OUTBOARD POCKET SERVICE GUIDE

MERCURY OUTBOARDS

MERC MODELS
40 (2-0/4) 45-75-110
200-402 500-650-700
800-850-900-1150
1400-1500 and V-6's

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# LUBRICATION and MAINTENANCE CHART

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| Upper Shift Shaft, Lubricate |   |   |

**NOTE:** Complete list of maintenance is not applicable to all models.

§: Units operated in salt water.

*: Includes all pivot points and sliding surfaces unless stated elsewhere.

A: Super-Duty Quicksilver Gear Lubricant
B: Perfect Seal
C: Anti-Corrosion Grease
D: Multipurpose Quicksilver Lubricant
E: SAE SW-30 or SAE SW-20 Specification "SE" Automotive Oil
L: Quicksilver Marine Cleaner
M: Quicksilver Spray Paint

### QUICKSILVER LUBRICANTS

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<thead>
<tr>
<th>(From Your Mercury Dealer)</th>
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<tbody>
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<td>Corrosion and Rust Preventive</td>
<td>C-92-65360</td>
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<tr>
<td>Engine Cleaner</td>
<td>C-92-65314</td>
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<td>Formula 50 2-Cycle Motor Oil</td>
<td>C-92-65183 C-92-65186</td>
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<td>Formula 50-D 2-Cycle Motor Oil</td>
<td>C-92-65193 C-92-66229</td>
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<td>Multipurpose Lubricant</td>
<td>C-92-65250</td>
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<td>Perfect Seal</td>
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<td>Storage Seal</td>
<td>C-92-65323</td>
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<tr>
<td>Super-Duty Gear Lubricant</td>
<td>C-92-66617 C-92-68623</td>
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### TUNEUP SERVICE

#### TUNEUP SEQUENCE

1. Compression Check
2. Fire and Starter Motor Inspection and Adjustment
3. Oil, Water, and Fuel System Inspection and Adjustment
4. Alternator and Rectifier Inspection and Adjustments
5. Battery, Check and Adjustments
6. Ignition System Inspection and Adjustments
7. Spark Plug Inspection and Adjustment
8. Interval Writing Harp Inspection
9. Lower Gearcase Band Check and Adjustment
10. Lower Gearcase Band Check and Adjustment
11. Upper Gearcase Band Check and Adjustment
12. Upper Gearcase Band Check and Adjustment
13. Lower Gearcase Band Check and Adjustment

#### OUTBOARD TUNEUP

A. An engine tuneup is a service to bring maximum engine efficiency, performance, and reliability back into the engine at the same time, ensuring maximum economy and performance. A tuneup involves a thorough check of all the major systems and components of the engine. This includes checking the spark plugs, ignition system, fuel system, and cooling system. It is important to perform a tuneup on a regular basis to ensure the engine is running at its best performance. The tuneup procedure should be performed by a qualified technician to ensure all components are checked and adjusted to factory specifications. This will help maintain the engine in optimal condition and ensure long life and performance.

B. Check for satisfactory water pump operation prior to tuneup (or repair).
1. Compression Check

1. Remove spark plug wires and all spark plugs and check condition.
2. Disconnect or install a ground wire, as instructed on wiring diagram (see "Wiring Diagram" by model, following), to render ignition system inoperative while performing compression check.
3. Install compression gauge in spark plug hole.
4. Crank engine thru at least 4 compression strokes at wide-open throttle (WOT) to obtain highest possible reading.
5. Check and record compression of each cylinder. Variation of more than 15 psi, per sq. in. (1.056 kg/cm²) between cylinders indicates that lower compression cylinders are in some way defective, such as worn or sticking piston rings and/or scored pistons and cylinders.
6. Compression check is important because an engine with low or uneven compression cannot be tuned successfully to give peak performance. It is essential, therefore, that improper compression be corrected before proceeding with an engine tuneup.
7. If powerhead shows any indications of overheating, such as discolored or scored paint, inspect cylinders visually thru transfer ports for possible scoring. It is possible for a cylinder to be scored slightly and still have comparatively good compression.
8. Check water pump. A failure may be cause of overheating.

2. Spark Plugs Inspection and Adjustment

1. Inspect each spark plug for make and heat range. All plugs must be of the same make and number or heat range.
2. Remove spark plugs, clean and inspect. If center electrode is eroded (Figure 1), replace with new spark plug listed in "Timing/Synchronizing/Adjusting" section, following.
3. Inspect spark plug hole threads and clean before installing plugs.

CAUTION: Crank engine several times to blow out any material which might become dislodged during cleaning operation.

4. Install spark plugs in engine with new gaskets and tighten to 17 ft. lbs. (2.35 mkg) torque. Improper installation is one of the greatest single causes of unsatisfactory spark plug performance.
5. Always use a new gasket and wipe seats in head clean. Gasket must be fully compressed on clean seats to complete heat transfer and provide a gas tight seal in the cylinder. For this reason, as well as the necessity of maintaining correct plug gap, the use of correct torque is extremely important during installation.

3. Water Pump Installation

REMOVE WATER PUMP

1. Set gear housing in vise in upright position with skeg held between blocks of wood.
2. Remove centrifugal slinger from drive shaft.
3. Remove water pump body assembly.
4. Remove water pump and remove impeller and impeller drive pin and face plate.
5. Check impeller face plate and water pump insert closely for wear or damage.
6. Remove water pump base assembly and water inlet tube (if equipped).
7. Remove "O" ring and oil seal from base plate assembly and watch for shims under base assembly.

SHIMMING of WATER PUMP BASE

Lower units, with a ball bearing on the drive shaft, must be shimmed to "zero" clearance between drive shaft ball bearing and water pump base, as follows:
1. Position a new gasket to lower unit over water pump studs.
2. Install original shims, plus .020" (.51 mm) additional shims, above drive shaft bearing. This will result in an "over-shim condition".
3. Lubricate seal in water pump base. Remove "O" ring from water pump base to ease installation for measurement only.
4. Position water pump base into lower unit; push down firmly.
5. Measure gap between water pump base gasket and water pump base with a feeler gauge.
6. The gap measured, plus .002" (.051 mm), is the correct amount of shims to remove. This will result in "zero" gap between water pump base and drive shaft bearing, which is correct and will result in .002" compression of the gasket.

EXAMPLE: If gap measured is .010" (.25 mm), remove .012" (.30 mm) shim. If gap measured is .005" (.13 mm), remove .007" (.18 mm) shim.
7. Merc 110-75-45 models do not use a gasket. If gap measured is .005", remove .005" shim to give "zero" gap.
8. Install "O" ring on water pump base and install base to lower unit.

NOTE: Lower units with tipped drive shaft bearings do not require shimming of water pump base.

INSTALLING WATER PUMP

1. Install water pump base to face plate gasket, stainless steel face plate and face plate to water pump cover gasket.
2. Coat drive pin area of drive shaft with Multipurpose Lubricant (C-92-63250).
3. Position drive pin on drive shaft and install impeller. Check that drive pin does not slide out of flat area, as this will cause the impeller to be forced against the insert after assembly and result in premature impeller wear.
4. Coat insert area of water pump cover with Perfect Seal (C-92-34227) and install insert. Be sure that tab on insert enters location hole in water pump cover. Clean off any excess Perfect Seal that was displaced while installing insert.
5. Lubricate insert with Multipurpose Lubricant.
6. Slide water pump cover over drive shaft and down onto impeller while turning the drive shaft in a clockwise direction (viewed from top of drive shaft). Be sure that impeller drive pin is in position and impeller turns with drive shaft.
7. Install washers, lockwashers, nuts and bolt (as required) and torque to specifications, as follows:
   
   1/8" bolts 20 in. lbs. (23kg-cm)
   5/16" studs 40 in. lbs. (46kg-cm)
   1/4" studs 30 in. lbs. (35kg-cm)

8. Install water guide tube and drive shaft slinger.

4. Carburetors

CARBURETOR ADJUSTMENT

1. Jet size recommendations are intended as a guide (like a propeller chart). Try a size larger or smaller if in doubt. See jet sizes in chart, following.

2. No change in spark advance is recommended for elevation operation. Propellers of lower pitch should be used at high elevations to allow proper engine RPM.

HIGH SPEED ADJUSTMENT

High speed has a fixed jet, similar to those used in automobiles.

IDLE ADJUSTMENT (Integral Fuel Pump Type Carburetor Only)

1. Idle mixture and idle speed have been set at the factory. Due to local conditions, it may be necessary to readjust the carburetor (in the test tank or on the boat).

2. Set idle mixture screw specified turns from a lightly seated position. (See specified setting in following "Timing/Synchronizing/Adjusting", by model) Start engine and allow it to warm up to operating temperature in forward gear.

NOTE: All carburetor settings must be made in FORWARD gear with the engine properly warmed-up.

3. With engine running, slowly turn the idle mixture screw counterclockwise until the affected cylinders start to load up or fire unevenly, due to an over-rich mixture.

4. Slowly turn idle mixture screw clockwise until the cylinders fire evenly and engine picks up speed.

5. Continue turning clockwise slowly until too lean a mixture is obtained and engine slows down and misses.

6. Set idle mixture screw one to 1/4 turns counterclockwise from lean-out position to gain approximate true setting.

7. Do not adjust leaner than necessary to attain reasonably smooth idling.

8. Too lean a setting is a major cause of hard starting.

9. If engine hesitates during acceleration after adjusting idle mixture, it is too lean, and idle mixture should be thinned slightly until the engine accelerates correctly.

10. Idle engine and adjust "idle stop screw" on stop bracket so that engine idles at recommended RPM (see "Timing/Synchronizing/Adjusting", following, by model) in forward gear.

11. Run engine in forward gear (4000 to 5000 RPM) to clear engine and re-check idle RPM.

CARB. MAIN JET SIZES FOR ELEVATIONS

<table>
<thead>
<tr>
<th>Model</th>
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<th>Serial No. Range</th>
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</table>

Man = Main Jet; Vent = Vent Jet; Float Bowl Cover; Idle = Idle Air Jet
Mem: 1 (Fl) = .305m; 1 (Inh) = .254m
REPAIRS and ADJUSTMENTS

For carburetor repair procedures (disassembly, cleaning, adjustments and reassembly), refer to "Fuel Systems" in Service Manual (by carburetor type).

HARD STARTING

2-Cylinder Models
1. When starting a cold engine, choke shutter must be fully closed. Adjust choke linkage and choke return spring for fast, positive action of choke shutter.
2. It may be necessary to readjust the carburetor idle mixture screw up to 1/4-turn with each change in brand of gasoline to compensate for varying volatility and differences in refining process.

3-4 and 6-Cylinder Models
Hard starting is often traced to improper choke shutter operation. Adjust choke linkage and choke return spring for fast, positive action of the choke shutters.

5. Fuel System

FUEL PUMPS - VACUUM TYPE (Figure 3)
1. Wash all parts thoroughly and use compressed air to dry.
2. Inspect each part carefully for wear or damage.
3. Replace pulsator diaphragm with new, if old diaphragm shows the least sign of deterioration.
4. Be sure that valve seats provide flat contact area for valve disc.
5. Tighten elbows and check valve connections firmly when replacing.
6. Do not use Permatex on valve retainer gasket.
7. Check valves after reassembling fuel pump cover by blowing thru outlet hole. Air should blow thru valve but should close immediately when attempting to draw air thru it.

8. Check inlet valve by reverse procedure. If leakage is encountered, check for free operation and accurate setting of valves.
9. Worn or slightly warped valve will cause leakage. Replace with new valves for more accurate seating.
10. When installing fuel line fittings, we recommend aviation Permatex for sealing. Apply sparingly to avoid clogging of fuel lines.

CAUTION: Do not use Liquid Neoprene on fuel line fittings. Neoprene is recommended only for exposed electrical connections. Permatex is available thru all local hardware stores.

11. Reassemble fuel pump(s), using new gasket(s).

FUEL LINES and FILTERS
1. Inspect fuel lines for kinks, leaks and restrictions and correct any defects found. If necessary, remove fuel lines and blow out with compressed air to remove any foreign material. When reinstalling lines, be sure that they are not twisted or kinked, thereby causing restrictions.
2. Clean or replace fuel line filter element(s) as follows:
   a. Remove filter cover(s) and element(s).
   b. Wash parts in solvent and dry with compressed air.
3. Reinstall element(s).

NOTE: If a complaint of poor high speed performance exists, fuel pump pressure test should be performed.

FUEL PUMP DIAPHRAGM
A defective fuel pump diaphragm (Figure 4) is often mistakenly diagnosed as ignition trouble. A tiny pin-hole in diaphragm will permit gas to enter crankcase, causing that particular cylinder to wet foul the spark plug at idle speed. At higher speeds, gas quantity is limited and plug will fire normally.
6. Ignition System

1. Use Mercury Marine Thunderbolt Ignition Analyzer (C-91-62503A1). All ignition components must be checked.
2. Maker Points (1975 Merc-45): Maker points (with some time on them) will show discoloration, but this is not a reason for replacement. Points, that show zero resistance across contacts, are satisfactory. Maker points, which show slight resistance, may affect idle operation. Points, which show high resistance, may cause a malfunction of ignition system and subsequent loss of spark.

See "Troubleshooting Thunderbolt Ignition", information, following.

7. Starter Motor and Solenoid

STATER MOTOR

Testing Starter Motor

1. Be sure that battery is fully charged and at least 70 ampere-hour capacity before testing starter motor. Many starter motors are needlessly disassembled when battery actually is at fault.
2. Using a voltmeter, connected to the starter motor positive terminal and ground, check battery voltage under load as follows: With voltmeter connected, turn ignition switch to Start position while observing voltmeter. If voltage is 9½ volts or more and starter motor fails to operate, repair or replace starter motor.

Cleaning and Inspection of Starter Motor

1. Remove starter motor and disassemble.
2. With starter motor completely disassembled, except for removal of field coils, component parts should be cleaned and inspected. DO NOT use grease dissolving solvent for cleaning armature or field coils, as insulation will be damaged.
3. Test pinion gear and screw shaft. Pinion gear must move freely on screw. Check pinion gear to see that it is not chipped or worn excessively. Check for bent armature shaft.
4. Check that brush holders are not deformed or bent and will properly hold brushes against commutator.
5. Check brush springs. If tension is insufficient, the brushes will arc and wear very rapidly.
6. Check condition of brushes. If pitted or worn to one half their original length, they should be replaced.
7. Check fit of armature shaft in bushing and end plate. Shaft should fit snugly in bushing. If bushing is worn, it should be replaced. Apply No. 10 oil to this bushing before reassembly. Avoid excessive lubrication.
8. Check fit of bushing in commutator end plate. If this bushing is damaged or worn excessively, end plate bushing or assembly should be replaced. Apply No. 10 oil to this bushing before reassembly. Avoid excessive lubrication. Lubricant forced onto commutator will gum and cause poor commutation, with resulting decrease in starter motor performance.
9. Inspect armature commutator. If commutator is rough or out-of-round, it should be turned down and under-cut. Inspect points, where armature conductors join commutator bars, to make sure that it is a good firm connection. Burned commutator bar usually is evidence of a poor connection. Burned commutator bar usually is evidence of a poor connection.
10. To remedy any of preceding conditions, refer to the Service Manual.
11. Reassemble starter motor and lubricate pinion gear and screw shaft with No. 10 oil.
12. Check return spring for normal tension. Pinion must return from engaged position smoothly and rapidly.

TESTING SOLENOID

1. Turn selector switch of Magneto Analyzer to Position No. 2 (Distributor Resistance) and clip small red and black lead together.
2. Turn meter adjustment knob for Scale No. 2 until meter pointer lines up with set position on left side of "OK" block on Scale No. 2.
3. Unclip small red and black leads. (Figure 5)
4. Connect small red test lead to one large terminal of solenoid and connect small black test lead to other large terminal, as shown in Figure 1.

CAUTION: Do not connect battery leads to large terminals of solenoid, or meter will be damaged.

5. Using 12 volt battery and jumper leads, connect positive lead to small "S" terminal of solenoid.
6. Connect negative battery lead to "I" terminal of solenoid.
7. Meter pointer hand must move into the "OK" block, or solenoid is open-circuited and must be replaced.
8. With leads apart, "zero" meter to right side of Scale 2. Check between "S" and "I" terminal (2.1 to 2.7 ohms).
8. Alternator and Rectifier

**TESTING ALTERNATOR**

1. Alternator may be tested without removing flywheel.
2. Disconnect 2 yellow alternator leads from rectifier.
3. Turn selector switch of Magneto Analyzer to Position No. 2.
4. DO NOT clip small red and black leads together.
5. Turn No. 2 Scale meter adjustment knob to adjust meter needle with red line on right side of Scale No. 2.
6. Connect small red and black test leads to terminals of yellow or yellow/red alternator leads.
7. Read figures on Scale No. 2. Refer to specification chart, following, for model being tested. If alternator does not meet specifications, it should be replaced.

### ALTERNATOR STATOR SPECIFICATIONS

<table>
<thead>
<tr>
<th>Year</th>
<th>Model</th>
<th>Part No.</th>
<th>Gross Amperes</th>
<th>Output at Rectifier*</th>
</tr>
</thead>
<tbody>
<tr>
<td>1976-77-78</td>
<td>75</td>
<td>A-74367/A2, A9</td>
<td>35.45</td>
<td>35.45</td>
</tr>
<tr>
<td>1976-77-78</td>
<td>110</td>
<td>A-74367/A2, A9</td>
<td>35.45</td>
<td>35.45</td>
</tr>
<tr>
<td>1975-77-78</td>
<td>200</td>
<td>A-74367/A2, A9</td>
<td>35.45</td>
<td>35.45</td>
</tr>
<tr>
<td>1975-77-78</td>
<td>400</td>
<td>A-74367/A2, A9</td>
<td>35.45</td>
<td>35.45</td>
</tr>
<tr>
<td>1975-77-78</td>
<td>500</td>
<td>A-74367/A2, A9</td>
<td>35.45</td>
<td>35.45</td>
</tr>
<tr>
<td>1975-77-78</td>
<td>600</td>
<td>A-74367/A2, A9</td>
<td>35.45</td>
<td>35.45</td>
</tr>
<tr>
<td>1975-77-78</td>
<td>650/700</td>
<td>A-74367/A2, A9</td>
<td>35.45</td>
<td>35.45</td>
</tr>
<tr>
<td>1975-77-78</td>
<td>830</td>
<td>A-74367/A2, A9</td>
<td>35.45</td>
<td>35.45</td>
</tr>
<tr>
<td>1975-77-78</td>
<td>880-950</td>
<td>A-74367/A2, A9</td>
<td>35.45</td>
<td>35.45</td>
</tr>
<tr>
<td>1975-77-78</td>
<td>950-1000</td>
<td>A-74367/A2, A9</td>
<td>35.45</td>
<td>35.45</td>
</tr>
<tr>
<td>1975-77-78</td>
<td>1150-1500</td>
<td>A-74367/A2, A9</td>
<td>35.45</td>
<td>35.45</td>
</tr>
<tr>
<td>1975-77-78</td>
<td>1500-1600</td>
<td>A-74367/A2, A9</td>
<td>35.45</td>
<td>35.45</td>
</tr>
</tbody>
</table>

*At wide-open throttle with somewhat discharged battery.

**RECTIFIER CHECK on THUNDERBOLT IGNITION MODELS**

1. The rectifier will protect the switch box from damage if the harness plug becomes loose or is removed during engine operation, however, the rectifier will become damaged.
2. Disconnecting battery leads during engine operation or reversing the battery leads will also damage the rectifier.
3. An open circuit, such as a broken wire or loose connection on internal engine harness, can cause rectifier failure.
4. Leaving battery leads connected to the wrong terminals will damage the switch box.

**NOTE:** The engine can be operated without the rectifier if the alternator leads are disconnected and properly insulated. Tape each lead wire so that it cannot touch the other lead or engine ground.

Mercury Marine will not honor warranty on rectifiers and switch boxes which are damaged under conditions described above. Rectifier can be tested without removing it from engine by removing alternator stator leads and disconnecting external engine harness and red lead from rectifier terminals.

![Diagram of alternator and rectifier](image)

**TESTING DIODE TYPE RECTIFIERS (Figures 6-7-8)**

**NOTE:** Use VOA Electrical Tester (C21-52751a) to test rectifier. Red and yellow/red wires must be removed from rectifier before testing.

**IMPORTANT:** Before making any tests with VOA Tester, turn meter selector to range specified and adjust pointer to ohms set position with small red and black leads clipped together. Ohms set position MUST BE readjusted each time meter range is changed.

**NOTE:** Refer to Figures 6-7-8 for rectifier terminal identification.
<table>
<thead>
<tr>
<th>Check</th>
<th>Range</th>
<th>Reading</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 - Red VOA lead to ground, black lead alternately to terminals one (1) and 3.</td>
<td>Rx1000</td>
<td>Continuity</td>
</tr>
<tr>
<td>2 - Black VOA lead to ground, red lead alternately to terminals one (1) and 3.</td>
<td>Rx1000</td>
<td>No Continuity</td>
</tr>
<tr>
<td>3 - Black VOA lead to terminal 2, red lead alternately to terminals one (1) and 3.</td>
<td>Rx1000</td>
<td>Continuity</td>
</tr>
<tr>
<td>4 - Red VOA lead to terminal 2, black lead alternately to terminals one (1) and 3.</td>
<td>Rx1000</td>
<td>No Continuity</td>
</tr>
</tbody>
</table>

NOTE: If rectifier test readings are not attained, replace the rectifier. Failure to obtain stated readings in Tests 1 and 3 in chart, above, indicates that diodes are open-circuited. Failure to obtain stated readings in Tests 2 and 4 indicates that diodes are short-circuited.

6. Ratio of two readings should be 10:1 or greater.
7. Remove analyzer test leads and connect to the two alternator terminals on rectifier. Note reading of figures on lower hand Scale No. 3.
8. Reverse test leads on rectifier and note readings again.
9. The ratio of the two readings should be no more than 2:1.
10. This is only a preliminary test to determine condition of rectifier. If questionable, as a final test, rectifier should be installed on engine and checked with ammeter while engine is running.

Figure 8. Diode Type Rectifier Terminals - Merc V-6's and 850-800-700-650-500-200-110-75

**TESTING PLATE TYPE RECTIFIER (Figure 9)**

(By Measuring Direct Current Resistance on Magneto Analyzer)

1. Set selector switch on Position No. 3 (Continuity).
2. Clip small red and black test leads together and turn meter adjustment knob for Scale No. 3 until meter pointer hand lines up on set position on Scale No. 3, right side.
3. Connect small red and black test leads from analyzer to positive terminal and ground stud.
4. Note reading of figures on lower hand, Scale No. 3.
5. Reverse test leads on rectifier and note readings again.
6. Gross DC Amperage Output of Rectifiers on All 2-4 and 6-Cylinder Engines

(Use VOA Tester [C-91-52751] ONLY.)

1. Connect an ammeter between red output lead from the rectifier and electrical internal harness red lead.
2. Open disconnects and connect ammeter, attaching lead from rectifier to one terminal of ammeter and lead from internal harness to second terminal.
3. Start engine and check amperage output. See chart, preceding, for output by model.

RECTIFIER REPLACEMENT

CAUTION: Make sure that battery is disconnected before connecting or disconnecting any wires in electrical system.

Rectifier replacement is a nut-and-bolt operation.

9. Internal Wiring Harness

If trouble has been experienced with any of the electrical components, the internal wiring harness should be checked carefully. Check for frayed or chaffed insulation and/or loose connections between wires and terminal ends.

The harness connector should also be checked for possible corrosion and/or bent or broken electrical "prongs". If any of these conditions exist, they must be corrected before proceeding with the following tests.

Be sure that "prongs" of harness connector are clean and free of corrosion for a good electrical connection between harness connector and remote control harness.

SHORT TEST (See Wiring Diagram at End of This Book)

1. Disconnect internal wiring harness from electrical components.
2. Using Magneto Analyzer, Scale No. 3, check for continuity between any of the wires in the harness.
3. Use Scale No. 3 and check for continuity between any wire and ground.
4. If continuity exists, harness will have to be repaired or replaced.

RESISTANCE TEST (See Wiring Diagrams, Following)

1. Turn selector switch of Magneto Analyzer to Position No. 2 (Distributor Resistance) and clip small red and black leads together.
2. Turn meter adjustment knob for Scale No. 2 until meter pointer lines up with set position on left side of "OK" block on Scale No. 2.
3. Unclip small red and black leads.
4. Using wiring diagram as a guide, check each wire for resistance between harness connection and terminal ends.
5. If resistance exists, meter reading is outside "OK" block and harness must be repaired or replaced.

10. Adjustments before Testing

Refer to "Timing/Synchronizing/Adjusting" for particular models, following. Importance of correct timing and synchronization cannot be emphasized, as a motor, even in excellent mechanical condition, will not perform satisfactorily unless timing and synchronization are correct.

11. Boat Test

1. Mount motor on boat.
2. Install remote control cables and check for proper adjustment.
3. Electric Models:
   a. Inspect battery and cables and perform necessary service on these components.
   b. Inspect for signs of corrosion on battery, cables and surrounding area, loose or broken wires, cracked or bulged cases, dirt and acid, electrolyte leakage and low electrolyte level.
   c. Fill cells to proper level with distilled water or water passed thru a "demineralizer".
   d. Top of battery should be clean and battery fastened securely in position. Particular care should be taken so that tops of 12-volt batteries are kept clean of acid, film and dirt because of high voltage between battery terminals.
   e. For best results, when cleaning batteries, wash first with a dilute ammonia or soda solution to neutralize any acid present, then flush off with clean water.
   f. Keep vent plugs tight so that neutralizing solution does not enter cell.
   g. Hold down device should be kept tight enough to prevent battery from shaking around in its holder, but it should not be tightened to a point where battery case will be placed under a severe strain.
   h. To ensure good contact, battery cables should be tight on battery posts. If battery posts or cable terminals are corroded, cables should be cleaned separately with a soda solution and wire brush.
   i. After cleaning and before installing clamps, apply a thin coating of Multipurpose Lubricant (C-92-63250) to posts and cable clamps to help retard corrosion.
   j. If battery has remained under-charged, check for high resistance in charging circuit.
   k. If battery has been using too much water, it may be defective or under size.
4. Check fuel tank(s) for dirt, water and/or "stale" fuel.

NOTE: If any doubt exists, clean fuel tanks and refill with fresh fuel before continuing test.
If other than Mercury Marine fuel tanks are used, see "12. Additional Checks and Adjustments".

5. If possible, boat should be tested with average load.
6. Check motor tilt angle adjustment. Boat should ride on even keel.
7. If motor is equipped with adjustable trim tab, tab should be adjusted so that boat steers with equal ease in either direction.
8. Check engine RPM at full throttle. RPM should be within specified range. If RPM is not within specified range, check propeller pitch.

Higher pitch propeller will decrease RPM, lower pitch propeller will increase RPM.

For optimum low speed motor performance, we recommend that idle mixture and idle RPM be readjusted under actual operating conditions.

"HOOK" and "ROCKER"

Check boat bottom carefully before testing. Any marine growth, or a "hook" or a "rocker" in boat bottom, can greatly reduce performance.

12. Additional Checks and Adjustments

Following tests are described herein for use as required where either an abnormal condition, requiring further checking, has been detected during Tuneup, or a specific complaint exists:

Water Pressure (Use Water Pressure Gauge A-55645A1 or A-55644A1)
Fuel Pressure (Use Fuel Pressure Gauge C-91-30692)
WATER PRESSURE TEST (A-55664A1 or A-65614A1)

1. Water pressure at the cylinder block should be checked whenever an overheating condition is detected or suspected.
2. A large keel or other accessories, located on the boat bottom forward of the motor, can cause what is mistakenly diagnosed as water pump failure.
3. A motor mounted unusually high on the transom also can cause overheating. A solid, unrestricted water flow must be delivered to the gear housing for maximum cooling and engine efficiency.
4. Install necessary fitting and water pressure hose on the cylinder block and place water pressure gauge in convenient position for viewing while operating boat. Water pressure at full throttle under any running conditions, i.e., turning, maneuvering, etc., must be 5 psi (lbs. per sq. in.) (0.35kg/cm²) or more.

FUEL PRESSURE (C-91-30692)

1. Fuel pressure at the top carburetor should be checked whenever insufficient fuel is suspected, or if other than Mercury Marine fuel tank is used. Check "foreign" fuel tanks for the following:
   a. Adequate air vent in fuel cap.
   b. Fuel line large enough (5/16-to-3/8") (8-to-9.5mm).
   c. Filter on end of pickup too small or clogged, or fuel pickup tube too small.
2. Insufficient fuel supply will cause engine to run lean, lose RPM or cause piston scoring.
3. The fuel pressure gauge should be installed at the end of the fuel line that leads to the upper carburetor. Fuel pressure must be 2 psi (lbs. per sq. in.) (0.1-0.14kg/cm²) or more at full throttle.

LOW SPEED PERFORMANCE

For optimum low speed motor performance, we recommend that idle mixture and idle RPM be readjusted under actual operating conditions.

OPERATION at RECOMMENDED RPM

The correct propeller should be installed on the engine so that it will run at recommended RPM.

<table>
<thead>
<tr>
<th>Merc Model</th>
<th>Max. RPM Range 1978</th>
<th>Max. RPM Range 1977</th>
<th>Max. RPM Range 1976</th>
<th>Max. RPM Range 1975</th>
</tr>
</thead>
<tbody>
<tr>
<td>40 (2-Cyl.)</td>
<td>4300-4700</td>
<td>4300-4700</td>
<td>4300-4700</td>
<td>4300-4700</td>
</tr>
<tr>
<td>45</td>
<td>4500-5500</td>
<td>4500-5500</td>
<td>4500-5500</td>
<td>4500-5500</td>
</tr>
<tr>
<td>75</td>
<td>4500-5500</td>
<td>4500-5500</td>
<td>4500-5500</td>
<td>4500-5500</td>
</tr>
<tr>
<td>110</td>
<td>4500-5500</td>
<td>4500-5500</td>
<td>4500-5500</td>
<td>4500-5500</td>
</tr>
<tr>
<td>200</td>
<td>4500-5500</td>
<td>4500-5500</td>
<td>4500-5500</td>
<td>4500-5500</td>
</tr>
<tr>
<td>402</td>
<td>4500-5500</td>
<td>4500-5500</td>
<td>4500-5500</td>
<td>4500-5500</td>
</tr>
<tr>
<td>500</td>
<td>4500-5500</td>
<td>4500-5500</td>
<td>4500-5500</td>
<td>4500-5500</td>
</tr>
<tr>
<td>650</td>
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<td>4500-5500</td>
<td>4500-5500</td>
<td>4500-5500</td>
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<tr>
<td>650XS</td>
<td>4800-5500</td>
<td>4800-5500</td>
<td>4800-5500</td>
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<tr>
<td>700</td>
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<td>5000-5500</td>
<td>5000-5500</td>
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<td>5000-5500</td>
<td>5000-5500</td>
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<tr>
<td>850XS</td>
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<td>5000-5500</td>
<td>5000-5500</td>
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<tr>
<td>900</td>
<td>5000-5500</td>
<td>5000-5500</td>
<td>5000-5500</td>
<td>5000-5500</td>
</tr>
<tr>
<td>1150</td>
<td>5000-5500</td>
<td>5000-5500</td>
<td>5000-5500</td>
<td>5000-5500</td>
</tr>
<tr>
<td>1400</td>
<td>5000-5500</td>
<td>5000-5500</td>
<td>5000-5500</td>
<td>5000-5500</td>
</tr>
<tr>
<td>1500</td>
<td>5000-5500</td>
<td>5000-5500</td>
<td>5000-5500</td>
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<td>5000-5500</td>
<td>5000-5500</td>
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</tr>
<tr>
<td>1500 V-6</td>
<td>5000-5500</td>
<td>5000-5500</td>
<td>5000-5500</td>
<td>5000-5500</td>
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<tr>
<td>1750 V-6</td>
<td>5000-5500</td>
<td>5000-5500</td>
<td>5000-5500</td>
<td>5000-5500</td>
</tr>
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<td>2000 V-6</td>
<td>5000-5500</td>
<td>5000-5500</td>
<td>5000-5500</td>
<td>5000-5500</td>
</tr>
</tbody>
</table>

The lower RPM is recommended for large, heavy, slow boats or for commercial applications. The higher RPM is recommended for light, fast boats. The wider RPM range will result in greater satisfaction derived from maximum performance and maximum fuel economy.

If the engine speed is too high, try a higher pitch or the same pitch cupped. Likewise, if engine speed is low, try a lower pitch prop. There normally is a 300-500 RPM change between propeller pitches.

For dual installation, the next higher pitch propeller may be best. For water skiing, it may be desirable to use the next lower pitch; however, use caution — do not operate at full throttle when using ski propeller and not pulling skiers.

In this case, the propeller has too little pitch for the application, and dangerous overspeed of the engine may result. If the propeller has too much pitch for the application, acceleration will be slow.

Spark Plug and Ignition Data

<table>
<thead>
<tr>
<th>1975-6-7-8 Spark Plug Type</th>
<th>AC</th>
<th>Champion</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spark Model</td>
<td></td>
<td></td>
</tr>
<tr>
<td>AC</td>
<td>40</td>
<td>M43FF</td>
</tr>
<tr>
<td>Champion</td>
<td>76</td>
<td>L76</td>
</tr>
<tr>
<td>Merc</td>
<td>45</td>
<td>2400FM</td>
</tr>
<tr>
<td>Capacitor/Module Test</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Black to Capacitor Terminal</td>
<td>2</td>
<td>White Lead to Ground and Red to Green Cap Lead</td>
</tr>
<tr>
<td>Red to Blue Terminal and Black to Capacitor Terminal</td>
<td>3</td>
<td>Red to Blue Terminal and Black to Capacitor Terminal</td>
</tr>
<tr>
<td>Red to Blue Terminal and Black to Capacitor Terminal</td>
<td>4</td>
<td>Red to Blue Terminal and Black to Capacitor Terminal</td>
</tr>
<tr>
<td>Black to Blue Terminal and Black to Capacitor Terminal</td>
<td>5</td>
<td>Black Lead to Ground and Red to Green Cap Lead</td>
</tr>
</tbody>
</table>

NOTE: Turn in all spark plugs finger-tight before applying torque wrench. Torque plugs to 20 ft. lbs. (27.6kgf).

§ Champion QL7J5 or QL7J for countries other than U.S.

Merc 45 Capacitor/Module Test

<table>
<thead>
<tr>
<th>Capacitor/Module Part No.</th>
<th>Scale</th>
<th>Test Leads to —</th>
<th>Scale Reading</th>
</tr>
</thead>
<tbody>
<tr>
<td>A-336-4516A2 1 or 2</td>
<td>X 1000</td>
<td>Cont.</td>
<td>Black Lead to Ground and Red to Green Cap Lead 45-55</td>
</tr>
<tr>
<td>A-336-4453</td>
<td>3</td>
<td>No Cont.</td>
<td>Left Side</td>
</tr>
</tbody>
</table>

* TEST METERS:
1. VOA Meter (C-91-52751), black case §
2. Thunderbolt Ignition Analyzer Meter (C-91-62563A1), red case §
3. Merc-O-Tronic Ignition Analyzer (C91-25213) §

$ Zero meter before using
## Thunderbolt Ignition Stator and Stator Coil Checks

**IMPORTANT:** Disconnect Stator Leads before Testing Stator Assembly. Disconnect Stator Coil Wires before Testing Coils.

### Table

<table>
<thead>
<tr>
<th>Part No.</th>
<th>Stator Assembly</th>
<th>Test Leads to —</th>
<th>Scale Reading</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>43</strong></td>
<td><strong>(1976-77-78)</strong></td>
<td><strong>(1975-76-77-78)</strong></td>
<td></td>
</tr>
<tr>
<td>▲A-339-556Aa</td>
<td>R x 100</td>
<td>Between Yellow Stator Wire and Ground</td>
<td>15-20</td>
</tr>
<tr>
<td>▲A-339-556Ba</td>
<td>R x 100</td>
<td>Between Yellow and White Coil Wires</td>
<td>7-10</td>
</tr>
<tr>
<td>▲A-339-555Aa</td>
<td>R x 100</td>
<td>Between Yellow Stator Lead and Ground</td>
<td>5-8-1</td>
</tr>
<tr>
<td>▲A-339-556Bb</td>
<td>R x 100</td>
<td>Between Yellow and White Coil Wires</td>
<td>7-10</td>
</tr>
<tr>
<td><strong>75-110</strong></td>
<td><strong>(1975-76-77-78)</strong></td>
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<td></td>
</tr>
<tr>
<td>▲A-339-5209Aa</td>
<td>R x 100</td>
<td>Between Yellow Stator Lead and Ground</td>
<td>15-20</td>
</tr>
<tr>
<td>▲A-339-556Aa</td>
<td>R x 100</td>
<td>Between Yellow and White Coil Wires</td>
<td>7-10</td>
</tr>
</tbody>
</table>

### Scale Tester

- **Red Lead**
- **White Lead**
- **Yellow Lead**

### Test Leads

- **Red Lead**
- **White Lead**
- **Yellow Lead**

### Scale Reading

- **15-20**
- **7-10**
- **5-8-1**

### (Continued on Next Page)

<table>
<thead>
<tr>
<th>Part No.</th>
<th>Stator Assembly</th>
<th>Test Leads to —</th>
<th>Scale Reading</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>402</strong></td>
<td><strong>(1975-76-77-78)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>▲A-398-4770</td>
<td>R x 1000</td>
<td>Between Blue Stator Lead and Ground</td>
<td>5-6</td>
</tr>
<tr>
<td>▲A-398-5255</td>
<td>R x 1</td>
<td>Between Red Stator Lead and Ground</td>
<td>50-60</td>
</tr>
</tbody>
</table>

### Ignition Driver Leads

- **4.4-5.5**
- **10-11**
- **0-10**

### Blue Stator Wire and Engine Ground

- **5-7.5**
- **56-75**
- **No Cont.**

### High Speed Leads

- **8-9.1**
- **125-175**
- **No Cont.**

### Low Speed Leads

- **5.4-6.2**
- **125-175**

### Not necessary to disassemble ignition driver. Leads must be disconnected from switch box.
TIMING/SYNCH./ADJUSTING
Merc 40 (2-Cyl.)

Firing Order
Spark Plug
Spark Plug Gap
Idle Timing
Timing Maximum Advance (WOT)
Throttle Pickup
Full Throttle RPM
Idle RPM
Water Pressure (at Flush Hole)

Alternate Firing
Champion L7J or AC-M43FF
(United States Only)*
.050" (1.27mm)
15° to 16° ATDC §
22° to 26° BTDC
14° ± 2° ATDC
4300 to 4700 RPM
600 to 700 RPM in Gear
5 to 1.0 psi at idle in Gear;
2.0 to 3.0 psi at WOT in Gear

*For countries other than the United States, use Champion QL7JS or
QL7.
§Set idle timing 2° below the advanced reading which is obtained as
idle speed approaches 600 RPM.

STATIC TIMING PROCEDURE
1. Place throttle lever in full retard position and carburetor shutter plate fully closed. Loosen throttle cam adjustment screw (Figure 1) and adjust throttle cam to provide .005" to .015" clearance between throttle cam and cluster pin. (Figure 1) Retighten throttle cam adjustment screw securely.

Figure 1. Adjustment Locations

- Advance Cable
- Retard Cable
- .005" to .015" (.127mm to .391mm) Clearance between Cluster Pin and Throttle Cam at Closed Position
- 3-to-4 Threads (1/8") Exposed on Retard Cable
2. Adjust retard cable (Figure 1) so that approximately 3-to-4 threads (3.2mm) are exposed, as shown in Figure 1. Tighten jam nuts securely.
3. With twist grip held against idle stop, adjust advance cable (Figure 1) until no slack exists in cable. Tighten jam nuts securely.
4. Remove remote idle lever from idle screw (on carburetor) and preset carburetor idle screw at 1¼ turns (± ¼ turn) out from lightly seated position.

DYNAMIC TIMING PROCEDURE
1. Place engine in a test tank and remove engine cowl.

2. Connect Timing Light (C-91-35507) to engine by connecting red lead to engine cowl.
3. Start engine, shift into DYNAMIC.
4. With twist grip held against idle stop, advance carburetor. Adjust carburetor setting as follows:
   a. Turn to mstrly
   b. Adjust trigger link rod (Figure 2) to set idle timing at + 1/8" ATDC. If throttle pickup is incorrect, repeat adjustment.
5. Advance throttle grip until top cowl, flywheel and module cover to expose maker-point set.
6. Rotate crankshaft to place cam follower at high point on cam (Figure 1). Adjust point gap to .020" (.51mm) and reinstall flywheel. Torque flywheel nut to specification in "Specifications" section of Service Manual.
7. Remove spark plug and install Dial Indicator (C-91-58222) into spark plug hole.
8. Rotate crankshaft clockwise to find piston TDC (top dead center). Set dial indicator at zero and lock set screw. (Figure 2)
9. Rotate crankshaft counterclockwise to place piston at 198° (5.03mm) BTDC.
10. Using VOA Meter (C-91-32751), set meter on R x 1000 scale. Clip test leads together and zero meter to right side of scale. Connect red test lead to ignition coil white wire terminal and black lead to engine ground.
11. Turn twist grip throttle to open throttle to maximum spark advance point. (Figure 3)

TIMING/SYNCH./ADJUSTING
Merc 45 with Phase-Maker Ignition

<table>
<thead>
<tr>
<th>Firing Order</th>
<th>Single Cylinder</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spark Plug</td>
<td>AC-V40FFK &amp; Champion L78V</td>
</tr>
<tr>
<td>Spark Plug Gap</td>
<td>Not Adjustable</td>
</tr>
<tr>
<td>Timing Maximum Advance</td>
<td>.198° BTDC</td>
</tr>
<tr>
<td>Throttle Pickup</td>
<td>9° ATDC</td>
</tr>
<tr>
<td>Full Throttle RPM</td>
<td>5° ATDC</td>
</tr>
<tr>
<td>Idle RPM</td>
<td>4500-5500 RPM</td>
</tr>
<tr>
<td>Water Pressure (at Tell-Tale)</td>
<td>650-800 RPM in Forward Gear (Approximately 9° to 12° ATDC)</td>
</tr>
</tbody>
</table>

TIMING ADJUSTMENTS
1. Remove top cowl, flywheel and module cover to expose maker-point set. (Figure 1)
2. Rotate crankshaft to place cam follower at high point on cam (Figure 1). Adjust point gap to .020" (.51mm) and reinstall flywheel. Torque flywheel nut to specification in "Specifications" section of Service Manual.
3. Remove spark plug and install Dial Indicator (C-91-58222) into spark plug hole.
4. Rotate crankshaft clockwise to find piston TDC (top dead center). Set dial indicator at zero and lock set screw. (Figure 2)
5. Rotate crankshaft counterclockwise to place piston at 198° (5.03mm) BTDC.
6. Using VOA Meter (C-91-32751), set meter on R x 1000 scale. Clip test leads together and zero meter to right side of scale. Connect red test lead to ignition coil white wire terminal and black lead to engine ground.
7. Turn twist grip throttle to open throttle to maximum spark advance point. (Figure 3)
Figure 1. Setting Point Gap

Figure 2. Dial Indicator Installed

8. Use twist grip to keep throttle against maximum spark advance screw while adjusting screw until meter indicates points just close (meter needle swings down scale [to right]). Tighten stop screw locknut.

9. Adjust carburetor vertical shaft to allow approximately .050" (1.27 mm) play between vertical shaft and throttle cam. (Figure 3) Retighten screws to lock vertical lever in position.

10. Rotate crankshaft clockwise to place piston at .005" (1.27 mm) ATDC.

11. With VOA meter connected as in Step 6, close the throttle with twist grip until meter indicates points closed.

12. Adjust throttle cam to just touch vertical throttle lever. (Figure 4).

13. Remove dial indicator and install spark plug.

14. Pre-set carburetor idle mixture screw to one turn (.25 turn) from lightly seated position.

15. Start engine and allow it to warm up in forward gear. Set idle mixture screw for best idle (refer to "Fuel System" in Section 5).

Figure 3. Adjusting Maximum Spark Advance

16. Check that twist grip decal "Start" aligns with cast arrow (with engine running at 2500-3000 RPM in neutral).

17. Set idle RPM screw to attain 650-800 RPM in forward and tighten locknut.

Figure 4. Adjusting Throttle Pickup

a - Throttle Cam  b - Just Touching  c - Throttle Lever
TIMING/SYNCH./ADJUSTING
Merc 75 (Below Serial No. 4314385) and Merc 110 (Below Serial No. 4304785)

TIMING ADJUSTMENTS
1. Place engine in test tank and attach fuel line.
2. Install Timing Light (C-91-35507) by connecting large red lead to No. 1 spark plug, then connect one small lead to battery negative (-) post and other lead to positive (+) post.
3. Start engine and shift into forward gear. Turn twist grip to full throttle.
4. Adjust maximum spark advance screw (Figure 1) until timing line on flywheel aligns with timing specification on starter housing decal. (Figure 2)
5. Tighten jam nut on spark advance screw after adjustment is made.

CARBURETOR ADJUSTMENTS
1. Start engine and adjust idle mixture screw for best idle. Refer to carburetor adjustment information, preceding. This engine is equipped with an integral fuel pump carburetor. Follow proper idle mixture instructions. Do not set carburetor leaner than necessary, as a lean setting causes hard starting.
2. Set engine idle RPM stop screw to attain 650 to 750 RPM in forward gear.

MAXIMUM NEUTRAL RPM LIMITER
1. With engine running in neutral gear, loosen neutral RPM limiter screw (located in the bottom cowl). Move limiter toward rear of engine and tighten the screw only enough to place light tension on the limiter. (Figure 3)
2. Turn twist grip to attain 2400 to 2700 RPM, then tighten the limiter screw securely. Recheck limiter RPM by returning to idle, then opening throttle to the limit stop. Readjust if necessary.
3. Check that neutral RPM limiter does not interfere with throttle operation in forward gear. If it should interfere, move end of limiter toward cylinder block and recheck neutral RPM.

NOTE: This adjustment must be accurate to assure easy starting when engine is cold.

a - Timing Decal  b - Timing Mark
Figure 2. Timing Mark Alignment

Figure 1. Maximum Spark Screw and Idle Speed Screw

<table>
<thead>
<tr>
<th>Firing Order</th>
<th>Alternate Firing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spark Plug</td>
<td>AC-V40FFK or Champion L78*</td>
</tr>
<tr>
<td>Spark Plug Gap</td>
<td>Not Adjustable</td>
</tr>
<tr>
<td>Timing Maximum Advance</td>
<td>35° BTDC</td>
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<tr>
<td>Throttle Primary Pickup</td>
<td>Not Adjustable</td>
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<tr>
<td>Full Throttle RPM</td>
<td>4500-5500 RPM</td>
</tr>
<tr>
<td>Idle RPM</td>
<td>550-750 RPM in Forward Gear</td>
</tr>
<tr>
<td>Water Pressure (at Tell-Tale)</td>
<td>4 to 8 psi (.281 to .562 kg/cm²) @ 4500 RPM</td>
</tr>
</tbody>
</table>

* Merc 75's (below 4131610) and Merc 110's (below 4126620) use AC-V40FFM or Champion L76V

- Maximum Spark Advance Screw
- Idle Mixture Screw
- Locknuts
- Idle RPM Screw

Figure 3: Timing Mark Alignment
TILLER HANDLE DECAL PLACEMENT

1. With engine running in neutral gear, turn twist grip to attain 2500 to 2700 RPM. At this point the "Start" position on twist grip should align with indicator arrow on tiller handle. (Figure 4)
2. Reposition twist grip, if necessary, by removing 2 allen head screws at tiller handle knuckle. (Figure 5)
3. Pull handle apart far enough to clear teeth of gears. Turn twist grip to align marks and install screws.

NOTE: This adjustment must be accurate to assure easy starting when engine is cold.
TIMING/SYNCH/ADJUSTING
Merc 75 (Serial No. 4314385-thru-4397536) and Merc 110 (Serial No. 4304785-thru-4387436)

4. Advance twist grip until timing line on flywheel aligns with maximum timing mark (see specification above) on starter housing. Adjust maximum advance screw (Figure 1) until end of screw just touches throttle lever. Tighten jam nut.


CARBURETOR ADJUSTMENT
1. Restart engine and adjust idle mixture for "best idle" in forward gear. See carburetor adjustment information, preceding.
2. Set idle RPM to specification in forward gear.

MAXIMUM NEUTRAL RPM LIMITER ADJUSTMENT
1. With engine running in neutral, loosen neutral RPM limiter screw. (Figure 2) Move limiter toward rear of engine and tighten screw only enough to place light tension on limiter.
2. Turn twist grip to attain 2400-2700 RPM, then tighten limiter screw securely. Recheck RPM by returning to idle, then open throttle against limiter. Readjust limiter if necessary.
3. Check that neutral RPM limiter does not interfere with throttle operation in forward gear. If limiter interferes, move its back edge toward cylinder block, then recheck neutral RPM.

NOTE: This adjustment MUST BE accurate to assure easy starting when engine is cold.

TIMING ADJUSTMENTS
1. Place engine in a test tank and connect fuel line. Pre-set idle mixture screw at 1¼ turns (¾ turn) out from seated position.
2. Install Timing Light (C91-35507) by connecting red lead to No. 1 (top) spark plug and connecting black leads to battery positive (+) and negative (-) posts.
3. Start engine and place shift lever in forward gear.

<table>
<thead>
<tr>
<th>Firing Order</th>
<th>Spark Plug</th>
<th>Spark Plug Gap</th>
<th>Timing Maximum Advance</th>
<th>Throttle Pickup</th>
<th>Full Throttle RPM</th>
<th>Idle RPM</th>
<th>Water Pressure (at Tell-Tale)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Merc 75</td>
<td>Alternate Firing</td>
<td>AC-V40FFK or Champion L78V</td>
<td>Not Adjustable</td>
<td>30° BTDC</td>
<td>650-750 RPM (in Gear)</td>
<td>850-2500 RPM (in Gear)</td>
<td>4 to 8 psi (.281 to .562kg/cm²) at 5000 RPM</td>
</tr>
<tr>
<td>Merc 110</td>
<td>Not Adjustable</td>
<td>Not Adjustable</td>
<td>35° BTDC</td>
<td>(Approx. 10° ATDC)</td>
<td>(Approx. 15° ATDC)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Figure 1. Maximum Spark Advance Adjustment

Figure 2. Neutral RPM Limiter Adjustment
TILLER HANDLE DECAL PLACEMENT

1. With engine in neutral and twist grip turned against neutral RPM limiter, "Start" on twist grip decal must align with arrow on tiller handle. (Figure 3)

![Image 0x0 to 841x595]

Figure 3. Tiller Handle and Decal Alignment

2. Reposition twist grip, if necessary, by removing 2 allen head screws at tiller handle knuckle (Figure 4) and realign gears, as necessary, to align "Start" with arrow. Reinstall allen screws.

![Image 0x0 to 841x595]

Figure 4. Tiller Handle Gear Realignement

TIMING/SYNCH./ADJUSTING
Merc 75 (Above Serial No. 4397537) and Merc 110 (Above Serial No. 4387437)

TIMING ADJUSTMENTS

1. Place engine in a test tank and connect fuel line.
2. Pre-set carburetor idle mixture screw 1½ turns out from lightly seated position.
3. Connect Timing Light (C-91-35507) to No. 1 (top) spark plug.

![Image 0x0 to 841x595]

Figure 1. Maximum Spark Advance Timing Marks Aligned

4. Start engine and shift into forward gear. Advance engine RPM until maximum timing mark on flywheel is aligned with timing alignment mark on starter housing, as shown in Figure 1. Adjust maximum spark advance screw (Figure 2) so that end of screw just touches throttle lever. Retighten nut on adjustment screw. Return throttle back to idle and turn off engine. Disconnect timing light.

Firing Order
Spark Plug
Spark Plug Gap
Timing Maximum Advance
Throttle Pickup
Full Throttle RPM
Idle RPM
Water Pressure (at Tell-Tale)

Alternate Firing
AC-V40FFK or Champion L78V
Not Adjustable
Align Timing Marks
Not Adjustable
4500-5500 RPM
650-750 RPM in Gear
4 to 8 psi (.281 to .562 kg/cm²)
at 5000 RPM

Spark Plug
Gap
Not Adjustable

Timing Maximum Advance
Align Timing Marks
Not Adjustable

Full Throttle RPM
Idle RPM
Water Pressure (at Tell-Tale)

Timing Maximum Advance
Align Timing Marks
Not Adjustable
CARBURETOR ADJUSTMENT

1. Start engine and allow to warm up to normal operating temperature.
2. With engine running in forward gear, adjust carburetor idle mixture screw to attain "best idle" in forward gear. Refer to carburetor adjustment information, preceding.
3. Adjust engine idle RPM to specifications with engine running in forward gear. (Figure 3) Retighten nut on adjustment screw.

MAXIMUM NEUTRAL RPM LIMITER ADJUSTMENT

IMPORTANT: Maximum neutral speed limiter adjustment stops the rotation of tiller handle-twist grip when throttle is at specified maximum neutral speed. This adjustment must be accurate to assure easy starting when engine is cold and prevent engine from starting at maximum RPM.

1. With engine idling in neutral, loosen bolt (Figure 4) just enough to enable maximum neutral speed stop (Figure 4) to slide back-and-forth, then turn twist grip (advance engine RPM) to 2400-2700 RPM. Without turning twist grip, position and secure maximum neutral speed stop against neutral speed limiter follower. (Figure 5) This will stop throttle at maximum neutral speed. Recheck adjustment to see if maximum neutral speed stop stops the throttle at 2400-2700 RPM. Readjust if necessary.
2. Shift engine into forward and check that neutral speed stop does not interfere with throttle operation in forward gear. If stop interferes, move back edge of stop toward cylinder block.
a. Remove (and retain) 2 screws (Figure 5) which secure tiller handle to engine.
b. Realign gears (Figure 5), as necessary, to align "Start" with arrow.
c. Reinstall tiller handle to engine with 2 screws. Tighten screws securely.

d. Place engine in test tank and connect fuel line.
2. Pre-set carburetor idle mixture screw at 1/4 turns out from lightly seated position.

TIMING/SYNCH./ADJUSTING
Merc 200 (All Models, except Electric Models, Serial No. 4709593 and Above)

<table>
<thead>
<tr>
<th>Firing Order</th>
<th>Alternate Firing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spark Plug</td>
<td>AC-V40FFK or Champion L78V</td>
</tr>
<tr>
<td>Spark Plug Gap</td>
<td>Not Adjustable</td>
</tr>
<tr>
<td>Timing Maximum Advance</td>
<td>33° BTDC @ 5000 RPM</td>
</tr>
<tr>
<td>Throttle Pickup</td>
<td>Below Serial No. 4102790 - 2° BTDC to 2° ATDC; Above Serial No. 4102789 - 3° to 7° BTDC</td>
</tr>
<tr>
<td>Full Throttle RPM</td>
<td>4800-5500 RPM</td>
</tr>
<tr>
<td>Idle RPM</td>
<td>550-650 in Gear (Approx. 10° ATDC)</td>
</tr>
<tr>
<td>Water Pressure (at Tiel-Tale)</td>
<td>6 to 8 psi (.422 to .562kg/cm²) at 5000 RPM</td>
</tr>
</tbody>
</table>

1. Place engine in test tank and connect fuel line.
2. Pre-set carburetor idle mixture screw at 1/4 turns out from lightly seated position.

4. Start engine and shift into forward gear. Advance throttle to full throttle RPM and adjust 2 elastic stop nuts (Figure 1) or adjust link rod (Figure 2), so that timing mark on flywheel is aligned with 33° BTDC mark on rewind starter housing, as shown in Figure 3. Retighten elastic stop nuts (Figure 1) or jam nut (Figure 2) and return throttle back to idle.
5. With engine running in forward gear, advance engine speed so that timing mark on flywheel is aligned with specified throttle pickup, then adjust throttle pickup screw (Figure 4) so that end of screw just touches carburetor cluster pin, as shown in Figure 4. Retighten nut on adjustment screw. Return engine speed back to idle, turn off engine and disconnect timing light.

6. With engine not running, move throttle arm to wide-open-throttle (WOT) and adjust full throttle stop screw (Figure 5) to allow full carburetor shutter opening at WOT. Make sure that carburetor shutter does not act as a throttle stop. Allow .010" to .015" (.25mm to .38mm) clearance between throttle pickup screw and carburetor cluster pin.

MAXIMUM NEUTRAL SPEED LIMITER ADJUSTMENT

IMPORTANT: Maximum neutral speed limiter adjustment stops the rotation of tiller handle-twist grip when throttle is at specified maximum neutral speed. This adjustment must be accurate to assure easy starting when engine is cold and prevent engine from starting at maximum RPM.
1. With engine idling in neutral, loosen bolt (Figure 7) just enough to enable maximum neutral speed stop (Figure 7) to slide back-and-forth, then turn twist grip (advance engine RPM to 2400-2700 RPM). Without turning twist grip, position and secure neutral speed stop against neutral speed limiter follower, as shown in Figure 7. This will stop throttle at maximum neutral speed. Recheck adjustment to see if maximum neutral speed stop stops the throttle at 2400-2700 RPM. Readjust if necessary.

2. Shift engine into forward and check that neutral speed stop does not interfere with throttle operation in forward gear. If stop interferes, move back edge of stop toward cylinder block.

a. Remove (and retain) 2 screws (Figure 9) which secure tiller handle to engine.

b. Realine gears (Figure 9), as necessary, to align "Start" with arrow.

c. Reinstall tiller handle to engine with 2 screws. Tighten screws securely.

---

**TILLER HANDLE and THROTTLE DECAL ALIGNMENT**

1. With engine not running, shift into neutral position and turn twist grip until throttle is against maximum neutral stop. The word, "Start", on throttle decal must be aligned with arrow on tiller handle, as shown in Figure 8. If "Start" does not align with arrow, refer to steps, following:

---

a. Maximum Neutral Speed Stop  b. Bolt

*Figure 7. Neutral RPM Limiter Adjustment*

a. Allen Head Screws

*Figure 8. Tiller Handle Gear Realignment*

a. Arrow  b. "Start"

*Figure 8. Throttle Handle and Throttle Decal Alignment*
TIMING/SYNCH./ADJUSTING
Merc 200 Electric Model
(Serial No. 4709593 and Above)

<table>
<thead>
<tr>
<th>Firing Order</th>
<th>Alternate Firing</th>
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<tbody>
<tr>
<td>Spark Plug</td>
<td>AC-V40FFK or Champion L78V</td>
</tr>
<tr>
<td>Spark Plug Gap</td>
<td>Not Adjustable</td>
</tr>
<tr>
<td>Timing Maximum Advance</td>
<td>Align Interrupted Line with Timing Pointer</td>
</tr>
<tr>
<td>Throttle Pickup</td>
<td>Align Solid Line with Timing Pointer</td>
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<tr>
<td>Full Throttle RPM</td>
<td>4800-5500 RPM</td>
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<tr>
<td>Idle RPM</td>
<td>650-650 in Gear</td>
</tr>
<tr>
<td>Water Pressure (at Tell-Tale)</td>
<td>6 to 8 psi (.422 to .562kg/cm²) at 5000 RPM</td>
</tr>
</tbody>
</table>

1. Place engine in test tank and connect fuel line.
2. Preset carburetor idle mixture screw at 1½ turns out from lightly seated position.

![Figure 1. Maximum Spark Advance Adjustment (Model with Adjustable Elastic Stop Nuts)](10964)

- a - Elastic Stop Nuts (2)
- b - Link Rod

![Figure 2. Maximum Spark Advance Adjustment (Model with Adjustable Link Rod)](11025)

- a - Jam Nut
- b - Link Rod

![Figure 3. Timing Mark Alignment](10962)

- a - Maximum Spark Advance Timing Mark
- b - Throttle Pickup Timing Mark
- c - Timing Pointer

Start engine and shift into forward gear. Advance throttle to full throttle RPM and adjust 2 elastic stop nuts (Figure 1), or adjust link rod (Figure 2) so that timing pointer is aligned with maximum spark advance mark (interrupted line) on flywheel. (Figure 3) Retighten elastic stop nuts (Figure 1) and return throttle back to idle.
5. With engine running in forward gear, advance engine speed so that timing pointer is aligned with throttle pickup mark (solid line) on flywheel (Figure 1), then adjust throttle pickup screw (Figure 4) so that end of screw just touches carburetor cluster pin, as shown in Figure 4. Retighten nut on adjustment screw. Return engine speed back to idle, turn off engine and disconnect timing light.

6. With engine not running, move throttle lever to wide-open-throttle (WOT) and adjust full throttle stop screw (Figure 5) to allow full carburetor shutter opening at WOT. Make sure that carburetor shutter does not act as a throttle stop. Allow .010" to .015" (.25mm to .38mm) clearance between throttle pickup screw and carburetor cluster pin.

**CARBURETOR ADJUSTMENT**

1. Start engine and allow to warm up to normal operating temperature.
2. With engine running in forward gear, adjust carburetor idle mixture screw to attain "best idle" in forward gear. Refer to carburetor adjustment information, preceding.
3. Adjust idle RPM to specifications with engine running in forward gear (Figure 6) Retighten nut on adjustment screw.
1. With engine idling in neutral, loosen bolt (Figure 7) just enough to enable maximum neutral speed stop (Figure 7) to slide back-and-forth, then turn twist grip (advance engine RPM to 2400-2700 RPM). Without turning twist grip, position and secure neutral speed stop against neutral speed limit, as shown in Figure 7. This will stop throttle at maximum neutral speed. Recheck adjustment to see if maximum neutral speed stop stops throttle at 2400-2700 RPM. Readjust if necessary.

2. Shift engine into forward and check that neutral speed stop does not interfere with throttle operation in forward gear. If stop interferes, move bade edge of stop toward cylinder block.

**TIMING/SYNCH./ADJUSTING**

**Merc 402**

<table>
<thead>
<tr>
<th>Firing Order</th>
<th>Alternate Firing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spark Plug</td>
<td>AC-V40FFM or Champion L76V</td>
</tr>
<tr>
<td>Spark Plug Gap</td>
<td>Not Adjustable</td>
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<tr>
<td>Timing Maximum Advance</td>
<td>Align Notch with Solid Line on Flywheel</td>
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<tr>
<td>Throttle Primary Pickup</td>
<td>See Step 6</td>
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<tr>
<td>Throttle Secondary Pickup</td>
<td>Throttle RPM</td>
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<tr>
<td>Idle RPM</td>
<td>5000-5500 RPM</td>
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<tr>
<td>Water Pressure (at Cylinder Block)</td>
<td>550-650 RPM in Gear</td>
</tr>
<tr>
<td></td>
<td>6 to 14 psi (.422 to .984kg/cm²) at 5200 RPM</td>
</tr>
</tbody>
</table>

**IMPORTANCE:** When timing engine, use proper timing window, as shown in Figure 7.

**TILLER HANDLE and THROTTLE DECAL ALIGNMENT**

1. With engine not running, shift into neutral position and turn twist grip until throttle is against maximum neutral stop. The word "Start" on throttle decal must be aligned with arrow on tiller handle, as shown in Figure 8. If "Start" does not align with arrow, refer to steps, following:
   a. Remove (and retain) 2 screws (Figure 9) which secure tiller handle to engine.
   b. Realign gears (Figure 9), as necessary, to align "Start" with arrow.
   c. Reinstall tiller handle to engine with 2 screws. Tighten screws securely.

**Figure 8. Throttle Handle and Throttle Decal Alignment (for Models with Tiller Handle)**

**Figure 9. Tiller Handle Gear Realignment (for Models with Tiller Handle)**

**Figure 1. Timing Location - Merc 402**

1. Place engine in test tank and connect fuel line.
2. Pre-set carburetor idle mixture screw at 1/2 turns out from lightly seated position.
4. Start engine and shift into forward gear. Advance engine RPM until timing mark (2 dots) are aligned with notch in timing window, as shown in Figure 2. Adjust turnbuckle so that throttle cam just touches the primary pickup arm on carburetor cluster. (Figure 3) Realign turnbuckle locknuts and return engine speed back to idle.
With engine running in forward gear, advance engine speed to full throttle 5000-5200 RPM. Adjust maximum spark advance screw (Figure 5) until timing mark (straight line) on flywheel is aligned with notch in timing window, as shown in Figure 4. Return engine speed back to idle and turn off engine. Disconnect timing light.
CARBURETOR ADJUSTMENTS

1. Start engine and allow it to warm up in forward gear.
2. Adjust carburetor idle mixture screw to attain best idle in forward gear. See carburetor adjustment information, preceding.
3. Adjust engine idle RPM as follows:
   a. With engine in water, connect electrical harness and fuel line to engine. Start engine and allow to warm up.
   b. With throttle cable barrel removed from barrel retainer, adjust idle RPM to 500-650 RPM with engine running in forward gear. (Figure 9) Retighten nut on adjustment screw.
   c. With end of throttle cable connected to throttle lever, hold throttle lever against idle stop. Adjust throttle cable barrel to slip into barrel retainer on cable anchor bracket with a very light preload of throttle lever against idle stop. Lock barrel in place.
   d. Check preload on throttle cable by placing a thin piece of paper between idle stop screw and idle stop. Preload is correct when paper can be removed without tearing but has some drag on it. Readjust cable barrel, if necessary.

   IMPORTANT: Excessive preload on throttle cable will cause difficulty when shifting from forward to neutral. (Readjust throttle cable barrel, if necessary.)

6. With engine not running, position spark advance lever against maximum spark stop. DO NOT actuate throttle lever. Adjust secondary throttle pickup screw (Figure 6) so that end of screw just touches secondary pickup arm on carburetor cluster, as shown in Figure 7. Retighten nut on adjustment screw.
7. With engine not running, move throttle lever to wide-open-throttle (WOT) and adjust throttle stop screw (Figure 8) to allow full carburetor shutter opening at WOT. Make sure that carburetor shutter does not act as a throttle stop. Allow .010" to .015" (.25mm to .38mm) clearance between secondary pickup screw and secondary pickup arm on carburetor cluster.

   IMPORTANT: Excessive preload on throttle cable will cause difficulty when shifting from forward to neutral. (Readjust throttle cable barrel, if necessary.)
DISTRIBUTOR DRIVE BELT INSTALLATION

1. Rotate flywheel until "Alignment Mark" (straight line on flywheel rim) is aligned with center of distributor shaft. (Figure 1)
2. Rotate distributor pulley until arrow (cast into pulley) is pointing at flywheel alignment mark. Slip drive belt over pulley and install pulley cover, washers and bolt. Torque cover bolt to 60 in. lbs. (69 kg-cm). (Figure 1)

NOTE: When installing timing belt on 4 and 6-cylinder outboards with Thunderbolt Ignition, the arrow on the pulley may not align directly with the mark on the flywheel. If this should occur, align the arrow slightly clockwise (as viewed from front of outboard). This will appear to be approximately ½-tooth off. (Figure 2) Installing the belt ½-tooth to the left (counterclockwise) will cause engine synchronization difficult and result in rough engine operation.

TIMING ADJUSTMENTS

1. Place engine in a test tank and connect engine electrical harness and fuel line.
2. Preset carburetor idle mixture screws at 1½ turn out from seated position.

Figure 1. Distributor Drive Belt Installation
Figure 2. Alignment ½-Tooth Clockwise
Figure 3. Throttle Primary Pickup
3. Install Timing Light (C-91-35507) by connecting red lead to No. 1 (top) spark plug and connecting black leads to 12-volt battery positive (+) and negative (-) posts. Connect tachometer to engine.

4. With engine running in forward gear, open throttle to align timing mark (straight line on flywheel rim) with throttle primary pickup specification. (Figure 3)

5. With throttle positioned as in Step 4, loosen 2 actuator plate screws (Figure 4) and rotate actuator plate, as necessary, so that primary cam just touches primary pickup lever on carburetor cluster (Figure 5), then tighten screws.

6. Due to the electronic timing characteristics of this ignition, it is necessary to run the engine at wide-open-throttle (WOT) and to know the approximate RPM while adjusting the maximum spark advance. Refer to the chart, following, for maximum spark advance settings at differing RPM while at wide-open-throttle. Engine RPM will vary, depending upon propeller pitch and water level in test tank.

**NOTE:** The engine may be timed on a boat, but it must be timed at wide-open-throttle.

<table>
<thead>
<tr>
<th>Engine RPM at Wide-Open-Throttle</th>
<th>Maximum Spark Advance Setting</th>
</tr>
</thead>
<tbody>
<tr>
<td>2000-4000</td>
<td>38°-39° BTDC</td>
</tr>
<tr>
<td>4000-4500</td>
<td>37°-38° BTDC</td>
</tr>
<tr>
<td>5200-5500</td>
<td>35° BTDC</td>
</tr>
</tbody>
</table>

7. With engine running in forward gear at WOT, determine engine RPM with tachometer. Use this RPM to select correct maximum spark advance from the preceding chart. With engine running in forward gear at WOT, adjust maximum spark stop screw to align timing mark on flywheel rim with corresponding degree mark on timing decal. Tighten locknut. (Figure 6)


9. With distributor adaptor held against maximum spark stop screw (but not actuating economizer collar spring), adjust throttle secondary pickup screw (Figure 4) to just touch secondary pickup arm on carburetor cluster. (Figure 7) Tighten locknut.

---

**Figure 4. Throttle Actuator Plate Adjustment**

- a - Screws
- b - Throttle Actuator Plate
- c - Throttle Secondary Pickup Screw

**Figure 5. Throttle Primary Pickup Adjustment**

- a - Carburetor Cluster
- b - Actuator Plate
- c - Just Touching

**Figure 6. Stop Screw Locations**

- a - Maximum Spark Stop Screw
- b - Full Throttle Stop Screw
- c - Idle RPM Screw
10. Rotate throttle to WOT position and adjust throttle stop screw (Figure 5) to allow full carburetor opening, but not to allow throttle shutters to set a stop or the carburetor cluster to hit carburetor filter cover.

**CARBURETOR ADJUSTMENTS**

1. Start engine and adjust idle mixture screw for best idle in forward gear. See carburetor adjustment information, preceding.
2. Set idle RPM within specifications while in forward gear.

**TIMING/SYNCH./ADJUSTING**

**Merc 500 (Up to Serial No. 4576236) with Distributor-Less Ignition System**

<table>
<thead>
<tr>
<th>Firing Order</th>
<th>1-3-2-4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Firing Sequence</td>
<td>90° Consecutive</td>
</tr>
<tr>
<td>Spark Plug</td>
<td>AC-V40FFM or Champion L76V</td>
</tr>
<tr>
<td>Spark Plug Gap</td>
<td>Not Adjustable</td>
</tr>
<tr>
<td>Timing Maximum Advance</td>
<td>30° @ 5000 RPM</td>
</tr>
<tr>
<td>Throttle Primary Pickup</td>
<td>7°-9° BTDC</td>
</tr>
<tr>
<td>Throttle Secondary Pickup</td>
<td>At 30° (Maximum) Stop</td>
</tr>
<tr>
<td>Full Throttle RPM</td>
<td>4800-5500 RPM</td>
</tr>
<tr>
<td>Idle RPM</td>
<td>550-600 RPM (5° ATDC)</td>
</tr>
<tr>
<td>Water Pressure (at Cylinder Block)</td>
<td>3 to 5 psi (.211 to .352 kg/cm²) @ 2000 RPM</td>
</tr>
</tbody>
</table>

**TIMING ADJUSTMENTS**

1. Place engine in a test tank and connect engine electrical harness and fuel line.
2. Pre-set carburetor idle mixture screws at one turn out from seated position.
3. Connect Timing Light (691-35507) by connecting red lead to No. 1 (top) spark plug and connecting black leads to 12-volt battery positive (+) and negative (-) posts. Connect tachometer to engine.

---

**Figure 7. Throttle Secondary Pickup**

- Secondary Arm
- Secondary Pickup Screw
- Just Touching

---

**Figure 1. Actuator Plate Screw Location**

- Actuator Plate
- Screws (2)
- Secondary Throttle Pickup Screw
- Top Carburetor
5. With engine running in forward gear, move throttle arm to retarded RPM to approximately 550 to 600 RPM (5° ATDC). Adjust idle screw against throttle arm and tighten locknut.

6. Advance throttle arm to align 7°-9° BTDC marks on flywheel decal with timing pointer. Loosen 2 throttle actuator plate retainer screws and rotate actuator plate so that the primary cam just touches primary pickup arm on carburetor cluster. (Figures 1 and 2) Tighten 2 retainer screws.

NOTE: Due to electronic timing characteristics of this ignition system, it is necessary to set the maximum spark advance at 32° BTDC, as described in Step 6, to obtain 30° BTDC spark advance at 5000 RPM.

6. Advance throttle arm to align 32° BTDC mark on flywheel decal with timing pointer, adjust maximum spark stop screw to touch spark arm and tighten locknut. (Figure 3)

---

**CARBURETOR ADJUSTMENTS**

1. Start engine and adjust idle mixture screw for best idle in forward gear. See carburetor adjustment information, preceding.

2. Set idle RPM within specifications while in forward gear.
TIMING/SYNCH./ADJUSTING
Merc 500 (Serial No. 4576237 and Above)

Firing Order 1-3-2-4
Firing Sequence 90° Consecutive
Spark Plug AC-V40FFK or Champion L78V
Spark Plug Gap Not Adjustable
Timing Maximum Advance
Throttle Primary Pickup 30° @ 5000 RPM
Throttle Secondary Pickup 7°-9° BTDC
Full Throttle RPM
Idle RPM
Water Pressure (at Cylinder Block)

TIMING ADJUSTMENTS
1. Place engine in a test tank or, if engine is mounted on boat, place boat and engine in water. Connect electrical harness and fuel line to engine.
2. Pre-set carburetor idle mixture screw at one turn out from lightly seated position.

Figure 5. Throttle Lever against Full Throttle Stop

Figure 1. Throttle Actuator Plate
With engine running in forward gear, advance engine speed until timing pointer is aligned with 7°-9° BTDC mark on timing decal, then loosen 2 throttle actuator plate retainer screws (Figure 1) and rotate actuator plate

Figure 6. Throttle Stop Adjustment
a - Throttle Lever b - Stop Screw

a - Secondary Pickup Screw
b - Carburetor Cluster Secondary Lever
c - .010" to .015" Clearance

Figure 6. Throttle Stop Adjustment

a - Actuator Plate c - Secondary Throttle Pickup Screw
b - Screws (2) d - Top Carburetor
Actuator Plate...

**Figure 2. Primary Throttle Pickup Adjustment**

so that the primary cam just touches primary pickup arm on carburetor cluster, as shown in Figure 2. Retighten retainer screws and return engine speed back to idle.

**IMPORTANT:** Electronic timing characteristics of this ignition system require that, when adjusting maximum spark advance, it is necessary to set the maximum spark advance at 32° BTDC to attain 30° BTDC spark advance.

**Figure 3. Maximum Spark Advance Adjustment**

**Figure 4. Secondary Pickup Screw Adjustment**

**Figure 5. Full Throttle Stop Screw Adjustment**
6. With engine not running, move throttle lever so that spark lever is against maximum spark advance stop screw, then adjust secondary pickup screw (Figure 4) so that end of screw just touches secondary lever.

7. With engine not running, move throttle lever to wide-open-throttle (WOT). Adjust full throttle stop screw (Figure 5) to allow full carburetor shutter opening at WOT. Make sure that carburetor shutters do not stop in a throttle stop. Allow .010” to .015” (.25mm to .38mm) clearance between secondary pickup screw and carburetor cluster secondary lever, as shown in Figure 6.

CARBURETOR ADJUSTMENTS

1. Start engine and allow it to warm up in forward gear.
2. Adjust carburetor idle mixture screw to attain best idle in forward gear. See carburetor adjustment information, preceding.
3. Adjust engine idle RPM as follows:
   a. With engine in water, connect electrical harness and fuel line to engine. Start engine and allow to warm up.
   b. With throttle cable barrel removed from barrel retainer, adjust idle RPM to 550-600 RPM with engine running in forward gear. (Figure 7) Re-tighten nut on adjustment screw.
   c. With end of throttle cable connected to throttle lever, hold throttle lever against idle stop. Adjust throttle cable barrel to slip into barrel retainer on cable anchor bracket with a very light preload of throttle lever against idle stop. Lock barrel in place.
   d. Check preload on throttle cable by placing a thin piece of paper between idle stop screw and idle stop. Preload is correct when paper can be removed without tearing but has some drag on it. Readjust cable barrel, if necessary.

IMPORTANT: Excessive preload on throttle cable will cause difficulty when shifting from forward to neutral. (Readjust throttle cable barrel, if necessary.)

NOTE: Carburetor idle mixture is not equipped with adjustment screw, as on other Mercury Outboards. See carburetor jet chart, preceding, for jet change.

TIMING/SYNCH./ADJUSTING

**Merc 650 (1975)**

| Firing Order | 1-2-3 |
| Firing Sequence | 120° Consecutive |
| Spark Plug | AC-V40FFM or Champion L76V |
| Spark Plug Gap | Not Adjustable |
| Timing Maximum | 23° BTDC |
| Throttle Primary Pickup | 3°-5° BTDC |
| Throttle Secondary Pickup | Not Adjustable |
| Full Throttle RPM | 4800-5300 RPM |
| Idle RPM | 550-600 RPM |
| Water Pressure (at Cylinder Block) | 3 to 5 psi (.211 to .352kg/cm²) |
| | @ 2000 RPM |

DISTRIBUTOR DRIVE BELT INSTALLATION

1. Place timing pointer (packed in emergency start rope pouch) into notch in cylinder block, as shown in Figure 1.
2. Rotate flywheel to align “Belt Alignment Mark” with timing pointer.
3. Align cast tab on distributor pulley with raised area on distributor adaptor (Figure 1)
4. Place distributor drive belt over distributor pulley. Install pulley cover, screw and washer. Torque screw to 60 in. lbs. (69kg-cm).
TIMING ADJUSTMENTS

1. Place engine in a test tank and connect electrical harness and fuel line.
2. Preset carburetor idle mixture screws at one turn out from seated position.

a - Belt Alignment Mark  
b - Timing Pointer  
c - Cast Tabs Aligned  

Figure 1. Distributor Drive Belt Alignment

TIMING ADJUSTMENTS

1. Place engine in a test tank and connect electrical harness and fuel line.
2. Preset carburetor idle mixture screws at one turn out from seated position.

Figure 1. Distributor Drive Belt Alignment

Figure 2. Throttle Primary Pickup Adjustment

a - Just Touching  
b - Throttle Actuator Cam  
c - Just Touching  
d - Adjustment Screw

Figure 2. Throttle Primary Pickup Adjustment

Figure 3. Adjusting Maximum Spark Advance

a - Spark Advance Arm  
b - Spark Stop Screw  
c - Just Touching

Figure 3. Adjusting Maximum Spark Advance

Figure 4. Adjusting Full Throttle Stop Screw

a - Throttle Arm  
b - Throttle Stop Screw

Figure 4. Adjusting Full Throttle Stop Screw

With engine running in forward gear, open throttle to align 3°-5° marks on flywheel with timing pointer. Adjust the screw between throttle and spark arm, as necessary, to cause the throttle actuator cam to just touch throttle lever pin. (Figure 2) Tighten locknut.
5. Advance throttle arm to align 23° BTDC mark on flywheel with timing pointer and adjust maximum spark stop screw to just touch push arm. (Figure 3) Tighten locknut.
6. Return engine to idling speed and remove Timing Light and timing pointer. Place timing pointer in "Emergency Starter Rope Pouch".
7. With engine stopped, advance throttle arm to wide-open-throttle (WOT) position. Adjust full throttle stop screw to allow full carburetor shutters to open, but not to allow shutters to act as a stop. Allow .010" to .015" (.25mm to .38mm) between actuator arm and pin on throttle lever. (Figure 4)

CARBURETOR ADJUSTMENTS

1. With engine running in forward gear, adjust idle mixture screws for best idle. See carburetor adjustment information, preceding.
2. Adjust idle RPM to specification in forward gear. (Figure 5) Tighten locknut.

TIMING/SYNCH./ADJUSTING
Merc 650 with Distributor-Less Ignition

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Firing Order</td>
<td>1-2-3</td>
</tr>
<tr>
<td>Firing Sequence</td>
<td>120° Consecutive AC</td>
</tr>
<tr>
<td>Spark Plug</td>
<td>40/AFM or Champion L76V</td>
</tr>
<tr>
<td>Spark Plug Gap</td>
<td>Not Adjustable</td>
</tr>
<tr>
<td>Timing Maximum Advance</td>
<td>23° BTDC @ 5300 RPM</td>
</tr>
<tr>
<td>Throttle Primary Pickup</td>
<td>6°-8° BTDC</td>
</tr>
<tr>
<td>Throttle Secondary Pickup</td>
<td>Not Adjustable</td>
</tr>
<tr>
<td>Full Throttle RPM</td>
<td>4800-5300 RPM</td>
</tr>
<tr>
<td>Idle RPM</td>
<td>550-650 RPM (6°-8° ATDC)</td>
</tr>
<tr>
<td>Water Pressure</td>
<td>3-Plus psi (.21kg/cm²) @ 2000 RPM</td>
</tr>
</tbody>
</table>

![Image](image.png)

**Figure 5. Adjusting Idle Stop Screw**

**Figure 1. Timing Pointer Alignment**

**IMPORTANT:** When timing engine with an adjustable timing pointer, as shown in Figure 1, first adjust the timing pointer BEFORE proceeding to timing adjustments.

**TIMING POINTER ADJUSTMENT (Only for Engines with Adjustable Timing Pointer)**

**SAFETY WARNING:** Engine could start when turning flywheel to check timing pointer adjustment. Remove all spark plugs from engine to prevent engine from starting.

1. Remove all spark plugs and install Dial Indicator (C-91-50222A1, Figure 2) into No. 1 cylinder (top).
2. Turn flywheel in a clockwise direction until No. 1 piston is at top dead center (TDC), then set dial indicator at "0" (zero) and tighten indicator set screw.
TIMING ADJUSTMENTS

1. Place engine in a test tank and connect electrical harness to engine.
2. Connect Timing Light (C-91-35507) by connecting red lead to No. 1 (top) spark plug and connecting black leads to 12-volt battery positive (+) and negative (-) posts.
3. Preset carburetor idle mixture screws at 1/8 to 1/4 turns out from seated position.
4. Crank engine with starter motor while moving throttle lever to align throttle primary pickup specification on timing decal with timing pointer. Without moving throttle lever, adjust the screw between throttle and spark levers (Figure 3) so that the throttle actuator cam just touches the carburetor throttle cluster pin, then tighten locknut. (Figure 4)
5. Remove dial indicator from cylinder and reinstall spark plugs and spark plug leads.

Figure 2. Dial Indicator Installed Into No. 1 Cylinder

3. Turn flywheel counterclockwise until dial indicator needle is approximately 3/4 turn beyond .464" (.12mm), then turn flywheel clockwise so that dial indicator reads .464" exactly.
4. Reposition timing pointer, if necessary, so that .464" mark on timing decal is aligned with groove in timing pointer, as shown in Figure 1. Retighten pointer attaching screw. (Figure 1)
5. Remove dial indicator from cylinder and reinstall spark plugs and spark plug leads.

Figure 3. Throttle Primary Pickup Adjustment

- Throttle Lever
- Spark Lever
- Primary Pickup Adjustment Screw
- Idle RPM Screw

Figure 4. Throttle Primary Pickup Adjustment

- Throttle Actuator Cam
- Carburetor Cluster Pin
- Just Touching

Figure 5. Maximum Spark Advance Adjustment

- Maximum Spark Advance Screw

Figure 6. Maximum Spark Advance Adjustment
CARBURETOR ADJUSTMENTS

1. Connect fuel line to engine. Start engine and allow to warm up.

2. Adjust carburetor idle mixture screws to attain best idle in forward gear.

3. Adjust engine RPM as follows: warm up engine.
   - With and without load.
   - Adjust idle mixture screws accordingly.

4. Tighten locknut against idle screw.

5. Move throttle lever to 25° from neutral.
6. Move throttle lever to idle position and remove timing light.

NOTE: DO NOT overtighten locknut. Use locknut as a back stop.

Figure 7. Full Throttle Stop Adjustment

Figure 6. Full Throttle Stop Screw Adjustment

a. Full Throttle Stop Screw
b. Carburetor Clutch Pin

c. Carburetor Actuator Cam

IMPORTANT: Excessive preload on throttle cable will cause difficulty when shifting from forward to neutral. (Readjust throttle cable, if necessary.)

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09842
TIMING/SYNCH./ADJUSTING
Merc 700

Firing Order
1-2-3
Firing Sequence
120° Consecutive
Spark Plug
AC-V40FFM or Champion L76V
Spark Plug Gap
Not Adjustable
Timing Maximum Advance
23° BTDC @ 5500 RPM
Throttle Primary Pickup
Not Adjustable
Throttle Secondary Pickup
At Maximum Spark (Set Statically)
Full Throttle RPM
5000-5500 RPM
Idle RPM
650-750 RPM (6°-8° ATDC) in Gear
Water Pressure
3-Plus psi (211kg/cm²) @ 2000 RPM

a - Dial Indicator Installed into No. 1 Cylinder
Figure 2. Dial Indicator Installed into No. 1 Cylinder

4. Reposition timing pointer, if necessary, so that .644" mark on timing decal is aligned with groove in timing pointer, as shown in Figure 1. Retighten pointer attaching screw. (Figure 1)
5. Remove dial indicator from cylinder and reinstall spark plugs and spark plug leads.

TIMING ADJUSTMENTS
1. Place engine in test tank or, if engine is mounted on boat, place boat and engine in water. Connect electrical harness and fuel line to engine.
2. Connect Timing Light (C-91-35507) to engine by connecting red lead to No. 1 (top) spark plug and connecting black leads to 12-volt battery (+) positive and (-) negative posts.

Figure 1. Timing Pointer Alignment

IMPORTANT: When timing engine with an adjustable timing pointer, as shown in Figure 1, first adjust the timing pointer BEFORE proceeding to timing adjustments.

TIMING POINTER ADJUSTMENT (Only for Engines with Adjustable Timing Pointer)

SAFETY WARNING: Engine could start when turning flywheel to check timing pointer adjustment. Remove all spark plugs from engine to prevent engine from starting.

1. Remove all spark plugs and install Dial Indicator (G-91-S822A1, Figure 2) into No. 1 cylinder (top).
2. Turn flywheel in a clockwise direction until No. 1 piston is at top dead center (TDC), then set dial indicator at "0" (zero) and tighten indicator set screw.
3. Turn flywheel counterclockwise until dial indicator needle is approximately ¼-turn beyond .644" (12mm), then turn flywheel clockwise so that dial indicator reads .644" exactly.

Figure 3. Maximum Spark Advance Adjustment
3. Preset carburetor idle mixture screws at 1½ to 1¾ turns out from rich position.
4. Place engine in forward gear and run at 5000 to 5500 RPM. Adjust maximum spark advance screw (Figure 3) so that timing pointer is aligned with 23° mark on timing deck. Retighten nut on adjustment screw, move throttle back to idle and turn off engine. Remove timing light.
CARBURETOR ADJUSTMENTS

1. Start engine and allow it to warm up in forward gear.
2. Adjust carburetor mixture screws to attain best idle in forward gear. See carburetor adjustment information, preceding.
3. Adjust engine idle RPM as follows:
   a. With engine in water, connect electrical harness and fuel line to engine. Start engine and allow to warm up.
   b. With throttle cable barrel removed from barrel retainer, adjust idle RPM to 650-750 RPM with engine running in forward gear. (Figure 9) Retighten nut on adjustment screw.
   c. With end of throttle cable connected to throttle lever, hold throttle lever against idle stop. Adjust throttle cable barrel to slip into barrel retainer on cable anchor bracket with a very light preload of throttle lever against idle stop. Lock barrel in place.
   d. Check preload on throttle cable by placing a thin piece of paper between idle stop screw and idle stop. Preload is correct when paper can be removed without tearing but has some drag on it. Readjust cable barrel, if necessary.

IMPORTANT: Excessive preload on throttle cable will cause difficulty when shifting from forward to neutral. (Readjust throttle cable barrel, if necessary.)

TIMING SYNCH./ADJUSTING
Merc 800 and 850 (Serial No. 4366802 and Above) with Distributor-Less Ignition

<table>
<thead>
<tr>
<th>Firing Order</th>
<th>1-3-2-4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Firing Sequence</td>
<td>90° Consecutive</td>
</tr>
<tr>
<td>Spark Plug</td>
<td>AC-V40FFK or Champion L78V</td>
</tr>
<tr>
<td>Spark Plug Gap</td>
<td>Not Adjustable</td>
</tr>
<tr>
<td>Timing Maximum</td>
<td>2° BTDC</td>
</tr>
<tr>
<td>Throttle Primary Pickup</td>
<td>2° BTDC to 2° ATDC (Serial No. 4423112 and Above)</td>
</tr>
<tr>
<td>Throttle Secondary Pickup</td>
<td>Not Adjustable</td>
</tr>
<tr>
<td>Full Throttle RPM</td>
<td>5000-5500 RPM</td>
</tr>
<tr>
<td>Idle RPM</td>
<td>550-650 RPM (5°-8° ATDC) in Gear Block</td>
</tr>
<tr>
<td>Water Pressure (at Cylinder)</td>
<td>2 to 5 psi (.141 to .352kg/cm²) @ 2000 RPM</td>
</tr>
</tbody>
</table>

SAFETY WARNING: Engine possibly could start when turning flywheel to check timing pointer adjustment. Remove all spark plugs from engine to prevent engine from starting.

1. Remove all spark plugs and install Dial Indicator (C81-58222A1, Figure 1) into No. 1 cylinder (top).
2. Turn flywheel in a clockwise direction until No. 1 piston is at top dead center (TDC), then set dial indicator at "0" (zero) and tighten indicator set screw.
3. Turn flywheel counterclockwise until dial indicator needle is approx. 1/4 turn beyond .364" (12 mm), then turn flywheel clockwise so that dial indicator reads .364" exactly.

4. Reposition timing pointer, if necessary, so that timing pointer is aligned with .364" mark on timing decal, as shown in Figure 2. Retighten pointer attaching screw. (Figure 2)

5. Remove dial indicator from cylinder and reinstall spark plugs and spark plug leads.

---

**TIMING ADJUSTMENTS**

1. Place engine in test tank or, if engine is mounted on boat, place boat and engine in water. Connect electrical harness and fuel line to engine.

2. Pre-set carburetor idle mixture screws at 1 1/2 turns out from lightly seated position.


4. With engine running in forward gear, move throttle lever so that throttle primary pickup cam just touches primary pickup on carburetor cluster, as shown in Figure 3. Then, without moving throttle lever, adjust primary pickup screw (Figure 4) so that timing pointer is aligned with specified throttle pickup on timing decal. Retighten nut on adjustment screw.

---

**Figure 2. Timing Pointer Alignment**

**Figure 3. Throttle Primary Pickup Adjustment**

**Figure 4. Throttle Primary Pickup Screw Adjustment**

**Figure 5. Maximum Spark Advance Adjustment**
5. With engine running in forward gear, advance engine speed so that timing pointer is aligned with specified maximum spark advance on timing decal. Adjust maximum spark advance stop screw so that end of screw just touches spark lever, as shown in Figure 5. Retighten nut on adjustment stop screw. Move throttle back to idle and turn off engine. Remove timing light.

6. With engine not running, advance throttle lever to wide-open-throttle (WOT) and adjust full throttle stop screw (Figure 6) to allow full carburetor shutter opening at WOT. Make sure that carburetor shutters do not act as a throttle stop. Allow .010" to .015" (.75mm to .38mm) clearance between throttle cam and pin on carburetor cluster when throttle is WOT, as shown in Figure 7.

---

**CARBURETOR ADJUSTMENTS**

1. Start engine and allow engine to warm up in forward gear.
2. Adjust carburetor idle mixture screws to attain best idle in forward gear. See carburetor adjustment information, preceding.
3. Adjust engine idle RPM as follows:
   a. With engine in water, connect electrical harness and fuel line to engine. Start engine and allow to warm up.
   b. With throttle cable barrel removed from barrel retainer, adjust idle RPM to 550-650 RPM with engine running in forward gear. (Figure 8) Retighten nut on adjustment screw.
   c. With end of throttle cable connected to throttle lever, hold throttle lever against idle stop. Adjust throttle cable barrel to slip into barrel retainer on cable anchor bracket with a very light preload of throttle lever against idle stop. Lock barrel in place.
   d. Check preload on throttle cable by placing a thin piece of paper between idle stop screw and idle stop. Preload is correct when paper can be removed without tearing but has some drag on it. Readjust cable barrel, if necessary.

**IMPORTANT:** Excessive preload on throttle cable will cause difficulty when shifting from forward to neutral. (Readjust throttle cable barrel, if necessary.)

---

**Figure 6. Full Throttle Stop Screw Adjustment**

**Figure 7. Full Throttle Stop Adjustment**

**Figure 8. Engine Idle RPM Adjustment**
TIMING/SYNCH./ADJUSTING
Merc 850 (Below Serial No. 4366801)

| Firing Order | 1-3-2-4 |
| Firing Sequence | 90° Consecutive |
| Spark Plug | AC-40FFM or Champion L76V |
| Spark Plug Gap | Not Adjustable |
| Timing Maximum Throttle Primary Pickup | 27° BTDC |
| Throttle Secondary Pickup | 3°-5° BTDC |
| Full Throttle RPM | 4800-5500 RPM |
| Idle RPM | 550-600 RPM |
| Water Pressure (at Cylinder Block) | 2 to 5 psi (.141 to .352 kg/cm²) |
| @ 2000 RPM |

DISTRIBUTOR DRIVE BELT INSTALLATION
1. Rotate flywheel until 3 dots on flywheel timing decal are aligned with center of distributor shaft. (Figure 1)

2. Rotate distributor pulley until arrow (cast into pulley) is pointing at 3 dots on flywheel decal. Slip drive belt over pulley and install pulley cover, washer and bolt. Torque cover bolt to 60 in. lbs. (69 kg cm).

NOTE: When installing timing belt on 4 and 6-cylinder outboards with Thunderbolt Ignition, the arrow on the pulley may not align directly with the mark on the flywheel. If this should occur, align the arrow slightly clockwise (as viewed from front of outboard). This will appear to be approximately 1/2-tooth off. (Figure 2) Installing the belt off-tooth to the left (counterclockwise) will make engine synchronization difficult and result in rough engine operation.

Figure 2. Alignment 1/2-Tooth Clockwise

TIMING ADJUSTMENTS
1. Place engine in a test tank and connect electrical harness and fuel line.
2. Press carburetor idle mixture screws 1 1/2 turns out from seated position.
3. Install Timing Light (C-91-35597) by connecting red lead to No. 1 (top) spark plug and connecting black leads to 12-volt battery positive (+) and negative (-) posts.
4. With engine running in forward gear, move the throttle lever to align 3° to 5° BTDC on timing decal with timing pointer. (Figure 3)
5. With throttle positioned as in Step 4, loosen 2 actuator plate retaining bolts (Figure 4) and rotate actuator plate, as necessary, so that primary cam just touches primary pickup lever on carburetor cluster. (Figure 4) Tighten 2 bolts.
6. Advance throttle lever to align 27° BTDC mark on timing decal with timing pointer (Figure 5) and adjust maximum spark stop screw (Figure 6) to just touch distributor adaptor. Tighten locknut and recheck maximum spark advance.
8. With engine stopped, advance throttle lever to maximum spark advance screw but not actuating the economizer collar spring, adjust the secondary throttle pickup screw (Figure 6) so that the secondary pickup just touches secondary lever on carburetor cluster. (Figure 7) Tighten locknut.
9. Advance throttle lever to wide-open-throttle (WOT) position. Adjust throttle stop screw (Figure 6) to allow full carburetor shutter opening, but not to allow shutters to act as a stop. Allow approximately 1/32" (.8mm) clearance between throttle secondary pickup and secondary lever on carburetor cluster, tighten locknut and recheck adjustment.

Figure 3. Adjusting Throttle Primary Pickup

Figure 4. Throttle Cam Just Touching Carburetor Primary Lever

Figure 5. Aligning 27° BTDC Mark with Timing Pointer

Figure 6. Adjusting Secondary Throttle Pickup
CARBURETOR ADJUSTMENTS
1. With engine running in forward gear, adjust idle mixture screws for best idle. See carburetor adjustment information, preceding.
2. Adjust idle RPM to specification in forward gear and tighten locknut.
(Figure 6)

TIMING/SYNCH./ADJUSTING
Merc 900-1400 and 1500XS
(1978) Models and Merc 1150
and 1500 In-Line Models

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<thead>
<tr>
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<td>AC-440FFM or Champion L76V</td>
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<td>Timing Maximum Advance</td>
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<td>4°-5° BTDC</td>
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<tr>
<td>Throttle Secondary Pickup</td>
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<td>Idle RPM</td>
<td>5000-5500 RPM (Merc 1150)</td>
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<td>5800-6300 RPM (1500XS)</td>
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<td>550-600 RPM in Gear</td>
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<td>2 to 5 psi (.14 to .35kg/cm²) @ 2000 RPM</td>
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DISTRIBUTOR DRIVE BELT INSTALLATION

SAFETY WARNING: Engine possibly could start when turning flywheel to install distributor drive belt, therefore, remove all spark plugs to prevent engine from starting.

1. Remove all spark plugs from engine.

Figure 7. Adjusting Secondary Throttle Pickup

Figure 1. Distributor Drive Belt Installation
2. Turn flywheel until single dot (3 dots on pre-1978 Merc 150 and 1500 models) on flywheel timing decal is aligned with center of distributor shaft, as shown in Figure 1.
3. Turn distributor pulley until arrow (Figure 1) is aligned with single dot (3 dots on pre-1978 Merc 150 and 1500 models) on the timing decal, then slip timing belt over pulley.

**IMPORTANT:** When installing timing belt on engines with Thunderbolt ignition, arrow on pulley may not align directly with dot(s) on flywheel. If this should occur, align arrow slightly counterclockwise. This will appear to be approximately 1/2-tooth off. If arrow is aligned slightly clockwise, instead of counterclockwise, this will make engine synchronization difficult and result in rough engine operation.

**TIMING POINTER ADJUSTMENT**

**SAFETY WARNING:** Engine could start when turning flywheel to check timing pointer adjustment. Remove all spark plugs from engine to prevent engine from starting.

1. Remove all spark plugs from engine and install Dial Indicator (C91-57722A1) into No. 1 cylinder, as shown in Figure 2.
2. Turn flywheel clockwise until No. 1 piston is at top dead center (TDC). Set dial indicator at "0" (zero) and tighten indicator set screw.
3. Turn flywheel counterclockwise until dial indicator needle is approx. 1/4-turn beyond .464" (12mm), then turn flywheel clockwise so that dial indicator reads .464" exactly.
4. Reposition timing pointer, if necessary, so that timing pointer is aligned with .464" mark on timing decal, as shown in Figure 3. Retighten pointer attaching screw.
5. Remove Dial Indicator from cylinder and reinstall spark plugs and spark plug leads.

---

**Figure 2. Dial Indicator Installed Into No. 1 Cylinder**

**Figure 3. Timing Pointer Alignment**

**Figure 4. Throttle Actuator Plate**

**Figure 5. Primary Throttle Pickup Adjustment**
TIMING ADJUSTMENTS

1. Place engine in test tank or, if engine is mounted on boat, place boat and engine in water. Connect electrical harness and fuel line to engine.

2. Preset carburetor idle mixture screws at 1 1/4 turns out from lightly seated position.

3. Connect timing light to No. 1 (top) spark plug.

4. With engine running in forward gear, advance throttle so that throttle primary pickup specification on timing decal is aligned with timing pointer. Then, without moving throttle lever, loosen 2 actuator plate retaining bolts (Figure 4) and rotate actuator plate, as necessary, so that throttle cam just touches primary pickup lever on carburetor cluster, as shown in Figure 5. Retighten retaining bolts.

5. With engine running in forward gear, advance engine speed so that timing pointer is aligned with specified maximum spark advance on timing decal. Adjust maximum spark advance stop screw (Figure 6) so that end of screw just touches distributor adaptor. Retighten nut on adjustment stop screw. Move throttle back to idle and turn off engine. Remove timing light.

6. With engine not running, advance throttle lever so that distributor is against the maximum spark advance screw but not actuating the economizer spring. (Figure 7) Adjust the throttle secondary pickup screw (Figure 7) so that secondary pickup just touches the secondary lever on carburetor, as shown in Figure 8. Retighten nut on adjustment screw.

7. With engine not running, advance throttle lever to wide-open-throttle (WOT) and adjust full throttle stop screw (Figure 9, 10 or 11) to allow full throttle shutter opening at WOT. Make sure that carburetor shutters do not act as a throttle stop. Allow .010” to .015” (.25mm to .38mm) clearance between throttle secondary pickup and secondary lever on carburetor. When throttle is at WOT, retighten nut on adjustment screw.
Figure 9. Full Throttle Stop Screw Adjustment (1977 and Older Models)

Figure 10. Full Throttle Stop Screw Adjustment (1977 and Older Models with Full Throttle Stop Kit Installed)

Figure 11. Full Throttle Stop Screw Adjustment (1978 and Newer Models)

CARBURETOR ADJUSTMENTS

1. Start engine and allow engine to warm up in forward gear.
2. Adjust carburetor idle mixture screws to attain best idle in forward gear. See carburetor adjustment information, preceding.
3. Adjust engine idle RPM as follows:
   a. With engine in water, connect electrical harness and fuel line to engine. Start engine and allow to warm up.
   b. With throttle cable barrel removed from barrel retainer, adjust idle RPM to 550-600 RPM with engine running in forward gear. (Figure 12) Retighten nut on adjustment screw.
   c. With end of throttle cable connected to throttle lever, hold throttle lever against idle stop. Adjust throttle cable barrel to slip into barrel retainer on cable anchor bracket with a very light preload of throttle lever against idle stop. Lock barrel in place.
   d. Check preload on throttle cable by placing a thin piece of paper between idle stop screw and idle stop. Preload is correct when paper can be removed without tearing but has some drag on it. Readjust cable barrel, if necessary.

IMPORTANT: Excessive preload on throttle cable will cause difficulty when shifting from forward to neutral. (Readjust throttle cable barrel, if necessary.)
TIMING/SYNCH./ADJUSTING
V-6 Merc 1500-2000 (1978)

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<th>V-6 Merc 2000</th>
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<td>Full Throttle RPM</td>
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<td>5300 to 5800</td>
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<td>Idle RPM (in Forward Gear)</td>
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<td>550-650 at 12°</td>
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<td></td>
<td>to 8.5° ATDC</td>
<td>to 15° ATDC</td>
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<td>Water Pressure</td>
<td>10 to 25 psi @ 5000 RPM</td>
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TIMING POINTER ADJUSTMENT

SAFETY WARNING: Engine could start when turning flywheel to check timing pointer adjustment, therefore, remove all spark plugs to prevent engine from starting.

1. Remove all spark plugs and install Dial Indicator (C-91-58222Al) (Figure 1) into No. 1 cylinder (top cylinder, starboard bank).
2. Turn flywheel in a clockwise direction until No. 1 piston is at top dead center (TDC). Set dial indicator at "0" (zero) and tighten indicator set screw.
3. Turn flywheel counterclockwise until dial indicator needle is approx. 462° (12mm), then turn flywheel clockwise so that dial indicator reads 462° exactly.

Figure 1. Dial Indicator Installed in No. 1 Cylinder

Figure 12. Engine Idle Adjustment

a - Idle RPM Screw

a - Dial Indicator Installed in No. 1 Cylinder
TIMING ADJUSTMENTS

IMPORTANT: If link rod was disassembled, make sure that 11/16" (17.5mm) dimension is retained, as shown in Figure 4.

4. Reposition timing pointer, if necessary, so that timing pointer is aligned with .402" mark on timing decal. (Figure 2) Retighten pointer attaching screws.

5. Remove dial indicator from cylinder and reinstall No. 1 spark plug and spark plug lead.

SAFETY WARNING: Before cranking engine, keep clear of propeller, as it may rotate.

6. With engine in neutral, hold throttle arm so that idle stop screw (Figure 4) is against idle stop. Crank engine with starter motor and adjust throttle primary pickup screw (Figure 4) to align specified throttle primary pickup mark on timing decal with timing pointer. Retighten nut on adjustment screw.

Figure 2. Timing Pointer Alignment

Figure 3. Idle Stop Screw Adjustment

Figure 4. Throttle Primary Pickup Adjustment
With engine in neutral, move throttle lever to place maximum spark screw against stop. Crank engine with starter motor and adjust maximum spark screw (Figure 6) to align 20° (Merc 2000) or 18° (Merc 1500) BTDC mark on timing decal with timing pointer. Because of spark advance characteristics of this ignition system, this adjustment will result in a spark advance of 16° (Merc 2000) or 14° (Merc 1500) at maximum RPM. Retighten nut on adjustment screw. Remove timing light from engine.

9. With engine not running, move throttle lever to wide-open-throttle (WOT) and adjust full throttle stop screw (Figure 7) to allow full throttle shutter opening at WOT. Make sure that throttle shutters do not act as a throttle stop. Allow .010"-.012" (.25mm to .30mm) clearance between roller and throttle cam at WOT, as shown in Figure 7. Retighten nut on adjustment screw.

7. Loosen 3 carburetor synchronizing screws. (Figure 5) Position throttle lever against idle stop. Move roller arm (Figure 5) until roller just touches throttle cam. Without moving roller arm, retighten 3 carburetor synchronizing screws.

Figure 5. Carburetor Synchronizing

- Idle Stop Screw
- Throttle Cam
- Full Throttle Stop Screw Boss
- 1/8" (3.2mm)

Figure 6. Maximum Spark Advance Adjustment

- Full Throttle Screw
- Push Downward
- Roller Stop Screw
- .010" to .015" Clearance
- Throttle Cam

Figure 7. Full Throttle Stop Adjustment

- Idle Stop Screw

Figure 8. Idle RPM Adjustment
10. Adjust engine idle RPM as follows:
   a. With engine in water, connect electrical harness and fuel line to engine. Start engine and allow to warm up.
   b. With throttle cable barrel removed from barrel retainer, adjust idle RPM to specified idle RPM with engine running in forward gear. (Figure 8) Retighten nut on adjustment screw.
   c. With end of throttle cable connected to throttle lever, hold throttle lever against idle stop. Adjust throttle cable barrel to slip into barrel retainer on cable anchor bracket with a very light preload of throttle lever against idle stop. Lock barrel in place.
   d. Check preload on throttle cable by placing a thin piece of paper between idle stop screw and idle stop. Preload is correct when paper can be removed without tearing but has some drag on it. Readjust cable barrel, if necessary.

IMPORTANT: Excessive preload on throttle cable will cause difficulty when shifting from forward to neutral. (Readjust throttle cable barrel, if necessary.)

NOTE: Carburetor idle mixture is not equipped with adjustment screw, as are other Mercury Outboards. See carburetor jet chart, preceding, for jet change.

NOTE: If sufficient throttle cable barrel adjustment is not available, a check must be made for correct installation of link rod (located between the throttle lever and throttle cam). Each end of this link rod must be threaded into plastic barrel until it bottoms against the throttle lever or throttle cam casting, then turned out only far enough to obtain correct orientation of link rod (less than one turn). All timing adjustments must be reset after this procedure.

**TIMING/SYNCH./ADJUSTING**

**V-6 Merc 1750 (1976-77)**

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<thead>
<tr>
<th>Firing Order</th>
<th>1-2-3-4-5-6</th>
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<tr>
<td>Spark Plug</td>
<td>60° Consecutive</td>
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<tr>
<td>Spark Plug Gap</td>
<td>AC-V40FFM or Champion L76V</td>
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<td>Timing Maximum</td>
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<td>Throttle Primary Pickup</td>
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<td>8-10° (3 Punch Marks) ATDC</td>
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<td>Idle RPM</td>
<td>4800-5800 RPM</td>
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<td>Water Pressure</td>
<td>550-650 RPM in Gear</td>
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<tr>
<td></td>
<td>8 to 11 psi (.56 to .77 kg/cm²) @3000 RPM</td>
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</table>

**IMPORTANT:** Timing procedure has been changed for all Merc 1750 (1976-77) models, as shown in Figure 1 (one punch mark replaces 2 punch marks on flywheel). If timing change has not been made to engine being timed, complete Step 1, following, before timing engine.

1. New timing change (Figure 1)
   a. Remove ALL spark plugs. Install a dial indicator (C-91-58222A1 or equivalent) in No. 1 spark plug hole.
   b. Rotate flywheel until top dead center (TDC) is found and set the dial indicator to zero.
   c. Rotate the flywheel counterclockwise to approximately .100" (2.54mm) before top dead center (BTDC), then rotate the flywheel clockwise until .069" (1.75mm) BTDC is located. (DO NOT locate .069" BTDC by rotating flywheel counterclockwise.)
   d. With a center punch, and using the existing timing reference mark on flywheel cover as a guide, make a new punch mark on flywheel in center of timing mark, as shown in Figure 1.
   e. Remove dial indicator and install spark plug in No. 1 cylinder only.
   f. Remove (or paint over with black paint) the .119" (22°) BTDC timing decal on the front air box cover.

---

![Diagram](image)

b - Punch Mark on Flywheel

Figure 1. New Punch Mark on Flywheel
TIMING ADJUSTMENTS

IMPORTANT: If link rod was disassembled, make sure that 11/16" (17.5mm) dimension is retained, as shown in Figure 4.

1. Place engine in test tank or, if engine is mounted on boat, place boat and engine in water.

CAUTION: Engine is timed while cranking engine over with starter motor. To prevent engine from starting when being cranked, all spark plugs must be removed, except No. 1 plug.

2. Remove all spark plugs, except No. 1 plug (top cylinder, starboard bank), from engine.
3. Disconnect remote fuel line from engine.
4. Connect electrical harness to engine.
5. If boss on reed block housing is as shown in Figure 2 (no edge), proceed with Step "a", immediately following. Or, if boss on reed block housing is as shown in Figure 3 (with edge), proceed with Step "b".

Figure 2. Idle Stop Screw Adjustment

a. Remove throttle cable barrel from barrel retainer on cable anchor bracket. Adjust idle RPM stop screw to align bottom edge of throttle cam to obtain 9/64" (3.2mm) clearance between top front corner of throttle stop screw boss, as shown in Figure 2. Do not reinstall throttle cable at this time.

b. Remove throttle cable barrel from barrel retainer on cable anchor bracket and adjust idle stop screw so that top surface of throttle cam is aligned with edge on reed block housing boss, as shown in Figure 3. Do not reinstall throttle cable at this time.

6. Connect Timing Light to No. 1 spark plug (top, starboard bank).

SAFETY WARNING: Before cranking engine, keep clear of propeller, as it may rotate.

7. With engine in neutral, hold throttle so that idle stop screw (Figure 4) is against idle stop. Crank engine with starter motor and adjust throttle primary pickup screw (Figure 4) to align 3 punch marks on flywheel with notch in window of flywheel cover. Retighten nut on adjustment screw.

8. Loosen 3 carburetor synchronizing screws. (Figure 5) Position throttle lever against idle stop. Move roller arm (Figure 5) until roller just touches throttle cam. Without moving arm, retighten 3 carburetor synchronizing screws.

NOTE: Timing mark (2 punch marks) on flywheel is no longer used.

9. With engine in neutral, move throttle lever to place maximum spark screw against stop. Crank engine with starter motor and adjust maximum spark screw (Figure 6) to align one punch mark on flywheel with notch in window of flywheel cover. (Figure 1) Because of spark advance characteristics of this ignition system, this adjustment will result in a spark advance of 15° at maximum RPM. Retighten nut on adjustment screw. Remove timing light from engine.
10. With engine not running, move throttle lever to wide-open throttle (WOT) and adjust full throttle stop screw (Figure 7) to allow full throttle shutter opening at WOT. Make sure that throttle shutters do not act as a throttle stop. Allow .010"-.015" (.25mm to .38mm) clearance between roller and throttle cam at WOT, as shown in Figure 7. Retighten nut on adjustment screw.

TIMING/SYNCH./ADJUSTING
V-6 Merc 1750 (1978)

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<th>Specification</th>
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<td>Firing Sequence</td>
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<td>Water Pressure</td>
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TIMING POINTER ADJUSTMENT

SAFETY WARNING: Engine could start when turning flywheel to check timing pointer adjustment. Remove all spark plugs from engine to prevent engine from starting.

1. Remove all spark plugs and install Dial Indicator (C-01.58222A1) (Figure 1) into No. 1 cylinder (top cylinder, starboard bank).

2. Turn flywheel in a clockwise direction until No. 1 piston is at top dead center (TDC). Set dial indicator at "0" (zero) and tighten indicator set screw.

3. Turn flywheel counterclockwise until dial indicator needle is approximately 1/4 turn past 462°, then turn flywheel clockwise so that dial indicator reads 462° exactly.

4. Reposition timing pointer (if necessary) so that timing pointer is aligned with 462° mark on timing gear, as shown in Figure 2. Retighten pointer attaching screws.

5. Remove dial indicator from cylinder and reinstall No. 1 spark plug and spark plug lead for timing.

NOTE: Carburetor idle mixture is not equipped with adjustment screw, as are other Mercury Outboards. See carburetor jet chart, preceding, for jet change.

Figure 1. Dial Indicator Installed In Cylinder

a - Idle Stop Screw

Figure 8. Idle RPM Adjustment

a - Dial Indicator Installed in No. 1 Cylinder

Figure 1. Dial Indicator Installed In Cylinder

- 110 -
TIMING ADJUSTMENTS

IMPORTANT: If link rod (Figure 4) was disassembled, make sure that 11/16" (17.5mm) dimension is retained, as shown in Figure 4.

CAUTION: Engine is timed while cranking engine with starter motor. To prevent engine from starting when being cranked, all spark plugs must be removed, except No. 1 spark plug.

1. Remove all spark plugs, except No. 1 plug (top cylinder, starboard bank) from engine.
2. Disconnect remote fuel line from engine.
3. Connect electrical harness to engine.
4. Remove throttle cable barrel from barrel retainer on cable anchor bracket.
5. Adjust throttle cam and carburetor synchronization, as follows:

- Remove choke knob and wing nuts and remove sound box cover from engine. This is necessary to be sure that all carburetor throttle shutters are closed and that they will open together.
- Loosen carburetor synchronizing screws (Figure 3) and allow all throttle shutters to close freely.
- Lightly press cam follower roller against throttle cam and, at the same time, lift up on bottom carburetor throttle shaft, as shown in Figure 3. This must be done to remove looseness in the linkage components.
- Adjust idle stop screw (Figure 3) so that first (short) slash mark on throttle cam is at the point of contact with roller. As shown in Figure 3. Retighten nut on idle adjustment screw.
- While still maintaining slight pressure against roller and lifting up bottom throttle shaft, retighten all carburetor synchronizing screws. CHECK that carburetor throttle shutters are completely closed when roller is at point of contact with first slash (short) mark on throttle cam and all looseness is removed from linkage so that carburetor shutter plates will start to open exactly at the same time that throttle lever is actuated.

IMPORTANT: Actuate throttle and spark levers a few times, then return throttle lever to Idle stop. Check that roller is at point of contact with first slash mark on throttle cam, that all carburetor throttle shutters are completely closed and that all looseness is removed so that carburetor throttle shutters will start to open exactly at the same time that throttle lever is actuated (readjust if necessary).
f. Reinstall sound box cover to engine.
6. Connect timing light to No. 1 spark plug (top starboard bank).

**SAFETY WARNING:** Before cranking engine, keep clear of propeller, as it may rotate.

7. With engine in neutral, hold throttle so that idle stop screw (Figure 4) is against idle stop, then crank engine with starter motor and adjust throttle primary pickup screw (Figure 4) to align 14° ATDC mark on timing decal with timing pointer. Retighten nut on adjustment screw.

8. With engine in neutral, move throttle lever to place maximum spark screw against stop. Crank engine with starter motor and adjust maximum spark screw (Figure 5) to align 20° BTDC mark on timing decal with the pointer. Due to the advance characteristics of this ignition system, this adjustment will result in a spark advance of 10° at maximum RPM. Retighten nut on adjustment screw. Remove timing light from engine.

9. With engine not running, move throttle lever to wide-open-throttle (WOT) and adjust full throttle stop screw (Figure 6) to allow full throttle shutter opening at WOT. Make sure that throttle shutters do not act as a throttle stop. Allow .010" - .015" (.25mm to 0.38mm) clearance between roller and throttle cam at WOT, as shown in Figure 6. Retighten nut on adjustment screw.

10. Adjust engine idle RPM as follows:
a. With engine in water, connect electrical harness and fuel line to engine. Start engine and allow to warm up.

---

**Figure 6. Full Throttle Stop Adjustment**

- a - Full Throttle Stop Screw
- b - Push Downward
- c - .010" to .015" Clearance
- d - Roller
- e - Throttle Cam

**Figure 7. Idle RPM Adjustment**

- a - Idle Stop Screw
MERC 200 (1976-77-78) MANUAL START

MERC 200 (1976-77-78) ELECTRIC START