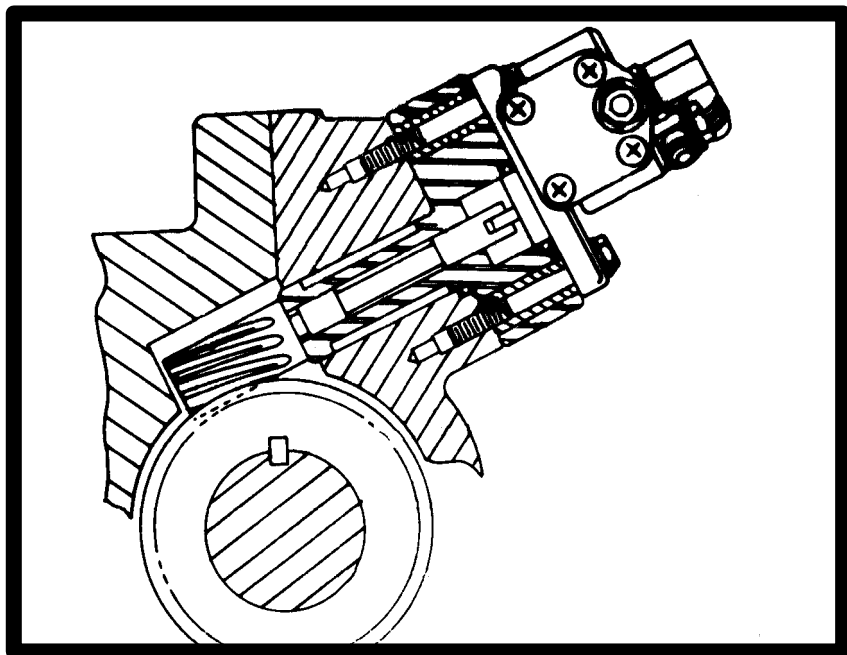




OIL INJECTION SYSTEM



3

B



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Troubleshooting Chart	3B-7



Description

⚠ CAUTION

Be careful not to get dirt or other contamination in tank, hoses or other components of the oil injection system.

⚠ CAUTION

Engines with oil injection must be run on a fuel/oil ratio of 50:1 in the fuel tank, in addition to the oil supplied by the oil injection system, for the first 30 gallons of fuel. Refer to break-in procedure in the Operation and 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 6 psig. If necessary, install a pressure regulator between electric fuel pump and engine and set at 6 psig maximum.

The major components of the oil injection system are an oil tank, oil pump, and low oil warning system.

The oil tank is attached to the powerhead and holds oil for delivery to the oil pump.

Oil is gravity fed to the oil pump via a hose.

The oil pump injects oil into the fuel at the fuel pump, and is driven by the crankshaft.

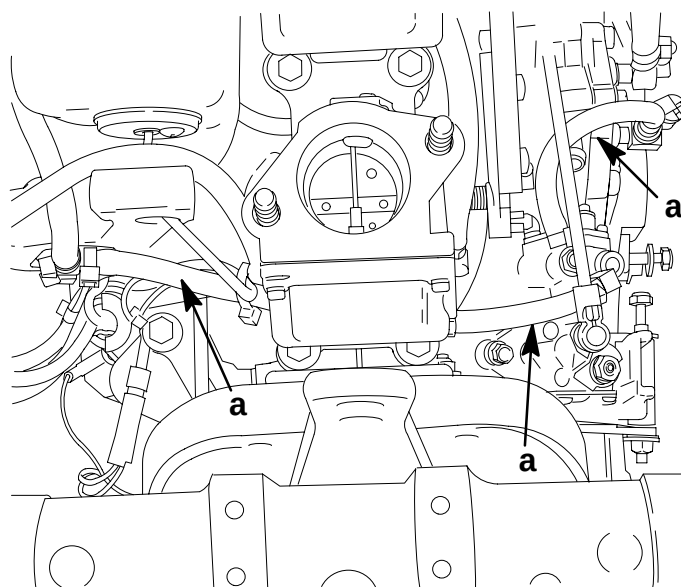
A link rod is connected between the throttle linkage and oil pump lever. When the throttle position is changed, the link rod rotates the oil pump valve, which changes the fuel/oil ratio from approximately 80:1 at idle speed, to 50:1 at wide-open-throttle.

The oil tank is equipped with a low oil sensor and a magnetic float. When oil level in oil tank drops to approximately 1 quart (.95 liter), the magnetized float will complete the circuit between the low oil sensor leads, causing the warning horn to sound.

IMPORTANT: Warning horn is also connected to the powerhead temperature sensor. If the warning horn sounds, either the oil level in oil tank is low, or the powerhead is overheated.

A warning horn test button is located next to oil tank fill cap. When ignition switch is in the "Run" position and warning horn test button is depressed, the horn should sound.

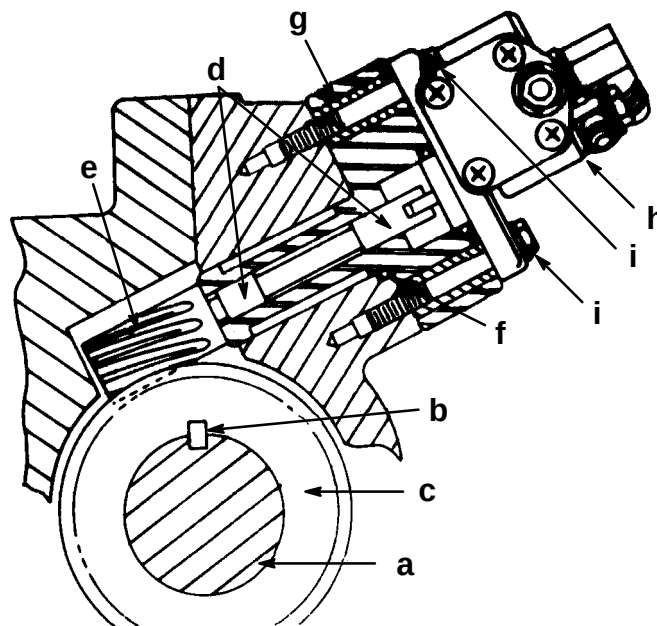
Hose Connections



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a - Oil Hose Connections

Oil Pump Drive System

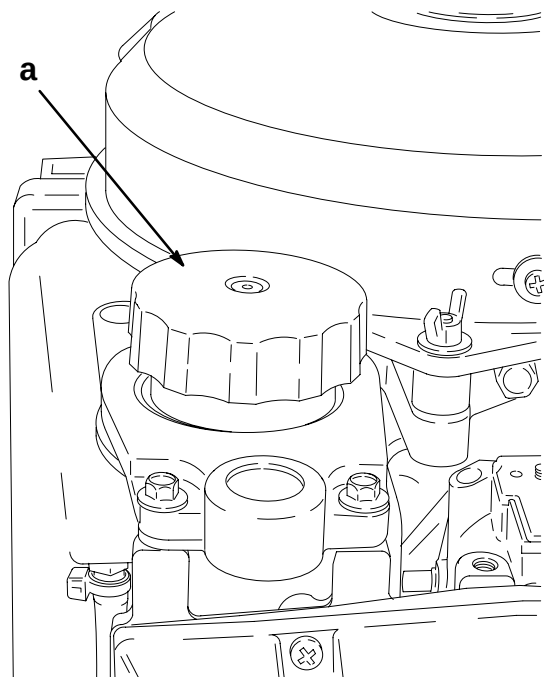


- a - Crankshaft
- b - Drive Key
- c - Drive Gear
- d - Apply Quicksilver 2-4-C w/Teflon on Both Areas
- e - Driven Gear
- f - O-Rings [.739" (18.77mm) I.D. x .809" (20.55mm) O.D.]
- g - Spacer
- h - Oil Pump
- i - Bolts; Torque to 60 lb. in. (6.8 N.m)



Filling Oil Tank

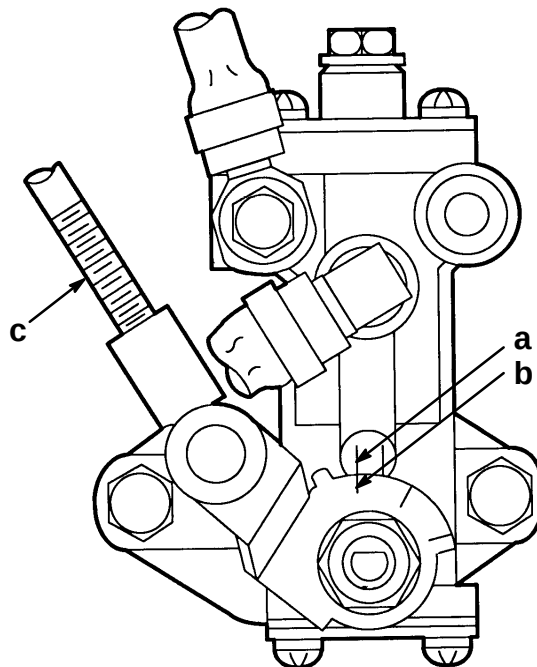
1. Quicksilver 2-Cycle Outboard Oil is recommended for this oil injection system. In an emergency, when Quicksilver 2-Cycle Outboard Oil is not available, substitute a high quality 2-cycle oil that is intended for outboard use and meets BIA rating TC-WII or TC-W3, shown on oil container. BIA rating TC-W is the Boating Industry Association's designation for approved, 2-cycle water-cooled outboard oils.
2. Remove fill cap from the oil tank and fill tank with oil. Retighten the fill cap.



a - Fill Cap

Carburetor/Oil Pump Synchronization

1. While holding throttle arm at idle position, adjust length of link rod so that stamped mark of oil pump body aligns with stamped mark of oil pump lever, and lever is in closed position.
2. Check full travel of link rod that it does not interfere with hoses, sta-straps, etc.



- a - Mark on Body
b - Mark, Fully Closed on Lever
c - Link Rod

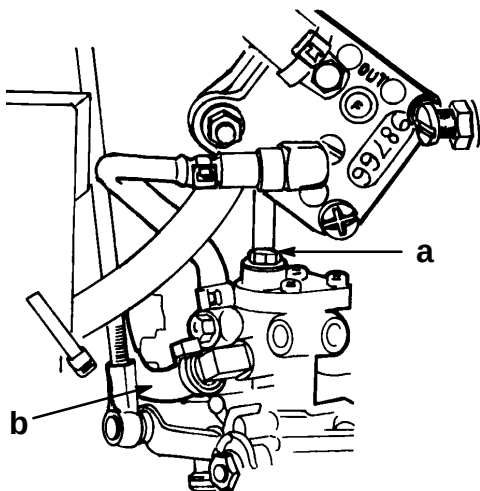


Bleeding Air from Oil Injection System

IMPORTANT: If air exists in either oil pump hose (inlet or outlet), the air **MUST BE** bled from the hose(s) before operating engine.

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.

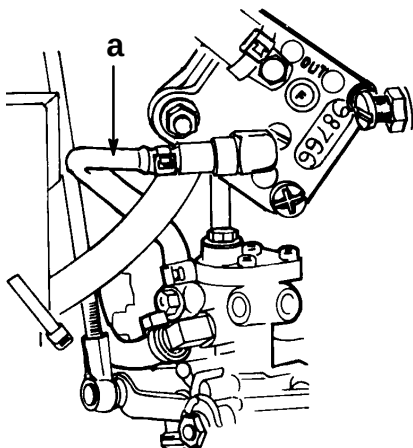


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a - Bleed Screw
b - Inlet Hose

Bleeding Air from Oil Pump Outlet Hose

1. Purge air from outlet hose, by running engine at idle speed, until no air bubbles are present in outlet hose.



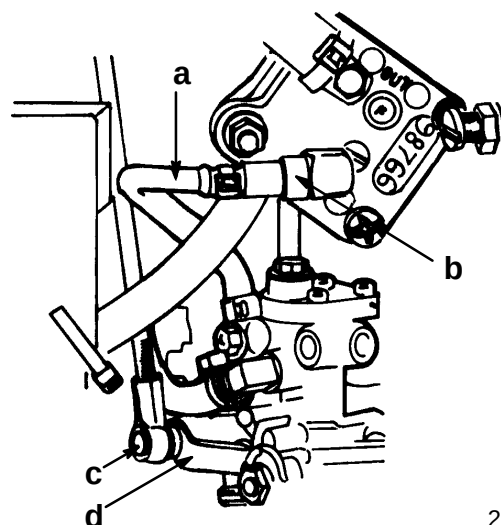
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a - Outlet Hose

Oil Pump Test

NOTE: A graduated container is required to perform this test.

1. Connect engine to remote fuel tank containing a 50:1 fuel/oil mixture (25:1 if during break-in period).
2. Attach flush device to outboard or place outboard in test tank.
3. Remove top cowling.
4. Disconnect oil outlet hose from fuel pump fitting.
5. Plug fuel pump fitting.
6. Remove link rod end from oil flow regulator.
7. Rotate oil pump regulator full counterclockwise and hold it in this position, (wide-open pump position).
8. Attach an accurate service tachometer to engine.
9. Place end of hose into graduated container.



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a - Outlet Hose
b - Fuel Pump Fitting
c - Link Rod End
d - Pump Regulator

10. Run engine at 700 RPM for 15 minutes.

11. 3 Cylinder:
pump # 42959/42959--1/42959--2 = $21 \pm 1.9\text{cc}$
pump # 42959--3 = $25 \pm 2.3\text{cc}$

- 4 Cylinder:
pump # 44345/44345--1/44345--2 = $28.6 \pm 2.6\text{cc}$
pump # 44345--3 = $33.3 \pm 4\text{cc}$

NOTE: Pump output specifications are derived at 70 degrees room temperature. Cooler or warmer test temperature will result in LESS oil pump discharge.



Low Oil Sensor Test

NOTE: Low oil sensor is located in bottom of oil tank.

1. Disconnect low oil sensor leads (tan and black) from terminal block.
2. Using an ohmmeter, perform both tests in chart, following.

Oil Level in Oil Tank	Test Leads Between	Scale Reading (x _____)
1/2 Full to Full	Low Oil Sensor Leads (tan and black)	No Continuity* (R x 1)
Empty	Low Oil Sensor Leads (tan and black)	Continuity** (R x 1)

* If continuity is indicated, check to see if float (located inside oil tank) is stuck in place or if magnet (attached to bottom of float) has come loose. If float checks O.K., replace sensor.

** If continuity is NOT indicated, check to see if float (located inside oil tank) is stuck in place. If float is NOT stuck in place, replace sensor (bottom of oil tank – remove screw and retract sensor).

Warning Horn System

Models Equipped with Test Button (3 Cylinder Only)

DESCRIPTION

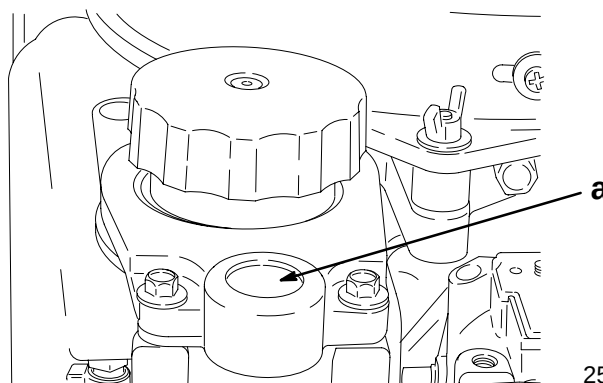
Major components of the warning horn system are an ignition switch, warning horn, low oil sensor, powerhead temperature sensor, and warning horn test button.

With the ignition switch in the “Run” position, electrical current is routed thru the warning horn and supplied to the powerhead temperature sensor, low oil sensor, and warning horn test button. If the powerhead overheats, the oil level in the oil tank drops below approximately 1 quart (.95 liter), or the warning horn test button is depressed, the electrical circuit completed, and the warning horn will sound.

WARNING HORN SYSTEM CHECK

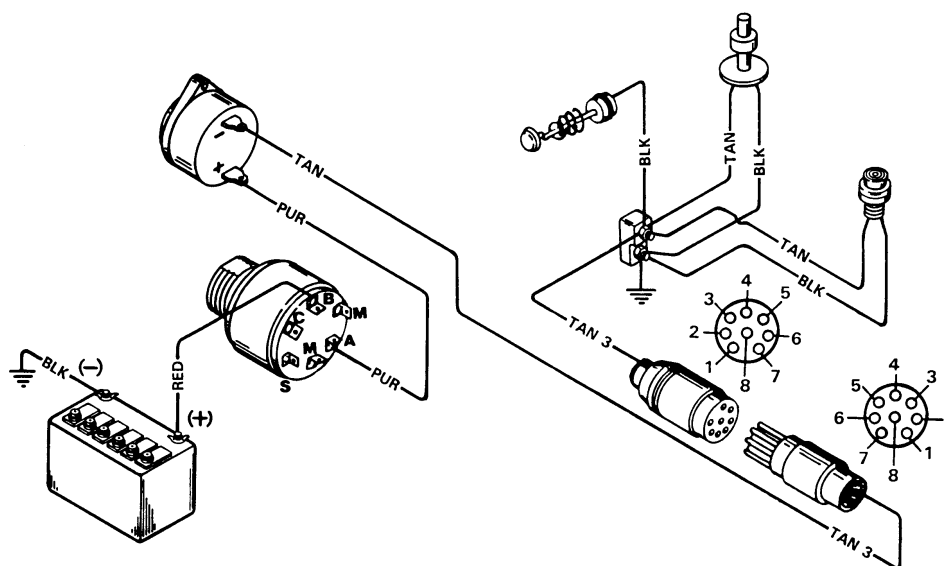
IMPORTANT: Warning horn will sound if powerhead is overheated or if oil level in oil tank has dropped below approximately 1 quart (.95 liter).

1. Turn ignition key switch to “Run” position.
2. Depress test button. Warning horn will sound if system is functioning properly.
3. Turn key switch to “Off” position.



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a - Test Button

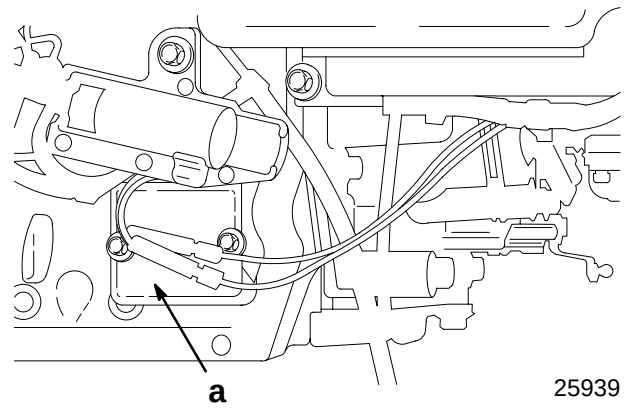




Models Not Equipped With Test Button (3 and 4 Cylinder)

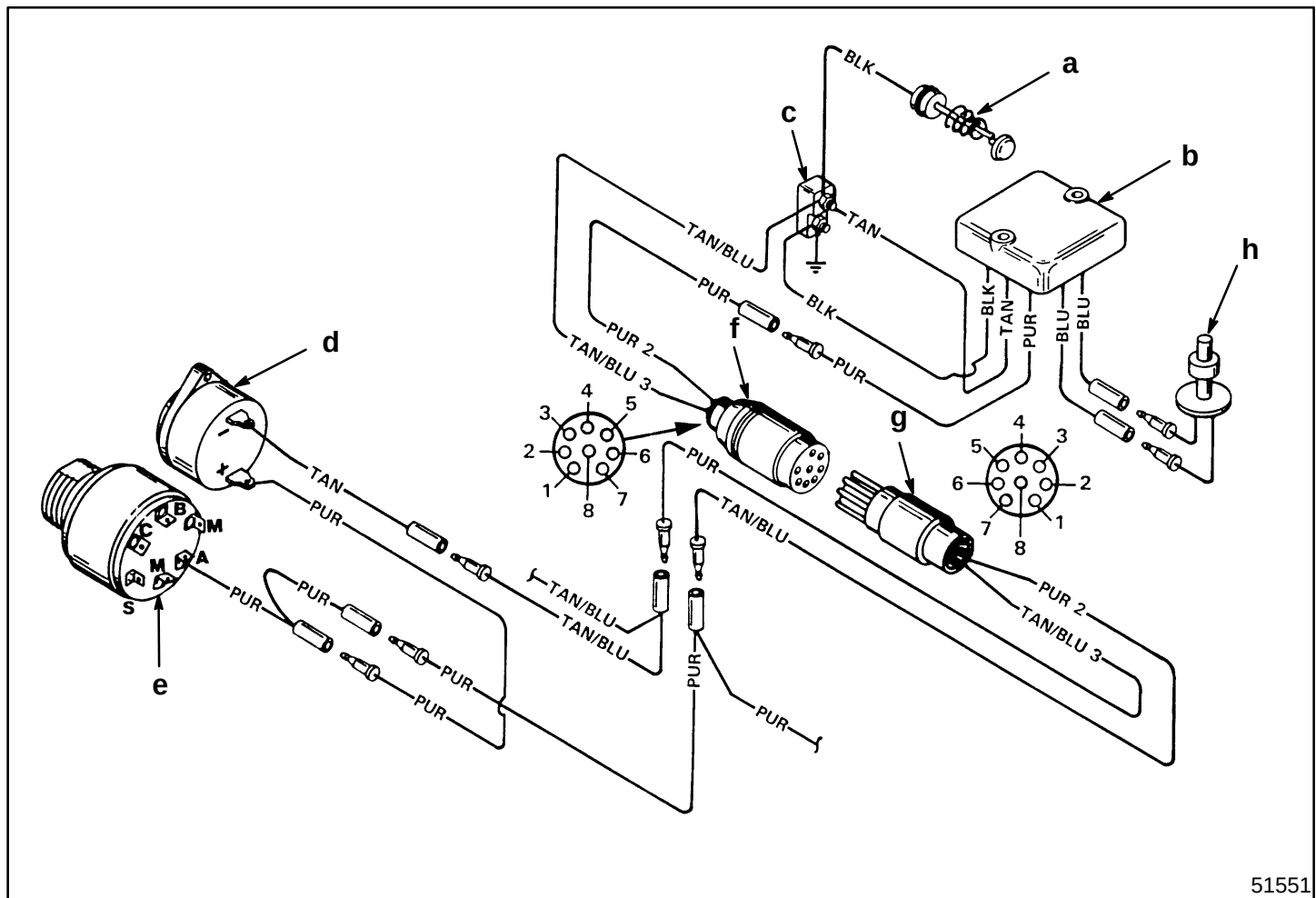
DESCRIPTION

Self-test of the warning system is performed by turning the ignition key to the "RUN" position. A steady beep is indicative of an overheat condition. An intermittent beep refers to a low oil condition. Both overheat and low oil conditions are monitored by a warning module mounted on the starboard side of the engine block.



a - Warning Module

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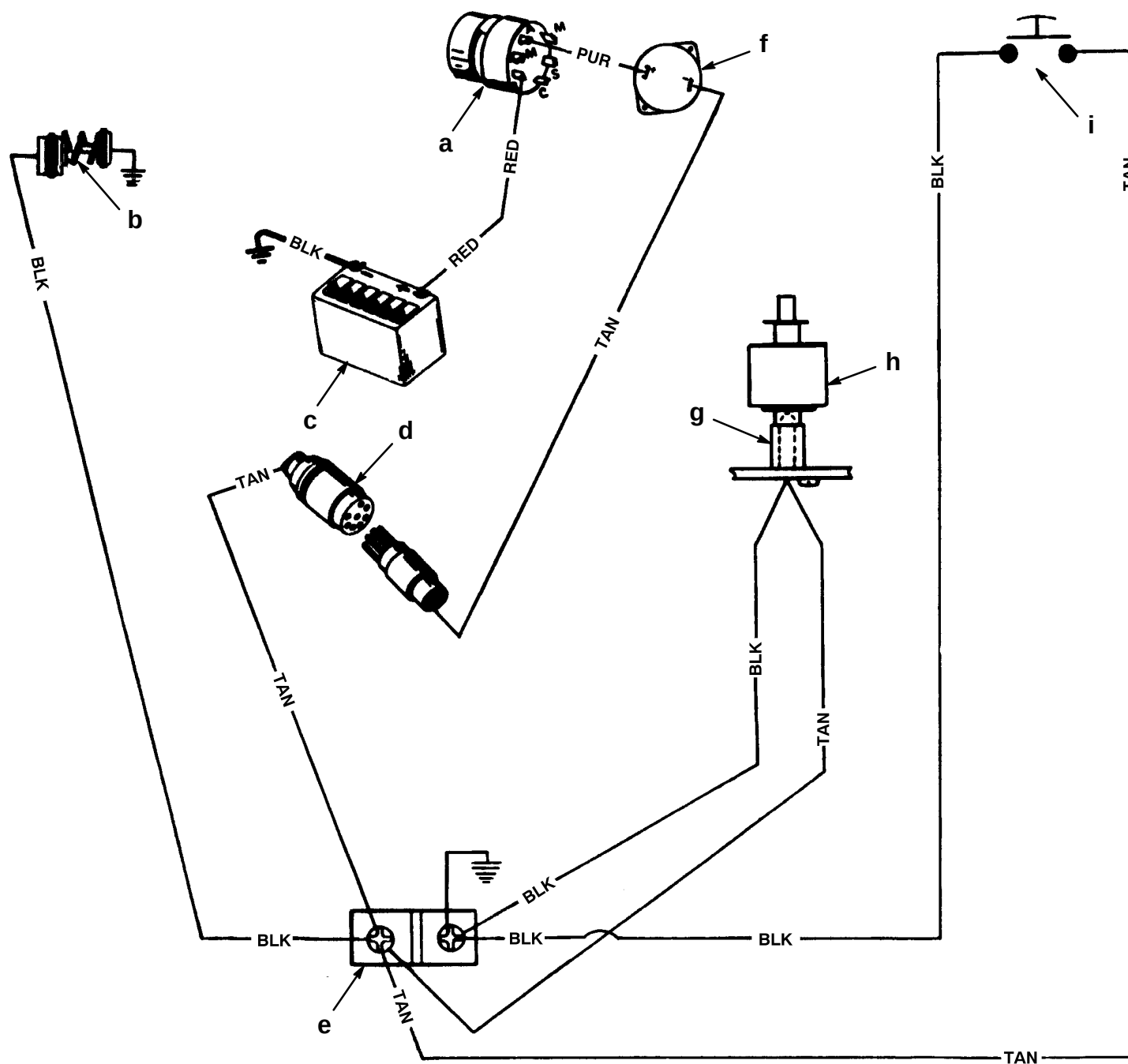
a - Powerhead Temperature Sensor
b - Warning Module
c - Terminal Block

d - Warning Horn
e - Ignition Switch
f - Engine Harness

g - Remote Control Harness
h - Low Oil Sensor



WARNING HORN SYSTEM WIRING DIAGRAM



- a - Ignition Switch
- b - Powerhead Temperature Sensor
- c - Battery
- d - Wiring Harness Connectors

- e - Terminal Block
- f - Warning Horn
- g - Low Oil Sensor

- h - Magnetic Float
- i - Warning Horn Test Button (Some Models)



Oil Injection System Troubleshooting Chart

(Models with Warning Module)

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 – 1 quart remaining, (2) the oil injection pump, or (3) a faulty warning module.

1. Open the engine cowl and check oil level in engine reservoir. If oil level is approximately one quart or less, the problem is low oil level. Add oil to reservoir.

NOTE: There is a safety reserve of oil left in the reservoir after the low oil warning is sounded. There is enough oil for approximately 50 minutes of full throttle operation on four cylinder engines and approximately 1 hour of full throttle operation on three cylinder engines.

2. If there is more than 1 quart of oil in the reservoir, then the problem may be in the oil injection pump. **DO NOT** run engine on straight gas when a problem may be in the oil injection pump. Engine can be run by connecting a remote fuel tank of 50:1 gas and oil mixture to engine.

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) wire between horn and engine	Disconnect tan lead from main engine wiring harness at terminal block on engine. Ground this tan lead to engine ground. Warning horn should sound. If not, check tan wire between horn and engine 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.	Refer to Quicksilver Accessory Guide for correct components

PROBLEM: Warning horn stays on when ignition key is turned to “ON” position.

POSSIBLE CAUSE	CORRECTIVE ACTION
Engine overheat sensor	If horn sounds a continuous “beep”, the engine overheat sensor may be faulty. Disconnect overheat sensor (BLACK Wire) and turn ignition key to “ON” position. If horn still sounds a continuous “beep”, the warning module is faulty. Replace module and retest. If “beep” does not sound, then engine overheat sensor is faulty. Replace and retest.
Warning Module	If horn continues to sound on intermittent “beep”, the warning module is faulty or oil level is too low.

PROBLEM: Warning horn sounds when engine is running. Oil level in engine reservoir is full.

POSSIBLE CAUSE	CORRECTIVE ACTION
Defective low oil sensor	Disconnect both low oil sensor leads (LIGHT BLUE) from bullet connectors. Connect an ohmmeter between leads. There should be no continuity through sensor. If continuity exists, sensor is faulty.
Drive system of oil injection pump	Refer to page 3B-3, “Oil Pump Test” to determine if oil pump is operating properly.
Warning Module	Replace warning module.