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State of California
AIR RESOURCES BOARD

EXECUTIVE ORDER D-70-7
Relating to Exemptions under Section 27156
of the Vehicle Code

MALLORY ELECTRIC
"HYFIRE IGNITION" INDUCTIVE 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 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 "Hyfire Ignition" inductive storage igntion system manufactured by Mallory Electric of 1801 Oregon Street, Carson City, Nevada 89701, 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 1982 and older model year gasoline powered motor vehicles without closed-loop (computer controlled carburetors) carburetion system.

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 "HYFIRE IGNITION" INDUCTIVE SYSTEM.

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 6th day of January, 1983.

K. D. Drachand, Chief
Mobile Source Control Division

State of California
AIR RESOURCES BOARD

EVALUATION OF MALLORY ELECTRIC'S "HYFIRE IGNITION" INDUCTIVE STORAGE IGNITION SYSTEM FOR EXEMPTION FROM THE PROHIBITIONS IN VEHICLE CODE SECTION 27156 IN ACCORDANCE WITH SECTION 2222, TITLE 13 OF THE CALIFORNIA ADMINISTRATIVE CODE

January 3, 1983

Issue Date: January 3, 1983

Evaluation of Mallory Electric's "Hyfire Ignition" Inductive Storage Ignition System for Exemption from the Prohibitions in Vehicle Code Section 27156 in Accordance with Section 2222, Title 13 of the California Administrative Code

by
Mobile Source Control Division
State of California
Air Resources Board
9528 Telstar Avenue
El Monte, California
91731

SUMMARY

Mallory Electric requested an exemption from the prohibitions in Vehicle Code Section 27156 for their "Hyfire Ignition" inductive storage ignition system for 1982 and older model year gasoline powered motor vehicles without closed-loop (without computer controlled carburetors) carburetion system.

The applicant's bench test data show increases in voltage/ current in both the primary and secondary coil of the modified ignition system over the OEM ignition system. The manufacturer, however, stated that bench tests in accordance with the SAE recommended practice simulating up to 50,000 miles of operation show no signs of failure or deterioration to the OEM ignition system components due to such increases.

Based on the above, the staff recommends that Mallory Electric be granted an exemption from the prohibitions in Vehicle Code Section 27156 for their "Hyfire Ignition" inductive storage ignition system for 1982 and older model year gasoline powered motor vehicles without closed-loop (computer controlled carburetors) carburetion system. The staff recommends that Executive Order No. D-70-7 be adopted.

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Evaluation of Mallory Electric's "Hyfire Ignition" Inductive Storage Ignition System for Exemption from the Prohibitions in Vehicle Code Section 27156 in Accordance with Section 2222, Title 13 of the California Administrative Code.

I. INTRODUCTION

Mallory Electric of 1801 Oregon Street, Carson City, Nevada 89701, has requested an exemption from the prohibitions in Vehicle Code Section 27156 for their "Hyfire Ignition" inductive storage ignition system. The exemption is sought for 1982 and older model year gasoline powered motor vehicles without closed-loop (computer controlled carburetors) carburetion system.

Comparative ignition system bench tests were performed by Mallory Electric at their test facility in Carson City, Nevada. The tests were performed on ignition systems from a California-certified 1977 General Motors 350 cubic inch displacement (CID) Monte Carlo (H.E.I. system), a 1980 Ford 302 CID Bronco (Dura-Spark II system), and a 1974 Dodge (Electronic Ignition system).

II. CONCLUSION

The Mallory Electric's bench test data show increases in voltage/current in both the primary and secondary coil of the modified over the OEM ignition system. Mallory Electric, however, stated that bench tests in accordance with the SAE recommended practice simulating up to 50,000 miles of operation show no signs of failure or deterioration to the OEM ignition system components due to such increases.

III. RECOMMENDATION

Based on the tests performed by Mallory Electric and their extensive durability bench tests to assure no failures or deterioration of the OEM ignition system components by the installation of the "Hyfire Ignition" System, the staff recommends that Mallory Electric be granted an exemption from the prohibitions in Vehicle Code Section 27156 for their "Hyfire Ignition" inductive storage ignition system for 1982 and older model year gasoline powered motor vehicles without closed-loop (computer controlled carburetors) carburetion system. The staff recommends that Executive Order No. D-70-7 be adopted.

IV. SYSTEM DESCRIPTION AND OPERATION

The Mallory Electric "Hyfire Ignition" inductive storage ignition system is an add-on module intended to modify the existing original equipment manufacturer (OEM) ignition system in the motor vehicle. The system is designed to easily adapt, without any modifications to the OEM ignition system, to both electronic and breaker actuated ignition systems.

The module consists of resistors, capacitors, diodes, a hybrid module, and a transistor mounted on a circuit board and encased in an aluminum housing. A wiring harness links the module to the OEM ignition system on the motor vehicle. Schematic diagrams showing the installation of the "Hyfire Ignition" system are shown in the Appendix.

The Mallory Electric modification, according to Mallory and substantiated by ignition bench test data, is designed to increase the ignition system's secondary coil output by increasing the energy (voltage and current) input in the primary coil.

V. DISCUSSION

The submitted application for exemption included comparative bench test data of OEM (vs. Mallory) ignition systems from a 1977 General Motors 350 CID Monte Carlo H.E.I., a 1980 Ford 302 CID Bronco Dura-Spark II, and a 1974 Dodge electronic ignition. The data indicates that the installation of Mallory Electric's "Hyfire Ignition" system will increase:

1. the OEM's ignition system coil primary current;
2. peak coil primary current;
3. secondary voltage available with load; and
4. secondary voltage available simulating fouled spark plugs.

These increases to the OEM ignition system parameters is of some concern to the staff relative to the durability of the OEM ignition system components. In response to the staff's concern, Mallory Electric stated in a letter (Appendix) that the device was extensively bench tested in accordance with the practices as recommended by S.A.E. simulating up to 50,000 miles of operation. The test showed no signs of failure or deterioration to the OEM ignition system components. Mallory also stated in their letter that the OEM spark plug wires for the applicable vehicles are rated for 45 KV on 7 mm and 70 KV on 8 mm wires, which is well above the secondary voltage output of the vehicle's ignition system modified with the "Hyfire Ignition".

APPENDICES

HYFIRE INSTALLATION INSTRUCTIONS

1.) Select a location for the Hyfire box in the engine compartment making sure that the box is well away from hot engine components, such as exhaust manifold, and in a fairly good air flow. NOTE: DO NOT MOUNT BOX ON ENGINE.

2.) Using Hyfire box as a template to mark the four holes in area chosen for box. Drill all four holes using a 5/32 drill bit.

3.) Attach box to location with the four #10 sheet metal screws supplied.

4.) Supplied with the Hyfire box are four preterminated wires. These wires are to be connected to the terminal block on the Hyfire box as follows:
Brown wire is connected to the terminal marked Coil-.
Yellow wire is connected to the terminal marked Coil+.
Black wire is connected to the terminal marked GND.
Green wire is connected to the terminal marked TRIG. (See figure 1)

5.) Before any wires are hooked up disconnect the negative (-) battery terminal so that there is no power in the electrical system.

6.) To connect Hyfire in a standard point system use steps 7 thru 12, for Mallory Unilite system use steps 13 thru 19, and for Ford and Chrysler electronic systems use steps 20 thru 25.

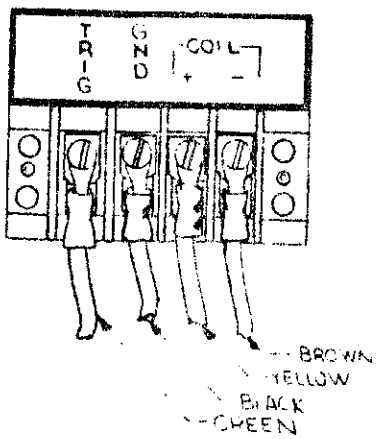

FIGURE 1

APPENDIX A-1

Table 1

Ignition System Test Data
Evaluation of Mallory's "Hyfire Ignition" System
1977 G.M. 350 CID Monte Carlo H.E.I.

	Baseline			Device		
	Start	Idle	1500 RPM	Start	Idle	1500 RPM
Coil Primary Current (A)	0.7	0.9	1.9	1.1	1.2	2.3
Peak Coil Primary Current (A)	4.7	5.5	5.5	7.3	7.4	7.4
Secondary Voltage Available (with load) (KV)	17	20	20	22	22	20
Secondary Voltage Available (simulating fouled plug) (KV)	13	15	15	17	18	16

Table 2

Ignition System Test Data
Evaluation of Mallory's "Hyfire Ignition" System
1980 Ford 302 CID Bronco Dura-Spark II

	Baseline			Device		
	Start	Idle	1500 RPM	Start	Idle	1500 RPM
Coil Primary Current (A)	1.1	1.4	1.2	1.1	1.2	1.7
Peak Coil Primary Current (A)	3.3	3.6	3.8	5.5	7.0	6.6
Secondary Voltage Available (with load) (KV)	13	16	18	30	35	33
Secondary Voltage Available (simulating fouled plug) (KV)	10	12	12	21	24	20

Table 3

Ignition System Test Data
Evaluation of Mallory's "Hyfire Ignition" System
1974 Dodge Electronic Ignition

	Baseline			Device		
	Start	Idle	1500 RPM	Start	Idle	1500 RPM
Coil Primary Current (A)	2.4	3.6	3.6	2.5	3.4	3.4
Peak Coil Primary Current (A)	4.3	5.0	4.8	4.6	5.6	5.2
Secondary Voltage Available (with load) (KV)	12	13	16	16	17	24
Secondary Voltage Available (simulating fouled plug) (KV)	8	9	12	10	12.5	15.5

December 6,1982

California Air Resources Board
Haagen-Smit Laboratory
9528 Telstar Ave.
El Monte, Ca. 91731

Attn: Mr Robert Kou

Dear Mr. Kou,

Referring to your request of December 3,1982, I am submitting the following data, which has been obtained during product durability testing at Mallory Electric.

Our Hyfire ignition systems have been tested with Ford, General Motors and Chrysler OEM ignition systems (ref: bench test data submitted along with our application for exemption of August 31,1982 and November 19,1982) with no adverse affect on the original ignition wires, spark plugs, distributors or ignition coils.

Our durability bench tests are performed in compliance with SAE J 139 a specification and the instructions of the "CARB Criteria for Evaluation of Add-On Parts and Modified Parts". Bench tests are based on average engine speeds of 2,800 RPM over 500 to 1,000 hours, simulating 25,000 to 50,000 miles at 50 miles per hour.

The most realistic test data, however, is obtained on actual test vehicles as follows:

VEHICLE TYPE	ENGINE SIZE	MILES COMPLETED
GM Monte Carlo	350 cubic inch	37,000
Chrysler Dodge	360 " "	7,000
Chrysler	440 " "	2,500
Ford Pinto	2,000 cc	3,000

Ten other test vehicles of various brands and engine sizes are also equipped with our ignitions and constantly monitored.

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In any of the above applications our Hyfire is powered through the OEM electronic ignition without any failure or deteriation of the OE systems.

OEM ignition wires produced by brand name manufacturers are rated for 45KV on 7mm and 60 to 70KV on 8mm wires, while our secondary voltage output in conjuction with the Hyfire box would not exceed 35KV, leaving an adequate safety margin.

Concluding, it may be noted that in most applications the spark plugs stay cleaner and show reduced wear when used with Hyfire ignitions. We monitor our test vehicles at scheduled intervals record date, milage and condition.

Should you need additional information or data please call me at your convenience.

Sincerely,

Werner O. Wizemann

Werner O. Wizemann
Engineering Manager

WOW/sn

APPENDIX C-2