4500
TRAN AUTO
AXEL /
CARB 1X2V
ODOM 16951
TEMP 74
BAR 29.96
HUMID 50
HOT START HFET w/DMU.

BAG#	REV	HC	CO	NO	CO2	HC	CO	NO	CO2
AMB1		7.0	0.0	0.6	0.03				
EXH1	17166	15.0	47.0	45.5	3.21	0.05	0.52	0.02	558.50
WTD GRAMS/MILE						0.05	0.52	0.02	558.50

FUEL CONSUMPTION   15.86 MPG

ZERO CALIBRATION

Attachment C

"Motor Trend" Article

GM X-CAR OWNERS SURVEY

THE COMPLETE AUTOMOTIVE MAGAZINE JULY 1980

MOTOR TREND

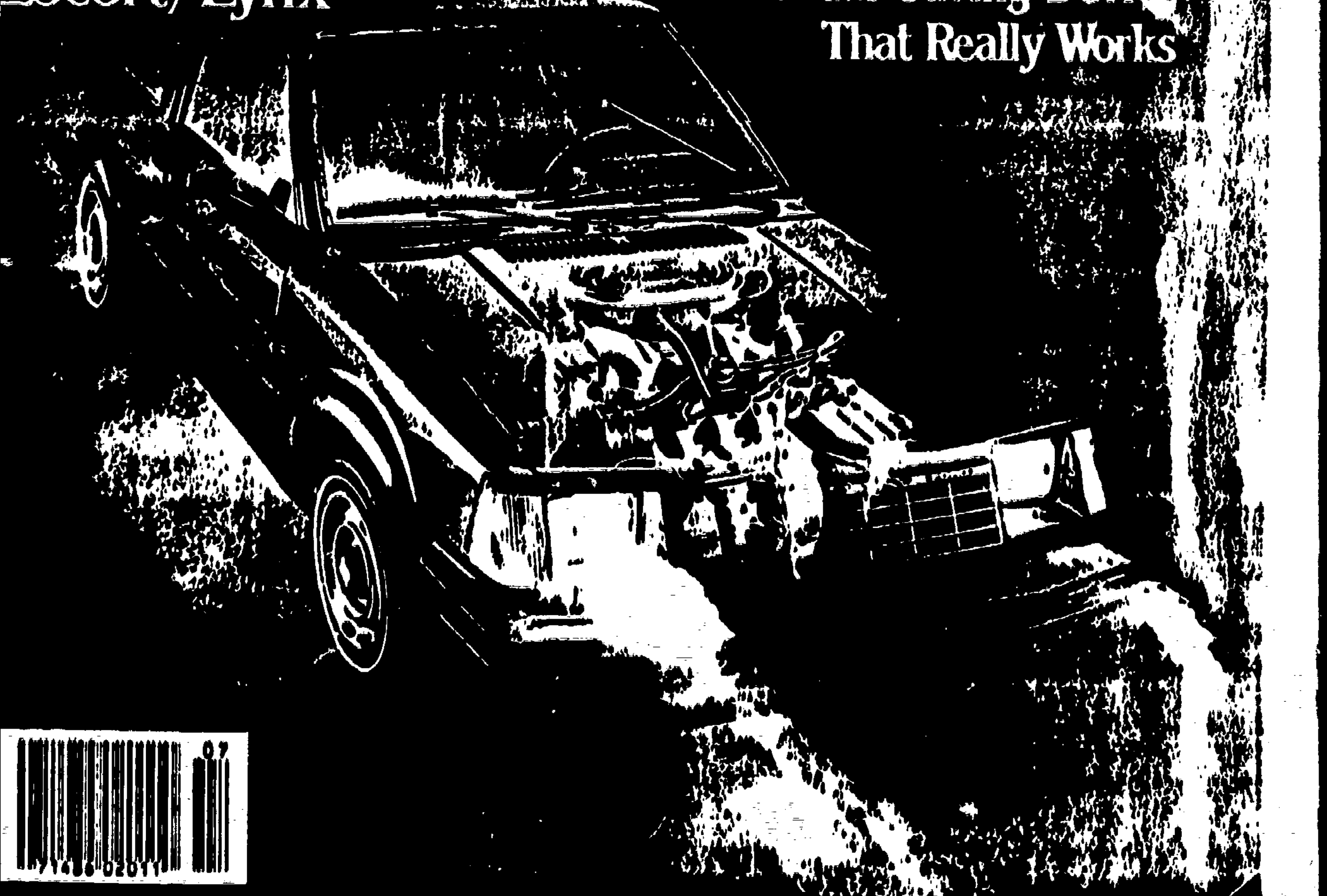
ROAD TESTS:
Audi 5000 Turbo
Plymouth Turismo
Renault Le Car

THE NEW 1981 FORDS

Front-Drive Escort/Lynx

INFLATION FIGHTERS:

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

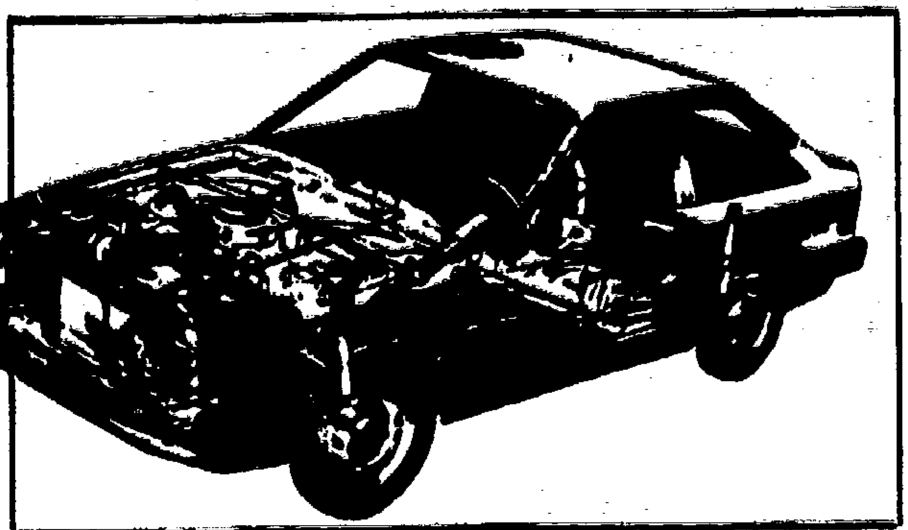


MOTOR TREND

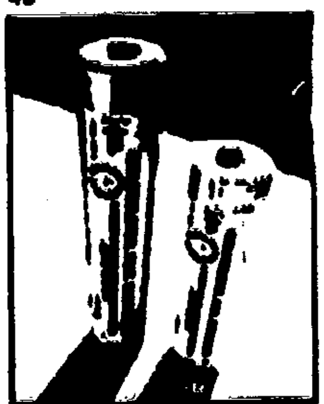
59 JULY 1980

VOL. 32, NO. 7

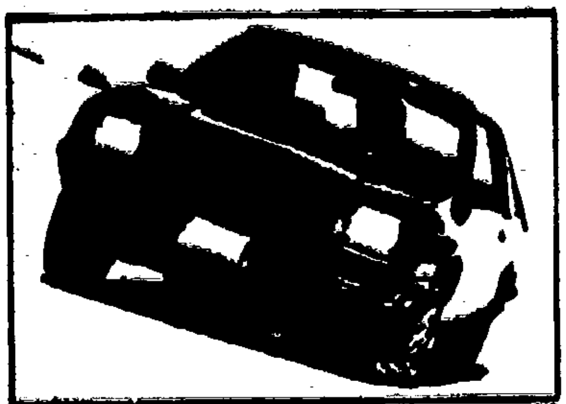
31



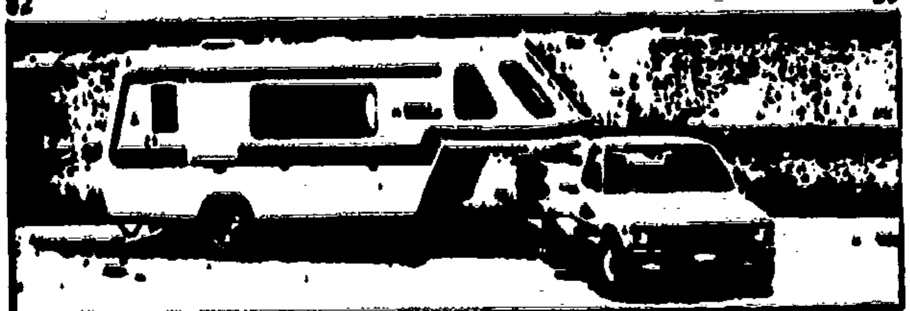
46



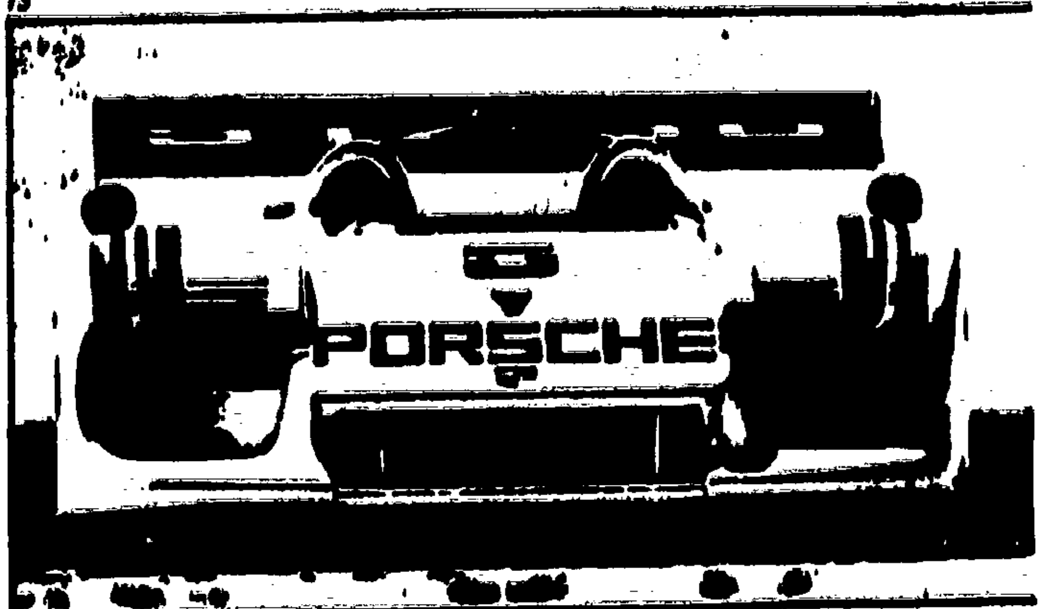
82



35



73



38

COVER STORY:

46 The 1981 Model E Ford
The all-new front-drive Escort may turn the world upside down—by Jim McCraw

ROAD TESTS:

31 Cross-Country in the Audi 5000 Turbo
Damn the tornados, full speed ahead—by Fred M.H. Gregory

35 TC3 Turismo
The 2 plus 2 Horizon moves toward becoming America's first new wave GT—by Bob Nagy

91 Renault Le Car
Americanizing a little car with a lot of value—by Jim McCraw

INFLATION FIGHTERS:

65 15 Econo Coupes Under $4500
Digging for the bare bones of personal transportation—by Peter Frey

73 Recreation Salvation
The latest vacation vehicles offer solutions for the $1.50-a-gallon problem

82 Miracle Mileage
We still don't believe it—by Chuck Nerpel and Peter Frey

87 Slaking the Automotive Thirst
Alcohol, whether grain or wood, is a gasoline stretcher and octane booster—by Chuck Nerpel

FEATURES:

23 The New Economics
Are you ready for the new money rules of car ownership?—by Leon Mandel

38 Porsche 917-30
Last symbol of a bygone era—by Burge Hulett

50 Retrospect: 1970 Fiat Abarth Scorpione
1958 is the year John Rich first went to Italy to meet Carlo Abarth—by Len Frank

57 The X-Car Owners Survey
How they really feel about it out there—by Ro McGonegal

DEPARTMENTS:

5 Editor's Report—*by John Dianna*

6 Readers' Report

13 Detroit Report—*by Ro McGonegal*

16 International Report—*by Fred Stafford*

18 Roving Report—*by Jim McCraw*

99 Competition Report—*by Bob Nagy*

104 Last Report—*by Leon Mandel*

COVER Photograph by Don Rackley, Ford Photomedia

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Miracle Mil

We still don't believe it

by Chuck Nerpel and Peter Frey

PHOTOS BY JIM BROWN

When we were approached by representatives of the Internal Energy Management Corporation with a device they called the Moleculator 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 rearranges 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 claims, 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 23%.

This all sounded very unlikely, but I.E.M. sparked 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.

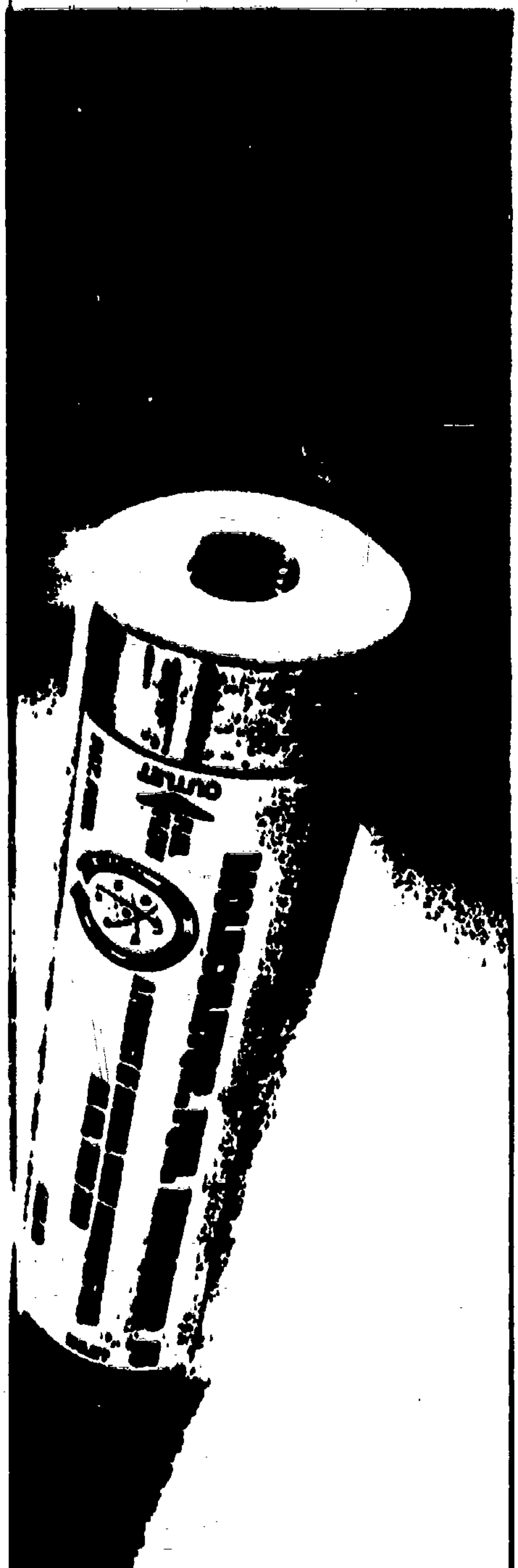
We agreed to run our own tests. A program involving five cars was set up, and while they were being run over a period of several weeks, we began digesting the information the Moleculator people supplied us.

The section of the Olson Engineering report that contained the hard data from the laboratory-controlled tests they ran seemed to indicate a fuel economy 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 driving 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 16.08 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 27156 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

eage



procedure. These cars showed average gains of 5-7% in urban-cycle fuel economy, and 1-2% in highway-cycle economy, both of ‹ 61 dered to be within the bounds of test variability. The remaining four cars showed 8-23% 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 two other cars, measuring the fuel economy with both the carbon-balance analysis of exhaust gases, and with a flowmeter 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 *n*th degree, seem to have torn the credibility of the Moleculator completely to shreds. We probably would have dropped the project right then except for two things: 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 Econoline van with a 351cid 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 73-mile loop and on an all-highway cruise at 55 mph.

Test No. 1: 1979 Ford Econoline Van (351cid V-8, automatic)
Test course—MT 73-mile fuel loop

	[illegible]	[illegible]
Distance	73 miles	73 miles
Time	2 hours	2 hours
Fuel used	4.9 gallons	4.2 gallons
Mileage	14.89 mpg	17.38 mpg
Increase: 16.7%		

Test course—highway (constant 55 mph)

Distance	100 miles	100 miles
Time	1.8 hours	1.8 hours
Fuel used	7.0 gallons	6.0 gallons
Mileage	14.29 mpg	16.66 mpg
Increase: 16.6%		

We also put the van through instrumented acceleration testing, with fuel supplied first 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 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 14.2% 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 considerable amount of energy 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 said, "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
(Note: Moleculator was installed in engine compartment, contrary to installation instructions)

	Baseline	Moleculator
Distance	73 miles	73 miles
Time	1.6 hours	1.6 hours
Fuel used	2.1 gallons	2.0 gallons
Mileage	34.76 mpg	36.5 mpg

Increase: 5%

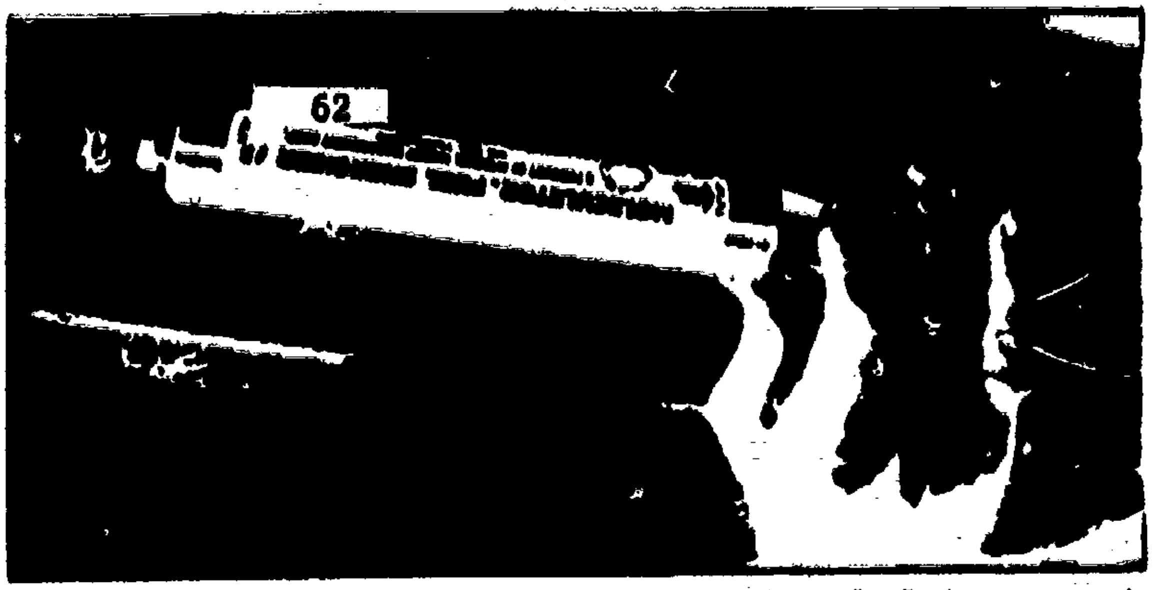
Test No. 3: 1980 Honda Civic
(1500cc 4-cylinder, 5-speed manual)
Test course—MT 73-mile fuel loop

	Baseline	Moleculator
Distance	73 miles	73 miles
Time	2 hours	2 hours
Fuel used	1.7 gallons	1.5 gallons
Mileage	42.8 mpg	48.6 mpg

Increase: 12.30%

Certainly there were variables, but we went 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 of humidity and temperature 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 15.4% and 17.1% 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."



A Moleculator was installed in the main tank fuel line of a 1979 Ford van equipped with two tanks. This allowed us to run back-to-back mileage tests, first on the un-Moleculated fuel from the auxiliary tank, then again with fuel from the main tank that passed through the device.

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 440cid engine, mpg had gone from 6.9 to 7.5 when members installed a Moleculator. She confirmed the results and said that several other club members had gotten similar results from their own tests. She 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 his 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 had gotten good and suspicious, everyone else we contacted confirmed a fuel economy improvement in their 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 year-and-a-half period. A company that services oil well drilling rigs tested the Moleculator on two diesel-engined generators and confirmed a 19.23% and a 21.18% 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: 1972 Toyota Land Cruiser
(236cid inline six, 3-speed manual)
Test course—highway (constant 55 mph)

	Baseline	Moleculator
Distance	250 miles	250 miles
Time	4.5 hours	4.5 hours
Fuel used	15.0 gallons	12.5 gallons
Mileage	16.6 mpg	20.0 mpg

Increase: 20.6%

(Note: This test was 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: 1970 Datsun 240Z
(2.4-liter inline six, 4-speed manual)
Test course—highway (constant 55 mph)

	Baseline	Moleculator
Distance	200 miles	200 miles
Time	3.6 hours	3.6 hours
Fuel used	7.2 gallons	6.7 gallons
Mileage	27.7 mpg	29.8 mpg

Increase: 7.58%

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 ARB 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.

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 us, 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 *decrease* in mileage (baseline mpg, 43.5; 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

I. 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.

II. Install Moleculator as per instructions. Follow specified break-in procedure.

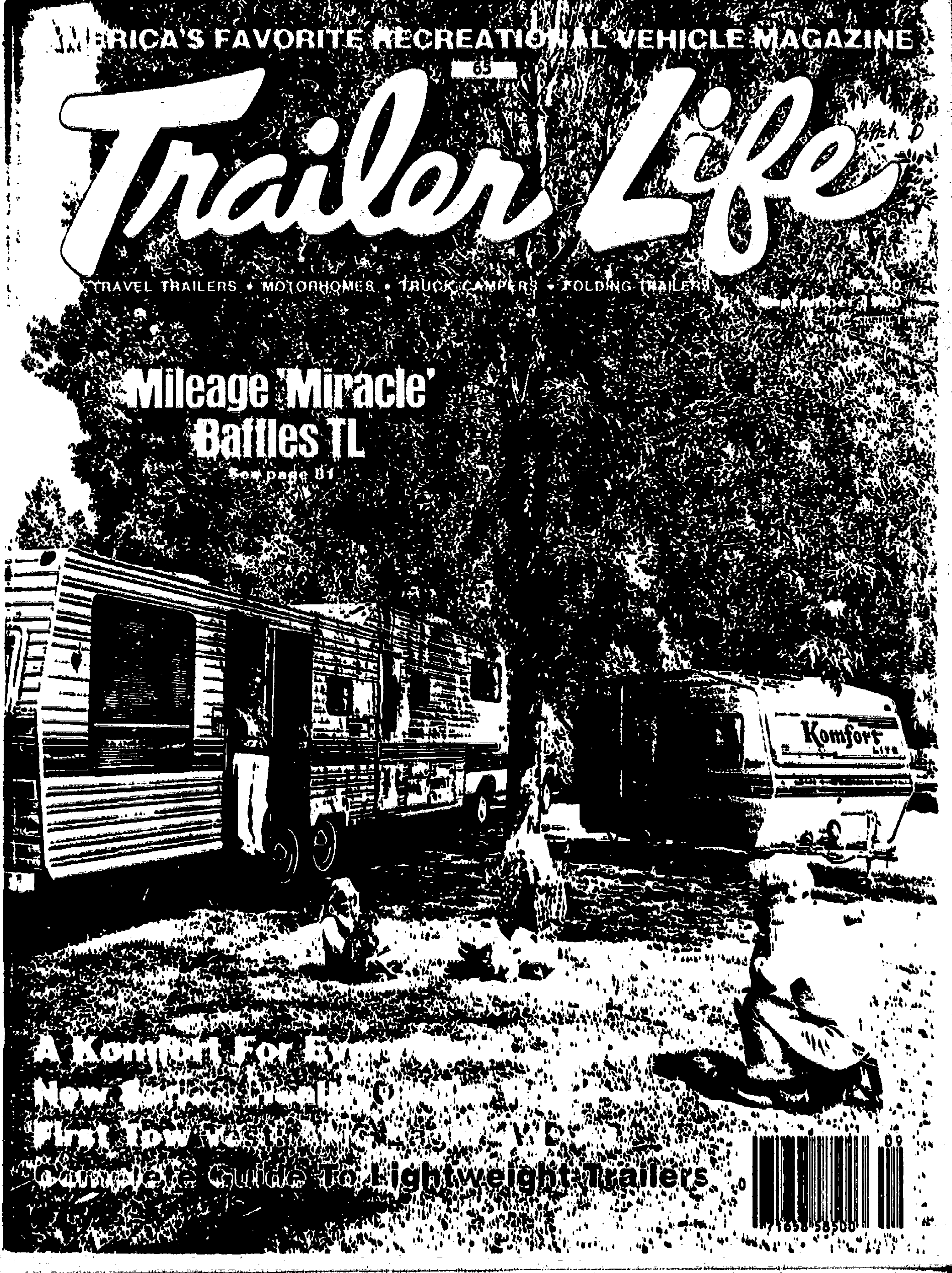
III. Re-test car as in section I. Try to duplicate conditions as accurately as possible.

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


AMERICA'S FAVORITE RECREATIONAL VEHICLE MAGAZINE
65
Trailer Life
TRAVEL TRAILERS • MOTORHOMES • TRUCK CAMPERS • FOLDING TRAILERS
Mileage 'Miracle' Baffles TL
Komfort
Complete Guide To Lightweight Trailers

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?"

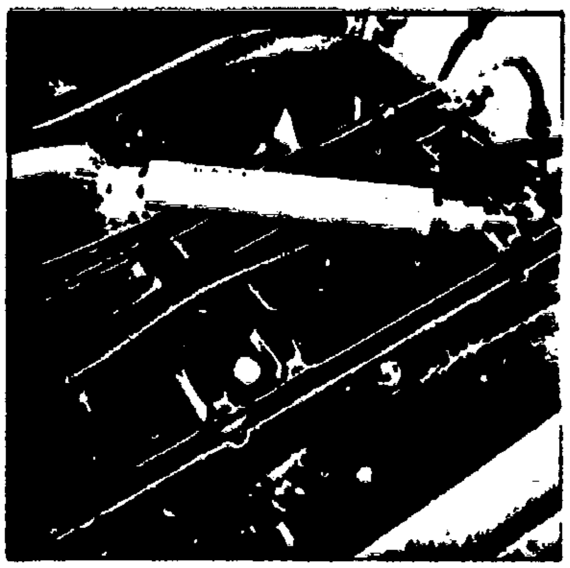
But before you're able to call for help (he's bigger than you are), he pulls out a rather exhaustive fuel economy test performed by a major automotive testing laboratory (Olson Engineering of Huntington Beach, California) and mentions that a couple of other magazines are involved in testing the device.

On closer examination, the Olson report shows fuel economy increases ranging from 10.82% to 20.30% 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. And he seems quite sincere in his belief that the Moleculetor does work. Lovegrove handles Nevada and Hawaii for the Moleculetor distributor, Internal Energy Management Corporation of Del Rio, Texas. 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.



Moleculetor is designed to be spliced into fuel line between fuel pump and tank.

Of course, most marketers of gas-saving devices are able to come up with a variety of testimonals. 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 tw[illegible] months and 3,000 miles. 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 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 shutoff 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 2 mpg increase.

"Why," we asked Lovegrove, "did the

more on page 93

MOLECULETOR *from page 81*

mileage increase before we even installed the Moleculetor?" His reply was a question: "Where did you carry the Moleculetor 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 Moleculetor produces would affect the "energization" of the vehicle even if the fuel is not routed through the device. The Moleculetor, 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 Moleculetor 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 $89.95 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.

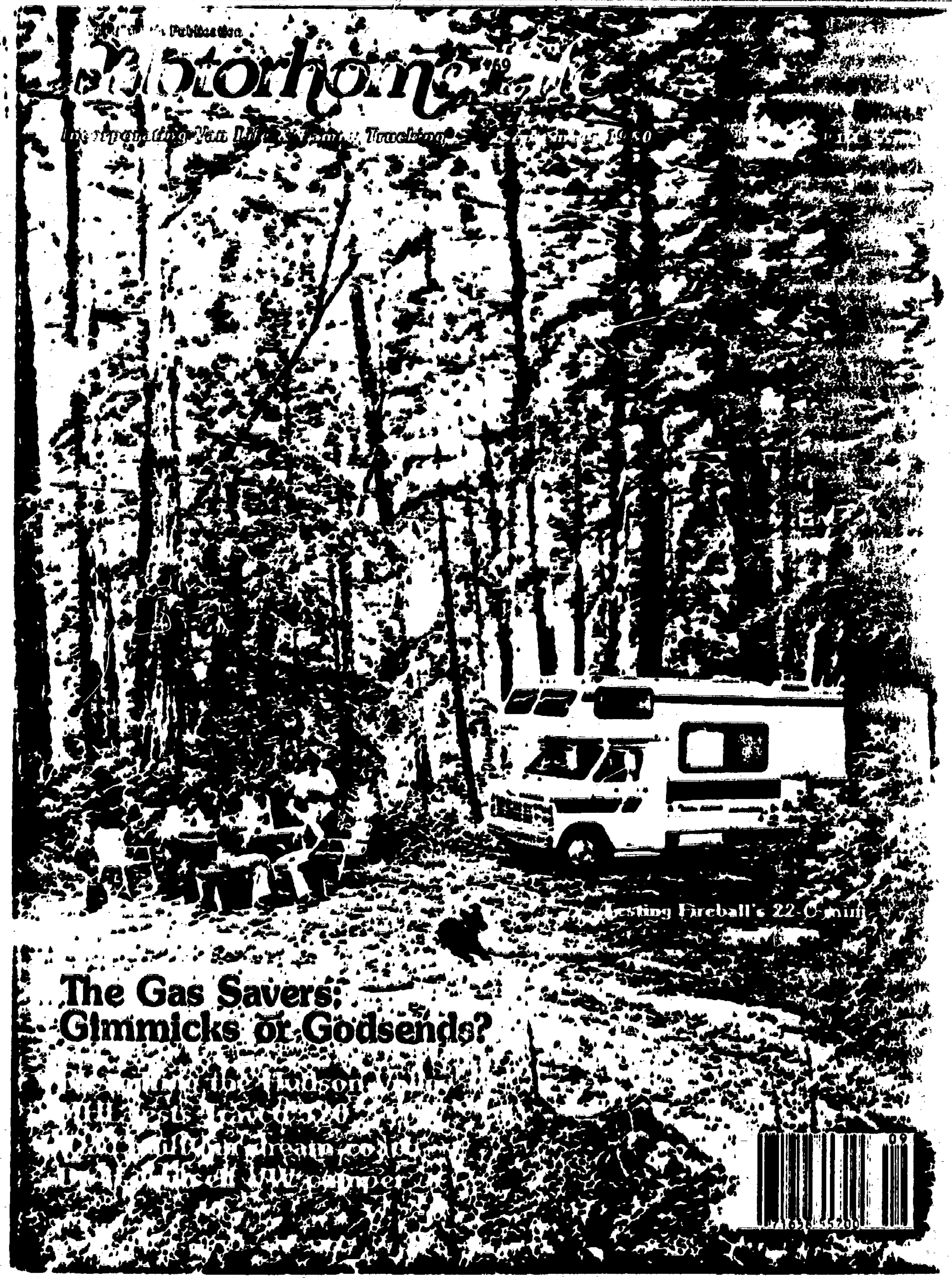
Do our tests and those conducted by *Motor Trend* mean the Moleculetor works? Your interpretation of the results is about as good as ours. While the results appear to be uniformly positive, the idea that a simple little aluminum tube can produce enough magic to improve fuel economy in vehicles weighing 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 1429, Del Rio, Texas 78840, or circle Reader Service No. 337. Phone 800/331-1750 except in Oklahoma; phone 800/722-3600 in Oklahoma.)

Attachment E

"Motorhome Life" Article


The Gas Savers:
Gimmicks or Godsends?

Moleculetor

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?

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But before you're able to call for help (he's bigger than you are), he pulls out a

Although no hard scientific data can be used to explain why the Molecuietor is successful, MHL tests reported a substantial increase in mileage.

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 10.82% to 20.30% 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 supposedly is distributed throughout the vehicle by the Moleculetor.

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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 is the one recommended in the beginning article, in this issue — *Gas Savers: Gimmicks or Godsends?* 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 shutoff nozzle on slow feed. When it shuts off automatically, we hang it up. Repeat tests showed a mileage margin of error of around ½ mpg . . . larger than we normally tolerate.

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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 Moleculetor 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 $89.95 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.

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(Company address: Internal Energy Management Corporation, Box 1429, Del Rio, Texas 78840. Phone 800/331-1750 except in Oklahoma; Phone 800/722-3600 in Oklahoma.)

Attachment F

Statements by Individuals

The World's Largest (and Fastest Growing) RV Owners Organization
International Headquarters, P.O. Box 500, Agoura, California 91301, (213) 991-4980

The Good Sam Club

ETHA MAE WILSON
Nevada State Director
2605 Spear St.
North Las Vegas, NV 89030

March 25, 1980

Moleculetor 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 equiped with a 440 Dodge engine. The results of the test showed an increase from 6.8 miles per gallon to 8.5 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 personaly 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,

Etha Mae Wilson

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, 1968.

The date set forth in the attached Exhibits 1 through 1 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 1 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 at Phoenix, AZ., Maricopa County this 30th day of January, 1980.

Joan Meagher

My Commission Expires July 31, 1981

Cummins Arizona Diesel Inc.
2239 North Black Canyon Highway
P. O. Box 6697
Phoenix, Arizona 85005
602 252 8021

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

Kenneth M. Taylor
General Service Manager

KMT/ck

Enclosures

CUSTOMER Internal Energy Management S/O# 25287 DYNO OPERATOR R Hubbard

ENGINE MODEL VTA-42 S/N 1/ 31592

OIL PRESSURE COLD START PSI 90 P.S.I. RPM 550 PUMP CODE 2383

TIME	RPM	SCALE	HP	INTAKE MFD PRESS	RAIL PRESS	INTAKE AIR TEMP	FUEL RATE	EXHAUST TEMP RB	EXHAUST TEMP LB	ENGINE WATER TEMP	ENGINE OIL TEMP	ENGINE OIL PRESS	CRANK CASE PRESS	DYNO WATER TEMP
8:24 8:54	2300	15.5	357	17.5	155	82	169			175	234	65		95
						WITHOUT	MOLECULATER							
10:00 11:00	2300	15.5	357	16.0	155	93	137			173	241	67		96
11:51 12:51	2300	15.5	357	16.0	155	96	151			173	238	65		98
9:16 9:16	2300	15.5	357	16.0	155	91	143	800		175	238	65	9	94

TAKE OIL SAMPLE. CHECK VISCOSITY & RECORD

STATE OF ARIZONA 77

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 The TANNER COMPANIES, which I presently serve in the capacity of ASST. 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, 1948.

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 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 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 _______________, _______________, _______________, on this 29th day of January, 1980.

Claire L. Fryer

My Commission Expires Sept. 12, 1983

AFFIDAVIT OF THE TANNER COMPANIES

I. Run Used for Standard

1. Basic Vehicle Description (Mfg., year, model, VIN, total miles, weight including engine, etc.) TRUCK NO. 43-591

MFG. - I.H.C., YEAR - 1978, VIN - HGB11682,

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 - NTC290,

S.N. - 10678578, 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. - CHALLENCE,

MODEL - BODOM DUMP, YEAR - 1977, NO. WHEELS - 12,

EMPTY WEIGHT - 11,800

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

AVERAGE GVW - 56,000

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 100874 miles

Starting odometer reading 90021 miles

Net Travel 10,853 miles

6. Inclusive Dates of Standard Run

Starting Date: 11-1 19 78

Finish date: 11-30 19 78

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

$$\frac{\text{Net miles traveled (5 above)}}{\text{Gal fuel used (7 above)}} = 4.5 \ \frac{\text{miles}}{\text{gal.}}$$

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: 111535 miles

Starting odometer reading: 101317 miles

Net Travel 10,218 miles

6. Inclusive Dates of Test Run:

Starting date: 12-1, 19 78

Finish date: 12-30, 19 78

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:

$$\frac{\text{Net miles traveled (5 above)}}{\text{Gal. fuel used (7 above)}} = 5.4 \ \frac{\text{miles}}{\text{gal.}}$$

III. Calculated Benefit Obtained by Adding MOLECULTOR to Engine:

$$\text{Benefit} = \frac{5.4\ \frac{\text{Miles}}{\text{gal}}\ \text{with energizer (P II, S 8)} \quad \frac{\text{Miles}}{\text{gal}}\ \text{standard (P I, S 8)}}{4.5\ \frac{\text{Miles}}{\text{gal.}}\ \text{Standard}}$$

$$= \frac{5.4\ \frac{\text{Miles}}{\text{gal.}}\ \text{increase}}{4.5\ \frac{\text{Miles}}{\text{gal.}}\ \text{standard}} = 0.9 = 0.\ 20.0\ \%$$

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 - CO4070

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 - 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.)

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: 7 - 1 19 79

Finish date: 8 - 30 19 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): 3,894.2 gallons

By FILLED IN YARD BY METERED PUMP

8. Calculated Rate of Consumption for Standard Run

$\frac{\text{Net miles traveled (5 above)}}{\text{Gal fuel used (7 above)}}$ = 5.2 $\frac{\text{miles}}{\text{gal.}}$

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

83

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: 121968 miles

Starting odometer reading: 102618 miles

Net Travel 19350 miles

6. Inclusive Dates of Test Run:

Starting date: 9-1, 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 - 3,071.4

FILLED SAME AS BASE TEST

8. Calculated Rate of Consumption for Test Run:

$$\frac{\text{Net miles traveled (5 above)}}{\text{Gal. fuel used (7 above)}} = 6.3 \ \frac{\text{miles}}{\text{gal.}}$$

III. Calculated Benefit Obtained by Adding MOLECULTOR to Engine:

$$\text{Benefit} = \frac{6.3\ \frac{\text{Miles}}{\text{gal}}\text{ with energizer (P II, S 8)} \quad \frac{\text{Miles}}{\text{gal}}\text{ standard (P I, S 8)}}{5.2\ \frac{\text{Miles}}{\text{gal.}}\ \text{Standard}}$$

$$= \frac{6.3\ \frac{\text{Miles}}{\text{gal.}}\ \text{increase}}{5.2\ \frac{\text{Miles}}{\text{gal.}}\ \text{standard}} = 1.1 = 0. = 21.1\ \%$$

84 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 - 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.)

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 19 79

Finish date: 8 - 30 19 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): 3,894.2 gallons

by FILLED IN YARD BY METERED PUMP

8. Calculated Rate of Consumption for Standard Run

$$\frac{\text{Net miles traveled (5 above)}}{\text{Gal fuel used (7 above)}} = 5.2 \ \frac{\text{miles}}{\text{gal.}}$$

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
86
"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: 121968 miles

Starting odometer reading: 102618 miles

Net Travel 19350 miles

6. Inclusive Dates of Test Run:

Starting date: 9-1, 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 - 3,071.4

FILLED SAME AS BASE TEST

______

8. Calculated Rate of Consumption for Test Run:

$$\frac{\text{Net miles traveled (5 above)}}{\text{Gal. fuel used (7 above)}} = \underline{6.3}\ \frac{\text{miles}}{\text{gal.}}$$

III. Calculated Benefit Obtained by Adding MOLECULTOR to Engine:

$$\text{Benefit} = \frac{6.3\ \frac{\text{Miles}}{\text{gal}}\ \text{with energizer (P II, S 8)}\quad \frac{\text{Miles}}{\text{gal}}\ \text{standard (P I, S 8)}}{5.2\ \frac{\text{Miles}}{\text{gal.}}\ \text{Standard}}$$

$$= \frac{6.3\ \frac{\text{Miles}}{\text{gal.}}\ \text{increase}}{5.2\ \frac{\text{Miles}}{\text{gal.}}\ \text{standard}} = \underline{1.1} = 0. = \underline{21.1}\ \%$$

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 date set forth in the attached Exhibits 1 through 10 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 10 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: Carl Etter]

SUBSCRIBED AND SWORN TO before me, the undersigned officer duly authorized to administer oaths and verify statements by the above named Carl Etter, at ________, ________, ________, on this 29 day of January, 1980.

[signature]

My Commission Expires Aug 20, 1982

88 EXHIBIT 2 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. 503

MFG. - I.H.C., YEAR - 1978, MODEL - CO4070, VIN. - E2317HGA18118, MILES - 137086, 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 - 137086, 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: 98,000 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 95558 miles

Starting odometer reading 74872 miles

Net Travel 20686 miles

6. Inclusive Dates of Standard Run

Starting Date: 89 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

$\frac{\text{Net miles traveled (5 above)}}{\text{Gal fuel used (7 above)}}$ = 4.9 $\frac{\text{miles}}{\text{gal.}}$

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: 116655 miles

Starting odometer reading: 95569 miles

Net Travel 21086 miles

6. Inclusive Dates of Test Run:

Starting date: 9-1, 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 - 3,573.9

8. Calculated Rate of Consumption for Test Run:

$$\frac{\text{Net miles traveled (5 above)}}{\text{Gal. fuel used (7 above)}} = 5.9 \ \frac{\text{miles}}{\text{gal.}}$$

III. Calculated Benefit Obtained by Adding MOLECULTOR to Engine:

$$\text{Benefit} = \frac{5.9 \ \frac{\text{Miles}}{\text{gal}} \text{ with energizer (P II, S 8)} \quad \frac{\text{Miles}}{\text{gal}} \text{ standard (P I, S 8)}}{4.9 \ \frac{\text{Miles}}{\text{gal.}} \text{ Standard}}$$

$$= \frac{5.9 \ \frac{\text{Miles}}{\text{gal.}} \text{ increase}}{4.9 \ \frac{\text{Miles}}{\text{gal.}} \text{ standard}} = 1.0 = 0. = 20.4$$

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 - C04070, VIN. - 229471Y034515, 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 - 1674

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 285931 miles

Starting odometer reading 280390 miles

Net Travel 5541 miles

6. Inclusive Dates of Standard Run

Starting Date: 7-1 19 79

Finish date: 8-30 19 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): 1,351.5 gallons

by FILLED IN YARD BY METERED PUMP

8. Calculated Rate of Consumption for Standard Run

Net miles traveled (5 above) / Gal fuel used (7 above) = 4.1 miles/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: 291662 miles

Starting odometer reading: 285944 miles

Net Travel 5718 miles

6. Inclusive Dates of Test Run:

Starting date: 9-1, 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 - 1,058.9

FILLED SAME AS BASE TEST

8. Calculated Rate of Consumption for Test Run:

$$\frac{\text{Net miles traveled (5 above)}}{\text{Gal. fuel used (7 above)}} = 5.4 \ \frac{\text{miles}}{\text{gal.}}$$

III. Calculated Benefit Obtained by Adding MOLECULTOR to Engine:

$$\text{Benefit} = \frac{5.4\ \frac{\text{Miles}}{\text{gal}}\ \text{with energizer (P II, S 8)} \quad \frac{\text{Miles}}{\text{gal}}\ \text{standard (P I, S 8)}}{4.1\ \frac{\text{Miles}}{\text{gal.}}\ \text{Standard}}$$

$$= \frac{5.4\ \frac{\text{Miles}}{\text{gal.}}\ \text{increase}}{4.1\ \frac{\text{Miles}}{\text{gal.}}\ \text{standard}} = 1.3 = 0. = 31.7\ \%$$

EXHIBIT 5 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. 507
MFG. - I.H.C., YEAR - 1979, MODEL - C0470, VIN. - E2317JGA10483, MILES 87199, 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 - 1979, MODEL - FORMULA 350, MILEAGE - 87199, 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.)
PHOENIX TO LOS ANGELES, BACK TO PHOENIX, WEATHER - GOOD, TRAFFIC - MEDIUM

5. Miles for Standard Run

Final odometer reading 52730 miles
Starting odometer reading 32874 miles
Net Travel 19856 miles

6. Inclusive Dates of Standard Run

Starting Date 95 7-1 19 79

Finish date: 8-30 19 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

$\frac{\text{Net miles traveled (5 above)}}{\text{Gal fuel used (7 above)}} = 4.6 \frac{\text{miles}}{\text{gal.}}$

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: 73536 miles

Starting odometer reading: 53180 miles

Net Travel 20356 miles

6. Inclusive Dates of Test Run:

Starting date: 9-1, 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) / Gal. fuel used (7 above) = 5.9 miles/gal.

III. Calculated Benefit Obtained by Adding MOLECULTOR to Engine:

Benefit = (5.9 Miles/gal with energizer (P II, S 8) Miles/gal standard (P I, S 8)) / (4.6 Miles/gal. Standard)

= (5.9 Miles/gal. increase) / (4.6 Miles/gal. standard) = 1.3 = 0. = 28.3

Attachment G

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

EPA-AA-TEB-81-18

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 Moleculetor 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 Moleculetor 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 Moleculetor (hereafter referred to as Moleculetor). The Moleculetor 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 Moleculetor 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 Moleculetor, 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 Moleculetor.

Purpose of EPA Program

The purpose of this program was to evaluate the effects of the Moleculetor 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: Chevette, 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, CO_2, 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 EEI. 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 Chevette 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 requires 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 sucessful 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 Moleculetor, 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 rebaselined because the Moleculetor had already been installed. According to the manufacturer's claims, 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 Moleculetor. 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 EEI. 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 "Moleculetor installed" FTP emission and fuel economy results for the test vehicles.

Table 1
Average FTP Emissions and Fuel Economy
(Emission values in grams/mile)

Vehicle	Test	Number of Tests	HC	CO	CO_2	NOx	MPG
Citation	Baseline	2	.47	4.00	427	1.55	20.40
	Moleculetor	2	.44	3.64	417	1.74	20.95
Chevette	Baseline	3	.60	6.20	348	1.50	24.70
	Moleculetor	3	.66	7.17	352	1.48	24.27
Fairmont	Baseline	6	.59	6.23	460	1.73	18.80
	Moleculetor	5	.61	6.42	443	2.02	19.50

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)

Vehicle	Test	Number of Tests	HC	CO	CO_2	NOx	MPG
Citation	Baseline	2	.11	.49	299	1.50	29.55
	Moleculetor	3	.10	.56	284	1.49	31.10
Chevette	Baseline	3	.13	.57	274	1.75	32.20
	Moleculetor	2	.12	.50	278	1.75	31.85
Fairmont	Baseline	6	.13	.06	366	1.50	24.18
	Moleculetor	5	.15	.03	348	1.57	25.48

As with the FTP, the HFET fuel economy varied on both the plus and minus side. The Citation and the Fairmont both displayed a 5% increase, while the Chevette decreased 1%. Overall, a 3% improvement was measured. The emission values displayed very little variances between the baseline and Moleculetor tests.

The original Fairmont which was subsequently disqualified showed marked increases in the FTP and HFET test numbers after the Moleculetor 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 Moleculetor 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 HFET, 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 Moleculetor 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

#1 Adrian Road Route

(130 miles, about 3 hours)

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

#2 - Ohio Road Route

(133 miles, about 3 hours)

Location	Route	Miles
EPA	Start at EPA Parking Lot	0.0
	EPA to Plymouth Road (turn left)	
	Plymouth Road to US-23 (South) (turn right, enter ramp)	
Toledo, Ohio	US-23 to SR-2 in Ohio (West) (exit right)	48.8
	SR-2 (West) to SR-109 (North) (turn right)	66.7
Ann Arbor, MI	SR-109 turns into M-52 at Michigan border (straight)	76.3
	M-52, through Adrian, to M-50 (East) (turn right)	96.8
	M-50 to Ridge Highway (turn left)	104.1
	Ridge Highway to Mooreville Road (turn right)	113.7
	Mooreville Road to Stony Creek (turn left)	114.2
	Stony Creek to Carpenter Road (turn left)	117.7
	Carpenter Road turns to Hogback at Washtenaw (straight)	125.8
	Hogback Road turns into Huron River Drive (straight)	
	Huron River Drive to Dixboro Road (turn left)	127.0
	Dixboro to Plymouth Road (turn left)	
	Plymouth Road to EPA (turn right)	
EPA	Finish at EPA Parking Lot	132.7

#3 - Ann Arbor Road Route

(153 miles, 3-1/2 to 4 hours)

Location	Route	Miles	Time hr:min
EPA	Start at EPA Parking Lot	0.0	0:00
	EPA to Plymouth Road (left turn)		
	Plymouth Road to Ford Road (right turn)		
	Ford Road to Prospect (right turn)	6.0	0:09
Ypsilanti	Prospect to Forest (right turn)	11.0	0:17
	Forest to Hamilton (left turn)	12.0	
	Hamilton through Ypsilanti & over I-94		
	Hamilton changes to Whittaker		
	Whittaker to Milan-Oakville Road (right turn)	23.0	0:36
Milan	Milan-Oakville Road to Main (veer right)		
	Main, through Milan, to Saline-Milan Road (right turn)	30.0	0:45
Saline	Saline-Milan Road to Michigan Ave. (left turn)	35.0	0:55
	Michigan Ave., through Saline, to Austin Road (right turn)	36.0	0:56
Manchester	Austin changes to M-52 in Manchester		
	M-52 to Main (left turn)	50.0	1:13
	Main changes back to Austin Road		
Napoleon	Austin Road to M-50 (straight at STOP sign)		
	M-50 to Napoleon Road (right turn)	62.0	1:29
	Napolean changes to Broad Street (straight at STOP sign on Lee)		
Michigan Center	Broad to Fifth (right turn)	68.0	1:37
	Fifth to Page Ave. (right turn)		
	Page to Ballard Road at TRICO Industries before RR tracks (see map on next page) (left turn)	69.0	1:40
	Ballard to Michigan Road (right turn)	70.0	1:42
Grass Lake	Michigan to Mt. Hope (left turn)	76.0	1:50
	NOTE: Mt. Hope is Union Street on the right side of Michigan Road in Grass Lake		
	Mt. Hope over I-94 to Seymour (right turn)	81.0	1:56
	Seymour turns into Trist (no noticeable turns)		
	Trist to Clear Lake (left turn)	84.0	2:00
	Clear Lake to Waterloo Road (turn right)		
	Waterloo to M-52 (turn right)	91.0	2:10

#3 – Ann Arbor Road Route cont.

Location	Route	Miles	Time hr:min
Chelsea	M-52 to Middle Street at light (left turn)	94.0	2:15
	Middle Street to McKinley (left turn)	94.0	2:16
	McKinley over RR tracks to Dexter-Chelsea Road (right turn)		
Dexter	Dexter-Chelsea Road to Main in Dexter (left turn)	101.0	2:24
	Main, under viaduct, to Dexter-Pinckney (veer right) NOTE: Main changes to Island Lake Road at Dexter-Pinckney Road		
Pinckney	Dexter-Pinckney Road to M-36 (right turn)	110.0	2:38
	M-36 to US-23 (North) (left turn)	12[illegible].0	2:54
	US-23 to I-96 (East) (exit right)	127.0	3:01
	I-96 to Milford-New Hudson, Exit 155, to Pontiac Trail (also Milford Road) (exit right, then turn right)	134.0	3:09
New Hudson	Pontiac Trail across Grand River (veer right) continue on Pontiac Trail (see map below)[2]		
	Pontiac Trail turns left at Silver Lake Road (left turn)		
South Lyon	Pontiac Trail through South Lyon		
	Pontiac Trail to Dixboro Road (left turn)	147.0	3:27
	Dixboro Road to Plymouth Road (right turn)	151.0	3:33
	Plymouth Road to EPA (right turn)		
EPA	Finish at EPA Parking Lot	153.0	3:37

#4 - Howell Road Route

(127 miles, 3-1/4 to 3-1/2 hours)

Location	Route	Miles	Time hr:min
EPA	Start at EPA Parking Lot	0.0	0:00
	EPA to Plymouth Road (turn left)		
	Plymouth Road to Ford Road (detour) (turn right)		
	Ford Road to M-153 (West) (turn right, then 180° left turn at island)		
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 I-275 (North) (right turn onto cloverleaf)	16.2	0:00
	I-275 to I-96 (West) (follow left lane of I-275 straight)		
	I-96 to Novi Exit (Walled Lake) (right turn off exit ramp)	27.0	
	Novi Road to East Lake Drive (right turn)		
	E. Lake Drive to Pontiac Trail (right turn)	30.8	0:45
	Pontiac Trail to South Commerce Road (left turn)	31.6	
	S. Commerce to Oakley Park Road (right turn)	33.7	
	Oakley Park to Newton (left turn)	34.2	
	Newton to Richardson (right turn)	34.5	0:52
	Richardson to Union Lake Road (left turn)	35.7	
	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 I-96 (West) (right turn on ramp)	67.5	
	I-96 to M-52 (South) (exit right, turn left off of ramp)	78.9	1:40
Chelsea	M-52 through Stockbridge to Chelsea	106.8	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)		

Location	Route	Miles	Time hr:min
A^2 cont.	Broadway to Plymouth (veer left at fork) Plymouth Road to EPA	125.7	
EPA	Finish at EPA Parking Lot	127.1	3:15

Appendix B

Individual Test Results

Moleculator Fuel Energizer Evaluation
1979 Chevette

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

Test Number	Date	Test Condition	HC	CO	CO_2	NOx	MPG
80-6781	11/19/80	Baseline	.62	6.9	351	1.42	24.4
80-6783	11/20/80	Baseline	.57	5.4	346	1.54	24.9
30-6785	11/21/80	Baseline	.61	6.3	346	1.53	24.8
80-6936	12/2/80	Moleculator	.76	7.8	348	1.39	24.5
80-6938	12/3/80	Moleculator	.61	6.8	354	1.48	24.2
80-6956	12/4/80	Moleculator	.60	6.9	355	1.56	24.1

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

Test Number	Date	Test Condition	HC	CO	CO_2	NOx	MPG
80-6782	11/19/80	Baseline	.13	0.8	280	1.79	31.5
80-6784	11/20/80	Baseline	.13	0.3	272	1.68	32.5
80-6784	11/21/80	Baseline	.13	0.6	271	1.78	32.6
80-6937	12/2/80	Moleculator*	.16	1.1	318	2.15	27.7
80-6939	12/3/80	Moleculator	.12	0.5	276	1.70	32.0
80-6955	12/4/80	Moleculator	.12	0.5	279	1.80	31.7

*Test voided - results not averaged into summary.

Moleculetor Fuel Energizer Evaluation

1980 Chevrolet Citation

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

Test Number	Date	Test Condition	HC	CO	CO_2	NOx	MPG
80-6786	11/18/80	Baseline	.50	3.9	420	1.52	20.7
80-6806	11/19/80	Baseline	.43	4.1	434	1.58	20.1
80-6786	12/2/80	Moleculetor*	.49	4.8	410	1.64	21.2
80-6788	12/3/80	Moleculetor	.43	3.3	416	1.76	21.0
80-6958	12/4/80	Moleculetor	.45	4.0	417	1.72	20.9

*Test voided - results not averaged into summary.

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

Test Number	Date	Test Condition	HC	CO	CO_2	NOx	MPG
80-6809	11/18/80	Baseline	.11	0.5	298	1.50	29.6
80-6807	11/19/80	Baseline	.10	0.5	299	1.49	29.5
80-6787	12/2/80	Moleculetor	.11	0.6	277	1.43	31.9
80-6789	12/3/80	Moleculetor	.10	0.5	291	1.52	30.4
80-6957	12/4/80	Moleculetor	.10	0.6	285	1.53	31.0

Moleculetor Fuel Energizer Evaluation
1980 Ford Fairmont

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

Test Number	Date	Test Condition	HC	CO	CO_2	NOx	MPG
80-7262	1/13/81	Baseline	.61	7.2	471	1.58	18.3
80-7264	1/14/81	Baseline	.59	6.3	460	1.66	18.8
80-7266	1/15/81	Baseline	.58	5.7	452	1.80	19.2
80-7268	1/16/81	Baseline	.58	5.9	460	1.92	18.8
80-7271	2/3/81	Baseline	.56	4.6	455	1.71	19.1
80-7273	2/4/81	Baseline	.64	7.8	462	1.71	18.6
80-7744	2/12/81	Baseline*	.41	2.3	456	2.22	19.2
80-7750	2/20/81	Moleculetor	.68	7.8	448	1.97	19.2
80-7752	2/24/81	Moleculetor	.58	5.2	443	2.01	19.6
80-7754	2/25/81	Moleculetor	.60	6.0	447	2.15	19.3
80-7756	3/3/81	Moleculetor	.60	6.3	435	1.98	19.8
80-7978	3/4/81	Moleculetor	.61	6.8	441	1.99	19.6

*Test voided - results not averaged into summary.

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

Test Number	Date	Test Condition	HC	CO	CO_2	NOx	MPG
80-7263	1/13/81	Baseline	.12	.03	370	1.45	23.9
80-7265	1/14/81	Baseline	.13	.09	371	1.51	23.9
80-7267	1/15/81	Baseline	.13	.04	363	1.50	24.4
80-7270	1/16/81	Baseline	.13	.06	367	1.56	24.1
80-7272	2/3/81	Baseline	.14	.03	356	1.47	24.9
80-7283	2/4/81	Baseline	.13	.09	371	1.49	23.9
80-7745	2/12/81	Baseline*	.14	.01	358	1.73	24.7

80-7751	2/20/81	Moleculetor	.15	.06	356	1.53	24.9
80-7753	2/24/81	Moleculetor	.15	.03	348	1.57	25.4
80-7755	2/25/81	Moleculetor	.15	.01	345	1.65	25.7
80-7757	3/3/81	Moleculetor	.15	.02	345	1.61	25.7
80-7979	3/4/81	Moleculetor	.14	.02	345	1.49	25.7

*Test voided - results are not averaged into summary.

Moleculetor Fuel Energizer Evaluation
1980 Ford Fairmont (Disqualified)

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

Test Number	Date	Test Condition	HC	CO	CO_2	NOx	MPG
80-6798	11/18/80	Baseline	.46	4.9	555	.49	15.7
80-6799	11/19/80	Baseline	.49	5.6	563	.51	15.5
80-6801	12/2/80	Moleculetor	.71	8.2	523	1.51	16.5
80-6803	12/3/80	Moleculetor	.71	3.9	456	1.51	19.1
80-6954	12/4/80	Moleculetor	.67	4.7	448	1.37	19.4
80-7254	1/13/81	Moleculetor	.65	6.3	458	1.08	18.9
80-7256	1/14/81	w/o Moleculetor	.62	5.1	452	1.06	19.2
80-7258	1/20/81	w/o Moleculetor	.68	5.7	456	1.19	19.0
80-7260	1/29/81	w/o Moleculetor	.65	5.1	470	1.14	18.5
80-7610	2/3/81	w/o Moleculetor	.65	5.2	470	1.21	18.5
80-7611	3/3/81	w/o Moleculetor	.62	4.8	414	1.14	20.9

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

Test Number	Date	Test Condition	HC	CO	CO_2	NOx	MPG
80-6797	11/18/80	Baseline	.05	.50	465	.46	19.0
80-6800	11/19/80	Baseline	.06	.60	469	.47	18.9
80-6802	12/2/80	Moleculetor	.14	.19	397	.95	22.3
80-6804	12/3/80	Moleculetor	.17	.05	367	1.19	24.1
80-6953	12/4/80	Moleculetor	.15	.13	363	1.02	24.4
80-7255	1/13/81	Moleculetor	.12	.22	371	.78	23.9
80-7257	1/14/81	w/o Moleculetor	.14	.22	364	.93	24.3
80-7259	1/20/81	w/o Moleculetor	.14	.16	364	.91	24.3
80-72[illegible]1	1/29/81	w/o Moleculetor	.14	.16	370	.80	23.9
80-7609	2/3/81	w/o Moleculetor	.16	.20	363	.93	24.4
80-7612	3/3/81	w/o Moleculetor	.14	.17	335	.98	26.4