



# LOWER UNIT

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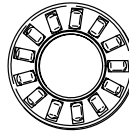
# Specifications

<b>GEAR HOUSING (2.42:1)</b>	<b>Gear Ratio</b> <b>Gearcase Capacity</b> <b>Lubricant Type</b> <b>Forward Gear</b>	2.42:1 14.9 fl. oz. (440 mL) Quicksilver Premium Gear Lubricant 29 Spiral/Bevel
	<b>Number of Teeth</b> <b>Pinion Gear</b> <b>Number of Teeth</b> <b>Pinion Height</b> <b>Forward Gear Backlash</b> <b>Water Pressure</b> @ Idle @ WOT	12 Spiral/Bevel 0.025 in. (0.64 mm) No Adjustment  2 – 4 PSI @ 800 rpm 12–17 PSI @ 6000 rpm

**NOTE:** Before filling gear case, apply 10-12 PSI of air pressure at the vent hole. Pressure should not drop for 5 minutes while alternately applying a 2-3 pound force to the top of the shift shaft in the fore and aft direction.

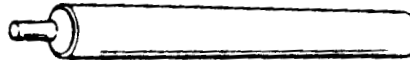
## Special Tools

1. Bearing 31-85560



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2. Driver 91-13779





3. Bearing Puller & Installation Tool 91-31229A7

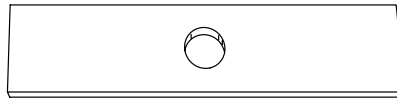
a. Nut 11-24156



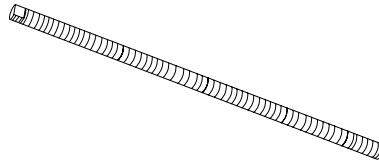
b. Washer (2) 12-34961



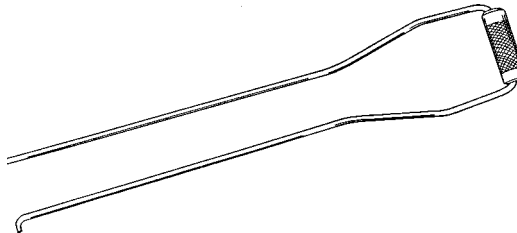
c. Plate 91-29310



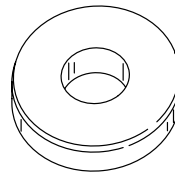
d. Shaft 91-31229



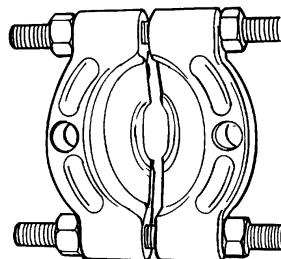
4. Bearing Puller Tool 91-27780



5. Mandrel 91-36571

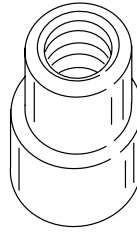


6. Universal Puller Plate 91-37241

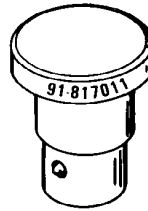




7. Driver Head 91-37312

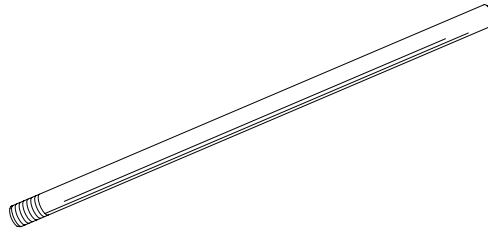


8. Driver 91-817011



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9. Driver Rod 91-37323



10. Drive Shaft Holding Tool

- a. 2-stroke models 91-825196
- b. 4-stroke models 91-83180M

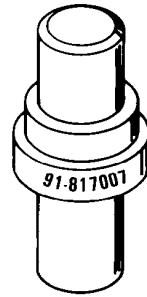


11. Mandrel 91-825197



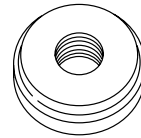


12. Driver 91-817007

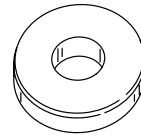


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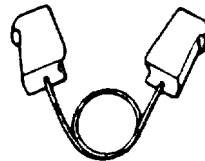
13. Mandrel 91-825198



14. Pilot 91-825199



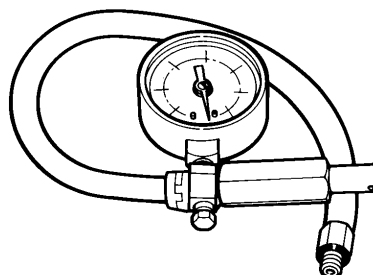
15. Spring Hook 91-825200A1



16. Driver 91-826872



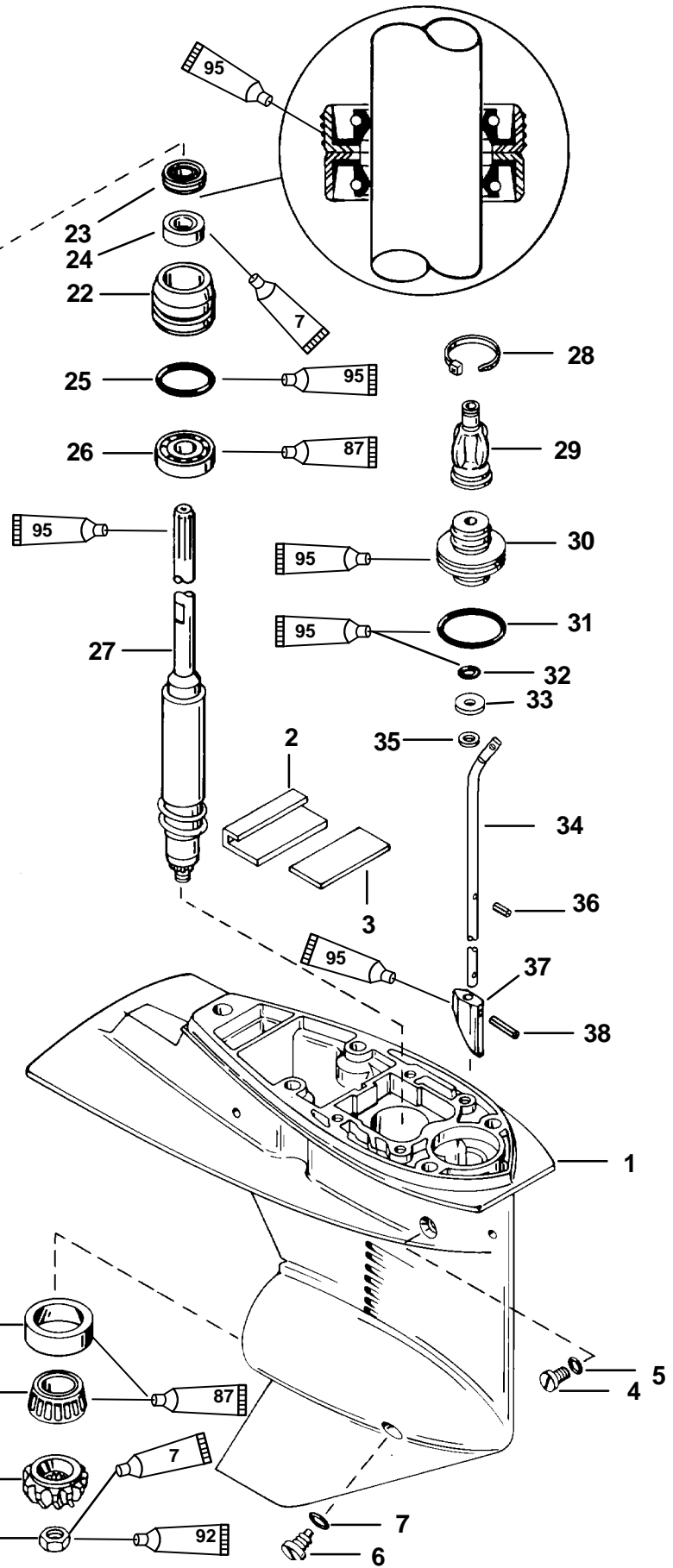
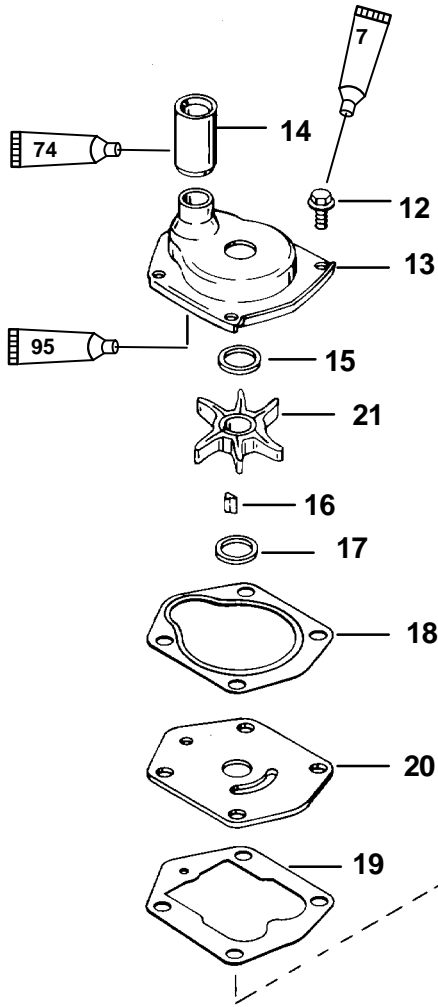
17. Leakage Tester FT8950





# GEAR HOUSING (Driveshaft) (2.42:1 Gear Ratio)

- 7 Loctite 271 Thread Locker
- 74 Loctite 405
- 87 Premium Gear Lubricant
- 92 Loctite 7649 Primer
- 95 2-4-C Marine Lubricant with Teflon



**3.44 IN./135MM  
TORPEDO DIA.**

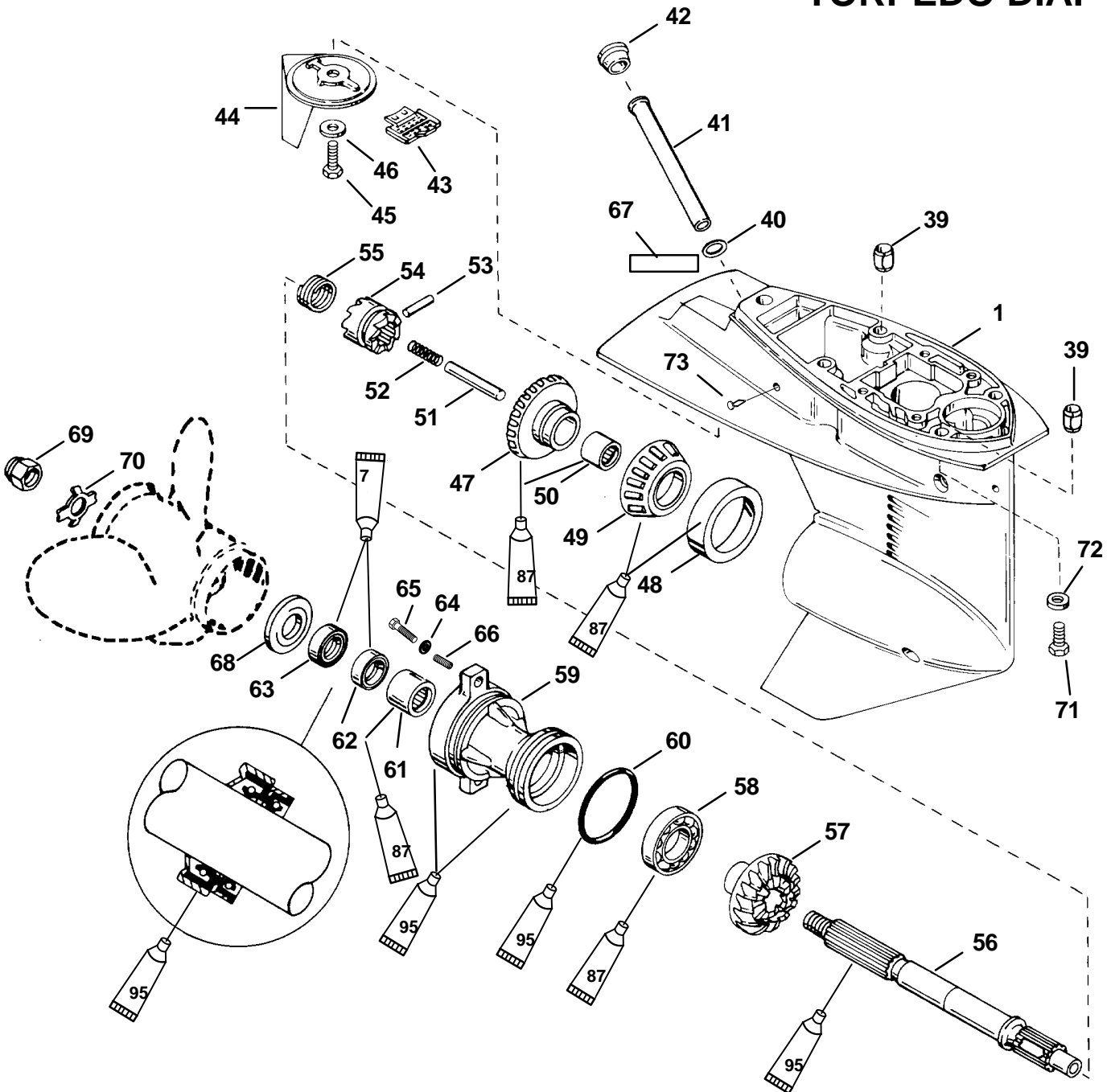
**GEAR HOUSING (Driveshaft) (2.42:1 Gear Ratio)**

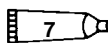
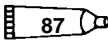
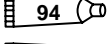
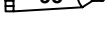
REF. NO.	QTY.	DESCRIPTION	TORQUE		
			lb. in.	lb. ft.	N-m
-	1	GEAR HOUSING (SHORT) (BLACK)			
-	1	GEAR HOUSING (SHORT) (GRAY)			
-	1	GEAR HOUSING (LONG) (BLACK)			
-	1	GEAR HOUSING (LONG) (GRAY)			
1	1	GEAR HOUSING (BASIC) (BLACK)			
	1	GEAR HOUSING (BASIC) (GRAY)			
2	1	SEAL/PLATE KIT			
3	1	PLATE (Part Of Ref #2)			
4	1	SCREW (.375-16 x .25)	60		7
5	1	WASHER-Sealing			
6	1	DRAIN SCREW (MAGNETIC)	60		7
7	1	WASHER-Sealing			
8	1	NUT		50	68
9	1	PINION GEAR (12 TEETH) (Part of 43-833000A2)			
10	1	BEARING ASSEMBLY-Roller			
11	1	CUP (Part Of Ref #10)			
12	4	SCREW (M6 x 16)	60		7
13	1	WATER PUMP ASSEMBLY			
14	1	SEAL-Water Tube (SHORT - 1-3/4)			
	1	SEAL-Water Tube (LONG - 2-1/4)			
15	1	WASHER			
16	1	KEY			
17	1	WASHER			
18	1	GASKET			
19	1	GASKET (LOWER)			
20	1	FACE PLATE			
21	1	IMPELLER			
22	1	WATER PUMP BASE ASSEMBLY			
23	1	SEAL-Oil			
24	1	SEAL-Oil			
25	1	O RING			
26	1	BALL BEARING			
27	1	DRIVESHAFT (SHORT)			
	1	DRIVESHAFT (LONG)			
28	1	CABLE TIE			
29	1	BOOT-Shift Shaft			
30	1	RETAINER-Shift Shaft			
31	1	O RING			
32	1	O RING			
33	1	WASHER			
34	1	SHIFT SHAFT (SHORT)			
	1	SHIFT SHAFT (LONG)			
35	1	WASHER			
36	1	ROLL PIN			
37	1	CAM-Shift			
38	1	PIN			



# GEAR HOUSING (Propeller Shaft) (2.42:1 Gear Ratio)

3.44 IN./135MM  
TORPEDO DIA.



-  7 Loctite 271
-  87 Premium Gear Lubricant
-  94 Anti-Corrosion Grease
-  95 2-4-C Marine Lubricant with Teflon





# GEAR HOUSING (Propeller Shaft) (2.42:1 Gear Ratio)

REF. NO.	QTY.	DESCRIPTION	TORQUE		
			lb. in.	lb. ft.	N-m
-	1	GEAR HOUSING (SHORT) (BLACK)			
-	1	GEAR HOUSING (SHORT) (GRAY)			
-	1	GEAR HOUSING (LONG) (BLACK)			
-	1	GEAR HOUSING (LONG) (GRAY)			
1	1	GEAR HOUSING (BASIC) (BLACK)			
	1	GEAR HOUSING (BASIC) (GRAY)			
39	2	DOWEL PIN			
40	1	GASKET Water Tube			
41	1	TUBE			
42	1	PLUG-RUBBER			
43	1	SCREEN-Water Inlet			
44	1	TRIM TAB			
45	1	SCREW (M8 x 20)	190	15.8	21.5
46	1	WASHER			
47	1	FORWARD GEAR ASSEMBLY (29 TEETH)			
48	1	ROLLER BEARING ASSY.			
49	1	CUP			
50	1	ROLLER BEARING			
51	1	FOLLOWER-Cam			
52	1	SPRING			
53	1	PIN-Cross			
54	1	CLUTCH			
55	1	SPRING			
56	1	PROPELLER SHAFT			
57	1	REVERSE GEAR (29 TEETH)			
58	1	BALL BEARING			
59	1	BEARING CARRIER			
60	1	O RING			
61	1	NEEDLE BEARING			
62	1	OIL SEAL			
63	1	OIL SEAL			
64	2	WASHER			
65	2	SCREW (M8 x 25 - Cap Screw)	225	16.5	22.5
66	2	THREADED INSERT			
67	1	DECAL (2.42:1)(12 x 29)			
68	1	THRUST HUB			
69	1	PROP NUT KIT		55	75
70	1	TAB WASHER			
71	4	SCREW		40	54
72	4	WASHER			
73	1	PLUG			

**THESE REPLACEMENT PARTS  
ARE NOT INCLUDED WITH  
COMPLETE GEAR HOUSING  
REPLACEMENT**



## General Service Recommendations

There may be more than one way to “disassemble” or “reassemble” a particular part(s), therefore, it is recommended that the entire procedure be read prior to repair.

**IMPORTANT: Read the following before attempting any repairs.**

In many cases, disassembly of a sub-assembly may not be necessary until cleaning and inspection reveals that disassembly is required for replacement of one or more components.

Service procedure order in this section is a normal disassembly-reassembly sequence.

Threaded parts are right hand (RH), unless otherwise indicated.

When holding, pressing or driving is required, use soft metal vise jaw protectors or wood for protection of parts. Use a suitable mandrel (one that will contact only the bearing race) when pressing or driving bearings.

Whenever compressed air is used to dry a part, verify that no water is present in air line.

## Bearings

All bearings must be cleaned and inspected. Clean bearings with solvent and dry with compressed air. Air should be directed at the bearing so that it passes through the bearing. DO NOT spin bearing with compressed air, as this may cause bearing to score from lack of lubrication. After cleaning, lubricate bearings with Gear Lubricant. DO NOT lubricate tapered bearing cups until after inspection.

Inspect all bearings for roughness, catches and bearing race side wear. Work inner bearing race in-and-out, while holding outer race, to check for side wear. When inspecting tapered bearings, determine condition of rollers and inner bearing race by inspecting bearing cup for pitting, scoring, grooves, uneven wear, imbedded particles and/or discoloration from over-heating. Always replace tapered bearing and race as a set.

Inspect gear housing for bearing races that have spun in their respective bores. If race(s) have spun, gear housing must be replaced.

Roller bearing condition is determined by inspecting the surface of the shaft that the roller bearing supports. Check shaft surface for pitting scoring, grooving, imbedded particles, uneven wear and/or discoloration from overheating. The shaft and bearing must be replaced if such a condition exists.

## Seals

As a normal procedure, all O-rings and oil seals should be replaced without regard to appearance. To prevent leakage around seals, apply Loctite 271 to outer diameter of all metal case seals. When using Loctite on seals or threads, surfaces must be clean and dry. Apply 2-4-C Marine Lubricant with Teflon on all O-rings and on I.D. of oil seals. Apply 2-4-C Marine Lubricant with Teflon to external surfaces of bearing carrier.

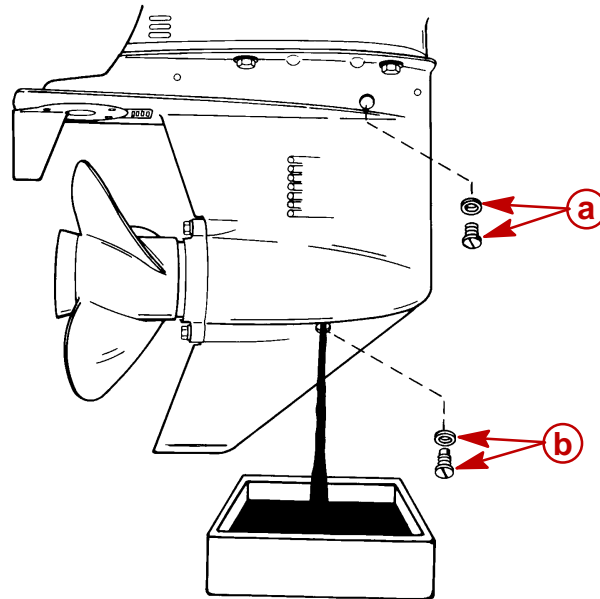


## Draining and Inspecting Gear Lubricant

### **⚠ WARNING**

If gear housing is installed on outboard, disconnect (and isolate) spark plug leads from spark plugs before working near the propeller.

1. With gear housing in normal running position, place a clean pan under housing and remove vent plug and fill/drain plug (with gaskets).



- a** - Vent Plug/Washer  
**b** - Fill/Drain Plug/Washer

2. Inspect gear lubricant for metal particles (lubricant will have a “metal flake” appearance). Presence of fine metal particles (resembling powder) on the drain plug magnet indicates normal wear. Metal chips on the magnet indicate the need for gear housing disassembly and component inspection.
3. Note color of gear lubricant. White or cream color indicates presence of water. Gear lubricant drained from a gear case assembled with Special Lubricant 101 or a gear case recently in operation will have a yellowish color due to lubricant agitation/aeration. This is normal and should not be confused with the presence of water.
4. Presence of water indicates the need for disassembly and inspection of oil seals, o-rings, gaskets and components for damage.



# Gear Housing Removal

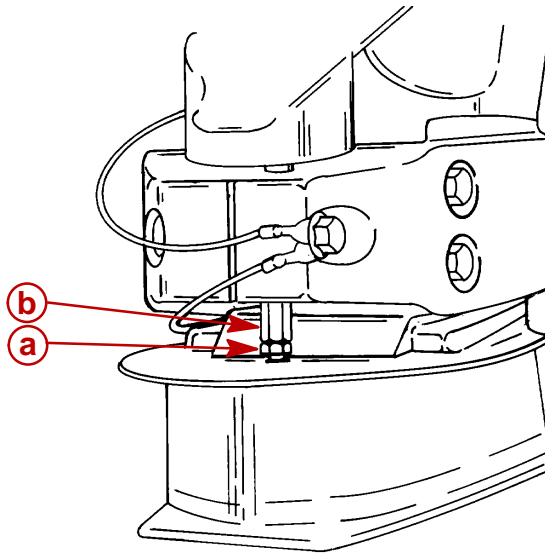
## **⚠ WARNING**

To prevent accidental engine starting, remove (and isolate) spark plug leads from spark plugs before removing gear housing.

1. Remove (and isolate) spark plug leads from spark plugs.
2. Shift into NEUTRAL.
3. Loosen jam nut. Unscrew attaching nut to separate shift shaft.

## 2-Stroke Models

MERCURY/MARINER 30/40, AND 40/50,  
FORCE 40/50



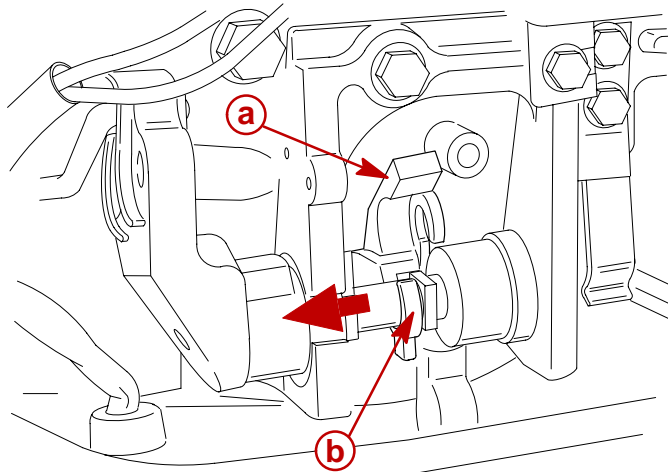
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- a** - Jam Nut  
**b** - Attaching Nut



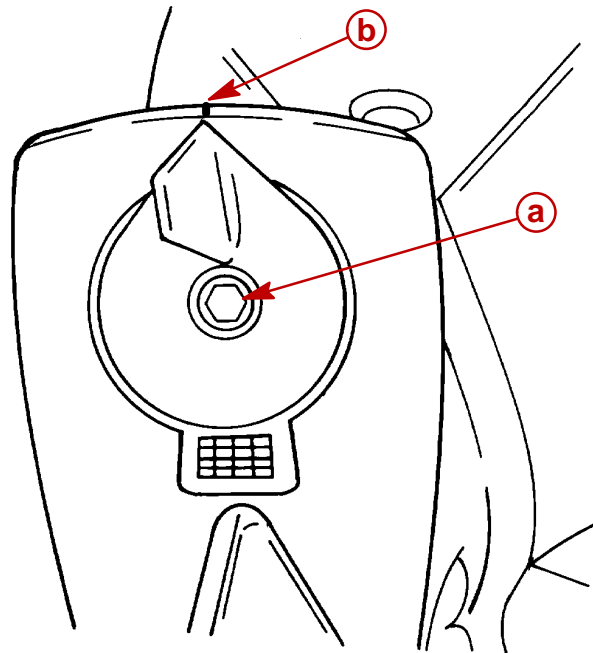
## 4-Stroke Models

### MERCURY/MARINER 25, 45/50



- a** - Retainer
- b** - Lower Clip

4. Make a scribe line showing alignment of trim tab to gear case and remove trim tab screw and washer.

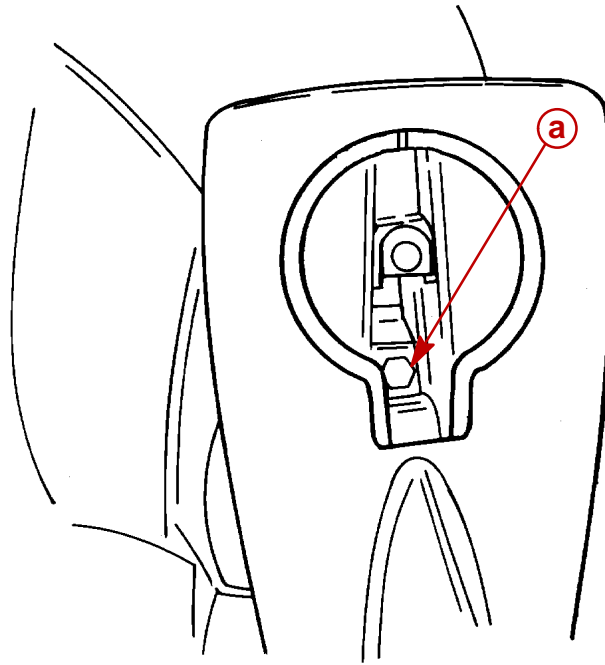


- a** - Screw and Washer
- b** - Scribe Line

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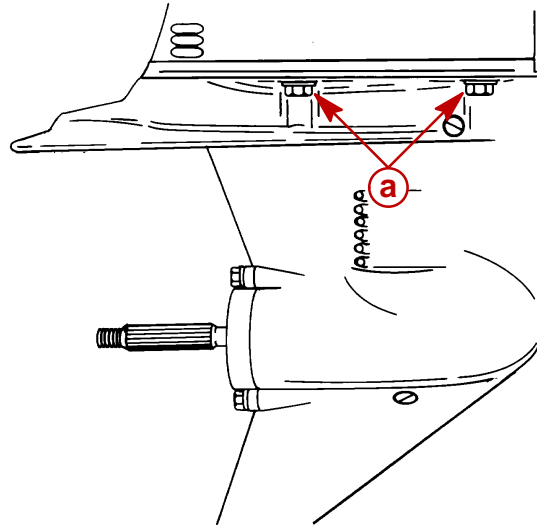
5. Remove nut and washer in trim tab cavity.



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**a** - Nut and Washer

6. Remove 4 screws securing gear case to drive shaft housing.



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**a** - Screw (4)

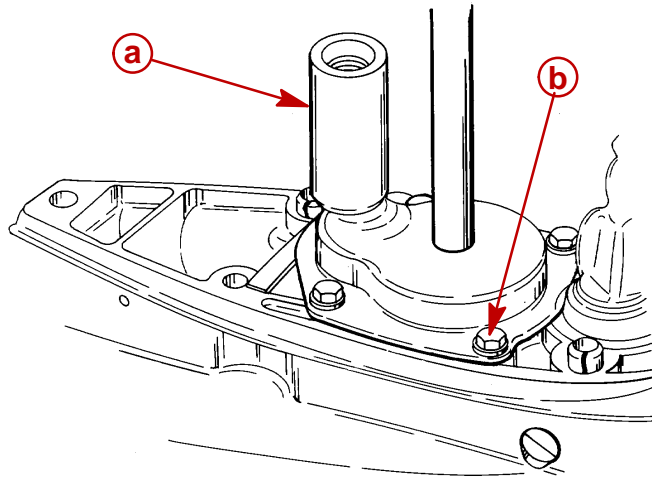


# Disassembly

## Water Pump

**NOTE:** If water tube seal remained in drive shaft housing, remove seal from housing and reinstall on water pump cover. Secure seal to cover with Loctite 405.

1. Remove 4 screws securing pump cover.



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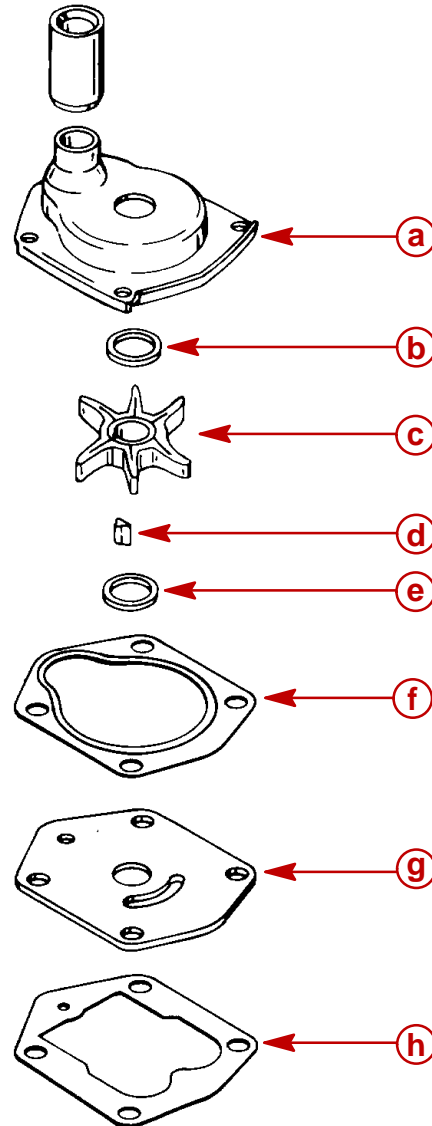
- a** - Seal
- b** - Screw (4)

**NOTE:** Replace cover if thickness of steel at discharge slots is 0.060 in. (1.524mm) or less, or if groove(s) (other than impeller sealing groove) in cover roof are more than 0.030 in. (0.762mm) deep.

2. Remove cover, washer (above impeller), impeller, key and washer (below impeller).



3. Remove cover gasket, base plate and base gasket.



- a** - Cover
- b** - Washer (above impeller)
- c** - Impeller
- d** - Key
- e** - Washer (below impeller)
- f** - Cover Gasket
- g** - Face Plate
- h** - Base Gasket

**NOTE:** Replace impeller if:

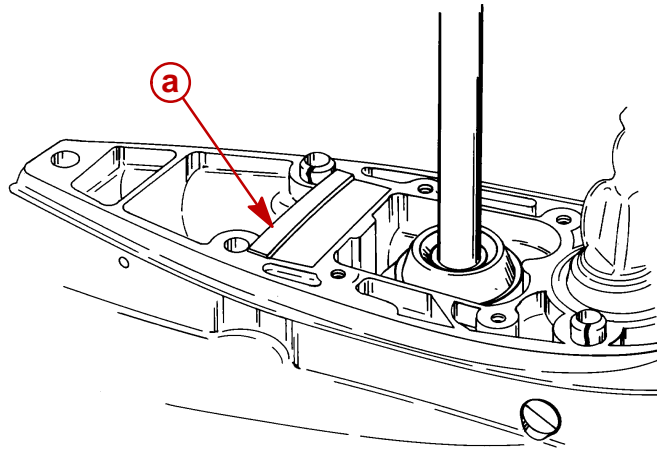
- Impeller blades are cracked, torn or worn.
- Impeller is glazed or melted
- Rubber portion of impeller is not bonded to impeller hub.

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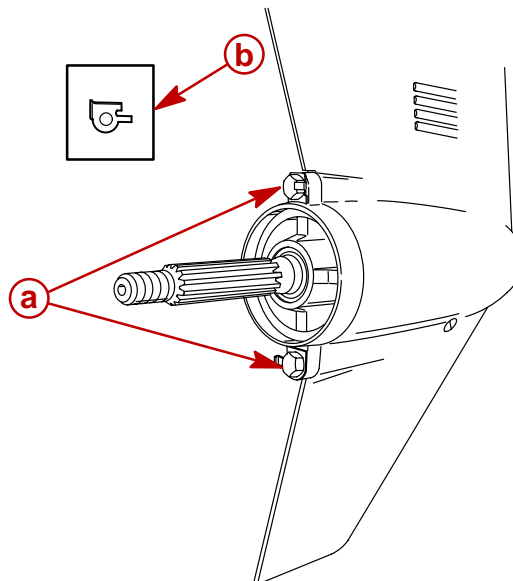
4. Remove and/or replace exhaust deflector plate if damaged.



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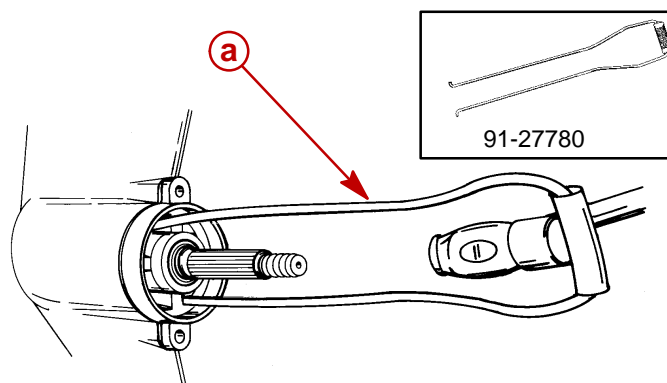
**a** - Deflector Plate

5. Remove bearing carrier attaching screws and locking tab washers or flat washers. Discard tab washers.



**a** - Screws and Tab Washers or Flat Washers  
**b** - Tab Washers Style 2

6. Using Puller (91-27780), remove carrier assembly from gear case.



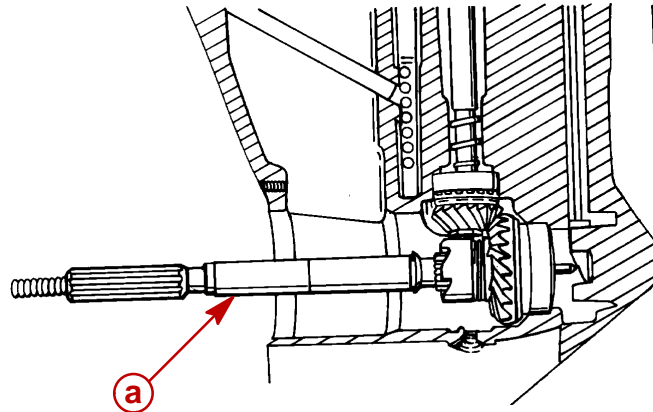
**a** - Puller (91-27780)

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**NOTE:** When removing propeller shaft assembly, cam follower may dislodge. Retrieve follower from gear housing.

7. Remove propeller shaft assembly.

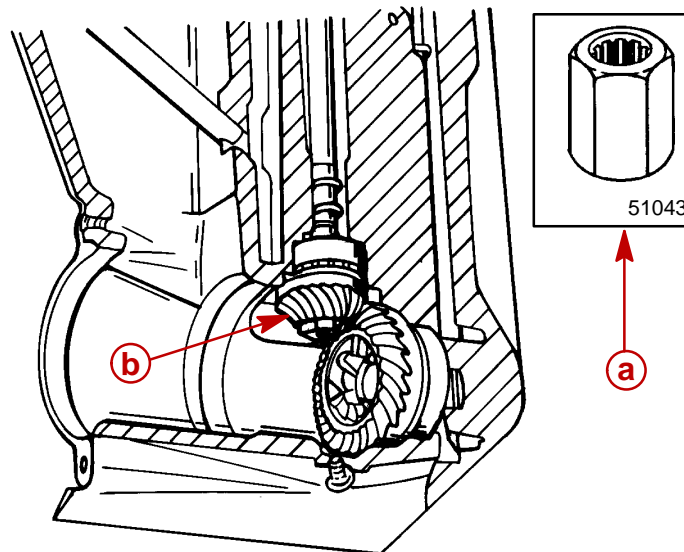


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**a** - Propeller Shaft

Models	Drive Shaft Holding Tool
4-Stroke Mercury/Mariner 25, 45/50	91-83180M
2-Stroke Force 40/50 Mercury 30/40, 40/50	91-825196

8. Remove pinion nut.

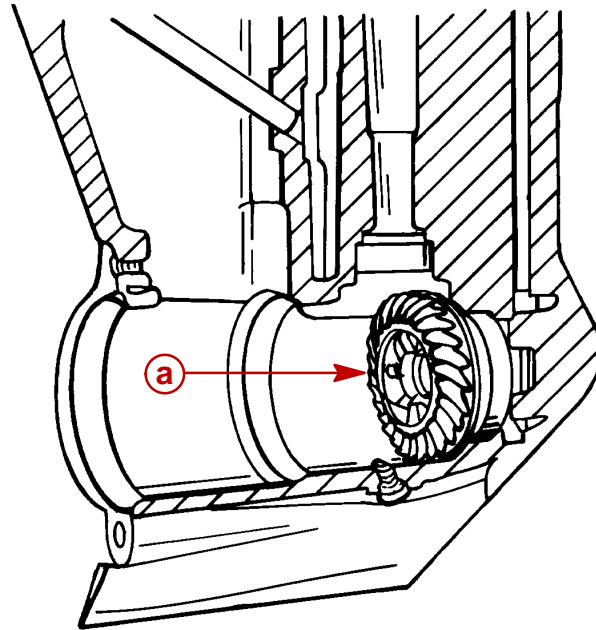


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**a** - Drive Shaft Holding Tool  
**b** - Pinion Gear



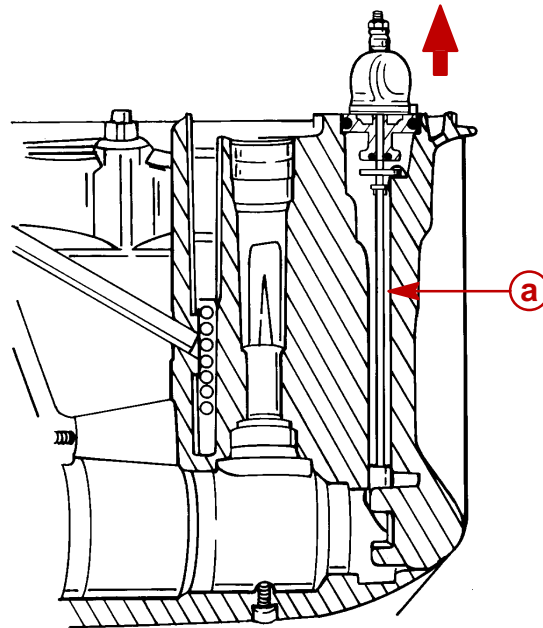
- 9. Remove drive shaft assembly and pinion gear.
- 10. Remove forward gear.



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**a** - Forward Gear

- 11. Remove shift shaft assembly

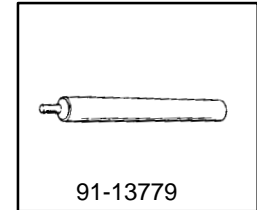
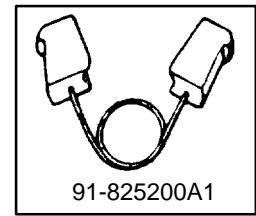
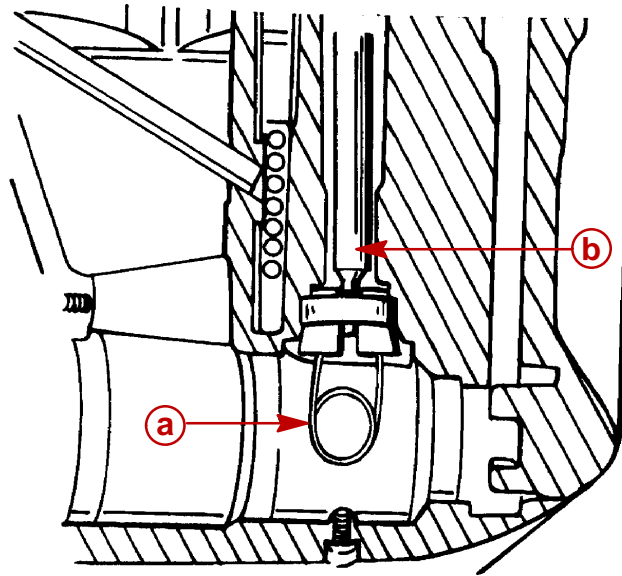


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**a** - Shift Shaft Assembly



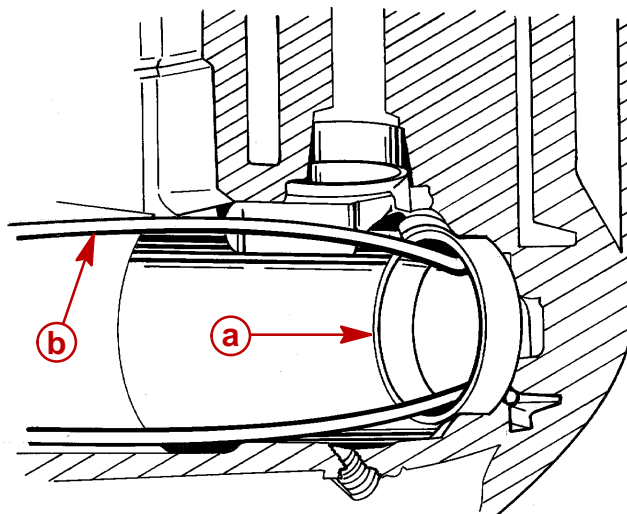
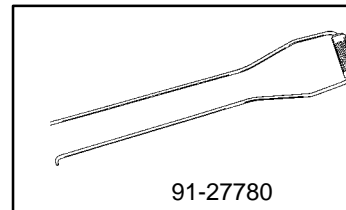
12. Insert pinion bearing race puller (91-825200A1) through gear case and position inside of pinion bearing race. Insert driver (91-13779) into puller through drive shaft cavity and drive out race.



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- a** - Puller (91-825200A1)
- b** - Driver (91-13779)

13. Remove forward bearing race with puller (91-27780).



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- a** - Race
- b** - Puller (91-27780)

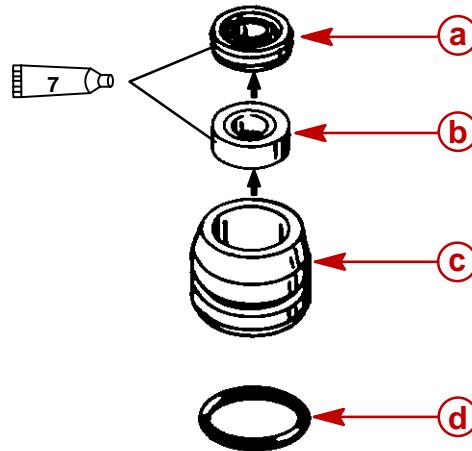


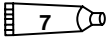
## Water Pump Seals

**NOTE:** All gaskets, seals and o-rings should be replaced as a normal repair procedure during gear case disassembly.

**NOTE:** DO NOT use a screwdriver to remove seals from carrier, as carrier may be damaged.

1. Using a suitable mandrel, press both seals from carrier.

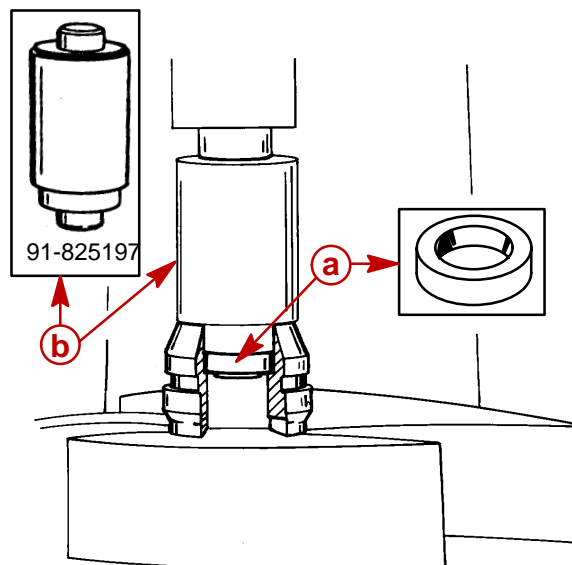


 Loctite 271 Thread Locker

- a** - Neoprene Ribbed Seal
- b** - Metal Cased Seal
- c** - Carrier
- d** - O-ring

52692

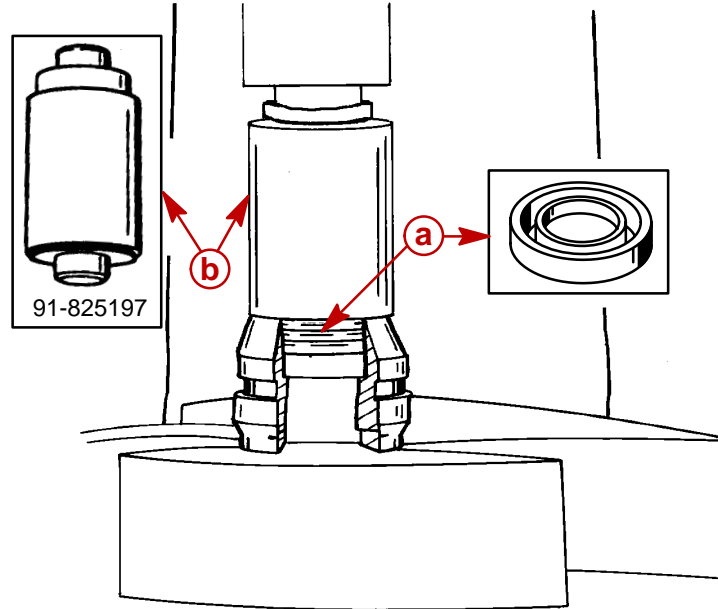
2. Apply Loctite 271 Thread Locker to the O.D. of the metal cased seal. With seal lip facing away from the large shoulder of mandrel (91-825197), press seal into carrier until mandrel bottoms on carrier.



- a** - Seal (Metal Cased) Lip Facing Down
- b** - Mandrel (91-825197)



3. With lip of ribbed neoprene O.D. seal facing towards small shoulder of Mandrel (91-825197), press seal into carrier until mandrel bottoms on carrier.

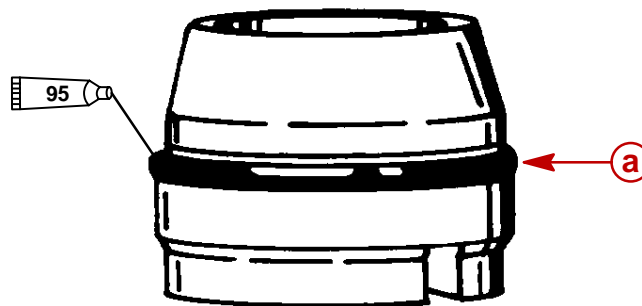


52853

- a** - Seal (Ribbed Neoprene) Lip Facing Up
- b** - Mandrel (91-825197)

**NOTE:** Apply a light coat of 2-4-C Marine Lubricant with Teflon to the lips of both seals after installation in carrier.

4. Apply a light coat of 2-4-C Marine Lubricant with Teflon to the new o-ring and install on carrier.



52825

**95** 2-4-C Marine Lubricant with Teflon

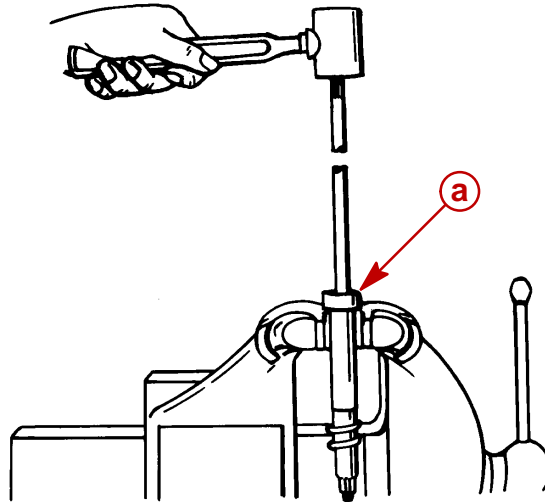
- a** - O-ring



# Inspection

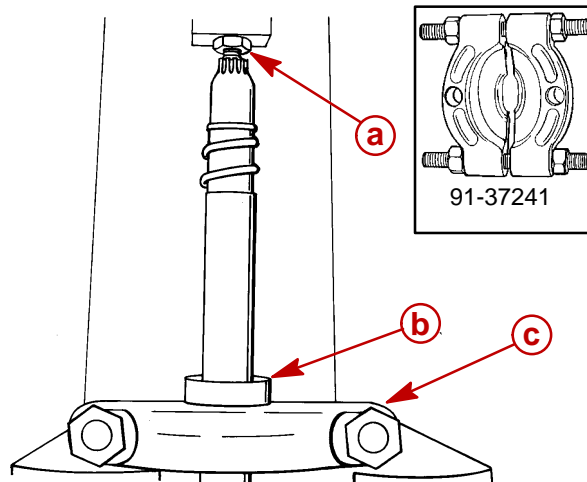
## Upper Drive Shaft Bearing

1. Inspect bearing for rust, roughness or discoloration from lack of lubricant.
2. DO NOT remove bearing from drive shaft unless bearing must be replaced, as removal process will damage bearing.
3. If bearing must be replaced, position drive shaft assembly in vise (jaws of vise supporting only bearing) and while holding drive shaft, strike top of drive shaft with lead hammer and drive bearing off.



**a** - Bearing

4. To install new bearing, thread old pinion nut 3/4 way onto drive shaft. Position Universal Puller Plate (91-37241) under bearing and press on pinion nut while holding drive shaft until bearing seats against shoulder.



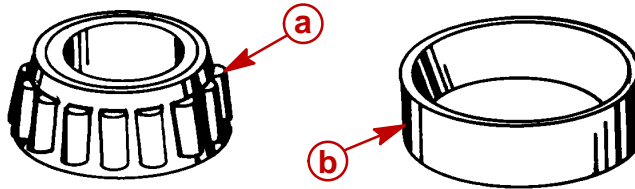
- a** - Old Pinion Nut (Nut Should be Above Drive Shaft)  
**b** - Bearing  
**c** - Universal Puller Plate (91-37241)

52387



## Pinion Gear Bearing

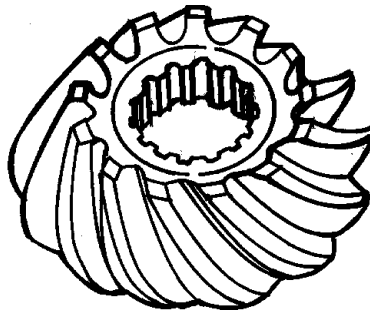
1. Inspect bearing for rust, roughness or discoloration from lack of lubricant.
2. If bearing is damaged, bearing and race must be replaced as an assembly.
3. If race appears to have spun in drive shaft bore, gear case housing must be replaced.



- a** - Bearing  
**b** - Race

## Pinion Gear

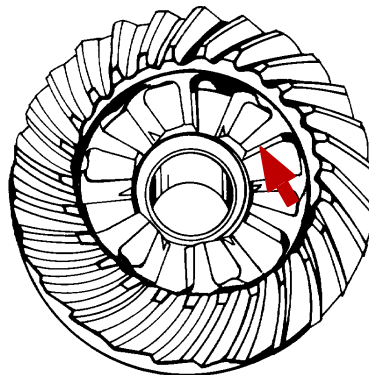
1. Inspect pinion gear teeth for rust, chipping, or excessive wear (teeth are sharp edged or broken).
2. If pinion gear teeth are damaged, also inspect forward and reverse gear teeth for damage.
3. Replace gears as required.



52839

## Forward Gear

1. Inspect forward gear teeth for rust, chipping, excessive wear (teeth are sharp edged or broken).
2. Inspect forward gear clutch jaws for wear. Rounded jaws indicate the following:
  - a. Improper shift cable adjustment.
  - b. Engine idle speed too high.
  - c. Shifting too slowly.

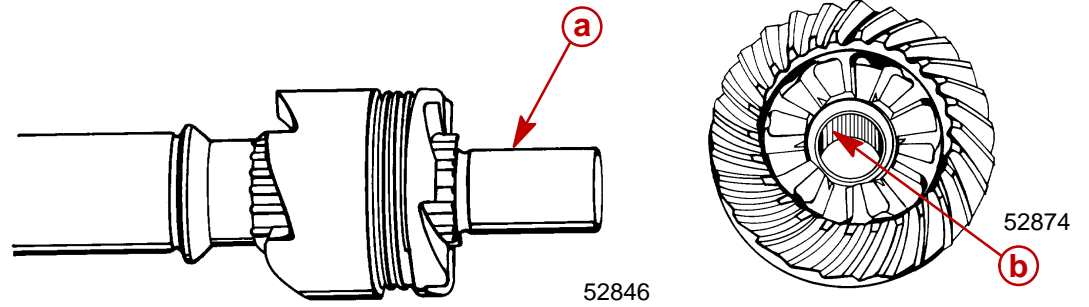


52874



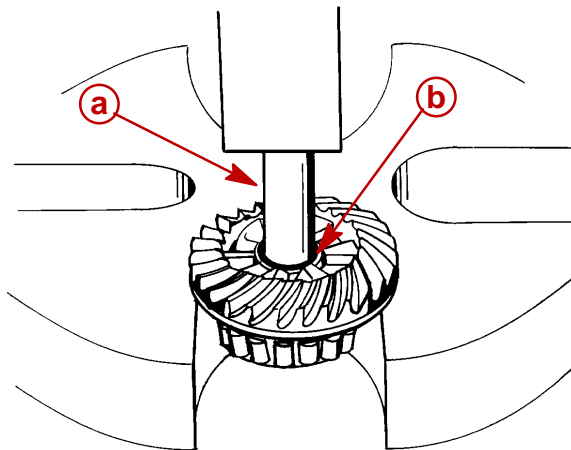


3. Inspect propeller shaft forward gear bearing surface to determine condition of forward gear needle bearing. If bearing surface is discolored (from lack of lubricant), pitted or worn, propeller shaft and bearing should be replaced.



- a** - Bearing Surface
- b** - Bearing

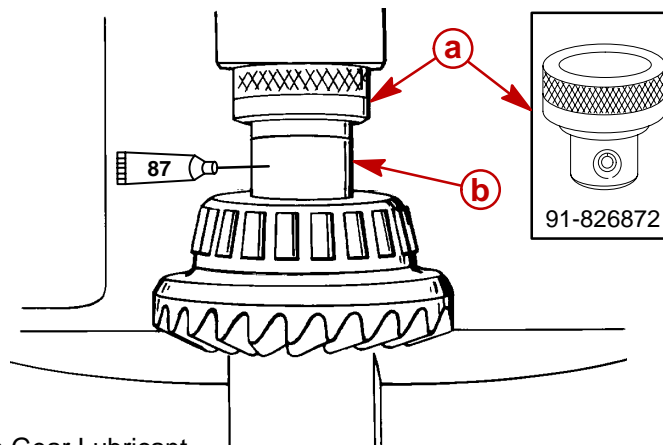
4. Use a suitable mandrel to press needle bearing out of forward gear.



52873

- a** - Mandrel (14 mm Socket)
- b** - Bearing

5. Use Driver 91-826872 to press new needle bearing into forward gear. Press on numbered side of bearing.



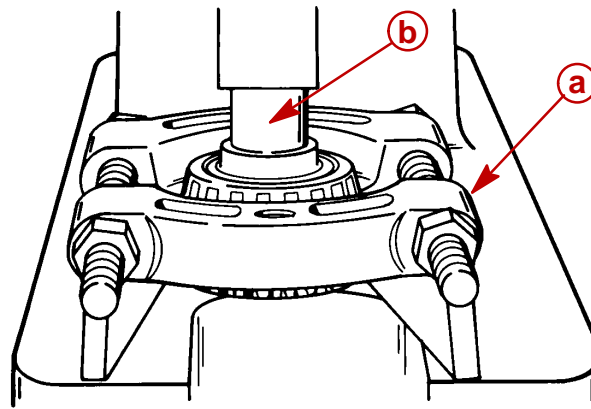
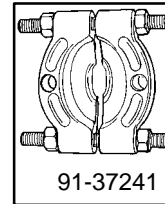
87 Premium Gear Lubricant

- a** - Driver (91-826872)
- b** - Bearing

52847

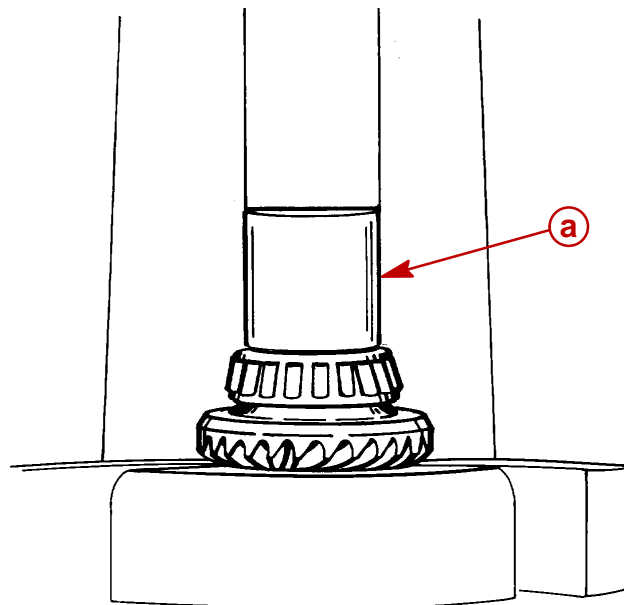


6. Inspect forward gear tapered bearing and race for rust, roughness or excessive wear (looseness).
7. If bearing is in serviceable condition, DO NOT remove bearing from gear, as removal process will damage bearing.
8. If bearing must be replaced, remove bearing from gear using Universal Puller Plate (91-37241) and suitable mandrel.
9. Replace bearing and race as a set. Use suitable mandrel to press bearing onto gear. PRESS ONLY ON INNER RACE when installing bearing.



### REMOVAL

- a** - Universal Puller Plate (91-37241)
- b** - Mandrel (15/16 in. socket)



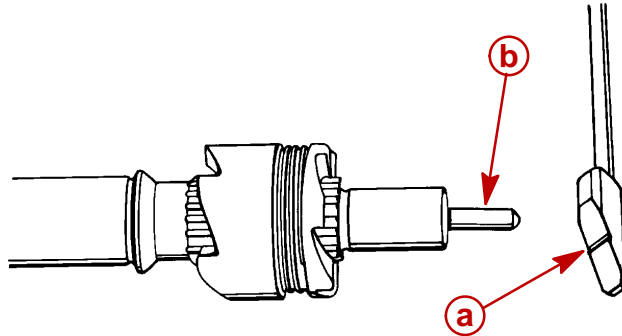
### INSTALLATION

- a** - Mandrel (1-1/8 in. socket)



## Shift Shaft

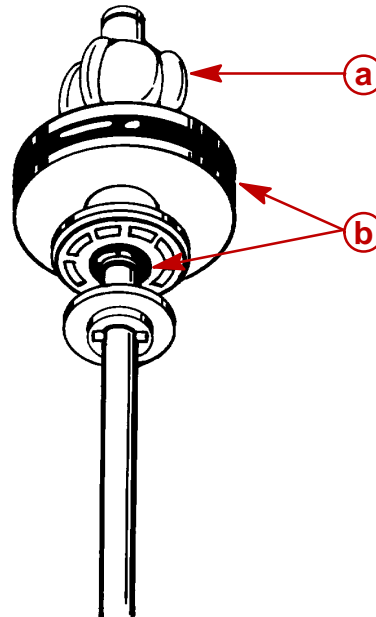
1. Inspect shift cam for wear or galling. Replace cam if necessary.
2. If cam is worn, inspect cam follower in end of propeller shaft for wear.



52845

- a** - Cam Follower
- b** - Shift Cam

3. Inspect shift shaft boot for deterioration.
4. Inspect shift shaft carrier o-ring for cuts or abrasions. It is a good service procedure to replace all o-rings, seals and gaskets regardless of appearance.



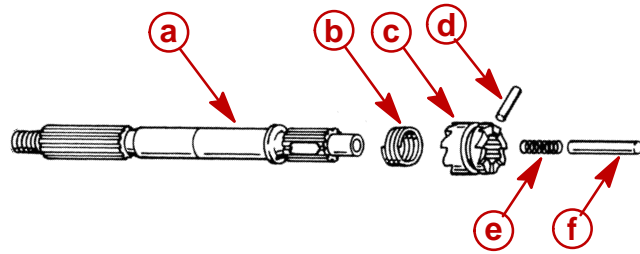
52828

- a** - Boot
- b** - O-ring



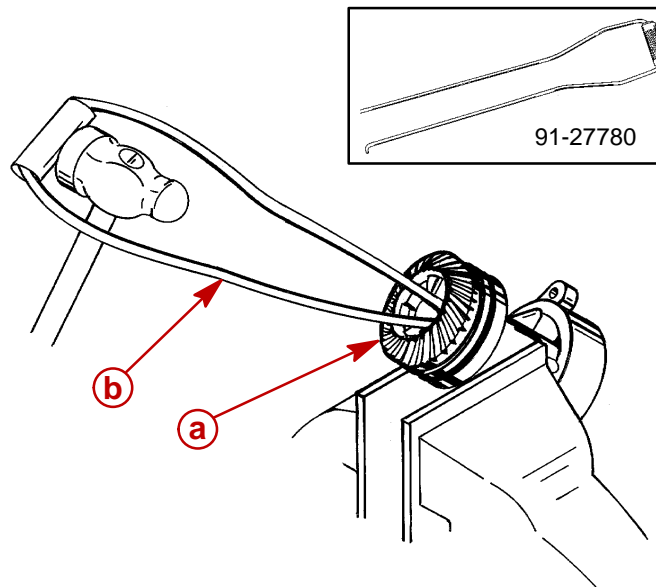
## Propeller Shaft Disassembly

1. Remove propeller shaft from carrier and disassemble shaft.



- a** - Prop Shaft
- b** - Retaining Spring
- c** - Clutch Dog
- d** - Cross Pin
- e** - Cam Follower Spring
- f** - Cam Follower

2. Remove reverse gear and bearing from carrier with Puller (91-27780).



- a** - Reverse Gear and Bearing
- b** - Puller (91-27780)

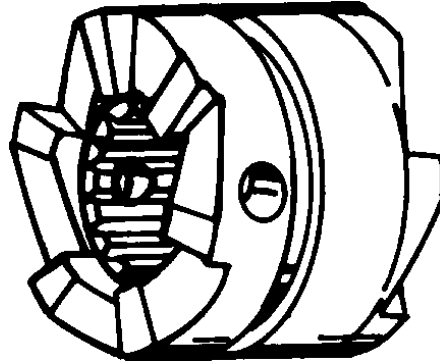
52840



# Propeller Shaft and Carrier Inspection

## Clutch

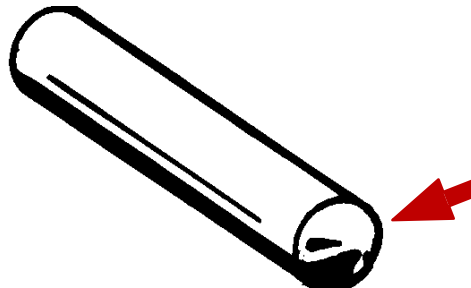
1. Inspect clutch jaws for chips or rounding off.
2. If wear is present, inspect corresponding forward or reverse gear matching jaws for similar wear. Replace appropriate components as required.



52824

## Cam Follower

1. Inspect cam follower for wear or galling.
2. If wear is present, inspect corresponding shift cam for wear. Replace if worn.

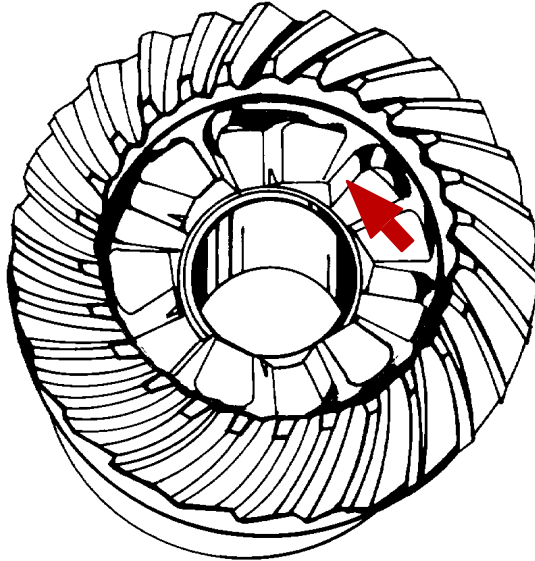


52822



## Reverse Gear

1. Inspect reverse gear teeth for rust, chipping excessive wear (teeth are sharpened edged) or broken teeth.
2. Inspect reverse gear clutch jaws for wear. Rounded jaws indicate the following:
  - a. Improper shift cable adjustment.
  - b. Engine idle speed too high.
  - c. Shifting too slowly.



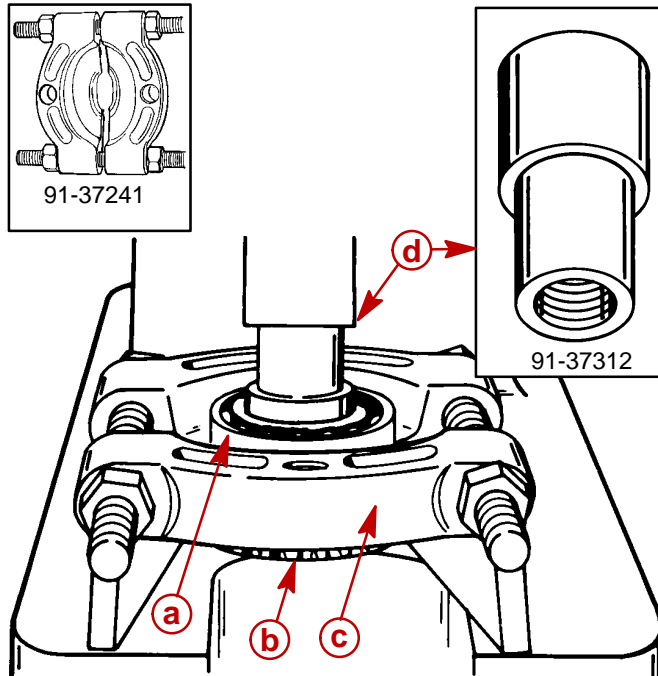
52875

## Reverse Gear Bearing

1. Inspect bearing for rust, roughness or excessive wear (looseness).
2. If bearing is in serviceable condition, DO NOT remove bearing from gear as removal will damage bearing.
3. If bearing must be replaced, remove bearing from gear using Universal Puller Plate (91-37241) and Driver (91-37312).

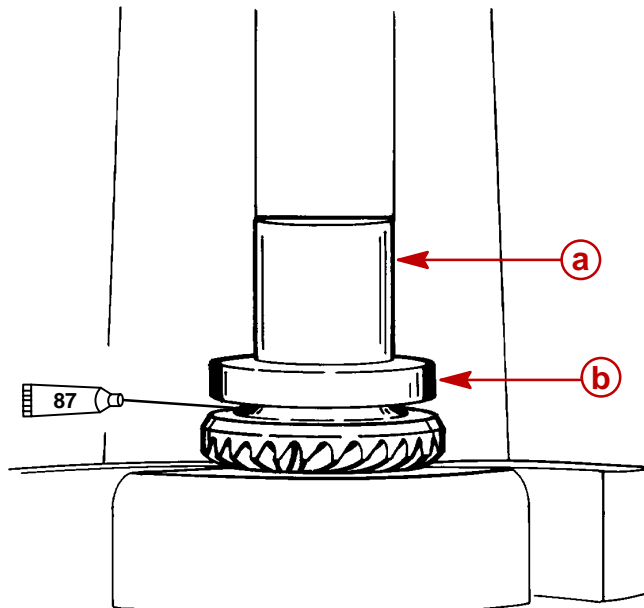


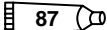
4. Install new bearing using a suitable mandrel. PRESS ONLY ON INNER RACE when installing bearing.



**REMOVAL**

- a - Bearing
- b - Reverse Gear
- c - Universal Puller Plate (91-37241)
- d - Driver (91-37312)



 87 Premium Gear Lubricant

**INSTALLATION**

- a - Mandrel (1-1/4 in. socket)
- b - Bearing

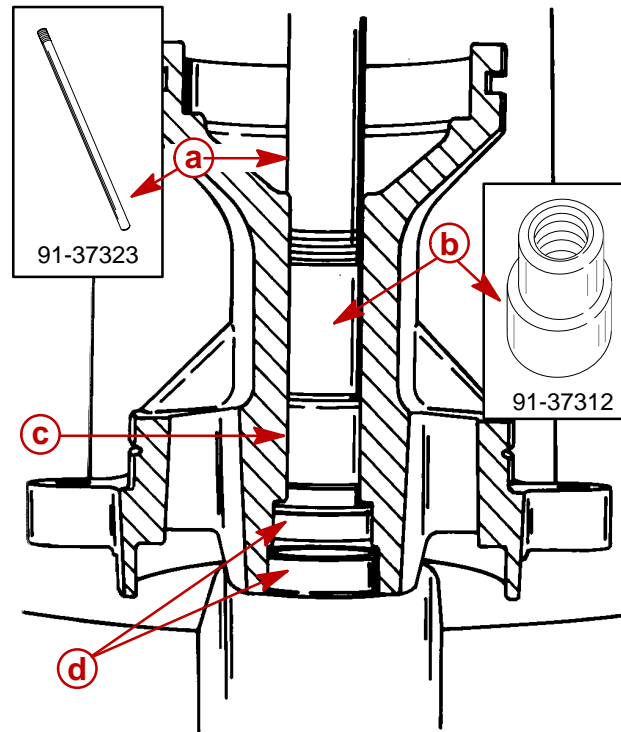
52867



## Bearing Carrier

### NEEDLE BEARING

1. The condition of the carrier needle bearing can be determined by inspecting its running surface on the propeller shaft.
2. If the shaft is discolored (from lack of oil) or pitted, replace bearing and shaft.
3. Bearing can be removed by using Driver Rod (91-37323) and Driver (91-37312). Removing bearing will also remove both propeller shaft seals.



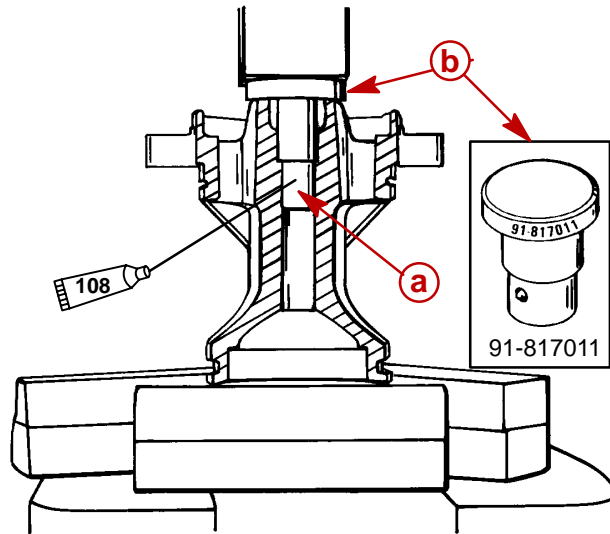
51264

- a** - Driver Rod (91-37323)
- b** - Driver (91-37312)
- c** - Needle Bearing
- d** - Seals





4. Apply a light coat of 2-4-C Marine Lubricant with Teflon to O.D. of bearing.
5. Install bearing using Mandrel 91-817011.
6. Press bearing into carrier until mandrel bottoms on carrier.

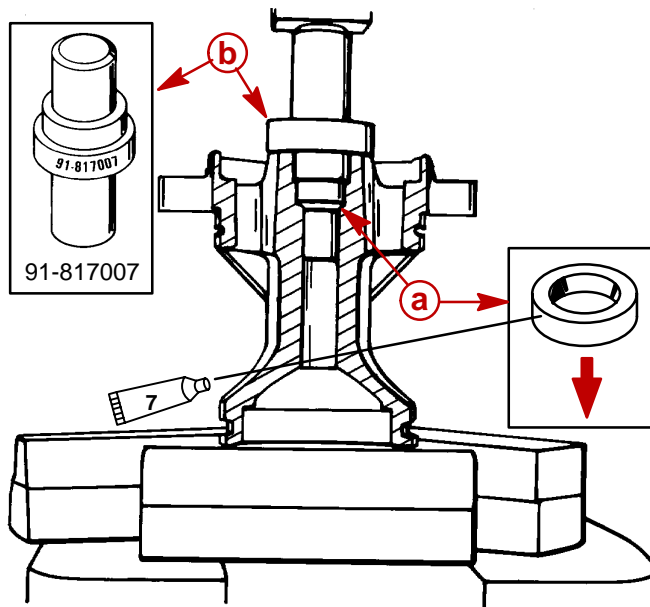


52861

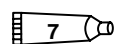
 2-4-C Marine Lubricant with Teflon

- a** - Bearing
- b** - Mandrel (91-817011)

7. Apply Loctite 271 Thread Locker to O.D. of small diameter seal.
8. With seal lip facing away from large shoulder of Mandrel 91-817007, press seal into carrier until mandrel bottoms on carrier.



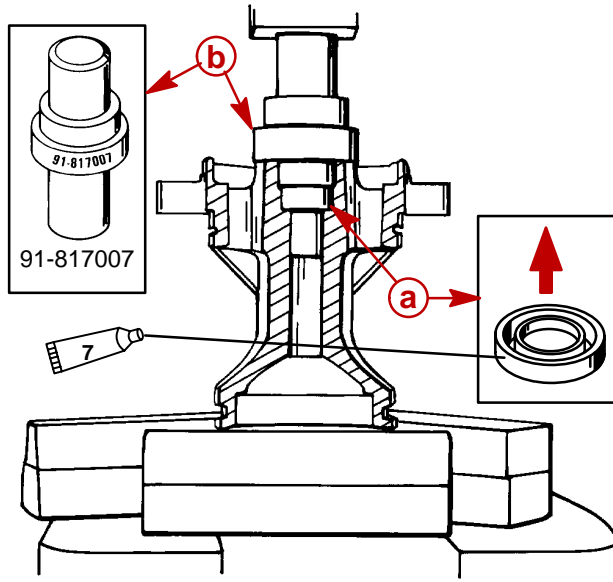
52862

 Loctite 271 Thread Locker

- a** - Seal
- b** - Mandrel (91-817007)



9. Apply Loctite 271 to O.D. of large diameter seal.
10. With seal lip FACING TOWARDS SMALL SHOULDER of Mandrel 91-817007, press seal into carrier until mandrel bottoms on carrier.

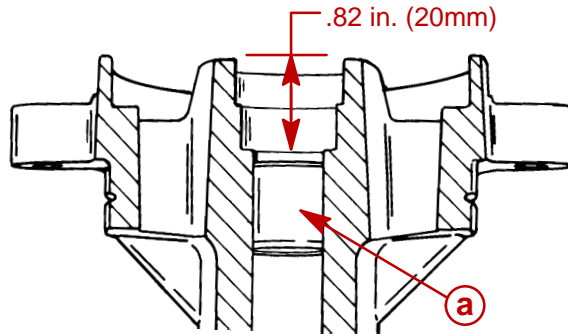


Loctite 271 Thread Locker

52863

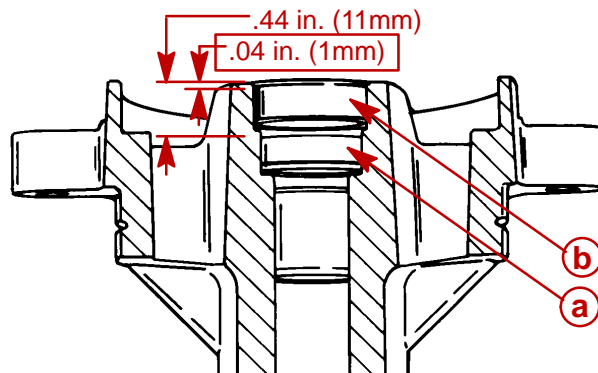
- a** - Seal
- b** - Mandrel (91-817007)

**Installation Note:** If service tools are not available, the following reference dimensions apply for installing bearing and seals to proper depths.



51275

- a** - Bearing



51275

- a** - Oil Seal (Install with Lip Down)
- b** - Oil Seal (Install with Lip Up)

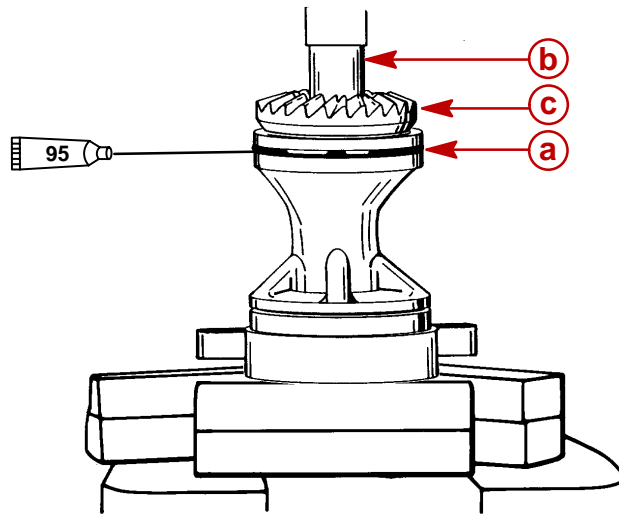


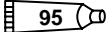
11. Bearing carrier o-ring should be inspected for cuts and abrasions.

**NOTE:** It is a good repair procedure to replace all o-rings and seals regardless of appearance.

12. Apply 2-4-C Marine Lubricant with Teflon to o-ring and install on carrier.

13. Using suitable mandrel, press reverse gear assembly into carrier.



 2-4-C with Teflon

- a - O-ring
- b - Mandrel (3/4 in. Socket)
- c - Reverse Gear Assembly

52827

## Gear Housing Reassembly

**IMPORTANT:** This gear case assembly does not have any shims for the gear assemblies. Backlash cannot be adjusted. The mechanic must verify that all bearing races are firmly seated in the gear case during reassembly and that all gear case components are in serviceable condition. Prior to installing the seal carrier and water pump assembly on the drive shaft, the FORWARD gear should be held stationary (with a screw driver or similar tool). While pulling up on the drive shaft, lightly turn the shaft back and forth. A light “clicking” sound should be heard indicating the presence of backlash between FORWARD and PINION gears. If this backlash is not present, the pinion gear race and/or forward gear race are not fully seated. Races should be removed and inspected for debris. Reinstall races and check backlash. If backlash is still not present, replace gear housing.

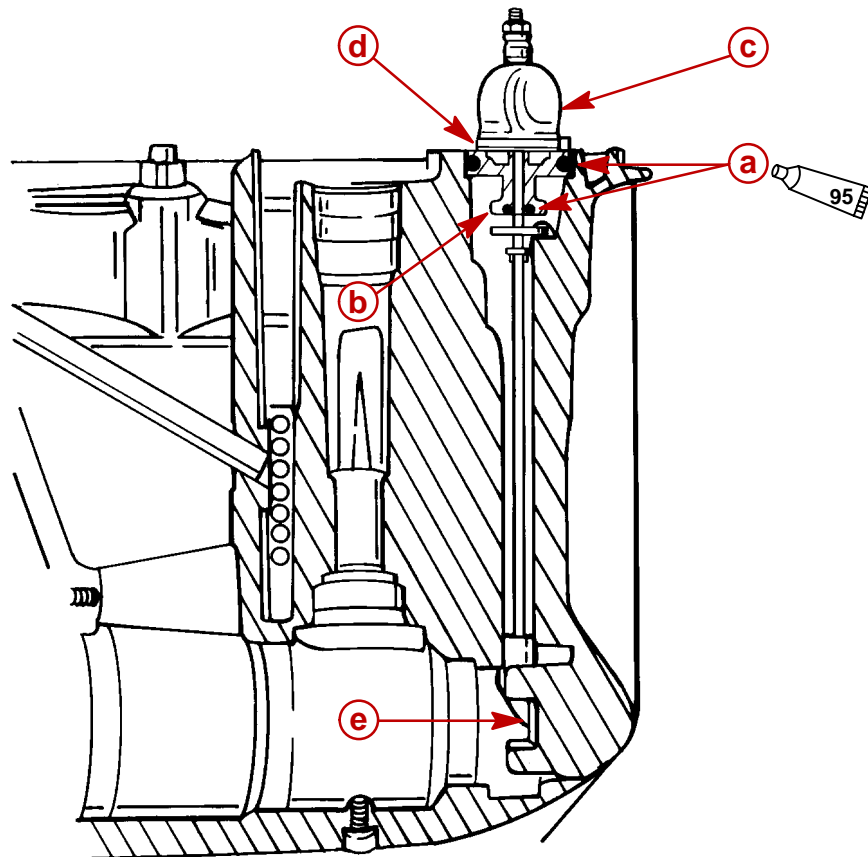


## Shift Shaft Assembly

1. Apply 2-4-C Marine Lubricant with Teflon to new o-rings and install o-rings on shift shaft and carrier.
2. Install carrier on shift shaft.

**IMPORTANT:** When installing shift shaft assembly into gear housing, **DO NOT BOTTOM OUT SHAFT IN HOUSING**. Pull up on shift shaft until shift boot is not deformed. If shaft is bottomed out, cross pin in clutch dog will be bent by cam follower when tightening carrier screws.

3. Install shift shaft/carrier assembly into gear housing.
4. Secure boot to carrier with sta-strap.
5. Position shift shaft so ramp faces towards propeller shaft.



 95 2-4-C Marine Lubricant with Teflon

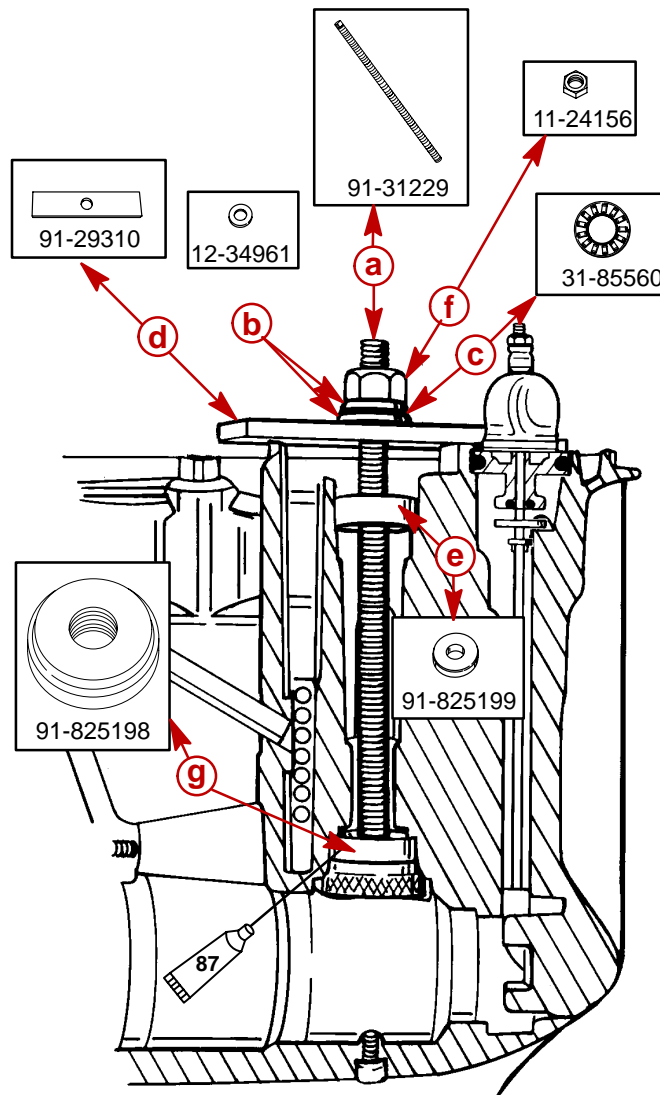
52841

- a** - O-rings
- b** - Carrier
- c** - Boot
- d** - Sta-strap
- e** - Ramp

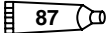


## Pinion Bearing Race

1. Apply Premium Gear Lubricant to O.D. of race.
2. Position race in gear housing (NUMBERS UP - TAPERED SIDE FACING DOWN).
3. Draw race up into housing until seated.



52842

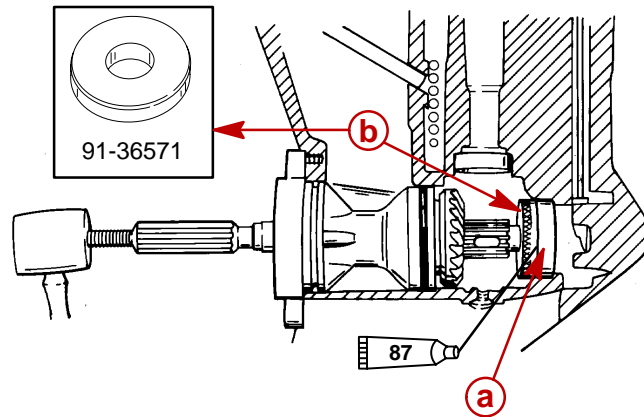
 87 Premium Gear Lubricant

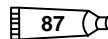
- a** - Threaded Rod (91-31229)
- b** - Washer (2) (12-34961)
- c** - Bearing (31-85560)
- d** - Plate (91-29310)
- e** - Pilot (91-825199)
- f** - Nut (11-24156)
- g** - Mandrel (91-825198)



## Forward Gear

1. Apply Premium Gear Lubricant to O.D. of race. Install forward gear bearing race into housing using Mandrel 91-36571 and propeller shaft. Use a lead hammer on prop shaft to prevent damage to threads. Bearing carrier should be installed to keep prop shaft centered while seating race.



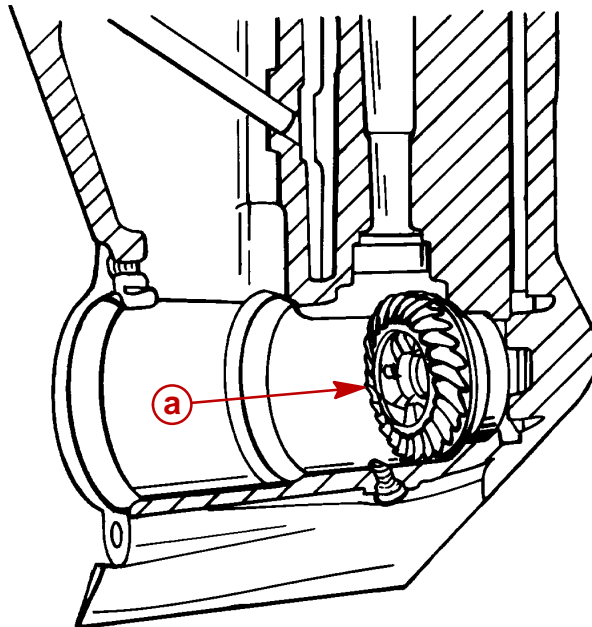
 87 Premium Gear Lubricant

- a** - Race
- b** - Mandrel (91-36571)

52843

**NOTE:** Remove drain plug/magnet assembly from gear case (if installed) to prevent possible breakage of magnet if struck by forward gear.

2. Install forward gear and bearing assembly into forward gear race.



- a** - Forward Gear Assembly

52870

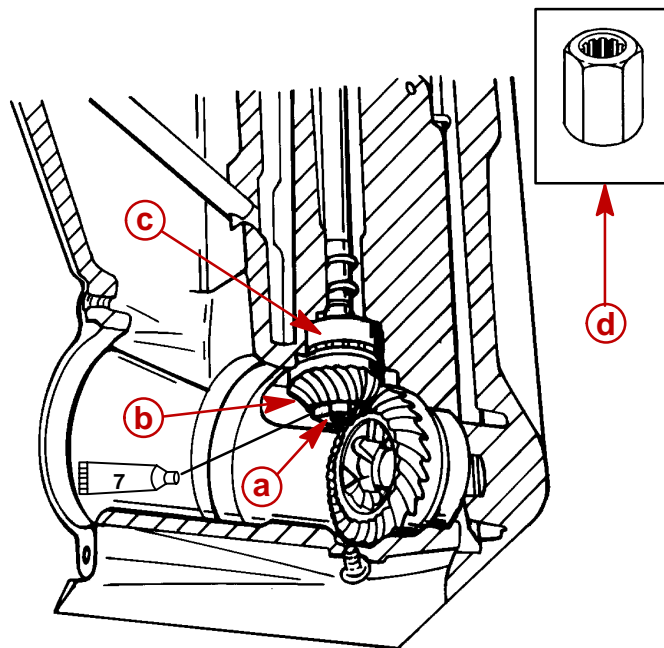


## Pinion Gear/Drive Shaft Assembly

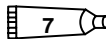
1. Clean pinion nut and pinion nut threads of drive shaft with Loctite 7649 Primer.
2. Position pinion bearing into race while installing drive shaft and pinion gear into housing.
3. Apply Loctite 271 to pinion nut threads.
4. Install **new** pinion nut, with rounded corners FACING pinion gear, onto drive shaft.

Models	Drive Shaft Holding Tool
4-Stroke Mercury/Mariner 25, 45/50	91-83180M
2-Stroke Force 40/50 Mercury 30/40, 40/50	91-825196

5. Using Drive Shaft Holding Tool to hold drive shaft, tighten pinion nut to the specified torque.



52864

 Loctite 271 Thread Locker

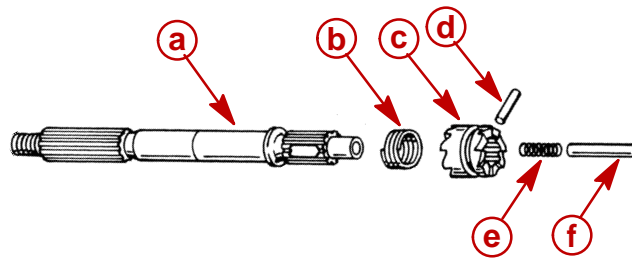
- a** - Pinion Nut [Torque to 50 lb. ft. (67.8 N·m)]
- b** - Pinion Gear
- c** - Pinion Bearing
- d** - Drive Shaft Holding Tool

Pinion Gear Nut Torque
50 lb. ft. (68 N·m)



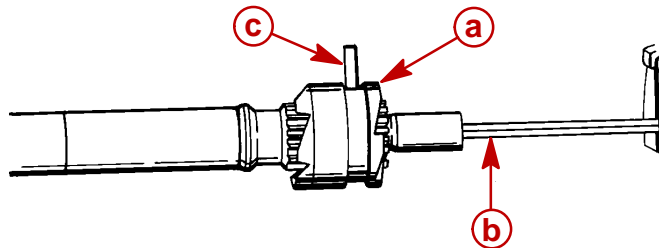
## Propeller Shaft

1. Slide clutch (short shoulder faces forward gear) over propeller shaft aligning cross pin hole with slot in propeller shaft.
2. Insert cam follower spring into propeller shaft.



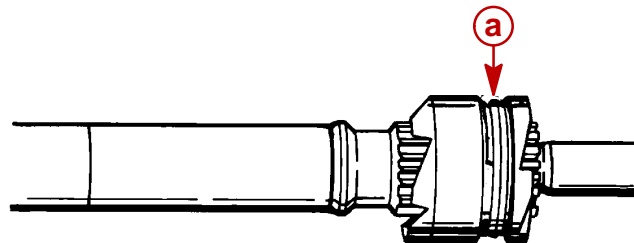
- a** - Prop Shaft
- b** - Retaining Spring
- c** - Clutch Dog
- d** - Cross Pin
- e** - Cam Follower Spring
- f** - Cam Follower

3. Using a 3/16 in. allen wrench or similar device, compress the follower spring enough to insert the cross pin partially through clutch.
4. Remove wrench and press cross pin through clutch and propeller shaft until flush.



- a** - Short Shoulder
- b** - Allen Wrench
- c** - Cross Pin

5. Reinstall retaining spring. position spring so as spring coils lay flat in clutch groove.



- a** - Spring

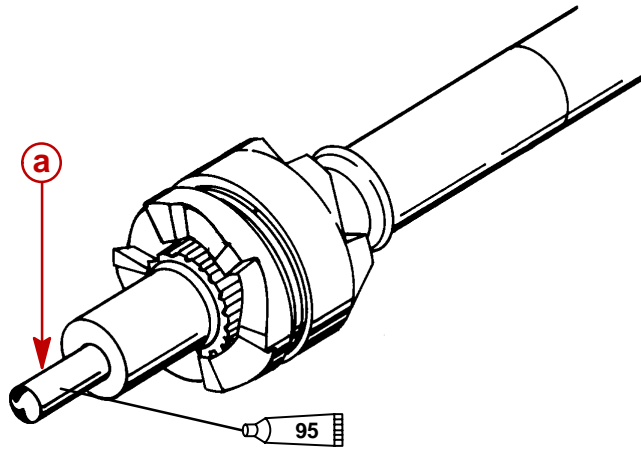
**NOTE:** Applying 2-4-C Marine Lubricant with Teflon to cam follower will aid in retention of follower in propeller shaft during installation of propeller shaft assembly into gear case.

52851

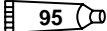




6. Install cam follower.

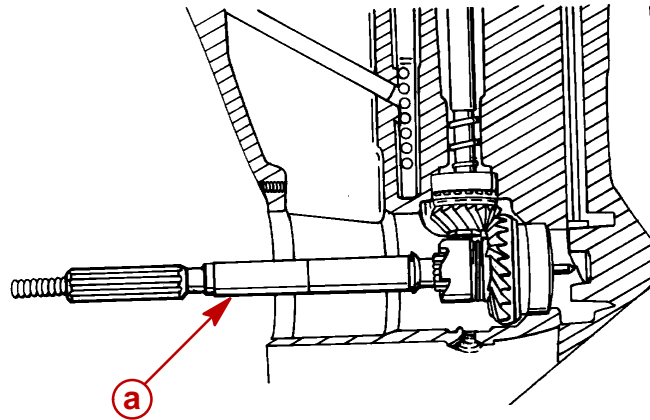


52826

 95 2-4-C Marine Lubricant with Teflon

**a** - Cam Follower

7. Install propeller shaft assembly into gear case.



52864

**a** - Propeller Shaft Assembly



## Bearing Carrier

1. Install carrier into gear case.
2. Discard the original tab washers or the thin 0.063 in. (1.60 mm) flat washers and the 25 mm long screws on models listed. Install thicker flat washers and longer screws.

25 (2 Cylinder - 4 Stroke)

USA ..... 0G621670 and below

45/50 (4 Cylinder - 4 Stroke) Non Big Foot

USA ..... 0G621709 and below

30/40 (2 Cylinder - 2 Stroke)

USA ..... 0G650736 and below

Belgium .... NA

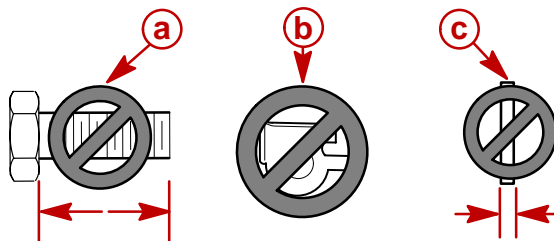
40/50 (3 Cylinder - 2 Stroke)

USA ..... 0G650699 and below

Belgium .... NA

Force 40/50 (2 Cylinder - 2 Stroke)

USA ..... 0E323508 and below

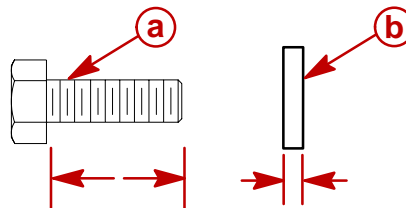


**a** - Screw 25 mm Long - Discard

**b** - Tab Washer - Discard

**c** - Thin Flat Washer 0.063 in. (1.60 mm) thick - Discard

3. Install thicker flat washers and longer screws.

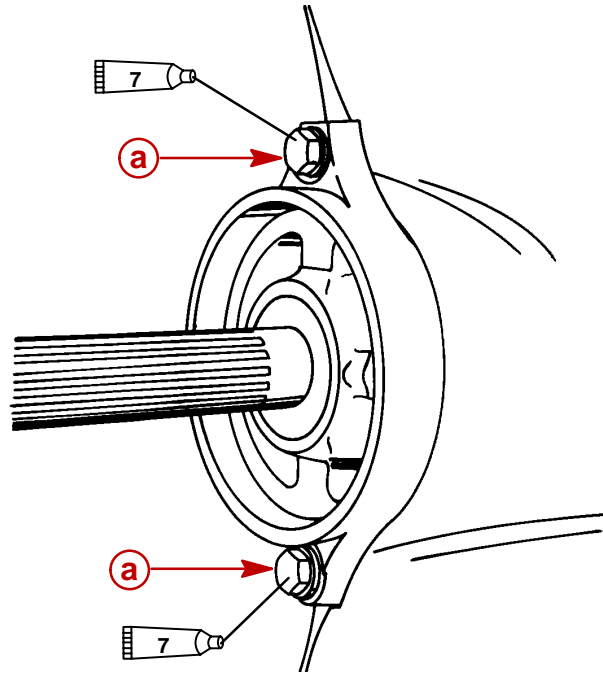


**a** - Screw (10-855940-30) 1.18 in. (30 mm) Long

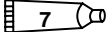
**b** - Washer (12-855941) 0.090 in. (2.29 mm) Thick



4. Tighten screws to the specified torque.



51117

 Loctite 271 Thread Locker

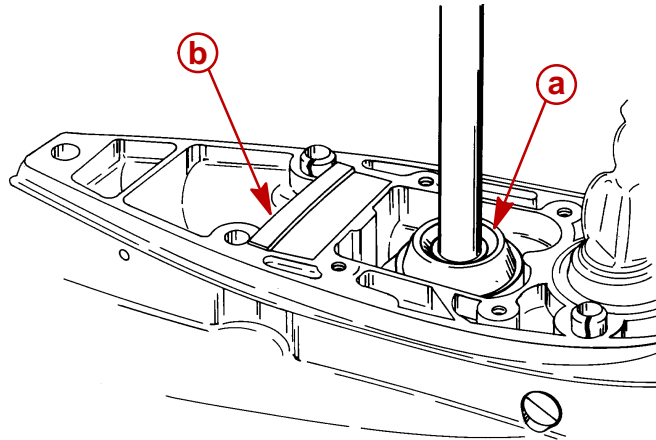
**a** - Bolt (2)

<b>Bearing Carrier Bolt Torque</b>
19 lb. ft. (25.5 N·m)



## Water Pump

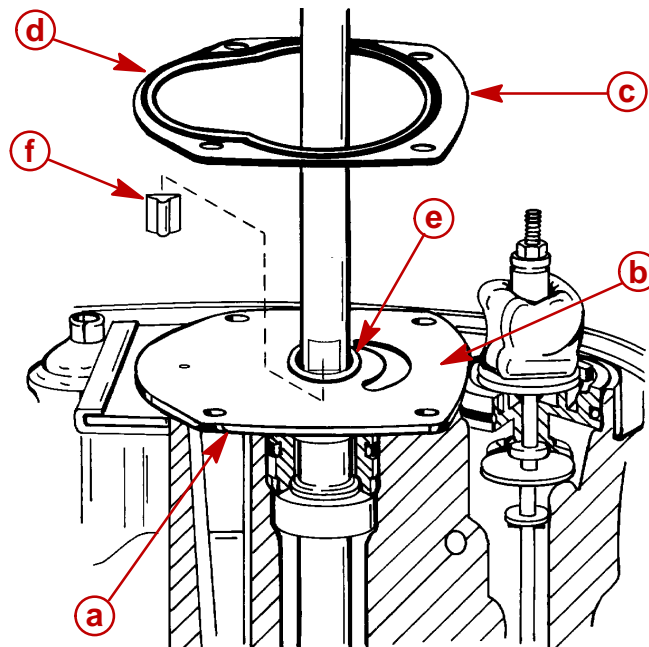
1. Install water pump seal carrier.
2. Install exhaust deflector plate, if removed.



52832

- a** - Seal Carrier
- b** - Exhaust Deflector

3. Install base gasket, face plate, pump cover gasket (NEOPRENE STRIP FACES UP), nylon washer and impeller key.



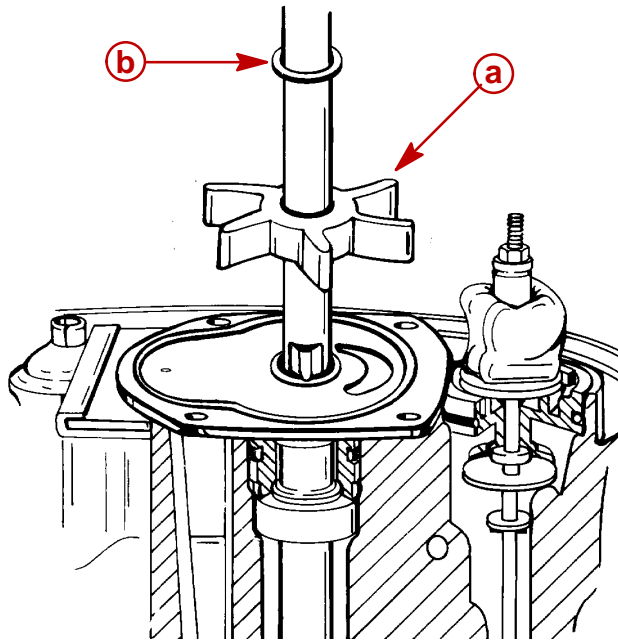
52868

- a** - Base Gasket
- b** - Base Plate
- c** - Cover Gasket
- d** - Neoprene Strip
- e** - Nylon Washer
- f** - Key

**IMPORTANT:** If impeller being installed has been previously used and vanes have taken a "set," DO NOT INSTALL THE IMPELLER WITH THE VANES REVERSED FROM THEIR PREVIOUS "SET" AS VANE BREAKAGE WILL OCCUR SHORTLY AFTER UNIT IS RETURNED TO SERVICE.



4. Install impeller and nylon washer.

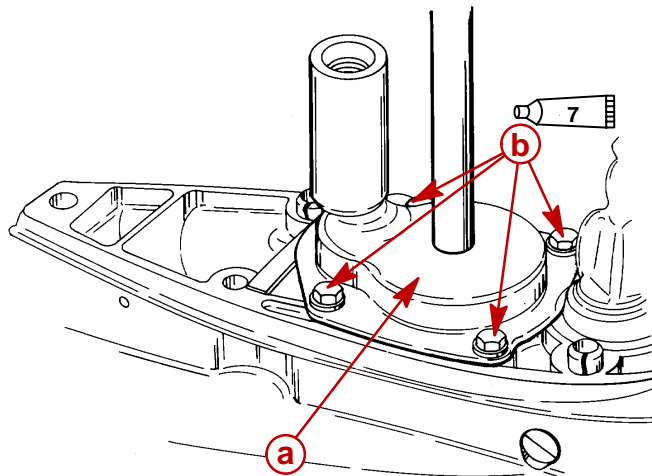


52869

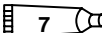
- a** - Impeller
- b** - Nylon Washer

**NOTE:** Apply a light coat of 2-4-C Marine Lubricant with Teflon to inside of pump cover to ease installation of cover over impeller.

5. Install pump cover. Rotate drive shaft CLOCKWISE while pressing cover down over impeller.
6. Apply Loctite 271 to retaining screws and tighten screws to the specified torque.



52830

 Loctite 271 Thread Locker

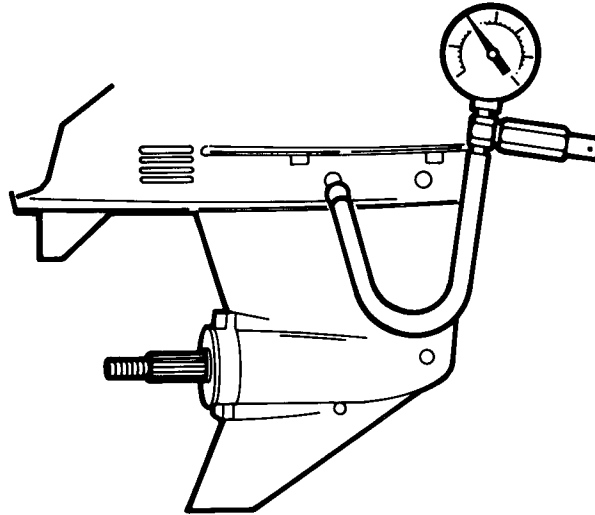
- a** - Cover
- b** - Bolts (4)

<b>Water Pump Cover Bolt Torque</b>
60 lb. in. (7 N-m)

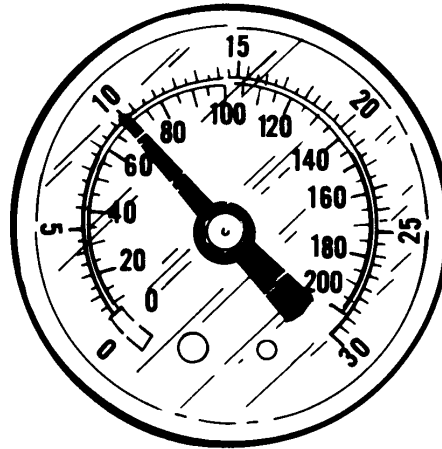


## Gear Housing Pressure Test

1. Remove vent plug and install pressure test gauge. Tighten securely.



2. Pressurize housing to 10-12 PSI (69-83 kPa) and observe gauge for 5 minutes.
3. Rotate drive shaft, prop shaft and move shift rod while housing is pressurized to check for leaks.



4. If pressure drop is noted immerse housing in water.
5. Re-pressurize to 10-12 PSI (69-83 kPa) and check for air bubbles.
6. Replace leaking seals as necessary. Retest housing.

**NOTE:** It should hold 10-12 PSI (69-83 kPa) for 5 minutes.

7. Remove tester from housing and install vent plug.



# Gear Housing Installation

## Filling Gear Housing with Lubricant

**NOTE:** Gear housing lubricant capacity is approximately 14.9 fl. oz. (440 ml).

### ⚠ WARNING

If gear housing is installed on outboard, disconnect (and isolate) spark plug leads from spark plugs before working near the propeller.

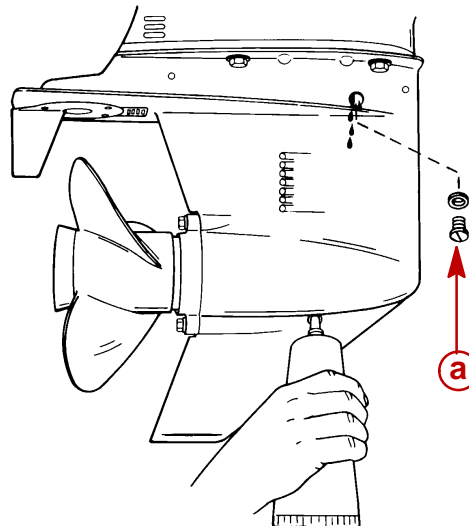
### ⚠ CAUTION

Do not use automotive grease in the gear housing. Use only Premium Gear Lube.

1. Remove any gasket material from “Fill” and “Vent” plugs and gear housing. Install new gaskets on “Fill” and “Vent” plugs.

**IMPORTANT:** Never add lubricant without removing “Vent” plug. Gear housing cannot be filled because of trapped air. Fill gear housing when driveshaft is in a vertical position.

2. Remove “Fill” plug and gasket.
3. Insert lubricant tube in “Fill” hole, then remove “Vent” plug and gasket.
4. Fill until excess lubricant flows out of “Vent” hole.
5. Replace this “Vent” plug and gasket.
6. Install “Fill” plug and gasket.



**a** - “Vent” Plug

7. Tighten Fill and Vent plugs to the specified torque.

### Fill and Vent Plug Torque

55 lb. in. (6 N·m)



## Installing Gear Housing to Drive Shaft Housing

### ⚠ WARNING

Disconnect (and isolate) spark plug leads before installing gear housing onto drive shaft housing.

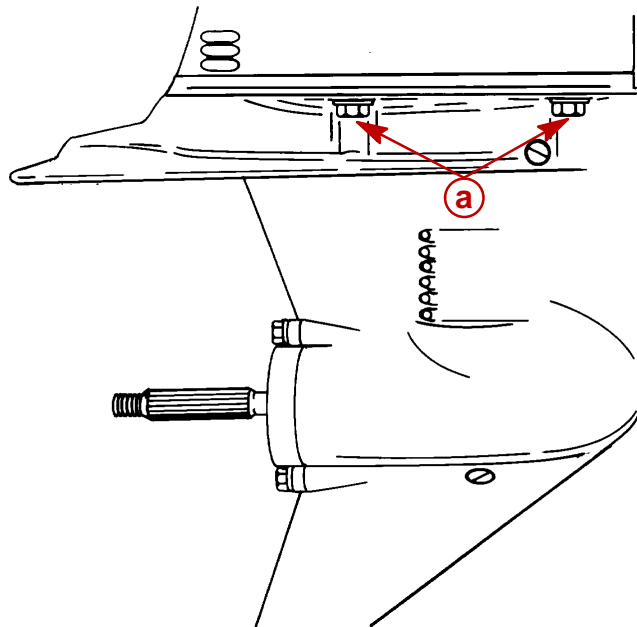
1. Position shift lever in NEUTRAL gear position.
2. Tilt engine to full "Up" position. Engage tilt lock lever.
3. Shift gear housing into NEUTRAL. Propeller shaft will rotate freely in either direction.

**IMPORTANT: Liberally apply 2-4-C Marine Lubricant with Teflon to drive shaft splines.**

4. Position drive shaft into drive shaft housing. Move gear housing upwards in drive shaft housing while aligning both shift shafts, water tube seal and drive shaft splines.

**NOTE:** If the drive shaft splines will not align with the crankshaft splines, rotate flywheel slightly while pushing gear housing into drive shaft housing.

5. Install 4 screws and washers, (two each side). Tighten screws to the specified torque.



52836

**a** - Bolt and Washers (2 each side)

### Gear Housing Bolt Torque

40 lb. ft. (54 N·m)

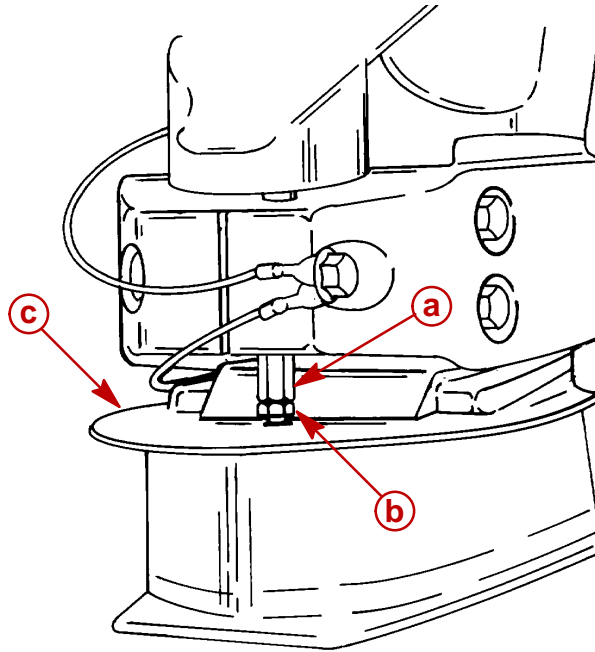




6. Reconnect shift shaft with coupler nut and jam nut. Tighten jam nut against coupler nut.

**NOTE:** After reconnecting shift shaft, bottom of jam nut should be approximately flush with top of spray plate.

**30/40, 40/50, FORCE 40/50**

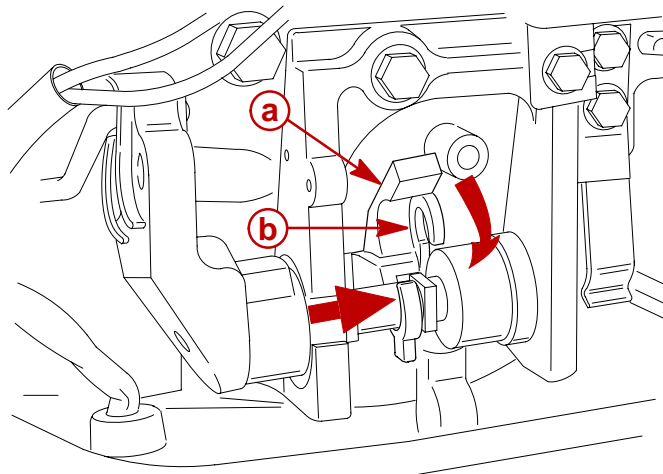


52834

- a** - Coupler Nut
- b** - Jam Nut
- c** - Spray Plate

7. Connect shift shaft by sliding retainer to the right and snapping into upper “locked” position.

**25 (4 STROKE), 45/50 (4 STROKE)**

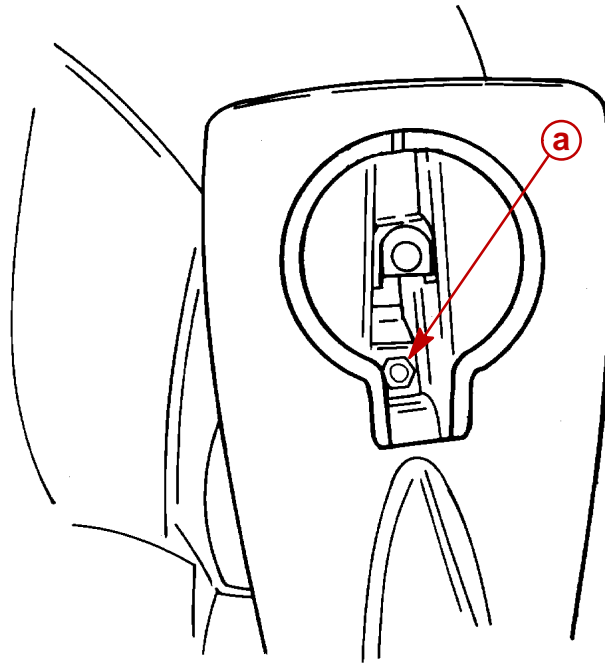


53859

- a** - Retainer
- b** - Lower Clip



8. Install locknut and washer. Tighten nut to the specified torque.



52833

**a** - Locknut and Washer

<b>Gear Housing Mounting Stud Nut Torque</b>
----------------------------------------------

40 lb. ft. (54 N·m)
---------------------

9. Check shift operation.
  - a. In NEUTRAL, propeller shaft should turn freely in either direction.
  - b. In FORWARD, propeller shaft SHOULD NOT TURN COUNTERCLOCKWISE.
  - c. In REVERSE, propeller shaft SHOULD NOT TURN IN EITHER DIRECTION.

**IMPORTANT: If shift operation is not as described, remove the gear housing and correct the shift operation.**



## Trim Tab Adjustment and Replacement

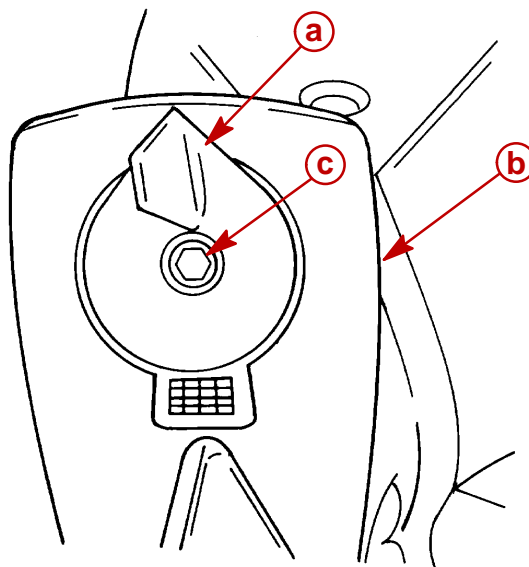
**IMPORTANT:** The trim tab is made of a special alloy to aid in protecting the drive shaft housing and gear housing from galvanic corrosion (corrosion and pitting of metal surfaces). Do not paint or place protective coating on the trim tab, or trim tab corrosion protection function will be lost.

Replace trim tab if 50% (or more) corroded. Mark location of old trim tab on anti-ventilation plate before removal. Install new trim tab in same location.

1. Check trim tab position as follows:
  - a. Operate boat at the speed at which it would normally be operated.
  - b. If the boat pulls to the right (starboard), the trailing edge of trim tab must be moved to the right. If the boat pulls to the left (port), the trailing edge of trim tab must be moved to the left.
2. If necessary, adjust trim tab as follows:
  - a. Shift engine control into NEUTRAL and turn ignition key to "OFF" position.

**NOTE:** Loosen trim tab screw sufficiently to allow trim tab to disengage from locking ridges in gear case before attempting to move tab. DO NOT strike trim tab with a hard object to make adjustments.

- b. If boat pulls to the left, adjust trailing edge of trim tab to the left. If boat pulls to the right, adjust trailing edge of trim tab to the right.



- a - Trim Tab
- b - Anti-Ventilation Plate
- c - Retaining Bolt and Washer

52835

Trim Tab Retaining Bolt Torque
16 lb. ft. (21.5 N-m)