



FUEL SYSTEM

Section 3A - Fuel Pump

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Specifications

Fuel Pump Pressure @ W.O.T.

Maximum – 10 psi (68.5 kPa)
Normal – 8-10 psi (41.0 – 54.8 kPa)
Minimum – 3 psi (20.5 kPa)

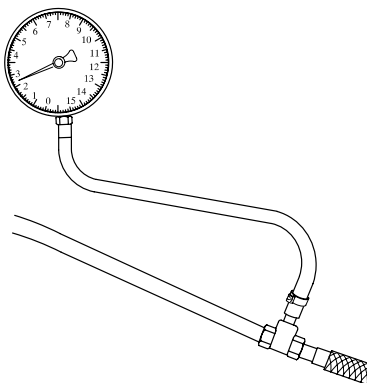
Fuel Pump Pressure @ Idle

Normal – 2-3 psi (13.7 – 20.5 kPa)
Minimum – 1 psi (6.8 kPa)

NOTE: Electric fuel pump pressure, if used in conjunction with engine mechanical fuel pump, must be limited to no more than 4 psi (27.4 kPa).

Special Tools

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



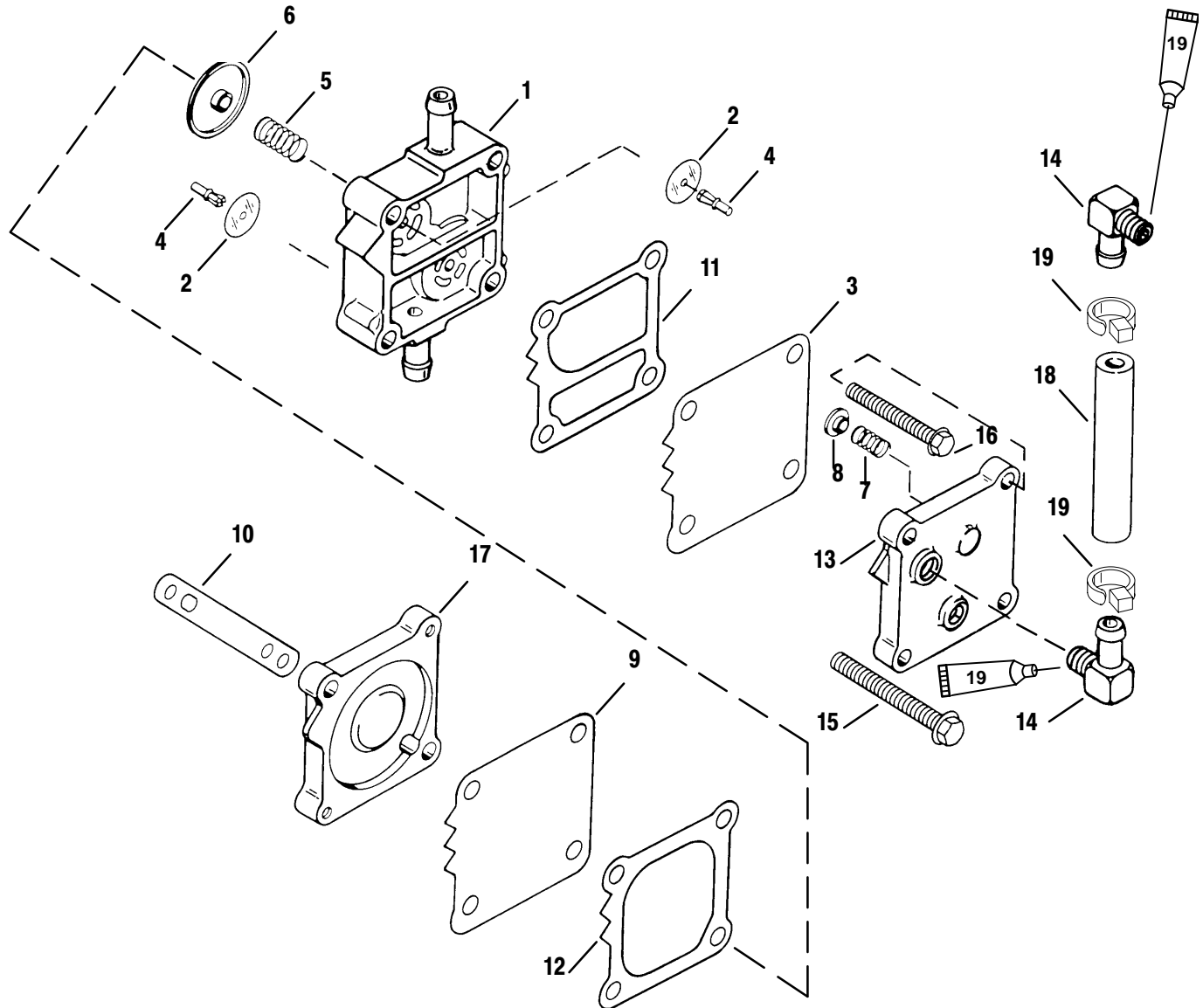
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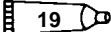


Notes:



Fuel Pump Assembly



 Perfect Seal (92-34227-1)



Fuel Pump Assembly

REF. NO.	QTY.	DESCRIPTION	TORQUE		
			lb-in	lb-ft	Nm.
-	1	FUEL PUMP ASSEMBLY			
1	1	FUEL PUMP ASSEMBLY			
2	1	DIAPHRAGM KIT			
3	1	DIAPHRAGM			
4	2	RETAINER			
5	1	SPRING			
6	1	CAP			
7	1	SPRING			
8	1	CAP			
9	1	DIAPHRAGM			
10	1	GASKET-base			
11	1	GASKET-Boost			
12	1	GASKET-Pulse			
13	1	PLATE-fuel pump			
14	2	ELBOW			
15	2	SCREW-pump to crankcase (M6 x 50)	55		6.0
16	2	SCREW-fuel pump (M5 x 40)	55		6.0
17	1	BASE-fuel pump			
18	1	FUEL LINE (6 IN.)			
19	2	STA STRAP			



Fuel Pump Description/Operation

The fuel pump is a crankcase-pressure-operated, diaphragm-type pump. Crankcase pulsating pressure (created by the up-and-down movement of piston) is transferred to fuel pump by way of a passage (hole) between crankcase and fuel pump.

When piston is in an upward motion, a vacuum is created in the crankcase, thus pulling in on the fuel pump diaphragm. The inlet check valve (in fuel pump) is opened and fuel (from fuel tank) is drawn into fuel pump.

Downward motion of the piston forces the air mixture out of the crankcase into the cylinder. This motion also forces out on the fuel pump diaphragm, which, in turn, closes the inlet check valve (to keep fuel from returning to fuel tank) and opens the outlet check valve, thus forcing fuel to the VST(EFI models) or carburetors.

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 - 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.

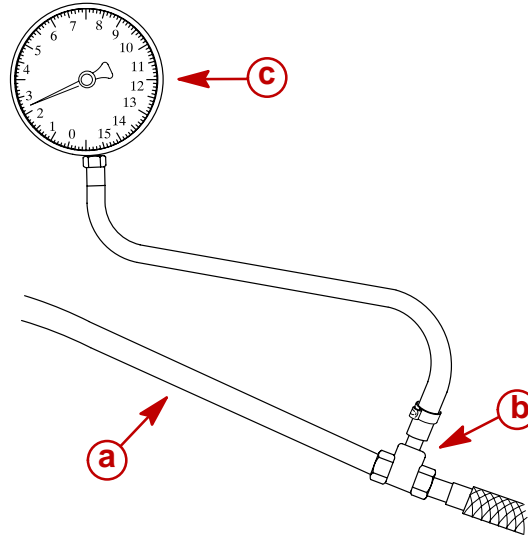
If, after using a separate fuel supply, it is found that the anti-siphon valve is the cause of the problem, there are 2 solutions to the problem; either 1) replace the anti-siphon valve with one that has lighter spring tension or 2) replace it with a solenoid-operated fuel shut off valve.



Checking Fuel Pump Lift (Vacuum)

The square 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.

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.



- 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

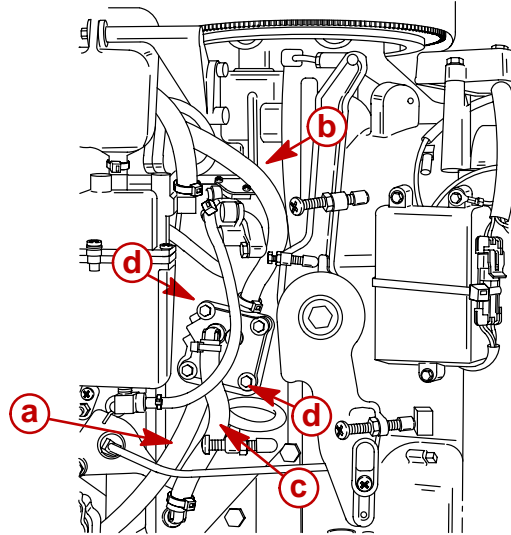
Problem: Air Bubbles in Fuel Line	
Low fuel in tank.	Fill tank with fuel.
Loose fuel line connection.	Check and tighten all connectors.
Fuel pump fitting loose.	Tighten fitting.
A hole or cut in fuel line.	Check condition of all fuel lines and replace
Fuel Pump anchor screw(s) loose.	Tighten all screws 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.
Primer bulb check valve not opening.	Replace primer bulb.
Excessive fuel lift required.	Fuel lift exceeds 2.5 in. of vacuum (mercury)



Fuel Pump Removal/Disassembly

IMPORTANT: Fuel pump diaphragm and gaskets should not be re-used once fuel pump is disassembled.

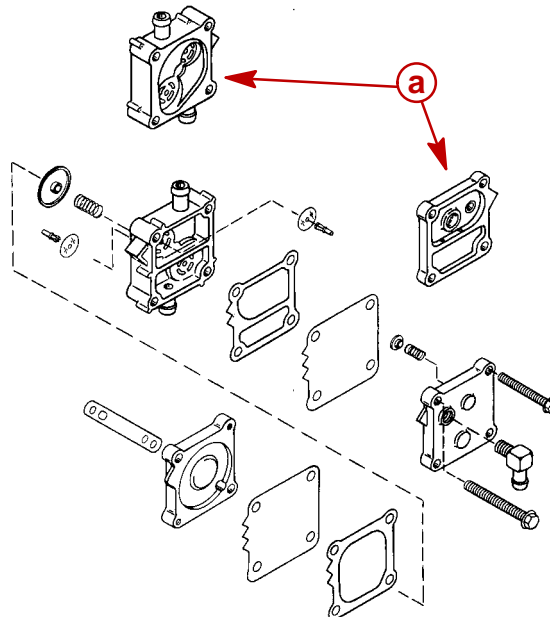
1. Disconnect fuel hoses from fuel pump.
2. Disconnect pulse hose.
3. Remove two mounting screws.
4. Remove fuel pump from engine.



- a** - Fuel Inlet
b - Fuel hose from fuel pump to carburetors
c - Pulse hose
d - Mounting screws

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5. Disassemble fuel pump.



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- a** - Reverse View of Pump Body



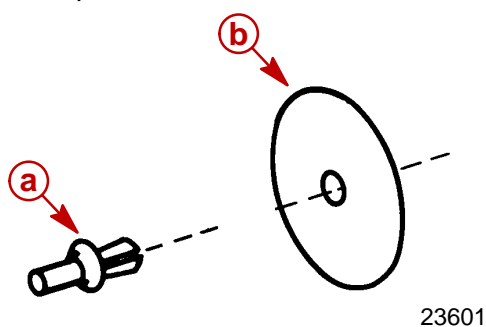
Cleaning/Inspection

1. Clean fuel pump housing, check valves, pulse chamber and pump base in solvent and dry all but check valves with compressed air.
2. Inspect each check valve for splits or chips.
3. Inspect boost springs for weakness or breakage.
4. Inspect fuel pump housing, pulse chamber and base for cracks or rough gasket surface and replace if any are found.
5. Inspect fitting on fuel pump housing for loosening or any signs of fuel or air leaks. Replace or tighten fitting if a leak is found.

Reassembly/Installation

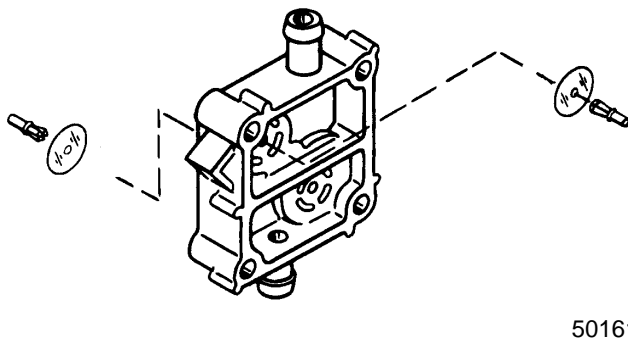
ASSEMBLY

1. Insert retainer thru plastic check valve.



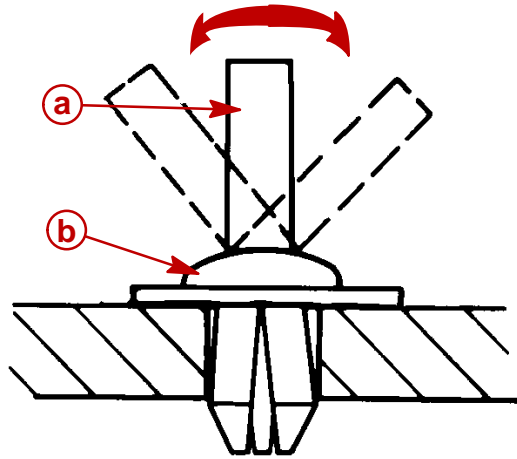
- a** - Retainer
b - Plastic Check Valve

2. Install check valves and retainers into fuel pump body.





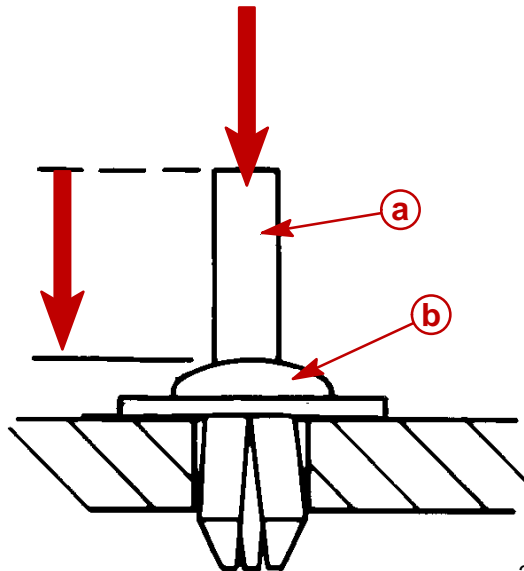
3. With retainer installed in pump body, break retainer rod from retainer by bending side-ways.



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- a - Rod
- b - Retainer Cap

4. Reinstall rod into retainer cap and, use a small hammer or hammer and punch to tap rod down into retainer until flush with top of retainer.

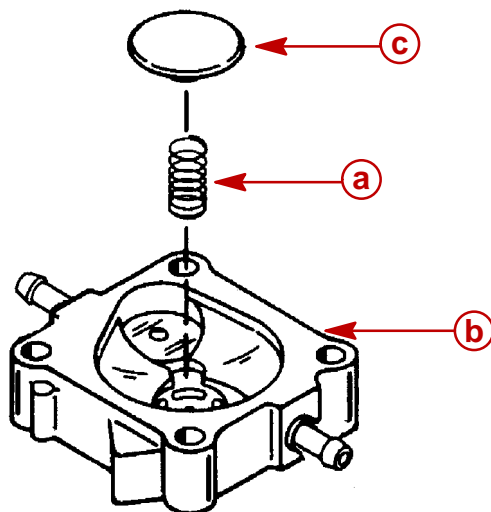


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- a - Rod
- b - Retainer Cap



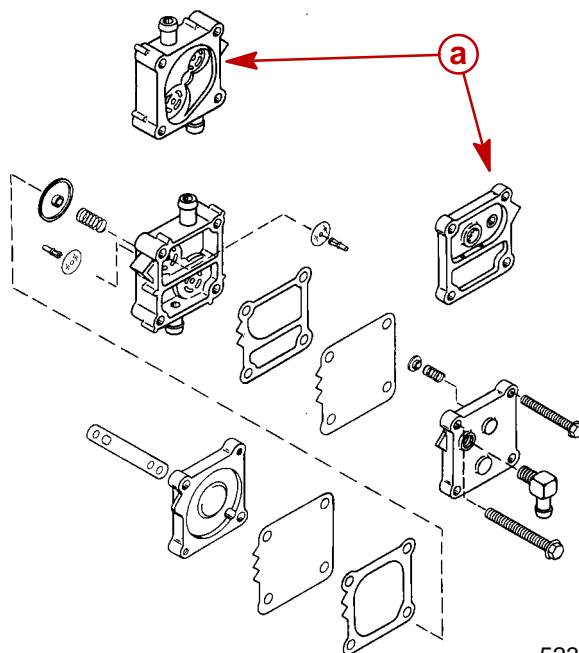
- Place boost spring into pump body and place cap onto boost spring.



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- a** - Boost Spring
- b** - Pump Body
- c** - Cap

- Assemble remainder of components as shown and install retaining screws thru to align.



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- a** - Reverse View of Pump Body

INSTALLATION

- Install pump onto engine. Torque to 55 lb. in. (6 N·m).
- Install hoses onto proper fittings and secure with sta-straps.
- Run engine and check for leaks.