



FUEL SYSTEM

Section 3A – Electric Fuel Pump

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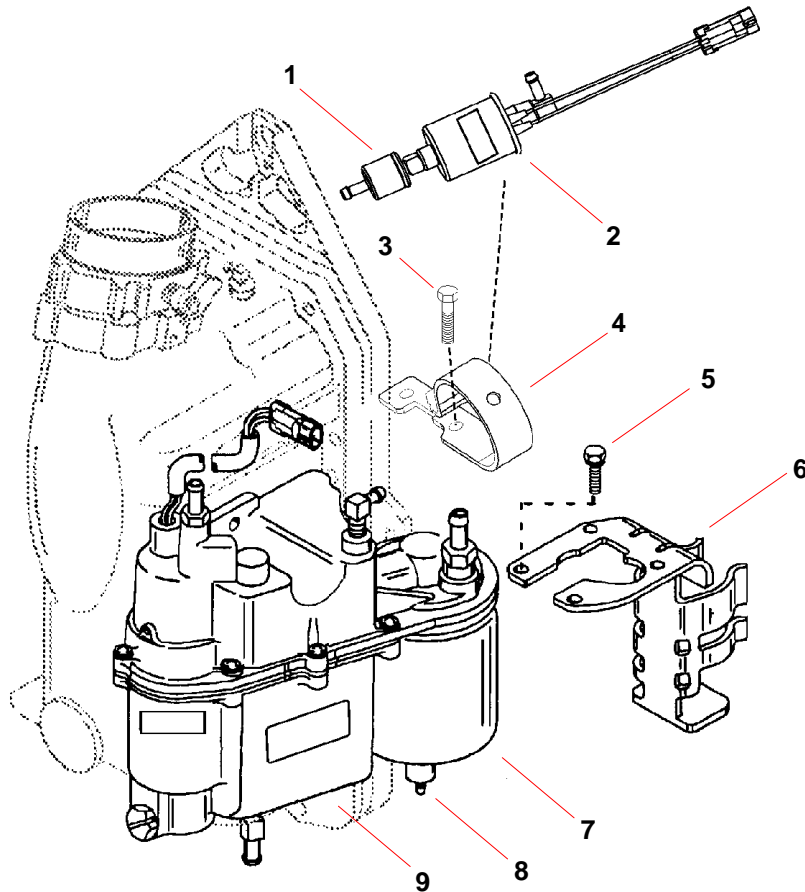
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Specifications

FUEL SYSTEM	Fuel Recommended Gasoline Recommended Oil Gasoline/Oil Ratio – @ Idle – @ WOT	Gasoline w/Oil Injection Unleaded 87 Octane Minimum Quicksilver TC-W3 Premium Plus 2 Cycle Outboard Oil 300 – 400:1 40:1
FUEL LIFT PUMP	Fuel Pressure Amperage Draw	Normal – 1-2 psi (6.8 – 13.7 kPa) Maximum – 10 psi (68.5 kPa) 1 – 2 Amperes



Fuel Pump Assembly

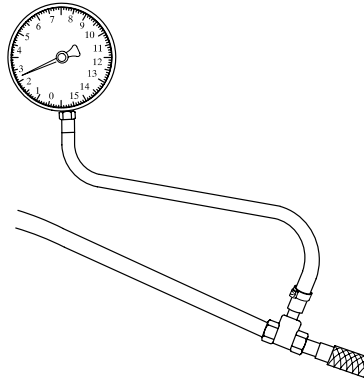


REF. NO.	QTY.	DESCRIPTION	TORQUE		
			lb. in.	lb. ft.	N-m
1	1	FUEL FILTER			
2	1	FUEL LIFT PUMP			
3	2	BOLT	145		16
4	2	BRACKET			
5	1	BOLT	145		16
6	1	BRACKET			
7	1	FUEL/WATER SEPARATOR			
8	2	WATER SENSOR			
9	1	VAPOR SEPARATOR			



Special Tools

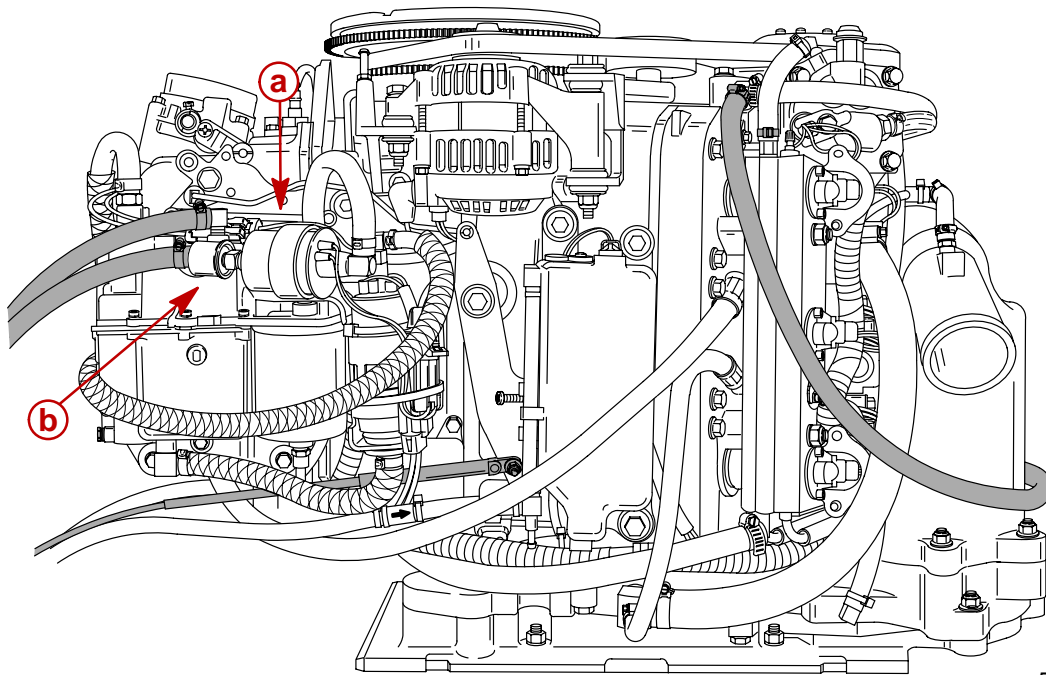
1. Fuel Pressure Gauge (0–15 psi) (Obtain Locally)



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Fuel Lift Pump Description/Operation

The fuel lift pump is an electric fuel pump used to supply fuel to the engine vapor separator.



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a - Fuel Lift Pump

b - Fuel Filter

Electrical power is supplied to the fuel lift pump from the starter solenoid positive terminal (starter side).



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 power-head 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 - Engine cuts out or hesitates upon acceleration
- 6 - Engine runs rough
- 7 - Engine quits and cannot be restarted
- 8 - Engine will not start
- 9 - Vapor lock

Since any type of anti-siphon device must be located between the engine 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 engine 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.

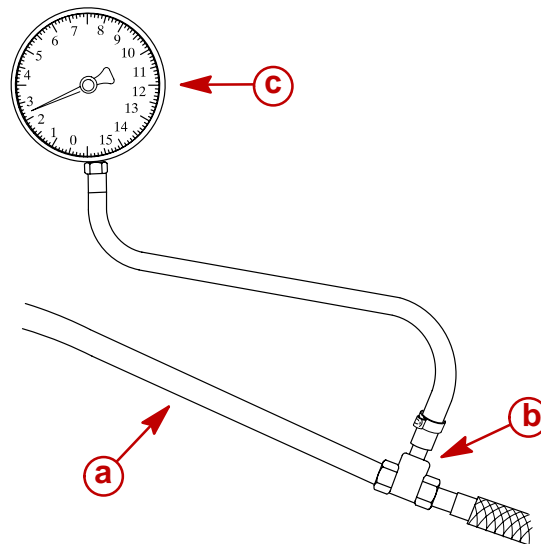


Checking Fuel Pump Lift (Vacuum)

The fuel lift 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.

Fuel pump vacuum and air bubbles in the fuel supply can be checked with a vacuum gauge, a t-fitting and a clear piece of fuel hose. Connect the clear hose between the inlet fitting on the pulse driven fuel pump and the vacuum gauge t-fitting; keeping the t-fitting as close as possible to the pump. Connect the fuel line from the fuel tank to the remaining connection on the t-fitting.

Before proceeding with the system vacuum test, confirm that the pulse fuel pump is capable of supplying the required vacuum. To do this, start the engine, pinch off/restrict the fuel supply hose between the vacuum gauge and fuel tank. The vacuum gauge should rise to or exceed the maximum normal reading of 2.5 inches vacuum (mercury). If it fails to reach this minimum number, the pump needs servicing or there is a lack of crankcase pressure to operate the pump.



- a - Clear Hose
- b - T-fitting
- c - Vacuum Gauge

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Vacuum Test Troubleshooting

This test is normally performed at an idle speed. As engine rpm increases, there will be a slight increase in vacuum. The increase should not exceed specification.

Normal Reading	Below 2.5 in. of vacuum (mercury)
Reading above 2.5 in. of vacuum (mercury)	Restriction within the fuel system – <ul style="list-style-type: none"> • Restricted anti-siphon valve • Restriction within the primer bulb • Kinked or collapsed fuel hose • Plugged water separating fuel filter (in the boat) • Restriction in fuel line thru-hull fitting • Restriction in fuel tank switching valves • Plugged fuel tank pick-up screen



Testing Fuel Pump

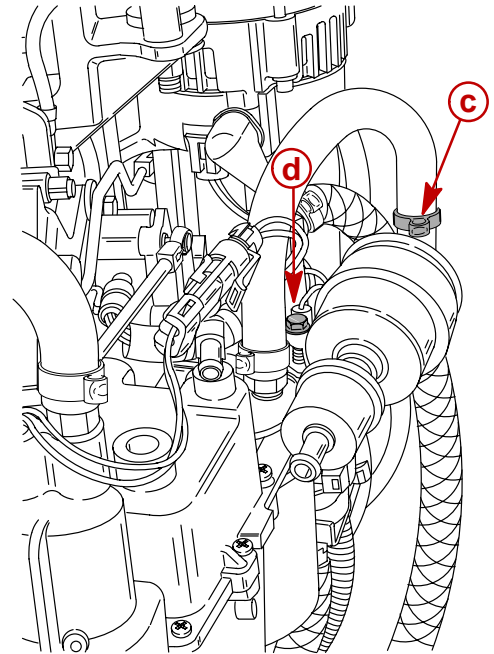
Install clear fuel hose(s) between fuel pump and VST. Run engine, and inspect fuel passing thru hose(s) for air bubbles.

Problem: Air Bubbles in Fuel Line	
Low fuel in tank.	Fill tank with fuel.
Loose fuel line connection.	Check and tighten all connectors.
Fuel pump fitting loose.	Tighten fitting.
A hole or cut in fuel line.	Check condition of all fuel lines and replace
Fuel Pump anchor screw(s) loose.	Tighten all screws evenly and securely.
Fuel Pump filter cover anchor screw loose.	Tighten screws securely.
Fuel pump filter gasket worn out.	Replace gasket.
Fuel pump gasket(s) worn out.	Rebuild fuel pump.
Fuel vaporizing	Fuel with high reed vapor pressure (winter grade fuel) may vaporize (form bubbles) when used in hot/warm weather. Use fuel with a lower reed vapor pressure (summer grade fuel)
Problem: Lack of Fuel Pump Pressure	
An anti-siphon valve.	See "Checking for Restricted Fuel Flow" preceding.
Air in fuel line.	See "Air Bubbles in Fuel Line", above.
A dirty or clogged fuel filter.	Clean or replace fuel filter.
The fuel pickup in fuel tank is clogged or dirty.	Clean or replace pickup.
Worn out fuel pump diaphragm.	Rebuild fuel pump.
Worn out check valve(s) in fuel pump.	Rebuild fuel pump.
A leaky check valve gasket.	Rebuild fuel pump.
Pulse hole(s) plugged.	Remove fuel pump and clean out holes.
Hole in pulse hose.	Replace pulse hose.
Loose pulse hose.	Tighten connection(s).
Fuel hose internal diameter too small.	Use 5/16 I.D. fuel hose.
Excessive fuel lift required.	Fuel lift exceeds 2.5 in. of vacuum (mercury)

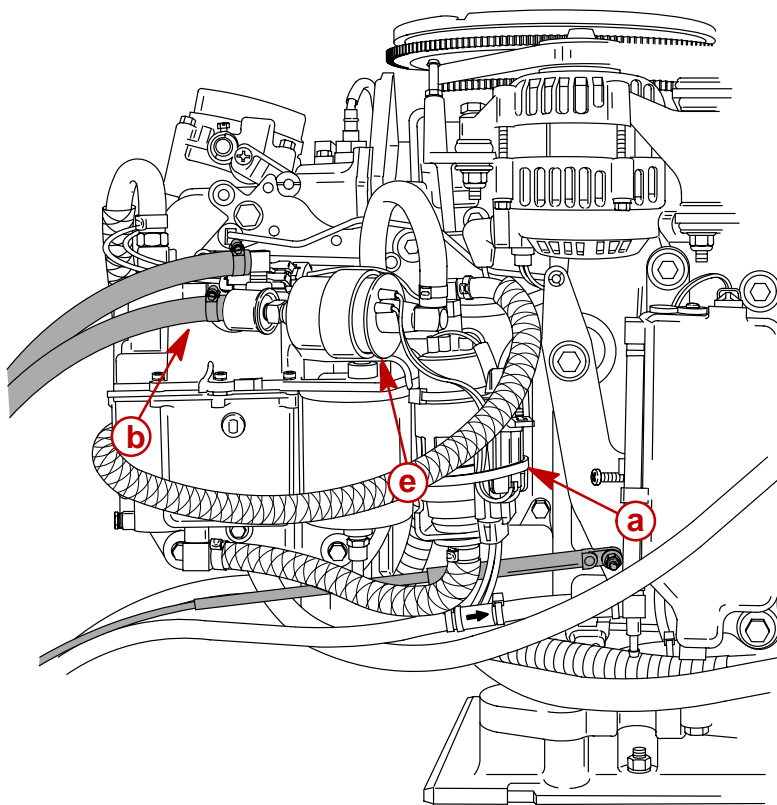


Fuel Lift Pump Removal/Disassembly

1. Disconnect fuel pump harness connector.
2. Disconnect fuel hose from fuel filter.
3. Use sharp side cutter or end cutter to peel back end of clamp securing vapor separator hose. Remove hose from fuel pump.
4. Loosen bolt securing pump retaining clamp and remove pump.



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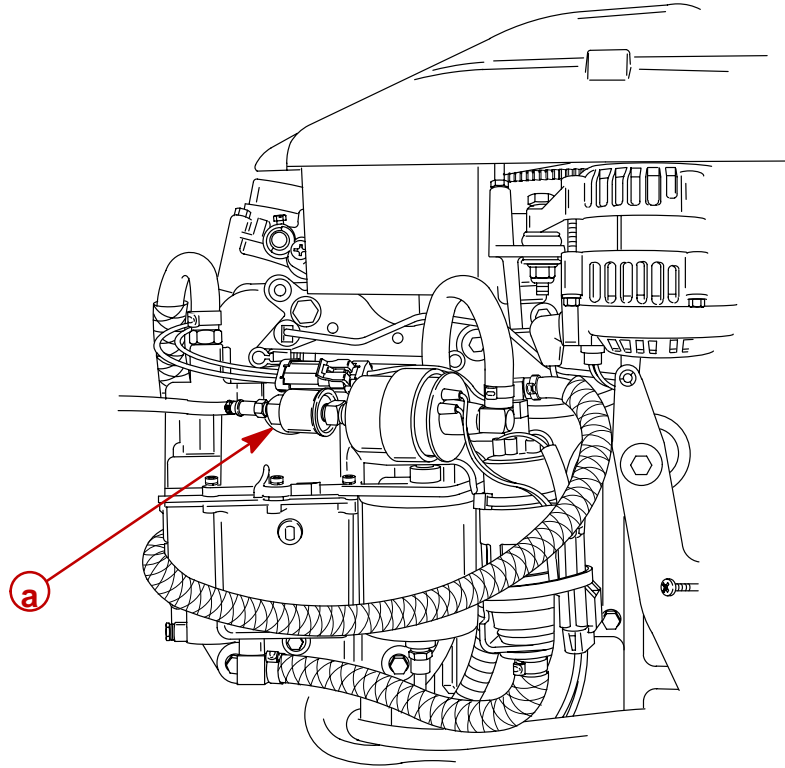
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- a** - Harness Connector
- b** - Fuel Hose
- c** - Clamp
- d** - Bolt
- e** - Fuel Pump



Cleaning/Inspection

There are no serviceable parts within the electric fuel pump. However, there is a replaceable fuel filter on the pump which should be replaced every 100 hours or once a season. Use a strap wrench to remove filter.



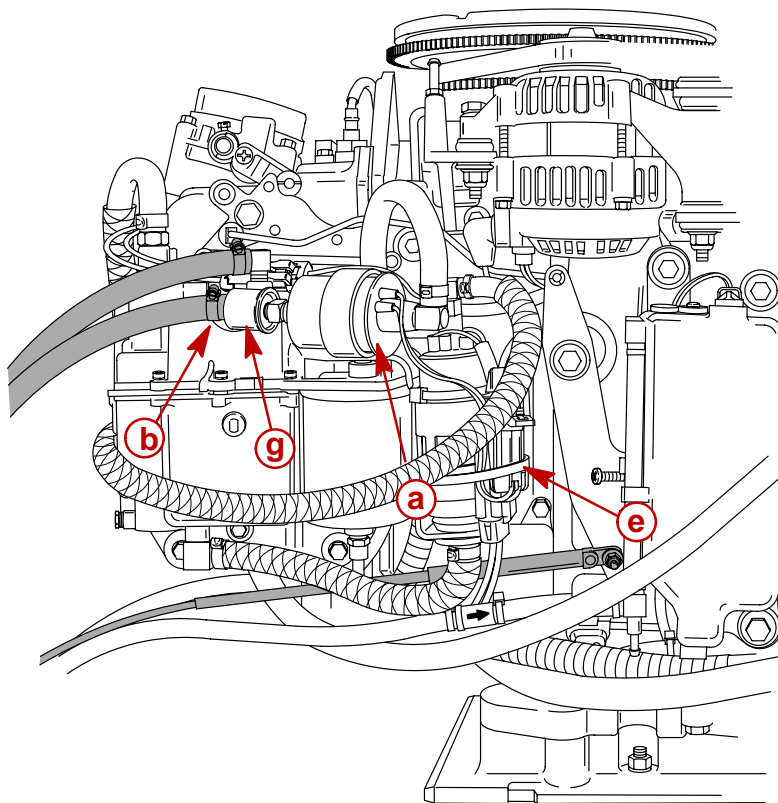
a - Fuel Filter



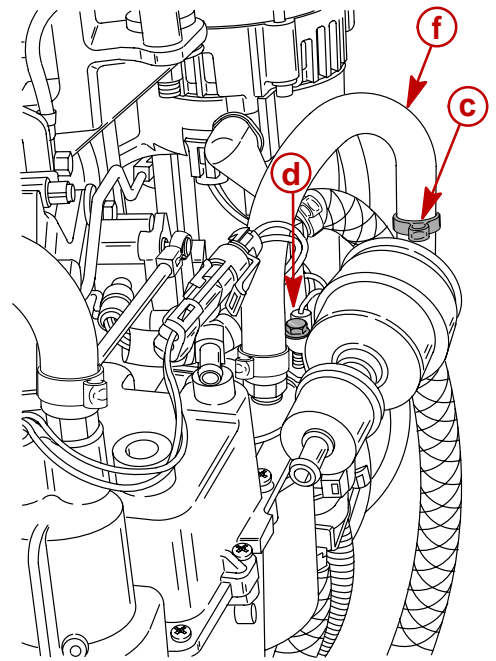
Reassembly/Installation

ASSEMBLY

1. Install fuel pump inside retaining clamp. Secure clamp with screw. Torque screw to 145 lb. in. (16.0 Nm)
2. Reconnect harness connector.
3. Reconnect fuel tank hose to filter. Use stainless hose clamp to secure fuel hose.
4. Reconnect vapor separator fuel hose to fuel pump. Secure hose with clamp #183. Use Clamp Tool 91-803146T to secure clamp.
5. Run engine and check for leaks.



- a** - Fuel Pump
- b** - Stainless Hose Clamp
- c** - Hose Clamp #183
- d** - Screw Torque to 145 lb. in. (16.0 Nm)



- e** - Harness Connector
- f** - Fuel Hose
- g** - Filter