OIL INJECTION SYSTEM

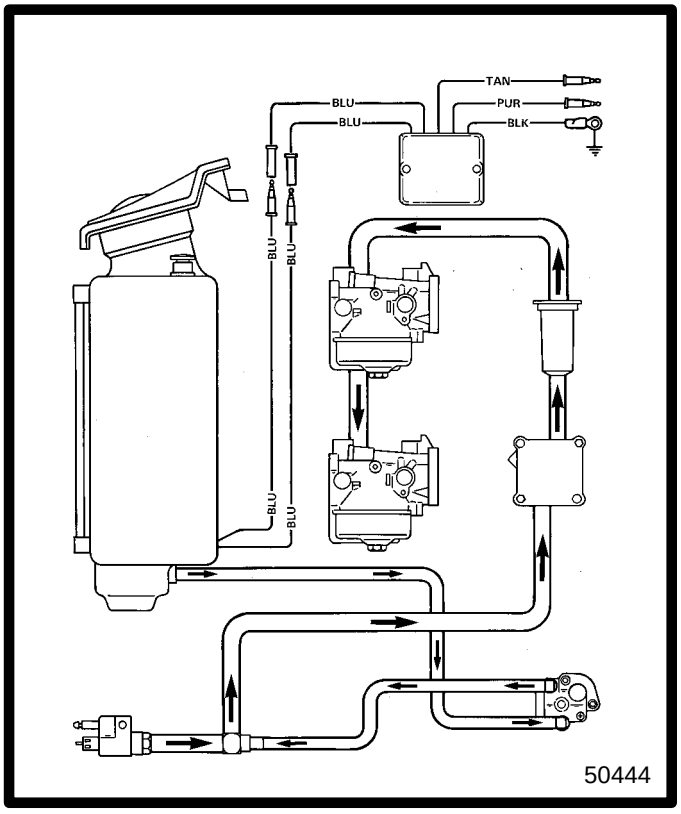


Table of Contents

Operation of the Oil Injection System

The oil injection system delivers an oil mixture of 50:1 by means of a constant ratio oil pump.

The engine mounted oil reservoir holds .935 gal. (3.54 Liters) which will provide 7 hours of running time at wide open throttle.

A low oil warning buzzer will be activated when 7.5 fl. oz. (225ml) of oil is left in the reservoir. This will provide approximately 30 minutes of wide open throttle running before the oil is depleted.

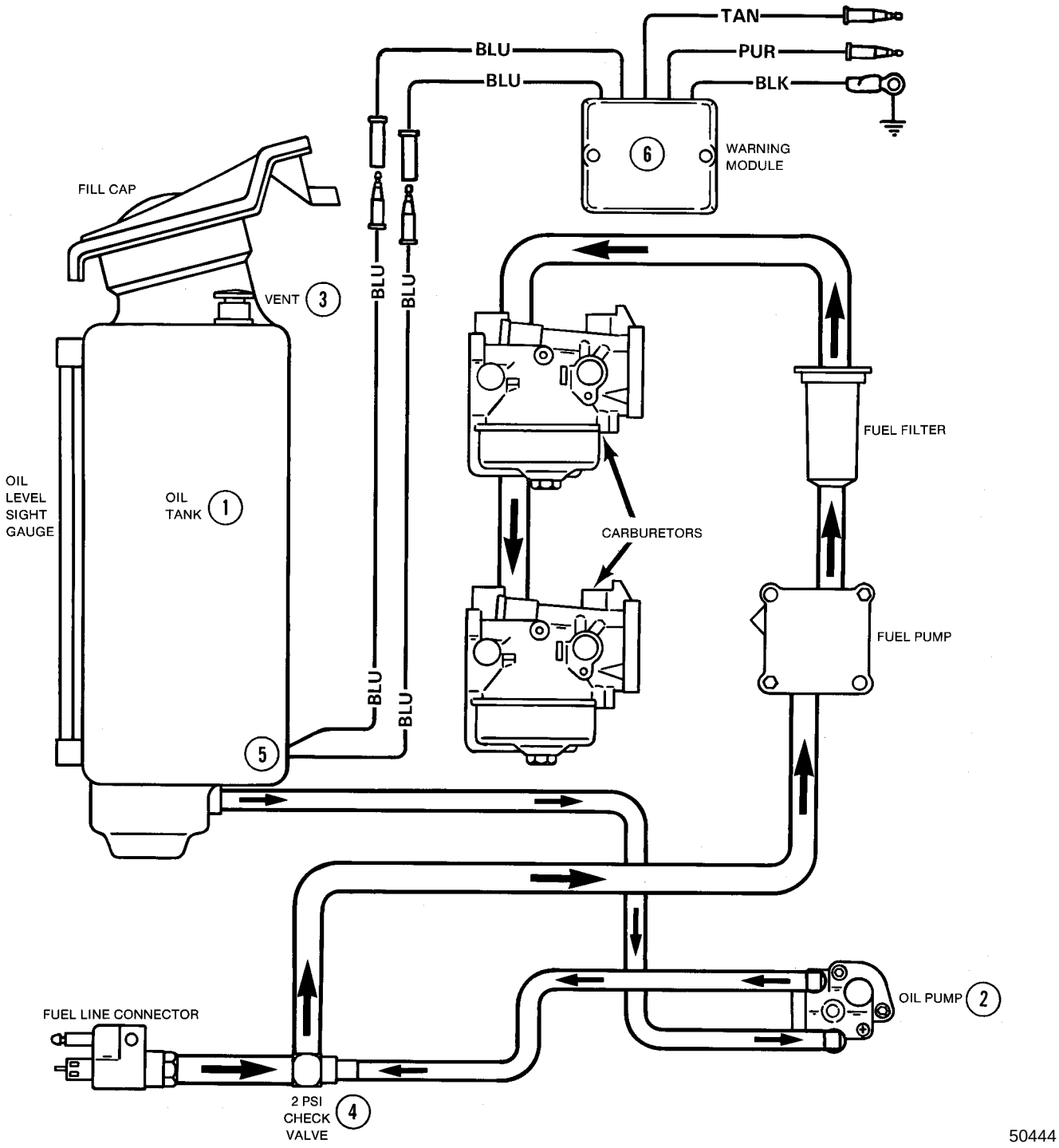
The oil injection pump is driven by the crankshaft and feeds oil into the fuel before the fuel pump.

Oil Injection Components

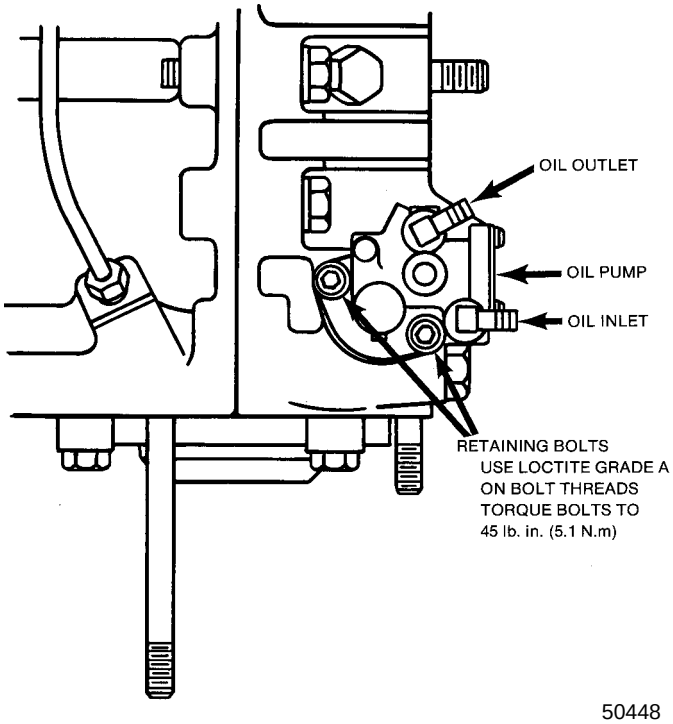
1. **Oil Reservoir**
   The oil reservoir gravity feeds oil to the oil pump. Oil reservoir contains a low oil sensor which activates a warning horn when 7.5 fl. oz. (225ml) of oil is left in reservoir.
2. **Oil Injection Pump**
   The oil injection pump is driven off of the crankshaft. It is a constant ratio oil pump and provides a mixture of 50:1.
3. **Check Valve Vent**
   Provides air to oil reservoir for proper venting of reservoir. Check valve prevents oil from leaking out of reservoir where outboard is tilted forward.
4. **2 PSI Check Valve**
   This valve prevents gasoline from being forced into the oil line.
5. **Low Oil (Float) Sensor**
   When oil level in oil reservoir drops until approximately 7.5 fl. oz. (225ml) remains, the sensor will signal the warning module to activate the warning horn.
6. **Warning Module**
   When ignition key is initially turned on, warning module will briefly provide a self test of its engine overheat warning system – a brief steady BEEP tone, followed by a self test of its low oil warning system – a brief BEEP-BEEP tone.

   If the oil level in the oil reservoir drops to less than 7.5 fl. oz. (225ml), the low oil (float) sensor in the oil reservoir will signal the warning module to activate the warning horn. If the powerhead temperature should exceed 300° F (65° C), the overheat temperature sensor in the water jacket cover will signal the warning module to activate the warning horn.

Oil Injection Flow System



Pump Drive Assembly



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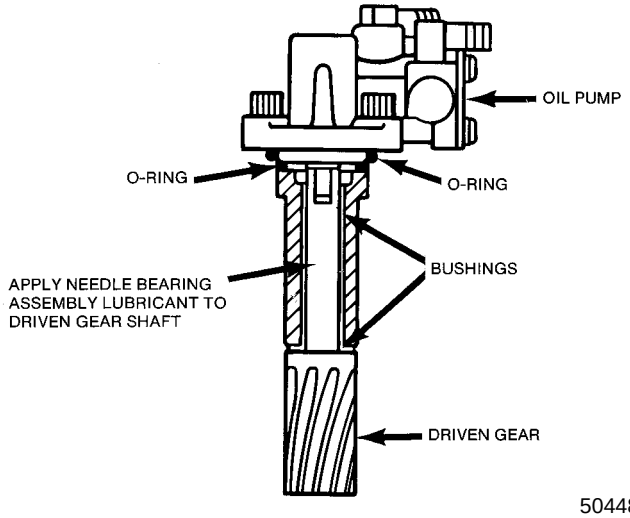

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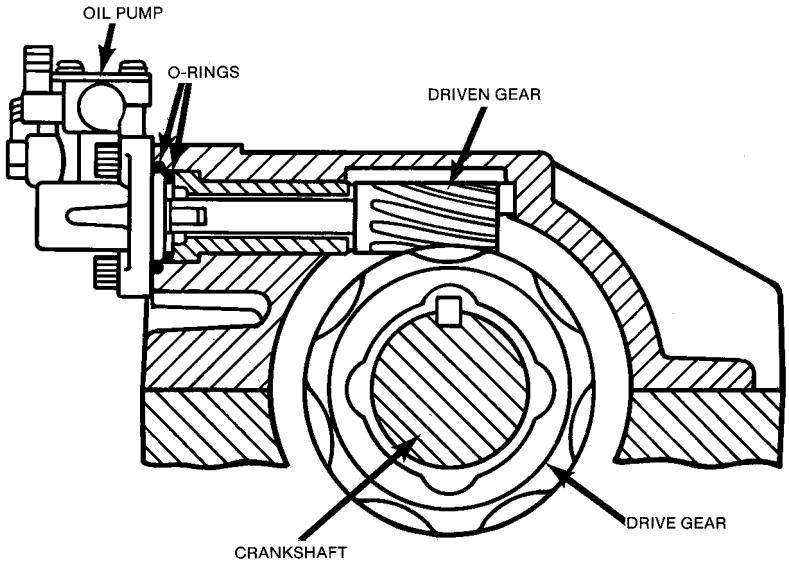
Pump Drive System



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Oil Pump to Powerhead Assembly

1 - Bolt (2 Each)
2 - Oil Pump
3 - O-ring (Large)
4 - O-ring (Small)
5 - Bearing
6 - Driven Gear

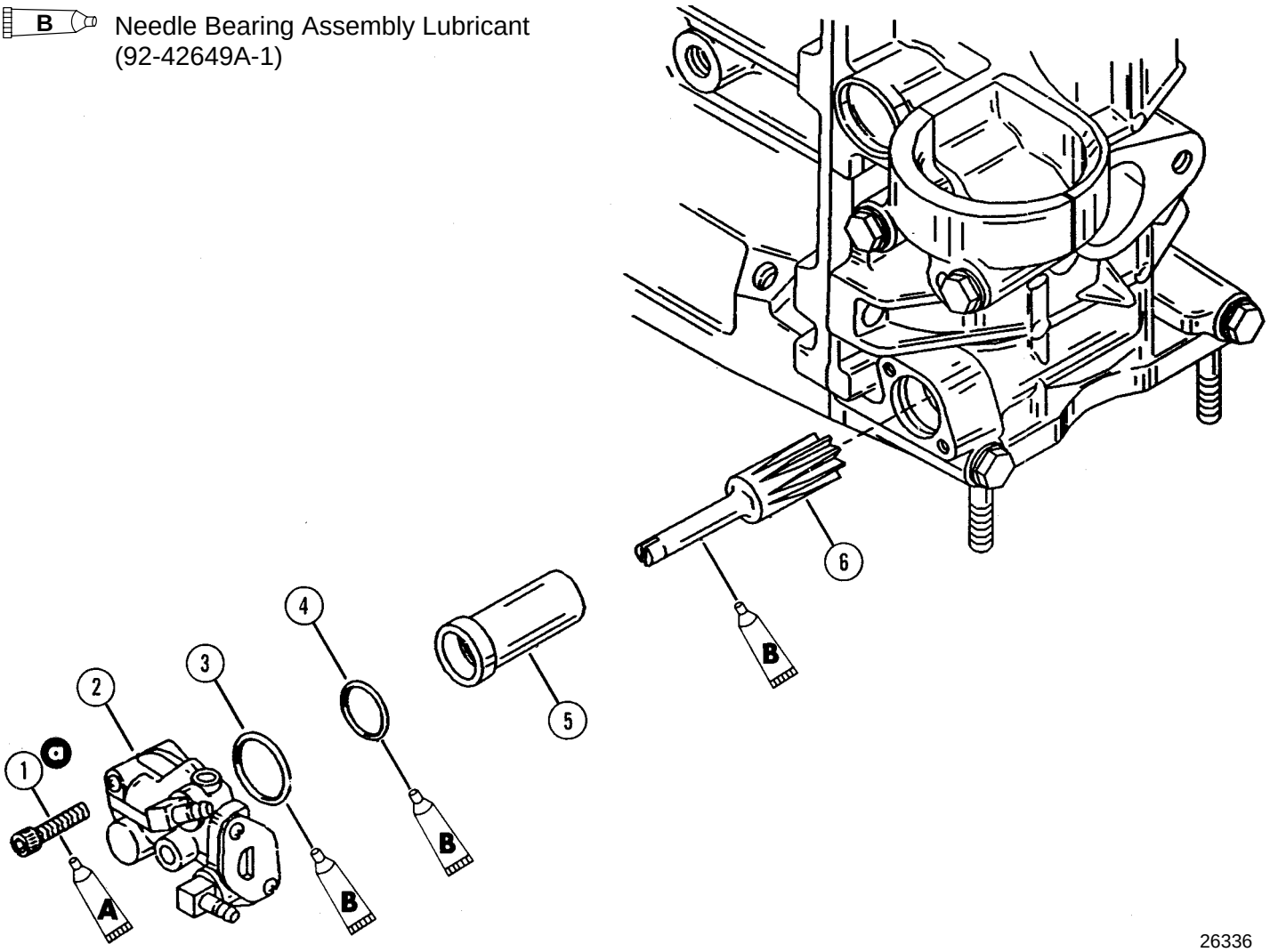
Torque Specifications

ⓐ 45 lb. in. (5.1 N·m)

Quicksilver Lubrication/Sealant Application Points

A Loctite Grade A (92-32609-1)

B Needle Bearing Assembly Lubricant (92-42649A-1)



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Set Up Instructions for Oil Injection System

⚠ CAUTION

Oil injected engines additionally, must be run on a 50:1 gasoline/oil mixture in the fuel tank for the first 15 gallons of fuel. Refer to engine break-in procedure in the Operation & Maintenance Manual.

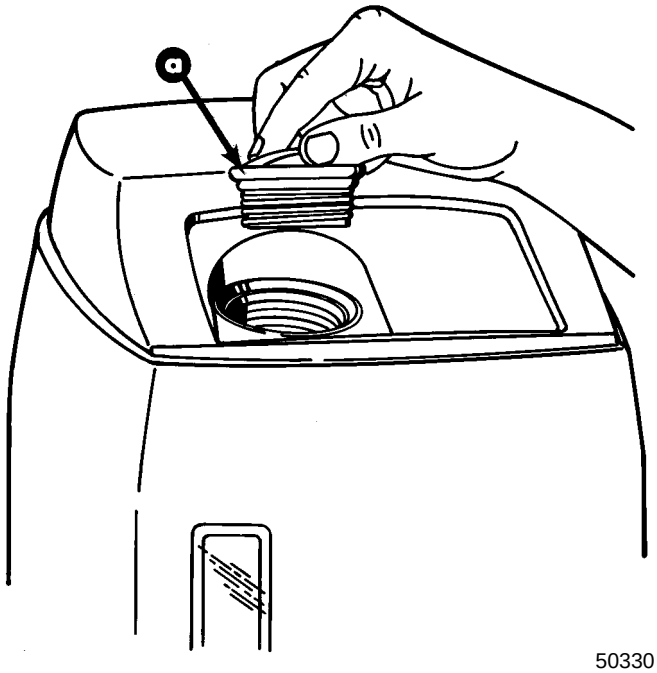
⚠ CAUTION

If an electric fuel pump is to be used on engines with oil injection, the fuel pressure at the engine must not exceed 2 psig. If necessary, install a pressure regulator between electrical fuel pump and engine and set at 2 psig maximum.

Filling the Oil Injection System with Oil

Quicksilver 2-Cycle Outboard Oil is recommended for this oil injection system. In an emergency, when 2-Cycle Outboard Oil is not available, substitute a high quality 2-cycle oil that is intended for outboard use and meet BIA ratings TC-W or TC-WII™, shown on oil container. BIA ratings TC-W and TC-WII™ are the Boating Industry Association's designation for approved, 2-cycle water-cooled outboard oils.

Remove fill cap from the oil tank and fill tank with oil. Retighten the fill cap.



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a - Fill Cap

Bleeding Air from Oil Injection System

⚠ CAUTION

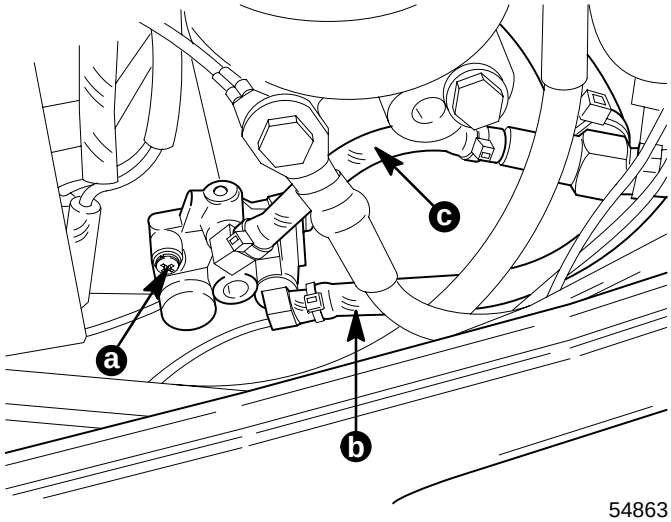
If air exists in either oil pump hose (inlet or outlet), the air MUST BE bled from the hose(s) or engine damage may occur.

BLEEDING AIR FROM OIL PUMP INLET HOSE

1. With engine not running, place a shop towel below the oil pump. Loosen bleed screw three to four turns and allow oil to flow from bleed hole until no air bubbles are present in inlet hose. Torque bleed screw to 25 lb. in. (2.8 N·m). This procedure also allows oil pump to fill with oil.

BLEEDING AIR FROM OIL PUMP OUTLET HOSE

1. Purge air from outlet hose by running engine (on 50:1 gasoline/oil mixture in fuel tank) at idle speed until no air bubbles are present in outlet hose.



54863

a - Bleed Screw
b - Inlet Hose
c - Outlet Hose

Operation of the Oil Injection System

1. Check oil level in oil tank.
2. Make sure a remote gasoline and oil mixture of 50:1 is used during the initial break-in of the engine or after extended storage.
3. Be certain the warning horn is operational.

Each time the key switch is turned from the “off” to “on” position (engine not running); the warning horn will sound momentarily. This tells you the warning system is functional and the warning horn is operational. If warning horn does not sound or horn stays on when key is turned to the “ON” position, refer to oil injection system troubleshooting chart following to correct the problem.

The oil injection warning sound is an intermittent “beep”, “beep”, etc. The overheat warning sound is a continuous “beep” (not intermittent).

Check Operation of the Oil Injection System (Engine Running)

1. Operate engine following the break-in procedure outlined in the Operation and Maintenance Manual. If warning horn should sound an intermittent “beep”, “beep”, “beep” during operation, this indicates a problem occurred in the oil injection system. Refer to troubleshooting following, to correct the problem.

Required Side Mount Remote Control or Ignition Key Switch Assembly to be Used with Engines Equipped with Oil Injection

BOATS EQUIPPED WITH A SIDE MOUNT REMOTE CONTROL

A Quicksilver Commander Series Side Mount Remote Control equipped with a warning horn, must be used with this outboard. This warning horn is necessary for both the oil injection warning system and the engine overheat warning system.

BOATS EQUIPPED WITH PANEL OR CONSOLE MOUNT REMOTE CONTROL

A Quicksilver Ignition Key/Choke Assembly equipped with a warning horn is necessary for both the oil injection warning system and the engine overheat warning system.

Oil Injection System Troubleshooting Chart

TROUBLESHOOTING THE OIL INJECTION SYSTEM

If a problem occurs with the oil injection system and the warning horn sounds in a pulsating manner, stop engine and check if problem is caused by (1) low oil level, or (2) a faulty warning sensor or module.

1. Check oil level in oil tank. If oil level is approximately 7.5 fl. oz. (225ml) or less, the problem is low oil level. Add oil to oil tank.

NOTE: *There is a safety reserve of oil left in the oil tank after the low oil warning is sounded that allows you enough oil for approximately 30 minutes of full throttle operation.*

2. If there is more than approximately 7.5 fl. oz. (225ml) of oil remaining in the oil tank, then the problem may be a faulty low oil warning sensor or a faulty warning module. Refer to troubleshooting chart following.

TROUBLESHOOTING CHART

Problem: Warning Horn Does Not Sound when Ignition Key is Turned to "ON" Position	
Possible Cause	**Corrective Action**
Horn malfunction or open (tan/blue) wire between horn and engine.	Disconnect tan/blue warning module lead, at bullet connection for engine overheat sensor (located in engine cylinder head). Use a jumper wire to ground tan/blue warning module lead to engine ground. Warning horn should sound. If not, check tan/blue wiring between engine and warning horn for open circuit and check horn.
Warning Module.	Check if all warning module leads are connected to harness leads. If so, warning module may be faulty.
Using incorrect side mount remote control or ignition/choke assembly.	See info on page 8-6.

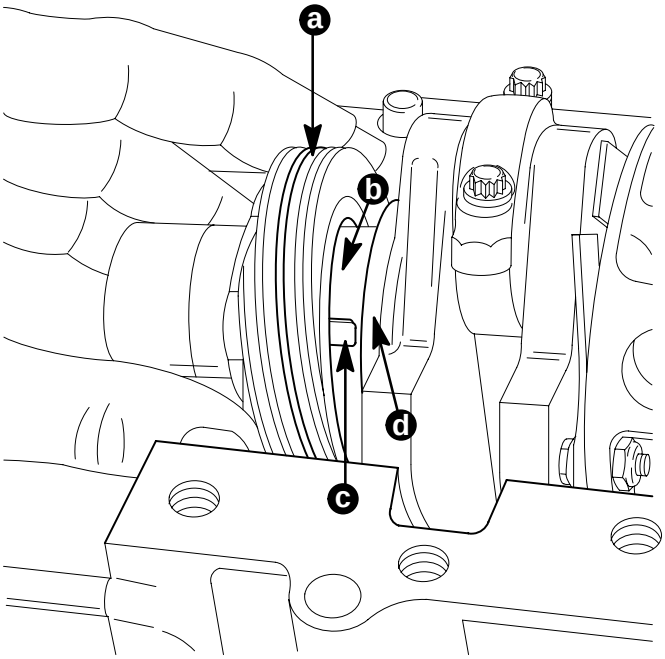
Problem: Warning Horn Stays On when Ignition Key is Turned to "ON" Position. (Engine Cold)	
Possible Cause	**Corrective Action**
Engine overheat sensor.	If warning horn sounds a continuous "beep", the engine overheat sensor may be faulty. Disconnect tan/blue overheat sensor lead at at bullet connection. Turn ignition key to "ON" position. If horn still sounds a continuous "beep", the warning module is faulty. replace module and retest. If horn stops sounding, the engine overheat sensor is faulty. Replace and retest.
Faulty Warning Module.	Check connections - replace module.

Problem: Warning Horn Sounds (Intermittent Beep) when Engine is Running, Oil Level in Oil Tank Is Full.	
Possible Cause	**Corrective Action**
Defective low oil sensor (located in bottom of oil tank).	Disconnect both low oil sensor leads (blue) at bullet connections. Connect an ohmmeter between sensor leads. There should be no continuity through sensor. If continuity exists, sensor is faulty.

If all of the checks are positive, the Warning Module is faulty. Replace Module and retest.

Installing Drive Gear (for Oil Injection Pump) Onto Crankshaft

1. Refer to Section 4A (Powerhead) for proper disassembly of components.
2. Inspect gear teeth for signs of fretting or excessive wear. Check teeth and hub of gear for cracks. Do not mistake plastic flow lines as cracks. Gear MUST BE replaced if excessive wear, fretting or cracks are observed.
3. Install key in keyway of crankshaft.
4. With chamfered side of gear facing #4 crankshaft throw, slide gear onto crankshaft, engaging key into gear against crankshaft throw.



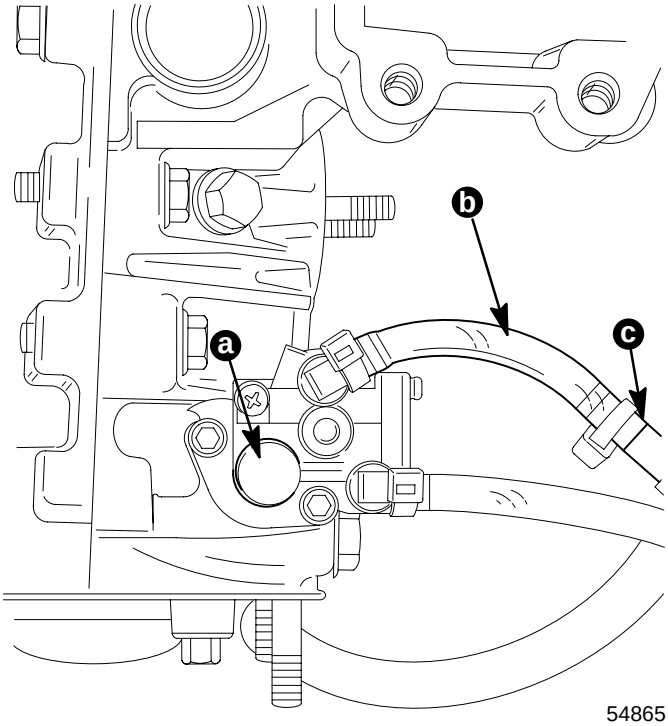
54864

a - Gear
b - Chamfer
c - Key
d - #4 Crankshaft Throw

5. Refer to Section 4A (Powerhead) for proper reassembly of powerhead components.

Oil Pump Volume (Flow) Test

NOTE: *The following specifications are determined with the outboard running off a remote fuel supply with pre-mix fuel. The oil pump output hose must be disconnected from the input fuel line TEE fitting and directed into a graduated container. The input fuel line TEE fitting from which the oil line was removed MUST BE CAPPED OFF to prevent fuel leakage while the engine is running.*



54865

a - Oil Pump
b - Output Hose
c - Tee Fitting

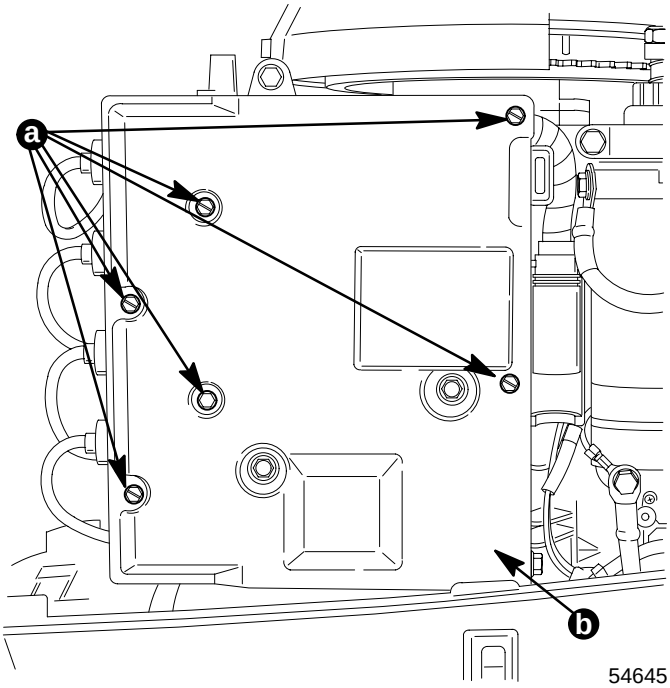
Flow specifications are as follows:

660 RPM = 25.6 cc ± 10% in 30 min.
1500 RPM = 20.2 cc ± 10% in 10 min.
2500 RPM = 33.6 cc ± 10% in 10 min.
5500 RPM = 74.2 cc ± 10% in 10 min.

Oil Warning Module

Removal

1. Disconnect engine battery cables from battery.
2. Verify ignition key is in “OFF” position.
3. Remove top cowl.
4. Remove 6 attaching bolts from electrical access cover and remove cover.



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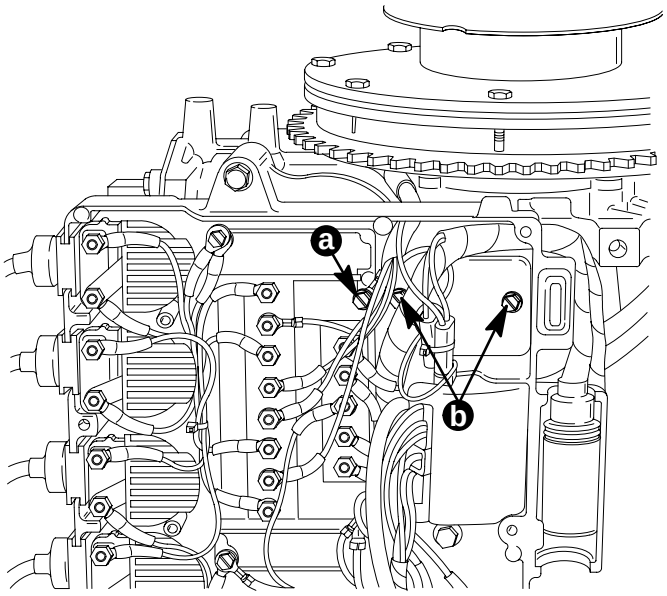
a - Bolts
b - Cover

5. Disconnect warning module PURPLE, TAN and both BLUE leads from their respective bullet connectors. Remove warning module BLACK ground lead from the upper right switch box mounting bolt.
6. Remove 2 bolts which secure warning module to electrical box and remove module.

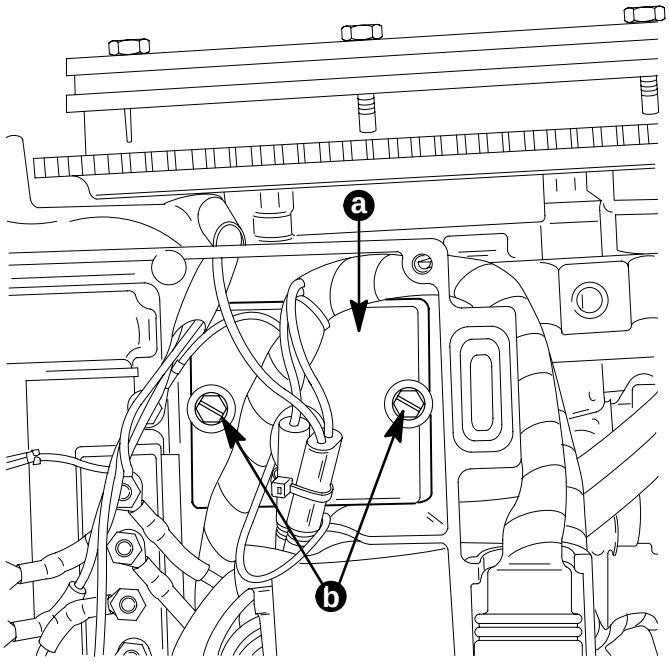


54866

a - Switch Box Mounting Bolt (remove Black Lead)
b - Warning Module Bolts

Installation

1. Connect warning module PURPLE, TAN and both BLUE leads to their respective bullet connectors. Secure warning module BLACK ground lead to upper right switch box mounting bolt. Torque bolt to 40 lb. in. (4.5 N·m).
2. Attach warning module to electrical box with 2 bolts. Torque bolts to 40 lb. in. (4.5 N·m).



54867

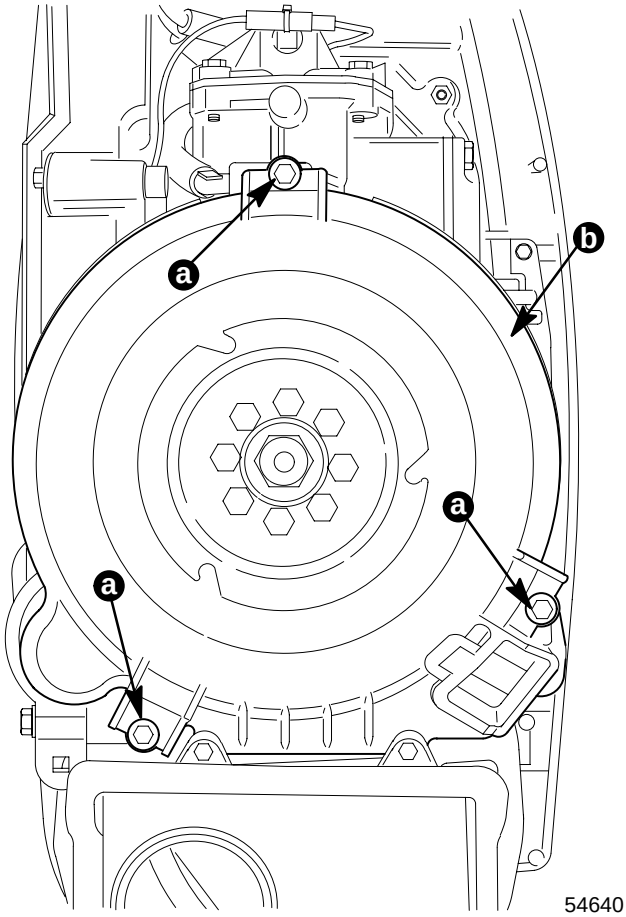
a - Warning Module
b - Bolts [Torque to 40 lb. in. (4.5 N·m)]

3. Reinstall electrical box access cover.
4. Reinstall top cowling.
5. Reconnect engine battery cables to battery.

Engine Mounted Oil Reservoir

Removal

1. Disconnect engine battery cables from battery.
2. Verify ignition key is in the “OFF” position.
3. Remove top cowl.
4. Remove 3 bolts securing flywheel cover to powerhead and remove cover.



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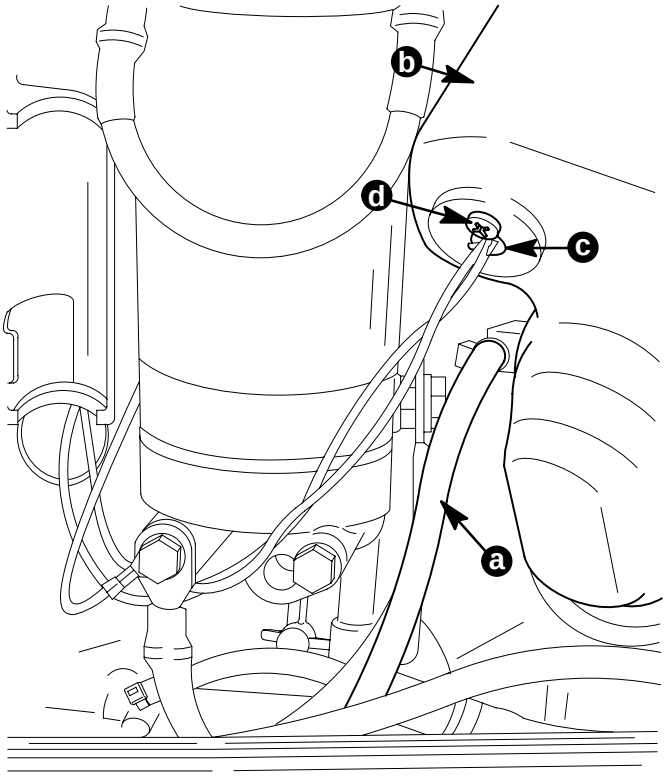
a - Bolts
b - Flywheel Cover

5. Tilt oil reservoir to gain access to bottom of oil reservoir.
6. Remove screw securing oil level sensor in bottom of oil reservoir and remove sensor.

⚠ CAUTION

Oil level sensor is FRAGILE. Handle with care.

7. Remove oil outlet hose from oil reservoir and remove reservoir from outboard.

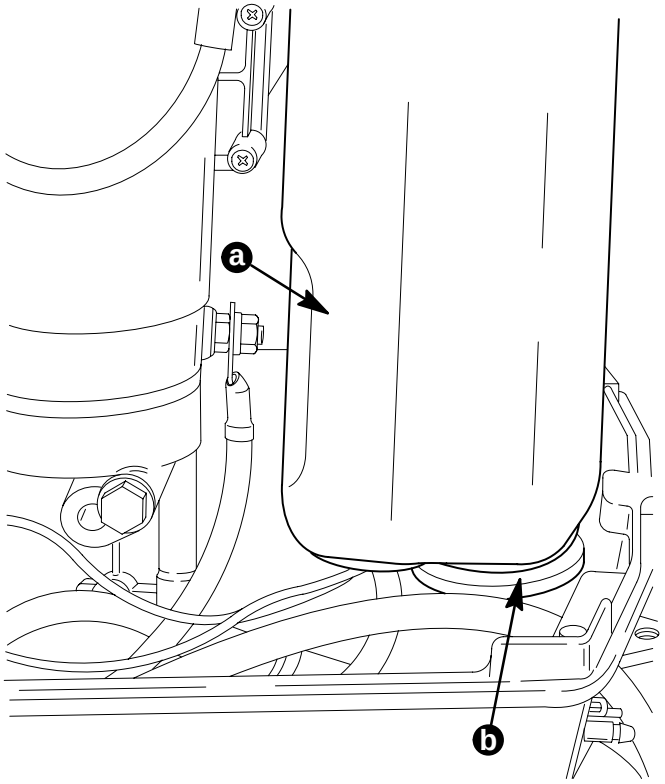


54868

a - Oil Outlet Hose
b - Oil Reservoir
c - Oil Level Sensor
d - Screw

Installation

1. Connect oil outlet hose to elbow fitting on oil reservoir. Secure hose with STA-STRAP.
2. Insert oil level sensor into bottom of oil reservoir. Secure sensor with screw.
3. Position oil reservoir upright with bottom of reservoir seated in support pocket in engine tray.



54869

a - Oil reservoir
b - Support Pocket

4. Reinstall flywheel cover while aligning oil fill cap and sealing O-ring on oil reservoir. Torque flywheel cover bolts to 100 lb. in. (11.3 N·m).
5. Remove oil fill cap and fill reservoir with QUICKSILVER 2-CYCLE OUTBOARD OIL or an acceptable oil rated BIA TC-W or TC-WII. Check oil outlet hose on reservoir for leakage.
6. Reinstall reservoir fill cap.
7. Reinstall top cowling.
8. Reconnect engine battery cables to battery.