

# GENERAL INFORMATION

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Gear Unit Jumps Out Of Gear	
Cause	Remedy
1. Shift cables improperly adjusted.	1. Adjust shift cables.
2. Worn or damaged clutch and gears.	2. Repair.
Gear Housing Noise	
Cause	Remedy
1. Disassemble, clean and inspect necessary components.	
2. Inspect mounting hardware correctly.	
3. Inspect and replace unit lubricant.	

## TROUBLESHOOTING

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# Troubleshooting

This section is a guide for performance and product troubleshooting. Referrals to specific sections of this manual are made where special tests or repair procedures are to be performed.

Because of the relationship between Power Package components (engine and sterndrive), it will be necessary, in some cases, to simultaneously refer to the appropriate Engine Service Manual for further trouble shooting information.

Effective troubleshooting is best enhanced by:

- Personal product knowledge and experience of the trained mechanic/technician.
- Allowing adequate time for testing and analysis.
- Utilizing these charts as a “guide” - a starting point.

## Sterndrive Unit Troubleshooting

### Sterndrive Unit Will Not Slide Into Bell Housing

Cause	Remedy
1. U-joint shaft splines not aligned with engine coupler splines.	1. Rotate propeller shaft COUNTERCLOCKWISE to align splines.
2. Engine not aligned.	2. Check engine alignment.
3. Gimbal bearing not properly installed.	3. Check engine alignment to determine if gimbal bearing is cocked, or improperly installed in gimbal housing.
4. Damaged u-joint shaft splines and/or engine coupler splines.	4. Inspect and replace if necessary.
5. Lower shift shaft not in forward gear position. Bell Housing shift shaft not lined up.	5. Properly align shift shafts.
6. Bell housing shift shaft coupler not aligned.	6. Place coupler in forward gear position.

### Drive Unit Does Not Shift Into Gear; Remote Control Shift Handle Moves

Cause	Remedy
1. Shift cables improperly adjusted.	1. Adjust shift cables.
2. Shift cables not connected.	2. Install and adjust shift cables.
3. Inner core wire broken or loose.	3. Reconnect or replace inner core wire.
4. Gear housing crank improperly installed.	4. Install shift crank properly.

## Drive Unit Does Not Shift Into Gear; Remote Control Shift Handle Does Not Move

Cause	Remedy
1. Control box not properly assembled.	1. Properly reassemble control box.
2. Broken or damaged linkage in control box.	2. Repair linkage.
3. Controls improperly adjusted-cable end guide hitting brass barrel.	3. Adjust shift cables.
4. Shift shaft or shift shaft lever jammed.	4. Install shift crank properly.
5. Shift cable not installed deep enough into bell housing.	5. Install cable further into bell housing.

## Drive Unit Shifts Hard

Cause	Remedy
1. Shift cables improperly adjusted.	1. Adjust shift cables.
2. Damaged remote control or drive unit shift cable.	2. Replace cable(s) and adjust.
3. Shift cable too short (sharp bends) or too long (loops and long bends).	3. Select and install proper length cable.
4. Corroded shift cables.	4. Replace, adjust, and check for water leakage.
5. Internal wear in remote control box.	5. Repair as needed.
6. Shift cable attaching nuts too tight (end cannot pivot).	6. Properly install nuts.
7. Shift cable pivot ends are corroded, or not lubricated.	7. Clean and lubricate.
8. Shift cutout switch improperly adjusted or inoperative.	8. Adjust or replace switch.
10 Shift shaft bushing in bell housing or gear housing corroded.	10. Replace.
11. Shift crank and/or clutch actuating spool worn.	11. Replace crank and spool.
12. Damaged shift shaft bushing.	12. Replace shift shaft bushing.
13. Bent upper, intermediate, or lower shift shaft(s).	13. Inspect and replace.

## Drive Unit In Gear, Will Not Shift Out Of Gear

Cause	Remedy
1. Shift cable broken.	1. Replace cable and adjust.
2. Cable end not connected in drive unit.	2. Remove and reinstall drive unit.
3. Remote control damaged.	3. Repair or replace remote control.
4. Internal shift mechanism damage.	4. Repair or replace as necessary.

## Drive Unit Jumps Out Of Gear

Cause	Remedy
1. Shift cables improperly adjusted.	1. Adjust shift cables.
2. Worn or damaged clutch and gears.	2. Repair.

## Gear Housing Noise

Cause	Remedy
1. Metal particles in drive unit lubricant.	1. Disassemble, clean and inspect, and replace necessary components.
2. Propeller incorrectly installed.	2. Inspect mounting hardware. Install propeller correctly.
3. Propeller shaft bent.	3. Inspect and replace if necessary.
4. Incorrect gear shimming.	4. Check gear housing backlash and pinion gear height.
5. Worn or damaged gears and/or bearings caused by impact, overheating, or improper shimming.	5. Disassemble, inspect, replace.

## Drive Shaft Housing Noise

Cause	Remedy
1. Steering lever contacting transom cutout opening in turns.	1. Modify transom cutout.
2. Engine flywheel housing contacting inner transom plate or exhaust pipe.	2. Determine cause for interference (loose engine mounts, transom too thin, etc.) and correct as necessary.
3. Propeller with untrue or out-of-balance blades.	3. Repair or replace, as required.
4. Abnormal sterndrive operation.	4. Instruct operator on proper operating technique.
5. U-joint cross and bearing assembly retaining rings improperly installed.	5. Make sure that proper thickness retaining rings are used and that rings are fully seated in u-joint bearing cap grooves.
6. Excessive side-to-side play in u-joint cross and bearing assemblies.	6. Replace cross and bearing assembly.
7. U-joint bearing caps contacting center socket or drive shaft housing bearing retainer.	7. Make sure proper cross and bearing assemblies are used. If interference is noted, replace center socket.
8. U-joint cross and bearings rough.	8. Disassemble cross and bearing assemblies and inspect. DO NOT RELY ON FEEL. Replace assemblies if they show signs of scoring, galling, roughness, lack of lubricant, etc.
9. O-rings missing or flattened out on u-joint shaft causing shaft to rattle against ID of gimbal bearing.	9. Install new o-rings.
10. Worn u-joint shaft splines and/or engine coupler splines.	10. Remove u-joint coupling end yoke and insert into gimbal bearing and engine coupling. Rotate shaft back-and-forth. If play is excessive, replace u-joint coupling end yoke and/or engine coupler, as necessary.
11. Engine alignment incorrect or engine coupler crooked.	11. Adjust alignment, making sure that alignment tool moves in-and-out of coupler freely. After proper alignment has been obtained, check for a cocked coupler by rotating engine coupler 1/2 turn and rechecking alignment. If proper alignment is no longer observed, coupler is crooked and must be replaced.

## Drive Shaft Housing Noise (continued)

Cause	Remedy
12. Gimbal bearing rough.	12. Replace gimbal bearing.  <b>IMPORTANT: Gimbal bearing and carrier MUST BE replaced as an assembly as they are a matched set. Failure to do this may result in a loose bearing fit in carrier.</b>
13. Loose gimbal bearing.	13. Reinstall bearing using a new tolerance ring if carrier is loose in gimbal housing. If bearing is loose in carrier, bearing assembly must be replaced.
14. Gimbal bearing not fully seated in gimbal housing. Yoke moves back and forth when turning and may hammer against bearing if not fully seated.	14. Drive bearing assembly into place. <b>IMPORTANT: Gimbal bearing must be pressed in past lead-in chamfer in bearing bore.</b>
15. Excessive clearance between gimbal ring and gimbal housing. This could cause misalignment between bell housing and gimbal housing, and also may allow gimbal ring to vibrate up-and-down, in turns.	15. Check and adjust clearance.
16. Improperly installed or failed rear engine mounts. This will affect engine alignment, but usually is not detectable with engine alignment tool.	16. Check for uneven mount height, or loose or soft mounts. Make sure there is clearance between flywheel housing and fiber washer. If no clearance exists, mounts have probably sagged. Install mounts correctly or replace, as necessary.
17. Boat transom too thin.  <b>Thickness:</b> 2 in. (51 mm) minimum 2-1/4 in. (57 mm) maximum	17. Add thickness to transom.
18. Boat transom thickness uneven. This could affect engine to transom assembly alignment. It is usually not detectable with alignment tool. <b>Variation:</b> 1/8 in (3 mm) maximum	18. Repair boat as necessary.
19. Bell housing contacting gimbal ring. This would cause knocking in the fully trimmed IN position only.	19. Check for soft or split trim cylinder bushings, and loose or worn hinge pin bushings.

## Drive Shaft Housing Noise (continued)

Cause	Remedy
20. Stringer height uneven or transom assembly installed crooked on boat transom. This will affect engine alignment, but is usually not detectable with alignment tool.	20. Measure the distance between the engine flywheel housing and the inner transom plate on both sides. If distances are uneven, the problem may be due to uneven stringer height or a cocked transom assembly. Adjust the stringer height or relocate the transom cutout as required.
21. Weak boat transom or boat bottom that flexes under power and causes engine misalignment - this condition will usually cause engine coupler failure.	21. This condition can sometimes be detected by having someone apply force to the top of the drive unit while watching the inner transom plate. If movement can be observed, the transom is weak and must be repaired.
22. Rear engine mount attaching hardware improperly installed or missing.	22. Reinstall hardware correctly.
23. Engine mounting holes drilled off-center in inner transom plate engine supports or engine flywheel housing	23. Make sure the holes are equally spaced fore and aft and are equal distance from the centerline.
24. Misalignment between bell housing, gimbal housing and engine coupler.	24. Contact your regional service center and arrange to have a technical service representative check the unit using a special gauge.



# Performance Troubleshooting

## Low Full-Throttle Engine RPM

Cause	Remedy
1. Improper drive unit trim angle.	1. Properly adjust drive unit trim angle.
2. Damaged propeller.	2. Repair or replace.
3. Improper propeller pitch.	3. Water test boat using a lower pitch propeller.
4. Dirty or damaged boat bottom.	4. Clean and/or resurface boat bottom.
5. Drive installation too low on transom.	5. Contact boat manufacturer for installation specifications.
6. Permanent “hook” in boat bottom.  <b>NOTE:</b> Some boats are built with a slight “hook” for correct boat performance.	6. Check for a “hook” in the boat bottom by placing a straight edge, at least 6ft. (2m) long, under the bottom edge of the transom. If a “hook” is found, contact the boat manufacturer.

## High Full-Throttle Engine RPM

Cause	Remedy
1. Improper propeller pitch.	1. Water test boat using a higher pitch propeller.
2. Propeller hub slipping.	2. Replace hub or replace propeller.
3. Drive installation too high on transom.	3. Contact boat manufacturer for installation specifications.
4. Engine coupler hub slipping.	4. Replace hub.

## Propeller Ventilating/Cavitating

Cause	Remedy
1. Drive unit trimmed too high.	1. Trim drive unit IN/DOWN.
2. Incorrect propeller.	2. Install correct propeller.
3. Propeller hub slipping.	3. Replace hub.

## Poor Boat Performance And/Or Poor Maneuverability-Bow Too Low

Cause	Remedy
1. Improper drive unit trim angle.	1. Properly adjust drive unit trim angle.
2. Boat is bow heavy.	2. Redistribute boat load to stern. If bow over weigh is caused by permanently installed fuel tank(s), etc., contact the boat manufacturer.
3. Boat is underpowered.	3. Check horsepower to weight ratio. Contact the boat manufacturer.
4. Permanent "hook" in boat bottom. <b>NOTE:</b> Some boats are built with a slight "hook" for correct boat performance.	4. Check for a "hook" in the boat bottom by placing a straight edge, at least 6ft. (2m) long, under the bottom edge of the transom. If a "hook" is found, contact the boat manufacturer.
5. Power hook or weak boat bottom.	5. Water test boat. Boat will perform normally until hook develops at high speed: then loss of RPM and speed will occur. Contact boat manufacturer.

## Poor Boat Performance And/Or Poor Maneuverability-Bow Too High

Cause	Remedy
1. Improper drive unit trim angle.	1. Properly adjust drive unit trim angle.
2. Boat is stern heavy.	2. Redistribute boat load to bow. If stern overweight is caused by permanently installed fuel tank(s), etc., contact the boat manufacturer.
3. Propeller pitch too high.	3. Water test the boat using a lower pitch propeller.
4. Permanent "rocker" in boat bottom. <b>NOTE:</b> Some boats are built with a slight "rocker" for correct boat performance.	4. Check for a "rocker" in the boat bottom by placing a straight edge, at least 6 ft. (2m) long, under the bottom edge of the transom. If a "rocker" is found, contact the boat manufacturer.
5. Dirty boat bottom.	5. Clean boat bottom.

# Steering System Troubleshooting

If Power Package is equipped with Power Steering, first determine if problem is caused by the Power Steering System or Ride Guide portion of the steering system.

Proceed as follows:

1. Remove clevis pin which attaches steering cable to Power Steering unit piston rod end clevis.

2. Remove clevis pin which secures piston rod end clevis to stern drive steering lever.
3. Turn steering wheel thru entire steering range. If steering difficulty is encountered problem is located in Ride Guide steering system.

If steering wheel turns with ease, problem is located in Power Steering system.

## Hard Steering - Ride Guide Steering System

Cause	Remedy
1. Damaged steering cable.	1. Replace cable.
2. Steering cable too short (sharp bends) or too long (loops and long bends).	2. Select and install proper length cable.
3. Steering cable corroded or not lubricated.	3. Lubricate or replace the cable.
4. Ride Guide rack or rotary head not lubricated.	4. Disassemble and lubricate.

## Hard Steering (Engine Running) Power Steering System

Cause	Remedy
1. Low power steering pump fluid level.	1. Check fluid level.
2. Loose power steering pump drive belt.	2. Adjust belt tension.
3. Air in system.	3. Locate source of air in lines or fittings. Correct and air bleed system.
4. Fluid leak.	4. Locate and correct source of leak.
5. If the above 4 steps do not solve the problem, test the power steering system.	5. Test power steering system.

## Power Steering System External Fluid Leaks

Cause	Remedy
1. Pump reservoir leaking at fill cap (reservoir too full).	1. Remove fluid to bring to proper level.
2. Pump reservoir leaking at fill cap (air or water in fluid).	2. Locate source of air or water and correct. Air may enter because of low reservoir fluid level or internal pump leak. Test pump.
3. Loose hose connections.	3. Tighten hose connections.
4. Damaged hose.	4. Replace hose.
5. Bad cylinder piston rod seal.	5. Replace seal.
6. Damaged or worn control valve seals.	6. Replace seals.
7. Bad power steering pump seals and o-rings.	7. Repair pump.
8. Cracked or porous metal parts.	8. Replace part(s).

# Power Trim Electrical System

## Power Trim Pump Motor Will Not Run In The Out/Up Or In/Down Direction (Solenoids Do Not Click)

**IMPORTANT:** Refer to wiring diagram at end of this section for assistance in electrical system troubleshooting.

Cause	Remedy
1. Thermal circuit breaker in pump motor broken.	1. Replace commutator end plate assembly.
2. 20 amp fuse blown.	2. Determine cause for blown fuse and correct before replacing fuse <b>NOTE:</b> If fuse blows while trimming "Out/Up" or raising drive unit, problem may be due to grounded trim limit switch leads. To check for grounded condition, disconnect trim limit switch leads at bullet connector "14," "15," "16," and "17" (in wiring diagram). If drive unit can now be raised (using "Trailer" switch), trim limit switch or leads are grounded.
3. Power trim pump battery cables or wiring harness connections corroded or loose.	3. Clean and or tighten connections "1," "2," "4," "10," "11," "12," and "18," as necessary.
4. Trim control wiring harness connector loose or corroded.	4. Clean and secure connection "13" as necessary.
5. 110 amp fuse blown. <b>NOTE:</b> Does not apply to an intermittent problem.	5. Check for voltage at terminal "4." If no voltage is indicated, determine cause for blown fuse and correct, then replace fuse. Trimming OUT/UP and IN/DOWN simultaneously will blow fuse)
6. Open circuit in trim control wiring harness.	6. Check for battery voltage at terminal "8" while trimming OUT/UP and at terminal "6" while trimming IN/DOWN. If no voltage is indicated, check trim control for a loose or corroded connection or a damaged power supply lead in harness

## Power Trim Pump Motor Will Not Run In The Out/Up Or In/Down Direction (Both Solenoids Click)

Cause	Remedy
1. Faulty solenoids or loose or corroded connections.	1. Check for battery voltage at terminal "5" (in wiring diagram) while trimming IN/DOWN and at terminal "3" while trimming OUT/UP. If no voltage is indicated check connections "2," "3," "4" and "5" and/or replace solenoids.
2. Pump motor brushes stuck, corroded or worn out.	2. Clean or replace, as required.
3. Armature commutator dirty.	3. Clean or replace armature, as required.
4. Armature faulty.	4. Test for shortened, open or grounded condition and replace if bad.
5. Field and frame faulty.	5. Check for open or grounded condition. Replace field and frame assembly, if bad.
6. Pump gears froze.	6. Replace pump valve body and gear assembly.
7. Power trim pump harness or trim control harness shortened	7. Disconnect blue-white lead from solenoid terminal "8." If pump motor will now run in the IN/DOWN direction, a short in harness exists. Repair or replace harness, as necessary.

## Power Trim Motor Runs In The Out/Up Direction, But Not In The In/Down Direction (In/Down Solenoid Does Not Click)

Cause	Remedy
1. Loose or dirty solenoid connections.	1. Check connections "6," "7," "8," and "9" (in wiring diagram) and clean and/or tighten, as required.
2. Open IN/DOWN circuit in trim control or pump wiring harness.	2. Check for battery voltage at terminal "6" while trimming IN/DOWN. If no voltage is indicated, check for a loose or corroded IN/DOWN circuit connection, damaged IN/DOWN circuit lead or a faulty IN/DOWN trim switch. Repair or replace, as required
3. Solenoid faulty.	3. Replace solenoid.

**Power Trim Motor Runs In The In/Down Direction, But Not In The Out/Up Direction - Both Trim And Trailer Switches Inoperative-(Out/Up Solenoid Does Not Click)**

<b>Cause</b>	<b>Remedy</b>
1. Loose or dirty solenoid connections.	1. Check connections "8" and "9." Clean and/or tighten as necessary.
2. Open OUT/UP circuit trim control or pump wiring harness.	2. Check for battery voltage at terminal "8" while trimming OUT/UP. If no voltage is indicated, check for a loose or corroded OUT/UP circuit connection, blown fuse (if trim control is so equipped), damaged OUT/UP circuit lead, or a faulty OUT/UP trim switch. Repair or replace as necessary.
3. Solenoid faulty.	3. Replace solenoid.

**Power Trim Pump Motor Runs In The Out/Up But Not In The In/Down Direction - In/Down Solenoid Clicks**

<b>Cause</b>	<b>Remedy</b>
1. Loose or dirty solenoid connections.	1. Check connections "4" and "5" (in wiring diagram) and clean and/or tighten, as required.
2. Faulty solenoid	2. Check for battery voltage at terminal "5" while trimming IN/DOWN. If no voltage is indicated, replace solenoid.
3. Faulty IN/DOWN field winding	3. Replace field and frame assembly.

**Power Trim Pump Motor Runs In The In/Down Direction, But Not In The Out/Up Direction - Both Trim And Trailer Switches Inoperative - (Out/Up Solenoid Clicks)**

<b>Cause</b>	<b>Remedy</b>
1. Loose or dirty solenoid connection.	1. Check connections "2" and "3" (in wiring diagram). Clean and/or tighten, as necessary.
2. Open OUT/UP circuit in trim control or pump wiring harness.	2. Check for battery voltage at terminal "3" while trimming OUT/UP. If no voltage is indicated, replace solenoid.
3. Solenoid faulty	3. Replace solenoid.

## Trim Control Out/Up Switch Inoperative (Trailer Switch Operates)

Cause	Remedy
1. Trim limit switch lead bullet connectors loose or corroded.	1. Clean and/or tighten connections "14," "15," "16" and "17" (in wiring diagram), as necessary.
2. Trim limit switch or leads faulty.	2. Disconnect trim limit switch leads from trim harness. Connect a continuity meter between leads "16" and "17." Continuity should be indicated with drive unit in full IN/DOWN position. If not, check for damaged leads or poor connections. If this is not the cause, replace limit switch.
3. Open in trim control OUT/UP circuit	3. Check for a loose or corroded OUT/UP circuit connection, damaged OUT/UP circuit lead or faulty OUT/UP trim switch. Repair or replace, as necessary.

## Trim Control Trailer Switch Inoperative (Trim Out/Up Switch Functions)

Cause	Remedy
Open trim control trailer circuit.	Check for a faulty trailer switch, loose or corroded connections, or damaged trailer circuit lead.

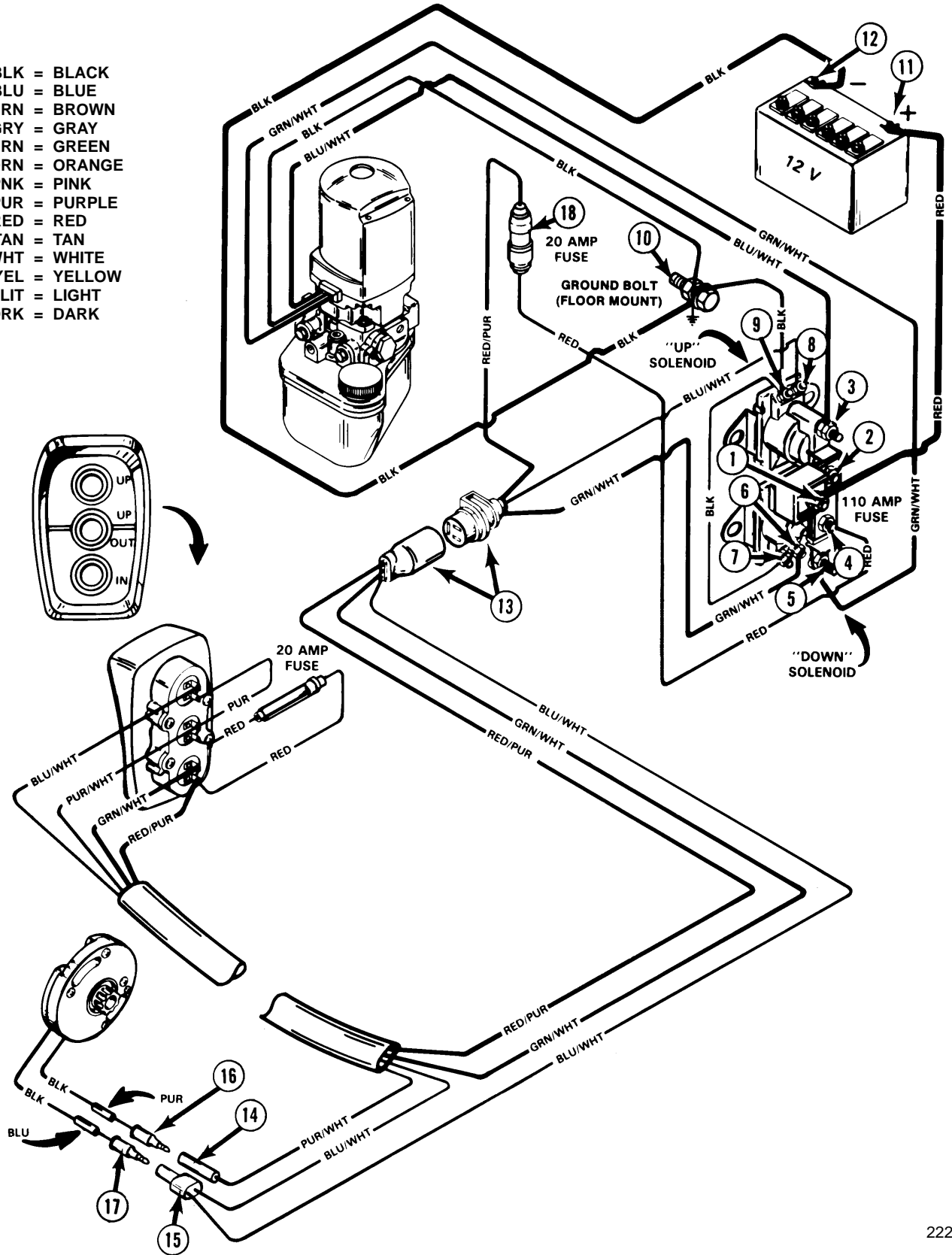
## Trim System Functions While Unattended

Cause	Remedy
1. Faulty trim or trailer switch.	1. Replace switch.
2. Shorted trim pump harness or trim control harness.	2. Repair or replace as required.



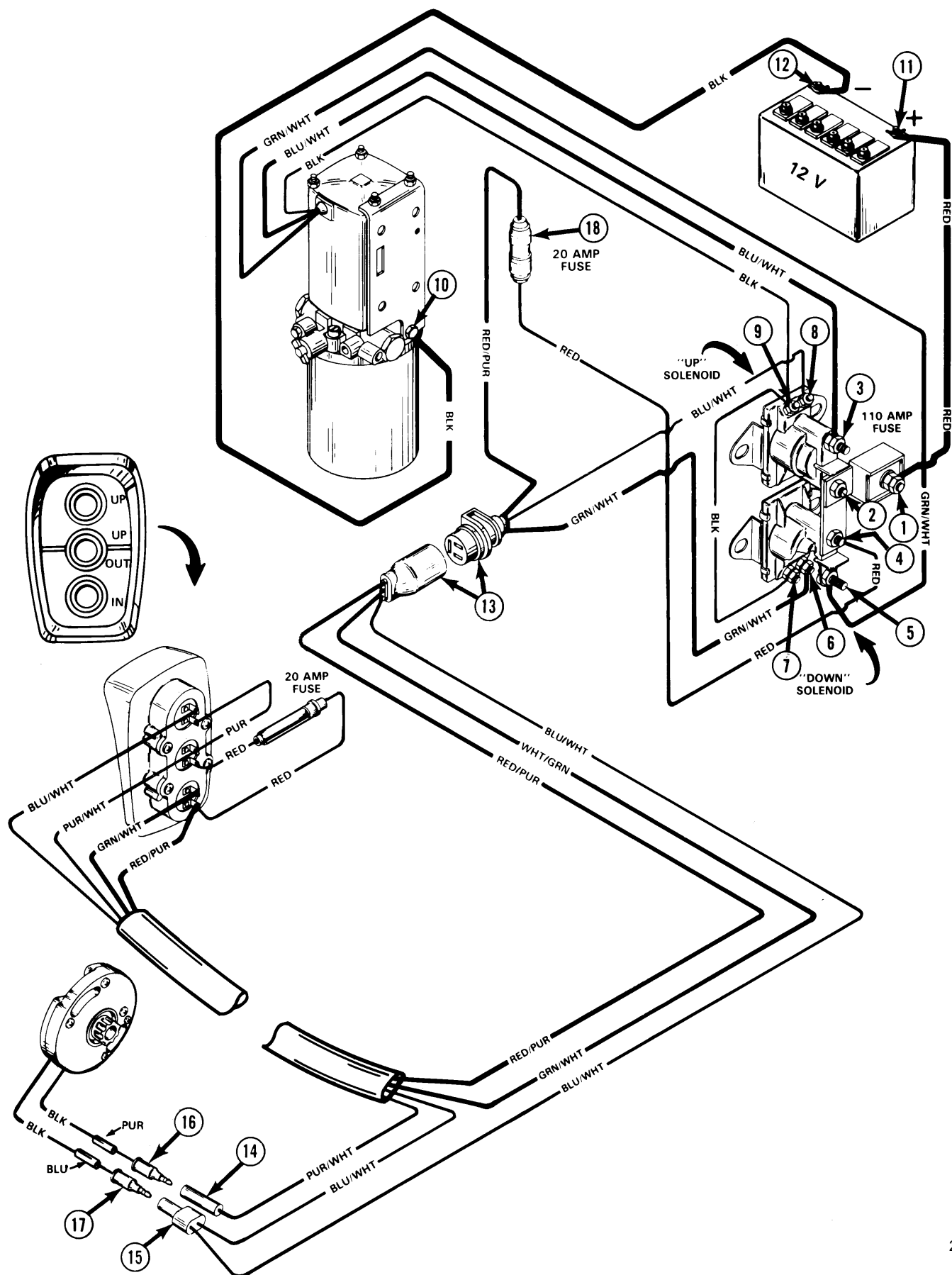
## Power Trim

BLK = BLACK  
 BLU = BLUE  
 BRN = BROWN  
 GRN = GREEN  
 ORN = ORANGE  
 PNK = PINK  
 PUR = PURPLE  
 RED = RED  
 TAN = TAN  
 WHT = WHITE  
 YEL = YELLOW  
 LIT = LIGHT  
 DRK = DARK



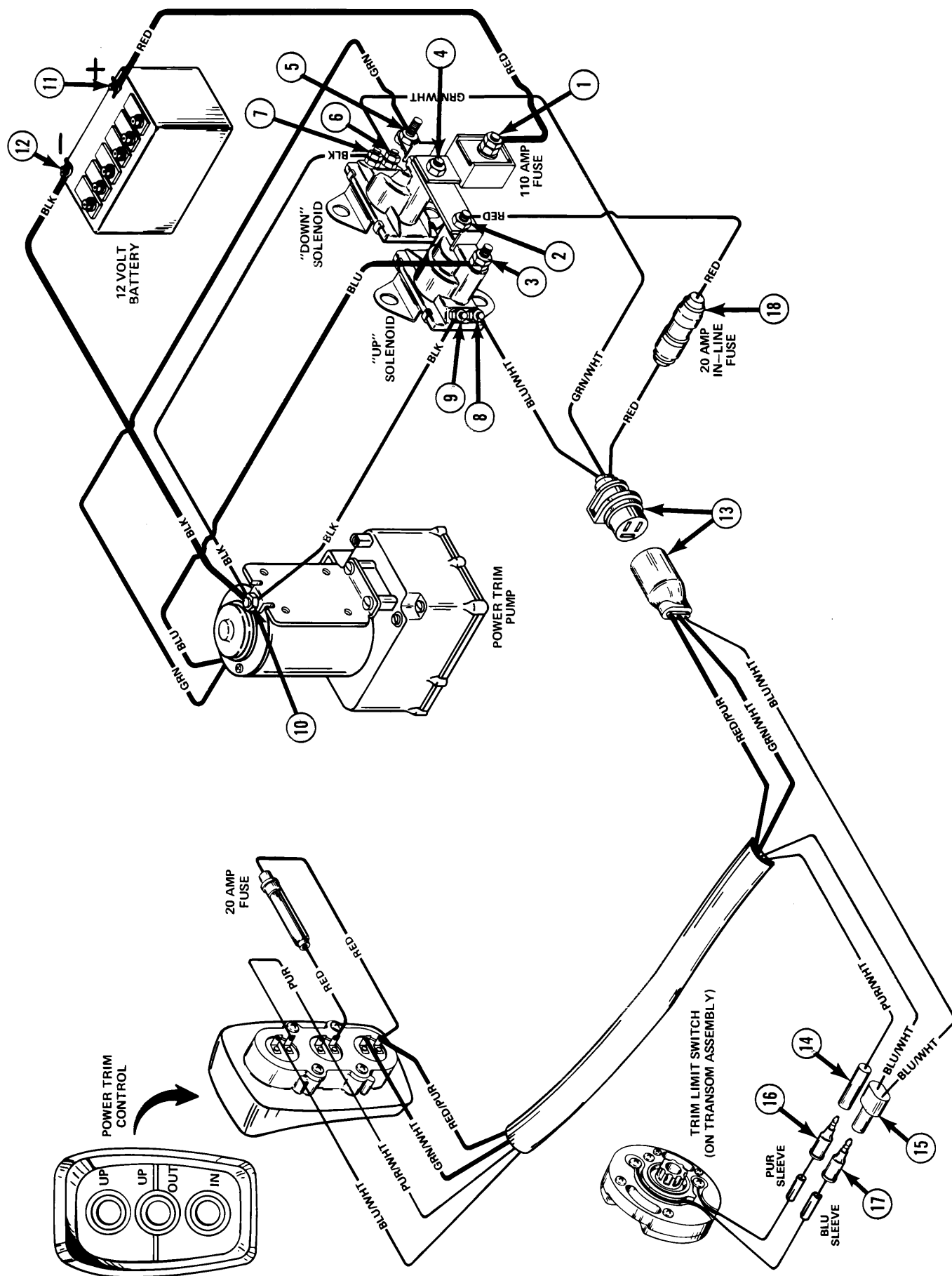
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Wiring Diagram (With 3-Button Trim Control)



26351

**Power Trim Electrical System Wiring Diagram (with 3-Button Trim Control)**



# Auto Trim Electrical System

**NOTE:** Refer to wiring diagram, following, for assistance in electrical system troubleshooting.

## Pump Motor Will Not Run Up Or Down In Either Manual Or Auto Mode (Solenoids Click)

Cause	Remedy
1. Pump positive battery cable connection loose or corroded.	1. Check cable "14."
2. 110 amp fuse blown or loose, or corroded solenoid connection.	2. Check for voltage at terminal "5."
3. Pump motor brushes stuck, corroded or worn out.	3. Clean or replace.
4. Armature commutator dirty.	4. Clean or replace.
5. Armature faulty.	5. Test and replace if bad.
6. Field and frame faulty.	6. Test and replace if bad.
7. Pump gears frozen.	7. Replace pump adaptor.
8. Trim harness shorted between UP and DOWN circuit.	8. Disconnect blue-white lead "2" from solenoid terminal. If pump motor will now run in the DOWN direction, a short in the harness is indicated.

## Pump Motor Will Not Run Up Or Down In Either Manual Or Auto Mode (Solenoids Do Not Click)

Cause	Remedy
1. Pump negative battery cable loose, corroded or damaged	1. Check cable "13" for a loose or corroded connection, or damage.
2. Mode switch wiring harness connector is loose at pump.	2. Secure connection "47."
3. Faulty thermal circuit breaker in pump motor.	3. Connect a jumper wire between terminals "1" and "7." If pump now operates, circuit breaker is faulty and field and frame assembly must be replaced.
4. Open circuit in mode switch wiring harness.	4. With ignition switch in "Run" position and mode switch in "Manual" mode, check for voltage at terminal "8" while trimming UP and terminal "12" while trimming DOWN. If no voltage is indicated, refer to items "5" and "6" immediately following.
5. No power to mode switch.	5. Check for voltage at terminal "25" (with ignition switch in "Run" position). If no voltage is indicated, check power lead for a poor connection.
6. Faulty mode switch.	6. Check for voltage at terminal "24" (with mode switch in "Auto" mode) and terminal "26" (with switch in the "Manual" mode). Replace switch if no voltage is indicated.

## Pump Motor Will Run Up, But Not Down In Both Manual And Auto Modes (Down Solenoid Does Not Click)

Cause	Remedy
1. Loose or Dirty solenoid connections.	1. Check connections "4," "7," and "12."
2. Faulty mode switch or open in DOWN circuit.	2. Check for voltage at terminal "12" while trimming DOWN (in "Manual" mode). If no voltage is indicated, repeat test at terminal "22" and "23." If voltage exists at terminal "23," but not at "22" switch is faulty. If voltage is present at terminal "22," check leads "3" and "48" and connector "47" for an open condition.
3. Faulty DOWN solenoid.	3. Replace.

### **Pump Motor Will Run Up, But Not Down In Both Manual And Auto Modes (Down Solenoid Clicks)**

<b>Cause</b>	<b>Remedy</b>
1. Loose or dirty solenoid connections.	1. Check connections "10" and "11."
2. Faulty solenoid.	2. Check for voltage at terminal "11" while trimming DOWN (in "Manual" mode). If no voltage is indicated, replace solenoid.
3. Faulty DOWN field winding.	3. Replace field and frame.

### **Pump Motor Runs Down, But Not Up In Both The Manual And Auto Modes (Up Solenoid Clicks)**

<b>Cause</b>	<b>Remedy</b>
1. Loose or dirty solenoid connections.	1. Check connections "5" and "6."
2. Faulty solenoid.	2. Check for voltage at terminal "6" while trimming UP. If no voltage is indicated, replace solenoid.
3. Faulty UP field winding.	3. Replace field and frame.

### **Pump Motor Runs Down, But Not Up In Both the Manual and Auto Mode - (Up Solenoid Does Not Click)**

1. Faulty solenoid	1. Replace solenoid
--------------------	---------------------

## Pump Motor Will Not Stop Running Down In Auto Mode (Trim Out/Up Switch And Trailer Switch Inoperative In Manual Mode)

**NOTE:** An internal timer in the control module stops the pump motor 50 seconds after this condition occurs.

Cause	Remedy
1. Loose or dirty solenoid connection.	1. Check connections "7" and "8."
2. Faulty solenoid.	2. Check for voltage at terminal "8" while trimming UP (in Manual mode). If voltage exists, an open condition in solenoid is indicated and solenoid must be replaced. If no voltage is indicated, refer to steps 3 through 6 following.
3. Loose or corroded trim limit switch lead connections.	3. Check connections "32" and "36."
4. Faulty trim limit switch.	4. Disconnect trim limit switch leads "32" and "36" and connect a continuity meter between leads. Continuity should exist with drive unit in DOWN position. If not, readjust or replace switch as necessary.
5. Open circuit in wiring harness.	5. Check leads "30," "35," "46," and "2" for loose or corroded connections or physical damage.
6. Faulty control module.	6. Replace.

## Pump Motor Will Not Run Up Or Down In Auto Mode (Manual Mode Functions Properly)

Cause	Remedy
1. Open in control module battery cables or wiring harness.	1. Check cables "16" and "18," and lead "20."
2. Faulty mode switch.	2. Check for voltage at terminal "24" and "25" with switch in Auto mode. If voltage exists at terminal "25," but not "24," switch is faulty.
3. Faulty control module.	3. Replace.

## **Pump Motor Will Run Down, But Not Up In Auto Mode (Manual Mode Functions Properly)**

1. Open circuit in control module sense lead.	1. Check lead "17" (in Figure 12) for loose or corroded connections or damage.
2. Faulty control module.	2. Replace.

## **Pump Motor Will Run Up, But Not Down In Auto Mode (Manual Mode Functions Properly)**

Cause	Remedy
1. Faulty mode switch.	1. Check for voltage at terminal "21" and "22" while turning ignition switch to "Run" position (in "auto" mode). If voltage exists at "21", but not at "22", switch is faulty.
2. Open circuit in wiring.	2. Check lead "19" for a loose or corroded connection or damage.
3. Faulty control module.	3. Replace.

## **Trim System Completely Inoperative In Manual Mode (Auto Mode Functions Properly)**

Cause	Remedy
1. Faulty mode switch.	1. Check for voltage at terminal "26" with mode switch in "Manual" mode. If no voltage is indicated, replace switch.
2. Open circuit wiring harness.	2. Check leads "27" and "33" for loose or corroded connections or damage.



## Trim In/Down Switch Inoperative In Manual Trim Control - Trim Out/Up Switch and Trailer Switch Function (Auto Mode Functions Properly)

Cause	Remedy
1. Faulty IN/DOWN switch in manual trim control.	1. Check for voltage at terminal "38" while trimming IN/DOWN (in "Manual" mode). If no voltage is indicated, switch is faulty.
2. Open circuit in wiring harness.	2. Check for voltage at terminal "23" while trimming IN/DOWN. If no voltage is present, check leads "28" and "34" for a loose or corroded connection or damage.
3. Faulty mode switch.	3. Check for voltage at terminal "22" while trimming IN/DOWN. If no voltage exists, switch is faulty.

## Trim Out/Up Switch And Trailer Switch Inoperative In Manual Trim Control - Trim In/Down Switch Operates (Auto Mode Functions Properly)

Cause	Remedy
1. Trim control 20 amp fuse (if so equipped) - "43" blown.	1. Determine cause for blown fuse and correct before replacing fuse.
2. Open in power supply lead to trim and trailer switch.	2. Check voltage at terminal "44." If no voltage is indicated, check lead "45" for a poor connection or damage.
3. Faulty trim OUT/UP switch (applies only to trim controls where it is necessary to actuate trim UP switch in order for trailer switch to function).	3. Check for voltage at terminal "40" while actuating trim OUT/UP switch. Replace switch if no voltage is indicated.

## Trim Out/Up Switch Inoperative In Manual Trim Control - Trailer Switch Operates Properly (Auto Mode Functions Correctly)

Cause	Remedy
1. Faulty trim OUT/UP switch (applies only to trim controls where it is not necessary to actuate trim UP switch in order for trailer switch to function - not shown).	1. While actuating switch, check for voltage at output terminal. Replace switch if voltage is not indicated.
2. Open circuit in wiring harness	2. Check leads "31" and "37" for loose or corroded connections or damage.
3. Faulty control module.	3. Replace.

## Trailer Switch Inoperative In Manual Trim Control - Trim Out/Up Switch Functions

Cause	Remedy
1. Faulty trailer switch.	1. Check for voltage at terminal "41" and "42" while actuating trailer switch. If voltage exists at terminal "42," but not at terminal "41," a faulty switch is indicated. If no voltage exists at terminal "42," check power supply lead for an open.
2. Open in wiring.	2. Check lead "39" for a loose or corroded connection or damage.

## Boat Is On Plane Well Before Drive Unit Begins To Trim Out

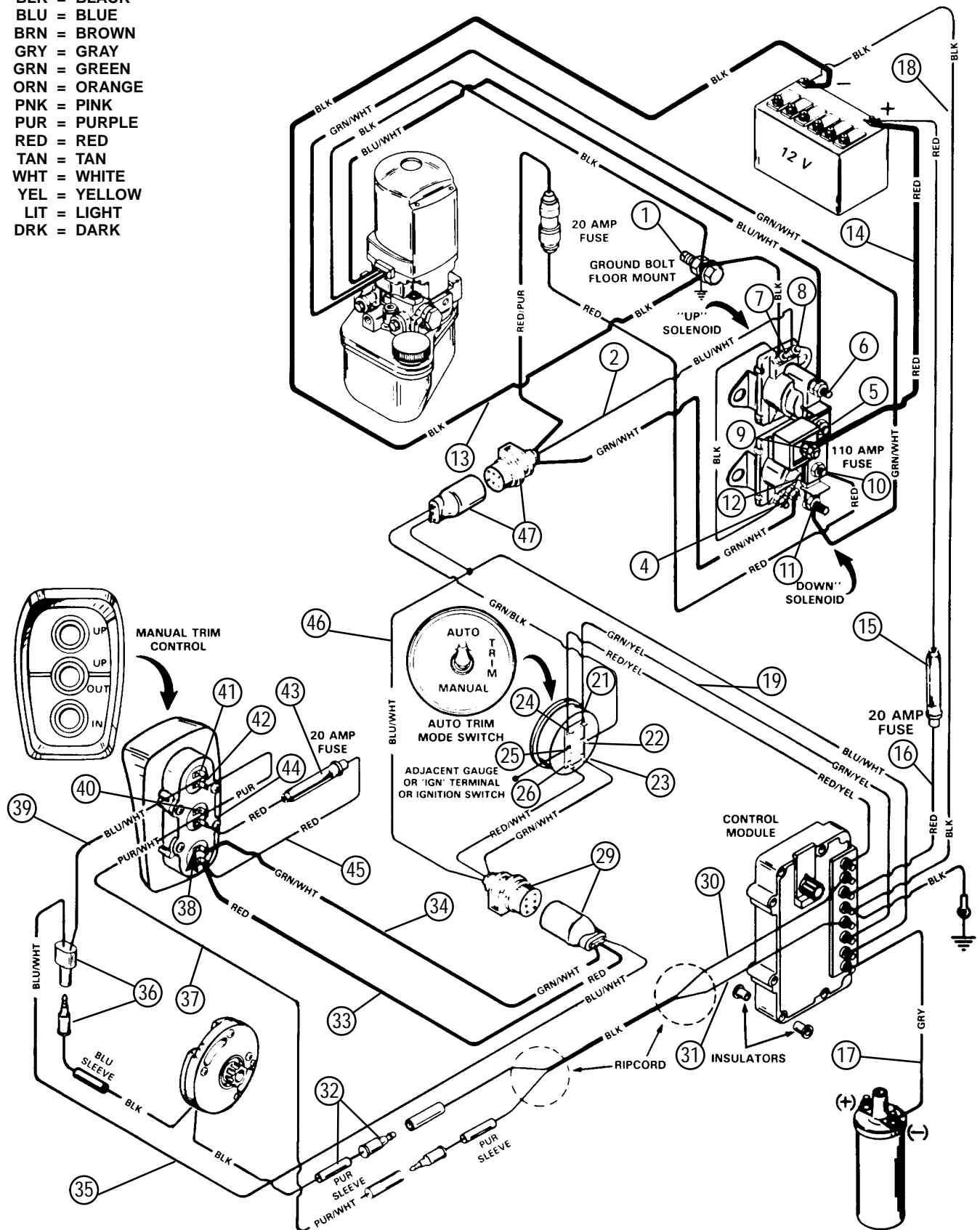
Cause	Remedy
1. Control module adjustment incorrect.	1. Refer to SECTION 5 for adjustment procedure.
2. Faulty control module.	2. Replace control module.

## Boat Is Not On Plane Before Drive Unit Begins To Plane Out

Cause	Remedy
1. Control module adjustment incorrect.	1. Refer to SECTION 5 for adjustment.
2. Faulty control module.	2. Replace control module.

# Auto Trim II System Wiring Diagram

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



22178

# Power Trim System Troubleshooting - Hydraulic System on Oildyne Trim Pump

**NOTE:** The callouts (eg. "5") in the Hydraulic System troubleshooting section refer to the hydraulic schematic on page 1C - 31.

## Drive Unit Cannot Be Trimmed Out/Up, Trims Slowly Or Trims With Jerky Movements

Cause	Remedy
1. Power Trim pump oil level low.	1. Check for cause of low oil level and correct. Add oil and bleed trim system.
2. Air in trim system.	2. Check for cause of entry and correct. Add oil to pump and bleed air from system.
3. O-rings damaged on Manual Release Valve (if equipped) or valve not completely closed.	3. Replace valve and/or close completely.
4. Insufficient pump pressure or pump shuttle valve stuck.	4. Test (as explained in "Testing Power Trim Pump", (Sec 5A). If shuttle "1" is stuck, replace pump adaptor (Sec 5A). If pressure is low, replace adaptor or attempt to repair by replacing the following components: <ul style="list-style-type: none"> <li>• OUT/UP pressure relief valve</li> <li>• Thermal relief valve</li> </ul>
5. Hoses reversed on one cylinder only.	5. Connect hoses "7" and "8" correctly.
6. Trim cylinder(s) binding.	6. Check for cause of binding (bent piston rod, scored cylinder, etc.). Repair or replace as necessary.
7. Gimbal housing-to-trim pump hydraulic hose pinched.	7. Replace hose "7."
8. Up pressure relief valve has dirt particles under check ball.	8. Replace with a new valve kit.
9. Relief balls stuck in the up side of the pump assembly.	9. Replace the pump assembly in the adapter.
10. Dirt or foreign material under the up pressure relief valve.	10. Replace the up pressure relief valve assembly.
11. Check the condition of the oil, it may be contaminated and thick like honey.	11. Remove the reservoir and clean out the contaminated oil.
12. A possible tight adaptor pump gear, or water or oil in the motor.	12. Replace the pump assembly in the adaptor, or replace the electric motor assembly.

## Drive Unit Cannot Be Lowered From Up Position Or Lowers With Jerky Movements

Cause	Remedy
1. Air in trim system.	1. Check for cause of entry. Fill and bleed trim system.
2. Low oil level.	2. Add oil.
3. Damaged O-rings on manual release valve (if equipped).	3. Replace valve.
4. Insufficient IN/DOWN pressure or shuttle "1" valve stuck.	4. Test (as explained in "Testing Power Trim Pump", Sec 5A). If shuttle "1" is stuck, replace pump adaptor. (Sec 5A) If pressure is low, replace adaptor or attempt to repair by replacing the following item: • IN/DOWN pressure relief valve "6."
5. Trim cylinder(s) block leaking internally.	5. Test. Rebuild or replace cylinder as necessary.
6. Trim cylinder(s) "5" binding.	6. Check for cause of binding. Repair or replace as necessary.
7. Gimbal housing-to-trim pump hydraulic hose "8" or "7" pinched.	7. Replace hose "8" or "7."
8. Hoses "10" and "11" reversed on one trim cylinder only.	8. Reconnect hoses "10" and "11" correctly.
9. Drive unit binding in gimbal ring.	9. Check for cause of binding and replace.
10. Down Pressure relief valve "6" has dirt particles under check ball.	10. Replace with a new valve kit.
11. Foreign material under down pressure relief valve.	11. Replace the down pressure relief valve assembly
12. Dirt or foreign material under the down pressure relief valve	12. Replace the down pressure relief valve assembly
13. Check the condition of the oil, it may be contaminated and thick like honey	13. Remove the reservoir and clean out the contaminated oil
14. A possible tight adaptor pump gear, or water or oil in the motor	14. Replace the pump assembly in the adaptor, or replace the electric motor assembly

## Drive Unit Will Not Stay In Full Up Position For Extended Periods

Cause	Remedy
1. External leakage.	1. Check for cause and correct. Add oil to pump and bleed trim system.
2. Damaged o-ring on manual release valve (if so equipped) or valve not closed completely.	2. Replace valve and/or close completely.
3. Pump OUT/UP circuit leaking internally.	3. Test. Replace adaptor "2" or attempt to repair by replacing the following: <ul style="list-style-type: none"><li>• Thermal relief valve "4"</li><li>• Pilot check valve or seals "9"</li></ul>
4. Trim cylinder(s) leaking internally and pump DOWN circuit leaking internally (both must be faulty to cause this problem).	4. Rebuild cylinders "5." Repair or replace adaptor "2" as required.
5. Either Foreign Material under the poppet valve seat or a bad rubber seat on the face of the poppet valve.	5. Install an Overhaul Kit.

## Drive Will Not Stay In The Trimmed Out/Up Position When Underway

**NOTE:** Use the following in conjunction with items mentioned under "Drive Unit Will Not Stay In Full 'Up' Position For Extended Periods"

Cause	Remedy
1. Air in trim system.	1. Check for cause of entry. Fill and bleed system.
2. Leaky shuttle poppet valve "1."	2. Install repair kit for shuttle valve "1."

## Drive Unit Trails Out/Up On Deceleration Or When Shifting Into Reverse (Unit Thumps When Shifting)

Cause	Remedy
1. Trim cylinders(s) leaking internally.	1. Test. Rebuild or replace cylinders as necessary.
2. Trim pump IN/DOWN circuit leaking internally.	2. Test. Replace adaptor or attempt to repair by replacing the following: <ul style="list-style-type: none"><li>• Pilot check valves or seals "9"</li><li>• Install trim pump rebuild kit</li></ul>

## Oil Foams Out Of Pump Fill/Vent Screw

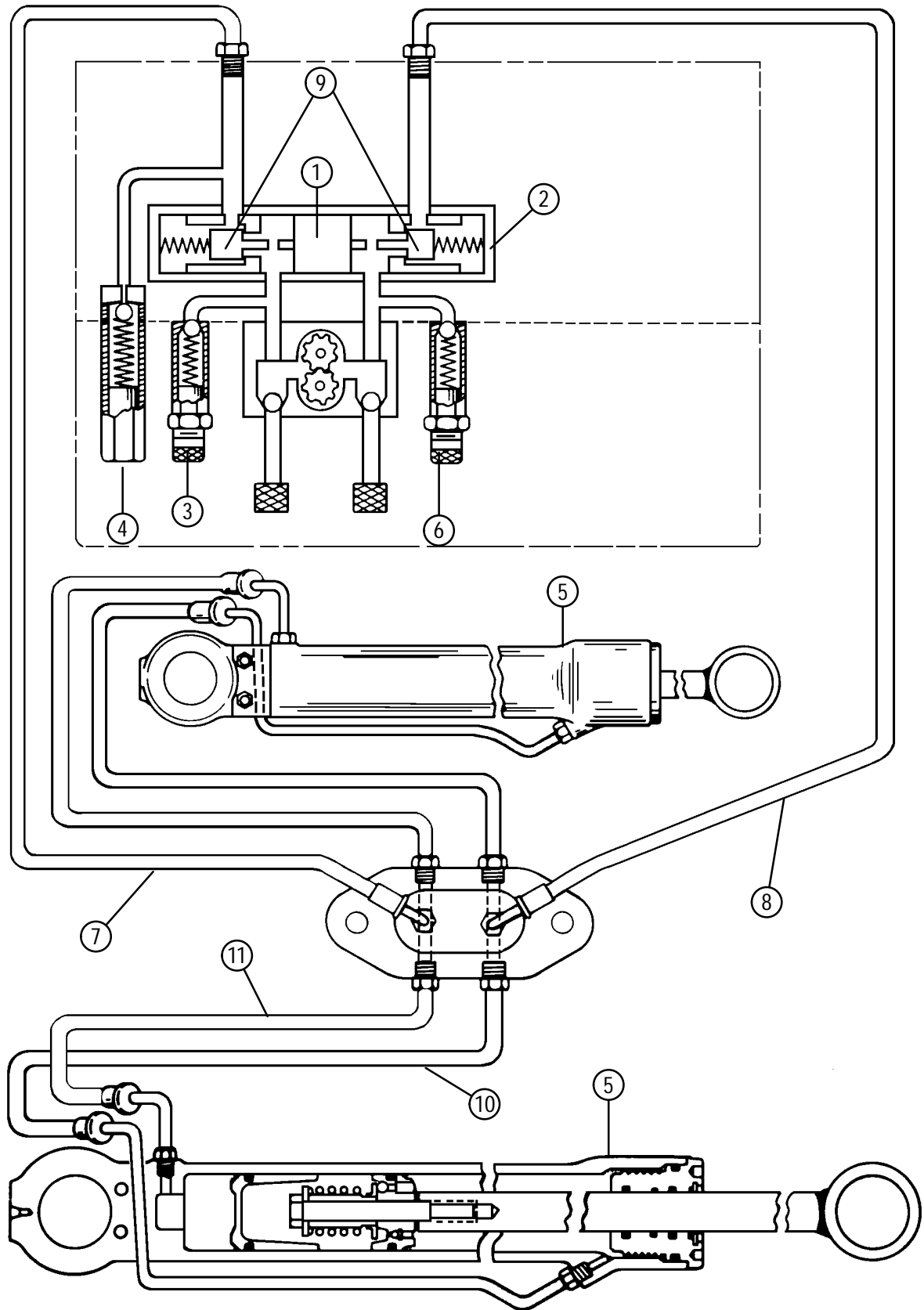
Cause	Remedy
1. Contaminated oil.	1. Flush system with clean oil refill pump and bleed trim system.
2. Oil level low.	2. Check for cause of low oil level and correct. Add oil to pump and bleed system.

## The Trim Pump Motor Runs But Does Not Pump Oil

Cause	Remedy
1. Broken coupler between the pump and the motor.	1. Replace the coupler.

## Power Trim Hydraulic Schematic

- 1 - Shuttle
- 2 - Pump Adaptor
- 3 - Out/Up  
Pressure  
Relief Valve
- 4 - Thermal Relief  
Valve
- 5 - Trim Cylinder
- 6 - IN/DOWN  
Pressure Relief  
Valve
- 7 - Out/Up  
Hose
- 8 - IN/DOWN  
Hose
- 9 - Pilot Check  
Valves
- 10 Gimbal Ring  
to Trim Cylinder  
IN/DOWN  
Hose
- 11 Gimbal Ring  
to Trim Cylinder  
OUT/UP  
Hose



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# Power Trim System Troubleshooting - Hydraulic System on Prestolite Trim Pump

## Drive Unit Cannot Be Trimmed OUT/UP Or Trims Slowly Or with Jerky Movements

(Numbers refer to callouts on the Oildyne Trim System Diagram P. 1C-21)

Cause	Remedy
1. Power trim pump oil level low (1).	1. Check for cause of low oil level and correct. Add oil.
2. Air in trim system.	2. Check for cause of entry and correct. Add oil to pump and bleed trim system.
3. Manual release valve (2) not completely closed.	3. Close valve (2) completely.
4. Insufficient pump pressure or pump shuttle valve (3) stuck.	4. Test, as explained following. Replace valve body and gear assembly.
5. Hoses (5) (6) reversed on one cylinder only.	5. Connect hoses (5) (6) correctly.
6. Trim cylinder(s) (7) binding.	6. Check for cause of binding (bent piston rod (8), etc.). Repair or replace, as necessary.
7. Gimbal housing-to-trim pump hydraulic hoses (4) (9) pinched.	7. Replace hose (4) (9).

## Drive Unit Cannot Be Lowered From OUT/UP Position or Lowers with Jerky Movements

Cause	Remedy
1. Air in trim system.	1. Check for cause of entry. Fill and bleed trim system.
2. Insufficient pump IN/DOWN pressure or shuttle valve (3) stuck.	2. Test, as explained following. Replace valve body and gear assembly.
3. Trim cylinder(s) (7) leaking internally.	3. Test, as explained following. Rebuild or replace cylinder (7) as necessary.
4. Trim cylinder(s) (7) binding.	4. Check for cause of binding (bent piston rod (8), etc.). Repair or replace, as necessary.
5. Gimbal housing-to-trim pump hydraulic hose (4) (9) pinched.	5. Replace hoses (4) (9).
6. Hoses (5) (6) reversed on one trim cylinder only.	6. Reconnect hoses (5) (6) correctly.
7. Drive unit binding in gimbal ring.	7. Check for cause of binding (bent gimbal ring, drive shaft housing, etc.) and replace.

## Drive Unit Will Not Stay In Full OUT/UP Position For Extended Periods

Cause	Remedy
1. External leakage.	1. Check for cause and correct. Add oil to pump (1) and bleed trim system.
2. Pump OUT/UP circuit (3) (4) (5) leaking internally.	2. Test as explained following. Replace valve body and gear assembly. Also check trim cylinders (7) for internal leakage.

## Drive Unit Will Not Stay In Trimmed OUT/UP Position When Underway

Cause	Remedy
1. Air in trim system.	1. Check for cause of entry. Fill and bleed system.
2. External leakage.	2. Check for cause and correct. Add oil to pump and bleed trim system.
3. Pump OUT/UP circuit leaking internally (3) (4) (5).	3. Test as explained following. Replace valve body and gear assembly.

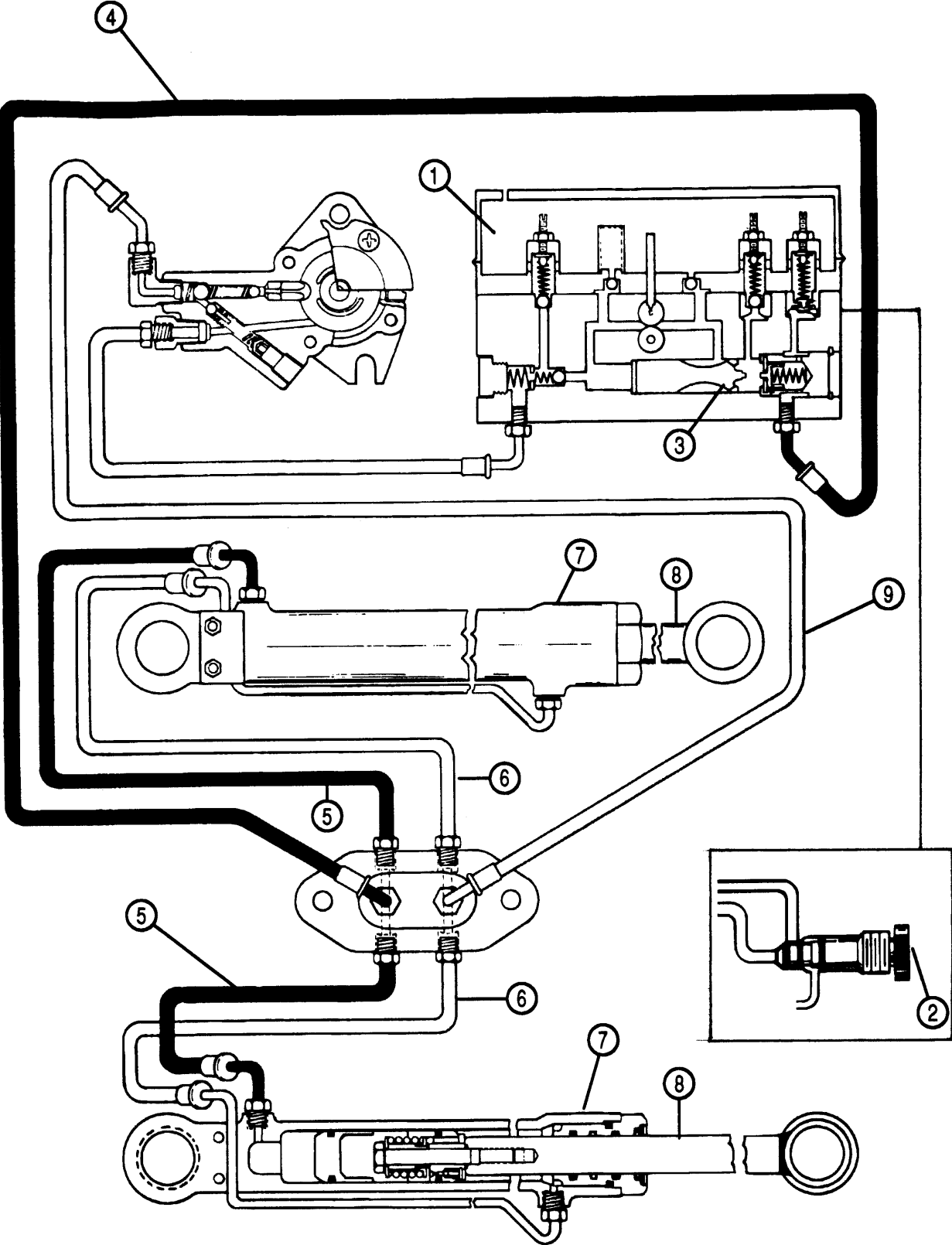
## Drive Unit Trails OUT/UP on Deceleration or When Shifting into Reverse (Unit Thumps When Shifting)

Cause	Remedy
1. Air in trim system.	1. Determine cause for air entry and correct. Add oil to pump and bleed trim system.
2. Trim cylinder(s) (7) leaking internally.	2. Test as explained following. Replace or rebuild cylinder(s) (7), as necessary.
3. Trim pump IN/DOWN circuit (3) (6) (9) leaking internally.	3. Test as explained following.

## Oil Foams Out of Pump “Vent” Screw

Cause	Remedy
1. Contaminated oil.	1. Flush system with clean oil, refill pump and bleed trim system.
2. Oil level low.	2. Check for cause of low oil level and correct. Add oil to pump (1) and bleed system.

Prestolite Trim System Diagram



# Corrosion Protection

## Corrosion Of Underwater Parts, Without Mercathode Or Current Protection

Cause	Remedy
1. Sacrificial anode(s) consumed.	1. Replace anode(s) when 50% consumed.
2. Stainless steel propeller installed.	2. Add Mercathode (impressed current protection) or additional sacrificial anodes.
3. Sacrificial anode(s) not grounded to drive.	3. Remove anode(s), clean contact surface, reinstall, check continuity.
4. Loss of continuity between underwater parts & ground.	4. Provide good ground connections.
5. Shore power causing overload of anode(s) and/or Mercathode.	5. Disconnect shore power or install Quicksilver isolator.
6. Paint on drive heavily abraded (exposed metal).	6. Prime and repaint, and/or install additional anode(s).
7. Sacrificial anode(s) painted.	7. Remove paint or replace anode(s).
8. Drive tilted so far that anode(s) are out of the water.	8. Leave drive down, install additional anode (below water line), or transom mount a Mercathode.
9. Only power trim cylinders corroded.	9. Provide good ground to drive. All parts must be grounded.
10. Corrosion in area of exhaust outlets (exhaust deposits can cause corrosion).	10. Remove deposits with marine or auto wax.
11. Corrosion occurring after unit removed from saltwater.	11. Wash exterior and flush interior with fresh water.

## Corrosion On Underwater Parts, With Mercathode Or Current Protection (Drive Corroding)

Cause	Remedy
1. Poor connection between reference electrode (brown) lead or anode (orange) lead and Mercathode controller.	1. Clean and/or tighten connection. Repair wiring.

## Corrosion On Underwater Parts, With Mercathode Or Impressed Current Protection (Drive Corroding) (Continued)

2. Faulty Mercathode reference electrode.	2. Disconnect reference electrode lead (brown) from the controller "R" terminal. Connect the lead to positive (+) terminal of a digital multi-meter (set on 0-2000 millivolt scale). Connect negative (-) meter lead to negative (-) battery terminal. Note meter reading; then repeat the test with a test silver/silver chloride reference electrode held behind the drive. The same reading should be obtained in both cases. If not, replace the reference electrode.
3. Faulty Mercathode controller.	3. With anode and reference electrode leads connected to controller, connect a jumper wire between "R" and "-" terminals on controller. Connect positive (+) lead of volt meter (set on 0-20 scale) to "A" terminal on controller. Connect the negative (-) meter lead to the negative (-) controller terminal. Reading should be as follows: <ul style="list-style-type: none"> <li>• Freshwater Areas = 11.5 volts minimum</li> <li>• Seawater Areas = 3.55 volts minimum</li> </ul> If the reading is low, replace the controller.
4. Too much cathode (such as stainless steel).	4. Mercathode system overpowered by large quantity of stainless steel below the water line.
5. Loss of continuity between drive components and ground.	5. Ensure continuity (check continuity wires and washers).
6. Sacrificial anodes consumed, painted, or inoperative.	6. Replace anodes.
7. Mercathode reference electrode or anode painted.	7. Remove paint or replace anode or Mercathode reference electrode.
8. No power to Mercathode controller.	8. Connect positive (+) lead of volt meter (set on 0-20 volt scale) to positive (+) terminal on the controller and negative (-) volt meter lead to negative (-) terminal. Meter should indicate battery voltage. Check for blown fuse (if so equipped) on a standard Mercathode system. Clean the connection or repair wiring as required.
9. Mercathode system not functioning.	9. <ul style="list-style-type: none"> <li>a. Check the fuse in the hot lead.</li> <li>b. Check battery.</li> <li>c. Check for loose connections at controller and battery.</li> <li>d. Check the grounding wire between the drive and the controller.</li> </ul>

## Corrosion On Underwater Parts, With Mercathode Or Impressed Current Protection (Drive Overprotected)

Cause	Remedy
1. Faulty Mercathode reference electrode.	1. Disconnect reference electrode lead (brown) from "R" terminal on controller. Connect the lead to the positive (+) terminal of a digital multimeter (set on 0-2000 millivolt scale). Connect the negative (-) meter lead to the negative (-) battery terminal. Note the meter reading; then repeat the test with a test silver/silver chloride reference electrode held behind the drive. The same reading should be obtained in both cases. If not, replace the reference electrode.
2. Faulty Mercathode controller.	2. a. Check controller output. If the hull potential indicates overprotection, remove the reference electrode lead from the controller. if the controller is off (no impressed current called for) the voltage between the negative (black) and the anode should be less than 1 volt. If your digital voltmeter can measure amperage; with the reference electrode disconnected, the amperage between the negative on the controller and the anode terminal should be less than 1 milliamp.  b. Replace the controller.
3. Stray current corrosion (electrical current leaves a metal conductor and creates a path through the water).	3. Disconnect electrical components one at a time and observe the multimeter reading until you eliminate the high reading (see Troubleshooting Procedures). Correct the source of the stray current.
4. Poor connection between the Mercathode reference electrode lead (brown) and the "R" terminal on the controller.	4. Clean and/or tighten the connection. Repair wiring as needed.
5. Mercathode system not functioning.	5. a. Check the fuse in the hot lead.  b. Check battery.  c. Check for loose connections at controller and battery.  d. Check the grounding wire between the drive and the controller.

## Corrosion Troubleshooting Procedures

1. Unplug shore power (if equipped).
2. Measure hull potential with silver/silver chloride reference electrode and digital volt/ohm meter.

### READINGS

Saltwater	Potential	Diagnosis <sup>1</sup>
	Below 850 millivolts	Drive is corroding, see <b>(DRIVE CORRODING)</b> , p. 1C - 35
	Between 850 - 1100 millivolts	Drive is protected
	Above 1100 millivolts	Drive is overprotected, see <b>(DRIVE OVERPROTECTED)</b> p. 1C - 37

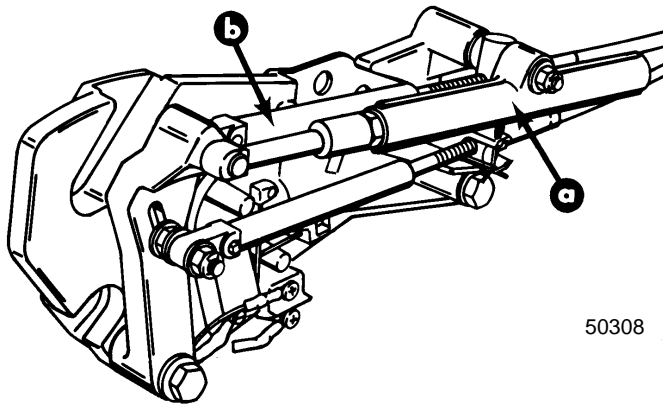
Freshwater	Potential	Diagnosis
	Below 750 millivolts	Drive is corroding, see <b>(DRIVE CORRODING)</b> , p. 1C - 35
	Between 750 - 1050 millivolts	Drive is protected
	Above 1050 millivolts	Drive is overprotected, see <b>(DRIVE OVERPROTECTED)</b> p. 1C - 37

### CORROSION SYMPTOMS

- Paint blistering (usually on sharp edges)
- Loosely adhering white corrosion products on exposed aluminum surfaces (do not confuse these with tenaciously clinging calcium carbonate deposits)
- Aluminum pitting

# Shift System Troubleshooting

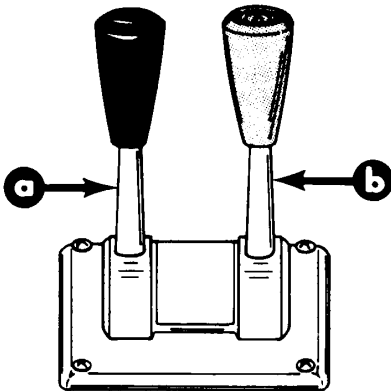
**NOTE:** Some models may be equipped with a shift assist assembly. The only difference with these models is that the remote control shift cable attaching hardware is slightly longer. Shift cable adjustment is the same as all other versions.



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- a - Shift Assist Assembly
- b - Remote Control Shift Cable

**IMPORTANT:** If boat is equipped with A REMOTE CONTROL THAT HAS SEPARATE SHIFT AND THROTTLE LEVERS, this shift assist assembly should NOT be used. The use of the shift assist assembly with this type of remote control can cause the shift lever to move out of gear unexpectedly.



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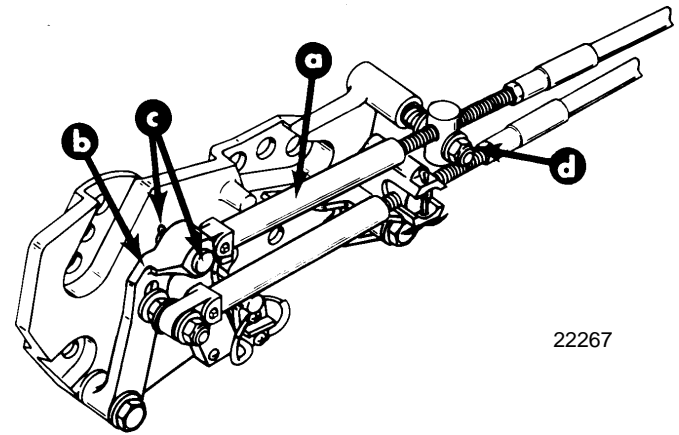
- a - Shift Lever
- b - Throttle Lever

## Checking for Excessive Play

Checking the drive unit for excessive play in shift system can be done with the boat in the water or on land. Refer to appropriate procedure following:

### Boat Out of Water (Engine Off)

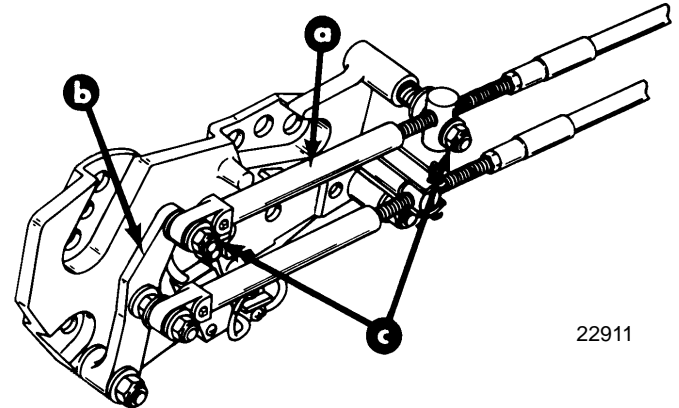
1. Disconnect remote control shift cable.



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### Later Models (With Plastic Shift Lever)

- a - Remote Control Shift Cable
- b - Plastic Shift Lever
- c - Clevis Pin and Cotter Pin
- d - Locknut and Washer



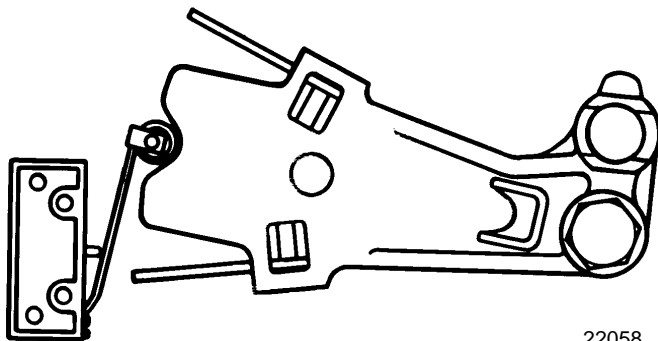
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### Earlier Models (With Metal Shift Lever)

- a - Remote Control Shift Cable
- b - Metal Shift Lever
- c - Locknuts and Washers



**IMPORTANT:** When pushing or pulling on drive unit shift cable in the following steps, apply enough pressure so that shift cutout switch roller starts to move off center of notch, then ease up slightly. Use a fine tip marking device to mark threaded tube to obtain an accurate measurement.

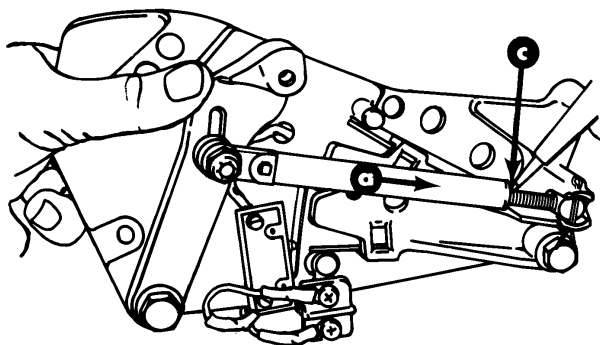


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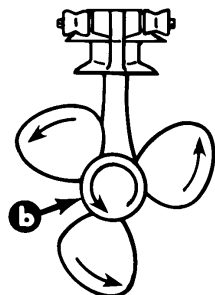
a - Shift Cutout Switch Roller

2. Check for excessive play in drive unit shift system as follows:

- a. Place drive unit into gear by pushing in on drive unit shift cable, while simultaneously rotating propeller shaft counterclockwise until shaft stops, to ensure full clutch engagement.
- b. Place a mark on shift cable threaded tube against edge of end guide.



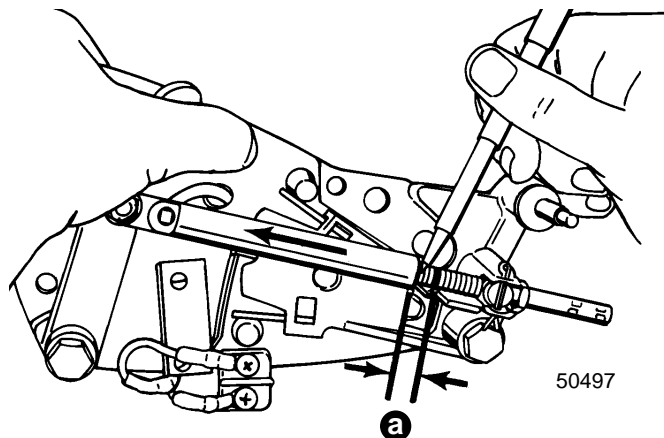
50499



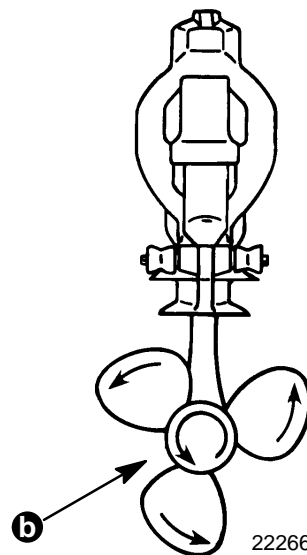
22266

- a - Drive Unit Shift Cable
- b - Propeller Shaft
- c - Threaded Tube

- c. While maintaining pressure on propeller shaft in a counterclockwise direction (to keep clutch locked with gear), lightly pull out on shift cable end guide and place another mark on threaded tube.
- d. Measure distance between both marks. Distance should be **9/16 in. (14 mm) or less**.



50497



22266

- a - 9/16 in. (14 mm) or Less
- b - Propeller Shaft

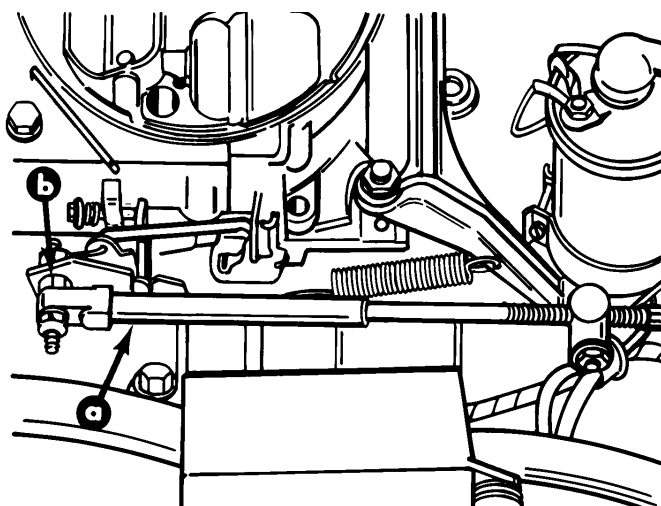
**If play is 9/16 in. (14 mm) or less:** No further attention to drive unit is needed. Proceed with adjustments.

**If play is more than 9/16 in. (14 mm):** Drive unit must be removed to further isolate excessive play.

## Boat In Water (Engine Running)

### **⚠ WARNING**

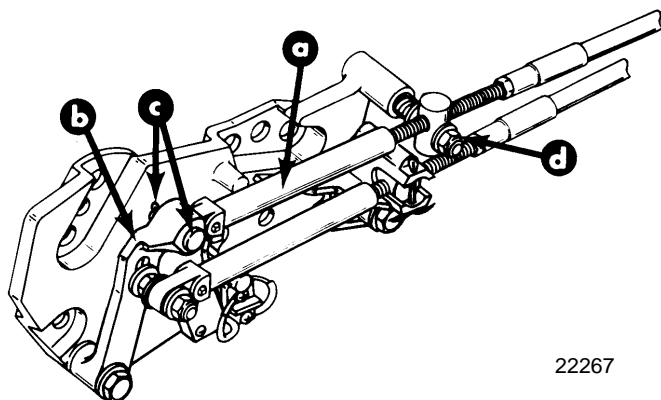
- At least two people will be needed for the following procedure, one person to check the adjustment and one person to stay at the control station of the boat.
  - Ensure boat is secured to dock and precautions have been taken to avoid damage to boat prior to placing drive unit into gear.
1. Start engine and let it warm up (Refer to operating procedures in Operation and Maintenance Manual).
  2. Disconnect throttle cable(s) from carburetor(s).



22062

- a - Throttle Cable End Guide
- b - Carburetor Throttle Lever

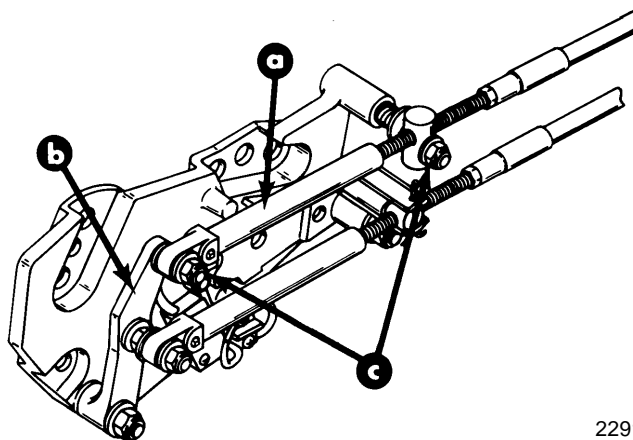
3. Disconnect remote control shift cable.



22267

### **Later Models (With Plastic Shift Lever)**

- a - Remote Control Shift Cable
- b - Plastic Shift Lever
- c - Clevis Pin and Cotter Pin
- d - Locknut and Washer

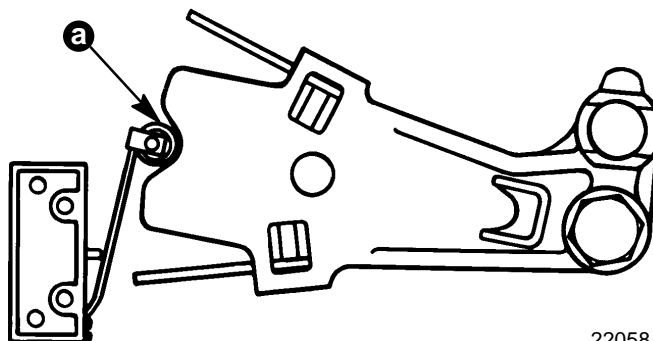


22911

### **Earlier Models (With Metal Shift Lever)**

- a - Remote Control Shift Cable
- b - Metal Shift Lever
- c - Locknuts and Washers

**IMPORTANT:** When pushing or pulling on drive unit shift cable, in the following steps, apply just enough pressure so that shift cutout switch roller just starts to move off center of notch; then, ease up slightly. Use a fine tip marking device to mark threaded tube to obtain an accurate measurement.

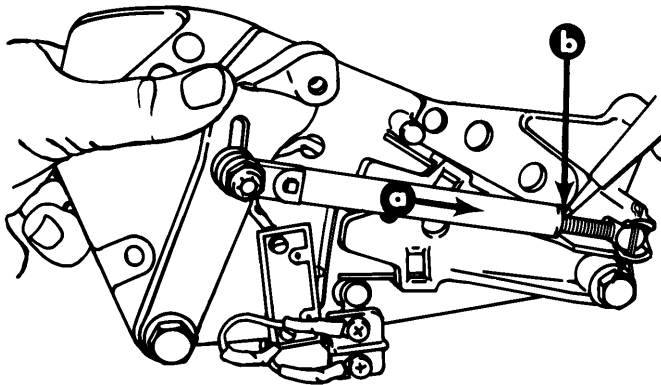


22058

- a - Shift Cutout Switch Roller

4. Check for excessive play in drive unit shift system as follows:

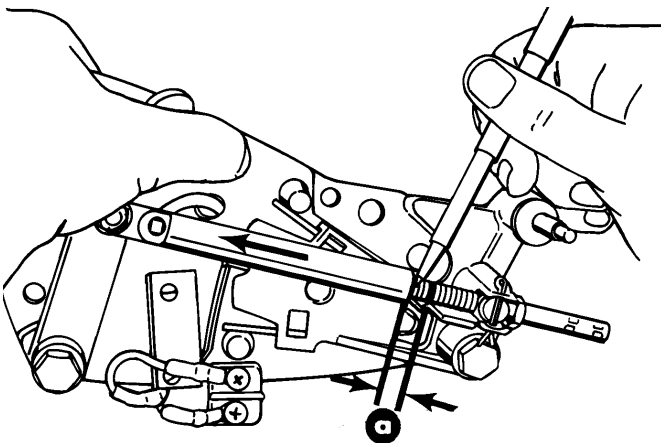
- a. Push in on drive unit shift cable.
- b. Place a mark on shift cable threaded tube, against cable end guide.



50499

a - Drive Unit Shift Cable  
b - Threaded Tube

- c. Lightly pull on drive unit shift cable end guide and place another mark on threaded tube.
- d. Measure distance between both marks. Distance should be **9/16 in. (14 mm) or less**.



50497

a - 9/16 in. (14 mm) Or Less

**If play is 9/16 in. (14 mm) or less:** No further attention to drive unit is needed. Proceed with adjustments.

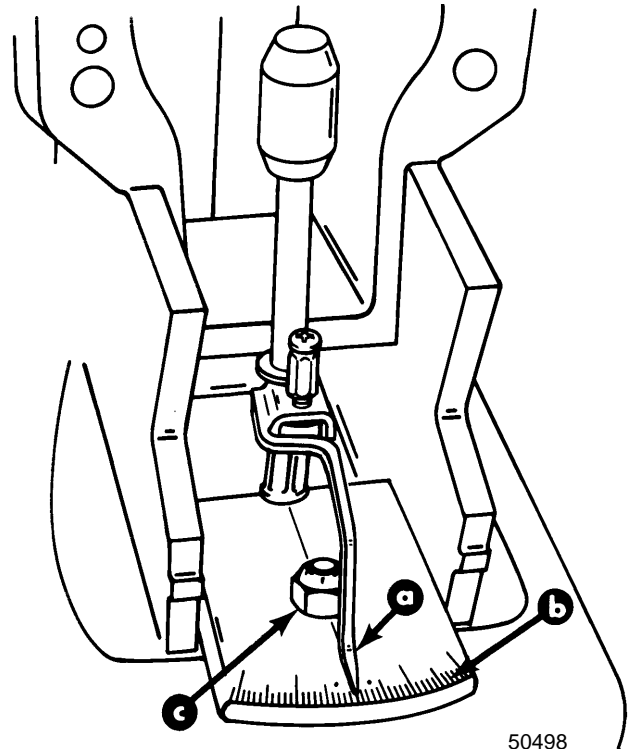
**If play is more than 9/16 in. (14 mm):** Drive unit must be removed to further isolate excessive play.

## Isolating Excessive Play

**NOTE:** Refer to the end of this section for templates and patterns needed to fabricate similar tools.

1. To determine shift shaft rotational end play, use a tool such as the one shown to measure degrees of play in shift shaft with clutch locked and held in gear.

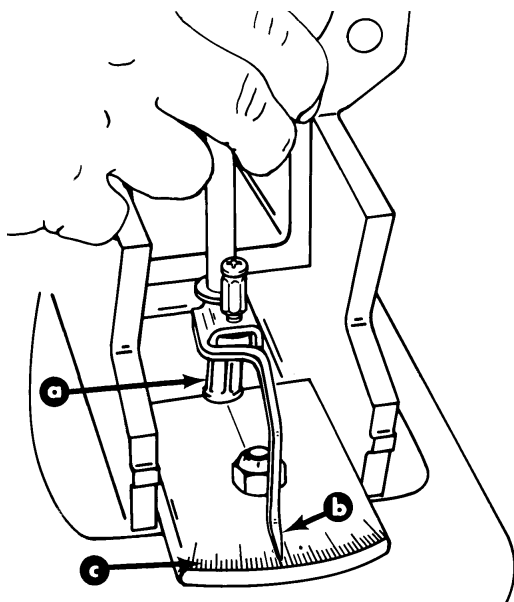
- a. Install tool as shown.



50498

a - Pointer - Installed on Shift Shaft  
b - Scale (1° Increments)  
c - Nut

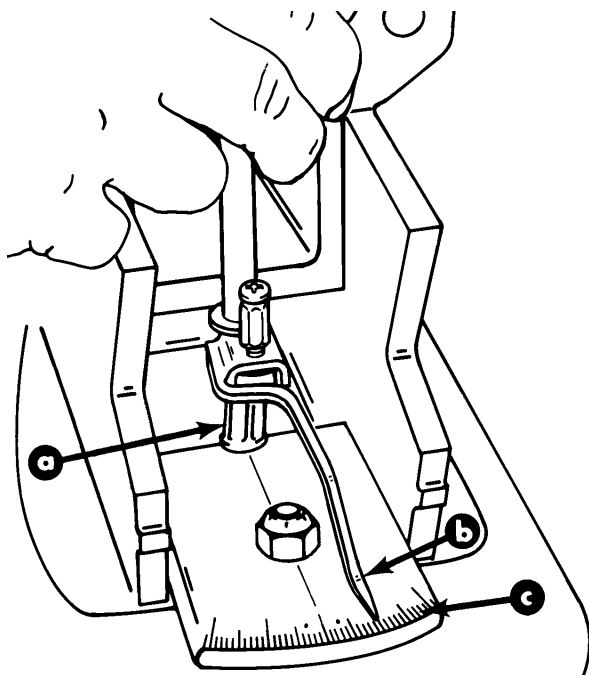
- b. Rotate shift shaft coupler clockwise while simultaneously turning propeller shaft counterclockwise until clutch locks into gear. Make note of pointer location on scale.



50498

- a - Shift Shaft Coupler  
b - Pointer  
c - Scale

- c. While maintaining pressure on propeller shaft to keep clutch locked with gear, lightly turn shift shaft coupler counterclockwise. Make note of pointer location.



50498

- a - Shift Shaft Coupler  
b - Pointer  
c - Scale

- d. Determine total degrees of movement.

**If 12° or less:** Problem is with the drive unit shift cable, upper shift shaft assembly and lever assembly.

**If more than 12°:** Problem is with gear case shift spool assembly.

Whichever the case, refer to appropriate section for repair of applicable components.

## Checking Remote Control Shift Cable Output

**IMPORTANT:** Remote control must provide a shift cable travel (at the shift plate end) of 2-7/8 in. (73 mm) to 3-1/8 in. (80 mm) with a 15 - 20 lb. (6.8 - 9 kg) load applied to the cable end guide.

**Models with Shift Assist:** This measurement can be taken by installing the remote control shift cable and using the shift assist assembly (provided) to place the proper load on the shift cable (drive unit shift cable should not be installed).

**Models without Shift Assist:** This measurement can be taken by lightly pushing and pulling on the remote control shift cable end guide, to place the proper load [15 - 20 lb. (6.8 - 9 kg)] on the shift cable.

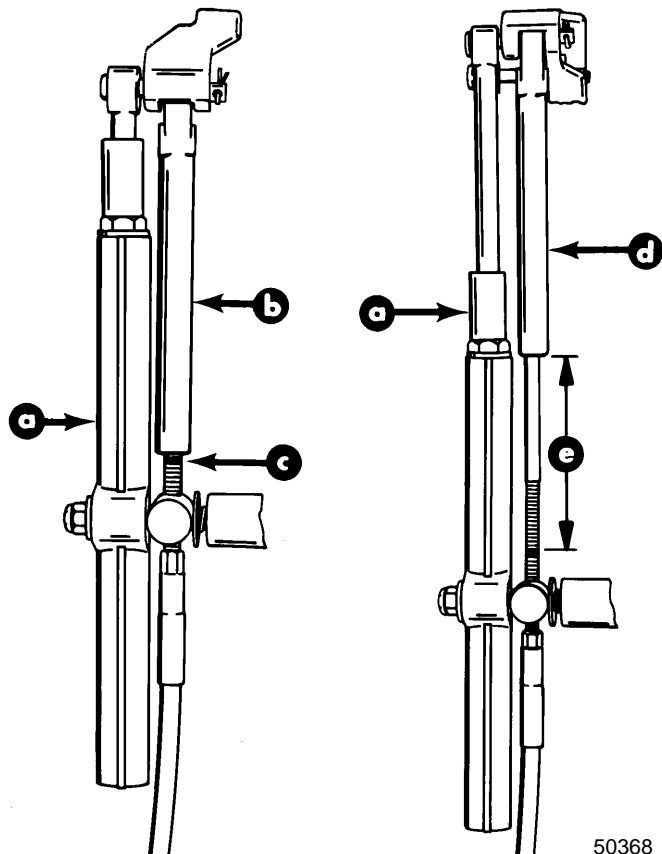
1. Place remote control into gear as follows:

**Right Hand Rotation Drive Unit** - forward gear wide-open-throttle position.

**Left Hand Rotation Drive Unit** - reverse gear wide-open-throttle position.

Place a mark on threaded tube against edge of cable end guide.

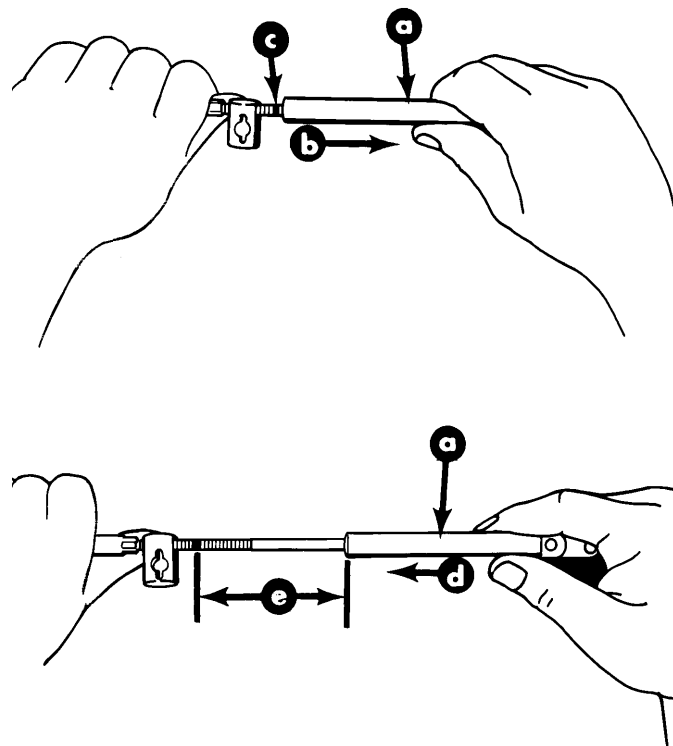
2. Place remote control into the opposite gear from that established in step 1. Measure the distance between the edge of the shift cable end guide and the mark in step 1. Total shift cable output must not be less than 2-7/8 in. (73 mm) or more than 3-1/8 (80 mm). If out put is incorrect, remote control and/or shift cable must be replaced.



50368

#### With Shift Assist Assembly

- a - Shift Assist Assembly
- b - Remote Control Shift Cable - Retracted
- c - Edge of Cable End Guide Mark
- d - Remote Control Shift Cable - Extended
- e - Measurement Taken from Mark to Edge of Cable End Guide: **2-7/8 in. (73 mm) to 3-1/8 in. (80 mm)**



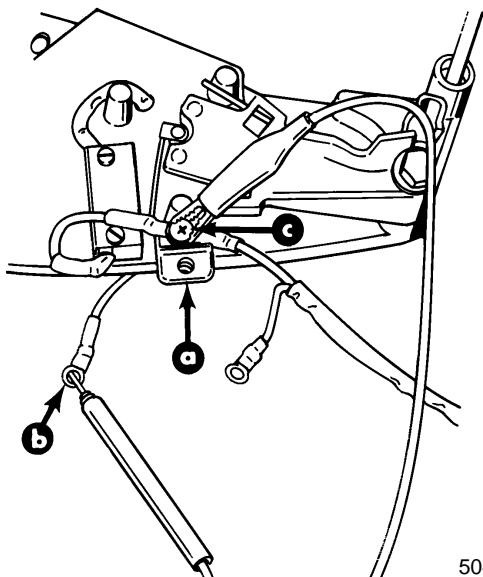
50499

#### Without Shift Assist Assembly

- a - Shift Cable End Guide
- b - Remote Control Shift Cable - Lightly Pull on End Guide
- c - Place a Mark on Tube Against Edge of Cable End Guide
- d - Remote Control Shift Cable - Lightly Push In on End Guide
- e - Measurement Taken from Mark to Edge of Cable End Guide: **2-7/8 in. (73 mm) to 3-1/8 in. (80 mm)**

## Checking Cutout Switch Timing

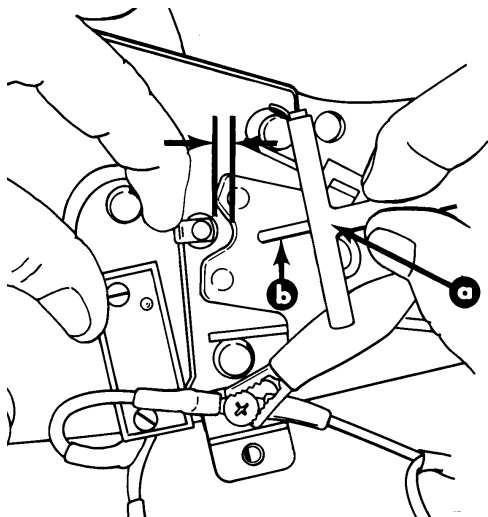
1. Disconnect cutout switch white/green wire from terminal block.
2. Connect ohmmeter positive (+) lead to cutout switch white/green wire and ohmmeter negative (-) lead to cutout switch black wire at terminal block.
3. Set ohmmeter on Rx1 scale.



- a - Terminal Block
- b - Cutout Switch WHITE/GREEN Wire
- c - Cutout Switch BLACK Wire

**NOTE:** Refer to the end of this section for the pattern and dimensions needed to fabricate a similar tool.

4. Slowly move cutout switch roller off of its seat. Circuit should close (full continuity reading), when roller is moved 1/8 in. (3 mm). Use the 1/8 in. rod on the end of special tool to gauge this movement.

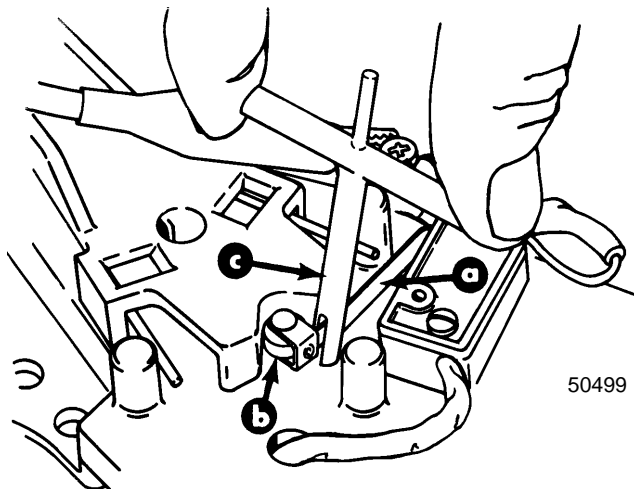


- a - Special Tool
- b - 1/8 in. (3 mm)

If switch closes too early [less than 1/8 in. (3 mm)]: Roller must be bent away from its seat.

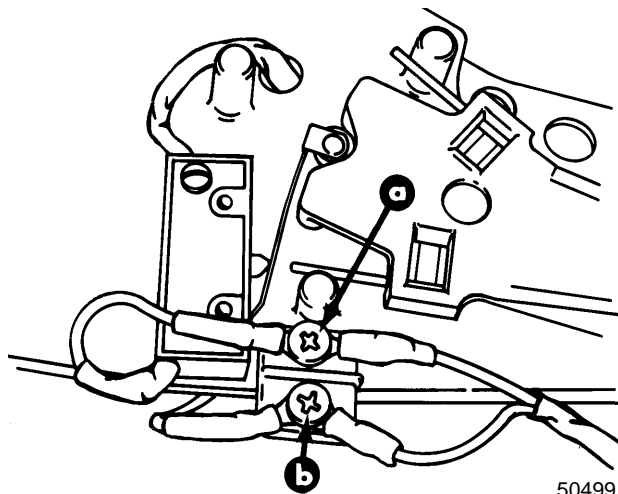
If switch closes too late [more than 1/8 in. (3 mm)]: Roller must be bent toward its seat.

If necessary, use special tool to bend lever as shown.



- a - Lever
- b - Roller
- c - Special Tool

5. Once cutout switch is timed properly, reconnect wires at terminal block and coat terminals with liquid neoprene.



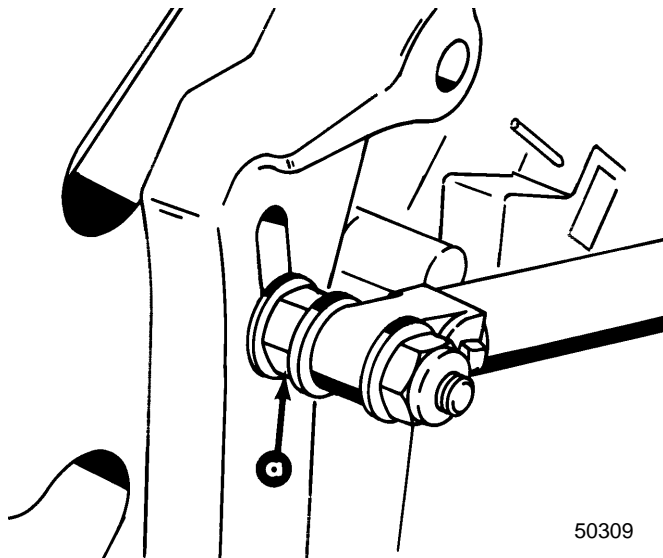
- a - BLACK Wires
- b - WHITE/GREEN Wires

6. Shift remote Control into gear as follows:

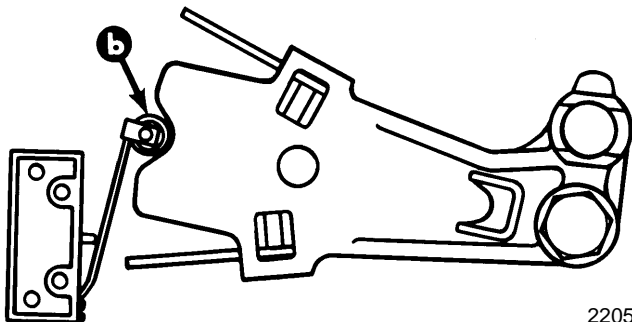
**Right Hand Rotation Drive Unit** - reverse gear wide open-throttle position.

**Left Hand Rotation Drive Unit** - forward gear wide open-throttle position.

While shifting, rotate propeller shaft clockwise. Clutch should engage and cause propeller shaft to lock. If clutch does not engage, loosen adjustable stud on shift lever and move it upward in slot until clutch engages with gear. Retighten stud. Shift remote control several times and ensure that shift cutout switch roller is still centered.



50309



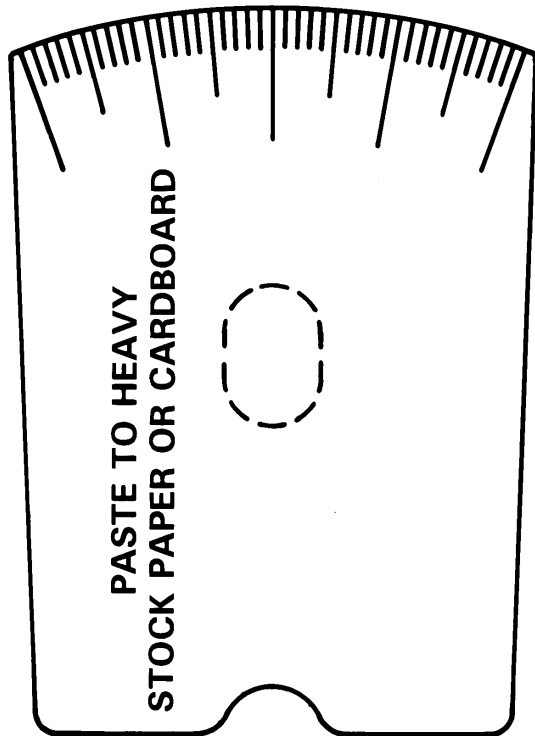
22058

- a - Adjustable Stud
- b - Shift Cutout Switch Roller

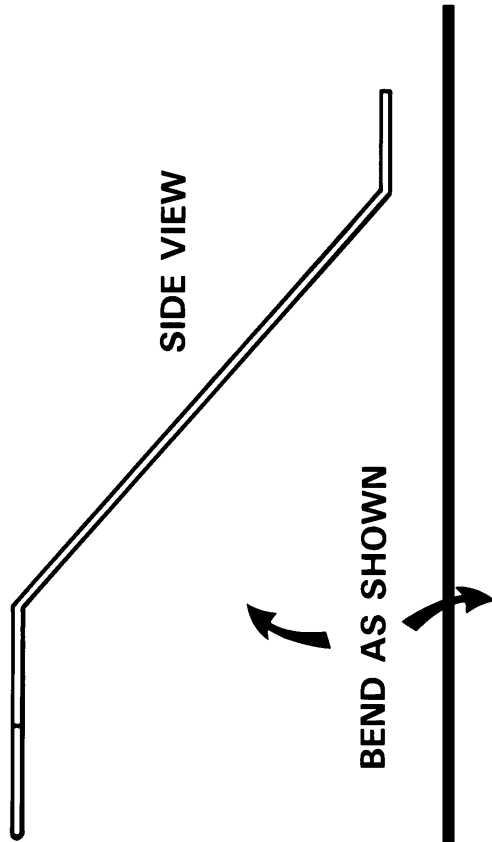
## Checking Operation

1. Reconnect throttle cable(s) removed earlier.
2. Place boat in water and start engine. Check the following:
  - a. Shift into forward and reverse gear, making sure that clutch engages before engine begins to accelerate.
  - b. Accelerate engine in forward and reverse gear to ensure engine does not shut down.
  - c. Check that shift cutout switch roller is centered in notch of shift cutout lever, with drive unit in forward and reverse gear.
  - d. Shifting from "in gear position" to neutral, ensure drive unit is in neutral before remote control shift lever comes to neutral detent position.

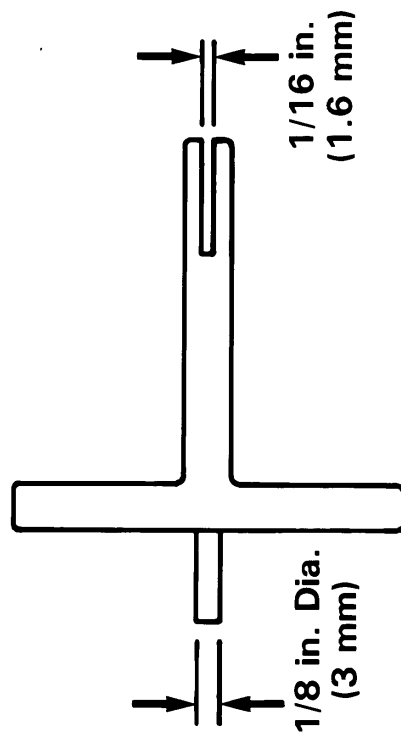
SCALE



POINTER



CUTOUT SWITCH  
ADJUSTMENT TOOL



TOP VIEW

