

State of California
AIR RESOURCES BOARD

EXECUTIVE ORDER D-60-1
Relating to Exemptions under Section 27156
of the Vehicle Code

SUPERIOR INDUSTRIES INC.
BREAKERLESS ELECTRONIC IGNITION SYSTEM

Pursuant to the authority vested in the undersigned 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 the "Electronition Solid State Retrofit Ignition System" manufactured by Superior Industries, Inc., 10797 Harry Hines Blvd., Dallas, Texas 75220 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 1974 and older model year vehicles equipped with V-8 engines and 12 volt ignition systems. This exemption does not apply to vehicles originally equipped with transistorized, C.D., or breakerless ignition systems.

The device consists of a light emitting diode and photocell sensor, a light beam interrupter, and an electronic control module to replace the points in a Kettering ignition system. The following is a list of companies marketing the device manufactured by Superior Industries and the trade name used by each company.

Acculite Electronic
Retrofit Ignition System

APD of America, Inc.
3003 LBJ Freeway, Suite #131
Dallas, Texas 75234

P & D Electronic
Ignition System

P & D Automotive Products
74 Conalco Drive
P. O. Box 1767
Jackson, Tenn. 38301

Borg Warner Electronic
Ignition System

Automotive Parts Division,
Borg Warner Corporation
11405 Gage Avenue
Franklin Park, Ill. 60131

Electronition Solid
State Retrofit Ignition
System

Superior Industries, Inc.
10797 Harry Hines Blvd.
Dallas, Texas 75220

Elightronic Solid State
Ignition Conversion System

Essex International, Inc.
Electro-Mechanical Division
6233 Concord Avenue
Detroit, Michigan 48211

Silver Beauty MSW Solid
State Retrofit Ignition
System

Triple-A Specialty Co.
5750 West 51st Street
Chicago, Illinois 60638

Micro Start Solid State
Retrofit Ignition System

Triple-A Specialty Co.
5750 West 51st Street
Chicago, Illinois 60638

The following is a list of the applicable model numbers for each marketed and the applicable vehicles for each model.

Model No.'s (California)

Brand Names	General Motors & American Motors 8 cyl. Engines	Ford 1966-1972	Ford 1972-1974
		8 cyl. Engines With Eccentric Breaker Plates	8 cyl. Engines With Pivotal- Concentric Breaker Plates
Acculite Electronic Retrofit Ignition System	G8-24, A8-34	F8-74	F8-34
P & D Electronic Ignition	CK-38A	CK-28AC	CK-28A
Borg-Warner Electronic Ignition System	EI-1	EI-3C	EI-3
Electronition Solid State Retrofit Ignition System	G8-24H, A834H-	F8-74H	F8-34H
Elightronic Solid State Ignition Conversion System	45-143	45-105	45-103
Silver Beauty MSW Solid State Retrofit Ignition System	7201	7203	7209
Micro Start Solid State Retrofit Ignition System	57201	57203	57209

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.

Changes made to the design or operating conditions of the device, 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 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 SUPERIOR INDUSTRIES, INC. "ACCULITE ELECTRONIC RETROFIT IGNITION SYSTEM", "P & D ELECTRONIC IGNITION SYSTEM" "BORG WARNER ELECTRONIC IGNITION SYSTEM", "ELECTRONITION SOLID STATE RETROFIT IGNITION SYSTEM", "ELIGHTRONIC SOLID STATE IGNITION CONVERSION SYSTEM", "SILVER BEAUTY MSW SOLID STATE RETROFIT IGNITION SYSTEM", OR "MICRO START SOLID STATE RETROFIT IGNITION 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 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.

Executive Order D-60, dated August 19, 1975 is superseded and of no further force and effect.

Executed at Sacramento, California, this 13th day of November, 1975.

WILLIAM LEWIS, JR.
Executive Officer

State of California

AIR RESOURCES BOARD

October 29, 1975

Staff Report

(Addendum to Staff Report Dated August 8, 1975)
Evaluation of the Superior Industries,
Inc. Breakerless Ignition
System Kits for Exemption
From the Prohibitions of
Motor Vehicle Code Section 27156

I. Introduction

Superior Industries, Inc. of 10797 Harry Hines Blvd., Dallas, Texas 75220 was issued an Executive Order number D-60 on August 19, 1975 which is an exemption from the prohibitions of Motor Vehicle Code Section 27156 for the "Electronition Solid State Retrofit Ignition System" which is also known by other brand names described in Executive Order D-60. The exemption was for 1974 and older model year General Motors and American Motors Corporation vehicles equipped with V-8 engines and 12 volt ignition systems. This exemption did not apply to vehicles originally equipped with transistorized, C.D., or breakerless ignition systems.

Superior Industries, Inc. has now applied (Exhibit A) for an extension to their exemption to include 1966 thru 1972 Ford 8 cylinder engines with eccentric vacuum advance breaker plates, and (Exhibit B) for 1972 through 1974 Ford 8 cylinder engines with pivotal concentric vacuum advance breaker plates. The applicant has also requested (Exhibit C) the addition of two more trade names "Silver Beauty MSW Solid State Retrofit Ignition System" and "Micro Start Solid State Retrofit Ignition System". They also request (Exhibit D) a correction of Part numbers previously shown in Executive Order D-60.

The following is an updated list of the trade names and the companies selling this device under the individual brands.

<u>Trade Name</u>	<u>Marketing Organization</u>
Acculite Electronic Retrofit Ignition System	AP0 of America, Inc. 3003 LBJ Freeway, Suite #131 Dallas, Texas 75234
P & D Electronic Ignition System	P & D Automotive Products 74 Conalco Drive P.O. Box 1767 Jackson, Tenn. 38301
Borg Warner Electronic Ignition System	Automotive Parts Division Borg Warner Corporation 11405 Gage Avenue Franklin Park, Ill. 60131
Electronition Solid State Retrofit Ignition System	Superior Industries, Inc. 10797 Harry Hines Blvd. Dallas, Texas 75220
Elightronic Solid State Ignition Conversion System	Essex International, Inc. Electro-Mechanical Division 6233 Concord Avenue Detroit, Michigan 48211
Silver Beauty MSW Solid State Retrofit Ignition System	Triple-A Specialty Co. 5750 West 51st Street Chicago, Ill. 60638

Micro Start Solid State Triple-A Speciality Co.
 Retrofit Ignition System 5750 West 51st Street
 Chicago, Ill. 60638

The following is a list of models for each trade name and the applicable vehicles.

<u>Brand Names</u>	<u>General Motors & American Motors 8 cyl. Eng.</u>	<u>Ford</u>	<u>Ford</u>
		<u>1966-1972 8 cyl. Engines With Eccentric Braker Plates</u>	<u>1972-1974 8 cyl. Engines With Pivotal- Concentric Breaker Plates</u>
Acculite Electronic Retrofit Ignition System	G8-24, A8-34	F8-74	F8-34
P & D Electronic Ignition System	CK-38A	CK-28AC	CK-28A
Borg-Warner Electronic Ignition System	EI-1	EI-3C	EI-3
Electronition Solid State Retrofit Ignition System	G8-24H, A8-34H	F8-74H	F8-34H
Elightronic Solid State Ignition Conversion System	45-143	45-105	45-103
Silver Beauty MSW Solid State Retrofit Ignition System	7201	7203	7209
Micro Start Solid State Retrofit Ignition System	57201	57203	57209

II. System Description

The Superior Industries, Inc. electronic ignition system is designed to replace the breaker points within a distributor. It consists primarily of a light emitting diode, and photocell sensor, a light beam interrupter, and an electronic control module. The light emitting diode and photocell operate in conjunction with the light beam interrupter to generate an ignition timing signal. The ignition signal is fed to the electronic control module which uses transistors instead of points to make and break the primary current to the coil.

The light beam interrupter of the two models submitted is designed with contoured windows to accommodate the vacuum advance characteristics of the two basic designs of Ford distributor breaker plates without altering the OEM calibration. These are the 1966-1972 model 8 cylinder eccentric breaker plates and the 1972-1974 model 8 cylinders pivotal concentric breakerplates.

III. System Evaluation

The applicant did not submit any emission data indicating the device will not have any adverse effect on the emission control system. The applicant did submit data for the centrifugal and vacuum advance characteristics of the unit.

To evaluate the device, the centrifugal and vacuum advance characteristics of ignition systems with and without the device were compared. Other electrical characteristics of the ignition unit were previously evaluated for the exemption granted under Executive Order D-60. Since the applicant has made no changes to the electronic control module, there was no need to repeat the evaluation of the other electrical characteristics.

Confirmatory tests were conducted by the Air Resources Board Laboratory on an ignition system simulator which consists of a Sun distributor tester, Tektronic Oscilloscope, Sun Ignition analyzer and associated accessories in accordance with SAE J973a instructions.

The applicants data to support the 1966-1972 design is shown in Table I and II.

Table I - Superior Ignition System Data Summary for the 1972 - Ford 8 cylinder engine distributors.

A. Centrifugal Spark Advance in Crankshaft Degrees

<u>Engine RPM</u>	<u>Baseline (OEM)</u>	<u>Device</u>
1000	0.0	0.0
1400	1.0	1.0
2000	10.0	10.0
2600	15.0	14.0
3200	17.0	16.0

B. Vacuum Spark Advance in Crankshaft Degrees

<u>Vacuum in. Hg.</u>	<u>Baseline</u>	<u>Device</u>
3	1.0	0.0
6	2.0	1.0
9	7.0	7.0
15	17.0	15.0
20	22.0	20.0

Table II - Superior Ignition System Data Summary for the 1968 Ford 8 cylinder engine distributors.

A. Centrifugal Spark Advance in Crankshaft Degrees

<u>Engine RPM</u>	<u>Baseline</u>	<u>Device</u>
600	0.0	0
1400	9.5	12.5
2000	14.0	14.5
2600	16.0	17.5
3200	18.0	18.5

B. Vacuum Spark Advance in Crankshaft Degrees

<u>Vacuum in. Hg.</u>	<u>At 600 Crankshaft RPM</u>		<u>At 2000 Crankshaft RPM</u>	
	<u>Baseline</u>	<u>Device</u>	<u>Baseline</u>	<u>Device</u>
3	0.0	0.0	0.0	0.0
6	0.0	0.0	0.0	0.0
9	6.5	6.5	6.5	8.5
15	18.0	18.0	18.0	19.0
20	22.0	22.0	22.0	23.0

The data shown in Table II at 2000 crankshaft RPM does not indicate the total spark advance of centrifugal and vacuum advance, only vacuum advance characteristics. The purpose of investigating the device at 2000 RPM was to determine the characteristics of the contoured window in the interrupter when combined with centrifugal spark advance.

The applicants data to support the 1972 and 1974 design is shown in Table III.

Table III - Superior Ignition System Data Summary for 1973 - Ford 8 cylinder engine distributors.

A. Centrifugal Spark Advance in Crankshaft Degrees

<u>Engine RPM</u>	<u>Baseline</u>	<u>Device</u>
600	0.0	0.0
1400	7.0	9.0
2000	14.0	14.5
2600	19.0	19.0
3200	22.0	24.0

B. Vacuum Spark Advance in Crankshaft Degrees

<u>Vacuum in. Hg.</u>	<u>Baseline</u>	<u>Devices</u>
3	0	0
6	3.0	2.0
9	12.0	10.5
15	20.0	20.0
20	21.0	22.0

The confirmatory tests conducted by the Air Resources Board Laboratory are shown as Tables IV and V.

Table IV - ARB Data Summary of Superior Ignition System for 1967 Ford -
8 cylinder engine distributors; (Rebuilt distributor with worn rotor bushings)

A. Centrifugal Spark Advance in Crankshaft Degrees

<u>Engine RPM</u>	<u>Baseline</u>	<u>Device</u>
600	0.0	0.0
1400	6.0	6.0
2000	9.0	10.0
2600	16.0	16.0
3000		18.0

B. Vacuum Spark Advance in Crankshaft Degrees

<u>Vacuum in. HG</u>	<u>At 600 Crankshaft RPM</u>		<u>At 3000 Crankshaft RPM</u>	
	<u>Baseline</u>	<u>Device</u>	<u>Baseline</u>	<u>Device</u>
3	0.0	0.0	19.0	18.0
6	1.0	0.0	20.0	18.0
9	2.0	1.0	21.0	19.0
15	20.0	14.0*	38.0	33.0
20	26.0	21.0	45.0	39.0

*Data considered invalid because of out of spec. distributor.

Table V - ARB Data Summary of Superior Ignition System for 1967 Ford -
8 cylinder engine distributors (New distributor)

A. Centrifugal Spark Advance in Crankshaft Degrees

<u>Engine RPM</u>	<u>Baseline</u>	<u>Device</u>
600	0.0	0.0
1400	9.0	12.0
2000	15.0	15.5
2600	18.0	17.5
3000	19.0	19.0

B. Vacuum Spark Advance in Crankshaft Degrees

<u>Vacuum in. Hg.</u>	<u>At 600 Crankshaft RPM</u>		<u>At 3000 Crankshaft RPM</u>	
	<u>Baseline</u>	<u>Device</u>	<u>Baseline</u>	<u>Device</u>
3	0.0	0.0	19.0	19.0
6	2.0	3.0	22.0	21.0
9	10.0	9.5	30.0	27.0
15	20.0	18.0	40.0	37.0
20	24.0	23.0	44.0	41.0

The first ARB test made is shown in Table IV and indicated a 6° spark retard with the device on vacuum spark advance when compared to the baseline. This exceeds the Air Resources Boards allowable tolerance of +0°, -4°. The applicant was notified of this condition and contended that the distributor used (1967 Ford - 8 cylinder) was not representative of distributors they find in the market place.

A review of ARB's distributor was made and the following points were noted.

- 1) The distributor was purchased at a local parts supplier as a rebuilt distributor.
- 2) The rotor-bushings were worn and the rebuilder did not replace them.
- 3) The friction washers and spring on the pivot point of the vacuum advance breaker plate was improperly assembled.

For this analysis and evaluation of the unit, the data from the rebuilt distributor has been invalidated and not considered because of questionable rebuild quality.

The applicant requested a test with another distributor. The laboratory then purchased a new replacement distributor from a Ford service dealer. The test results with the new distributor are shown in Table V.

The vacuum advance characteristics at idle RPM showed maximum deviations from baseline for each test as follows:

<u>Ford Distributor</u>	<u>Type of Vacuum Advance</u>	<u>Range of Deviation (degree crankshaft)</u>
1967	eccentric	+1 to -2
1968	eccentric	zero
1972	eccentric	0 to -2
1973	pivotal concentric	+1 to -1.5

These results are considered within experimental and test variabilities and is evaluated as meeting the Air Resources Boards criteria of $+0^{\circ}$ to -4° . The $+1.0$ shown in the data is attributed to instrument readability and data scatter.

The centrifugal advance characteristics were reviewed and the deviation from baseline indicated a $+3$ to -2° advance characteristic. The deviation from baseline was plotted versus RPM and is shown in figures 1 and 2.

Figure 1 and 2 shows that the centrifugal spark advance condition is in the low range of engine RPM, just above idle, on some distributors. At low speeds the production of NOx is not very great and this condition will not increase emissions significantly. It is the opinion of the staff that this is an acceptable condition.

IV. Conclusion and Recommendations

Based on the evaluation of the application and ARB test results, the installation of the Superior Industries Inc. - "Electronition Solid State Retrofit Ignition System" (also known by other brand names) would not adversely affect the operation of the OEM emission control system. The staff recommends that Superior Industries be issued an exemption from the prohibitions of Section 27156 of the Motor Vehicle Code for its "Electronition Solid State Ignition Conversion System" as noted in the introduction.

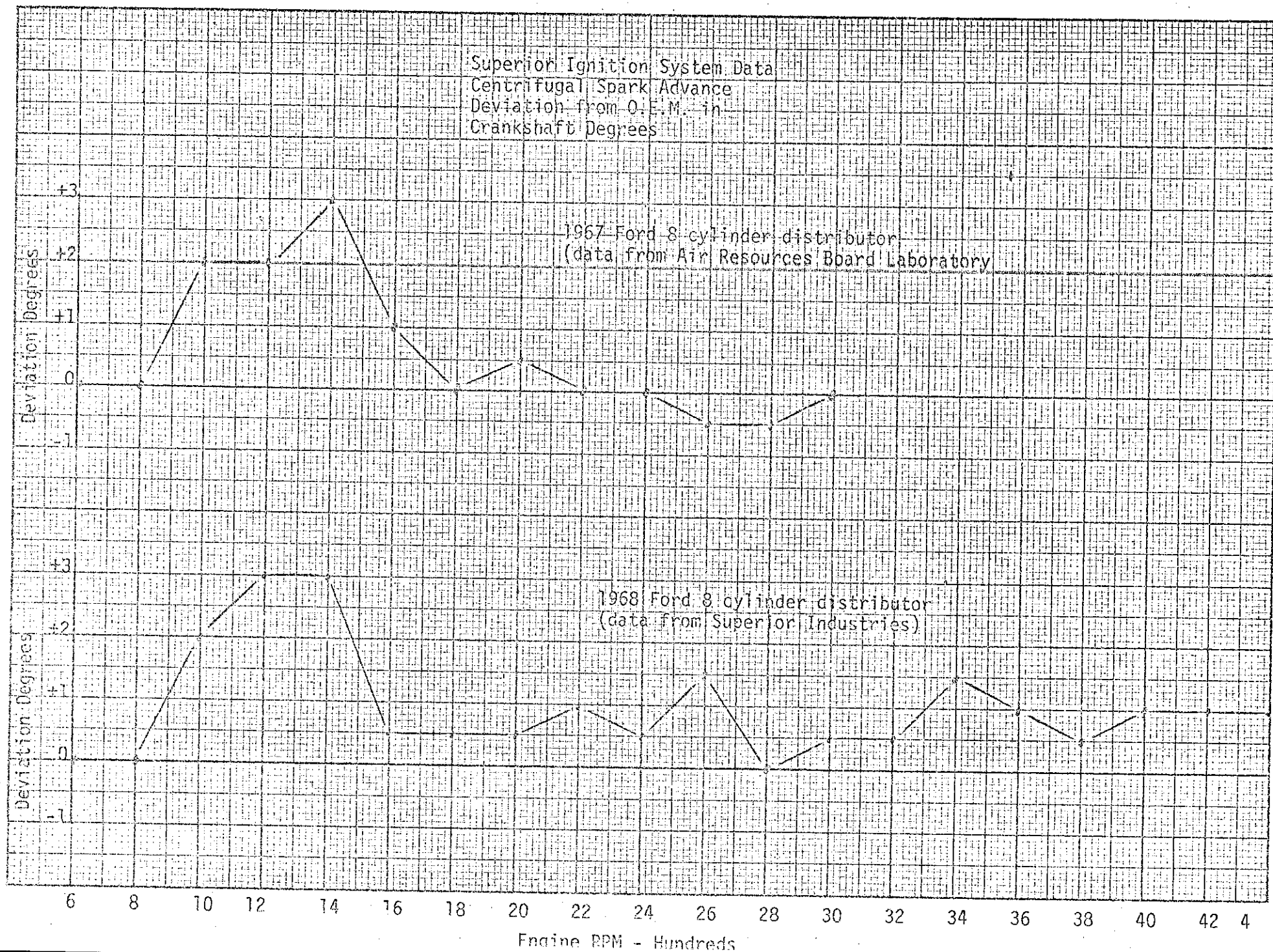


FIGURE 1

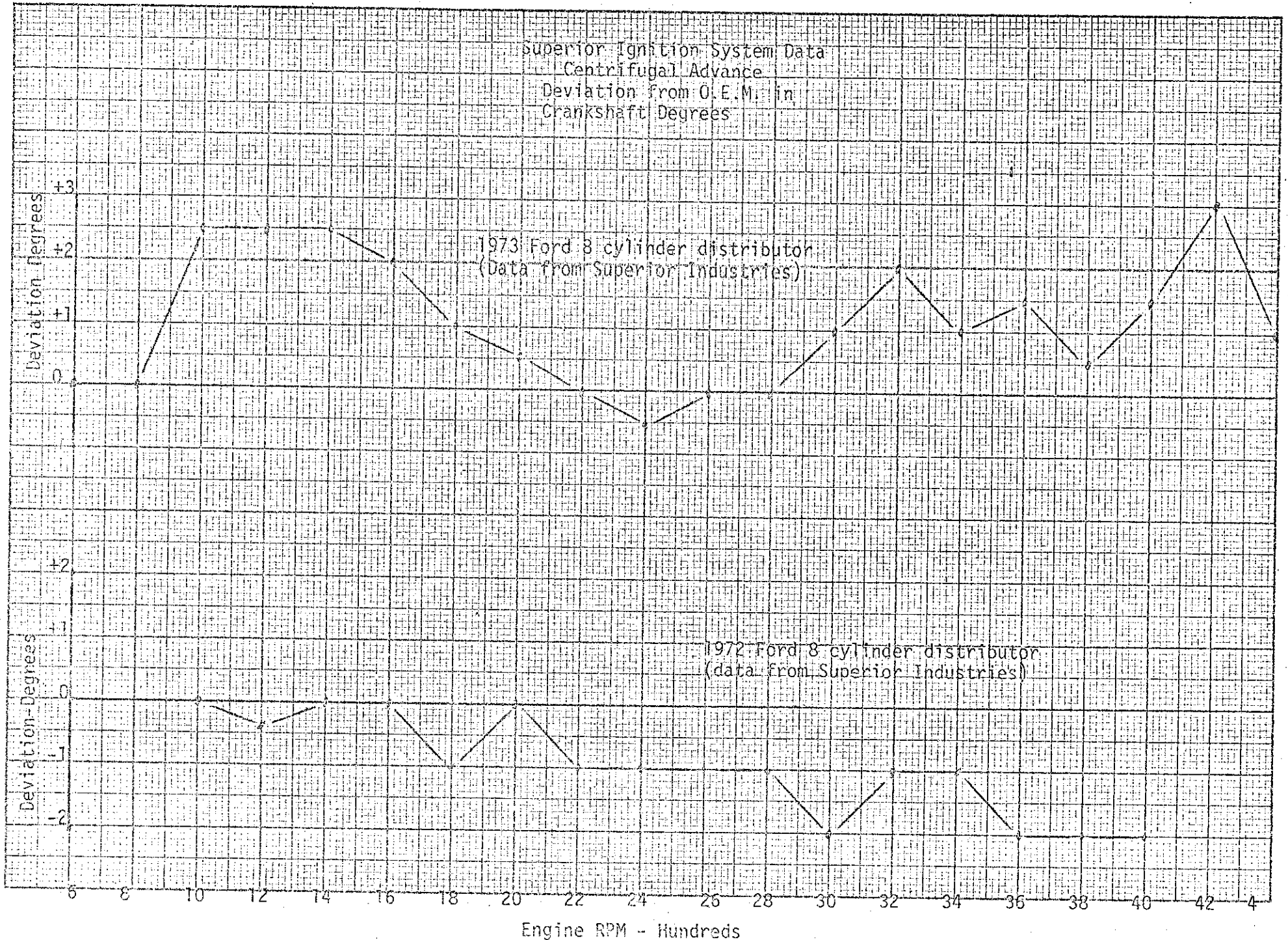


FIGURE 2



SUPERIOR INDUSTRIES INC.

10797 Harry Hines Blvd.

Dallas, Texas, 75220

Phone: 214/350-9911

August 19, 1975

Mr. G. C. Hass, Chief
Division of Vehicle Emission Control
Air Resources Board
9528 Telstar Avenue
El Monte, California 91731

Dear Mr. Hass:

We are hereby applying to the California Air Resources Board for additional exemptions to vehicle code section 27156 for the breakerless electronic ignition systems.

These electronic ignition systems will be marketed by the companies and under the brand names as listed in previous application under the model numbers as follows.

APO of America, Inc.

Acculite Electronic Retrofit
Ignition System
Model No. F8-74

P. & D Automotive Products

P & D Electronic Ignition System
Model No. CK-28AC

Automotive Parts Division,
Borg-Warner Corporation.

Borg-Warner Electronic
Ignition System
Model No. EI-3C

Superior Industries, Inc.

Electronition Solid State
Retrofit Ignition System
Model No. F8-74H

Essex International, Inc.

Elightronic Solid State Ignition
Conversion System
Model No. 45-105

Triple-A Specialty Co.
5750 West 51st Street
Chicago, Illinois 60638

Silver Beauty MSW Solid
State Retrofit Ignition System
Model No. 7203

Micro Start Solid State
Retrofit Ignition System
Model No. 57203

Mr. G. C. Hass
August 19, 1975
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The above model numbers are applicable to eccentric single pivot point design 1972 and older year model Ford V-8 vehicles with the exception of the 1972 concentric distributors as follow:

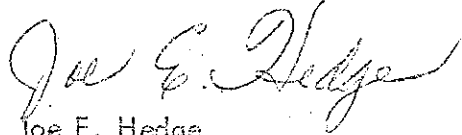
302 CID Engine	#DOOF-12127-AL
351 CID Engine	#D2MF-12127-GA #D2AF-12127-PA
429 CID Engine	#D2MF-12127-FA #D2MF-12127-EA #D2AF-12127-MA #D2AF-12127-NA #D2AF-12127-NC #D2SF-12127-EA
460 CID Engine	#D2VF-12127-AA #D2VF-12127-BA

All data supporting this application was made on our new V-8 Ford system retro-fitted into a 1972 eccentric Ford distributor. These tests represent units that will be produced in like quality when hard production tooling is developed.

Thank you for your expeditious handling of this matter.

Yours very truly,

SUPERIOR INDUSTRIES, INC.


Joe E. Hedge
President

JEH:cr



SUPERIOR INDUSTRIES INC.

10797 Harry Hines Blvd.

Dallas, Texas, 75220

Phone: 214/350-9911

September 18, 1975

Mr. G. C. Hass, Chief
Division of Vehicle Emission Control
Air Resources Board
9528 Telstar Avenue
El Monte, California 91731

Dear Mr. Hass:

We are hereby applying to the California Air Resources Board for additional exemptions to vehicle code section 27156 for the breakerless electronic ignition systems.

These electronic ignition systems will be marketed by the companies and under the brand names as listed in previous application under the model numbers as follows.

APO of America, Inc.

Acculite Electronic Retrofit
Ignition System
Model No. F8-34

P & D Automotive Products

P & D Electronic Ignition System
Model No. CK-28A

Automotive Parts Division,
Borg-Warner Corporation

Borg-Warner Electronic
Ignition System
Model No. EI-3

Superior Industries, Inc.

Electronition Solid State
Retrofit Ignition System
Model No. F8-34H

Essex International, Inc.

Elightronic Solid State Ignition
Conversion System
Model No. 45-103

Triple-A Specialty Co.

Silver Beauty MSW Solid
State Retrofit Ignition System
Model No. 7209

Micro Start Solid State
Retrofit Ignition System
Model No. 57207

Mr. G. C. Hass
September 18, 1975
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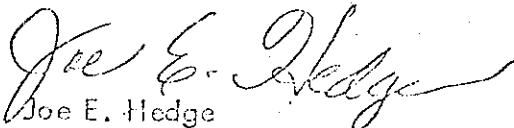
The above model numbers are applicable to 1972 through 1974 year model Ford V-8 vehicles using concentric plate pivot design. Data supporting this application was obtained using a 1973 Ford V-8 distributor, part number D3AF-12127-AA.

All identifying markings will be the same as agreed to in previous applications. These systems are electronically identical to the electronic ignition systems shown in Executive Order D-60.

Thank you for your help. Should you require further information, please do not hesitate to contact us, or Mr. Best at A.P.O.

Yours very truly,

SUPERIOR INDUSTRIES, INC.


Joe E. Hedge
President

JEH:cr



SUPERIOR INDUSTRIES INC.

10797 Harry Hines Blvd.

Dallas, Texas, 75220

Phone: 214/350-9911

August 20, 1975

Mr. G. C. Hass, Chief
Division of Vehicle Emission Control
Air Resources Board
9528 Telstar Avenue
El Monte, California 91731

Dear Mr. Hass:

Superior Industries, Inc. hereby requests that the following company, their brand names and model numbers be added to our present, pending and any future applications to the California Air Resources Board for exemption to vehicle code section 27156 for the breakerless electronic ignition systems.

Triple-A Specialty Co.
5750 West 51st Street
Chicago, Illinois 60638

Silver Beauty MSW Solid
State Retrofit Ignition System
Model No. 7203 (Ford V-8)
Model No. 7201 (G.M. V-8)

Micro Start Solid State
Retrofit Ignition System
Model No. 57203 (Ford V-8)
Model No. 57201 (G.M. V-8)

All identifying markings will be the same as agreed to in previous applications. These systems are electronically and mechanically identical to other systems manufactured by Superior Industries, Inc. other than cosmetic appearance.

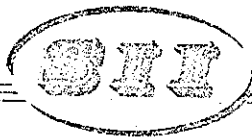
Thank you for your help. Should you require further information, please do not hesitate to contact us.

Yours very truly,

SUPERIOR INDUSTRIES, INC.

Joe E. Hedge
President

JEH:cr

**SUPERIOR INDUSTRIES INC.**

10727 Harry Hines Blvd.

Dallas, Texas, 75220

Phone: 214/350-9911

September 16, 1975

Mr. G. C. Hass, Chief
Division of Vehicle Emission Control
Air Resources Board
9528 Telstar Avenue
El Monte, California 91731

Dear Mr. Hass:

Superior Industries, Inc. hereby requests on behalf of the companies marketing our breakerless electronic ignition systems that the following model number corrections be made to Executive Order D-60:

As Shown on Executive Order:

P & D Electronic Ignition System
Model No. CR-381

Borg-Warner Electronic Ignition
System
Model No. EI-1

Electronition Solid State
Retrofit Ignition System
Model No. G8-24 & A8-34

Change to:

P & D Electronic Ignition System
Model No. CK-38A

Borg-Warner Electronic Ignition
System
Model No. EI-1

Electronition Solid State
Retrofit Ignition System
Model No. G8-24H & A8-34H

These changes are model number identification corrections only and are not to be construed as physical or cosmetic changes to the device.

Thank you for your assistance. We hope the above does not severely increase your burden.

Yours very truly,

SUPERIOR INDUSTRIES, INC.

Joe E. Hedge
President

JEH:cr