



SERVICE MANUAL

EF2400iS

7CF-28197-E0

331153

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.

EF2400iS
SERVICE MANUAL
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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

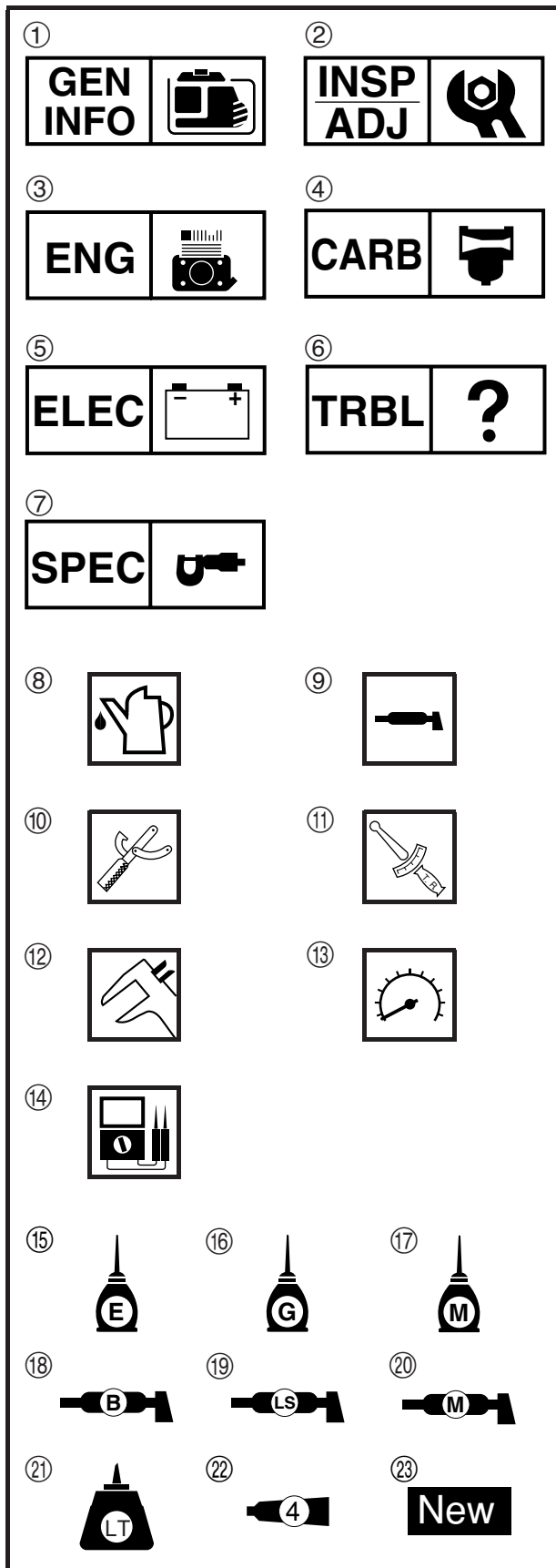
The procedures in this manual are organized in a sequential, step-by-step format. The information has been compiled to provide the mechanic with an easy to read, handy reference that contains comprehensive explanations of all disassembly, repair, assembly, and inspection operations.

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 ⑳ 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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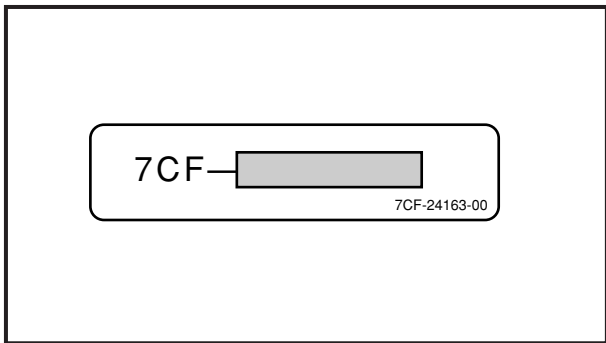
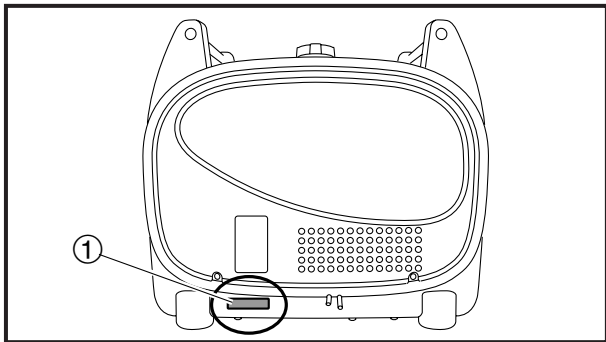
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GENERAL INFORMATION
MACHINE IDENTIFICATION
SERIAL NUMBER

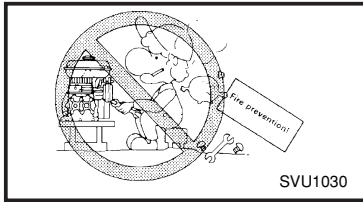
The serial number is printed on a label ① which is affixed to the generator as shown.

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 (For Canada)	7CF2	7CF-260101~
230V/50Hz (For Germany)	7CF2	7CF-300101~
230V/50Hz (For Australia)	7CF3	7CF-310101~
220V/60Hz (For Korea)	7CF3	7CF-320101~

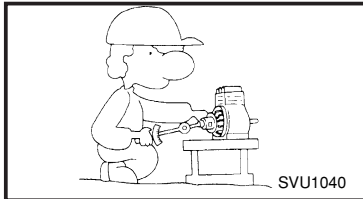
NOTE: _____
Designs and specifications are subject to change without notice.



IMPORTANT INFORMATION PREPARATION FOR REMOVAL AND DISASSEMBLY CAUTION ON SERVICE

1. Fire prevention

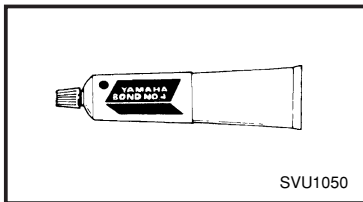
When servicing the engine, always keep the engine and yourself away from fire.



NOTES ON SERVICE

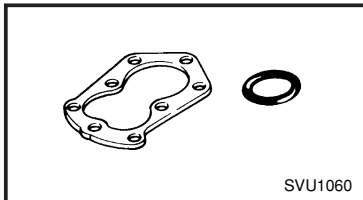
1. Correct tools

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



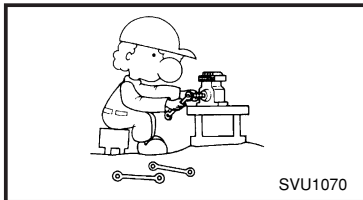
2. Oil, grease and seals

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



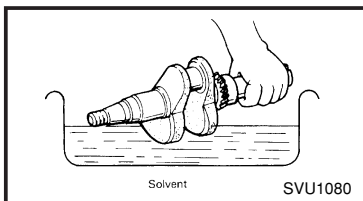
3. Expendable parts

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



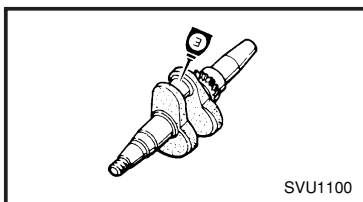
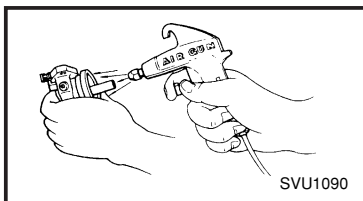
4. Tightening torque

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.



5. Notes on disassembly and assembly

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



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.

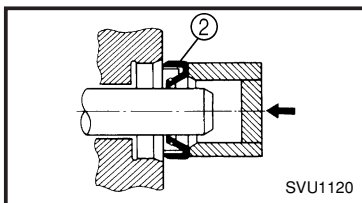
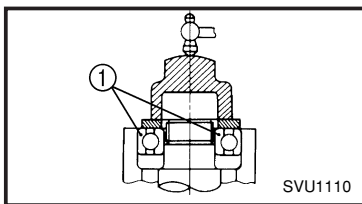


ALL REPLACEMENT PARTS

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.

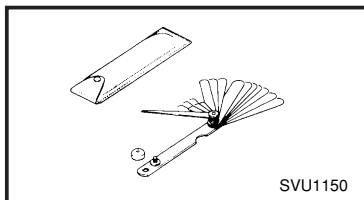
CAUTION:

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.

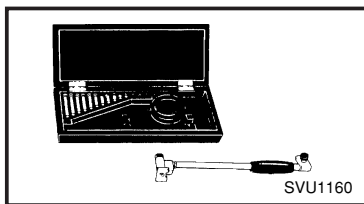


SVU1150

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.

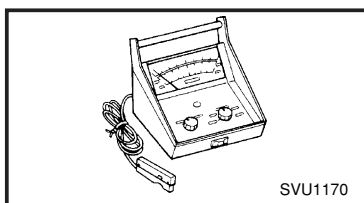


SVU1160

2. Cylinder gauge

Commercially obtainable

This instrument is used for checking cylinder bore size and condition.



SVU1170

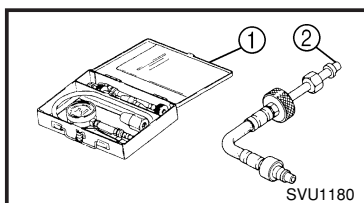
3. Inductive tachometer

P/N. YU-8036-A

Engine tachometer

P/N. 90890-03113

This instrument is used for reading engine r/min.



SVU1180

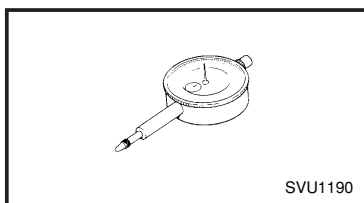
4. Compression gauge ①

P/N. YU-33223, 90890-03081

Adapter ②

P/N. YU-33223-3, 90890-04082

This gauge is used for checking engine compression.

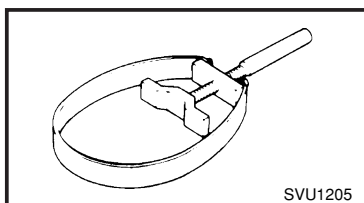


SVU1190

5. Dial gauge

P/N. YU-03097, 90890-03097

This instrument is used for checking crankshaft side clearance.

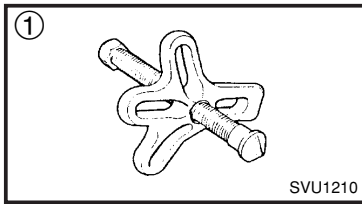


SVU1205

6. Sheave holder

P/N. YS-01880, 90890-01701

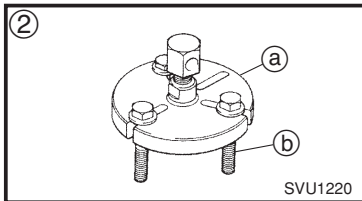
This tool is necessary for holding the magneto rotor.



7. Rotor puller

- ① P/N. YU-33270
- ② a P/N. 90890-01362
- b P/N. 90890-01355 (M6)

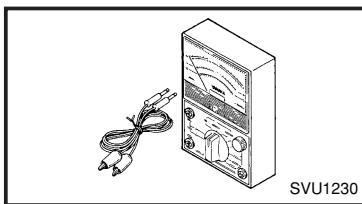
This tool is necessary for removing the magneto rotor.



8. Pocket tester

P/N. YU-03112, 90890-03112

This instrument is necessary for checking the electrical system.



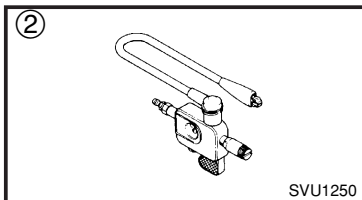
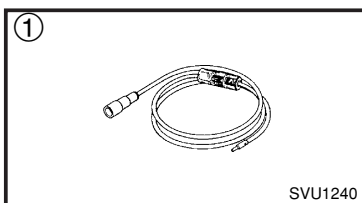
9. Dynamic spark tester ①

P/N. YM-34487

Ignition checker ②

P/N. 90890-06754

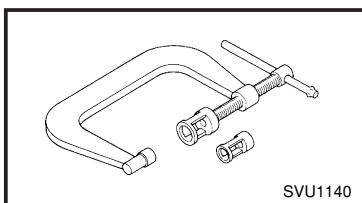
This instrument is necessary for checking the ignition system components.



10. Valve spring compressor

P/N. YM-01253, 90890-01253

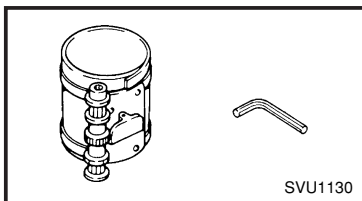
This tool is used to remove the valve springs.



11. Piston ring compressor ①

P/N. YU-33294, 90890-05158

This tool is used to compress the piston rings when installing the piston.





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] * Idle speed	Check and adjust engine idle speed.						●
5.	[N] * Exhaust System	Check for leakage. Retighten or replace gasket if necessary.	●					
		Check muffler screen and spark arrester. Clean/replace if necessary.						●
6.	[O] Engine Oil	Check oil level	●					
		Replace		●		●		
7.	[P] * Air Filter	Clean. Replace if necessary.			●			
8.	[Q] Fuel Filter	Clean fuel tank filter. Replace if necessary.					●	
9.	[R] Fuel Line	Check fuel hose for crack or damage. Replace if necessary.	●					
10.	[S] * Choke knob	Check choke operation.	●					
11.	[T] Cooling System	Check for fan damage.						●
12.	[U] Starting System	Check recoil starter operation.	●					

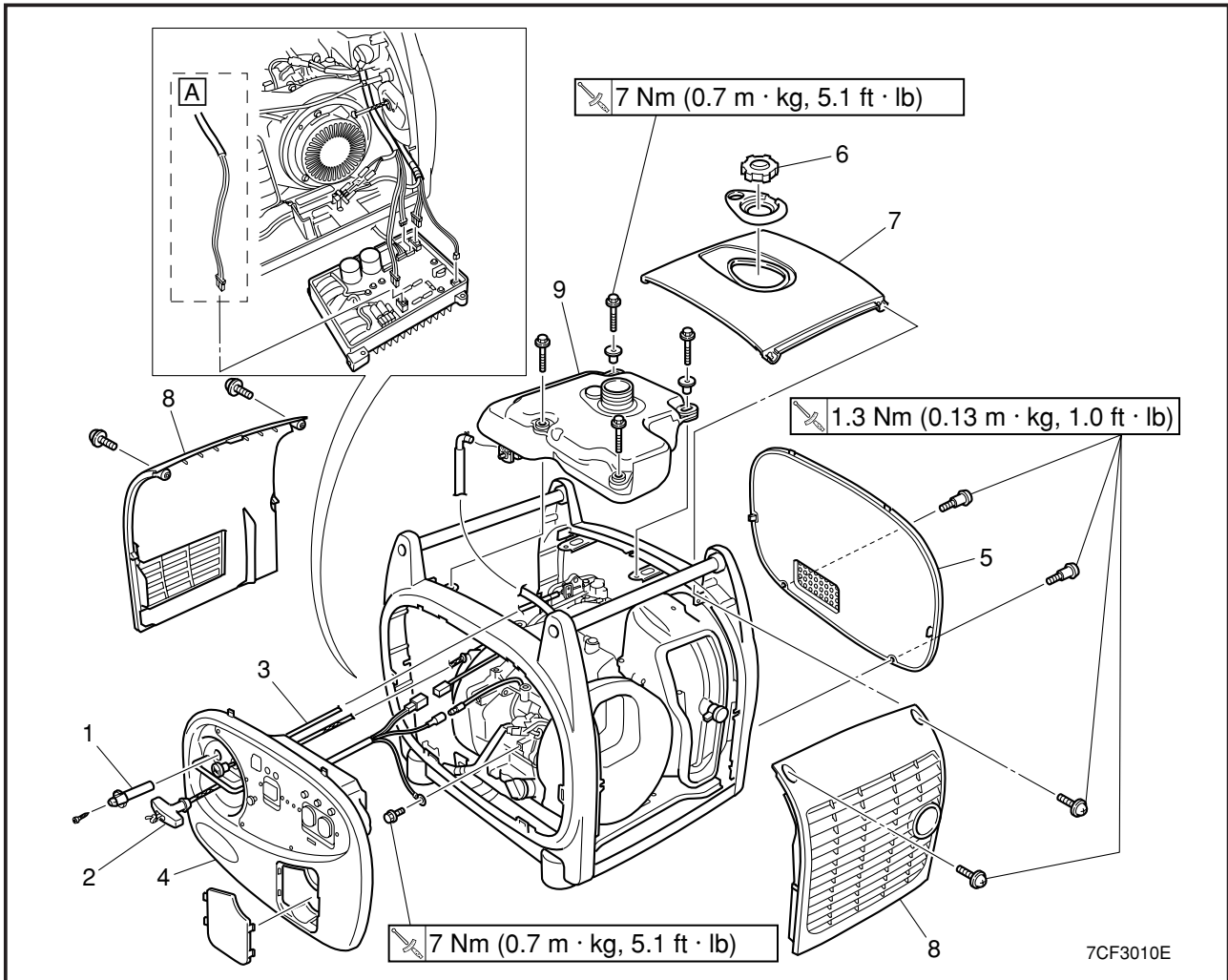
* : Related to emission control system.

PERIODIC MAINTENANCE/LUBRICATION INTERVALS



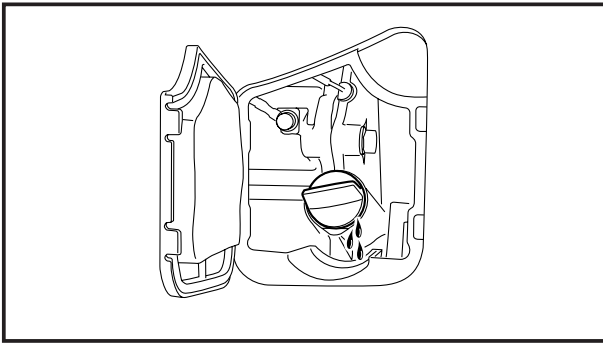
No.	A Item	B Remarks	C Pre- Operation check (daily)	D Initial	E Every			
				F 1 month or 20 Hr	G 3 months or 50 Hr	H 6 months or 100 Hr	I 12 months or 300 Hr	
13.	J Generation	Check the pilot light comes on.	●					
14.	K Fittings/ Fasteners	Check all fittings and fasteners. Correct if necessary.			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

COVERS AND FUEL TANK



Order	Job name	Q'ty	Remarks
	Covers and fuel tank removal		Remove the parts in the order listed below.
1	Fuel cock	1	
2	Recoil starter handle	1	
3	Choke cable	1	Disconnect the choke cable from the carburetor side.
4	Front cover	1	Disconnect the couplers and lead wires.
5	Rear cover	1	
6	Fuel tank cap	1	
7	Top cover	1	
8	Side cover left/right	1/1	
9	Fuel tank assembly	1	Disconnect the fuel hose from the fuel cock. For installation, reverse the removal procedure.

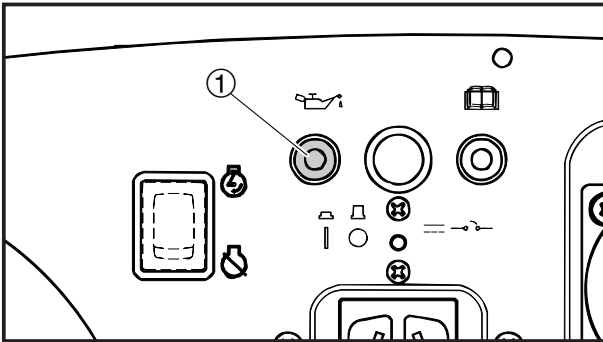
A: For GERMANY



ENGINE

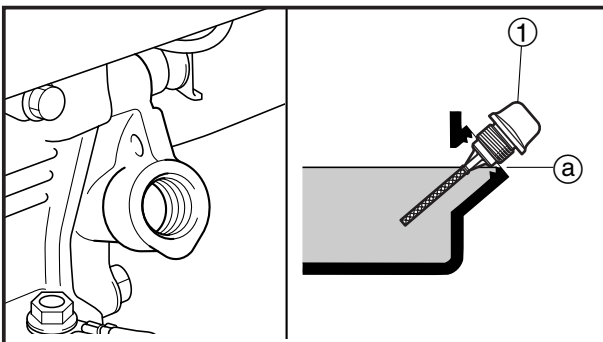
ENGINE OIL LEAKAGE CHECKING

1. Open the oil filler 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

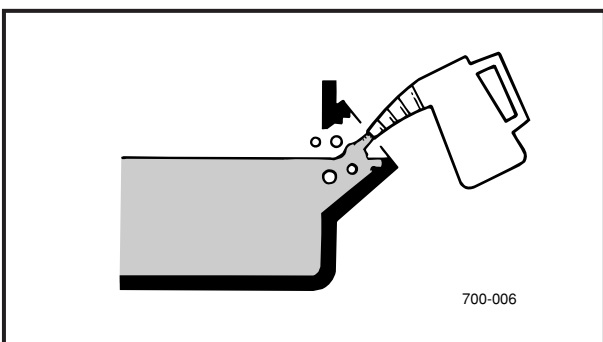
1. Check:
 - Oil level with oil warning light ①
Check whether the oil warning light flashes by operating the recoil starter.
Oil warning light flashes → Add oil.
Oil warning light does not flash → OK

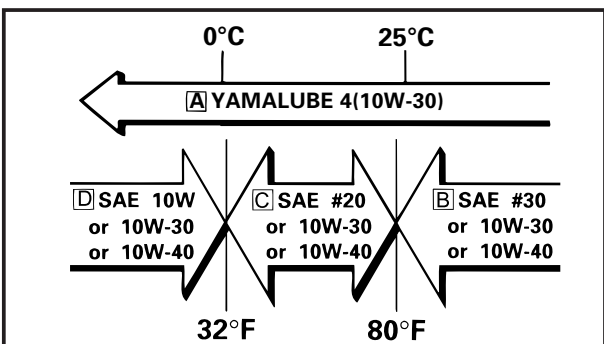
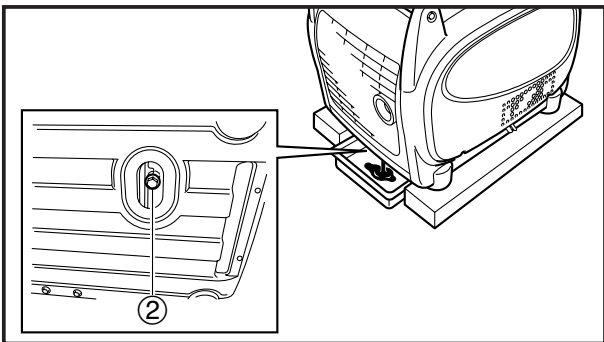
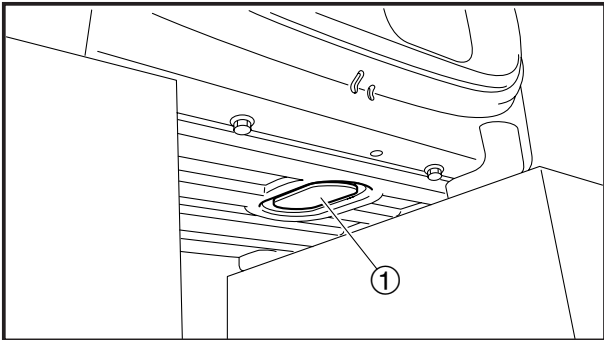
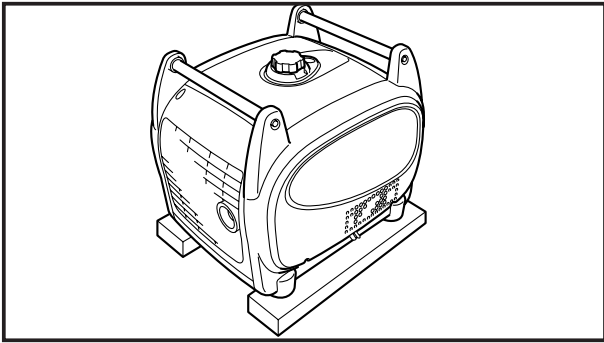


2. Open the oil filler cover.
3. Remove:
 - Oil filler cap ①
4. Check:
 - Check that the engine oil is at the specified level ②.

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 ②. Add oil if necessary.
5. Install:
 - Oil filler cap





OIL REPLACEMENT

1. Warm up the engine for several minutes.
2. Stop the engine and place the stable blocks as shown.


3. Remove:
 - Rubber cover ①

4. Place the oil pan under the engine, and then to drain the oil completely.

5. Tighten:
 - Oil drain bolt ②

6. Remove:
 - Oil filler cap

7. Fill:



Recommended oil:

- A** YAMALUBE 4 (10W-30) or SAE 10W-30 type SE
- B** SAE #30 or 10W-30, 10W-40
- C** SAE #20 or 10W-30, 10W-40
- D** SAE 10W or 10W-30, 10W-40

Engine oil quantity:
0.6 L (0.53 Imp qt, 0.63 US qt)

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

8. Install:
 - Oil filler cap
 - Rubber cover



FUEL LEAKAGE

1. Remove:
 - Rear cover
 - Side cover rightRefer to "COVERS AND FUEL TANK".
2. Check:
 - LeakageCheck at fuel tank, fuel cock, fuel hose, and carburetor.

CAUTION:

Replace hose every four years.

FUEL TANK FILTER

WARNING

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

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

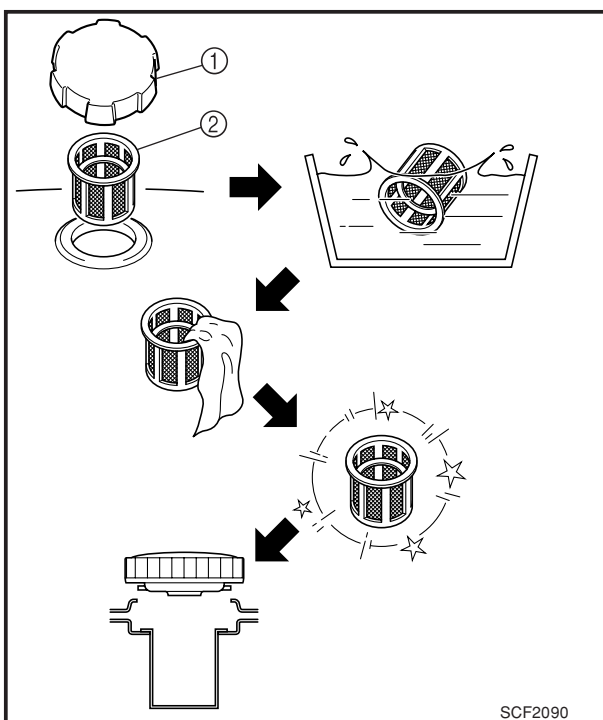
NOTE:

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

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

WARNING

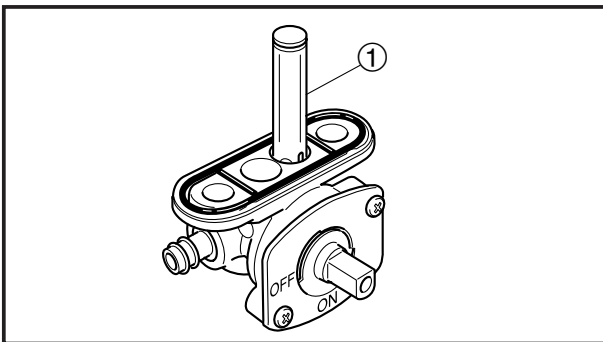
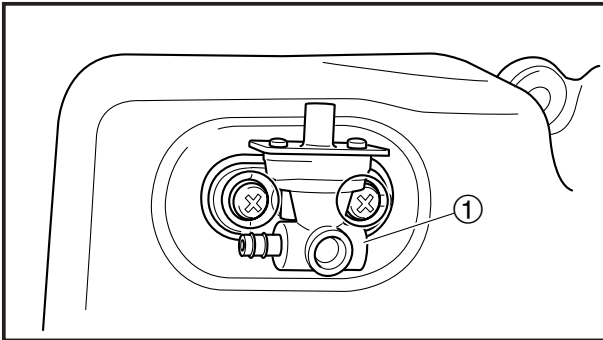
Be sure the tank cap is tightened securely.



FUEL TANK STRAINER

⚠ WARNING

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

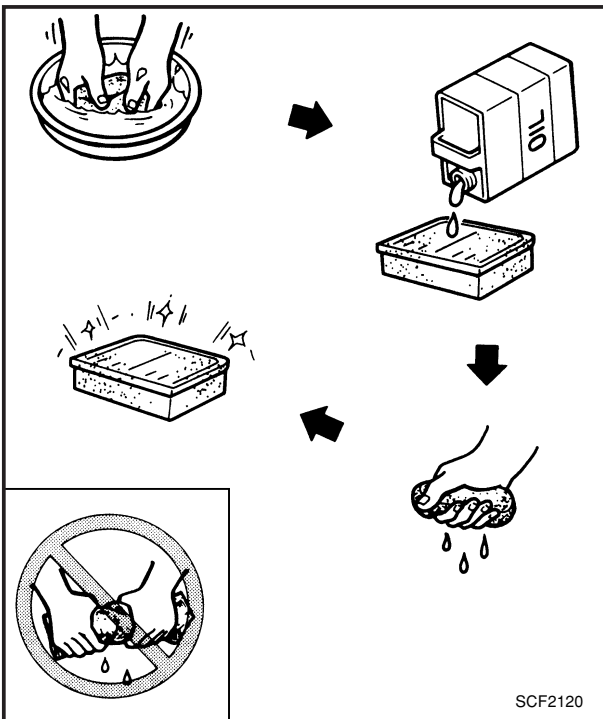
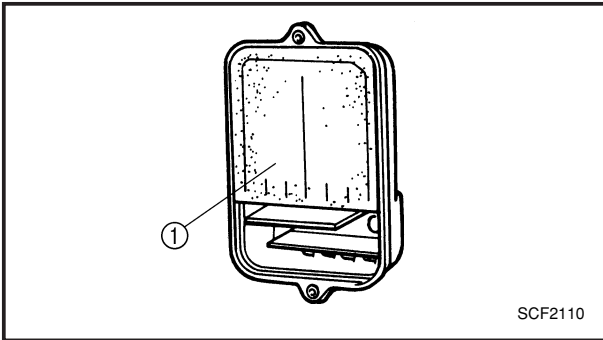
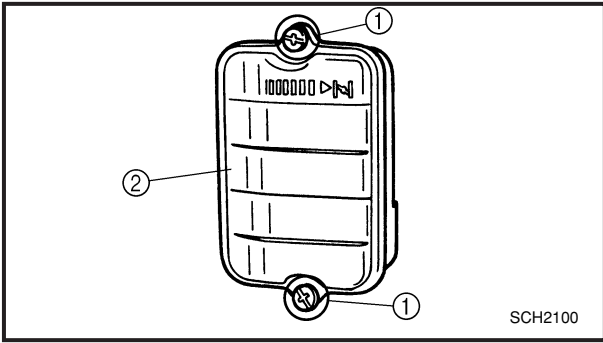


1. Remove:
 - Fuel cock lever
 - Rear cover
 - Fuel tank cap
 - Top cover
 - Side cover right
 - Side cover left
 Refer to "COVERS AND FUEL TANK".
2. Drain the fuel from the fuel tank completely.
3. Remove:
 - Fuel tank
 - Fuel hose
 - Fuel cock ①
4. Inspect:
 - Fuel tank strainer ①
Damage → Replace the fuel cock.
5. Clean:
 - Fuel tank strainer
Damage → Replace the fuel cock.

NOTE:

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

6. Install:
 - Fuel cock
7. Install:
 - Fuel hose
 - Fuel tank
 - Side cover left
 - Side cover right
 - Top cover
 - Fuel tank cap
 - Rear cover
 - Fuel cock lever
 Refer to "COVERS AND FUEL TANK".



AIR CLEANER ELEMENT

CAUTION:

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

1. Remove:

- Side cover right
- Rear cover
- Refer to "COVERS AND FUEL TANK".
- Screw ①
- Air cleaner case cap ②

2. Remove:

- Air cleaner element ①

3. inspect:

- Air cleaner element
- 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, alkaline, or organic solvents.

4. Install:

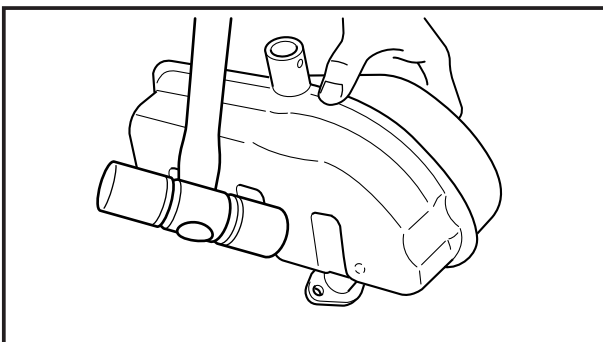
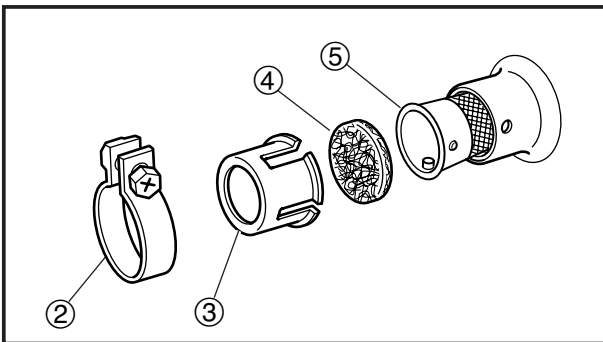
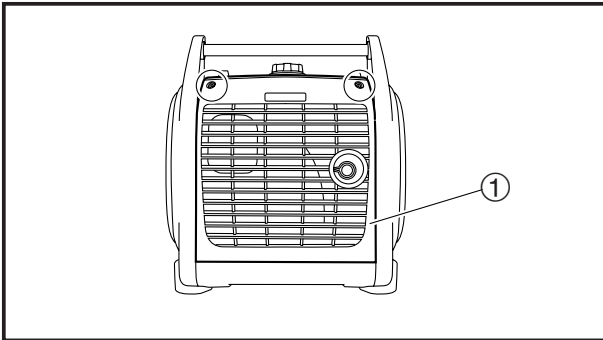
- Air cleaner element
- Air cleaner case cap
- Screw
- Rear cover
- Side cover right
- Refer to "COVERS AND FUEL TANK".

MUFFLER

⚠ WARNING

The engine and muffler will be very hot after the engine has been run.

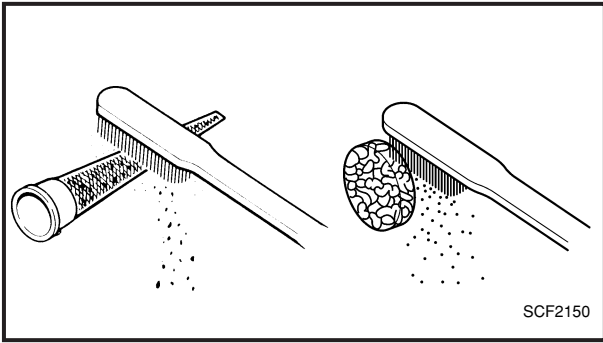
Avoid touching the engine and muffler while they are still hot with any part of your body or clothing during inspection or repair.



1. Remove:
 - Side cover left ①
Refer to “COVERS AND FUEL TANK”.
 - Muffler
Refer to “MUFFLER AND AIR CLEANER” in CHAPTER 3.
 - Muffler band ②
 - Muffler cap ③
 - Muffler screen ④
 - Spark arrester ⑤
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

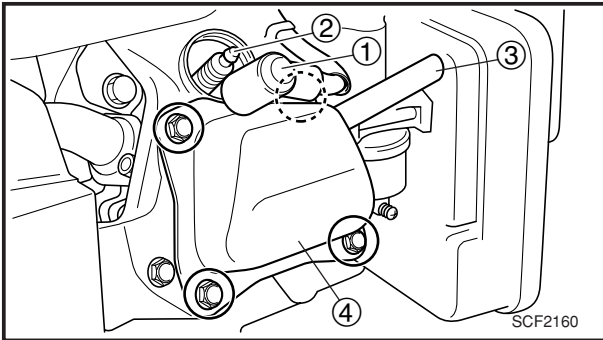
CAUTION: _____

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 AND AIR CLEANER" in CHAPTER 3.
 - Side cover left
Refer to "COVERS AND FUEL TANK".

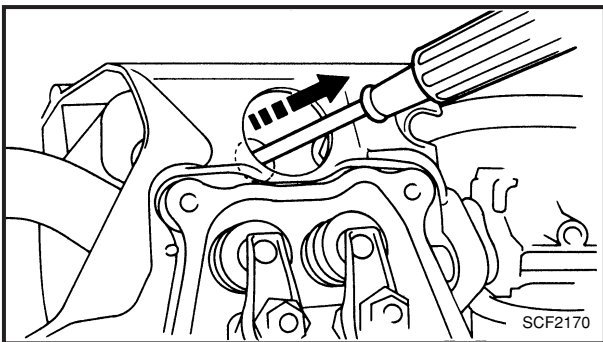
VALVE CLEARANCE ADJUSTMENT

1. Remove:
 - Rear cover
Refer to "COVERS AND FUEL TANK".



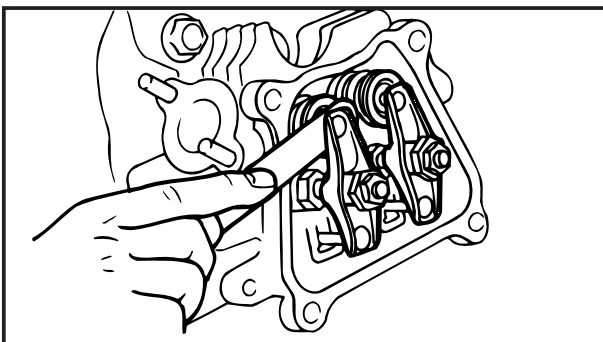
2. Remove:
 - Spark plug cap ①
 - Spark plug ②
 - Breather hose ③
 - Cylinder head cover ④


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.

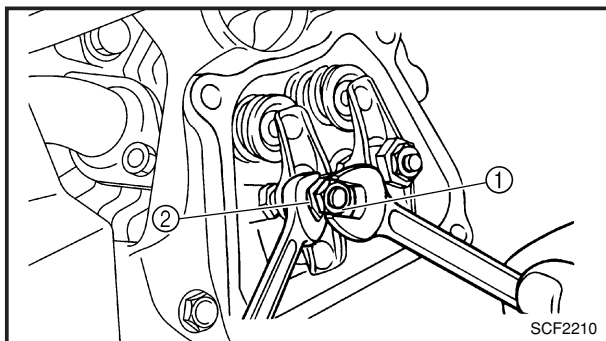
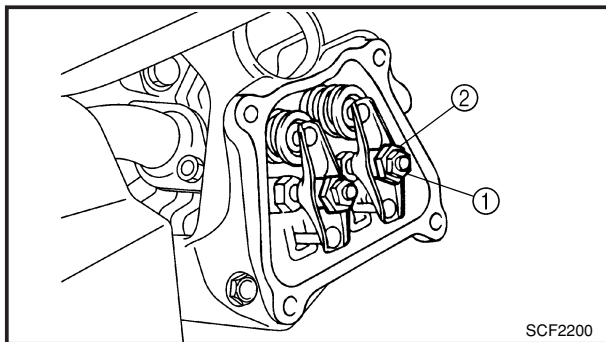


	Intake Valve (cold): 0.1 mm (0.004 in)
	Exhaust Valve (cold): 0.1 mm (0.004 in)

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

VALVE CLEARANCE ADJUSTMENT/ COMPRESSION PRESSURE

**INSP
ADJ**




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 (1).
use hexagonal wrench.

Adjuster	Valve clearance
Turn in	Decrease
Turn out	Increase

 **Locknut:**
10 Nm (1.0 m · kg, 7.2 ft · lb)

6. Install:
- Cylinder head cover gasket **New**
 - Cylinder head cover
 - Breather hose
 - Spark plug
 - Spark plug cap
 - Rear cover
- Refer to "COVERS AND FUEL TANK".

 **Cylinder head cover bolt:**
10 Nm (1.0 m · kg, 7.2 ft · lb)
Spark plug:
18 Nm (1.8 m · kg, 13 ft · lb)

COMPRESSION PRESSURE

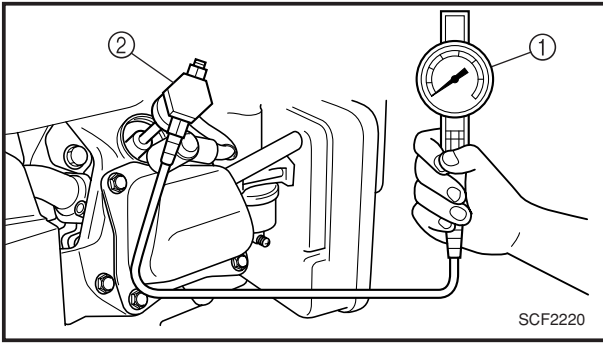
NOTE:

Measure the compression after checking and adjusting the valve clearance.

1. Warm up the engine for several minutes.
2. Remove:
 - Spark plug
3. Remove:
 - Rear cover

Refer to "COVERS AND FUEL TANK".

COMPRESSION PRESSURE



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:
820 ~880 kPa
(8.2 ~8.8 kg/cm² , 119 ~ 128 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	<ul style="list-style-type: none"> • Worn cylinder, piston, and piston ring
If the same as without oil	<ul style="list-style-type: none"> • 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.

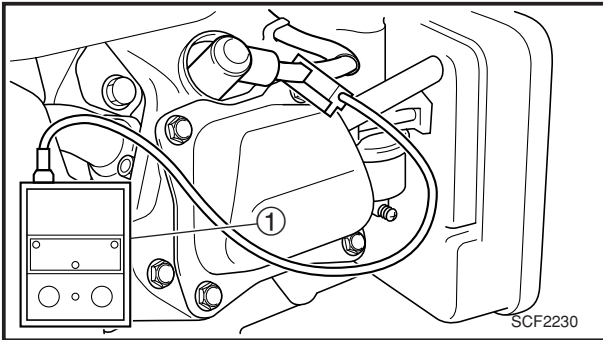
6. Install:
- Spark plug
 - Rear cover
- Refer to "COVERS AND FUEL TANK".



Spark plug:
18 Nm (1.8 m · kg, 13 ft · lb)

RATED ENGINE SPEED/BREATHER HOSE

INSP
ADJ



RATED ENGINE SPEED

1. Remove:
 - Rear cover
Refer to "COVERS AND FUEL TANK".
2. Connect:
 - Inductive tachometer ①



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

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



Rated engine speed:
3,200 r/min

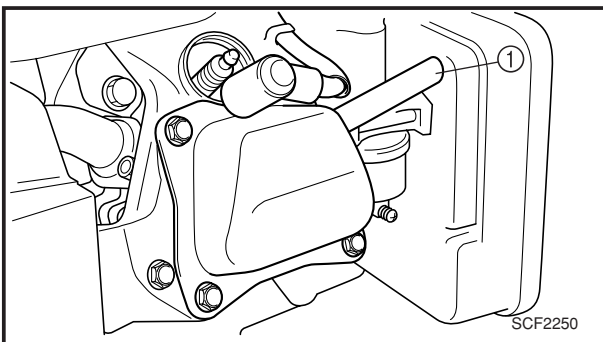
Inspection steps:

- Operate the engine (with no load).
- Measure the engine speed.



Engine speed:
2,600 r/min

4. Install:
 - Rear cover
Refer to "COVERS AND FUEL TANK".



BREATHER HOSE

1. Remove:
 - Rear cover
Refer to "COVERS AND FUEL TANK".
2. Inspect:
 - Breather hose ①
Cracks/damage → Replace.
Poor connection → Correct.
3. Install:
 - Rear cover
Refer to "COVERS AND FUEL TANK".

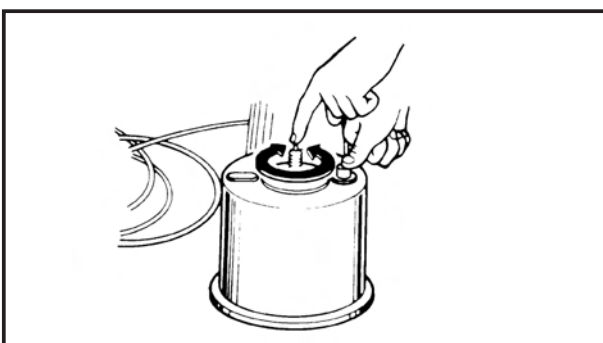
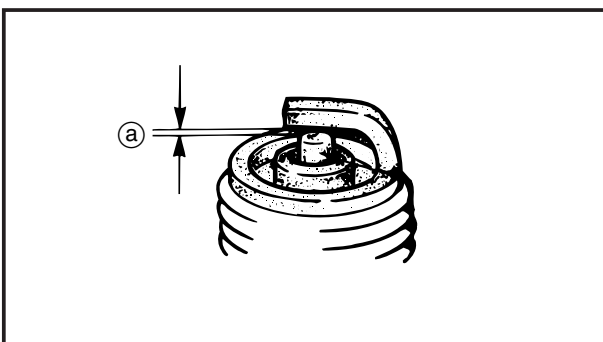
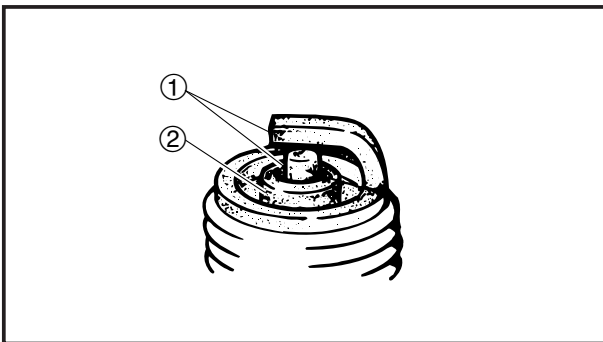
ELECTRICAL
SPARK PLUG

⚠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.

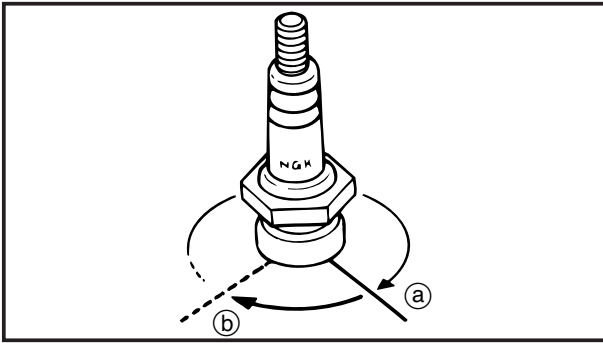


1. Remove:
 - Rear cover
Refer to “COVERS AND FUEL TANK”.
2. Remove:
 - Spark plug cap
 - Spark plug
3. Inspect:
 - Electrode ①
Wear/damage → Replace.
 - Insulator color ②
4. Measure:
 - Spark plug gap ③
Use a wire gauge or thickness gauge.
Out of specification → Regap.
If necessary, clean the spark plug with a spark plug cleaner.

	<p>Spark plug gap: 0.7 ~ 0.8 mm (0.028 ~ 0.031 in) Standard spark plug (with resistor): BPR4ES (NGK)</p>
---	---

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

SPARK PLUG/ENGINE SWITCH



5. Tighten:
 - Spark plug

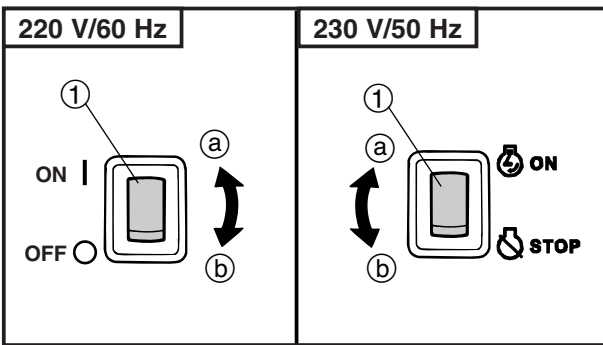
NOTE:

To prevent thread damage, temporarily tighten (a) the spark plug before tightening it to the specified torque (b).

	Spark plug: 18 Nm (1.8 m · kg, 13 ft · lb)
---	---

6. Install:
 - Rear cover

Refer to “COVERS AND FUEL TANK”.

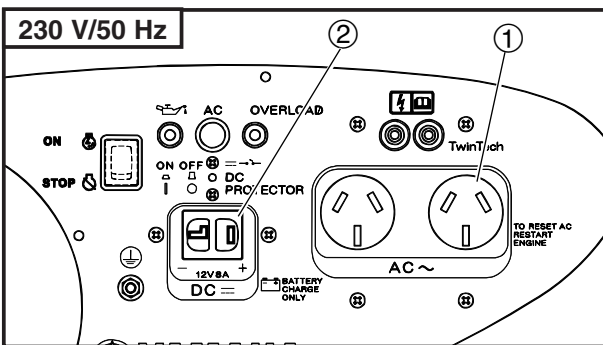
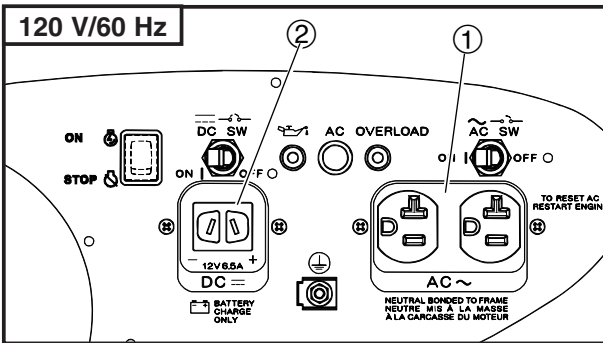
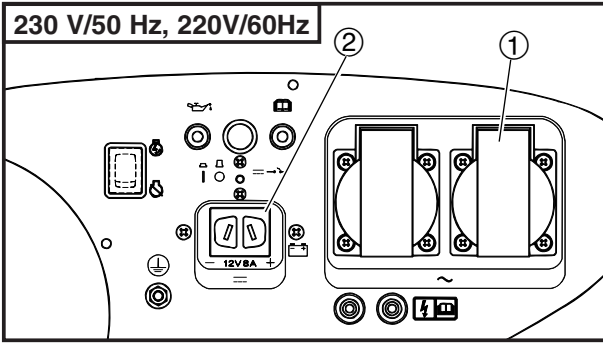


ENGINE SWITCH

1. Check:
 - Engine switch (1)

Checking steps:

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



RECEPTACLE

1. Check:

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

① : 8.7 A

② : 12 V, 8 A

For GERMANY

① : 9.1 A

② : 12 V, 8 A

For KOREA

① : 16.7 A

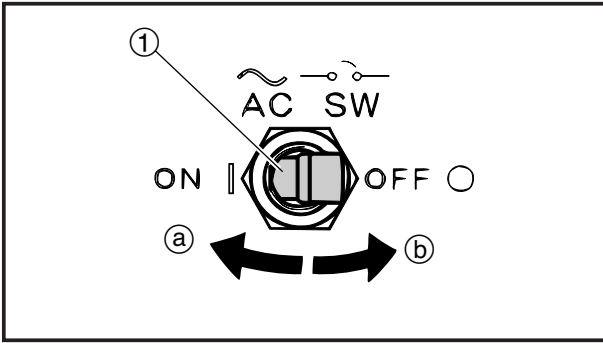
② : 12 V, 6.5 A

For CANADA

① : 8.7 A

② : 12 V, 8.7 A

For AUSTRALIA



AC SWITCH (NFB For CANADA)

1. Set the AC switch (NFB) ① to the “ON” ① 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).



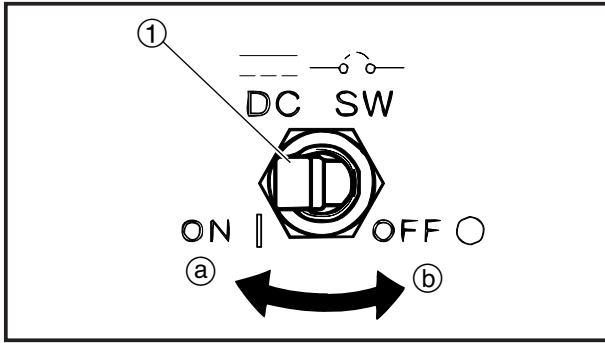
Pocket tester:

YU-03112, 90890-03112

Digital circuit tester:

90890-03174

3. Set the AC switch (NFB) ① to the “OFF” ② 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” ①a.
- 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.



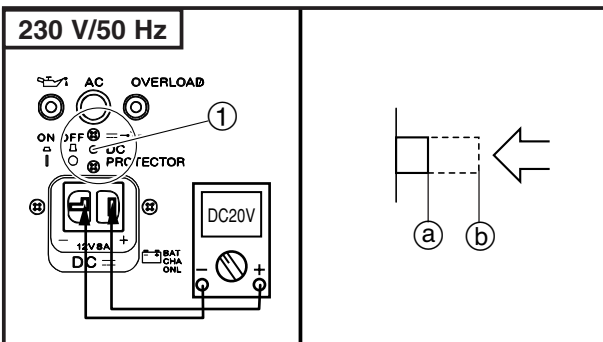
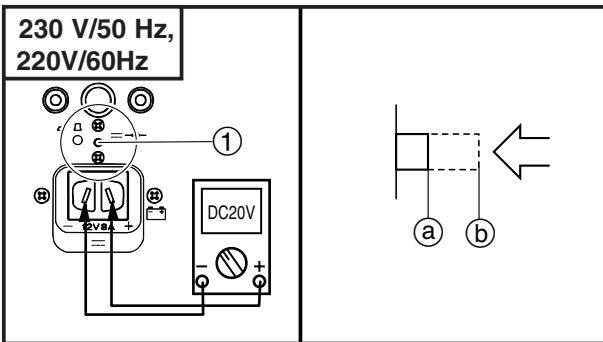
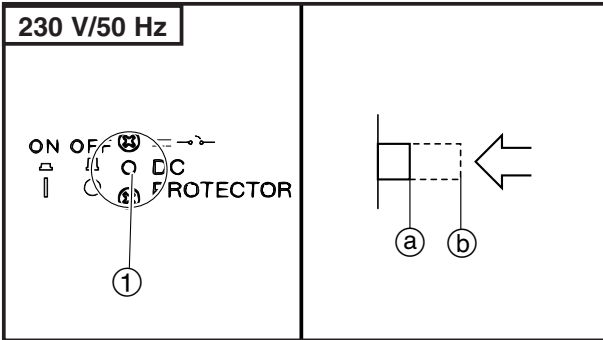
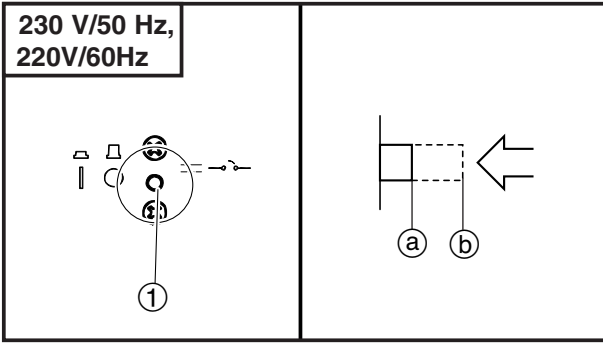
DC voltage:

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

- Set the DC switch ① to “OFF” ①b.
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” ①.
- Connect the pocket tester (DC 20 V).

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

- Start the engine.
- Measure the DC voltage.

	DC voltage: More than 12 V at 2,600 r/min (with no load at AC output current)
---	--

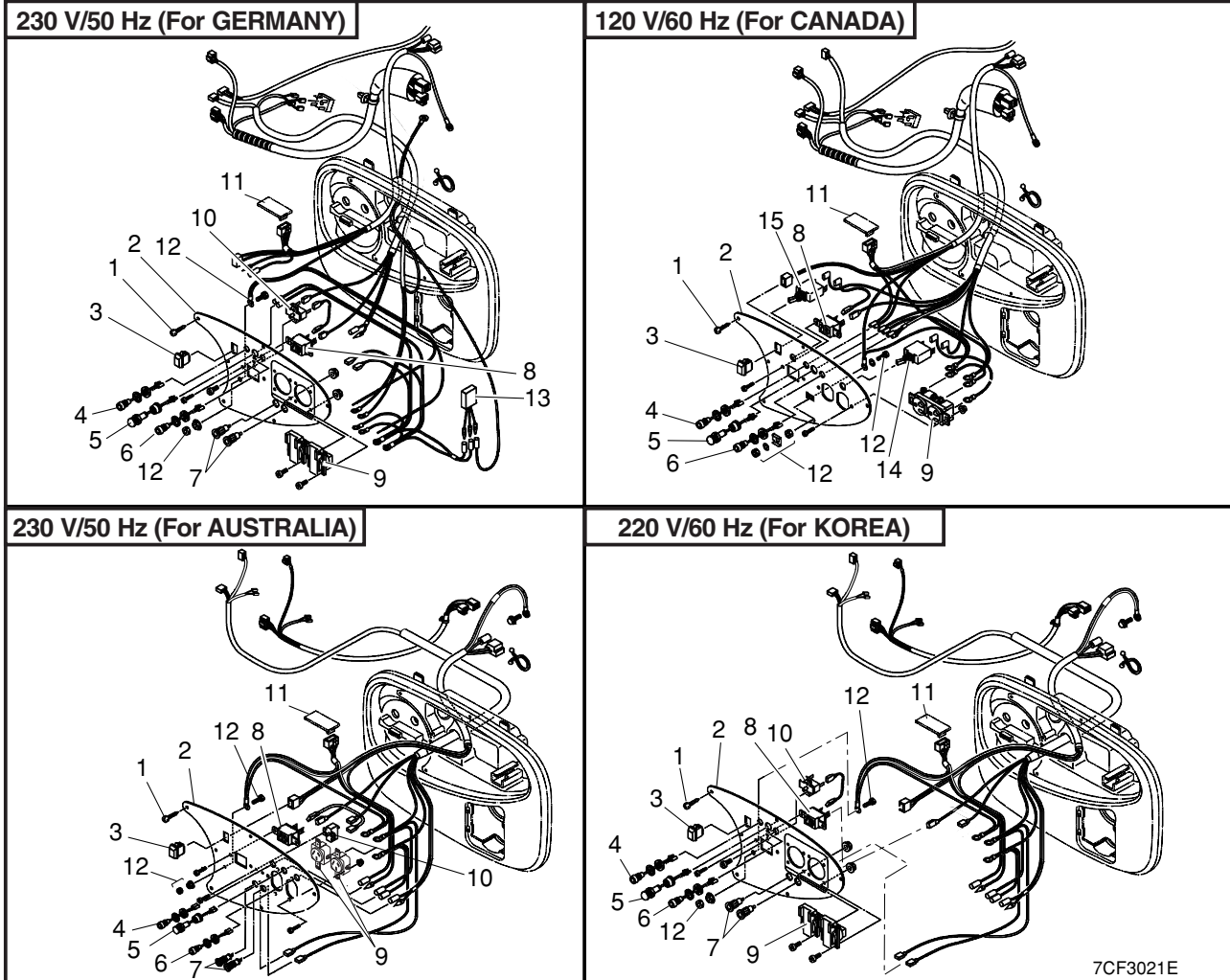
- Set the reset button to “OFF” ②.
Voltage is zero → OK

NOTE: _____
 If the reset button pop out (“OFF”) again, refer to “GENERATOR SYSTEM” in CHAPTER 5.



ENGINE

CONTROL BOX
CONTROL BOX DISASSEMBLY

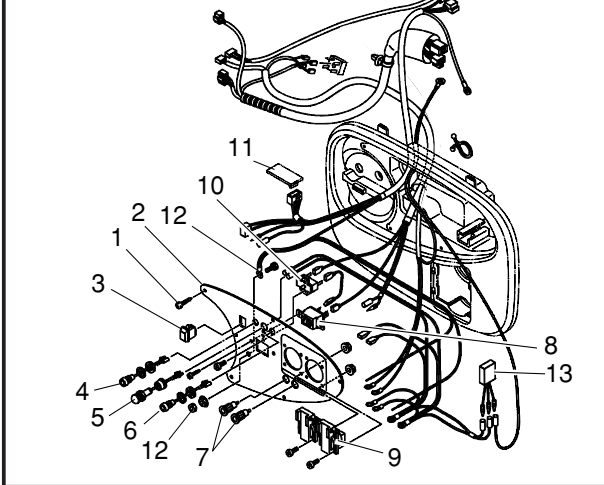


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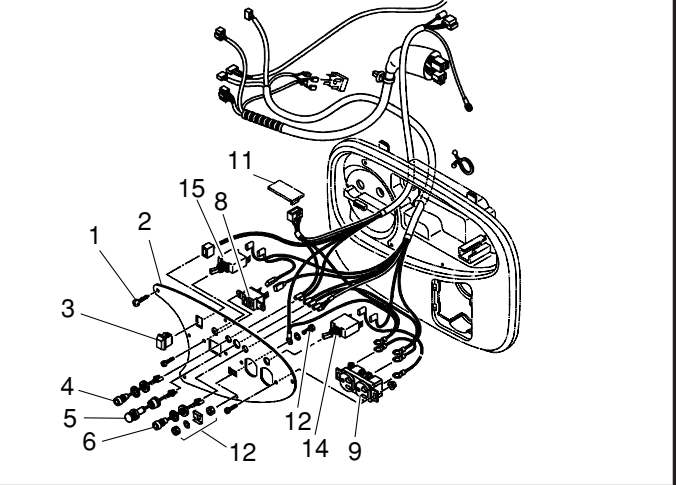
Order	Job name	Q'ty	Remarks
	Control box disassembly		Remove the parts in the order listed below.
	Front cover and rear cover		Refer to "COVERS AND FUEL TANK" section in CHAPTER 2.
1	Tapping screw	6	
2	Plate assembly	1	Disconnect.
3	Engine switch	1	Disconnect.
4	Oil warning light (red)	1	Disconnect.
5	Pilot light (green)	1	Disconnect.
6	Over load warning light (red)	1	Disconnect.
7	Terminal	2	Except for CANADA
8	DC receptacle	1	Disconnect.
9	AC receptacle	1	Disconnect.
10	DC circuit breaker	1	Disconnect.



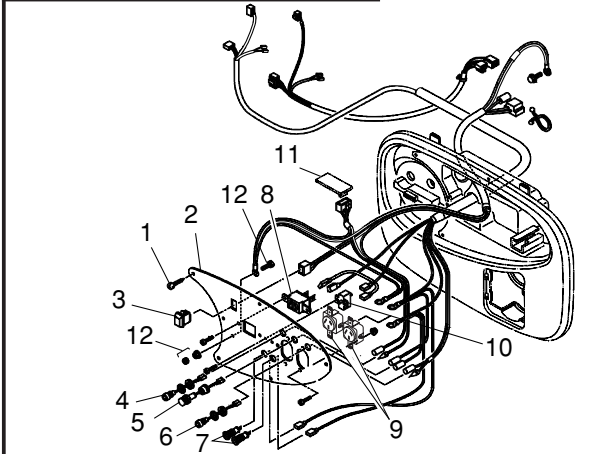
230 V/50 Hz (For GERMANY)



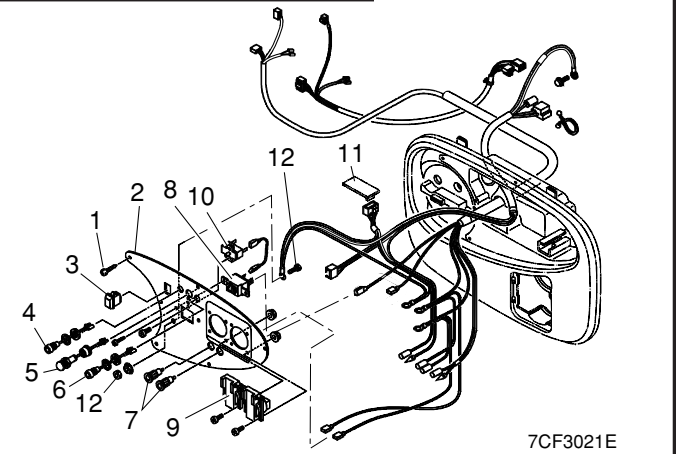
120 V/60 Hz (For CANADA)



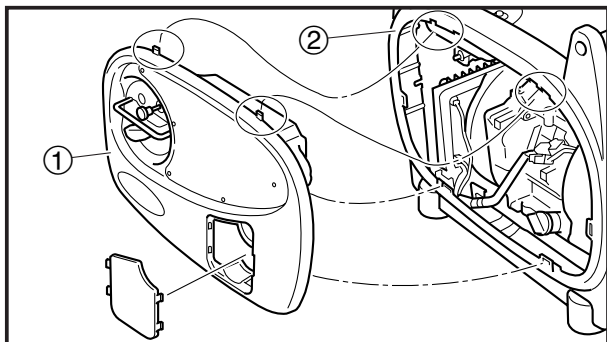
230 V/50 Hz (For AUSTRALIA)



220 V/60 Hz (For KOREA)



Order	Job name	Q'ty	Remarks
11	Speed limiter	1	Disconnect.
12	Earth terminal	1	Disconnect.
13	Noise filter	1	For GERMANY
14	AC switch (NFB)	1	For CANADA
15	DC switch (NFB)	1	For CANADA
For assembly, reverse the disassembly procedure.			

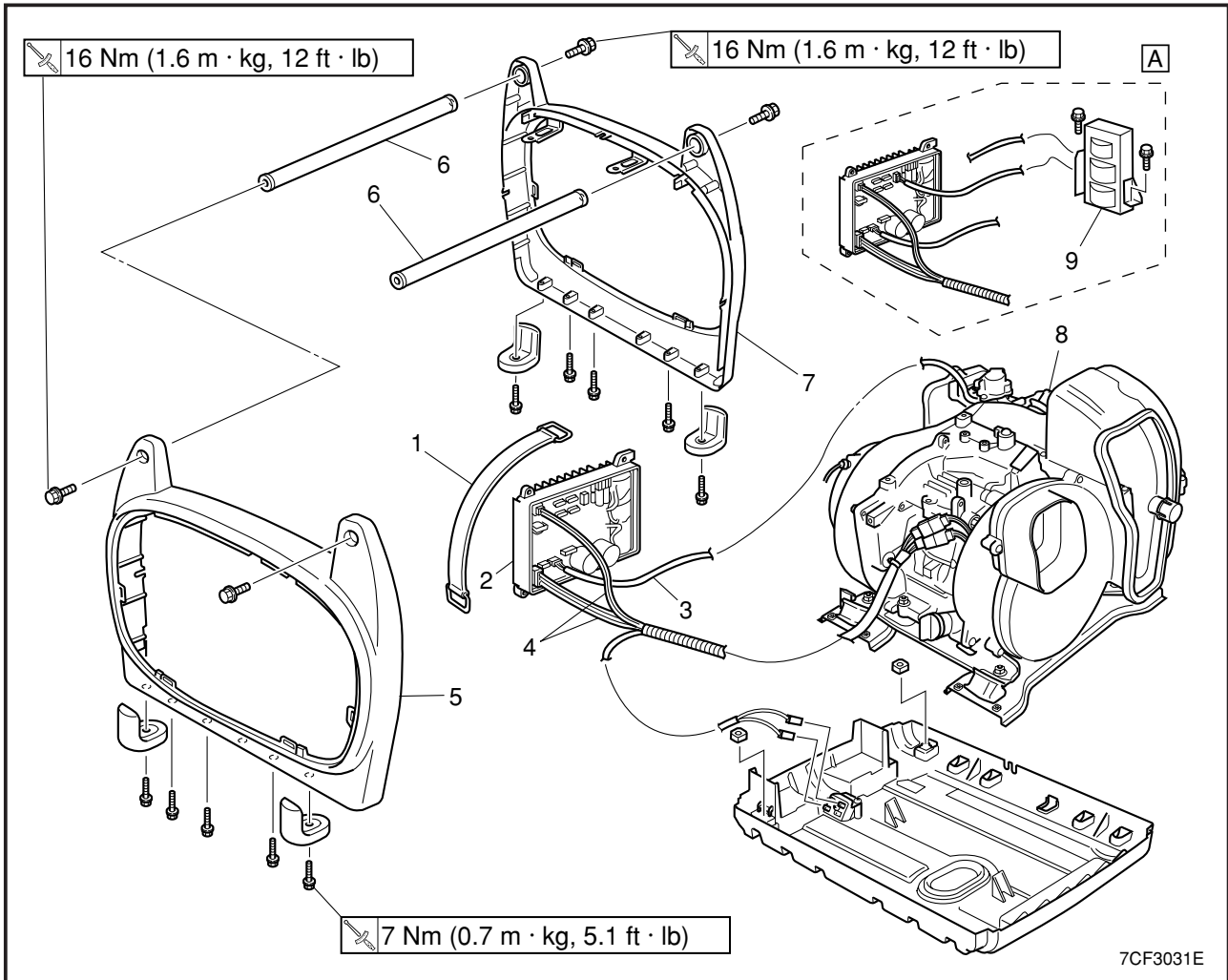
**CONTROL BOX ASSEMBLY**

- 1 Install:
- Control box ①

NOTE: _____
Insert the rid of control box to the frame ②.



ENGINE



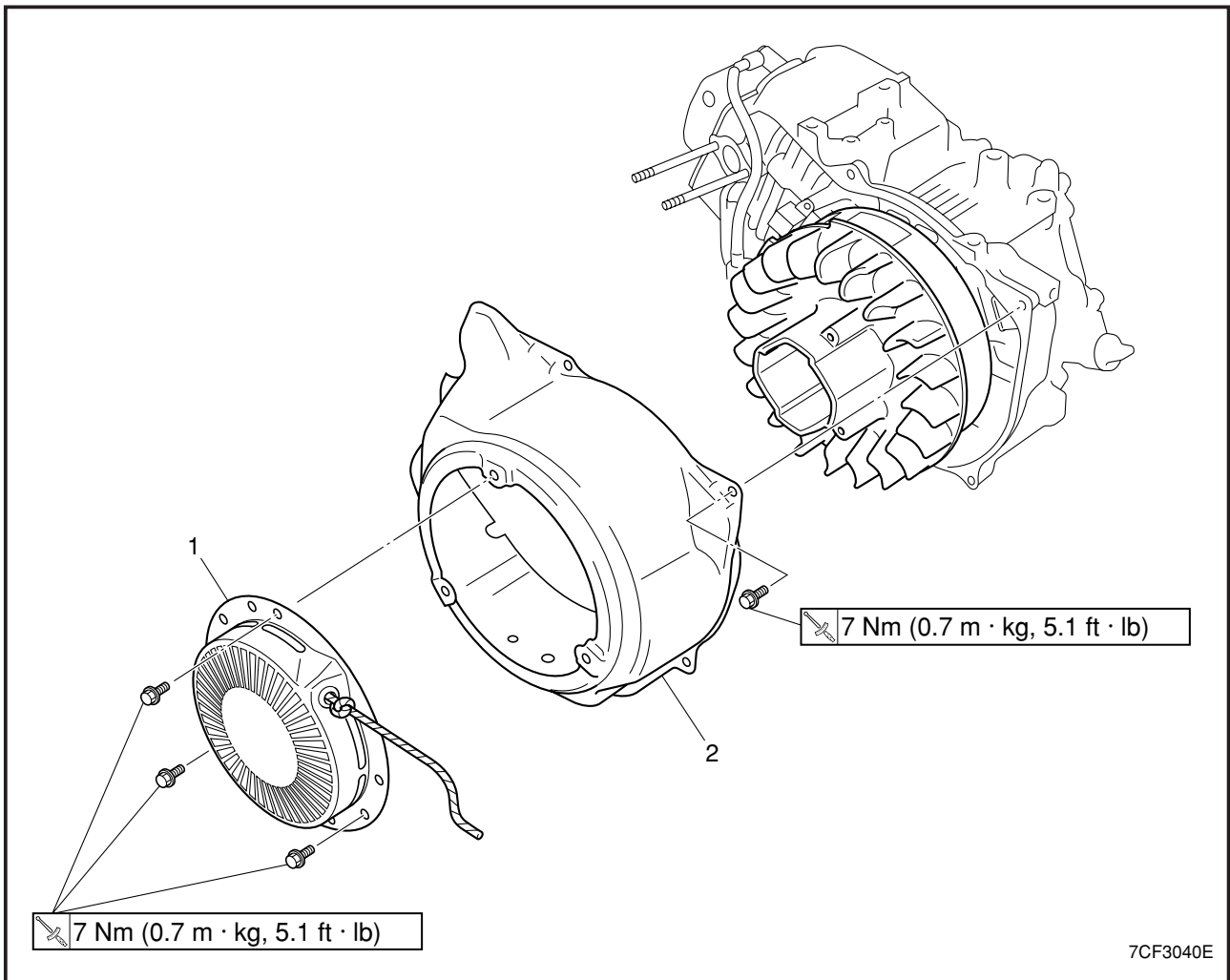
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Order	Job name	Q'ty	Remarks
	Engine removal		Remove the parts in the order listed below.
	Front cover, rear cover, side covers and fuel tank		Refer to "COVERS AND FUEL TANK" section in CHAPTER 2.
1	Band	1	
2	Control unit	1	
3	Throttle control motor wire coupler	1	Disconnect.
4	Generator lead wire couplers	1	Disconnect.
5	Front frame	1	
6	Handle	2	
7	Rear frame	1	
8	Engine assembly	1	
9	Noise filter	1	For GERMANY For installation, reverse the removal procedure.

A): For GERMANY



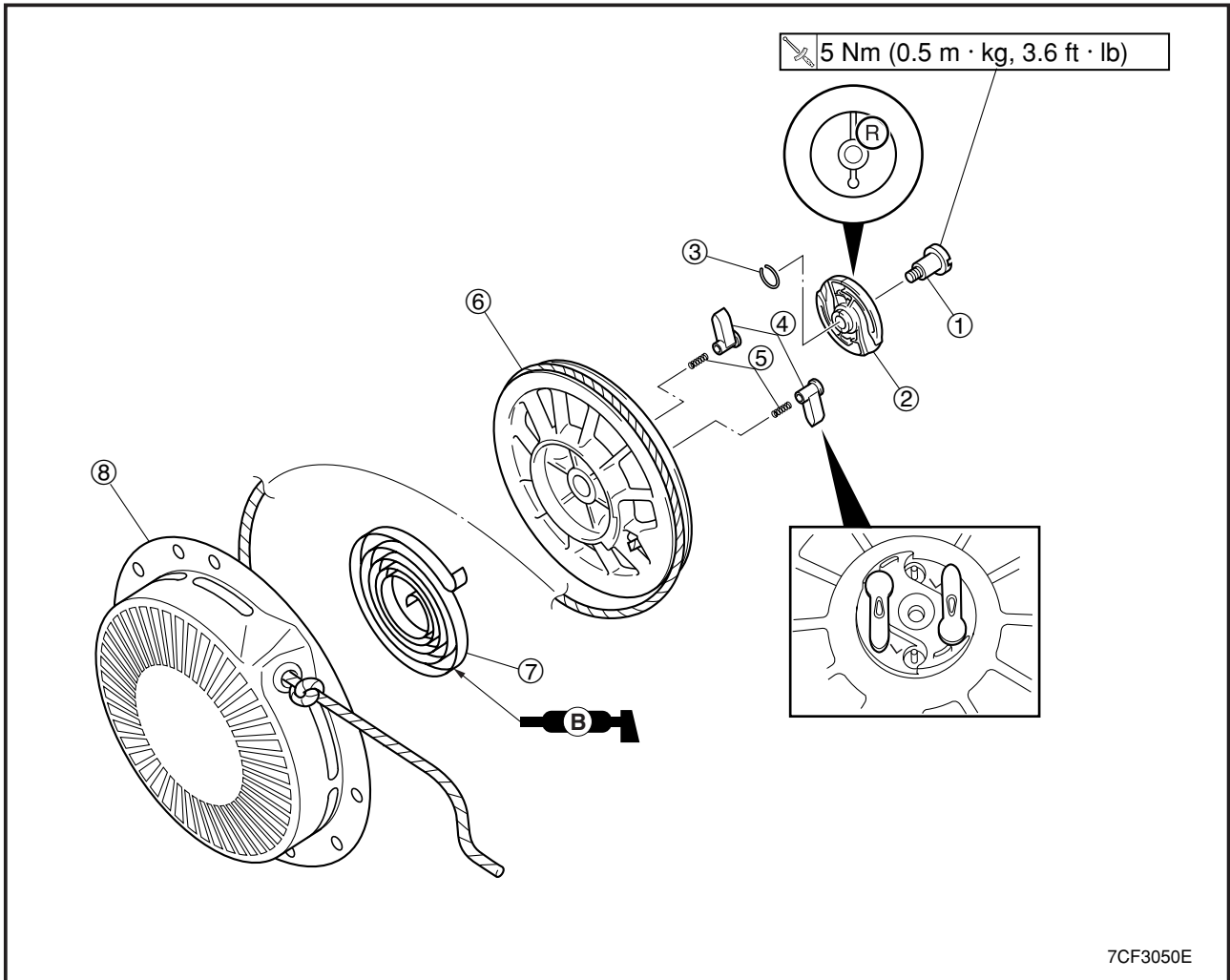
RECOIL STARTER



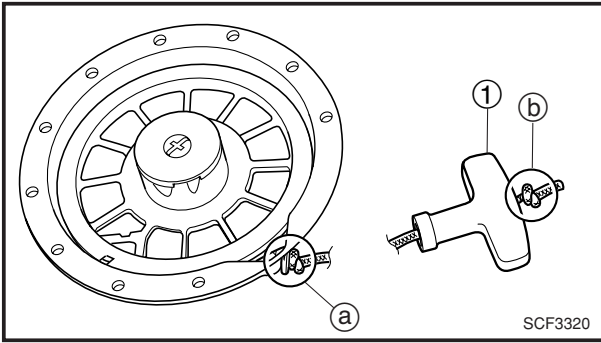
7CF3040E

Order	Job name	Q'ty	Remarks
	Recoil starter removal		Remove the parts in the order listed below.
	Front cover, rear cover and side covers and fuel tank		Refer to "COVERS AND FUEL TANK" section in CHAPTER 2.
	Carburetor		Refer to "CARBURETOR" section in CHAPTER 4.
1	Recoil starter assembly	1	
2	Fan case cover	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	Bolt	1	
②	Drive plate	1	
③	Clip	1	
④	Drive pawl	2	
⑤	Spring	2	
⑥	Sheave drum	1	
⑦	Starter spring	1	
⑧	Starter case	1	
			For disassembly, reverse the assembly procedure.

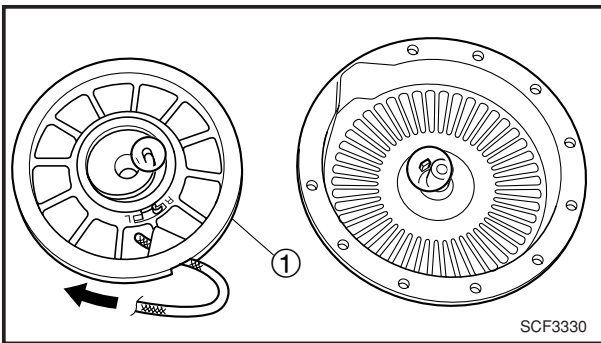


RECOIL STARTER DISASSEMBLY

1. Remove:
 - Starter handle ①

NOTE:

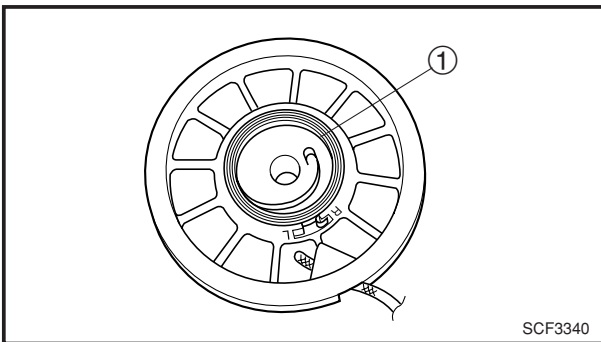
Make a knot (a) at the end of the starter rope to prevent the rope from being retracted into the starter case. Then, undo the knot (b) at the starter handle to remove the starter handle ①.



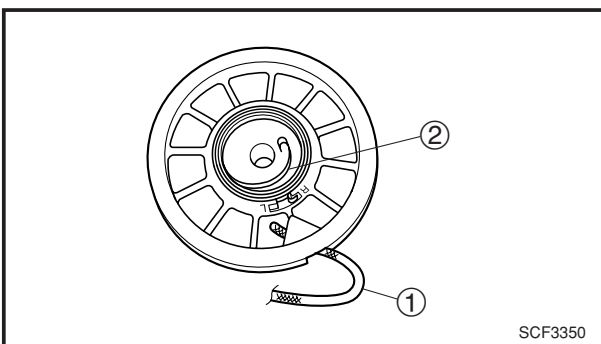
2. Remove:
 - Drum sheave ①

CAUTION:

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

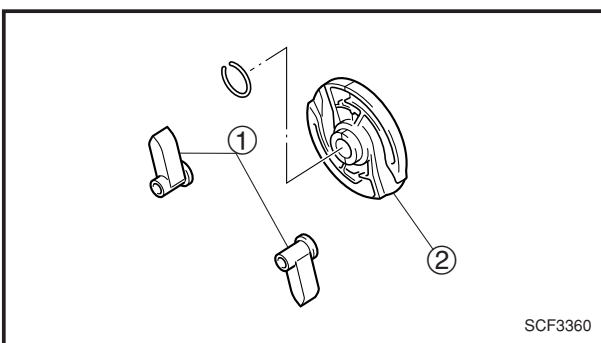


3. Remove:
 - Spiral spring ①

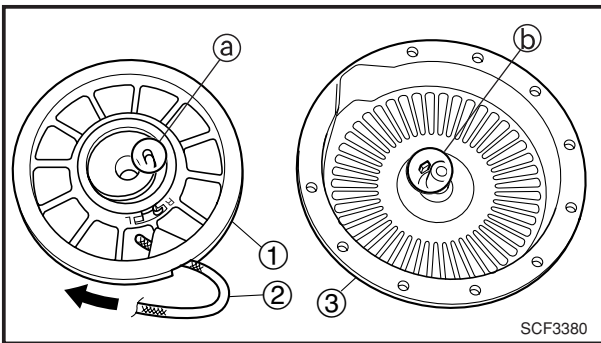
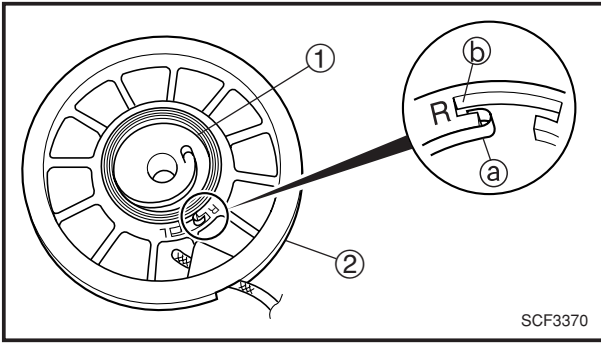


RECOIL STARTER INSPECTION

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



3. Inspect:
 - Drive pawl ①
 - Drive plate ②
Wear/damage → Replace.



RECOIL STARTER ASSEMBLY

1. Install:

- Starter spring ①
 - Sheave drum ②
- install the swing arm to the collar.

NOTE:

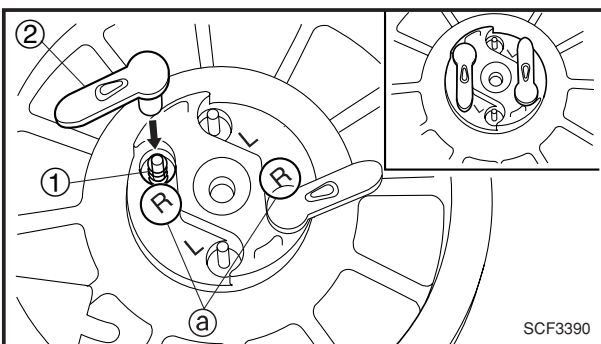
Engage starter spring outer hook (a) with groove (b) marked "R" on the sheave drum (2). Carefully wind the spring counterclockwise and place it on the sheave drum (2).

2. Install:

- Sheave drum ①
- Starter rope ②
- Starter case ③

NOTE:

- Wind the starter rope (2) clockwise two turns on the sheave drum (1).
- Engage starter spring inner hook (a) with the strut (b) of the starter case (3) and install the parts.

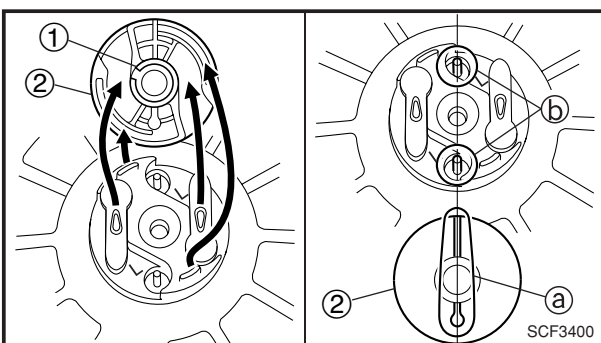


3. Install:

- Spring ①
- Drive pawl ②

NOTE:

Install the spring (1) and drive pawl (2) to the "R" mark (a).

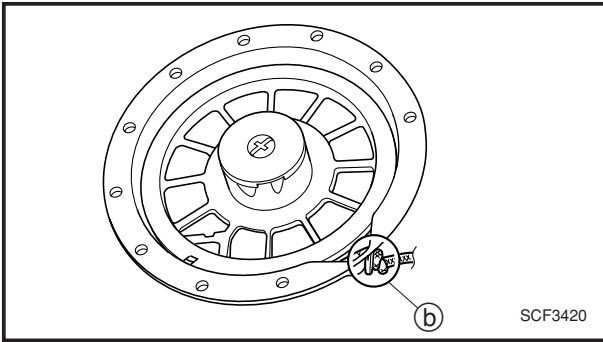
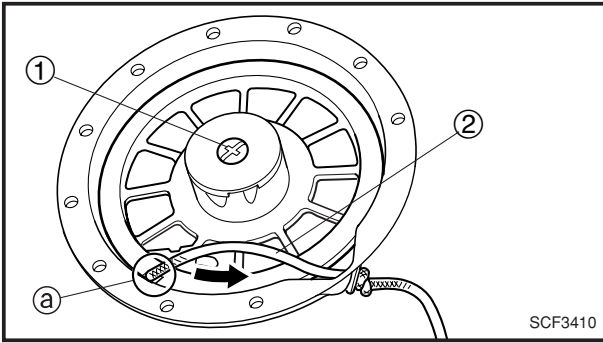


4. Install:

- Clip ①
- Drive plate ②


NOTE:

Align the groove (a) of the drive plate (2) with the sheave drum strut (b), and then install the parts.



5. Install:

- Bolt ①

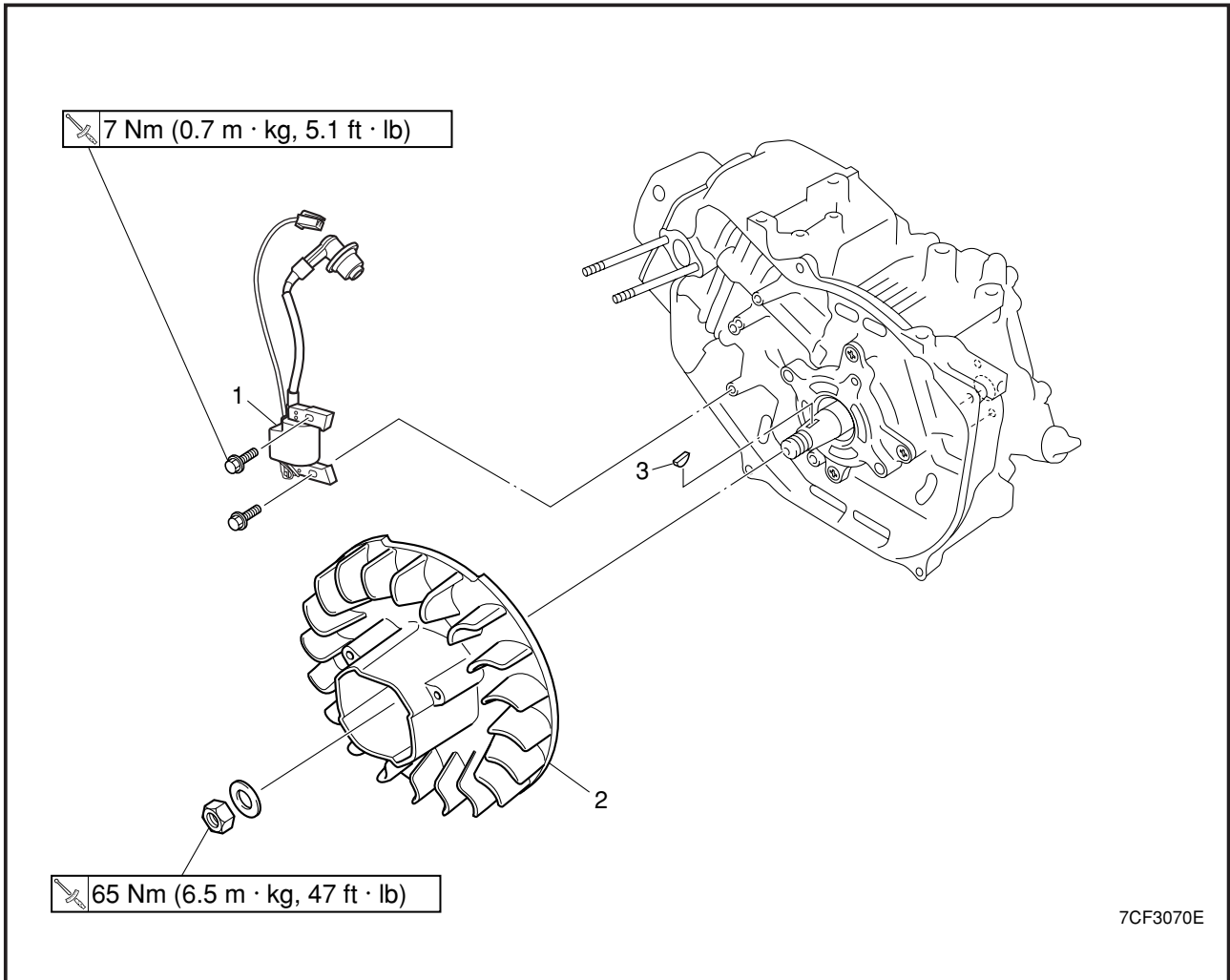
 5 Nm (0.5 m · kg, 3.6 ft · lb)

After tightening the bolt, place starter rope ② in the cut-out ① in the sheave drum, and wind it counterclockwise four turns.

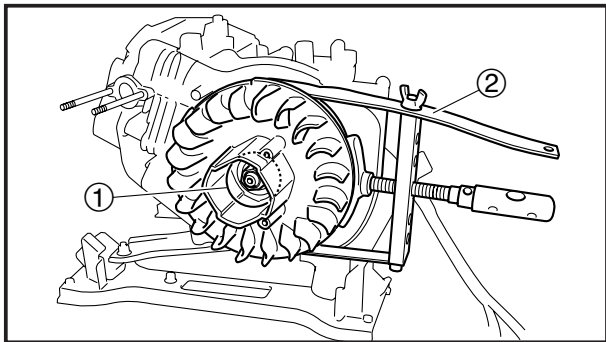
NOTE:

Make a knot ② at the end of the starter rope to prevent the rope from being retracted into the recoil starter case.

IGNITION COIL AND ROTOR



Order	Job name	Q'ty	Remarks
	Ignition coil and rotor removal		Remove the parts in the order listed below.
	Engine assembly		Refer to "ENGINE".
	Spark plug cap		Refer to "ENGINE".
	Recoil starter, fan case		
1	Ignition coil	1	
2	Rotor	1	
3	Woodruff key	1	
			For installation, reverse the removal procedure.



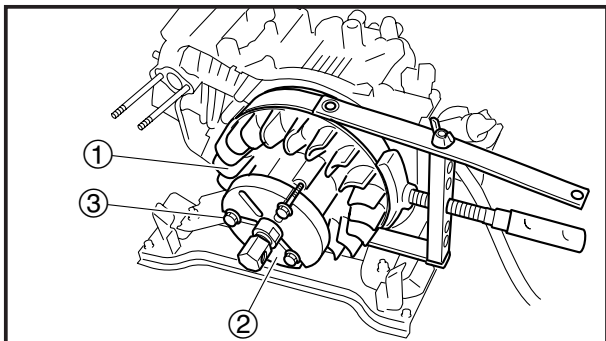
IGNITION COIL AND ROTOR REMOVAL

1. Remove:

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



Sheave holder:
YS-01880, 90890-01701

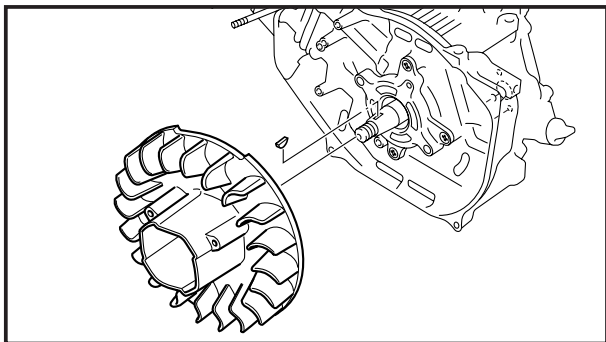


2. Remove:

- Rotor ①
use the rotor puller ②, bolt ③.



Rotor puller:
YU-33270, ② 90890-03162
③ 90890-01355 (M6)



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.

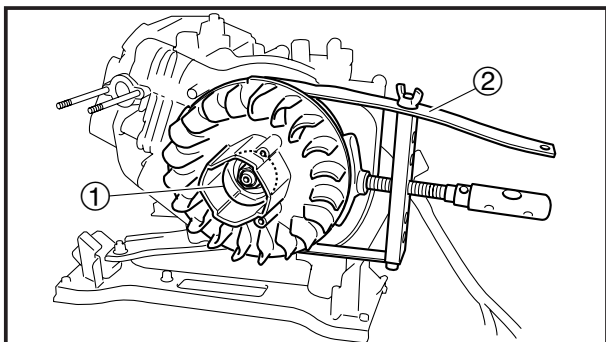
1. Install:

- Woodruff key
- Rotor
- Rotor nut ①
use the sheave holder ②.

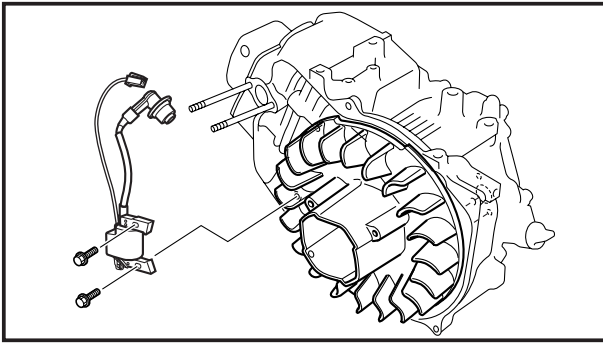
65 Nm (6.5 m · kg, 47 ft · lb)

NOTE:


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

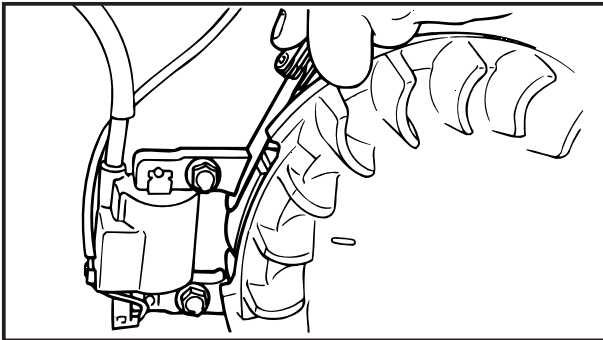


Sheave holder:
YS-01880, 90890-01701



2. Install:
- Ignition coil

 **10 Nm (1.0 m · kg, 7.2 ft · lb)**



3. Inspection:
- Air gap
inspect the clearance between the magneto on the rotor and ignition coil.



Air gap:

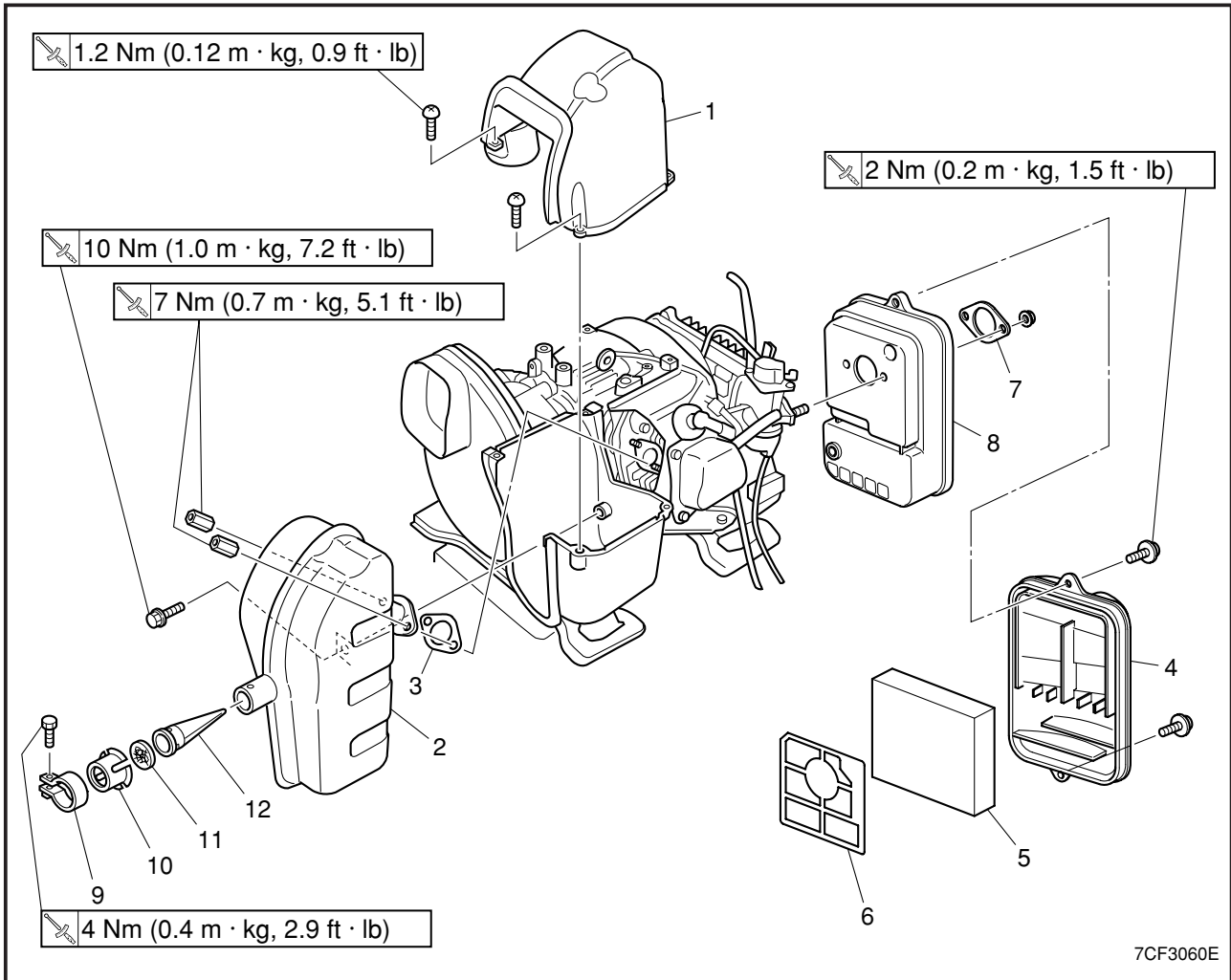
0.5 ± 0.1 mm

(0.02 ± 0.004) in

Out of specification → Replace.

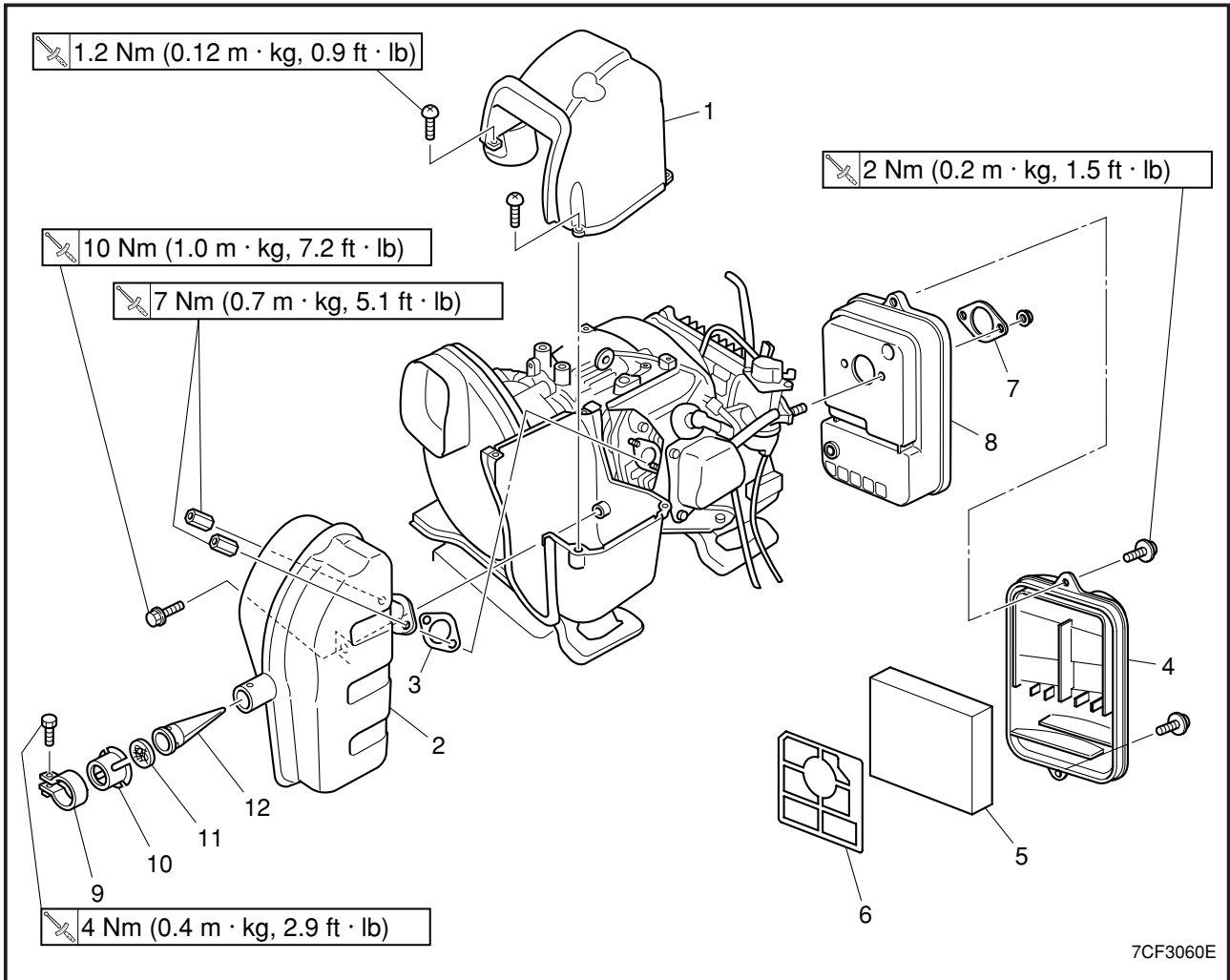


MUFFLER AND AIR CLEANER

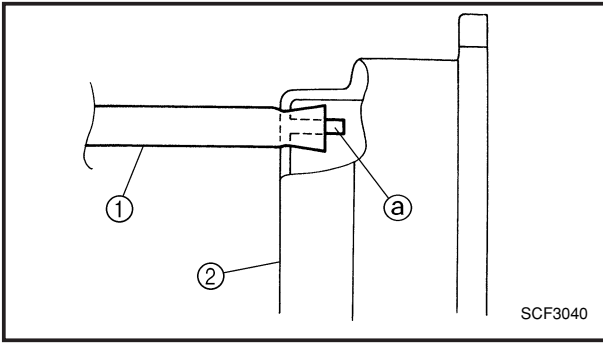


7CF3060E

Order	Job name	Q'ty	Remarks
	Muffler and air cleaner removal		Remove the parts in the order listed below.
	Front cover, rear cover, side covers and fuel tank		Refer to "COVERS AND FUEL TANK" section in CHAPTER 2.
	Front and rear flame		Refer to "ENGINE".
	Carburetor		Refer to "CARBURETOR" section in CHAPTER 4.
1	Exhaust cover	1	
2	Muffler assembly	1	
3	Gasket	1	
4	Air cleaner case cap	1	
5	Element	1	
6	Metal gasket	1	
7	Plate	1	
8	Air cleaner case	1	



Order	Job name	Q'ty	Remarks
9	Silencer band	1	For installation, reverse the removal procedure.
10	Cap	1	
11	Muffler screen	1	
12	Spark arrester	1	

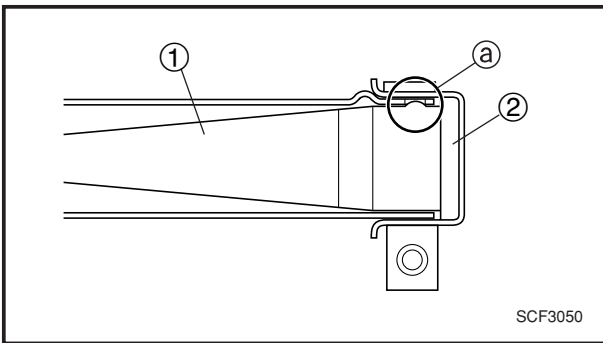


BREATHER HOSE INSTALLATION

1. Install:
 - Breather hose ①
 - Air filter case ②

NOTE:

Contact the end of the breather hose ① to the stopper ① to the stopper ① of the air filter case ②.



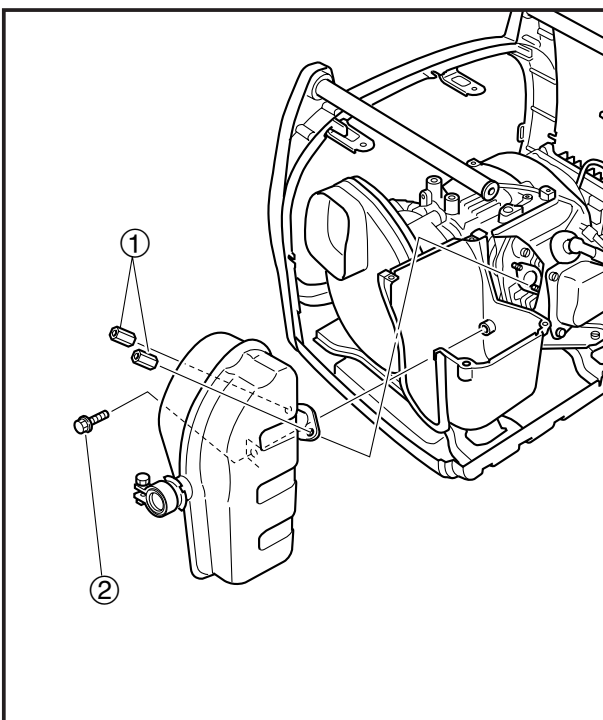
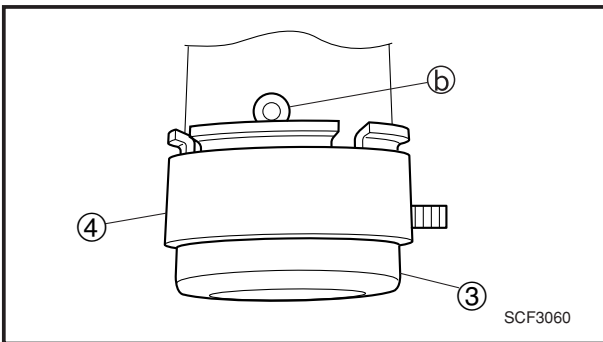
MUFFLER ASSEMBLY

1. Install:
 - Spark arrester ①
 - Muffle screen ②
 - Muffle cap ③
 - Muffle band ④

4 Nm (0.4 m · kg, 2.9 ft · lb)

NOTE:

- Align the protrusion ① located outside the spark arrester with the upper hole in the tail pipe.
- Align the rim of the muffle cap ③ with the protrusion ② of the tail pipe.
- Contact the protrusion against the rim of the muffle cap ③, without allowing it to enter the slit.



2. Install:

- Muffer nuts ①

7 Nm (0.7 m · kg, 5.1 ft · lb)

- Muffer bolt ②

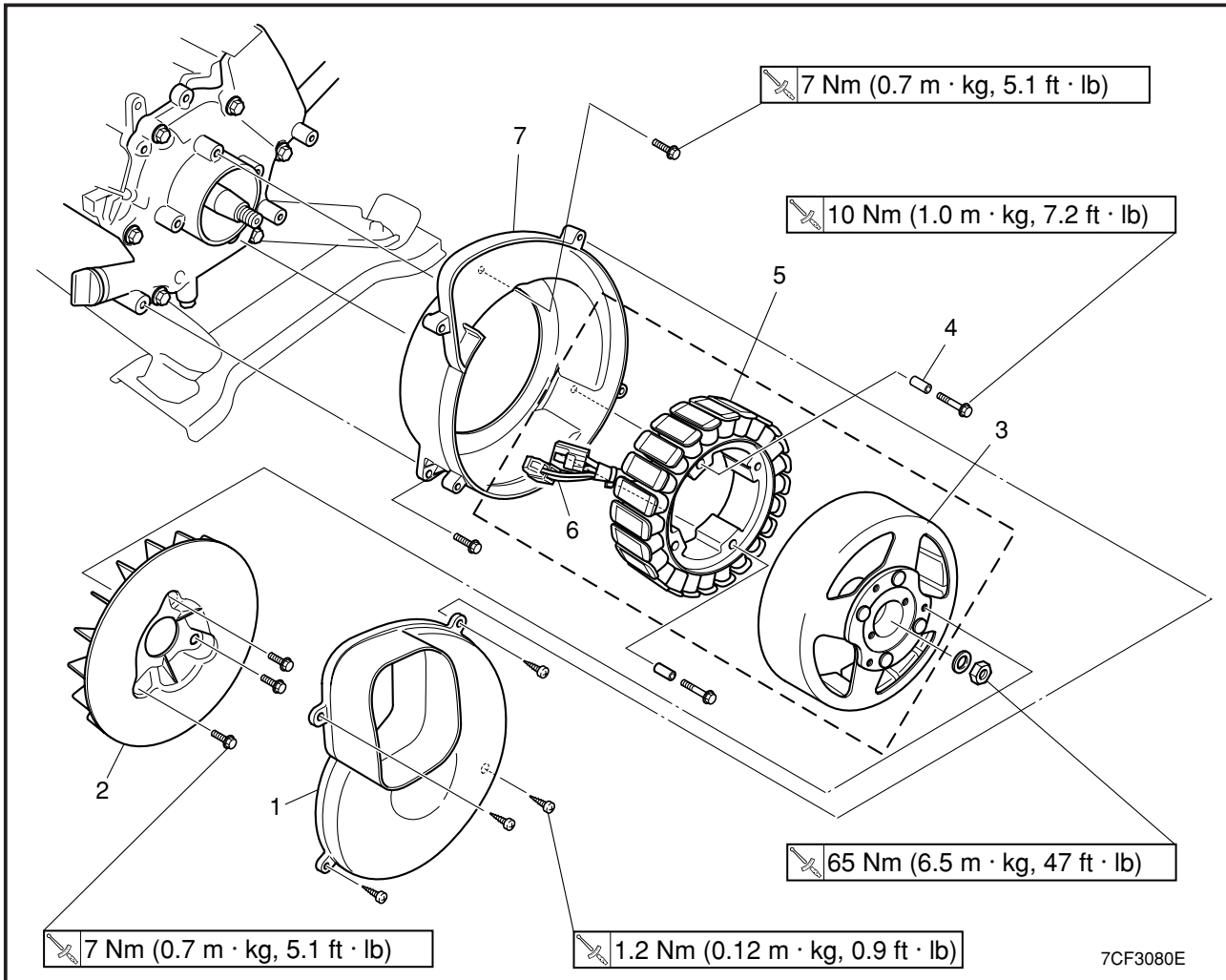
10 Nm (1.0 m · kg, 7.2 ft · lb)

NOTE:

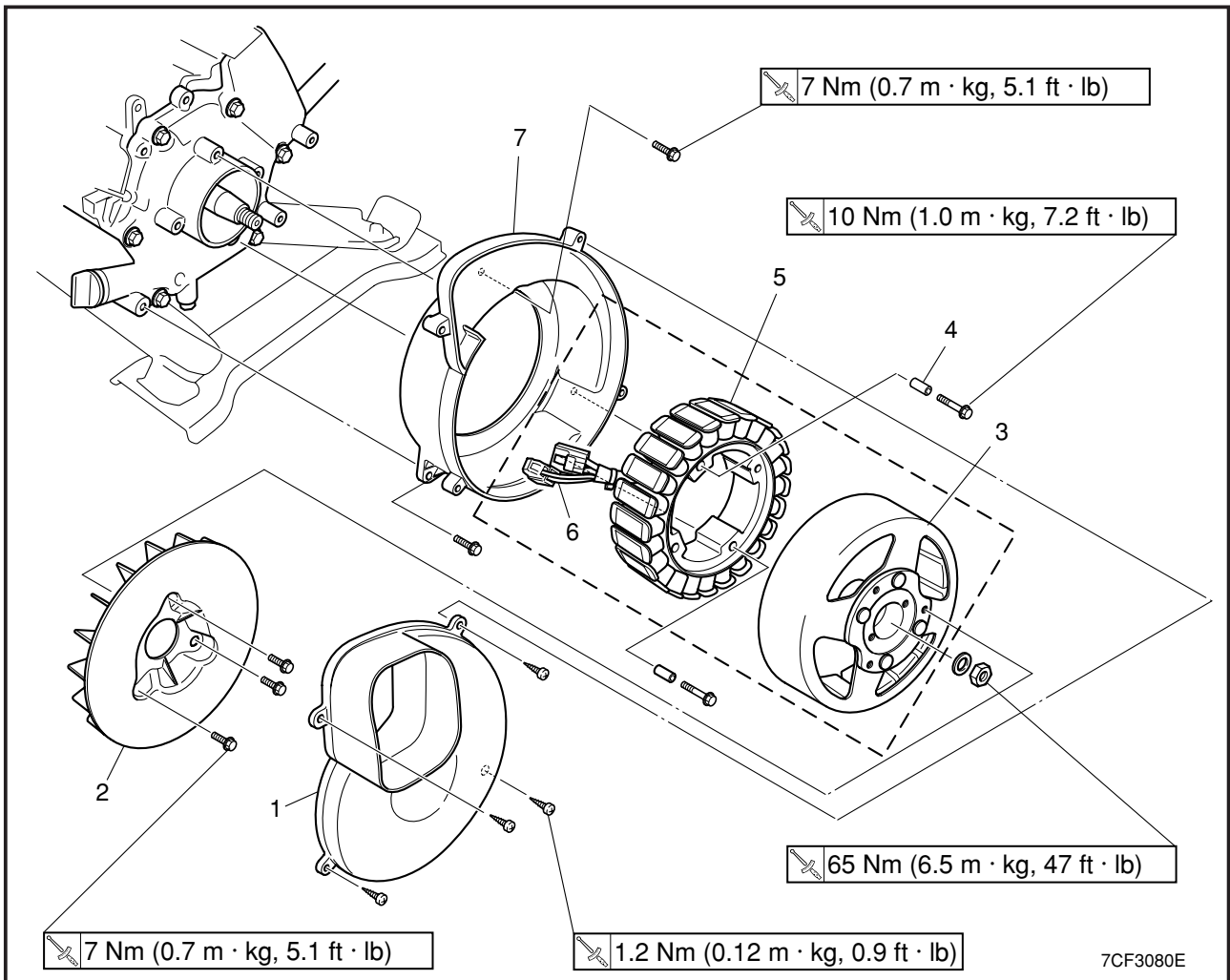
Tighten the nuts and bolts to the specified torques in order from ① to ②.



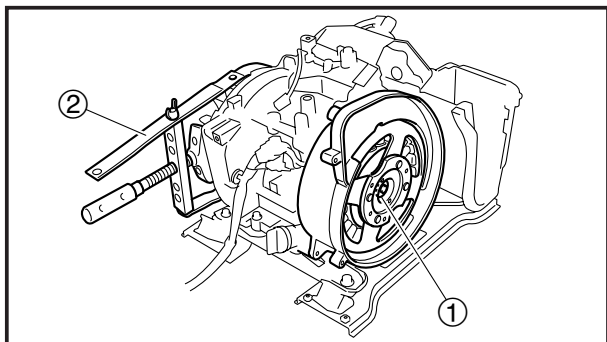
GENERATOR



Order	Job name	Q'ty	Remarks
	Generator removal		Remove the parts in the order listed below.
	Front cover, rear cover, side covers and fuel tank		Refer to "COVERS AND FUEL TANK" section in CHAPTER 2.
	Front and rear flame		Refer to "ENGINE".
	Carburetor		Refer to "CARBURETOR" section in CHAPTER 4.
	Muffler		Refer to "MUFFLER AND AIR CLEANER" section.
	Engine assembly		Refer to "ENGINE" section.
1	Rear end cover	1	
2	Generator fan	1	
3	Generator rotor	1	
4	Tube	2	
5	Stator coil assembly	1	



Order	Job name	Q'ty	Remarks
6	Stator assembly coupler	2	For installation, reverse the removal procedure.
7	Cover	1	



MAGNETO ROTOR AND STATOR COIL ASSEMBLY REMOVAL

1. Remove:
 - Magneto rotor nut ①

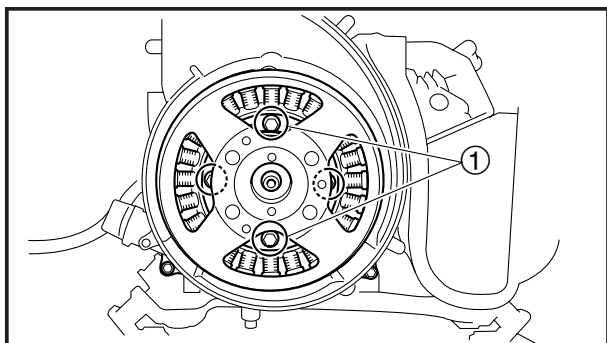
NOTE: _____

Attach the sheave holder ② to hold the rotor.



Sheave holder:

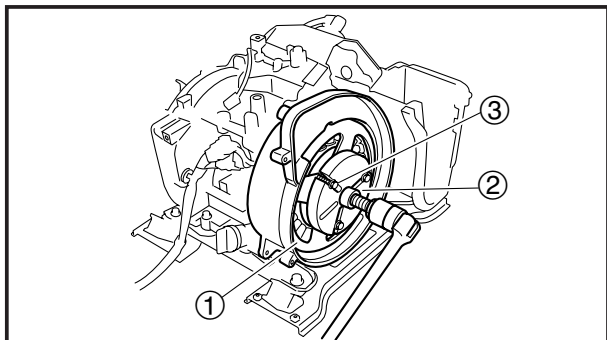
YS-01880, 90890-01701



2. Remove:
 - Stator coil assembly bolts ①
 - Tubes

NOTE: _____

Turn the magneto rotor until the stator coil assembly bolts are visible through the holes in the rotor, and then remove the bolts.



3. Remove:
 - Magneto rotor ①

NOTE: _____

- Remove the magneto rotor ① together with the stator coil assembly using the magneto rotor puller ②.
- Fully tighten the tool holding bolts, making sure the tool body is parallel with the magneto rotor. If necessary, one screw may be backed out slightly to level the tool body.

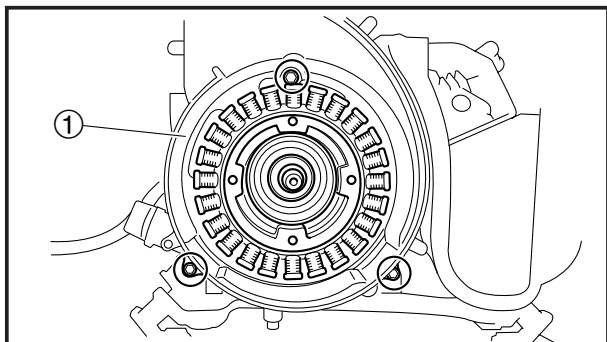
CAUTION: _____

The magnetic force of the magneto rotor is very strong. Therefore, do not change the position of the magneto rotor and stator coil assembly during or after removal, otherwise they may be damaged.



Rotor puller:

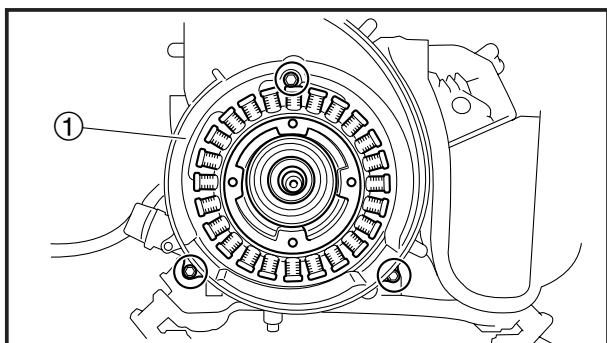
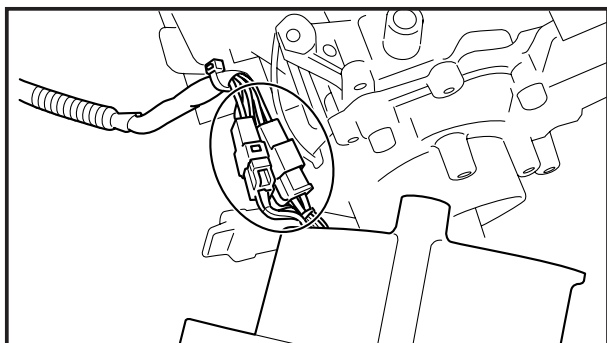
YU-33270, 90890-01362



4. Remove:
 - Cover ①

NOTE:

Remove the cover ①, and then disconnect the stator coil couplers.

**MAGNETO ROTOR AND STATOR COIL ASSEMBLY INSTALLATION**

1. Install:
 - Cover ①

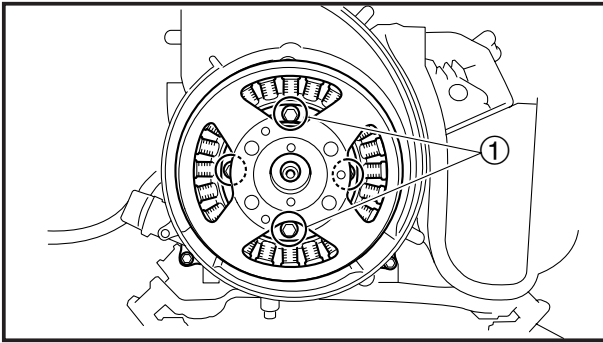
NOTE:

Connect the stator coil couplers, before install the cover ①.

2. Install:
 - Magneto rotor
 - Stator coil assembly
 - Washer
 - Magneto rotor nut


CAUTION:

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



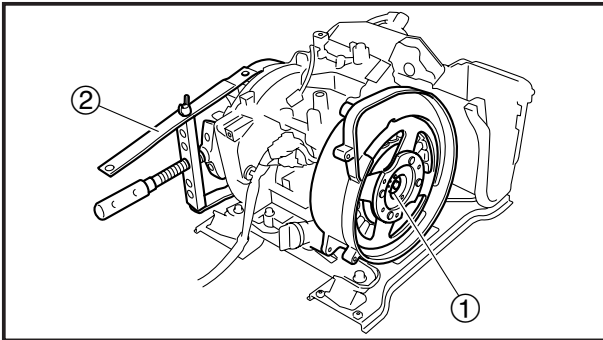
3. Install:

- Tubes
- Stator coil assembly bolts ①

 10 Nm (1.0 m · kg, 7.2 ft · lb)


NOTE:

Turn the magneto rotor until the stator coil assembly bolts are visible through the holes in the rotor, and then remove the bolts ①.



4. Tighten:

- Washer
- Magneto rotor nut ①

 65 Nm (6.5 m · kg, 47 ft · lb)

NOTE:

Tighten the magneto rotor nut ① using the sheave holder ②.

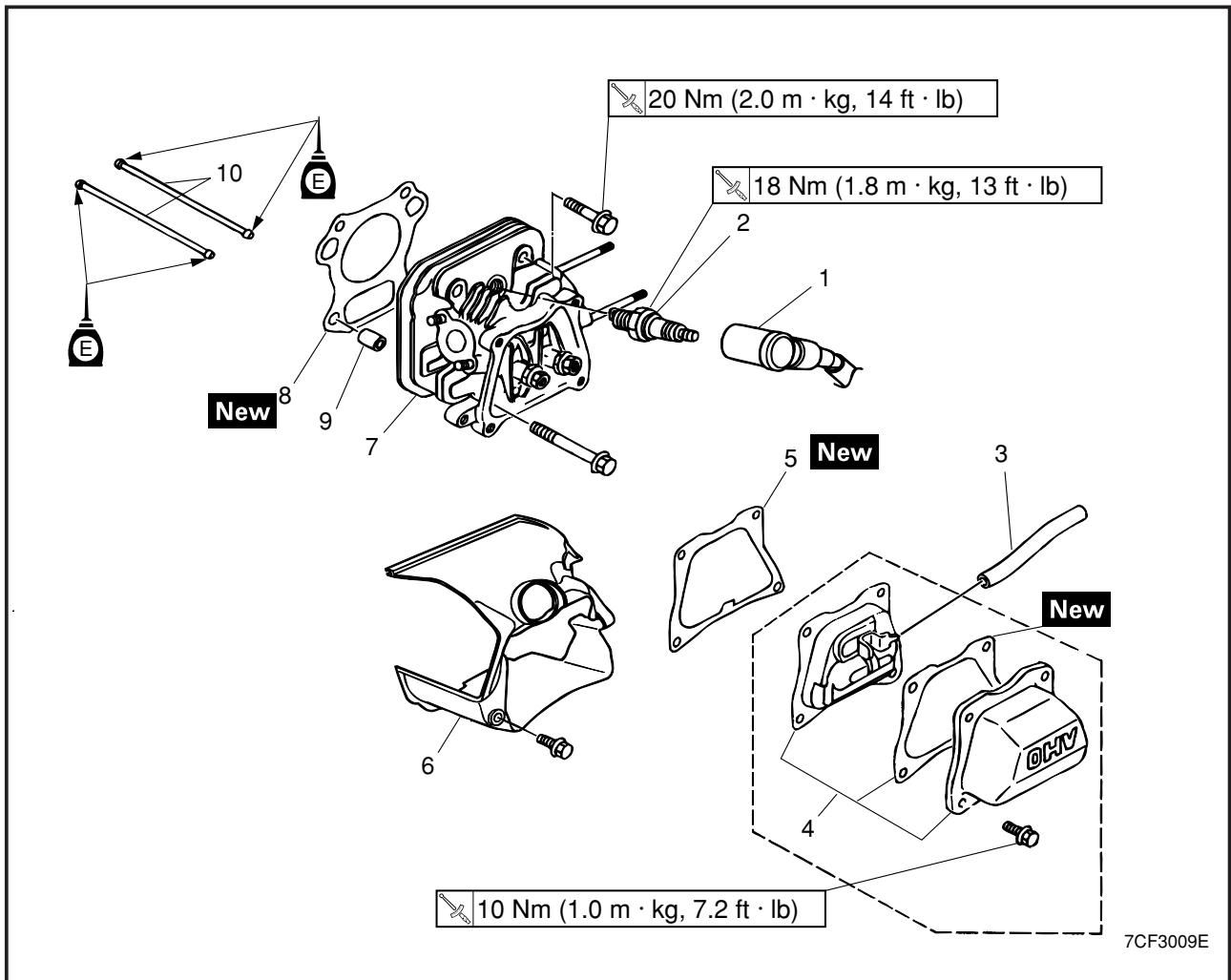


Sheave holder:

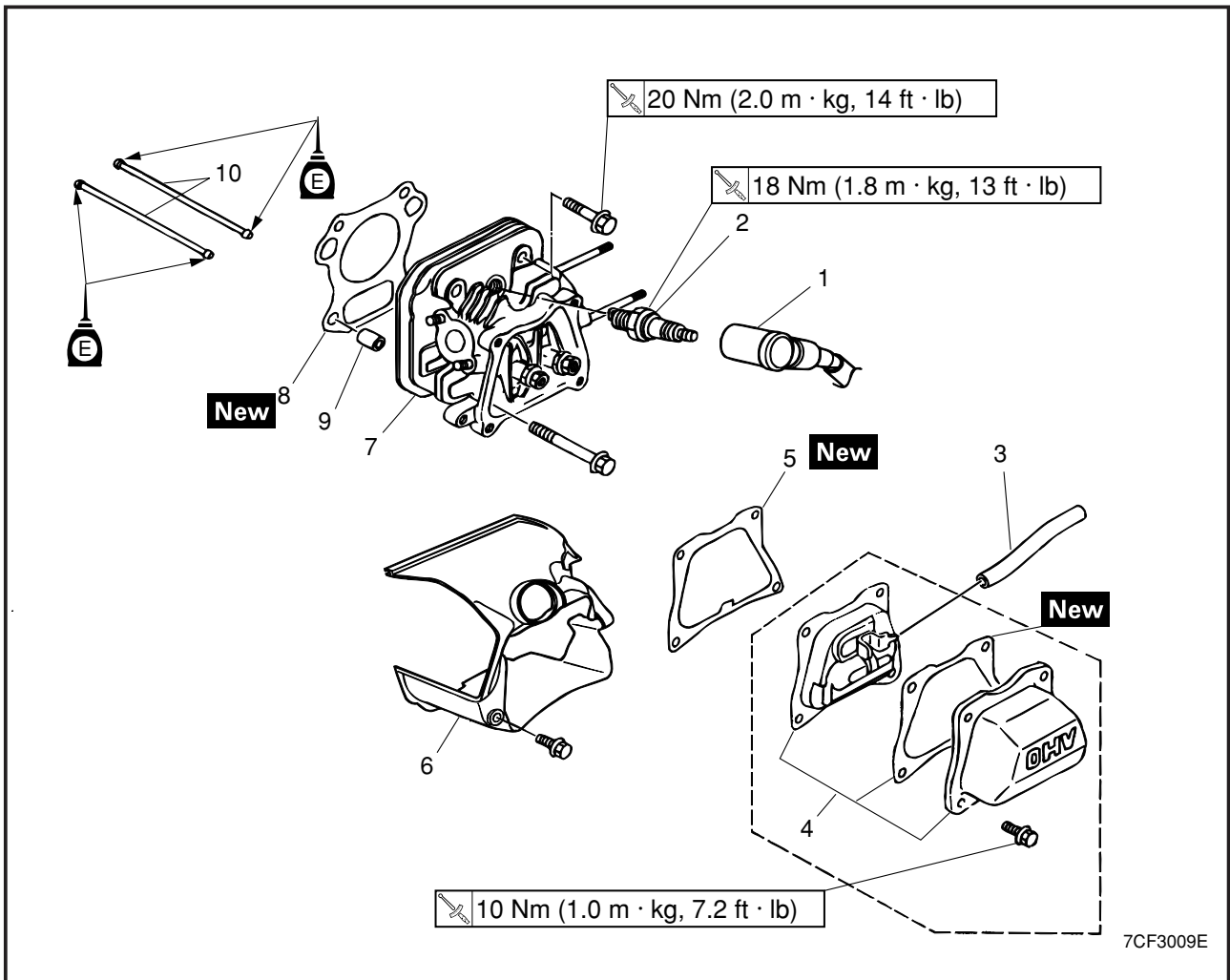
YS-01880, 90890-01701



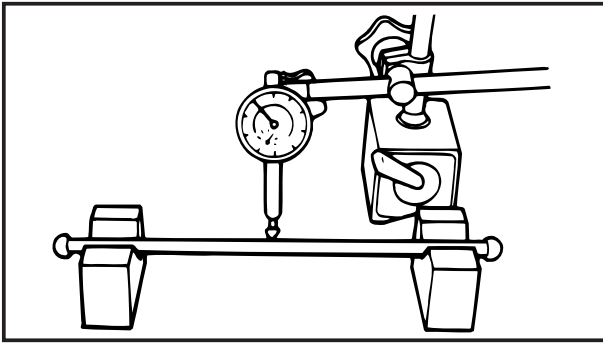
CYLINDER HEAD COVER AND CYLINDER HEAD



Order	Job name	Q'ty	Remarks
	Cylinder head cover and cylinder head removal		Remove the parts in the order listed below.
	Front cover, rear cover, side covers and fuel tank		Refer to "COVERS AND FUEL TANK" section in CHAPTER 2.
	Front and rear flame		Refer to "ENGINE".
	Carburetor		Refer to "CARBURETOR" section in CHAPTER 4.
	Muffler		Refer to "MUFFLER AND AIR CLEANER" section.
	Engine assembly		Refer to "ENGINE" section.
	Recoil starter		Refer to "RECOIL STARTER AND ROTOR" section.
	Generator		Refer to "GENERATOR REMOVAL" section.
1	Spark plug cap	1	
2	Spark plug	1	



Order	Job name	Q'ty	Remarks
3	Breather hose	1	Disconnect.
4	Cylinder head cover	1	
5	Gasket	1	
6	Cylinder air shroud	1	
7	Cylinder head	1	
8	Gasket	1	
9	Dowel pin	2	
10	Push rod	2	
			For installation, reverse the removal procedure.



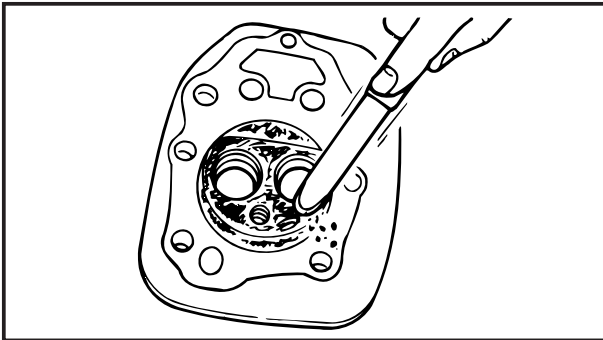
PUSH ROD INSPECTION

1. Inspect:
 - Push rod runout



Runout limit:
0.5 mm (0.02 in)

Out of specifications → Replace.



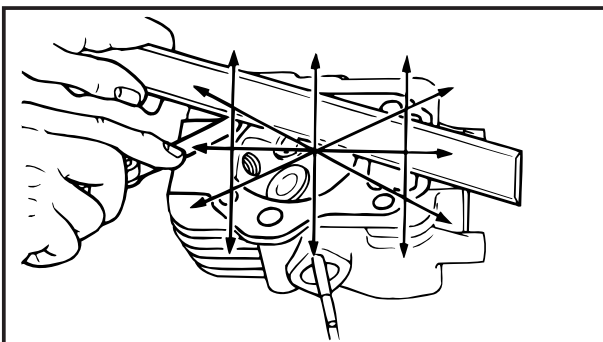
CYLINDER HEAD INSPECTION

1. Inspect:
 - Cylinder head combustion chamber
Check the combustion chamber for carbon deposits
Carbon deposits → Remove.

NOTE:

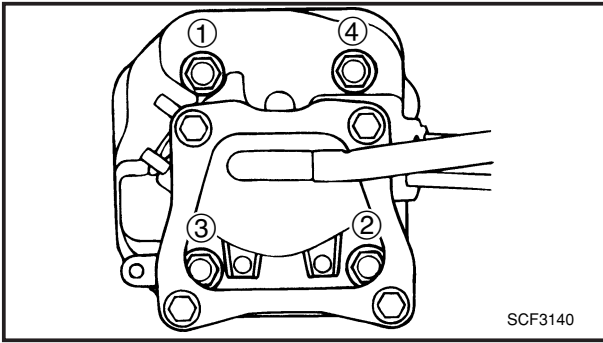
Be sure not to damage the contact surface of the cylinder.

2. Inspect:
 - Cylinder head
Cracks/damage around the hole of spark plug → Replace.
3. Measure:
 - Cylinder head warpage
Measure the warpage on the contact surface of the cylinder head at six points using the straight edge and thickness gauge.



Warpage limit:
0.05 mm (0.002 in)


Out of specifications → Resurface or replace.



CYLINDER HEAD ASSEMBLY

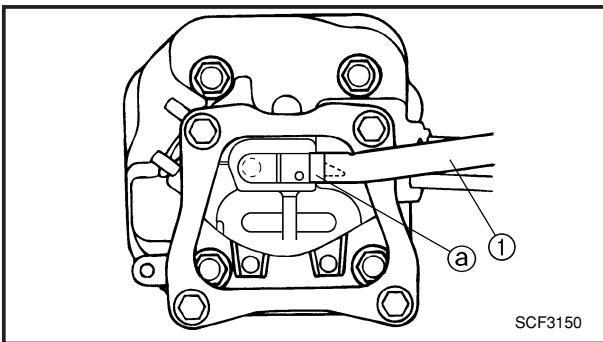
1. Inspect:

- Cylinder head bolts ① to ④.

 20 Nm (2.0 m · kg, 14 ft · lb)

NOTE:

Tighten the bolts to the specified torque in two steps and in order from ① to ④.



BREATHER HOSE ASSEMBLY

1. Inspect:

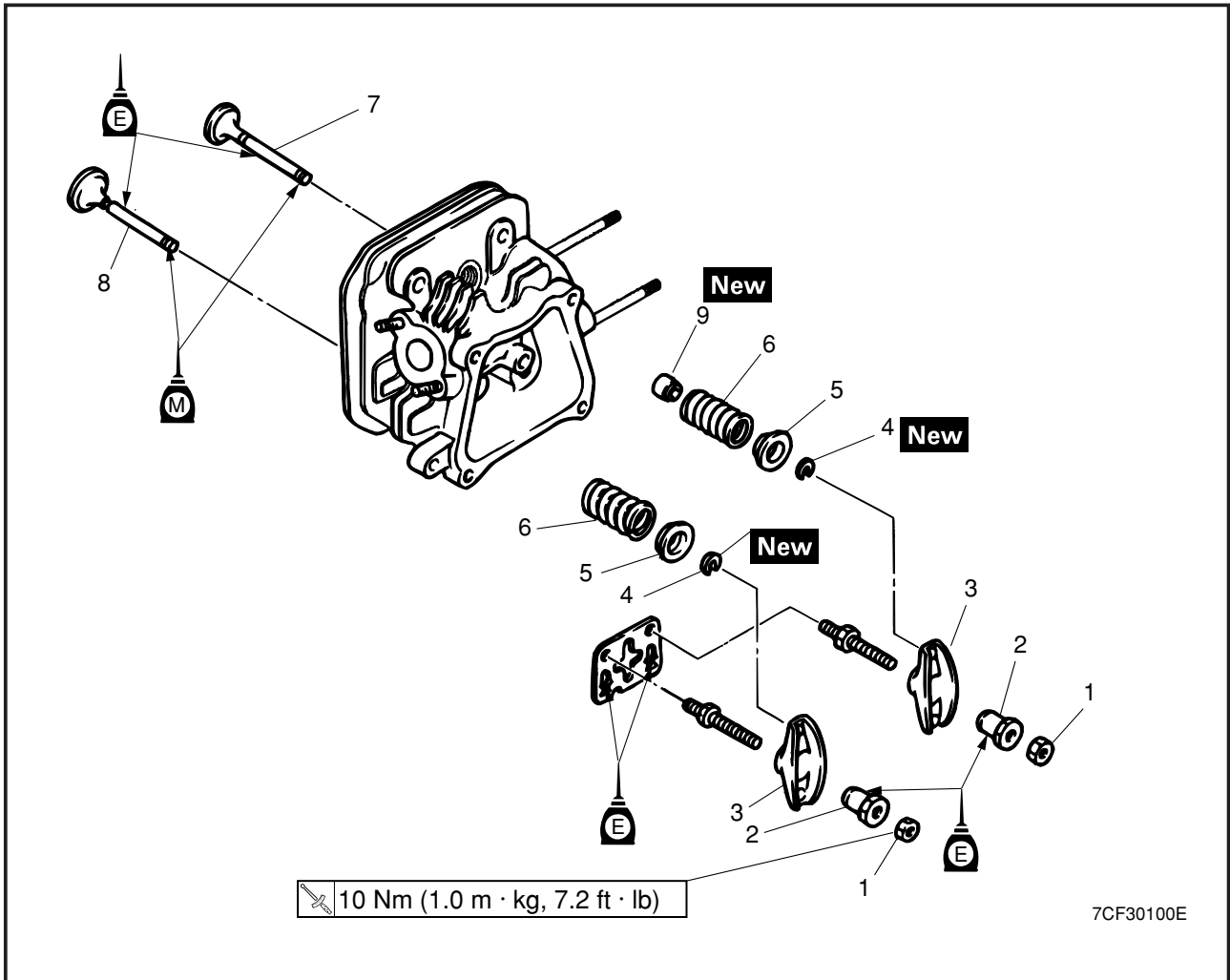
- Breather hose ①

NOTE:

Contact the end of the breather hose to the reed valve stopper ①.

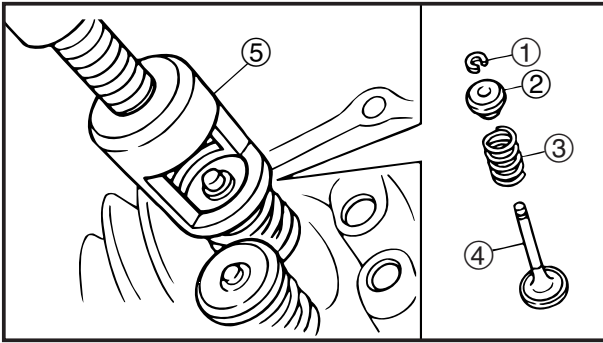


VALVE



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Order	Job name	Q'ty	Remarks
	Valve removal		Remove the parts in the order listed below. Refer to "CYLINDER HEAD" section.
1	Cylinder head		
1	Lock nut	2	
2	Adjuster	2	
3	Rocker arm	2	
4	Valve cotter	2	
5	Spring retainer	2	
6	Spring	2	
7	Exhaust valve	1	
8	Intake valve	1	
9	Stem seal	1	
			For installation, reverse the removal procedure.



VALVE AND VALVE SPRING REMOVAL

1. Remove:

- Valve cotter ①
- Valve spring retainer ②
- Valve spring ③
- Valve ④

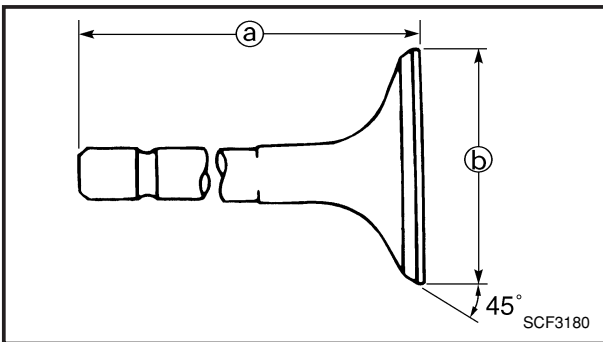
Remove the parts using the valve spring compressor ⑤.

NOTE:

Do not compress the spring more than necessary.



Valve spring compressor:
YM-01253, 90890-01253



VALVE AND VALVE SPRING INSPECTION

1. Measure:

- Valve stem length ①
- Valve face diameter ②



Valve stem length:
Intake: 65.9 mm (2.59 in)
Exhaust: 66.2 mm (2.61 in)
Valve face diameter:
Intake: 24.0 mm (0.94 in)
Exhaust: 22.0 mm (0.87 in)

Out of specifications → Replace.

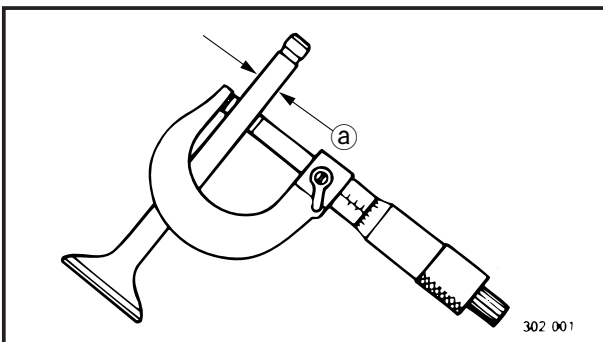
2. Measure:

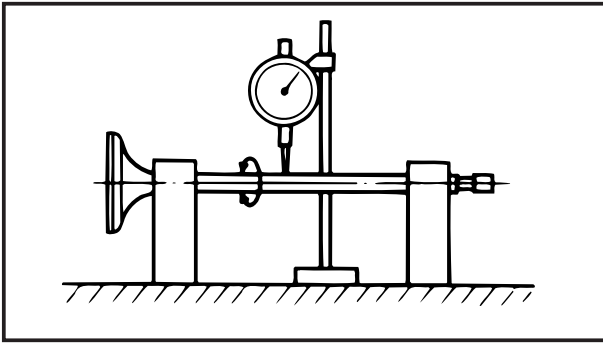
- Valve stem diameter ①



Valve stem diameter:
Intake and exhaust: 5.5mm
(0.22 in)
Wear limit
Intake: 5.4 mm (0.21 in)
Exhaust: 5.4 mm (0.21 in)

Out of specifications → Replace.





3. Measure:
- Valve stem runout

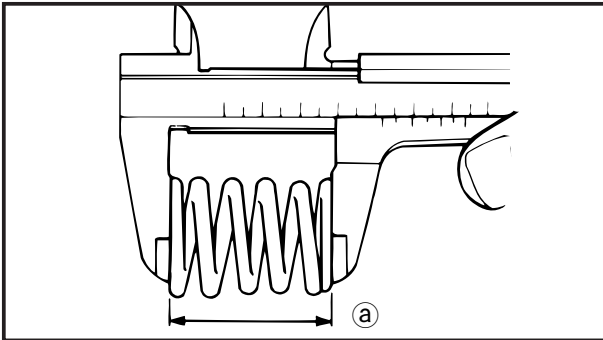


Runout limit:
0.01 mm (0.0004 in)

Out of specifications → Replace.

NOTE:

The value is half of that indicated on the dial gauge.

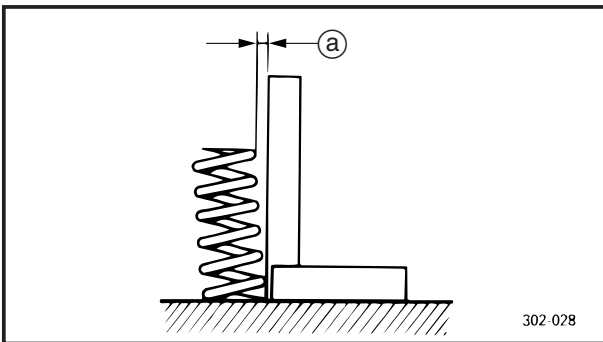


4. Measure:
- Valve spring free length (a)



Valve spring free length:
Intake and exhaust: 26.5 mm
(1.04 in)
Limit: 25.0 mm (0.98 in)

Out of specifications → Replace.

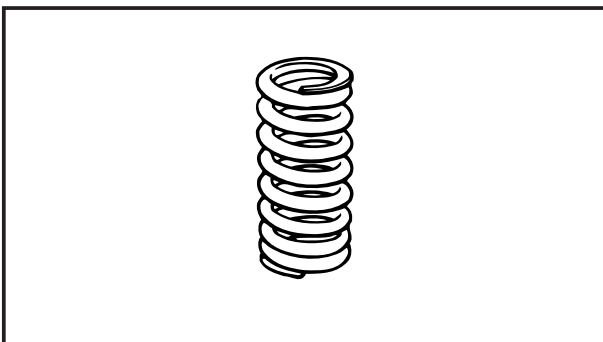


5. Measure:
- Valve spring free length (a)



Tilt limit:
1.6 mm (0.06 in)

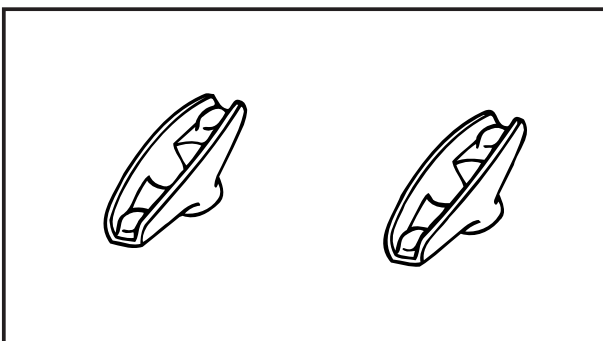
Out of specifications → Replace.



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

LOCKER ARM INSPECTION

1. Inspect:
- Locker arm
Wear/damage/cracks → Replace.



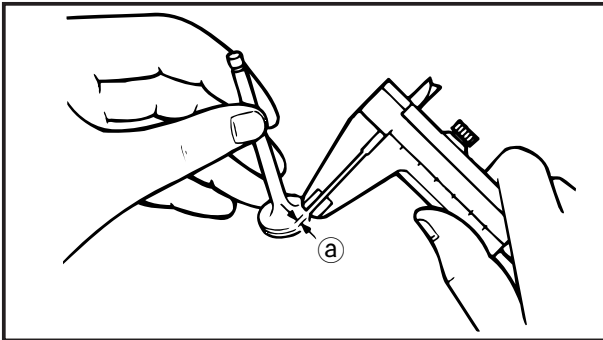


VALVE SEAT INSPECTION

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

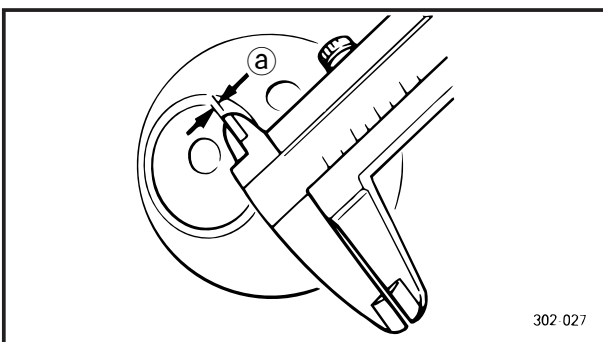


Valve face contact width (intake and exhaust):

0.7 mm (0.03 in)

Limit: 1.7 mm (0.067 in)

Out of specification/rough/eccentric wear → Replace.



5. Measure:

- Valve seat contact width (a)
Make sure that the contact width along the entire valve seat is within specifications.

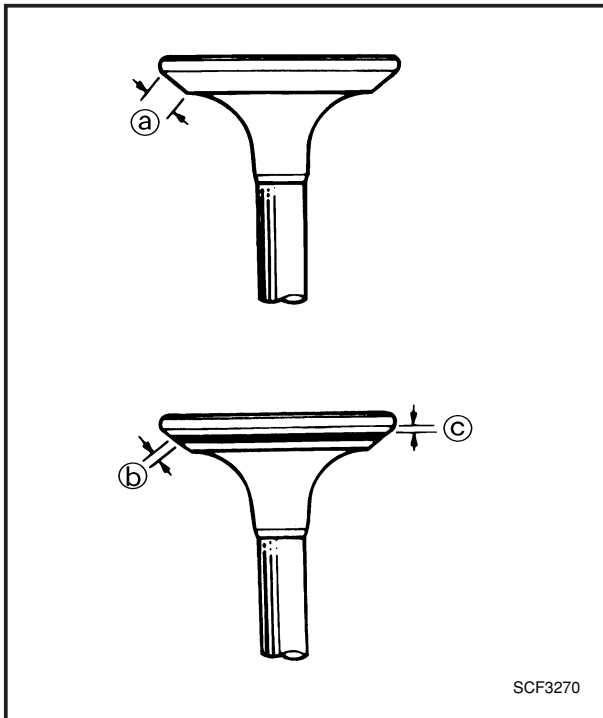


Valve seat contact width (intake and exhaust) :

0.7 mm (0.03 in)

Limit: 1.7 mm (0.067 in)

Out of specification/rough/eccentric wear → Replace.



6. Remove the carbon deposits on the valve face (a) and valve seat.

- Valve face contact seat width (b)
- Valve margin thickness (c)

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.

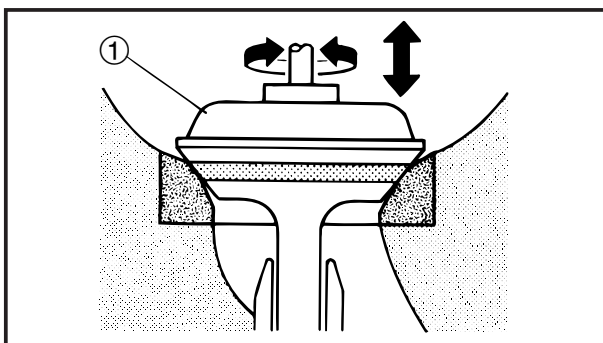


Valve seat width:

0.7 mm (0.03 in)

Valve margin thickness:

0.3 mm (0.012 in)



VALVE LAPPING

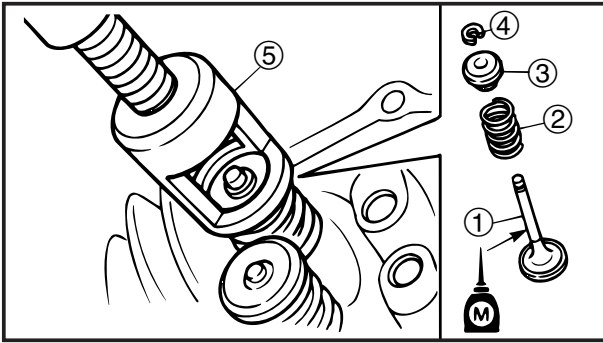
1. Apply a coarse lapping compound evenly on the valve face. Lap the valve by tapping and rotating the valve lapper (1) clockwise and counterclockwise.
2. Clean off all of the lapping compound from the valve face and valve seat. Apply fine lapping compound on the valve face and lap the valve as in step 1.
3. If the contact width on the valve face shines white along the entire face, apply mechanic's blueing dye (Dykem) to make sure that there are traces of even contact in the center of the valve face.

CAUTION:

Do not let the lapping compound enter the gap between the valve stem and the valve guide.

NOTE:

After every lapping procedure, clean off the compound from the valve face and valve seat.

**VALVE AND VALVE SPRING ASSEMBLY**

1. Install:

- Valve ①
- Valve spring ②
- Valve spring retainer ③
- Valve cotter ④ **New**

Apply a small amount of molybdenum disulfide oil to the valve stem and use the valve spring compressor ⑤ to install the parts.



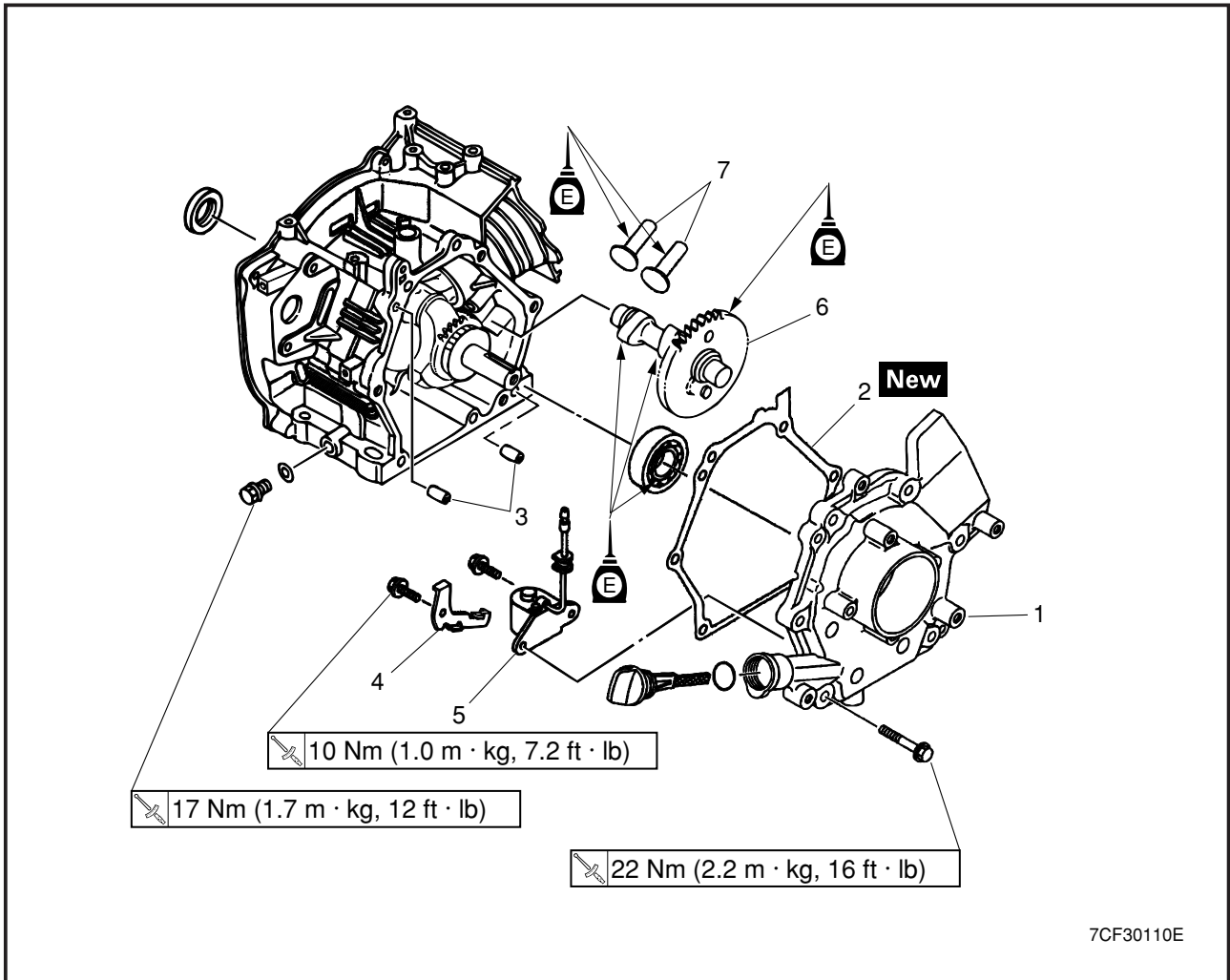
Valve spring compressor:
YM-01253, 90890-01253

CAUTION: _____

Do not compress the valve spring more than necessary.

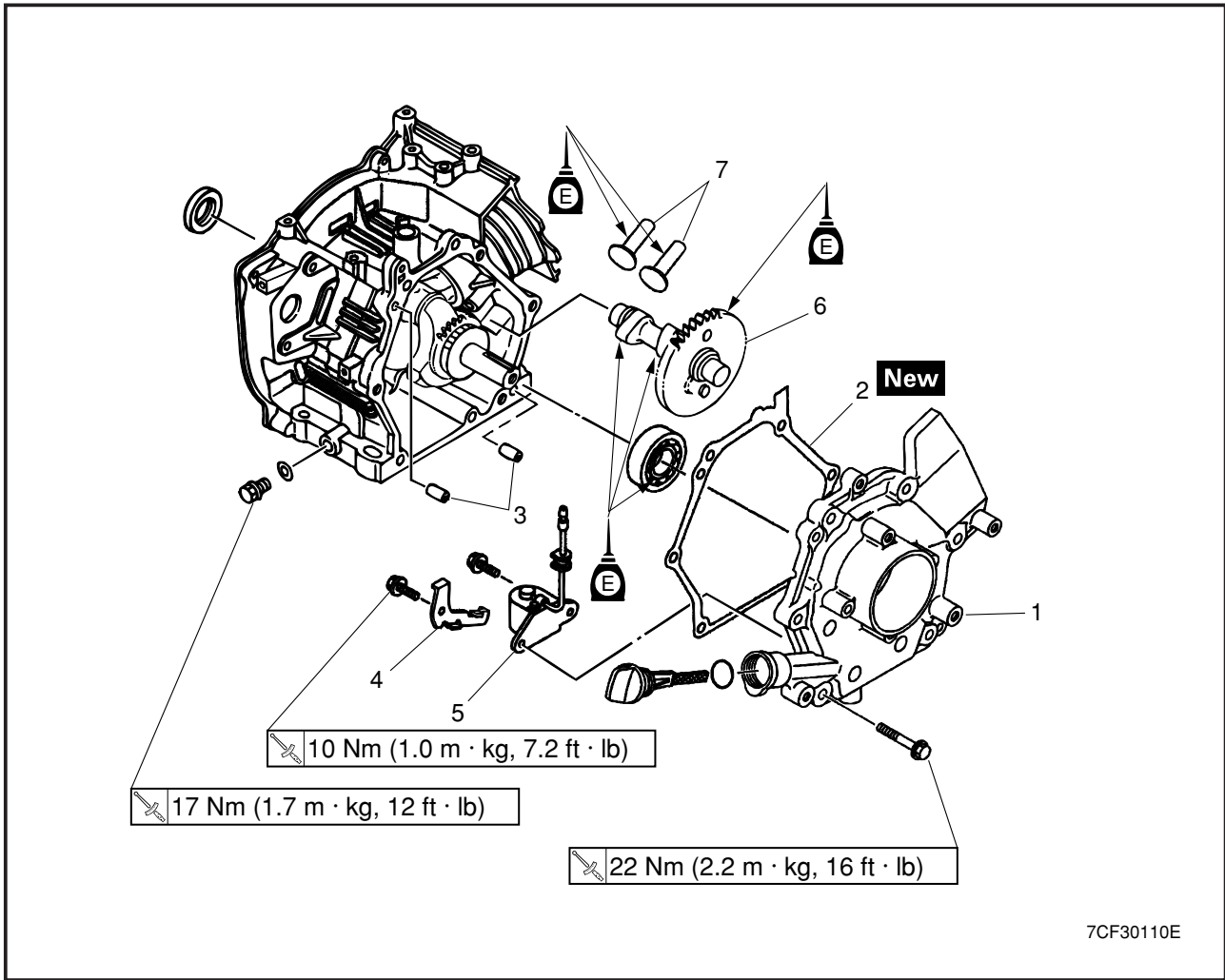


CRANKCASE COVER AND CAMSHAFT

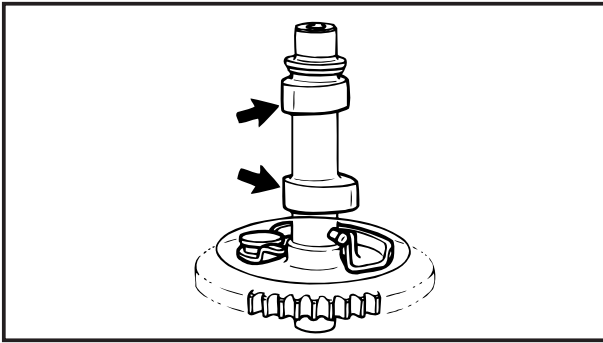


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Order	Job name	Q'ty	Remarks
	Crankcase cover and crankshaft removal		Remove the parts in the order listed below.
	Engine assembly		Refer to "ENGINE" section.
	Cylinder head		Refer to "CYLINDER HEAD COVER, CYLINDER HEAD" section.
	Recoil starter		Refer to "RECOIL STARTER AND ROTOR" section.
	Generator		Refer to "GENERATOR REMOVAL" section.
1	Crankcase cover	1	
2	Gasket	1	
3	Dowel pin	2	
4	Bracket	1	
5	Oil level switch	1	
6	Camshaft	1	

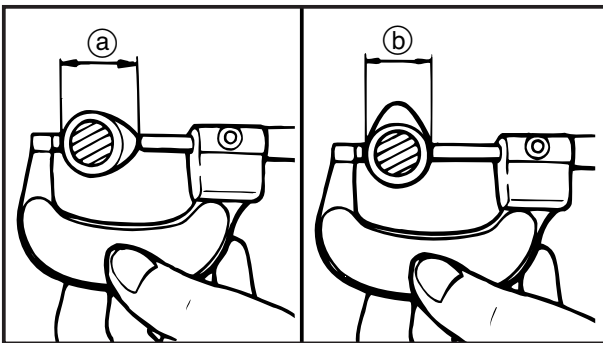


Order	Job name	Q'ty	Remarks
7	Valve lifter	2	For installation, reverse the removal procedure.



CAMSHAFT INSPECTION

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



- Inspect:
 - Cam lobes length (a) and (b)



Cam lobes length:

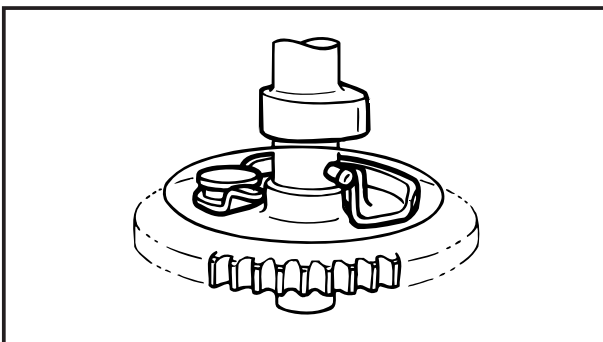
Intake (a): 26.9 ± 0.05 mm
(1.06 ± 0.002 in)

(b): 22.0 ± 0.05 mm
(0.87 ± 0.002 in)

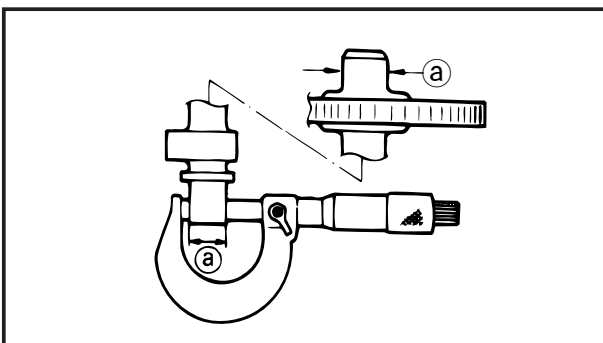
Exhaust (a): 26.68 ± 0.05 mm
(1.05 ± 0.002 in)

(b): 22.03 ± 0.05 mm
(0.87 ± 0.002 in)

Out of specification → Replace.



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



- Inspect:
 - Camshaft diameter (a)

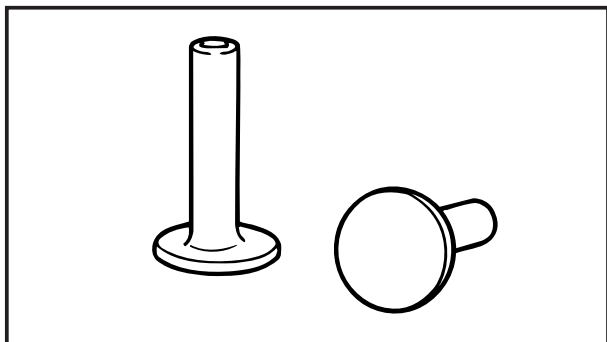


Camshaft diameter:

14.965 ~ 14.990 mm
(**0.5892 ~ 0.5902** in)

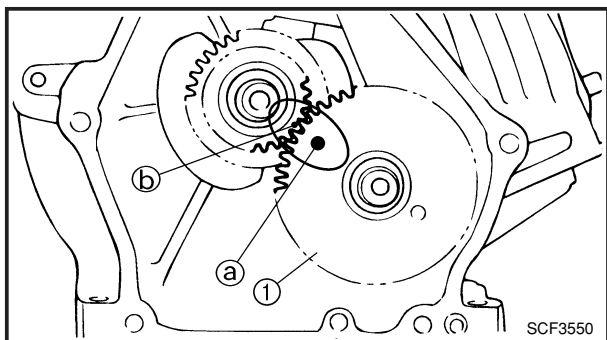
Wear limit: 14.950 mm (0.59 in)

Out of specification → Replace.



VALVE LIFTER INSPECTION

- Inspect:
 - Valve lifter
 - Damage → Replace.

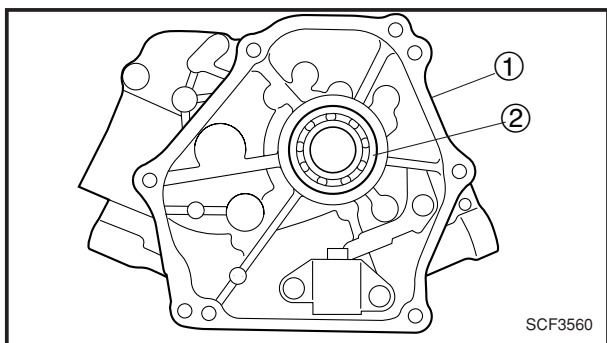


CAMSHAFT ASSEMBLY

- Install:
 - Camshaft ①

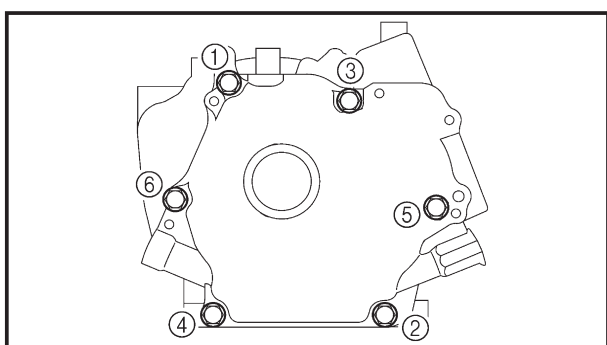
CAUTION:

Be sure to align the hole ① of camshaft gear with the crankshaft gear mark ②.



CRANKCASE COVER INSPECTION

- Inspect:
 - Crankcase cover ①
 - Damage → Replace.
 - Bearing ②
 - Noise/wear/rotational failure → Replace.



CRANKCASE COVER INSTALLATION

- Install:
 - Crankcase cover bolts ① to ⑥

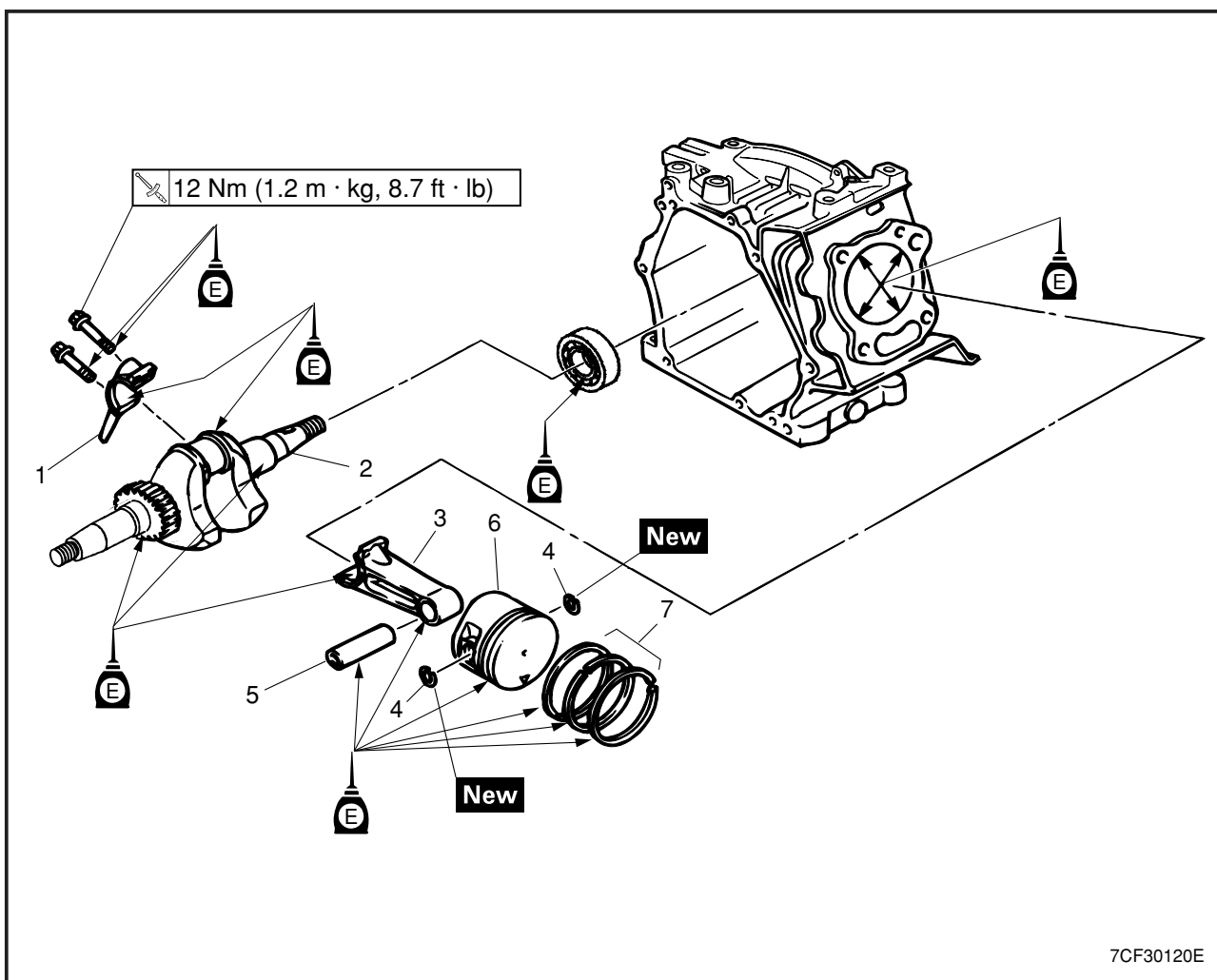
22 Nm (2.2 m · kg, 16 ft · lb)

NOTE:

Tighten the bolts to the specified torque in two steps and in order from ① to ⑥.

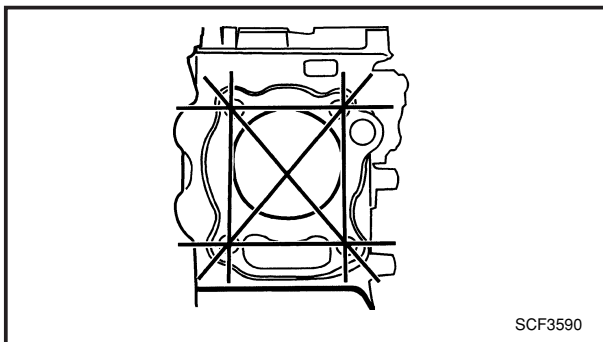
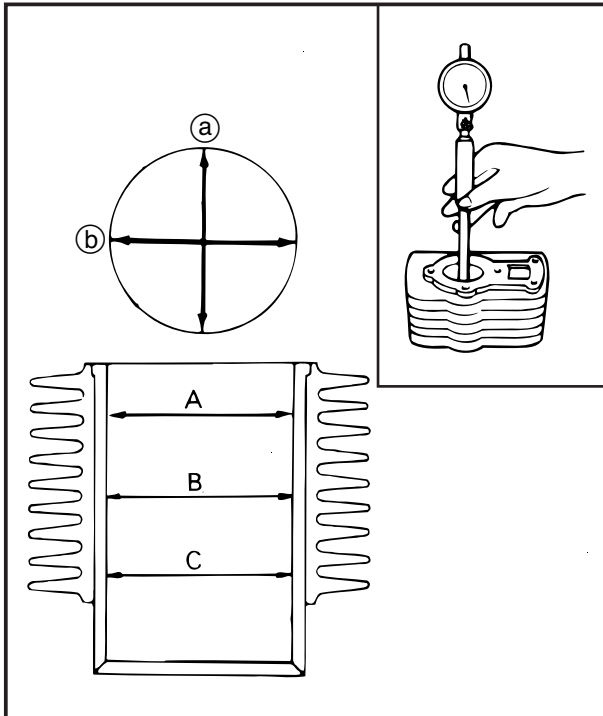


PISTON, CONNECTING ROD, CRANKSHAFT AND CRANKCASE



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Order	Job name	Q'ty	Remarks
	Piston, connecting rod, crankshaft and crankcase removal		Remove the parts in the order listed below. Refer to "ENGINE" section. Refer to "RECOIL STARTER AND ROTOR" section. Refer to "GENERATOR REMOVAL" section. Refer to "ROCKER ARM AND CAMSHAFT" section. For installation, reverse the removal procedure.
	Engine assembly		
	Recoil starter		
	Generator		
	Rocker arm and camshaft		
1	Connecting rod cap	1	
2	Crank shaft	1	
3	Connecting rod	1	
4	Piston pin circlip	2	
5	Piston pin	1	
6	Piston	1	
7	Piston ring set	1	



CYLINDER INSPECTION

- Measure:
 - Cylinder inside diameter

NOTE:

Take side to side (a) and front to back (b) 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:
 66.00 ~ 66.02 mm
 (2.5984 ~ 2.5990 in)
Cylinder inside diameter wear limit:
 66.020 mm (2.5990 in)
Cylinder taper limit:
 0.05 mm (0.002 in)

- Measure:
 - Cylinder warpage

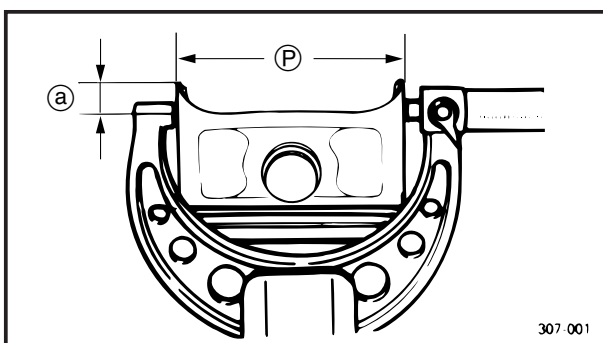
NOTE:

Measure the warpage on the contact surface of the cylinder head at six points using a straight edge and thickness gauge.



Warpage limit:
 0.05 mm (0.002 in)

Out of specification → Replace.



PISTON AND PISTON PIN INSPECTION

- Measure:
 - Piston skirt diameter (P)

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

Out of specification → Replace.



Piston skirt diameter:
 66.0 mm (2.598 in)
Wear limit:
 65.9 mm (2.594 in)



2. Measure:

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



Piston clearance:

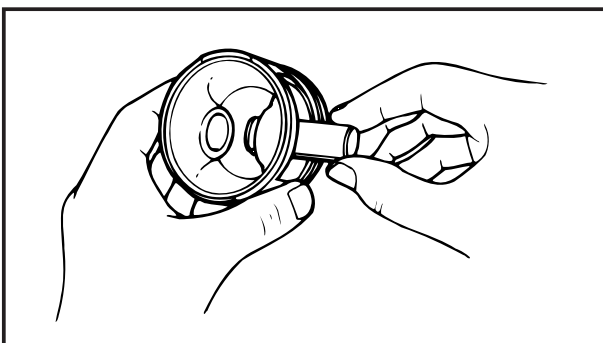
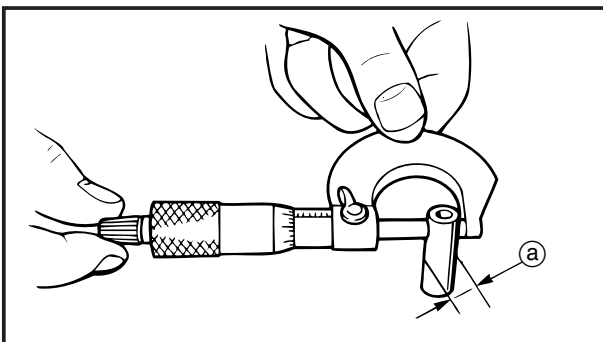
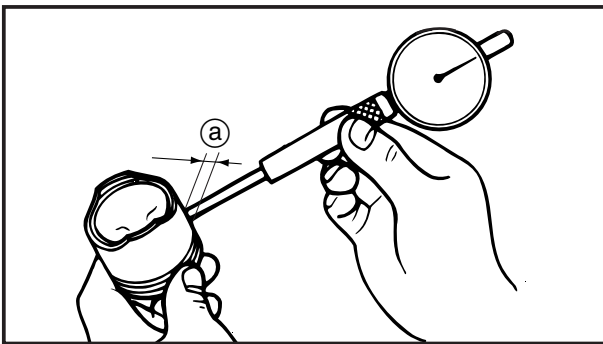
0.015 ~ 0.040 mm

(0.0006 ~ 0.00157 in)

Piston clearance =

Cylinder inside diameter -

Piston skirt diameter



3. Measure:

- Piston pin hole inside diameter (a)
Out of specifications → Replace.



Piston pin hole inside diameter:

16.002 ~ 16.013 mm

(0.6300 ~ 0.6304 in)

Wear limit:

16.020 mm (0.6307 in)

4. Measure:

- Piston pin diameter (a)
Out of specifications → Replace.



Piston pin diameter:

15.995 ~ 16.000 mm

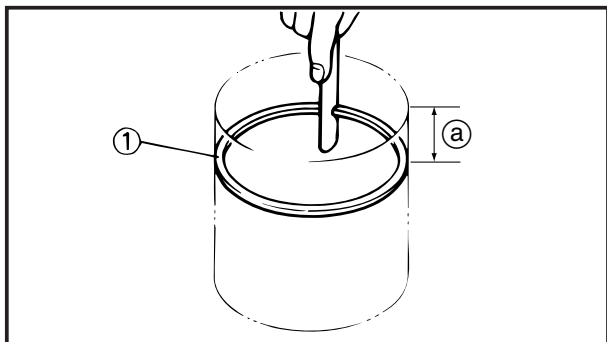
(0.6297 ~ 0.6299 in)

Wear limit:

15.950 mm (0.6280 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 ② 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	0.2 ~ 0.4 mm (0.008 ~ 0.016 in)	0.9 mm (0.0354 in)
2nd ring	0.2 ~ 0.4 mm (0.008 ~ 0.016 in)	0.9 mm (0.0354 in)
Oil ring	0.2 ~ 0.4 mm (0.008 ~ 0.016 in)	0.9 mm (0.0354 in)

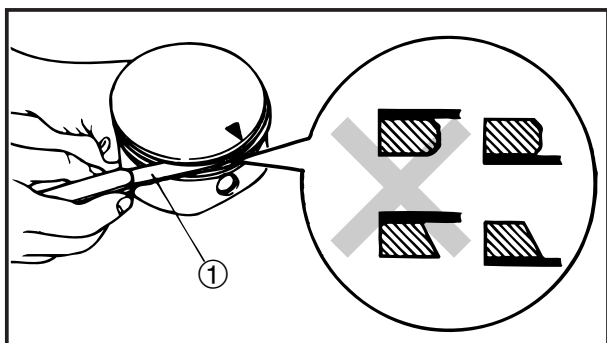
Out of specifications → Replace the piston and piston ring as a set.


2. Measure:

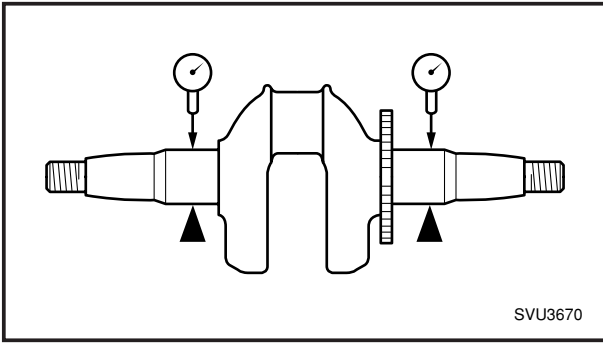
- Piston side clearance
Out of specification → Replace.
Use a thickness gauge ①.

NOTE:

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



	Piston ring side clearance	Wear limit
Top ring	0.04 ~ 0.08 mm (0.0016 ~ 0.0031 in)	0.1 mm (0.0039 in)
2nd ring	0.02 ~ 0.06 mm (0.0008 ~ 0.0024 in)	

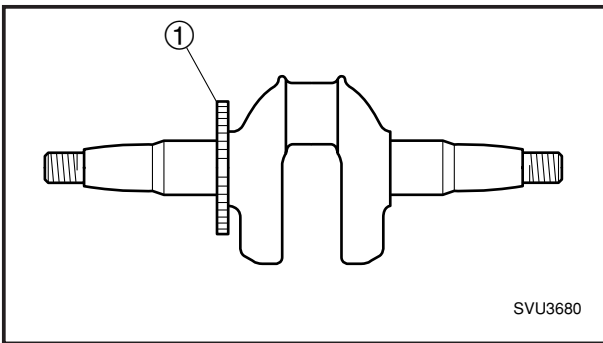


CRANKSHAFT INSPECTION

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



Runout limit:
0.04 mm (0.0016 in)



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

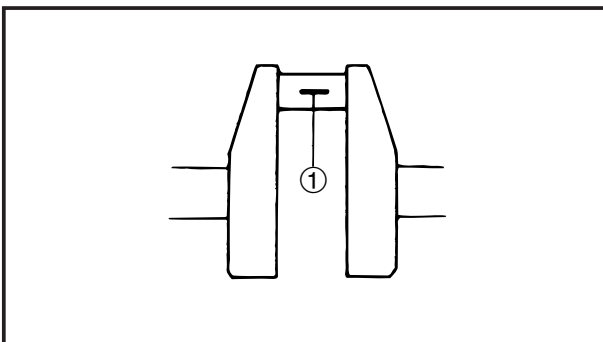
- Measure:
 - Crank pin outside diameter
Use a micrometer.
Out of specification → Replace.



Crank pin outside diameter:
28.0 mm (1.102 in)
Wear limit:
27.9 mm (1.098 in)

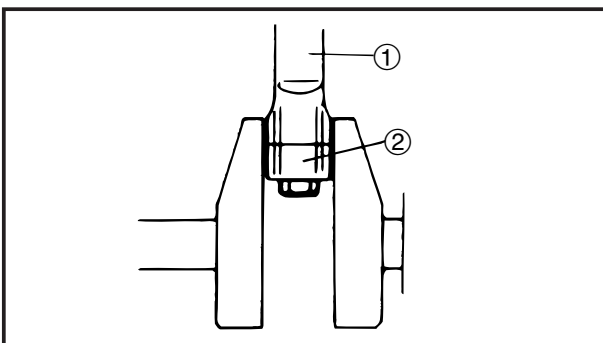
CONNECTING ROD OIL CLEARANCE INSPECTION

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



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

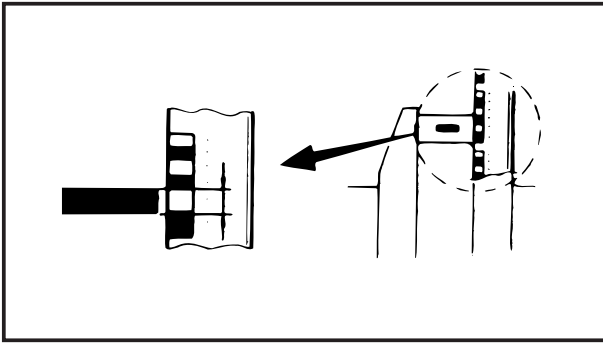
NOTE: _____
Clean off oil from all parts thoroughly.



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

12 Nm (1.2 m · kg, 8.7 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
Crack/damage/wear → Replace the crankshaft.

4. Measure:

- Widest portion of the pressed Plasti-gauge
Out of specification → Replace crankshaft or connecting rod, and then measure the clearance again.

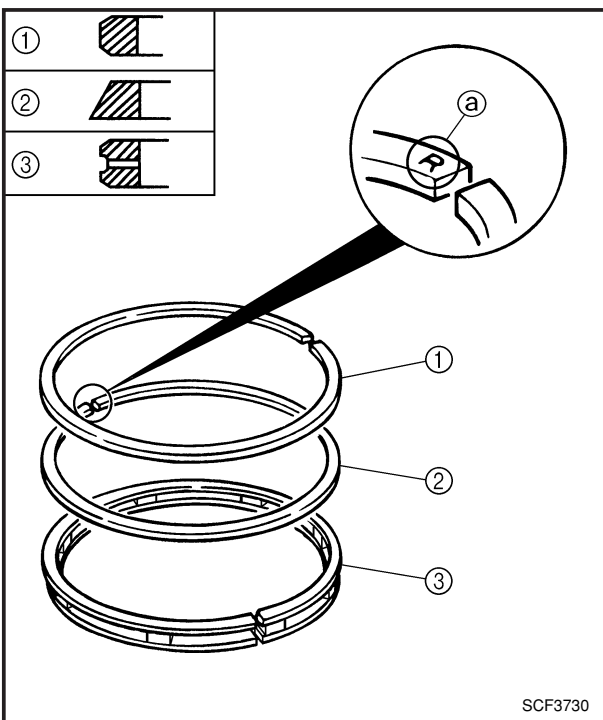


Connecting rod big end oil clearance:

0.015 ~ 0.040 mm
(0.0006 ~ 0.0016 in)

Wear limit:

0.1 mm (0.004 in)



PISTON AND PISTON RING INSTALLATION

1. Install:

- Top ring ①
- Second ring ②
- Oil ring ③

NOTE:

- Be sure to install the top ring and second ring so that the “R” mark (a) faces toward the piston head.
- Make sure that the piston rings move smoothly.

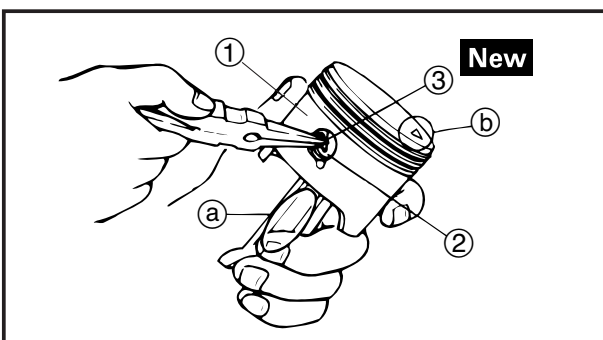
2. Apply 4-stroke engine oil to the inside of the connecting rod small end.

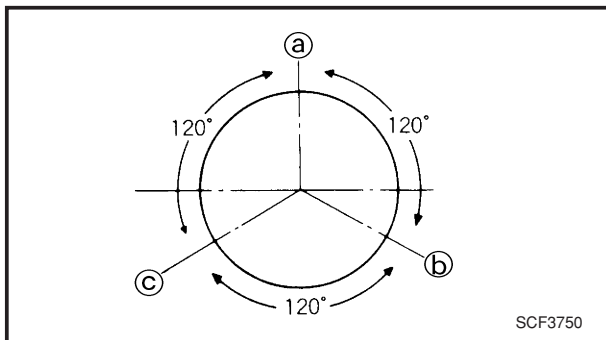
3. Install:

- Piston ①
- Piston pin ②
- Piston pin circlip ③ **New**

NOTE:

- Make sure that the “YAMAHA” mark (a) on the connecting rod faces toward the crankcase cover.
- Make sure that the “∇” mark (b) on the piston head faces toward the push rod.

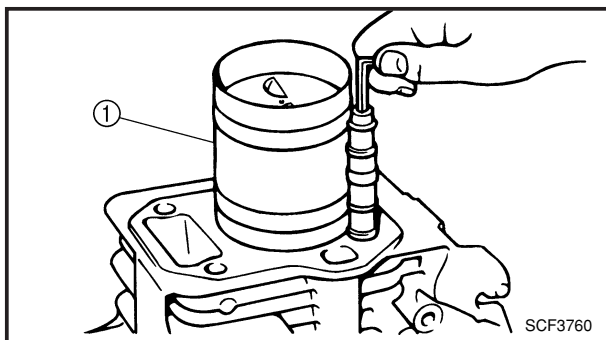




CRANKSHAFT ASSEMBLY

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

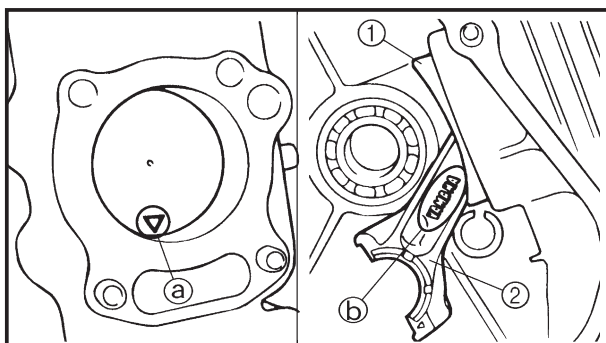
- Ⓐ Top ring
- Ⓑ Second ring
- Ⓒ Oil ring



2. Install:
 - Piston ring compressor ①



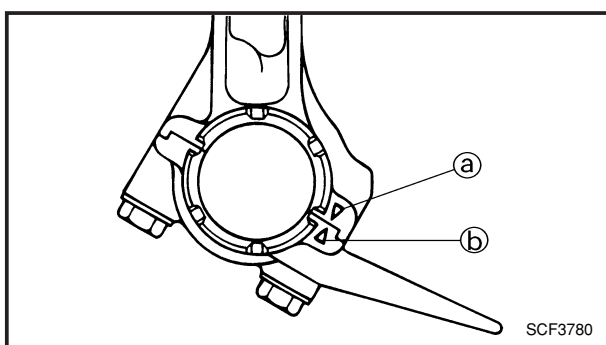
Piston ring compressor:
YU-33294, 90890-05158



3. Install:
 - Piston ①
 - Connecting rod ②

NOTE:

- Make sure that the “∇” mark Ⓐ on the piston head faces toward the push rod.
- Make sure that the “YAMAHA” mark Ⓑ on the connecting rod faces toward the crank-case cover.



4. Install:
 - Crankshaft
 - Connecting rod cap

12 Nm (1.2 m · kg, 8.7 ft · lb)

NOTE:

Make sure that the “∇” mark Ⓐ on the connecting rod is aligned with the “∇” mark Ⓑ on the rod cap.

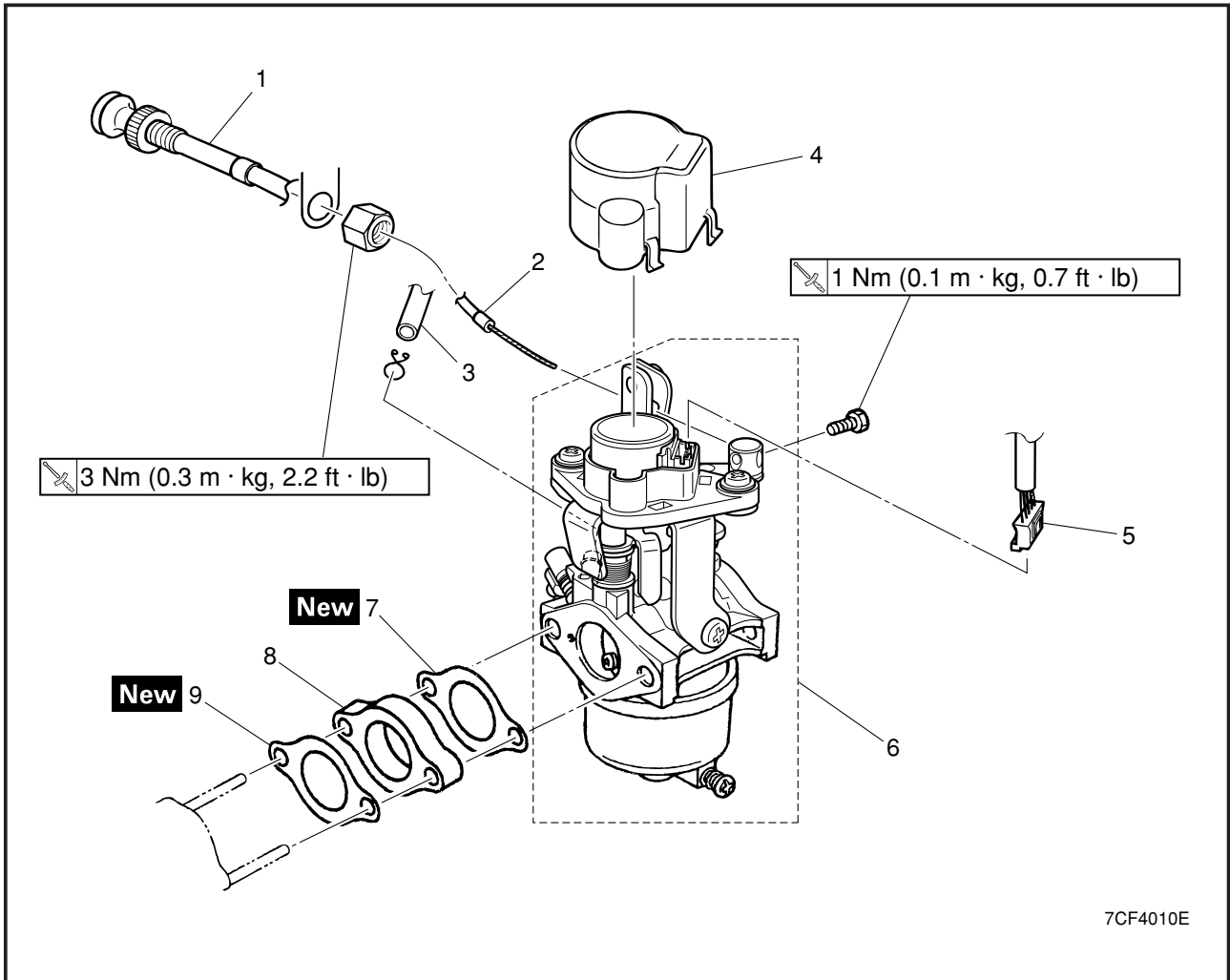
5. Install:
 - Camshaft
 - Crankcase cover

Refer to “CRANKCASE COVER AND CAMSHAFT”.



CARBURETOR

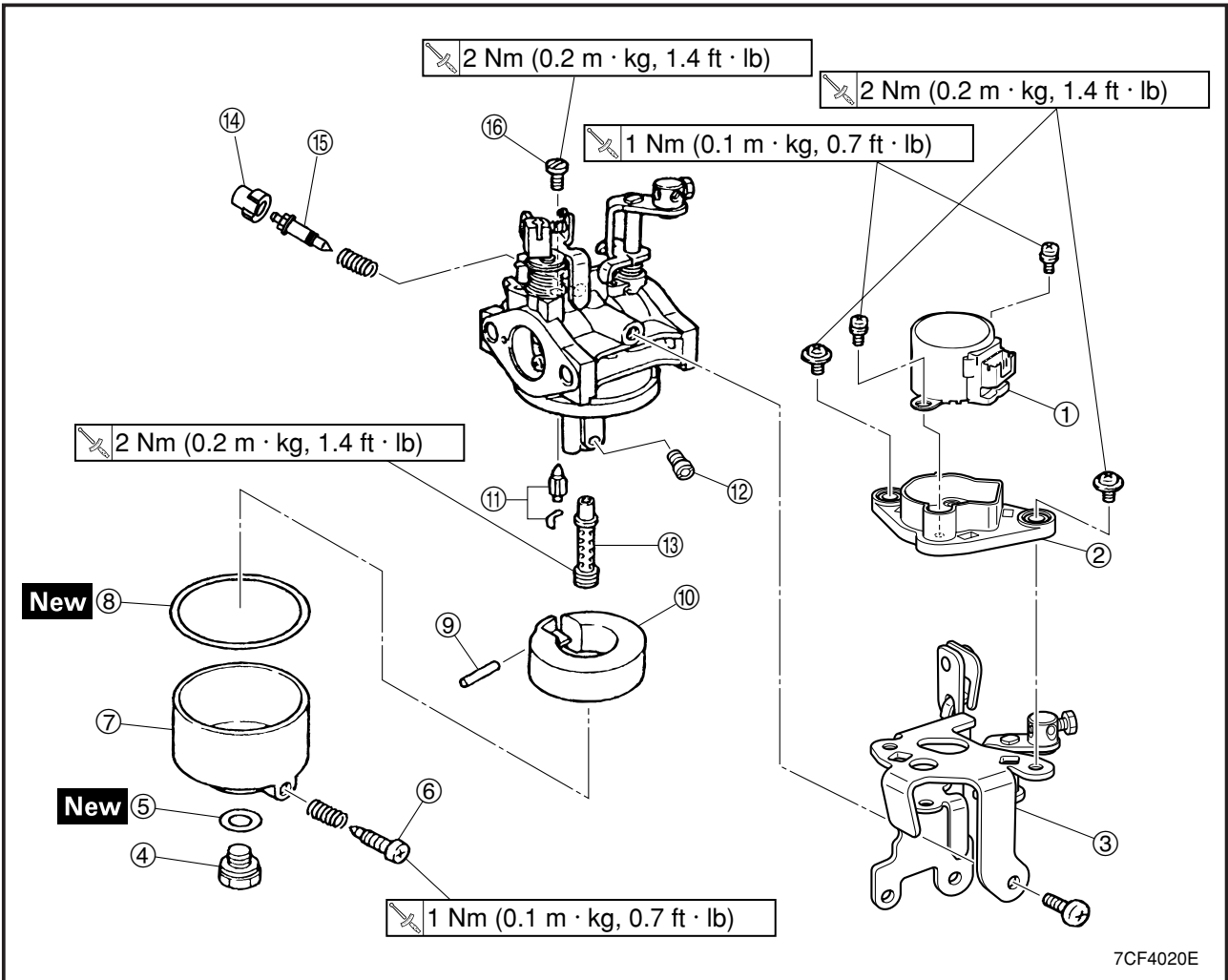
CARBURETOR



Order	Job name	Q'ty	Remarks
	Carburetor removal		Remove the parts in the order listed below. Refer to "COVERS" section in CHAPTER 2.
	Rear cover and right side cover		
	Air cleaner case		
1	Choke knob	1	
2	Choke cable	1	Disconnect.
3	Fuel hose	1	
4	Throttle control motor cover	1	
5	Throttle control motor coupler	1	Disconnect.
6	Carburetor assembly	1	
7	Gasket	1	
8	Carburetor joint	1	
9	Gasket	1	
			For installation, reverse the removal procedure.

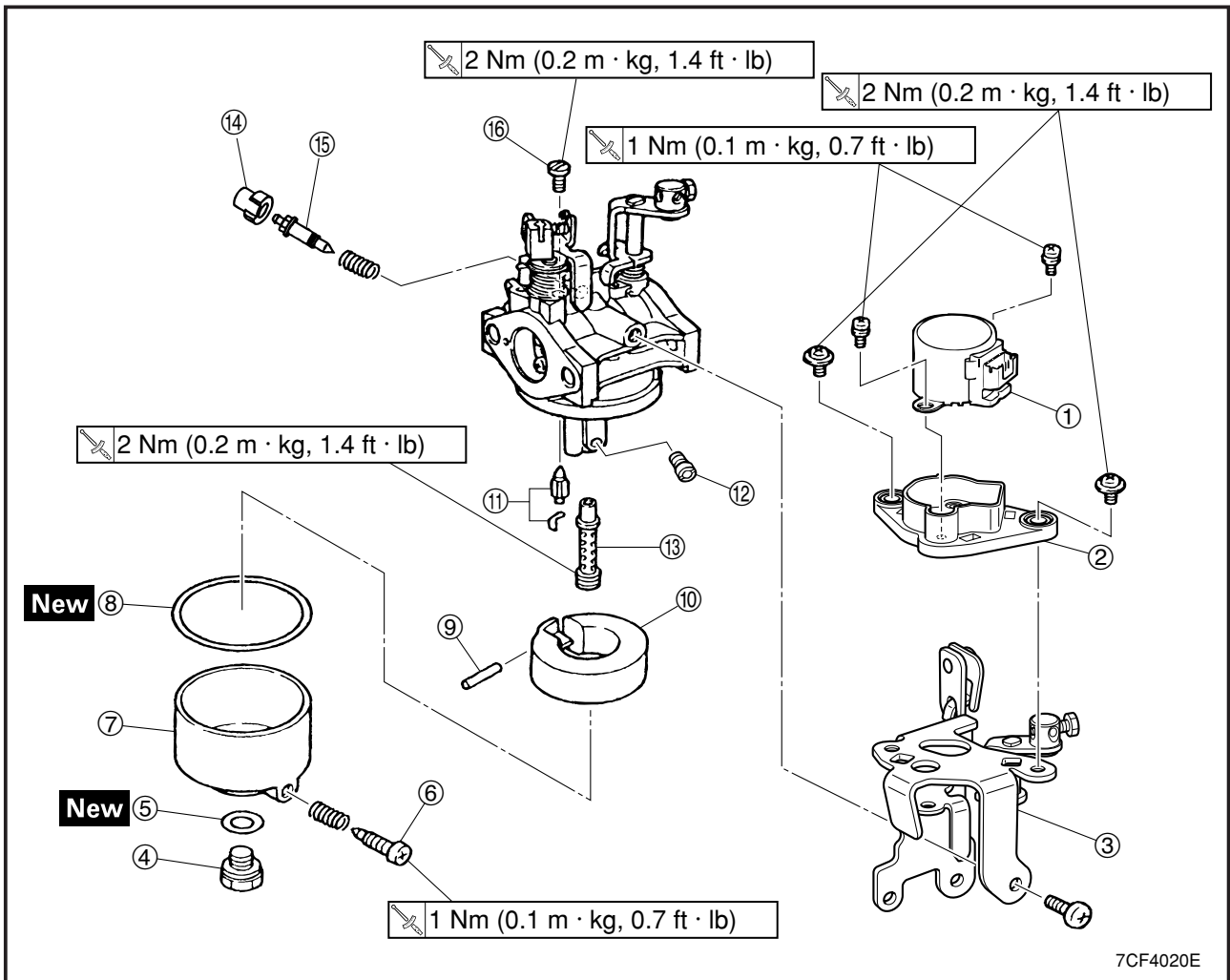


CARBURETOR DISASSEMBLY

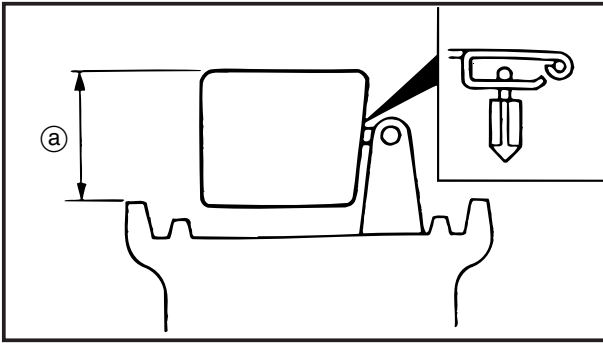


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Order	Job name	Q'ty	Remarks
	Carburetor disassembly		Disassemble the parts in the order listed below.
①	Throttle control motor	1	
②	Motor bracket	1	
③	Plate	1	
④	Bolt	1	
⑤	Gasket	1	
⑥	Drain screw	1	
⑦	Float chamber	1	
⑧	Float chamber gasket	1	
⑨	Float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



Order	Job name	Q'ty	Remarks
⑭	Cap	1	For assemble, reverse the disassembly procedure.
⑮	Pilot screw	1	
⑯	Pilot jet	1	



FLOAT HEIGHT INSPECTION

1. Measure:

- Float height
Out of specification → Replace.

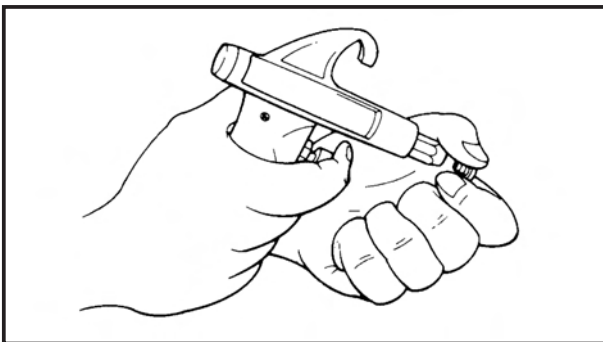
NOTE:

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



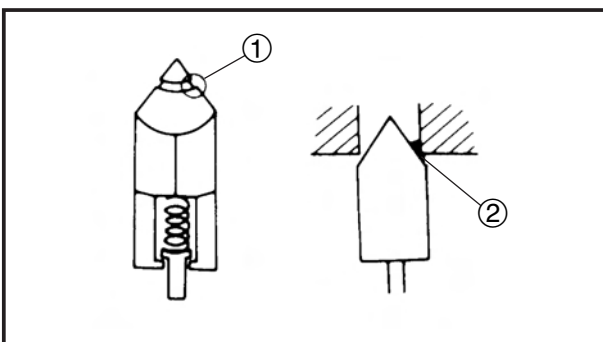
Float height:

16.0 mm (0.63 in)



2. Clean:

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

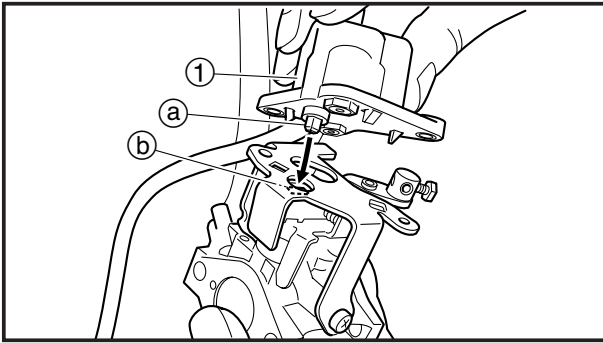


3. Inspect:

- Valve seat
Wear/damage → Replace.
Dirt → Clean.

① Wear at groove

② Dirt

**THROTTLE CONTROL MOTOR**

1. Install:

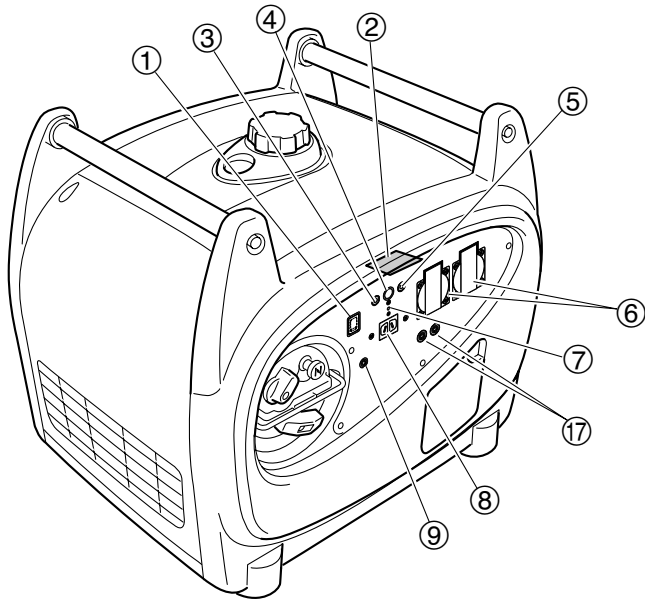
- Throttle control motor ①

NOTE:

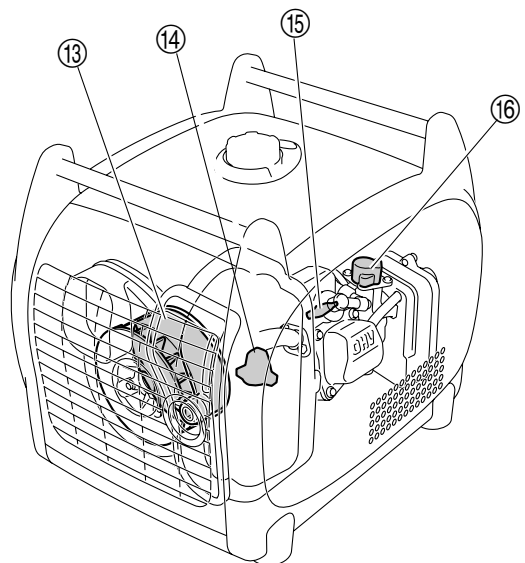
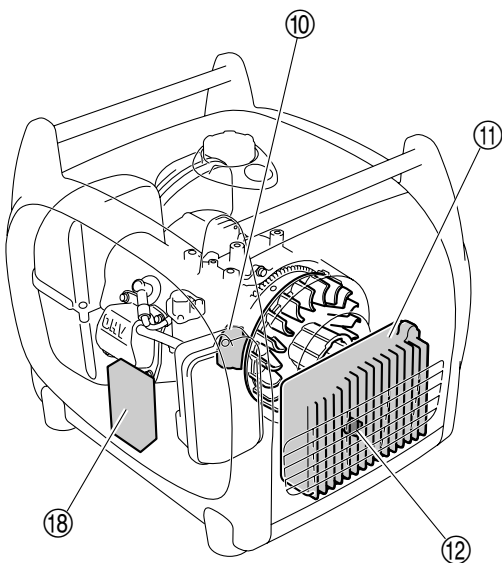
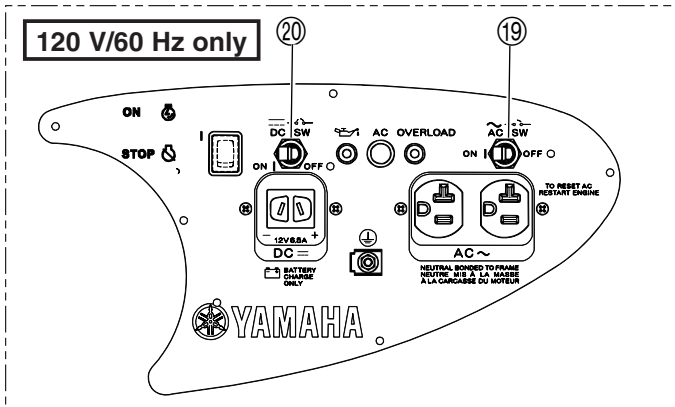
- Install the shaft ① of the throttle control motor by aligning it with the groove ② of the throttle shaft.
- Install the throttle valve, and then make sure that it moves smoothly.
- When installing the engine, fully open the throttle valve.



ELECTRICAL
ELECTRICAL COMPONENTS



- ① Engine switch
- ② Speed limiter
- ③ Oil warning light (Red)
- ④ Pilot light (Green)
- ⑤ Overload warning light (Red)
- ⑥ AC receptacle
- ⑦ DC circuit breaker
- ⑧ DC receptacle
- ⑨ Ground terminal
- ⑩ TCI unit
- ⑪ Control unit assembly
- ⑫ Rectifier
- ⑬ Generator assembly
- ⑭ Oil level switch
- ⑮ Spark plug
- ⑯ Throttle control motor
- ⑰ Twin tech (parallel running terminal)
- ⑱ Noise filter (For GERMANY)
- ⑲ AC switch (NFB: For CANADA)
- ⑳ DC switch (NFB: For CANADA)



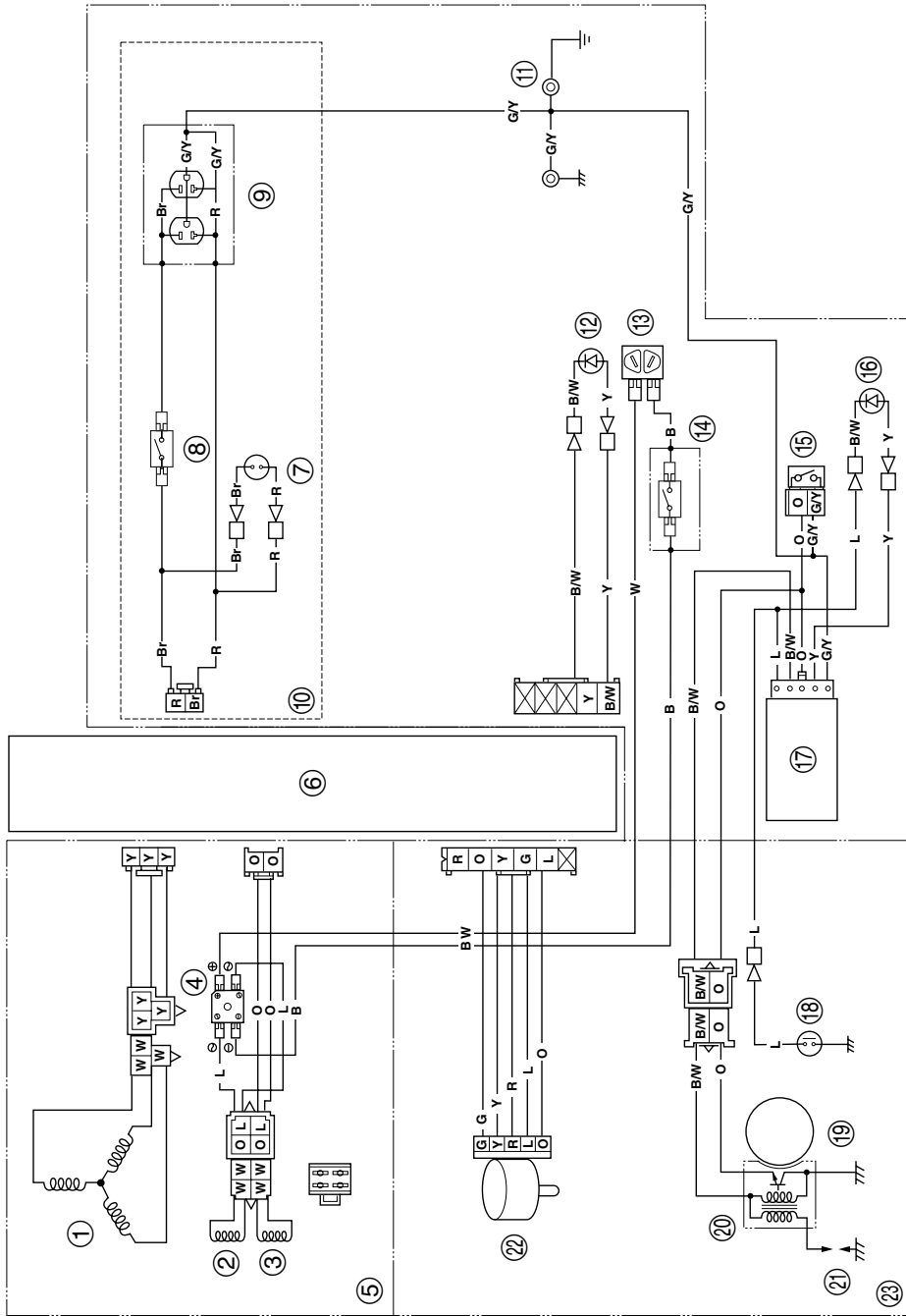


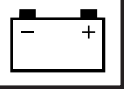
- ① AC coil
- ② DC charge coil
- ③ Sub coil
- ④ Rectifier
- ⑤ Generator assembly
- ⑥ Control unit assembly
- ⑦ Pilot light (Green)
- ⑧ AC switch (NFB)
- ⑨ AC receptacle (16.7A × 2)
- ⑩ Control box
- ⑪ Ground terminal
- ⑫ Overload warning light (Red)
- ⑬ DC receptacle (12V-6.5A)
- ⑭ DC switch (NFB)
- ⑮ Engine switch
- ⑯ Oil warning light (Red)
- ⑰ Speed limiter
- ⑱ Oil level switch
- ⑲ Magneto rotor
- ⑳ TCI unit
- ㉑ Spark plug
- ㉒ Throttle control motor
- ㉓ Engine assembly

COLOR CODE

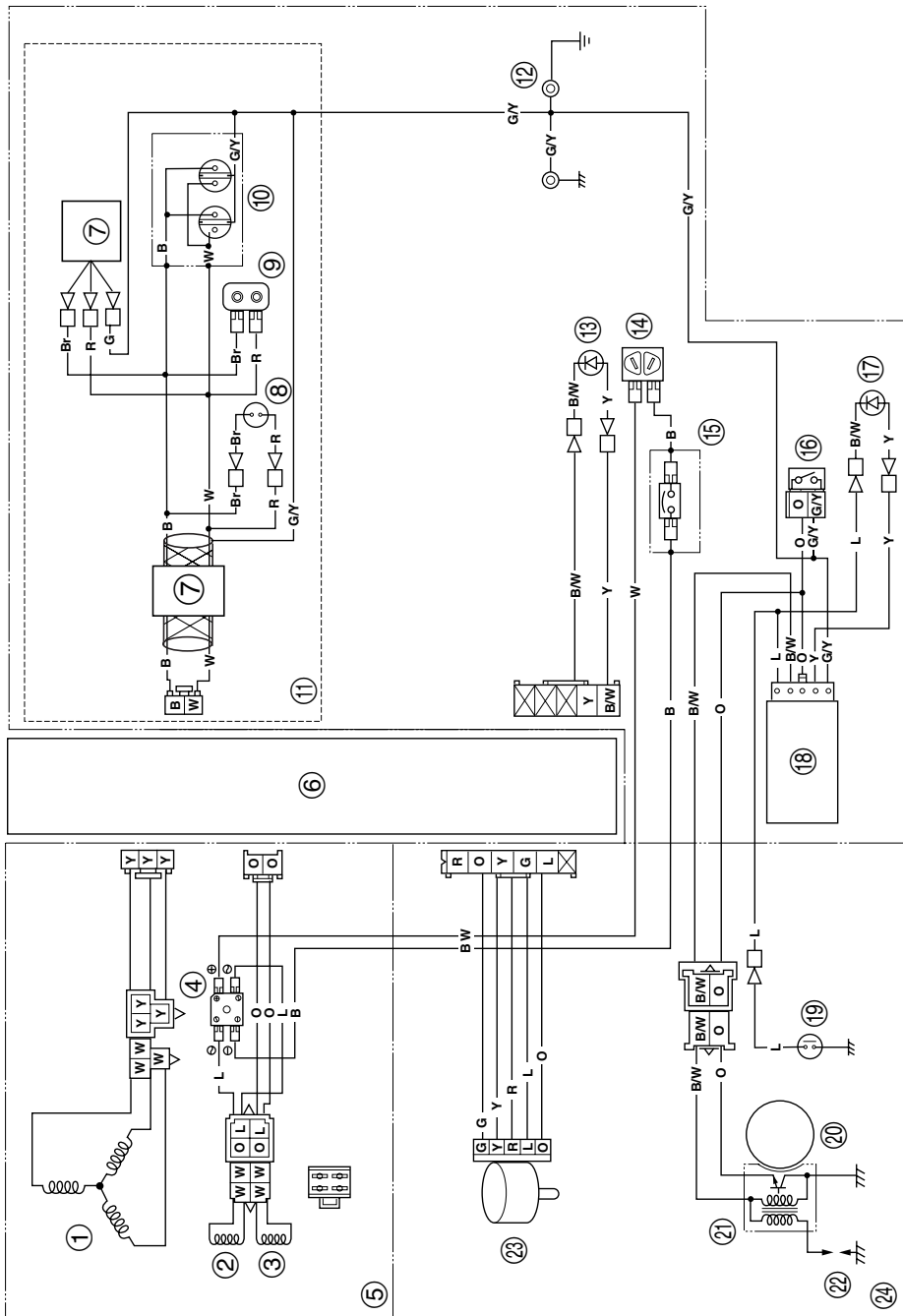
- B Black
- Br Brown
- G Green
- L Blue
- Or Orange
- R Red
- W White
- Y Yellow
- B/W Black/White
- G/Y Green/Yellow

**CIRCUIT DIAGRAM
120V/60Hz For CANADA**





- ① AC coil
- ② DC charge coil
- ③ Sub coil
- ④ Rectifier
- ⑤ Generator assembly
- ⑥ Control unit assembly
- ⑦ Noise filter
- ⑧ Pilot light (Green)
- ⑨ Twin tech(parallel running terminal)
- ⑩ AC receptacle (8.7A x 2)
- ⑪ Control box
- ⑫ Ground terminal
- ⑬ Overload warning light (Red)
- ⑭ DC receptacle (12V-8A)
- ⑮ DC circuit breaker
- ⑯ Engine switch
- ⑰ Oil warning light (Red)
- ⑱ Speed limiter
- ⑲ Oil level switch
- ⑳ Magneto rotor
- ㉑ TCI unit
- ㉒ Spark plug
- ㉓ Throttle control motor
- ㉔ 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



- ① AC coil
- ② DC charge coil
- ③ Sub coil
- ④ Rectifier
- ⑤ Generator assembly
- ⑥ Control unit assembly
- ⑦ Pilot light (Green)
- ⑧ Twin tech(parallel running terminal)

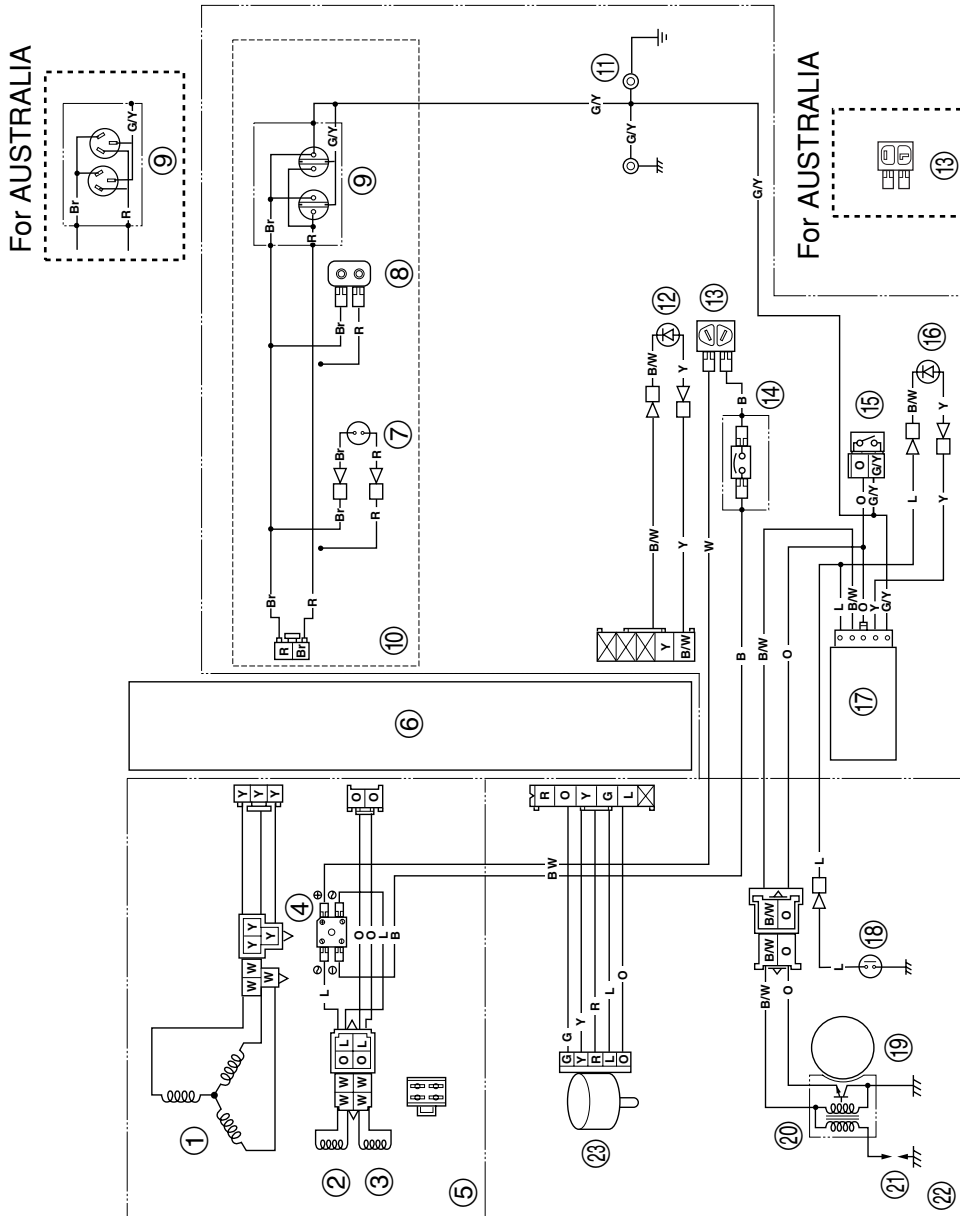
- ⑨ AC receptacle
(For AUSTRALIA: 9.1A × 2)
(For KOREA: 8.7A × 2)

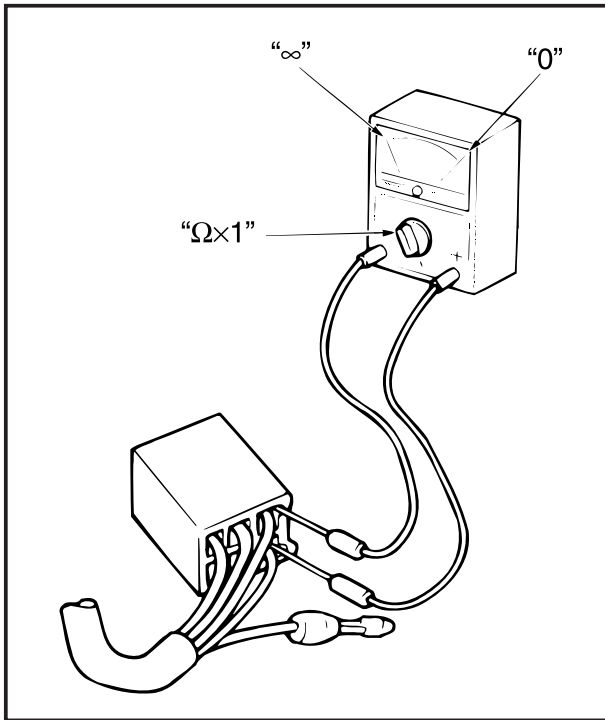
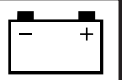
- ⑩ Control box
- ⑪ Ground terminal
- ⑫ Overload warning light (Red)
- ⑬ DC receptacle (12V-8A)
- ⑭ DC circuit breaker
- ⑮ Engine switch
- ⑯ Oil warning light (Red)
- ⑰ Speed limiter
- ⑱ Oil level switch
- ⑲ Magneto rotor
- ⑳ TCI unit
- ㉑ Spark plug
- ㉒ Throttle control motor
- ㉓ Engine assembly

COLOR CODE

- BBlack
- BrBrown
- GGreen
- LBlue
- OrOrange
- RRed
- WWhite
- YYellow
- B/WBlack/White
- G/YGreen/Yellow

230V/50Hz For AUSTRALIA
220V/60Hz For KOREA





SWITCHES

CHECKING SWITCH CONTINUITY

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

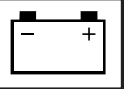


Pocket tester:

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

NOTE:

- Remove the following part(s) before troubleshooting.
 - 1) Front cover and rear cover
 - 2) Spark plug
 - 3) Drain the engine oil
- Use the following special tool(s) for troubleshooting.

 **Pocket tester:**
YU-03112, 90890-03112

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

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

↓ GOOD

NO GOOD →

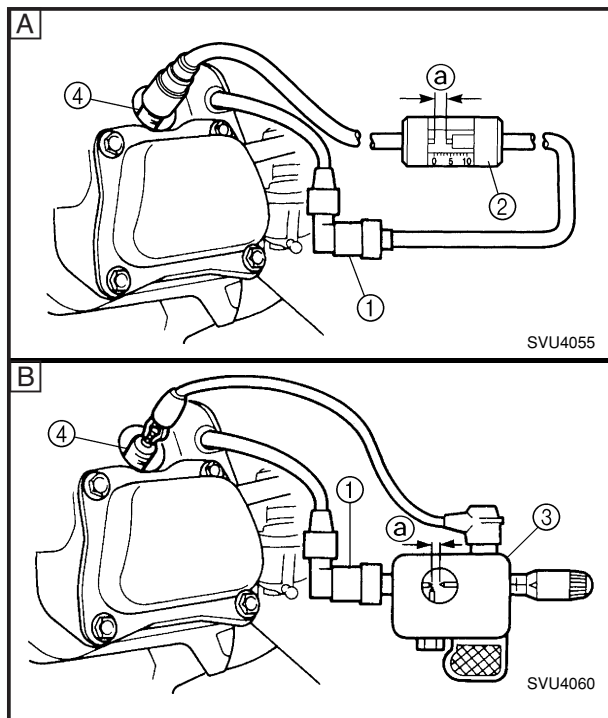
Repair or replace the spark plug.

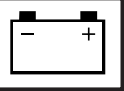
- Ignition spark gap
 - Disconnect the spark plug cap ① from the spark plug.
 - Connect the dynamic spark tester ② or ignition checker ③ as shown.

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

- A** For USA
- B** Except for USA

- Turn the crankshaft and measure the ignition spark gap ②.





 **Minimum spark gap:**
6 mm (0.24 in)

OUT OF SPECIFICATION
OR NO SPARK

MEETS SPECIFICATION

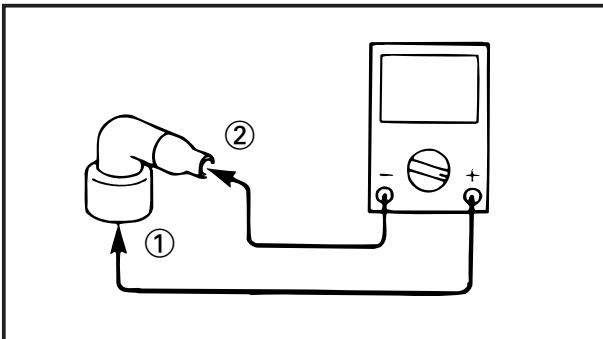
The ignition system is good.

3. Spark plug cap

- Remove the spark plug cap.
- Connect the pocket tester ($\Omega \times 1k$) to the spark plug.

Tester (+) lead → Spark plug side ①

Tester (-) lead → High-tension cord side ②



 **Spark plug cap resistance:**
4.0 ~ 6.0 k Ω at 20 °C (68 °F)

MEETS SPECIFICATION

OUT OF SPECIFICATION

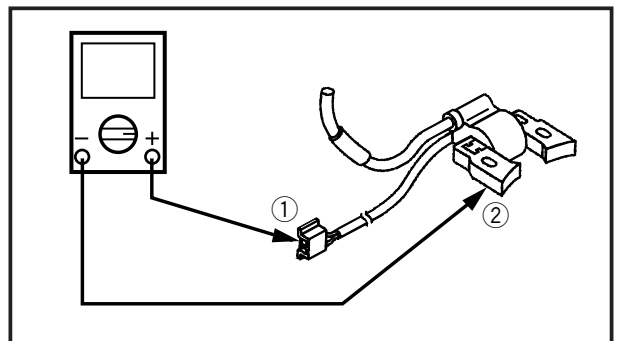
Repair or replace the spark plug.


4. Ignition coil resistance

- Remove the ignition coil.
- 1) Primary coil resistance
- Connect the pocket tester ($\Omega \times 1k$) to the primary terminal.

Tester (+) lead → Black/White terminal ①

Tester (-) lead → Ground terminal ②



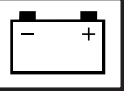
 **Primary coil resistance:**
1.35 $\Omega \pm 20\%$ at 20 °C (68 °F)

MEETS SPECIFICATION

OUT OF SPECIFICATION

Replace the ignition coil.

*

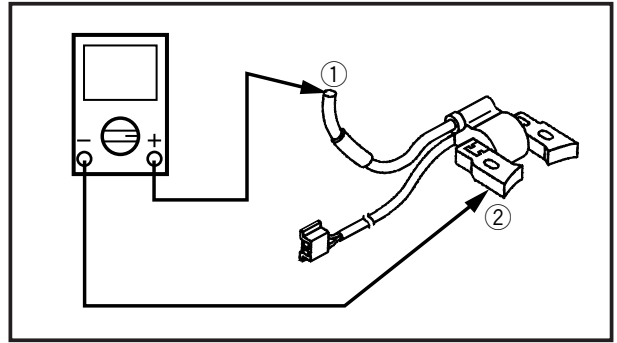


2) Secondary coil resistance

- Connect the pocket tester ($\Omega \times 1k$) to the secondary terminal.

Tester (+) lead → High-tension cord ①

Tester (-) lead → Ground terminal ②



	<p>Secondary coil resistance: $6.8\text{ k}\Omega \pm 20\%$ at $20\text{ }^\circ\text{C}$ ($68\text{ }^\circ\text{F}$)</p>
--	---

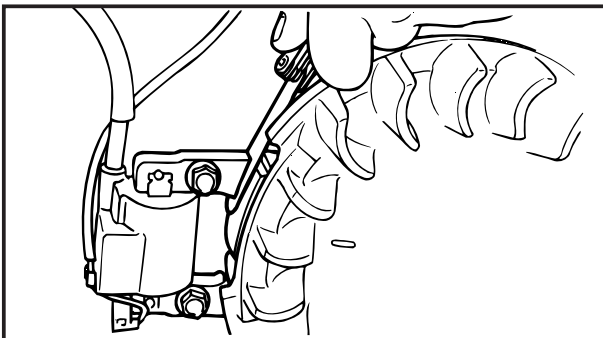
MEETS SPECIFICATION

OUT OF SPECIFICATION

Replace the ignition coil.

5. Air gap

- Measure the thickness between the magnet rotor and ignition coil.



	<p>Air gap: $0.5 \pm 0.1\text{ mm}$ ($0.02 \pm 0.004\text{ in}$)</p>
--	--

MEETS SPECIFICATION

OUT OF SPECIFICATION

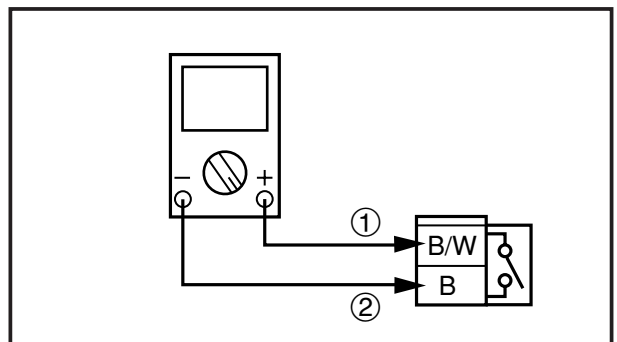
Adjust the air gap.

6. Engine switch

- Disconnect the engine switch coupler in the control box.
- Connect the pocket tester ($\Omega \times 1k$) to the engine switch terminal.

Tester (+) lead → Black/white terminal ①

Tester (-) lead → Black terminal ②



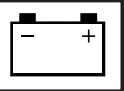
	<p>Switch "ON" → Continuity Switch "STOP" → No continuity</p>
--	--

CONTINUITY

NO CONTINUITY

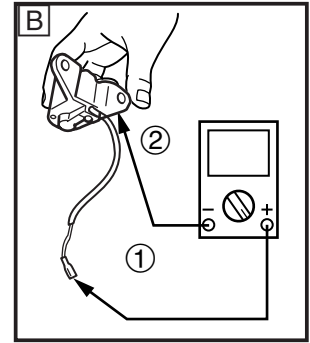
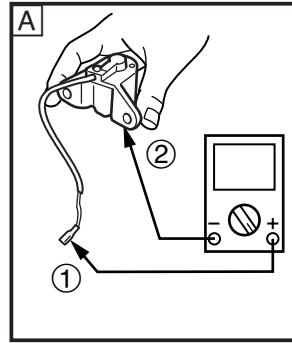
Replace the engine switch.

*



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

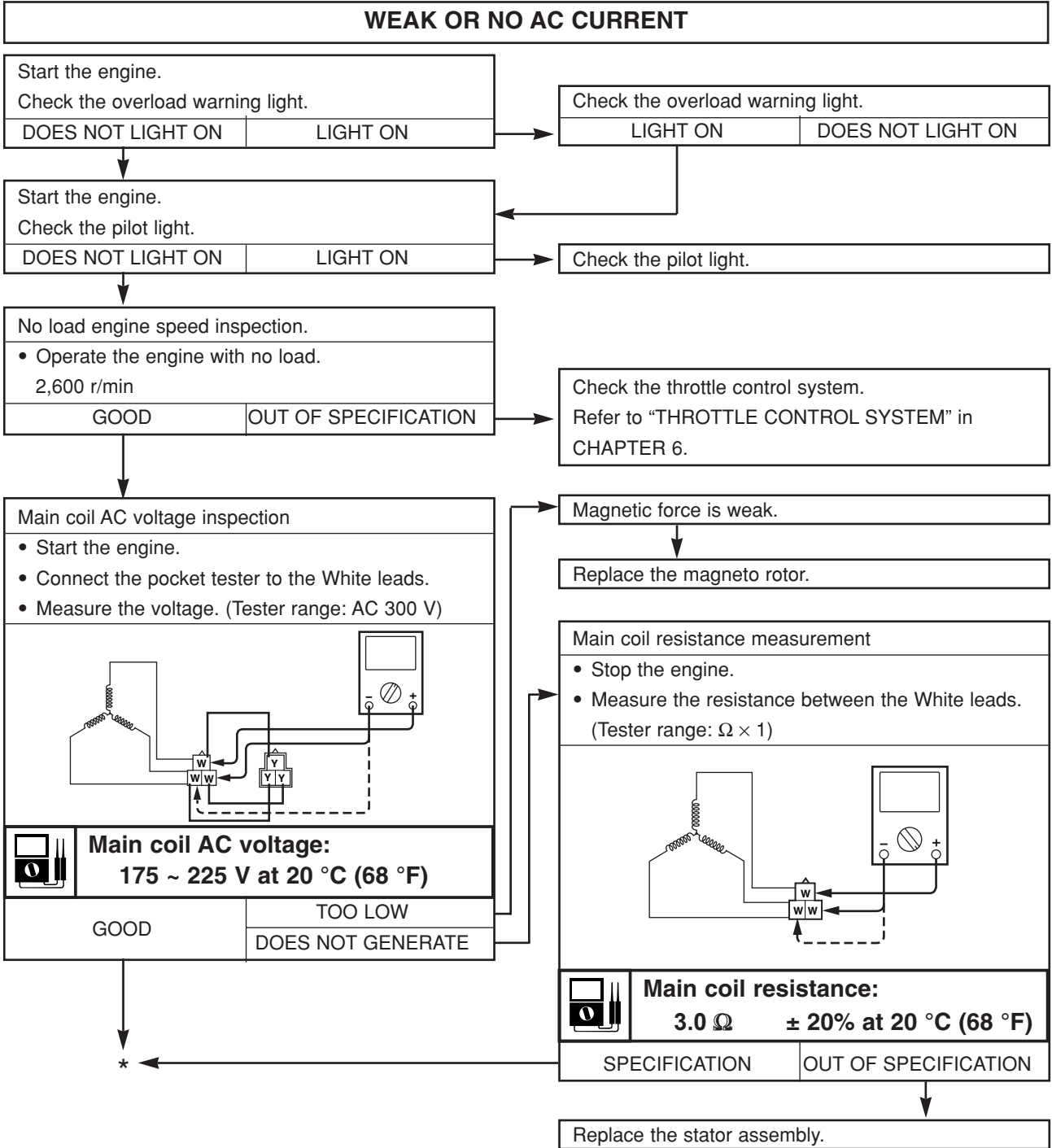
Correct or replace the connector.

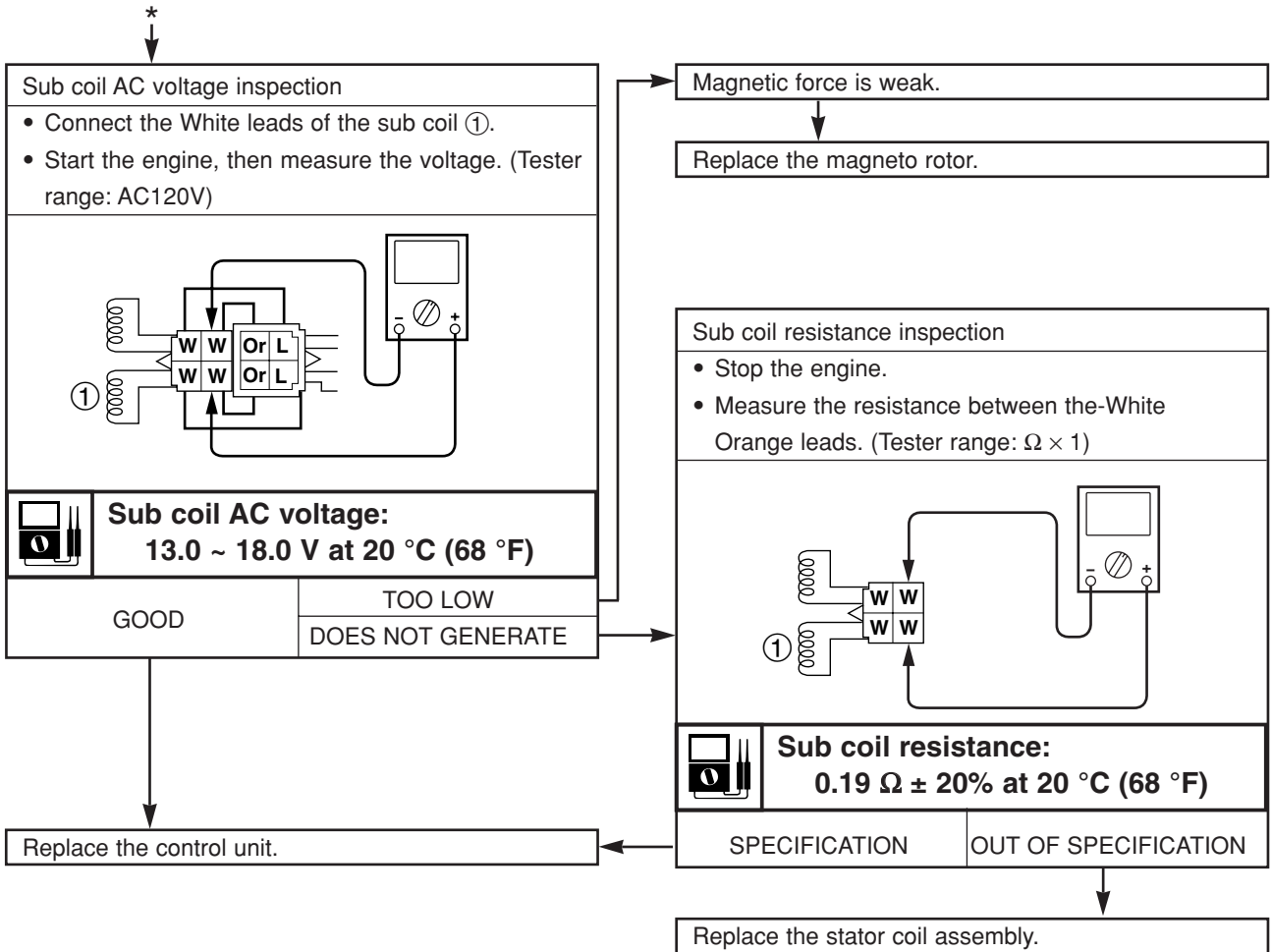
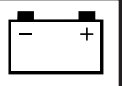
Replace the speed limiter.

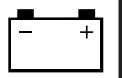
GOOD

Replace the TCI unit.

**GENERATOR SYSTEM
TROUBLESHOOTING CHART**







TROUBLESHOOTING CHART

WEAK OR NO DC CURRENT

No load engine speed inspection.

- Operate the engine with no load.
2,600 r/min

GOOD	OUT OF SPECIFICATION
------	----------------------

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

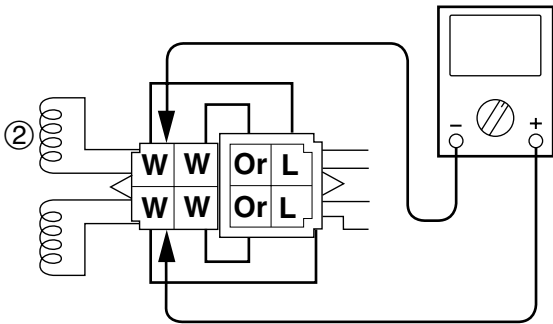
Check the DC circuit breaker.

GOOD	DISCONNECTED
------	--------------

Replace the DC circuit breaker.

DC coil DC voltage inspection

- Connect sub coil ② White leads.
- Start the engine, then measure the voltage. (Tester range: DC 20V)

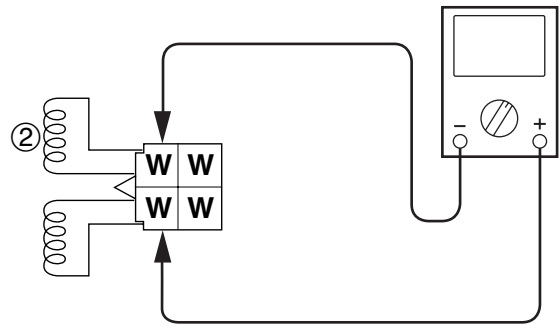


	DC coil DC voltage: 17 ~ 23 V at 20 °C (68 °F)
GOOD	TOO LOW DOES NOT GENERATE

Magnetic force is weak.
Replace the magneto rotor.

DC coil resistance inspection

- Stop the engine.
- Measure the resistance between the-White. (Tester range: $\Omega \times 1$)



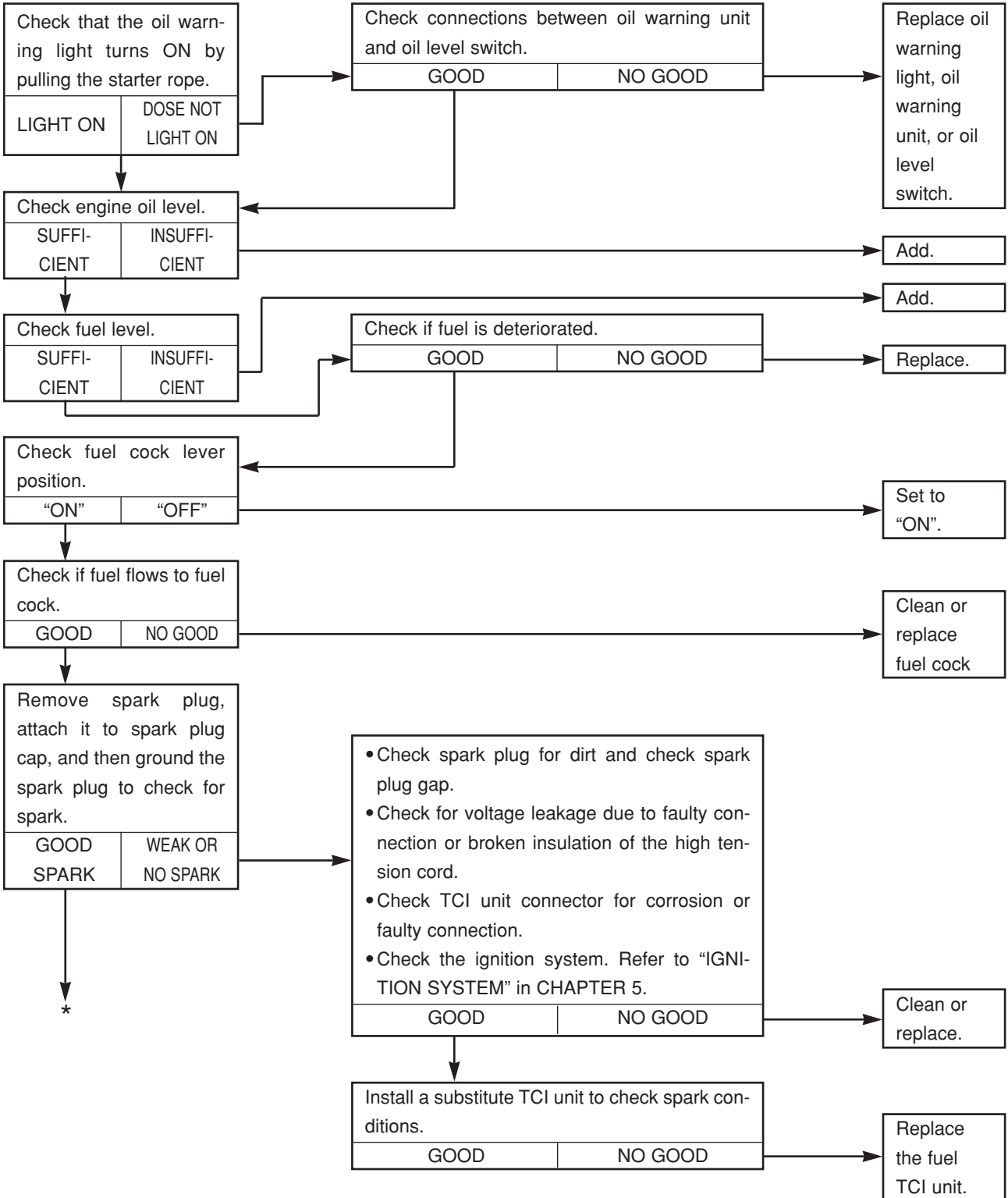
	DC coil resistance: 0.12 $\Omega \pm 20\%$ at 20 °C (68 °F)
SPECIFICATION	OUT OF SPECIFICATION

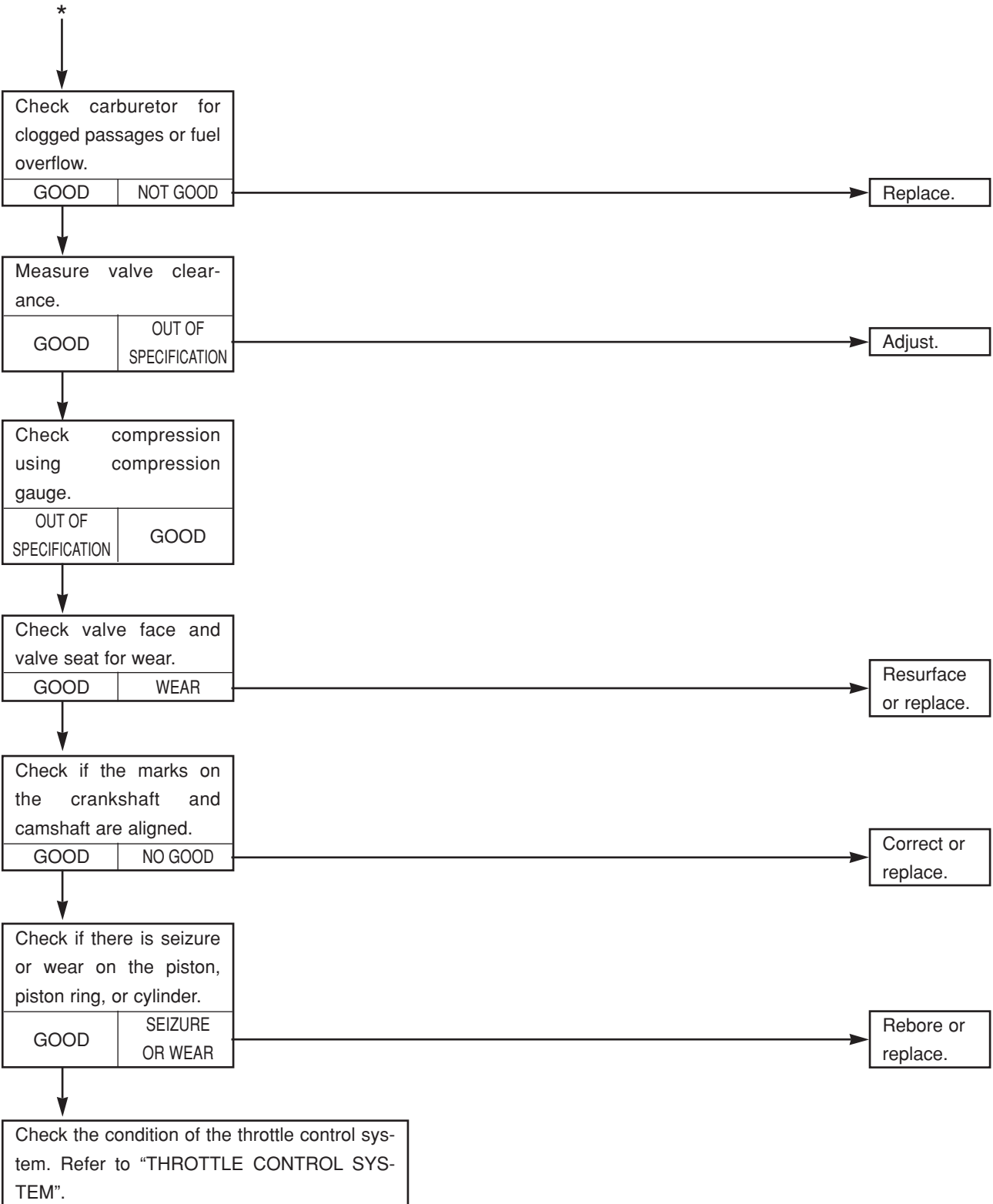
Replace the rectifier.

Replace the DC coil.

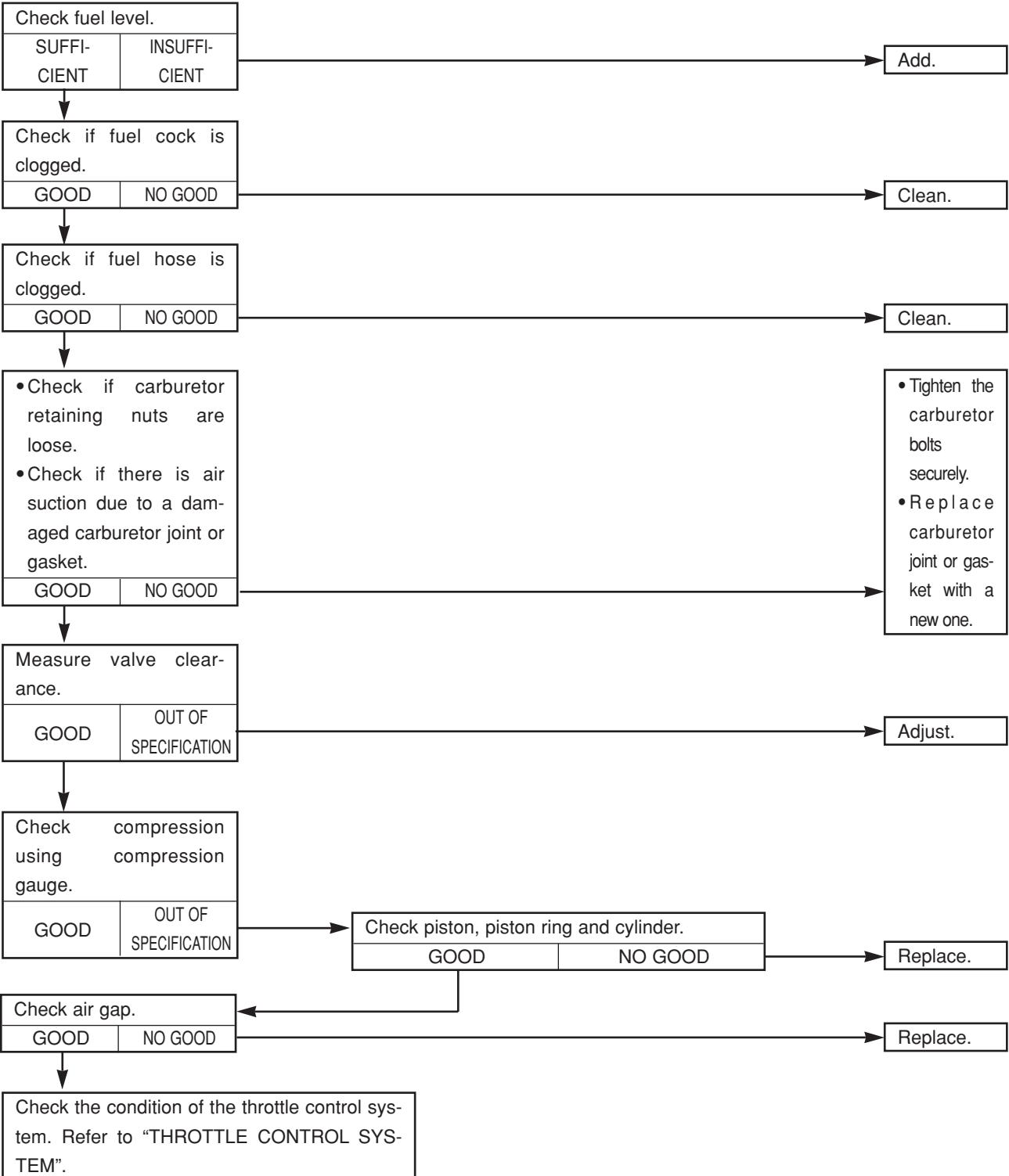
**TROUBLE SHOOTING
ENGINE**

ENGINE DOES NOT START

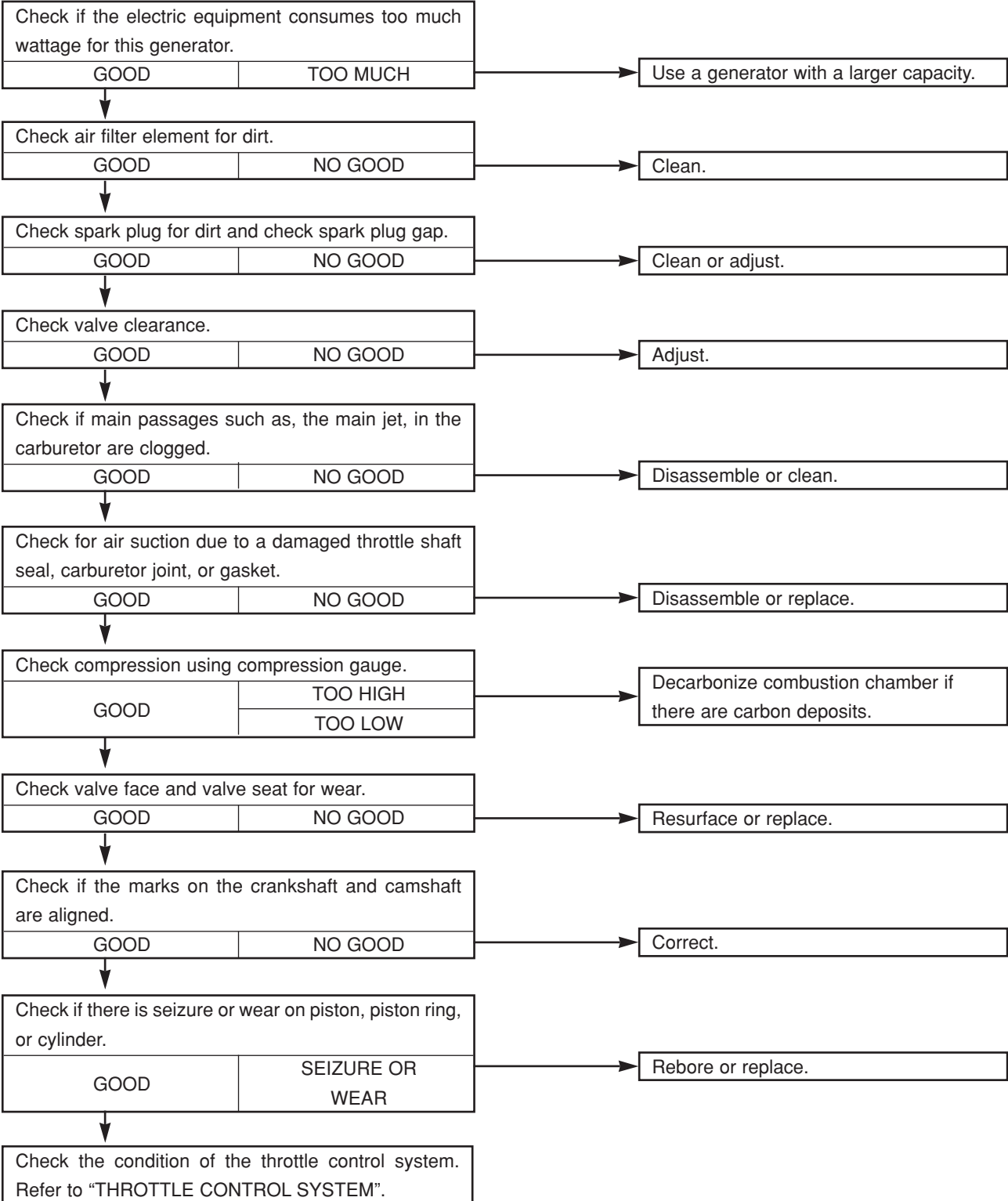


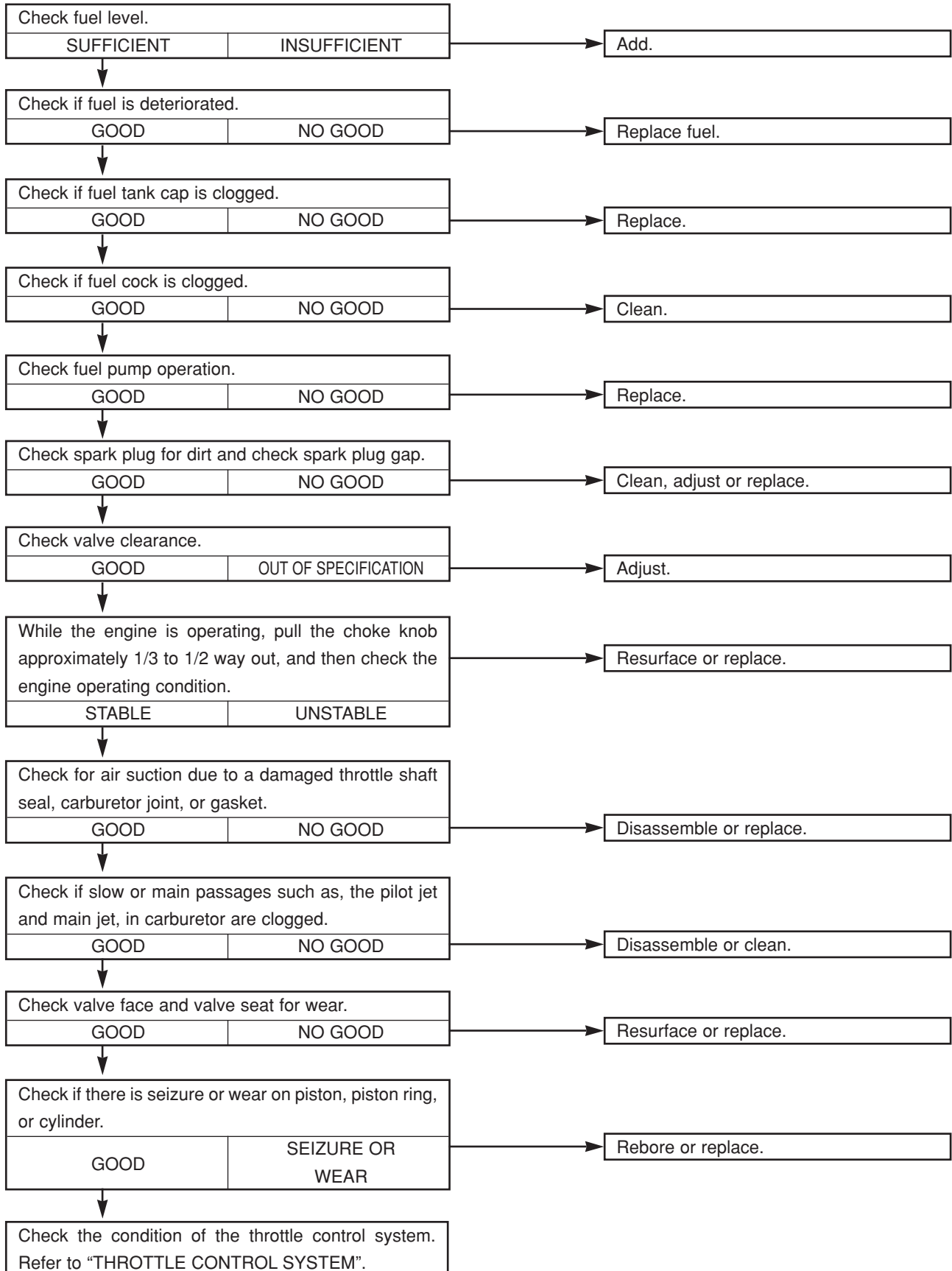


ENGINE STARTS BUT STALLS



ENGINE SPEED DOES NOT INCREASE



ENGINE SPEED IS UNEVEN

THROTTLE CONTROL SYSTEM

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

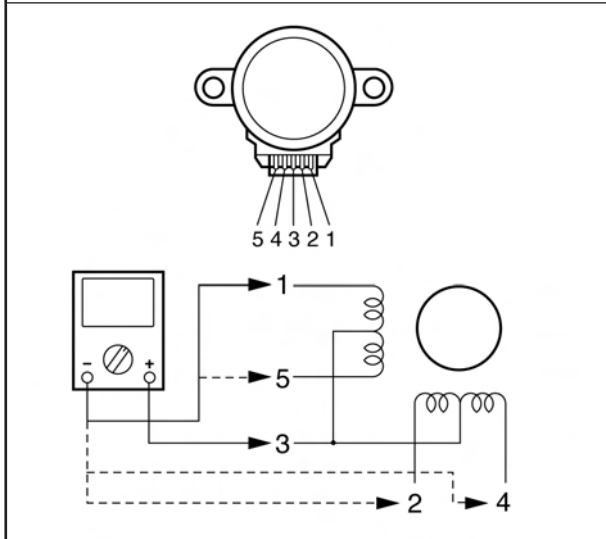
Check AC output.	
GOOD	NO GOOD

Refer to "GENERATOR SYSTEM" in CHAPTER 5.

Rotate the shaft of the throttle control motor to check if it turns smoothly with slight resistance.	
GOOD	NO GOOD

Replace the throttle control motor.

Measure the coil resistance between 3-1, 3-2, 3-4, and 3-5 of the throttle control motor. (Tester range: $\Omega \times 1$)



	Coil resistance: 250 Ω \pm 20% at 20 °C (68 °F)
--	---

SPECIFICATION	OUT OF SPECIFICATION
---------------	----------------------

Replace the throttle control motor.

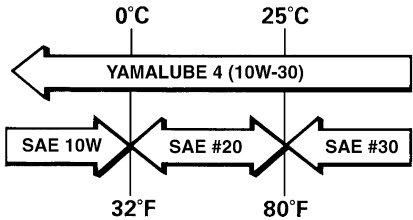
Check the connections of the wire harness connectors and couplers, and the wires for an open circuit or short circuit.	
GOOD	NO GOOD

Correct or replace.

Replace the control motor.

SPECIFICATIONS

GENERAL SPECIFICATIONS

A Unit	EF2400iS
B Model code number	7CF2/7CF3
C Dimensions: D Overall length mm (in) E Overall width mm (in) F Overall height mm (in) G Dry weight kg (lb)	527 (20.7) 419 (16.5) 461 (18.1) 33 (72.8) (For GERMANY) 32 (70.5) (Except for GERMANY)
H Engine: I Engine type K Cylinder arrangement L Displacement L (cm ³) M Bore × Stroke mm (in) N Compression ratio O Rated output 50/60 Hz · kW (PS) / 3,200 r / min P Rated engine speed r / min Q Operating hours 50/60 Hz · Hrs R 1/4 rated load S W / rated load T Fuel V Fuel tank capacity L (Imp gal, US gal) W Engine oil capacity L (Imp qt, US qt) X Engine recommended oil	J 4-stroke OHV forced air cooled 1 0.171 (171) 66.0 × 50.0 (2.60 × 1.97) 8.5 : 1 2.5 (3.4) 3,200 8.6 5.0 U Unleaded regular gasoline 6.0 (1.32, 1.59) 0.6 (0.53, 0.63) Y 4-stroke engine oil API service classification SE or SF, if not available, SD <div data-bbox="906 1323 1321 1541" style="text-align: center;">  <p>The diagram shows a horizontal bar labeled 'YAMALUBE 4 (10W-30)' with arrows pointing left. Below it are three boxes labeled 'SAE 10W', 'SAE #20', and 'SAE #30' with arrows pointing right. Vertical lines connect the temperature markers 0°C and 25°C to the top of the bar, and 32°F and 80°F to the bottom. The SAE 10W grade is associated with 0°C and 32°F, SAE #20 with 25°C and 80°F, and SAE #30 with 80°F.</p> </div>
Z Electrical: a Ignition system c Ignition timing d Spark plug type e Spark plug gap mm (in)	b TCI BTDC 23°±3° BPR4ES (NGK) 0.7 ~ 0.8 (0.028 ~ 0.031)
f Generator: g Type i Initial excitation k Driving method m Rated power factor	h Multi pole rotating field magnet j Permanent magnet l Direct connection 1

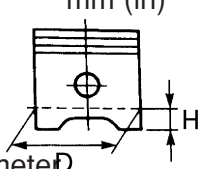
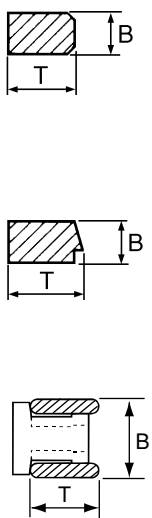
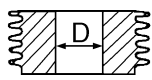
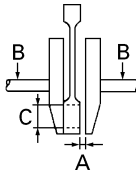
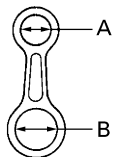
GENERAL SPECIFICATIONS

SPEC



[A] Unit	EF2400iS																							
[B] Frequency variation	[D] Less than 1 % [E] Settling [G] Settling time [F] Less than 0.1 % [H] Less than 1 sec																							
[I] Voltage fluctuation	[J] Instantaneous [L] Settling [N] Settling time [K] Less than 20 % [M] Less than 3 % [O] Less than 3 sec																							
[P] AC output	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 25%;">For CANADA</th> <th style="width: 25%;">For GERMANY</th> <th style="width: 25%;">For AUSTRALIA</th> <th style="width: 25%;">For KOREA</th> </tr> </thead> <tbody> <tr> <td>120</td> <td>230</td> <td></td> <td>220</td> </tr> <tr> <td>60</td> <td>50</td> <td></td> <td>60</td> </tr> <tr> <td colspan="4" style="text-align: center;">2.0</td> </tr> <tr> <td>16.7</td> <td>8.7</td> <td></td> <td>9.1</td> </tr> </tbody> </table>				For CANADA	For GERMANY	For AUSTRALIA	For KOREA	120	230		220	60	50		60	2.0				16.7	8.7		9.1
For CANADA	For GERMANY	For AUSTRALIA	For KOREA																					
120	230		220																					
60	50		60																					
2.0																								
16.7	8.7		9.1																					
[Q] Rated voltage	V																							
[R] Frequency	Hz																							
[S] Rated output	kVA																							
[T] Rated current	A																							
[U] DC output	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 25%;">For CANADA</th> <th style="width: 25%;">For GERMANY</th> <th style="width: 25%;">For AUSTRALIA</th> <th style="width: 25%;">For KOREA</th> </tr> </thead> <tbody> <tr> <td colspan="4" style="text-align: center;">12</td> </tr> <tr> <td>52</td> <td colspan="2" style="text-align: center;">96</td> <td></td> </tr> <tr> <td>6.5</td> <td colspan="2" style="text-align: center;">8</td> <td></td> </tr> </tbody> </table>				For CANADA	For GERMANY	For AUSTRALIA	For KOREA	12				52	96			6.5	8						
For CANADA	For GERMANY	For AUSTRALIA	For KOREA																					
12																								
52	96																							
6.5	8																							
[V] Rated voltage	V																							
[W] Rated output	W																							
[X] Rated current	A																							
[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	3,200																						
[e] Voltage regulation		[f] Voltage feed back system																						
[g] Voltage stability		[h] Within ± 1 %																						
[i] Frequency stability	Hz	[j] Within ± 0.1																						
[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 type		[t] B type																						
[u] Receptacle	AC	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 25%;">20 A (Duples) × 2</td> <td style="width: 25%;">16A</td> <td colspan="2" style="width: 50%; text-align: center;">15A</td> </tr> </table>			20 A (Duples) × 2	16A	15A																	
20 A (Duples) × 2	16A	15A																						
	DC	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td colspan="2" style="width: 50%; text-align: center;">12 A × 1</td> <td style="width: 25%; text-align: center;">20 A × 1</td> <td style="width: 25%; text-align: center;">12A × 1</td> </tr> </table>			12 A × 1		20 A × 1	12A × 1																
12 A × 1		20 A × 1	12A × 1																					

MAINTENANCE SPECIFICATIONS
ENGINE

[A] Unit	[B] Standard	[C] Limit
<p>[D] Piston:</p> <p>[E] Piston clearance</p> <p>[F] Piston skirt " D "</p> <p>[G] Measuring point " H "</p> <p>[H] Piston pin hole inside diameter D</p> 	<p>mm (in)</p> <p>0.015 ~ 0.040 (0.0006 ~ 0.0016)</p> <p>66.0 (2.598)</p> <p>10 mm (0.4)</p> <p>16.002 ~ 16.013 (0.6300 ~ 0.6304)</p>	<p>0.1 (0.004)</p> <p>65.9 (2.594)</p> <p>•••</p> <p>16.020 (0.6307)</p>
<p>[I] Piston pin:</p> <p>[J] Piston pin diameter</p>	<p>mm (in)</p> <p>15.995 ~ 16.000 (0.6297 ~ 0.6299)</p>	<p>15.950 (0.6280)</p>
<p>[K] Piston ring:</p> <p>[L] Top ring</p> <p>[M] Type</p> <p>[O] Dimensions " B × T "</p> <p>[P] End gap</p> <p>[Q] Side clearance</p> <p>[R] 2nd ring</p> <p>[S] Type</p> <p>[U] Dimensions " B × T "</p> <p>[V] End gap</p> <p>[W] Side clearance</p> <p>[X] Oil ring</p> <p>[Y] Type</p> <p>[a] Dimensions " B × T "</p> <p>[b] End gap</p> 	<p>mm (in)</p> <p>[N] Barrel face</p> <p>1.5 × 2.7 (0.059 ~ 0.106)</p> <p>0.2 ~ 0.4 (0.008 ~ 0.016)</p> <p>0.04 ~ 0.08 (0.0016 ~ 0.0031)</p> <p>[T] Taper</p> <p>1.5 × 2.7 (0.059 ~ 0.106)</p> <p>0.2 ~ 0.4 (0.008 ~ 0.016)</p> <p>0.02 ~ 0.06 (0.0008 ~ 0.0024)</p> <p>[Z] Solid</p> <p>2.5 × 2.7 (0.098 ~ 0.106)</p> <p>0.2 ~ 0.4 (0.008 ~ 0.016)</p>	<p>•••</p> <p>•••</p> <p>0.9 (0.0354)</p> <p>0.1 (0.0039)</p> <p>•••</p> <p>•••</p> <p>0.9 (0.0354)</p> <p>0.1 (0.0039)</p> <p>•••</p> <p>•••</p> <p>0.9 (0.0354)</p>
<p>[c] Cylinder:</p> <p>[d] Inside diameter " D "</p> <p>[e] Taper limit</p> <p>[f] Warpage limit</p> 	<p>mm (in)</p> <p>66.00 ~ 66.02 (2.5984 ~ 2.5990)</p> <p>•••</p> <p>•••</p>	<p>66.020 (2.5990)</p> <p>0.05 (0.002)</p> <p>0.05 (0.002)</p>
<p>[g] Crankshaft:</p> <p>[h] Big end side clearance " A "</p> <p>[i] Runout " B "</p> <p>[j] Crank pin diameter " C "</p> 	<p>mm (in)</p> <p>0.2 ~ 0.60 (0.008 ~ 0.024)</p> <p>•••</p> <p>28.0 (1.102)</p>	<p>0.75 (0.029)</p> <p>0.04 (0.0016)</p> <p>27.9 (1.098)</p>
<p>[k] Connecting rod:</p> <p>[l] Small end diameter " A "</p> <p>[m] Oil clearance</p> <p>[n] Small end diameter " B "</p> <p>[o] Oil clearance</p> 	<p>mm (in)</p> <p>16.006 ~ 16.020 (0.6301 ~ 0.6307)</p> <p>0.006 ~ 0.025 (0.0002 ~ 0.0010)</p> <p>28.000 ~ 28.015 (1.1023 ~ 1.1029)</p> <p>0.015 ~ 0.040 (0.0006 ~ 0.0016)</p>	<p>•••</p> <p>•••</p> <p>•••</p> <p>0.1 (0.004)</p>

MAINTENANCE SPECIFICATIONS

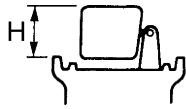


[A] Unit	[B] Standard	[C] Limit	
[D] Camshaft: mm (in) [E] Camshaft outside diameter [F] Cam dimension <div style="display: flex; align-items: center;"> <div style="margin-right: 20px;"> " A " A " B " B </div> </div> [G] Camshaft diameter	IN	EX	
	26.9 ±0.05 (1.06 ±0.002)	26.68 ±0.05 (1.05 ±0.002)	
	22.0 ±0.05 (0.87 ±0.002)	22.03 ±0.05 (0.87 ±0.002)	
	14.965 ~ 14.990 (0.5892 ~ 0.5902)		14.950 (0.59)
[H] Valve: mm (in) [I] Valve [J] Face diameter " A " IN EX [K] Stem diameter " B " IN EX [L] Stem length " C " IN EX [M] Valve face contact width " D " IN EX [N] Valve stem runout limit " θ " IN EX [O] Valve guide [P] Guide inside diameter IN EX [Q] Stem to guide clearance IN EX [R] Valve clearance (cold) IN EX			
	24.0 (0.94)	•••	
	22.0 (0.87)	•••	
	5.5 (0.22)	•••	
	5.5 (0.22)	•••	
	65.9 (2.59)	•••	
	66.2 (2.61)	•••	
	0.7 (0.03)	1.7 (0.067)	
	0.7 (0.03)	1.7 (0.067)	
	•••	0.01 (0.0004)	
	•••	90°	
	5.5 (0.22)	5.4 (0.21)	
	5.5 (0.22)	5.4 (0.21)	
	0.04 ~ 0.06 (0.0016 ~ 0.0020)	•••	
	0.06 ~ 0.08 (0.002 ~ 0.003)	•••	
0.1 (0.004)	•••		
0.1 (0.004)	•••		
[S] Push rod: mm (in)			
[T] Runout limit	0.5 (0.02)	•••	
[U] Valve spring: mm (in)			
[V] Free length IN	26.5 (1.04)	25.0 (0.98)	
EX	26.5 (1.04)	25.0 (0.98)	
[W] Set length IN	21.6 (0.85)	•••	
EX	21.6 (0.85)	•••	
[X] Set force IN	4.5 kg (9.9 lb)	•••	
EX	4.5 kg (9.9 lb)	•••	
[Y] Tilt limit	•••	1.6 (0.06)	

MAINTENANCE SPECIFICATIONS



[A] Unit	[B] Standard	[C] Limit
[D] Carburetor: mm (in)		
[E] Type / manufacture	BV20-15 / MIKUNI	•••
[F] I.D.mark	7CF 10	•••
[G] Bore size	Ø 15 (0.5906)	•••
[H] Main jet	#86.3	•••
[I] Main air jet	Ø 1.8 (0.0709)	•••
[J] Pilot air jet	Ø 1.1 (0.0433)	•••
[K] Pilot outlet	Ø 0.9 (0.0354)	•••
[L] Valve seat size	Ø 1.8 (0.0709)	•••
[M] Main nozzle	31B	•••
[N] Pilot jet	#35	•••
[O] Throttle valve	#150	•••
[P] Float height " H "	16.0 (0.63)	•••



GENERATOR AND ELECTRICAL

[A] Unit	[B] Standard	[C] Limit
<p>[D] Generator:</p> <p>[E] Main coil AC voltage (3 phase) (V/r/min)</p> <p>[F] (With the throttle control motor coupler disconnected)</p> <p>[G] Sub coil AC voltage (single phase) (V/r/min)</p> <p>[H] (With the throttle control motor coupler disconnected)</p> <p>[I] DC coil DC voltage (V/r/min)</p> <p>[J] Coil resistance</p> <p>[K] Main coil ($\Omega \pm 20\%$)</p> <p>[W - W (R - S), (S - T), (R - T)]</p> <p>[L] With coupler disconnected]</p> <p>[M] Sub coil ($\Omega \pm 20\%$)</p> <p>[W - W (R - S), (S - T), (R - T)]</p> <p>[N] With coupler disconnected]</p> <p>[O] DC coil ($W \pm 20\%$)</p> <p>[P] [W - W With 4P coupler disconnected]</p>	<p>175 ~ 225 / 2,600</p> <p>13.0 ~ 18.0 / 2,600</p> <p>17.0 ~ 23.0 / 2,600</p> <p>3.0</p> <p>0.19</p> <p>0.12</p>	<p>...</p> <p>...</p> <p>...</p> <p>...</p> <p>...</p> <p>...</p> <p>...</p>
<p>[Q] Electrical:</p> <p>[R] Ignition system</p> <p>[T] Ignition timing</p> <p>[U] Ignition coil</p> <p>[V] Primary coil resistance ($\Omega \pm 20\%$)</p> <p>[W] Secondary coil resistance ($k\Omega \pm 20\%$)</p> <p>[X] Spark plug cap resistance ($k\Omega$)</p> <p>[Y] Spark plug minimum spark gapmm(in)</p>	<p>[S] TCI</p> <p>BTDC $23^\circ \pm 3^\circ$</p> <p>1.35</p> <p>6.8</p> <p>4.0 ~ 6.0</p> <p>6 (0.24)</p>	<p>...</p> <p>...</p> <p>...</p> <p>...</p> <p>...</p> <p>...</p>



TIGHTENING TORQUE

[A] Item	[B] Thread size	[C] Tightening torque Nm (m·kg, ft·lb)
[D] Spark plug	M14 × 1.25	18 (1.8, 13)
[E] Cylinder head cover	M6 × 1.0	10 (1.0, 7.2)
[F] Connecting rod cap	M7 × 1.0	12 (1.2, 8.7)
[G] Valve adjuster locknut	M5 × 0.8	10 (1.0, 7.2)
[H] Cylinder head	M6 × 1.0	20 (2.0, 14)
[I] Air filter case	M6 × 1.0	2 (2.0, 1.5)
[J] Oil drain bolt	M10 × 1.25	17 (1.7, 12)
[K] Muffler (nut)	M6 × 1.0	7 (0.7, 5.1)
[L] Muffler (bolt)	M6 × 1.0	10 (1.0, 7.2)
[M] Muffler stay	M8 × 1.25	16 (1.6, 1.1)
[N] Muffler band	M6 × 1.0	4 (0.4, 2.9)
[O] Engine mount (nut)	M6 × 1.0	7 (0.7, 5.1)
[P] Engine mount (bolt)	M8 × 1.25	16 (1.6, 1.1)
[Q] Crankcase	M8 × 1.25	22 (2.2, 16)
[R] Recoil starter	M6 × 1.0	7 (0.7, 5.1)
[S] Fuel tank	M6 × 1.0	7 (0.7, 5.1)
[T] Rectifier	M5 × 0.8	2.5 (0.3, 1.8)
[U] Ignition coil	M6 × 1.0	7 (0.7, 5.1)
[V] Magneto rotor	M14 × 1.5	65 (6.5, 47)
[W] Stator coil assembly	M6 × 1.0	10 (1.0, 7.2)
[X] Generator rotor	M14 × 1.5	65 (6.5, 47)
[Y] Cover	M5 × 0.8	1.3 (0.13, 0.1)
[Z] Grip	M8 × 1.25	16 (1.6, 12)
[a] Oil level switch	M6 × 1.0	7 (0.7, 5.1)
[b] Ground lead	M6 × 1.0	7 (0.7, 5.1)
[c] Frame	M6 × 1.0	7 (0.7, 5.1)
[d] Fan case cover	M6 × 1.0	7 (0.7, 5.1)
[e] Rear end cover	M6 × 1.0	7 (0.7, 5.1)
[f] Generator fan	M6 × 1.0	7 (0.7, 5.1)

GENERAL TORQUE SPECIFICATIONS/ DEFINITION OF UNITS



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] Millimeter	[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 millimeter	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] Crankshaft bearing	[P] Engine oil
[Q] Valve stem	[R] Engine oil
[S] Valve stem end	[T] Molybdenum disulfide oil
[U] Valve rocker arm shaft	[V] Engine oil
[W] Valve push rod	[X] Engine oil
[Y] Push rod guide	[Z] Engine oil
[a] Lifter stem	[b] Engine oil
[c] Camshaft gear	[d] Engine oil
[e] Camshaft lobe	[f] Engine oil
[g] Decompressor cam	[h] Engine oil
[i] Crankcase ball bearing	[j] Engine oil
[k] Crankcase cover ball bearing	[l] Engine oil

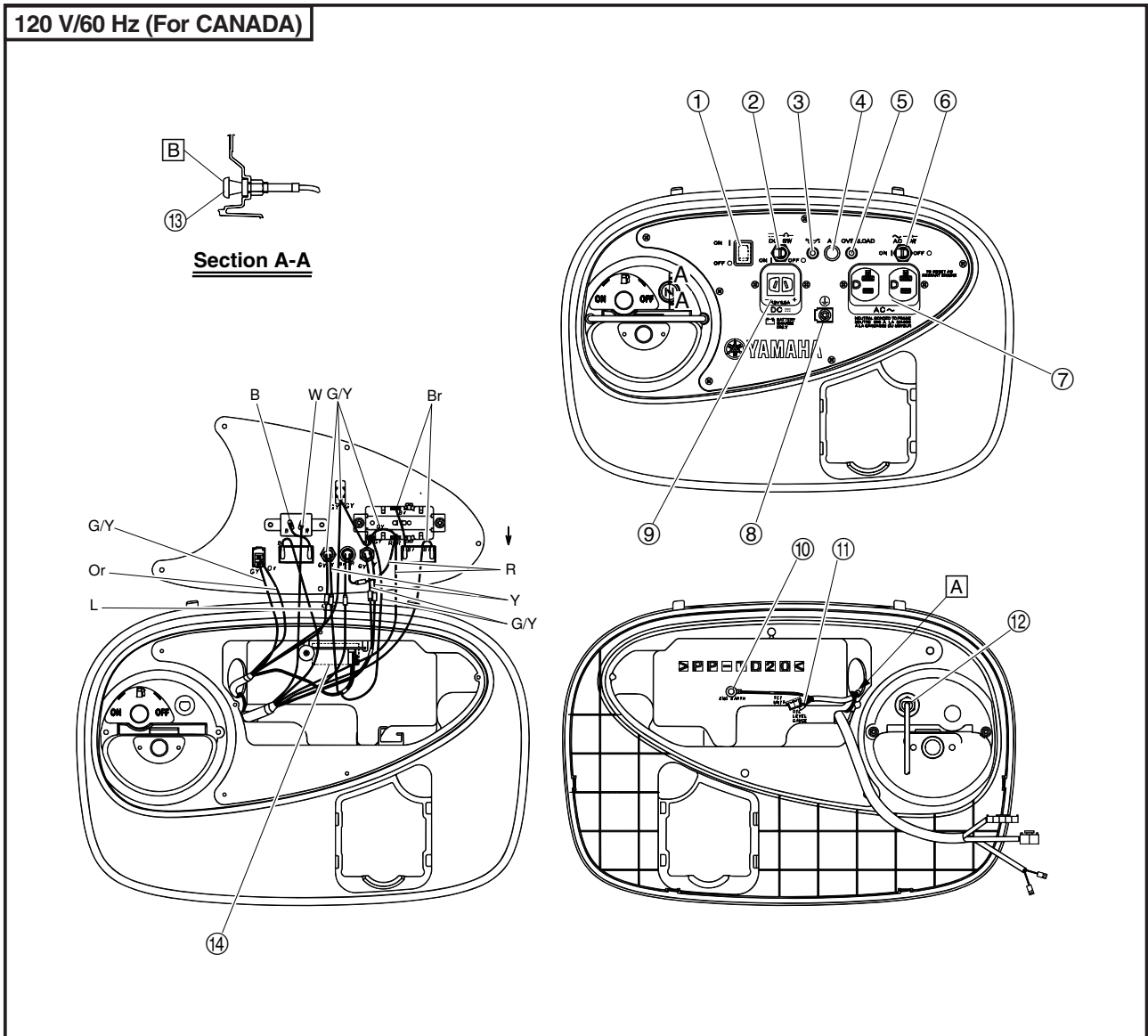


**WIRE ROUTING DIAGRAM
CONTROL BOX PANEL AND BEHIND CONTROL BOX**

- ① Engine switch
- ② DC switch (NFB)
- ③ Oil warning light (Red)
- ④ Pilot light (Green)
- ⑤ Over load warning light (Red)
- ⑥ AC switch (NFB)
- ⑦ AC receptacle (16.7A x 2)
- ⑧ Ground terminal
- ⑨ DC receptacle (12V-8A)
- ⑩ Ground terminal lead
- ⑪ Oil warning light lead
- ⑫ Choke cable
- ⑬ Choke knob
- ⑭ Speed limiter

- [A] Clamp with white tape.
- [B] Be sure to fully pushed, when install the choke cable to the carburetor.

- COLOR CODE**
- BBlack
 - BrBrown
 - GGreen
 - LBlue
 - OrOrange
 - RRed
 - WWhite
 - YYellow
 - B/WBlack/White
 - G/YGreen/Yellow



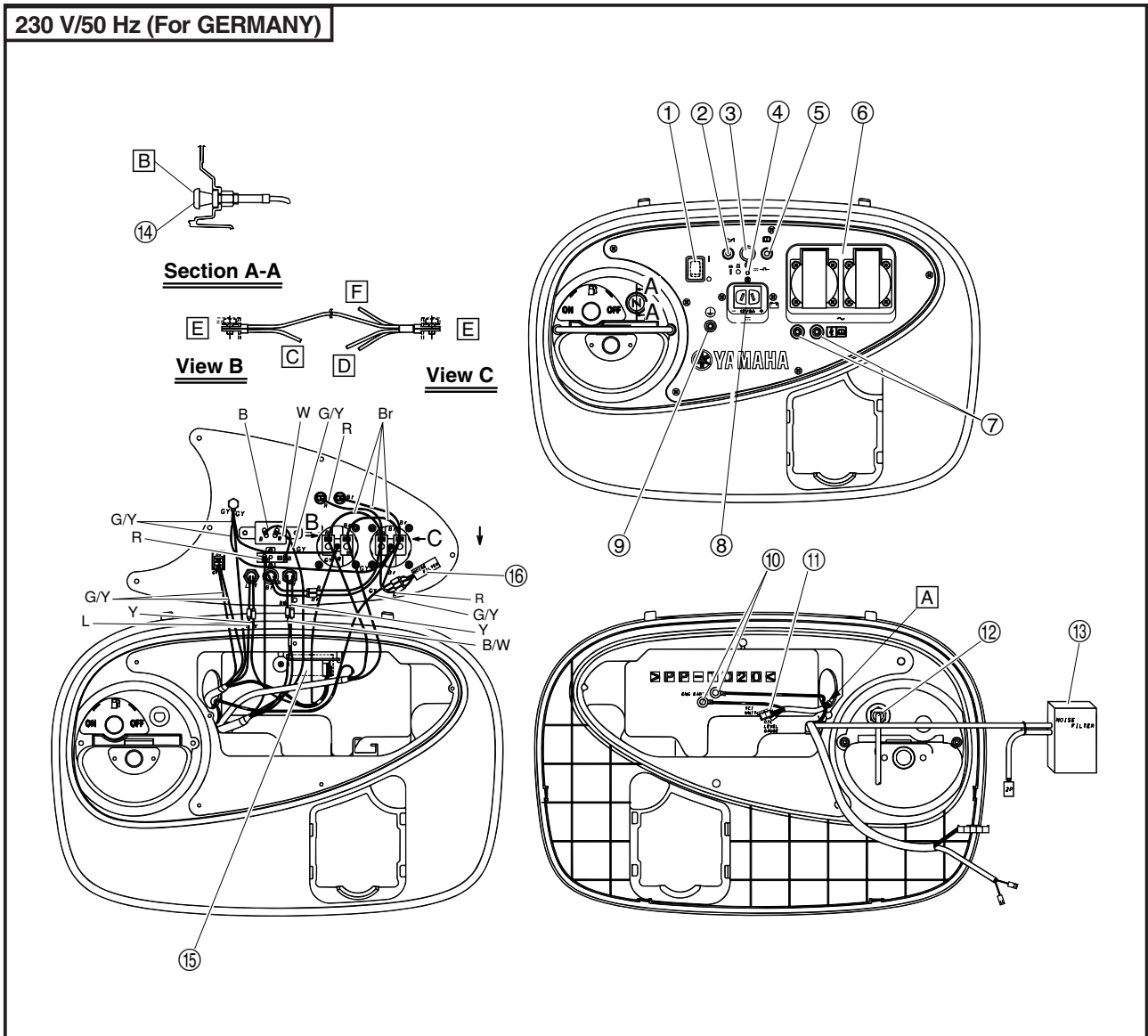


- ① Engine switch
- ② Oil warning light (Red)
- ③ Pilot light (Green)
- ④ DC circuit breaker
- ⑤ Over load warning light (Red)
- ⑥ AC receptacle (8.7A x 2)
- ⑦ Twin tech terminal
- ⑧ DC receptacle (12V-8A)
- ⑨ Ground terminal
- ⑩ Ground terminal lead
- ⑪ Oil warning light lead
- ⑫ Choke cable
- ⑬ Noise filter
- ⑭ Choke knob
- ⑮ Speed limiter
- ⑯ Noise filter

- [A] Clamp with white tape.
- [B] Be sure to fully pushed, when install the choke cable to the carburetor.
- [C] To noise filter lead.
- [D] To pilot lamp and noise filter.
- [E] Tighten with each terminal as shown.
- [F] Back to back two terminals with tape, and then tighten them.

COLOR CODE

- BBlack
- BrBrown
- GGreen
- LBlue
- OrOrange
- RRed
- WWhite
- YYellow
- B/WBlack/White
- G/YGreen/Yellow





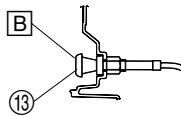
- ① Engine switch
- ② Oil warning light (Red)
- ③ Pilot light (Green)
- ④ DC circuit breaker
- ⑤ Over load warning light (Red)
- ⑥ Twin tech terminal
- ⑦ AC receptacle (8.7A x 2)
- ⑧ DC receptacle (12V-8A)
- ⑨ Ground terminal
- ⑩ Ground terminal lead
- ⑪ Oil warning light lead
- ⑫ Choke cable
- ⑬ Choke knob
- ⑭ Speed limiter

- [A] Clamp with white tape.
- [B] Be sure to fully pushed, when install the choke cable to the carburetor.

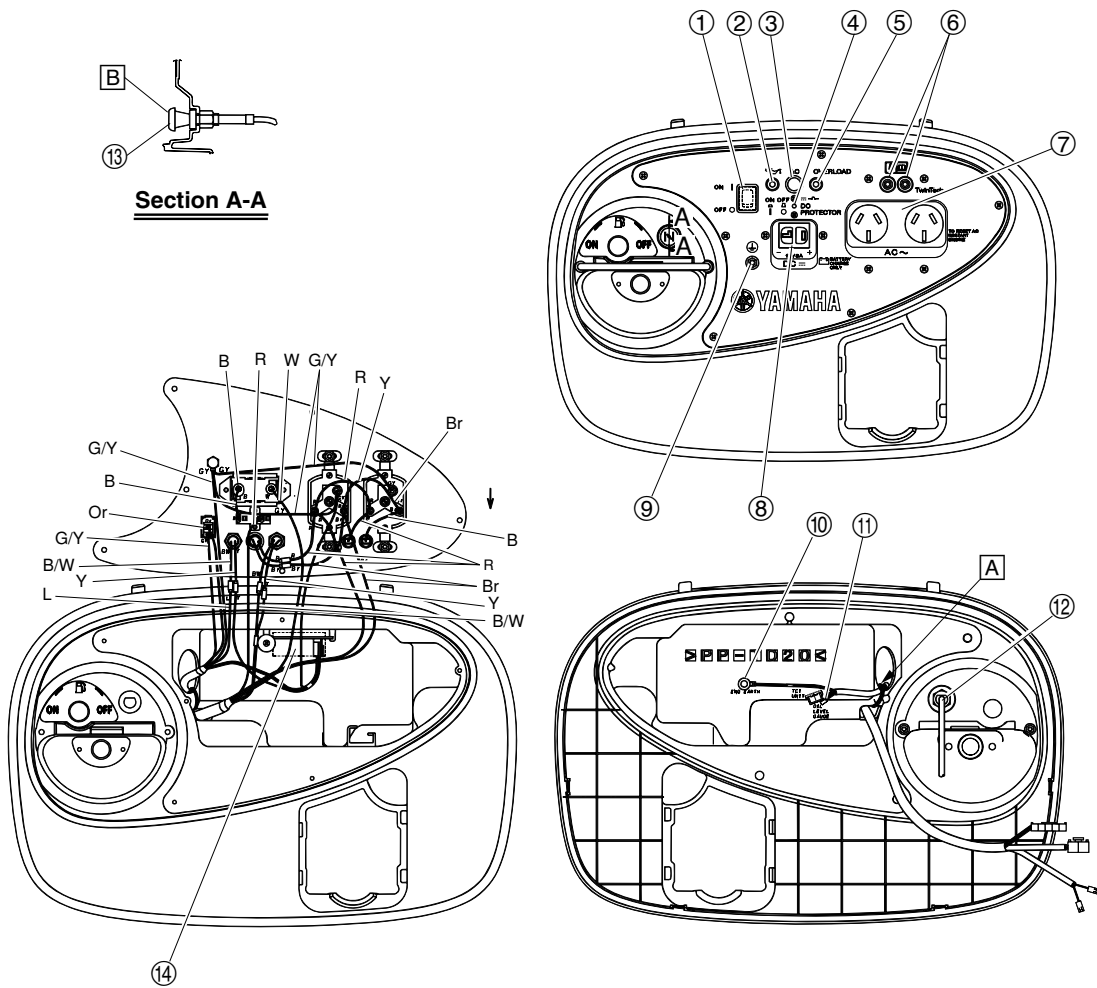
COLOR CODE

- BBlack
- BrBrown
- GGreen
- LBlue
- OrOrange
- RRed
- WWhite
- YYellow
- B/WBlack/White
- G/YGreen/Yellow

230 V/50 Hz (For AUSTRALIA)



Section A-A



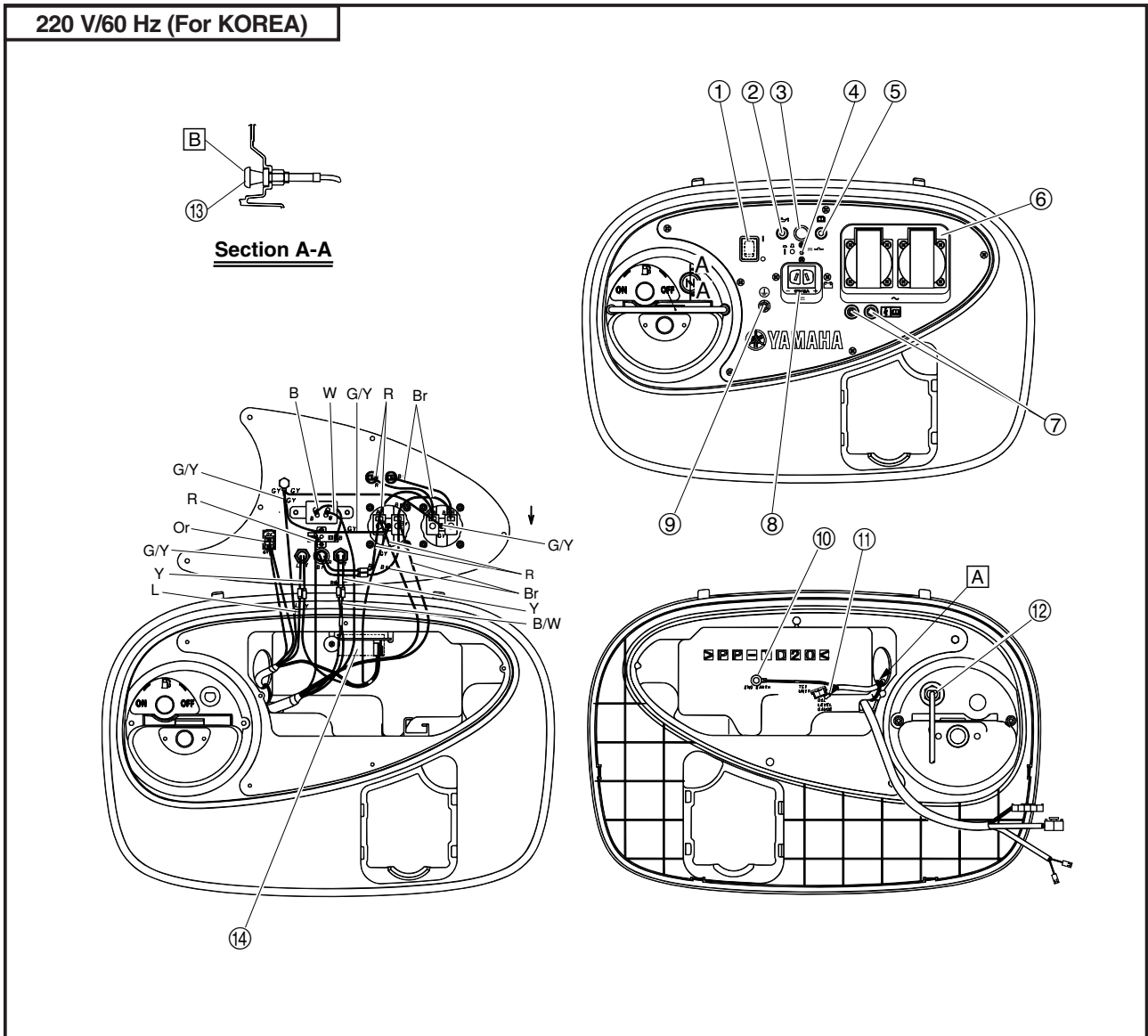


- ① Engine switch
- ② Oil warning light (Red)
- ③ Pilot light (Green)
- ④ DC circuit breaker
- ⑤ Over load warning light (Red)
- ⑥ AC receptacle (9.1A x 2)
- ⑦ Twin tech terminal
- ⑧ DC receptacle (12V-8A)
- ⑨ Ground terminal
- ⑩ Ground terminal lead
- ⑪ Oil warning light lead
- ⑫ Choke cable
- ⑬ Choke knob
- ⑭ Speed limiter

- [A] Clamp with white tape.
- [B] Be sure to fully pushed, when install the choke cable to the carburetor.

COLOR CODE

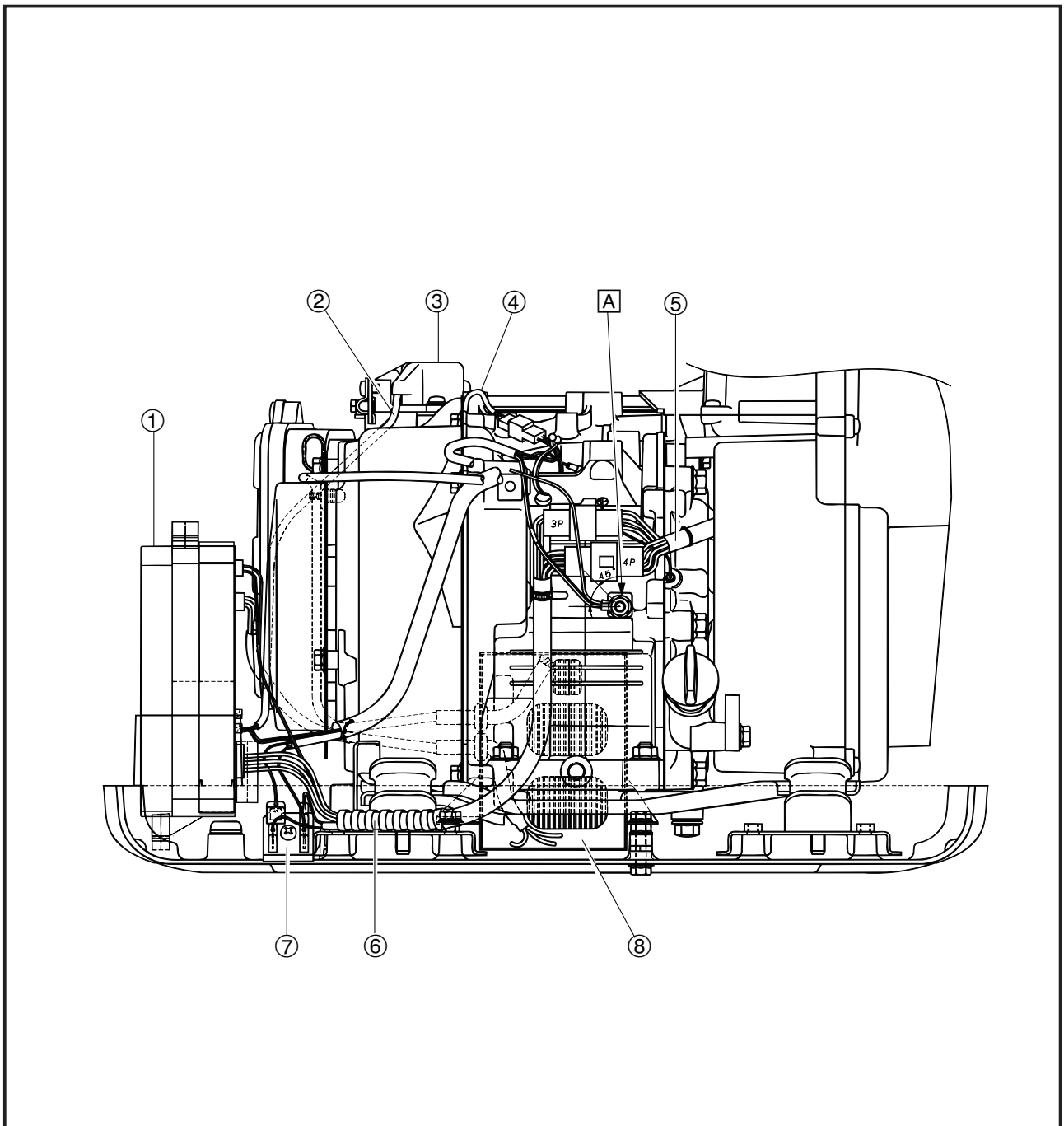
- BBlack
- BrBrown
- GGreen
- LBlue
- OrOrange
- RRed
- WWhite
- YYellow
- B/WBlack/White
- G/YGreen/Yellow



ENGINE AND GENERATOR

- ① Control unit
- ② Throttle control motor lead
- ③ Throttle control motor
- ④ TCI unit lead
- ⑤ Stator coil lead
- ⑥ Control unit lead
- ⑦ Rectifier
- ⑧ Noise filter (For GERMANY)

[A] Install the ground lead as shown in illustration 45°.



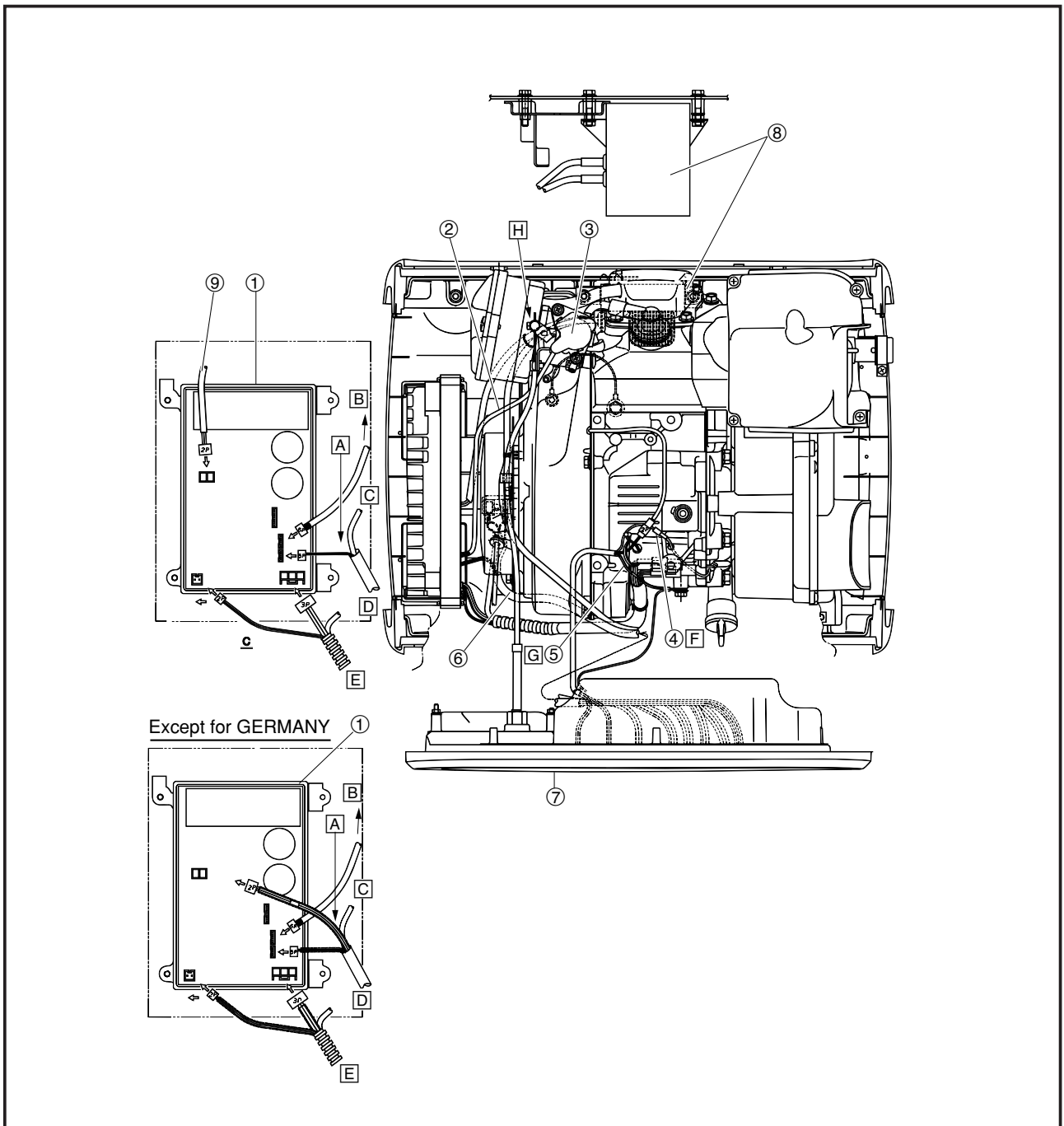
WIRE ROUTING DIAGRAM

SPEC



- ① Control unit
- ② Throttle control motor lead
- ③ Throttle control motor
- ④ Oil level gauge lead
- ⑤ Clamp
- ⑥ Control box lead
- ⑦ Control box
- ⑧ Noise filter (For GERMANY)
- ⑨ Noise filter lead (For GERMANY)

- A Pass through the throttle control motor lead under the Red and Brown lead.
- B To throttle control motor.
- C To rectifier.
- D To control box.
- E To generator.
- F To Pass through into the hole on the crankcase.
- G Clamp with TCI unit 2P coupler.
- H Put in completely the cable cap to the clamp.

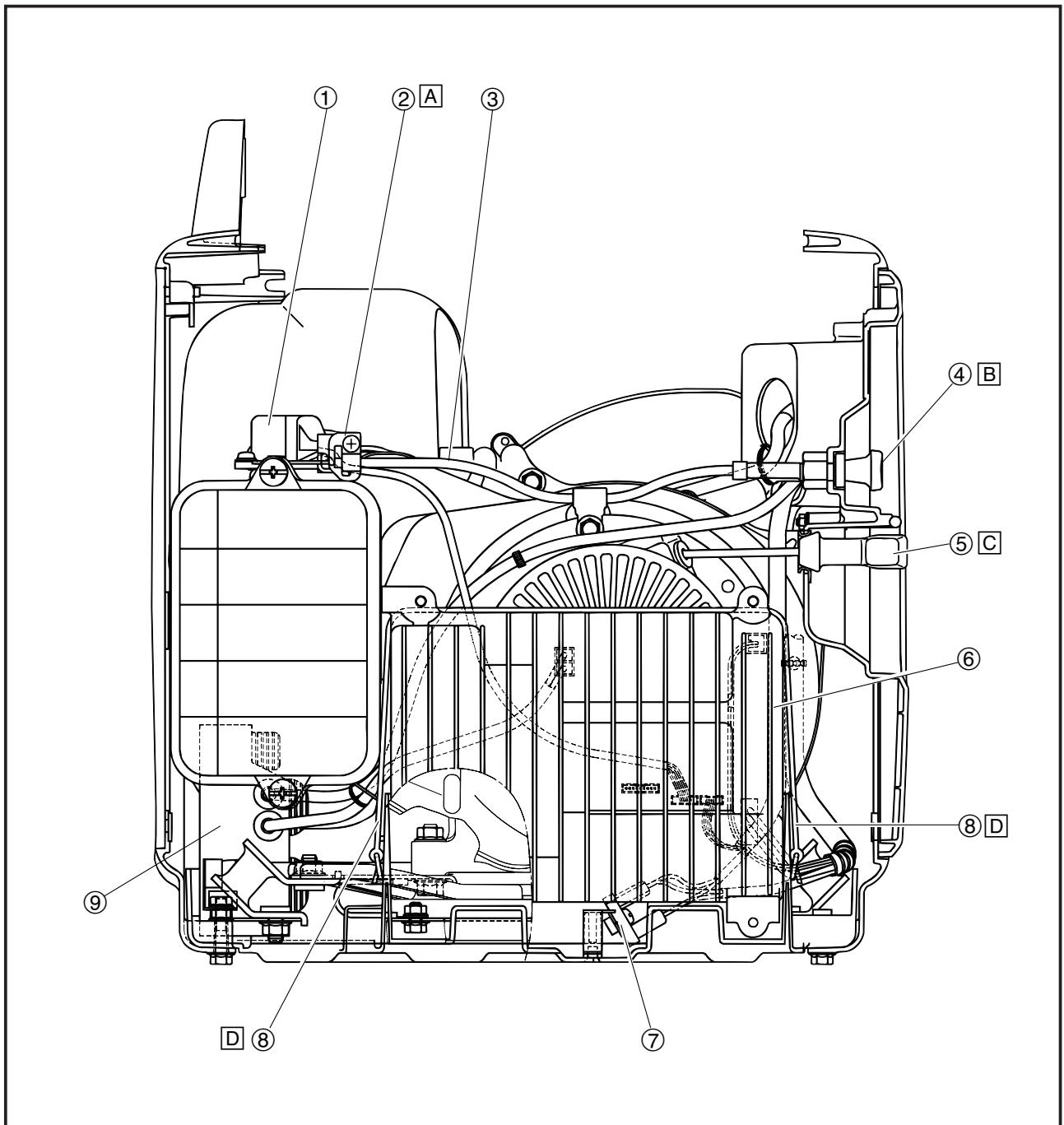


WIRE ROUTING DIAGRAM



- ① Throttle control motor
- ② Clamp
- ③ Choke cable
- ④ Choke knob
- ⑤ Starter handle
- ⑥ Control unit
- ⑦ Rectifier
- ⑧ Band
- ⑨ Noise filter (For GERMANY)

- A Put in completely the cable cap to the clamp.
- B Be sure to fully-pushed position, when install the choke cable to the carburetor.
- C Pass through the starter rope into the front cover, and then tie knot the rope end.
- D Hook the mount latch.



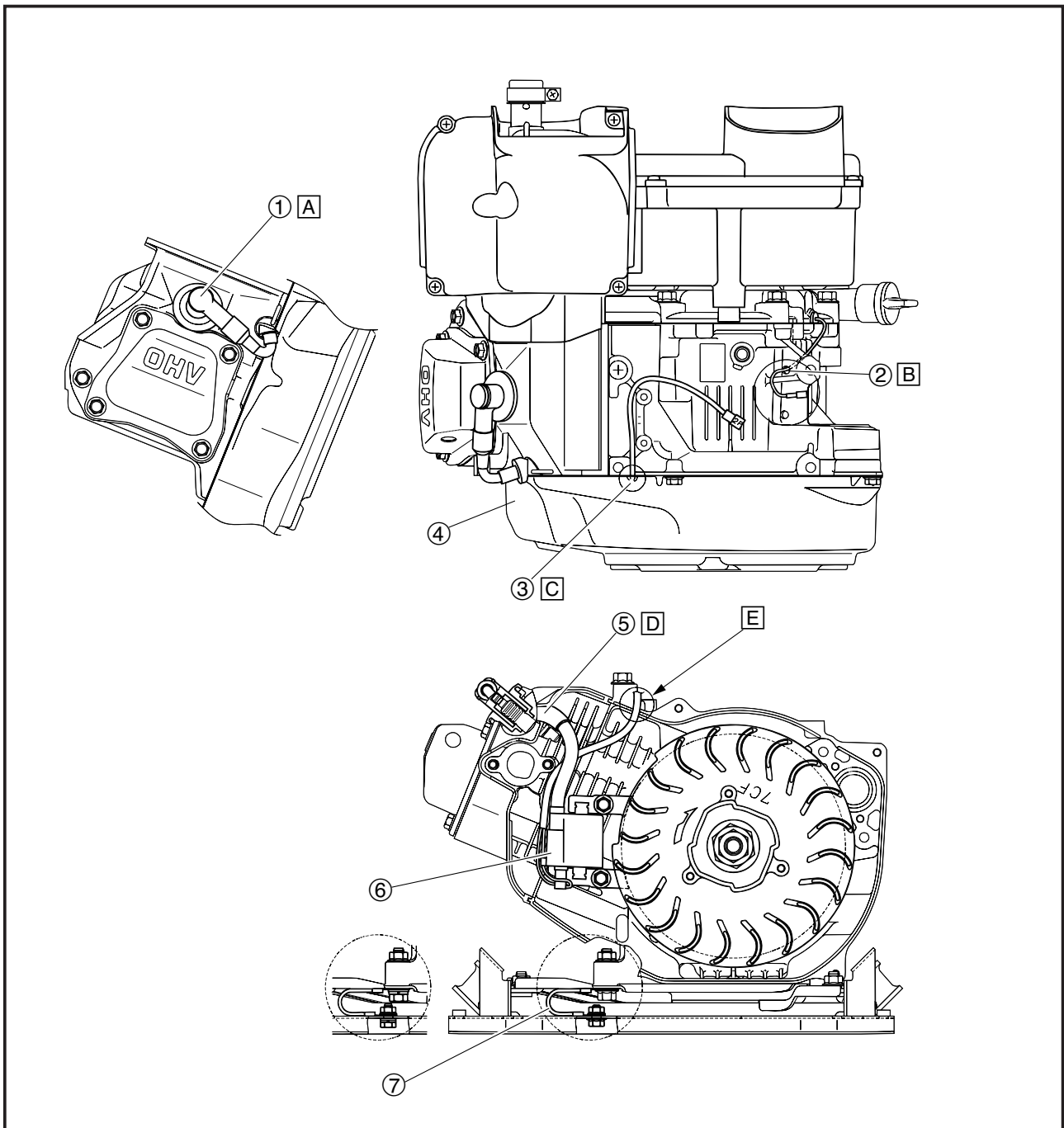
WIRE ROUTING DIAGRAM

SPEC



- ① Spark plug cap
- ② Oil level gauge lead
- ③ TCI unit lead
- ④ Fan case
- ⑤ High-tension cord
- ⑥ Ignition coil
- ⑦ Ground lead

- A Install the plug cap as shown.
- B Pass through the hole on the crankcase.
- C Through out the hole on the crank case.
- D Install the high-tension cord, through the cut portion on the air shroud.
- E Install the lead into the slot on the crankcase.

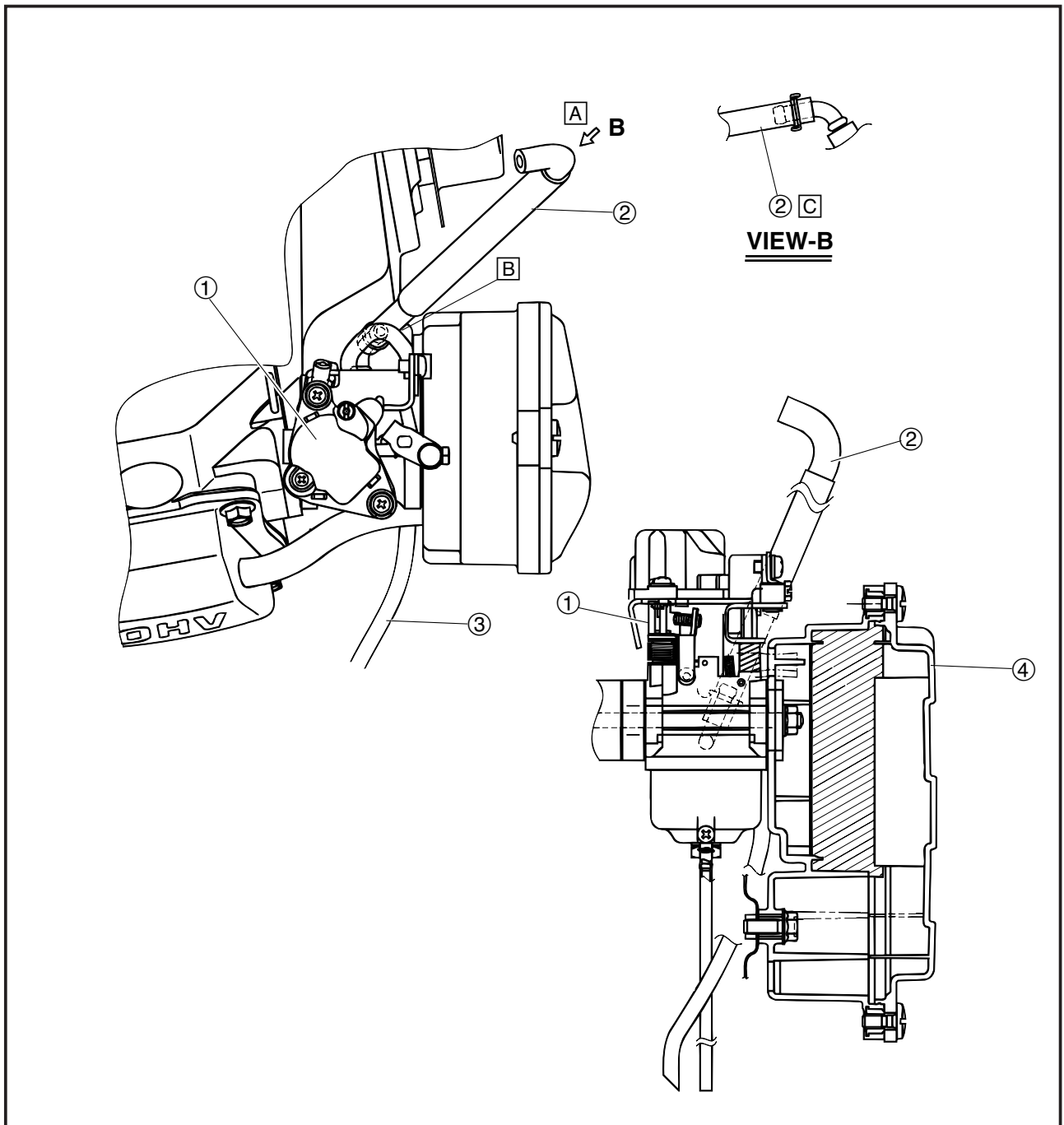


WIRE ROUTING DIAGRAM




- ① Carburetor assembly
- ② Air vent hose
- ③ Fuel hose
- ④ Air cleaner case

- A Install the fuel hose, visible the white paint on the fuel hose between the fan case and air cleaner.
- B Pass the air vent hose onto the fuel hose.
- C Align the white paint onto the fuel hose with clip. Check that the clip position is mounted on the spool on the joint. Install the clip to over the white paint





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