

State of California  
AIR RESOURCES BOARD

EXECUTIVE ORDER D-117  
Relating to Exemptions under Section 27156  
of the Vehicle Code

MPG PERFORMANCE PRODUCTS  
VARI-FLOW WATER INJECTOR

Pursuant to the authority vested in the Air Resources Board by Section 27156 of the Vehicle Code; and

Pursuant to the authority vested in the undersigned by Sections 39515 and 39516 of the Health and Safety Code and Executive Order G-45-5;

IT IS ORDERED AND RESOLVED: That the installation of the Vari-Flow water injector manufactured by MPG Performance Products of Chatsworth, California, has been found not to reduce the effectiveness of required motor vehicle pollution control devices and, therefore, is exempt from the prohibitions of Section 27156 of the Vehicle Code for 1980 and older gasoline-powered vehicles with engines of 140 CID or less.

This Executive Order is valid provided that installation instructions for this device will not recommend tuning the vehicle to specifications different from those submitted by the device manufacturer.

Changes made to the design or operating conditions of the device, as exempted by the Air Resources Board, that adversely affect the performance of a vehicle's pollution control system shall invalidate this Executive Order.

Marketing of this device using an identification other than that shown in this Executive Order or marketing of this device for an application other than those listed in this Executive Order shall be prohibited unless prior approval is obtained from the Air Resources Board. Exemption of a kit shall not be construed as an exemption to sell, offer for sale or advertise any component of a kit as an individual device.

This Executive Order does not constitute any opinion as to the effect that the use of this device may have on any warranty either expressed or implied by the vehicle manufacturer.

THIS EXECUTIVE ORDER DOES NOT CONSTITUTE A CERTIFICATION, ACCREDITATION, APPROVAL, OR ANY OTHER TYPE OF ENDORSEMENT BY THE AIR RESOURCES BOARD OF ANY CLAIMS OF THE APPLICANT CONCERNING ANTI-POLLUTION BENEFITS OR ANY ALLEGED BENEFITS OF THE VARI-FLOW WATER INJECTOR.

No claim of any kind, such as "Approved by Air Resources Board" may be made with respect to the action taken herein in any advertising or other oral or written communication.

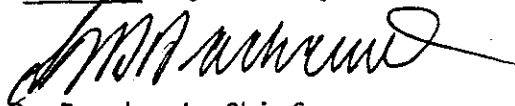
Section 17500 of the Business and Professions Code makes untrue or misleading advertising unlawful, and Section 17534 makes violation punishable as a misdemeanor.

Section 43644 of the Health and Safety Code provides as follows:

"43644. (a) No person shall install, sell, offer for sale, or advertise, or, except in an application to the state board for certification of a device, represent, any device as a motor vehicle pollution control device for use on any used motor vehicle unless that device has been certified by the state board. No person shall sell, offer for sale, advertise, or represent any motor vehicle pollution control device as a certified device which, in fact, is not a certified device. Any violation of this subdivision is a misdemeanor."

Any apparent violation of the conditions of this Executive Order will be submitted to the Attorney General of California for such action as he deems advisable.

Executed at El Monte, California, this 31<sup>st</sup> day of July, 1981.

  
K. D. Drachand, Chief  
Mobile Source Control Division

State of California  
AIR RESOURCES BOARD

July 17, 1981

EVALUATION OF THE MPG PERFORMANCE PRODUCTS COMPANY  
"VARI-FLOW INJECTOR" IN ACCORDANCE WITH  
SECTION 2222, TITLE 13 OF THE CALIFORNIA ADMINISTRATIVE CODE

I. INTRODUCTION

MPG Performance Products of Chatsworth, California, has applied for an exemption from Section 27156 of the California Vehicle Code (VC) for an add-on device known as the "Vari-Flow Injector". Exemption is sought for all gasoline-powered motor vehicles.

The device was evaluated by bench flow tests and back-to-back Constant Volume Sampler, 1975 (CVS-75) emissions tests, and Highway Fuel Economy tests (HFET).

II. DEVICE DESCRIPTION AND OPERATION

The Vari-Flow Injector is a water injection system which sprays water through a nozzle installed in the air cleaner housing into the air horn (intake) of the carburetor.

The major components of the system are a water reservoir, an electric pump, a vacuum-actuated proportional control valve, and the spray nozzle. Additional components are a water filter, oil pressure interlock switch, manual on-off switch, and a solenoid valve (Figure 1).

The Vari-Flow Injector is designed to inject water into the carburetor inlet only during periods of increased demand for engine power, as evidenced by low intake manifold vacuum. When the engine is not running, an oil pressure interlock switch disconnects the water pump and closes the solenoid valve to stop the water flow.

The Vari-Flow is available with five different size nozzles capable of maximum flow rates ranging from 40 to 270 cc/min. One nozzle, appropriate to the size of the engine of the purchaser's car, is supplied with each vari-flow unit. Water flow starts at 11 inches of manifold vacuum and increases to maximum flow rate at zero vacuum.

### III. ARB TEST RESULTS

At the request of the ARB staff, the applicant submitted four nozzles for bench testing. The Vari-Flow was assembled as shown in Figure 2 and the flow rates determined at appropriate manifold vacuum increments are shown in Table 1.

Table 1

Water Flow vs. Control Vacuum  
Pump Voltage = 14.5 volt

| POINT | VACUUM<br>in Hg | W A T E R F L O W - cc/min |                     |                     |                     |
|-------|-----------------|----------------------------|---------------------|---------------------|---------------------|
|       |                 | <u>.016" Nozzle</u>        | <u>.020" Nozzle</u> | <u>.025" Nozzle</u> | <u>.029" Nozzle</u> |
| 1     | 0               | 30                         | 80                  | 210 <sup>(1)</sup>  | 265 <sup>(1)</sup>  |
| 2     | 3               | 18*                        | 65                  | 180                 | 230                 |
| 3     | 6               | 18                         | 45                  | 125                 | 170                 |
| 4     | 9               | 15                         | 20                  | 60                  | 65                  |
| 5     | 11              | 0                          | 0                   | 0                   | 0                   |
| 6     | 10              | 2                          | 5                   | 10                  | 10                  |
| 7     | 9               | 13                         | 20                  | 60                  | 70                  |
| 8     | 6               | 18                         | 45                  | 135                 | 165                 |
| 9     | 3               | 40                         | 65                  | 170                 | 235                 |
| 10    | 0               | 55                         | 80                  | 210                 | 270                 |

\* Irratic Flow Rate Noted and Verified

(1) Two-Hole Nozzle

A plot of these data based upon second order polynomial equations obtained by computer normalization is presented in Figure 3. The large difference between the .020" and the .025" nozzle was discussed with the applicant. The applicant then submitted a two-hole .020 nozzle for testing. This nozzle was not tested because it was apparent that the flow rate would fit within the void area of the curves.

#### IV. APPLICANT'S TEST DATA

The Air Resources Board specified two vehicles to be tested by the applicant according to the CVS-75 test procedure.

Data from the first vehicle was submitted on April 10, 1981. The applicant has not been able to complete the second vehicle in a timely manner.

The submitted data are:

##### Test Vehicle

Year: 1980  
Make: Chevrolet  
Model: Chevette (Engine size - CID)  
Odometer: 14,292

| <u>TEST<br/>DATE</u> | <u>CONDITION</u> | <u>HC<br/>g/mi</u> | <u>CO<br/>g/mi</u> | <u>NOx<br/>g/mi</u> | <u>CVS/HEFT<br/>ECONOMY<br/>MPG*</u> |
|----------------------|------------------|--------------------|--------------------|---------------------|--------------------------------------|
| 4-9-81               | Baseline         | .187               | 3.099              | .256                | 25.5/32.8                            |
| 4-8-81               | w/Device         | .223               | 2.850              | .197                | 25.6/32.5                            |

\*Rounded values.

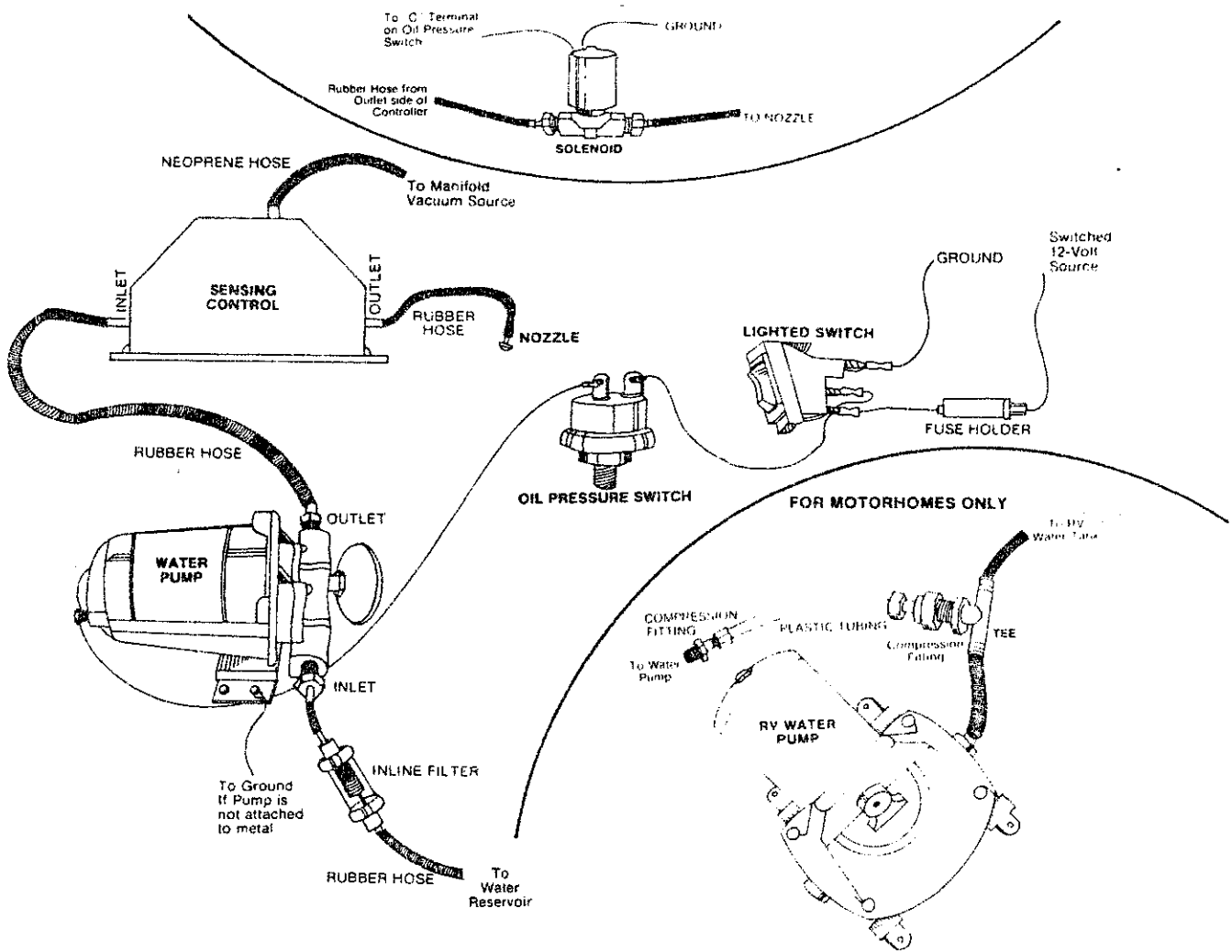
The staff finds that there is no significant increase in emissions resulting from the installation of the Vari-Flow water injector on this vehicle. The absence of second vehicle data makes it impossible to ascertain the effect of the Vari-Flow on larger vehicles.

V. CONCLUSIONS AND RECOMMENDATIONS

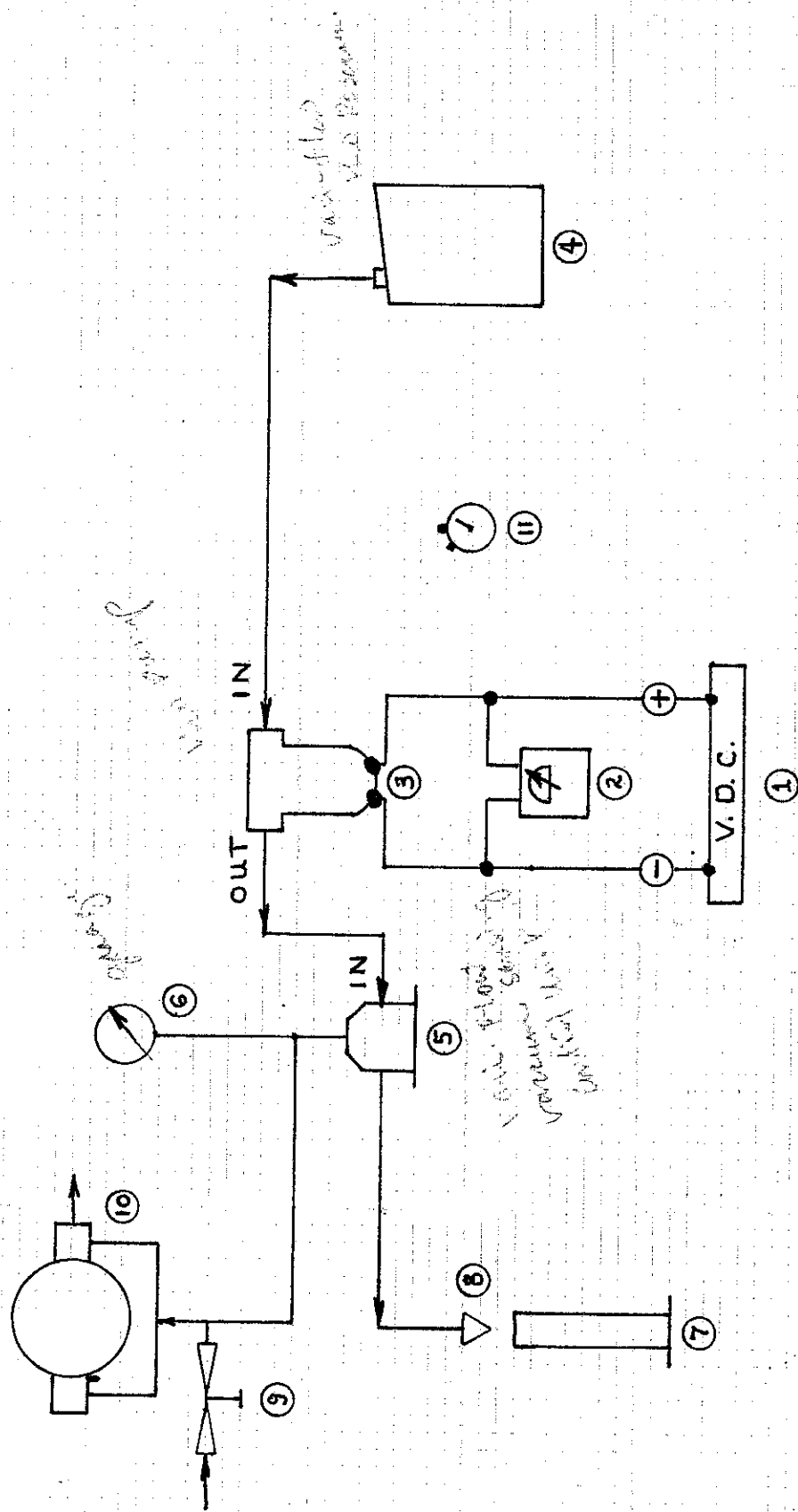
The staff finds no evidence that the Vari-Flow water injector will have a significant adverse effect upon the emissions from motor vehicles under 140 cubic inch displacement.

The staff, therefore, recommends that Executive Order D-117 exempting the Vari-Flow water injector from the prohibitions of VC 27156 be granted.

Figure 1  
VERI-FLOW INJECTOR



VARI-LOW  
BENCHTEST



Project: 2V8011

Figure 2

VARI-FLOW  
BENCH TEST  
Equipment List  
Project: 2V8011

- ① Uniply Mdl. Tw 6050A D.C. Power Supply
- ② Simpson Mdl. 314 V. O. M.
- ③ VARI-FLOW water pump
- ④ VARI-FLOW water Reservoir
- ⑤ VARI-FLOW vacuum sensing Control Unit
- ⑥ U.S. Gauge 0-30 in./Hg. vacuum gauge
- ⑦ 500 ml. graduated cylinder
- ⑧ VARI-FLOW nozzle
- ⑨ BLEED VALVE
- ⑩ Gast Mdl. 4VCF-10-M400X Vacuum Pump
- ⑪ Stopwatch

Figure 3  
MPG Vari-Flow  
Water Flow vs. manifold vacuum  
Bench Data

