YAMAHA

SERVICE MANUAL

EF1000iS

7VV-28197-E0
310141

FOREWORD

This manual was written by the Yamaha Motor Company primarily for use by Yamaha dealers and their qualified mechanics. It is not possible to put an entire mechanic's education into one manual, so it is assumed that persons using this book to perform maintenance and repairs on Yamaha generators have a basic understanding of the mechanical precepts and procedures inherent to generator repair technology. Without such knowledge, attempted repairs or service to this model may render it unfit for use and/or unsafe.

Yamaha Motor Company Ltd. is continually striving to further improve all models manufactured by Yamaha. Modifications and significant changes in specifications or procedures will be forwarded to all Authorized Yamaha dealers and will, where applicable, appear in future editions of this manual.

NOTE:

This Service Manual contains information regarding periodic maintenance to the emission control system. Please read this material carefully.

EF1000iS
SERVICE MANUAL

Printed in Japan

HOW TO USE THIS MANUAL

PARTICULARLY IMPORTANT INFORMATION

This material is distinguished by the following notation.

⚠

The Safety Alert Symbol means ATTENTION! BECOME ALERT! YOUR SAFETY IS INVOLVED!

⚠WARNING

Failure to follow WARNING instructions could result in severe injury or death to the machine operator, a bystander, or a person inspecting or repairing the machine.

CAUTION:

A CAUTION indicates special precautions that must be taken to avoid damage to the machine.

NOTE:

A NOTE provides key information to make procedures easier or clearer.

MANUAL FORMAT

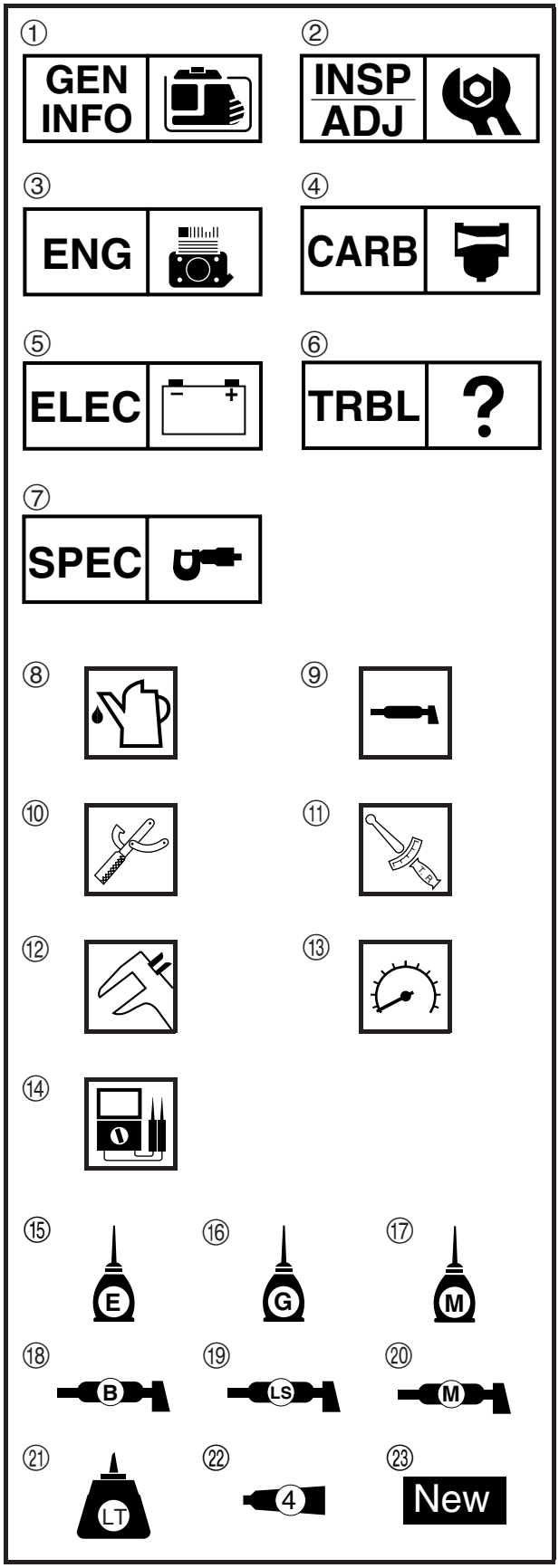
The procedures in this manual are organized in a sequential, step-by-step format. The information has been compiled to provide the mechanic with an easy to read, handy reference that contains comprehensive explanations of all disassembly, repair, assembly, and inspection operations.

In this revised format, the condition of a faulty component will precede an arrow symbol and the course of action required will follow the symbol, e.g.,

- Bearings
  Pitting/damage → Replace.

EXPLODED DIAGRAM

Each chapter provides exploded diagrams before each disassembly section for ease in identifying the correct disassembly and assembly procedures.



ILLUSTRATED SYMBOLS (Refer to the illustration)

Illustrated symbols ① through ⑦ are designed as thumb tabs to indicate the chapter's number and content.

① General information
② Periodic inspections and adjustments
③ Engine
④ Carburetor
⑤ Electrical
⑥ Trouble shooting
⑦ Specifications

Illustrated symbols ⑧ through ⑭ are used to identify the specific tools and test equipment.

⑧ Filling fluid
⑨ Lubricant
⑩ Special tool
⑪ Tightening
⑫ Wear limit, clearance
⑬ Engine speed
⑭ W, V, A

Illustrated symbols ⑮ through ㉓ in the exploded diagram indicate the grades of lubricant and the locations of the lubrication points.

⑮ Apply engine oil
⑯ Apply gear oil
⑰ Apply molybdenum disulfide oil
⑱ Apply wheel bearing grease
⑲ Apply lightweight lithium-soap base grease
⑳ Apply molybdenum disulfide grease
㉑ Apply a locking agent (LOCTITE®)
㉒ Apply Yamaha bond
㉓ Use a new one

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GENERAL INFORMATION

CHAPTER 2.
PERIODIC INSPECTIONS AND ADJUSTMENTS

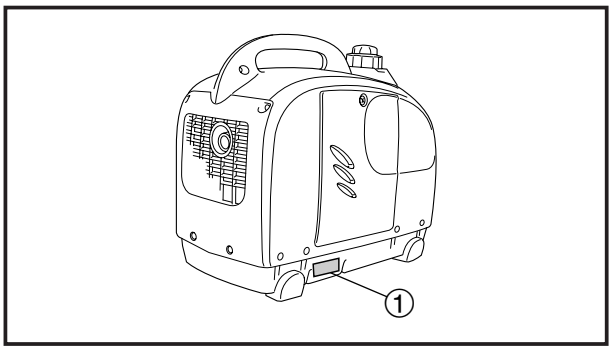
CHAPTER 3.
ENGINE

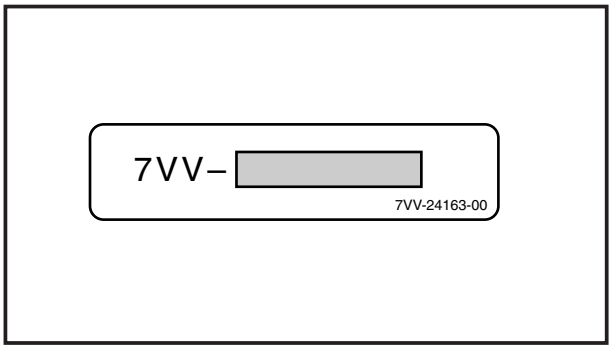
CHAPTER 4. CARBURETOR

CHAPTER 5. ELECTRICAL

CHAPTER 6. TROUBLESHOOTING

CHAPTER 7. SPECIFICATIONS





GENERAL INFORMATION

MACHINE IDENTIFICATION

SERIAL NUMBER

The serial number is printed on a label ① which is affixed to the generator as shown.

NOTE:

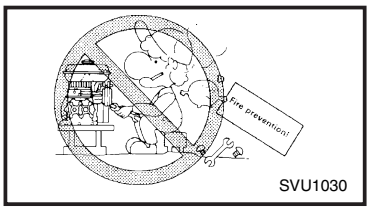
The first three characters of this number are for model identification, the remaining digits are the unit production number.

STARTING SERIAL NUMBER

120V/60Hz	7VV2	7VV-220101~
220V/50Hz	7VV3	7VV-340101~
230V/50Hz (For Germany)	7VV3	7VV-320101~
230V/50Hz	7VV3	7VV-300101~
240V/50Hz	7VV4	7VV-400101~

NOTE:

Designs and specifications are subject to change without notice.



SVU1030

IMPORTANT INFORMATION

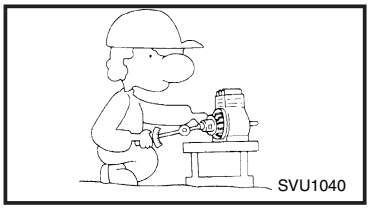
PREPARATION FOR REMOVAL AND DISASSEMBLY

CAUTION ON SERVICE

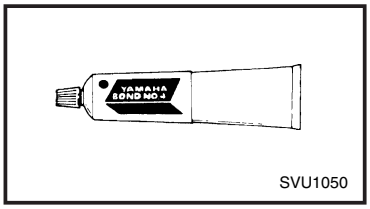
1. Fire prevention
   When servicing the engine, always keep the engine and yourself away from fire.

NOTES ON SERVICE

1. Correct tools
   Be sure to use the correct special tool for the job to guard against damage.

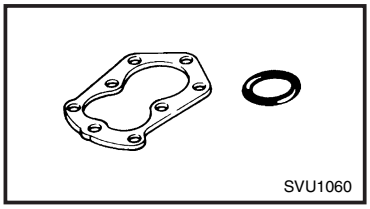

SVU1040

2. Oil, grease and seals
   Be sure to use genuine Yamaha oils, grease and sealers, or the equivalents.

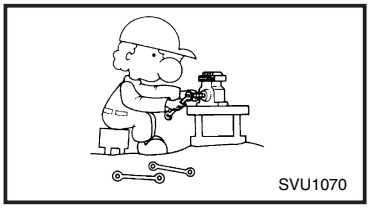


SVU1050

3. Expendable parts
   Always replace the gaskets, O-rings, cotter pins and circlips with new parts when servicing engine.

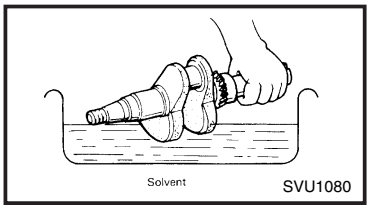

SVU1060

4. Tightening torque
   Be sure to follow torque specifications. When tightening bolts, nuts or screws, start with the largest-diameter fastener and work from an inner position to an outer position in a crisscross pattern.


SVU1070

5. Notes on disassembly and assembly

a. Parts should be cleaned in solvent and blown dry with compressed air after disassembly.



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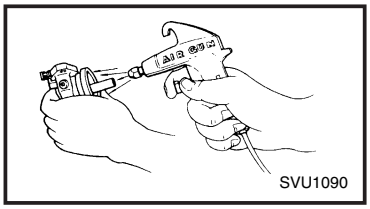
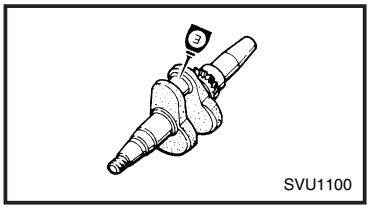

SVU1090

b. Contact surfaces of moving parts should be oiled when reassembled.

c. Make sure that the parts, move smoothly after each section of the machine is assembled.


SVU1100

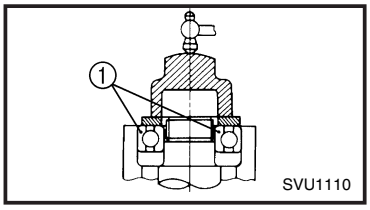
ALL REPLACEMENT PARTS

We recommend the use of genuine Yamaha parts for all replacements. Use oil and/or grease, recommended by Yamaha, for assembly and adjustment.

GASKETS, OIL SEALS, AND O-RINGS

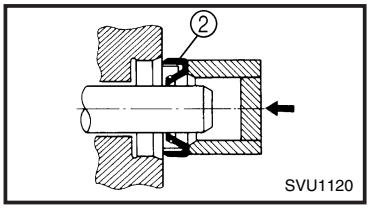
1. All gaskets, seals, and O-rings should be replaced when an engine is overhauled. All gaskets surfaces, oil seal lips, and O-rings must be cleaned.
2. Properly oil all mating parts and bearings during reassembly.

Apply grease to the oil seal lips.



BEARINGS AND OIL SEALS

Install the bearing(s) ① and oil seal(s) ② with their manufacture's marks or numbers facing outward. (In other words, the stamped letters must be on the side exposed to view.) When installing oil seal(s), apply a light coating of lightweight lithium base grease to the seal lip(s). Oil the bearings liberally when installing.

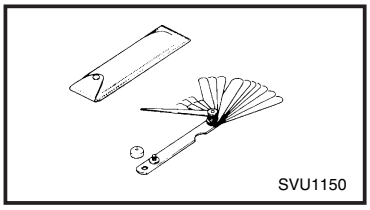


CAUTION:

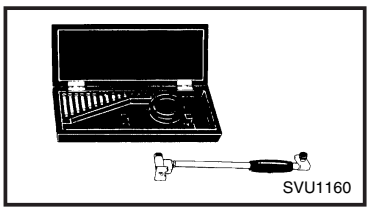
Do not use compressed air to spin the bearings dry. This causes damage to the bearing surfaces.

SPECIAL TOOLS AND TESTERS

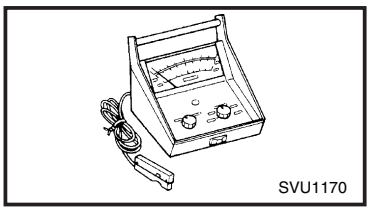
The proper special tools are necessary for complete and accurate tune-up and assembly. Using the correct special tool will help prevent damage caused by the use of improper tools or improvised techniques.



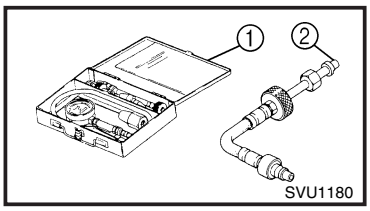
1. Thickness gauge
   P/N. YU-26900-9, 90890-03079
   This gauge is used to adjust valve clearance, piston clearance and piston ring end gap.



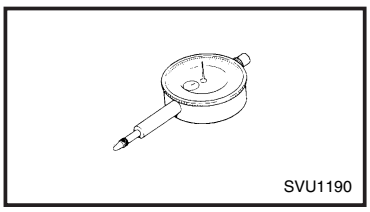
2. Cylinder gauge
   Commercially obtainable
   This instrument is used for checking cylinder bore size and condition.



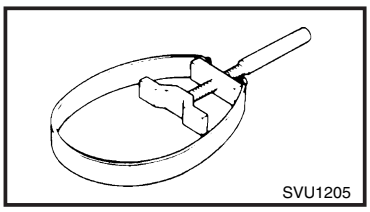
3. Inductive tachometer
   P/N. YU-8036-A
   Engine tachometer
   P/N. 90890-03113
   This instrument is used for reading engine r/min.



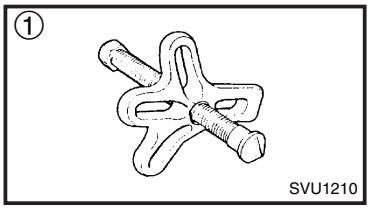
4. Compression gauge ①
   P/N. YU-33223, 90890-03081
   Adapter ②
   P/N. YU-33223-3, 90890-04082
   This gauge is used for checking engine compression.



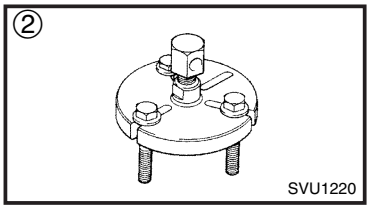
5. Dial gauge
   P/N. YU-03097, 90890-03097
   This instrument is used for checking crankshaft side clearance.

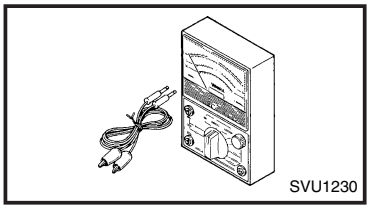


6. Sheave holder
   P/N. YS-01880, 90890-01701
   This tool is necessary for holding the magneto rotor.

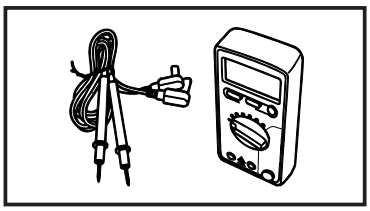


7. Rotor puller
   ① P/N. YU-33270
   ② P/N. 90890-01362
   This tool is necessary for removing the magneto rotor.

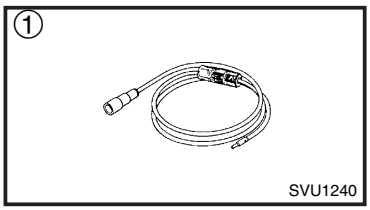




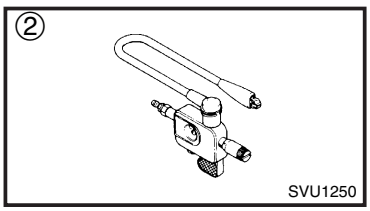
8. Pocket tester
   P/N. YU-03112, 90890-03112
   This instrument is necessary for checking the electrical system.



9. Digital circuit tester
   90890-03174
   This instrument is necessary for checking the electrical system.



10. Dynamic spark tester ①
    P/N. YM-34487
    Ignition checker ②
    P/N. 90890-06754
    This instrument is necessary for checking the ignition system components.



PERIODIC INSPECTIONS AND ADJUSTMENTS

INTRODUCTION

This chapter includes all information necessary to perform recommended inspections and adjustments. These preventive maintenance procedures, if followed, will ensure more reliable machine operation and a longer service life. The need for costly overhaul work will be greatly reduced. This information applies to machines already in service as well as new machines that are being prepared for sale. All service technicians should be familiar with this entire chapter.

MAINTENANCE INTERVALS CHART

Proper periodic maintenance is important. Especially important are the maintenance services related to emissions control. These controls not only function to ensure cleaner air but are also vital to proper engine operation and maximum performance. In the following maintenance tables, the services related to emissions control are indicated as "*" in the chart.

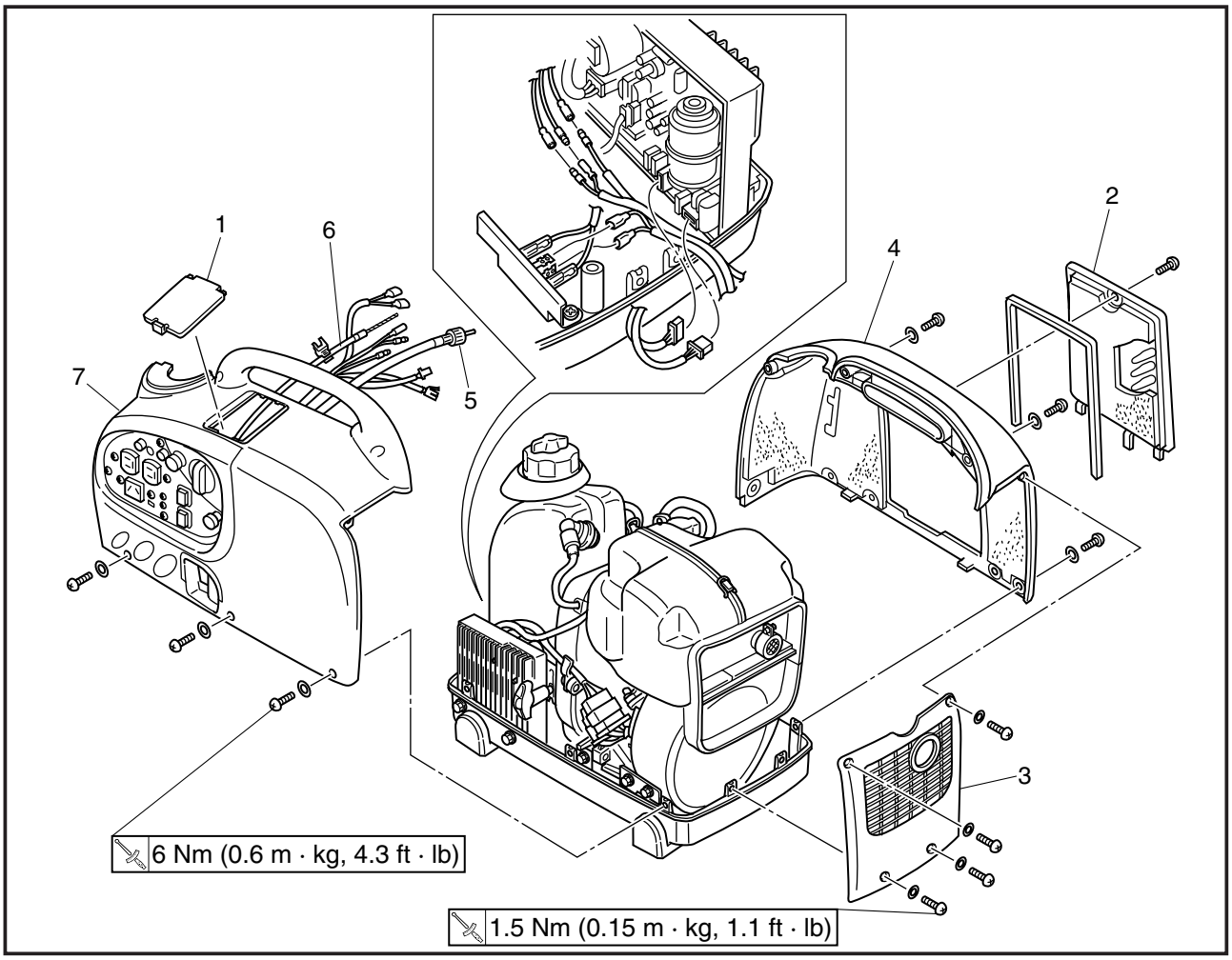
PERIODIC MAINTENANCE/LUBRICATION INTERVALS

No.	A Item	B Remarks	C Pre-Operation check (daily)	D Initial	E Every		
				F 1 month or 20 Hr	G 3 months or 50 Hr	H 6 months or 100 Hr	I 12 months or 300 Hr
1.	*J Spark Plug	Check condition. Adjust gap and clean. Replace if necessary.			●		
2.	*K Valve Clearance	Check and adjust when engine is cold.					●
3.	*L Crankcase breather system	Check breather hose for cracks or damage. Replace if necessary.					●
4.	*M Exhaust System	Check for leakage. Retighten or replace gasket if necessary.	●				
		Check muffler screen and spark arrester. Clean/ replace if necessary.					●
5.	N Engine Oil	Check oil level	●				
		Replace		●		●	
6.	*O Air Filter	Clean. Replace if necessary.			●		
7.	P Fuel Filter	Clean fuel tank filter. Replace if necessary.			●		
8.	Q Fuel Line	Check fuel hose for crack or damage. Replace if necessary.	●				
9.	*R Choke knob	Check choke operation.	●				
10.	S Cooling System	Check for fan damage.					●
11.	T Starting System	Check recoil starter operation.	●				

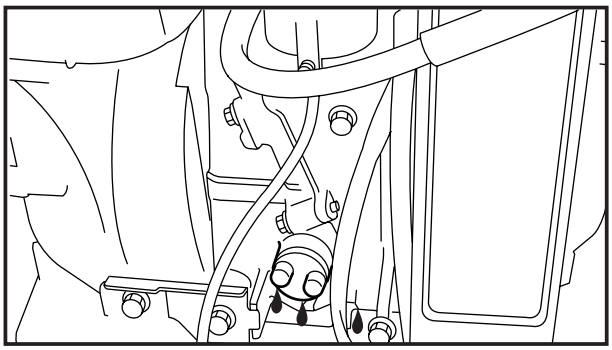
* : Related to emission control system.

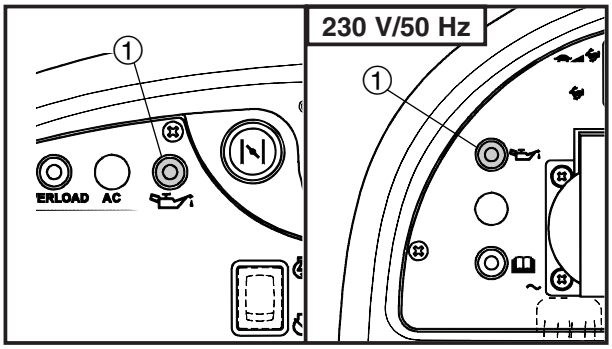
No.	A Item	B Remarks	C Pre-Operation check (daily)	D Initial	E Every		
				F 1 month or 20 Hr	G 3 months or 50 Hr	H 6 months or 100 Hr	I 12 months or 300 Hr
12.	J Generation	Check the pilot light comes on.	●				
13.	K Fittings/ Fasteners	Check all fittings and fasteners. Correct if necessary.				●	

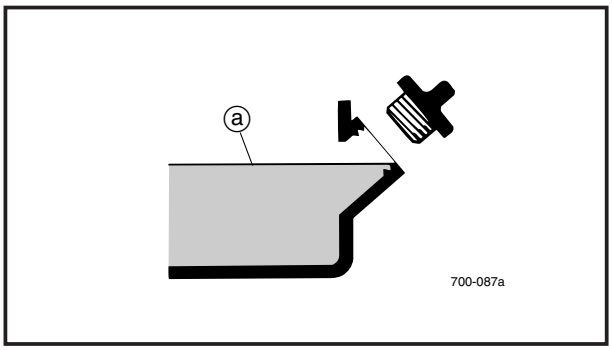
COVERS



Order	Job name	Q'ty	Remarks
	Cover 2, cover 3, side cover 2, rear cover, front cover removal		Remove the parts in the order listed below.
1	Cover 2	1	
2	Cover 3	1	
3	Side cover 2	1	
4	Rear cover	1	
5	Remote control cable	1	Disconnect the fuel hose from the fuel cock side.
6	Choke cable	1	Disconnect the fuel hose from the carburetor side.
7	Front cover	1	Disconnect the couplers and lead wireds. For installation, reverse the removal procedure.







ENGINE

ENGINE OIL LEAKAGE CHECKING

1. Remove:
   - Cover 3
   - Side cover 2
   - Rear cover
2. Check the areas outside of the engine for oil leakage.
   Oil leakage → Replace the gasket, oil seal, or O-ring.

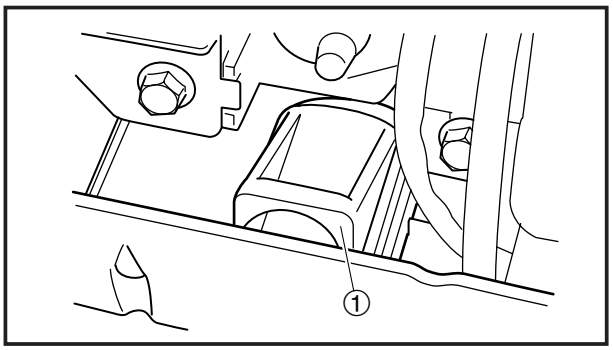
OIL LEVEL CHECKING

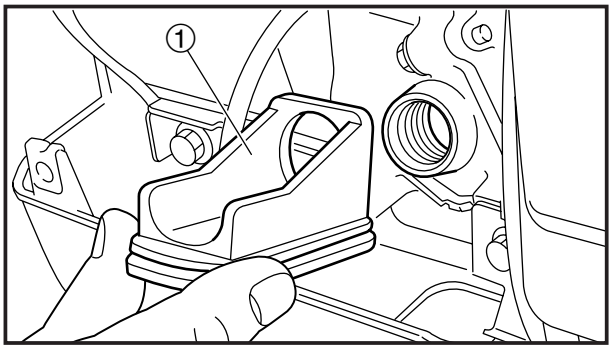
1. Check:
   - Oil level with oil warning light ①
   Check whether the oil warning light flashes by operating the recoil starter.
   Oil warning light flashes → Add oil.
   Oil warning light does not flash → OK
2. Remove:
   - Cover 3
   - Oil filler cap
3. Check:
   - Check that the engine oil is at the specified level ⓐ.

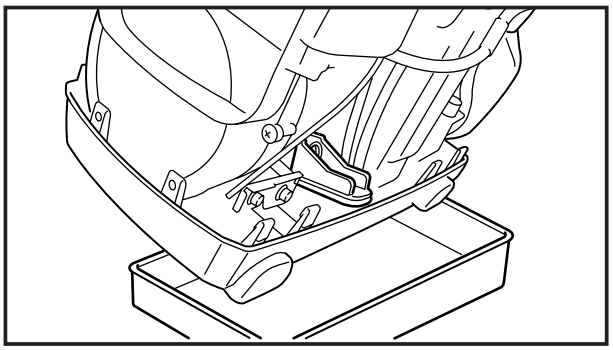
Oil level checking steps:

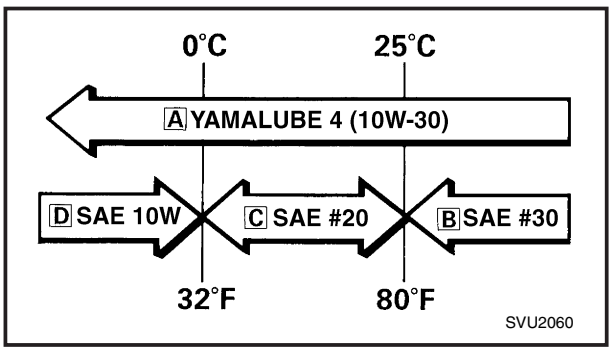
- Place the engine on a level surface.
- Warm up the engine for several minutes.
- Stop the engine.
- Check that the engine oil is at the specified level ⓐ. Add oil if necessary.

4. Install:
   - Oil filler cap
   - Cover 3









OIL REPLACEMENT

1. Warm up the engine for several minutes.
2. Stop the engine.
3. Remove:
   - Drain joint ①
   - Cover 3

   Remove the drain joint from the mount base.
4. Place a receptacle under the engine.
5. Remove:
   - Oil filler cap
6. Install:
   - Drain joint ①

7. Tilt the engine to drain the oil completely.
8. Fill:

Recommended oil:
A YAMALUBE 4 (10W-30) or SAE 10W-30 type SE
B SAE #30
C SAE #20
D SAE 10W
Engine oil quantity:
0.32 L (0.28 Imp qt, 0.34 US qt)

NOTE:
Recommended engine oil classification:
API Service “SE” or “SF”, if not available, “SD”.

9. Remove:
   - Drain joint

10. Install:
    - Oil filler cap
    - Drain joint

      Clean the drain joint then install the drain joint t the mount base.
    - Cover 3

FUEL LEAKAGE

1. Remove:
   - Cover 3
2. Check:
   - Leakage
     Check at fuel tank, fuel pump, fuel cock, fuel hose, and carburetor.

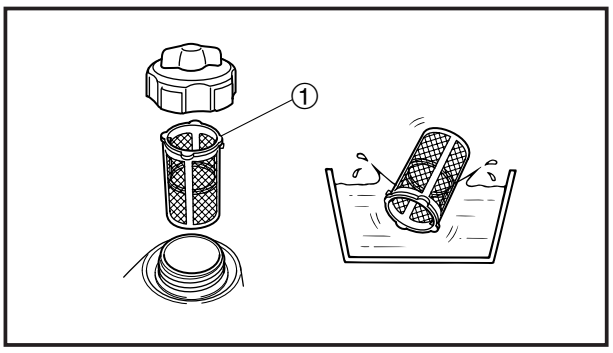
CAUTION:

Replace hose every four years.

FUEL TANK FILTER

⚠WARNING

Do not smoke, and keep away form open flames, sparks, or any other source of fire when handling or in the vicinity of fuel.



1. Remove:
   - Fuel tank cap
   - Fuel tank filter ①
2. Inspect:
   - Fuel tank filter
     Damage → Replace.
3. Clean:
   - Fuel tank filter

NOTE:

Clean the fuel tank filter with solvent, and then dry it thoroughly.

4. Install:
   - Fuel tank filter
   - Fuel tank cap

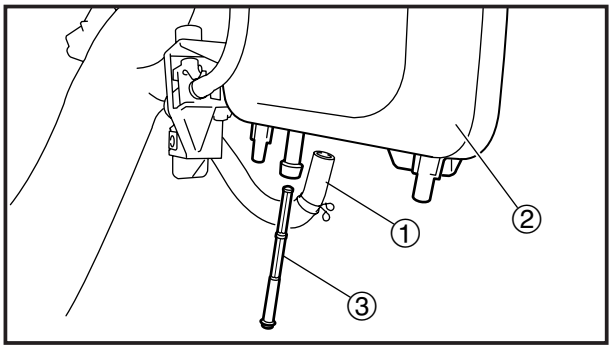
⚠WARNING

Be sure the tank cap is tightened securely.

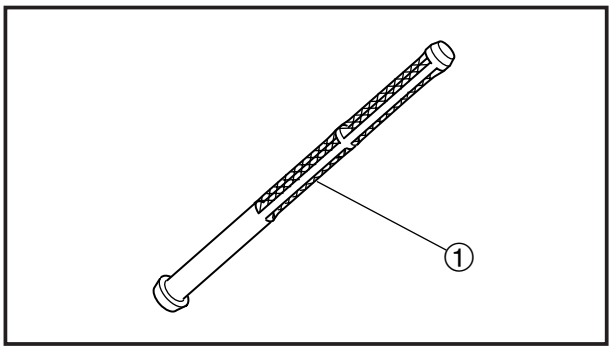
FUEL TANK STRAINER

⚠WARNING

Do not smoke, and keep away form open flames, sparks, or any other source of fire when handling or in the vicinity of fuel.



1. Remove:
   - Cover 3
   - Side cover 2
   - Rear cover
   - Front cover
2. Drain the fuel from the fuel tank compleatly.
3. Remove:
   - Fuel hose ①
   - Fuel tank ②
   - Fuel tank strainer ③



4. Inspect:
   - Fuel tank strainer ①
     Damage → Replace.
5. Clean:
   - Fuel tank strainer
     Damage → Replace.

NOTE:

Clean the fuel tank strainer with solvent, and then dry it thoroughly.

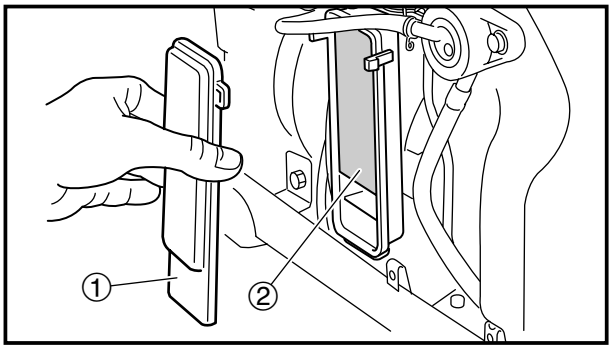
6. Install:
   - Fuel tank strainer
     to the fuel tank
7. Install:
   - Fuel hose
   - Fuel tank
   - Front cover
   - Rear cover
   - Side cover 2
   - Cover 3

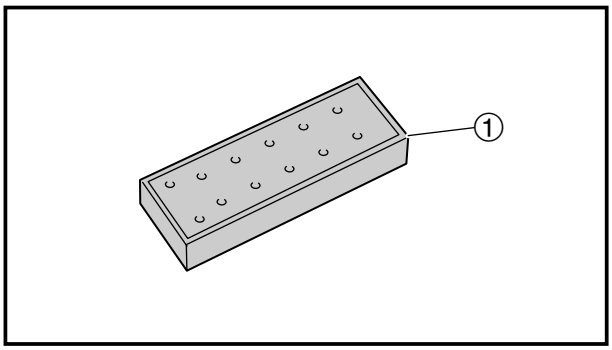
AIR FILTER ELEMENT

CAUTION:

The engine should never run without the element, otherwise excessive piston and/or cylinder wear may result.

1. Remove:
   - Cover 3
   - Air filter case cover ①
2. Remove:
   - Air filter element ②

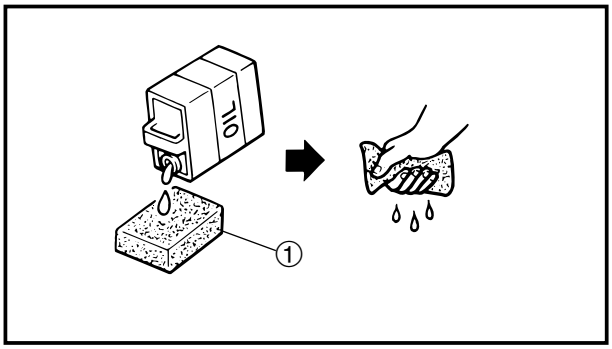




3. Inspect:
   - Air filter element ①
     Damage → Replace.
     Clogging → Wash the element in a solvent, and then dry it thoroughly.
     Oil the element and squeeze out the excess oil.

CAUTION:

- **Do not wring out the element: this could cause it to tear.**
- **Do not wash the element in gasoline or in acidic, alkalinic, or organic solvents.**

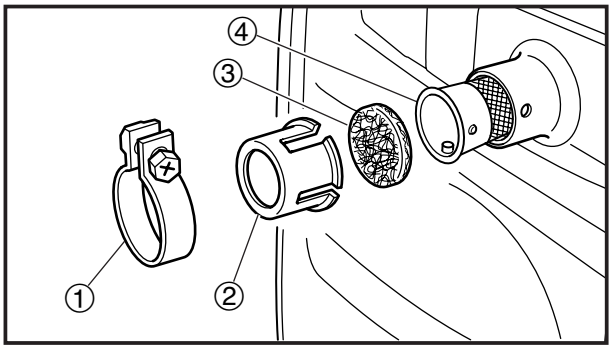


4. Install:
   - Air filter element
   - Air filter case cover
   - Cover 3

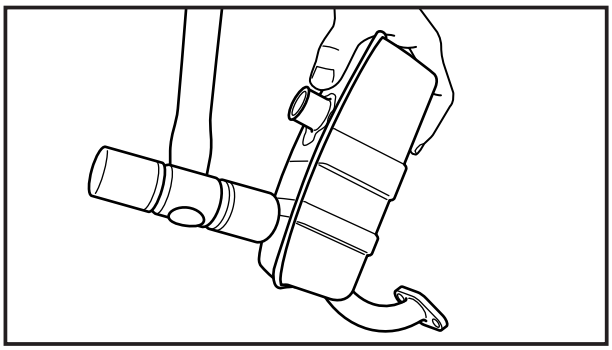
MUFFLER

⚠WARNING

The engine and muffler will be very hot after the engine has been run.
Avoid touching the engine and muffler while they are still hot with any part of your body or clothing during inspection or repair.



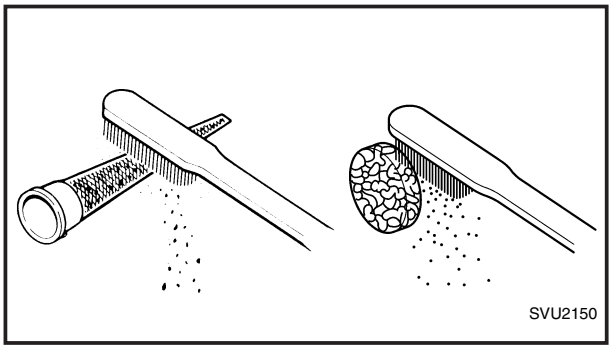
1. Remove:
   - Side cover 2
   - Muffler
     Refer to “MUFFLER” in CHAPTER 3.
   - Muffler band ①
   - Muffler cap ②
   - Muffler screen ③
   - Spark arrester ④



2. Decarbonize:
   - Muffler
     Tap on the muffler in the area shown in the illustration to loosen carbon buildup, and then shake it out of the end of the muffler.

CAUTION:

Don’t use a wire to clean, otherwise the noise damping material may come out, and the damping effect may be reduced.

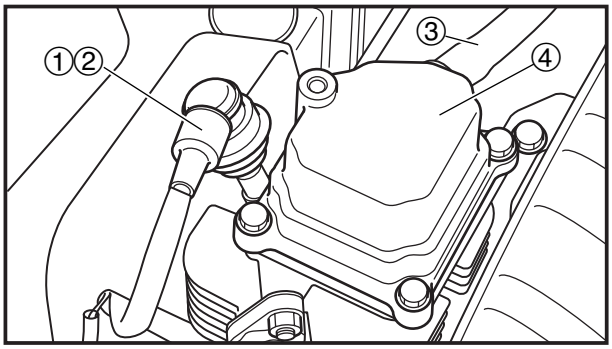


3. Decarbonize:
   - Muffler screen
   - Spark arrester

CAUTION:

When cleaning, use the wire brush lightly to avoid damaging or scratching of the muffler screen and spark arrester.

4. Install:
   - Spark arrester
   - Muffler screen
   - Muffler cap
   - Muffler band
   - Muffler
     Refer to “MUFFLER” in CHAPTER 3.

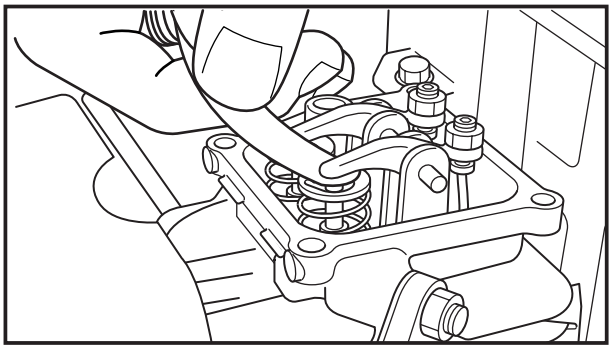


VALVE CLEARANCE ADJUSTMENT

1. Remove:
   - Cover 3
   - Side cover 2
   - Rear cover
   - Front cover
     Refer to “COVERS”.
   - Carburetor
     Refer to “CARBURETOR” in CHAPTER 3.
   - Cylinder air shroud
     Refer to “MUFFLER” in CHAPTER 3.

2. Remove:
   - Spark plug cap ①
   - Spark plug ②
   - Breather hose ③
   - Cylinder head cover ④
   - Cylinder head cover gasket

3. Gently operate the starter rope to bring the piston to the top-dead-center of its compression stroke (when the screwdriver inserted into the spark plug hole reaches the highest position).

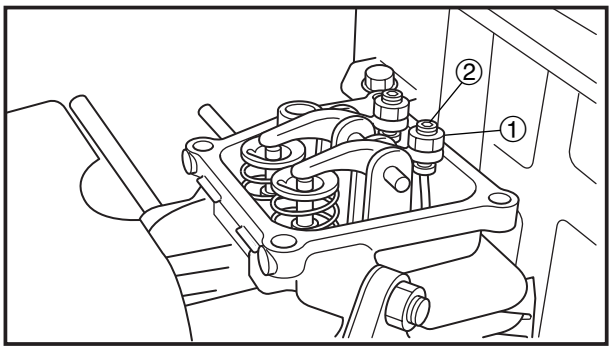


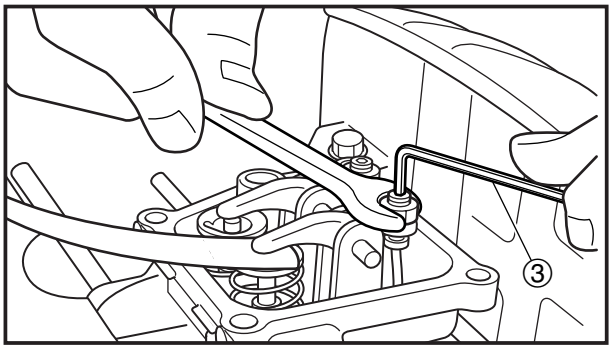
4. Measure:
   - Valve clearance
     Out of specification → Adjust.

NOTE:
Valve clearance must be measured when the engine is cool to the touch.

Intake Valve (cold):
0.1 mm (0.004 in)
Exhaust Valve (cold):
0.1 mm (0.004 in)

Thickness gauge:
YU-26900-9, 90890-03079





5. Adjust:
   - Valve clearance

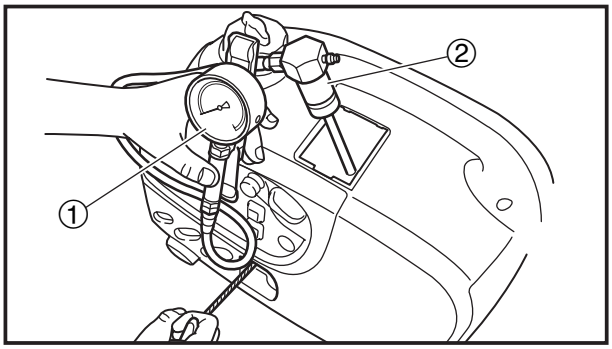
Adjustment steps:
- Loosen the locknut ①.
- Turn the adjuster ② in or out to obtain the proper clearance.
- Tighten the locknut ③.
  use hexagonal wrench.

Adjuster	Valve clearance
Turn in	Decrease
Turn out	Increase

Locknut:
4 Nm (0.4 m · kg, 2.9 ft · lb)

6. Install:
   - Cylinder head cover gasket **New**
   - Cylinder head cover
   - Breather hose
   - Spark plug
   - Spark plug cap
   - Front cover
   - Rear cover
   - Side cover
   - Side cover 2
   - Side cover 3

Cylinder head cover bolt:
6 Nm (0.6 m · kg, 4.3 ft · lb)
Spark plug:
13 Nm (1.3 m · kg, 9.4 ft · lb)



COMPRESSION PRESSURE

NOTE:
Measure the compression after checking and adjusting the valve clearance.

1. Warm up the engine for several minutes.
2. Remove:
   - Cover
3. Remove:
   - Spark plug
4. Connect:
   - Compression gauge ①
   - Adapter ②

Compression gauge:
YU-33223, 90890-03081
Adapter:
YU-33223-3, 90890-04082

5. Measure:
   - Compression

   To measure the compression, pull the recoil starter until the needle stops rising on the compression gauge.

Standard compression pressure:
400 kPa
(4 kg/cm² , 57 psi)

⚠WARNING

To prevent sparking when cranking the engine, ground the high-tension cord.

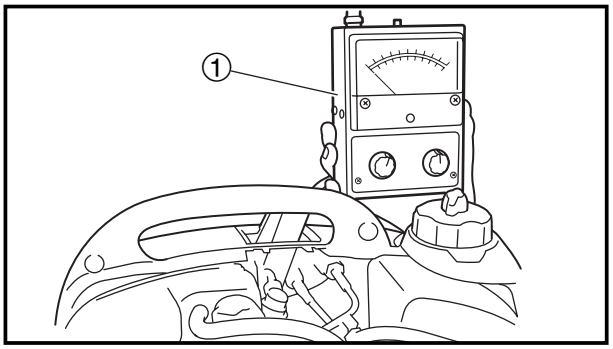
Testing steps (below minimum level):
- Squirt a few drops of oil into the cylinder.
- Measure the compression again.

Reading	Diagnosis
If higher than without oil	• Worn cylinder, piston, and piston ring
If the same as without oil	• Defective piston, ring(s), valve(s), and cylinder head gasket • Improper valve timing and valve clearance

Testing steps (above maximum level):
- Check the cylinder head, valve surfaces, and piston crown for carbon deposits.

6. Install:
- Spark plug

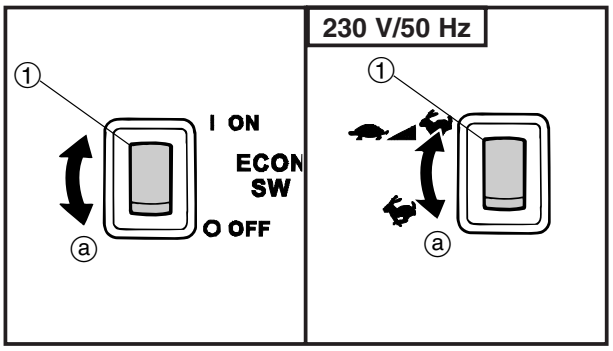
Spark plug:
13 Nm (1.3 m · kg, 9.4 ft · lb)



RATED ENGINE SPEED

1. Remove:
   - Cover 2
2. Connect:
   - Inductive tachometer ①

Inductive tachometer:
YU-8036-A
Engine tachometer:
90890-03113

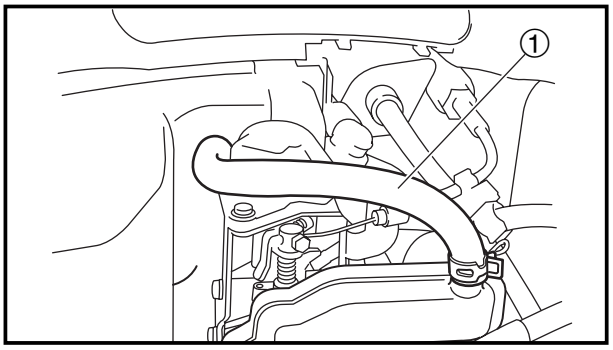


NOTE:
Install the cover and should be full close the cover inside.

3. Inspect:
   - Rated engine speed
     Specified engine speed → OK
     Out of specification → Refer to "TROUBLESHOOTING" in CHAPTER 6.

Inspection steps:
- Operate the engine (with no load).
- Turn economy switch ① to "OFF" (🐢) ⓐ.
- Measure the rated engine speed.

Rated engine speed:
5,000 r/min



BREATHER HOSE

1. Remove:
   - Side cover 2
   - Rear cover
2. Inspect:
   - Breather hose ①

   Cracks/damage → Replace.
   Poor connection → Correct.

ELECTRICAL
SPARK PLUG

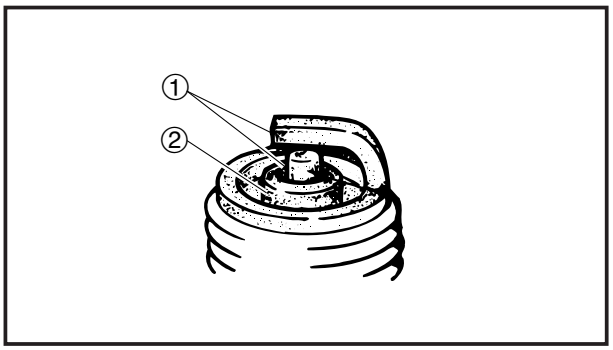
⚠WARNING

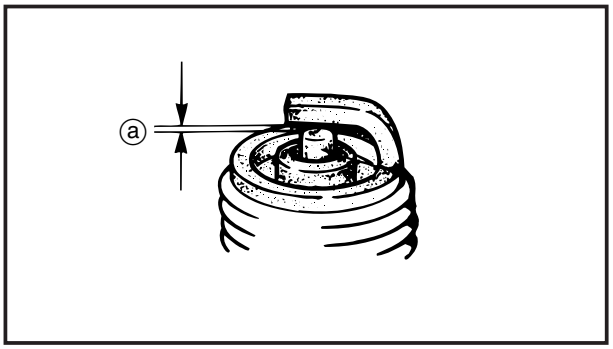
Inspect and adjust the areas around the cylinder head after the engine has cooled down completely.

CAUTION:

Before removing the spark plug, use compressed air to clean the cylinder head cover to prevent dirt from falling into the engine.

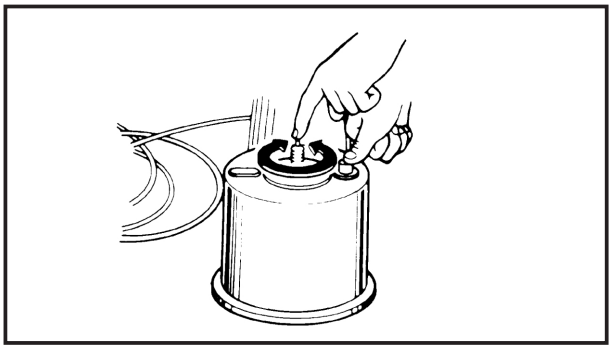
1. Remove:
   - Cover 2
2. Remove:
   - Spark plug cap
   - Spark plug
3. Inspect:
   - Electrode ①
     Wear/damage → Replace.
   - Insulator color ②



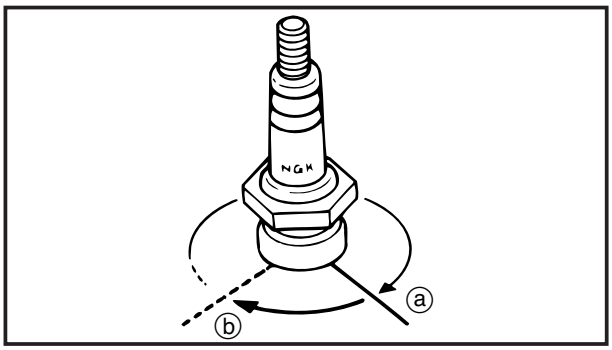


4. Measure:
   - Spark plug gap ⓐ
     Use a wire gauge or thickness gauge.
     Out of specification → Regap.
     If necessary, clean the spark plug with a spark plug cleaner.

Spark plug gap:
0.7 ~ 0.8 mm (0.028 ~ 0.031 in)
Standard spark plug (with resistor):
CR6HSB (NGK)



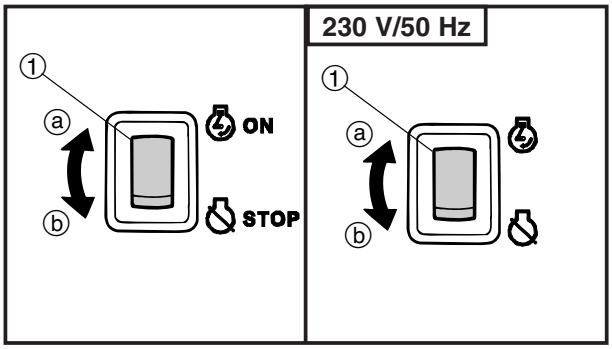
Before installing the spark plug, clean the gasket surface and plug surface.



5. Tighten:
   - Spark plug

NOTE:
To prevent thread damage, finger tighten ⓐ the spark plug before tightening it to the specified torque ⓑ.

	Spark plug: **13 Nm (1.3 m · kg, 9.4 ft · lb)**

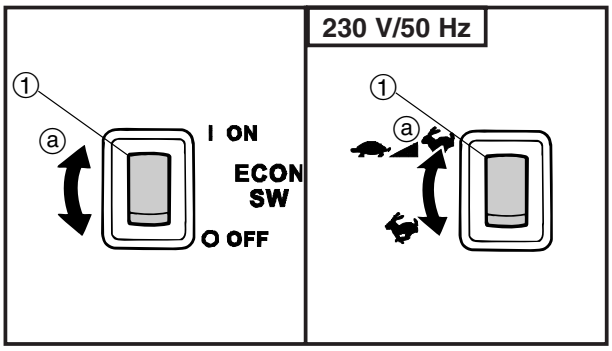


ENGINE SWITCH

1. Check:
   - Engine switch ①

Checking steps:

- Set the engine switch ① to "ON" (⏻) ⓐ.
- Start the engine.
- Check that the engine stops when the switch is set to "STOP" (⏼) ⓑ.

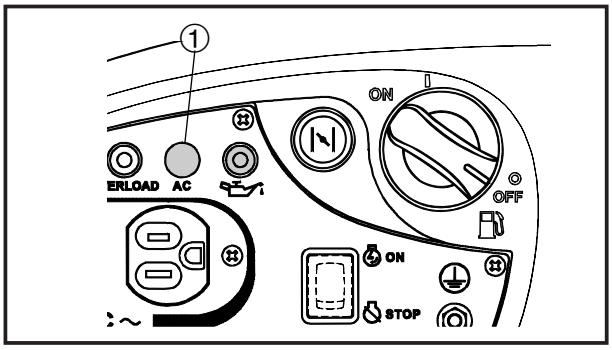


ECONOMY SWITCH

1. Check:
   - Economy switch ①

Checking steps:

- Set the economy switch ① to "ON" (🐢◢🐇) ⓐ.
- Start the engine.
- Turn the switch of the electric device connected to the AC outlet "ON" and "OFF" to check whether the engine speed increases and decreases.



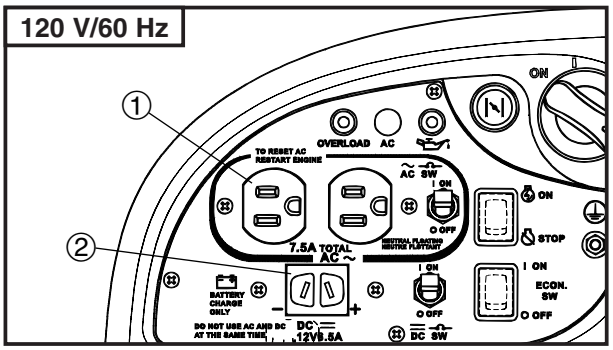
PILOT LIGHT

1. Check:
   - Pilot light ①

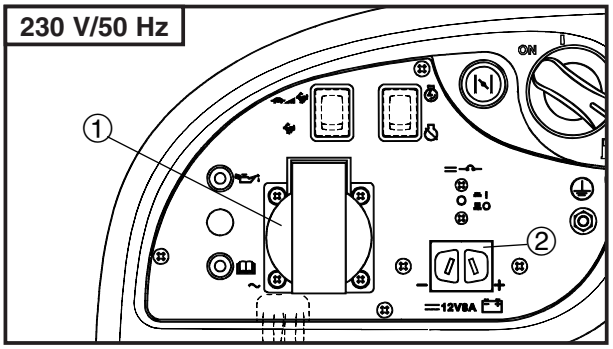
Checking steps:

- Start the engine.
- Make sure that the pilot light ① turns on.

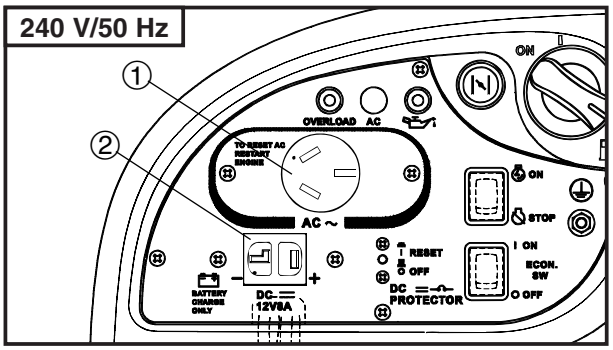
120 V/60 Hz



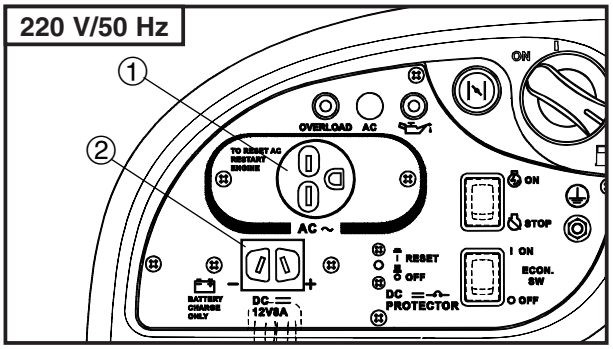
230 V/50 Hz



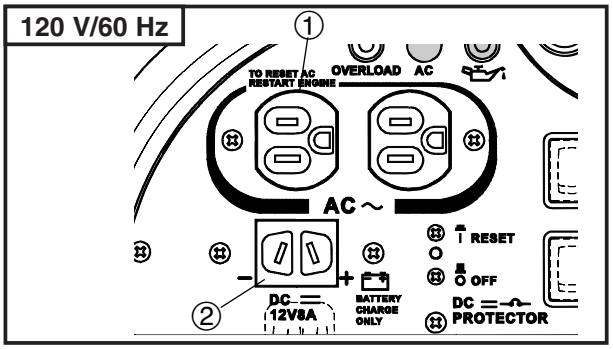
240 V/50 Hz



220 V/50 Hz



120 V/60 Hz



RECEPTACLE

1. Check:
   - AC receptacles ①
   - DC receptacle ②
     Cracks/damage → Replace.
     Poor connection → Correct.

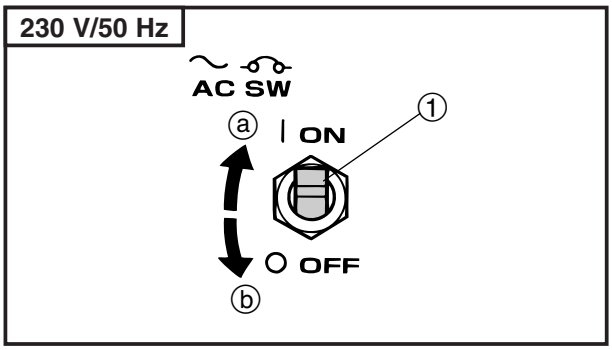
① : 7.5 A
② : 12 V, 6.5 A
For CANADA

① : 3.9 A
② : 12 V, 8 A

① : 3.8 A
② : 12 V, 8 A

① : 4.1 A
② : 12V, 8A

① : 7.5A
② : 12V, 8A

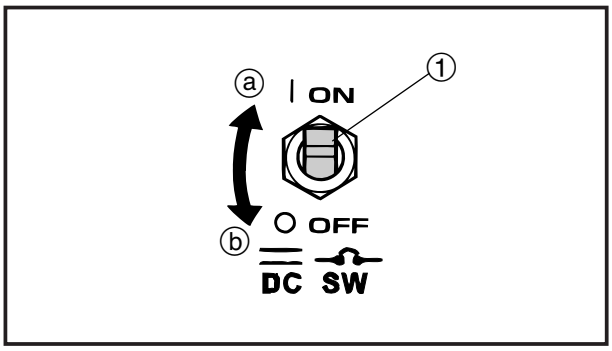


AC SWITCH (NFB For CANADA)

1. Set the AC switch (NFB) ① to the "ON" ⓐ position.
2. Connect the pocket tester (AC 120 V) to the AC receptacle and check the AC switch (NFB) for continuity.
   No continuity → Replace the AC switch(NFB).

Pocket tester:
YU-03112, 90890-03112
Digital circuit tester:
90890-03174

3. Set the AC switch (NFB) ① to the "OFF" ⓑ position.
4. Connect the pocket tester (AC 120 V) to the AC receptacle and check the AC switch (NFB) for continuity.
   Continuity → Replace the AC switch (NFB).



DC SWITCH (For CANADA)

1. Check:
   - DC switch

Checking steps:

- Set the DC switch ① to the position of "ON" ⓐ.
- Connect the pocket tester (DC 20 V).

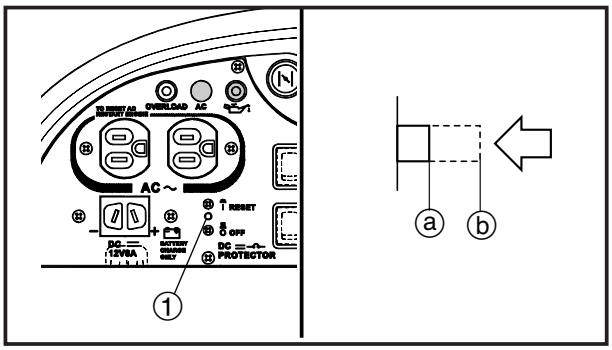
Pocket tester:
YU-03112, 90890-03112
Digital circuit tester:
90890-03174

- Start the engine.
- Set the economy switch to "OFF".
- Measure the DC voltage.

DC voltage:
More than 12 V at 5,000 r/min (with no load at AC output current)

- Set the DC switch to "OFF" ⓑ.
  Voltage is zero → OK

NOTE:
If the DC switch to "OFF" again, refer to "GENERATOR SYSTEM" in CHAPTER 5.



DC CIRCUIT BREAKER

1. Check:
   - DC circuit breaker

Checking steps:

- Press the reset button ① to the position of "RESET" ⓐ.
- Connect the pocket tester (DC 20 V).

Pocket tester:
YU-03112, 90890-03112
Digital circuit tester:
90890-03174

- Start the engine.
- Set the economy switch to "OFF".
- Measure the DC voltage.

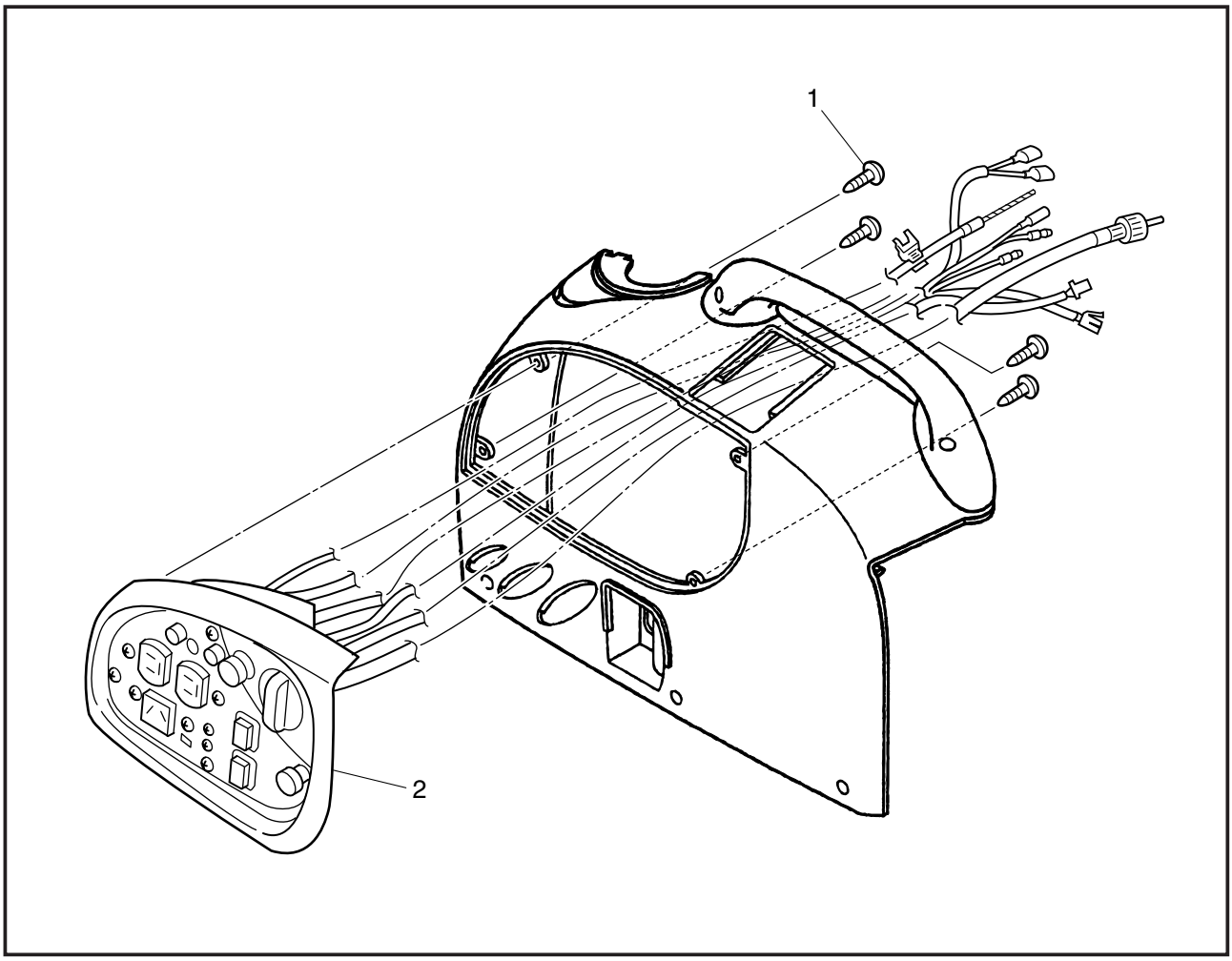
DC voltage:
More than 12 V at 5,000 r/min (with no load at AC output current)

- Set the reset button to "OFF" ⓑ.
  Voltage is zero → OK

NOTE:
If the reset button pup out ("OFF") again, refer to "GENERATOR SYSTEM" in CHAPTER 5.

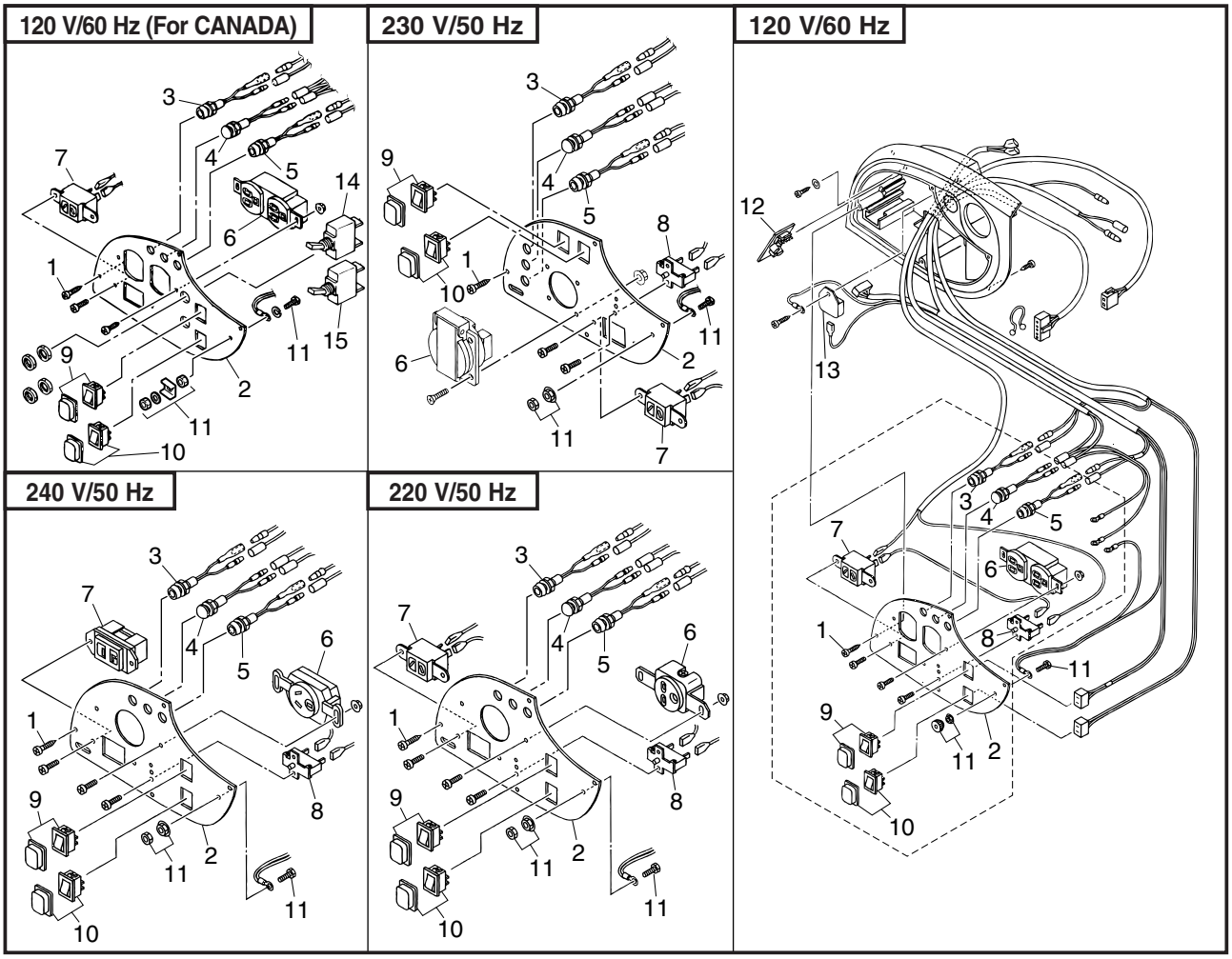
ENGINE

CONTROL BOX

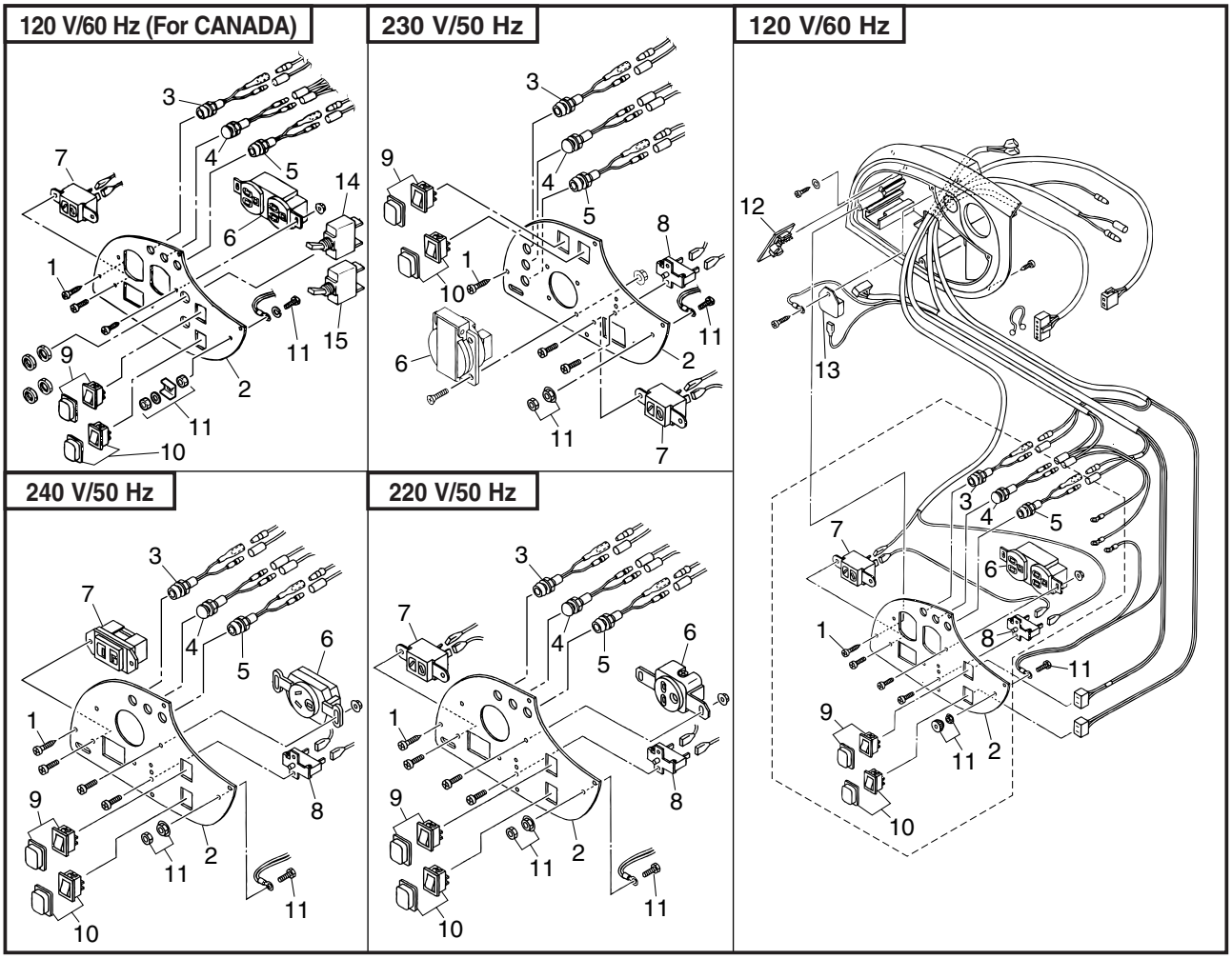


Order	Job name	Q'ty	Remarks
	Control box removal		Remove the parts in the order listed below.
	Front cover and rear cover		Refer to "COVERS" section in CHAPTER 2.
1	Tapping screw	4	
2	Control box assembly	1	
			For installation, reverse the removal procedure.

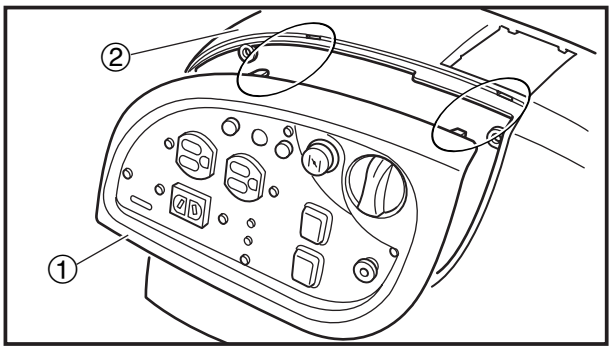
CONTROL BOX DISASSEMBLY



Order	Job name	Q'ty	Remarks
	Control box disassembly		Remove the parts in the order listed below.
1	Tapping screw	4	
2	Plate Assembly	1	
3	Over load warning light	1	Disconnect.
4	Pilot light	1	Disconnect.
5	Oil warning light	1	Disconnect.
6	AC receptacle	1	Disconnect.
7	DC receptacle	1	Disconnect.
8	DC circuit breaker	1	Disconnect.
9	Engine switch	1	Disconnect.
10	Economy switch	1	Disconnect.
11	Earth terminal	1	Disconnect.
12	Speed limiter	1	Disconnect.
13	TCI unit	1	Disconnect.



Order	Job name	Q'ty	Remarks
14	AC switch	1	Disconnect.
15	DC switch	1	Disconnect.
			For assembly, reverse the disassembly procedure.



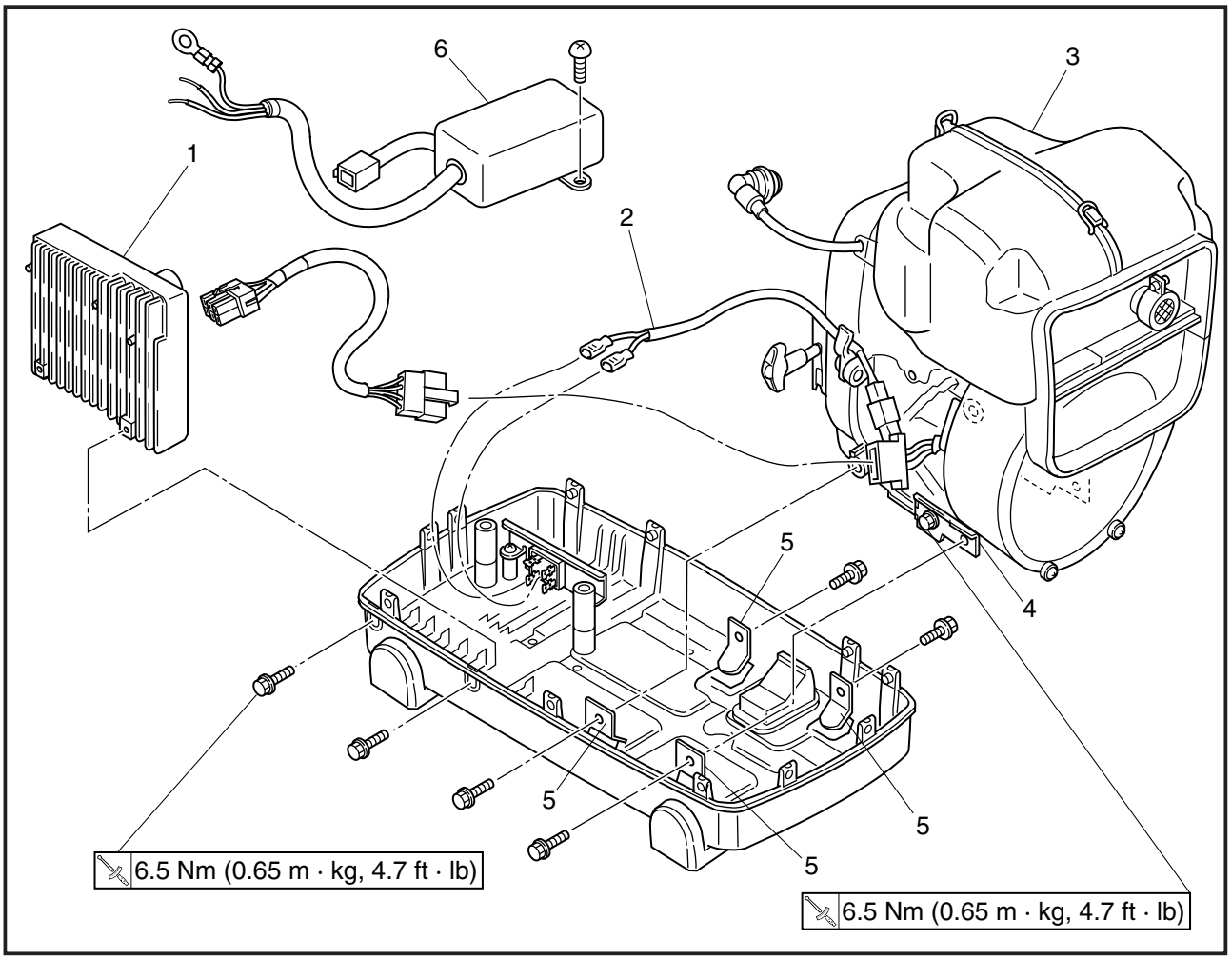
CONTROL BOX ASSEMBLY

1 Install:
- Control box ①

NOTE:

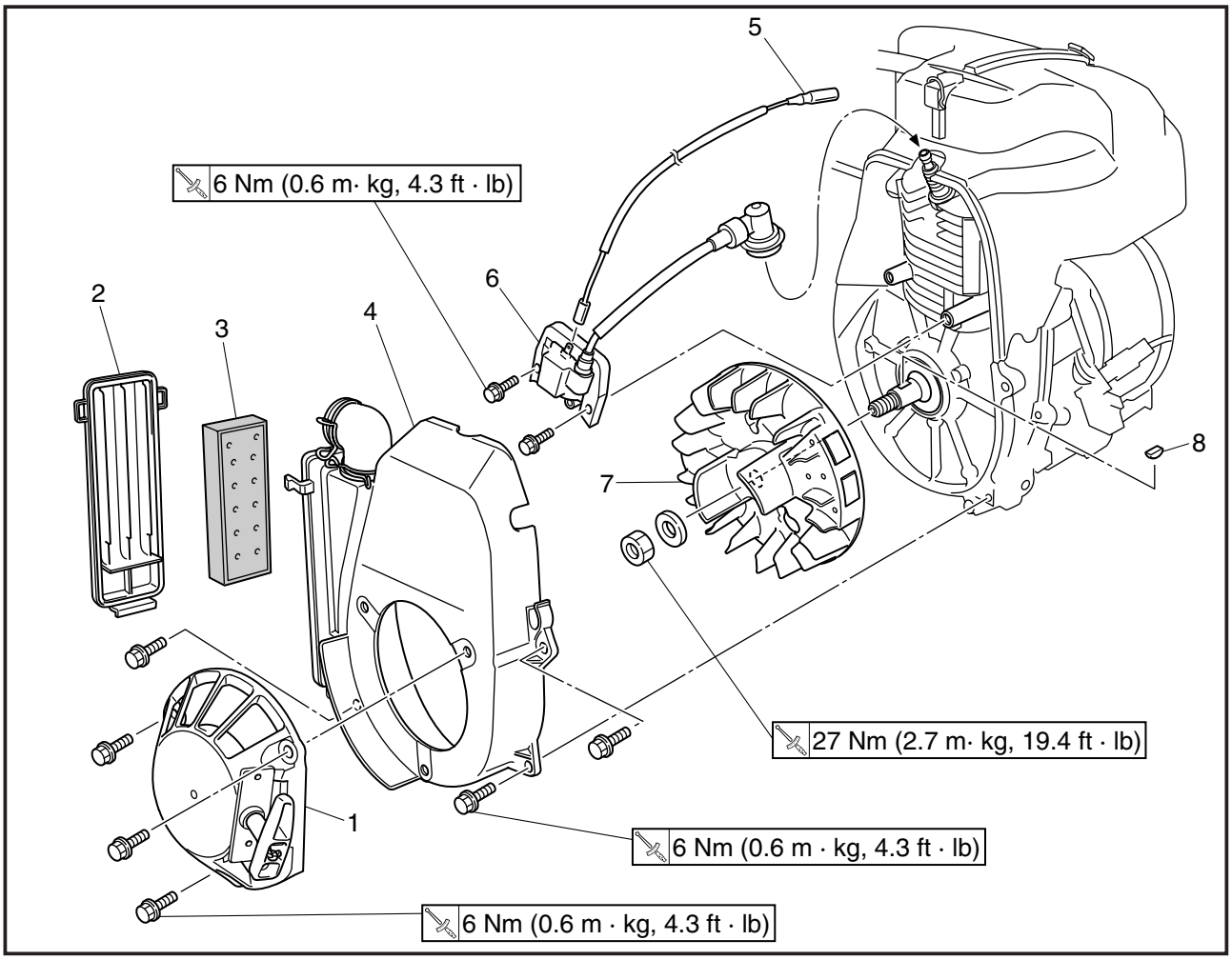
Insert the rid of control box to the front cover ②.

ENGINE



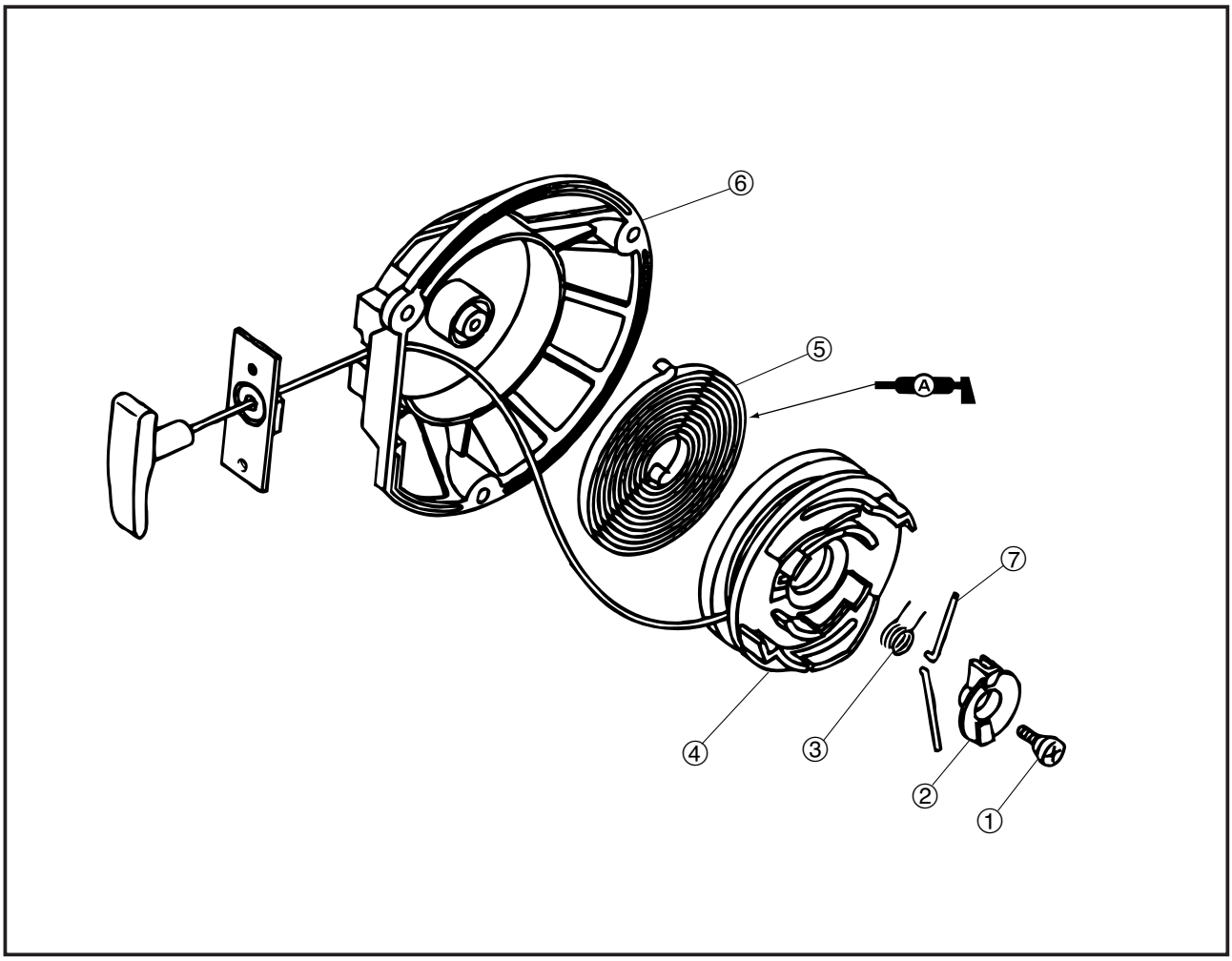
Order	Job name	Q'ty	Remarks
	Engine removal		Remove the parts in the order listed below.
	Front cover, rear cover and fuel hose		Refer to "COVERS" section in CHAPTER 2.
	Vacuum hose		Refer to "CARBURETOR" section in CHAPTER 4.
	Fuel tank		
1	Control unit	1	
2	Generator lead wire coupler	1	Disconnect.
3	Engine assembly	1	
4	Engine bracket left/right	1/1	
5	Mount insulator	4	
6	Noise filter	1	(For 230V/50Hz) For installation, reverse the removal procedure.

RECOIL STARTER AND ROTOR

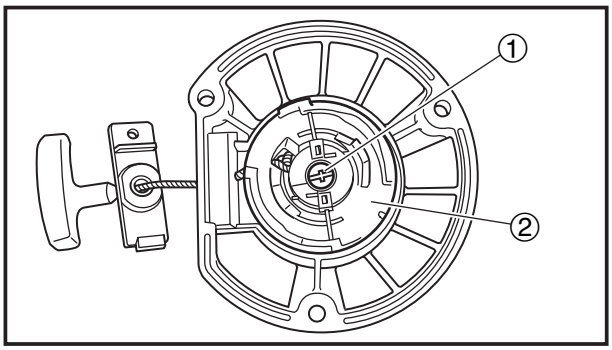


Order	Job name	Q'ty	Remarks
	Recoil starter and rotor removal		Remove the parts in the order listed below.
	Front cover and rear cover		Refer to "COVERS" section in CHAPTER 2.
	Fuel tank		Refer to "CARBURETOR, FUEL TANK AND FUEL PUMP" section in CHAPTER 4.
	Carburetor		
1	Recoil starter assembly	1	
2	Case cover	1	
3	Element	1	
4	Air filter case assembly	1	
5	Ignition coil wire lead	1	
6	Ignition coil	1	
7	Rotor assembly	1	
8	Woodruff key	1	
			For installation, reverse the removal procedure.

RECOIL STARTER DISASSEMBLY

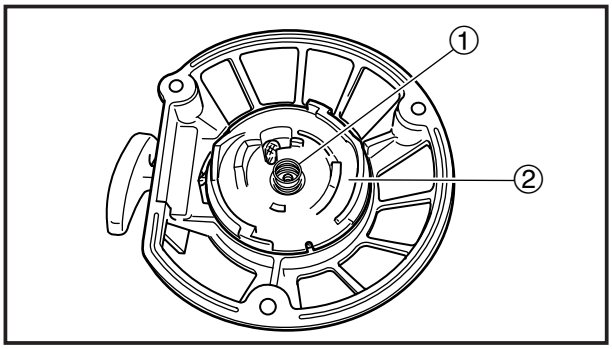


Order	Job name	Q'ty	Remarks
	Recoil starter disassembly		Remove the parts in the order listed below.
①	Set screw	1	
②	Collar	1	
③	Friction spring	1	
④	Reel	1	
⑤	Spiral spring	1	
⑥	Starter case	1	
⑦	Swing arm	2	
			For disassembly, reverse the assembly procedure.



RECOIL STARTER DISASSEMBLY

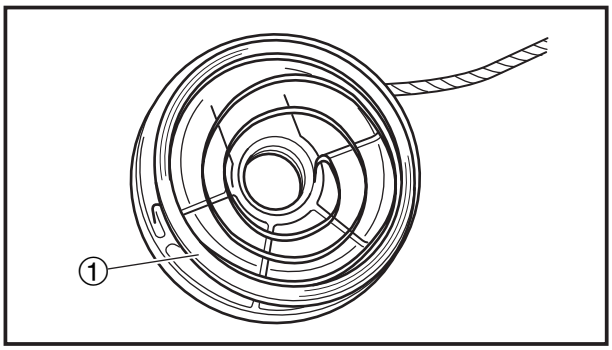
1. Remove:
   - Set screw ①
   - Collar ②



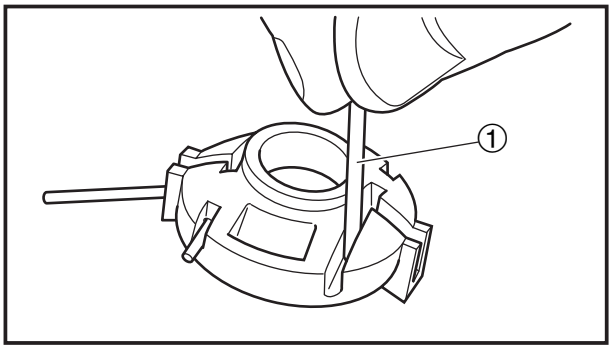
2. Remove:
   - Friction spring ①
   - Reel ②

CAUTION:

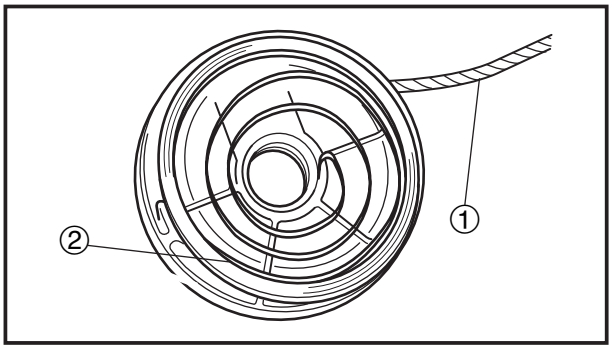
Be sure to press down on the reel, because the spring will pop out suddenly when it is removed from the reel.



3. Remove:
   - Spiral spring ①

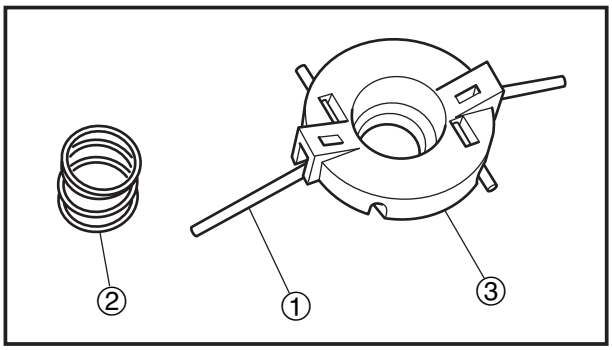


4. Remove:
   - Swing arm ①



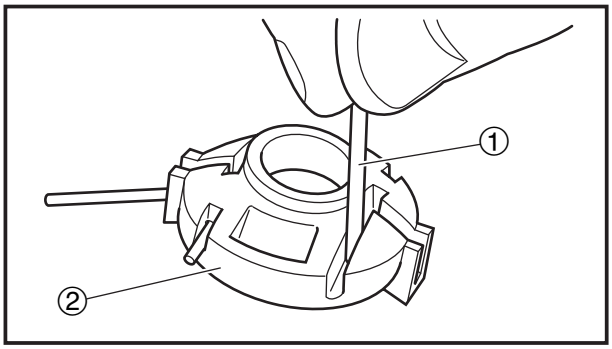
RECOIL STARTER INSPECTION

1. Inspect:
   - Starter rope ①
     Damage → Replace.
   - Spiral spring ②
     Deternation/crack/damage → Replace.



2. Inspect:
   - Swing arm ①
   - Friction spring ②
   - Collar ③

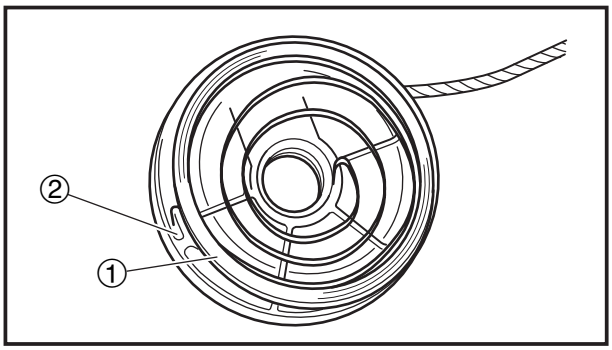
   Deternation/crack/damage → Replace.



RECOIL STARTER ASSEMBLY

1. Install:
   - Swing arm ①
   - Collar ②

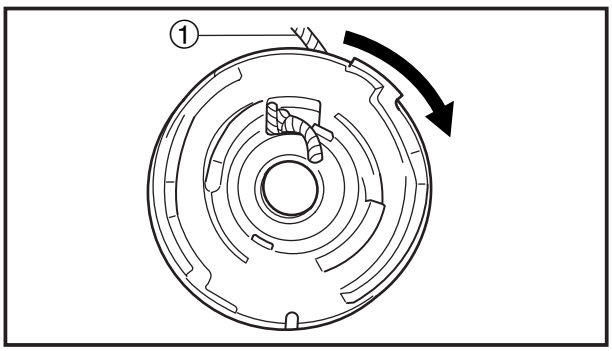
   install the swing arm to the collar.



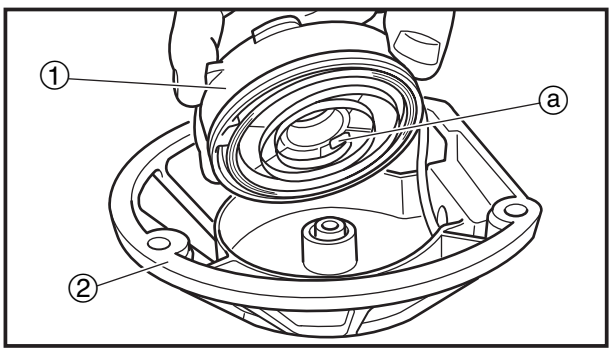
2. Install:
   - Spiral spring ①
   - Reel ②

NOTE:

Hook the edge of spiral spring to the groove and then carefully wind the spring counter clockwise and place it on the reel.



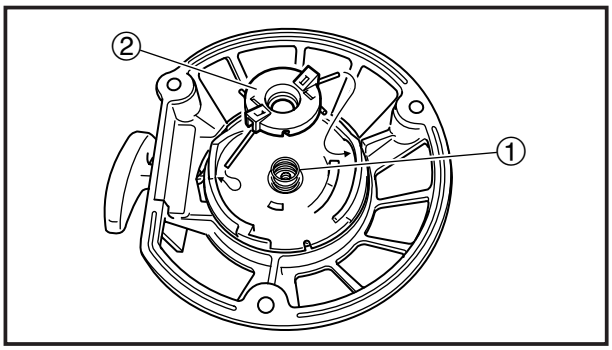
3. Wind the starter rope ① clockwise two turns on the reel.



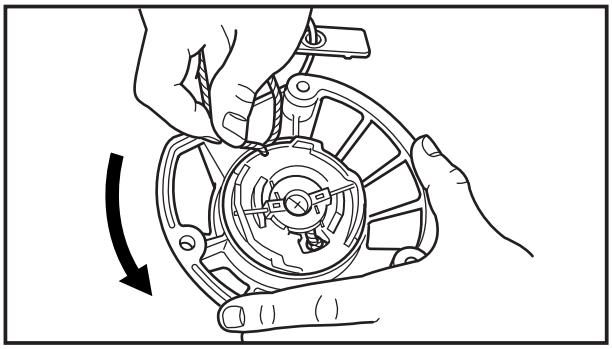
4. Install:
   - Reel ①
   - Starter case ②

NOTE:

Slowly install the hook ⓐ of the spiral spring into the groove.

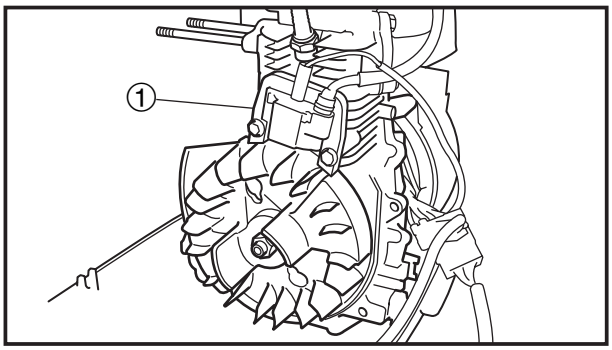


5. Install:
   - Friction spring
   - Collar ①
   - Set screw ②



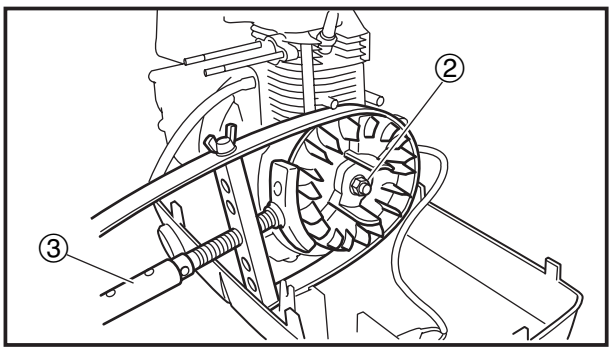
6. Hook the starter rope in the cutout in the reel, and wind it counter clockwise four turns.
7. Pull the starter rope and check the recoil starter operation.

IGNITION COIL AND ROTOR REMOVAL



1. Remove:
   - Ignition coil ①
   - Rotor nut ②
     use the sheave holder ③.

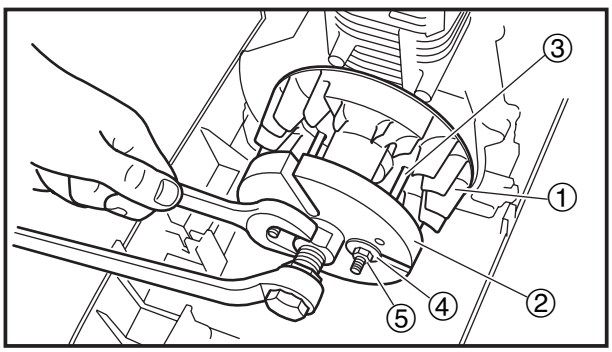
	Sheave holder: **YS-01880, 90890-01701**

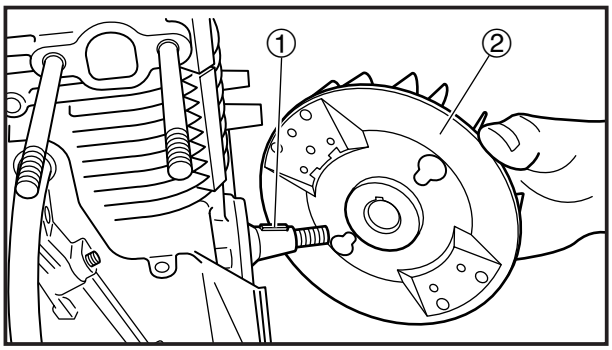


2. Remove:
   - Rotor ①
     use the rotor puller ②, bolt ③, washer ④ and nut ⑤.

	Rotor puller: **YU-33270, 90890-03162**

Bolt ③	95817-06100	2 pcs.
Washer ④	95817-06380	2 pcs.
Nut ⑤	95817-06254	2 pcs.





IGNITION COIL AND ROTOR INSTALLATION

CAUTION:

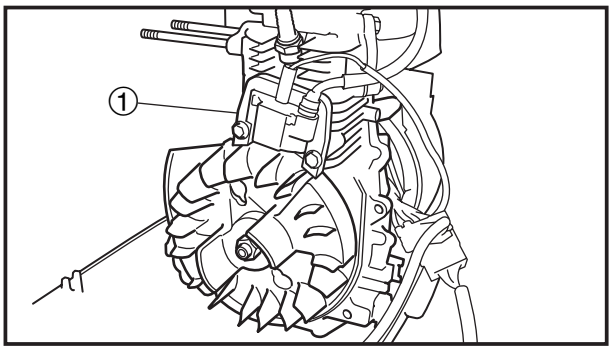
Be sure to remove any oil grease from the tapered portion of the magneto rotor using a cloth dampened with thinner.

1. Install:
   - Woodruff key ①
   - Rotor ②
   - Rotor nut

27 Nm (2.7 m · kg, 19.4 ft · lb)

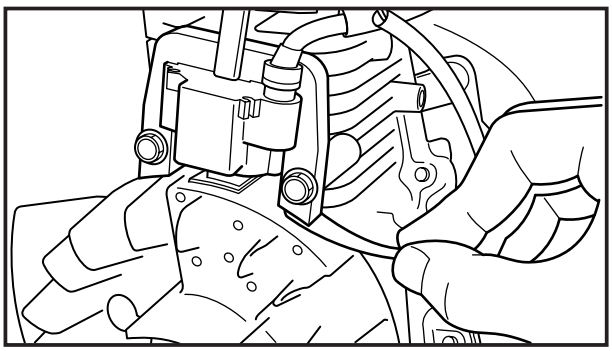
NOTE:

When installing the rotor, make sure the woodruff key is properly seated in the key way of the crankshaft.



2. Install:
   - Ignition coil ①

6 Nm (0.6 m · kg, 4.3 ft · lb)



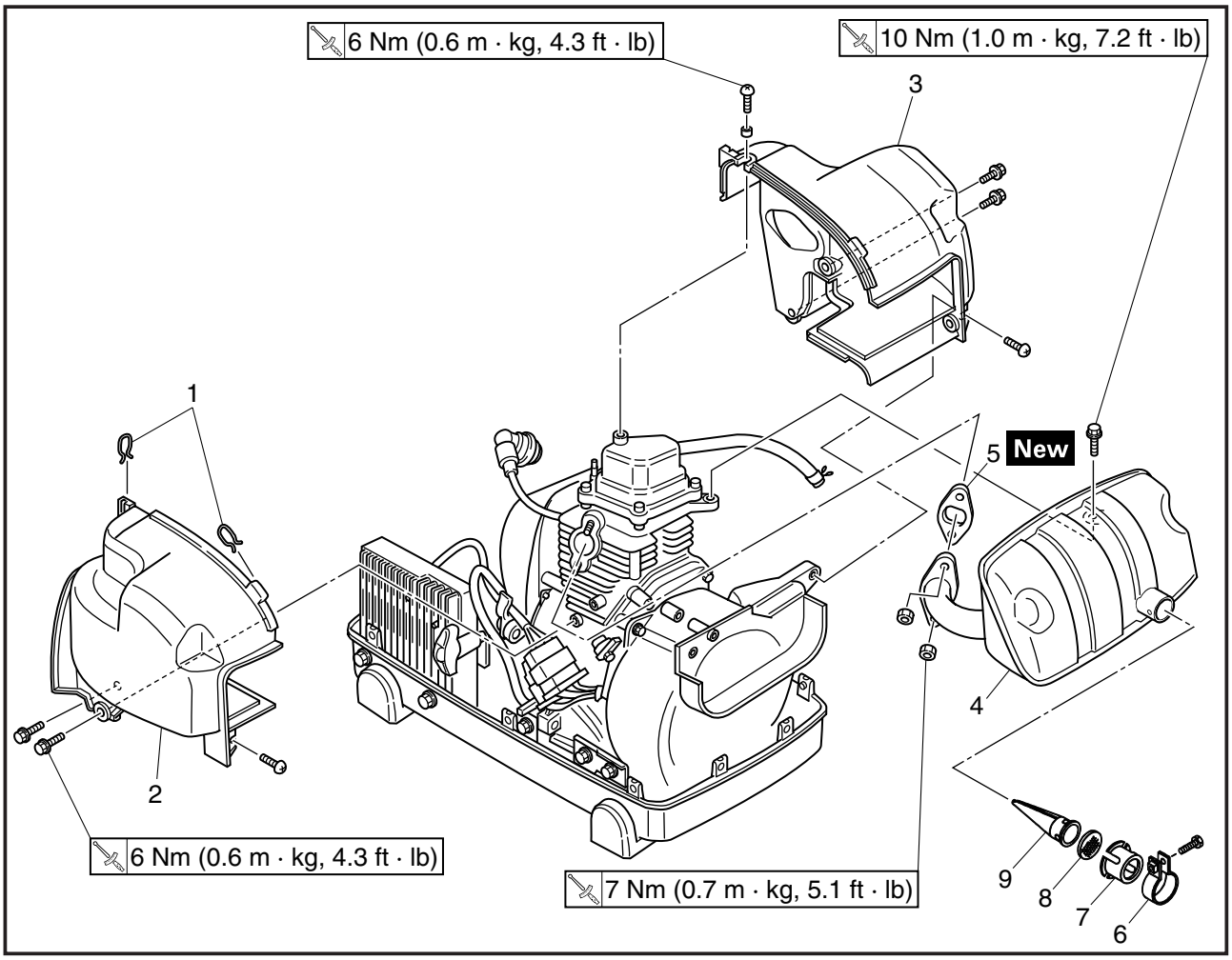
3. Inspection:
   - Air gap

   inspect the clearance between the magneto on the rotor and ignition coil.

Air gap:
0.5 ± 0.1 mm
(0.02 ± 0.004 in)

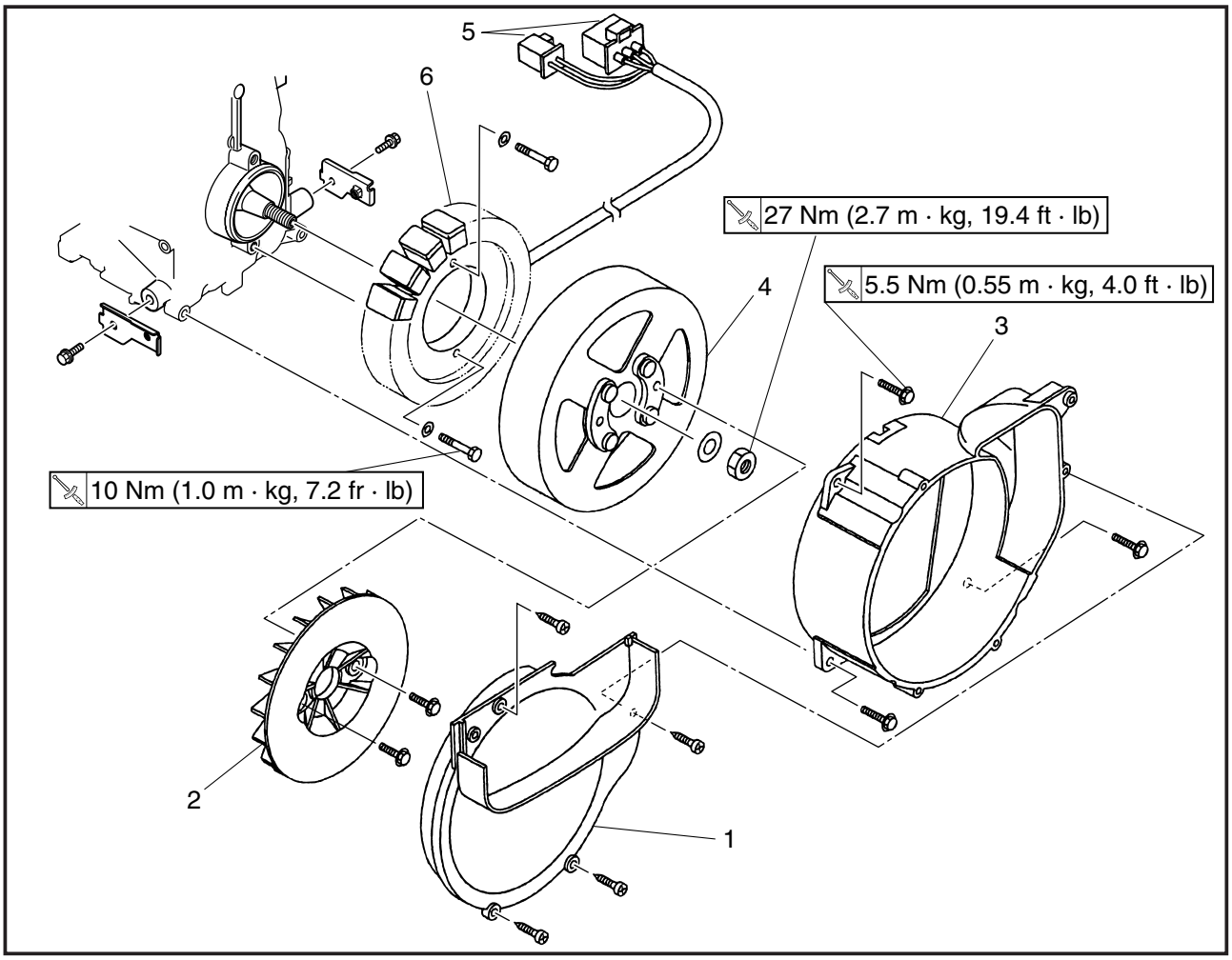
Out of specification → Replace.

MUFFLER

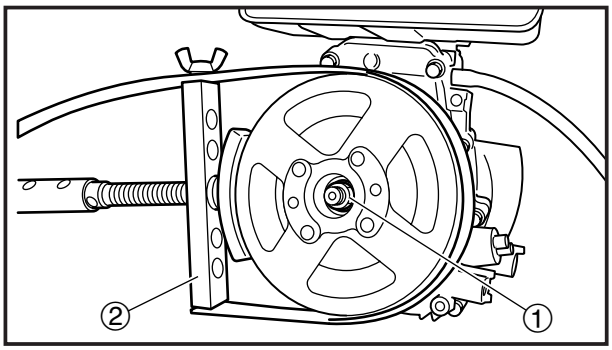


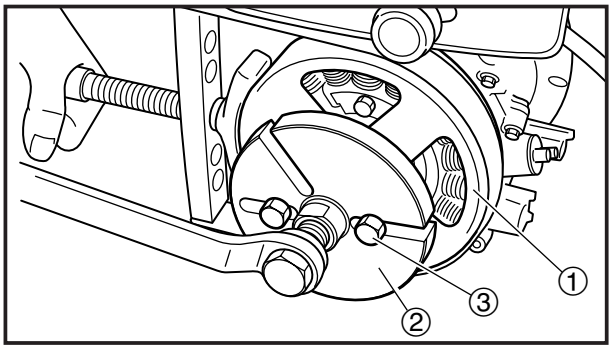
Order	Job name	Q'ty	Remarks
	Muffler removal		Remove the parts in the order listed below.
	Front cover and rear cover		Refer to "COVERS" section in CHAPTER 2.
	Carburetor		Refer to "CARBURETOR, FUEL TANK AND FUEL PUMP" section in CHAPTER 4.
1	Clip	2	
2	Cylinder air shroud 2	1	
3	Cylinder air shroud 1	1	
4	Muffler assembly	1	
5	Gasket	1	
6	Silencer band	1	
7	Cap	1	
8	Wire net	1	
9	Spark arrester	1	
			For installation, reverse the removal procedure.

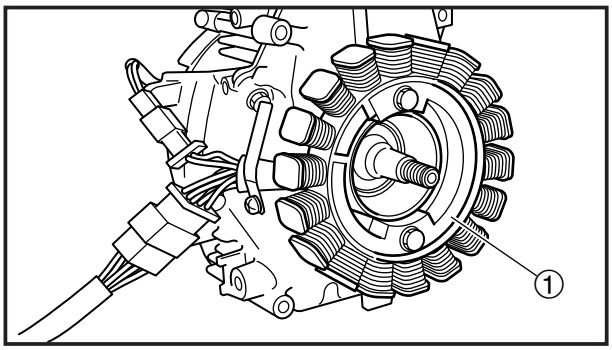
GENERATOR



Order	Job name	Q'ty	Remarks
	Generator removal		Remove the parts in the order listed below.
	Front cover and rear cover		Refer to "COVERS" section in CHAPTER 2.
	Fuel tank		Refer to "CARBURETOR, FUEL TANK AND FUEL PUMP" section in CHAPTER 4.
	Carburetor		
	Cylinder air shroud		Refer to "MUFFLER" section.
	Engine assembly		Refer to "ENGINE REMOVAL" section.
1	Rear end cover	1	
2	Magneto fan	1	
3	Cover	1	
4	Generator rotor	1	
5	Stator assembly coupler	2	
6	Stator coil assembly	1	
			For installation, reverse the removal procedure.







ROTOR AND STATOR COIL ASSEMBLY REMOVAL

1. Remove:
   - Rotor nut ①

NOTE:
Attach the sheave holder ② to hold the rotor.

	Sheave holder: **YS-01880, 90890-01701**

2. Remove:
   - Magneto rotor ①

NOTE:
Use the flywheel puller ② and bolts ③ to remove the rotor.

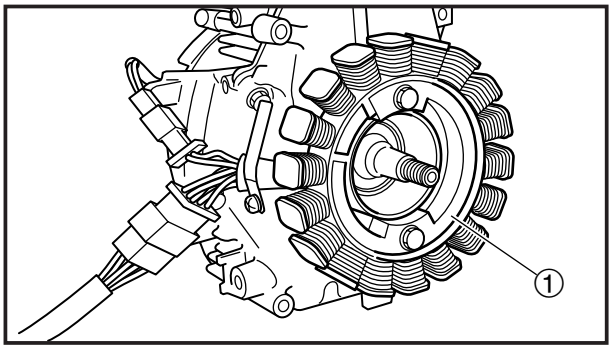
	Rotor puller: **YU-33270, 90890-03162**

Bolt ③ ····· 95817-06100 ····· 2 pcs.

3. Remove:
   - Stator coil ①

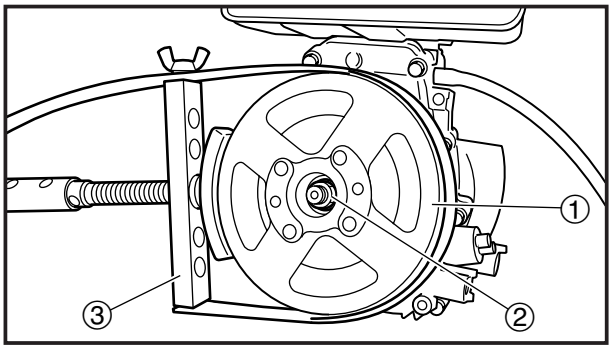
STATOR COIL INSTALLATION

CAUTION:
Be sure to remove any oil grease from the tapered portion of the magneto rotor using a cloth dampened with thinner.



1. Install:
   - Stator coil assembly ①

10 Nm (1.0 m · kg, 7.2 ft · lb)



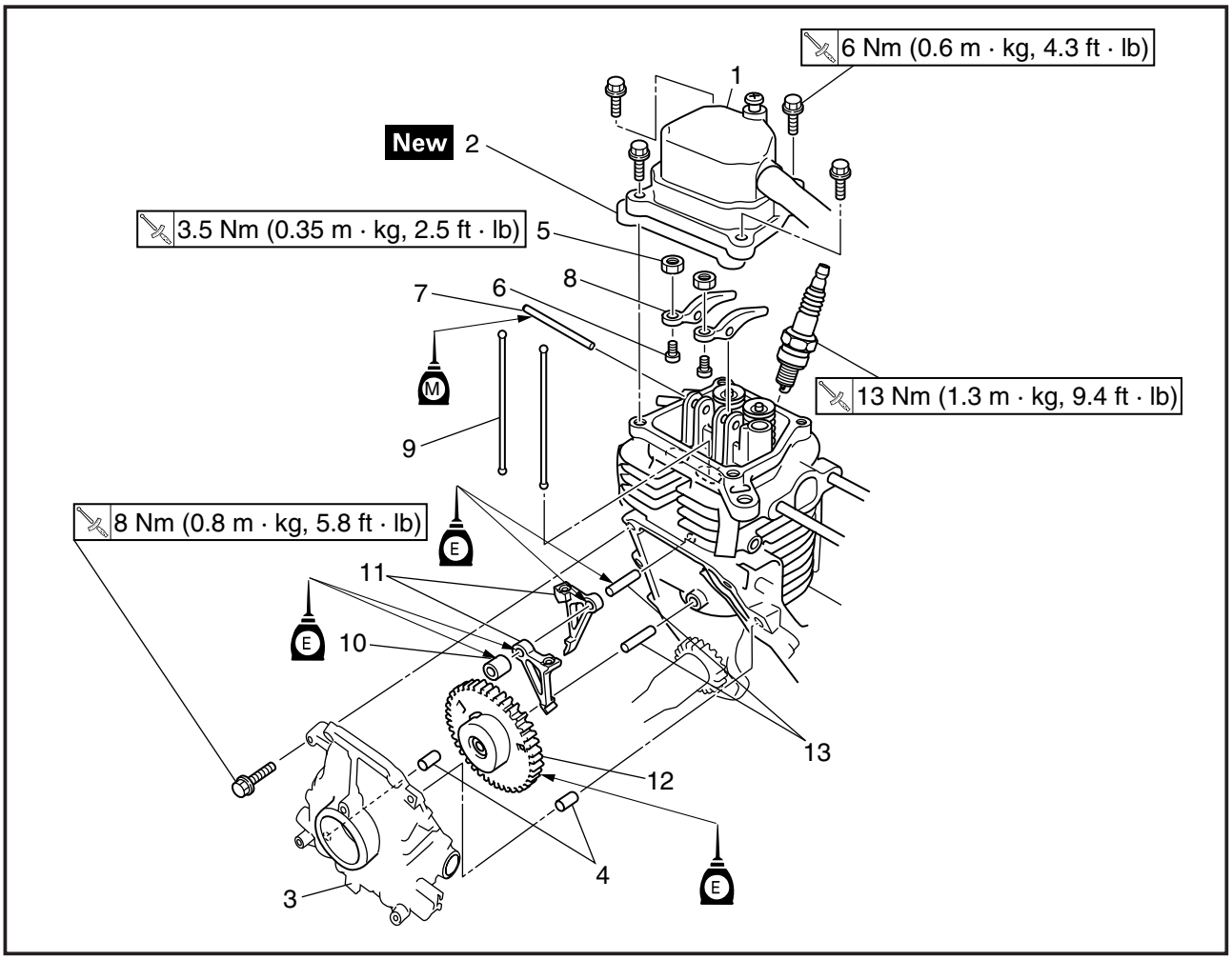
2. Install:
   - Rotor ①
   - Rotor nut ②

27 Nm (2.7 m · kg, 19.4 ft · lb)

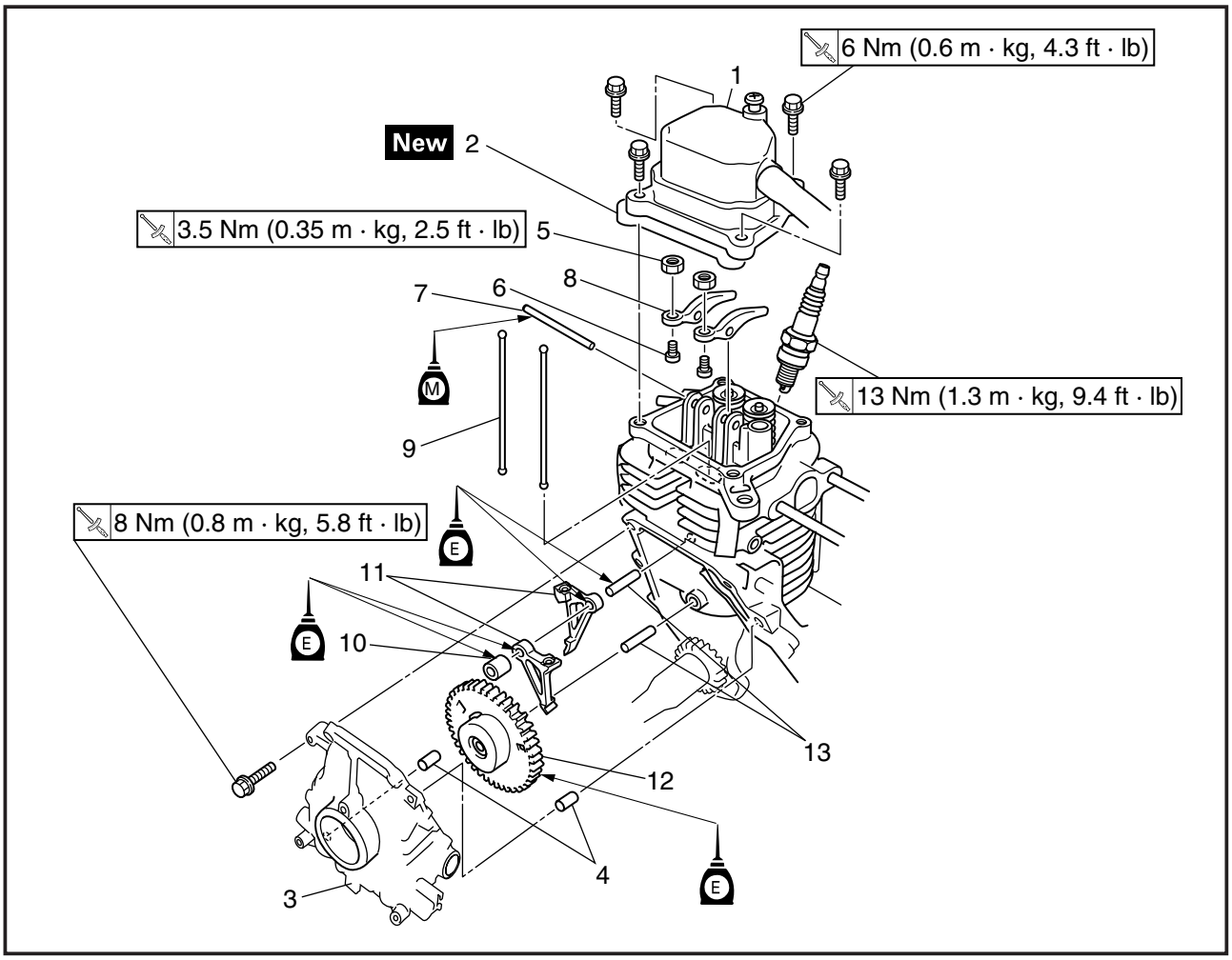
NOTE:
Attach the sheave holder ③ to hold the rotor.

Sheave holder:
YS-01880, 90890-01701

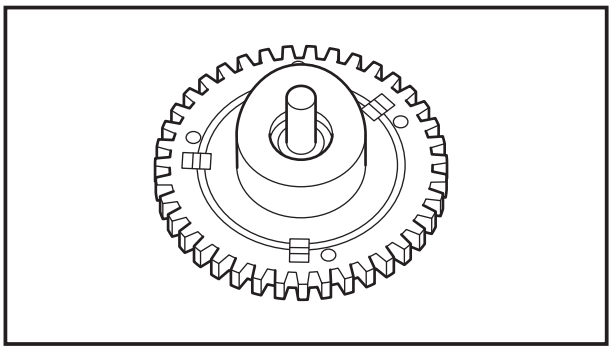
CRANKCASE2, CAMSHAFT AND ROCKER ARM



Order	Job name	Q'ty	Remarks
	Crankcase 2, camshaft and rocker arm removal		Remove the parts in the order listed below.
	Front cover and rear cover		Refer to "COVERS" section in CHAPTER 2.
	Fuel tank		Refer to "CARBURETOR, FUEL TANK AND FUEL PUMP" section in CHAPTER 4.
	Carburetor		
	Cylinder air shroud		Refer to "MUFFLER" section.
	Engine assembly		Refer to "ENGINE REMOVAL" section.
	Generator		Refer to "GENERATOR REMOVAL" section.
1	Cylinder head cover	1	
2	Cylinder head cover gasket	1	
3	Crankcase 2	1	
4	Dowel pin	2	
5	Lock nut	2	Loosen.

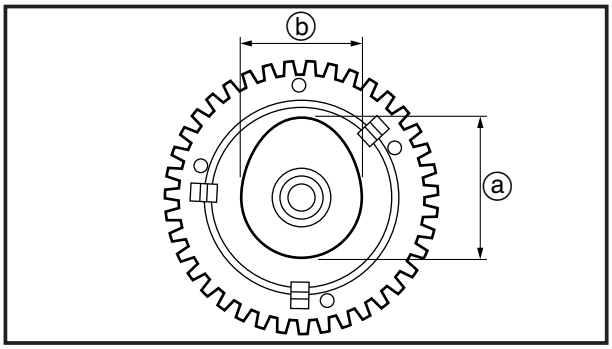


Order	Job name	Q'ty	Remarks
6	Adjuster	2	Loosen.
7	Dowel pin	1	below.
8	Rocker arm	2	
9	Push rod	2	
10	Collar	1	
11	Cam follower	2	
12	Camshaft assembly	1	
13	Dowel pin	2	
			For installation, reverse the removal procedure.



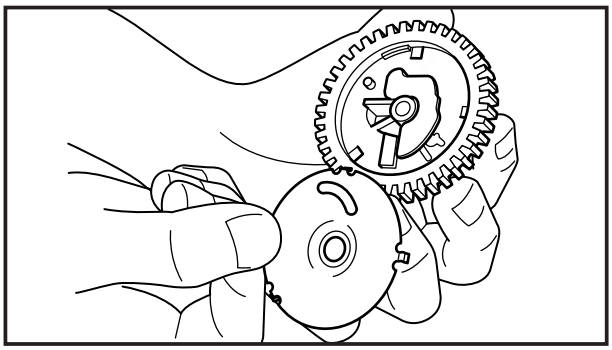
CAMSHAFT INSPECTION

1. Inspect:
   - Camshaft
     Crack/damage/wear → Replace.

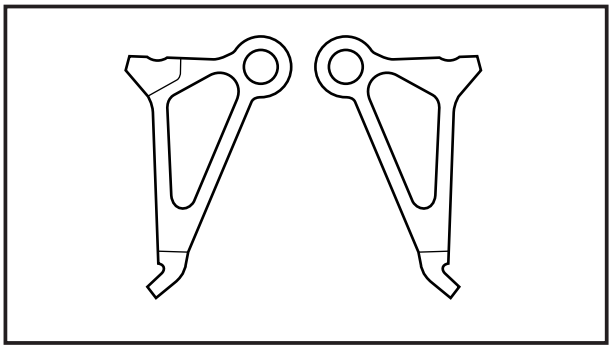


2. Inspect:
   - Cam lobes length ⓐ and ⓑ
     Out of specifications → Replace.

Cam lobes length:
ⓐ:
32.65 mm (1.29 in)
ⓑ:
28.25 mm (1.11 in)
Limit:
ⓐ:
31.65 mm (1.25 in)
ⓑ:
27.25 mm (1.07 in)

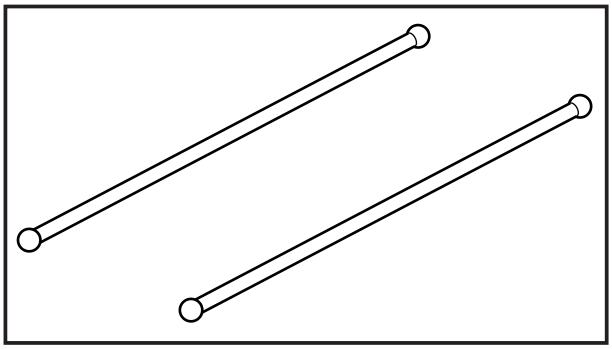


3. Inspection:
   - Surface of camshaft gear teeth
   - Decompressor
     Crack/damage/wear → Replace.



CAM FOLLOWER INSPECTION

1. Inspect:
   - Cam follower
     Crack/damage/wear → Replace.

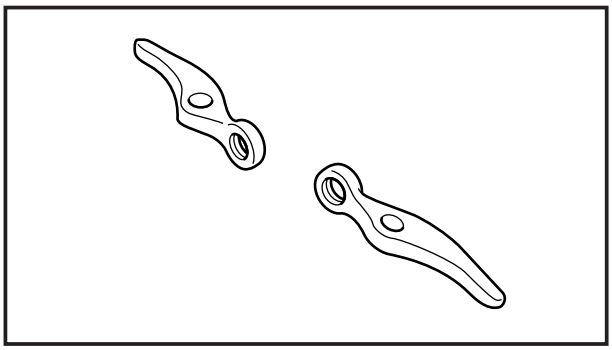


PUSH ROD INSPECTION

1. Inspect:
   - Push rod runout

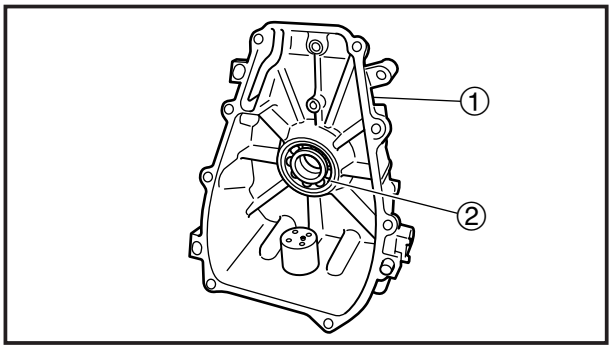
Runout limit:
0.5 mm (0.02 in)

Out of specifications → Replace.



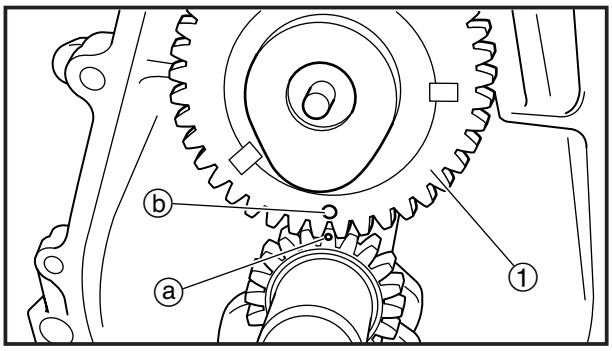
ROCKER ARM INSPECTION

1. Inspect:
   - Rocker arm
     Crack/damage/wear → Replace.



CRANKCASE 2 INSPECTION

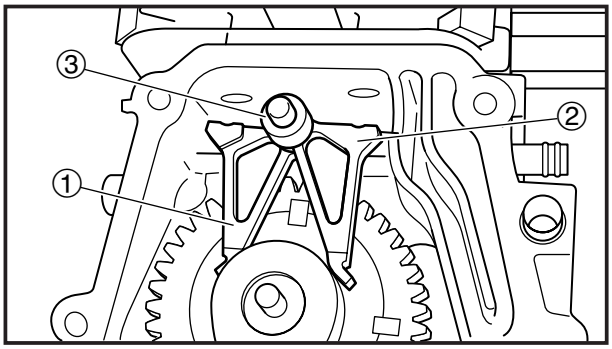
1. Inspect:
   - Crankcase 2 ①
     Crack/damage/wear → Replace.
   - Bearing ②
     Noise/wear/rotational failure → Replace.
   - Oil seal
     Crack/damage/wear → Replace.



CAMSHAFT AND LOCKER ARM INSTALLATION

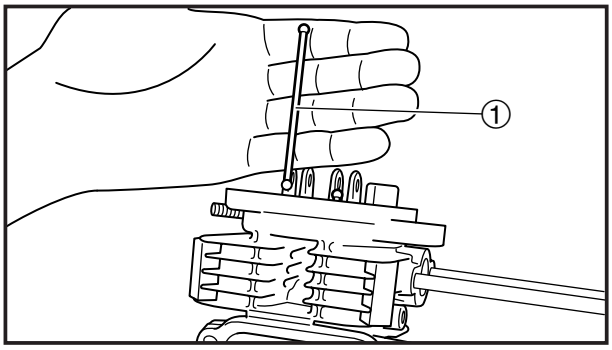
1. Install:
   - Camshaft ①

NOTE:
Make sure that the "❍" mark ⓐ on the crankshaft is aligned with the "❍" mark ⓑ on the camshaft.



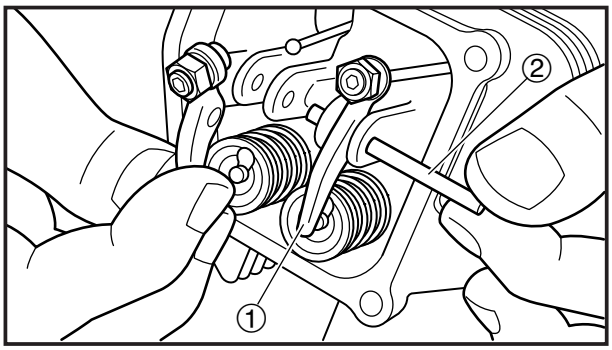
2. Install:
   - Cam follower (exhaust side) ①
   - Cam follower (intake side) ②
   - Collar ③

NOTE:
Make sure that the piston place in "Top Dead Center" position, then install the cam follower.



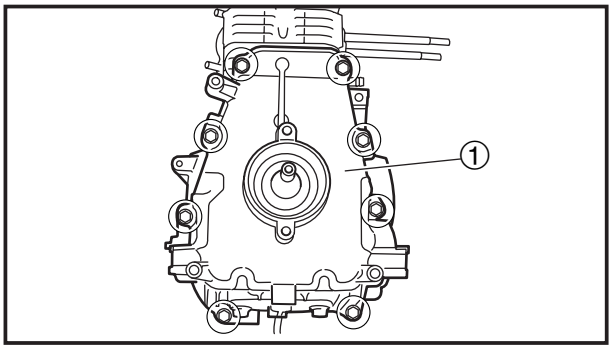
3. Install:
   - Push rod ①

NOTE:
Be sure install the push rod to the groove through the cylinder head cover side.



4. Install:
   - Rocker arm ①
   - Dowel pin ②

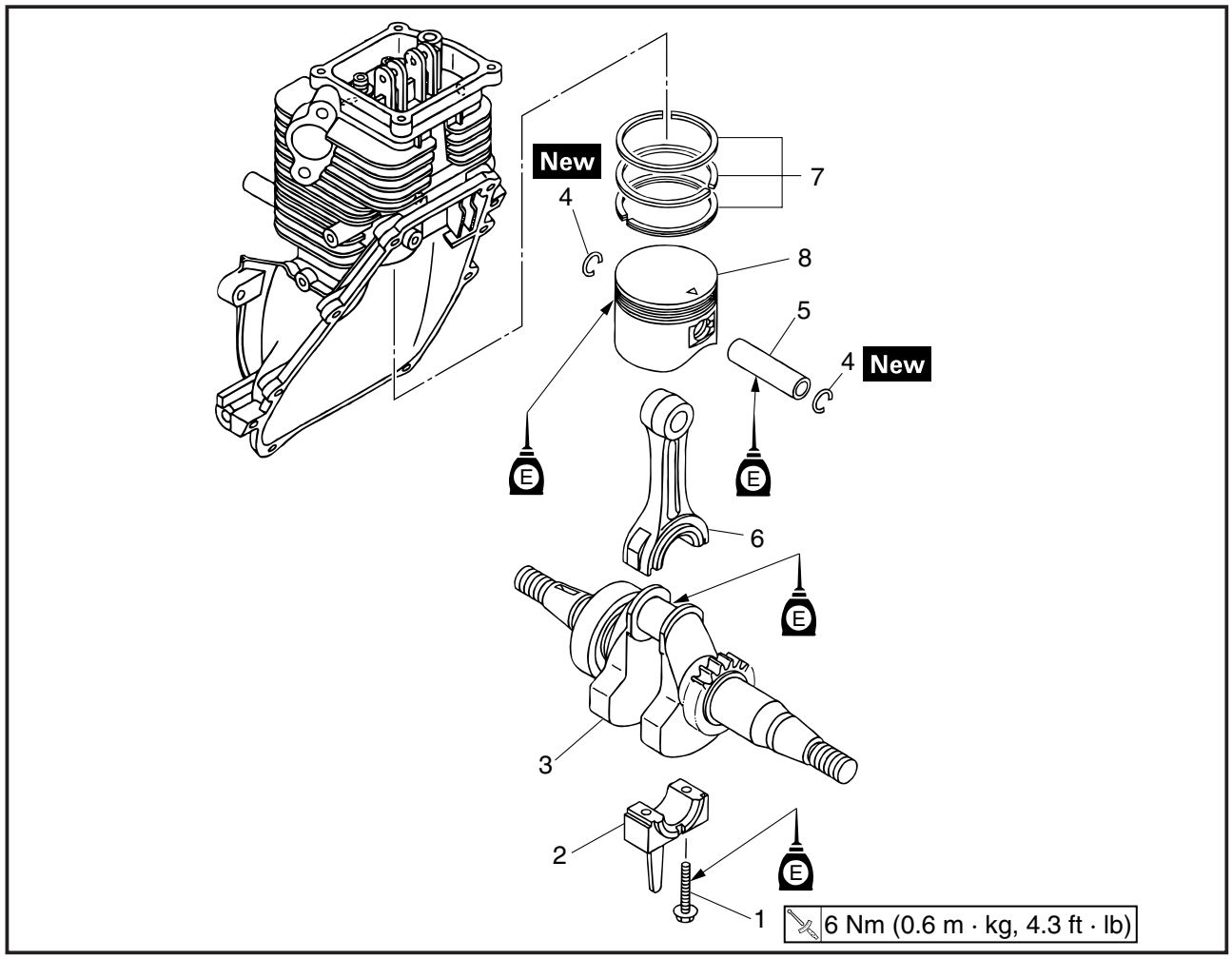
NOTE:
Make sure align the push rod edge with the rocker arm groove, then install the rocker arm.



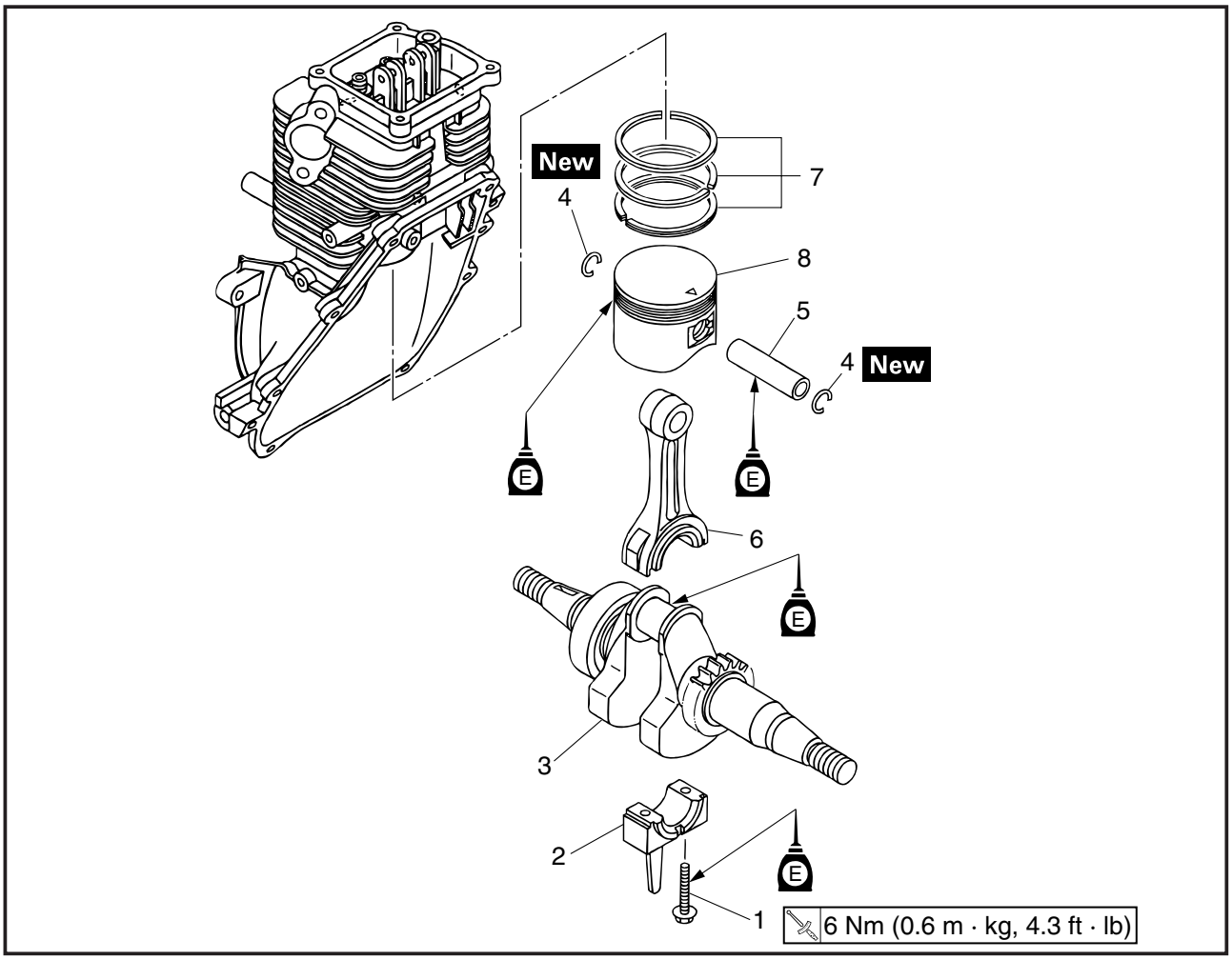
5. Install:
   - Crankcase ①

NOTE:
Tighten the bolts to the specified torque in to steps and in order.

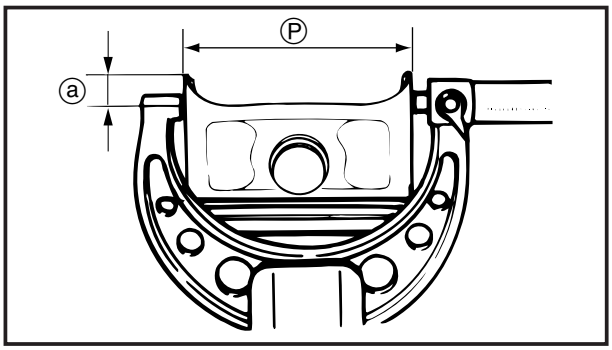
CRANKSHAFT, PISTON AND PISTON RING



Order	Job name	Q'ty	Remarks
	Crankshaft, piston and piston ring removal		Remove the parts in the order listed below.
	Front cover and rear cover		Refer to "COVERS" section in CHAPTER 2.
	Fuel tank		Refer to "CARBURETOR, FUEL TANK AND FUEL PUMP" section in CHAPTER 4.
	Carburetor		
	Cylinder air shroud		Refer to "MUFFLER" section.
	Engine assembly		Refer to "ENGINE REMOVAL" section.
	Recoil starter		Refer to "RECOIL STARTER AND ROTOR" section.
	Generator		Refer to "GENERATOR REMOVAL" section.
	Rocker arm and camshaft		Refer to "ROCKER ARM AND CAMSHAFT" section.
1	Bolt	2	
2	Connecting rod cap	1	
3	Crankshaft assembly	1	



Order	Job name	Q'ty	Remarks
4	Piston pin circlip	2	
5	Piston pin	1	
6	Connecting rod	1	
7	Piston ring set	1	
8	Piston	1	
			For installation, reverse the removal procedure.



PISTON AND PISTON PIN INSPECTION

1. Measure:
   - Piston skirt diameter Ⓟ

   ⓐ = 10 mm (0.4 in) from the piston bottom edge

   Out of specification → Replace.

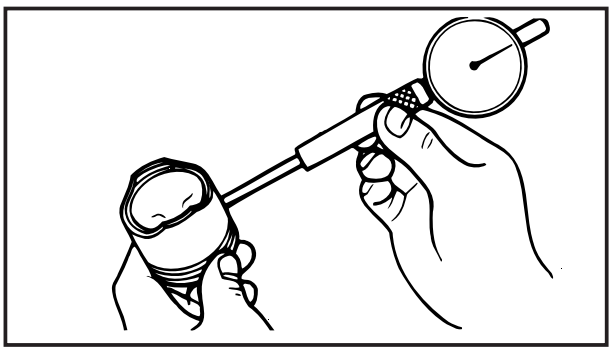
Piston skirt diameter:
Standard:
40.95 ~ 40.97 mm
(1.612 ~ 1.613 in)

2. Measure:
   - Piston clearance

   Out of specifications → Rebore or replace cylinder and replace piston and piston rings.

Piston clearance:
0.01 ~ 0.04 mm
(0.0004 ~ 0.0016 in)

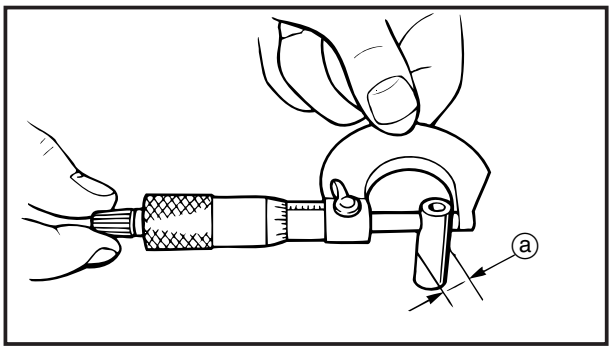
Piston clearance =
Cylinder inside diameter -
Piston skirt diameter

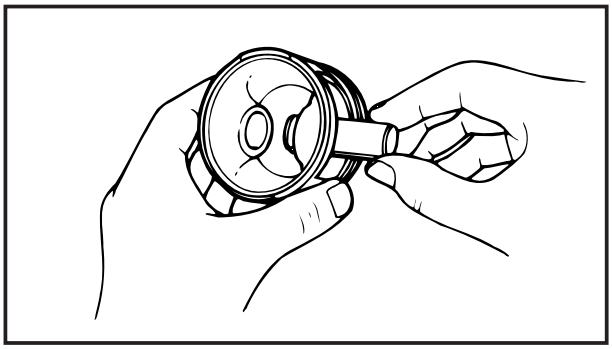


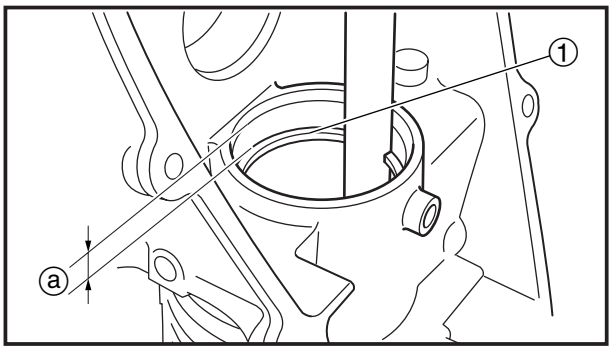
3. Measure:
   - Piston pin hole inside diameter

   Out of specifications → Replace.

Piston pin hole inside diameter:
Standard:
10.000 ~ 10.020 mm
(0.3937 ~ 0.3945 in)
Limit:
10.050 mm
(0.3956 in)







4. Measure:
   - Piston pin diameter ⓐ
     Out of specifications → Replace.

Piston pin diameter:
9.99 ~ 10.00 mm
(0.3933 ~ 0.3937 in)
Limit:
9.95 mm
(0.3917 in)

5. Inspect:
   - Check the piston pin enters smoothly into the piston pin hole.
     If the piston pin fits tightly into the piston, check the piston pin hole. If there is any protrusion, use a knife or scraper to gently remove it so that piston pin can be pushed in gently with your fingers.

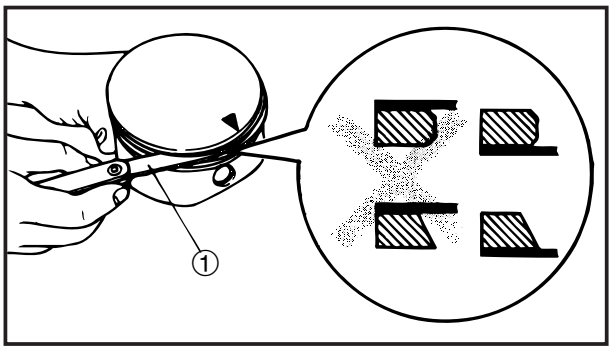
PISTON RING INSPECTION

1. Measure:
   - Piston ring end gap
     Out of specification → Replace.

NOTE:
Insert the piston ring ① into the cylinder, and push it approximately ⓐ 5 mm (0.2 in) into the cylinder. Push the ring with the piston crown so that the ring is at angles to the cylinder bore.

	Ring end gap	Wear limit
Top ring	0.10 ~ 0.30 mm (0.0039 ~ 0.0118 in)	0.6 mm (0.0236 in)
2nd ring	0.10 ~ 0.30 mm (0.0039 ~ 0.0118 in)	0.6 mm (0.0236 in)
Oil ring	0.2 ~ 0.7 mm (0.0078 ~ 00275 in)	0.9 mm (0.0354 in)

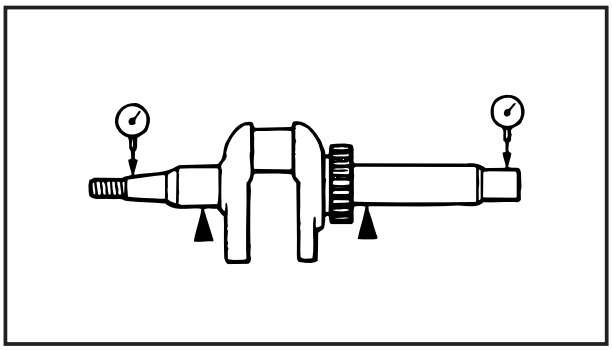
Out of specifications → Replace the piston and piston ring as a set.



2. Measure:
   • Piston side clearance
   Out of specification → Replace.

NOTE:
- Clean carbon deposits from the piston ring grooves and ring s before measuring the side clearance.
- Measure the side clearance at several portions.

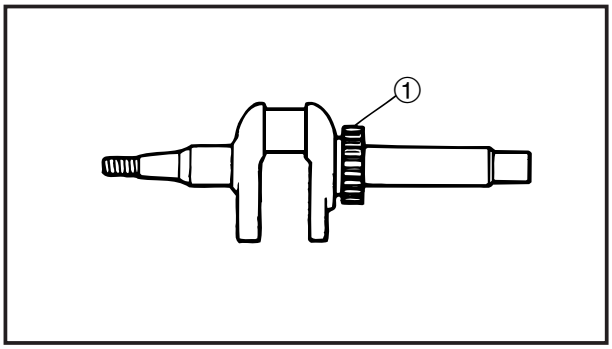
	Piston ring side clearance	Wear limit
Top ring	0.06 ~ 0.11 mm (0.002 ~ 0.004 in)	0.15 mm (0.006 in)
2nd ring	0.06 ~ 0.11 mm (0.002 ~ 0.004 in)	



CRANKSHAFT INSPECTION

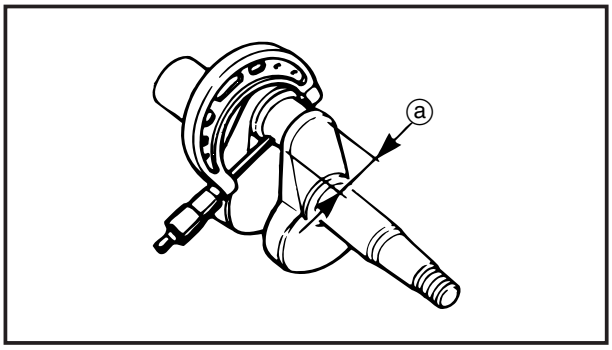
1. Measure:
   • Crankshaft runout limit
   use a dial gauge
   Out of specification → Replace.

Runout limit:
0.03 mm (0.001 in)



2. Inspect:
   • Crankshaft sprocket ①
   Crack/damage/wear → Replace the crankshaft.

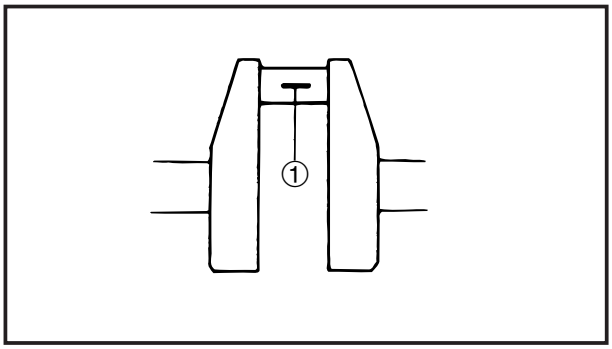
3. Measure:
   • Crank pin diameter ⓐ
   Out of specification → Replace the crankshaft.



Crank pin diameter:
15.970 ~ 15.985 mm
(0.629 ~ 0.630 in)
Limit:
15.940 mm
(0.627 in)

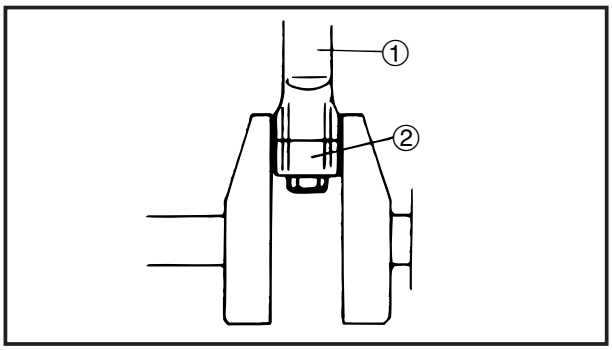
CONNECTING ROD OIL CLEARANCE INSPECTION

NOTE:
Measure the oil clearance if replacing the crankshaft or connecting rod.



1. Place a piece of Plastigauge ① on the crank pin horizontally.

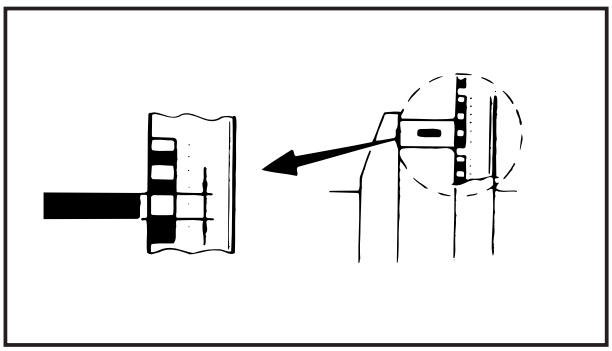
NOTE:
Clean off oil from all parts thoroughly.



2. Install:
   - Connecting rod ①
   - Connecting rod cap ①

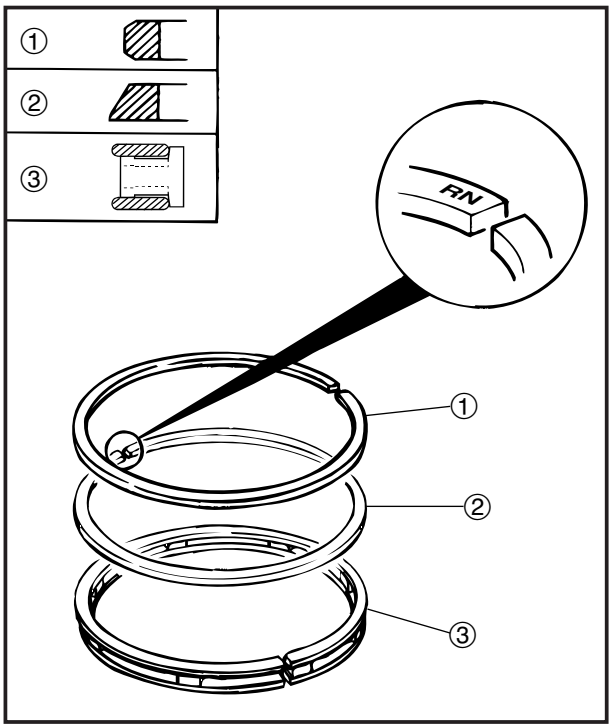
6 Nm (0.6 m · kg, 4.3 ft · lb)

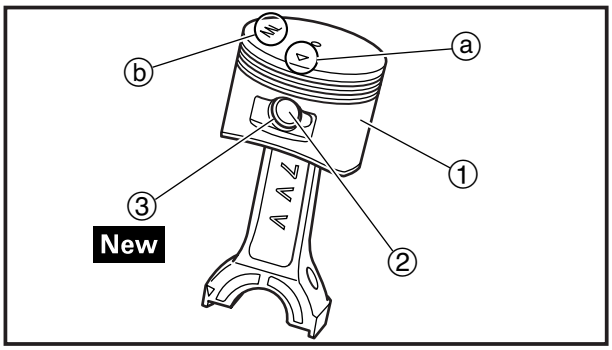
NOTE:
Tighten the cap bolts so that the crankshaft does not move while the oil clearance is being measured.

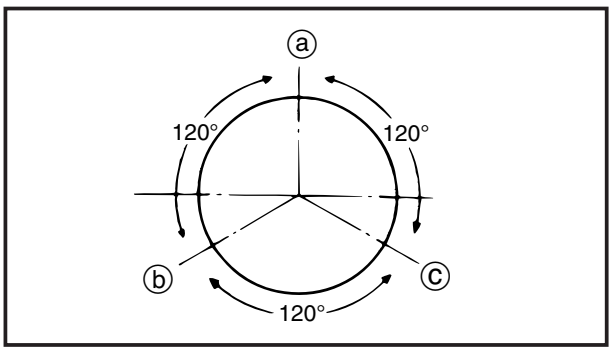


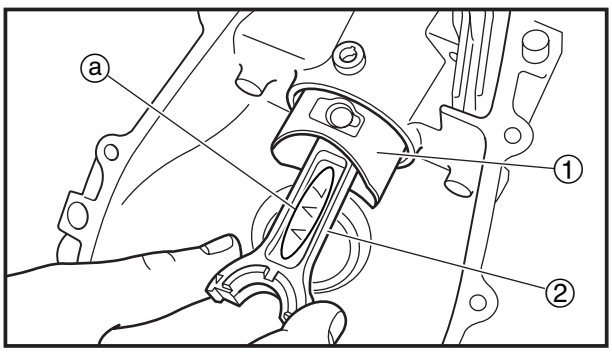
3. Remove:
   - Connecting rod cap
   - Connecting rod
4. Measure:
   - Connecting rod oil clearance
     Widest portion of the pressed Plastigauge
     Out of specification → Replace crankshaft or connecting rod, and then measure the clearance again.

Connecting rod oil clearance:
0.015 ~ 0.050 mm
(0.0006 ~ 0.0020 in)
Limit:
0.100 mm
(0.004 in)









PISTON AND PISTON RING INSTALLATION

1. Install:
   - Top ring ①
   - Second ring ②
   - Oil ring ring ③

NOTE:

- Be sure to install the second ring so that the "RN" mark a faces toward the piston head.
- Make sure that the piston rings move smoothly.

2. Apply 4-stroke engine oil to the inside of the connecting rod small end.
3. Install:
   - Piston ①
   - Piston pin ②
   - Piston pin circlip ③ **New**

NOTE:

Make sure that the "∇" mark ⓐ on the piston head and the "7VV" mark ⓑ on the connecting rod toward as same faces, then install.

CONNECTING ROD AND CRANKSHAFT INSTALLATION

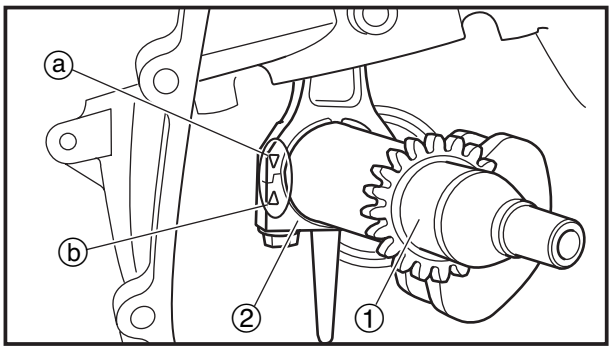
1. Make sure that the end gap of each piston ring is positioned, as shown in the illustration.

ⓐ Top ring
ⓑ Second ring
ⓒ Oil ring

2. Install:
   - Piston ①
   - Connecting rod ②

CAUTION:

Make sure that the "7VV" mark ⓐ on the connecting rod faces toward the crankcase cover.



3. Install:
   - Crankshaft ①
   - Connecting rod cap ②

6 Nm (0.6 m · kg, 4.3 ft · lb)

CAUTION:

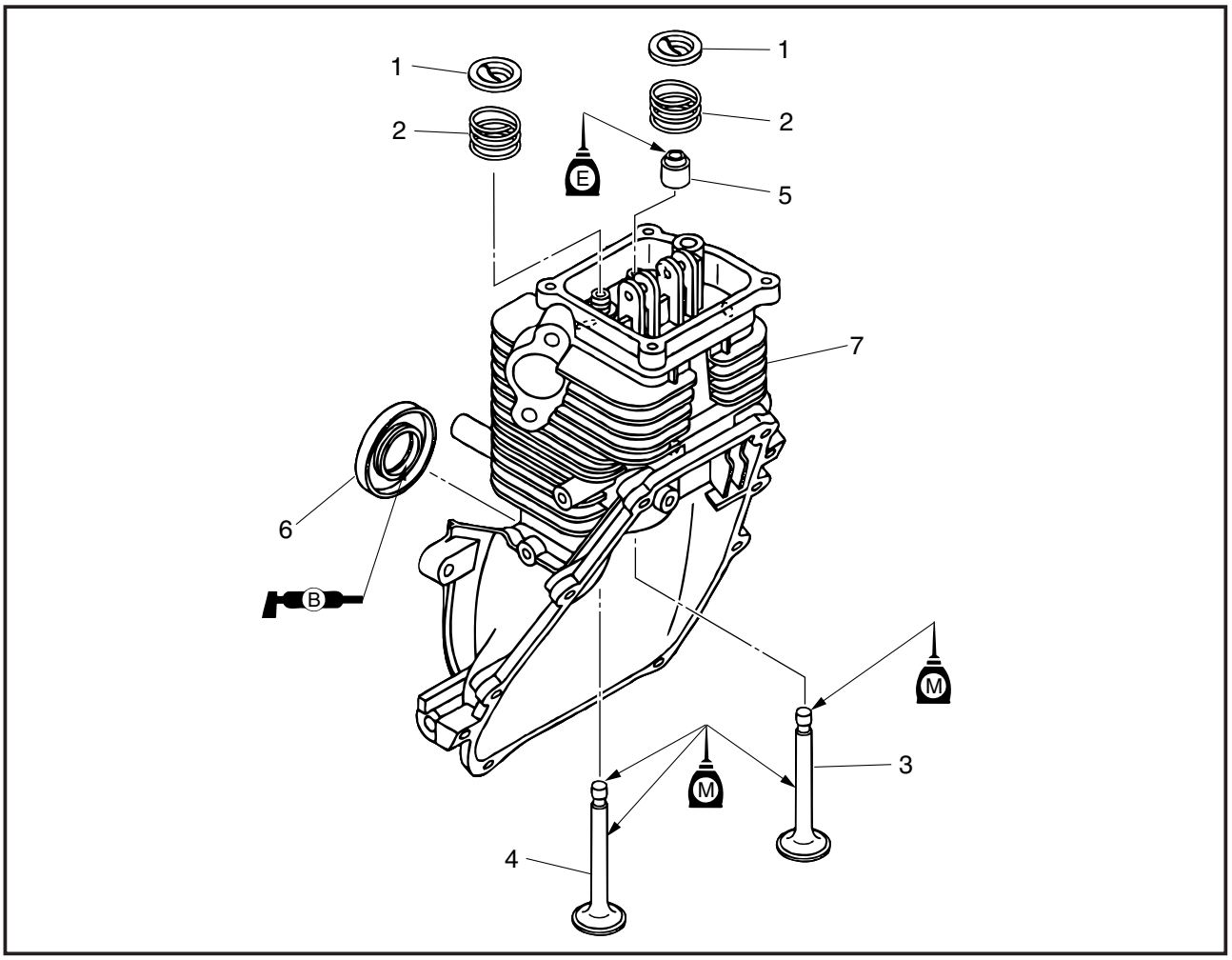
Make sure that the "∇" mark ⓐ on the connecting rod is aligned the "Δ" mark ⓑ on the rod cap.

4. Install:
   - Crankshaft
   - Connecting rod cap
   - Cam follower (exhaust side)
   - Cam follower (intake side)
   - Collar
   - Push rod
   - Rocker arm
   - Crankcase 2

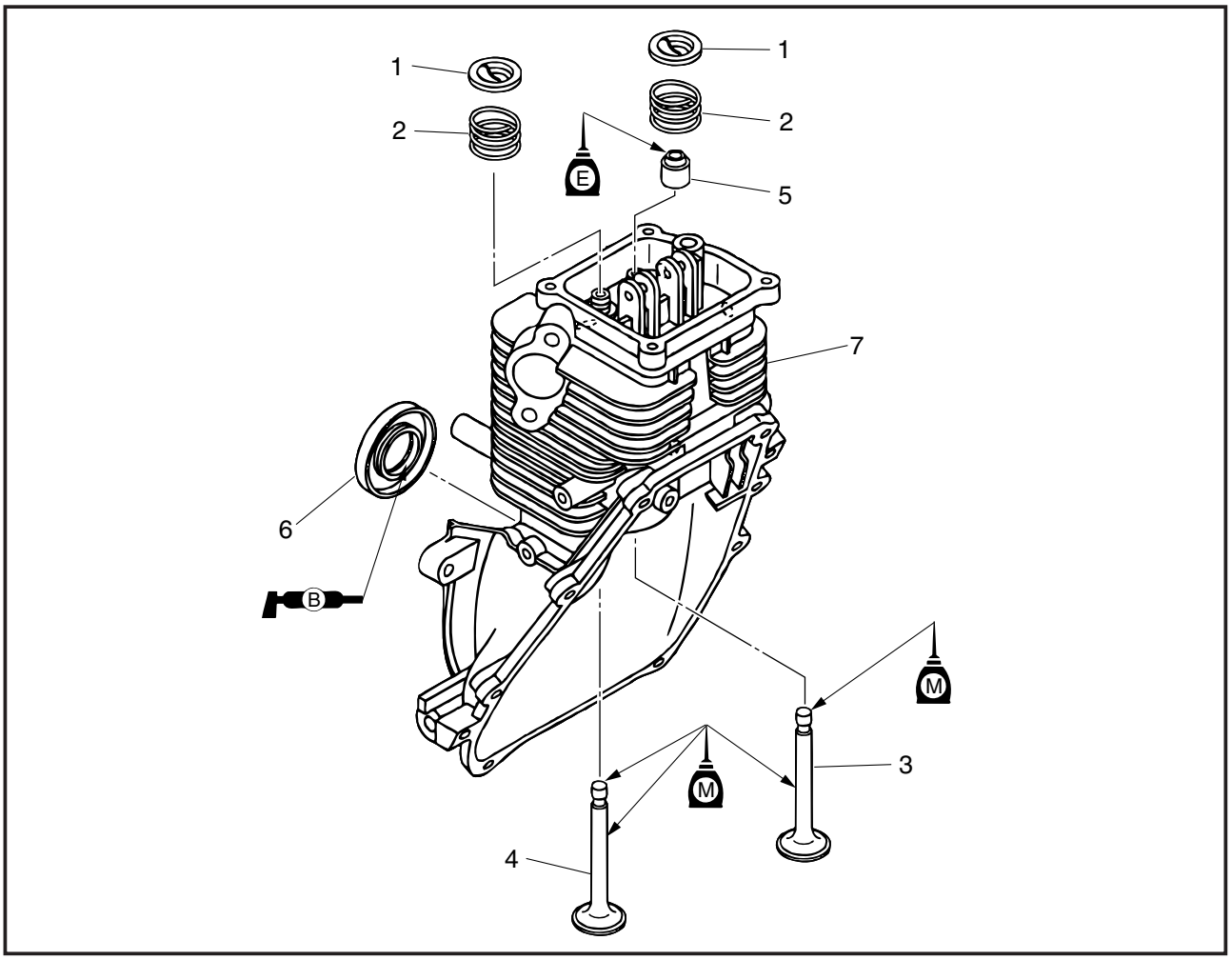
8 Nm (0.8 m · kg, 5.8 ft · lb)

Refer to "CRANKCASE 2 AND CAMSHAFT" section.

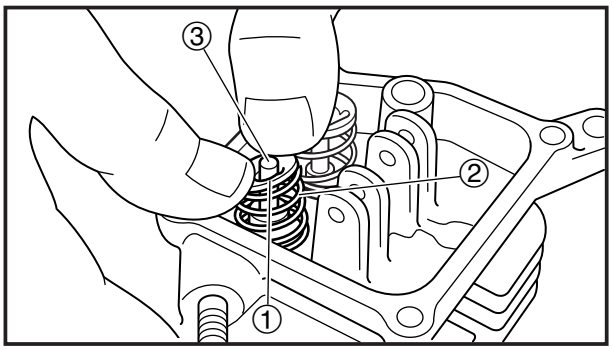
CYLINDER (CRANKCASE 1) AND VALVE



Order	Job name	Q'ty	Remarks
	Cylinder (crankcase 1) and valve removal		Remove the parts in the order listed below.
	Front cover and rear cover		Refer to "COVERS" section in CHAPTER 2.
	Fuel tank		Refer to "CARBURETOR, FUEL TANK AND FUEL PUMP" section in CHAPTER 4.
	Carburetor		
	Cylinder air shroud 1, 2		Refer to "MUFFLER" section.
	Engine assembly		Refer to "ENGINE REMOVAL" section.
	Generator		Refer to "GENERATOR REMOVAL" section.
	Rocker arm and camshaft		Refer to "ROCKER ARM AND CAMSHAFT" section.
	Crankshaft and piston		Refer to "CRANKSHAFT, PISTON AND PISTON RING" section.
	Piston ring		
1	Spring retainer	2	
2	Valve spring	2	
3	Valve 1	1	



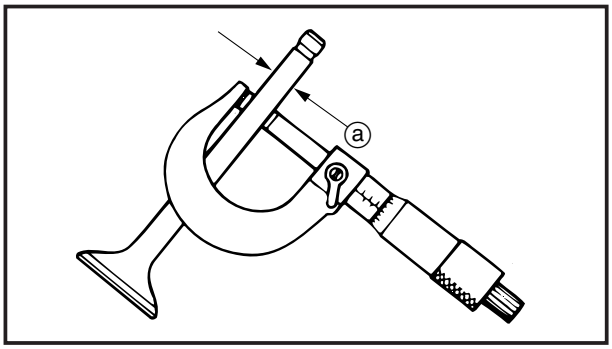
Order	Job name	Q'ty	Remarks
4	Valve 2	1	
5	Stem oil seal	1	
6	Oil seal	1	
7	Cylinder (crankcase 1)	1	
			For installation, reverse the removal procedure.



VALVE AND VALVE SPRING REMOVAL

1. Remove:
   - Spring retainer ①
   - Valve spring ②
   - Valve ③

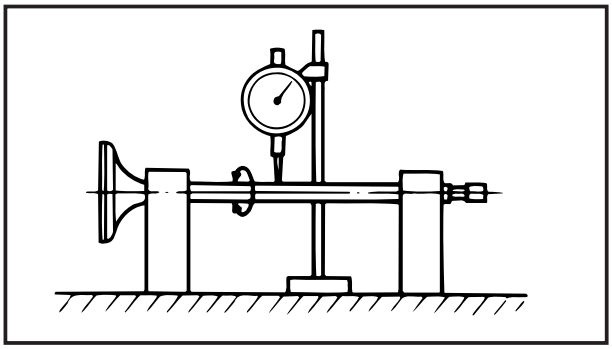
NOTE:
Press the spring retainer by your finger while removing the spring retainer.



VALVE AND VALVE SPRING INSPECTION

1. Measure:
   - Valve stem diameter ⓐ
     Out of specification → Replace.

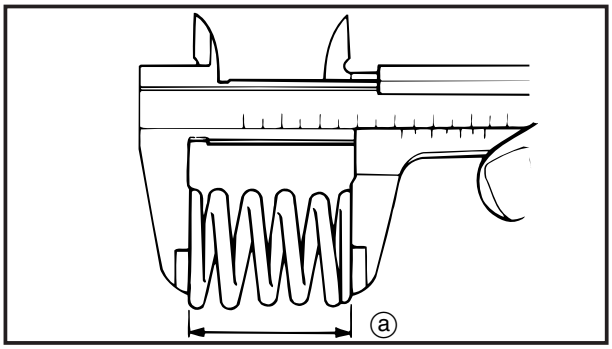
Valve stem diameter:
3.96 ~ 3.98 mm (Intake)
(0.156 ~ 0.157 in)
3.94 ~ 3.96 mm (Exhaust)
(0.155 ~ 0.156 in)
Limit:
3.92 mm (Intake)
(0.154 in)
3.90 mm (Exhaust)
(0.153 in)



2. Measure:
   - Valve stem runout
     Out of specification → Replace.

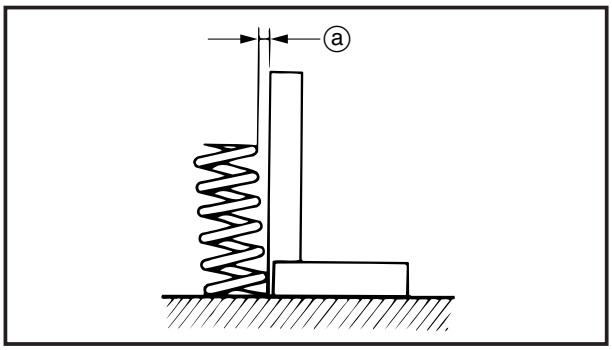
Valve stem runout limit:
0.01 mm (0.0004 in)

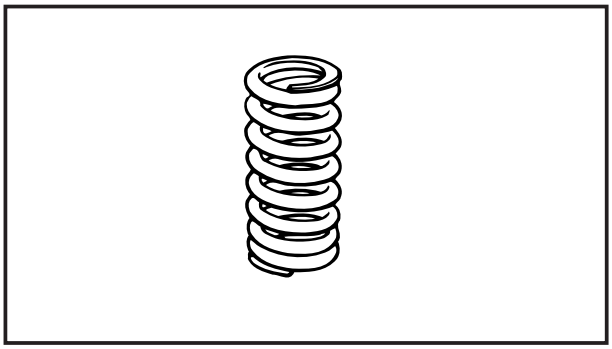
NOTE:
The value is half of that indication on the dial gauge.



3. Measure:
   - Valve spring free length ⓐ
     Out of specification → Replace.

Valve spring free length:
25.0 mm (0.984 in)
(Intake/Exhaust)
Limit:
24.0 mm (0.945 in)





4. Measure:
   - Valve spring tilt ⓐ
     Out of specification → Replace.

Tilt limit:
2.0 mm (0.079 in)

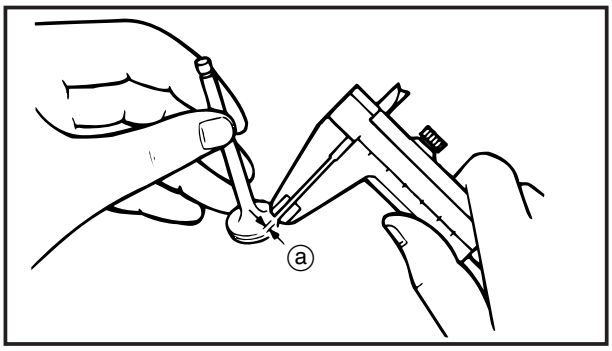
5. Inspect:
   - Valve contact surface
     More than 2/3 of the contact surface does not contact → Replace.

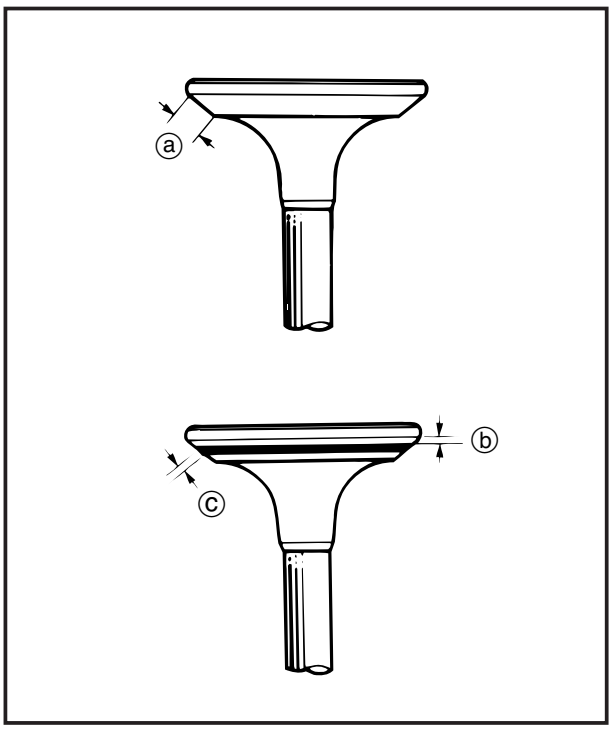
VALVE SEAT INSPECTION

1. Remove carbon deposits from the valve face and valve seat.
2. Apply a small amount of coarse mechanic's blueing dye (Dykem) to the valve face.
3. Insert the vale into the valve guide and use a valve lapper to contact the valve face with the valve seat.

NOTE:

Do not rotate the valve while the valve face is contacting the valve seat.





4. Measure:
   - Valve face contact width ⓐ

   Make sure that the contact width along the entire valve face is within specifications.

   Out of specification/rough/ eccentric/wear → Replace.

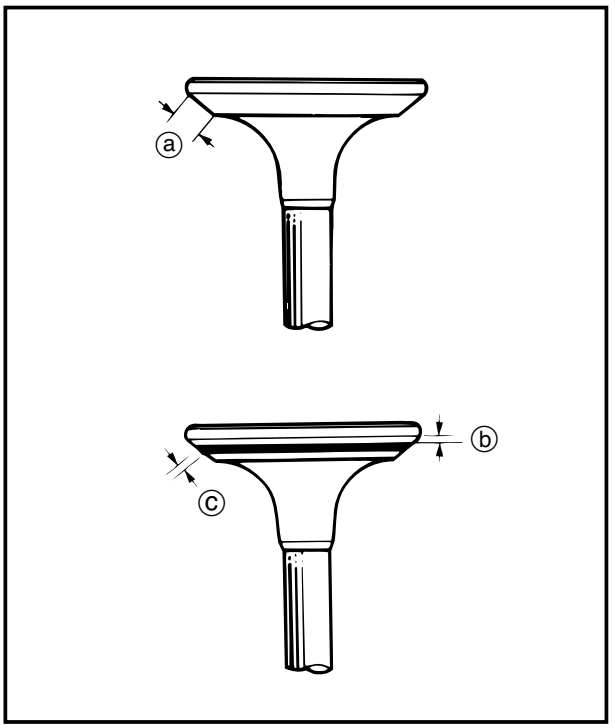
Valve face contact width:
(Intake/Exhaust)
0.8 mm (0.03 in)
Limit:
1.8 mm (0.07 in)

5. Measure:
   - Valve seat contact width ⓑ

   Make sure that the contact width along the entire valve seat is within specifications.

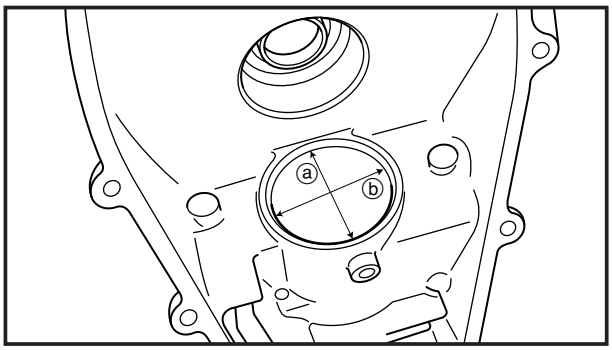
   Out of specification/rough/ eccentric/wear → Replace.

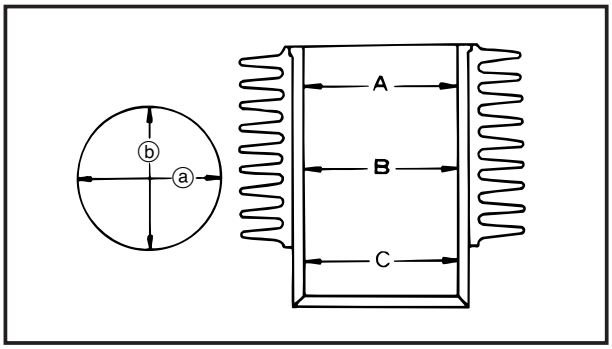
Valve seat contact width:
(Intake/Exhaust)
0.5 mm (0.02 in)



6. Remove the carbon deposits on the valve face ⓐ and valve seat.
   - Valve face contact seat width ⓒ
   - Valve margin thickness ⓑ
     Apply a small amount of coarse mechanic's blueing dye (Dykem) to the valve seat.
     Press the valve through the valve guide and onto the valve seat to make a clear impression.
   - Valve margin thickness
     Out of specification → Replace.
   - Valve face contact width
     Out of specification → Replace.

Valve seat width:
(Intake/Exhaust)
0.8 mm (0.03 in)





CYLINDER (CRANKCASE 1) INSPECTION

1. Measure:
   - Cylinder inside diameter

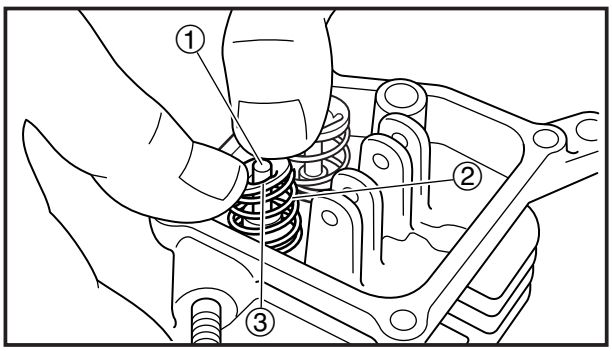
NOTE:

Take side to side ⓐ and front to back ⓑ measurements at each of the three locations A, B, C (total of six measurements), and then find the average of the measurements.

Maximum wear = Maximum A, B, C.
Cylinder taper =
Maximum A – Minimum C.

Out of specification → Replace.

Cylinder inside diameter:
41.00 ~ 41.02 mm
(1.614 ~ 1.615 in)
Cylinder inside diameter wear limit:
41.10 mm (16.18 in)
Cylinder taper limit:
0.05 mm (0.002 in)



VALVE AND VALVE SPRING ASSEMBLY

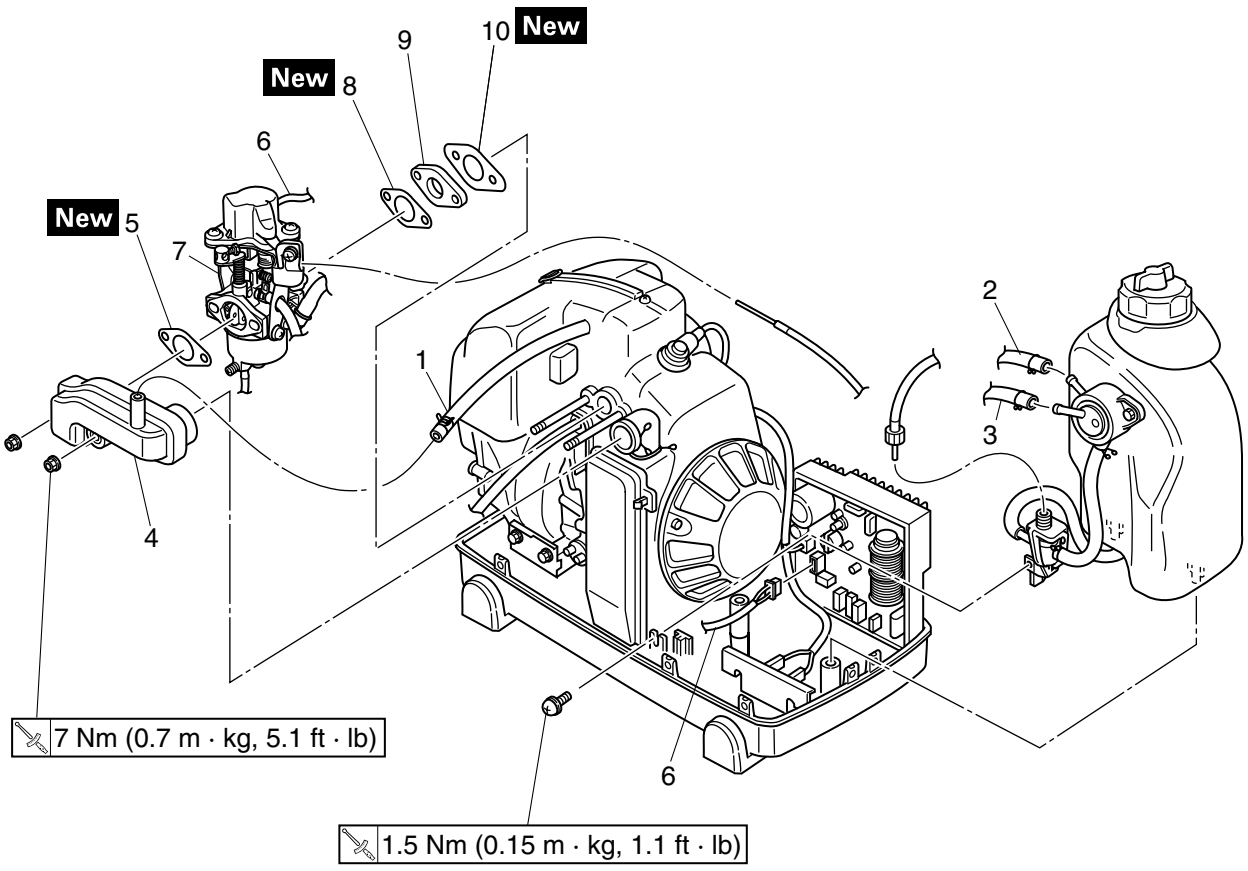
1. Install:
   - Valve ①
   - Valve spring ②
   - Valve spring retainer ③

NOTE:

- Apply a small amount of molybdenum disulfide oil to the valve stem and use the valve spring compressor 5 to install the parts.
- Press the spring retainer by your finger while installing the spring retainer.

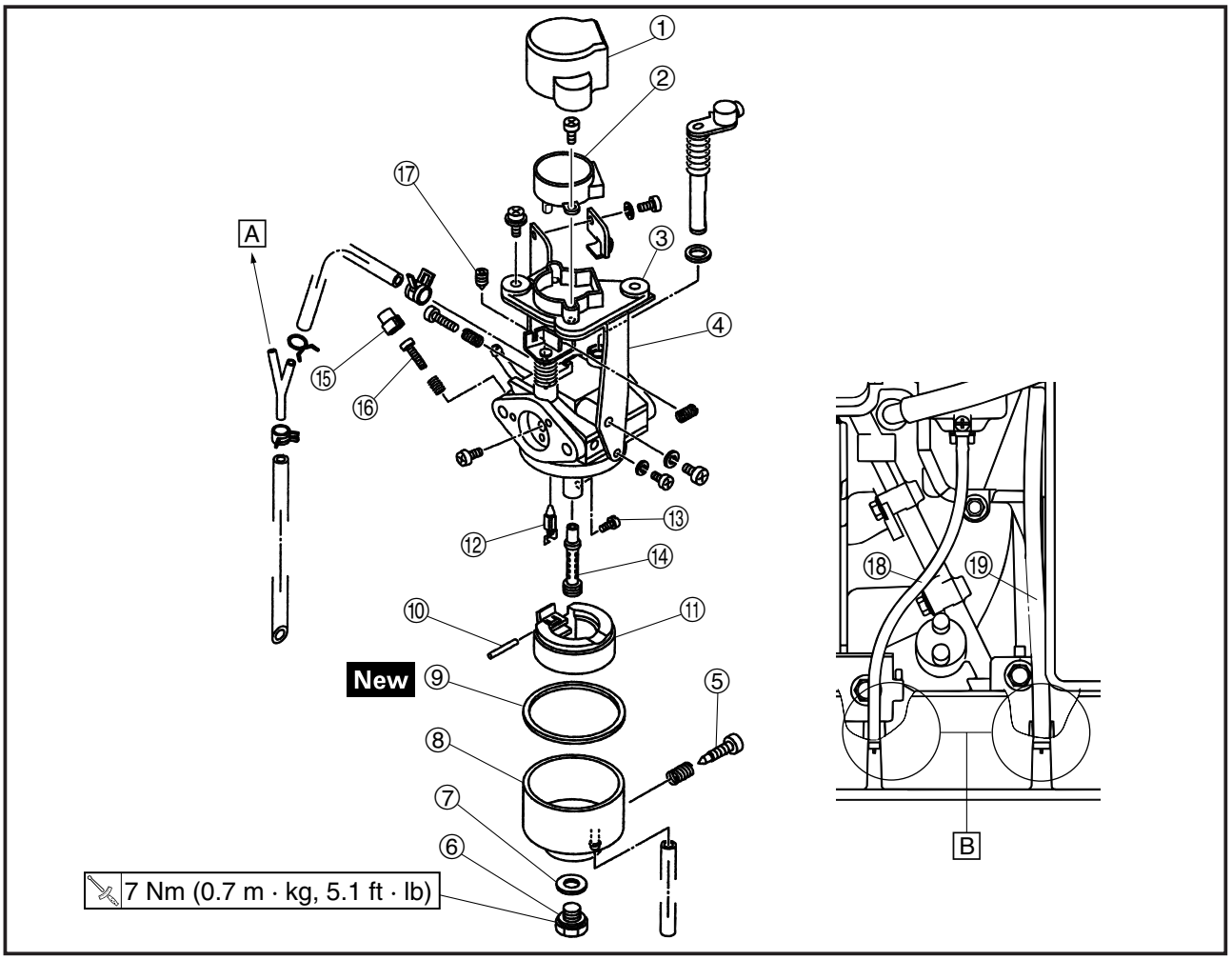
CARBURETOR

CARBURETOR



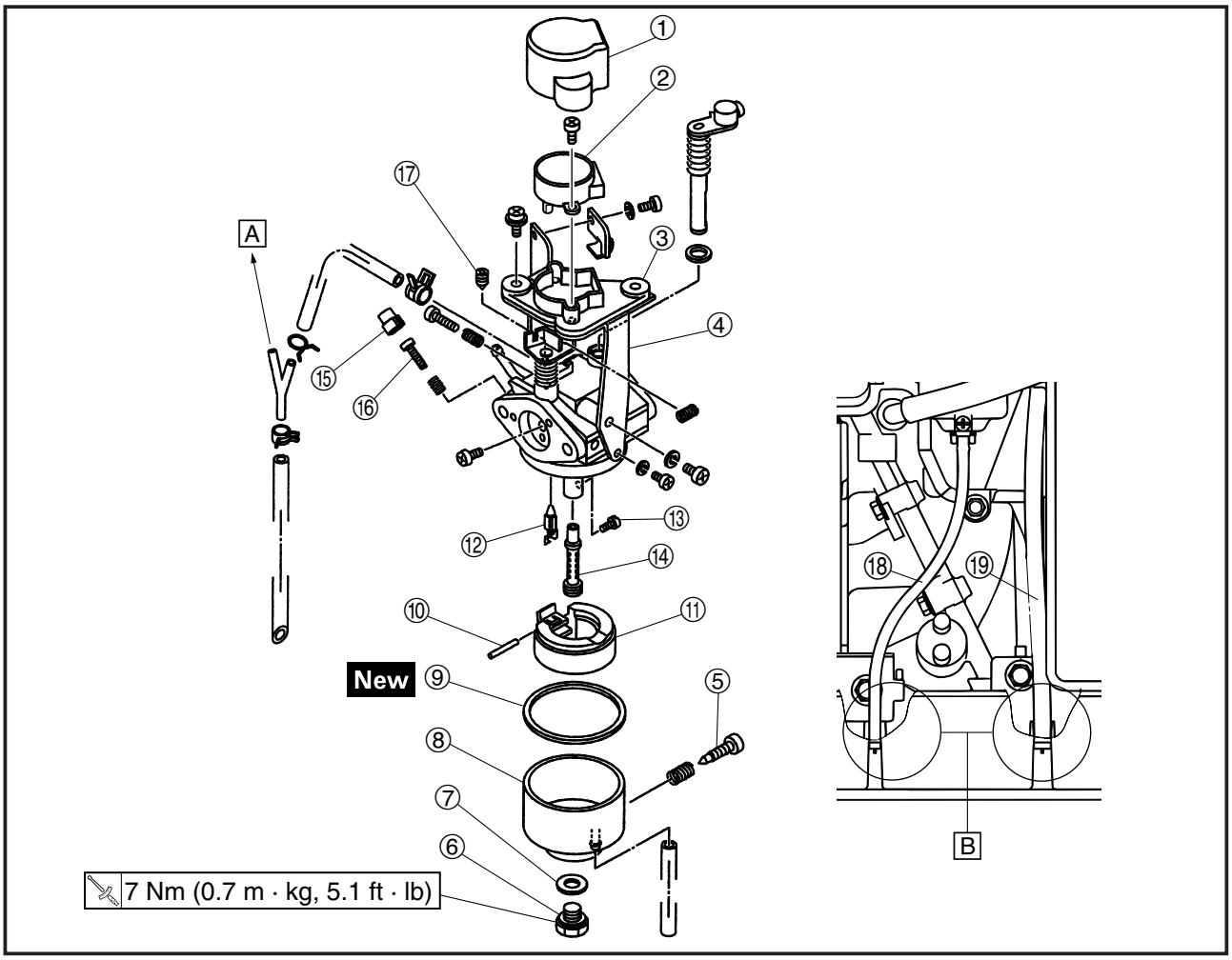
Order	Job name	Q'ty	Remarks
	Carburetor removal		Remove the parts in the order listed below.
	Front cover and rear cover		Refer to "COVERS" section in CHAPTER 2.
	Air cleaner case		
1	Breather hose	1	
2	Hose 3	1	
3	Hose 4	1	
4	Joint	1	
5	Gasket	1	
6	Throttle control motor coupler	1	Disconnect.
7	Carburetor assembly	1	
8	Gasket	1	
9	Carburetor joint	1	
10	Gasket	1	
			For installation, reverse the removal procedure.

CARBURETOR DISASSEMBLY



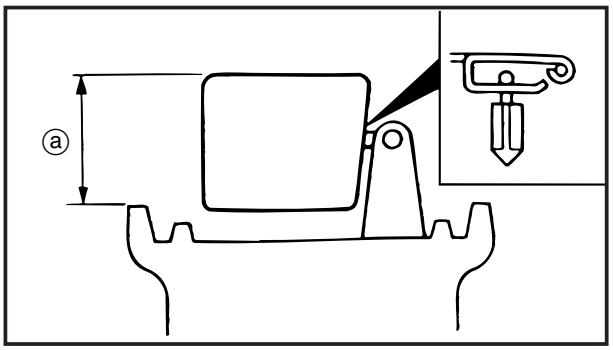
A Release the atmosphere pressure.
B Insert the air vent hose end to the base tray hole.

Order	Job name	Q'ty	Remarks
	Carburetor disassembly		Disassemble the parts in the order listed below.
①	Throttle control motor cover	1	
②	Throttle control motor	1	
③	Motor bracket	1	
④	Plate	1	
⑤	Drain screw	1	
⑥	Bolt	1	
⑦	Gasket	1	
⑧	Float chamber	1	
⑨	Float chamber gasket	1	
⑩	Float pin	1	
⑪	Float	1	
⑫	Needle assembly	1	
⑬	Main jet	1	



A Release the atmosphere pressure.
B Insert the air vent hose end to the base tray hole.

Order	Job name	Q'ty	Remarks
⑭	Main nozzle	1	
⑮	Cap	1	
⑯	Pilot screw	1	
⑰	Pilot jet	1	
⑱	Carburetor drain hose	2	
⑲	Air vent hose	1	
			For assemble, reverse the disassembly procedure.



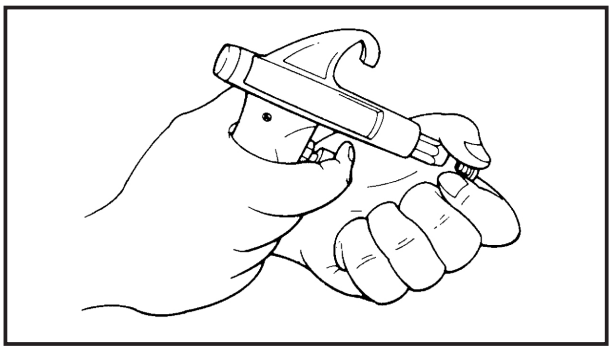
FLOAT HEIGHT INSPECTION

1. Measure:
   - Float height
     Out of specification → Replace.

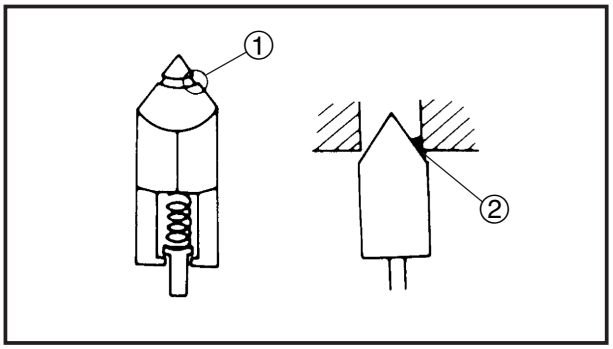
NOTE:

- Lift up the float height so that the tip of the float valve lightly contacts the float arm, and then measure the float height ⓐ. (This measurement should be made with the gasket removed.)
- Do not adjustable the float height.

Float height:
1.5 mm (0.06 in)

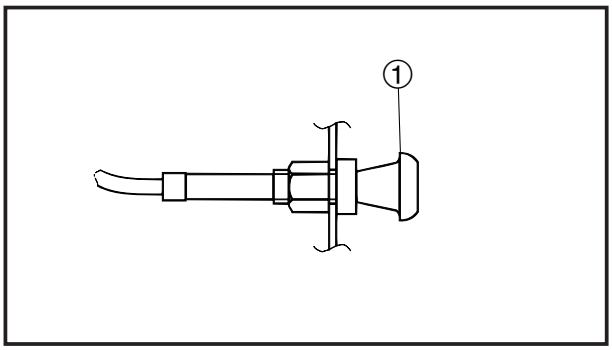


2. Clean:
   - Carburetor body
     Blow out all passages, jets, and carburetor body with compressed air.



3. Inspect:
   - Valve seat
     Wear/damage → Replace.
     Dirt → Clean.

① Wear at groove
② Dirt

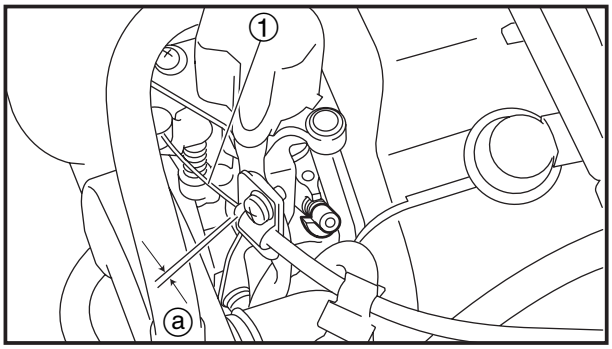


CHOKE CABLE INSTALLATION

1. Install:
   - Choke cable

NOTE:

Push the choke knob ① entirely in before installing it to the panel.

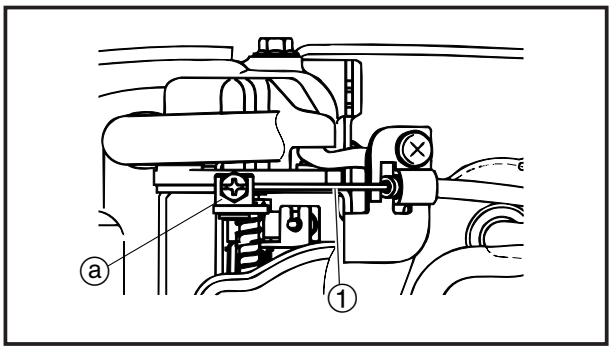


2. Install
   - Choke cable ①

3 Nm (0.3 m · kg, 2.2 ft · lb)

NOTE:

Be sure install the choke cable end cap push out ⓐ 3mm (0.118 in) form the holder.

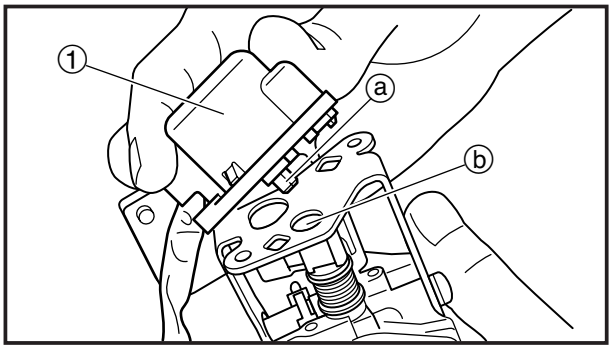


3. Install:
   - Inner cable ①

1 Nm (0.1 m · kg, 0.7 ft · lb)

NOTE:

Place the carburetor choke valve in its fully open position ⓐ, insert the tip of the inner cable into drum hole, and then secure it in place with the screw.



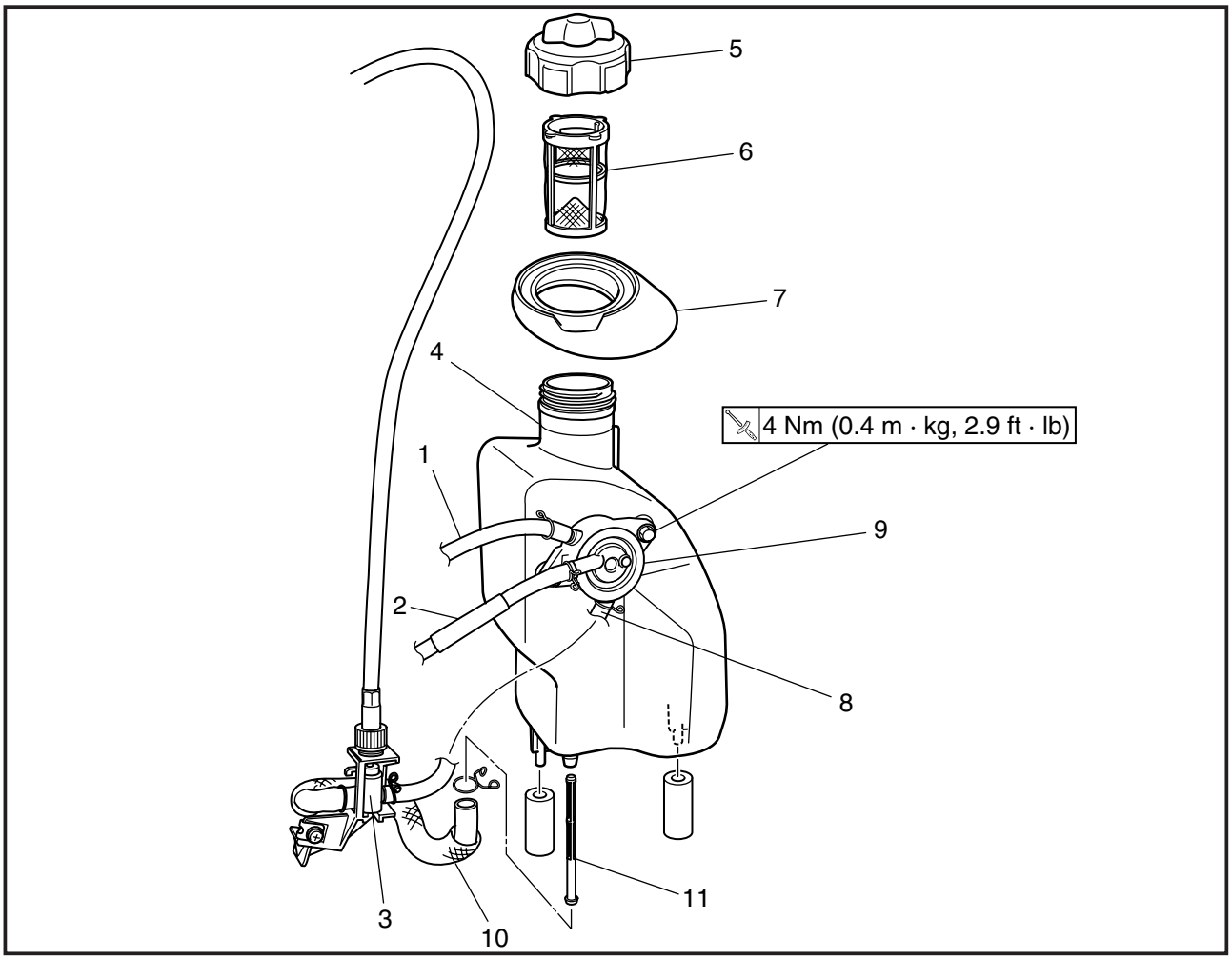
THROTTLE CONTROL MOTOR

1. Install:
   - Throttle control motor ①

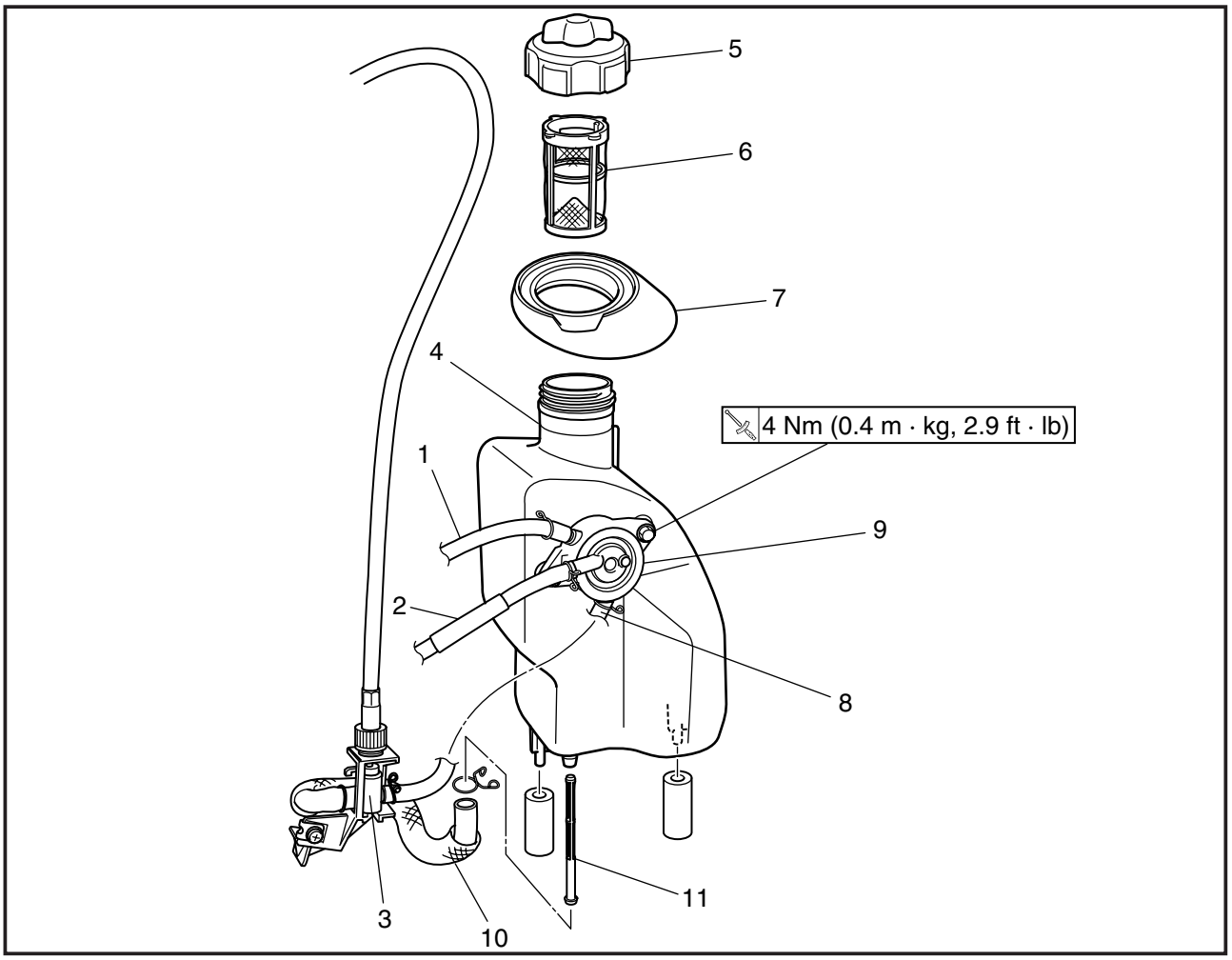
NOTE:

- Install the shaft ⓐ of the throttle control motor by aligning it with the groove ⓑ of the throttle shaft.
- Install the throttle valve, and then make sure that is moves smoothly.
- When installing the engine, fully open the throttle valve.

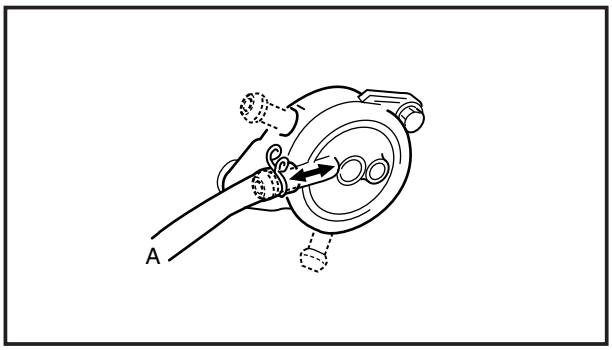
FUEL PUMP, FUEL TANK AND FUEL CHANGE LINK

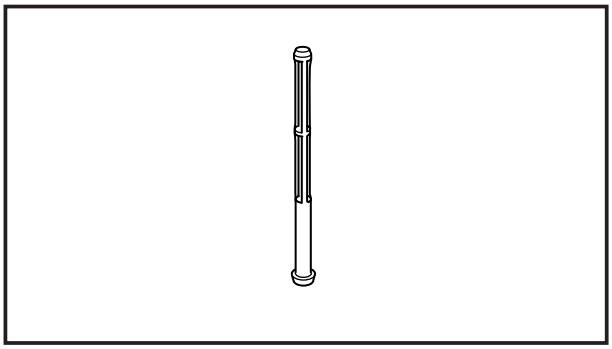


Order	Job name	Q'ty	Remarks
	Fuel cock, fuel tank and fuel change link removal		Remove the parts in the order listed below.
	Front cover and rear cover		Refer to "COVERS" section in CHAPTER 2.
1	Pipe 3	1	Set the fuel cock to "OFF" position.
2	Pipe 4	1	
3	Fuel change link assembly	1	Remove from the bracket.
4	Fuel tank assembly	1	
5	Cap assembly	1	
6	Strainer 1	1	
7	Holder	1	
8	Pipe 2	1	
9	Fuel pump assembly	1	
10	Fuel hose	1	



Order	Job name	Q'ty	Remarks
11	Fuel tank filter	1	Remove the parts in the order listed For installation, reverse the removal procedure.





FUEL PUMP INSPECTION

1. Inspect:
   - Fuel pump
     Inhale the hose form A → Open.
     Blow the hose to A → Close.

CAUTION:

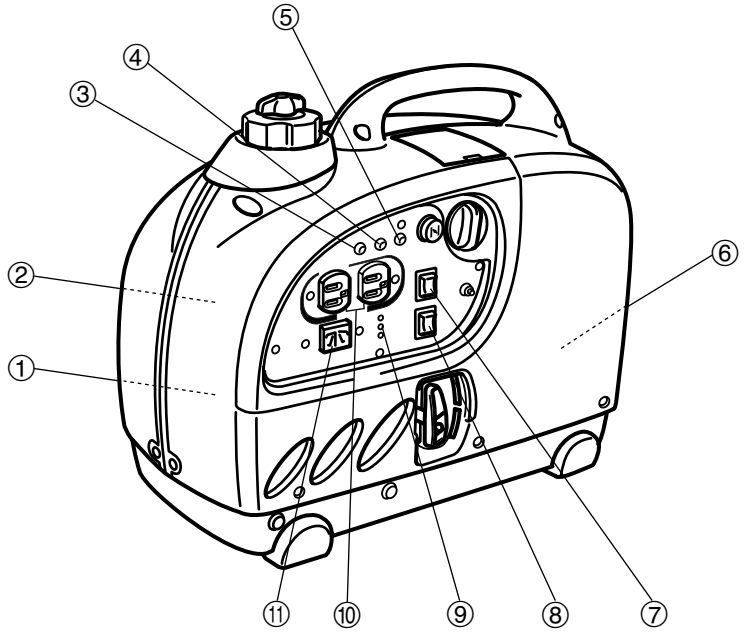
Excessive force will damage the fuel pump must be replaced.

FUEL TANK FILTER INSPECTION

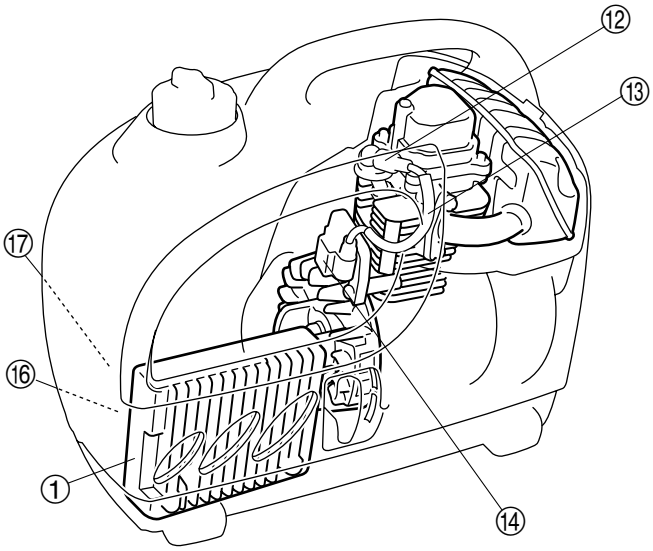
1. Inspect:
   - Fuel tank filter
     Wear → Replace.
     Dirt/clog → Clean.

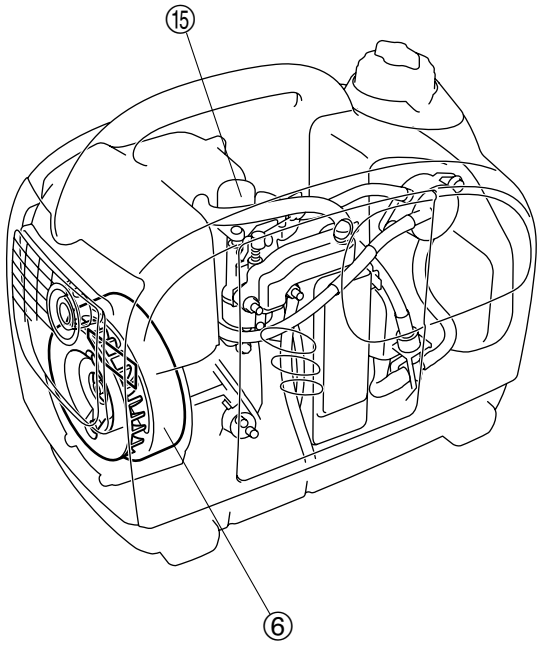
ELECTRICAL

ELECTRICAL COMPONENTS



① Control unit assembly
② Speed limiter
③ Overload warning light (Red)
④ Pilot light (Green)
⑤ Oil warning light (Red)
⑥ Generator assembly
⑦ Engine switch
⑧ Economy switch
⑨ DC circuit breaker
⑩ AC receptacle
⑪ DC receptacle
⑫ Spark plug cap
⑬ High-tension cable
⑭ Ignition coil
⑮ Throttle control motor
⑯ Rectifier
⑰ Noise filter (For 230V/50Hz)





① AC coil 1 (AC)
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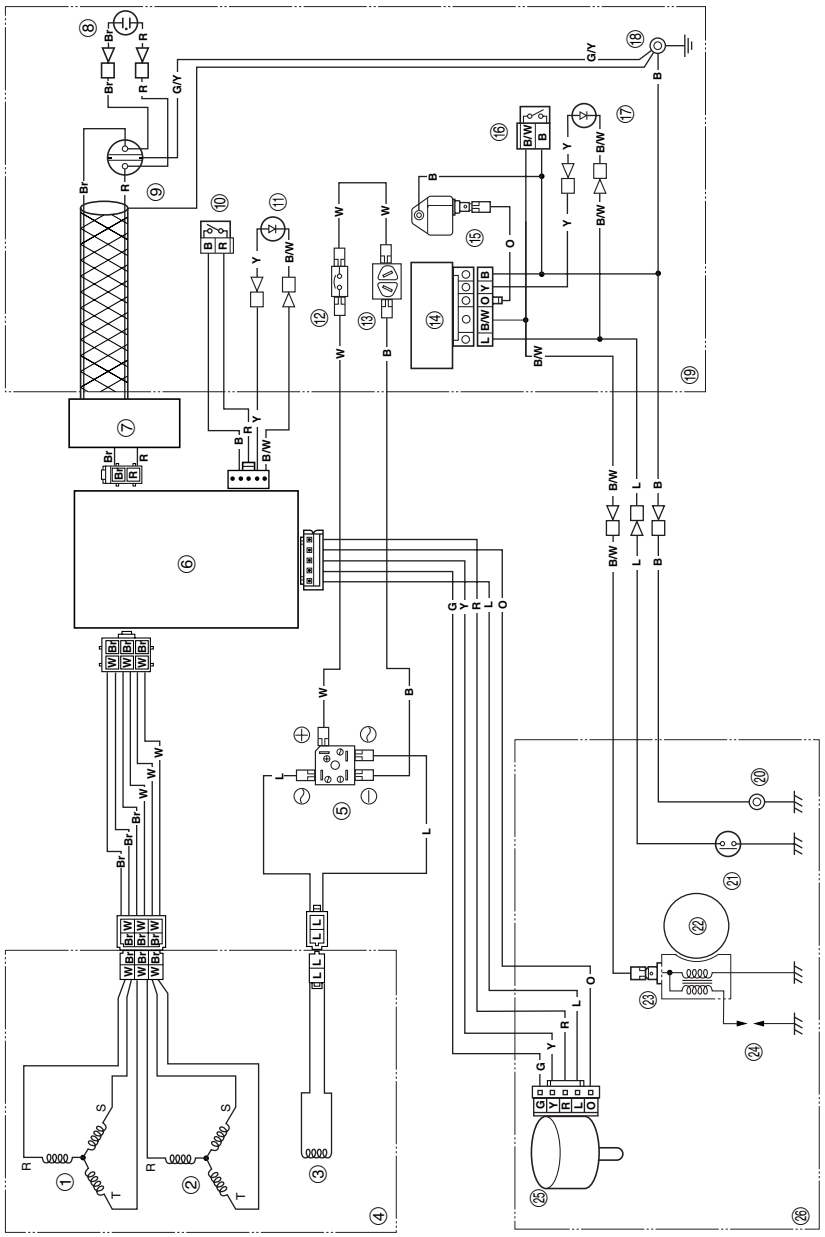
⑤ Rectifier
⑥ Control unit assembly
⑦ Noise filter
⑧ Pilot light (Green)
⑨ AC receptacle
⑩ Economy switch
⑪ Overload warning light (Red)
⑫ DC circuit breaker
⑬ DC receptacle
⑭ Speed limiter
⑮ TCI unit
⑯ Engine switch
⑰ Oil warning light (Red)
⑱ Ground terminal
(Earth terminal)
⑲ Control box
⑳ Ground terminal
㉑ Oil level switch
㉒ Magneto rotor
㉓ Ignition coil
㉔ Spark plug
㉕ Throttle control motor
㉖ Engine assembly

COLOR CODE
B.....Black
Br.....brown
G.....Green
L.....Blue
Or.....Orange
R.....Red
W .....White
Y .....Yellow
B/W....Black/White
G/Y ....Green/Yellow

CIRCUIT DIAGRAM
230V/50Hz



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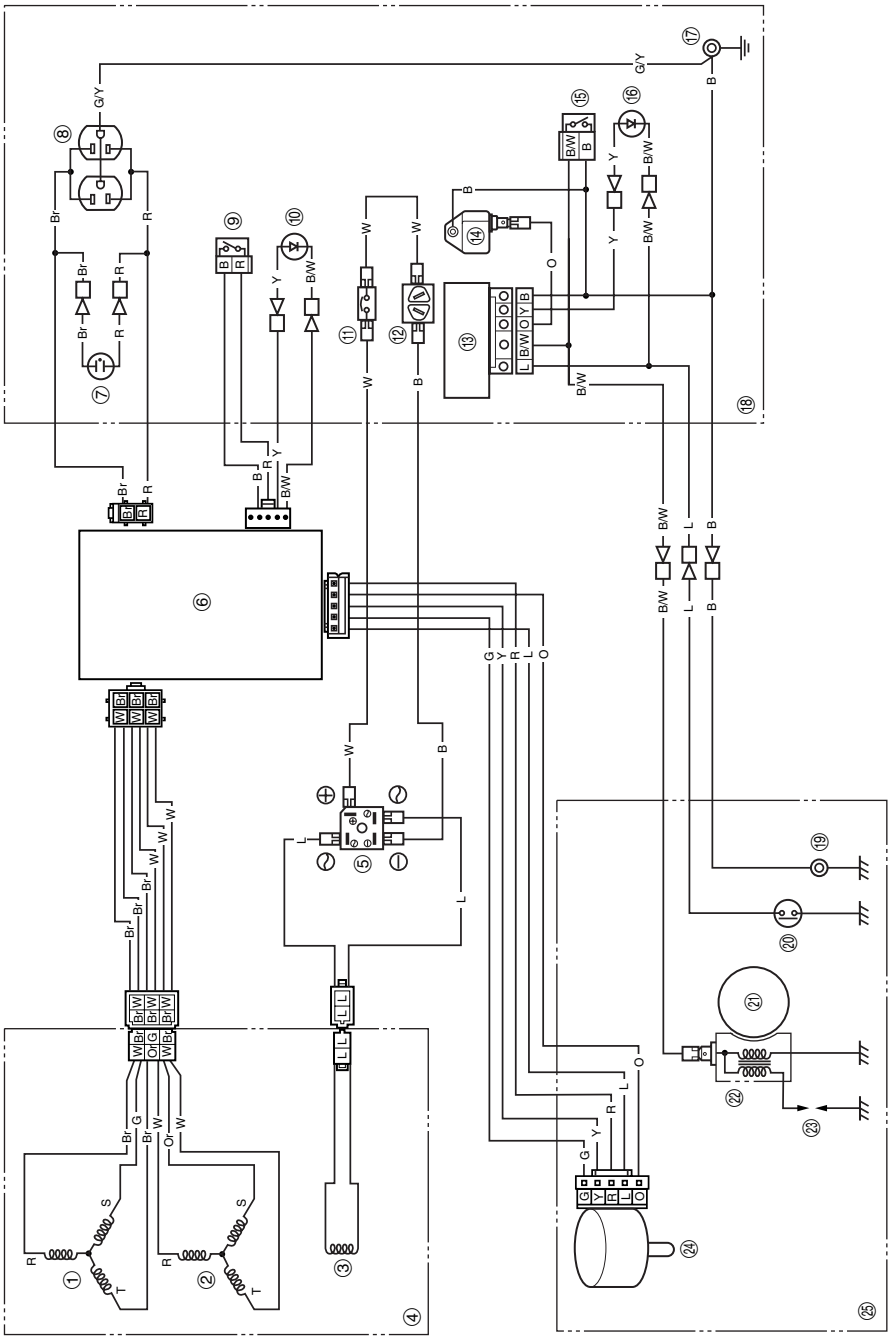
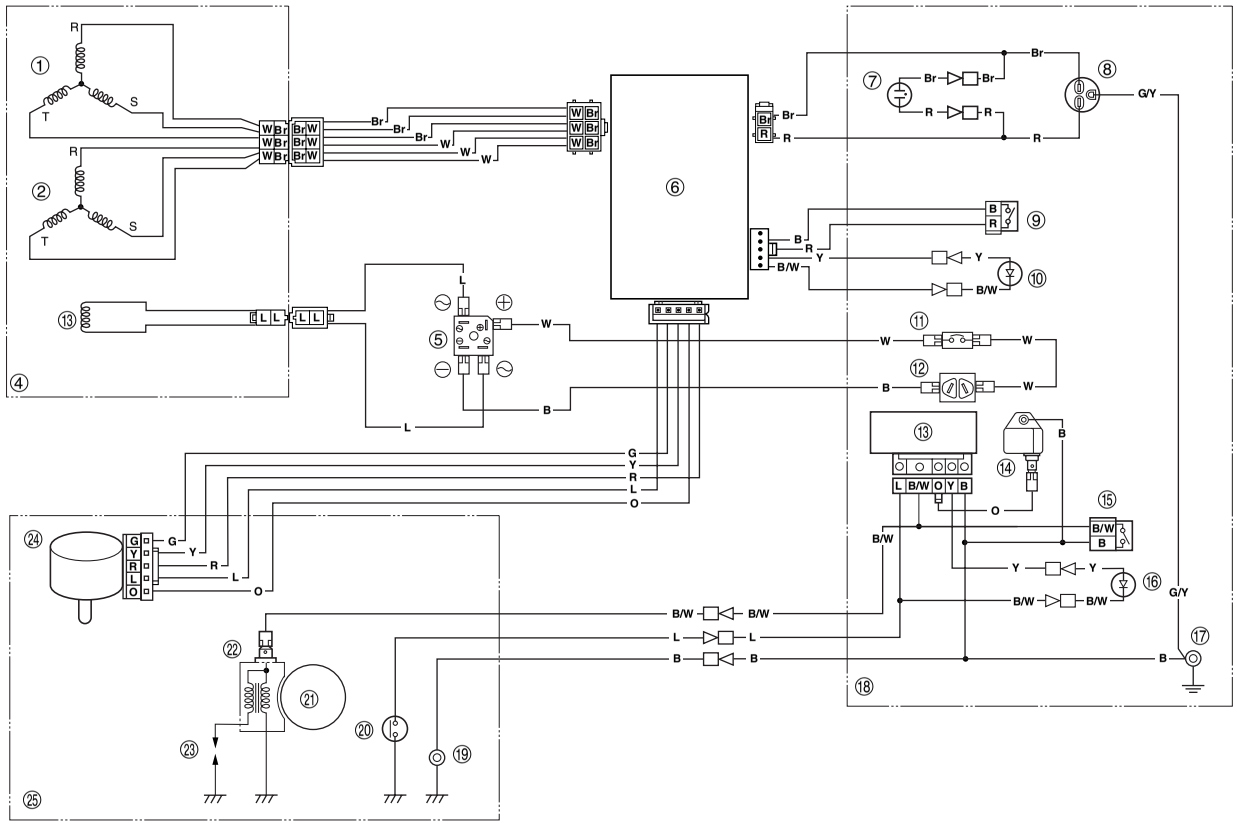
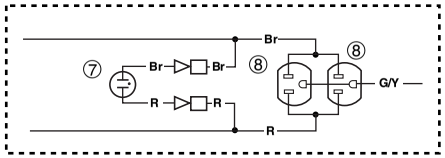


120V/60Hz For CANADA

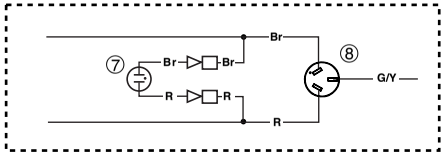
220V/50Hz for General market



120V/60Hz for General market



240V/50Hz for AUSTRALIA



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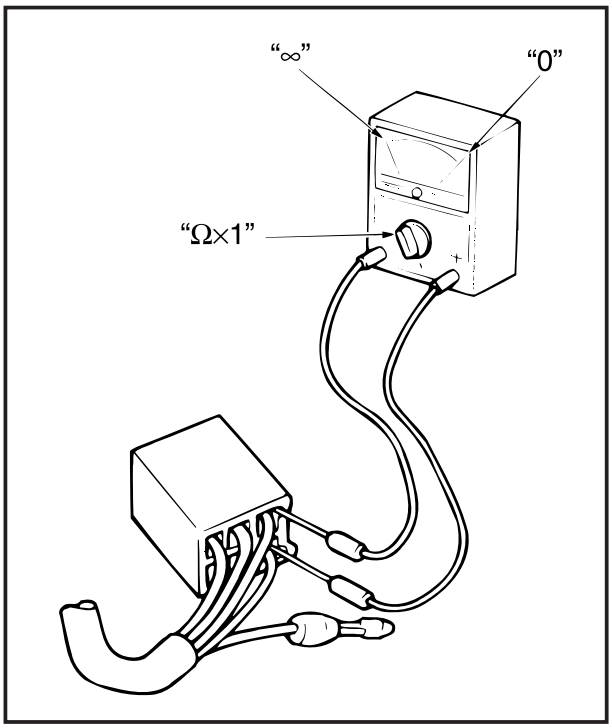


SWITCHES

CHECKING SWITCH CONTINUITY

Use a tester to check the terminals for continuity. If the continuity is faulty at any point, replace the switch.

Pocket tester:
YU-03112, 90890-03112

NOTE:

- Set the pocket tester to "0" before starting a test.
- When testing the switch for continuity the pocket tester should be set to the "× 1" Ω range.
- When checking the switch turn it on and off a few times.

IGNITION SYSTEM

TROUBLESHOOTING CHART

NO SPARK OR WEAK SPARK

Inspection steps:

1. Spark plug
2. Ignition spark gap
3. Spark plug cap
4. Ignition coil resistance
5. Air gap
6. Engine switch
7. Oil level switch
8. Wire harness

NOTE:

- Remove the following part(s) before troubleshooting.
  1) Front cover and rear cover
  2) Cylinder air shroud 1
  3) Cylinder air shroud 2
- Use the following special tool(s) for troubleshooting.

Pocket tester:
YU-03112, 90890-03112
Digital circuit tester:
90890-03174

Dynamic spark tester:
YU-34487
Ignition checker:
90890-06754

1. Spark plug
- Check the spark plug condition.
  Refer to "SPARK PLUG" in CHAPTER 2.

GOOD ↓

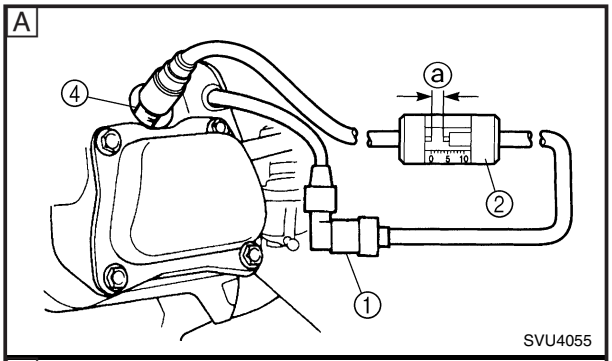
NO GOOD → Repair or replace the spark plug.

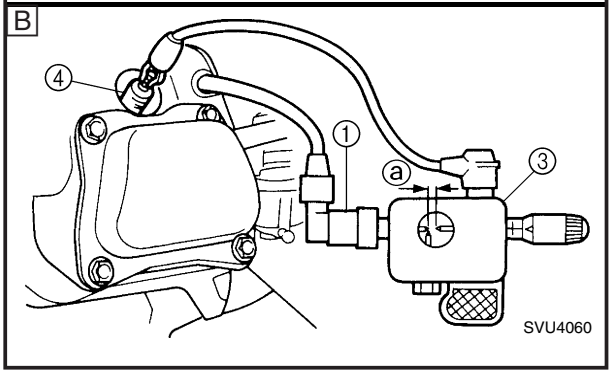
2. Ignition spark gap
- Disconnect the spark plug cap ① from the spark plug.
- Connect the dynamic spark tester ② or ignition checker ③ as shown.

Spark plug cap ① → Dynamic spark tester or ignition checker
Dynamic tester lead or ignition checker lead → Spark plug ④

A For USA
A Except for USA

- Turn the crankshaft and measure the ignition spark gap ⓐ.





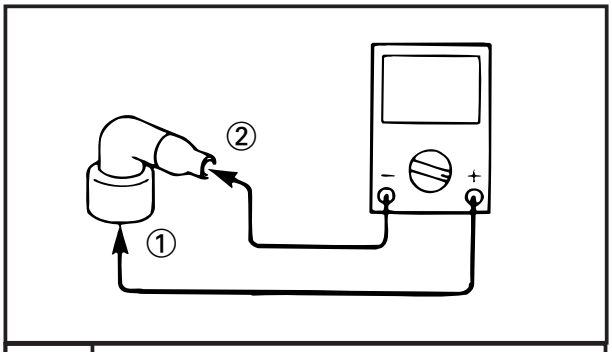
Minimum spark gap:
6 mm (0.24 in)

OUT OF SPECIFICATION OR NO SPARK

MEETS SPECIFICATION → The ignition system is good.

3. Spark plug cap
- Remove the spark plug cap.
- Connect the pocket tester (Ω × 1k) to the spark plug.

Tester (+) lead → Spark plug side ①
Tester (–) lead → High-tension cord side ②



Spark plug cap resistance:
3.8 ~ 6.3 kΩ at 20 °C (68 °F)

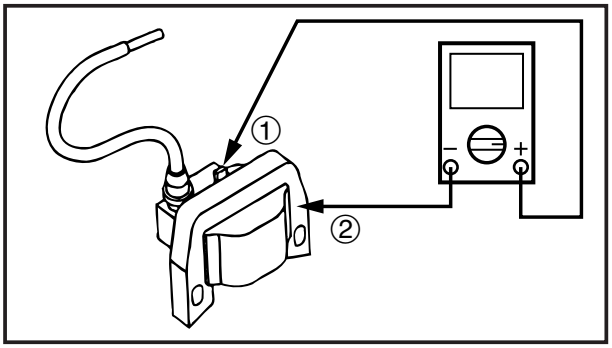
MEETS SPECIFICATION

OUT OF SPECIFICATION → Repair or replace the spark plug.

NOTE:
- Do not pull out the plug cap from the high-tension cord.
- Remove → Turn the plug cap counterclockwise.
- Install → Turn the plug cap clockwise.
- Inspect the high-tension cord for cracks or deterioration, when install the pug cap.
- Cut 5 mm off the end of the high-tension cord, and then connect it to the plug cap.

4. Ignition coil resistance
- Remove the ignition coil.
  1) Primary coil resistance
- Connect the pocket tester (Ω × 1k) to the primary terminal.

Tester (+) lead → Black/White terminal ①
Tester (–) lead → Ground terminal ②



Primary coil resistance:
0.7 Ω ± 20% at 20 °C (68 °F)

MEETS SPECIFICATION

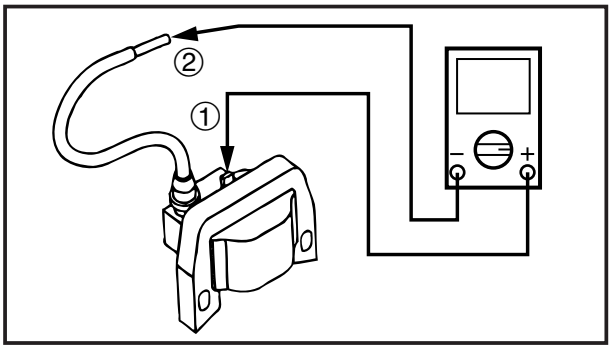
OUT OF SPECIFICATION → Replace the ignition coil.

*

*

2) Secondary coil resistance
- Connect the pocket tester (Ω × 1k) to the secondary terminal.

Tester (+) lead → High-tension cord ①
Tester (–) lead → Ground terminal ②

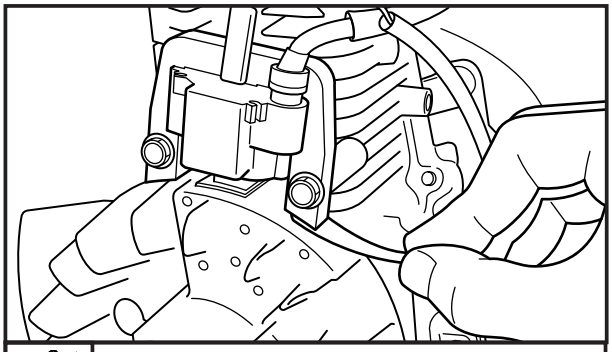


Secondary coil resistance:
11.5 kΩ ± 20% at 20 °C (68 °F)

MEETS SPECIFICATION

OUT OF SPECIFICATION → Replace the ignition coil.

5. Air gap
- Measure the thickness between the magnet rotor and ignition coil.



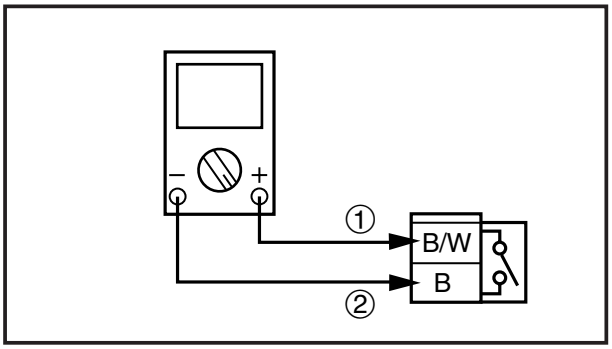
Air gap:
0.5 ± 0.1 mm (0.02 ± 0.004 in)

MEETS SPECIFICATION

OUT OF SPECIFICATION → Adjust the air gap.

6. Engine switch
- Disconnect the engine switch coupler in the control box.
- Connect the pocket tester (Ω × 1k) to the engine switch terminal.

Tester (+) lead → Black/white terminal ①
Tester (–) lead → Black terminal ②



Switch "ON" → Continuity
Switch "STOP" → No continuity

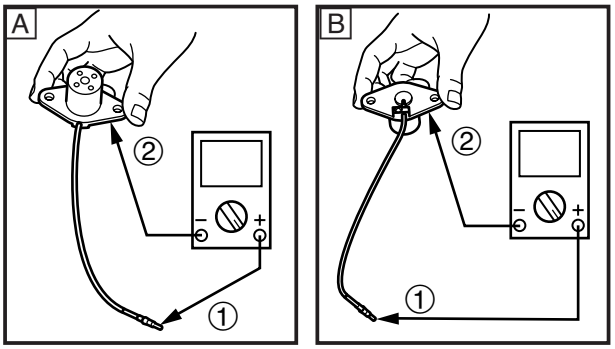
CONTINUITY

NO CONTINUITY → Replace the engine switch,

*

*

7. Oil level switch
- Remove the oil level switch from the bottom of the crankcase.
  Refer to "CRANKSHAFT2, CAMSHAFT AND ROCKER ARM" in CHAPTER 3.
- Connect the pocket tester to the oil level switch for continuity.



Tester (+) lead → Blue lead ①
Tester (–) lead → Ground ②

A Continuity → Correct
B No continuity → Correct

CONTINUITY

NO CONTINUITY → Replace the oil level switch.

8. Wire harness
- Check the terminal of the connector for contamination, rust, or disconnection.

GOOD

NO GOOD → Correct or replace the connector.

Replace the speed limiter.

GOOD

Replace the TCI unit.

GENERATOR SYSTEM

TROUBLESHOOTING CHART

WEAK OR NO AC CURRENT

Start the engine.
Check the overload warning light.

DOES NOT TURN ON	TURNS ON

→ Check the overload warning light.

TURNS ON	DOES NOT TURN ON

Start the engine.
Check the pilot light.

DOES NOT TURN ON	TURNS ON

→ Check the pilot light.

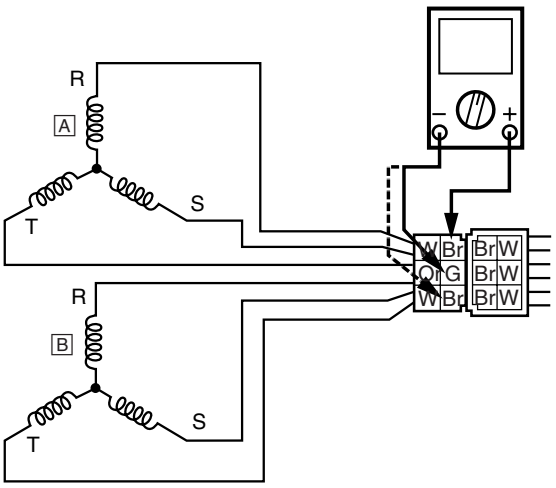
Rated engine speed inspection.
- Operate the engine with no load.
- Set the economy switch to "OFF".

5,000 r/min

GOOD	OUT OF SPECIFICATION

→ Check the throttle control system.
Refer to "THROTTLE CONTROL SYSTEM" in CHAPTER 6.

AC coil 1 AC voltage inspection
- Connect Brown-Green (R-S), Green-Brown (S-T), and Brown-Brown (R-T) leads.
- Start the engine, set the economy switch to "ON" then measure the voltage. (Tester range: AC300V)

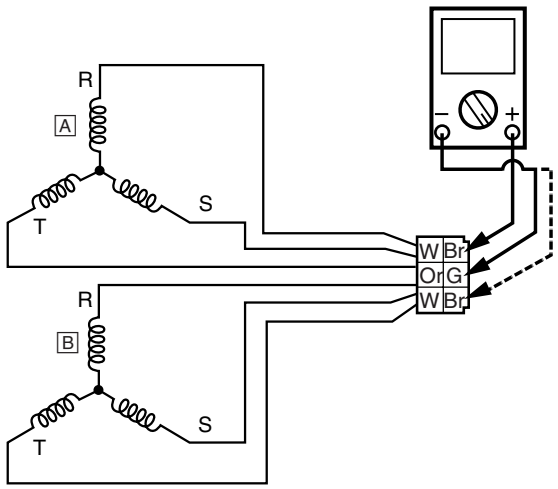


AC coil 1 AC voltage:
190 ~ 270 V at 20 °C (68 °F)

GOOD	TOO LOW
	DOES NOT GENERATE

→ Magnetic force is weak.
→ Replace the magneto rotor.

AC coil 1 resistance inspection
- Stop the engine.
- Measure the resistance between Brown-Green (R-S), Green-Brown (S-T), and Brown-Brown (R-T) leads. (Tester range: Ω × 1)



AC coil 1 resistance:
Br-G: 9.6 Ω ± 20% at 20 °C (68 °F)
Br-Br: 8.7 Ω ± 20% at 20 °C (68 °F)

SPECIFICATION	OUT OF SPECIFICATION

→ Replace the AC coil 1.

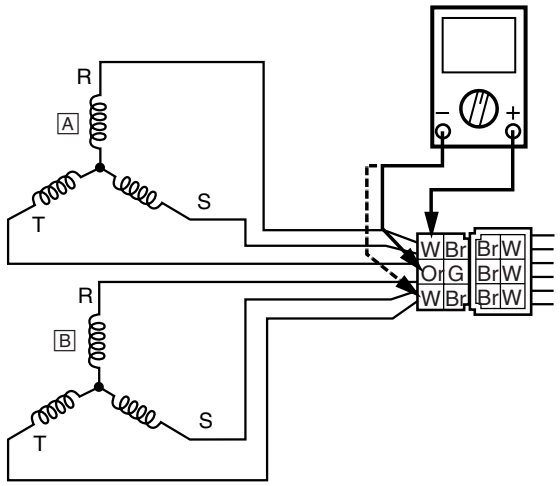
*

A AC coil 1
B AC coil 2

*

AC coil 2 AC voltage inspection

- Connect White-Orange (R-S), Orange-White (S-T), and White-White (R-T) leads.
- Start the engine, set the economy switch to "OFF" then measure the voltage. (Tester range: AC300V)



AC coil 2 AC voltage:
130 ~ 180 V at 20 °C (68 °F)

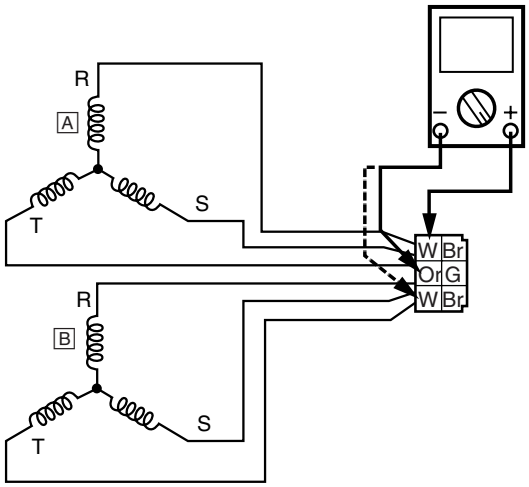
GOOD	TOO LOW
	DOES NOT GENERATE

Magnetic force is weak.

Replace the magneto rotor.

AC coil 2 resistance inspection

- Stop the engine.
- Measure the resistance between White-Orange (R-S), Orange-White (S-T), and White-White (R-T) leads. (Tester range: Ω × 1)



AC coil 2 resistance:
W-Or: 4.6 Ω ± 20% at 20 °C (68 °F)
W-W: 4.2 Ω ± 20% at 20 °C (68 °F)

SPECIFICATION	OUT OF SPECIFICATION

Replace the AC coil 2.

Economy switch continuity inspection

- Switch "ON" → Continuity
- Switch "OFF" → No Continuity

CONTINUITY	NO CONTINUITY

Replace the control unit.

A AC coil 1
B AC coil 2

TROUBLESHOOTING CHART

WEAK OR NO DC CURRENT

Rated engine speed inspection.
- Operate the engine with no load.
- Set the economy switch to “OFF”.

5,000 r/min

GOOD	OUT OF SPECIFICATION

→ Check the throttle control system.
Refer to “THROTTLE CONTROL SYSTEM” in CHAPTER 6.

↓

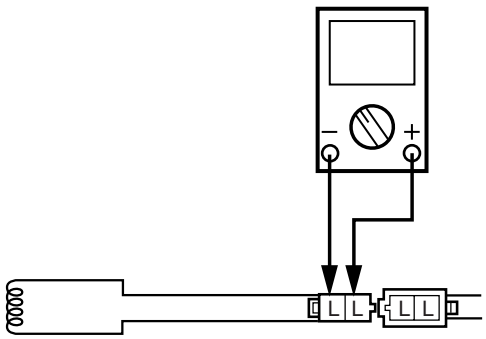
Check the DC circuit breaker.

GOOD	DISCONNECTED

→ Replace the DC circuit breaker.

↓

DC coil DC voltage inspection
- Connect Blue leads.
- Start the engine, then measure the voltage. (Tester range: DC 20V)



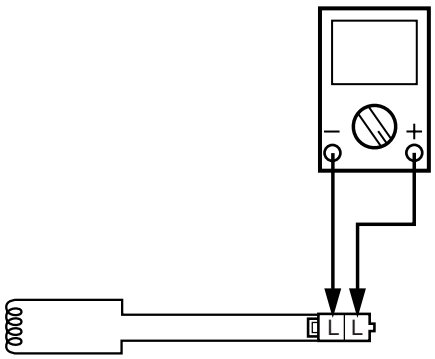
DC coil DC voltage:
13.5 ~ 23.0 V at 20 °C (68 °F)

GOOD	TOO LOW
	DOES NOT GENERATE

TOO LOW → Magnetic force is weak.

→ Replace the magneto rotor.

DOES NOT GENERATE → DC coil resistance inspection
- Stop the engine.
- Measure the resistance between Blue leads. (Tester range: $\Omega \times 1$)



DC coil resistance:
0.13 Ω ± 20% at 20 °C (68 °F)

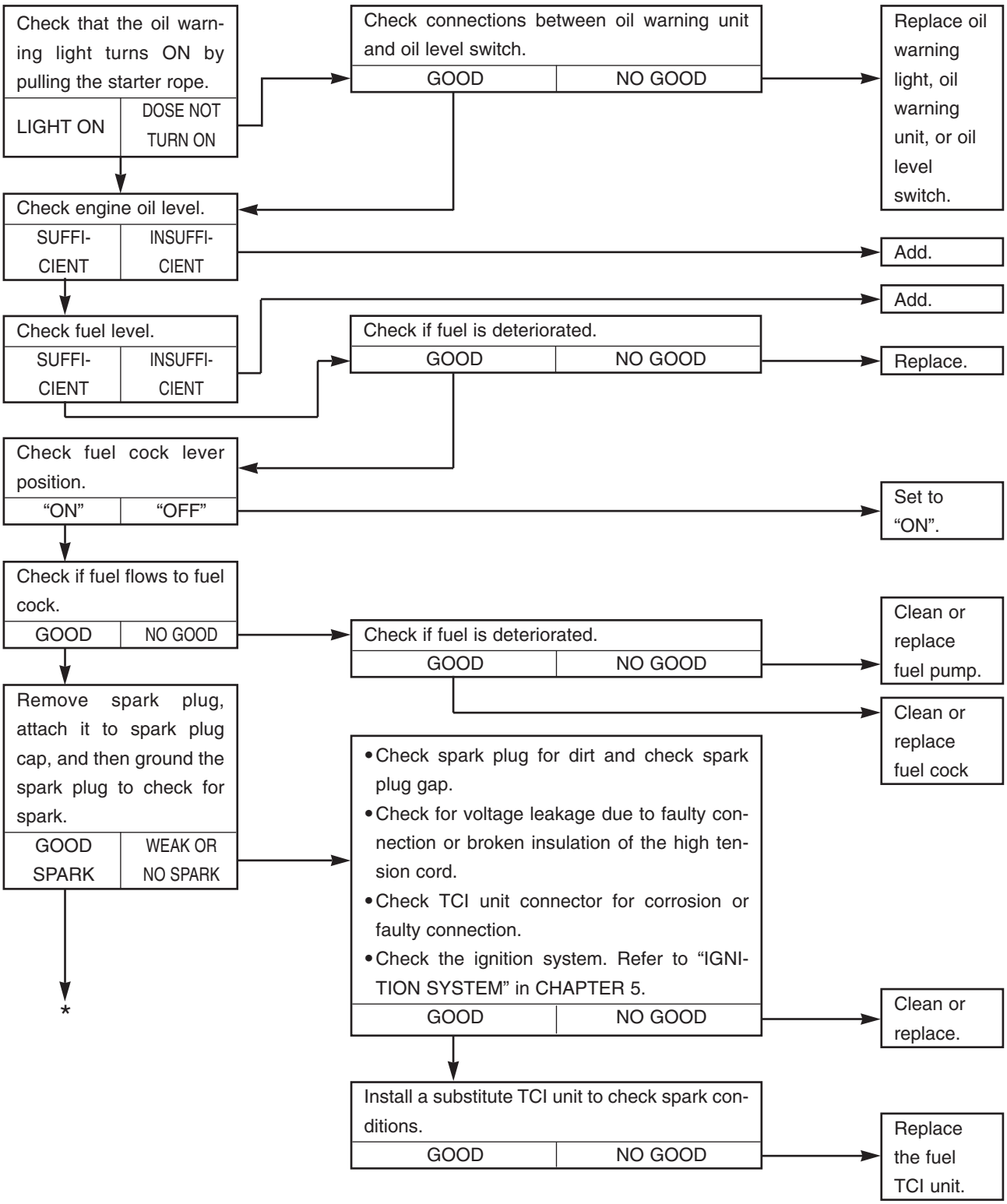
SPECIFICATION	OUT OF SPECIFICATION

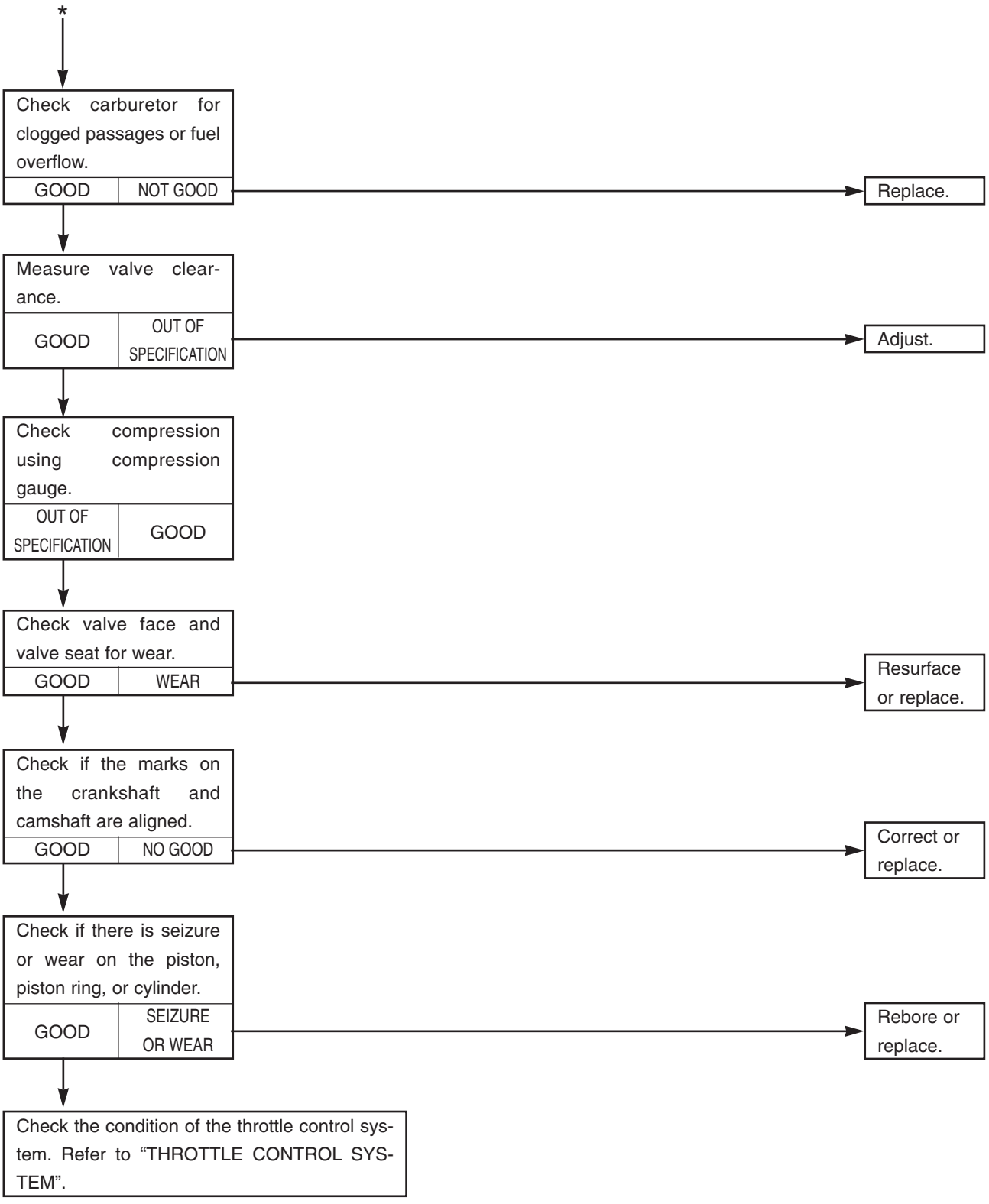
SPECIFICATION → Replace the rectifier.

OUT OF SPECIFICATION → Replace the DC coil.

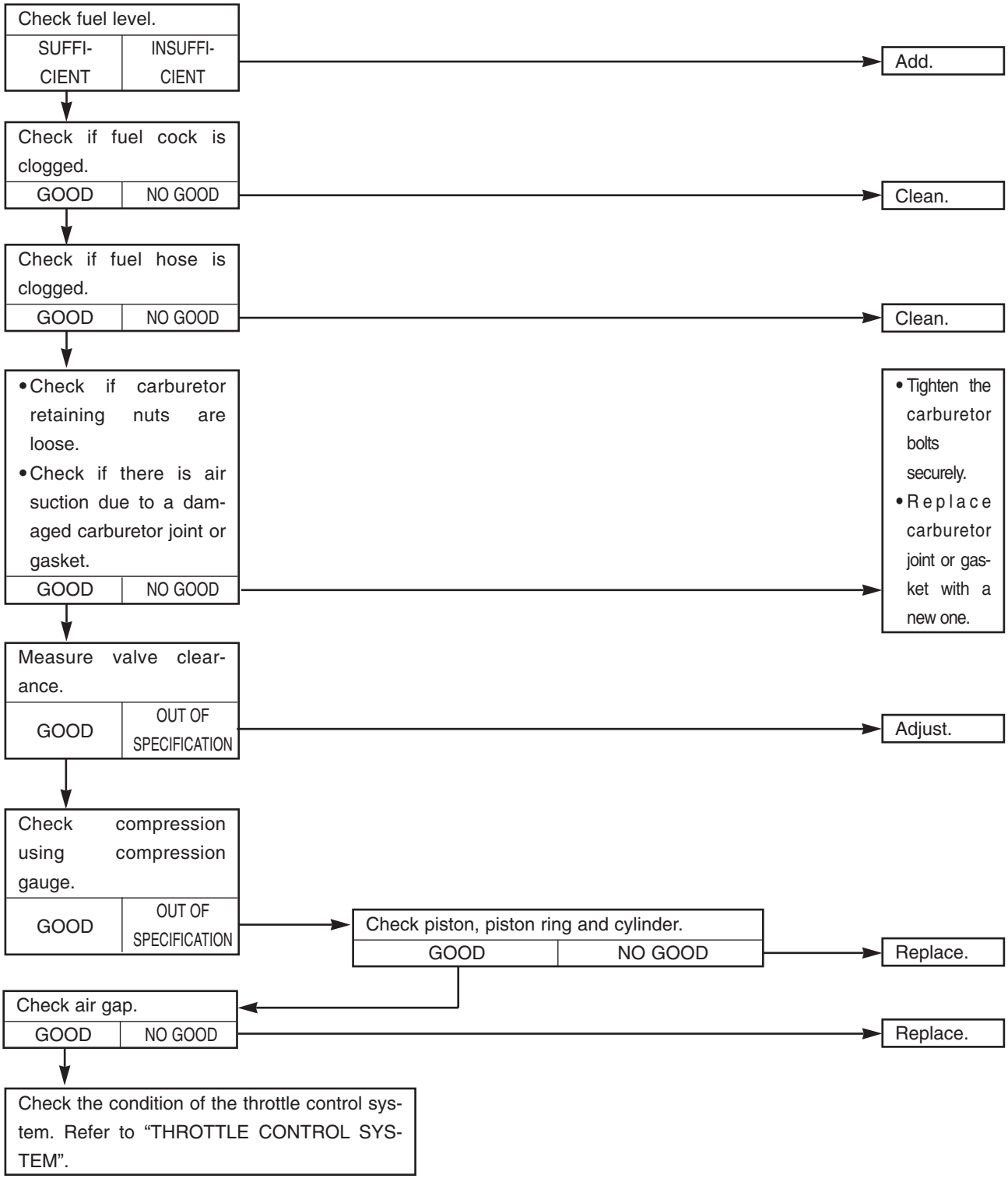
TROUBLE SHOOTING
ENGINE

ENGINE DOES NOT START




*
Check carburetor for clogged passages or fuel overflow.
GOOD
NOT GOOD
Replace.
Measure valve clearance.
GOOD
OUT OF SPECIFICATION
Adjust.
Check compression using compression gauge.
OUT OF SPECIFICATION
GOOD
Check valve face and valve seat for wear.
GOOD
WEAR
Resurface or replace.
Check if the marks on the crankshaft and camshaft are aligned.
GOOD
NO GOOD
Correct or replace.
Check if there is seizure or wear on the piston, piston ring, or cylinder.
GOOD
SEIZURE OR WEAR
Rebore or replace.
Check the condition of the throttle control system. Refer to “THROTTLE CONTROL SYSTEM”.

ENGINE STARTS BUT STALLS



ENGINE SPEED DOES NOT INCREASE

Check if the electric equipment consumes too much wattage for this generator.
- GOOD
- TOO MUCH → Use a generator with a larger capacity.

↓

Check air filter element for dirt.
- GOOD
- NO GOOD → Clean.

↓

Check spark plug for dirt and check spark plug gap.
- GOOD
- NO GOOD → Clean or adjust.

↓

Check valve clearance.
- GOOD
- NO GOOD → Adjust.

↓

Check if main passages such as, the main jet, in the carburetor are clogged.
- GOOD
- NO GOOD → Disassemble or clean.

↓

Check for air suction due to a damaged throttle shaft seal, carburetor joint, or gasket.
- GOOD
- NO GOOD → Disassemble or replace.

↓

Check compression using compression gauge.
- GOOD
- TOO HIGH
- TOO LOW → Decarbonize combustion chamber if there are carbon deposits.

↓

Check valve face and valve seat for wear.
- GOOD
- NO GOOD → Resurface or replace.

↓

Check if the marks on the crankshaft and camshaft are aligned.
- GOOD
- NO GOOD → Correct.

↓

Check if there is seizure or wear on piston, piston ring, or cylinder.
- GOOD
- SEIZURE OR WEAR → Rebore or replace.

↓

Check the condition of the throttle control system. Refer to “THROTTLE CONTROL SYSTEM”.

ENGINE SPEED IS UNEVEN

Check fuel level.		
SUFFICIENT	INSUFFICIENT	→ Add.
Check if fuel is deteriorated.		
GOOD	NO GOOD	→ Replace fuel.
Check if fuel tank cap is clogged.		
GOOD	NO GOOD	→ Replace.
Check if fuel cock is clogged.		
GOOD	NO GOOD	→ Clean.
Check fuel pump operation.		
GOOD	NO GOOD	→ Replace.
Check spark plug for dirt and check spark plug gap.		
GOOD	NO GOOD	→ Clean, adjust or replace.
Check valve clearance.		
GOOD	OUT OF SPECIFICATION	→ Adjust.
While the engine is operating, pull the choke knob approximately 1/3 to 1/2 way out, and then check the engine operating condition.		
STABLE	UNSTABLE	→ Resurface or replace.
Check for air suction due to a damaged throttle shaft seal, carburetor joint, or gasket.		
GOOD	NO GOOD	→ Disassemble or replace.
Check if slow or main passages such as, the pilot jet and main jet, in carburetor are clogged.		
GOOD	NO GOOD	→ Disassemble or clean.
Check valve face and valve seat for wear.		
GOOD	NO GOOD	→ Resurface or replace.
Check if there is seizure or wear on piston, piston ring, or cylinder.		
GOOD	SEIZURE OR WEAR	→ Rebore or replace.
Check the condition of the throttle control system. Refer to “THROTTLE CONTROL SYSTEM”.		

THROTTLE CONTROL SYSTEM

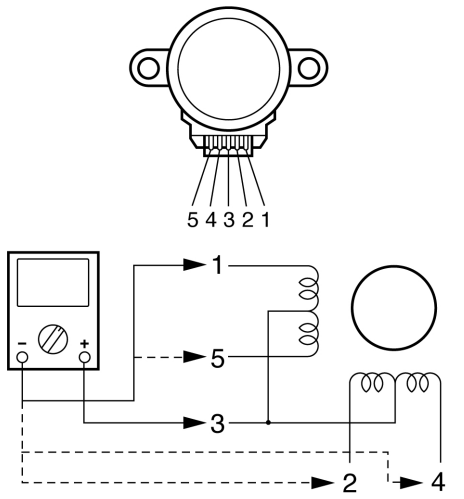
ENGINE DOES NOT START, ENGINE STARTS BUT STALLS, ENGINE SPEED DOES NOT INCREASE, OR ENGINE SPEED IS UNEVEN.

Check AC output.

GOOD → Rotate the shaft of the throttle control motor to check if it turns smoothly with slight resistance.

NO GOOD → Refer to “GENERATOR SYSTEM” in CHAPTER 5.

GOOD → Measure the coil resistance between 3-1, 3-2, 3-4, and 3-5 of the throttle control motor.
(Tester range: Ω × 1)



Coil resistance:
250 Ω ± 7% at 25 °C (68 °F)

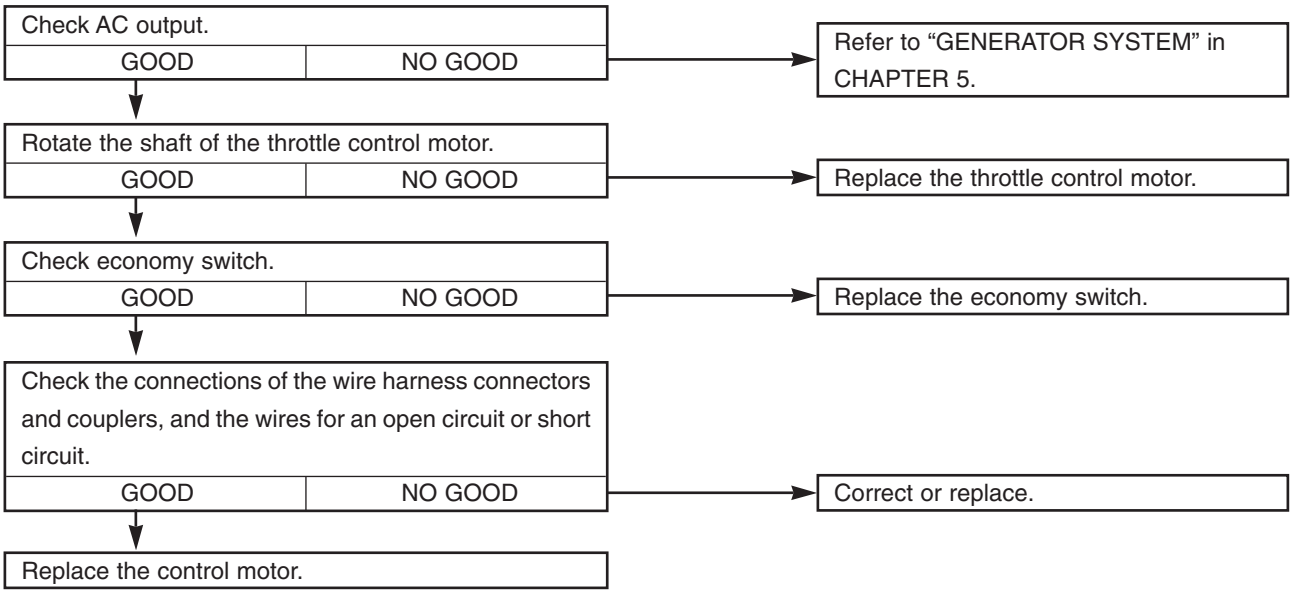
SPECIFICATION → Check the connections of the wire harness connectors and couplers, and the wires for an open circuit or short circuit.

OUT OF SPECIFICATION → Replace the throttle control motor.

GOOD → Replace the control motor.

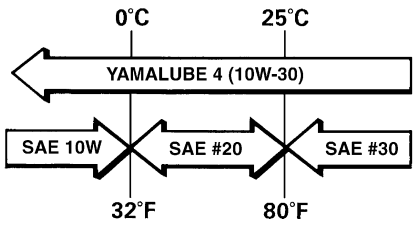
NO GOOD → Correct or replace.

With no load, engine speed does not increase when economy control switch is set to "OFF".
With no load, engine speed does not decrease when economy control switch is set to "ON".
With load, engine speed does not increase when economy control switch is set to "ON".



SPECIFICATIONS

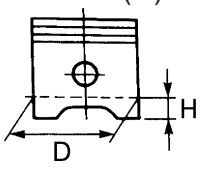
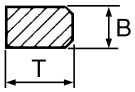
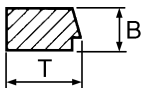
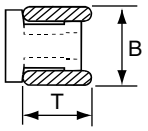
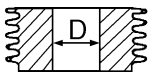
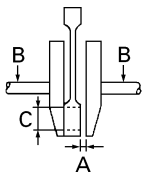
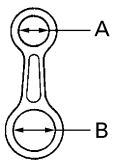
GENERAL SPECIFICATIONS

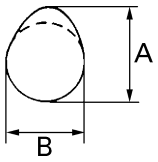
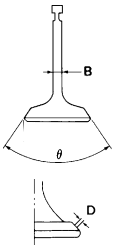
A Unit		EF1000iS
B Model code number		7VV2/7VV3/7VV4
C Dimensions:		
D Overall length	mm (in)	450 (17.7)
E Overall width	mm (in)	240 (9.5)
F Overall height	mm (in)	380 (15.0)
G Dry weight	kg (lb)	13.0 (28.7) (For EUROPE) 12.7 (27.9) (Except for EUROPE)
H Engine:		
I Engine type		J 4-stroke OHV forced air cooled
K Cylinder arrangement		1
L Displacement	L (cm^3)	0.050 (50)
M Bore × Stroke	mm (in)	41.0 × 38.0 (1.61 × 1.50)
N Compression ratio		8.2 : 1
O Rated output 60 Hz · kW (PS) / 5,000 r / min		1.21 (1.65)
P Rated engine speed	r / min	5,000
Q Operating hours	60 Hz · Hrs	
R W / no load		12.0
S W / rated load		4.3
T Fuel		U Unleaded regular gasoline
V Fuel tank capacity	L (Imp gal, US gal)	2.5 (0.55, 0.66)
W Engine oil capacity	L (Imp qt, US qt)	0.32 (0.28, 0.34)
X Engine recommended oil		Y 4-stroke engine oil API service classification SE or SF, if not available, SD 
Z Electrical:		
a Ignition system		b TCI
c Ignition timing		BTDC 33°
d Spark plug type		CR6HSB (NGK)
e Spark plug gap	mm (in)	0.7 ~ 0.8 (0.028 ~ 0.031)
f Generator:		
g Type		h Multi pole rotating field magnet
i Initial excitation		j Permanent magnet
k Driving method		l Direct connection
m Rated power factor		1

A Unit		EF1000iS				
B Frequency variation						
C Instantaneous		D Less than 1 %				
E Settling		F Less than 0.1 %				
G Settling time		H Less than 7 sec				
I Voltage fluctuation						
J Instantaneous		K Less than 20 %				
L Settling		M Less than 3 %				
N Settling time		O Less than 5 sec				
P AC output		For CANADA	For EUROPE	For AUSTRALIA	For General market	
Q Rated voltage	V	120	230	240	220	120
R Frequency	Hz	60	50			60
S Rated output	kVA	0.9				
T Rated current	A	7.5	3.9	3.8	4.1	7.5
U DC output		For CANADA	For EUROPE	For AUSTRALIA	For General market	
V Rated voltage	V	12				
W Rated output	W	78	96			
X Rated current	A	6.5	8			
Y Safety device type	AC	Z Electronic no fuse braker and AC switch	a Electronic no fuse breaker			
	DC	b N.F.B.	c DC Circuit breaker			
d Rated engine speed	r / min	5,000				
e Voltage regulation		f Voltage feed back system				
g Voltage stability		h Within ± 4 %				
i Frequency stability	Hz	j Within ± 1				
k Rotating speed control		l Throttle motor control type				
m Wave distortion ratio		n Less than 2.5 %				
o Number of phase		p Single phase				
q Insulation resistance	MΩ	r Over 10				
s Insulation class		t B				
u Receptacle	AC	15 A (Duples) × 2	16A	15A		
	DC	12 A × 1		20A × 1	12A × 1	

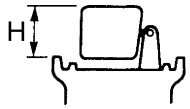
MAINTENANCE SPECIFICATIONS

ENGINE

A Unit		B Standard	C Limit
D Piston:	mm (in)		
E Piston clearance		0.01 ~ 0.04 (0.0004 ~ 0.0016)	0.1 (0.004)
F Piston skirt " D "		40.95 ~ 40.97 (1.612 ~ 1.613)	40.94 (1.6118)
G Measuring point " H "		10 mm (0.4)	•••
H Piston pin hole inside diameter		10.000 ~ 10.020 (0.3937 ~ 0.3945)	10.050 (0.3956)
I Piston pin:	mm (in)		
J Piston pin diameter		9.99 ~ 10.00 (0.3933 ~ 0.3937)	9.95 (0.3917)
K Piston ring:	mm (in)		
L Top ring			
M Type		N Barrel face	•••
O Dimensions " B × T "		0.8 × 1.6 (0.03 ~ 0.06)	•••
P End gap		0.1 ~ 0.30 (0.0039 ~ 0.0118)	0.6 (0.0236)
Q Side clearance		0.06 ~ 0.11 (0.002 ~ 0.004)	0.15 (0.006)
R 2nd ring			
S Type		T Taper	•••
U Dimensions " B × T "		0.8 × 1.7 (0.03 ~ 0.07)	•••
V End gap		0.10 ~ 0.3 (0.0039 ~ 0.0118)	0.6 (0.0236)
W Side clearance		0.06 ~ 0.11 (0.002 ~ 0.004)	0.15 (0.006)
X OIl ring			
Y Type		Z Solid	•••
a Dimensions " B × T "		1.5 × 1.9 (0.059 ~ 0.075)	•••
b End gap		0.2 ~ 0.7 (0.0078 ~ 0.0275)	0.9 (0.0354)
c Cylinder:	mm (in)		
d Inside diameter " D "		41.00 ~ 41.02 (16.14 ~ 16.15)	41.10 (16.18)
e Taper limit		•••	0.05 (0.002)
f Warpage limit		•••	0.05 (0.002)
g Crankshaft:	mm (in)		
h Big end side clearance " A "		0.2 ~ 0.65 (0.008 ~ 0.026)	0.7 (0.028)
i Runout " B "			0.03 (0.001)
j Crank pin diameter " C "		15.970 ~ 15.985 (0.629 ~ 0.630)	15.940 (0.627)
k Connecting rod:	mm (in)		
l Small end diameter " A "		10.006 ~ 10.020 (0.3944 ~ 0.3945)	10.050 (0.396)
m Oil clearance		0.015 ~ 0.050 (0.0006 ~ 0.0020)	0.100 (0.004)
n Small end diameter " B "		16.000 ~ 16.015 (0.6299 ~ 0.6305)	16.050 (0.632)
o Oil clearance		0.015 ~ 0.050 (0.0006 ~ 0.0020)	•••

A Unit		B Standard	C Limit
D Camshaft:	mm (in)		
E Camshaft outside diameter			
F Cam dimension			
" A "		32.65 (1.29)	31.65 (1.25)
" B "		28.25 (1.11)	27.25 (1.07)
G Valve:	mm (in)		
H Valve			
I Stem diameter " B "	IN	3.96 ~ 3.98 (0.156 ~ 0.157)	3.92 (0.154)
	EX	3.94 ~ 3.96 (0.155 ~ 0.156)	3.90 (0.153)
J Valve face contact			
width " D "	IN	0.8 (0.03)	1.8 (0.07)
	EX	0.8 (0.03)	1.8 (0.07)
K Valve stem runout limit		•••	0.01 (0.0004)
" θ "		•••	90°
L Valve guide			
M Guide inside diameter	IN	4.0 (0.157)	•••
	EX	4.0 (0.157)	•••
N Valve clearance (cold)	IN	0.1 (0.004)	•••
	EX	0.1 (0.004)	•••
O Push rod:	mm (in)		
P Runout limit		0.5 (0.02)	•••
Q Valve spring:	mm (in)		
R Free length	IN	25.0 (0.984)	24.0 (0.945)
	EX	25.0 (0.984)	24.0 (0.945)
S Set length	IN	15.1 (0.594)	•••
	EX	15.1 (0.594)	•••
T Tilt limit		•••	2.0 (0.079)

A Unit	B Standard	C Limit
D Carburetor: mm (in)		
E Type / manufacture	BV15-11 / MIKUNI	•••
F I.D.mark	7VV 02	•••
G Bore size	Ø 11 (0.433)	•••
H Main jet	#62.5	•••
I Main air jet	Ø 1.4 (0.055)	•••
J Pilot air jet	Ø 0.9 (0.004)	•••
K Pilot outlet	Ø 0.8 (0.031)	•••
L Valve seat size	Ø 1.5 (0.059)	•••
M Main nozzle	21A	•••
N Pilot jet	#40	•••
O Throttle valve	#110	•••
P Float height " H "	1.5 (0.06)	•••



GENERATOR AND ELECTRICAL

A Unit		B Standard	C Limit
D Generator:			
E AC coil 1 AC voltage (3 phase) (V/r/min)		190 ~ 270 / 5,000	•••
[Br - G (R - S), G - Br (S - T), Br - Br (R - T)			
F With coupler disconnected]			
G AC coil 2 AC voltage (3 phase) (V/r/min)		130 ~ 180 / 5,000	•••
[W - Or (R - S), Or - W (S - T), W - W (R - T)			
H With coupler disconnected]			
I DC coil DC voltage	(V/r/min)	13.5 ~ 23.0 / 5,000	•••
J Coil resistance			
K AC coil 1	(Ω ± 20 %)		•••
Br - G (R - S), G - Br (S - T)		9.6	
Br - Br (R - T)		8.7	
L With coupler disconnected			
M AC coil 2	(Ω ± 20 %)		•••
W - Or (R - S), Or - W (S - T)		4.6	
W - W (R - T)		4.2	
N With coupler disconnected			
O DC coil	(Ω ± 20 %)	0.13 (Blue-Blue)	•••
P Electrical:			
Q Ignition system		R TCI	•••
S Ignition timing		BTDC 33°	•••
T Ignition coil			
U Primary coil resistance	(Ω ± 20 %)	0.7	•••
V Secondary coil resistance	(kΩ ± 20 %)	11.5	•••
W Spark plug cap resistance	(kΩ)	3.8 ~ 6.3	•••
X Spark plug minimum spark gap	mm(in)	6 (0.24)	•••

TIGHTENING TORQUE

A Item	B Thread size	C Tightening torque Nm (m·kg, ft·lb)
D Spark plug	M10S × 1.0	13 (1.3, 9.4)
E Cylinder head cover	M5 × 0.8	6 (0.6, 4.3)
F Connecting rod	M5 × 0.8	6 (0.6, 4.3)
G Valve adjuster locknut	M5 × 0.8	6 (0.6, 4.3)
H Air shroud cylinder 1,2	M5 × 0.8	6 (0.6, 4.3)
I Air filter case	M5 × 0.8	6 (0.6, 4.3)
J Muffler stay	M6 × 1.0	10 (1.0, 7.2)
K Stud bolt (IN)	M6 × 1.0	7 (0.7, 5.1)
L Stud bolt (EX)	M6 × 1.0	7 (0.7, 5.1)
M Crankcase	M5 × 0.8	8 (0.8, 5.8)
N Recoil starter	M5 × 0.8	6 (0.6, 4.3)
O Mount insulator	M6 × 1.0	6.5 (0.65, 4.7)
P Engine bracket	M6 × 1.0	6.5 (0.65, 4.7)
Q Ignition coil	M5 × 0.8	6 (0.6, 4.3)
R Magneto rotor	M10 × 1.25	27 (2.7, 19.4)
S TCI unit	M4	1.1 (0.1, 0.7)
T Stator coil assembly	M6 × 1.0	10 (1.0, 7.2)
U Generator rotor	M10 × 1.25	27 (2.7, 19.4)
V Front cover	M5 × 0.8	6 (0.6, 4.3)
W Oil level switch	M6 × 1.0	7 (0.7, 5.1)

GENERAL TORQUE SPECIFICATIONS

This chart specifies torque for standard fasteners with standard I.S.O. pitch treads. Torque specifications for special components or assemblies are included in the applicable sections of this book. To avoid warpage, tighten multi fastener assemblies in a crisscross fashion, in progressive stages, until full torque is reached. Unless otherwise specifications call for clean, dry treads. Components should be at room temperature.

A Tread size	B Tightening torque		
	Nm	m·kg	ft·lb
M4	2	0.2	1.4
M5	3	0.3	2.2
M6	7	0.7	5.1
M7	10	1.0	7.2
M8	15	1.5	11
M10	30	3.0	22
M12	60	6.0	43

DEFINITION OF UNITS

C Unit	D Read	E Definition	F Measure
mm	G Milimeter	H 10^3 meter	I Length
cm	J Centimeter	K 10^2 meter	L Length
kg	M Kilogram	N 10^3 gram	O Weight
N	P Newton	Q 1 kg x m/sec^2	R Force
Nm	S Newton meter	N x m	T Torque
m·kg	U Meter kilogram	m x kg	V Torque
Pa	W Pascal	N/m^2	X Pressure
N/mm	Y Newton per milimeter	N/mm	Z Spring rate
L	a Liter	—	c Volume or capacity
cm^3	b Cubic centimeter		
r/min	d Rotation per minute	—	e Engine speed

LUBRICATION POINT AND TYPE OF LUBRICANTS

A Part name	B Type of lubricants
C Oil seal lip (All)	D Lithium-soap base grease
E Connecting rod big end	F Engine oil
G Crank pin	H Engine oil
I Connecting rod bolt	J Engine oil
K Piston pin	L Engine oil
M Piston	N Engine oil
O Camshaft 1	P Engine oil
Q Crankshaft bearing	R Engine oil
S Valve stem	T Molybdenum disulfide oil
U Valve stem end	V Molybdenum disulfide oil
W Valve rocker arm shaft	X Molybdenum disulfide oil
Y Valve push rod	Z Engine oil
a Valve cam follower	b Engine oil
c Camshaft gear	d Engine oil
e Camshaft lobe	f Engine oil
g Decompressor cam	h Engine oil
i Crankcase 2 bearing	j Engine oil

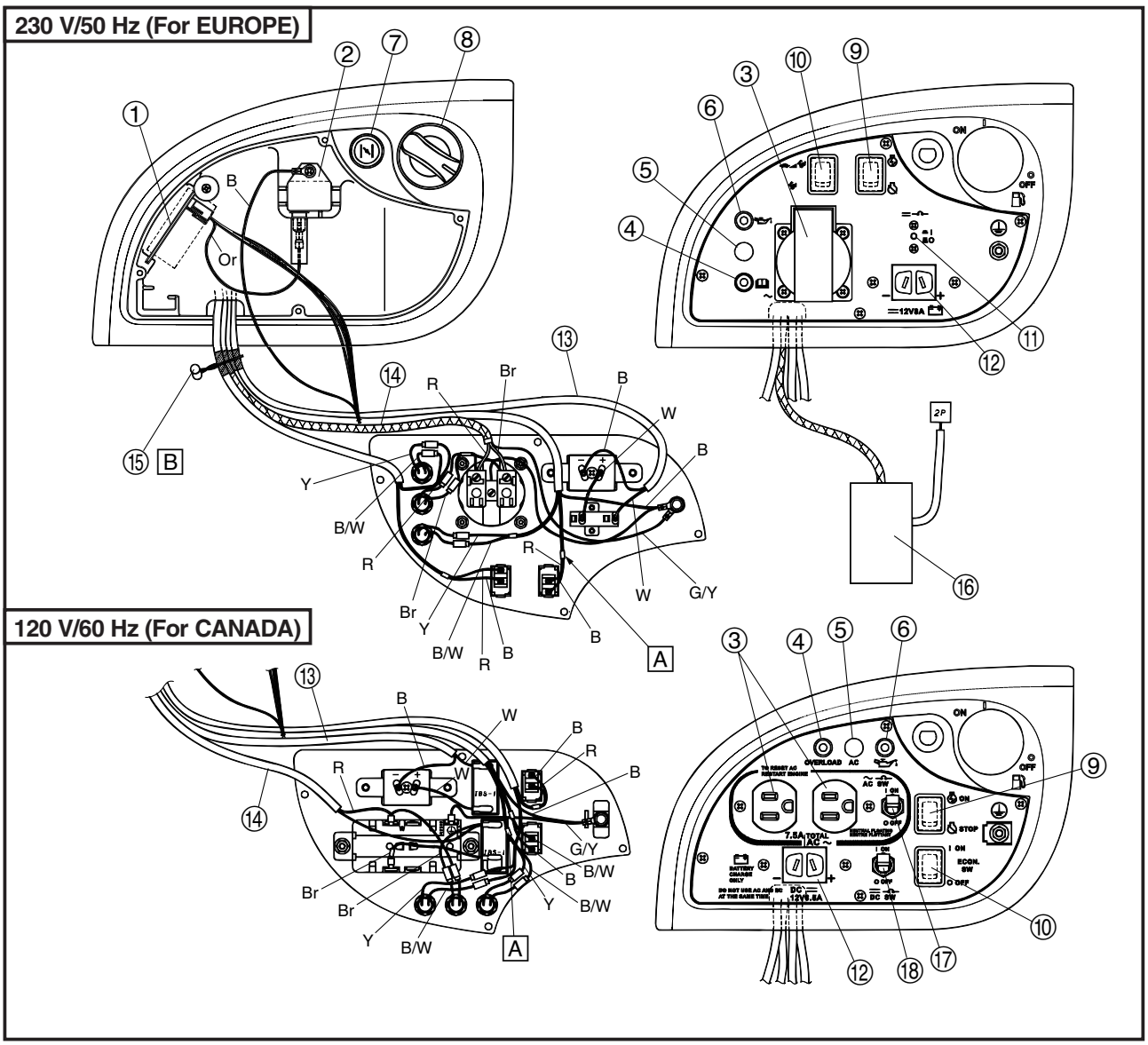
WIRE ROUTING DIAGRAM

CONTROL BOX PANEL AND BEHIND CONTROL BOX

① Speed limiter
② TCI unit
③ AC receptacle
④ Over load warning light (Red)
⑤ Pilot light (Green)
⑥ Oil warning light (Red)
⑦ Choke knob
⑧ Change link
⑨ Engine switch
⑩ Economy switch
⑪ DC circuit breaker
⑫ DC receptacle
⑬ DC receptacle lead
⑭ AC receptacle lead
⑮ Clamp
⑯ Noise filter
⑰ AC switch
⑱ DC switch

[A] White tape side.
[B] Clamp with each white tape.

COLOR CODE
B .....Black
Br.....brown
G.....Green
L.....Blue
Or.....Orange
R.....Red
W .....White
Y .....Yellow
B/W....Black/White
G/Y ....Green/Yellow



① Speed limiter
② TCI unit
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⑤ Pilot light (Green)
⑥ Oil warning light (Red)
⑦ Choke knob
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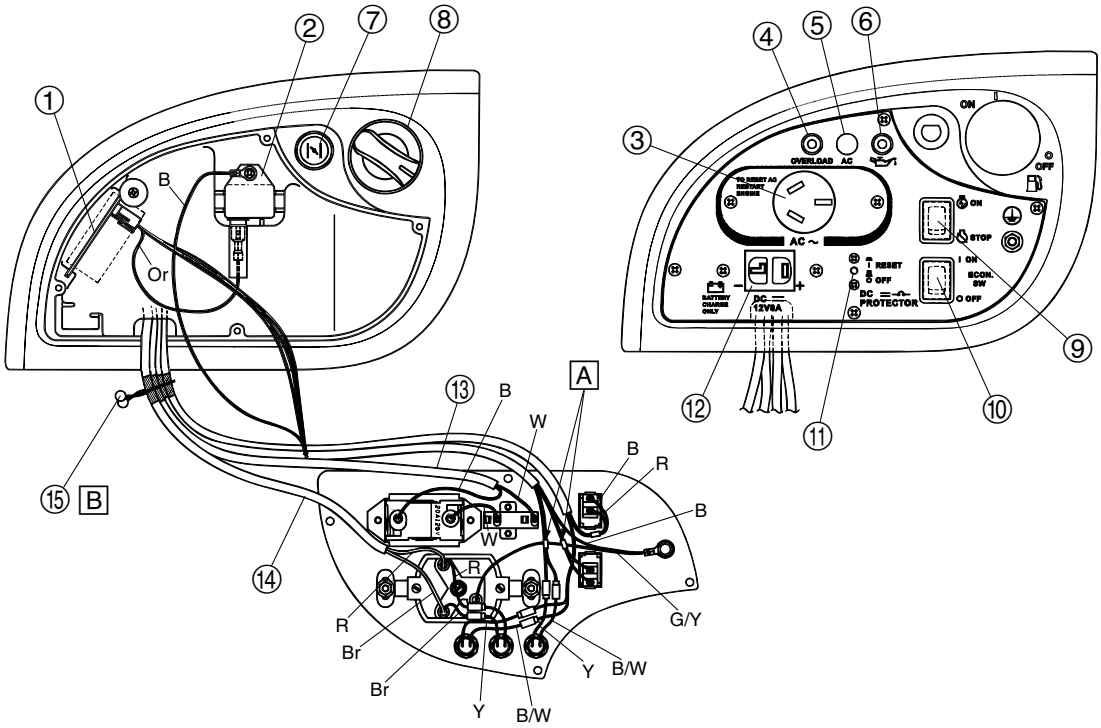
240 V/50 Hz (For AUSTRALIA)



① Speed limiter
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⑧ Change link
⑨ Engine switch
⑩ Economy switch
⑪ DC circuit breaker
⑫ DC receptacle
⑬ DC receptacle lead
⑭ AC receptacle lead
⑮ Clamp

[A] White tape side.
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COLOR CODE
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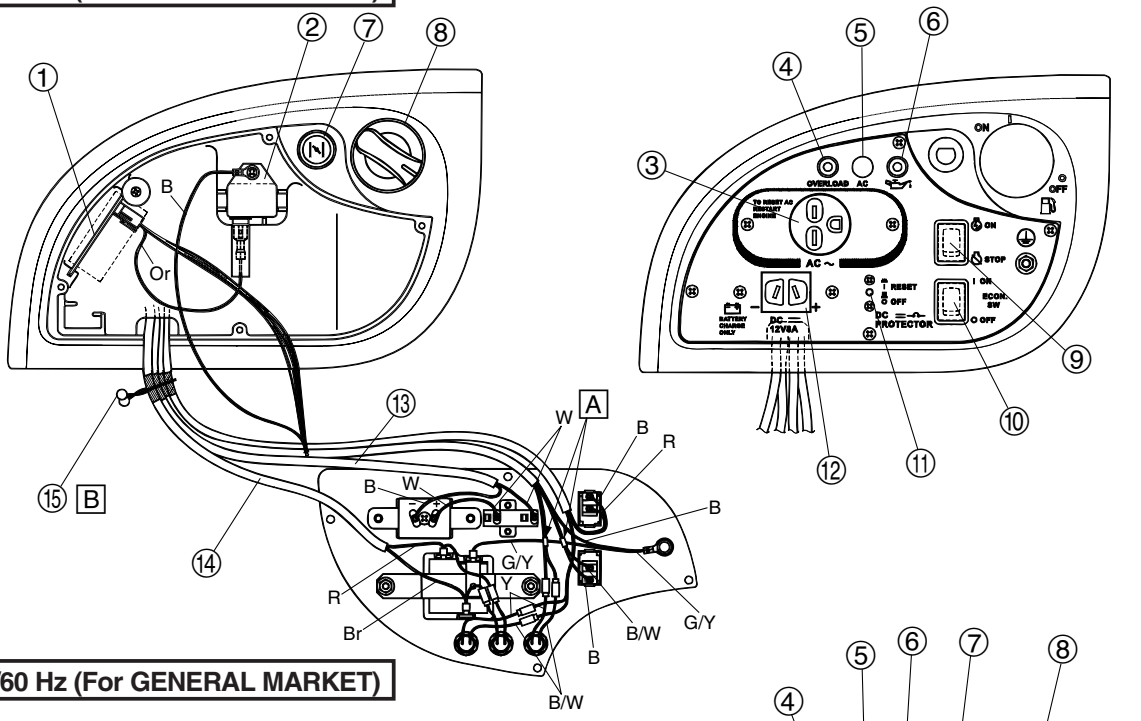
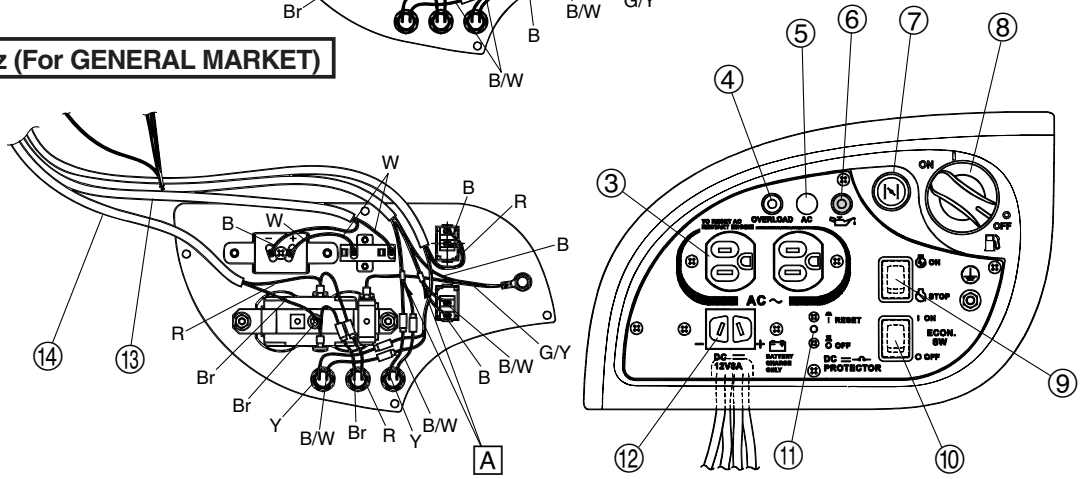
L.....Blue
Or.....Orange
R.....Red
W .....White
Y .....Yellow
B/W....Black/White
G/Y ....Green/Yellow

220 V/50 Hz (For GENERAL MARKET)



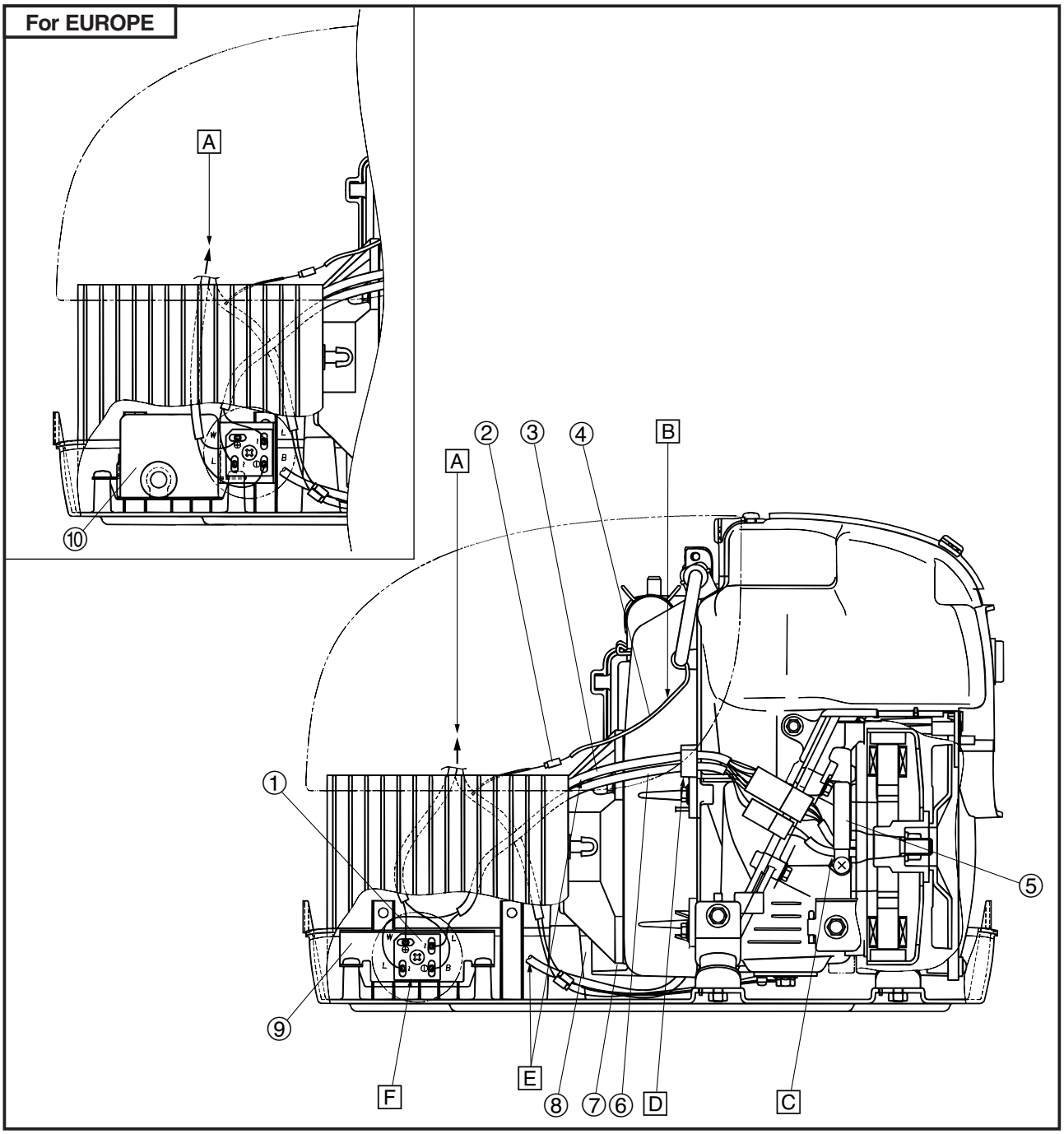
120 V/60 Hz (For GENERAL MARKET)



ENGINE AND GENERATOR

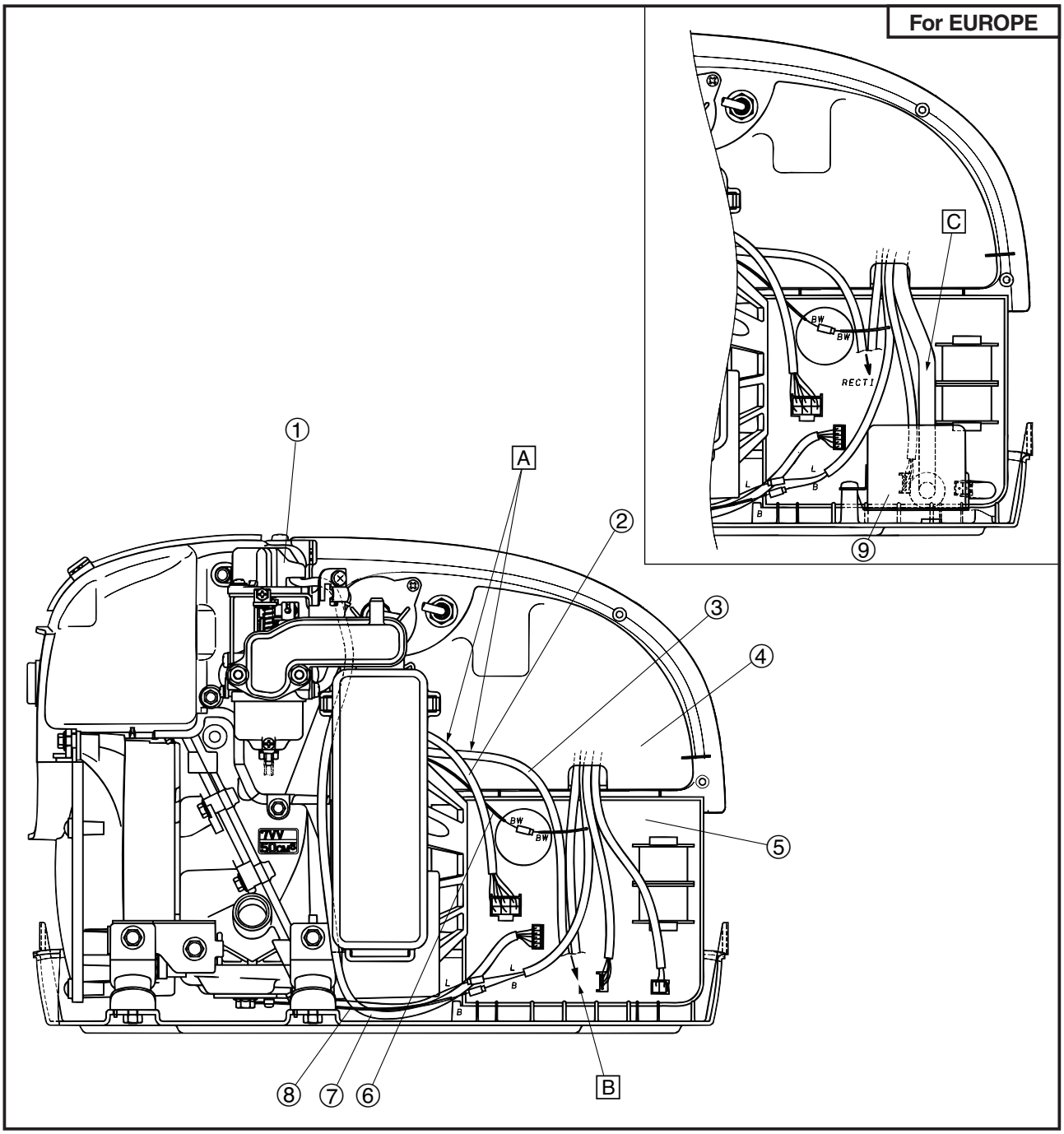
① Rectifier
② Ignition coil lead connector
③ AC coil 1, 2 lead
④ Ignition coil lead
⑤ Clamp
⑥ DC coil lead
⑦ Ground lead
⑧ Control motor lead
⑨ Rectifier stay
⑩ Noise filter

A To control box.
B From ignition coil.
C Clamp the generator lead with clamp.
D Insert the AC coil 1, 2 lead, DC coil lead and the clamp them.
E To controller.
F Certainly connect the each leads.



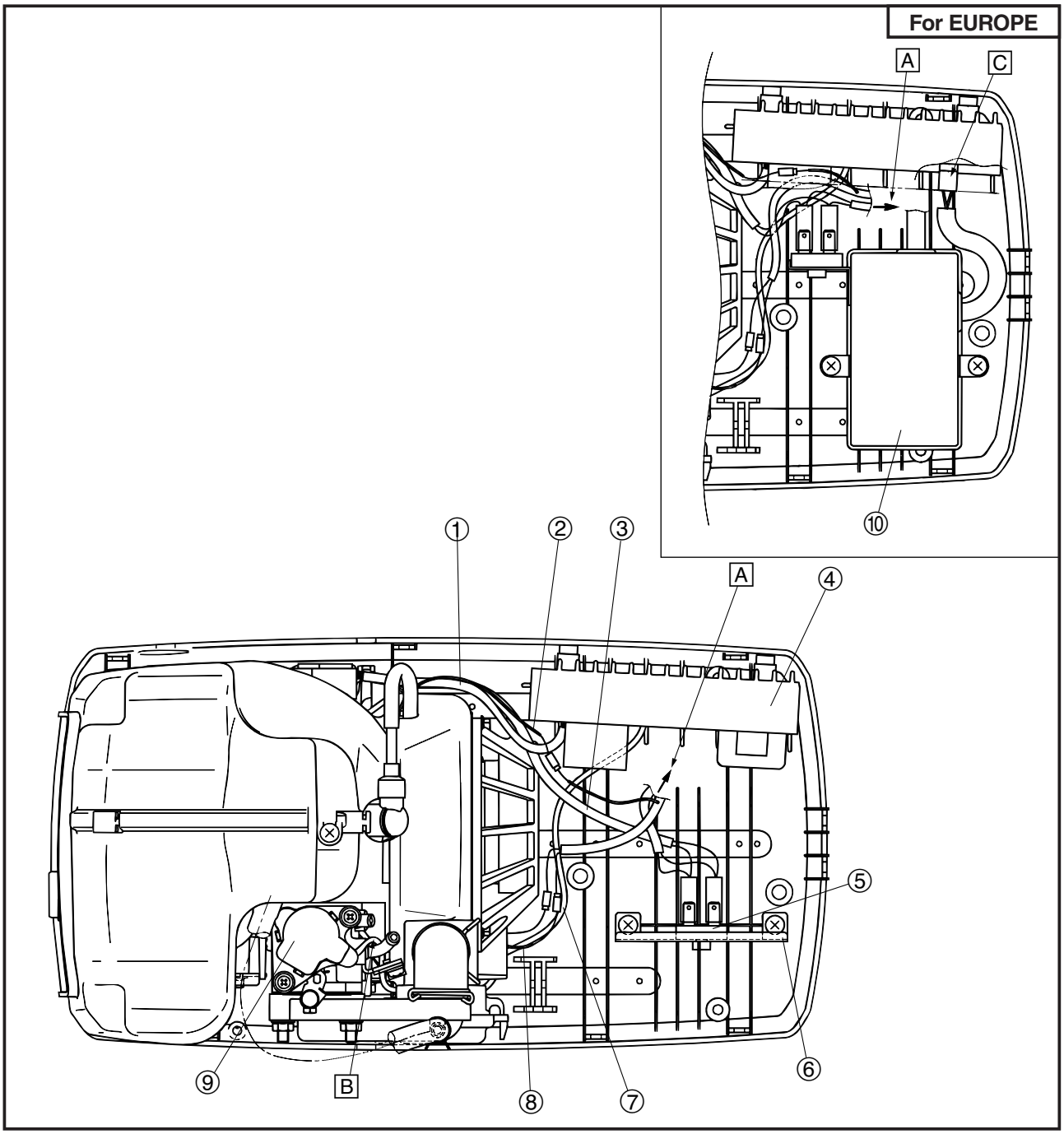
① Control motor
② AC coil 1, 2 lead
③ DC coil lead
④ Control box
⑤ Control unit
⑥ Ignition coil lead
⑦ Control motor lead
⑧ Ground lead
⑨ Noise filter

A From generator.
B To rectifier.
C Connect the noise filter output lead to the receptacle and ground terminal behind the control panel.



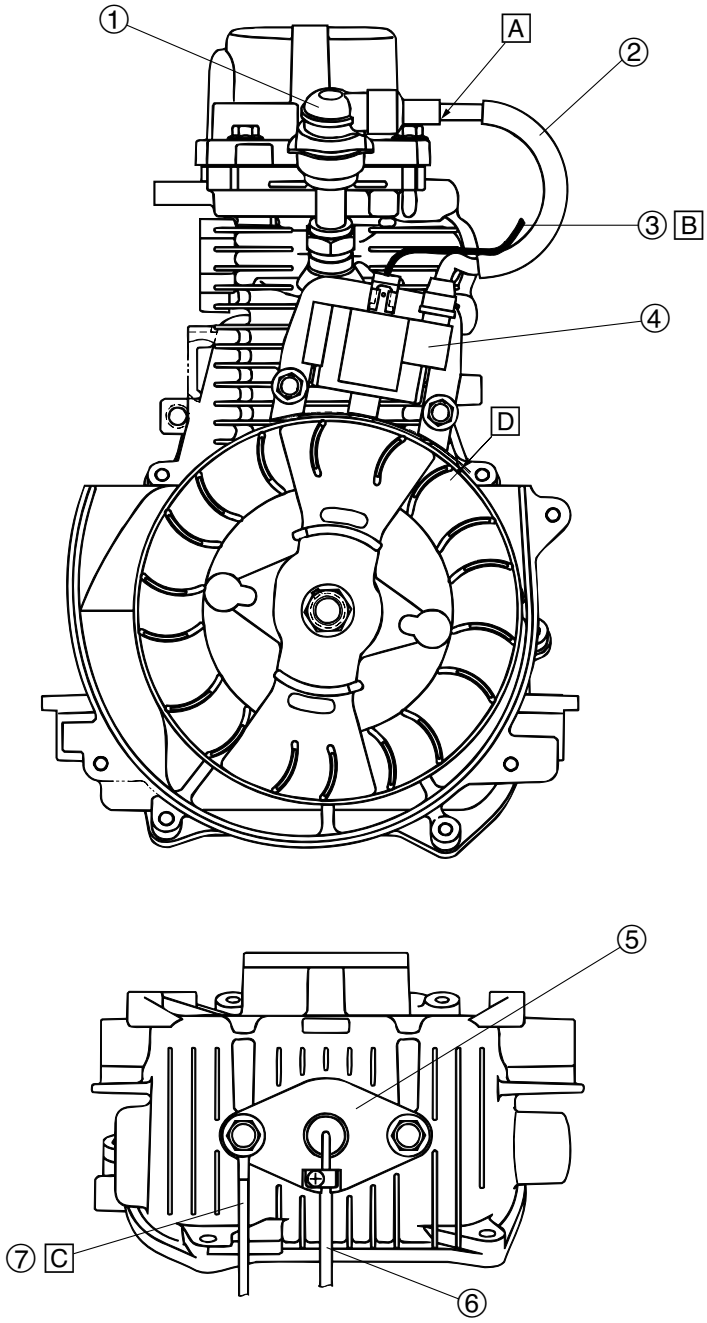
① AC coil 1, 2 lead
② Ignition coil lead
③ DC coil lead
④ Control unit
⑤ Rectifier
⑥ Rectifier stay
⑦ Control motor lead
⑧ Ground lead
⑨ Control motor
⑩ Noise filter

[A] To control box.
[B] Pass the control motor lead under the fuel hose.
[C] Connect to the 2P connecter from controller.



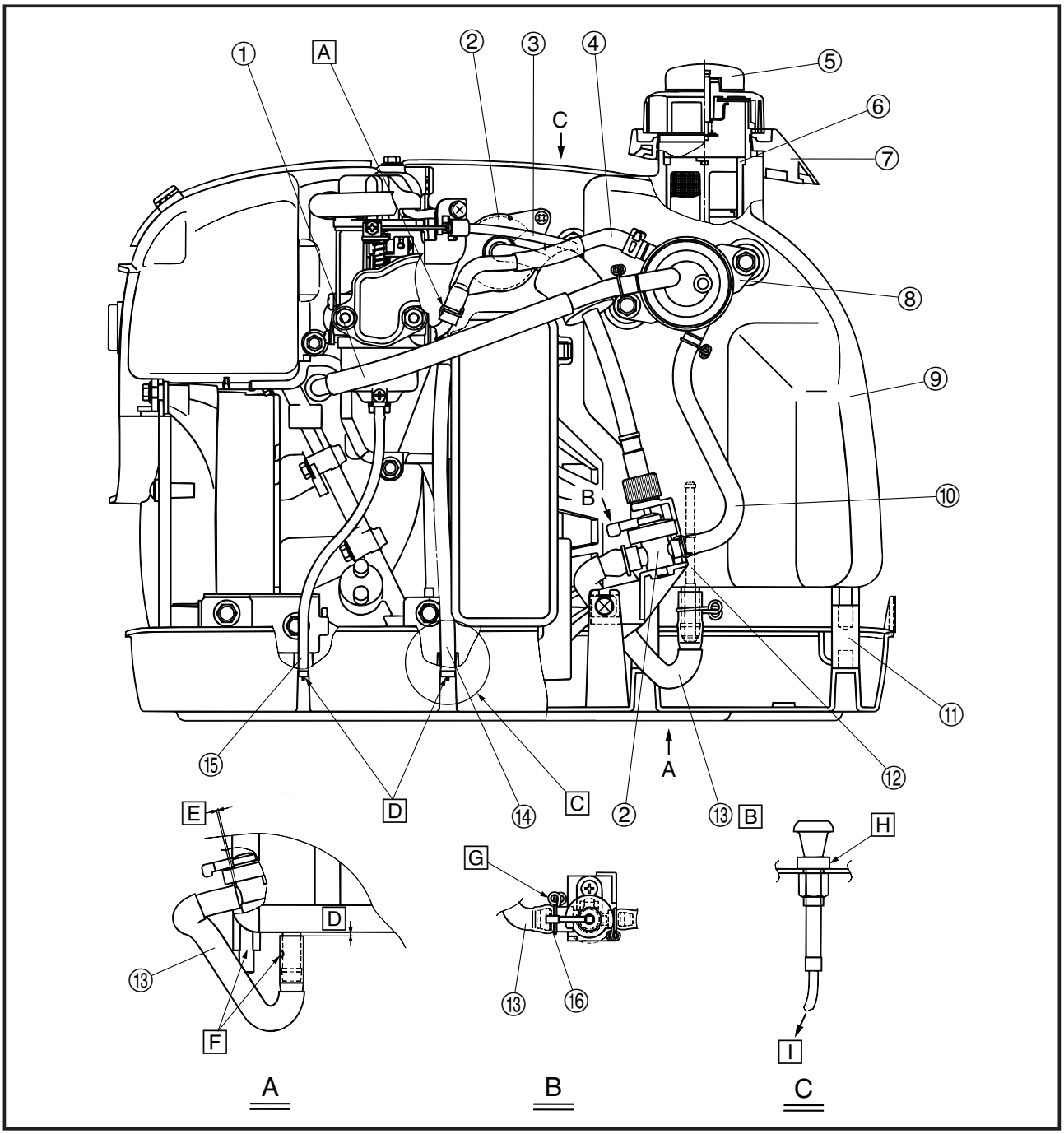
① Spark plug cap
② High-tension cord
③ Ignition coil lead
④ Ignition coil
⑤ Oil level switch
⑥ Oil level switch lead
⑦ Ground lead

A Install the spark plug cap until stop the spark plug.
B To TCI unit.
C Tighten with the ground lead with oil level switch.
D After tightened, adjust the both air gaps to 0.5 ± 0.1 mm (0.02 ± 0.004 in).



① Pipe 4
② Change link
③ Choke cable
④ Pipe 3
⑤ Fuel tank cap assembly
⑥ Strainer
⑦ Holder
⑧ Fuel pump assembly
⑨ Fuel tank
⑩ Pipe 2
⑪ Locating damper
⑫ Filer net 1
⑬ Fuel pipe
⑭ Air vent hose
⑮ Drain hose
⑯ Lever

[A] Install the clip as shown.
[B] Refer the angle A.
[C] Make sure place the hose end at original position.
[D] Install the hoses until it stops.
[E] Less than 1.5 mm (0.059 in).
[F] Mating the white both marks.
[G] Do not contact to install the clip and lever.
[H] Do not remove the rollett nut, when install the fuel change link cable.
[I] Fully pushed the choke knob as shown, when install the choke cable to the carburetor.



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