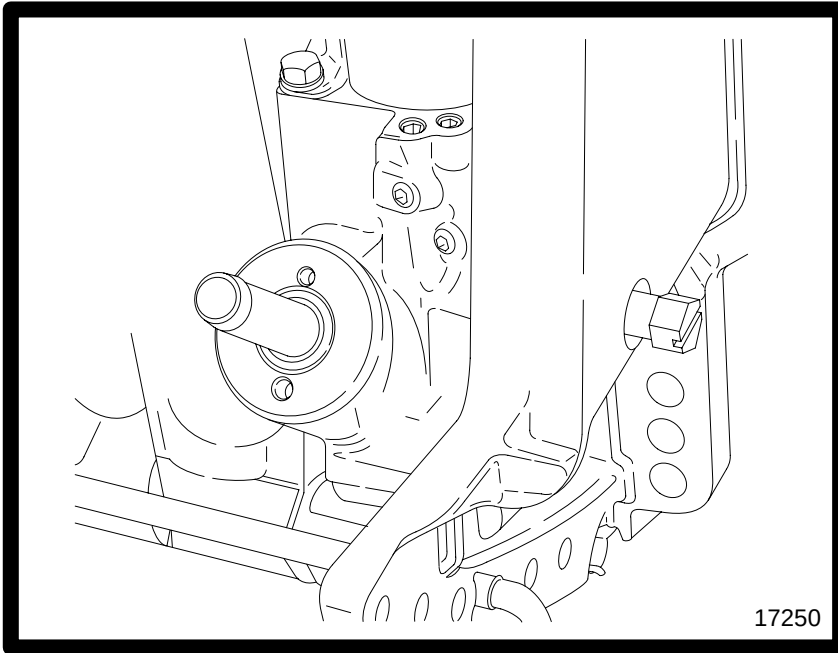




POWER TRIM



**DESIGN I
(SIDE FILL RESERVOIR)**

6

A



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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 trailed, 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 trailed.



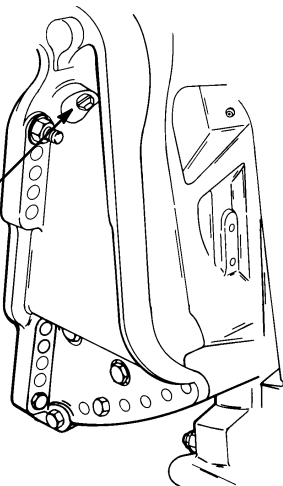
Tilting Outboard Manually

⚠ WARNING

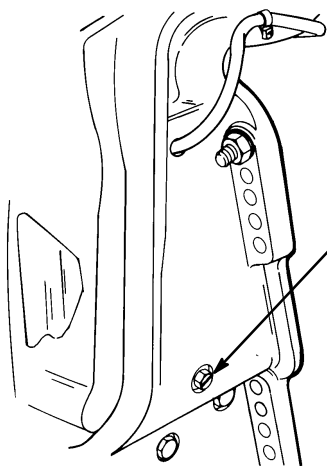
Before opening the manual release valve knob, insure all persons are clear of outboard as outboard will drop to full “Down” when valve is opened.

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.

Fill Screw (System is Pressurized, DO NOT Open unless Outboard is Tilted to Full Up Position)



Manual Release Valve



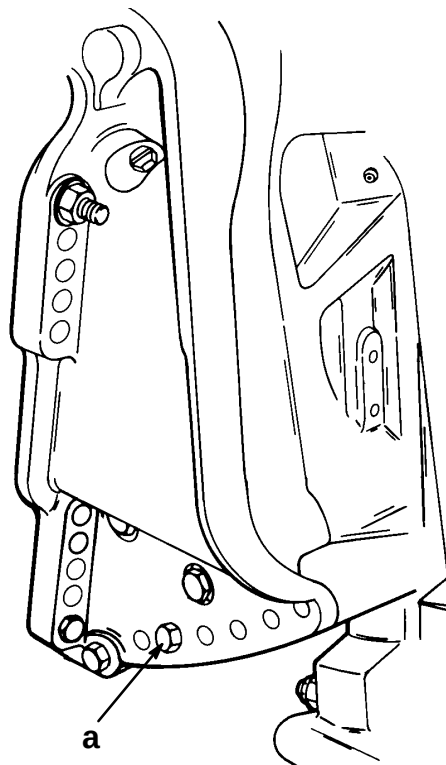
23321

Trim “In” Angle Adjustment

⚠ WARNING

Boat operation with outboard trimmed to the full “In” trim angle [not using the trim angle adjustment bolt] 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 bolt 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 may be advantageous to acceleration and planing. A water test is required to determine if these characteristics apply to a particular boat/motor combination.



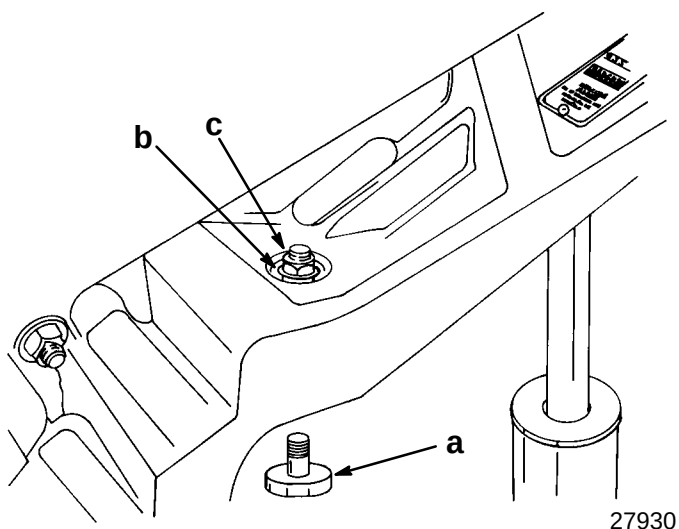
23321

a - Trim Angle Adjustment Bolt



Striker Plate Replacement

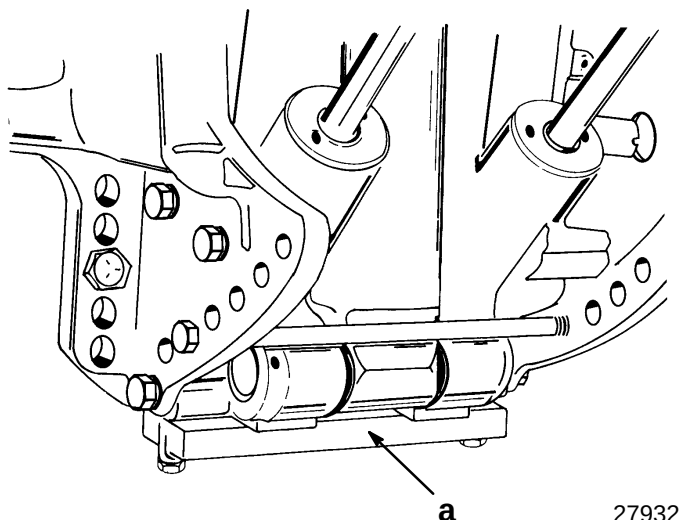
Visually inspect striker plates and replace if worn excessively.



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

Anode Plate

Anode plate 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).

Fill, Check, and Purge - Power Trim System

TO FILL:

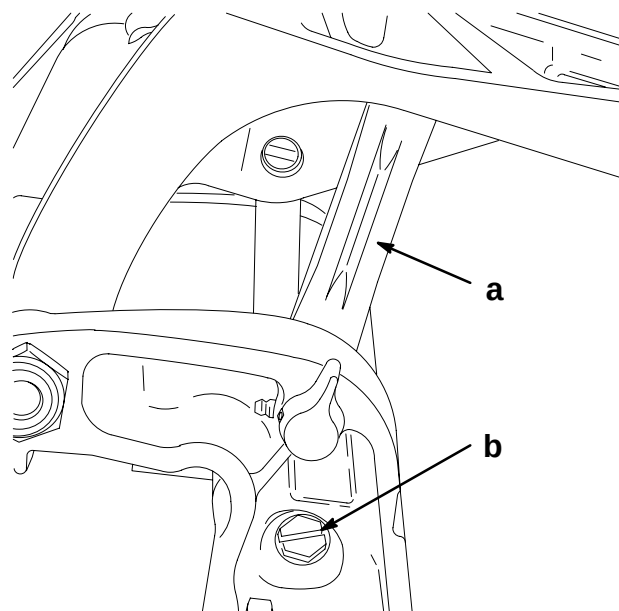
IMPORTANT: This trim system is pressurized. Remove "Fill" plug only when outboard is tilted to the full "Up" position or the trim/tilt rams are fully extended. Retighten "Fill" plug before tilting outboard down or retracting tilt/trim rams. Remove "Fill" plug and O-ring. System is full when oil level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

Trim engine to full "up" position. Engage tilt lock lever. Trim system fluid can only be checked when engine is in this position.

Slowly remove fill screw and check fluid level. Fluid level should be visible in fill tube.

If necessary, add Quicksilver Power Trim and Steering Fluid or Automatic Transmission Fluid (ATF) Type F, FA or Dexron II to power trim system.

Reinstall fill screw; tighten screw securely.



- a - Tilt Lock Lever
- b - Fill Screw



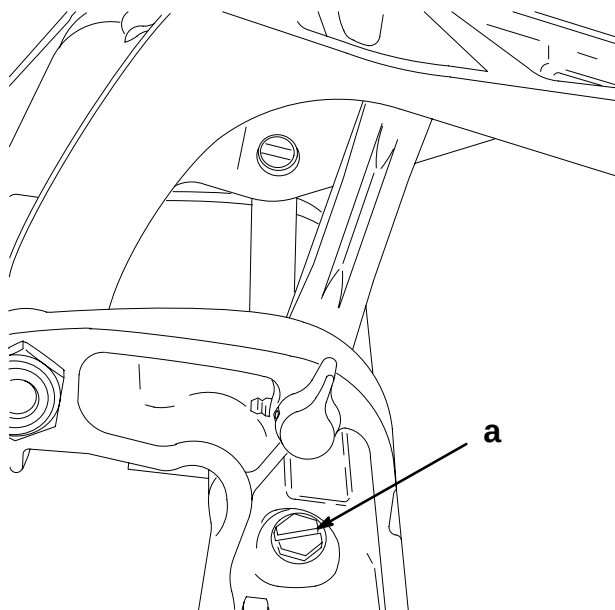
Bleeding Air From Power Trim System

To determine if the Power Trim system contains air, position engine so two trim rods are slightly extended. Do not extend tilt ram. Push down on lower unit. If trim rods retract into trim cylinders more than 1/8" (3.2mm), it will be necessary to bleed air from the Power Trim system.

Bleed air from Power Trim system as follows:

IMPORTANT: This trim system is pressurized. Remove fill screw only when engine is trimmed to the full "up" position. Retighten fill screw securely before trimming engine down.

Trim engine 3 or 4 times thru entire trim range; check fluid level (fill if necessary) each time engine is trimmed to the full "up" position. See "Checking Fluid Level and Filling," preceding.



20319

a - Fill Screw

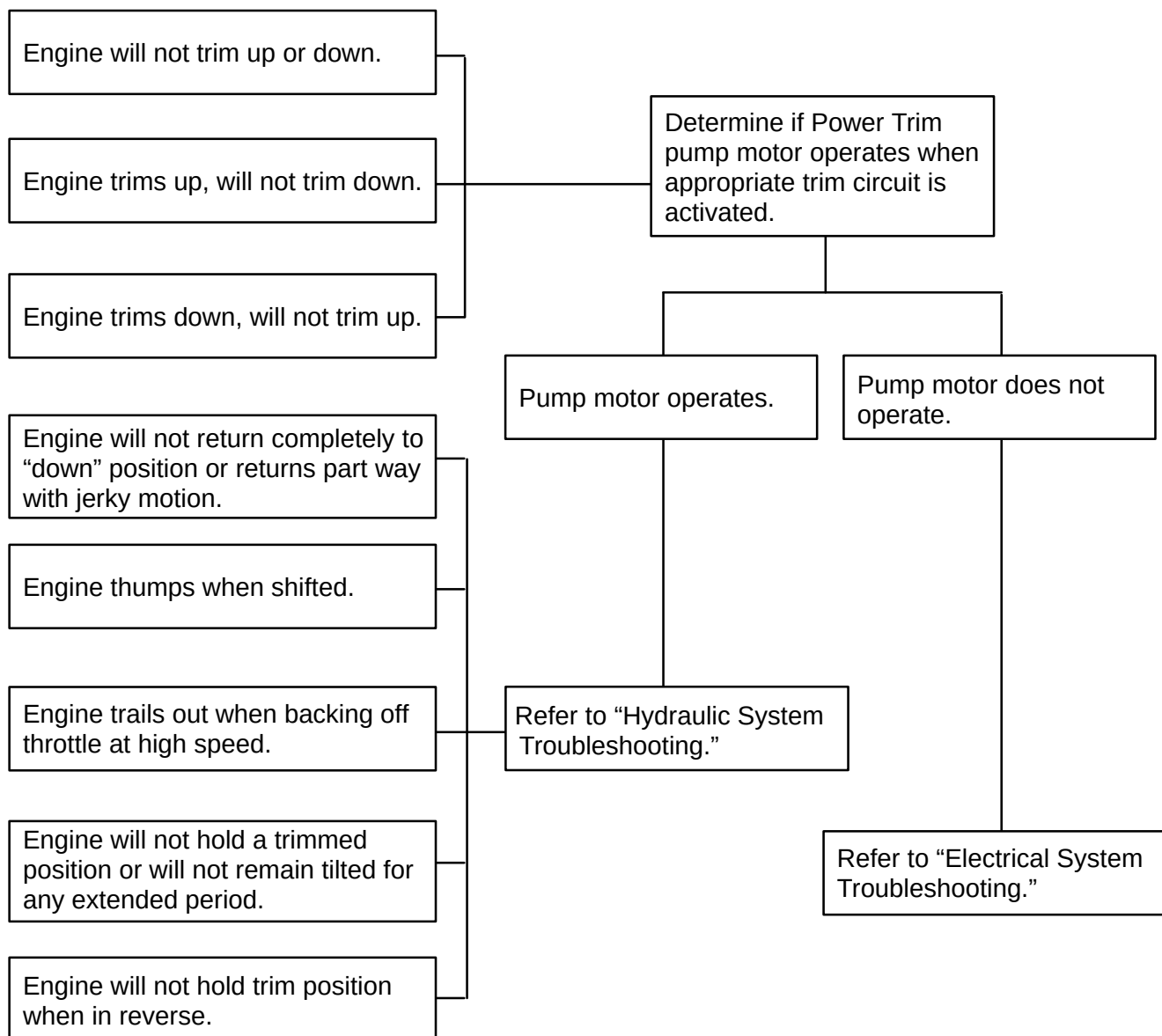


Troubleshooting

Determining if Problem is Electrical or Hydraulic

When a problem is encountered with the Power Trim system, the first step is to determine whether the malfunction is in the “electrical system” or the “hydraulic system.” Refer to the following chart to determine which system is at fault.

Trouble Chart





Hydraulic System

Troubleshooting

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

1. Check that manual release valve knob is tightened to full right (clockwise) position.
2. Check trim pump fluid level and fill if necessary. Refer to "Filling and Bleeding the Power Trim System," preceding.
3. Check for external leaks in Power Trim system. Replace defective part(s) if leak is found.
4. Check for air in Power Trim system and bleed if necessary. Refer to "Filling and Bleeding the Power Trim System," preceding.

CAUTION

Do not remove check valve from port trim rod. Check valve is preset to operate at a specific pressure. Removal and reinstallation of check valve could result in improper operating pressure and possible Power Trim system damage.

5. If engine will not hold a tilted (trailer) position (leaks down to trim position) – Remove port trim rod assembly from Power Trim housing; refer to "Trim Rod Removal," following.

Inspect check valve (located in port trim rod) for debris; clean debris from check valve if found. If debris can not be cleaned from check valve, replace trim rod and check valve as an assembly.

Inspect trim rod O-ring and replace if damaged. Reinstall trim rod in housing; refer to "Trim Rod Installation," following.

6. Disconnect trim pump motor wires, and remove starboard transom bracket from engine. Refer to "Removal" instructions in "Power Trim Assembly Removal and Installation," following.

Slowly remove fill screw to bleed pressure from reservoir.

Place a pan under manual release valve, and slowly remove valve. Inspect the valve and O-rings for damage.

If damaged component(s) are found, replace component(s) and proceed to STEP 9.

If damaged component(s) are not found, reinstall manual release valve and proceed to STEP 7.

7. Remove Power Trim assembly from engine; refer to "Removal" instructions in "Power Trim Assembly Removal and Installation," following.

Disassemble Power Trim assembly; refer to "Trim Rod," "Tilt Ram," and "Pump Replacement," following. Inspect O-rings for damage. Inspect check valves for debris that could cause them to remain open.

If O-rings are damaged or debris is found, replace O-rings or clean debris from check valve(s), then reassemble Power Trim assembly and proceed to STEP 9.

If damaged O-ring(s) or debris are not found, proceed to STEP 8.

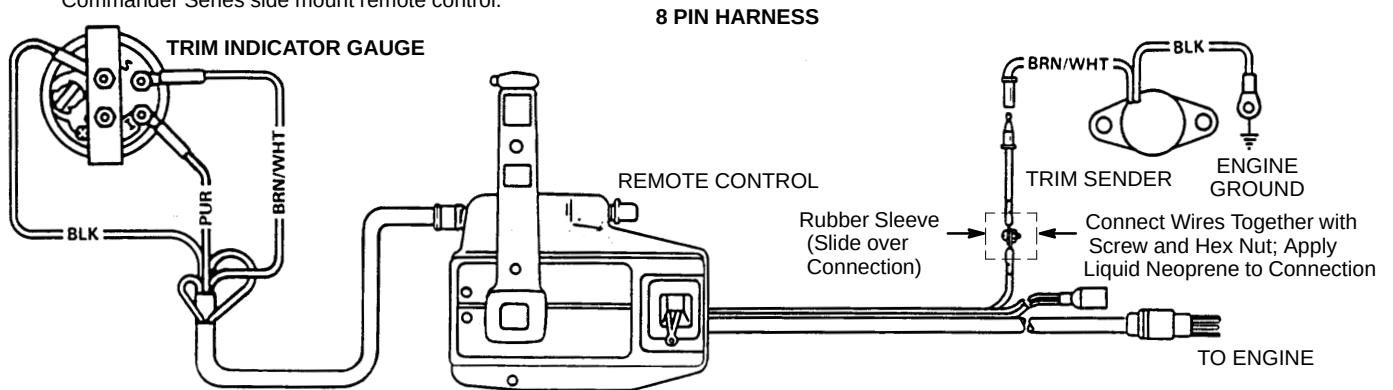
8. Replace pump assembly; refer to "Pump Replacement," following.
9. Install Power Trim assembly and/or starboard transom bracket, steering retaining nut (models with thru-tilt tube steering) and motor wires; refer to "Installation" instructions in "Power Trim Assembly Removal and Installation," following.



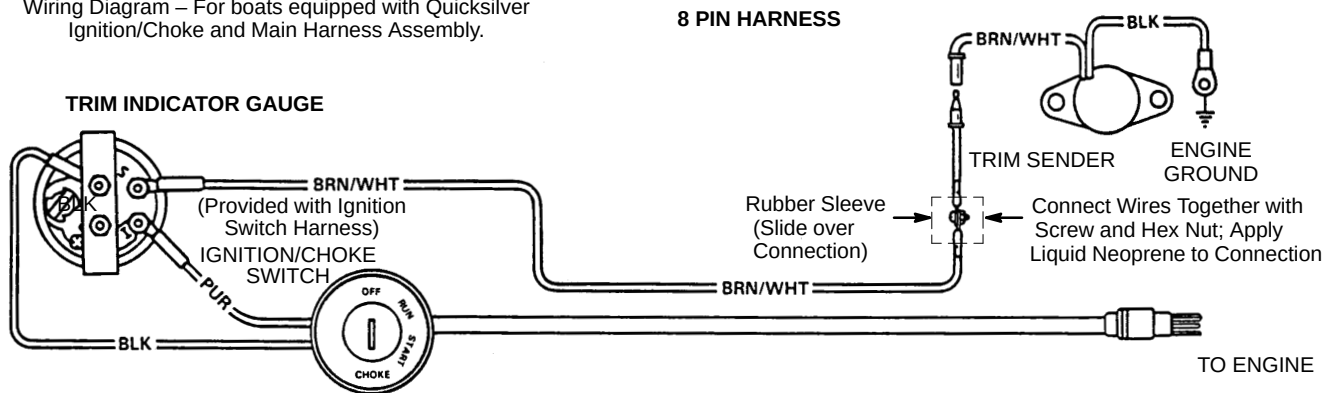
Wiring Diagram

Trim Indicator Gauge and Trim Sender Wiring Diagrams

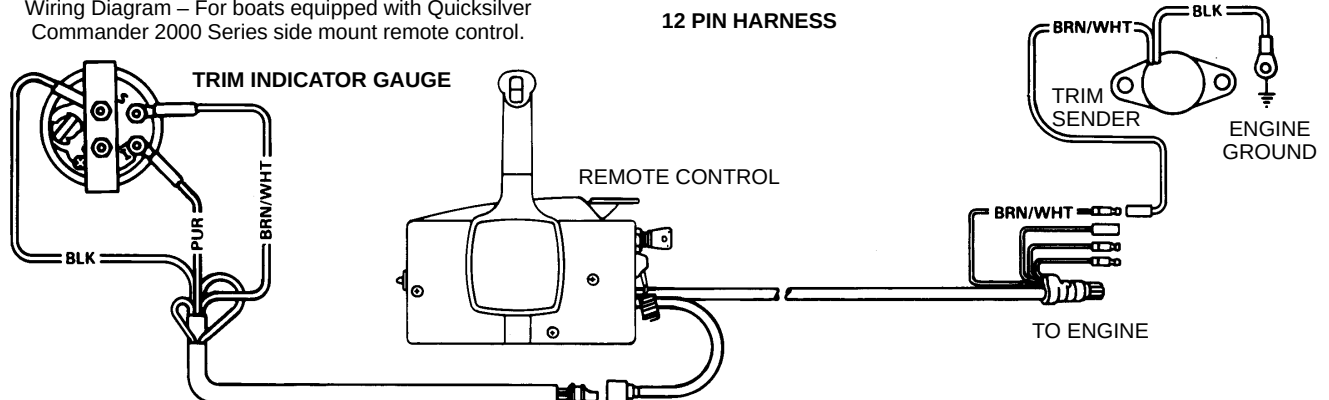
Wiring Diagram – For boats equipped with Quicksilver Commander Series side mount remote control.



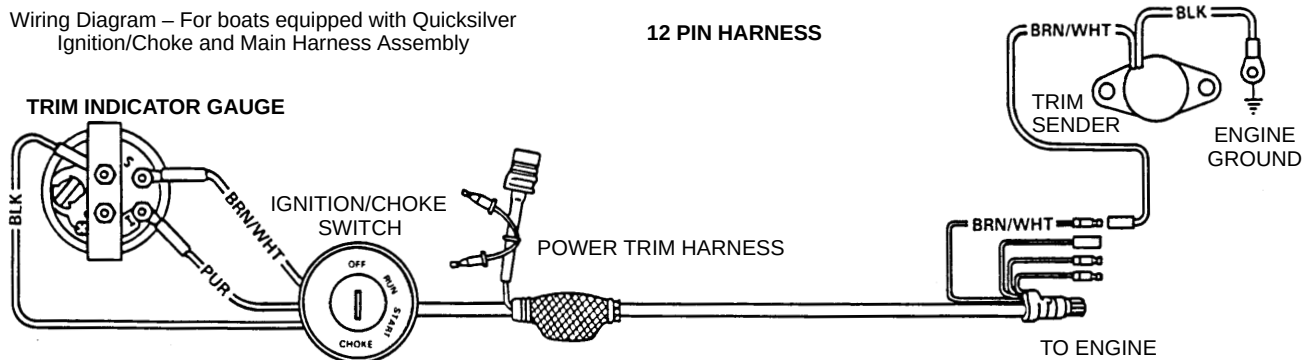
Wiring Diagram – For boats equipped with Quicksilver Ignition/Choke and Main Harness Assembly.



Wiring Diagram – For boats equipped with Quicksilver Commander 2000 Series side mount remote control.

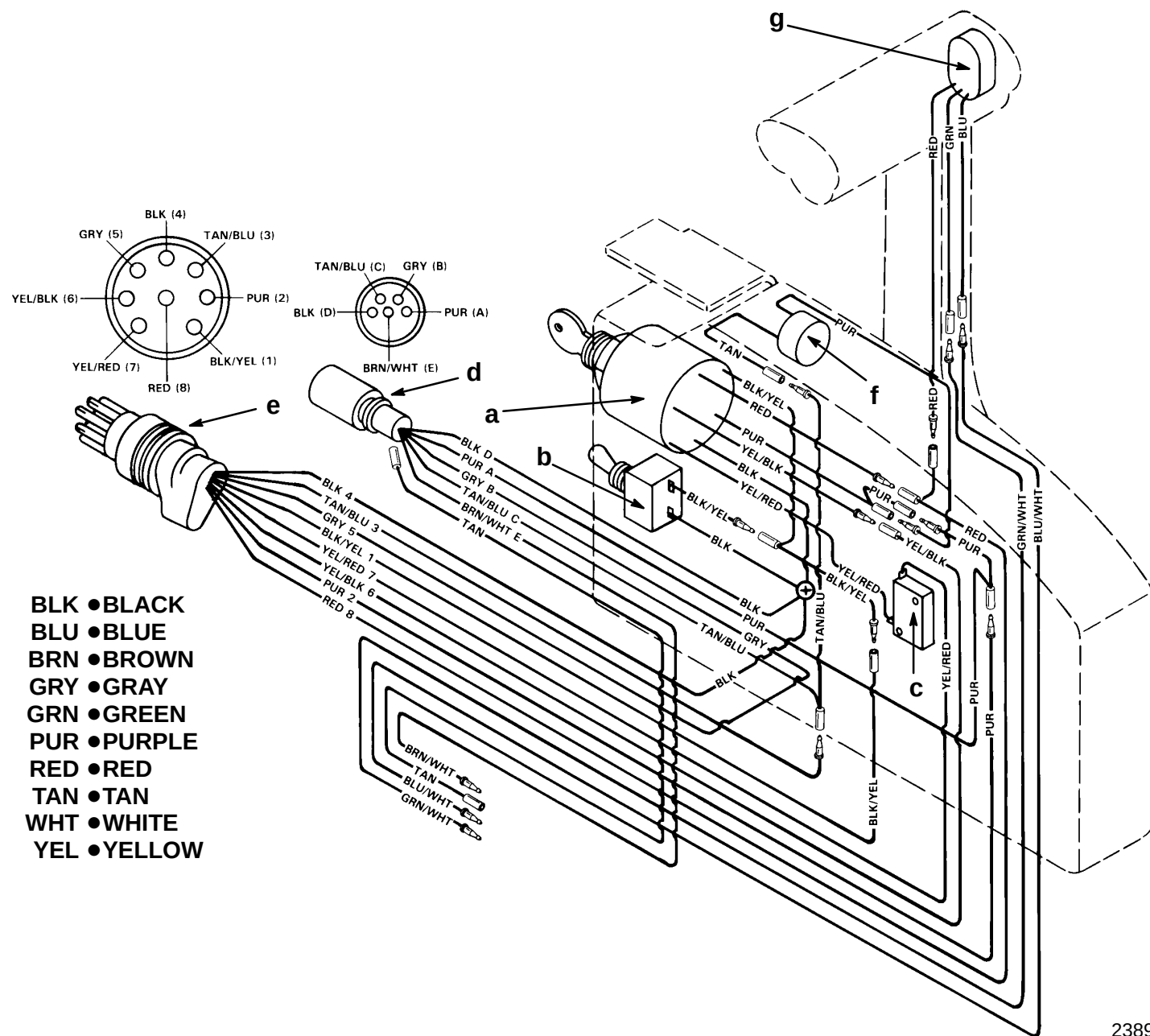


Wiring Diagram – For boats equipped with Quicksilver Ignition/Choke and Main Harness Assembly



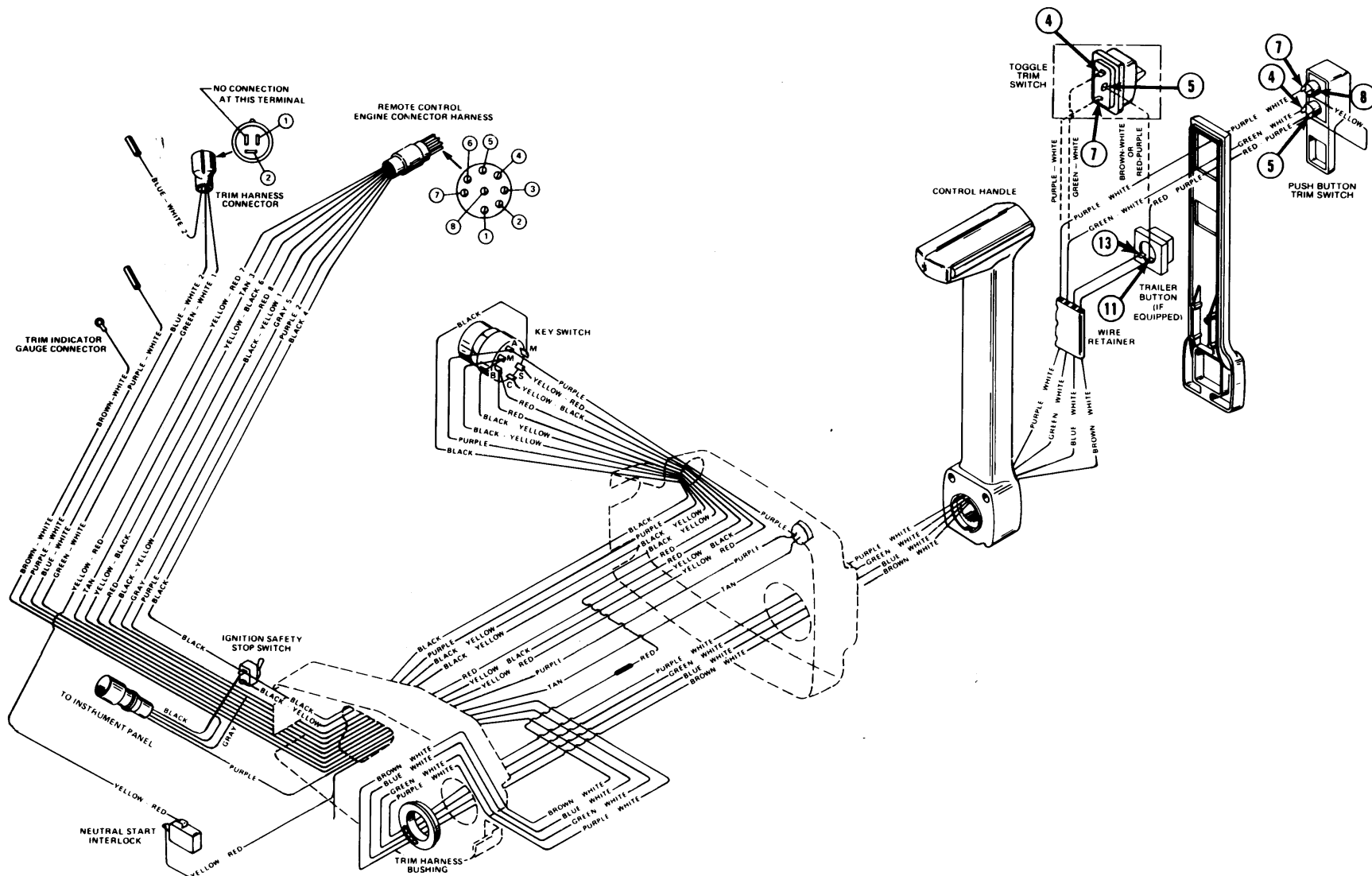


Side Mount Remote Control Wiring Diagram



23891

- a - Ignition/Choke Switch
- b - Emergency Stop Switch
- c - Neutral Start Switch
- d - Tachometer/Accessories Harness Connector
- e - Wiring Harness Connector
- f - Warning Horn
- g - Trim/Tilt Switch

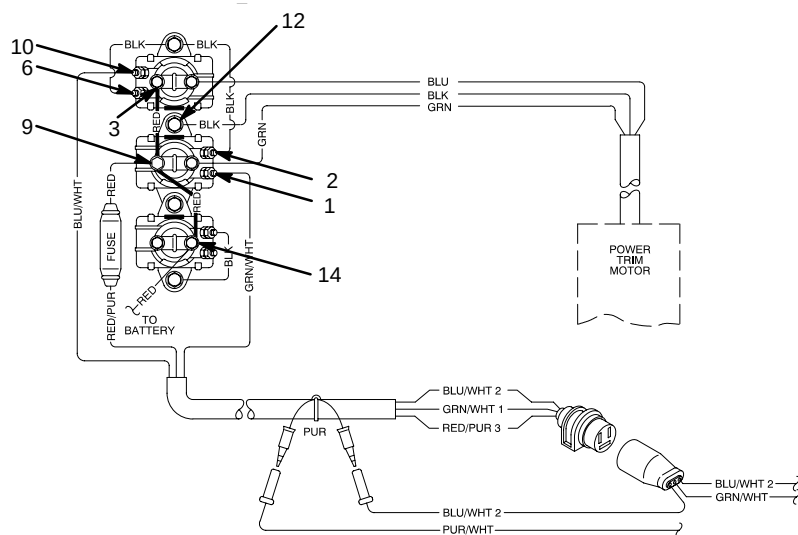


Commander Side Mount Remote Control Wiring Diagram



**Power Trim System Wiring Diagram
(3 Cylinder Models Using COMMANDER
Side Mount Remote Control)**

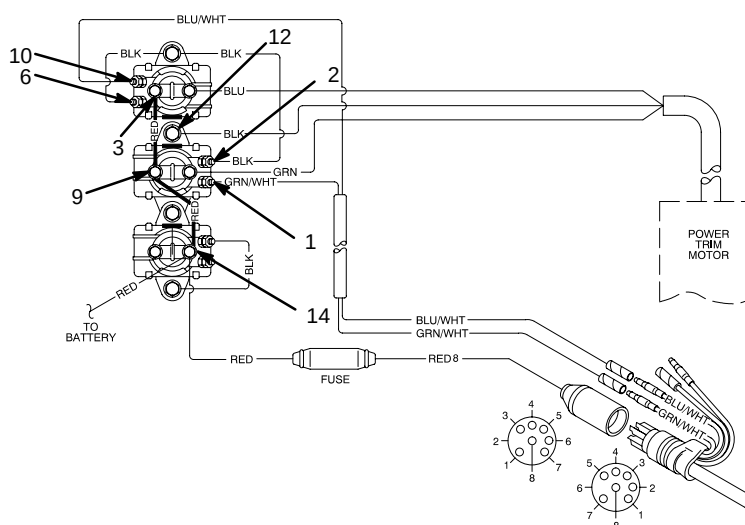
BLK •BLACK
BLU •BLUE
GRN •GREEN
PUR •PURPLE
RED •RED
WHT •WHITE



23884

**Power Trim System Wiring Diagram
(3 Cylinder Models Using COMMANDER
2000 Side Mount Remote Control)**

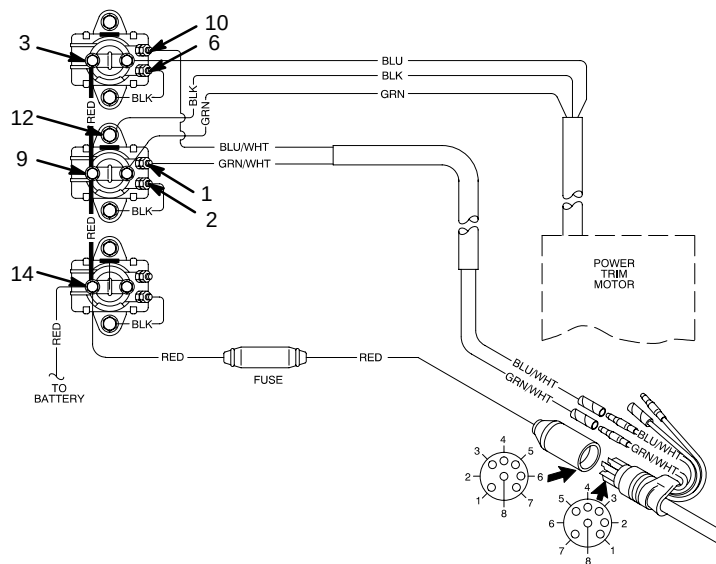
BLK •BLACK
BLU •BLUE
GRN •GREEN
RED •RED
WHT •WHITE



23886

**Power Trim System Wiring Diagram
(4 Cylinder Models Using COMMANDER
2000 Side Mount Remote Control)**

BLK •BLACK
BLU •BLUE
GRN •GREEN
RED •RED
WHT •WHITE



23885



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 wiring diagrams for connection points when troubleshooting the electrical system. (Connection points are specified by number.)

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

* Remote Control Equipped with Trailer Button

Use an Ohmmeter (R x 1 scale) and check continuity of wire between Point 10 on “Up” solenoid and Point 13 on trailer button. If no continuity, wire is open.

If wire is OK, disconnect all battery leads from battery and check continuity across trailer button terminals with trailer button depressed. If no continuity is indicated, trailer button is faulty.

Troubleshooting the “Up” and “Trailer” Circuits* (Both Circuits Inoperative: “Down” Circuit Is OK)

* Remote Control Equipped with Trailer Button

Connect Voltmeter red lead to Point 10 and BLACK lead to ground.
Depress the trailer button.

Battery Voltage Indicated:

Connect Voltmeter RED lead to Point 3.

Battery Voltage Indicated:

- Connect Voltmeter RED lead to Point 6.
- Depress trailer button.

Battery Voltage Indicated:

- Check “Up” solenoid terminals for loose or corroded connections.
- Check BLACK ground wire (on “Up” solenoid) for corrosion or open.
- Test “Up” solenoid. Refer to “Motor and Electrical Tests,” following.

No Voltage Indicated:

There is an open circuit in wires [BLUE-WHITE (or BLUE), PURPLE-WHITE (or PURPLE)] between “Up” solenoid and trim buttons.

No Voltage Indicated:

- Check for loose or corroded connection at Point 9 or Point 3.
- Check RED lead between Point 9 and Point 3 for open.

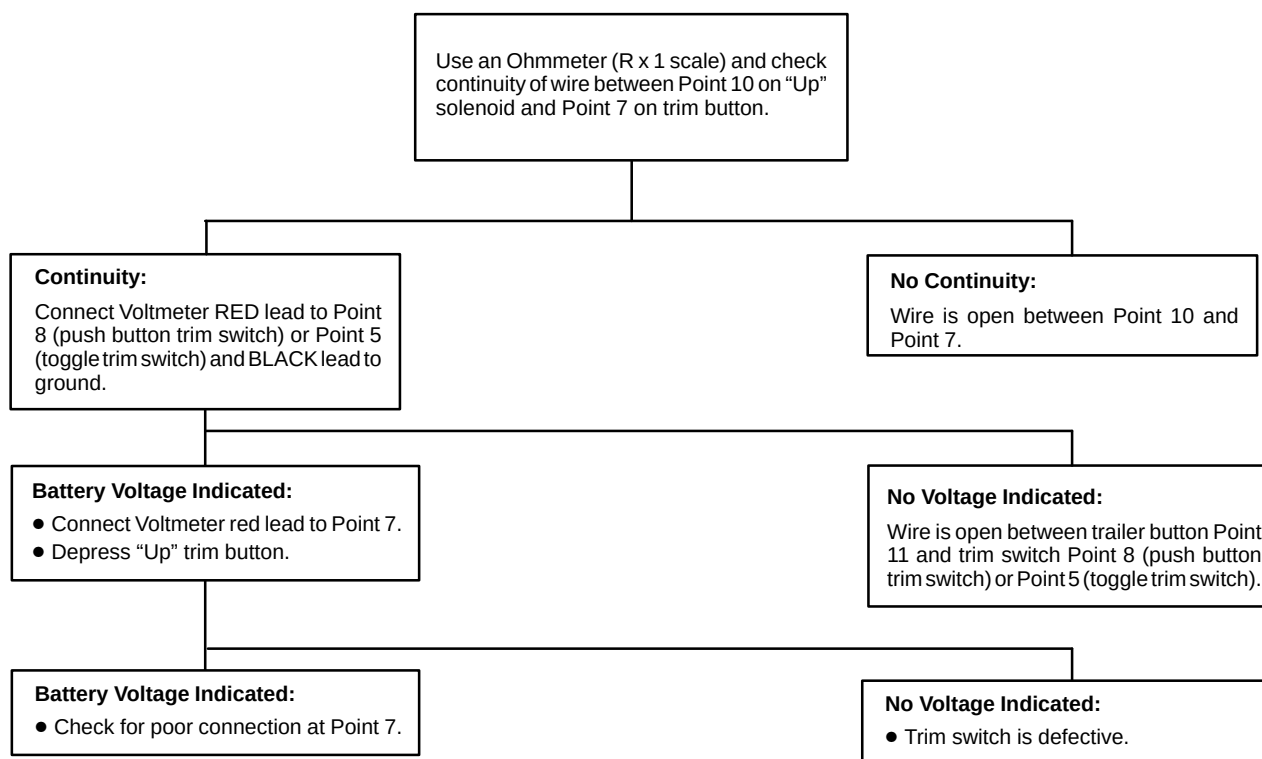
No Voltage Indicated:

Solenoid is defective.



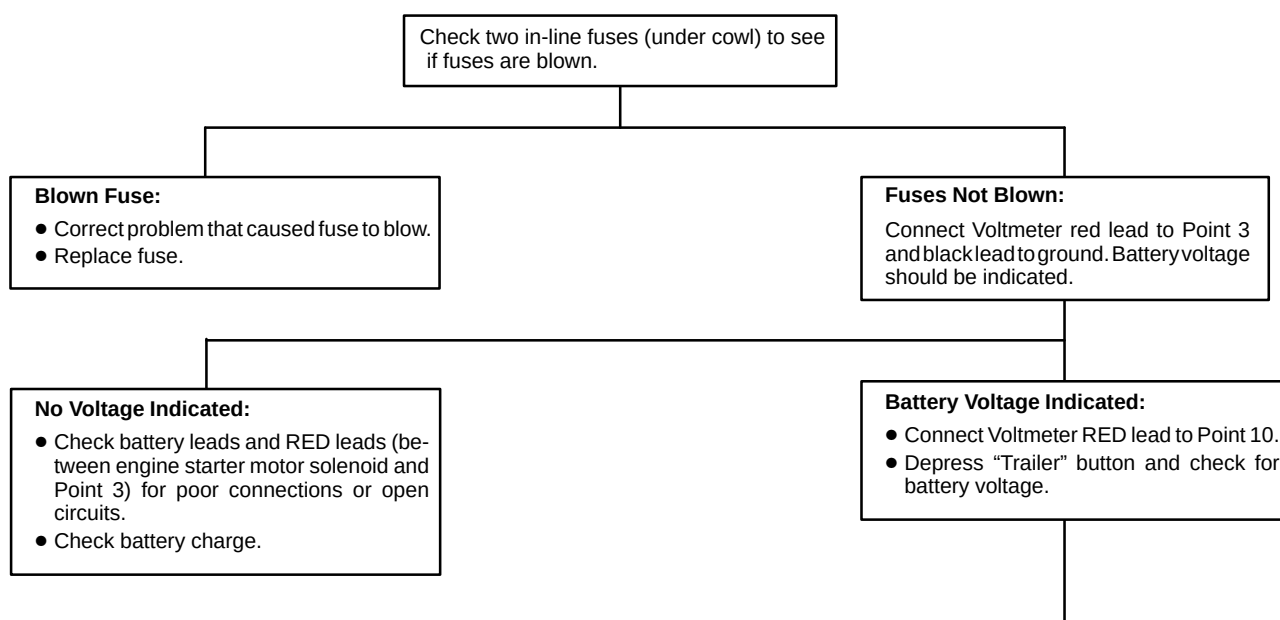
Troubleshooting the “Up” Circuit* (When “Trailer” Circuit Is OK)

* Remote Control Equipped with Trailer Button



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

* Remote Control Equipped with Trailer Button



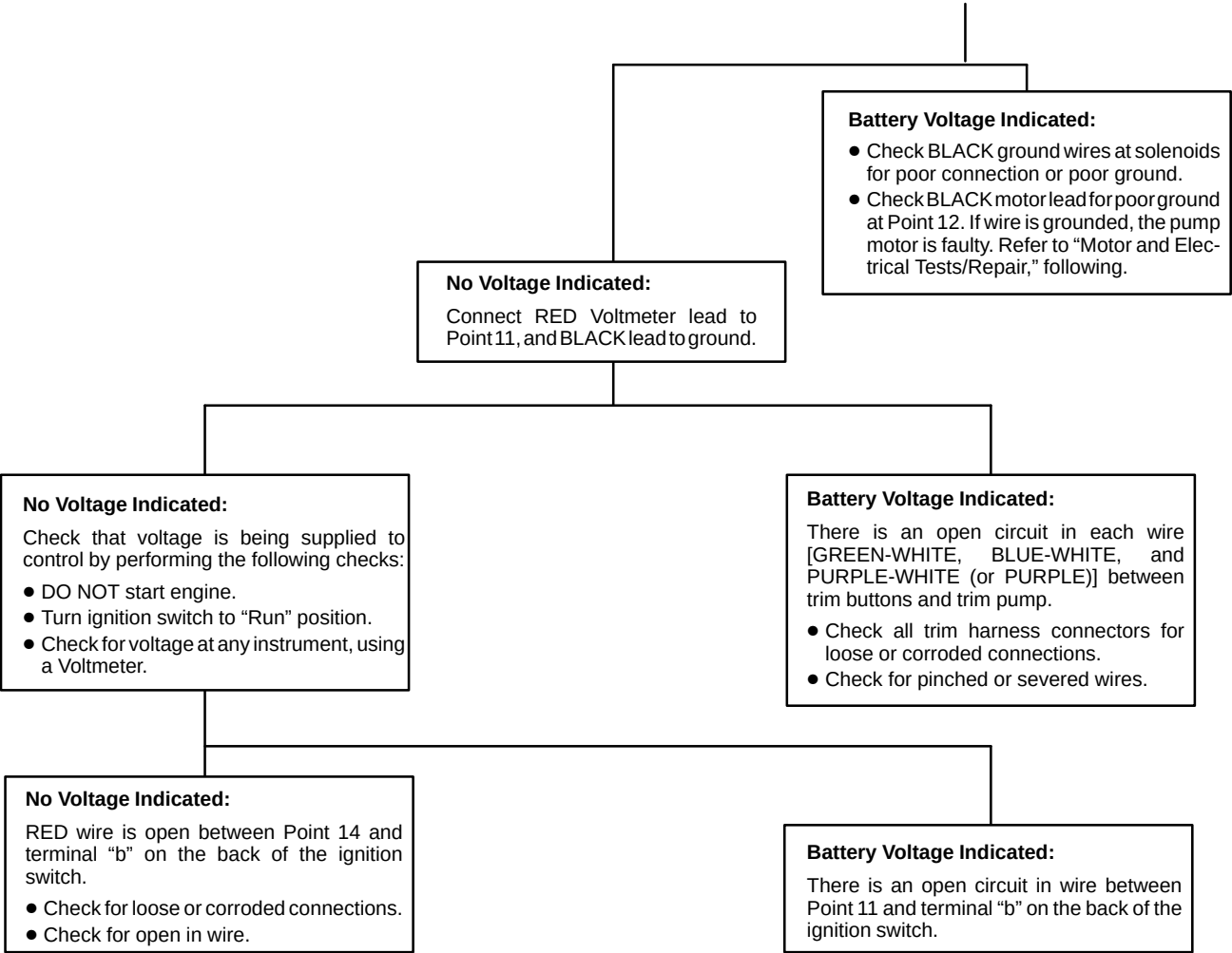
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Troubleshooting the “Down,” “Up” and “Trailer” Circuits* (All Circuits Inoperative)

* Remote Control Equipped with Trailer Button

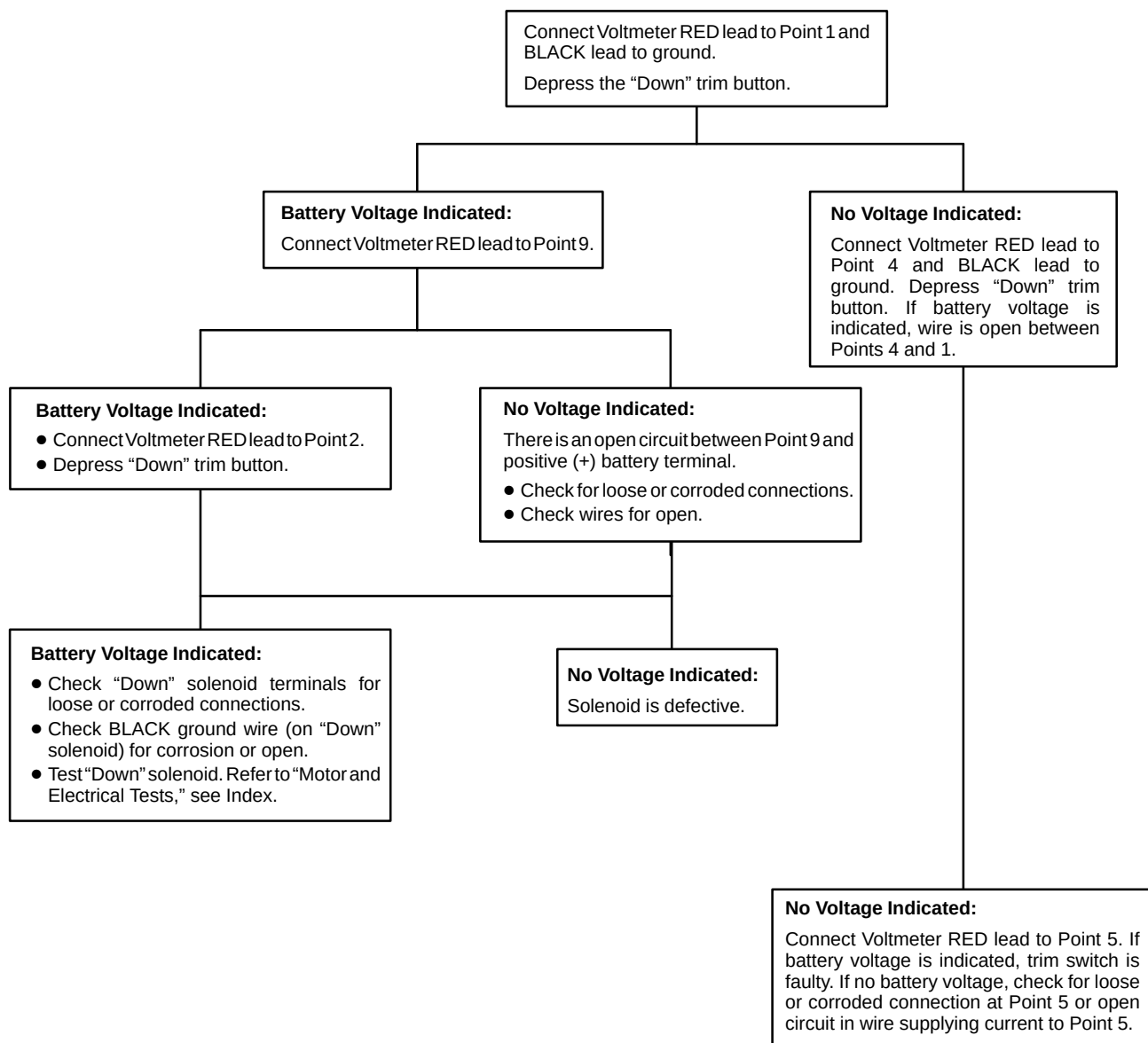
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Troubleshooting the “Down” Circuit (When “Up” Circuit Is OK)

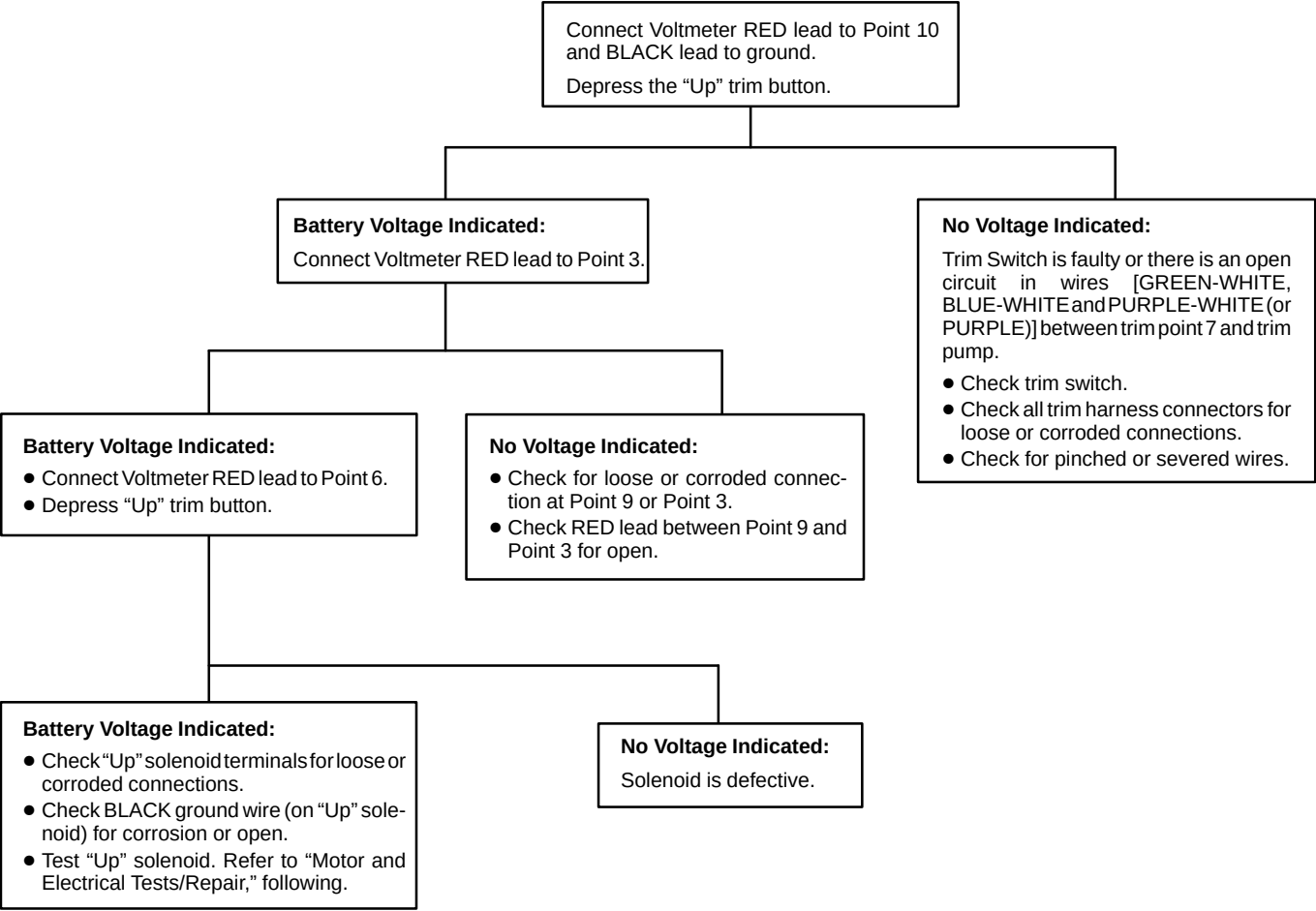
Remote Controls With or Without Trailer Buttons





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

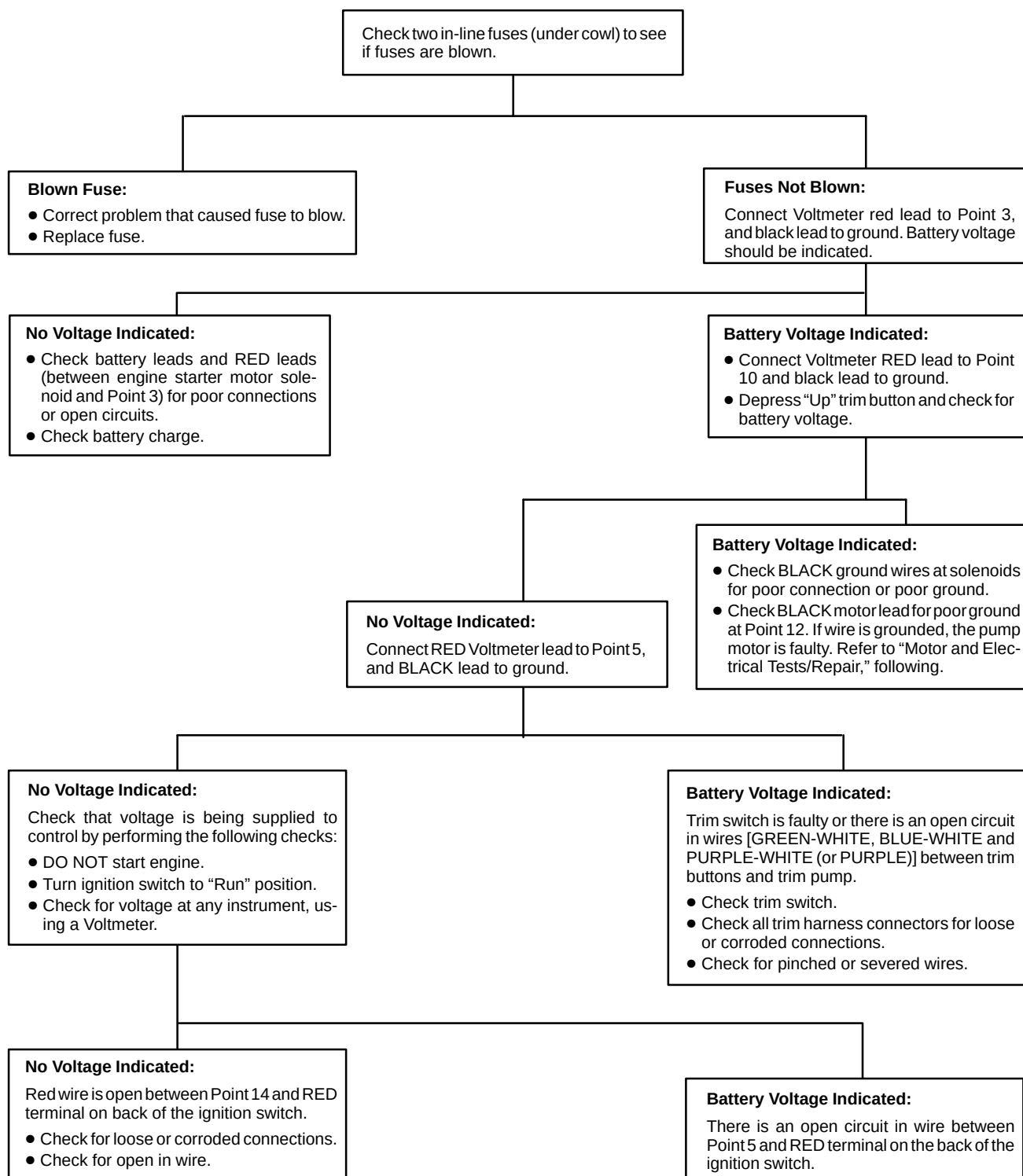
* Remote Control NOT Equipped with Trailer Button





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

* Remote Control NOT Equipped with Trailer Button

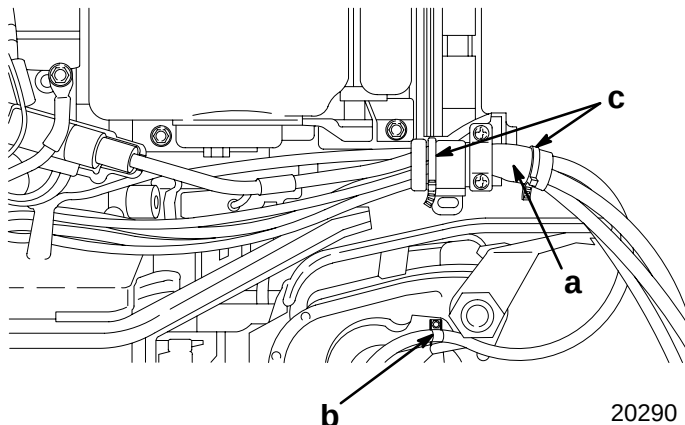




Power Trim Assembly Removal and Installation

Removal

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

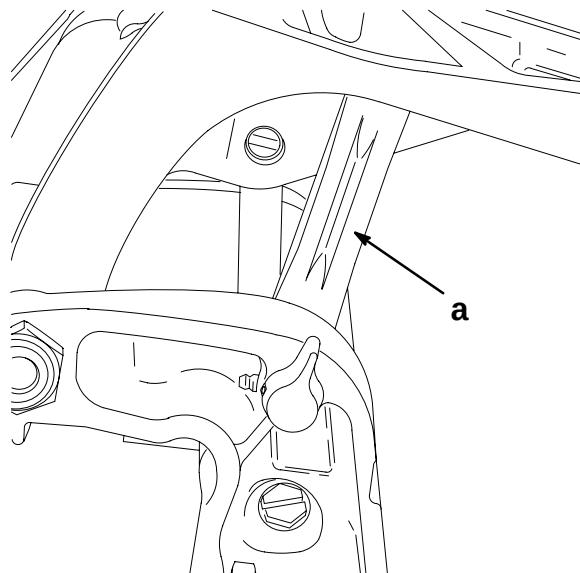


- a - Harness Retainer
- b - Clamp
- c - Sta-Strap(s)

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

⚠ WARNING

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

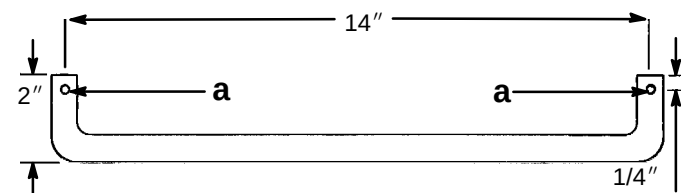


- a - Tilt Lock Lever

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

SUPPORT TOOL

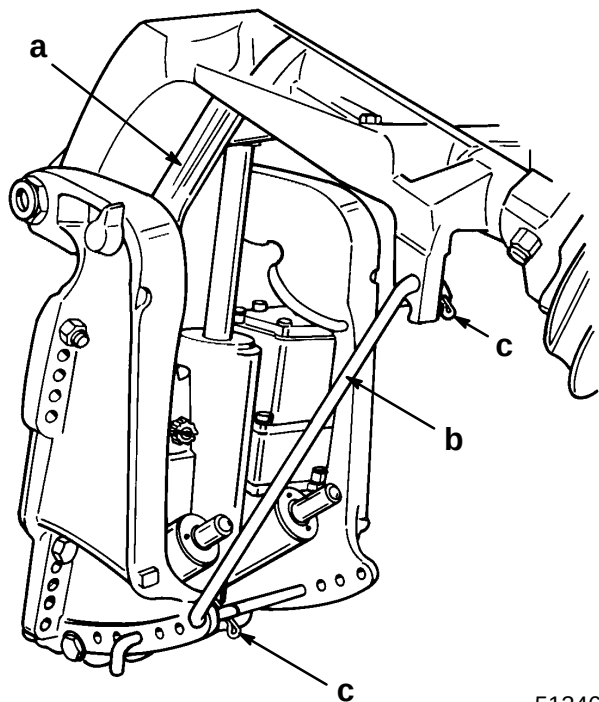
3/8 in. diameter metal rod (a used shift shaft works well).



- a - Drill Holes for Retaining Clips

METRIC CONVERSION

14" = 35.56cm
2" = 50.8mm
3/8" = 9.5mm
1/4" = 6.35mm



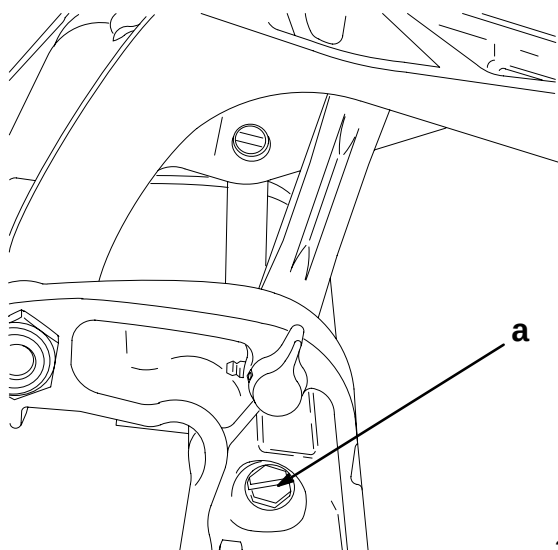
51346

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

⚠ CAUTION

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

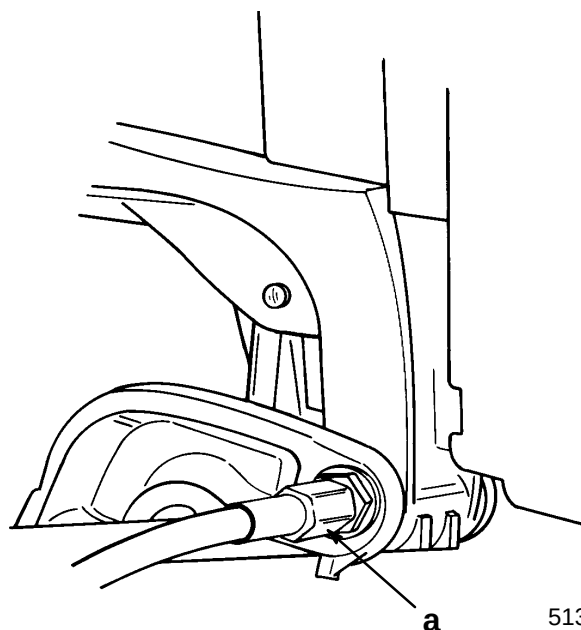
3. Disconnect power trim wires at solenoids (BLUE, GREEN, and BLACK).
4. Open filler cap and release any remaining pressure in the system.



20319

- a - Filler Cap

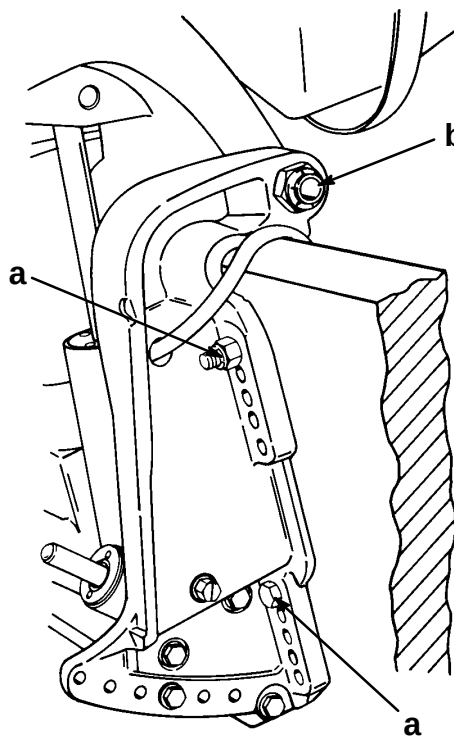
IMPORTANT: Outboards equipped with thru-the-tilt-tube steering - remove steering link arm from end of steering cable and cable retaining nut from tilt tube.



51354

- a - Retaining Nut

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

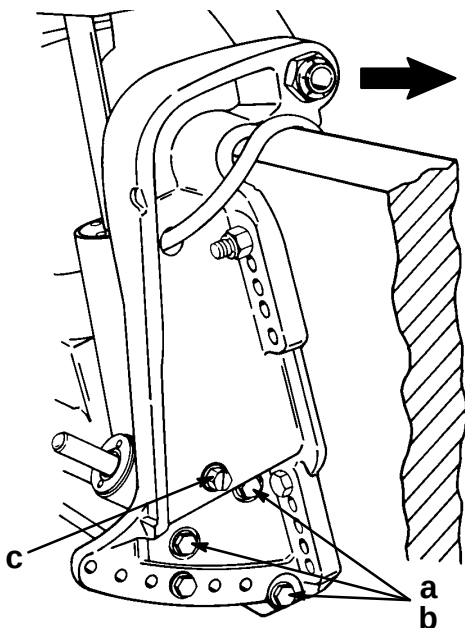


51375

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



- Remove 3 screws and washers and move starboard transom bracket so that manual release valve will clear bracket when power trim is removed.

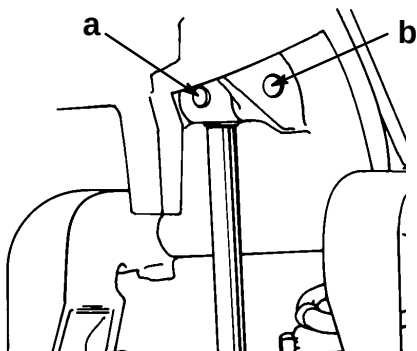


51375

- a - Screws (3)
- b - Washers (3)
- c - Manual Release Valve

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

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

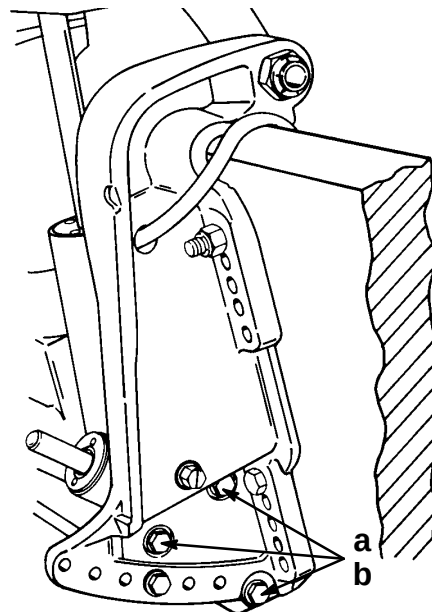


51339

- a - Cross Pin
- b - Upper Swivel Pin

Installation

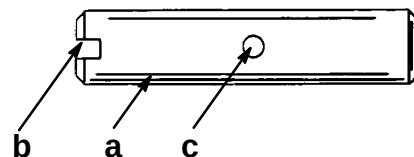
- Paint any exposed metal surfaces to prevent corrosion.
- Apply Loctite 271 to screws. Install trim system, starboard transom bracket, and tilt tube nut.



51375

- a - Screw (6) Torque to 45 lb. ft. (61.0 N·m)
- b - Flatwasher (6) Install one per screw

- 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 (+).
- Install Upper Swivel Pin with slotted end to left (port) side of engine.

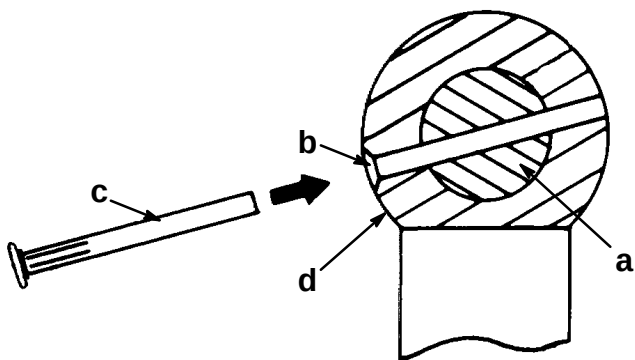


- a - Upper Swivel Pin
- b - Slotted End
- c - Cross Hole (in line with slotted end)

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 - Cross Pin (Tri-lobe Design)
- 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.

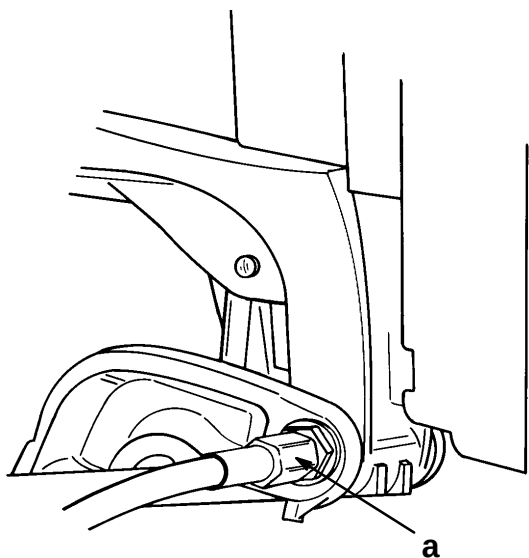
- Apply marine sealer to shanks of mount bolts and install transom mount bolts.

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.

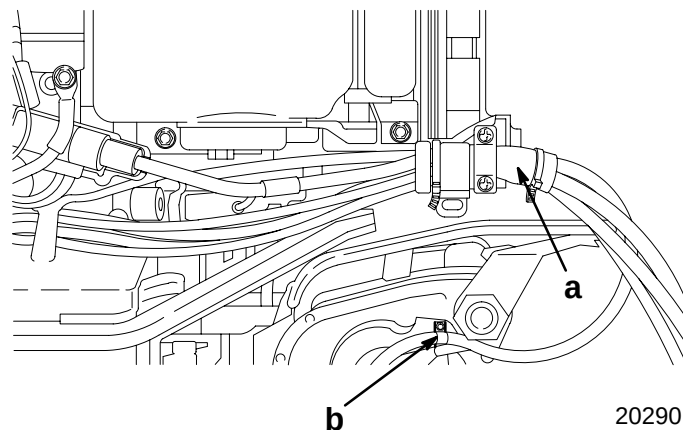
IMPORTANT: Outboards equipped with thru-the-tilt-tube steering: Tighten steering cable retaining nut securely to tilt tube.



- a - Steering Cable Retaining Nut

51354

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



- a - Harness Retainer
- b - Clamp

20290

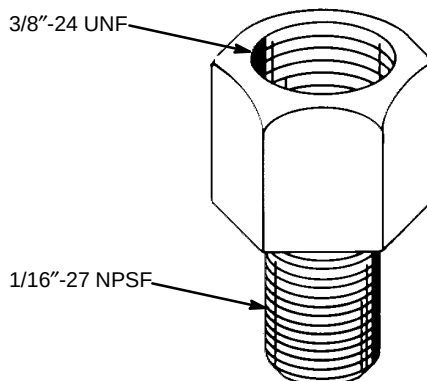
⚠ WARNING

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 (91-52915A3)

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.

Use Adapter Fitting (22-11243) to connect test gauge to trim system.

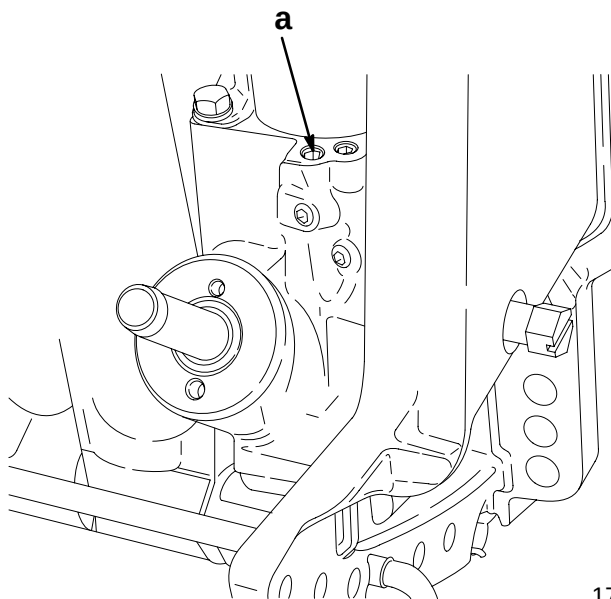




“UP” Pressure Check

IMPORTANT: Insure battery is fully charged before performing tests.

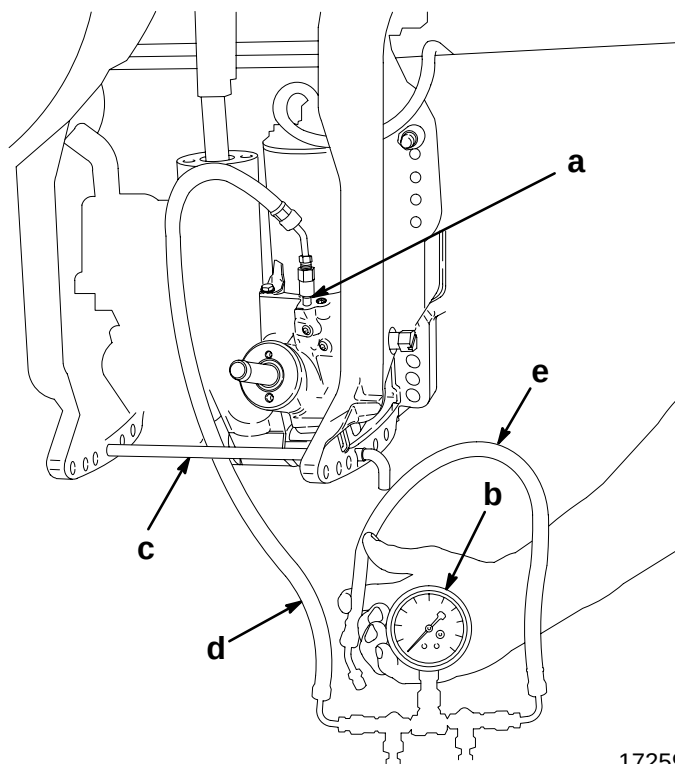
1. Tilt outboard to full “Up” position and engage tilt lock lever.
2. Slowly remove “Fill” plug to bleed pressure from reservoir.
3. Turn Manual Release Valve 3 to 4 turns (counter-clockwise) to bleed any remaining pressure.
4. Remove allen plug.



17250

a - Allen Plug

5. Install components.



17259

- a - Adaptor Fitting (22-11243)
- b - Test Gauge Assembly
- c - Tilt Pin (Position in Hole Shown)
- d - Hose (Route Hose Behind Tilt Pin, as Shown)
- e - Hose (Not Used for This Check)

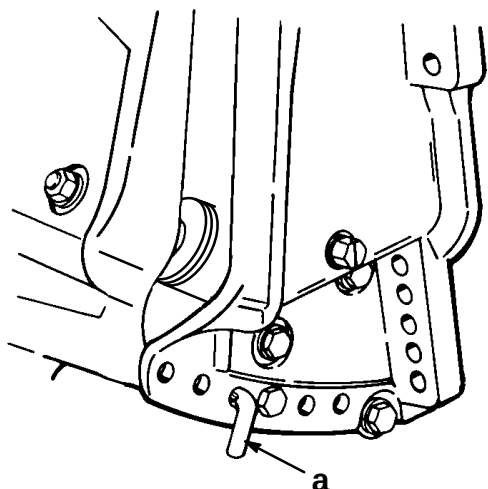
6. Disengage tilt lock lever.



⚠ CAUTION

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

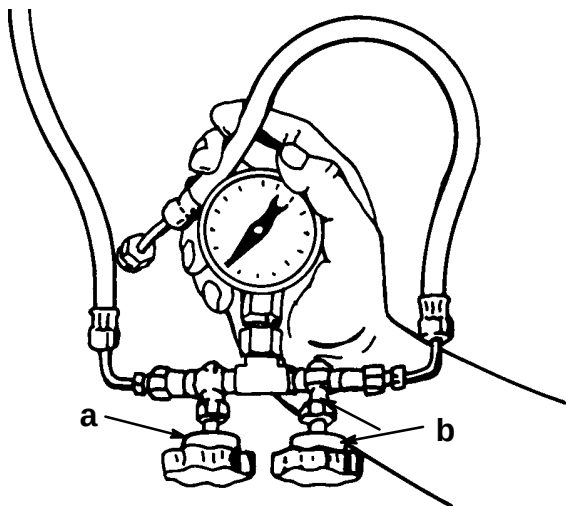
7. Move outboard "In" until hole in swivel bracket "ear" aligns with the third tilt hole in transom bracket. Lock engine in trim range by installing a 3/8 in. (9.5mm) diameter tilt pin or two 3/8 in. (9.5mm) hardened bolts and nuts thru the transom brackets and swivel bracket in the hole shown.



18456

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

8. Install "Fill" plug.
9. Close Manual Release Valve (clockwise).
10. Open valve (a) and close valve (b).



51374

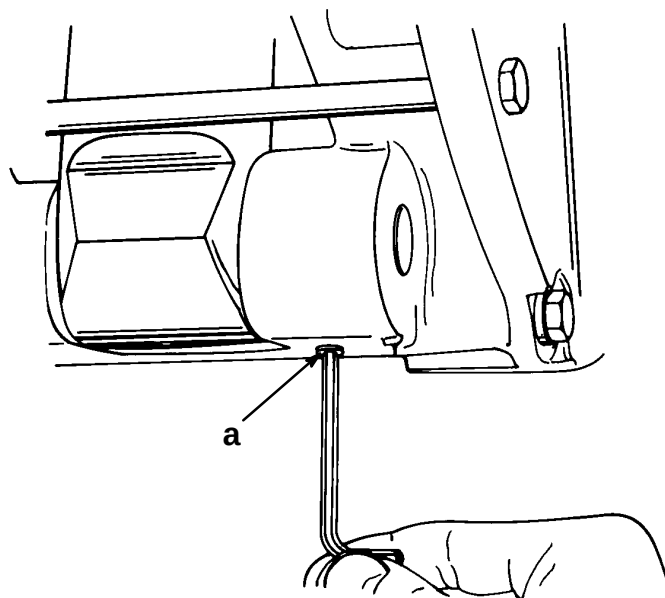
a - Open Valve
b - Close Valve

11. Run trim "UP". The minimum pressure should be 1300 P.S.I. (91 kg/cm²).
12. Run trim "DOWN" to release pressure and remove spare tilt pin or bolts and nuts.
13. Tilt outboard full "UP" and engage tilt lock lever.
14. Slowly remove "Fill" plug to bleed pressure.
15. Open Manual Release Valve 3 to 4 turns to bleed any remaining pressure.
16. Remove test gauge hose and adapter, and install allen plug.

NOTE: If pressure is less than 1300 PSI (91 kg/cm²), troubleshoot system per instructions on page 6A-6.

"DOWN" Pressure Check

1. Repeat steps 1 through 4 from preceding "UP" pressure check, removing allen plug as shown.

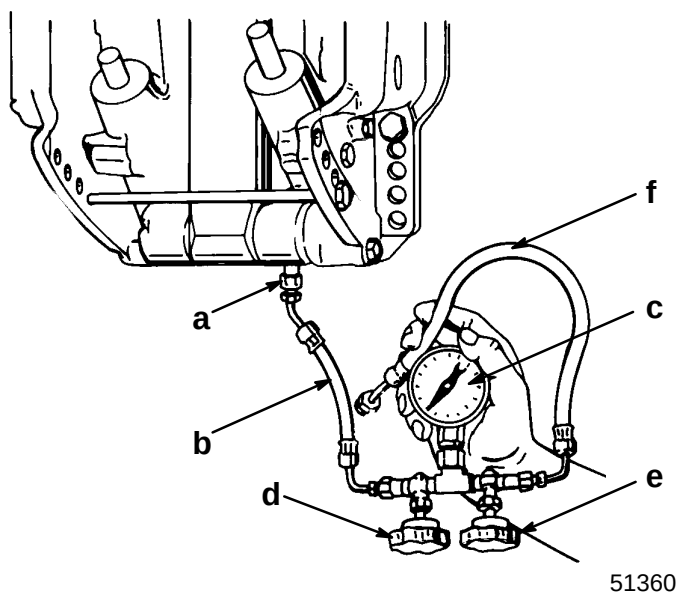


51367

a - Allen Plug



2. Install components.



a - Adapter Fitting (22-11243)

b - Hose (route hose so it will not be pinched when outboard is trimmed "DOWN")

c - Test Gauge Assembly

d - Valve Open

e - Valve Close

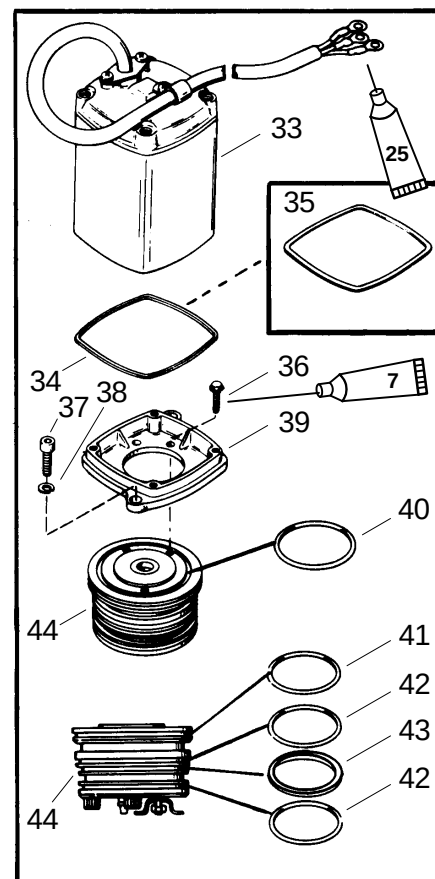
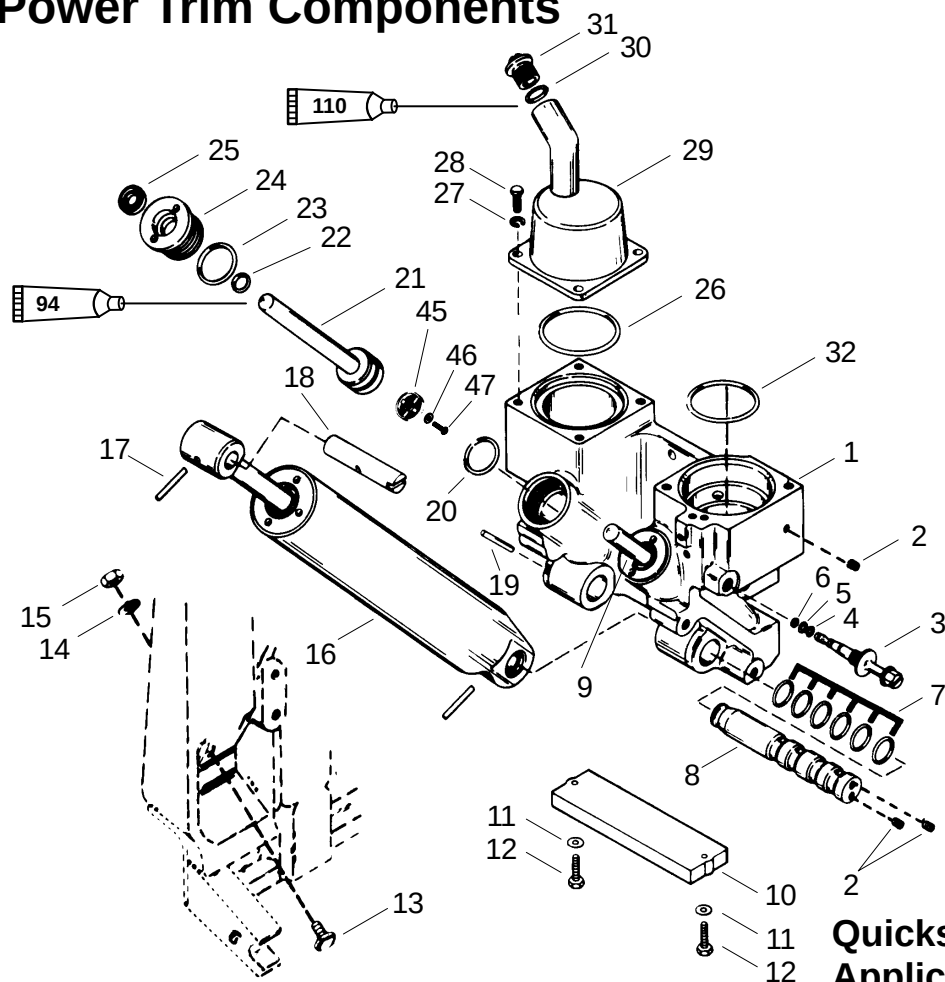
f - Hose (not used for this test)

3. Open valve (d) and close valve (e).
4. Install fill plug.
5. Close Manual Release Valve (clockwise).
6. Run trim "DOWN". Minimum pressure should be 500 P.S.I. (35 kg/cm²).
7. Tilt outboard full "UP" and engage tilt lock lever.
8. Slowly remove "Fill" plug to bleed pressure.
9. Open Manual Release Valve 3 to 4 turns to release any remaining pressure.
10. Remove test gauge hose and adapter fitting. Install allen plug.
11. Fill Power Trim system and purge system; refer to "Fill, Check, and Purge" preceding.

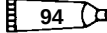
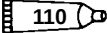
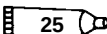
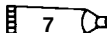
NOTE: If pressure is less than 500 PSI (35 kg/cm²), troubleshoot system per instructions on Page 6A-6.



Power Trim Components



Quicksilver Lubrication/Sealant Application Points

-  94 Anti-Corrosion Grease (92-78376A6)
-  110 Power Trim and Steering Fluid (92-90100A12)
-  25 Liquid Neoprene (92-25711--2)
-  7 Loctite 271 (Obtain Locally)

REF. NO.	DESCRIPTION	TORQUE		
		lb. in.	lb. ft.	N·m
1	Housing			
2	Allen Plug			
3	Manual Release Valve			
●4	O-ring [.239" (6.07mm) I.D.]			
●5	O-ring [.208" (5.28mm) I.D.]			
●6	O-ring [.114" (2.90mm) I.D.]			
●7	O-ring [.989" (25.12mm) I.D.]			
8	Shaft			
9	Trim Rod Assembly, Starboard			
10	Anode Plate			
11	Washer			
12	Bolt	70		7.9
13	Striker Plate, Trim Rod			
14	Lockwasher			
15	Nut	80		9.0



Power Trim Components (Continued)

REF. NO.	DESCRIPTION	TORQUE		
		lb. in.	lb. ft.	N·m
16	Tilt Cylinder Assembly			
17	Cross Pin			
18	Retaining Pin			
19	Pin			
●20	O-ring [1.248" (31.70mm) I.D.]			
21	Trim Rod Assembly w/Check Valve, Port			
●22	O-ring [.612" (15.54mm) I.D.]			
●23	O-ring [1.475" (37.47mm) I.D.]			
24	Cap, Trim Cylinder			
●25	Seal			
●26	O-ring (2.864" I.D.)			
27	Washer			
28	Bolt			
29	Reservoir Cover			
●30	O-ring [.583" (14.81mm) I.D.]			
31	Fill Screw			
■●32	O-ring [2.739" (69.57mm) I.D.] (If Equipped)			
33	"Square" Motor Assembly			
34	Square Ring, used when end frame cap has groove			
35	Gasket, used when end frame cap does NOT have groove			
36	Bolt	70		7.9
37	Allen Bolt	70		7.9
38	Lockwasher			
39	End Frame Cap			
40	O-ring (or Flat Ring)			
■41	O-ring [2.739" (69.57mm) I.D.]			
■42	O-ring [2.614" (66.40mm) I.D.]			
■43	Flat Ring			
44	Pump Assembly			
45	Screen (If Equipped)			
46	Washer (If Equipped)			
47	Screw (If Equipped)			
■ Contents of "Pump Seal Kit" (P/N 12663) ● Contents of "Power Trim O-ring Kit" (P/N 25-48462A1) * It is recommended O-ring be installed even if pump was not originally equipped with this O-ring.				



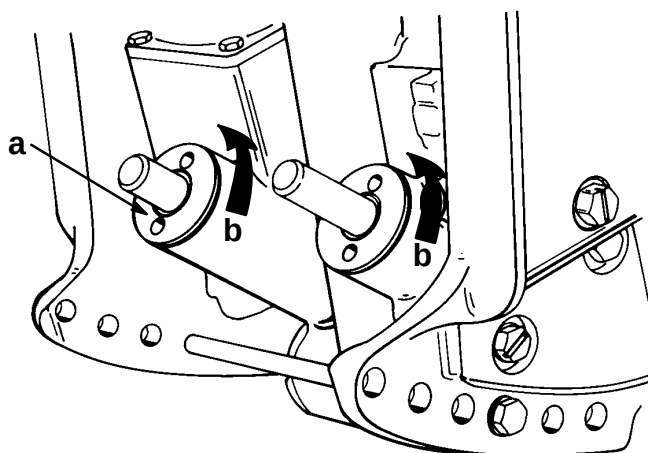
Hydraulic Repair

TRIM ROD REMOVAL AND REPAIR

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

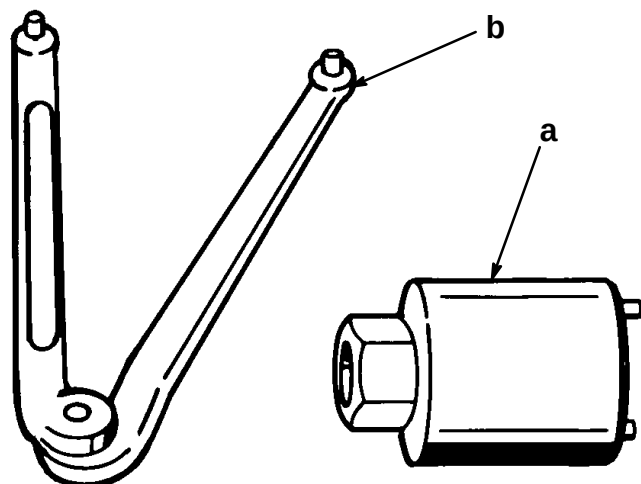
1. Tilt outboard to full "UP" position and engage tilt lock lever.
2. Slowly remove "Fill" plug to bleed reservoir pressure.
3. Turn Manual Release Valve 3 to 4 turns (counterclockwise) to bleed remaining pressure.
4. Remove trim rod cylinder caps.

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



51353

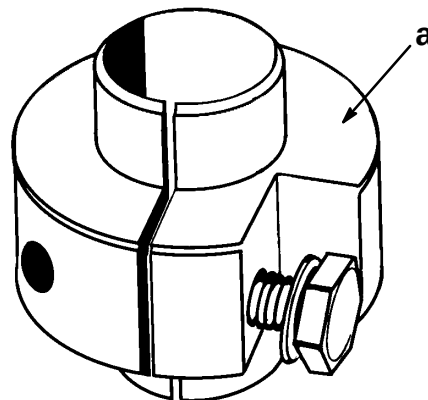
- a - Trim Rod Cylinder Cap
b - Turn Counterclockwise to Remove



51337

- 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)

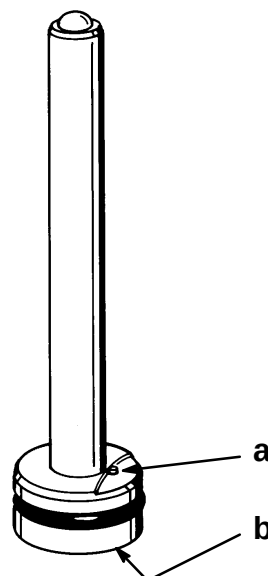
CLEANING AND INSPECTION - TRIM RODS AND CAPS

⚠ 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.



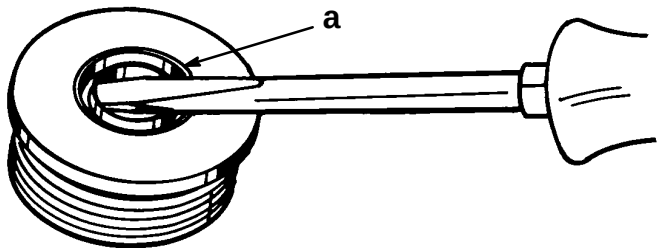
51352

- 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.



51343

a - Seal (Remove as shown)

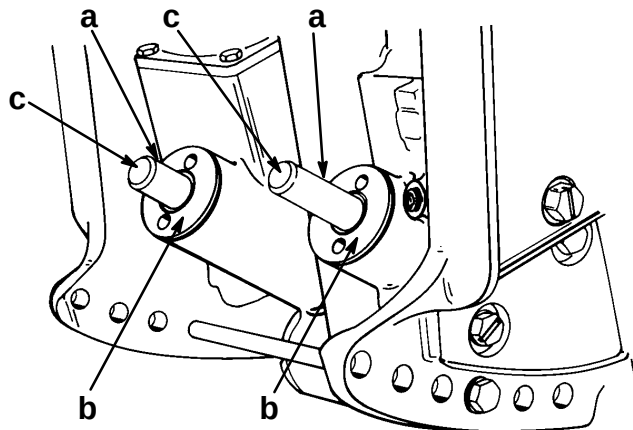
2. Install new seal with seal lip up.

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

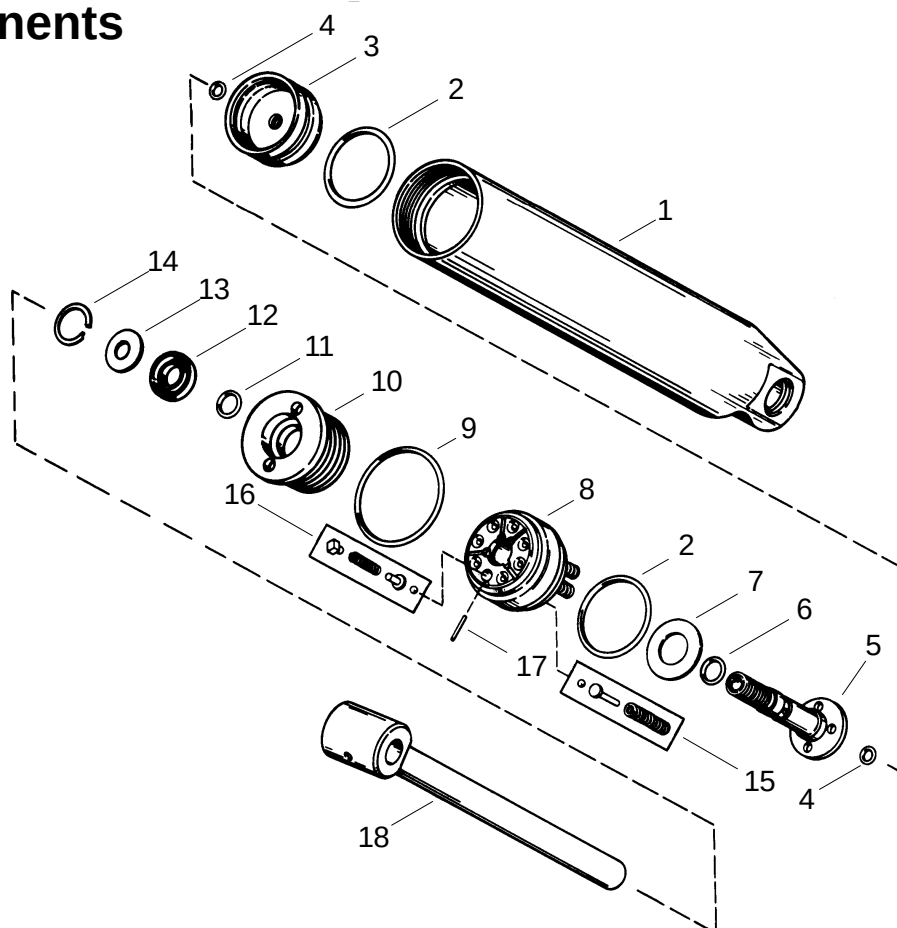
a - Trim Rods

b - Cylinder End Caps

c - Rod End Rollers (lubricate with Quicksilver Anti-Corrosion Grease or 2-4-C w/Teflon)



Tilt Ram Components



REF. NO.	QUAN.	DESCRIPTION	TORQUE		
			lb. in.	lb. ft.	N·m
1	1	Housing, Tilt Ram			
°2	1	O-ring (1.957" I.D.)			
3	1	Cup			
°4	1	O-ring (.307" I.D.)			
5	1	Rod End			
°6	1	O-ring (.661" I.D.)			
7	1	Washer			
8	1	Piston			
°9	1	O-ring (2.067" I.D.)			
°10	1	Cap			
11	1	O-ring (.854" I.D.)			
°12	1	Scraper			
°13	1	Washer			
°14	1	Retaining Ring			
15	1	Check Valve Assembly			
16	1	Check Valve Assembly			
17	1	Roll Pin			
18	1	Rod			

° Contents of "Tilt Cylinder O-ring Kit" (P/N 25-41478A1)



Tilt Ram

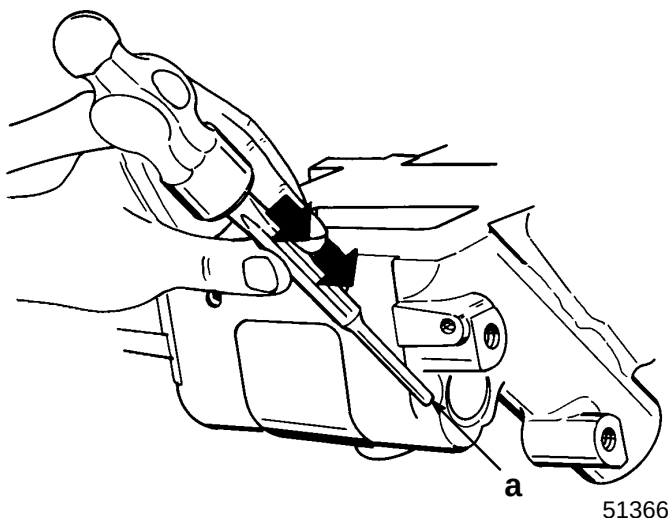
REMOVAL

1. Remove Power Trim assembly from engine, refer to "Removal" instructions in "Power Trim Assembly Removal and Installation," preceding.

Slowly remove fill screw to bleed pressure from reservoir.

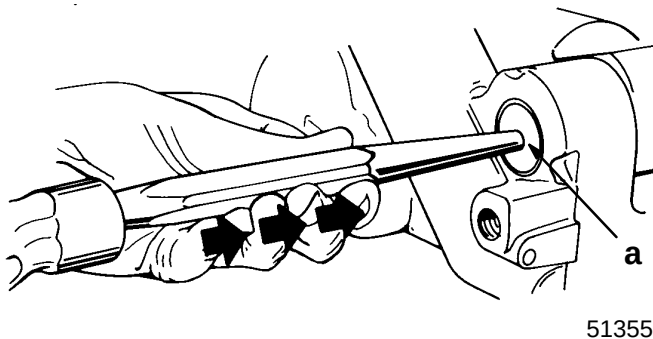
From a full closed (clockwise) position, slowly open manual release valve 3 to 4 turns (counterclockwise) to bleed remaining pressure from Power Trim system.

Remove pin by driving pin in direction shown.



a - Pin

2. Remove shaft by driving shaft in direction shown.



a - Shaft

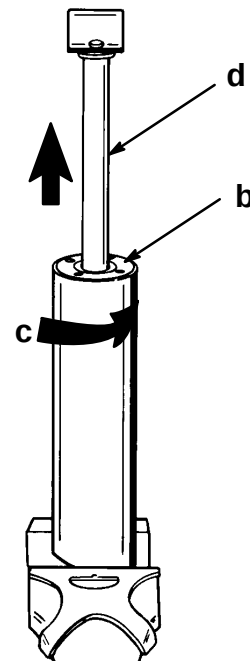
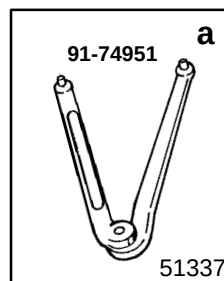
DISASSEMBLY

1. Secure tilt ram (at its base) in a soft jawed vise.

Using Spanner Wrench, loosen cap by turning cap in direction.

Remove ram from vise, and pour fluid from ram.

Pull rod assembly out of ram.



a - Spanner Wrench

b - Cap

c - Turn in Counterclockwise Direction

d - Rod Assembly

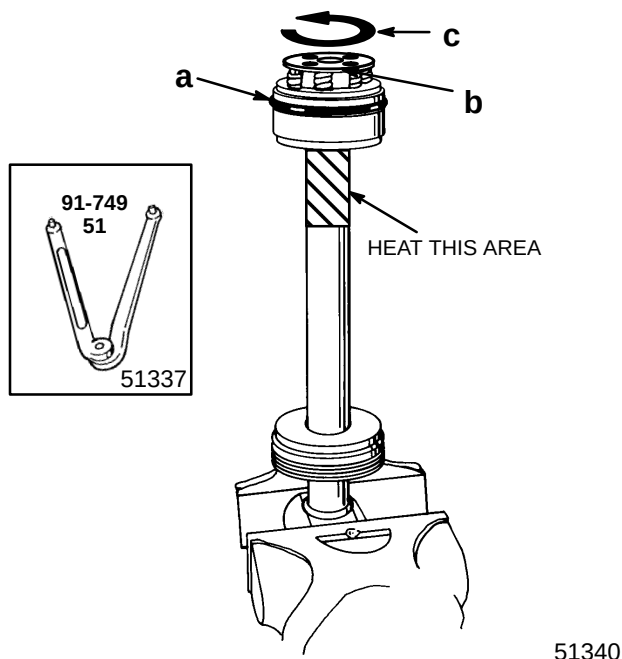


2. Clamp tilt rod in a soft jawed vise, as shown.

Remove o-ring.

Heat rod with Torch Lamp (91-63209 or 91-74042).

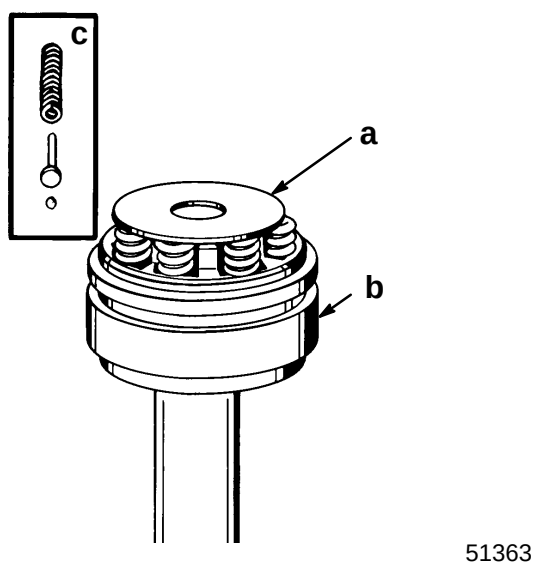
Using spanner wrench (91-74951), remove rod end by turning rod end in direction shown.



- a - O-ring
- b - Rod End
- c - Turn in Counterclockwise Direction

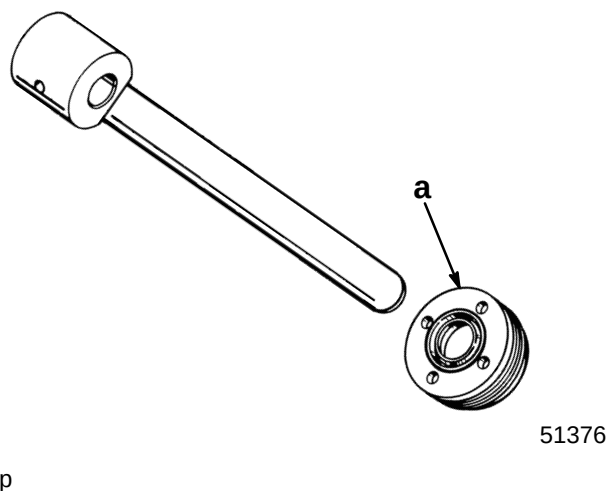
3. Lift washer and piston from rod; do not let check valve assemblies fall.

Remove check valve assemblies.

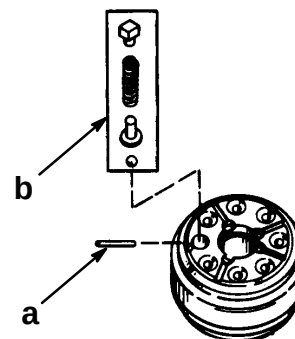


- a - Washer
- b - Piston
- c - Valve Assemblies

4. Slide cap off from rod.



5. Remove roll pin using a punch and hammer.
Remove check valve assembly.

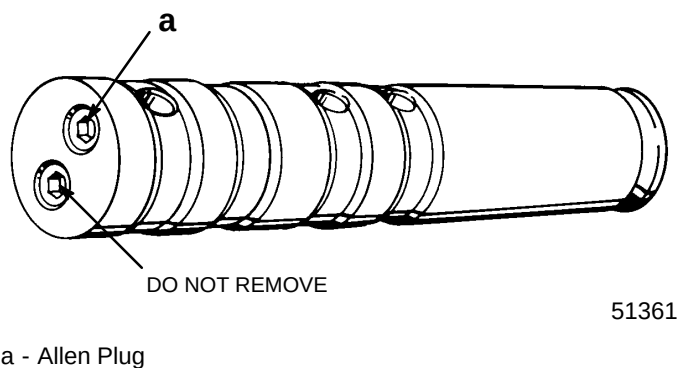


- a - Roll Pin
- b - Check Valve Assembly

6. Remove allen plug from shaft.

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

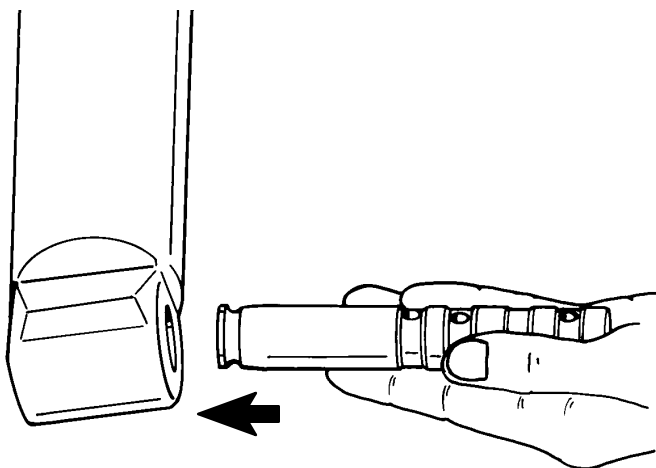
Lubricate shaft with Automatic Transmission Fluid (ATF) Type A or AF.



- a - Allen Plug

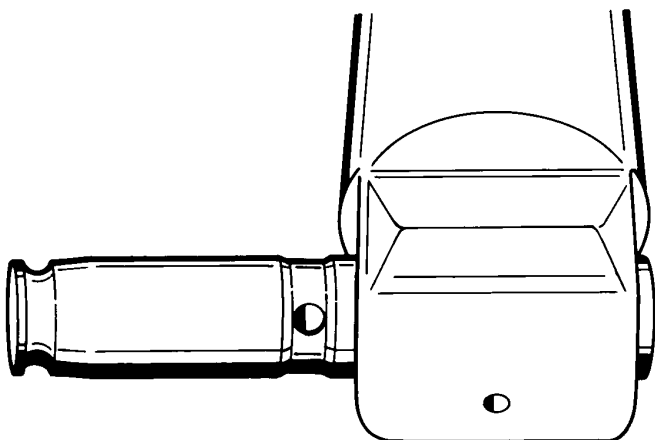


7. Insert shaft into housing, as shown.



51342

Tap shaft into housing until shaft is positioned as shown.



51365

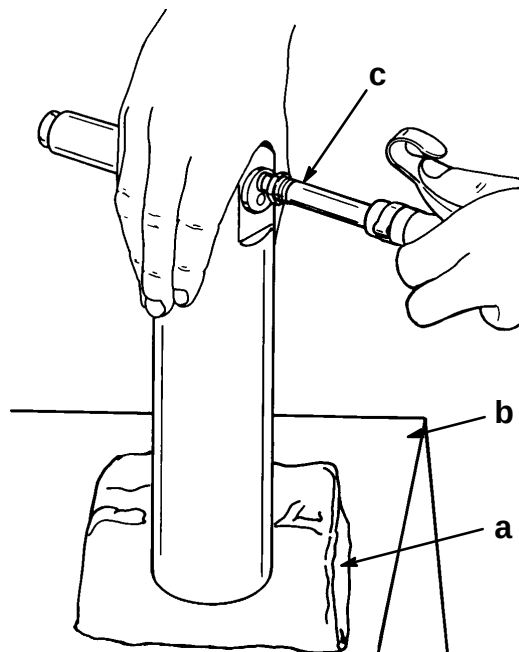
⚠ DANGER

Cup will be expelled from housing at a high velocity when air pressure is applied. Failure to place housing as shown could result in severe personal injury or death.

8. Place housing, as shown.

Hold down on housing and inject air into shaft opening, as shown.

Reinstall allen plug into shaft.



51353

- a - Shop Cloth
- b - Solid Work Bench (or Floor)
- c - Air Nozzle

CLEANING AND INSPECTION

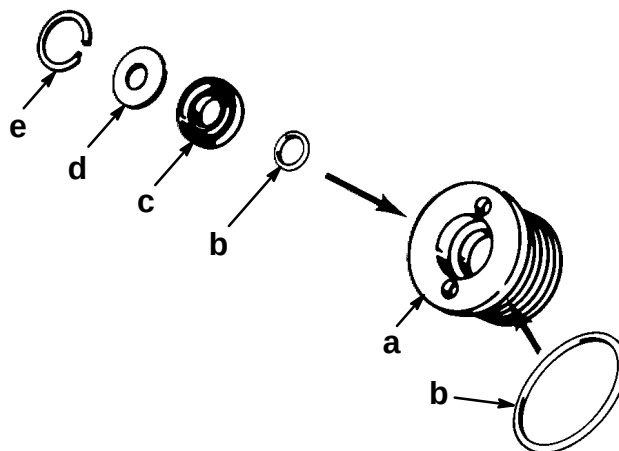
Inspect O-rings, and replace if damaged.

Clean components with parts cleaner and dry with compressed air.

Inspect tilt rod. If scraper (located in cap) has failed to keep rod clean, replace scraper; refer to instructions, following.

SCRAPER REPLACEMENT

Use a screwdriver to remove components from cap.



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



REASSEMBLY

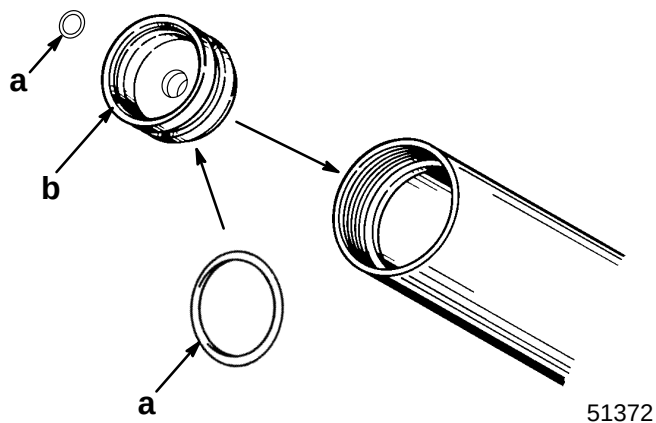
IMPORTANT: Components must be dirt and lint free. Slightest amount of debris in Power Trim system could cause system to malfunction.

1. Apply Automatic Transmission Fluid (ATF) Type A (Dexron II) on O-rings during reassembly.

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

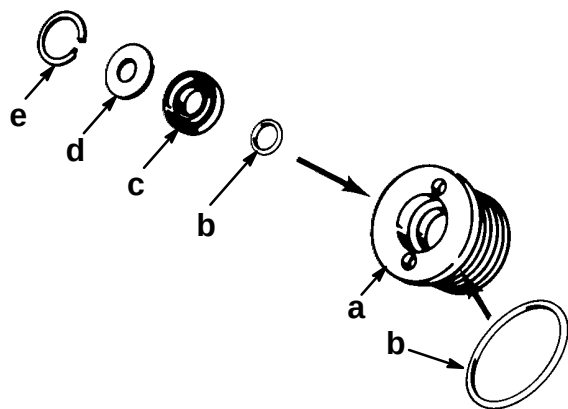
Install O-rings.

2. Insert cup into housing.



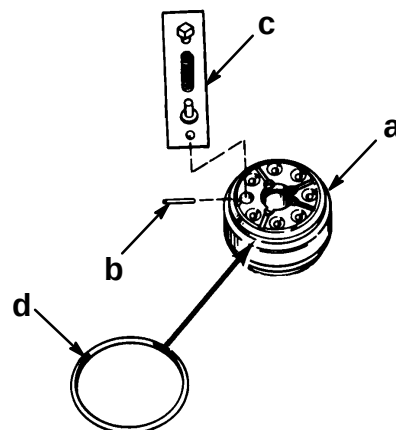
- a - O-ring
- b - Memory Piston Cup (Design 1 shown)

3. Assemble cap, as shown.



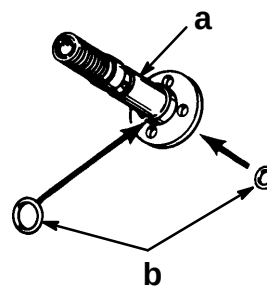
- a - End Cap
- b - O-ring (2)
- c - Scraper Seal
- d - Washer
- e - Retaining Ring

4. Install components, as shown.



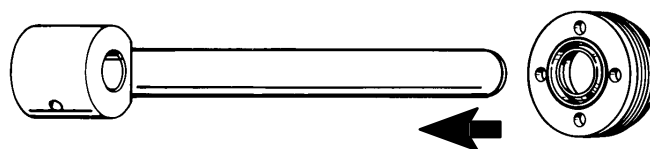
- a - Piston
- b - Roll Pin
- c - Check Valve Assembly
- d - O-ring

5. Install O-rings in locations shown.



- a - Rod End
- b - O-rings

6. Install end cap.



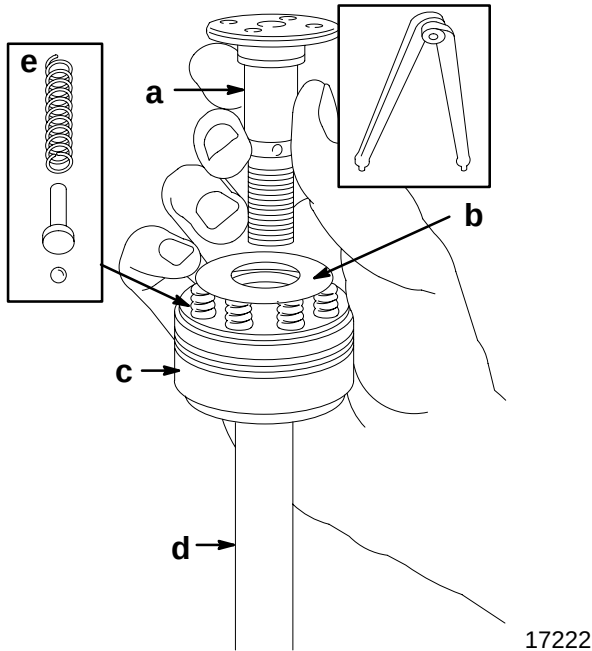
51376

NOTE: Some tilt rams have one check valve spring that is a lighter duty than the other six springs.

7. Install components onto rod, as shown.



Screw rod end into rod. Tighten rod end securely using Spanner Wrench.

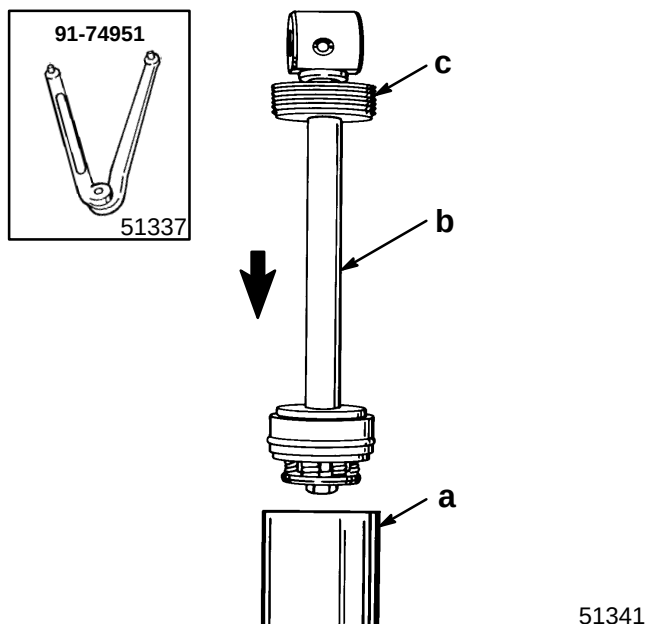


- a - Rod End
- b - Washer
- c - Piston
- d - Rod
- e - Check Valve Assemblies (7)

8. Clamp housing in a soft jawed vise.

Install rod assembly into housing.

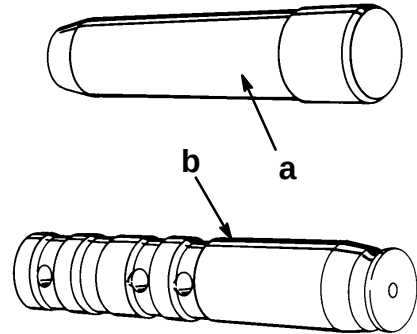
Tighten cap securely using Spanner Wrench (91-74951).



- a - Housing
- b - Rod Assembly
- c - Cap

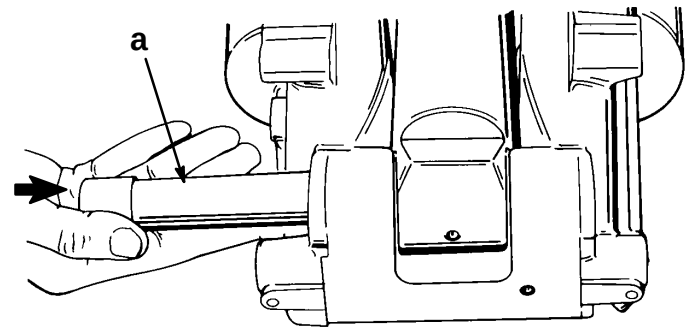
INSTALLATION

1. Lubricate alignment tool and shaft with Quicksilver Power Trim and Steering Fluid or Automatic Transmission Fluid (ATF) Type F, FA or Dexron II.



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

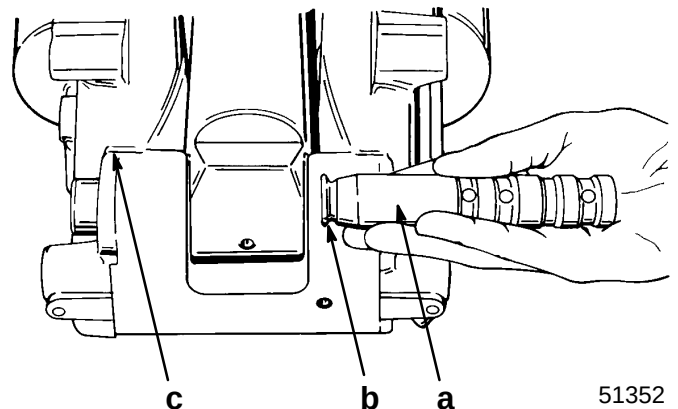
2. Align tilt ram with Power Trim housing by inserting alignment tool in direction shown.



- a - Alignment Tool

3. Install shaft into housing, as shown.

Groove will align with hole when shaft is properly installed.

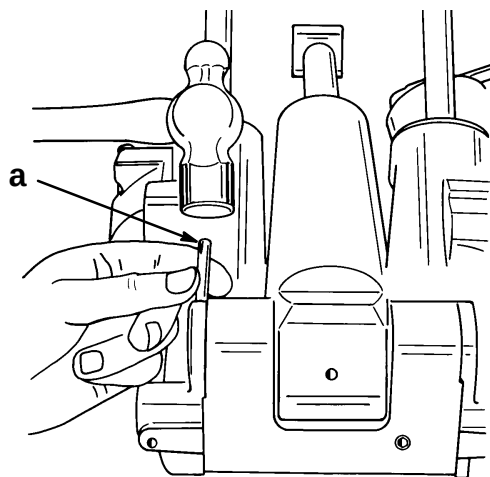


- a - Shaft
- b - Groove
- c - Hole



4. Install pin. Drive pin in until flush.

Install Power Trim assembly on engine, refer to "Installation" instructions in "Power Trim Assembly Removal and Installation," preceding.



51356

a - Pin (Drive Against Knurled End)

Pump Replacement

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

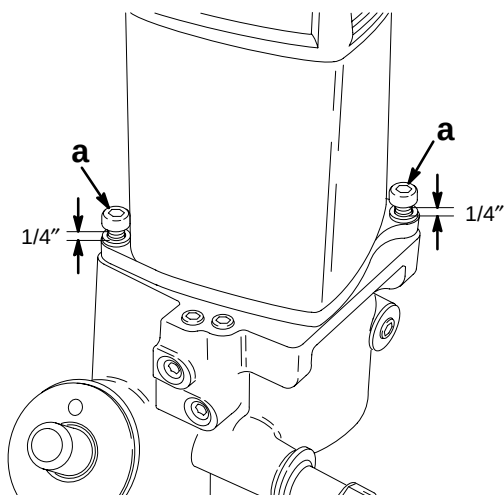
NOTE: Power Trim assembly does not have to be removed from engine to replace pump.

1. Disconnect trim pump motor wires, and remove starboard transom bracket from engine; refer to "Removal" instructions in "Power Trim Assembly Removal and Installation," preceding.

Unseat motor and pump assembly from housing as follows:

OPERATIVE TRIM MOTOR

Loosen 2 bolts until 1/4" (6mm) of each bolt is exposed. Do not remove bolts.



18458

a - Bolts

Tighten manual release valve to full right (clockwise).

Operate trim motor in "Up" direction by connecting trim motor wires to a 12-volt battery [BLUE wire to POSITIVE (+) terminal and BLACK wire to NEGATIVE (-) terminal].

Slowly remove fill screw to bleed pressure from reservoir.

From a full closed (clockwise) position, slowly turn manual release valve counterclockwise four turns to bleed remaining pressure from system.

Remove 2 bolts and lockwashers.

Lift motor and pump assembly from housing.

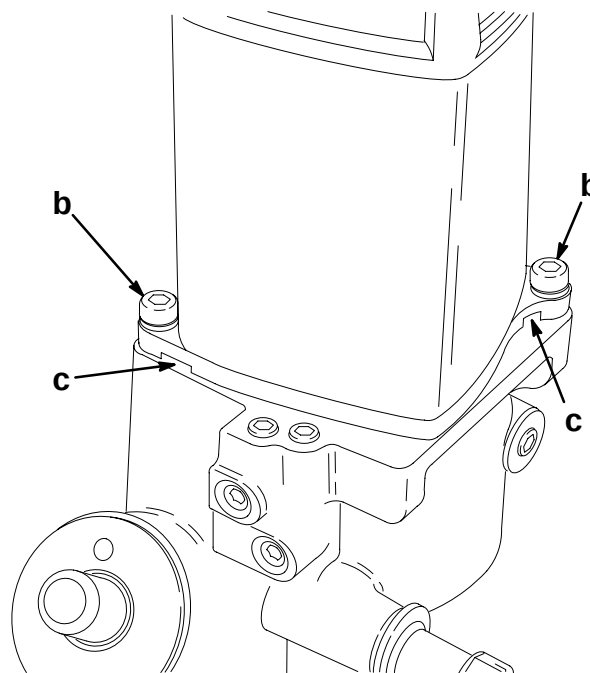
INOPERATIVE TRIM MOTOR

Slowly remove fill screw to bleed pressure from reservoir.

From a full closed (clockwise) position, slowly turn manual release valve counterclockwise four turns to bleed remaining pressure from system.

Remove 2 bolts and lockwashers.

Using 2 screwdrivers, pry up on motor at slots.



18461

b - Bolts

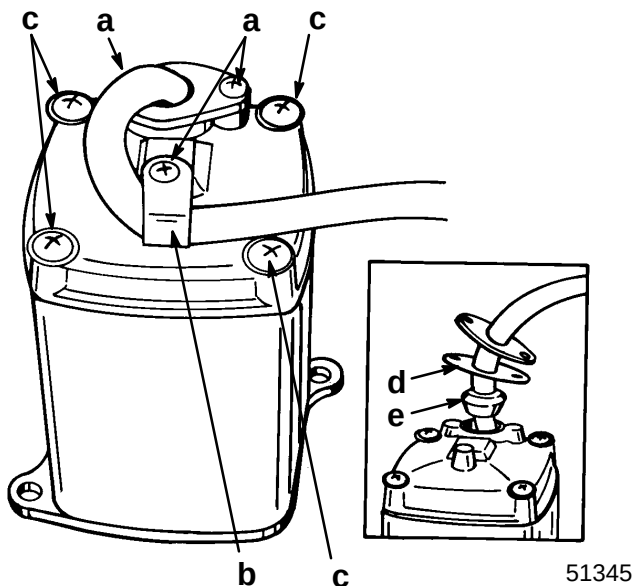
c - Slots



2. Remove screws and clamp.

Remove screws.

Lift motor from end cap, taking care not to drop armature.



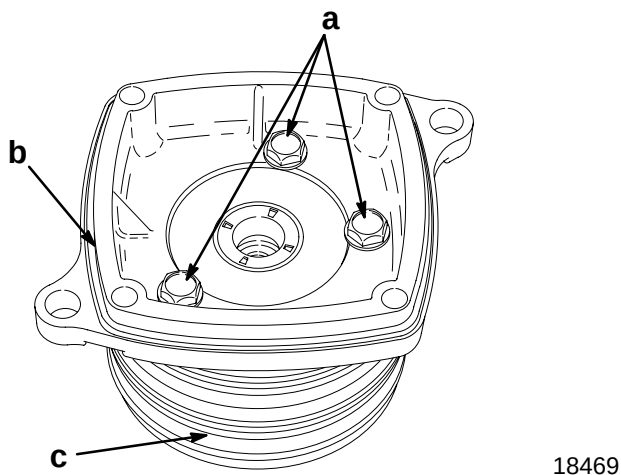
- a - Screw (3)
- b - Clamp
- c - Screw (4)
- d - Gasket
- e - Grommet

3. Remove bolts.

NOTE: Some motors use 2 bolts to secure end frame cap.

Lift end cap from pump.

Follow "Reassembly" and "Installation" instructions in "Motor Repair," following.



- a - Bolts
- b - End Cap
- c - Pump

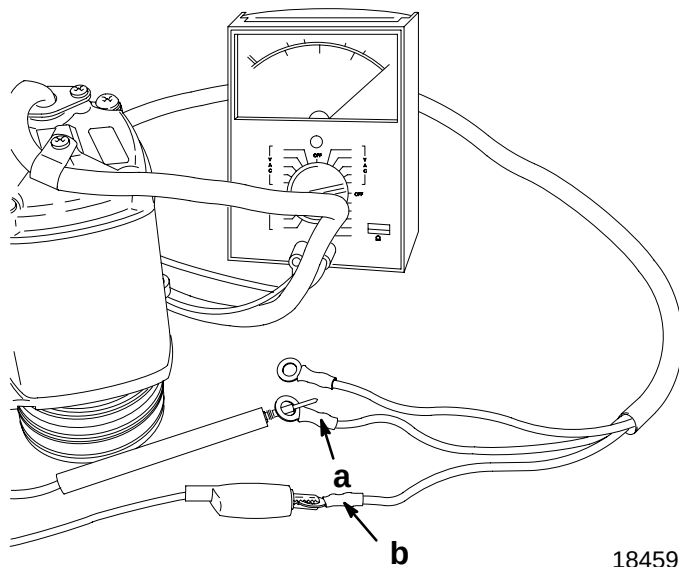
Motor and Electrical Tests/Repair

Thermal Overload Switch Test

IMPORTANT: If trim pump has just been operated, do not run pump for approximately one minute before testing thermal overload switch. After this period of time the switch should close (reset itself) and pump again may be operated. Perform the following check(s) only if switch does not reset itself.

MOTOR ASSEMBLED

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



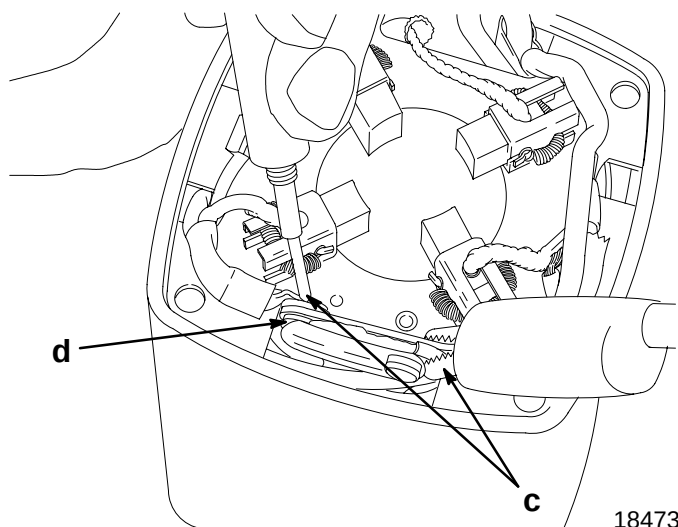
- a - Motor Wire (BLUE)
- b - Motor Wire (BLACK)



MOTOR DISASSEMBLED

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

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



c - Test Leads

d - Switch Contact Surface

Recheck switch; if full continuity is not indicated, replace brush card. Switch is supplied on brush card.

Trim Pump Motor Test

⚠ WARNING

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

1. Disconnect BLUE (motor) wire and BLACK (motor) wire at solenoids.
2. Connect a 12-volt supply to motor wires [POSITIVE (+) wire to BLUE (motor) wire, and NEGATIVE (-) wire to BLACK (motor) wire]. Motor should run.
3. If motor does not run, disassemble motor and check components. Refer to "Motor Repair," following.

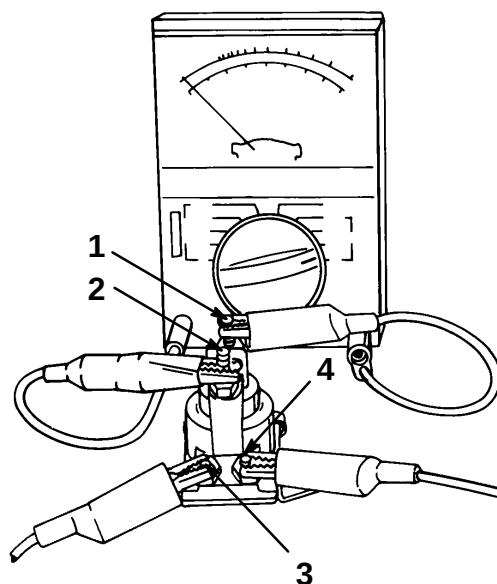
Solenoid Test

⚠ 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 R x 1 scale and connect meter leads to solenoid terminals 1 and 2.

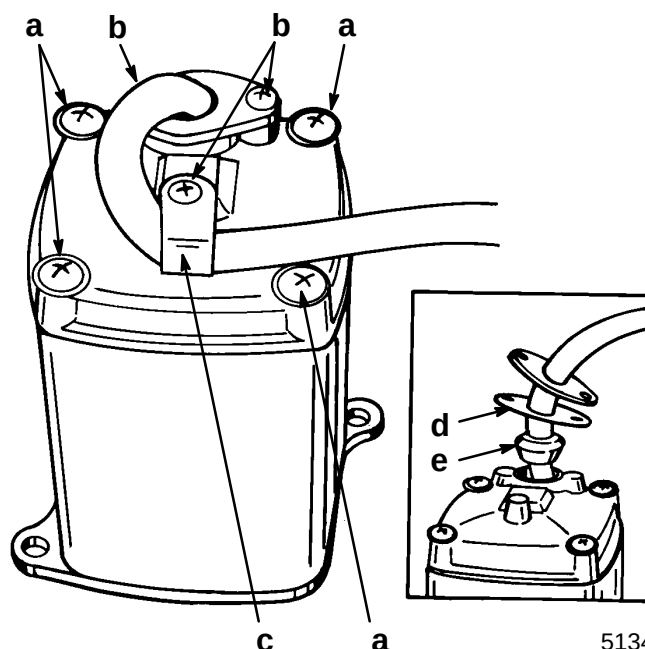
3. Connect a 12-volt power supply to terminals 3 and 4. Solenoid should click and meter should read zero (0) ohms (full continuity).



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

Motor Disassembly

1. Remove screws and clamp.



a - Screw (4)

b - Screw (3)

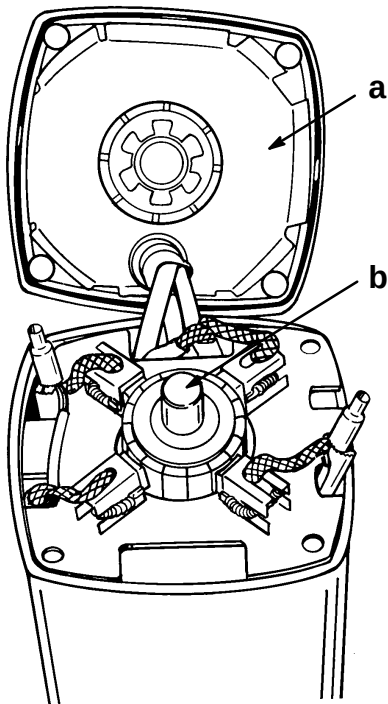
c - Clamp

d - Gasket

e - Grommet



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



a - End Cap
b - Armature

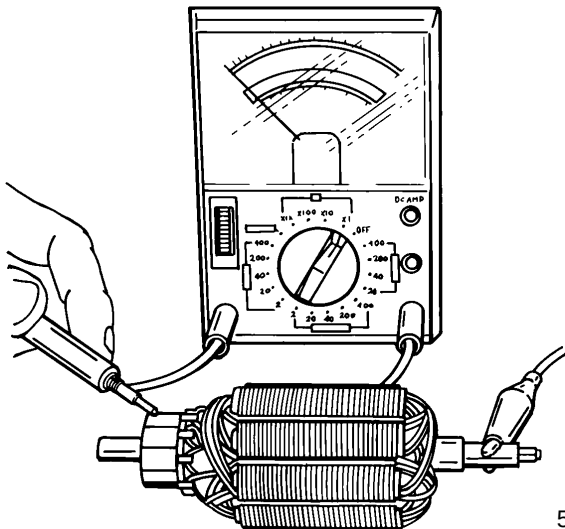
Armature Tests

TEST FOR SHORTS

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

TEST FOR GROUND

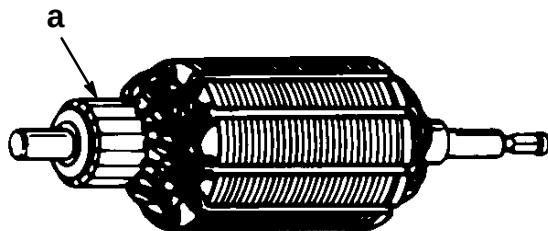
1. Use an Ohmmeter (R x 1 scale). Connect one lead on armature shaft and other lead on commutator. If continuity is indicated, armature is grounded. Replace armature.



51359

CHECKING AND CLEANING COMMUTATOR

1. If commutator is worn, it may be turned on an armature conditioner or a lathe.
2. 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 (R x 1)
Green and Black Motor Wires	0	Full Continuity (R x 1)
Blue and Black Motor Wires	0	Full Continuity (R x 1)
Black Motor Wire, and Frame (Motor Housing)	No Continuity	No Continuity (R x 1)
Green Motor Wire, and Frame	No Continuity	No Continuity (R x 1)
Blue Motor Wire, and Frame	No Continuity	No Continuity (R x 1)

*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.



Trim Sender (Optional Accessory) Test

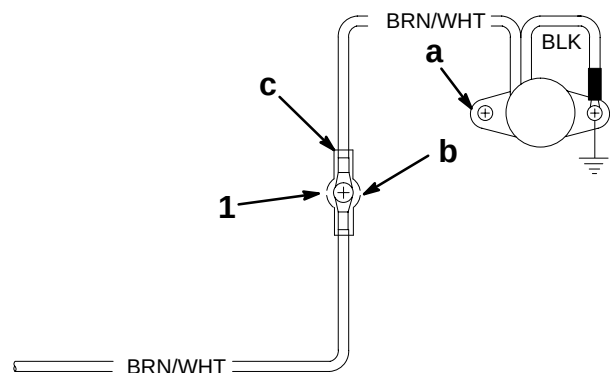
Check trim sender BLACK lead for proper ground.

Trim engine to full “Down” position.

Place ignition switch in “Off” position.

Connect Ohmmeter (R x 1 scale) leads between engine ground and Point 1.

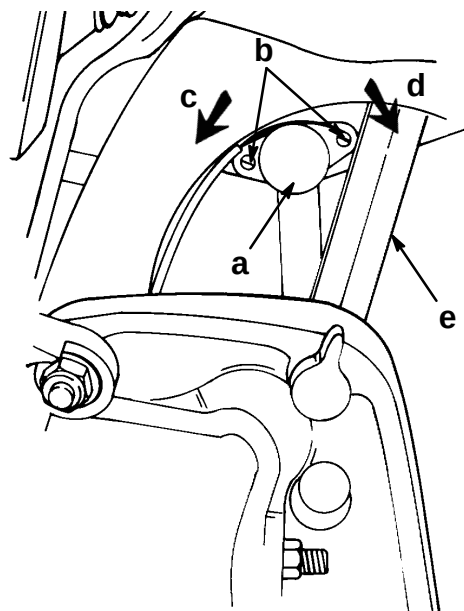
Depress “Up” trim button. Ohmmeter needle should move as the engine is trimmed up. If needle does not move, the trim sender is defective.



- a - Trim Sender
- b - Connect with Screw and Hex Nut (Coat with Liquid Neoprene)
- c - Rubber Sleeve (Slide Over Connection)

Trim Indicator Gauge (Optional Accessory) Needle Adjustment

Trim engine to full “Down” position. If trim indicator needle is not at the bottom of the green arc on the gauge face, tilt engine “up” to gain access to the trim sender. Loosen screws and reposition trim sender, as shown. Trim engine to full “Down” position and re-check needle position.



22744

- 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

Motor Repair

REMOVAL

NOTE: Power Trim assembly does not have to be removed from engine to repair motor.

Remove motor and pump as an assembly; refer to “Pump Replacement,” preceding.

DISASSEMBLY

Refer to “Pump Replacement,” preceding, for proper disassembly procedure.

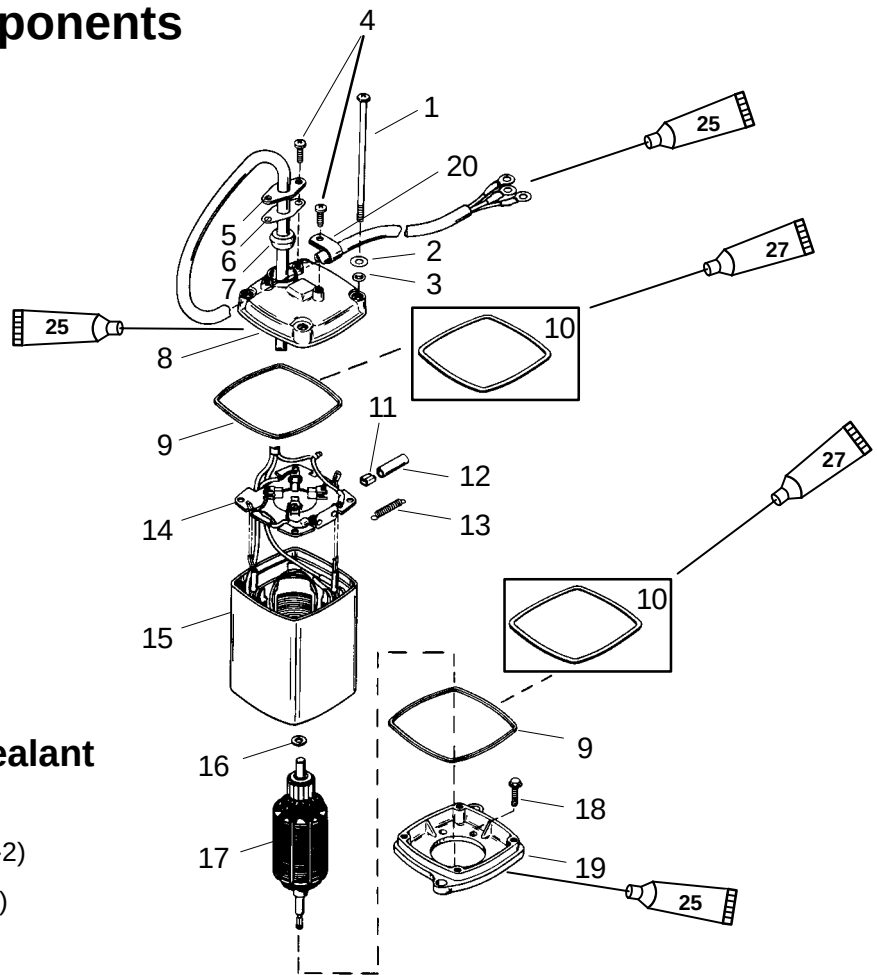
CLEANING AND INSPECTION

Inspect O-rings, and replace if damaged.

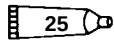
Clean, inspect and test motor components; refer to “Brush Replacement,” “Armature Test,” and “Field Tests,” preceding.

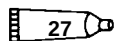


“Square” Motor Components



Quicksilver Lubrication/Sealant Application Points

 25 Liquid Neoprene (92-25711--2)

 27 Bellows Adhesive (92-86166)

REF. NO.	QUAN.	DESCRIPTION	TORQUE		
			lb. in.	lb. ft.	N·m
1	4	Thru Bolt	13		1.5
2	4	Nylon Washer (If Equipped)			
3	4	O-ring			
4	3	Self-Tapping Screw	13		1.5
5	1	Retainer, metal			
6	1	Nylon Isolator (If Equipped)			
7	1	Seal, rubber			
8	1	End Frame Cap, upper			
9	2	Square Ring, used when end frame cap has groove			
10	2	Gasket, used when end frame cap does not have groove			
11	3	Connector, metal			
12	2	Sleeve			
13	4	Brush Spring			
14	1	Brush Card			
15	1	Field and Frame Assembly			
16	1	Thrust Washer			
17	1	Armature			
18	2 or 3	Bolt	70		7.9
19	1	End Frame Cap, lower			
20	1	Clamp			

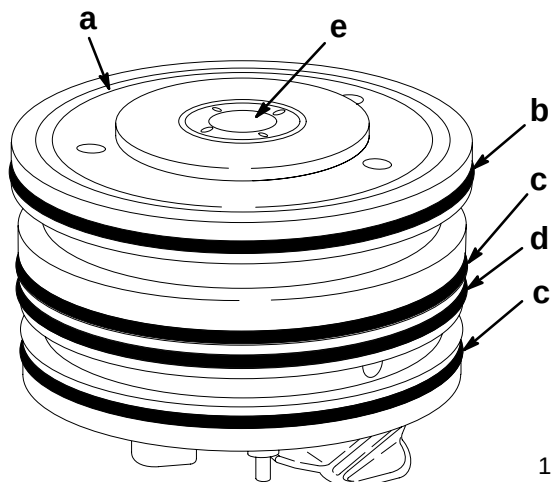


Reassembly

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

1. Install O-rings and flat ring(s).

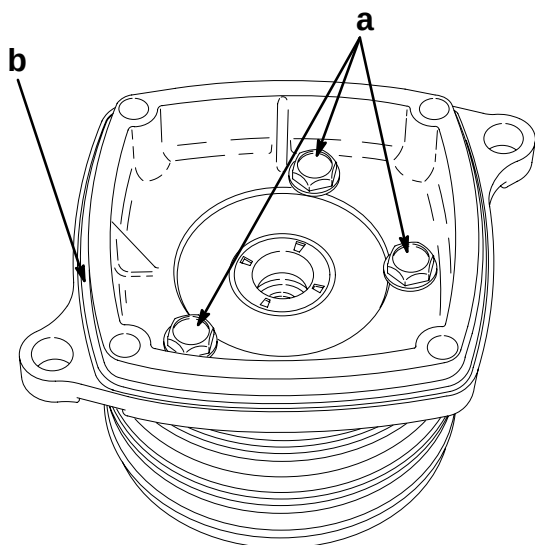
Apply Quicksilver Power Trim and Steering Fluid or Automatic Transmission Fluid (ATF) Type F, FA or Dexron II on lip of seal.



18452

- a - O-ring (or Flat Ring)
- b - O-ring [2.739" (69.57mm) I.D.]
- c - O-ring [2.614" (66.40mm) I.D.]
- d - Flat Ring
- e - Seal

2. Apply Loctite 271 on bolts, and install end frame cap.



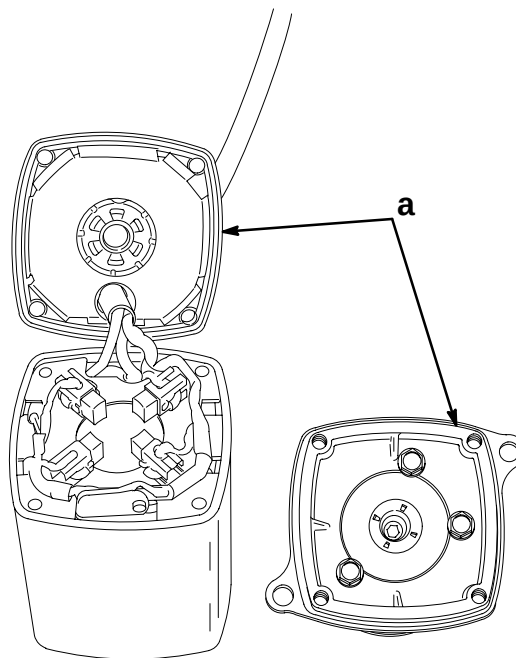
18469

- a - Bolts
- b - End Cap

NOTE: Some motors use 2 bolts to secure end frame cap.

3. Install a flat ring (if equipped) into groove in each end cap.

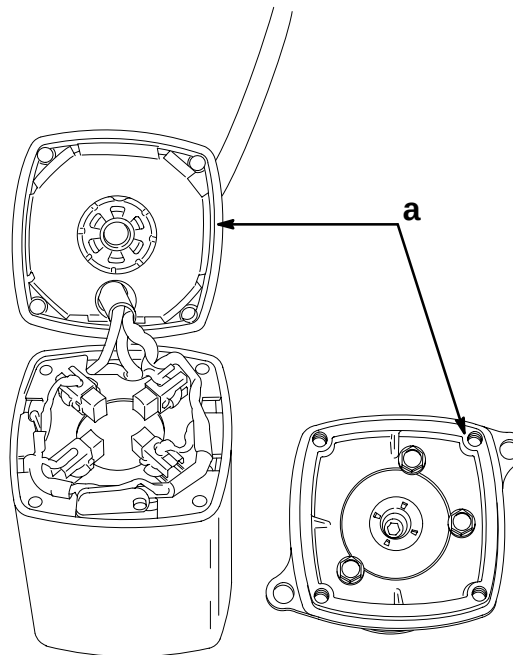
NOTE: Verify rings are not twisted after installation.



18465

- a - Flat Ring (If Equipped)

Glue a rubber gasket (if equipped) onto each end cap using Quicksilver Bellows Adhesive.



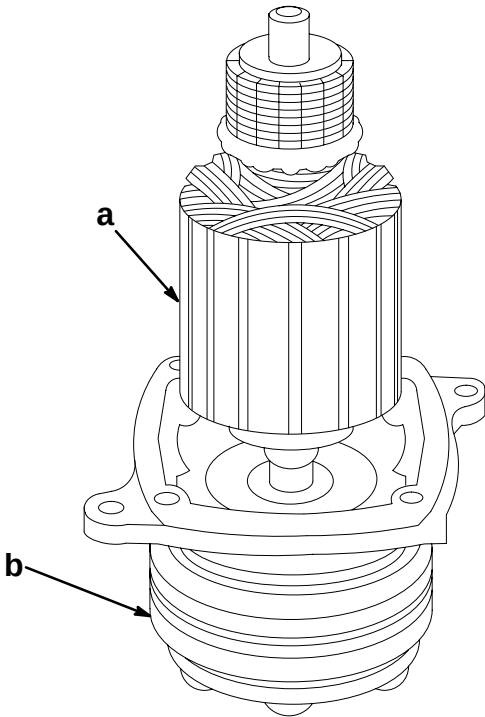
18462

- a - Rubber Gasket



4. Install armature into pump.

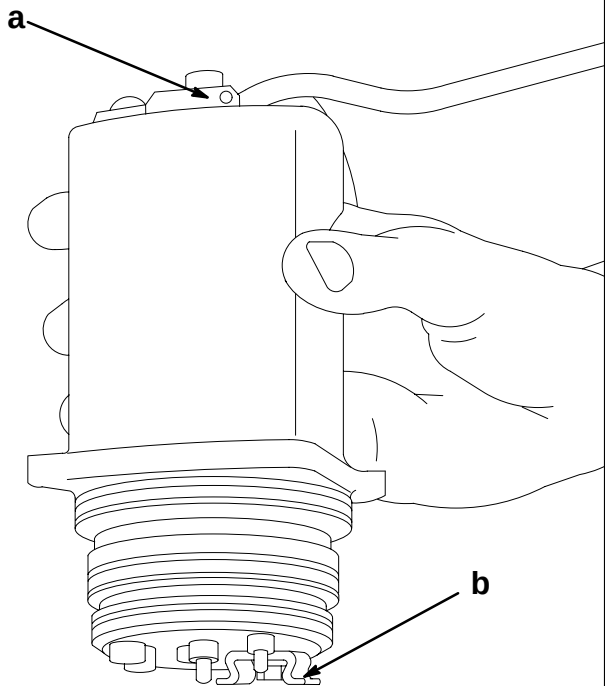
Rotate armature to align hex shaft with pump.



18464

a - Armature
b - Pump

5. Install field and frame assembly onto pump as shown.

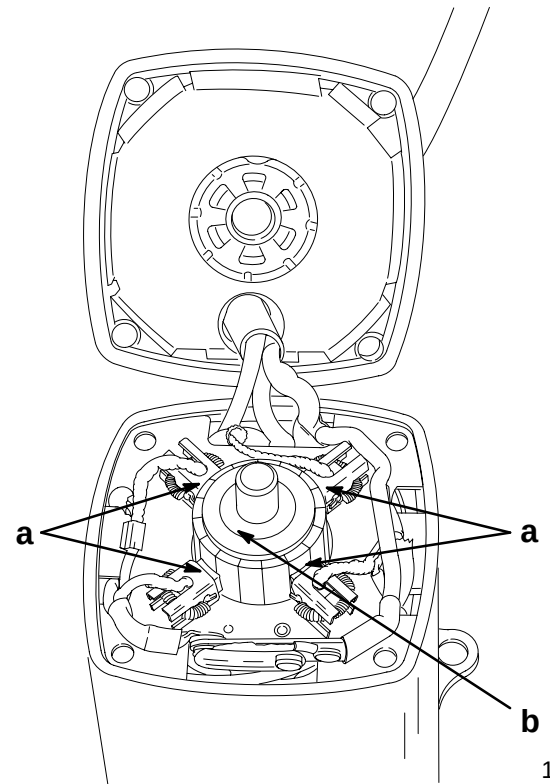


18454

a - Thermal Overload Switch
b - Rocker Arm

6. Spread brushes; position brushes as shown.

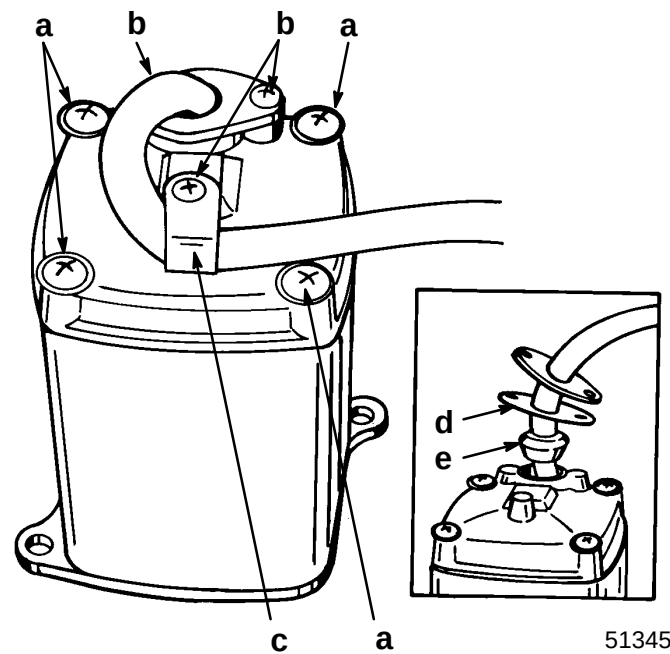
Install thrust washer (if equipped).



18457

a - Brushes
b - Thrust Washer

7. Install end cap and screws.



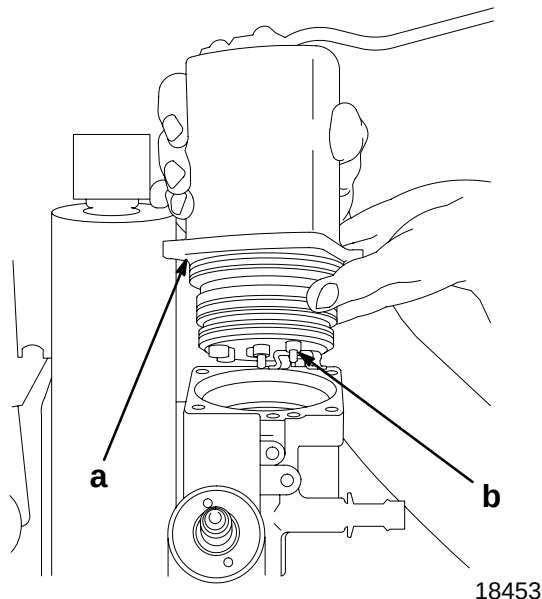
51345

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



8. Install O-ring [2.739" (69.57mm) I.D.]. It is recommended O-ring be installed even if pump did not originally have O-ring.

Insert pump and motor assembly into Power Trim housing, with rocker arm positioned as shown.

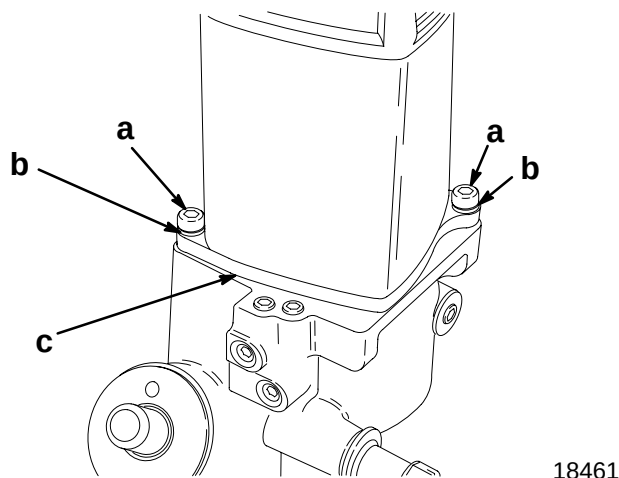


- a - O-ring
b - Rocker Arm

9. Apply Quicksilver Perfect Seal on threads of 2 bolts.

Secure motor using 2 bolts and lockwashers.

Waterproof Power Trim system by applying Quicksilver Liquid Neoprene on seam.

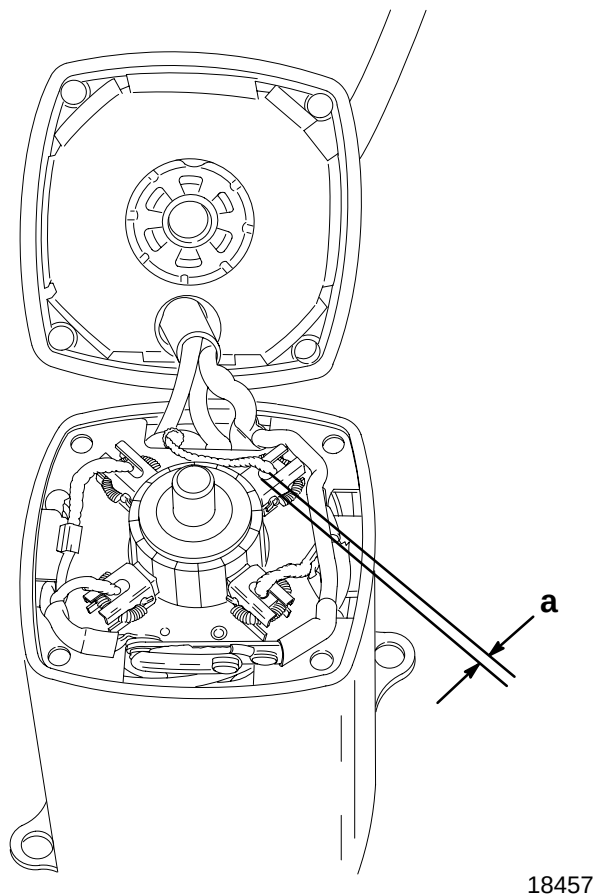


- a - Bolts
b - Lockwashers
c - Seam

10. Install starboard transom bracket, steering retaining nut (models with thru-tilt tube steering), and motor wires; refer to "Installation" instructions in "Power Trim Assembly Removal and Installation," preceding.

Brush Replacement ("Square" Motor)

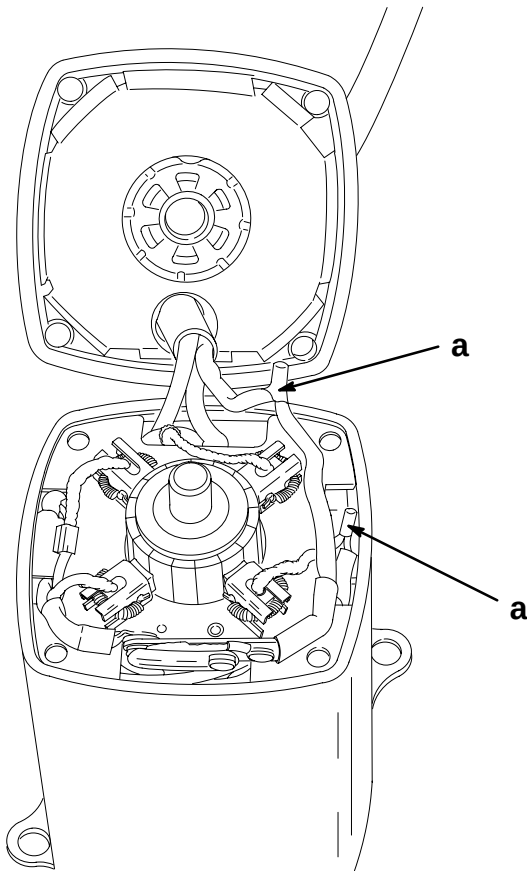
1. Brush replacement is recommended if brushes are pitted, chipped, or if distance (a) between the brush pigtail and end of brush holder slot is 1/16" or less. Check the distance with armature installed, as shown.



a - Distance = 1/16 in. (1.6mm)



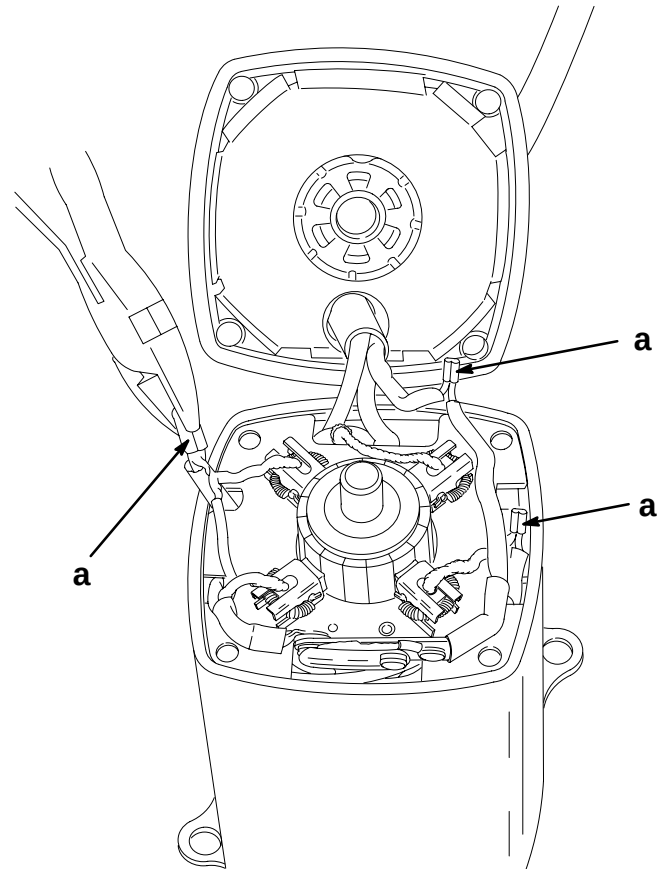
2. To replace brush card, remove plastic insulators.



18463

a - Insulators

3. Remove metal connectors by separating the slit in connectors using a side cutter, as shown.



18466

a - Metal Connectors

Install new brush card.

Crimp metal connectors on connections.

Use heat shrink tubing to insulate connections.