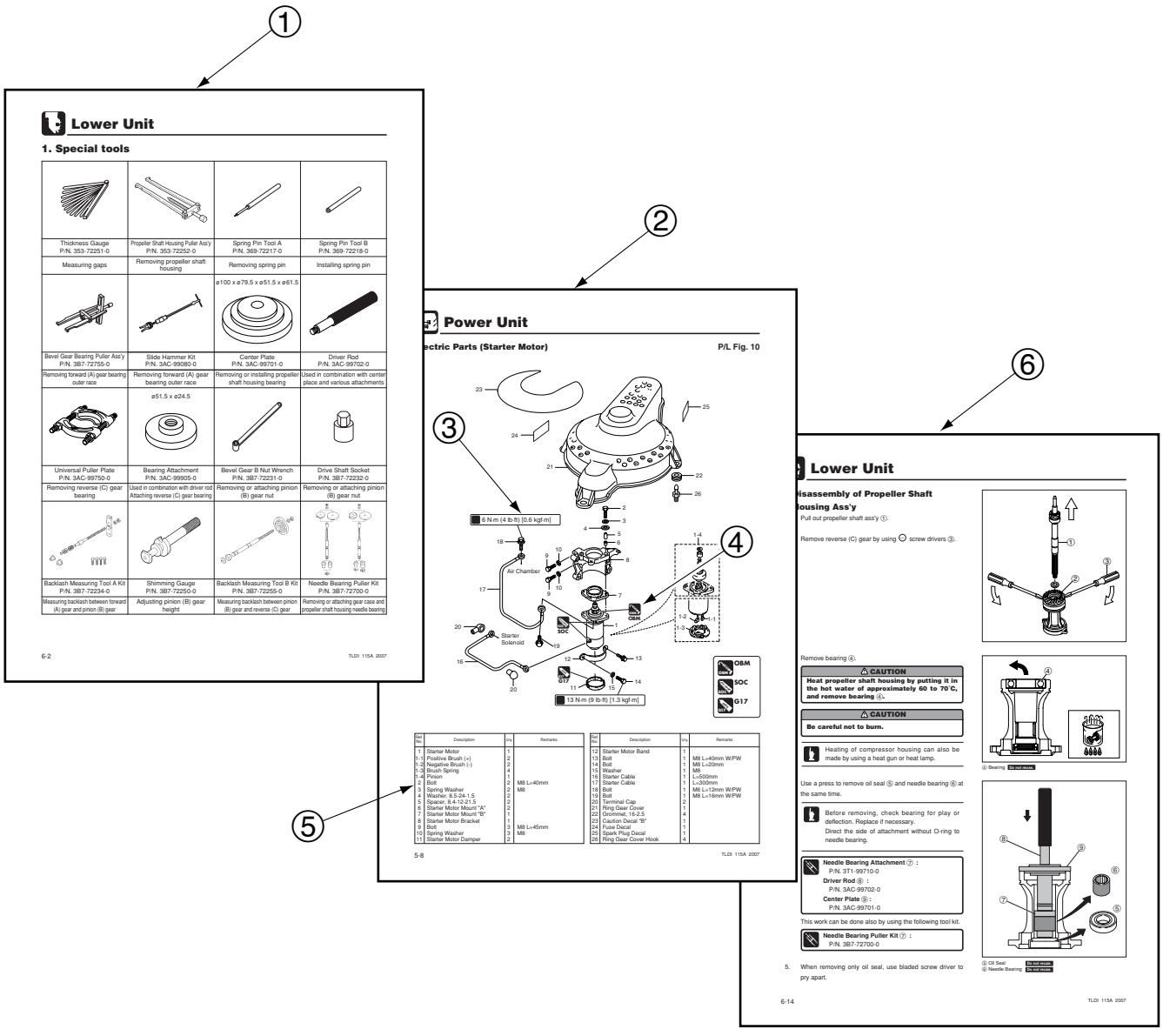
About this manual

Composition and use of this manual

This service manual is designed so that service persons are able to perform their work correctly.
Understand the following matters well for efficient works.

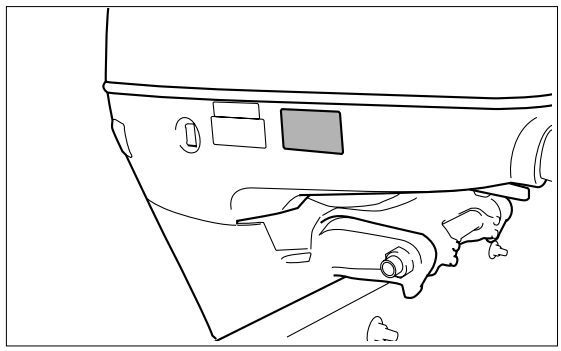
① Each chapter begins with the introduction of special tools that are used for the work described in the chapter so that the service persons are able to figure out the tools needed.
② Parts that are serviced in each chapter and their details are presented by using a component composition diagram.
③ Driving torques are described in the component composition diagram and in the body text are critical points of the applicable work.
④ Pictograms indicate that there is an important work instruction for the relevant parts. It also shows the type of lubricant and its application point(s).
⑤ The component composition diagrams describe the names of the parts, the number of pieces of the parts used, size of fasteners and special notes.
⑥ Specific works are described in detail by using illustrations and adding advice on the work.



1. Identification (Engine Serial Number)

Engine serial number is stamped on the bottom cowl of outboard motor body.

① Model Name
② Model Type
③ Serial Number

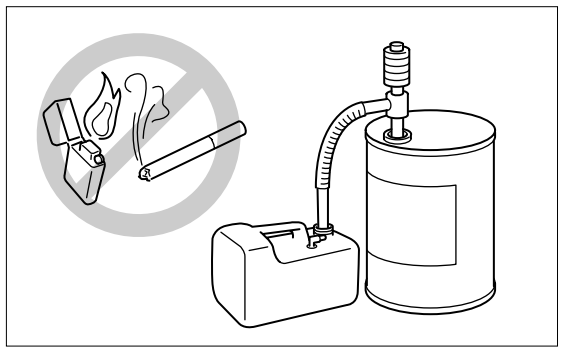


Tokyo, Made in Japan
2006 Model 115A ① 3T1 ②
SERIAL No. XXXXXXXX ③
RATED POWER 84.6 kW
FULL THROTTLE RANGE
5150 5850 r / min
MASS 178 181 kg

2. Securing of work safety

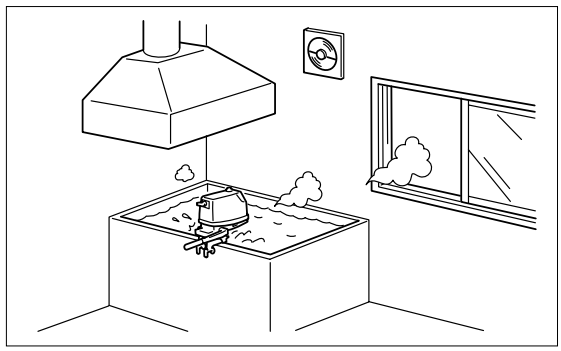
1) Fire Prevention

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



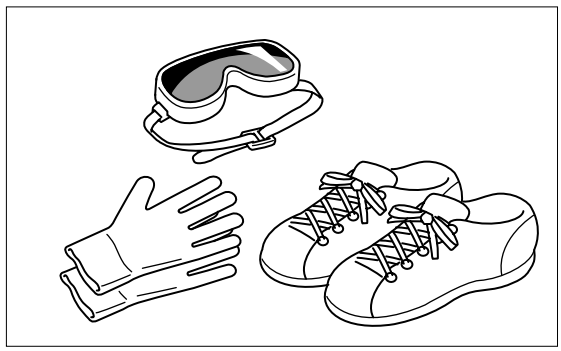
2) Ventilation

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



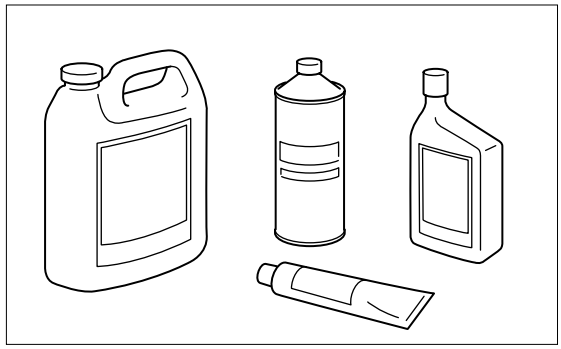
3) Protection

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



4) Genuine Parts

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



6) Fuel Line

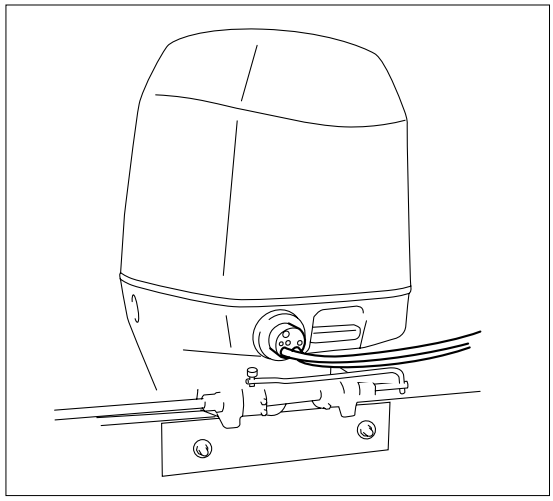
Check that fuel tank contains sufficient amount of gasoline, fuel line is connected and does not leak.

⚠ CAUTION

Supply only unleaded regular octane gasoline into fuel tank. Never use fuel mixed with oil. Use of fuel mixed with engine oil will cause engine trouble.

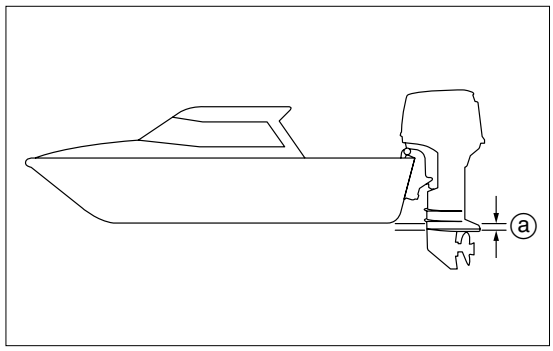
7) Installation of Outboard Motor (Rigging)

Check that outboard motor is fixed on the hull with installation bolts and nuts securely. Check location of anti-ventilation plate relative to boat bottom.



Test-run to determine the best installation height.

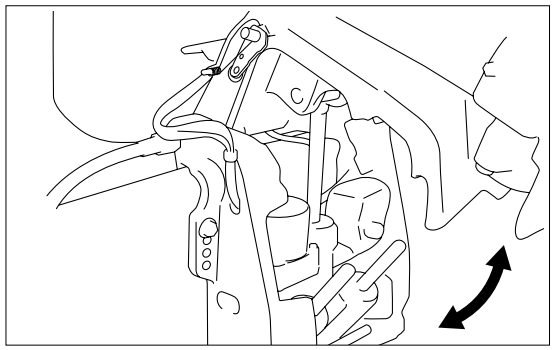
Anti-ventilation plate standard position ⓐ :
5～25 mm (0.2～1.0in) below boat bottom



ⓐ 5 - 25 mm (0.2 - 1.0 in)

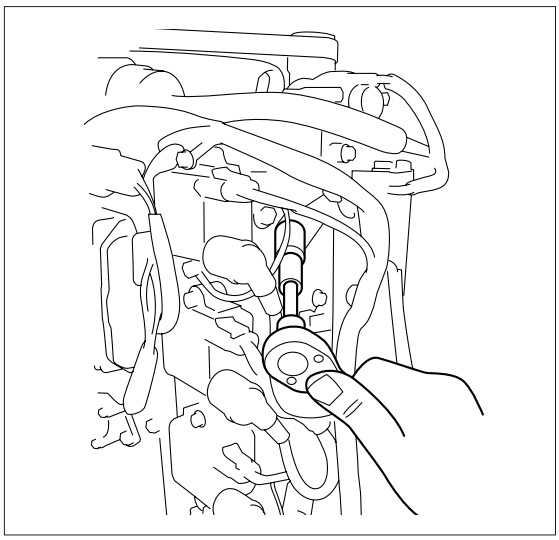
8) Inspection of PTT Unit

1. Operate PTT switch to check that outboard motor tilts up/down smoothly.
2. Operate PTT switch to check that tilting up/down outboard makes no abnormal noise.
3. Tilt up outboard motor and steer fully to the right and left to check that cables and hoses do not interfere with each other and with any part of hull.
4. Tilt outboard motor down to check that trim meter indicates the lowest position.



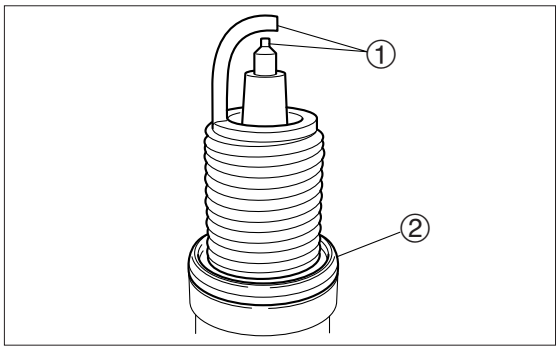
3) Inspection of Spark Plugs

1. Remove plug caps and then spark plugs.



2. Clean spark plug electrodes ① by using spark plug cleaner. Replace if necessary.

3. Check electrodes ① for corrosion or excessive build up of carbon, and washer ② for damage. Replace if necessary.

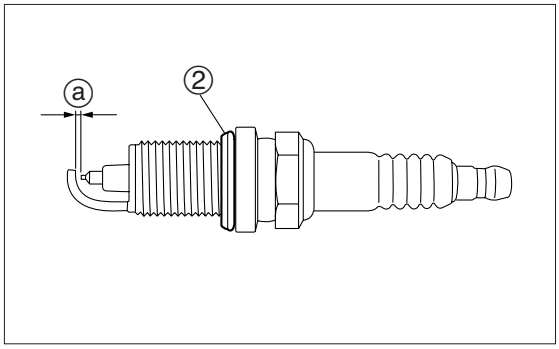


4. Check spark plug gap ⓐ. Replace if it is over specified value. Adjust gap if it is out of specified range.

Spark Plug Gap ⓐ:Standard Value
0.7 - 0.8 mm (0.029 - 0.032 in)

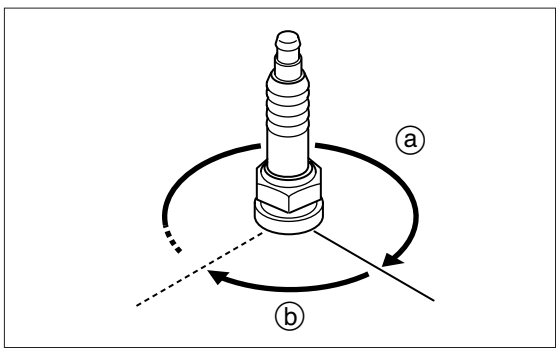
Functional Limit:
0.9 mm (0.036 in)

Specified Spark Plug:
IZFR5J [NGK]



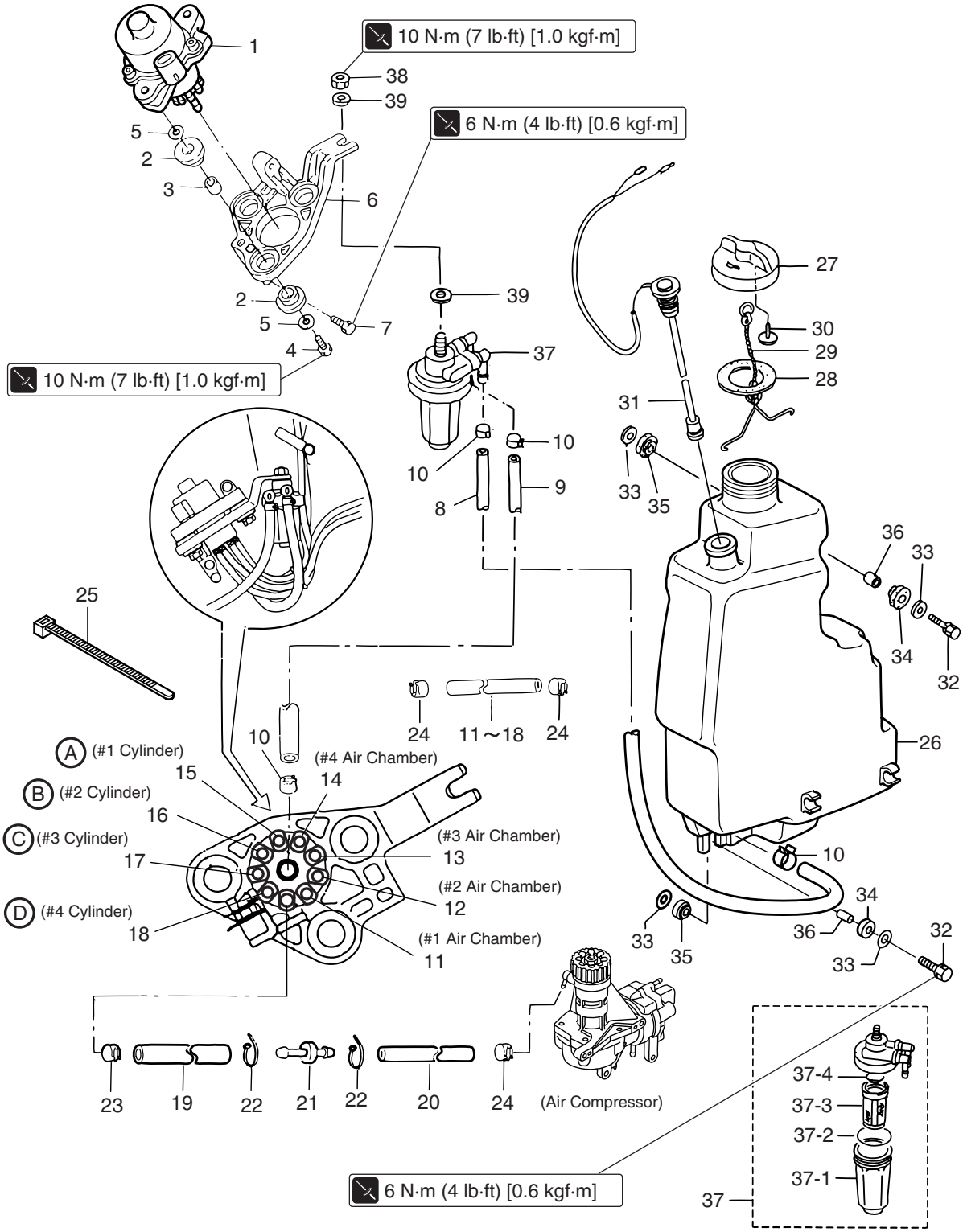
5. Install spark plug, fully hand-tighten ⓐ, and then use plug wrench to tighten to specified torque ⓑ.

Spark Plug:
25 N · m (18 lb · ft) [2.5 kgf · m]



Oil Pump

P/L Fig. 12



5) Disassembly of Compressor Housing

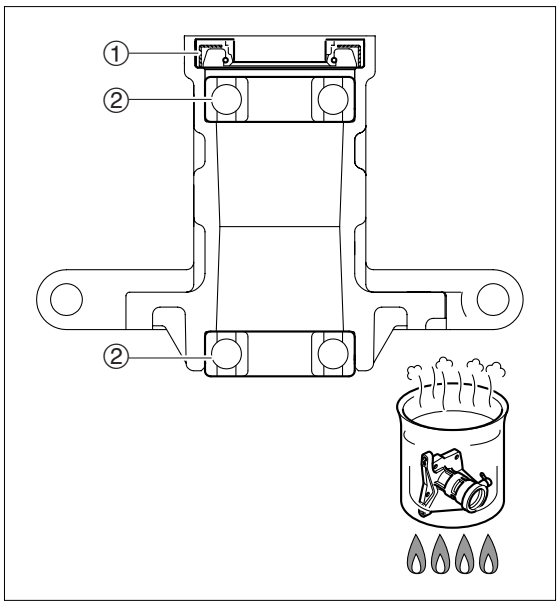
1. Remove oil seal ① and bearing ②.

Heat compressor housing to 60 to 70 degrees Centigrade (140 to 158 degrees Fahrenheit) by using hot water before removing bearing ②.

⚠ CAUTION

Do not reuse removed bearing.

Heating of compressor housing can also be made by using a heat gun or heat lamp.

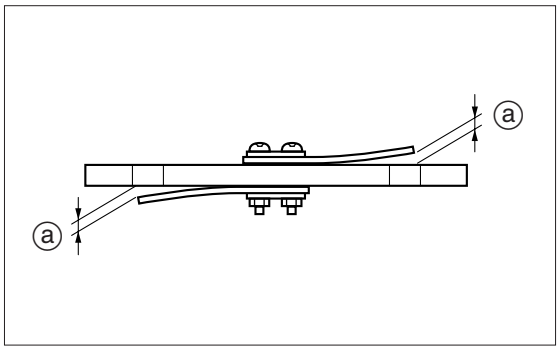


① ② **Do not reuse**

6) Inspection of Reed Valve

1. Check if reed valve is bent, damaged or worn.
   Replace reed valve ass'y if the reed valve gap is over the specified limit.

Gap of Reed Valve at the Tip ⓐ :
0.2 mm (0.008 in)or less



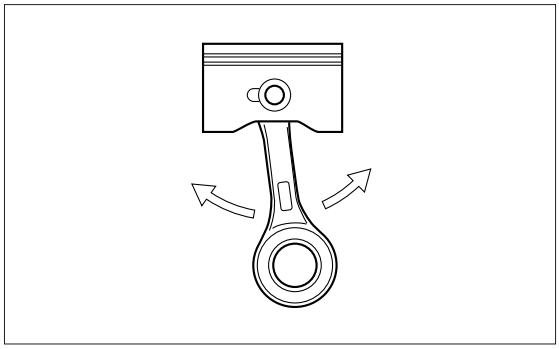
7) Inspection of Cylinder and Piston

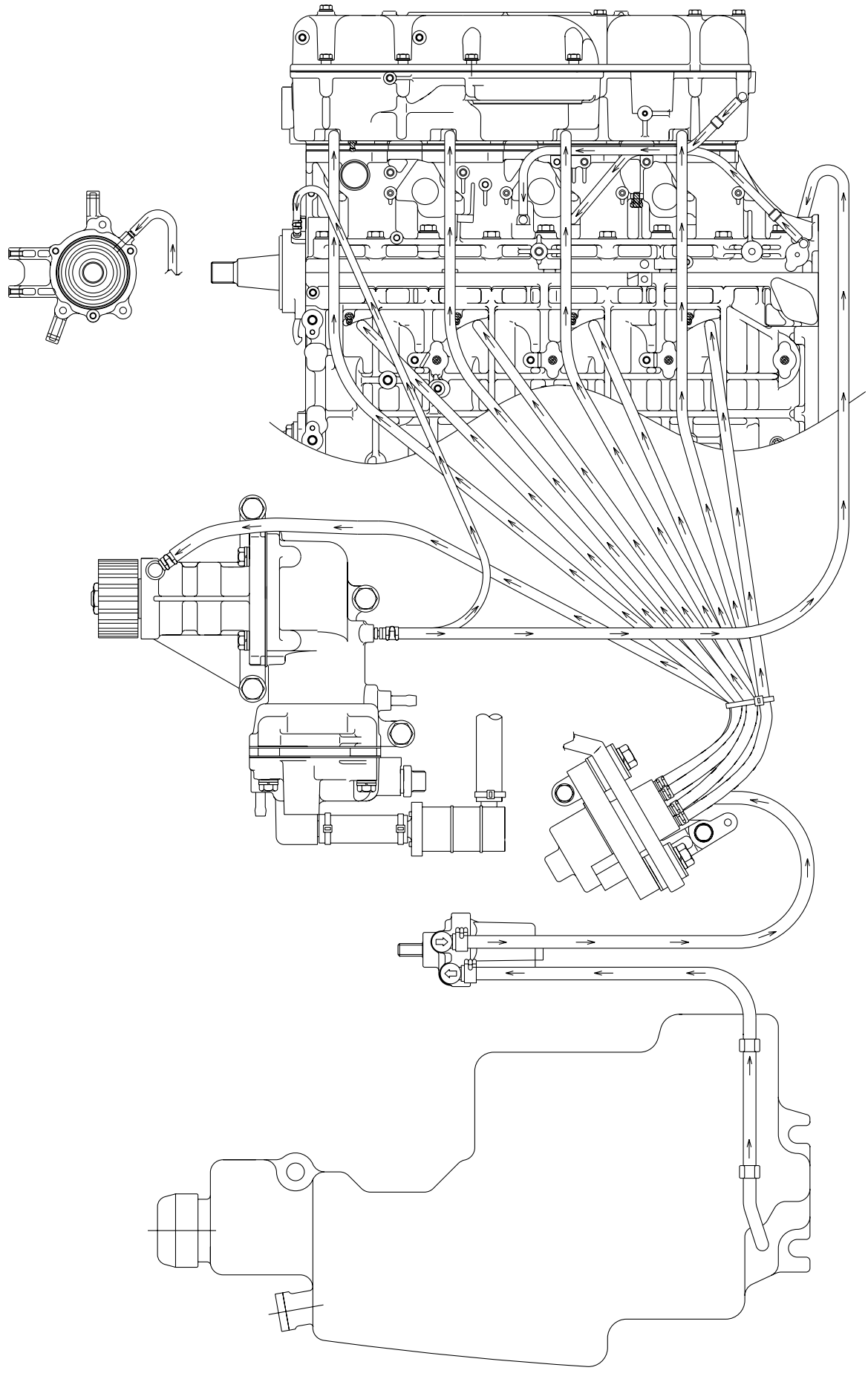
1. Clean compressor cylinder, compressor head and compressor housing, check the parts for cracks damages.
   Replace if necessary.

2. Check cylinder wall for wear or scuffing.
   Replace if necessary.

3. Clean piston and check for crack and damages.
   Replace if necessary.

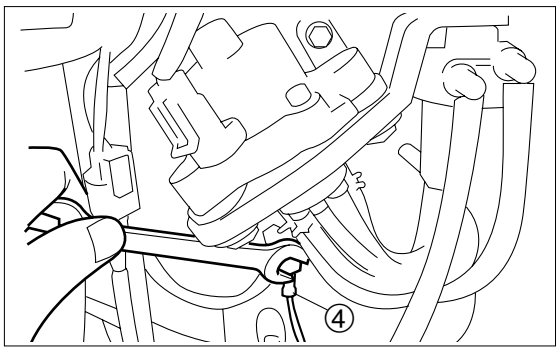
4. Check that connecting rod small end moves smoothly.
   Replace if necessary.



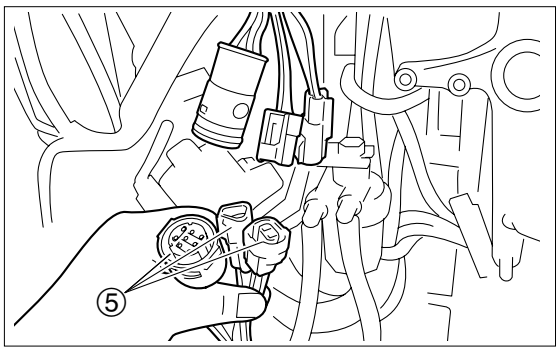


Arrangement of Oil Feed Lines

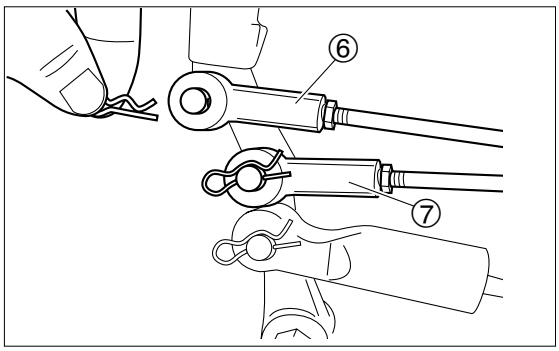
5. Disconnect earth wire ④ located below electric oil pump.



6. Disconnect remote control harness connectors ⑤.

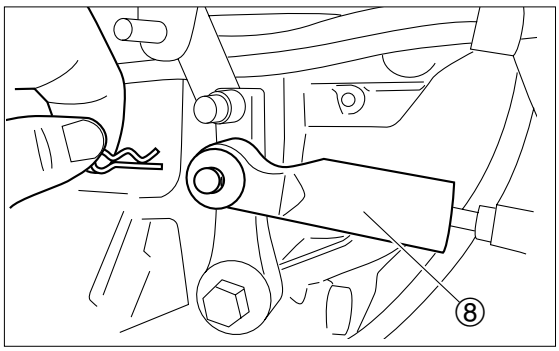


7. Remove "R" shaped pins and then throttle cable ⑥ and shift cable ⑦.

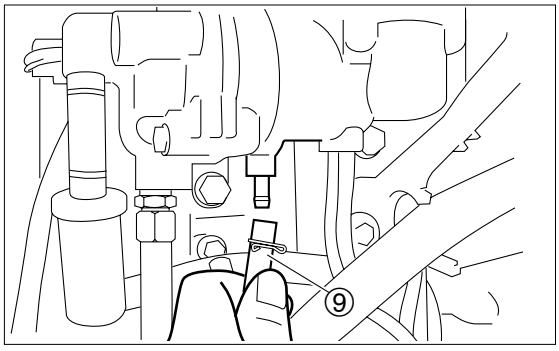


8. Remove shift assist ass'y ⑧ from shift arm.

Be careful not to lose washers that are removed together with cables.



9. Loosen clip of cooling water check port hose ⑨ clip located below air compressor and disconnect the hose.

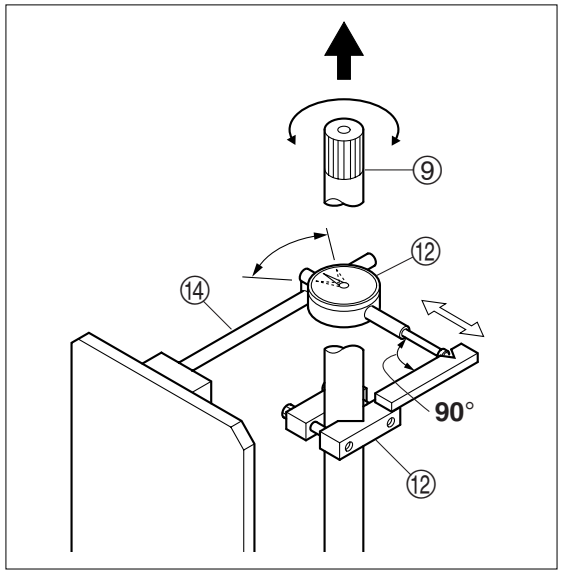


5. Attach backlash measuring tool clamp ⑫ to drive shaft.

6. Turn drive shaft ⑨ clockwise / counterclockwise slowly while pulling it up, and read change of dial gauge ⑬ indication.

When measuring, contact dial gauge tip to inside of V groove located in the clamp ass'y.

Backlash Measuring Tool Clamp ⑫ :
P/N. 3B7-72720-0
Dial Gauge ⑬ :
Commercially Available Item
Magnetic Stand ⑭ :
Commercially Available Item



7. Select proper thickness of shim based on the backlash measured with dial gauge and on the table shown.

Proper Backlash :
0.24 - 0.48 mm (0.0094 - 0.0189 in)

- Confirm dial gauge reading and adjust backlash by using thickness of shim selected.
- Measure backlash several times while changing gear teeth contact position.
- When measuring backlash, make drive shaft pulling up force equal among the measurements.

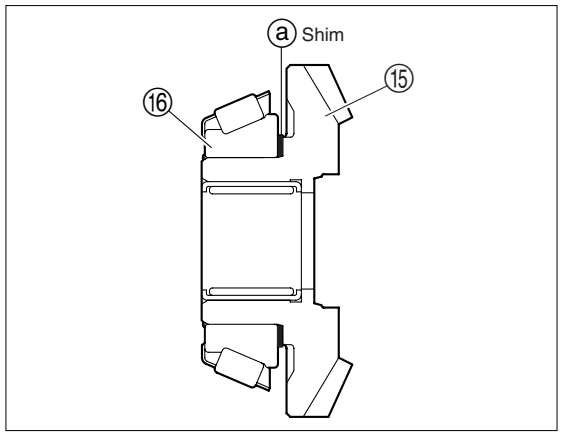
This work can be made easier when the opening of gear case of propeller shaft side is faced upward and fixed horizontally with a holder.

Dial Gauge Reading : mm (in)		Shim Thickness : mm (in) + means addition of shim/- means removal of shim
0.00 - 0.11	(0.00 - 0.0043)	-0.10 (0.0040)
0.12 - 0.23	(0.0048 - 0.0091)	-0.05 (0.0020)
0.24 - 0.48	(0.0095 - 0.0189)	0.00
0.49 - 0.59	(0.0193 - 0.0232)	+0.05 (0.0020)
0.60 - 0.74	(0.0236 - 0.0291)	+0.10 (0.0039)
0.75 - 0.89	(0.0295 - 0.0351)	+0.15 (0.0059)
0.90 - 1.04	(0.0355 - 0.0410)	+0.20 (0.0079)
1.05 - 1.20	(0.0414 - 0.0473)	+0.25 (0.0100)
1.21 - 1.35	(0.0477 - 0.0532)	+0.30 (0.0118)
1.36 - 1.50	(0.0536 - 0.0591)	+0.35 (0.0138)
1.51 - 1.65	(0.0595 - 0.0650)	+0.40 (0.0157)
1.66 - 1.81	(0.0654 - 0.0713)	+0.45 (0.0177)
1.82 - 1.96	(0.0717 - 0.0772)	+0.50 (0.0197)
1.97 - 2.11	(0.0776 - 0.0831)	+0.55 (0.0217)
2.12 - 2.26	(0.0835 - 0.0890)	+0.60 (0.0240)

8. Add shim ⓐ into the gap between forward (A) gear ⑮ and taper roller bearing ⑯ if necessary.

⚠ CAUTION
For removal or installation of taper roller bearing, refer to;
"Disassembly of Forward (A) Gear" or "Assembly of Forward (A) Gear" respectively.

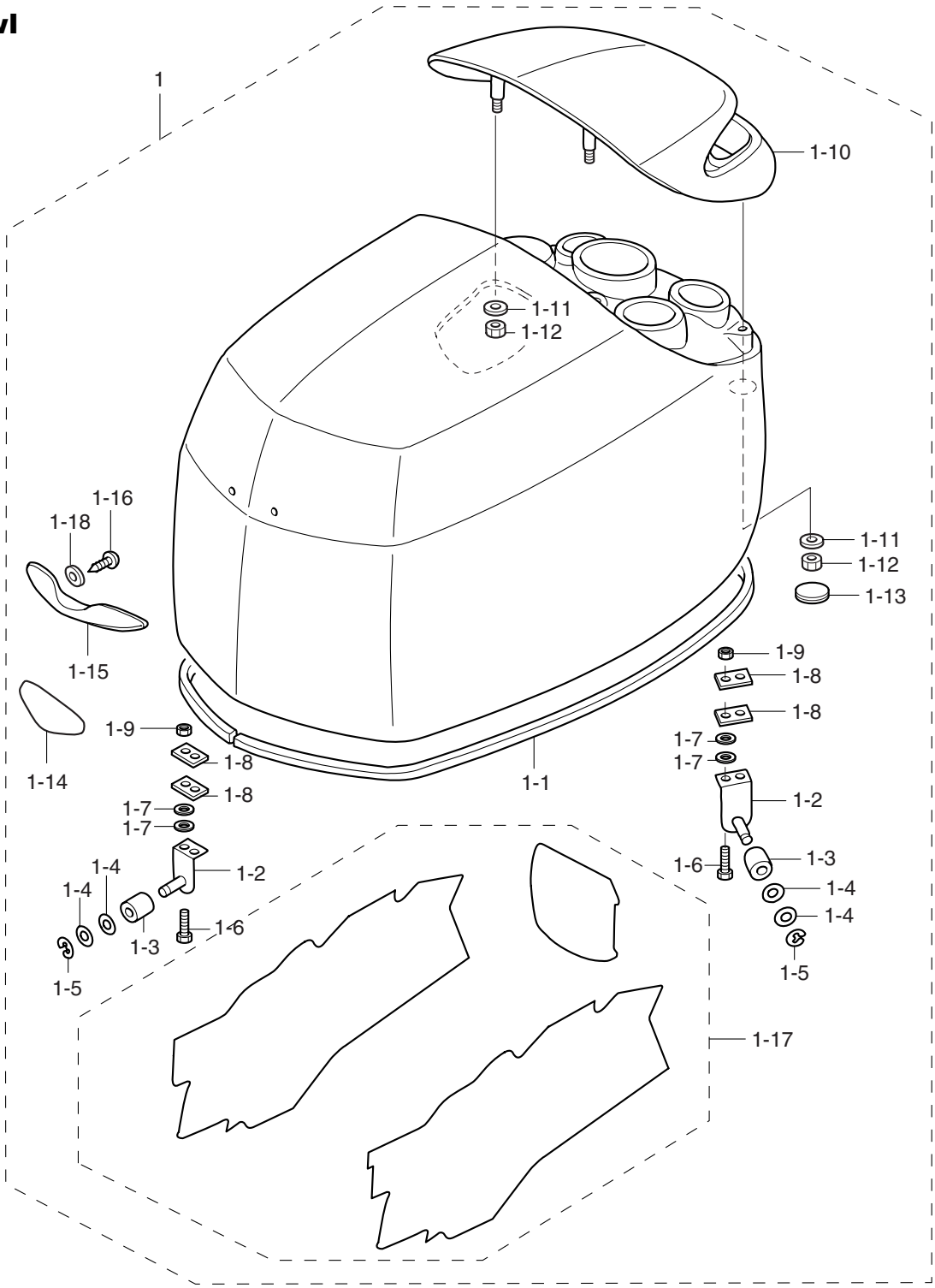
Types of Shims ⓐ :
0.1 mm (0.0039 in) P/N. 3B7-64016-0
0.15 mm (0.0059 in) P/N. 3B7-64015-0



2. Parts Layout

P/L Fig. 20

Cowl



Ref. No.	Description	Q'ty	Remarks
1	Top Cowl	1	UNIQUE
1-1	Top Cowl Seal	1	
1-2	Cover Stay Ass'y	3	
1-3	Roller, 6.1-14.7-14	3	
1-4	Washer	6	M6
1-5	E-Ring, d=5	3	Do not reuse.
1-6	Bolt	6	M5 L=25mm
1-7	Washer	12	M5
1-8	Cover Stay Plate	6	
1-9	Nylon Nut	6	M5

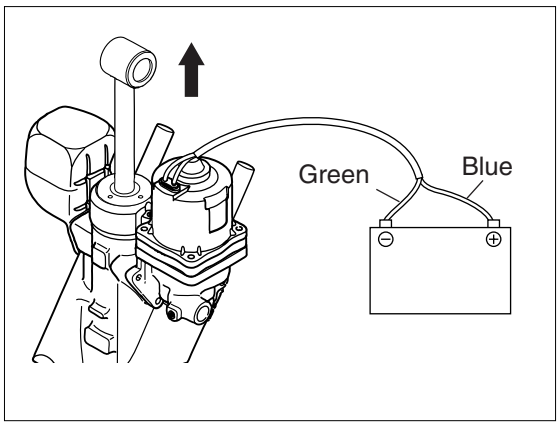
Ref. No.	Description	Q'ty	Remarks
1-10	Tilt Handle	1	
1-11	Washer, 6-16-1.5	4	
1-12	Nylon Nut	4	M6
1-13	Grommet	2	
1-14	Front Mark	1	UNIQUE
1-15	Cowl Handle	1	
1-16	Tapping Screw, 6-16	2	
1-17	Decal Set	set	UNIQUE 2
1-18	Washer, 6.5-23-1.5	2	

5. Attach bushings to PTT (upper) and swivel bracket.

6. Extend tilt rod until PTT tilt rod hole aligns with swivel bracket hole.

7. Install cylinder pin upper ④ and secure with bolt ⑤.

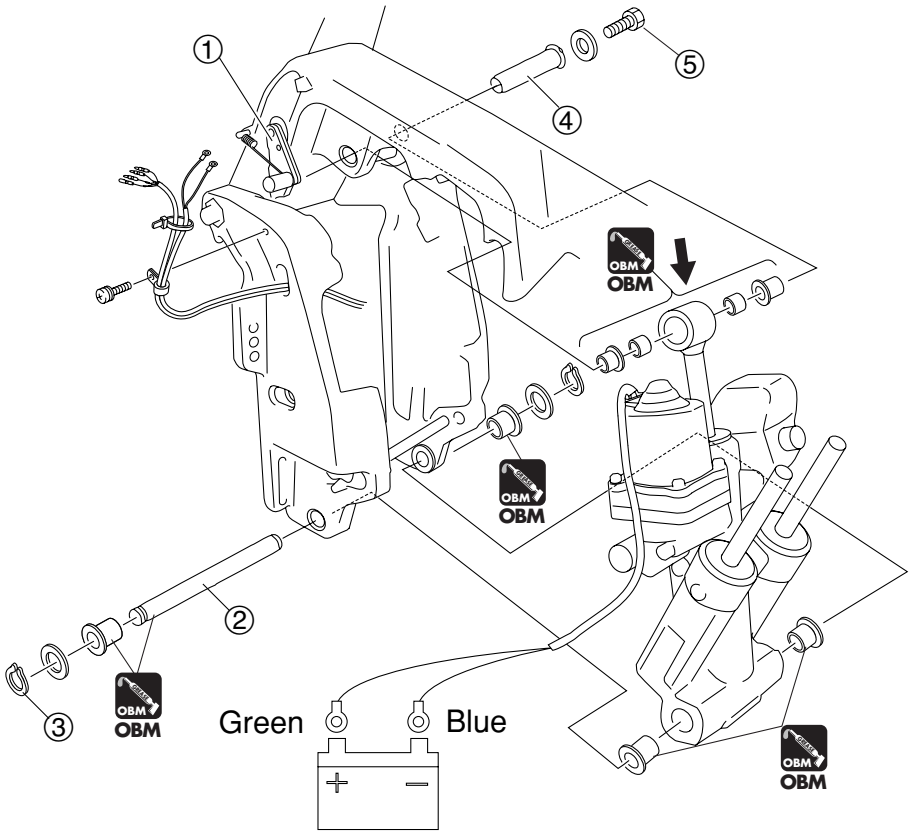
8. Run PTT and trim sensor leads through clamp bracket hole and collect them using wire clamp and tile wrap.



Connect blue lead to battery positive terminal to extend tilt rod.
Connect green lead to battery positive terminal to retract tilt rod.

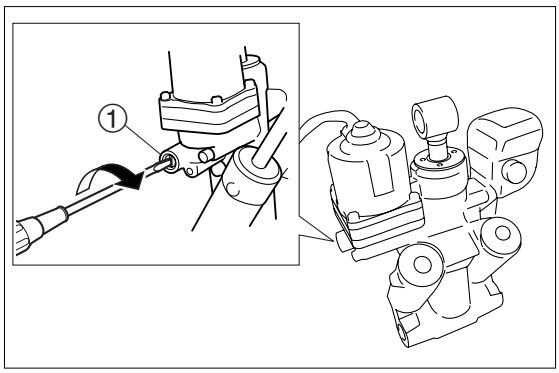
⚠ WARNING

Connecting electrical wires to battery terminals may cause sparks to occur. Do not perform this work when flammable matter is near the working area.



7

24) Air-Purging PTT Unit



1. Turn manual valve ① clockwise to tighten.
2. Set PTT unit upright.
3. Remove reservoir cap and check PTT fluid level.

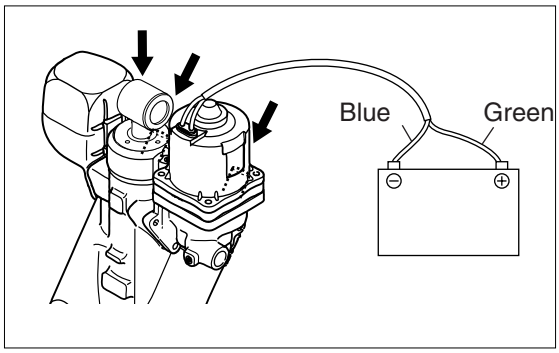
> **⚠ CAUTION**
>
> **If the fluid level is correct, the fluid should overflow out of the filter hole when the reservoir cap is removed.**

4. Add fluid until filter hole is filled if necessary.

> **PTT Fluid :**
> ATF DEXIRON III

5. Tighten reservoir cap to specified torque.

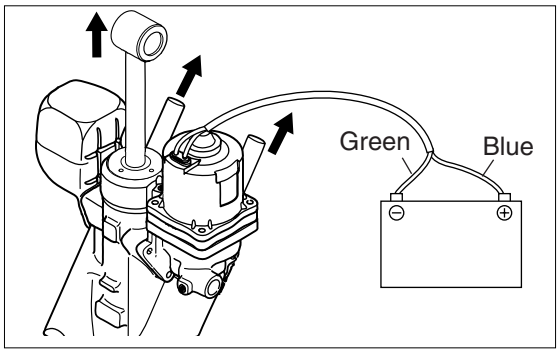
> **Reservoir Cap :**
> 7 N · m (5 lb · ft) [0.7 kgf · m]



6. Connect PTT motor leads to battery terminals to retract power trim and tilt rods.

Rod	PTT Motor Lead	Battery Terminal
DOWN	Green	⊕
	Blue	⊖

> **⚠ WARNING**
>
> **Connecting electrical wires to battery terminals may cause sparks to occur. Do not perform this work when flammable matter is near the working area.**

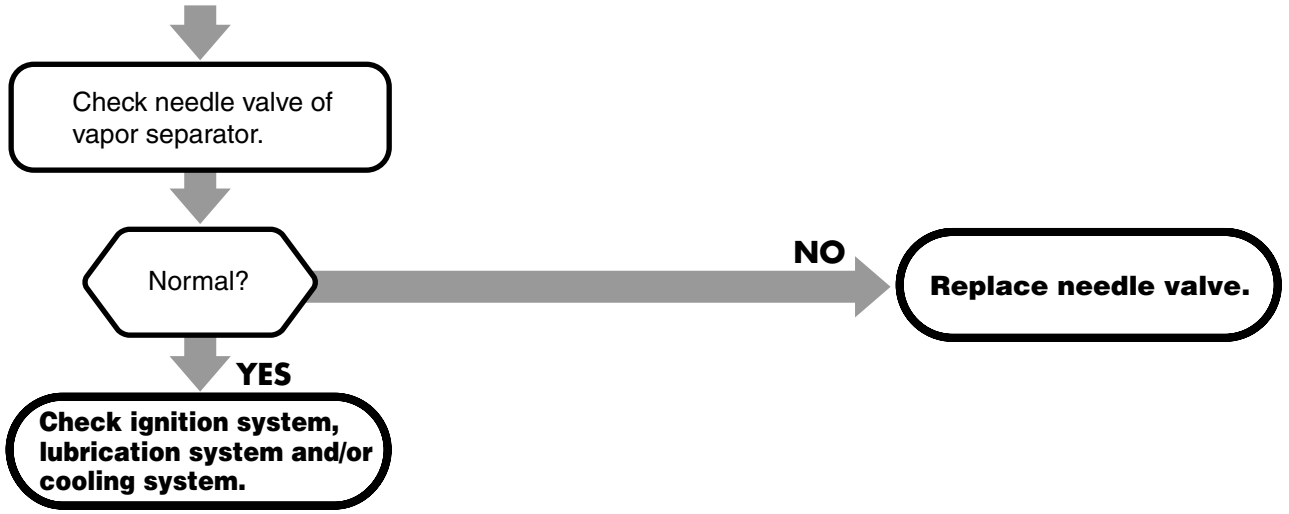


7. Reverse the motor lead connections to fully extend the rods.

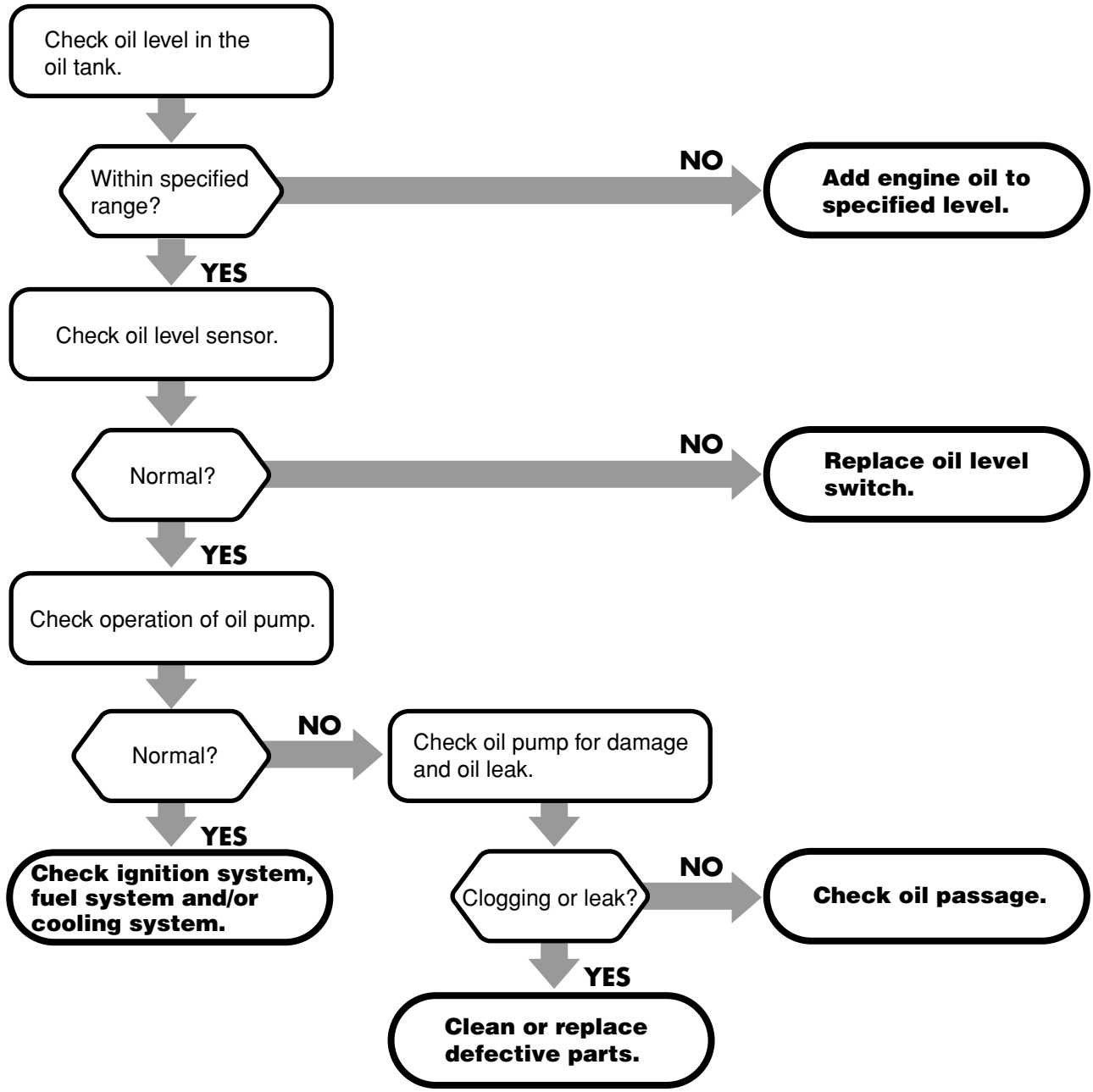
Rod	PTT Motor Lead	Battery Terminal
UP	Blue	⊕
	Green	⊖

> **⚠ CAUTION**
>
> - **Repeat these steps several times to retract and extend the rods. (Take time between the steps to assure this process.)**
> - **If the rods cannot extend and retract well, assist the motion with hand.**

8. Fully extent tilt rod and check fluid level.
   Add fluid if necessary.

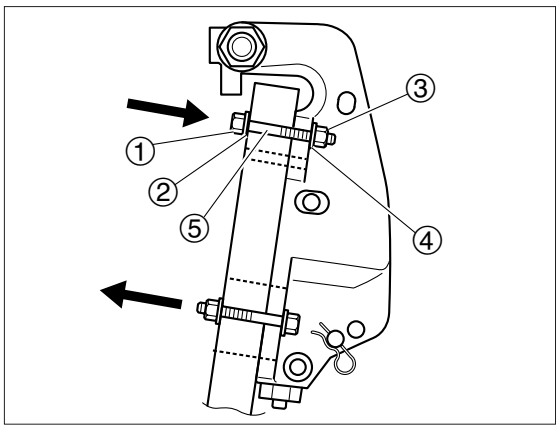


Lubrication system



3. Install outboard motor(s).

4. Secure the outboard motor by using fasteners contained in the package of the product.
   ① : 12.7mm (1/2in.) Bolts (4 pcs.)
   ② : Flat Washers (4 pcs.)
   ③ : Lock Nuts (4 pcs.)
   ④ : Flat Washers (4 pcs.)
   ④ : Marine Sealant : Apply to the bolts' surface excluding their threaded area.



3. Fuel System

It is recommended to install additional large sized fuel/water separator on the boat to effectively remove water and foreign substances contained in the fuel. At the same time however, note that the fuel filter added to the fuel system may prevent smooth flow of fuel, possibly causing the engine to stall at low speeds, or fuel to be lean at higher engine speed resulting in giving damage to the engine. Use of valve fitting can also cause similar troubles.

⚠ WARNING

To prevent damaging to the engine, use the following steps to prime the electric oil pump, pressure-feed the oil, and air-purge the oil in the order described below before starting the engine initially after the installation of the outboard motor.

1) Fuel

Avoid the use of old gasoline or gasoline containing impurities such as sand or mud in any occasion such as break-in operation of the engine and even after the break-in.

⚠ WARNING

Do not use gasoline pre-mixed with engine oil for this engine.

2) Oil

Use Genium MD Oil. (Oil for two stroke direct injection engine recommended by the outboard manufacture)

Use of low quality engine oil can cause serious damage to the engine.

3) Electric Fuel Pump

Electric fuel pump pressure, if used in conjunction with engine mechanical fuel pump, must be limited to no more than 0.03 MPa (4 psi) [0.3kg/cm^2].

4) Installation of Fuel Filter

<Portable Fuel Tank>

Fix the tank on the proper location of the boat taking into consideration the engine's fuel hose length.

<Stationary Fuel Tank>

Install the tank in accordance with regulations relevant to grounding, anti-siphoning protection, ventilation and other matters.

7. Accessories and Meters

1) Accessories.

Start In-Gear Protection (Neutral Safe Starting Switch)

The remote control box connected to the outboard motor is equipped with start in-gear protection (neutral safe starting switch) This function disables the engine starting when shift gear is engaged.

⚠ WARNING

If engine starts with the shift gear engaged, the boat may start to move unexpectedly, possibly leading to serious injury or fatal accident. To prevent this accident, the outboard motor is equipped with the start in-gear protection (neutral safe starting switch), which must not be disabled.

<Selection of Outboard Motor Accessories>

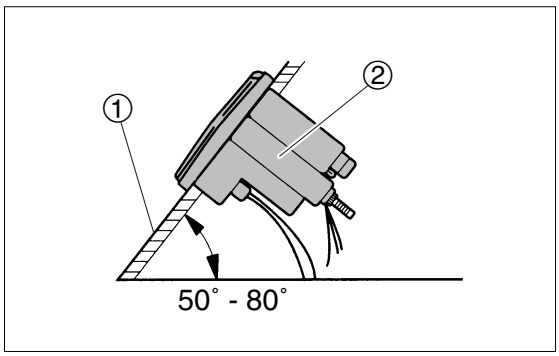
For this outboard motor, use the manufacturer's genuine parts and accessories.

For safety reasons, it is not recommended to use parts and accessories supplied by other than the manufacturer. Before using any accessories, thoroughly read the installation manual and operation manual.

2) Installation of Meters

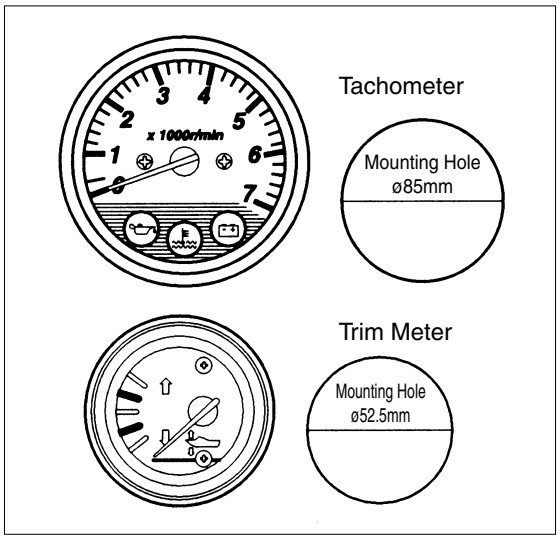
When installing meters, select a place on the dash board ① where operator can watch them easily and they are not exposed to water spray.

The meters can be installed on the dashboard of 2 to 11 mm thick. When the thickness is over 11mm, cut fitting plate ② so that the meters can be installed.



<Installation Angle>

Install meters so that the angle is in between 50 to 80 degrees from horizontal plane.



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