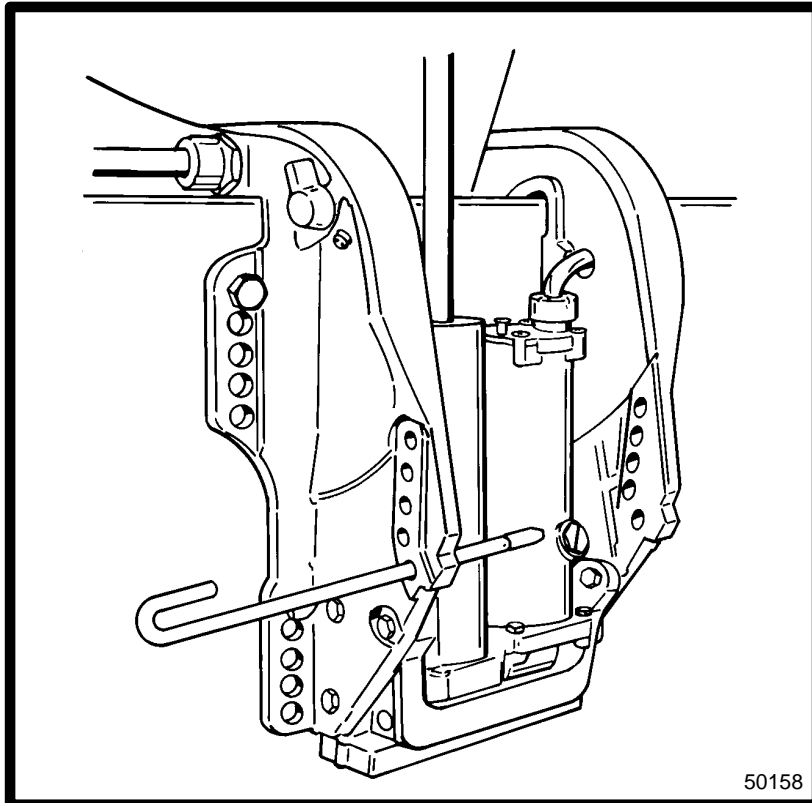




MID-SECTION



5

C

POWER TRIM (DESIGN II)



Table of Contents

	Page
Power Trim General Information	5C-1
Description	5C-1
Trimming Characteristics	5C-1
Trimming Outboard "Up" ("Out")	5C-1
Trimming Outboard "Down" ("In")	5C-1
Trailing Outboard	5C-2
Tilting Outboard Up and Down Manually ..	5C-2
Trim "In" Angle Adjustment	5C-2
Power Trim System Components	5C-3
Torque Specifications	5C-3
Quicksilver Lubricant/Sealant Application	
Points	5C-3
Power Trim Flow Diagrams Design II	5C-4
Design II	5C-5
Design II	5C-6
Design II	5C-7
Design II	5C-8
Design II	5C-9
Design II	5C-10
Troubleshooting	5C-11
Determining if Problem is Electrical or	
Hydraulic	5C-11
Trouble Chart	5C-11
Hydraulic System Troubleshooting	5C-12
Preliminary Checks	5C-12
Leak Down Check – Pump and Manifold	
Assembly	5C-12
Leak Down Check – Pilot Valve	
Assembly	5C-13
Leak Down Check – Manual Release	
Valve	5C-13
Leakage Past Ball and Seat – Piston	
Assembly	5C-13
Troubleshooting Flow Diagram	5C-14
Troubleshooting Flow Diagram	5C-15
Electrical System Troubleshooting	5C-16
COMMANDER 2000 Side Mount Remote	
Control (Power Trim/Tilt Electric Start with	
Warning Horn) Wiring Diagram	5C-16
Power Trim System Wiring Diagram	5C-17
Troubleshooting the "Down" Circuit*	
(When "Up" Circuit is OK)	5C-18
Troubleshooting the "Up" Circuit*	
(When "Down" Circuit Is OK)	5C-19
Troubleshooting the "Down" and "Up" Circuits	
(All Circuits Inoperative)*	5C-20

	Page
Power Trim System Removal	5C-21
Power Trim System Disassembly	5C-22
Trim Rod Removal	5C-22
Trim Rod Disassembly	5C-23
Trim "Motor" Removal	5C-25
Trim Motor Disassembly	5C-25
Reservoir Assembly Removal	5C-26
Oil Pump/Manifold Removal	5C-27
Cleaning and Inspection of Trim Rod	
Components	5C-28
Motor and Electrical Tests/Repair	5C-29
Trim Pump Motor Test	5C-29
Thermal Overload Switch Test	5C-29
Motor Assembled	5C-29
Motor Disassembled	5C-29
Armature Tests	5C-30
Test for Shorts	5C-30
Test for Ground	5C-30
Checking and Cleaning Commutator ..	5C-30
Power Trim System Re-assembly	5C-30
Manifold/Oil Pump Installation	5C-30
Trim Motor Re-assembly	5C-31
Reservoir Installation	5C-33
Trim Rod Re-assembly	5C-34
Trim Rod Installation	5C-35
Bleeding Power Trim Unit	5C-36
Power Trim Unit Installation	5C-37



Power Trim General Information

Description

The Power Trim system consists of an electric motor, pressurized fluid reservoir, pump and trim cylinder.

The remote control (or trim panel) is equipped with a switch that is used for trimming the outboard “up” and “down”, and for tilting the outboard for shallow water operation (at slow speed) or for “trailing”. The outboard can be trimmed “up” or “down” while engine is under power or when engine is not running.

Trimming Characteristics

NOTE: *Because varying hull designs react differently in various degrees of rough water, it is recommended to experiment with trim positions to determine whether trimming “up” or “down” will improve the ride in rough water.*

When trimming your outboard from a mid-trim position (trim tab in neutral, straight fore-and-aft, position), you can expect the following results:

TRIMMING OUTBOARD “UP” (“OUT”)

⚠ WARNING

Excessive trim “out” may reduce the stability of some high speed hulls. To correct instability at high speed, reduce the power gradually and trim the motor “In” slightly before resuming high speed operation. (Rapid reduction in power will cause a sudden change of steering torque and may cause additional momentary boat instability.)

Will lift bow of boat, generally increasing top speed.

Transfers steering torque harder to left on installations below 23 in. transom height.

Increases clearance over submerged objects.

In excess, can cause porpoising and/or ventilation.

In excess, can cause insufficient water supply to water pump resulting in serious water pump and/or powerhead overheating damage.

⚠ WARNING

Excessive engine trim angle will result in insufficient water supply to water pump causing water pump and/or powerhead overheating damage. Make sure that water level is above gear housing water intake holes whenever engine is running.

Operating “Up” circuit will actuate the “up” solenoid (located under engine cowl) and close the electric motor circuit. The electric motor will drive the pump, thus forcing automatic transmission fluid thru internal passageways into the “up” side of the trim ram.

The trim cylinder/trim ram will position the engine at the desired trim angle within the 20° maximum trim range. The Power Trim system is designed so the engine cannot be trimmed beyond the 20° maximum trim angle as long as engine RPM is above approximately 2000 RPM.

The engine can be raised beyond the 20° maximum trim angle for shallow water operation, etc., by keeping the engine RPM below 2000 RPM. If engine speed increases above 2000 RPM, the thrust created by the propeller (if deep enough in the water) should cause the trim system to automatically lower the engine back to the 20° maximum trim angle.

TRIMMING OUTBOARD “DOWN” (“IN”)

⚠ WARNING

Excessive speed at minimum trim “In” may cause undesirable and/or unsafe steering conditions. Each boat should be tested for handling characteristics after any adjustment is made to the tilt angle (tilt pin relocation).

Will help planing off, particularly with a heavy load.

Usually improves ride in choppy water.

In excess, can cause boat to veer to the left or right (bow steer).

Transfers steering torque harder to right (or less to the left).

Improves planing speed acceleration (by moving tilt pin one hole closer to transom).

Operating “Down” circuit will actuate the “down” solenoid (located under engine cowl) and close the electric motor circuit (motor will run in opposite direction of the “Up” circuit). The electric motor will drive the pump, thus forcing automatic transmission fluid thru internal passageways into the “down” side of the tilt ram. The tilt ram will move the engine downward to the desired angle.



Trailing Outboard

⚠ WARNING

Excessive engine trim angle will result in insufficient water supply to water pump causing water pump and/or powerhead overheating damage. Make sure that water level is above gear housing water intake holes whenever engine is running.

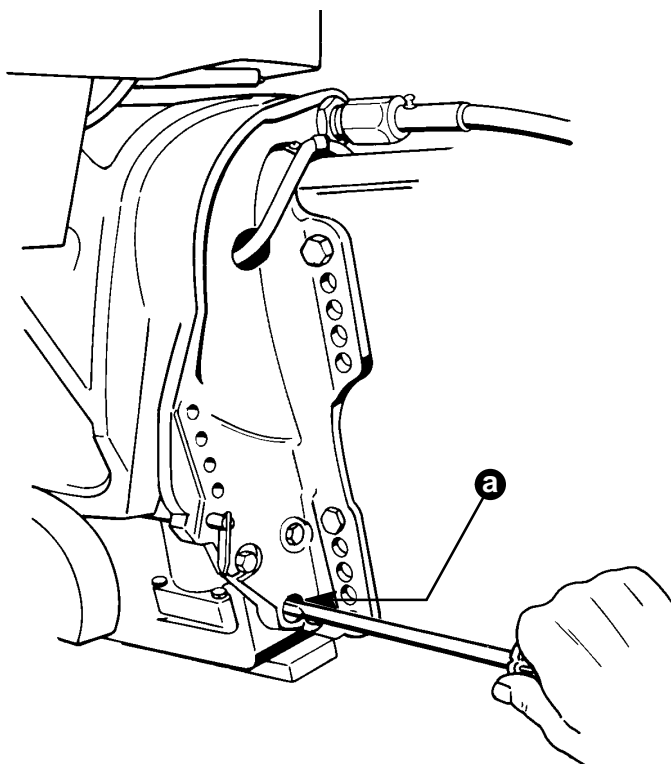
While operating “up” circuit, tilt ram will continue to tilt outboard to full up position for trailering.

Tilting Outboard Up and Down Manually

⚠ WARNING

Before loosening the manual release valve, make sure all persons are clear of engine as engine will drop to full “down” position when valve is loosened.

With power trim installed, the outboard can be raised or lowered manually by opening the manual release valve 3 to 4 turns (counterclockwise).



50146

a - Manual Release Valve

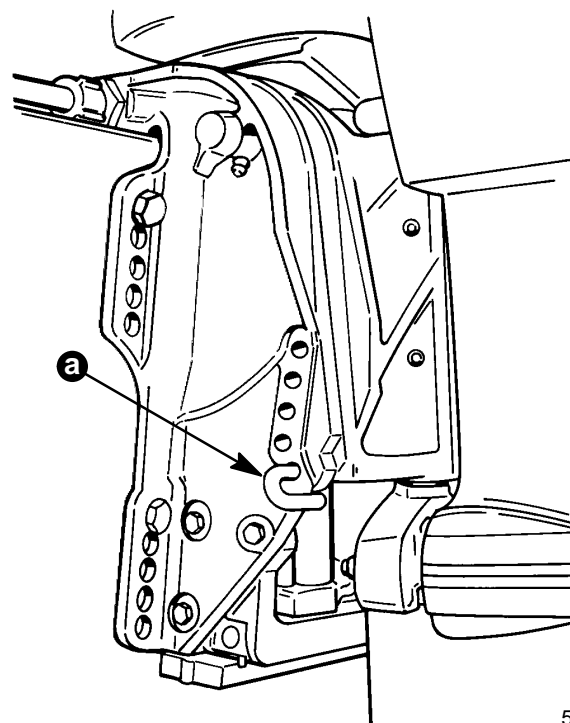
Trim “In” Angle Adjustment

⚠ WARNING

Operating some boats with engine trimmed to the full “in” trim angle [not using trim adjustment pin (a)] at planing speed will cause undesirable and/or unsafe steering conditions. Each boat must be water tested for handling characteristics after engine installation and after any trim adjustments.

IMPORTANT: Some boat/motor combinations, that do not use the trim adjustment pin (a) and are trimmed to the full “in” trim angle, will not experience any undesirable and/or unsafe steering conditions during planing speed. Thus, not using trim adjustment pin may be desired. However, some boats with engine trimmed to the full “in” trim angle at planing speed will cause undesirable and/or unsafe steering conditions. If these steering conditions are experienced, under no circumstances should the engine be operated without the trim adjustment pin and without the pin adjusted in the proper holes to prevent unsafe handling characteristics.

Water test the boat not using the trim adjustment pin. If undesirable and/or unsafe steering conditions are experienced (boat runs with nose down), install trim adjustment pin in proper hole to prevent unsafe handling characteristics.



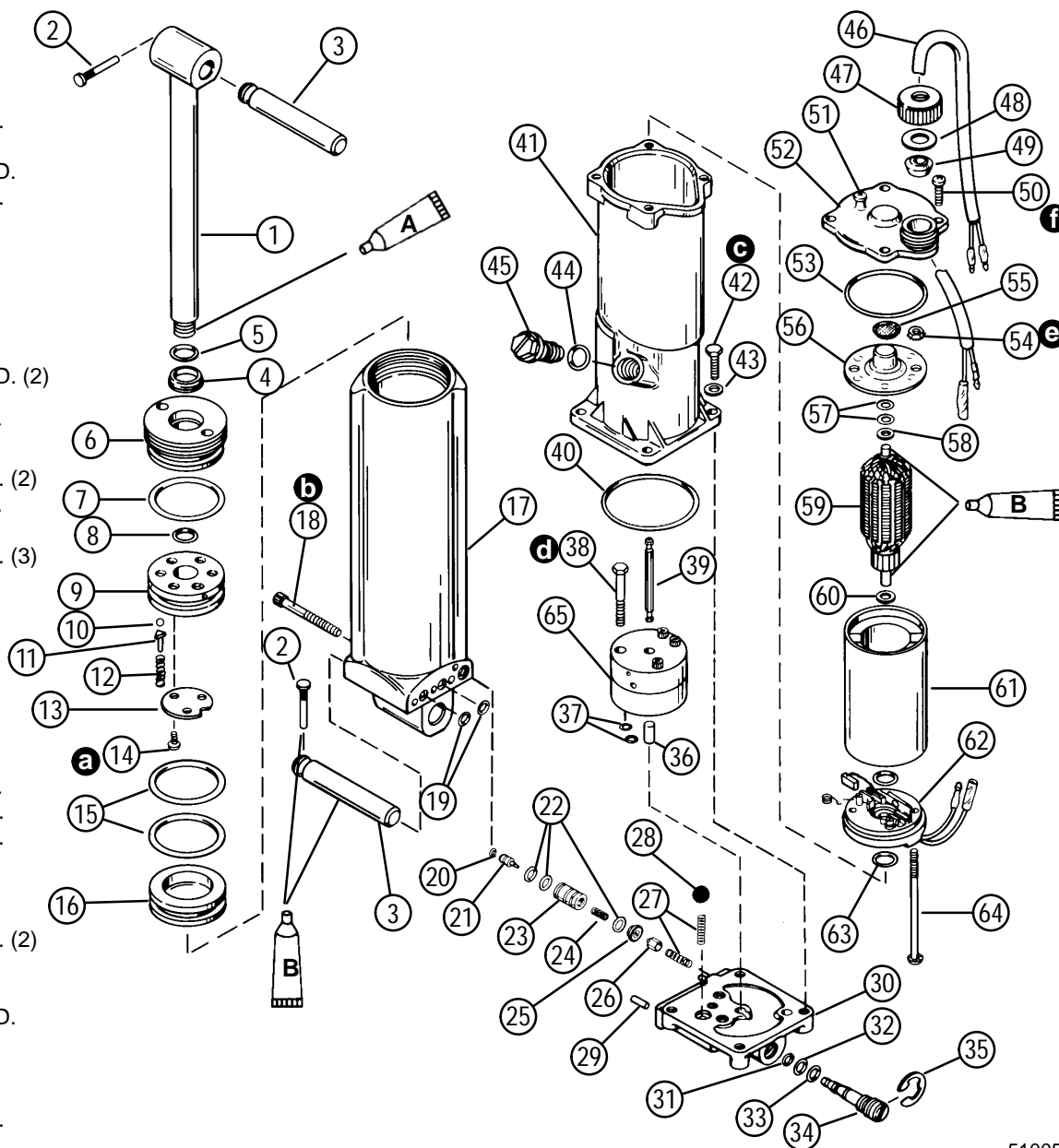
51057



Power Trim System Components

NOTE: It is recommended that "ALL" O-rings be replaced when servicing tilt system.

- 1 - Trim Rod
- 2 - Dowel Pin
- 3 - Pivot Pin
- 4 - Rod Wiper
- 5 - O-ring .671 in. I.D.
- 6 - Cylinder Cap
- 7 - O-ring 1.864 in. I.D.
- 8 - O-ring .614 in. I.D.
- 9 - Trim Rod Piston
- 10 - Ball (5)
- 11 - Seat Spring (5)
- 12 - Spring (5)
- 13 - Retainer Plate
- 14 - Screw (3)
- 15 - O-ring 1.600 in. I.D. (2)
- 16 - Memory Piston
- 17 - Trim Rod Cylinder
- 18 - Screw (2)
- 19 - O-ring .208 in. I.D. (2)
- 20 - O-ring .114 in. I.D.
- 21 - Spool
- 22 - O-ring .301 in. I.D. (3)
- 23 - Sleeve
- 24 - Spring
- 25 - Valve Seat
- 26 - Valve
- 27 - Spring (2)
- 28 - Ball
- 29 - Dowel Pin (2)
- 30 - Manifold
- 31 - O-ring .114 in. I.D.
- 32 - O-ring .208 in. I.D.
- 33 - O-ring .239 in. I.D.
- 34 - Relief Valve
- 35 - "E" Clip
- 36 - Dowel Pin
- 37 - O-ring .176 in. I.D. (2)
- 38 - Bolt
- 39 - Drive Shaft
- 40 - O-ring 2.364 in. I.D.
- 41 - Reservoir
- 42 - Bolt (4)
- 43 - Washer (4)
- 44 - O-ring .538 in. I.D.
- 45 - Fill Screw
- 46 - Wire Harness
- 47 - Cap
- 48 - Washer
- 49 - Grommet
- 50 - Screw (4)
- 51 - Screw
- 52 - Reservoir Cap
- 53 - O-ring 2.634 in. I.D.
- 54 - Nut (2)
- 55 - Disk Foam Pad
- 56 - End Cap
- 57 - Washer (2; .030 in. Thick)
- 58 - Thrust Washer
- 59 - Armature
- 60 - Washer (.010 in. Thick)
- 61 - Housing
- 62 - End Frame
- 63 - O-ring .489 in. I.D.
- 64 - Bolt (2)
- 65 - Trim Pump



51005

Torque Specifications

- a** 35 lb. in. (4.0 N·m)
- b** 100 lb. in. (11.3 N·m)
- c** 70 lb. in. (7.9 N·m)
- d** 90 lb. in. (10.2 N·m)
- e** 25 lb. in. (2.8 N·m)
- f** 13 lb. in. (1.5 N·m)

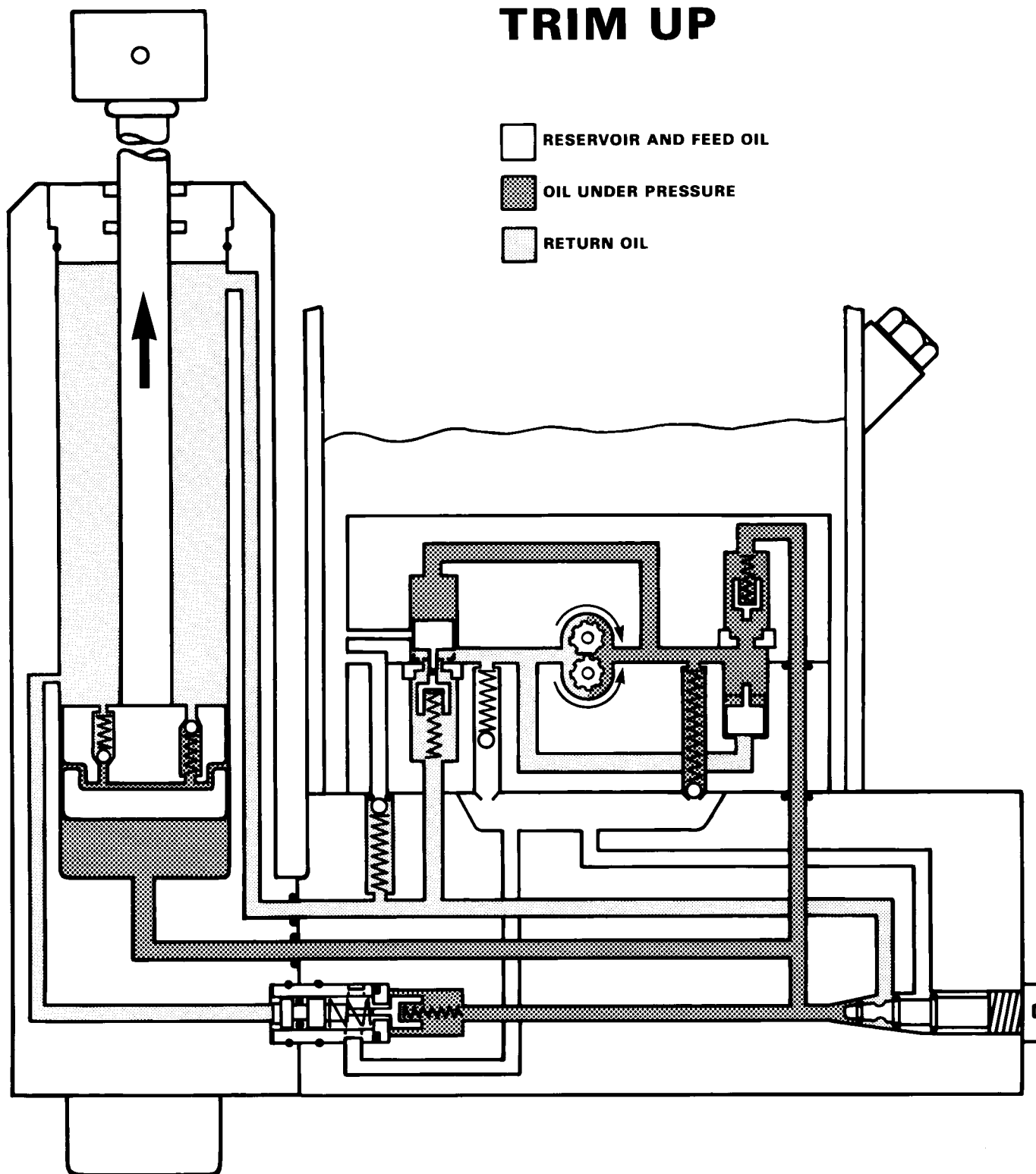
Quicksilver Lubricant/Sealant Application Points

- A** Loctite Grade "A" (271)
- B** Special Lubricant 101



Power Trim Flow Diagrams Design II

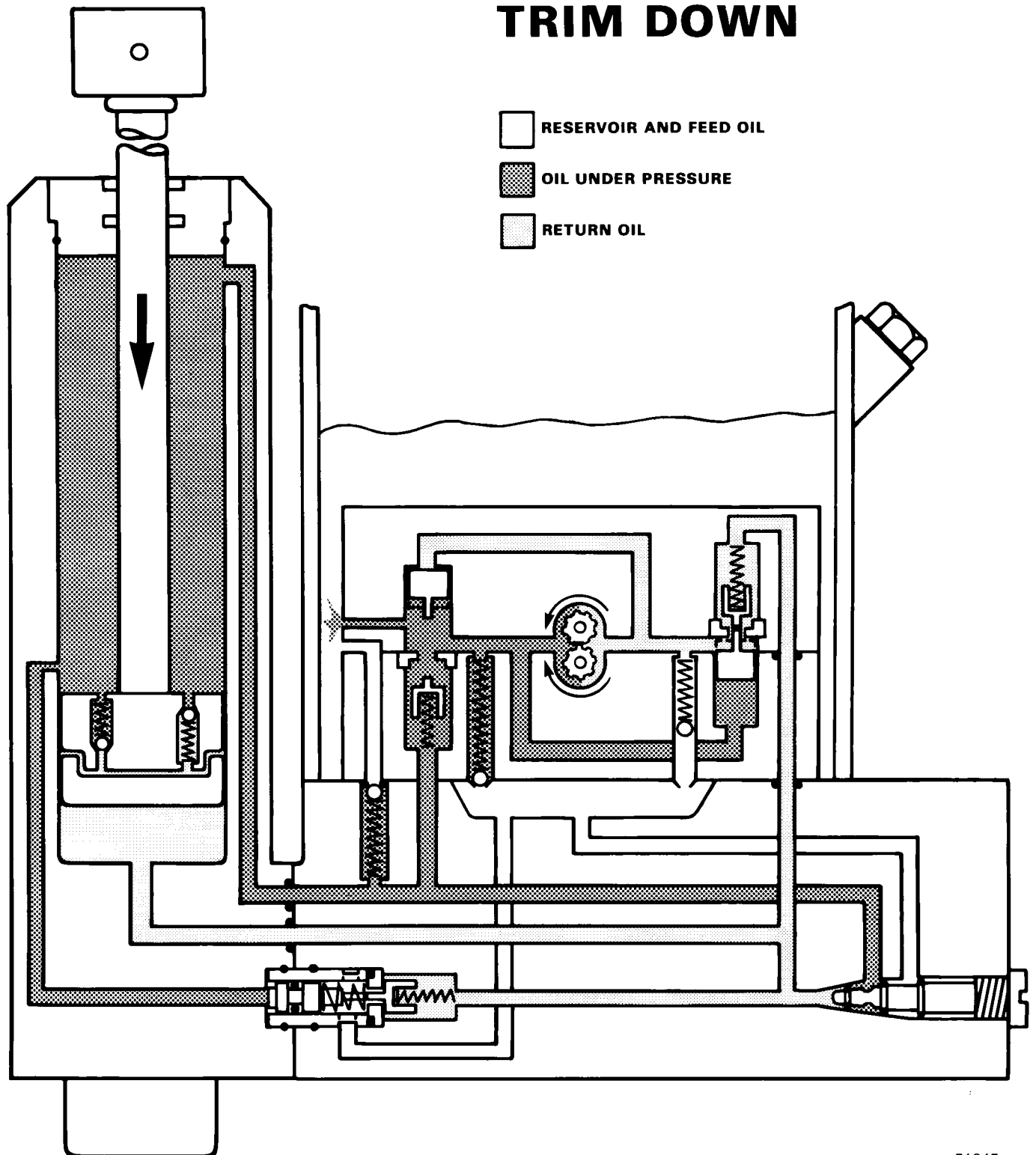
TRIM UP



51644



TRIM DOWN



51645



HYDRAULIC TILT

RESERVOIR AND FEED OIL

OIL UNDER PRESSURE

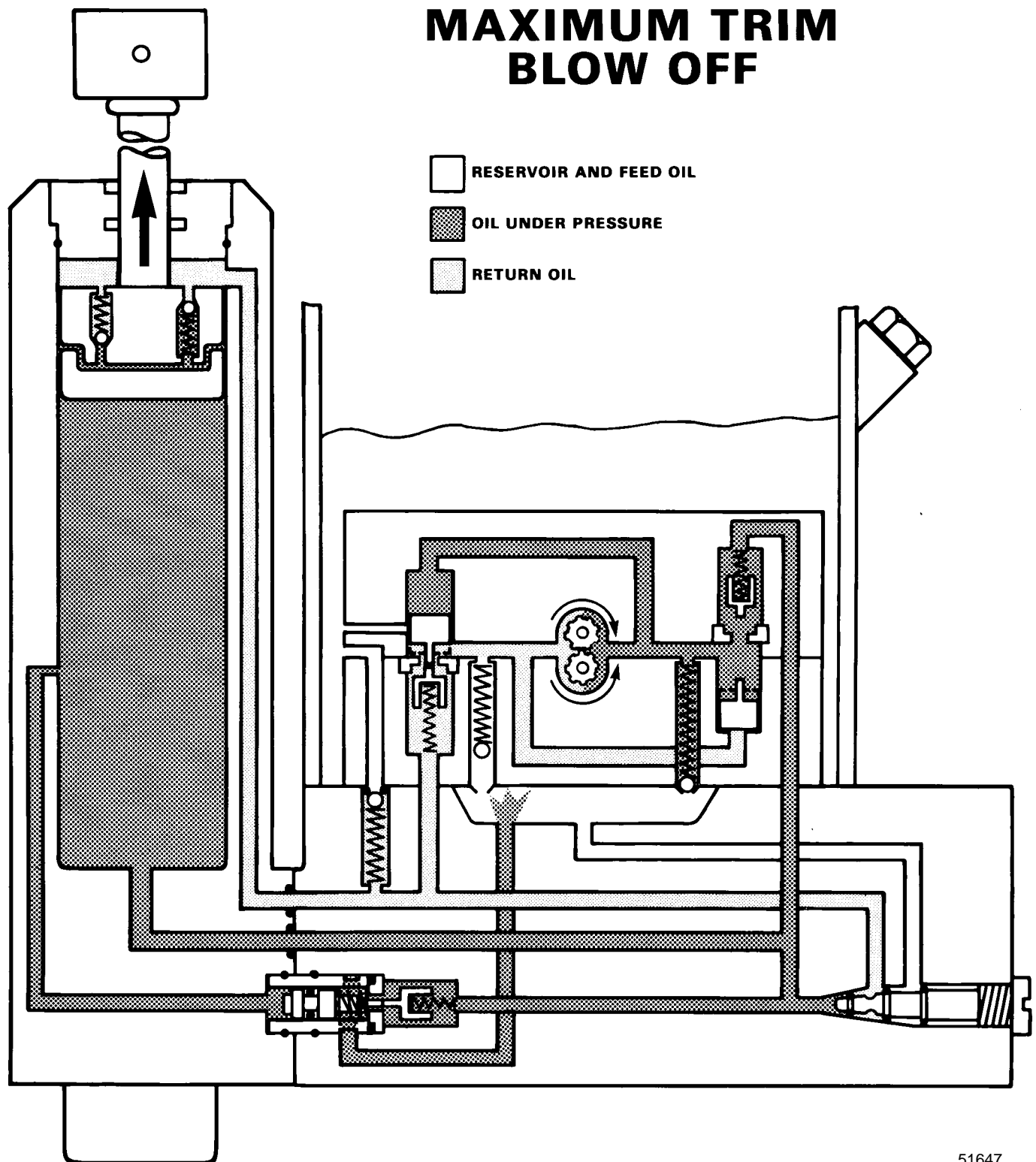
RETURN OIL

51646

51646



MAXIMUM TRIM BLOW OFF

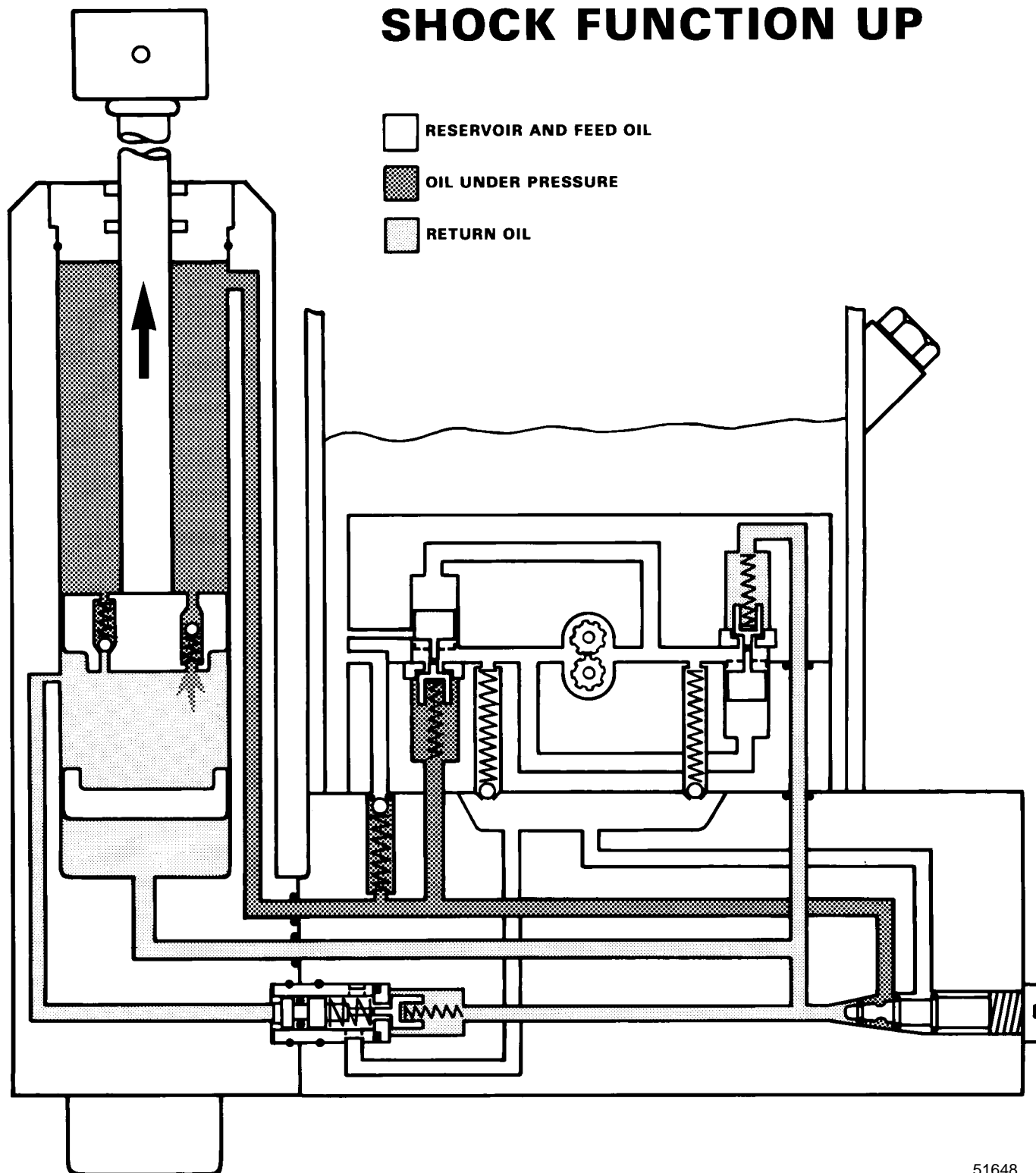


51647



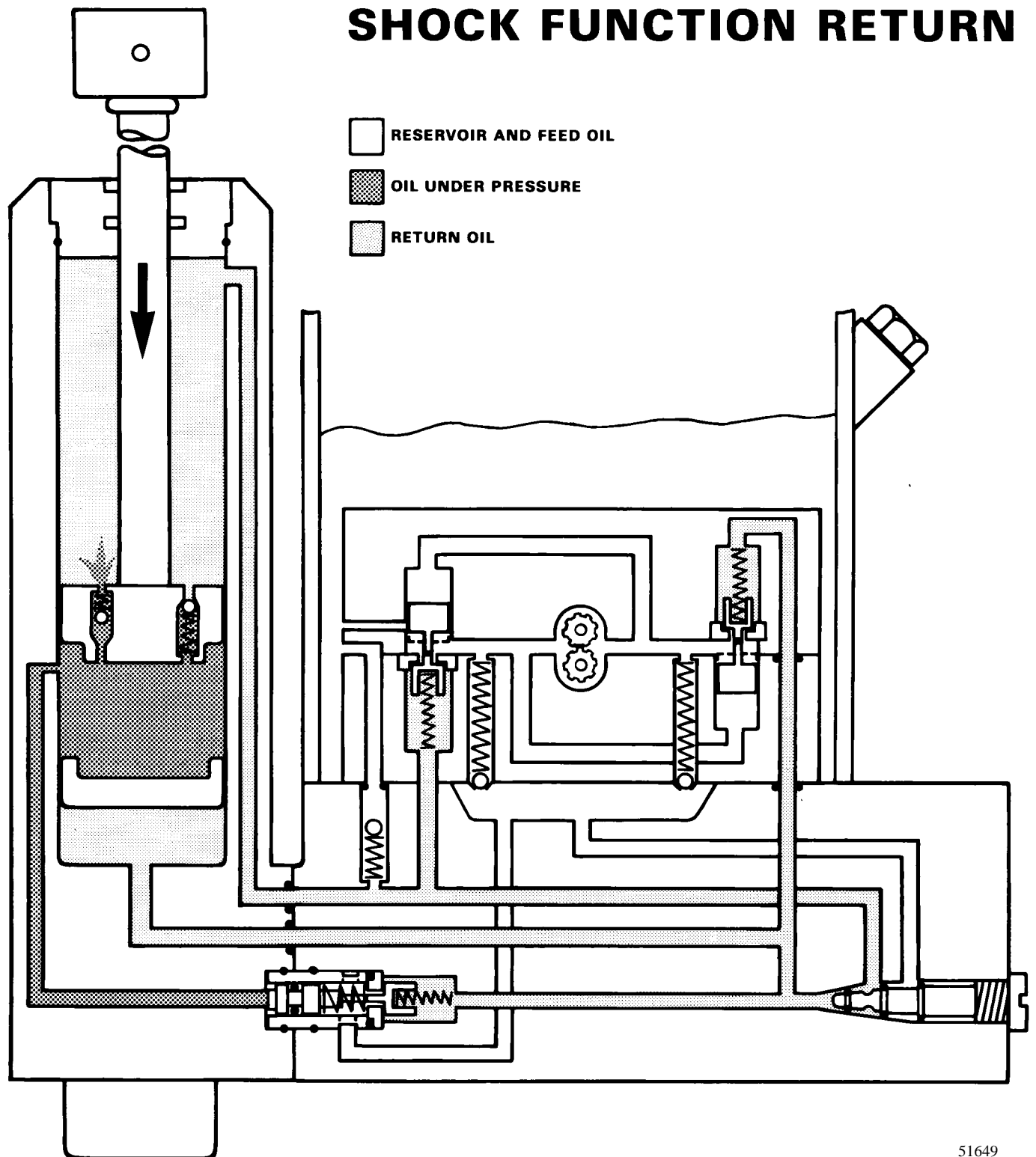
Design II

SHOCK FUNCTION UP





SHOCK FUNCTION RETURN



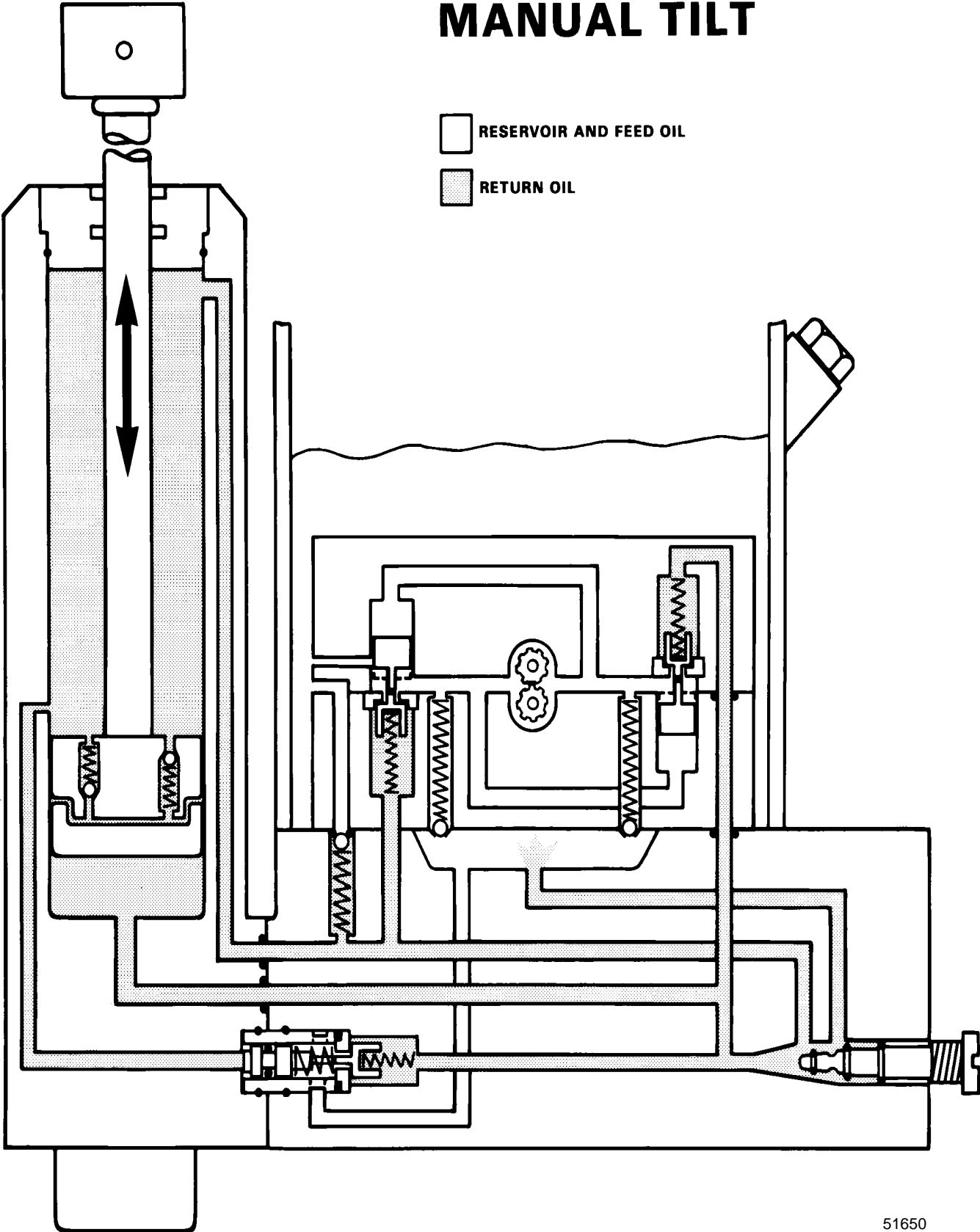
51649



Design II

MANUAL TILT

- RESERVOIR AND FEED OIL
- RETURN OIL



51650

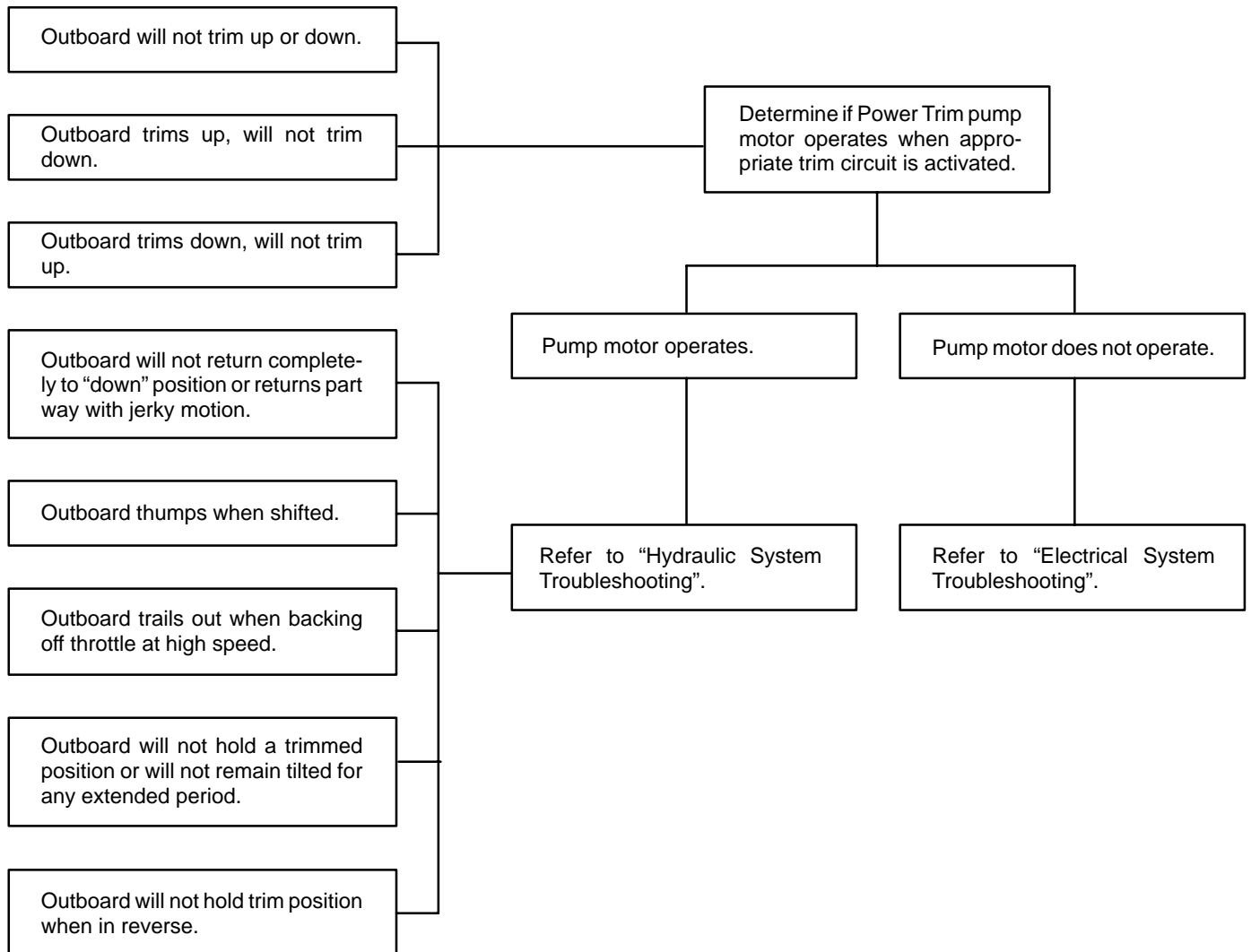


Troubleshooting

Determining if Problem is Electrical or Hydraulic

Refer to the following chart to determine which system is at fault.

Trouble Chart





Hydraulic System Troubleshooting

Support outboard with tilt lock lever when servicing power trim system.

IMPORTANT: After debris or failed components have been found (during troubleshooting procedure) it is recommended that unit be disassembled completely and ALL O-rings be replaced. Check ball valve components and castings must be cleaned using engine cleaner and compressed air or replaced prior to reassembly.

IMPORTANT: Power trim system is pressurized. Outboard must be in the full “UP” position (trim rod fully extended) prior to fill/drain plug, or manual release valve removal.

Refer to instructions following if disassembly is required when servicing.

Follow preliminary checks before proceeding to troubleshooting flow diagrams (following).

Preliminary Checks

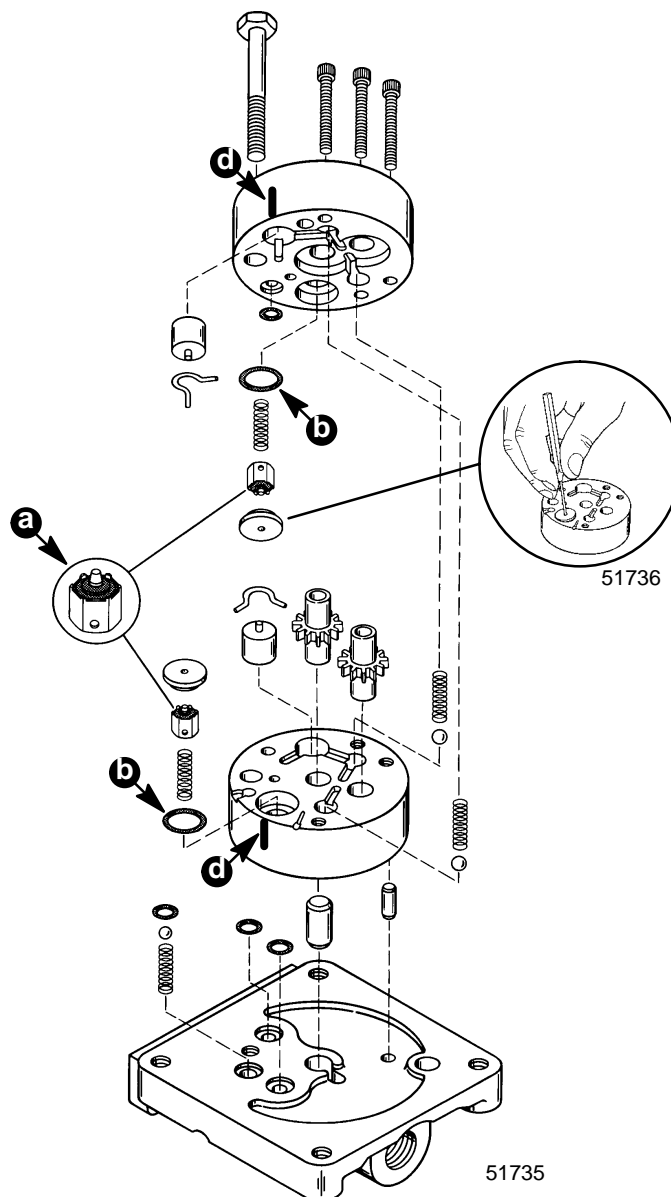
IMPORTANT: Operate Power Trim system after each check to see if problem has been corrected. If problem has not been corrected proceed to next check.

1. Check that manual release valve is tightened to full right (clockwise) position.
2. Check trim pump fluid level with outboard in full “UP” position and fill if necessary. Refer to “Bleeding Power Trim Unit”.
3. Check for external leaks in Power Trim system. Replace defective part(s) if leak is found.
4. Outboard not holding tilted position (falls down to trim position) indicates debris or defective components in trim valve assembly. Clean or replace components as required.
5. Check manual release valve for broken stem and one O-ring remaining in the release valve passage. (Separate the manifold assembly from the cylinder to dislodge broken stem.) Install new release valve and test system.
6. Check for nicked, deteriorated or misplaced O-rings throughout trim system.

Leak Down Check – Pump and Manifold Assembly

NOTE: Scribe (d) pump housing halves before disassembly. Check pump for problems as follows:

1. Debris or chips between valve and seat (a). Usually imbedded in rubber valve seat.
2. Nicked or deteriorated O-ring (b).
3. Nicked, deteriorated or misplaced O-ring between manifold and trim cylinder. Refer to “Manifold Removal” for O-ring location.



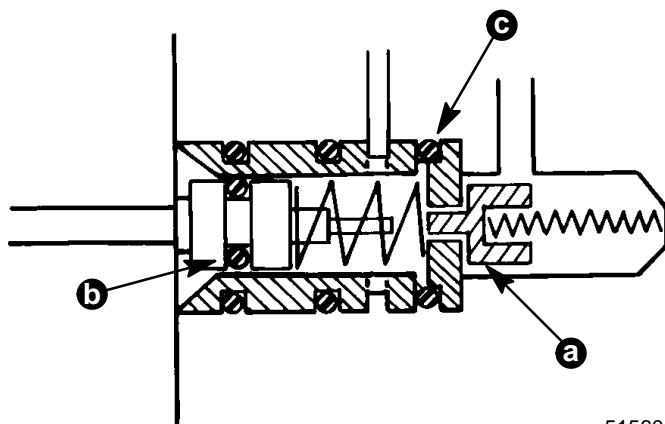
4. After reassembly, insert drive shaft and check pump rotation resistance to turning – housing halves can shift/turn during reassembly. Align scribe marks (d) carefully.



Leak Down Check – Pilot Valve Assembly

1. Debris or chips between valve and seat (a), usually imbedded in rubber valve seat.
2. Pilot valve installed from non-chamfered end of spool results in nicked or damaged O-ring (b).
3. Nicked or deteriorated O-ring (c).

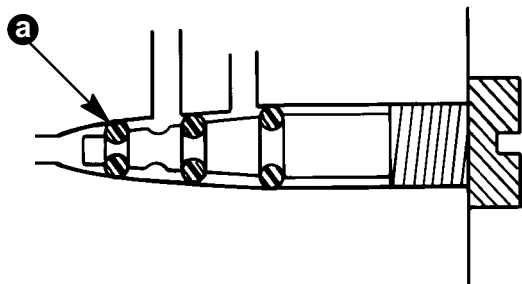
A leak path is created between the UP side of the cylinder and the reservoir. The trim system will leak DOWN until the trim port in cylinder is covered.



- a - Valve and Seat
b - Pilot Valve O-ring
c - O-ring

Leak Down Check – Manual Release Valve

1. Debris or chips under O-ring (a).
2. Flash from valve molding causing O-ring (a) to not seal.
3. Nicked O-ring (a).



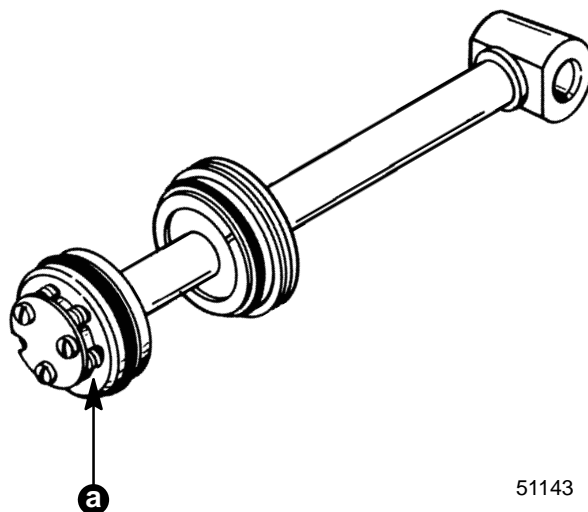
- a - O-ring

Leakage Past Ball and Seat – Piston Assembly

Unit will trim to full or near full DOWN position and then will begin to trim UP while trim switch is held in "DOWN" mode.

If trim switch is released, outboard can be pushed (by hand) DOWN to the point where trim UP started.

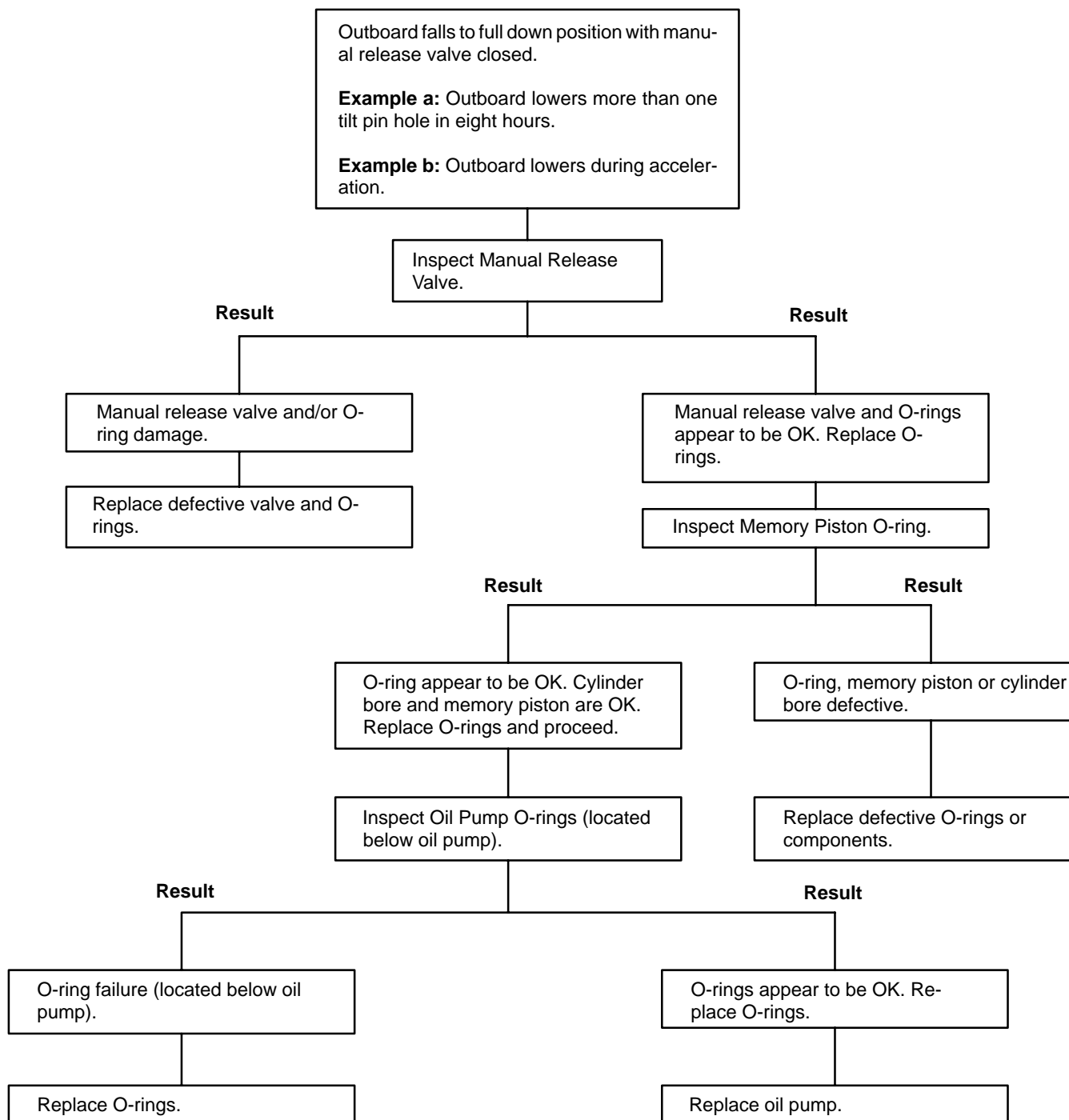
1. Inspect balls and seats in piston assembly for debris or damage. Repair or replace balls/seats.



- a - Ball and Seat. Check for Debris or Damage

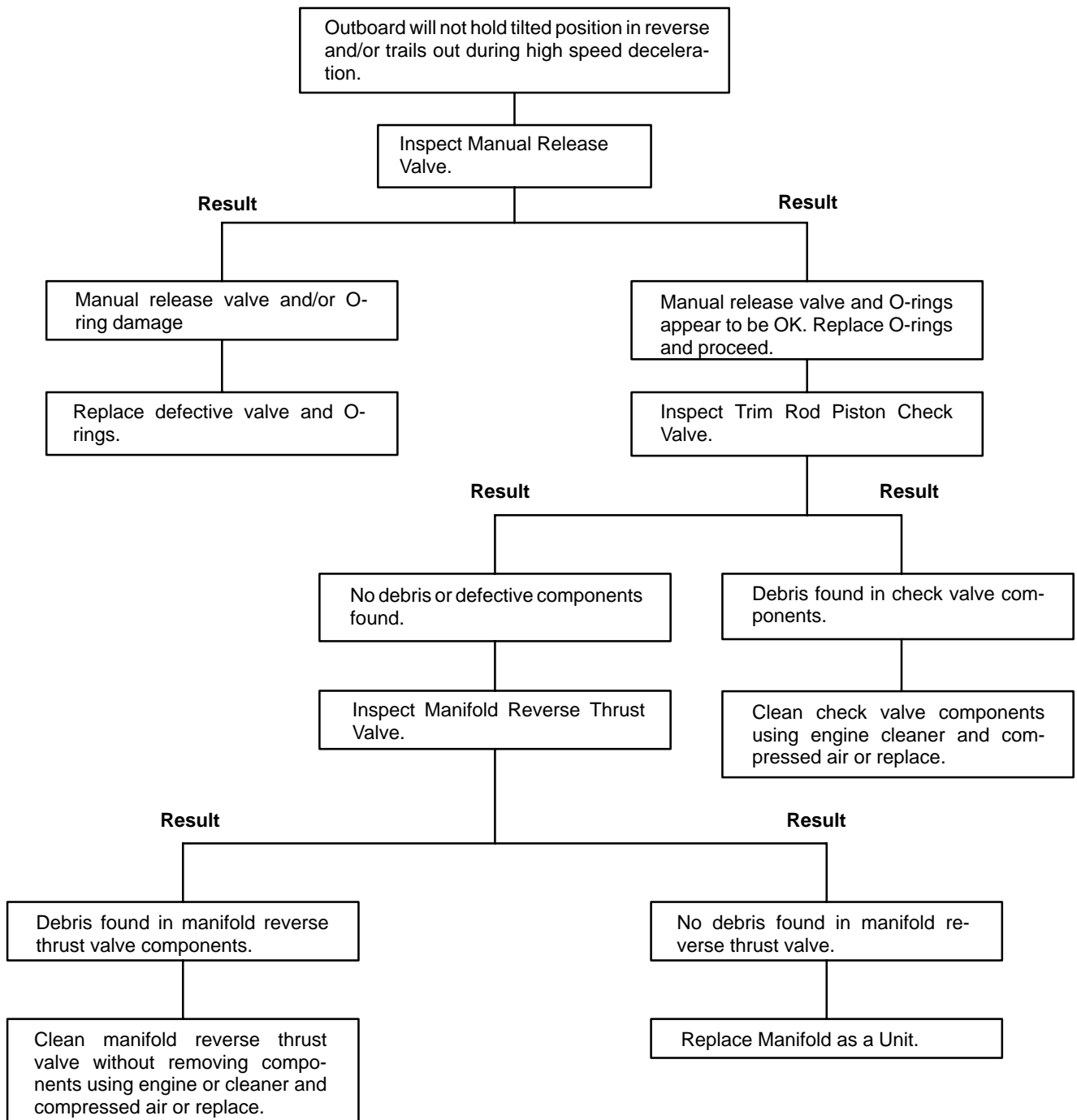


Troubleshooting Flow Diagram





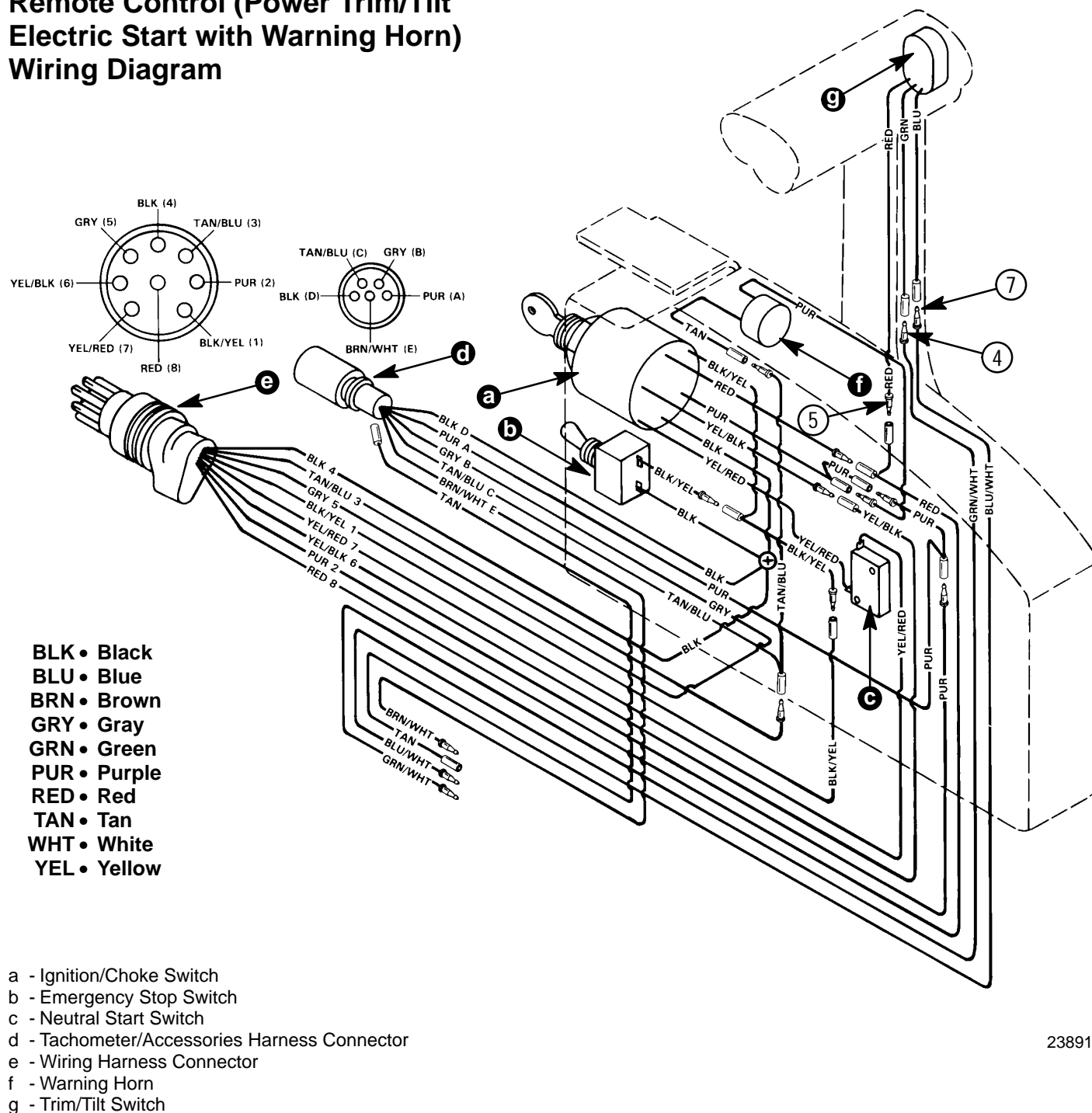
Troubleshooting Flow Diagram





Electrical System Troubleshooting

COMMANDER 2000 Side Mount Remote Control (Power Trim/Tilt Electric Start with Warning Horn) Wiring Diagram



23891



Diagram illustrating the wiring for the Power Trim Motor and Starter Solenoid.

Power Trim Motor: The motor is connected to the Power Trim Module via a 20-amp fuse. The motor's terminals are labeled BLU (Blue) and GRN (Green). The Power Trim Module's terminals are labeled BLU/WHT (Blue/White) and GRN/WHT (Green/White).

Starter Solenoid: The solenoid is connected to the battery and the Power Trim Module. The solenoid's terminals are labeled BLK (Black) and RED (Red). The Power Trim Module's terminals are labeled BLU/WHT (Blue/White) and GRN/WHT (Green/White).

Wiring Details:

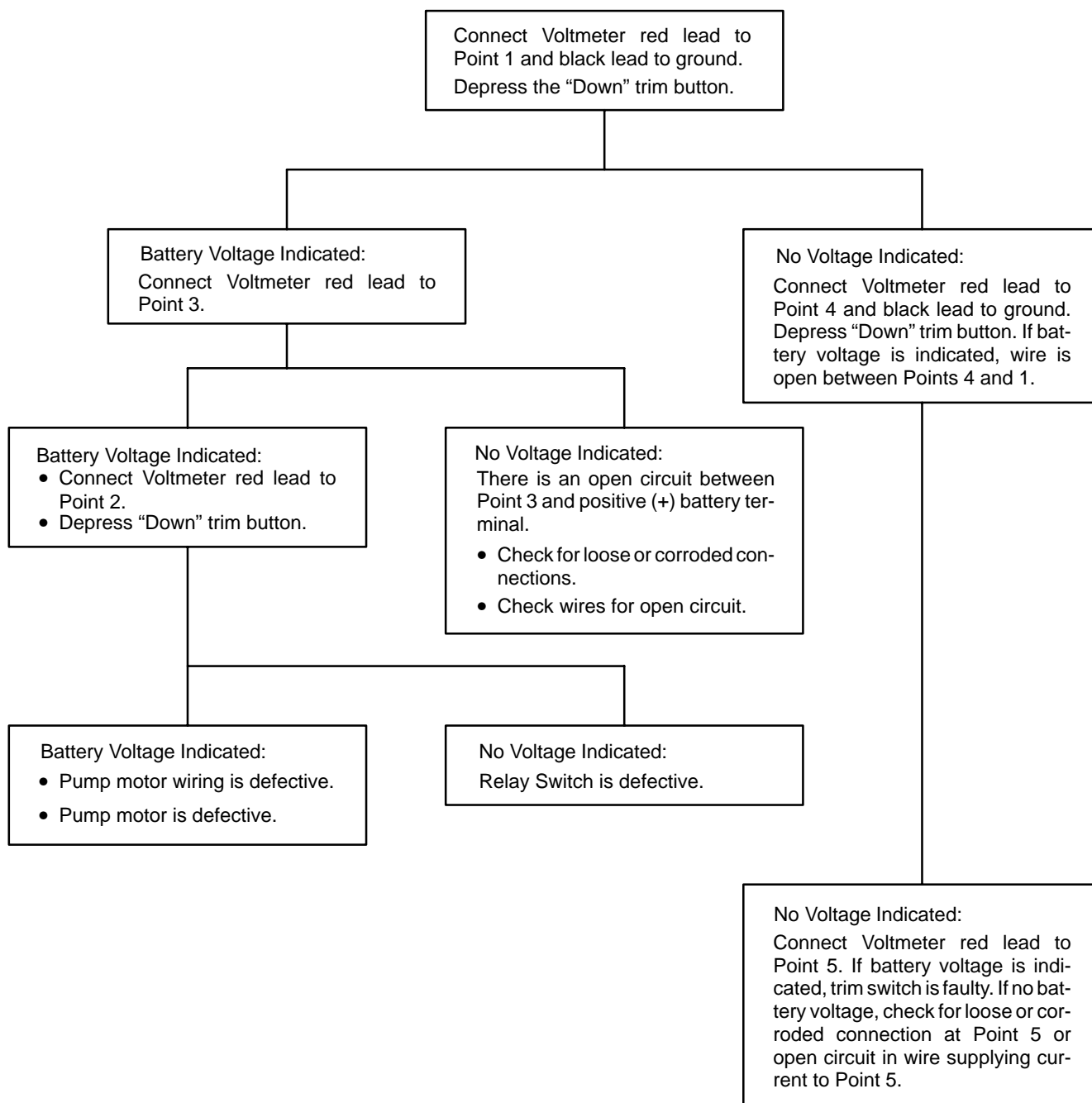
- The Power Trim Module is connected to the Power Trim Motor via a 20-amp fuse.
- The Starter Solenoid is connected to the battery and the Power Trim Module.
- The 20-amp fuse is located in the battery line.
- The Power Trim Module is connected to the Starter Solenoid via a 20-amp fuse.

WIRES FROM
SIDE MOUNT
REMOTE CONTROL
HARNESS

MID-SECTION - 5C-17

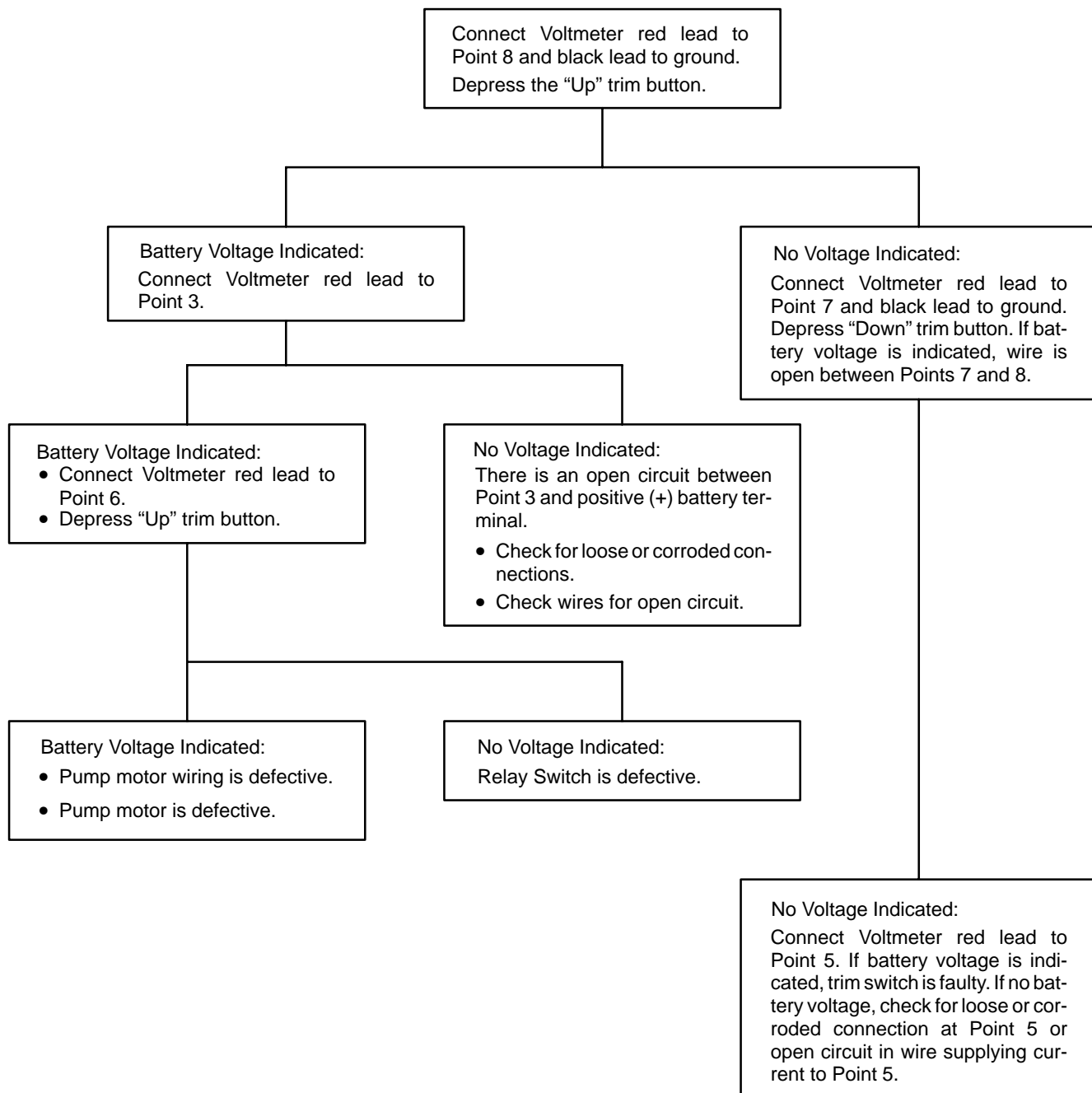


Troubleshooting the “Down” Circuit* (When “Up” Circuit is OK)



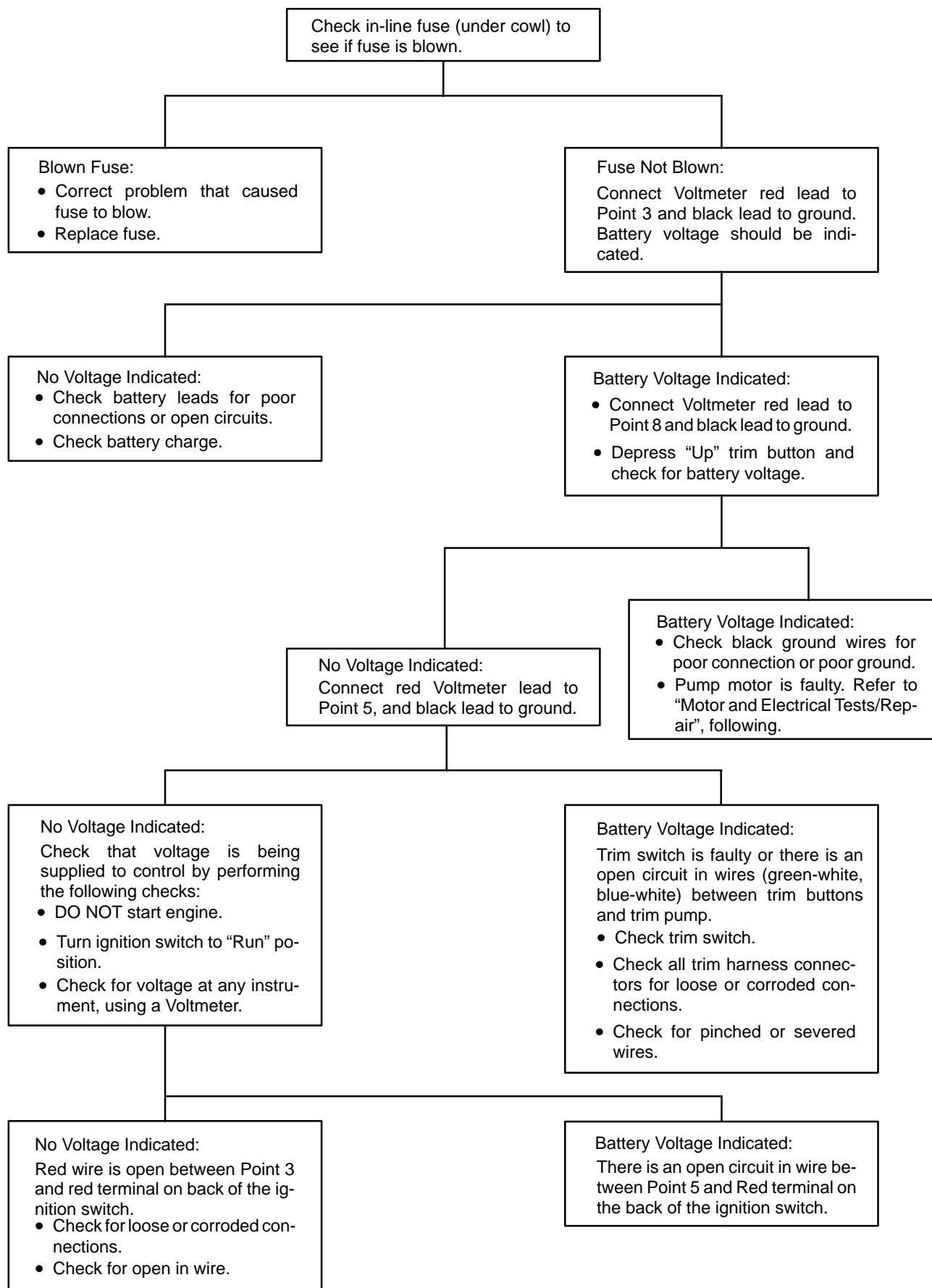


Troubleshooting the “Up” Circuit* (When “Down” Circuit Is OK)





Troubleshooting the “Down” and “Up” Circuits (All Circuits Inoperative)*

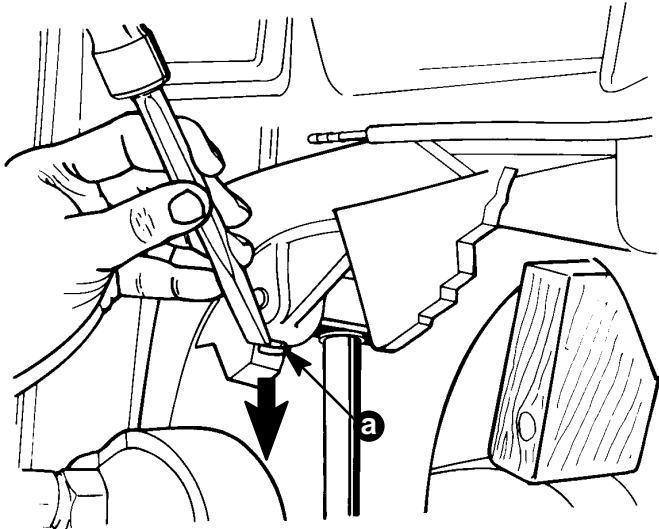




Power Trim System Removal

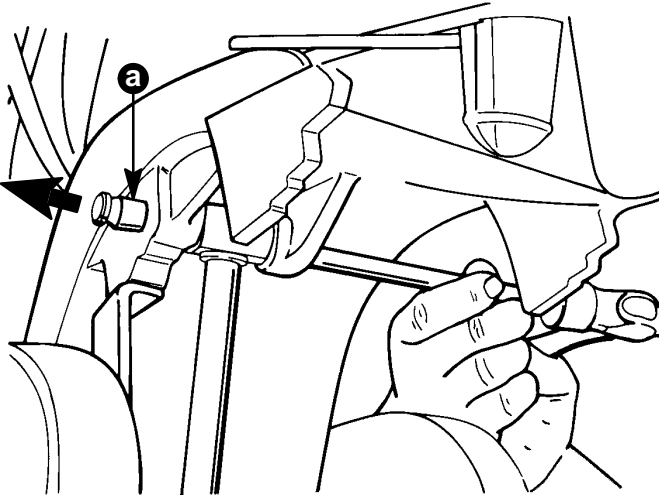
Support outboard with tilt lock lever when servicing power trim system.

1. Disconnect power trim harness form outboard wiring harness.
2. Remove screw and clip securing wiring harness to clamp bracket.
3. Use suitable tool to remove (DRIVE DOWN) upper dowel pin. Retain pin.



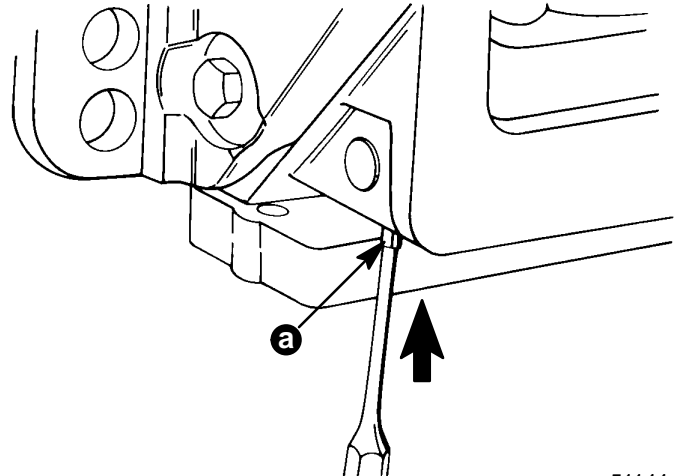
a - Dowel Pin

4. Use suitable punch to drive out upper pivot pin.



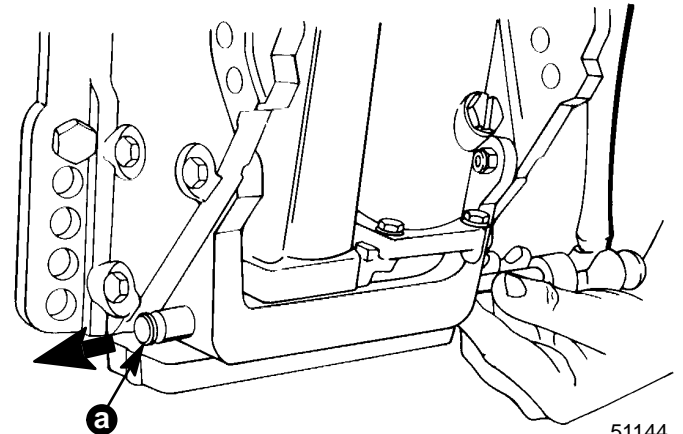
a - Pivot Pin

5. Use suitable punch to remove (DRIVE UP) lower dowel pin. Retain dowel pin.



a - Dowel Pin

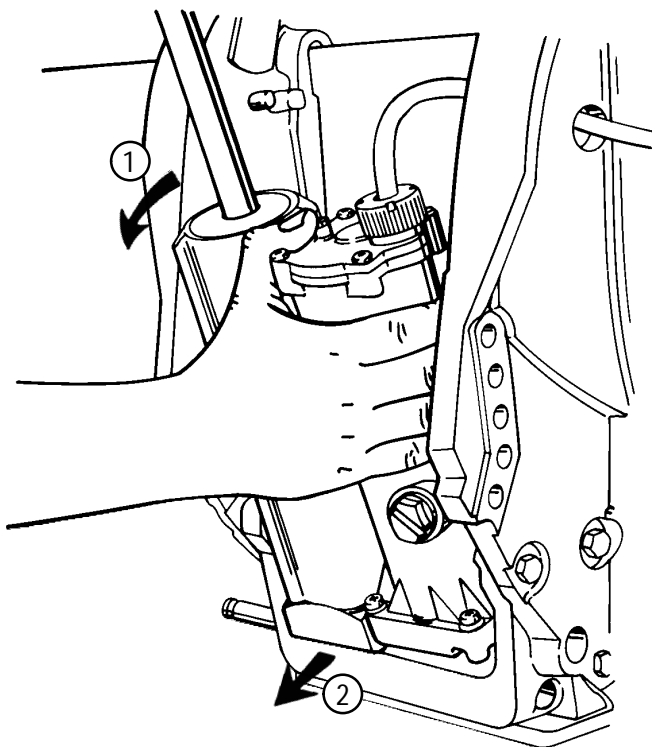
6. Use suitable punch to drive out lower pivot pin.



a - Pivot Pin

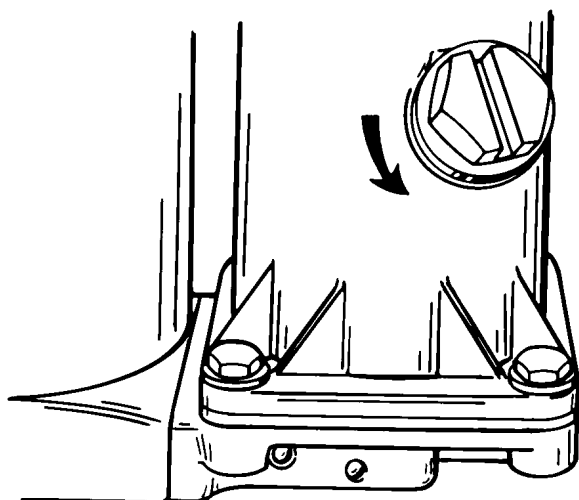


7. Tilt power trim assembly (top first) out from clamp bracket and remove assembly.



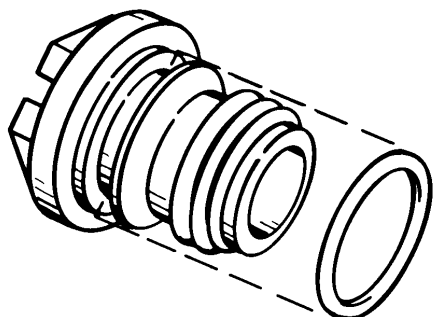
51195

8. Remove fill cap and drain unit.



51193

9. Remove O-ring from fill cap.



51194

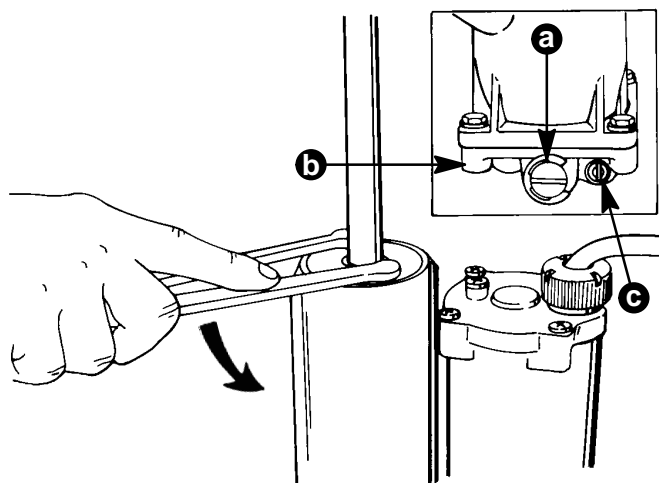
Power Trim System Disassembly

Trim Rod Removal

⚠ CAUTION

DO NOT ADJUST OR REMOVE REVERSE THRUST VALVE. THIS VALVE IS PRESET AT FACTORY FOR PRECISE REVERSE THRUST PRESSURE AND DOES NOT REQUIRE ADJUSTMENT.

1. Secure power trim assembly in soft jawed vise.
2. Open manual release valve three or four turns (counterclockwise) and position trim rod to full up position.
3. Remove cylinder end cap assembly from cylinder using trim cylinder spanner wrench (1/4 in. x 5/16 in. long pegs).

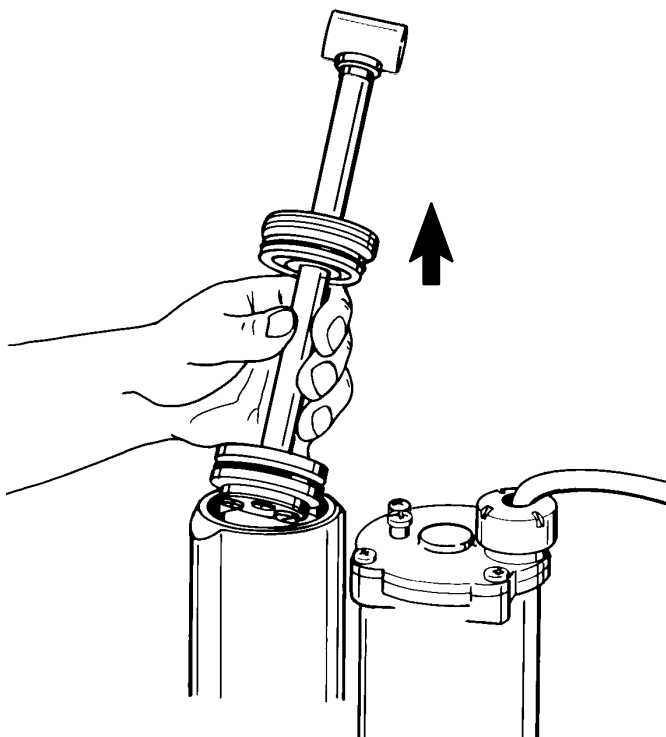


51194

- a - Manual Release Valve
b - Manifold
c - Reverse Thrust Valve (Do Not Remove, or Adjust)

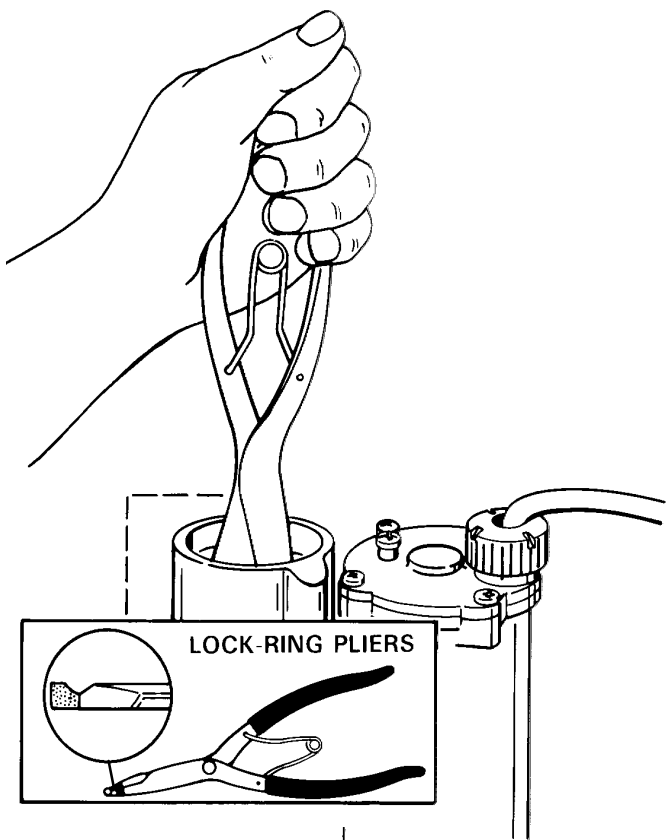


4. Remove trim rod assembly from cylinder.



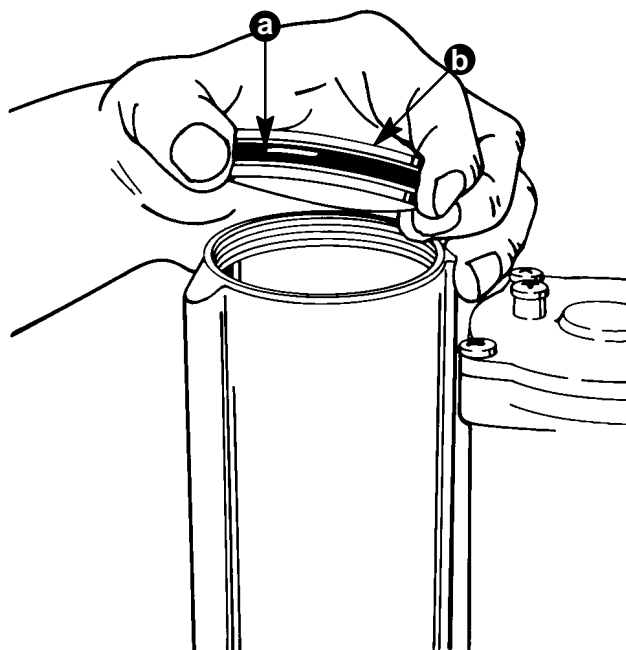
51196

5. Remove memory piston from cylinder using locking pliers (Craftsman P/N 4735) or suitable tool.



51193

6. Remove O-ring from memory piston.



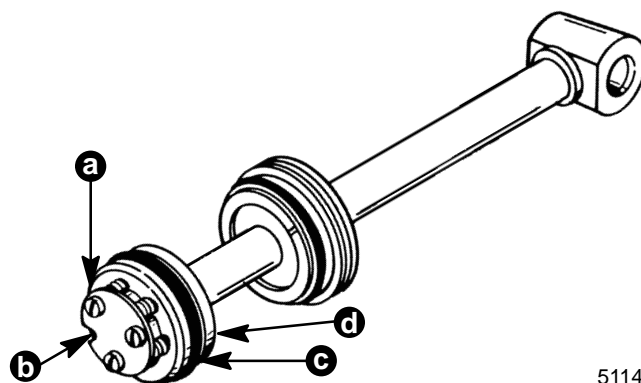
51196

a - O-ring
b - Memory Piston

7. Remove trim system from vise and empty fluid into appropriate container.

Trim Rod Disassembly

1. Place trim rod assembly on clean work surface.
2. Remove screws securing plate to trim rod piston and O-ring.
3. Remove check valve components from trim rod piston.



51143

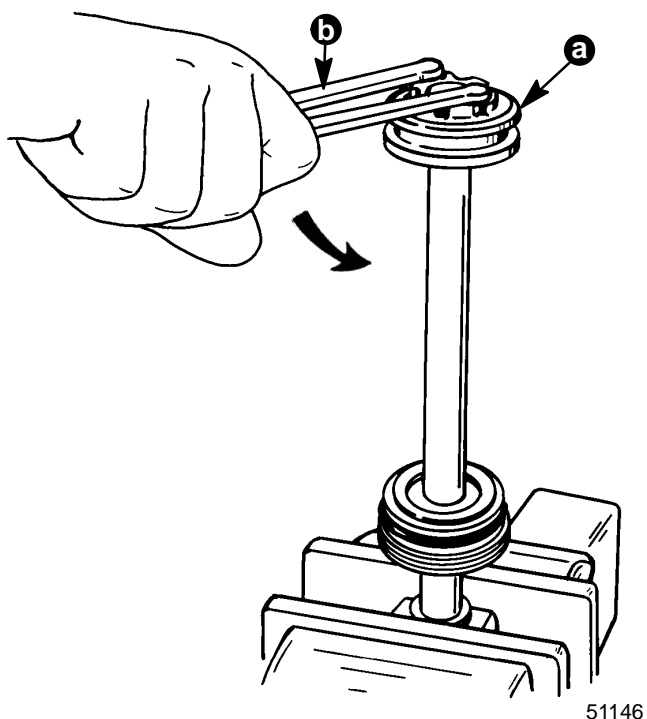
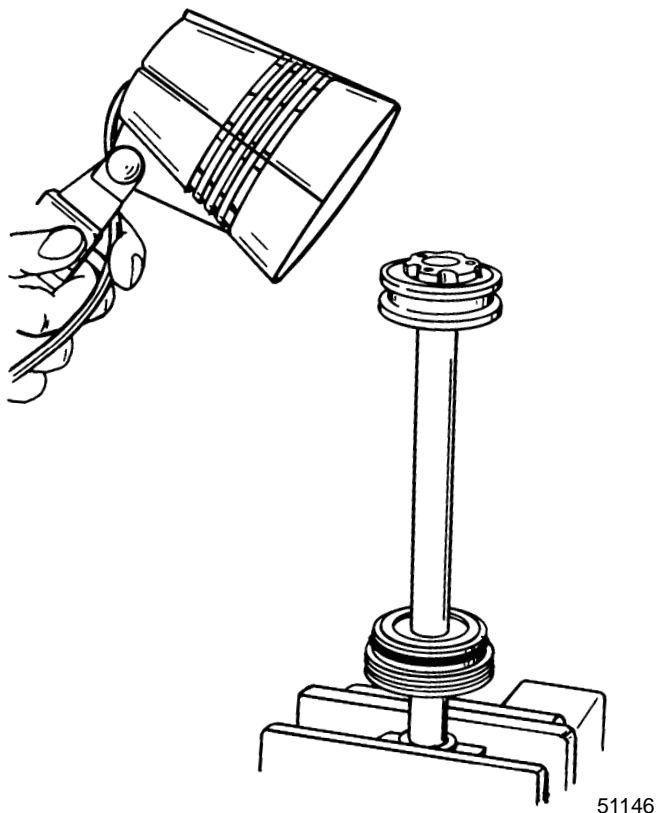
a - Screw (3)
b - Plate
c - O-ring
d - Piston

⚠ CAUTION

When removing Trim Rod piston, spanner wrench must have 1/4 in. x 5/16 in. long pegs to avoid damage to trim piston.



4. Place trim rod into soft jawed vise and apply heat to loosen piston using torch lamp (P/N 91-63209).
5. Loosen trim rod piston using trim spanner spanner wrench (1/4 in. x 5/16 in. long pegs).
6. Allow trim rod piston to cool, remove from trim rod.

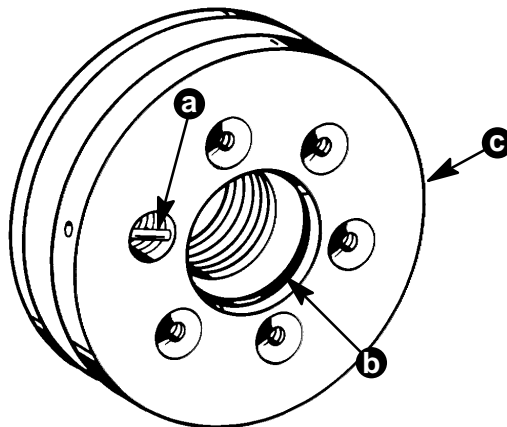


a - Trim Rod Piston
b - Spanner Wrench

⚠ CAUTION

Do not remove check ball components from trim rod piston. Removal and re-installation of check valve could result in improper operating pressure and possible power trim system damage. If check valve is defective, replace trim rod piston.

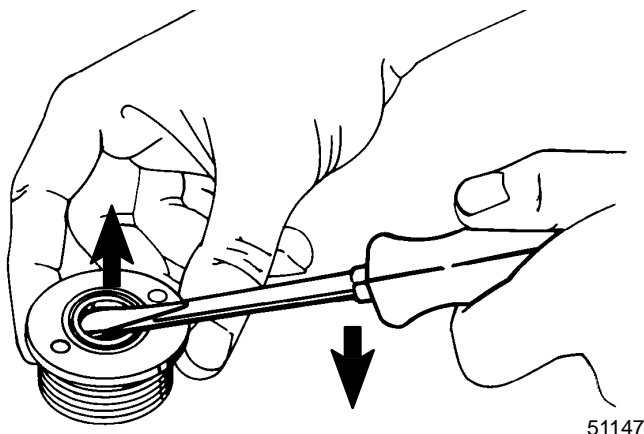
7. Remove inner O-ring from piston.



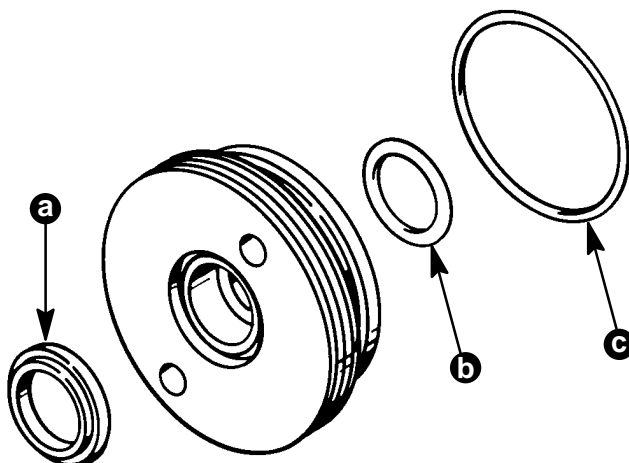
51199

a - Check Ball Components
b - O-ring
c - Piston

8. Remove rod wiper, inner O-ring and outer O-ring.



51147



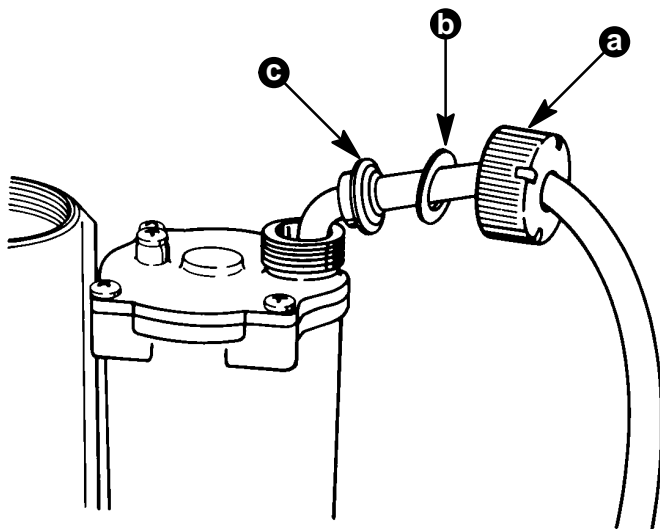
51145

a - Rod Wiper
b - Inner O-ring
c - Outer O-ring



Trim “Motor” Removal

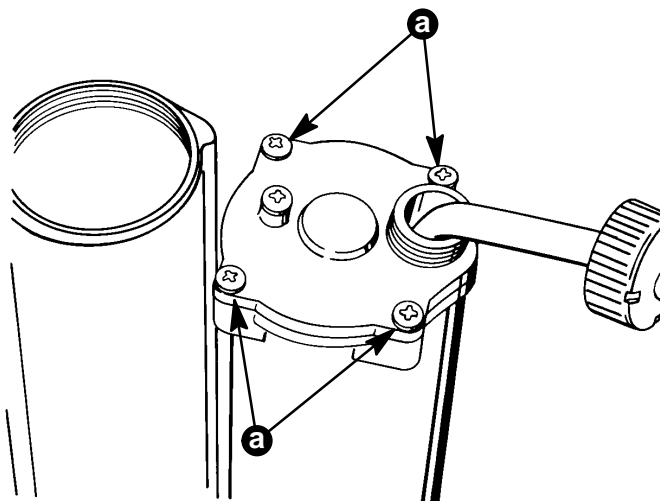
1. Secure power trim assembly in soft jawed vise.
2. Remove cap, washer and grommet from reservoir assembly.



51195

- a - Cap
b - Washer
c - Grommet

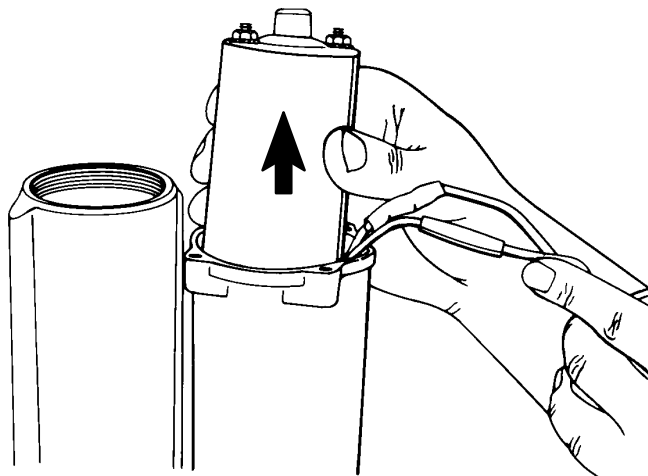
3. Remove screws securing reservoir cap to reservoir.



51193

- a - Screws (4)

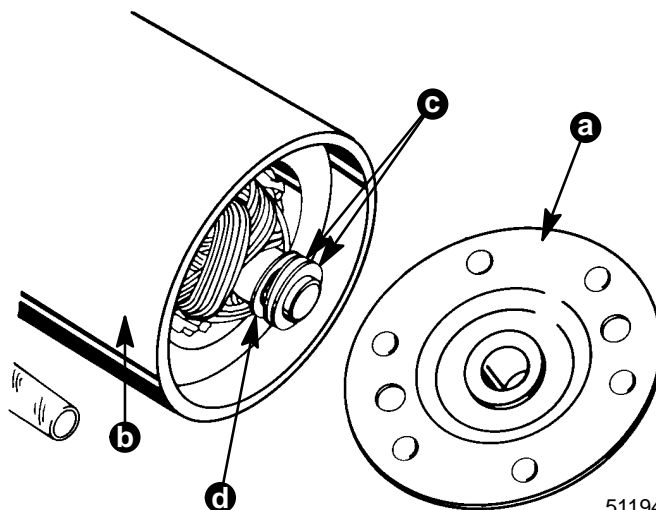
4. Remove motor harness from reservoir.



51196

Trim Motor Disassembly

1. Remove end cap from motor housing. Note position of washers on armature.

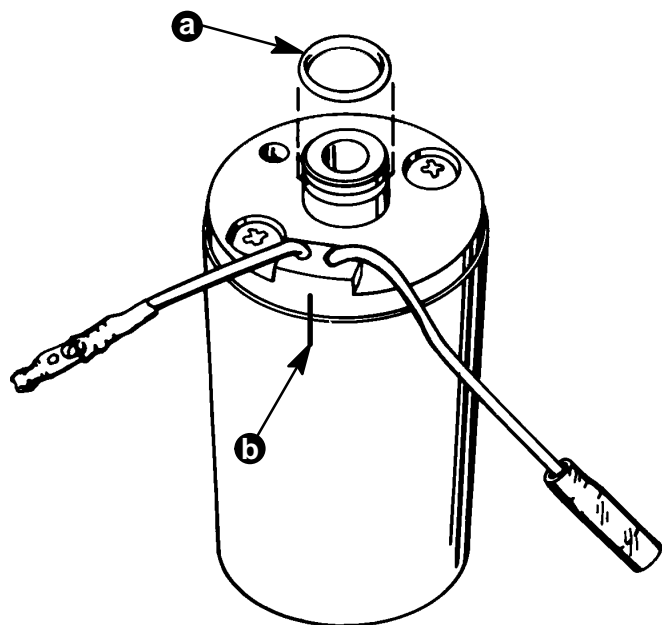


51194

- a - End Cap
b - Motor Housing
c - Wave Washer (2)
d - Washer



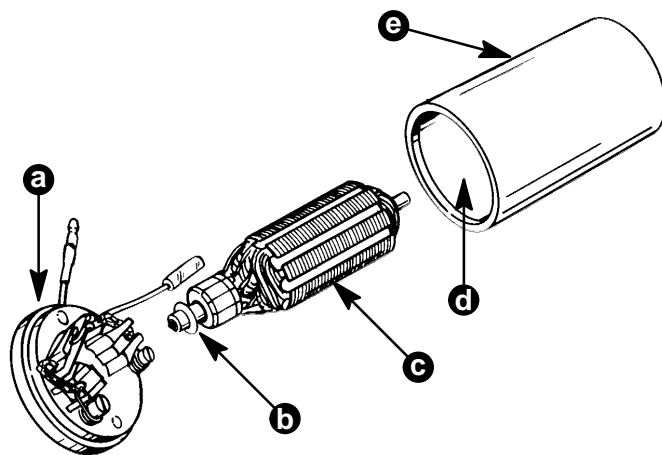
2. Remove O-ring from end frame.
3. Place scribe mark on motor housing and end frame as re-assembly reference, as shown.



51194

- a - O-ring
b - Scribe Mark

4. Remove end frame and armature from housing.



51194

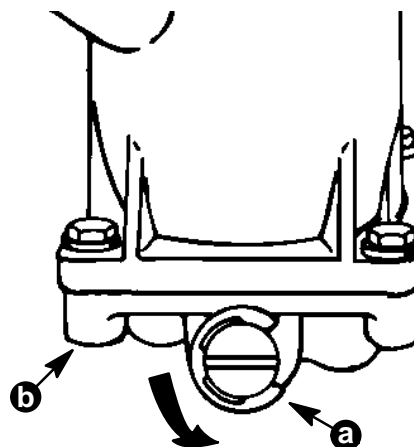
- a - End Frame
b - Washer
c - Armature
d - Fiber Guard (Liner)
e - Housing

Reservoir Assembly Removal

⚠ CAUTION

DO NOT ADJUST OR REMOVE REVERSE THRUST VALVE. THIS VALVE IS PRESET AT FACTORY FOR PRECISE REVERSE THRUST PRESSURE AND DOES NOT REQUIRE ADJUSTMENT.

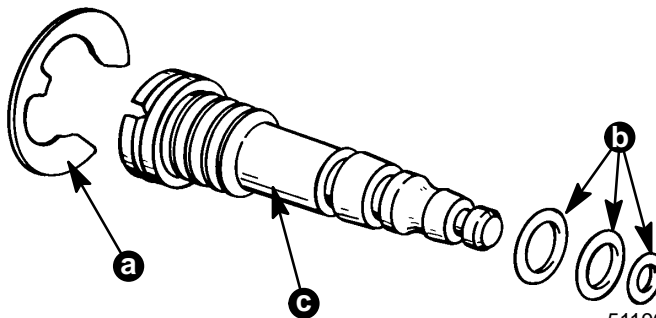
1. Remove manual release valve from manifold.
DO NOT remove or adjust reverse thrust valve.



51194

- a - Manual Release Valve
b - Manifold

2. Remove "E" clip and O-rings from manual release valve.

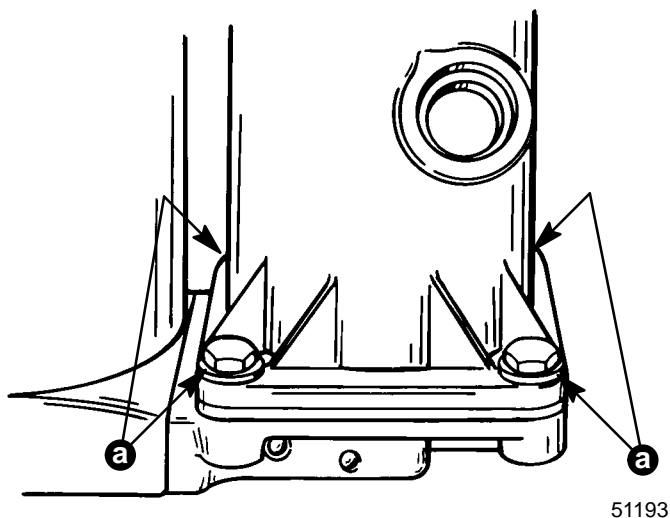


51196

- a - "E" Clip
b - O-rings
c - Manual Release Valve

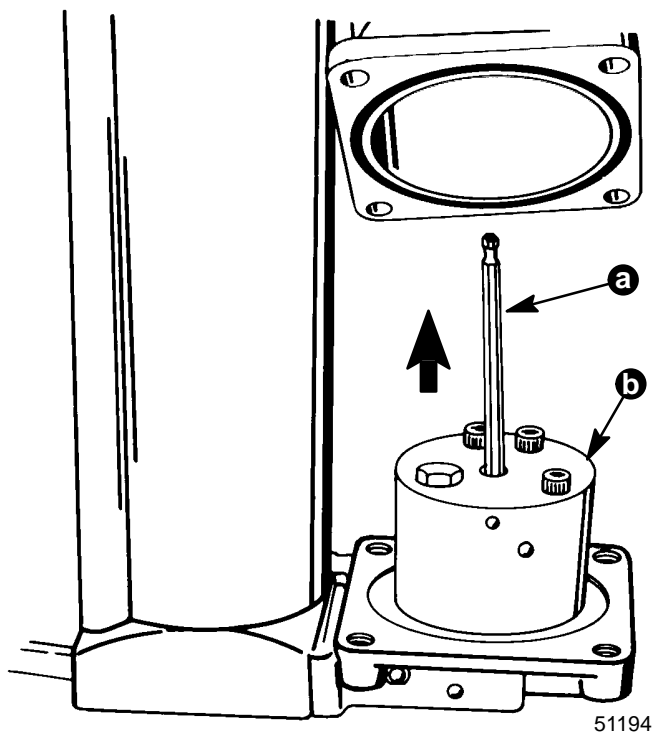


3. Remove four screws securing reservoir to manifold.



a - Screws (4)

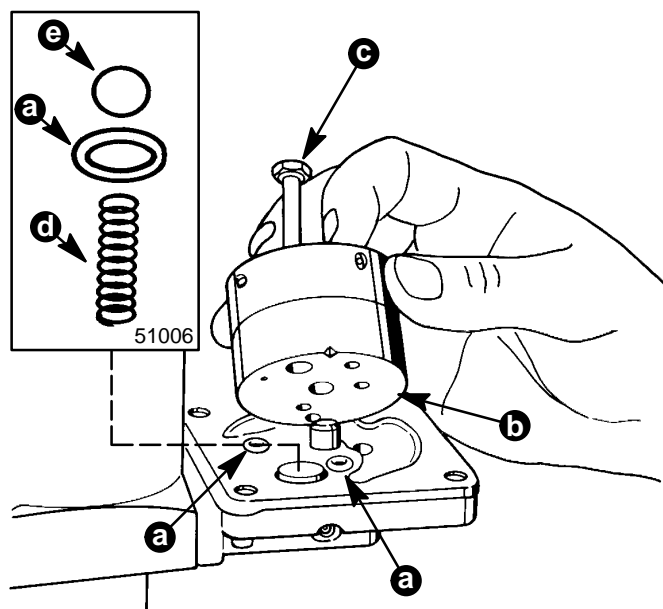
4. Remove reservoir from manifold.
5. Remove drive shaft from oil pump.



a - Drive Shaft
b - Oil Pump

Oil Pump/Manifold Removal

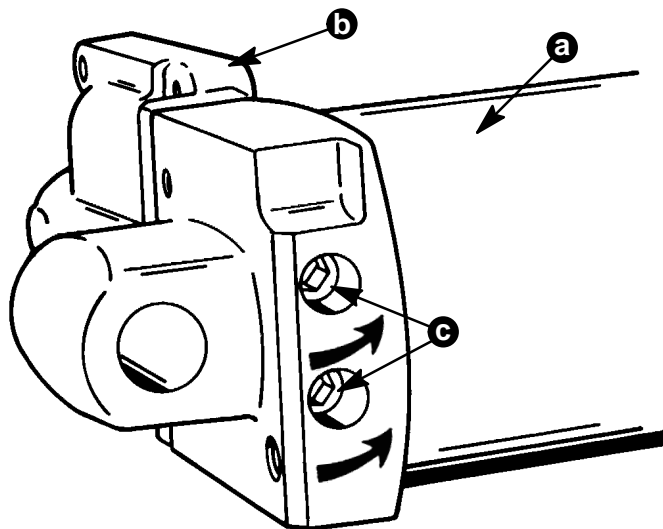
1. Remove screw, oil pump, O-rings and check valve components from manifold.



a - O-rings (3)
b - Oil Pump
c - Screw
d - Spring
e - Check Ball

51007

2. Remove screws and manifold from cylinder.



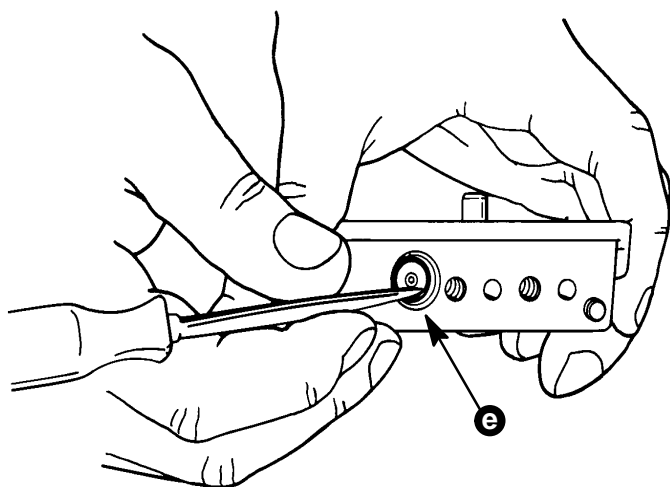
a - Trim Cylinder
b - Manifold
c - Screw

51007

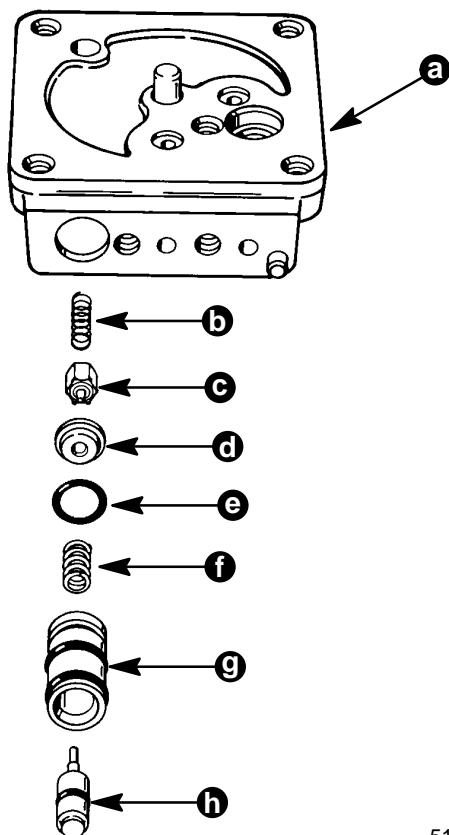


IMPORTANT: Removal of O-ring (e) from manifold will result in damage to O-ring. O-ring MUST be replaced after removal.

3. Remove check valve components from manifold.



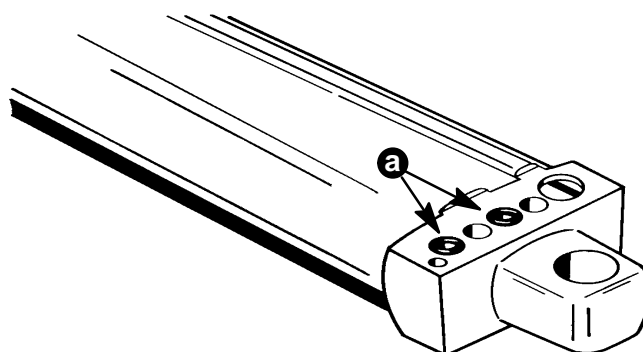
51736



51008

- a - Manifold
- b - Spring
- c - Check Valve
- d - Check Valve Seat
- e - O-ring
- f - Spring
- g - Sleeve
- h - Spool

4. Remove O-rings from cylinder.



51008

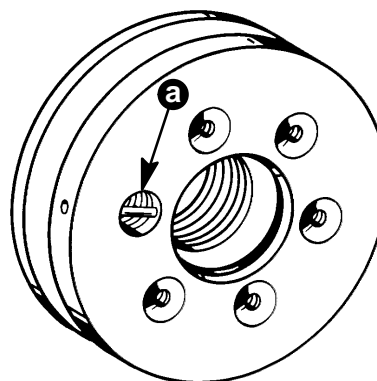
a - O-rings

Cleaning and Inspection of Trim Rod Components

IMPORTANT: Components must be dirt and lint free. Slightest amount of debris in Power Trim system could cause system to malfunction.

CAUTION

Do not remove check valve components (a) from trim rod piston. Removal and re-installation of check valve could result in improper operating pressure and possible power trim system damage.



51199

Inspect check valve for debris; clean debris from check valve if found. If debris cannot be cleaned from check valve, replace trim rod piston as an assembly.

Clean trim rod and components with parts cleaner and dry with compressed air.

It is recommended that all O-rings in trim system be replaced.

Inspect trim rod. If scraper (located in cap) has failed to keep rod clean, replace scraper.

Lubricate all O-rings using Quicksilver Power Trim and Steering Fluid or; (ATF) Type F, FA or Dexron II.



Motor and Electrical Tests/ Repair

Trim Pump Motor Test

⚠ WARNING

Do not perform this test near flammables (or explosives), as a spark may occur when making connections.

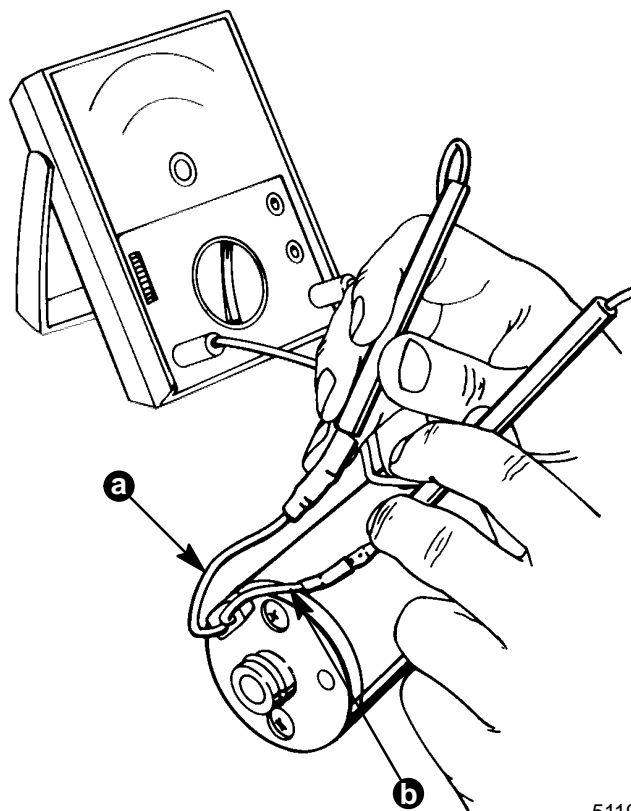
1. Disconnect orange (motor) wire and black (motor) wire from relay switch wiring harness.
2. Connect a 12 volt power supply to motor wires (positive to orange; negative to black results in motor up direction. Positive to black; negative to orange results in motor down direction). Motor should run.
3. If motor does not run, disassemble motor and check components.

Thermal Overload Switch Test

IMPORTANT: If thermal overload switch has been activated, pump motor cannot be tested for a minimum of one minute. After this period switch should close (reset itself) and pump motor may be operated. Perform the following check(s) only if switch does not reset itself.

MOTOR ASSEMBLED

Connect Ohmmeter (R x 1 scale) leads as shown. If switch is good, full continuity (zero ohms) will be indicated. If full continuity is not indicated, disassemble motor and recheck switch per instructions, following.

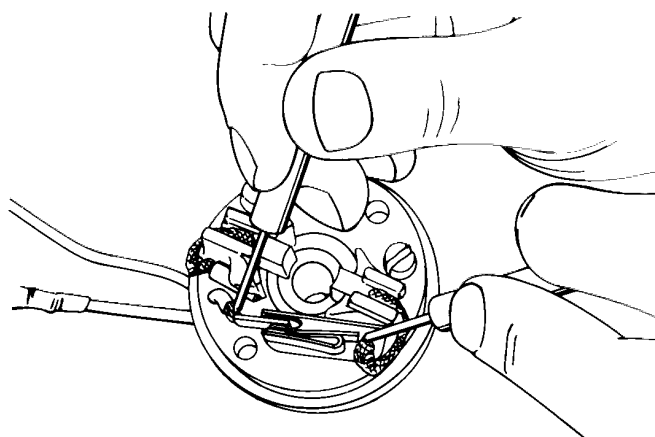


a - Motor Wire (Black)
b - Motor Wire (Orange)

51196

MOTOR DISASSEMBLED

Connect Ohmmeter (R x 1 scale) leads as shown. If switch is good, full continuity (zero ohms) will be indicated.



51193

If full continuity is not indicated, clean switch contact surfaces, using an ignition point file.

Recheck switch; if full continuity is not indicated, replace end frame.



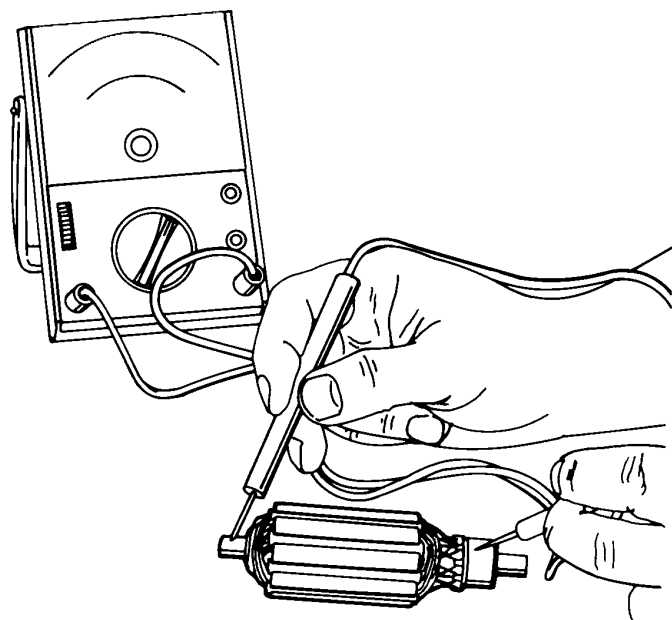
Armature Tests

TEST FOR SHORTS

Check armature on a Growler (follow Growler manufacturer's test instructions). Indication of a short requires replacement of armature.

TEST FOR GROUND

Use an Ohmmeter (R x 1 scale). Place one lead on Ohmmeter on armature shaft and other lead on commutator, as shown. If continuity is indicated, armature is grounded and must be replaced.

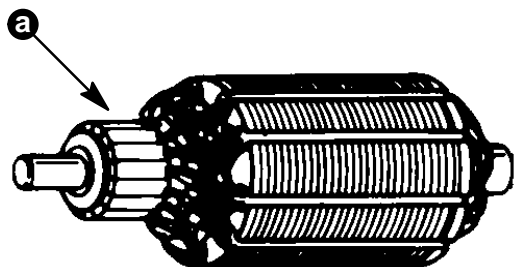


51195

CHECKING AND CLEANING COMMUTATOR

If commutator (a) is worn it can be turned down on an armature conditioner tool or on a lathe.

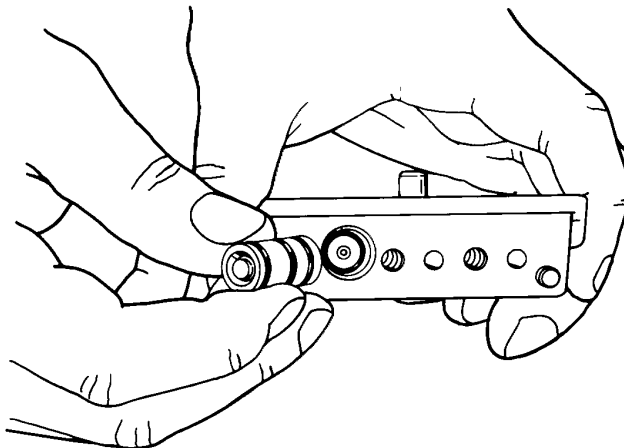
Clean commutator with "00" sandpaper.



Power Trim System Reassembly

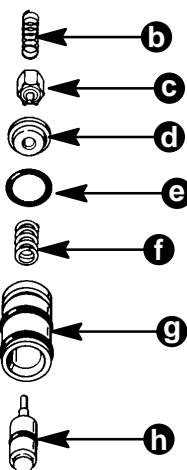
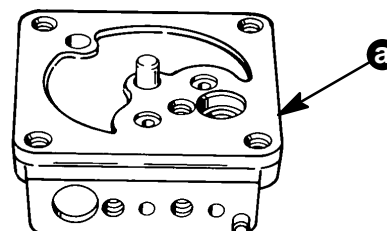
Manifold/Oil Pump Installation

IMPORTANT: Install spring, check valve and O-ring into manifold. Position components in place using sleeve to seat in place.



50999

1. Install check valve components into manifold.

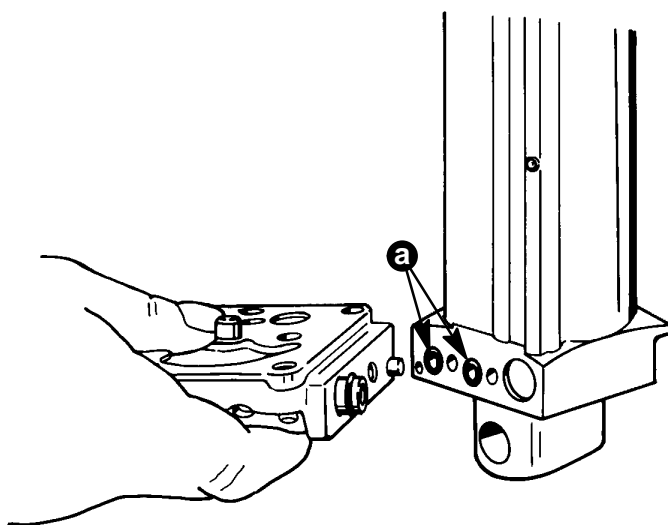


51008

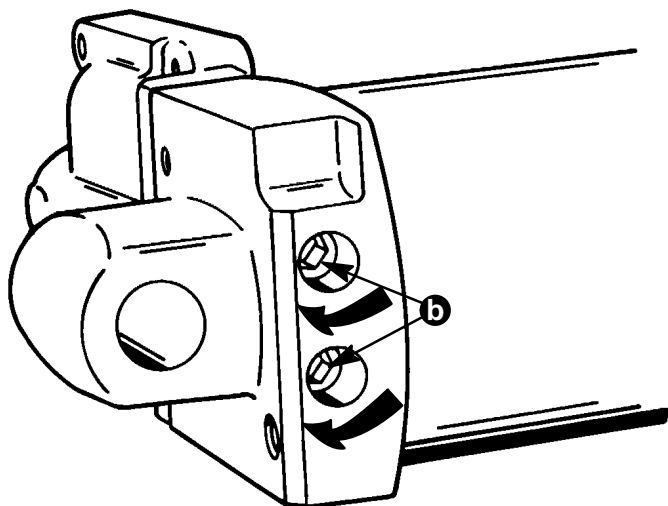
- a - Manifold
- b - Spring
- c - Check Valve
- d - Check Valve Seat
- e - O-ring
- f - Spring
- g - Sleeve
- h - Spool



2. Install O-rings on cylinder and secure manifold assembly to cylinder using screws. Torque screws to 100 lb. in. (11.3 N·m).



51008

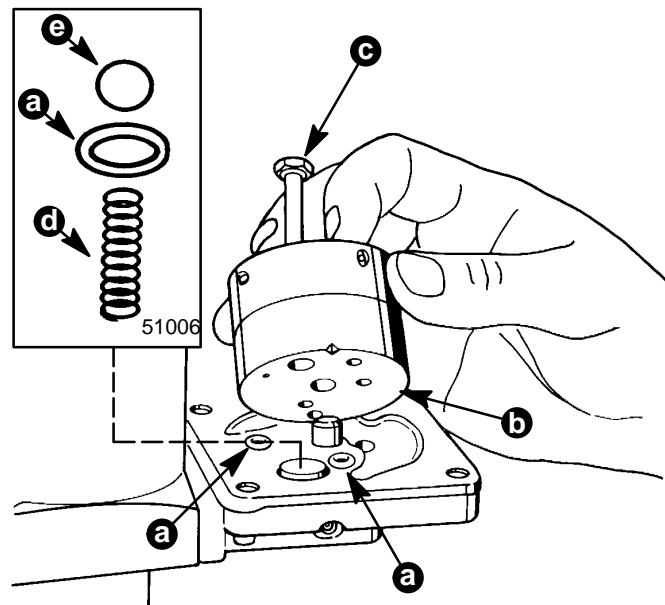


51007

- a - O-ring
- b - Screws [100 lb. in. (11.3 N·m)]

3. Secure power trim unit in soft jawed vise.

4. Install check valve components and O-rings to manifold. Secure oil pump to manifold using bolt. Torque bolt to 90 lb. in. (10.2 N·m).

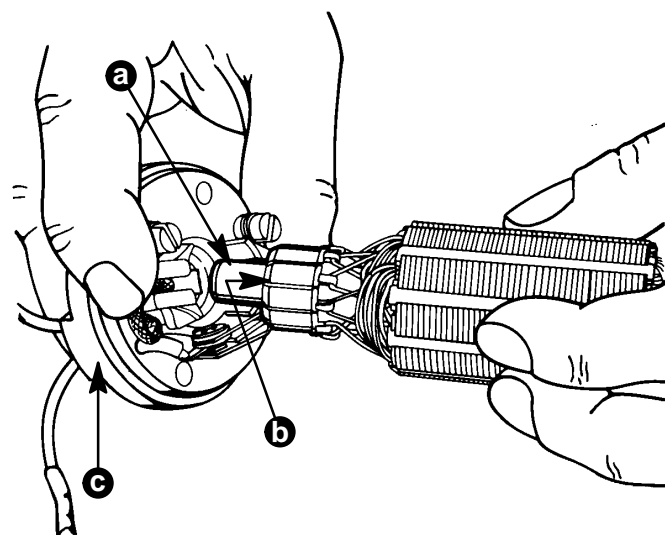


51007

- a - O-rings (3)
- b - Oil Pump
- c - Screw
- d - Spring
- e - Check Ball

Trim Motor Reassembly

1. Apply Quicksilver Marine Lubricant (2-4-C) to armature shaft and insert into end frame.

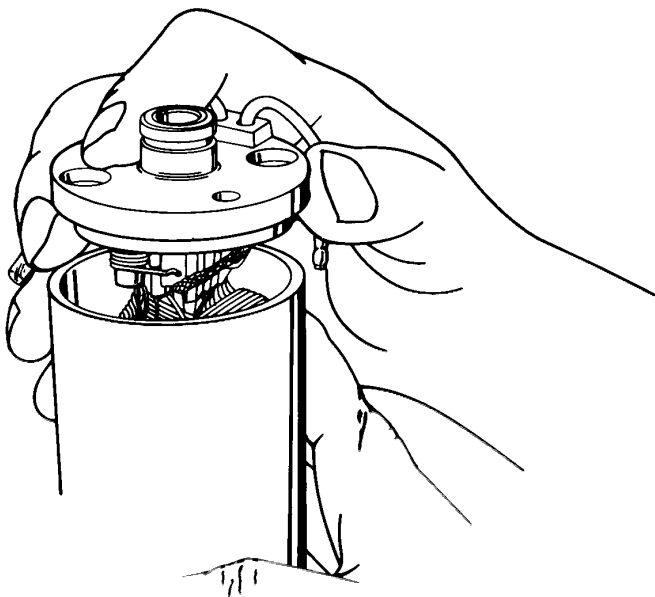


51195

- a - Armature Shaft
- b - Washer
- c - End Frame

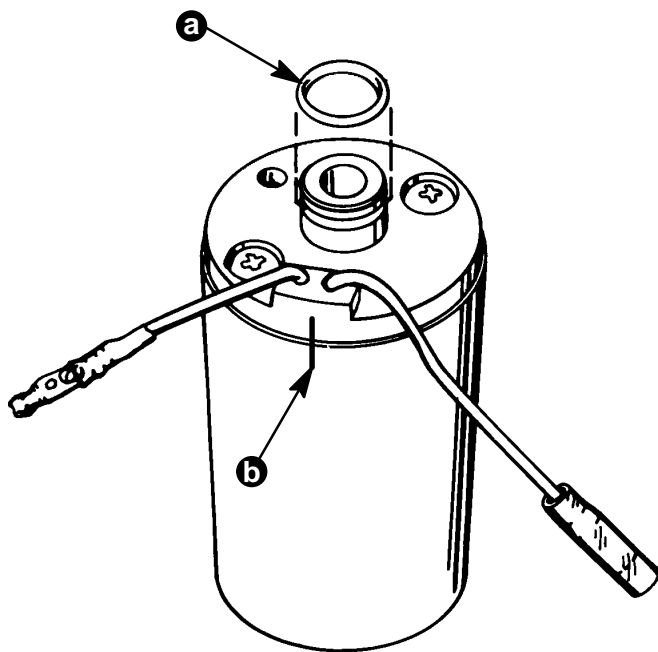


2. Guide armature and end frame into housing as shown.



51196

3. Align scribe mark on housing to mark on end frame.
4. Install lubricated O-ring to end frame.

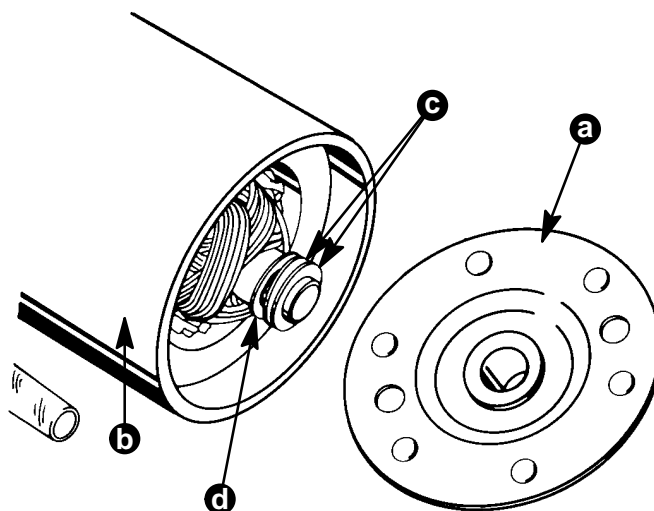


51194

- a - O-ring
b - Scribe Mark

5. Install washers to armature shaft as shown.

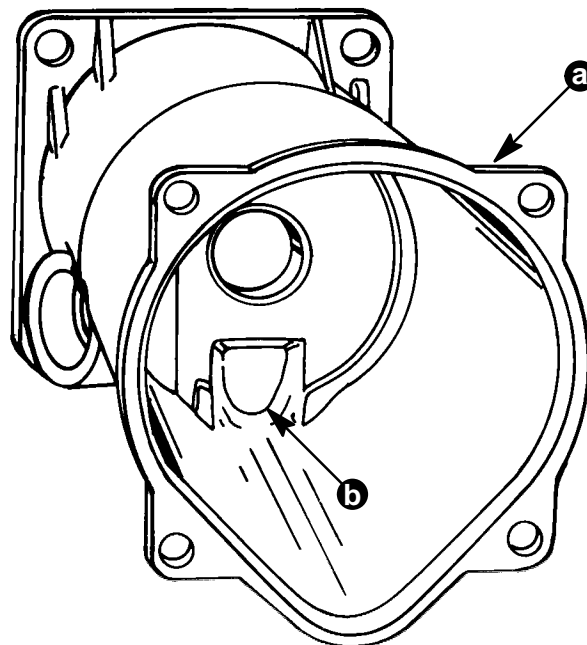
6. Install end cap to housing. Torque nuts to 25 lb. in. (2.8 N·m).



51194

- a - End Cap
b - Motor Housing
c - Wave Washer
d - Washer

IMPORTANT: When installing motor, wires (black, orange) must rest in cavity of cylinder allowing motor to seat properly.



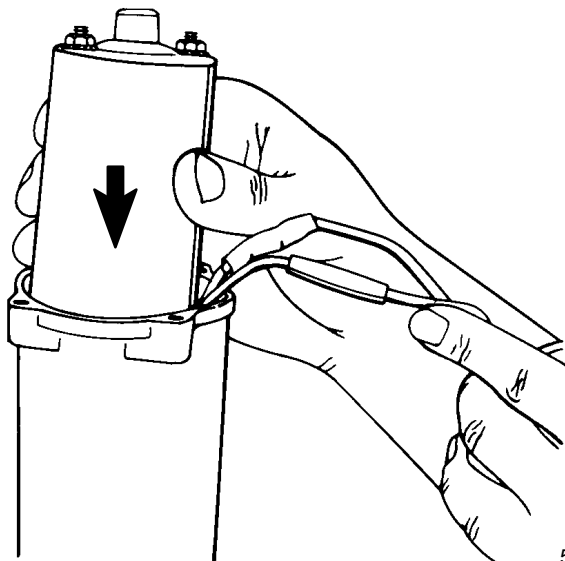
51194

- a - Manifold
b - Cavity



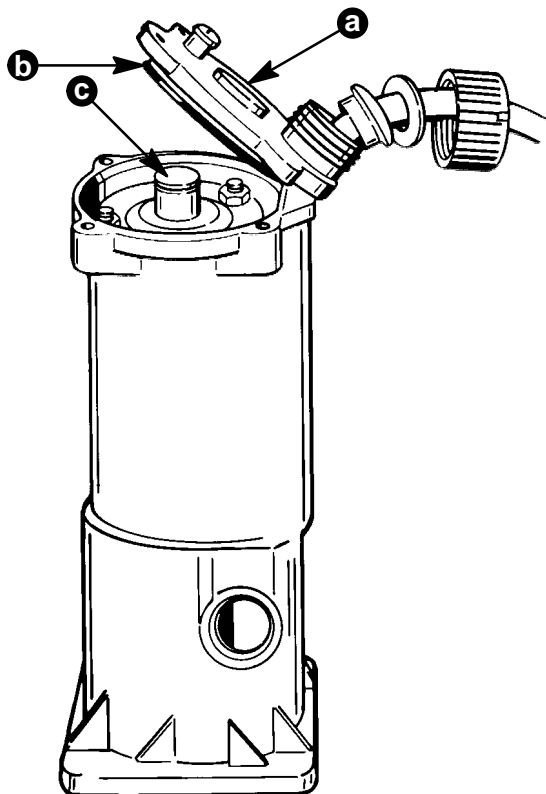
Reservoir Installation

1. Connect trim motor wires to harness.
2. Insert motor into reservoir. Motor must be seated properly prior to end cap installation.



51196

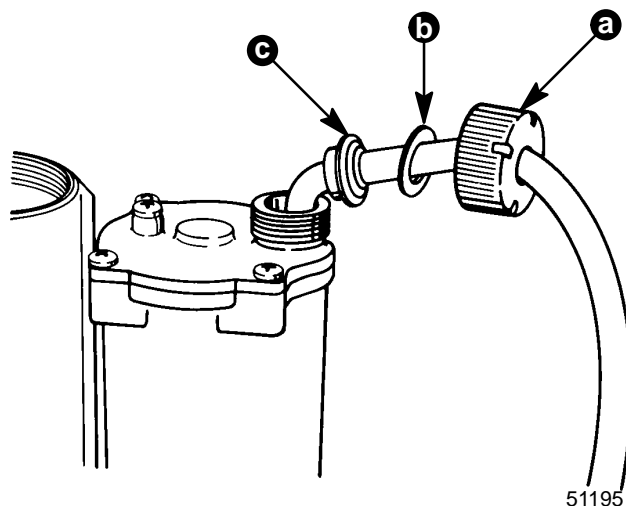
3. Install end cap, O-ring and foam pad to cylinder.
4. Torque screws to 13 lb. in. (1.5 N·m).



51195

- a - End Cap
- b - O-ring
- c - Foam Pad

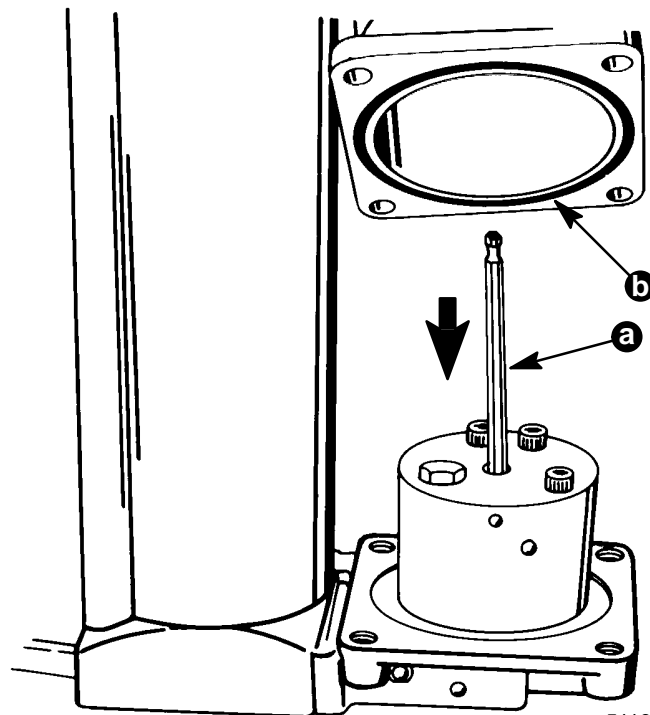
5. Install grommet, washer and screw cap to cylinder end cap. Tighten screw securely.



51195

- a - Screw Cap
- b - Washer
- c - Grommet

6. Place drive shaft into oil pump.
7. Install lubricated O-ring to base of reservoir.
8. Carefully guide (cylinder/motor) down onto drive shaft.

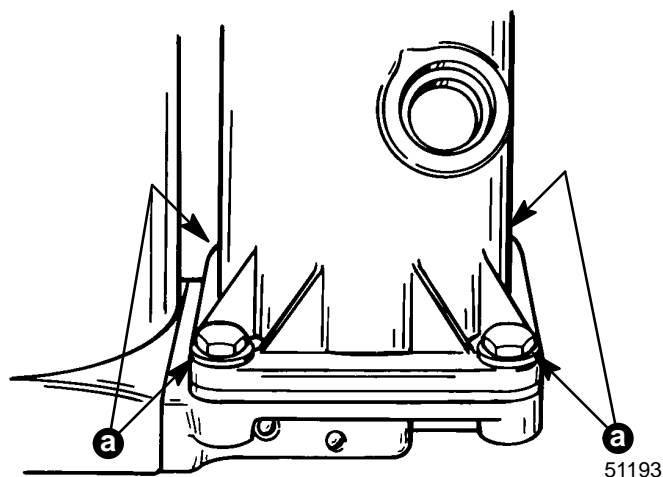


51194

- a - Drive Shaft
- b - O-ring

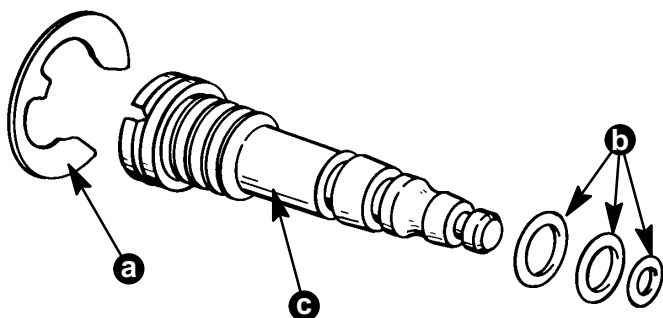


9. Secure reservoir to manifold using four screws. Torque screws to 70 lb. in. (7.7 N·m).



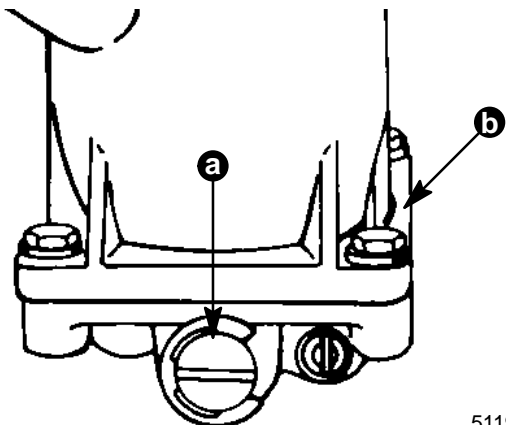
a - Screw

10. Install "E" clip, lubricated O-rings and to manual release valve.



a - "E" Clip
b - O-ring
c - Manual Release Valve

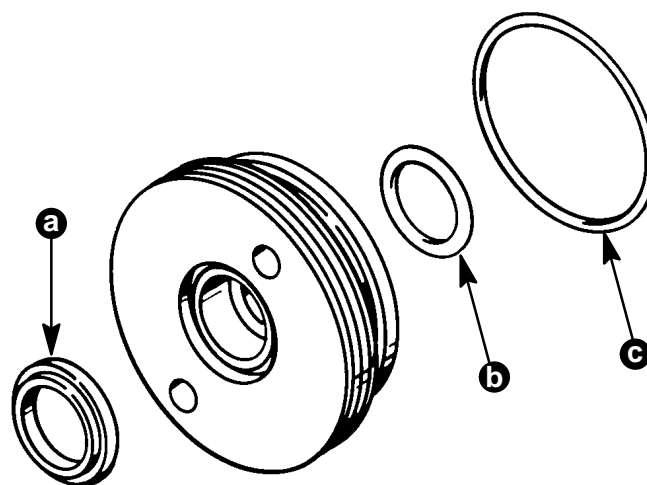
11. Insert manual release valve into manifold and tighten snugly. Back release valve out 3 or 4 turns allowing trim rod installation.



a - Manual Release Valve
b - Manifold

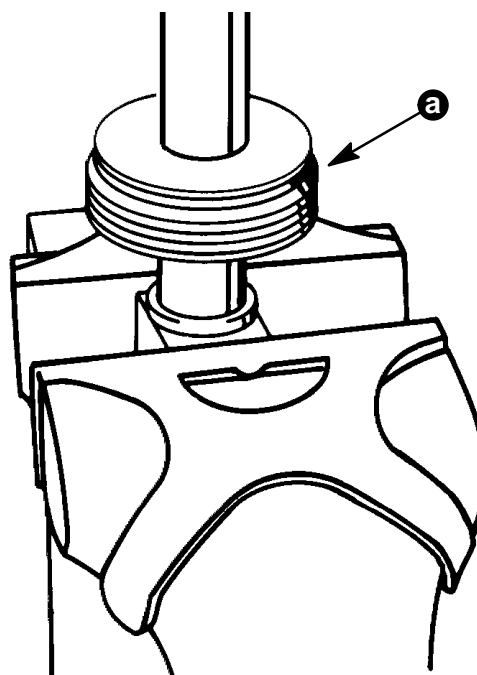
Trim Rod Reassembly

1. Install lubricated O-rings and rod wiper to end cap.



a - Rod Wiper
b - Inner O-ring
c - Outer O-ring

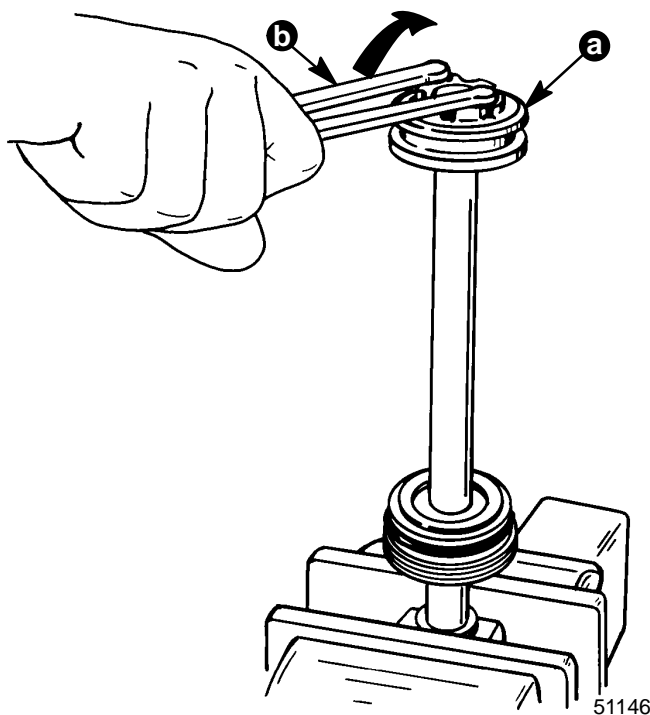
2. Secure trim rod in soft jawed vise as shown.
3. Slide end cap onto trim rod.



a - End Cap

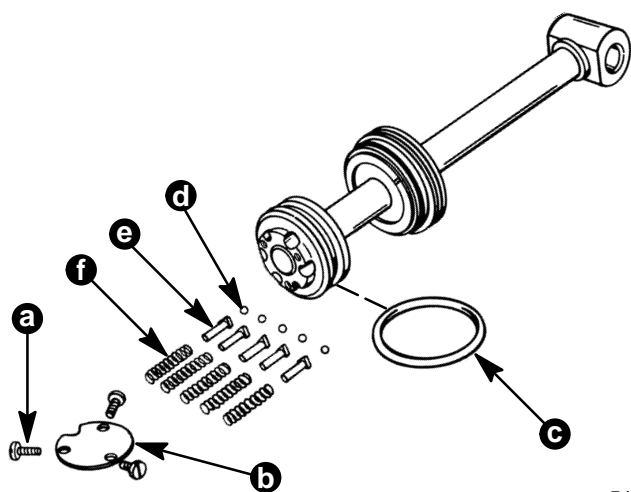


4. Apply Loctite Grade A (271) to threads of trim rod and install rod piston. Tighten piston securely using trim cylinder spanner wrench (1/4 in. x 5/16 in. long peg).



a - Trim Rod Piston
b - Spanner Wrench

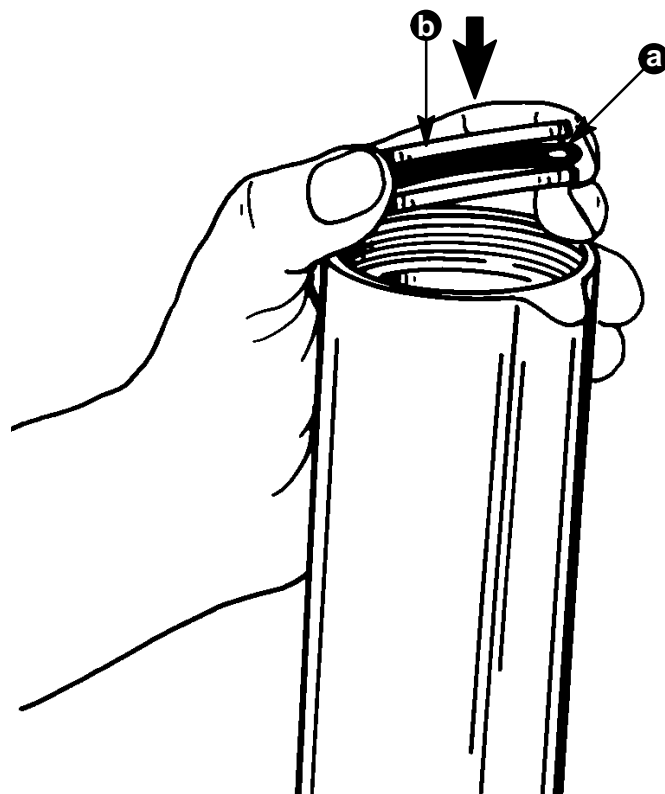
5. Install lubricated O-ring to trim rod piston.
6. Install check valve components into their respective seats.
7. Secure components in place using plate and screws. Torque screws to 35 lb. in. (4.0 N·m).



a - Screw (3)
b - Plate
c - O-ring
d - Ball (5)
e - Seat, Spring (5)
f - Spring (5)

Trim Rod Installation

1. Place trim cylinder in soft jawed vise.
2. Fill trim cylinder three inches (76.2mm) from top of cylinder using Quicksilver Power Trim and Steering Fluid or; (ATF) Type F, FA or Dexron II.
3. Install lubricated O-ring to memory piston and place into cylinder. Push piston down to level of oil.

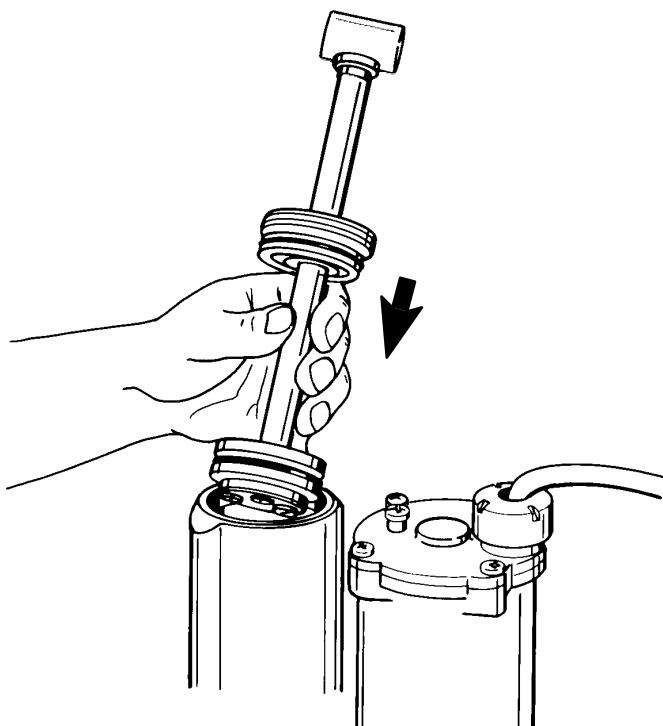


a - O-ring
b - Memory Piston

IMPORTANT: Memory piston must not come in contact with trim rod end cap during end cap/trim rod installation.



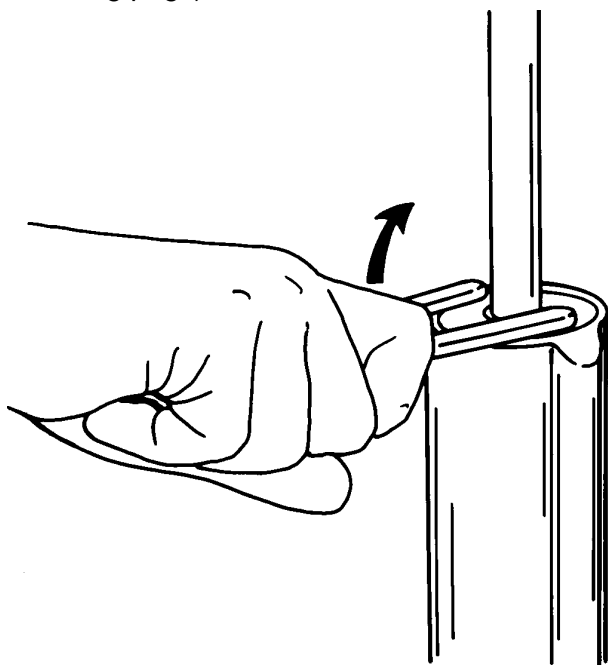
4. Install trim rod into cylinder.



51196

IMPORTANT: Memory piston must not come in contact with trim rod end cap during end cap/trim rod installation.

5. Tighten end cap assembly to cylinder securely using trim cylinder spanner wrench (1/4 in. x 5/16 in. long pegs).



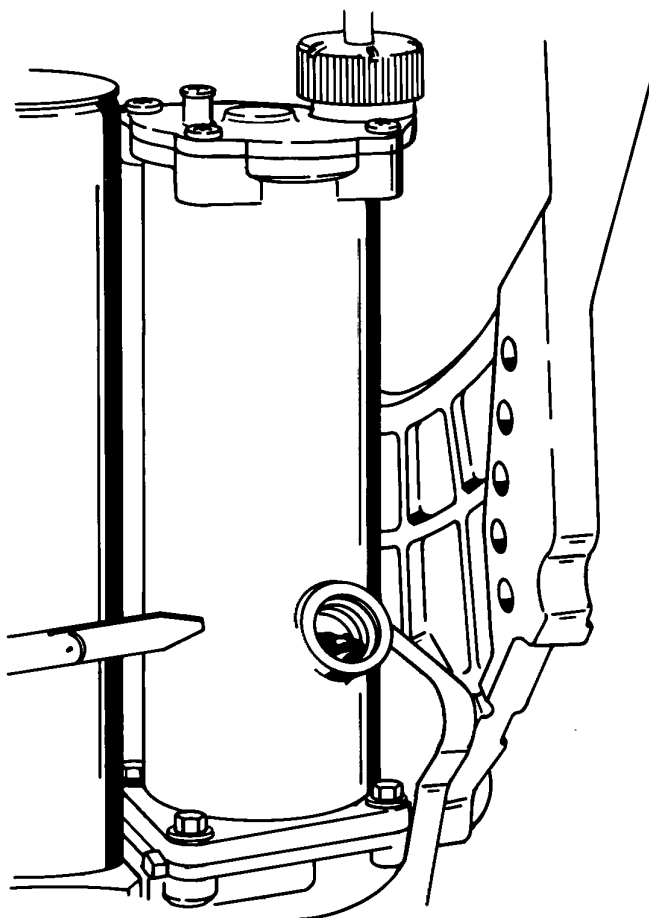
51145

6. Tighten manual release valve snugly following end cap installation.

Bleeding Power Trim Unit

IMPORTANT: Manual release valve must be in the closed position during power trim bleeding and operation.

1. Secure power trim unit in soft jawed vise.
2. Remove fill screw. Add Quicksilver Power Trim and Steering Fluid (92-90100A12) or Automatic Transmission Fluid (ATF) Type F, FA or Dexron II up to threads of reservoir. Install cap.



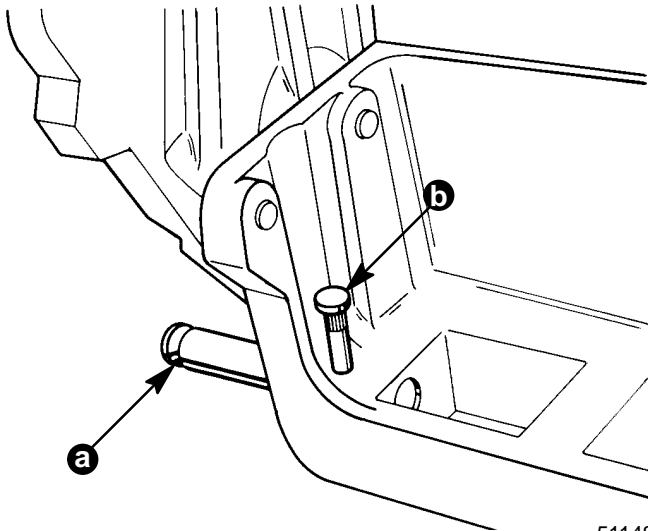
50241

3. Using a 12 volt power supply connect positive lead to green wire, negative lead to blue wire and drive trim rod to the down position. Connect positive lead to blue wire and negative lead to green wire and drive trim rod to the up position. Re-check fluid level, add fluid if required and repeat cycle until fluid level remains at lower portion of threads.



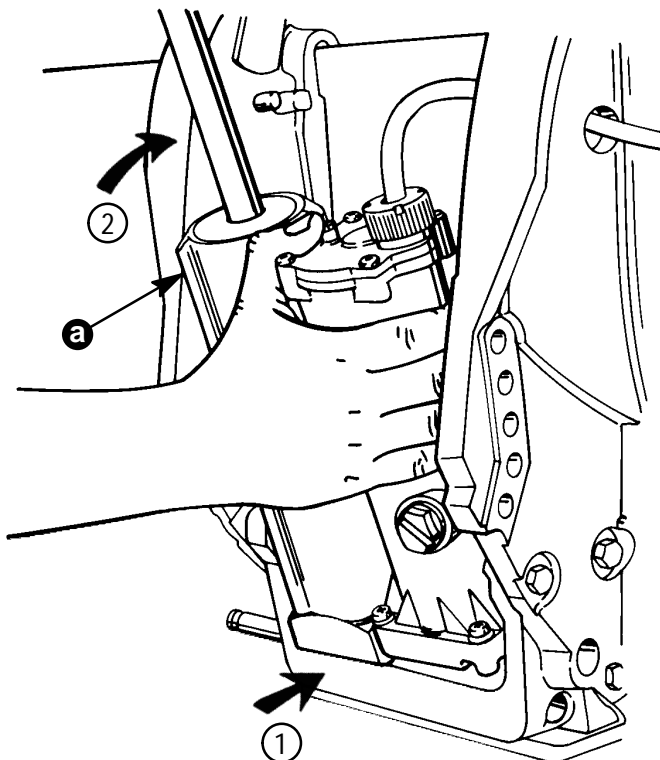
Power Trim Unit Installation

1. Apply Special Lubricant 101 (92-13872A1) to lower pivot pin hole and pivot pin surface.
2. Start lower pivot pin into pivot pin bore and position lower dowel pin (RETAINED) in its respective hole.



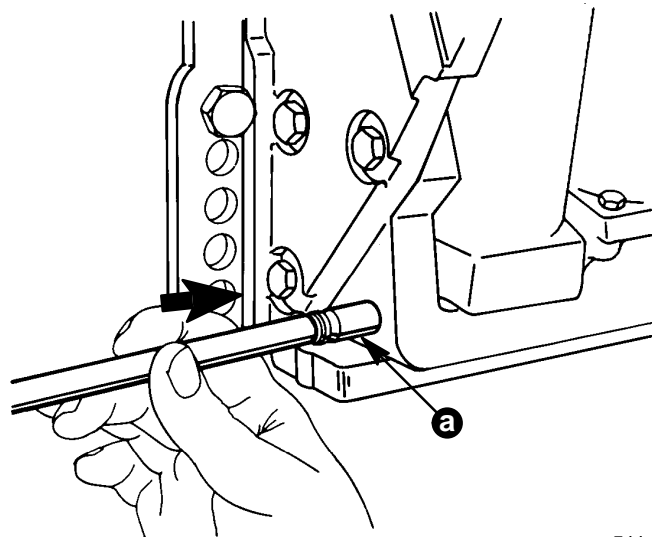
a - Lower Pivot Pin
b - Lower Dowel Pin

3. Position trim cylinder assembly (BOTTOM FIRST) between clamp brackets and route trim pump electrical harness through access hole in starboard clamp bracket.



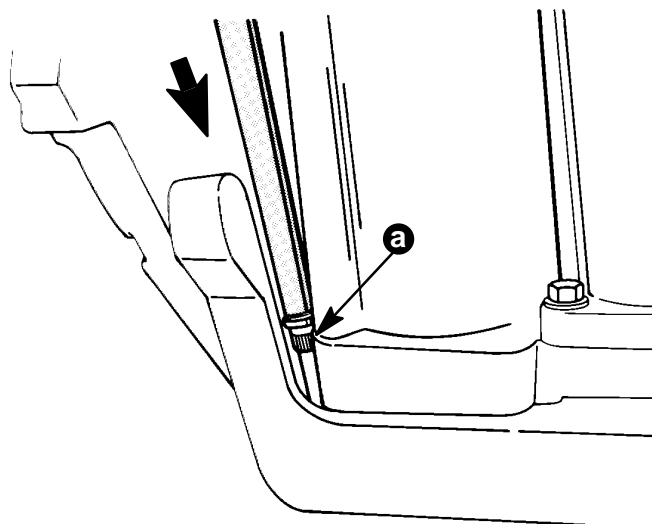
a - Trim Cylinder Assembly

4. Using a suitable punch, drive lower pivot pin into clamp bracket and trim cylinder assembly until pivot pin is flush with outside surface.



a - Lower Pivot Pin

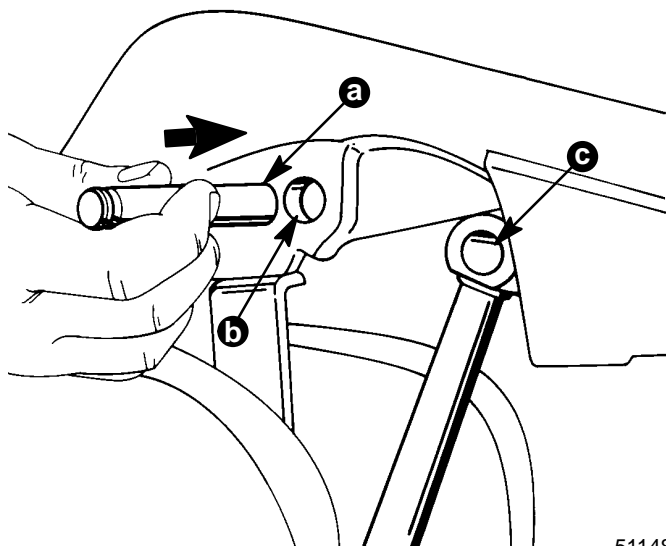
5. Using a suitable punch, drive lower dowel pin into its hole until seated.



a - Lower Dowel Pin



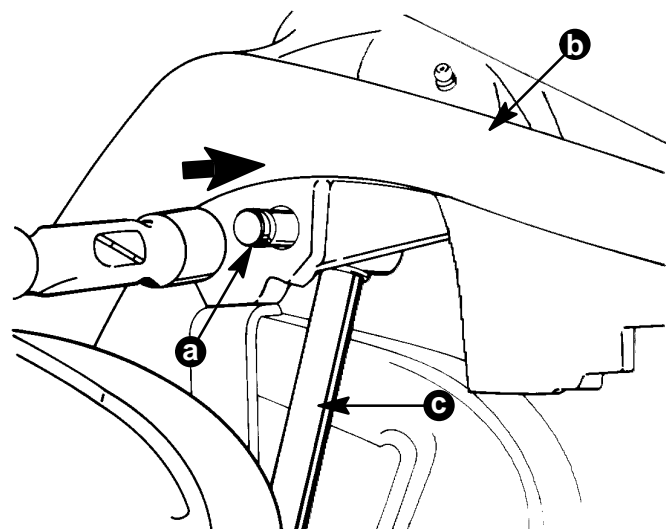
6. Apply Special Lubricant 101 (92-13872A1) to surface of upper pivot pin, pivot pin bore and trim ram bore.



51148

- a - Pivot Pin
b - Pivot Pin Bore
c - Trim Ram Bore

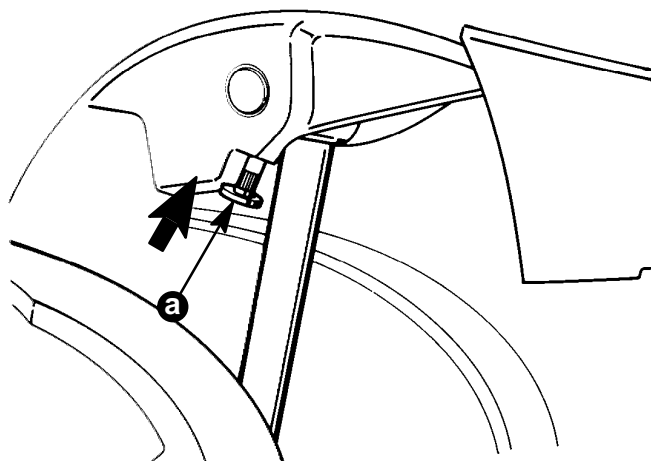
7. Using a suitable mallet, drive upper pivot pin into swivel bracket and through trim ram until pivot pin is flushed with swivel bracket.



51148

- a - Pivot Pin
b - Swivel Bracket
c - Trim Ram

8. Drive upper dowel pin (a) into its hole until seated.



51147

9. Recheck fluid level.
10. Power trim may now be operated to lower out-board to desired position. Trim system is self bleeding.
11. Re-connect spark plug leads to spark plugs.
12. Re-install top cowl.
13. Connect battery leads to battery terminals.