



# ELECTRICAL

## Section 2C - Timing, Synchronizing, & Adjusting

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# Specifications

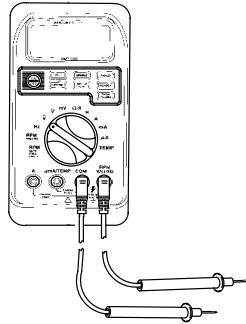
<b>IGNITION SYSTEM</b> Readings taken @ 68°F (20°C).	<b>Type</b> <b>Spark Plug:</b> Type Gap Hex Size Torque Hole Size <b>Firing Order</b> <b>Ignition Timing:</b> @ Idle @ 1500-1800 @ WOT (6000 rpm) <b>Stator Resistance</b> <b>Crank Position Sensor (CPS)</b> Resistance <b>Ignition Coil Resistance:</b> Internal Shielding Electronic Spark Trigger (EST) Secondary High Tension Lead/Boot Resistance <b>ECM Engine Speed Limiter</b> <b>Fuel/Spark Cut-out on Cylinders</b> #2 and #3 <b>Fuel/Spark Cut-out on All</b> <b>Cylinders</b> <b>ECM Overheat Speed Control</b>  <b>ECM Low Oil Pressure Speed Control</b>  <b>MAT/ECT Temperature Sensor</b> <b>Manifold Absolute Pressure (MAP)</b> <b>Sensor Resistance</b> <b>Fuel Injector Resistance</b>  <b>Main Power Relay</b> <b>Idle Air Control (IAC)</b> <b>Throttle Position Sensor Typical</b> Range Output Voltage @ Idle Output Voltage @ WOT (6000)	Capacitor Discharge Ignition  Champion RA8HC 0.040 in. (1.0 mm) 5/8 in. (16 mm) 150 lb-in. (17 Nm) 12 mm 1-3-4-2  Controlled by ECM 14° B.T.D.C 28° B.T.D.C 0.20 - 0.30 Ω (YEL-YEL)  300 - 350 Ω (RED - WHT)  0 - 10.0 KΩ (Pin A - Mounting Bracket) 8.5 - 12KΩ (Pin B - Pin C) 3.0 - 7.0 kΩ (Pin A - Coil Tower)  0.600 - 1.100 KΩ  6225 rpm  6350 rpm Guardian System is activated. Power limit will vary with level of overheat.  Guardian System is activated. Engine power is limited to 10% of maximum (Approximately 2000 RPM) See Graph Section 3B - EFI  See Table Section 3B - EFI 10.0 - 13.5Ω  81-99 Ω (Pin 85 - Pin 86) 24-30 Ω (Between Pins)  0.39-1.00 Volts 3.66-4.80 Volts
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**NOTE:** The 50/60 EFI (4-stroke) ECM unit electronically controls the ignition timing, therefore making the ignition timing non-adjustable. When initially running the outboard, use a timing light to verify that the ignition timing falls within the timing windows (as outlined in this section).

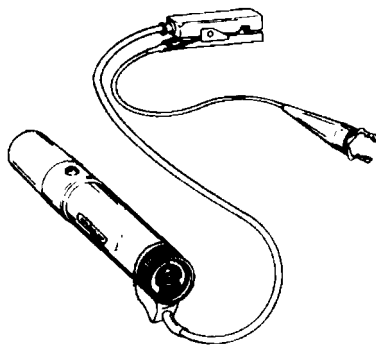


# Special Tools

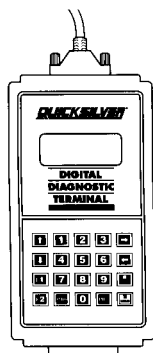
1. DMT 2000 Digital Tachometer Multi-meter P/N 91-854009A1



2. Timing Light P/N 91-99379



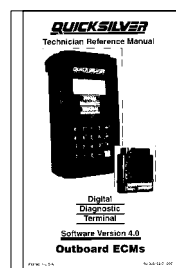
3. Digital Diagnostic Tester 91-823686A2



4. DDT Cartridge 91-880118--2 and DDT Reference Manual 90-881204--2.



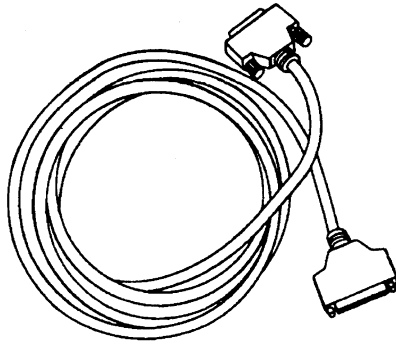
91-880118--2



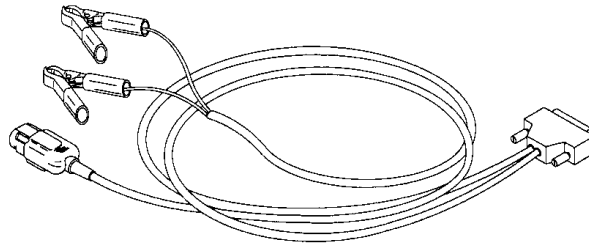
90-881204--2



5. DDT Cable 10' (3.05m) Extension 84-825003A1



6. DDT Test Harness 84-822560A5



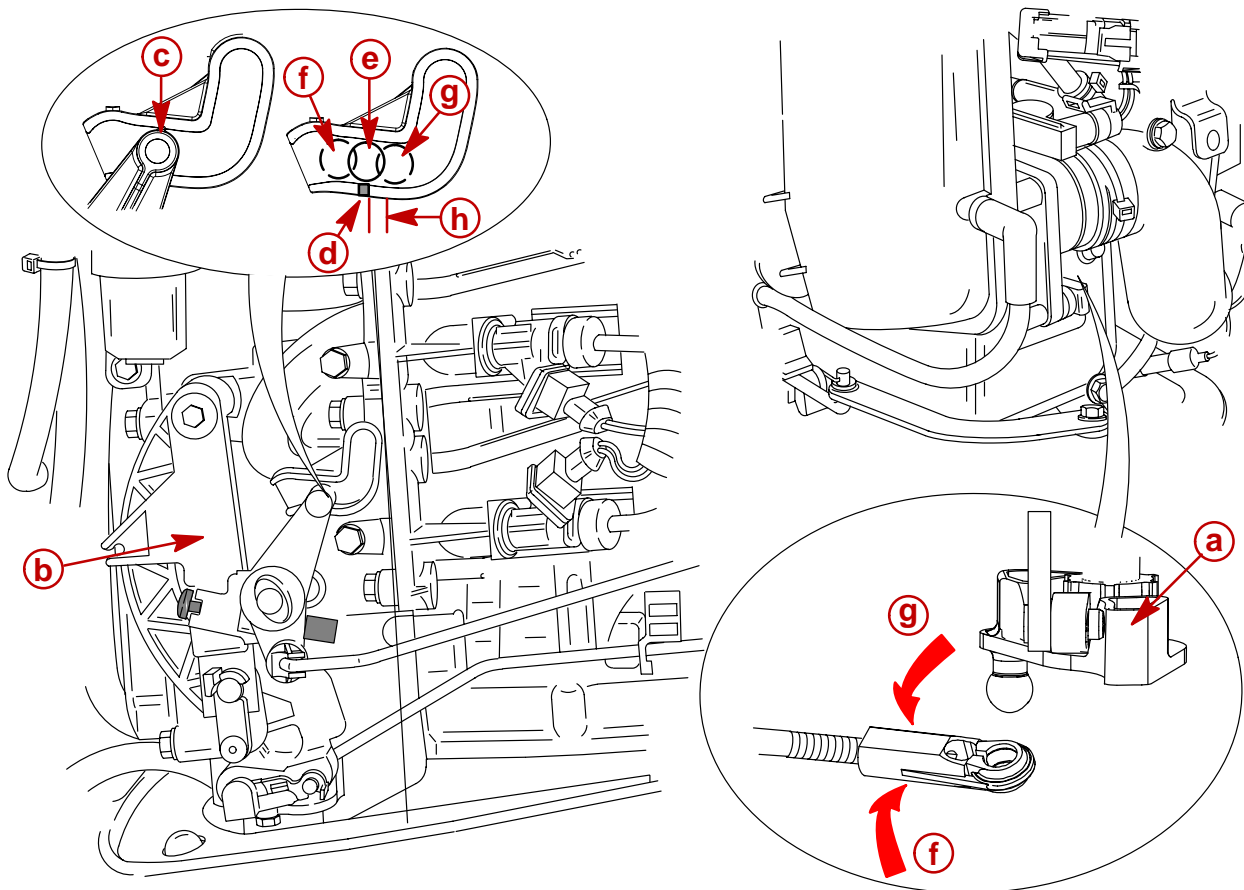


# Throttle Link Setting

## Idle

**NOTE:** For remote control models, remove remote control throttle cable during throttle link adjustment. For tiller handle models, throttle cables remain attached and throttle twist grip should be used to advance throttle during throttle link adjustment.

1. Lightly hold throttle body arm against idle stop.
2. Slowly push throttle lever forward until you feel the throttle body arm start to move. The center of throttle arm roller should line up with the throttle cam alignment mark. Tolerance may range from mark to 1/8 inch (3.2 mm) after mark.
3. If adjustment is needed refer to **Throttle Link Adjustment** section 7A .

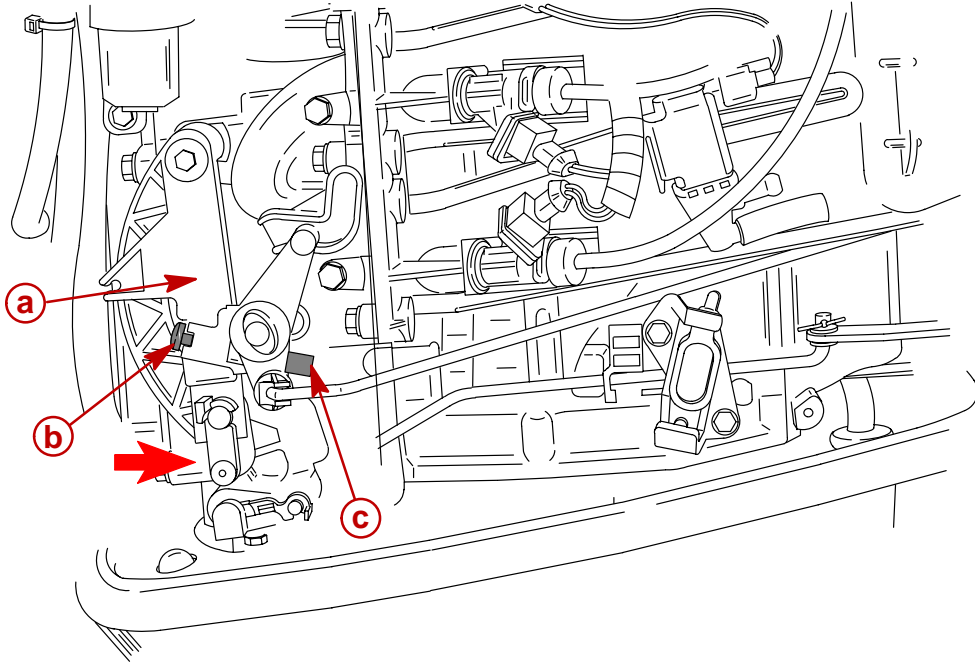


- a - Throttle Body Arm
- b - Throttle Lever
- c - Throttle Arm Roller
- d - Throttle Cam Alignment Mark
- e - Correct
- f - Shorten Link Rod
- g - Lengthen Link Rod
- h - Alignment Tolerance - 1/8 inch (3.2mm)



## Maximum Throttle

1. With throttle cable(s) attached, advance throttle (remote control handle or throttle twist grip) to wide open throttle position.
2. Throttle stop should lightly contact adjoining surface. To ensure the throttle shutter is fully open, back the throttle stop screw out until there is a gap between the throttle stop screw and adjoining surface (at WOT position). Keep turning the throttle stop screw “in” until the throttle stop lightly contacts the adjoining surface.



- a** - Throttle Lever
- b** - Throttle Stop Screw
- c** - Throttle Stop



# Timing

## ⚠ WARNING

To prevent personal injury or possible death, from loss of balance or stability while servicing the motor, DO NOT attempt to check timing while boat is in motion. Failure to follow one of the recommended servicing procedures may result in the person falling overboard or causing personal injury from fall in boat.

## ⚠ WARNING

To prevent personal injury from spinning flywheel, Do Not attempt to remove flywheel cover or place hands on top of cover when checking ignition timing.

Ignition timing is not adjustable. The Electronic Control Module unit electronically controls the ignition timing.

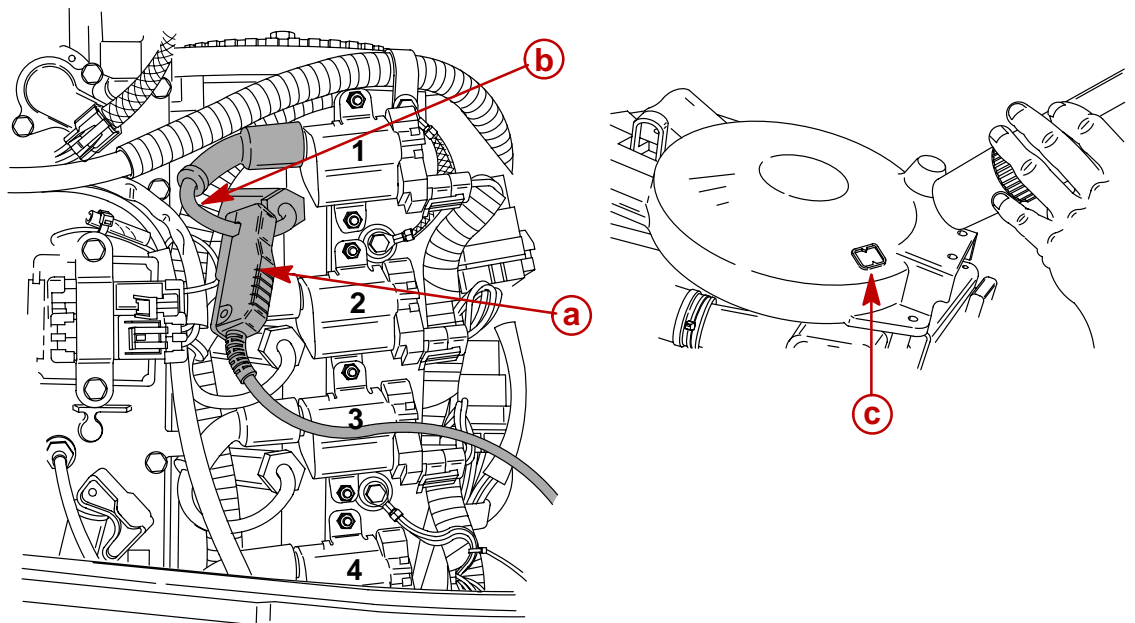
When initially running the outboard, use a timing light to verify that the ignition timing falls within the timing windows as described within the following tests.

**IMPORTANT: When checking the timing with the engine running, one of the following test procedures must be followed.**

Check maximum timing per specification while running the outboard:

- IN A TEST TANK
- ON A DYNAMOMETER
- ON A BOAT SECURED ON A TRAILER “Backed in Water”

1. Attach timing light to #1 spark plug lead.

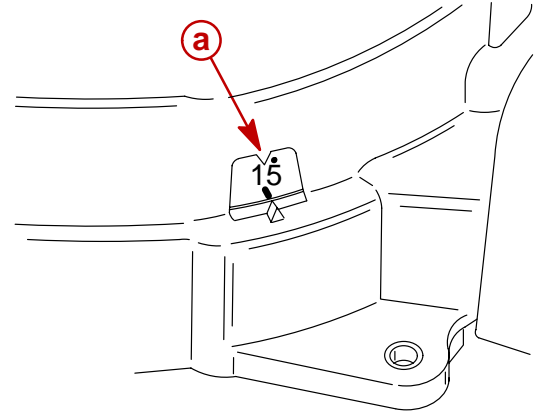
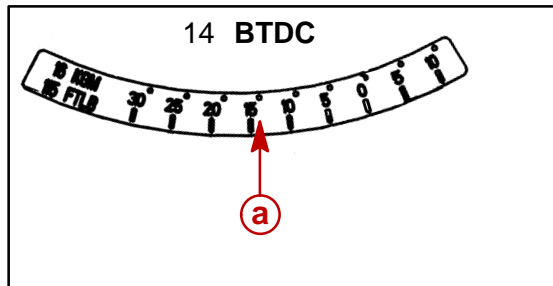


- a - Timing Light Clamp
- b - #1 Spark Plug Lead
- c - Timing Window-Electric Start Models



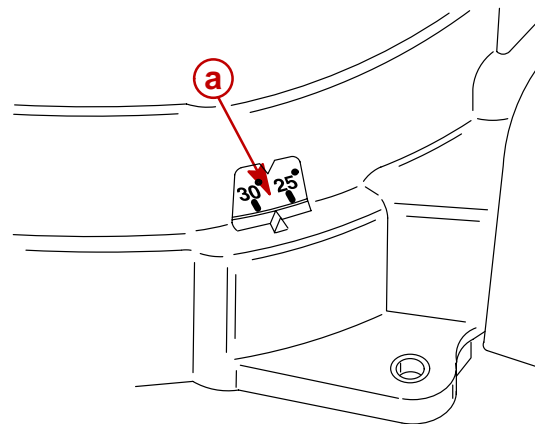
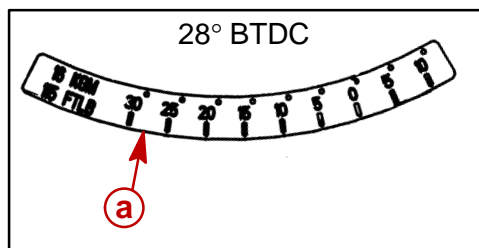
**NOTE:** Idle timing is controlled by the ECM and will vary for idle speed control. Checking the ignition timing marks using a timing light will not be stable until 1500-1800 rpm.

2. Start the engine and place the outboard in “Forward” gear. Check timing at 1500 - 1800 rpm, timing should be 14° BTDC. If timing is not within specification refer to **section 3B EFI Troubleshooting and Diagnostics**.



**a** - Timing Mark (1500-1800 rpm)

3. Slowly increase the engine RPM while watching the ignition timing marks. The timing should increase to the maximum timing specification “Full Advance” at approximately 6000 RPM. If not within specification window, refer to **section 3B - EFI Troubleshooting and Diagnostics**.



**a** - Timing Mark (Full Advance)

## Idle Speed

Engine idle speed is maintained by the ECM and is therefore not adjustable. The parameters affecting idle speed can be checked and monitored using the Digital Diagnostic Terminal (DDT). Refer to **section 3B - EFI Troubleshooting and Diagnostics**.

## Throttle Position Sensor (TPS)

The Throttle Position Sensor (TPS) is not adjustable. TPS voltage reading can be monitored with the DDT through the ECM. If readings are not within specifications, refer to **section 3B EFI Troubleshooting and Diagnostics**.