



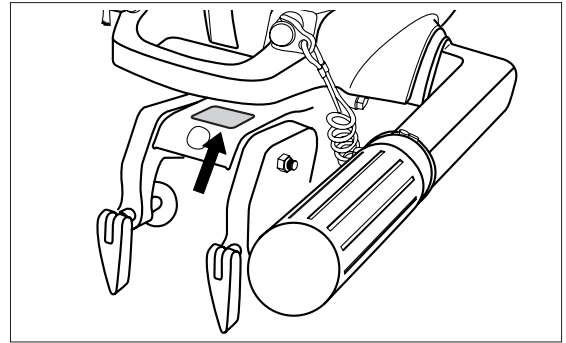
Service Information

1. Identification (Engine Serial Number)

Engine serial number is stamped on the swivel bracket of outboard motor body.

- ① Model Name
- ② Model Type
- ③ Serial Number

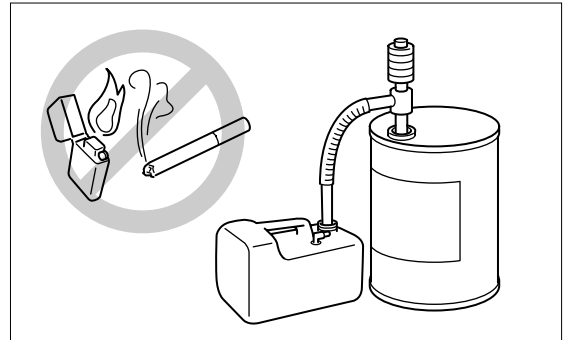
CE		Tokyo, Made in Japan	
2006 Model	F3.5A	① 3BR	②
SERIAL No.	XXXXXXXXX ③		
RATED POWER	kW		
FULL THROTTLE RANGE		r / min	
5000	6000		
MASS 18	20	kg	



2. Securing of work safety

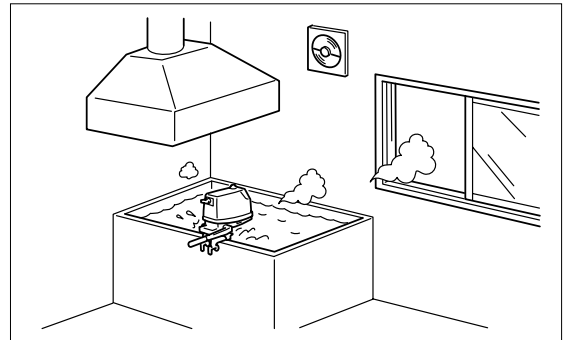
1) Fire Prevention

Gasoline is hazardous material and very flammable. Do not handle gasoline near ignition source such as spark or static electricity.



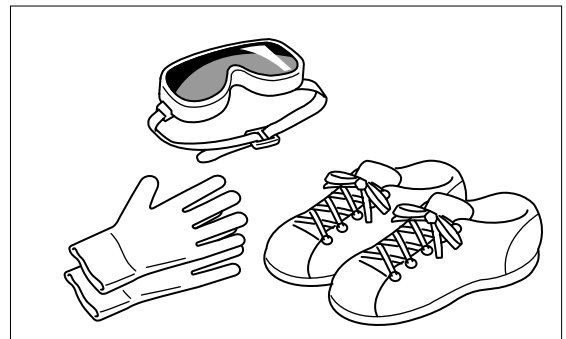
2) Ventilation

Exhaust gas or gasoline vapor is hazardous for human health. Be sure to ventilate well when working indoors.



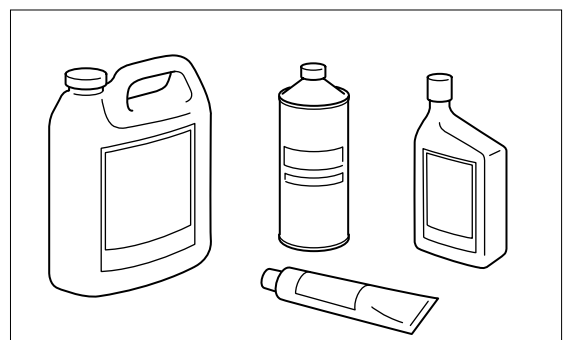
3) Protection

Wear a pair of goggles, working gloves and safety shoes to protect your body from chemicals and oils and eyes from particles generated by grinding or polishing. Avoid contact with oil, grease or sealing agent to the skin. In case of exposure to such matters, wash away with soap and warm water immediately.



4) Genuine Parts

Use parts and/or chemicals that are genuine items or recommended.

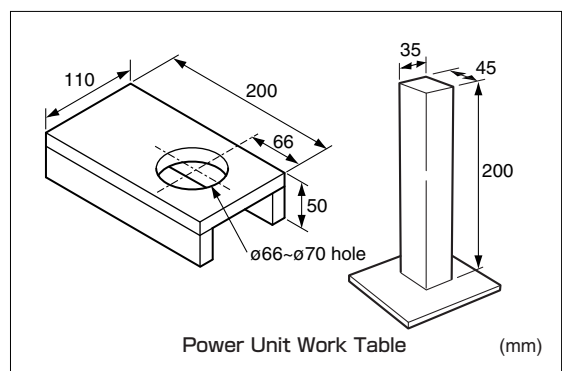
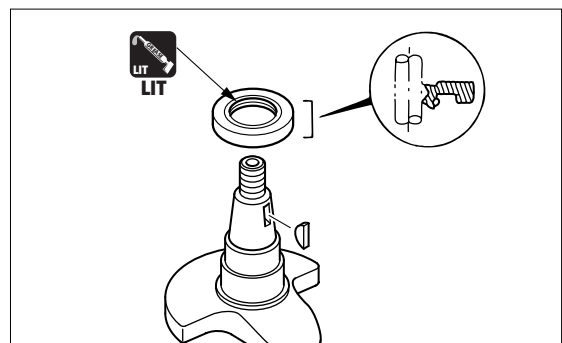
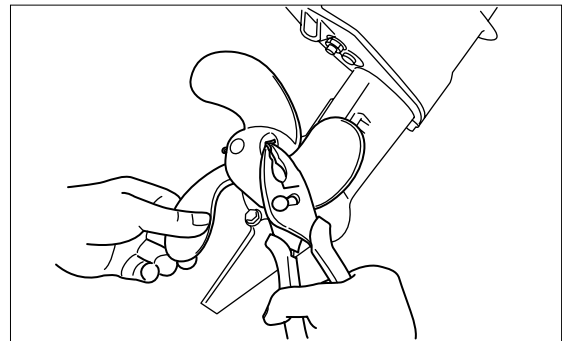
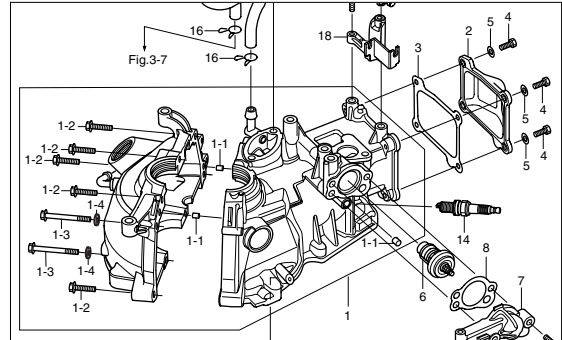
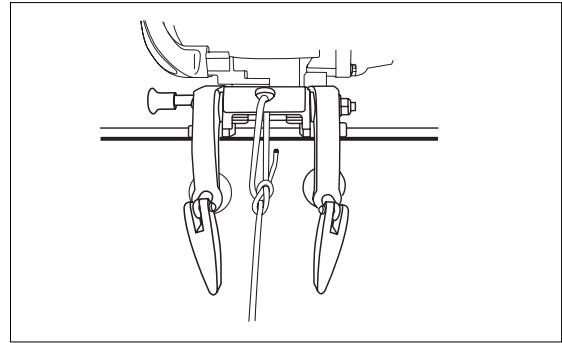




Service Information

7) Cautions in Disassembling and Assembling Components

- (1) Secure outboard motor to dedicated stand firmly.
- (2) Take special care not to scratch painted surface or mating surfaces of cylinder and crankcase.
- (3) Replace un reusable parts such as packings, gaskets, O rings, oil seals, spring pins or split pins with new ones after they were removed. Replace deformed snap rings with new ones.
- (4) When replacing parts, be sure to use genuine parts. For fluids such as gear oil, use genuine product.
- (5) Be sure to use special tools that are specified, and perform the work properly.
- (6) When reassembling parts, use their mating marks. For parts without mating marks, simple marking makes reassembling easier. Use applicable parts list for reference. Refer to applicable parts list.
- (7) Clean individual parts that have been removed, and check their condition.
- (8) When reassembling parts, take sufficient care also for details such as fit, repair limits, air tightness, cleanliness of oil holes for lubrication and greasing, packings, wirings and piping. For components using many bolts and nuts for assembling, such as cylinder head and crankcase, tighten all the fasteners evenly to their specified torque clockwise in two or three stages, inner ones first and then outer ones. (Reverse the order when disassembling.)
- (9) When installing bearings, bring the flat (numbered) side of the component to the special assembling tool.
- (10) When installing oil seals, be careful not to scratch the surface of the lip that contacts with the shaft, and install them in correct orientation. Apply recommended grease to the lip before installation.
- (11) When applying liquid packing, take sufficient care of the thickness and quantity. Excessive application may ooze out, adversely affecting interior of the crankcase. Use adhesive after thoroughly reading the instructions.
- (12) When servicing power unit, use of wooden work board makes the work easier.





Service Information

11) Propeller Selection

- Select a propeller that is best-suited to type of boat and application.



Range of operating engine revolution at WOT

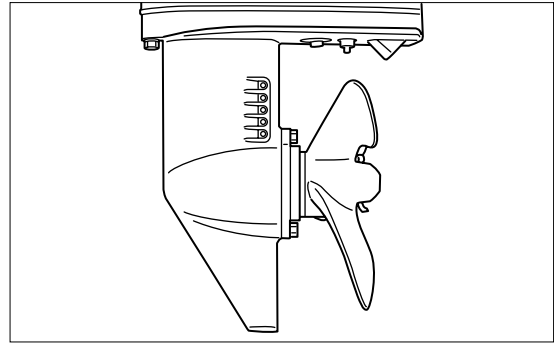
F2/2.5 : 4,500 - 5,500r/min

F3.5 : 5,000 - 6,000r/min

CAUTION

Incorrect-selection of propeller can cause adverse effects on engine life, fuel consumption, etc. as well as on performance.

Propeller [Marking]	[17]	3 x 7 ³ / ₈ x 7	(3 x 188 x 178)	Plastic	Standard
No. of Blades x Diameter x Pitch	[F6/B6]	3 x 7 ³ / ₈ x 6	(3 x 188 x 145)	Plastic/Aluminum	Option
in (mm)	[]	3 x 7 ³ / ₈ x 4.5	(3 x 188 x 110)	Plastic	Option



12) Inspection of Forward and Reverse Shifts

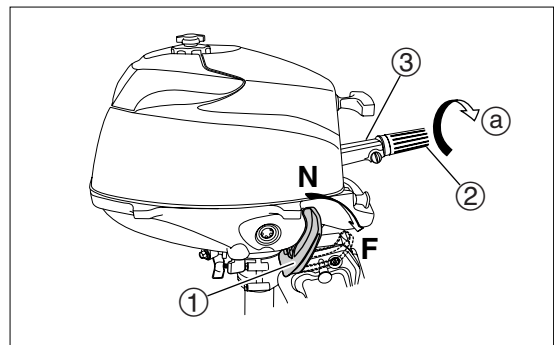
Use shift lever ① to shift the gear to forward (F) and Neutral (N).

- Forward

Return handle grip ② to idle speed ③, and then, move shift lever ① toward the operator (F) quickly.
- Reverse

In the same way as forward shift inspection, set the engine to idle speed, shift into ① to neutral (N), put up handle ③, turn outboard motor 180 degrees, and then, shift into forward (F) quickly.
- Shallow water run

In shallow water, run at the lowest possible speed while watching the depth and obstacles.



① Shift Lever



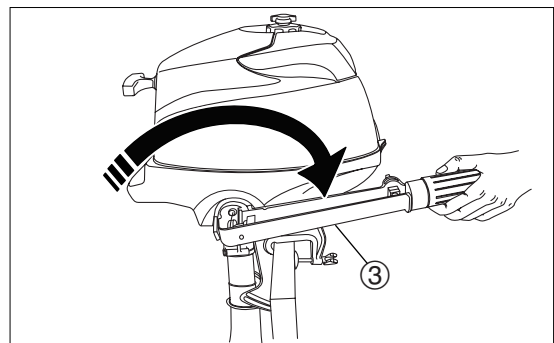
In reverse operation, run at low speed, and do not increase the engine speed unnecessarily.

WARNING

Shifting at high engine speed may cause fall of passenger due to abrupt acceleration and damage to gear, clutch and other components of the outboard motor. Shift at the lowest engine speed.

CAUTION

Shear pin is designed to be broken when the propeller receives damaging impact. However, it may be broken when shifting at high engine speed because of high shear stress applied to the pin.





Service Data

7.Sealant Application Locations

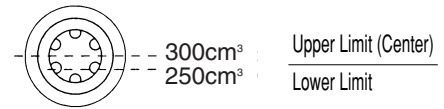
	Applied to	Screw Lock Agent		Gasket Seal Agent		Adhesive	Low Temperature Resistant Lithium Grease	Waterproof Grease	Teflon Grease	Silicon Grease	4-stroke Engine Oil	Gear Oil	Remarks
		Loctite	Three Bond	Loctite	Three Bond	Konishi	LIT	OBM	TEF	SOC	Shin-etsu Silicones		
		271	1342	518	1107	G 1 7							
		Chuo Yuka					Centax L2	FM-531	LM-902	KS-64			
Engine	Camshaft										●	Area of bearings, cams and gears	
	Lifter										●	Cam sliding face, push rod insertion area	
	Push Rod										●	Both ends	
	Push Rod Plate										●	Push rod pass hole end face	
	Rocker Arm										●	Push rod sliding area, pivot sliding area	
	Rocker Arm Pivot										●	Locker arm sliding face	
	Valves (IN, EX)										●	Shaft area, stem head area	
	Valve Spring										●	Whole area of the part	
	Retainer, Cotter										●	Whole area of the part	
	Valve Stem Seal (IN, EX)										●	Lip area and interior	
	Slinger Pin	●											Inner face of pin insertion hole
	O-Ring (Filler Cap)										●	Whole area of the part	
	Cylinder Liner										●	Inner wall	
	Piston										●	Ring grooves and circumference	
	Piston Rings										●	Whole area of the part	
	Piston Pins										●	Outer circumference	
	Connecting Rod										●	Inner surface of big and small ends	
	Connecting Rod Cap										●	Inner surface	
	Crankshaft										●	Sliding area, and areas of bearings and gears	
	Oil Seal (Crankshaft)							●					Lip area
	Thrust Plate (Crankshaft)										●		Whole area of the part
	Crank Case-Cylinder Mating Face			●									
	Oil Pan	Oil Level Gauge										●	Outer circumference
		Oil Seal										●	Outer circumference
									●				
		Oil Seals (2 pcs. In the crank case head)							●				
	Engine Base Gasket				●								Both faces
	Intake Manifold	Throttle Drum								●			Inner surface
Throttle Opener									●			Inner surface	
Throttle Rod									●			Both ends hole insertion area	
Electrical Parts	Spark Plug Cap									●		Spark plug insertion area	
						●						High tension cord area	



Maintenance

6) Replacement of Engine Oil

1. Oil Level



2. Oil Specification

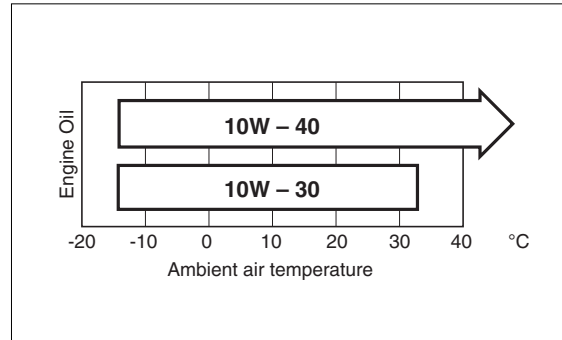


Engine Oil :

4 Stroke Engine Oil
 API : SF, SG, SH
 SAE : 10W-30, 10W-40
 NMMA : FC-W Certified 10W-30

Quantity of Engine Oil :

300cm³ (10 fl.oz)



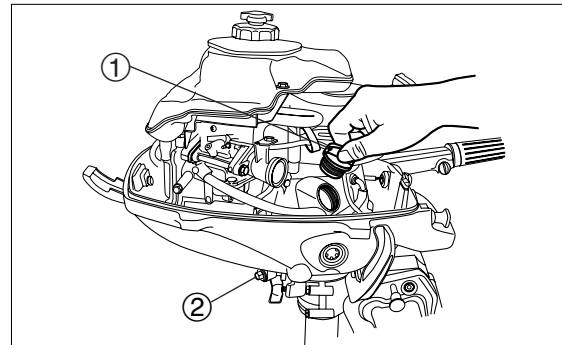
Use oil with viscosity that is suited to ambient air temperature of the operating region.

3. Engine Oil Replacement Procedure

Use of engine oil containing dirt or water can significantly shorten the lives of rotating and sliding parts of engine.

Replacement of Engine Oil :

1. Stop the engine and set outboard motor straight ahead and vertical.
2. Remove top cowl and then oil filler cap ①.



3. Place drain oil pan below drain bolt ②.
4. Remove drain bolt ② to drain oil.
5. Tighten drain bolt ② to specified torque.

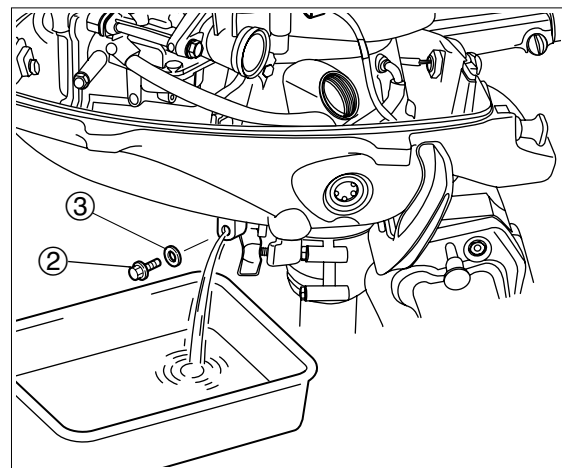


Apply oil to washer ③ of drain bolt ②.



Drain Bolt :

18N·m (13 lb·ft) [1.8kgf·m]

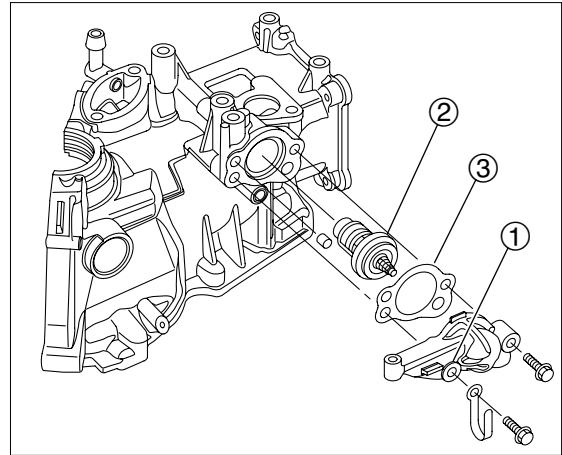


③Washer **Do not reuse.**



22) Inspection of Thermostat

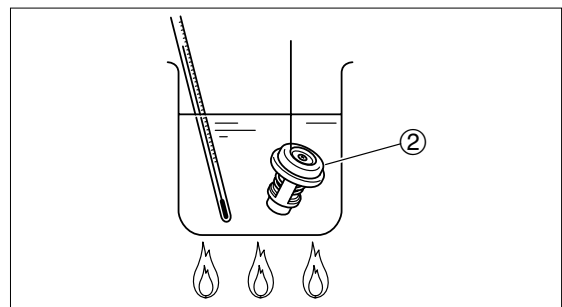
1. Remove bolts, and then thermostat cap ① and thermostat ②.



2. Hang thermostat ② in the water contained in vessel.
3. Put thermometer in the water, and warm up water to measure valve opening temperature.



Put a piece of thread in the closed valve gap and hang it in the water. Valve opening moment can be known when thermostat ② is released to drop due to opening with rise of temperature.

**Valve Opening Temperature :**

52°C±2°C(125°F±4°F)

(Valve starts to open at this temperature.)

4. Measure valve lift ① of thermostat ② when prescribed temperature has been reached. Replace if the length is less than specified value.

**Water Temperature**

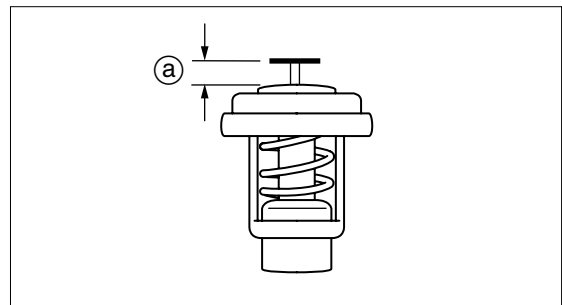
65°C±2°C(150°F±4°F)

Valve Lift①

3.0 mm (0.12 in) or more



Since thermostat starts to open a few minutes after the opening temperature is reached, measure the lift ① after maintaining it for approximately 5 minutes at around 65°C(150°F).



5. Install thermostat ②, new gasket ③ and then cap ①.

**Thermostat Cap Bolt :**

6 N·m (4 lb·ft) [0.6 kgf·m]



Fuel System (Carburetor)

8) Assembling Carburetor

1. Attach carburetor ass'y to intake manifold.

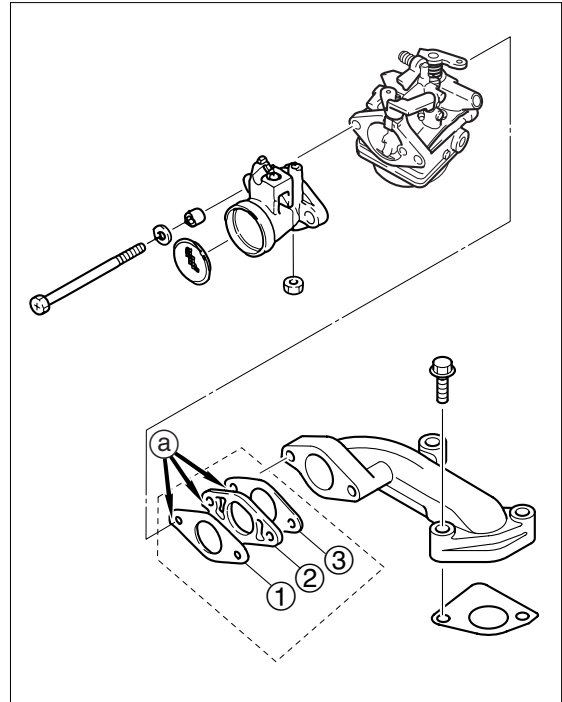


Carburetor Bolt :

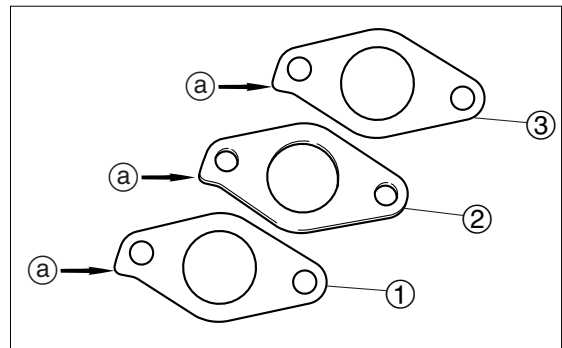
6N · m (4 lb · ft) [0.6kgf · m]



Put carburetor gaskets ① and ③ and insulator ② together with their projections ④ at the same side, and install carburetor.

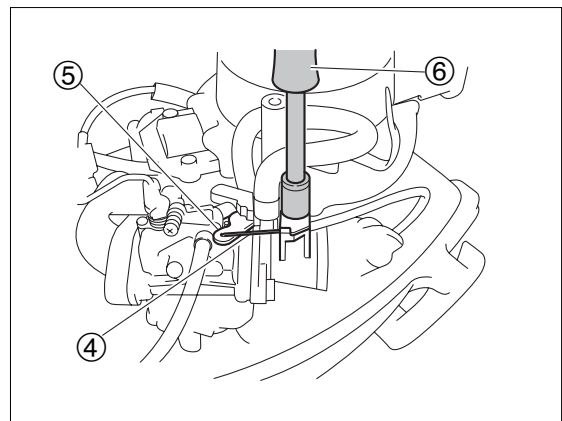


④ Projections ① and ③ **Do not reuse.**



④ Projections ① and ③ **Do not reuse.**

2. Attach choke wire ④ to choke lever ⑤ of carburetor.



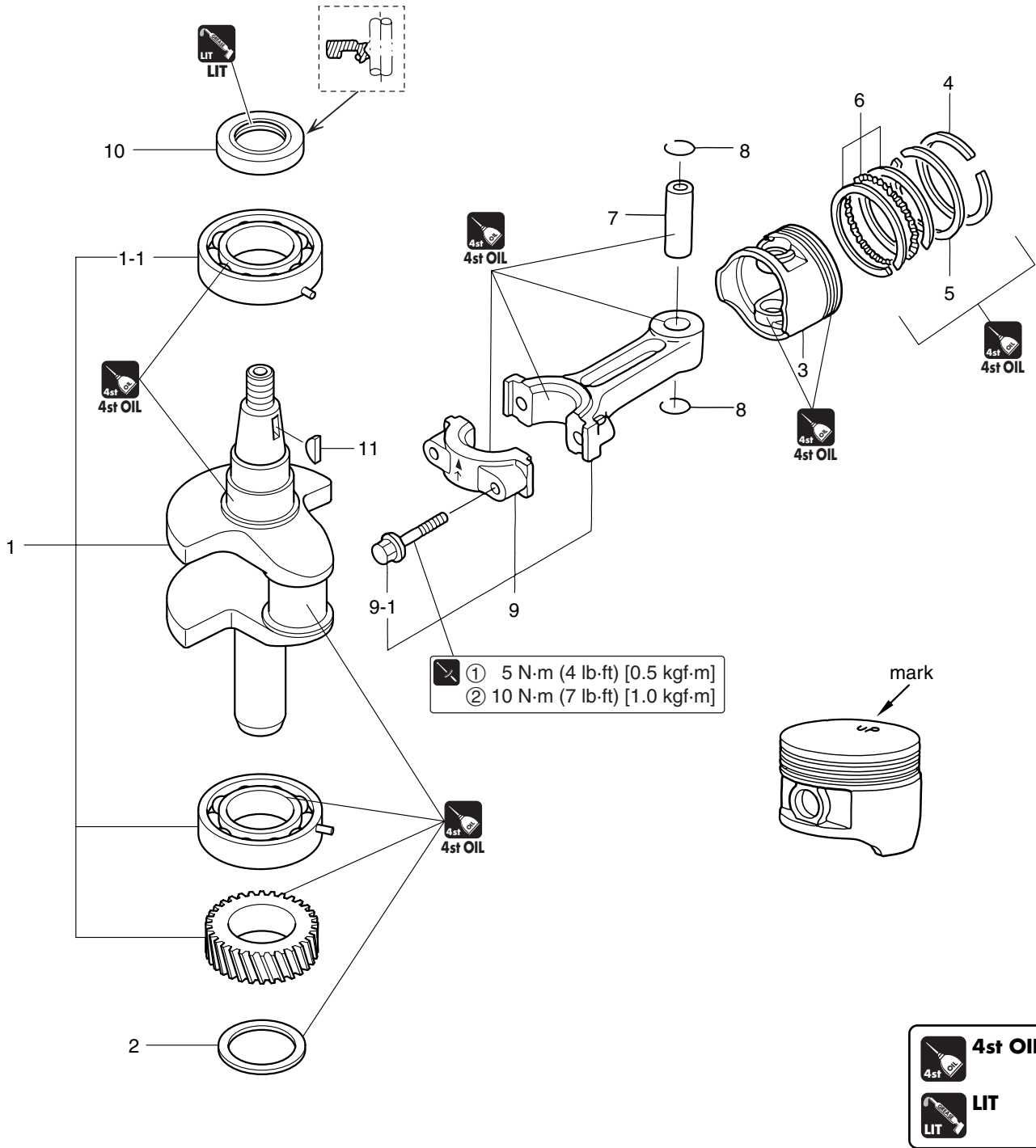
⑥ 10 mm Wrench



Power Unit

Piston & Crank Shaft

P/L Fig. 2



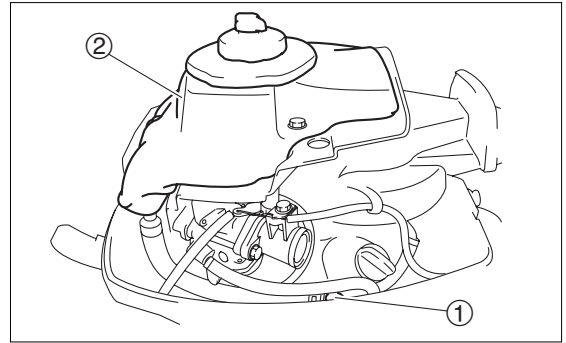
Ref. No.	Part Name	Q'ty	Remarks
1	Crankshaft Ass'y	1	with Gear
1-1	Ball Bearing, 6204	1	Do not reuse.
2	Thrust Plate, 20.2-32-1	1	
3	Piston	1	
4	Piston Ring Top	1	
5	Piston Ring 2nd	1	
6	Piston Ring Oil	1	
7	Piton Pin	1	
8	Piton Pin Clip	2	Do not reuse.
9	Connecting Rod Ass'y	1	
9-1	Connecting Rod Bolt	2	
10	Oil Seal, 20-35-7	1	Do not reuse.
11	Magneto Key	1	



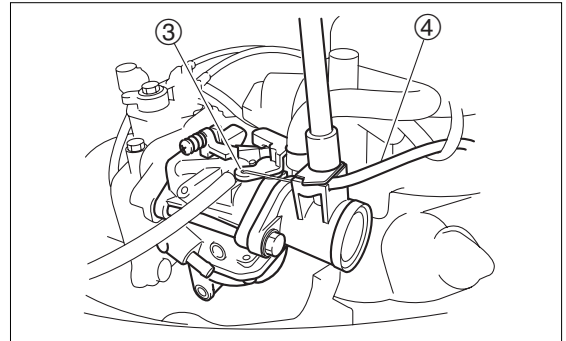
Power Unit

3) Removing Power Unit

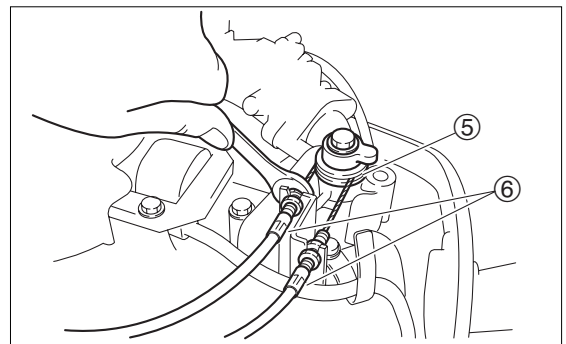
1. Turn fuel cock ① to OFF and remove fuel tank ass'y ② and fuel cock ass'y ①.



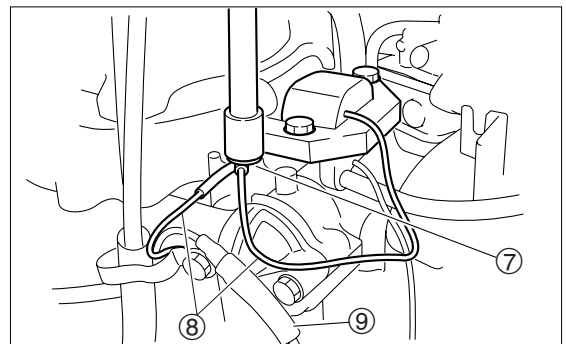
2. Remove choke cable ④ from carburetor ③.



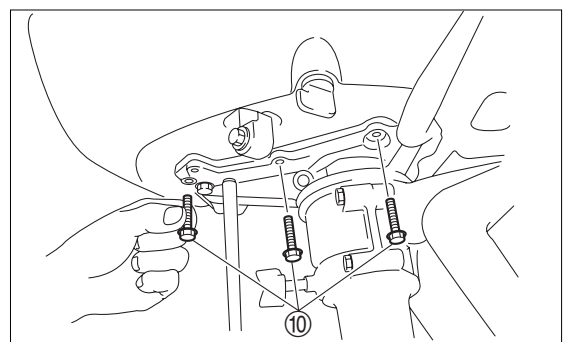
3. Turn throttle grip to full close position, and disconnect throttle cables ⑥ (2 pcs.) from throttle drum ⑤.



4. Remove bolt ⑦ and disconnect leads (black) ⑧ of igniter and stop switch.



5. Disconnect lead ⑨ (brown) of igniter.



6. Remove bolts ⑩ (7 pcs.), and then, lift power unit to remove.



When lifting power unit, perform the work carefully while checking if cables and hoses are caught by other parts.

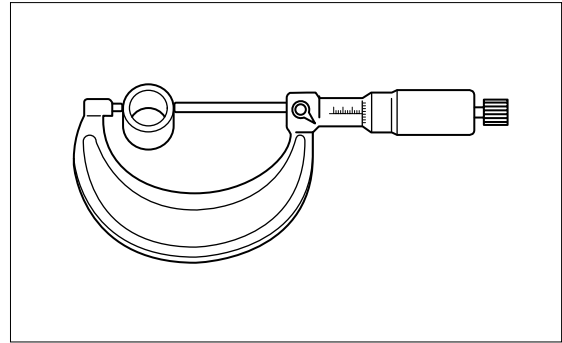


Power Unit

22) Inspection of Piston Pin

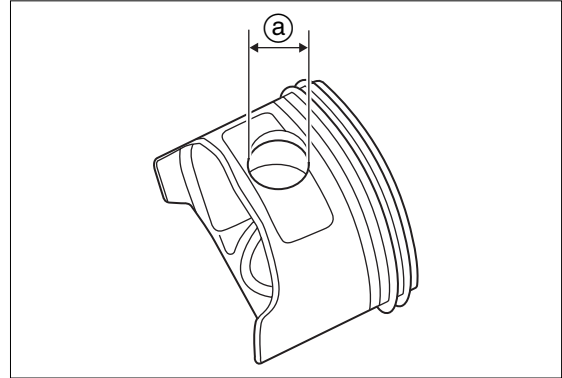
1. Measure piston pin outer diameter. Replace if it is less than specified value.

	Piston Pin Outer Diameter : Standard value 14.00 mm (0.5512in)
	Functional Limit : 13.97 mm (0.5500 in)



2. Measure piston pin boss inner diameter (a).
3. Obtain clearance between piston pin and pin boss. Replace piston pin or piston if the clearance is over specified value.

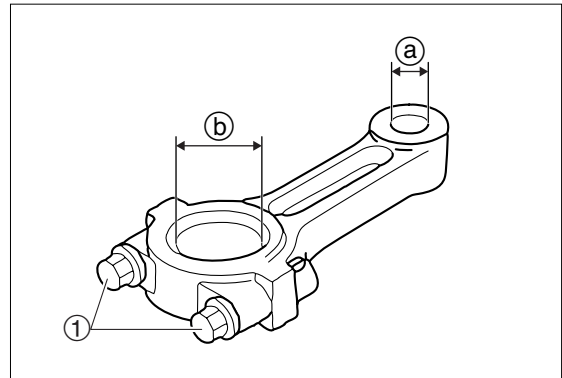
	Clearance between Piston Pin and Pin Hole : 0.002 - 0.012 mm (0.00008 - 0.00047 in)
	Functional Limit : 0.040 mm (0.00157 in)



23) Inspection Connecting Rod Small End Inner Diameter

1. Measure connecting rod small end inner diameter (a). Replace if it is over specified value.

	Connecting Rod Small End Inner Diameter (a) : Standard value 14.01 mm (0.5516 in)
	Functional Limit : 14.04 mm (0.5528 in)



24) Inspection of Connecting Rod Big End Inner Diameter

1. Tighten connecting rod cap bolts to specified torque, and measure connecting rod big end inner diameter (b). Replace if it is over specified value.

	Connecting Rod Bolts (1) : 1st tightening torque : 5 N · m (4 lb · ft) [0.5 kgf · m] 2nd tightening torque : 10 N · m (7 lb · ft) [1.0 kgf · m]
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	Connecting Rod Big End Inner Diameter (b) : Standard value 20.010 mm (0.78780 in)
	Functional Limit : 20.015 mm (0.78799 in)



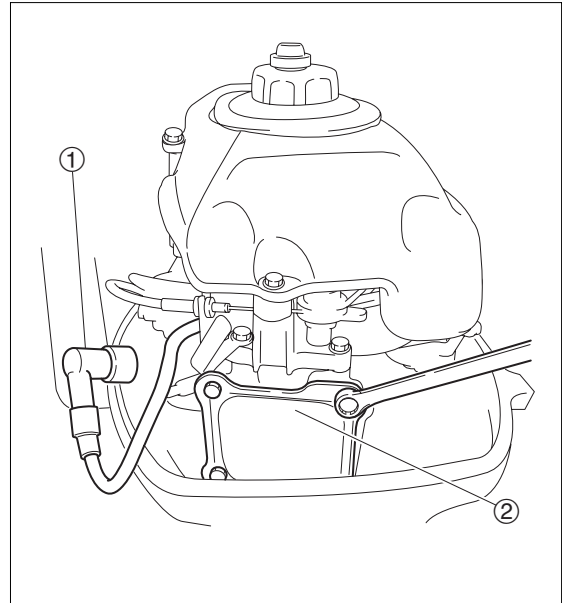
Maintenance

13) Inspection and Adjustment of Valve Clearances

1. Disconnect plug cap ① connection, and then, remove spark plug and cylinder head cover ②.



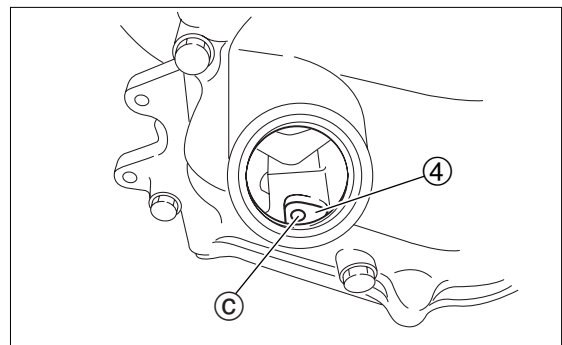
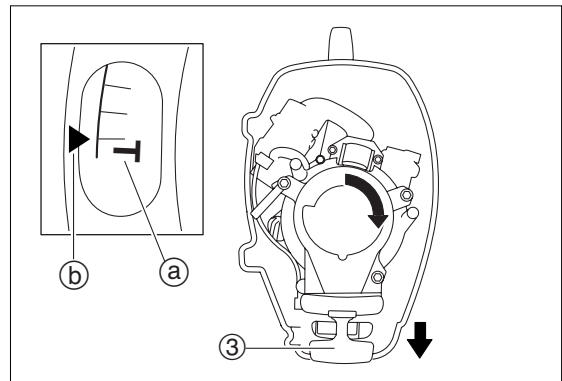
When removing or installing cylinder head cover without removing power unit, use 10 mm box wrench with large offset angle.



2. Pull recoil starter ③ to turn flywheel clockwise until flywheel "T" mark (a) is brought to flywheel cover "▲" mark (b).



- Set piston to top dead center of compression stroke.
- Remove oil filler cap and check that ø5 mm (0.2 in) hole (c) of cam shaft gear (4) can be seen.



3. Check clearances of intake valve (d) and exhaust valve (e). Adjust gap if it is out of specified range.



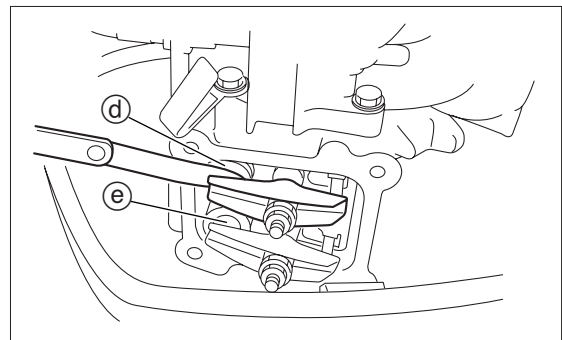
Perform inspection and adjustment of valve clearances when engine is cold.



Valve Clearance (when engine is cold) :

(IN) Intake side (d) : 0.06 - 0.14 mm
(0.0024 - 0.0055 in)

(EX) Exhaust side (e) : 0.11 - 0.19 mm
(0.0043 - 0.0075 in)



40) Assembly of Power Unit

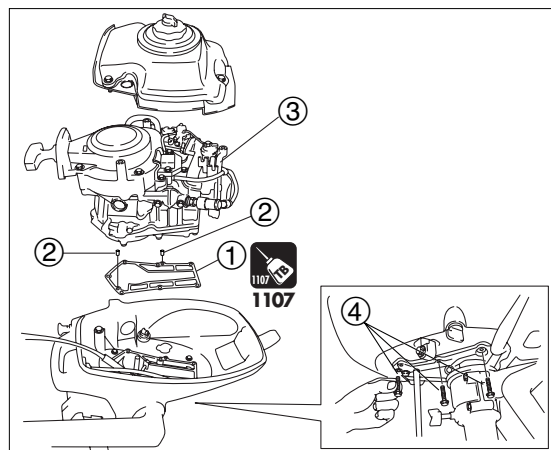
1. Apply ThreeBond 1107 to both faces of new gasket, and attach dowel pins ③ (2 pcs.) and gasket ①.
2. Install power unit ③, and tighten bolts ④ (7 pcs.) in two or three steps to specified torque.



Power Unit Installation Bolt :

6 N · m (4 lb · ft) [0.6 kgf · m]

3. Connect igniter leads and stop switch leads (two leads respectively).
4. Connect choke wire ⑤.



5. Connect throttle cable ⑥. Refer to 3.4.7.
6. Apply grease to sliding parts such as rods and cables.
7. Install fuel tank ⑦ and fuel cock ass'y ⑧, and tighten the bolts to specified torque.

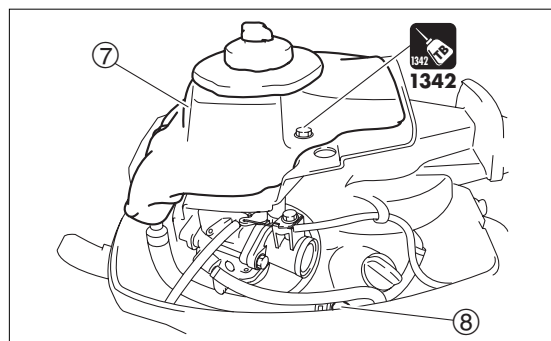
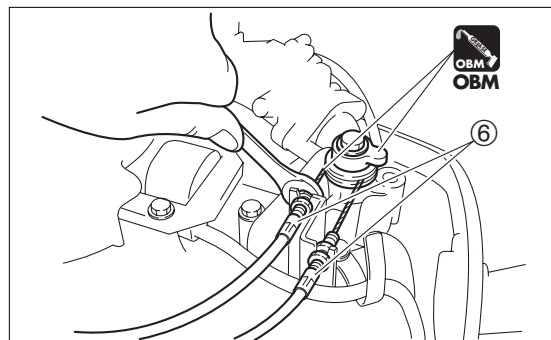
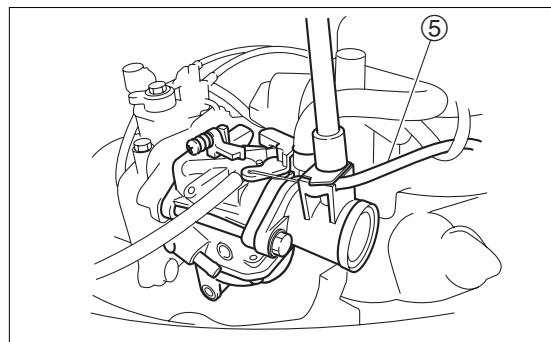


Fuel Tank Bolts :

6 N · m (4 lb · ft) [0.6 kgf · m]



1342



8. Fill with specified amount of engine oil.



Engine Oil :

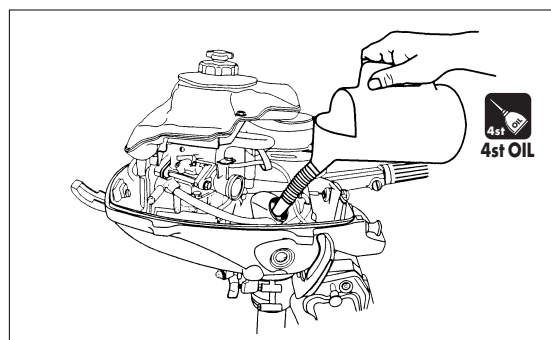
4 Stroke Engine Oil

API : SF, SG, SH

SAE : 10W-30, 10W-40

NMMA : FC-W Certified 10W-30

Quantity of Engine Oil : 300 cm³ (10 fl.oz)

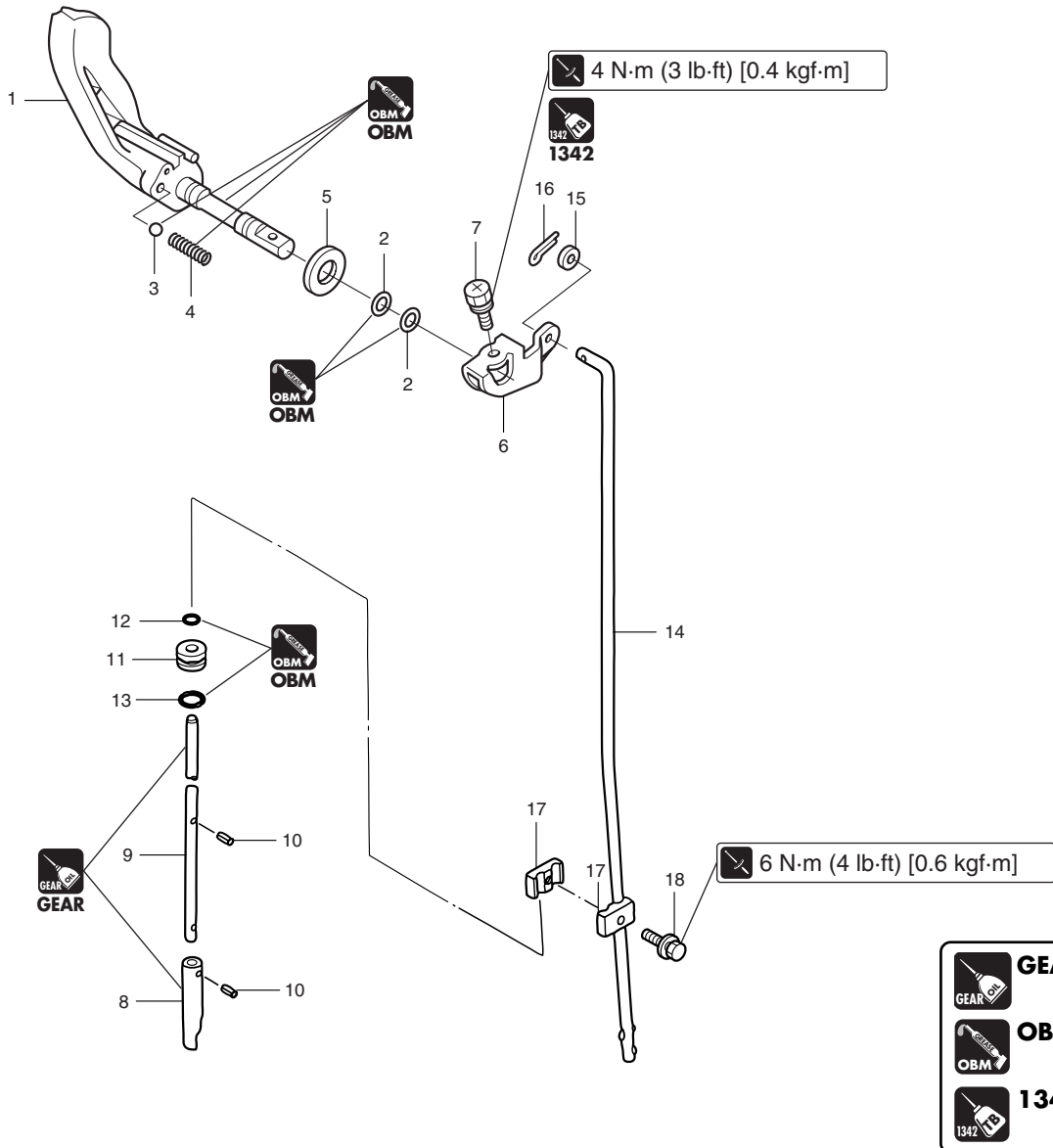




Lower Unit

Shift

P/L Fig. 12



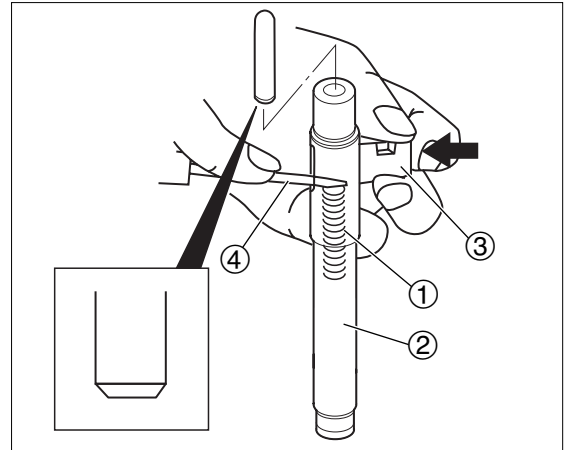
Ref. No.	Description	Qty	Remarks
1	Shift Lever	1	
2	O-Ring, 1.9-6.8	2	Do not reuse.
3	Ceramic Ball, 7.7	1	
4	Shift Lever Stopper Spring	1	
5	Washer, 10.5-18-1.5	1	
6	Shift Rod Lever	1	
7	Bolt	1	M6 L=12mm
8	Clutch Cam	1	
9	Cam Rod "S"	1	for "S"
	Cam Rod "L"	1	for "L"
10	Spring Pin, 3-8	2	Do not reuse.
11	Cam Rod Bushing	1	
12	O-Ring, 2.5-4.9	1	Do not reuse.
13	O-Ring, 2.4-9.5	1	Do not reuse.
14	Shift Rod	1	
15	Washer	1	
16	Split Pin, 2-12	1	Do not reuse.
17	Shift Rod Joint	1set	
18	Bolt	1	M6 L=16mm

9) Assembly of Propeller Shaft Ass'y

1. Put clutch spring ① and attach clutch ③ to propeller shaft ②.



When installing clutch ③, push down clutch spring ① by using a bladed screw driver ④.

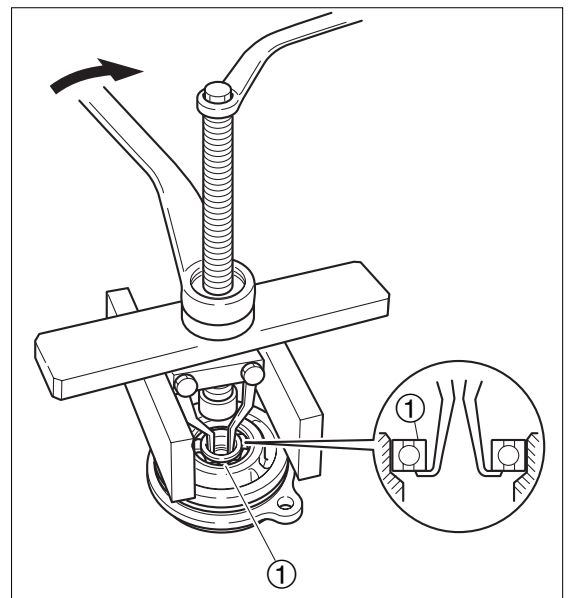


10) Disassembly of Propeller Shaft Housing

1. Remove bearing ① by using commercially available bearing puller.

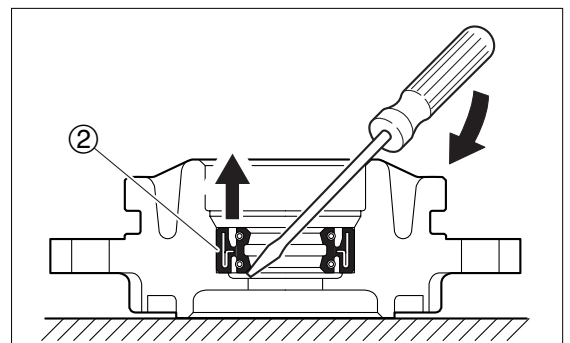
CAUTION

- Do not reuse removed bearing.
- When reusing bearing without removing it, check it for play or deflection. Replace if necessary.



② Do not reuse.

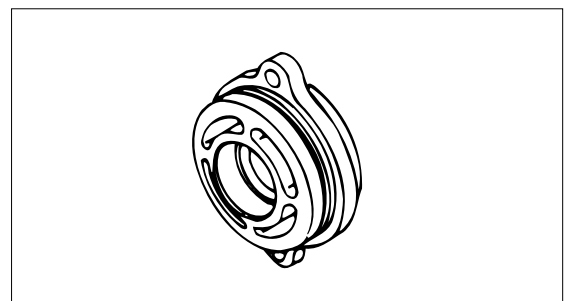
2. Remove oil seal ②.



Do not reuse.

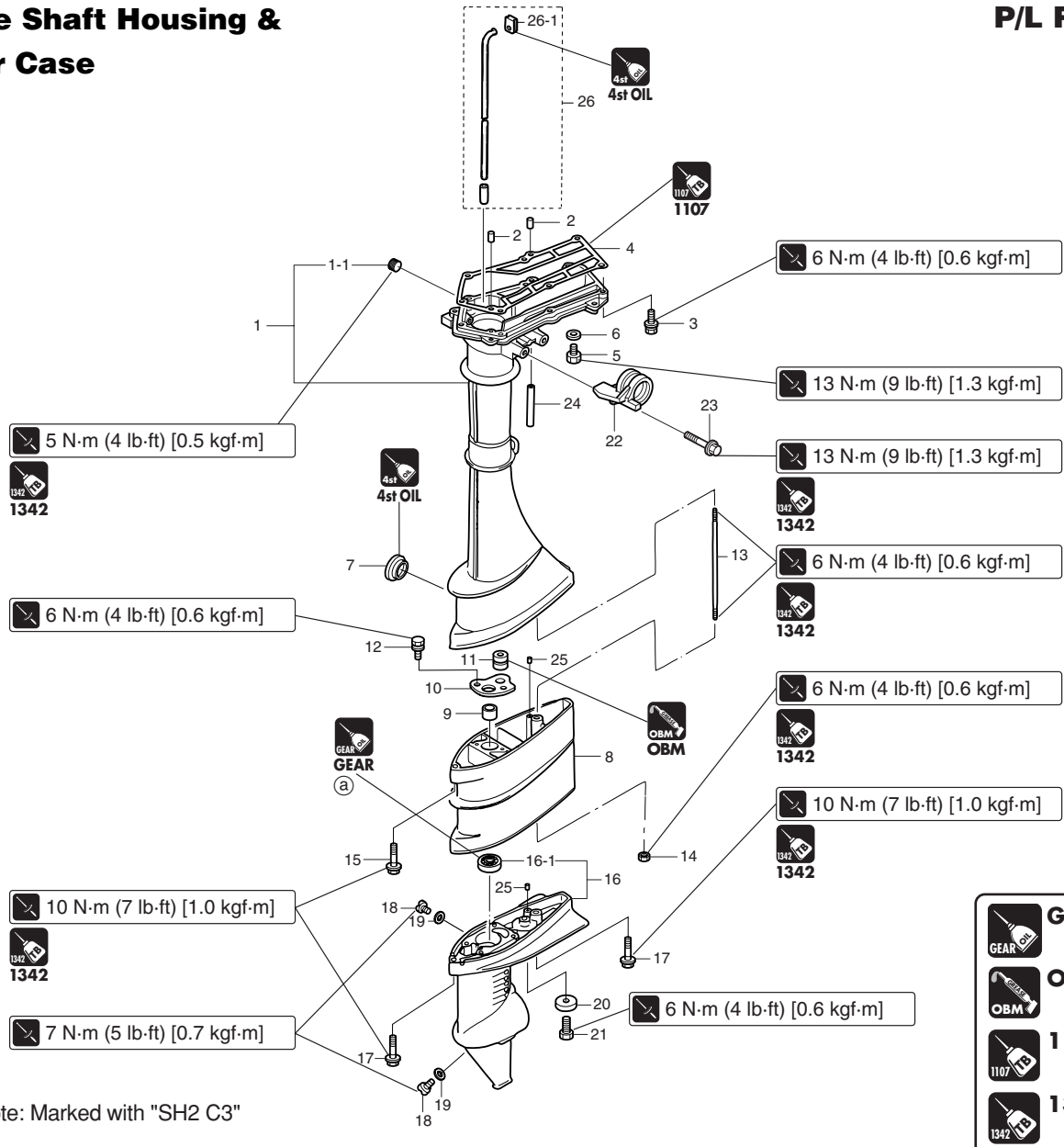
11) Inspection of Propeller Shaft Housing

1. Use cleaning oil and cleaning brush to clean propeller shaft housing, and check it for cracks or damage. Replace if necessary.
2. When reusing bearing without removing it, check it for play or deflection. Replace if necessary.



Drive Shaft Housing & Gear Case

P/L Fig. 9



(a) Note: Marked with "SH2 C3"

	GEAR
	OBM
	1107
	1342

7

Ref. No.	Part Name	Qty	Remarks
1	Drive Shaft Housing "S"	1	
1-1	Exhaust Plug	1	PT 1/8
2	Dowel Pin, 6-12	2	
3	Bolt	7	M6 L=30mm
4	Drive Shaft Housing Gasket	1	Do not reuse.
5	Water Plug	1	M8 P1.25
6	Gasket, 8.1-15-1	1	Do not reuse.
7	Grommet, 29-3	1	
8	Extension Housing " L"	1	for "L"
9	Drive Shaft Bushing	1	
10	Drive Shaft Bushing Stopper	1	
11	Grommet, 13-2	1	
12	Bolt	2	M6 L=12mm
13	Stud Bolt, 6-171	1	M6 L=171mm
14	Nut	1	M6
15	Bolt, 6-30 Pre-coated	1	M6 L=30mm
16	Gear Case	1	
16-1	Ball Bearing, 6000	1	Do not reuse.
17	Bolt, 6-30 Pre-coated	2	M6 L=30mm
18	Oil Plug	2	ø6
19	Gasket, 8.1-15-1	2	Do not reuse.
20	Anode	1	
21	Bolt	1	M6 L=16mm
22	Steering Bracket	1	

Ref. No.	Part Name	Qty	Remarks
23	Bolt	2	M8 L=35mm
24	Rubber Hose	1	
25	Dowel Pin, 6-12	2	
26	Water Pipe "S"	1	for "S"
	Water Pipe "L"	1	for "L"
26-1	Water Pipe Grommet (Upper)	1	