

LOWER UNIT

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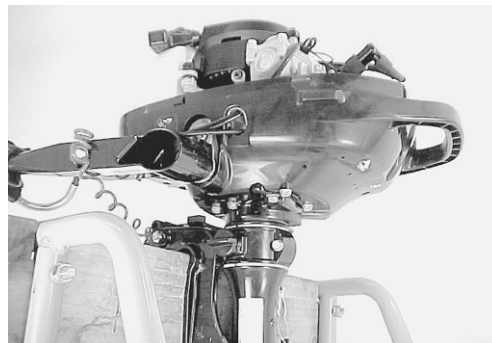
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REMOVAL AND DISASSEMBLY

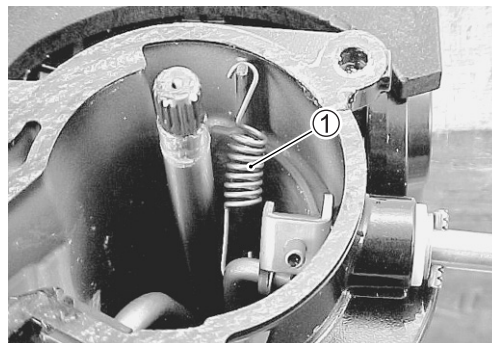
⚠ WARNING

Disconnect the spark plug cap from the spark plug before removing the lower unit.

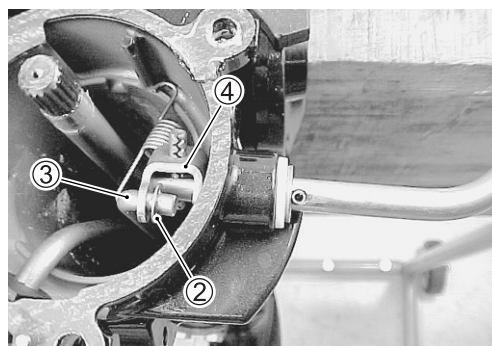
1. Remove the four engine mounting bolts.
Detach the power unit with the lower cover.



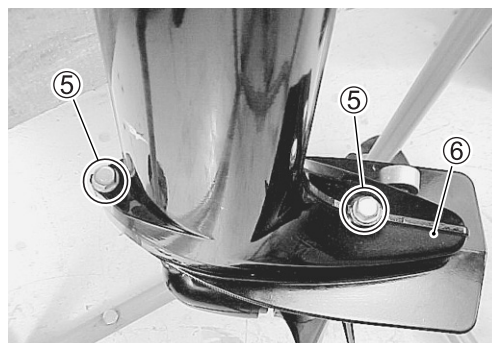
2. Remove the spring ①.



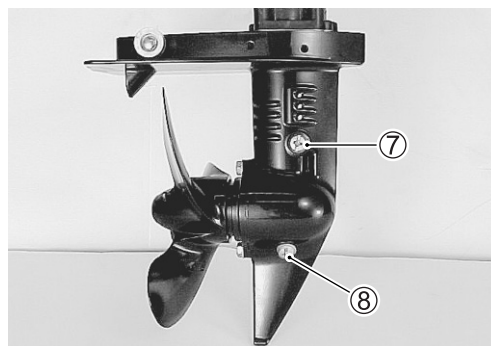
3. Remove the E-ring ②.
4. Take out the shift rod ③ from the clutch rod arm ④.



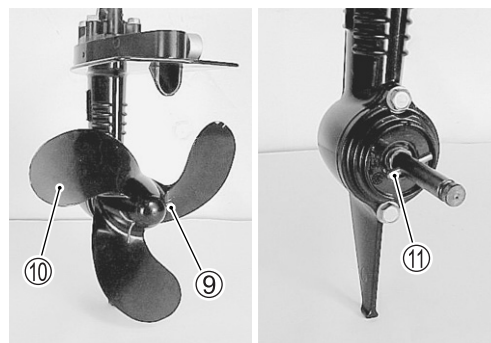
5. Remove the two bolts ⑤.
6. Separate the gearcase assembly from the driveshaft housing ⑥.



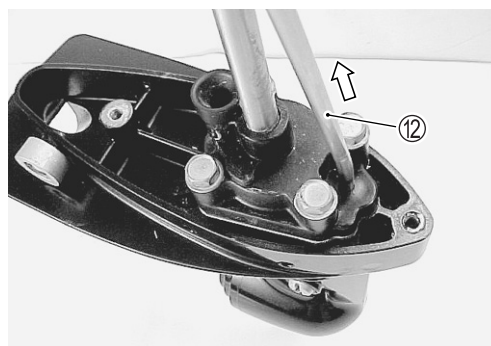
7. Remove the gear oil drain plug ⑧ before the gear oil level plug ⑦ and drain the gear oil.



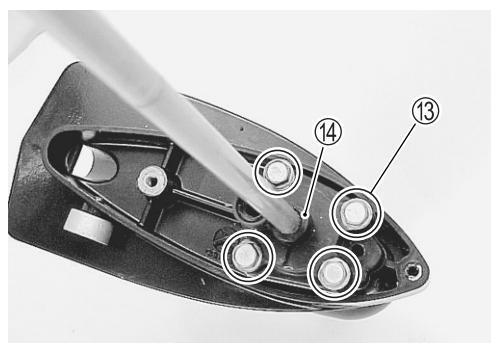
8. Remove the cotter pin ⑨ then detach the propeller ⑩.
9. Remove the shear pin ⑪.



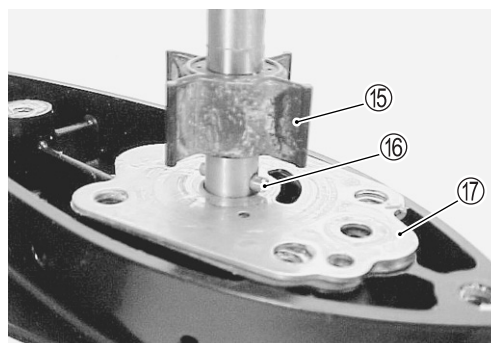
10. Pull out the shift rod ⑫.



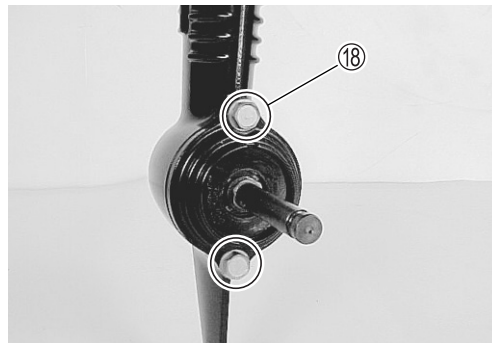
11. Remove the four bolts ⑬.
12. Remove the pump case ⑭.



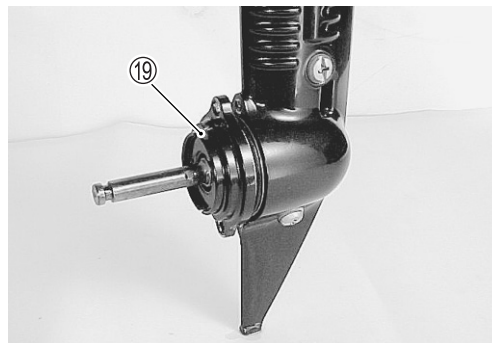
13. Remove the following parts.
 - Water pump impeller ⑮
 - Key ⑯
 - Pump under panel ⑰



14. Remove the two bolts ⑱ securing the propeller shaft bearing housing.



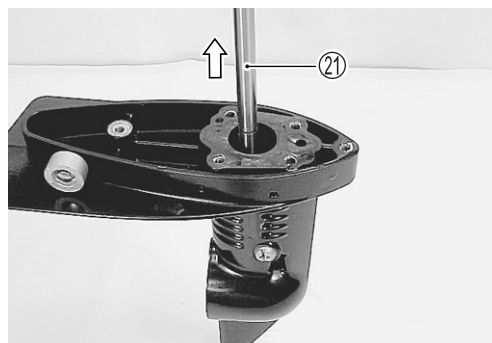
15. Remove the propeller shaft bearing housing ⑲.



16. Remove the E-ring ⑳.

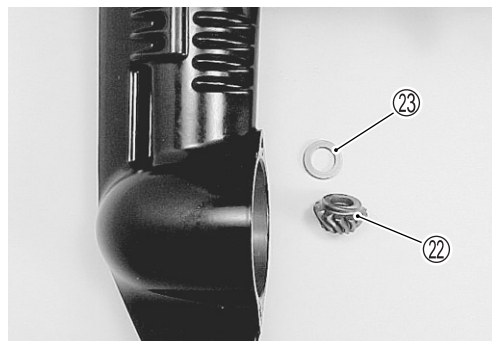


17. Pull out the driveshaft ㉑.



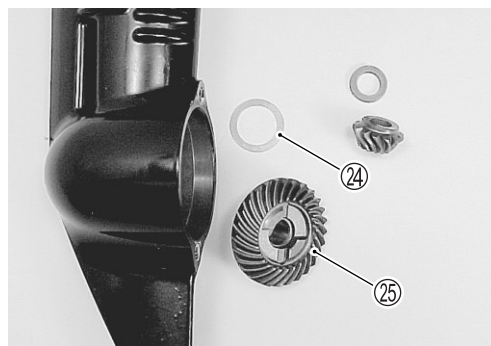
18. Take out the following parts.

- Pinion gear ㉒
- Pinion gear backup shim ㉓



19. Take out the following parts.

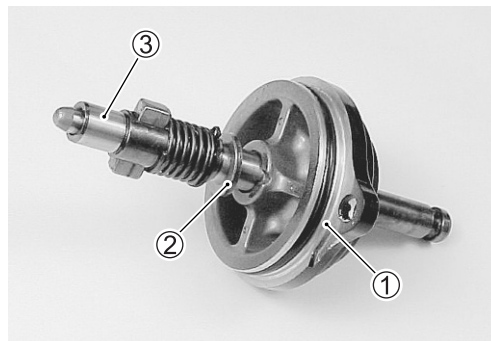
- Forward gear ②④
- Forward gear backup shim ②⑤



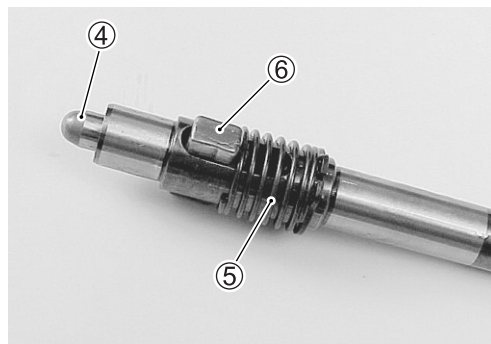
DISASSEMBLY OF PROPELLER SHAFT COMPONENTS

1. Separate the following parts.

- Bearing housing ①.
- Washer ②.
- Propeller shaft assy ③.

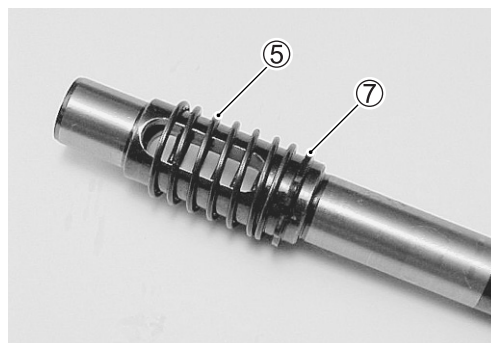


2. Push rod out the propeller shaft ④.
Remove the clutch dog ⑥.



3. Remove the spring ⑤.

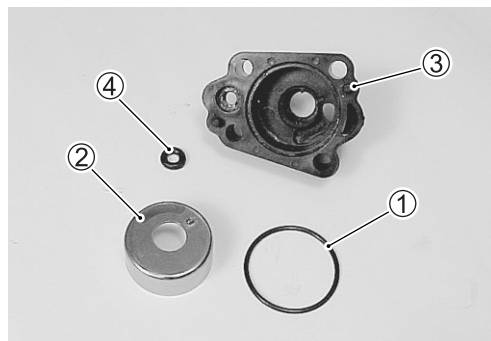
4. Remove the circlip ⑦.



DISASSEMBLY OF WATER PUMP COMPONENTS

Separate the following parts.

- Water pump case seal ①.
- Water pump case sleeve ②.
- Water pump case ③.
- O-ring ④.



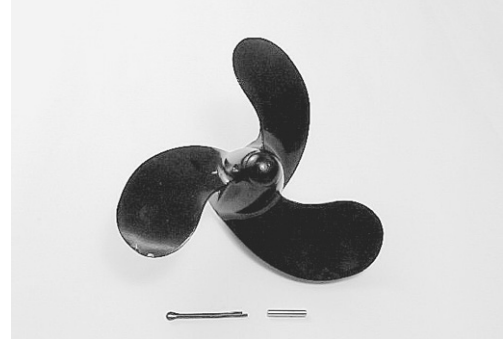
INSPECTION

NOTE:

If excessive wear, crack, defective or other damage is found on any component, replace.

PROPELLER

- Inspect the propeller. If bend, chip or other damage is found on the blades, replace or repair the propeller.
- Inspect the shear pin. If bend or other damage is found, replace the shear pin.



GEARCASE

- Inspect the gearcase. If crack or other damage is found, replace the gearcase.
- Visually check the forward gear bearing. If pitting, noisy, rough or other damage is found, replace the bearing.
- Visually check the driveshaft bushing. If excessive wear, pitting or other damage is found, replace the bushing.



GEAR

- Inspect the teeth of the forward gear and pinion gear. If excessive wear, chip or other damage is found, replace.

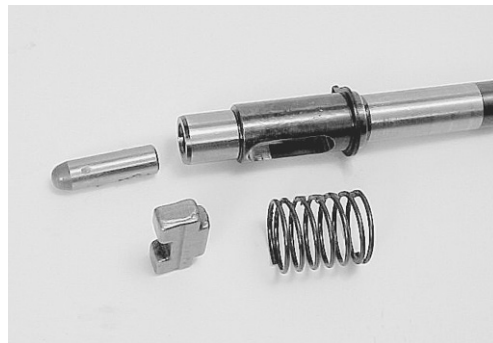


- Inspect the engaging dogs of the forward gear. If excessive wear, chip or other damage is found, replace.



PROPELLER SHAFT COMPONENTS

- Inspect the push rod. If excessive wear or other damage is found, replace.
- Inspect the clutch dog shifter. If excessive wear, crack, chip or other damage is found, replace.
- Inspect the return spring. If excessive wear or other damage is found, replace.

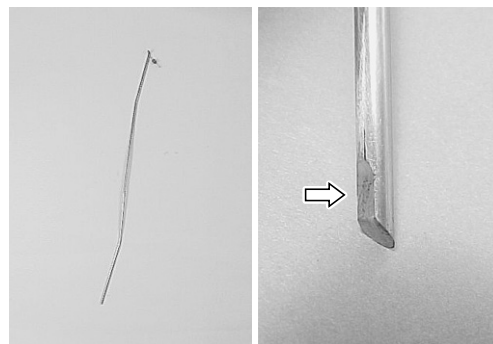


- Inspect the propeller shaft. If excessive wear, twist or other damage is found, replace.



SHIFT ROD AND SHIFT CAM

- Inspect the “stepped” surfaces of the shift cam. If excessive wear, chip or other damage is found, replace the cam.



PROPELLER SHAFT BEARING HOUSING

- Inspect the housing. If crack or other damage is found, replace the housing.
- Visually check the oil seal and O-ring. If cut, nick, excessive wear or other damage is found, replace the oil seal.

CAUTION

Do not re-use the oil seal and the O-ring once removed. Always use new parts.



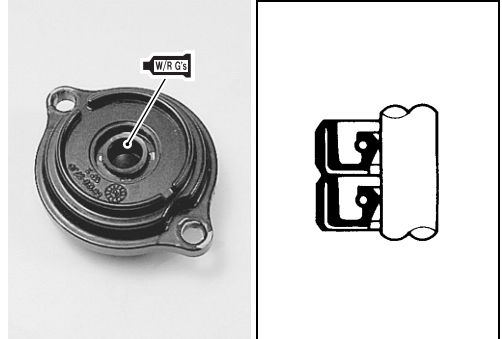
Replacing propeller shaft bearing housing oil seal

1. Remove the oil seals using a screwdriver.

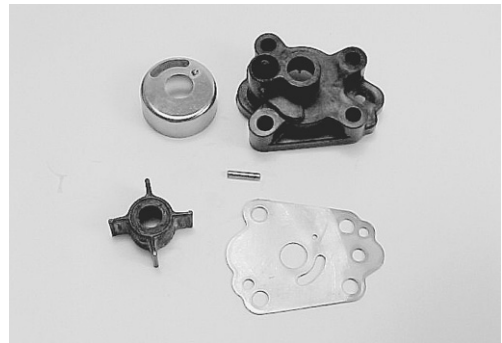


2. Apply the Water Resistant Grease to the outer circumference of the oil seal.
3. Drive the oil seals down into the housing with the lipped portion toward the propeller. (one at a time)
4. Apply the Water Resistant Grease to the seal lips.

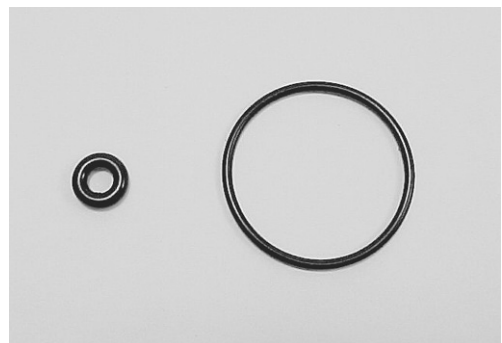
W/R G's 99000-25161: SUZUKI WATER RESISTANT GREASE

**WATER PUMP AND RELATED ITEMS**

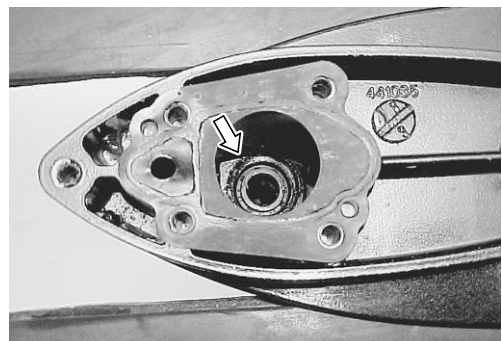
- Inspect the impeller. If cut, tear or excessive wear is found, replace the impeller.
- Inspect the pump case, the inner sleeve and the under panel. If wear, crack, distortion or corrosion is found, replace.
- Inspect the impeller pin. If excessive wear or other damage is found, replace the pin.
- Inspect the seal and the O-ring. If cut, excessive wear or other damage is found, replace.

**CAUTION**

**Do not re-use the seal and the O-ring once removed.
Always use new parts.**

**DRIVESHAFT OIL SEALS**

- Visually check the oil seals. If cut, nick, excessive wear or other damage is found, replace the oil seal.



REPLACING DRIVESHAFT OIL SEAL

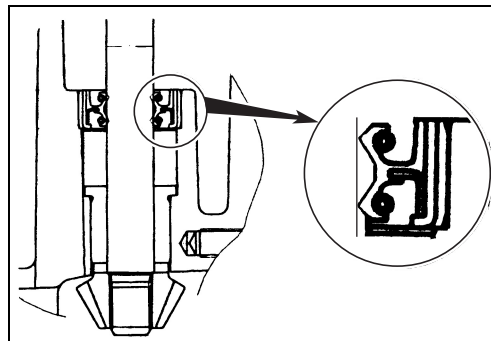
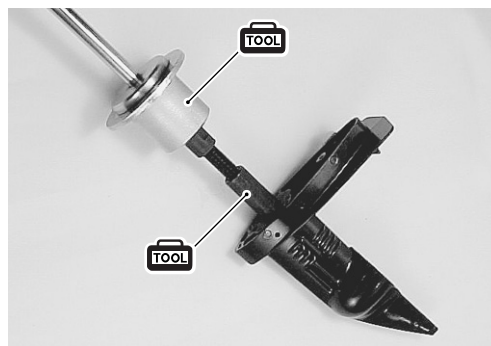
1. Remove the oil seal using special tools.
2. Apply the Water Resistant Grease to outer circumference of the oil seal.
3. Drive the oil seals down into the housing with lipped portion toward the water pump case. (one at a time)
4. Apply the Water Resistant Grease to the seal lips.



09921-20210: Bearing remover
09930-30104: Sliding hammer

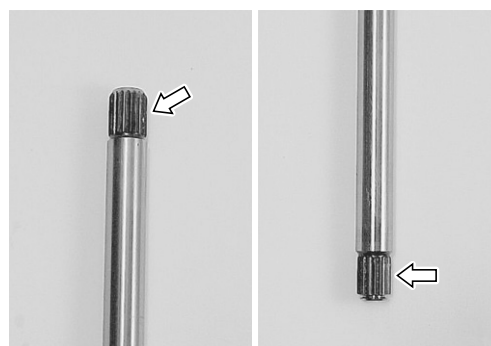


99000-25161: SUZUKI WATER RESISTANT GREASE



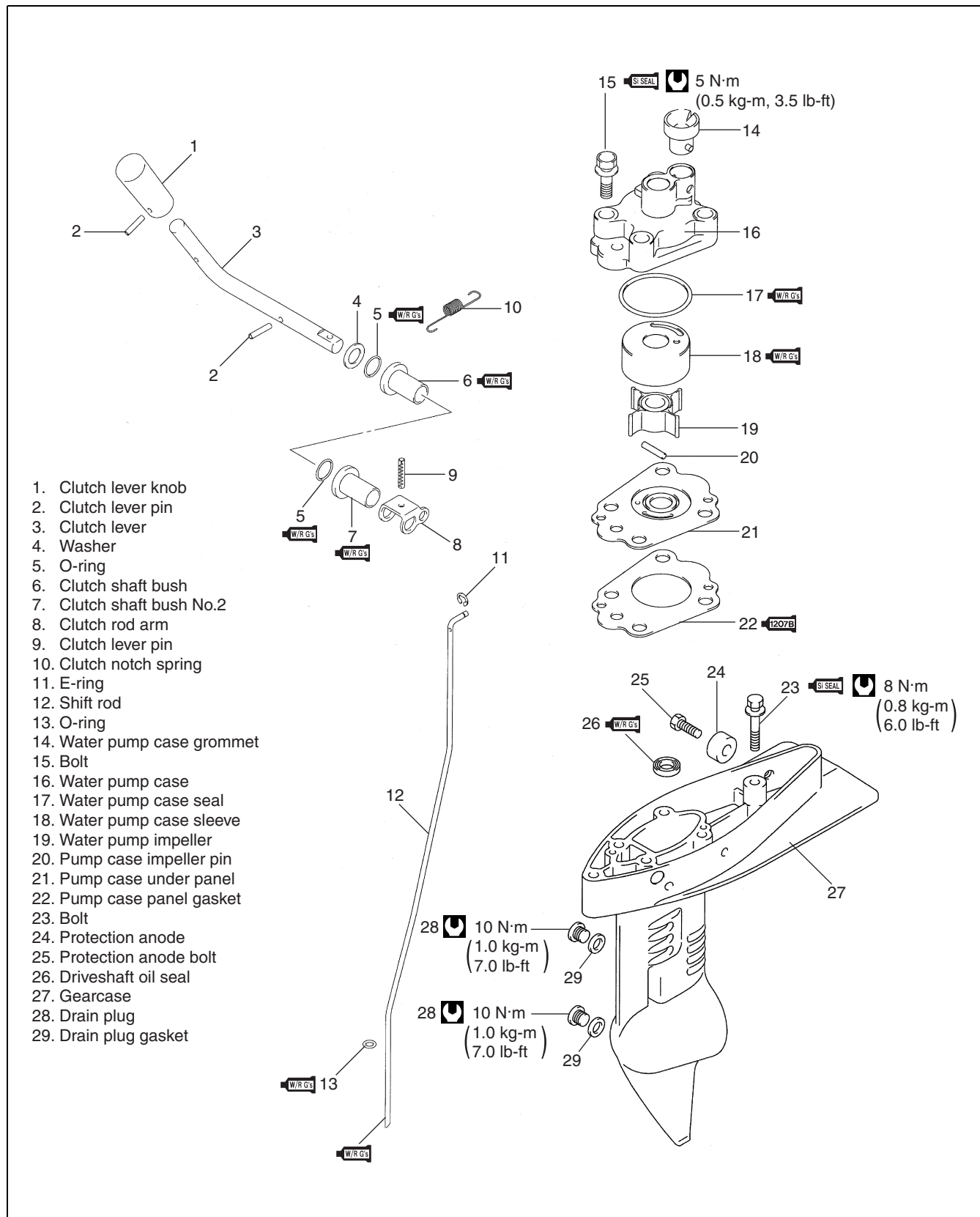
DRIVESHAFT

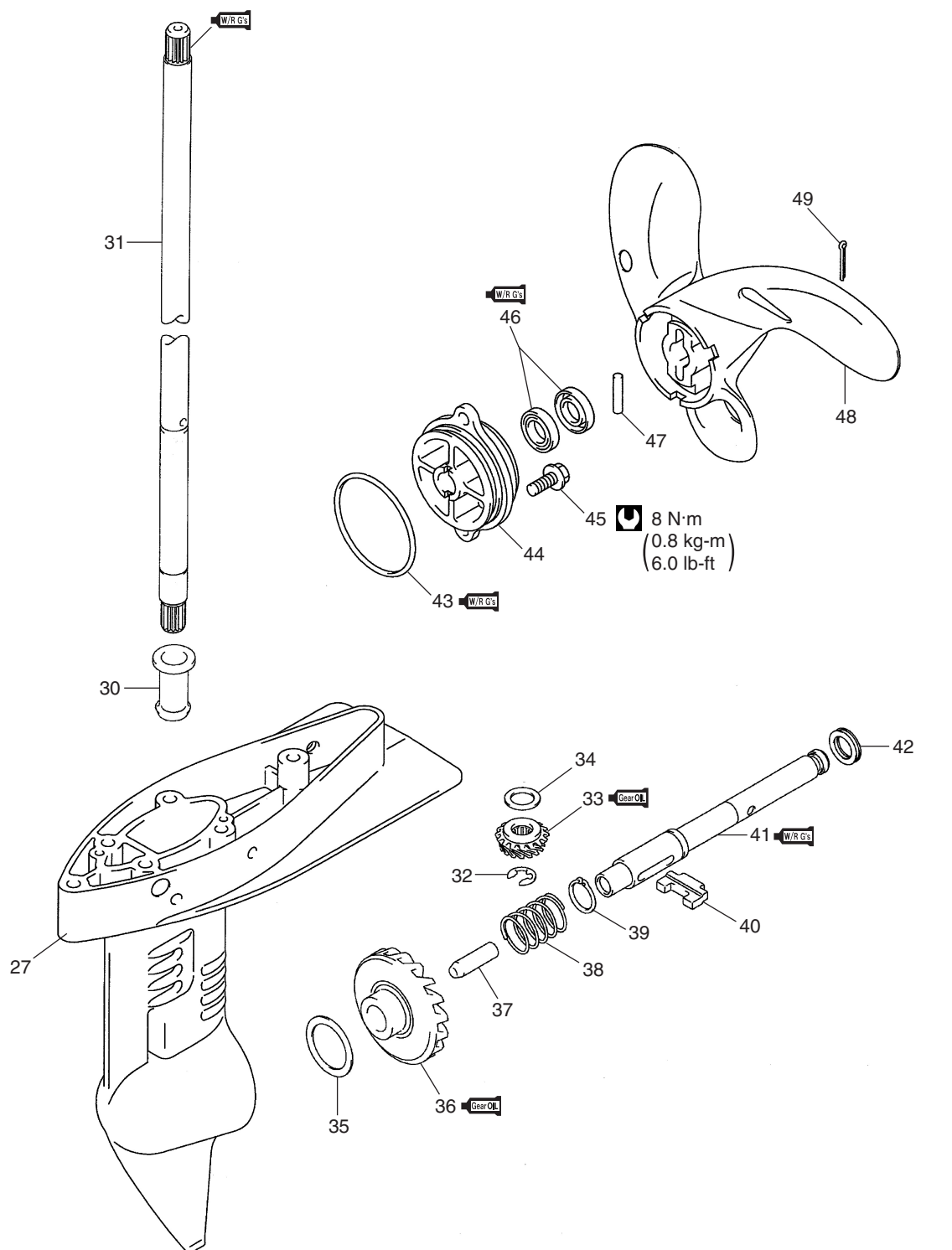
Inspect the driveshaft. If wear, twist or other damage is found on the splines, replace the driveshaft.



REASSEMBLY AND INSTALLATION

Reassembly and installation is reverse of removal and disassembly with the special attention to the following steps.





- 30. Driveshaft bush
- 31. Driveshaft
- 32. E-ring
- 33. Pinion gear
- 34. Pinion gear backup shim
- 35. Forward gear backup shim
- 36. Forward gear

- 37. Push rod
- 38. Return spring
- 39. Propeller shaft circlip
- 40. Shifter clutch dog
- 41. Propeller shaft
- 42. Thrust washer
- 43. Propeller shaft housing O-ring

- 44. Propeller shaft housing
- 45. Bolt
- 46. Propeller shaft housing oil seal
- 47. Shear pin
- 48. Propeller
- 49. Cotter pin

CAUTION

- Make sure that all parts used in assembly are clean and lubricated.
- After assembly, check the parts for tightness and smoothness of operation.
- Before final assembly, be absolutely certain that all gear contact, shim adjustments and tolerances are correct.
- Failure to correctly adjust these areas will result in lower unit damage.
(See the “LOWER UNIT GEARS-SHIMMING AND ADJUSTMENT” section on the page 8-19.)
- Do not re-use the gasket, the O-ring and the cotter pin once removed. Always use new parts.

FORWARD GEAR

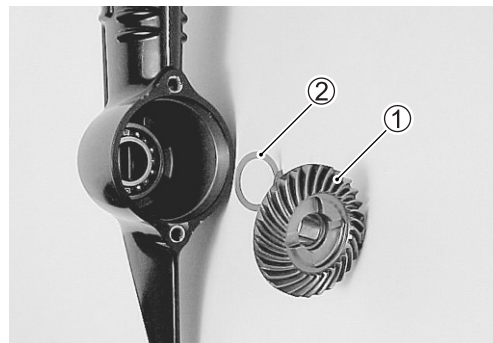
Apply the gear oil to the following parts.

- Forward gear backup shim ②
- Forward gear ①

 **99000-22540: SUZUKI OUTBOARD MOTOR GEAR OIL**

NOTE:

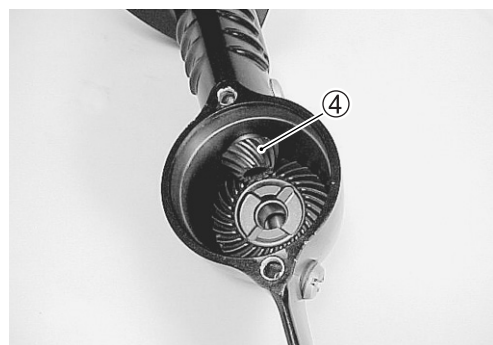
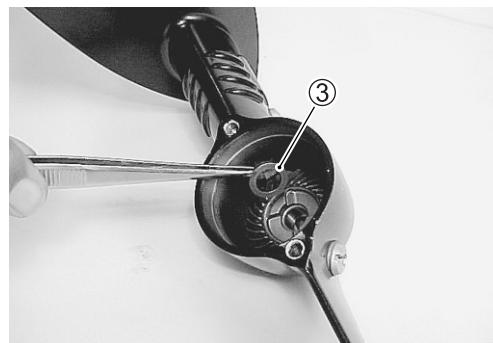
The forward gear has the bushing and the dents at the side of the dog bosses.

**PINION GEAR**

Apply the gear oil to the following parts.

- Pinion gear backup shim ③
- Pinion gear ④

 **99000-22540: SUZUKI OUTBOARD MOTOR GEAR OIL**



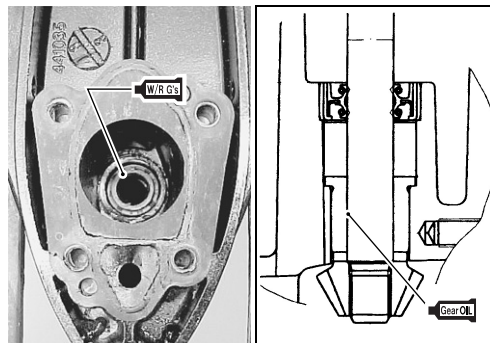
DRIVESHAFT

- Apply the Water Resistant Grease to the oil seal lips.

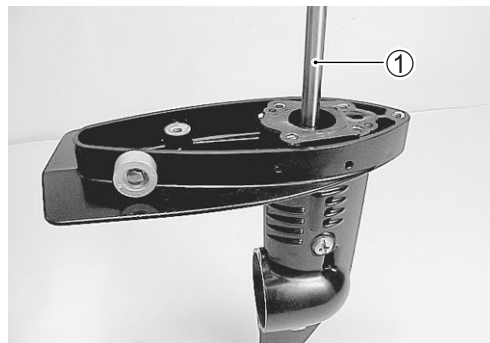
 **99000-25161: SUZUKI WATER RESISTANT GREASE**

- Apply the gear oil to the bushing in the housing.

 **99000-22540: SUZUKI OUTBOARD MOTOR GEAR OIL**



- Install the driveshaft ①.

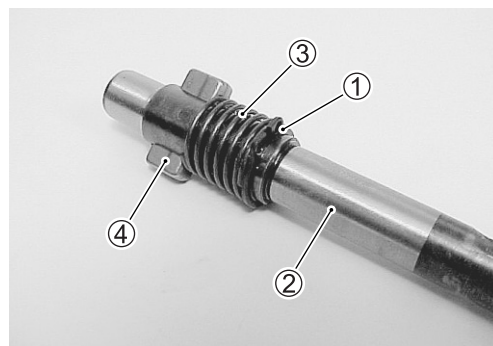


- Install the E-ring ②.

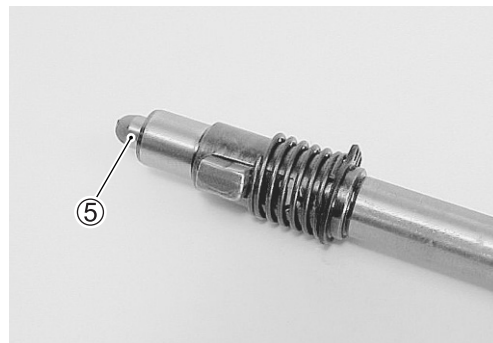


PROPELLER SHAFT COMPONENTS

- Install the circlip ① to the propeller shaft ②.
- Insert the return spring ③ and the clutch dog ④ to the propeller shaft ②.



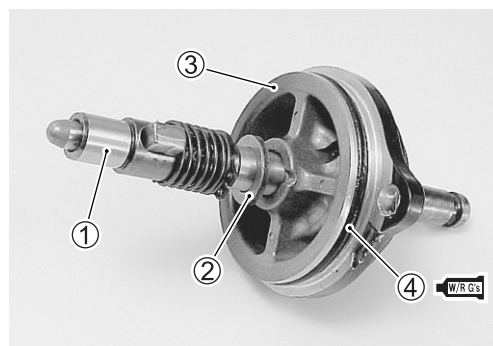
- Insert push rod ⑤ into the propeller shaft ②.



Propeller shaft assy/bearing housing

- Insert the thrust washer ② and the bearing housing ③ to the propeller shaft ①.
- Apply the Water Resistant Grease to the O-ring ④ and the oil seals of the bearing housing.

 **99000-25161: SUZUKI WATER RESISTANT GREASE**



- Install the propeller shaft/housing assembly to the gearcase and tighten the two bolts to the specified torque.

 **Propeller shaft bearing housing bolt:**
8 N·m (0.8 kg-m, 6.0 lb-ft)



WATER PUMP AND RELATED ITEMS

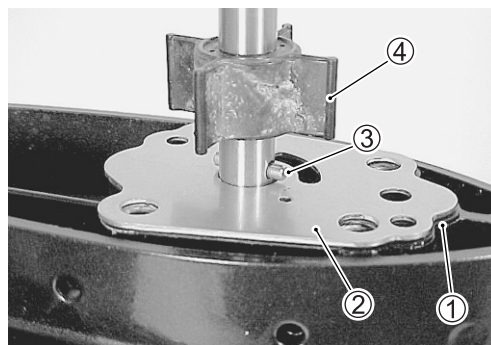
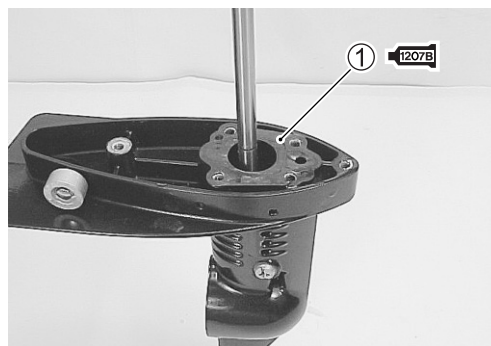
- Under panel gasket ① into position.
- Apply SUZUKI BOND “1207B” to under panel gasket.

NOTE:

Apply both side sealant evenly/without irregularity.

 99000-31140: SUZUKI BOND “1207B”

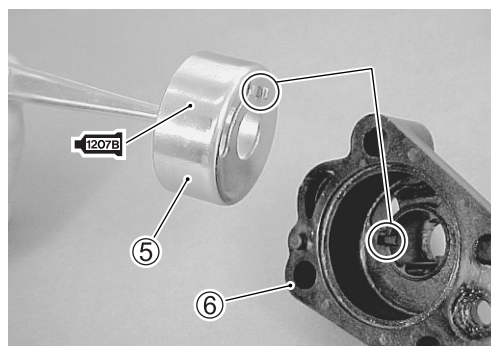
- Install the under panel ②.
- Install the impeller pin ③.
- Install the impeller ④.



- Apply SUZUKI BOND “1207B” onto the outer-surface of water pump sleeve ⑤.

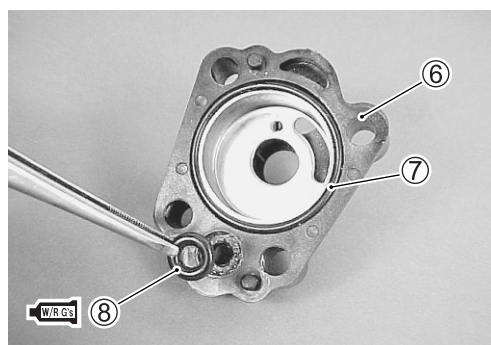
 99000-31140: SUZUKI BOND “1207B”

- Install the water pump sleeve into the water pump case ⑥ by confirming the boss on the sleeve should be meeting with the groove on the pump case.



- Install the water pump case seal ⑦.
- Apply the Water Resistant Grease to the O-ring ⑧.
- Install the O-ring ⑧.

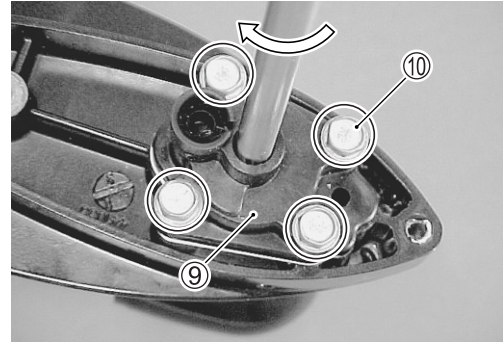
 99000-25161: SUZUKI WATER RESISTANT GREASE



WATER PUMP AND RELATED ITEMS

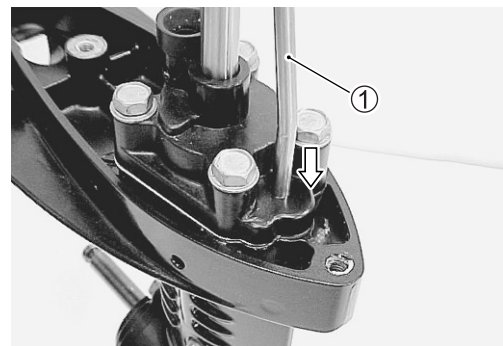
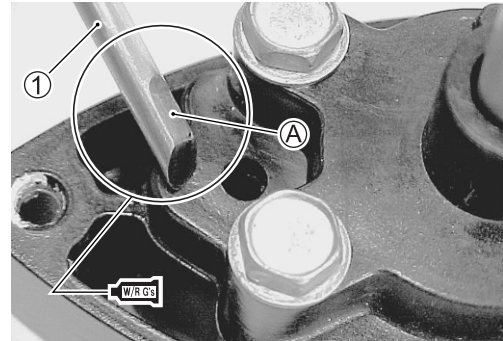
- Install the water pump case ⑨ while rotating the driveshaft clockwise in order to flex the impeller vanes in the correct direction.
- Tighten the water pump case bolts ⑩ to the specified torque.

 **Water pump case bolt: 5 N·m (0.5 kg-m, 3.5 lb-ft)**



SHIFT ROD

- Install the shift rod ① with the stepped section of the shift cam (A) toward the propeller shaft.



LEAKAGE CHECK

Check for leakage of the oil seals and O-ring when applying the specified pressure inside of the gearcase.

TOOL 09950-69512: Oil leakage tester

09952-99310: Air pump

09950-69710: Attachment

Procedure

1. Install the special tool into the oil level hole.
2. Connect an air pump into the special tool.
3. Rotate the driveshaft and the propeller shaft clockwise several times and then apply the specified pressure for the test.

NOTE:

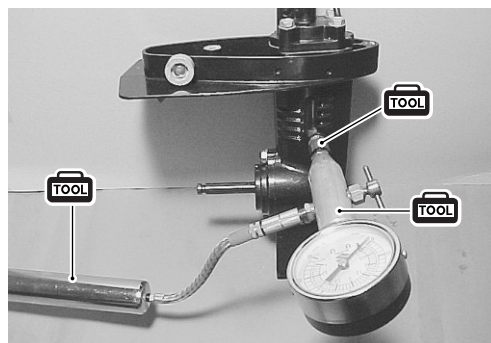
Apply low initial pressure of 20 – 40 kPa (0.2 – 0.4 kg/cm², 2.8 – 5.7 psi) first, then apply the specified pressure.

Leakage test pressure: 100 kPa (1.0 kg/cm², 14.2 psi)

CAUTION

Do not exceed pressure of 110 kPa (1.1 kg/cm², 15.6 psi) or damage to oil seals will result.

4. Once stabilized, the pressure should remain steady for at least 5 minutes.
If the pressure does not fall, sealing performance is correct.



PROPELLER

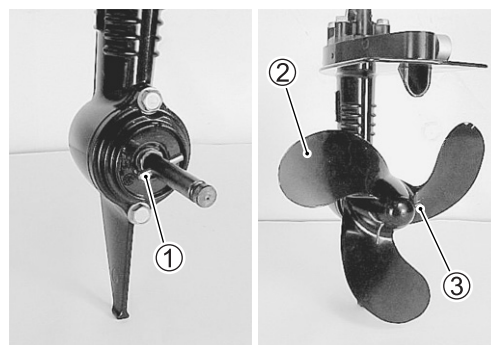
- Apply the Water Resistant Grease to the propeller shaft.

WRG's 99000-25161: SUZUKI WATER RESISTANT GREASE

- Install the shear pin ① and propeller ②.
- Push the cotter pin ③ through the propeller shaft, then bend the pin securely.

⚠ WARNING

To prevent injury from the propeller blades, wear gloves.



LOWER UNIT INSTALLATION

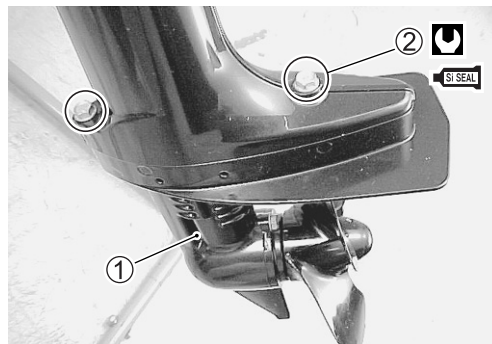
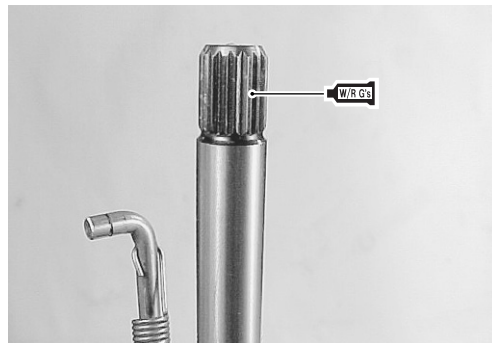
- Apply the Water Resistant Grease to the driveshaft splines.
- Install the lower unit ①.

99000-25161: SUZUKI WATER RESISTANT GREASE

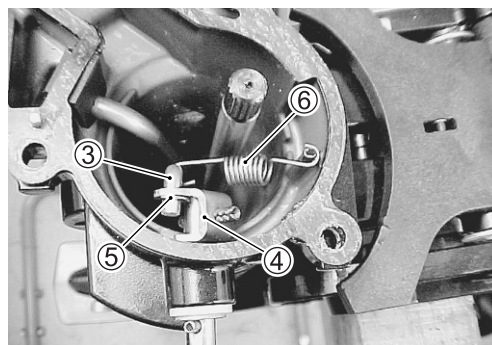
- Apply the Silicone Seal to the gearcase retaining bolts ② and tighten the bolts to the specified torque.

09900-31120: SUZUKI SILICONE SEAL

 Gearcase bolt: 8 N·m (0.8 kg-m, 6.0 lb-ft)



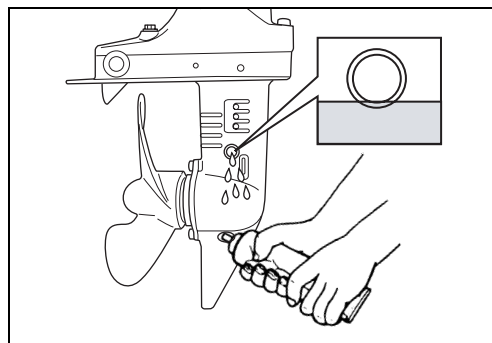
- Install the shift rod ③ to the clutch rod arm ④.
- Install the E-ring ⑤.
- Install the clutch notch spring ⑥.
- Shift the clutch lever from neutral and forward to check.



GEAR OIL

Fill the gearcase with the specified gear oil. (See page 2-5.)

99000-22540: SUZUKI OUTBOARD MOTOR GEAR OIL

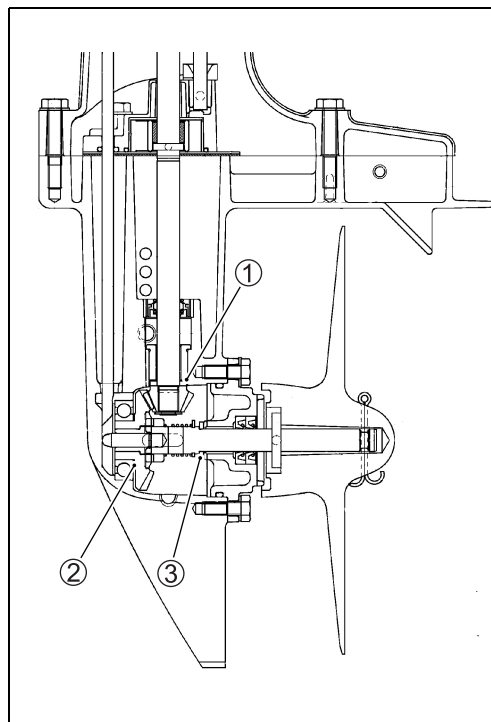


LOWER UNIT GEARS-SHIMMING AND ADJUSTMENT

If the lower unit has been rebuilt or has had components replaced, shimming for correct gear contact and backlash will have to be adjusted in order to ensure smooth, reliable operation of gears.

Shim/Washer and Mounting position

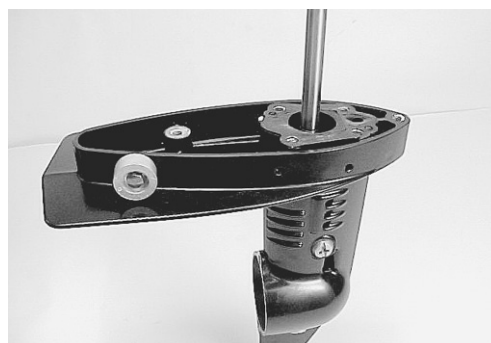
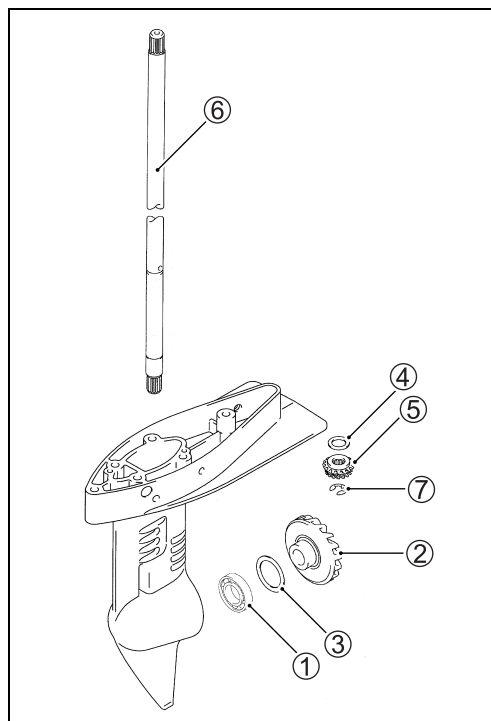
	Numerical index/item	Available thickness (mm)	Design specification thickness (mm)
①	Pinion gear backup shim	1.8, 1.9, 2.0, 2.1, 2.2	2.0
②	Forward gear backup shim	0.3, 0.4, 0.5, 0.6	0.5
③	Propeller shaft thrust washer	1.6, 1.7, 1.8, 1.9, 2.0	0.2 (Thrust play)



FORWARD GEAR/PINION GEAR SHIM ADJUSTMENT

Adjust the forward gear/pinion gear shimming as shown below.

- Install the forward gear bearing ①, the backup shim ③ and the forward gear ②.
- Install the driveshaft ⑥, the pinion gear backup shim ④, the pinion gear ⑤ and E-ring ⑦.

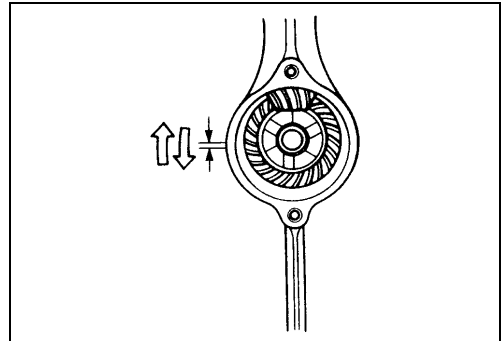
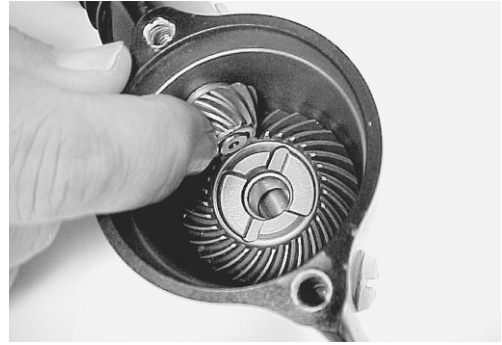


Adjusting gear backlash (Pinion and Forward gear)

To check the backlash, hold the pinion gear by hand, then gently rock forward gear back and forth by hand.

Gear backlash: 0.10 – 0.20 mm (0.004 – 0.008 in)

- If backlash is larger than the specified, the thickness of the forward gear backup shim must be increased.
- If backlash is smaller, the thickness of the backup shim must be decreased.

**Checking and adjusting tooth contact pattern (Pinion and Forward gear)**

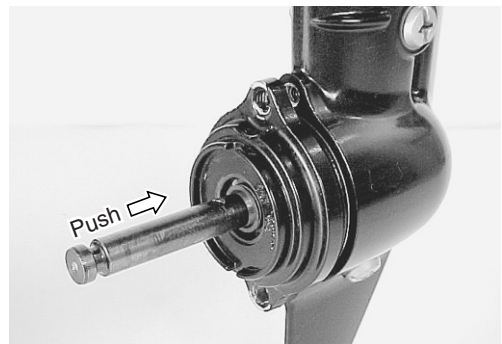
Check tooth contact pattern by using the following procedure.

- To assess tooth contact, apply a light coat of Prussian Blue on the convex surface of the forward gear.
- Install the propeller shaft and the housing assembly.
Do not install the push rod.

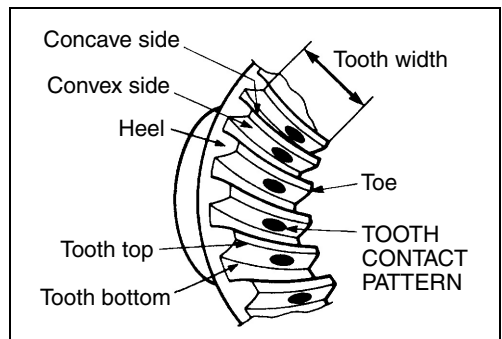
NOTE:

Securing the propeller shaft housing with the bolts is not required.

- Push the propeller shaft inward and hold in position.
- Rotate the driveshaft 5 – 6 times clockwise.



- Carefully pull out propeller shaft and housing to check tooth contact pattern.



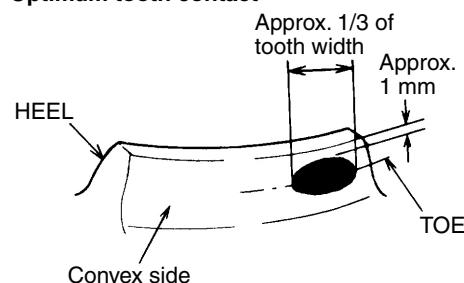
Optimum tooth contact

The optimum tooth contact is shown in the figure.

A shim adjustment may be necessary in order to obtain the optimum tooth contact pattern.

CAUTION

The backlash of the gear should be checked when increasing or decreasing the thickness of the shim to adjust tooth contact.

Optimum tooth contact**Example (1)**

Incorrect top side toe contact:

Correction measures:

- Decrease the thickness of the forward gear shim.
- Slightly increase the pinion gear shim thickness.

CAUTION

Do not set tooth contact in the top side toe contact position. Damage and chipping of the forward and pinion gear may result.

**EXAMPLE OF INCORRECT
Top side toe contact****Example (2)**

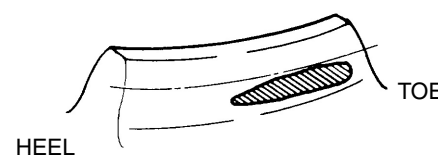
Incorrect bottom side toe contact:

Correction measures:

- Increase the thickness of the forward gear shim.
- Slightly decrease the pinion gear shim thickness.

CAUTION

Do not set tooth contact in the bottom side toe contact position. Chipping of the pinion gear may result.

**EXAMPLE OF INCORRECT
Bottom side toe contact**

CHECKING PROPELLER SHAFT THRUST PLAY

After adjusting all gear positions, measure the propeller shaft thrust play.

Propeller shaft thrust play:

0.20 – 0.40 mm (0.008 – 0.016 in)

Measurement step

1. Assemble the gear adjusting gauge to the propeller shaft as shown in the figure.

** 09951-09530: Gear adjusting gauge**

2. Push the propeller shaft inward.
3. Hold the propeller shaft in and set the dial gauge pointer to zero.
4. Slowly pull the propeller shaft outward and read the maximum thrust play on the dial.
 - If the measurement is more than the specification, increase the propeller shaft thrust washer thickness.
 - If the measurement is less than the specification, reduce the propeller shaft thrust washer thickness.

