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State of California  
AIR RESOURCES BOARD

EXECUTIVE ORDER D-27  
Relating to Exemptions under Section 27156  
of the Vehicle Code

MANFREDI ENTERPRISES, INC.  
"MANFREDI FUEL BOOSTER" INJECTOR SYSTEM

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 Section 39023 of the Health and Safety Code;

IT IS ORDERED AND RESOLVED: That the installation of "Manfredi Fuel Booster" injector system manufactured by Manfredi Enterprises, Inc. of Cleveland, Ohio has been found to not 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 1974 and older model-year vehicles with engines of 200 cubic inch displacement and larger.

This exemption is valid on those units which meet the following requirements:

- (1) The name "Manfredi Fuel Booster" and Model No. 200 is identified on the container.
- (2) The flow limiting check valve (Model No. 200A) is incorporated in the unit.
- (3) The vaporous mixture is admitted into the existing PCV system of the engine.
- (4) The use of water in warm weather or 50% isopropyl-alcohol water mixture for cold weather is specified.

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

Changes made to the design or operating conditions of the device as originally submitted to the Air Resources Board for evaluation that adversely affect the performance of the vehicle's pollution control devices 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.

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 "MANFREDI FUEL BOOSTER" INJECTOR SYSTEM DEVICE.

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 unlawful, untrue or misleading advertising and Section 17534 makes violation punishable as a misdemeanor.

Sections 39130 and 39184 of the Health and Safety Code provide as follows:

"39130. No person shall install, sell, offer for sale, or advertise, or, except in an application to the board for certification of a device, represent, any device as a motor vehicle pollution control device unless that device has been certified by the 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 section is a misdemeanor."

"39184. (a) No person shall install, sell, offer for sale, or advertise, or, except in an application to the board for accreditation 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 accredited by the board. No person shall sell, offer for sale, advertise, or represent any motor vehicle pollution control device as an accredited device which, in fact, is not an accredited 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 Sacramento, California, this 31 day of May, 1974.

Original signed by  
William Simmons  
WILLIAM SIMMONS  
Executive Officer

State of California

AIR RESOURCES BOARD

May 13, 1974

Staff Report

Evaluation of the Manfredi Enterprises, Inc.  
"Manfredi Fuel Booster" Vapor Injector System  
For Exemption from the Prohibitions of Section  
27156 of the California Motor Vehicle Code

I. Introduction

Manfredi Enterprises, Inc. of Cleveland, Ohio, has applied for exemption from the prohibitions of Section 27156 of the California Motor Vehicle Code for its "Manfredi Fuel Booster" Vapor Injector System. This section prohibits the advertising, sale, and installation of any device which alters or modifies the performance of any motor vehicle pollution control device or system. The applicant is requesting that the exemption be granted for 1974 and older model-year vehicles with engines 200 cubic inch displacement (CID) or larger.

An exemption to Section 27156 was issued for the "Manfredi Fuel Booster" by Resolution No. 72-99 dated June 21, 1972 to Charles Kolton Enterprises for 1970 and older model-year vehicles with engines 200 cubic inch displacement or larger. This device included a flow limiting check valve.

In this application the manufacturer submitted a "Manfredi Fuel Booster" without the check valve. The data submitted by the applicant indicated the device would adversely affect the performance of the emission control system. Based on this data, the applicant was informed by the

staff that a recommendation for an exemption to Section 27156 could not be made for this design. The applicant subsequently modified his device to include a flow limiting check valve.

## II. System Description

This device consists of a fluid container identified by Model No. 200, rubber hose, check valve (Part No. 200A) and a plastic tee. A rubber hose provides the connection between the engine and the plastic fluid container mounted in the engine compartment. Figure 1 is a schematic of the device showing how the fluid vapor is admitted into the engine through the PCV system.

Manfredi Enterprises, Inc. specifies the use of water in warm climates and a 50% isopropyl alcohol-water mixture in cold weather. According to the applicant, this formulation would improve engine performance and fuel economy.

The plastic fluid container has a filtered air inlet port (1) and an electric motor (2) to circulate the inlet air. Connected to the motor is a hollow conical shaped shaft (3) with an impeller on the upper end which aides in the air circulation. According to the manufacturer, the function of the motor is to agitate the fluid to enhance the rate of vaporization. The outlet rubber hose contains a spring loaded plastic check valve (4) which is inside the plastic container. This valve restricts the quantity of air flow at high vacuum (idle and cruise

conditions) and allows a higher air flow rate at low vacuum (high speed and wide open throttle conditions). The rubber hose (5) connects the air outlet port of the device to a tee connecting the device to the PCV line.

### III. System Function

When the container's lower chamber (7) is full of liquid, the rotation of the motor shaft is sufficient to blow a film of water on the tray (8). By applying vacuum on the tee of the PCV line, vaporization of the water on the tray is enhanced. However, when the lower chambers are half full with water, the rotating shaft is insufficient to pump the water onto the tray. Under this condition the rotating impeller blades on the shaft blows air across the tray. The fluid levels never reach sufficient height that would lead to conditions of injecting water into the intake manifold because of the presence of overfill holes on the container.

### IV. System Evaluation

The following discussion summarizes the applicant's data and the bench flow test performed by the Air Resources Board Laboratory.

#### A. Applicant's Emission Data

The applicant submitted back-to-back baseline and device Hot CVS I emission tests performed by Olson Laboratories of Anaheim, California. These tests were performed on the device without the check valve. A

1974 Buick Apollo with a 250 cubic inch displacement engine and automatic transmission was selected as the test vehicle. The following table summarizes the applicant's emission data. In all cases an adverse effect on the exhaust emission control system was reported for the device without the flow limiting check valve.

Percent Change in Exhaust Emission  
by Hot CVS I Test

<u>Test Fluid</u>	<u>HC</u>	<u>grams/mile</u>	
		<u>CO</u>	<u>NOx</u>
Water	-32.3	-16.0	+20.3
Water isopropyl- alcohol	+25.8	+11.5	- 6.78
Air	+61.3	+17.3	-11.9

+ Denotes increase in emissions compared to baseline.

As stated previously, this data is not considered applicable to the present design of the device because the flow limiting check valve was not included in the emission tests.

B. Air Resources Board Bench Flow Test

The Air Resources Board staff uses maximum air flow limits as a basis of judgement for the leaning effect of the device. These established air flow limits are judged by the staff to not adversely affect the performance of the emission control system.

The Air Resources Board Laboratory conducted two bench flow tests, one without the check valve and one with the check valve, by measuring the air flow rate under various vacuum

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conditions. Air flow rates without the check valve indicate a range in flow capacity of 0.8 to 2.2 cubic feet per minute (CFM) over the vacuum range 6 to 20 inches Hg. (reference Figure 2). However, air flow rates with the check valve indicate a maximum flow of 0.52 CFM at 6 inches Hg. vacuum. Between 6 and 20 inches vacuum Hg., the air flow rate decrease from 0.52 to 0.27 CFM. (Reference Figure 3.)

The results without the check valve showed the air flow permitted by the device exceeded the established limits. Therefore an adverse effect on emissions would be expected without the check valve. This fact was substantiated by the applicant's data.

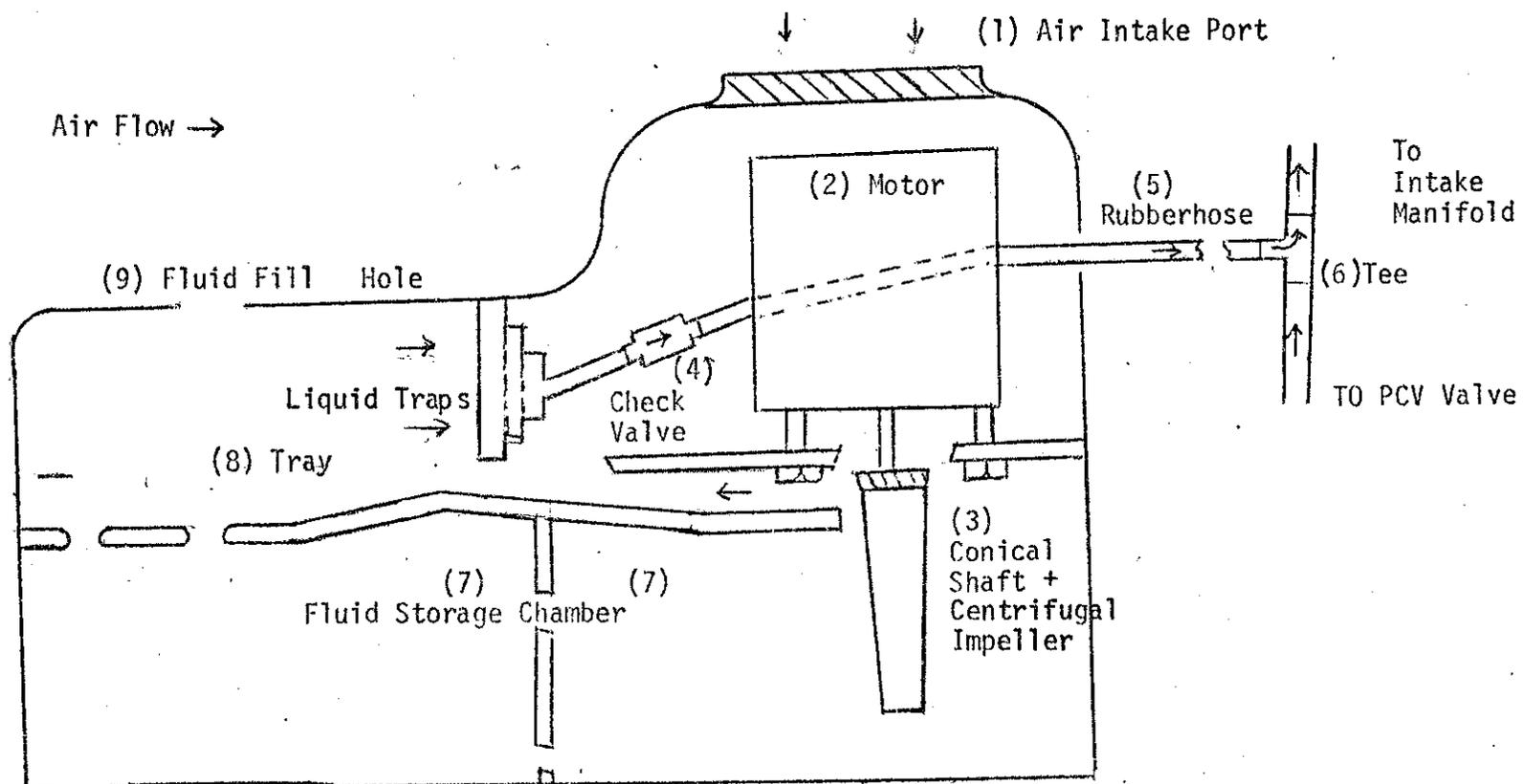
If the device includes the check valve, the tests showed the air flow permitted does not exceed the limits established for the model-year vehicles and engine specified in this application, except in instances of low engine vacuum. Although the limit is exceeded at low engine vacuum, the percentage of time which the vehicle operates in this range is minimal.

V. Conclusion & Recommendation

The staff is of the opinion that the "Manfredi Fuel Booster" vapor injector system incorporating the flow limiting check valve would not have an adverse effect on the existing pollution control system.

Therefore, the staff recommends that Manfredi Enterprises Inc., be granted an exemption for its "Manfredi Fuel Booster" for 1974 and older model-year vehicles with engines 200 CID and larger.

Figure 1 - Schematic of "Manfredi Fuel Booster"



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Figure 2 - Bench Flow Tests of the Manfredi Fuel  
Booster Without Check Valve

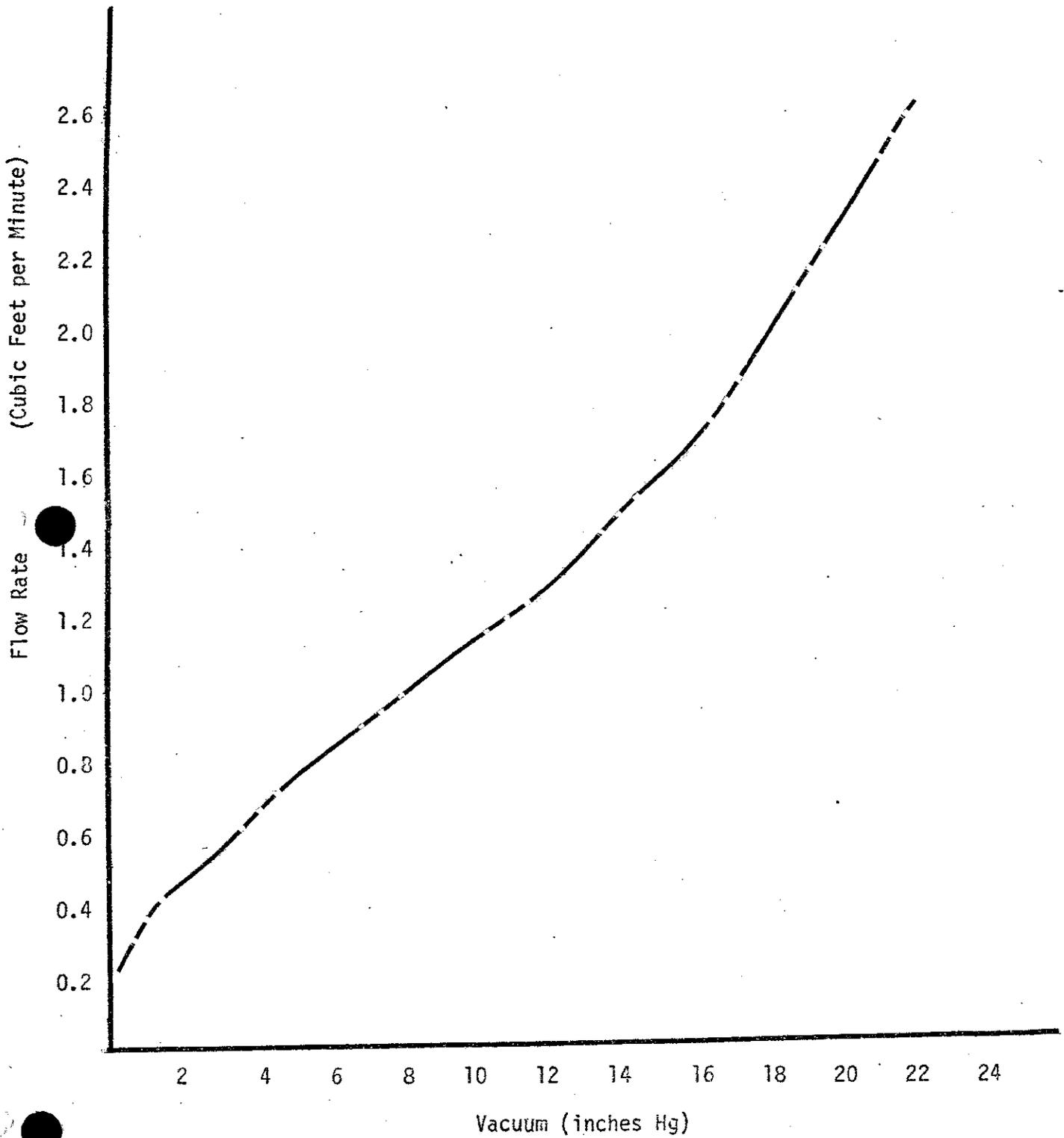


Figure 3 - Bench Flow of Manfredi Fuel Booster  
With Check Valve

