

and exhaust is evaporation of fuel from the fuel tank and carburetor. The first model year for evaporative emission controls on passenger cars was 1970. The emissions were measured in two phases. First, the diurnal emissions from the fuel tank associated with a parked vehicle were measured by placing a carbon canister on the fuel tank vent and heating the fuel tank through the typical temperature excursion experienced by a fuel tank during a Southern California day. The hydrocarbons absorbed in the canister produced a change in the canister's weight which reflected the diurnal emissions. The second phase of the test represented the emissions from a carburetor after the engine was shut off due to the hot fuel in the carburetor. A canister was also used to capture these emissions. The canister method of measuring evaporative emissions was deficient in that it only determined the emissions associated with vents to which the canisters were attached. An improved evaporative emission test procedure was developed by General Motors (13) and was adopted for the 1975 model year California passenger cars. In the Sealed Housing Evaporative Determination (SHED) test, the entire automobile was placed in a sealed housing and the change in hydrocarbon concentration in the housing under the testing conditions was measured. The diurnal and hot soak portions of the test were retained.

Vehicles which meet the latest evaporative emission standards of 2 grams per test using the SHED procedure have more than 90% less evaporative hydrocarbon vapor than uncontrolled cars.

EXHAUST EMISSION STANDARDS FOR USED CARS - Two separate legislatively mandated programs for the control of exhaust emissions from in-use passenger cars have been implemented in California. One program was intended to control HC and CO emissions from cars with no factory

installed exhaust emission control systems. 1955-1965 model year vehicles are subjected to this retrofit program.* The other program was intended to reduce NOx emissions from cars equipped with emission controls for HC and CO but not for NOx (1966-1970 model years). The retrofit legislation required CARB to mandate the installation of retrofit devices when such devices had been "certified". Certification was to be granted by the CARB as soon as devices were available. The 1955-65 devices, on the average, reduced HC 42%, CO 14%, and NOx 10%. The average reductions achieved by the 1966-1970 retrofit devices were 2% HC, 8% CO, and 24% NOx. The 1955-1965 program was implemented in September 1972 while the 1966-1970 NOx retrofit program commenced April 1973. Both programs require the installation of certified retrofit devices by in-state licensed private garages upon change of vehicle ownership or the initial registration of a used car in the state.

The majority of devices which have been certified employ vacuum spark advance disconnect (VSAD) to reduce hydrocarbon and oxides of nitrogen emissions. Some of the devices have provisions for restoring vacuum spark advance during conditions which could lead to engine overheating.

A description of the 1966-1970 retrofit program and descriptions of the devices certified for both of the programs are contained in Appendices 3 and 4.

*The 1955-1965 retrofit program was terminated by the Board on October 22, 1980. All device installations completed before that date are required to be retained.

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Appendix 3

California Air Resources Board announces:

**CALIFORNIA'S NEW SMOG CONTROLS FOR
1966-1970 MODEL VEHICLES**

Throughout California, all 1966-70 model automobiles and most 1966-70 light duty pickups, except those cars and pickups exempt for technical reasons, must be equipped with a device to control oxides of nitrogen (NOx) exhaust emissions before they can be transferred and registered to new owners or first registered in California from another state.

This program is mandated by the Legislature (Health & Safety Code, Sections 39176 & 39177.1; Motor Vehicle Code, Sections 4000.1 & 4602).

**PURPOSE OF THE PROGRAM IS TO HELP ELIMINATE SMOG
FROM CALIFORNIA'S AIR**

Photochemical smog is caused by the reaction of NOx with hydrocarbons in sunlight. 1966-70 model cars have exhaust controls which limit hydrocarbon and carbon monoxide emissions. They have no NOx controls, however, and their NOx emissions are high. Since 1971, NOx controls have been required on all new models. All accredited devices reduce NOx by 42% or more. By law, installed price of the devices and any related service is limited to \$35, plus tax on parts only.

Devices may be installed by the owner of the vehicle or by a licensed installer; in either case, a certificate of compliance must be issued by a licensed installer prior to the date listed in the above schedule. The installer will also attach a compliance sticker to the windshield. Vehicles equipped with devices display blue stickers; exempt vehicles display red stickers. The California Highway Patrol provides on-road enforcement of the program.

Vehicles *originally* equipped with more than one carburetor, turbo chargers or fuel injection are exempt from installation requirements. Vehicles which operate on natural gas or liquefied petroleum gas or are equipped with exempt devices (see chart on reverse side of page) are also exempt. Exempt vehicles must be certified by a licensed installer and must display a red windshield sticker. Information about exemptions should be obtained from licensed installers.

Smog device stations and installers are licensed by the Bureau of Automotive Repair of the Department of Consumer Affairs. All licensed stations display official blue and gold shields. Licensed stations are usually located in service stations, independent garages, or automobile dealerships.

Information about the program may be obtained by calling the California Air Resources Board, toll-free, at 800-242-4450. Complaints about overcharges or faulty installation may be reported by calling the Bureau of Automotive Repair, toll-free, at 800-952-5210.

HOW THE DEVICES WORK

All accredited NOx control devices reduce formation of NOx by lowering the peak flame temperature in the combustion chamber.

Two types of devices have been accredited:

Exhaust Gas Recirculation (EGR) and Vacuum Spark Advance Disconnect (VSAD).

EGR-type devices conduct a small amount of exhaust gas from the exhaust system through a control valve into the incoming fuel-air mixture. EGR devices may reduce gas mileage by as much as 5%. They may have a small effect on exhaust gas or coolant temperatures. Annual maintenance is required for the EGR valve and associated tubing.

VSAD-type systems control the vacuum to the distributor advance mechanism during some or all operation conditions. VSAD-type devices retard the basic engine timing by several degrees in most installations. VSAD devices may reduce gasoline mileage by as much as 10%. Because VSAD involves an increase in exhaust gas temperature and, usually, an increase in coolant temperature, some manufacturers have incorporated features in their devices to mitigate these effects. Although some engineers believe an increase in exhaust temperature may be related to exhaust valve wear in the course of tens of thousands of miles of driving, an administrative hearing in 1973 failed to establish such effects from the accredited devices. Because the Kar-Kit device has no mechanical features to disconnect the device at high engine speeds or high coolant temperatures, the manufacturer recommends the Kar-Kit device not be used on vehicles intended for high speed driving. Because of its uncomplicated design, Kar-Kit may be significantly lower-priced than the other devices, perhaps in the under \$10 range.

(Over)

DEVICE CHARACTERISTICS

<u>Device</u>	<u>Type</u>	<u>Period of Operation</u>	<u>Special Features</u>
CARTER CARBURETOR	VSAD	VSAD operates only at speeds below 57 mph and at low to moderate coolant temperatures.	Some additional retard in basic timing; speed switch disconnects device above 57 mph; temperature switch disconnects device at high coolant temperatures.
DANA CORPORATION	EGR with intermittent VSAD	Predominantly EGR, with short periods of VSAD. On some engines, EGR only.	Speed switch or vacuum delay valve controls EGR and VSAD operating periods.
ECHLIN CORPORATION	VSAD	VSAD is continuous at all speeds and coolant temperatures.	Usually some additional retard in basic timing. Additional air admitted through a control valve and acoustic unit.
STP CORPORATION EGR Device	EGR with intermittent VSAD	Predominantly EGR, with short periods of VSAD. On some engines, EGR only.	EGR valve operates independently of vacuum delay valve.
Air Computer	Intermittent VSAD and air bleed	Intermittent VSAD except during cruising, and air bleed from 30 to 57 mph.	System controlled by vacuum modulated valve activated by carburetor and intake manifold vacuums.
AIR QUALITY PRODUCTS Kar-Kit	VSAD	VSAD is continuous at all speeds and coolant temperatures.	Usually some additional retard in basic timing. An owner's booklet warns against hazards of high speed use. Decal on speedometer reminds driver to control speed.
Pure-Power-Electro-NOx	VSAD and Air Bleed	Predominantly VSAD with minimal air bleed. Restores normal vacuum advance at speeds above 57 mph.	VSAD and air bleed controlled by speed switch, combined with maximum 4 degree basic timing retard.

EXEMPT DEVICES (These devices are not bound by the \$35 statutory cost)

AIR QUALITY PRODUCTS	VSAD	Restores normal vacuum advance at speeds above 57 mph.	Usually some additional retard at low speeds. System includes electronic ignition system. System does not meet price criterion for accreditation, but otherwise meets standards.
CONTIGNITRON	VSAD	VSAD is continuous at all speeds and coolant temperatures. The device has varying degrees of retard at various speeds.	Electronic ignition system which retards spark at low speeds and advances it at high speeds. Total advance at high speeds is less than without device.

For more information about the 1966-70 NOx device program, see a licensed installer.

Appendix 4

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EXHAUST EMISSION CONTROL DEVICES -- 1955-65 VEHICLES

APPROVED DEVICES -- The Air Resources Board has accredited five exhaust emission control devices for 1955-65 model year light-duty vehicles, one manufactured by General Motors, three by Air Quality Products and one by STP.

General Motors (Delco) -- Vacuum spark advance disconnect with temperature override to restore spark advance at high coolant temperatures. System includes lean, fast idle adjustment.

Air Quality Products --

Pure Power -- Basically vacuum spark advance disconnect with some additional spark retard at low speeds. System restores normal spark advance at higher speeds. System also includes lean, fast idle adjustment and functions as an electronic ignition system.

Kar-Kit -- Vacuum spark advance disconnect is continuous at all speeds and coolant temperatures. An owner's booklet warns against use at sustained speeds above 60 mph.

Electro-NOx -- Vacuum spark advance disconnect controlled by speed switch which restores normal vacuum advance at higher speeds.

STP Air Computer -- This device is an intermittent vacuum spark advance disconnect with an air bleed. The air bleed leans the air-fuel mixture to reduce carbon monoxide. The VSAD operates primarily during acceleration.

COST -- Under the law, the installed cost of 1955-65 devices may not exceed \$85. GM estimates installed price of its device at \$25; AQP estimates installed price of up to \$85 for the Pure Power, and approximately \$10 for Kar-Kit. The Pure Power Electro-NOx is priced at approximately \$40 installed. STP estimates \$27.50 to \$35 for installation.

PURPOSE -- All of the devices reduce hydrocarbons and oxides of nitrogen emissions and carbon monoxide from equipped vehicles. Hydrocarbon and oxides of nitrogen react in sunlight to produce photochemical smog. New 1955-65 vehicles had no exhaust emission controls.

INSTALLATION REQUIREMENTS -- Upon change of registration or first registration of a 1955-65 model year vehicle in Los Angeles, Ventura, Orange, Santa Barbara, San Bernardino, Riverside, San Diego, San Francisco, Alameda, Santa Clara, San Mateo, Contra Costa, Marin, Napa and Sonoma Counties, and in that portion of Solano County which lies within the San Francisco Bay Area Air Basin.

(OVER)

1955-65

LEGAL BASIS -- Section 43652 of the Health and Safety Code* (added in 1968 and amended in 1971 and 1975) sets forth the basic requirement that whenever exhaust emission control devices are accredited by the Air Resources Board, vehicles not in a class exempted by the ARB shall be equipped with such a device. The Board has now accredited five exhaust emission control devices. Hence every 1955 through 1965 vehicle not exempted will be required to be so equipped according to a schedule of installation published by the ARB under the authority of Section 43655.

*All references, unless otherwise noted, are to the Health and Safety Code.

6-21-77 ARB Fact Sheet 13 (Revised)

State of California
AIR RESOURCES BOARD

Junipero Serra State Building
107 S. Broadway, Room 1138
Los Angeles, CA

April 18, 1973
9:30 a.m.

AGENDA

- 73-8-1 Approval of Minutes of April 4, 1973 Meeting.
- 73-8-2 Retrofit NOx Control Devices.
- a. Comparison Report
 - b. Report of Emissions and Control Committee
 - c. Consideration of Applications for Accreditation of NOx Control Devices:
 1. Contignitron Company
 2. Clean Air Research Company
- 73-8-3 Proposed Exemptions of Class "a" 1966-70 Model Year Vehicles from Required NOx Control Devices.
- 73-8-4 Consideration of Proposed changes to Assembly-Line Test procedures for 1974 and Subsequent Model Year Vehicles.
- 73-8-5 Consideration of Proposed Changes to Standards and Test Procedures for 1975 and Subsequent Model Gasoline Powered Motor Vehicles under 6,001 Pounds Gross Vehicle Weight.
- 73-8-6 Consideration of Proposed Limitations on Certification of Crankcase Emission Control Devices.
- 73-8-7 Report of Emissions and Control Committee on Fuel Detergent Additives.
- 73-8-8 Other Business

- a. Report on City of Pasadena Peaking Units.
- b. Research Contracts.
- c. Report of Implementation Plans and Compliance Committee on Second Quarter 1973 Assembly Line Test Results.

73-8-9 Remarks from Audience - End of Morning and Afternoon Sessions.

ITEM NO.: 73-8-2a

Staff report on comparative effects of NOx retrofit devices.

RECOMMENDATION

Information item only.

SUMMARY

As requested by the Board, this report presents a staff evaluation of the effects of seven NOx retrofit devices. The report discusses NOx emissions, exhaust gas temperature, coolant overheating, and fuel consumption.

ITEM NO.: 73-8-2b

Report of Emissions and control Committee on the Applications of Contignitron and Carco for Accreditation of their NOx Retrofit Control Devices.

RECOMMENDATION

The two devices be conditionally accredited.

SUMMARY

Report of findings from a review of the applications of the Contignitron and Carco using criteria applied to the four NOx devices previously accredited.

ITEM NO.: 73-8-2c1

Contignitron Company's Application for Accreditation of an NOx Control Device for 1966-70 Model Year Vehicles.

RECOMMENDATION

Deny Accreditation.

SUMMARY

At its March 21, 1973 meeting, the Board considered Contignitron Company's application for accreditation of its device for NOx exhaust emission control for 1966 through 1970 model year vehicles in engine size classes a, c, d, e, and f. The Board deferred action on the application and referred it to the Emissions and Control Committee for review and recommendation. The applicant has submitted data verifying compliance with the oxides of nitrogen emission reduction standard of 41.6 percent. Although the applicant has also submitted data showing compliance with the general standards except for the adverse effects criterion, the staff has reservations concerning his financial responsibility, and his capability to adequately meet the requirements for training, franchising and servicing a state-wide program.

If it is the Board's decision to grant accreditation of Contignitron's device, a proposed resolution is attached to the staff report.

ITEM NO.: 73-8-2c2

Clean air Research Company, Inc. Application for Accreditation of an NOx Control Device for 1966-1970 Model Year Vehicles.

RECOMMENDATION

Deny accreditation.

SUMMARY

At its March 21, 1973 meeting, the board considered Clean air Research Company's application for accreditation of its device for NOx exhaust emission control for 1966 through 1970 model year vehicles in engine size classes b, c, d, e, and f. The Board deferred action on the application and referred it to the Emissions and Control Committee for review and recommendation. The applicant has submitted data verifying compliance with the oxides of nitrogen emission reduction standard of 41.6 percent. Although the applicant has also submitted data showing compliance with the general standards except for the adverse effects criterion, the staff has reservations concerning his financial responsibility, and his capability to adequately meet the requirements for training, franchising and servicing a state-wide program.

If it is the Board's decision to grant accreditation of the CARCO device, a proposed resolution is attached to the staff report.

ITEM NO.: 73-8-3

Proposed Exemptions of Class (a) 1966-70 Model Year Vehicles from Required NOx Controls.

RECOMMENDATION

Comment on the proposed Executive Order listing the general vehicle exemptions.

SUMMARY

The Air Resources Board has recently accredited an NOx control device for Class (a), 140 CID or less, vehicles. The blanket exemption from the NOx retrofit program for these vehicles is removed by the proposed Executive Order, G-19-2. Information was sought from the manufacturers concerning exemptions for class (a) vehicles for other reasons, and the information received to date is summarized. Also included are revisions to the previous exemption list to clarify and make more specific certain exemption categories. The proposed changes to Executive Order G-19-1 are set forth in italics.

ITEM NO.: 73-8-5

Consideration of Proposed Exhaust Emission Standards and Test Procedures for 1975 and Subsequent Model Gasoline Powered Motor Vehicles under 6,001 Pounds Gross Vehicle Weight.

RECOMMENDATION

None. (A public hearing concerning these procedures will be held at a future Board meeting.)

SUMMARY

In order to make the California approval test procedure compatible with the Federal certification procedure for New Motor Vehicles, the format for the California procedure is being changed to identify the unique California requirements as stated in the Health and Safety Code and Title 13 of the California Administrative Code in addition to the applicable Federal Regulations. The format contained herein makes maximum use of the Environmental Protection Agency procedures by reference to the applicable Federal Register Vol. 37 No. 221, dated November 15, 1972 and for subsequent revisions which may be adopted.

These procedures are applicable to exhaust emissions from new light-duty vehicles first sold and registered in the State of California. Where specific differences exist between the Federal and California requirements, the California regulations are stated. The requirements for crankcase and evaporative controls for new vehicle approval have been pre-empted by the Environmental Protection Agency.

ITEM NO.: 73-8-6

Proposed restriction on certification of crankcase emissions control devices.

RECOMMENDATION

Hold a public hearing on proposed changes.

SUMMARY

Positive crankcase ventilation (PCV) valves on late model vehicles have flow characteristics which may be critical to the exhaust emission control system.

The proposed restriction will limit the certification of replacement crankcase devices to 1967 and earlier vehicles.

The operative standard for post-1967 vehicles will be the original equipment design, as is the case with other replacement parts.

ITEM NO.: 73-8-7

Report of Emissions and Control Committee on investigation of effect of fuel surfactant additives on emissions.

RECOMMENDATION

No immediate action. Review situation in 1974.

SUMMARY

Report of findings from two meetings with gasoline and automobile manufacturers.

ITEM NO.: 73-8-8a

Gas Turbine Peaking Units at the Glenarm Plant of the City of Pasadena.

RECOMMENDATION

None. This is an informational report.

SUMMARY

The attached report is submitted in response to the Board's request at the April 4 meeting, and provides updated information on the status of the power plant and proposed for construction by the City of Pasadena.

ITEM NO.: 73-8-8b

Research Contracts.

RECOMMENDATION

Adoption of Resolution 73-19 and 73-20.

SUMMARY

Research projects recommended by the Research Proposal Screening Committee.

ITEM NO.: 73-8-8c

Report of Implementation Plans and Compliance Committee on review of deficiencies noted in staff report presented to the Board at its March 21, 1973 Meeting on "Assembly-Line Test Results for the 2nd Quarter Production of 1973 Model Year Vehicles."

RECOMMENDATION

No further action at this time.

SUMMARY

The Implementation Plans and Compliance Committee met on April 10, 1973 at the Air Resources Board Laboratory to review the deficiencies noted in the results of the 2nd quarter reports of assembly-line tests of 1973 model year vehicles. The committee reviewed the letters sent to manufacturers noting these deficiencies. Most manufacturers noted what steps they were taking to correct these deficiencies. The staff is waiting for a reply from these manufacturers.

Certain deficiencies noted were the results of some misunderstanding and misinterpretation of the assembly-line test procedures which have since been clarified by the latest revisions. Most other deficiencies were resolved by agreements reached with the various manufacturers.