State of California
AIR RESOURCES BOARD

EXECUTIVE ORDER D-61
Relating to Exemptions under Section 27156
of the Vehicle Code

MOTOROLA INC.
"BREAKERLESS ELECTRONIC IGNITION SYSTEM KIT"

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 "Breakerless Electronic Ignition System Kit" models 6SK2027A and 6SK2026A manufactured by Motorola Inc., 9401 W. Grand Ave., Franklin Park, Illinois 60131 has been found not to reduce the effectiveness of required motor vehicle emission control devices and, therefore, is exempt from the prohibitions of Section 27156 of the Vehicle Code for 1974 and older model year vehicles for the following applications.

Application	Adapter Number
GM-8 cylinder	6-20, 6-19
Ford-8 cylinder (1972 thru 1974)	6-22
Ford-6 cylinder (1972 thru 1974)	6-23

Application	Adapter Number
Holley (IHC) - 8 cyl.	6-26
Hitachi (Datsun) - 4 cyl.	6-30
Denso (Toyota) - 4 cyl.	6-31 & 6-32
Bosch - 4 cyl.	6-33 & 6-32
Bosch - 6 cyl.	6-41
Lucas - 4 cyl.	6-34 & 6-32
Femsa - 4 cyl.	6-35

This device is not for use on vehicles originally equipped with breakerless, C-D, electronic ignition systems or leading ignition systems for rotary engines or dual point distributors where one of the points are used for emission control and 1966-1970 vehicles with NOx devices and 4° retard (i.e. Carter-CER, Echlin, STP - Air Computer and AQP - Electro-NOx).

The device consists of a magnetic reluctance sensor operating on the original distributor cam and an amplifier module for transistor switching of the primary current to the standard ignition 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.

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 "BREAKERLESS ELECTRONIC IGNITION SYSTEM KIT".

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 14th day of October, 1975.

WILLIAM H. LEWIS, JR.
Executive Officer

State of California

AIR RESOURCES BOARD

September 25, 1975

Staff Report

Evaluation of the Motorola Inc.,
"Breakerless Electronic Ignition System Kit"

I. Introduction

Motorola Inc. of 9401 W. Grand Ave., Franklin Park, Illinois 60131 has applied for an exemption from the prohibitions of Section 27156 of the California Motor Vehicle Code for the "Breakerless Electronic Ignition System Kit" models 6SK2027A and 6SK2026A (Exhibit A) for 1974 and older model year vehicles as follows:

Application	Adapter Number
GM-8 cylinder	6-20, 6-19
GM-6 cylinder	6-21
Ford-8 cylinder (1972 thru 1974)	6-22
Ford-6 cylinder (1972 thru 1974)	6-23

Application	Adapter Number
Holley (IHC) - 8 cyl.	6-26
Hitachi (Datsun) 4 cyl.	6-30
Denso (Toyota) - 4 cyl.	6-31 & 6-32
Bosch - 4 cyl.	6-33 & 6-32
Bosch - 6 cyl.	6-41
Lucas - 4 cyl.	6-34 & 6-32
Femsa - 4 cyl.	6-35

This device is not for use on vehicles originally equipped with breakerless, C-D, electronic ignition systems or leading ignition systems for rotary engines or dual point distributors where one of the points are used for emission control and 1966-1970 vehicles with NOx devices and 4° spark retard (i.e., Carter-CER, Echlin, STP - Air Computer and AQP-Electro-NOx).

Section 27156 of the Motor Vehicle Code prohibits the installation of any device or mechanism which reduces the effectiveness of the required emission control devices. This vehicle code section also authorizes the Air Resources Board to exempt devices from this prohibition if a finding shows that the device will not adversely affect the performance of the emission control system.

II. System Description

The Motorola "Breakerless Electronic Ignition System Kit" is a kit designed to replace the breaker points within a distributor. This kit consists of an amplifier, magnetic pick-up unit, mounting bracket, solderless connectors and feeler gauge. The installation instructions are attached as Exhibit B. The manufacturer presented the electrical schematic of the amplier in drawing number 63D44479E. The drawing has been classified "Company Confidential".

A magnetic pick-up is placed on a mounting bracket supplied with the kit. This bracket is custom made for each specific distributor application. The air gap between the pick-up and the distributor cam lobe is determined by a feeler gauge. When the high points of the cam moves past the magnet pick-up, an induced voltage signal is generated. This signal is transferred to the amplifier which triggers an electronic switch controlling the current flow to the primary side of the ignition coil. This signal stops the current flow to the primary side of the coil which causes the magnetic field of the coil primary to collapse. The collapse of the magnetic field builds up the voltage in the coil secondary and causes the spark plug to fire.

The pick-up unit is free from wear prevalent with standard distributor points and thus is capable of providing better control of ignition timing. According to the applicant the purpose of this device is to reduce ignition system maintenance.

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 describing the electrical characteristics of the unit. In order to evaluate the device, the output characteristics of three ignition systems with and without the device 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, Ignition System Measurements Procedure.

The ARB evaluation of the unit consisted of measuring the spark duration, available secondary voltage, secondary voltage rise time, average secondary voltage and current, and centrifugal and vacuum advance timing characteristics. The baseline and device tests were conducted with 1968 General Motors 6 cylinder, 1973 Ford 8 cylinder and 1973 Volkswagen 4 cylinder distributors. The results of this comparison are shown in Tables I, II and III.

The device test data for the General Motors 6 cylinder distributor indicated a spark retard in excess of the ARB limit of 4° crankshaft.

The difference between the baseline and device results for the Ford 8 cylinder and Volkswagen 4 cylinder are within experimental and test variabilities. Therefore the installation of the device will not change the ignition performance characteristics.

IV. Conclusion and Recommendations

Based on the evaluation of the application and ARB test results, the installation of the Motorola - "Breakerless Electronic Ignition System Kit" would not adversely affect the performance or operation of the OEM emission control system. The staff recommends that Motorola Inc. be issued an exemption from the prohibitions of Section 27156 of the Vehicle Code for its "Breakerless Electronic Ignition System Kit" for 1974 and older model year vehicles for the kits specified in the introduction except the General Motors 6 cylinder vehicles.

Table I

1973 Volkswagen - 4 Cylinder Distributor

Centrifugal Spark Advance in Crankshaft Degrees

Engine RPM	Baseline Test	Device Test
600	0	0
1400	8	7
2000	13	10
2600	17	15
3200	21	18
3800	23	20

Vacuum Spark Advance in Crankshaft Degrees

Vacuum in. Hg.	Baseline Test	Device Test
3	0	0
6	1	1
9	6	6
15	6	6
20	6	6

Spark Duration in Microseconds

Engine RPM	Baseline Test	Device Test
800	950	700
4000	600	650

Secondary Voltage Rise Time in Microseconds

Engine RPM	Baseline Tests	Device Test
800	80	50
4000	40	50

Spark Energy in Millijoules

Engine RPM	Baseline Test	Device Test
800	18.0	13.3
4000	10.1	13.5

Table II

1973 Ford 8 Cylinder Distributor

Centrifugal Spark Advance in Crankshaft Degrees

Engine RPM	Baseline Test	Device Test
600	0	0
1400	6	5
2000	9	8
2600	13	12
3000	15	14

Vacuum Spark Advance in Crankshaft Degrees

Vacuum in. Hg.	Baseline Test	Device Test
3	0	0
6	1	1
9	8-1/2	8
15	20	20
20	25	25

Spark Duration in Microseconds

Engine RPM	Baseline Test	Device Test
600	1300	1200
3000	950	900

Secondary Voltage Rise Time in Microseconds

Engine RPM	Baseline Test	Device Test
600	40	50
3000	40	50

Spark Energy in Millijoules

Engine RPM	Baseline Test	Device Test
600	19.6	16.6
3000	11.3	11.6

Table III

1968 General Motors 6 Cylinder

Centrifugal Spark Advance in Crankshaft Degrees

Engine RPM	Baseline Test	Device Test
600	0	0
1400	8	6
2000	17	14
2600	19	19
3000	21	21

Vacuum Spark Advance in Crankshaft Degrees

Vacuum in. Hg.	Baseline Test	Device Test
3	0	0
6	0	0
9	7	5
12	18	14
15	26	21
18	26	21
20	26	21

Spark Duration in Microseconds

Engine RPM	Baseline Test	Device Test
600	1500	1400
3000	1400	1600

Secondary Voltage Rise Time in Microseconds

Engine RPM	Baseline Test	Device Test
600	40	30
3000	30	30

Spark Energy in Millijoules

Engine RPM	Baseline Test	Device Test
600	22.6	18.1
3000	25.3	22.8

Exhibit A

MOTOROLA INC.

June 26, 1975

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

Dear Mr. Kenney:

Enclosed you will find a copy of data taken with respect to our models 6SK2026 and 6SK2027 aftermarket ignition systems. This data, in conjunction with your specifications form is being submitted for certification for sale and use of these products in the state of California.

We have limited our list of applications to include only those which fall within your 4° retard limit. (See List.)

List of distributor applications submitted for exemption (see enclosed test data).

				Kit #
General Motors	CCW	V8		6-20
General Motors	CW	V8		6-19
General Motors	CW	6		6-21
Ford 6 (Vacuum only dist.)			Pre 1967	6-23
Holley (I.H.C.)		8		6-26
Hitachi (Datsun)		4		6-30
Denso (Toyota)		4		6-31
Bosch		4		6-33
Bosch		6		6-41
Lucas		4		6-34
Femsa		4		6-35

We have tested the advance characteristics of all of these distributors and have found that retard introduced by the installation of our system is less than 4° engine in all cases (see enclosed test data).

At this time, we have chosen to exclude the following applications as their advance characteristics exceed your 4° retard limit.

List of distributor applications excluded from submission:

Chrysler	CW	6	
Chrysler	CW	8	
Chrysler	CCW	8	
Ford		8	
Ford		6	1967 to present (centrifugal and vacuum)

Exhibit A

We are currently engineering revisions to our system to bring the above applications within your prescribed limits. When this is accomplished, we will separately submit these applications to you for exemption.

The data enclosed was taken on our laboratory test equipment in conjunction with S.A.E. standards for ignition testing, numbers SAE - J139, and SAE - J973a. You will note that the electrical data was taken for a Ford 8 application. This application is not being submitted, however the electrical parameters for all applications are similar and this was selected as being typical. I might also mention that the modules in both the 6SK2026 and the 6SK2027 are electrically identical. The only difference between the two kits is the physical size of the sensor. The sensor used with the 6SK2027 is smaller so it will fit in certain 4 cylinder distributors.

We request an early review of our application. As you know, we are unable to compete in California without the sought exemption. In view of the fact that many of our competitors do not meet your retard limit and yet are able to market in California under previous standards, we find ourselves at a precarious competitive disadvantage. We will appreciate your immediate and expeditious processing of our application.

Sincerely,

Myles H. Kitchen
Electrical Engineer

Exhibit A

MOTOROLA®

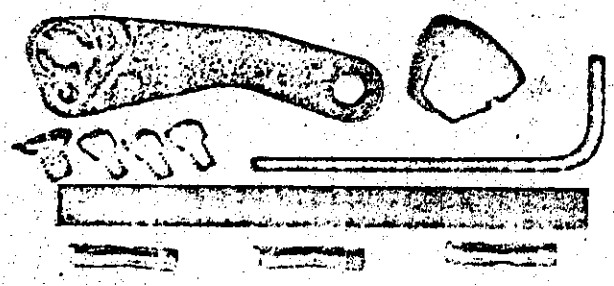
electronic ignition

ELECTRONIC IGNITION SYSTEM

12 VOLT NEGATIVE GROUND
FOR GAS ENGINES WITH STANDARD IGNITION SYSTEM

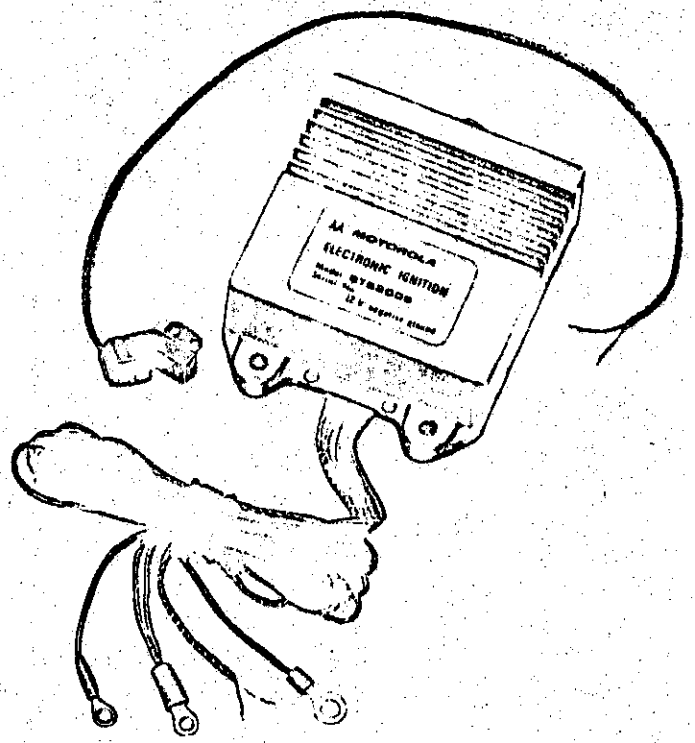
IMPORTANT FEATURES

- Improves starting capability.
- Extends miles between ignition tune up.
- Replaces points and condenser.
- Uses original coil and distributor.
- Easy to install.
- Complete system in 2 kits.
- Does not effect operation of most tachometers.
- Module and sensor epoxy encapsulated to protect against moisture and vibration.



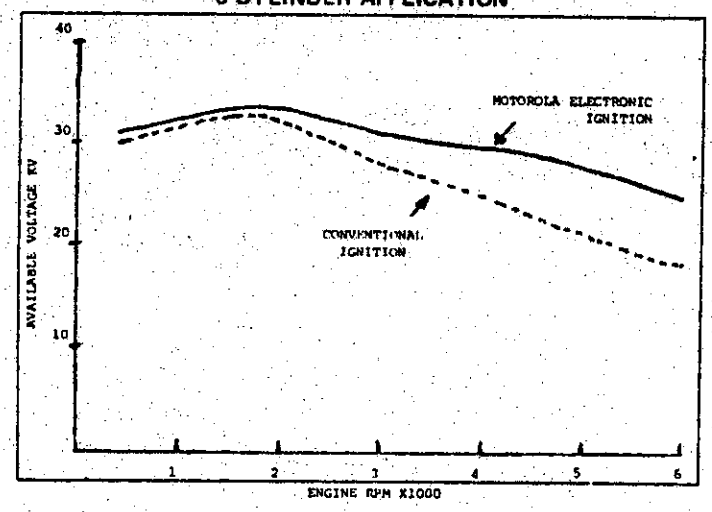
The proper sensor plate for each application is required with the 6SK2026 kit. Kit No. 6-23 shown.

Kit 6SK2026

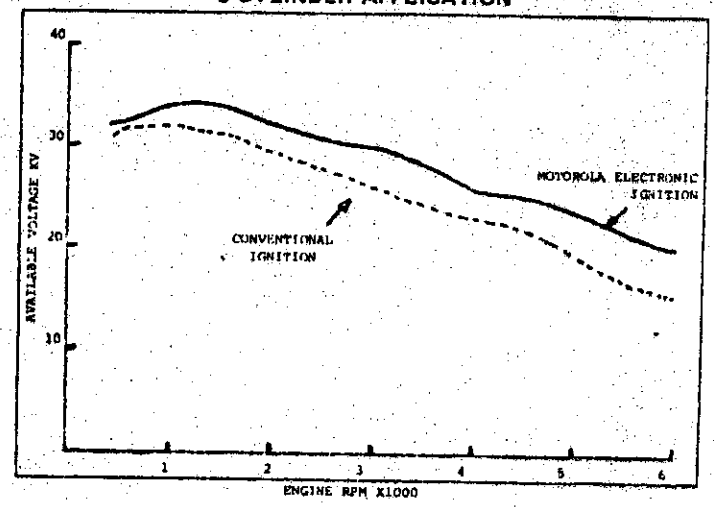


PERFORMANCE CURVES

6 CYLINDER APPLICATION



8 CYLINDER APPLICATION



TEST PARAMETER

Output voltage measured with coil secondary open.
Supply voltage 14 volts.
Coil primary resistance 1.38 ohm.
Coil primary inductance 7.3 mh.

Performance measured on techtronic type 564B oscilloscope with type P60 15 high voltage probe.

EXHIBIT A

SPECIFICATIONS

1. Current drain 8 cycle engine.
   Start – 4.5 amps @ 0 rpm
   Idle – 4.9 amps @ 100 rpm
   Run – 2.9 amps @ 3000 rpm
2. Output voltage.
   Start – 32 KV @ 100 rpm
   Run – 25 KV @ 3000 rpm
3. Rise time 40 MSEC @ 3000 rpm.
4. Spark duration 2.3 MSEC @ 3000 rpm.
5. Primary stored energy 75.5 millijoules @ 100 rpm.
6. Supply voltage 12-14 volts. Unit will operate with battery as low as 6 volts.
7. Temperature -40°F to + 260°F.

SPECIAL FEATURES

- Dwell circuitry is designed for maximum performance.
- System has radio frequency suppression. "Remove Capacitors On Coil"
- Protected for load dump and high voltage transients.
- Reverse polarity protected.
- System may be transferred to future car.
- One system operates on all 12 volt – Neg Gnd Standard Ignition Systems.

SENSOR PLATE KITS

AMERICAN MOTORS
6 Cyl. All '63 & later 6-21
8 Cyl. All 6-19

BUICK
6 Cyl. All '63 & later (except V6) 6-21
8 Cyl. All '57 & later 6-19

CADILLAC
8 Cyl. All '56 & later 6-19

CHECKER
6 Cyl. All '64 & later 6-21
8 Cyl. All 6-19

CHEVROLET
6 Cyl. All '63 & later (except Corvair) 6-21
8 Cyl. All '57 & later (except dual point) 6-19

CHRYSLER CORPORATION CARS
6 Cyl. All '62 & later 6-24
8 Cyl. All '61 & later up to 360 cu. in. and larger (except dual-point) 6-24
8 Cyl. All '61 & later 361 cu. in. and larger (except dual-point) 6-25
8 Cyl. Dual point 273, 340 cu. in. 6-27

FORD MOTOR COMPANY CARS
6 Cyl. All '56 & later (except V6) 6-23
8 Cyl. All '57 & later (except dual-point) 6-22

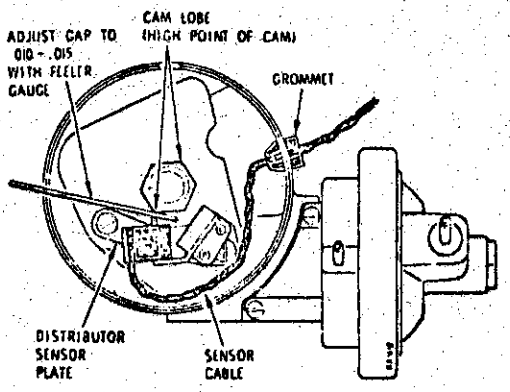
JEEP
6 Cyl. All '63 & later (except V6) 6-21
8 Cyl. All 6-19

OLDSMOBILE
6 Cyl. All '63 & later 6-21
8 Cyl. All '56 & later 6-20

PONTIAC
6 Cyl. All '63 & later 6-21
8 Cyl. All '57 & later (except 307 cu. in.) 6-20
8 Cyl. 307 cu. in. 6-19

See dealer for chart with other listings.

MAGNETIC SENSOR INSTALLATION



TOP VIEW OF DISTRIBUTOR HOUSING

1. Remove points and condenser and primary lead.
2. Install sensor plate in position of points.
3. Mount sensor on sensor plate.

MOTOROLA Automotive Products, Div. • 9401 West Grand Avenue • Franklin Park, Illinois 60131

Exhibit A

ELECTRONIC IGNITION

CONVERSION KIT SELECTION CHART

This chart provides three tables to assist you in selecting the proper Sensor Plate Kit and Electronic Ignition System Kit for a particular vehicle or ignition distributor.

- TABLE I lists proper kits by car models for U.S.A. built cars.
- TABLE II lists proper kits by car models for Foreign built cars.
- TABLE III lists proper kits by distributor.

TABLE I

MAKE OF CAR	DESCRIPTION	DISTRIBUTOR ADAPTER	DISTRIBUTOR ROTATION	BASIC INSTALL. KIT
AMERICAN MOTORS	6 Cyl. All '63 & later	6-21	CW	6SK2026
	8 Cyl. All	6-19	CW	6SK2026
BUICK	6 Cyl. All '63 & later (except V-6	6-21	CW	6SK2026
	8 Cyl. All '57 & later	6-19	CW	6SK2026
CADILLAC	8 Cyl. All '56 & later	6-19	CW	6SK2026
CHECKER	6 Cyl. All '64 & later	6-21	CW	6SK2026
	8 Cyl. All	6-19	CW	6SK2026
CHEVROLET	4 Cyl. All		CW	†
	6 Cyl. All '63 & later (except Corvair)	6-21	CW	6SK2026
	8 Cyl. All '57 & later (except dual points)	6-19	CW	6SK2026
CHRYSLER CORP.	6 Cyl. All '62 & later	6-24	CW	6SK2026
	8 Cyl. All '61 & later up to 360 cu.in. (except dual-pts.)	6-24	CW	6SK2026
	8 Cyl. All '61 & later 361 cu.in. and larger (except dual-points)	6-25	CCW	6SK2026
	8 Cyl. Dual point 273, 340 Cu. in.	6-27	CW	6SK2026
FORD MOTOR CO.	6 Cyl. All '56 & later (except V6)	6-23	CW	6SK2026
	8 Cyl. All '57 & later (except dual-point)	6-22	CCW	6SK2026
	4 Cyl. 2,000 cc engine	6-33	CW	6SK2027 & 6-32
	V6 Cyl. 2,800 cc engine	†	CW	6SK2027 & 6-32
	4 Cyl. 2,300 cc engine			
JEEP	6 Cyl. All '63 & later (except V6)	6-21	CW	6SK2026
	8 Cy. All	6-19	CW	6SK2026
OLDSMOBILE	6 Cyl. All '63 & later	6-21	CW	6SK2026
	8 Cyl. All '56 & later	6-20	CCW	6SK2026
PONTIAC	6 Cyl. All '63 & later	6-21	CW	6SK2026
	8 Cyl. All '57 & later (except 307 cu. in.)	6-20	CCW	6SK2026
	8 Cyl. 307 cu. in.	6-19	CW	6SK2026

All above cars use 6SK2026 Basic kit except 4 cyl. Ford 2,000 cc Engine and 2,800 cc Engine

If your car is not listed in this Table, refer to Table III

† = To Be Announced

12 VOLT NEG

MAKE OF CAR	MODEL YEARS	MODELS	KITS REQUIRED
ALFA-ROMEO 4 Cyl.	From '66	Spider 92 PS (Bosch)	
	From '66	2600 Berlina 130 PS Sprint	6SK2027
	From '66	Spider 145 PS	
	From '66	GT 1300 Junior (Dist. #0 231 110 044)	6–32
	From '65	Giulia Super	6–33
	From '66	Giulia Sprint 1600 GTV	
	From '66	Giulia Spider Duetto	*6–36
	From '66	1750 Berlina (Dist. #0231 110 044, and 129034)	
	From '68	Spider Veloce, GTV (Dist. #0231 110 044, and 129034)	
AUDI 4 Cyl.	From '61	Audi 60	
	'67 & '68	Audi 60L, Variant 72 (Dist. #0 231 115 068)	
	From '68	Audi 75L, 75 Variant	
	'66, 67, 68	Audi 80, 80L, Variant 80	
	From '66	Audi Super 90 (Dist. #0 231 115 067)	
	From '68	Audi 100, 100S & 100 LS	
	From '70	Audi Coupe S	
AUSTIN HEALEY 4 Cyl.	'58 through '60	Sprite (H.C.)	6SK2026
	'61 & '62	Sprite Standard Mark II	6–34
	'65 & '66	Sprite Mark III	
BMW 4 Cyl.	From '67	1600/2	
	From '68	1600 Cabriolet (Dist. #0 231 115 072)	6SK2027
	'67 & '68	1600 T1, GT	
	From '63	1800 (Dist. #0 231 114 072)	6–32
	'64 & '65	1800 T1, T1/SA (Dist. #0 231 129 026)	6–33
	From '65	2000C Automatic	*6–36
	From '66	2000 (Dist. #0 231 115 071)	
	From '68	2002 (Dist. #0 231 115 071)	
	From '68	2002 T1	
DAIMLER-BENZ 4 Cyl.	From '68	200/8, 220/8 (Dist. #0 231 115 064)	
DATSUN 4 Cyl.	'63 & '64	PL, SPL 310	
	'63 thru '69	LG 35	6SK2026
	'64 thru '69	PL 410	
	'65 thru '67	311	6–30
	'65 thru '69	PL 411, 520	
	'66 thru '69	41 Junior	

GROUND ONLY

MAKE OF CAR	MODEL YEARS	MODELS	KITS REQUIRED
FORD (ENGLISH) 4 Cyl.	'59 thru '61	Consul	6SK2026
	'61	Consul 315	
	'63 thru '66	Zephyr 4 MK111	
	'59 thru '62	Anglina, 105E, & Prefect	6–34
	'67 thru '69	1½/2 to K Series	
	'67 & '68	Zephyr 4 LC	
KARMANN GHIA 4 Cyl.	From '68	1500 (44 PS)	6SK2027
	From '67	1500 Automatic	6–32
	From '68	1600L	6–33
	From '67	1600 L Automatic	*6–36
MG 4 Cyl.	From '58	All 4 Cylinder	6SK2026 6–34
MORRIS 4 Cyl.	From '56	All except Cowley Saloon, Oxford, Hindustan (seriesII). Quarter Ton Van	
OPEL 4 Cyl.	From '67	Kadett B, 1.1 Ltr. 45 PS, 1.1 Ltr. S 55 PS, 1.1 Ltr. SR 60 PS	6SK2027
	From '68	Kadett B, 1.1 Ltr SRUS 60 PS	6–32
	From '67	Kadett B, 1.5 Ltr. S 65 PS	6–33
	'67 & '68	Kadett B, 1.5 Ltr. SUS 68 PS	
	From '67	Kadett B, 1.7 Ltr. S 75 PS	*6–36
	From '66	Kadett B Rallye (LS). 1.1 Ltr. SR 60 PS	
	From '67	Kadett B Rallye (LS) 1.9 Ltr. S 90 PS	
PORSCHE 4 Cyl.	From '65	912 (Dist. #0 231 129 031	
ROVER 4 Cyl.		All 4 Cyl. models that use Lucas 423–153 points	6SK2026 6–34
SAAB 4 Cyl.	From '66	95 V 4, 96 V4	6SK2027 6–32 6–33 *6–36
SUNBEAM 4 Cyl.	From '57	All 4 Cyl.	6SK2026 6–34
TOYOTA 4 Cyl.	From '67	Corolla	6SK2027 6–31 6–32
	From '72	Corona, Corona Mark II	
TRIUMPH 4 Cyl.	From '58	All 4 Cyl. Except Spitfire	6SK2026 6–34
VOLKSWAGEN	From '67	All Models using Bosch #1 237 013 044,063, 065, or 066 points	6SK2027 6–32 6–33 *6–36

*If distributor is not equipped with Bosch Rotor 1234 332 074, either order this rotor from Dealer, or obtain Motorola Rotor Kit 6–36, or alter existing rotor as instructed by the Instruction sheet packaged with the 6–33 Distributor Kit. (Note – 6-32 is a Sensor Only.)

Exhibit A

TABLE III - 12 VOLT NEGATIVE GROUND ONLY

DISTRIBUTOR MAKE	DIST. PART NO. or PART NO. OF POINTS	NO. OF CYL.	DIST. ROTATION	BASIC KIT NO.	DIST. KIT NO.	ADDITIONAL KITS
BOSCH	1 237 013 044, 1 237 013 051, 1 237 013 057, 1 237 013 058, 1 237 013 063, 1 237 013 065, 1 237 013 066, 1 237 013 067, 1 237 013 068	4	CW	6SK2027	6-33	6-32 *6-36
CHRYSLER/ PRESTOLITE	2098244, 1838643, 2098057	6 & 8	CW	6SK2026	6-24	NONE
	2098244. 1838643. 2098057	6	CCW	6SK2026	6-25	NONE
DELCO/REMY		4				†
	D-108P, 1954557	6	CW	6SK2026	6-21	NONE
		6	CCW			†
	D-106P, PS, 1931988, 1948671, 1949838, 1966289	8	CW	6SK2026	6-19	NONE
	D-106P, PS, 1931988, 1948671, 1949838, 1966289	8	CCW	6SK2026	6-20	NONE
DENSO (TOYOTA)	19145-41010, 19145-41020	4	CW	6SK2027	6-31	6-32
FEMSA (Series DF4)	All	4	CW	6SK2026	6-35	NONE
FORD/BOSCH	464.163 D1F2-12171A DP-124. D2RY 121, 74HF12100LA	4	CW	6SK2027	6-33	6-32 *6-36
	74TF - 12100MA	6	CW	6SK2027	6-41	6-32 *6-42
FORD/MOTORCRAFT	D4ZF12127DA, 7RA12171, FAA12171A, C9A2-12171B, C3D2-12171A,DP3,7,70	6	CW	6SK2026	6-23	NONE
		4				†
	FAB-12171B, FAB-12171A	8	CCW	6SK2026	6-22	NONE
HITACHI (DATSUN)	22145-71301, 22145-18005	4	CCW	6SK2026	6-30	NONE
HOLLEY	433142-C91	8	CW	6SK2026	6-26	NONE
LUCAS	54413568, 423 153 54419946	4	CCW	6SK2026	6-34	NONE
MALLORY	YL-512DV, D1JJ-12100B	8	CCW	6SK2026	6-37	NONE
OPEL/BOSCH	RP1212.007, 1612011, 1212007	4	CW	6SK2027	6-33	6-32 *6-36
VW/BOSCH	311.998.063, 111.998.063	4	CW	6SK2027	6-33	6-32 *6-36

*If distributor is not equipped with Bosch Rotor 1234 332 074, either order this rotor from Dealer, or obtain Motorola Rotor Kit 6-36, or alter existing rotor as instructed by the instruction sheet packaged with the 6-33 Distributor Kit (For Bosch Rotor 1234332197 Use Motorola Rotor Kit 6-42) † = To Be Announced

INSTRUCTIONS FOR USING TABLE III

1. Determine distributor make.
2. Determine distributor part number or point set part number.
3. Check the number of cylinders.
4. Determine whether rotation of distributor is clockwise or counter-clockwise as viewed from top of rotor. Rotation can be determined by either A) cranking engine and observing movement of rotor, or B) twisting rotor which will turn approximately 15 degrees in the direction of rotation and then spring back.
5. Select proper Motorola kits from Table.

MOTOROLA Automotive Products, Div. • 9401 West Grand Avenue • Franklin Park, Illinois 60131

Exhibit A

MOTOROLA INC.

August 6, 1975

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

Dear Mr. Kenney:

At this time we wish to add two more applications to our submission for exemption for our electronic ignition (model 6SK2026). These two applications are the Ford 8-cylinder - 1957 and later single point, and the Ford 6-cylinder 1968 and later. These applications are our kit numbers 6-22 and 6-23 respectively.

Earlier testing done at our laboratory showed that these applications did not fall within your 4^{o} retard limit. However, upon further investigation, it was found that our lab distributors were no longer within manufacturer's calibration. At this point, new distributors were purchased and one other distributor was removed from a vehicle and tested. All of these were found to be within your 4^{o} retard limit. (See enclosed data.)

At the time of our first submission, your laboratory tested our system on a Ford distributor and found the results to be unsatisfactory. This does not agree with data taken in our laboratory. For this reason, I am planning on bringing the above mentioned distributors with me when I visit your laboratory during the week of August 19 to help clear up this correlation problem.

We discussed this matter in our telephone conversation of July 29 and we agreed that this would be in order.

If you or your staff have any further questions or require any samples, please do not hesitate to contact me. I will be looking forward to visiting your facility in the upcoming weeks and hope that we will be able to clear up this matter.

Thank you.

Sincerely,

Myles H. Kitchen
Electrical Engineer

MHK:jc

Exhibit A

MOTOROLA INC.

August 27, 1975

Mr. Mitchell Luczynski
Engineer
State of California
Air Resources Board
9528 Telstar Avenue
El Monte, California 91731

Dear Mitch:

As you required, I am writing you to clarify some of the points we discussed during my recent visit to your facility. These include:

1) Electrical connection of the module - Because the high performance connection (see figure 3 of the installation instructions) provides higher levels of spark energy as compared to our standard connection, we are revising the instruction sheet to include only the high performance connection. We will no longer terminate the blue and red leads with a single ring terminal. They will each have separate terminals to accomplish this installation. Existing stock will be re-worked and a suffix "A" will be added to the model number of the basic kits. This means all 6SK2026A and 6SK2027A ignition kits will comply with your request.

2) Our current request for exemption asks for all Ford 6 and 8 cylinder applications from 1957 through 1974. We will limit this application on our conversion kit selection chart to model years 1972 - 1974 due to the type of breaker plate used these distributors. The test done in your laboratory demonstrates our ability to perform on this type of distributor. Any other distributor applications listed in our chart; but not applied for exemption (such as Chrysler) will be clearly marked, indicating that they do not comply with California requirements.

3) The Motorola 6SK2026A and 6SK2027A is electrically compatible with the Dana Retronox speed sensor. A Dana Retronox device has been tested in our laboratory in conjunction with the 6SK2026A without failure.

I hope this will clear up the issues we discussed. If you have any further questions or require any further correspondence from myself, please contact me directly so I can respond as quickly as possible. We are understandably very anxious to reach the California marketplace with our product just as soon as possible. Any steps you can take to help us minimize any delays will certainly be appreciated.

Let me once again express my sincerest thanks to yourself, Dick Kenney, Rod Summerfield and the rest of the staff for the cooperation and help I was given while visiting your facility. It certainly made my visit enjoyable as well as informative. I will certainly keep in touch to keep track of our progress.

Sincerely,

Myles H. Kitchen
Electrical Engineer

MHK:jc

EXHIBIT A

MOTOROLA INC.

October 2, 1975

Mr. Mitchell Luczynski
Engineer
State of California
Air Resources Board
9528 Telstar Avenue
El Monte, California 91731

Dear Mitch:

I am writing to confirm our telephone conversation of September 30, 1975, regarding our request for exemption on General Motors' 6-cylinder distributors (clockwise rotation). We will agree to remove this application from our request as there may be cases where we cannot comply with the 4° retard limit. This means that our distributor adapter kit #6-21 should be excluded from the list of applications on my letter of June 26, 1975. As of this date our list of applications should be as follows:

	KIT #
General Motors CCW V8	6-20
General Motors CW V8	6-19
Ford 6 (1972 - 1974)	6-23
Ford 8 (1972 - 1974)	6-22
Holley 8 (I.H.C.)	6-26
Hitachi (Datsun) 4	6-30
Denso (Toyota) 4	6-31
Bosch 4	6-33
Bosch 6	6-41
Lucas 4	6-34
Femsa 4	6-35

These distributor adapter kits are used in conjunction with the basic ignition kits, 6SK2026A and 6SK2027A (as described in my letter of August 27, 1975.) If there are any further questions, please contact me immediately as we are quite anxious to resolve this matter.

Thank you.

Sincerely,

Myles H. Kitchen
Electrical Engineer

MHK:jc

INSTALLATION INSTRUCTIONS FOR

MODEL 6SK2026 AND 6SK2027 ELECTRONIC IGNITION SYSTEMS

FOR 12 VOLT NEGATIVE GROUND INSTALLATIONS

GENERAL

Your Motorola Electronic Ignition system converts the conventional electro-mechanical system to an electronic ignition system in cars that have a 12-volt negative ground electrical system. All parts needed to convert to the Motorola Electronic Ignition System, except distributor sensor plate for the distributor, are provided in this package.

A distributor sensor plate with mounting instructions is available for most makes of cars. Your dealer has a complete listing to assist you in selecting the proper one.

An electronic ignition system, just as a conventional ignition system, performs at optimum efficiency when the spark plugs are in good condition. Therefore, the spark plugs should be checked if there is any doubt about their condition. At the same time, also inspect the distributor rotor, distributor cap, and the ignition wires. We recommand that you replace the ignition wires if they are more than two years old. Should the spark plugs need cleaning and regapping, regap them according to the engine manufacturer's specification. Another important requirement for top ignition performance is that the engine timing is set to the engine manufacturer's specification (see TIMING CHECK).

This electronic ignition system can be easily removed and reinstalled in another car. The only additional part that will be needed is a distributor sensor plate kit designed for that car. When installing this electronic ignition system, it is advisable to save the parts removed from the car so that, should you decide to trade in your car at a later date, you can remove the electronic ignition system and convert the car back to the conventional ignition system.

AMPLIFIER INSTALLATION (Figure 1)

1. Disconnect the battery ground cable from battery.

2. Select a well-ventilated surface for mounting the amplifier. The spot should be located away from the radiator and manifold hear. Mounting on one of the front fender splash panels is preferred. Although the unit may be mounted in any position, the position with the wires facing down is preferred.

3. Using the amplifier as a template, drill 0.193" diameter holes (#10 drill bit), then fasten down with the #14 sheet metal screws and lockwashers.

Part No. 68P44801A96-0

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To insure proper alignment, drill holes and install screws one at a time. If mounting surface is of a plastic material, use the three spring nuts provided to hold screws in place.

SENSOR INSTALLATION

Install sensor as outlined by the instructions packaged with the Distributor Sensor Plate Kit.

WIRING INSTRUCTIONS (Figure 2)

1. Route wires from amplifier to the ignition coil and distributor as indicated by the hook-up diagram in Figure 2. Route wires along existing harness wherever possible. Use cable straps and wire clamp provided where necessary. Keep wires away from points of high heat, ignition wires, antenna leads, and moving parts.

2. Check the ignition coil and note the type connector attaching the primary wire (wires) to positive terminal (marked either "+" or "BAT"). If the connector is a push-on type, cut connector from wire. Then strip 1/4" of insullation from wire, crimp on a ring terminal and fasten to positive terminal with #10-32 nut. In instances where there were two wires attached to the push-on connector, crimp a ring terminal to each wire. (Ring terminals and 10-32 nuts for this purpose are provided in the Distributor Sensor Plate Kit).

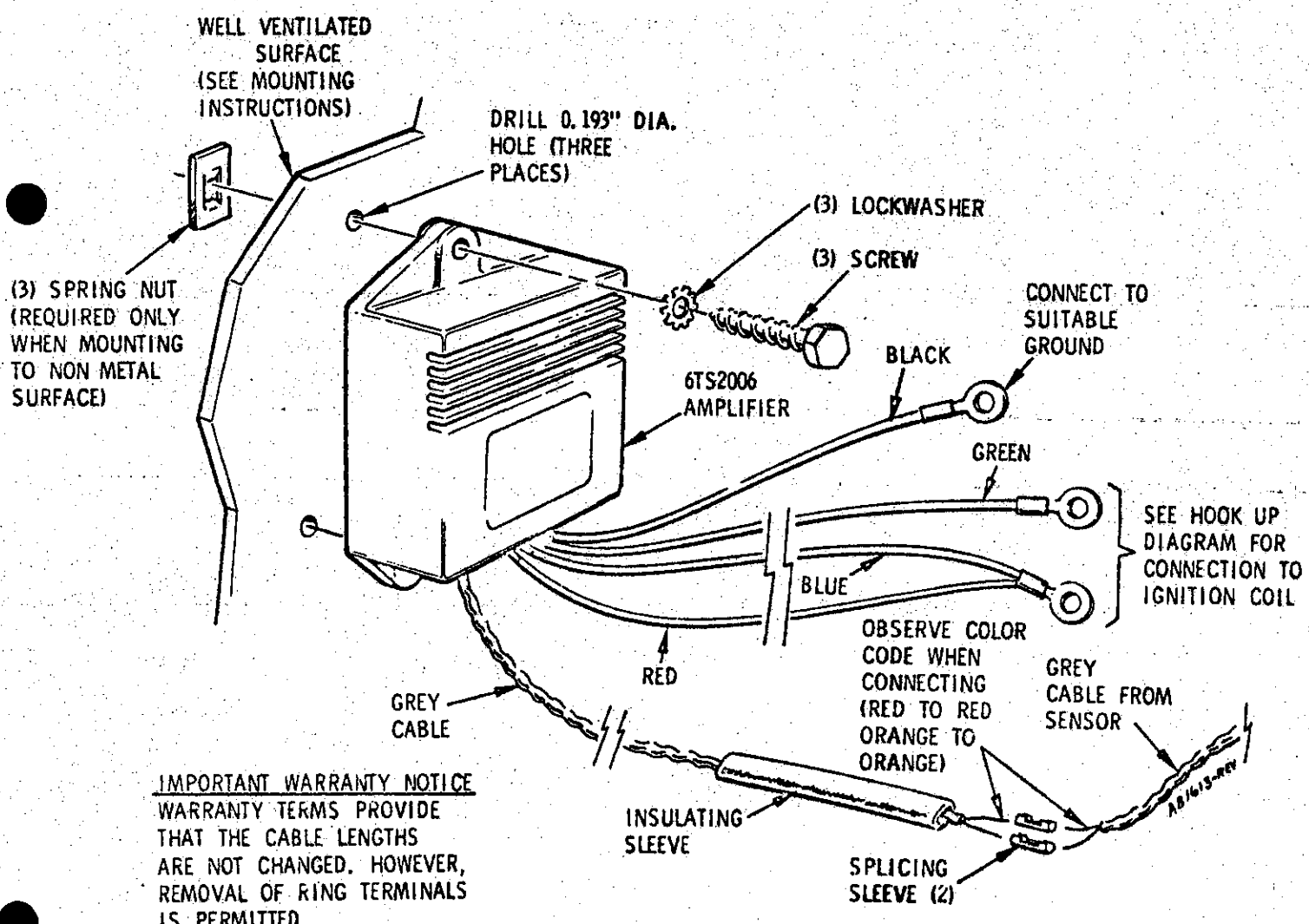


FIGURE 1

3. Connect blue/red wire to positive terminal (marked either "+" or "BAT") of ignition coil. Connect green wire to negative terminal (marked either "-" or "DIST") of ignition coil. See Figure 2. For high performance applications, see Figure 3. A special high performance coil is available for either hook up. See your dealer for more information.

4. Connect black wire to an existing bolt that is grounded to vehicle. If amplifier is mounted on metal panel or surface that provides good ground, the black wire can be connected to one of the amplifier mounting screws. See Figure 1.

5. Connect grey amplifier cable to grey sensor cable from distributor as follows: Slip 4" long black insulating sleeve over one of the cables, then splice red wire to red wire and orange wire to orange wire with yellow splicing sleeves provided. Use ordinary pliers to crimp sleeves. Cover spliced connections with 4" long black insulating sleeve. (Wires can also be connected by soldering and taping.) Check connections by gently pulling cables.

6. Reconnect battery cable.

7. Start engine. If engine does not start, check that:

   a) All connections make good contact,

   b) Rotor has been reinstalled,

   c) Sensor wires were not connected in reverse,

   d) High tension wires fit tight into distributor cap,

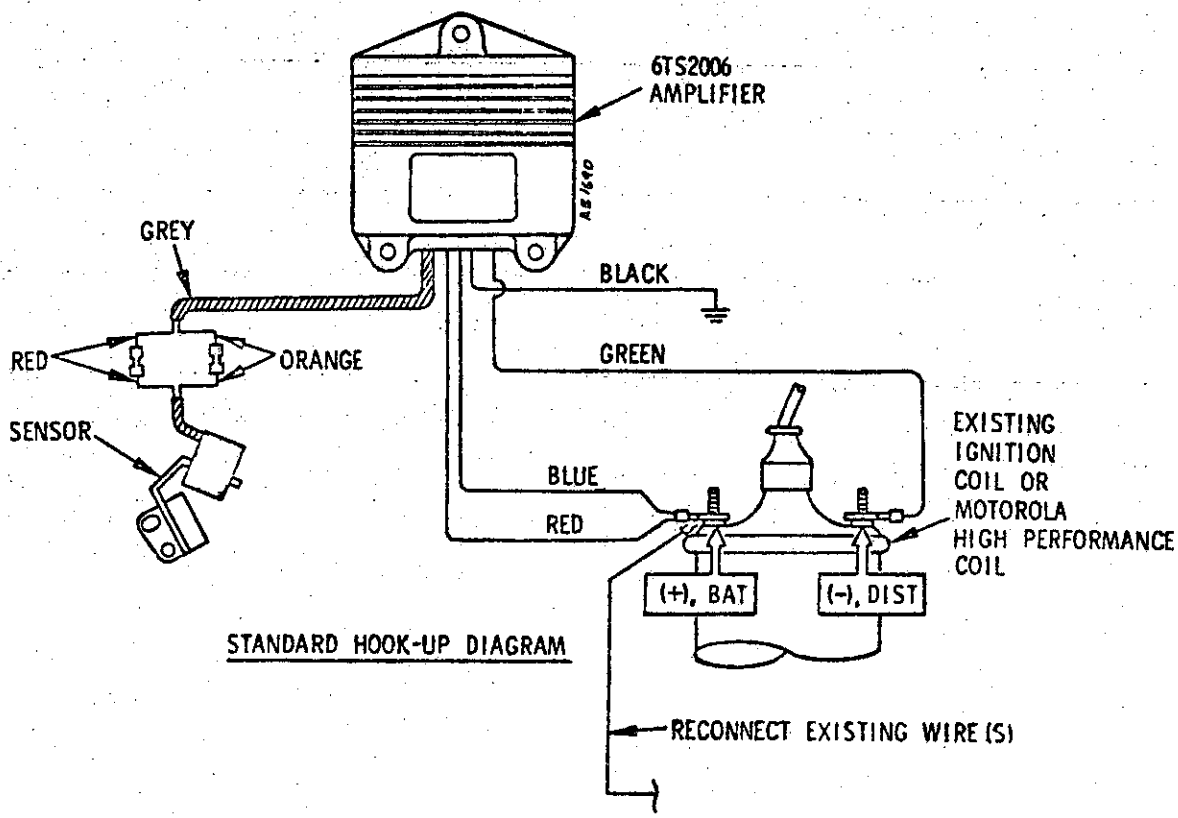


FIGURE 2

continued on back page

e) Green and blue/red wires from amplifier are connected to proper terminals on ignition coil,

f) Wire from ignition switch is connected to positive terminal (marked either "+" or "BAT") of coil.

REPLACEMENT PARTS

DESCRIPTION	MOTOROLA PART NO.
Sensor for 6SK2026 Ignition Kit (Model 6SM2005)	6-29
Sensor for 6SK2027 Ignition Kit (Model 6SM2008)	6-32
Amplifier for 6SK2026 or 6SK2027 Ignition Kit (Model 6TS2006)	6-28

TIMING CHECK

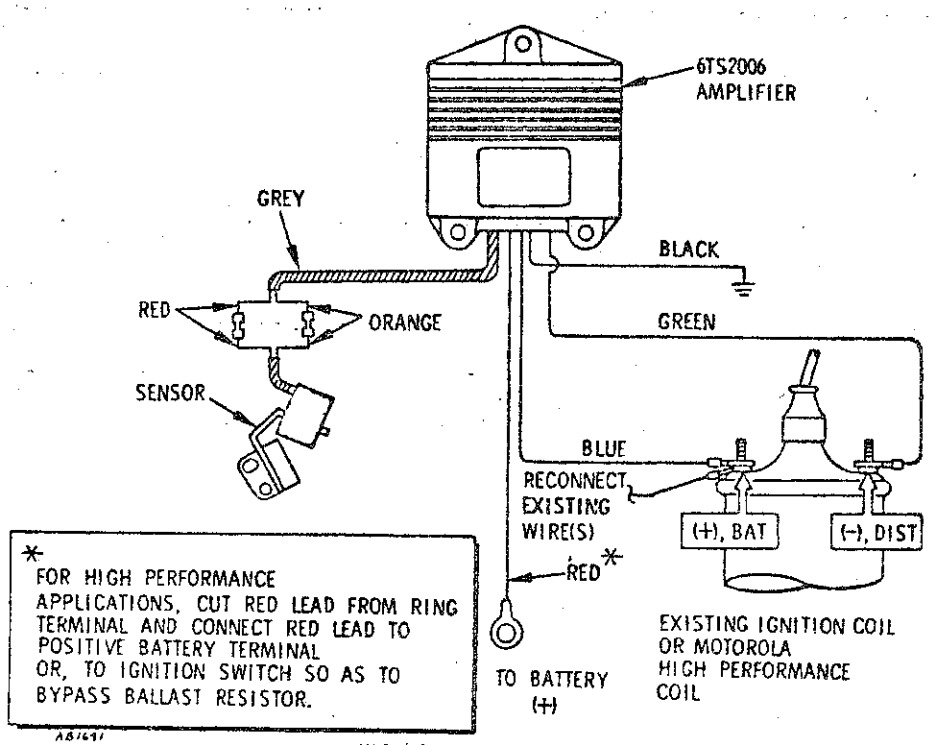
Check timing as instructed in engine manual.

Since dwell in the Motorola Electronic Ignition System is electronically preset at the factory and cannot be adjusted mechanically as in a breaker point ignition system, a dwell meter is not necessary for the timing check or for tune ups. A dwell meter reading taken of a Motorola Electronic Ignition system will differ from a reading taken of a breaker point ignition system and does not indicate improper or erratic dwell. Adjusting the sensor gap has no effect on dwell.

IMPORTANT: Engine must be timed properly for efficient operation. However, once the engine is timed properly, it never needs to be re-set unless the distributor is loosened or removed from engine.

TACHOMETERS

Your Motorola Electronic Ignition system is compatible with most popular tachometers. Simply, connect tachometer according to manufacturer's installation instructions.



HIGH PERFORMANCE HOOK-UP DIAGRAM

FIGURE 3

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INSTALLATION INSTRUCTIONS FOR MODEL 6–19 OR 6–20 DISTRIBUTOR SENSOR PLATE

IMPORTANT: Before starting the following installation, read the installation instructions provided with the 6SK2026 Electronic Ignition System Kit.

NOTE: In many cars, it will be easier to install the sensor plate into the distributor with the distributor removed from the engine block.

A. REMOVE DISTRIBUTOR

1. Disconnect the battery ground cable from battery.
2. Disconnect point wire from ignition coil.
3. Detach vacuum hose from distributor.
4. Remove distributor cap.
5. Mark position of rotor in relation to distributor housing.
6. Mark position of distributor housing in relation to engine block.
7. Remove bolt and clamp holding distributor to engine block.
8. Remove distributor from engine block.

CAUTION: DO NOT CRANK ENGINE WHILE DISTRIBUTOR IS OUT OF ENGINE BLOCK.

B. INSTALL DISTRIBUTOR SENSOR PLATE

1. Remove rotor.
2. Push point wire grommet upwards into distributor. (If installation is being made with distributor in engine block, it may be difficult to remove grommet. In this case, the grommet can be left inside the distributor since it will not interfere with the operation of the distributor.) Remove radio shield and cam oiler if they are part of the distributor assembly. Then remove the distributor points, the condenser, and point wire from distributor. Save hold-down screws.

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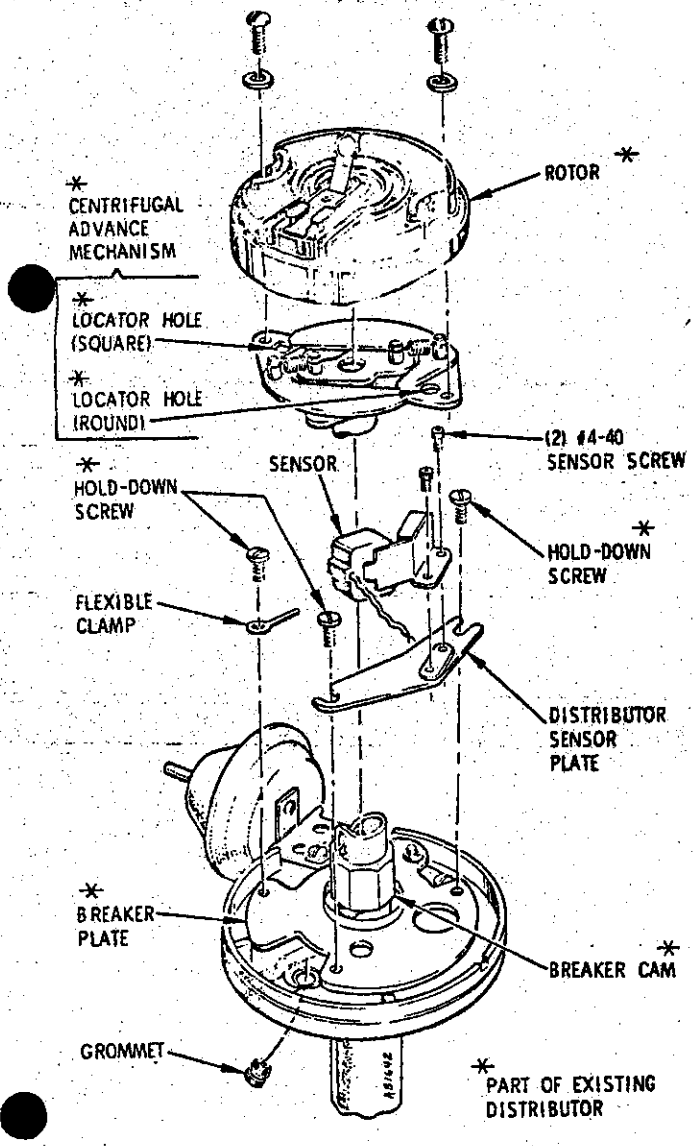
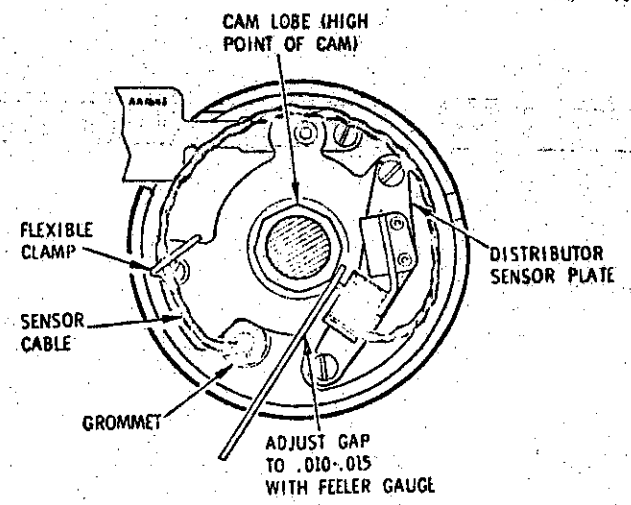


CLOCKWISE (CW) DISTRIBUTOR

FIGURE 1



TOP VIEW OF DISTRIBUTOR HOUSING (CLOCKWISE ROTATION - CW)

FIGURE 2

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INSTALLATION INSTRUCTIONS FOR MODEL 6-21 DISTRIBUTOR SENSOR PLATE

IMPORTANT: Before starting the following installation, read the installation instructions provided with the 6SK2026 Electronic Ignition System Kit.

1. Disconnect the battery ground cable from battery.
2. Remove distributor cap and rotor.
3. Disconnect point wire from ignition coil; remove the distributor points, the condenser and point wire, and the grommet from the distributor housing. See Figure 1 to remove grommet. (Save hold-down screw and grommet.)
4. Securely mount distributor sensor plate to distributor breaker plate at existing breaker point mounting hole with the 8-32 flat head screw from this kit. (Figure 1)
5. Mount sensor (part of 6SK2026 Kit) to distributor sensor plate with two #4-40 sensor screws. Tighten sensor screws only enough to keep the sensor in position.
6. Adjust gap between sensor and cam lobe (high point of cam) to .010 - .015 using feeler gauge, and tighten sensor screws securely (Figure 2).
7. Attach flexible clamp to condenser mounting hole in breaker plate with hold-down screw. Route sensor cable (grey) as indicated in Figure 2. Hook flexible clamp around sensor cable to hold cable away from cam. Insert sensor cable into grommet and reinstall grommet to distributor housing, being sure to allow enough slack in cable to account for vacuum movement of breaker plate.
8. Reinstall rotor and distributor cap.
9. Complete the installation as outlined in the installation instructions provided with the 6SK2026 Kit.

NOTE: this kit contains one extra #4-40 sensor screw and one extra splicing sleeve.

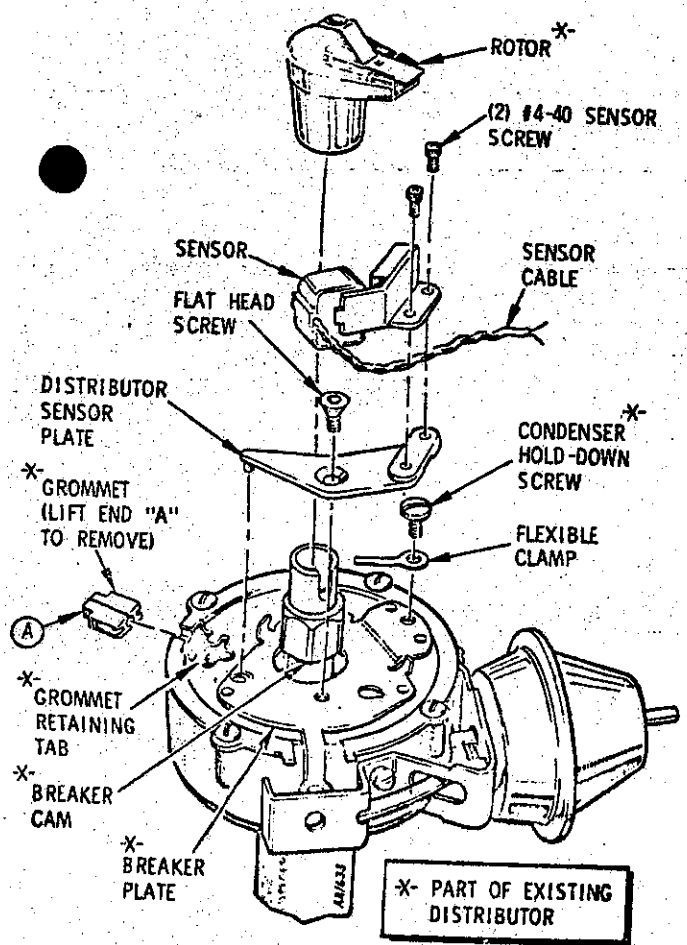

FIGURE 1

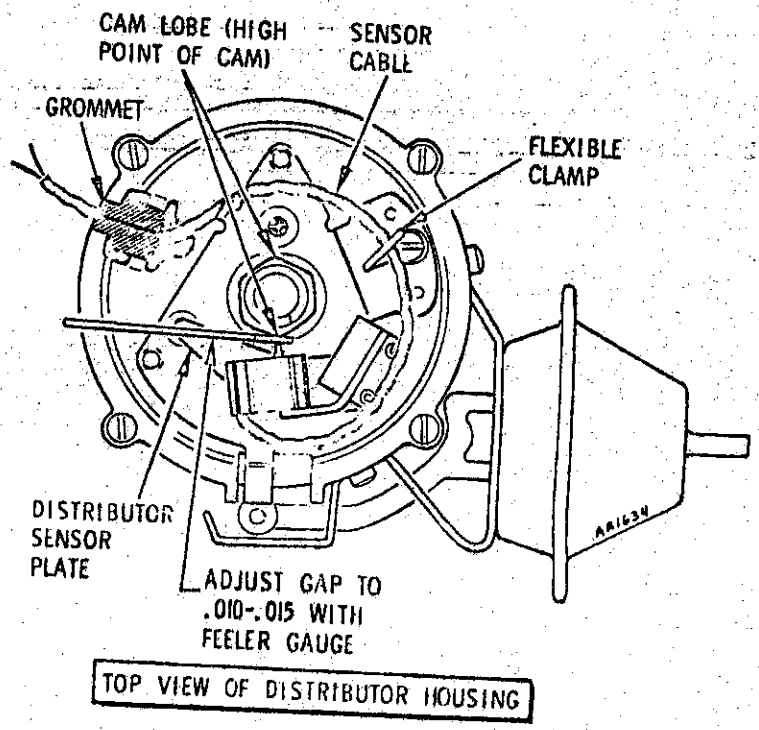

FIGURE 2

Part No. 68P44801A89-0

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MOTOROLA®

INSTALLATION INSTRUCTIONS FOR MODEL 6–22 DISTRIBUTOR SENSOR PLATE

IMPORTANT: Before starting the following installation, read the installation instructions provided with the 6SK2026 Electronic Ignition System Kit.

1. Disconnect the battery ground cable from battery.
2. Remove distributor cap and rotor.
3. Disconnect point wire from ignition coil; remove the distributor points, the condenser and point wire from the distributor. (Save two hold-down screws.)
4. Securely mount distributor sensor plate to distributor breaker plate, using existing breaker point mounting holes, with one of the hold-down screws and the flat head screw from this kit. (Figure 1)
5. Mount sensor (part of 6SK2026 Kit) to distributor sensor plate with two #4–40 sensor screws. Tighten sensor screws only enough to keep the sensor in position.
6. Adjust gap between sensor and cam lobe (high point) to .010 – .015 using feeler gauge, and tighten sensor screws securely (Figure 2).
7. Attach flexible clamp to condenser threaded mounting hole in breaker plate with second hold-down screw. Route sensor cable (grey) as indicated in Figure 2, and slip through hole inside of distributor housing. Hook flexible clamp around sensor cable to hold cable away from cam. Then install split grommet around sensor cable and into hole, being sure to allow enough slack in cable to account for vacuum movement of breaker plate.
8. Reinstall rotor and distributor cap.
9. Complete the installation as outlined in the installation instructions provided with the 6SK2026 Kit.

NOTE: this kit contains one extra #4-40 sensor screw and one extra splicing sleeve.

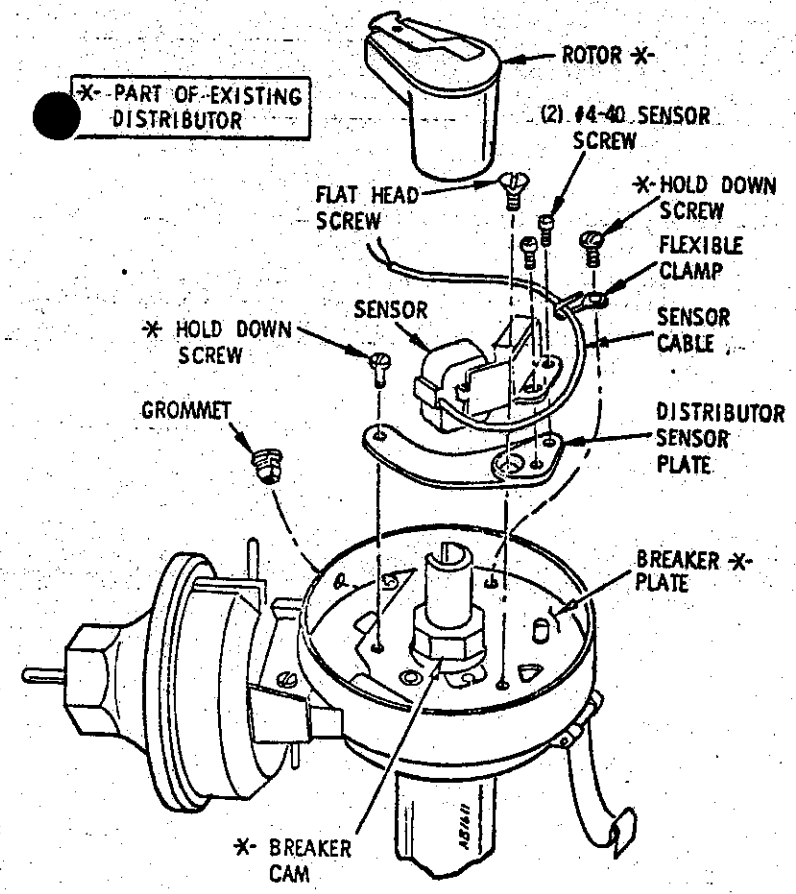
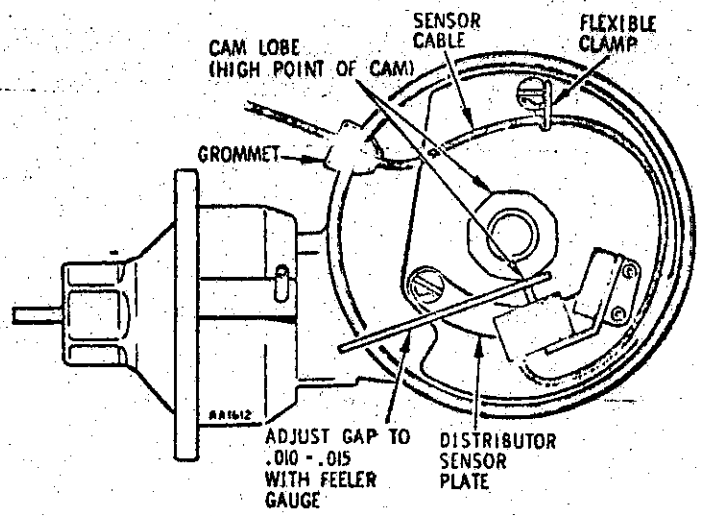


FIGURE 1



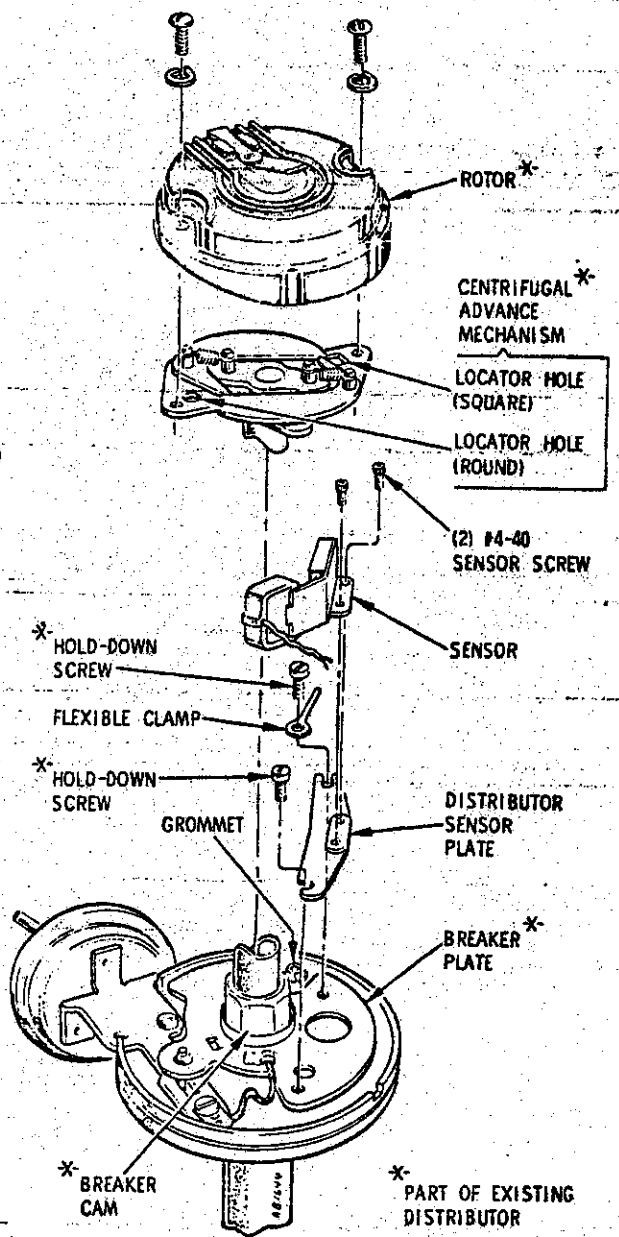
TOP VIEW OF DISTRIBUTOR HOUSING

FIGURE 2

3. Securely mount distributor sensor plate to distributor breaker plate with hold-down screws, using existing mounting holes. Install flexible clamp as indicated by applicable illustration. Refer to Figures 1 and 2 for CW distributors, and Figures 3 and 4 for CCW distributors.

4. Mount sensor (part of 6SK2026 kit) to distributor sensor plate with two #4-40 sensor screws. Tighten sensor screws only enough to keep the sensor in position.

5. Adjust gap between sensor and cam lobe (high point) to .010 – .015 using feeler gauge, then tighten sensor screws securely.



COUNTER-CLOCKWISE (CCW) DISTRIBUTOR

FIGURE 3

6. Route sensor cable (grey) as indicated. (Figure 2 for CW distributor or Figure 4 for CCW distributor) Slip cable through hole in base of distributor housing and fit split grommet around sensor cable. Then insert grommet into hole from underneath distributor housing, being sure to allow enough slack in sensor cable to account for vacuum movement of breaker plate. Hook flexible clamp around sensor cable to hold sensor cable away from cam.

C. REINSTALL DISTRIBUTOR

1. Reattach rotor.

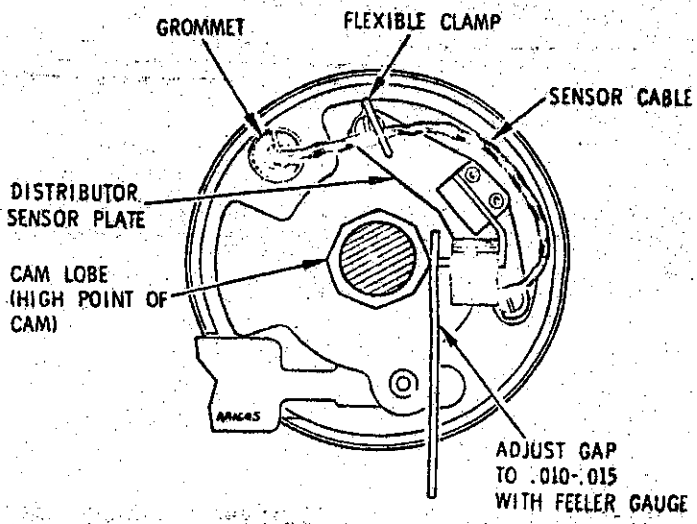
2. Align mark on rotor with mark on distributor housing.

3. While holding rotor to distributor alignment, insert distributor base into engine block so that mark on distributor housing lines up with mark on engine block. Use a slight twisting motion while inserting distributor base to align gears. The marks on rotor, distributor housing, and engine block should line up as they did before removal.

4. Reinstall distributor cap and vacuum hose.

5. Complete the installation as outlined in the installation instructions provided with the 6SK2026 Kit.

NOTE: This kit contains an extra #4-40 sensor screw and an extra splicing sleeve.



TOP VIEW OF DISTRIBUTOR HOUSING (COUNTER-CLOCKWISE ROTATION - CCW).

FIGURE 4

MOTOROLA®

INSTALLATION INSTRUCTIONS FOR MODEL 6–23 DISTRIBUTOR SENSOR PLATE

IMPORTANT: Before starting the following installation, read the installation instructions provided with the 6SK2026 Electronic Ignition System Kit.

1. Disconnect the battery ground cable from battery.
2. Remove distributor cap and rotor.
3. Disconnect point wire from ignition coil; remove the distributor points, the condenser and point wire from the distributor. (Save one hold-down screw.)
4. Securely mount distributor sensor plate to distributor breaker plate, using existing breaker point mounting holes, with one of the hold-down screws and the flat head screw from this kit. (Figure 1)
5. Mount sensor (part of 6SK2026 Kit) to distributor sensor plate with two #4-40 sensor screws. Tighten sensor screws only enough to keep the sensor in position.
6. Adjust gap between sensor and cam lob (high point) to .010 – .015 using feeler gauge, then tighten sensor screws securely.
7. Route sensor cable (grey) as indicated in Figure 2, and slip cable through hole in side of distributor housing. Then install split grommet around sensor cable and into hole, being sure to allow enough slack in cable to account for vacuum movement of breaker plate.
8. Reinstall rotor and distributor cap.
9. Complete the installation as outlined in the installation instructions provided with the 6SK2026.

NOTE: this kit contains one extra #4-40 sensor screw and one extra splicing sleeve.

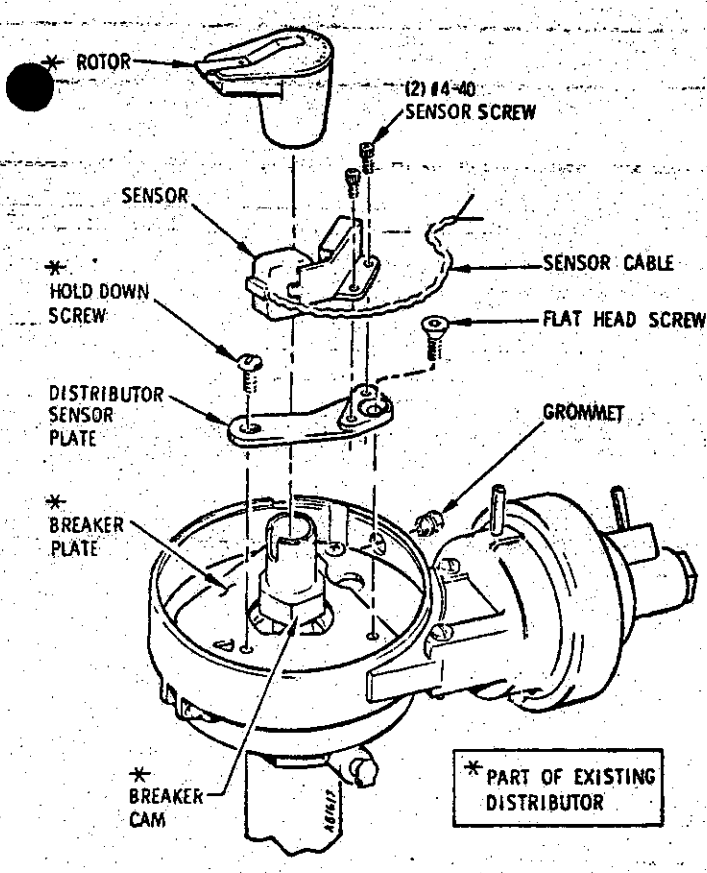
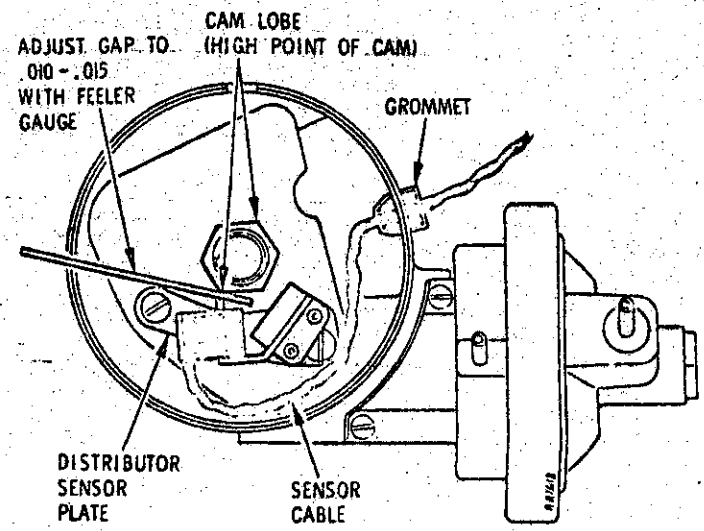


FIGURE 1



TOP VIEW OF DISTRIBUTOR HOUSING

FIGURE 2

MOTOROLA®

INSTALLATION INSTRUCTIONS FOR MODEL 6 – 24 OR 6 – 25 DISTRIBUTOR SENSOR PLATE

IMPORTANT: Before starting the following installation, read the installation instructions provided with the 6SK2026 Electronic Ignition System Kit.

1. Disconnect the battery ground cable from battery.
2. Remove distributor cap and rotor.
3. Disconnect point wire from ignition coil; remove the distributor points, the condenser and point wire from the distributor. (Save one hold-down screw.)
4. Position distributor sensor plate over locating pin on distributor breaker plate and secure with the flat head screw from this kit (Figure 1).
5. Mount sensor (part of 6SK2026 Kit) to distributor sensor plate with two #4-40 sensor screws. (Note: Top of sensor will be at a higher lever than top of cam.) Tighten sensor screws only enough to keep sensor in position.
6. Adjust gap between sensor and cam lobe (high point) to .010 – .015 using feeler gauge and tighten sensor screws securely (Figure 2).
7. Route sensor cable (grey) as indicated in Figure 2, and slip cable through hole in side of distributor housing. Install split grommet around sensor cable and fit grommet into hole from inside of distributor housing.
   NOTE: Some installations require a flexible clamp as indicated in Figures 1 and 2. For these installations, attach flexible clamp to existing threaded mounting hole in breaker plate with the hold-down screw. Then hook flexible clamp around sensor cable to hold cable away from cam, being sure to allow enough slack in cable to account for vacuum movement of breaker plate.
8. Reinstall rotor and distributor cap.
9. Complete the installation as outlined in the Installation instructions provided with the 6SK2026 Kit.
   NOTE: This kit contains one extra #4-40 sensor screw and one extra splicing sleeve.

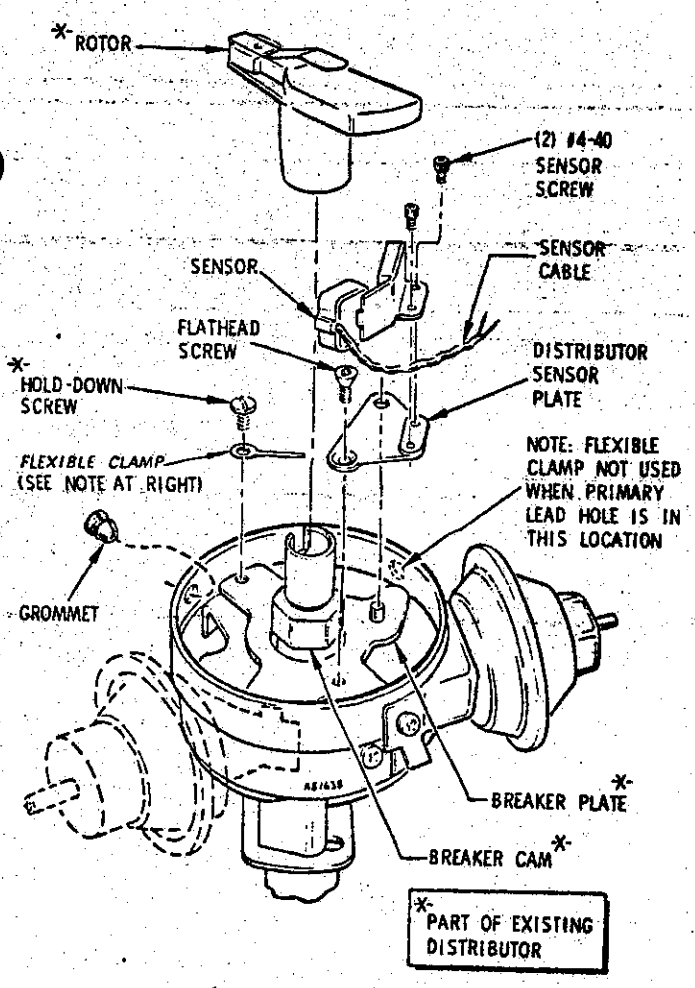


FIGURE 1

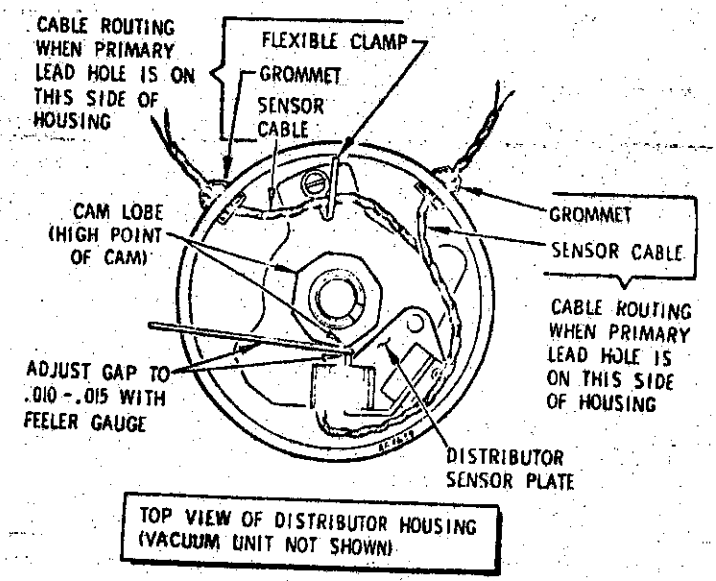


FIGURE 2

MOTOROLA®

INSTALLATION INSTRUCTIONS FOR MODEL 6–27 DISTRIBUTOR SENSOR PLATE

1. Disconnect the battery ground cable from battery.
2. Remove distributor cap and rotor.
3. Disconnect point wire from ignition coil; remove distributor points, the condenser and point wire from the distributor. (Save two-hold down screws.
4. Securely mount distributor sensor plate to existing mounting holes in distributor breaker plate, using one of the hold-down screws and the flat head screw from this kit (Figure 1).
5. Mount sensor (part of 6SK2026 Kit) to distributor sensor plate with two #4-40 sensor screws. (Note: Top of sensor will be at a higher level than top of cam.) Tighten sensor screws only enough to keep sensor in position.
6. Adjust gap between sensor and cam lobe (high point) to .010 – .015 using feeler gauge, and tighten sensor screws securely (Figure 2).
7. Attach flexible clamp to existing threaded mounting hole in breaker plate with second hold-down screw. Route sensor cable (grey) as indicated in Figure 2, and slip cable through hole in side of distributor housing. Hook flexible clamp around sensor cable to hold cable away from cam. Then install split grommet around sensor cable and fit grommet into hole from inside of distributor housing. Be sure to allow enough slack in cable to account for vacuum movement of breaker plate.
8. Reinstall rotor and distributor cap.
9. Complete the installation as outlined in the installation instructions provided with the 6SK2026 Kit.

NOTE: This kit contains one extra #4-40 sensor screw and one extra splicing sleeve.

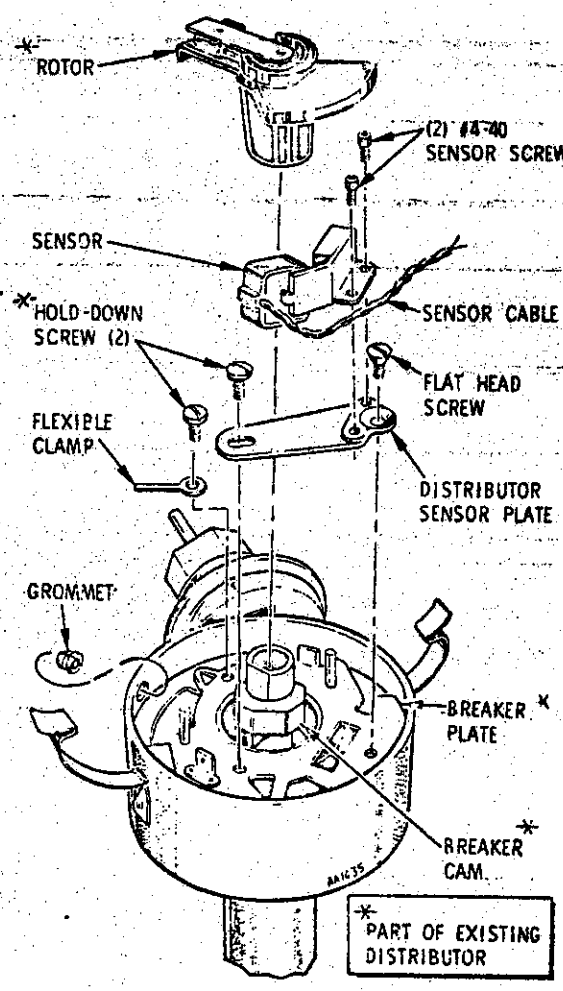


FIGURE 1

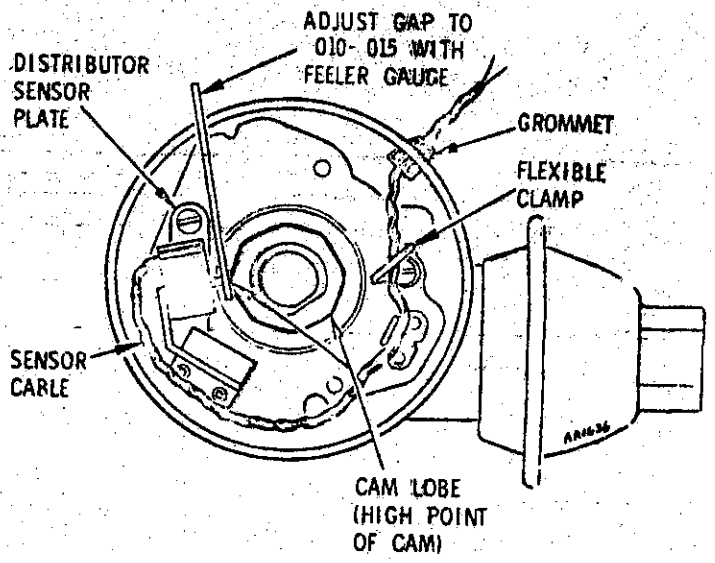


FIGURE 2

State of California
AIR RESOURCES BOARD

EXECUTIVE ORDER D-69-7
Relating to Exemptions Under Section 27156
of the Vehicle Code

CONDENSATOR, INC.
THE CONDENSATOR MODEL DX DEVICE

Pursuant to the authority vested in the Air Resources Board (ARB) by Section 27156 of the Vehicle Code; and

Pursuant to the authority vested in the undersigned by Sections 39515 and 39516 of the Health and Safety Code and Executive Order G-45-5;

IT IS ORDERED AND RESOLVED: That the installation of the Condensator Model DX device, manufactured by Condensator, Inc., of 433 Bull River Road, Noxon, Montana, 59853-9707, and marketed by Crankcase Management Systems, Inc., of 1825 Sussex Street, Lafayette, Colorado, 80026, has been found not to reduce the effectiveness of the applicable vehicle pollution control system and, therefore, is exempt from the prohibitions of Section 27156 of the Vehicle Code for 1993 and older model-year diesel fueled vehicles with engine displacements greater than 3.2 liters.

This Executive Order is valid provided the installation instructions for this Condensator Model DX device, will not recommend tuning the vehicle to specifications different from those submitted by Condensator, Inc.

Changes made to the design or operating conditions of the Condensator Model DX device, as exempt by the ARB, which adversely affect the performance of a vehicle's pollution control system shall invalidate this Executive Order.

Marketing of this Condensator Model DX device, using an identification other than that shown in this Executive Order or marketing of this Condensator Model DX device, for an application other than those listed in this Executive Order shall be prohibited unless prior approval is obtained from the ARB.

In addition to the foregoing, the ARB reserves the right in the future to review this Executive Order and the exemption provided herein to assure that the exempted add-on or modified part continues to meet the standards and procedures of Title 13, California Code of Regulations, section 2222 et seq.

This Executive Order does not constitute any opinion as to the effect the use of this Condensator Model DX 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 CLAIMS OF THE APPLICANT CONCERNING ANTI-POLLUTION BENEFITS OR ANY ALLEGED BENEFITS OF THE CONDENSATOR, INC.'S THE CONDENSATOR MODEL DX DEVICE.

No claim of any kind , such as "Approved by the Air Resources Board" may be made with respect to the action taken herein in any advertising or other oral or written communication.

Violation of any of the above conditions shall be grounds for revocation of this order. The order may be revoked only after ten day written notice of intention to revoke the order, in which period the holder of the order may request in writing a hearing to contest the proposed revocation. If a hearing is requested, it shall be held within ten days of receipt of the request and the order may not be revoked until a determination after the hearing that grounds for revocation exist.

Executed at El Monte, California, this 17th day of August, 1993.

R. B. Summerfield
Assistant Division Chief
Mobile Source Division

State of California
AIR RESOURCES BOARD

EVALUATION OF CONDENSATOR, INC.'S THE CONDENSATOR MODEL DX DEVICE FOR EXEMPTION FROM THE PROHIBITIONS OF VEHICLE CODE SECTION 27156 IN ACCORDANCE WITH SECTION 2222, TITLE 13, OF THE CALIFORNIA CODE OF REGULATIONS

August 1993

State of California
AIR RESOURCES BOARD

EVALUATION OF CONDENSATOR, INC.'S THE CONDENSATOR MODEL DX DEVICE FOR EXEMPTION FROM THE PROHIBITIONS OF VEHICLE CODE SECTION 27156 IN ACCORDANCE WITH SECTION 2222, TITLE 13, OF THE CALIFORNIA CODE OF REGULATIONS

by

Mobile Source Division
State of California
Air Resources Board
9528 Telstar Avenue
El Monte, CA 91731-2990

CONTENTS

SUMMARY

Condensator, Inc., of 433 Bull River Road, Noxon, Montana, 59853-9707, has applied for exemption from the prohibitions in Section 27156 of the California Vehicle Code for The Condensator Model DX device. The device is designed for installation on all 1993 and older model-year diesel fueled vehicles with engine displacement greater than 3.2 liters.

Based on an engineering evaluation, the staff finds the Condensator Model DX device, when installed according to the manufacturer's instructions, will not have any adverse effects on the exhaust emissions from diesel fueled vehicles.

The staff recommends that The Condensator Model DX device be exempted from the prohibitions in Vehicle Code Section 27156 and that Executive Order D-69-7 be issued.

EVALUATION OF CONDENSATOR, INC.'S THE CONDENSATOR MODEL DX DEVICE FOR EXEMPTION FROM THE PROHIBITIONS OF VEHICLE CODE SECTION 27156 IN ACCORDANCE WITH SECTION 2222, TITLE 13, OF THE CALIFORNIA CODE OF REGULATIONS

I. INTRODUCTION

Condensator, Inc. of 433 Bull River Road, Noxon, Montana, 59853-9707 has applied for exemption for The Condensator Model DX device. Condensator, Inc. intends to market this device for all 1993 and older model-year diesel fueled vehicles with engine displacements greater than 3.2 liters.

II. CONCLUSION

Based on an engineering evaluation, the staff finds The Condensator Model DX device, when installed according to the manufacturer's instructions, will not have any adverse effects on the exhaust emissions of diesel fueled vehicles.

III. RECOMMENDATION

The staff recommends Condensator, Inc. be granted an exemption from the prohibitions in California Vehicle Code Section 27156 for The Condensator Model DX device and Executive Order D-69-7 be issued.

IV. DEVICE DESCRIPTION AND OPERATION

Each of The Condensator Model DX devices consists of a closed plastic container with a threaded neck which screws into the mounting/hose connection device (see Appendix A). The mounting/connection device has two passages connecting the inside of the container to the road draft exhaust tube and to the air intake pipe. A wire mesh holding the absorbent beads housed inside the plastic container encloses the outlet of the passage leading from the road draft exhaust tube. The beads act as a separator trapping the heavy particles and allowing the air and light particles to

pass to the engine air intake.

According to the manufacturer, all installations of The Condensator Model DX are generally the same. All installations require a properly sized and configured adaptor for the crankcase breather outlet, a pressure relief valve between the crankcase and the Condensator device as a precaution against excessive blow-by pressure, two Condensator Model DX devices, hose and fitting diameters sized to provide adequate air flow and a tap installed into the air intake (see Appendix B for examples).

In operation, the entire system utilizes two Condensator Model DX devices configured to act in parallel. The crankcase exhaust, previously vented directly into atmosphere through road draft exhaust tube, is routed through the Condensators. According to the manufacturer, the crankcase blow-by gases, containing suspended oil particles, circulate through the device where the adsorbent beads entrap oil. The oil accumulates in plastic containers while allowing crankcase gases to pass to the engine air intake to be burned in the engine. Maintenance consists of disposing of the accumulated oil on a regular basis.

The manufacturer claims increased power, reduced opacity, improved fuel economy, extends oil change intervals, and reduces oil consumption. The Air Resources Board did not investigate any of these claims.

V. DISCUSSION

An engineering evaluation was conducted to evaluate the impact of The Condensator Model DX device on emissions. The manufacturer requested The Condensator Model DX device be exempted for all 1993 and older model-year diesel fueled vehicles equipped with engines with displacements greater than 3.2 liters.

This device operates similarly to a Positive Crankcase Ventilation system (PCV) - manatory equipment on gasoline powered vehicles. It scavenges the crankcase blow-by gases which are presently emitted directly into the atmosphere. These gases are present in the crankcase because the high pressure inherent in the combustion process forces some gases to escape past the piston rings. These gases, which consist of burned and unburned fuel mixture and byproducts, combine with the oil mist created by the rotating crankshaft. According to the manufacturer, the oil mist, from the road draft exhaust, is removed and stored within the device. The remaining gases, consisting mainly of the crankcase blow-by gases, are routed into the air intake, mixed with intake air and burned in the combustion chamber. The crankcase blow-by gases are of similar mixture to that present in the combustion chamber, therefore, little foreign matter is introduced into the combustion chamber. Therefore, the effects on emissions will be the same as that of PCV valve in gasoline engines.

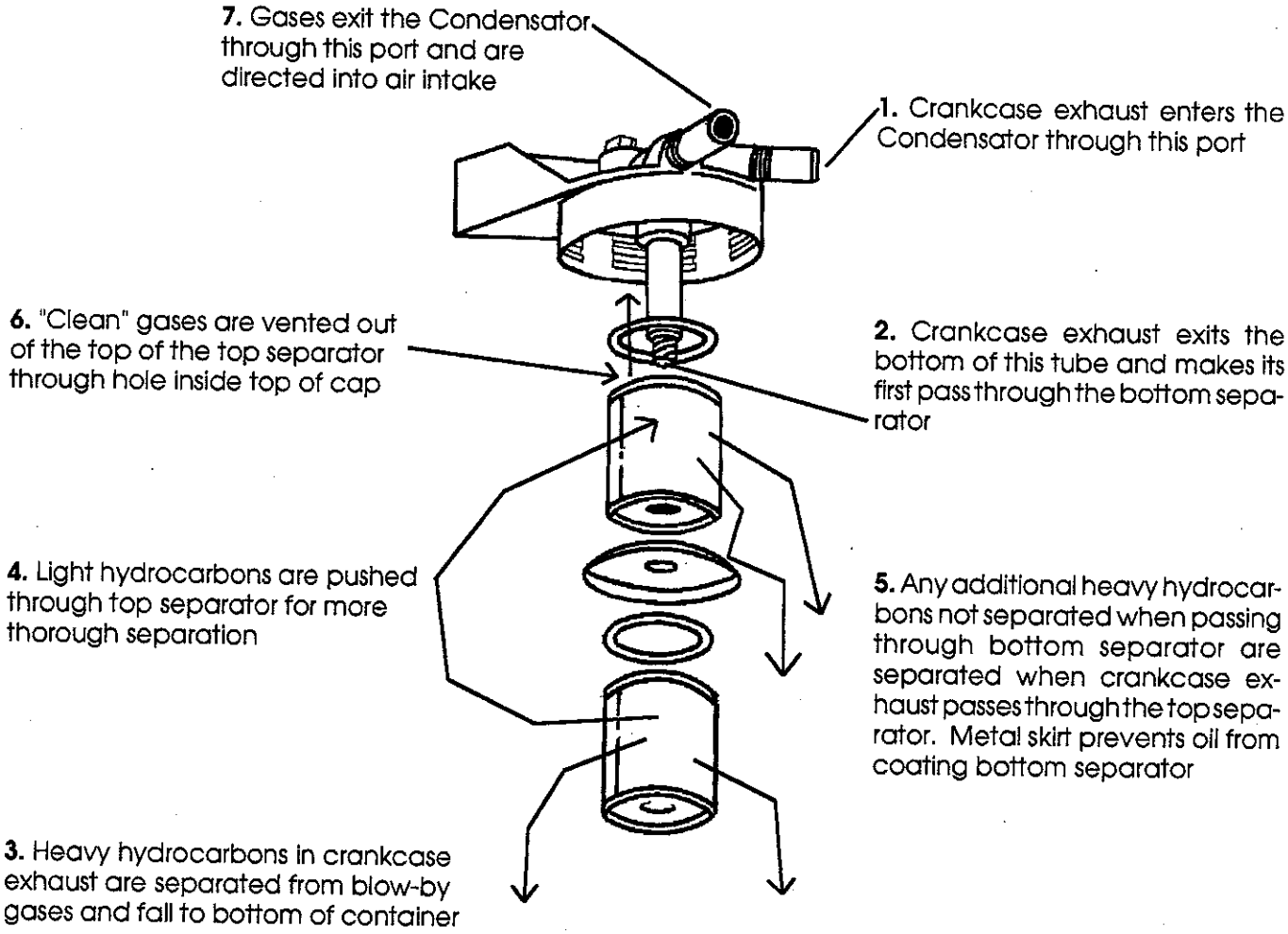
Staff finds The Condensator Model DX device will not adversely affect emissions from the motor vehicles for which exemption is sought.

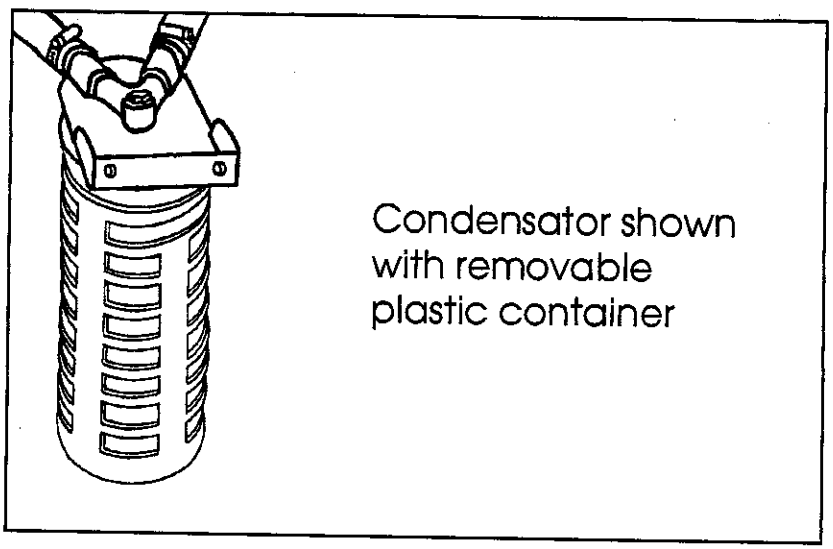
APPENDIX A

How the Condensator Processes Crankcase Exhaust

Blow-apart diagram with Condensator head and separators

Model DX





Condensator shown with removable plastic container

APPENDIX B

CRANKCASE
MANAGEMENT
SYSTEMS, INC.

200 East South Boulder Road, Lafayette, CO 80026
(303) 665-6455 (800) 598-4344

Diesel Condensator Installation Instructions

Caterpillar 3406

Please read instructions completely before starting

Important: **Use pipe sealer on all connections.** Parts provided do not have sealer on them.

1. Remove the road draft tube from the breather assembly on the valve cover.

2. If necessary, the clamp on the breather assembly can be loosened allowing the breather to be rotated to a position that will ease the installation of the Condensator adapter pipe. When this is done, be certain to torque the clamp to the specified amount.

3. The short piece of 1-1/2" hose can be installed over the breather outlet. The two #28 hose clamps supplied can be put on the hose. The Condensator adapter should be installed in the hose and the two clamps tightened.

4. Find a suitable location to mount the Condensator units. The Condensators will work more efficiently if they are not placed in an area of high heat. A position close to the engine is preferable.

5. Once the Condensators are mounted, it can be determined if the 3/8" elbows supplied will be needed to improve the location of the hoses.

6. Remove a section of the air intake as close to the turbo charger as possible. It will be neces sary to drill two 3/4" holes into the intake pipe. Weld the two aluminum adapters supplied to the intake over these holes. Re-assemble the air intake system.

7. Install the two 3/4" hoses from the Condensator adapter onto the two crankcase ports on the Condensator units.

8. Connect two hoses from the Condensator intake ports to the adapters welded into the air intake.

9. Attach the piece of 5/8" hose to the pressure relief valve.

10. Secure hoses with nylon tie straps.

Call Mark Blakemore at (303) 666-6700 if you have any questions.

Installation and Adjustment
Instructions and Drawings

Please note: Two samples for different engine types have been provided.

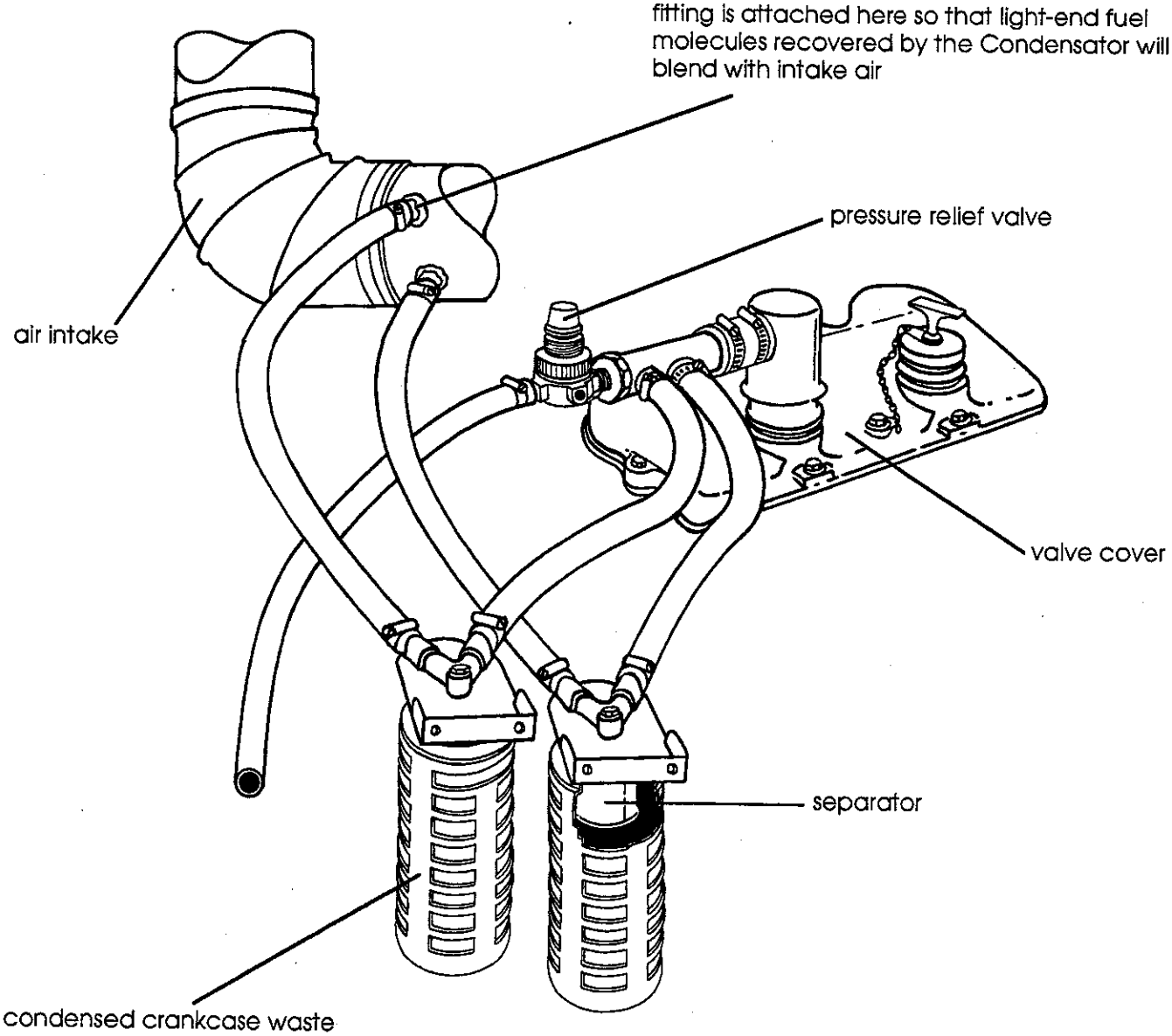
All installations are generally the same requiring:

- **a properly sized and configured adaptor for the crankcase breather outlet,**
- **a pressure relief valve between the crankcase and the Condensators as a safety precaution since engine malfunction such as a blown piston ring might possibly result in excessive blowby exceeding the air flow capacity of the Condensators**
- **two Condensator Model DX units**
- **hose and fitting diameters large enough to allow for adequate air flow and,**
- **a tap into the air intake that is either welded or attached with fittings.**

Caterpillar 3406

Diesel Condensator Installation

Crankcase Management Systems, Inc.
200 East South Boulder Road, Lafayette, CO 80026
(303) 665-6455 (800) 598-4344



installation kit includes all fittings needed to complete installation

CMS International
(303) 665-5455
(800) 598-4344

Caterpillar 3406
Installation Kit Parts List

- Two 2" aluminum pipes
- Four 3/8" street elbows
- One 1/4" street elbows
- Four 3/4" x 3/8" pipe hose adapter
- One pressure relief valve
- One valve cover adapter
- One 4" section of 1-1/2" hose
- Two #28 clamps
- Eight #12 clamps
- One #10 clamp
- Six 8" ties
- Four 15" ties
- Four nut/bolt/washer mounting assemblies
- 12' - 3/4" hose

Call Mark Blakemore at (303) 666-6700 if you have any questions.

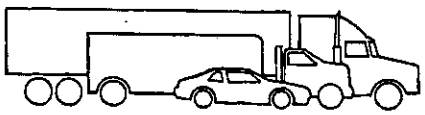
CMS International
(303) 665-5455
(800) 598-4344

Caterpillar 3406
Installation Kit Parts List

- Two 2" aluminum pipes
- Four 3/8" street elbows
- One 1/4" street elbows
- Four 3/4" x 3/8" pipe hose adapter
- One pressure relief valve
- One valve cover adapter
- One 4" section of 1-1/2" hose
- Two #28 clamps
- Eight #12 clamps
- One #10 clamp
- Six 8" ties
- Four 15" ties
- Four nut/bolt/washer mounting assemblies
- 12' - 3/4" hose

Call Mark Blakemore at (303) 666-6700 if you have any questions.

CRANKCASE
MANAGEMENT
SYSTEMS, INC.



200 East South Boulder Road, Lafayette, CO 80026
(303) 665-6455 (800) 598-4344

Diesel Condensator Installation Instructions

Cummins NTC

Please read instructions completely before starting

Important: **Use pipe sealer on all connections.** Parts provided do not have sealer on them.

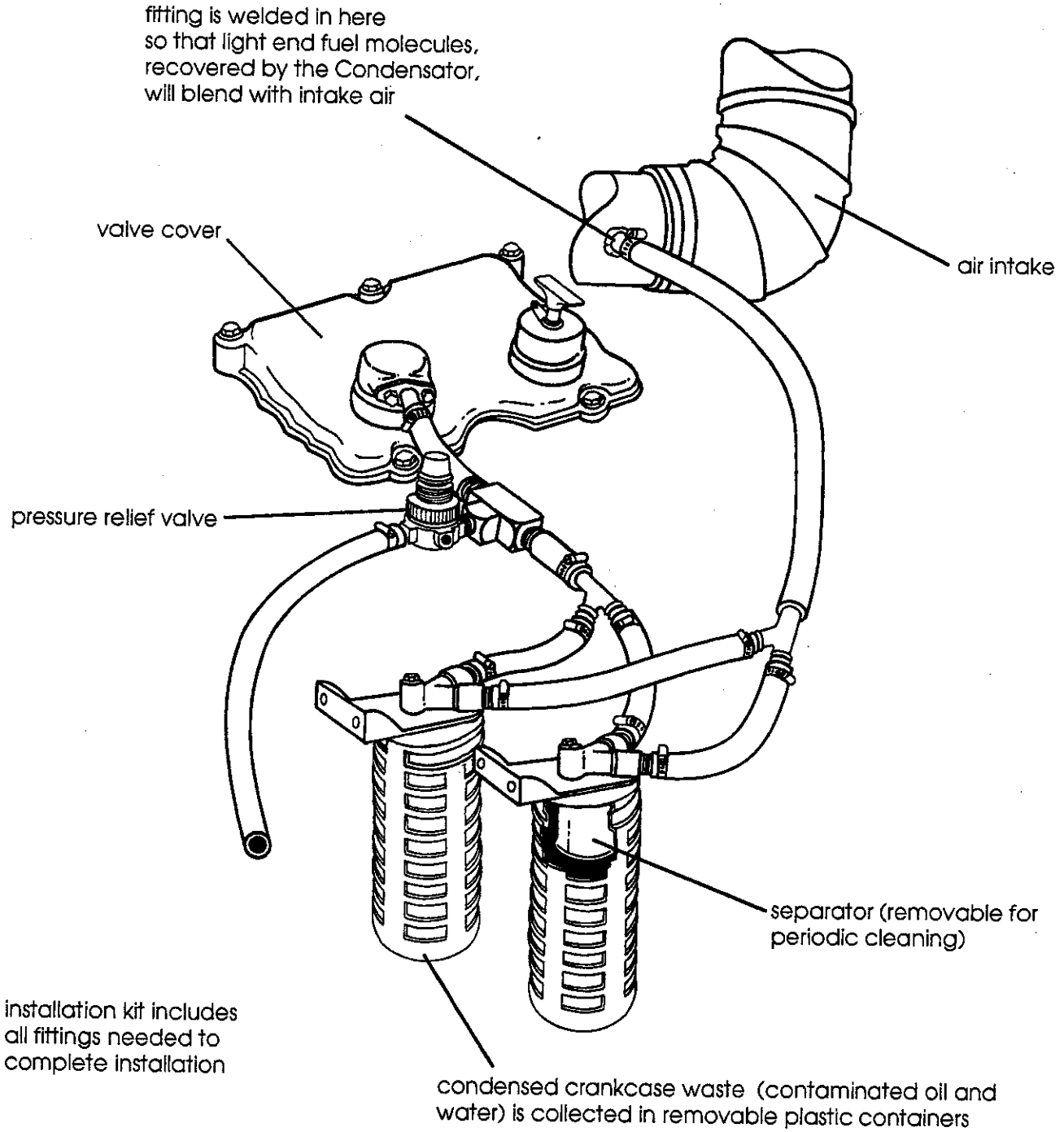
1. Remove a section of the aluminum intake tubing at a place between the air filter and the turbocharger where it will be convenient to attach a hose.
2. Drill a 3/4" hole in the intake tubing.
3. Weld the intake adaptor to the intake tube.
4. Re-assemble air intake system.
5. Find a suitable location to mount the Condensator units. The Condensator will work more efficiently if they are not placed in an area of high heat. A position close to the engine is preferable.
6. Mount the Condensator units to bracket provided by the supplier.
7. Remove road draft tube from valve cover.
8. Attach a section of 3/4" hose to the valve cover.
9. Assemble the pressure relief valve unit.
10. Install the pressure relief valve on the hose
11. Connect another hose from the pressure relief valve to the "Y" connector.
12. Attach two short pieces of 5/8" hose to the Condensator connectors and to the "Y", connector
13. Connect two short pieces of hose to the intake connectors on the Condensators to a "Y" connector.
14. Attach a section of 3/4" hose from the "Y" connector to the intake adaptor.
15. Tie up the hoses with nylon tie straps.

If you have any questions, call Whiterock Truck Repair at (303)666-6700 and ask for Mark Blakemore.

Cummins NTC

Diesel Condensator Installation

Crankcase Management Systems, Inc.
200 East South Boulder Road, Lafayette, CO 80026
(303) 665-6455 (800) 598-4344



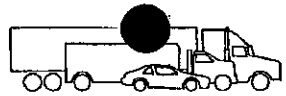
CMS International
(303) 665-6455

Cummins NTC
Installation Kit Parts List

Your installation kit should include:

- Four 1/4" x 1" Mounting assembly
- Six 12# hose clamps
- Nine #10 hose clamps
- Four 3/8" street elbows
- One 1/2" to 1/4" pipe reducer
- Two 3/4" x 3/4" x 3/4" PVC "Y" connectors
- One 2" piece of aluminum tubing
- Assembled Pressure Relief Adaptor
  - One 1/4" close nipple
  - One 1/4" x 1" nipple
  - One 1/2" pipe tee
  - One pressure relief valve
  - Two 1/2" x 3/4" hose - hose adaptors
  - One Breather adaptor
- One 6' section of 3/4" hose
- Two 12' sections of 5/8" hose
- Six 8" nylon ties
- Four 15" nylon ties

CMS International
(303) 665-6455



John Deere
Installation Kit Parts List

Your installation kit should include:

- Four 1/4" x 1" Mounting assembly
- Six 12# hose clamps
- Nine #10 hose clamps
- Four 3/8" street elbows
- One 1/2" to 1/4" pipe reducer
- Two 3/4" x 3/4" x 3/4" PVC "Y" connectors
- One 2" piece of aluminum tubing
- Assembled Pressure Relief Adaptor
  - One 1/4" close nipple
  - One 1/4" x 1" nipple
  - One 1/2" pipe tee
  - One pressure relief valve
  - Two 1/2" x 3/4" hose - hose adaptors
  - One Breather adaptor
- One 6' section of 3/4" hose
- Two 12' sections of 5/8" hose
- Six 8" nylon ties
- Four 15" nylon ties