



ELECTRONIC FUEL INJECTION

Section 3B - Troubleshooting and Diagnostics

Table of Contents

Table of Contents	3B-1	Troubleshooting Without the Digital Diagnostic Terminal	3B-11
Special Tools	3B-2	Guardian Protection System	3B-11
EFI System Diagnostic Procedures	3B-4	EFI System Troubleshooting Guide	3B-13
Pressure Regulator Test	3B-4	Component Resistance Tests	3B-17
Mechanical Fuel Pump Test	3B-5	Engine Coolant Temperature (ECT) Sensor	
Checking for Restricted Fuel Flow		Manifold Air Temperature (MAT) Sensor .	3B-17
Caused by Anti-Siphon Valves	3B-5	Fuel Injector	3B-18
Vacuum (Lift) Test	3B-5	Main Power Relay	3B-18
Pressure Test	3B-8	Manifold Absolute Pressure	
EFI System Troubleshooting	3B-10	(MAP) Sensor	3B-19
Using the Digital Diagnostical		Crank Position Sensor (CPS)	3B-19
Terminal (DDT)	3B-10		

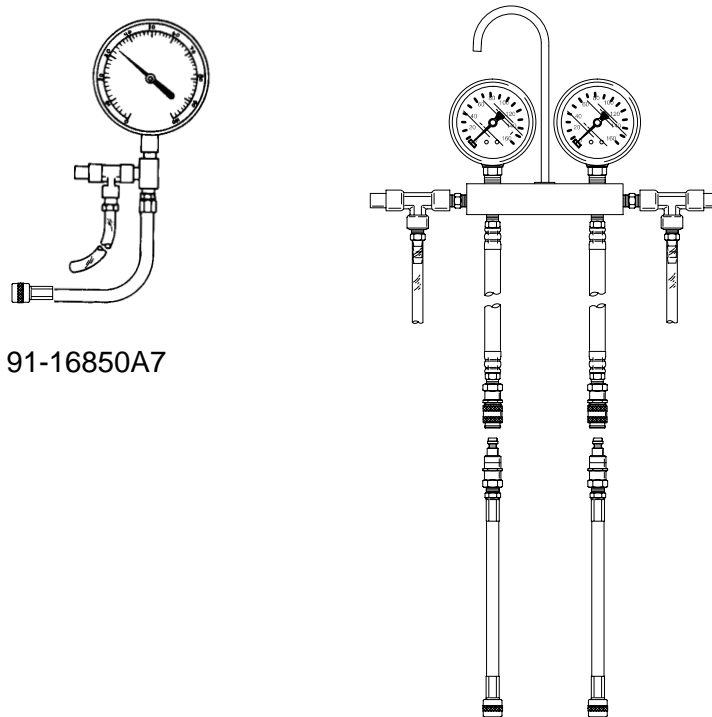
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FUEL SYSTEM	Fuel Pump Type Fuel Pump: Pressure Fuel Tank Capacity	Mechanical Water Cooled (Plunger/Diaphragm) 3-6 psi Accessory
FUEL INJECTION	Fuel Injector System Idle rpm (Out Of Gear) Idle rpm (In Forward Gear) Wide Open Throttle rpm (WOT) Range Fuel Pump Pressure - Electric	Batch (1 & 4) - (2 & 3) 725 ± 25 rpm 725 ± 25 rpm 5500–6000 42-44 psi (290-303 kPa)

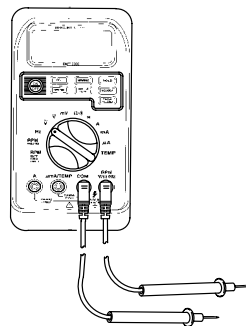


Special Tools

1. Fuel Pressure Gauge 91-16850A7 or Fuel Pressure Gauge 91-852087A3.



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

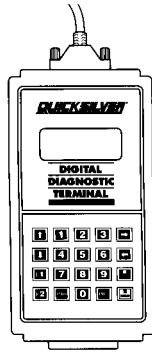


3. Cartridge 91-880118--2

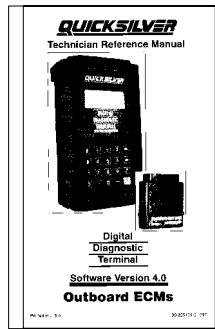




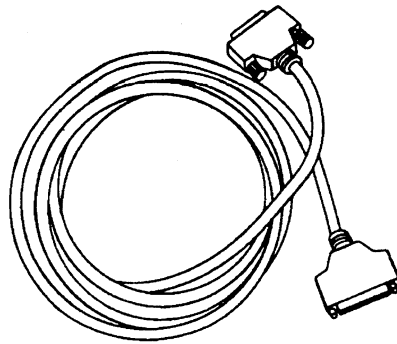
4. Digital Diagnostic Tester 91-823686A2



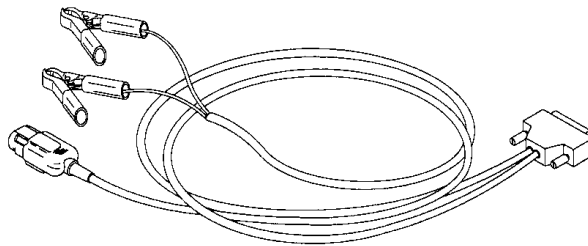
5. DDT Reference Manual 90-881204--2



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



7. DDT Test Harness 84-822560A5

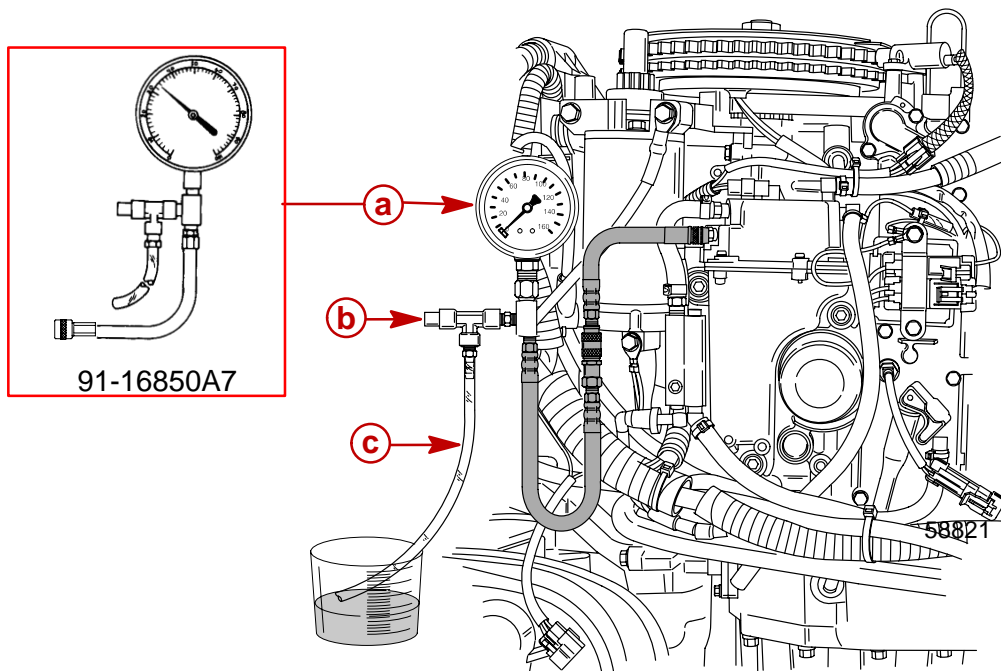




EFI System Diagnostic Procedures

Pressure Regulator Test

1. Install the fuel pressure gauge onto the pressure check valve (located on the VST).
2. Start the engine. Fuel pressure should be within specification.



- a** - Fuel Pressure Gauge
- b** - Pressure Relief Button
- c** - Drain Hose



Mechanical Fuel Pump Test

Checking for Restricted Fuel Flow Caused by Anti-Siphon Valves

While anti-siphon valves may be helpful from a safety stand-point, they clog with debris, they may be too small, or they may have too heavy a spring. Summarizing, the pressure drop across these valves can, and often does, create operational problems and/or powerhead damage by restricting fuel to the fuel pump and VST. Some symptoms of restricted (lean) fuel flow, which could be caused by use of an anti-siphon valve, are:

- 1 - Loss of fuel pump pressure
- 2 - Loss of power
- 3 - High speed surging
- 4 - Preignition/detonation (piston dome erosion)
- 5 - Outboard cuts out or hesitates upon acceleration
- 6 - Outboard runs rough
- 7 - Outboard quits and cannot be restarted
- 8 - Outboard will not start
- 9 - Vapor lock

Since any type of anti-siphon device must be located between the outboard fuel inlet and fuel tank outlet, a simple method of checking [if such a device (or bad fuel) is a problem source] is to operate the outboard with a separate fuel supply which is known to be good, such as a remote fuel tank.

If, after using a separate fuel supply, it is found that the anti-siphon valve is the cause of the problem, there are 2 solutions to the problem; either 1) replace the anti-siphon valve with one that has lighter spring tension or 2) replace it with a solenoid-operated fuel shut off valve.

Vacuum (Lift) Test

Fuel system vacuum can be checked using a short piece of extra fuel hose, vacuum gauge, and a "TEE" fitting.

1. Conduct test with water to the engine cooling system using one of the following methods:
 - In a test tank.
 - With boat/outboard lower unit in water
2. Disconnect fuel hose from inlet fitting of mechanical fuel pump.
3. Connect extra fuel hose onto the inlet fitting of pump.
4. Install "TEE" fitting into extra hose making connection as close to pump as possible.
5. Connect vacuum gauge and fuel inlet hose onto "TEE" fitting.
6. Start engine and run at 1000 RPM, normal fuel system vacuum (lift) should be to specifications.

NOTE: The system vacuum test is normally performed at 1000 RPM. As engine RPM is increased there will be a slight increase in vacuum; this increase should not exceed normal readings.

Normal Fuel System Vacuum (Lift) @ 1000 RPM
1 – 2 in. Hg (25 – 50 mm Hg)

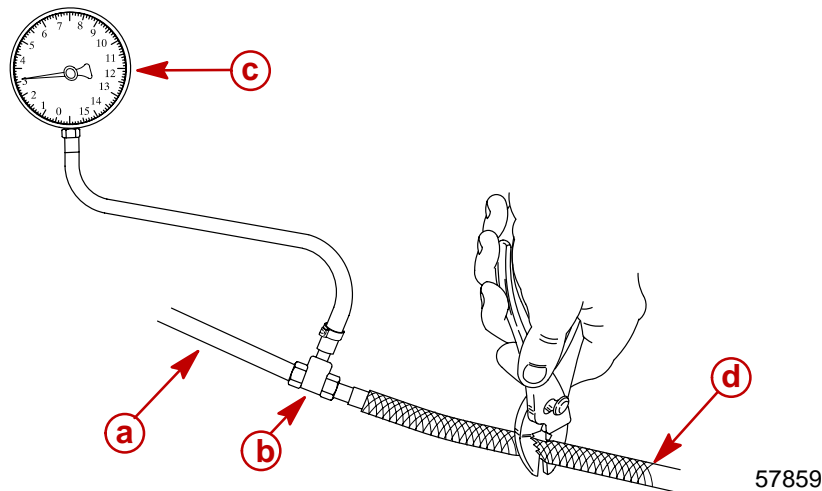


7. To isolate the mechanical fuel pump from the rest of the fuel system:
 - a. Pinch off/restrict the fuel supply hose between the vacuum gauge and the fuel tank.
 - b. The mechanical fuel pump vacuum (lift) should be to specifications.
 - c. If vacuum reading for the pump is below specifications, the pump needs rebuilding.

Mechanical Fuel Pump Vacuum (Lift) @ 1000 RPM
4 in. Hg (101.6 mm Hg)

8. If vacuum reading is not within specifications, refer to "Vacuum (Lift) Troubleshooting" table.
9. Stop engine, remove gauge, and reconnect fuel line to inlet fitting of fuel pump.

The fuel pump is designed to lift fuel (vertically) about 60 in. (1524 mm) if there are no other restrictions in the system using a fuel hose that is 5/16 in. (7.9 mm) minimum diameter. As restrictions are added, such as filters, fittings, valves etc., the amount of fuel pump lift decreases.



- a** - Extra Hose - To Inlet Fitting of Mechanical Fuel Pump
- b** - "TEE"-fitting
- c** - Vacuum Gauge
- d** - Fuel Supply Hose - From Fuel Tank



Vacuum (Lift) Troubleshooting		
Condition	Cause	Correction
Fuel system vacuum (lift) above specification	Restricted anti-siphon valve	Refer to "Checking for Restricted Fuel Flow caused by Anti-Siphon Valves" preceding
	Plugged fuel tank pick-up screen	Clean/replace fuel pick-up screen
	Pinched/collapsed fuel hose	Inspect/replace fuel hose(s)
	Dirty/plugged water separating fuel filter	Clean/replace water separating fuel filter
	Restriction in fuel line thru-hull fitting	Clean/replace fitting
	Restriction in fuel tank switching valve	Clean/replace valve
	Restriction within primer bulb	Rebuild/replace primer bulb
Fuel system vacuum (lift) below specifications	Low fuel level in fuel tank	Fill tank with fuel
	Hole/cut in pick-up tube of fuel tank	Replace fuel pick-up tube
	Loose fuel line connection	Check/tighten all connections
	Hole/cut in fuel line	Inspect/replace fuel hose(s)
	Loose fuel pump screws	Torque screws to specification
	Fuel pump gasket(s) worn or leaking	Rebuild/replace fuel pump
	Fuel pump check valves/seals leaking	Rebuild/replace fuel pump
	Leaky fuel pump diaphragm	Rebuild/replace fuel pump
	Worn/broken fuel pump springs	Rebuild/replace fuel pump
	Leaky fuel pump seals	Rebuild/replace fuel pump
	Fuel filter bowl loose	Tighten fuel filter bowl
	Fuel filter gasket cut/worn	Replace gasket
	Fuel vaporization	Check for plugged fuel pump water cooling circuit



Pressure Test

Fuel system pressure/trouble shooting can be performed using piece of clear fuel hose 4 in. (10 cm) long, a pressure gauge, and a “TEE” fitting.

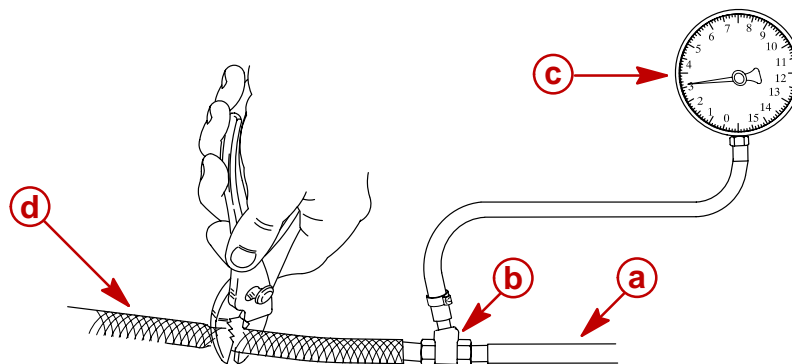
1. Conduct test with water to the engine cooling system using one of the following methods:
 - In a test tank
 - With boat/outboard lower unit in water
2. Disconnect fuel hose from outlet fitting of mechanical fuel pump.
3. Connect clear fuel hose onto the inlet fitting of pump.
4. Install “TEE” fitting onto clear fuel hose.
5. Connect pressure gauge and fuel outlet hose (to VST) onto “TEE” fitting.
6. Start engine and run at 1000 RPM, normal fuel system pressure should be to specifications.

Normal Fuel System Pressure @ 1000 RPM
Pressure should exceed 2 psi (13.7 kPa)

7. To isolate the mechanical fuel pump from the rest of the fuel system:
 - a. Pinch off/restrict the fuel hose between the “TEE” fitting and the VST.
 - b. The mechanical fuel pump pressure should be to specifications.
 - c. If pressure reading for the pump is below specifications, the pump needs rebuilding.

Mechanical Fuel Pump Pressure @ 1000 RPM
Pressure should exceed 3 psi (20.7 kPa)

8. If fuel pressure reading is below specifications, refer to “Fuel Pressure Troubleshooting” table.
9. Stop engine, remove gauge/clear hoses and reconnect fuel line to outlet fitting of fuel pump.



- a** - Clear Hose - From Mechanical Fuel Pump Outlet to “Tee” Fitting
- b** - “TEE”-fitting
- c** - Fuel Pressure Gauge
- d** - Fuel Hose - To VST



Fuel Pressure Troubleshooting		
Condition	Cause	Correction
Fuel system pressure below specification	Restricted anti-siphon valve	Refer to "Checking for Restricted Fuel Flow caused by Anti-Siphon Valves" preceding
	Low fuel level in fuel tank *	Fill tank with fuel
	Plugged fuel tank pick-up screen	Clean/replace fuel pick-up screen
	Hole/cut in pick-up tube of fuel tank *	Replace fuel pick-up tube
	Loose fuel line connection *	Check/tighten all connections
	Hole/cut in fuel line *	Inspect/replace fuel hose(s)
	Fuel line primer bulb check valves not opening	Replace fuel line primer bulb
	Fuel hose/line internal diameter too small	Use 5/16 in. (8mm) fuel hose
	Restriction in fuel line thru-hull fitting	Clean/replace fitting
	Restriction in fuel tank switching valve	Clean/replace valve
	Restriction within primer bulb	Rebuild/replace primer bulb
	Pinched/collapsed fuel hose	Inspect/replace fuel hose(s)
	Dirty/plugged water separating fuel filter	Clean/replace water separating fuel filter
	Fuel filter bowl loose *	Tighten fuel filter bowl
	Fuel filter gasket cut/worn *	Replace gasket
	Loose fuel pump screws *	Torque screws to specification
	Fuel pump gasket(s) worn or leaking *	Rebuild/replace fuel pump
	Fuel pump check valves/seals leaking	Rebuild/replace fuel pump
	Leaky fuel pump diaphragm *	Rebuild/replace fuel pump
	Worn/broken fuel pump springs	Rebuild/replace fuel pump
Leaky fuel pump seals	Rebuild/replace fuel pump	
Fuel vaporization	Check for plugged fuel pump water cooling circuit	

NOTE: * Air bubbles may also be visible as fuel passes through the clear fuel (test) hose installed between the mechanical fuel pump outlet fitting and the VST.

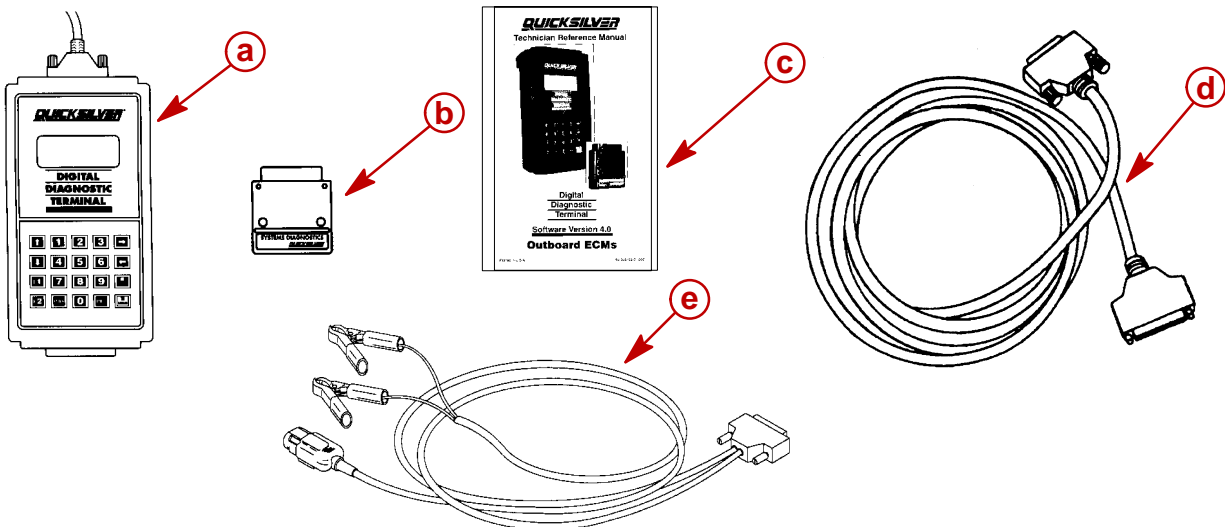


EFI System Troubleshooting

The ECM is designed such that if a sensor fails the ECM will compensate so that the engine does not go into an over-rich condition. Because of this, disconnecting a sensor for troubleshooting purposes may have no noticeable effect.

Using the Digital Diagnostic Terminal (DDT)

IMPORTANT: Any sensor that is disconnected while the engine is running will be recorded as a fault in the ECM Fault History. Use the DDT to view and clear the fault history when troubleshooting/repair is completed.



- a** - Digital Diagnostic Terminal (91-823686A2)
- b** - Software Cartridge (91-880118--2)
- c** - DDT Reference Manual (90-881204--2)
- d** - DDT Cable 10ft. (3.05m) Extension (84-825003A1)
- e** - Adaptor Harness (84-822560A5)

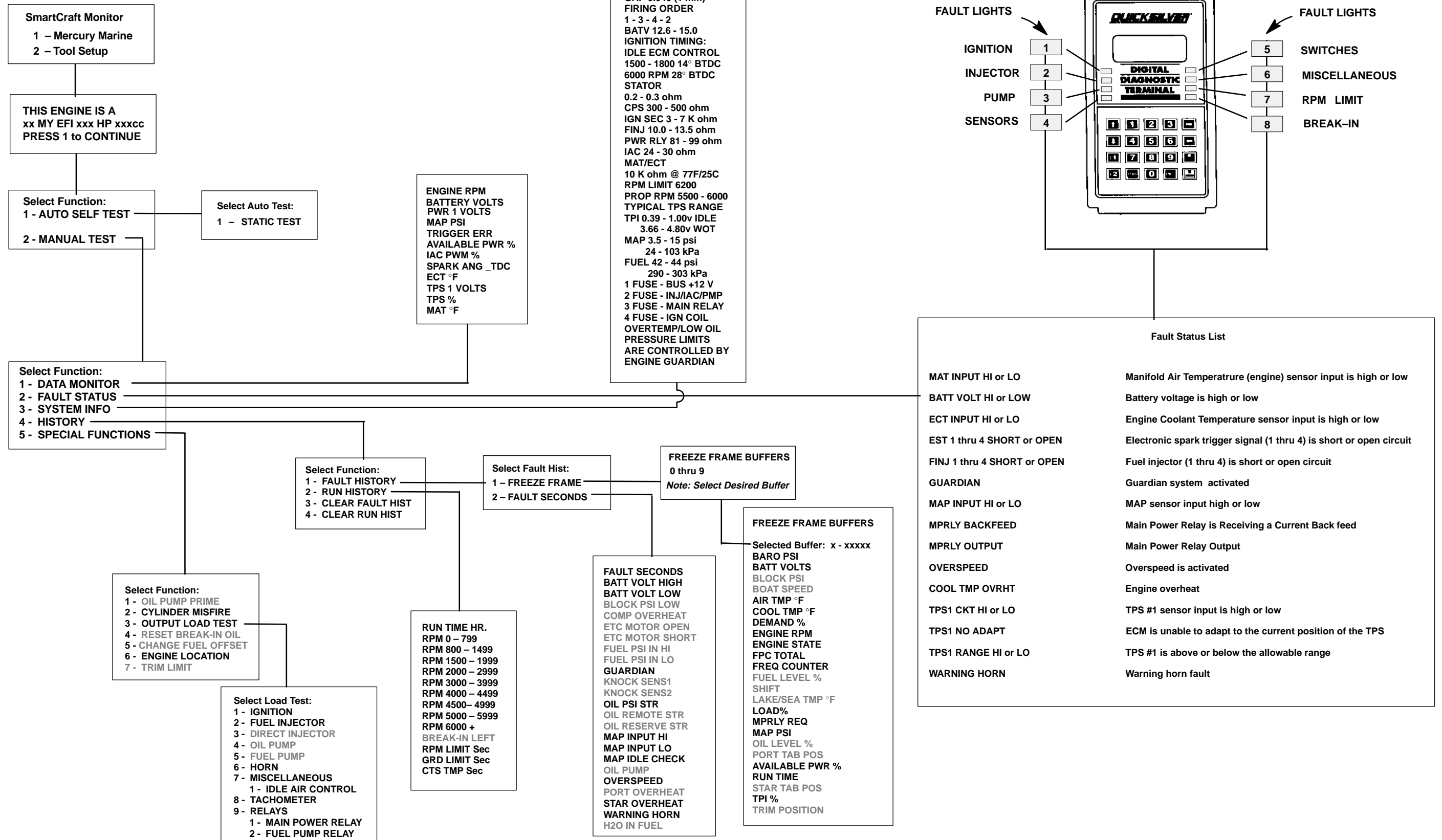
The Quicksilver Digital Diagnostic Terminal (DDT) has been developed specifically to help technicians diagnose and repair Mercury Marine 2 and 4 cycle engines.

Attach the diagnostic cable to the ECM diagnostic connector and plug in the software cartridge. You will be able to monitor sensors and ECM data values including status switches. The ECM program can help diagnose intermittent engine problems. It will record the state of the engine sensors and switches for a period of time and then can be played back to review the recorded information.

Refer to the Digital Diagnostic Terminal Reference Manual for complete diagnostic procedures.



DDT Functions – 4-Stroke EFI Models Software Version 1.2 (P/N 91-880118-2)





Troubleshooting Without Digital Diagnostic Terminal

Troubleshooting without the DDT is limited to checking resistance on some of the sensors. Typical failures usually do not involve the ECM. Connectors, set-up, and mechanical wear are most likely at fault.

- Verify spark plug wires are securely installed (pushed on) on the coil tower.
- The engine may not run or may not run above idle with the wrong spark plugs installed.
- Swap ignition coils to see if the problem follows the coil or stays with the particular cylinder.

NOTE: ECMs are capable of performing a cylinder misfire test to isolate problem cylinders. Once a suspect cylinder is located, an output load test on the ignition coil or fuel injector can be performed using the DDT.

- Any sensor or connection can be disconnected and reconnected while the engine is operating without damaging the ECM. Disconnecting the crank position sensor will stop the engine.

IMPORTANT: Any sensor that is disconnected while the engine is running will be recorded as a Fault in the ECM Fault History. Use the DDT to view and clear the fault history when troubleshooting/repair is completed.

- If all cylinders exhibit similar symptoms, the problem is with a sensor or harness input to the ECM.
- If problem is speed related or intermittent, it is probably connector or contact related. Inspect connectors for corrosion, loose wires or loose pins. Secure connector seating; use dielectric compound 92-823506-1.
- Inspect the harness for obvious damage: pinched wires, chaffing.
- Secure grounds and all connections involving ring terminals (coat with Liquid Neoprene 92-25711--3).
- Check fuel pump connections and fuel pump pressure.

Guardian Protection System

The guardian protection system monitors critical engine functions and will reduce engine power accordingly in an attempt to keep the engine running within safe operating parameters.

IMPORTANT: The Guardian System cannot guarantee that powerhead damage will not occur when adverse operating conditions are encountered. The Guardian System is designed to (1) warn the boat operator that the engine is operating under adverse conditions and (2) reduce power by limiting maximum rpm in an attempt to avoid or reduce the possibility of engine damage. The boat operator is ultimately responsible for proper engine operation.



Warning Horn/Guardian System Operation		
Sound	Condition	Description
One Beep on key up	Normal	System Test
Six Beeps on key up, or during a running failure.	Failure detected with MAP, MAT *, TPS, or Flash Check Sum (ECM)	Engine should run well however, service will be required.
Three Beeps every 4 Minutes.	Failure detected with: <ul style="list-style-type: none"> • Battery Voltage * • EST *- Open detected at key up. Short detected with engine running • Fuel Injector - Detected while cranking/running * • Coolant Sensor * • IAC ** 	Engine will start hard, run rough and/or stall. Utilizing the neutral fast idle feature may assist starting. Service is required.
Intermittent Beeps	Failure detected with: <ul style="list-style-type: none"> • Fuel Pump - May start momentarily ** • Main Power Relay - No start ** • ECM Reference Voltage to MAP/TPS - Starts but stalls under load 	Engine may or may not start. If engine starts it easily stalls. Service is required.
Continuous	Engine Overheat	Engine Guardian System is activated. Power limit will vary with level of overheat. Stop engine and check water intake for obstruction. Advancing throttle above idle may provide additional cooling.
	Low Oil Pressure	Guardian System is activated. Engine power is limited to 10% of maximum. Stop engine and check oil level. Add oil if necessary.
	Battery Voltage Less Than 10v or More Than 16v	Engine Guardian System is activated. Engine power is limited to 75% of maximum.
	Coolant Sensor Failure	Engine Guardian System is activated. Engine power is limited to 50% of maximum. Engine overheat protection is compromised.
	Engine Speed Limiter	Exceeding 6200 rpm cuts spark/injection on cylinders #2 and #3 to reduce engine speed. Exceeding 6350 rpm cuts spark/injection on all cylinders to reduce engine speed.

* Horn Beeps once on key up, plus failure code.

** Sticky Fault requires key off to reset.



EFI System Troubleshooting Guide

IMPORTANT: In all instances check wiring harness integrity (especially ground connections) in boat and on engine.

Condition	Cause/Fault	Warning Mode	Check
Engine cranks but will not start	Lanyard stop switch is in the "OFF" position	None	Set lanyard stop switch to "RUN"
	Weak battery or bad starter motor. Battery voltage drops below 8 volts while cranking (ECM cuts out below 6 volts) (Fuel pump requires 8 volts).	3 Beeps every 4 minutes for low battery voltage.	Check condition of battery/starter solenoid terminals and cables. Charge/replace battery. Inspect condition of starter motor.
	Blown Fuse	None	Replace fuse. Inspect engine wiring harness and electrical components. Fuse #2 - Fuel Injectors/IAC/Fuel Pump Fuse #3 - Main Power Relay/Accessory Fuse #4 - Ignition Coils
	Main Power Relay	Intermittent Beeps	Listen for relay to "click" when key switch is turned to "ON" 81 - 99 ohms Between pin #22 (YEL/PUR) of port ECM connector and (RED/BLU) wire of fuse #3 (fuse removed) - or - Between pin #85 and pin #86 of relay
	Crank Position Sensor (CPS)	None Note: No rpm reading at tachometer	300 – 350 ohms Between pin #5 (RED) and pin #6 (WHT) of starboard ECM connector. - or - Between pin #1 (RED) and pin #2 (WHT) of CPS connector.
	Electric fuel pump	Intermittent Beeps	Listen for pump. Fuel pump should run 2 seconds after key switch is turned to "RUN" position. 32 - 41 ohms Between pin #19 (BLK/BLU) and pin # 23 (RED/BLU) - or - Between pins of fuel pump connector.
	Flywheel misaligned	None	Remove flywheel and inspect flywheel key/key way
	Engine Coolant Temperature (ECT) sensor	3 Beeps every 4 minutes	See ECT sensor resistance chart - Section 3B "ELECTRONIC FUEL INJECTION". Advancing the remote control fast idle feature or advancing the tiller handle throttle grip half way may assist starting.



IMPORTANT: In all instances check wiring harness integrity (especially ground connections) in boat and on engine.			
Condition	Cause/Fault	Warning Mode	Check
Engine cranks, starts and stalls	Remote control to engine wiring harness connection is poor	None	Clean and inspect male and female connections.
	Air in fuel system/lines	None	Crank and start engine several times.
	Manifold Absolute Pressure (MAP) sensor	6 Beeps at key up or failure	See MAP sensor resistance chart - Section 3B "ELECTRONIC FUEL INJECTION".
	Throttle Position Sensor (TPS)	6 Beeps at key up or failure	Typical TPI range with DDT: Idle 0.39-1.0 volts, WOT 3.66-4.80 volts.
	Idle Air Control (IAC)	3 Beeps every 4 minutes	20 - 24 ohms Between pin #20 (WHT/ORG) and pin #23 (RED/BLU) of starboard ECM connector. - or - Between pin A and pin B of IAC.
	ECM reference voltage to MAP/TPS	Intermittent Beeps	5 volts Between PUR/YEL pin of MAP sensor wiring harness connector and engine ground (key switch to "RUN").
	Fuel pressure at VST fitting	None	See fuel pressure test - Section 3B "ELECTRONIC FUEL INJECTION".
	Flywheel misaligned	None	Remove flywheel and inspect flywheel key and key way
Engine Idles Fast after warm-up (900-1100rpm)	Engine Coolant Temperature (ECT) sensor	3 Beeps every 4 minutes	See ECT sensor resistance chart - Section 3B "ELECTRONIC FUEL INJECTION".
Poor off idle or WOT running quality	Fuel injector	3 Beeps every 4 minutes	10.0 - 13.5 ohms Between fuel injector pin #1 and pin #2. - or - Between (removed) fuse #2 (RED/BLU) wire and port ECM connector: Pin #17 (PNK/BRN) Fuel Injector #1 Pin #2 (PNK/RED) Fuel Injector #2 Pin #1 (PNK/ORG) Fuel Injector #3 Pin #18 (PNK/YEL) Fuel Injector #4
	Ignition coil (EST) ***	3 Beeps every 4 minutes	See ignition coil resistance chart - Section 2A "IGNITION"
	Fuel pressure at VST fitting	None	See fuel pressure test - Section 3B "ELECTRONIC FUEL INJECTION".
	Fuel filter plugged	None	Replace fuel filter
	Improper spark plugs	None	Use recommended resistive spark plugs
	Loose grounds	None	Check all ground connections.
	Flywheel timing tooth pattern	None	Check tooth pattern for partially missing or damaged teeth
	Fouled spark plug(s)	None	Replace spark plug(s).



IMPORTANT: In all instances check wiring harness integrity (especially ground connections) in boat and on engine.

Condition	Cause/Fault	Warning Mode	Check
Poor idle quality	Crank Position Sensor (CPS)	None	300 - 350 ohms Between pin #5 (RED) and pin #6 (WHT) of starboard ECM connector. - or - Between pin #1 (RED) and pin #2 (WHT) of CPS connector.
	Manifold Absolute Pressure (MAP) sensor	6 Beeps at key up or failure	See MAP sensor resistance chart - Section 3B "ELECTRONIC FUEL INJECTION".
	Throttle Position Sensor (TPS)	6 Beeps at key up or failure	Typical TPI range with DDT: Idle 0.39-1.0 volts, WOT 3.66-4.80 volts.
	Engine Coolant Temperature (ECT) sensor	3 Beeps every 4 minutes	See ECT sensor resistance chart - Section 3B "ELECTRONIC FUEL INJECTION".
	Manifold Air Temperature (MAT) sensor	6 Beeps at key up or failure	See MAT sensor resistance chart --- Section 3B "ELECTRONIC FUEL INJECTION".
	Fuel injector	3 Beeps every 4 minutes	10.0 - 13.5 ohms Between fuel injector pin #1 and pin #2. - or - Between (removed) fuse #2 (RED/BLU) wire and port ECM connector: Pin #17 (PNK/BRN) Fuel Injector #1 Pin #2 (PNK/RED) Fuel Injector #2 Pin #1 (PNK/ORG) Fuel Injector #3 Pin #18 (PNK/YEL) Fuel Injector #4
	Ignition coil (EST) ***	3 Beeps every 4 minutes	See ignition coil resistance chart - Section 2A "IGNITION"
	Idle Air Control (IAC)	3 Beeps every 4 minutes	20 - 24 ohms Between pin #20 (WHT/ORG) and pin #23 (RED/BLU) of starboard ECM connector. - or - Between pin A and pin B of IAC.
	Fuel pressure at VST fitting.	None	See fuel pressure test - Section 3B "ELECTRONIC FUEL INJECTION".
	Loose grounds	None	Check all ground connections.
Fouled spark plug(s)	None	Replace spark plug(s).	

*** The ECM will only monitor the EST connection to the ignition coil, use resistance tests and/or spark gap test to confirm an ignition coil failure.



IMPORTANT: In all instances check wiring harness integrity (especially ground connections) in boat and on engine.			
Condition	Cause/Fault	Warning Mode	Check
Engine runs rich	Fuel pressure regulator	None	42 - 44 psi (290 – 303 kPa) at VST fitting - Section 3B “ELECTRONIC FUEL INJECTION”
	Engine Coolant Temperature (ECT) Sensor	3 Beeps every 4 minutes	See ECT sensor resistance chart - Section 3B Electronic Fuel Injection
	Thermostat stuck open	None	Remove and inspect thermostat. Section 4A “CYLINDER HEAD”
Speed Reduction Engine RPM Limited to 2000	Low oil pressure or grounded oil pressure switch lead	GUARDIAN Continuous Horn Above 10% Power Setting	Check engine oil level and add oil as needed. Remove oil pressure switch and install oil pressure gauge, (warm engine) oil pressure should be: Above 2.9 psi (20.0 kPa) at idle 30-40 psi. (207-278 kPa) at 3000 rpm. See Oil Pressure Switch test - Section 4B “Cylinder Block/Crankcase”. Check for short between pin #7 (BLU) of starboard ECM connector and open connector of oil pressure switch.
Speed Reduction Engine RPM Limited	Engine Overheat	GUARDIAN Continuous	Engine Guardian System is activated. Power limit will vary with level of overheat. Stop engine and check water intake for obstruction. Advancing throttle above idle may provide additional cooling.
	Battery Voltage Less Than 10v or More Than 16v	GUARDIAN Continuous Horn Above 75% Power Setting	Engine Guardian System is activated. Engine power is limited to 75% of maximum.
	Engine Coolant Temperature (ECT) Sensor Failure	GUARDIAN Continuous Horn Above 50% Power Setting	Engine Guardian System is activated. Engine power is limited to 50% of maximum. Engine overheat protection is compromised



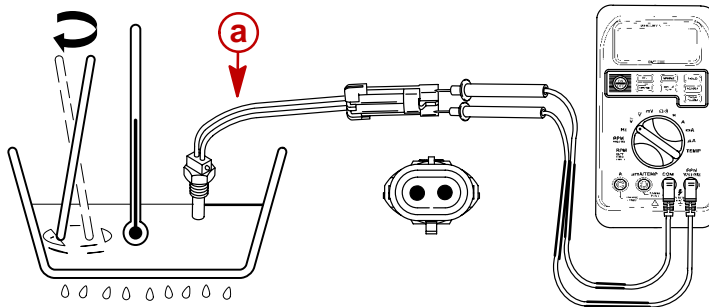
Component Resistance Tests

NOTE: Refer to section 1C **General Information** (powerhead reference views) for location of sensors.

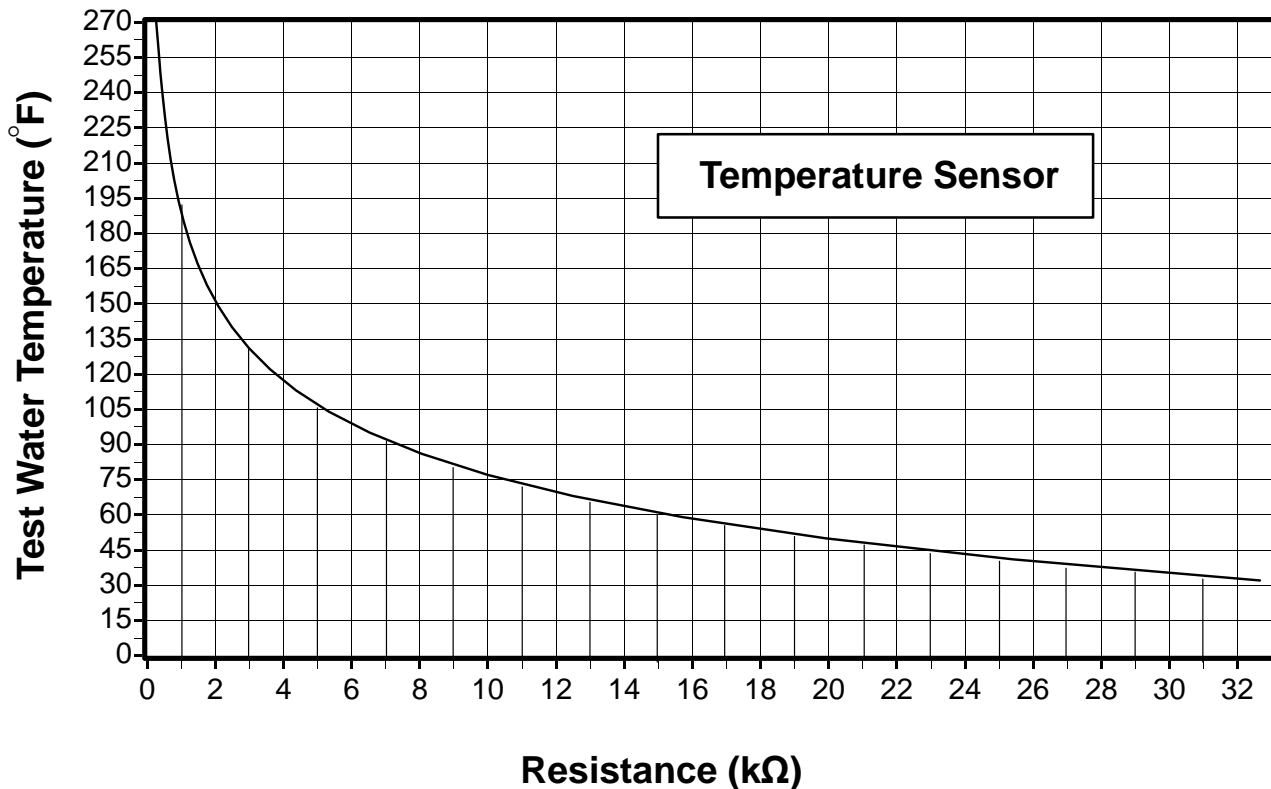
NOTE: If using DMT 2000 turn the selector switch to Ω . Allow the meter to auto-range.

Engine Coolant Temperature (ECT) Sensor Manifold Air Temperature (MAT) Sensor

1. Place the engine coolant temperature sensor in a container filled with water.
2. Place a thermometer in the water and slowly heat the water.
3. Measure the resistance when the specified temperature is reached. If the reading is out of specification, replace the sensor.

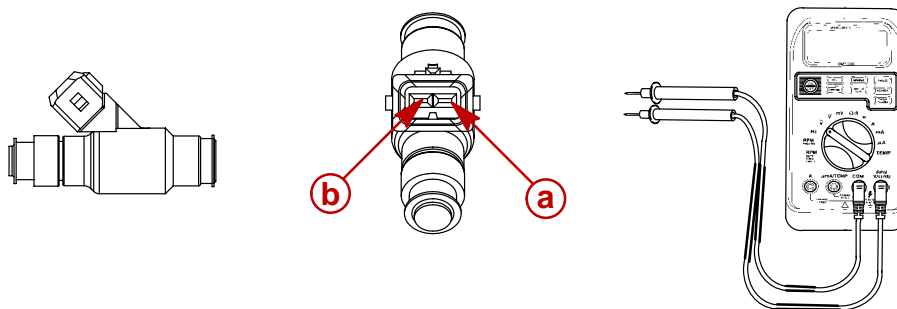


a - Engine Coolant Temperature(ECT) Sensor



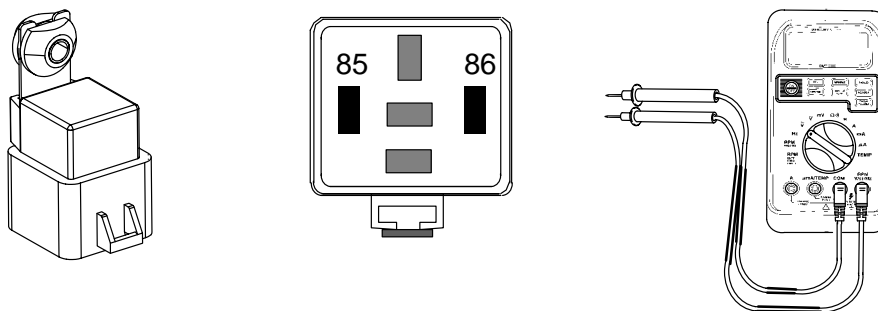


Fuel Injector



METER TEST LEADS		METER SCALE (ANALOG)	READING (Ω)
RED	BLACK	RX1	10 - 13.5
PIN A	PIN B		

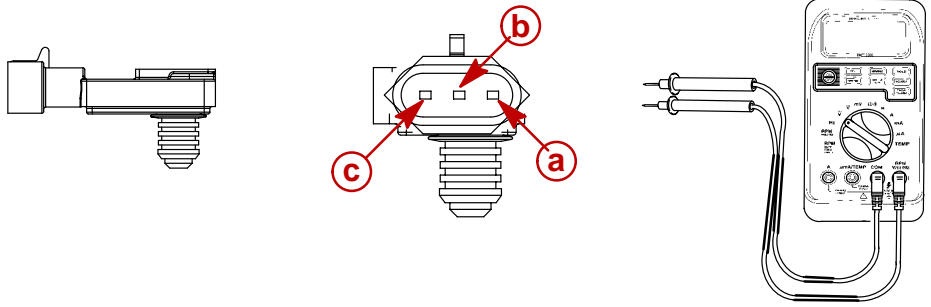
Main Power Relay



METER TEST LEADS		METER SCALE (ANALOG)	READING (Ω)
RED	BLACK	RX1	81 - 91
PIN 85	PIN 86		



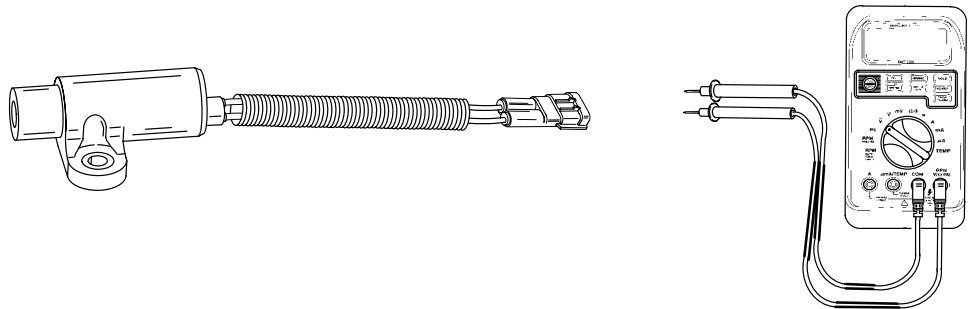
Manifold Absolute Pressure (MAP) Sensor



- a** - Black/Orange
- b** - Yellow
- c** - Purple/Yellow

METER TEST LEADS		METER SCALE (ANALOG)	READING (Ω)
RED	BLACK	RX1K	95 - 105 K
PIN A	PIN B		
PIN A	PIN C		
PIN B	PIN C		

Crank Position Sensor



METER TEST LEADS		METER SCALE (ANALOG)	READING (Ω)
RED	BLACK	RX1	300 - 350
RED	WHT		