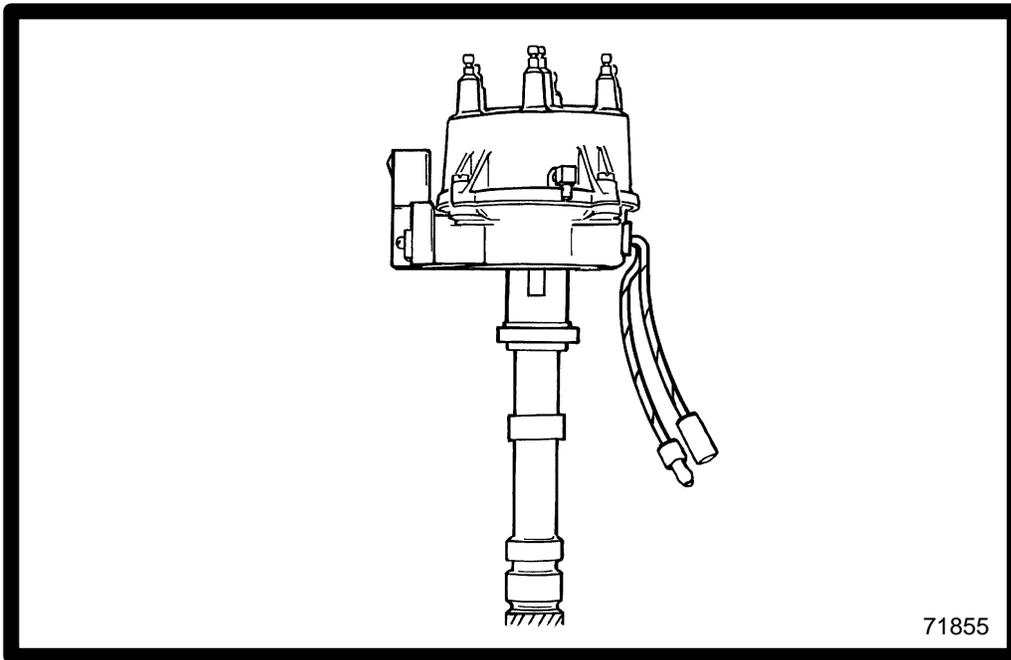


ELECTRICAL SYSTEMS



IGNITION SYSTEM

4

B

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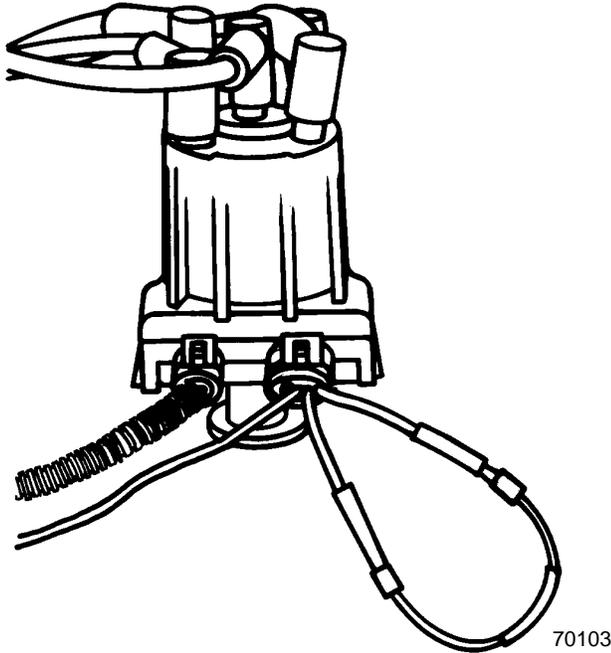
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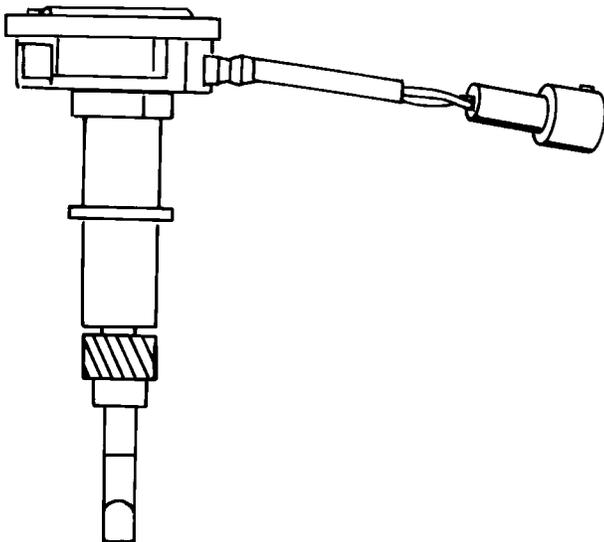
NOTICE

For information and procedures on troubleshooting, refer to SECTION 1C.

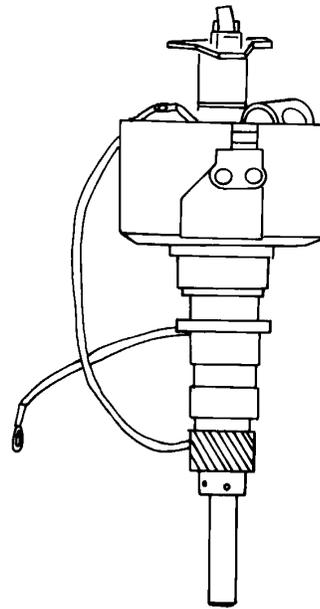
Identification



DELCO EST (ELECTRIC SPARK TIMING)



DIGITAL DISTRIBUTORLESS IGNITION SYSTEM (DDIS)



BREAKER POINTS IGNITION

Replacement Parts Warning

⚠ WARNING

Electrical, ignition and fuel system components on your MerCruiser are designed and manufactured to comply with U.S. Coast Guard Rules and Regulations to minimize risks of fire and explosion.

Use of replacement electrical, ignition or fuel system components, which do not comply with these rules and regulations, could result in a fire or explosion hazard and should be avoided.

3.0L Breaker Point Ignition Prestolite Distributor System

Torque Specifications

Fastener Location	Lb. Ft.	N•m
Distributor Clamp 3/8-16	20	27
Spark Plugs (14 mm)	15	20

Tools/Lubricants/Sealants

Mercury Marine Special Tools	
Description	Part Number
Dwell Meter	91-59339
Magneto Analyzer	91-76032
Remote Starter Switch	91-52024A1
Timing Light	91-99379
Volt/Ohm Meter	91-99750
Timing Jumper	91-818812A1

Kent-Moore Tools	
Description	Part Number
Module Tester	J24642

Specifications

Coil

Description	Specification
Coil Part Number	392-7803A4
Max. Operating Amps*	1.1
Primary Resistance	1.1-1.5 Ohms
Secondary Resistance	9.400 - 11.700 Ohms
Secondary Continuity*	67 - 77
Resistor Wire	1.8 - 2 Ohms

Distributor

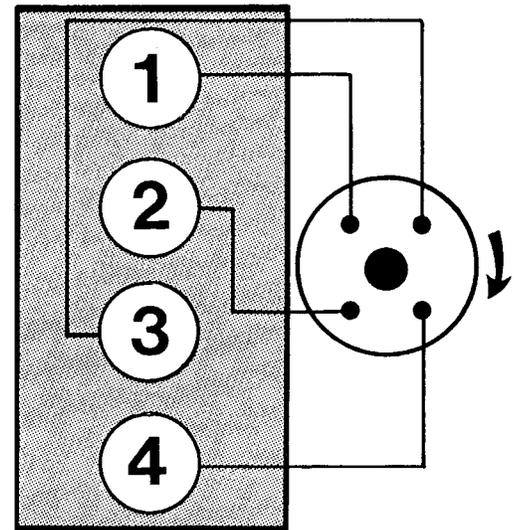
Model	3.0L
Condenser*	.18 - .25 mfd
Point Dwell	39° - 45°
Point Gap	.016 in. (0.5mm)
Point Spring Tension	20 - 27 oz. (567 - 765 g)
Timing	8° BTDC

NOTE: * Use Magneto Analyzer

Spark Plugs

Model	3.0L
Spark Plug Gap	.035 in. (0.9 mm)
Spark Plug Type	AC-MR43T NGK-BR6FS Champion RV15YC4

Firing Order



Firing Order 1-3-4-2

50683

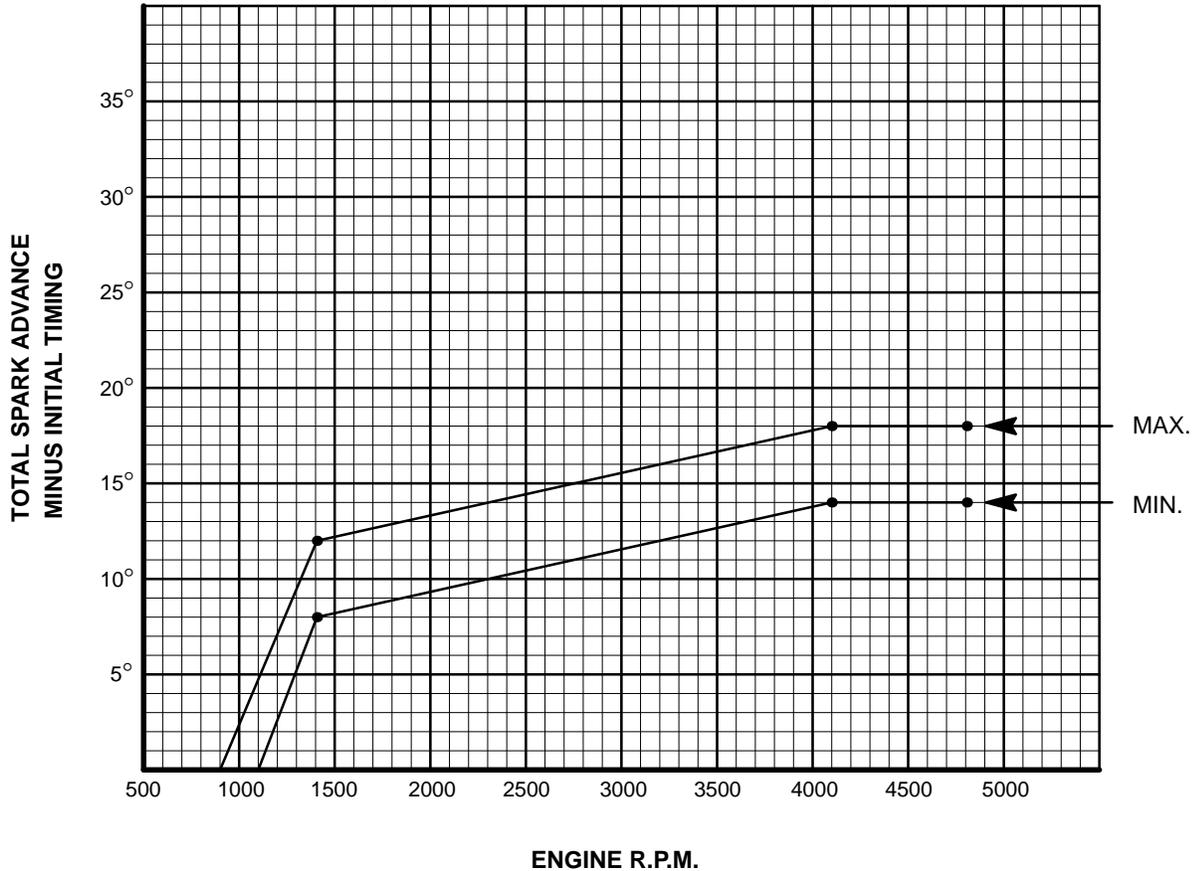
Distributor Advance Curves

MCM 3.0L with Prestolite Distributor

Distributor Advance: 16°
Initial Timing: 8° BTDC
Total Advance: 24° @ 4100 RPM
Point Gap: .016 in. (0.41 mm)
Point Dwell: 39° - 45°
Point Spring Tension: 20 -27 oz.
(567 - 765 g)

IMPORTANT: Distributor advance curve charts do not include the initial engine timing. Basic initial timing must be added to chart for total advance curve.

IMPORTANT: The spark advance is controlled by the ignition module.



70808-3

Precautions

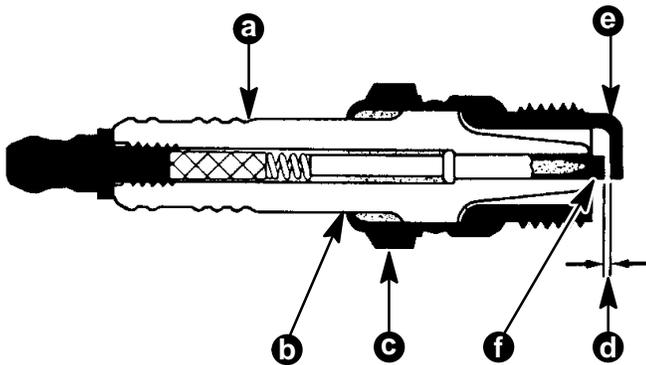
⚠ WARNING

When performing the following procedure, be sure to observe the following:

- Be sure that engine compartment is well ventilated and that no gasoline vapors are present, to avoid the possibility of fire.
- Be sure to keep hands, feet and clothing clear of moving parts.
- Do not touch or disconnect any ignition system parts while engine is running.
- Do not reverse battery cable connections. System is negative (-) ground.
- Do not disconnect battery cables while engine is running.

Spark Plugs

1. Inspect each plug individually for badly worn electrodes, glazed, broken or blistered porcelain and replace plug where necessary.
2. Inspect each spark plug for make and heat range. All plugs must be the same make and number or heat range. Refer to "Specifications" for spark plug numbers.
3. Adjust spark plug gaps with a round feeler gauge.



50674

Spark Plug Detail

- a - Porcelain Insulator
- b - Check For Cracks In This Area of Porcelain
- c - Shell
- d - Proper Gap
- e - Side Electrode (Bend to Adjust Gap)
- f - Center Electrode (File Flat When Adjusting Gap) - Do Not Bend

IMPORTANT: Tapered seat spark plugs are not interchangeable with non-tapered (with gasket) spark plugs.

4. Clean spark plug seating area. DO NOT use gaskets on taper seat plugs. Install spark plugs and torque to 15 lb. ft. (20 N-m.). Heat transfer and a gas-tight seal must be achieved.

Spark Plug Wires

1. Inspect spark plug wires for damage.
2. Check spark plug wires for continuity.
3. Replace any wires that are cracked, cut, or have damaged spark plug boots.
4. Replace any wires that do not show continuity from end to end.
5. Reinstall spark plug wires in proper order.

IMPORTANT: Proper positioning in spark plug wires is important to prevent cross firing.

Distributor Cap and Rotor

6. Loosen distributor cap retaining screws.
7. Remove distributor cap.
8. Clean cap with warm soap and water and blow off with compressed air.
9. Check cap contact for excessive burning or corrosion. Check center contact for deterioration.

IMPORTANT: Distributor caps (for marine use) should have brass contacts, aluminum contacts should not be used.

10. Check cap for cracks or carbon tracks using magneto analyzer.
11. Remove rotor.
12. Check for burned or corroded center contact.
13. Check rotor for cracks and carbon tracks using magneto analyzer.
14. Install rotor on shaft. Be sure rotor is completely seated on shaft.
15. Place cap on distributor.
16. Tighten retaining screws securely.

Contact Points

1. Examine contact points for dirt, wear, pitting and misalignment. Dirty points should be cleaned. Normal point condition is an overall grey color on contact surface.
2. Check for point resistance. A voltage drop of less than .125 volts across points should exist. Make this check with a sensitive volt meter or point resistance meter.

ABNORMAL POINT WEAR

1. Points, which have been operated for period of time, have a rough surface, but this may not mean that points are worn out.
2. If points burn or pit, however, they soon become unsatisfactory for further operation. Not only must they be replaced, but ignition system and engine must be checked to determine cause and elimination of trouble. Unless condition is corrected, new points will provide no better service than old points.

CLEANING POINTS

1. Dirty contact points should be dressed with a few strokes of a clean, fine -cut contact file. File should not be used on other metals and should not be allowed to become greasy or dirty.

IMPORTANT: Never use emery cloth to clean contact points.

2. Contact surfaces, after considerable use, may not appear bright and smooth, but this is not necessarily an indication that they are not functioning satisfactorily. Do not attempt to remove all roughness nor dress point satisfactorily. Do not attempt to remove all roughness nor dress point surfaces down smooth. Merely remove scale or dirt.
3. Badly burned or pitted contact points should be replaced and cause of trouble determined and corrected.

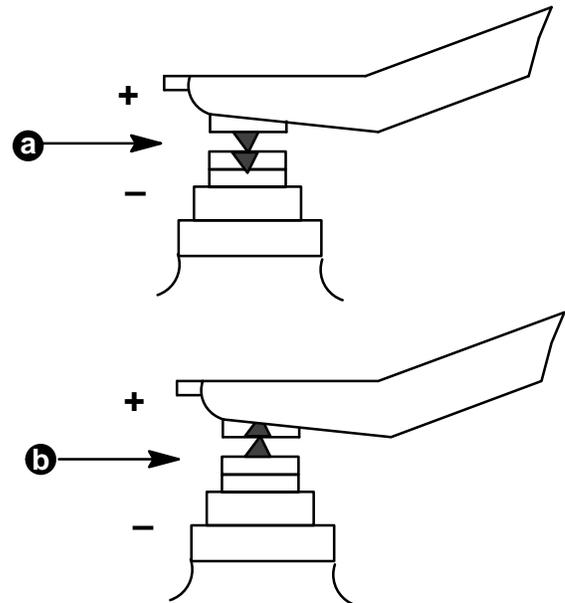
BURNED POINTS

1. Contact point burning results from high voltage, presence of oil or other foreign material, defective condenser and improper point adjustment.

2. High voltage causes excessively high current flow thru contact points which burns them rapidly. High voltage can result from improperly adjusted or inoperative voltage regulator.
3. Oil or crankcase vapors, which work up into distributor and deposit on point surfaces, cause them to burn rapidly.
4. If contact point opening is too small (cam angle too large), points will be closed too long. Average current flow thru points will be too high, so points will burn rapidly and arcing will occur between points.
5. High series resistance in condenser circuit will prevent normal condenser action, so contact points will burn rapidly. This resistance may be caused by a loose condenser mounting or lead connection, or by poor connections inside condenser.

PITTED POINTS

1. Contact point pitting results from an out-of-balance condition in ignition system which causes transfer of material from one point to other so that a tip builds up on one point while a pit forms in other.



Material Transfer

- a - Negative to Positive
- b - Positive to Negative

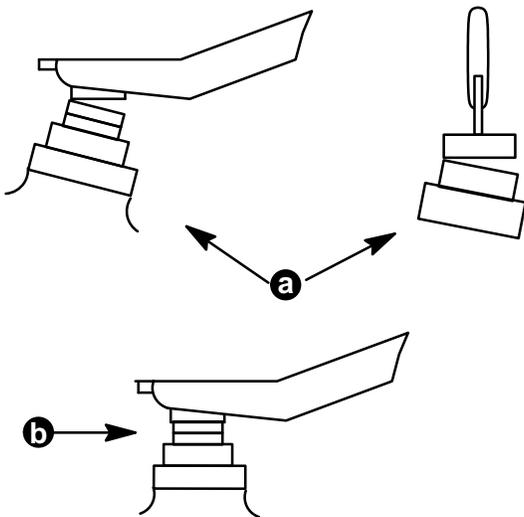
2. If points are pitted, replace condenser (and points).

Replacement

1. Remove primary and condenser lead wires from contact point terminal.
2. Remove contact set attaching screw and lift contact point set from breaker plate.
3. Clean oil smudge and dirt from breaker plate.

IMPORTANT: Carefully wipe protective film from point set prior to installation.

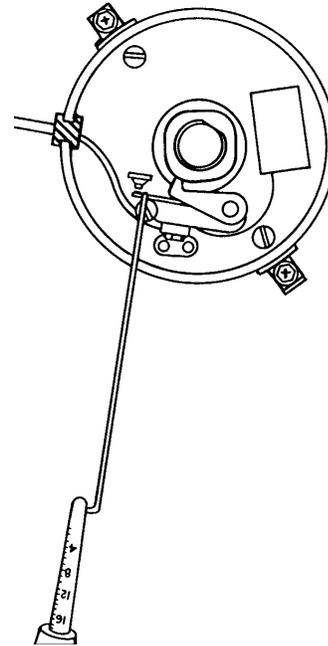
4. Place a small amount of Distributor Cam Lubricant on distributor cam.
5. Place new contact point assembly in position on breaker plate and install attaching screw.
6. Check points for proper alignment. If points do not align properly, replace with another set of points.



- a - Lateral Misalignment
b - Proper Lateral Alignment

7. Connect primary and condenser lead wires to terminal on contact point set.

8. Check point spring tension (20-27 oz.) 567-765g.



50641

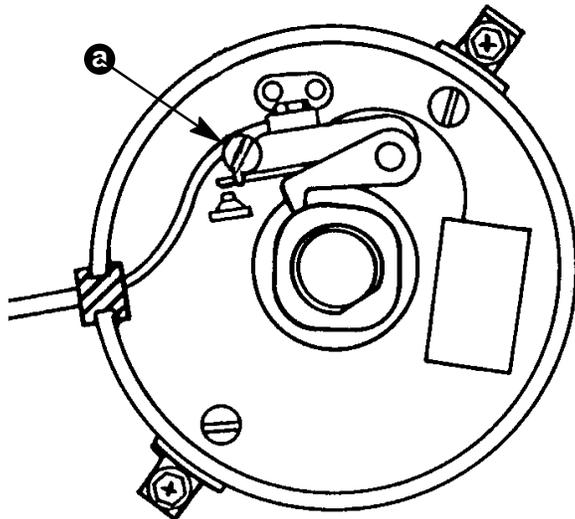
- a - Movable Contact
b - Spring Tension Gauge

Contact point pressure must fall within specified limits (Step 8, preceding). Weak tension will cause chatter which results in arcing and burning of points and an ignition miss at high speed, while excessive tension will cause undue wear of contact points, cam and rubbing block. Contact point pressure should be checked with a spring gauge. Scale should be hooked to breaker lever, and pull exerted at 90° to breaker level. Reading should be taken just as points separate. Pressure can be adjusted by bending breaker level spring. If pressure is excessive, it can be decreased by pinching spring carefully. To increase pressure, remove lever from distributor so that spring can be bent away from lever. Avoid excessive spring distortion.

IMPORTANT: Point gap or (dwell) can be adjusted by 2 methods. It is preferred that points be adjusted with a feeler gauge, then checked with a dwell meter. Points, however, also can be adjusted, as well as checked, with a dwell meter: After points have been set, dwell should be checked with engine running.

POINT ADJUSTMENT WITH FEELER GAUGES

1. Rotate distributor until rubbing block rests on peak of cam lobe, which will provide maximum breaker point opening.
2. Insert correct feeler gauge between breaker points.
3. Loosen lock screw and adjust points to .016 in. (0.5mm).



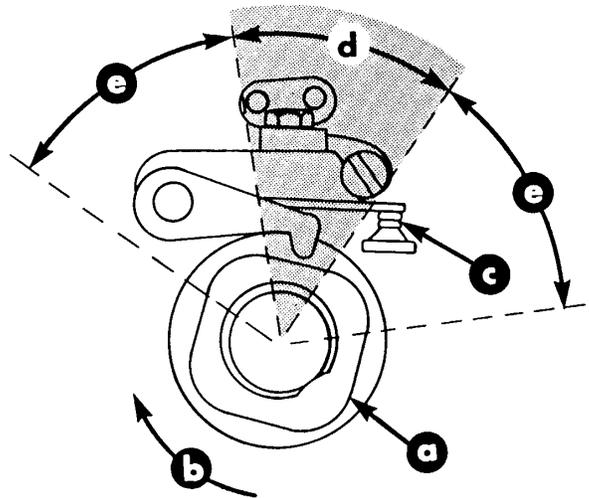
27045

a - Lock Screw

DWELL ADJUSTMENT

1. Remove distributor cap and rotor.
2. Connect positive (+) dwell meter lead to negative (-) side of coil. Connect negative (-) meter lead to ground.
3. Loosen point lock screw slightly.
4. While cranking engine with starter, adjust dwell with a screwdriver to obtain reading on dwell meter, as specified in "Specifications", and tighten lock screw. (Dwell reading will be unsteady using this method.)

IMPORTANT: Cam angle increases as point opening is decreased and vice versa.



50654

Cam Angle

- a - Cam
- b - Direction or Rotation
- c - Breaker Points
- d - Dwell (In Degrees When Points Are Closed)
- e - Points Open

5. Install rotor and distributor cap and recheck dwell with engine running.

IMPORTANT: Dwell should be checked between idle and 1750 RPM. Any dwell reading variations of more than 3° between idle and 1750 RPM would indicate wear in the distributor. Cam angle readings, taken at speeds above 1750 engine RPM, may prove unreliable on some dwell meters.

Condenser

1. Use Magneto Analyzer for test.
2. Test condenser for the following:
 - a. Condenser capacity test (.18-.25 mfd).
 - b. Condenser leakage and short test.
 - c. Condenser series resistance test.
3. Replace condenser if test results are not within specifications.

Coil

1. Use Magneto Analyzer for test.
2. Check coil for the following:
 - a. Coil power test.
 - b. Coil surface insulation test.
 - c. Coil continuity test.
 - d. Primary resistance test.
 - e. Secondary resistance.
3. Replace coil if test results are not within specifications.

Ignition Resistance Wire

(ELECTRIC CHOKE)

1. Disconnect wire from positive (+) side of coil.
2. Unplug quick disconnect (with 2 wires) from electric choke heater element.
3. Connect ohmmeter leads to ends of disconnected wire. Replace resistor wire if reading is not within specifications.
4. Reconnect wires to coil and choke.
5. **Breaker Point Ignition Models:** For instructions on replacing resistor wire, refer to "Section 4, Part E".

Distributor Repair

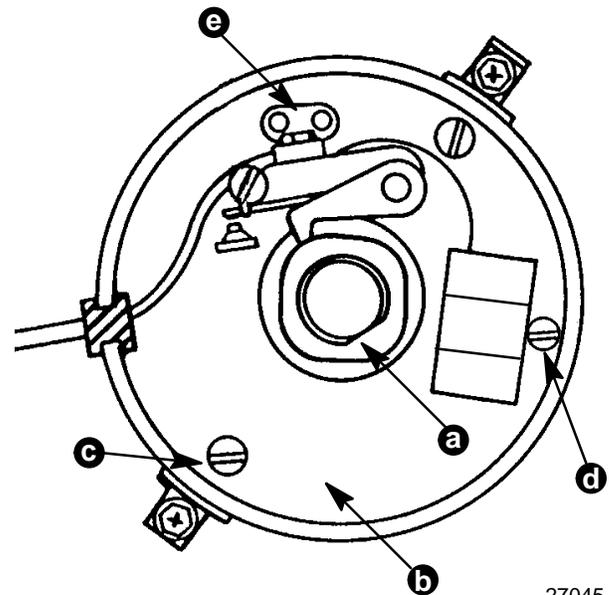
Removal

1. Disconnect distributor primary lead from coil terminal.
2. Remove distributor cap and rotor.

IMPORTANT: If necessary to remove leads from distributor cap, mark position on cap tower for lead to number 1 cylinder. This will aid in installation of leads in cap.

3. Scribe a realignment mark on distributor in line with rotor notch (located on distributor shaft).
4. Mark distributor housing in reference to engine block.
5. Remove bolt and hold-down clamp and remove distributor.

IMPORTANT: Avoid rotating engine with distributor removed, as ignition timing will be upset.



Breaker Plate And Attaching Parts

- a - Rotor Alignment "Flat"
- b - Breaker Plate
- c - Breaker Point Attaching Screw
- d - Condenser Bracket With Screw
- e - Wire Terminal With Screw

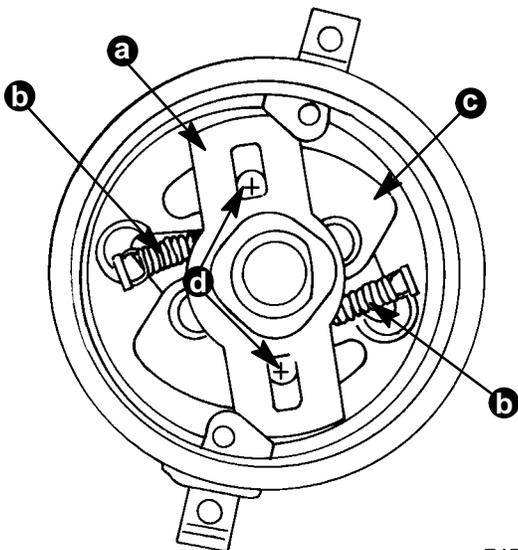
Disassembly

IMPORTANT: It is not necessary to disassemble distributor any further than required to complete repairs.

1. Remove condenser and breaker points from breaker plate. Test condenser and check breaker points.
2. Remove breaker plate from distributor housing. Excessive oil on breaker plate assembly would indicate a bad oil seal in distributor housing.

IMPORTANT: Main shaft bushings and oil seal in housing are not serviced separately. Housing, bushings and oil seal are serviced as complete assembly.

3. Remove roll pin retaining driven gear to main shaft and slide gear from shaft.
4. Check for side play between main shaft and bushings in distributor housing. Maximum side play allowed is .002 in. (0.05 mm).
5. Remove shaft from housing and check shaft for being bent with a dial indicator and V-blocks. Maximum runout is .002 in. (0.5 mm).
6. Remove weight cover, check weights and weight stop for wear. Check weights for free movement on pins.



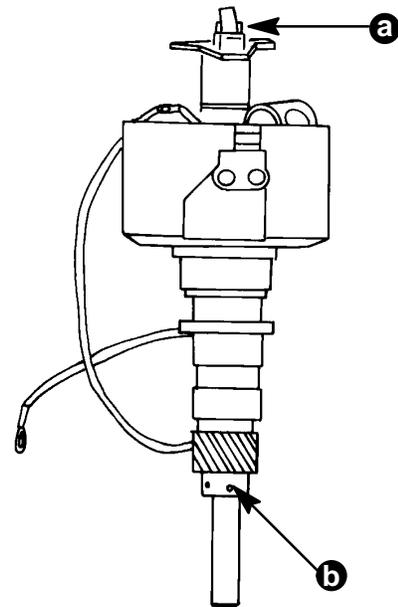
74551

- a - Weight Cover
- b - Weight Springs
- c - Weights
- d - Weight Stop Studs

Advance Weights and Components

Reassembly

1. Replace centrifugal advance, as necessary.
2. Lubricate shaft with engine oil. Install main shaft in distributor housing.
3. Install driven gear on main shaft.
4. Line up mark on driven gear with rotor tip on main shaft.
5. Install roll pin through gear and main shaft.
6. Install breaker plate on distributor housing.
7. Install condenser and breaker points on breaker plate.
8. Install rotor.
9. Install distributor as outlined in "Distributor Installation" following.



74551

Gear Installation

- a - Rotor Contact
- b - Gear Alignment Mark

Distributor Installation

Engine Not Disturbed

1. Install new gasket on distributor housing.
2. Turn rotor approximately 1/8 turn in a counterclockwise direction past mark previously scratched on distributor housing.
3. Work distributor down into position in engine block with distributor positioned as noted during removal.

IMPORTANT: It may be necessary to move rotor slightly to start gear into mesh camshaft gear, but rotor should line up with mark when distributor is down in place. Distributor shaft must enter oil pump shaft for complete installation.

4. Replace and tighten distributor hold-down bolt and clamp. Connect primary lead to coil. Also install spark plug and coil secondary wires, if removed.

IMPORTANT: Wires must be installed in supports, to prevent cross-firing. Firing order is 1-3-4-2.

5. Set points gap to .016 in (0.5 mm).
6. Install rotor
7. Check dwell (39- 45 degrees)
8. Time ignition as outlined under "IGNITION TIMING".

Engine Disturbed

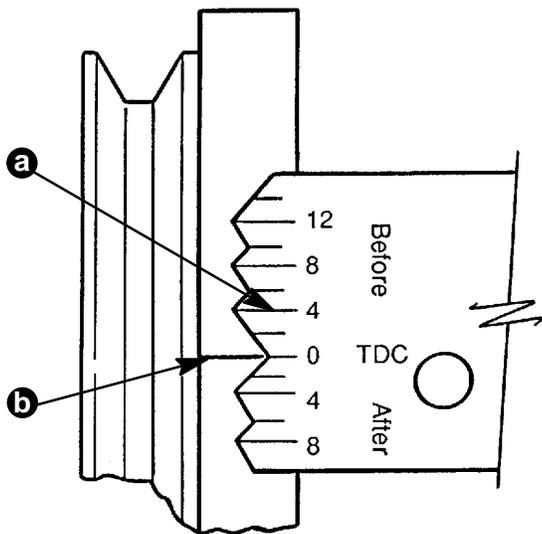
1. Locate No. 1 piston in firing position by either of two methods described below.
 - a. Remove No. 1 spark plug and, with finger on plug hole, crank engine until compression is felt in No. 1 cylinder. Continue cranking until pointer lines up with timing mark on crankshaft pulley, or
 - b. Remove rocker cover and crank engine until No. 1 intake valve closes, continuing to crank slowly until pointer lines up with timing mark on crankshaft pulley.
2. Position distributor to opening in block in normal installed attitude.

3. Position rotor to point toward front of engine (with distributor housing held in installed attitude), then turn rotor counterclockwise approximately 1/8-turn more to the left and push distributor down to engage camshaft. It may be necessary to rotate rotor slightly until camshaft engagement is felt.
4. While pressing down firmly on distributor housing, engage starter a few times to make sure oil pump shaft is engaged. Install hold-down clamp and bolt and snug up bolt.
5. Turn distributor body slightly until points just open and tighten distributor clamp bolt.
6. Place distributor cap in position and check that rotor lines up with terminal for No. 1 spark plug. Install cap.
7. Install cap, distributor primary lead to coil. Check and connect spark plug wires, if they have been removed. Wires must be installed in their proper location in supports to prevent cross-firing. Firing order is 1-3-4-2.
8. Set points gap to .016 in (0.5 mm).
9. Install rotor
10. Check dwell (39- 45 degrees)
11. Time ignition as outlined under "ignition Timing".

Ignition Timing

1. Connect timing light to No. 1 spark plug. Connect power supply leads on light to 12 volt battery. Refer to "Specifications" for cylinder numbering and location.
2. Connect tachometer to engine.
3. Start engine and run at normal idle speed.
4. Aim timing light at timing tab, located on timing gear cover and crankshaft torsional damper.

IMPORTANT: GM engine timing marks (on tab) are in 2-degree increments. Timing must be set on the “before” side of “0” (Top Dead Center).



72328

a - Degree Marks
b - Timing Mark

5. Adjust timing by loosening distributor clamp and rotating distributor body as required until timing mark on damper or pulley lines up with the mark on tab specified in “Specifications.” Tighten clamp and recheck location of timing mark.
6. Stop engine and remove timing light.

(DDIS) Digital Distributorless Ignition System

Specifications

COIL

Description	Specification
Primary Resistance	1.9-2.5 Ohms *1
Secondary Resistance	11.3 - 15.5 Ohms *2

* At Room Temperature 68° F (20° C)

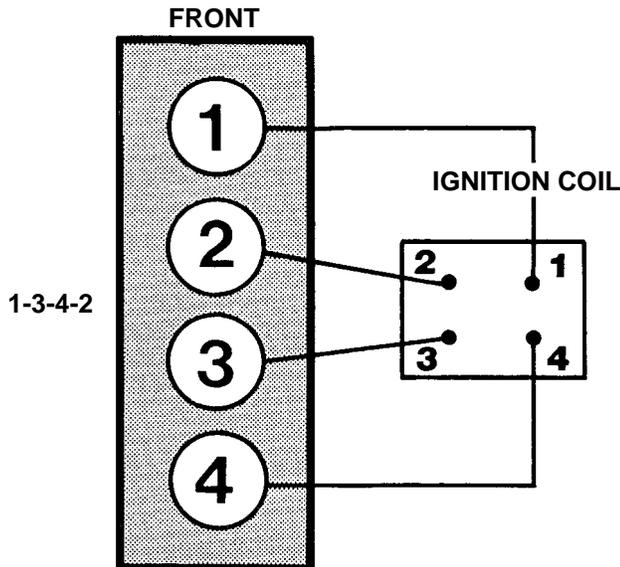
1 Ohmmeter scale Rx1

2 Ohmmeter scale Rx1000

IGNITION TIMING

Timing	8° BTDC at 700 RPM
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FIRING ORDER



Torque Specifications

Fastener Location	In. Ft.	Lb. Ft.	N·m
Motion Sensor Clamp 3/8-16		20	27
Ignition Amplifier	65		7.3
Ignition coils	20		2.2
Spark Plugs (14 mm)		15	20

Tools/Lubricants/Sealants

Mercury Marine Special Tools	
Description	Part Number
Dwell Meter	91-59339
Magneto Analyzer	91-76032
Remote Starter Switch	91-52024A1
Timing Light	91-99379
Volt/Ohm Meter	91-99750
Timing Jumper	91-818812A1

Spark Plugs

Spark Plug Gap	.035 In. (0.9 mm)
3.0L (DDIS)	AC-MR43T NGK-BR6FS Champion RV15YC4
3.0LX (DDIS)	AC-MR43LTS NGK-BPR6EFS Champion RS12YC

Overspeed Prevention Control

CONTROL MODULE FUNCTION SPECIFICATIONS

ENGINE SPEED (RPM)	SPARK CONTROL FUNCTION
4750	Normal Spark
5050	Misfires - Intermittent Spark
5150	Spark Shuts OFF, completely

NOTE: Refer to SECTION 1-C for troubleshooting

Description

The Digital Distributorless Ignitions System (DDIS) replaces the conventional point style ignition system.

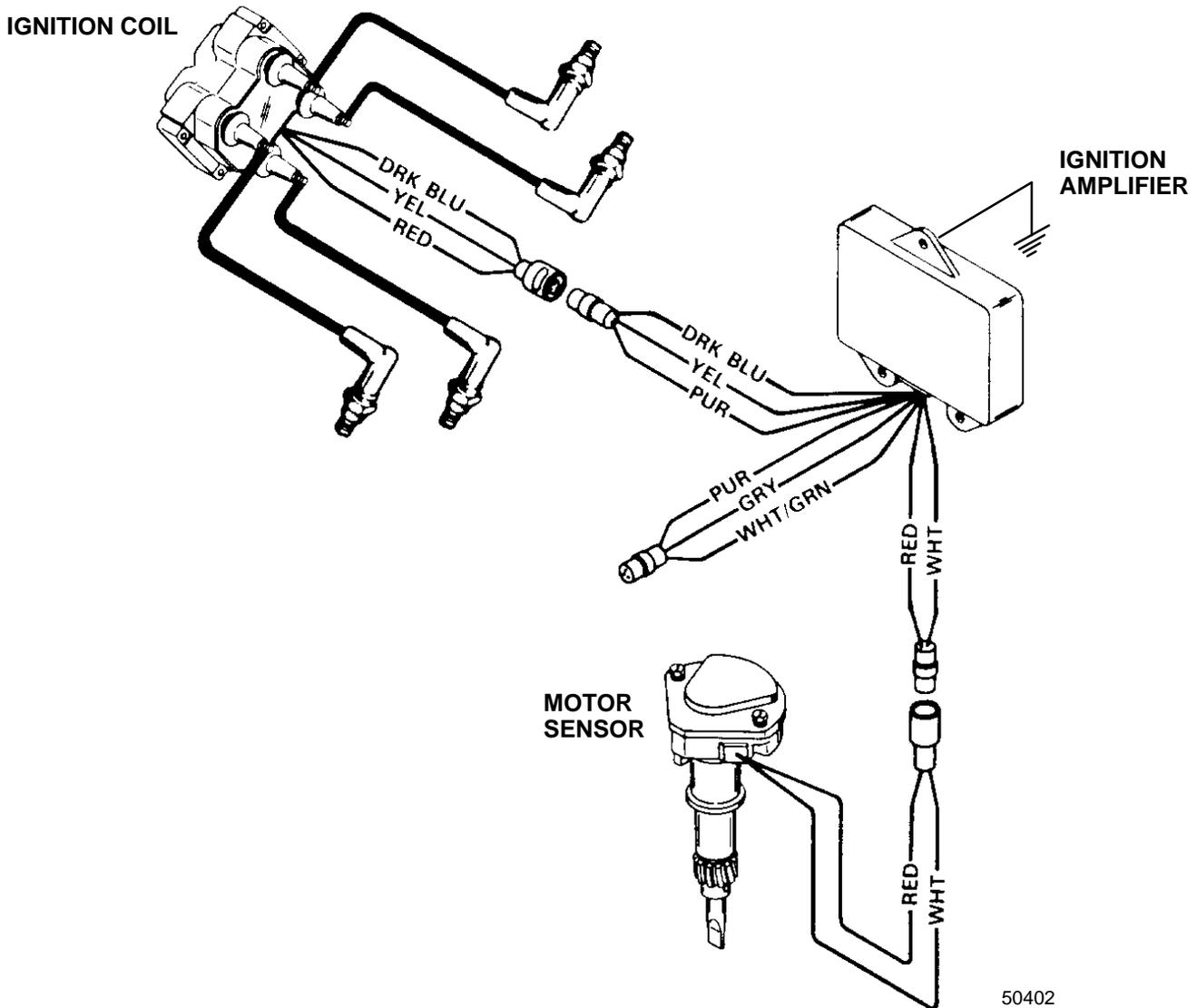
A motion sensor replaces the conventional distributor and senses crankshaft position.

The ignition amplifier controls coil output, spark advance, and limits engine speed to approximately 5000 RPM.

The ignition coil is actually two coils in one with four high voltage towers. The coils are fired on both compression stroke and exhaust stroke.

DDIS System Components

MCM 3.0L/3.0LX Models



IMPORTANT: Models equipped with Digital Distributorless Ignition System (D.D.I.S.) have an over-speed prevention control built into the system. The control module limits engine speed to 5000 RPM, when speed exceeds 5000 RPM, the control misfires ignition spark and continues to slow

down engine until engine speed drops below 4800 RPM.

When the engine exceeds 5100 RPM, primary pulses to the ignition coil stop until engine speed drops below 5000 RPM.

Spark Advance Control

IMPORTANT: The ignition amplifier controls spark advance above 1000 RPM. There is no adjustment. Initial timing must be set below 1000 RPM.

NOTE: Many timing lights are inaccurate at high engine speeds; therefore, timing should not be adjusted above 1000 RPM.

Module Part Number: 18811T1

Module Advance: 18°

Initial Timing: 8° BTDC

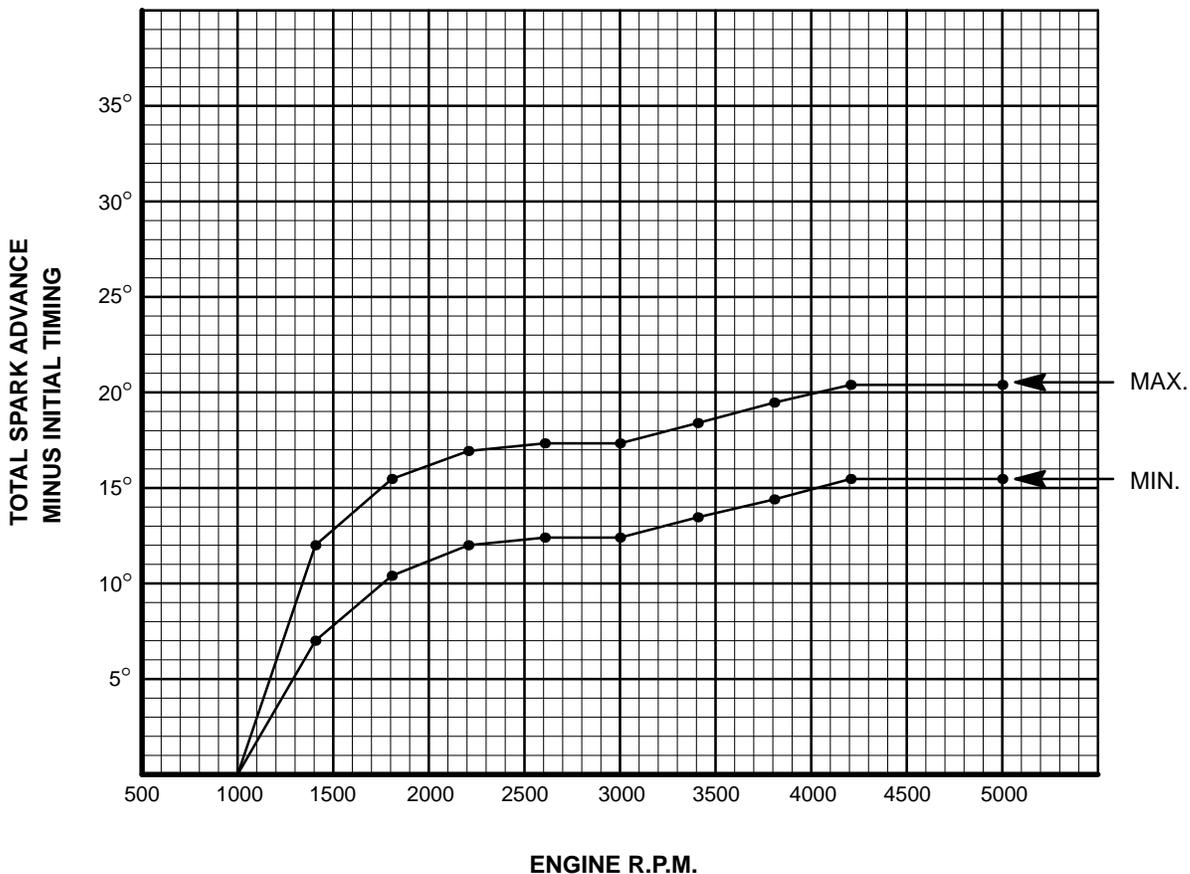
Total Advance: 26°

Advance Curve Chart (Reference Only)

IMPORTANT: Advance curve charts do not include the initial engine timing. Basic initial timing must be added to chart for total advance curve.

EXAMPLE: Advance curve chart shows 13° spark advance at 2000 RPM. Add 8° BTDC initial timing for a total spark advance of 21° at 2000 RPM.

MCM 3.0 L DDIS MODELS



70808-4

Spark Advance Control

IMPORTANT: The ignition amplifier controls spark advance above 1000 RPM. There is no adjustment. Initial timing must be set below 1000 RPM.

NOTE: Many timing lights are inaccurate at high engine speeds; therefore, timing should not be adjusted above 1000 RPM.

Module Part Number: 18811T2

Module Advance: 18°

Initial Timing: 8° BTDC

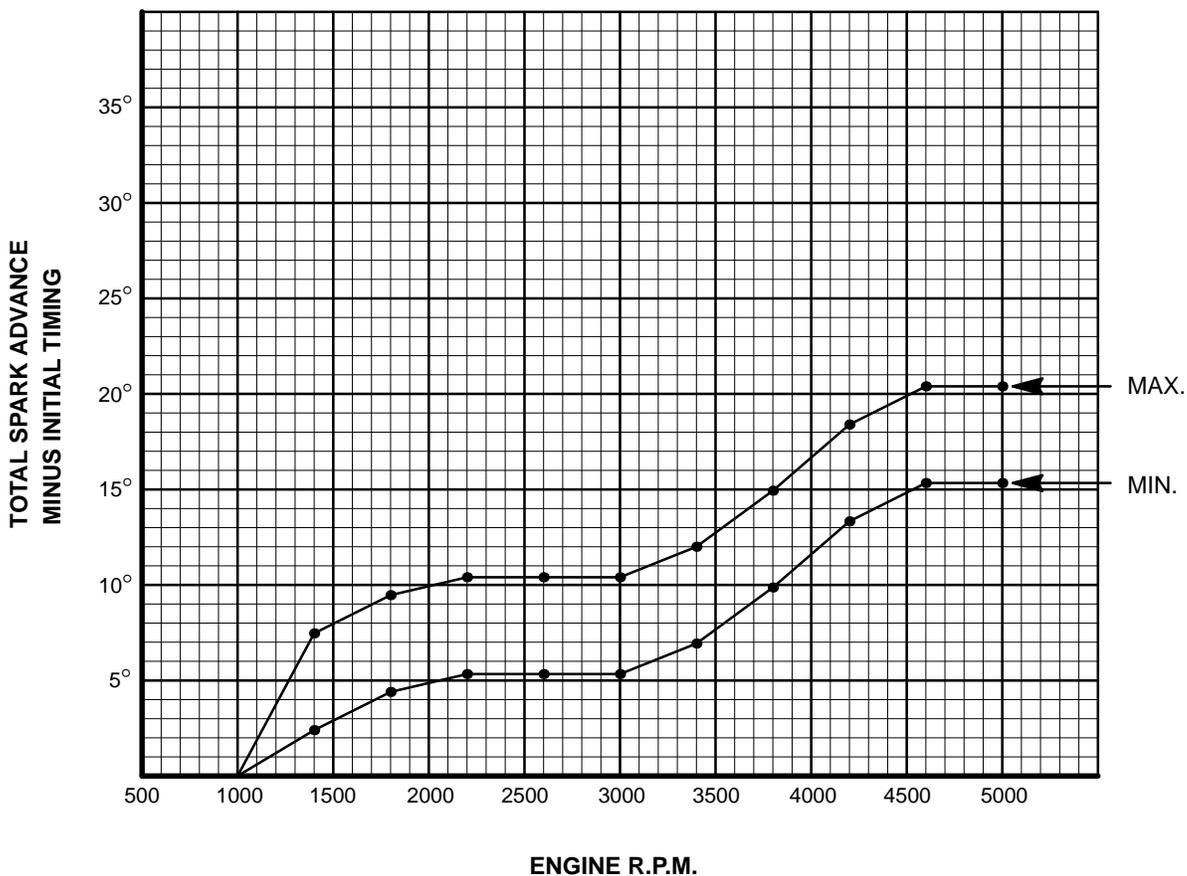
Total Advance: 26°

Advance Curve Chart (Reference Only)

IMPORTANT: Advance curve charts do not include the initial engine timing. Basic initial timing must be added to chart for total advance curve.

EXAMPLE: Advance curve chart shows 8° spark advance at 2000 RPM. Add 8° BTDC initial timing for a total spark advance of 16° at 2000 RPM.

MCM 3.0 LX (DDIS) MODELS



70808-5

Components Tests

IMPORTANT: Check spark plugs and spark plug wires before the DDIS system. Use Multi-Meter 91-99750 to test DDIS components.

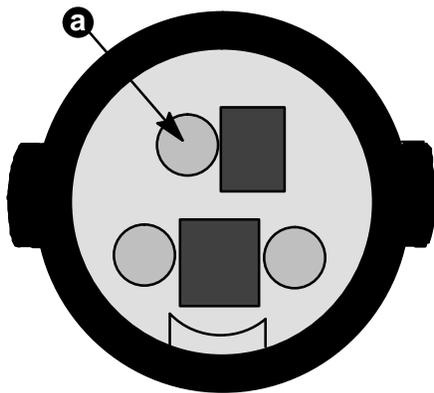
⚠ WARNING

When performing the following procedures, be sure to observe the following:

- Be sure that engine compartment is well ventilated and that no gasoline vapors are present, to avoid the possibility of fire.
- Be sure to keep hands, feet, and clothing clear of moving engine parts.
- Do not touch or disconnect any ignition system parts while engine is running.
- Do not reverse battery cable connections. System is negative (-) ground.
- Do not disconnect battery cables while engine is running.

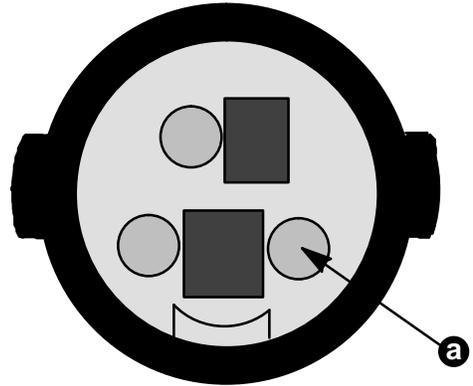
Ignition Amplifier

1. Disconnect ignition amplifier form coil. With the ignition switch in the "RUN" position, check voltage at terminal from ignition amplifier. Reading should be battery voltage.



a - Check Voltage Here

2. Disconnect engine harness form ignition amplifier. With ignition switch in the "RUN" position, check voltage at terminal from engine harness. Reading should be battery voltage.



a - Check Voltage Here

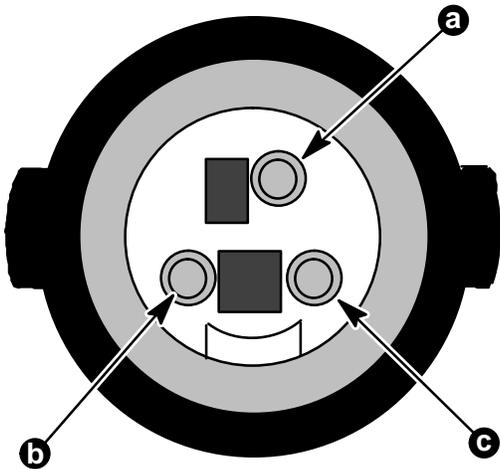
3. If voltage readings in steps one and two differ more than approximately 1/2 volt, ignition amplifier is defective.

Ignition Coil

NOTE: Ignition switch must be in the "OFF" position when testing ignition coil.

1. Primary coil resistance:

- a. Disconnect coil from ignition amplifier.
- b. Measure resistance between coil connector terminals as shown.



- a - Check Resistance From "a" to "b"
 b - Check Resistance From "b" to "c"

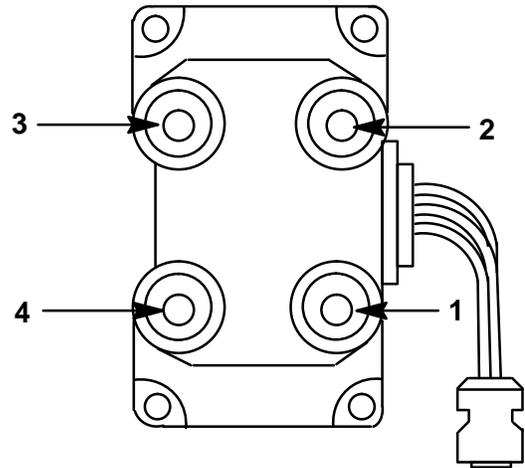
TERMINALS	RESISTANCE RANGE
a to b	1.9 - 2.5 Ohms * 1
a to c	

* At Room Temperature 68° F (20° C)
 1 Ohmmeter set on the Rx1 Scale

2. Secondary coil resistance:

- a. Disconnect spark plug wires from coil high voltage towers.

- b. Measure resistance between towers as shown.



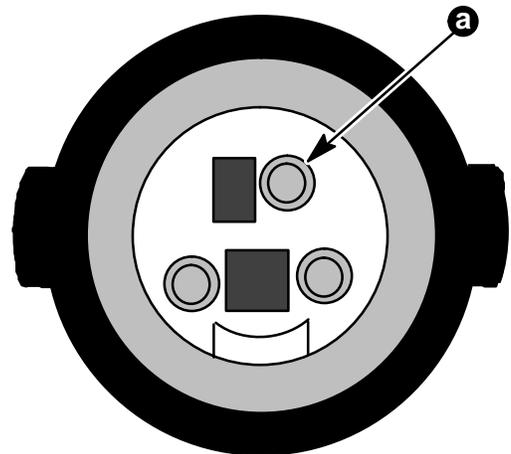
74672

* At Room Temperature 68° F (20° C)
 1 Ohmmeter set on the Rx1000 Scale

HIGH VOLTAGE TOWERS	RESISTANCE RANGE
1 to 4	11.3 - 15.5 Ohms * 1
2 to 3	

3. Coil insulation resistance:

- a. Measure resistance between coil connector terminal and engine ground. Minimum resistance - 10 megohms.



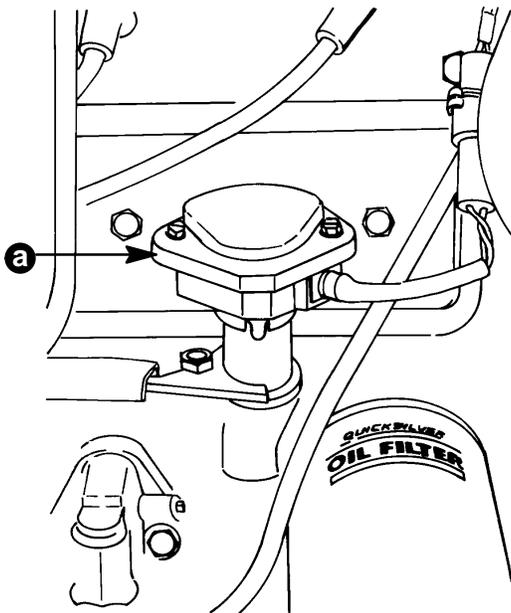
- a - Measure Resistance Between Here and Ground

- b. Measure resistance between each high voltage tower and engine ground. Minimum resistance - 10 megohms.

Motion Sensor

NOTE: Motion sensor is factory set and not adjustable.

IMPORTANT: Do not remove cover unless it is damaged. There are no serviceable parts inside the motion sensor. Replace entire unit if defective.

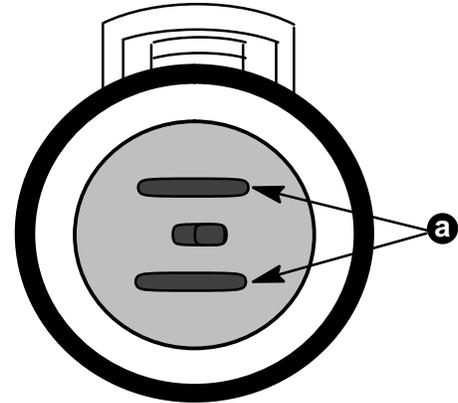


74537

Motion Sensor

1. With ignition switch in the "OFF" position, disconnect motion sensor from ignition amplifier. Measure resistance between sensor terminals. Resistance range - 140 to 180 ohms. (Rx10) If resistance is not within specifications, replace motion sensor.

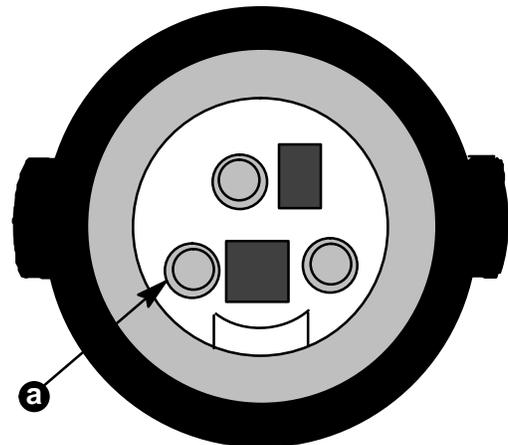
IMPORTANT: Motion sensor must be at room temperature, 68° F (20° C), when testing.



a - Check Resistance Between These Two Points

Shift Interrupter Switch

1. Disconnect ignition amplifier from engine harness. Check for continuity between harness connector (a) and engine ground. Switch is normally open. When shifting out of forward or reverse, switch will close momentarily.

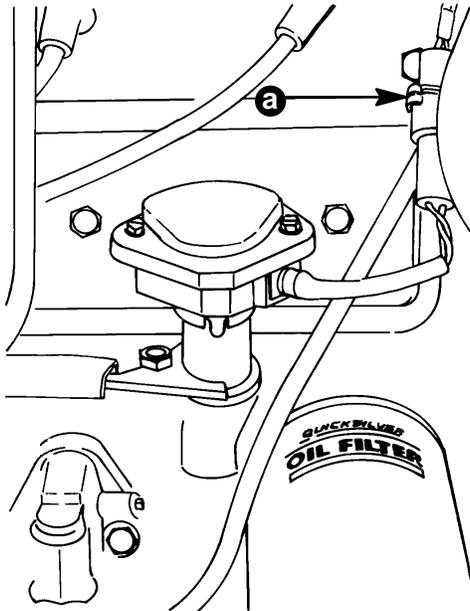


a - Check For Continuity From Here To Ground

Motion Sensor

Removal

1. Disconnect wires (a).



a - Wires

2. Crank engine until timing mark is on zero.
3. Remove motion sensor.

IMPORTANT: To simplify motion sensor reinstallation, do not turn crankshaft with motion sensor removed from engine.

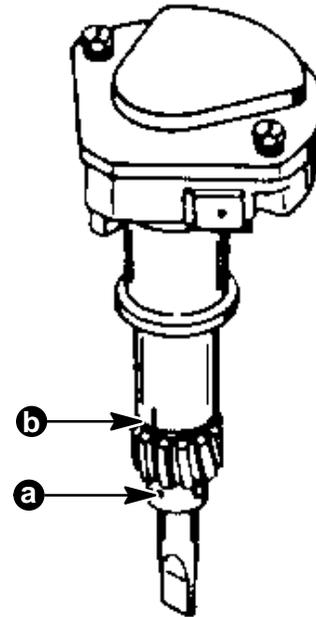
Installation

IMPORTANT: After installation, apply Liquid Neoprene to all mounting fasteners and ground wires of the ignition amplifier and ignition coil.

NOTE: The DDIS signals the coil to fire on both compression and exhaust strokes. To install the motion sensor, number one piston does not have to be TDC of its compression stroke. Simply align the timing mark on zero.

1. Crank engine until timing mark is on zero.

2. Align hole [not roll pin hole] in gear with notch on motion sensor housing. Install new gasket. Apply Quicksilver 2-4-C Marine Lubricant with Teflon to gear.

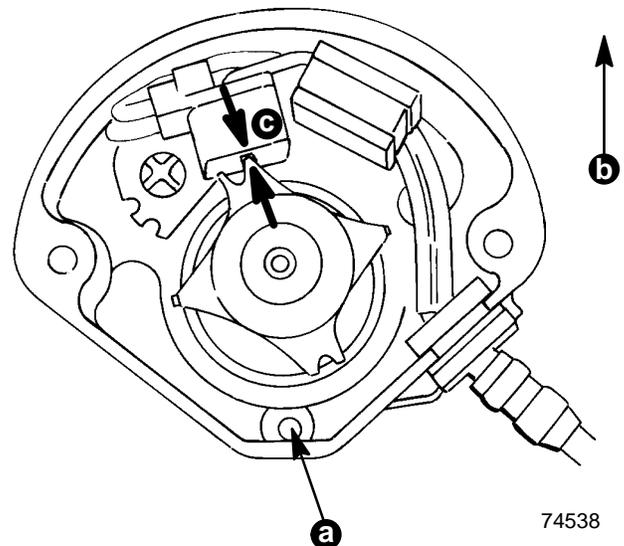


a - Hole

b - Notch in Motion Sensor Housing

NOTE: When installing motion sensor it may be necessary to turn oil pump drive shaft for alignment with motion sensor drive shaft.

3. Remove motion sensor cover. Install motion sensor so drain hole is opposite engine block and sensor is aligned as shown.

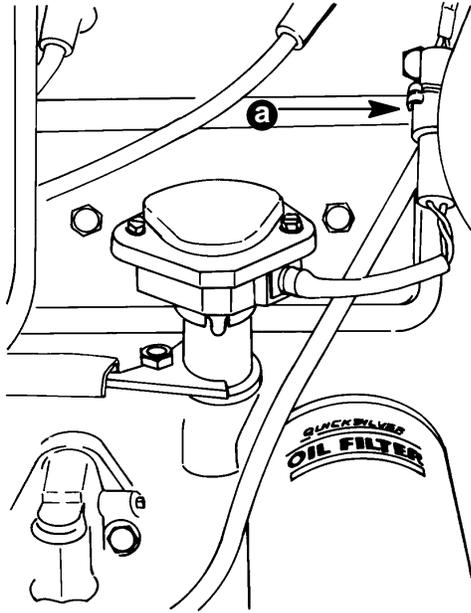


a - Drain Hole

b - Toward Engine Block

c - Align These

4. Reinstall cover. Tighten screws securely.
5. Connect wires.



26549

a - Connect Wires

DDIS Ignition Timing

1. Connect timing light to No.1 spark plug. Connect power supply leads on light to battery.

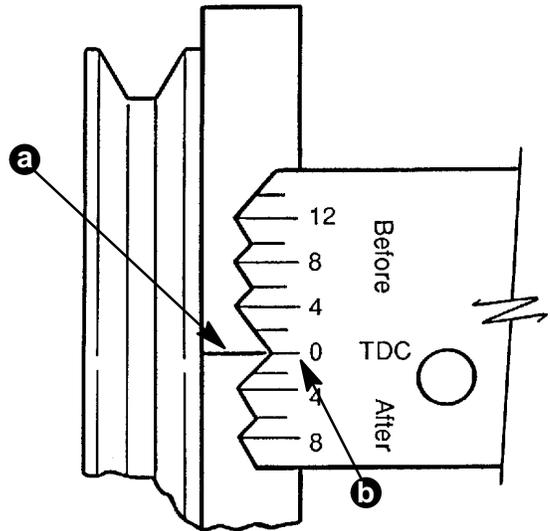
CAUTION

If the following procedure is performed out of water, a water source must be supplied to the water intake openings in gear housing.

2. Start engine and run at normal idle speed (under 900 RPM - use tachometer in boat instrumentation).

3. Adjust timing by loosening clamp and rotating motion sensor, as required, until timing mark on pulley aligns with 8° BTDC mark on tab. Torque clamp bolt to 20 lb. ft. (27 N·m), and recheck location of timing mark.
4. Stop engine and disconnect timing light.

IMPORTANT: GM engine timing marks (on tab) are in 2° increments. Timing must be set on the "BEFORE" (Advance) side of "0" (Top Dead Center).



72328

Timing Marks on GM 4-Cylinder Engines

- a - Timing Mark
- b - Degree Marks

Delco EST Ignition

Torque Specifications

Fastener Location	Lb. Ft.	N•m
Distributor Clamp 3/8-16	20	27
Spark Plugs (14 mm)	15	20

Tools/Lubricants/Sealants

Mercury Marine Special Tools	
Description	Part Number
Dwell Meter	91-59339
Magneto Analyzer	91-76032
Remote Starter Switch	91-52024A1
Timing Light	91-99379
Volt/Ohm Meter	91-99750
Timing Jumper	91-818812A1
Liquid Neoprene	92-25711-1

Kent-Moore Tools	
Module Tester	J24642
Kent-Moore Special Tools 29784 Little Mack Roseville, MI 48066 Phone: (313) 574-2332	

Tools/Lubricants Obtained Locally
Point Spring Tension Gauge
Distributor Cam Lubricant

Specifications

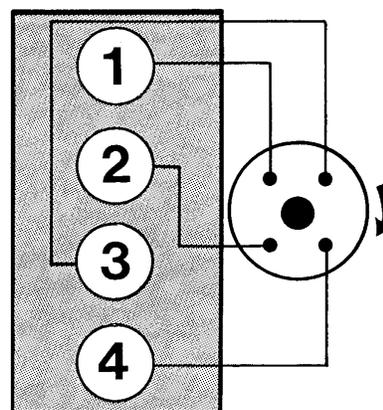
Timing (At Idle RPM)	EST Ignition* 1° BTDC
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* Timing must be set using a special procedure as outlined in this section. Timing cannot be properly set using the conventional method.

Spark Plugs

Spark Plug Gap	.035 In. (0.9 mm)
3.0L	AC-MR43T NGK-BR6FS Champion RV15YC4
3.0LX	AC-MR43LTS NGK-BPR6EFS Champion RS12YC

GM 4-Cylinder In-line Firing



Firing Order 1-3-4-2

50683

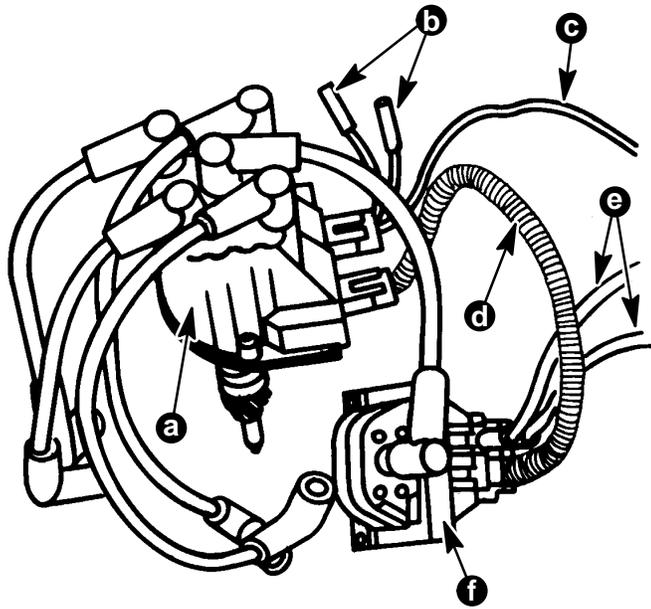
Description

EST or Electronic Spark Timing is a High Energy Ignition System (HEI). The distributor itself has no centrifugal advance mechanism or devices.

The spark plug wires are a carbon-impregnated cord conductor with a silicone rubber jacket. It is important they be handled with care, and routed so as not to cross each other, or to be in contact with other parts of the engine to prevent rubbing.

The EST System uses a square coil with epoxy covered windings to protect against moisture and arc-over.

The timing cannot be set the same way that other ignition systems were.

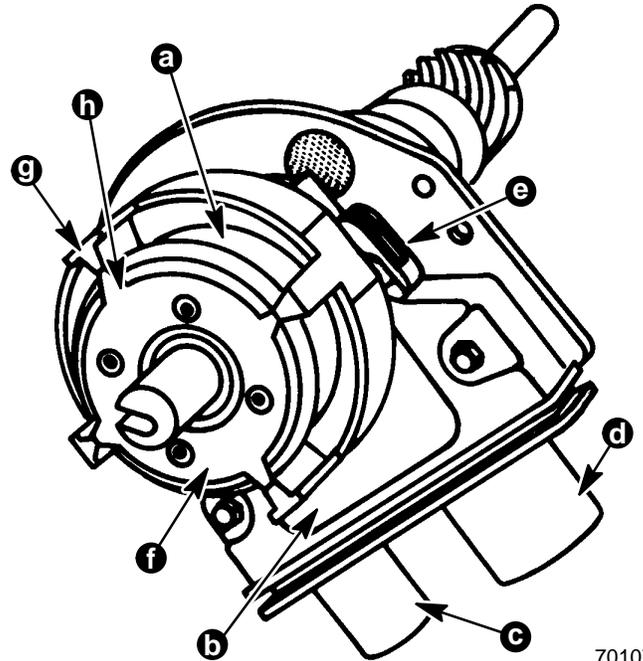


70106

- a - Distributor with Spark Plug Wires
- b - Wires (WHITE) Used in Timing Procedure
- c - Wire from Shift Interrupt Switch
- d - Distributor Harness
- e - Engine Harness Wire (PURPLE AND GRAY)
- f - Coil

EST uses a magnetic pulse generator and an electronic module to primary circuit current. Internally the Pulse Generator, or magnetic pick-up assembly, takes the place of conventional points. A timer core on the main shaft of the distributor has external teeth which align with an equal number of pole piece teeth (four for a four cylinder engine). The electronic module is small enough to allow it to be mounted inside the distributor, and contains the circuits necessary for dwell control and advance of the timing.

Molded into the module is a two-prong connector for the coil terminals and four prong connector. Only three of the four terminals of the second connector are used by MerCruiser (one for the shift interrupt and two white leads are used to "freeze" advance for properly setting initial timing). Inside the distributor, the pick-up coil attaches to the module at a molded prong connector.



70107

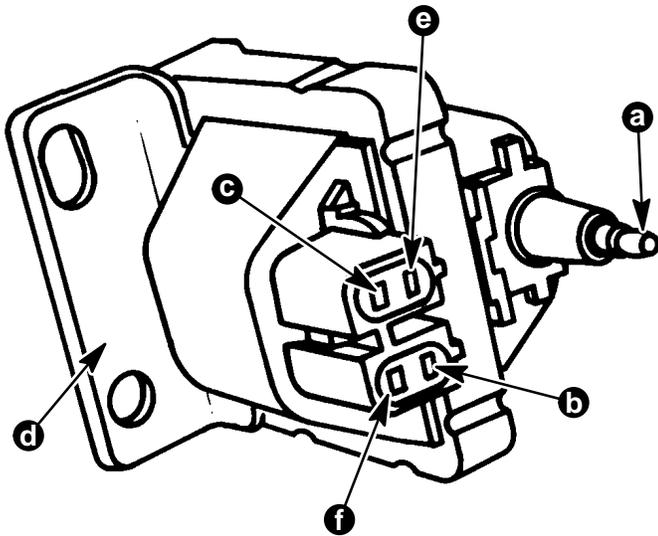
- a - Magnetic Pulse Generator
- b - Electronic Module
- c - Two Prong Connector
- d - Four Prong Connector
- e - Pick-up Coil Connector
- f - Timer Core
- g - Pole Piece Teeth
- h - External Teeth

Component Tests

The following tests can be made with the distributor and coil mounted on or off the engine. The test procedures will check each component of the distributor and ignition coil. Distributor cap and rotor should be checked for corrosion, cracks, carbon tracks or wear. Replace if needed.

In order to test the module, an approved module tester, such as Kent-Moore Tester, (J24642 or equivalent), must be used. Be certain to follow the manufacturer's directions precisely for proper results. However, do not overlook that corrosion on the terminals of the module could cause improper ignition action and should therefore be inspected and cleaned if needed.

Testing Ignition Coil



70104

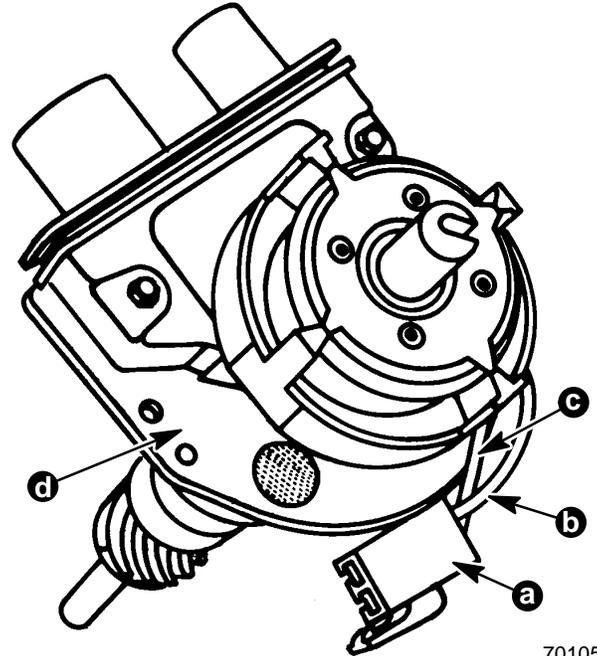
1. If not already done, disconnect wiring from ignition coil. Connectors are molded and keyed to assure proper positioning. The terminal (e) feeds 12 volts to the distributor.

NOTE: Upon reinstallation, first install black connector (distributor harness) to coil. Then install gray connector (engine harness).

2. Set ohmmeter to "Rx100" scale and connect one lead to 12 volt terminal (b) of coil and the other lead to "ground" (d), any clean metal on the coil frame. Reading should be infinite. If not, replace coil.
3. Set ohmmeter to "Rx100" scale and connect to 12 volt terminal (b) and terminal (c). Reading should be approximately .4 ohms. If not, replace coil.
4. Set ohmmeter to "Rx1" scale and connect to 12 volt terminal (b) and tachometer terminal (f). Reading should be approximately .4 ohms. If not, replace coil.

5. Set ohmmeter to "Rx100" high scale. Connect ohmmeter to 12 volt terminal (b) and to coil high tension post (a). Reading should be between 7800 and 8800 ohms. If it reads outside of this range, replace coil.

Testing Pickup Coil



70105

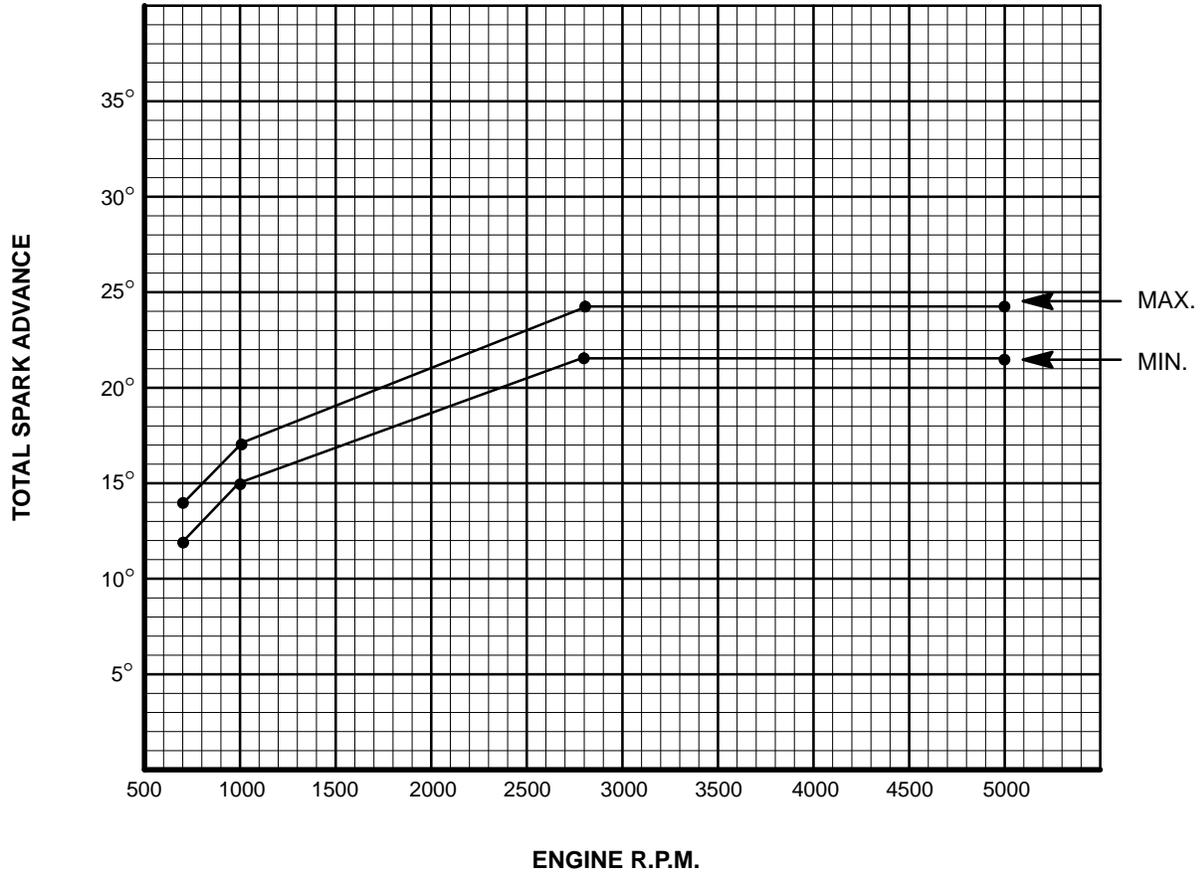
- a - Connector
- b - GREEN Lead
- c - WHITE Lead
- d - Distributor Housing

1. Remove distributor cap.
2. Identify the two pickup coil leads. On almost all applications these two leads are one WHITE and one GREEN. Remove the connector that houses these two leads from the module.
3. Set ohmmeter to "Rx1" scale. Connect one lead of ohmmeter to WHITE lead and the other to distributor housing. Reading should be infinite. If not, replace pickup coil.
4. Repeat Step 3 with ohmmeter connected to GREEN lead. Reading should be infinite. If not, replace pickup coil.
5. Set ohmmeter to "Rx100" scale. Connect ohmmeter to GREEN and WHITE pickup coil leads. Reading should be constant, unchanging value in the range of 500-1500 ohms. If not, replace pickup coil. Be certain to flex leads by hand during this test to locate possible intermittent "open" circuits (loss of continuity). If any exist, replace pickup coil.

MCM 3.0L, 3.0LX with EST

Module Part Number: 811637
Module Advance: See Notice
Initial Timing: 1° BTDC
Total Advance: 23°

NOTICE
Advance curve includes initial timing. **DO NOT** add initial timing degrees to total advance degrees.

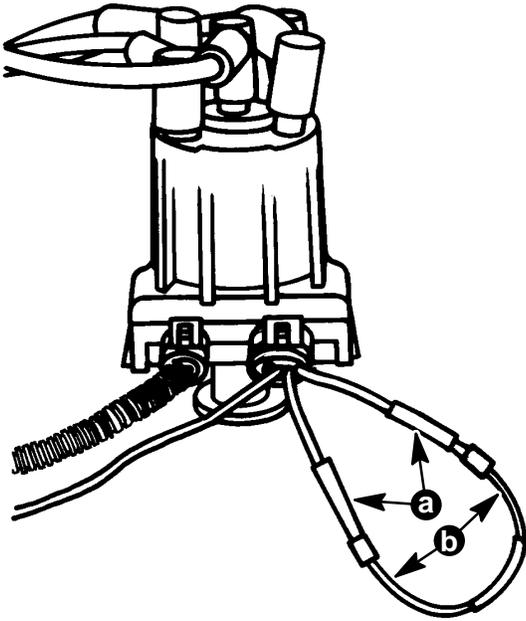


70808-15

Timing Procedure

IMPORTANT: Failure to follow the timing procedure instructions will result in improper timing causing performance problems and possible severe engine damage.

1. Start engine and allow to reach operating temperature.
2. With engine running, install a jumper wire across the two WHITE leads on the distributor using (91-818812A1), or fabricate one using a 6 in. (150 mm) section of 16 gauge wire with two male bullet terminal ends connected.



70103

a - WHITE Leads
b - Jumper Lead

3. Bypass the shift interrupt switch by disconnecting wires at shift interrupt switch. Temporarily join the engine harness wires together.

IMPORTANT: Do not fail to reconnect these two wires to the shift interrupt switch when timing procedures are complete.

4. With timing light connected, check timing. Timing should be 1° BTDC.
5. If required, loosen distributor hold down clamp and rotate distributor to obtain specified timing.
6. Secure distributor hold down clamp, and recheck timing as above.
7. Reconnect the two wires to the shift interrupt switch. Remove jumper wire at distributor white leads.

IMPORTANT: Be sure to remove jumper wire before returning engine to service, otherwise timing will not advance.

8. With timing light still connected, and engine at IDLE, verify that timing did advance to 12° BTDC, (plus or minus 2°). At 2400-2800 RPM maximum (total) advance is obtained and should be 27° BTDC (plus or minus 2°).