E.O.

State of California
AIR RESOURCES BOARD

EXECUTIVE ORDER D-5-2
Relating to Exemptions Under Section 27156
of the Vehicle Code

DELTA PRODUCTS, INC.

Delta Products, Inc. - Mark Ten, Mark Ten B, Mark Ten C Capacitive Discharge Ignition Systems and Model 800 Breakerless Ignition Adapter

Radio Shack - Archer and Micronta Capacitive Discharge Ignition Systems

Heath Co. - Heathkit-CP1060 Capacitive Discharge Ignition System and CP 1051 Breakerless Ignition Adapter

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 manufactured by Delta Products, Inc., 630 South 7th Street, Grand Junction, Colorado, 81501, identified and marketed as indicated 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 1975 and older model year vehicles except for those vehicles originally equipped with C-D or high energy ignition (HEI) systems.

The following is a list of each device manufactured by Delta Products, Inc. and marketed as indicated; each device consists of a d-c to d-c converter, capacitor, electronic switch (silicon controlled rectifier), and a special adapter circuit for those vehicles equipped with a Dana electronic speed sensor.

Mark Ten, Mark Ten B, Mark Ten C	Delta Products Inc. 630 South 7th Street Grand Junction, Colorado 81501
Archer, Micronta (Delta Products, Mark Ten B)	Radio Shack Division of the Tandy Corp. Dallas, Texas
Heathkit - CP 1060 (Delta Products, Mark Ten B)	Heath Company Hilltop Road St. Joseph, Michigan 49085

BE IT FURTHER RESOLVED: That the installation of the "Breakerless Ignition Adapter - Model 800" manufactured by Delta Products, Inc., 630 South 7th Street, Grand Junction, Colorado, 81501 and marketed as indicated below 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 1975 and older model year General Motors Corporation vehicles with V-8 engines and exempted capacitor discharge ignition systems manufactured only by Delta Products and identified by the brand names shown in this Executive Order. This device is not for use on vehicles originally equipped with breakerless or dual point distributors where one set of points is used for emission control.

The following is a list of each device manufactured by Delta Products, Inc. and marketed as indicated; each device consists of a sensing inductor and an adapter module.

Breakerless Ignition Adapter - Model 800	Delta Products Inc. 630 South 7th Street Grand Junction, Colorado 81501
Breakerless Ignition Adapter - CP 1051	Heath Company Hilltop Road St. Joseph, Michigan 49085

This Executive Order is valid provided that installation instructions for these devices will not recommend tuning the vehicle to specifications different than those listed by the vehicle manufacturer.

Changes made to the design or operating conditions of the devices, as exempted by the Air Resources Board, that adversely affect the performance of the vehicle's pollution control system shall invalidate this Executive Order.

Marketing of these devices using an identification other than that shown in this Executive Order or marketing of these devices 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 these devices 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 AFOREMENTIONED DEVICES.

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.

Sections 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. (a) 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 which, in fact, is not an accredited 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.

This Executive Order rescinds Executive Order D-5 dated March 30, 1973.

Executed at Sacramento, California, this 8th day October, 1975.

WILLIAM H. LEWIS, JR.
Executive Officer

State of California

AIR RESOURCES BOARD

October 3, 1975

Staff Report

Evaluation of Delta Products, Inc., Capacitive Discharge Ignition Systems, and Breakerless Ignition Adapters for Exemption from the Prohibitions of Section 27156 of the Motor Vehicle Code

I. Introduction

Delta Products, Inc., Grand Junction, Colorado, has applied (Exhibit A) for an extension of their exemption from 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 to include 1974 and 1975 model year vehicles and to include the additional brand names, Radio Shack - "Archer" and "Micronta", (Mark Ten B) and Heath Co. - Heathkit CP-1060" (Mark Ten B). The manufacturer has stated that the units to be marketed under the brand names Archer, Micronta and Heathkit CP-1060 are the same as the Mark Ten B system already exempt. Their request also included an exemption for their Delta Products, Inc. - "Breakerless Ignition Adapter Model 800" and the identical Heath Co. - "Heathkit Breakerless Ignition Adapter - CP1051" for 1975 and older model year General Motors vehicles with V-8 engines using the above C-D units.

The Mark Ten, Mark Ten B and Mark Ten C capacitive discharge ignition systems were previously exempted by Executive Order D-5 for 1966 through 1973 model year vehicles. The Heathkit CP-1060 capacitor discharge ignition system was previously exempted by Executive Order D-5-1 (Heathkit Company named as manufacturer although original kits are manufactured by Delta Products, Inc.).

II. System Description

The capacitive discharge ignition device 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. A system schematic, electrical diagram and installation instructions are contained in Appendix A.

The breakerless ignition adapter kit consists of a "sensing inductor" and "adapter module" to be used with the Delta Products, Inc. C-D ignition systems. The "sensing inductor" is a magnetic pickup unit mounted within the distributor to sense the high points of the cam lobes. This signal modulates the 500 KHZ carrier signal of a Colpitts oscillator within the adapter module. The modulated signal is detected and controls a square wave generator which supplies a signal to an output amplifier to provide a trigger pulse to the capacitor discharge system.

III. System Evaluation

The capacitive discharge ignition systems were evaluated for 1966-1973 model year applications in staff reports titled "Evaluation of Delta Products, Inc., Mark Ten, Mark Ten B and Mark Ten C Capacitive Discharge Ignition Systems for Exemption from the Prohibitions of Section 27156 of the Motor Vehicle Code" dated March 16, 1973 and also staff report titled "Evaluation of Heath Company - Heathkit CP-1060 Capacitive Discharge Ignition System for Compliance with the Requirements of Section 27156 of the California Motor Vehicle Code" dated May 15, 1975. It was the staff's opinion that the use of this capacitor discharge ignition system on 1974 and 1975 model year vehicles except for those vehicles originally equipped with C-D or high energy ignition systems would not alter the emission control systems.

Previous testing showed that installing this device would decrease spark energy by 24 to 62% when compared with the O.E.M. Kettering ignition system. This decrease is judged to be a significant degradation of the ignition system performance. However, no adverse effects on emissions occurred in the limited ARB tests which were performed on engines which had been properly maintained and tuned just prior to the test. The measured degradation in electrical system critical parameters is believed to be capable of causing an increase in exhaust emissions of certain vehicles due to cold start misfires, ignition system conditions, lean air fuel mixtures, engine loading, etc. The staff intends to conduct further ignition system studies to determine minimum standards of performance for ignition systems designed to replace the original OEM system to determine the effect on vehicle emissions.

The applicant submitted data for the characteristics of the breakerless ignition adapter. In order to evaluate the adapter unit the output characteristics of the exempted C-D ignition system with and without the adapter were compared. Confirmatory tests were conducted on the Air Resources Board's ignition system simulator which consists of a Sun distributor tester, Tektronix Oscilloscope, Sun Ignition Analyzer and associated accessories according to SAE J973a. The baseline and device (adapter) tests were conducted on a 1973 Chevrolet 8 cylinder distributor and a Delta Products, Inc. Mark Ten B - C-D ignition system. The manufacturer specified that the breakerless ignition adapter is for use only with C-D ignition systems manufactured by Delta Products.

During the initial setup and system checkout a test hookup lead wire (with alligator clips) accidentally fell off and caused a burnout of some electrical component in the Mark Ten B C-D unit causing it to be inoperative. A second Mark Ten B C-D unit was used for the test.

It was discovered during the test that the slide switch on the adapter module would not allow system operation in the breaker point mode (baseline condition). The slide switch contacts may have been damaged when the first C-D unit was damaged. The baseline test was made by externally overriding the switch. The results of the comparison tests (on a 1973 Chevrolet 8 cylinder distributor) are shown in Table I.

Table I

Centrifugal Spark Advance in Crankshaft Degrees

Engine RPM	Baseline Test	Device Test	Deviation from Baseline
600	0	0	0
1400	2	2	0
2000	6	7	+1
2600	10	11	+1
3200	13	14	+1

Vacuum Spark Advance in Crankshaft Degrees

Vacuum in. Hg.	Baseline Test	Device Test	Deviation From Baseline
3	0	0	0
6	9	9	0
9	14	14	0
15	14	14	0
20	14	14	

Spark Duration in Microseconds

Engine RPM	Baseline Test	Device Test
600	400	400
3000	400	400

Secondary Voltage Rise Time in Microseconds

Engine RPM	Baseline Test	Device Test
600	20	20
3000	20	20

Spark Energy in Millijoules

Engine RPM	Baseline Test	Device Test
600	8.1	8.1
3000	5.6	5.8

The difference between the baseline and device results are within experimental and test variabilities. Therefore the installation of the breakerless ignition adapter will not change the electrical performance characteristics of the basic C-D ignition system.

IV. Conclusion and Recommendations

Based on the evaluation of the application and ARB test results, the installation of the "Breakerless Ignition Adapter-Model 800" or the "Mark Ten Series" C-D ignition systems or any of the other identical devices listed in the introduction would not adversely affect the performance or operation of the OEM emission control systems. The staff recommends that Delta Products, Inc. be issued an exemption from the prohibitions of Section 27156 of the Vehicle Code for its "Breakerless Ignition Adapter - Model 800" or the "Mark Ten Series" C-D ignition systems or any of the other identical devices manufactured by them and sold under other brand names listed in the introduction for 1975 and older model year except as follows:

Capacitive Discharge Ignition System - except vehicles originally equipped with C-D or HEI ignition systems.

Breakerless Ignition Adapter - except vehicles originally equipped with breakerless or dual point distributors where one set of points is used for emission control, or vehicles other than General Motors Company V-8 engines.

EXHIBIT A

DIAL 303 242-9000
P. O. BOX 1147

DELTA PRODUCTS

630 SOUTH 7TH STREET GRAND JUNCTION, COLORADO 81501

May 9, 1975

Mr. George Lew
Air Resources Board
9528 Telstar Avenue
El Monte, California 91731

Re: Delta Products, Inc.
Mk-10, Mk-10B, Mk-10C abd Model 800
Breakerless Ignition Adapter
Compliance with Section 27156

Dear Mr. Lew:

Thank you for providing us with the current Specification Forms for re-submitting our capacitive discharge ignition systems for determining Compliance with Section 27156 of the Vehicle Code.

At the outset, I would like to confess our ignorance of the requirement that we re-submit every year to extend our exemption. This oversight will not reoccur.

As for 1974, I improperly thought that my January 10, 1974 response to Mr. R. J. Kenneys' letter of December 21, 1973, would cover the 1974 model year, but having received no reply, I must assume that I am requesting that the enclosed submission cover 1974 and 1975. No changes have been made to the units nor have we found instances where they interfer with the operation of pollution control devices currently employed. We are enclosing literature and schematics covering these systems, and would be pleased to send samples of each of the devices upon request.

If I may, I would also like to request approvals on the same devices sold under private label to other parties. Specifically, the Mark Ten B unit is marketed by the Radio Shack Division of the Tandy Corporation, Dallas, Texas, under the tradename of "Archer" and Micronta". These units, other than the label, are exact duplicates of our Mark Ten B units, and are manufactured and boxed here at our factory. In addition, the Heath Company markets a "Capacitive Discharge Ignition" which is an exact duplicate of our Mark Ten B system and we provide all but the label and the instructions. If these units and their tradenames may be included as a part of this request, we would appreciate your consideration at the same time.

In addition, I would respectfully request your consideration of our Model 800 Breakerless Ignition Adapter, which I mentioned to Mr. Kenny earlier. Realizing that you people are extremely well versed in such systems, I would add, in addition to enclosing a complete engineering workup of the system, that we feature a switch allowing transfer back to the breaker point operation, which we feel is desirable. We will, of course, be please to provide units for your examination. These units will also be provided to the Heath Company under their "Breakerless Ignition" tradename.

I do appreciate the fact that I have submitted a number of matters here for consideration which should, perhaps, be segregated or submitted under a different format. I will await your instructions, in that regard, trusting that you will consider those matters properly presented which may be considered at this time. As always, we stand ready to cooperate with you and your group in furtherance of your most necessary objective.

Respectfully submitted,

DELTA PRODUCTS, INC.

Ronald B. Duff
Vice President

RBD/gb

Enclosures

EXHIBIT A

DIAL 303 242-9000
P. O. BOX 1147

DELTA PRODUCTS

630 SOUTH 7TH STREET GRAND JUNCTION, COLORADO 81501

May 13, 1975

Mr. Richard Kenney
Air Resources Board
9528 Telstar Avenue
El Monte, California 91731

Re: Telephone conversation May 13, between Mr. Kenney and Mr. Schweitzer and letter dated May 9, from Ron Duff addressed to Mr. George Lew.

Dear Mr. Kenney:

As per our telephone conversation, we are sending under separate cover one Model 800 Breakerless Ignition Adapter. An identical version will be marketed in kit form by Heath Electronics under the Model No. CP1051.

This adapter provides a convenient method for triggering the capacitive discharge system, and still allows a back up of point operation on General Motors vehicles.

Enclosed you will find a complete description of theory of operation plus schematic and specifications.

Extensive field testing has been done on the breakerless adapter and we feel that the advantages of maintaining timing accuracy can help in the pursuit of cleaner air.

Yours truly,

DELTA PRODUCTS, INC.

John C. Schweitzer,
President

JCS/gb

Enclosures

EXHIBIT A

MANUFACTURED IN U.S.A. BY
DELTA PRODUCTS, INC.
P.O. BOX 1147
GRAND JCT CO 81501

MODEL 800

BREAKERLESS IGNITION

INSTALLATION INSTRUCTIONS MODEL 800

BREAKERLESS ELECTRONIC IGNITION ADAPTER

APPLICATION: General Motors Distributors - 8 cylinder vehicles.

INTRODUCTION: The Model 800 Electronic Ignition is designed with the latest, solid state circuitry, to provide the ultimate electronic switching. Operating on an advanced magnetic principal, the pickup head reads the position of the distributor cam and maintains timing accuracy within one degree over the full range of operating voltage and temperature. Because the breakerpoints are eliminated, there will not be any variance in dwell angle, or any timing shift. This function will promote better engine operation and efficiency.

PRE INSTALLATION INSTRUCTIONS

1. To ease working conditions, it is recommended that the engine and engine compartment be cleaned prior to attempting installation.
2. Allow two hours for installation. Less time will normally be required, but do not rush; or attempt the job when there is limited time available.
3. If work is done at night, have a well lighted area.
4. Have the Capacitive Discharge Ignition hooked up and operating properly.
5. Make sure the following tools are available prior to starting:
   (A) No. 2 Phillips screwdriver.
   (B) Standard screwdriver, with a 1/4" blade.
   (C) Hand, or electric drill, equipped with a 3/32" diameter drill.
   (D) Combination box and open end wrench for bolt with 9/16" head.
   (E) Timing light.
   (F) Dwell meter and 1/8" Allen wrench.
   (G) Small pen knife.
   (H) Small soldering iron and electrical grade 60/40 resin core solder.
   (I) Small pair of pliers.
6. Read entire installation instructions carefully.
7. Using the 1/8" Allen wrench and dwell meter, set point dwell for 30 degrees.

INSTALLATION OF PICKUP ASSEMBLY IN DISTRIBUTOR: Although the pickup may be installed in the distributor without removing the distributor from the car, it is recommended that the distributor be removed. The following instructions should be read carefully before attempting installation, and followed step by step during installation of the pickup.

1. Remove air cleaner, if necessary, for access to distributor, and pull distributor cap by releasing locking clamps.
2. Note exact position of rotor tip. It is preferable to either make a simple skerch, or to "bump" starter until the rotor is either straight forward or straight back.
3. Note position of distributor vacuum advance mechanism, with respect to the engine.
4. Locate and disconnect wire running from points to Capacitive Discharge System. Disconnect vacuum advance hose, or hoses, from distributor.
5. Remove bolt, holding clamping yoke on distributor (located on engine block, at point where distributor enters engine). Set yoke and bolt aside for later re-installation.
6. Lift the distributor straight up out of the engine block. NOTE: As you lift up, the rotor will rotate about 45 degrees. Make a note of the position of the rotor as it comes out, as this will be the starting position when you put the distributor back in.

   Put a clean rag over the hole in the engine block, wipe excess oil off of the distributor shaft, and remove rotor.
7. Remove point condenser from the breaker plate. The condenser must be remounted on coil bracket, or on the vehicle immediately adjacent to coil. Attach the condenser pigtail to the negative coil terminal. NOTE: Some late model GM distributors utilize a "Unitized" point system where the condenser is part of the points. The condenser can be unscrewed from the points. DO NOT change point adjustment. With a unitized point system, it will be necessary to purchase a standard point condenser and mount it as previously stated.
8. Note direction of distributor rotation by examining gear. A shiny surface will be evident on the driven side of the gear teeth. Rotate distributor in its normal direction until the points just open. This can be determined visually, or with an ohmmeter across the points. With a pencil, mark on the breaker plate next to cam lobe, the location of the closest, clockwise lobe to the screw hole where the condenser was mounted. Refer to Figure A.
9. The outer line of holes in the pickup mounting bracket are for mounting to the distributor plate. Place the transducer pickup assembly on the distributor plate. With the lobe of the cam lined up on your pencil mark, align the transducer pickup head with the cam lobe. Attach the transducer mounting bracket to the distributor plate. Use the new flat head mounting screw provided, and use the mounting hole that most closely allows the above alignment. Refer to Figure B.
10. Using the rotation adjustment on the mounting bracket, set the transducer adjustment. With the cam lobe aligned with your pencil mark, move the transducer head off center with the lobe, in accordance with the direction of rotation. Note Figure B. If the rotation of the distributor is counter clockwise, the pickup should be off center to the left. If the rotation is clockwise, the pickup is off center to the right. This offset is illustrated in Figure B.

EXHIBIT A

APPLICATION: The Model 800 Adapter provides a method for modifying a standard distributor to generate a timing signal and eliminate the breaker points, when used with a Capacitive Discharge Ignition. Provision is made so that the vehicle may be operated on standard points, if necessary. Although initial tooling is designed for GM products, the pickup assembly may be mounted on Ford or Chrysler products by drilling and tapping a single hole in the breaker plate.

SPECIFICATIONS:

Physical Size: Approximately 3 3/4" by 1 3/4" by 3", with flange mount.

Case: Anodized Aluminum.

Pickup: Consists of a specially designed core and sleeve inductor, mounted on an adjustable bracket. (The pickup replaces capacitor in distributor).

Interconnecting Cables: The connection between the distributor and the Model 800 consists of a shielded type cable from the pickup, and a No. 18 AWG lead with lug terminations from the points. The power, ground, and output leads of the Model 800 utilize a flat ribbon conductor, terminated with lugs.

Operating Voltage: Eight volts minimum to 18 volts maximum. Short term surges may be in excess of this voltage, if the voltage time product does not exceed 40 millisecond volts.

Operating Temperature: -35°F to +185 degrees F.

Timing Accuracy: Stable within one degree over full range of operating voltage and temperature.

RPM Range: The low RPM range will vary slightly, dependent on spacing between pickup and cam. With recommended spacing, typical low RPM is 120 RPM or 2 RPS.

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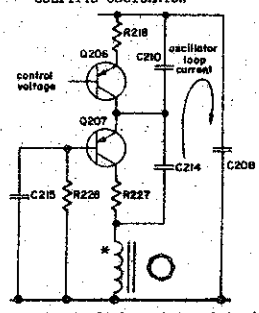
(7) A turn on clamp to prevent an output from being generated until the oscillator is stabilized.

(8) A low voltage regulator to stabilize the voltage supplying the oscillator and other references.

(9) An output circuit to provide the necessary power to drive the Capacitive Discharge System.

CIRCUIT DESCRIPTION:

COLPITTS OSCILLATOR



* Pick up located in distributor

Figure 1

Referring to Figure 1, Q207 (a pnp transistor) serves as the active element in the oscillator circuit to provide the gain necessary to sustain oscillation. Q206 operates as a variable resistor to control oscillator level, and maintain operation in the linear mode.

C208 and C210 provide a capacitive voltage divider. The divider provides positive feedback to start and sustain oscillations. R218 serves as a minimum control resistance to prevent instability. R227 is used to prevent damage to the oscillator

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generator. With the values normally used, the maximum RPM range is in excess of 7,000 RPM's.

Controls: A slide switch has been provided to allow transfer back to breaker point operation. Complete revertability to standard ignition can be made by removing or switching the Capacitive Discharge Ignition. (Point capacitor must be relocated and connected to - coil terminal).

CIRCUIT ELEMENTS:

The Model 800 consists of the following basic circuits:

(1) A high frequency (600 KHZ) colpitts type oscillator.

(2) An oscillator control circuit to maintain the oscillator in a lineal mode.

(3) A specially designed pickup, consisting of an inductor located in proximity to the distributor cam. The inductor is utilized as one of the frequency determining elements of the colpitts oscillator. The location of the inductor is such that a variable loss occurs as the distributor cam lobes approach the pickup. The variable loss produces amplitude modulation of the oscillator.

(4) A filter network to remove the carrier and pass the modulation.

(5) A peak point detector to determine the closest approach of the cam. This circuit produces a square wave that is approximately coincident with the maximum and minimum points of its input.

(6) An output pulse generator to generate a controlled trigger pulse to the Capacitive Discharge System.

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from any coupled radio frequency hash. C215 and R228 serve as base bypass, and turn on bias for the oscillator transistor. C208 is used as a supply bypass, and is necessary to complete the oscillator tank circuit.

CONTROL CIRCUIT

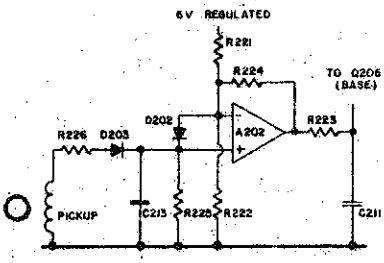

Figure 2

Referring to Figure 2, the AC signal from the pickup is coupled through R226, which serves as a surge resistor, and is rectified and filtered by D203 and C213. The decay time constant of the filter is determined by R225. R221 and R222 serve as a reference divider, and set the control point of the amplifier. D202 is used to aid in initial turn on, and rapidly pulls the amplifier + input into a region where the first stage is not in cut-off. R224 provides negative feedback for the amplifier, and gives proper gain for stable operation of the control loop. R223 and C211 operate as a filter to remove any noise or oscillator signal from the output.

The integrated circuit is internally constructed such that, if both inputs are below approximately two volts, the output will be high. For this reason, the oscillator will start with minimum forward bias on the control transistor, and the forward bias will increase until the oscillator level reaches the reference level

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EXHIBIT A

Upon initial application of voltage to the system, a positive pulse is coupled through C102 and R101 to Q101. This positive pulse turns on Q101, effectively grounding the junction of R104 and D102. The clamp remains on (approximately 1/2 second) until C102 is charged. D101 serves as a recovery diode to reset C102 to zero charge when power is turned off (approximately three seconds required for recovery).

Output drive stages Q103 and Q104 provide the necessary power gain to drive the Capacitive Discharge Ignition System.

Q102 is used as a protective foldback clamp to prevent damage to the output transistor Q104, if the switch on the Model 800 and capacitive discharge switch are in the wrong configuration.

D105 and C103 serve as a filter network to prevent Q102 from conducting under normal operating conditions.

Diode 104 provides overvoltage protection for Q104 under conditions of improper switch actuation.

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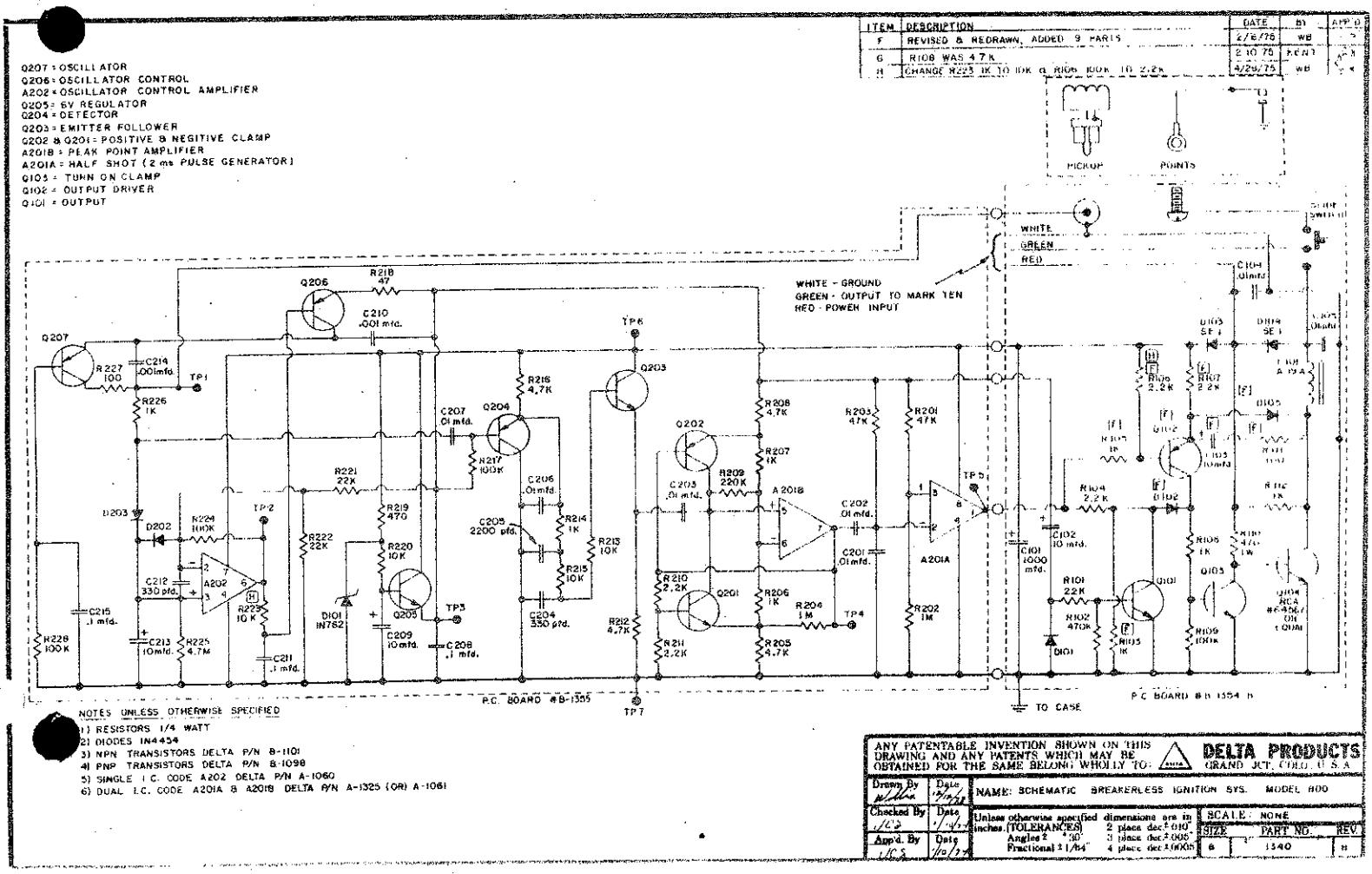


EXHIBIT A

DIAL 303 242-9000
P. O. BOX 1147

DELTA PRODUCTS

630 SOUTH 7TH STREET GRAND JUNCTION, COLORADO 81501

May 30, 1975

Mr. K. D. Drachand, Chief
Vehicle Compliance
Air Resources Board Laboratory
9528 Telstar Avenue
El Monte, California 91731

Dear Mr. Drachand:

As requested, we are furnishing system test data on the Model 800 Breakerless Ignition Adapter, and electrical data on the Mark Ten, Mark Ten "B" and Mark Ten "C".

Further testing on the Ford and Chrysler distributors has indicated that excessive change occurs in vacuum advance with the Model 800. We are therefore requesting exemption on MV Code 27156 for General Motors 8 cylinder vehicles only.

With regard to NOx devices with electronic speed sensors, the capacitive discharge systems manufactured by Delta Products should be connected as follows:

Carter; Connect the green wire normally connected to the negative coil terminal, to the positive coil terminal

Dana; Install resistor diode network as shown in drawing, or replace speed sensor with vacuum switch manufactured by Dana.

I hope this information is suitable for your requirements. If there is any other information or data required, please contact the undersigned.

Very truly yours,

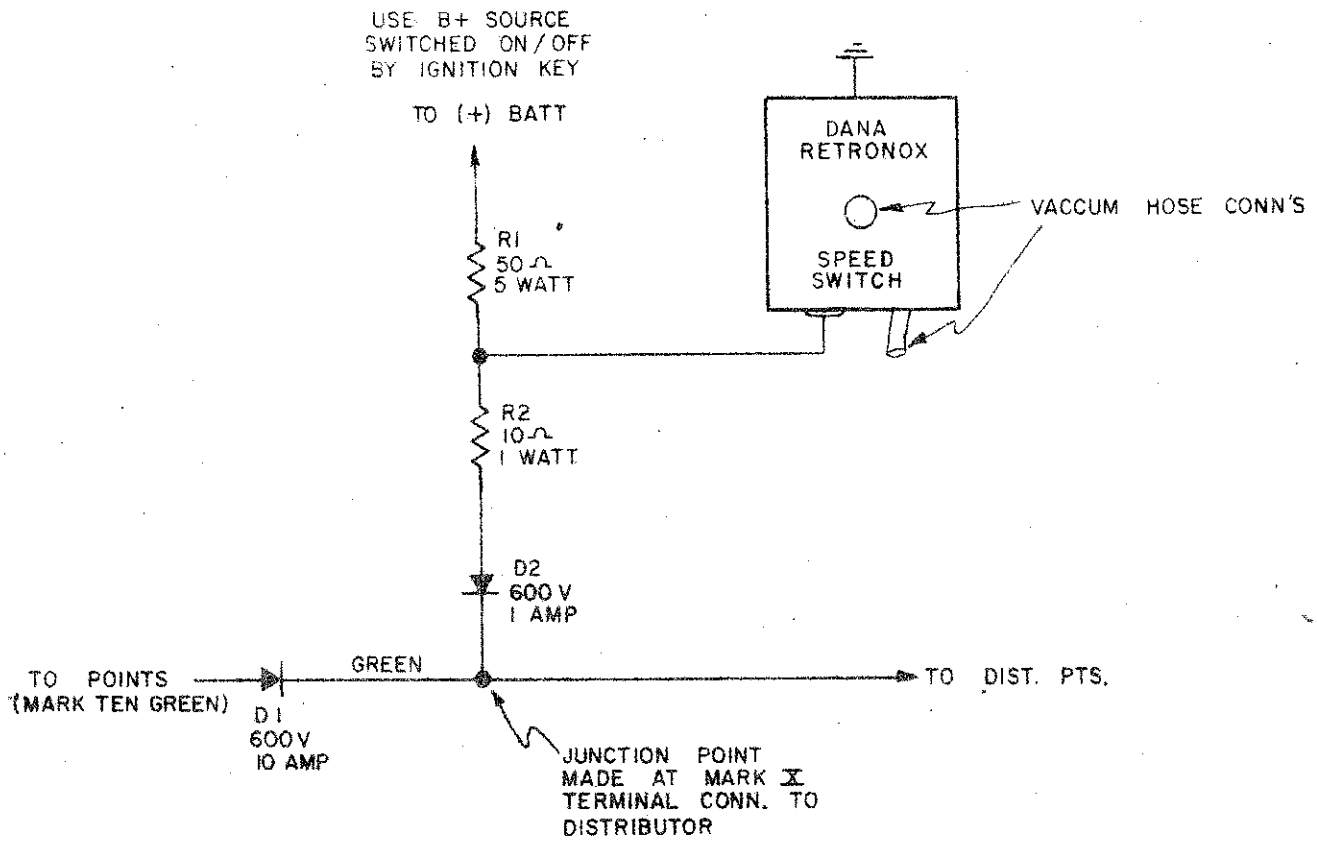
DELTA PRODUCTS, INC.

John C Schweitzer

John Schweitzer
President

JS/pp

Enclosures



CAUTION: D1 MUST BE WIRED ELECTRICALLY WHERE SHOWN SO THAT IT REMAINS IN THE NORMAL IGNITION CIRCUIT PATH WHEN THE MARK TEN C.D. UNIT IS SWITCHED OUT. FAILURE TO DO SO WILL RESULT IN DAMAGE TO THE DANA SPEED SWITCH.

DELTA PRODUCTS
GRAND JCT., COLO., U. S. A.

Drawn By	Date
Checked By	Date
App'd. By	Date

NAME: DANA RETRONOX ADAPTOR

Unless otherwise specified dimensions are in inches. (TOLERANCES) 2 place dec. ±.010" Angles ± 30' 3 place dec. ±.005" Fractional ± 1/64" 4 place dec. ±.0005

SCALE: NONE

SIZE	PART NO.	REV.
A	1716	

EXHIBIT A

State of California
AIR RESOURCES BOARD

EXECUTIVE ORDER D-6
Relating to Exemptions under Section 27156
of the Vehicle Code

SOLID STATE PRODUCTS, INC.
"SSP STAGE II"

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 an "SSP Stage II" transistorized ignition system as a replacement part manufactured by Solid State 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 current amplifier (transistor), ballast resistor and high turns ratio coil.

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 "SSP STAGE II" 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 Solid State Products, Inc., "SSP Stage II" Transistorized Ignition System for Exemption to the Prohibitions of Section 27156 of the Motor Vehicle Code

I. Introduction

Solid State Products, Inc., Edina, Minnesota, has applied for exemption to the prohibitions of Section 27156 of the Motor Vehicle Code for the "SSP Stage II" transistorized ignition system. 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 Motor Vehicle Code".

II. System Description

For a general description of transistorized ignition systems, see staff report "Evaluation of Capacitive Discharge and Transistorized Ignition Systems for Compliance with the Requirements of Section

The test results indicate that the device does not significantly effect the exhaust emissions of a "tuned engine".

IV. Conclusions and Recommendations

It is the staff's opinion that Solid State Products, Inc., "SSP Stage II" transistorized 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 in that it maintains the "tuned" condition of the engine for a longer period of time. Therefore, "SSP Stage II" transistorized ignition system should be exempt from the prohibitions of Section 27156 of the Motor Vehicle Code.

27156 of the Motor Vehicle Code", dated February 14, 1973.

The "SSP Stage II" device consists of electronic circuitry containing a coil, a transistor for switching and current amplification and a ballast resistor. The system produces a spark energy capability of 110 millijoules.

III. Emission Testing

The "SSP Stage II" device was selected for the evaluation of transistorized ignition systems. The device was installed on a 1968 318 CID Plymouth and the engine put into a "tuned" condition. Refer to "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 "SSP Stage II" tests are listed below:

	Emissions - grams/mile			Change in Emissions-%		
	HC	CO	NOx	HC	CO	NOx
Baseline	1.68	11.33	5.54	-	-	-
SSP	1.58	11.65	5.52	6.0	-2.0	0

(-) Indicates an increase.

	Open Circuit Voltage - Volts	
	Idle	3,000 RPM
Baseline	24,000	20,000
SSP	23,000	23,000