Chapter Eighteen

Power Trim and Tilt Systems

The MerCruiser power trim system permits raising or lowering the stern drive unit for efficient operation under varying conditions. Early stern drive units used a mechanical tilt system in the form of a series of holes in the gimbal ring. After the unit was set at the desired angle, an adjustment stud inserted through the appropriate hole held it in place.

This chapter covers three MerCruiser power trim and tilt systems: the high-pressure pump system, low-pressure pump system and auto trim system.

HIGH-PRESSURE PUMP SYSTEM

This MerCruiser power trim and tilt system is electro-hydraulically operated. Its electrical sub-system consists of a power trim control panel or handle, a pump motor and a trim limit switch, with connecting wiring. Some models may also be equipped with a trim indicator sender. **Figure 1** shows a typical system.

The hydraulic sub-system contains a Prestolite or Oildyne hydraulic pump, the trim cylinders, a reverse lock valve and the necessary hoses and fittings. See **Figure 2.**

Electrical Sub-system

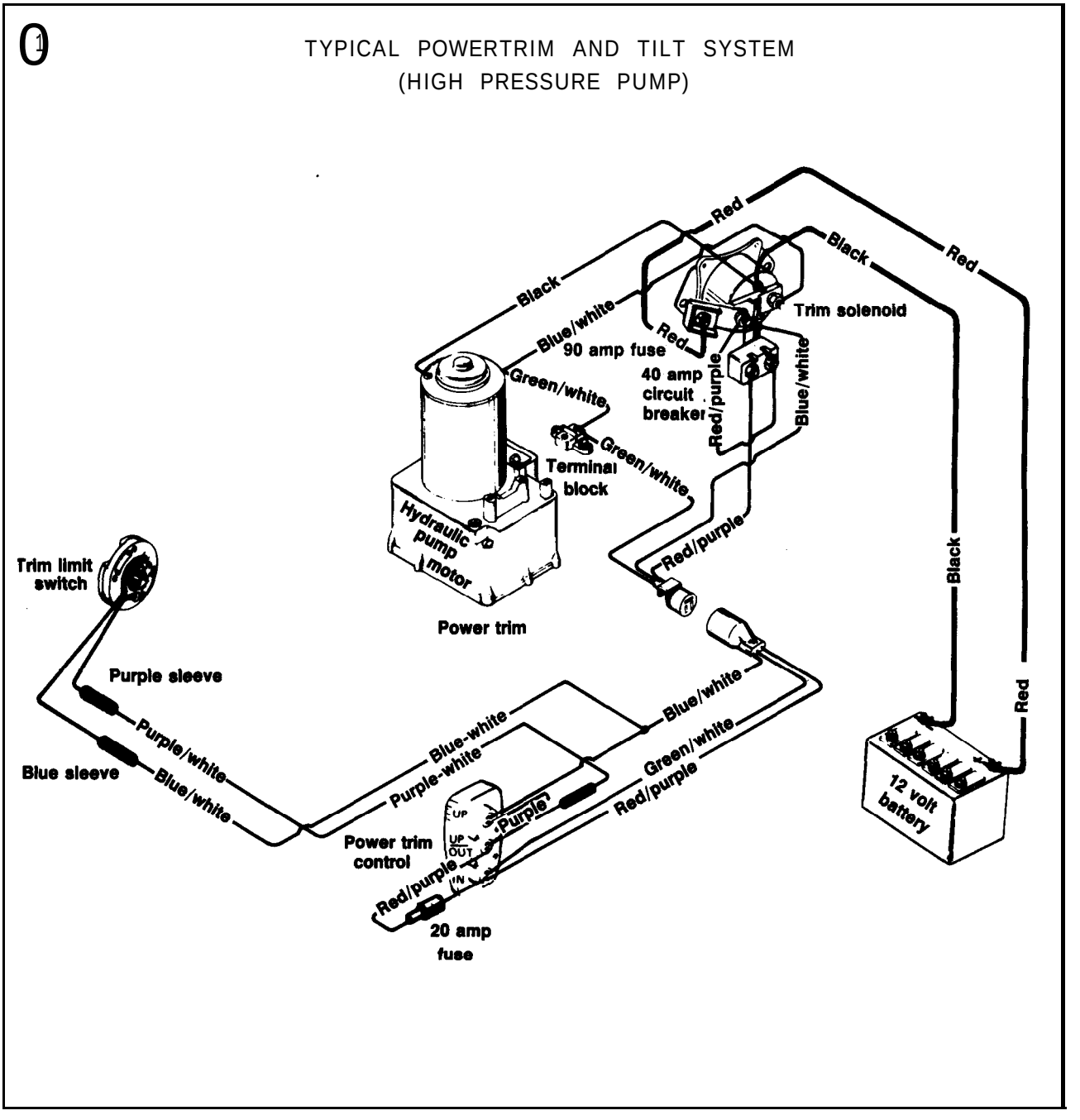
Single or dual solenoids may be used according to system application.

Single Solenoid System

A 3-button power trim panel control operates the single solenoid system shown in **Figure 1.** Battery current reaches the solenoid through the red lead, a 90-amp fuse, a 40-amp circuit breaker and the red/purple lead. Depressing the IN button routes current from the red/purple lead to the green/white wire, operating the pump in the down direction.

Depressing the UP/OUT button sends current from the red/purple extension lead through the purple/white lead to the trim limit switch. Current reaching the switch passes through the blue/white lead to the solenoid, where it travels to the trim motor through a larger blue/white lead. The trim motor can provide about 17" of trim before the trim limit switch opens and shuts off current to the pump.

Depressing the UP/OUT and UP switches at the same time allows the current to bypass the trim limit switch. It passes from the red extension lead to the blue/white wire and on to the solenoid to drive the unit to its full up position.



Dual Solenoid System

A dual solenoid trim pump is generally used when an in-handle trim control is required or when the harness length would cause an excessive voltage drop. The circuitry and its operation is similar **(Figure 3),** with one solenoid controlling the "up" function and the other operating the "down" function.

Pump Protection

In each system, a bi-metal switch built into the brush lead protects the pump motor from overheating. If the motor continues to operate after the cylinders are extended, the high amperage opens the circuit as soon as the brush lead temperature becomes excessive. Once the motor cools, the switch closes to allow normal operation.

Trim Limit/Trim Position Sender Switches

The trim limit (TL) switch is located on the left side of the gimbal housing. This switch permits only a limited amount of outward trim travel to provide safe control at high speeds and prevent damage to drive unit or trim cylinder due to lost side support of drive unit.

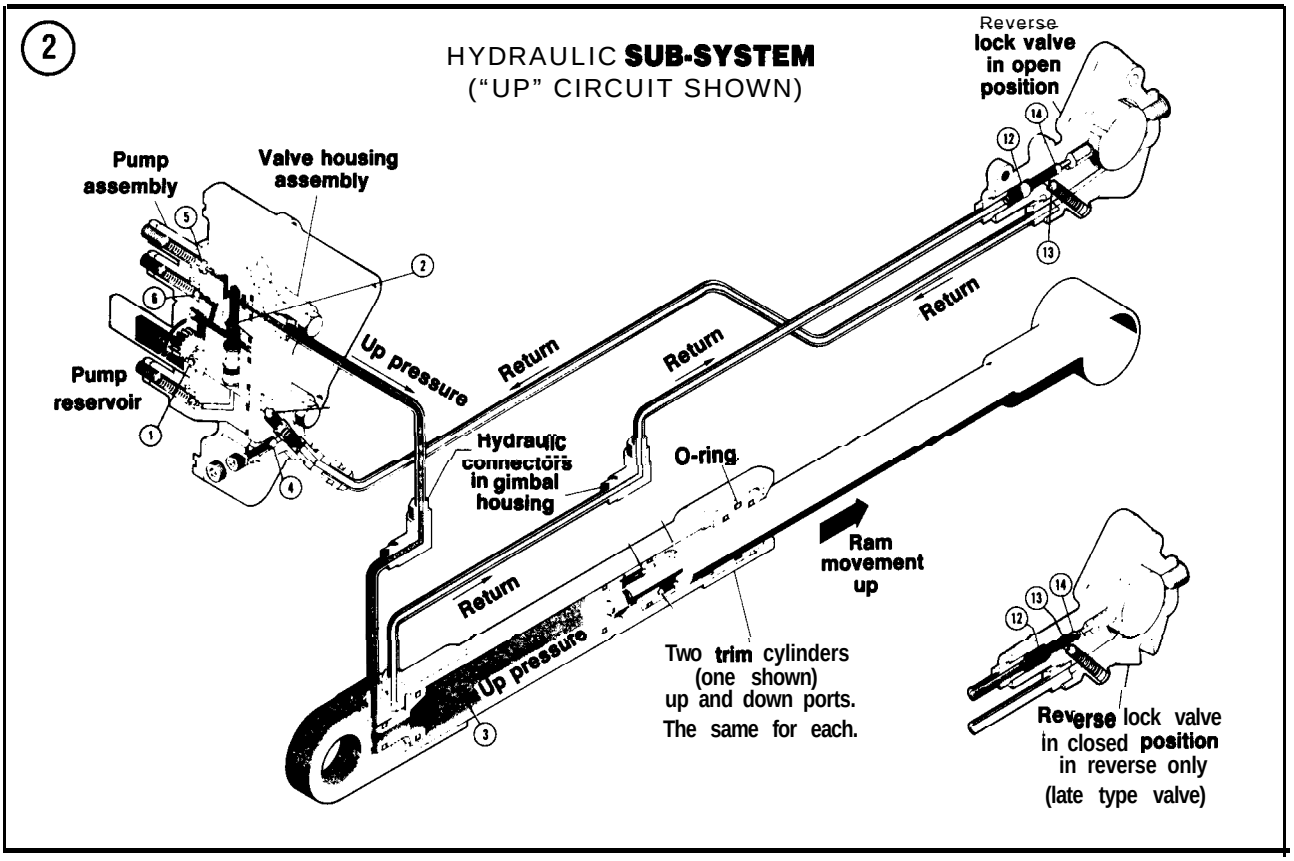
The trim position (TP) sender is installed on the opposite (starboard) side. If not equipped with a trim position gauge, an empty and unmarked housing is installed in place of the TP sender.

Trim Limit Switch Testing

1. Disconnect the trim limit switch bullet leads from the trim control harness inside the boat (see **Figure 1** or **Figure 3).**
2. Connect an ohmmeter to the switch bullet leads. Meter should show continuity with drive unit in down position.
3. Operate power trim and note meter reading. At about one-third trim travel, the switch should open and the meter should show no continuity.
4. If the switch does not perform as specified in Step 2 or Step 3, remove it from the gimbal ring. Repeat Step 2 and Step 3 while operating switch manually. The ohmmeter should show a lack of continuity twice in every 360" revolution when the switch is operated manually.
5. Replace the switch if it does not operate as specified.

Trim Position Sender Testing

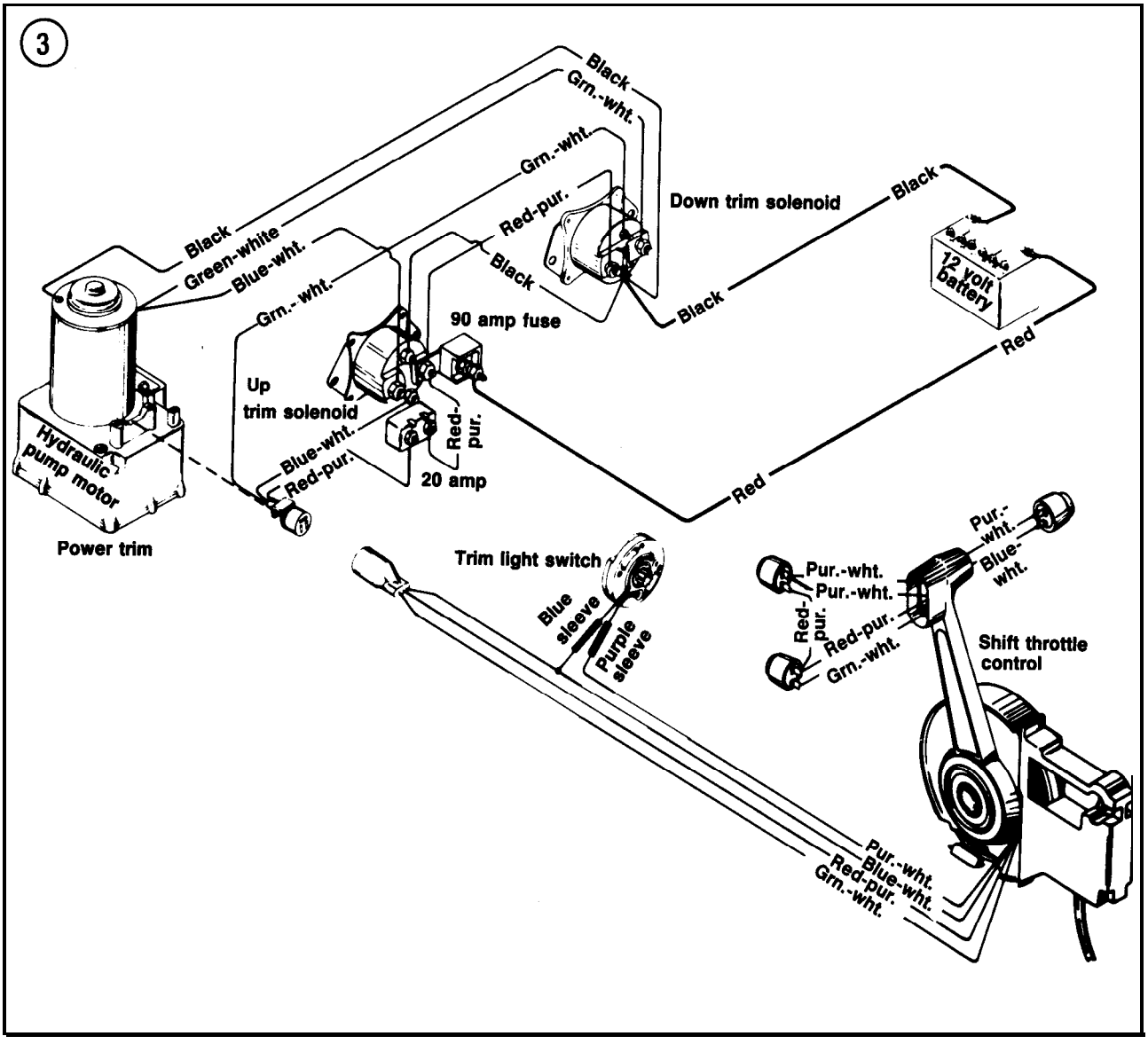
1. Disconnect the indicator leads from the terminal block on the harness plug bracket.
2. Connect an ohmmeter to the disconnected leads.
3. Start with the unit in a down position and trim through the total travel range, watching the meter. It should show a smooth progression from zero through 80 ohms (dual station sender) or 160 ohms (single station sender).
4. If the meter needle does not move or if it moves erratically, remove the sender and repeat the test. If erratic or no movement is still noted with the sender off the gimbal ring, replace the sender.

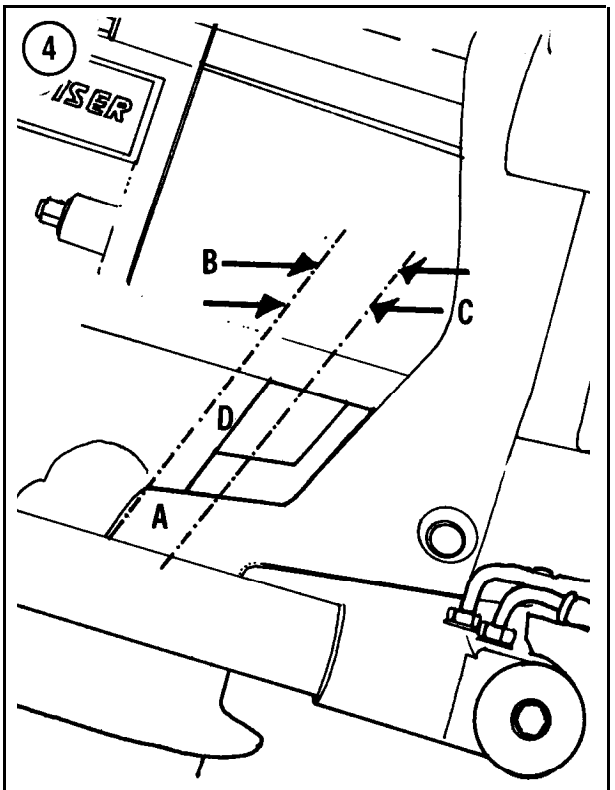


5. If the meter needle responds correctly with the sender unit removed, check the hinge pin while trimming the unit up and down. If there is no hinge pin movement, lubricate it with Anti-Corrosion Grease (part No. C-92-74048).

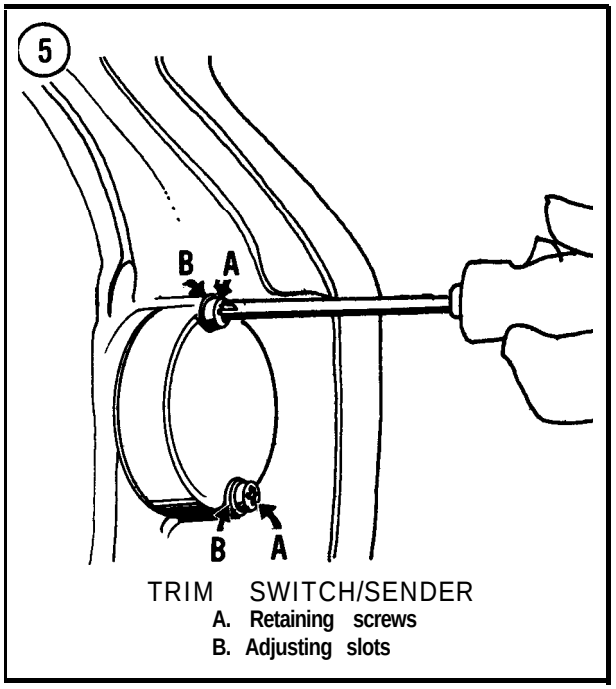
Trim Limit/Trim Position
Sender Switches Replacement

1. Remove 2 screws, lo&washers and retainers holding switch/sender to the gimbal ring. Remove the switch/sender.
2. Disconnect 2 wires from back of switch/sender unit.
3. Reconnect wires to back of new switch/sender. Tighten screws securely and fill grooves with Anti-Corrosion Lubricant (part No. C-92-74048). Be sure screws are completely covered.
4. Align slots on insulator with rear of housing assembly and install.
5. Align index on rotor with housing index. Install assembly on gimbal ring with bell housing in "down" position.
6. Install switch/sender attaching screws with lo&washers and retainers.
7. Reconnect leads inside boat.
8. Adjust switch/sender as described in this chapter.





TRIM LIMIT SWITCH ADJUSTMENT
A. Gimbal ring support boss
B. 3/4 inch
C. 1 inch
D. Drive shaft housing edge



TRIM SWITCH/SENDER
A. Retaining screws
B. Adjusting slots

Trim Limit Switch Adjustment

1. Trim the drive unit upward until the front edge of the drive shaft housing protrudes 3/4-1 in. into the gimbal ring support bosses. **See Figure 4.**
2. Disconnect switch bullet leads at harness inside boat. Connect an ohmmeter to disconnected leads.
3. Loosen trim limit switch retaining screws.
4. Watch ohmmeter and rotate switch housing in either direction until the switch circuit just opens.
5. Tighten retaining screws. Reconnect leads to harness inside boat.

Trim Position Sender Adjustment

1. Place drive unit in full "down" position.
2. Loosen trim position sender retaining screws. See **Figure 5.**
3. Turn ignition key to RUN.
4. Rotate sender housing in either direction until power trim gauge needle rests at bottom of green arc.
5. Tighten retaining screws. Recheck instrument reading and turn ignition key OFF.

Trim Indicator Gauge Testing

1. Check gauge terminals and connections for looseness or corrosion. Correct as required.
2. Disconnect leads at gauge terminals.
3. Connect a jumper lead between the red wire terminal on the ignition switch and the terminal marked "IGN" on the indicator gauge. The gauge needle should deflect beyond the red arc.
4. With jumper lead still in place, ground other gauge lead to gauge case. Needle should deflect back past the green arc slightly.
5. If needle does not react as specified in either Step 3 or Step 4, replace the gauge.

Dual Trim Test Sequence

The control box harness connectors must be disconnected and the key switch must be OFF for the following test procedures. The tests are given in the sequence of likely component failure. Make sure that the jumper lead is installed between terminals 3 and 5 only when specified. Refer to **Figure** 6 for this series of test procedures.

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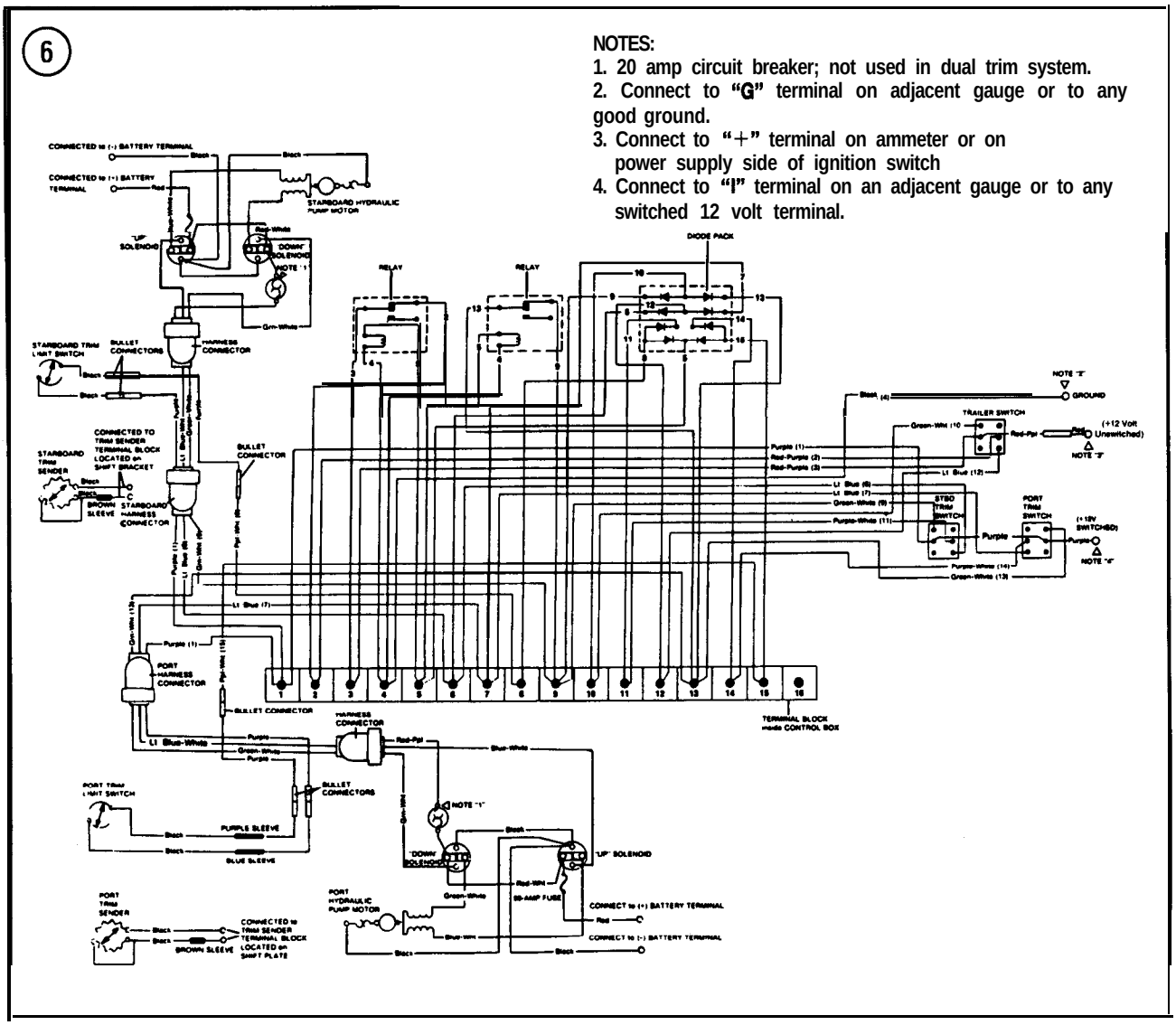
CAUTION

Control box terminals 2 and 3 carry 12 volts at all times. Exercise caution when testing in or near the area of these terminals, as a short could damage the control box or your test meter.



Relay No. 1 test

1. Connect a voltmeter between terminals 2 and 4. If voltmeter scale shows no reading, replace the relay.
2. Connect a jumper lead between terminals 3 and 5.
3. Repeat Step 1. Replace relay if voltage is shown.

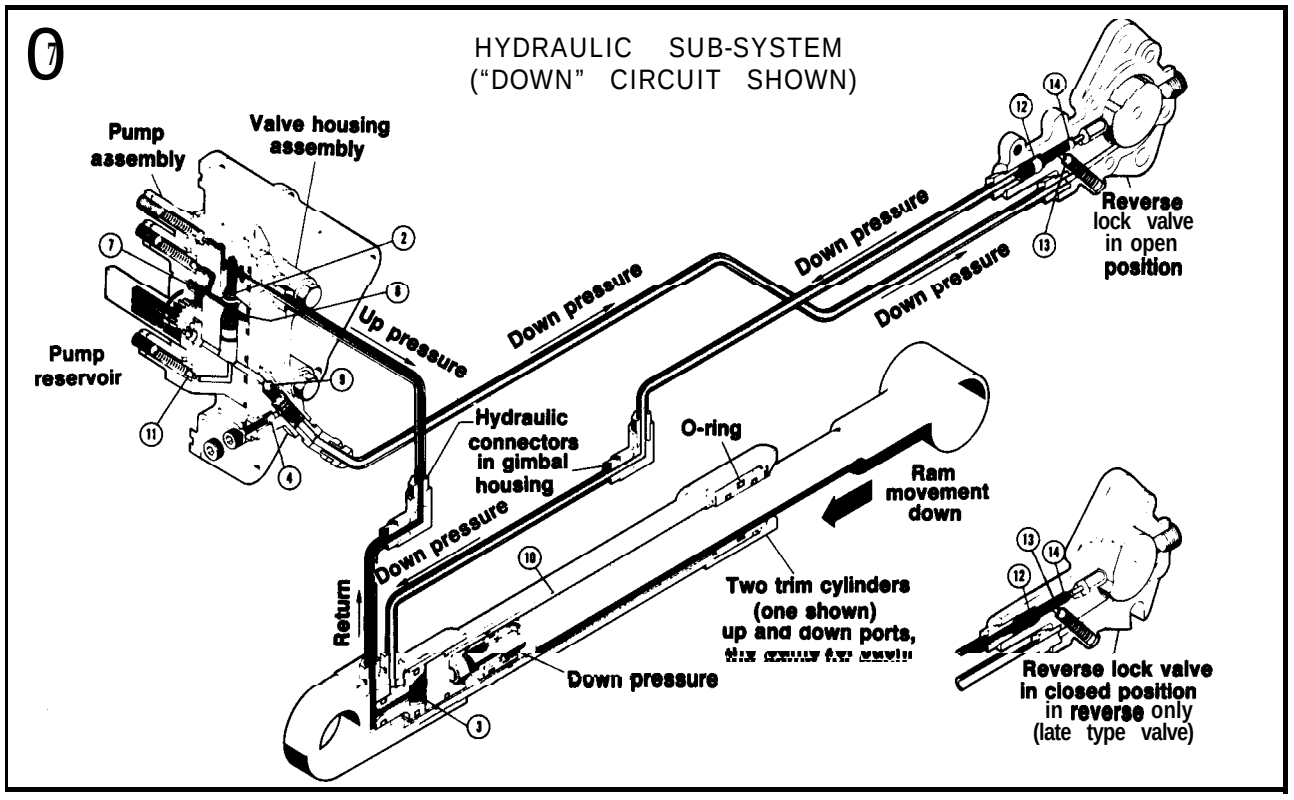
Relay No. 2 test

1. Connect an ohmmeter between terminals 9 and 13. If no continuity is shown, replace the relay.
2. Connect a jumper lead between terminals 3 and 5.
3. Repeat Step 1. Replace relay if continuity is shown.

Diode pack test

To test the diodes properly, set the ohmmeter on the RX 1 scale. Connect the ohmmeter leads to the terminals mentioned, note the reading, reverse the ohmmeter leads and note the second reading. If diode is good, ohmmeter will indicate high or infinite resistance (no needle movement) when connected one way and a low reading (less than 60 ohms) when connected the other. If both readings are high, diode is open; if both are low, diode is shorted. In either case, replace the diode pack.

1. Connect the jumper lead between terminals 3 and 5.
2. Test No. 1 diode at terminals 9 and 10.
3. Test No. 2 diode at terminals 10 and 13.



4. Disconnect the jumper lead from terminals 3 and 5.

CAUTION

Remove fuse from red/purple lead at this time to prevent the possibility of shorting either the control box or your test instrument.

5. Test No. 3 diode at terminals 6 and 12.
6. Test No. 4 diode at terminals 12 and 7.
7. Test No. 5 diode at terminals 8 and 11.
8. Test No. 6 diode at terminals 14 and 15.
9. Test No. 7 diode at terminals 8 and 15.
10. Test No. 8 diode at terminals 5 and 15.

NOTE

If any switch in the next 3 procedures fails any part of the tests, replace the complete switch/harness assembly, which includes the 3 switches and associated wiring.

Trailer Switch Testing

Remove the fuse before performing the following procedure.

1. Depress switch; there should be continuity between terminals 10 and 3.
2. Push switch up; there should be continuity between terminals 2 and 12.

Starboard Trim Switch Testing

1. Depress switch; there should be continuity between terminals 1 and 9.
2. Push switch up; there should be continuity between terminals 11 and 6.

Port Trim Switch Testing

1. Depress switch; there should be continuity between terminals 1 and 13.
2. Push switch up; there should be continuity between terminals 14 and 7.

HYDRAULIC SUBSYSTEM

When troubleshooting the hydraulic portion of the power trim/tilt system, an understanding of how the system operates does much to dispel any mystery about what's happening. If you know what is supposed to happen when you push the "up" or "down" button, you stand a better chance of locating the reason it is not happening. This brief description should help you understand the hydraulic portion of the power trim/tilt system.

Hydraulic "Up" Circuit

Figure 2 is a functional diagram of the hydraulic "up" circuit. When the power trim pump starts to trim in the upward direction, the pump gear draws fluid from check ball (1). Hydraulic pressure thus opens valve (2) and lets fluid move into the trim cylinder chambers (3). As the pressure created pushes the piston outward, fluid in the "down" side of the system is forced out of the cylinder. It passes through the reverse lock valve (4) and back to the pump reservoir.

Valve (5) is a safety backup valve that prevents excessive pressure in the "up" circuit when the pump is not running and valve (2) is closed. Valve (6) regulates the amount of pump pressure by opening once the drive unit is in its full up position, even if the pump continues to operate. Valve (2) is a check valve that prevents leak-back through the pump.

Hydraulic "Down" Circuit

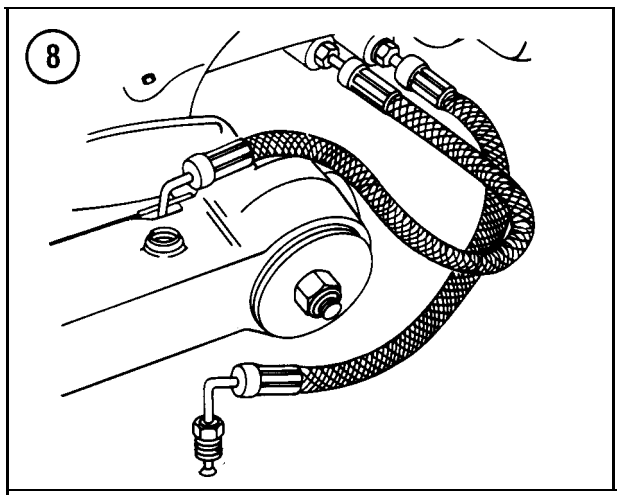
Figure 7 is a functional diagram of the "down" circuit. When the pump operates in the downward mode, the pump gear draws fluid from check ball (7). The hydraulic pressure thus created moves slide valve (8) which unseats check ball (2) and lets fluid return. Pressure moves through (9) to the reverse lock valve-and then to the trim cylinders.

Reaching the cylinders, the fluid moves between the double walls (10) and into the inner cylinder on the "down" side of the piston. As the piston moves inward, fluid on the "up" side of the cylinder is forced back to the pump and through valve (2) which is kept open by (8). Any excess fluid passes through valves (4) or (11) to the pump reservoir. Valve (11) serves the same function in the "down" circuit as valve (5) in the "up" circuit; it's a backup safety valve.

Reverse Lock Valve

Shifting the stern drive into reverse gear causes propeller thrust to close off the normally-open valve (14). This prevents any upward travel of the drive unit. Valve (13) is a bypass that permits trimming the drive unit while in reverse gear on 1977 and later units. Previous systems used an interlock switch which prevented the pump from running in the "up" direction with the stem drive unit in reverse.

Shock piston assembly (15) and floating piston (16) are designed to separate in case the drive unit strikes a submerged object. The speed at which the drive unit strikes the object determines the manner in which they separate, but whether the blow is a light pressure or a considerable force, the piston separation is designed to cushion the shock to the drive unit as much as possible.



Hydraulic Trim Pump
Removal/Installation

A variety of trim pump designs have been used in MerCruiser installations over the years. Trim pump malfunctions may be either hydraulic or electrical in nature. It is best to remove the trim pump and take it to your dealer or a qualified marine shop for disassembly and testing.

1. Place the drive unit in its full "down" position.
2. Disconnect the trim pump leads at the battery. Remove the other end of the black wire from the solenoid and the red wire from the fuse.
3. Disconnect the trim control harness at the trim pump.
4. Disconnect the hydraulic lines at the bottom of the pump. Cap the fittings and plug the hoses to prevent leakage.

5A. V6 and V8 installation-Remove pump from mounting bracket.

5B. Inline installation-Remove pump from transom plate.

6. Installation is the reverse of removal.

Trim Cylinder
Removal/Installation

1. Disconnect hydraulic lines at the front of the trim cylinder. **See Figure** 8. Cap the fittings and plug the lines to prevent leakage.

2. Remove the fore and aft anchor pin nuts. Remove trim cylinder. Place spiral springs, continuity springs, washer and rubber bushings in a container for reassembly.
3. Installation is the reverse of removal.

Trim Cylinder Disassembly

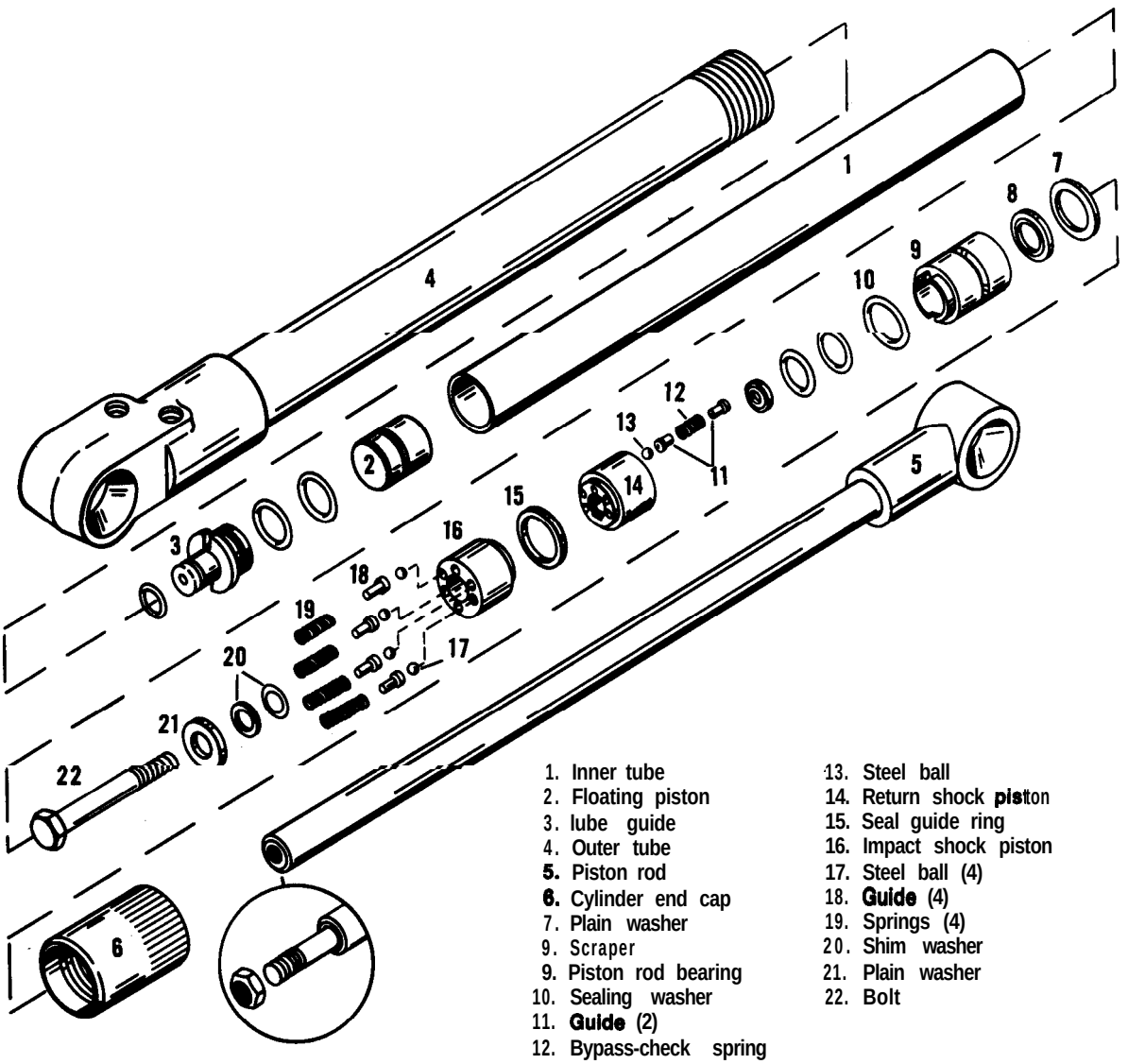
Refer to **Figure** 9 for this procedure.
1. Hold cylinder ports over a suitable container while extending and retracting the piston rod by hand several times to expel oil from-the cylinder..
2. Clamp piston rod in a vise with protective jaws as close as possible to the pivot end.

NOTE

If pivot end is tight in Step 3, apply heat with the piston rod extended. Use care not to overheat the cylinder.

3. Insert a suitable metal bar through the pivot eye and rotate it counterclockwise to loosen and remove the pivot eye.

9 POWER TRIM CYLINDER



1. Inner tube
2. Floating piston
3. lube guide
4. Outer tube
5. Piston rod
6. Cylinder end cap
7. Plain washer
9. Scraper
9. Piston rod bearing
10. Sealing washer
11. Guide (2)
12. Bypass-check spring
13. Steel ball
14. Return shock piston
15. Seal guide ring
16. Impact shock piston
17. Steel ball (4)
18. Guide (4)
19. Springs (4)
20. Shim washer
21. Plain washer
22. Bolt

4. Turn end cap counterclockwise with a pipe wrench and remove from cylinder.
5. Pull piston rod and components from cylinder.

NOTE

***If** tube guide remains in outer tube in Step 6, tap end of tube against a block of wood or use a wire hook to remove it.*

6. Remove inner tube, floating piston and tube guide.
7. Clamp piston rod in a vise with protective jaws as close as possible to pivot end. Remove bolt holding piston assembly.
8. Remove piston assembly from piston rod, keeping all parts of piston in relative position. Pay particular attention to the seal washer between the piston and piston rod.

NOTE

***Mercury Marine does not recommend** disassembly of the shock pistons. **If** they are disassembled, however, each spring, brass shim and check ball must be installed in its original hole in the piston.*

9. Remove piston rod bearing, scraper, plain washer and end cap from piston rod.
10. Clean all parts with solvent and blow dry with low-pressure compressed air.

Trim Cylinder Assembly

Refer to **Figure** 9 for this procedure.

1. Insert floating piston and tube guide into the inner tube. The flat diameter of the floating piston should face toward the tube guide.
2. Insert the inner tube into the outer tube.
3. Install the end cap, plain washer, scraper and piston rod bearing on the piston rod in that order. The O-rings must be in position on the piston rod bearing and the rubber seal in position over the metal scraper.
4. Check shock pistons to make certain all parts are intact. The impact piston with the male embossment should contain 4 check balls.
5. Clamp piston rod in a vise with protective jaws as close as possible to the pivot end (not on threads).
6. Wipe piston assembly bolt threads with Loctite and install with impact piston away from the piston rod and sealing washer *toward* piston rod. Tighten bolt to 20 ft.-lb.
7. Insert piston rod assembly into inner tube. Fit piston rod bearing into outer tube.
8. Wipe outer tube threads with Perfect Seal (part No. C-92-34277) and install end cap. Tighten cap to 35-45 ft.-lb.
9. Clamp trim cylinder in a vise with protective jaws as close as possible to the pivot end. Wipe pivot end threads with Loctite and install. Tighten to 25-30 ft.-lb.
10. Clean exterior of cylinder and paint any scratched areas to protect exposed metal.
11. Submerge front end of trim cylinder in a container of clean SAE 10W-30 or SAE 10W-40 engine oil. Extend and retract piston rod several times to partially fill cylinder with oil.
12. Wipe excess oil off cylinder and reinstall to front anchor pin.
13. Bleed system as described in this chapter.

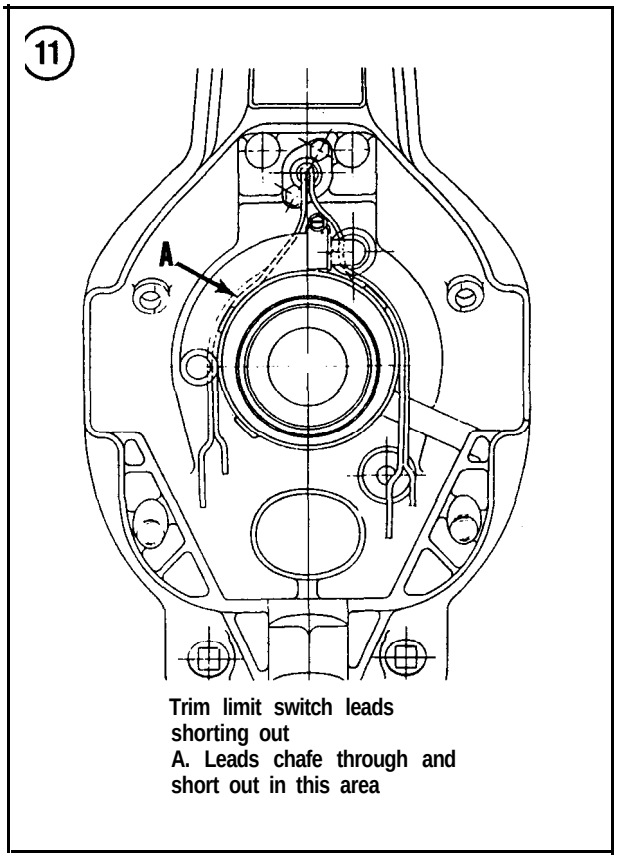
Bleeding Trim System

1. Clean any dirt away from the trim pump fill plug hole. Remove the fill plug **(Figure 10)** and fill pump reservoir to bottom of plug holes with clean SAE 10W-30 or SAE 10W-40 engine oil.

NOTE

Keep an eye on the oil level in the trim pump reservoir during bleeding. If the fluid level is allowed to drop too low, air will enter the system and the entire bleeding process will have to be repeated.

2. With trim lines disconnected and aft end of trim cylinder disconnected from anchor pin, run trim pump in the "up" direction until a solid stream of oil flows from the lines.



Trim limit switch leads shorting out
A. Leads chafe through and short out in this area

3. Repeat Step 2 with the trim pump in the "down" direction.
4. Retract trim cylinder piston rods. Connect "up" lines and refill pump reservoir. Let cylinders hang in vertical position.
5. Cover "down" ports of cylinders with a rag and run pump in the "up" direction until the piston rods are fully extended.
6. Disconnect the "up" lines and momentarily run pump in "down" direction to expel any air from "down" lines. Reconnect "down" lines to cylinders.
7. Refill pump reservoir and run pump in the "down" direction until the piston rods are fully retracted.
8. Momentarily run pump in the "up" direction to expel any air from the "up" lines.
9. Connect the **"up"** lines to the cylinders and refill the pump reservoir.
10. Run pump in "up" and "down" directions several times while fully extending and retracting the piston rods several times.
11. Install aft end of cylinders to anchor pins.
12. Check pump reservoir level. Add oil, if required, and install fill screw tightly.

Bleeding hydraulic trim indicator sender system

Some early MerCruiser models were equipped with a hydraulic trim indicator sender. This should be bled as follows:
1. Remove the bleed screw farthest from the hydraulic sender output shaft.
2. Momentarily depress the DOWN or IN button, then let it up. Repeat this step until the oil flowing from the bleed screw hole is free of air bubbles, then reinstall the bleed screw securely.
3. Remove the bleed screw nearest the hydraulic sender output shaft.
4. Momentarily depress the UP button, then let it up. Repeat this step until the oil flowing from the bleed screw hole is free of air bubbles, then reinstall the bleed screw.
5. Check the fluid level in the trim pump. Top up as required.

LOW-PRESSURE PUMP SYSTEM

MerCruiser stern drives with transom serial numbers as follows are equipped with the low-pressure pump system:
a. MCM 120R through MCM 260R models-Serial No. 6216687 and above.
b. MCM TR and TRS models-Serial No. 6037486 and above.

Prestolite and Oildyne pumps are used interchangeably in production installations. Both types of pumps share the same internal valving, oil flow and pressure specifications.

CAUTION
Differences in internal valving prevent a low-pressure pump from interchanging with an earlier high-pressure pump. Use of an incorrect trim pump will affect trim operation and can damage the trim system.

Trim Switch Leads Shorting Out

Owners of MCM 120 through 300R and MR models with transom assemblies below serial No. OA354131 may encounter a problem with the power trim pump 20 amp fuse. If it blows out when trimming "Out/Up", the trim limit switch leads are probably shorting out due to chafed insulation allowing the conductor to contact the gimbal housing and short out in the area shown in **Figure 11.** If this is the cause of the problem, replace the trim limit switch with part No. 99122A3 (includes harness part No. 84-99279-2) and route the leads as shown in **Figure 12.**

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Trim System Bleeding

The trim system is self-purging when the drive unit is raised and lowered 6- 10 times after filling with SAE 10W-30 or SAE 20W-40 engine oil. However, the system should be bled whenever a rebuilt trim cylinder is installed. Use the bleeding procedure provided in the ***High-pressure Pump System*** section of this chapter.

Electrical Troubleshooting

Whenever a problem develops in the low-pressure power trim system, the initial step is to determine whether the problem is in the electrical or hydraulic system. Electrical tests are given below. If the problem appears to be in the hydraulic system and cannot be corrected by bleeding the system, refer it to a dealer or qualified specialist for necessary service.

Before troubleshooting any electrical circuit:

1. Make sure the plug-in connectors are properly engaged and that all terminals and wires are free of corrosion. Clean and tighten as required.
2. Make sure the battery is fully charged. Charge or replace as required.

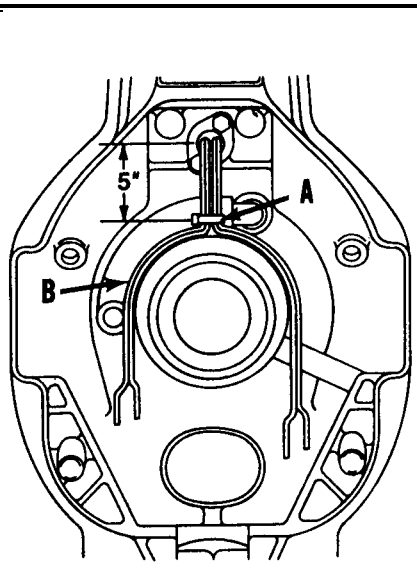
All circuits inoperative; solenoids do not click

NOTE

If 20 amp fuse blows while trimming "Out/In," check for shorted trim switch leads as described in this chapter.

Refer to **Figure 13** for this procedure.

1. Check 20 amp and 110 amp fuses. If one or both fuses are blown, locate and correct cause before replacing fuse(s).
2. Disconnect the trim limit switch leads at points 14- 17, **Figure 13.** Depress TRAILER switch . If drive unit can be raised, the trim limit switch or leads are grounded.
3. Clean and/or tighten connections at points 1, 2, 4, 10, 11 and 12 in **Figure 13.**
4. Separate connector (point 13, **Figure 13).** Clean as required and reconnect.
5. Connect a voltmeter between point 4 and ground. If no voltage is shown, repeat Step 1.
6. Connect a voltmeter between point 8 and ground. Depress the OUT/UP button. Move the red voltmeter lead to point 6 and depress the IN/DOWN button. If no voltage is shown at one or both test points, check the trim control for a loose/corroded connection or a damaged power supply lead in the harness.



Trim limit switch lead routing
A. Sta-strap 61990
B. Route leads on front side of hose (as viewed from rear)

All circuits inoperative; solenoids click

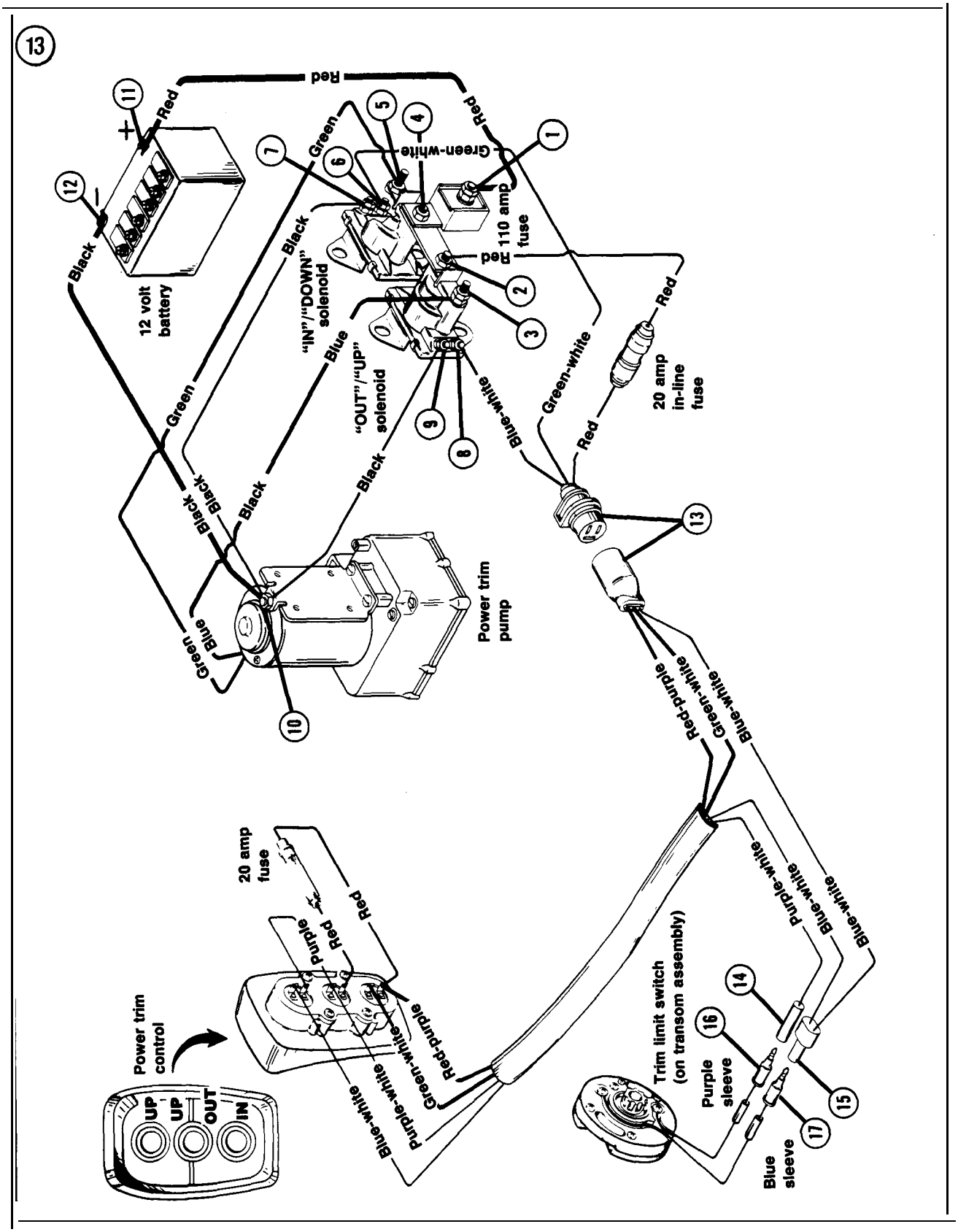
Refer to **Figure 13** for this procedure.

1. Connect a voltmeter between point 5 and ground. Depress the IN/DOWN button. Move the red voltmeter lead to point 3 and depress the OUT/UP button. If no voltage is shown at one or both test points, check connections at points 2, 3, 4 and 5. If connections are good, replace the solenoids.
2. Disconnect the blue/white lead at the solenoid terminal point 8. Depress the IN/DOWN button. If pump motor operates, there is a short in the wire harness. Repair or replace harness as required.

DOWN circuit inoperative; IN/DOWN solenoid does not click (UP circuit good)

Refer to **Figure 13** for this procedure.

1. Check connections at point 6 and point 7. Clean and/or tighten if necessary.


13
11
Red
Red
Red
5
4
Green-white
1
12
+
−
7
Green
6
Black
Black
12 volt battery
"IN"/"DOWN" solenoid
110 amp fuse
Red
2
3
"OUT"/"UP" solenoid
Blue
Green
Black
Black
Black
9
8
Blue-white
Green-white
Red
Red
20 amp in-line fuse
Black
Blue
Green
10
Power trim pump
13
Red-purple
Green-white
Blue-white
20 amp fuse
Red
Red
Purple
Power trim control
UP
UP
OUT
IN
Green-white
Red-purple
Purple
Blue-white
Blue-white
Purple-white
Blue-white
Trim limit switch (on transom assembly)
14
16
Purple sleeve
15
17
Blue sleeve

2. Connect a voltmeter between point 6 and ground. Depress the IN/DOWN button. If no voltage is shown, check the IN/DOWN circuit for a loose/corroded connection or a damaged IN/DOWN circuit lead. If the connections and leads are good, test the trim switch continuity. If satisfactory, replace the IN/DOWN solenoid.

DOWN circuit inoperative;
IN/DOWN solenoid clicks
(UP circuit good)

Refer to **Figure 13** for this procedure.
1. Check connections at point 4 and point 5. Clean and/or tighten if necessary.
2. Connect a voltmeter between point 5 and ground. Depress the IN/DOWN button. If no voltage is shown, replace the IN/DOWN solenoid.

UP circuit inoperative;
OUT/UP solenoid does not click;
TRIM and TRAILER switches inoperative
(DOWN circuit good)

Refer to **Figure 13** for this procedure.
1. Check connections at point 8 and point 9. Clean and/or tighten if necessary.
2. Connect a voltmeter between point 8 and ground. Depress the OUT/UP button. If no voltage is shown, check the OUT/UP circuit for a loose/corroded connection or a damaged OUT/UP circuit lead. If the connections and leads are good, test the trim switch continuity. If satisfactory, replace the OUT/UP solenoid.

UP circuit inoperative;
IN/DOWN solenoid clicks;
TRIM and TRAILER switches inoperative
(DOWN circuit good)

Refer to **Figure 13** for this procedure.
1. Check connections at point 2 and point 3. Clean and/or tighten if necessary.
2. Connect a voltmeter between point 3 and ground. Depress the OUT/UP button. If no voltage is shown, replace the OUT/UP solenoid.

OUT/UP trim switch inoperative
(TRAILER switch good)

Refer to **Figure 13** for this procedure.
1. Clean and tighten connections at points 14, 15, 16 and 17 as necessary.
2. Disconnect trim limit switch leads at trim harness. Connect an ohmmeter between lead 16 and lead 17. With drive unit in full IN/DOWN position, the meter should show continuity. If not, check for poor connections or damaged leads. If connections and leads are good, replace the trim limit switch.

TRAILER switch inoperative
(OUT/UP trim switch good)

1. Check trailer switch with an ohmmeter. It should show continuity when switch is depressed and no continuity when switch is at rest.
2. If switch is good, check for loose/corroded connections or a damaged trailer circuit lead.

Trim system functions while unattended

1. Check trim pump harness and trim control harness for a short circuit. Repair or replace as required.
2. If harness circuits are good, check the TRIM and TRAILER switches with an ohmmeter. Each switch should show continuity when depressed and no continuity when switch is at rest. Replace switch as required.

AUTO TRIM SYSTEM

The Met-Cruiser Auto Trim system was introduced on 1985 260R and 260MR models as a factory-installed option from the boat manufacturer.

Auto trim automatically adjusts the drive unit trim angle relative to engine speed. Once the boat is on plane, the Auto Trim system then trims out to a preset position that maximizes performance.

The system consists of an auto trim pump (same as used on standard power trim models), a solid-state control module, a 2-position mode switch which allows the operator to select manual or auto trim, a manual trim, control, trim limit switch and a 3-button control panel or remote control panel control.

The Auto Trim electrical system is protected by a 110 amp fuse on the pump, a 20 amp in-line fuse at the control module positive battery lead, and a 20 amp in-line fuse at the ignition switch (if switch is a Quicksilver product). If the boat is equipped with the 3-button control panel, a 20 amp in-line fuse is also located at the panel.

Trim Limit Switch Adjustment

The amount of "out" trim capability is controlled by the trim switch. Proper switch adjustment requires the help of an assistant. If trim limit switch requires adjustment, take the following precautions:

a. Use extreme caution not to start the engine.
b. Make sure no one is near the propeller area.
c. Do not place hands where they can be injured by drive unit movement.

CA UTION

Trim switch adjustment must be made exactly as described in the following procedure. If switch adjustment is incorrect, the drive unit can move out beyond the gimbal ring support flanges during the test run. If this happens, the drive unit may be severely damaged.

1. Make sure the drive unit is in its full IN position.
2. Loosen the trim switch retaining screws. Rotate switch clockwise to the end of the slots.
3. Place Auto Trim mode switch in MANUAL position and turn ignition key to RUN.
4. Have assistant operate manual trim control switch (do not use TRAILER switch) to trim drive unit OUT while you slowly turn the trim limit switch counterclockwise until trim cylinders extend 6 1/4-6 3/4 in. (measured from cylinder end cap to centerline of pivot end nut). At this point, retighten the trim switch retaining screws.
5. Turn the ignition to OFF. Test your adjustment by running the boat along a smooth stretch of water and trim the boat with the manual trim control until maximum performance is obtained.
6. Once the best trim angle has been found, stop the engine without changing the drive unit trim angle. Measure the distance between the trim cylinder end cap and pivot end (same measurement as made in Step 4).
7. Repeat Step 1 and Step 2.
8. With Auto Trim switch in MANUAL position, turn ignition key to RUN.
9. Have assistant operate manual trim control switch to trim drive unit out while you slowly turn the trim limit switch counterclockwise until trim cylinders extend to the dimension measured in Step 4. At this point, retighten the trim switch retaining screws.

WARNING

Adjusting the drive unit too far "out" can result in handling difficulties and loss of operational control. Perform Step IO with caution and if difficulties arise, move the drive trim angle "in" enough to eliminate the problem.

10. Turn ignition switch to OFF. Test your adjustment by running the boat along a smooth stretch of water with the Auto Trim switch in AUTO position. Run boat at various speeds, through turns with varying water and load conditions. If not satisfied with boat performance, repeat the procedure.

Trim Position Indicator Adjustment

Place the ignition key in the RUN mode and check the Auto Trim indicator gauge. The needle should rest at the bottom of the scale when the drive unit is fully "in." If not, adjust as follows:

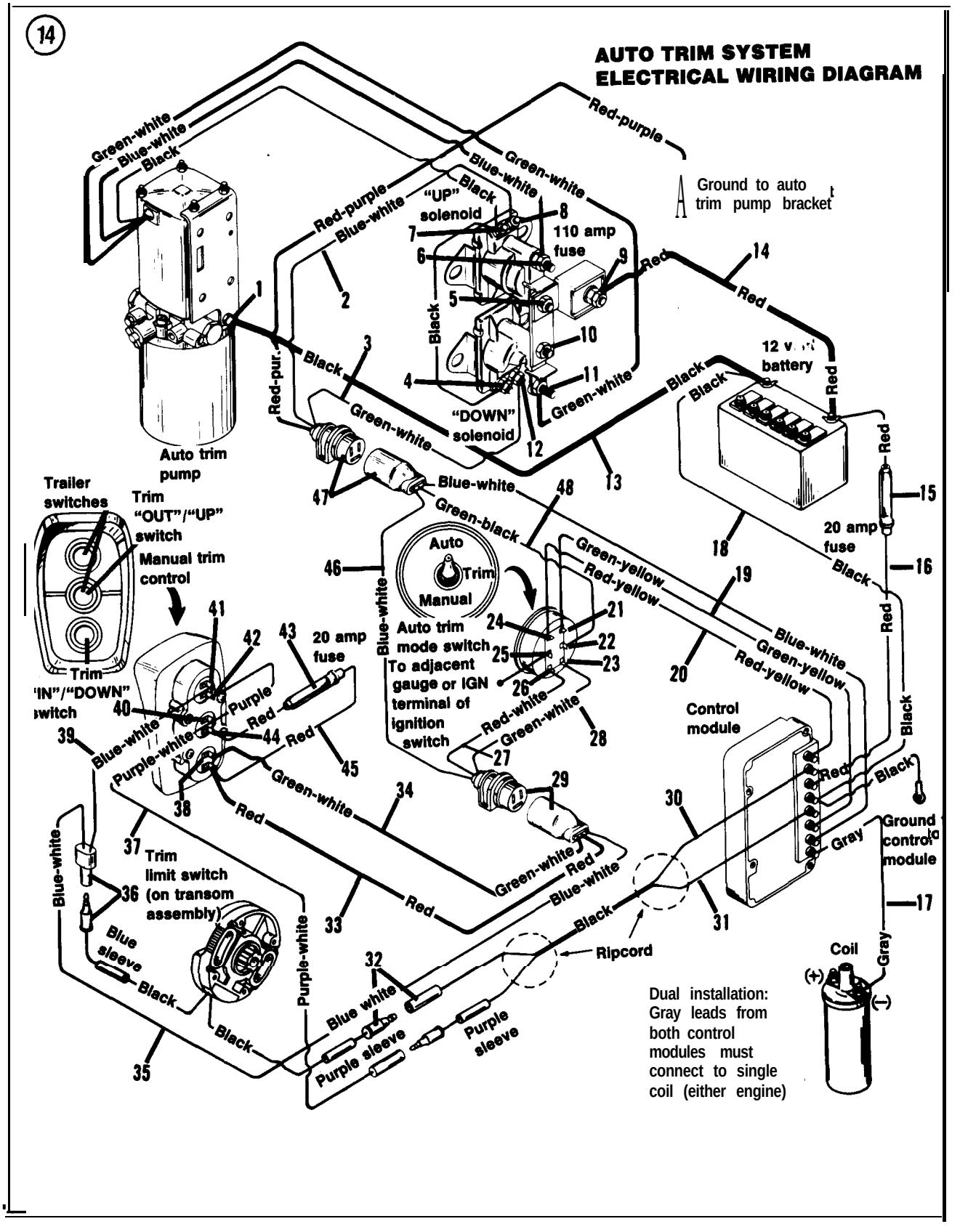
1. Turn ignition key to RUN.
2. Loosen trim position sender retaining screws.
3. Rotate sender as required to position needle at bottom of gauge scale.
4. Tighten sender retaining screws securely. Recheck instrument reading and turn ignition key to OFF.

Electrical System Troubleshooting

Refer to **Figure 14** for all of the following procedures.

All circuits inoperative in manual and auto modes (solenoids do not click)

1. Check cable at point 13 for a loose/corroded connection or damaged leads. Correct as required.
2. Disconnect connector plugs at point 47. Clean as required and reconnect snugly.
3. Connect a jumper lead between point 1 and point 7. If pump operates, internal circuit breaker is faulty. Replace the pump.
4. Place ignition switch in RUN position. Move mode switch to MANUAL. Connect a voltmeter between point 8 and ground. Depress the UP switch. If no voltage is shown, complete this step and move to Step 5. Move the red voltmeter lead to point 12 and depress the DOWN switch. If no voltage is shown, proceed with Step 6.
5. Connect the voltmeter between point 25 and ground. If no voltage is shown, check for a poor connection in the power lead.


14
AUTO TRIM SYSTEM
ELECTRICAL WIRING DIAGRAM
Ground to auto trim pump bracket
Green-white
Blue-white
Black
Red-purple
"UP" solenoid
110 amp fuse
"DOWN" solenoid
Red
12 volt battery
Auto trim pump
Trailer switches
Trim "OUT"/"UP" switch
Manual trim control
Trim "IN"/"DOWN" switch
20 amp fuse
Auto
Trim
Manual
Auto trim mode switch
To adjacent gauge or IGN terminal of ignition switch
Green-black
Green-yellow
Red-yellow
Red-white
Purple
Purple-white
Control module
Trim limit switch (on transom assembly)
Blue sleeve
Purple-white
Blue white
Purple sleeve
Ripcord
Gray
Ground control module
Coil
(+)
(-)
Dual installation: Gray leads from both control modules must connect to single coil (either engine)

6. Connect the voltmeter between point 26 and ground (mode switch in MANUAL). Move mode switch to AUTO position and connect the voltmeter between point 24 and ground. If no voltage is shown at one or both connections, replace the mode switch.

All circuits inoperative in manual and auto modes (both solenoids click)

1. Check cable at point 14 for a loose/corroded connection or damaged leads. Correct as required.
2. Connect a voltmeter between point 5 and ground. If no voltage is shown, the 110 amp fuse is blown or the solenoid connection is loose or corroded.
3. Disconnect the blue/white lead at point 8. If pump motor now runs in the DOWN direction, there is a short in the trim harness. Repair or replace harness as required.

DOWN circuit inoperative in manual and auto modes; UP circuit good DOWN solenoid does not click)

1. Check connections at points 4, 7 and 12 for damaged leads or a loose/corroded connection. Correct as required.
2. Connect a voltmeter between point 12 and ground. Depress the DOWN switch (MANUAL mode). If no voltage is shown, repeat this step at point 22 and then at point 23.
   a. If there is voltage at point 23 but not at point 22, replace the mode switch.
   b. If there is voltage at point 22, check leads at point 3 and point 48, and the connector at point 47 for an open in the DOWN circuit.
   c. If there is no open in the DOWN circuit, replace the DOWN solenoid.

DOWN circuit inoperative in manual and auto modes; UP circuit good (DOWN solenoid clicks)

1. Check connections at point 10 and point 11 for damaged leads or a loose/corroded connection. Correct as required.
2. Connect a voltmeter between point 11 and ground. Depress the DOWN switch (MANUAL mode). If no voltage is shown, replace the DOWN solenoid.

UP circuit inoperative in manual and auto modes; DOWN circuit good (UP solenoid clicks)

1. Check connections at point 5 and point 6 for damaged leads or a loose/corroded connection. Correct as required.
2. Connect a voltmeter between point 6 and ground. Depress the UP switch (MANUAL mode). If no voltage is shown, replace the UP solenoid.

Pump motor continues running DOWN in auto mode until internal timer shuts it off (UP/OUT and TRAILER switches inoperative in manual mode)

1. Check connections at point 7 and point 8 for damaged leads or a loose/corroded connection. Correct as required.
2. Connect a voltmeter between point 8 and ground. Depress the UP switch (MANUAL mode).
   a. If voltage is shown, replace the solenoid.
   b. If no voltage is shown, continue testing.
3. Check connections at point 32 and point 36 for damaged leads or a loose/corroded connection. Correct as required.
4. Disconnect the trim limit switch leads at point 32 and point 36. Connect an ohmmeter between the disconnected leads. If continuity is not shown with the drive unit in the DOWN position, readjust or replace the switch as required.
5. If continuity is shown in Step 4, check leads 30, 35, 46 and 2 for damage or a loose/corroded connection. Correct as required.
6. If the problem has not been located at this time, replace the control module.

All circuits inoperative in auto mode (manual mode good)

1. Check the 20 amp control module fuse at point 15 to make sure it is good. If not, locate and correct cause before installing another fuse.
2. Check cables 16 and 18 and lead 20 for damage or a loose/corroded connection. Correct as required.
3. With the switch in AUTO, connect a voltmeter between point 24 and ground, then between point 25 and ground. If voltage is shown at point 25 but not at point 24, replace the mode switch.
4. If no voltage is shown in Step 3, replace the control module.

UP circuit inoperative in auto mode (manual mode good)

1. Check lead 17 for damage or loose/corroded connections. Correct as required.
2. If lead 17 is good, replace the control module.

DOWN circuit inoperative in auto mode (manual mode good)

1. Connect a voltmeter between point 21 and ground while turning the ignition switch to RUN (AUTO mode). Repeat this step at point 22.
2. If voltage is shown at point 21 but not at point 22, replace the mode switch.
3. Check lead 19 for damage or loose/corroded connections. Correct as required.
4. If lead is good in Step 3, replace the control module.

All circuits inoperative in manual mode (auto mode good)

1. Connect a voltmeter between point 26 and ground (MANUAL mode). If no voltage is shown, replace the mode switch.
2. Check lead 27 and lead 33 for damage or loose/corroded connections. Correct as required.

DOWN circuit inoperative in manual mode (UP/OUT and TRAILER switches good in auto mode)

1. Connect a voltmeter between point 38 and ground. Depress the DOWN switch (MANUAL mode). If no voltage is shown, replace the manual trim control DOWN switch.
2. Connect a voltmeter between point 23 and ground. Depress the DOWN switch (MANUAL mode). If no voltage is shown, check lead 28 and lead 34 for damage or a loose/corroded connection. Correct as required.
3. If leads are good in Step 2, connect the voltmeter between point 22 and ground. Depress the DOWN switch. If no voltage is shown, replace the mode switch.

UP/OUT and TRAILER switches inoperative in manual mode (DOWN switch good and auto mode functions good)

1. Check the 20 amp trim control fuse at point 43 to make sure it is good. If not, locate and correct cause before installing another fuse.
2. Connect a voltmeter between point 44 and ground. If no voltage is shown, check lead 45 for damage or a loose/corroded connection. Correct as required.
3. Connect the voltmeter between point 40 and ground. Depress the UP/OUT switch. If no voltage is shown, replace the switch.

UP/OUT switch inoperative in manual mode (TRAILER switch good and auto mode functions good)

1. Connect a voltmeter between the switch output terminal and ground. Depress the UP/OUT switch. If no voltage is shown, replace the switch.
2. Check lead 31 and lead 37 for damage or loose/corroded connections. Correct as required.
3. If leads are good in Step 2, replace the control module.

TRAILER switch inoperative in manual mode (UP/OUT switch is good)

1. Connect a voltmeter between point 41 and ground. Depress the TRAILER switch. Repeat this step at point 42.
2. If voltage is shown at point 42 but not at point 41, replace the TRAILER switch.
3. If no voltage is shown at point 42, check for an open in the power supply lead.
4. If lead is good in Step 3, check lead 39 for damage or a loose/corroded connection.