

State of California
AIR RESOURCES BOARD

EXECUTIVE ORDER D-75-3
Relating to Exemptions under Section 27156
of the Vehicle Code

CAGLE CORPORATION
"CAGLE MARK II AUTOMATIC FUEL CONTROL" DEVICE

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 "Cagle Mark II Automatic Fuel Control" device manufactured by Cagle Corporation, 2667 E. 28th St., Suite 517, Long Beach, California 90806 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 model year motor vehicles that are powered by gasoline with conventional carburetors and mechanical or electric fuel pumps with and without recirculation systems.

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 "CAGLE MARK II AUTOMATIC FUEL CONTROL" 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 untrue or misleading advertising unlawful, and Section 17534 makes violation punishable as a misdemeanor.

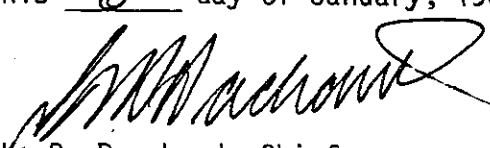
Section 43644 of the Health and Safety Code provides as follows:

"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.

Executive Orders D-75 dated June 13, 1977, D-75-1 dated September 21, 1979 and D-75-2 dated August 15, 1979 are superseded and of no further force and effect.

Executed at El Monte, California, this 6th day of January, 1981.



K. D. Drachand, Chief
Mobile Source Control Division

State of California
AIR RESOURCES BOARD

December 17, 1980

Addendum to Staff Reports Dated
September 15, 1977 and August 3, 1979

"Cagle Corporation Mark II Automatic Fuel Control" Device for Compliance
with the Requirements of Section 27156 of the Vehicle Code

I. INTRODUCTION

Cagle Corporation, of 2667 E. 28th St., Suite 517, Long Beach, California 90806 requested by letter dated September 9, 1980 (See Appendix A) an update of the existing Air Resources Board's, Executive Order D-75-2. The applicant requested that the exemption from the prohibitions of Vehicle Code Section 27156 for their "Cagle Mark II Automatic Fuel Control" device be updated to include all 1980 and older model year motor vehicles that are powered by gasoline engines with conventional carburetors and mechanical or electrical fuel pumps with and without fuel recirculation systems.

II. DEVICE DESCRIPTION AND OPERATION

The "Cagle Mark II" is a fuel pressure regulator installed between the fuel pump and the carburetor. It has three external fittings: (a) a fitting at the top for measuring intake manifold vacuum (b) an inlet fitting marked "PUMP" for connection to the fuel pump and (c) an outlet fitting marked "CARB" for connection to the carburetor. It is designed to reduce the fuel supply pressure under low demand conditions but still maintain the required fuel flow to the carburetor under all

operating modes. The regulator is controlled by the intake manifold vacuum operating on a spring balanced Buna-N diaphragm.

Reference is made to Appendix B. When the engine is idling or cruising, the intake manifold vacuum draws the diaphragm "H" upwards against spring "F" thus lifting plunger pin "C" away from diaphragm "J". Diaphragm "J" regulates fuel pressure from the fuel pump to the carburetor in the conventional manner of using opposing spring tensions (springs O and N) balanced to maintain a constant fuel supply of 1 to 1 1/2 lbs. per square inch.

During periods of acceleration or heavy demand, the manifold vacuum is substantially reduced thus allowing spring "F" to force plunger pin "C" down on diaphragm "J" as shown in the figure of Appendix C. This action then assists spring "O" to override the pressure regulator.

At manifold vacuum ranging from 0 to 20 inches Hg. and fuel pump pressures ranging from 3 to 12 psig, the graphs in Figure 1 to 6 of Appendix C (Daigh Automotive Engineering Co. (DAECO) data) show that the regulator outlet pressure to the carburetor is generally reduced as vacuum is increased. In the operating range of 15 to 20 inches Hg. manifold vacuum, the higher the fuel pump pressure the lower the regulator outlet pressure. This is not true for manifold vacuum range of 0 to 12 inches Hg. Hence the device can maintain full discharge pressure when the intake manifold vacuum is low (as in wide open throttle, high speed operation) but can reduce delivery pressure when the intake manifold vacuum is high (as in deceleration or cruise conditions).

Appendix D presents the DAECO data for a given fuel flow rate (16 lbs. per hour) and fuel pump pressure (7.0 psig.) showing the regulator outlet pressure as a function of steady-state vacuum from 0 to 29 inches Hg. This data shows that between 0 and 15 inches manifold vacuum, there is a linear decrease in regulator outlet pressure and at greater than 15 inches manifold vacuum, the regulator outlet pressure is a constant 1.1 psig.

Appendix E shows the effect of pump speed on regulator outlet pressure at a given constant flow, fuel pump pressure and manifold vacuum. Above 1500 engine rpm, the pump speed has no effect on the regulator outlet pressure.

III. DISCUSSION

Prior to issuing Executive Order D-75-2 (which exempts 1979 and older model year vehicles) the staff performed emissions tests on a 1979 Ford Fairmont/302 CID engine with variable venturi carburetor and on a 1979 Chevrolet Malibu/231 CID engine. The results of these tests were as follows:

1979 Ford Fairmont
ARB Emission Data - Cold Start CVS

	Grams per miles		
	HC	CO	NOx
Baseline	0.492	3.37	2.46
Device	0.517	3.65	2.48

1979 Chevrolet Malibu
ARB Emission Data - Cold Start CVS

	grams per mile		
	<u>HC</u>	<u>CO</u>	<u>NOx</u>
Baseline	0.440	9.43	0.89
Device	0.353	6.21	0.89

In addition, fuel pressure measurements were taken before and after the regulator for various manifold vacuums. The results were as follows:

<u>Manifold Vacuum (inches Hg)</u>	<u>Fuel Pressure (#/in²)</u>		<u>Change in Pressure</u>
	<u>Before Regulator</u>	<u>After Regulator</u>	
15	4.2	2.55	1.65
13	4.2	2.50	1.70
11	4.2	2.50	1.70
9	4.2	3.05	1.15
7	4.2	3.70	0.50
5	4.2	3.88	0.32
3	3.6	3.6	0

In response to Cagle's request that their existing Executive Order be updated to include all 1980 and older model year vehicles that are powered by gasoline engines with conventional carburetors and mechanical or electrical fuel pumps with and without fuel recirculation systems, the staff compared the vehicle's fuel system design on some 1979 and 1980 model year vehicles. No significant differences were noted

between the 1979 and 1980 vehicles' fuel system design even though the newer cars tend to operate more fuel efficient. The staff, therefore, did not recommend or perform any additional tests.

IV. MANUFACTURER'S CLAIMS

The following beneficial claims for the "Cagle Mark II" device made by the applicant are:

1) The device, when installed in a vehicle, will automatically adjust the fuel pressure at the carburetor to the engines demands from idling to full throttle.

2) Third party testimonials citing actual experienced fuel economy results are used for advertising purposes in selling the device.

3) Cagle Corporation has an established guarantee program, "If you do not get an increase in mileage, unit may be returned within 120 days for refund of purchase price."

The advertising folder contains testimonials of fuel economy gains up to 25% when the device is installed in a motor vehicle.

V. CONCLUSION AND RECOMMENDATION

Previous ARB confirmatory emission tests showed that the use of the "Cagle Mark II Automatic Fuel Control" device did not have an adverse effect on the exhaust emission control system of 1979 model year vehicles.

The staff found no significant differences between the 1979 and 1980 vehicles' fuel system design.

Cagle Corporation was granted an exemption (Executive Order

D-75-2 dated August 15, 1979) from VC 27156 for 1979 and older model year vehicles that are powered by gasoline engines with conventional carburetors and mechanical or electrical fuel pumps with and without fuel recirculation systems.

Based on the above, the staff concluded that granting the Cagle Corporation an exemption from the prohibitions of the Vehicle Code Section 27156 for its "Cagle Mark II Automatic Fuel Control" device for 1980 and older model vehicles that are powered by gasoline engines with conventional carburetors and mechanical or electrical fuel pumps with and without fuel recirculation systems is justified. The staff, therefore, recommends that Executive Order D-75-3 be adopted.