E.O.

State of California
AIR RESOURCES BOARD

EXECUTIVE ORDER D-58
Relating to Exemptions under Section 27156
of the Vehicle Code

GULF AND WESTERN
GENERAL AUTOMOTIVE PRODUCTS GROUP
"GRAND PRIX II"
"MAGNITION"
"POWEREADY"
"ZENITH ELECTRONIC IGNITION"

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 the "Grand Prix II", "Magnition", "Poweready" and "Zenith Electronic Ignition" breakerless electronic ignition kits marketed by Guaranteed Parts, Inc., Seneca Falls, New York 13148, Sorensen Manufacturing Co., Inc., Glasgow, Kentucky 42141, American Parts, 3000 Pawnee Street, Houston, Texas 77054 and Zenith Ignition, Seneca Falls, New York 13148, respectively, and manufactured by Gulf and Western, General Automotive Products Group, 17500 Northland Park Court, Southfield, Michigan 48075 has been found to not 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 12 volt battery, standard ignition coil, negative ground and eight cylinder Delco distributor. This exemption does not include those vehicles originally equipped with breakerless or electronic ignition systems.

The devices named in this Executive Order are identical in all respects except their tradenames. The device consists of an amplifier, magnetic sensor, interrupter wheel and wiring harness.

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 "GRAND PRIX II", "MAGNITION", "POWEREADY" AND "ZENITH ELECTRONIC IGNITION" 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.

Executed at Sacramento, California, this 12th day of August, 1975.

WILLIAM SIMMONS
Executive Officer

State of California

AIR RESOURCES BOARD

Staff Report

July 30, 1975

Evaluation of Gulf and Western, General Automotive Products Group's "Grand Prix II", "Magnition", "Zenith Electronic Ignition", and "Poweready" Breakerless Electronic Ignition kits for Compliance with the Requirements of Section 27156 of the California Motor Vehicle Code

I. Introduction

Gulf and Western, General Automotive Products Group, 17500 Northland Park Court, Southfield, Michigan 48075 has submitted an application requesting an exemption from Section 27156 of the Vehicle Code for the "Grand Prix II", "Magnition", "Zenith Electronic Ignition" and Poweready" Electronic Ignition Systems. These electronic ignition systems are identical in all respects and are marketed by Guaranteed Parts Inc., Seneca Falls, New York 13148, Sorensen Manufacturing Co., Inc., Glasgow, Kentucky 42141, Zenith Ignition, Seneca Falls, New York 13148 and American Parts, 3000 Pawnee Street, Houston, Texas 77054 respectively. A request for granting the exemption on 1974 and older model vehicles equipped with eight cylinder Delco distributors has been made by the applicant. (Ref. Exhibit A.)

Section 27156 of the Vehicle Code prohibits the installation, sale or advertisement of any device or mechanisms which alters the performance or design of the vehicle's emission control systems. The Air Resources Board is empowered to exempt any devices from this prohibition if a finding shows the device will not reduce the effectiveness of the emission control systems.

II. System Description and Function

The Gulf and Western electronic system is designed to replace the breakerpoints with an electronic switching system. This device consists of an amplifier, magnetic sensor, sensor mounting bracket, interrupter wheel, wiring harness, spacer gauge, and mounting screws. The interrupter wheel consists of a metal skirt with eight slits approximately 0.5 inch wide.

The magnetic sensor is placed on the mounting bracket which is customized for specific distributor applications. Connected electrically to the sensor is a switching amplifier. An interrupter wheel is mounted on the distributor drive shaft. Air gap between the sensor and wheel is determined by a special feeler gauge. (ref. Exhibit - B Installation Instructions.)

The magnetic sensor is designed to detect changes in the magnetic field generated by its own coil. Interruption of the magnetic field caused by the presence of metal (eg., metal skirt of the interrupter wheel) allows the sensor to signal the amplifier which in turn permits current flow to the primary side of the ignition coil. Current flow to the ignition coil is switched off by the amplifier when the sensor sends no signal because it detects the absence of metal such as the wheel's slits within the magnetic field. Stopping the current flow to the ignition coil causes the magnetic field within the coil to collapse which induces a high secondary voltage. This high voltage allows the spark plug to fire.

The purpose of this device is to eliminate the breakerpoints and limitations associated with their use. Installation of this breakerless system according to the applicant increases spark plug life and provides better control of ignition timing.

III. System Evaluation

The applicant submitted Hot CVS-1975 emission data (Ref. Exhibit C) performed by Automotive Research Associates, Inc., 5404-08 Bandera Road, San Antonio, Texas 78238. Results of these tests are shown below:

Hot CVS-1975
Exhaust Emissions (Grams/mile)

	HC	CO	NOx
Baseline	1.39	7.97	1.88
Device	1.26	6.48	1.72

The above tests were obtained on a 1971 Oldsmobile Delta 88 with a 1973 Oldsmobile 455 CID engine. According to the report submitted, the vehicle's carburetion and ignition settings were adjusted to the vehicle manufacturer's recommendations. Comparison of the data with and without the device indicate a slight reduction in exhaust emissions.

Vacuum advance data comparing the effects with and without device were submitted by the applicant. The vacuum advance data indicated substantial timing retard on tests with the device using Ford and Chrysler distributors. Only tests with the General Motors' 8 cylinder Delco distributor show no timing deviation.

The Air Resources Board staff conducted confirmatory tests measuring the vacuum and centrifugal advance characteristics of the device on Ford and Chrysler distributors. These tests were conducted on a distributor machine. Data generated from these tests are shown below.

Centrifugal Advance (Engine Degree)

Engine RPM	Ford Distributor		Chrysler Distributor	
	Baseline	Device	Baseline	Device
600	0	0	0	0
1000	3	3	3	5
1400	6	5	17	19
1800	8	9	20	21
2200	12	12	21	23
2600	17	17	24	24
3000	20	20	25	26

Vacuum Advance (Engine Degree)

Vacuum (in. Hg)	Ford Distributor		Chrysler Distributor	
	Baseline	Device	Baseline	Device
0	0	0	0	0
3	0	0	0	0
6	1	0	1	1
9	7	4	1	1
12	16	8	8	5
15	21	13	20	11
18	26	16	20	11
20	28	18	20	11

The centrifugal advance data indicate no significant timing deviation is attributable to the device. However, the vacuum advance data essentially confirms the applicant's results. This substantial retard in timing on the Chrysler and Ford distributors is due to the off-center-breaker plate assembly. On vehicles equipped with breakerpoints the movement of the plate assembly decreases the dwell angle resulting in a timing advance. The timing with the Gulf and Western Breakerless unit is not affected by the breakerplate movement because the dwell is dictated by the width of the slits. General Motors' eight cylinder Delco distributor with concentric pivots are not affected by this phenomena.

Excessive retard is expected to increase exhaust gas temperatures which would accelerate the deterioration of the exhaust valves. When the valves are sufficiently degraded, hydrocarbon emission is expected to increase. Therefore, the staff established a maximum allowable retard of 4° (engine degree). When the applicant was informed that the Chrysler and Ford applications exceeded the allowable retard, the applicant amended his application to include only those vehicles equipped with the eight cylinder Delco distributor.

The Air Resources Board staff also conducted tests measuring the electrical characteristics of this device on Ford and Chrysler distributors. Data generated from these tests are shown below:

	Chrysler				Ford			
	Baseline		Device		Baseline		Device	
	Idle RPM	3000 RPM	Idle RPM	3000 RPM	Idle RPM	3000 RPM	Idle RPM	3000 RPM
Secondary Voltage Available (Kilovolts)	20	18	22	19	22	20	22	20
Secondary Voltage Required (Kilovolts)	12	12	12	12	12	12	12	12
Voltage Rise Time (Microseconds)	42	40	50	40	40	40	40	45
Spark Duration (Microseconds)	1700	1300	1500	1200	1200	1200	1100	1200
Average Spark Voltage (Volts)	1200	1200	1200	1300	1100	1200	1200	1300
Average Spark Current (Milliamps)	12.9	15.5	12.9	12.9	12.9	12.9	12.9	12.9
Spark Energy (Millijoules)	25.4	20.34	23.2	20.2	17.1	18.6	17	20.2

All speeds noted above are crankshaft rpm.

The differences between the baseline and device results are within experimental and test variabilities. Therefore, the installation of this device will not change ignition performance characteristics. It is expected that the General Motor 8 cylinder Delco distributor will produce similar results.

IV. Conclusion and Recommendation

Based on the applicant's data, the staff believes the installation of this device on eight cylinder Delco distributors will not lead to increases in emissions. Therefore, the staff recommends Gulf and Western, General Automotive Products Group be granted an exemption for the "Grand Prix II", "Magnition", "Zenith Electronic Ignition" and "Poweready" systems installed on 1974 and older vehicles equipped with 8 cylinder Delco distributors with concentric pivots.

EXHIBIT A

General Automotive Products Group
A GULF + WESTERN MANUFACTURING COMPANY (MICHIGAN)
Detroit Sales and Engineering Office

17500 Northland Park Court
Southfield, Michigan, 48075
Telephone: 313-444-5090
313-352-9345

July 8, 1975

Mr. K.D. Drachand
Chief, Vehicle Compliance
State of California Resources Agency
Air Resources Board Laboratory
9528 Telstar Avenue
ElMonte, California 91731

Dear Mr. Drachand:

Per our discussions in our meeting of July 3, 1975, please ammend our request for exemption to MV Code Section 27156 (as requested on our application dated March 14, 1975). The original application requested exemption for all applications for which we manufactured a system.

We now desire exemption for the following applications:

Year	Model or Engine	GP Kit #
American Motors Corp.-	Ambassador, American, AMX, Classic, Gremlin, Hornet, Javelin, Matador, Rambler Rebel, Rogue	
74-63	8 Cylinder All (w/Delco Dist.)	ECK-110
Buick, Apollo, Century, Skylark, Special		
74-59	8 Cylinder All (w/Conventional Ign.)	ECK-110
Cadillac		
74-59	8 Cylinder All (w/Conventional Ign.)	ECK-110
Checker Motors (Taxi & Car)		
74-64	8 Cylinder All (DR. Equip. w/Conventional Ign. Exc. 1968-66 Aerobus w/327 eng.)	ECK-110
Chevrolet & Corvette		
74-59	8 Cylinder All (w/Conventional Ign. Exc. 1962 Corvette w/Fuel Injection)	ECK-110

EXHIBIT A (Continued)

Year	Model or Engine	GP Kit #
Chevrolet - Camaro, Chevelle, Chevy II (Nova El Camino, Monte Carlo		
74-63	8 Cylinder All (w/Conventional Ign.	ECK-110
Jeep Corp. - Includes Kaiser Jeep & Willys		
74-72	8 Cylinder 304 Eng. (DR. Equip)	ECK-110
71-70	8 Cylinder 350 Eng. J series (DR. Equip)	ECK-110
Oldsmobile, Cutlass, F-85, Omega, Toronado		
74-59	8 Cylinder All (w/Conventional Ign.)	ECK-110
Pontiac & Grand Prix		
74-59	8 Cylinder All (w/Conventional Ign)	ECK-110
Pontiac - Firebird, GTO, Lemans, Tempest, Ventura		
74-61	8 Cylinder All (w/Conventional Ign.)	ECK-110
Studebaker & Lark		
66-65	8 Cylinder 283 Eng. (DR. Equip)	ECK-110
TRUCKS		
Chevrolet Truck		
74-59	8 Cylinder All (w/Conventional Ign.)	ECK-110
GMC Truck		
74-67	8 Cylinder All (w/Conventional Ign.)	ECK-110
International Truck		
74	8 Cylinder V-400 Eng. (Dist. 1112215)	ECK-110
70-67	8 cylinder V-266, 304, 345, 392 Eng. (DR. Equip - w/Conventional Ign.)	ECK-110
70-66	8 Cylinder V-461 Eng. (serial 61005 up-DR. Equipment Dual Ign. w/Dist. 1112746,47)	ECK-110
70-66	8 Cylinder FTV549 Eng. (DR Equipment Dual Ign. w/Dist. 1112792, 93)	ECK-110
66-59	8 Cylinder V-266, 304 Eng. (DR Equipment w/Conventional Ign.)	ECK-110
66-59	V-345, 392 Eng. (Dist. 1112743,4,71,2)	ECK-110
64	1100, 1200, 1300 Series (Dist. 1110954 and Dist. 1112743 w/Governor	ECK-110
61-56	8 Cylinder V-401, 461, 549 Eng. (Dist. 1112746,7,8,9)	ECK-110

Gulf + Western will submit several other applications for expanded usage of the system on other vehicles at a later date.

Thank you for your continued help on this program. If any additional information is required, please do not hesitate to contact me.

Very truly yours,

Roger B. Anthony
Manager, Product Development

cc: R.Bradley
J.Madeira
K.Merklen
G.Gilkey

GM 8 CYLINDER INSTALLATION

(Includes 8 Cylinder AMC Products with GM Distributors)

Note: Please read the instructions thoroughly prior to starting the installation of the system.

1. Remove distributor cap. Check for cracks or burnt electrodes. Replace if found defective. Remove RF shield (if installed) and set it aside.

2. Remove rotor hold down screws and remove rotor. Check for burnt or oxidized contacts, replace if necessary. Set original hold down screws aside.

3. Remove points and condenser and hold down screws and set aside.

4. Remove distributor lead from negative (- or dist) terminal on the ignition coil. Pull it out of the distributor completely and set aside.

5. Use bracket "A" (black without white dot) for all clockwise rotating distributors (cw) and bracket "B" (black with white dot) for all counter-clockwise rotating distributors (ccw). Please refer to the enclosed application chart for determining your engine rotation direction. Position the "signal generator" mounting bracket on the base plate of the distributor in the place previously occupied by the point contact set. Loosely install two (2) brass #8-32 x 1/4" mounting screws.

6. Snap the provided "signal generator" locator over the distributor shaft below the centrifigual advance mechanism and slide down until the locator goes inside the slot of the signal generator mounting bracket. Tighten the two screws of the signal generator mounting brackets to the distributor base plate. Remove the locator from the distributor shaft.

7. Position the "signal generator" on the base plate of the distributor. Do not align the "signal generator" into its proper place at this time.

8. Take the "signal chopper" and slide at least half way over the centrifigual advance mechanism. Align the "signal chopper" into the slot in the "signal generator" (see figure C). Let the "signal chopper" fall over the centrifigual advance mechanism and lay on base of distributor.

9. Place the "signal generator" into the mounting bracket, using care to align the two locator posts of the bracket into the "signal generator" base. Drive the #8-32 x 1/4" brass "signal generator" mounting screw.

10. Using a good rotor, position it into its proper place, insert two screws provided in package (6/32 x 5/8), lift signal chopper up and align screw holes to rotor hold down screws. Visually check to insure that the signal chopper is seated inside of the rotor skirt. Tighten screws.

11. Remove the metal window from the distributor cap by bending the inside retaining tabs carefully and set aside. Install the new window (provided in package) into the distributor cap. Place the provided split grommet over the "signal generator" wires, and insert the red, black, and green wires individually through the distributor cap window hole. Slide the grommet down the wires and seat the grommet into the window hole.

GM 8 Cylinder Installation (cont'd)

12. With the distributor cap almost in position, dress the wires from the "signal generator" through the grommet (rubber insulator) to remove excess length of wire and to remove any possibility of the wire getting cut by the rotating signal chopper, but providing enough wire to allow the distributor vacuum advance to work freely. The length of wires protruding from the distributor should be 5 3/4" on the V8 cw and 5 1/2" on the V8 ccw distributors. Carefully install loose connector shell on red wire terminal.

13. Install the good distributor cap and ignition wires.

14. Install the provided harness to the coil and distributor signal generator: (refer to circuit diagram of figure A):

    a. Connect red wires together.
    b. Connect green wires together.
    c. Connect black wires together.
    d. Connect blue wire to positive (+ or batt) terminal on the boil. Make sure that the original equipment wire to the coil is also still on this terminal.
    e. Connect the yellow wire to the negative (- or dist) terminal on the coil.

15. Route the wiring across the engine to the fenderwell or firewall of the vehicle. Use care to keep the wiring away from moving mechanisms and exhaust manifold and to allow the harness to flex freely between the engine and fenderwell or firewall.

16. CAUTION: Before mounting the electronic control unit, make sure the wire harness will reach from the engine to the mounting location and that it is subjected to the least amount of heat. A fenderwell may be best suited(do not mount to a plastic fenderwell). Excess harness length may be folded back on itself and taped together.

17. Remove the center screw from the control unit and remove back mounting plate. Using the mounting plate as a template, drill four 1/8" holes in firewall or fenderwell.

18. Mount the control unit mounting plate with 4—#10 x 3/8" sheet metal screws provided. Remount the control unit to the mounting bracket with the center screw.

19. Plug the wire harness into the control unit. Drill a 1/8" hole in the nearby sheet metal for mounting the ground wire (black). Mount the black ground wire with the #10 x 3/8" sheet metal screw provided.

20. Start engine, check timing and reset to manufacturers specifications if needed. The dwell cannot be adjusted, because it is fixed by design.

21. For maximum performance, check the condition of all spark plugs, ignition wiring, and coil. Replace if necessary.

GM 8 Cylinder Installation (cont'd)

22. Place "Attention" sticker on air cleaner or in other prominent location.

23. Original parts previously set aside should be retained for future re-installation when the car is disposed of.

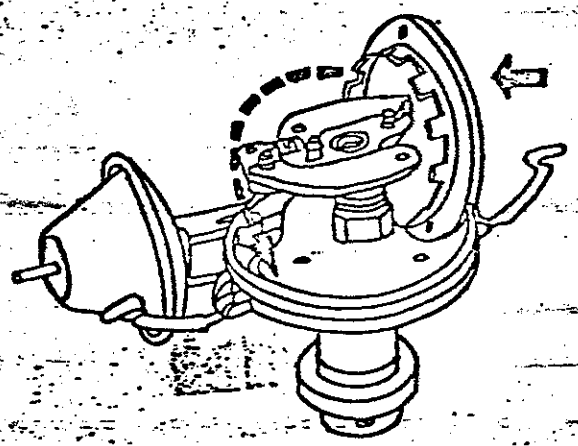

FIGURE C

GM 6 CYLINDER INSTALLATION

(Includes 6 Cylinder AMC Products with GM Distributors)

Note: Please read the instructions thoroughly prior to starting the installation of the system.

1. Remove distributor cap. Check for cracks or burnt electrodes. Replace if found defective.

2. Remove rotor and set aside.

3. Remove points and condenser and hold down screw. Set these aside.

4. Remove distributor lead from negative (- or dist) terminal on the ignition coil. Pull it out of the distributor completely and set it aside.

5. Place existing distributor wire grommet (rubber insulator) over the signal generator wires. Insert the grommet down into the distributor base plate and seat the grommet into the slot.

6. Position the "signal generator" mounting bracket on the base plate of the distributor in the place previously occupied by the point contact set. Loosely secure bracket to base plate with #8/32 x 1/4" brass screw in place of original screw and #6/32 x 1/4" steel thread forming screw in the remaining mounting hole in bracket. (This is a thread forming screw and will present some resistance as it forms its own threads in the untapped hole).

7. Place the provided "signal generator" locator (see figure B) over the distributor shaft and slide down until the locator goes inside the slot of the signal generator mounting bracket. Tighten the two screws of the signal generator mounting bracket to the distributor base plate. Remove the locator from the distributor shaft.

8. Place the "signal generator" onto the mounting bracket, using care to align the two locator posts of the bracket into the "signal generator" base. Drive the #8/32 x 1/8" brass "signal generator" mounting screw.

9. Place the signal chopper-rotor on the distributor shaft and rotate and push down until you feel it index on the shaft. Make sure the signal chopper blades do <u>not</u> touch the signal generator when rotated.

10. Dress the wires from the "signal generator" through the grommet (rubber insulator) to remove any possibility of the wire getting cut by the rotating signal chopper, but providing enough wire to allow the distributor vacuum advance to work freely. The length of the wires protruding from the distributor should be 5 1/4". Carefully install the loose connector shell on the red wire terminal.

11. Install a good distributor cap and ignition wires.

12. Install the provided harness to the coil and distributor signal generator: (refer to circuit diagram of figure A):

    a. Connect red wires together.

GM 6 Cylinder Installation (cont'd)

b. Connect green wires together.
c. Connect black wires together.
d. Connect blue wire to positive (+ or batt) terminal on the coil. Make sure that the original equipment wire to the coil is also still on this terminal.
e. Connect the yellow wire to the negative (- or dist) terminal on the coil.

13. Route the wiring across the engine to the fenderwell or firewall of the vehicle. Use care to keep the wiring away from moving mechanisms and exhaust manifold and to allow the harness to flex freely between the engine and fenderwell or firewall.

14. CAUTION: Before mounting the electronic control unit, make sure the wire harness will reach from the engine to the mounting location and that it is subjected to the least amount of heat. A fenderwell may be best suited (do not mount to a plastic fenderwell). Excess harness length may be folded back on itself and taped together.

15. Remove the center screw from the control unit and remove back mounting plate. Using the mounting plate as a template, drill four 1/8" holes in firewall or fenderwell.

16. Mount the control unit mounting plate with 4-#10 x 3/8" sheet metal screws provided. Remount the control unit to the mounting bracket with the center screw.

17. Plug the wire harness into the control unit. Drill a 1/8" hole in the nearby sheet metal for mounting the ground wire (black). Mount the ground wire with the #10 x 3/8" sheet metal screw provided.

18. Start engine, check timing and reset to manufacturers specifications if needed. The dwell cannot be adjusted, because it is fixed by design.

19. For maximum performance, check the condition of all spark plugs, ignition wiring, and coil. Replace if necessary.

20. Place "Attention" sticker on air cleaner or in other prominent location.

21. Original parts previously set aside should be retained for re-installation when the car is disposed of.

GM 6 Cylinder Installation (cont'd)

b. Connect green wires together.
c. Connect black wires together.
d. Connect blue wire to positive (+ or batt) terminal on the coil. Make sure that the original equipment wire to the coil is also still on this terminal.
e. Connect the yellow wire to the negative (- or dist) terminal on the coil.

. Route the wiring across the engine to the fenderwell or firewall of the vehicle. Use care to keep the wiring away from moving mechanisms and exhaust manifold and to allow the harness to flex freely between the engine and fenderwell or firewall.

. CAUTION: Before mounting the electronic control unit, make sure the wire harness will reach from the engine to the mounting location and that it is subjected to the least amount of heat. A fenderwell may be best suited (do not mount to a plastic fenderwell). Excess harness length may be folded back on itself and taped together.

. Remove the center screw from the control unit and remove back mounting plate. Using the mounting plate as a template, drill four 1/8" holes in firewall or fenderwell.

. Mount the control unit mounting plate with 4-#10 x 3/8" sheet metal screws provided. Remount the control unit to the mounting bracket with the center screw.

. Plug the wire harness into the control unit. Drill a 1/8" hole in the nearby sheet metal for mounting the ground wire (black). Mount the ground wire with the #10 x 3/8" sheet metal screw provided.

. Start engine, check timing and reset to manufacturers specifications if needed. The dwell cannot be adjusted, because it is fixed by design.

. For maximum performance, check the condition of all spark plugs, ignition wiring, and coil. Replace if necessary.

. Place "Attention" sticker on air cleaner or in other prominent location.

. Original parts previously set aside should be retained for re-installation when the car is disposed of.

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CHRYSLER 6 AND 8 CYLINDER INSTALLATION

Note: Please read the instructions thoroughly prior to starting the installation of the system.

1. Remove distributor cap. Check for cracks or burnt electrodes. Replace if found defective.

2. Remove rotor and set it aside.

3. Remove points and condenser and hold down screws. Set these aside.

4. Remove distributor lead from negative (- or dist) terminal on the ignition coil. Completely remove it from the distributor and set it aside.

5. Place the provided split grommet over the signal generator wires and insert the red, black, and green wires individually through the distributor housing hole. Slide the grommet (rubber insulator) down the wires and seat the grommet into the hole or slot from the outside of the distributor.

6. Position the "signal generator" mounting bracket on the base plate of the distributor in the place previously occupied by the point contact set. Replace the hold down screw loosely with a #8/32 x 1/4" brass screw.

7. Place the provided "signal generator" locator (see figure B) over the distributor shaft and slide down until the locator goes inside the slot of the signal generator mounting bracket. Tighten the screw of the signal generator mounting bracket to the distributor base plate. Remove the locator from the distributor shaft.

8. Place the "signal generator" onto the mounting bracket, using care to align the two locator posts of the bracket into the "signal generator" mounting screw.

9. Place the signal chopper-rotor on the distributor shaft and rotate and push down until you feel it index on the shaft. Make sure the signal chopper blades do <u>not</u> touch the signal generator when rotated.

10. Dress the wires from the "signal generator" through the grommet to remove excess length of wire and to remove any possibility of the wire getting cut by the rotating signal chopper, but providing enough wire to allow the distributor vacuum advance to work freely. The length of the wires protruding from the distributor should be 4 1/2" for the V8 ccw, 4 3/4" for the V8 cw, and 4" for the 6 cylinder engines. Carefully install loose connector shell on the red wire terminal.

11. Install a good distributor cap and ignition wires.

12. Install the provided harness to the coil and distributor signal generator (refer to circuit diagram of Figure A):

    a. Connect red wires together.
    b. Connect green wires together.

CHRYSLER 6 AND 8 CYLINDER INSTALLATION

: Please read the instructions thoroughly prior to starting the installation of the system.

1. Remove distributor cap. Check for cracks or burnt electrodes. Replace if found defective.

2. Remove rotor and set it aside.

3. Remove points and condenser and hold down screws. Set these aside.

4. Remove distributor lead from negative (- or dist) terminal on the ignition coil. Completely remove it from the distributor and set it aside.

5. Place the provided split grommet over the signal generator wires and insert the red, black, and green wires individually through the distributor housing hole. Slide the grommet (rubber insulator) down the wires and seat the grommet into the hole or slot from the outside of the distributor.

6. Position the "signal generator" mounting bracket on the base plate of the distributor in the place previously occupied by the point contact set. Replace the hold down screw loosely with a #8/32 x 1/4" brass screw.

7. Place the provided "signal generator" locator (see figure B) over the distributor shaft and slide down until the locator goes inside the slot of the signal generator mounting bracket. Tighten the screw of the signal generator mounting bracket to the distributor base plate. Remove the locator from the distributor shaft.

8. Place the "signal generator" onto the mounting bracket, using care to align the two locator posts of the bracket into the "signal generator" mounting screw.

9. Place the signal chopper-rotor on the distributor shaft and rotate and push down until you feel it index on the shaft. Make sure the signal chopper blades do not touch the signal generator when rotated.

0. Dress the wires from the "signal generator" through the grommet to remove excess length of wire and to remove any possibility of the wire getting cut by the rotating signal chopper, but providing enough wire to allow the distributor vacuum advance to work freely. The length of the wires protruding from the distributor should be 4 1/2" for the V8 ccw, 4 3/4" for the V8 cw, and 4" for the 6 cylinder engines. Carefully install loose connector shell on the red wire terminal.

1. Install a good distributor cap and ignition wires.

2. Install the provided harness to the coil and distributor signal generator (refer to circuit diagram of Figure A):

   a. Connect red wires together.
   b. Connect green wires together.

CHRYSLER 6 AND 8 CYLINDER INSTALLATION

Please read the instructions thoroughly prior to starting the installation of the system.

1. Remove distributor cap. Check for cracks or burnt electrodes. Replace if found defective.

2. Remove rotor and set it aside.

3. Remove points and condenser and hold down screws. Set these aside.

4. Remove distributor lead from negative (- or dist) terminal on the ignition coil. Completely remove it from the distributor and set it aside.

5. Place the provided split grommet over the signal generator wires and insert the red, black, and green wires individually through the distributor housing hole. Slide the grommet (rubber insulator) down the wires and seat the grommet into the hole or slot from the outside of the distributor.

6. Position the "signal generator" mounting bracket on the base plate of the distributor in the place previously occupied by the point contact set. Replace the hold down screw loosely with a #8/32 x 1/4" brass screw.

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8. Place the "signal generator" onto the mounting bracket, using care to align the two locator posts of the bracket into the "signal generator" mounting screw.

9. Place the signal chopper-rotor on the distributor shaft and rotate and push down until you feel it index on the shaft. Make sure the signal chopper blades do <u>not</u> touch the signal generator when rotated.

10. Dress the wires from the "signal generator" through the grommet to remove excess length of wire and to remove any possibility of the wire getting cut by the rotating signal chopper, but providing enough wire to allow the distributor vacuum advance to work freely. The length of the wires protruding from the distributor should be 4 1/2" for the V8 ccw, 4 3/4" for the V8 cw, and 4" for the 6 cylinder engines. Carefully install loose connector shell on the red wire terminal.

11. Install a good distributor cap and ignition wires.

12. Install the provided harness to the coil and distributor signal generator (refer to circuit diagram of Figure A):

    a. Connect red wires together.
    b. Connect green wires together.

CHRYSLER 6 AND 8 CYLINDER INSTALLATION

e: Please read the instructions thoroughly prior to starting the installation of the system.

1. Remove distributor cap. Check for cracks or burnt electrodes. Replace if found defective.

2. Remove rotor and set it aside.

3. Remove points and condenser and hold down screws. Set these aside.

4. Remove distributor lead from negative (- or dist) terminal on the ignition coil. Completely remove it from the distributor and set it aside.

5. Place the provided split grommet over the signal generator wires and insert the red, black, and green wires individually through the distributor housing hole. Slide the grommet (rubber insulator) down the wires and seat the grommet into the hole or slot from the outside of the distributor.

6. Position the "signal generator" mounting bracket on the base plate of the distributor in the place previously occupied by the point contact set. Replace the hold down screw loosely with a #8/32 x 1/4" brass screw.

7. Place the provided "signal generator" locator (see figure B) over the distributor shaft and slide down until the locator goes inside the slot of the signal generator mounting bracket. Tighten the screw of the signal generator mounting bracket to the distributor base plate. Remove the locator from the distributor shaft.

8. Place the "signal generator" onto the mounting bracket, using care to align the two locator posts of the bracket into the "signal generator" mounting screw.

9. Place the signal chopper-rotor on the distributor shaft and rotate and push down until you feel it index on the shaft. Make sure the signal chopper blades do <u>not</u> touch the signal generator when rotated.

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1. Install a good distributor cap and ignition wires.

2. Install the provided harness to the coil and distributor signal generator (refer to circuit diagram of Figure A):

   a. Connect red wires together.
   b. Connect green wires together.

CHRYSLER 6 AND 8 CYLINDER INSTALLATION

Please read the instructions thoroughly prior to starting the installation of the system.

1. Remove distributor cap. Check for cracks or burnt electrodes. Replace if found defective.

2. Remove rotor and set it aside.

3. Remove points and condenser and hold down screws. Set these aside.

4. Remove distributor lead from negative (- or dist) terminal on the ignition coil. Completely remove it from the distributor and set it aside.

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7. Place the provided "signal generator" locator (see figure B) over the distributor shaft and slide down until the locator goes inside the slot of the signal generator mounting bracket. Tighten the screw of the signal generator mounting bracket to the distributor base plate. Remove the locator from the distributor shaft.

8. Place the "signal generator" onto the mounting bracket, using care to align the two locator posts of the bracket into the "signal generator" mounting screw.

9. Place the signal chopper-rotor on the distributor shaft and rotate and push down until you feel it index on the shaft. Make sure the signal chopper blades do <u>not</u> touch the signal generator when rotated.

10. Dress the wires from the "signal generator" through the grommet to remove excess length of wire and to remove any possibility of the wire getting cut by the rotating signal chopper, but providing enough wire to allow the distributor vacuum advance to work freely. The length of the wires protruding from the distributor should be 4 1/2" for the V8 ccw, 4 3/4" for the V8 cw, and 4" for the 6 cylinder engines. Carefully install loose connector shell on the red wire terminal.

11. Install a good distributor cap and ignition wires.

12. Install the provided harness to the coil and distributor signal generator (refer to circuit diagram of Figure A):

    a. Connect red wires together.
    b. Connect green wires together.

CHRYSLER 6 AND 8 CYLINDER INSTALLATION

[illegible]: Please read the instructions thoroughly prior to starting the installation of the system.

1. Remove distributor cap. Check for cracks or burnt electrodes. Replace if found defective.

2. Remove rotor and set it aside.

3. Remove points and condenser and hold down screws. Set these aside.

4. Remove distributor lead from negative (- or dist) terminal on the ignition coil. Completely remove it from the distributor and set it aside.

5. Place the provided split grommet over the signal generator wires and insert the red, black, and green wires individually through the distributor housing hole. Slide the grommet (rubber insulator) down the wires and seat the grommet into the hole or slot from the outside of the distributor.

6. Position the "signal generator" mounting bracket on the base plate of the distributor in the place previously occupied by the point contact set. Replace the hold down screw loosely with a #8/32 x 1/4" brass screw.

7. Place the provided "signal generator" locator (see figure B) over the distributor shaft and slide down until the locator goes inside the slot of the signal generator mounting bracket. Tighten the screw of the signal generator mounting bracket to the distributor base plate. Remove the locator from the distributor shaft.

8. Place the "signal generator" onto the mounting bracket, using care to align the two locator posts of the bracket into the "signal generator" mounting screw.

9. Place the signal chopper-rotor on the distributor shaft and rotate and push down until you feel it index on the shaft. Make sure the signal chopper blades do <u>not</u> touch the signal generator when rotated.

10. Dress the wires from the "signal generator" through the grommet to remove excess length of wire and to remove any possibility of the wire getting cut by the rotating signal chopper, but providing enough wire to allow the distributor vacuum advance to work freely. The length of the wires protruding from the distributor should be 4 1/2" for the V8 ccw, 4 3/4" for the V8 cw, and 4" for the 6 cylinder engines. Carefully install loose connector shell on the red wire terminal.

11. Install a good distributor cap and ignition wires.

12. Install the provided harness to the coil and distributor signal generator (refer to circuit diagram of Figure A):

    a. Connect red wires together.
    b. Connect green wires together.

HRYSLER 6 AND 8 CYLINDER INSTALLATION

- Please read the instructions thoroughly prior to starting the installation of the system.

- Remove distributor cap. Check for cracks or burnt electrodes. Replace if found defective.

- Remove rotor and set it aside.

- Remove points and condenser and hold down screws. Set these aside.

- Remove distributor lead from negative (- or dist) terminal on the ignition coil. Completely remove it from the distributor and set it aside.

- Place the provided split grommet over the signal generator wires and insert the red, black, and green wires individually through the distributor housing hole. Slide the grommet (rubber insulator) down the wires and seat the grommet into the hole or slot from the outside of the distributor.

- Position the "signal generator" mounting bracket on the base plate of the distributor in the place previously occupied by the point contact set. Replace the hold down screw loosely with a #8/32 x 1/4" brass screw.

- Place the provided "signal generator" locator (see figure B) over the distributor shaft and slide down until the locator goes inside the slot of the signal generator mounting bracket. Tighten the screw of the signal generator mounting bracket to the distributor base plate. Remove the locator from the distributor shaft.

Place the "signal generator" onto the mounting bracket, using care to align the two locator posts of the bracket into the "signal generator" mounting screw.

Place the signal chopper-rotor on the distributor shaft and rotate and push down until you feel it index on the shaft. Make sure the signal chopper blades do <u>not</u> touch the signal generator when rotated.

Dress the wires from the "signal generator" through the grommet to remove excess length of wire and to remove any possibility of the wire getting cut by the rotating signal chopper, but providing enough wire to allow the distributor vacuum advance to work freely. The length of the wires protruding from the distributor should be 4 1/2" for the V8 ccw, 4 3/4" for the V8 cw, and 4" for the 6 cylinder engines. Carefully install loose connector shell on the red wire terminal.

Install a good distributor cap and ignition wires.

Install the provided harness to the coil and distributor signal generator (refer to circuit diagram of Figure A):

- Connect red wires together.

b. Connect green wires together.

EXHIBIT C

AUTOMOTIVE RESEARCH ASSOCIATES, INC.
5404-08 BANDERA ROAD
SAN ANTONIO, TEXAS 78238

February 7, 1975

Mr. Jim Fernquist
Gulf & Western
General Automotive Products Group
17500 Northland Park Court
Southfield, Michigan 48075

Dear Mr. Fernquist:

I am attaching copies of the emission test data which was performed to evaluate your breakerless ignition system. Two (2) 1975 hot start CVS tests were run, the first with the factory breaker point ignition (baseline) and the second with the Gulf & Western breakerless system installed. The data is summarized below and indicates an improvement in emission levels.

	BASELINE	GULF & WESTERN IGNITION
Carbon Monoxide (CO)	7.97 gm/mi	6.48 gm/mi
Hydro Carbon (HC)	1.39 gm/mi	1.26 gm/mi
Oxides of Nitrogen (NO_X)	1.88 gm/mi	1.72 gm/mi

The tests were conducted on a 1971 Oldsmobile Delta 88 fitted with a 1973 Oldsmobile 455 CID engine (ARA vehicle #733). The vehicle is utilized exclusively by our emission lab and the data obtained is similar to the historical data from the vehicle. The ignition timing, dwell and idle speed were checked, found to be within factory specifications, and the baseline test performed. A Gulf & Western ignition (module #3, pickup #130) was removed from ARA vehicle #992 another Oldsmobile where it had accumulated 47,000 durability miles, and installed into vehicle #733. The timing was set to factory specifications, the idle speed checked and the test performed.

In summary, the data indicates that the Gulf & Western breakerless system causes no emission deterioration but rather lowers the emission levels slightly.

Very truly yours,

Michael Kloppe
Senior Project Engineer

MK/ms
attach.

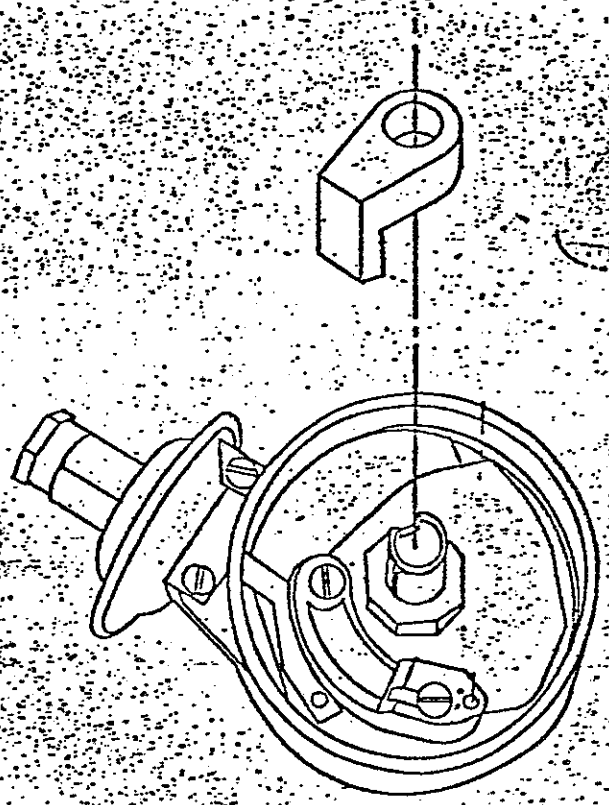


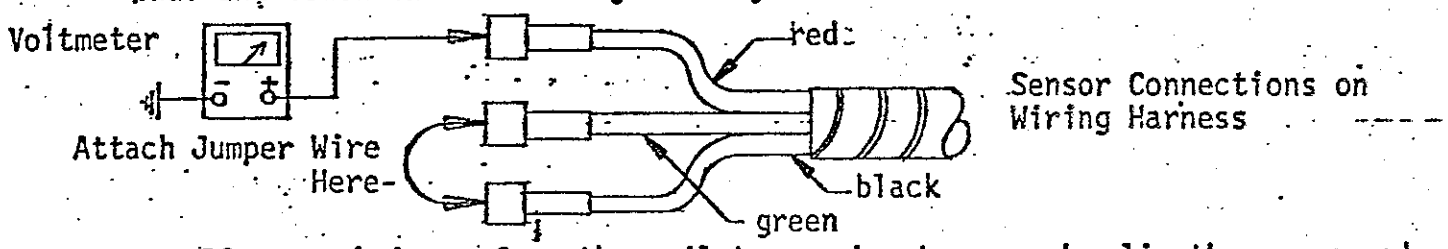
FIGURE B

TROUBLESHOOTING THE ZENITH SOLID STATE LONGLIFE IGNITION SYSTEM

The following test procedure is designed to make any necessary troubleshooting of your ignition system as easy as possible. For accurate diagnosis of any failure, it is recommended that this procedure be followed as written.

1. Check the wiring against the wiring diagram to ensure that the system is properly wired. Make sure that the control box black ground lead is securely grounded.
2. Check battery voltage at battery and battery connections. Make a mental note of battery voltage. Check the ignition timing to ensure that it is set at the Original Equipment Manufacturers specifications.
3. Remove distributor cap, inspect for cracks, carbon tracking, or carbon on the center tower contact. Replace if necessary.
4. Inspect the "signal generator" and the "signal chopper" for any indication of rubbing action or nicks on the opening of the signal generator slots. If any damage is noticed, replace the "signal generator" and the "signal chopper".
5. Remove the spark plug wires, one at a time, and measure the resistance of each with an ohm meter (also the coil tower wire), then reconnect each. None of these readings should exceed 20,000 ohms. If any wire exhibits an unnaturally high resistance, or they are all old and the insulation is cracked, replace all of them with a new ignition wire set.

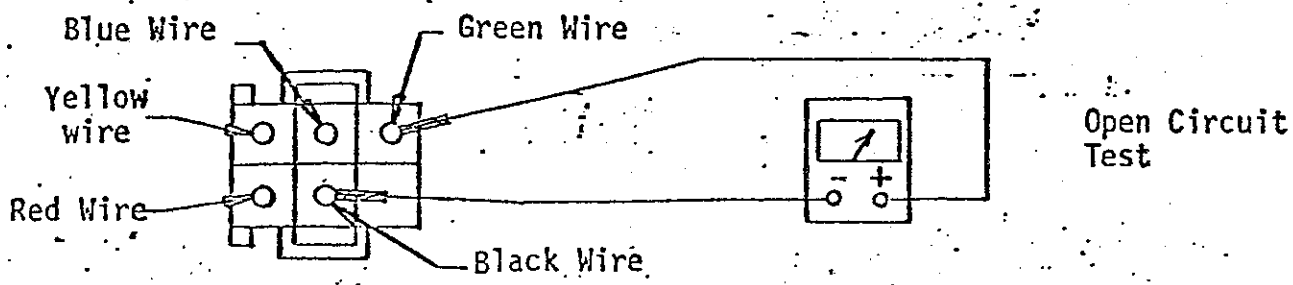
   If no fault has been found up to this point, proceed with the following steps.
6. Sensor test. Disconnect the three single wire connectors at the distributor end of the harness. Remove the center ignition wire from the distributor cap and place it 1/4" from a good ground. Turn the ignition switch to the run position. Attach a jumper to the green harness wire at the disconnected terminal and touch intermittently the adjacent black harness.



   a. If a spark jumps from the coil-tower wire to ground, clip the green and black wires together and measure the voltage at the disconnected terminal of the red harness wire. If the voltage is over 1/2 battery voltage, replace the "signal generator" in the distributor. If the voltage is below 1/2 battery voltage, proceed with step 7 below.

   b. If no spark is obtained from the coil tower wire to ground, proceed with step 7 below.
7. Harness test. Turn the ignition switch off. Disconnect the yellow and blue harness wires from the coil, separate the harness connectors at the control unit. The ground connection can be left on.

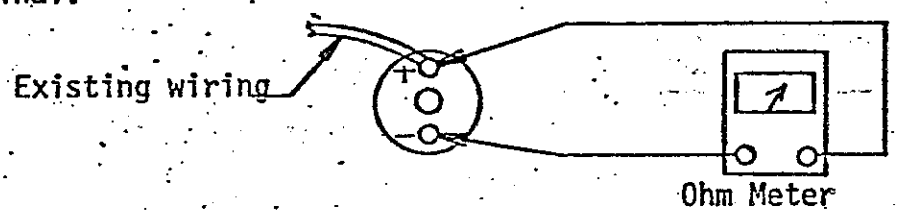
a. Using a high resistance scale of an ohm meter, clip one ohm meter lead to a terminal in the 6-cavity harness connector as shown. Touch each of the adjacent terminal pins in succession with the other ohm meter lead. (make sure that none of the loose terminals are shorting out to each other or to ground).



These should all read "open" or "∞" resistance. If an open resistance is obtained, proceed with step (b) below. If a near zero resistance or indicate "short" or the ohm meter needle fluctuates off "open", replace the wire harness.

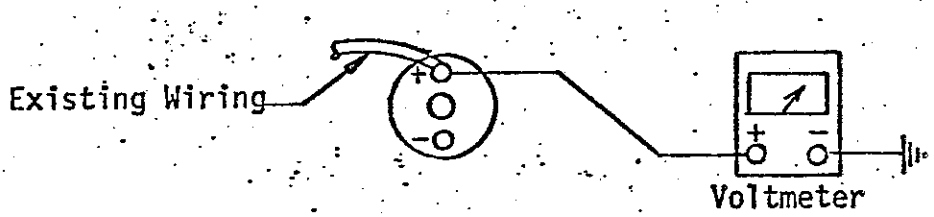
b. Using a low resistance scale of an ohm meter, clip one ohm meter lead on the ground screw holding the black wire and touch the other ohm meter probe to the other end of both black wire connector terminals. This should read near zero ohms. Check each wire color in turn in this manner, checking for continuity of each wire from terminal to terminal. If any of these read "open" or high resistance, replace the harness. If they all check good, proceed with the next step.

8. Coil and Ballast Resistor test. With the harness still disconnected, measure the resistance of the coil from the (-) coil terminal to the (+) coil terminal.



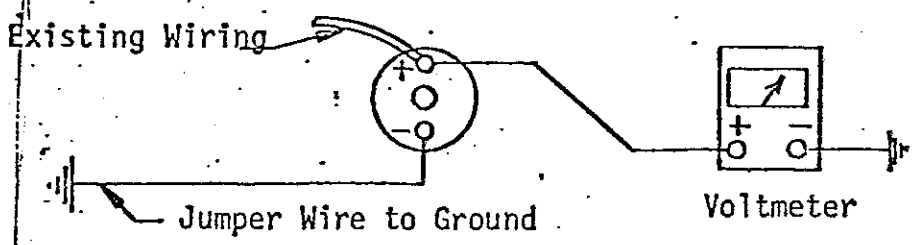
It should read between 1 and 2 ohms. If it does, continue testing, if it doesn't, replace the coil. Turn the ignition switch to the "run" position.

a. Measure the voltage at the (+) or "battery" terminal of the coil. It should read full battery voltage.

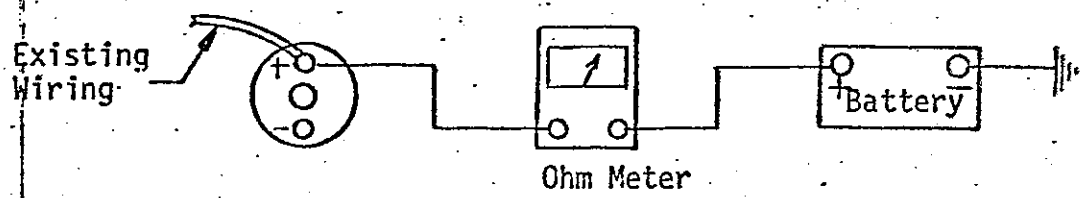


If it does, skip to step (b). If it reads zero or significantly less than battery potential, look for an open wire, disconnected terminal, ballast resistor, or inoperative ignition switch back towards the ignition switch and repair or replace it.

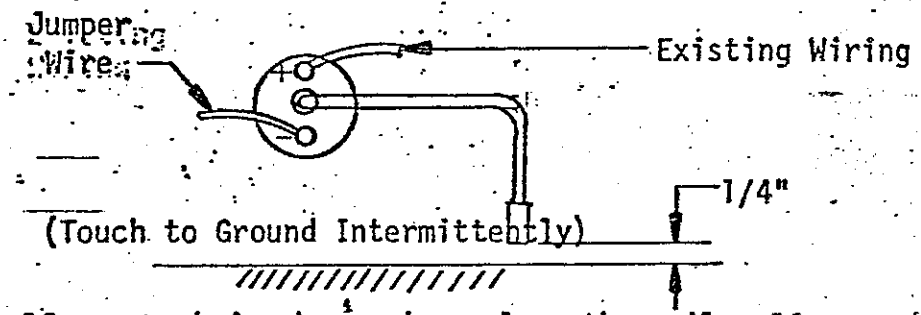
b. Attach one end of a clip lead to the negative (-) terminal of the coil and attach the other end of the clip lead to a good ground. Measure the voltage at the (+) coil terminal again.



It should read about 1/2 battery voltage. If it does, skip to step (c) below. If it reads either much higher or much lower than 1/2 battery potential, check for a poor connection or a shorted ballast resistor or resistance wire and repair or replace it. Ballast resistors typically measure between 1 and 2 ohms.

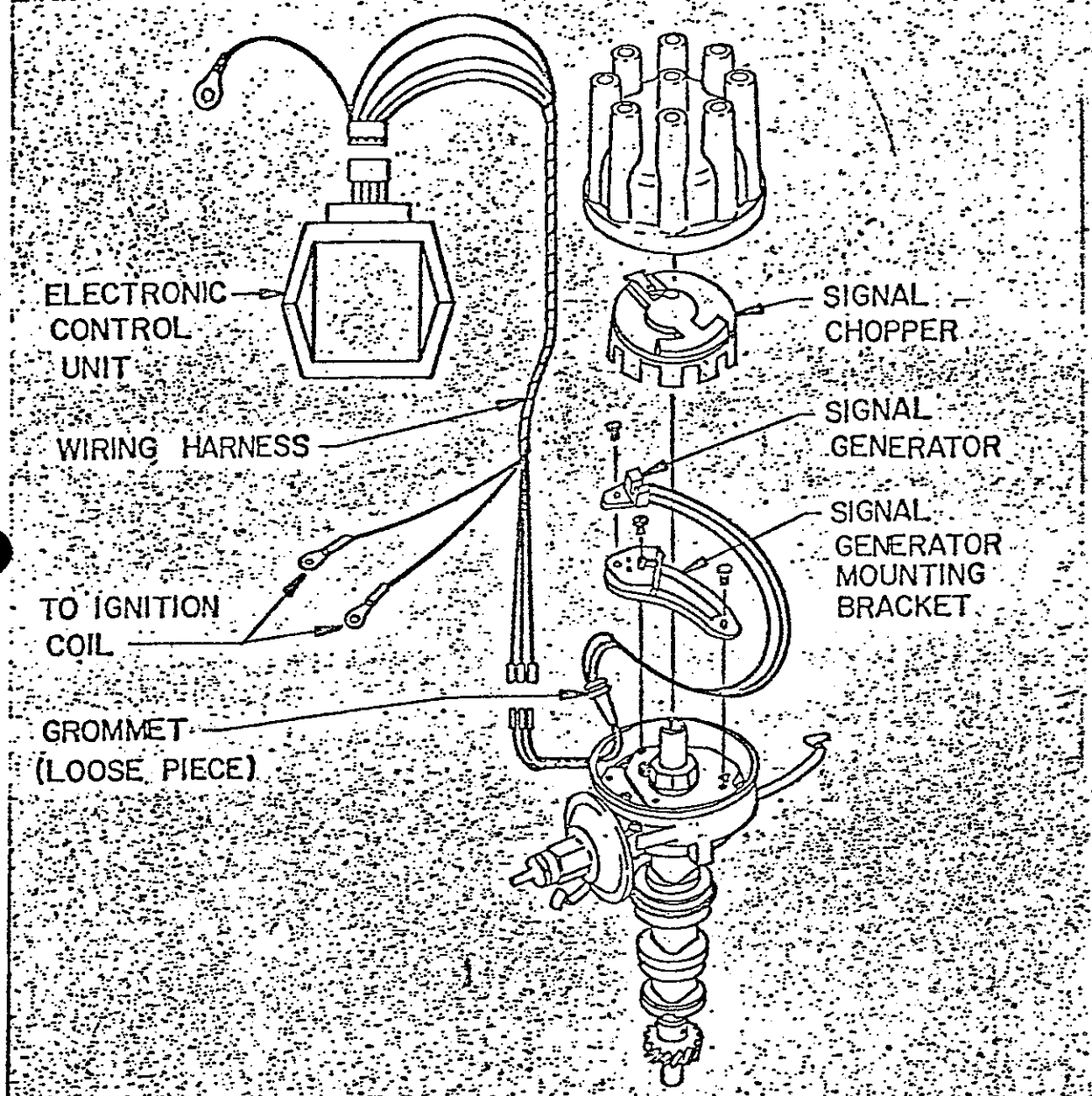


c. Remove the center ignition wire from the distributor cap and place it close to a good ground. While watching for a spark between the coil tower wire and ground, lift the clip lead off the negative (-) coil terminal. Touch it back on and remove it several times, if necessary.



If no spark is observed, replace the coil. If a good spark is observed, replace the control unit and reconnect the wire harness and connections. It will be very rare that either the "signal generator" or the control unit require replacement, so before replacing either unit, it would be advisable to run through the troubleshooting to be sure that nothing has been overlooked.

In the unlikelihood of system failure where replacement components are not readily available, the system may be easily converted to conventional ignition by installing points, condenser and distributor lead.



FORD 8 CYLINDER SYSTEM SHOWN

FIGURE D

1976 DYNAMOMETER EMISSION TEST

TEST NO: 733-01
PROJECT: 51903
VEHICLE: 733

TEST DATE: 01-21-75
REPT DATE: 02/06/75.
MILEAGE : NA

TEST RESULTS

BAG: 1 COLD START TRANSIENT (G/TEST PHASE)

CO: 29.052

HC: 5.959

NO: 9.037

BAG: 2 COLD START STABILIZED (G/TEST PHASE)

CO: 31.062

HC: 4.713

NO: 6.294

BAG: 3 HOT START TRANSIENT (G/TEST PHASE)

CO: 28.462

HC: 5.512

NO: 6.857

WEIGHTED MASS EMISSIONS (G / MILE)

CO: 7.970

HC: 1.389

NO: 1.879

REMARKS: GULF-WESTERN BASELING
STOCK IGNITION, '76 HOT START

V0(1): .131687
V0(2): .131687
V0(3): .131327

VMIX(1): 2210.490
VMIX(2): 3749.012
VMIX(3): 2256.213

1976 DYNAMOMETER EMISSION TEST

TEST NO: 733-01
PROJECT: 51903
VEHICLE: 733
INPUT DATA

TEST DATE: 01-21-75
REPT DATE: 02/06/75.
MILEAGE : NA

AMBIENT CONDITIONS

	COLD START		HOT START	
HUMIDITY (R-H)	55.00	95.76	37.00	66.26
MIXTURE TEMP.	120.00		105.00	
BAROMETER	29.10		29.09	
SAT. VAPOR P.	1.14		1.18	

CVS DATA

	--- BAG 1 ---		--- BAG 2 ---		--- BAG 3 ---	
PRESSURES: DELTA/OUTPUT	40.0	.6	40.0	.6	41.0	.6
BLOWER REV.	21050		35701		21054	

ANALYTICAL DATA

	--- BAG 1 ---		--- BAG 2 ---		--- BAG 3 ---	
HCE /HCD (PPM)	172.50	9.50	85.00	9.50	157.50	10.00
COEM/CODM(PPM)	426.00	.70	265.60	.70	410.20	6.00
NOXE/NOXD(PPM)	70.00	2.40	30.00	2.40	60.00	2.00
CO2E(%)	2.35		1.76		2.28	

1976 DYNAMOMETER EMISSION TEST

TEST NO: 733-03
PROJECT: 51903
VEHICLE: 733

TEST DATE: 02-05-75
REPT DATE: 02/06/75.
MILEAGE : 45956.9

TEST RESULTS

BAG: 1 COLD START TRANSIENT (G/TEST PHASE)

CO: 20.218

HC: 5.428

NO: 6.326

BAG: 2 COLD START STABILIZED (G/TEST PHASE)

CO: 28.520

HC: 4.255

NO: 5.206

BAG: 3 HOT START TRANSIENT (G/TEST PHASE)

CO: 19.951

HC: 4.949

NO: 8.702

WEIGHTED MASS EMISSIONS (G / MILE)

CO: 6.478

HC: 1.255

NO: 1.718

REMARKS: '76 HOT START
SPECIAL IGNITION SYSTEM

VO(1): .291042
VO(2): .291042
VO(3): .291043

AUTOMOTIVE RESEARCH ASSOCIATES, INC.

1976 DYNAMOMETER EMISSION TEST

TEST NO: 733-03
PROJECT: 51903
VEHICLE: 733
INPUT DATA

TEST DATE: 02-05-75
REPT DATE: 02/06/75.
MILEAGE : 45956.9

AMBIENT CONDITIONS

	COLD START		HOT START	
HUMIDITY (R-H)	39.00	71.84	72.00	113.89
MIXTURE TEMP.	109.00		108.00	
BAROMETER	29.12		29.12	
SAT. VAPOR P.	1.21		1.03	

CVS DATA

	--- BAG 1 ---		--- BAG 2 ---		--- BAG 3 ---	
PRESSURES: DELTA/OUTPUT	24.0	2.2	24.0	2.2	24.0	2.2
BLOWER REV.	10074		17212		10098	

ANALYTICAL DATA

	--- BAG 1 ---		--- BAG 2 ---		--- BAG 3 ---	
HCE /HCD (PPM)	157.50	30.50	86.00	29.00	137.50	21.00
COEM/CODM(PPM)	267.30	10.00	220.00	10.00	263.90	7.40
NOXE/NOXD(PPM)	48.00	.80	23.50	.80	53.00	.95
CO2E(%)	2.13		1.52		2.20	