State of California
AIR RESOURCES BOARD

EXECUTIVE ORDER D-85
Relating to Exemptions under Section 27156
of the Vehicle Code

ENGINEERING SYSTEMS CORPORATION
"AES-3000 FUEL SAVING 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 "AES-3000 Fuel Saving Device" manufactured and sold by Engineering Systems Corporation, 2975 Scott Blvd., Suite 100, Santa Clara, California 95050 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 6 or 8 cylinder, 1978 and older model cars as per the enclosed attachment.

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

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 "AES-3000 FUEL SAVING 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.

Executed at El Monte, California, this 17 day of October, 1978.

G. C. Hass

G. C. Hass, Chief
Vehicle Emissions Control Division

Air Resources Board

Attachment to Executive Order D-85

Manufacturer: Engineering Systems Corporation

List of Applicable Cars

1. All General Motors models and makes - All 6 and 8 cylinder cars 1966-1978.

2. All American Motors models and makes - All 6 and 8 cylinder cars 1966-1978.

3. All Chrysler Corporation models and makes - All 6 and 8 cylinder cars 1966-1975. (Note: All 6 and 8 cylinder cars 1976-1978, without the optional "Lean Burn System.")

4. All Ford Corporation - All 6 and 8 cylinder cars 1966-1975. (Note: All 6 and 8 cylinder cars 1976-1978 without the optional "Variable Venturi" carburetor.)

5. BMW - All 6 cylinder 1970-1978.

6. Capri - All 6 cylinder 1972-1978.

7. Datsun - All 6 cylinder 1971-1978.

8. Jensen - All 8 cylinder 1974-1975.

9. Mazda - All rotary engines 1970-1978.

10. Mercedes-Benz - All 6 and 8 cylinder 1968-1975.

11. Toyota - All 6 cylinder 1966-1978.

12. Volvo - All 6 cylinder 1966-1974.

Air Resources Board

Attachment to Executive Order D-85

Manufacturer: Engineering Systems Corporation

List of Nonapplicable Cars

1. Chrysler Motors - Exclude all Chrysler Corporation products: Chrysler, Dodge, Plymouth 1976-1978 with the Optional Lean Burn System. Any Chrysler product with lean burn system has the words "Lean Burn" on the small computer box attached to the side of the air cleaner.

2. Ford Motors - Exclude all 1976-1978 Ford products which have the Optional Variable Venturi System. The Variable Venturi carburetor has black sliding floats when looking from the top downward through the carburetor.

3. Exclude all: Jaguars, Triumphs, Porsches, and Peugeots.

4. Exclude any Pre-1970 BMW or Mazda automobiles.

5. Exclude any post-1974 Volvo.

6. Exclude all Fuel Injection cars.

7. Exclude all 4-cylinder cars.

8. Exclude all diesel engines.

State of California
AIR RESOURCES BOARD

Staff Report

October 5, 1978

I. Synopsis:

This staff report evaluates the "AES-3000 Fuel Saving Device" manufacturered and marketed by Engineering Systems Corporation, 2975 Scott Blvd., Suite 100, Santa Clara, California 95050, for compliance with the requirements of Section 27156 of the California Vehicle Code. Starting with a brief introduction to the device, the report describes its operation, the benefit claims the applicant makes, the test data submitted by the applicant, the confirmatory tests done on the device at Air Resources Board's Haagen-Smit Laboratory and finally concludes with recommendations, to enable the Executive Officer to arrive at a decision.

II. Introduction:

The "AES-3000" is a typical intake manifold vacuum modulated air bleed device which allows an extremely small proportion of air to enter the engine through the PCV system. This air bleed is supposed to enter only during high and low manifold vacuum conditions, thereby helping to save a little fuel. A built-in electronic timing device prevents the device from operation during engine starting and warm up periods. A small air filter ensures the cleanliness of the auxiliary air bleed.

III. System Description and Function:

The "AES-3000" consists of a diaphragm which is to be connected to manifold vacuum. Changes in manifold vacuum causes a small piston, contacting the diaphragm, to reciprocate. A pivotted lever with a contact point picks up the piston motion. The contact point moves between 2 contact poles, making contact with them at the high and low vacuum conditions. A solenoid energized by 12 volt d.c. from engine ignition system is in series with the contact lever/contact point circuit.

The circuit is complete during the contacting time period. When the solenoid gets energized, it magnetizes a pole, located in its core, which in turn pulls a soft iron clapper. When the clapper is magnetically pulled from its seat, an annular space is created, which allows atmospheric air into PCV line. When the ignition is turned off, the solenoid is not energized. Consequently, the clapper rests on the PCV air bleed inlet, keeping it closed thereby preventing the PCV line from contamination during the time when the car is not in operation. A delay circuit prevents the solenoid from being energized as soon as the ignition is turned on. This will not allow any air bleed during starting and warm up periods and so may not interfere with the engine starting characteristics.

Since the clapper is magnetically pulled from its rest position against its own weight, it is imperative that the device be installed in an upright position.

The applicant plans to market the device through franchised dealers, who will install the device on a car. After installation, if the electrical components do not function, the chances are that this will go unnoticed. This is due to small amount of air bleed.

IV. System Evaluation:

A. Applicant's Data

The applicant submitted a CVS-75 cold start emission and fuel consumption data. The tests were done at Olson Engineering on a 1978 Camaro, with 305 CID engine. The car odometer read only 243 miles at the commencement of tests. The outcome of the tests are summarized in the tables given below:

1978 Camaro with 305 CID, V8 engine and auto transmission. CVS-75 back to back test.

	grams per mile			
	HC	CO	NOx	MPG
baseline	.45	5.17	0.97	12.77
with AES 3000	0.31	5.47	1.02	13.32
percent change	-31	+5.8	+5.2	+ 4.3
HEFT				
baseline	0.05	.00	1.18	19.19
with AES 3000	0.03	-0.01	1.23	19.76
percent change	-.40	-	+4.2	+ 3.0
1978 Cal. std.	0.41	9.0	1.5	-

B. ARB Flow Test

A bench flow test was done to find out the amount of auxiliary air allowed into the PCV line, at various manifold vacuum, applied to the sensing diaphragm. To have an idea of product variation, the tests were done on 2 separate devices. The first device showed a maximum air bleed of 0.02 SCFM at 8 inches of Hg vacuum. The second device showed a maximum air bleed of 0.05 SCFM around 9 inches and 24 inches of Hg vacuum. This shows a 250% product variation.

V. Conclusion and Recommendation

The flow through the device is very low, about 1.5% of a typical PCV flow. The staff is of the opinion, based on similar air bleed devices tested in our laboratory in the past, that the installation of the device will have little effect on emissions. Even though the CVS-75 test data show an increase of 5.2% on NO and 5.8% on CO and 4.3% in MPG these couldn't be regarded as representative figures, as the car had only 243 miles at the commencement of tests and such variations of emissions and fuel consumption characteristics are common during the break-in period.

The staff also feels that with such a small air flow, the installation of the device will have little effect on the improvement of fuel economy.

The staff favors the approval of exemption of the device from the provisions of the Vehicle Code 27156. Executive Order D-85 with its attachment giving list of applicable and nonapplicable models and makes, has been prepared for this device.