Ignition Test Procedures

Direct Voltage Adapter (DVA)

⚠ WARNING

DANGER - HIGH VOLTAGE/SHOCK HAZARD! Do not touch ignition components and/or metal test probes while engine is running and/or being "cranked". STAY CLEAR OF SPARK PLUG LEADS. To assure personal safety, each individual spark plug lead should be grounded to engine.

⚠ WARNING

When testing or servicing the ignition system, high voltage is present. DO NOT TOUCH OR DISCONNECT any ignition parts while engine is running, while key switch is on or while battery cables are connected.

⚠ CAUTION

Failure to comply with the following items may result in damage to the ignition system.

1. **DO NOT reverse battery cable connections. The battery negative cable is (-) ground.**
2. **DO NOT "spark" battery terminals with battery cable connections to check polarity.**
3. **DO NOT disconnect battery cables while engine is running.**
4. **DO NOT crank engine with CDI or Ignition Coils not grounded.**

⚠ CAUTION

To protect against meter and/or component damage, observe the following precautions:

- 400 VDC* test position (or higher) MUST BE used for all tests.
- INSURE the Positive (+) lead/terminal of DVA is connected to the Positive (+) receptacle of meter.
- DO NOT CHANGE meter selector switch position while engine is running and/or being "cranked".
- ALL COMPONENTS MUST BE GROUNDED during tests. Running or "cranking" engine with CDI or Ignition Coils ungrounded may damage components.

* If using a meter with a built-in DVA, the DVA/400 or DVA/500 VDC test position should be used.

NOTE: *Test leads are not supplied with the Direct Voltage Adapter. Use test leads supplied with multi meter.*

Test procedures and specifications are provided for **checking primary ignition voltage** while the engine is **running** and/or being **"cranked" with all harnesses connected.**

Ignition Troubleshooting

⚠ WARNING

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Ignition Diagnostic Procedures

TROUBLESHOOTING TIP: With engine running, use inductive timing light to check spark advance of each cylinder as throttle is opened and closed. If timing advances and retards smoothly on each cylinder, ignition system is MOST LIKELY functioning properly

IMPORTANT: If outboard appears to have an ignition system failure, it is recommended that before beginning in-depth troubleshooting:

a. Ensure that the engine is mechanically sound condition. (Fuel System, Cylinder Compression etc.).

b. Check all engine ground leads for loose or corroded connections.

c. Disconnect and reconnect ignition harness connectors to verify proper continuity.

PROBLEM	CORRECTION
1. No Spark or Weak Spark on Both Cylinders	No Spark – Trigger, Stator, Ignition Switch Box or Bad Ground Connection from Switch Box to Block Weak Spark – Stator
2. No Spark or Weak Spark on 1 Cylinder	Ignition Switch Box or Coil
3. Timing Fluctuates – Note: It is normal for timing to fluctuate 2•-3• @ Idle. – If engine RPM exceeds 5800, switch box will retard timing from 25• BTDC to 15• BTDC – If engine RPM drops below 600, idle stabilizer in switch box will advance timing to as high as 10• BTDC @ cranking speed of 300 RPM.	Shorted Trigger Wire or Ignition Switch Box
4. Timing will not Advance – Note: If timing will not advance on only 1 cylinder, check wiring for shorted trigger wire	Defective Switch Box
5. Engine Misfires @ High RPM	Defective Coil Defective Switch Box

6. Engine Hard to Start when Cold	Defective Trigger Assembly Defective Ignition Switch Box
7. Engine Misfires @ Low RPM but Runs Smooth @ High RPM	Defective Harness or (loose connections) Defective Switch Box Defective Stator
8. Engine Starts Hard when Hot	Defective Switch Box or Trigger
9. Engine Occasionally Misfires	Replace Standard Spark Plug with Inductor Plug Bad Ground Connection from Switch Box to Block

Ignition Troubleshooting

Electronic Spark Advance

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⚠ WARNING

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Tool: Multimeter/DVA Tester 91-99750A1

	Component Test	Selector Sw. Position	DVA Lead Red	DVA Lead Black	Voltage Reading(1) @300-3000 RPM	Voltage Reading @ 3000-4000 RPM
Test 1	Coil Primary	400 DVA*	Coil (+) Terminal	Coil (-) Terminal	160-250 (1)	200-280
Test 2	Sw. Box - Stop Circuit	400 DVA*	Black/Yellow Sw. Box Terminal	Ground	220-320	300-350
Test 3	Stator - Low Speed	400 DVA*	Blue Sw. (2) Box Terminal	Ground	220-320	300-350
Test 4	Stator - High Speed	400 DVA*	Red Sw. (2) Box Terminal	Ground	30-220	200-280

*If using a meter that requires a DVA adapter, place selector switch to the 400 VDC position.

(1)Readings may vary at cranking speed or at idle.

(2)Back probe the electrical connector in order to make connection.

Multimeter Ohm Checks					
	Tested Part	Multimeter Wires	Connected To:	Meter Scale	Meter Reading
Test 5	Stator	RED BLACK	RED BLACK	R x 1 •	100 - 180
		RED BLACK	BLUE BLACK	R x 100 •	29 - 35
		RED BLACK	RED BLUE	R x 100 •	28 - 34
Test 6	Trigger	RED BLACK	BROWN/WHITE BROWN/YELLOW	R x 100 •	6.5 - 8.5

Test 7	Ignition Coils ("+") wire disconnected)	RED BLACK	(+) Terminal (–) Terminal	R x 1 •	0
		RED BLACK	Spark Plug Tower (+) Terminal	R x 100 •	8.5 - 12

NOTE: *Copper is an excellent conductor, however resistance may notably vary between low and high temperature. Therefore, reasonable differences can be accepted between resistance readings and specifications.*
The above readings are for a cold (room temperature) engine. Resistance will increase if the engine is warm.

Ignition Troubleshooting

Mechanical Spark Advance

TOOL : MULTIMETER/DVA TESTER 91-99750

Tested Part	Multimeter Wires	Connected To	Scale	Resistance (ohms)
Stator (BLACK/YELLOW and BLACK/WHITE wires disconnected from switch boxes)	RED BLACK	BLACK/WHITE GROUND	R x 1	120 - 180
	RED BLACK	BLACK/YELLOW GROUND	R x 100	32 - 38
	RED BLACK	BLACK/YELLOW BLACK/WHITE	R x 100	31 - 37
Trigger (BROWN/YELLOW and BROWN wires disconnected from switch boxes)	RED BLACK	BROWN/YELLOW BROWN	R x 100	6.5 - 8.5

Tested Part	Multimeter	Connected To	Scale	Resistance (ohms)
Ignition Coils (all wires disconnected)	RED BLACK	+ Terminal – Terminal	R x 1	0.02 - 0.04
	RED BLACK	Spark Plug Tower – Terminal	R x 1000	8 - 11

Tested Part	Multimeter Wires	Connected To	Selector Position	Reading At 300 - 1000 RPM	Reading At 1000 - 4000 RPM
Switch Box Primary Coil	RED BLACK	– Terminal + Terminal	400 VDC	125 -260	200 - 360
Switch Box Stop Circuit Stator Low Speed	RED BLACK	GROUND BLACK/YELLOW	400 VDC	150 - 300	250 - 360
Stator High Speed	RED BLACK	GROUND BLACK/WHITE	400 VDC	10 - 75	50 - 300

Ignition Troubleshooting (RED Stator)

TOOL : MULTIMETER/DVA TESTER 91-99750

Tested Part	Multimeter Wires	Connected To	Scale	Resistance (ohms)
Stator (GREEN/ WHITE and WHITE/GREEN wires disconnected from switch boxes)	RED BLACK	GREEN/WHITE WHITE/GREEN	R x 1	370 - 445
Trigger (BROWN/ YELLOW and BROWN/WHITE wires disconnected from switch boxes)	RED BLACK	BROWN/YELLOW BROWN/WHITE	R x 100	6.5 - 8.5

Tested Part	Multimeter	Connected To	Scale	Resistance (ohms)
Ignition Coils (all wires dis-connected)	RED BLACK	+ Terminal - Terminal	R x 1	0.02 - 0.04
	RED BLACK	Spark Plug Tower - Terminal	R x 1000	8 - 11

Tested Part	Multimeter Wires	Connected To	Selector Position	Reading At 300 - 1000 RPM	Reading At 1000 - 4000 RPM
Switch Box Primary Coil	RED BLACK	- Terminal + Terminal	400 VDC	125 - 320	200 - 320
Switch Box Stop Circuit	RED BLACK	BLACK/YELLOW GROUND	400 VDC	150 - 330	250 - 330
Stator Voltage	RED BLACK	GREEN/WHITE GROUND	400 VDC	150 - 330	250 - 330
	RED BLACK	WHITE/GREEN GROUND	400 VDC	150 - 330	250 - 330

NOTE: *Copper is an excellent conductor, but resistance may notably vary between low and high temperature. Therefore, reasonable differences can be accepted between resistance readings and specifications.*