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State of California
AIR RESOURCES BOARD

EXECUTIVE ORDER D-5
Relating to Exemptions under Section 27156
of the Vehicle Code

DELTA PRODUCTS, INC.
"MARK TEN, MARK TEN B AND MARK TEN C"

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 39023 of the Health and Safety Code;

IT IS ORDERED AND RESOLVED: That the installation of "Mark Ten, Mark Ten B and Mark Ten C" capacitive discharge ignition system as a replacement part manufactured by Delta Products, Inc. has been found to not reduce the effectiveness of required emission control devices in vehicles and therefore is exempt from the prohibitions of Section 27156 of the Vehicle Code for 1966-1973 model-year vehicles. The device consists of a d-c to d-c converter, capacitor, and electronic switch (silicon controlled rectifier).

This Executive Order is valid provided that installation instructions for this device will not recommend tuning the vehicle to specifications different than those listed 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 "MARK TEN, MARK TEN B AND MARK TEN C" 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 unlawful, untrue or misleading advertising and Section 17534 makes violation punishable as a misdemeanor.

Section 39130 and 39184 of the Health and Safety Code provide as follows:

"39130. No person shall install, sell, offer for sale, or advertise, or, except in an application to the board for certification of a device, represent, any device as a motor vehicle pollution control device unless that device has been certified by the 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 section is a misdemeanor."

"39184. No person shall install, sell, offer for sale, or advertise, or, except in an application to the board for accreditation 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 accredited by the board. No person shall sell, offer for sale, advertise, or represent any motor vehicle pollution control device as an accredited device. Any violation of this section is a misdemeanor."

Any apparent violation of the policy or laws will be submitted to the Attorney General of California for such action as he deems advisable.

Executed at Sacramento, California, this 30 day of March, 1973.

JOHN A. MAGA
Executive Officer

State of California

AIR RESOURCES BOARD

March 16, 1973

Staff Report

Evaluation of Delta Products, Inc.,
"Mark Ten, Mark Ten B and Mark
Ten C" Capacitive Discharge Ignition
Systems for Exemption to the Prohibitions
of Section 27156 of the Motor Vehicle Code

I. Introduction

Delta Products, Inc., Grand Junction, Colorado, has applied for exemption to the prohibitions of Section 27156 of the Motor Vehicle Code for the "Mark Ten, Mark Ten B and Mark Ten C" capacitive discharge ignition systems. Section 27156 prohibits the installation of any device which reduces the effectiveness of motor vehicle emission control systems. The applicant intends to sell the device as an "after-market" part to replace the standard ignition system.

The Air Resources Board has adopted criteria for the evaluation of "after-market" devices for compliance with Section 27156. The basis for evaluation is defined in the "Air Resources Board Criteria for Determining Compliance with Section 27156 of the Vehicle Code".

II. System Description

For a general description of capacitive discharge ignition systems, see staff report "Evaluation of Capacitive Discharge and Transistorized

Ignition Systems for Compliance with the Requirements of Section 27156 of the Motor Vehicle Code", dated February 14, 1973.

Specifically, the "Mark Ten" devices consists of circuits for a d-c to d-c converter, storage capacitor and a silicon controlled rectifier which serves as an electronic switch, and a trigger conditioner. The devices produce a peak impulse of 1000 watts and a 400 volt rise in the primary coil in approximately 2 micro-seconds. The "Mark Ten B" circuitry includes a feature to vary the spark duration from a stated 600 micro-seconds during starting and idle to 200 micro-seconds at high engine RPM's.

III. Emission Testing

The applicant has submitted hot CVS, hot 7-mode and 60 MPH steady-state test data conducted by Olson Laboratories (Table I). The hot CVS test data is summarized below:

	<u>Hot CVS</u>		
	<u>Percent Reduction</u>		
	<u>From Baseline</u>		
	<u>HC</u>	<u>CO</u>	<u>NOx</u>
Mark Ten	21	11	2
Mark Ten B	17	-10	0
Mark Ten C	12	11	0

(-) Indicates an increase.

The "Mark Ten B" device was tested by the Air Resources Board Laboratory. The device was installed in a 1968 318 CID Plymouth and the engine put into a "tuned" condition. See "Evaluation of Capacitive Discharge and Transistorized Ignition Systems for Compliance with the Requirements of Section 27156 of the Motor Vehicle Code" for test details. The results of the "Mark Ten B" tests are listed below:

	<u>Emissions - grams/mile</u>			<u>Change in Emissions-%</u>		
	<u>HC</u>	<u>CO</u>	<u>NOx</u>	<u>HC</u>	<u>CO</u>	<u>NOx</u>
Baseline	1.68	11.33	5.54	-	-	-
Mark Ten B	1.23	11.18	5.76	26.8	1.3	-4.0

(-) Indicates an increase.

	<u>Open Circuit Voltage - Volts</u>	
	<u>Idle</u>	<u>3,000 RPM</u>
Baseline	24,000	20,000
Mark Ten B	24,000	24,000

IV. Conclusions and Recommendations

It is the staff's opinion that Delta Products, Inc., "Mark Ten, Mark Ten B and Mark Ten C" capacitive discharge ignition system will not adversely effect motor vehicle exhaust emissions when evaluated with respect to the exhaust emissions obtained with a conventional ignition system of a "tuned" engine. This device may also have a beneficial effect in the control of exhaust emissions

"Mark Ten, Mark Ten B and Mark Ten C"

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in that it maintains the "tuned" condition of the engine for a longer period of time. Therefore, the "Mark Ten, Mark Ten B and Mark Ten C" capacitive discharge ignition systems should be exempt from the prohibitions of Section 27156 of the Motor Vehicle Code.

TABLE I

DEVICE & TEST	RUN NO.	HC		CO		NOx		NO		COMMENTS
		gm/mi	Δ %	gm/mi	Δ %	gm/mi	Δ %	ppm	Δ %	
Baseline CVS 7-mode S.S.	105252 105253 105253	2.17 2.43	- -	5.46 4.76	- -	5.47 7.77	- -	2934	-	Plug gap = .035"
Mark 10 CVS 7-mode S.S.	305257 305258 305258	1.70 2.10	-21 -13	4.83 5.47	-11 +14	5.33 8.58	-2 +10	3023	+3	Plug gap = .040"
Mark 10B CVS 7-mode S.S.	205255 205256 205256	1.79 2.13	-17 -12	6.04 6.18	+10 +29	5.44 7.64	-0 -1	2921	-0	Plug gap = .040"
Mark 10C CVS 7-mode S.S.	405259 405260 405260	1.90 2.19	-12 -9	4.83 4.52	-11 -5	5.52 8.07	+0 +3	3022	+2	Plug gap = .040"

Test Vehicle
1969 Ford LTD
351 C.I.D., V-8, 2V

Engine Settings
Idle mixture: 1.7% CO, 190ppm HC
Idle speed: 550 rpm (hot w/a.c. & lights on)
Timing: 6° BTDC
Dwell: 28.5°

Δ % = change from baseline

Table 2-1 Emission Data Summary