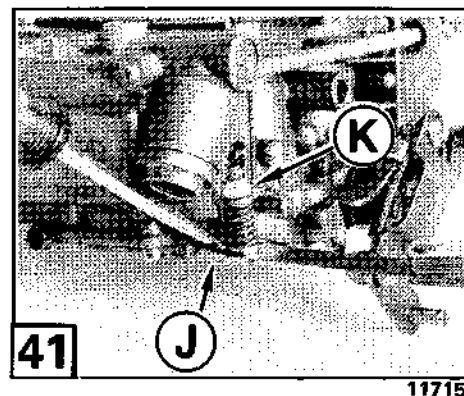


## Adjustments - 4.3 HO, 5.8 Litre Models *OMC* *Cobra 4 BBL. Carburetors*

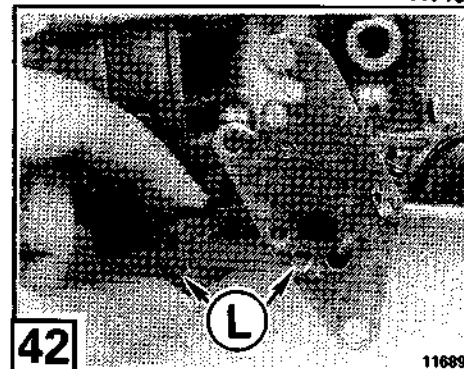
### Accelerator Pump Clearance

**41** Block the primary throttle plates in the wide open position, and manually depress the accelerator pump arm **J**. Use a feeler gauge to check for the specified clearance between the arm and the pump lever screw head. Turn the adjusting nut **K** in to increase the clearance and out to decrease the clearance. This adjustment ensures maximum pump output, full primary throttle opening, and prevents off-idle hesitation.



### Accelerator Pump Stroke

**42** The accelerator pump stroke is controlled by the pump cam position. The proper amount of fuel is delivered when the attachment screw is in the specified hole **L** of both the cam and throttle arm.

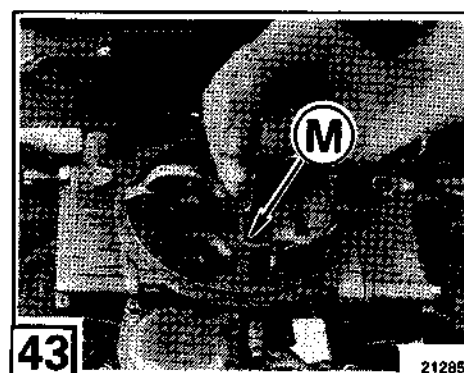


### Choke Unloader Adjustment

**43** 1. Hold throttle valves in wide open position, insert a  $1/64$  in. drill between lower edge **M** of choke valve and inner wall of air horn. This will give the required clearance of 0.300 in. (7.6 mm) when measured at the lower edge of the choke valve.

2. Press finger lightly against choke control lever. A slight drag should be felt as drill is pulled out.

**44** 3. To adjust, bend tab **N** on kick-down lever until correct opening has been obtained.



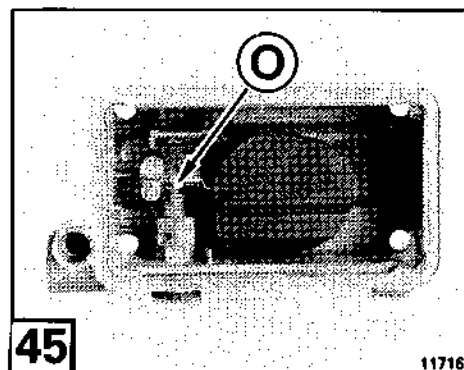
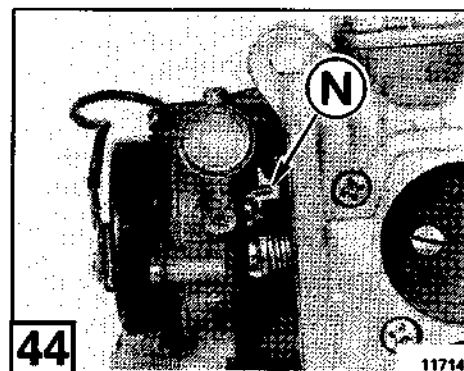
### Float Adjustment

**45** Both the primary and secondary floats are adjusted in the same manner. Drain fuel from the carburetor and remove the fuel bowl and float assembly. Remove float baffle. With bowl inverted, carefully bend the curved float arm **O** that contacts the inlet needle to set the float parallel to the fuel bowl. Reinstall bowl using new gaskets.

**!** Do not spill fuel. This will create a fire hazard.

### Secondary Throttle Plate Adjustment

1. Hold the secondary throttle plates closed.



Safety Related

**46** 2. Turn the secondary throttle shaft adjusting screw (stop screw) **A** out (counterclockwise) until the secondary throttle plates close in the throttle bores.

**46** 3. Snap the secondary throttle plates closed. Turn in the stop screw (clockwise) until the screw just contacts the secondary lever **B**. The plates should not stick in the bores. If they do, slightly turn in the stop screw. Again snap the throttle plates. Properly adjusted plates will not stick in the bores but will be cracked open slightly.

#### Idle Speed and Mixture Adjustment

1. Initially set the idle mixture by turning the idle mixture screws inward until they are lightly seated, then turn the screws outward the specified turns. Do not turn the screws tightly against the seats. If the screw tips are damaged, they must be replaced before a satisfactory fuel-air mixture can be obtained.

2. Final adjustments are made with the engine running and the engine temperatures stabilized. Install a tachometer to make the final adjustments. Refer to specifications and set engine for the specified idle RPM.

3. Turn the idle mixture adjusting screws inward until the engine RPM begins to drop due to the lean mixture, and then turn the screws outward until the engine RPM begins to drop due to the rich mixture. Finally, turn the screws inward for maximum engine RPM and smoothness. Turn the screws evenly and alternately the same amount.

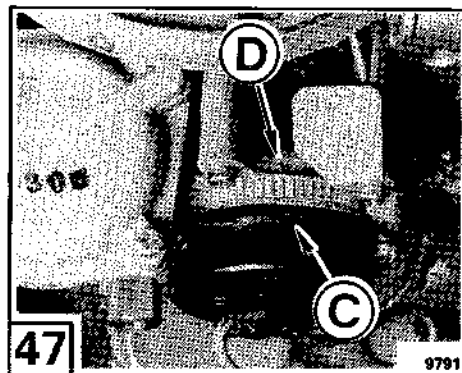
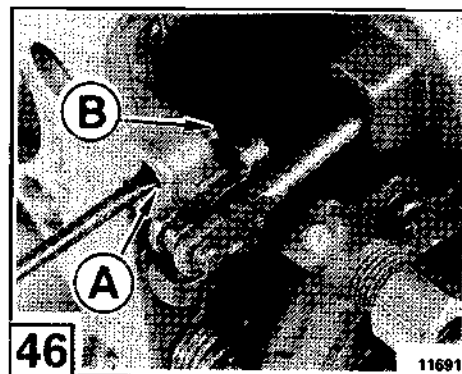
4. Readjust idle speed as necessary, always adjusting idle speed last.

#### Electric Choke Adjustment

The electric choke has an adjustment to control its reaction to engine temperature. By loosening the clamp screws that retain the thermostatic spring housing to the choke housing, the spring housing can be turned to alter the adjustment. Turning the housing in a counterclockwise direction will richen the mixture and make the choke stay on longer. Turning the spring housing in the opposite direction (clockwise) will lean out the mixture and make the choke come off sooner.

**47** 1. Set the choke so that the index mark on the choke cover **C** is aligned relative to the index marks on the choke housing **D** as specified.

2. If a richer or leaner mixture during warmup period is desired, it can be obtained by rotating thermostat cover one mark at a time. Never set index mark on cover more than two graduations off specified setting.

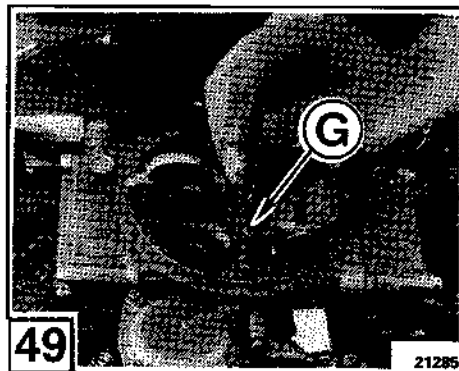
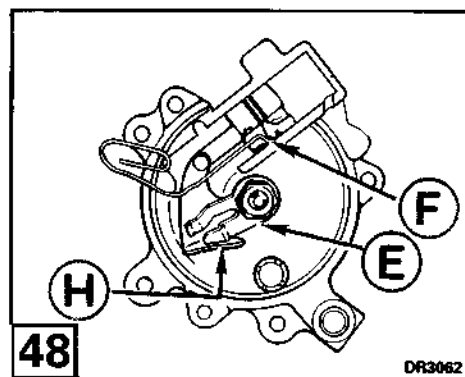


## Choke Vacuum Qualification

1. Remove thermostat choke plastic cover.

**48** 2. Straighten a paper clip 2 in. (50,8 mm). Make a 90° bend at the tip  $\frac{3}{32}$ - $\frac{1}{8}$  in. (2,38-3,18 mm) long. Hold choke plate fully closed with your finger by pushing on choke piston lever **E**. Insert bent tip of paper clip into slot **F** at lower rear edge of piston. Release choke plate and push piston to bottom of well with paper clip.

**48** **49** 3. Slowly close choke plate by pulling on the paper clip and pushing against the choke piston lever with your finger until plate stops. Measure clearance **G** between lower edge of choke plate and inside of air horn wall with a  $\frac{3}{4}$  in. (3,56 mm) drill. Adjust plate clearance by bending tab **H** as required.



## Carburetor Torque Values - *Holley 2 & 4 BBL*

|                                  |                                |
|----------------------------------|--------------------------------|
| <b>Inlet Needle Seat</b> .....   | <b>10 in. lbs. (1,1 N·m)</b>   |
| <b>Inlet Screw Fitting</b> ..... | <b>80 in. lbs. (9 N·m)</b>     |
| <b>Main Jets</b> .....           | <b>10 in. lbs. (1,1 N·m)</b>   |
| <b>Nuts</b>                      |                                |
| Carburetor Mounting .....        | 10-14 ft. lbs. (13-19 N·m)     |
| Flame Arrestor Cover .....       | 25-35 in. lbs. (2,8-4 N·m)     |
| <b>Power Valve</b> .....         | <b>100 in. lbs. (11,3 N·m)</b> |
| <b>Screws</b>                    |                                |
| Accelerator Pump Cover .....     | 5 in. lbs. (0,6 N·m)           |
| Choke Housing .....              | 5 in. lbs. (0,6 N·m)           |
| Choke Plate .....                | 6 in. lbs. (0,7 N·m)           |
| Fuel Bowl .....                  | 45 in. lbs. (5,1 N·m)          |
| Pump Discharge Nozzle .....      | 15 in. lbs. (1,7 N·m)          |
| Thermostat Cover .....           | 5 in. lbs. (0,6 N·m)           |
| Throttle Body .....              | 50 in. lbs. (5,6 N·m)          |
| Throttle Plate .....             | 10 in. lbs. (1,1 N·m)          |

**Note** Fuel bowl screws should be torqued once a year.

### Carburetor Specifications - 2.3 Litre PWS *OMC Cobra* Models

| <b>Holley List 80313</b>           | <b>350 CFM Model 2300-2V</b>                    | <b>OMC P/N 986478</b> |
|------------------------------------|-------------------------------------------------|-----------------------|
| Pump Lever Clearance .....         | 0.010-0.015 in. (0,254-0,381 mm)                |                       |
| Choke Unloader .....               | 0.300 in. (7,6 mm) Measured Lower Edge of Plate |                       |
| Choke Setting .....                | 5 Notches Lean                                  |                       |
| Initial Idle Mixture Setting ..... | ½ Turn Off Seat                                 |                       |
| Main Jet .....                     | 62                                              |                       |
| Power Valve .....                  | 25                                              |                       |
| Float Setting .....                | Level                                           |                       |
| Choke Vacuum Qualification .....   | ⅞ in. (7,1 mm) Measured Lower Edge of Plate     |                       |
| Pump Cam Position .....            | No. 2 Hole                                      |                       |

### Carburetor Specifications - 3.0 Litre PWS *OMC Cobra* Models

| <b>Holley List 80321</b>           | <b>350 CFM Model 2300-2V</b>                    | <b>OMC P/N 986510</b> |
|------------------------------------|-------------------------------------------------|-----------------------|
| Pump Lever Clearance .....         | 0.010-0.015 in. (0,254-0,381 mm)                |                       |
| Choke Unloader .....               | 0.380 in. (9,7 mm) Measured Lower Edge of Plate |                       |
| Choke Setting .....                | 3 Notches Lean                                  |                       |
| Initial Idle Mixture Setting ..... | ¾ Turn Off Seat                                 |                       |
| Main Jet .....                     | 63                                              |                       |
| Power Valve .....                  | 25                                              |                       |
| Float Setting .....                | Level                                           |                       |
| Choke Vacuum Qualification .....   | 0.250 in. (6,4 mm) Measured Lower Edge of Plate |                       |
| Pump Cam Position .....            | No. 2 Hole                                      |                       |

## Carburetor Specifications - 3.0 HO Litre *OMC Cobra* Models

| <b>Holley List 80316</b>           | <b>500 CFM Model 2300-2V</b>                    | <b>OMC P/N 986494</b> |
|------------------------------------|-------------------------------------------------|-----------------------|
| Pump Lever Clearance .....         | 0.010-0.015 in. (0,254-0,381 mm)                |                       |
| Choke Unloader .....               | 0.300 in. (7,6 mm) Measured Lower Edge of Plate |                       |
| Choke Setting .....                | 5 Notches Lean                                  |                       |
| Initial Idle Mixture Setting ..... | 1 Turn Starboard - ½ Turn Port Off Seat         |                       |
| Main Jet .....                     | 75                                              |                       |
| Power Valve .....                  | 25                                              |                       |
| Float Setting .....                | Level                                           |                       |
| Choke Vacuum Qualification .....   | 0.365 in. (9,3 mm) Measured Lower Edge of Plate |                       |
| Pump Cam Position .....            | No. 2 Hole                                      |                       |

## Carburetor Specifications - 4.3 Litre *OMC Cobra* Models

| <b>Holley List 80312</b>           | <b>500 CFM Model 2300-2V</b>                    | <b>OMC P/N 986469</b> |
|------------------------------------|-------------------------------------------------|-----------------------|
| Pump Lever Clearance .....         | 0.010-0.015 in. (0,254-0,381 mm)                |                       |
| Choke Unloader .....               | ¾ in. (9,5 mm) Measured Lower Edge of Plate     |                       |
| Choke Setting .....                | 5 Notches Lean                                  |                       |
| Initial Idle Mixture Setting ..... | ¾ Turn Off Seat                                 |                       |
| Main Jet .....                     | 70                                              |                       |
| Power Valve .....                  | 25                                              |                       |
| Float Setting .....                | Level                                           |                       |
| Choke Vacuum Qualification .....   | 0.250 in. (6,4 mm) Measured Lower Edge of Plate |                       |
| Pump Cam Position .....            | No. 1 Hole                                      |                       |

## Carburetor Specifications - 5.0, 5.0 HO Litre *OMC Cobra* Models

| <b>Holley List 0-50461</b>         | <b>300 CFM Model 2300-2V</b>                    | <b>OMC P/N 985773</b> |
|------------------------------------|-------------------------------------------------|-----------------------|
| Pump Lever Clearance .....         | 0.010-0.015 in. (0,254-0,381 mm)                |                       |
| Choke Unloader .....               | 0.300 in. (7,6 mm) Measured Lower Edge of Plate |                       |
| Choke Setting .....                | 1 Notches Lean                                  |                       |
| Initial Idle Mixture Setting ..... | 1½ Turn Off Seat                                |                       |
| Main Jet .....                     | 60                                              |                       |
| Power Valve .....                  | 50                                              |                       |
| Float Setting .....                | Level                                           |                       |
| Choke Vacuum Qualification .....   | 0.140 in. (3,6 mm) Measured Lower Edge of Plate |                       |
| Pump Cam Position .....            | No. 1 Hole                                      |                       |

## Carburetor Specifications - 5.7 Litre PWS *OMC Cobra* Models

| <b>Holley List 80328</b>           | <b>650 CFM 4175 Spread Bore</b>                           | <b>OMC P/N 986714</b> |
|------------------------------------|-----------------------------------------------------------|-----------------------|
| Pump Lever Clearance .....         | 0.010-0.015 in. (0,254-0,381 mm)                          |                       |
| Choke Unloader .....               | 0.230-0.240 in. (5,9-6,1 mm) Measured Lower Edge of Plate |                       |
| Choke Setting .....                | Index                                                     |                       |
| Initial Idle Mixture Setting ..... | ¼ Turn Off Seat                                           |                       |
| Main Jet .....                     | 60                                                        |                       |
| Power Valve .....                  | 50                                                        |                       |
| Secondary Throttle Setting .....   | ½ Turn Beyond Contact                                     |                       |
| Float Setting .....                | Level                                                     |                       |
| Choke Vacuum Qualification .....   | 0.228 in. (5,8 mm) Measured Lower Edge of Plate           |                       |
| Pump Cam Position .....            | No. 2 Hole                                                |                       |

## 4.3 Litre HO *OMC Cobra* Models

| <b>Holley List 80315</b>           | <b>575 CFM Model 4160</b>                       | <b>OMC P/N 486475</b> |
|------------------------------------|-------------------------------------------------|-----------------------|
| Pump Lever Clearance .....         | 0.010-0.015 in. (0,13-0,4 mm)                   |                       |
| Choke Unloader .....               | 0.300 in. (7,6 mm) Measured Lower Edge of Plate |                       |
| Choke Setting .....                | 5 Notches Lean                                  |                       |
| Initial Idle Mixture Setting ..... | ¾ Turns Out                                     |                       |
| Main Jet .....                     | No. 67                                          |                       |
| Power Valve .....                  | No. 25                                          |                       |
| Secondary Throttle Setting .....   | ¼ Turn Beyond Contact                           |                       |
| Float Setting .....                | Parallel to Fuel Bowl When Bowl is Inverted     |                       |
| Choke Vacuum Qualification .....   | 0.250 in. (6,4 mm) Measured Lower Edge of Plate |                       |
| Pump Cam Position .....            | No. 2 Hole                                      |                       |

## 5.8 Litre *OMC Cobra* Models

| <b>Holley List 0-50463</b>         | <b>600 CFM Model 4160</b>                       | <b>OMC P/N 985721</b> |
|------------------------------------|-------------------------------------------------|-----------------------|
| Pump Lever Clearance .....         | 0.010-0.015 in. (0,13-0,4 mm)                   |                       |
| Choke Unloader .....               | 0.300 in. (7,6 mm) Measured Lower Edge of Plate |                       |
| Choke Setting .....                | One Notch Lean                                  |                       |
| Initial Idle Mixture Setting ..... | 1½ Turns Out                                    |                       |
| Main Jet .....                     | No. 73                                          |                       |
| Power Valve .....                  | No. 65                                          |                       |
| Secondary Throttle Setting .....   | ¼ Turn Beyond Contact                           |                       |
| Float Setting .....                | Parallel to Fuel Bowl When Bowl is Inverted     |                       |
| Choke Vacuum Qualification .....   | 0.140 in. (3,6 mm) Measured Lower Edge of Plate |                       |
| Pump Cam Position .....            | No. 1 Hole                                      |                       |

## **Carburetor Troubleshooting**

### **FLOAT ADJUSTMENT**

Determines fuel level in float bowl

#### **High Float Levels**

1. Raises fuel level
2. Speeds main system start-up
3. Promotes flooding; stalling
4. Increases fuel consumption

#### **Low Float Level**

1. Lowers fuel level
2. Delays main system start-up
3. Results in flat spots, hesitation
4. Can decrease maximum fuel float capability

### **ACCELERATOR PUMP STROKE**

Cam type and placement determines volume of fuel per stroke

#### **Performance Problems**

1. Lean or rich condition
2. Hesitation or acceleration lag throughout RPM range
3. Damage pump diaphragm

### **ACCELERATOR PUMP CLEARANCE**

Provides full pump output

#### **Performance Problems**

1. Prevents overstroking pump
2. Prevents off idle hesitation

### **CHOKE VACUUM QUALIFICATION**

Determines amount of choke plate opening that occurs after starting a cold engine

#### **Performance Problems**

Plate closes too far (too rich)

1. Engine loads up
2. Runs rough, may die
3. Increase fuel consumption

Plate opens too far (too lean)

1. Engine runs rough
2. Will die quickly
3. Hesitation upon acceleration

## **CHOKE ADJUSTMENT**

Determines how long the choke stays on for a given temperature condition

### **Performance Problems**

Choke too rich

1. Increase fuel consumption
2. Difficult hot start

Choke too lean

1. Poor cold engine performance
2. Difficult cold engine starting

## **CHOKE UNLOADER**

Determine amount of choke plate opening at W.O.T. on a cold engine

### **Performance Problems**

1. Affects cold engine at W.O.T.
2. Aids starting flooded engine

## **IDLE MIXTURE**

Determines fuel/air volume exiting idle circuit

### **Performance Problems**

1. Rough or unbalanced idle
2. Tendency to die
3. May diesel or run-on

## **IDLE SPEED**

Used in conjunction with mixture screws to set idle RPM

### **Performance Problems**

1. Idle RPM too high, may diesel or run-on
2. Idle RPM too low, may die

## **SECONDARY THROTTLE PLATE OPENING**

Opens secondary throttle plates to allow secondary idle circuits to function

### **Performance Problems**

1. Open too far - high idle RPM
2. Closed too much - hesitation during transition from primary to secondary throttle operation
3. Sticking closed - hesitation during transition from primary to secondary throttle operation
4. Hole in diaphragm - hesitation during transition from primary to secondary throttle operation

# Section 5

## Cooling System

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### Safety Warning

Before working on any part of the cooling system, read the section called Safety at the beginning of this manual.

## Description

Water is supplied to the engine by means of an impeller type pump in the vertical drive and circulated in the engine by means of a centrifugal type pump (recirculating) mounted on the front of the cylinder block.

The impeller pump in the vertical drive is a self priming type and is driven by the upper gear housing U-joint shaft. During low speed operation the impeller functions as a positive displacement pump. At higher speeds it functions as a combination centrifugal and positive displacement pump. The position of the impeller is offset somewhat from the center of the housing. This causes an eccentric action of the impeller blades during engine operation. During periods of high speed operation, the resistance of the water on its way through the pump is sufficient to prevent the ends of the impeller blades from making contact and following the inside perimeter of the pump housing. The blades merely flex in toward the center of the impeller to perform as a combination centrifugal and positive displacement pump.

The centrifugal pump, which is mounted on the front of the cylinder block, has a pulley bolted to the pump shaft hub at its forward end. This in turn is driven by means of a belt from the crankshaft pulley. The pump shaft and bearing assembly is pressed in the water pump housing. The bearing is permanently lubricated during manufacture and sealed to prevent loss of lubricant and entry of dirt. The pump is sealed against coolant leakage by a non-adjustable seal assembly pressed into the pump cover.

Cooling water for the engine is picked up at the water intakes on both sides of the lower gearcase. Water is pulled upward thru the lower gearcase until it enters a water tube that transfers it to the upper gear housing. The water pump is mounted at the rear of the upper gear housing and is driven by an extension of the U-joint shaft. Water is pulled into the starboard side of the water pump and exits under pressure on the port side. The upper gear housing water passage meets a nipple and hose attached to the pivot housing. Water is routed through the transom mount assembly to a tube that's mounted on the inside of the gimbal housing.

From the gimbal housing water tube, water is carried through a hose to the inlet nipple of the thermostat housing. The water is now carried downward through the thermostat housing where it enters the flexible hose which attaches to the inlet pipe of the water pump. This inlet pipe is a part of the pump cover and feeds the coolant into a low pressure area located at the axis of the impeller. Vanes on the rotating impeller cause the coolant to be thrown outward and into the cylinder block.

The cooling water flows rearward through the water jacket which surrounds each cylinder and extends below the lower limit of piston ring travel. After flowing the full length of the cylinder block, the water is forced upward through two passages and into the cylinder head(s). The water now flows forward in the cylinder head(s) to cool the combustion chamber areas. At the forward end of the cylinder head(s), the water enters the thermostat housing. If the water within the block is sufficiently warmed up, the thermostat will be open and a portion of the water will be pumped upward past the thermostat. The remainder will be returned via the flexible hose to the water pump for recirculation within the powerhead. The water which was pumped upward past the thermostat will enter the hose(s) connected to the thermostat housing outlet(s) and travel to the manifold(s). At this point the water flows rearward through the manifold passages and into the high rise elbow. All of the water that enters the high rise elbow is mixed with the exhaust gases prior to entering the exhaust tube(s) and hose(s). This mixture of exhaust gases and water then enters the exhaust passages of the gimbal housing, pivot housing and vertical drive where it is discharged under water.

In the event the engine cooling water is cold, as in first starting up, the thermostat will be closed and will not allow any of the water to pass through for eventual discharge overboard. Instead, the water will be carried via the flexible hose back to the circulating pump for recirculation within the block. While the water within the block is recirculating, the water pump in the upper gear housing is pumping water to the block. Since this water is not able to enter the cylinder block, it is necessary to provide a method of discharge. This is provided in the bypass passage within the thermostat housing. If this were not provided, the resulting water pressure would be enough to force the thermostat off its seat, resulting in a greatly increased warm-up period.

## **Cooling System Troubleshooting**

### **1. Quiz Customer for the Following Information:**

- A. How old is unit, how many hours of operation? (Wear and corrosion.)
- B. How long has problem existed? (Gradual or sudden.)
- C. What were the operating conditions prior to problem? (Fresh or salt water, silty or sandy water.)
- D. What previous repairs and service have been made on unit? (Tune-ups, impeller replacement, etc.)
- E. At what RPM does problem occur? (Low, high.)

## 2. Possibilities That Must Be Considered First:

### A. Temperature Gauge Malfunction.

- Improper or defective sender unit - See **Section 3**.
- Malfunctioning gauge - Check ground wire - substitute good gauge.

### B. Engine Water Circulation Pump Malfunction.

- Loose alternator belt - See **Section 3**.
- Impeller vanes worn - replace pump.
- Impeller shaft seal failure - replace pump.

### C. Water Intake Screens Blocked.

### D. Ventilation - Marine growth on keel, hull deformities, etc.

### E. Ignition Timing.

- Running with retarded timing - Check timing. See **Section 2**.

## 3. Isolating Cooling Problem:

### A. Air or exhaust gas entering cooling water:

1. **Procedure** - Replace water hose between engine or power steering oil cooler and thermostat housing with clear plastic hose. Operate unit in test tank or boat in water at RPM at which overheat occurs.

**Note** If operating unit in test tank, run motor in neutral. Some test tanks may not have sufficient water volume to allow running engine in gear without creating turbulence. This can be picked up by the water intake and by misconstrued as evidence of a cooling problem.

2. **Results and Conclusions** - No bubbles in hose, air/exhaust is not entering cooling water. Bubbles in hose, air/exhaust is entering cooling water.

3. **Check for** - Lower gearcase water tube guide and seal, guide and seal O-ring, water tube grommet, adaptor to gear housing inlet seal, impeller plate gasket, and impeller housing O-ring.

## **B. Insufficient water supply:**

1. **Procedure** - Disconnect water supply hose from transom bracket at thermostat housing. Operate engine at specified idle RPM. Hold end of hose 15 in. (39 cm) above transom bracket.

2. **Results and Conclusions** - A 2-4 inch (5-10 cm) head of water discharge, water supply is good. If less than 2 inches (5 cm), look for source of water loss.

3. **Check for** - Blocked intake screens, impeller housing O-ring, impeller plate gasket, broken or worn impeller, pivot housing water passage O-ring, pivot housing drain screw seal, pivot housing to gimbal housing water hose clamps.

## **C. Thermostat malfunction - overheating or slow warm-up:**

1. **Procedure** - Operate engine until indicated temperature exceeds 160°. Touch hoses between thermostat and exhaust manifolds.

2. **Results and Conclusions** - Hoses cold, thermostat is stuck closed. Hoses warm or hot, thermostat is good.

3. **Check for** - Thermostat stuck open or closed, defective thermostat O-ring, correct thermostat style for engine type, clear thermostat housing bypass passage.

## **D. Engine head gasket leakage - overheating or hard starting (water in cylinder(s)):**

1. **Procedure - 2.3 Litre Models:** Allow engine to cool. Disconnect circulating pump belt. Remove transom bracket water supply hose at thermostat housing. Fill housing with water until level with nipple opening. Start engine and accelerate momentarily.

2. **Procedure - All Models except 2.3 Litre:** Allow engine to cool. Disconnect circulating pump belt. Remove thermostat housing (on **3.0 Litre Models**, only remove upper housing half and then thermostat). Fill engine block with water until level with thermostat housing gasket face. Start engine and accelerate momentarily.

**Note** Do not run engine longer than 20 seconds on this test or damage to pistons, rings and cylinder walls could occur.

3. **Results and Conclusions** - No bubbles evident, head gaskets not leaking. Bubbles evident, head gaskets leaking.

4. **Check for** - Cylinder compression using appropriate tester, water in engine oil, water in cylinder(s) (spark plug(s) wet with water).

## **Cooling System Problem Checkpoints:**

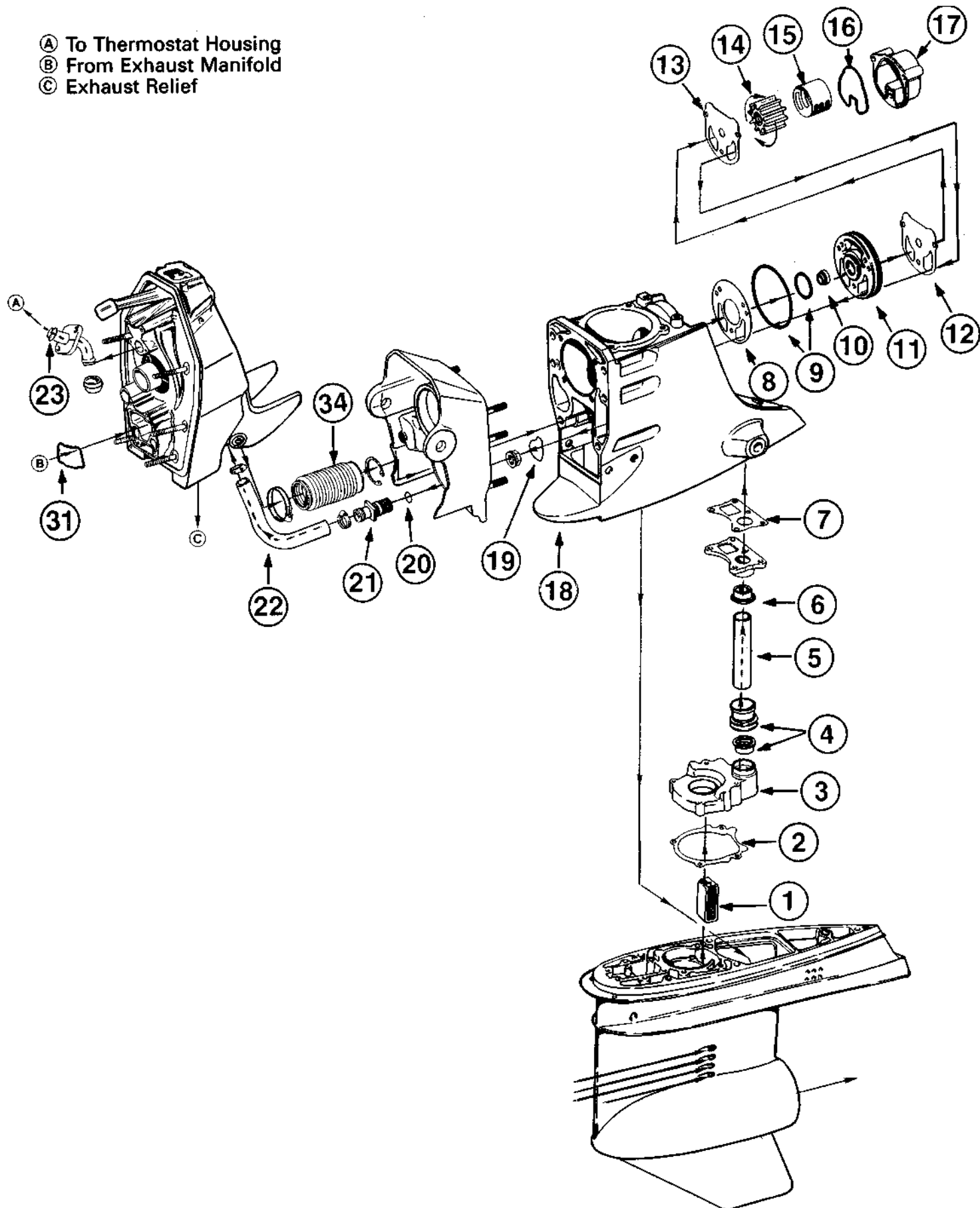
**Note** Numbers refer to Cooling System Flow Diagrams.

1. Intake Screen - Blocked with debris.
2. Water Passage Cover Gasket - Improperly sealed.
3. Water Passage Cover - Loose nuts on mounting screws.
4. Grommet and Guide - Deteriorated, improperly seated.
5. Water Tube - Plugged with debris.
6. Grommet - Deteriorated, improperly seated.
7. Water Tube Cover Gasket - Screws loose, improperly seated.
8. Adaptor Gasket - Not sealed properly, deteriorated.
9. Adaptor O-rings - Not sealed properly, damaged or cut.
10. Adaptor Seal - Installed backwards, improperly sealed, worn.
11. Adaptor - Cracked from freezing.
12. Impeller Plate Gasket - Not sealed properly, damaged.
13. Impeller Plate - Worn or scored, warped from freezing.
14. Impeller - Worn, freeze damage, hub damage.
15. Liner - Scored, warped from freezing, debris blocking openings.
16. Housing Seal - Damaged, out of position, improperly sealed.
17. Impeller Housing - Cracked, plugged vent hose, heat warpage.
18. Upper Gear Housing - Debris blocking passage, freeze damaged.
19. Pivot Housing Seal - Damaged, out of position, improperly sealed.
20. Nipple O-ring - Out of position, improperly sealed, damaged.

21. Nipple - Blocked by debris, freeze cracked.
22. Water Hose and Clamps - Clamps loose, hose collapsed or leaking.
23. Water Tube - Blocked by debris.
24. Thermostat Housing - Corroded, restricted or improperly installed gasket.
25. Thermostat - Defective thermostat, or wrong type for engine; improperly seated, damaged O-ring, leaking gasket.
26. Belts - Loose or worn and slipping.
27. Circulating Water Pump (Engine) - Failed seal, corroded or bad bearings, eroded impeller, leaking mounting gaskets or backing plate.
28. Cylinder Block Water Passages - Corrosion, slag, blocked passages or leaking plugs.
29. Cylinder Head - Corrosion, slag, blocked passages or leaking gaskets.
30. Manifold, Elbows, Gaskets and Hoses - Gaskets improperly installed. Corrosion, sand in manifold and elbows. Hoses collapsed, burned through, or leaking.
31. Seal - Improperly sealed or installed, leaking.
32. Bellows, Clamp and Retainer - Loose clamp, detached or torn bellows.
33. Oil Cooler - Restricted or cracked.
34. Timing - Check, see **Section 2**.
35. Boat Hull - Condition of hull, marine growth or under hull equipment.

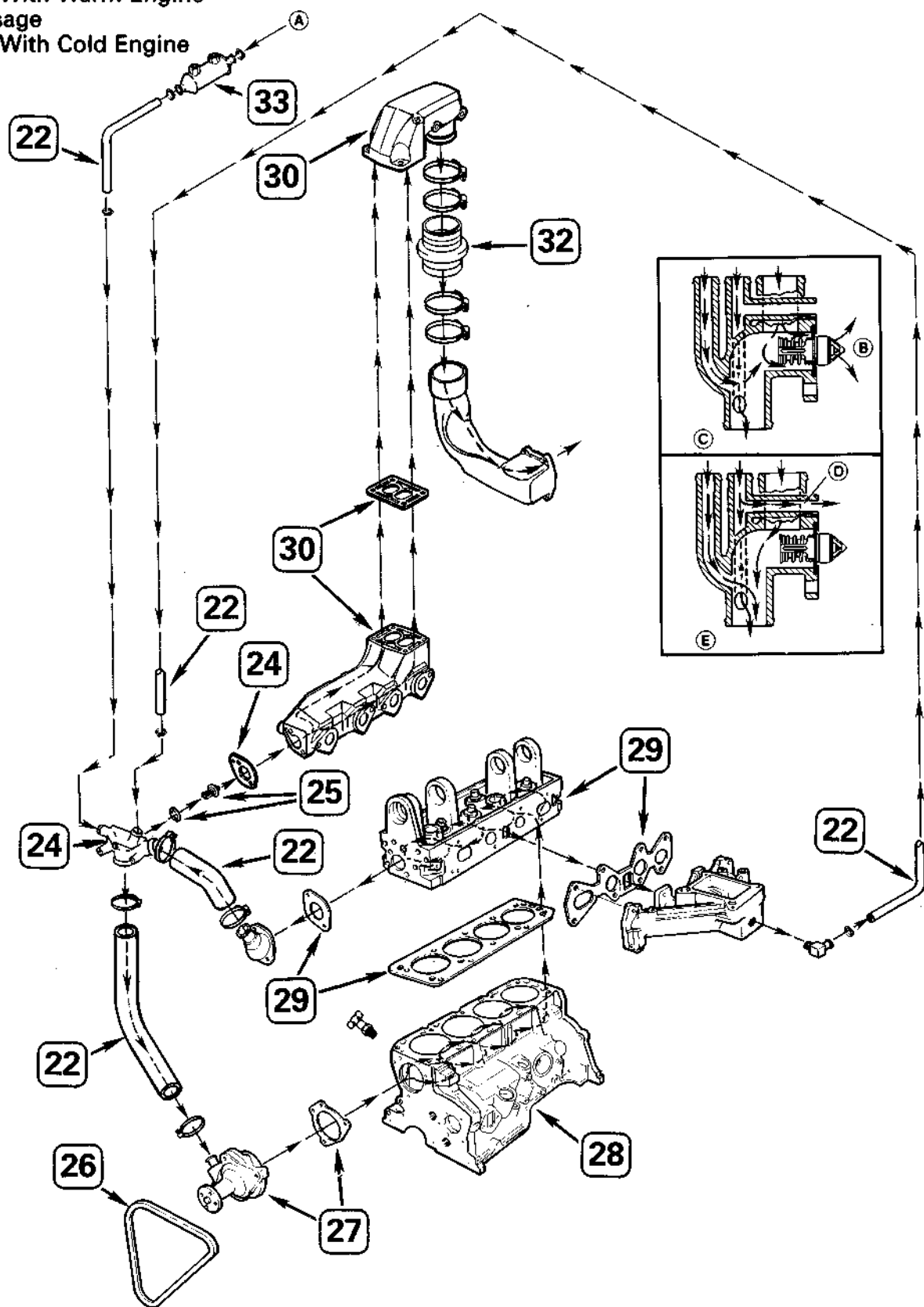
**Note** Fittings protruding through hull may cause air bubble streams which can be picked up by the lower gearcase and mixed with incoming cooling water to cause an overheat condition.

- Ⓐ To Thermostat Housing
- Ⓑ From Exhaust Manifold
- Ⓒ Exhaust Relief



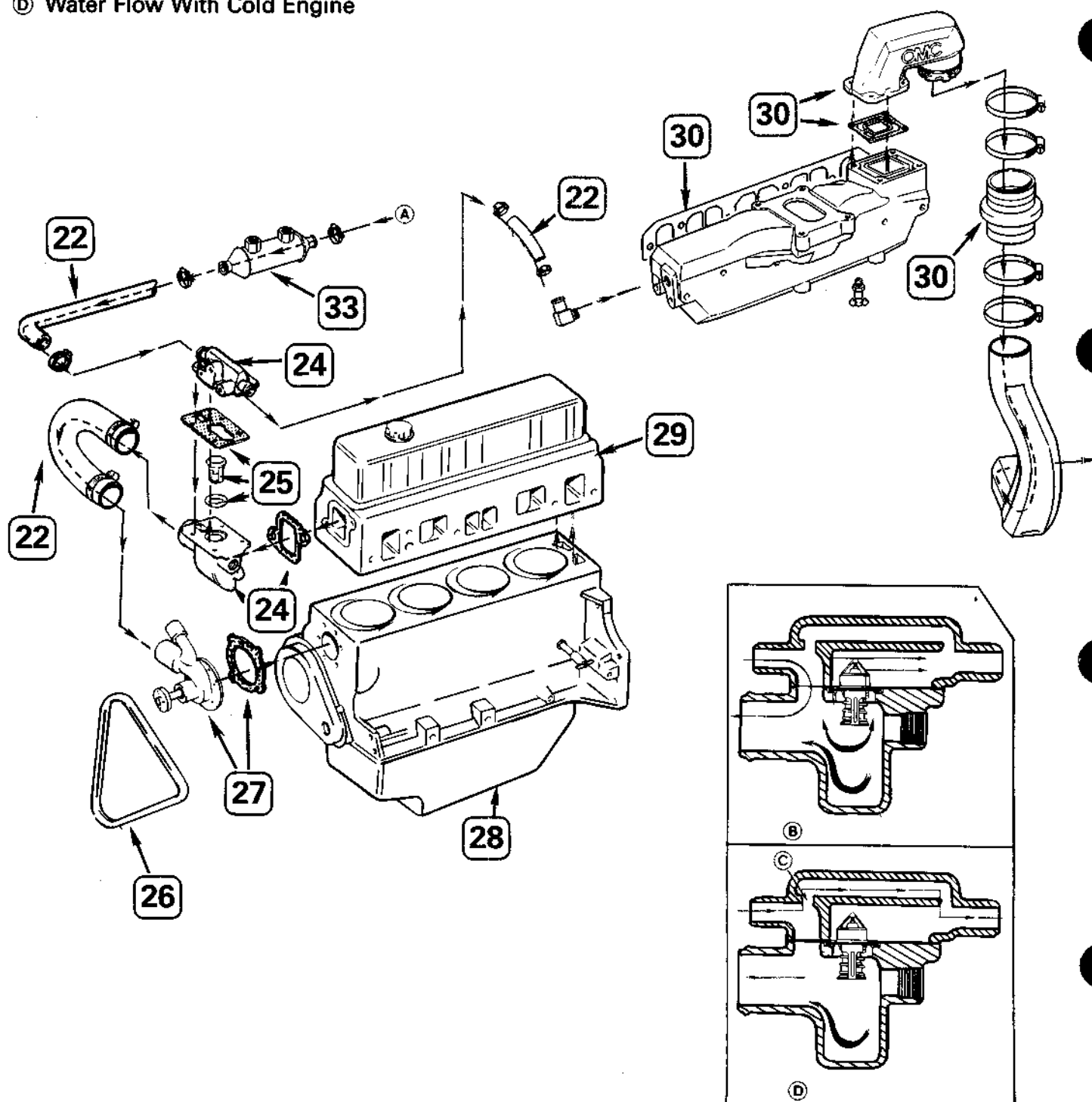
**Vertical Drive or Transom Mount, All Models**

- Ⓐ From Transom Bracket
- Ⓑ To Manifold for Discharge
- Ⓒ Water Flow With Warm Engine
- Ⓓ Bypass Passage
- Ⓔ Water Flow With Cold Engine



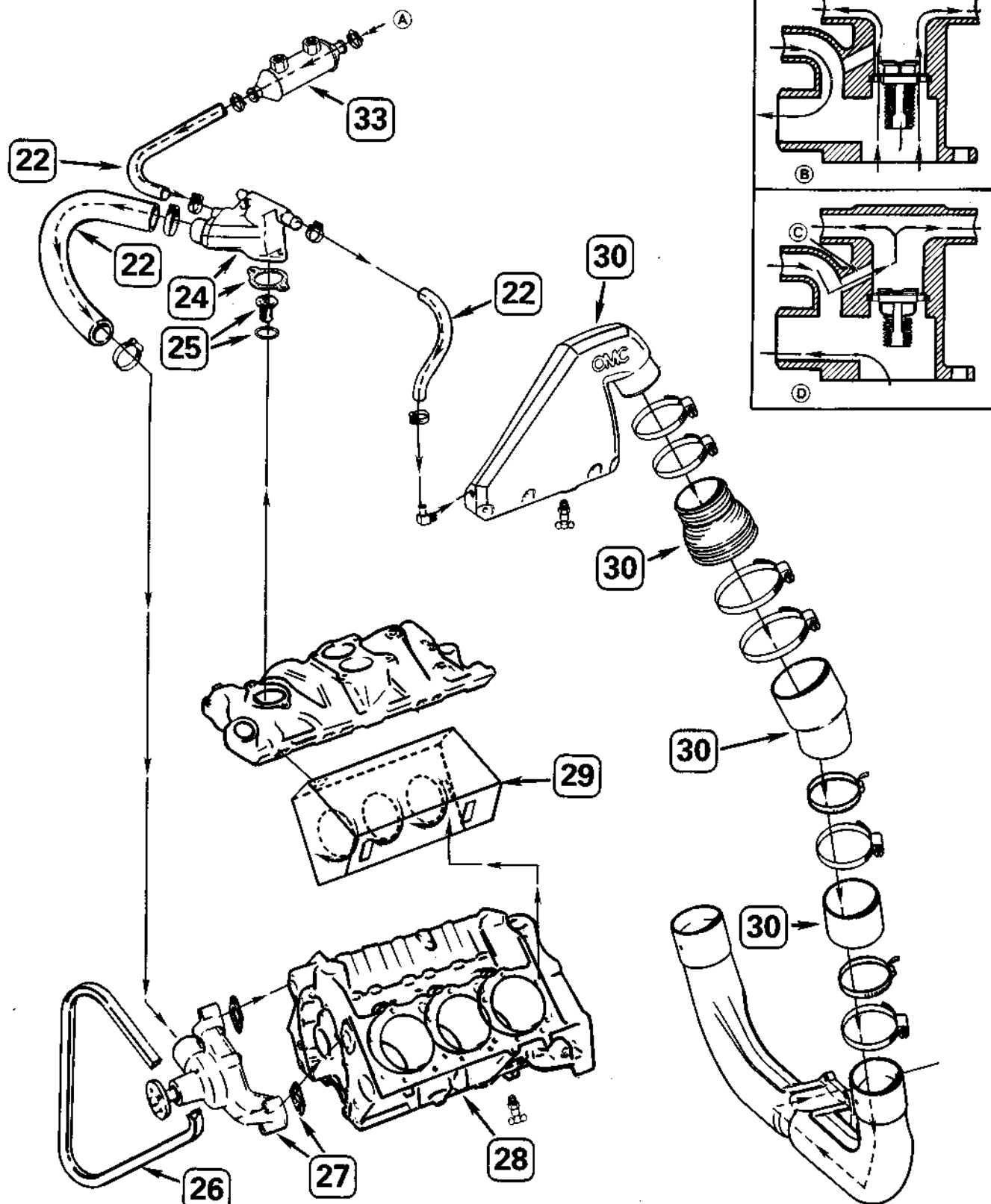
**2.3 Litre Models**

- Ⓐ From Transom Bracket
- Ⓑ Water Flow With Warm Engine
- Ⓒ Bypass Passage
- Ⓓ Water Flow With Cold Engine



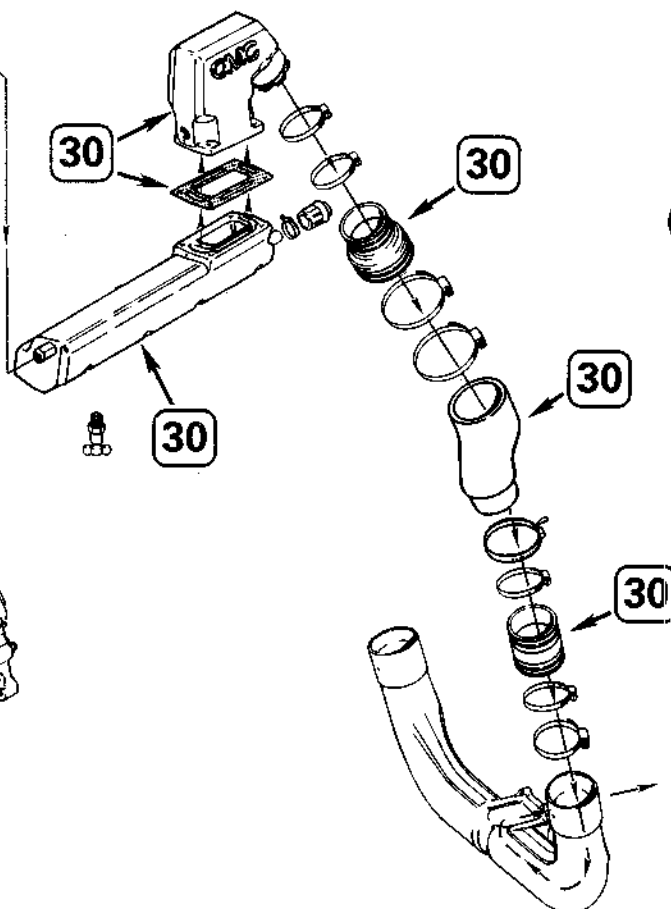
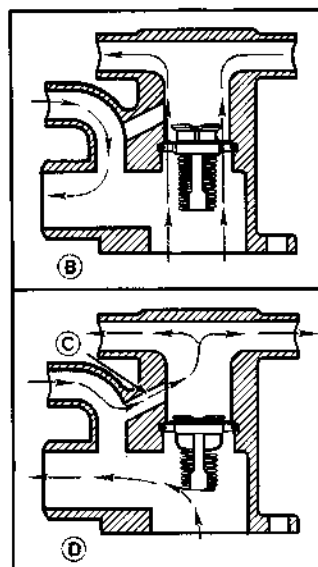
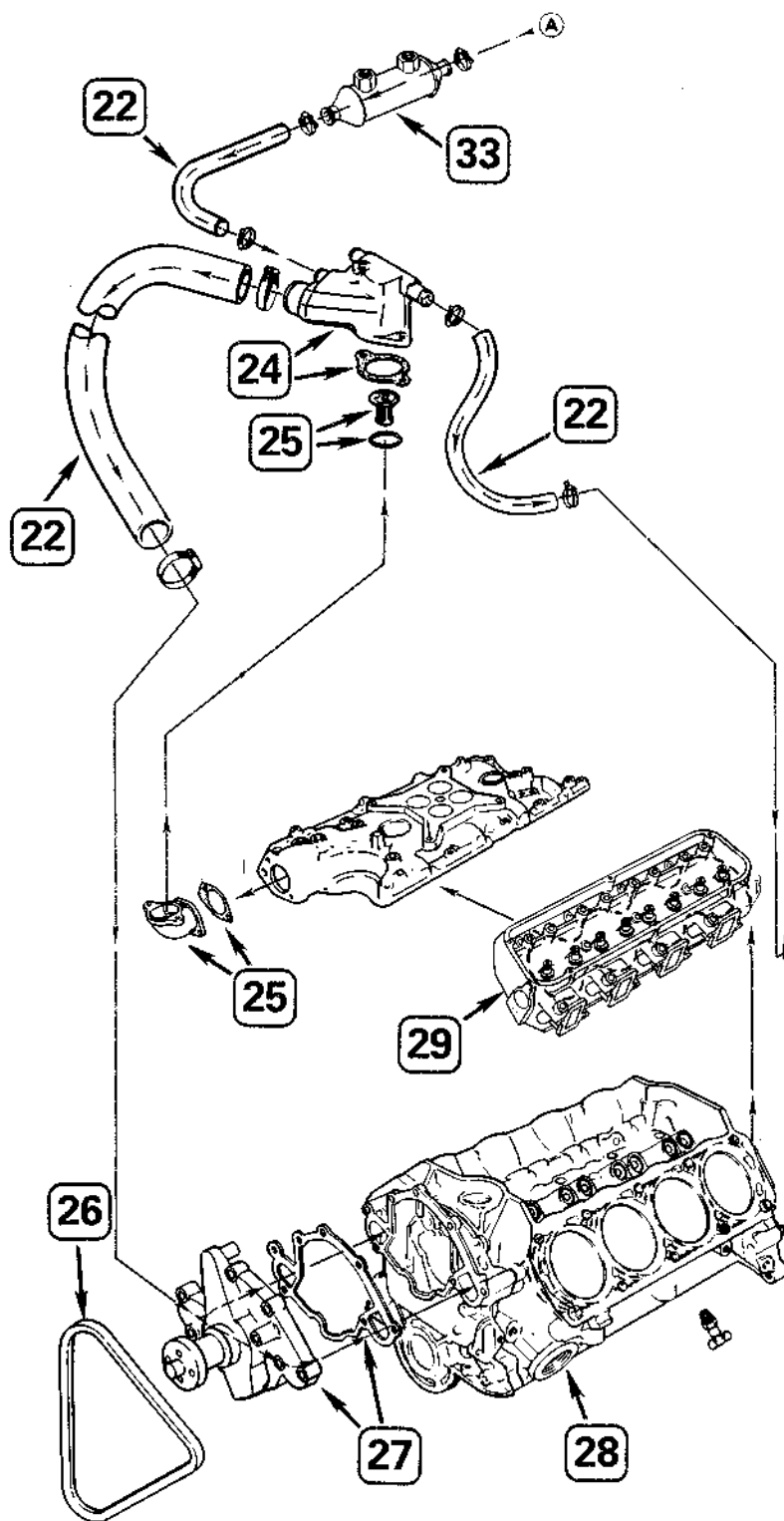
**3.0 Litre, 3.0 Litre HO Models**

- Ⓐ From Transom Bracket
- Ⓑ Water Flow With Warm Engine
- Ⓒ Bypass Passage
- Ⓓ Water Flow With Cold Engine



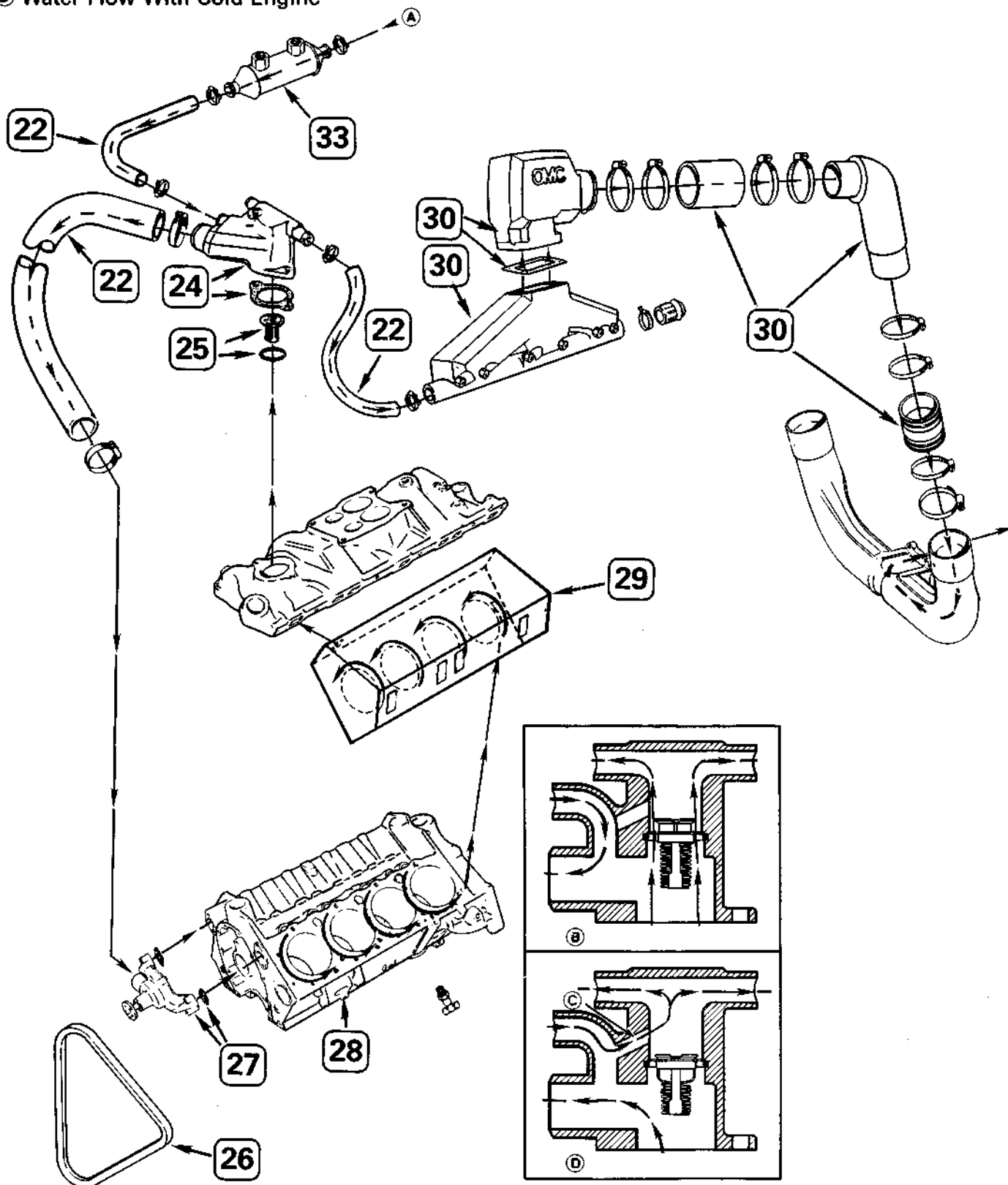
**4.3 Litre, 4.3 Litre HO Models**

- (A) From Transom Bracket
- (B) Water Flow With Warm Engine
- (C) Bypass Passage
- (D) Water Flow With Cold Engine



**5.0 Litre, 5.0 Litre HO, 5.8 Litre Models**

- Ⓐ From Transom Bracket
- Ⓑ Water Flow With Warm Engine
- Ⓒ Bypass Passage
- Ⓓ Water Flow With Cold Engine



### 5.7 Litre Models

## Cooling System Components

**Component Name:** Hoses, Fittings, and Petcocks

**For Models:** All

**Special Tools Required:** None

### Inspection Procedure

Examine all external cooling system components for leaks, wear, deterioration, and damage. Check all connections for tightness.

Inspect hoses for cracks, checking or deterioration.

### Repair Procedure

Repair or replace as required.

**Note** Water supply hoses used for replacement must conform to S.A.E. 20R3, class D-2.

**Component Name:** Thermostat

**For Models:** All

**Special Tools Required:** None

### Test Procedure

**1** **2** Place a 0.005 in. x ¼ in. (13 mm x 6,4 mm) wide shim stock **A** between the thermostat valve and the seat.

Immerse the thermostat and a thermometer in a container of water. Heat water. Thermostat should open at rated temperature marked on the unit. Thermostat should release shim at between 157-163° F and also should open to ½ in. (3,7 mm) minimum at 182° F. A 160° F thermostat is standard.

### Repair Procedure

None, replace unit.

**Component Name:** Manifolds and Elbows

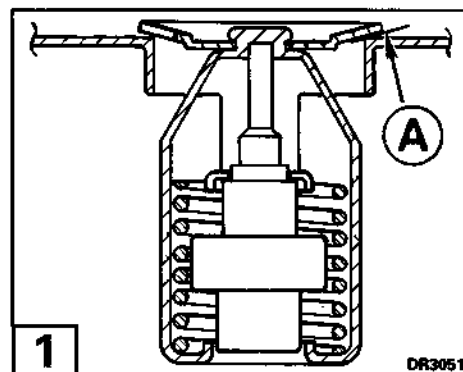
**For Models:** All

**Special Tools Required:** None

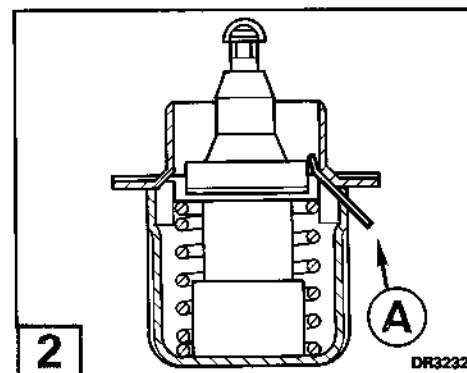
### Inspection Procedure

Pressure check for leaks.

Disassemble and inspect for corrosion or accumulation of foreign material.



4.3, 4.3 HO, 5.0, 5.0 HO, 5.7, 5.8



2.3, 3.0, 3.0 HO

### **Repair Procedure**

Rod out any accumulation of foreign matter build up in water passages. If evidence of porosity between water passages and exhaust chambers or exterior is found, replace component. Install new gaskets on reassembly.

**Component Name:** Engine Circulating Pump

**For Models:** All

**Special Tools Required:** None

### **Inspection Procedure**

Make sure belt tension is correct. With the engine running, observe the rotation of the circulating pump pulley. If the pulley does not run true it can cause excessive drive belt wear and damage to the circulating pump itself.

If the leakage of water occurs at the circulating pump while the engine is in operation, the pump may be loosely mounted to the engine, the seal in front of the pump may be bad, or the circulating pump mounting gaskets are leaking.

If the above inspections do not detect any defect, the pump must be removed and inspected for internal corrosion, blockage, or damage. Inspect impeller for erosion.

### **Repair Procedure**

None, replace the pump.

**Note** OMC marine engines have a special circulating water pump stainless steel components and a special marine shaft seal assembly. Do not replace with an automotive water pump.

**Component Name:** Upper Gear Housing Water Pump

**For Models:** All

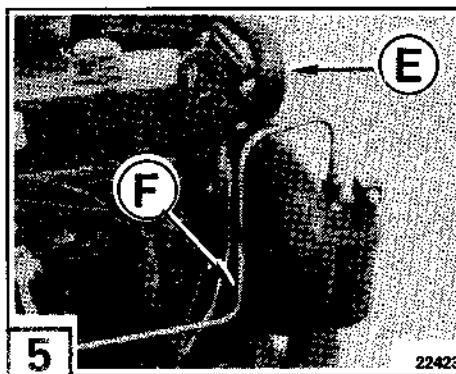
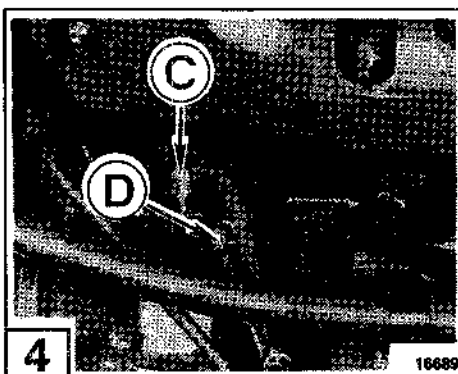
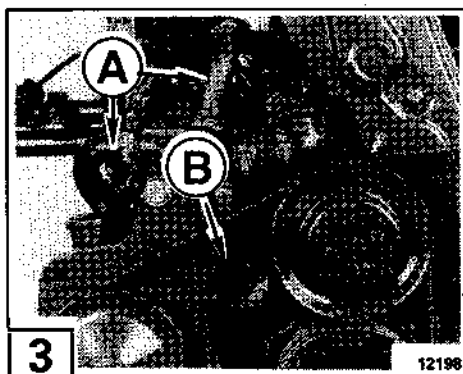
**Special Tools Required:** None

### **Inspection Procedure**

Check to see that lower gearcase water intake screen is not blocked. Perform test for sufficient water supply as indicated in the **Cooling Troubleshooting** section.

### **Repair Procedure**

Disassemble water pump and repair or replace defective components. Make sure to properly seal water pump on reassembly. Follow procedures in **Section 7, Upper Gear Housing**.



## Draining Engine Block or Exhaust Manifold

Some service work performed on the engine block and exhaust manifold may require the complete drainage of those components.

### 2.3 Litre Models

- 3 1. Disconnect and drain two long water hoses A at thermostat housing.
- 3 2. Disconnect and drain large hose B at water pump.
- 4 3. Open petcock C on exhaust manifold and petcock D on starboard side of block. Clear holes with a small wire and leave petcocks open after draining.

### 3.0 Litre, 3.0 Litre HO Models

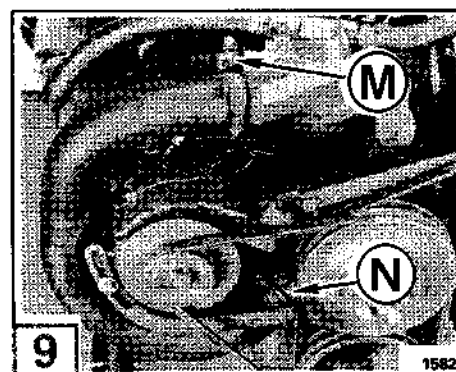
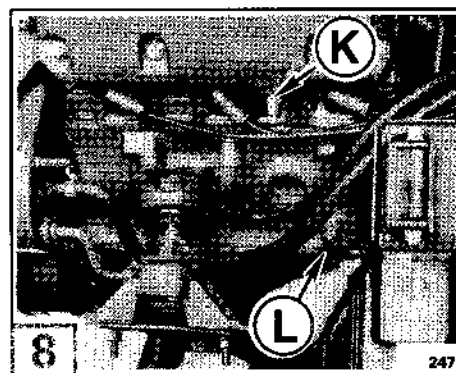
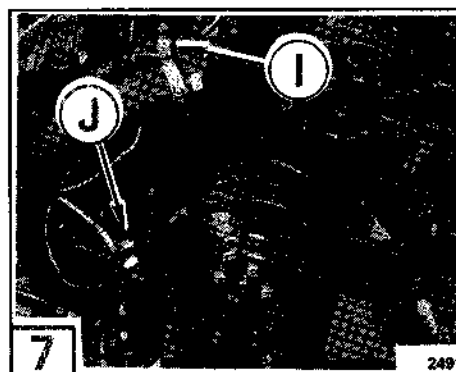
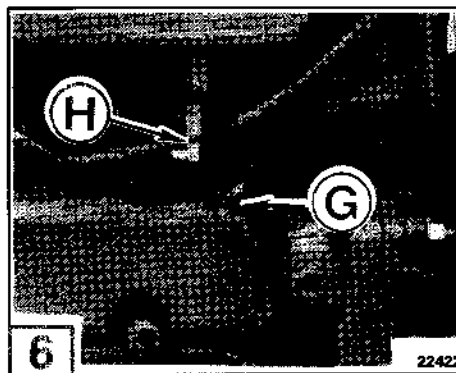
- 5 1. Remove the long supply hose at thermostat housing E and drain it completely.
- 5 2. Disconnect and drain large hose F at water pump.
- 6 3. Open the port side cylinder block G and exhaust manifold H petcocks. Clear holes with a small wire to ensure complete drainage. Leave petcocks open after drainage.

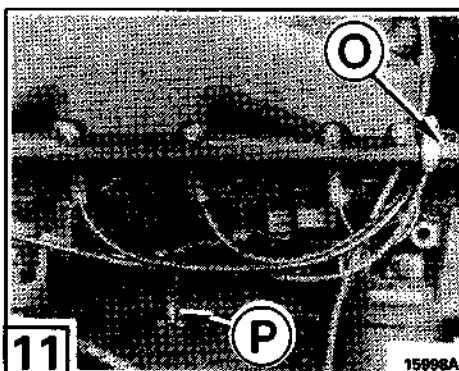
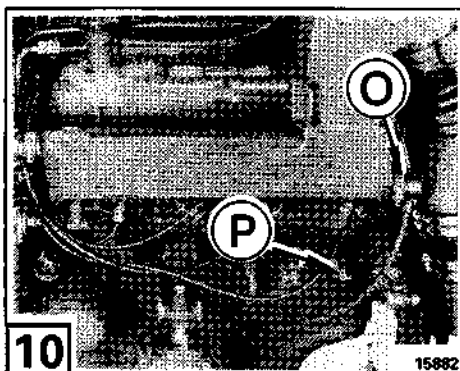
### 4.3 Litre, 4.3 Litre HO Models

- 7 1. Remove the long water supply hose at the thermostat housing I and drain it completely.
- 7 2. Disconnect and drain the large hose at the water pump J.
- 8 3. Open the port and starboard exhaust manifold petcocks K and cylinder block petcocks L. Clear holes with a small wire to ensure complete drainage. Leave petcocks open after draining.

### 5.0 Litre, 5.0 Litre HO, 5.7 Litre, 5.8 Litre Models

- 9 1. Remove the long water supply hose at the thermostat housing M and drain it completely.





9 2. Disconnect and drain the large hose at the water pump (N).

10 11 3. Remove rubber cap (O) from each of the port and starboard exhaust manifolds. Open the petcocks (P) at the front of the manifolds and on both sides of the cylinder block. Clear holes with a small wire to ensure complete drainage. Leave petcocks open after draining.

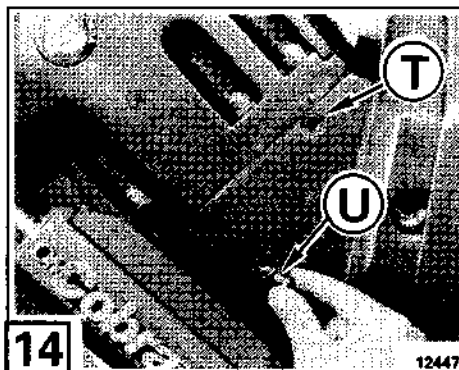
#### Models With Power Steering Oil Coolers

12 Remove the lowest water hose from the power steering oil cooler. If cooler is mounted horizontally, remove one water hose (Q) from the cooler, loosen cooler mounting bolt (R), and tip cooler downward to drain.

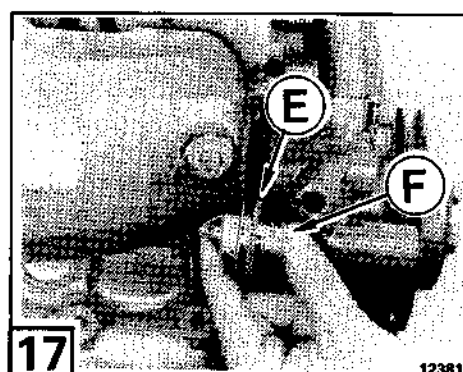
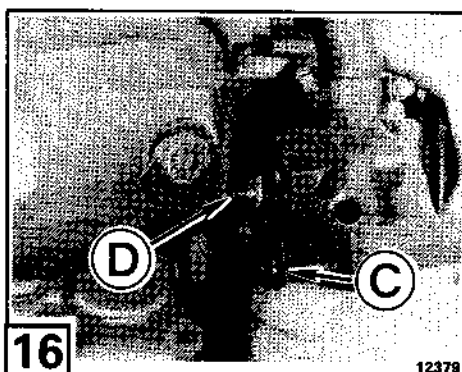
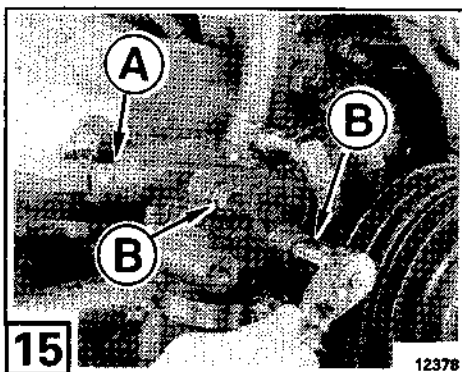


#### Vertical Drive - All Models

13 14 With the vertical drive in the full down position, remove the water drain plug (S) from the port side of the pivot housing. Crank the engine momentarily to expel any water trapped in the vertical drive water pump and cooling passages. Run the vertical drive to the full tilt up position. Remove both the vent plug (T) and drain plug (U) on the starboard side of the pivot housing. Allow the unit to drain completely then replace all pivot housing drain plugs. Return vertical drive to the full tilt down position.



**Note** Failure to ensure complete drainage of the cooling system may result in serious damage to the engine and/or drive unit if temperatures should drop below freezing.



## Thermostat Replacement

### 2.3 Litre Models

**15** 1. Disconnect transom bracket water hose at starboard nipple **A** of thermostat housing. Remove two screws and lockwashers **B** mounting thermostat housing.

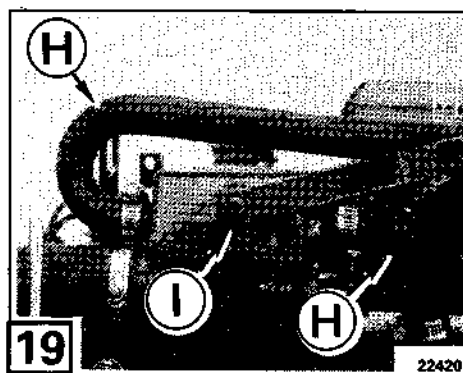
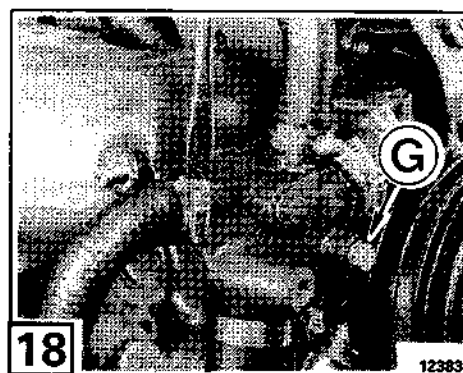
**16** 2. Pull thermostat housing off end of manifold. Remove and discard gasket **C**, and take thermostat **D** out of housing. Discard thermostat cork seal.

**17** 3. Thoroughly clean manifold and housing gasket surfaces. Place a new cork seal **E** on the base of the thermostat. Do not apply sealer to cork seal.

**17** 4. Insert thermostat into housing. Make sure temperature sensing element **F** is inside housing, not manifold.

5. Coat both sides of a new gasket with *OMC Gasket Sealing Compound*, and place it on the thermostat housing. Make sure bolt holes and water passages are properly aligned.

**18** 6. Install thermostat housing. Place lockwashers on both screws, and insert long screw **G** into lower inner hole. Tighten both screws to 20-25 ft. lbs. (27-34 N-m). Connect water hose and tighten clamp securely.



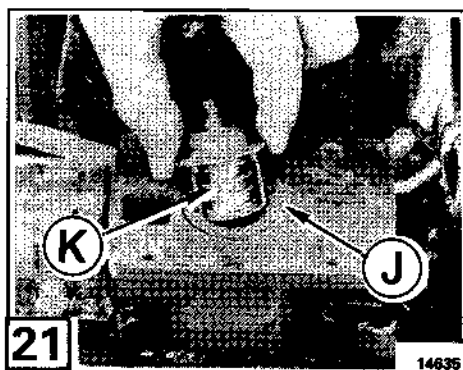
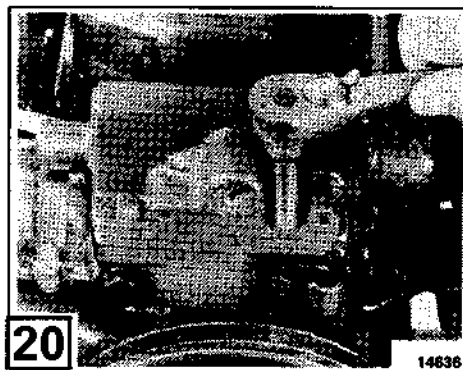
### 3.0 Litre, 3.0 Litre HO Models

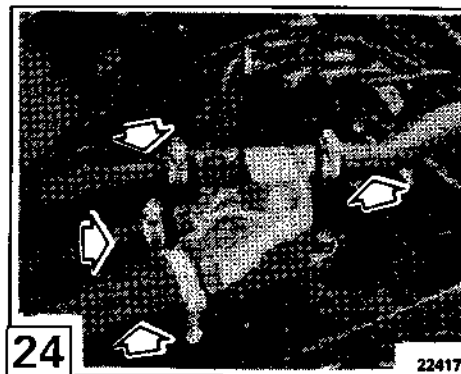
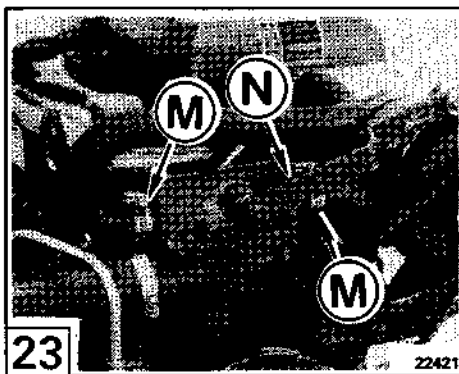
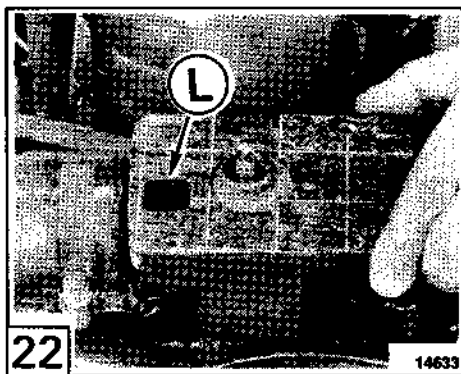
**19** 1. Remove both water hoses **H** and alternator brace **I** from upper thermostat housing.

**20** 2. Take out four mounting screws and remove the upper thermostat housing.

**21** 3. Remove and discard upper housing gasket, then lift out thermostat. Remove and discard cork seal **J**.

**21** 4. Thoroughly clean both gasket surfaces, then insert a new cork seal into housing. Do not apply sealer to cork seal. Install thermostat in housing with temperature sensing element **K** down.





**22** 5. Coat both sides of a new gasket with *OMC Gasket Sealing Compound*. Properly align the four screw holes and water bypass opening **L**, then place gasket on housing.

6. Install upper housing and tighten four mounting screws to 5-7 ft. lbs. (7-9 N-m).

**23** 7. Attach both water hoses **M** and alternator brace **N**. Tighten the hose clamps and brace mounting screw securely.

#### All V-6 and V-8 Models

**24** **25** 1. Remove four water hoses from thermostat housing. Unscrew two bolts **C** and lift off thermostat.

**26** 2. The thermostat is held in place by an O-ring **P**. Pry the O-ring out of its groove, then lift thermostat out of housing.

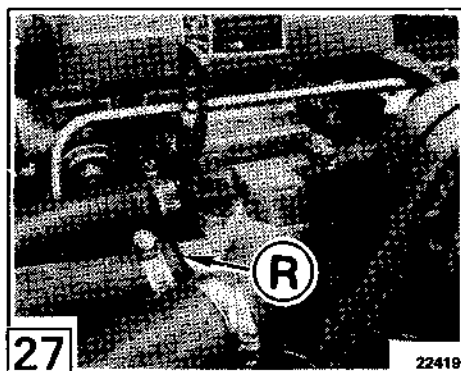
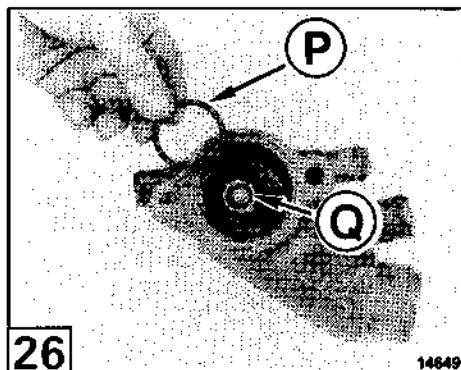
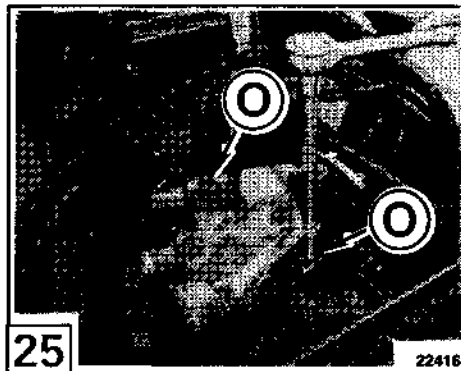
3. Discard housing gasket and O-ring. Thoroughly clean the housing and manifold gasket surfaces.

**26** 4. Place thermostat in housing. The temperature sensing element **Q** must face you when installed. Install a new O-ring to seal the thermostat in housing. Make sure O-ring is completely seated in the groove.

**25** 5. Coat both sides of a new gasket with *OMC Gasket Sealing Compound* and place it on the manifold. Install the housing with two screws and lockwashers. Tighten the screws to 20-25 ft. lbs. (27-34 N-m).

**27** 6. Connect transom bracket water hose to nipple **R** and tighten hose clamp securely. Connect three remaining water hoses and tighten hose clamps securely.

**Note** If the transom bracket water hose is attached to the wrong nipple, the engine will overheat.



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# Section 6

## Transom Bracket Assembly

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## OMC Special Tools

| P/N    | Description             |
|--------|-------------------------|
| 303859 | Retaining Ring Pliers   |
| 311880 | Drive Handle            |
| 322697 | Insert Tool             |
| 322698 | Pin Removal Tool        |
| 322699 | Socket Removal Tool     |
| 326582 | Rod                     |
| 390898 | Adapter                 |
| 391008 | Slide Hammer            |
| 391010 | Puller Jaws             |
| 910103 | Crowfoot Torque Adapter |
| 912269 | Remover/Installer       |
| 912270 | Driver                  |
| 912271 | Installer               |
| 912279 | Installer               |
| 912281 | Remover/Installer       |
| 912286 | Installer               |
| 912287 | Installer               |
| 984146 | Puller                  |
| 984322 | Stop Gauge              |

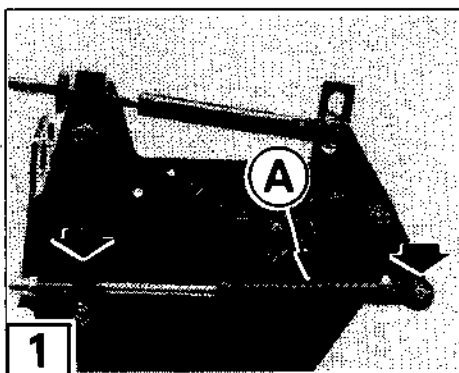
### Sealants, Lubricants and Adhesives

*OMC Gasket Sealing Compound*  
*Locquic Primer*  
*OMC Nut Lock Adhesive*  
*OMC Triple-Guard® Grease*  
*OMC Adhesive M™ Sealant*  
*OMC Ultra Lock Adhesive*  
*OMC Marine Wheel Bearing Grease*

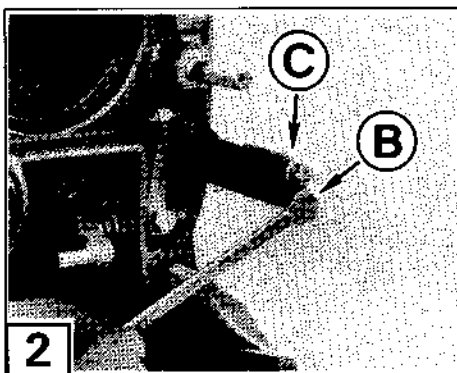


### Safety Warning

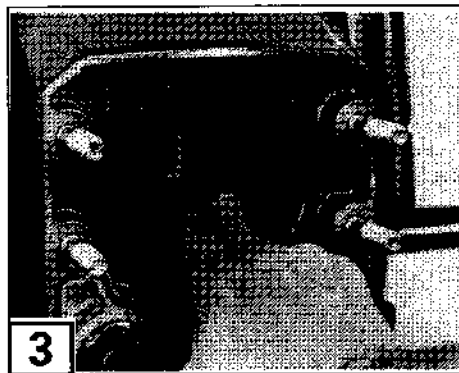
- Before working on any part of the transom bracket assembly, read the section called Safety at the beginning of this manual.
- When replacement parts are required, use genuine **OMC®** parts or parts with equivalent characteristics including type, strength and material. Failure to do so may result in product malfunction and possible injury to the operator and/or passengers.
- Some screw holes have special *Heli-Coil* inserts that provide a thread-locking feature. Do not clean *Heli-Coil* holes with a thread tap. This will damage the *Heli-Coil* inserts and force their replacement.



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## Pivot Housing Removal

Remove the vertical drive following the procedure in **Section 17**.

**1** 1. Disconnect transom bracket shift cable **A** at engine.

**2** 2. Remove collared retainer nut **B** from inner shift cable wire. Remove screw and unscrew retainer **C** at end of shift lever.

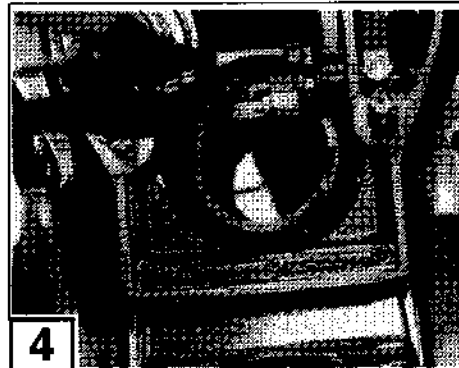
**3** 3. Disengage the U-joint boot from the lip of the pivot housing and push it inside.

**4**  4. **Wear safety glasses.** Use *OMC* retaining ring pliers P/N 303859 to remove the retainer from inside of the exhaust boot, then push the boot inside the housing.

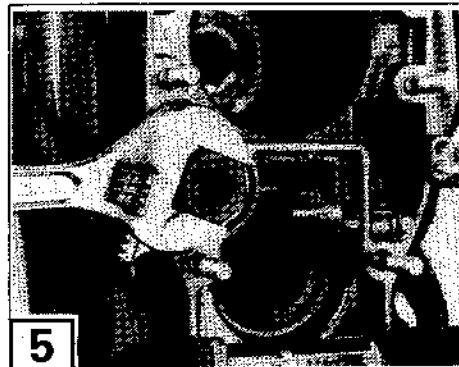
**5** 5. Unscrew the nut holding the water hose nipple, and push the nipple through the housing as far as possible.

**6** 6. Turn the gimbal ring and remove both ground straps **D**.

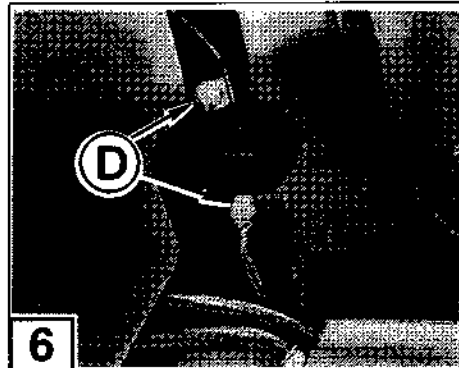
**7** 7. Use a 1/2" hex drive wrench or socket and remove both pivot pins.



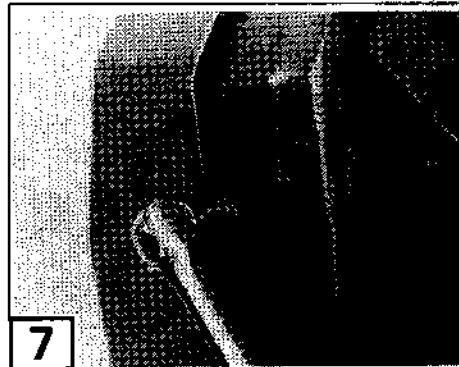
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- 8** 8. Pull the pivot housing out as far as you can. Loosen the cable retaining nut **A**, then remove the housing from the cable.

## Gimbal Ring Removal

Remove the pivot housing as described in the preceding section.

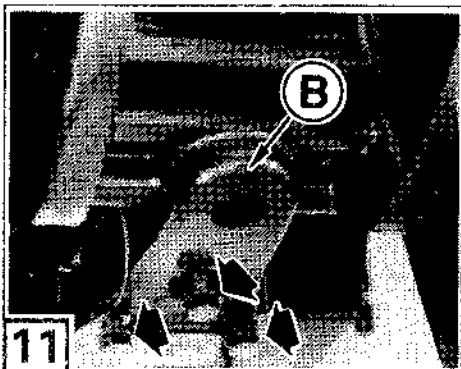
- 9** 1. Hold one trim/tilt cylinder shaft locknut and unscrew the opposite one. Take off the locknut and washer from one side, then pull the shaft completely out.

- 10** 2. Turn the gimbal to port and remove the two screws holding the trim sender. Do not attempt to pull out the sender as its leads are secured to the transom bracket.

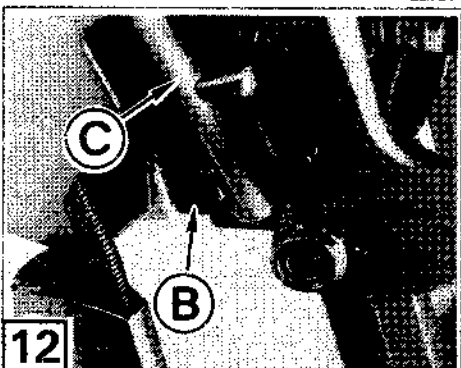
- 11** **12** 3. Remove the three screws and lockwashers holding the lower steering support bracket **B** and pull the bracket off. If it's tight, place a drift punch **C** on one side of the bracket and hit the punch with a mallet. Hit alternate sides until it's free.

- 13** 4. Remove cotter pin **D** and steering arm pin from clevis. Remove ground strap **E** from steering arm.

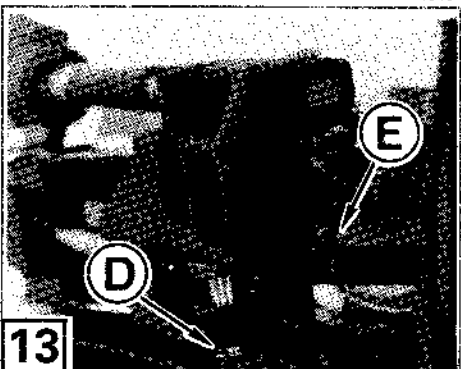
- 14** 5. Remove two screws and the gimbal housing cover. Remove two additional screws and the steering cavity cap. Peel off and discard the foam gasket.



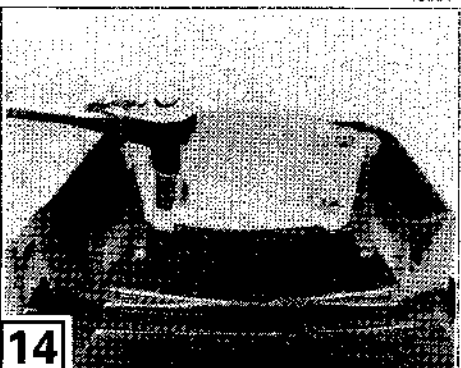
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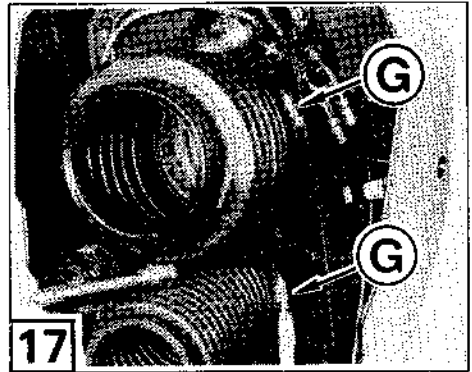
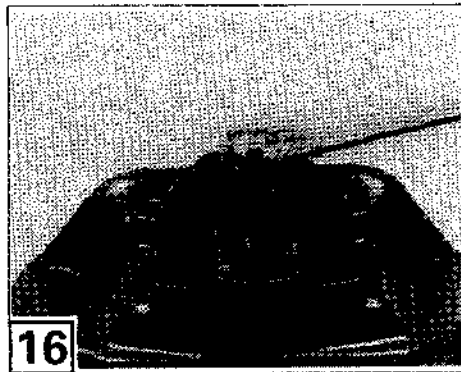
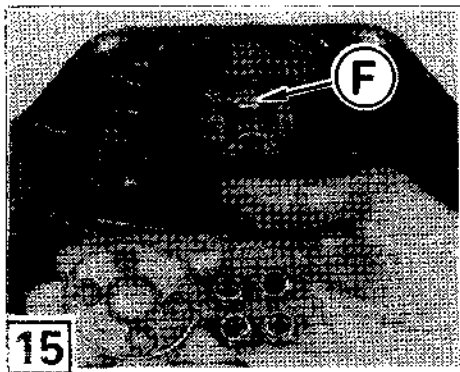


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**15** 6. Remove the four elastic locknuts and retaining plate from the top of the steering arm. Unscrew the center steering arm bolt **F**.

**16** 7. Rest *OMC* Steering Arm Puller P/N 984146 on top of the two alignment dowels inside the steering arm, and install the center bolt. Tighten the bolt and pull off the steering arm. Be ready to catch the gimbal ring when the arm comes free.

## Gimbal Housing Disassembly

### Water Hose and Bellows Removal

Remove pivot housing and gimbal ring following preceding instructions.

**17** 1. Unscrew clamps **G** and pull off the U-joint and exhaust bellows.

**18** 2. Loosen clamp **H** on upper end of hose and pull hose and nipple assembly off water tube.

### Anode Replacement

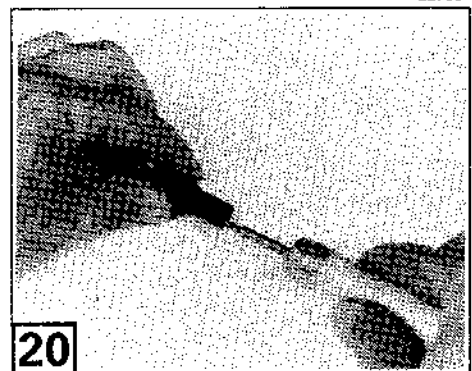
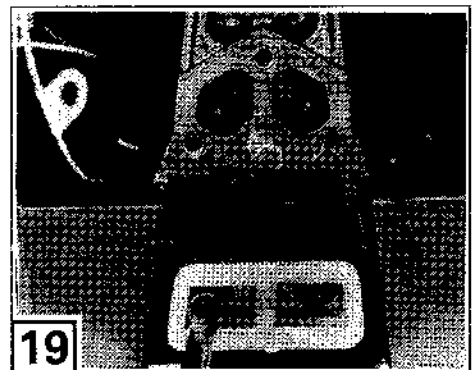
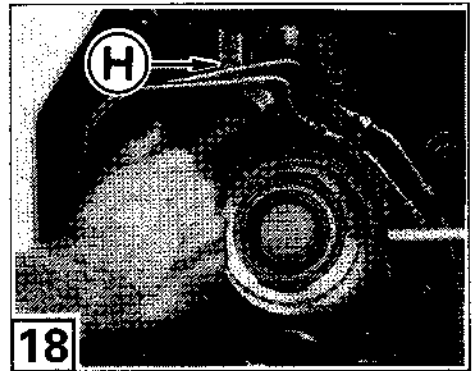
The sacrificial zinc anode need not be removed unless it's  $\frac{2}{3}$  deteriorated and needs to be replaced.

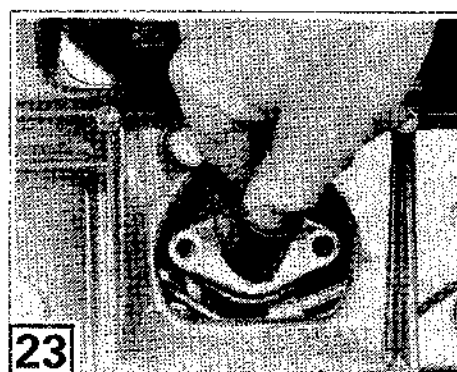
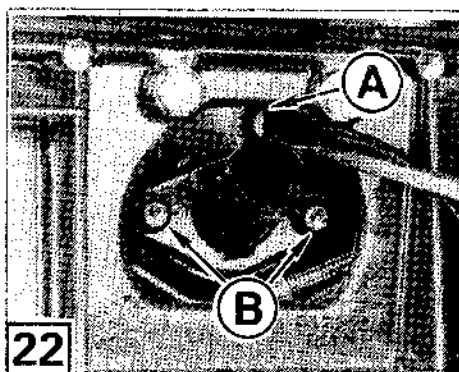
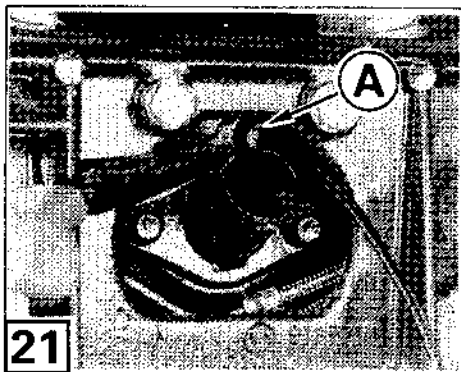
**19** 1. Remove the two screws, lockwashers, ground wires, flat washers, and the anode.

2. Clean the mounting surface, then install the new anode and the attaching hardware. Tighten the screws to a torque of 12-14 ft. lbs. (16-19 N-m).

### Trim Sender Removal

**20** 1. Disconnect rubber connector at wiring harness on engine. Use *OMC* Socket Removal Tool P/N 322699 to push terminals out of rubber plug.





- 21 22** 2. Pull the retaining clip off the grommet **A** in the transom bracket, then push the grommet out with a screwdriver. Pull the wires through the hole and remove the trim sender.

### Water Tube Removal

- 22 23** 1. Remove the two screws **B** from the water tube retainer. Pull the water tube and grommet out of the gimbal housing. If the grommet sticks, go to the outside of the transom and push it through.

2. If the grommet needs to be replaced, slide it off the water tube. It can be reused if undamaged.

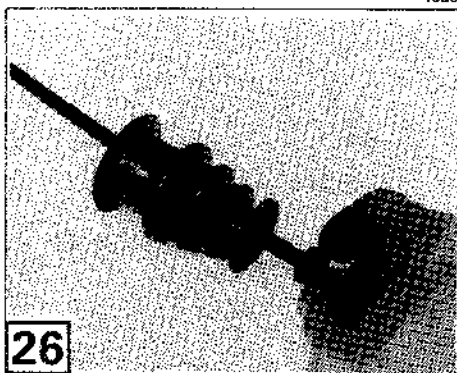
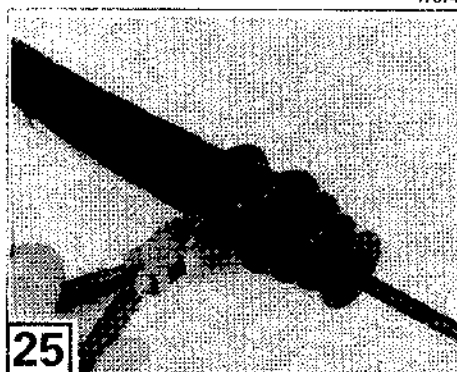
### Shift Cable Removal

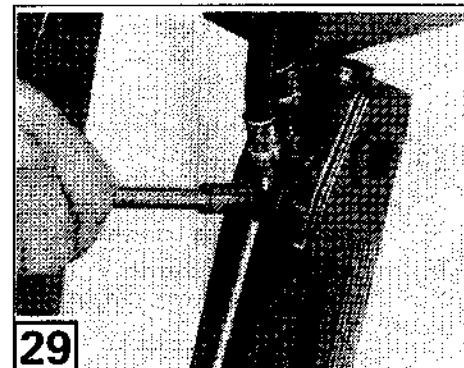
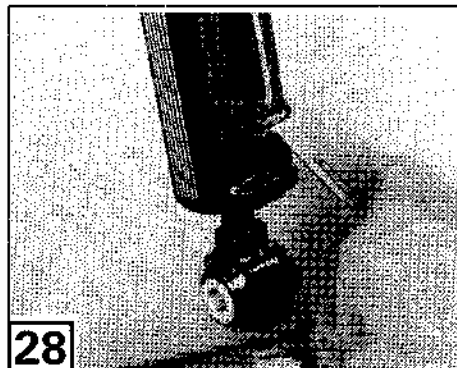
Disconnect the transom bracket shift cable at the engine shift bracket, and unscrew it from the pivot housing following the procedure described in Pivot Housing Removal.

- 24** 1. Slide the plastic corrugated casing off the shift cable and pull it out of the housing.

- 25** 2. Cut the two tie straps securing the boot to the end of the cable sleeve inside the boat. Pull the boot off the sleeve, and pull out the cable assembly.

- 26** 3. Pull the split-ring grommet from the end of the boot and take it off the cable. Slide the boot off the end of the cable.





## Trim/Tilt Cylinder Removal

**Note** Do not remove the trim/tilt cylinders unless you intend to service or replace them. Have a drain pan ready to catch fluid that will drain from the disconnected lines. Fully extend cylinder rams before starting removal.

**⚠** Wear safety glasses. Since there may be high pressure at the line fittings, fully open manual release valve and remove refill plug to equalize pressure. Reinstall fill plug and close manual release valve to prevent fluid loss from reservoir. Cover fitting with a shop cloth to catch fluid.

**27** 1. Remove the screws, ground wire, and retainer at the front of the cylinder, then lift off the cover.

**28** 2. Let the cylinder hang down and unscrew the lower line fitting. Allow line to drain completely.

**29** 3. Remove the screw and retainer at the top of the cylinder. Disconnect the remaining line and set the cylinder aside to drain.

4. Repeat steps 1 thru 3 for the remaining cylinder. Remove and discard all line fitting O-rings.

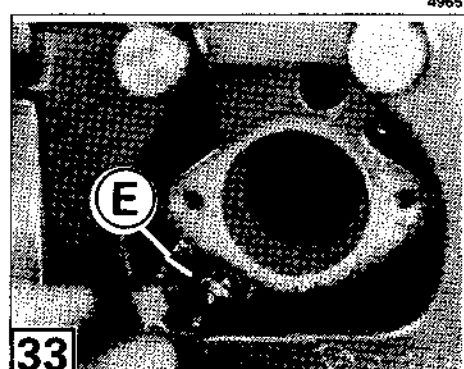
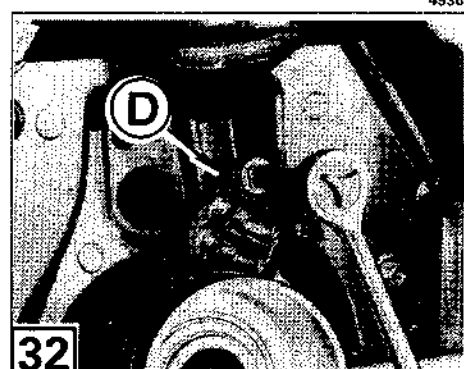
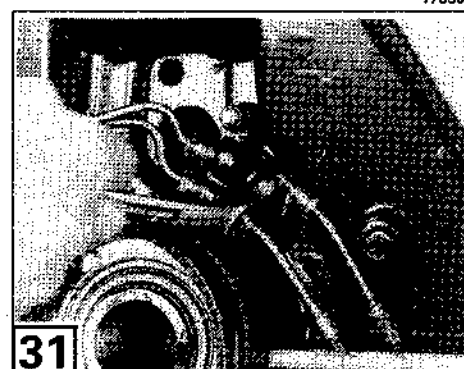
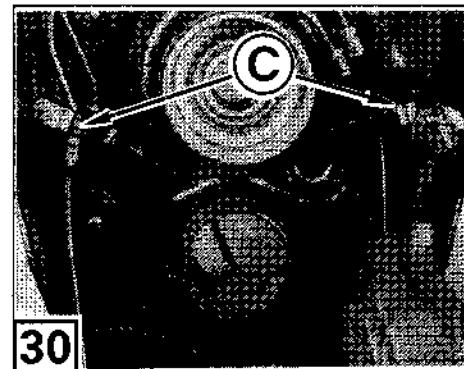
## Hydraulic Lines and Manifold Removal

Remove trim/tilt cylinders as previously instructed.

**30** 1. Remove the two clamps **©** that secure the lines to each side of the gimbal housing.

**31** 2. Unscrew all four manifold lines and remove them from the housing. Remove and discard the fitting O-rings.

**32 33** 3. Remove the elastic locknut and washer **ⓓ** that attach the manifold to the housing. Since the manifold is sealed by an O-ring, use a small drift punch **ⓔ** to drive it out of the housing from the inside of the boat.



**34** 4. Pull the manifold and lines through the hole as far as possible. Tag one line **A** for reference and note their direction of routing.

5. Unscrew both lines, then discard the fitting O-rings. Remove the manifold O-ring and discard it.

#### Gimbal Bearing, Pivot Bearing, and Seal Removal

**Note** Do not remove the gimbal bearing or upper pivot bearing unless they need to be replaced.

**35** 1. Use a three-jaw puller such as *Owatonna Tool* P/N OEM-4184 to pull out the gimbal housing bearing. Spread the tool jaws between the bearing and inner seal, and expand them tightly behind the bearing. Remove and discard the bearing.

2. Pull the inner seal out in a similar manner and discard it.

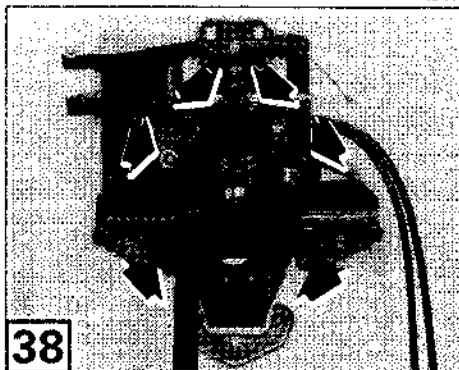
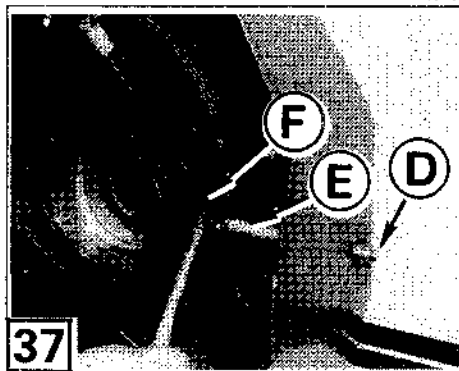
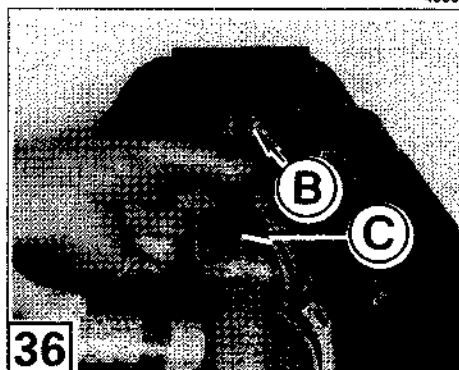
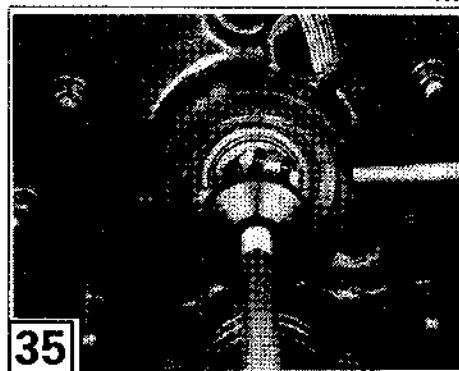
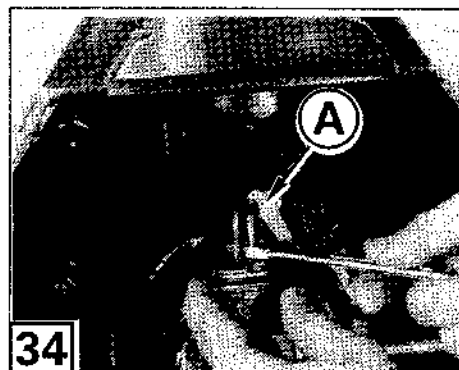
**36** 3. Remove the thrust washer from around the top of the upper pivot bearing. Use OMC Installer P/N 912287 **B** and OMC Driver P/N 912270 **C** to remove the bearing. Insert the driver into the installer and position the tool underneath the bearing as shown. Drive the bearing up and out of the bracket.

**37** **Note** 4. The grease fitting **D** on the starboard side of the bracket can be replaced if necessary, however, do not remove the extension tube **E** unless the tube is damaged. If removal is required, clamp *Vise Grip* pliers close to bearing bore. Rotate the tube to loosen it, then pry against the pliers head **F** to force the tube out of the housing.

#### Gimbal Housing and Transom Plate Removal

Remove transom exhaust pipe and steering cylinder following instructions in **Section 17**.

**38** 1. Remove the two screws and four nuts and washers securing the transom plate inside the boat. Lift the plate off the studs, note the routing of the hydraulic lines, and pull them through the manifold opening.



- 39** 2. Unscrew the two remaining nuts and washers, and pull the gimbal housing off the transom.

### Cable Connector and Seals Removal

- 40** 1. Peel off and discard the exhaust opening O-ring seal **G** and the large rubber transom seal **H**.
- 41** 2. Use OMC Crowfoot Torque Adapter P/N 910103 and unscrew the shift cable sleeve and connector assembly. Discard the connector O-ring.

### Gimbal Housing Cleaning and Inspection

Clean grease and sealer from bearing cavity, seal seat, and manifold cavity. Check inner bore diameter for scoring or discoloration that indicates a spinning bearing.

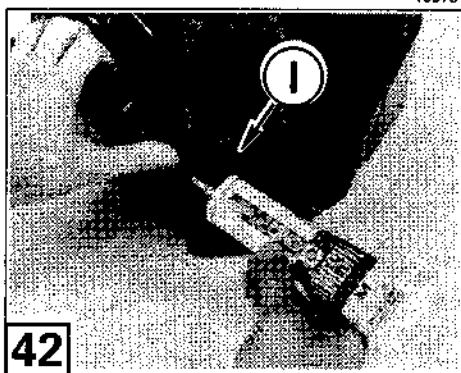
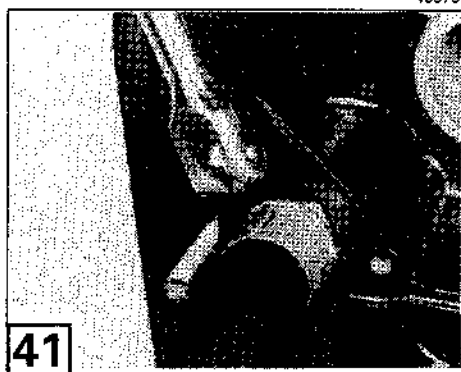
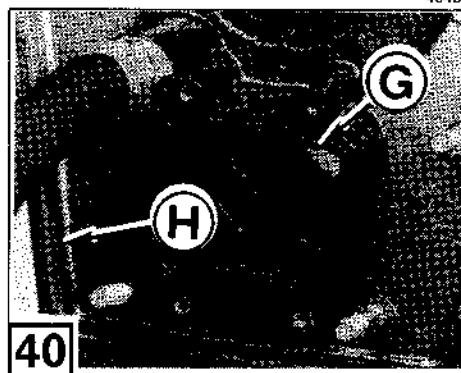
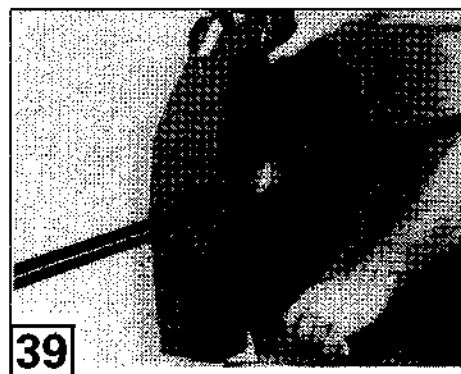
- **Pivot Bearing** - Inspect *Teflon* surface for wear or corrosion.
- **Gimbal Bearing** - Rollers must spin freely and hub must pivot in all directions; inner diameter must be free of corrosion.
- **Hydraulic Manifold** - O-ring groove must be free of nicks and burrs; all fluid passages must be clear.
- **Hydraulic Lines** - Lines must be clear and fittings undamaged.
- **Grease Fitting and Tube** - must be unobstructed.
- **Mounting Studs** - must be tight and have no thread damage.
- **Seal Grooves** - Check for corrosion, burrs and damaged edges.
- **Anode** - Check amount of deterioration.

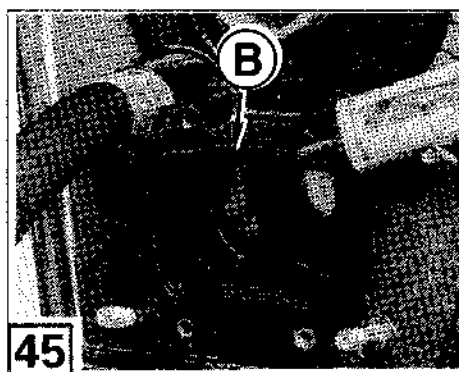
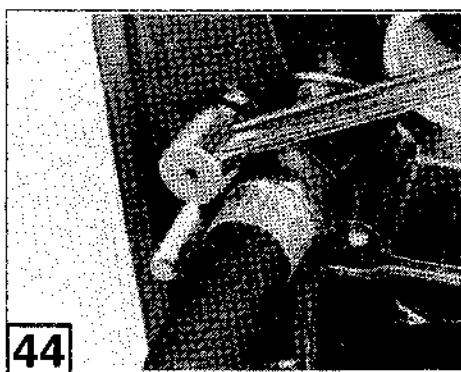
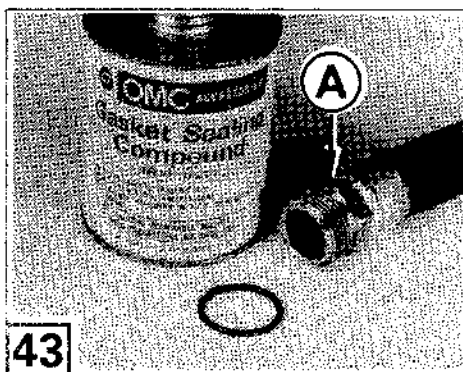
Clean parts in solvent and dry thoroughly.

**⚠ Note** Some screw holes have special *Heli-Coil* inserts that provide a thread-locking feature. Do not clean *Heli-Coil* holes with a thread tap. This will damage the *Heli-Coil* inserts and force their replacement.

### Gimbal Housing Assembly

- 42** 1. Apply *Scotch Grip™ rubber adhesive 1300* to the entire seal groove around the gimbal housing. Firmly push a new seal into the groove. Also apply *Scotch Grip™ rubber adhesive 1300* to the seal ends and butt them together **I** to form a watertight junction.





**43** 2. Apply *OMC Gasket Sealing Compound* to a new O-ring. Slide it onto the connector and position it against the hex **A** then coat the connector threads with sealer.

**44** 3. Install the sleeve and connector assembly, and use *OMC Crowfoot Torque Adapter P/N 910103* to tighten the connector to a torque of 65-68 ft. lbs. (88-92 N-m).

**45** 4. Apply *Scotch Grip™ rubber adhesive 1300* to the groove **B** around the exhaust opening, then install a new O-ring seal.

#### Gimbal Housing Installation

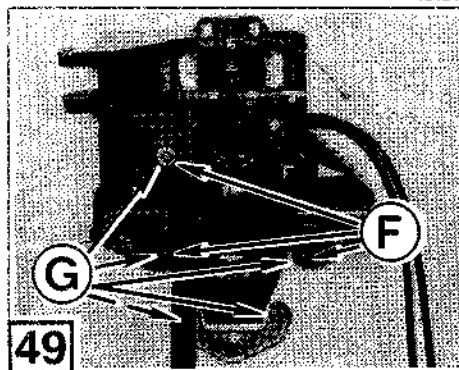
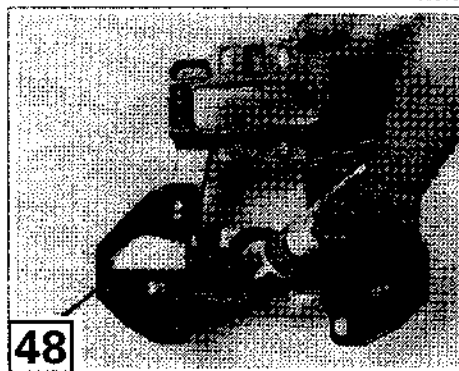
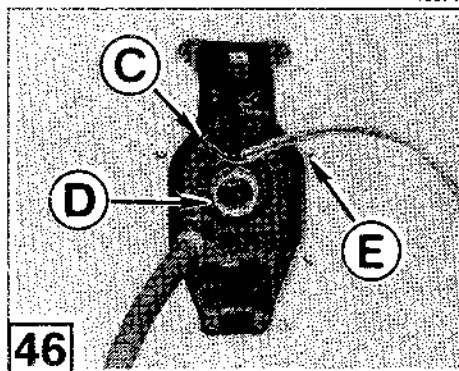
1. Thoroughly clean transom surface where gimbal housing seal makes contact, then install gimbal housing. Do not use sealer between housing seal and transom, and do not attach washers or nuts at this time.

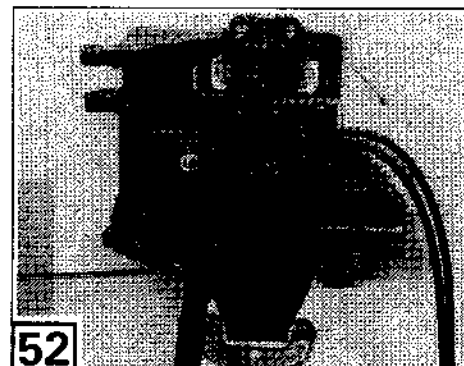
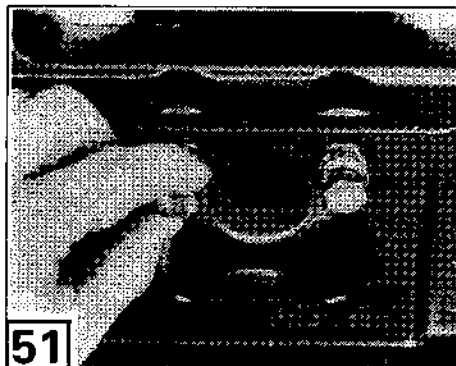
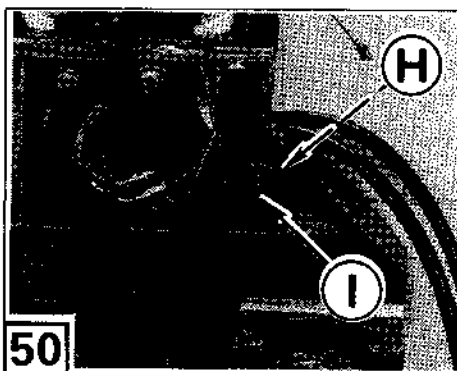
**46** 2. Feed the two trim/tilt lines through the manifold opening **C**. Route the lines above the alignment tube **D** and over the uppermost port stud **E** as shown.

**47** 3. Lightly coat the six gimbal housing studs with *OMC Gasket Sealing Compound*.

**48** 4. Apply a light coat of *OMC Triple-Guard®* grease to the inside of the transom plate alignment tube.

**49** 5. Position the two hydraulic lines above the uppermost port stud and mount the transom plate. Place the lower bearing plate over the two bottom studs, flat side against transom. Install three flat washers **F** and five new elastic locknuts **G**. Tighten nuts until they just contact plate and transom. Do not torque nuts at this time.





**50** 6. Position ground wire **H** onto transom bracket stud **I**. Install washer and elastic locknut. **Do not** tighten at this time.

**51** 7. Place lockwashers on the two alignment screws. Lightly coat the screw threads with *OMC Gasket Sealing Compound*, then screw them completely in only finger tight. **Do not** torque the screws at this time.

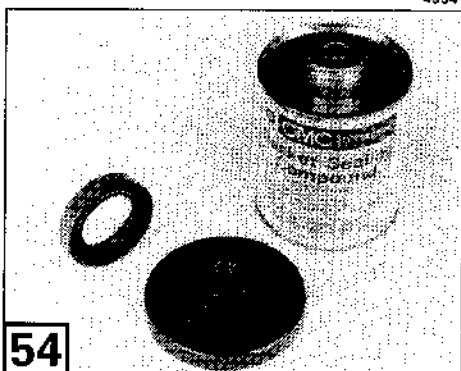
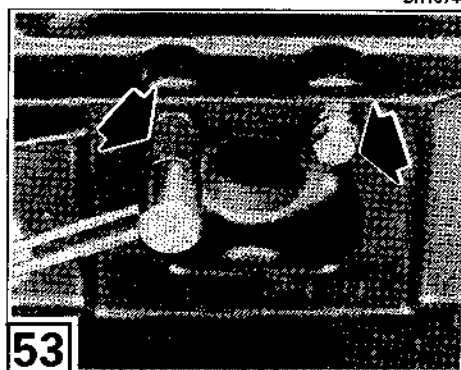
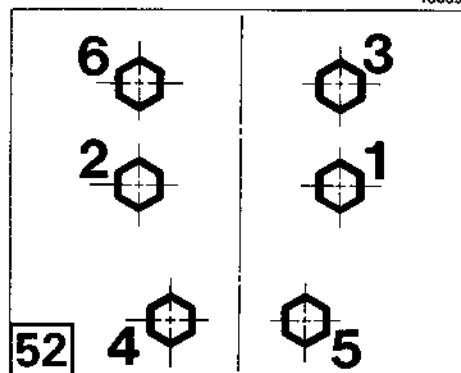
**52** 8. Tighten the six locknuts in a cross pattern, starting with the two center nuts. Tighten them to a torque of 20-25 ft.lbs. (27-34 N-m).

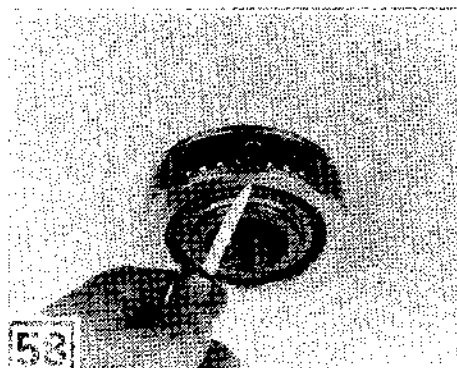
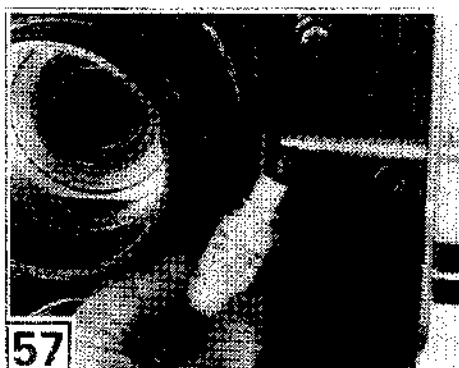
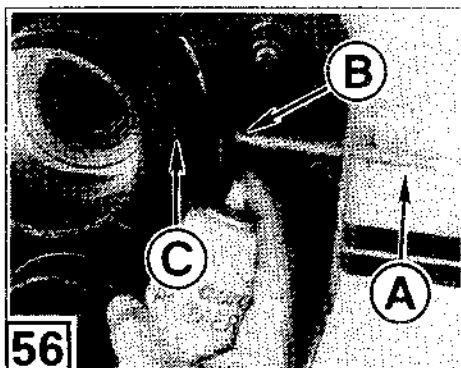
**53** 9. Tighten the two alignment screws to a torque of 12-14 ft. lbs. (16-19 N-m).

#### Gimbal Bearing, Pivot Bearing, and Seal Installation

**54** 1. Face the open end of a new gimbal housing seal toward OMC Installer P/N 912279 and place it on the projecting nose of the tool. Lightly coat the metal case with *OMC Gasket Sealing Compound*.

**55** 2. Screw the installer onto OMC Drive Handle P/N 311880. Drive the seal into the housing until it seats. Coat the seal lip with *OMC Triple-Guard* grease.





3. If the grease extension tube was removed, install it as follows:

**56** a. Remove the grease fitting from the tube. Apply *OMC Gasket Sealing Compound* to the last 1/4" (A) of the grease fitting end of the tube. Insert tube through outer wall of housing.

**56** b. Spray tapered end of tube (B) and housing hole (C) with *OMC Locquic Primer* and allow to air dry.

**57** c. Sparingly apply *OMC Ultra Lock* to tapered end of tube, and drive tube into housing until it seats. Wipe away excess adhesive that may enter bearing cavity or end of tube.

**58** 4. To ensure adequate lubrication of the gimbal bearing, it must be correctly positioned prior to installation. Rotate the outer band until its slot aligns with the lubrication hole. Scribe a reference mark at this point on the bearing case.

**59** 5. Oil the exterior of the bearing case. Place the bearing in the housing with the reference mark (D) facing the extension tube opening. Screw the raised side (E) of OMC Installer P/N 912279 onto OMC Drive Handle P/N 311880. Drive the bearing in until it seats. Lubricate the bearing with *OMC Marine Wheel Bearing Grease* through the grease fitting on the starboard side of the housing.

**60** 6. To install the upper pivot bearing, slide OMC Installer P/N 912287 (F) onto OMC Rod P/N 326582 (G), then place a new bearing (H) on the installer. Lightly oil the outside of the bearing.

**60** 7. OMC Installer P/N 912286 (I) will act as a stop to seat the bearing. When positioned inside the steering arm cavity, the recessed side of the tool must face the bearing as shown.

**61** 8. Face recessed side of OMC Installer P/N 912286 down, and insert it into the steering arm cavity from inside the boat. Screw puller rod into the installer until it's flush with the top of the installer. Hold the rod and tighten the nut until the bearing seats.

