

F9.9
T9.9

SERVICE MANUAL



LIT-18616-03-03

6AU-28197-1K-11

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Identification

Model

This manual covers the following models.

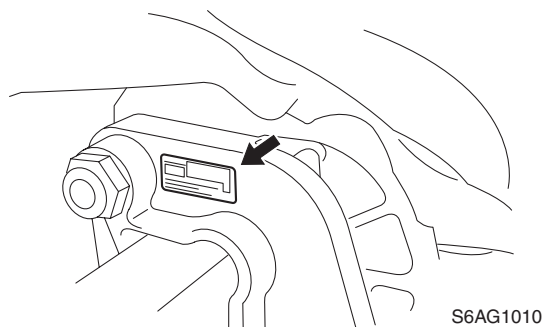
Applicable model
F9.9FMH, T9.9GEH, T9.9GPH, T9.9GPR

Model name	Approved model code	Starting serial No.
F9.9F	6AU	1000001-
T9.9G	6AV	1000001-

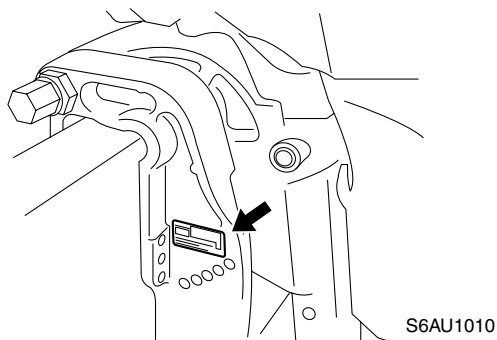
Serial number

The outboard motor serial number is stamped on a label attached to the port clamp bracket.

A

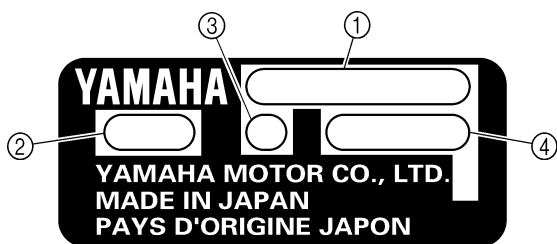


B



A MT model

B PT model



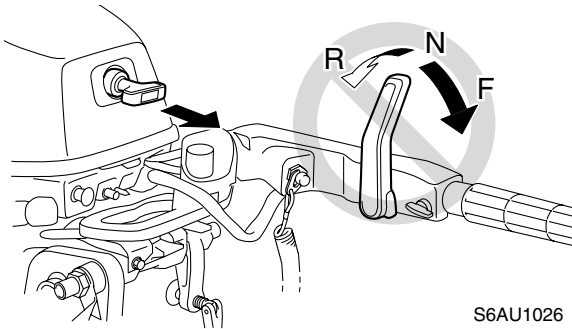
S6AL1D00

- ① Model name
- ② Approved model code
- ③ Transom height
- ④ Serial number

NOTE: _____

- The shift lever cannot be operated unless the throttle grip is in the fully closed position. (H model)
- The resistance of the throttle grip (H model) or remote control lever (R model) can be adjusted using the throttle friction adjuster ①.

3. Set the shift lever to the F position or R position, and then check that the starter handle cannot be pulled. If the starter rope can be pulled out normally, adjust the start-in-gear protection cable. (M model)

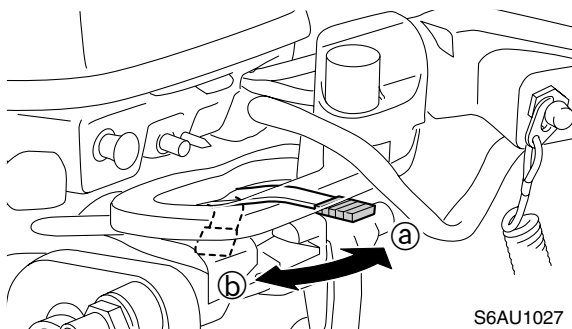


NOTE: _____

To adjust the start-in-gear protection cable, see “Checking the start-in-gear protection (M model)” (3-11).

Checking the steering system

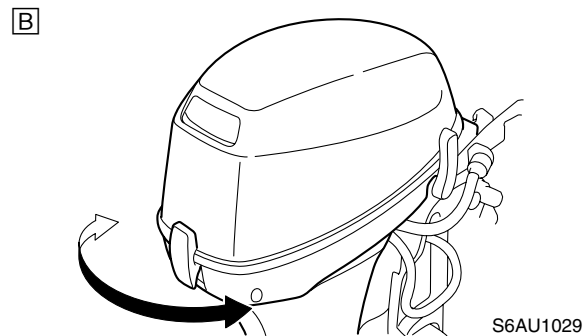
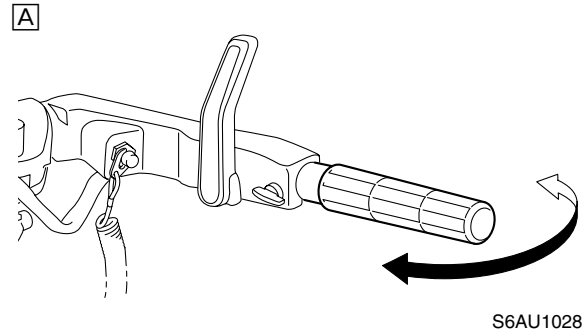
1. Check the steering friction for proper adjustment. (H model)



NOTE: _____

- To increase the friction, move the steering lock lever in direction ①.
- To decrease the friction, move the steering lock lever in direction ②.

2. Check that the steering operates smoothly.

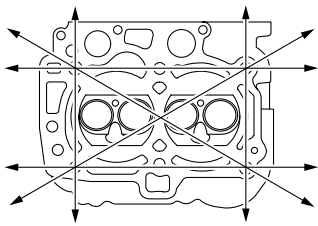
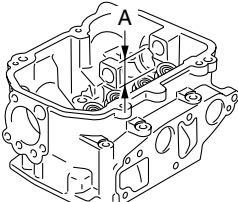
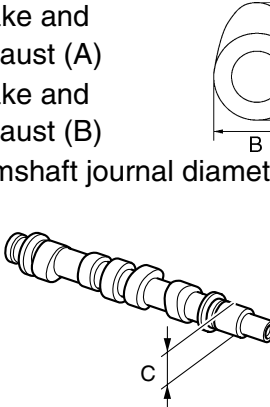


- A H model
- B R model

3. Check that there is no interference with leads, cables, or hoses when the out-board motor is steered.

Maintenance specification

Power unit

Item	Unit	Model			
		F9.9FMH	T9.9GEH	T9.9GPH	T9.9GPR
Power unit Minimum compression pressure ^(*)	kPa (kgf/cm ² , psi)	630 (6.3, 91.4)	700 (7.0, 101.5)		
Cylinder head Warpage limit  (lines indicate straightedge position) Cylinder head journal inside diameter (A) 	mm (in)	0.10 (0.0039)			
Camshaft Intake and exhaust (A) Intake and exhaust (B) Camshaft journal diameter (C)  Camshaft runout limit	mm (in)	23.45–23.55 (0.9232–0.9272)	19.95–20.05 (0.7854–0.7894)		
	mm (in)	17.975–17.991 (0.7077–0.7083)			
	mm (in)	0.03 (0.0012)			
Rocker arm shaft Outside diameter	mm (in)	12.941–12.951 (0.5095–0.5099)			
Rocker arm Inside diameter	mm (in)	13.000–13.018 (0.5118–0.5125)			

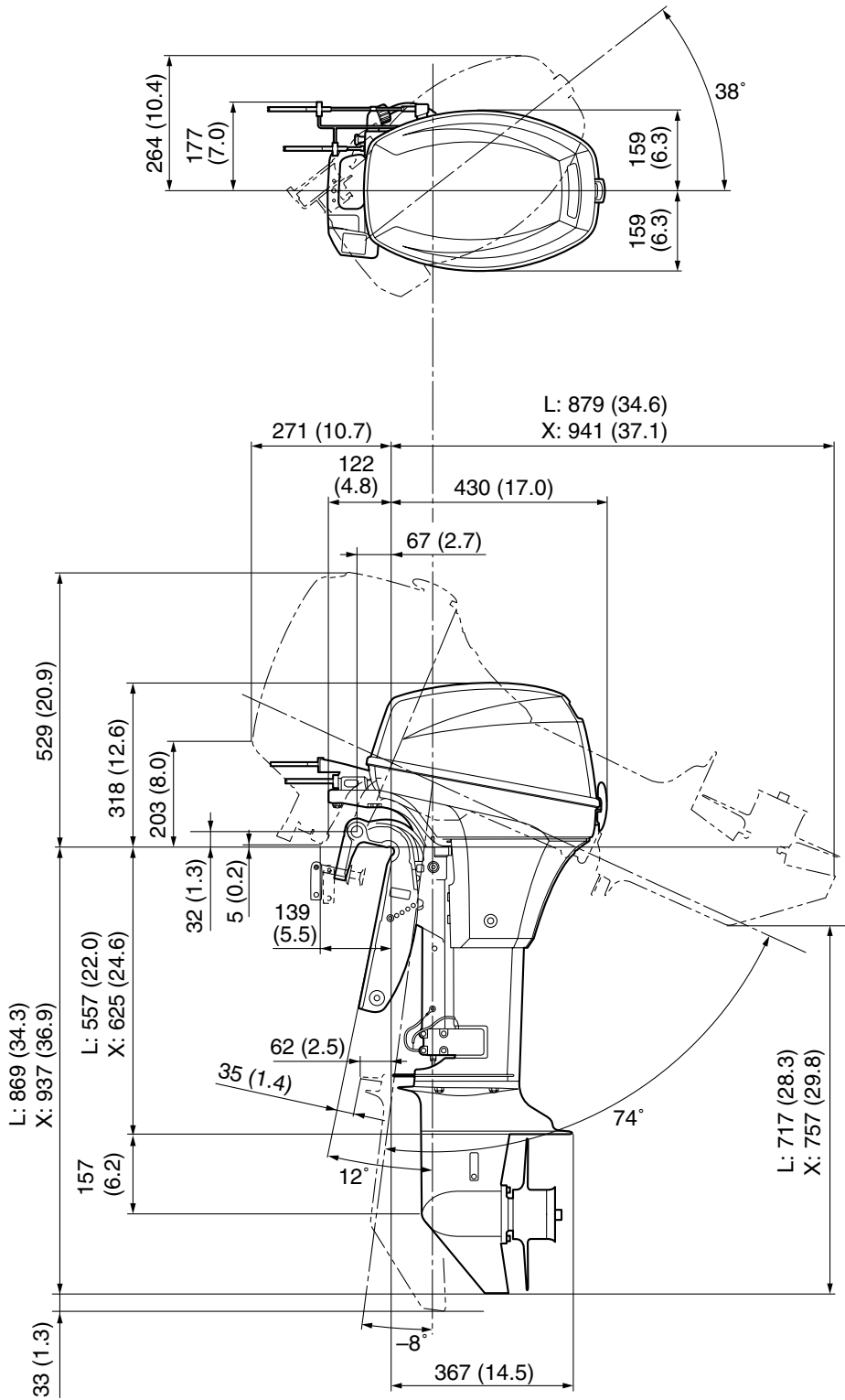
^(*) Measuring conditions:

Ambient temperature 20 °C (68 °F), wide open throttle, with spark plugs removed from all cylinders.

The figures are for reference only.

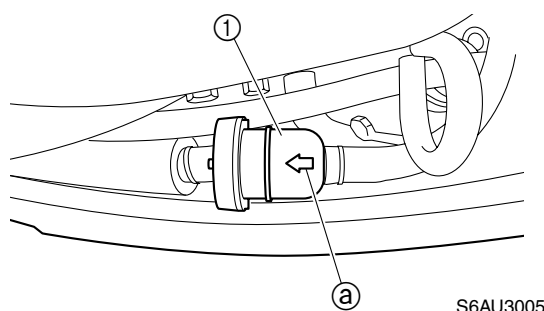
Exterior T9.9GPR

mim (in)



2

S6AU2010



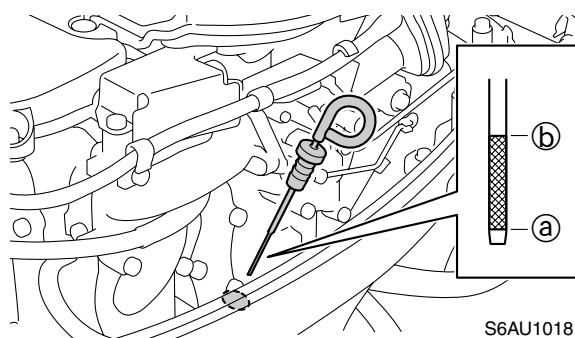
S6AU3005

CAUTION:

When replacing the fuel filter ①, the arrow mark ② must face toward the fuel pump.

NOTE:

Be sure not to spill any fuel when removing the fuel filter ①.



S6AU1018

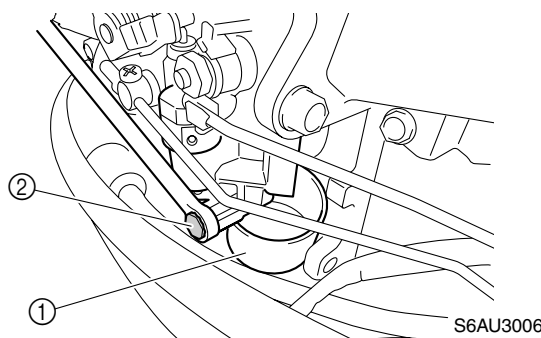
NOTE:

- If the oil appears milky or dirty, check for and repair the cause, and then change the oil.
- If the engine oil is below the minimum level mark ②, add sufficient oil until the level is between ② and ③.

3

Draining the fuel

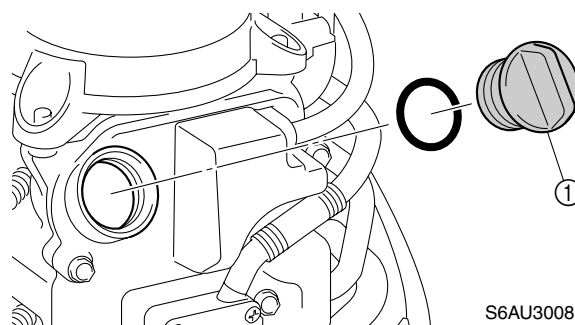
1. Place a container ① or rag under the carburetor fuel drain hole, and then remove the fuel drain screw ② and let the fuel drain completely.



S6AU3006

Changing the engine oil

1. Start the engine, warm it up, and then turn it off.
2. Remove the oil dipstick and oil filler cap ①.



S6AU3008


Power unit

Checking the engine oil


1. Place the outboard motor in an upright position.
2. Remove the oil dipstick, wipe it clean, and then insert it back into the oil dipstick hole.
3. Remove the oil dipstick again to check the oil level and to check the oil for discoloration and its viscosity.

NOTE:
If the fluid is at the correct level, a small amount of fluid should overflow out of the filler hole when the cap is removed.

3. If necessary, add sufficient fluid of the recommended type until it overflows out of the filler hole.

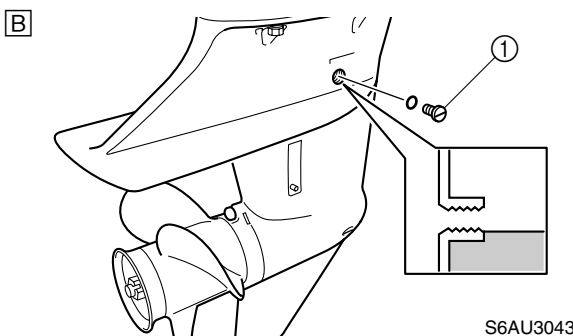
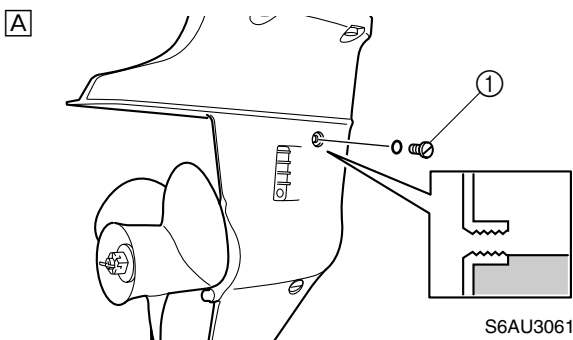
	Recommended PT fluid: ATF Dexron II
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4. Install a new O-ring and the reservoir cap ①, and then tighten the cap to the specified torque.

	Reservoir cap ①: 5 N·m (0.5 kgf·m, 3.7 ft·lb)
---	--

Lower unit Checking the gear oil

1. Fully tilt the outboard motor down.
2. Remove the gear oil check screw ①, and then check the gear oil level in the lower case. Also, check the oil for discoloration and its viscosity.




- A** Except for high thrust model
B For high thrust model


NOTE:

- If the oil is at the correct level, a small amount of oil should overflow out of the check hole when the gear oil check screw ① is removed.
- If the oil appears milky or dirty, check for and repair the cause, and then change the oil.

3. If necessary, add sufficient gear oil of the recommended type until it overflows out of the check hole.

	Recommended gear oil: Hypoid gear oil API: GL-4 SAE: 90
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4. Install a new gasket and the gear oil check screw ①, and then tighten the gear oil check screw to the specified torque.

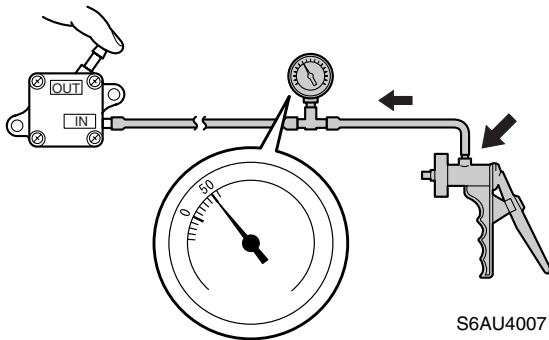
	Gear oil check screw ①: 9 N·m (0.9 kgf·m, 6.6 ft·lb)
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Changing the gear oil


1. Fully tilt the outboard motor down.


Checking the fuel pump

1. Connect the special service tool to the fuel pump inlet.
2. Cover the fuel pump outlet with your finger, and then apply the specified positive pressure. Check that there is no air leakage.

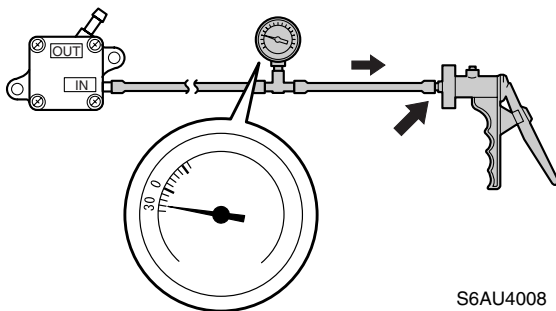


S6AU4007


 Pressure/vacuum tester:
YB-35956-A

 Specified positive pressure:
50 kPa (0.5 kgf/cm², 7.3 psi)

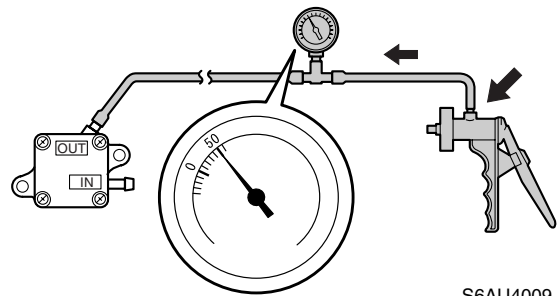
3. Apply the specified negative pressure and check that there is no air leakage.




S6AU4008

 Specified negative pressure:
30 kPa (0.3 kgf/cm², 4.4 psi)

4. Connect the special service tool to the fuel pump outlet.
5. Apply the specified positive pressure and check that there is no air leakage.



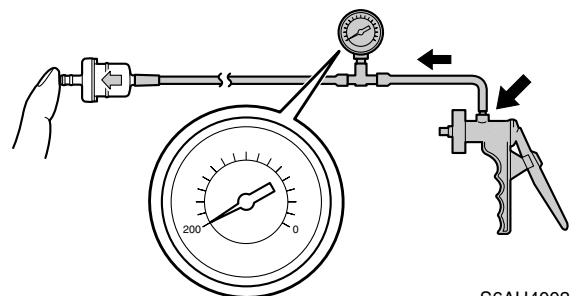
S6AU4009

 Specified positive pressure:
50 kPa (0.5 kgf/cm², 7.3 psi)

Checking the fuel filter


NOTE: _____
To check the fuel filter, see “Checking the fuel filter” (3-3).

1. Connect a vacuum/pressure pump gauge and a meter to the fuel inlet.
2. Cover the fuel outlet with your finger, and then apply the specified positive pressure. Replace the fuel filter if the specified pressure cannot be maintained for at least 10 seconds.



S6AU4003

NOTE: _____
Use a commercially available vacuum/pressure pump gauge and meter that can be pressurized up to 200 kPa (2.0 kgf/cm², 29.0 psi).

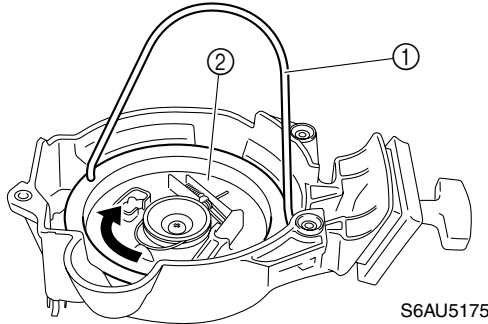
 Specified positive pressure:
200 kPa (2.0 kgf/cm², 29.0 psi)

— MEMO —

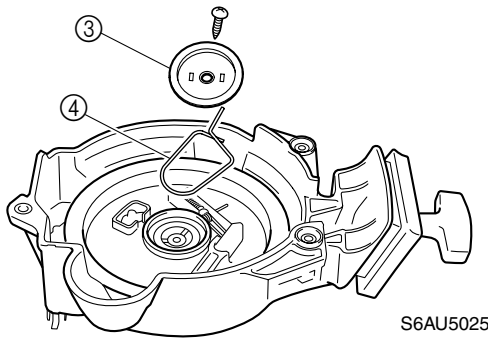
4

Disassembling the manual starter

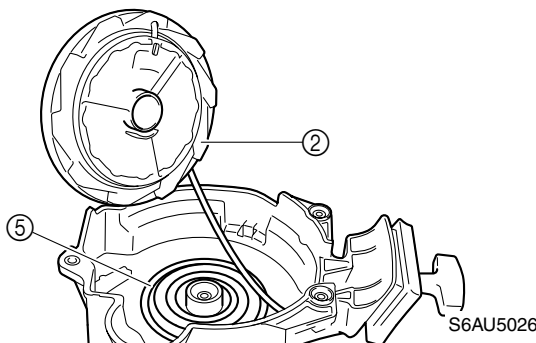
1. While holding the starter rope ①, turn the sheave drum ② in the direction of the arrow shown until there is no tension in the spiral spring.



2. Remove the drive plate ③ and drive pawl spring 1 ④.



3. Remove the sheave drum ②.

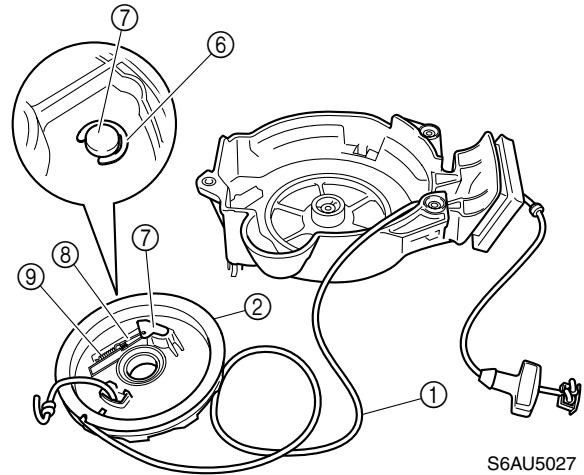


4. Remove the spiral spring ⑤ from the manual starter cover.

⚠ WARNING

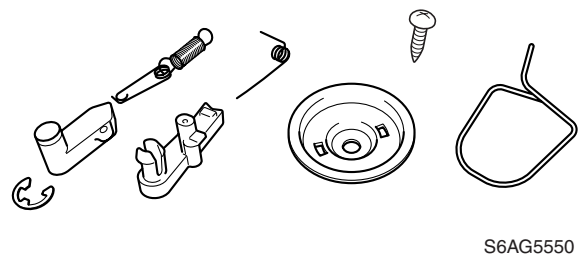
The spiral spring can pop out. Cover the spiral spring with rags when removing it.

5. Remove the starter rope ① and E-clip ⑥, and then remove the drive pawl ⑦, drive pawl spring 2 ⑧, and spring ⑨ from the sheave drum ②.



Checking the manual starter

1. Check the drive pawl, E-clip, starter plunger, and drive plate. Replace if cracked or damaged.
2. Check the springs. Replace if bent, cracked, or damaged.

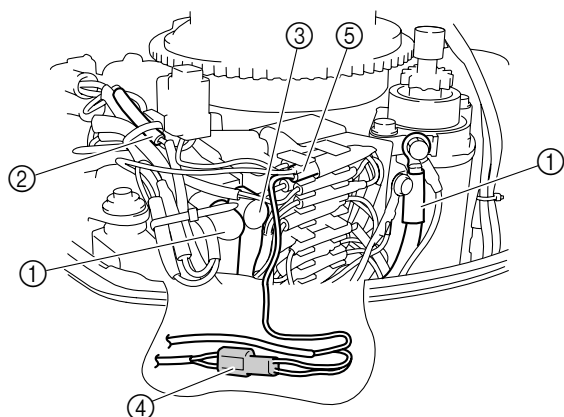


Removing the power unit

1. Disconnect the start-in-gear protection cable, and then remove the driven sprocket cover and manual starter. (M model)

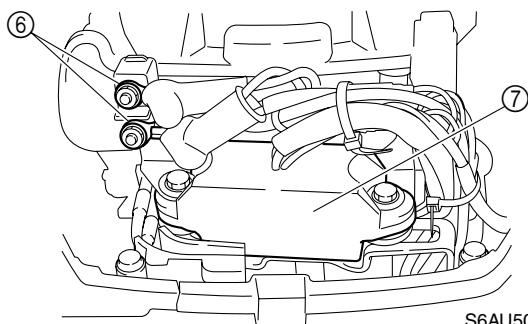
Remove the driven sprocket cover and flywheel magnet cover. (E model)

2. Disconnect the battery cables ①, battery lead ②, and starter motor lead ③. (E model)



S6AU5047

3. Disconnect the PT switch coupler ④, PT switch lead (R) ⑤, and PT relay lead (G, L) ⑥, and remove the PT relay ⑦. (PT model)



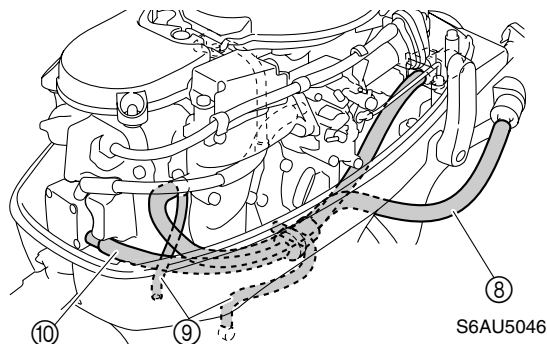
S6AU5048

4. Disconnect the engine shut-off switch leads, oil pressure warning indicator leads, and engine start button leads. (H model)

Disconnect the 10-pin main harness from the power unit. (R model)

NOTE: _____
To disconnect the leads, see "Electrical component and wiring harness routing" (8-1).

5. Disconnect the flushing hose ⑧, cooling water hoses ⑨, and fuel hose ⑩.

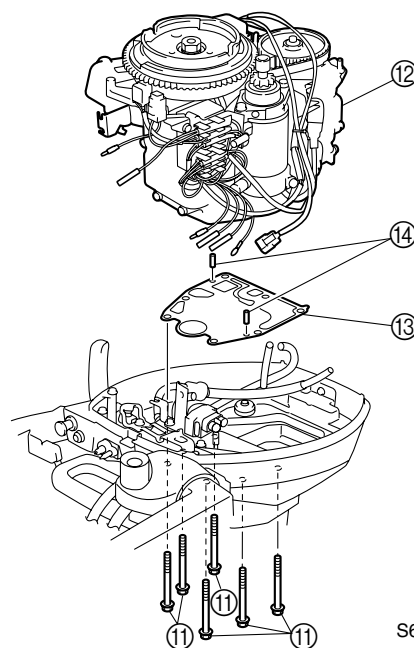


S6AU5046

6. Disconnect the throttle cables from the throttle cam. (H model)
Disconnect the throttle cable joint from the throttle cam. (R model)

7. Remove the choke rod, dipstick, and apron, and then remove the mounting bolts ⑪.

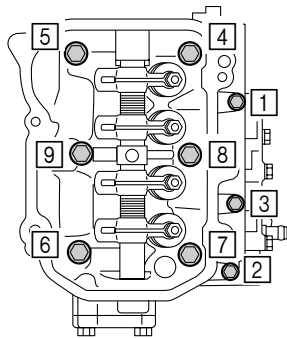
8. Remove the power unit ⑫, gasket ⑬, and dowels ⑭.



S6AU5052

Removing the cylinder head

1. Remove the cylinder head cover.
2. Remove the cylinder head bolts in the sequence shown.



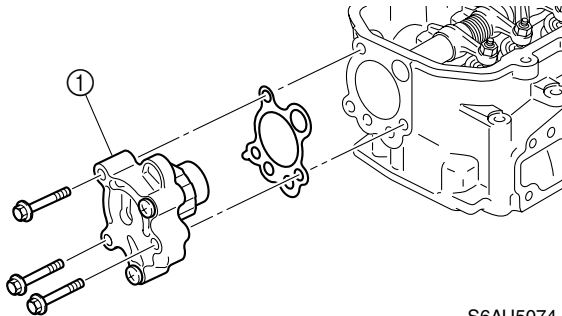
S6AU5073

CAUTION:

Do not scratch or damage the mating surfaces of the cylinder head and cylinder block.

Disassembling the cylinder head

1. Remove the oil pump assembly ①.

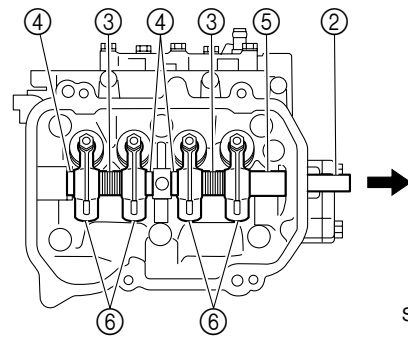


S6AU5074

NOTE:

To disassemble, check, and assemble the oil pump, see "Checking the oil pump" (5-37).

2. Pull out the rocker arm shaft ②, and then remove the springs ③, collars ④ and ⑤, and rocker arms ⑥.

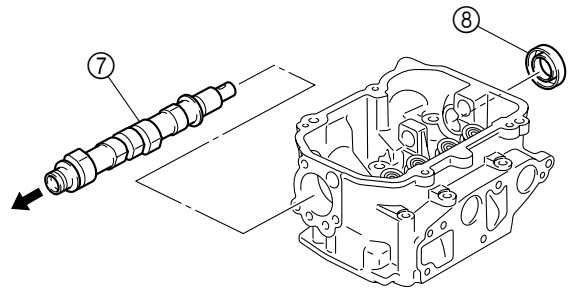


S6AU5075

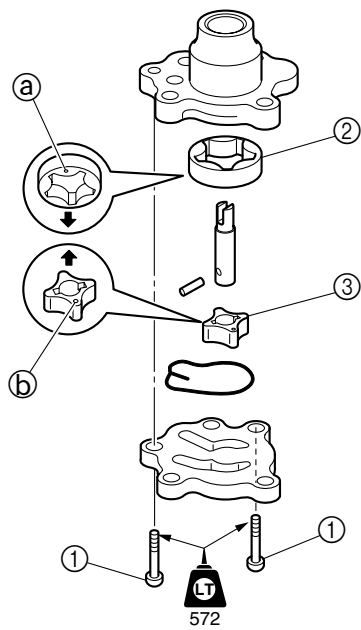
NOTE:

- Loosen the locknuts and adjusting screws to ease the tension on the rocker arm shaft before pulling it out.
- Be sure to keep the parts in the order as they were removed.

3. Remove the camshaft ⑦ and oil seal ⑧.



S6AU5076



S6AU5125


NOTE:

- The punch mark (a) on the outer rotor (2) faces towards the oil pump cover.
- The punch mark (b) on the inner rotor (3) faces towards the oil pump housing.



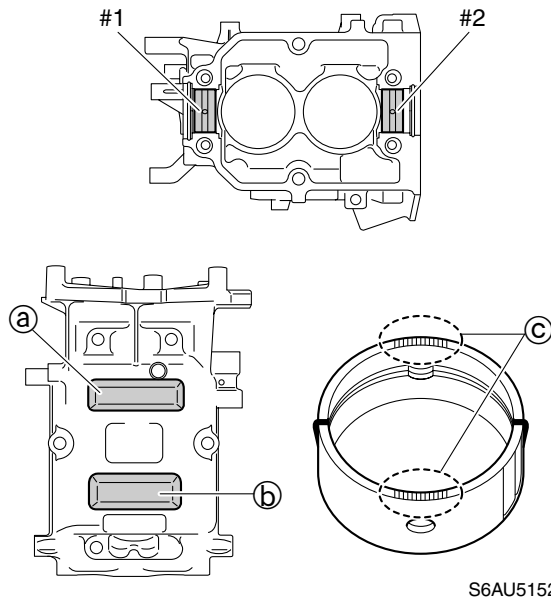
Oil pump screw (1):
5 N·m (0.5 kgf·m, 3.7 ft·lb)

NOTE: _____
 When loosening the crankcase bolts, loosen them in the opposite order used for tightening.

 Crankshaft journal oil clearance (reference data):
 0.006–0.034 mm
 (0.0002–0.0013 in)

Selecting the crankshaft main bearing

1. Check the stamped marks (a) and (b) on the crankcase.



S6AU5152

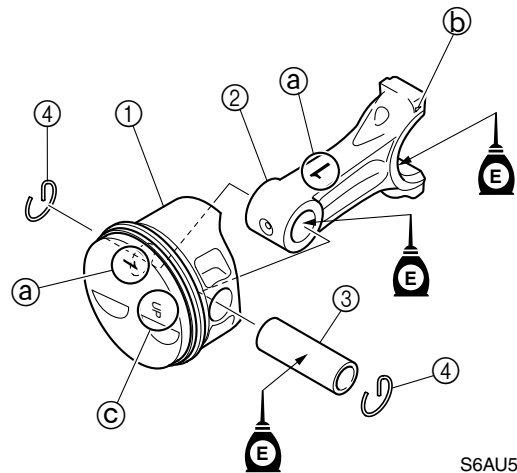
NOTE: _____
 The stamped mark (a) is for the main bearings of crankshaft journal #1 and the stamped mark (b) is for the main bearings of crankshaft journal #2.

2. Select the suitable bearing color (c) for the main bearings from the table.

Stamped marks (a) and (b)	Bearing color (c)
A	Blue
B	Black
C	Brown

Assembling the cylinder block

1. Assemble the piston (1), connecting rod (2), piston pin (3), and piston pin clips (4).



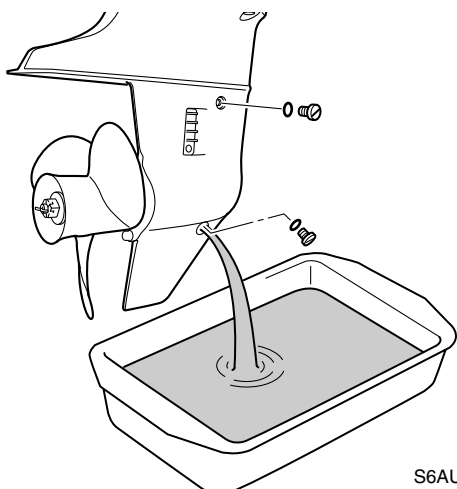
S6AU5153

CAUTION: _____
 Do not reuse the piston pin clips (4), always replace them with new ones.

NOTE: _____
 • Before assembly, make sure that the identification numbers (a) made on the piston and connecting rod during removal are the same.
 • Face the “▲” mark (b) on the connecting rod in the same direction as the “UP” mark (c) on the piston.

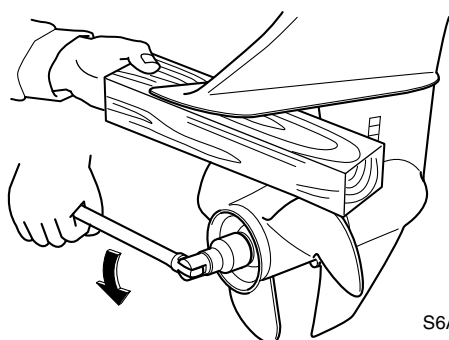
Removing the lower unit

1. Drain the gear oil.



S6AU6003

2. Set the gear shift to the N position, place a block of wood between the anti-cavitation plate and propeller to keep the propeller from turning, and then remove the propeller nut and propeller.



S6AU6004

⚠ WARNING

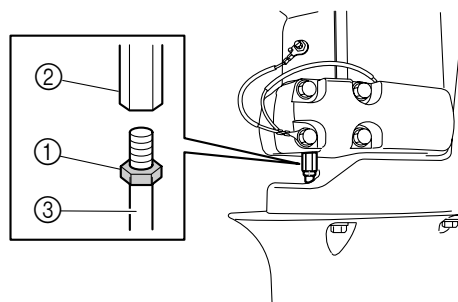
- Do not hold the propeller with your hands when loosening or tightening it.
- Be sure to disconnect the battery cables from the battery and remove the clip from the engine shut-off switch. (E model)

3. Loosen the locknut ① while holding the adjusting nut ②, and then turn the adjusting nut to disconnect the shift rod ③.

NOTE:

Set the gear shift to the R position before disconnecting the shift rod.

4. Remove the locknut ①.

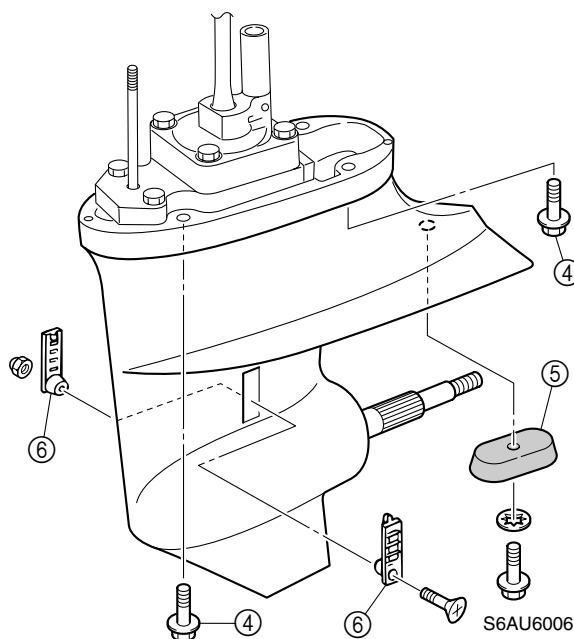


S6AU6005

NOTE:

Be sure to remove the locknut from the shift rod before removing the lower unit.

5. Remove the lower unit by removing the lower case mounting bolts ④.
6. Remove the anode ⑤ and cooling water inlet covers ⑥.



S6AU6006

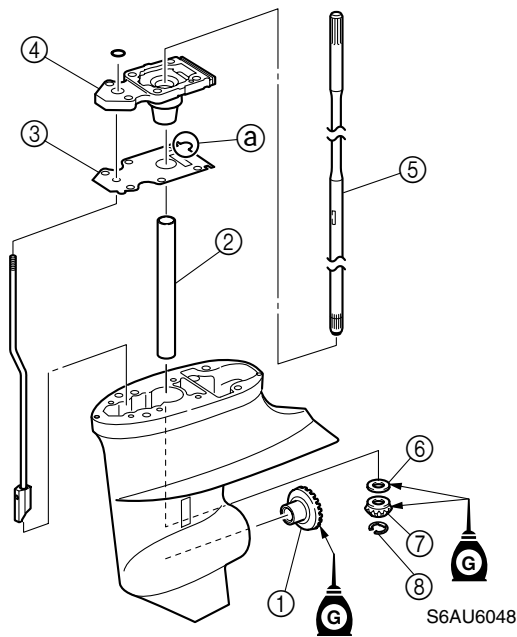
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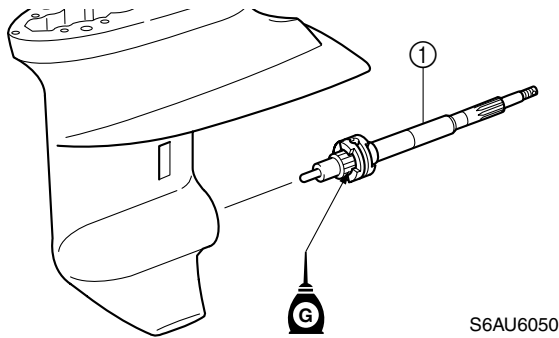


NOTE:

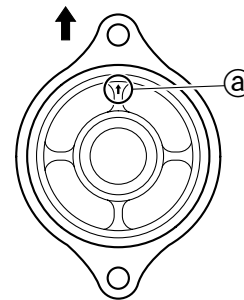
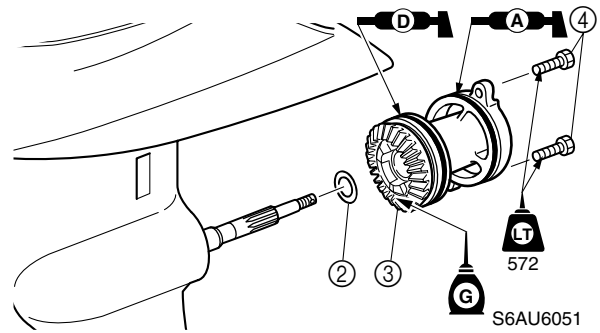
When installing the pinion, lift up the drive shaft slightly and align the pinion and shaft splines.

Installing the propeller shaft housing

1. Install the propeller shaft assembly ① into the lower case.




2. Install the washer ② and propeller shaft housing assembly ③ into the lower case, and then tighten the bolts ④ to the specified torque.

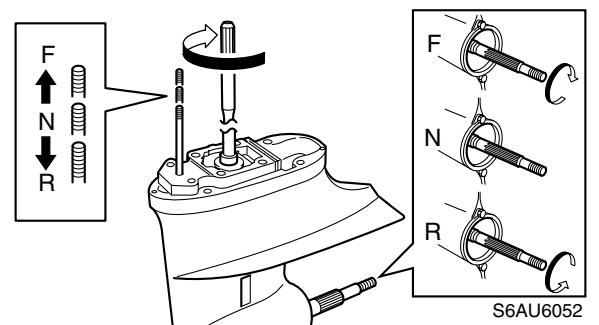


NOTE:

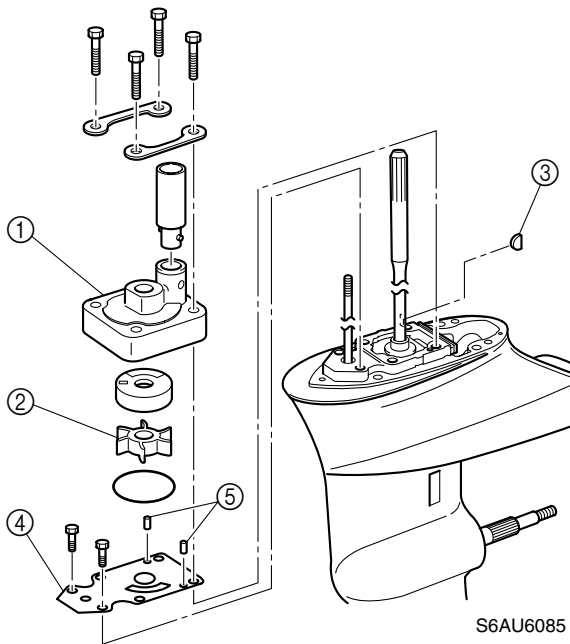
Install the propeller shaft housing assembly with the arrow mark ① facing upward.

	Propeller shaft housing bolt ④: 8 N·m (0.8 kgf·m, 5.9 ft·lb)
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3. Check that the shifting mechanism works properly and smoothly.



3. Remove the dowels ⑤ from the lower case.



Checking the water pump

1. Check the water pump housing. Replace if deformed.

NOTE:

If the engine overheated, the inside of the water pump housing may be deformed, therefore be sure to remove the insert cartridge when checking the housing.

2. Check the impeller, insert cartridge, and outer plate cartridge. Replace if cracked or worn.
3. Check the Woodruff key and the keyway in the drive shaft. Replace if worn or deformed.

Drive shaft and lower case (high thrust model)



Installation depth ©:
7.0–8.0 mm (0.28–0.31 in)

Installing the shift rod, drive shaft housing, and drive shaft

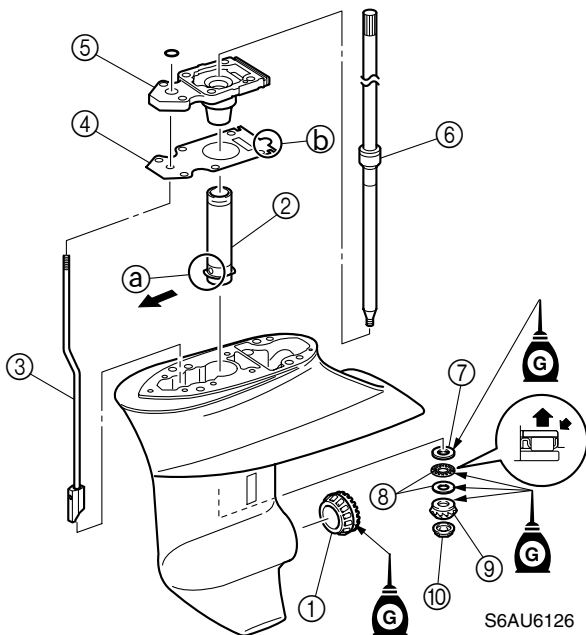
1. Install the forward gear assembly ① into the lower case.
2. Install the drive shaft sleeve ② into the lower case.

NOTE: _____
Install the drive shaft sleeve ② with the hole ① facing forward.

3. Install the shift rod ③, a new gasket ④, and the drive shaft housing assembly ⑤.

NOTE: _____
Make sure that the projection ② on the gasket is toward the port side.

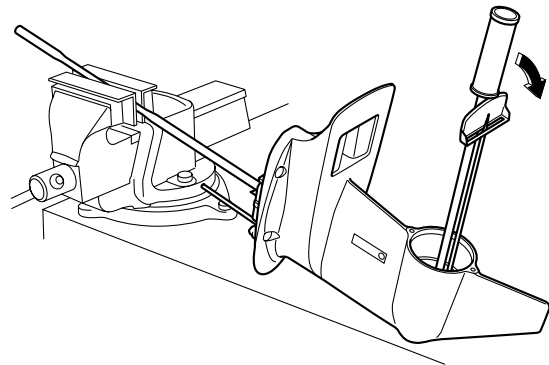
4. Install the drive shaft ⑥, original pinion shim(s) ⑦, roller bearing ⑧, pinion ⑨, and pinion nut ⑩ to the drive shaft.



NOTE: _____

- When installing the pinion, lift up the drive shaft slightly and align the pinion and shaft splines.
- Be sure to select the pinion shim(s) if replacing the pinion, roller bearing, or lower case. To select the shim, see “Shimming (high thrust model)” (6-38).

5. Tighten the pinion nut ⑩ to the specified torque.



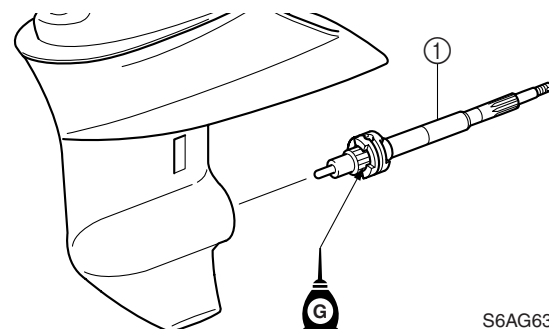
S6AU6127



Pinion nut ⑩:
25 N·m (2.5 kgf·m, 18.4 ft·lb)


Installing the propeller shaft housing

1. Install the propeller shaft assembly ① into the lower case.

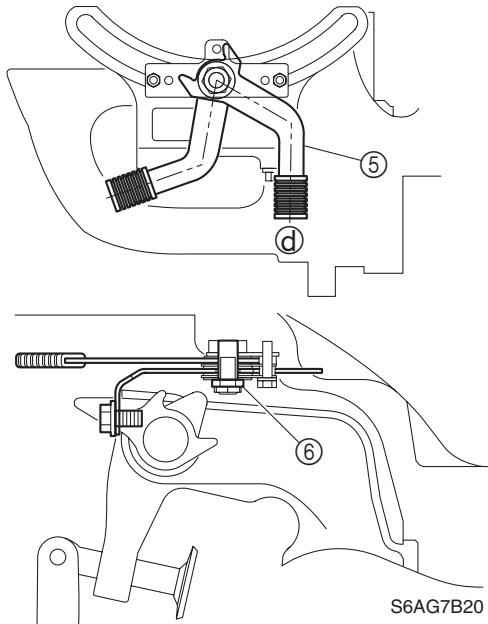


S6AG6341


— MEMO —

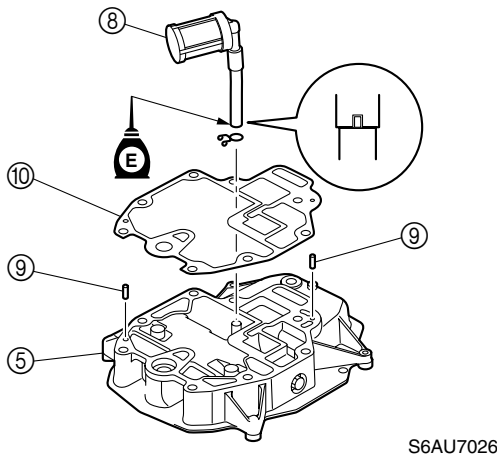
	Friction plate bolt (M8) ③: 18 N·m (1.8 kgf·m, 13.3 ft·lb)
	Friction plate bolt (M5) ④: 7 N·m (0.7 kgf·m, 5.2 ft·lb)

5. Move the steering lock lever ⑤ to position ④, and then tighten the self-locking nut ⑥ to the specified torque.

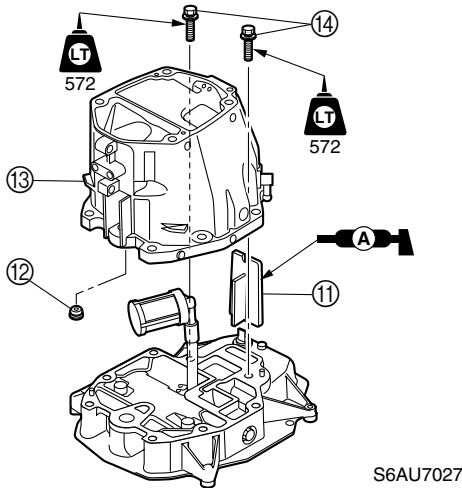



NOTE:
To check and adjust the friction plate, see “Checking the steering operation (H model)” (3-12).

	Friction self-locking nut ⑥: 6 N·m (0.6 kgf·m, 4.4 ft·lb)
---	--

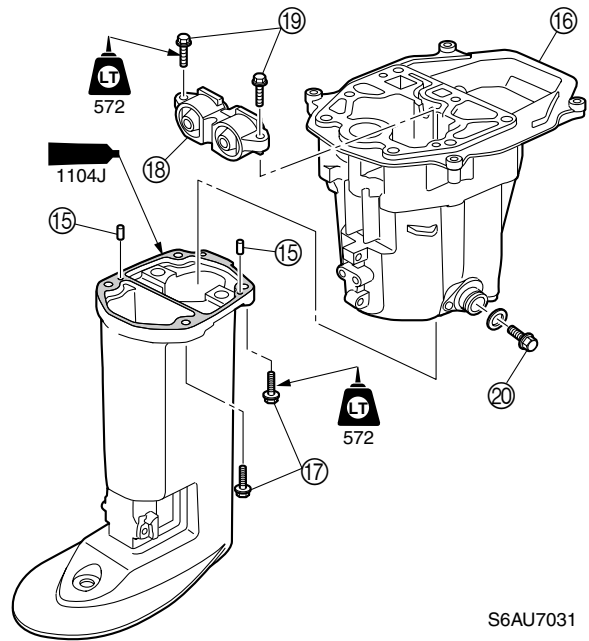


4. Install the baffle plate (11) and rubber seal (12) to the oil pan (13), and then tighten the oil pan bolts (14) to the specified torque.




	Oil pan bolt (14): 21 N·m (2.1 kgf·m, 15.5 ft·lb)
---	--


5. Install the dowels (15) and oil pan assembly (16), and then tighten the upper case bolts (17) to the specified torque.
6. Install the upper mount (18), and then tighten the upper mount bolts (19) to the specified torque.



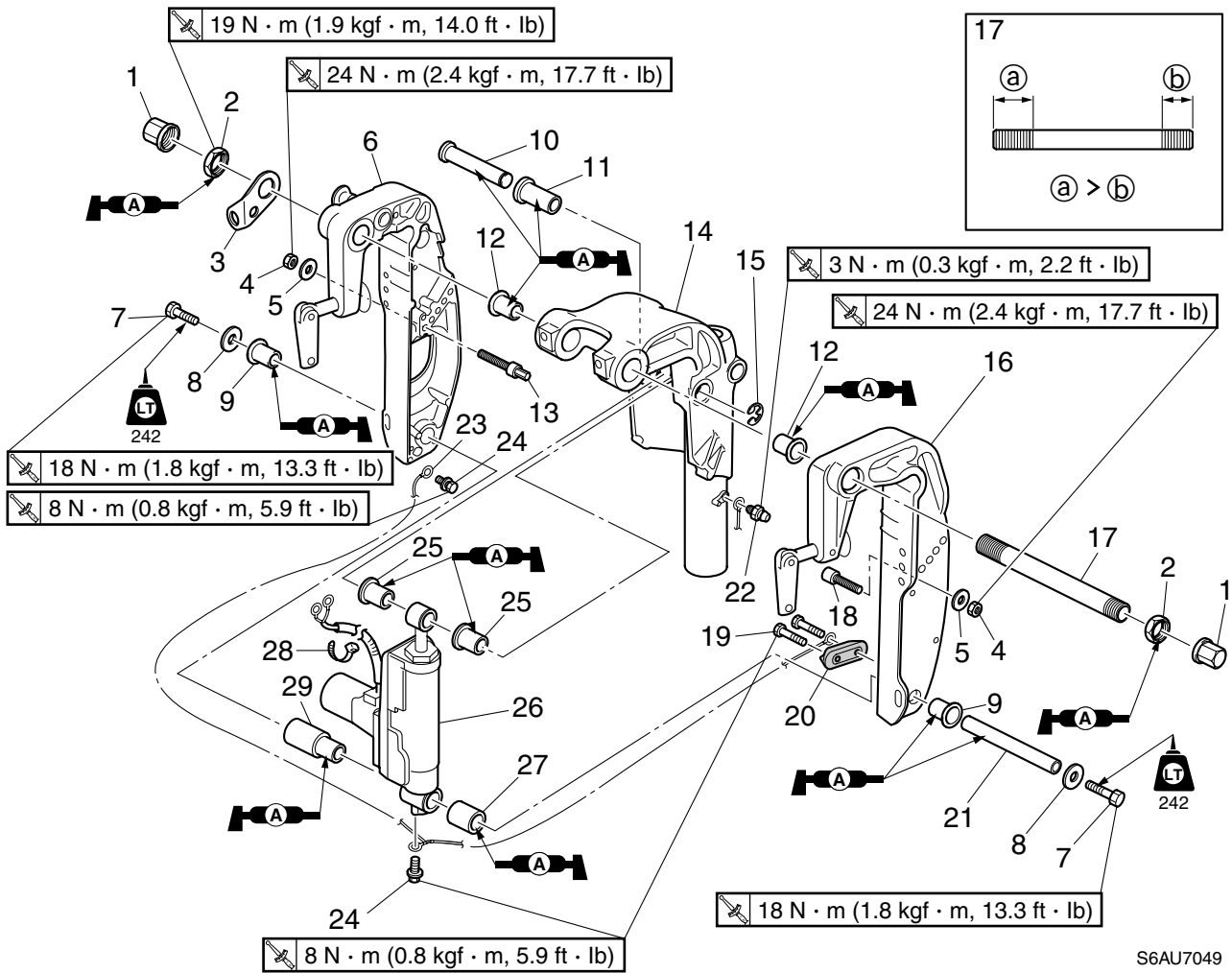
NOTE:
Apply sealant (1104J) to the mating surface.

	Upper case bolt (17): 18 N·m (1.8 kgf·m, 13.3 ft·lb)
	Upper mount bolt (19): 11 N·m (1.1 kgf·m, 8.1 ft·lb)

7. Install the grommet and engine oil drain bolt (20), and then tighten the drain bolt to the specified torque.

	Engine oil drain bolt (20): 24 N·m (2.4 kgf·m, 17.7 ft·lb)
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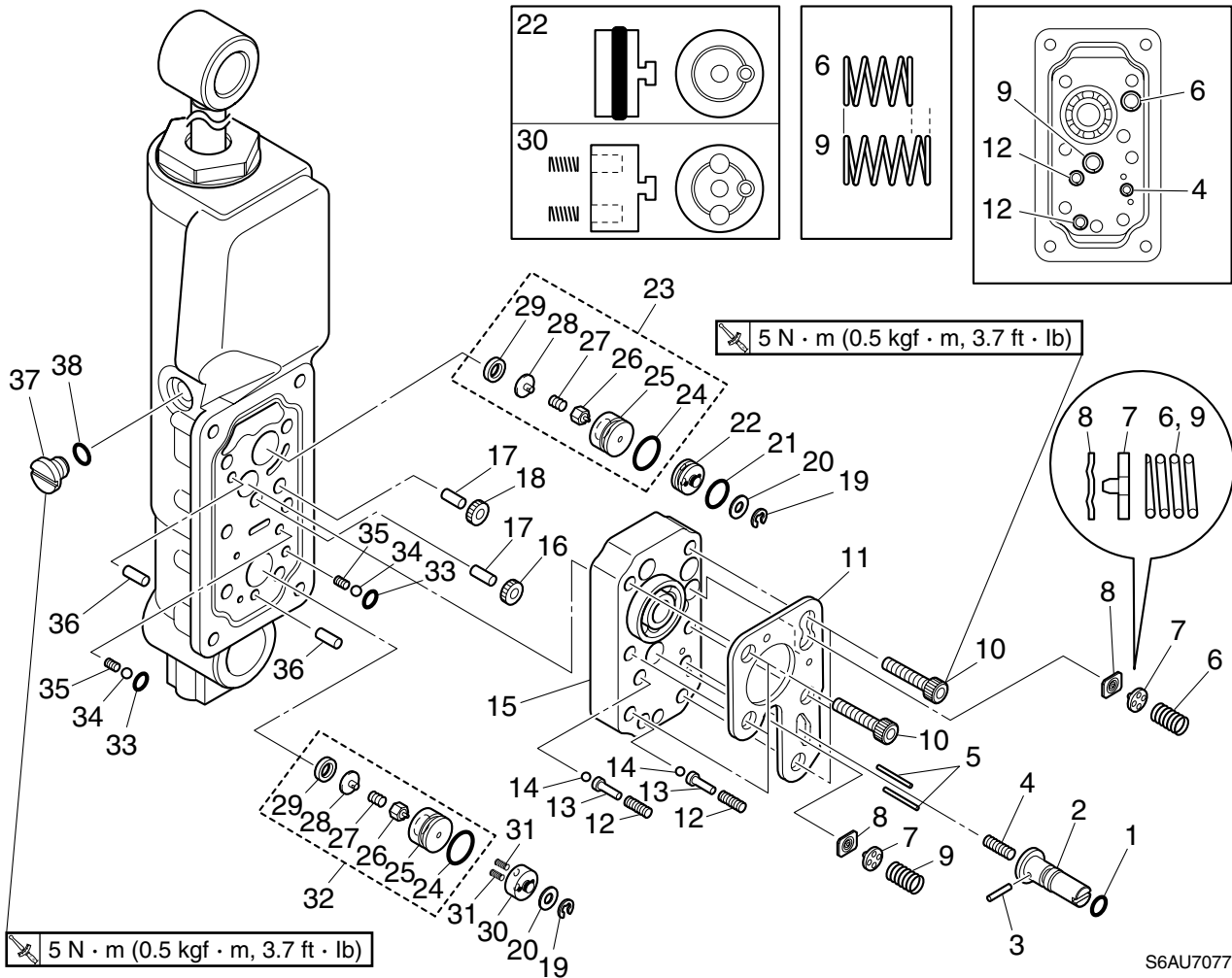
Clamp bracket and swivel bracket (PT model)



S6AU7049

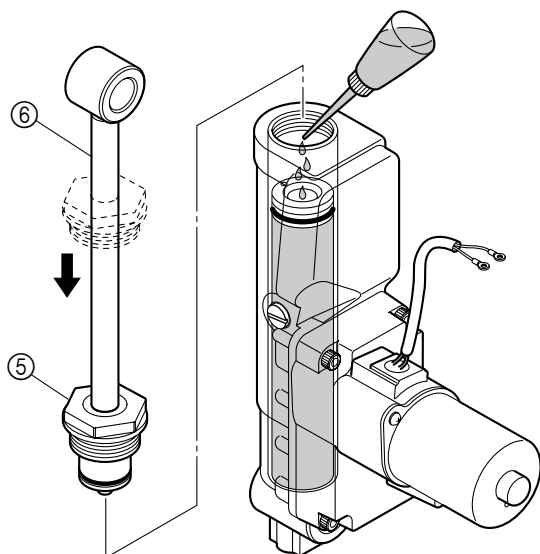
No.	Part name	Q'ty	Remarks
18	Stopper 2	1	
19	Bolt	2	M6 × 25 mm
20	Anode	1	
21	Shaft	1	
22	Grease nipple	1	
23	Ground lead	1	
24	Bolt	2	M6 × 10 mm
25	Collar	2	
26	PT unit	1	
27	Collar	1	
28	Plastic tie	1	
29	Collar	1	

7



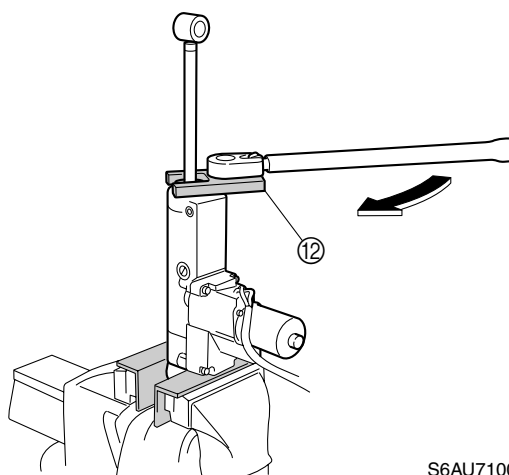
S6AU7077

No.	Part name	Q'ty	Remarks
18	Driven gear	1	
19	E-clip	2	
20	Main valve seal	2	
21	O-ring	1	Not reusable
22	Shuttle piston 1	1	
23	Down-main valve	1	
24	O-ring	2	Not reusable
25	Valve seat	2	
26	Main valve	2	
27	Spring	2	
28	Spacer	2	
29	Filter	2	
30	Shuttle piston 2	1	
31	Spring	2	
32	Up-main valve	1	
33	O-ring	2	Not reusable
34	Ball	2	





S6AU7099

13. Tighten the tilt cylinder end screw to the specified torque.



S6AU7100

	Tilt rod wrench ⑫: YB-06560
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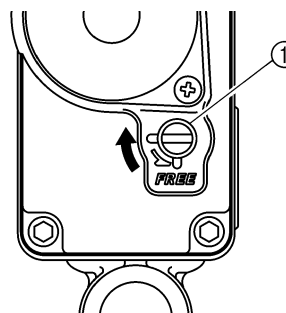
	Tilt cylinder end screw ⑤: 45 N·m (4.5 kgf·m, 33.2 ft·lb)
---	--

Bleeding the PT unit

NOTE: _____
Make sure that the tilt ram is fully extended.

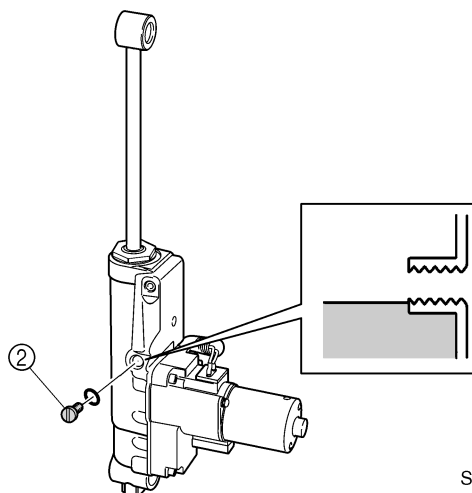
1. Place the PT unit in an upright position.

2. Turn the manual valve ① clockwise 90° to close it.




S6AG7341

3. Remove the reservoir cap ②, and then check the fluid level in the reservoir.




S6AG7360

- NOTE:** _____
- If the fluid is at the correct level, a small amount of fluid should overflow out of the filler hole.
 - If fluid is below the correct level, add the recommended PT fluid.

	Recommended PT fluid: ATF Dexron II
---	--

4. Install the reservoir cap ②, and then tighten it to the specified torque.

	Reservoir cap ②: 5 N·m (0.5 kgf·m, 3.7 ft·lb)
---	--

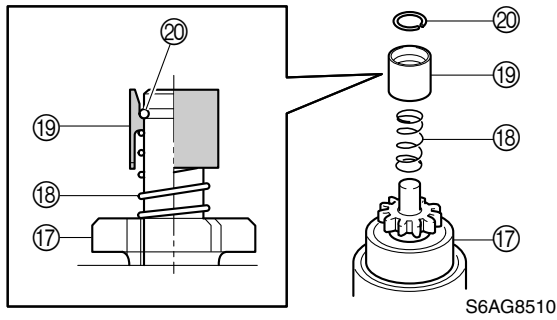
⑩ PT switch lead (PT model)

- Ⓐ Install the terminal plate, making sure that it contacts the PT relay. (PT model)
- Ⓑ Route the lighting coil lead to the outside of the crankcase pin.
- Ⓒ Route the oil pressure switch lead in the direction shown.
- Ⓓ Fit the oil pressure switch lead into the groove in the driven sprocket cover.
- Ⓔ Bend the side of the junction box outward as shown.
- Ⓕ Route the battery cable under the bracket.
- Ⓖ Route the warning indicator lead under the shift cable.
- Ⓗ Fasten the PT motor lead with the holder, making sure that there is no slack in the lead. (PT model)

Electrical component and wiring harness routing

- A** Route the engine shut-off switch lead under the throttle cables.
- B** Route the engine shut-off switch lead along the tiller handle bracket so that it does not contact the throttle shaft, and then route it and the throttle cables through the corrugated tube.
- C** Fasten the engine start button lead at the white tape with a plastic tie. Install the plastic tie as shown. (E model)
- D** Align the blue tape on the engine start button lead with the grommet in the bottom cowling. Position the slack in the engine start button lead toward the tiller handle. (E model)

Starter motor (E model) / Starting system



S6AG8510

NOTE:

- Install the pinion stopper ⑱ in the direction shown.
- Check the starter motor operation again after assembling it.

Installing the starter motor

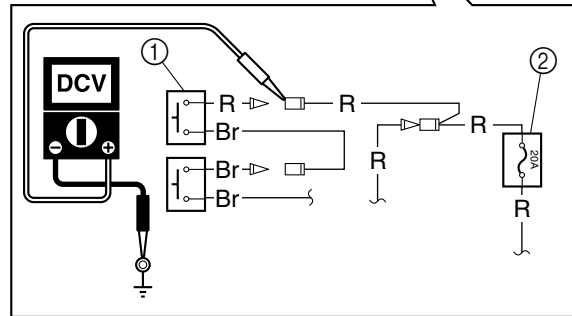
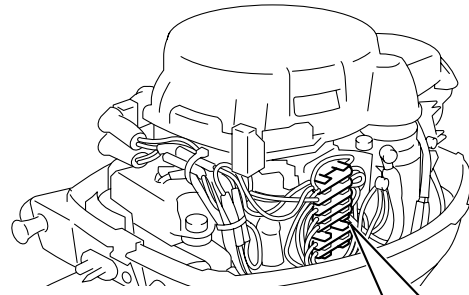
1. Install the starter motor to the power unit.
2. Connect the wiring harness to the starter motor, and then fasten the wiring harness.

NOTE:

To connect the wiring harness to the starter motor, see “Electrical component and wiring harness routing” (8-1).

Checking the engine start button (H model with electric starter)

1. Disconnect the engine start button ① connectors.
2. Measure the input voltage between the connector (wiring harness end) of the engine start button ① and the ground. Check the fuse ② and wiring harness if below specification.

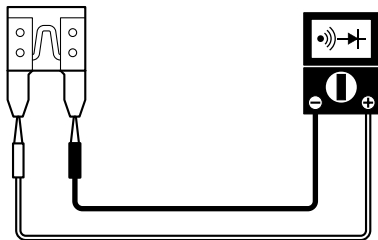


S6AU8025

Starting system

Checking the fuse (E model)

1. Check the fuse for continuity. Replace if there is no continuity.



S6AU8024

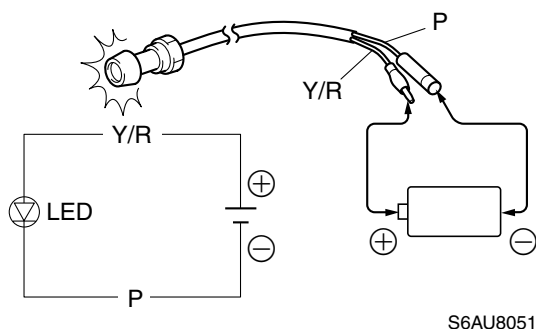
NOTE:

For the location of the fuse, see “Electrical component and wiring harness routing” (8-1).

	Engine start button input voltage (reference data): Red (R) – Ground 12 V (battery voltage)
--	--

Engine electric control system / Charging system (E model)

- Connect the yellow/red (Y/R) lead to the positive penlight battery terminal (1.5 V) and connect the pink (P) lead to the negative terminal, and then check that the warning indicator comes on. Replace the warning indicator assembly if it does not come on.



CAUTION:

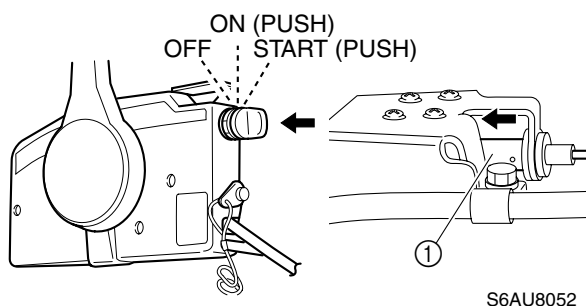
- Only use a penlight battery (1.5 V) when checking the LED. Other batteries (e.g., alkaline batteries or high-voltage batteries) will damage the diode.
- Do not apply more than 1.7 V to the leads when checking the LED.

NOTE:

A feature of an LED is that it only allows current to flow in one direction.

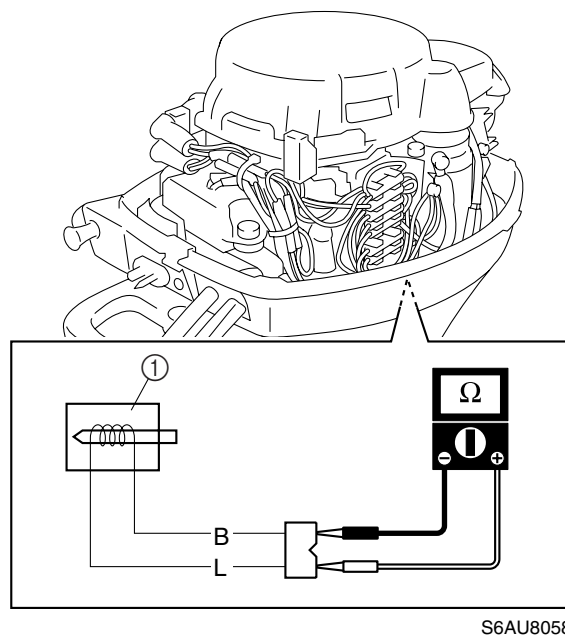
Checking the choke solenoid (R model)

- Push the engine start switch at the "ON" or "START" position, and then check the operation of the choke solenoid ①. Check the choke solenoid resistance if it does not operate.



- Disconnect the choke solenoid coupler.

- Measure the choke solenoid ① resistance. Replace if out of specification.



Choke solenoid resistance
(reference data):

Blue (L) – Black (B)

4.0 Ω at 20 °C (68 °F)

- Connect the choke solenoid ① coupler.

Charging system (E model) Checking the lighting coil

- Disconnect the lighting coil connectors.

Troubleshooting the outboard motor

Symptom 2	Cause 1	Cause 2	Checking step	Refer to page
Fuel not supplied	Pinched or kinked fuel hose	—	Check the fuel hoses and fuel hose joint.	3-3
	Clogged fuel filter	—	Replace the fuel filter.	3-3
	Fuel pump malfunction	—	Disassemble and check the fuel pump.	4-4
	Carburetor malfunction	Malfunction of the carburetor internal parts	Disassemble and check the carburetor.	4-11
Low compression pressure	Valve clearance not adjusted correctly	—	Adjust the valve clearance.	5-1
	Damaged cylinder head gasket	—	Disassemble and check the cylinder head and power unit.	5-28 5-41
	Damaged valve			
	Valve stuck to valve guide			
	Scratched piston or cylinder			
	Damaged or worn piston ring			

— MEMO —

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