

Right Hand Rotation Unit

Diagnostic Information and Procedures

Diagnose Lower Unit Malfunction

ZAJ6113104001

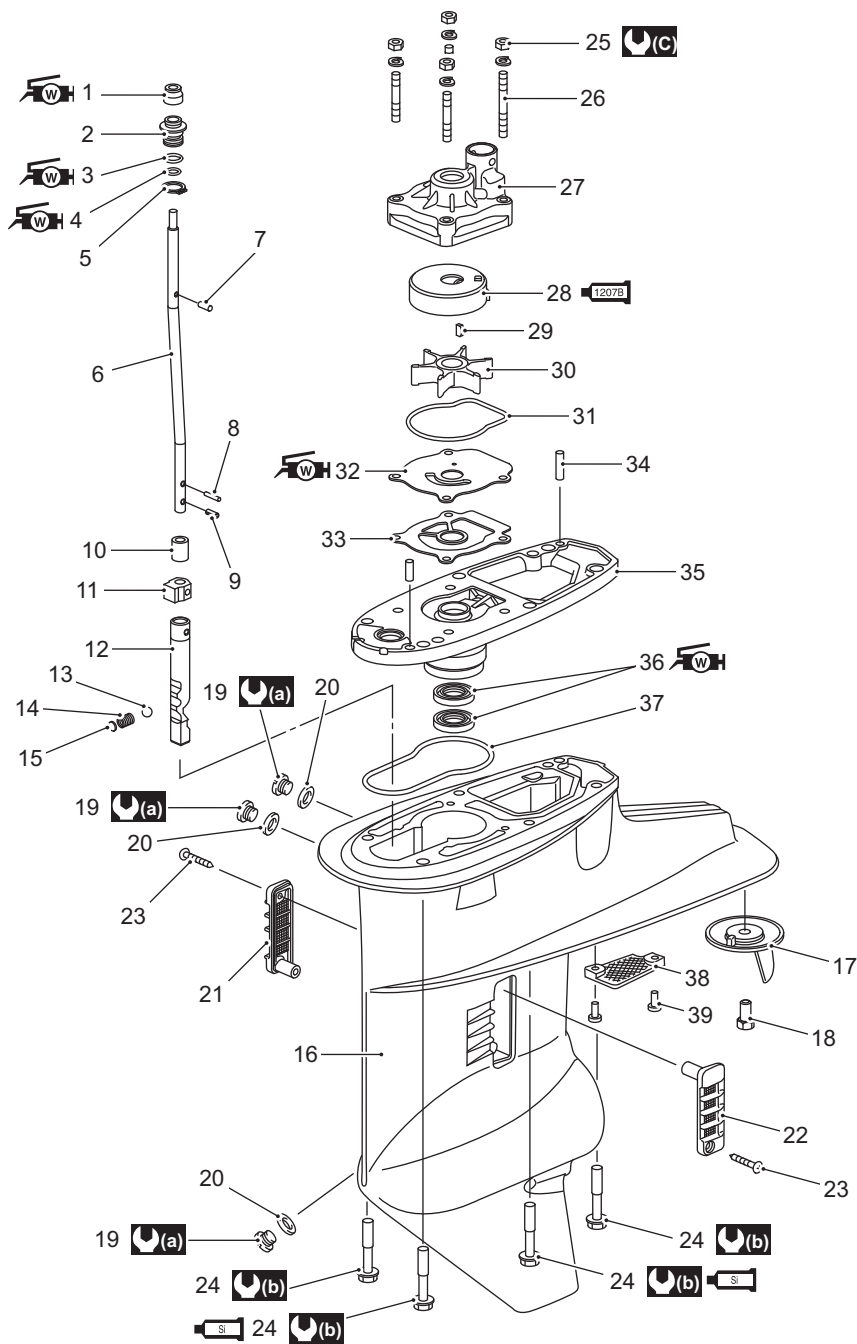
Trouble Check Chart

Condition	Possible cause	Correction / Reference Item
Engine stalls when engaging gear	Idling speed set too low.	<i>Adjustment.</i>
	Propeller shaft bearings damaged, lacking lubrication or seized.	<i>Replace.</i>
Engaging gear(s) has no effect on propulsion	Clutch out of adjustment.	<i>Adjustment.</i>
	Driveshaft broken or splines damaged.	<i>Replace.</i>
	Chipped or worn dog clutches.	<i>Replace.</i>
	Propeller not secured correctly (fallen off).	<i>Inspection or retighten.</i>
Loss of power. (Assuming engine is OK)	Propeller bush slipping.	<i>Replace.</i>
	Bent or worn propeller.	<i>Repair or replace.</i>
Engine shakes the boat	Failed propeller bush.	<i>Replace.</i>
	Bent driveshaft or propeller shaft.	<i>Replace.</i>
	Damaged propeller.	<i>Replace.</i>
Clutch will not engage or disengage	Seized shift rod.	<i>Inspection.</i>
	Clutch shaft and clutch rod have become detached.	<i>Inspection.</i>
	Seized / broken remote control cable.	<i>Replace.</i>
	Problem at control box end.	<i>Inspection or replace.</i>

Service Instructions

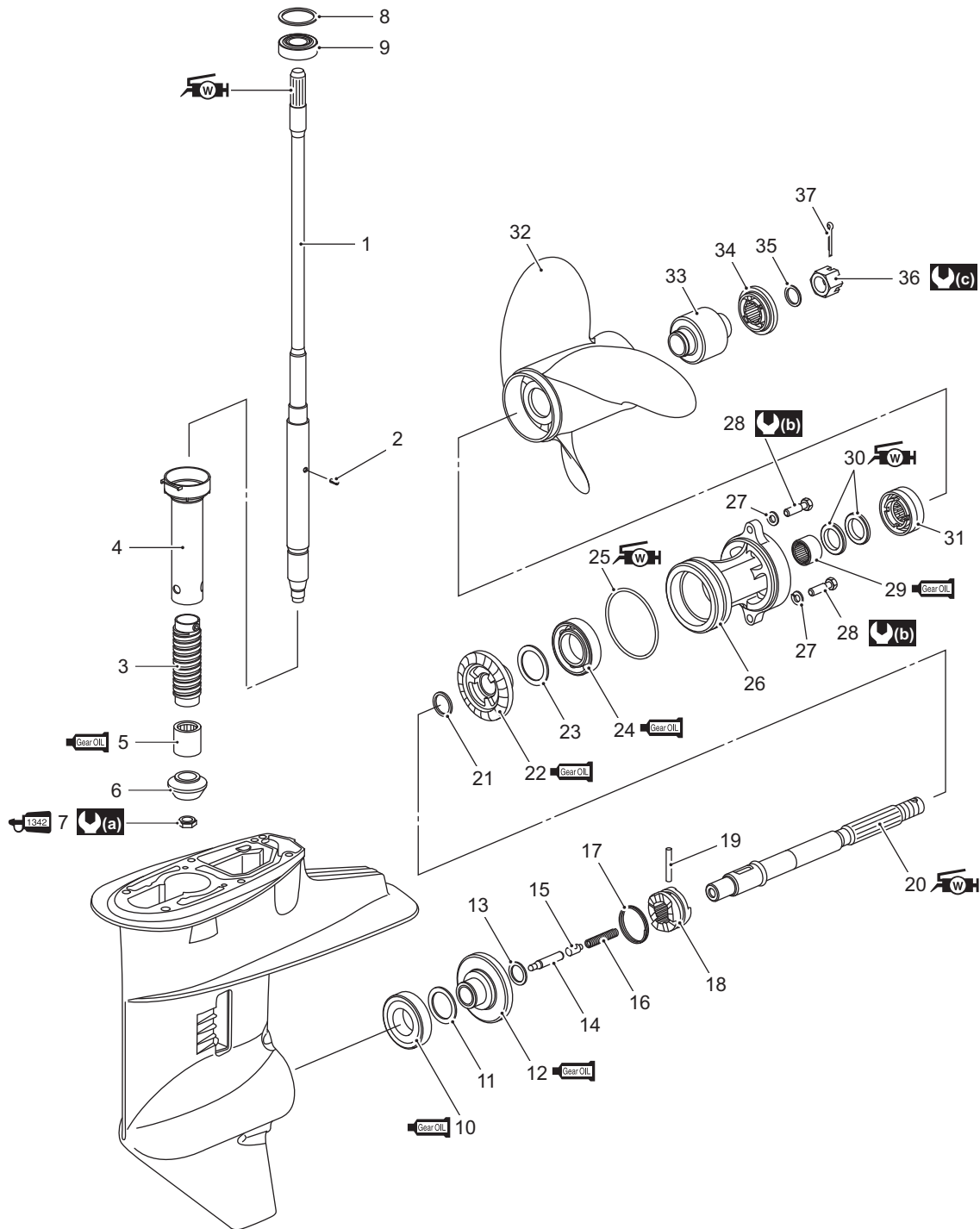
Lower Unit Components

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1. Dust seal	12. Shift cam	23. Screw	34. Dowel pin
2. Shift rod guide	13. Ball	24. Bolt	35. Driveshaft bearing housing
3. O-ring	14. Spring	25. Nut	36. Oil seal
4. O-ring	15. Plate	26. Stud bolt	37. Seal ring
5. Circlip	16. Gearcase	27. Water pump case	38. Sub water filter
6. Shift rod	17. Trim tab	28. Inner sleeve	39. Screw
7. Pin	18. Bolt	29. Key	(a) : 10 N·m (1.1 kgf-m, 7.2 lbf-ft)
8. Pin	19. Plug	30. Water pump impeller	(b) : 23 N·m (2.3 kgf-m, 16.6 lbf-ft)
9. Pin	20. Gasket	31. Sealing	(c) : 8 N·m (0.8 kgf-m, 6.0 lbf-ft)
10. Magnet	21. Water filter STBD	32. Under panel	: Apply SUZUKI Water Resistant Grease.
11. Guide	22. Water Filter PORT	33. Gasket	Si : Apply SUZUKI Silicon seal.



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1. Driveshaft	12. Forward gear	23. Shim	34. Spacer
2. Pin	13. Thrust washer	24. Bearing	35. Washer
3. Driveshaft collar	14. Push rod	25. O-ring	36. Nut
4. Housing	15. Push pin	26. Propeller shaft bearing housing	37. Pin
5. Pinion bearing	16. Spring	27. Washer	(a) : 45 N·m (4.5 kgf-m, 32.5 lbf-ft)
6. Pinion gear	17. Dog spring	28. Bolt	(b) : 23 N·m (2.3 kgf-m, 16.6 lbf-ft)
7. Pinion nut	18. Clutch dog shifter	29. Bearing	(c) : 55 N·m (5.5 kgf-m, 40 lbf-ft)
8. Shim	19. Dog pin	30. Oil seal	W : Apply SUZUKI Water Resistant Grease.
9. Driveshaft bearing	20. Propeller shaft	31. Stopper	Oil : Apply SUZUKI Outboard Motor Gear Oil.
10. Forward gear bearing	21. Thrust washer	32. Propeller	1342 : Apply SUZUKI Thread Lock 1342.
11. Shim	22. Reverse gear	33. Propeller bush	

Propeller Removal and Installation

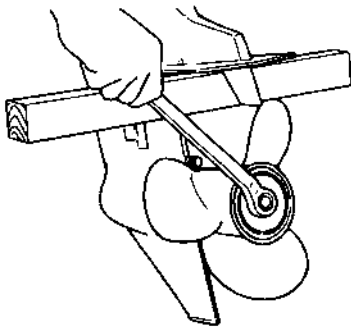
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⚠ WARNING

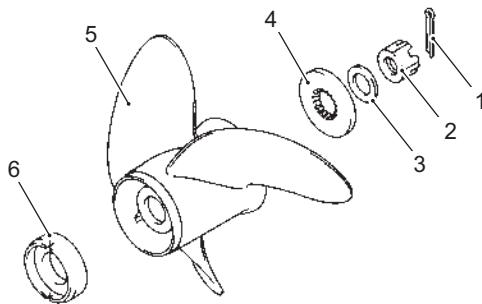
- When installing or removing the propeller, shift into “Neutral” and remove the emergency stop switch lock plate so that the motor cannot be started accidentally.
- To prevent injury from propeller blades, wear gloves and place a block of wood between the anti-cavitation plate and the propeller blade tips to lock the propeller in place before attempting to remove or install propeller nut.

Removal

- 1) Shift to “Neutral” position.
- 2) Remove cotter pin (1) from propeller nut and remove propeller nut (2).
- 3) Remove washer (3), spacer (4), propeller (5) and stopper (6) from the propeller shaft.




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Installation

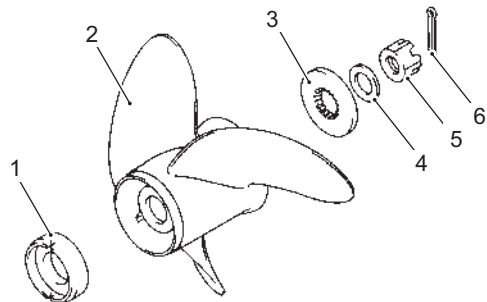
- 1) Coat the propeller shaft splines liberally with Suzuki water resistant grease.

 : Grease 99000-25161 (SUZUKI Water Resistant Grease (250 g))

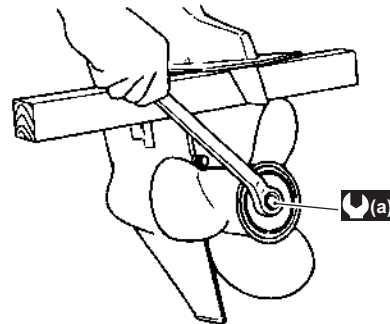
- 2) Install propeller stopper (1) onto propeller shaft, then slide on the propeller (2).
- 3) Fit spacer (3), washer (4) and nut (5), then tighten nut to specified torque.
- 4) Push cotter pin (6) through nut and shaft, then bend to secure.

Tightening torque

Propeller nut (a): 55 N·m (5.5 kgf-m, 40.0 lbf-ft)



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Propeller / Nut / Cotter Pin Inspection

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Refer to "Propeller / Propeller Nut and Cotter Pin Inspection" in Section 0B (Page 0B-16).

Lower Unit Removal and Installation

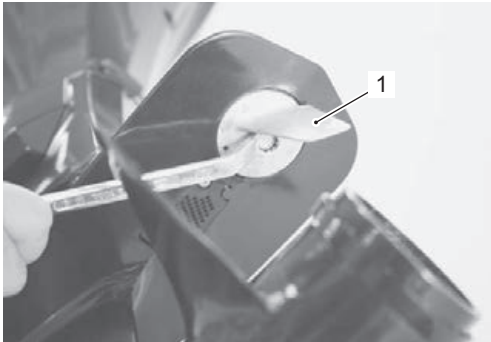
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Removal

⚠ WARNING

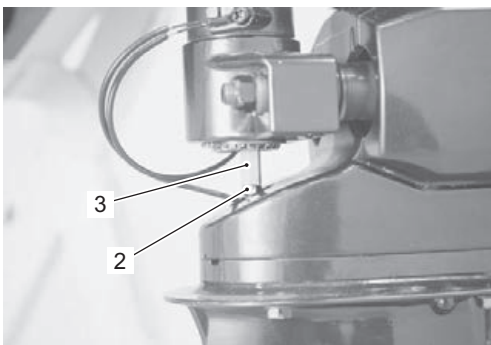
Always disconnect the battery cable, before removing lower unit.

- 1) Shift to "Neutral" position. Remove bolt and trim tab (1) (if necessary).



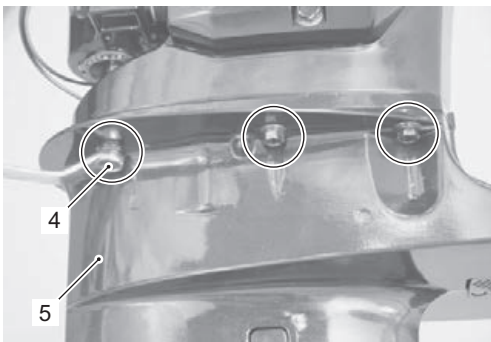
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- 2) To separate the clutch rod from the shift rod, loosen the clutch rod lock nut (2), then unscrew the connector (3).



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- 3) Remove six bolts (4) and separate gearcase (5) from driveshaft housing.



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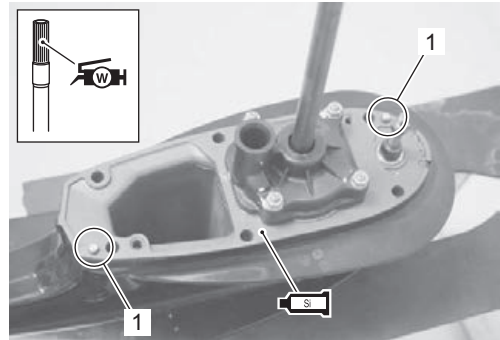
Installation

- 1) Insert two dowel pins (1).
- 2) Apply water resistant grease to driveshaft splines.

: Grease 99000-25161 (SUZUKI Water Resistant Grease (250 g))

- 3) Apply a light coating of suzuki silicone seal to mating surfaces of gearcase and driveshaft housing.

: Sealant 99000-31120 (SUZUKI Silicone Seal (50 g))



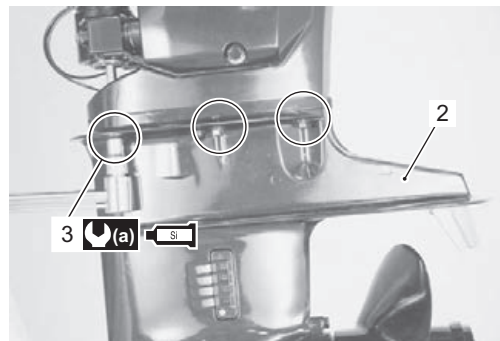
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- 4) Slide the lower unit (2) into place, ensuring that the top of driveshaft engages properly with crankshaft and that water tube locates in water pump case outlet.
- 5) Apply suzuki silicone seal to six gearcase bolts (3) and tighten them to specified torque.

: Sealant 99000-31120 (SUZUKI Silicone Seal (50 g))

Tightening torque

Gearcase bolt (a): 23 N·m (2.3 kgf-m, 16.6 lbf-ft)



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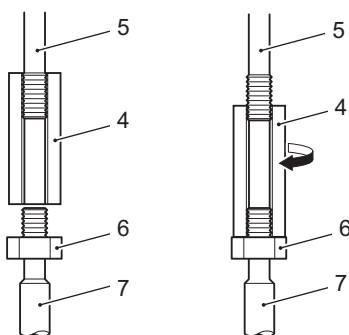
3A-6 Right Hand Rotation Unit:

- 6) Connect the clutch rod and the shift rod using the clutch rod connector in the following procedure:

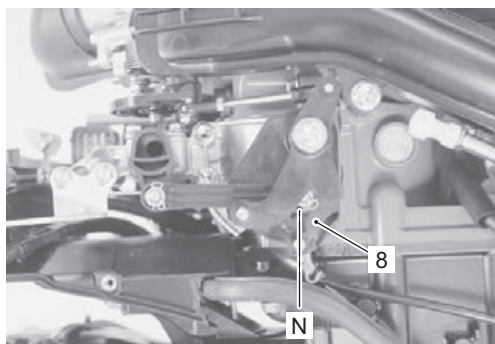
NOTE

The clutch rod connector is not a turnbuckle but just a long nut with right-hand thread.

- Screw the clutch rod connector (4) onto the clutch rod (5) all the way to the end of its thread.
- Screw the lower nut (6) onto the shift rod (7) all the way to the end of its thread.
- Locate the shift cam at Neutral position by moving shift rod (7) up or down and then hold it at the position.
- While holding the clutch control lever (8) and shift cam at neutral position, screw the clutch rod connector (4) onto the shift rod (7) until the connector contacts the lower nut (6).



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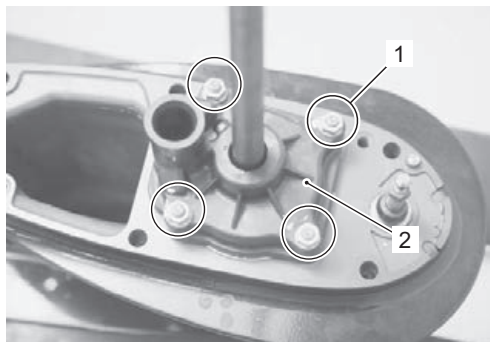
- With the clutch rod connector (4) securely held, tighten the lower nut (6) firmly against the connector.
- 7) Shift the clutch control lever to "Forward" and "Reverse" position from "Neutral" position to check proper gear engagement.

Water Pump Removal and Installation

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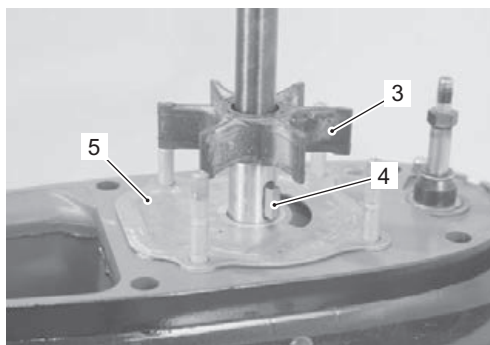
Removal

- Remove the lower unit. Refer to "Lower Unit Removal and Installation" (Page 3A-5).
- Loosen four nuts (1), then remove water pump case (2).



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- Remove impeller (3), impeller key (4) and pump under plate (5). Keep impeller key (4) for reuse and discard the plate gasket.

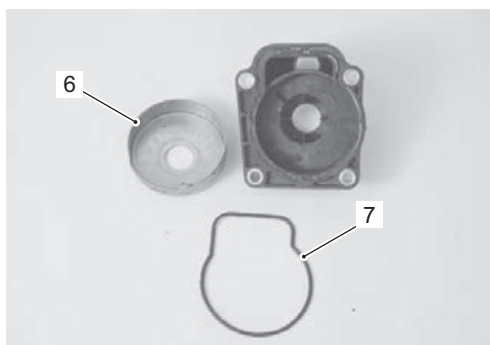


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NOTE

To facilitate the removal of inner sleeve from pump case, warm up the entire case using a heater like hair dryer.

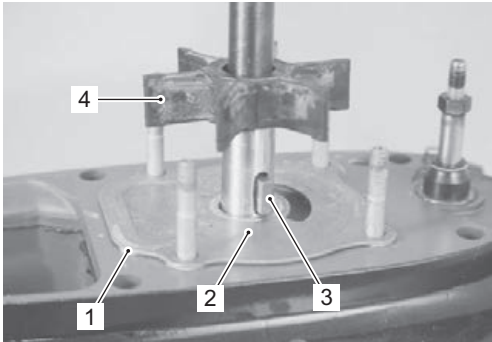
- Remove inner sleeve (6) and rubber seal ring (7).



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Installation

- 1) Place the under panel gasket (1) and under panel (2) into position.
- 2) Insert the key (3) in the driveshaft and slide the impeller (4) onto driveshaft, ensuring that key and keyway is aligned.



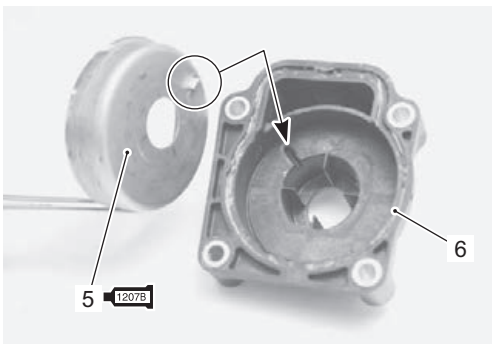
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NOTE

Before installing pump inner sleeve, apply SUZUKI Bond 1207B lightly between inner sleeve and pump case mating surfaces.

1207B : Sealant 99000-31140 (SUZUKI Bond 1207B (100 g))

- 3) Install inner sleeve (5) into the pump case (6), ensuring that projection of inner sleeve and groove of pump case are aligned.



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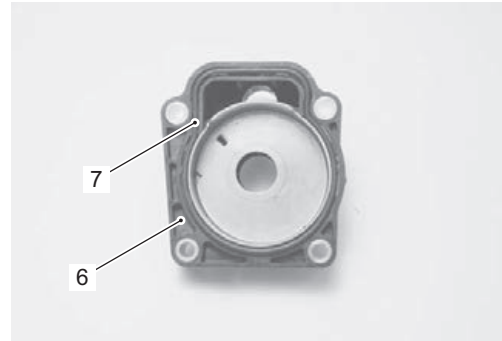
- 4) Place the seal ring (7) into groove of the pump case (6).

CAUTION

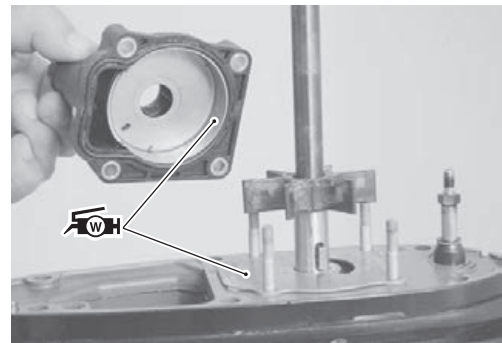
Do not reuse seal ring once removed. Always use new ring.

NOTE

Before installing water pump case assembly, apply water resistant grease lightly on pump case inner sleeve and under panel for initial lubrication.



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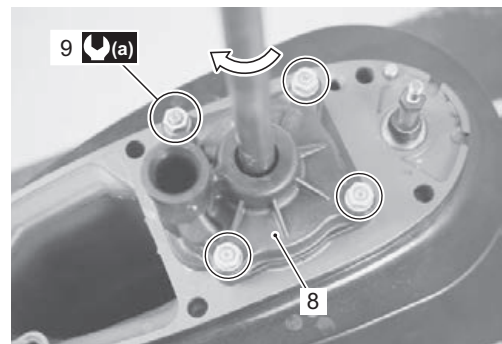


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- 5) Install the pump case assembly (8) while rotating driveshaft clockwise to flex the impeller vanes in the correct direction. Securely tighten the four pump case nuts (9) to the specified torque.

Tightening torque

Water pump case nut (a): 8 N·m (0.8 kgf-m, 6.0 lbf-ft)



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- 6) Install the Lower Unit. Refer to "Lower Unit Removal and Installation" (Page 3A-5).

3A-8 Right Hand Rotation Unit:

Water Pump and Related Items Inspection

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Inspect the following parts.

- Inspect impeller. Replace if vanes are cut, torn, worn or other abnormal conditions.
- Inspect pump case. Replace if cracked, distorted or other abnormal conditions are noted.
- Inspect pump inner sleeve. Replace if worn, cracked, distorted, corroded or other abnormal conditions are noted.
- Inspect under panel. Replace if cracked, distorted, corroded or other abnormal conditions are noted.

CAUTION

**Do not reuse seal ring once removed.
Always use new ring.**



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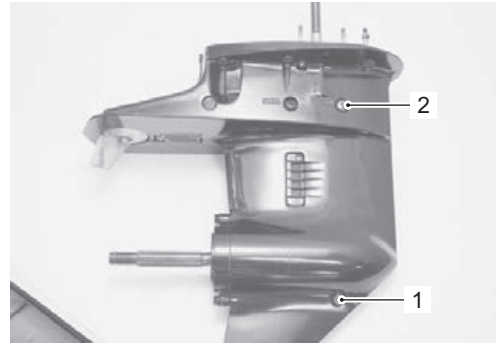
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Lower Unit Disassembly

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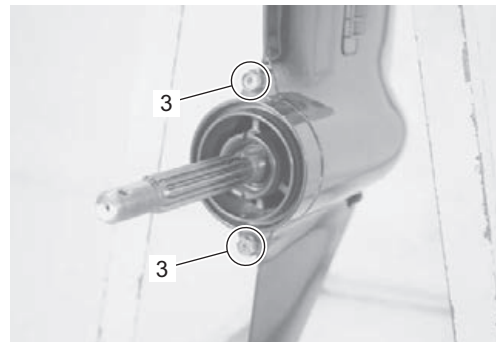
- 1) Remove the lower unit. Refer to "Lower Unit Removal and Installation" (Page 3A-5).
- 2) Remove the propeller. Refer to "Propeller Removal and Installation" (Page 3A-4).
- 3) Remove the water pump and related parts. Refer to "Lower Unit Removal and Installation" (Page 3A-5) and "Water Pump Removal and Installation" (Page 3A-6).

- 4) Place a drain pan under oil drain plug. Remove oil drain plug (1) first then oil level plug (2) and allow gear oil to drain.
Inspect oil for water, contaminants or metal.



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- 5) Remove two bolts (3) securing the propeller shaft bearing housing to the gearcase.




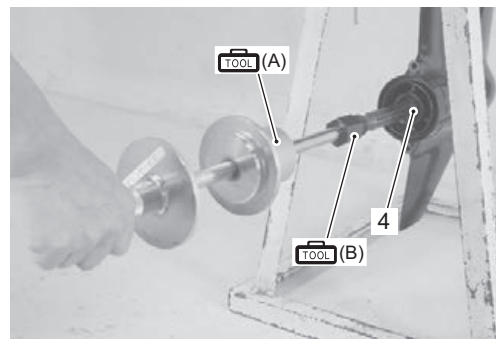
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- 6) Using special tools, pull out the propeller shaft bearing housing.
Remove the propeller shaft and bearing housing assembly (4).

Special tool

 (A): 09930-30104 (Sliding hammer)


 (B): 09930-30161 (Propeller shaft remover)

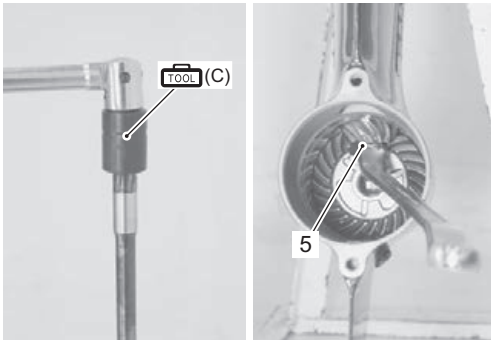


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- 7) Hold the pinion nut securely, then fit special tool to the driveshaft and loosen the pinion nut. Remove pinion nut (5).

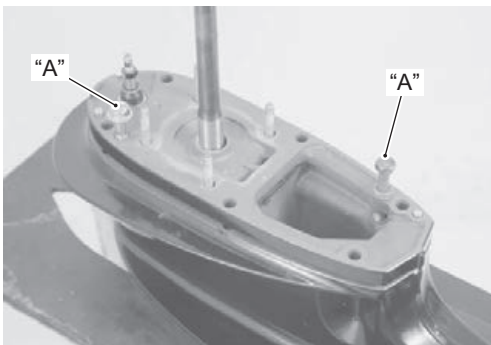
Special tool

 (C): 09921-29511 (Driveshaft holder)



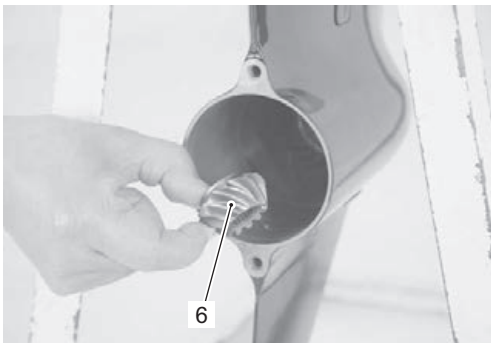
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- 8) To separate the bearing housing from the gearcase, use two 8 mm bolts "A" as screw jacks, by alternately turning each one equally. This will keep the housing level as it pushed off the gearcase.

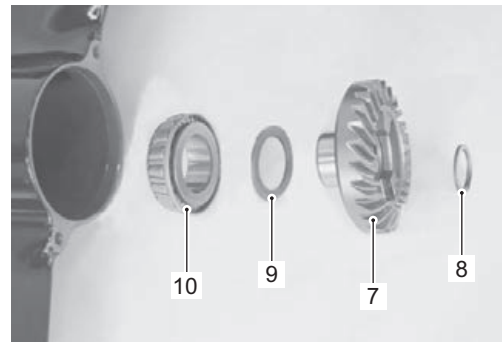


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- 9) Remove the pinion gear (6). Remove the forward gear (7) (with thrust washer (8), back-up shim (9) and bearing (10)).

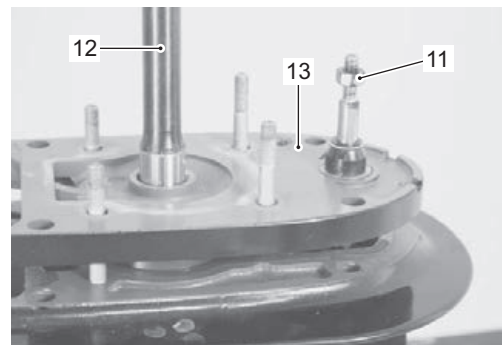


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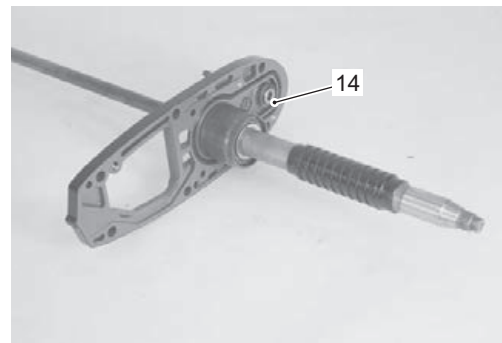


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- 10) Remove the nut (11) from shift rod. Lift out driveshaft (12), driveshaft bearing housing (13). Account for the seal (14) on the driveshaft bearing housing.

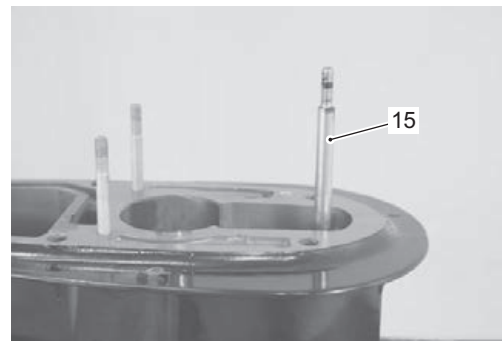


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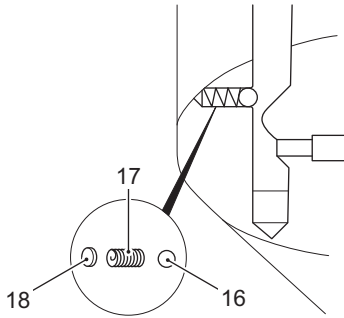
- 11) Lift out shift rod assembly (15).



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3A-10 Right Hand Rotation Unit:


- 12) Remove the detent ball (16), spring (17) and plate (18).

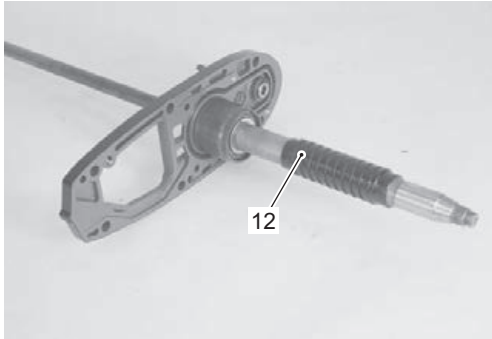


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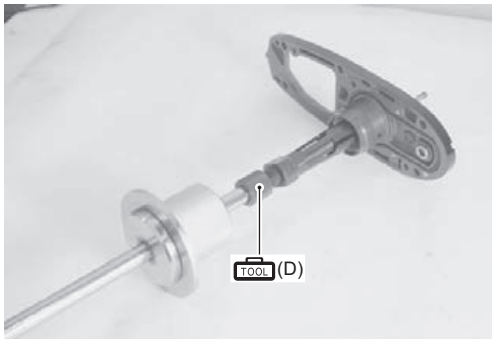
- 13) Remove driveshaft (12) from driveshaft bearing housing.
Using bearing remover, draw the bearing outer race (19) out of the driveshaft bearing housing.
Remove the shim (20).

Special tool

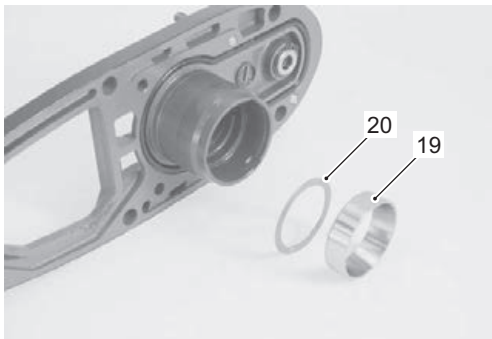
 (D): 09941-64511 (Bearing remover)



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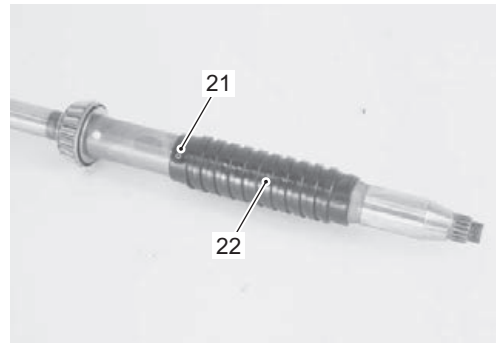


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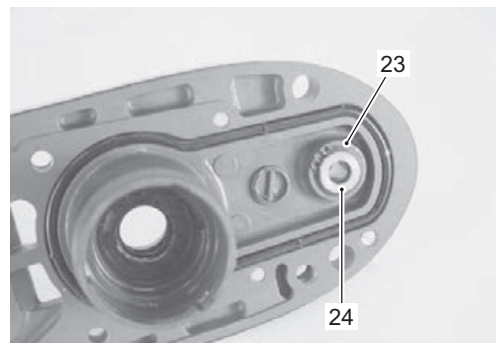
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- 14) Remove the pin (21) and driveshaft collar (22) from driveshaft (if necessary).



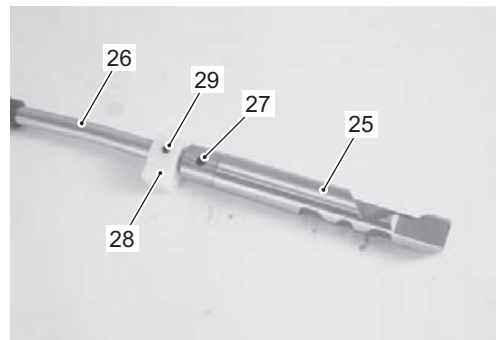
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- 15) Remove the snap ring (23) and push shift rod guide (24) out of bearing housing.



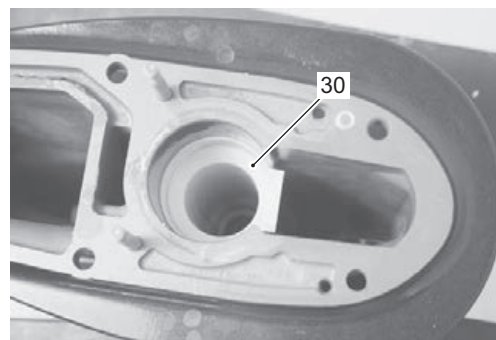
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- 16) Separate the shift cam (25) from the shift rod (26) by driving out the spring pin (27).
Remove the lower shift rod guide (28) by driving out the spring pin (29).



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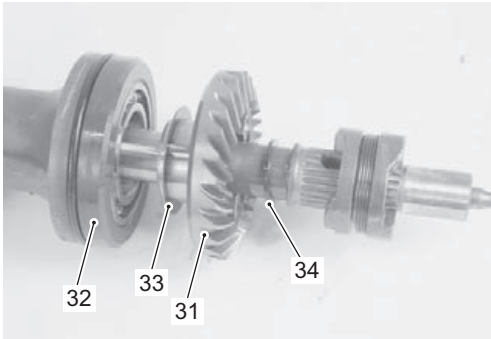
- 17) Remove the driveshaft spring housing (30) from the gear case.



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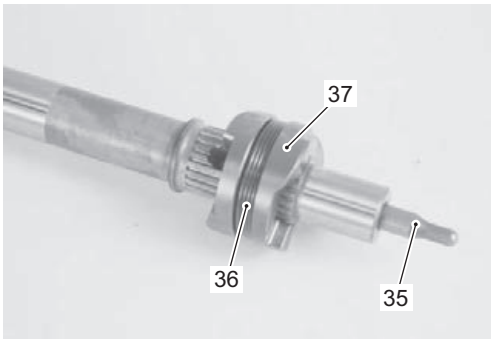
18) To disassemble propeller shaft components, refer to following.

- a) Slide propeller shaft away from reverse gear (31) and bearing housing assembly (32). Account for the reverse gear back-up shim (33) and reverse gear thrust washer (34).



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- b) Pull the push rod (35) out of the propeller shaft. Remove spring (36) from clutch dog shifter (37).

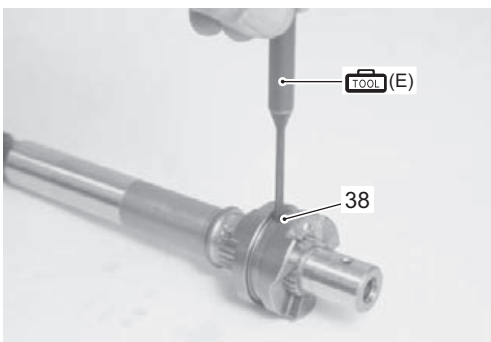


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- c) Use special tool to push the dog pin (38) out of the clutch dog shifter.

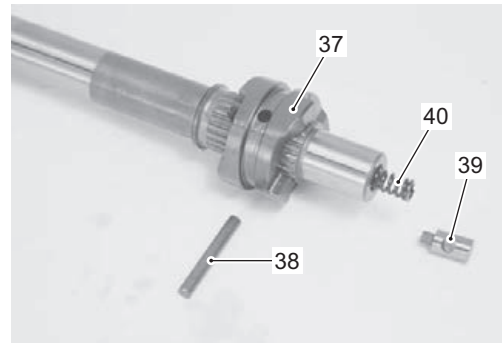
Special tool

TOOL (E): 09922-89810 (Shift lock pin remover)



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- d) Remove the clutch dog shifter (37), push pin (39), and return spring (40) from propeller shaft.



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Pinion Bearing Removal and Installation

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CAUTION

- When removing the pinion bearing, use care to avoid damaging the gearcase.
- Do not reuse pinion bearing once removed. Always use a new pinion bearing.

Removal and Installation Tools

To remove the pinion bearing from the gearcase, use the following special tools.

Special tool

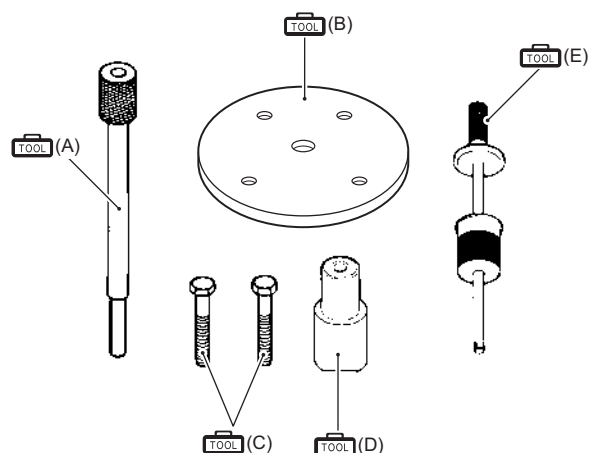
TOOL (A): 09951-59910 (Shaft (removal and installation))

TOOL (B): 09951-39914 (Plate)

TOOL (C): 01500-08403 (Bolt)

TOOL (D): 09951-19431 (Attachment)

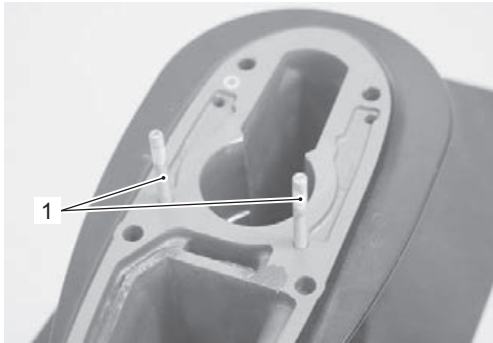
TOOL (E): 09930-30104 (Sliding hammer)



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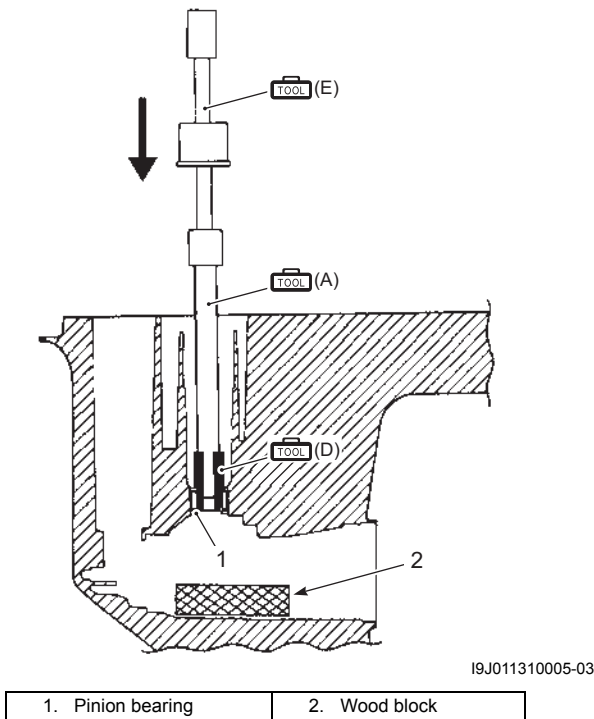
Removal

- 1) Disassemble the lower unit. Refer to "Lower Unit Disassembly" (Page 3A-8).
- 2) Remove the water pump stud bolts (1).



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- 3) Place the attachment (D) inside the pinion bearing.
- 4) Insert the removal shaft (A) into attachment (D).
- 5) Thread sliding hammer (E) into top of removal shaft (A).
- 6) Put wood block under pinion bearing.
- 7) Drive the pinion bearing out downwards by striking top of shaft (A) with sliding hammer (E).

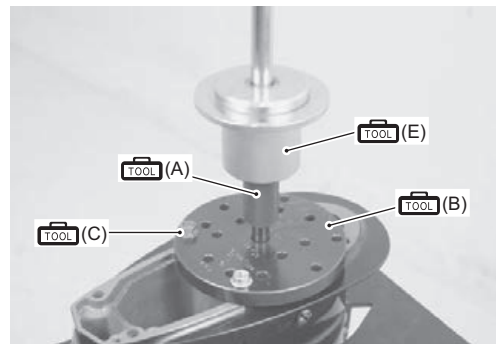


Installation

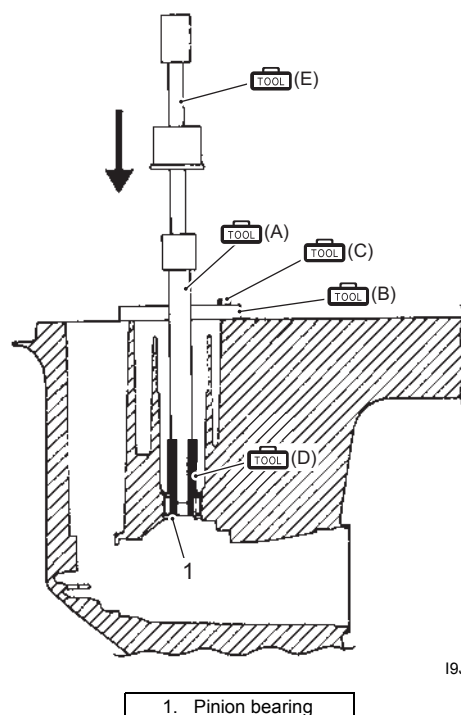
CAUTION

- Before installing bearing, ensure that inside of gearcase is clean and free of debris.
- Ensure that the bearing stamped mark faces upward.

- 1) Set the installer shaft (A), plate (B), attachment (D) and pinion bearing as shown in the figure.
- 2) Place the installer shaft (A) (with pinion bearing on end of installer shaft) into the gearcase.
- 3) Secure the plate (B) by tightening the bolt (C).
- 4) Thread the sliding hammer (E) into the top of the installer shaft (A).
- 5) Drive the pinion bearing down into position by gently striking the installer shaft (A) until the coupler touches plate.
- 6) Assemble the lower unit. Refer to "Lower Unit Assembly" (Page 3A-16).



IAJ611310044-01



Lower Unit Related Items Inspection

ZAJ6113106009

⚠ WARNING

Wear safety glasses when using compressed air.

NOTE

- If any component is worn excessively, cracked, defective or damaged in any way, it must be replaced.
- Thoroughly wash all metal components with cleaning solvent and dry with compressed air.

Gearcase

- Inspect the gearcase. Replace if cracked, damaged or other abnormal conditions are noted.
- Visually check the pinion bearing. Replace bearing if pitted, rough or other abnormal conditions are noted.

NOTE

If removal and replacement are required, refer to Pinion bearing removal and installation.



IAJ611310045-01

Gears / Bearing

- Inspect forward, reverse and pinion gear teeth and engaging dogs. Replace gears if damaged worn or other abnormal conditions are noted.
- Inspect propeller shaft forward bearing, forward gear bearing. Replace bearing if pitted, noisy, rough or other abnormal conditions are noted.



IAJ611310046-01

Propeller Shaft Components

- Inspect the push rod and push pin. Replace if worn, damaged or other abnormal conditions are noted.
- Inspect clutch dog shifter. Replace if chipped, worn, damaged or other abnormal conditions are noted.
- Inspect dog pin. Replace if bent, worn or other abnormal conditions are noted.
- Inspect propeller shaft / splines. Replace if worn, twisted, damaged or other abnormal conditions are noted.



IAJ611310047-01



IAJ611310048-01

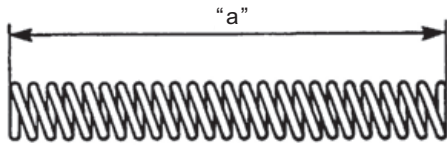
3A-14 Right Hand Rotation Unit:

- Check clutch return spring by measuring its free length. If free length is not within specifications, replace clutch return spring.

Clutch return spring free length "a"

Standard: 57 mm (2.24 in.)

Service limit: 55 mm (2.17 in.)



IAJ011310062-01

Propeller Shaft Bearing Housing

- Inspect housing. Replace if cracked, damaged or other abnormal conditions are noted.
- Inspect reverse gear bearing and propeller shaft bearing. Replace bearing if pitted, noisy, rough or other abnormal conditions are noted.
- Check condition of oil seal and O-ring. Replace oil seal and O-ring if nicked, cut, worn or other abnormal conditions are noted.



IAJ611310049-01



IAJ611310050-01

Shift Rod and Shift Cam Components

- Inspect the "stepped" surface of shift cam. Replace if worn, damaged or other abnormal conditions are noted.
- Inspect shift rod guide. Replace if cracked, damaged or other abnormal conditions are noted.
- Inspect O-ring. Replace if nicked, cut, torn, swollen or other abnormal conditions are noted.
- Inspect dust seal. Replace if nicked, cut, worn or other abnormal conditions are noted.



IAJ611310051-01

Driveshaft Bearing Housing

- Inspect housing. Replace if cracked, damaged or other abnormal conditions are noted.
- Check condition of oil seals. Replace if nicked, cut, worn or other abnormal conditions are noted.
- Inspect seal ring. Replace if worn, nicked, cut or other abnormal conditions are noted.



IAJ611310052-01

Driveshaft

- Inspect driveshaft / splines. Replace if worn, twisted, damaged or other abnormal conditions are noted.
- Inspect driveshaft bearing, replace if pitted, noisy, rough or other abnormal conditions are noted.



IAJ611310053-01



IAJ611310054-01

Propeller Shaft Oil Seal Replacement

ZAJ6113106010

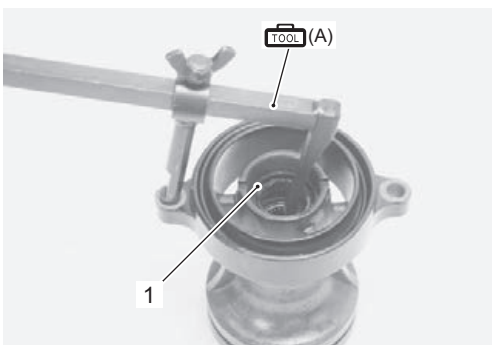
- 1) Remove the propeller shaft bearing housing. Refer to "Lower Unit Disassembly" (Page 3A-8).
- 2) Extract seals (1) with oil seal remover.

CAUTION

Do not reuse oil seal once removed.
Always use new oil seal.

Special tool

TOOL (A): 09913-50121 (Oil seal remover)

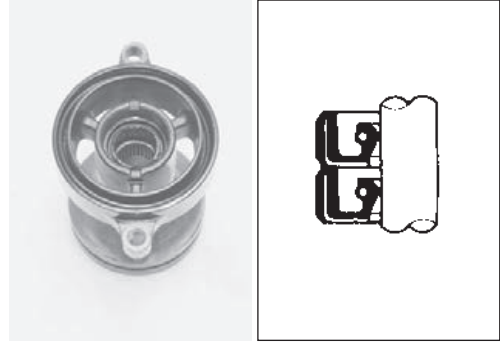


IAJ611310097-01

- 3) Apply water resistant grease to the inner circumference of the housing.

TOOL (A): Grease 99000-25161 (SUZUKI Water Resistant Grease (250 g))

- 4) Using an oil seal installer, drive the two oil seals (one at a time) into the propeller shaft bearing housing. The lipped portion of the seal must face towards the propeller. Apply water resistant grease to the seal lips.



IAJ611310056-01

- 5) Assemble the propeller shaft bearing housing. Refer to "Lower Unit Assembly" (Page 3A-16).

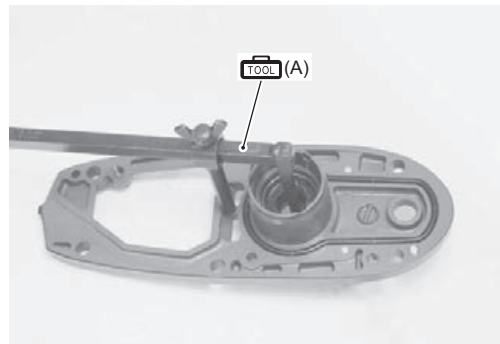
Driveshaft Oil Seal Replacement

ZAJ6113106011

- 1) Remove the driveshaft bearing housing. Refer to "Lower Unit Disassembly" (Page 3A-8).
- 2) Using special tool, remove two oil seals out of the driveshaft bearing housing.

Special tool

TOOL (A): 09913-50121 (Oil seal remover)



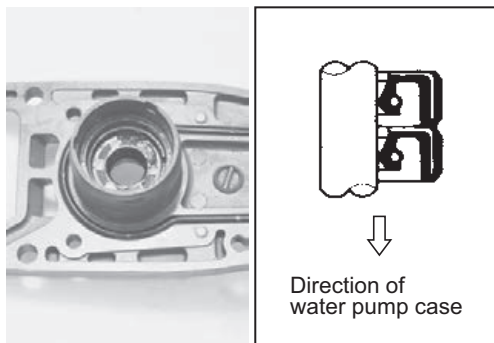
IAJ611310057-01

- 3) Apply water resistant grease to inner circumference of driveshaft bearing housing.

TOOL (A): Grease 99000-25161 (SUZUKI Water Resistant Grease (250 g))

3A-16 Right Hand Rotation Unit:

- 4) Grease the inner lips of oil seal.
With the lips facing away from driveshaft bearing, place seal in position and drive it into the bearing housing.



IAJ611310058-01

- 5) Assemble the driveshaft bearing housing. Refer to "Lower Unit Assembly" (Page 3A-16).

Lower Unit Assembly

ZAJ6113106012

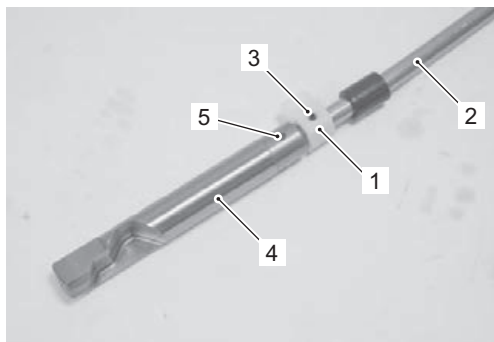
Assembly is in reverse order of disassembly with special attention to the following steps.

CAUTION

- Make sure that all parts used in assembly are clean and lubricated.
- It is recommended that all seals, gaskets and O-rings be replaced with new on assembly.
- After assembly, check 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. Refer to "Lower Unit Gears - Shimming and Adjustment" (Page 3A-22).

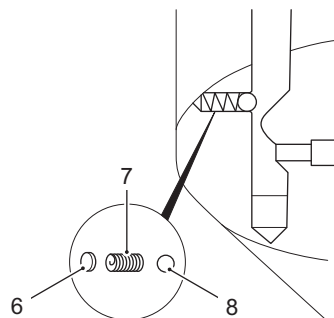
Shift Cam and Shift Rod

- Attach lower shift rod guide (1) to shift rod (2), then secure it with the pin (3).
- Attach shift cam (4) to shift rod, then insert pin (5).



IAJ611310059-01

- Insert the plate (6), spring (7) and detent ball (8) into gearcase.

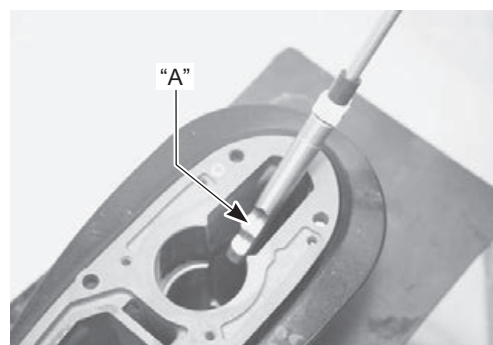


IAJ611310060-01

- Install the shift rod/cam assembly to gearcase.

NOTE

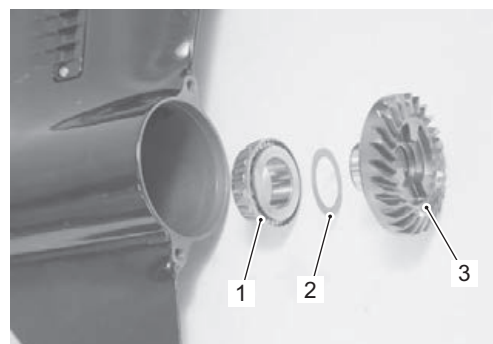
Be sure the stepped section "A" of shift cam faces towards propeller shaft. Also be sure the rear side of the shift cam (with detent notch) is positioned over the detent ball (8) in the gearcase.



IAJ611310061-01

Forward Gear

- Place the forward gear bearing (1) and back-up shim (2) in position, then install forward gear (3).



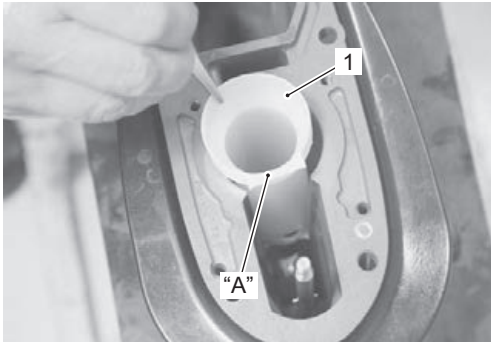
IAJ611310062-01

Driveshaft Spring Housing

- Install the driveshaft spring housing (1).

NOTE

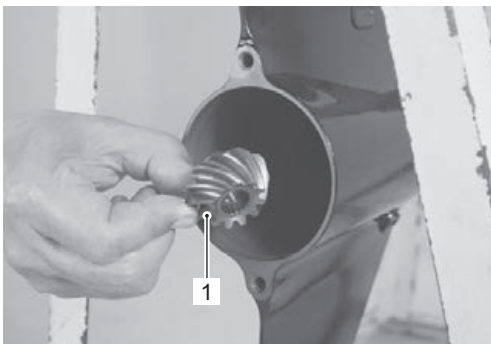
The tongue "A" of housing must be located into groove on the gearcase.



IAJ611310063-01

Pinion Gear

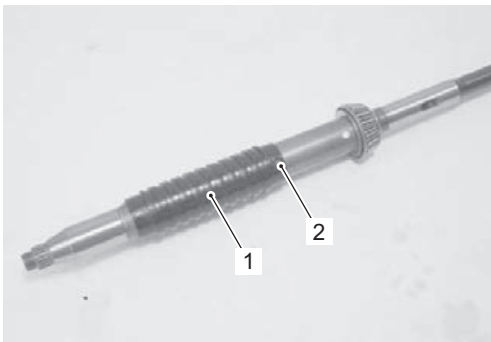
Place pinion gear (1) in gearcase.



IAJ611310064-01

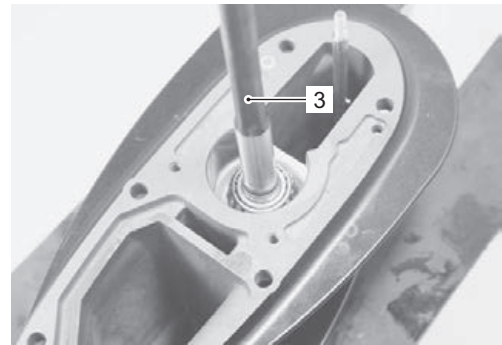
Driveshaft

- Assemble the driveshaft collar (1) to driveshaft.
- Install the pin (2).



IAJ611310065-01

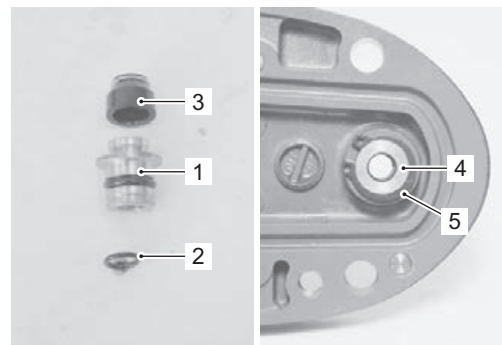
- Lower the driveshaft assembly (3) down into the gearcase until the bottom of shaft protrudes through center of pinion.



IAJ611310066-01


Driveshaft Bearing Housing / Shift Rod Guide

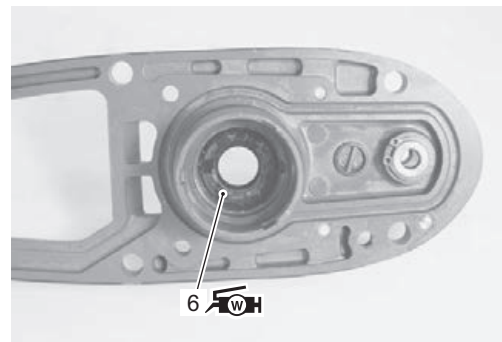
- Apply water resistant grease to the shift rod guide O-ring (1), (2) and the inside of the dust seal (3).
- Slide complete dust seal (3) and shift rod guide (4) into the driveshaft bearing housing, then secure it with the snap ring (5).



IAJ611310067-01

- Apply water resistant grease to the driveshaft oil seal (6).

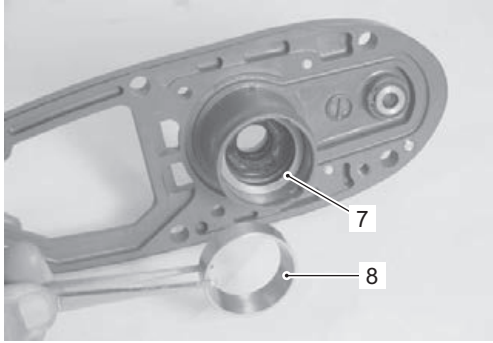
 : Grease 99000-25161 (SUZUKI Water Resistant Grease (250 g))



IAJ611310069-01


3A-18 Right Hand Rotation Unit:

- Install the pinion shim (7) and bearing outer race (8).

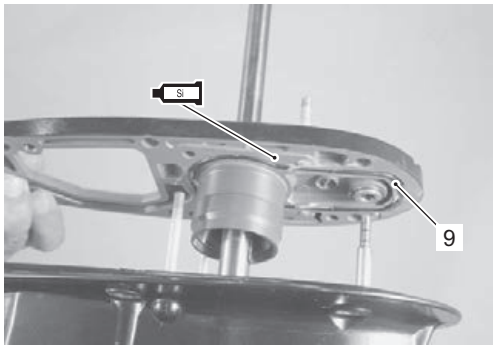


IAJ611310070-01

- Install the gearcase seal ring (9) into the groove on the driveshaft bearing housing. Apply suzuki silicone seal to gearcase and driveshaft bearing housing surfaces.

 : Sealant 99000-31120 (SUZUKI Silicone Seal (50 g))


- Install complete housing and shift rod guide assembly on gearcase.



IAJ611310071-01

Pinion Nut

- Apply thread lock 1342 to the threads of pinion nut (1) before threading it onto driveshaft.


 : Thread lock cement 99000-32050 (SUZUKI Thread Lock 1342 (50 g))

- Tighten pinion nut to specified torque.

NOTE

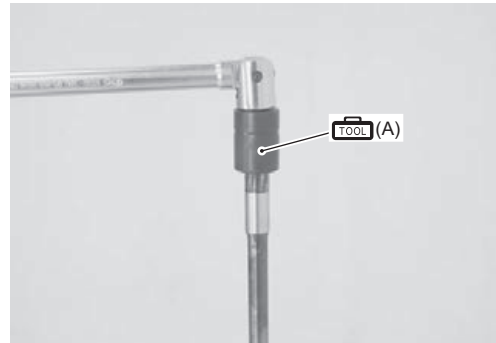
It is recommended the original pinion nut be used for the purposes of shimming during repair. A new pinion nut should be used on final assembly.

Special tool

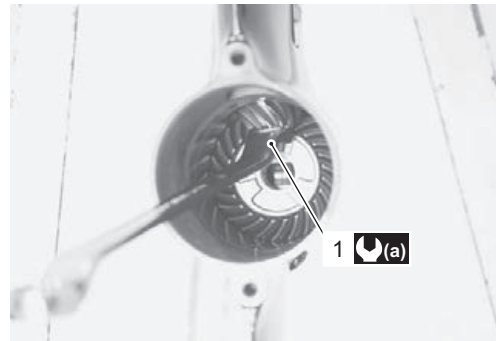
 (A): 09921-29511 (Driveshaft holder)

Tightening torque

Pinion nut (a): 45 N·m (4.5 kgf-m, 32.5 lbf-ft)



IAJ611310072-01




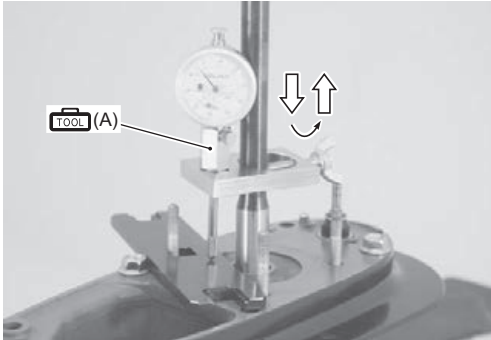
IAJ611310073-01

Checking Driveshaft Thrust Play

Before installing reverse gear, driveshaft thrust play should be checked. Refer to "Lower Unit Gears - Shimming and Adjustment" (Page 3A-22).

Special tool

 (A): 09951-09530 (Gear adjusting gauge)



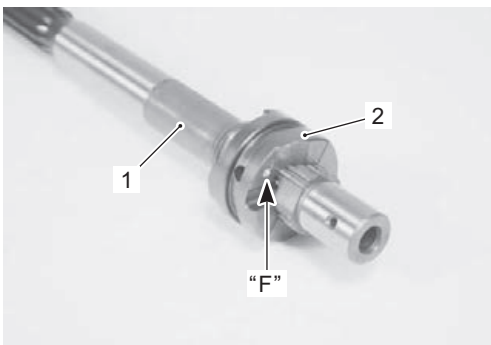
IAJ611310074-02

Propeller Shaft

- Slide the clutch dog shifter (2) onto the propeller shaft (1).

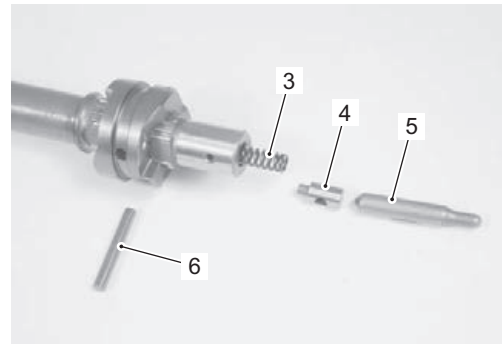
NOTE

The side of the clutch dog shifter marked with the letter "F" must face towards Forward gear.



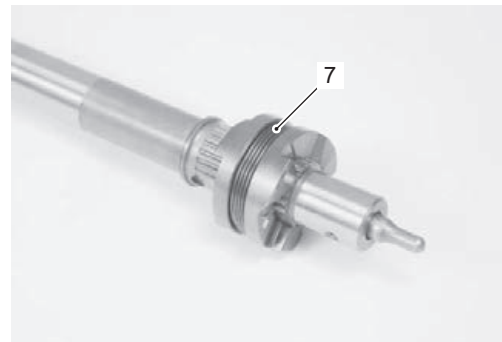
IAJ611310075-01

- Insert the return spring (3), push pin (4) and push rod (5) into propeller shaft. Align the holes in the shifter dog and push pin. Depress the push rod and slide the dog pin (6) through both dog and push pin.



IAJ611310076-01


- Install the dog pin retaining spring (7), ensuring that it fits snugly into the groove on the dog shifter.




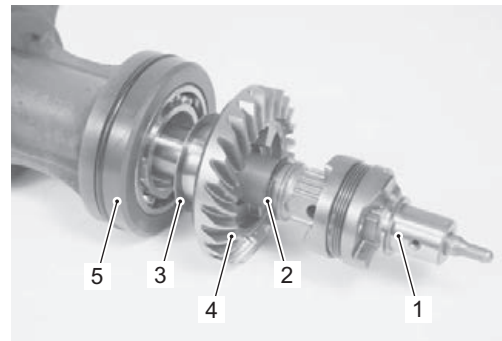
IAJ611310077-01

Propeller Shaft / Bearing Housing

- Place the forward thrust washer (1) and reverse thrust washer (2) on the propeller shaft.
- Install back-up shim (3) and reverse gear (4) to propeller shaft bearing housing (5).
- Slide propeller shaft into reverse gear and propeller shaft bearing housing.

 : Grease 99000-25161 (SUZUKI Water Resistant Grease (250 g))

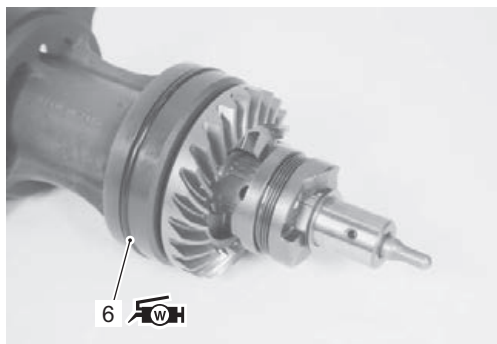
 : Gear Oil 99000-22540 (SUZUKI Outboard Motor Gear Oil)



IAJ611310078-02

3A-20 Right Hand Rotation Unit:

- Apply water resistant grease to the bearing housing O-ring (6).



IAJ611310079-01

NOTE

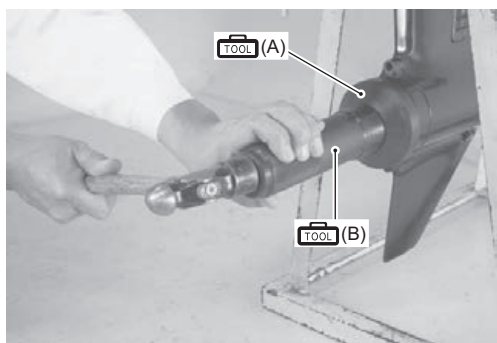
Before installing the propeller shaft / bearing housing assembly, bring shift cam to the forward position by moving shift rod up or down.

- Using special tools, install the propeller shaft and housing assembly in the gearcase.

Special tool

TOOL (A): 09922-59410 (Propeller shaft housing installer)

TOOL (B): 09922-59420 (Housing installer handle)

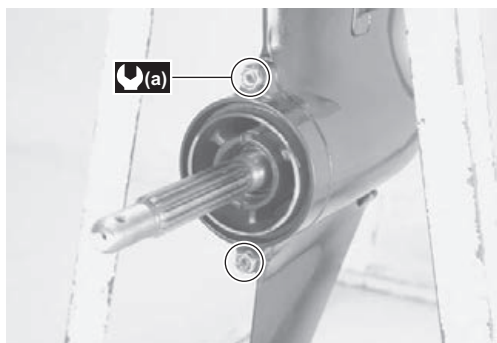


IAJ611310080-01

- When the housing is fully seated, tighten both retaining bolts to the specified torque.

Tightening torque

Bearing housing bolt (a): 23 N·m (2.3 kgf-m, 16.6 lbf-ft)



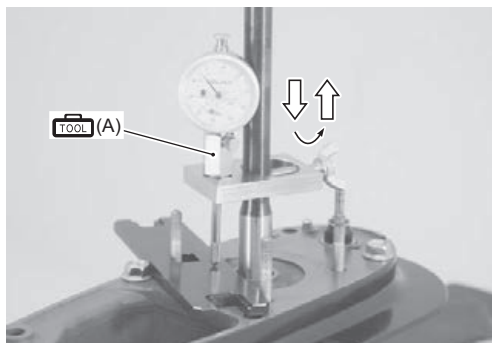
IAJ611310081-01

Rechecking Driveshaft Thrust Play

Recheck the driveshaft thrust play. This should not be less than previously checked. If less, reduce the number / thickness of the reverse gear back-up shims. Refer to "Lower Unit Gears - Shimming and Adjustment" (Page 3A-22).

Special tool

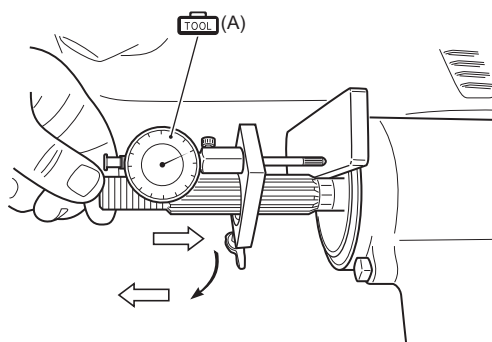
TOOL (A): 09951-09530 (Gear adjusting gauge)



IAJ611310082-02

Checking Propeller Shaft Thrust Play

Check propeller shaft thrust play. Refer to "Lower Unit Gears - Shimming and Adjustment" (Page 3A-22).

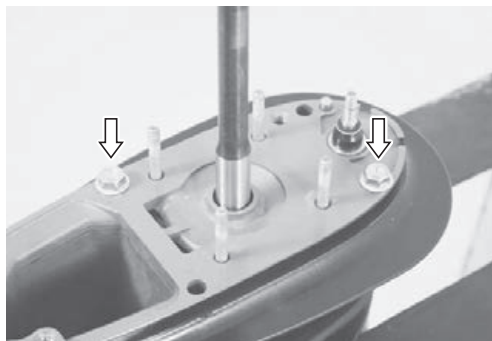


IAJ611310083-01

Leakage Check

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

- 1) Temporarily fasten the driveshaft bearing housing to gearcase using two bolts and nuts (placed through the two diagonally opposite gearcase mounting holes).



IAJ611310084-01

- 2) Install the test tool into the oil level hole.
- 3) Connect the air pump to the tester.
- 4) Rotate driveshaft and propeller shaft clockwise several times and then apply specified pressure for the test.

CAUTION

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

NOTE

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

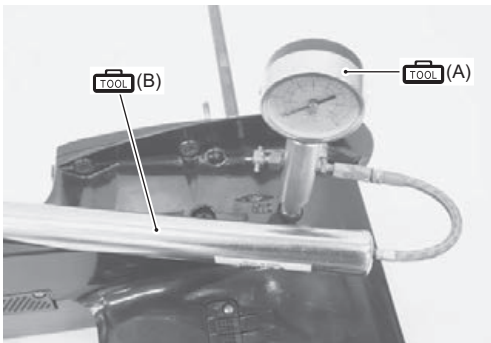
Special tool

TOOL (A): 09950–69512 (Gearcase oil leakage tester)

TOOL (B): 09952–99310 (Hand air pump)

Leakage pressure test

100 kPa (1.0 kg/cm², 14.2 psi.)



IAJ611310085-01

- 5) Once stabilized, pressure should remain steady for at least 5 min.
If pressure does not fall, sealing performance is correct.

Water Pump

Install the water pump and related parts.

Refer to “Lower Unit Removal and Installation” (Page 3A-5) and “Water Pump Removal and Installation” (Page 3A-6).

Propeller

Install the propeller.

Refer to “Propeller Removal and Installation” (Page 3A-4).

Lower Unit

Install the Lower Unit.

Refer to “Lower Unit Removal and Installation” (Page 3A-5).

Gear Oil

Fill the gearcase with specified gear oil. Refer to “Gear Oil Change” in Section 0B (Page 0B-6).

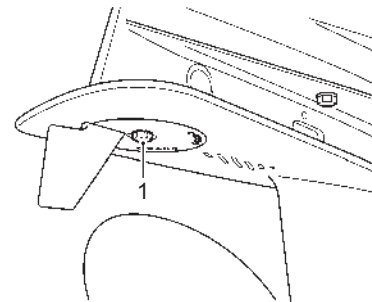
Trim Tab Adjustment

ZAJ6113106013

The trim tab counteracts or minimizes propeller torque pull felt through the steering system.

If the steering is pulled to the starboard or port side, adjust the trim tab with the following procedure.

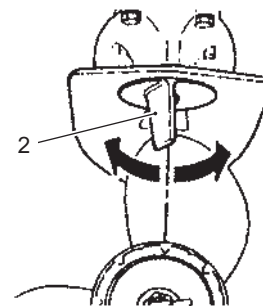
- 1) Loosen the trim tab bolt (1).



I9J011310009-03

- 2) Changing the trim tab setting.

- To compensate for a veer to starboard, set the trailing edge of tab (2) to the right (as viewed from behind).
- To compensate for a veer to port, set the trailing edge of tab to the left.



I9J011310010-03

- 3) Tighten the bolt of trim tab.

- 4) Test drive the boat and repeat the procedure 1 – 3 to set the trim tab in the best position.

With a properly adjusted trim tab, steering should be neutral and there should be no tendency for the steering to be pulled to either port or starboard.

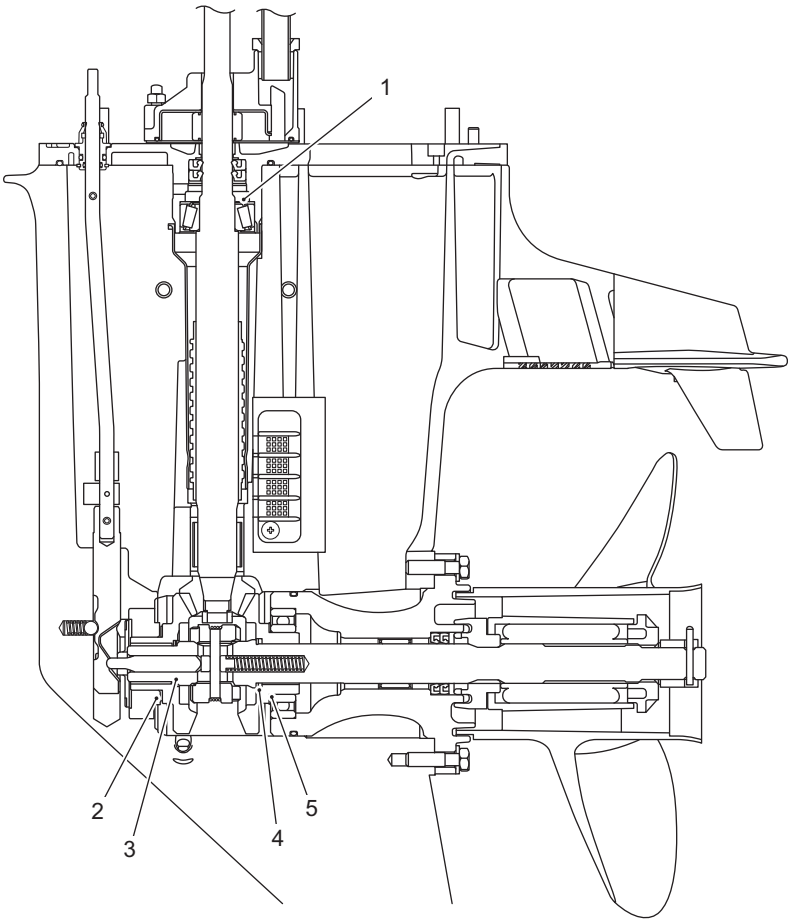
Lower Unit Gears - Shimming and Adjustment

ZAJ6113106014

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

Shim / Washer and Mounting Position

Item	Available thickness (mm)	Design specification thickness (mm)
Pinion gear back up shim	0.50, 0.55, 0.60, 0.65, 0.70, 0.75, 0.80, 0.85, 0.90, 0.95, 1.00	1.0
Forward gear back up shim	0.50, 0.60, 0.70, 0.80, 0.90	1.3
Forward gear thrust washer	2.0	2.0
Propeller shaft reverse thrust washer	1.80, 1.90, 2.00, 2.10, 2.20, 2.30	2.0
Reverse gear back up shim	0.50, 0.60, 0.70, 0.80, 0.90, 1.00	1.0



IAJ611310086-01

1. Pinion gear back up shim	3. Forward gear thrust washer	5. Reverse gear back up shim
2. Forward gear back up shim	4. Propeller shaft reverse thrust washer	

Forward Gear / Pinion Gear Back-Up Shim Adjustment

Follow the procedure below to adjust forward gear / pinion gear.

Prior to adjustment

- 1) Install standard pinion gear back-up shim thickness according to \pm design specification mark on the gear.



I9J011310012-01

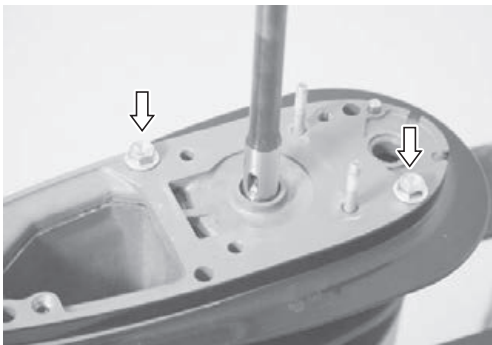
“A”: \pm design spec. mark

- 2) Correctly assemble driveshaft bearing housing, driveshaft, forward gear, pinion gear and related components. Refer to “Lower Unit Assembly” (Page 3A-16).
Do not install reverse gear at this time.
- 3) Tighten pinion nut to specified torque.

Tightening torque

Pinion nut: 45 N·m (4.5 kgf-m, 32.5 lbf-ft)

- 4) Temporarily fasten the driveshaft bearing housing to the gearcase with two bolts and nuts.



IAJ611310088-01

Checking driveshaft thrust play

- 1) Affix the gear adjusting gauge to driveshaft.

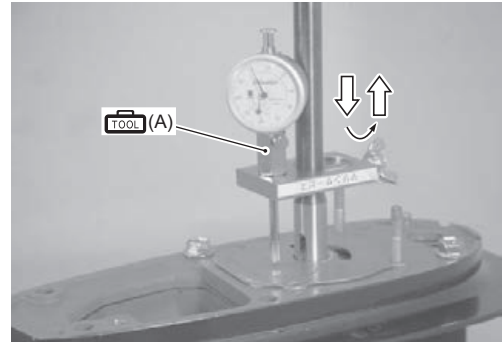
Special tool

TOOL (A): 09951-09530 (Gear adjusting gauge)

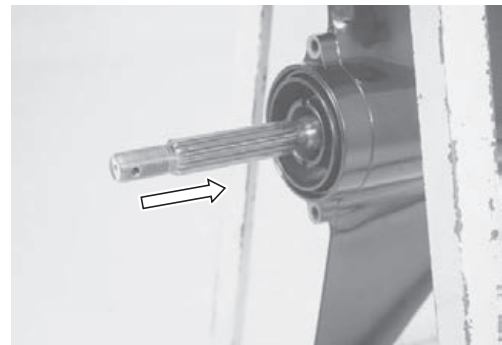
- 2) To check driveshaft thrust play, push the forward gear inward and hold it in this position. Slowly push the driveshaft downward completely, then slowly pull the driveshaft up and read the maximum thrust play.

Driveshaft thrust play

0.4 – 0.6 mm (0.016 – 0.023 in.)



IAJ611310089-03



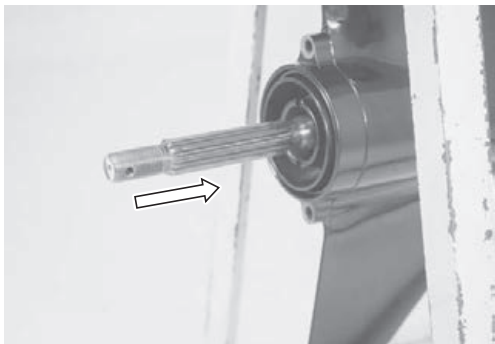
IAJ611310090-01

- If thrust play is larger than specified, the forward gear back-up shim thickness must be increased.
- If thrust play is smaller than specified, the forward gear back-up shim thickness must be decreased.

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

Check tooth contact pattern using the following procedure.


- 1) To assess tooth contact, apply a light coat of prussian blue on the convex surface of the forward gear.
- 2) Install the propeller shaft and housing assembly (minus reverse gear and internal components).
- 3) Push the propeller shaft inward and hold it in position.

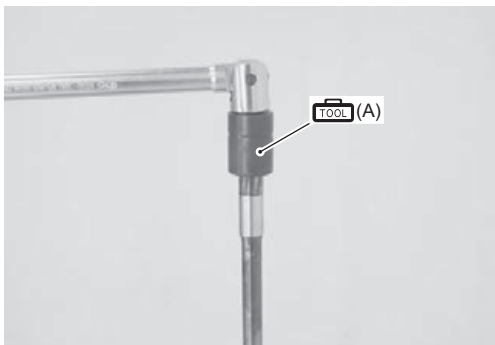


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- 4) Using the driveshaft holder tool, rotate the driveshaft 5 – 6 times.

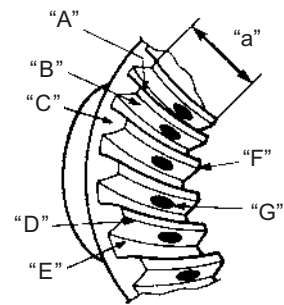
Special tool

 (A): 09921–29511 (Driveshaft holder)



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- 5) Carefully remove the propeller shaft and housing to check the tooth contact pattern.



I9J011310013-02

"A": Concave side	"E": Tooth bottom
"B": Convex side	"F": Toe
"C": Heel	"G": Tooth contact pattern
"D": Tooth top	"a": Tooth width

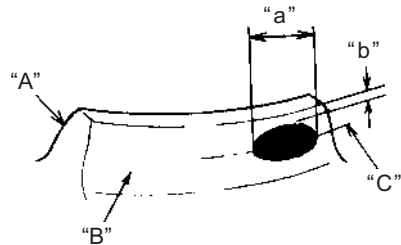
Optimum tooth contact

The optimum tooth contact is shown in the figure. A shim adjustment may be necessary to obtain this contact pattern.

CAUTION

The driveshaft thrust play should be checked when increasing or decreasing shim thickness to adjust tooth contact.

Optimum tooth contact



I9J011310014-02

"A": Heel	"a": Approx. 1/3 of tooth width
"B": Convex side	"b": Approx. 1 mm
"C": Toe	

Example [A]

Incorrect topside toe contact.

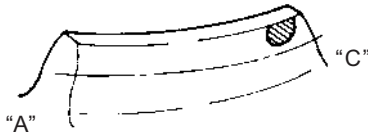
Correction measures.

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

CAUTION

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

Example of incorrect



19J011310015-01

Example [B]

Incorrect bottom side toe contact.

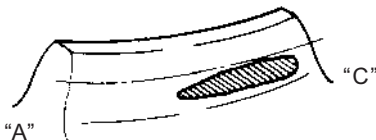
Correction measures.

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

CAUTION

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

Example of incorrect



19J011310016-01

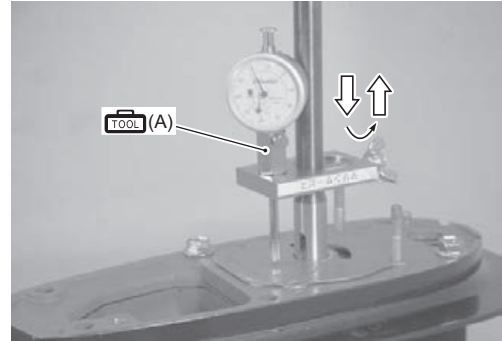
Rechecking driveshaft thrust play

After obtaining optimum tooth contact, driveshaft thrust play should be measured.

- 1) Affix the gear adjusting gauge to the driveshaft.

Special tool

TOOL (A): 09951-09530 (Gear adjusting gauge)



IAJ611310089-03

- 2) To check driveshaft thrust play, push the forward gear inward and hold it in this position. Push the driveshaft down completely, then slowly pull the driveshaft up and read the maximum thrust play. Designate this amount of play as "A".

NOTE

Driveshaft thrust play "A" must be known to adjust reverse gear shim.

Driveshaft thrust play



0.4 – 0.6 mm (0.016 – 0.023 in.)

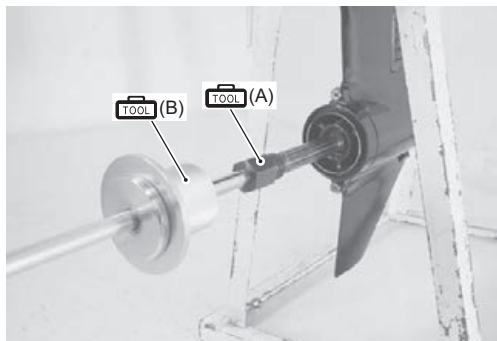
Reverse Gear Back-Up Shim Adjustment

After adjusting the forward gear tooth contact pattern, follow the procedure below to adjust the reverse gear.

- 1) Correctly assemble and install reverse gear, propeller shaft, propeller shaft bearing housing and related components.
- 2) Screw a slide hammer assembly onto the propeller shaft and strike it a few gentle outward taps.

Special tool


-  (A): 09930-30161 (Propeller shaft remover)
 (B): 09930-30104 (Sliding hammer)



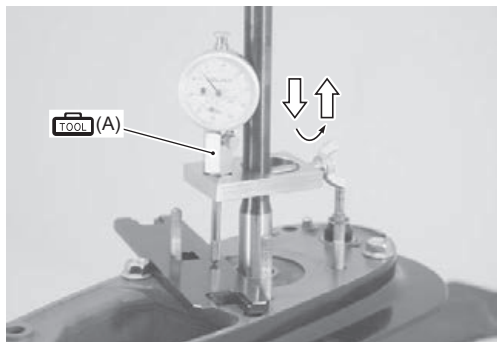
IAJ611310092-01

- 3) Affix the gear adjusting gauge to driveshaft.

Special tool

-  (C): 09951-09530 (Gear adjusting gauge)

- 4) Slowly push the driveshaft downward completely, then slowly pull the driveshaft up and read the maximum thrust play. Designate this measurement as play "B".



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- 5) Compare play "B" to play "A".

Refer to "Rechecking driveshaft thrust play" (Page 3A-25).

- 6) Reverse gear back-up shim adjustment is correct if "B" is equal to "A".
If "B" is less than "A", reduce reverse gear back-up shim thickness.

Checking propeller shaft thrust play

After adjusting all gear positions, measure the propeller shaft thrust play. If not within the following specification, a shim adjustment is required.

NOTE


Maintain the forward gear thrust washer at standard thickness (2.0 mm) and use only the reverse gear thrust washer to adjust thrust play.

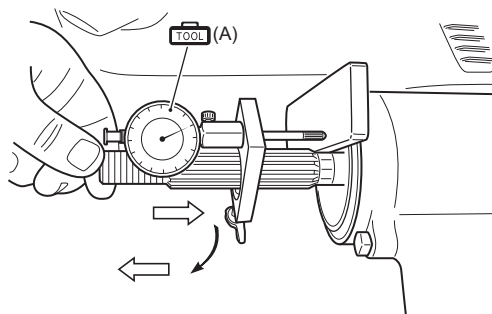
Propeller shaft thrust play

Approx. 0.2 – 0.4 mm (0.01 – 0.02 in.)

- 1) Assemble the gear adjusting gauge to the propeller shaft.

Special tool

-  (A): 09951-09530 (Gear adjusting gauge)



IAJ611310094-01

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