

EPA Evaluation of the "Environmental Fuel Saver" Device

This document contains several pages which may not reproduce well. Any questions concerning the legibility of these pages should be directed to: Merrill W. Korth, Environmental Protection Agency, Office of Mobile Source Air Pollution Control, Emission Control Technology Division, 2565 Plymouth Road, Ann Arbor, MI 48105, (313) 668-4299 or FTS 374-8299

By

Thomas J. Penninga

February 1980

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

Billing Code 6560-01

ENVIRONMENTAL PROTECTION AGENCY

[40 CFR Part 610]

[FRL _____]

FUEL ECONOMY RETROFIT DEVICES

Announcement of Fuel Economy Retrofit Device Evaluation
for the "Environmental Fuel Saver"

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 Environmental Fuel Saver (EFS) under the provisions of Section 511 of the Motor Vehicle Information and Cost Savings Act.

FOR FURTHER INFORMATION CONTACT: F. Peter Hutchins, Emission Control Technology Division, Office of Mobile Source Air Pollution Control, Environmental Protection Agency, 2565 Plymouth Road, Ann Arbor, Michigan 48105, 313-668-4340.

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

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

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

- (1) the effect of any retrofit device on fuel economy;
- (2) the effect of any such device on emissions of air pollutants;
and
- (3) any other information which the Administrator determines to be relevant in evaluating such device."

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

ORIGIN OF REQUEST FOR EVALUATION: On March 31, 1979 the EPA received a request from Ms. Vicki Kosar of VK Manufacturing for evaluation of a fuel saving device termed the "Environmental Fuel Saver" (EFS). An evaluation has been made and the results are described completely in a report entitled: EPA Evaluation of "Environmental Fuel Saver" Under Section 511 of the Motor Vehicle Information and Cost Savings Act. Copies of this report are available upon request.

SUMMARY OF EVALUATION: The basic conclusion following review of testing by independent laboratories and by the California Air Resources Board is that the "Environmental Fuel Saver" does not improve either vehicle fuel economy or exhaust emissions. The fuel economy results were exactly the same with and without the device installed for testing performed according to the Federal Test Procedure and Highway Fuel Economy Test. The exhaust emissions varied somewhat, but did not show any significant net reduction in hydrocarbons, carbon monoxide, or oxides of nitrogen. Therefore, the VK Manufacturing claims of 1) up to 35 percent better mileage and 2) up to 65 percent less pollutant emissions are not substantiated by the test data.

Date

David G. Hawkins
Assistant Administrator
for Air, Noise, and Radiation

EPA Evaluation of "Environmental Fuel Saver" 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.

1. Marketing Identification of the Device: "Environmental Fuel Saver" or "EFS."
2. Inventor of the Device and Patents: Arthur Hayward, U.S. Patent Number 4020812.
3. Manufacturer of the Device: VK Manufacturing, Inc.
4. Manufacturing Organization's Principals: Vicki Kosar.
5. Marketing Organization in U.S. Making Application: VK Manufacturing, Inc., 1068 N.W. 3rd Street, Hallandale, Florida 33009.
6. Identity of Applicant: Vicki Kosar of Miami Beach, Florida.
7. Description of the Device: (As supplied by the applicant).

" the unit is constituted by an electrical element placed between a pair of spaced mesh screens to define a permeable assembly having a pocket therein. The assembly functions as a restrictor in the conduit whose impedance to flow is in the order of about 15 to 20 percent, whereby the screens intercept and atomize the droplets, creating a suspension of minute fuel particles in air to produce a downstream mist or fog which is forced by the restriction to assume a vortex-like flow pattern. The heat supplied to the pocket by the heater is sufficient to raise the temperature of the fog in the output of the unit to a level conducive to complete combustion when the fog reaches the chamber, thereby minimizing fuel waste and the emission of pollutants." A further detailed description is given in Attachment 1.

8. Claimed Applicability of the Device: See the attached application chart (Attachment 2).
9. Device Installation, Tools Required, Expertise Required (claimed):

An installation sheet is enclosed with each "EFS" unit. Specific instructions for specific cars are included in the installation instructions. The tools required for installation are a 1/2 inch socket, a 9/16 inch socket, a 4 inch extension, a ratchet wrench, a 9/16 inch open or box wrench, a 1/2 inch open or box end wrench and a regular screwdriver. No special equipment is needed to install the EFS device. A little

mechanical knowledge, however, is required. A do-it-yourselfer can install a unit in about one hour. Attachment 3 is a copy of the full installation instructions."

10. Device Maintenance (claimed): "The product is maintenance "free." Checking the fuse every now and then would be the only required maintenance."
11. Effects on Vehicle Emission (non-regulated) (claimed): "At no time, under regular operating conditions, or malfunction, will this unit emit into the ambient more harmful emissions than a motor car without one. Enclosed test reports prove this."
12. Emission and Fuel Economy Results Reported by Applicant:
 - a. Olson Engineering tests (Attachment 4).
 - b. Documentation of California Air Resources Board (CARB) retrofit approval (Attachment 5).
 - c. Steady state data - unknown origin included in the patent (Attachment 6).
 - d. Energy Dynamics Corporation (Attachment 7).
14. Information Gathered by EPA:
 - a. Telephone communication with CARB to determine if confirmatory retrofit testing was done. It was, and the data showed no improvement in fuel economy or emissions (see Attachment 5).
 - b. Telephone communication with Olson Engineering to get specific HC, CO, CO₂, and NOx readings for both FTPs and HFETs (see Addendum to Attachment 4).
 - c. Telephone communications with Mr. DeMartino of VK manufacturing on the nature of the data presented in the patent. He did not know the details but mentioned that this testing was done by the inventor, prior to purchase of the patent.
15. Analysis: The installation, while the estimate of one hour installation time appears to be quite optimistic, seems quite simple and straightforward. No real problems should occur and it is estimated that any qualified mechanic or person with mechanical ability could complete the installation within 1 1/2 to 2 hours.

The safety aspects of the "EFS" device are not so clearly defined. While claims of 6 million miles of safe operation are impressive, the idea of spraying gasoline on a 600°F hot wire (as stated in the patent) may be very unsafe. Gasoline vapors will ignite at 600°F if the Air/Fuel Ratio is suitable for burning. Under conditions where the wire is heated but

the engine is not turning (example: defective starter) and fuel is injected into the carburetor (example: accelerator pump utilized), the possibility of having a fire is very real. No data was submitted on the safety aspects of the device.

The Olson test data for the HFET appears to be questionable on the CO readings. The value of .07 gms/mile is extremely low for a 1975 vehicle - especially when there was not such a reduction in CO for the CARB testing.

While the Olson data does demonstrate a lowering of HC and CO, the fuel economy stayed the same for the vehicles tested at CARB and Olson. The 3 percent gain on the Olson HFET is well within test-to-test variability. When it is noted that the Olson tested vehicle was supplied by VK Manufacturing, Inc. and adjusted by VK Manufacturing, Inc., the lack of fuel economy improvements demonstrates the lack of suitability of this unit to improve fuel economy.

16. Conclusions of EPA Evaluation: The fuel economy results for tests performed at Olson Laboratories and at the California Air Resources Board for both the Federal Test Procedure and the Highway Fuel Economy Test indicated no improvement in fuel economy for the "Environmental Fuel Saver." The Olson Laboratory test data indicated that CO emissions were reduced substantially in one test, the HFET, but it was not possible to determine if that result was due to the "Environmental Fuel Saver" or to the leaning of the carburetor as required by the installation instructions or for other reasons. A similar CO reduction was not indicated by the California Air Resources Board data.

The data submitted with this application does not substantiate the claims of improved fuel economy and reduced emissions, made about the "Environmental Fuel Saver." There is no need for the EPA to design a test program to further test the device.

List of Attachments

Attachment No. 1	Device Description
Attachment No. 2	Application Chart
Attachment No. 3	Installation Instructions
Attachment No. 4	Olson Engineering Test Data
Attachment No. 5	Documentation of CARB Retrofit Approval
Attachment No. 6	Steady-State Data (unknown origin)
Attachment No. 7	Energy Dynamics Corporation Letter

" the smog now encountered in many major cities is largely the result of photochemical reactions involving unburned hydrocarbons from automobile exhausts. These unburned hydrocarbons are also responsible for inefficient engine operation, in that carbon deposits are formed on the walls of combustion chambers.

Thus, with existing internal-combustion engines, a measurable portion of the fuel supplied there to remains unburned and is discharged. This not only results in an uneconomical engine operation, but it also contaminates the atmosphere.

In view of the foregoing, it is the main object of this invention to provide an improved fuel atomizing unit serving to homogenize and heat the fuel mixture fed into the combustion engine or burner so that complete combustion thereof takes place, thereby making maximum use of available fuel and minimizing the emission of unburned fuel constituents."

" the unit is constituted by an electrical element placed between a pair of spaced mesh screens to define a permeable assembly having a pocket therein. The assembly functions as a restrictor in the conduit whose impedance to flow is in the order of about 15 to 20 percent, whereby the screens intercept and atomize the droplets, creating a suspension of minute fuel particles in air to produce a downstream mist or fog which is forced by the restriction to assume a vortex-like flow pattern. The heat supplied to the pocket by the heater is sufficient to raise the temperature of the fog in the output of the unit to a level conducive to complete combustion when the fog reaches the chamber, thereby minimizing fuel waste and the emission of pollutants.

For a better understanding of the invention see the accompanying drawings:

Figure 1 is a schematic sectional illustration of a carburetor coupled in a conventional manner to the intake manifold of an internal combustion engine.

Figure 2 is the same as Figure 1, save that an atomizer unit in accordance with the invention is interposed between the carburetor and the intake manifold.

Figure 3 is an exploded view of one preferred embodiment of an actual atomizing unit of the single assembly type in accordance with the invention.

Figure 4 is a perspective view of the actual unit.

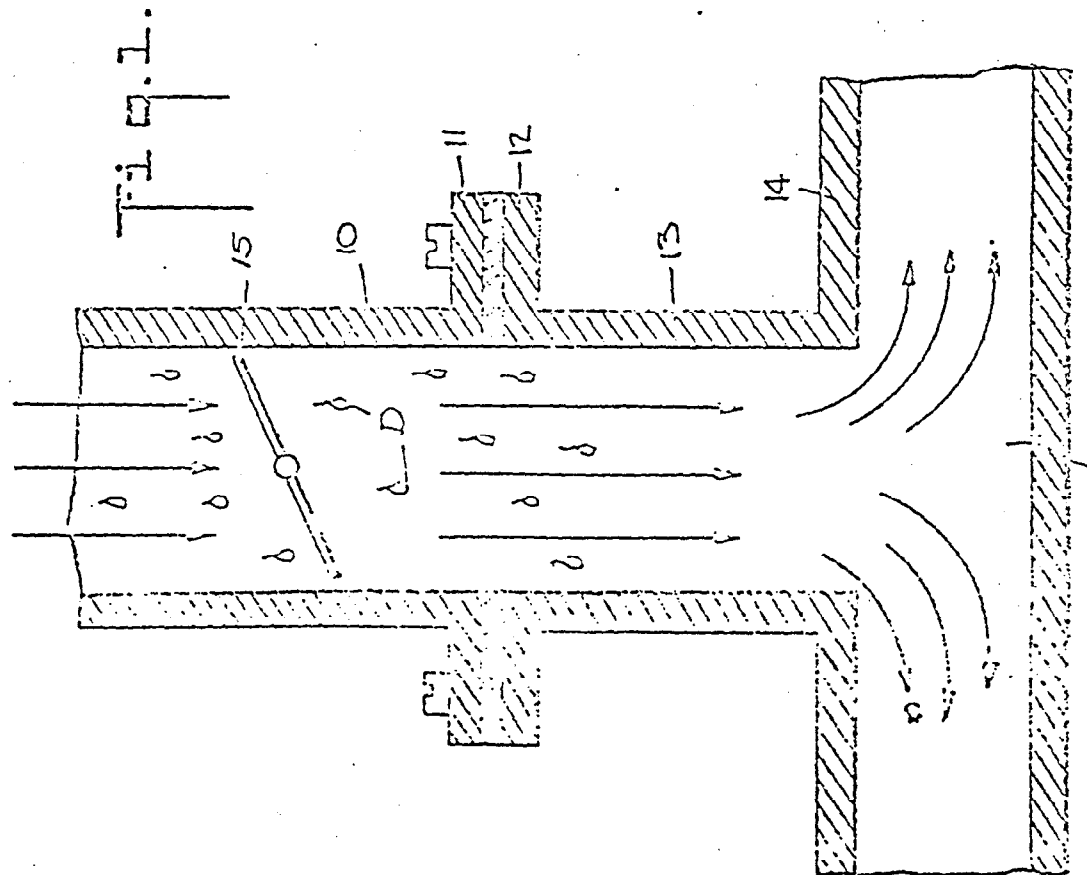
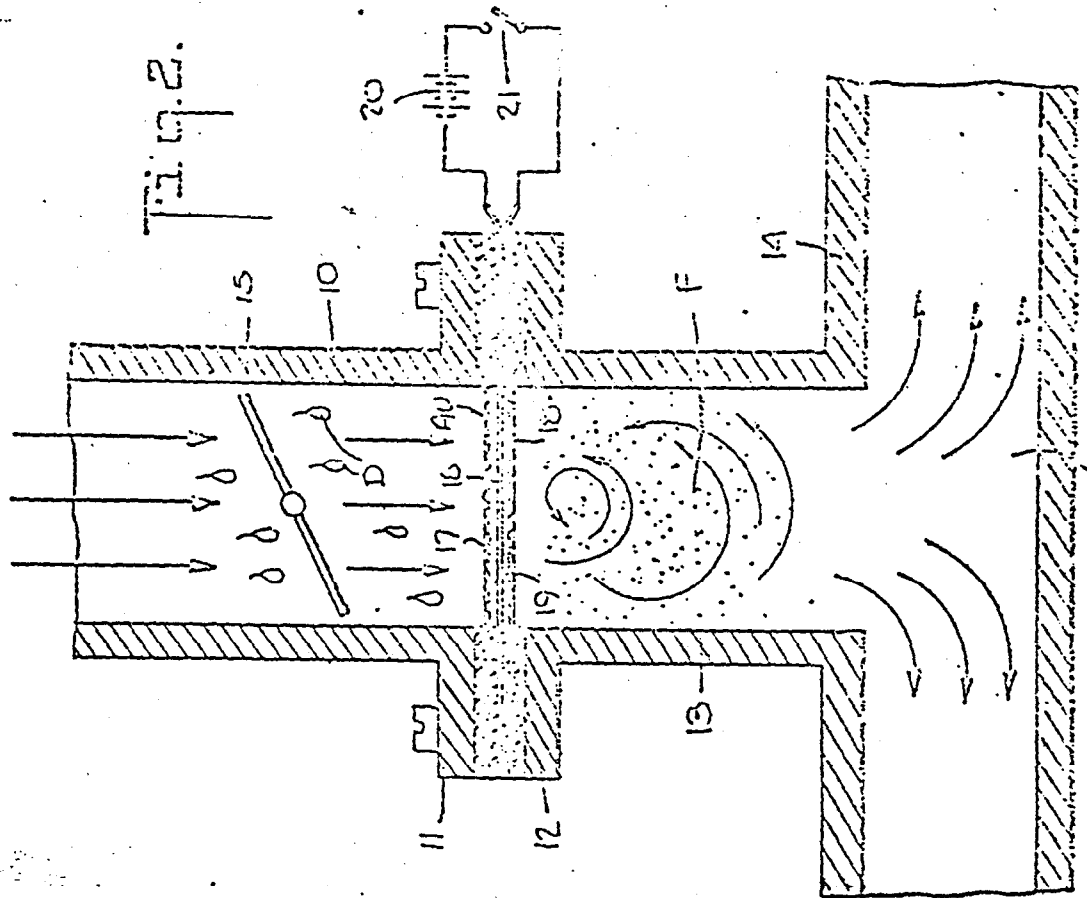
Figure 5 is a section taken through the single assembly unit in the plan indicated by line 5 - 5 in Figure 4.

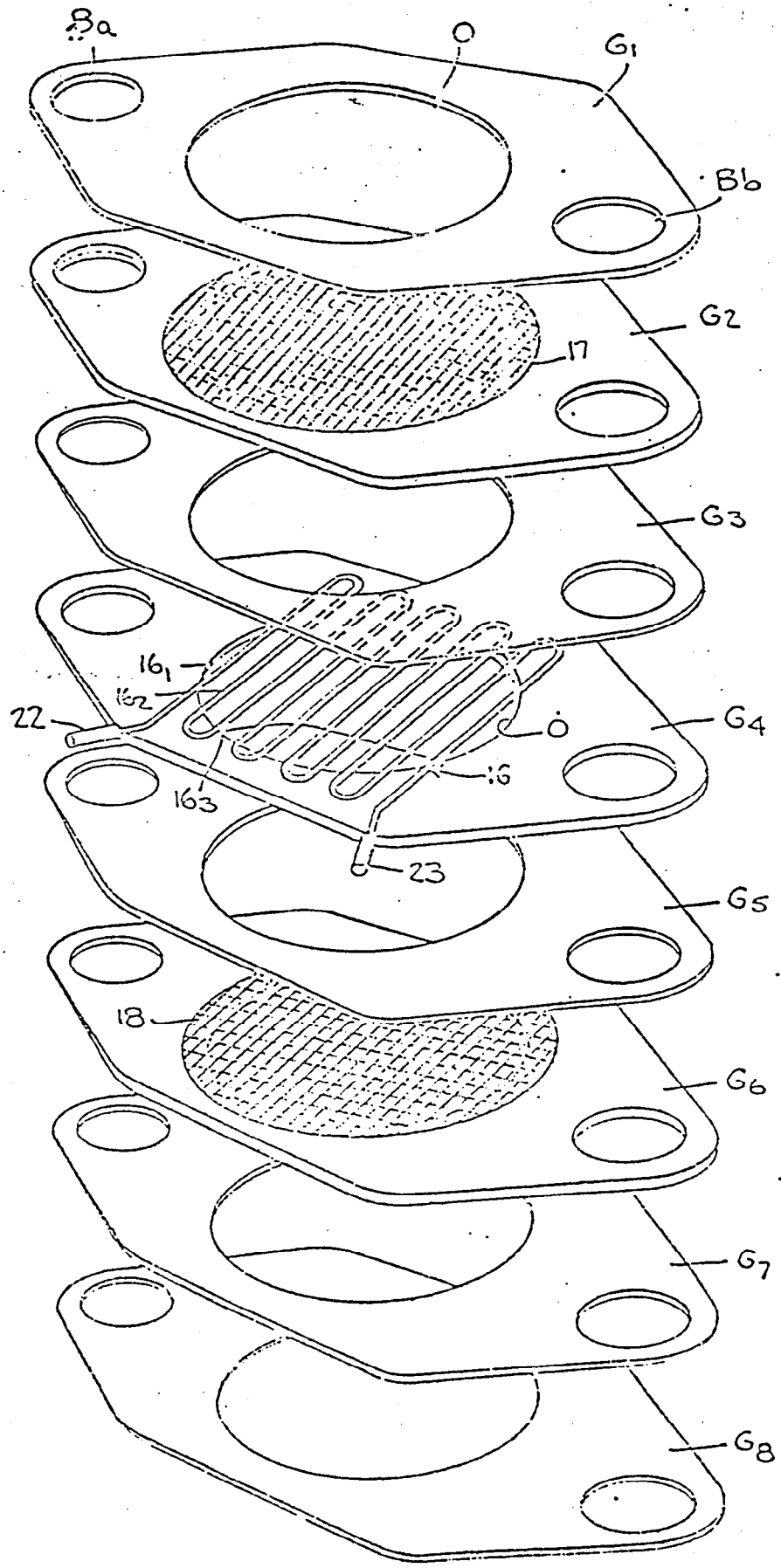
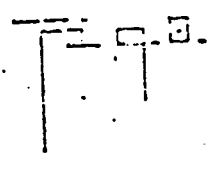
Figure 6 is a perspective view of a dual assembly atomizing unit in accordance with the invention.

Figure 7 is an exploded view illustrating the manner in which the dual assembly is interposed between a standard carburetor and a dual input intake manifold.

It is well known that under certain circumstances the introduction of a restriction in a flow conduit may change the character of the flow and influence the downstream flow pattern. Thus, while in the absence of the restriction of air flow pattern is essentially laminar, the presence of the restriction results in downstream turbulence to create vortices.

The reason the downstream vortices produced by the atomizing unit is beneficial is that these vortices effectively prolong the path between the carburetor and the combustion chambers in the cylinders and thereby lengthen the period during which heat is absorbed to volatilize the fuel the heater is adapted to elevate the temperature of the fog to a level conducive to the full volatilization thereof by the time the fog reaches the combustion chamber."





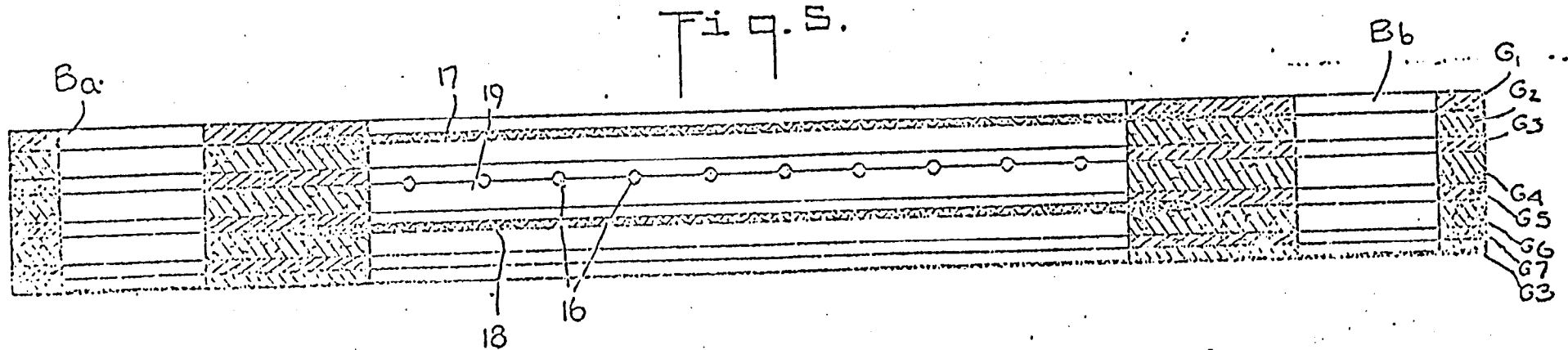
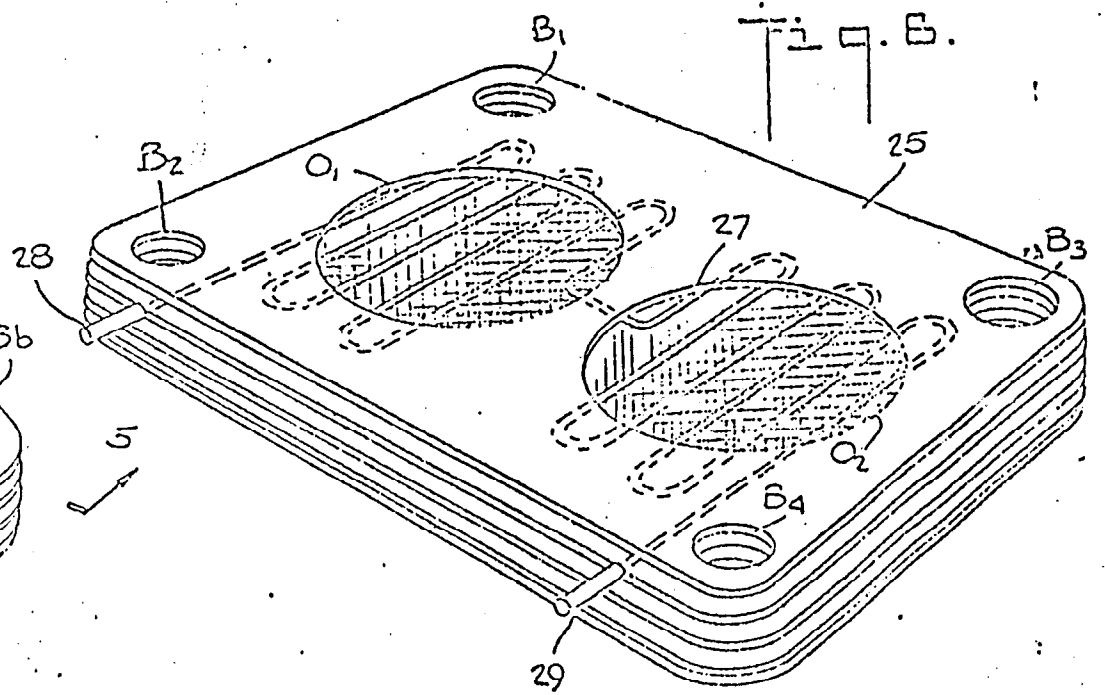
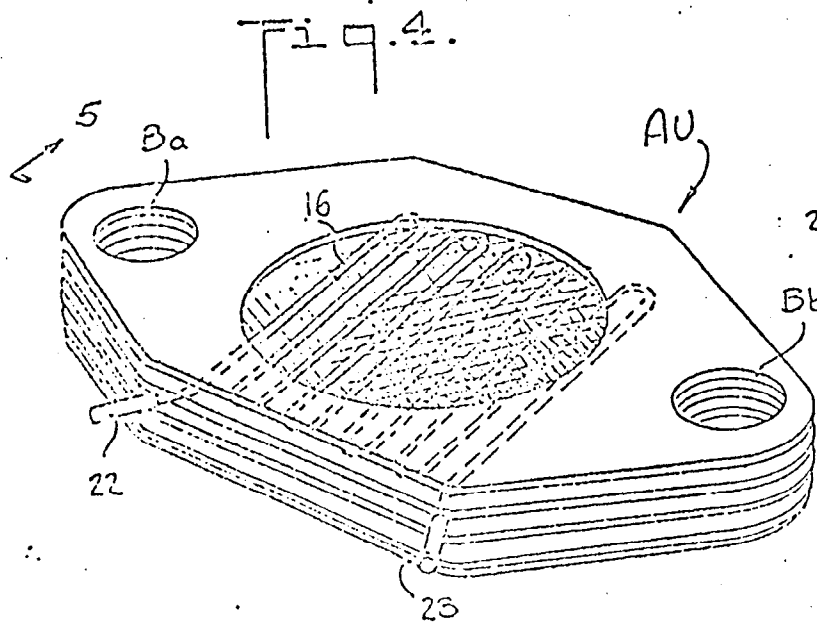
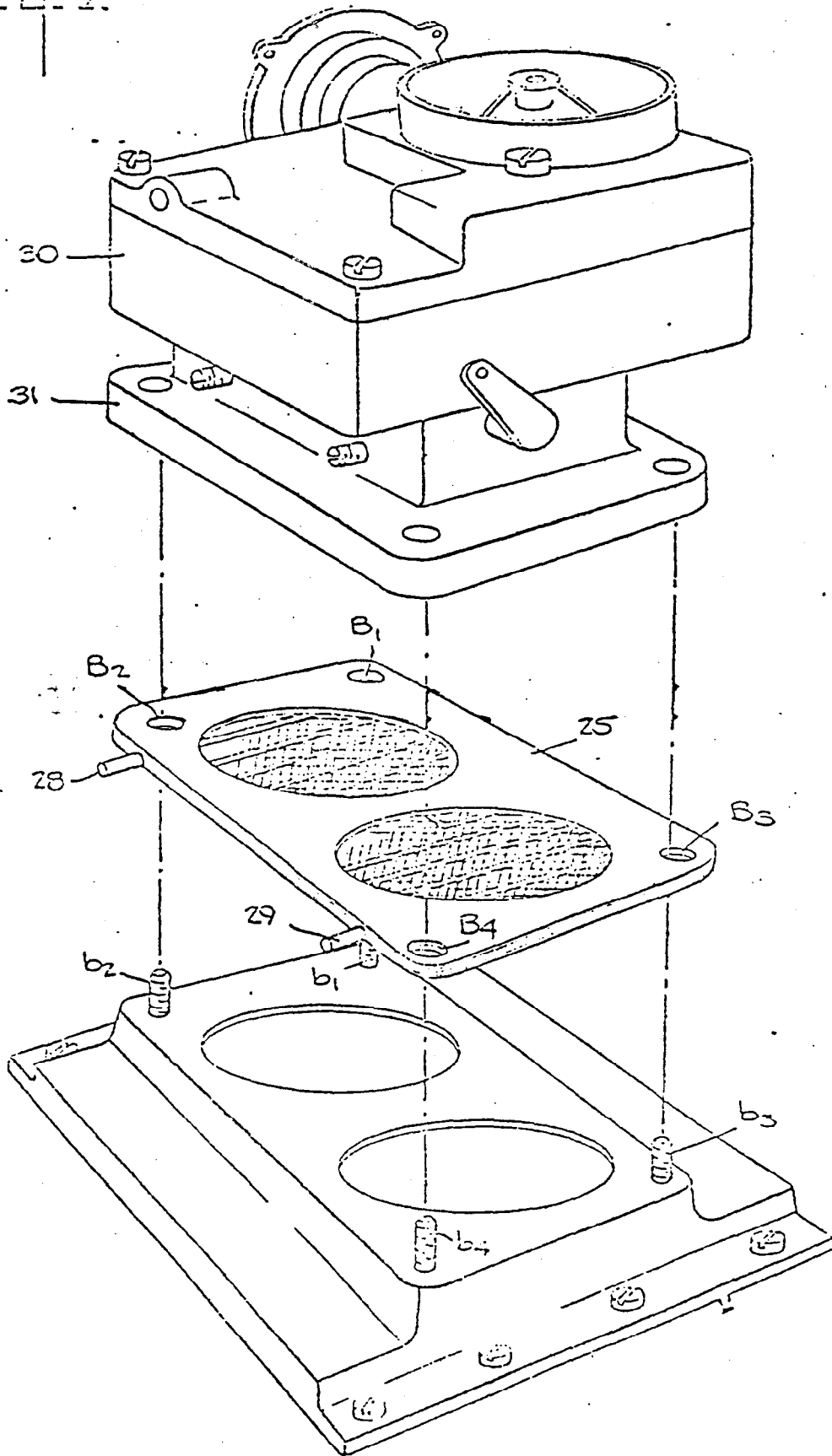
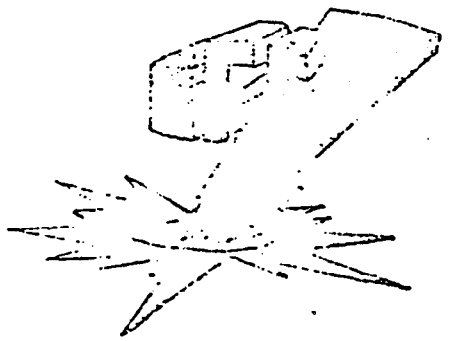


FIG. 7.





To **STRETCH** Gas Mileage

- Save Gas
- Reduce Pollution
- Maintenance Free

PASSENGER CAR & LIGHT TRUCK APPLICATION GUIDE

YEAR	MODEL	B L	H F G	OUR NO.	YEAR	MODEL	B L	H F G	OUR NO.	YEAR	MODEL	B L	H F G	OUR NO.
AMERICAN MOTORS					CHEVROLET (Continued)					DODGE PASSENGER				
6 CYLINDER					1968-77 327,350,396, 400,402, 427,454 Eng... 4 C,R H80					6 CYLINDER				
1960-77 196,199,232, 258 Eng... 1 C,H B20					1968-77 307 Eng... 2 R E50					1960-77 225 Eng... 1 C,H A10				
8 CYLINDER					1969-77 327,350,396, 400 Eng... 2 R F60					8 CYLINDER				
1960-77 287,290,304,327, 343,360 Eng... 2 C,H C30					1970-77 350,396,402, 454 Eng... 4 H 191					1960-77 360,361,383, 400 Eng... 2 C,H F61				
1960-77 290,327,343,350, 390,401 Eng... 4 C,H 190					1975-77 305 Eng... 2 R F60					1962-77 273,318 Eng... 2 C D40				
BUICK					CHEVROLET TRUCK					DODGE TRUCK				
6 CYLINDER					4 & 6 CYLINDER					6 CYLINDER				
1962-63 193,225 Eng... 2 R E50					1963-77 194,230,250, 292 Eng... 1 C,R B20					1960-77 225 Eng... 1 C,H A10				
1964-65 225,250 Eng... 2 R B20					8 CYLINDER					8 CYLINDER				
1966-67 193,225 Eng... 2 R E50					1960-67 265,283,322, 327 Eng... 2 C,R E50					1960-68 413 Eng... 4 C 191				
1968-77 225,250 Eng... 1 R B20					1966-77 348,350, 366 Eng... 2 R F60					1960-77 273,313, 318 Eng... 2 C,S D40				
8 CYLINDER					1967-77 366 Eng... 4 H 191					1960-77 360,361,383, 413 Eng... 2 S F61				
1962-63 LeSabre... 2 R F60					1968 396 Eng... 2 H F61					1969-71 413 Eng... 4 H 191				
1964-67 300,340 Eng... 2 C,R F60					1968-77 307 Eng... 2 R E50					FORD PASSENGER				
1966-77 350,400,425,430, 455 Eng... 4 C,R H80					1968-77 427 Eng... 4 H 191					6 CYLINDER				
1968-77 350 Eng... 2 R F60					1969-77 350,396, 402 Eng... 4 C,R H80					1965-69 240 Eng (Exc. '68,69w/S.T.) 1 H B20				
CADILLAC					1975-77 305 Eng... 2 C F60					1965-74 240 Eng... 1 C,F B20				
1967-77 All... 4 C,R H80					CHRYSLER & IMPERIAL					8 CYLINDER				
CHEVROLET PASSENGER					1960-64 All... 2 C D40					1963-70 260,289,302,351, 390,429 Eng... 2 C,H C30				
6 CYLINDER					1965-77 360,383, 400 Eng... 2 C,H F61					1965-77 352,390,428, 429 Eng... 4 H,F 190				
1960-77 194,230 250 Eng... 1 C,R B20					1966-77 440 Eng... 4 C H80					1971 351C,351W,390, 400,429 Eng... 2 H C30				
8 CYLINDER					1966-77 353 Eng... 4 C 191					1971-77 302,351C, 351W,390, 400,429 Eng... 2 F C71				
1965-69 307,327,356, 427 Eng... 4 H H80					1967-77 400 Eng... 4 C,H 191					1971 302 Eng... 2 H C30				
1966-69 283,327 Eng... 2 R E50										1972-77 429 Eng... 4 F J100				
1967-69 427 Eng (400, 435 hp)... 2 H F61														

C - CARTER H - HOLLEY R - ROCHESTER S - STROMBERG F - FORD (Motorcraft)

BRONCO

8 CYLINDER
 1966-71 289,302 Eng... 2 H C30
 1966-77 289,302 Eng... 2 F C30

FAIRLANE/TORINO

6 CYLINDER
 1969 250 Eng 1 H B20
 1969-77 250 Eng 1 C,F B20
 8 CYLINDER
 1962-77 260,269,302,351,
 390,400 Eng... 2 C,F C30
 1970 302,351C Eng... 2 H C30

FALCON

8 CYLINDER
 1963-70 260,289, C,H,
 302 Eng..... 2 F C30

MAVERICK

6 CYLINDER
 1971-77 250 Eng 1 C B20
 8 CYLINDER
 1971-77 302 Eng 2 H,F C30

MUSTANG

6 CYLINDER
 1969-77 250 Eng 1 C,H,F B20
 8 CYLINDER
 1965-77 260,289,302,
 351 Eng..... 2 C,F C30
 1969 302 Eng(Boss) . 4 H,F 190
 1970 351 Eng 2 H C30
 1970 302 Eng 2 H C30
 1971 302 Eng 2 H C30
 1971-77 351C Eng..... 2 H,F C30
 1972-77 302, 351W Eng . 2 F C31
 4 CYLINDER K110

THUNDERBIRD

1961-77 390,428,429,
 460 Eng..... 4 H,F 190

FORD TRUCK

6 CYLINDER
 1964-69 240,262,
 300 Eng..... 1 H B20
 1964-77 144,170,200,
 240,250,262,
 300 Eng..... 1 C,F B20
 8 CYLINDER
 1960-77 292,302,330,
 332,352,360,
 361,390 Eng... 2 F C30
 1960-64 292,342 Eng... 2 H C30
 1962-77 330,342,352,
 360,361,
 380 Eng..... 2 H C31

FORD TRUCK (Continued)

1966-71 302 Eng 2 H D40
 1970-77 401,477,
 534 Eng..... 4 H 190,
 191

G.M.C. TRUCK

4 & 6 CYLINDER
 1960-63 351,401,
 478 Eng..... 2 S F60
 1961-69 305C,D,E Eng.. 2 S E50
 1964-70 153,194,230,
 250,292 Eng.. C,R B20
 1965-69 351,351E,
 351C Eng ... 2 S F60
 1970 305C,351C Eng.
 w/CCS 2 S F60
 1972-77 153,194,230,
 250,292 Eng.. 1 C,R B20
 8 CYLINDER
 1966-69 327,350,
 396 Eng..... 4 C H80
 1968-70 307 Eng 2 R E50
 1969 366,427 Eng... 4 H 191
 1969-77 350 Eng 2 R F60
 1971-77 366,427 Eng... 4 H 191

I.H.C. TRUCK

1966 BD-282,BG-241 1 H A10
 1966 V-329 Eng 4 H 191
 66-69-77 RD-450 Eng ... 2 H F61
 1966-77 V-266,V-304,
 V-345 Eng ... 2 H C30
 1968 V-304; BG-220,
 265 Eng..... 1 H A10
 1968-76 V-549 Eng 4 H 190
 1968-76 RD-406 Eng ... 2 H F60
 1969-71 V-304 Eng 2 C 191
 1969-77 196,232,
 258 Eng..... 1 H B20
 1969-77 V-392 Eng 4 H 191
 1969-77 RD-501 Eng ... 4 H 190
 1970 V-549,V-220,
 VF-200 Eng .. 4 H 191
 1970-71 V-401,V-461,
 478 Eng..... 2 H F61
 1972-77 V-478 Eng 4 H 190
 1972-77 V-401 Eng 4 H 191

JEEP CORP. (Willys)

1962-65 230 Eng 2 H D40
 1964-76 225,226,230, C,H,
 232,258 Eng... 1 R B20
 66-67,71 225 Eng 2 R E50
 68,70-71 350 Eng 2 R F60

LINCOLN

1960-67 420 Eng 2 C C30
 1968-77 430,460,
 462 Eng..... 4 C,M 190
 J 100

MERCURY

8 CYLINDER
 1960-76 292,351,352,
 350,400,
 429 Eng..... 2 C,F C30
 1960-62 352 Eng 2 H C30
 1961-77 352,390,410,
 428,429 Eng.. 4 H,F 190
 1970-77 351,390,400,
 429 Eng..... 2 H C31
 1971-77 429 Eng..... 4 F J100

COMET/MONTEGO

6 CYLINDER
 1969 250 Eng 1 H B20
 1969-77 260 Eng 1 C,F B20

COUGAR

8 CYLINDER
 1963-77 260,289,302,
 351,390 Eng.. 2 C,F C30
 1971-77 351 Eng 2 H C31
 1971-77 302 Eng..... 2 H C30

OLDSMOBILE

6 CYLINDER
 1964-77 225,250 Eng... 1 C,R B20
 8 CYLINDER
 1963-77 330,350,394,
 400,425,
 455 Eng..... 2 C,R F60
 1966-77 330,350,400,
 425,455 Eng... 4 R H80

PLYMOUTH

(Barracuda, Valiant)

6 CYLINDER
 1960-77 225 Eng..... 1 C,H A10
 8 CYLINDER
 1962-77 273,318 Eng... 2 C, D40
 1963-77 360,361,383,
 400 Eng..... 2 C,H F61
 1966-77 273,340,
 383 Eng..... 4 C 191
 1967-77 400,426,
 440 Eng..... 4 C,H H 80

PONTIAC (Firebird, Tempest)

4 CYLINDER K110
 6 CYLINDER
 1964-77 215,230,
 250 Eng..... 1 C,R B20
 8 CYLINDER
 1963-77 326,350,389,
 400,455 Eng.. 2 C,R F60
 1968-77 350,400,428,
 455 Eng..... 4 C,R H80
 1969 Tempest, Firebird:
 350 Eng..... 2 R E50
 1971-77 VenturaII:
 350 Eng..... 2 R E50

CLASSIFICATION / MODEL & APPLICATION INDEX

CONTAINS 5 PARTS OF FORM 463
THIS INDEX SUPERSEDES ALL PREVIOUS & IS EFFECTIVE 4/1/78

THE CLASSIFICATION OR POPULARITY RATING, OF THE PART NUMBERS IN THIS LISTING ARE BASED ON SALES TRENDS AND DO NOT NECESSARILY REFLECT REGIONAL POPULARITY.

THE LOCAL MARKET MUST BE THE FACTOR WHICH DETERMINES THE PART NUMBERS TO BE CARRIED IN YOUR STOCK.

1978 VK MANUFACTURING INC.

CLASS	E.F.S. - NO.	MODEL	APPLICATION
	A-10 1- BARREL	Dge. Pass 6 Cyl. 60-77 225 Eng. 1 Bbl. (C-H) Dge. Trk. 6 Cyl. 61-77 225 Eng. 1 Bbl. (C-H) I.H.C. Trk. 80-282, 80-241, Eng. 1955 1 Bbl. (H) I.H.C. Trk. V-304, 80-220, 255, Eng. 1955 1 Bbl. (H) Ply. Barracuda, Valiant 6 Cyl. 60-77 225 Eng. 1 Bbl. (C-H)	
	B-20 1- BARREL	AMC 6 Cyl. 60-77 195, 199, 232, 258 Eng. 1 Bbl. (C-H) Buick 6 Cyl. 64-65 225, 250 Eng. 1 Bbl. (R) Buick 6 Cyl. 68-77 225, 250 Eng. 1 Bbl. (R) Chev. Pass 6 Cyl. 63-77 194, 230, 250 Eng. 1 Bbl. (C-R) Chev. Trk. 6 Cyl. & 4 Cyl. 63-77 194, 230, 250, 292 Eng. 1 Bbl. (C-R) Ford Pass 6 Cyl. 65-69 240 Eng. Fac. 63-69 W/ST 1 Bbl. (H) Ford Pass 6 Cyl. 65-74 240 Eng. 1 Bbl. (C-F) Ford Torino 6 Cyl. 1969 250 Eng. 1 Bbl. (H) Ford Torino 6 Cyl. 69-77 250 Eng. 1 Bbl. (C-F) Ford Maverick 6 Cyl. 71-77 250 Eng. 1 Bbl. (C) Ford Mustang 6 Cyl. 69-77 250 Eng. 1 Bbl. (C-H-F) Ford Trk. 6 Cyl. 64-69 240, 262, 300 Eng. 1 Bbl. (H) Ford Trk. 6 Cyl. 64-77 144, 170, 200, 240, 250, 262, 300 Eng. 1 Bbl. (C-F) G.M.C. Trk. 455 Cyl. 64-70 153, 194, 230, 250, 292 Eng. 1 Bbl. (C-R) G.M.C. Trk. 455 Cyl. 72-77 153, 194, 230, 250, 292 Eng. 1 Bbl. (C-R) I.H.C. Trk. 175, 232, 258 Eng. 67-77 1 Bbl. (H) Jeep-Hilllys 225, 225, 230, 232, 253 Eng. 1 Bbl. 64-76 (C-H-R) Marc. Comet/Montego 6 Cyl. 1959 250 Eng. 1 Bbl. (H) Marc. Comet/Montego 6 Cyl. 67-77 250 Eng. 1 Bbl. (C-F) Dies Pass 6 Cyl. 64-77 225, 250 Eng. 1 Bbl. (C-R) Pont. Firebird/Tempest 6 Cyl. 64-77 215, 230, 250 Eng. 1 Bbl. (C-R)	
	C-30 2- BARREL	AMC 8 Cyl. 60-77 287, 290, 304, 327, 342, 360, Eng. 2 Bbl. (C-H) Ford Pass. 8 Cyl. 63-70 260, 290, 302, 351, 390, 429 Eng. 2 Bbl. (C-H-F) Ford Pass. 8 Cyl. 1971 351C, 351W, 370, 400, 429 Eng. 2 Bbl. (H) Ford Pass. 8 Cyl. 1971 302 Eng. 2 Bbl. (H) Ford Bronco 3 Cyl. 66-71 280, 302 Eng. 2 Bbl. (H) Ford Bronco 8 Cyl. 60-77 287, 302 Eng. 2 Bbl. (F)	

PART 1
FORM 463
EFFECTIVE 4/1/78
SUPERSEDES ALL PREVIOUS

()=CARB. MAKE H=HOLLY R=ROCHESTER S=STROMBERG C=CARTER F=FORD or MOTORCRAFT



CLASS	E.F.S. NO.	MODEL	APPLICATION
	E-50 2- BARREL		Buick 6 Cyl. 62-63 195, 225 Eng. 2 Bbl. (R) Chev. Pass. 8 Cyl. 63-77 307 Eng. 2 Bbl. (R) Chev. Trk. 8 Cyl. 60-67 265, 283, 322, 327 Eng. 2 Bbl. (C-R) Chev. Trk. 8 Cyl. 65-77 307 Eng. 2 Bbl. (R) GMC Trk. 436 Cyl. 61-69 305C, D, E, Eng. 2 Bbl. (S) GMC Trk. 8 Cyl. 63-70 307 Eng. 2 Bbl. (R) Jeep/Willys 66-67 3 71 225 Eng. 2 Bbl. (R) Pont. Firebird/Tempest 8 Cyl. 1969 350 Eng. 2 Bbl. (R) Pont. Ventura 8 Cyl. 71-77 350 Eng. 2 Bbl. (R) Buick 6 Cyl. 66-67 193, 225 Eng. 2 Bbl. (R) Chev. Pass. 8 Cyl. 65-69 263, 327 Eng. 2 Bbl. (R)
	F-60 2- BARREL		Buick/LeSabre 8 Cyl. 62-63 285l. (R) Buick 8 Cyl. 64-67 300, 340 Eng. 2 Bbl. (C-R) Buick 8 Cyl. 68-77 350 Eng. 2 Bbl. (R) Chev. Pass. 8 Cyl. 69-77 327, 350, 396, 400 Eng. 2 Bbl. (R) Chev. Pass. 8 Cyl. 75-77 305 Eng. 2 Bbl. (R) Chev. Trk. 8 Cyl. 66-77 343, 350, 365 Eng. 2 Bbl. (R) Chev. Trk. 8 Cyl. 75-77 335 Eng. 2 Bbl. (R) GMC Trk. 436 Cyl. 60-63 351, 401, 478 Eng. 2 Bbl. (S) GMC Trk. 436 Cyl. 65-69 351, 351C, 351C Eng. 2 Bbl. (S) GMC Trk. 436 Cyl. 1970 305C, 351C, Eng. W/CCS 2 Bbl. (S) GMC Trk. 8 Cyl. 69-77 350 Eng. 2 Bbl. (R) IHC Trk. 66-75 30-405 Eng. 2 Bbl. (H) Jeep/Willys 8 Cyl. 1959, 70-71 350 Eng. 2 Bbl. (R) Olds 8 Cyl. 63-77 300, 350, 394, 400, 425, 455 Eng. 2 Bbl. (C-R) Pont. Firebird/Tempest 8 Cyl. 63-77 326, 350, 399, 400, 455 Eng. 2 Bbl (C-R)
	F-61 2- BARREL		Chev. Pass. 8 Cyl. 67-69 427 Eng./400, 430HP 2 Bbl. (H) Chev. Trk. 8 Cyl. 1968 396 Eng. 2 Bbl. (H) Chry./Imperial 8 Cyl. 65-77 300, 383, 400 Eng. 2 Bbl. (C-H) Dge. Pass. 8 Cyl. 60-77 350, 361, 383, 400 Eng. 2 Bbl. (C-H) Dge. Trk. 8 Cyl. 60-77 350, 351, 383, 413 Eng. 2 Bbl. (S)

PART 2
FORM 463
EFFECTIVE 4/1/78
SUPERSEDES ALL PREVIOUS

CLASS	E.F.S. - NO.	MODEL	APPLICATION
	C-30 2- BARREL		Ford Fairlane/Torino 8 Cyl. 62-77 250, 289, 302, 351, 390, 400 Eng. 2 Bbl. (C-F) Ford Fairlane/Torino 6 Cyl. 1973 302, 351C Eng. 2 Bbl. (H) Ford Falcon 8 Cyl. 63-70 260, 289, 302 Eng. (C-H-F) Ford Maverick 8 Cyl. 71-77 302 Eng. 2 Bbl. (H-F) Ford Mustang 8 Cyl. 65-77 260, 289, 302, 351 Eng. 2 Bbl. (C-F) Ford Mustang 8 Cyl. 1970 351 Eng. 2 Bbl. (H) Ford Mustang 8 Cyl. 1970 302 Eng. 2 Bbl. (H) Ford Mustang 8 Cyl. 1971 302 Eng. 2 Bbl. (H) Ford Mustang 8 Cyl. 71-77 351C Eng. 2 Bbl. (H-F) Ford Trk. 8 Cyl. 292, 302, 330, 332, 352, 353, 351, 390 Eng. 2 Bbl. (F) Ford Trk. 8 Cyl. 60-64 292, 302 Eng. 2 Bbl. (H) I.H.C. Trk. 65-77 V236, V304, V345 Eng. 2 Bbl. (H) Lincoln 8 Cyl. 60-62 420 Eng. 2 Bbl. (C) Merc. 8 Cyl. 60-76 292, 351, 352, 390, 400, 429 Eng. 2 Bbl. (C-F) Merc. 8 Cyl. 60-62 352 Eng. 2 Bbl. (H) Merc. Cougar 8 Cyl. 63-77 250, 280, 302, 351, 390 Eng. 2 Bbl. (C-F) Merc. Cougar 8 Cyl. 71-77 302 Eng. 2 Bbl. (H) Ford Mustang Cobra II V-6 171 Eng. 2 Bbl. (F) 76-77
	C-31 2- BARREL		Ford Pass. 8 Cyl. 71-77 302, 351C, 351W, 390, 400, 429 Eng. 2 Bbl. (F) Ford Mustang 8 Cyl. 72-77 322, 351W Eng. 2 Bbl. (F) Ford Trk. 8 Cyl. 62-77 300, 302, 352, 350, 361, 390 Eng. 2 Bbl. (H) Merc. Pass 8 Cyl. 70-77 351, 390, 400, 429 Eng. 2 Bbl. (H) Merc. Cougar 8 Cyl. 71-77 351 Eng. 2 Bbl. (H)
	D-60 2- BARREL		Chry./Imperial ALL 60-64 All Eng. 2 Bbl. (C) Dge. Trk. 8 Cyl. 60-77 273, 313, 319 Eng. 2 Bbl. (C-S) Ford Trk. 8 Cyl. 66-71 302 Eng. 2 Bbl. (H) Jeep/Willys 62-65 200 Eng. 2 Bbl. (H) Ply. Barracuda/Volante 8 Cyl. 62-77 273, 313 Eng. 2 Bbl. (C) Chev. Pass. 8 Cyl. 62-77 273, 313, Eng. 2 Bbl. (C)

PART 3
FORM 463
EFFECTIVE 4/1/78
SUPERSEDES ALL PREVIOUS

CLASS	E.F.S. NO.	MODEL	APPLICATION
	F-61 2- BARREL		<p>IMC Trk. 8 Cyl. 1966/69-77 RD-450 Eng. 2 Bbl. (H)</p> <p>IMC Trk. 8 Cyl. 70-71 V401, V451, 478 Eng. 2 Bbl. (H)</p> <p>Ply. Barracuda/Valliant 8 Cyl. 63-77 360, 351, 333, 400 Eng. 2 Bbl. (C-H)</p>
	K-110 2- BARREL		<p>Ford Mustang 4 Cyl.</p> <p>Pont. Firebird/Tempst 4 Cyl.</p>
	H-80 4- BARREL		<p>Buick 8 Cyl. 66-77 350, 400, 425, 430, 455 Eng. 4 Bbl. (C-R)</p> <p>Cadillac 8 Cyl. 67-77 ALL 4 Bbl. (C-R)</p> <p>Chev. Pass. 8 Cyl. 65-69 307, 327, 335, 427 Eng. 4 Bbl. (H)</p> <p>Chev. Pass. 8 Cyl. 68-77 327, 350, 335, 400, 402, 427, 454 Eng. 4 Bbl. (C-R)</p> <p>Chev. Trk. 8 Cyl. 69-77 350, 336, 402 Eng. 4 Bbl. (C-R)</p> <p>Chry. Imperial 8 Cyl. 66-77 440 Eng. 4 Bbl. (C)</p> <p>GM Trk. 8 Cyl. 69-69 327, 350, 376 Eng. 4 Bbl. (C)</p> <p>Olds 8 Cyl. 66-77 333, 350, 400, 425, 455 Eng. 4 Bbl. (R)</p> <p>Ply. Barracuda/Valliant 8 Cyl. 67-77 400, 426, 440 Eng. 4 Bbl. (C-H)</p> <p>Pont. Firebird/Tempst 8 Cyl. 68-77 350, 400, 428, 455 Eng. 4 Bbl. (C-R)</p>
	I-90 4- BARREL		<p>AMC 8 Cyl. 63-77 290, 327, 343, 360, 330, 401 Eng. 4 Bbl. (C-H)</p> <p>Ford Pass. 8 Cyl. 65-77 352, 330, 428, 429 Eng. 4 Bbl. (H-F)</p> <p>Ford/Thunderbird 8 Cyl. 61-77 330, 428, 429, 450 Eng. 4 Bbl. (H-F)</p> <p>Ford/Mustang 8 Cyl. 1969 205S 302 Eng. 4 Bbl. (H-F)</p> <p>Ford Trk. 8 Cyl. 70-77 401, 477, 531 Eng. 4 Bbl. (H)</p> <p>IMC Trk. 8 Cyl. 68-76 V549 Eng. 4 Bbl. (H)</p> <p>IMC Trk. 8 Cyl. 69-77 RD501 Eng. 4 Bbl. (H)</p>

PART 4
FORM 463
EFFECTIVE 4/1/78
SUPERSEDES ALL PREVIOUS

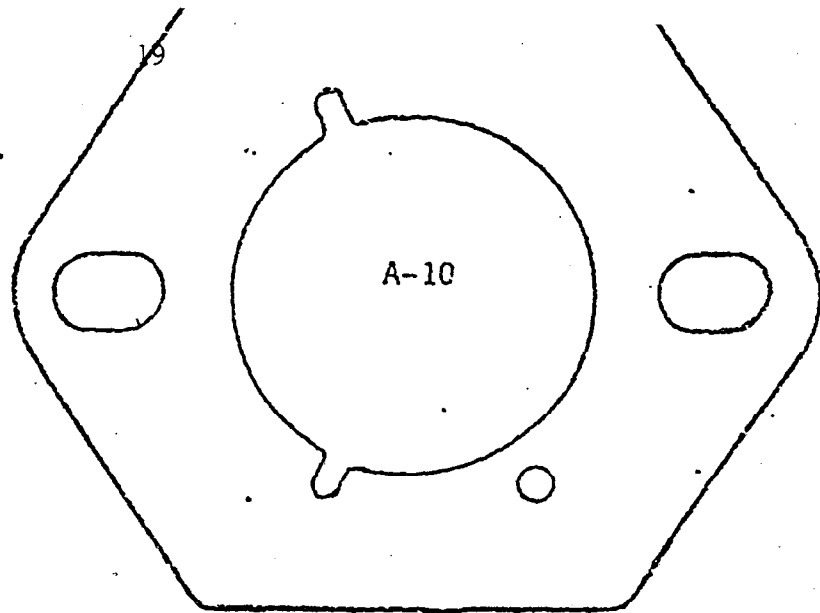
*SOME MAKES MAY USE E.F.S. #1-90

CLASS	E.F.S. NO.	MODEL	APPLICATION
	I-90 4- BARREL		<p>IMC Trk. 8 Cyl. 72-77 V478 Eng. 4 Bbl. (H)</p> <p>Lincoln 8 Cyl. 63-77 430, 460, 452 Eng. 4 Bbl. (C-F)</p> <p>Merc. Pass. 8 Cyl. 61-77 352, 330, 410, 428, 429 Eng. 4 Bbl. (H-F)</p>
	I-91 4- BARREL		<p>Chev. Pass. 8 Cyl. 70-77 350, 335, 402, 454 Eng. 4 Bbl. (H)</p> <p>Chev. Trk. 8 Cyl. 67-77 356 Eng. 4 Bbl. (H)</p> <p>Chev. Trk. 8 Cyl. 68-77 427 Eng. 4 Bbl. (H)</p> <p>Chry./Imperial 8 Cyl. 65-77 333 Eng. 4 Bbl. (C)</p> <p>Chry./Imperial 8 Cyl. 67-77 400 Eng. 4 Bbl. (C-H)</p> <p>Ege. Pass. 8 Cyl. 66-77 273, 340, 333, 426 Eng. 4 Bbl. (C)</p> <p>Dge. Trk. 8 Cyl. 60-63 413 Eng. 4 Bbl. (C)</p> <p>Dge. Trk. 8 Cyl. 62-71 413 Eng. 4 Bbl. (H)</p> <p>Ford Trk. 8 Cyl. 70-77 401, 477, 531 Eng. 4 Bbl. (H)</p> <p>GM Trk. 8 Cyl. 1959 366, 427 Eng. 4 Bbl. (H)</p> <p>GM Trk. 8 Cyl. 71-77 355, 427 Eng. 4 Bbl. (H)</p> <p>IMC Trk. 8 Cyl. 1965 V329 Eng. 4 Bbl. (H)</p> <p>IMC Trk. 8 Cyl. 69-71 V104 Eng. 4 Bbl. (C)</p> <p>IMC Trk. 8 Cyl. 69-77 V392 Eng. 4 Bbl. (H)</p> <p>IMC Trk. 1970 V549, V220, V200 Eng. 4 Bbl. (H)</p> <p>IMC Trk. 8 Cyl. 72-77 V401 Eng. 4 Bbl. (H)</p> <p>Ply. Barracuda/Valliant 66-77 273, 340, 353, Eng. 4 Bbl. (C)</p>
	J-100 4- BARREL		<p>Ford Pass. 8 Cyl. 72-77 429 Eng. 4 Bbl. (F)</p> <p>Lincoln 8 Cyl. 63-77 430, 450, 452 Eng. 4 Bbl. (C-F)</p> <p>Merc. Pass. 8 Cyl. 71-77 429 Eng. 4 Bbl. (F)</p>

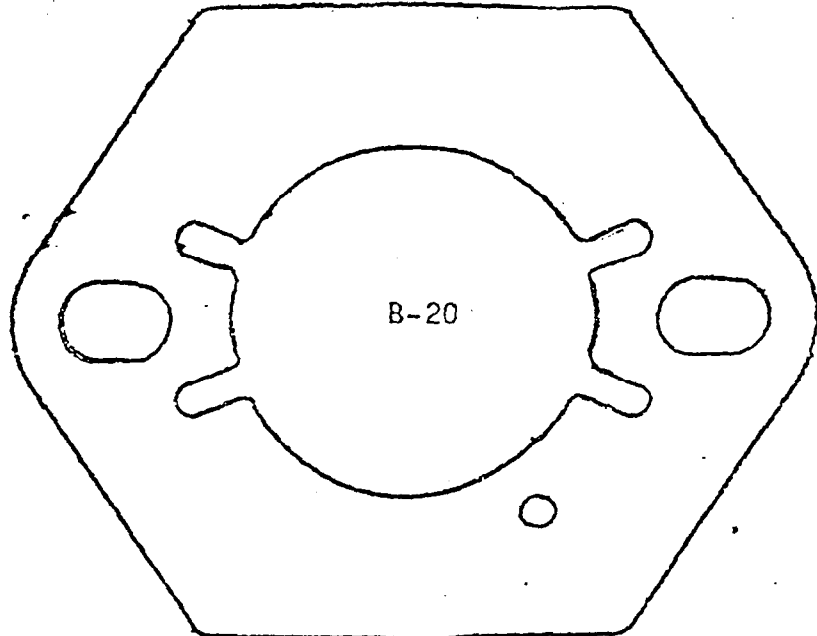
PART 5
FORM 463
EFFECTIVE 4/1/78
SUPERSEDES ALL PREVIOUS



Manufacturing, Inc.



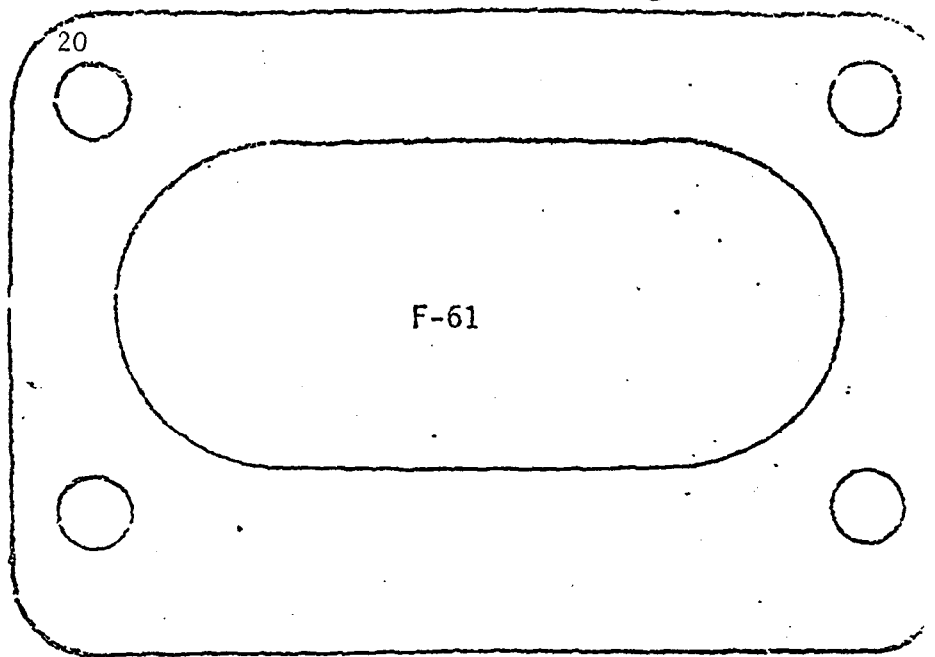
E.F.S. - NO.	MODEL	APPLICATION
A-10		Dge. Pass 6 Cyl. 60-77 225 Eng. 18bl. (C-H)
1- BARREL		Dge. Trk. 6 Cyl. 61-77 225 Eng. 18bl. (C-H)
		I.H.C. Trk. 80-282, 86-241, Eng. 1956 1 Bbl. (H)
		I.H.C. Trk. V-304, 85-220, 265, Eng. 1958 1 Bbl. (H)
		Ply. Barracuda, Valiant 6 Cyl. 60-77 225 Eng. 1 Bbl. (C-H)



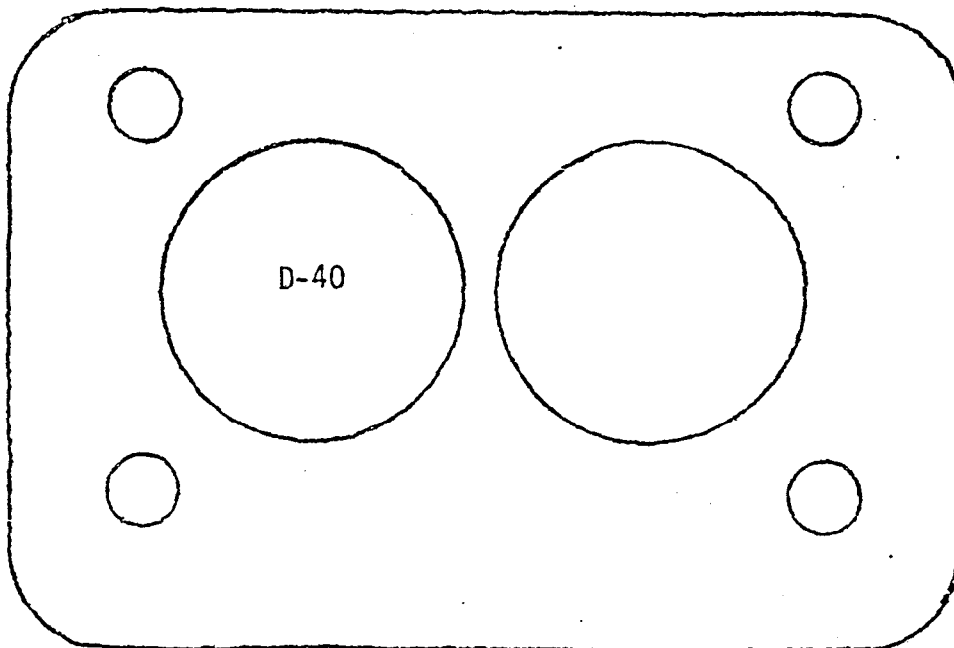
B-20	AMC 6 Cyl. 60-77 195, 197, 232, 258 Eng. 1 Bbl. (C-H)
1- BARREL	Buick 6 Cyl. 64-65 225, 250 Eng. 1 Bbl. (R)
	Fulck 6 Cyl. 66-77 225, 250 Eng. 1 Bbl. (R)
	Chev. Pass 6 Cyl. 63-77 194, 233, 250 Eng. 1 Bbl. (C-R)
	Chev. Trk. 6 Cyl. & 4 Cyl. 63-77 194, 233, 250, 292 Eng. 1 Bbl. (C-R)
	Ford Pass 6 Cyl. 65-69 240 Eng. Exc. 66-69 W/ST 1 Bbl. (H)
	Ford Pass 6 Cyl. 65-74 240 Eng. 1 Bbl. (C-F)
	Ford Torino 6 Cyl. 1969 250 Eng. 1 Bbl. (H)
	Ford Torino 6 Cyl. 69-77 250 Eng. 1 Bbl. (C-F)
	Ford Maverick 6 Cyl. 71-77 250 Eng. 1 Bbl. (C)
	Ford Mustang 6 Cyl. 69-77 250 Eng. 1 Bbl. (C-H-F)
	Ford Trk. 6 Cyl. 64-69 240, 262, 300 Eng. 1 Bbl. (H)
	Ford Trk. 6 Cyl. 64-77 144, 170, 200, 240, 250, 262, 300 Eng. 1 Bbl. (C-F)
	G.M.C. Trk. 456 Cyl. 64-70 193, 194, 230, 250, 292 Eng. 1 Bbl. (C-R)
	G.M.C. Trk. 456 Cyl. 72-77 193, 194, 230, 250, 292 Eng. 1 Bbl. (C-R)
	I.H.C. Trk. 195, 220, 268 Eng. 69-77 1 Bbl. (H)
	Jeep-Willys 225, 226, 230, 232, 250 Eng. 1 Bbl. 64-76 (C-H-R)
	Merc. Comet/Montego 6 cyl. 1959 250 Eng. 1 Bbl. (H)
	Merc. Comet/Montego 6 Cyl. 67-77 250 Eng. 1 Bbl. (C-F)
	Olds Pass 6 Cyl. 64-77 225, 250 Eng. 1 Bbl. (C-R)
	Pont. Firebird/Torquet 6 Cyl. 64-77 215, 230, 250 Eng. 1 Bbl. (C-R)



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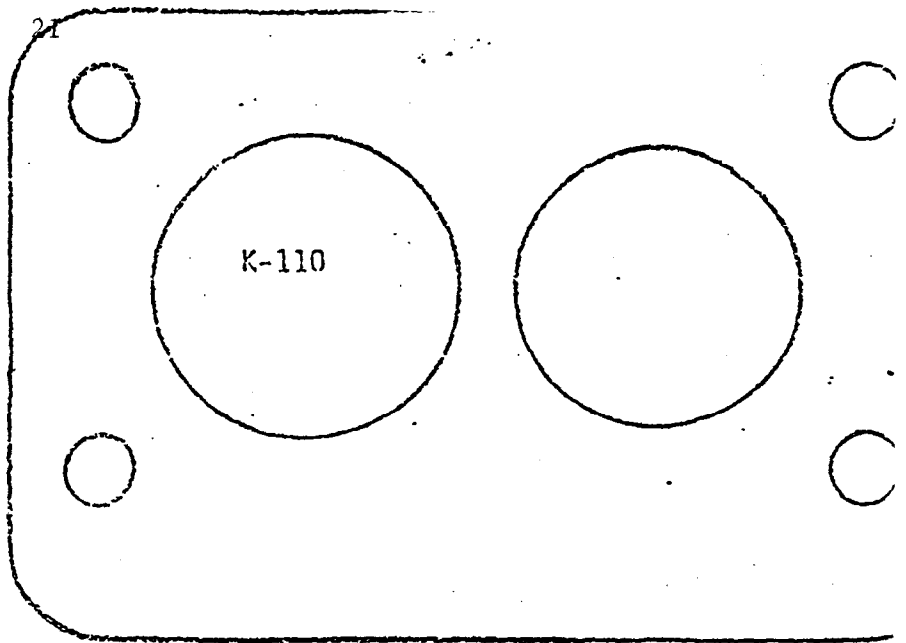
E.F.S. NO.	MODEL	APPLICATION
F-61 2- BARREL		IHC Trk. 8 Cyl. 1956/67-77 RD-450 Eng. 2 Bbl. (H) IHC Trk. 8 Cyl. 70-71 V40L, V45L, 478 Eng. 2 Bbl. (H) Ply. Barracuda/Valiant 8 Cyl. 63-77 360, 361, 383, 400 Eng. 2 Bbl. (C-H)
F-61 2- BARREL		Chev. Pass. 8 Cyl. 67-69 427 Eng./400, 435HP 2 Bbl. (H) Chev. Trk. 8 Cyl. 1958 325 Eng. 2 Bbl. (H) Chry./Imperial 8 Cyl. 65-77 360, 383, 400 Eng. 2 Bbl. (C-H) Dge. Pass. 8 Cyl. 60-77 360, 361, 383, 400 Eng. 2 Bbl. (C-H) Dge. Trk. 8 Cyl. 60-77 360, 361, 383, 413 Eng. 2 Bbl. (S)



D-40 2- BARREL	Chry./Imperial ALL 63-64 ALL Eng. 2 Bbl. (C) Ford Trk. 8 Cyl. 67-71 360, 383, 400 Eng. 2 Bbl. (C-S) Ford Trk. 8 Cyl. 72-73 360, 383, 400 Eng. 2 Bbl. (C) Jeep/Jeeplys 60-66 432 Eng. 2 Bbl. (H) Ply. Barracuda/Valiant 8 Cyl. 62-77 270, 318 Eng. 2 Bbl. (C)
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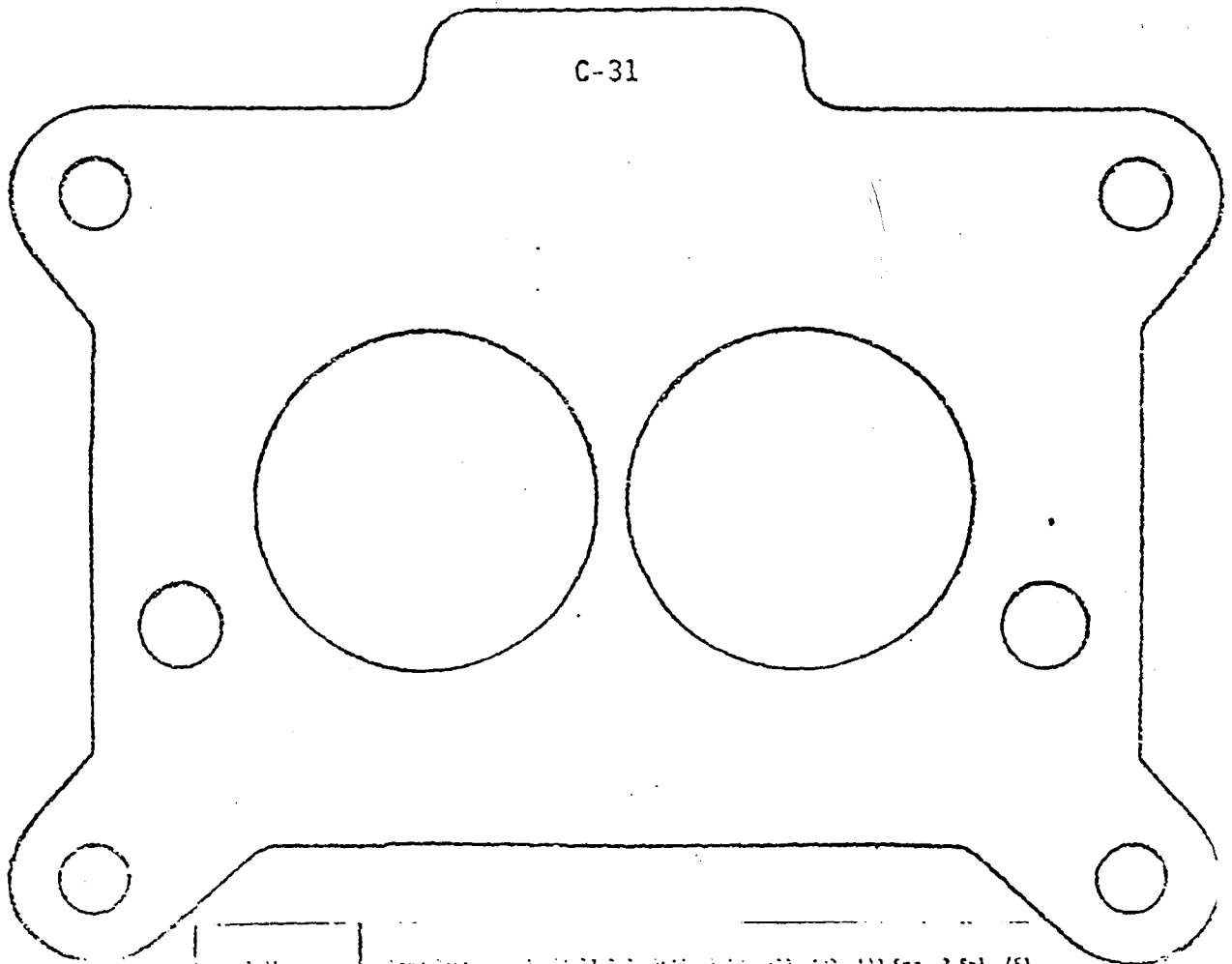


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K-110

K-110 2- BARREL	Ford Mustang 4 Cyl. Pont. Firebird/Tempst 4 Cyl.
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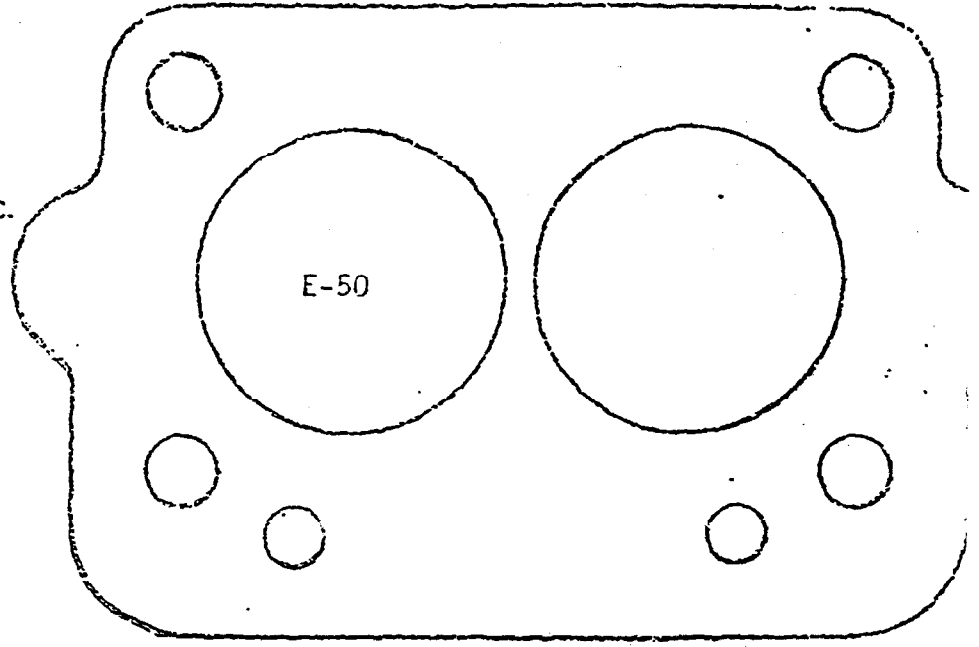


C-31

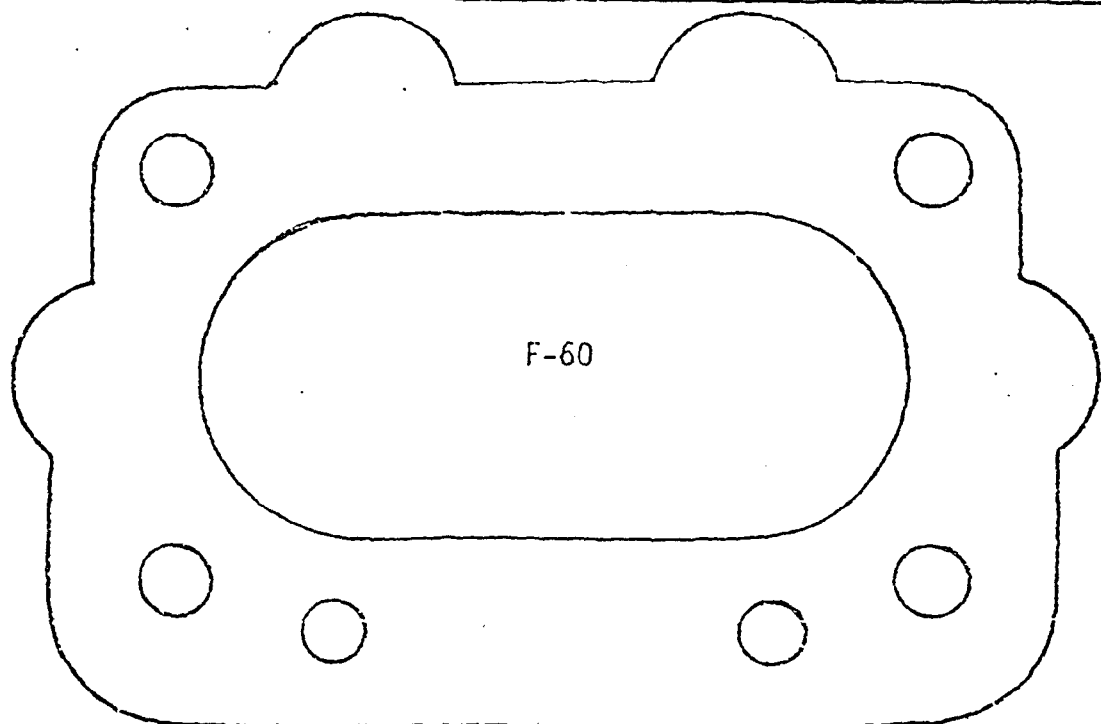
C-31 2- BARREL	Ford Pass. 4 Cyl. 71-77 2.0, 2.3, 2.8, 3.0, 3.3, 4.0, 4.9 Eng. 2 Bbl. (F) Ford Mustang 4 Cyl. 71-77 2.0, 2.3, 2.8, 3.0, 3.3, 4.0, 4.9 Eng. 2 Bbl. (F) Ford Trk. 4 Cyl. 82-77 3.0, 3.3, 3.8, 5.0, 5.8, 6.0, 7.0, 8.0 Eng. 2 Bbl. (H) Mer. Pass. 4 Cyl. 71-77 3.0, 3.3, 4.0, 4.9 Eng. 2 Bbl. (H) Mer. Truck 4 Cyl. 71-77 3.0 Eng. 2 Bbl. (H)
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Manufacturing, Inc.



E.F.S. NO.	MODEL	APPLICATION
E-50		Buick 6 Cyl. 62-63 193, 225 Eng. 2 Bbl. (R)
		Chev. Pass. 8 Cyl. 68-77 307 Eng. 2 Bbl. (R)
2- BARREL		Chev. Trk. 8 Cyl. 60-67 258, 273, 322, 327 Eng. 2 Bbl. (C-R)
		Chev. Trk. 8 Cyl. 68-77 327 Eng. 2 Bbl. (R)
		GMC Trk. 425 Cyl. 61-63 305C, O, E. Eng. 2 Bbl. (S)
		GMC Trk. 8 Cyl. 68-70 327 Eng. 2 Bbl. (R)
		Jeep/Willys 65-67 4 71 225 Eng. 2 Bbl. (R)
		Pont. Firebird/Tempst 6 Cyl. 1969 350 Eng. 2 Bbl. (R)
		Pont. Ventura 8 Cyl. 71-77 350 Eng. 2 Bbl. (R)
		Buick 6 Cyl. 66-67 193, 225 Eng. 2 Bbl. (R)
		Chev. Pass. 8 Cyl. 66-67 231, 327 Eng. 2 Bbl. (R)

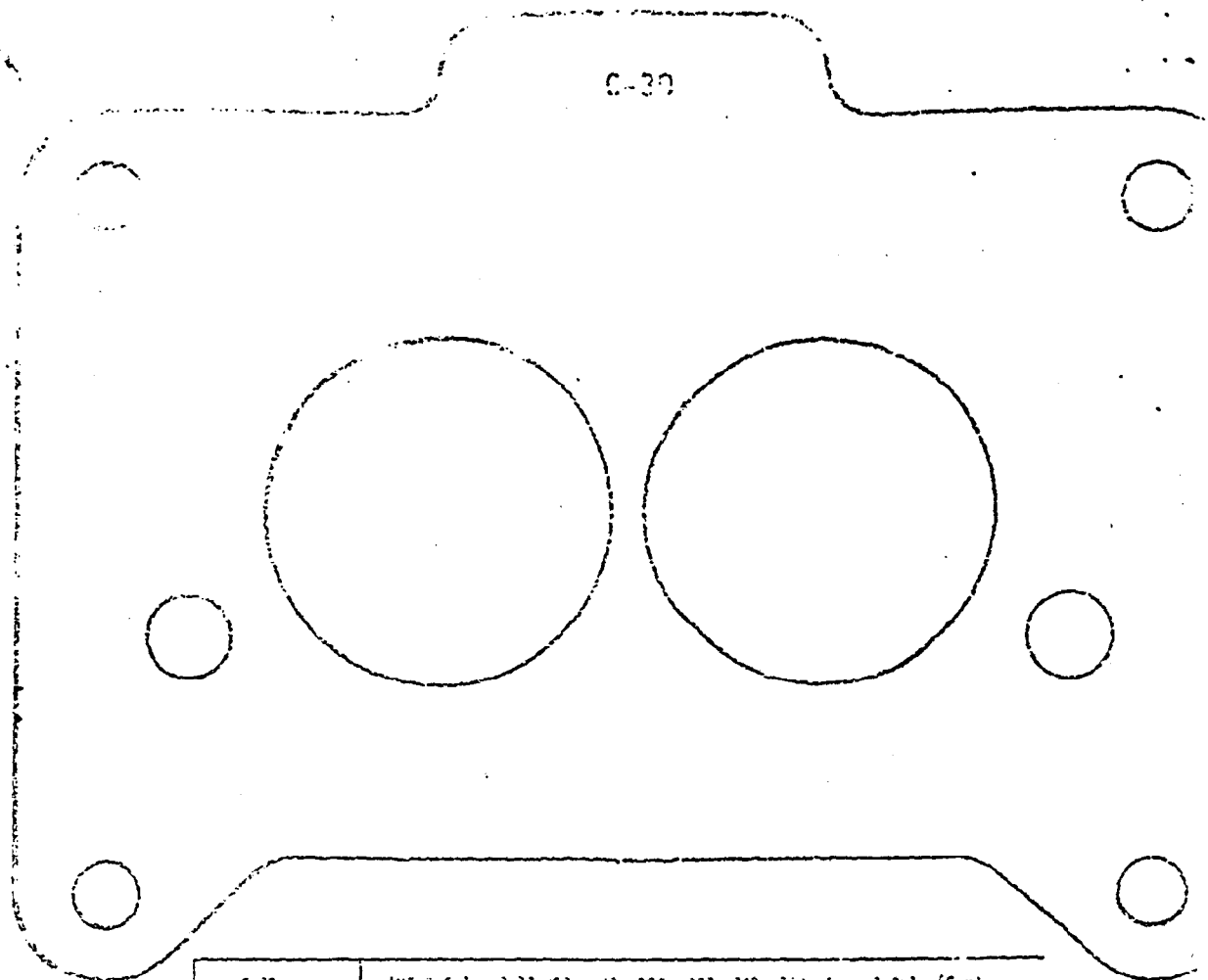


E.F.S. #F-61 replaces / E.F.S. #F-60 / after 1972 / VKMI 79

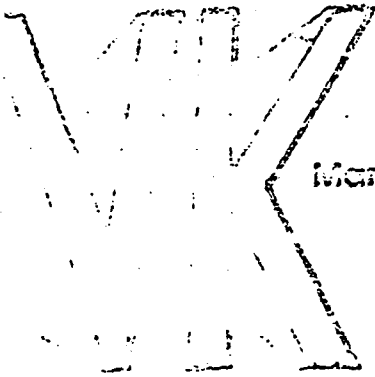
F-60	Buick/Lesabre 8 Cyl. 62-63 281. (R)
	Buick 8 Cyl. 64-67 300, 340 Eng. 2 Bbl. (C-R)
2- BARREL	Buick 8 Cyl. 68-77 300 Eng. 2 Bbl. (R)
	Chev. Pass. 8 Cyl. 68-77 307, 300, 300, 300 Eng. 2 Bbl. (R)
	Chev. Pass. 8 Cyl. 78-77 300 Eng. 2 Bbl. (R)
	Chev. Trk. 8 Cyl. 68-77 348, 350, 350 Eng. 2 Bbl. (R)
	Chev. Trk. 8 Cyl. 78-77 315 Eng. 2 Bbl. (R)
	GMC Trk. 425 Cyl. 60-63 301, 401, 476 Eng. 2 Bbl. (S)
	GMC Trk. 425 Cyl. 68-69 301, 301C, 311C Eng. 2 Bbl. (S)
	GMC Trk. 425 Cyl. 1973 301C, 301C, Eng. WCCS 2 Bbl. (S)
	GMC Trk. 8 Cyl. 67-77 315 Eng. 2 Bbl. (R)
	Jeep/Willys 8 Cyl. 1964, 70-71 350 Eng. 2 Bbl. (R)
	Olds 8 Cyl. 69-77 330, 330, 375, 425, 425, 425 Eng. 2 Bbl. (C-R)

Department of Justice

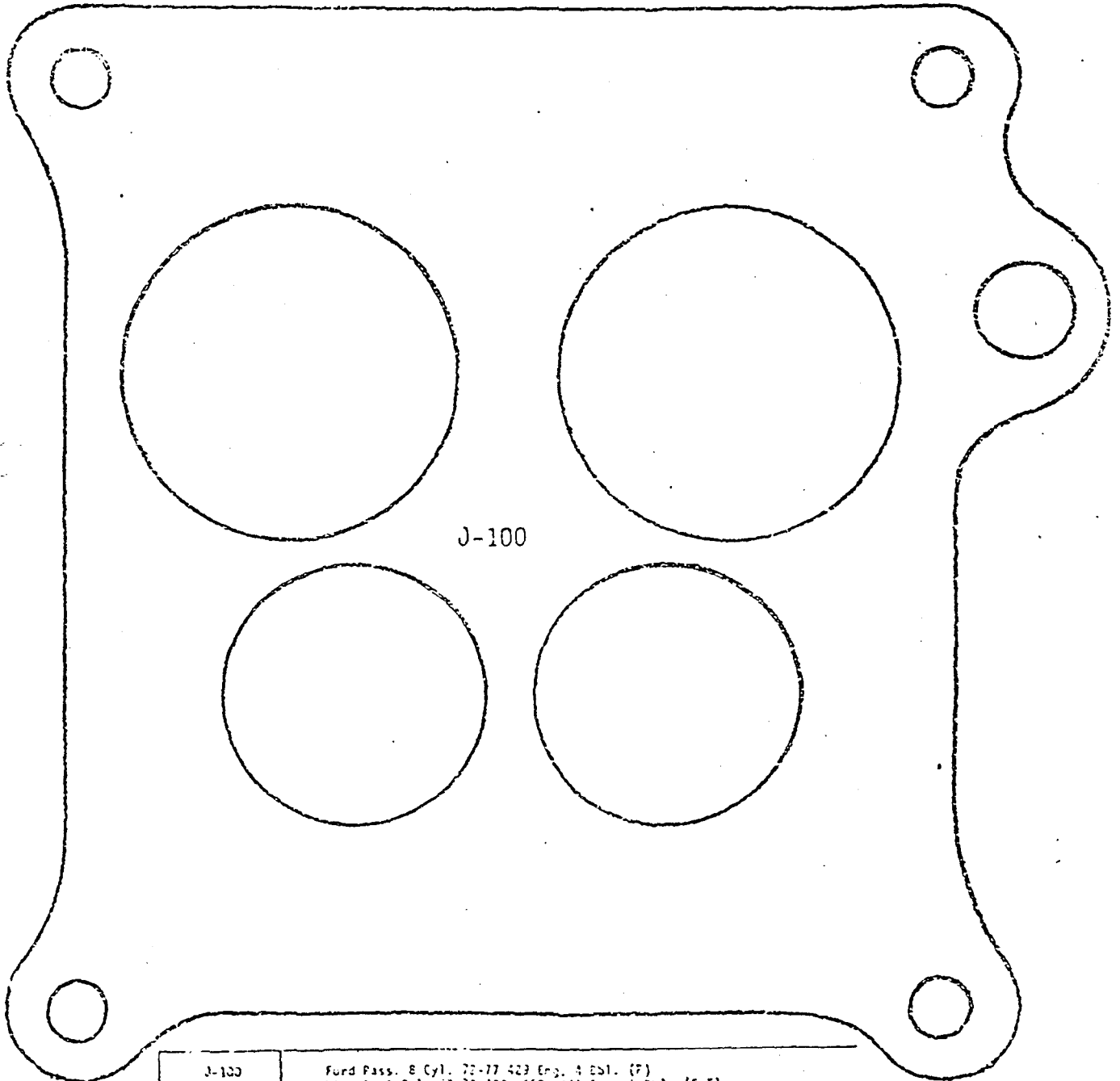
C-30



<p>C-30 2-BARREL</p>	<p>197 8 Cyl. 62-77 277, 288, 301, 327, 342, 360, Eng. 2 801. (C-F) Ford Pass. 8 Cyl. 63-72 269, 288, 302, 321, 342, 429 Eng. 2 801. (C-F) Ford Pass. 8 Cyl. 1971 310, 3514, 372, 400, 42- Eng. 2 801. (H) Ford Pass. 8 Cyl. 1971 327 Eng. 2 801. (H) Ford Bronco 8 Cyl. 66-71 342, 362 Eng. 2 801. (H) Ford Bronco 8 Cyl. 66-77 342, 362 Eng. 2 801. (F)</p>
<p>E.F.S. - 83.</p>	<p>MODEL APPLICATION</p> <p>Ford Falcon/Ford F Cyl. 62-77 280, 289, 301, 321, 342, 429 Eng. 2 801. (C-F) Ford Falcon/Ford F Cyl. 1970 322, 342 Eng. 2 801. (H) Ford Falcon/Ford F Cyl. 1971 322 Eng. (C-F) Ford Falcon/Ford F Cyl. 1972 322 Eng. (C-F) Ford Falcon/Ford F Cyl. 1973 322 Eng. (C-F) Ford Falcon/Ford F Cyl. 1974 322 Eng. (C-F) Ford Falcon/Ford F Cyl. 1975 322 Eng. (C-F) Ford Falcon/Ford F Cyl. 1976 322 Eng. (C-F) Ford Falcon/Ford F Cyl. 1977 322 Eng. (C-F) Ford Falcon/Ford F Cyl. 1978 322 Eng. (C-F) Ford Falcon/Ford F Cyl. 1979 322 Eng. (C-F) Ford Falcon/Ford F Cyl. 1980 322 Eng. (C-F) Ford Falcon/Ford F Cyl. 1981 322 Eng. (C-F) Ford Falcon/Ford F Cyl. 1982 322 Eng. (C-F) Ford Falcon/Ford F Cyl. 1983 322 Eng. (C-F) Ford Falcon/Ford F Cyl. 1984 322 Eng. (C-F) Ford Falcon/Ford F Cyl. 1985 322 Eng. (C-F) Ford Falcon/Ford F Cyl. 1986 322 Eng. (C-F) Ford Falcon/Ford F Cyl. 1987 322 Eng. (C-F) Ford Falcon/Ford F Cyl. 1988 322 Eng. (C-F) Ford Falcon/Ford F Cyl. 1989 322 Eng. (C-F) Ford Falcon/Ford F Cyl. 1990 322 Eng. (C-F) Ford Falcon/Ford F Cyl. 1991 322 Eng. (C-F) Ford Falcon/Ford F Cyl. 1992 322 Eng. (C-F) Ford Falcon/Ford F Cyl. 1993 322 Eng. (C-F) Ford Falcon/Ford F Cyl. 1994 322 Eng. (C-F) Ford Falcon/Ford F Cyl. 1995 322 Eng. (C-F) Ford Falcon/Ford F Cyl. 1996 322 Eng. (C-F) Ford Falcon/Ford F Cyl. 1997 322 Eng. (C-F) Ford Falcon/Ford F Cyl. 1998 322 Eng. (C-F) Ford Falcon/Ford F Cyl. 1999 322 Eng. (C-F) Ford Falcon/Ford F Cyl. 2000 322 Eng. (C-F)</p>



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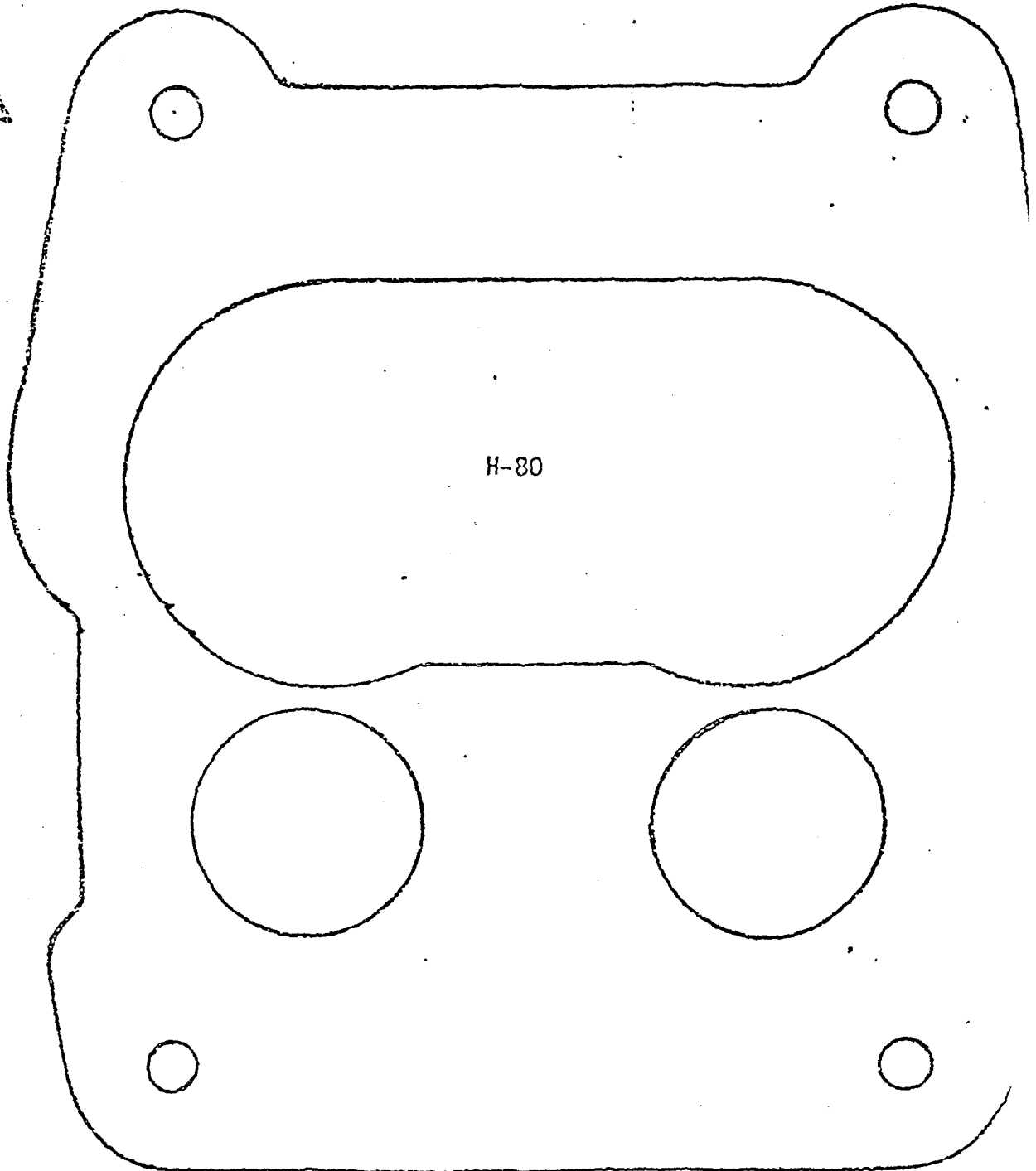


J-100

J-100	Ford Pass. 8 Cyl. 72-77 429 Eng. 4 Eol. (F) Lincoln 8 Cyl. 63-77 430, 450, 462 Eng. 4 Eol. (C-F)
4- BARKEL	Merc. Pass. 8 Cyl. 71-77 429 Eng. 4 Eol. (F)



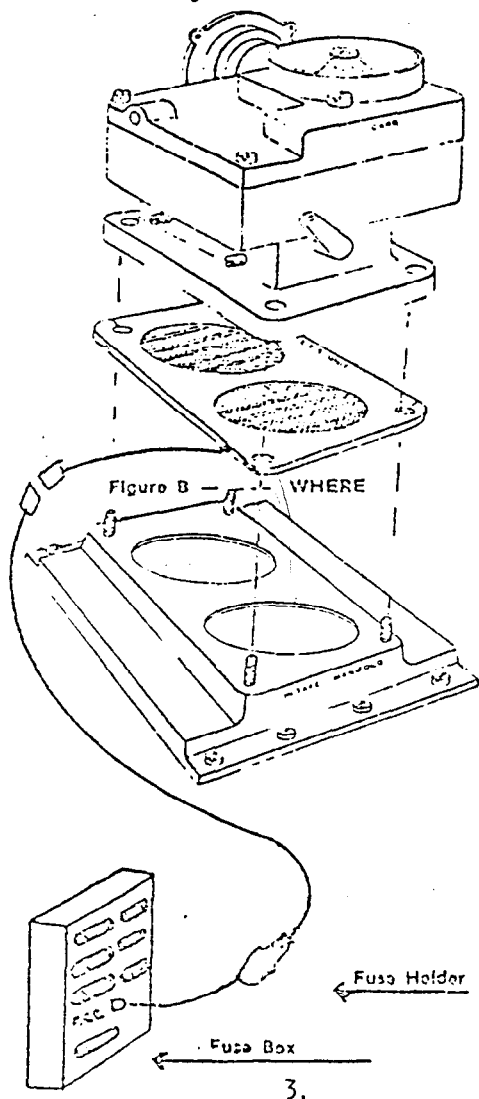
Manufacturing, Inc.



H-80

H-80	Buick 8 Cyl. 66-77 350, 400, 425, 430, 455 Eng. 4 Bbl. (C-R)
4- BARREL	Cadillac 6 Cyl. 67-77 All 4 Bbl. (C-R) Chev. Pass. 8 Cyl. 66-69 327, 327, 395, 427 Eng. 4 Bbl. (H) Chev. Pass. 8 Cyl. 68-77 377, 350, 395, 400, 430, 427, 454 Eng. 4 Bbl. (C-R)
	Chev. Trk. 8 Cyl. 69-77 350, 395, 402 Eng. 4 Bbl. (C-R) Chry. Imperial 6 Cyl. 66-77 440 Eng. 4 Bbl. (C)
	Chry. Trk. 8 Cyl. 68-77 327, 310, 375 Eng. 4 Bbl. (C) Gly. 6 Cyl. 67-77 311, 311, 410, 425, 455 Eng. 4 Bbl. (R)
	Ply. LeBaron/Valiant 8 Cyl. 67-77 400, 425, 443 Eng. 4 Bbl. (C-H) Pont. Firebird/Torquet 8 Cyl. 68-77 350, 400, 428, 455 Eng. 4 Bbl. (C-R)
	(C-R)

Figure A — HOW



GENERAL INSTALLATION INSTRUCTIONS

1. Remove carburetor air-cleaner. Disconnect carburetor gas-line, all the various vacuum lines and linkage connection to carburetor, replacing all vacuum lines having cracks or showing wear.
2. Carefully clean gasket residue from engine manifold and bottom of carburetor. Both manifold and carburetor must be spotless.
3. When manifold studs are present, carefully press Environmental Fuel Saver unit (thin gasket facing down, the one closest to wire mesh) on studs, with circuit wires of the unit facing front toward radiator. In all cases, the studs may need to be BACKED OUT OF THE MANIFOLD a few turns. This can be done by using two nuts on one stud and backing out the stud with the wrench on the bottom nut. (If no manifold studs are present, longer bolts are contained in this package.)
4. This unit is self grounding (silver tab). Tighten down all carburetor bolts or nuts together to achieve an even distribution of pressure...until a tight seal is made. (per manufacturer's spec.)
5. Reconnect carburetor gas-line, all vacuum lines (making sure they are replaced as they were), and linkage connections to the carburetor. Unit will add height; make up the difference on the choke rod or tube. (Rod provided in package where necessary.)
6. Run lead-wire through an opening in the fire-wall and connect to accessory side of the fuse-box. The wire plugged into is "alive" only when the ignition switch is turned on to the run position. (DO NOT PLUG INTO CAR WIRE THAT IS "ALIVE" ALL THE TIME.)
7. Tape lead-wire on engine-side of fire-wall for support so as not to hang free, making sure that fuse connection* is free of all obstructions and areas of excessive heat.
8. Test for in-line circuit connection. Without car running, turn ignition key to "on" position. Line voltage should read 12 to 13 volts. When motor is turned on, line voltage should read approximately 14.8 volts. Line voltage determines the amount of heat radiated from the screens.
9. All vacuum-lines that are open must be closed for adjustment. Start engine and let run until it reaches normal operating temperature, 10 to 15 minutes approximately, permitting engine to stabilize with the Fuel Saver. Then, air-fuel function should be "leaned out," to insure maximum efficiency. Remove plug and connect air-filter vacuum-line to carburetor. Replace carburetor air cleaner.
10. Reconnect air-filter and all vacuum lines to their positions.

*NOTE: IN THE EVENT OF MALFUNCTION, CHECK FUSE FOR ANY VARIANCE. PLEASE NOTE MOTOR COMPANY AND CHECK OTHER SIDE FOR SPECIFIC INSTALLATION INSTRUCTIONS.

Olson



Engineering Inc.

15512 Commerce Lane
Huntington Beach, Ca. 92649
(714) 894-9875

891-4821

VEHICLE EMISSION TEST REPORTDATE: June 13, 1PROJECT NO: 6140-1CLIENT V.K. Manufacturing, Inc.ADDRESS 1068 N.W. 3rd Street - Hallandale, Florida 33009CLIENT'S REPRESENTATIVE Mr. E. DeMartinoVEHICLE: Chevrolet YEAR: 1975 MODEL: Monte CarloLICENSE NO: 601 NAP STATE: CATRANSMISSION: Auto CARBURETOR: _____ BBL: 2ENGINE: NO. OF CYLINDERS: V-8 CID: 350ODOMETER: START: 55791 FINISH: 55802TYPE TEST: CVS COLD STARTPROCEDURE USED: 1975 FTPDEVICE BRAND NAME: BaselineDRY BULB TEMP: 86 °F WET BULB TEMP: 63 °F BAROMETER 29.90 "DYNAMOMETER INERTIA SETTING 4500 #ROAD LOAD HORSEPOWER SETTING 12.7FUEL ECONOMY RESULTS: 13.57 MPG TEST FUEL: Indolene Clear
(CARBON BALANCE METHOD)TEST RESULTS

<u>HC</u>	<u>CO</u>	<u>NOx</u>
<u>0.55 gm/m.</u>	<u>6.77 gm/m.</u>	<u>1.65 gm/m.</u>

COMMENTS: The Test Vehicle Tune-up Parameters were sent to
manufacturers specifications prior to testing.

RECEIVED BY: _____

REVIEWED BY: J.C. Coker

TITLE: _____

TITLE: V.P. Test Operations

Olsen



Engineering Inc.

15512 Commerce Lane
Huntington Beach, Ca. 92649
(714) 894-9875

VEHICLE EMISSION TEST REPORTDATE: June 15, 19PROJECT NO: 6140-1CLIENT V.K. Manufacturing, Inc.ADDRESS 1068 N.W. 3rd Street - Hallandale, Florida 33009CLIENT'S REPRESENTATIVE Mr. E. DeMartinoVEHICLE: Chevrolet YEAR: 1975 MODEL: Monte CarloLICENSE NO: 601 NAP STATE: CATRANSMISSION: Auto CARBURETOR: _____ BBL: 2ENGINE: NO. OF CYLINDERS: V-8 CID: 350ODOMETER: START: 55839 FINISH: 55850TYPE TEST: CVS Cold StartPROCEDURE USED: 1975 FTPDEVICE BRAND NAME: Environmental Fuel Saver (E.F.S.)DRY BULB TEMP: 34 °F WET BULB TEMP: 66 °F BAROMETER: 29.89DYNAMOMETER INERTIA SETTING 4500 #ROAD LOAD HORSEPOWER SETTING 12.7FUEL ECONOMY RESULTS: 13.57 MPG TEST FUEL: Indolene Clear
(CARBON BALANCE METHOD)TEST RESULTS

<u>HC</u>	<u>CO</u>	<u>NOx</u>
<u>0.45 gm/m.</u>	<u>1.86 gm/m.</u>	<u>1.36 gm/m.</u>


COMMENTS: The E.F.S. Device was installed by the clients representa
and the Tune-up Specifications were re-confirmed by OEI Personel.

RECEIVED BY: _____

REVIEWED BY: J.C. Coker

TITLE: _____

TITLE: V.P. Test Operations

Olson  Engineering Inc.
 15512 Commerce Lane
 Huntington Beach, Ca. 92649
 (714) 894-9875

HIGHWAY DRIVING CYCLE FOR FUEL ECONOMY
 CALCULATION SHEET

PROJECT NO.: 6140-1

DATE: June 15, 1975

CLIENT V.K. Manufacturing, Inc.

VEHICLE Chevrolet MODEL Monte Carlo YEAR 1975

LICENSE NO.: 601 MAP STATE CA ODOMETER 55803

1. $K_1 = 0.06783$ (PER MILE VALUE) (10.242 MILES)

2.
$$P_p = \left[\frac{29.90}{\text{BAR PRESS (IN HG)}} \times 25.4 \right] - \left[\frac{50.4}{\text{INLET PRESS (IN H}_2\text{O)}} \times 1.868 \right] =$$

$$\frac{665.31}{\text{MM HG}}$$

3. $T_p = 460^\circ + \frac{110}{570} \times 570 = 570^\circ \text{F} = \frac{570}{1.8} = 317^\circ \text{R}$

4.
$$V_{\text{MIX}} = \left[\frac{P_p}{T_p} \times \frac{665.31}{570} \right] \times \frac{17255}{\text{REVOLUTIONS}} \times \frac{.06783}{K_1} \times \frac{0.2647}{V/\text{REV}}$$

$$= \frac{361.61}{\text{LITERS}}$$

5. A. $\text{HC MASS} = V_{\text{MIX}} \times 16.33 \times \text{CONC} \times 10^{-6} \times 0.866 = \frac{0.147}{\text{GRAMS}}$


B. $\text{CO MASS} = V_{\text{MIX}} \times 32.97 \times \text{CONC} \times 10^{-6} \times 0.429 = \frac{1.150}{\text{GRAMS}}$

C. $\text{CO}_2 \text{ MASS} = V_{\text{MIX}} \times 51.85 \times \text{CONC} \div 100 \times 0.273 = \frac{114.529}{\text{GRAMS}}$

6. ~~XXXXX~~ \div A + B + C = 20.90 MPG FUEL ECONOMY
 2421

COMMENTS: Baseline - set to manufacturers Tune-up specifications
prior to test.

CORRECTED BY J.C. Coker TEST SITE Huntington Beach, CA

Olson  Engineering Inc.
 15512 Commerce Lane
 Huntington Beach, Ca. 92649
 (714) 894-9875

HIGHWAY DRIVING CYCLE FOR FUEL ECONOMY
 CALCULATION SHEET

PROJECT NO.: 6140-1

DATE: June 15, 19

CLIENT V.K. Manufacturing, Inc.

VEHICLE Chevrolet MODEL Monte Carlo YEAR 1975

LICENSE NO.: 601 NAP STATE CA ODOMETER 55850

1. $K_1 = 0.06783$ (PER MILE VALUE) (10.242 MILES)

$$2. P_P = \left[\frac{29.87}{\text{BAR PRESS (IN HG)}} \times 25.4 \right] - \left[\frac{51.3}{\text{INLET PRESS (IN H}_2\text{O)}} \times 1.868 \right] =$$

662.87 MM HG

$$3. T_P = 460^\circ + \frac{110}{570} \times 570 = 570^\circ \text{ F} = 570^\circ \text{ R}$$

$$4. V_{\text{MIX}} = \left[\frac{P_P}{T_P} \times \frac{662.87}{570} \right] \times \frac{17273}{\text{REVOLUTIONS}} \times \frac{0.06783}{K_1} \times \frac{0.2646}{V/\text{REV}}$$

360.52

$$5. A. \text{ HC MASS} = V_{\text{MIX}} \times 16.33 \times \text{CONC} \times 10^{-6} \times 0.866 = \underline{0.061}$$

$$B. \text{ CO MASS} = V_{\text{MIX}} \times 32.97 \times \text{CONC} \times 10^{-6} \times 0.429 = \underline{0.03}$$

$$C. \text{ CO}_2 \text{ MASS} = V_{\text{MIX}} \times 51.85 \times \text{CONC} \div 100 \times 0.273 = \underline{112.572}$$

$$6. \frac{\text{XXXXX}}{2421} \div A + B + C = \underline{21.50} \text{ MPG FUEL ECONOMY}$$

COMMENTS: With EFS Device - Manufacturers Tune-up specifications were re-confirmed prior to the Device Test.

CORRECTED BY J.C. Coker TEST SITE Huntington Beach, CA

Addendum to Attachment 4

When asked, Olson Engineering supplied the following data about the tests run for VK Manufacturing Inc.

<u>Test Type</u>	<u>HC*</u>	<u>CO*</u>	<u>CO₂*</u>	<u>NOx*</u>	<u>F.E.</u>
FTP Baseline	.55	6.77	641.05	1.65	13.57
FTP with Device Installed	.45	1.86	649.52	1.36	13.57
MFET Baseline	.17	2.68	419.52	1.39	20.90
MFET with Device Installed	.07	.07	412.35	1.40	21.50

* In gms/mile.

The vehicle was brought to Olson by VK Manufacturing and modified by VK Manufacturing personnel. The vehicle parameters that were set by Olson Engineering to manufacturers specifications were timing and idle RPM, not idle CO. Olson Engineering never measured the idle mixture.

STATE OF CALIFORNIA

AIR RESOURCES BOARD LABORATORY

18 TELSTAR AVENUE
MONTIE 21731
31 575-6860

Reference No. A-78-213



September 5, 1978

Mr. Ernie De Martino
VK Manufacturing Co
1068 N.W. 3rd Street
Hollandale, FL 33009

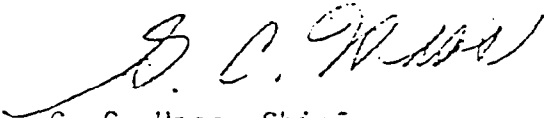
Dear Mr. De Martino:

This is in response to your request for an exemption from the prohibitions of Section 27156 of the California Motor Vehicle Code for the "Environmental Fuel Saver" device to be used on 1978 and older model vehicles.

Our evaluation, documented in the enclosed staff report, indicates that the installation of the "Environmental Fuel Saver" device would not cause any adverse affects on emissions.

Enclosed you will find Executive Order D-84 exempting the "Environmental Fuel Saver" from the prohibitions of Section 27156 of the Motor Vehicle Code for use on all 1978 and older model gasoline powered vehicles with conventional carburetors. May we remind you that unsubstantiated claims, whether written or verbal, are prohibited.

Should you have any questions regarding this matter, please contact Mr. N. Kayne, Manager, Aftermarket Parts and Modifications Evaluation Section at (213) 575-6839.



G. C. Hass, Chief
Vehicle Emissions Control Division

Attachment

State of California
AIR RESOURCES BOARD

August 23, 1978

Evaluation of the VK Manufacturing, Inc;
"Environmental Fuel Saver" Device in Accordance with Section 2222,
Title 13 of the California Administrative Code

I. Introduction

VK Manufacturing Inc., 1068 N.W. 3rd St., Hollandale, Fla. 33009, has applied for an exemption for the "Environmental Fuel Saver" device from the prohibitions of Section 27156 of the Vehicle Code (See Exhibit A). The applicant is requesting that an exemption be granted for 1978 and older gasoline powered vehicles with conventional carburetors.

II. System Description

The "Environmental Fuel Saver" device consists of a spacer plate containing a wire mesh and a heated element. The spacer plate is installed between the carburetor and the intake manifold. The applicant claims that the system helps atomize the fuel and promotes evaporation.

III. System Evaluation

The applicant submitted CVS-75 data obtained at Olson Engineering, 15512 Commerce Lane, Huntington Beach, California; a recognized vehicle emission laboratory. The tests were run on a 1975 Chevrolet Monte Carlo, 350-V8 engine, with automatic transmission and 55,791 miles. The results were as follows:

	<u>Baseline</u> gm/mi	<u>With Device</u> gm/mi
HC	0.55	0.45
CO	6.77	1.86
NOx	1.65	1.36
Economy	13.57 mi/gal	13.57 mi/gal

The applicant also submitted Highway Driving Cycle tests on the same vehicle with the following results.

	<u>Baseline</u> gm/mi	<u>With Device</u> gm/mi
HC	0.15	0.06
CO	1.15	0.03
NOx	-	-
Economy	20.9 mi/gal	21.5 mi/gal

The Air Resources Board Laboratory performed confirmatory tests on a 1970 Chevrolet Impala, 350-V8 engine with automatic transmission and 77,400 miles. The results were as follows:

Cold Starts CVS-II

	<u>Baseline</u> gm/mi	<u>With Device</u> gr/mi
HC	3.34	3.50
CO	51.37	41.97
NOx	3.98	4.20
Economy	13.4 mi/gal	13.4 mi/gal

Highway Cycle

	<u>Baseline</u> gr/mi	<u>With Device</u> gr/mi
HC	2.34	2.39
CO	42.72	44.52
NOx	4.77	4.29
Economy	19.2 mi/gal	19.2 gr/mi

Based on the above tests, the staff believes there is no significant increase in emissions or fuel economy.

IV. Manufacturer's Claims

The manufacturer has made unsubstantiated claims regarding vehicle emissions, fuel economy and engine efficiency. He has been advised that he may not use these claims in any of his verbal or written sales efforts.

V. Conclusion and Recommendations

Based on the above tests and prior experience with similar devices, the staff is of the opinion that the device will not result in an increase in emissions when installed on gasoline powered vehicles using conventional carburetors. The staff therefore recommends that VK Manufacturing Inc. be granted an exemption, by Executive Order D-84, for its "Environmental Fuel Saver" device from the prohibitions of Vehicle Code Section 27156 for 1978 and older model gasoline powered vehicles using conventional carburetors.

Tests

The following road tests were performed on various models of standard automobiles, all running at 60 miles per hour, to determine the miles per gallon (MPG) normally obtained in the absence of the atomized unit as compared to the MPG realized with the unit installed and operating the vehicle:

<u>Vehicle</u>	<u>MPG</u> <u>without Unit</u>	<u>MPG</u> <u>with Unit</u>
1970 Mercury (390 Engine)	13.3	20.8
1972 Plymouth (225 Engine)	16.9	26.7
1974 Plymouth (225 Engine)	20.5	27.8
1971 Pontiac Grand Prix	12.5	18.9
1974 Ford (351 Engine)	11.8	18.8
1971 Buick (225 Engine)	14.4	19.1
1973 Thunderbird	12.2	18.8
1967 Olds Supreme	13.1	19.2

It will be evident from the foregoing that with the unit installed, a major improvement in fuel economy was obtained in each vehicle tested. Emission tests carried out on vehicles with and without the unit were similarly impressive. Various vehicles were tested without the unit (BLR = Base Line Run), and then with the unit installed (TUR = Test Unit Run). The following results are typical of those obtained with respect to the emission of hydrocarbon (HC) and carbon monoxide.

	<u>HC</u>	<u>CO</u>
BLR at 1250 RPM	71 ppm	.60%
TUR at 1250 RPM	21 ppm	.10%
BLR at 2500 RPM	25 ppm	.15%
TUR at 2500 RPM	15 ppm	.10%
BLR at 750 RPM	150 ppm	3.4%
TUR at 750 RPM	90 ppm	.31%
BLR at 1250 RPM	25 ppm	.15%
TUR at 1250 RPM	15 ppm	.10%
BLR at 750 RPM	150 ppm	3.4%
TUR at 750 RPM	90 ppm	.31%

Thus, in each of the above five comparative tests, the emission of noxious contaminants was significantly reduced by the unit. It is evident, therefore, that the unit acts to strikingly improve the fuel efficiency of the engine while at the same time reducing the emission of pollutants.