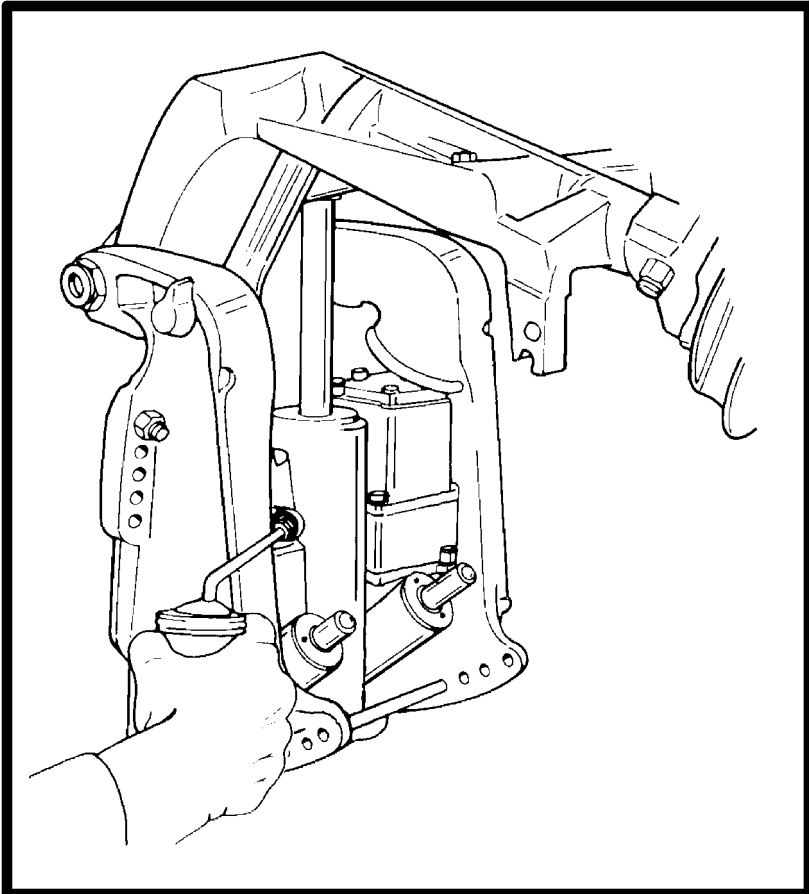




# MID-SECTION



**POWER TRIM  
SQUARE MOTOR AND  
ROUND MOTOR DESIGN**

**5**

**B**



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53794	5B-25		

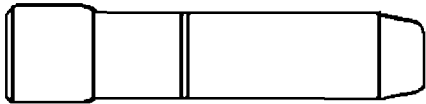


# Power Trim Specifications

Test	Reading
Trim "UP"	1300 PSI (91kg/cm <sup>2</sup> ) Maximum Pressure
Trim "DOWN"	500 PSI (35kg/cm <sup>2</sup> ) Minimum Pressure

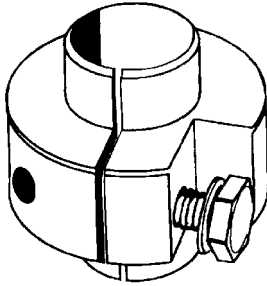
## Special Tools

Alignment Tool 91-11230



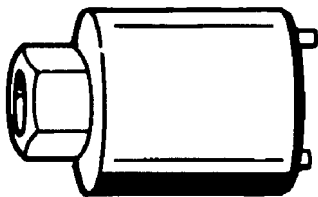
17238

Trim Rod Removal Tool 91-44486A1



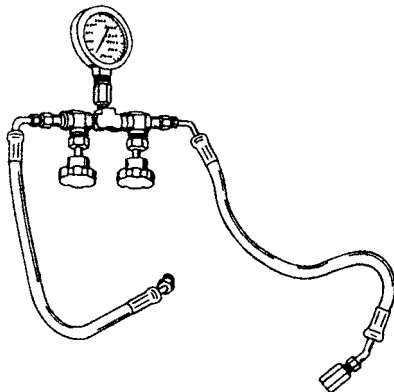
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Trim Rod Guide Removal Tool 91-44487A1



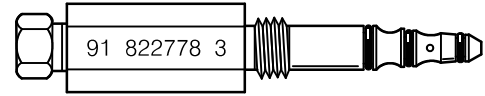
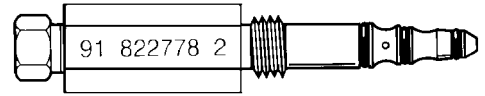
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Power Trim Test Gauge Kit 91-52915A6



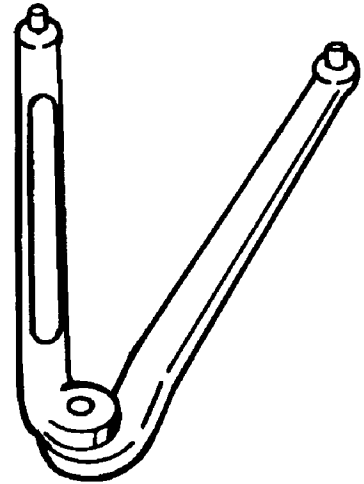
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Adaptor Fitting 91-822778A2 and 91-822778A3



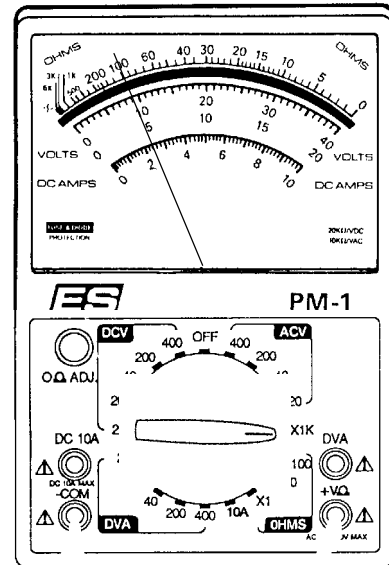
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Spanner Wrench 91-74951



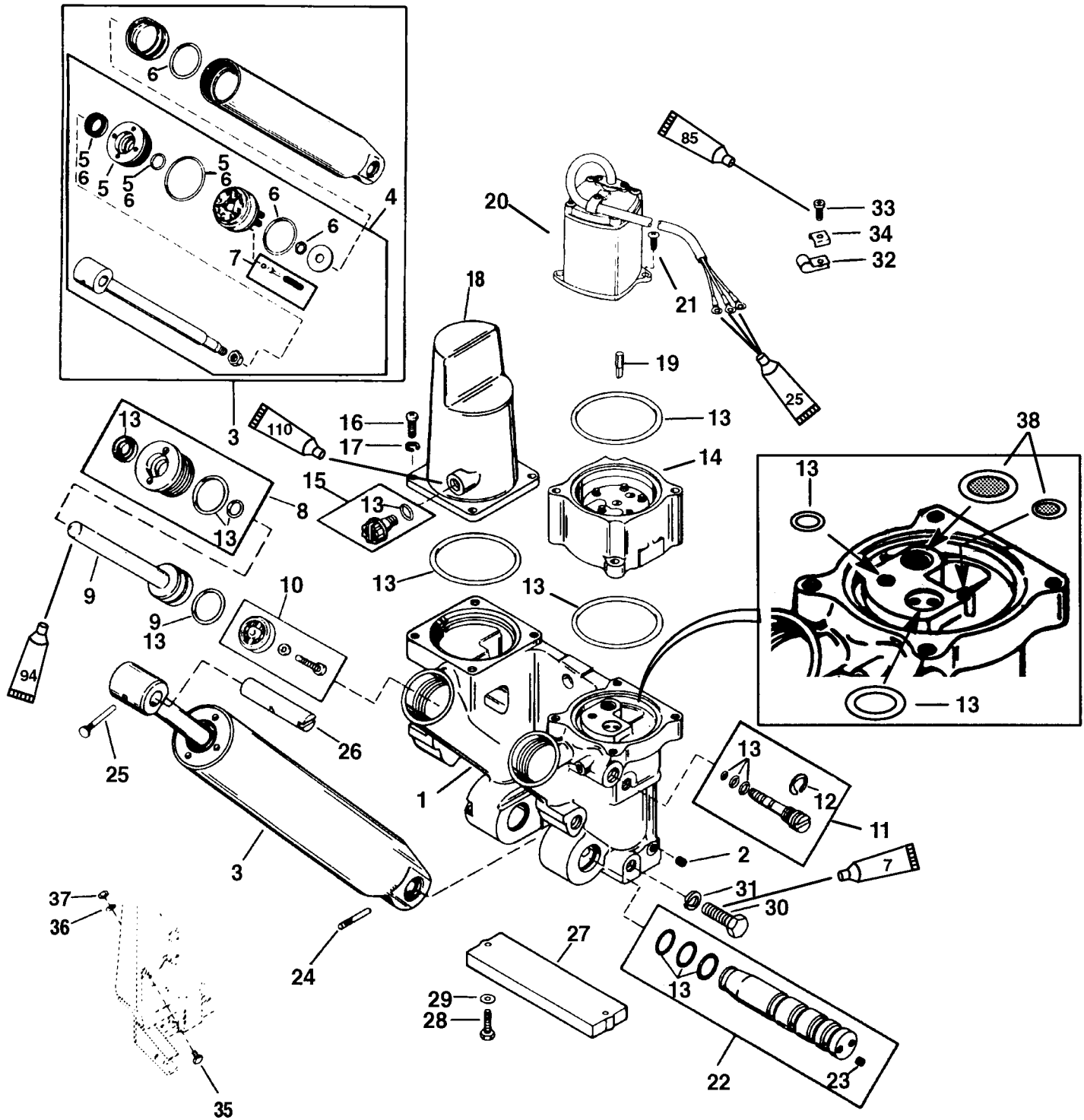
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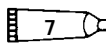
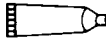
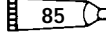
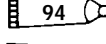
Multi-Meter DVA Tester 91-99750A1





# Power Trim Components (Square Motor)



-  7 Loctite 271 (92-809820)
-  85 RTV Silicone Sealer (92-91601-1)
-  94 Anti-Corrosion Grease (92-78376A6)
-  110 Power Trim and Steering Fluid (92-90100A12)



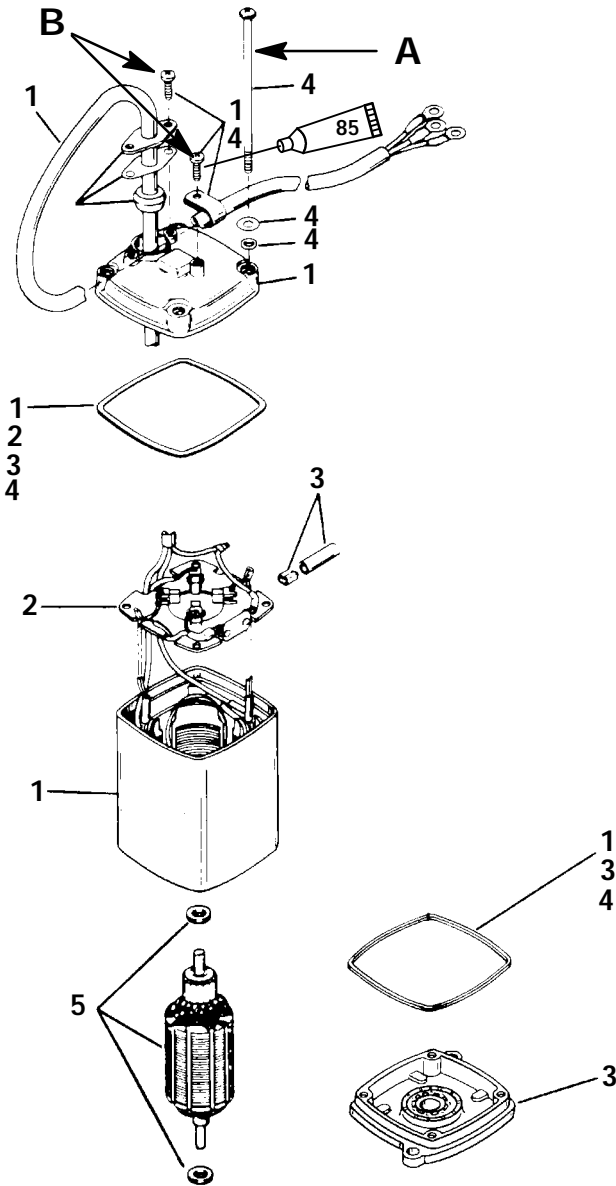
## Power Trim Components (Square Motor)

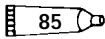
REF. NO.	QTY.	DESCRIPTION	TORQUE		
			lb. in.	lb. ft.	N·m
-	1	POWER TRIM ASSEMBLY-Complete			
1	1	MANIFOLD ASSEMBLY			
2	9	PIPE PLUG			
3	1	TILT CYLINDER ASSEMBLY			
4	1	PISTON ROD			
5	1	GUIDE KIT			
6	1	REPAIR KIT			
7	1	CHECK VALVE KIT			
8	2	GUIDE ASSEMBLY			
9	1	PISTON/ROD ASSEMBLY (PORT)			
	1	PISTON/ROD ASSEMBLY (STBD.)			
10	1	TRIM FILTER ASSEMBLY			
11	1	VALVE ASSEMBLY			
12	1	E RING			
13	1	O RING KIT			
14	1	PUMP			
15	1	PLUG ASSEMBLY			
16	4	SCREW			
17	4	WASHER			
18	1	COVER			
19	1	DRIVE SHAFT			
20	1	TRIM MOTOR			
21	2	SCREW (LONG)	80		9.0
	2	SCREW (SHORT)	80		9.0
22	1	SHAFT ASSEMBLY			
23	2	PIPE PLUG			
24	1	GROOVE PIN			
25	1	GROOVE PIN			
26	1	SHAFT			
27	1	ANODE ASSEMBLY			
28	2	SCREW (M6 x 1 x 25)	60	5	6.8
29	2	WASHER			
30	6	SCREW (M10 x 1.5 x 30)		40	54.2
31	6	WASHER			
32	2	CLIP			
33	2	SCREW (10-16 x .44)			
34	2	C WASHER			
35	2	STRIKER PLATE			
36	2	LOCKWASHER			
37	2	NUT	80	6.5	9.0
38	2	FILTER SCREENS			

**NOTE: Lubricate all o-rings with Power Trim and Steering Fluid.**



# Power Trim Motor



 85 RTV Silicone Sealer (92-91601-1)

REF. NO.	QTY.	DESCRIPTION	TORQUE		
			lb. in.	lb. ft.	N·m
-	1	POWER TRIM MOTOR			
1	1	FRAME AND FIELD KIT			
2	1	BRUSH CARD KIT			
3	1	END FRAME KIT			
4	1	SEAL KIT			
5	1	ARMATURE KIT			

**A** - Torque to 60 lb. in. (6.8 N·m).

**B** - Drive tight.

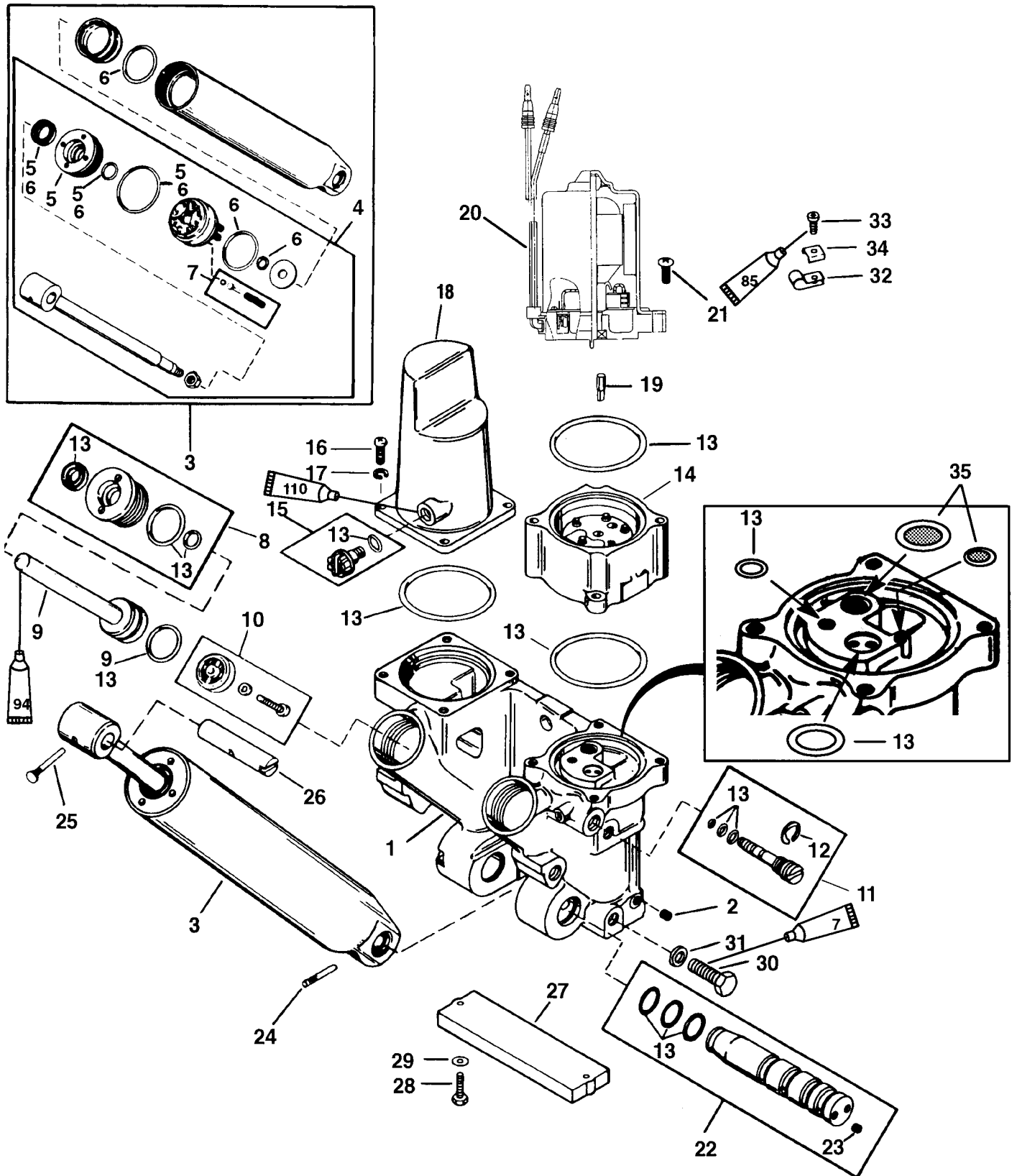


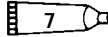
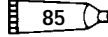
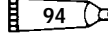

Notes:





# Power Trim Components (Round Motor)



-  7 Loctite 271 (92-809820)
-  85 RTV Silicone Sealer (92-91601-1)
-  94 Anti-Corrosion Grease (92-78376A6)
-  Power Trim and Steering Fluid (92-90100A12)





## Power Trim Components (Round Motor)

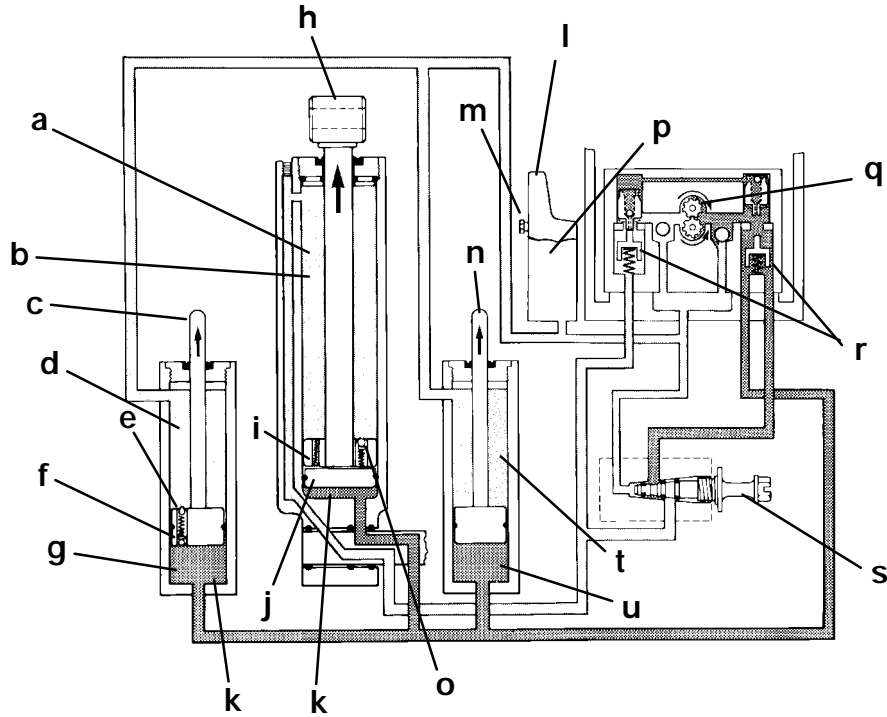
REF. NO.	QTY.	DESCRIPTION	TORQUE		
			lb. in.	lb. ft.	N·m
1	1	MANIFOLD ASSEMBLY			
2	9	PIPE PLUG			
3	1	TILT CYLINDER ASSEMBLY			
4	1	PISTON ROD			
5	1	GUIDE KIT			
6	1	REPAIR KIT			
7	1	CHECK VALVE KIT			
8	2	GUIDE ASSEMBLY			
9	1	PISTON/ROD ASSEMBLY (PORT)			
9	1	PISTON/ROD ASSEMBLY (STBD.)			
10	1	TRIM FILTER ASSEMBLY			
11	1	VALVE ASSEMBLY			
12	1	E RING			
13	1	O RING KIT			
14	1	PUMP			
15	1	PLUG ASSEMBLY			
16	4	SCREW			
17	4	WASHER			
18	1	COVER			
19	1	DRIVE SHAFT S/N-0G217420 & UP			
20	1	TRIM MOTOR			
19	1	DRIVE SHAFT S/N-0G217419 & BELOW			
20	1	TRIM MOTOR			
21	2	SCREW (LONG)(S/N-0G217420 & UP)	80		9.0
21	2	SCREW (LONG)(S/N-0G217419 & BELOW)	80		9.0
21	2	SCREW (SHORT)	80		9.0
22	1	SHAFT ASSEMBLY			
23	2	PIPE PLUG			
24	1	GROOVE PIN			
25	1	GROOVE PIN			
26	1	SHAFT			
27	1	ANODE ASSEMBLY			
28	2	SCREW (M6 x 1 x 25)	70		7.9
29	2	WASHER			
30	6	SCREW (M10 x 1.5 x 30)		40	54.2
31	6	WASHER			
32	2	CLIP(S/N-0G217419 & BELOW)			
32	2	CLIP(S/N-0G217420 & UP)			
33	2	SCREW (10-16 x .44)			Drive Tight
34	2	C WASHER			
35	2	FILTER SCREEN			

**NOTE: Lubricate all o-rings with Power Trim and Steering Fluid.**



# 3 Ram Power Trim (External Mounted - Aft Fill) Hydraulic System

## Trim Up



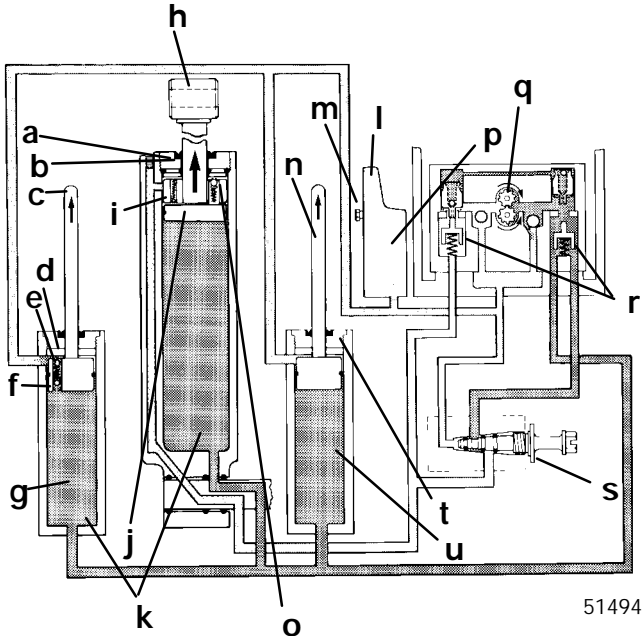
51492

- a - Down Pressure 500 psi (3424.0kPa)
- b - Down Cavity
- c - Trim Ram
- d - Down Cavity
- e - Mechanical Check Valve
- f - Tilt Relief 850-1150 psi (5820.8 - 7875.2kPa)
- g - Up Pressure 1300 psi (8902.4kPa)
- h - Tilt and Shock Ram
- i - Siphon Valve
- j - Memory Piston
- k - Up Cavity
- l - Reservoir
- m - Fill Cap
- n - Trim ram
- o - Impact Relief Valve 1 Opens at 600 psi (4108.8kPa), the Remaining at 3200 psi (21913.6kPa)
- p - Reservoir Pressure 6 psi (41.1kPa)
- q - Oil Pump
- r - Pilot Valve
- s - Manual Tilt Valve
- t - Down Cavity
- u - Up Cavity



# 3 Ram Power Trim (External Mounted - Aft Fill) Hydraulic System

## Hydraulic Tilt



- a - Down Pressure 500 psi (3424.0kPa)
- b - Down Cavity
- c - Trim Ram
- d - Down Cavity
- e - Mechanical Check Valve
- f - Tilt Relief 850-1150 psi (5820.8 - 7875.2kPa)
- g - Up Pressure 1300 psi (8902.4kPa)
- h - Tilt and Shock Ram
- i - Siphon Valve
- j - Memory Piston
- k - Up Cavity
- l - Reservoir
- m - Fill Cap
- n - Trim ram
- o - Impact Relief Valve 1 Opens at 600 psi (4108.8kPa), the Remaining at 3200 psi (21913.6kPa)
- p - Reservoir Pressure 6 psi (41.1kPa)
- q - Oil Pump
- r - Pilot Valve
- s - Manual Tilt Valve
- t - Down Cavity
- u - Up Cavity

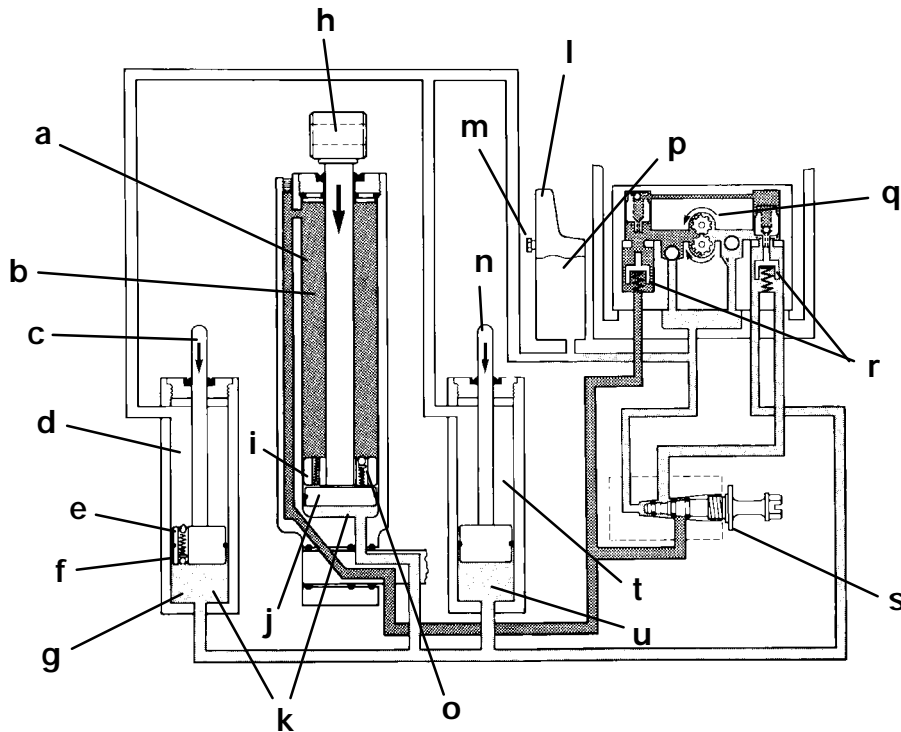
## UP CIRCUIT

When the up button is activated the electric motor will rotate the oil pump gears. As the oil pump gears begin to rotate, oil is drawn through the up circuit pick up and into the pump, supplying pressure for the up circuit. Oil is blocked from returning into the reservoir by the closed check ball inside the down circuit pick up. Oil, under pressure moves the (up) shuttle valve up, oil also flows through the (up) shuttle valve center pin. Oil flows past the check ball and through a connecting passage into a chamber above the down shuttle valve. The down shuttle valve and check ball are forced against the spring loaded down circuit pilot check valve, opening the pilot check valve and allowing oil to return into the pump from the down side cavity of the tilt cylinder, which supplies oil to operate the "up circuit". Oil under pressure opens the up circuit pilot check valve, allowing oil to exit through the up pressure port, and into the manifold casting. The oil then continues on through the up passage into the up cavities below the trim and tilt ram pistons, pushing the rams up and out. Oil returns into the reservoir, from the trim rams, through passages cast inside of the manifold. Oil returning from above the tilt cylinder piston exits the down cavity through an interconnecting passage cast located along side of the cylinder. Oil returns through the lower pivot pin and past the open pilot valve, into the pump, supplying some of the oil required for the up circuit. Due to the surface area of their pistons, the small outer trim rams move first. As the trim rams reach the limit of their travel, the mechanical check valve, on the top of the port trim ram piston, contacts the trim ram cover. The "pin" contact with the cover mechanically opens the shut off valve, allowing oil, to flow through the piston. The oil flowing through the port trim ram lowers the pressure available for the tilt ram (850-1150 psi). However, due to the smaller diameter of the tilt cylinder, the engine will move at a faster rate. The tilt cylinder will continue to raise the outboard engine, until reaching its maximum limit. At full travel, the only passage for the oil from the pump is through the port trim ram, at a very slow rate. To supply oil into the pump at this time, a small amount of oil is drawn up through the oil pick up. If the up button is not released, the electric motor will heat up and the thermal overload switch, inside the electric motor will open, stopping the motor. To prevent the high oil "up" pressure from continuing to move the engine, after the trim button is released, the "system" pressure must be bleed off. A small bleed passage past the down circuit oil pick up will allow the up pressure to bleed out of the pump.






# 3 Ram Power Trim Hydraulic System

## Trim Down



51493

- a - Down Pressure 500 psi (3424.0kPa)
- b - Down Cavity
- c - Trim Ram
- d - Down Cavity
- e - Mechanical Check Valve
- f - Tilt Relief 850-1150 psi (5820.8 - 7875.2kPa)
- g - Up Pressure 1300 psi (8902.4kPa)
- h - Tilt and Shock Ram
- i - Siphon Valve
- j - Memory Piston
- k - Up Cavity
- l - Reservoir
- m - Fill Cap
- n - Trim ram
- o - Impact Relief Valve 1 Opens at 600 psi (4108.8kPa), the Remaining at 3200 psi (21913.6kPa)
- p - Reservoir Pressure 6 psi (41.1kPa)
- q - Oil Pump
- r - Pilot Valve
- s - Manual Tilt Valve
- t - Down Cavity
- u - Up Cavity

-  Reservoir and Feed Oil
-  Return Oil
-  Oil Under Pressure

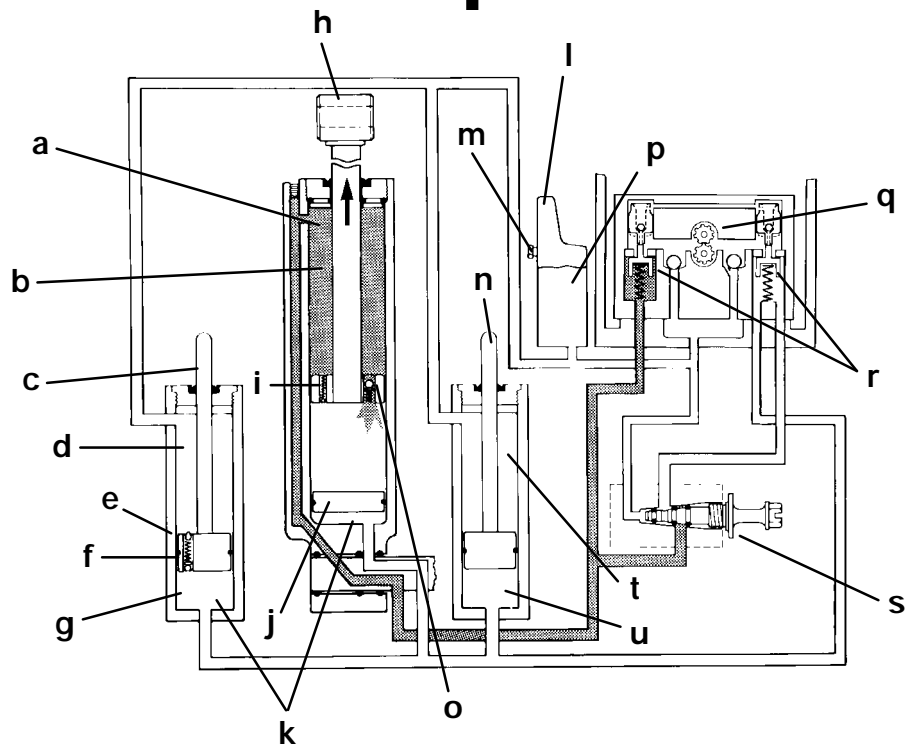
## Down Circuit

When you depress the down button, the power trim pump is activated in the opposite direction. As the oil pump gears begin to rotate, oil is drawn through the down circuit pickup and into the pump, supplying pressure for the down circuit. Oil is blocked from returning into the reservoir by the closed check ball inside the up circuit pickup. Oil under pressure then moves the down shuttle valve up. Oil also flows around the down shuttle valve center "pin", around the check ball and into a connecting passage to the chamber above the "up" shuttle valve. The check ball inside the "up" shuttle valve closes. The "up" shuttle valve then moves down and opens the up circuit pilot check valve. The oil pump draws returning oil from the up circuit trim and tilt cylinders cavities to supply oil to the trim pump for the down circuit. At this same time, oil under pressure opens the down circuit pilot valve allowing oil to exit through the down pressure port. The oil then continues through the down pressure passage, through the pivot pin, and into the interconnecting passage of the cylinder leading to the cavity above the tilt ram piston, and pushes the piston rod in and down. As the outboard engine contacts the extended ends of the trim rams, the weight of the motor, propeller thrust and pump down pressure will force the trim rams to retract.



# 3 Ram Power Trim Hydraulic System

## Bounce and Shock Absorber



51495

- a - Down Pressure 500 psi (3424.0kPa)
- b - Down Cavity
- c - Trim Ram
- d - Down Cavity
- e - Mechanical Check Valve
- f - Tilt Relief 850-1150 psi (5820.8 - 7875.2kPa)
- g - Up Pressure 1300 psi (8902.4kPa)
- h - Tilt and Shock Ram
- i - Siphon Valve
- j - Memory Piston
- k - Up Cavity
- l - Reservoir
- m - Fill Cap
- n - Trim ram
- o - Impact Relief Valve 1 Opens at 600 psi (4108.8kPa), the Remaining at 3200 psi (21913.6kPa)
- p - Reservoir Pressure 6 psi (41.1kPa)
- q - Oil Pump
- r - Pilot Valve
- s - Manual Tilt Valve
- t - Down Cavity
- u - Up Cavity

 Oil Under Pressure

## Bounce System

Should the outboard motor strike a submerged object with light steady pressure, while in forward motion, the oil in the trim system is locked in a static position by the up and down circuit pilot check valves and the manual tilt valve. Due to no oil movement in the up side of the trim cylinder, the tilt rod and piston move outward and will create a vacuum between the tilt ram shock piston and the floating piston, until the outboard engine returns to its normal running position.

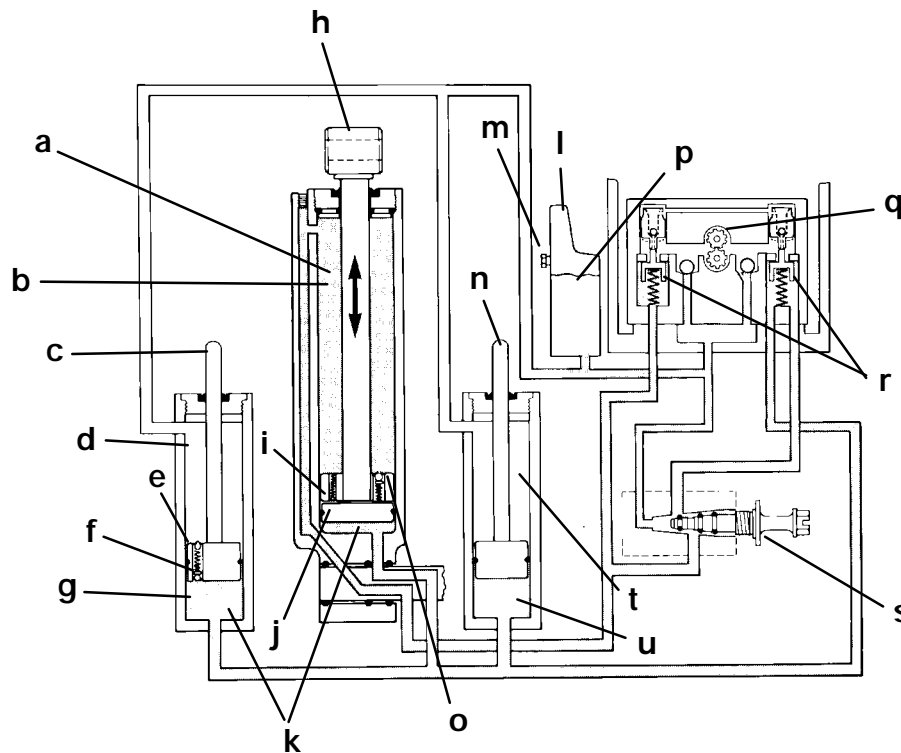
## Shock System

When a submerged object is hit with great force, oil will build up sufficient pressure in the tilt cylinder down side cavity to open the piston impact relief valve. Oil in the "up" side cavity is locked in by the up circuit pilot check valve and manual tilt valve. Therefore, the piston impact relief valve allows the oil from the down side cavity of the trim cylinder to pass through the piston impact relief valve, into the vacuum area between the tilt ram piston and the floating piston. The siphon valve allows the oil to return through the piston, back to the down side cavity as the outboard returns to its normal running position. Propeller thrust and the weight of the outboard provides the return motion for the engine.



# 3 Ram Power Trim Hydraulic System

## Manual Tilt



51496

- a - Down Pressure 500 psi (3424.0kPa)
- b - Down Cavity
- c - Trim Ram
- d - Down Cavity
- e - Mechanical Check Valve
- f - Tilt Relief 850-1150 psi (5820.8 - 7875.2kPa)
- g - Up Pressure 1300 psi (8902.4kPa)
- h - Tilt and Shock Ram
- i - Siphon Valve
- j - Memory Piston
- k - Up Cavity
- l - Reservoir
- m - Fill Cap
- n - Trim ram
- o - Impact Relief Valve 1 Opens at 600 psi (4108.8kPa), the Remaining at 3200 psi (21913.6kPa)
- p - Reservoir Pressure 6 psi (41.1kPa)
- q - Oil Pump
- r - Pilot Valve
- s - Manual Tilt Valve
- t - Down Cavity
- u - Up Cavity

 Return Oil

## Manual Tilt System

If the outboard motor is to be raised manually, turn the manual release (tilt) valve counterclockwise to the full out position. When in the full (out) position, oil in the trim cylinder can flow freely from the up side to the down side or from the down side to the up side. The oil return line into the reservoir is also open, allowing free oil flow to either side of the tilt cylinder to accommodate the differential oil capacities between the tilt cylinder up side and down side cavities.

When trimming the outboard in either the up or down position, with the manual tilt valve open or leaking, little or no movement will occur. Oil pressure from the pump will move to both, the up cavity and through the manual tilt valve into the down cavity, each cavity would have equal pressure resulting in little or no movement.

## Reverse Operation

To prevent the outboard from coming up or trailing out, when shifted into reverse and/or throttling back rapidly, oil in the trim system must be locked in a static position. This is accomplished with the up and down pilot check valves. Thus, not allowing oil in the system to move in either direction.



# Power Trim - General Information

## Description

The Power Trim System consists of an electric motor, pressurized fluid reservoir, pump, tilt cylinder, and two trim rams.

The remote control (or trim panel) has switches that trim the outboard "Up" or "Down" and tilt the engine for "Trailing". The outboard can be trimmed and tilted under power or when the outboard is not running.

## Trimming Characteristics

**NOTE:** Because hull designs react differently in varying water conditions, varying the trim position will often improve the ride and boat handling. When trimming from a mid-trim position (with outboard trim tab in a straight fore and aft position), expect the following:

### TRIMMING OUTBOARD "UP" (OUT):

#### WARNING

**Excessive trim "Out" may reduce the stability of some high speed hulls. To correct instability, reduce the power gradually and trim the outboard "In" slightly before resuming high speed operation. A rapid reduction in power will result in a sudden change of steering torque and may cause additional boat instability.**

Will lift boat bow, increasing top speed.

Transfers steering torque harder to port (left) on installations above 23 in. transom height.

Increases gearcase clearance over submerged objects.

Excess trim can cause "porpoising" and/or ventilation.

#### WARNING

**Excessive outboard trim angle will result in insufficient water supply causing water pump and/or powerhead overheating damage. Insure water level is above water intake holes whenever outboard is running.**

The "Up" circuit actuates the "up" solenoid (under outboard cowl) and closes the motor circuit. The electric motor drives the pump, forcing fluid thru passageways into the "up" side of the trim cylinders.

The trim cylinders position the outboard at the desired trim angle in the 20 degree maximum trim range. The system will not allow the outboard to be trimmed above the 20 degree trim range as long as the engine RPM is above approximately 2000 RPM.

The outboard can be trimmed above the 20 degree maximum trim angle (for shallow water operation, etc.), by keeping the engine RPM below 2000. If the RPM increases over 2000, propeller thrust (if propeller is deep enough) will result in the trim system to return the outboard to the 20 degree maximum trim position.

### TRIMMING OUTBOARD "DOWN" (IN):

#### WARNING

**Excessive speed at minimum trim "In" may result in undesirable and/or unsafe steering conditions. Test for handling characteristics after any adjustment is made to the trim angle (and tilt pin location).**

Aids planing, particularly with heavy loads.

Improves ride in choppy water conditions.

Excess trim "In" can cause "bow steer" (boat veers to left or right).

Transfers steering torque to starboard (right).

Improves acceleration to planing speed.

The "Down" circuit actuates the "down" solenoid (under engine cowl) and closes the motor circuit. The electric motor drives the pump in the opposite direction as the "up" circuit, forcing fluid thru passageways into the "down" side of the tilt ram. The tilt ram moves the engine down to the desired position.

## Trailing Outboard

The "Up" circuit first moves the trim cylinders; when the trim cylinders extend fully, the tilt ram extends to tilt the outboard to the full "Up" position for trailing.

Before the boat is trailered, the operator should check for clearance between the outboard skeg and pavement to prevent damage to skeg from striking pavement.

If the outboard must be tilted for clearance between skeg and pavement, a device such as a "Transom Saver" should be installed to prevent stress to boat transom from outboard weight while the boat/outboard are being trailered.

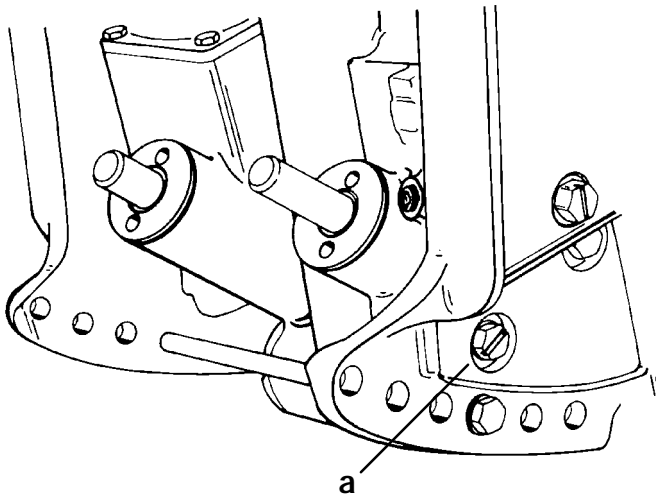


## Tilting Outboard Manually

### ⚠ WARNING

Before opening the manual release valve knob, insure all persons are clear of outboard as outboard will drop to full "Down" when valve is opened.

The outboard can be raised or lowered manually by opening the manual release valve 3 to 4 turns counterclockwise. Close manual release valve to hold outboard at the desired tilt position.



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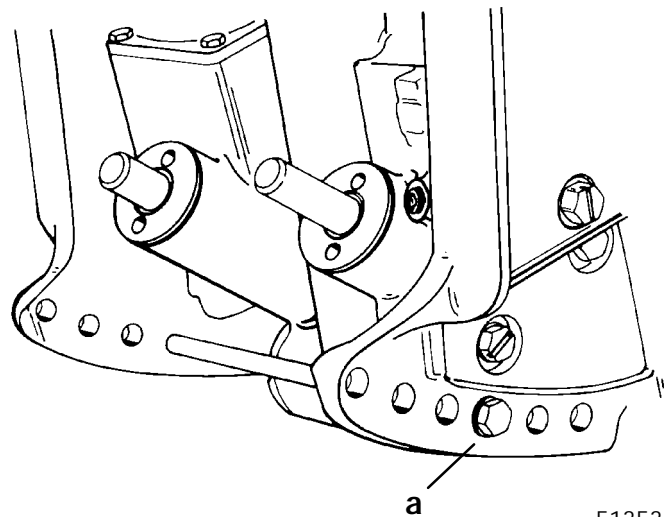
a - Manual Release Valve

## Trim "In" Angle Adjustment

### ⚠ WARNING

Boat operation with outboard trimmed to the full "In" trim angle [not using the trim angle adjustment bolt (a)] at planing speed may result in undesirable and/or unsafe steering conditions. A water test for handling/steering conditions is required after any trim angle adjustments.

**IMPORTANT:** Some boat/motor combinations not using the trim angle adjustment pin (a) and trimmed to the full "In" trim angle position may not exhibit any undesirable and/or unsafe handling and/or steering characteristics at planing speed. If so, not using the trim angle adjustment bolt (a) may be advantageous to acceleration and planing. A water test is required to determine if these characteristics apply to a particular boat/motor combination.



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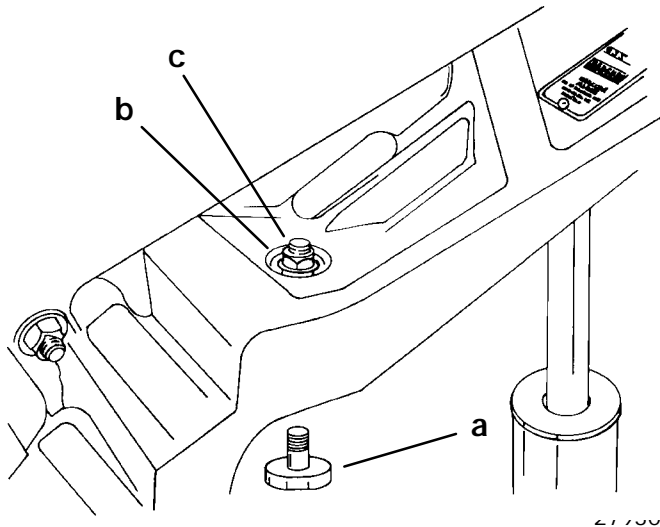
a - Trim Angle Adjustment Bolt





## Striker Plate Replacement

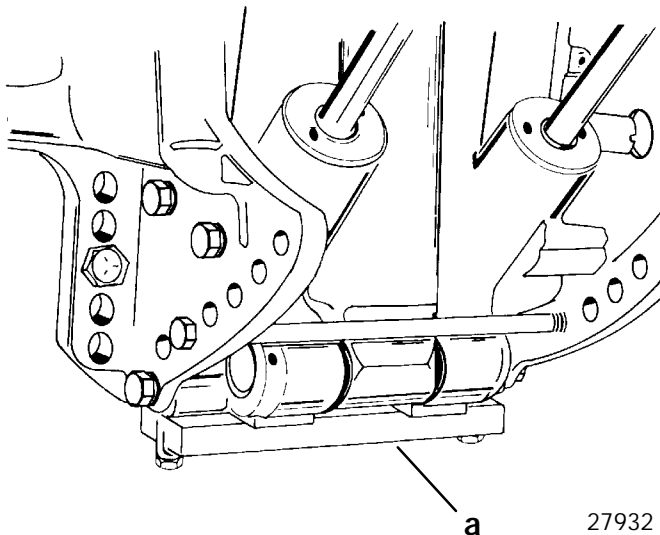
Visually inspect striker plates (a) and replace if worn excessively.



- a - Striker Plate (2)
- b - Lockwasher
- c - Locknut. Torque to 80 lb. in. (9.0 N-m)

## Anode Plate

Anode plate (a) is a self-sacrificing alloy plate that is consumed gradually by corrosion while providing protection to the midsection and power trim from galvanic corrosion. Replace anode plate when it is 50% consumed.



- a - Anode Plate

**IMPORTANT:** Do not paint or place protective coating on anode plate, or corrosion protection function will be lost.

## Trim Indicator Gauge

A Quicksilver Trim Indicator Gauge accessory kit is available for the power trim sender (if not previously installed).

## Check, Fill and Purge - Power Trim System

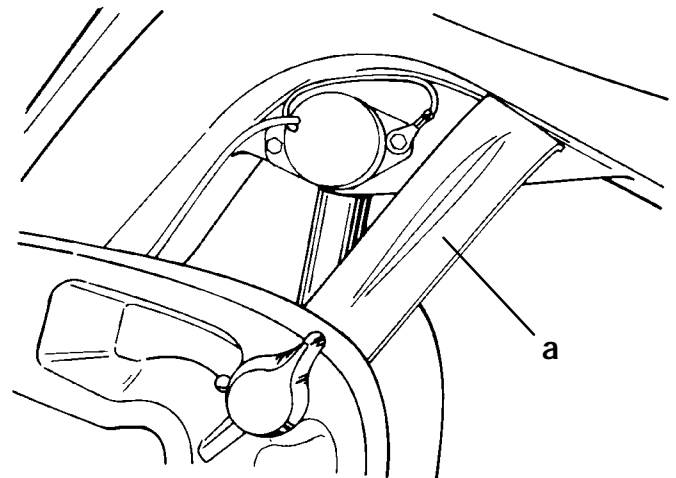
TO CHECK:

### ⚠ CAUTION

Tilt outboard to full "Up" position and engage tilt lock lever before checking fluid level. System is pressurized. Extend trim and tilt rams fully to depressurize system.

Remove fill plug and O-ring. System is full when oil level is present at filler hole. Tighten fill plug securely.

**NOTE:** Automatic Transmission Fluid (ATF) Type F, FA, Dexron II or Dexron III may be used.



- a - Tilt Lock Lever

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TO FILL:

**IMPORTANT:** This trim system is pressurized. Remove "Fill" plug only when outboard is tilted to the full "Up" position or the trim/tilt rams are fully extended. Retighten "Fill" plug before tilting outboard down or retracting tilt/trim rams. Remove "Fill" plug and O-ring. System is full when oil level is present at fill hole. Tighten "Fill" plug securely.

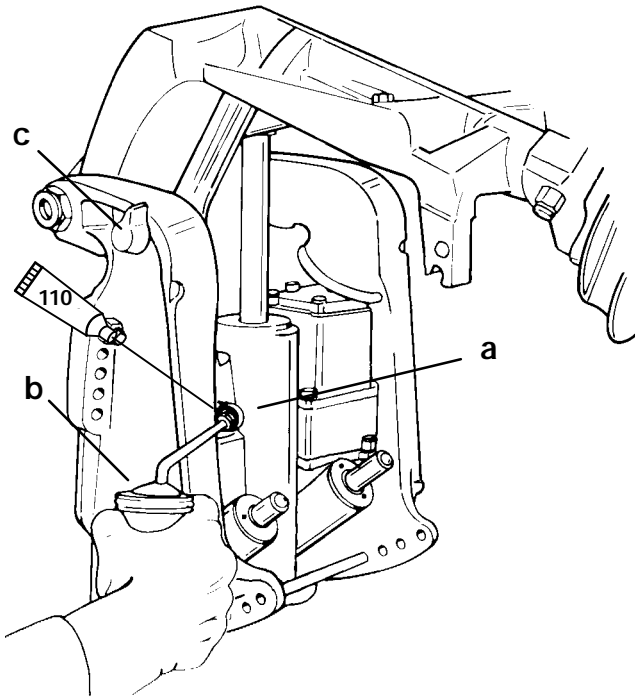


## Hydraulic System Troubleshooting

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

1. Check that Manual Release Valve knob is tightened to full right (clockwise) position.
2. Check trim pump fluid level and fill if necessary. (Refer to "**Check, Fill and Purge - Power Trim System**") preceding.
3. Check for external leaks in the system. Replace defective parts if leak is found.
4. Check for air in the system and purge if necessary. (Refer to "**Check, Fill and Purge - Power Trim System**") preceding.

**NOTE:** When troubleshooting the hydraulic system, cleanliness, and inspection of sealing surfaces, seals, O-rings, and moving parts is important. The internal pressures required for proper operation of the Power Trim System require these parts to be in excellent condition. Replace any parts that may be suspect of failure.



 Power Trim & Steering Fluid (92-90100A12)

- a - Fill Plug and O-ring (remove to fill system, tighten securely)
- b - Oil Can (fill system with Quicksilver Power Trim and Steering Fluid)
- c - Tilt Lock Lever (engage to support engine in "Up" position)

### TO PURGE:

**IMPORTANT:** Fill plug and O-ring must be tightened securely before purging system.

**IMPORTANT:** Run Trim System in short "jogs" until pump is primed and trim system moves. If trim motor is run without priming pump, drive-shaft failure could result.

Cycle outboard through entire trim/tilt range 4 times. Check fluid level after purging system.

Push down on outboard when trim rams are slightly extended. If rams retract more than 1/8 in. (3.2 mm), air is present in system. Cycle system again and check fluid level.



## Troubleshooting (Square Motor)

**IMPORTANT:** Determine if Electrical or Hydraulic problem exists.

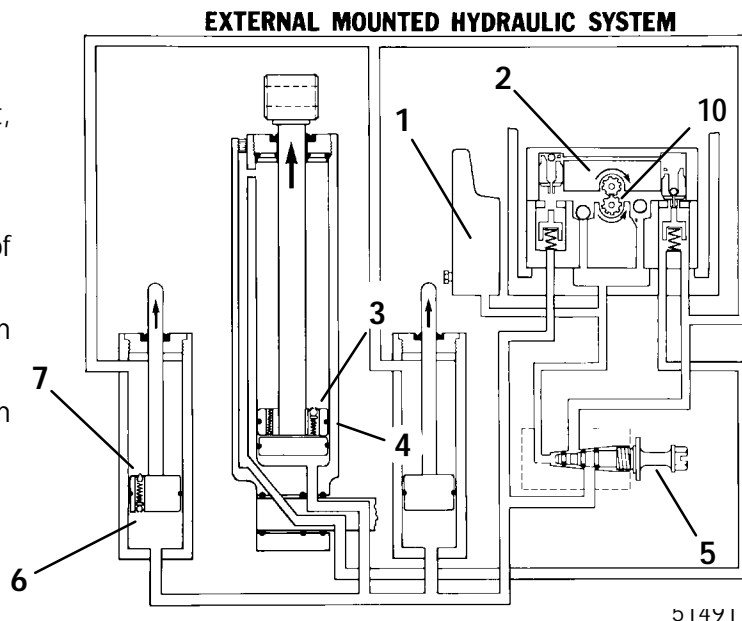
### HYDRAULIC SYSTEM TROUBLESHOOTING

**IMPORTANT:** Make one correction at a time. Check operation of trim system before proceeding to the next check.

CONDITION OF TRIM SYSTEM	PROBLEM
A. Trim motor runs; trim system does not move up or down.	1, 2, 5, 10
B. Does not trim full down. Up trim OK.	2, 3, 4
C. Does not trim full up. Down trim OK.	1, 6
D. Partial or "Jerky" down/up.	1
E. "Thump" noise when shifting.	2, 3, 6, 7
F. Does not trim under load.	8, 9
G. Does not hold trim position under load.	2, 5, 6
H. Trail out when backing off from high speed.	3, 4
I. Leaks down and does not hold trim.	2, 5, 7
J. Trim motor working hard and trims slow up and down.	8, 9
K. Trims up very slow.	1, 2, 8, 9
L. Starts to trim up from full down position when "IN" trim button is depressed.	3, 4
M. Trim position will not hold in reverse.	3, 4

### PROBLEM

1. Low oil Level.
2. Pump Assembly faulty.
3. Tilt ram piston ball not seated (displaced, dirt, nickel seat).
4. Tilt ram piston O-ring leaking or cut.
5. Manual release valve leaking (check condition of O-rings) (Valve not fully closed.)
6. Lower check valve not seating in port side trim ram.
7. Upper check valve not seating in port side trim ram.
8. Check condition of battery.
9. Replace motor assembly.
10. Broken motor/pump driveshaft.





# ELECTRICAL SYSTEM TROUBLESHOOTING (SQUARE MOTOR)

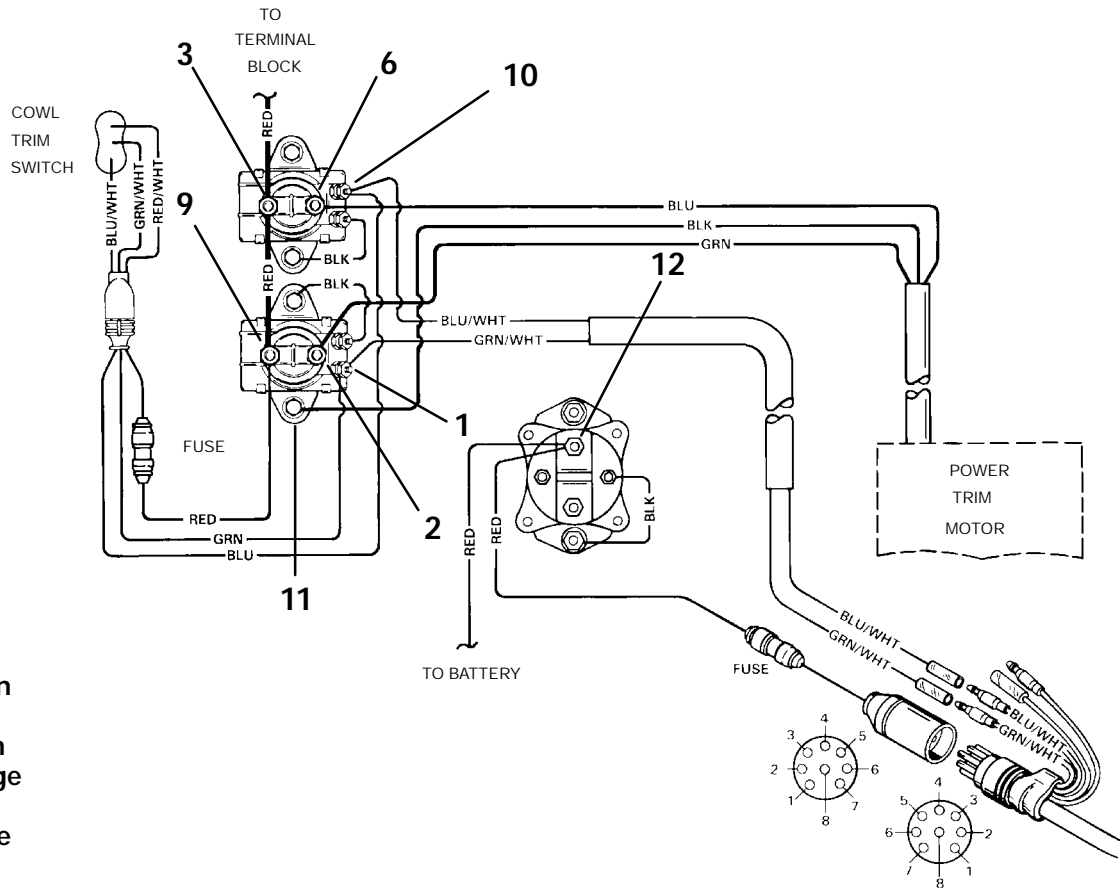
CONDITION OF TRIM SYSTEM	PROBLEM
A. Trim motor does not run when trim button is depressed.	1, 2, 4, 5, 6
B. Trim system trims opposite of buttons.	3
C. Cowl mounted trim buttons do not activate trim system.	2, 4, 5, 6

## PROBLEM

1. Battery low or discharged.
2. Open circuit in trim wiring.
3. Wiring reversed in remote control.
4. Wire harness corroded through.
5. Internal motor problem (brushes, shorted armature).
6. Blown fuse(s).

**NOTE:** Refer to following pages to troubleshoot Power Trim Electrical System.

## POWER TRIM SYSTEM WITH SOLENOIDS AND 3 WIRE TRIM MOTOR

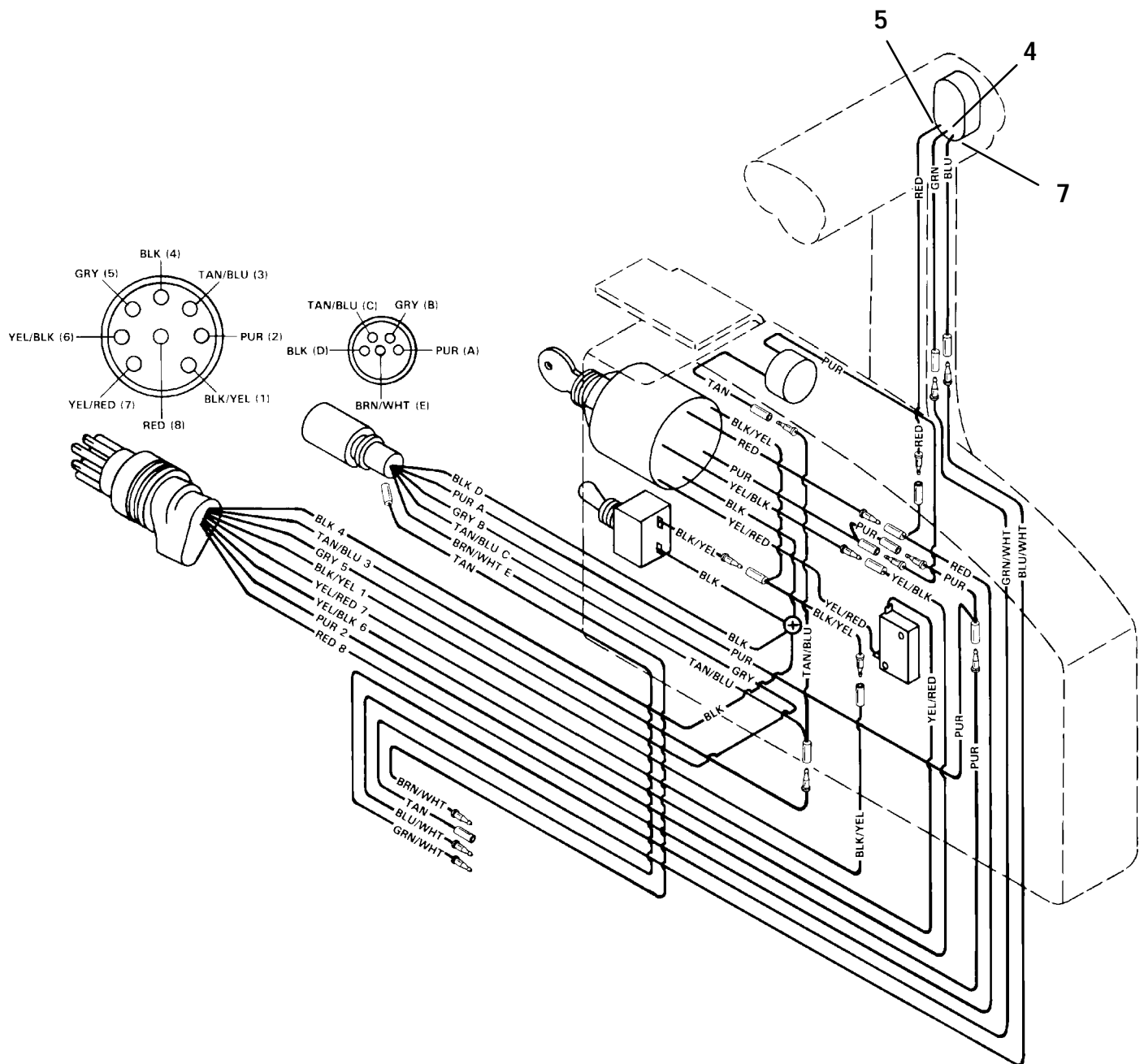


- BLK = Black
- BLU = Blue
- BRN = Brown
- GRY = Gray
- GRN = Green
- ORN = Orange
- PNK = Pink
- PUR = Purple
- RED = Red
- TAN = Tan
- WHT = White
- YEL = Yellow
- LIT = Light
- DRK = Dark

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# Side Mount Remote Control Wiring Diagram (Test Points for Electrical Troubleshooting)



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# Electrical System Troubleshooting

## GENERAL CHECKS

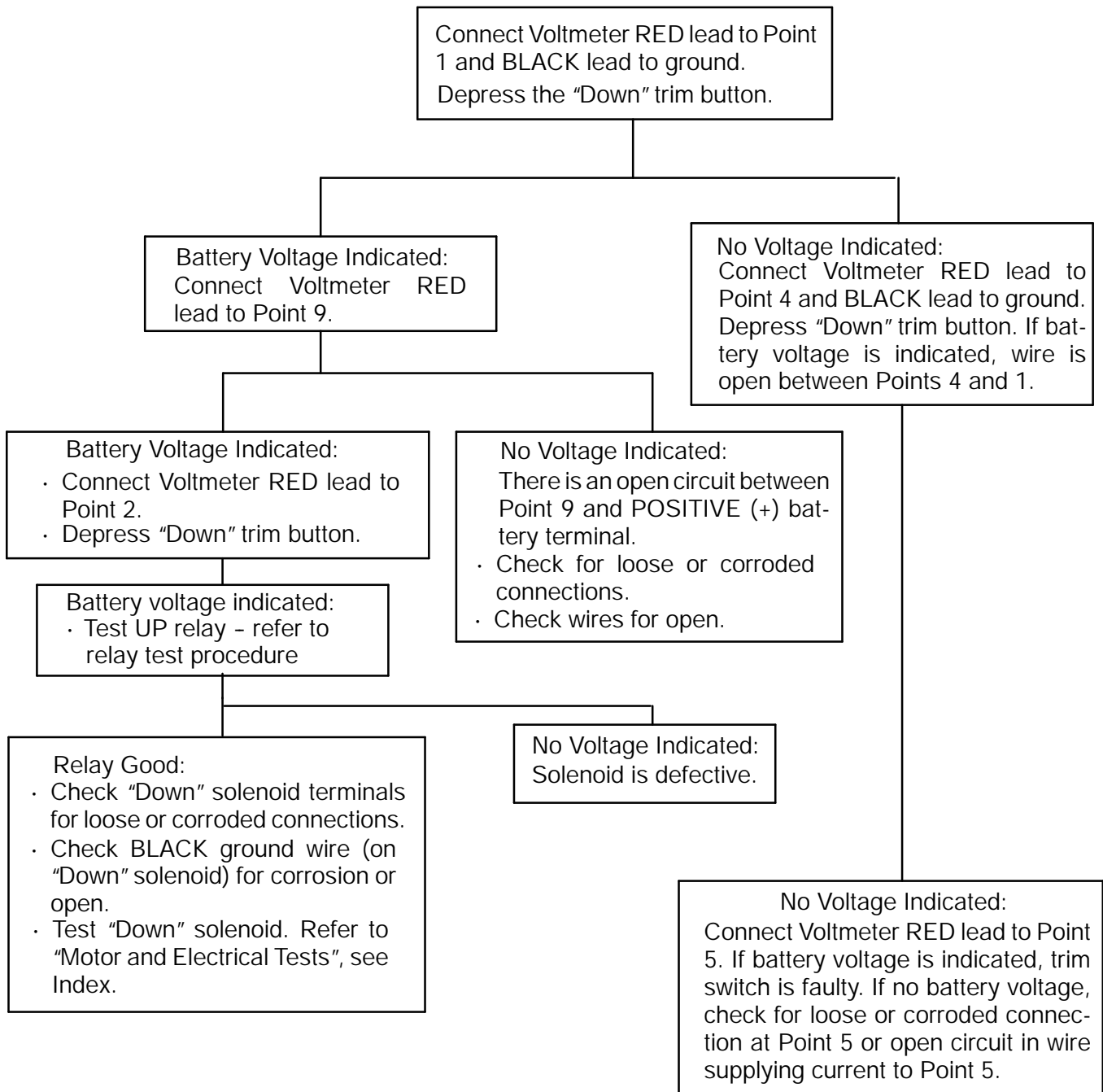
Before troubleshooting the Power Trim electrical system, check the following:

1. Check for disconnected wires.

2. Make certain all connections are tight and corrosion free.
3. Check that plug-in connectors are fully engaged.
4. Make certain battery is fully charged.

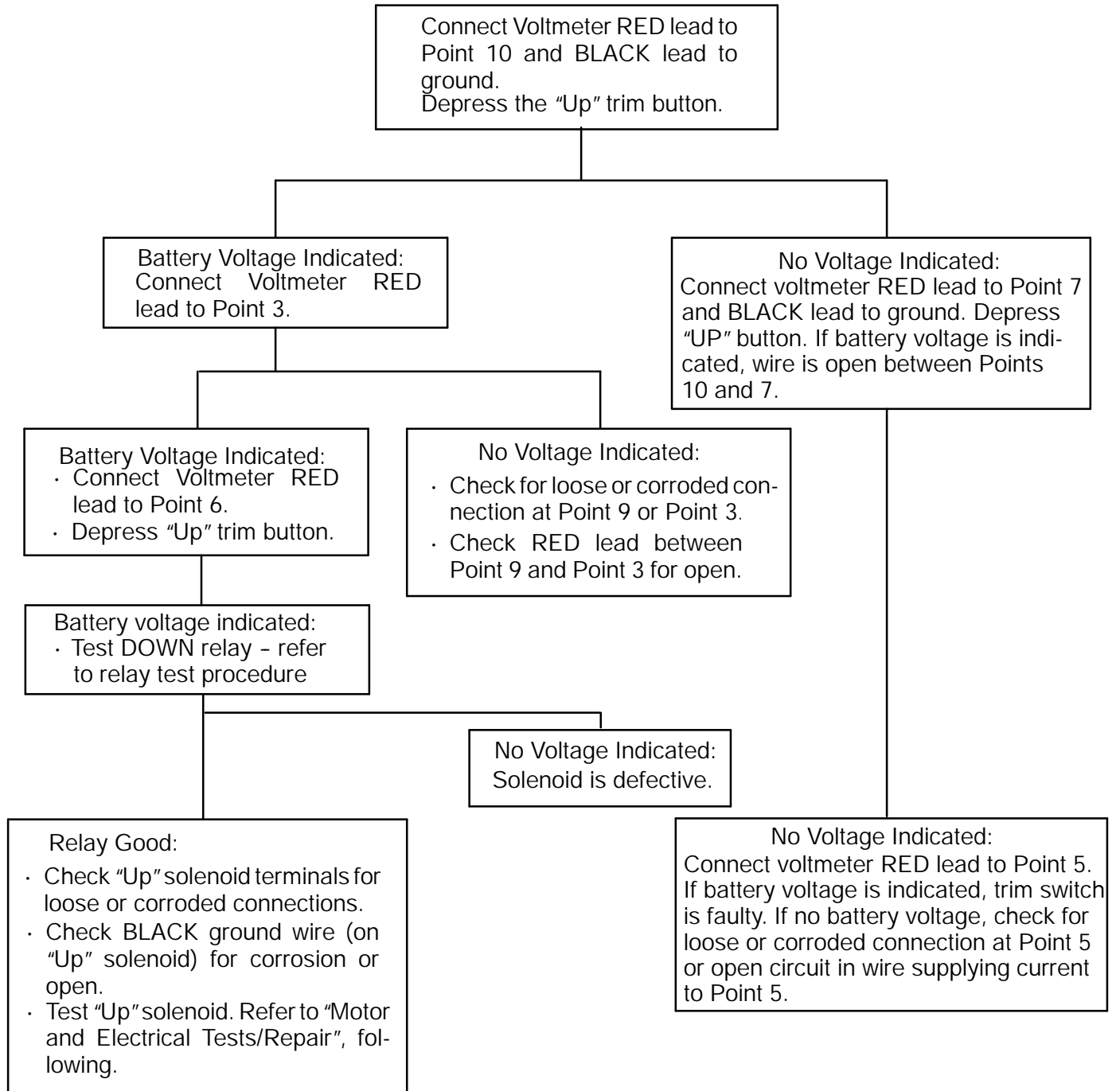
Refer to the preceding four wiring diagrams for connection points when troubleshooting the electrical systems (Connection points are specified by number.)

## Troubleshooting the "Down" Circuit (When "Up" Circuit is OK)



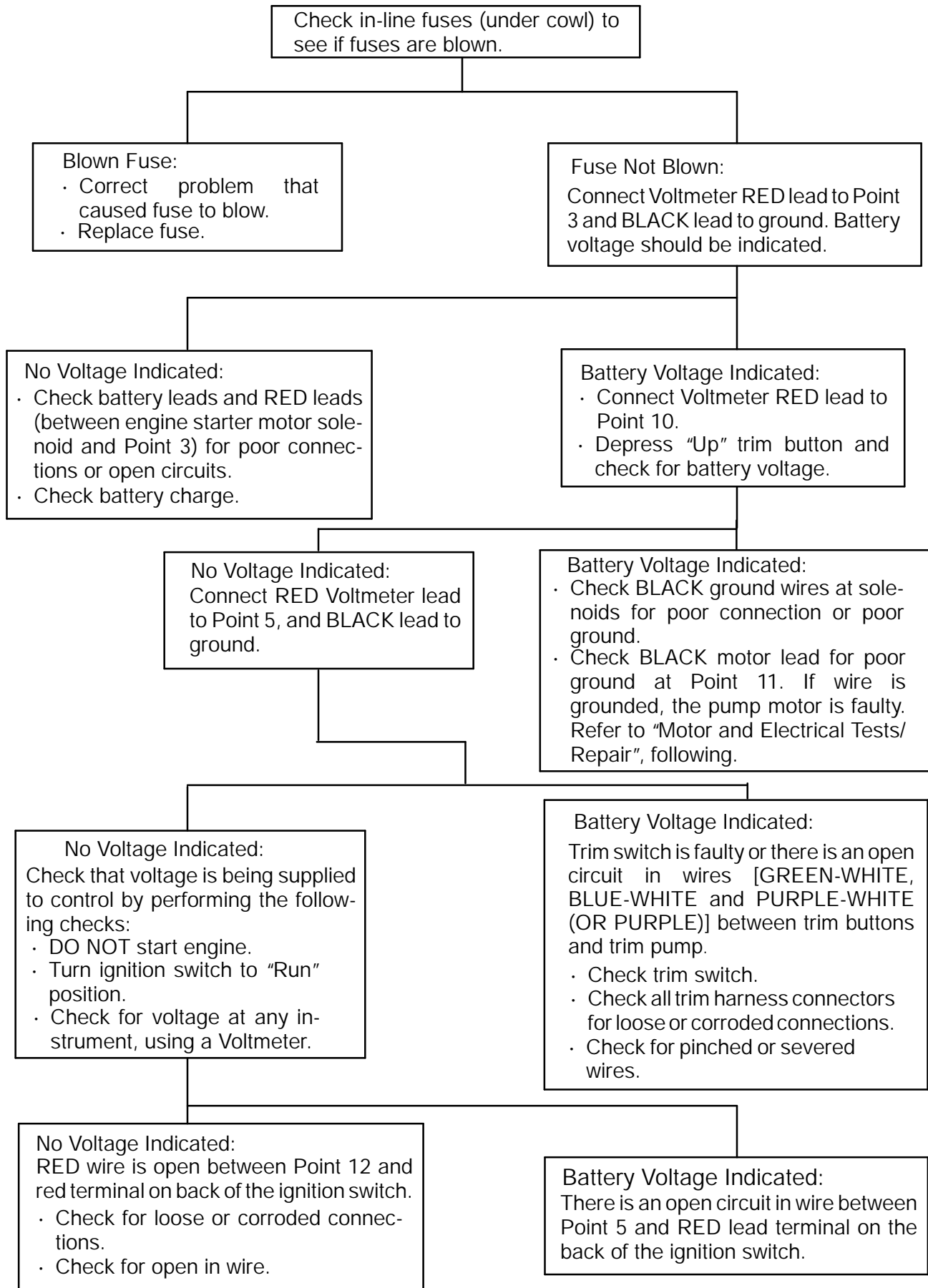


## Troubleshooting the "Up" Circuit (When "Down" Circuit Is OK)





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







## Troubleshooting (Round Motor)

**IMPORTANT:** Determine if Electrical or Hydraulic problem exists.

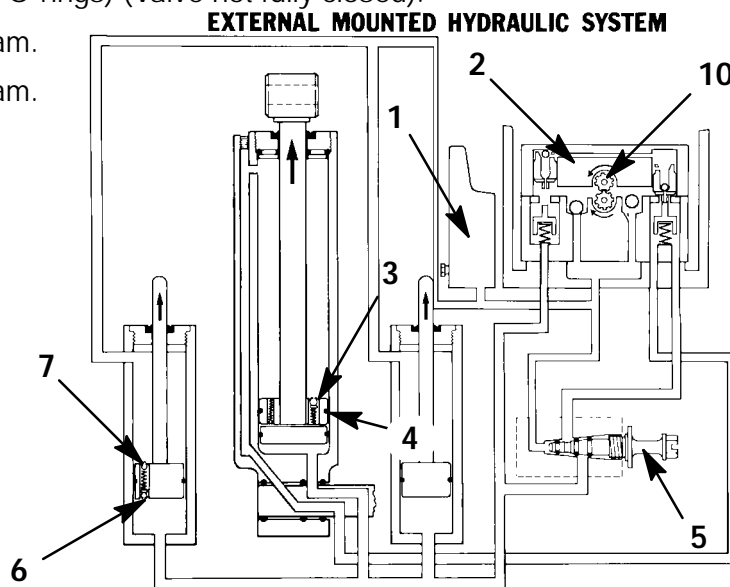
### HYDRAULIC SYSTEM TROUBLESHOOTING

**IMPORTANT:** Make one correction at a time. Check operation of trim system before proceeding to the next check.

CONDITION OF TRIM SYSTEM	PROBLEM
A. Trim motor runs; trim system does not move up or down.	1, 2, 5, 10
B. Does not trim full down. Up trim OK.	2, 3, 4
C. Does not trim full up. Down trim OK.	1, 6
D. Partial or "Jerky" down/up.	1, 3
E. "Thump" noise when shifting.	2, 3, 6, 7
F. Does not trim under load.	5, 8, 9, 10
G. Does not hold trim position under load.	2, 5, 6
H. Trail out when backing off from high speed.	3, 4
I. Leaks down and does not hold trim.	2, 5, 7
J. Trim motor working hard and trims slow up and down.	8, 9
K. Trims up very slow.	1, 2, 8, 9
L. Starts to trim up from full down position when "IN" trim button is depressed.	3, 4
M. Trim position will not hold in reverse.	3, 4

### PROBLEM

1. Low oil level.
2. Pump assembly faulty.
3. Tilt ram piston ball not seated (displaced, dirt, nickel seat).
4. Tilt ram piston O-ring leaking or cut.
5. Manual release valve leaking (check condition of O-rings) (Valve not fully closed).
6. Lower check valve not seating in port side trim ram.
7. Upper check valve not seating in port side trim ram.
8. Check condition of battery.
9. Replace motor assembly.
10. Broken motor/pump drive shaft.



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## ELECTRICAL SYSTEM TROUBLESHOOTING (ROUND MOTOR)

CONDITION OF TRIM SYSTEM	PROBLEM
A. Trim motor does not run when trim button is depressed.	1, 2, 4, 5, 6, 7, 8
B. Trim system trims opposite of buttons.	3
C. Cowl mounted trim buttons do not activate trim system.	2, 4, 5, 6, 7

### PROBLEM

1. Battery low or discharged.
2. Open circuit in trim wiring.
3. Wiring reversed in remote control.
4. Wire harness corroded through.
5. Internal motor problem (brushes, shorted armature).
6. Blown fuse(s).
7. Trim switch failure.
8. Verify relays are functioning correctly.

### POWER TRIM RELAY TEST PROCEDURE

The trim motor relay system used on permanent magnet trim systems connect each of the two wires from the trim motor to either ground or positive in order to allow the motor to run in both directions.

If the motor will not run in the UP direction, it could be either the UP relay is not making contact to 12 volts **OR** the DOWN relay is not making contact to ground. The opposite is true if the system will not run DOWN. When the system is not energized, both relays should connect the heavy motor leads to ground.

To test which relay is faulty if the trim system does not operate in one direction:

1. Disconnect the heavy gauge pump wires from the trim control relay.

2. Check for continuity between the heavy leads from the trim relays to ground.

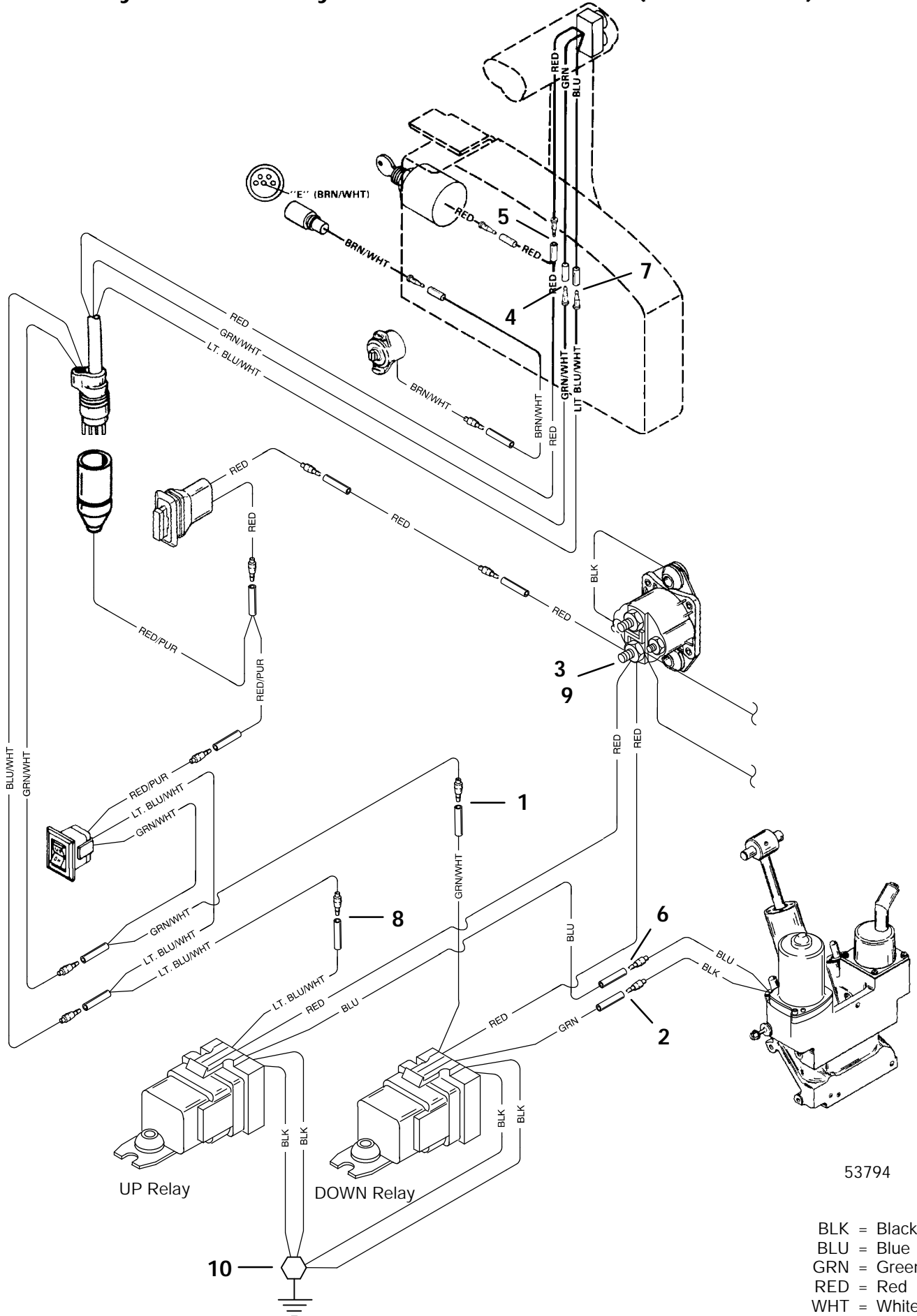
Ohmmeter Leads Between	Resistance (Ohms)	Scale Reading* (x _____)
GREEN and Ground	0	Full Continuity (Rx1)
BLUE and Ground	0	Full Continuity (Rx1)

Replace the relay that does not have continuity.

3. Connect a voltmeter to the heavy BLUE lead and to ground. You should have 12 volts on the BLUE lead when the UP switch is pushed. You should also have 12 volts on the GREEN lead when the DOWN switch is pushed. Replace the relay that does not switch the lead to positive.



# Power Trim System with Relays and 2 Wire Trim Motor (Round Motor)





# Electrical System Troubleshooting (Round Motor)

## GENERAL CHECKS

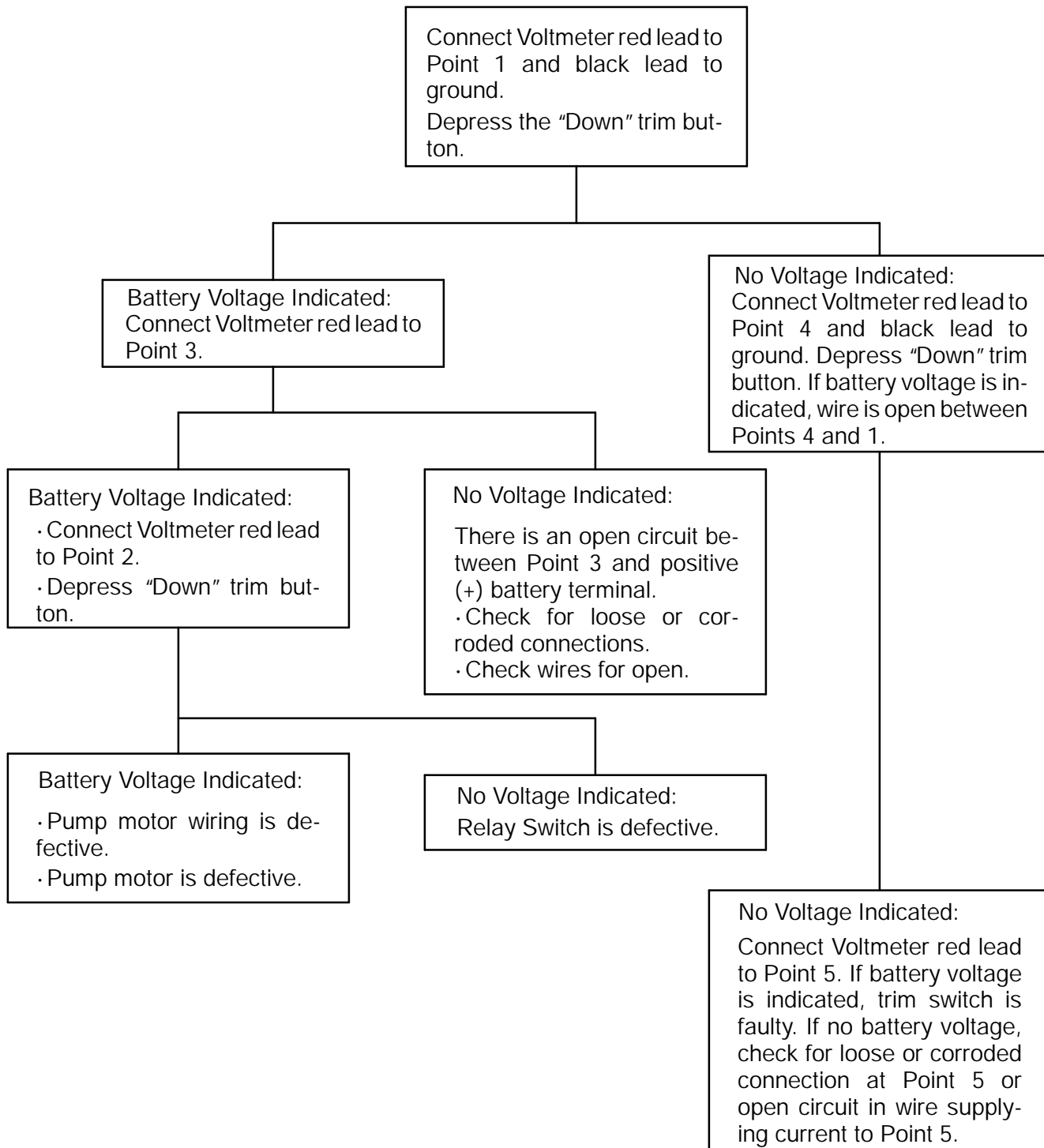
Before troubleshooting the Power Trim electrical system, check the following:

1. Check for disconnected wires.

2. Make certain all connections are tight and corrosion free.
3. Check that plug-in connectors are fully engaged.
4. Make certain battery is fully charged.

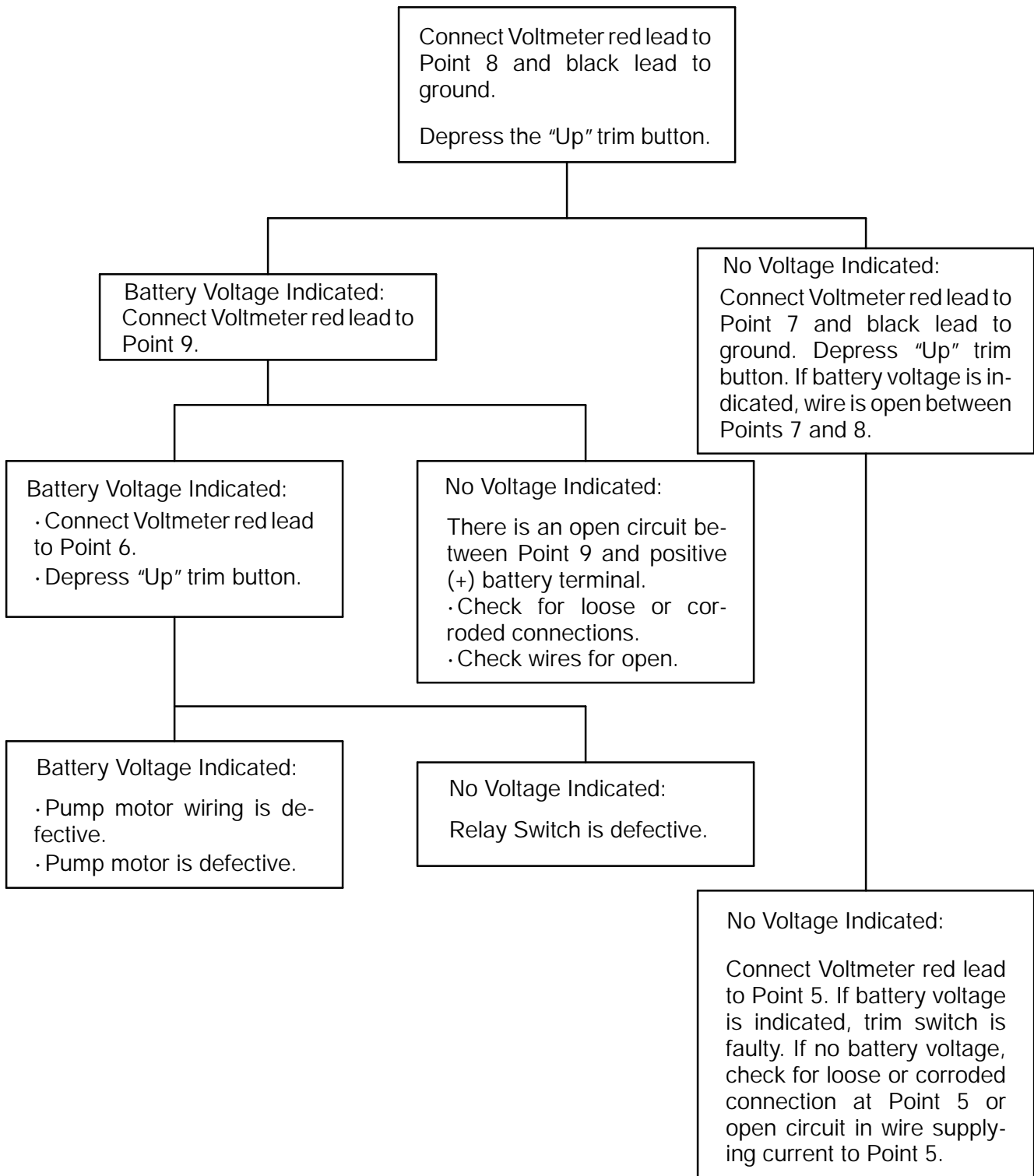
Refer to the preceding four wiring diagrams for connection points when troubleshooting the electrical systems (Connection points are specified by number.)

## Troubleshooting the "Down Circuit"



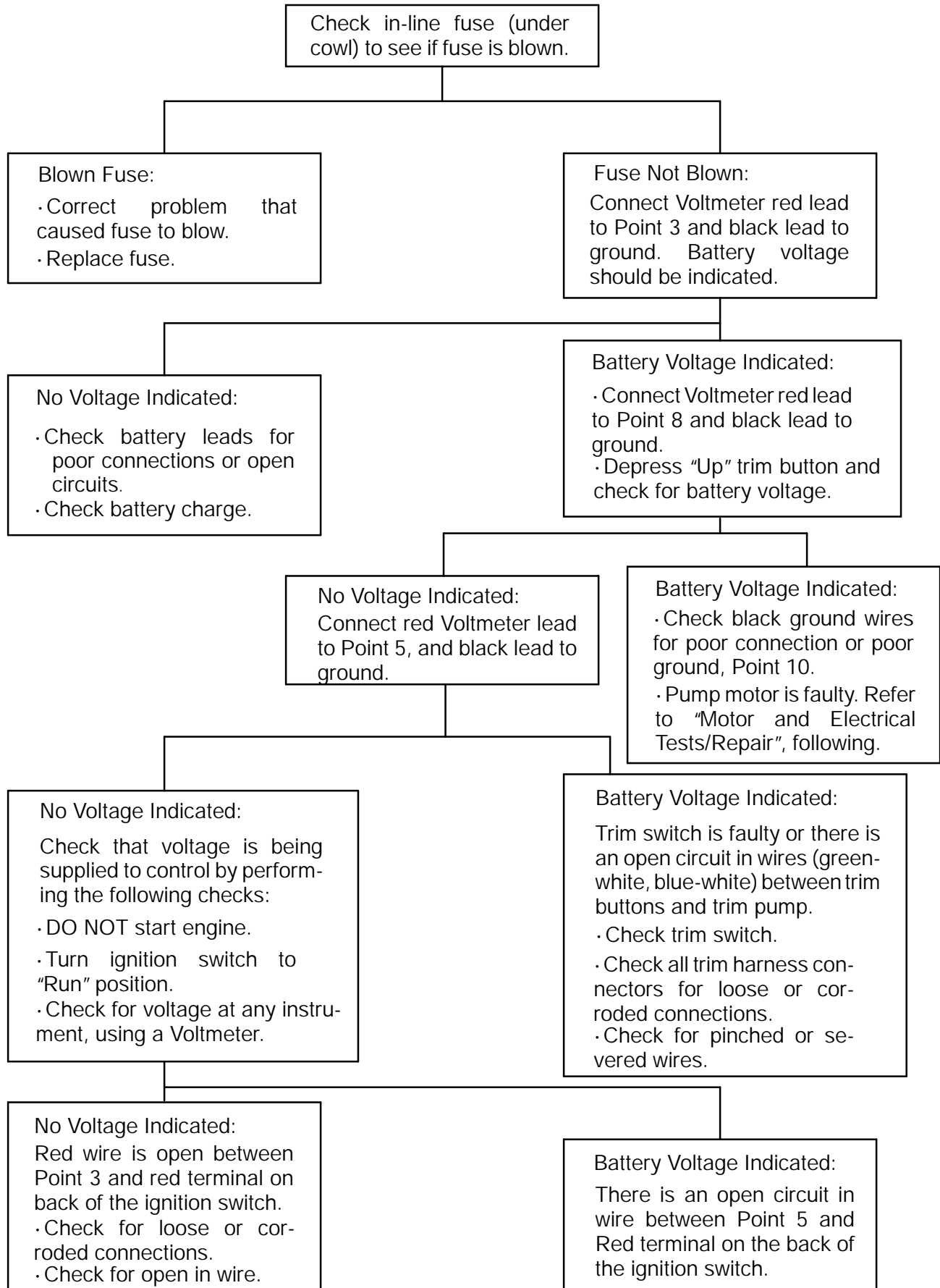


# Troubleshooting the "Up" Circuit





# Troubleshooting the "Down" and "Up" Circuits (All Circuits Inoperative)

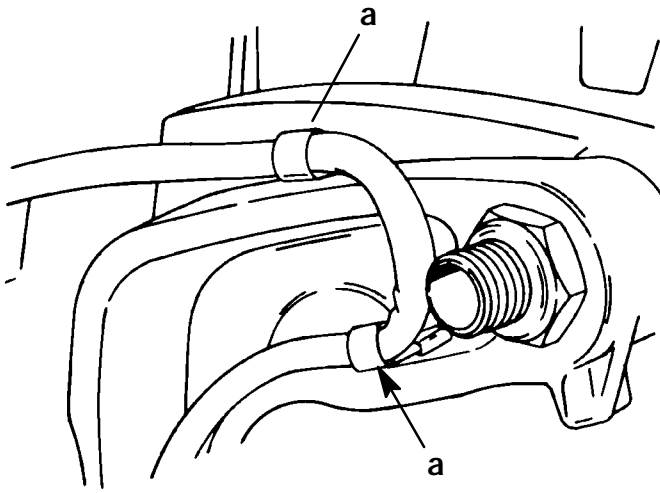




# Power Trim Assembly Removal and Installation (All Models)

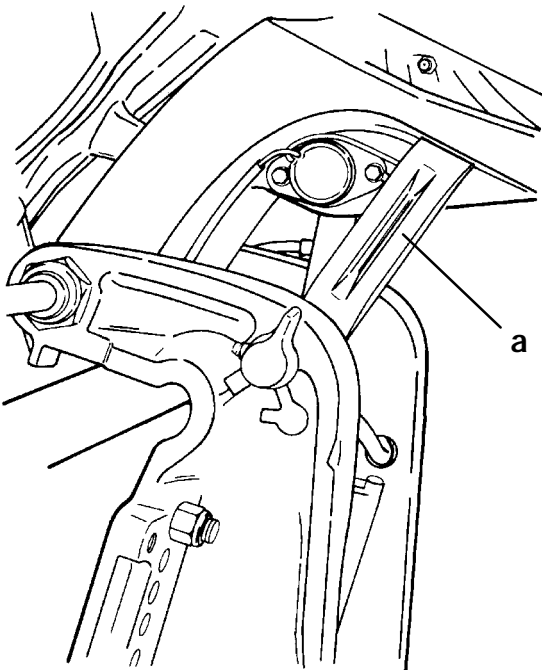
## Removal

1. Remove clamps on transom bracket to free power trim wiring.



a - Clamps

2. Raise outboard to full "Up" position and engage tilt lock lever.



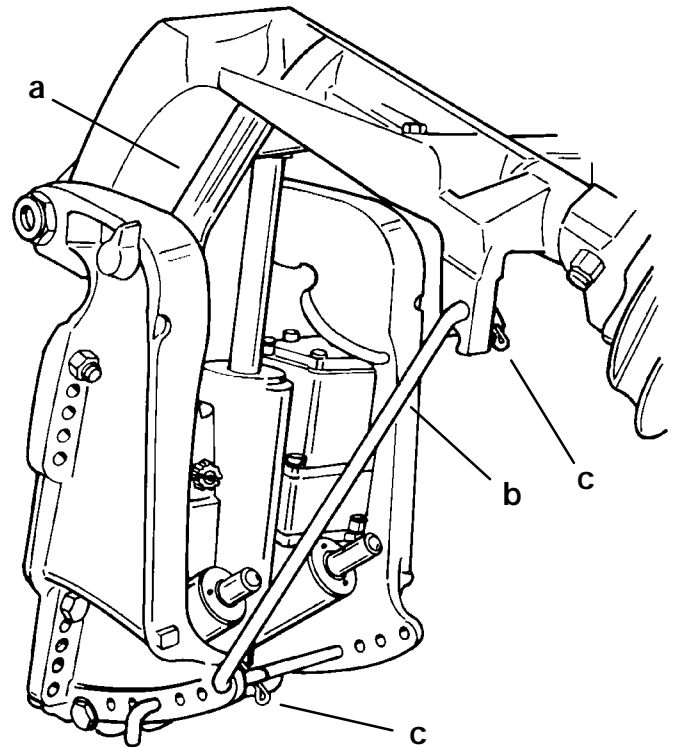
a - Tilt Lock Lever

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## ⚠ WARNING

Failure to support outboard as shown could result in personal injury and/or damage to outboard or boat.

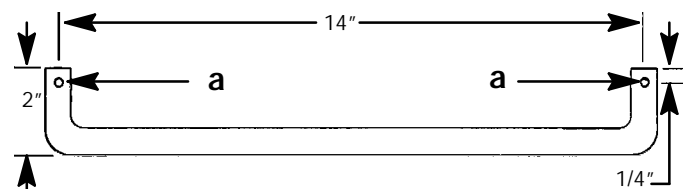


a - Tilt Lock Lever  
b - Support Tool  
c - Retaining Clips

**IMPORTANT:** Support outboard as shown above to prevent engine from tipping when power trim retaining pin is removed.

## SUPPORT TOOL

3/8 in. diameter metal rod (a used shift shaft works well)



a - Drill holes for retaining clips

## METRIC CONVERSION

14 in. = 35.56 cm.

2 in. = 50.8 mm

3/8 in. = 9.5 mm.

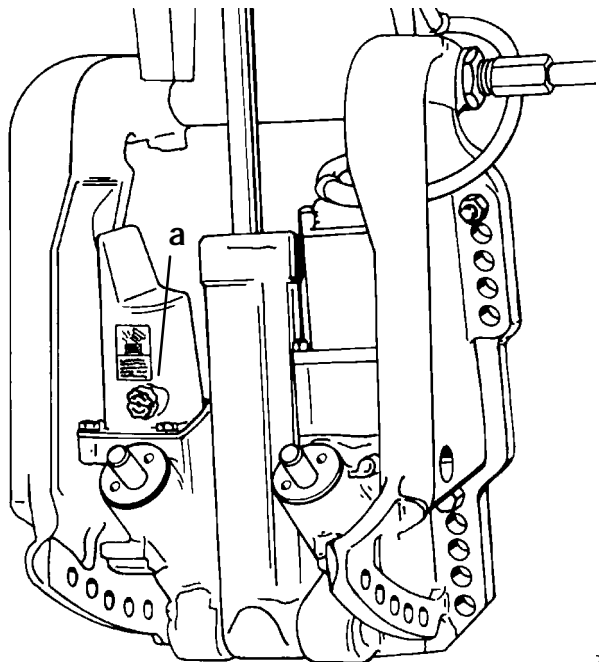
1/4 in. = 6.35 mm.



### CAUTION

Disconnect battery cables at battery before removing power trim wires from solenoids.

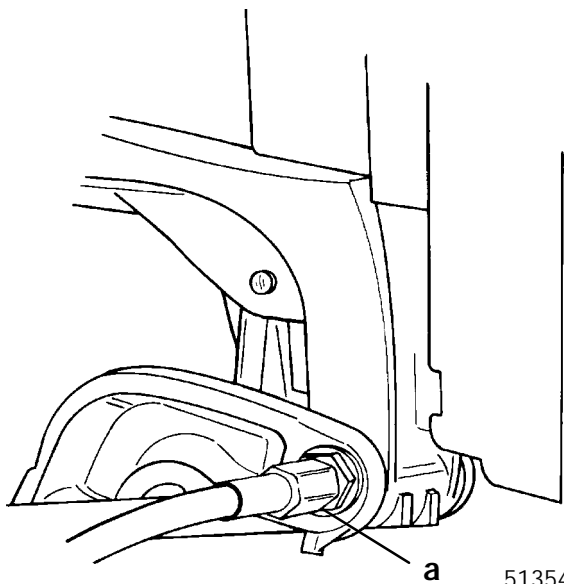
3. Disconnect power trim wires at solenoids (BLUE, GREEN, and BLACK) or if relay style, disconnect (BLUE and GREEN) bullet connector harness.
4. Open filler cap and release any remaining pressure in the system.



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a - Filler Cap

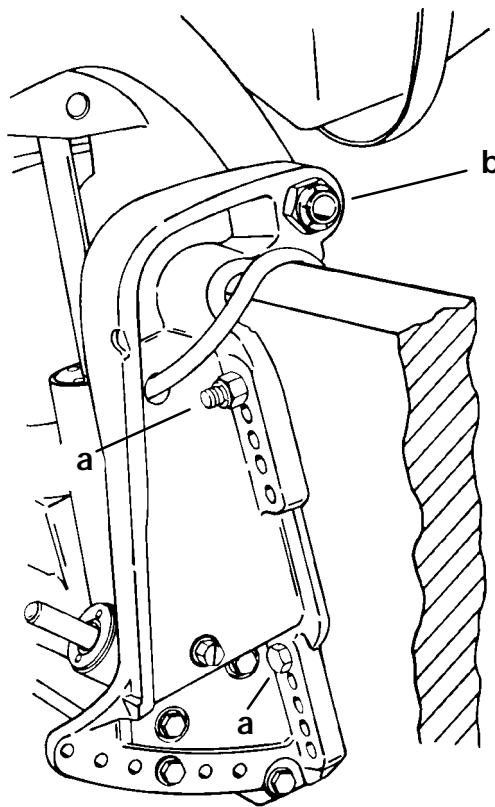
**IMPORTANT:** Outboards equipped with thru-tilt-tube steering - remove steering link arm from end of steering cable and cable retaining nut from tilt tube.



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a - Retaining Nut

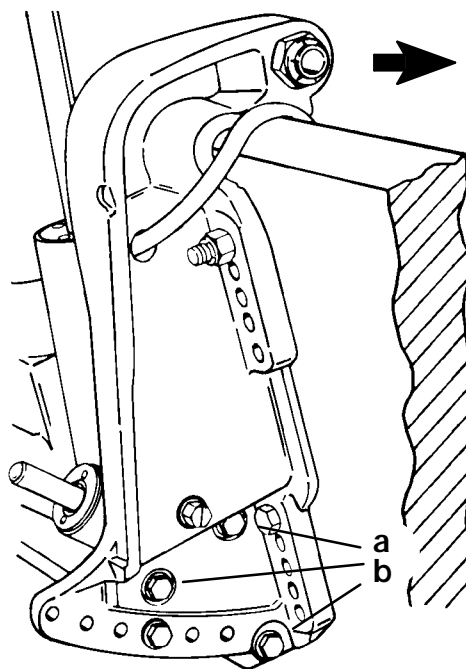
5. Remove outboard transom mounting bolts, and loosen tilt tube nut until nut is flush with end of tilt tube thread.



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- a - Transom Mount Bolts (2)
- b - Tilt Tube Nut (flush with end of thread)

6. Remove 3 screws and washers and move starboard transom bracket.



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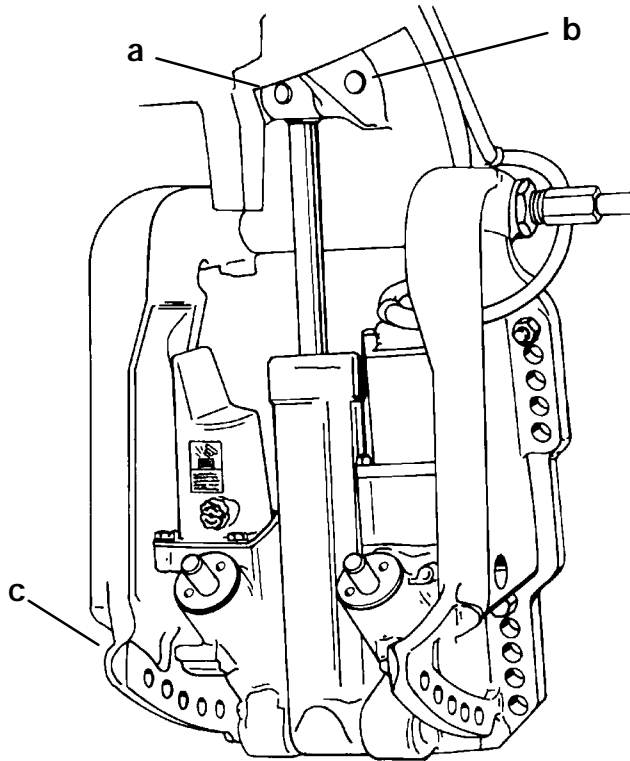
- a - Screws (3)
- b - Washers (3)





**IMPORTANT: Cross pin (a) should not be reused. Replace with new cross pin.**

7. Drive out cross pin, push out upper swivel pin, and remove 3 screws and washers retaining trim system. Remove system from outboard.

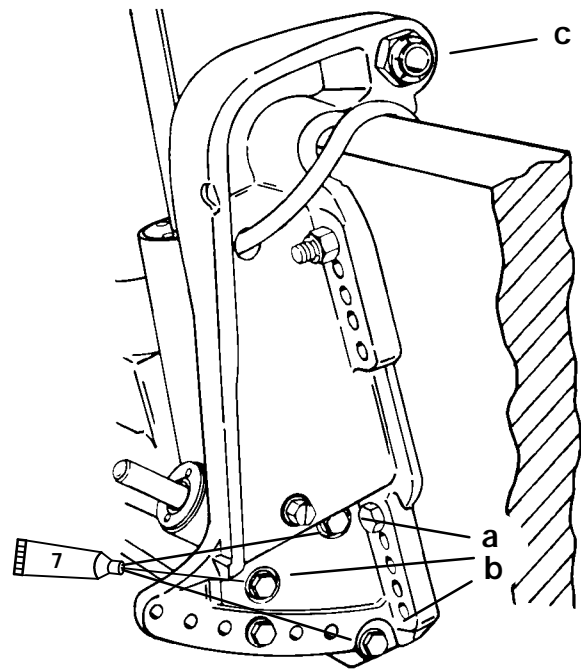


- a - Cross Pin
- b - Upper swivel pin
- c - Port transom bracket screws and washers (3). Remove to release trim system from outboard.

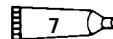
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## Installation

1. Paint any exposed metal surfaces to prevent corrosion.
2. Apply Loctite 271 to screws. Install trim system, starboard transom bracket, and tilt tube nut.



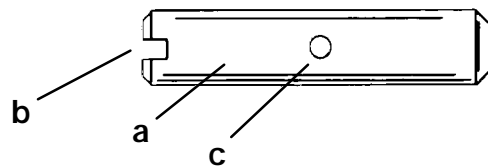
51375



Loctite 271 (92-809820)

- a - Screw (6) Torque to 40 lb. ft. (54.0 N-m)
- b - Lockwasher (6) Install one per screw
- c - Tilt Tube Nut

3. Use a 12 volt power source to extend tilt ram up to align upper swivel shaft hole and end of ram. Connect trim motor wires [BLUE wire to POSITIVE (+), BLACK wire to NEGATIVE (-)]. If ram extends too far, retract ram by connecting GREEN wire to POSITIVE (+).
4. Install Upper Swivel Pin with slotted end to left (port) side of engine.

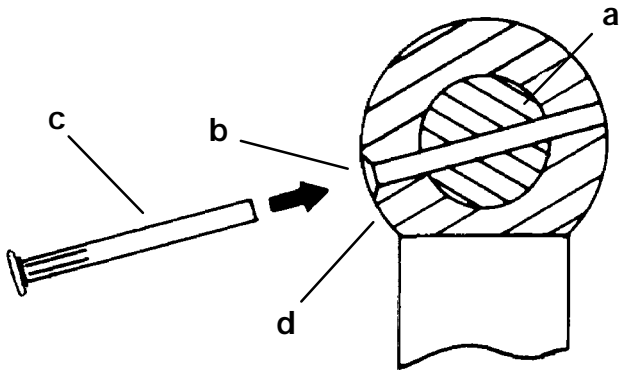


- a - Upper Swivel Pin
- b - Slotted end
- c - Cross hole (in line with slotted end)

**IMPORTANT: Cross pin should not be reused. Install a new pin.**



- Position slot on end of swivel shaft in line with hole in tilt ram end. Insert a punch into tilt ram hole to align cross hole in upper swivel shaft. Tap new cross pin in until flush.



- a - Upper Swivel Shaft (Slot is in line with cross hole)
- b - Chamfered end of hole (Faces away from transom)
- c - Retaining pin
- d - Tilt ram end

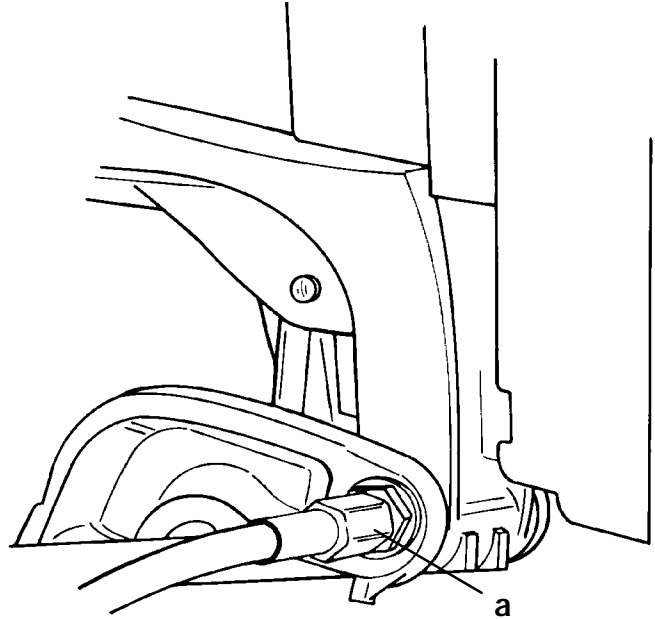
- Connect trim motor wires to solenoids. Refer to Wiring Diagrams in this manual. Route trim wires as specified in this manual.
- Apply marine sealer to shanks of mount bolts and install transom mount bolts.

**IMPORTANT: Do not use an impact driver to tighten transom mount bolts.**

Apply marine sealer to threads of mount bolts. Secure with flat washers and locknuts. Be sure installation is watertight.

- Tighten tilt tube nut securely.

**IMPORTANT: Outboards equipped with thru-the-tilt-tube steering: Tighten steering cable retaining nut securely to tilt tube.**



- a - Steering Cable Retaining Nut

- Apply Quicksilver Liquid Neoprene (91-25511--2) on all electrical connections.

**⚠ WARNING**

**Electrical wires passing through cowl openings must be protected from chafing or being cut. Follow the recommended procedures outlined in Section 1 of this Manual. Failure to protect wires as described could result in electrical system failure and/or injury to occupants of boat.**



## Testing Power Trim System With Test Gauge Kit (91-52915A6)

**IMPORTANT:** This test will not locate problems in the trim system. The test will show if the system is correct after a repair. If minimum pressures are not obtainable, the trim system requires additional repair.

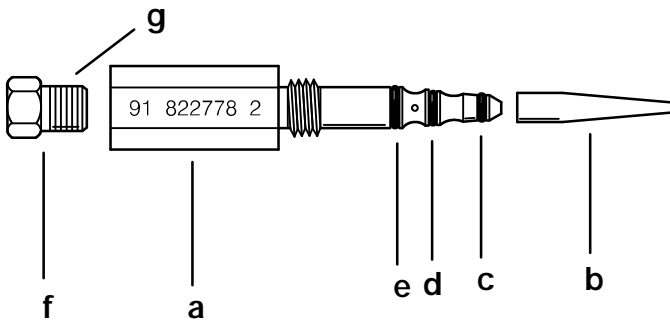
### “UP” Pressure Check

**IMPORTANT:** Insure battery is fully charged before performing tests.

1. Tilt outboard to full “Up” position and engage tilt lock lever.
2. Slowly remove “Fill” plug to bleed pressure from reservoir.
3. Remove circlip securing manual release valve and unscrew release valve from trim assembly.

**NOTE:** A small amount of trim fluid may drip from manual release valve hole. Place a suitable container under trim assembly to collect any leakage.

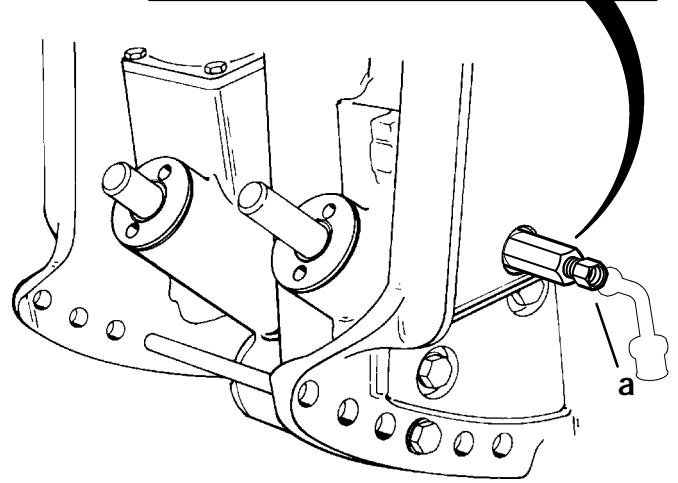
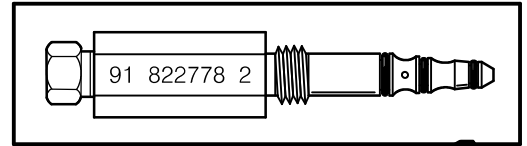
**NOTE:** Assemble test adaptor by using O-ring installation tool to position small O-ring onto adaptor 1st, then install medium O-ring and lastly large O-ring. Thread brass fitting into test adaptor securely using teflon tape on threads.



54457

- a - Test Adaptor (91-822778A2)
- b - O-ring Installation Tool
- c - Small O-ring (Install 1st)
- d - Medium O-ring (Install 2nd)
- e - Large O-ring (Install Last)
- f - Brass Fitting
- g - Apply Teflon Tape

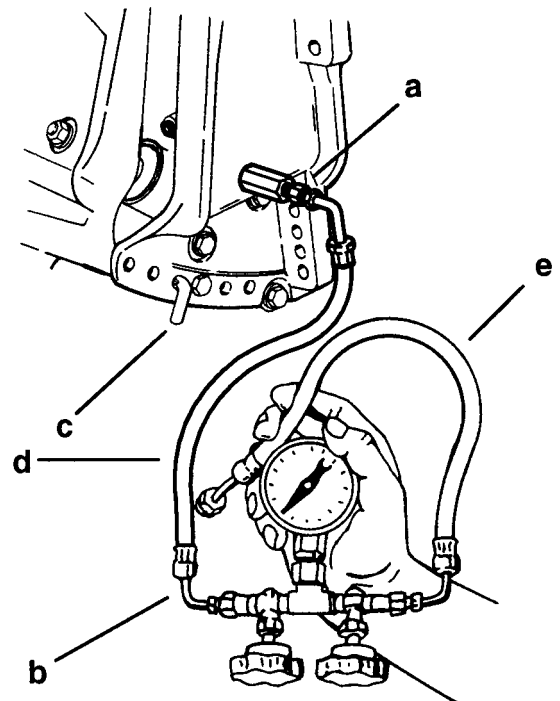
4. Install test adaptor 91-822778A2 into manual release valve hole.



54458

- a - Test Adaptor (91-822778A2)

5. Thread hose from Test Gauge Kit (91-52915A6) into brass fitting on adaptor.



54459

- a - Brass Fitting
- b - Test Gauge Assembly
- c - Tilt Pin (Position in Hole Shown)
- d - Hose
- e - Hose (Not Used)

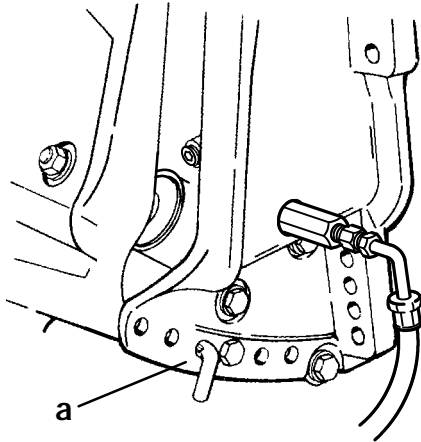
6. Reinstall fill plug.
7. Disengage tilt lock lever.



## CAUTION

Failure to install spare tilt pin (or hardened bolts and nuts) in hole shown could result in transom bracket failure and possible injury.

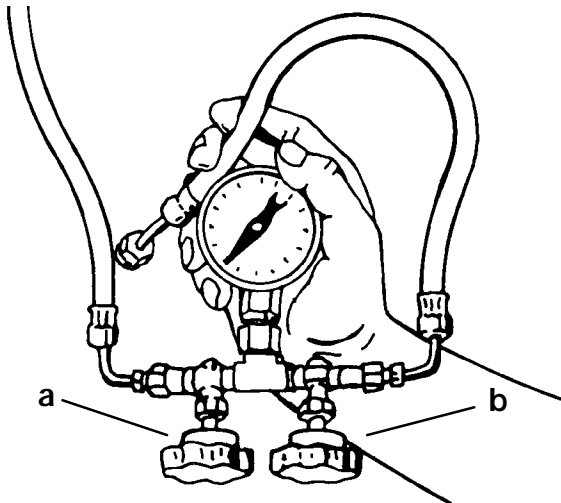
8. Move outboard "IN" until hole in swivel bracket "ear" aligns with the 3rd tilt hole in transom bracket. Lock engine in trim range by installing a 3/8 in. (9.5 mm) diameter tilt pin or two 3/8 in. (9.5 mm) hardened bolts and nuts thru the transom brackets and swivel bracket in the hole shown.



54460

a - Tilt Pin Hole (Install Spare Tilt Pin or Hardened Bolts and Nuts)

9. Open valve (a) and close valve (b).



374

10. Run trim "UP". The minimum pressure should be 1300 psi (8902.4kPa).
11. Run trim "DOWN" to release pressure and remove spare tilt pin or bolts and nuts.
12. Tilt outboard full "UP" and engage tilt lock lever.
13. Slowly remove "Fill" plug to bleed pressure.
14. Remove test gauge hose and adapter.
15. Reinstall Manual Release Valve and secure valve with circlip.

16. Retighten "Fill" plug.

**NOTE:** If pressure is less than 1300 psi (8902.4kPa), troubleshoot system per instructions on page 5B-16.

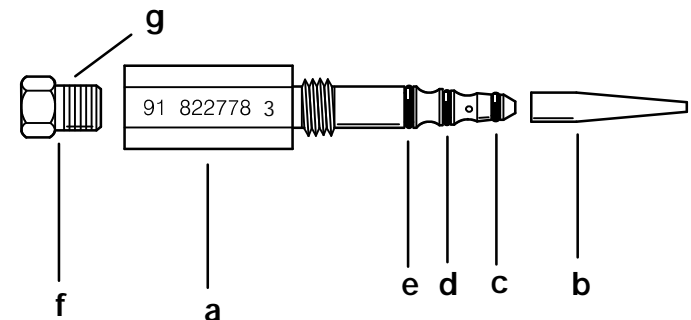
## "DOWN" Pressure Check

**IMPORTANT:** Insure battery is fully charged before performing tests.

1. Tilt outboard to full "Up" position and engage tilt lock lever.
2. Slowly remove "Fill" plug to bleed pressure from reservoir.
3. Remove circlip securing manual release valve and unscrew release valve from trim assembly.

**NOTE:** A small amount of trim fluid may drip from manual release valve hole. Place a suitable container under trim assembly to collect any leakage.

**NOTE:** Assemble test adaptor by using O-ring installation tool to position small O-ring onto adaptor 1st, then install medium O-ring and lastly large O-ring. Thread brass fitting into test adaptor securely using teflon tape on threads.

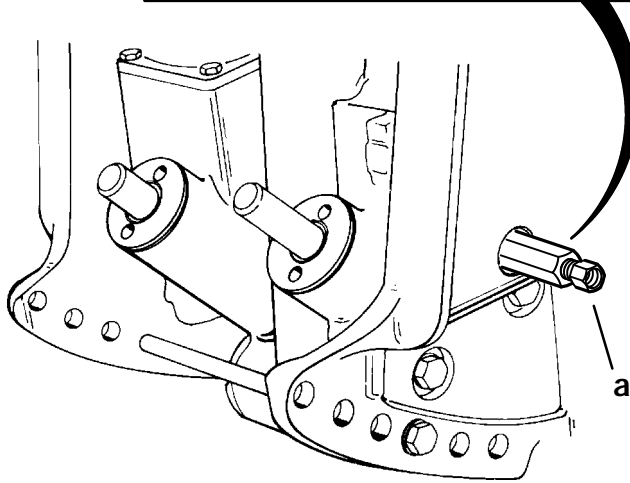
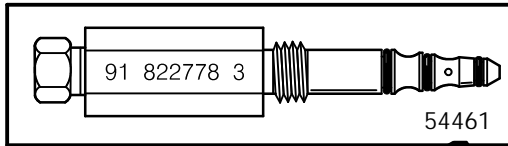


54457

- a - Test Adaptor (91-822778A3)
- b - O-ring Installation Tool
- c - Small O-ring (Install 1st)
- d - Medium O-ring (Install 2nd)
- e - Large O-ring (Install Last)
- f - Brass Fitting
- g - Apply Teflon Tape



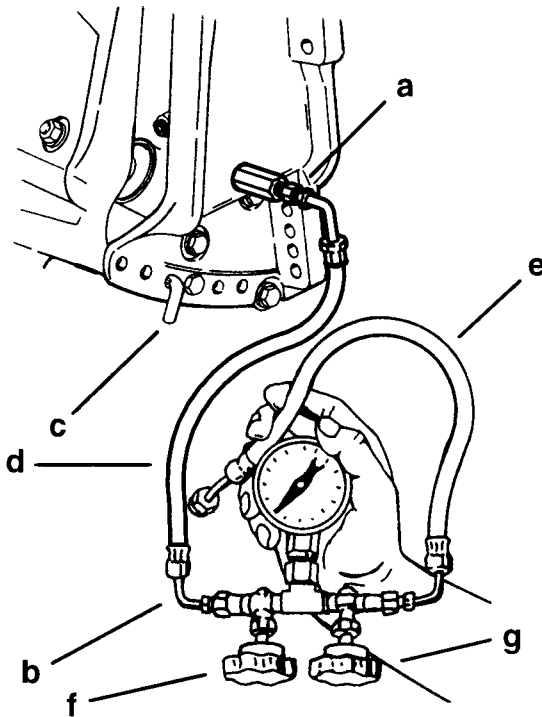
4. Install test adaptor 91-822778A3 into manual release valve hole.



54458

a - Test Adaptor (91-822778A3)

5. Thread hose from Test Gauge Kit (91-52915A6) into brass fitting on adaptor.



54459

- a - Brass Fitting
- b - Test Gauge Assembly
- c - Tilt Pin (Position in Hole Shown)
- d - Hose
- e - Hose (Not Used)
- f - OPEN Valve
- g - CLOSE Valve

6. Reinstall fill plug.
7. Disengage tilt lock lever.
8. Open valve (f) and close valve (g).
9. Run trim "DOWN". Minimum pressure should be 500 p.s.i. (4324.0kPa).
10. Tilt outboard full "UP" and engage tilt lock lever.
11. Slowly remove "Fill" plug to bleed pressure.
12. Remove test gauge hose and adaptor.
13. Reinstall manual release valve and secure valve with circlip.
14. Retighten "Fill" plug.

**NOTE:** If pressure is less than 500 psi troubleshoot system per instructions on Page 5B-16.

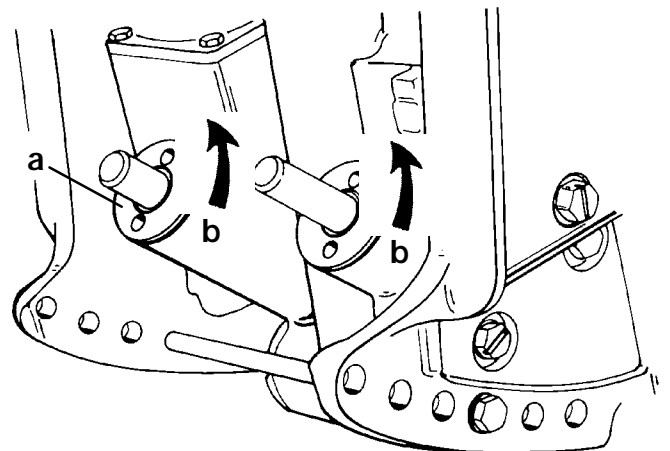
## Hydraulic Repair

### TRIM ROD REMOVAL AND REPAIR

**Note:** Power Trim does not have to be removed from outboard to remove trim rods.

1. Tilt outboard to full "UP" position and engage tilt lock lever.
2. Slowly remove "Fill" plug to bleed reservoir pressure.
3. Turn Manual Release Valve 3 to 4 turns (counterclockwise) to bleed remaining pressure.
4. Remove trim rod cylinder caps.

**NOTE:** Place a clean pan under trim system to catch fluid.



51353

- a - Trim Rod Cylinder Cap
- b - Turn counterclockwise to remove



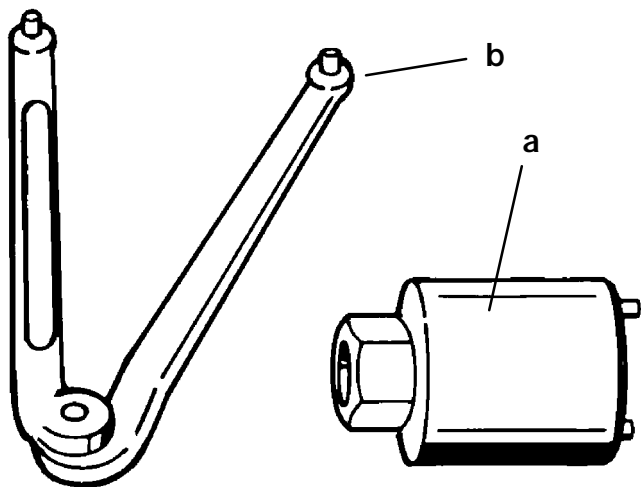
## CLEANING AND INSPECTION - TRIM RODS AND CAPS

### ⚠ CAUTION

Do not remove check valve (a). Check valve is preset to operate at a specific pressure. Removal and installation of check valve could result in improper operating pressure and possible system damage.

**NOTE:** Check valve is in port side trim rod only.

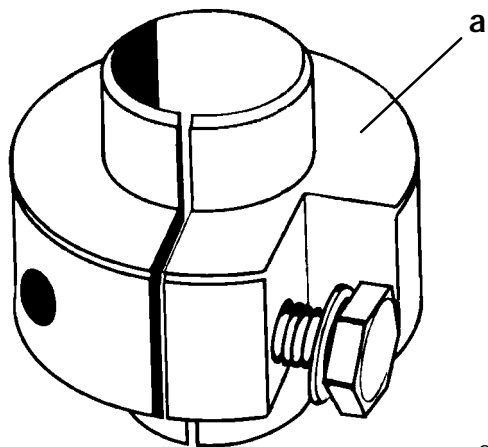
1. Inspect check valve and check valve screen for debris; if debris cannot be removed, replace trim rod assembly. Clean trim rod with parts cleaner and dry with compressed air.



51357

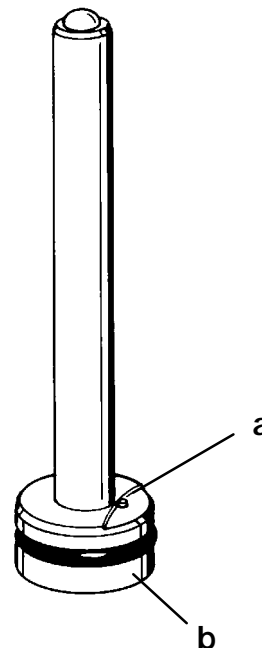
- a - Removal Tool (91-44487A1)
- b - Spanner Wrench (91-74951)

5. Install trim rod removal tool and pull trim rod from cylinder.



27933

- a - Trim Rod Removal Tool (91-44486A1)

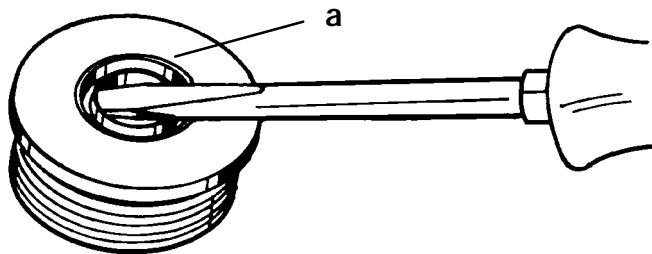


51352

- a - Check valve
- b - Check valve screen

## Trim Rod End Cap Seal

1. Inspect trim cap end seal and replace if damaged or if seal does not keep trim rod clean.



- a - Seal (Remove as shown)

2. Install new seal with seal lip up.

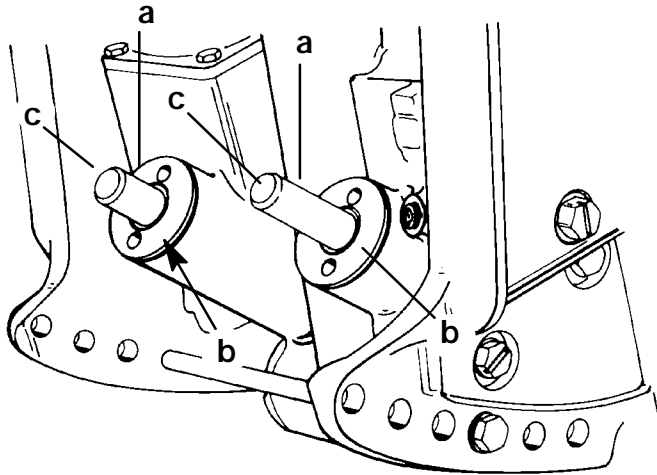


## TRIM ROD INSTALLATION

**IMPORTANT:** Components must be free of dirt and lint. Any debris in the system can cause system to malfunction.

**NOTE:** Install trim rod with check valve in the port (left) cylinder.

1. Apply Quicksilver Power Trim and Steering Fluid on all O-rings and seals before installation.
2. Install trim rods and caps. Use installation tool (91-44487A1) or spanner wrench (91-74951) to tighten caps securely.



51353

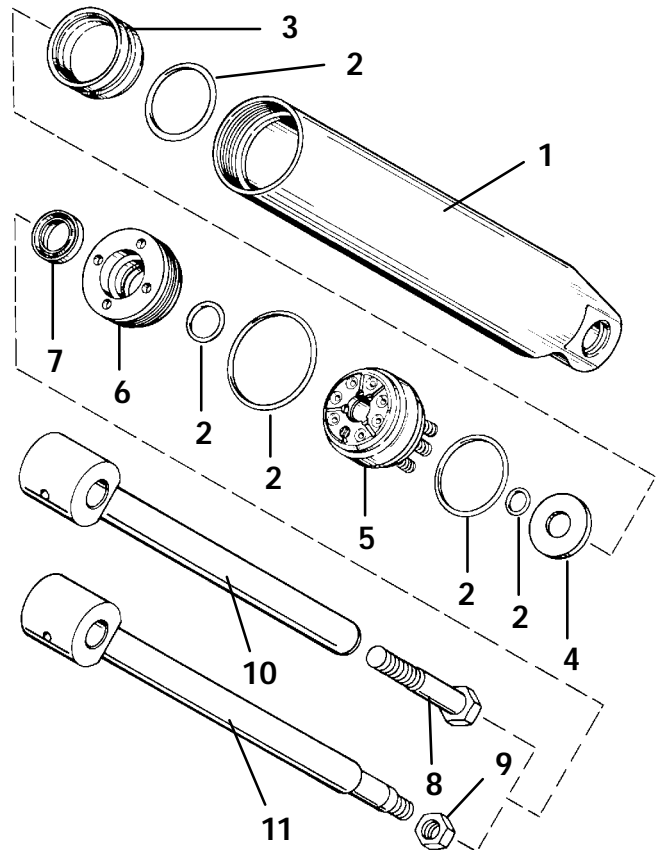
- a - Trim rods
- b - Cylinder end caps
- c - Rod end rollers (lubricate with Quicksilver Anti-Corrosion Grease or Special Lubricant 101)

## Tilt Ram

### REMOVAL - TILT ROD ASSEMBLY ONLY

**NOTE:** Tilt Rod Assembly can be removed from cylinder without removing entire power trim system from outboard.

### TILT RAM COMPONENTS



- 1 - Housing - Tilt Ram
- 2 - O-ring\* (5)
- 3 - Memory Piston\*\*
- 4 - Washer
- 5 - Piston Assembly
- 6 - End Cap
- 7 - Oil Seal
- 8 - Bolt (Design 1)
- 9 - Nut (Design 2)
- 10- Tilt Rod (Design 1)
- 11- Tilt Rod (Design 2)

\*O-ring Repair Kit Available, P.N. 811607A1 (Includes item 7, Oil Seal)

\*\*Memory piston (3) for tilt rods (j and k) are different and must be used with correct tilt rod/cylinder assembly. Memory piston for Design 1 tilt rod is flat, Design 2 is dished to clear nut and thread.

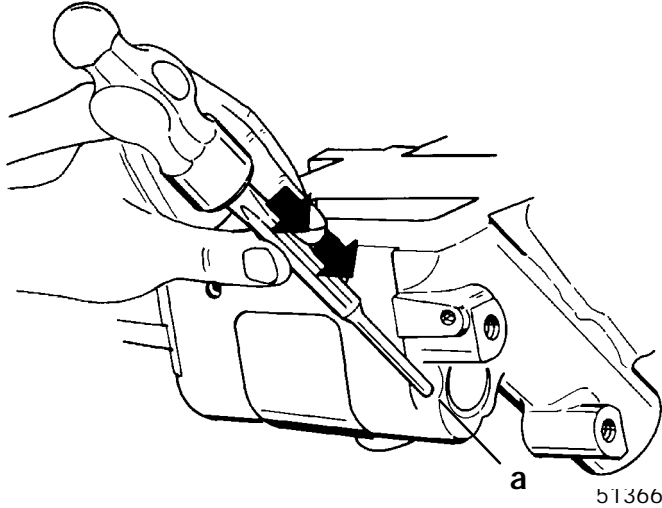


# TILT RAM REMOVAL - POWER TRIM SYSTEM REMOVED FROM OUTBOARD

**CAUTION**

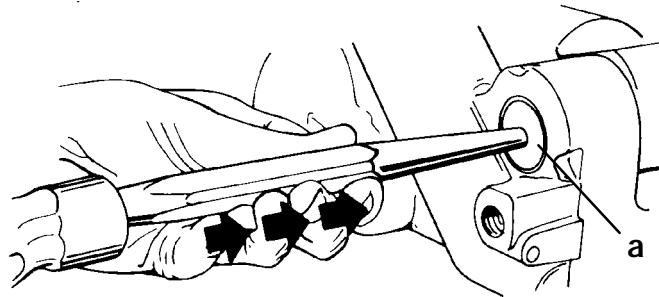
Insure trim system is depressurized prior to tilt ram removal.

- 1. Remove cross pin.



a - Cross Pin (Remove as shown)

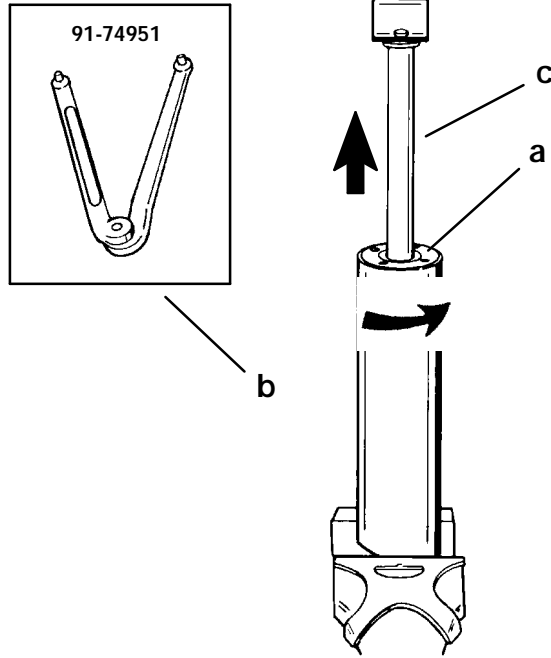
- 2. Remove lower swivel pin.



a - Lower Swivel Pin (Remove as shown)

## Disassembly

- 1. Secure tilt ram in a soft jawed vise. Remove tilt rod and cap.

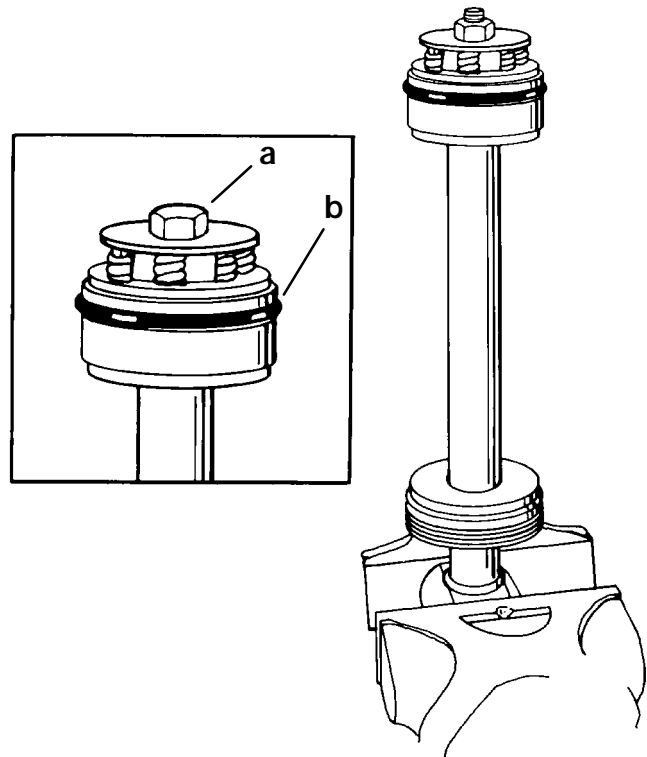


a - Cap (Turn counterclockwise to remove)

b - Spanner wrench (91-74951)

c - Tilt Rod - Pull to remove

- 2. Clamp tilt rod in a soft jawed vise. Remove bolt or nut as applicable to disassemble rod assembly. Remove O-ring.



a - Bolt (Design 1) or Stud/Nut (Design 2)

b - O-Ring

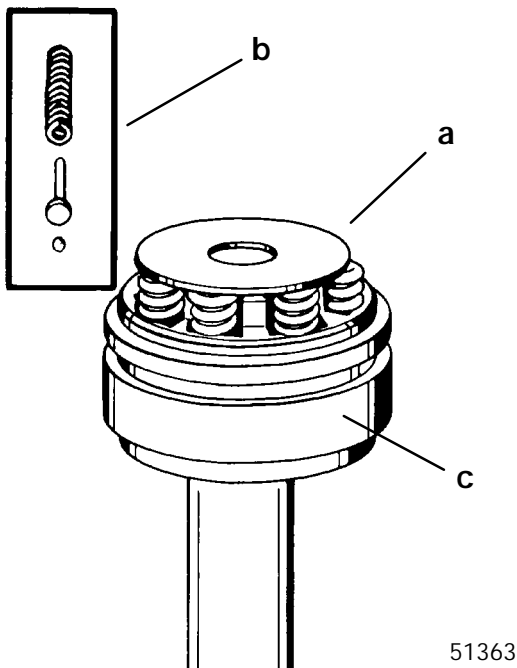




**IMPORTANT:** Note Design 1 and 2 on page 5B-36. Design 1 tilt rod assembly replaces either tilt rod assembly. Either design will fit as a (replace) cylinder assembly complete. Design 2 will NOT fit a cylinder originally using a Design 1 tilt rod assembly. Memory Pistons for Design 1 and 2 differ also and must be used only on the cylinder the piston was removed from.

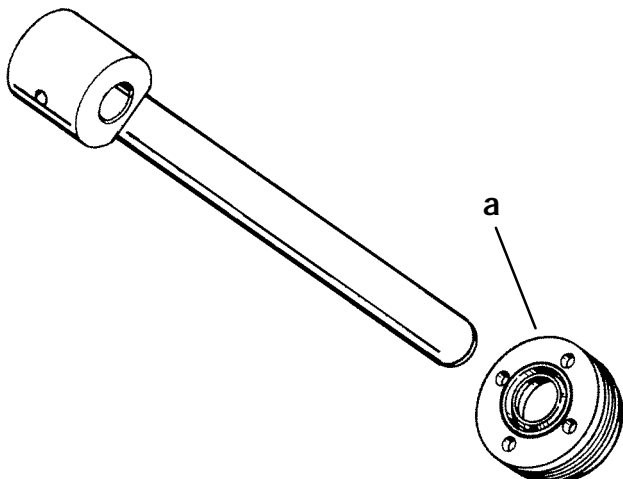
3. Remove washer, check valve assemblies, and piston.

**NOTE:** Check valve held in by roll pin can be cleaned but not removed.



- a - Washer
- b - Check valve assembly (7)
- c - Piston

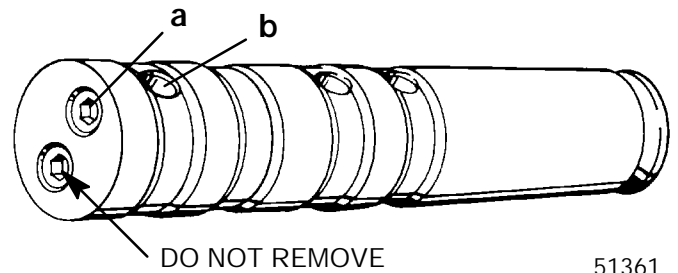
4. Remove end cap from tilt rod.



- a - End cap

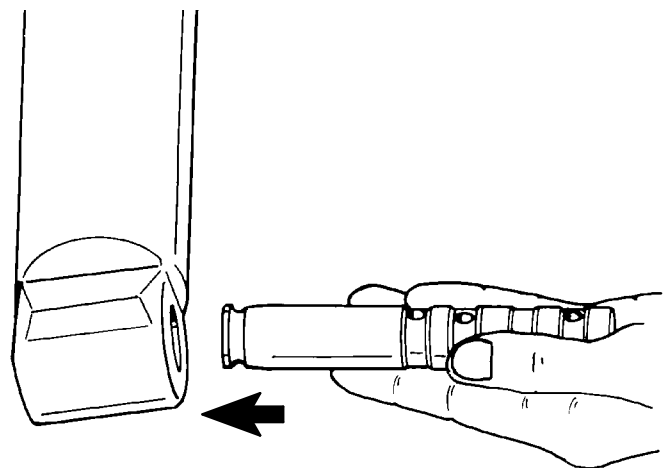
5. Remove allen plug.

**IMPORTANT:** Remove plug from same side as holes in shaft.



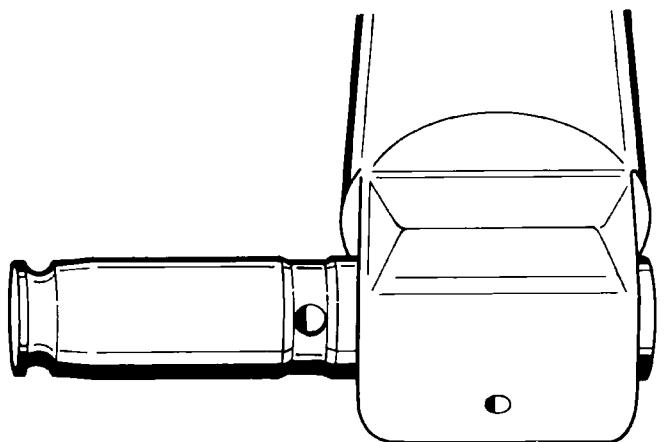
- a - Allen plug
- b - Hole in shaft

6. Lubricate shaft with Quicksilver Power Trim and Steering Fluid. Insert shaft into cylinder.



51342

7. Tap shaft into cylinder until shaft is positioned as shown.



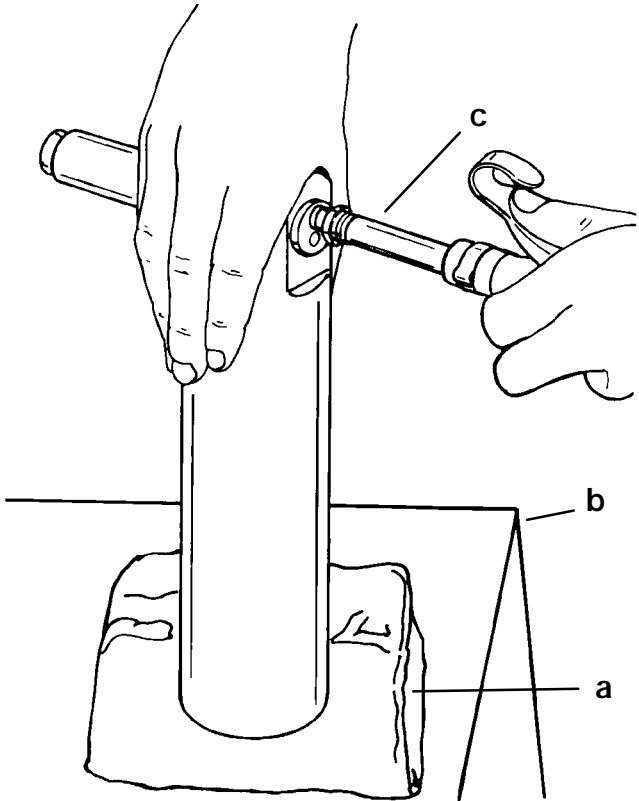
51365



### ⚠ WARNING

Memory Piston Cup may be expelled at a high velocity when air pressure is applied. Failure to place cylinder as shown below could result in personal injury.

- 8. Place cylinder as shown. Hold down on cylinder and inject air into shaft opening.



- a - Shop Cloth
- b - Solid surface
- c - Air nozzle

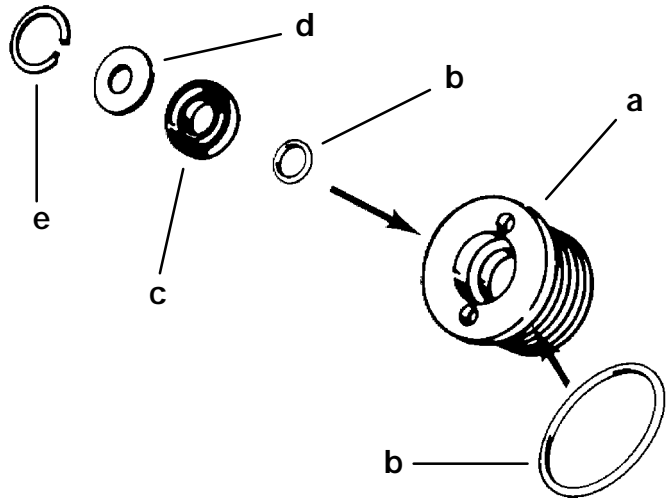
- 9. Remove shaft after Memory Piston Cup has been expelled. Replace allen plug removed in Step 5 and tighten securely.

### CLEANING AND INSPECTION

- 1. Inspect all internal parts for damage or wear. Clean and replace parts as necessary.
- 2. Inspect tilt rod for scratches. Replace scraper seal in rod end cap if tilt rod is scratched or worn.
- 3. Slight scratches or tool marks less than 0.005 in. (0.1 mm) deep in cylinder are acceptable.

### Scraper Seal Replacement

- 1. Remove components from end cap.



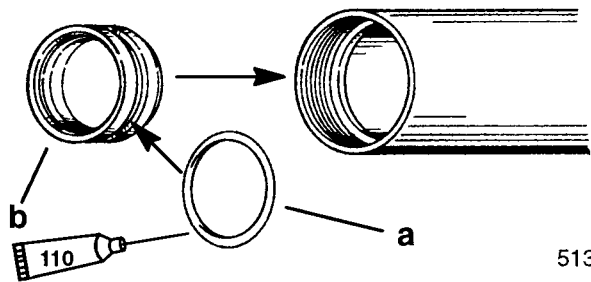
- a - Cap
- b - O-ring (2)
- c - Scraper seal
- d - Washer
- e - Retaining ring

### REASSEMBLY

**IMPORTANT:** Components must be clean for reassembly. Any debris in the system can cause the system to malfunction.

**NOTE:** Refer to "Tilt Ram Components" for proper O-ring sizes.

- 1. Apply Quicksilver Power Trim and Steering Fluid on O-rings prior to reassembly.
- 2. Install O-ring on Memory Piston Cup and install in cylinder.



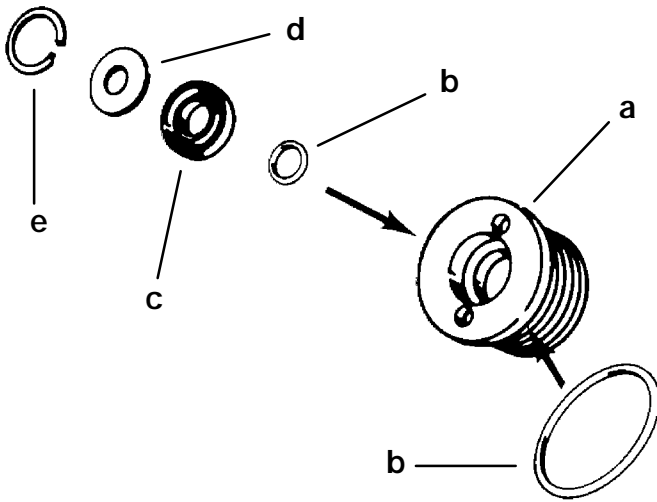
51372

Power Trim & Steering Fluid (92-90100A12)

- a - O-ring
- b - Memory piston cup (Design 1 shown)

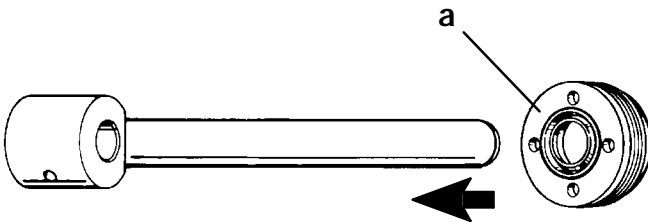


3. Assemble end cap.



- a - End Cap
- b - O-ring (2)
- c - Scraper seal
- d - Washer
- e - Retaining ring

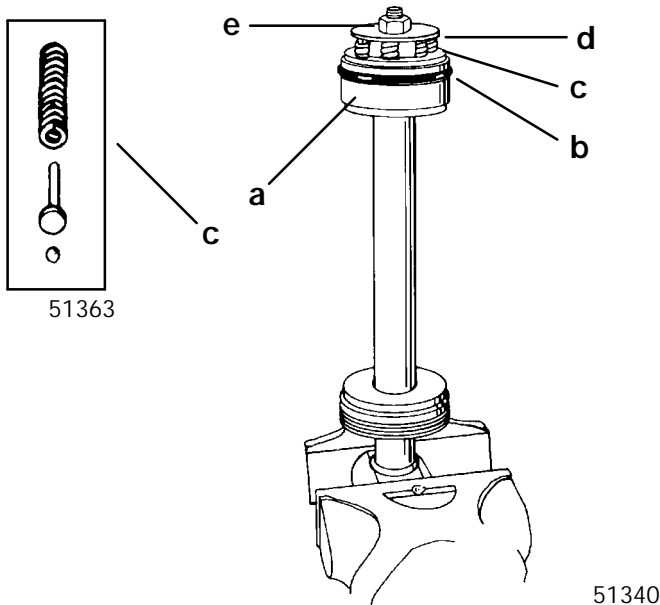
4. Install end cap.



51376

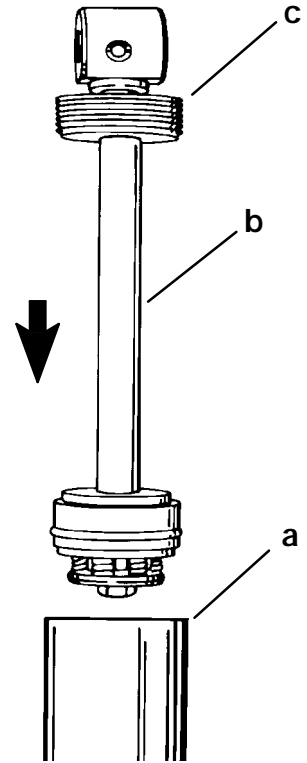
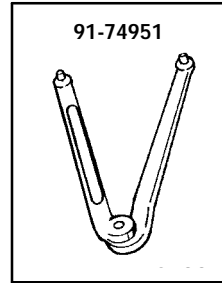
- a - End Cap

5. Install components on rod.



- a - Piston
- b - O-ring
- c - Check valve assembly (7)
- d - Washer
- e - Bolt or Locknut. (Tighten securely)

6. Clamp cylinder in a soft jawed vise and install tilt rod assembly. Use spanner wrench and tighten end cap securely.

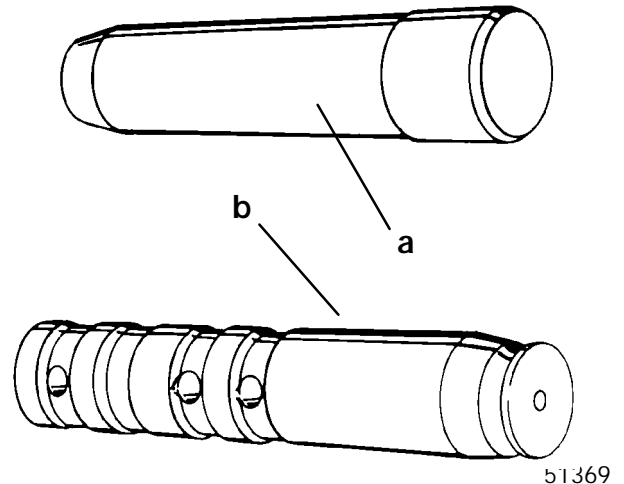


51341

- a - Cylinder
- b - Tilt rod assembly
- c - End cap (Tighten securely.) Use spanner wrench.

### TILT RAM ASSEMBLY INSTALLATION

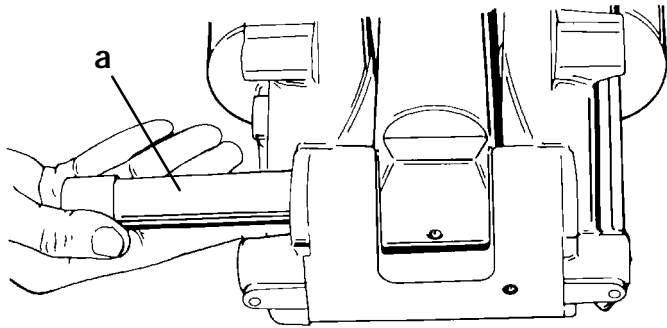
1. Lubricate alignment tool (91-11230) and shaft. Use Quicksilver Power Trim and Steering Fluid.



- a - Alignment Tool (91-11230)
- b - Shaft



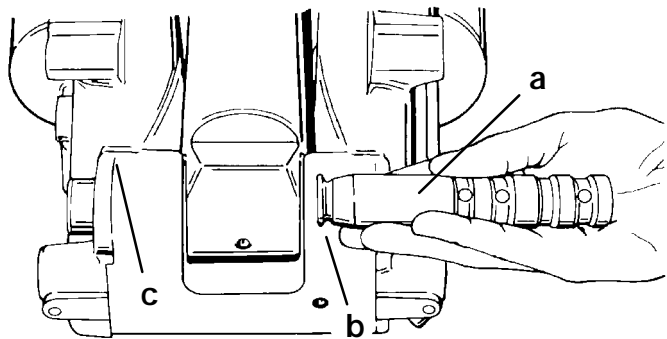
2. Align tilt ram and housing using alignment tool.



51348

a - Alignment Tool (91-11230)

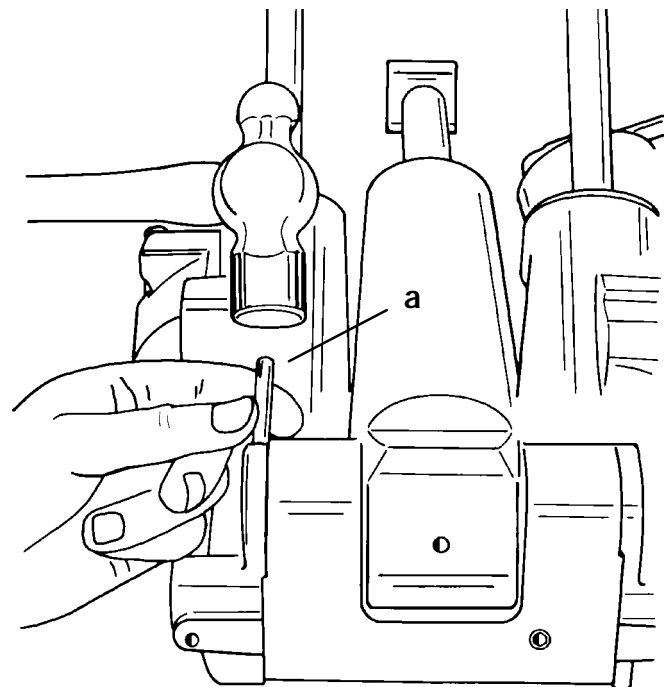
3. Install shaft.



51352

a - Shaft  
b - Groove  
c - Hole [groove (b) will align with this hole]

4. Drive pin in until flush.



51356

a - Pin (Drive Against Knurled End)

5. Install Power Trim Assembly on outboard. Refer to "Installation" instructions on page 5B-30.

### MOTOR AND PUMP REPLACEMENT (SQUARE MOTOR)

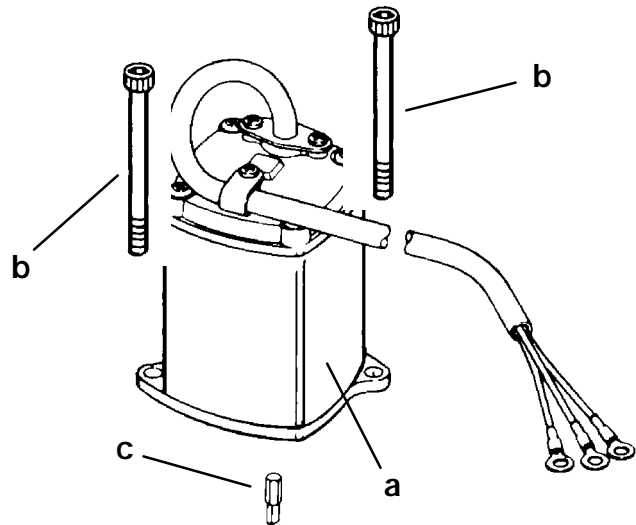
**IMPORTANT:** The pump is not rebuildable. If pump is defective, replace as an assembly.

**NOTE:** Power Trim System does not have to be removed from outboard to replace pump or motor.

1. Tilt outboard to full "UP" position. Depressurize power trim system, and loosen starboard transom bracket as outlined in "Removal and Installation" on page 5B-28.

2. Remove 2 screws to remove motor from system.

**NOTE:** Driveshaft is a loose part and may fall out of motor when motor is removed.

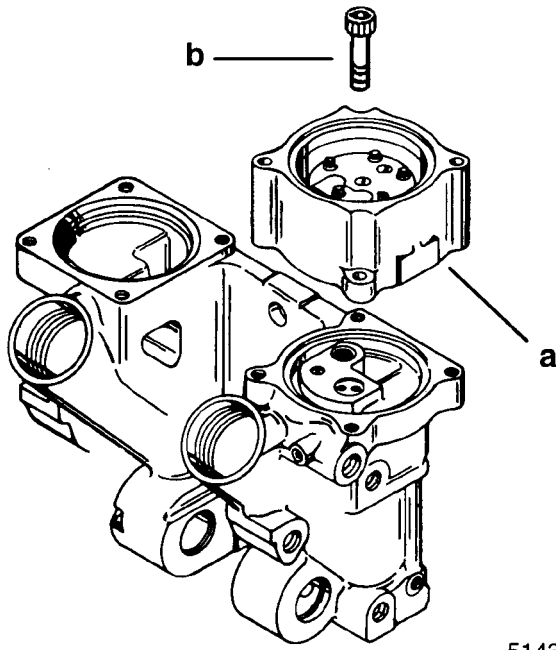


51455

a - Motor  
b - Screw (2)  
c - Driveshaft



3. Remove two screws to remove pump.



51433

a - Pump  
b - Screw (2)

## Motor and Electrical Tests/ Repair (Square Motor)

### Trim Pump Motor Test

#### **⚠ WARNING**

Do not perform this test near flammable materials, as a spark may occur while making electrical connections.

1. Connect a 12 volt power supply to motor wires [positive (+) to blue wire and negative (-) to black wire]. Motor should run. Disconnect blue wire and connect green wire to positive (+) terminal of power supply. Motor should run.
2. If motor does not run, disassemble and check components.

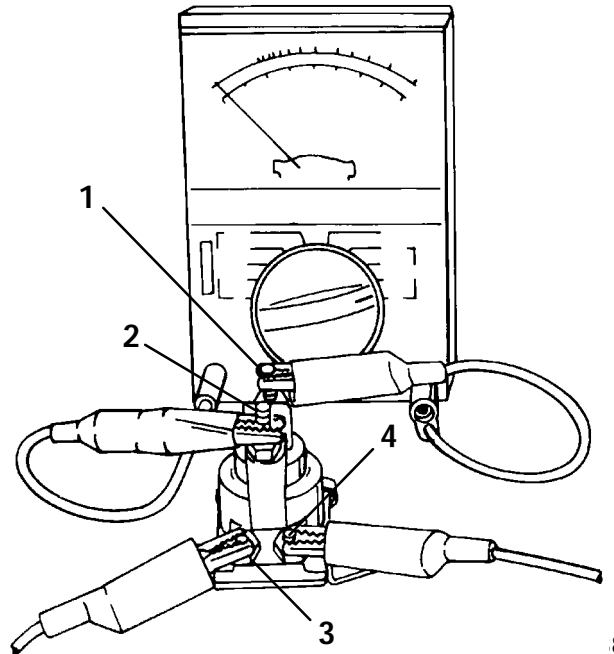
### Solenoid Test

#### **⚠ WARNING**

Do not perform this test near flammable materials, as a spark may occur while making electrical connections.

1. Disconnect all wires from solenoid terminals.

2. Set an Ohmmeter to Rx1 scale and connect meter leads to solenoid terminals 1 and 2.
3. Connect a 12 volt power supply to terminals 3 and 4. Solenoid should click and meter should read zero (0) ohms (full continuity).

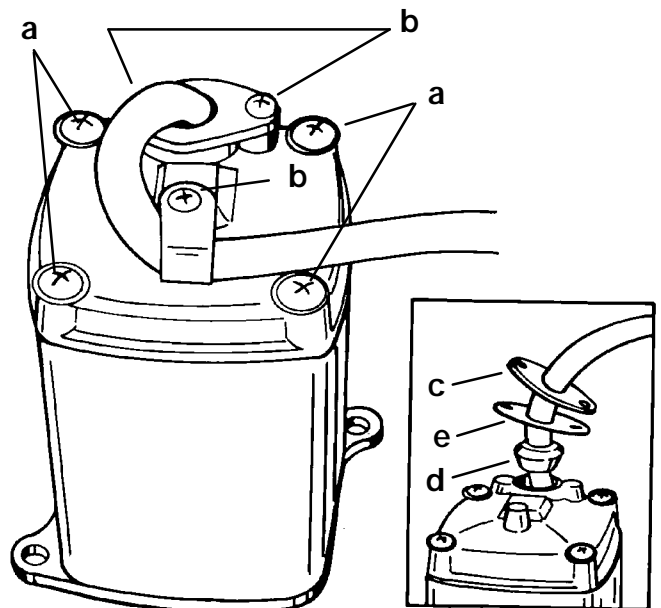


8

4. If meter does not read zero (0) ohms, replace solenoid.

### Motor Disassembly

1. Remove screws and clamp.

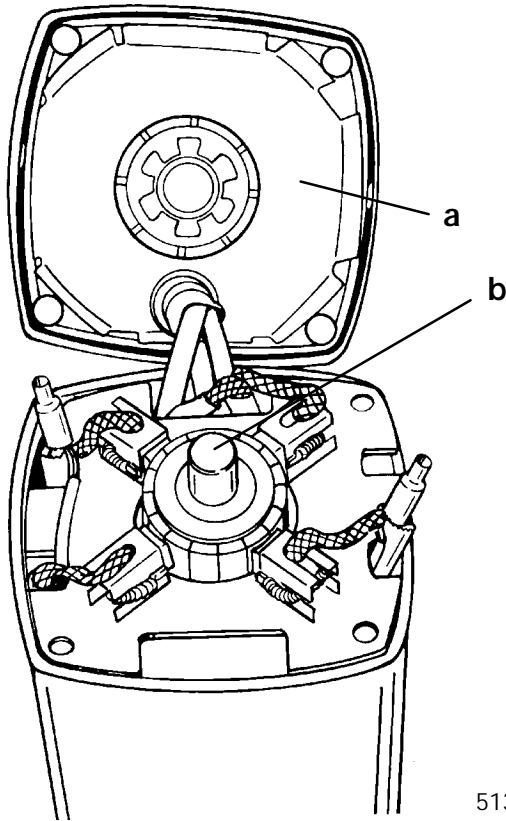


51345

a - Screw (4)  
b - Screw (3)  
c - Clamp  
d - Grommet  
e - Gasket



- Lift motor from end cap. Use care not to drop armature.



51349

- a - End Cap
- b - Armature

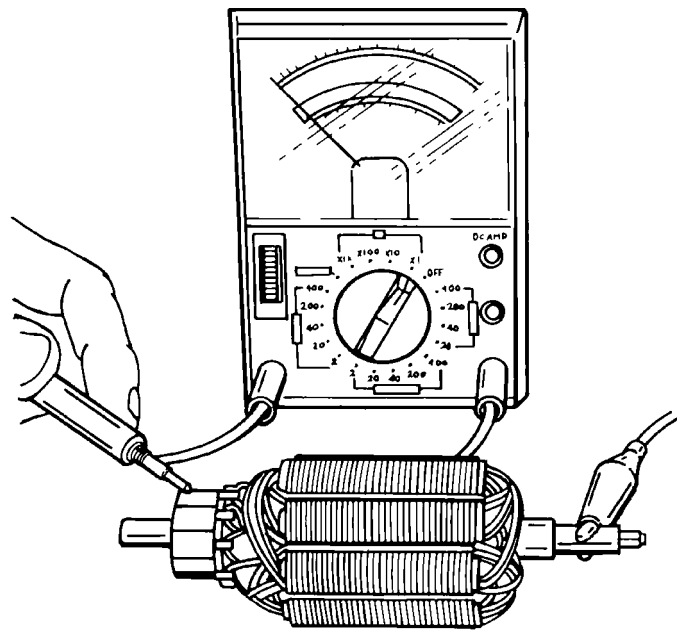
## Armature Tests

### TEST FOR SHORTS

Check armature on a Growler per the Growler manufacturer's instructions. Replace armature if a short is indicated.

### TEST FOR GROUND

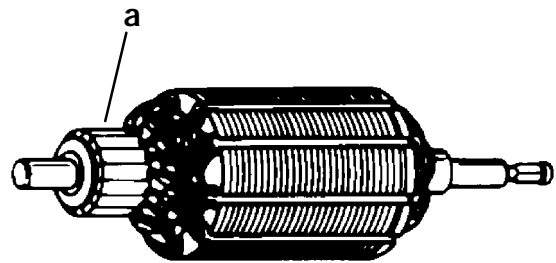
- Use an Ohmmeter (Rx1 scale). Connect one lead on armature shaft and other lead on commutator. If continuity is indicated, armature is grounded. Replace armature.



51359

### CHECKING AND CLEANING COMMUTATOR

- If commutator is worn it may be turned on an armature conditioner or a lathe.
- Clean commutator with "OO" sandpaper.



a - Commutator



## FIELD TESTS

**IMPORTANT:** Commutator end of armature must be installed in brushes when performing the following tests.

Ohmmeter Leads Between	Resistance (Ohms)	Scale Reading* (x _____)
Green and Blue Motor Wires	0	Full Continuity (Rx1)
Green and Black Motor Wires	0	Full Continuity (Rx1)
Blue and Black Motor Wires	0	Full Continuity (Rx1)
Black Motor Wire, and Frame (Motor Housing)	No Continuity	Full Continuity (Rx1)
Green Motor Wire, and Frame	No Continuity	Full Continuity (Rx1)
Blue Motor Wire, and Frame	No Continuity	Full Continuity (Rx1)

\*If specified readings are not obtained, check for:

- defective armature
- dirty or worn brushes
- dirty or worn commutator

If defective components are found, repair or replace component(s) and retest.

## Motor Repair

### REMOVAL

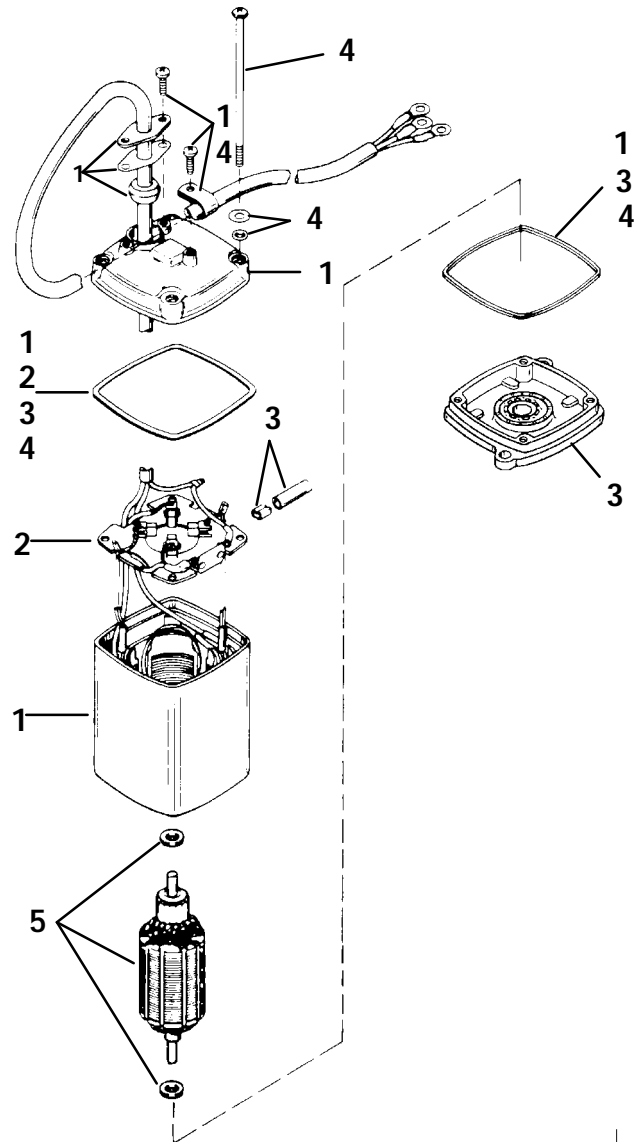
**NOTE:** Power Trim System does not have to be removed from outboard to repair/replace motor.

### DISASSEMBLY

Refer to "Motor and Pump Replacement" on page 5B-41 to disassemble motor from pump.

## CLEANING AND INSPECTION

Inspect O-rings and replace if necessary. Clean, inspect, and test motor components. Refer to "Brush Replacement", "Armature Test", and "Field Tests" for inspection and test procedures.

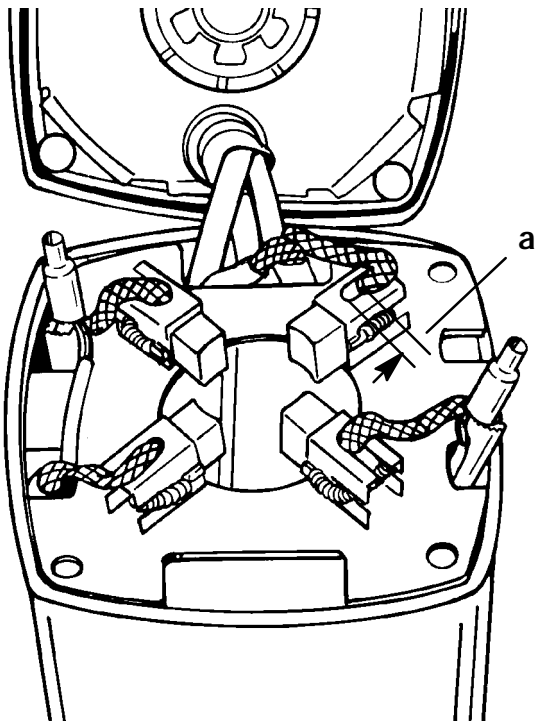


- Power Trim Motor
1. Frame and Field Kit
  2. Brush Card Kit
  3. End Frame Kit
  4. Seal Kit
  5. Armature Kit



## BRUSH REPLACEMENT

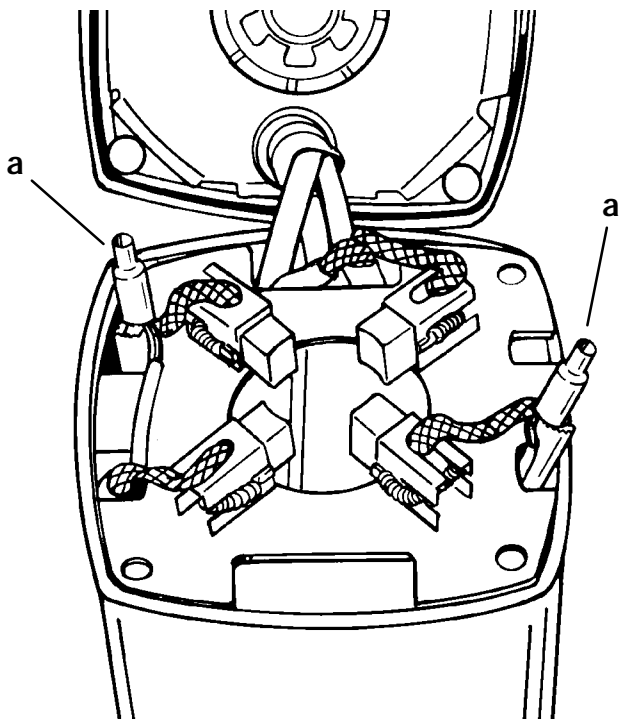
1. Brush replacement is required if brushes are pitted, chipped, or if distance (a) between the brush pigtail and end of brush holder slot is 1/16 in. or less. Check distance with armature installed.



51350

a - 1/16 in.

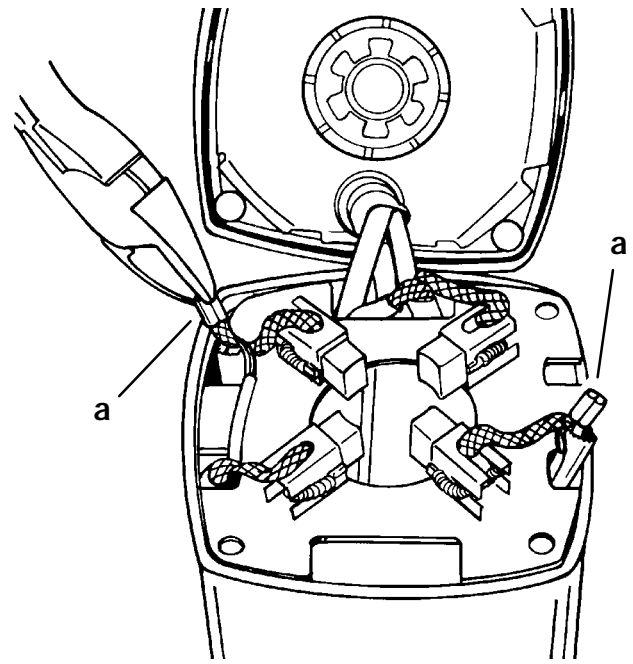
2. To replace brush card, remove insulators.



51350

a - Insulators

3. Remove metal connectors.



51351

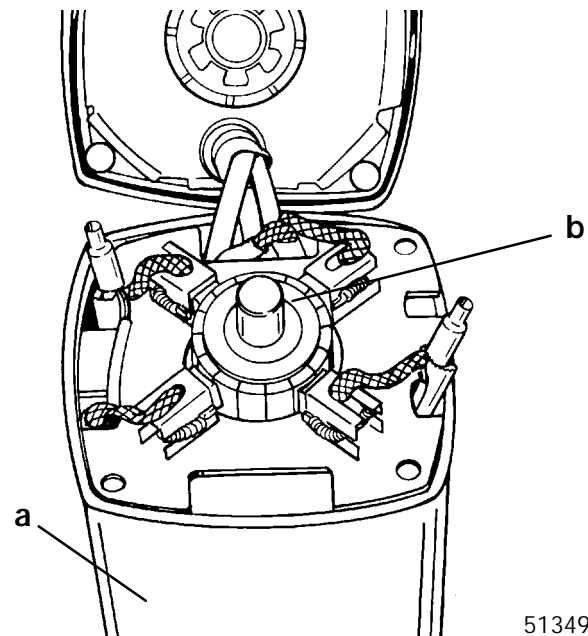
a - Metal Connectors

4. Install new brush card.
5. Crimp new metal connectors onto wires.
6. Insulate connections with heat shrink tubing.

## Reassembly

**IMPORTANT: Components must be clean. Any debris in power trim system can cause system to malfunction.**

1. Install armature in motor housing.



51349

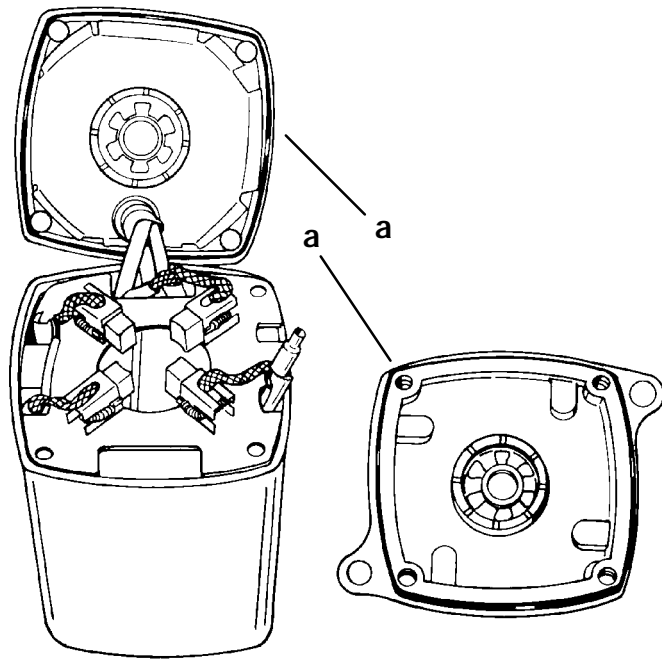
a - Motor Housing

b - Armature (Spread brushes to insert commutator.)





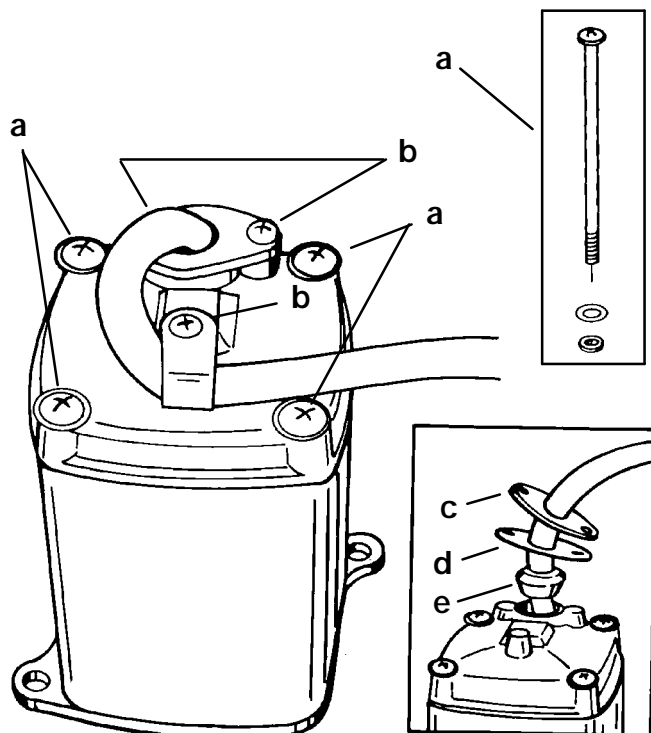
2. Install O-rings in end caps.



a - O-rings

51347

3. Install screws and clamp. Tighten screws securely.



51345

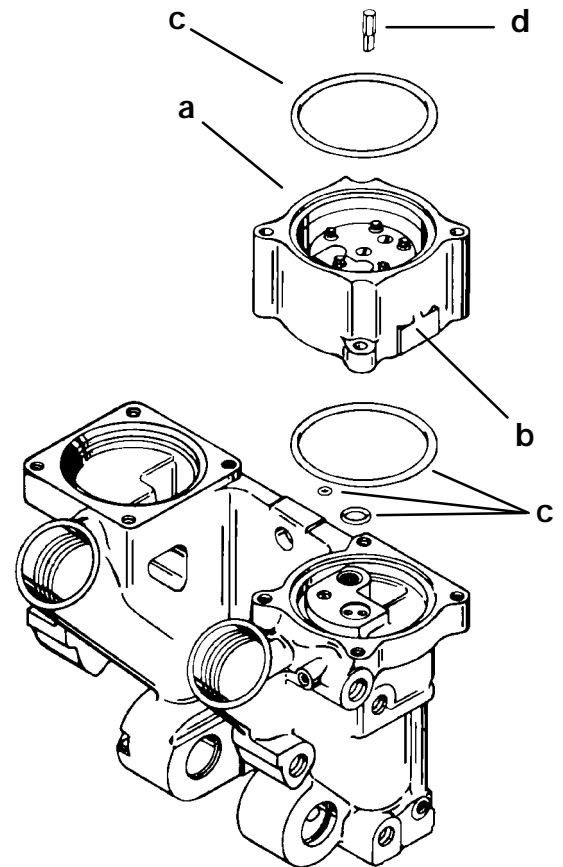
a - Screw (4) Contains flat washer and O-ring. Torque screws to 60 lb. in. (6.8 N·m).  
 b - Screw (3)  
 c - Clamp  
 d - Gasket  
 e - Grommet

## Reassembly - Motor and Pump

**NOTE:** Driveshaft is a loose part and may fall out of position.

1. Install pump onto power trim manifold. Insure O-rings are in proper locations. Secure with two (2) screws. Torque screws to 80 lb. in. (9.0 N·m).

**IMPORTANT:** Install pump with location flat facing towards starboard transom bracket.



51433

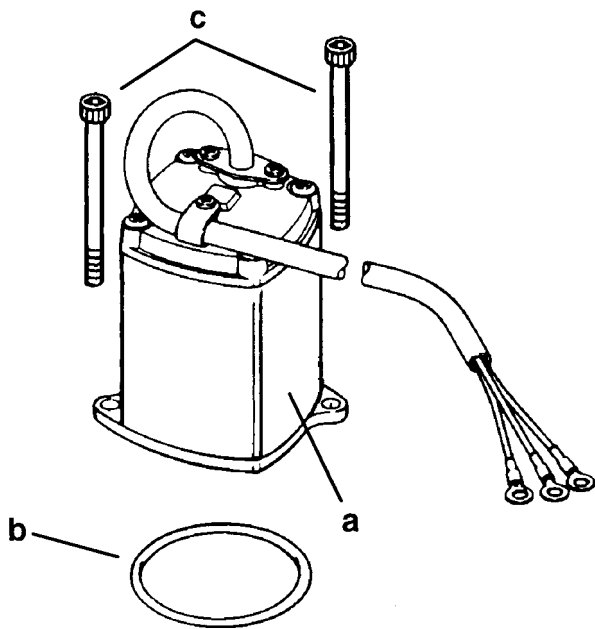
a - Pump (Flat towards starboard transom bracket)  
 b - Flat - faces starboard transom bracket  
 c - O-rings (4)  
 d - Driveshaft (Install in center hole in pump)

2. Fill pump with Quicksilver Power Trim and Steering Fluid prior to installing motor.

3. Install motor, secure with two (2) screws. Torque screws to 80 lb. in. (9.0 N·m). Route wiring; refer to Wiring Diagrams in this service manual.



**NOTE:** Insure motor and driveshaft are aligned.



51433

- a - Motor
- b - O-ring
- c - Screw (2) - Torque to 80 lb. in. (9.0 N·m)

4. Complete reassembly of Power Trim System as outlined in **"Installation"** on page 5B-30.

## Priming Power Trim System

1. Fill system with Quicksilver Power Trim and Steering Fluid or Automatic Transmission Fluid (ATF) Type F, FA Dexron II or Dexron III. Refer to **"Fill, Check, and Purge"** on page 5B-14.

**IMPORTANT:** Run Trim System in short "jogs" until pump motor primes and trim system moves. If trim motor is run without priming pump, drive-shaft failure could result.

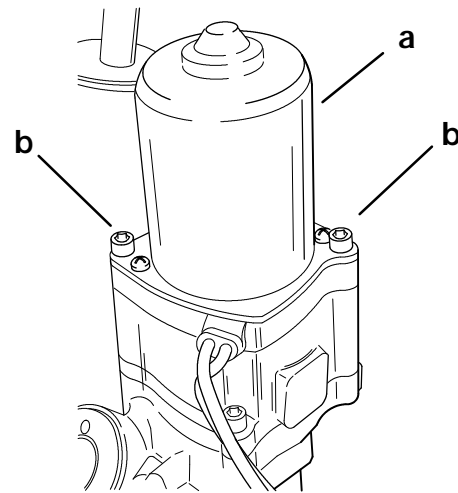
## MOTOR AND PUMP REPLACEMENT

**IMPORTANT:** The pump is not rebuildable. If pump is defective, replace as an assembly.

**NOTE:** Power Trim System does not have to be removed from outboard to replace pump or motor.

1. Tilt outboard to full "UP" position. Depressurize power trim system, and loosen starboard transom bracket as outlined in **"Removal and Installation"** on page 5B-28.
2. Remove 2 allen screws to remove motor from system.

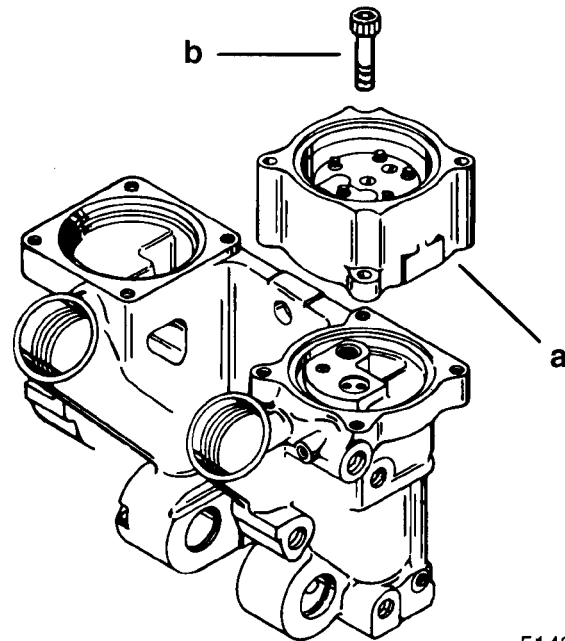
**NOTE:** Drive shaft is a loose part and may fall out of motor when motor is removed.



53777

- a - Motor
- b - Screw (2)

3. Remove two screws to remove pump.



51433

- a - Pump
- b - Screw (2)



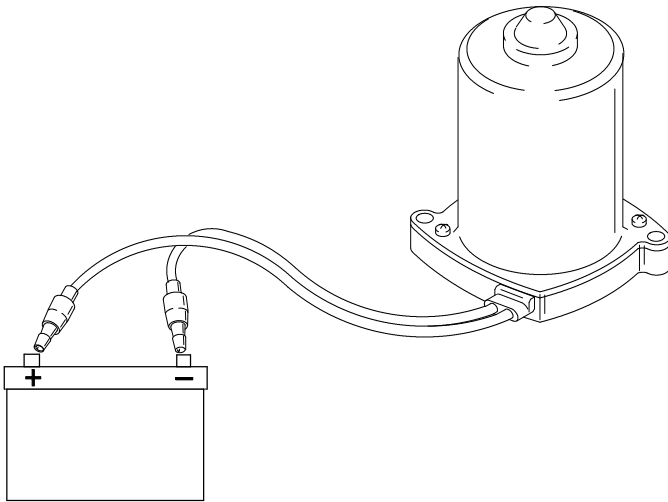
# Motor and Electrical Tests/ Repair (Round Motor)

## Trim Pump Motor Test

### **⚠ WARNING**

Do not perform this test near flammable materials, as a spark may occur while making electrical connections.

1. Connect a 12 volt power supply to motor wires; one motor lead to POSITIVE (+) battery terminal and the other motor lead to the NEGATIVE (-) battery terminal. Motor should run. Reverse motor leads between battery terminals. Motor should run.

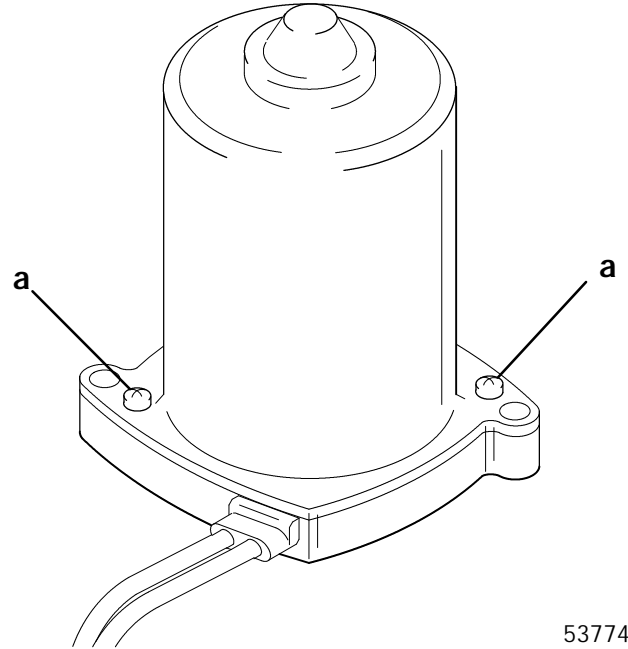


53774

2. If motor does not run, disassemble and check components.

## Motor Disassembly

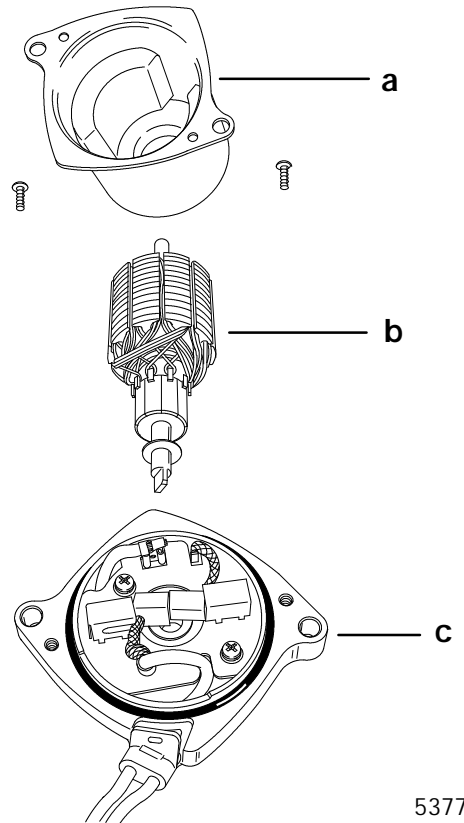
1. Remove 2 screws.



53774

a - Screw (2)

2. Remove frame and armature from end cap. Use care not to drop armature.



53779

a - Frame  
b - Armature  
c - End Cap



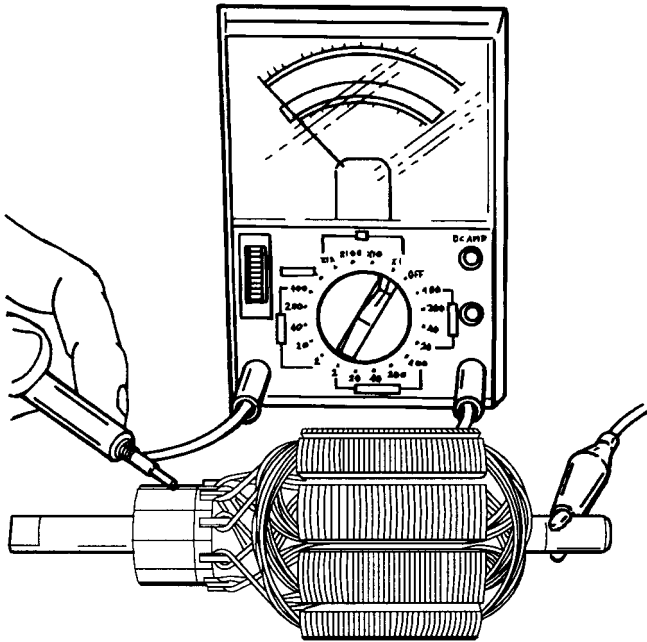
## Armature Tests

### TEST FOR SHORTS

Check armature on a Growler per the Growler manufacturer's instructions. Replace armature if a short is indicated.

### TEST FOR GROUND

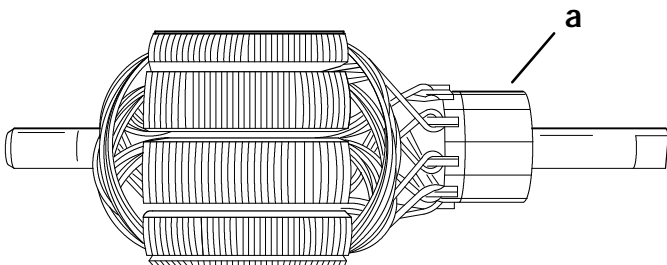
1. Use an Ohmmeter (Rx1 scale). Connect one lead on armature shaft and other lead on commutator. If continuity is indicated, armature is grounded. Replace armature.



53786

### CHECKING AND CLEANING COMMUTATOR

1. If commutator is worn it may be turned on an armature conditioner or a lathe.
2. Clean commutator with "OO" sandpaper.



53775

a - Commutator

## FIELD TESTS

**IMPORTANT:** Commutator end of armature must be installed in brushes when performing the following tests.

Ohmmeter Leads Between	Resistance (Ohms)	Scale Reading* (x _____)
BLUE and BLACK Motor Wires	0	(Rx1)
BLACK Motor Wire, and Frame (Motor Housing)	No Continuity	(Rx1)
BLUE Motor Wire and Frame	No Continuity	(Rx1)

\*If specified readings are not obtained, check for:

- defective armature
- dirty or worn brushes
- dirty or worn commutator

If defective components are found, repair or replace component(s) and retest.



# Motor Repair

## REMOVAL

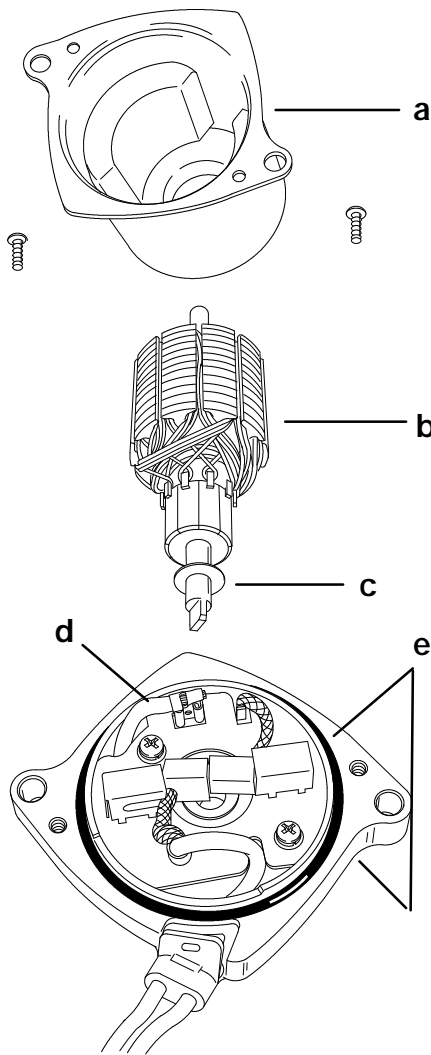
**NOTE:** Power Trim System does not have to be removed from outboard to repair/replace motor.

## DISASSEMBLY

Refer to "Motor Disassembly" on page 5B-42 to disassemble motor from pump.

## CLEANING AND INSPECTION

Inspect O-rings and replace if necessary. Carefully inspect power cord for cuts or tears which will allow water to enter motor. Replace cord if cut or torn. Clean, inspect, and test motor components. Refer to "Brush Replacement", "Armature Test", and "Field Tests" for inspection and test procedures.

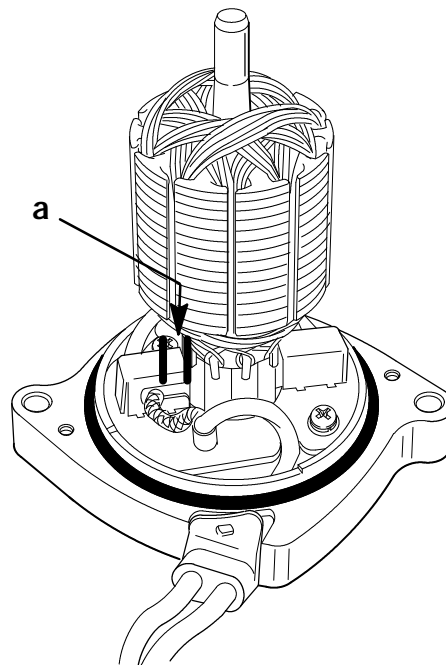


53779

- a - Frame
- b - Armature
- c - Shim
- d - Brush Card Assembly
- e - O-rings

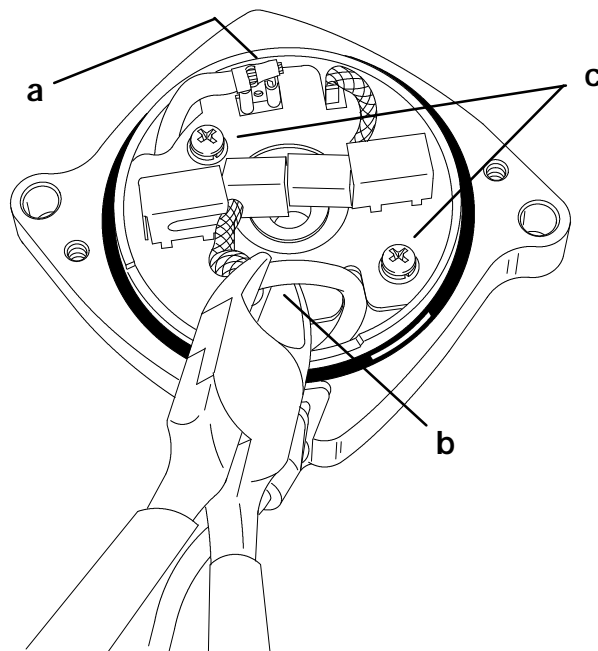
## BRUSH REPLACEMENT

1. Brush replacement is required if brushes are pitted, chipped, or if distance (a) between the brush pigtail and end of brush holder slot is 1/16 in. (1.6mm) or less. Check distance with armature installed.



53784

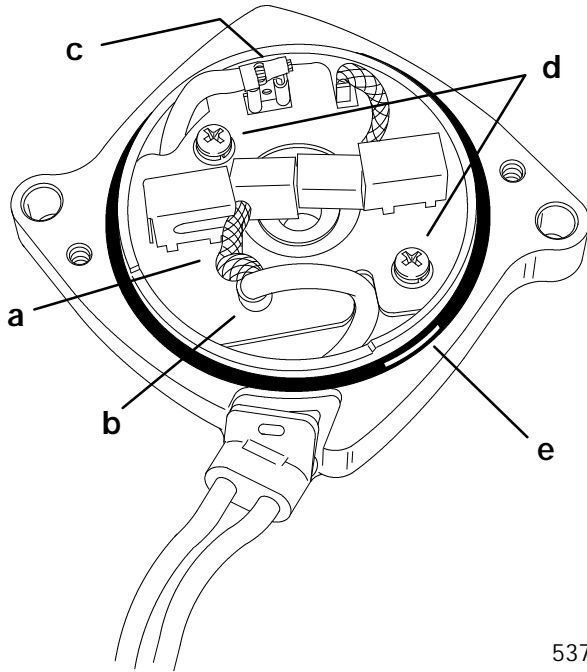
- a - 1/16 in. (1.6mm)
2. To replace brush card, disconnect spade terminal.
3. Cut crimped brush lead.
4. Remove 2 screws securing brush card to end cap.



- a - Spade Terminal
- b - Crimped Brush Lead
- c - Screws



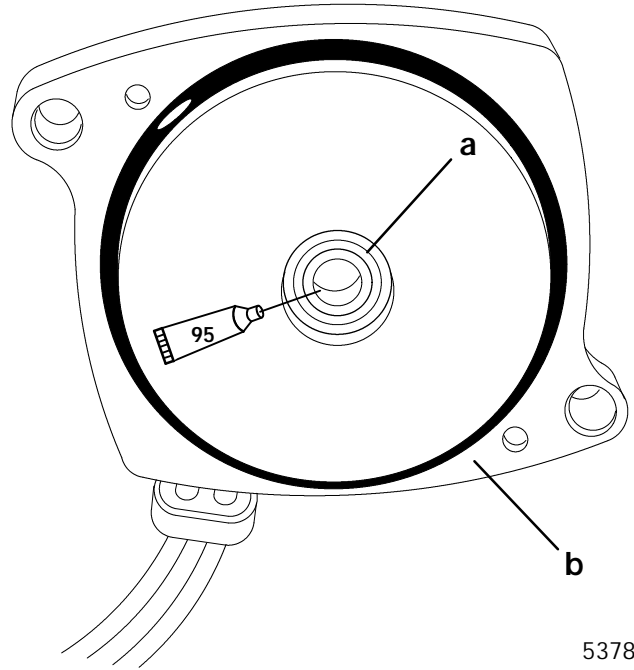
5. Install new brush card (BRUSH and SEAL KIT 828714A1).
6. Crimp metal connector onto motor lead and new brush lead.
7. Connect spade connector motor lead to brush card connector.
8. Secure brush card to end cap with 2 screws and lockwashers.
9. Inspect O-ring for cuts and abraisions. Replace O-ring as required (BRUSH and SEAL KIT 828714A1).



- a - Brush Card
- b - Metal Connector
- c - Spade Connector
- d - Screws and Lockwashers
- e - O-ring

## END CAP INSPECTION

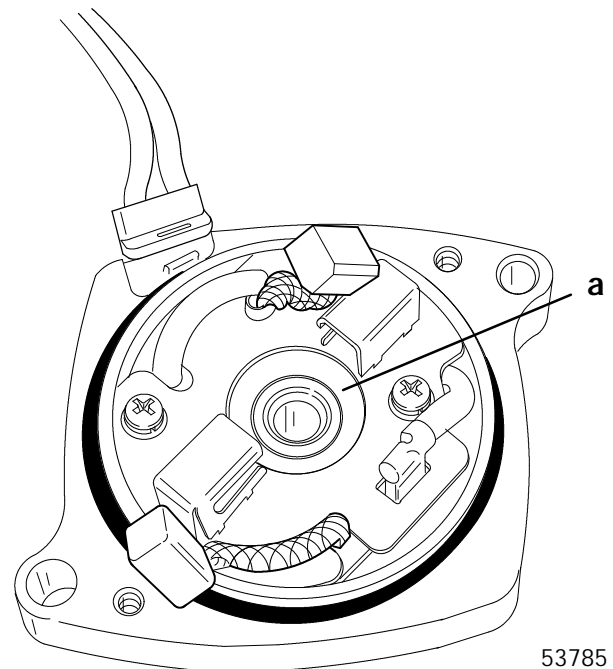
1. Inspect seal and O-ring for cuts and abraisions. If replacement is required, install BRUSH and SEAL KIT 828714A1.



 95 2-4-C With Teflon (92-825407A12)

- a - Seal (Apply 2-4-C w/Teflon to seal lips)
- b - O-ring

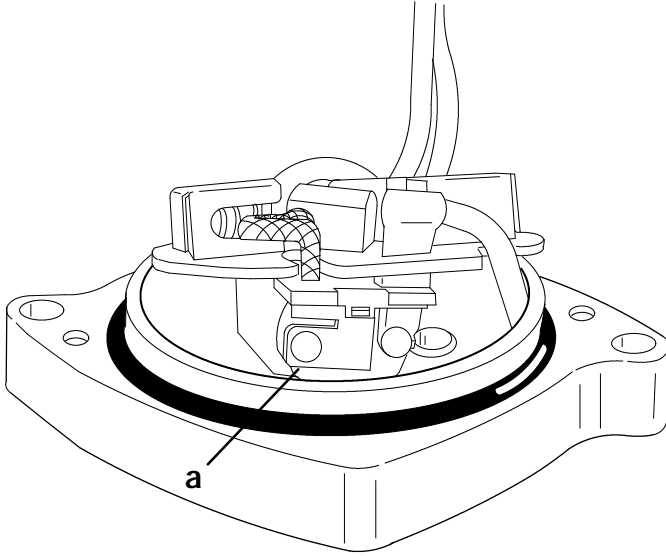
2. Inspect bushing for wear. If bushing appears to be excessively worn - grooves, scratches, etc. - install END FRAME ASSEMBLY (COMPLETE) 828715A1.



- a - Bushing



- If trim motor is overheated, a thermoswitch located under brush card will open. Normally, this switch will reset itself within 1 minute.



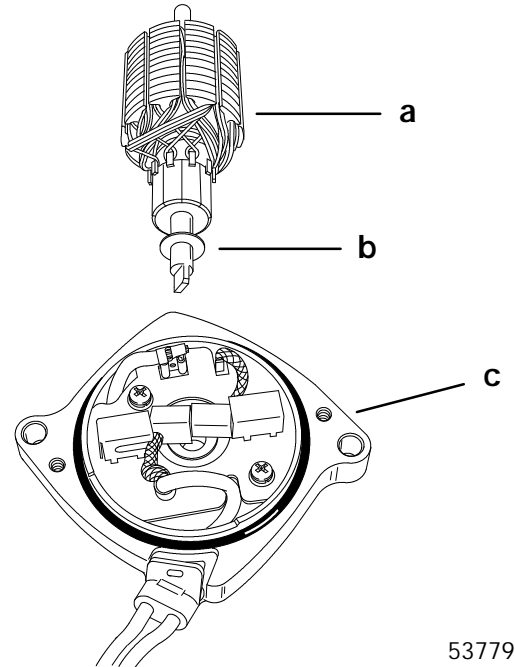
53781

a - Thermoswitch

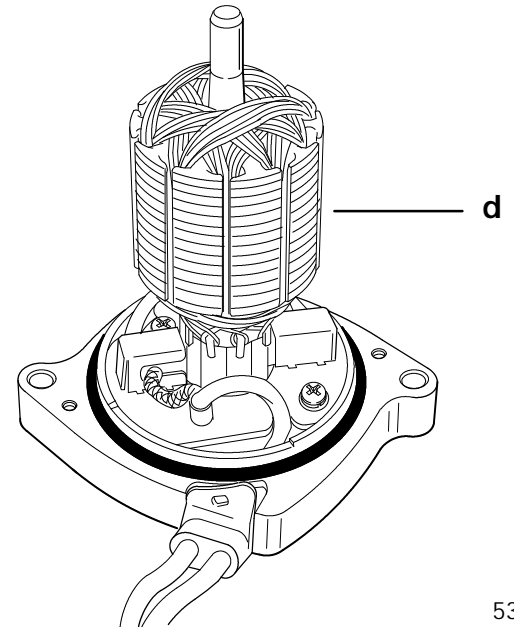
## Reassembly

**IMPORTANT: Components must be clean. Any debris in power trim system can cause system to malfunction.**

- Install armature into end cap/brush card assembly.



53779

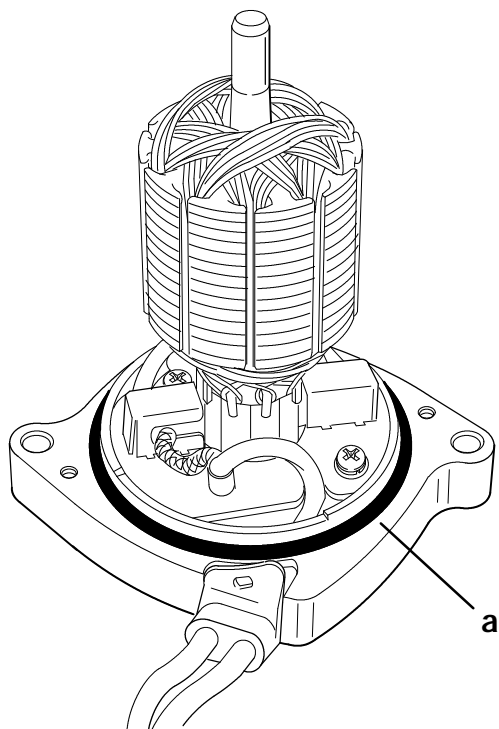


53784

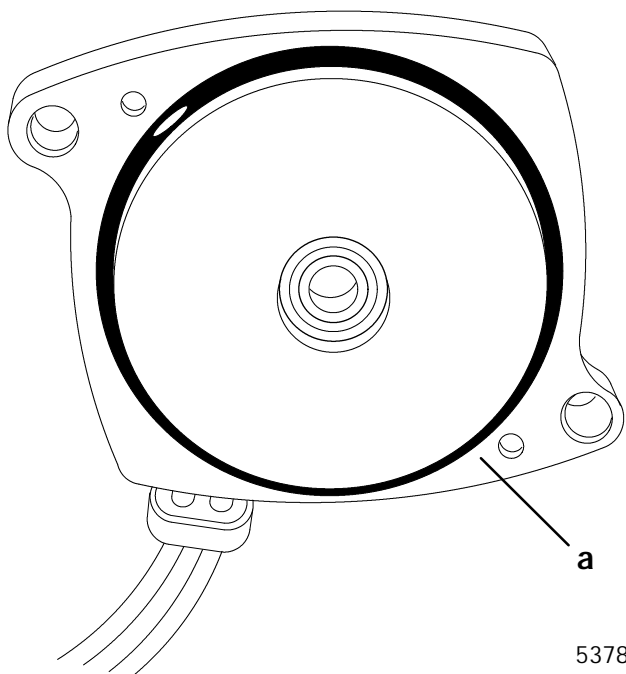
- a - Armature
- b - Shim
- c - End Cap Assembly
- d - Armature (Spread brushes to install armature into end cap)



2. Install O-rings in end cap.



53784

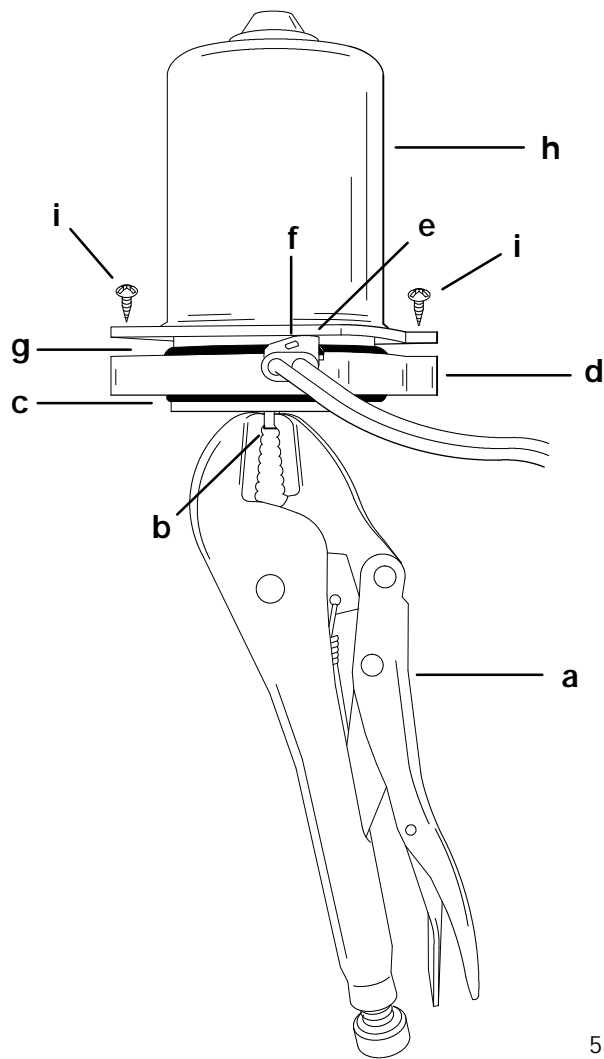


53783

a - O-rings

**IMPORTANT:** Attach Vise Grip® pliers to armature shaft before installing frame assembly. The Vise Grip® pliers will prevent the armature from being drawn out of the brush card assembly by the frame magnets while installing the frame assembly.

3. Install Vise Grip® pliers on armature shaft.
4. Carefully install frame assembly over armature.
5. Position harness retainer hole over tab in end cap.
6. Secure frame assembly to end cap with 2 screws.



53776

- a - Vise Grip® Pliers
- b - Armature Shaft
- c - O-ring
- d - End Cap
- e - Harness Retainer
- f - Retainer Hole
- g - O-ring
- h - Frame Assembly
- i - Screws



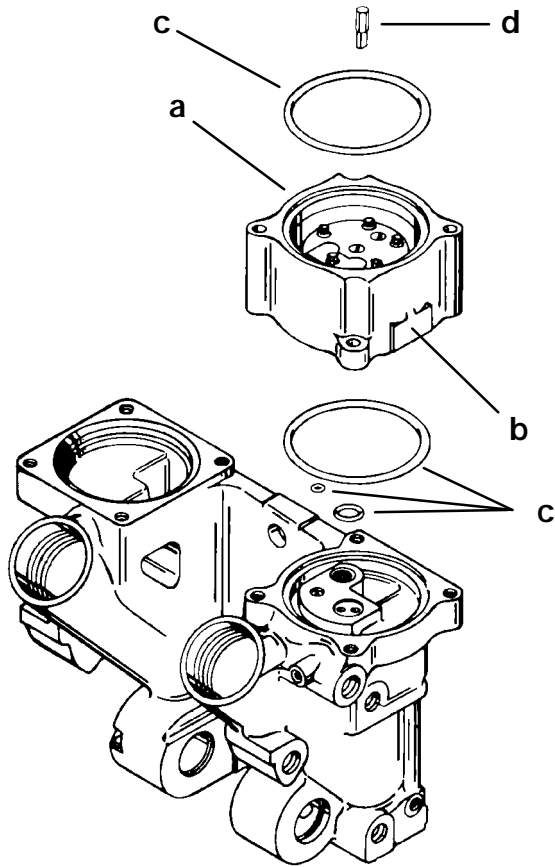


## Reassembly - Motor and Pump

**NOTE:** Drive shaft is a loose part and may fall out of position.

1. Install pump onto power trim manifold. Insure O-rings are in proper locations. Secure with two (2) screws. Torque screws to 80 lb. in. (9.0 N·m).

**IMPORTANT:** Install pump with location flat facing towards starboard transom bracket.

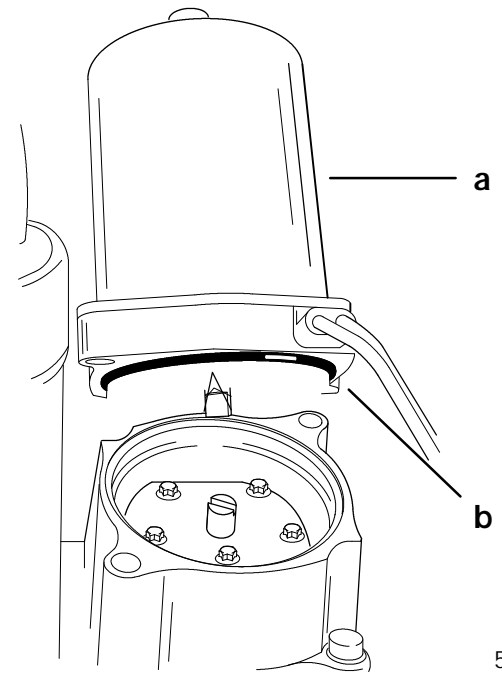


- a - Pump (Flat towards starboard transom bracket)
- b - Flat - faces starboard transom bracket)
- c - O-rings (4)
- d - Drive Shaft (Install in center hole in pump)

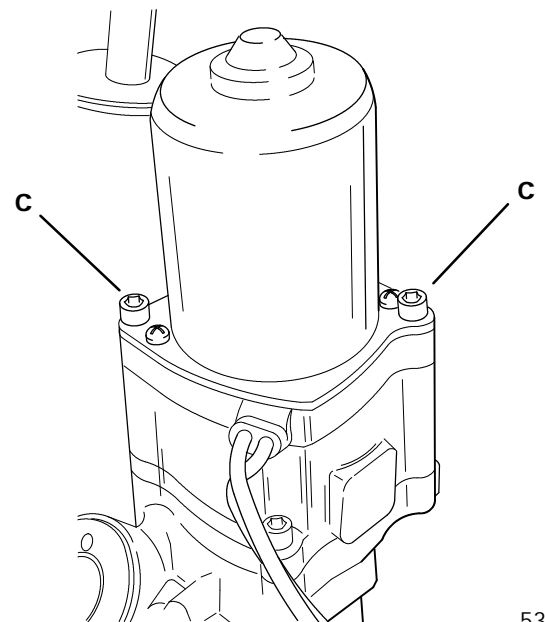
51433

2. Fill pump with Quicksilver Power Trim and Steering Fluid prior to installing motor.
3. Install motor, secure with two (2) screws. Route wiring; refer to Wiring Diagrams in this service manual.

**NOTE:** Verify motor and drive shaft are aligned.



53782



53777

- a - Motor
- b - O-ring
- c - Screw (2) Tighten securely.

4. Complete reassembly of Power Trim System as outlined in "Installation" on page 5B-28.



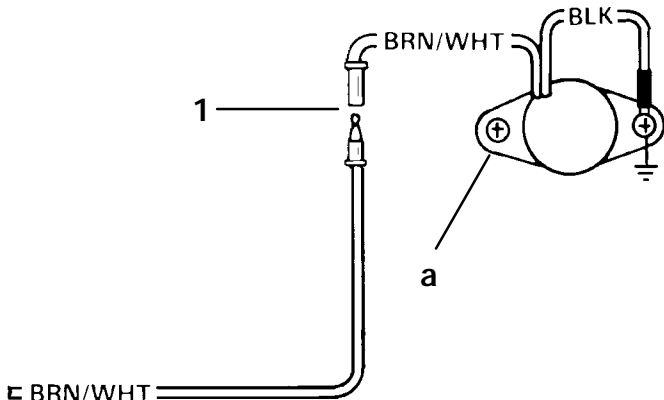
## Priming Power Trim System

1. Fill system with Quicksilver Power Trim and Steering Fluid or Automatic Transmission Fluid (ATF) Type F,FA, Dexron II or Dexron III. Refer to "Fill, Check, and Purge" on page 5B-14.

**IMPORTANT: Run Trim System in short "jogs" until pump motor primes and trim system moves. If trim motor is run without priming pump, drive shaft failure could result.**

## Trim Sender (Optional Accessory) Test

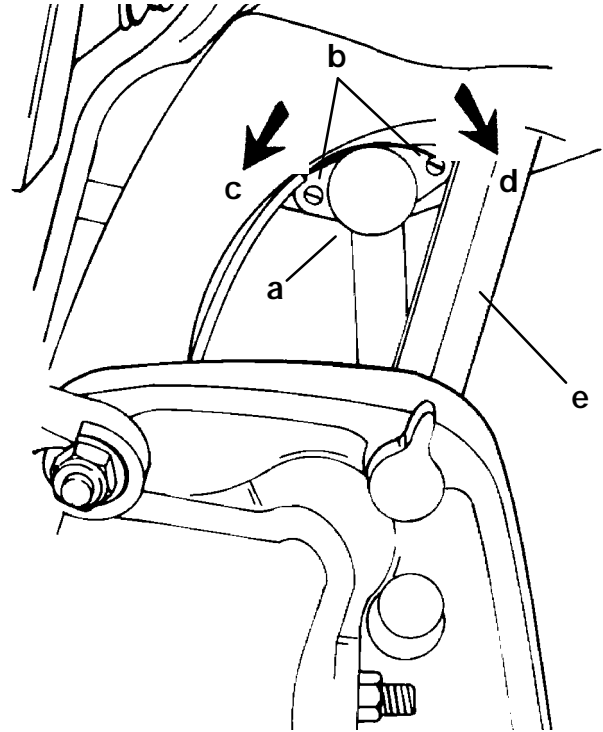
1. Check trim sender black lead for proper ground.
2. Trim outboard to full "DOWN" position.
3. Place ignition switch to "ON" position.
4. Disconnect BRN/WHT trim sender wire from trim sender harness.
5. Connect Ohmmeter (Rx1 scale) leads between outboard ground and Point 1 (trim sender end).
6. Depress "UP" button. Ohmmeter needle should move as the outboard is trimmed up. If needle does not move, trim sender is defective.



a - Trim sender

## Trim Indicator Gauge Needle Adjustment

1. Turn ignition key to "RUN" position.
2. Tilt outboard to full "IN" position. Needle of trim indicator gauge should be in full "IN" position.
3. If not, tilt outboard to full "OUT" position to gain access to trim sender and engage tilt lock lever.
4. Loosen trim sender screws and reposition trim sender.
5. Tighten trim sender screws.



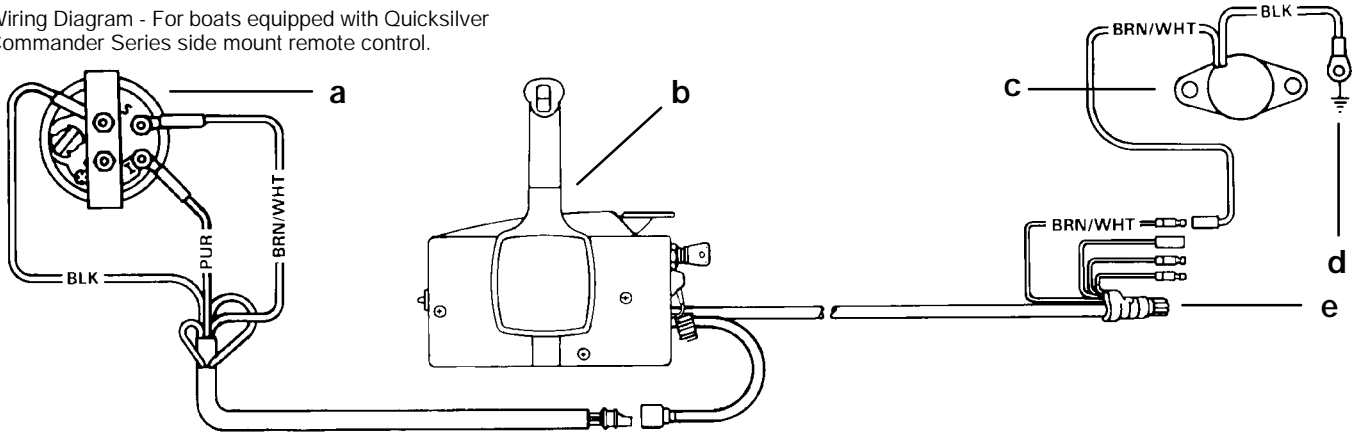
744

- a - Trim Sender  
 b - Screws, loosen to rotate sender  
 c - Turn sender **counterclockwise** to raise needle reading  
 d - Turn sender **clockwise** to lower needle reading  
 e - Tilt lock lever

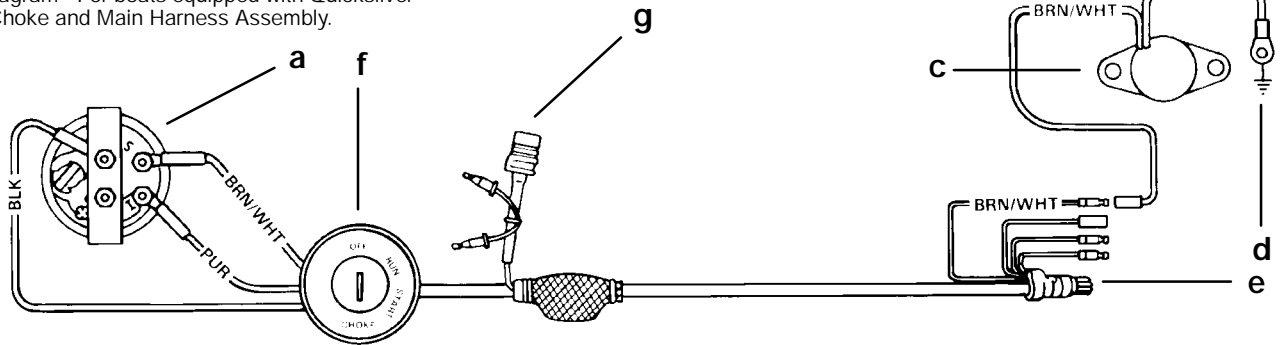


# Trim Indicator Wiring Diagrams

Wiring Diagram - For boats equipped with Quicksilver Commander Series side mount remote control.



Wiring Diagram - For boats equipped with Quicksilver Ignition/Choke and Main Harness Assembly.



22908

- a - Trim Indicator
- b - Remote Control
- c - Trim Sender
- d - Engine Ground
- e - To Engine
- f - Ignition Switch
- g - Power Trim Harness