

State of California
AIR RESOURCES BOARD

EXECUTIVE ORDER D-69-1
Relating to Exemptions under Section 27156
of the Vehicle Code

CONDENSATOR INC.,
"CONDENSATOR, MODEL B" 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 Section 39515 of the Health and Safety Code and Executive Order G-30A;

IT IS ORDERED AND RESOLVED: That the installation of the "Condensator, Model B" manufactured by Condensator Inc., 2010 Trimble Way, Sacramento, CA 95825, has been found to not reduce the effectiveness of required motor vehicle pollution control devices and, therefore, is exempt from the prohibition of Section 27156 of the Vehicle Code for installation on 1978 and older model year gasoline powered vehicles with standard positive crankcase ventilation (PCV) systems except for the following applications:

1. Vehicles equipped with fuel injection systems.
2. Vehicles equipped with three-way catalyts and oxygen sensors.

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 "CONDENSATOR, MODEL B" 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 Sacramento, California, this 28th day of June, 1978.

Original Signed By

Thomas C. Austin
Deputy Executive Officer

State of California

AIR RESOURCES BOARD

June 7, 1978

Staff Report

Evaluation of the Condensator Inc.
"Condensator, Model B" Device in
Accordance with Section 2222,
Title 13 of the California Administrative Code

I. Introduction

Condensator Inc., 2010 Trimble Way, Sacramento, California 95825, has applied for an extension of Vehicle Code Section 27156 exemption for its "Condensator, Model B" device for 1978 and older model year gasoline powered vehicle applications (Exhibit A). The applicant was previously granted an exemption to market both Model A and Model B for installation on 1976 and older model year vehicles. The previous exemption limits Model A application to engine sizes greater than 140 CID, and Model B for vehicles with engine sizes 140 CID and less.

II. System Description

The Condensator device is a crankcase vapor/liquid separator installed in the PCV system. The device consists of an upper metal housing which incorporates an air bleed valve, and a lower glass jar, which contains silica glass beads enclosed in a metal screen that acts as a liquid vapor separator. Model B has a 0.04 inch orifice in the air bleed valve.

A more detailed description of the system can be found in the Air Resources Board (ARB) staff report titled "Evaluation of the Condensator Inc. 'Condensator, Model A and B' Device for Exemption from the Provisions of Section 27156 of the Vehicle Code" dated November 12, 1976.

III. System Evaluation

A. Applicant's Submitted Test Data

To support the claim that the installation of the "Condensator, Model B" device on 1976 through 1978 model year vehicles will not adversely increase vehicle emissions, the applicant submitted back-to-back emission data for the following vehicles:

1. 1978 Volkswagen Scirocco, 4 cylinder, equipped with Bosch K-Jetronic fuel injection system.
2. 1978 Ford Pinto, 4 cylinder, equipped with oxidation catalyst.
3. 1978 Volvo, 4 cylinder, equipped with three-way catalyst.
4. 1978 Volvo, V6, equipped with three-way catalyst.

The emission tests were conducted at 55 MPH, 30 MPH, and at idle. In most cases, emissions were not measurable due to the difficulty of measuring low level raw exhaust emissions.

The emission data is not presented in this report because the ARB staff did not consider the tests valid since they did not simulate typical driving conditions. Mass emission measurement by the CVS-75 or CVS-72 cycle is the acceptable method for emission testing.

B. ARB Findings

The "Condensator, Model B" device introduces an air leak to the air induction system through the 0.04 inch orifice via the PCV system. This air leak may have a leaning effect on the fuel-air mixtures. Maximum leaning will occur at high manifold vacuum (engine idle condition).

Previous ARB evaluation of this device indicated that the maximum air bleed rate allowed by the 0.04 in. orifice was 0.2 cfm (see Appendix A for mathematical calculations).

This air bleed rate is below the maximum allowable air flow of 0.3 cfm at greater than 7 inches Hg. for all engine sizes. Air flow rates less than 0.3 cfm have been judged by the staff not to have a significant effect on the performance of most vehicle exhaust emission control systems.

Some of the newer vehicles, however, are equipped with unique emission control systems that are extremely sensitive to air flow or fuel-air mixtures changes. These are the Bosch fuel injection system and the three way catalyst with oxygen sensor. Introduction of an air leak in the intake manifold by the "Condensator, Model B" device changes the air flow rate thereby upsetting the calibration of the emission control systems. This could result in an increase of vehicle emissions. Volkswagen of America and AB Volvo, when contacted regarding the potential adverse effect of introducing a small quantity of air leak in the intake manifold, concurred with the staff's evaluation.

IV. Manufacturer's Claims

The applicant claims that the installation of the device on the vehicles will have the following benefits (Exhibit B):

1. Longer engine life.
2. More efficiency.
3. Better Fuel economy
4. Reduction of harmful emissions that are expelled into the combustion chamber.

According to the applicant, this is done by removing the entrained oil and burning the heavy hydrocarbons in the blow-by gas in the presence of a catalytic filter before allowing to enter the engine induction system.

Previous evaluation of the device showed that there is no indication of any catalytic reaction of the hydrocarbons with the device (Ref. ARB Staff Report "Evaluation of the Condensator Inc. 'Condensator Model A and B' Device for Exemption from the Provisions of Section 27156 of the Vehicle Code"). It is the staff's judgment that the device simply removes oil entrained with the blow-by gas and older vehicles with excessive blow-by gas may benefit from the installation of the device.

The Condensator is also an air bleed device. Previous tests by the ARB have shown the leaning effect of this device may produce slight improvements in fuel economy of older vehicles which operate on richer fuel-air mixtures. On newer engines with leaner fuel-air mixtures, the use of such an air bleed device will have no significant effect on fuel economy.

It is the staff's opinion that the installation of the "Condensator" device on older vehicles may show some marginal benefits as claimed by the applicant. However, the device will probably have no significant effect on the fuel economy or the performance of newer vehicles.

V. Conclusion and Recommendation

The ARB staff's previous evaluation indicated that the "Condensator Model B" device when installed on typical in-use vehicles would introduce an insignificant air leak in the engine induction system. This air leak would not have any adverse effect on exhaust emission control systems of newer model vehicles except those equipped with unique emission control systems that are extremely sensitive

to air flow or fuel-air mixture changes. The staff therefore recommends that Condensator Inc. be granted an exemption from the prohibitions of Vehicle Code Section 27156 for its "Condensator, Model B" device for installation on 1978 and older model year gasoline powered vehicles equipped with positive crankcase ventilation (PCV) systems, except for the following applications:

1. Vehicles equipped with fuel injection systems.
2. Vehicles equipped with three-way catalysts and oxygen sensors.

Appendix A

Air Flow Rate Through An Orifice

The equation for the mass flow rate through an orifice is:

$$\dot{m}_{\text{air}} = \frac{1.62 \text{ Ca } P_1 d^2}{\sqrt{T_1}} \cdot \sqrt{(P_2/P_1)^{1.43} - (P_2/P_1)^{1.71}} \quad \frac{\text{lb. mass}}{\text{sec.}}$$

P_1 = inlet pressure = 14.7 psia

P_2 = intake manifold pressure = 8.82 psia

d = diameter of orifice, inch = 0.04 in.

T_1 = inlet temperature, °R = 530°R

Ca = discharge coefficient = 0.65

$$\dot{m} = \frac{1.62 \times 0.65 \times 14.7 \times (0.04)^2}{\sqrt{530}} \cdot \sqrt{\left(\frac{8.8}{14.7}\right)^{1.43} - \left(\frac{8.8}{14.7}\right)^{1.71}} \quad \frac{\text{lbm}}{\text{sec.}}$$

$$= 2.7 \times 10^{-4} \text{ lb./sec.}$$

Density of Air = 0.075 lb./ft.³ at standard conditions

$$\text{Flow Rate} = \left(\dot{m} \frac{\text{lb}}{\text{sec.}} \right) \left(60 \frac{\text{sec.}}{\text{min.}} \right) \frac{1}{0.075} \frac{\text{ft.}^3}{\text{lb.}}$$

$$= 2.7 \times 10^{-4} \times 60 \times \frac{1}{0.075} \text{ Ft.}^3/\text{min.}$$

$$= 0.220 \text{ SCFM}$$

April 5, 1978

M&M Distributors
 Engineering Dept.
 6549 Landis Ave.
 Carmichael, CA., 95608

Mr. G. C. Hass
 State of California
 Department of Air Resources
 9528 Telstar Ave.
 El Monte, Calif., 91731

: Application for extension of Executive Order-D-69 through 1978.

Dear Mr. Hass:

Condensators Inc., 2010 Triable Way, Sacramento, California 95825, has a Vehicle Code Section 27156 exemption (Executive Order D-69, issued on Sept. 27, 1976) for installation of the "Condensator" on 1976 and earlier model vehicles.

During my telephone conversation with Mr. Kenney, for acceptance on vehicles through the 1978 models, he suggested that evaluation be done on the following engines:

1. Volvo-V6 & 4 with fuel injection and the Lambda Sond System
2. Volkswagen liquid cooled with the continuous injection system
3. Ford's small engine with the 3 way catalyst exhaust system
4. Chrysler lean burn engine

The back-to-back testing has been done with Model 'B' Condensator unit.

Sincerely:

Ahmed Mohamed

Ahmed Mohamed

Enc.: 5 copies test results.
 2 copies advertising as enclosed with condensator in package.
 2 copies installation instructions as enclosed with Condensator in package.

Elmer W. Bush
 Elmer W. Bush, President
 CONDENSATOR INC.

PRINCIPLE OPERATION OF
THE SUPPLEMENTARY CARBURETOR
MANUFACTURED BY CONDENSATOR, INC.

The heart of the Supplementary Carburetor is Silica Gel (adsorbant separator), the element which, by itself, causes a change of state without itself being changed. The operating principle is that of adsorption.

— From Ephraim's Inorganic Chemistry

"Silica Gel adsorbs vapours other than water vapour and this property is utilized in the recovery of solvent vapours when diluted with large volumes of air or other gases."

Such is the empirical nature of silica gel as an adsorbative compound long recognized in solvent recovery systems, i.e., the separation of lighter molecular weight solvents from airborne masses.

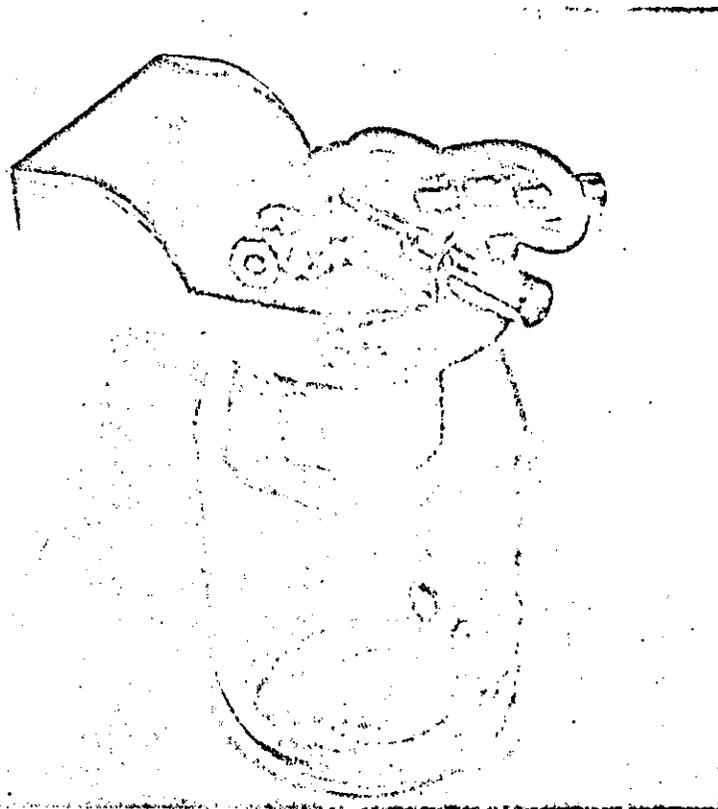
— From Smith's Chemistry

"Incompletely dehydrated silicic acid, containing 5 to 7% of water (silica gel) is employed as an adsorbent material for recovering valuable vapors (such as sulfur dioxide, oxides of nitrogen and volatile organic solvents) from the issuing gases in many large scale industrial processes. The adsorbed vapors are given up on heating and the gel is ready for renewed use. Silica gel is also used in the deodorizing of petroleum oils, and as a catalyst. One cubic inch of the gel is said to present a surface area of about 50,000 square feet."

It is evident that the silica gel serves as an adsorbant and separator, where the adsorbant qualities are described as a "condensing" property. The "condensing" mechanism is actually one of electrovalent attraction as opposed to simple condensation. It is empirically assumed that the lighter solvents extracted from the mass are passed back into the air-flow separate from the mass. This accounts also for visual cleanliness of the silica gel after 30,000 miles of operation.

CONDENSATOR

Supplementary Carburetor



MANUFACTURED BY

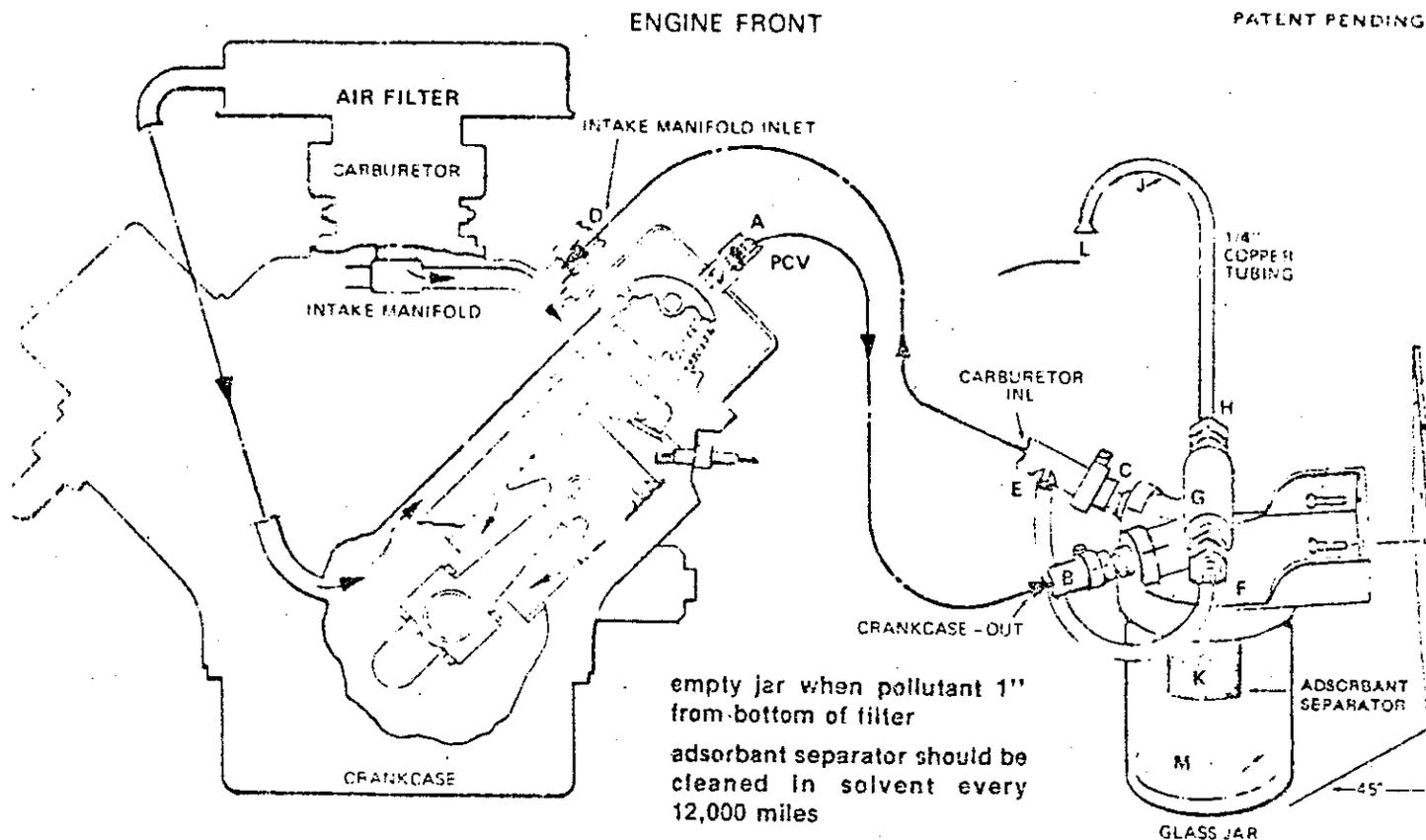
DISTRIBUTED BY

CONDENSATOR, INC.
2010 TRIMBLE WAY
SACRAMENTO, CA 95825

PATENT PENDING

INSTALLATION INSTRUCTIONS
 THE SUPPLEMENTARY CARBURETOR
 Engine Pollutant Collector

PATENT PENDING



1. Find appropriate location under hood on fire wall - fender well - frame - in front of radiator - on guard - or grill - may even be mounted on outside. If you have trouble finding location, write to CONDENSATOR DISTRIBUTOR, or manufacturer and give year, make, model, size and type of engine, of auto, truck, boat, fork lift, mobile or stationary engine.
2. Drill or punch holes to match mounting holes on unit. Then attach with sheet metal screws or bolts, supplied in package. The unit may be mounted on angle if necessary, not to exceed 45 degrees.
3. Connect 1/2 inch proper type PCV hose with hose clamp to PCV valve where ever it is located - leave PCV valve in normal factory position see figure (A) - connect other end of same hose to Condensator fitting marked crank case out, see figure (B) - Be sure PCV valve is installed

pressure is lowered in tubing opening, making a low pressure area causing temperature to drop, thus allowing Condensator to draw in cooler air to collide with hot crankcase emissions that pass through the adsorbant separator, see figure (K), in the glass jar.

7. Inspect complete installation, remove all tools, start engine, squeeze hose to feel if air flow is clear. Place finger over end of opening on 1/4 inch copper tubing. See diagram, figure (L) to feel fresh air being sucked in - on small engines suction will be slight - on larger engines suction will be proportionately stronger. When throttle is accelerated and released sharply fog can be observed in jar for an instant. This is normal - vaccum is reduced sharply and fog is visibly formed due to instant temperature change in collecting chamber, see figure (M).
8. If installation is proper, depending on amount of miles

Condensator

Supplementary Carburetor

The "CONDENSATOR" is primarily made for automobiles, trucks, stationary or mobile engines, including fork lifts, boats, welders, etc., etc.

Crankcase emissions which normally were vented out of the engine, are now utilized with the "CONDENSATOR"—SUPPLEMENTARY CARBURETOR.

Since the PCV system (positive crankcase ventilation) for internal combustion engines was incorporated, the emissions from the crankcase consisting of blow-by gases that originate in the cylinders, pickup the crankcase oil, carbon, moisture, and harmful type emissions,* are then carried directly to the intake manifold unbalancing the mixture of fuel and air which start from the gas tank through the carburetor on to the intake manifold and finally the combustion chamber.

When these emissions mix with the carburetor fuel/air mixture in the intake manifold, it unbalances the ratio. Consequently, when it enters the combustion chamber and firing takes place, the HEAVY HYDROCARBONS (which is primarily combustible crankcase oil) do not burn sufficiently under normal firing conditions, form CARBON in the cylinders, on the valves, spark plugs; also powders CARBON down to form deposits in the rings, further causing HARMFUL exhaust emissions.

To combat HARMFUL emissions that become photosynthesis smog, there have been incorporated many types of emission control devices for the internal combustion engine, the latest being the catalytic converter which cuts down the oxides of nitrogen, carbon monoxide and hydrocarbons that are being expelled into the atmosphere and become SMOG!

Emission controls of various types have reduced the efficiency of the engine, causing increased fuel consumption, inferior performance, such as rough running, or hesitation in the engine operation.

The "CONDENSATOR"—SUPPLEMENTARY CARBURETOR has been developed to aid the various emission controls to do a better job.

The "CONDENSATOR" does the same job with the fuel that comes out of the crankcase—in the form of emissions—as the carburetor on normal internal combustion engines do with the fuel which comes out of the gas tank in the form of gasoline. With the present emission controls being

incorporated in the engine the efficient fuel from the gas tank is UN-balanced by the crankcase emissions that are being expelled to the intake manifold through the PCV valve—it throws off the fuel/air ratio of the carburetor.

Upon installation of the "CONDENSATOR" in the PCV line this very efficient fuel then has a better chance of cleaner combustion, causing less buildup of CARBONS, LEADS, CALCIUM, and various deposits that normally build in the cylinders of the internal combustion engine.

Consequently, the "CONDENSATOR" will allow the spark plugs to keep firing more efficiently, the valves will have less CARBON deposits, and less CARBON is formed to get down into the rings to keep them from operating properly, helps engine compression to remain better balanced.

Therefore, with the installation of the "CONDENSATOR" throughout engine life, the efficiency will not drop off on a fast curve (as on a graph) like it would if operating from the PCV valve only having emissions put directly into the intake manifold.

Major Benefits of the "Condensator"—Supplementary Carburetor

- Longer engine life
- More efficiency
- Better fuel economy
- Reduction of harmful emissions that are expelled into the combustion chamber.

— RESULTS —

LESS USE OF ENERGY, WHICH CANNOT BE REPLACED ONCE USED.

WE ARE AIDING THROUGH USE OF THE "CONDENSATOR"—SUPPLEMENTARY CARBURETOR, THE GENERATIONS YET TO COME IN SHARING THE ENERGY—ALSO KEEPING A — —

"Cleaner Environment"

*Chilton Professional Auto Service Manual 1976 P.C.V. System page 789.