FUEL SYSTEM

Section 3A - Fuel Pump & Fuel Primer

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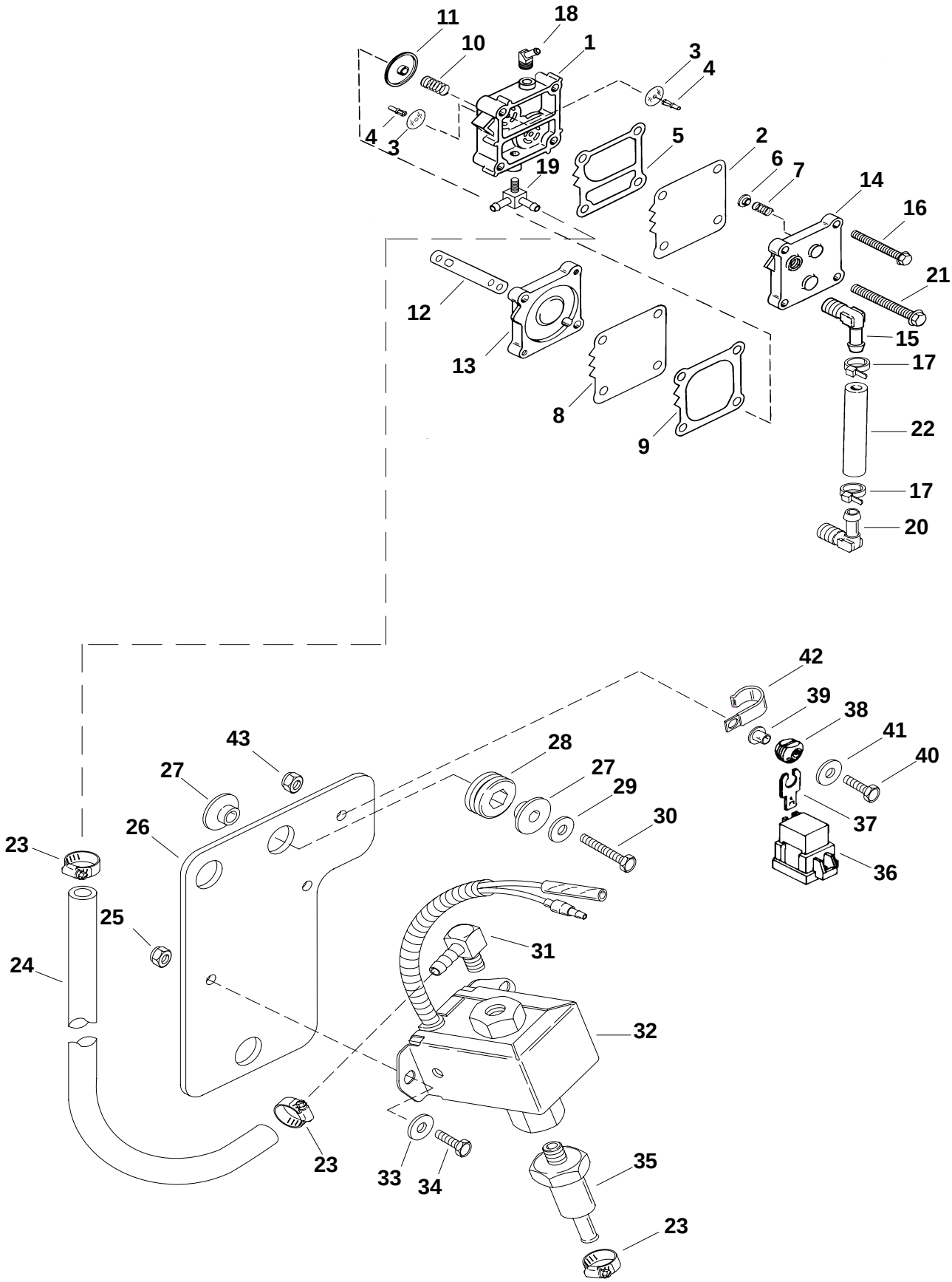
3A

Fuel Pump Assembly



Fuel Pump Assembly

REF. NO.	QTY.	DESCRIPTION	TORQUE		
			lb. in.	lb. ft.	N·m
1	1	PUMP ASSEMBLY-Fuel			
2	1	DIAPHRAGM KIT			
3	2	CHECK VALVE			
4	2	RETAINER			
5	1	GASKET-Boost			
6	1	CAP-Spring End			
7	1	SPRING			
8	2	DIAPHRAGM			
9	1	GASKET-Pulse			
10	1	SPRING			
11	1	CAP-Spring End			
12	1	GASKET-Base			
13	1	BASE-Fuel Pump			
14	1	PLATE-Fuel Pump			
15	1	ELBOW			
16	2	SCREW (M5 x 40)-Fuel pump	36		4
17	2	CABLE TIE (8.00 Inch)			
18	1	FITTING (45 Degree)			
19	1	FITTING			
20	1	ELBOW			
21	2	SCREW (M6 x 50)-Fuel Pump To Crankcase	70		8
22	1	TUBING **(70.00 Inches Bulk) (Cut 6.00 Inches)**			
23	3	CLAMP			
24	1	HOSE **(11.00 Inches Bulk) (Cut 9.500 Inches)**			
25	2	NUT (#10-32)	40		4.5
26	1	PLATE-Electric Fuel Pump Mount			
27	6	BUSHING			
28	3	GROMMET			
29	3	WASHER			
30	3	SCREW (#10-32 x 1.12)	35		4
31	1	ELBOW			
32	1	PUMP ASSEMBLY-Electric			
33	2	WASHER			
34	2	SCREW (#10-32 x .625)	40		4.5
35	1	FILTER-Fuel			
36	1	RELAY ASSEMBLY			
37	1	BRACKET			
38	1	GROMMET			
39	1	BUSHING			
40	1	SCREW (#10-32 x 1.12)			
41	1	WASHER			
42	1	J CLIP			
43	1	NUT (#10-32)			

Fuel Pump

General Information

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 a fuel/air mixture (from carburetor) or intake plenum (on EFI models) into crankcase. This vacuum also pulls in on the fuel pump diaphragm, thus 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 fuel/air mixture out of the crankcase into the cylinder. This motion also forces out on the fuel pump diaphragm, which closes the inlet check valve (to keep fuel from returning to fuel tank) and opens the outlet check valve, thus forcing fuel to the carburetors.

FUEL PUMP SPECIFICATIONS

NOTE: *Fuel pressure should be measured between in-line fuel filter and carburetors or vapor separator.*

Fuel Pump Pressure at Wide Open Throttle:

Maximum: 10 PSI
Normal: 6 - 8 PSI

Fuel Pump Pressure at Idle:

Normal : 2 - 3 PSI
Minimum: 1 PSI

Electric Fuel Pump Pressure, if used, must be limited to no more than 4 PSI.

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. The pressure drop across these valves can create operational problems and/or powerhead damage by restricting fuel flow to the fuel pump and carburetor(s). 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. Pre-ignition/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 it is found that the anti-siphon valve is the cause of the problem, replace it with a solenoid-operated fuel shut off valve.

Testing Fuel Pump

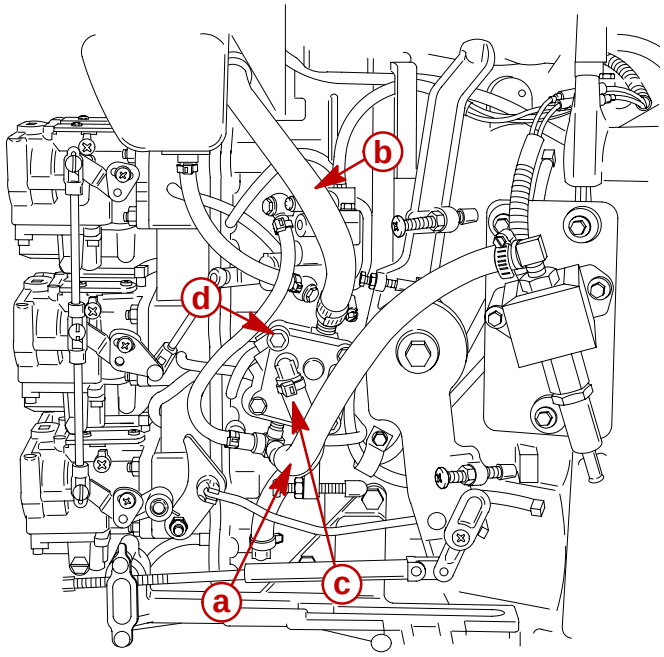
Install clear fuel hose(s) between fuel pump and carburetor(s) or vapor separator. Run engine and inspect fuel passing thru hose(s) for air bubbles. If air bubbles are found, see “Air Bubbles in Fuel Line” below. If air bubbles are NOT found, see “Lack of Fuel Pump Pressure” below.

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 gasket(s) worn out.	Rebuild fuel pump.
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).
Excessive fuel hose length.	Cut fuel hose to proper length.
Fuel hose internal diameter too small.	Use 5/16 in. (7.9 mm) I.D. fuel hose.

Fuel Pump Removal/Disassembly

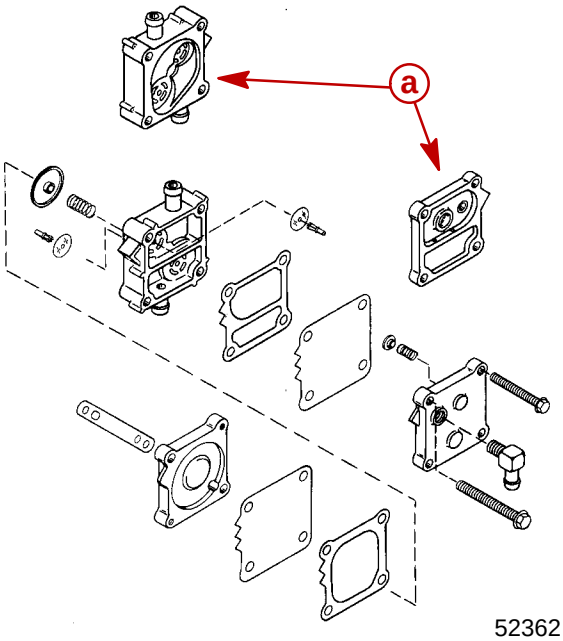
IMPORTANT: Fuel pump diaphragm and gaskets should not be re-used once fuel pump is disassembled.

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

5. Disassemble fuel pump.



a - Reverse View of Pump Body

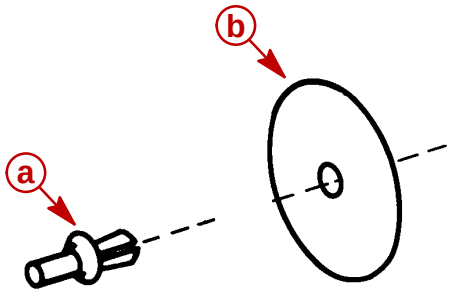
Cleaning/Inspection

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 mylar check valve.



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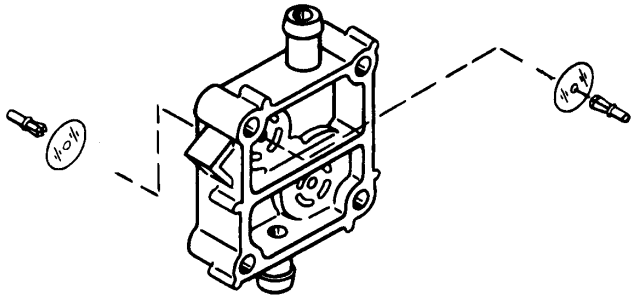
a - Retainer
b - Mylar Check Valve

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



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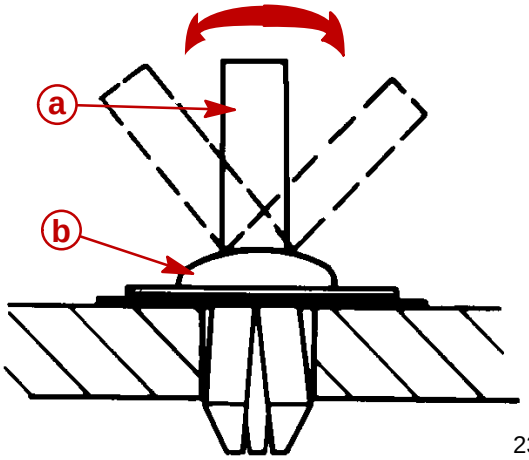
3. With retainer installed in pump body, break retainer rod from retainer by bending sideways.



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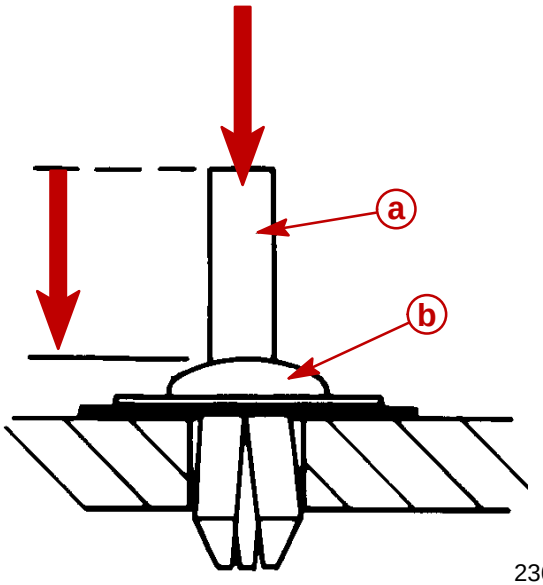
a - Rod
b - Retainer Cap

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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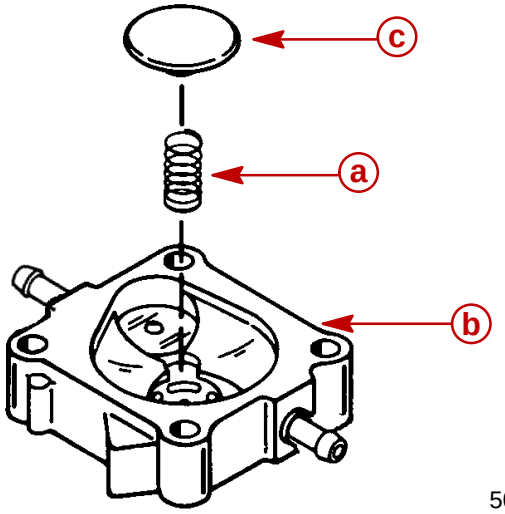
a - Rod
b - Retainer Cap

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



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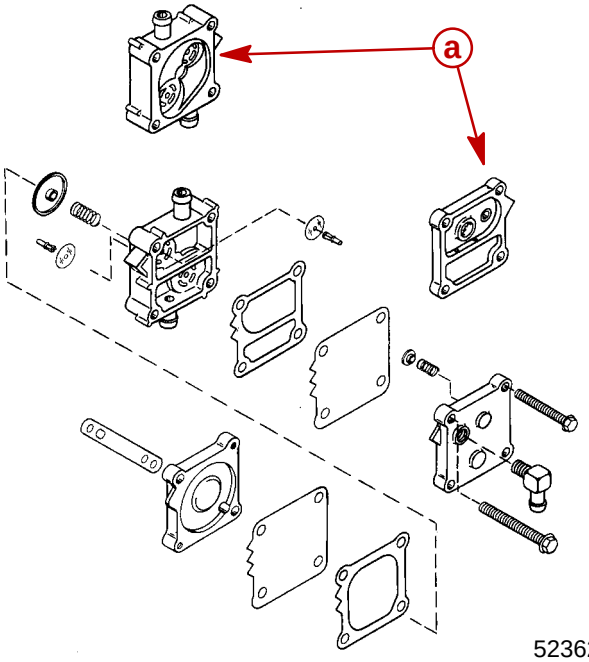
a - Boost Spring
b - Pump Body
c - Cap

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



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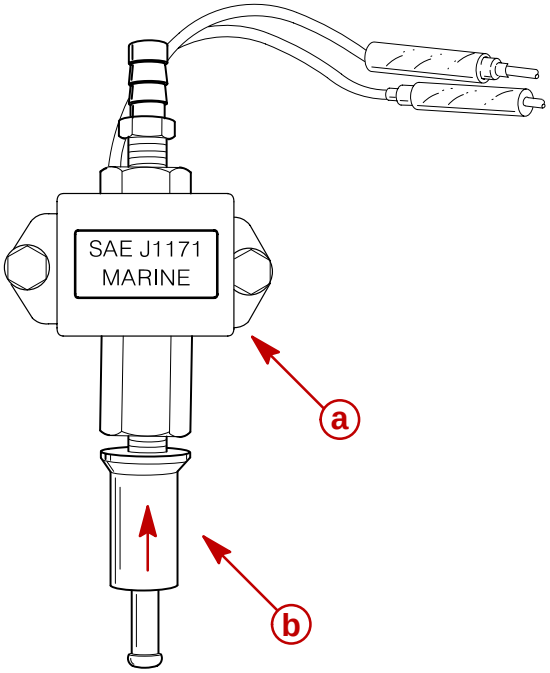
a - Reverse View of Pump Body

INSTALLATION

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

Fuel Primer

The fuel primer is an electric fuel pump used to supply fuel to the engine driven fuel pump while the engine is being cranked.



a - Fuel Primer
b - Fuel Filter

Electrical power is supplied to the fuel primer from the starter solenoid positive terminal (starter side). A three (3) amp fuse is used to protect the electrical circuit.