

Chapter Fourteen

MerCruiser Drive System

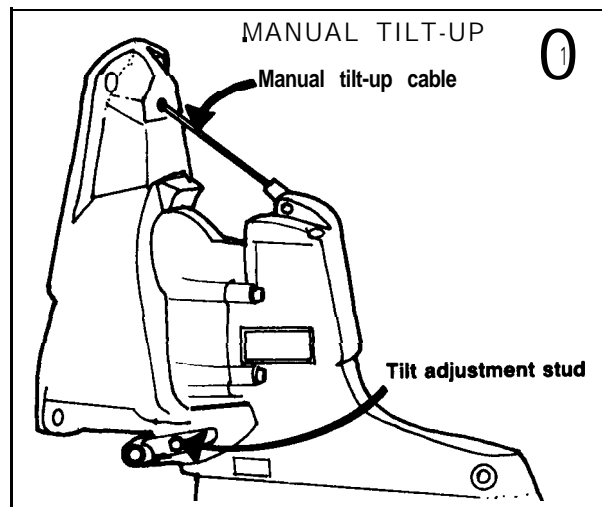
This chapter provides removal and installation procedures for all **MerCruiser** stern drive models. Repair procedures for individual subsections are given in the chapters that follow. Engine removal and installation procedures are described in the appropriate engine chapter. Refer to Chapters Six through Ten as required.

Stern drive removal is generally a fairly simple procedure. However, if the unit has not been

removed recently or if it has been subjected to considerable corrosion, it may be necessary to use force in excess of that normally required. In some cases, it may even be necessary to heat components with a welding torch to free frozen bearings or shafts.

Installation of the stern drive is more complex than removal, requiring both time and patience. Components must be properly aligned and care should be taken in mating them to prevent possible bearing, gasket or seal damage.

Table 1 contains a reference guide to engine/stern drive installations by model and year. **Table 2** lists the stern drive gear ratios by engine usage. Tightening torques are provided in **Table 3**. **Tables 1-3** are at the end of the chapter.



CAUTION

Stern drive removal and installation involves the use of elastic stop nuts. Such nuts should never be used more than twice. When elastic stop nuts are used, it is a good idea to replace them with new nuts during reinstallation. Never use worn-out stop nuts or non-locking nuts.

MERCUISER MODEL 0

Stern Drive Removal

1. Shift the drive unit into its forward position.
- 2A. Manual tilt-Disconnect the tilt-up cable (Figure 1).
- 2B. Power tilt-Remove tilt adjustment stud from gimbal ring. Disconnect the tilt cylinders at the stern drive unit. See Figure 2.
3. Remove the 4 elastic stop nuts and washers from the stern drive-to-bell housing studs.

WARNING

Do not attempt to remove the stern drive unit from the boat in Step 4 without the aid of a hoist for support. The unit is heavy and may slip from your grasp, causing damage to the stern drive and possible personal injury.

4. Attach an overhead hoist to the stern drive unit with an appropriate sling. Support the unit with the hoist.
5. Carefully guide the stern drive unit straight back and remove it from the boat.
6. Lower stem drive to the ground and remove the hoist.
7. Remove and discard the bell housing gasket.

Stern Drive Installation

1. Lubricate the drive shaft housing pilot and drive shaft splines with Multipurpose Lubricant (part No. C-92-63250) or equivalent.

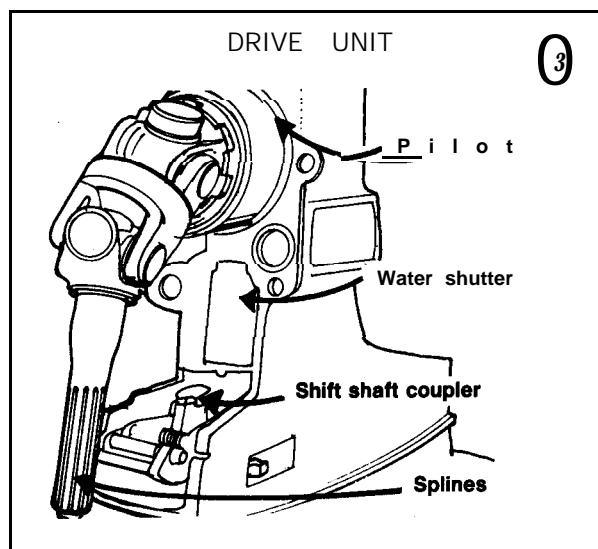
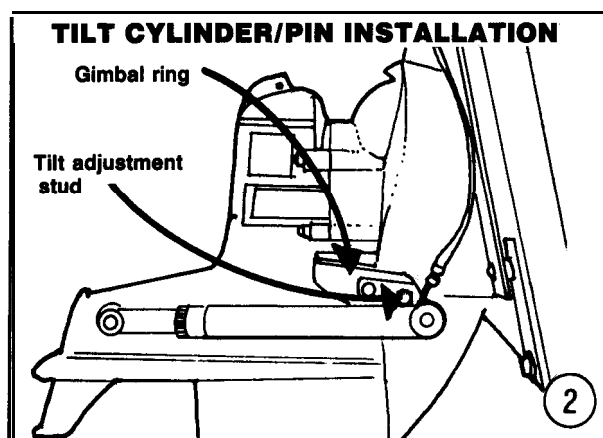
NOTE

If necessary, the coupler can be positioned in Step 2 by rotating the propeller shaft.

CAUTION

Failure to position the intermediate and upper shift shaft couplers as described in Step 2 and Step 6 may result in damage to the couplers and bell housing when the stern drive is installed.

2. Position the intermediate shift shaft coupler (located in drive unit) straight ahead. See Figure 3.
3. Check position of the water shutter. Its tabs must fit in the drive shaft housing recesses.
4. Lubricate the inside of the bell housing bore and the shift shaft coupler with Multipurpose Lubricant. See Figure 4.
5. Install a new gasket on the bell housing.
6. From inside the boat, move the shift lever as far to the port side as possible. This will position the upper shift shaft coupler straight ahead (Figure 4).



WARNING

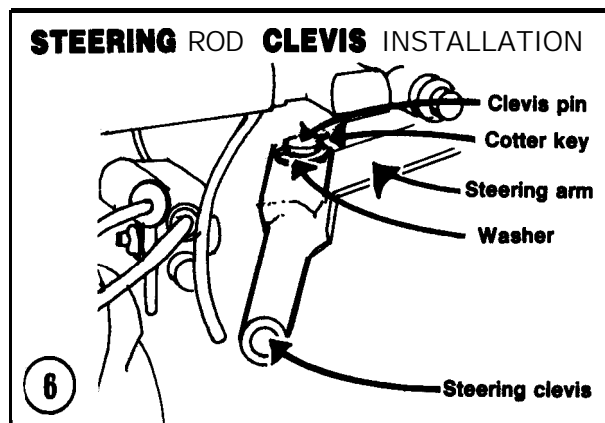
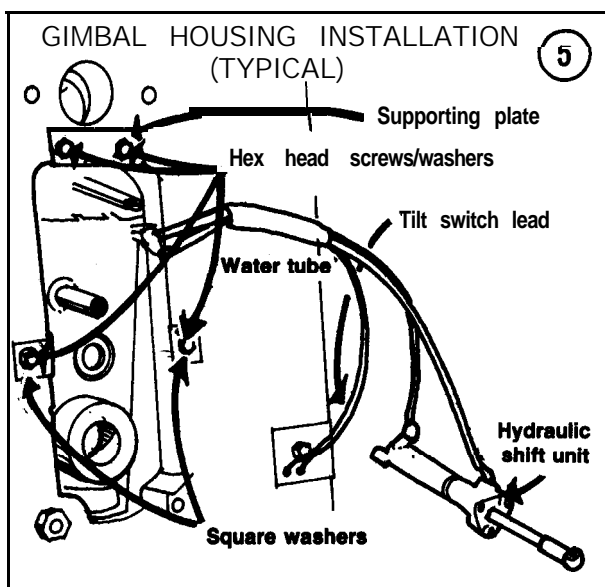
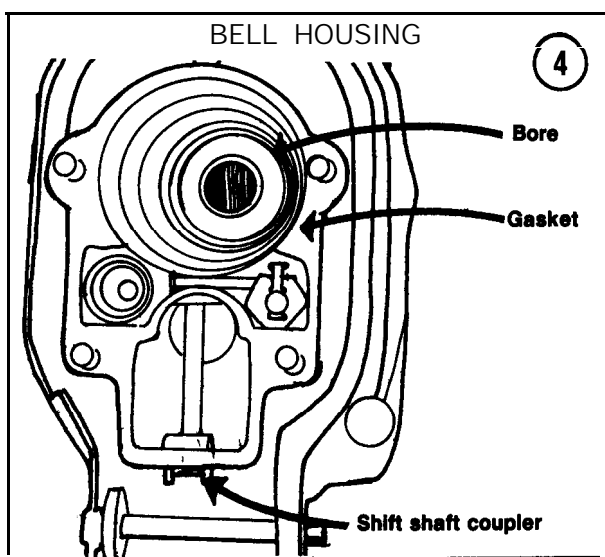
Do not attempt to install the stern drive unit to the boat without the aid of a hoist for support. The unit is heavy and may slip from your grasp, causing damage to the stern drive and possible personal injury.

7. Attach an overhead hoist to the stern drive with a suitable sling.

NOTE

If drive shaft splines do not engage with engine coupling splines in Step 8, rotate the propeller shaft counterclockwise until the stern drive can be pushed into position.

8. Install the stern drive to the bell housing, guiding the drive shaft through the gimbal housing bearing and into the engine coupling.



9. Install a flat washer and new elastic stop nut on each stem drive-to-bell housing stud. Tighten nuts evenly by hand, then torque to specifications (Table 3).

10A. Manual tilt-Connect the tilt-up cable to the stem drive top cover.

10B. Power tilt-Install the tilt adjustment stud in the gimbal ring. Install tilt cylinders.

Gimbal Housing Removal

Refer to Figure 5 for this procedure.

1. Remove stem drive as described in this chapter.
2. Remove the gimbal housing-to-transom fasteners.
3. Remove the gimbal housing with inside supporting plate.

Gimbal Housing Installation

Refer to Figure 5 for this procedure.

1. Insert the hydraulic shift unit and tilt switch leads through the large opening in the boat's transom.
2. Position the gimbal housing on the outside of the transom. Hold housing in this position and install supporting plate on the inside of the transom.

CAUTION

Do not drive fasteners through the transom in Step 3 or the gimbal housing threads will be damaged.

3. Insert the hex head fasteners with lockwashers through the supporting plate and transom, threading them into the gimbal housing holes.
4. Tighten fasteners to specifications (Table 3).

Ride-Guide Attachment

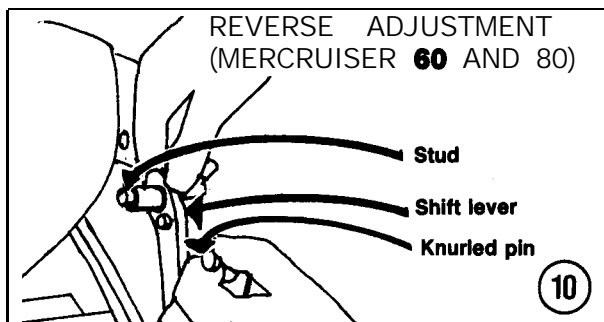
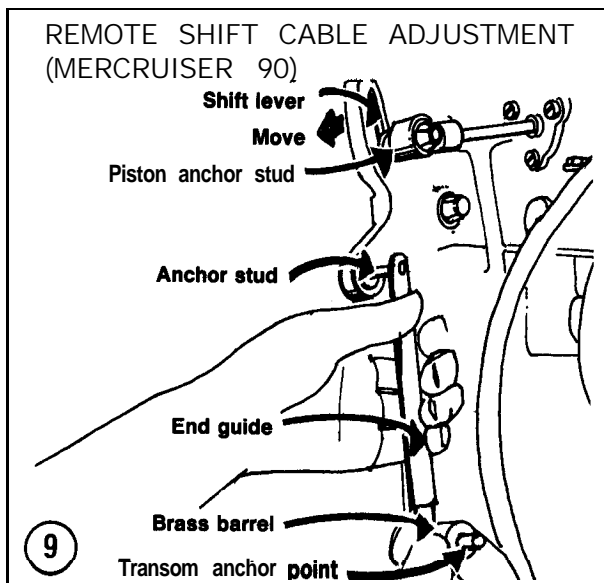
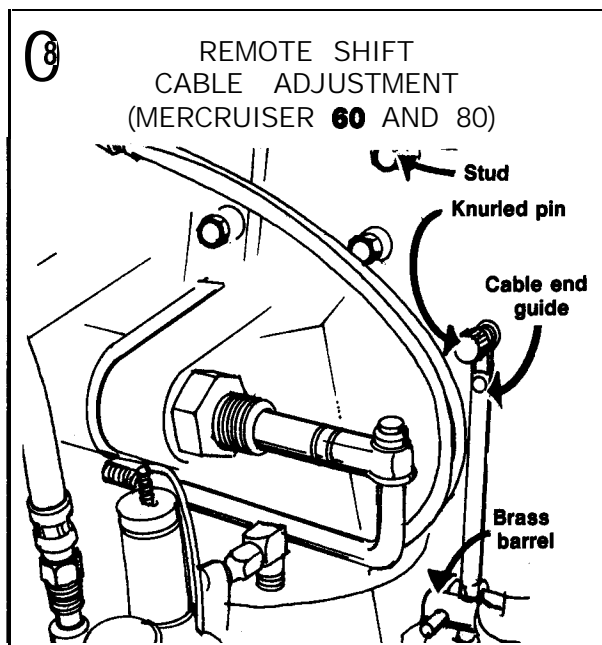
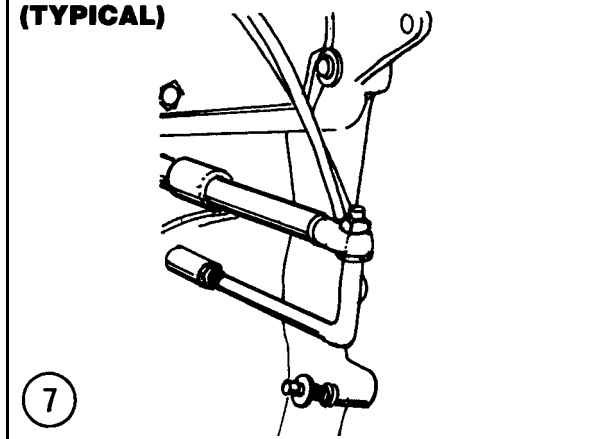
1. Lubricate cable guide tube with Multipurpose Lubricant (part No. C-92-63250) or equivalent.
2. Insert the cable end through the tube and thread fastening nut securely onto the tube.
3. Place steering rod clevis on the steering arm and install the clevis pin, washer and a new cotter pin. See Figure 6.
4. Thread the steering rod into the clevis, then assemble cable on steering rod as shown in Figure 7. Tighten the nut securely, then back it off 1/4 turn.
5. Turn steering wheel until the gimbal ring is centered in the gimbal housing. If the steering

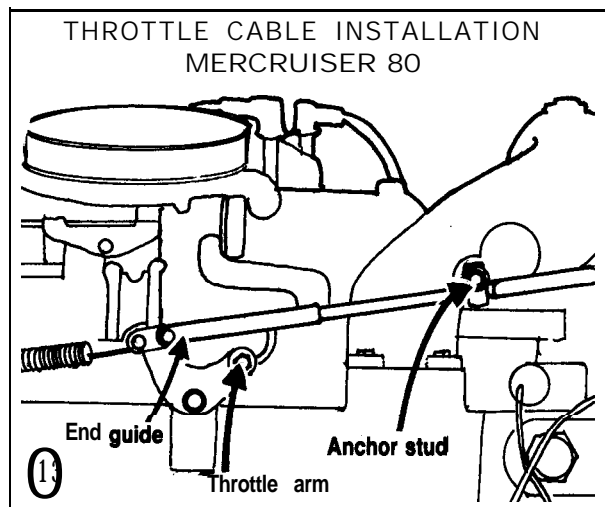
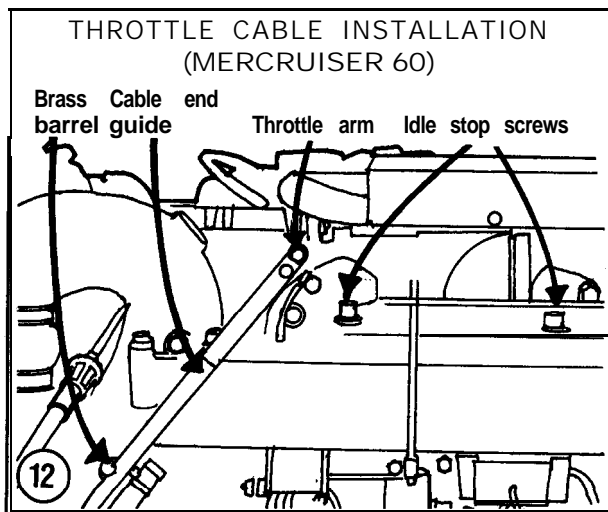
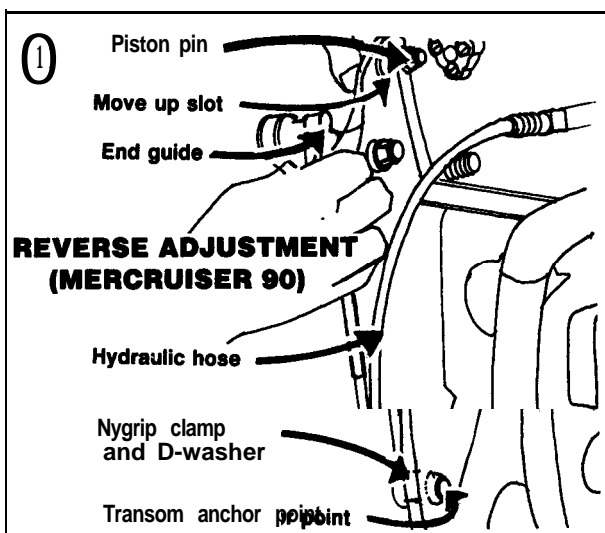
wheel is not centered at this point, remove steering rod from the clevis. Adjust steering rod in the clevis until the steering wheel is centered, then repeat Step 4 and tighten nut securely.

Shift Cable Attachment

1. Place the remote control handle in its full forward position. Manually pull the shift lever out as far as possible to shift stem drive into forward gear. While doing this, turn the propeller shaft counterclockwise as far as possible to make certain the clutch is fully engaged.
2. Loosen the piston anchor stud on the hydraulic shift unit. Move anchor stud to the bottom of the shift lever slot, then tighten the nut. Position the remote control shift cable end guide on the shift lever. **See Figure 8 (Model 60 and 80) or Figure 9 (Model 90).**
3. Pull the outer shift cable as far away from the cable guide as it will go, then adjust the shift cable brass barrel until it is aligned with the mounting stud on the transom plate anchor point. **See Figure 8 (Model 60 and 80) or Figure 9 (Model 90).**
- 4A. Manual tilt-Fasten brass barrel on end guide by installing the spacer, washers and nut. Tighten the nut securely.
- 4B. Power tilt-Fasten hydraulic hose with a nygrip clamp and D washer.
5. Place the remote control handle in its full reverse position. Manually push the shift lever inward as far as possible to shift stem drive into reverse. While shifting, rotate the propeller shaft clockwise until the shaft stops to make certain the clutch is fully engaged.

CABLE STEERING ROD INSTALLATION (TYPICAL)





6. Loosen the anchor stud on the hydraulic shift unit piston. Move the anchor stud up the shift lever slot until the cable end guide can be reinstalled. See **Figure 10** (Model 60 and 80) or **Figure 11** (Model 90).

7. Tighten nut on stud holding hydraulic shift unit piston to shift lever.

8. Model 60-Install hydraulic shift tubes to shift sender unit on inner transom plate assembly. Connect long hydraulic tube to left inlet (looking aft from inside the boat) and the short tube to the right inlet.

9. Connect short tube to upper inlet of shift receiver in bell housing. Connect long tube to lower inlet of shift receiver.

Throttle Cable Attachment

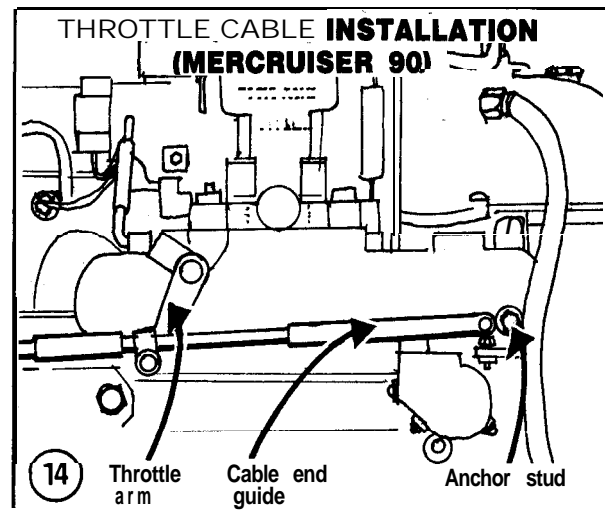
1. Install throttle cable to side and transom of boat with cable clips, making certain there are no sharp bends in the cable.

2. Move the remote control handle to its neutral position (warmup lever down).

3. Holding the cable at a point behind the brass barrel, push in on the cable end guide and adjust the brass barrel to align with the attaching points.

4. Install the flat washer sleeve and brass barrel on the attaching stud. Install flat washer and stop nut on stud. Tighten nut securely. See **Figure 12** (Model 60), **Figure 13** (Model 80) or **Figure 14** (Model 90).

5. Move the remote control handle to its fully forward position and make sure the carburetor throttle valve is fully open. Move control handle back to neutral and make sure the throttle valve is



fully closed. If throttle valve is not positioned as described, repeat Steps 2-4.

CAUTION

Do not operate engine unless a source of cooling water is flowing through the water pump. The neoprene pump impeller will be damaged if the engine is operated without water.

6. Start the engine and adjust idle speed. See Chapter Four.

Tilt and Shock Cylinder Removal/Installation

1. Remove the fore and aft anchor pin retaining nuts.
2. Remove the flat washer and rubber spacer/bushing from each side of the anchor pins.
3. Remove the tilt cylinders from the anchor pins.
- 4A. Early models-Remove the rubber bushing, washer and rubber sleeve from each side of the anchor pins and inspect for wear, deterioration or damage. See Figure 15.
- 4B. Late models-Remove the wave washer, flat washer and rubber spacer from each side of the anchor pins and inspect for wear, deterioration or damage. See Figure 16.
5. Installation is the reverse of removal. Tighten anchor pin retaining nuts securely.

MERCRUISER MODEL I

MerCruiser I stern drive designation is changed with 1983 models. The 1983-on model line is referred to as the MerCruiser MCM 120R, 140R, 470R, 488R, 185R, 898R, 228R and 260R. The same nomenclature is used when referring to the stern drive or transom unit individually. These units can be identified quickly by their flat top cover, squared-off anti-ventilation plate and larger (1 1/2 in.) ID trim cylinders.

MerCruiser MCM 120R-260R engines and transom assemblies cannot be used to replace previous 120-260 engines and transom assemblies. There is a difference in the center-to-center dimension of the engine mounting holes in the flywheel housing and inner transom plate, as well as a change in exhaust collector system design.

Older stem drive units will not mate satisfactorily with the "R" model transom assembly. In addition, the universal joint coupling end yoke on older models is shorter than the yoke used with "R" models, and will not fully engage the

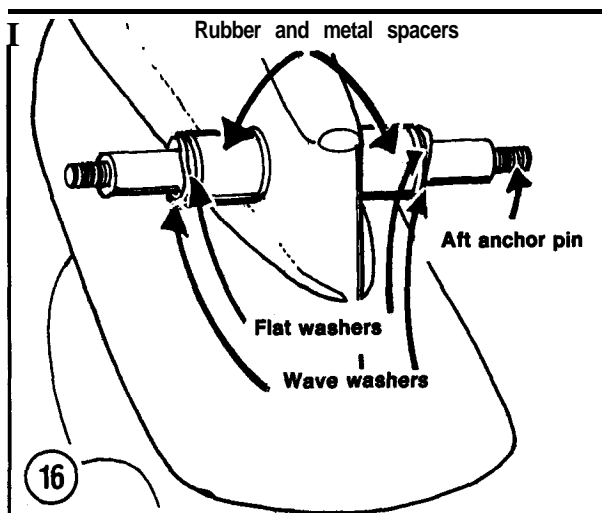
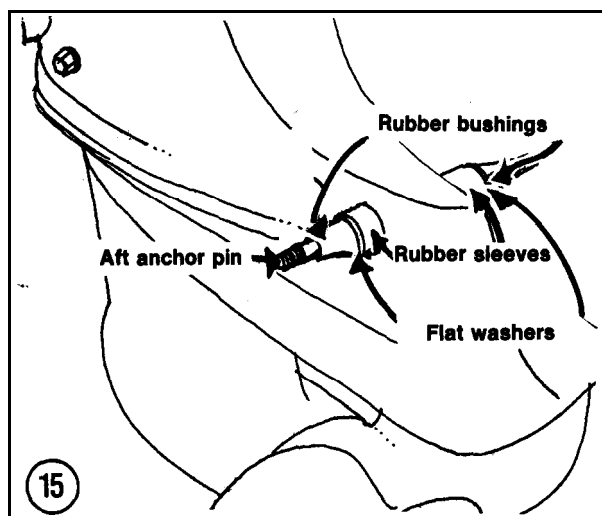
engine coupler splines. If an older inline stem drive is installed on one of the new "R" models, coupling and/or yoke spline failure will result.

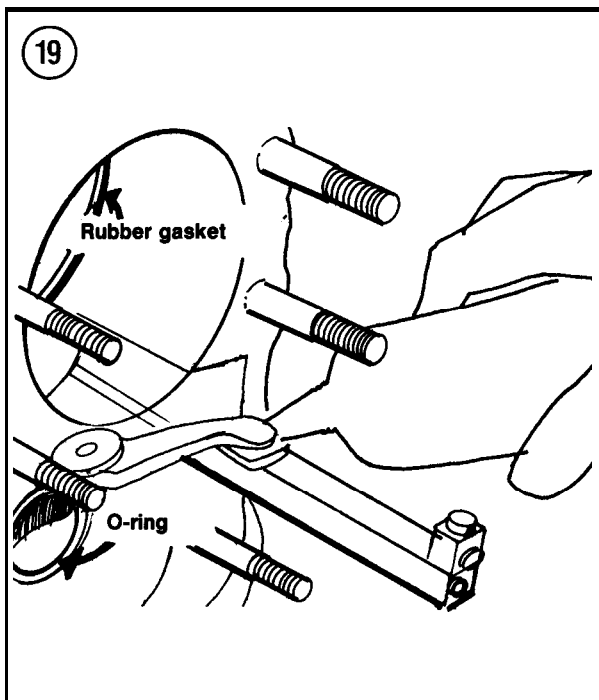
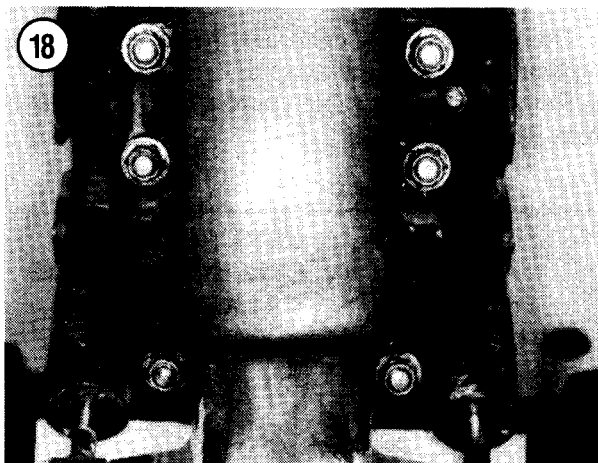
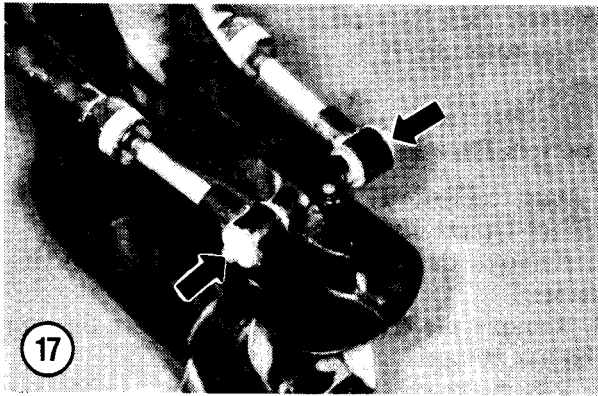
When installing a MerCruiser MCM 120R-260R stem drive unit to the "R" model bell housing, use gasket part No. 27-94996. If an "R" drive unit is installed to an old style bell housing, use gasket part No. 27-64818.

Removal, installation and service procedures are essentially the same for "R" models and older versions.

Stern Drive Removal

1. Shift the drive unit into its forward position.
2. Disconnect the aft end of each trim cylinder from the drive unit (Figure 17).





3. Remove the 6 elastic stop nuts and washers from the stem drive-to-bell housing studs (Figure 18).

WARNING

Do not attempt to remove the stern drive unit from the boat in Step 4 without the aid of a hoist for support. The unit is heavy and may slip from your grasp, causing damage to the stern drive and possible personal injury.

4. Attach an overhead hoist to the stem drive top cover lifting eye with an appropriate sling. Support the unit with the hoist.
5. Carefully guide the stem drive unit straight back and remove it from the boat.
6. Lower stem drive to the ground and remove the hoist.
7. Remove and discard the bell housing gasket.

Stern Drive Installation

CAUTION

Do not install a Model I stern drive to a Model IA-IB-IC bell housing (or vice versa). The bolt pattern is identical on all units but the drive shaft will not align with the gimbal housing bearing.

1. Lubricate the shift slide assembly with Multipurpose Lubricant (part No. C-92-63250) or equivalent. See Figure 19.
2. Lubricate the drive shaft housing pilot with multipurpose grease.
3. Lubricate the universal joint shaft splines with Universal Joint Lubricant (part No. C-92-74058) or equivalent.
4. Install a new rubber gasket and O-ring in the bell housing (Figure 19).

NOTE

If necessary, the coupler can be positioned in Step 5 by rotating the propeller shaft.

CAUTION

Failure to position the intermediate shaft coupler and bell housing shift lever coupler slot as described in Step 5 and Step 6 may result in damage to the couplers when the stern drive is installed.

5. Position the intermediate shift shaft coupler (located in drive unit) straight ahead. Drive unit must be in forward gear position.
6. Move bell housing shift lever to the right (facing transom from inside the boat) until the shift lever

coupler locating slot faces to the rear. Lubricate slot with Perfect Seal (part No. C-92-34227).

7. Lubricate reverse lock roller in bell housing (if so equipped) with Multipurpose Lubricant.

8. Lubricate coupler cam surface and lower roller with Multipurpose Lubricant.

9. Lubricate the universal joint O-rings with Multipurpose Lubricant.

NOTE

Two different bell housings have been used. Early bell housings (Figure 20) require the use of 2 gaskets, while later bell housings (Figure 21) use only one. The MCM 120R-260R bell housing gasket (part No. 27-94996) also differs from the gasket used on previous models (part No. 27-64818).

10. Install a new gasket on the bell housing with water-resistant gasket sealant.

NOTE

Move drive shaft housing reverse lock hook release lever to its locked position, if so equipped.

WARNING

Do not attempt to install the stern drive unit to the boat without the aid of a hoist for support. The unit is heavy and may slip from your grasp, causing damage to the stern drive and possible personal injury.

11. Attach an overhead hoist to the stern drive top cover lifting eye with a suitable sling.

NOTE

If universal joint shaft splines do not engage with engine coupling splines in Step 12, rotate the propeller shaft counterclockwise until the stern drive can be pushed into position.

12. Install the stern drive to the bell housing, guiding the universal joint shaft through the gimbal housing bearing and into the engine coupling. At the same time, guide the shift shaft into the drive shaft housing opening. Do not move shift shaft assembly or coupler.

13. Install a flat washer and new elastic stop nut on each stern drive-to-bell housing stud. Tighten nuts evenly by hand, then torque to specifications (Table 3).

14. Reinstall the aft end of each trim cylinder to the stern drive housing.

15. Make sure the tilt adjustment bolt is installed in the gimbal ring if so equipped. Tighten bolt

securely, then back off about 1/2 turn to permit bolt to rotate freely.

Transom Plate Removal

Refer to Figure 22 (inline) or Figure 23 (V6 and V8) for typical installations.

1. Remove the stern drive as described in this chapter.

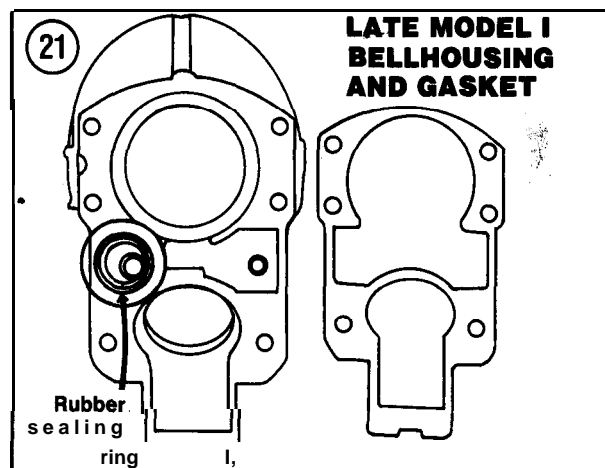
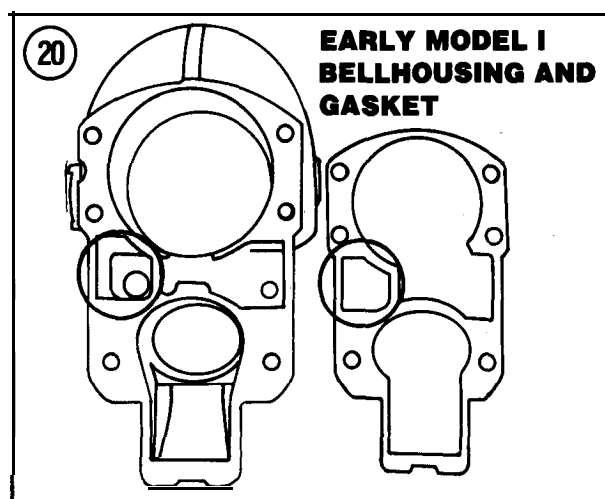
2. Remove the engine. See Chapters Six through Ten as appropriate.

3. Remove the steering link rod.

4. Remove the cotter pin from the locking sleeve, if so equipped.

5. On V6 and V8 installations, remove the clevis pin from the cable end adaptor.

6. Remove steering cable coupler nut. Slide cable from its support tube.



7. Disconnect the black hydraulic hose at the trim pump. On inline installations, also disconnect the gray hydraulic hose at the reverse lock valve. Cap hoses and plug connections to prevent leakage.
8. Disconnect and cap the black plastic hydraulic hoses at the trim sender, if so equipped.

9. Remove the clamp holding the hoses to the inner transom plate.
10. Remove the power steering lines from the control valve, if so equipped.
11. Remove the exhaust elbow assembly from the gimbal housing.

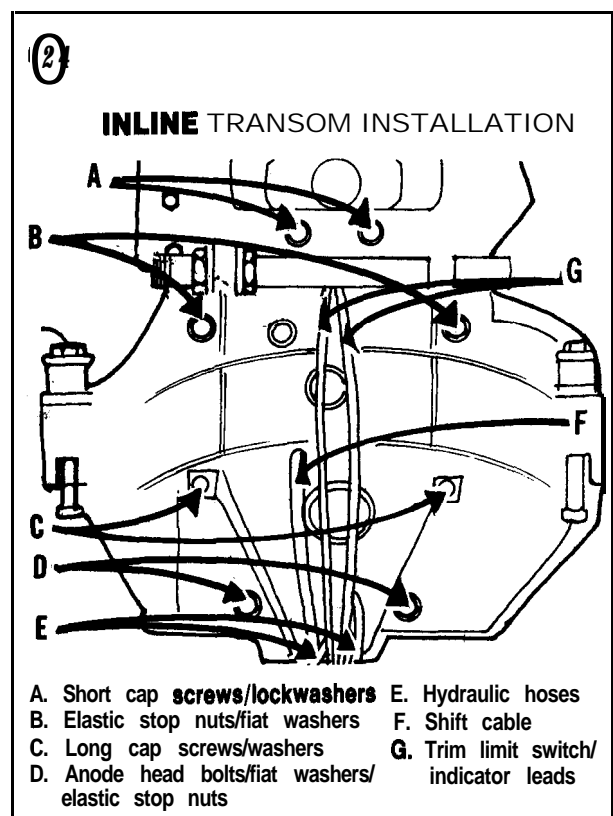
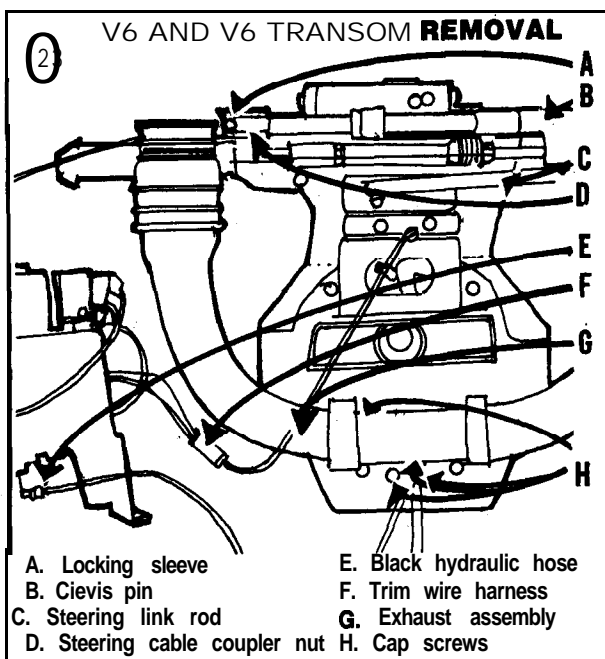
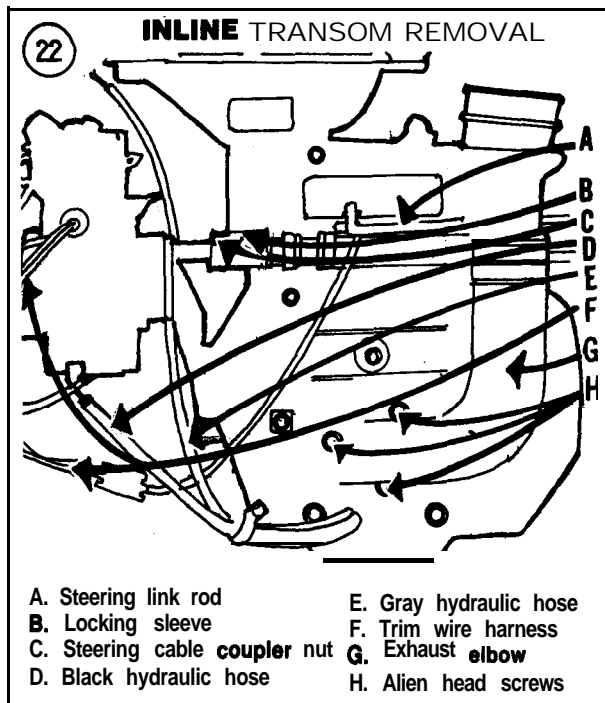
NOTE

If the power trim pump is mounted separately, disconnect the tilt limit switch from the trim wiring harness and the reverse lock valve cutout switch from the pump in Step 12.

12. Disconnect the power trim panel wiring harness at the pump.
13. Remove the transom plate fasteners. See Figure 24 (inline) or Figure 25 (V6 and V8), typical. Remove the inner transom plate, then the outer transom plate.

Transom Plate Installation

If the hydraulic trim cylinders have been removed, install the front end of each to the gimbal housing as described in this chapter to prevent damage to the cylinders or hydraulic hoses.



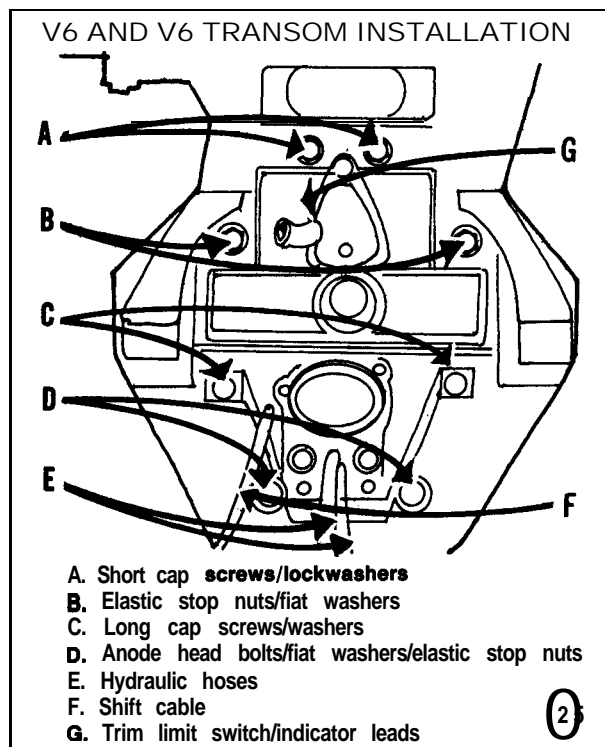
Refer to **Figure 26** (early), **Figure 24 (inline)** or **Figure 25** (V6 and V8) for this procedure.

1. Place the gimbal housing assembly and inner transom plate in position over the transom opening in the boat.
2. Insert shift cable, switch leads, hydraulic lines, etc. through the proper openings in the transom.
3. Insert the hydraulic hose through the transom opening and install the gimbal housing. Position hydraulic hose on port side of exhaust elbow.

CAUTION

Do not drive fasteners through the transom in Step 4 as the gimbal housing threads will be damaged.

4. Hold gimbal housing in position and inner transom plate in position. Install fasteners and tighten evenly, working from the center up, then down. Torque to specifications (**Table 3**).
5. If cast exhaust elbow was removed from gimbal housing, install new O-ring(s) and clean all mating surfaces. Install elbow to housing and tighten fasteners to specifications (**Table 3**).



Ride-Guide Steering Cable Attachment

The cable can be attached to the drive unit from either the right or left side.

1A. Early style:

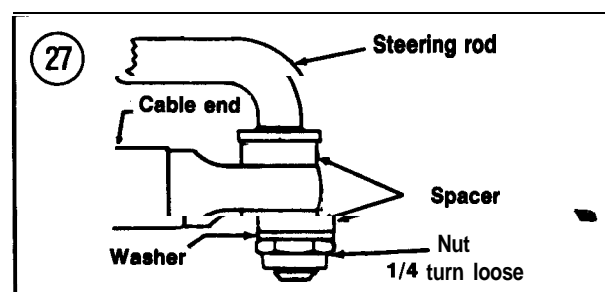
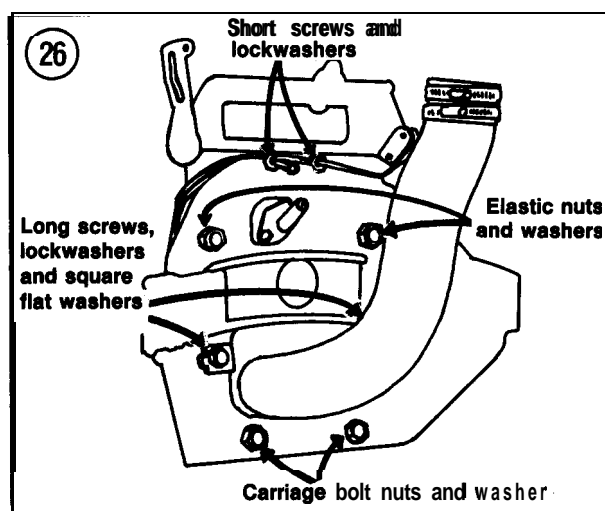
- a. Assemble the spacers and install the steering link rod through the hole in the end of the drive unit steering lever as shown in **Figure 27**.
- b. Tighten nut securely, then back off 1/4 turn.

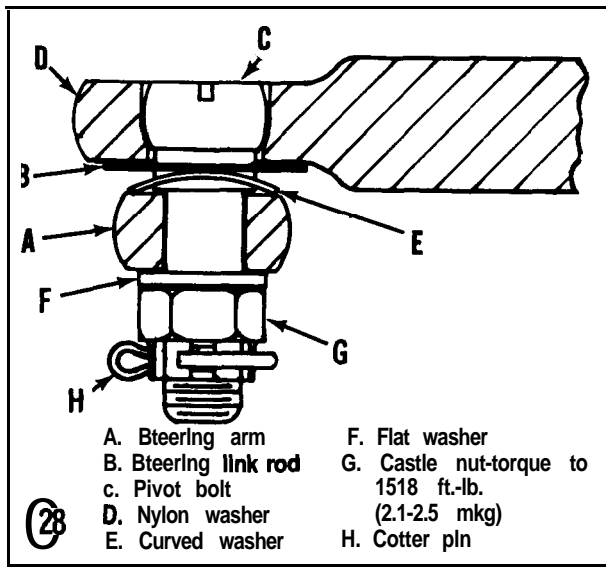
1B. Late style V8:

- a. Install the steering link rod through the hole in the end of the drive unit steering lever.
- b. Install parts as shown in **Figure 28**.
- c. Tighten castellated nut to specifications (**Table 3**).
- d. If necessary, back nut off sufficiently to install a new cotter pin through the nut and steering rod holes, then spread pin ends.

1C. Late style inline:

- a. Install the steering link rod through the hole in the end of the drive unit steering lever.
- b. Install parts as shown in **Figure 29**.
- c. Wipe special sleeve with Universal Joint Lubricant (part No. C-92-74057A1) or equivalent.





- d. Install sleeve, thin washer and castellated nut.
- e. Tighten nut to specifications (Table 3).
- f. If necessary, back nut off sufficiently to install a new cotter pin through the nut and steering rod holes, then spread pin ends.
- 1 D. "R" models-Connect steering cable directly to steering lever.

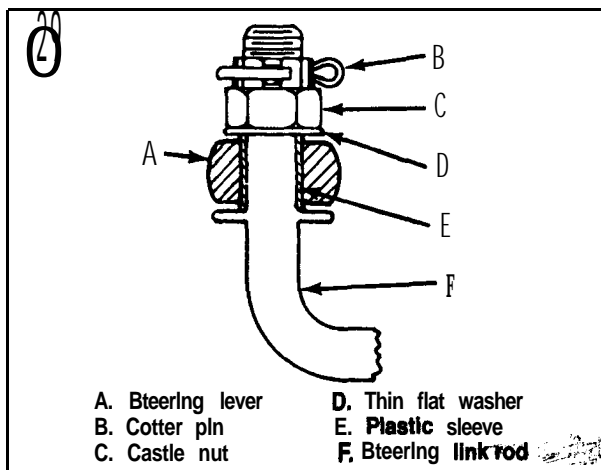
CAUTION

Use of any lubricant other than that specified in Step 2 can result in damage to the components.

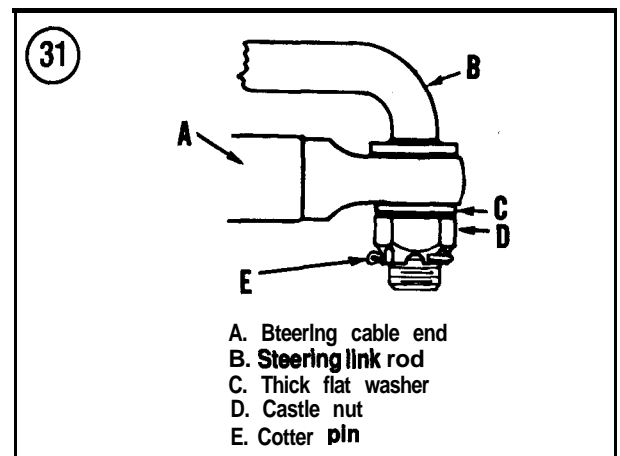
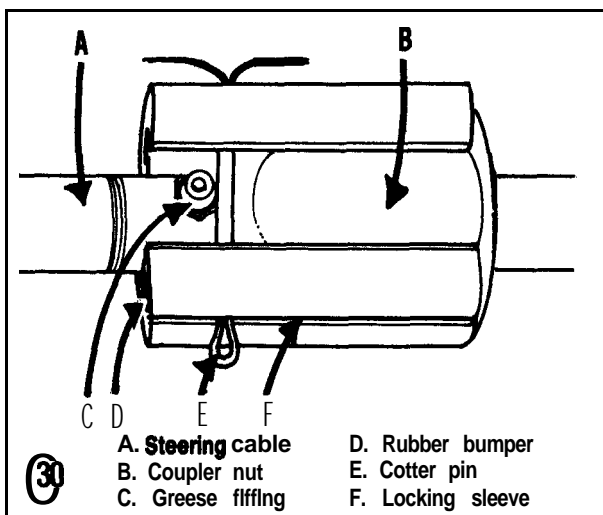
2. Lubricate the inside of the cable guide tube with MerCruiser Special Lubricant 101 or equivalent.
3. Insert end of cable through the tube. Thread the coupler nut on the tube. Hold the tube adjusting sleeve or tube nut with a wrench and tighten coupler nut securely.

NOTE

If locking sleeve installation in Step 4 interferes with power steering hydraulic lines, replace lines with longer ones before installing the sleeve.



4. On models equipped with a coupler nut locking sleeve, position the locking sleeve on the steering cable and slide it over the coupler nut until cotter pin hole in sleeve is between nut and cable grease fitting. Install a new cotter pin and spread ends. See Figure 30.
5. On V8 installations, connect the cable output shaft to the adaptor, inserting clevis pin through adaptor to position cotter pin between adaptor and transom.
- 6A. Except V8—Connect steering rod to cable end with thick washer and castellated nut as shown in Figure 31.



6B. V8 -Connect steering rod to cable end adaptor with flat washer and castellated nut as shown in **Figure 32**.

7. Tighten castellated nut to specifications (**Table 3**). If necessary, back off sufficiently to install a new cotter pin through the nut and rod holes.

8. Turn the steering wheel lock to lock. The drive unit should traverse fully in each direction. If not, loosen the adjusting nuts and move the cable guide tube as required to obtain full traverse. Tighten adjusting nuts to specifications (**Table 3**).

9. Turn the steering wheel until the drive unit is centered. If the steering wheel is not centered at this point, readjust the cable guide slightly as described in Step 8 to center wheel. Repeat Step 8 to make certain that both adjustments are correct.

Stern Drive and Remote Control Shift Cables

Refer to **Figure 33** (inline) or **Figure 34** (V8) for this procedure.

1A. On V8 installations:

- Route drive unit shift cable over the top of the exhaust separator, then between the separator and exhaust elbow toward the starboard side of the engine.
- Route cable back toward engine under the starboard exhaust elbow and install in a J-clip. Do not close J-clip until remote control shift cable is installed.
- Route remote control shift cable under the starboard exhaust elbow and install in the J-clip. Bend J-clip over cables, but make sure they can move back and forth inside the clip.

1 B. Inline installation:

- Route drive unit shift cable from gimbal housing up the port side of the engine to the shift plate.
- Install shift cable in a J-clip on the flywheel housing and bend clip closed.
- If remote control shift cable is installed from the starboard side, attach the cable brass barrel to the shift lever anchor.
- If cable is installed from port side, connect brass barrel to shift plate anchor stud.

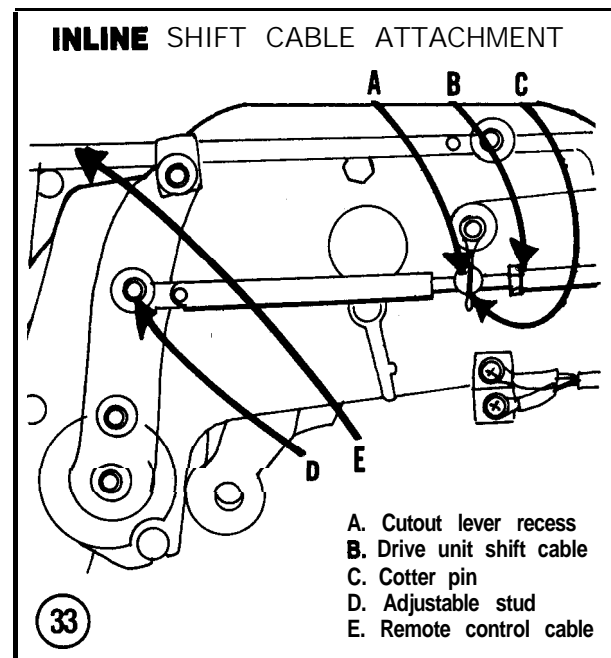
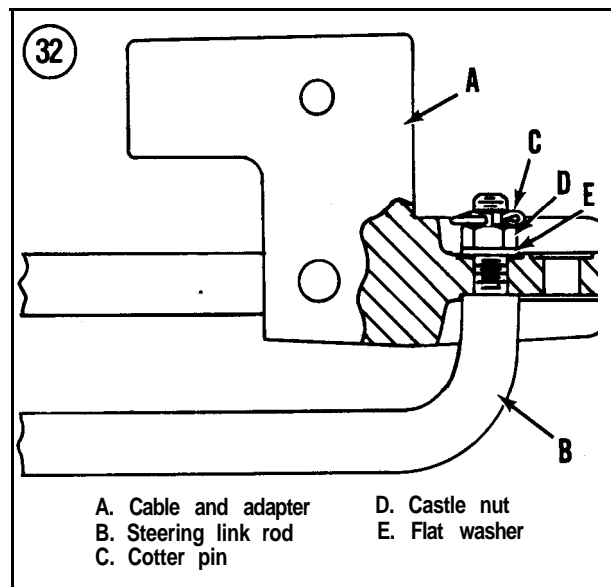
2. Wipe shift cutout lever recess and unthreaded part of shift lever adjustable stud with Universal Joint Lubricant.

3. Install shift cable brass barrel in cutout lever recess and fit cable end guide on the shift lever adjustable stud,

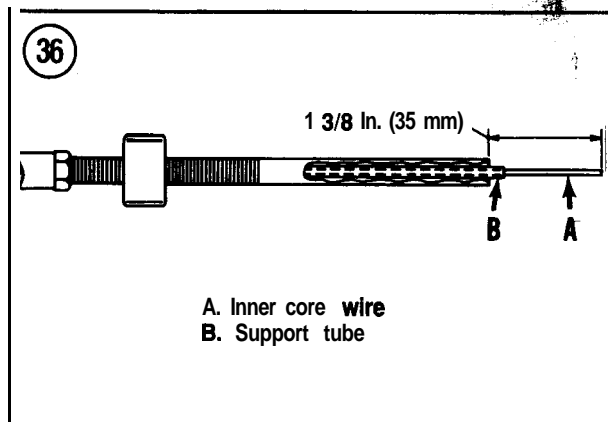
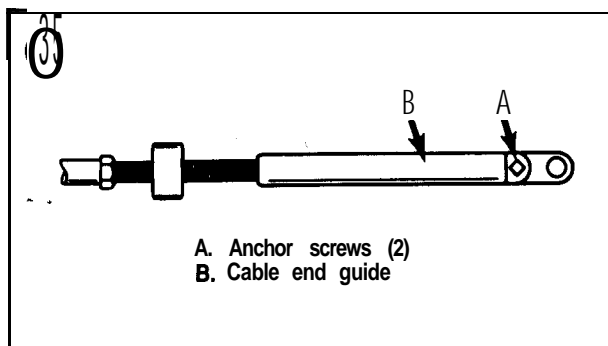
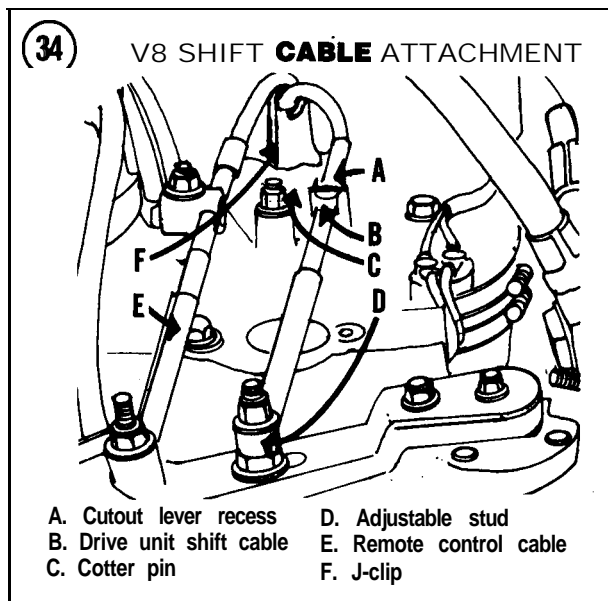
4. Install a new cotter pin in the shift cutout lever recess and spread the pin ears.

NOTE

If remote shift cable is installed from the port side on *inline* installations, move the 2 remaining washers from the shift plate anchor stud to the *shift* lever anchor stud, then move the shift lever anchor stud sleeve to the shift plate anchor stud.



5. Position remote control cable on anchor studs and install washers and nuts. Do not tighten nuts against the cable. The end guide and brass barrel must pivot on anchor studs without resistance.



Shift Cable Adjustment

1. Remove the shift cable from the engine shift bracket.
2. Shift the stern drive into FORWARD gear by pushing inward on shift cable end guide. Rotate the propeller counterclockwise while shifting until the propeller stops to ensure full gear engagement.
3. To ensure maximum adjustability of the shift cable is possible, perform the following steps:

- a. Remove the 2 anchor screws securing the cable end guide and remove the end guide. See **Figure 35**.
- b. With the stern drive in FORWARD gear, the end of the core wire should be *exactly* 1-3/8 in. from the end of the cable threaded tube (**Figure 36**) and 1/2 in. from the end of the support tube (**Figure 37**). Note that early models may not be equipped with the support tube. If too long, cut the core wire as necessary. If too short, replace the core wire (Chapter Seventeen).
- c. Place the cable end guide over the cable and insert the core wire through the cable anchor. Tighten one cable anchor screw until snug, then tighten the remaining anchor screw securely. See **Figure 37**.

4. Make sure forward gear is fully engaged, then measure the distance between the center of the brass barrel and end guide mounting hole as shown in **Figure 38**. Distance should be exactly 5-7/8 in. on models prior to 1974 and 6 in. on models after 1973. Adjust the brass barrel on the threaded tube as required to obtain the specified distance.

5. Make sure the shift lever adjustable stud (D, **Figure 33** or D, **Figure 34**) is located in the bottom of its slotted hole (away from remote control cable). Loosen the stud locking nut and reposition adjustable stud if necessary.

6. Lubricate shift cable anchor points with Quicksilver 2-4-C Multi-Lube.

7. Install the shift cable on the shift bracket as shown in **Figure 39**. Tighten nut (C) until bottomed, then back off 1/2 turn. Secure the brass barrel with a new cotter pin (E).

8. Check shift cable adjustment by shifting into reverse gear wide-open throttle position while an assistant rotates the propeller in a clockwise direction. The shifting clutch should engage causing the propeller shaft to stop turning. If not, loosen the shift lever adjustable stud nut and move the adjustable stud in its slot as required to engage reverse gear. Retighten the nut securely.

Remote Control Cable Adjustment

1. Install the shift cable as outlined in *Shift Cable Adjustment*.

2. Shift the drive unit into FORWARD gear. Make sure forward gear is fully engaged by rotating the propeller shaft counterclockwise while shifting. Place the remote control assembly in the forward gear, full throttle position.

3. Lubricate the remote control cable mounting points with Quicksilver 2-4-C Multi-Lube.

4. Hold the shift cable next to the shift bracket as shown in **Figure 40**, typical. Lightly pull the brass barrel (A, **Figure 40**) outward to remove any slack in the cable.

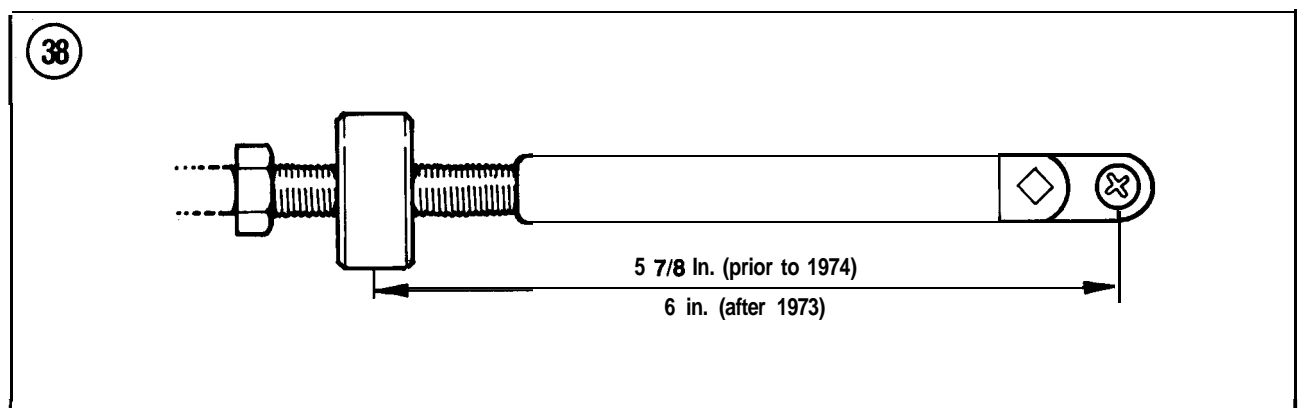
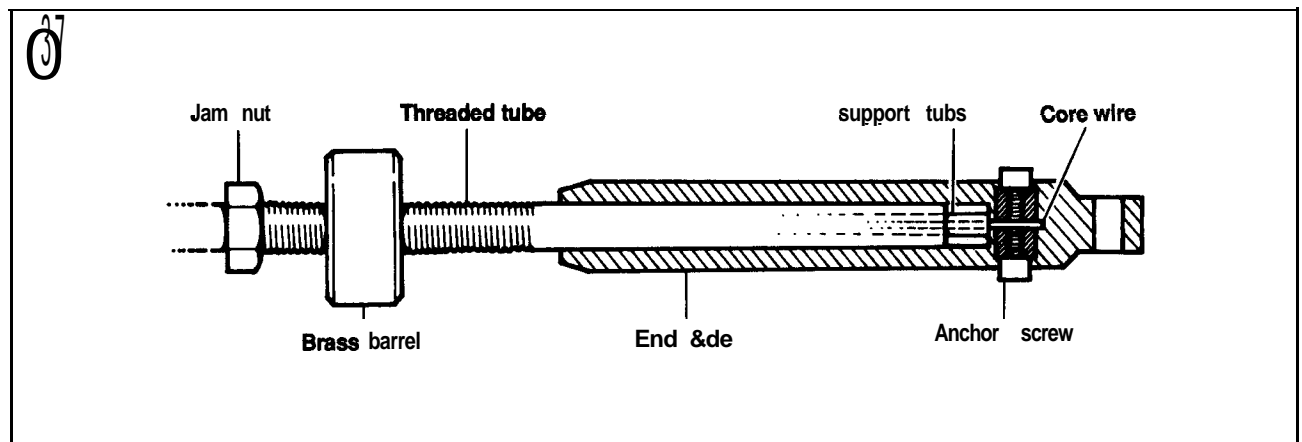
5. Turn the brass barrel as necessary to align the cable attaching holes with the shift bracket anchor studs (**Figure 40**, typical). Once the correct alignment is obtained, back off the brass barrel (counterclockwise) 4 complete turns, then install the remote control cable on the anchor studs. Install the cable mounting nuts and washers. Tighten the nuts finger tight.

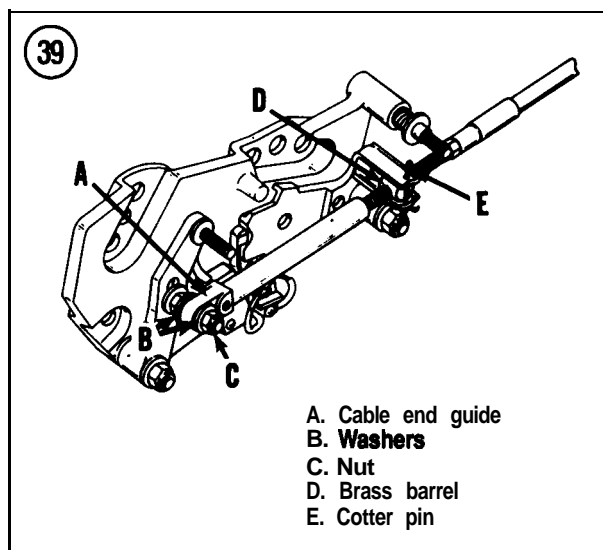
6. Shift the remote control into the REVERSE position (full throttle) while an assistant rotates the propeller shaft clockwise to ensure full gear engagement.

7. Note the position of the shift cutout switch roller in the shift plate. The roller should be centered in the notch as shown in **Figure 41**. If not, remove the remote control cable from the shift bracket and adjust the cable brass barrel one turn at a time to center the roller.

8. When the correct adjustment is obtained, tighten the remote control cable attaching nuts until bottomed, then back off 1/2 turn.

9. With the boat in the water or attached to a flushing device, shift the remote control into FORWARD and REVERSE gear. Full gear engagement should occur before the engine begins to accelerate. If the engine accelerates before gear engagement, loosen the adjustable stud on the shift lever (shift cable mounting stud) and adjust as required to obtain positive gear engagement.





Tilt/Trim Cylinder Installation (Without Dyna-Shock Absorbers)

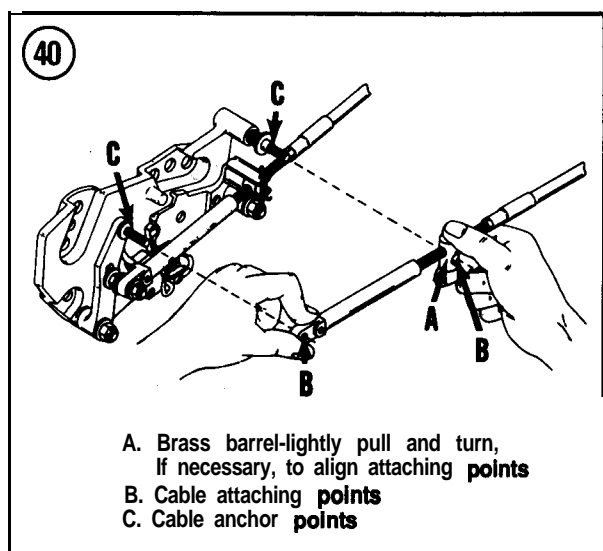
NOTE

Riding characteristics of boat are affected by location of tilt adjustment stud in Step 1. If initial run is unsatisfactory after installation, change location of stud.

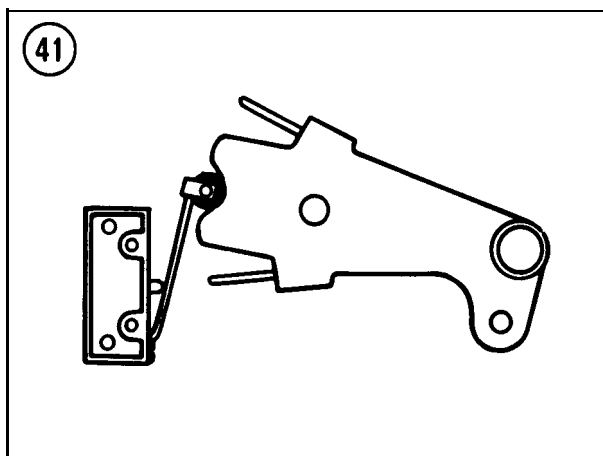
1. Insert tilt adjustment stud through the set of gimbal ring holes that will bring the anti-ventilation plate parallel with the boat bottom on models so equipped.
2. Insert the front anchor pin in the gimbal ring.

NOTE

If cylinder has an aluminum rod aji end (without nylon coating), make sure a spiral grounding spring is installed between the rubber bushings on each side of front and aft anchor pins. They are required to ground the cylinder to the stern drive to reduce galvanic corrosion.



3. Install a flat washer, rubber bushing and spiral spring on each side of front anchor pin.
4. Install aft anchor pin in drive shaft housing. Place washer, rubber bushing and spiral spring on each side of aft anchor pin.
5. Install the cylinder on the front and aft anchor pins.
6. Install rubber bushings in front and aft end of each cylinder. Small end of aft bushing faces drive shaft housing.
7. Install a flat washer and nut on the end of the front (Figure 42) and aft (Figure 43) anchor pins. Tighten nuts securely.
8. Repeat Steps 3-7 for the other cylinder.



Tilt-Trim Cylinder Installation (With Dyna-Shock Absorbers)

Use the following steps to attach Dyna-Shock absorber to drive shaft housing:

1. Install a washer on the Dyna-Shock through bolt. Insert bolt through right Dyna-Shock, drive shaft housing and left Dyna-Shock.
2. Install a washer and new elastic stop nut on the end of the through bolt (**Figure 44**). Tighten nut securely and then back off 1/2 turn.

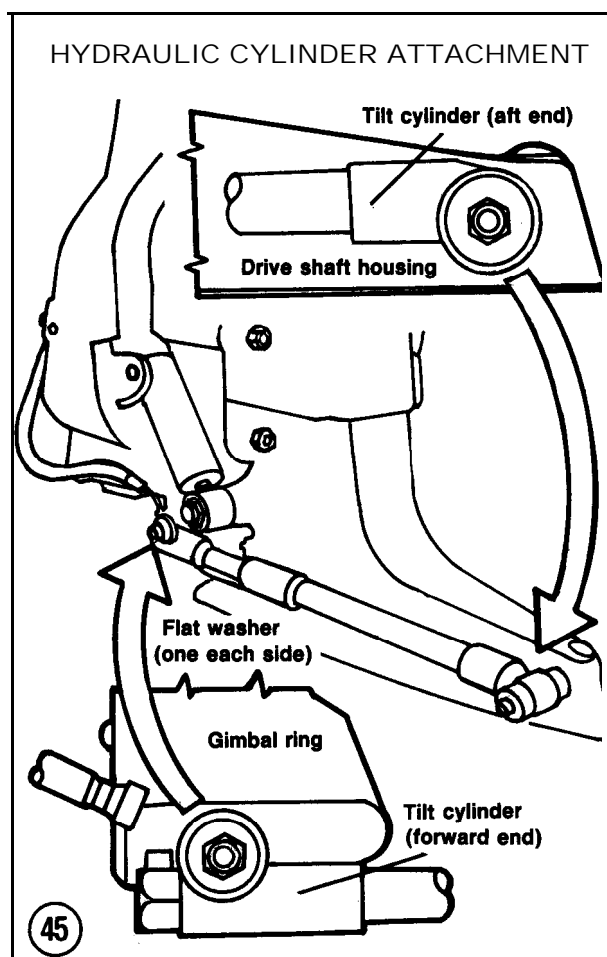
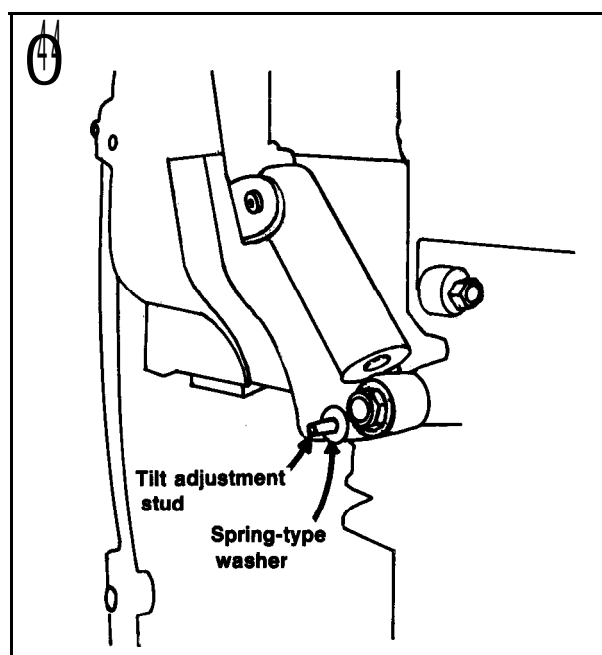
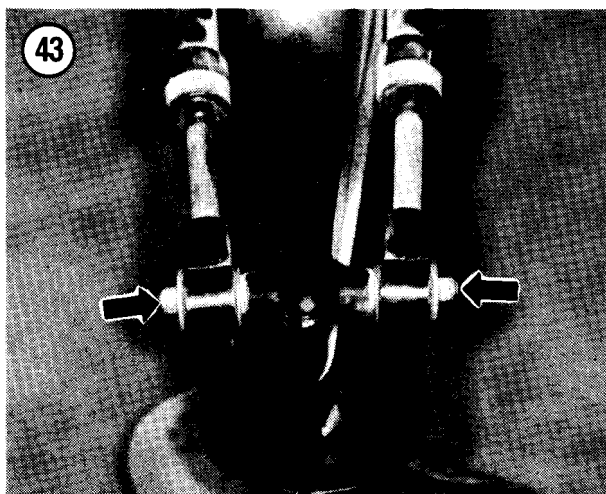
Use the following steps to attach hydraulic cylinders.

1. Insert tilt adjustment stud through desired set of gimbal ring holes.

NOTE

Place one spring washer (dished side out) on each side **of** tilt pin stud.

2. Install aft anchor pin in drive shaft housing. Assemble a rubber sleeve, flat washer and rubber bushing (in that order) on each side of the aft anchor pin.
3. Wipe each rubber bushing with a light coat of Multipurpose Lubricant (part No. C-92-63250) or equivalent.
4. Install cylinder on tilt pin and aft anchor pin as shown in **Figure 45**. Do not rotate outer end of cylinder or internal damage will result.
5. Install rubber bushing in aft end of cylinder and secure with a flat washer and nut on tilt pin stud and aft anchor pin. Tighten nuts securely.
6. Repeat Step 4 and Step 5 to install the other cylinder.



MERCUISER MODEL II NON-TRANSOM MOUNTED

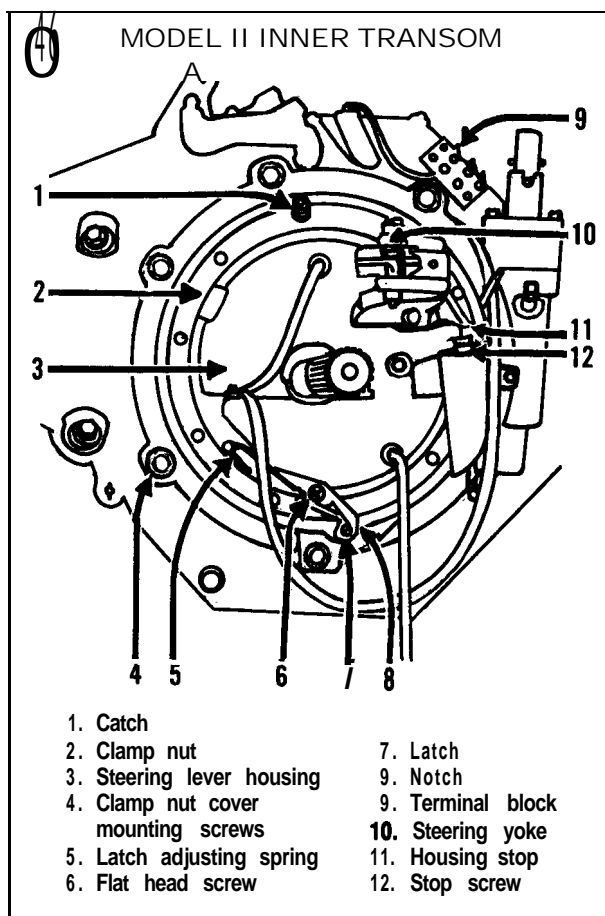
Stern Drive Removal (Except Models 200 and 225)

1. Disconnect the aft end of each trim cylinder from the drive unit.
2. Remove the 6 elastic stop nuts and washers from the stern drive-to-bell housing studs.

WARNING

Do not attempt to remove the stern drive unit from the boat in Step 3 without the aid of a hoist for support. The unit is heavy and may slip from your grasp, causing damage to the stern drive and possible personal injury.

3. Attach an overhead hoist to the stern drive unit with an appropriate sling. Support the unit with the hoist.
4. Carefully guide the stern drive unit straight back and remove it from the boat.



5. Lower stem drive to the ground and remove the hoist.
6. Remove and discard the bell housing gasket.

Stern Drive Installation (Except Models 200 and 225)

Refer to **Figure 46** for this procedure.

1. Lubricate outer transom plate bore and drive unit splined shaft with Multipurpose Lubricant (part No. C-92-63250) or equivalent.
2. Install tilt adjustment bolt in one set of gimbal ring holes. Thread nut on bolt and tighten securely, then back nut off 1/2 turn so bolt can rotate freely.

NOTE

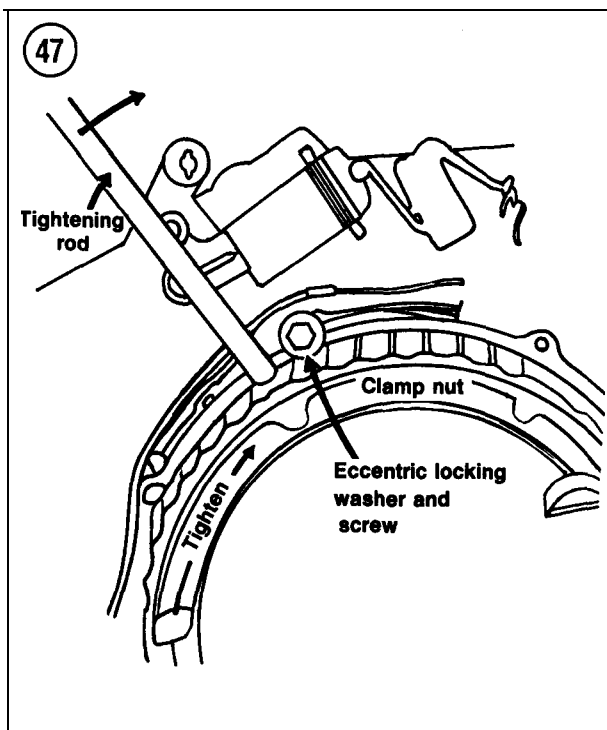
Tilt adjustment bolt may require reinstallation later. When stern drive installation is complete, check to see if anti-ventilation plate is parallel to bottom of boat. If not, remove tilt adjustment bolt, align anti-ventilation plate and reinstall bolt in proper set of holes. Further adjustment may be required when boat is operated to arrive at the proper boat operating attitude.

3. Insert shift cable and tilt-up switch cable through transom plates opening.
4. Support stern drive unit with hoist attached to lifting eye in top cover and align unit with hole in transom plates.
5. Rotate stern drive unit clockwise 15° (seen from rear) to clear stop screw, then push unit into opening. Align shaft splines with splines in engine coupler, turning propeller shaft if required.
6. Install crank on crank extension. Depress crank and slowly turn clockwise until a slight inward movement of the unit indicates thread engagement. Now slowly turn crank counterclockwise to thread gimbal housing into clamp nut.

NOTE

If cranking is difficult, turn crank in opposite direction. Then repeat Step 6. Do not force crank; cross-threading will strip the threads.

7. Continue cranking until gimbal housing stop is located over the stop screw.
8. Align drive unit as close as possible to perpendicular with the boat bottom.
9. Operate crank to tighten clamp nut securely.
10. Hold free end of latch spring away from steering lever housing and assemble latch to housing with flat head nylock screw. Tighten screw,



then back off 1/4 turn to allow latch to pivot freely. The free formed end of the latch spring must contact the step in the latch.

11. The catch on the clamp nut must be in the one o'clock position (seen from inside the boat). Reposition catch in another set of holes in clamp nut, if necessary, to achieve proper latch and catch engagement.

NOTE

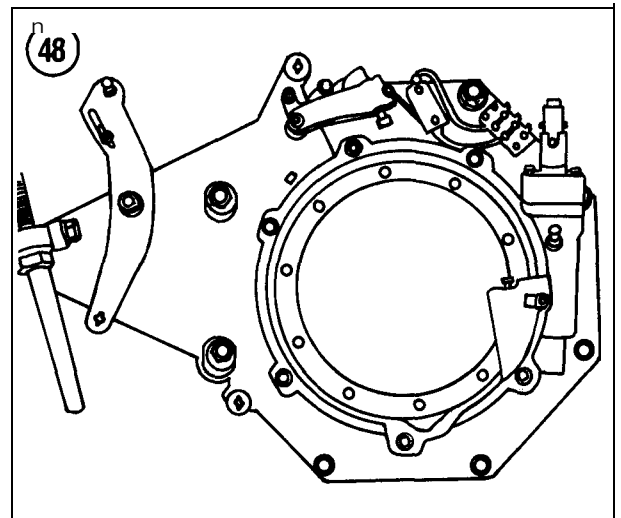
If catch is not properly positioned, teeth on gimbal housing and outer transom plate will be meshed when catch engages latch and unit cannot be raised to UP position.

12. Loosen clamp nut cover mounting screws and rotate cover until latch seats firmly in notch.

NOTE

Latch must prevent any clockwise rotation of clamp nut cover.

13. Tighten cover mounting screws.
14. Adjust stop screw against stop on steering lever housing.
15. Depress crank and turn clockwise to raise unit up for check.
16. Crank unit down to running position, then crank another 25 turns until firmly locked.



Stern Drive Removal (Models 200 and 225)

1. Remove eccentric locking screw and washer (**Figure 47**).
2. Insert a tightening bar (part No. C-91-49670 or other suitable metal bar) in clamp nut (**Figure 47**) and turn counterclockwise to loosen nut. Remove nut from steering drum.

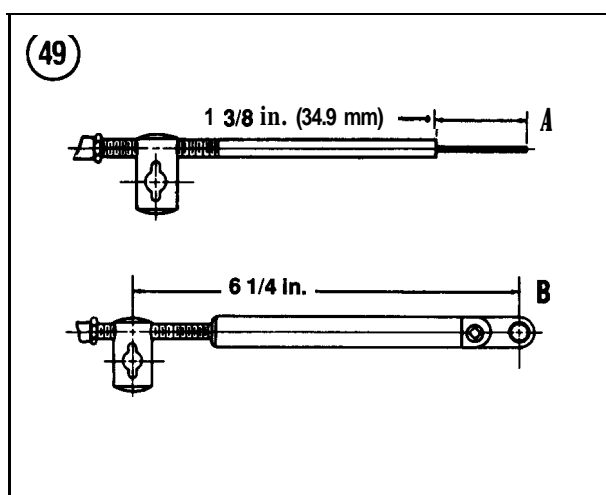
WARNING

Do not attempt to remove the stern drive unit from the boat in Step 3 without the aid of a hoist for support. The unit is heavy and may slip from your grasp, causing damage to the stern drive and possible personal injury.

3. Attach an overhead hoist to the stern drive top cover lifting eye with an appropriate sling. Support the unit with the hoist.
4. Carefully guide the stern drive unit straight back and remove it from the boat.
5. Lower stern drive to the ground and remove the hoist.

Stern Drive Installation (Models 200 and 225)

1. Lubricate outer transom plate bore, O-rings and splined shaft of drive unit with Multipurpose Lubricant (part No. C-92-63250) or equivalent.
2. Attach an overhead hoist to the stern drive top cover lifting eye with an appropriate sling. Support the unit with the hoist.
3. Insert the drive unit shift cable and tilt-up switch cable through the transom plate opening.



4. Place clamp nut over engine coupling with tapered edge facing flywheel.
5. Push unit into transom plate opening, aligning shaft spline with splines in engine coupling. Also align locating pin with recess in drive.
6. Thread clamp nut onto steering drum while holding stern drive unit in place.

CAUTION

Thread clamp nut onto steering drum carefully to avoid cross-threading, which could damage parts. If tightening is difficult, back off clamp nut and rethread.

7. Insert tightening bar (part No. C-91-49670 or other suitable metal bar) into clamp nut as shown in Figure 47 and tighten nut. Align clamp nut flute with one of 6 holes and install the locking screw and washer.

NOTE

If original locking screw and washer will not hold clamp nut, obtain a locking screw (part No. C-10-35192) and eccentric washer (part No. C-12-54208) from dealer and install.

8. Adjust shift cables as described in this chapter.

Transom Plate Installation

Refer to Figure 48 for this procedure.

1. Locate outer and inner transom plates over holes drilled in transom as shown in Figure 48. Insert lock-in switch lead through opening in inner transom plate.
2. Insert 8 transom bolts with rubber seals under heads through holes in transom (from outside

boat). Install washers and nuts on bolts (from inside boat) and tighten evenly to 30 ft.-lb.

3. Position lock-in switch cover and install fasteners.

NOTE

If stern drive is not locked in operating position and remote control lever is not in NEUTRAL, starter cannot operate.

Shift Cable Adjustment

This procedure must be performed as a part of the stern drive installation. To avoid damage to the stern drive unit, perform the steps in this procedure exactly and carefully. In addition, keep the following points in mind:

- a. Early MerCruiser II models do not have reverse lock valve. Disregard instructions for reverse lock valve adjustment below for early II model.
- b. The MerCruiser II stern drive normally produces left-hand rotation (counterclockwise when seen from rear) and must use a left-hand propeller. Instructions for changing from left- to right-hand rotation are given in this procedure. If the change is made, install a right-hand propeller.
- c. Do not install propeller until shift cable is installed and adjusted.
- d. Do not attach throttle cable to carburetor before shift cable is installed and adjusted.
- e. Engine must be running and power shift operating when cable adjustment procedure calls for remote control handle to be placed in full forward and full reverse positions. After handle has been moved, engine may be stopped.
- f. When installing shift cables, adjustment must be made so that remote control lever synchronizes with stern drive unit and full clutch engagement is made in both forward and reverse positions of remote control lever.

1. Place unit in full reverse position (left-hand rotation) or full forward position (right-hand rotation) and remove cable guide. Inner core wire of stern drive unit shift cable must extend exactly 1 3/8 in. from end of cable guide insert, as shown in A, Figure 49.

2. Reinstall cable end guide and leave unit fully in gear. The distance from center line of brass

barrel to center line of cable end guide mounting hole (B, **Figure 49**) must be exactly 6 1/4 in. Adjust brass barrel as required.

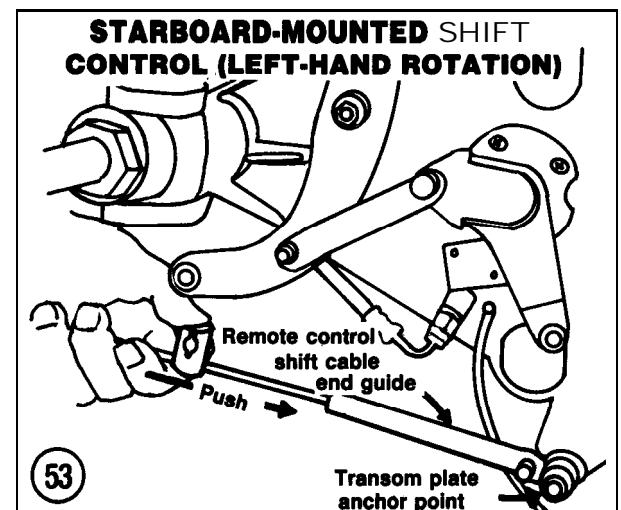
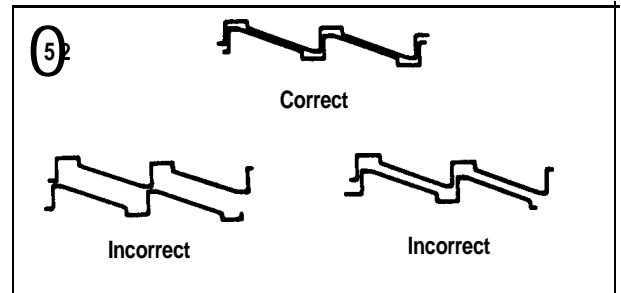
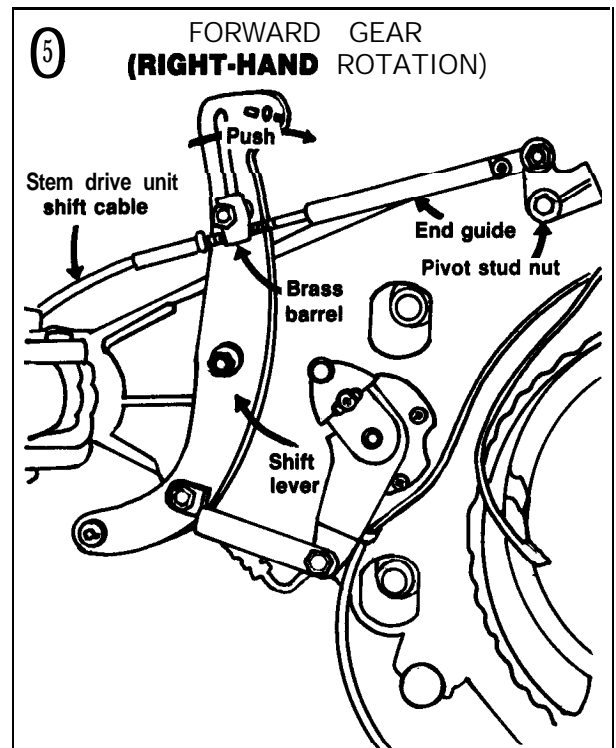
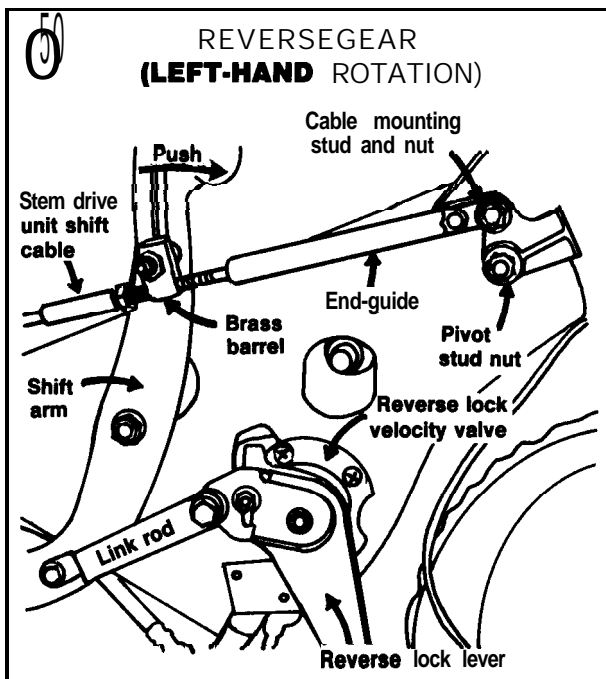
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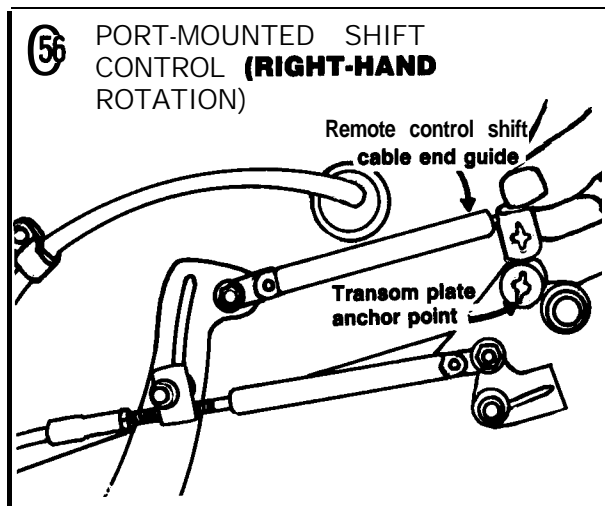
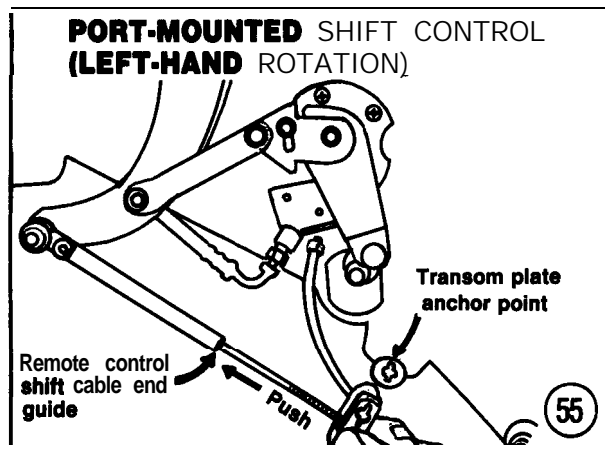
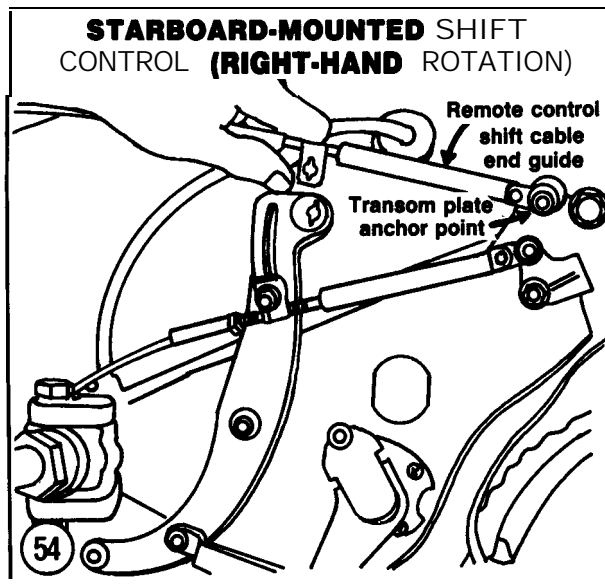
Steps 3-9 adjust reverse gear on models with left-hand propeller rotation (LH) and forward gear on models with right-hand rotation (RH).

3. Tighten nut on switch lever pivot stud so that lever cannot be moved. See **Figure 50** (LH) or **Figure 51** (RH).
4. Fasten stern drive shift cable end guide to mounting stud on switch lever with washer and new elastic stop nut. Nut must be loose enough to allow end guide to pivot freely on stud. See **Figure 50** (LH) or **Figure 51** (RH).
5. Loosely mount brass barrel in curved slot of shift lever, using cap screw, spacer, 2 washers and nut. Washers must be on either side of shift lever (**Figure 50** or **Figure 51**). Do not tighten nut.
6. Push top of shift lever as far to right (as seen from inside boat) as possible. At the same time, turn the propeller shaft counterclockwise to shift the unit fully into gear. The clutch will stop when properly engaged. See **Figure 52**.

CAUTION

This adjustment is very important; improper clutch engagement will damage the clutch.



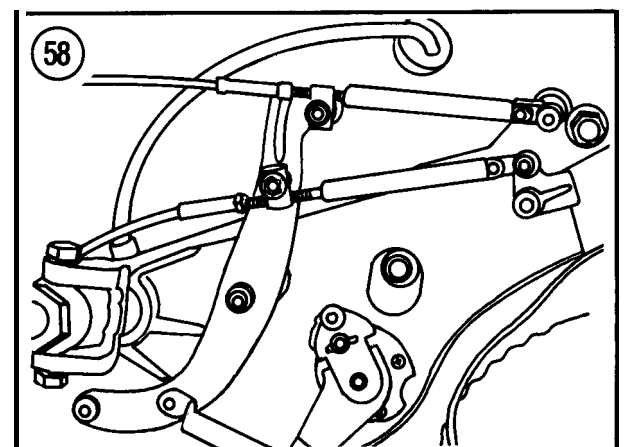
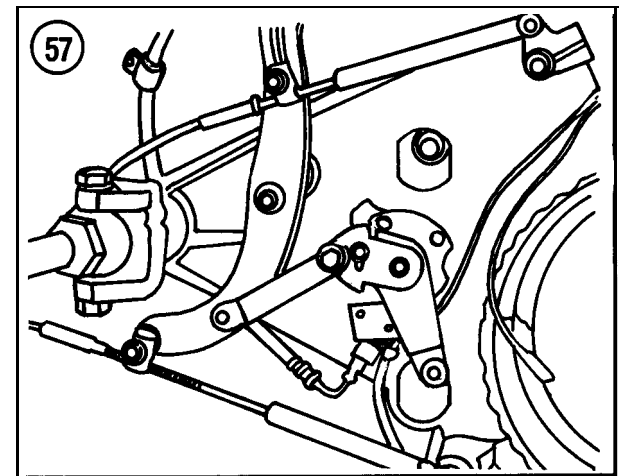


7. Move the remote control handle to full reverse position (LH) or full forward position (RH).

8A. Starboard-mounted shift control-Anchor remote control shift cable end guide to transom plate anchor point with cap screw, 2 washers and nut. Push outer conduit toward cable guide as far as possible to eliminate cable slack, then adjust brass barrel to align with mounting hole in shift lever. See **Figure 53 (LH)** or **Figure 54 (RH)**.

8B. Port-mounted shift control-Anchor remote control shift cable end guide to shift lever with screw, washer and nut. Push outer conduit toward cable guide as far as possible to eliminate cable slack, then adjust brass barrel to align with mounting hole in transom plate anchor point. See **Figure 55 (LH)** or **Figure 56 (RH)**.

9A. Starboard-mounted shift control-Fasten brass barrel to shift lever with cap screw, spacer, washers and nut. Tighten the nut securely. Refer to **Figure 57 (LH)** or **Figure 58 (RH)**.



9B. Port-mounted shift control-Fasten brass barrel to anchor point using cap screw, washers, spacers and nut. Tighten nut securely. See **Figure 59** (LH) or **Figure 60** (RH).

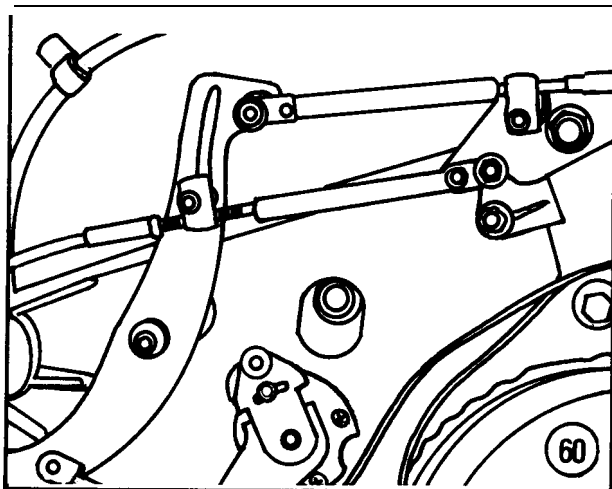
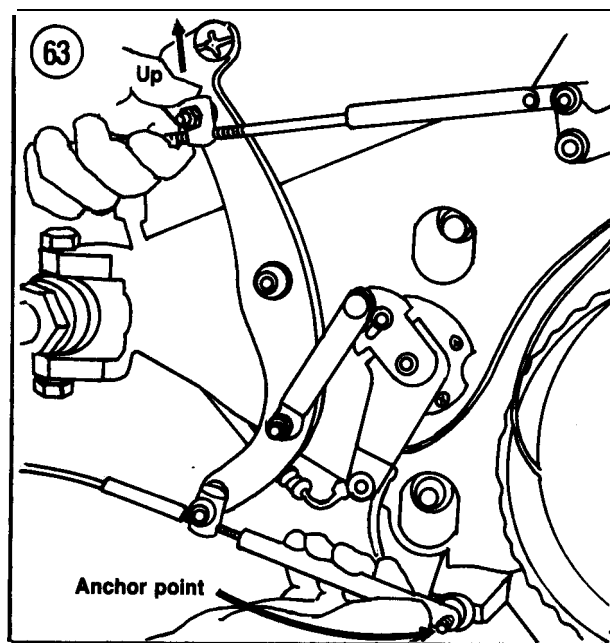
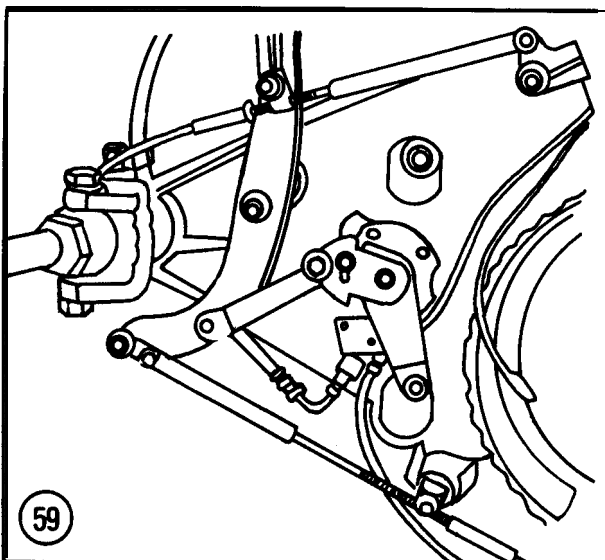
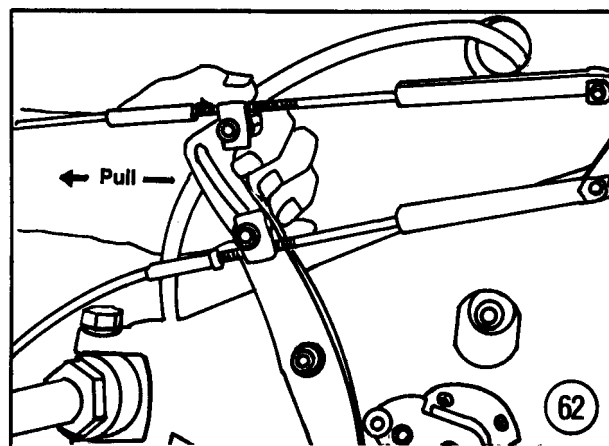
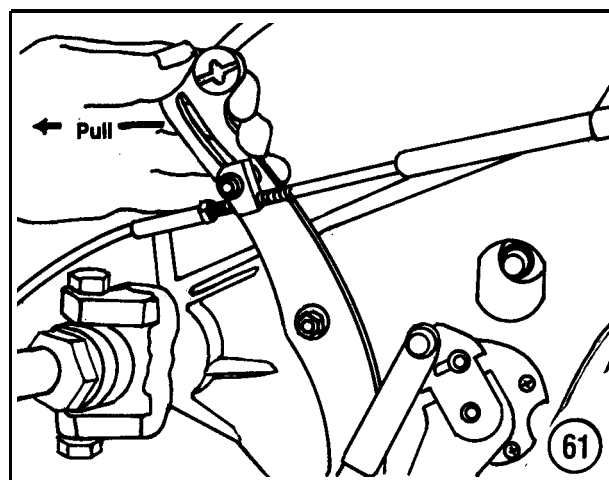
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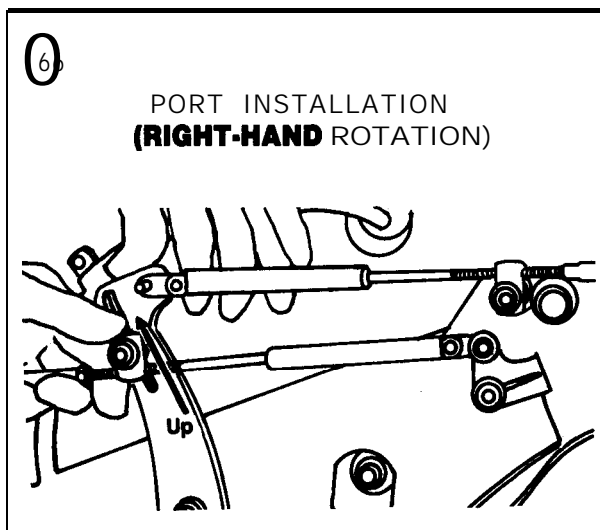
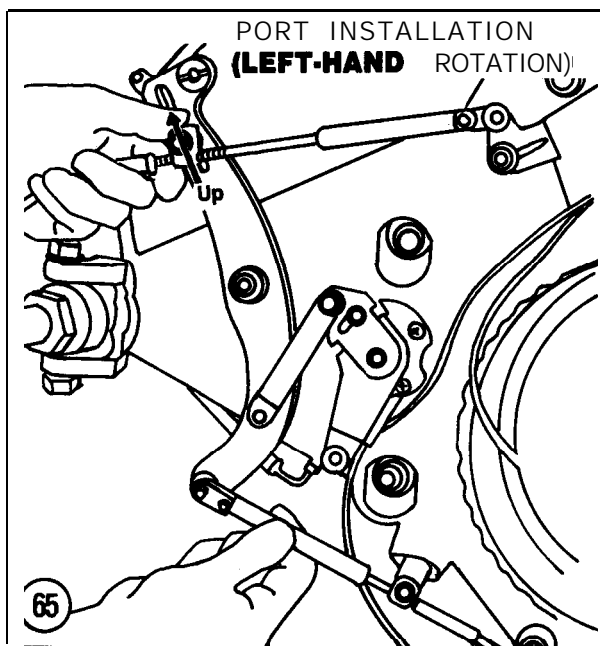
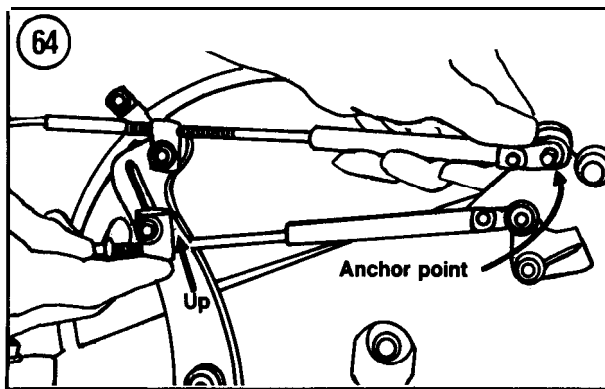
Steps 10-16 adjust forward gears on models with left-hand rotation (LH) and reverse gear on models with right-hand rotation (RH).

10. Disconnect remote control shift cable end guide from transom plate anchor point (starboard control) or shift lever (port control).

11. Move remote control lever to full forward position (LH) or full reverse position (RH).

12. Pull top of shift lever to left as far as possible while turning propeller shaft clockwise (as seen



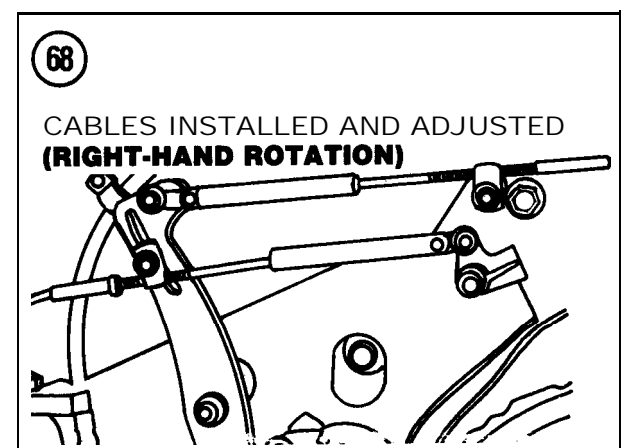
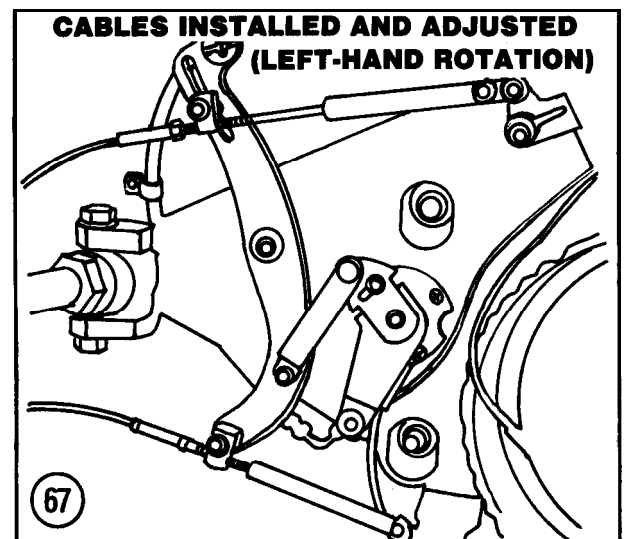


from behind boat) until it cannot be turned further. See **Figure 61 (LH)** or **Figure 62 (RH)**. This shifts LH units into forward gear and RH units into reverse with clutch properly engaged.

13. Raise the drive unit shift cable brass barrel up in the shift lever slot until the remote control shift cable can be installed in the transom plate anchor point. See **Figure 63 (LH)** and **Figure 64 (RH)** for starboard installations. See **Figure 65 (LH)** and **Figure 66 (RH)** for port installations.

14. Continue to slide brass barrel upward in slot to remove slack from remote control shift cable, then securely tighten cap screw and nut holding brass barrel to shift lever.

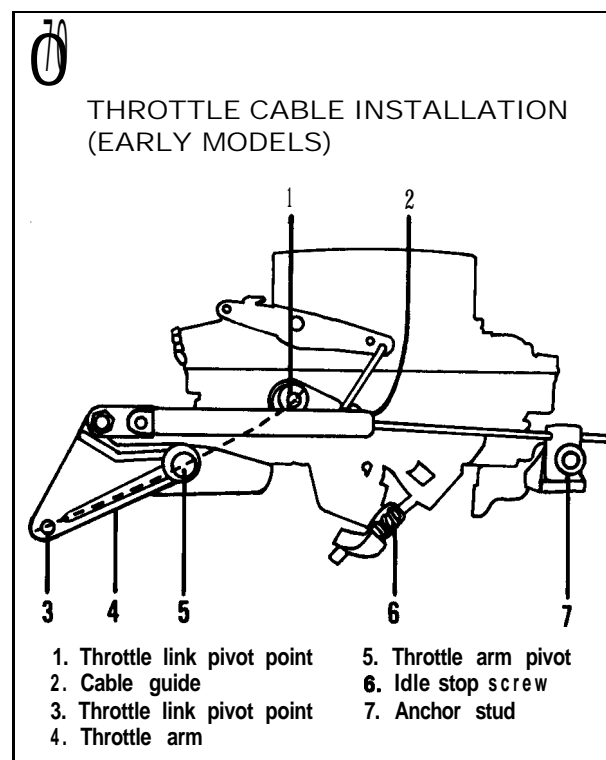
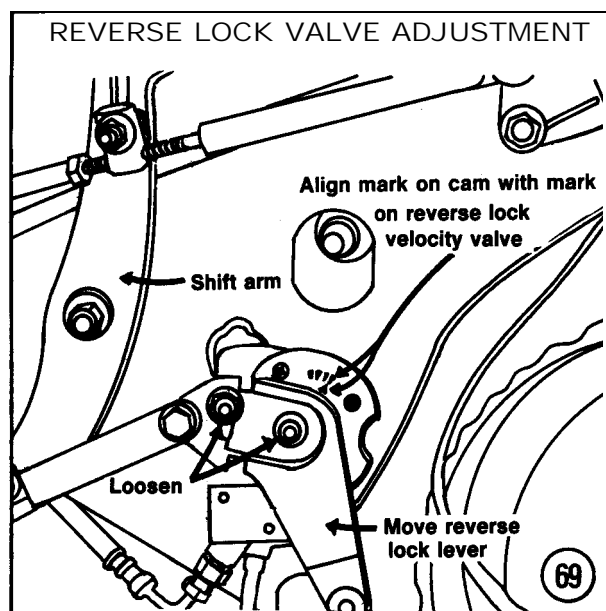
15. Loosen nut on pivot stud of switch lever one full turn. Lever must pivot freely when shifting with engine running. See **Figure 67 (LH)** and **Figure 68 (RH)**.



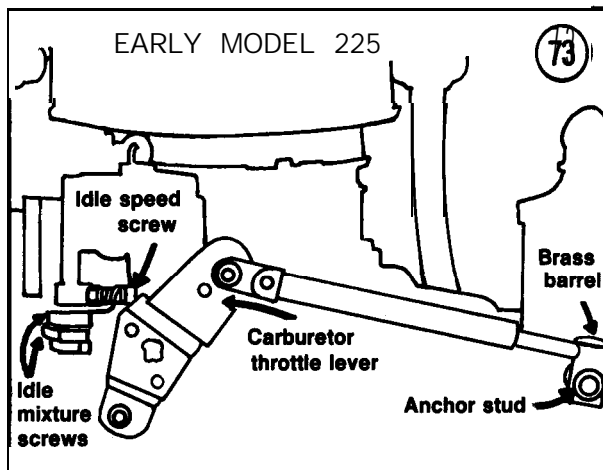
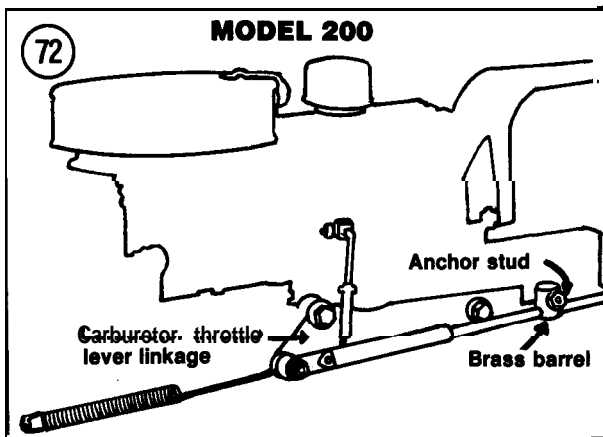
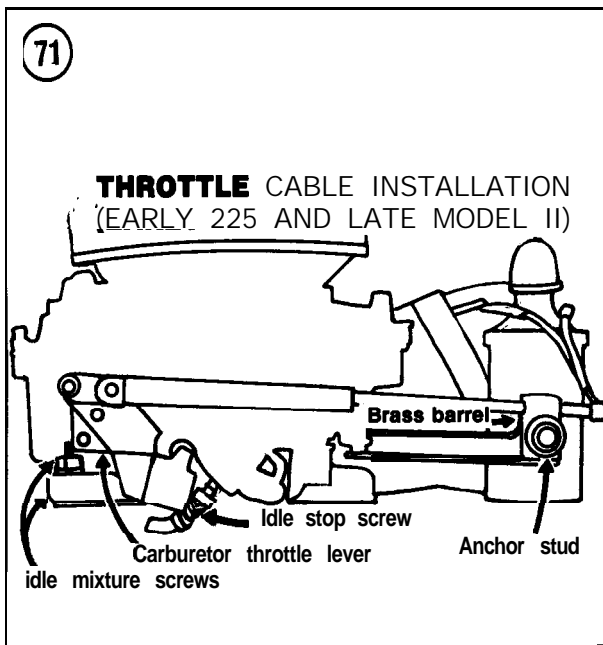
16. On later models with reverse lock valve, shift unit into full reverse. At the same time, rotate propeller shaft counterclockwise until shaft stops. Loosen 2 nuts on reverse lock lever and move upper nut as required to align raised triangular marks on cam and reverse lock valve cover with each other. Tighten 2 nuts on reverse valve lock lever. See **Figure 69**.

Throttle Control Cable Attachment and Adjustment (Except Models 200 and 225)

1. Connect throttle cable to side of boat and transom with clips. Cable should form a gradual bend leading to throttle linkage lever.
2. Place remote control handle in NEUTRAL position and neutral warmup lever in fully down position.
3. Early model carburetors-Refer to **Figure 70** and attach cable end guide and brass barrel as follows:
 - a. Remove roll pin which passes through knurled pin in cable end guide. Remove pin and spring.
 - b. Remove nut and washer from bolt passing through carburetor throttle lever.
 - c. Place cable end guide over spacer and install washer and nut. Tighten nut securely.
 - d. Grasp throttle cable behind brass barrel and push toward throttle arm. Align brass barrel with bracket anchor stud.
 - e. Install flat washer, sleeve and barrel (in that order) on anchor stud. Install another flat washer and stop nut on stud. Tighten nut securely.
4. Late model carburetors-Refer to **Figure 71** and attach cable end guide and brass barrel as follows :
 - a. Remove roll pin which passes through knurled pin in cable end guide. Remove pin and spring.
 - b. Connect cable end guide to throttle arm with bolt, sleeve and new elastic stop nut.
 - c. Position throttle arm to align the 2 throttle link pivot points with the throttle arm pivot stud. Hold arm in this position, grasp throttle cable behind brass barrel and push toward throttle arm. Adjust brass barrel to align with bracket anchor stud.
 - d. Install flat washer, sleeve and barrel (in that order) on stud. Install another flat washer and stop nut on stud. Tighten nut securely.



5. Make sure that the carburetor primary throttle valves are fully open when remote control handle is fully forward. Return handle to NEUTRAL and make sure throttle valves are fully closed.
6. Adjust engine idle speed to 500-600 rpm in forward gear. See Chapter Four.



Throttle Control Cable Attachment and Adjustment (Models 200 and 225)

1. Connect throttle cable to side of boat and transom with clips. Cable should form a gradual bend leading to throttle lever linkage.
2. Place remote control handle in NEUTRAL and neutral warmup lever fully down.

NOTE

If knurled pin is in cable guide end, remove pin and spring.

3. Remove nut and washer from bolt passing through carburetor throttle lever.
4. Place cable end guide over spacer. Place washer and nut on bolt and tighten nut securely. See **Figure 72** (Model 200), **Figure 73** (early Model 225) or **Figure 70** (early Model 225).
5. Hold cable behind brass barrel and push toward throttle arm. Adjust barrel to align with bracket anchor stud. Install flat washer, sleeve and barrel (in that order) on stud. Install another flat washer and stop nut on stud. Tighten nut securely. See **Figure 70**, **Figure 72** or **Figure 73** as appropriate.
6. Make sure that carburetor primary throttle valves are fully open when the remote control handle is fully forward.
7. Adjust engine idle speed to 500-600 rpm in forward gear. See Chapter Four.

Ride-Guide Attachment

1. Lubricate the steering cable tube end with Multipurpose Lubricant (part No. C-92-63250) or equivalent.
2. Thread steering pivot yoke into bracket until it seats firmly. Back off one turn to prevent possible binding when the unit is rotated 180°.
3. Insert cable end through tube and thread the large attaching nut loosely on the tubes.
4. Remove coupler valves from steering arm yoke. Do not lose sleeves in yoke.
5. Thread steering arm yoke into steering arm until it seats. Back out one or two turns to prevent yoke from binding when unit is rotated 180°.
6. Turn steering wheel until cable end extends out far enough to attach coupler halves into groove at end of cable.
7. Place coupler halves in cable tube groove. Place cable with coupler halves into steering arm yoke.

8. Place spacers in yoke and insert cap screw from top. Secure coupler assembly with a new elastic stop nut. **See Figure 74.**
9. Rotate the steering wheel to its extreme right position.
10. Make sure that the steering cable tube is fully threaded in against the yoke locknut.
11. Turn the steering tube out until the steering wheel starts to move to the left.
12. Secure the locknut on the tube against the swivel. Tighten large attaching nut on cable.

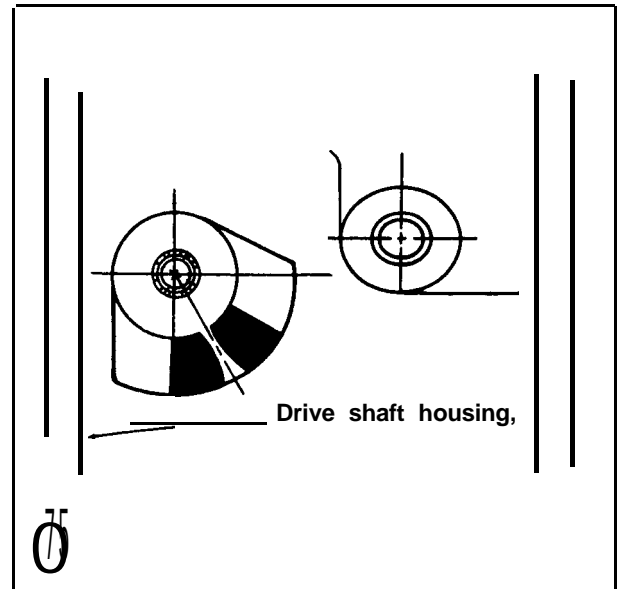
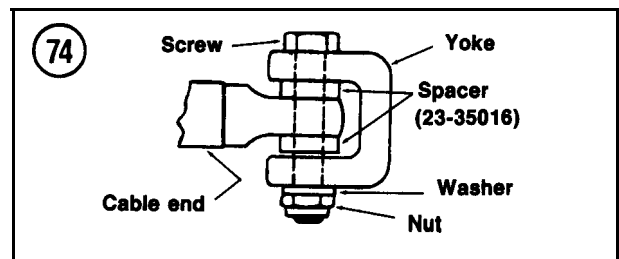
Changing Propeller Shaft Rotation

Propeller rotation is converted from left- to right-hand by repositioning the cam and cable on the inner transom plate. No internal changes are required.

1.33:1 drives

To convert 1.33: 1 drives, serial No. 1602186 and above, from left-hand to right-hand rotation, proceed as follows.

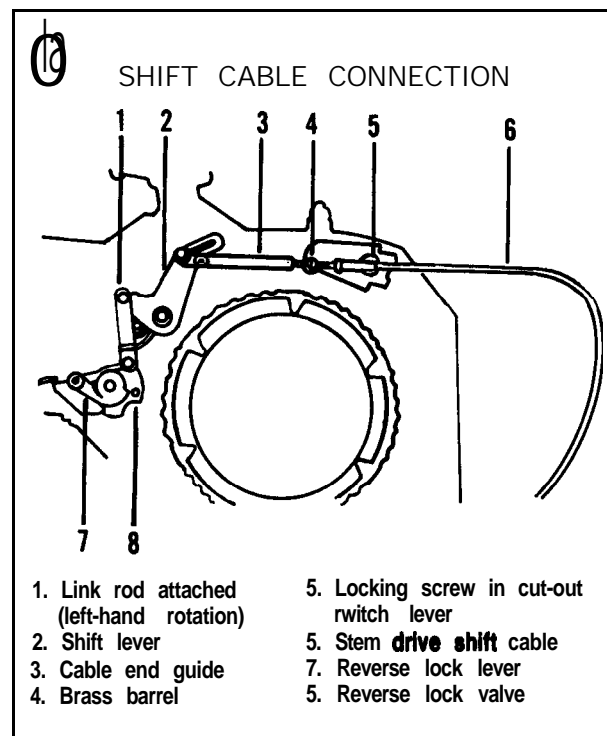
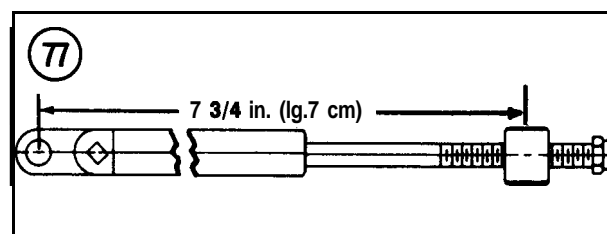
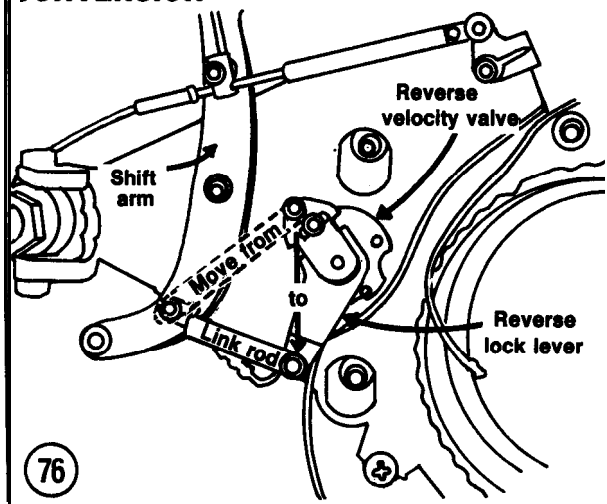
1. Rotate the unit to an inverted position with the hand crank.
2. Push the drive unit gear housing toward the transom. Hold the unit in this position and depress both reverse lock hook arms, allowing drive unit to pivot downward.
3. Remove nut from bolt holding shock absorber to drive shaft housing and remove bolt. Swivel shock absorber up toward the gimbal ring.
4. Carefully note position of reverse assembly components for reassembly reference.
5. Remove and discard the cotter pin passing through the reverse lock tube and shaft.
6. Push the pivot shaft from the drive shaft housing. Remove reverse lock assembly.
7. Loosen cam-to-shaft setscrew. Remove cam from shaft.
8. Hold drive unit shift cable brass barrel and push cable end guide toward brass barrel while rotating propeller shaft. Continue to push end guide toward brass barrel until it stops.
9. Reinstall cam on shaft in the position shown in **Figure 75**. Securely tighten setscrew.
10. Install reverse lock assembly, pivot shaft and a new cotter pin. Make sure the reverse lock arm tension spring is over the top of the drive shaft housing lug and that the nylon roller is on top of the cam.
11. Install shock absorber, bolt and nut.



12. Pivot drive unit up until the reverse lock hooks lock on the tilt adjustment bolt.
 13. Rotate drive unit downward to operating position with crank until unit is tight and locked in this position.
 14. Install right-hand rotation propeller of proper pitch and diameter.
- To change the rotation of 1.78: 1 drive units from left-hand to right-hand rotation, proceed as follows.
1. Install right-hand rotation propeller of proper pitch and diameter.
 2. Reposition and adjust shift cable as described in this chapter.
 3. Remove link rod from upper reverse lock lever arm and install on lower arm as shown in **Figure 76**.

Tilt/Trim Cylinder Installation

This procedure is identical to the one for I-drive models described in this chapter.

LEFT-HAND TO RIGHT-HAND ROTATION CONVERSION**MERCUISER MODEL II TRANSOM-MOUNTED MODELS****Removal/Installation**

This procedure is identical to the one for non-transom mounted models 200 and 225 described in this chapter.

Shift Cable Adjustment

To avoid damage to the stern drive unit, perform the steps in this procedure exactly and carefully. In addition, keep the following points in mind:

- Do not attach the throttle cable to the carburetor until after the shift cable is installed and adjusted.
- This model stern drive normally produces left-hand rotation (counterclockwise when seen from rear) and must use a left-hand propeller. To change propeller rotation from left- to right-hand rotation, see *Changing Propeller Shaft Rotation* for non-transom mounted models in this chapter. If the change is made, a right-hand propeller of the proper pitch and diameter must be installed.
- The clutch must be fully engaged when adjusting the shift cable in both forward and reverse positions. This is achieved by turning the propeller while shifting as directed in the following procedure.
 - With cable end guide removed and unit in full reverse (left-hand rotation) or forward (right-hand rotation), inner core wire of stem drive shift cable must extend exactly $1 \frac{3}{8}$ in. from end of cable guide insert. See A, Figure 49.
 - With cable end guide installed and unit still fully in gear, distance from center line of brass barrel to center line of cable end guide mounting hole must be exactly $7 \frac{3}{4}$ in. See Figure 77.

NOTE

Steps 3-7 adjust forward gear on boats with left-hand propeller rotation (LH) and reverse gear on boats with right-hand propeller rotation (RH).

- Connect stern drive shift cable to mounting stud in shift lever slot. Install brass barrel in cutout switch lever recess. Install a new cotter pin. See Figure 78.
- Shift unit into gear by moving shift lever top as far left as possible while turning propeller shaft as far as it will go.

5. Move remote control handle to its full forward position (LH) or full reverse position (RH).
6. Install remote control cable end guide with spacer, washer and nut to shift lever or transom mounting stud, as appropriate. Pull outer conduit away from cable guide as far as possible to eliminate cable slack, then adjust brass barrel to align with transom or shift lever mounting stud, as appropriate.
7. Install brass barrel to transom or shift lever mounting stud with sleeve, washers and nuts.

NOTE

Steps 8-14 adjust reverse gear on boats with left-hand (LH) propeller rotation and forward gear on boats with right-hand (RH) propeller rotation.

8. Disconnect the remote control shift cable end guide from the shift lever or transom anchor stud.
9. Shift unit into gear by moving shift lever top as far right as possible while turning propeller shaft as far as it will go.
10. Remove remote control handle to its full reverse position (LH) or full forward position (RH).
11. Lift cable end guide of stem drive shift cable up in the shift lever slot until the remote control shift cable can be reinstalled.
12. Continue to slide cable end guide up slot until slack is removed from the remote control shift cable. Tighten the anchor stud and nut which hold the cable end guide to the shift lever.
13. Shift into full reverse and check alignment marks on reverse lock valve cover and cam. If adjustment is necessary, loosen 2 nuts on reverse lock lever (**Figure 79** or **Figure 80**), align marks and tighten the nuts securely.
14. Remove screw extending through the shift cutout switch lever (**Figure 81**).

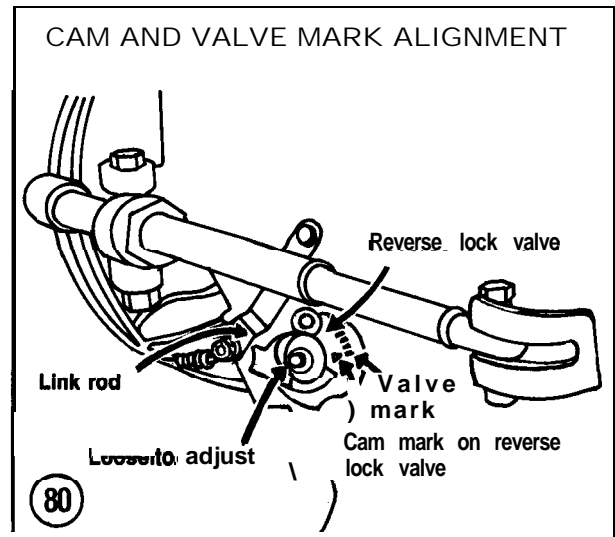
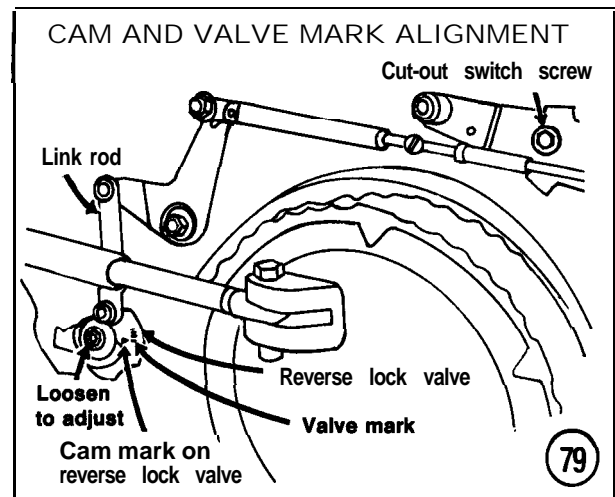
Throttle Control Cable Attachment and Adjustment

See Throttle Control Cable Attachment and Adjustment, (Except Models 200 and 225) for non-transom mounted models in this chapter.

MERCRUISER II-TR, II-TRS, III AND 215-H

Stern Drive Removal

1. Disconnect the aft end of each trim cylinder from the drive unit.

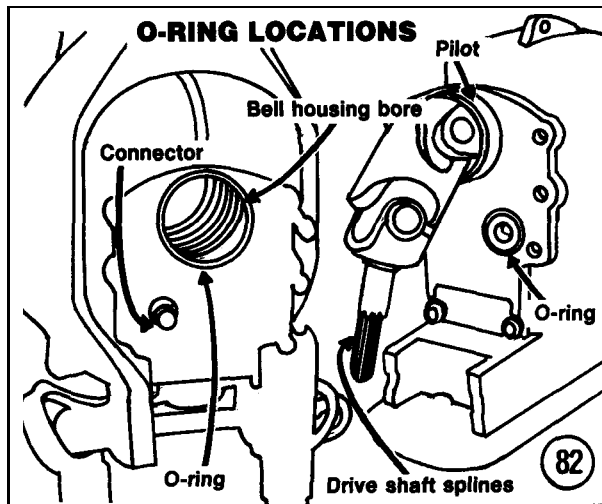
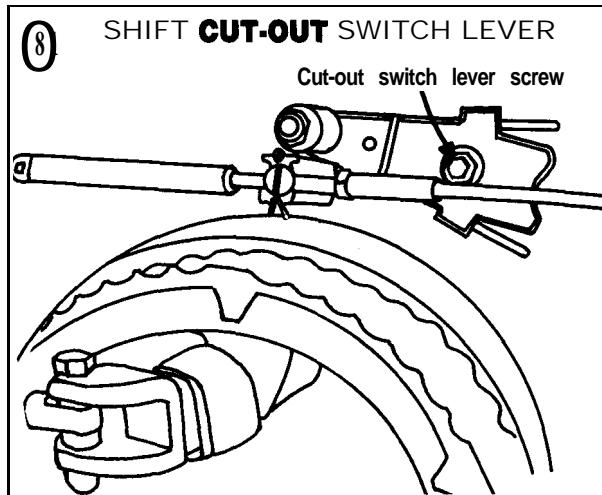


2. Remove the 6 elastic stop nuts and washers from the stem drive-to-bell housing studs.

WARNING

Do not attempt to remove the stern drive unit from the boat in Step 3 without the aid of a hoist for support. The unit is heavy and may slip from your grasp, causing damage to the stern drive and possible personal injury.

3. Attach an overhead hoist to the stern drive unit with an appropriate sling. Support the unit with the hoist.
4. Carefully guide the stern drive unit straight back and remove it from the boat.
5. Lower stern drive to the ground and remove the hoist.



6. Remove and discard the bell housing gasket.

Stern Drive Installation

CAUTION

Engine must be installed and properly aligned before stern drive unit is installed.

Refer to **Figure 82** for this procedure.

1. Make sure that the rear mount retaining nuts are correctly torqued (70 in.-lb.) before installing stern drive unit.
2. Lubricate the drive shaft housing pilot, O-ring and oil connector with Multipurpose Lubricant (part No. C-92-63250) or equivalent.
3. Lubricate the bell housing bore and oil connector with Multipurpose Lubricant or equivalent.

4. Lubricate universal joint shaft ends with Universal Joint Lubricant (part No. C-92-74058) or equivalent.
5. Install a new gasket on the bell housing studs.
6. Install the front anchor pin in the gimbal ring.
7. Attach an overhead hoist to the stern drive top cover lifting eye with an appropriate sling. Support the unit with the hoist.

NOTE

If universal joint shaft splines do not mesh with transmission splines in Step 8, rotate propeller shaft slightly until drive unit can be pushed completely in place.

8. Insert drive unit universal joint shaft through bell housing pilot bearing and push drive unit into position in bell housing.
9. Install flat washers and new elastic stop nuts on bell housing studs. Tighten stop nuts to specifications (**Table 3**).
10. Fill the drive unit with fresh lubricant of proper type and amount. See Chapter Four.

Trim/Shock Absorber Installation

See *MerCruiser Model I Tilt/Trim Cylinder Installation* in this chapter.

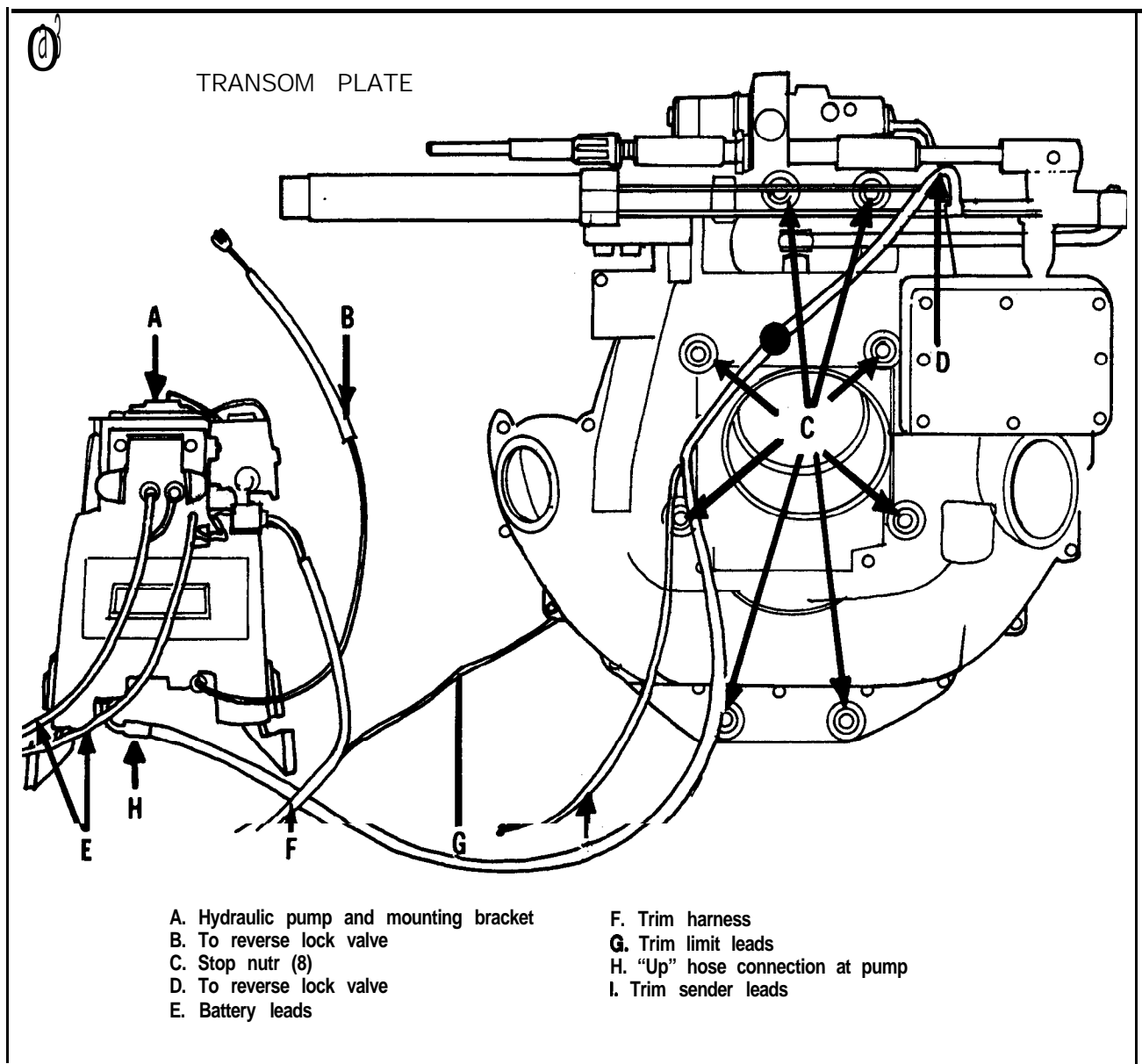
Transom Plate Removal

The engine and stern drive must be removed to service the transom plate. Refer to **Figure 83** for this procedure.

1. Disconnect and remove steering link rod and steering cable from tube.
2. Disconnect and remove black hydraulic "up" hose from trim pump. Cap the hose and plug the hose connection to prevent leakage.
3. Disconnect the tilt limit switch leads at the trim wiring harness.
4. Disconnect the drive unit oil hose from the reservoir. Plug hose and reinstall hose clamp. Cap reservoir hose fitting.
5. Remove nuts holding inner and outer transom plates together. Remove inner transom plate. Remove outer transom plate.

Transom Plate Installation

1. Lubricate the exhaust tube O-ring in the gimbal housing and inner transom plate exhaust pilot with Multipurpose Lubricant (part No. C-92-63250) or equivalent.



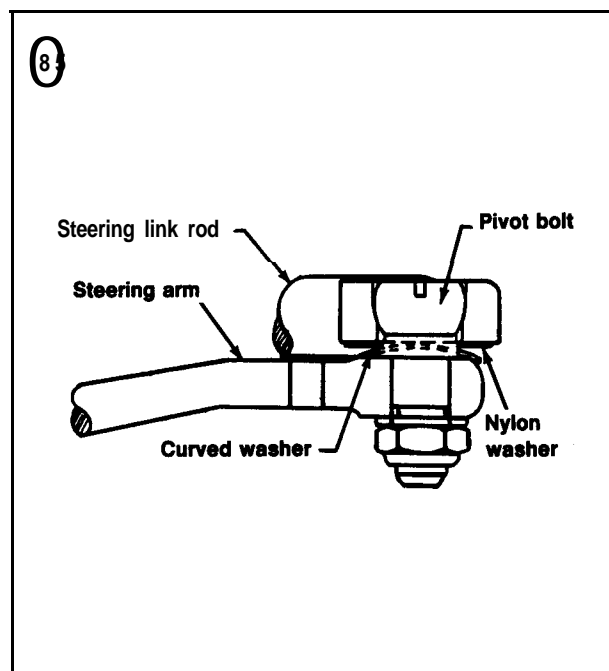
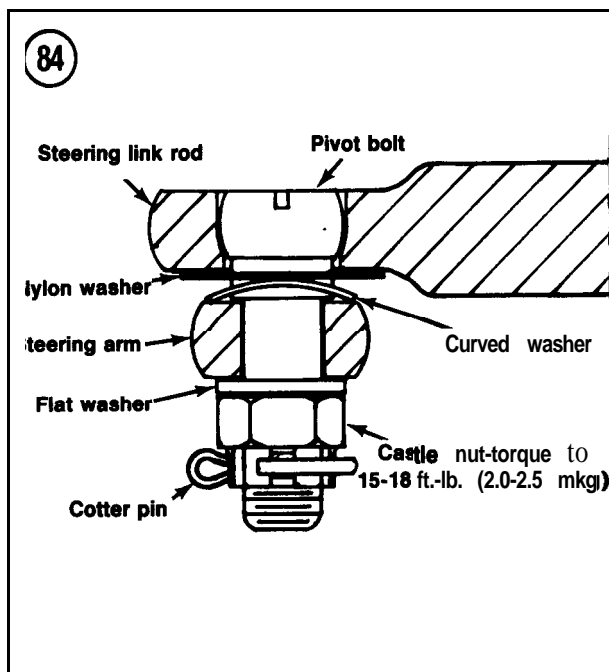
2. Install gimbal housing and inner transom plate in transom holes.
3. Insert switch leads, hydraulic hoses, steering link rod and reservoir oil hose through the transom opening.
4. Install gimbal housing and inner transom plate to transom with flat washers and new elastic stop nuts. Tighten nuts evenly to specifications (**Table 3**), working from the center up, then down.
5. Uncap and reconnect hydraulic hose to trim pump.
6. Unplug and reconnect drive oil hose to reservoir fitting. Tighten clamp securely.

7. Connect aft end of trim cylinders to aft anchor pins.

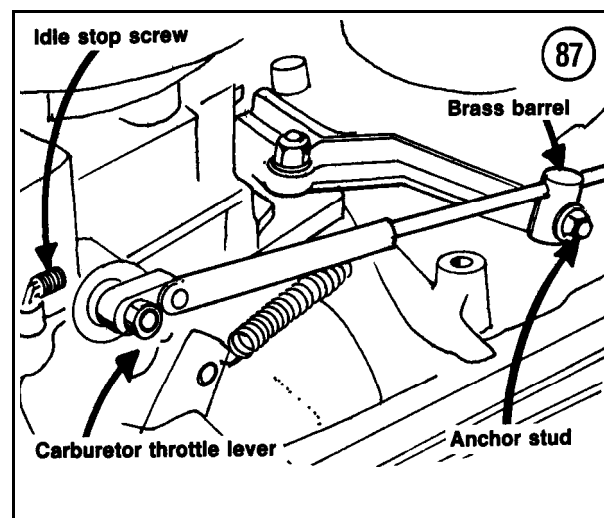
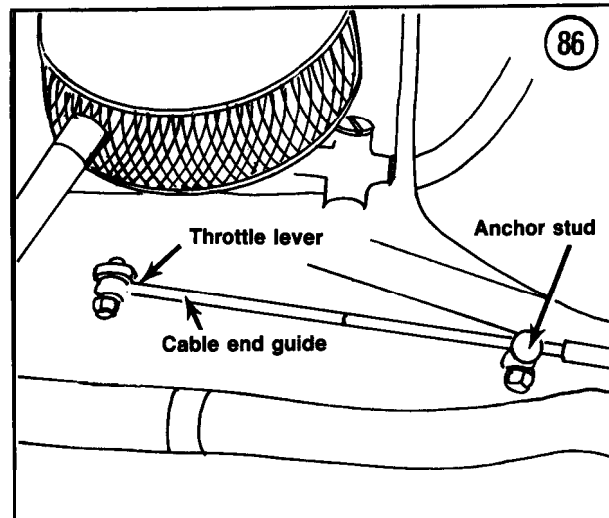
8. Lubricate steering link rod pivot area with Multipurpose Lubricant (part No. C-92-63250) or equivalent. Connect link rod to steering arm as shown in **Figure 84** (II-TR and II-TRS) or **Figure 85** (III and 215-H).

Throttle Cable Installation (MerCruiser II-TR, II-TRS and 215-H)

1. Place remote control handle in NEUTRAL, idle position.



2. Attach cable end guide to throttle lever with bolt, bushing, washers and nut. See **Figure 86**.
 3. Hold cable behind brass barrel and push lightly toward throttle lever.
 4. Adjust brass barrel to align with anchor stud. Fasten barrel to stud with washers and nut. See **Figure 86**.



Throttle Cable Installation (MerCruiser III)

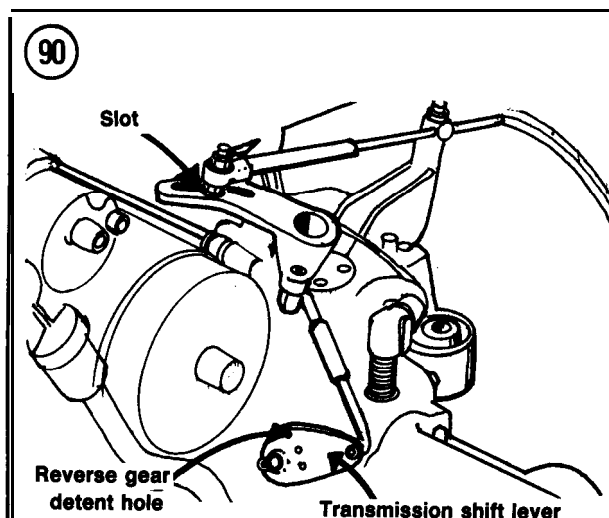
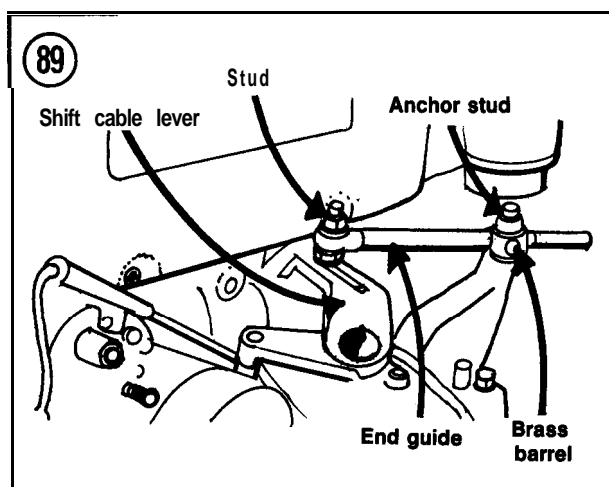
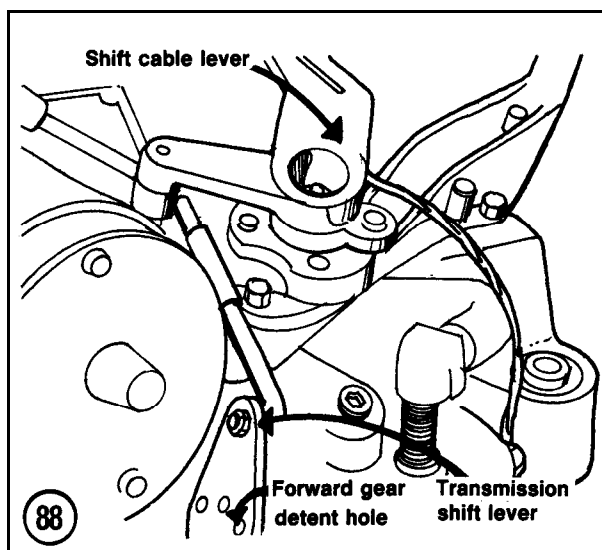
Refer to **Figure 87** for this procedure.

1. Place remote control handle in NEUTRAL. Place neutral warmup lever in down position.
2. Remove the roll pin from the knurled pin in the cable end guide. Remove the knurled pin and spring.
3. Remove nut and one washer from carburetor throttle lever screw.
4. Fit cable end guide over spacer, install flat washer and nut on screw and tighten nut securely.
5. Hold throttle cable behind brass barrel and push toward throttle arm.
6. Adjust brass barrel to align with bracket anchor stud. Install flat washer, sleeve and barrel on stud.

Install another flat washer and stop nut on stud. Tighten nut securely.

Shift Cable Installation and Adjustment (MerCruiser III and 215-H).

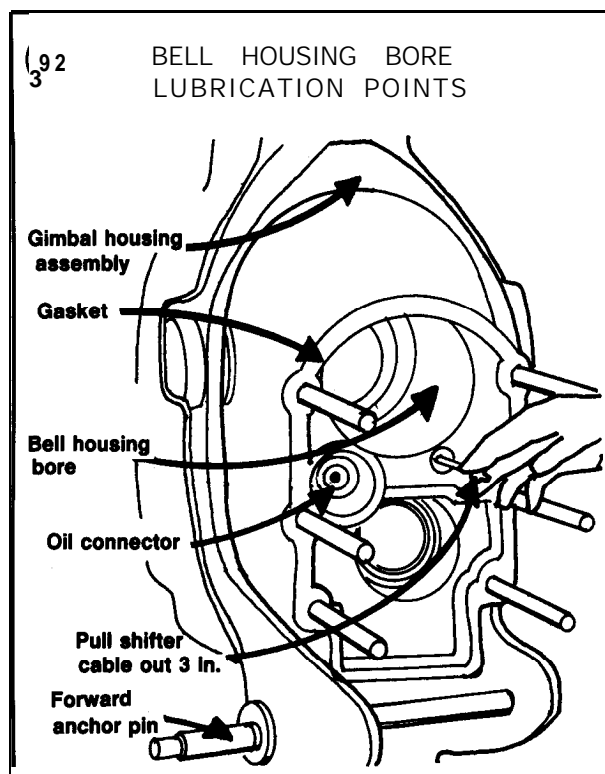
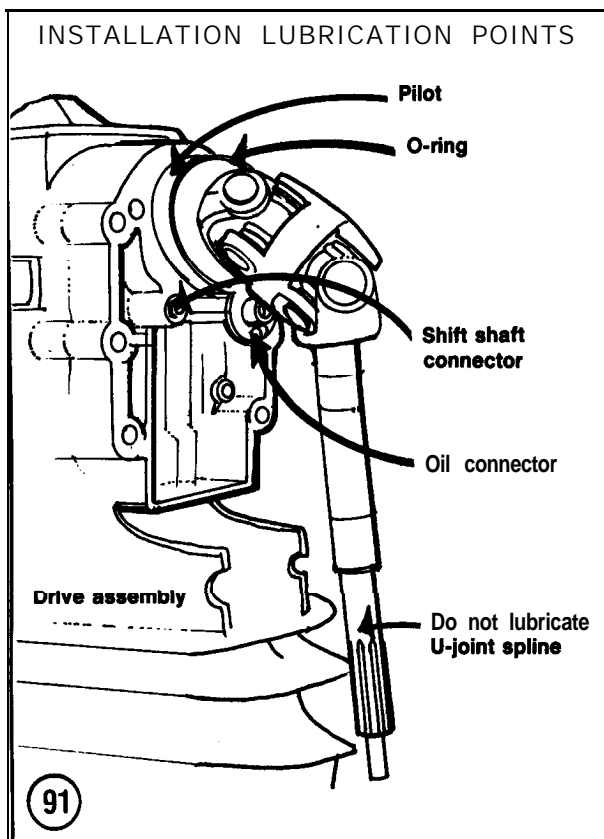
1. Move remote control cable to its full forward position.
2. Shift transmission into forward gear by moving shift cable lever to the right until the detent ball (located behind transmission shift lever) appears in the rear hole of the transmission shift lever. See **Figure 88**.
3. Remove roll pin from knurled pin in cable end guide. Remove knurled pin and spring.
4. Install cable end guide on shift cable lever stud (**Figure 89**).
5. Adjust shift cable brass barrel until it can be installed on anchor stud without disturbing the shift cable lever position (**Figure 89**).
6. Install end guide to shift cable lever stud with flat washer and nut. Tighten nut, then back off slightly to allow end guide to pivot freely.
7. Attach brass barrel to anchor stud with flat washer and nut. Tighten nut securely.
8. Move remote control lever to full reverse position.
9. Loosen nut holding stud to shift cable lever. Move lever to the left while sliding the stud down the lever slot until detent ball is centered in front hole in transmission shift lever. See **Figure 90**. Tighten nut securely.
10. Move remote control handle to full forward position to check adjustment. Detent ball must be centered in rear hole in transmission shift lever (**Figure 88**). Now move remote control handle to full reverse position. Detent ball must be centered in front hole (**Figure 90**). If transmission lever does not position correctly to allow detent ball centering as described, readjust the cable.



MERCRUISER 215-E

Stern Drive Removal

1. Disconnect the aft end of each trim cylinder from the drive unit.
2. Remove the 6 elastic stop nuts and washers from the stern drive-to-bell housing studs.

**WARNING**

Do not attempt to remove the stern drive unit from the boat in Step 3 without the aid of a hoist for support. The unit is heavy and may slip from your grasp, causing damage to the stern drive and possible personal injury.

3. Attach an overhead hoist to the stern drive unit with an appropriate sling. Support the unit with the hoist.
4. Carefully guide the stern drive unit straight back and remove it from the boat.
5. Lower stern drive to the ground and remove the hoist.
6. Remove and discard the bell housing gasket.

Stern Drive Installation**CAUTION**

Operating electrical shift control without drive shaft installed will cause clutch plate misalignment. Do not connect electrical shift control harness leads to actuator box unless battery is disconnected or fuse is removed from holder in red wire located over flywheel housing. If clutch plate has been moved out of position, an engine alignment tool (part No. C-91-57797A1) with clutch alignment tool (part No. C-91-57795) will be required to realign the clutch plate as described in this chapter.

1. Lubricate the drive shaft housing pilot O-ring and the oil/shift connectors with Multipurpose Lubricant (part No. C-92-63250) or equivalent. Do not lubricate shaft splines. See **Figure 91**.
2. Apply a light coat of Multipurpose Lubricant to the inside surfaces of the bell housing bore and position a new gasket.
3. Install front anchor pin in gimbal ring.
4. Support stern drive unit with hoist attached to lifting eye in top cover and align unit with hole in transom plates.
5. Install drive shaft into bell housing bore.
6. Pull shifter cable about 3 in. out of bell housing (**Figure 92**) and insert square end of shifter cable into shifter shaft connector.

CAUTION

Do not turn connector shaft in stern drive to insert shift cable.

7. Push stern drive into bell housing and install flat washers and new elastic stop nuts on mounting studs. Tighten nuts evenly to specifications (**Table 3**).

NOTE

*If drive shaft splines do not mesh with clutch disc splines, rotate universal joint shaft slightly until splines mesh. **If** unit still cannot be pushed into position, perform clutch plate realignment procedure in this chapter.*

8. Install unit shifter shaft as described in this chapter.
9. Check shift harness installation to actuator box. Reinstall fuse in red wire fuse holder over flywheel housing.

Changing Propeller Shaft Rotation

The Model 215-E drive unit is normally assembled for left-hand propeller shaft rotation (counterclockwise when seen from rear) and must be used with a left-hand propeller. If right-hand rotation is required, perform the following steps.

1. Remove shifter gear stop screw at left-hand positioning hole (**Figure 93**).
2. Coat stop screw with Loctite "A" (part No. C-92-32609-1) and install in shifter gear through the right-hand positioning hole.
3. Using a small screwdriver, rotate shifter gear shaft clockwise until the stop screw hits the stop and can be seen in the left-hand positioning hole.
4. Install a right-hand propeller of the proper pitch and diameter.

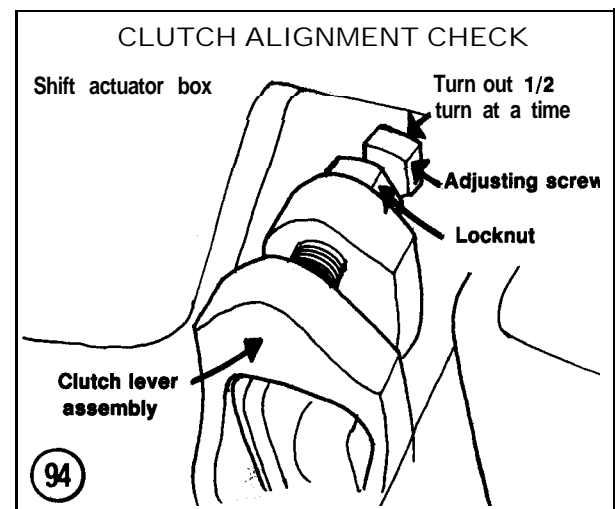
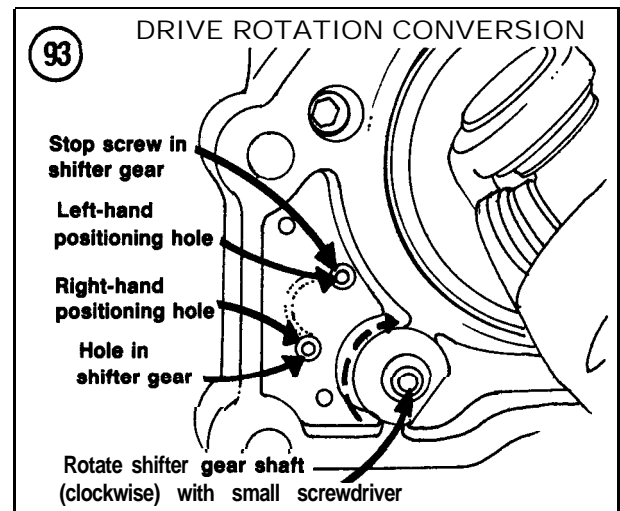
Clutch Plate Realignment

1. Make sure electric shift control is connected and placed in NEUTRAL.
2. Insert engine alignment shaft (part No. C-91-57797A1) with the clutch alignment tool (part No. C-91-57795) through the clutch plate splines.
3. When tool is fully through the clutch plate, shift the control into FORWARD to hold the plate in alignment.

NOTE

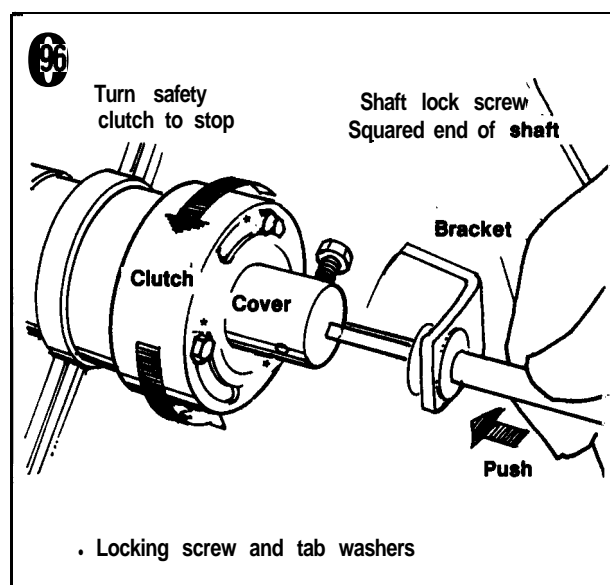
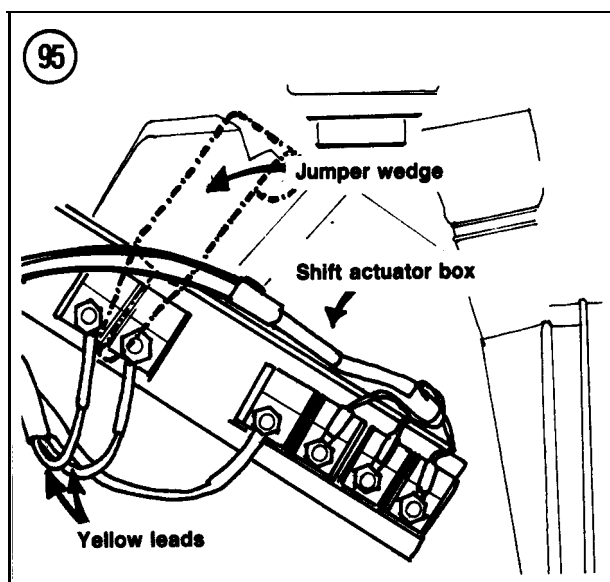
To manually release clutch plate, remove fuse from holder and turn safety clutch toward forward gear (direction of decal arrow) until it reaches a firm stop. Then turn clutch in opposite direction until clutch plate is released. After positioning plate with alignment tool, return safety clutch to forward gear, as above.

4. Remove fuse from holder in red lead to prevent a possible shift cycle.
5. Remove the alignment tools and install the drive unit.

**Clutch Alignment**

If the stern drive does not shift smoothly when engine is operating, clutch requires adjustment. Also adjust the Model 215-E clutch after the first 20 hours of operation.

1. Place the electric MerControl in forward gear. Remove fuse from fuse holder on red wire over flywheel housing.
2. Loosen clutch lever locknut. Turn adjusting screw 1/2 turn, then tighten locknut and reinstall fuse. See **Figure 94**.
3. Start engine and shift into reverse gear, then into forward gear. If the unit does not shift smoothly, readjust until smooth operation is obtained.



Emergency Manual Shift Operation

If shifting the electric MerControl becomes difficult or impossible, the stern drive can be manually shifted into forward gear as follows.

1. Remove the fuse from the fuse holder on the red wire.
2. Turn the safety clutch in the direction of the decal arrow until it stops firmly. The drive unit is now in forward gear.
3. Remove the jumper wedge from the holder on the port rocker cover. Jam the wedge between 2 yellow terminals on the port side of the shift

actuator box. **See Figure 95.** Unit will now start in gear.

CAUTION

When starting engine, place throttle in idle and remember that stern drive is in gear. Cautiously start and stop engine to control boat motion, as drive cannot be shifted into NEUTRAL or REVERSE.

Unit Shifter Shaft Installation and Synchronization

1. Route the long flexible shaft and cable housing under the engine mounts and through the brackets to the actuator box safety clutch. There should be no sharp bends in shaft/cable housing.
2. Route the short cable housing over the engine mount and through the bracket to the safety clutch.
3. Insert flexible shaft fully into the safety clutch cover (**Figure 96**). Tighten lockscrew to 55 in.-lb.

CAUTION

*Do not turn flexible shaft to align with safety clutch cover. If squared shaft end is not aligned, rotate safety clutch to forward gear stop (in direction of decal arrow). Loosen 3 screws in safety clutch cover (**Figure 96**) and rotate in slots until shaft can be installed. Tighten setscrews to 24 in.-lb. and bend tabs to lock screws.*

4. Connect shift control electrical leads.
5. Cycle shift control 2 times to automatically set shift synchronization.

Throttle Cable Installation

See Throttle Cable Installation (MerCruiser ZZ-TR, II-TRS and 215-H in this chapter.

Trim/Shock Absorber Installation

See MerCruiser Tilt/Trim Cylinder Installation in this chapter.

Ride-Guide Steering

Lubricate steering link rod pivot area with Multipurpose Lubricant (part No. C-92-63250) or equivalent. Connect link rod to steering arm as shown in **Figure 85**.

Table 1 **MERCUISER** ENGINE/STERN DRIVE MODELS

Engine model	Mfgr. ¹	1963	1964	Stern drive model year				
				1965	1966	1967	1968	1969
60	Ren.			0	0	0	0	
80	Ren.				0	0	0	0
110	GM	I	IA	IA EZ	IA EZ			
120	GM		IB	IB EZ	IB EZ	120	120	120,140
1402	GM	I	IC	IC EZ	IC EZ			
1403	GM							120,140
150	GM		IC	IC EZ	IC EZ	IC EZ		
160	GM					160	160	160
190	GM	II	II					
200	GM							II
225	GM	II	II	II	II	II	II	II
270	GM							II
310	GM	II	II	II	II			
315	GM					II		
325	GM							III
Engine model	Mfgr. ¹	1970	1971	1972	1973	1974	1975	
90	Ren.	0	0	0				
120	GM							
1403	GM							
165	GM							
888	Ford							
215H	Ford		215H					
215E	Ford	215E	215E	215E				
2258	Ford							
225TR	Ford				II-TR	II-TR		
233	Ford							
255	Ford				II-TR	II-TR		
255	GM						II-TR	
255	Ford				II-TR	II-TRS		
260	GM							
270	GM	II	II	II				
280	GM						II-TRS	
325	GM	III	III	III				
370	GM	II-TRS	II-TRS	II-TRS	II-TRS	II-TRS	II-TRS	
Engine model	Mfgr. ¹	1976	1977	1978	1978	1980	1981	
120	GM							
1403	GM							
165	GM							
470	MM							
485	MM							
888	Ford							
898	GM							
225	GM	II-TR						
228	GM					I		
255	Ford	II-TR						

(continued)

Table 1 MERCURISER ENGINE/STERN DRIVE MODELS (continued)

Engine model	Mfgr. ¹	1976	1977	Stern drive model year				1980	1981
260	GM			I	I			- i - - - -	I
270	GM	II-TRS							
280	GM	II-TRS							
330	GM		II - T R	II-TR	II-TR	II-TR	II-TR		II-TR
330	GM		II-TRS	II-TRS	II-TRS	II-TRS	II-TRS		II-TRS
370	GM	II-TRS	II-TRS	II-TRS	II-TRS	II-TRS	II-TRS		II-TRS

8 Cyl

Engine model	Mfgr. ¹	1982	1983	1984	1985	1986	1987
120	GM	I	I				
120R	GM			I-R			
120MR	GM				I-MR		
1403	GM	I	I				
140R	GM			I-R			
140MR	GM				I-MR		
470	MM	I	I				
470R	MM			I-R			
170MR	MM				I-MR		
465	MM	I					
466	MM		I				
486R	MM			I-R			
190MR	MM				I-MR		
185	GM		I				
185R	GM			I-R			
185MR	GM				I-MR		
696	GM	I					
205MR	GM				I-MR		
226	GM	I	I				
226R	GM			I-R			
228TR	GM			II-TR			
230MR	GM				I-MR		
230TR	GM				II-TR	II-TR	II-TR
260	GM	I	I				
260R	GM			I-R			
260MR	GM				I-MR		
260TR	GM				II-TR	II-TR	II-TR
330	GM	II-TR	II-TR	II-TR	II-TR	II-TR	II-TR
330	GM	II-TRS	II-TRS	II-TRS	II-TRS	II-TRS	II-TRS
370	GM	II-TRS	II-TRS	II-TRS	II-TRS	II-TRS	II-TRS

I. Ren. = Renault; GM = General Motors; MM = Mercury Marine
 I. 6-cylinder.
 I. 4-cylinder.

Table 2 MERCURISER STERN DRIVE RATIOS

Drive ratio	Engine model
1.30:1	330 (II-TRS)
1.33:1	200, 225
1.50:1	898, 898R, 225S, 228, 228R, 230MR, 155TRS, 250, 260, 260R, 260MR, 280TRS, 370, 898, 898R

(continued)

Table 2 **MERCRUISER** STERN DRIVE RATIOS **(continued)**

Drive ratio	Engine model
1.65:1	165, 898R , 205MR
1.66:1	110, 140* , 160
1.78:1	215H
1.84:1	90 , 185R , 185MR , 470 , 470R , 485 , 488 , 488R , 170MR , 190MR , 120
1.98:1	120R , 120MR , 140** , 140R , 140MR , 150
2:1	60 , 80 , 90 , 215E , 225TR , 226 (II-TR), 255TR , 270, 330 (II-TR)
2.01:1	120
. 6-cylinder. * . 4-cylinder.	

Table 3 TIGHTENING TORQUES

Fastener	ft.-lb.	in.-lb.
MODEL 0		
Bell housing		
Stud-to-drive shaft housing nut	40	
To gimbal ring hinge pin	40	
Exhaust bellows clamp	12	
Gimbal housing seal retaining cover screw		20-30
Gimbal ring-to-upper swivel shaft screw	20	
Hydraulic pump bracket bolt	14	
Ride-Guide bolt	30	
Shift cutout lever arm spring retainer	10-32	
Steering lever-to-upper swivel shaft nut	35	
Steering link rod nut	30	
Transom plate carriage bolts	20-25	
Transom plate-to-gimbal housing bolts	20-25	
Universal joint bellows clamp	12	
MODEL I		
Bell housing		
Stud-to-drive shaft housing nut	50	
To drive shaft housing nut	50	
Drive shaft housing		
Top cover bolts	20	
To rear housing nuts	35	
Engine mount nut	35	
Exhaust bellows		
Bolt or screw	20-25	
Clamp		35-36
Gimbal housing		
Stud nut	20-25	
Stud-to-transom plate nut	20-25	
Gimbal ring-to-upper swivel shaft bolt	20	
Hydraulic connector-to-gimbal housing stud nut	10	
Hydraulic pump bracket bolt	14	
(continued)		

Table 3 **TIGHTENING TORQUES** (continued)

Fastener	ft.-lb.	in.-lb.
MODEL I		
Reverse lock valve nut or screw	14	
Shift bellows clamp		35-38
Shift cable-to-core wire support nut	15	
Shift cutout lever arm spring retainer bolt		50-75
Steering lever		
Coupler nut	20	
To upper swivel shaft nut	45-50	
Steering link rod		
To Ride-Guide nut		20
To steering lever	15-18	
Transom plate		
Carriage bolt nut	20-25	
To gimbal housing bolt	20-25	
Trim tab bolt		180
Universal joint shatt		
Bellows clamp		35-38
Cover retainer	200	
Pinion nut	85	
Upper swivel shatt pipe plug	40-45	
MODELS II, II-TR, II-TRS, III, 215		
Bell housing		
To drive shatt housing stud nut	80	
To gimbal ring hinge pin	80	
Drive shaft housing		
Rear cover bolt	20	
Top cover bolt	20	
To gear housing stud nut	35	
Exhaust bellows clamp		35
Exhaust cover-to-transom plate		
Nut	25-30	
Screw	12	
Exhaust elbow bolt or screw	20-25	
Gimbal housing stud-to-transom plate nut	25-30	
Gimbal ring-to-upper swivel shaft bolt	20	
Hydraulic connector-to-gimbal housing stud nut	10	
Hydraulic pump bracket bolt	20	
Oil hose clamp		12-15
Reservoir cover-to-transom plate bolt	20	
Reverse lock valve bolt	14	
Steering lever-to-upper swivel shaft nut	45-50	
Steering link rod nut		
To Ride-Guide cable		20
To steering lever	15-18	
Trim tab bolt		180
Universal joint shatt		
Bellows clamp		35
Pinion nut	200	
Upper swivel shatt pipe plug	40-45	
Valve guide		
Cover-to-bell housing bolt or screw	15	
To drive shatt housing bolt		30