A Few Words About Safety

SERVICE INFORMATION

The service and repair information contained in this manual is intended for use by qualified, professional technicians. Attempting service or repairs without the proper training, tools, and equipment could cause injury to you and/or others. It could also damage this Honda product or create an unsafe condition.

This manual describes the proper methods and procedures for performing service, maintenance, and repairs. Some procedures require the use of special tools. Any person who intends to use a replacement part, service procedure, or a tool that is not recommended by Honda must determine the risks to their personal safety and the safe operation of this product.

If you need to replace a part, use Honda Genuine parts with the correct part number or an equivalent part. We strongly recommend that you do not use replacement parts of inferior quality.

For Your Customer's Safety

Proper service and maintenance are essential to the customer's safety and the reliability of this product. Any error or oversight while servicing this product can result in faulty operation, damage to the product, or injury to others.

⚠WARNING

Improper service or repairs can create an unsafe condition that can cause your customer or others to be seriously hurt or killed.

Follow the procedures and precautions in this manual and other service materials carefully.

For Your Safety

Because this manual is intended for the professional service technician, we do not provide warnings about many basic shop safety practices (e.g., Hot parts-wear gloves). If you have not received shop safety training or do not feel confident about your knowledge of safe servicing practices, we recommend that you do not attempt to perform the procedures described in this manual.

Some of the most important general service safety precautions are given below. However, we cannot warn you of every conceivable hazard that can arise in performing service and repair procedures. Only you can decide whether or not you should perform a given task.

⚠WARNING

Failure to properly follow instructions and precautions can cause you to be seriously hurt or killed.

Follow the procedures and precautions in this manual carefully.

Important Safety Precautions

Make sure you have a clear understanding of all basic shop safety practices and that you are wearing appropriate clothing and using safety equipment. When performing any service task, be especially careful of the following:

- Read all of the instructions before you begin, and make sure you have the tools, the replacement or repair parts, and the skills required to perform the tasks safely and completely.
- Protect your eyes by using proper safety glasses, goggles, or face shields anytime you hammer, drill, grind, or work around pressurized air, pressurized liquids, springs, or other stored-energy components. If there is any doubt, put on eye protection.
- Use other protective wear when necessary, for example gloves or safety shoes. Handling hot or sharp parts can cause severe burns or cuts. Before you grab something that looks like it can hurt you, stop and put on gloves.
- Protect yourself and others whenever you have equipment hoisted in the air. Anytime you lift this product with a hoist, make sure that the hoist hook is securely attached to the product.

Make sure the engine is off before you begin any servicing procedures, unless the instruction tells you to do otherwise. This will help eliminate several potential hazards:

- Carbon monoxide poisoning from engine exhaust. Be sure there is adequate ventilation whenever you run the engine.
- Burns from hot parts. Let the engine and exhaust system cool before working in those areas.
- Injury from moving parts. If the instruction tells you to run the engine, be sure your hands, fingers, and clothing are out of the way.

Gasoline vapors and hydrogen gasses from batteries are explosive. To reduce the possibility of a fire or explosion, be careful when working around gasoline or batteries.

- Use only a nonflammable solvent, not gasoline, to clean parts.
- Never store gasoline in an open container.
- Keep all cigarettes, sparks, and flames away from the battery and all fuel-related parts.

CONTENTS

INTRODUCTION

This manual covers the service and repair procedures for the Honda EU22iT generator.

All information contained in this manual is based on the latest product information available at the time of printing. We reserve the right to make changes at anytime without notice.

No part of this publication may be reproduced, stored in a retrieval system, or transmitted, in any form, by any means, electronic, mechanical, photocopying, recording, or otherwise, without prior written permission of the publisher. This includes text, figures, and tables.

As you read this manual, you will find information that is preceded by a NOTICE symbol. The purpose of this message is to help prevent damage to this Honda product, other property, or the environment.

SAFETY MESSAGES

Your safety and the safety of others are very important. To help you make informed decisions, we have provided safety messages and other safety information throughout this manual. Of course, it is not practical or possible to warn you about all the hazards associated with servicing these products. You must use your own good judgement.

You will find important safety information in a variety of forms, including:

- Safety Labels – on the product.
- Safety Messages – preceded by a safety alert symbol ⚠ and one of three signal words, DANGER, WARNING, or CAUTION. These signal words mean:

⚠DANGER You WILL be KILLED or SERIOUSLY HURT if you don't follow instructions.

⚠WARNING You CAN be KILLED or SERIOUSLY HURT if you don't follow instructions.

⚠CAUTION You CAN be HURT if you don't follow instructions.

- Instructions – how to service these products correctly and safely.

ALL INFORMATION, ILLUSTRATIONS, DIRECTIONS, AND SPECIFICATIONS INCLUDED IN THIS PUBLICATION ARE BASED ON THE LATEST PRODUCT INFORMATION AVAILABLE AT THE TIME OF APPROVAL FOR PRINTING. Honda Motor Co., Ltd. RESERVES THE RIGHT TO MAKE CHANGES AT ANY TIME WITHOUT NOTICE AND WITHOUT INCURRING ANY OBLIGATION WHATSOEVER. NO PART OF THIS PUBLICATION MAY BE REPRODUCED WITHOUT WRITTEN PERMISSION. THIS MANUAL IS WRITTEN FOR PERSONS WHO HAVE ACQUIRED BASIC KNOWLEDGE OF MAINTENANCE ON Honda PRODUCTS.

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Date of Issue: December 2017

SERVICE RULES

- Use Honda Genuine or Honda-recommended parts and lubricants or their equivalents. Parts that do not meet Honda's design specifications may damage the unit.
- Use the special tools designed for the product.
- Install new gaskets, O-rings, etc. when reassembling.
- When torquing bolts or nuts, begin with larger-diameter or inner bolts first and tighten to the specified torque diagonally, unless a particular sequence is specified.
- Clean parts in cleaning solvent upon disassembly. Lubricate any sliding surfaces before assembly.
- After assembly, check all parts for proper installation and operation.
- Many screws used in this machine are self-tapping. Be aware that cross-threading or overtightening these screws will strip the threads and ruin the hole.

Use only metric tools when servicing this unit. Metric bolts, nuts and screws are not interchangeable with non-metric fasteners. The use of incorrect tools and fasteners will damage the unit.

SYMBOLS

The symbols used throughout this manual show specific service procedures. If supplementary information is required pertaining to these symbols, it will be explained specifically in the text without the use of the symbols.

	Replace the part(s) with new one(s) before assembly.
	Use the recommended engine oil, unless otherwise specified.
	Use multi-purpose grease (lithium based multi-purpose grease NLGI #2 or equivalent).
	Apply a locking agent. Use a medium strength locking agent unless otherwise specified.
	Apply sealant.
○ x ○ (○)	Indicates the diameter, length, and quantity of metric bolts used.
page 1-1	Indicates the reference page.

HOW TO READ A WIRING DIAGRAM & RELATED INFORMATION

The wiring diagram, connector general layout drawing, connector drawings, and the symbols used in troubleshooting are explained in this section.

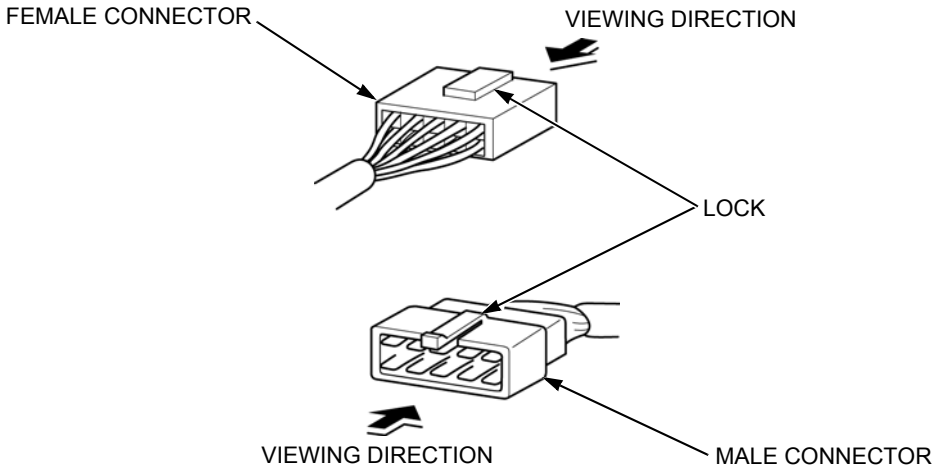
HOW TO READ CONNECTOR DRAWINGS

Connector drawings show the terminal arrangement, terminal No., number of pins, and the shape of terminal (male or female).

Both the male and female connectors are shown for the common connectors, while only the main wire harness side connectors are shown for the dedicated connectors.

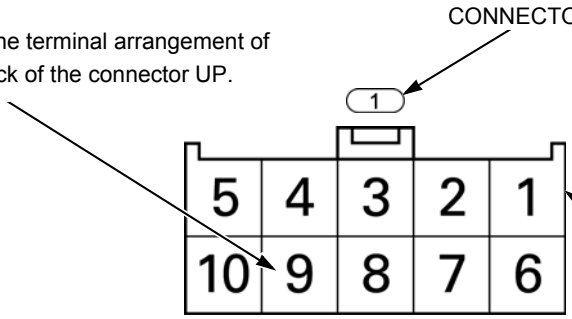
The double frame connectors represent the male connectors and the single frame connectors represent the female connectors.

Both the male and female connectors are shown by viewing them from the terminal side.



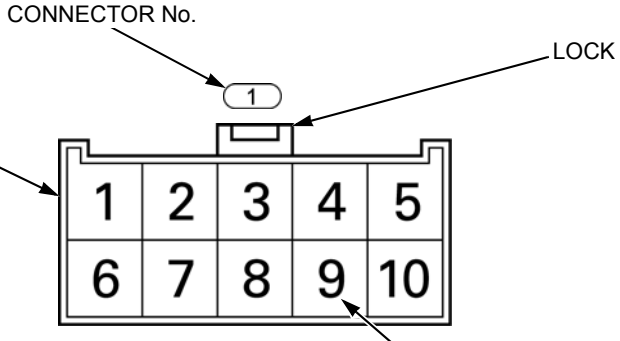
TERMINAL ARRANGEMENT

The connector drawing shows the terminal arrangement of the (1) connector with the lock of the connector UP.



FEMALE CONNECTOR DRAWING (SINGLE FRAME)

Female connector viewed from the terminal side.



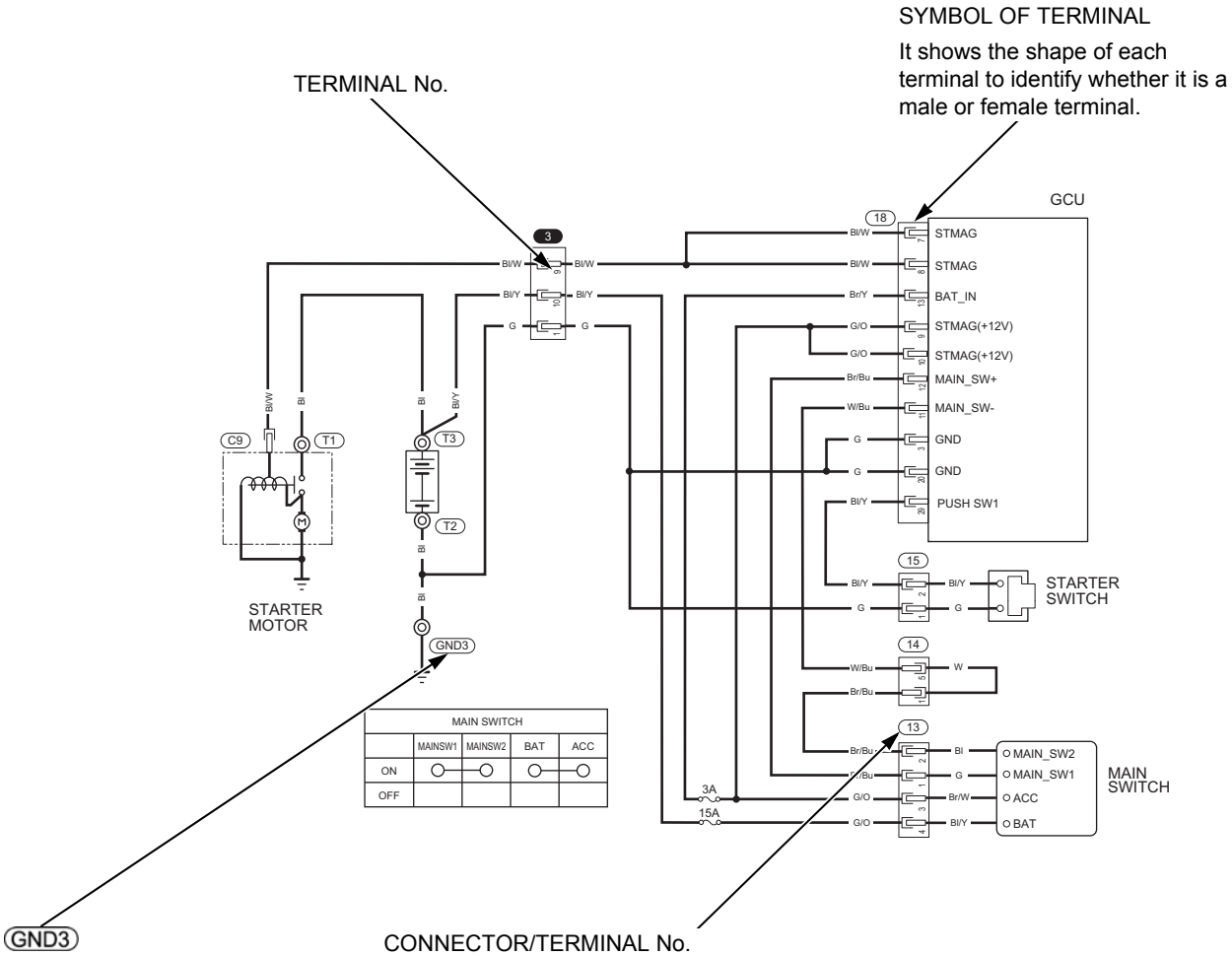
MALE CONNECTOR DRAWING (DOUBLE FRAME)

Male connector viewed from the terminal side.

TERMINAL No.

The system drawing shows the No.9 terminal of the (1) connector.

HOW TO READ A WIRING DIAGRAM



GND3

Indicates the ground.
(Circled GND followed with No. in white background)

CONNECTOR/TERMINAL No.

Every connector and terminal has a number to help the users find the location and shape of the connector and the terminal arrangement by referring to the “Connector general layout drawing” and/or the “Connector drawing.” All the connector/terminal numbers shown in this Service Manual are either of those shown in this section.

- 1 : Connector that joins a harness to a harness (Circled No. in black background)
- 1 : Connector that connects to electrical equipment (Circled No. in white background)
- C1 : Connector (Circled C followed with No. in white background)
- T1 : Terminal (Circled T followed with No. in white background)
- GND1 : Ground (Circled GND followed with No. in white background)

ABBREVIATIONS

Throughout this manual, the following abbreviations are used to identify the respective parts or systems.

Abbreviated term	Full term
ACG	Alternator
API	American Petroleum Institute
Approx.	Approximately
Assy.	Assembly
ATDC	After Top Dead Center
ATF	Automatic Transmission Fluid
ATT	Attachment
AVR	Automatic Voltage Regulator
BAT	Battery
BDC	Bottom Dead Center
BTDC	Before Top Dead Center
BARO	Barometric Pressure
CKP	Crankshaft Position
Comp.	Complete
CMP	Camshaft Position
CYL	Cylinder
DLC	Data Link Connector
D-AVR	Digital Automatic Voltage Regulator
EBT	Engine Block Temperature
ECT	Engine Coolant Temperature
ECM	Engine Control Module
EMT	Exhaust Manifold Temperature
EOP	Engine Oil Pressure
EX	Exhaust
F	Front or Forward
GND	Ground
HO2S	Heated Oxygen sensor
IAB	Intake Air Bypass
IAC	Idle Air Control
IAT	Intake Air Temperature
I.D.	Inside diameter
IG or IGN	Ignition
IN	Intake
INJ	Injection
L.	Left
MAP	Manifold Absolute Pressure
MIL	Malfunction Indicator Lamp
O.D.	Outside Diameter
OP	Optional Part
PGM-FI	Programmed-Fuel Injection
P/N	Part Number
Qty	Quantity
R.	Right
SAE	Society of Automotive Engineers
SCS	Service Check Signal
STD	Standard
SW	Switch
TDC	Top Dead Center

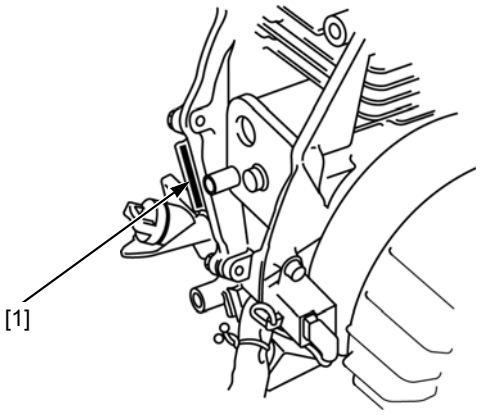
Bl	Black	G	Green	Br	Brown	Lg	Light green
Y	Yellow	R	Red	O	Orange	P	Pink
Bu	Blue	W	White	Lb	Light blue	Gr	Gray

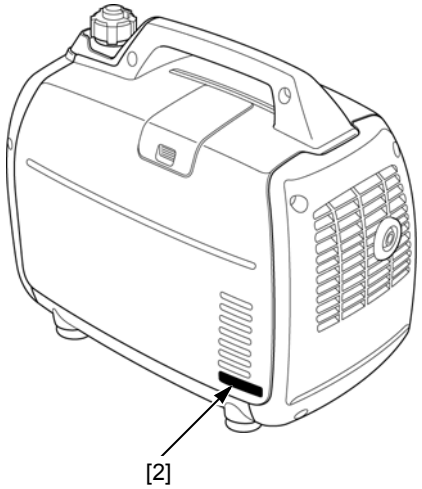
1. SPECIFICATIONS

SERIAL NUMBER LOCATION

The engine serial number [1] is stamped on the cylinder barrel, and the frame serial number [2] is shown at the underside of the Right side cover.

Refer to it when ordering parts or making technical inquiries.





SPECIFICATIONS

DIMENSIONS AND WEIGHTS

Model	EU22iT		
Type	E, F, B1, W, S, SK, U, R, RG, RH	G	B
Description code	EAMT		
Overall length	509 mm (20.0 in)	519 mm (20.4 in)	541 mm (21.3 in)
Overall width	290 mm (11.4 in)		
Overall height	425 mm (16.7 in)		
Dry weight	21.1 kg (46.5 lbs)		
Operating weight	24.2 kg (53.4 lbs)		

ENGINE

Model	GXR120T
Description code	GCCET
Type	4 stroke, overhead valve, single cylinder
Displacement	121 cm^3 (7.38 cu-in)
Bore x stroke	60.0 x 43.0 mm (2.36 x 1.69 in)
Compression ratio	8.5 : 1
Cooling system	Forced air
Ignition system	Transistorized magneto ignition
Ignition timing	BTDC 25° ± 2°
Spark plug	CR5HSB (NGK)
Carburetor	Float type, Butterfly valve type, Side draft type
Air cleaner	Semi-dry type
Governor	Electronic control type
Lubrication system	Forced splash
Oil capacity	0.44 Liter (0.46 US qt, 0.39 Imp qt)
Recommended oil	SAE 10W-30 API service classification SE or higher
Starting system	Recoil starter
Stopping system	Primary circuit ground
Fuel used	Automotive unleaded gasoline with a Research Octane Number of 91 or higher (a Pump Octane Number of 86 or higher) with E10 fuel referenced in EU regulation.

GENERATOR

Model		EU22iT		
Description code		E, F, G, B1, W, RG, RH	R	B
Type		EAMT		
Generator type		Multi–electrode field rotation type		
Generator structure		Self-ventilation, drip-proof type		
Excitation		Self-excitation		
Voltage regulation system		PWM (Pulse width modulation)		
Phase		Single phase		
Rotating direction		Clockwise (Viewed from the generator)		
Rated output	AC	1800 VA		
	DC	99.6 W		–
Rated frequency		50 Hz		
AC	Rated voltage	230 V	220 V	110 V
	Rated current	7.8 A	8.2 A	16.4 A
DC	Rated voltage	12 V		–
	Rated current	8.3 A		–
Power factor (cosθ)		1.0		
Electric power transfer system		DC-AC transfer system (Inverter type)		

Model		EU22iT	
Description code		U	S, SK
Type		EAMT	
Generator type		Multi–electrode field rotation type	
Generator structure		Self-ventilation, drip-proof type	
Excitation		Self-excitation	
Voltage regulation system		PWM (Pulse width modulation)	
Phase		Single phase	
Rotating direction		Clockwise (Viewed from the generator)	
Rated output	AC	1800 VA	
	DC	99.6 W	
Rated frequency		50 Hz	60 Hz
AC	Rated voltage	240 V	220 V
	Rated current	7.5 A	8.2 A
DC	Rated voltage	12 V	
	Rated current	8.3 A	
Power factor (cosθ)		1.0	
Electric power transfer system		DC-AC transfer system (Inverter type)	

CHARACTERISTICS

Model		EU22iT			
Type		E, F, G, B1, W	RG, RH	R	B
Voltage variation rate	Momentary	10% max.			
	Average	6% max.			
	Average time	3 sec. max.			
Voltage stability		within ± 1%			
Frequency variation rate	Momentary	1% max.			
	Average	1% max.			
	Average time	1 sec. max.			
Frequency stability		within ± 0.1 Hz			
Insulation resistance		10 MΩ min.			
AC circuit protector		10.7 A		11.2 A	22.4 A
DC circuit protector		10 A			–
Insulation type		Type F		Type E	Type F
Fuel tank capacity		3.6 Liters (0.95 US gal, 0.79 Imp gal)			
Fuel consumption	E10	1.14 Liter (0.301 US gal, 0.251 Imp gal) /Hr.			
	E0	1.22 Liter (0.322 US gal, 0.268 Imp gal) /Hr.			
Max. operating hours at rated load	E10	3.2 Hr.			
	E0	3.0 Hr.			
Sound power level (L_{WA}) at rated load		–	L_{WA} 90 dB		–
Measured sound power level (2000/14/EC, 2005/88/EC)		88 dB (A) (with Eco throttle ON)	–		88 dB (A) (with Eco throttle ON)
	Uncertainty	2 dB (A)	–		2 dB (A)
Guaranteed sound power level (2000/14/EC, 2005/88/EC)		90 dB (A) (with Eco throttle ON)	–		90 dB (A) (with Eco throttle ON)

Model		EU22iT	
Type		U	S, SK
Voltage variation rate	Momentary	10% max.	
	Average	6% max.	
	Average time	3 sec. max.	
Voltage stability		within ± 1%	
Frequency variation rate	Momentary	1% max.	
	Average	1% max.	
	Average time	1 sec. max.	
Frequency stability		within ± 0.1 Hz	
Insulation resistance		10 MΩ min.	
AC circuit protector		10.7 A	11.2 A
DC circuit protector		10 A	10 A
Insulation type		Type F	Type E
Fuel tank capacity		3.6 Liters (0.95 US gal, 0.79 Imp gal)	
Fuel consumption	E10	1.14 Liter (0.301 US gal, 0.251 Imp gal) /Hr.	
	E0	1.22 Liter (0.322 US gal, 0.268 Imp gal) /Hr.	
Max. operating hours at rated load	E10	3.2 Hr.	
	E0	3.0 Hr.	
Sound power level (L_{WA}) at rated load		L_{WA} 90 dB	

PERFORMANCE CURVE

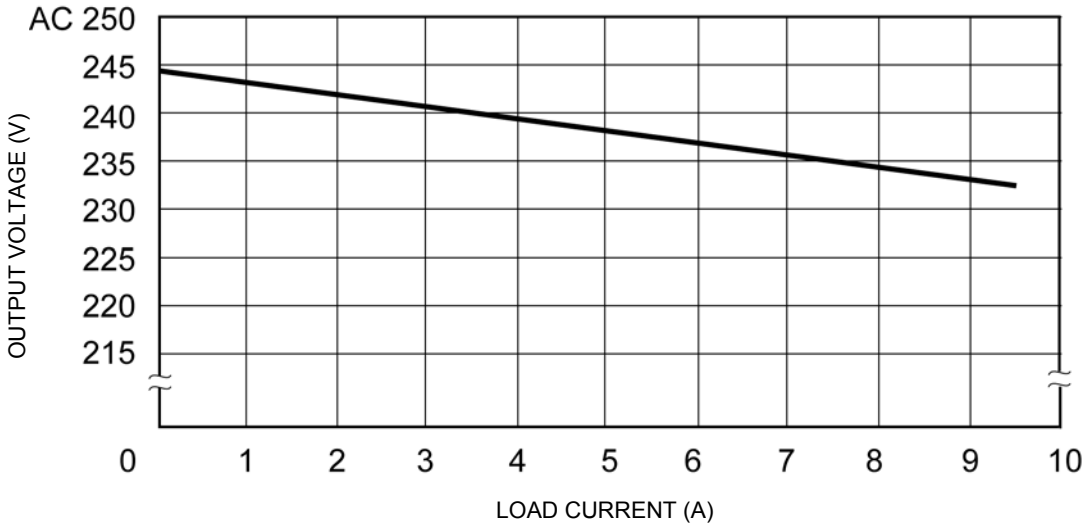
The curve shows performance of the generator under average conditions.

Performance may vary to some degree depending on ambient temperature and humidity.

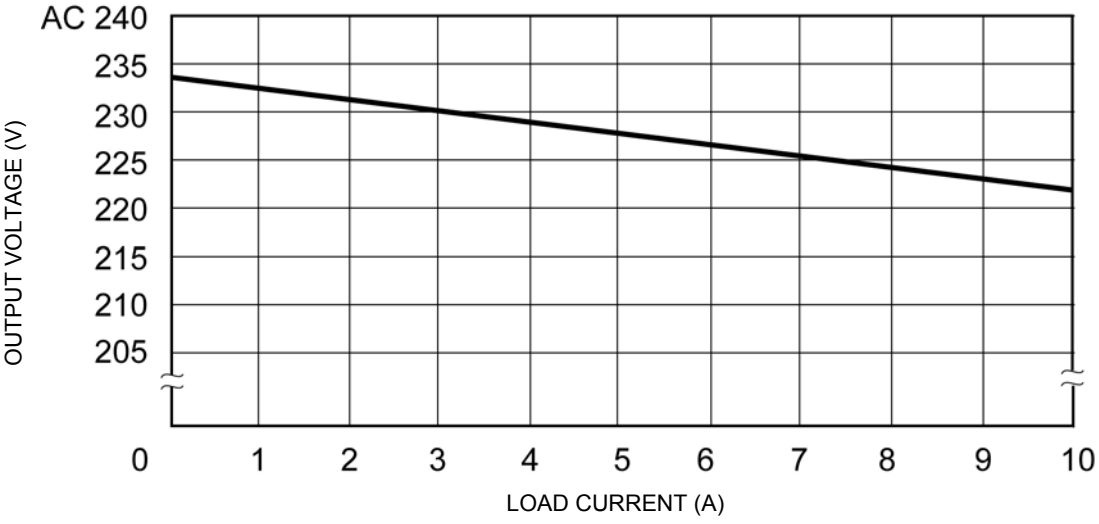
The output voltage will be higher than usual when the generator is still cold, immediately after the engine starts.

AC EXTERNAL CHARACTERISTIC CURVE

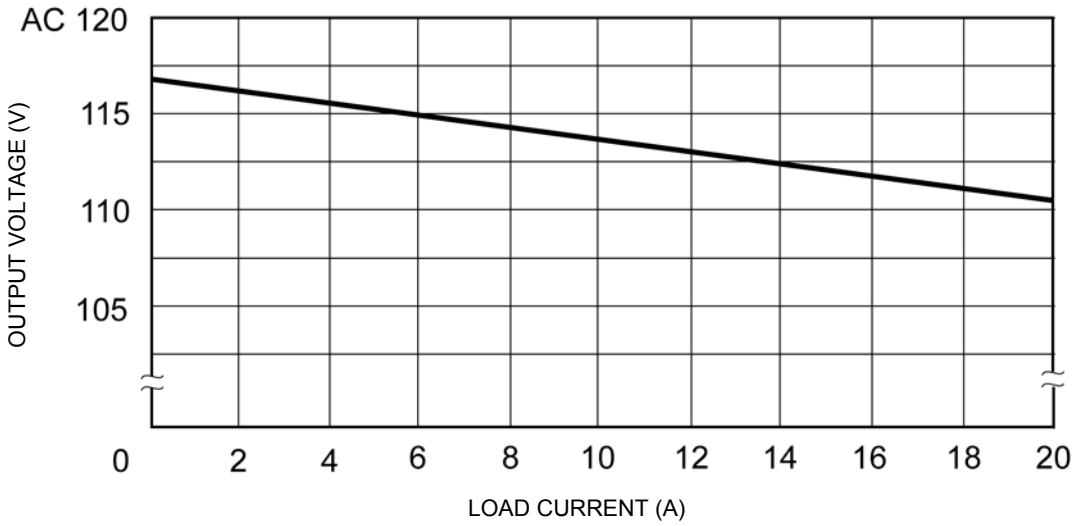
E, F, G, B1, W, RG, RH, U TYPES



R, S, SK TYPES

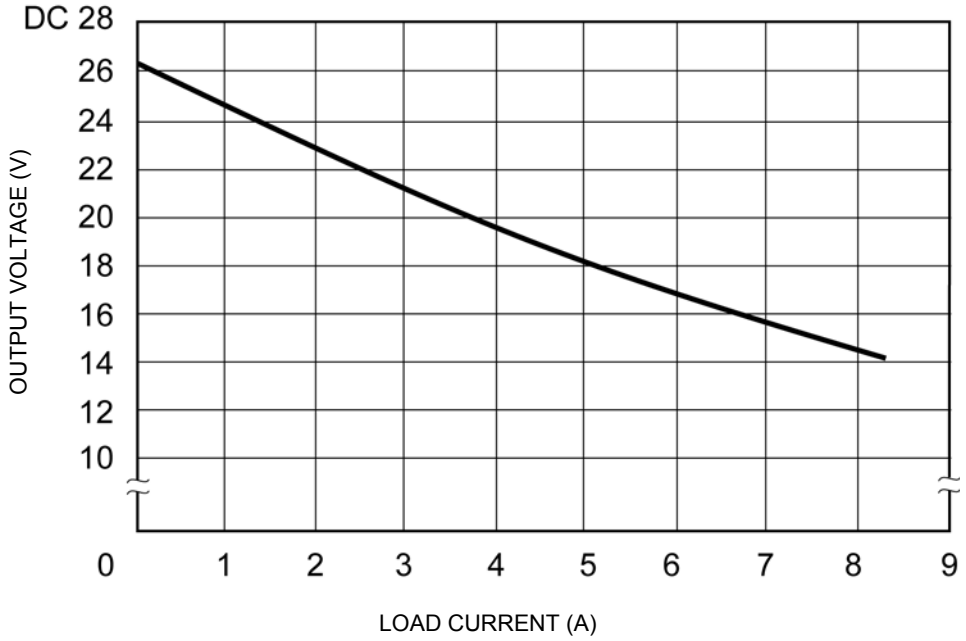


B TYPE



DC EXTERNAL CHARACTERISTIC CURVE

With Eco-Throttle OFF

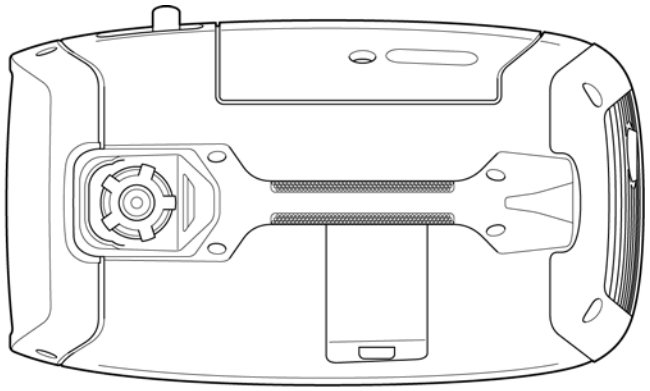


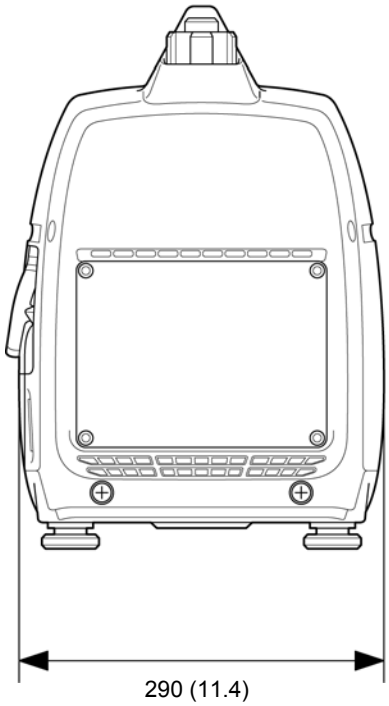
This DC output characteristic was measured under the condition with capacitors (100,000 µF) were connected in parallel.

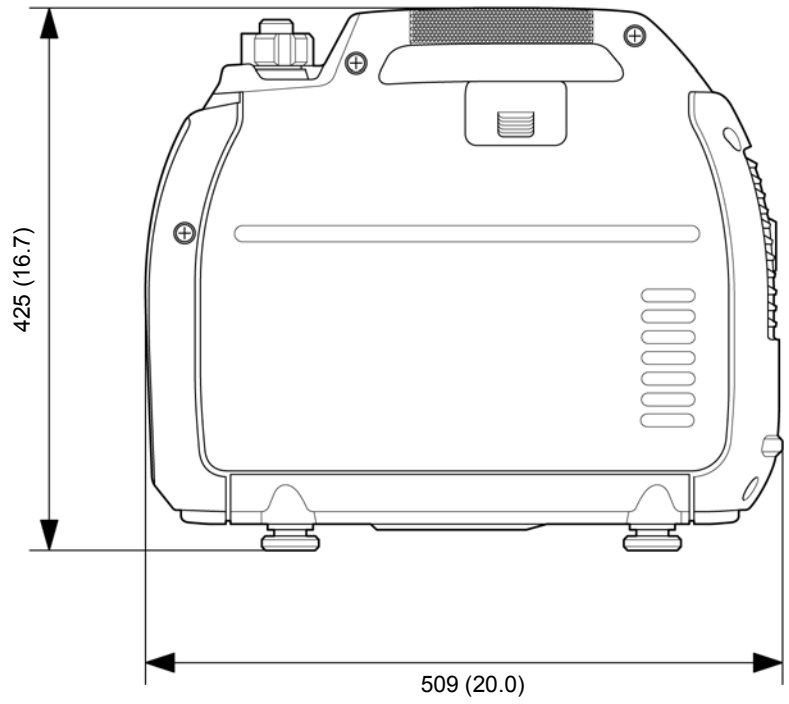
DIMENSIONAL DRAWINGS

EXCEPT G, B TYPES

Unit: mm (in)

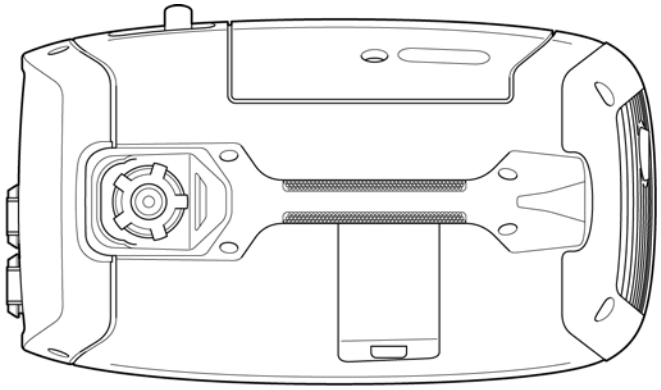


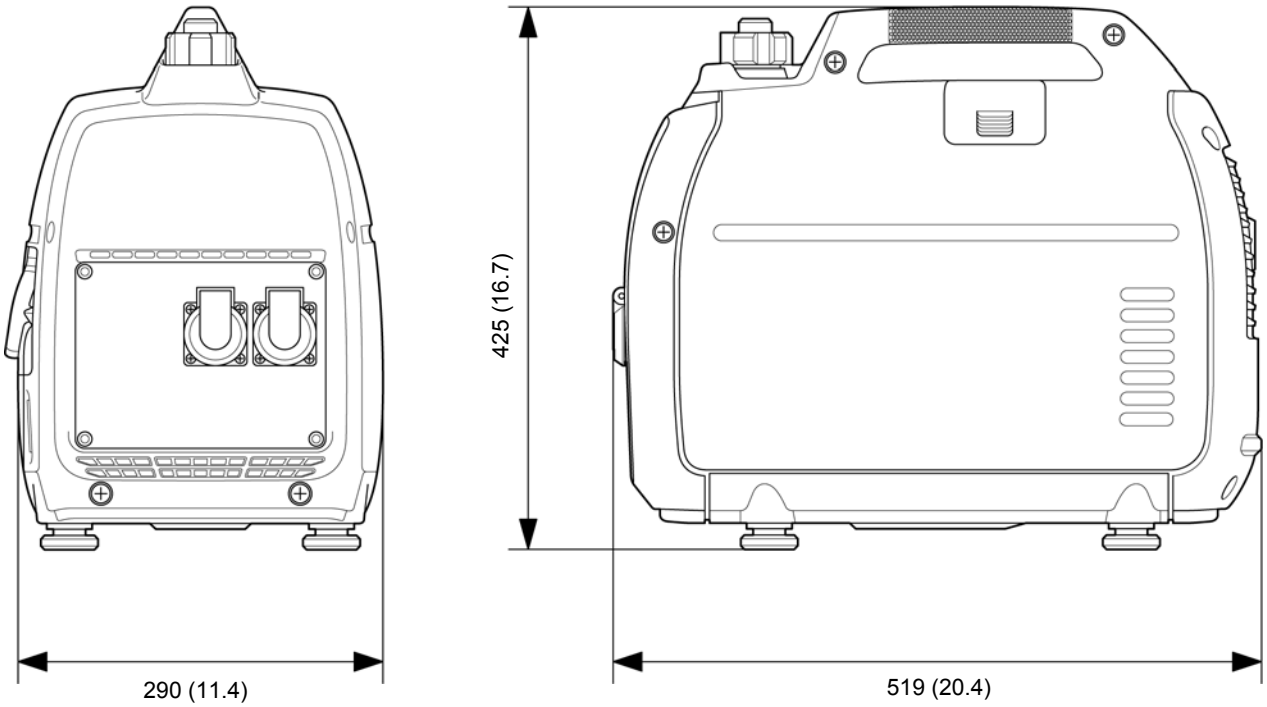




G TYPE

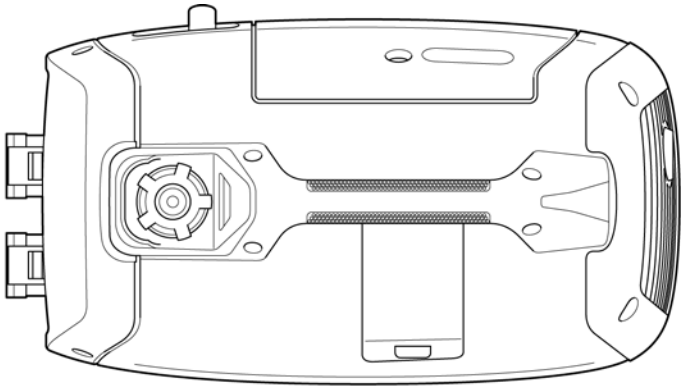
Unit: mm (in)

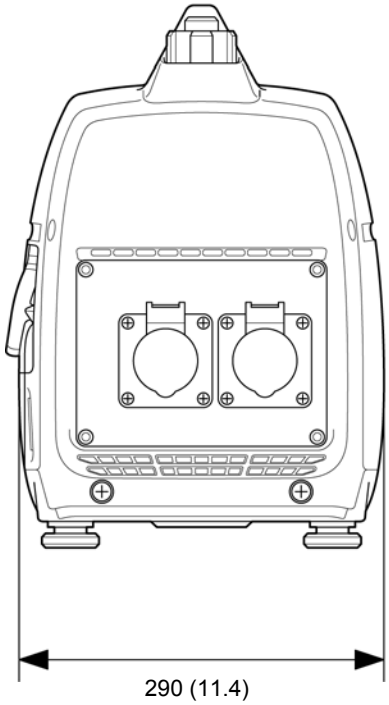


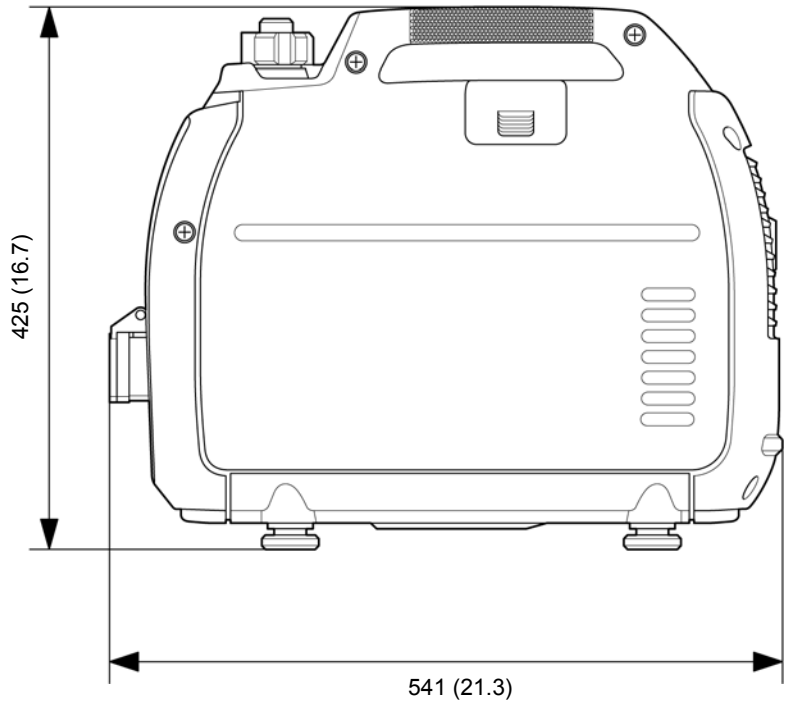


B TYPE

Unit: mm (in)







MEMO

2. SERVICE INFORMATION

MAINTENANCE STANDARDS

ENGINE

Unit: mm (in)

Part	Item		Standard	Service limit
Engine	Engine speed [Eco–Throttle OFF]		2,800 – 4,500 min^{-1} (rpm) [4,000 – 4,500 min^{-1} (rpm)]	–
	Cylinder compression		0.50 MPa (5.1 kgf/cm^2, 73 psi)/ 700 min^{-1} (rpm)	–
Cylinder block	Sleeve I.D.		60.000 – 60.015 (2.3622 – 2.3628)	60.165 (2.3687)
Piston	Skirt O.D.		59.971 – 59.985 (2.3611 – 2.3616)	59.870 (2.3571)
	Piston-to-cylinder clearance		0.015 – 0.044 (0.0006 – 0.0017)	0.100 (0.0039)
	Piston pin bore I.D.		13.002 – 13.012 (0.5119 – 0.5123)	13.048 (0.5137)
Piston pin	Pin O.D.		12.994 – 13.000 (0.5116 – 0.5118)	12.954 (0.5100)
	Piston pin-to-piston pin bore clearance		0.002 – 0.018 (0.0001 – 0.0007)	0.080 (0.0031)
Piston rings	Ring side clearance	Top	0.015 – 0.054 (0.0006 – 0.0021)	0.12 (0.0047)
		Second	0.030 – 0.069 (0.0012 – 0.0027)	0.14 (0.0055)
	Ring end gap	Top	0.15 – 0.25 (0.0059 – 0.0098)	0.55 (0.0217)
		Second	0.40 – 0.55 (0.0157 – 0.0217)	0.85 (0.0335)
		Oil (side rail)	0.1 – 0.4 (0.004 – 0.016)	0.70 (0.0276)
	Ring width	Top	0.970 – 0.990 (0.0382 – 0.0390)	0.940 (0.0370)
		Second	1.155 – 1.175 (0.0455 – 0.0463)	1.125 (0.0443)
Connecting rod	Small end I.D.		13.005 – 13.020 (0.5120 – 0.5126)	13.070 (0.5146)
	Big end I.D.		26.020 – 26.033 (1.0244 – 1.0249)	26.06 (1.0260)
	Big end side clearance		0.1 – 0.5 (0.004 – 0.020)	0.90 (0.0354)
	Big end oil clearance		0.040 – 0.063 (0.0016 – 0.0025)	0.12 (0.005)
Crankshaft	Crankpin O.D.		25.970 – 25.980 (1.0224 – 1.0228)	25.920 (1.0205)
	Crankshaft runout		–	0.10 (0.004)
Valves	Valve clearance	IN	0.15 ± 0.04 (0.006 ± 0.002)	–
		EX	0.20 ± 0.04 (0.008 ± 0.002)	–
	Valve stem O.D.	IN	3.970 – 3.985 (0.1563 – 0.1569)	3.900 (0.1535)
		EX	3.935 – 3.950 (0.1549 – 0.1555)	3.880 (0.1528)
Valve guide	Valve guide I.D.	IN/EX	4.000 – 4.018 (0.1575 – 0.1582)	4.060 (0.1598)
	Guide-to-stem clearance	IN	0.015 – 0.048 (0.0006 – 0.0019)	0.098 (0.0039)
		EX	0.050 – 0.083 (0.0020 – 0.0033)	0.120 (0.0047)
	Valve guide installation height	IN	7.5 (0.3)	–
	Valve seat width	IN/EX	0.60 – 0.80 (0.0236 – 0.0315)	1.800 (0.0709)
Valve spring	Valve spring free length	IN/EX	25.8 (1.02)	24.9 (0.98)
Cam pulley	Cam height		36.283 – 36.683 (1.4285 – 1.4442)	35.483 (1.3970)
	Cam pulley I.D.		10.057 – 10.087 (0.3959 – 0.3971)	10.105 (0.3978)
	Cam pulley shaft O.D.		9.972 – 9.987 (0.3926 – 0.3932)	9.920 (0.3906)
Rocker arm	Rocker arm I.D.		6.000 – 6.030 (0.2362 – 0.2374)	6.043 (0.2379)
	Rocker arm shaft O.D.		5.960 – 5.990 (0.2346 – 0.2358)	5.953 (0.2344)
	Rocker arm shaft journal I.D.		6.000 – 6.018 (0.2362 – 0.2369)	6.043 (0.2379)
Carburetor	Main jet		#65	–
	Pilot screw opening		1-7/8 turns out	–
	Float height		12.0 (0.47)	–
Spark plug	Gap		0.60 – 0.70 (0.024 – 0.028)	–
Ignition coil	Resistance	Primary resistance	0.7 – 1.1 Ω	–
		Secondary resistance	12 – 21 kΩ	–
	Air gap		0.2 – 0.7 (0.01 – 0.03)	–
Ignition pulse generator	Resistance		300 – 360 Ω	–

GENERATOR

Part	Item	Terminals			Standard	Service limit
Stator	AC winding resistance	3	1 – 2	B type	1.0 – 1.8 Ω	–
				Except B type	5.0 – 6.0 Ω	–
			1 – 3	B type	1.0 – 1.8 Ω	–
				Except B type	5.0 – 6.0 Ω	–
			2 – 3	B type	1.0 – 1.8 Ω	–
				Except B type	5.0 – 6.0 Ω	–
	Sub winding resistance	1	1 – 2		0.1 – 0.2 Ω	–
	DC winding resistance	9	3 – 4		0.1 – 0.2 Ω	–
	Exciter winding resistance	2	3– 5		0.2 – 0.3 Ω	–

TORQUE VALUES

ENGINE TORQUE VALUES

Item	Tread Dia. and pitch	Torque values			Remark
		N·m	kgf·m	lbf·ft	
Spark plug	M10 x 1.0	12	1.2	9	
Connecting rod bolt	M6 x 1.0	9.8	1.0	7.2	Apply engine oil to the threads and seating surface.
Valve adjusting lock nut	M5 x 0.5 (Special nut)	7.5	0.76	5.5	
Stopper plate screw	M3 x 0.5	1	0.1	0.7	
Breather pipe bolt	M4 x 0.7	3.5	0.36	2.6	

FRAME TORQUE VALUES

Item	Tread Dia. and pitch	Torque values			Remark
		N·m	kgf·m	lbf·ft	
Rotor nut	M14	90	9.2	66	Degrease the crankshaft and flywheel tapered surface. Apply engine oil to the threads and seating surface.
Maintenance cover screw	M6 screw	2.3	0.23	1.7	
Air cleaner cover screw	M6 screw	2.3	0.23	1.7	
Fuel pump self-tapping screw	M5 screw	3.4	0.35	2.5	This portion is resin and care shall be taken.
Fuel valve self-tapping screw	M5 screw	3.4	0.35	2.5	This portion is resin and care shall be taken.
Recoil rope guide self-tapping screw	M5 screw	1.2	0.12	0.9	This portion is resin and care shall be taken.
L. side cover self-tapping screw	M5 screw	1.2	0.12	0.9	This portion is resin and care shall be taken.
Control panel self-tapping screw	M5 screw	1.4	0.14	1.0	This portion is resin and care shall be taken.
Air duct self-tapping screw	M5 screw	1.4	0.14	1.0	This portion is resin and care shall be taken.
Engine stop switch self-tapping screw	M3 screw	0.5	0.05	0.4	This portion is resin and care shall be taken.
Front cover screw	M6 screw	4.4	0.45	3.2	

Item	Tread Dia. and pitch	Torque values			Remark
		N·m	kgf·m	lbf·ft	
Rear cover screw	M6 screw	4.4	0.45	3.2	
Carburetor insulator bolt	M6	7.4	0.75	5.5	
Muffler bolt	M6	11.8	1.2	8.7	
R. side cover bolt	M6	9.3	0.95	6.9	
Air cleaner nut	M5	4.9	0.5	3.6	
Inverter unit	M5	6.9	0.7	5.1	
R. front frame screw	M6 screw	4.4	0.45	3.2	
L. front frame screw	M6 screw	4.4	0.45	3.2	
Protector circuit mount nut	M11 x 1.0	1.8	0.18	1.3	
Receptacle mount screw	M5 x 0.8	1.3	0.13	1.0	
Receptacle mount screw	M4 x 0.7	1.3	0.13	1.0	
Receptacle mount nut	M4	1.3	0.13	1.0	
Receptacle terminal screw	M5 x 0.8	0.7	0.07	0.5	

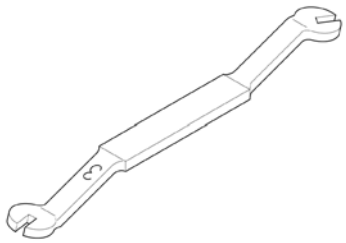
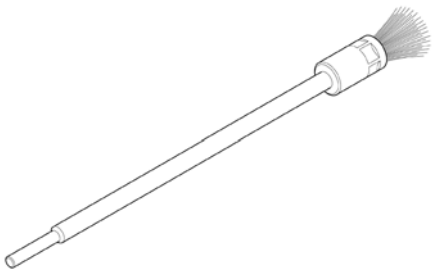
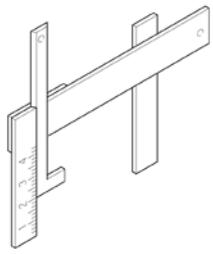
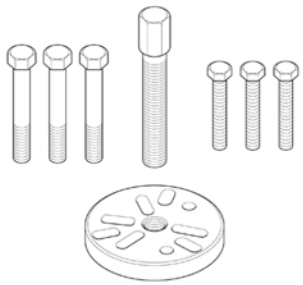
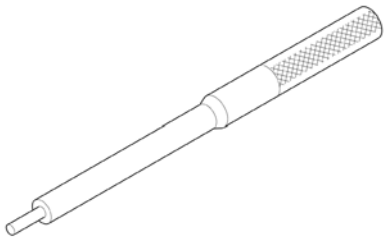
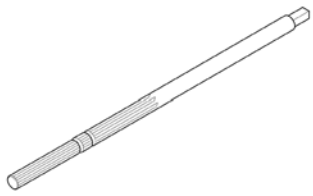
STANDARD TORQUE VALUES

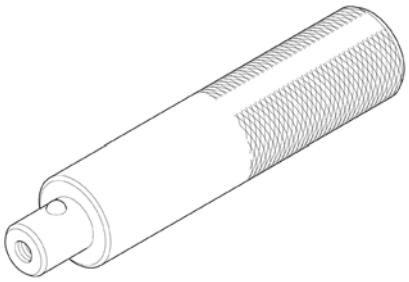
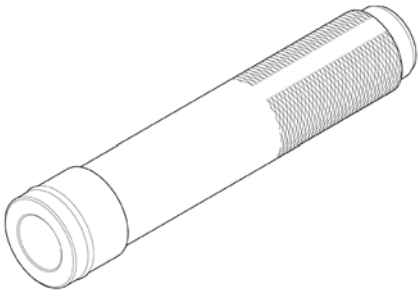
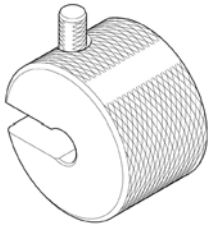
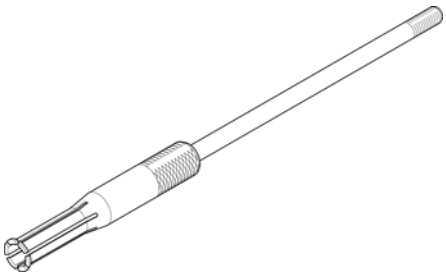
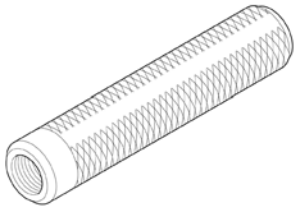
Item	Tread Dia.		Torque values		
			N·m	kgf·m	lbf·ft
Screw	M3		1	0.1	0.7
	M4		2.1	0.2	1.5
	M5		4.2	0.4	3.1
	M6		9	0.9	6.6
Bolt and nut	M5		5.3	0.54	3.9
	M6		10	1.0	7
	M8		22	2.2	16
	M10		34	3.5	25
	M12		54	5.5	40
Flange bolt and nut	M4		3.4	0.35	2.5
	M5		5.4	0.55	4.0
	M6	Engine	12	1.2	9
		Frame	10	1.0	7
	M8		26.5	2.7	20
	M10		40	4.1	30
CT (Cutting threads) flange bolt (Retightening)	M5		5.4	0.55	4.0
	M6	Engine	12	1.2	9
		Frame	10	1.0	7
SH (Small head) flange bolt	M6		9	0.9	6.6

LUBRICATION & SEAL POINT

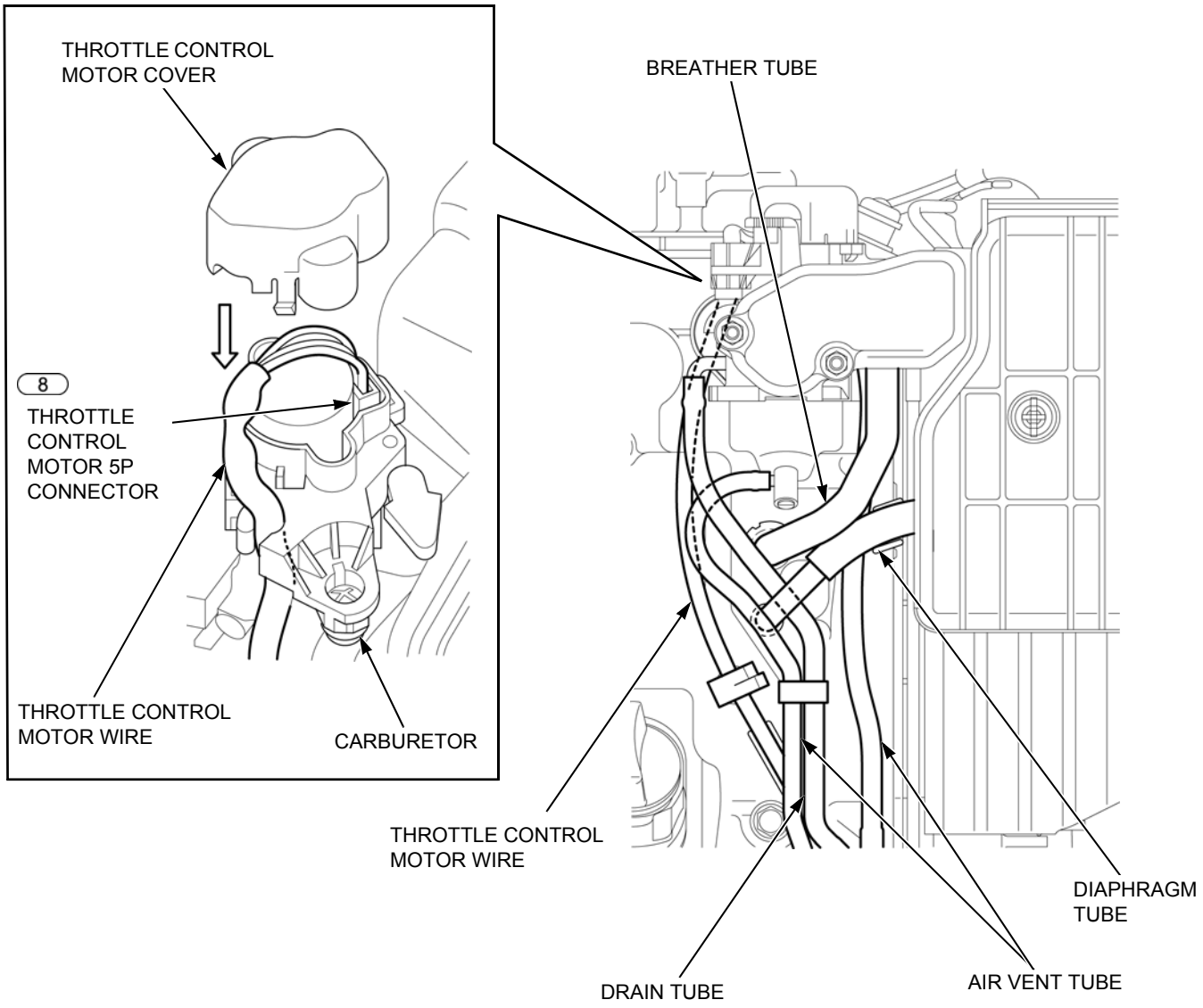
Material	Location	Remarks
Engine oil	Crankshaft pin and gear teeth	
	Crankcase cover bolt threads and seating surface	
	Piston outer surface, ring groove and piston pin hole	
	Piston pin outer surface	
	Piston ring entire surface	
	Cylinder inner surface	
	Connecting rod big and small end bearing	
	Connecting rod bolt threads and seating surface	
	Cam pulley cam lobe, journal and decompressor area	
	Cam pulley shaft sliding surface	
	Valve stem sliding surface and stem end	
	Valve stem seal lips	
	Valve spring entire surface	
	Valve adjusting screw threads	
	Valve adjusting lock nut threads and seating surface	
	Rocker arm pivot and slipper surface	
	Rocker arm shaft entire surface	
	Timing belt entire surface	
	Flywheel nut threads and seating surface	
	Governor weight holder gear	
	Governor holder shaft journal	
	Each oil seal outer surface	
	Each bearing rotating area	
Multi-purpose grease	Each O-ring entire surface	
	Each oil seal lips	
Threebond® 1207B	Head cover mating surface	
	Cylinder barrel mating surface	
	Breather pipe	See page 15-3
LOCTITE® 638	Limiter cap inside	See page 6-8

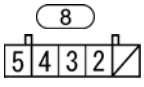
TOOLS

Valve adjuster wrench, 3 mm 07908-KE90000 	Cleaning brush 07998-VA20100 	Float level gauge 07401-0010000 
Flywheel puller 07935-8050004 	Valve guide driver, 3.6 x 8.0 07JMD-KY20100 	Valve guide reamer, 4.008 07MMH-MV90100 

Driver 07749-0010000 	Inner driver handle, 22 07746-0020100 	Attachment, 42 x 47 07746-0010300 
Attachment, 32 x 35 07746-0010100 	Pilot, 22 07746-0041000 	Remover weight 07741-0010201 
Bearing remover, 22 mm 070MC-MFR0100 	Bearing remover shaft handle 07936-3710100 	

CABLE/HARNESS ROUTING



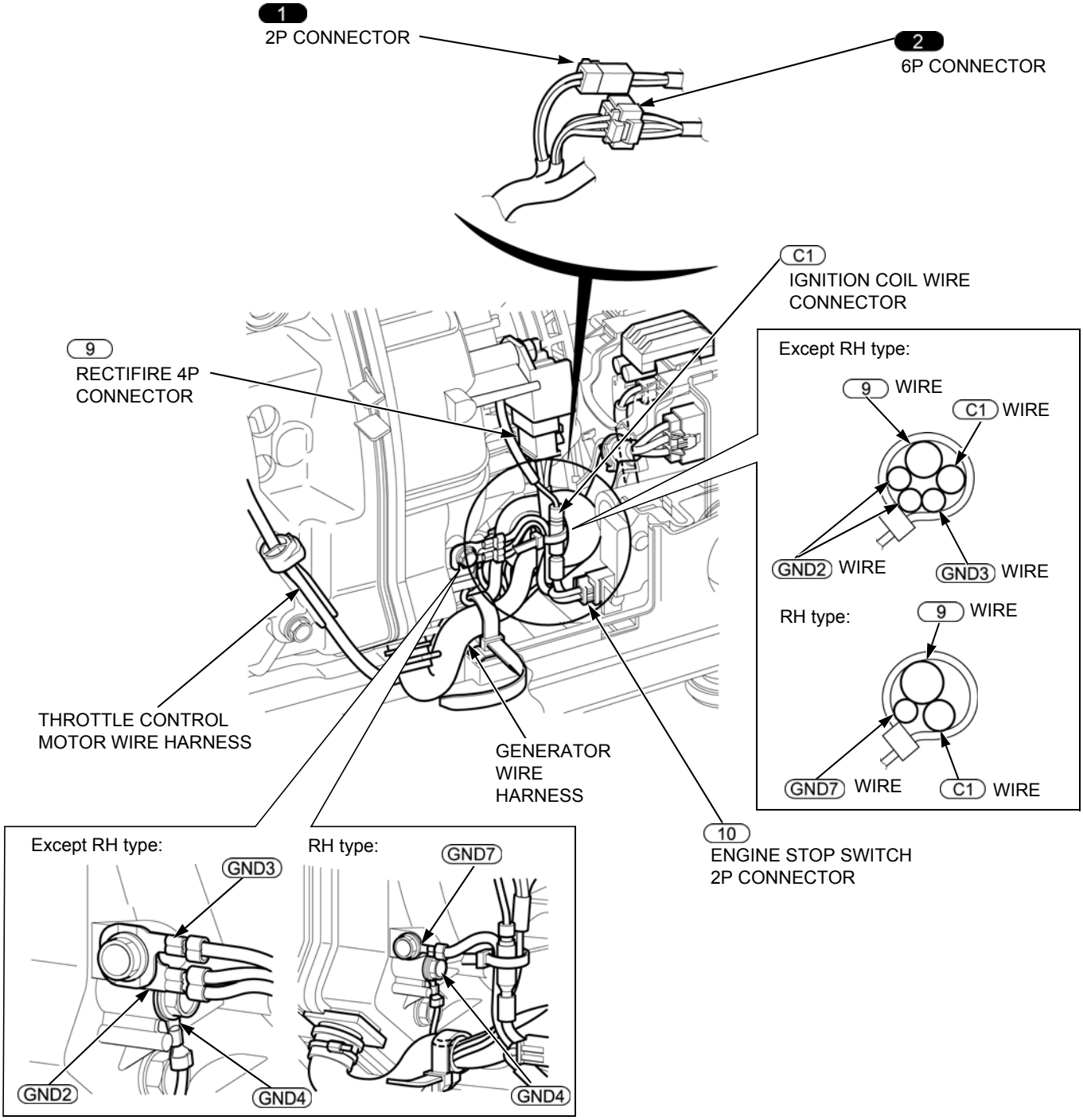


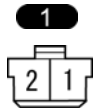
Wire side

Terminal number	Wire color
2	Bu
3	R
4	Y
5	W

Bl	Black	Br	Brown
Y	Yellow	O	Orange
Bu	Blue	Lb	Light blue
G	Green	Lg	Light green
R	Red	P	Pink
W	White	Gr	Gray

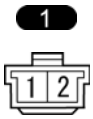
E, F, G, B1, W, RG, RH, U TYPES:





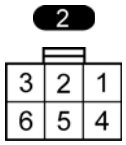
Generator wire harness side

Terminal number	Wire color
1	P
2	Gr



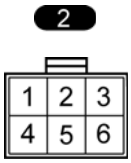
Control wire harness side

Terminal number	Wire color
1	P
2	Gr



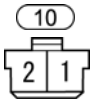
Generator wire harness side

Terminal number	Wire color
1	Y
2	Bu
3	Bl/Bu
4	Bl/R
5	Y/G
6	W/R



Control wire harness side

Terminal number	Wire color
1	Y
2	Bu
3	Bl/Bu
4	Bl/R
5	Y/G
6	W/R

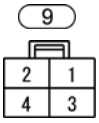


Control wire harness side

Terminal number	Wire color
1	Y/G
2	Bl

Engine stop switch side

Terminal number	Wire color
1	G
2	Bl



Inverter unit wire harness side

Terminal number	Wire color
1	W/R
2	Bl/R
3	Br
4	Br

Terminal number	Wire color
C1	Bl

Except RH type:

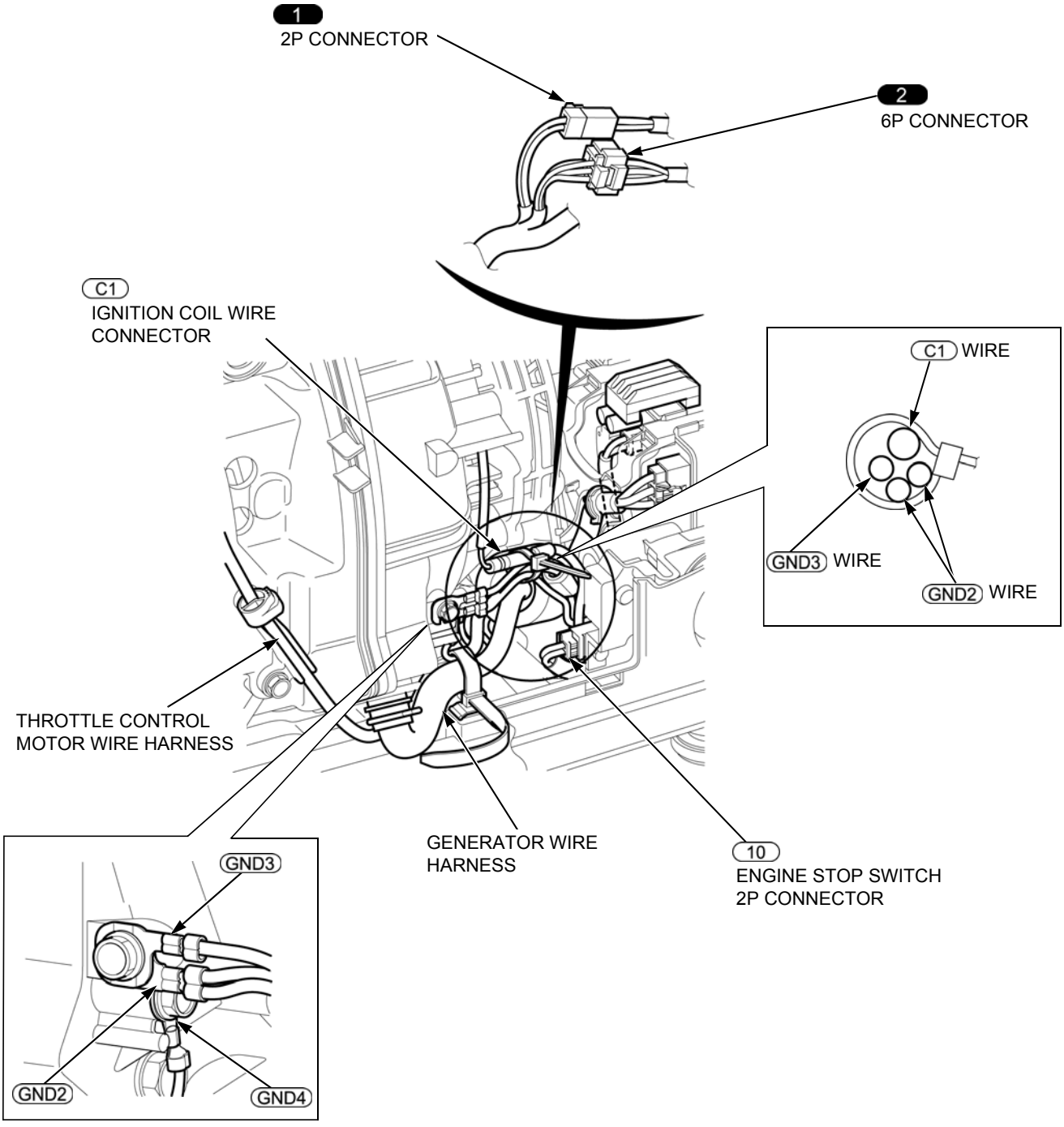
Terminal number	Wire color
GND2	Y/G
GND3	Y/G
GND4	Y/G

RH type:

Terminal number	Wire color
GND4	Y/G
GND7	Y/G

Bl	Black	Br	Brown
Y	Yellow	O	Orange
Bu	Blue	Lb	Light blue
G	Green	Lg	Light green
R	Red	P	Pink
W	White	Gr	Gray

B TYPE:


1
2P CONNECTOR
2
6P CONNECTOR
C1
IGNITION COIL WIRE
CONNECTOR
C1 WIRE
GND3 WIRE
GND2 WIRE
THROTTLE CONTROL
MOTOR WIRE HARNESS
GENERATOR WIRE
HARNESS
10
ENGINE STOP SWITCH
2P CONNECTOR
GND3
GND2
GND4

1

Generator wire harness side

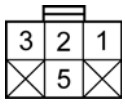
Terminal number	Wire color
1	P
2	Gr

1

Control wire harness side

Terminal number	Wire color
1	P
2	Gr

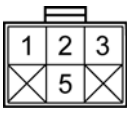
2



Generator wire harness side

Terminal number	Wire color
1	Y
2	Bu
3	Bl/Bu
5	Y/G

2



Control wire harness side

Terminal number	Wire color
1	Y
2	Bu
3	Bl/Bu
5	Y/G

10

Control wire harness side

Terminal number	Wire color
1	Y/G
2	Bl

10

Engine stop switch side

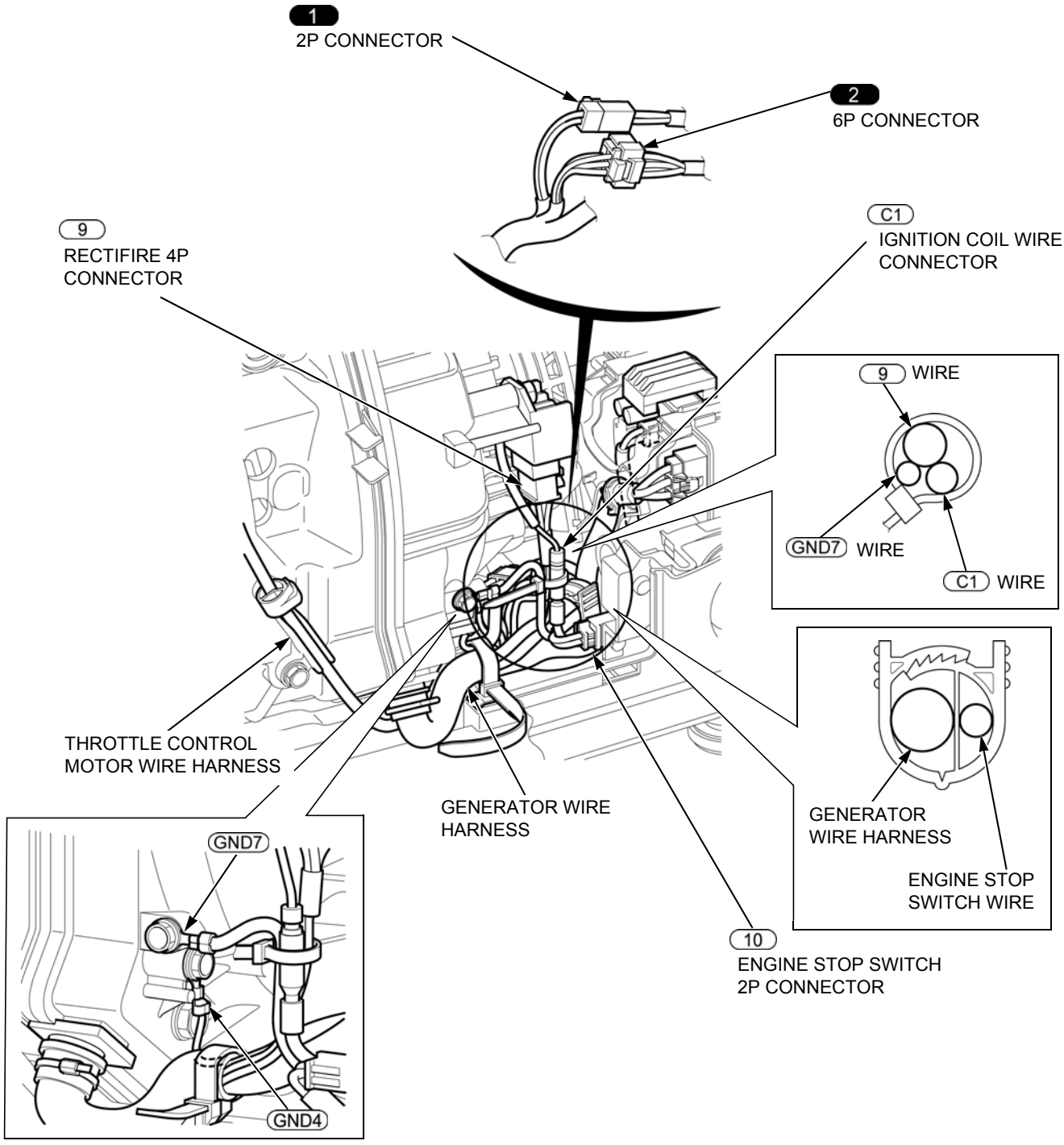
Terminal number	Wire color
1	G
2	Bl

Terminal number	Wire color
GND2	Y/G
GND3	Y/G
GND4	Y/G

Terminal number	Wire color
C1	Bl

Bl	Black	Br	Brown
Y	Yellow	O	Orange
Bu	Blue	Lb	Light blue
G	Green	Lg	Light green
R	Red	P	Pink
W	White	Gr	Gray

R, S, SK TYPES:


1
2P CONNECTOR
2
6P CONNECTOR
9
RECTIFIRE 4P
CONNECTOR
C1
IGNITION COIL WIRE
CONNECTOR
9 WIRE
GND7 WIRE
C1 WIRE
THROTTLE CONTROL
MOTOR WIRE HARNESS
GENERATOR WIRE
HARNESS
GENERATOR
WIRE HARNESS
ENGINE STOP
SWITCH WIRE
10
ENGINE STOP SWITCH
2P CONNECTOR
GND7
GND4

1

Generator wire harness side

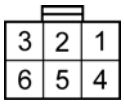
Terminal number	Wire color
1	P
2	Gr

1

Control wire harness side

Terminal number	Wire color
1	P
2	Gr

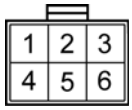
2



Generator wire harness side

Terminal number	Wire color
1	Y
2	Bu
3	Bl/Bu
4	Bl/R
5	Y/G
6	W/R

2



Control wire harness side

Terminal number	Wire color
1	Y
2	Bu
3	Bl/Bu
4	Bl/R
5	Y/G
6	W/R

10

Control wire harness side

Terminal number	Wire color
1	Y/G
2	Bl

10

Engine stop switch side

Terminal number	Wire color
1	G
2	Bl

9

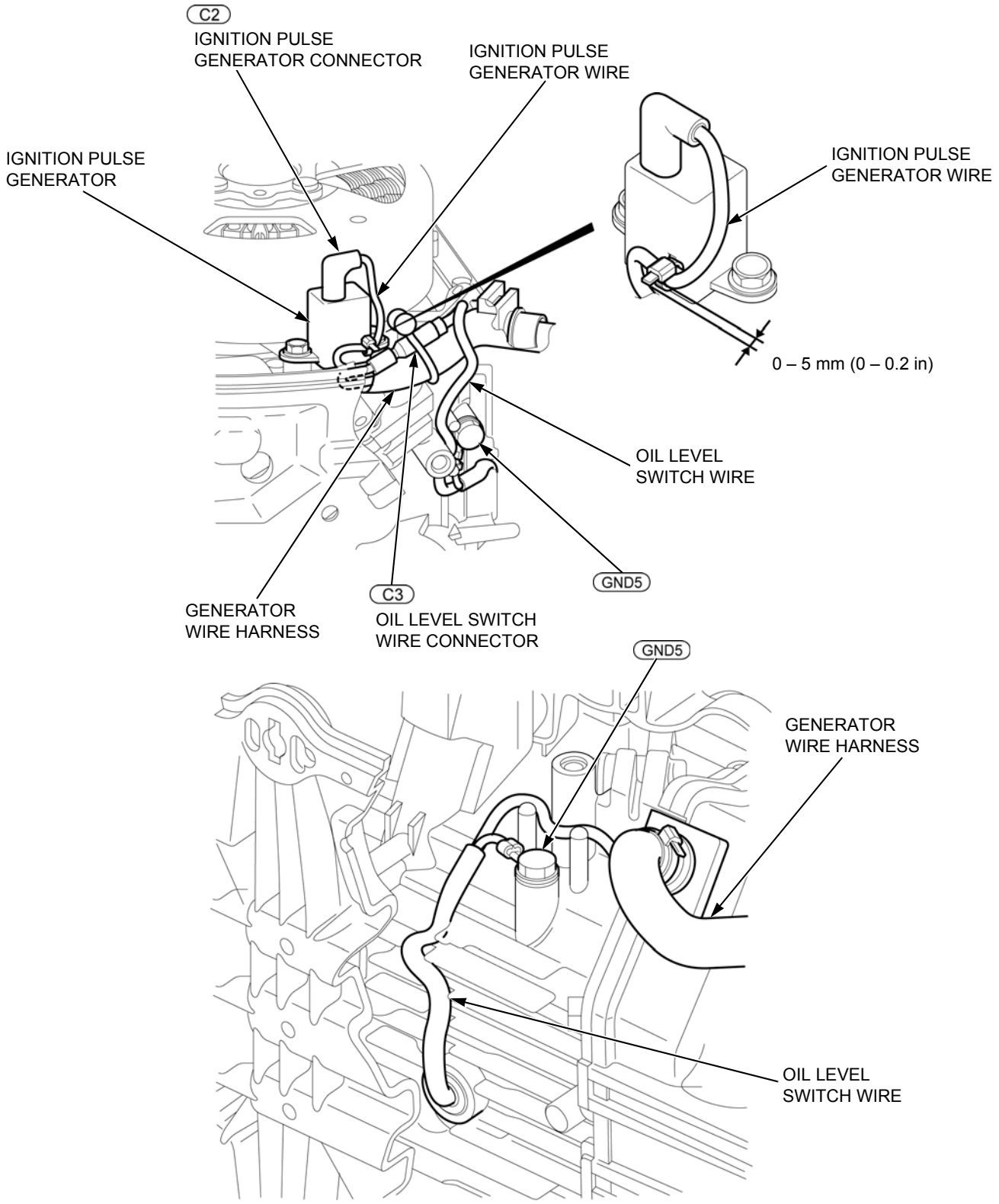
Inverter unit wire harness side

Terminal number	Wire color
1	W/R
2	Bl/R
3	Br
4	Br

Terminal number	Wire color
GND4	Y/G
GND7	Y/G

Terminal number	Wire color
C1	Bl

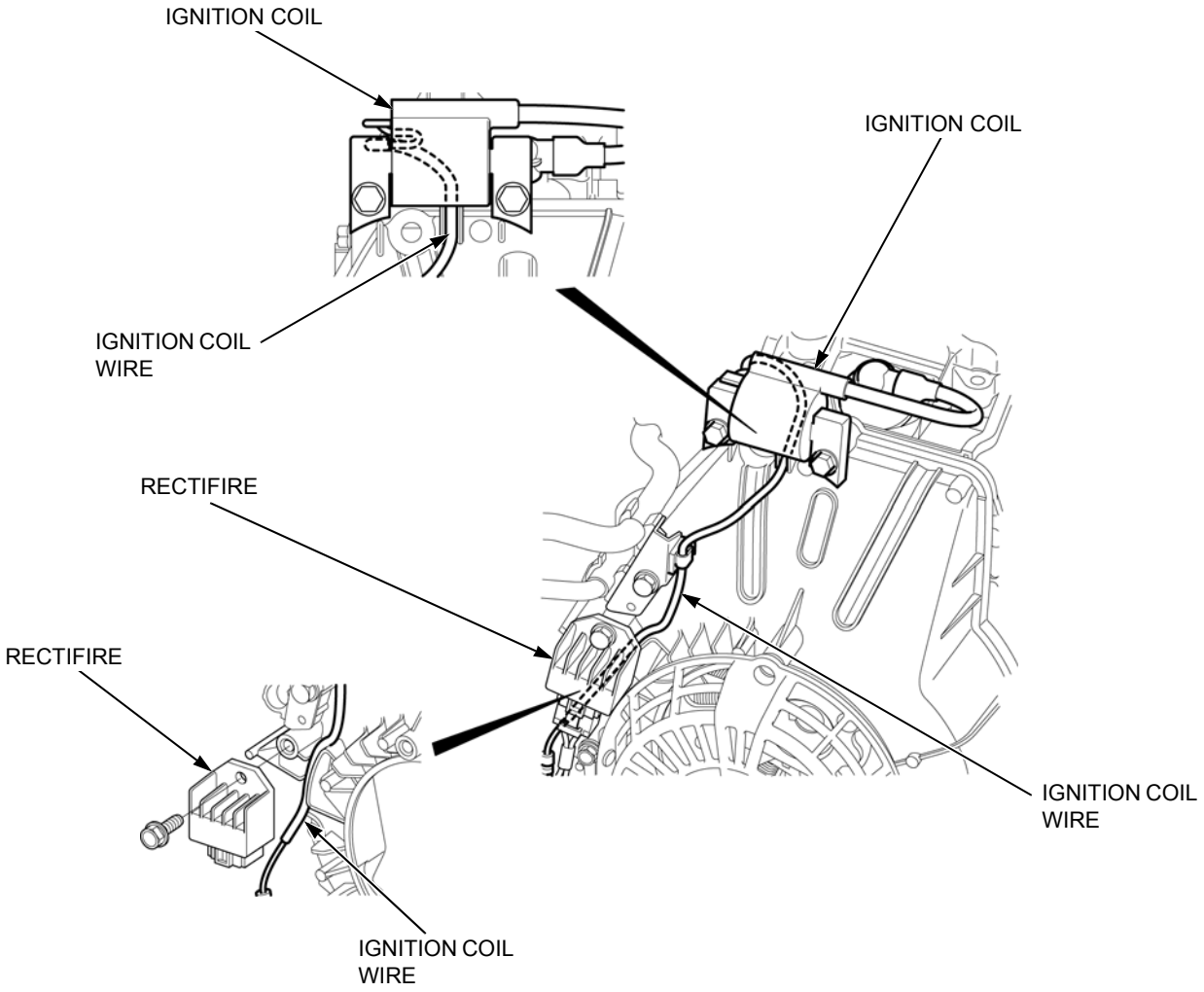
Bl	Black	Br	Brown
Y	Yellow	O	Orange
Bu	Blue	Lb	Light blue
G	Green	Lg	Light green
R	Red	P	Pink
W	White	Gr	Gray

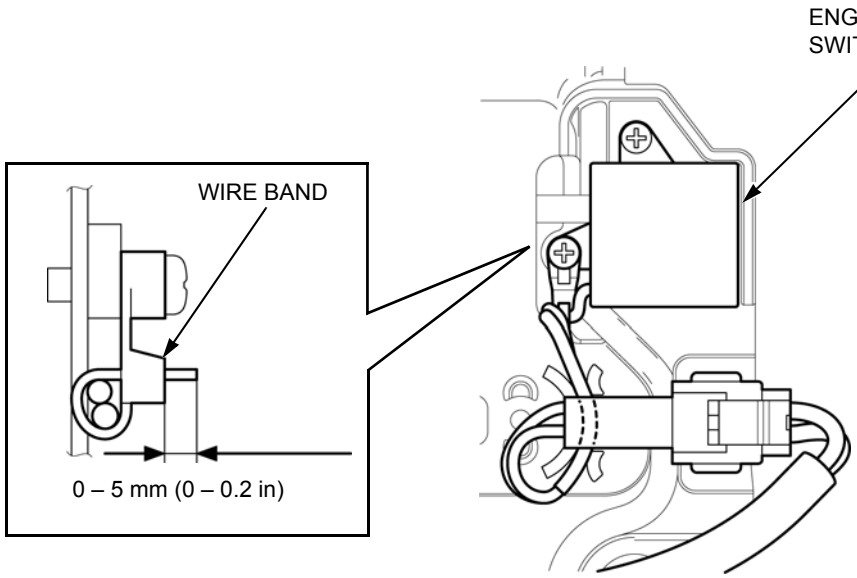


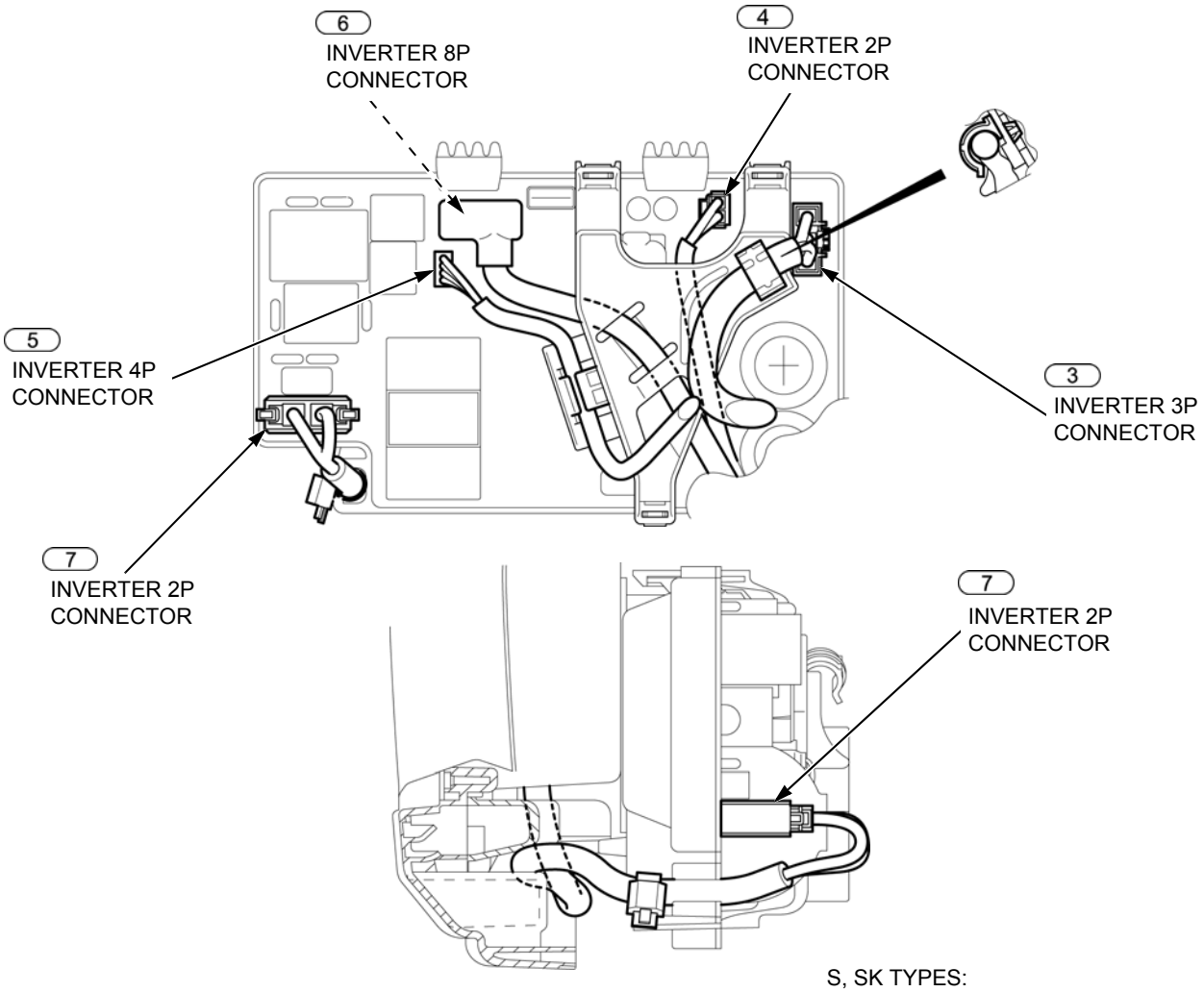
Terminal number	Wire color
C2	Bu
C3	Y

Terminal number	Wire color
GND5	G

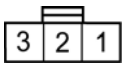
Bl	Black	Br	Brown
Y	Yellow	O	Orange
Bu	Blue	Lb	Light blue
G	Green	Lg	Light green
R	Red	P	Pink
W	White	Gr	Gray


IGNITION COIL
IGNITION COIL
IGNITION COIL WIRE
RECTIFIRE
RECTIFIRE
IGNITION COIL WIRE
IGNITION COIL WIRE


ENGINE STOP SWITCH
WIRE BAND
0 – 5 mm (0 – 0.2 in)



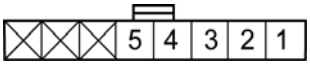
3



Inverter unit wire harness side

Terminal number	Wire color
1	Bu
2	W
3	R

6



Inverter unit wire harness side

S, SK TYPES:

Terminal number	Wire color
1	R/Y
2	R/W
3	G/Bl
4	G/R
5	R/W

EXCEPT S, SK TYPES:

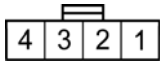
Terminal number	Wire color
1	R/Y
3	G/Bl
4	G/R
5	R/W

4

Inverter unit wire harness side

Terminal number	Wire color
1	Gr
2	P

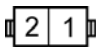
5



Inverter unit wire harness side

Terminal number	Wire color
1	W
2	R
3	Bu
4	Y

7



Inverter unit wire harness side

B TYPE:

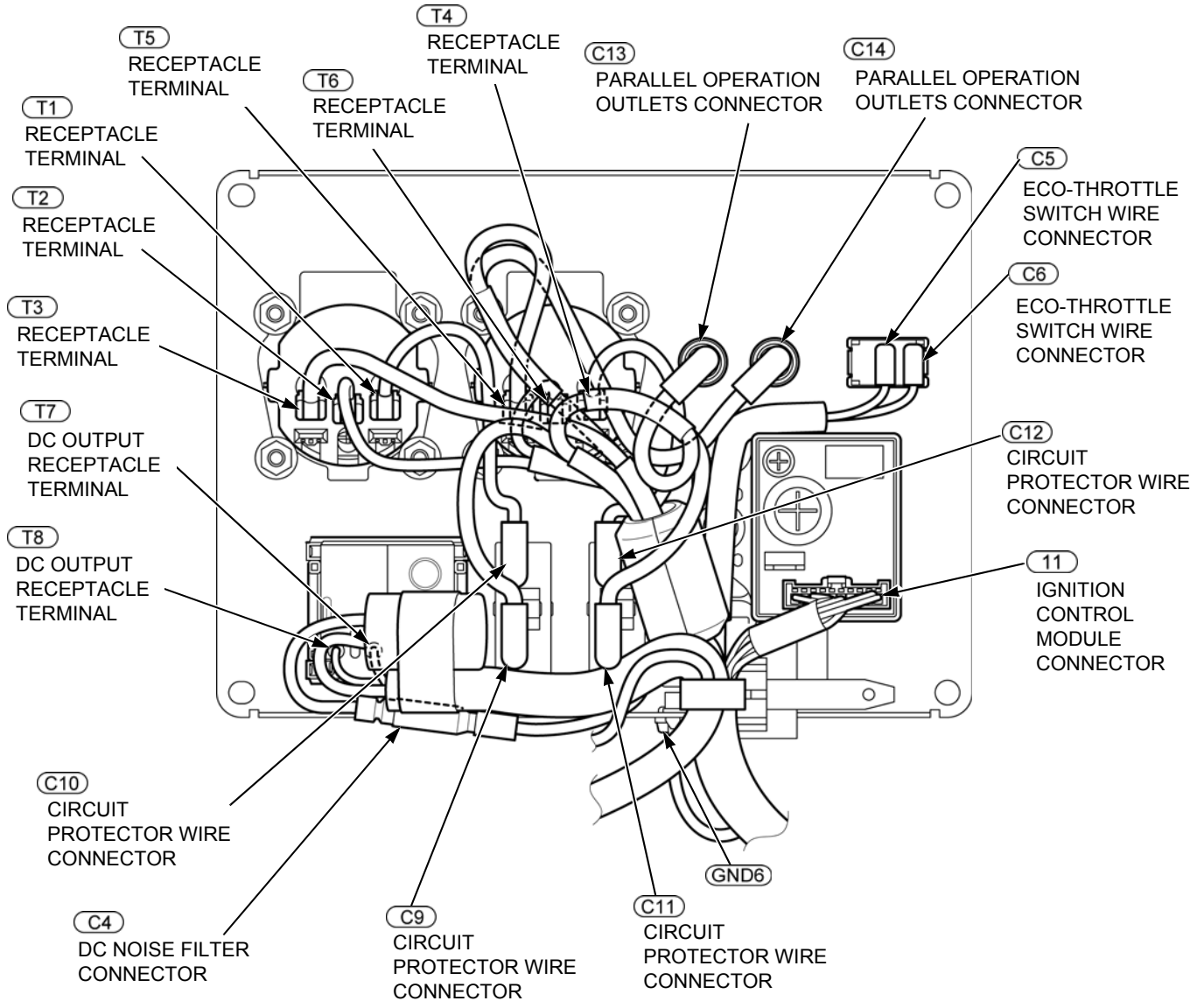
Terminal number	Wire color
1	R
2	W

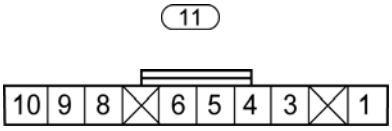
EXCEPT B TYPE:

Terminal number	Wire color
1	Br
2	W

Bl	Black	Br	Brown
Y	Yellow	O	Orange
Bu	Blue	Lb	Light blue
G	Green	Lg	Light green
R	Red	P	Pink
W	White	Gr	Gray

E, F, G, RG TYPES:





Control wire harness side

Terminal number	Wire color
1	Bl
3	Y
4	Bu
5	Y/G
6	Bl/Bu
8	G/R
9	G/Bl
10	R/W

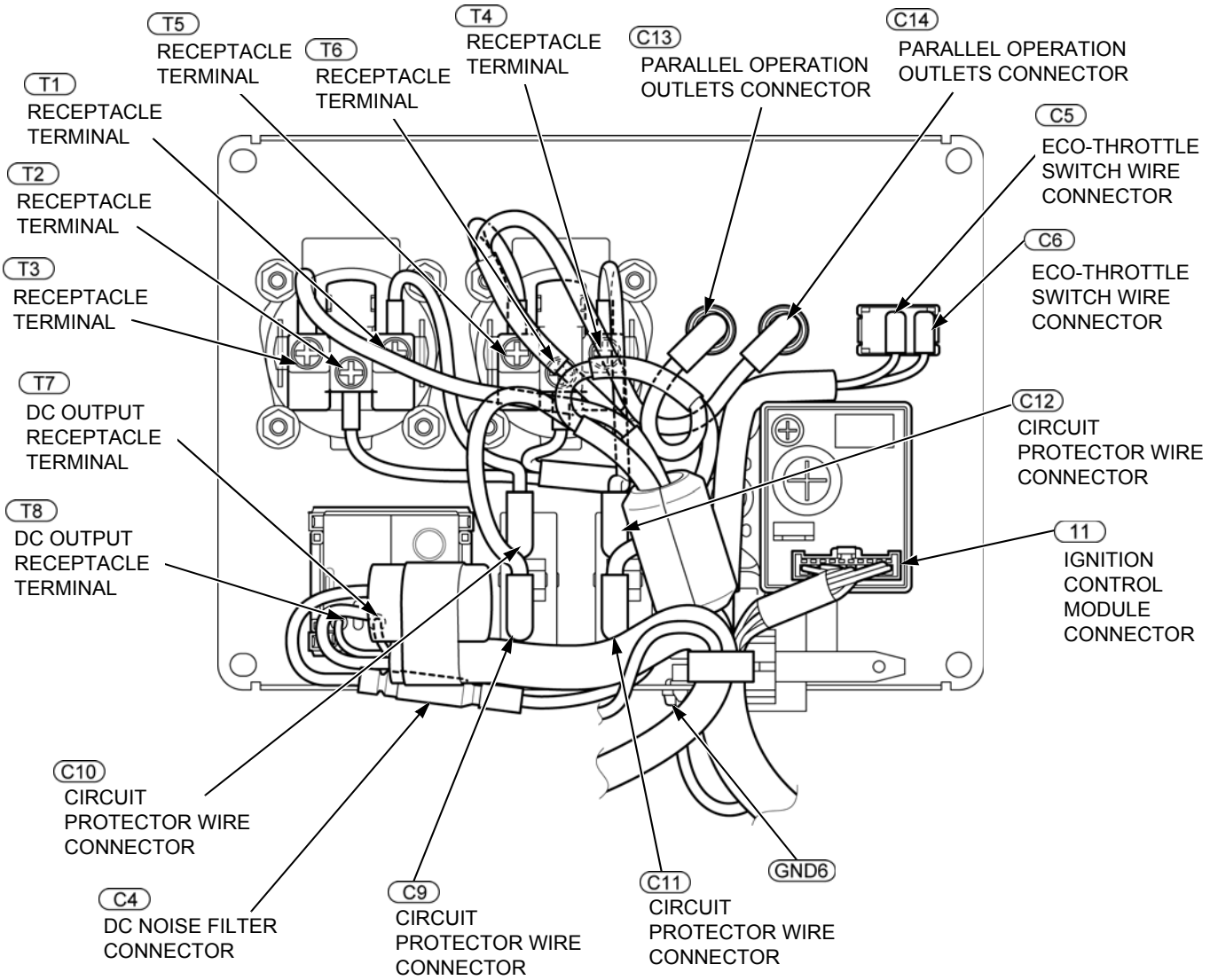
Terminal number	Wire color
T1	Br
T2	W
T3	Y/G
T4	Br
T5	W
T6	Y/G
T7	W/R
T8	Bl/R

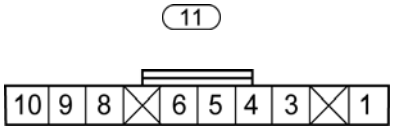
Terminal number	Wire color
C5	R/W
C6	R/Y
C9	Br
C10	Br
C11	Br
C12	Br
C13	Br
C14	W

Terminal number	Wire color
GND6	Y/G

Bl	Black	Br	Brown
Y	Yellow	O	Orange
Bu	Blue	Lb	Light blue
G	Green	Lg	Light green
R	Red	P	Pink
W	White	Gr	Gray

B1 TYPE:





Control wire harness side

Terminal number	Wire color
1	Bl
3	Y
4	Bu
5	Y/G
6	Bl/Bu
8	G/R
9	G/Bl
10	R/W

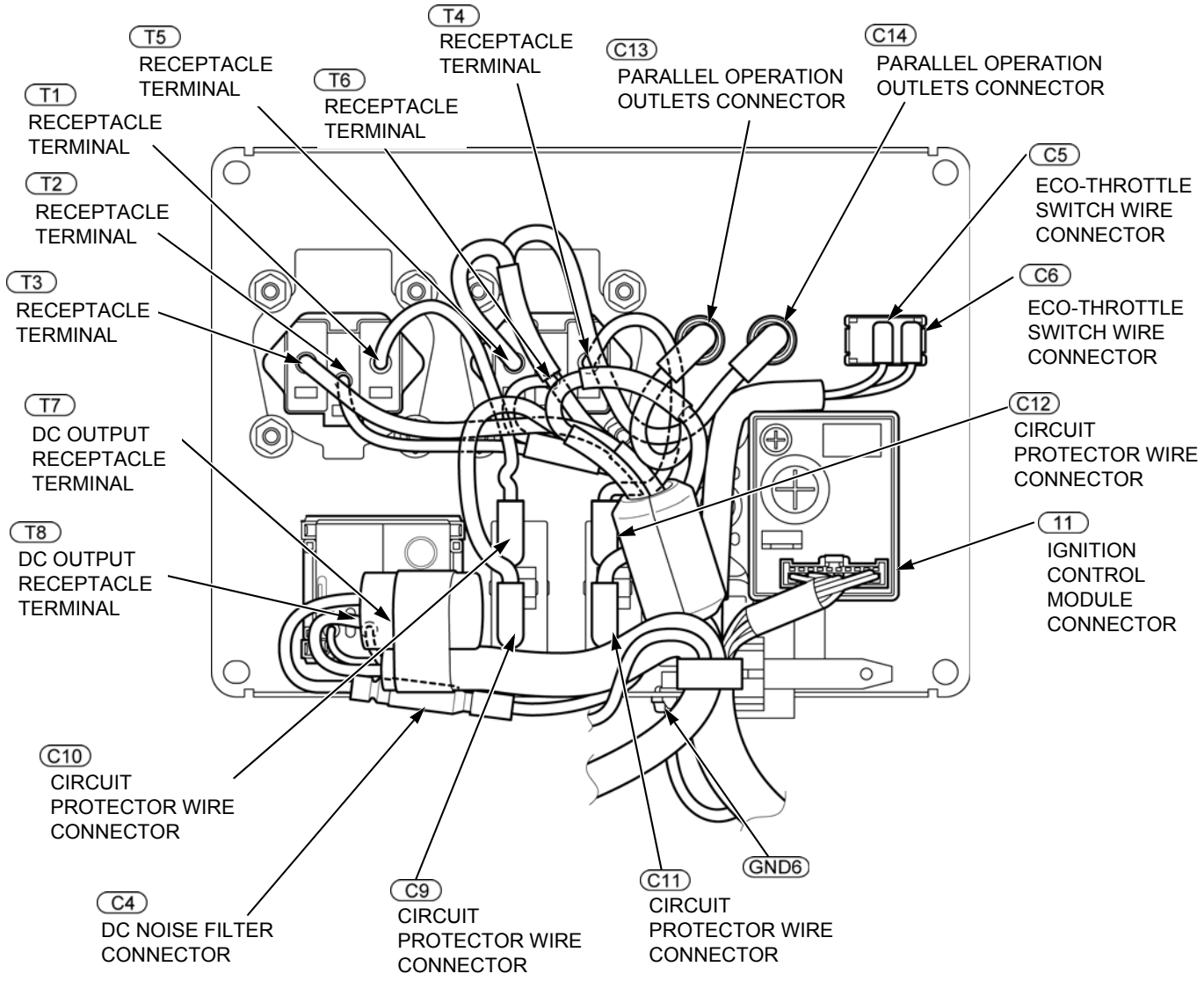
Terminal number	Wire color
T1	Br
T2	W
T3	Y/G
T4	Br
T5	W
T6	Y/G
T7	W/R
T8	Bl/R

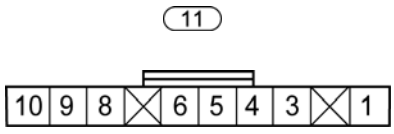
Terminal number	Wire color
C5	R/W
C6	R/Y
C9	Br
C10	Br
C11	Br
C12	Br
C13	Br
C14	W

Terminal number	Wire color
GND6	Y/G

Bl	Black	Br	Brown
Y	Yellow	O	Orange
Bu	Blue	Lb	Light blue
G	Green	Lg	Light green
R	Red	P	Pink
W	White	Gr	Gray

W TYPE:





Control wire harness side

Terminal number	Wire color
1	Bl
3	Y
4	Bu
5	Y/G
6	Bl/Bu
8	G/R
9	G/Bl
10	R/W

Terminal number	Wire color
T1	Br
T2	W
T3	Y/G
T4	Br
T5	W
T6	Y/G
T7	W/R
T8	Bl/R

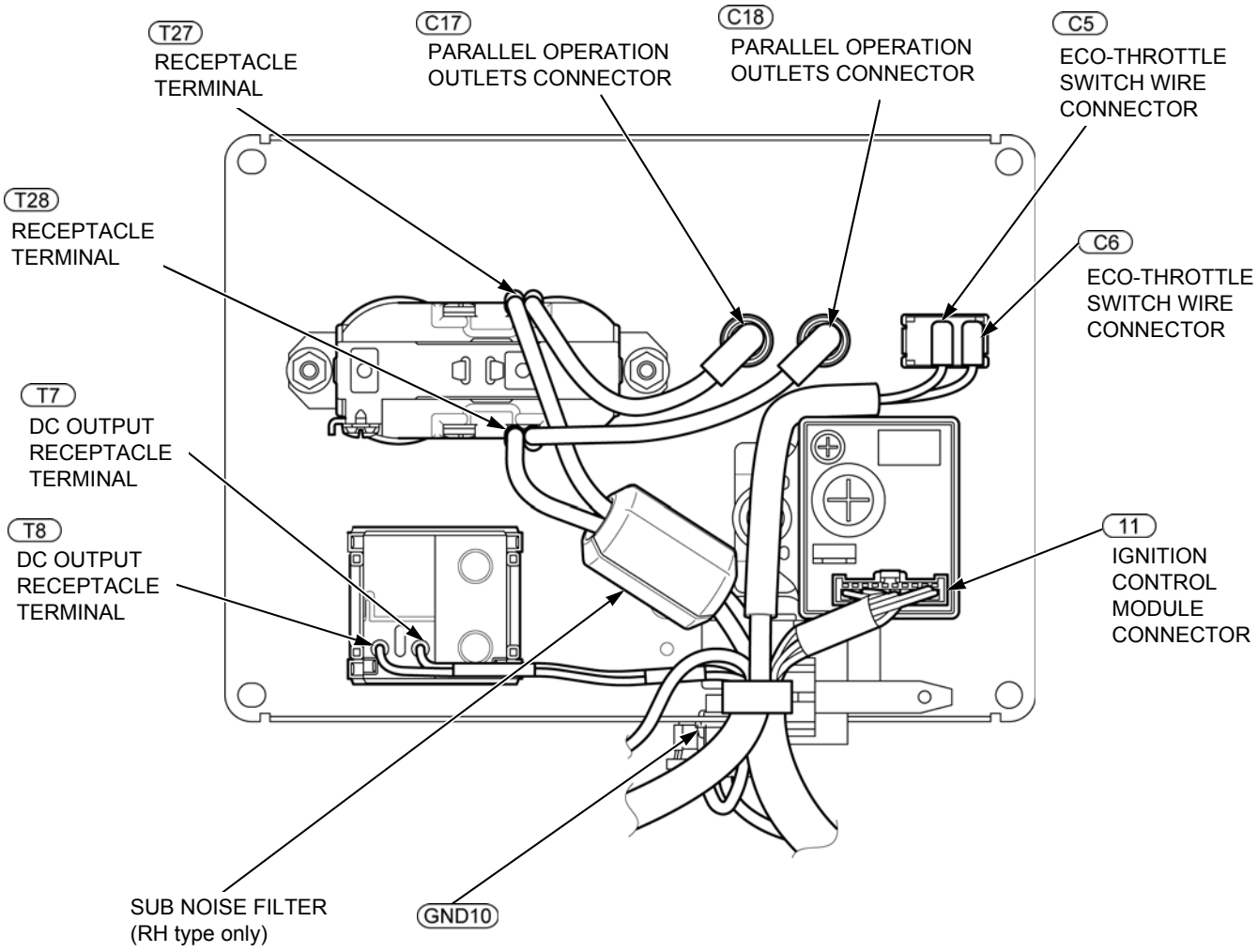
Terminal number	Wire color
C5	R/W
C6	R/Y
C9	Br
C10	Br
C11	Br
C12	Br
C13	Br
C14	W

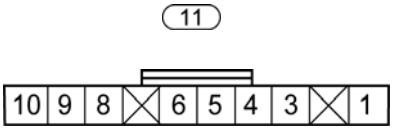
Terminal number	Wire color
GND6	Y/G

Bl	Black	Br	Brown
Y	Yellow	O	Orange
Bu	Blue	Lb	Light blue
G	Green	Lg	Light green
R	Red	P	Pink
W	White	Gr	Gray

RH, R, S TYPES:

RH type shown:





Terminal number	Wire color
1	Bl
3	Y
4	Bu
5	Y/G
6	Bl/Bu
8	G/R
9	G/Bl
10	R/W

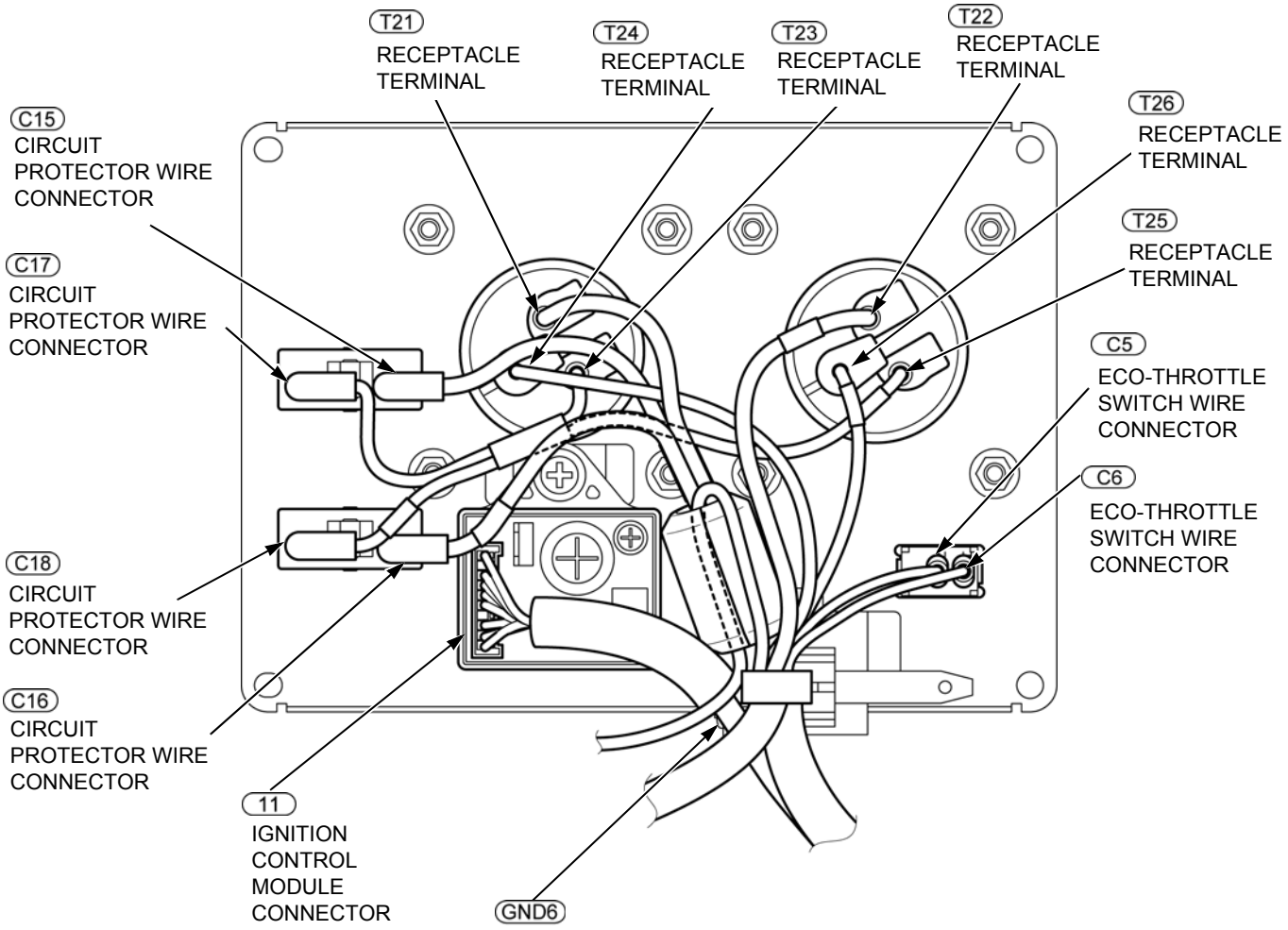
Terminal number	Wire color
T27	Br
T28	W
T7	W/R
T8	Bl/R

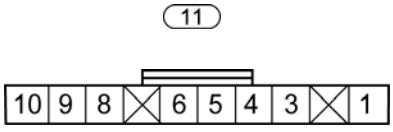
Terminal number	Wire color
C5	R/W
C6	R/Y
C17	Br
C18	W

Terminal number	Wire color
GND10	Y/G

Bl	Black	Br	Brown
Y	Yellow	O	Orange
Bu	Blue	Lb	Light blue
G	Green	Lg	Light green
R	Red	P	Pink
W	White	Gr	Gray

B TYPE:





Terminal number	Wire color
1	Bl
3	Y
4	Bu
5	Y/G
6	Bl/Bu
8	G/R
9	G/Bl
10	R/W

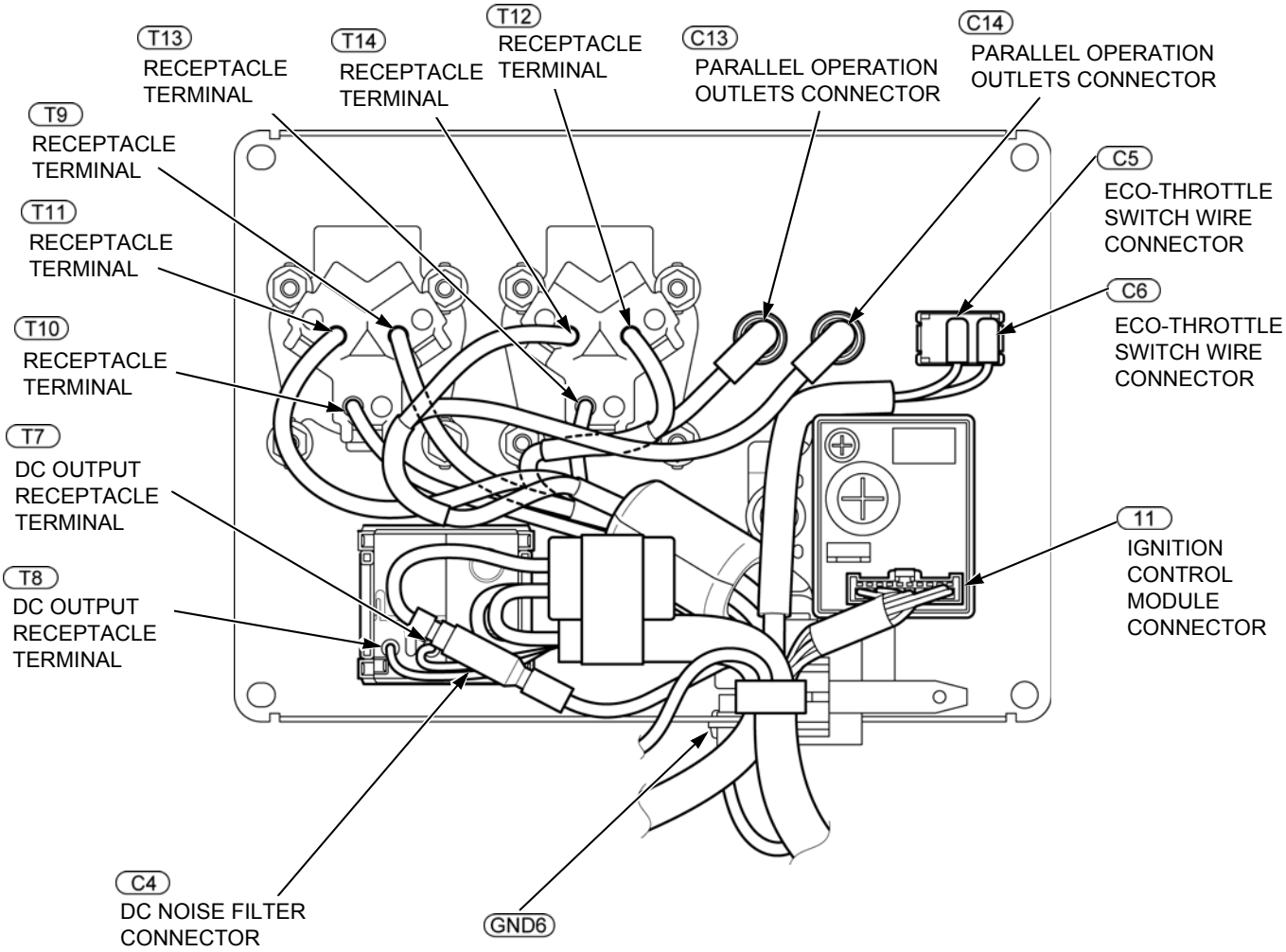
Terminal number	Wire color
T21	W
T22	W
T23	R
T24	Y/G
T25	R
T26	Y/G

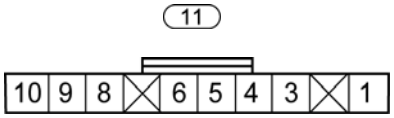
Terminal number	Wire color
C5	R/W
C6	R/Y
C15	R
C16	R
C17	R
C18	R

Terminal number	Wire color
GND6	Y/G

Bl	Black	Br	Brown
Y	Yellow	O	Orange
Bu	Blue	Lb	Light blue
G	Green	Lg	Light green
R	Red	P	Pink
W	White	Gr	Gray

U TYPE:





Terminal number	Wire color
1	Bl
3	Y
4	Bu
5	Y/G
6	Bl/Bu
8	G/R
9	G/Bl
10	R/W

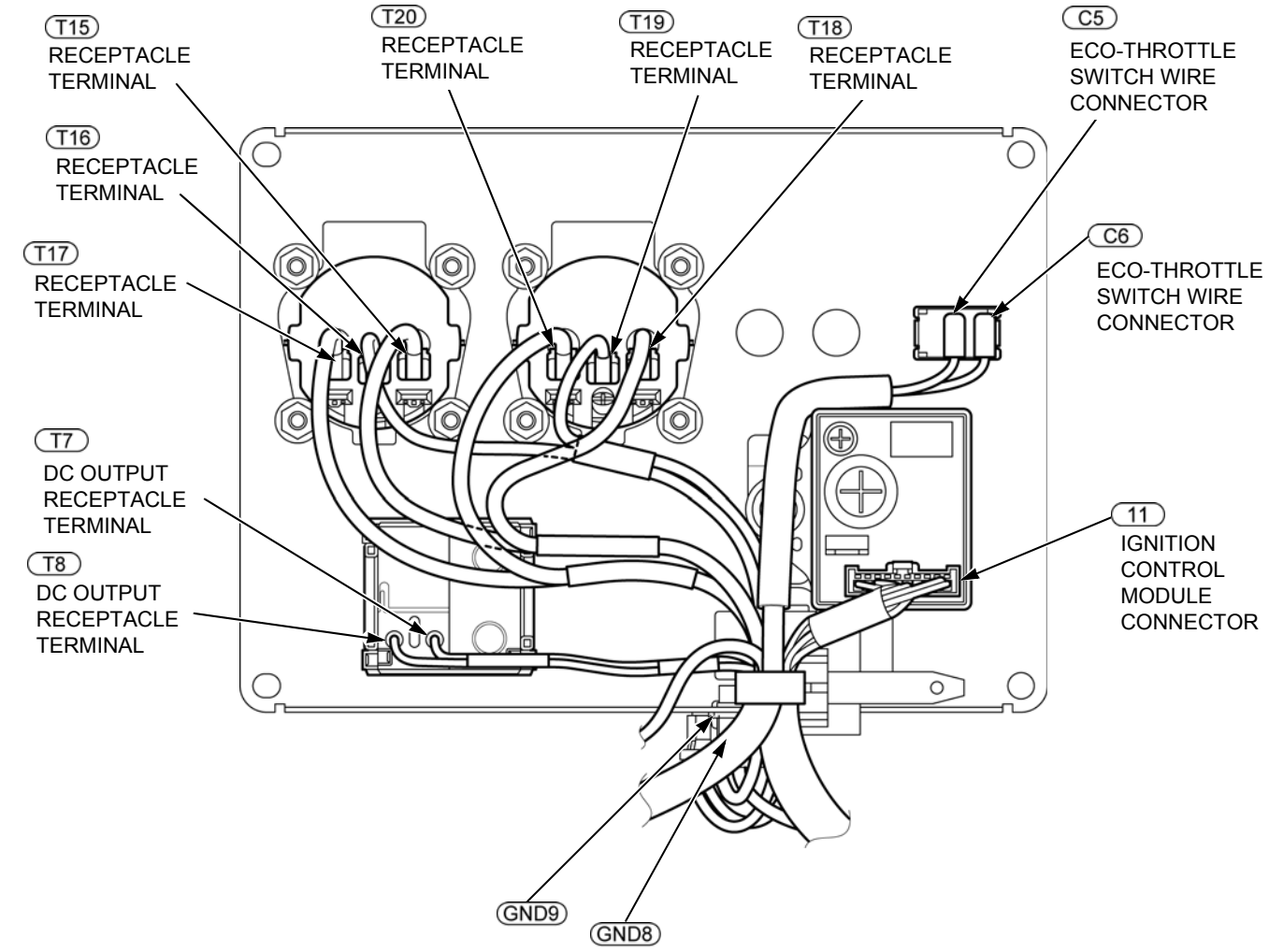
Terminal number	Wire color
T9	Br
T10	Y/G
T11	W
T12	Br
T13	Y/G
T14	W
T7	W/R
T8	Bl/R

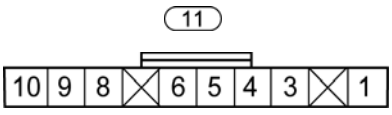
Terminal number	Wire color
C5	R/W
C6	R/Y
C13	Br
C14	W

Terminal number	Wire color
GND6	Y/G

Bl	Black	Br	Brown
Y	Yellow	O	Orange
Bu	Blue	Lb	Light blue
G	Green	Lg	Light green
R	Red	P	Pink
W	White	Gr	Gray

SK TYPE:





Control wire harness side

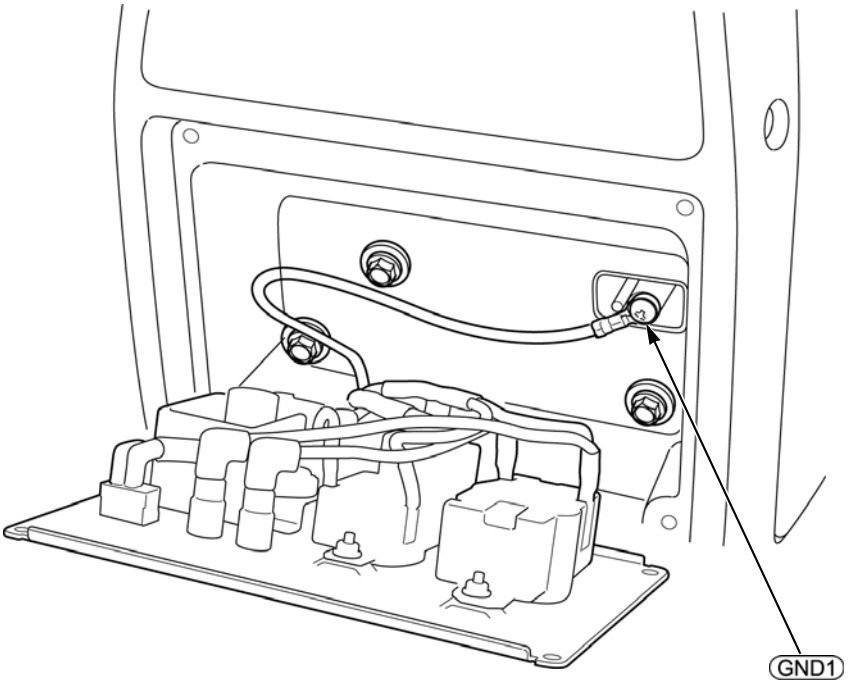
Terminal number	Wire color
1	Bl
3	Y
4	Bu
5	Y/G
6	Bl/Bu
8	G/R
9	G/Bl
10	R/W

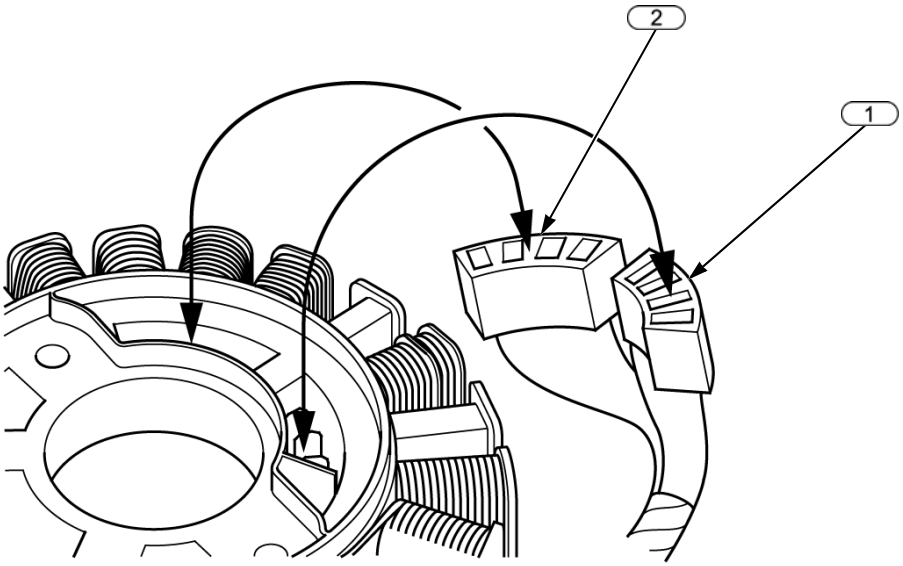
Terminal number	Wire color
T15	Br
T16	Y/G
T17	W
T18	Br
T19	Y/G
T20	W
T7	W/R
T8	Bl/R

Terminal number	Wire color
C5	R/W
C6	R/Y

Terminal number	Wire color
GND8	Y/G
GND9	Y/G

Bl	Black	Br	Brown
Y	Yellow	O	Orange
Bu	Blue	Lb	Light blue
G	Green	Lg	Light green
R	Red	P	Pink
W	White	Gr	Gray





Terminal number	Wire color
1	Bl/Bu
2	Bu
3	W
4	R

B type:

Terminal number	Wire color
4	Br
5	Br

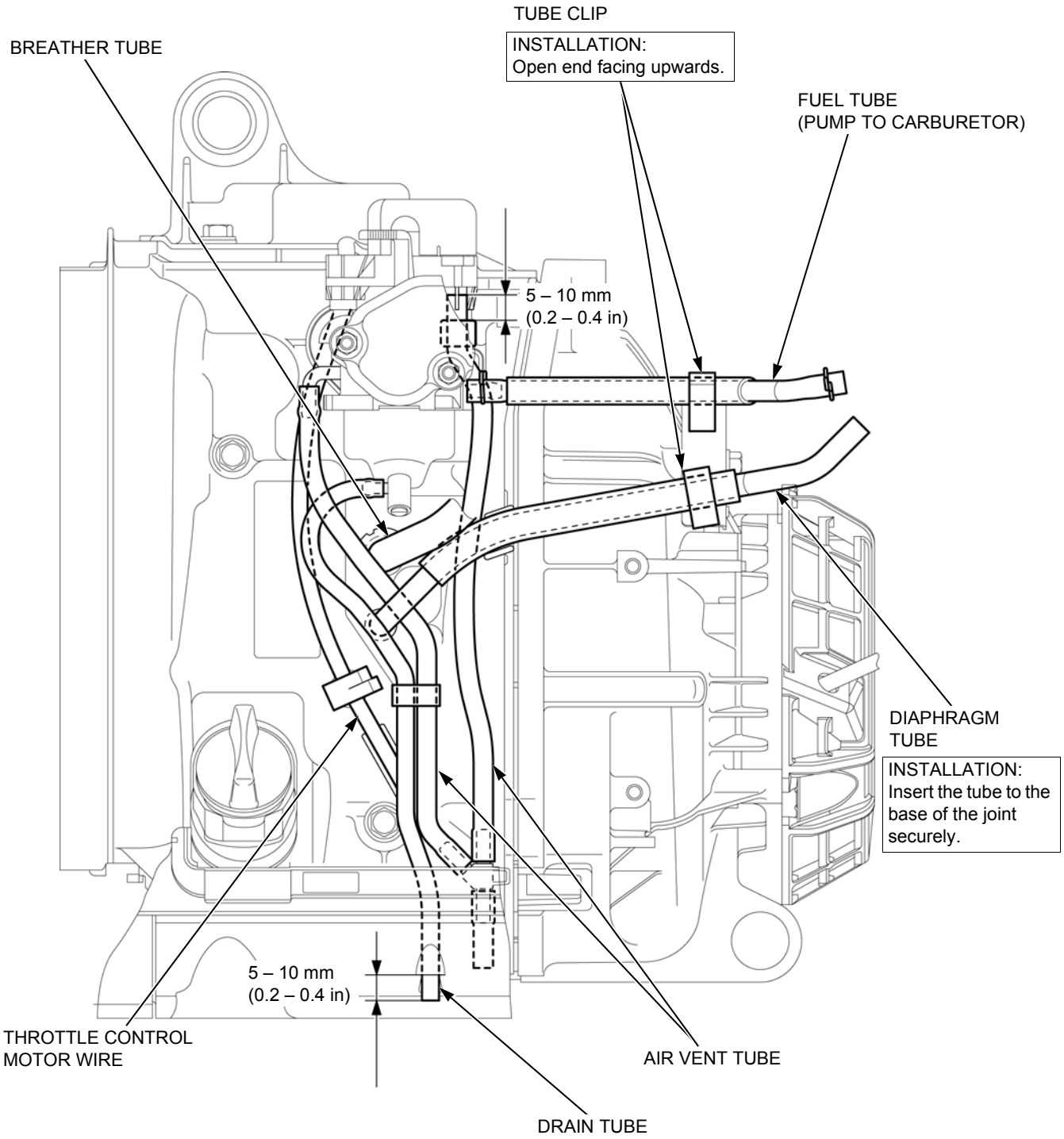
Except B type:

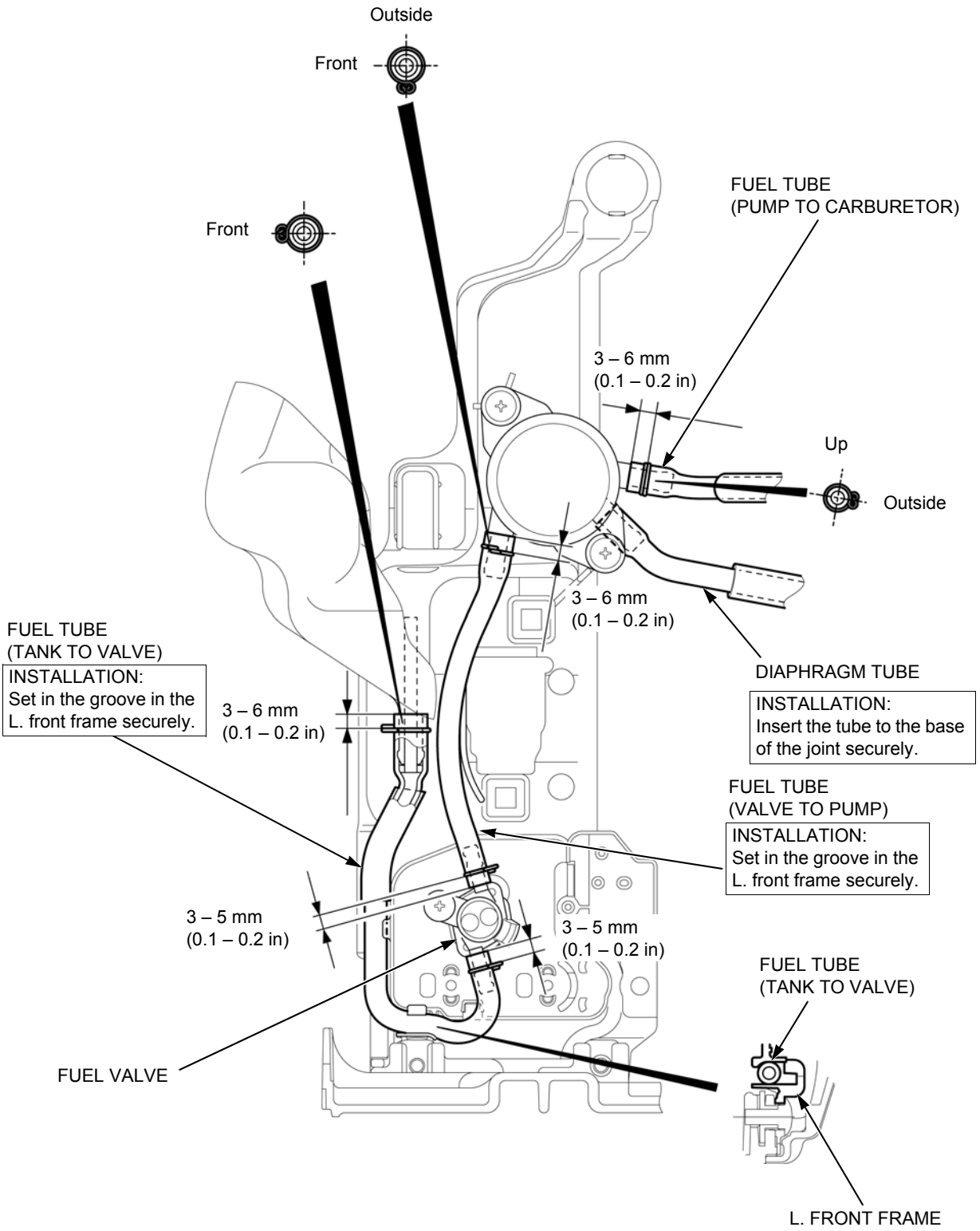
Terminal number	Wire color
2	P
3	G
4	Br
5	Br

Terminal number	Wire color
GND1	Y/G

Bl	Black	Br	Brown
Y	Yellow	O	Orange
Bu	Blue	Lb	Light blue
G	Green	Lg	Light green
R	Red	P	Pink
W	White	Gr	Gray

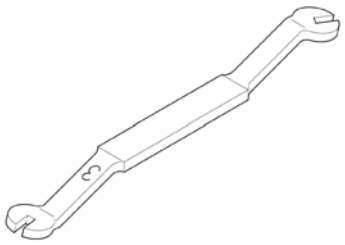
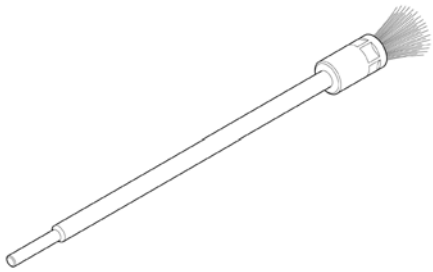
TUBE ROUTING




Outside
Front
Front
FUEL TUBE
(PUMP TO CARBURETOR)
3 – 6 mm
(0.1 – 0.2 in)
Up
Outside
3 – 6 mm
(0.1 – 0.2 in)
DIAPHRAGM TUBE
INSTALLATION:
Insert the tube to the base of the joint securely.
FUEL TUBE
(TANK TO VALVE)
INSTALLATION:
Set in the groove in the L. front frame securely.
3 – 6 mm
(0.1 – 0.2 in)
FUEL TUBE
(VALVE TO PUMP)
INSTALLATION:
Set in the groove in the L. front frame securely.
3 – 5 mm
(0.1 – 0.2 in)
3 – 5 mm
(0.1 – 0.2 in)
FUEL TUBE
(TANK TO VALVE)
FUEL VALVE
L. FRONT FRAME

3. MAINTENANCE

TOOL

Valve adjuster wrench, 3 mm 07908-KE90000 	Cleaning brush 07998-VA20100 

MAINTENANCE SCHEDULE

ITEM	Perform at every indicated month or operating hour interval, whichever comes first.	REGULAR SERVICE PERIOD (1)					Refer to page
		Each use	First month or 20 hrs.	Every 3 months or 50 hrs.	Every 6 months or 100 hrs.	Every years or 200 hrs.	
Engine oil	Check level	○					3-3
	Change		○		○		3-3
Air cleaner	Check	○					3-4
	Clean			○ (2)			
Spark plug	Check-adjust				○		3-5
	Replace					○	
Valve clearance	Check-adjust					○	3-6
Combustion chamber	Clean	After every 300 hrs.					3-7
Fuel tank and filter	Clean				○		3-7
Fuel tube	Check	Every 2 years (Replace if necessary)					3-8

(1) For commercial use, log hours of operation to determine proper maintenance intervals.

(2) Service more frequently when used in dusty areas.

ENGINE OIL LEVEL CHECK

LEVEL CHECK

Remove the maintenance cover (page 5-2).

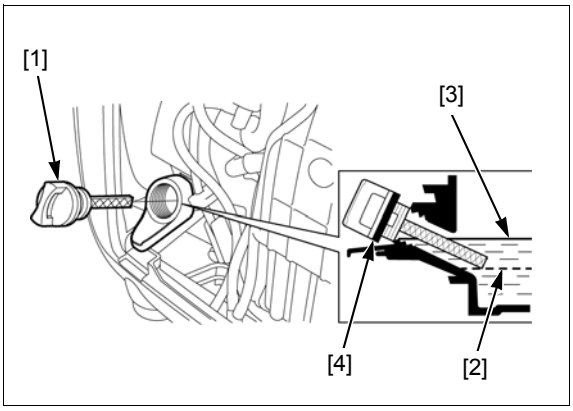
Place the engine on a level surface.

Remove the oil filler cap [1] and wipe the dipstick clean.

Check the oil level by inserting the dipstick into the oil filler neck without screwing it in.

If the level is low [2], fill to the upper limit [3] of the oil filler neck with the recommended oil.

RECOMMENDED OIL:
SAE 10W-30
API service classification: SE or higher



Check that the O-ring [4] is in good condition; replace it if necessary.

Install and tighten the oil filler cap securely.

Install the maintenance cover (page 5-2).

CHANGE

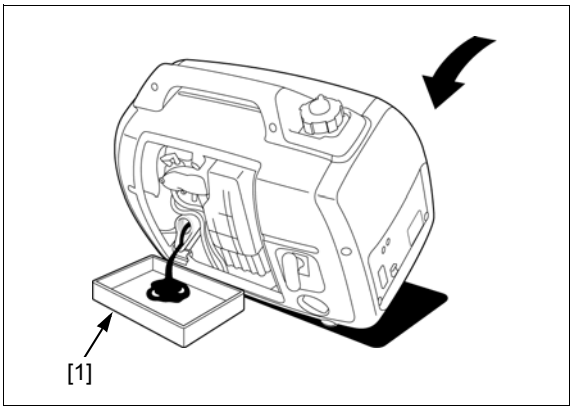
Drain the used oil while the engine is warm. Warm oil drains quickly and completely.

Remove the maintenance cover (page 5-2).

Place the engine on a level surface.

Place a suitable container [1] to collect the drained oil.

Remove the oil filler cap and drain the oil into the suitable container.



Please dispose of used motor oil in a manner that is compatible with the environment. We suggest you take used oil in a sealed container to your local recycling center or service station for reclamation. Do not throw it in the trash, pour it into the ground, or pour it down a drain.

⚠ CAUTION

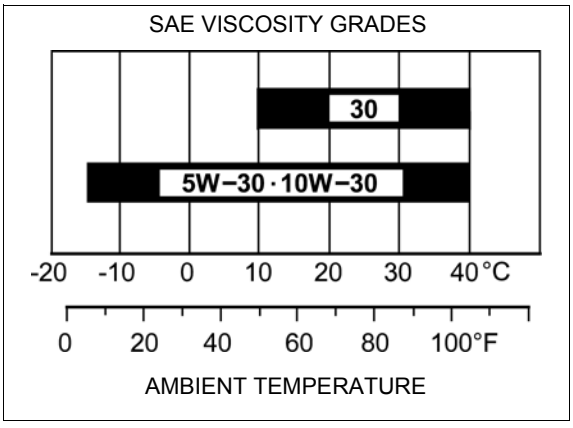
Used engine oil contains substances that have been identified as carcinogenic. If repeatedly left in contact with the skin for prolonged periods, it may cause skin cancer. Wash your hands thoroughly with soap and water as soon as possible after contact with used engine oil.

SAE 10W-30 is recommended for general use. Other viscosities shown in the chart may be used when the average temperature in your area is within the recommended range.

Fill with the recommended oil.

OIL CAPACITY: 0.44 Liter (0.46 US qt, 0.39 Imp qt)

RECOMMENDED OIL:
SAE 10W-30
API service classification: SE or higher



After filling the oil, check the oil level.

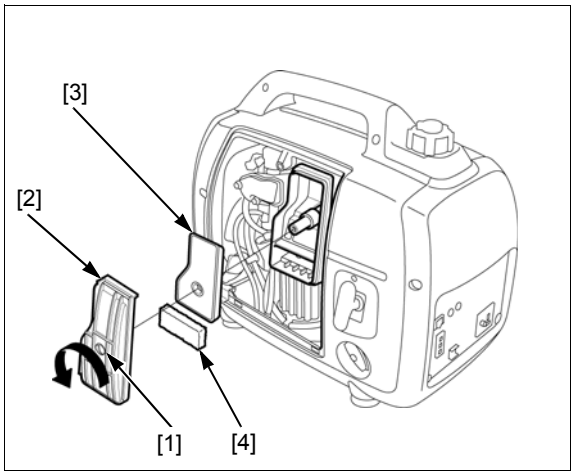
Install the maintenance cover (page 5-2).

AIR CLEANER CHECK/CLEANING

Remove the maintenance cover (page 5-2).

Loosen the air cleaner cover screw [1] and remove the air cleaner cover [2].

Remove the main air cleaner element [3] and outer air cleaner element [4] from the air cleaner cover.



Clean the air cleaner element in warm soapy water [1], rinse, and allow to dry thoroughly, or clean with a high flash point solvent and allow to dry.

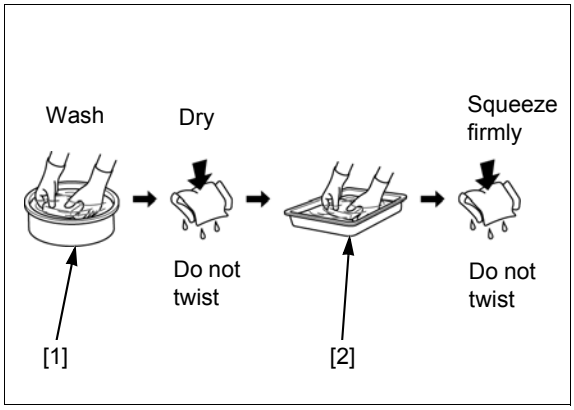
Dip the elements in clean engine oil [2], and squeeze out all the excess oil.

NOTE:

- Excess oil will restrict air flow through the foam element and may cause the engine to smoke at startup.

NOTICE

- *Do not twist to squeeze oil from the air cleaner element. Twisting the element can damage it.*



Install the air cleaner element in the air cleaner case.

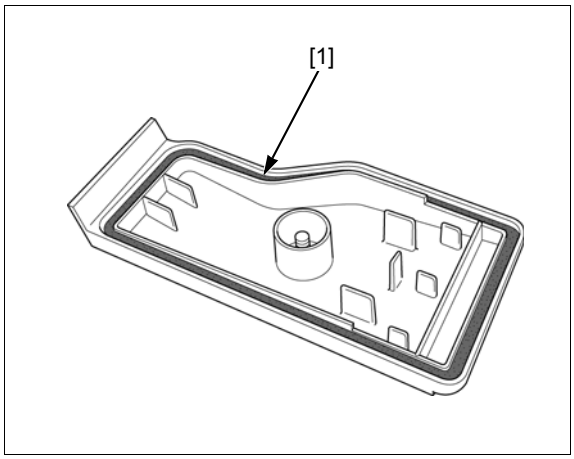
Install the air cleaner cover and tighten the air cleaner cover screw.

NOTE:

Replace the cover seal [1] if damaged.

NOTICE

- *A loosely installed air cleaner cover can come off by vibration during running. Operating the engine without an air cleaner element or with a damaged air cleaner element will allow dirt to enter the engine, causing rapid engine wear.*



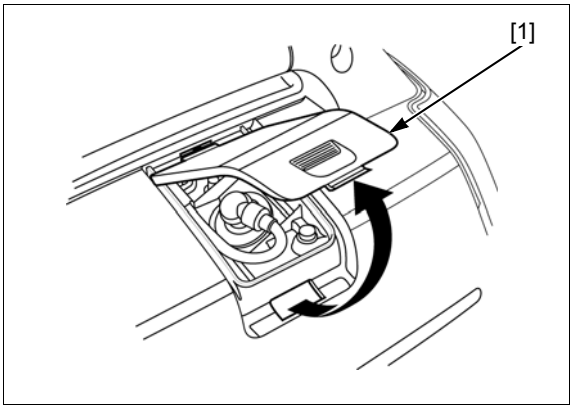
Install the maintenance cover (page 5-2).

SPARK PLUG CHECK/ADJUSTMENT/ REPLACEMENT

⚠ CAUTION

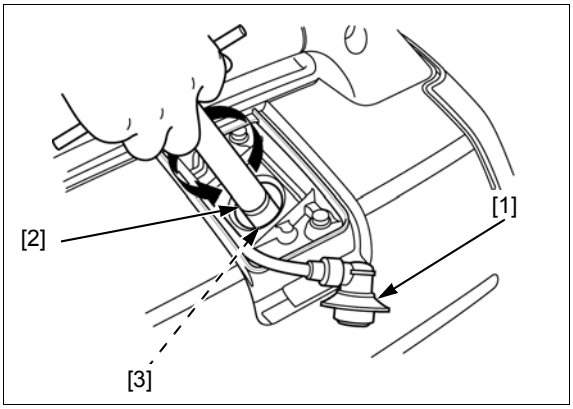
If the engine has been running, the engine will be very hot. Allow it to cool before proceeding.

Remove the spark plug maintenance cover [1].



Clean any dirt from around the spark plug.

Disconnect the spark plug cap [1], and use a spark plug wrench [2] to remove the spark plug [3].



Visually inspect the spark plug. Replace the plug if the insulator [1] is cracked, chipped, or heavily fouled.

Check the sealing washer [2] for damage. Replace the spark plug if the sealing washer is damaged.

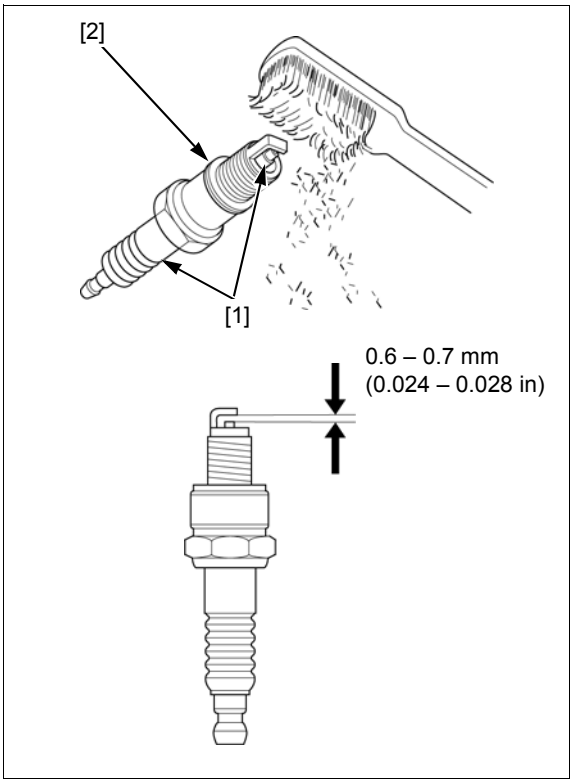
SPARK PLUG: CR5HSB (NGK)

Measure the plug gap with a wire-type feeler gauge. If the measurement is out of the specification, adjust by bending the side electrode.

PLUG GAP: 0.6 – 0.7 mm (0.024 – 0.028 in)

Install the spark plug finger tight to seat the washer, and then tighten it to the specified torque.

TORQUE: 12 N·m (1.2 kgf·m, 9 lbf·ft)



NOTICE

- *A loose spark plug can become very hot and can damage the engine. Overtightening can damage the threads in the cylinder head.*

Connect the spark plug cap securely.

Install the spark plug maintenance cover.

VALVE CLEARANCE CHECK/ ADJUSTMENT

NOTICE

- *Valve clearance inspection and adjustment must be performed with the engine cold.*

Remove the following:

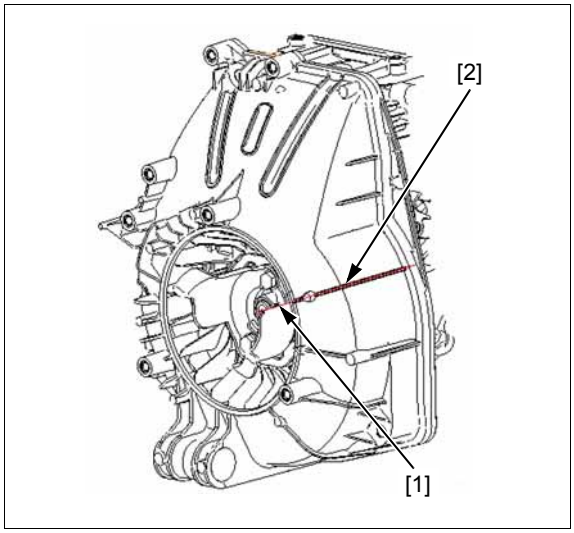
– Cylinder head cover (page 14-4)
– Recoil starter (page 10-2)

Set the piston top dead center of the compression stroke (both valves fully closed).

Align the alignment point [1] (plain of the starter pulley) with the rib [2] on the fan cover.

NOTE:

- If the exhaust valve opens when the cutout in the starter pulley is aligned with the rib on the fan cover, turn the flywheel one turn and alignment with specified position.



Insert a feeler gauge [1] between the valve adjust screw [2] and valve stem [3] to measure the valve clearance.

VALVE CLEARANCE:
IN: 0.15 ± 0.04 mm (0.006 ± 0.002 in)
EX: 0.20 ± 0.04 mm (0.008 ± 0.002 in)

If adjustment is necessary, proceed as follows.

Hold the valve adjust screw using the special tool, and loosen the pivot lock nut [4].

TOOL:
Valve adjuster wrench, 3 mm [5] 07908-KE90000

Insert a feeler gauge between the valve adjust screw and the valve stem.

Adjust by turning the adjusting screw until there is a slight drag on the feeler gauge.

VALVE CLEARANCE:
IN: 0.15 ± 0.04 mm (0.006 ± 0.002 in)
EX: 0.20 ± 0.04 mm (0.008 ± 0.002 in)

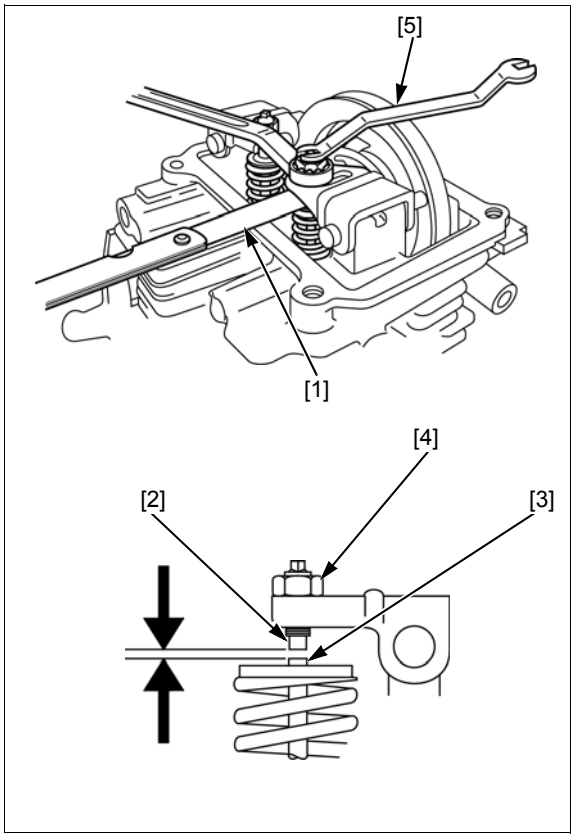
Hold the valve adjust screw using the special tool, and retighten the lock nut to the specified torque.

TORQUE: 7.5 N·m (0.76 kgf·m, 5.5 lbf·ft)

Recheck the valve clearance, and if necessary, readjust the clearance.

Install the following:

– Recoil starter (page 10-2)
– Cylinder head cover (page 14-4)



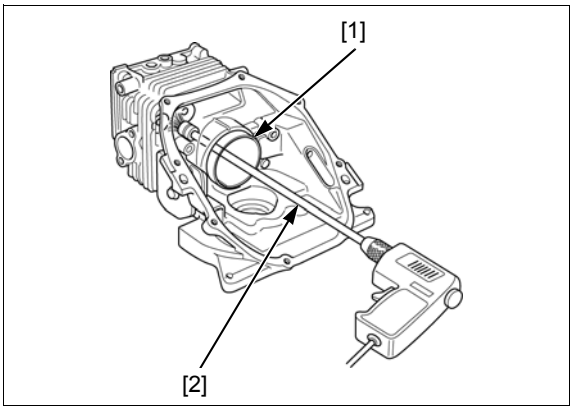
COMBUSTION CHAMBER CLEANING

Remove the piston/connecting rod assembly (page 15-3).

Prepare a cylinder of a thick paper or equivalent material [1], which diameter is as large as the inner wall of the cylinder, and insert the paper into the cylinder.

Attach the special tool to an electric drill and clean any carbon deposits from the combustion chamber.

TOOL:
Cleaning brush [2] **07998-VA20100**



NOTICE

- *Be sure to insert a thick paper into the cylinder to protect the inner wall of the cylinder during clearing of the combustion chamber.*
- *Do not press the cleaning brush with force against the combustion chamber.*

FUEL TANK AND FILTER CLEANING

⚠WARNING

Gasoline is highly flammable and explosive. You can be burned or seriously injured when handling fuel.
- Keep heat, sparks, and flame away.
- Handle fuel only outdoors.
- Wipe up spills immediately.

Drain the fuel from the fuel tank [1] and carburetor.

Remove the side cover (page 5-3).

Disconnect the fuel tube [2] from the fuel tank, and remove the fuel filter [3].

Clean the fuel filter and fuel tank with non-flammable solvent, and allow it to dry thoroughly.

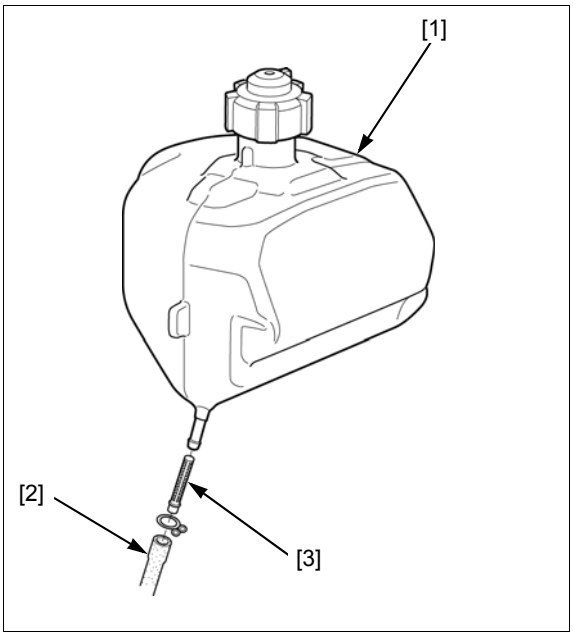
Check the screen of the fuel filter for contamination or damage.

Replace if necessary.

Install the fuel filter into the fuel tank, and connect the fuel tube.

Install the removed parts in the reverse order of removal.

After installation, check for any signs of fuel leakage.



FUEL TUBE INSPECTION

⚠WARNING

Gasoline is highly flammable and explosive.
You can be burned or seriously injured when handling fuel.
- Keep heat, sparks, and flame away.
- Wipe up spills immediately.
- Handle fuel only outdoors.

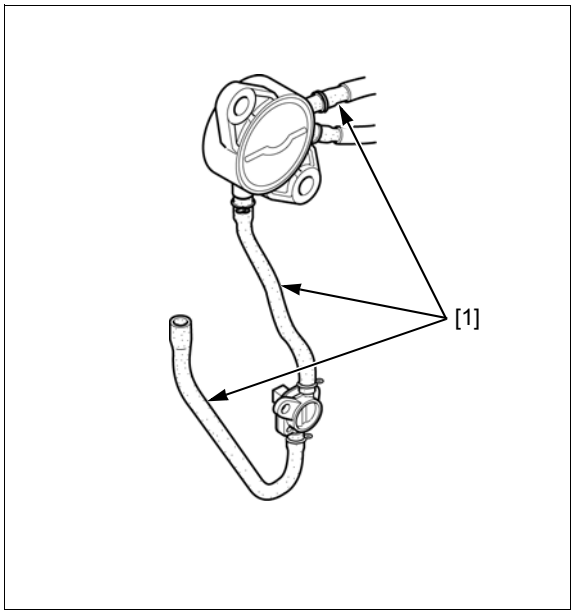
Remove the side cover (page 5-3).

Check the fuel tubes [1] for damage, fuel leakage, corrosion, and other abnormalities.

Check that the fuel tube is not interfering with the neighboring parts.

Replace the fuel tube if there is damage, fuel leakage, or corrosion (page 5-5).

Install the removed parts in the reverse order of removal.



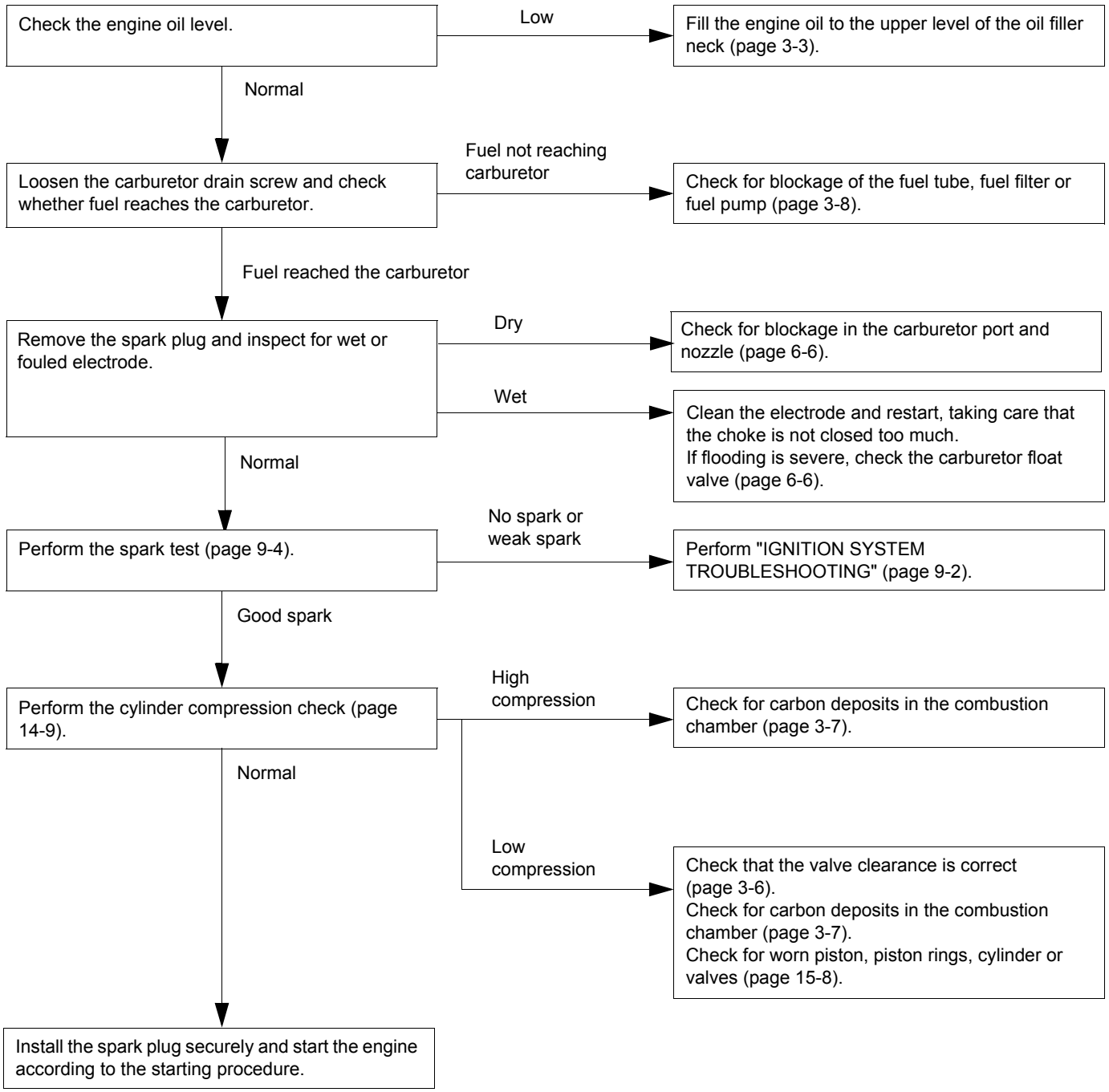
4. TROUBLESHOOTING

BEFORE TROUBLESHOOTING

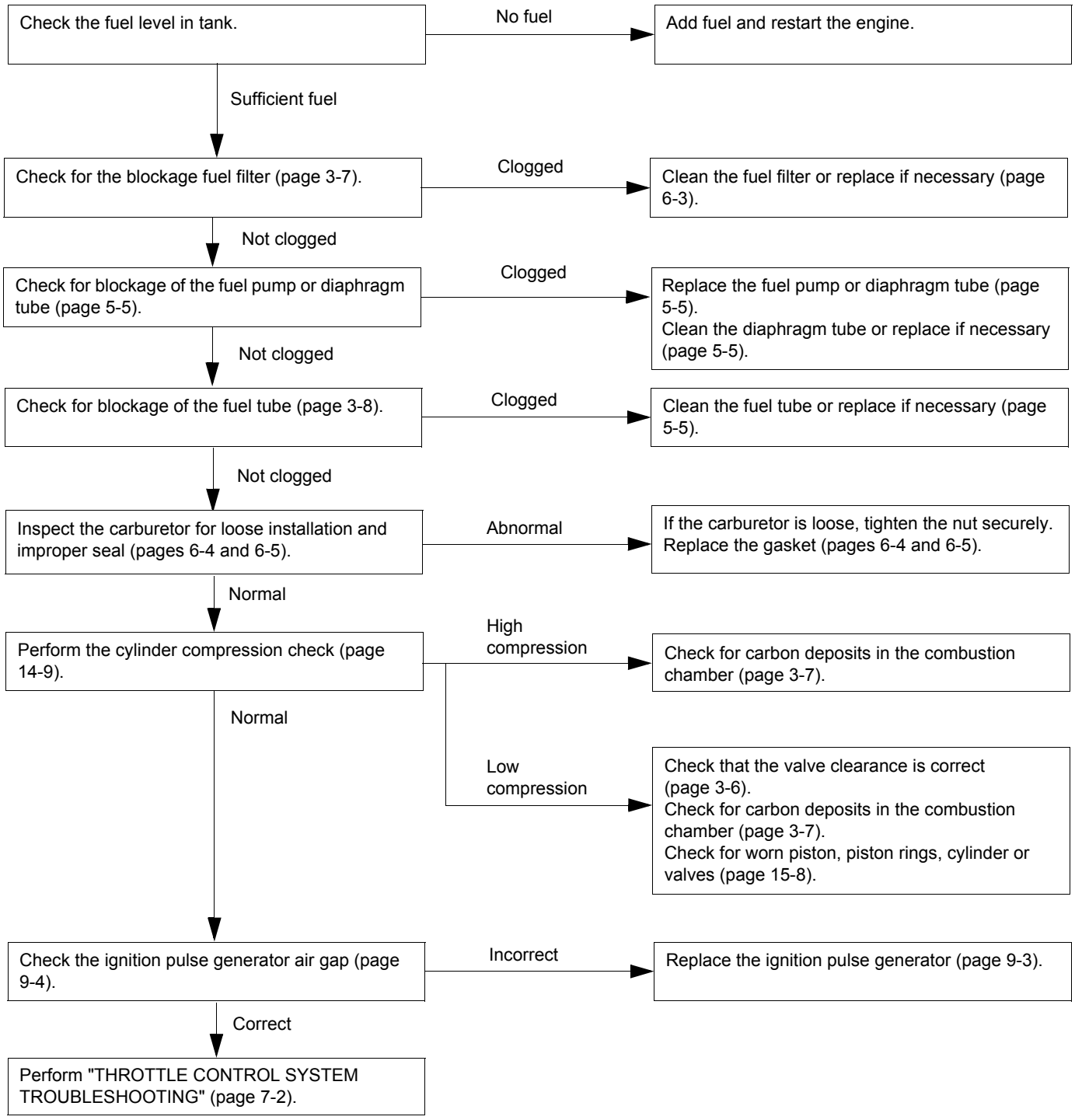
- Check that the connectors are connected securely.
- Check for sufficient fresh fuel in the fuel tank.
- Read the circuit tester's operation instructions carefully, and observe the instructions during inspection.

HARD STARTING

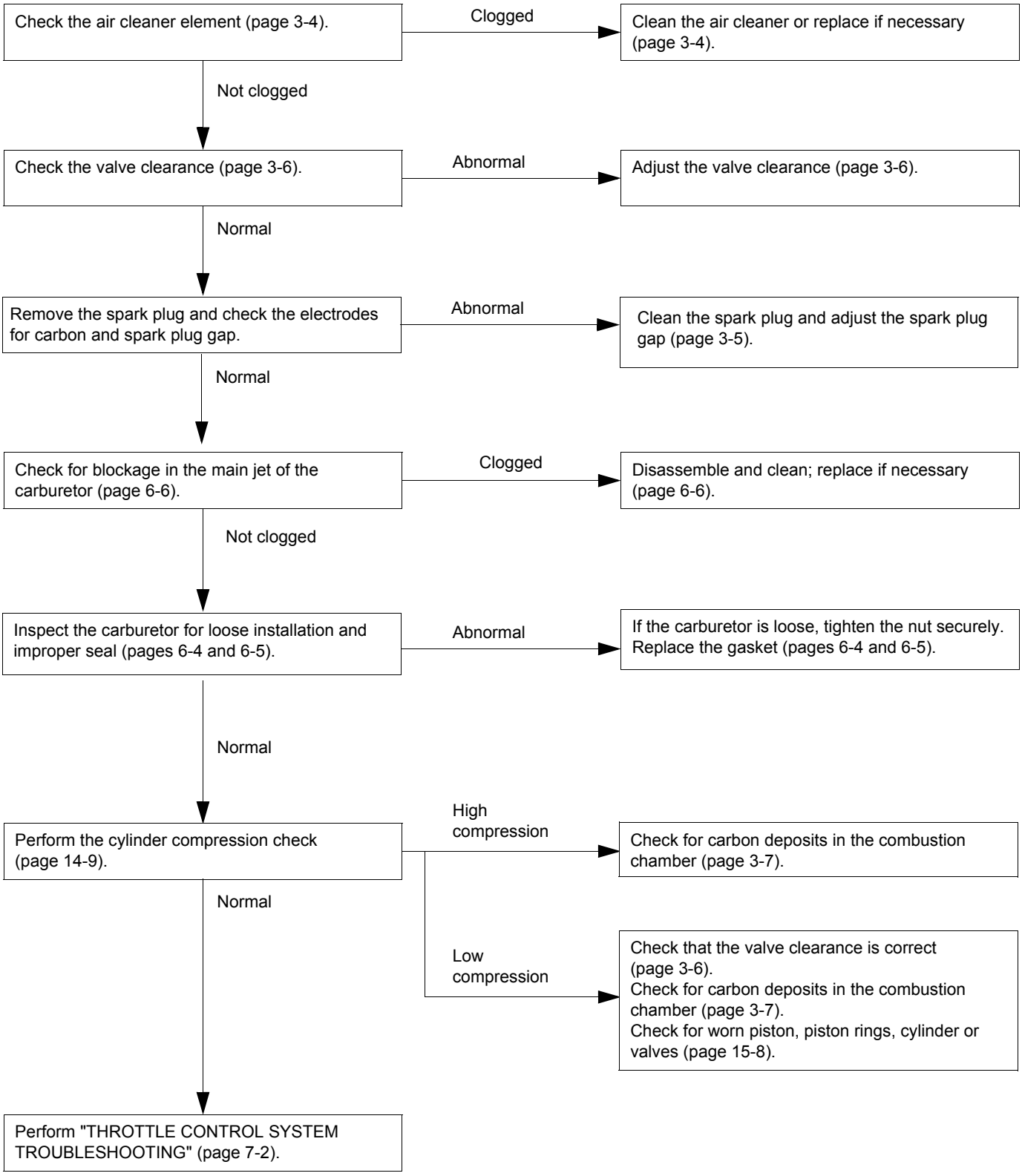
If the engine does not start or is hard starting after reassembly, check to see whether the throttle valve is at the full open position.



ENGINE STARTS BUT THEN STALLS



ENGINE SPEED DOES NOT INCREASE OR STABILIZE



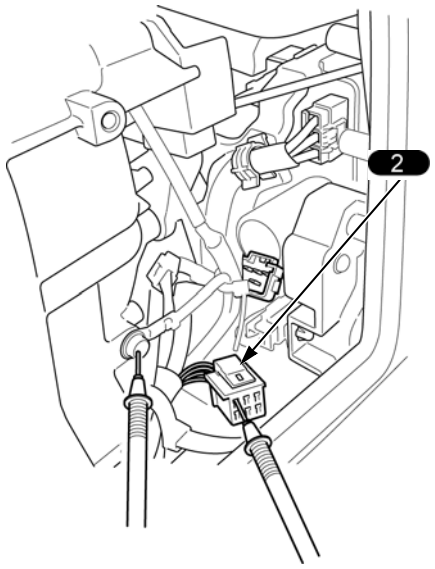
ENGINE OIL LEVEL IS LOW, BUT ENGINE DOES NOT STOP

Check the following at the engine on a level surface.

Drain the engine oil.
Pull the recoil starter grip and check the Oil Alert indicator light on the control panel.

No light

Disconnect the 6P generator connector from the inverter unit.
Check for continuity between the yellow wire of the connector and the ground terminal on the fan cover.



Lights

Perform the spark test (page 9-4).
Replace the ignition control module if necessary (page 11-2).

Continuity

No continuity

Replace the oil level switch (page 15-7).

Replace the generator wire harness (page 8-13).
Perform the spark test (page 9-4).
Replace the ignition control module if necessary (page 11-2).

MEMO

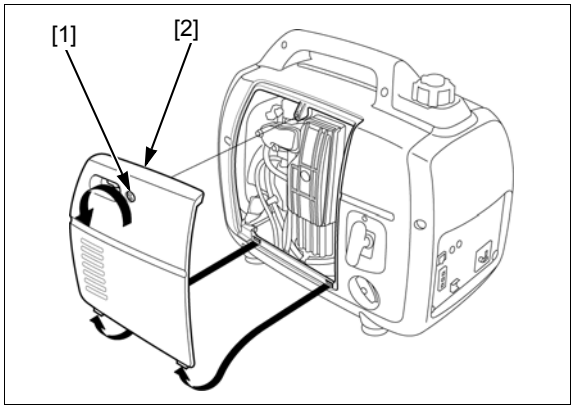
MAINTENANCE COVER REMOVAL/ INSTALLATION

Loosen the screw [1] and remove the maintenance cover [2].

To install the maintenance cover, set it on the L. side cover by aligning the tabs with the holes.

Tighten the maintenance cover screw to the specified torque.

TORQUE: 2.3 N·m (0.23 kgf·m, 1.7 lbf·ft)



REAR COVER REMOVAL/ INSTALLATION

Remove the following:

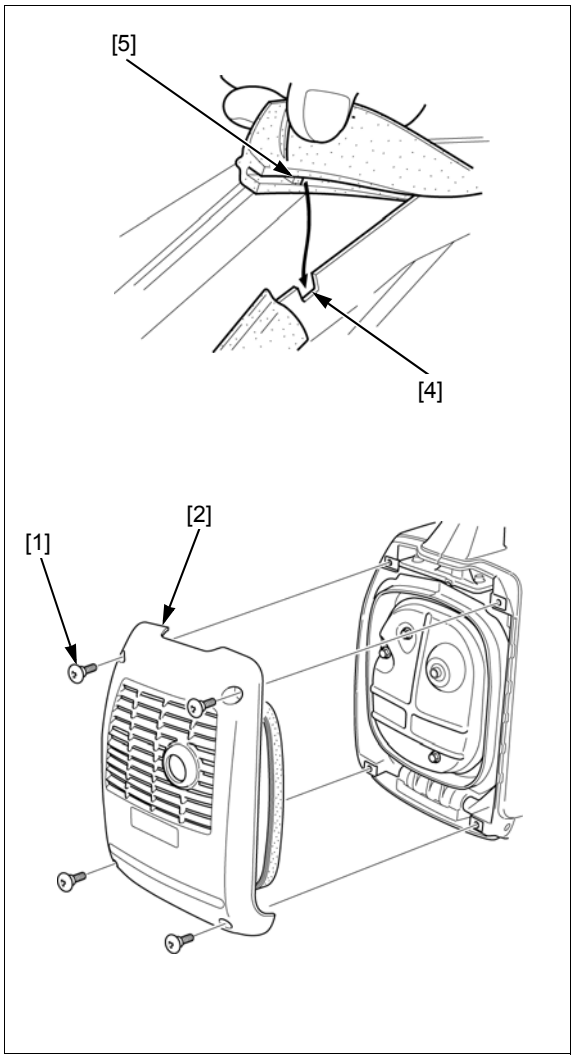
– Four special screws (6 × 15 mm) [1]
– Rear cover [2]

Installation is in the reverse order of removal.

TORQUE:
REAR COVER SCREW:
4.4 N·m (0.45 kgf·m, 3.2 lbf·ft)

NOTE:

- Be sure that the rubber seal is set on the cover securely.
- Set the rubber seal on the protector by aligning the projection [4] with the groove [5] as shown.



SIDE COVER REMOVAL/ INSTALLATION

REMOVAL

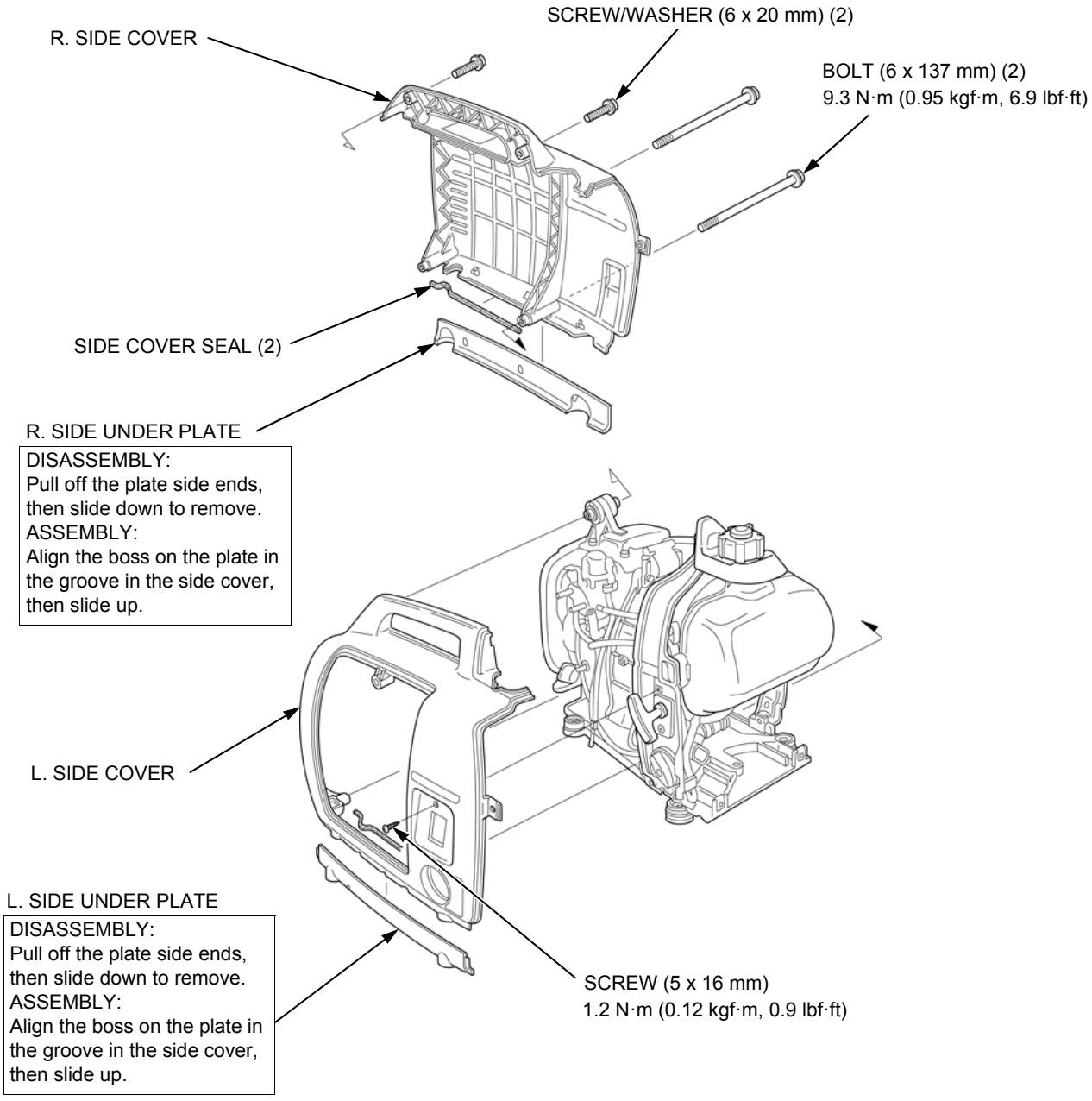
⚠WARNING

Gasoline is highly flammable and explosive.
You can be burned or seriously injured when handling fuel.
- Keep heat, sparks, and flame away.
- Wipe up spills immediately.
- Handle fuel only outdoors.

Drain the fuel from the fuel tank and carburetor.

Remove the following:

– Air cleaner case (page 6-4)
– Rear cover (page 5-2)
– Front cover (page 8-6)

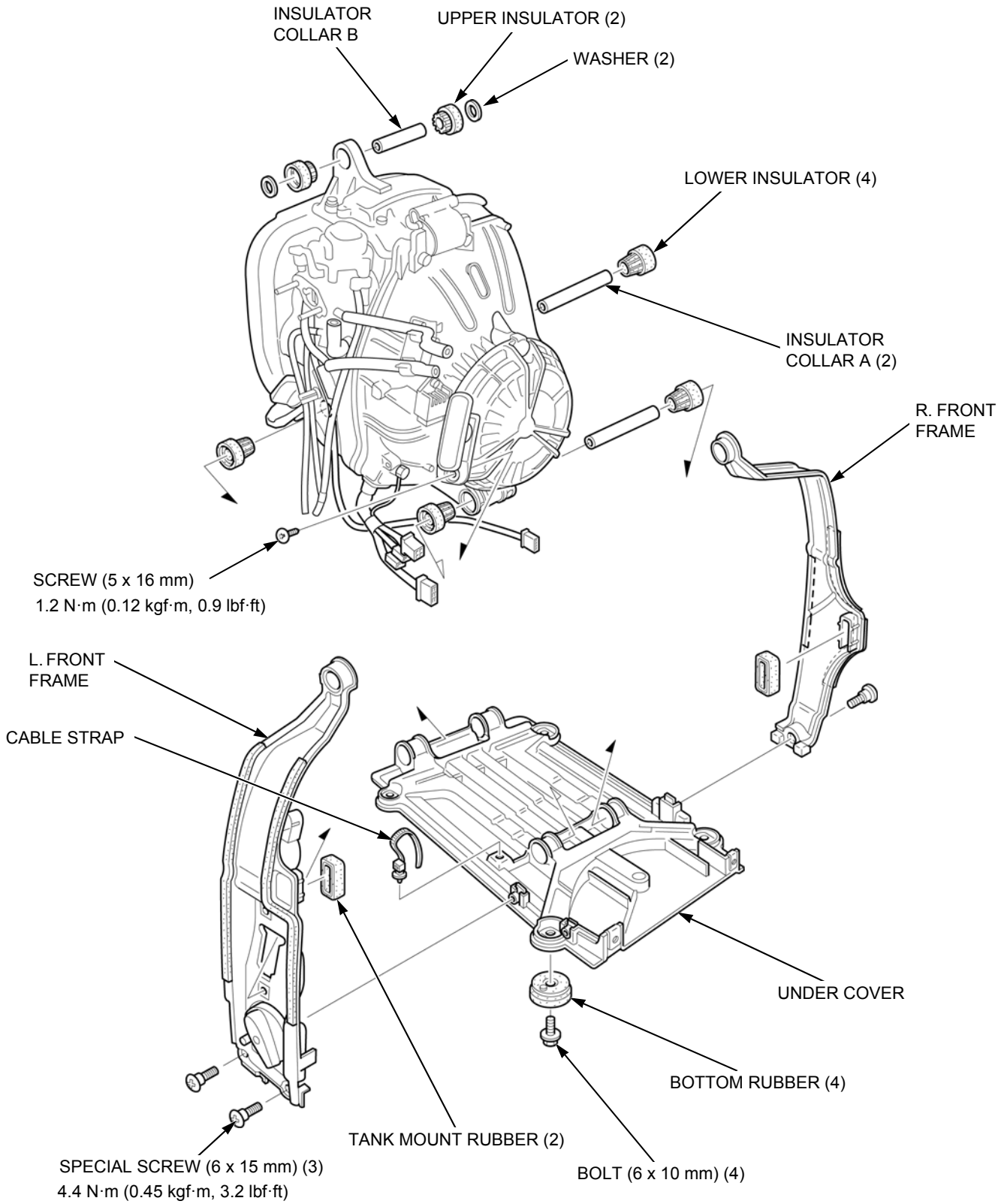


FRONT FRAMES/UNDER COVER REMOVAL/INSTALLATION

Remove the fuel tank (page 6-3).

NOTE:

- When installing, route the wire properly (page 2-7).

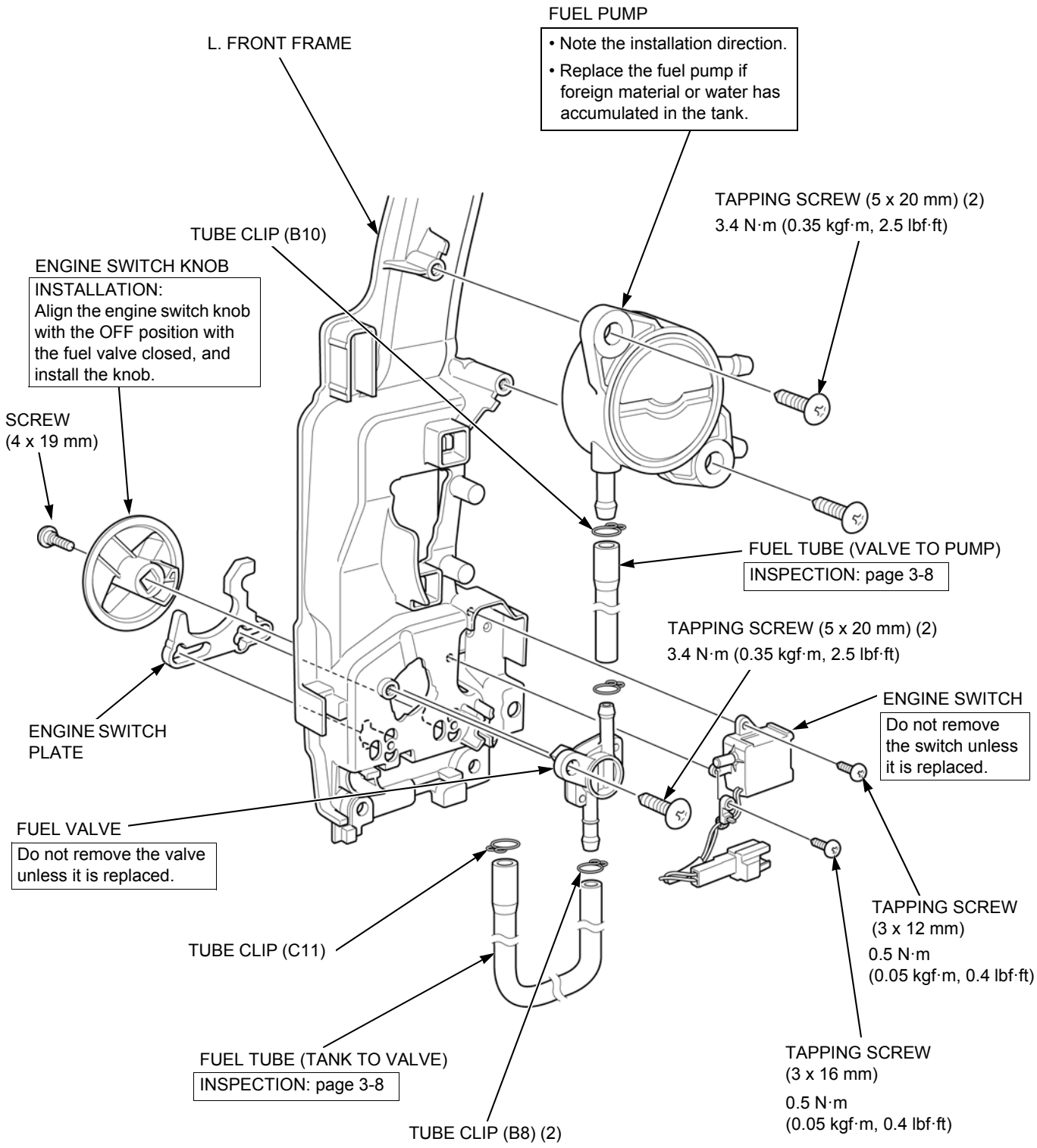


L. FRONT FRAME DISASSEMBLY/ ASSEMBLY

Remove the L. front frame (page 5-4).

NOTE:

- When installing, route the wire properly (page 2-7).

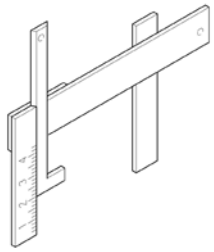


MEMO

6. FUEL SYSTEM

TOOL

Float level gauge
07401-0010000



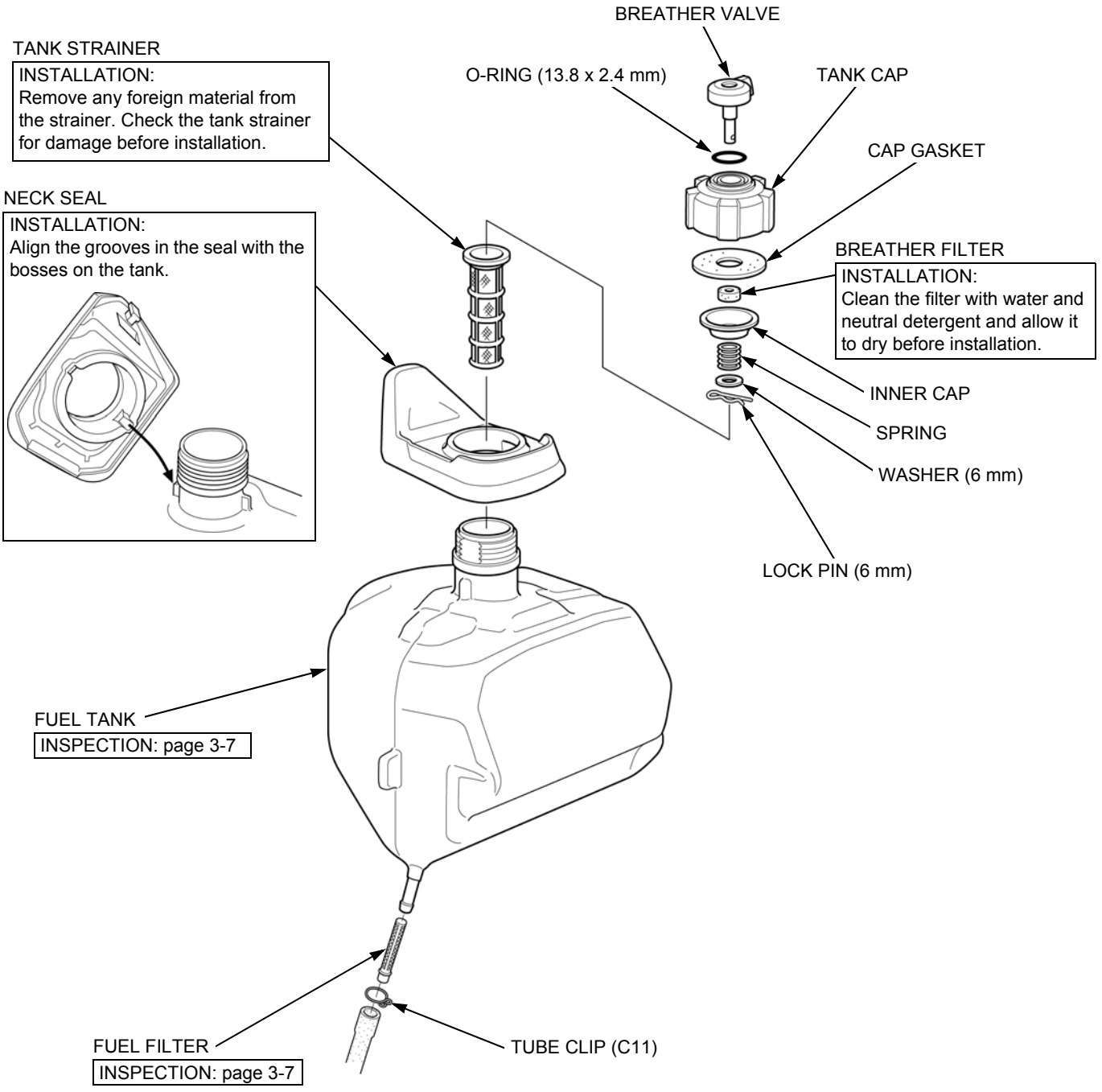
FUEL TANK DISASSEMBLY/ASSEMBLY

⚠ WARNING

Gasoline is highly flammable and explosive. You can be burned or seriously injured when handling fuel.
- Keep heat, sparks, and flame away.
- Handle fuel only outdoors.
- Wipe up spills immediately.

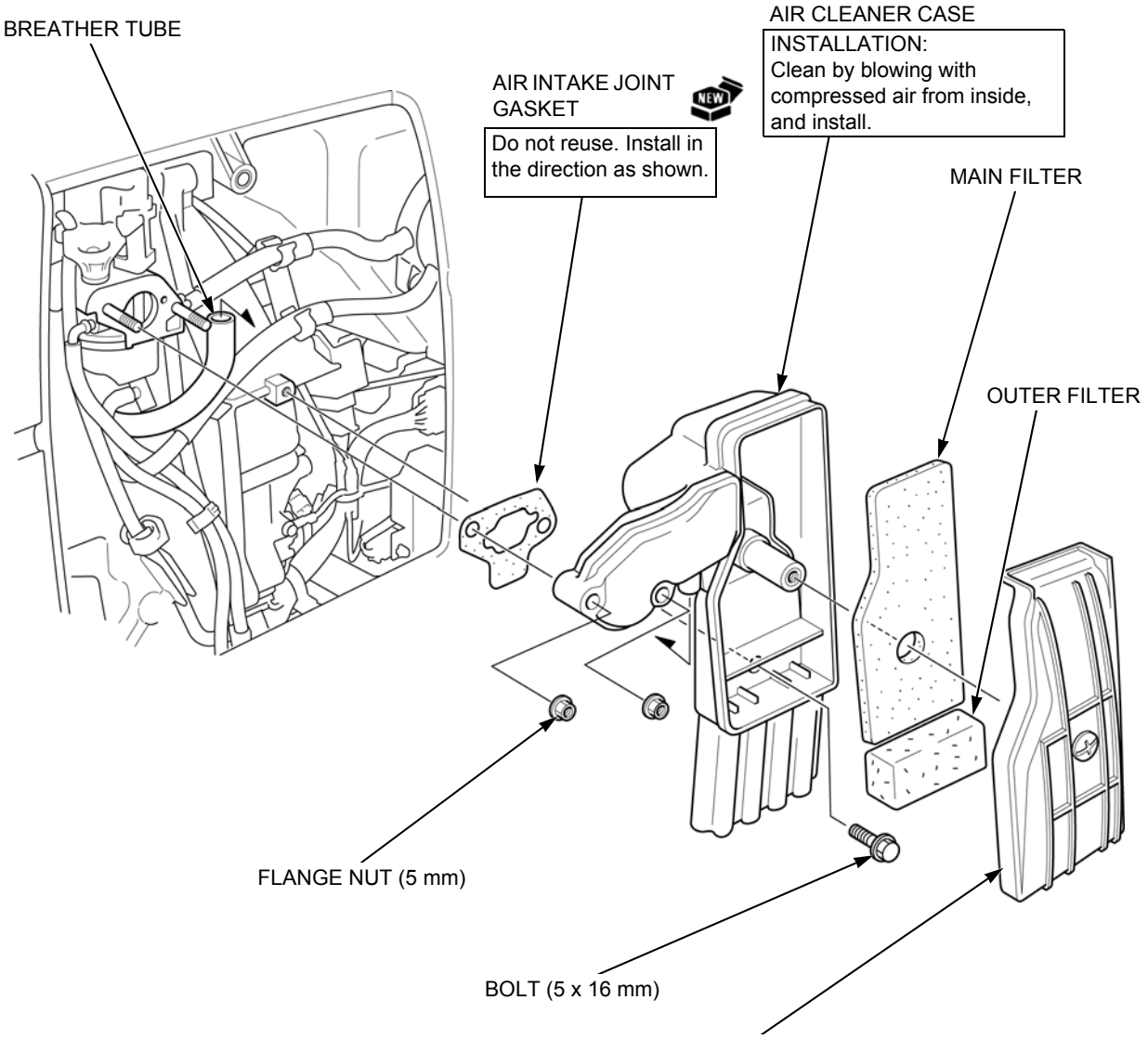
Drain the fuel from the fuel tank and carburetor.

Remove the side covers (page 5-3).



AIR CLEANER CASE REMOVAL/INSTALLATION

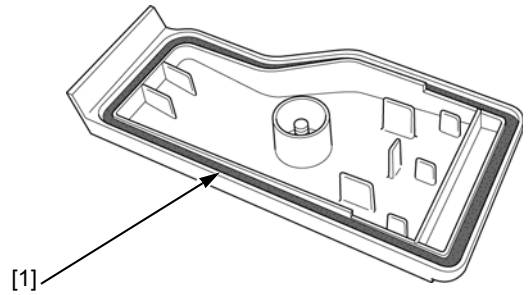
Remove the maintenance cover (page 5-2).



INSTALLATION:

Clean by blowing with compressed air from inside, and install.

Be sure that the cover seal [1] is set on the air cleaner cover securely.



CARBURETOR REMOVAL/INSTALLATION

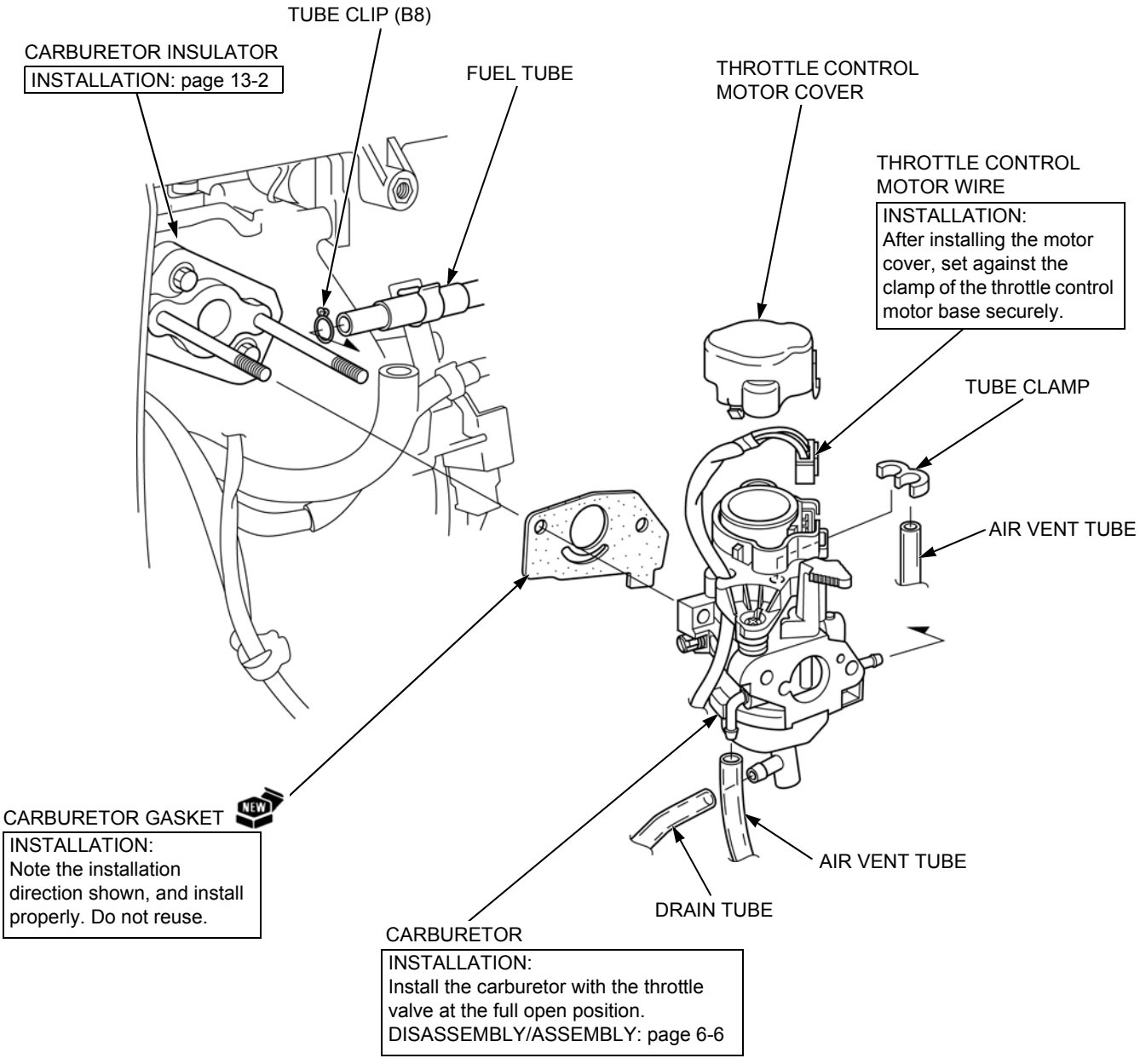
⚠WARNING

Gasoline is highly flammable and explosive. You can be burned or seriously injured when handling fuel.
- Keep heat, sparks, and flame away.
- Handle fuel only outdoors.
- Wipe up spills immediately.

Loosen the drain screw to drain the carburetor thoroughly before removal.

Remove the air cleaner case (page 6-4).

NOTE:
When installing, route the wire and tubes properly (page 2-7).



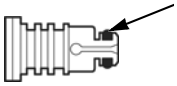
CARBURETOR DISASSEMBLY/ASSEMBLY

⚠ WARNING

Gasoline is highly flammable and explosive. You can be burned or seriously injured when handling fuel.
- Keep heat, sparks, and flame away.
- Handle fuel only outdoors.
- Wipe up spills immediately.

Remove the throttle control motor (page 7-4).

PILOT JET
ASSEMBLY:
Before installing, clean thoroughly with low pressure compressed air.
Lightly lubricate the O-ring [1] to ensure easy installation into the carburetor body.



NEW O-RING

CARBURETOR BODY
INSTALLATION:
Clean internal passages and orifices with the compressed air before installation.

MAIN NOZZLE
ASSEMBLY:
Before installing, clean thoroughly with low pressure compressed air.
UPPER SIDE

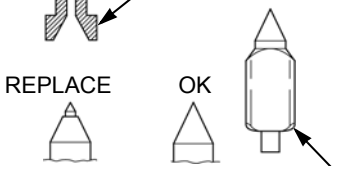
THROTTLE STOP SCREW
INSTALLATION: page 6-7

PILOT SCREW
INSTALLATION: page 6-8

SPRING

LIMITER CAP

FLOAT VALVE
INSTALLATION:
Check for worn float valve seat [1], float valve [2], or weak spring before installation.



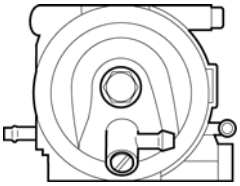
MAIN JET
ASSEMBLY:
Before installing, clean thoroughly with low pressure compressed air.
UPPER SIDE

FLOAT VALVE SPRING

FLOAT
INSTALLATION:
Check for smooth movement after installation.

FLOAT PIN

FLOAT CHAMBER
ASSEMBLY:
Install the float chamber to the carburetor body at an angle as shown.
ENGINE SIDE



AIR CLEANER CASE SIDE

NEW FLOAT CHAMBER GASKET
INSTALLATION: page 6-7

NEW O-RING

DRAIN SCREW

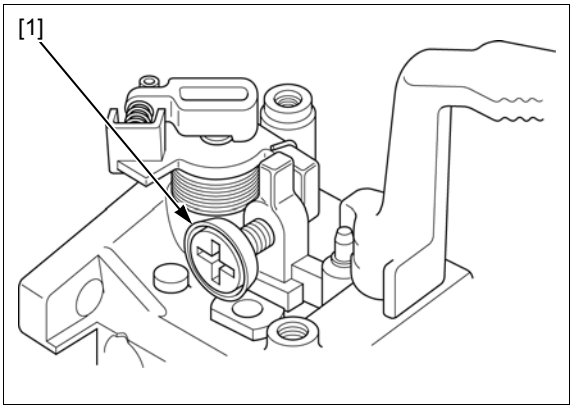
NEW SET BOLT GASKET

SET BOLT
ASSEMBLY:
After installing the carburetor, check for any sign of fuel leakage.

THROTTLE STOP SCREW

Install the throttle stop screw [1] after installing the pilot jet.

Install so that the throttle valve is fully closed and the screw end does not come out of the bracket.



FLOAT CHAMBER GASKET

Install the new float chamber gasket [1] in the groove on the carburetor body [2].

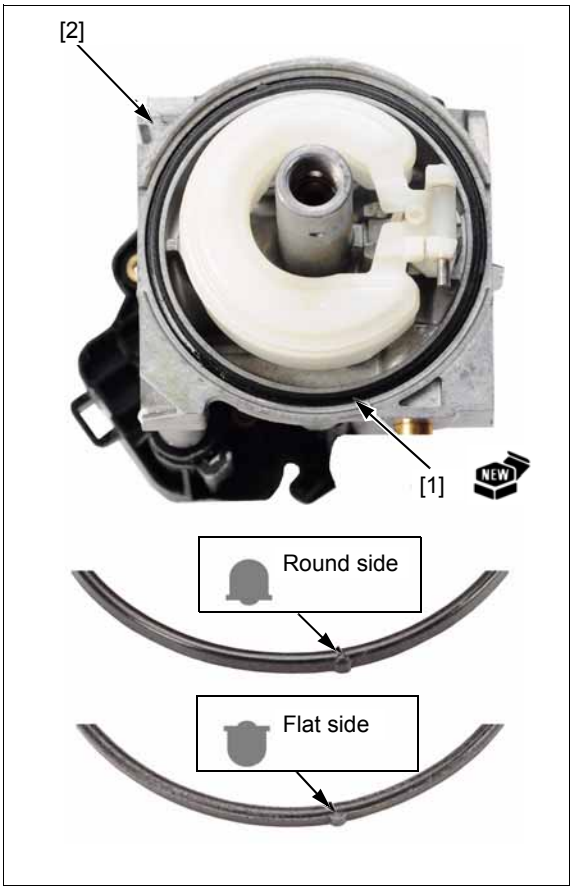
NOTE:

- The gasket must completely seat in the groove to prevent misalignment of the float chamber.

The round side of the gasket must be inserted into the carburetor body.

The flat side of the gasket will contact the carburetor float chamber.

- A magnifying glass may be necessary to fully view the gasket profile.



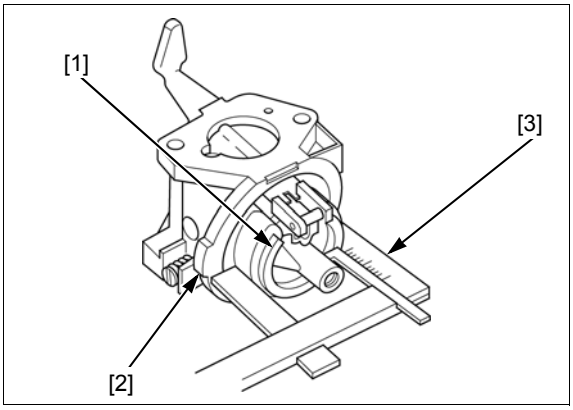
FLOAT LEVEL HEIGHT INSPECTION

Place the carburetor in the position shown, and measure the distance between the float top [1] and carburetor body [2] when the float just contacts the seat without compressing the valve spring.

TOOL:
Float level gauge [3] **07401-0010000**

FLOAT HEIGHT: 12.0 mm (0.47 in)

If the height is outside the specification, replace the float and float valve and recheck the height.



PILOT SCREW REPLACEMENT

Only remove the pilot screw [1] and limiter cap [2] when necessary for repair or for cleaning stubborn deposits from the pilot circuit passages.

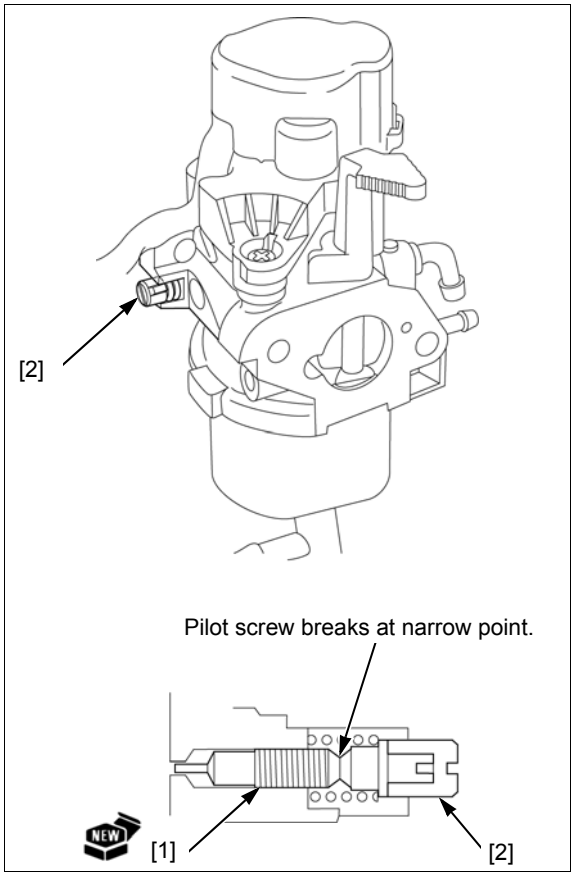
Removal of the limiter cap requires breaking the pilot screw. A new pilot screw and limiter cap must be installed.

When the limiter cap has been broken off, remove the broken pilot screw.

Place the spring on the replacement pilot screw, and install it on the carburetor.

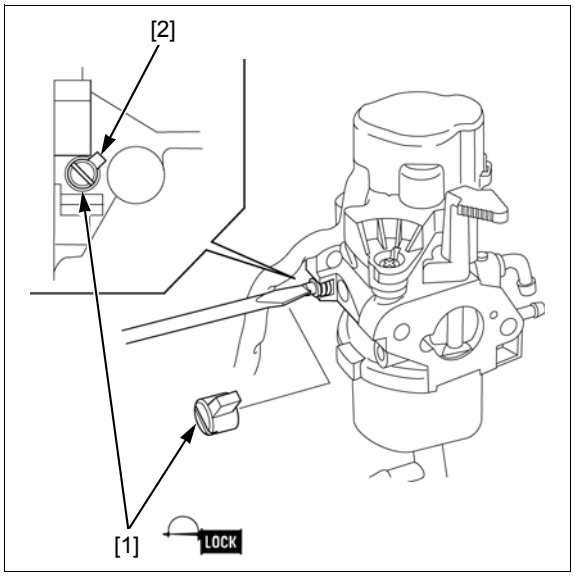
Turn the pilot screw in until it is lightly seated, and then turn it out the required number of turns.

Pilot screw opening: 1-7/8 turns out



Apply LOCTITE® 638, or equivalent to the inside of the limiter cap [1], and then install the cap so its stop [2] prevents the pilot screw from being turned counterclockwise.

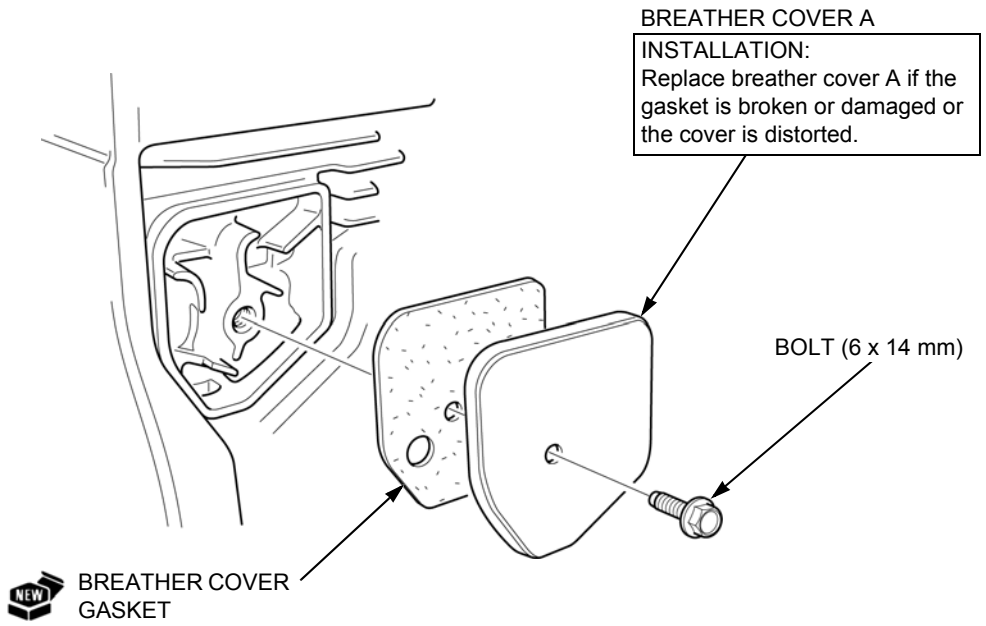
Be careful to avoid turning the pilot screw while installing the limiter cap. The pilot screw must stay at its required setting.



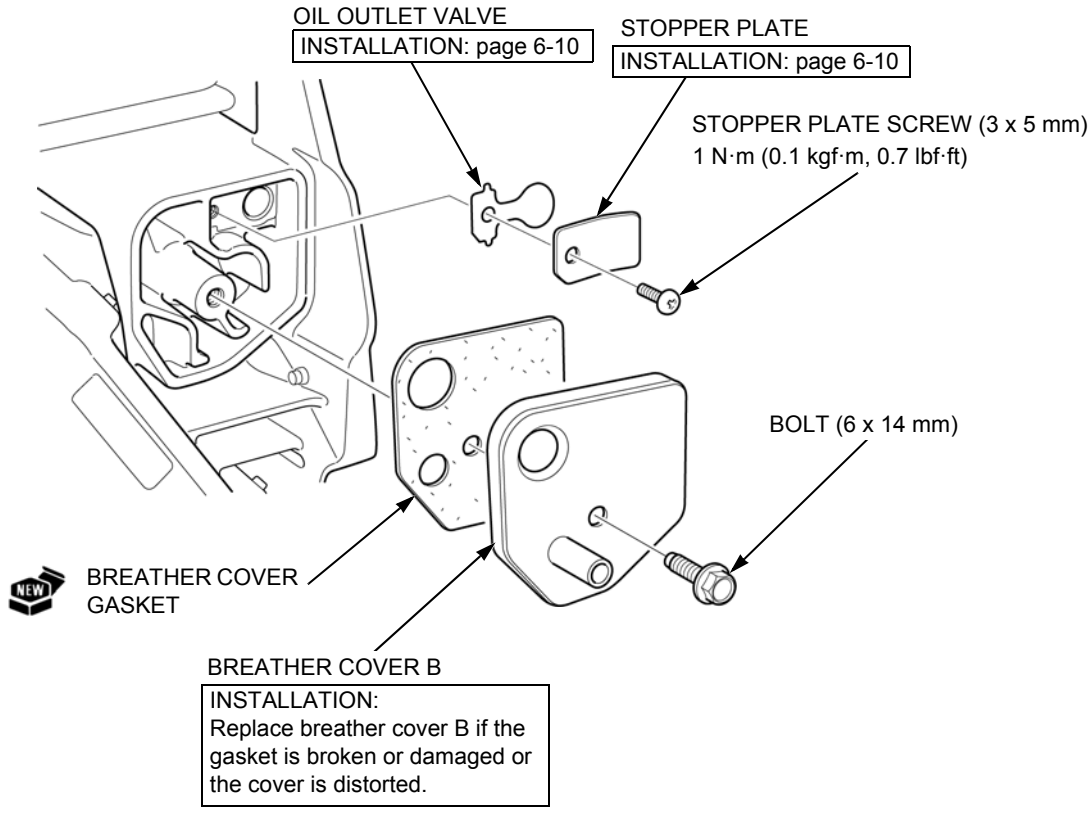
BREATHER COVER DISASSEMBLY/ ASSEMBLY

Remove the fan shroud (page 13-2).

BREATHER COVER A:



BREATHER COVER B:



OUTLET VALVE/STOPPER PLATE INSTALLATION

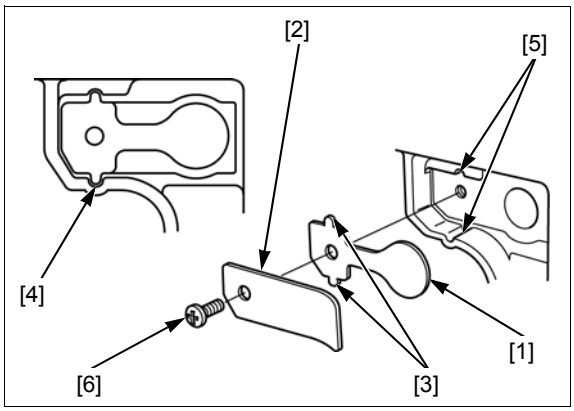
Clean the oil outlet valve [1], stopper plate [2] and the valve installation area of the cylinder barrel.

Install the valve aligning the positioning projections [3] and chamfer [4] of the valve with the grooves [5] and chamfer of the cylinder barrel.

Install the stopper plate on the valve aligning the chamfer of the stopper plate with the chamfer of the cylinder barrel.

Tighten the screw (3 x 5 mm) [6] to the specified torque.

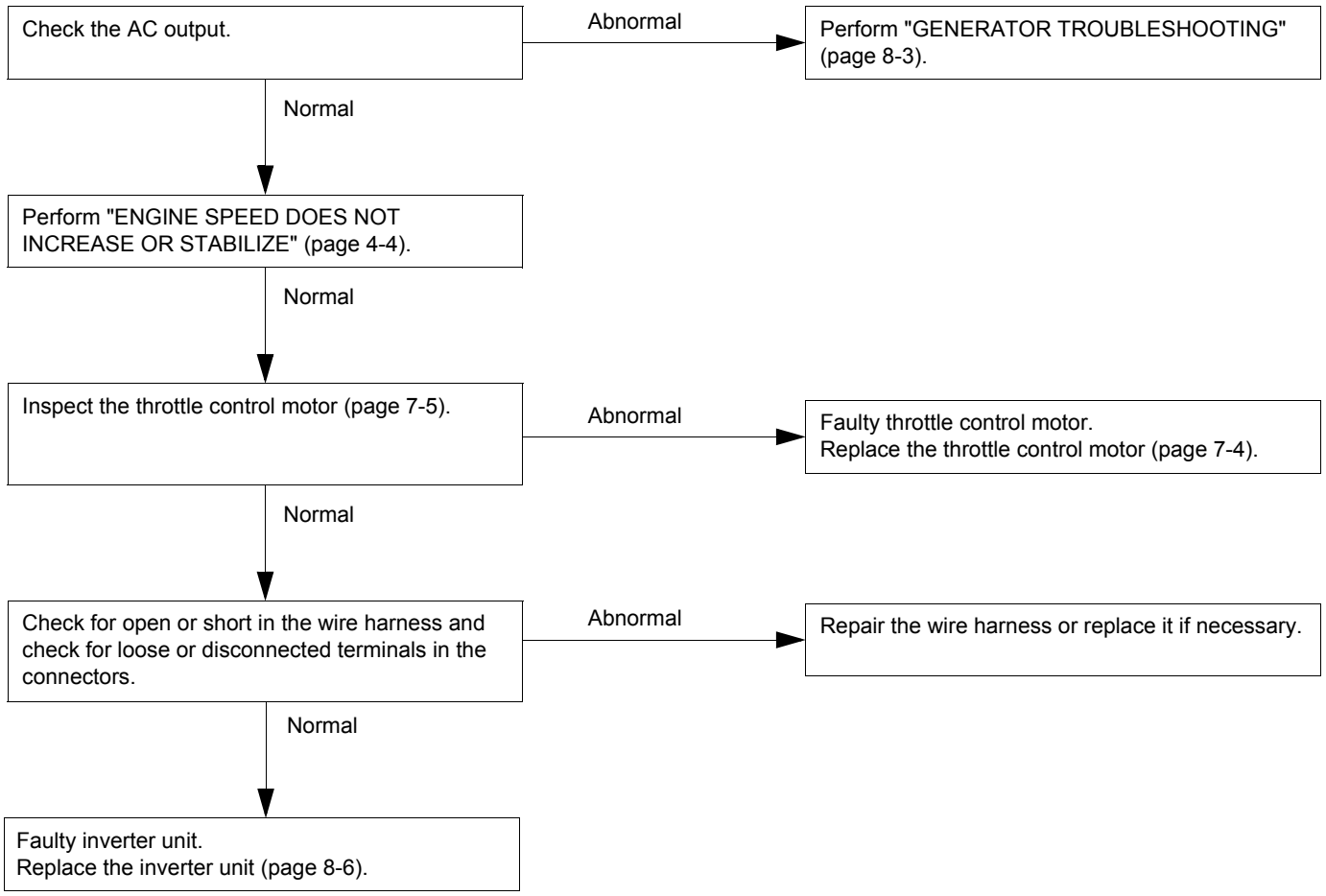
TORQUE: 1 N·m (0.1 kgf·m, 0.7 lbf·ft)



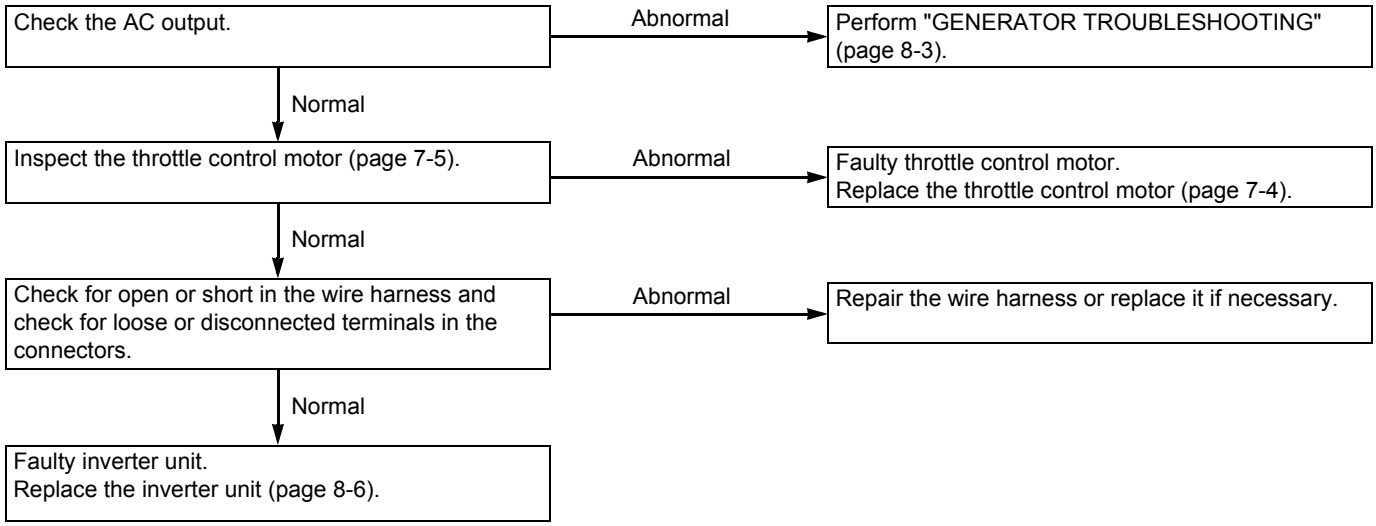
7. GOVERNOR SYSTEM

THROTTLE CONTROL SYSTEM TROUBLESHOOTING

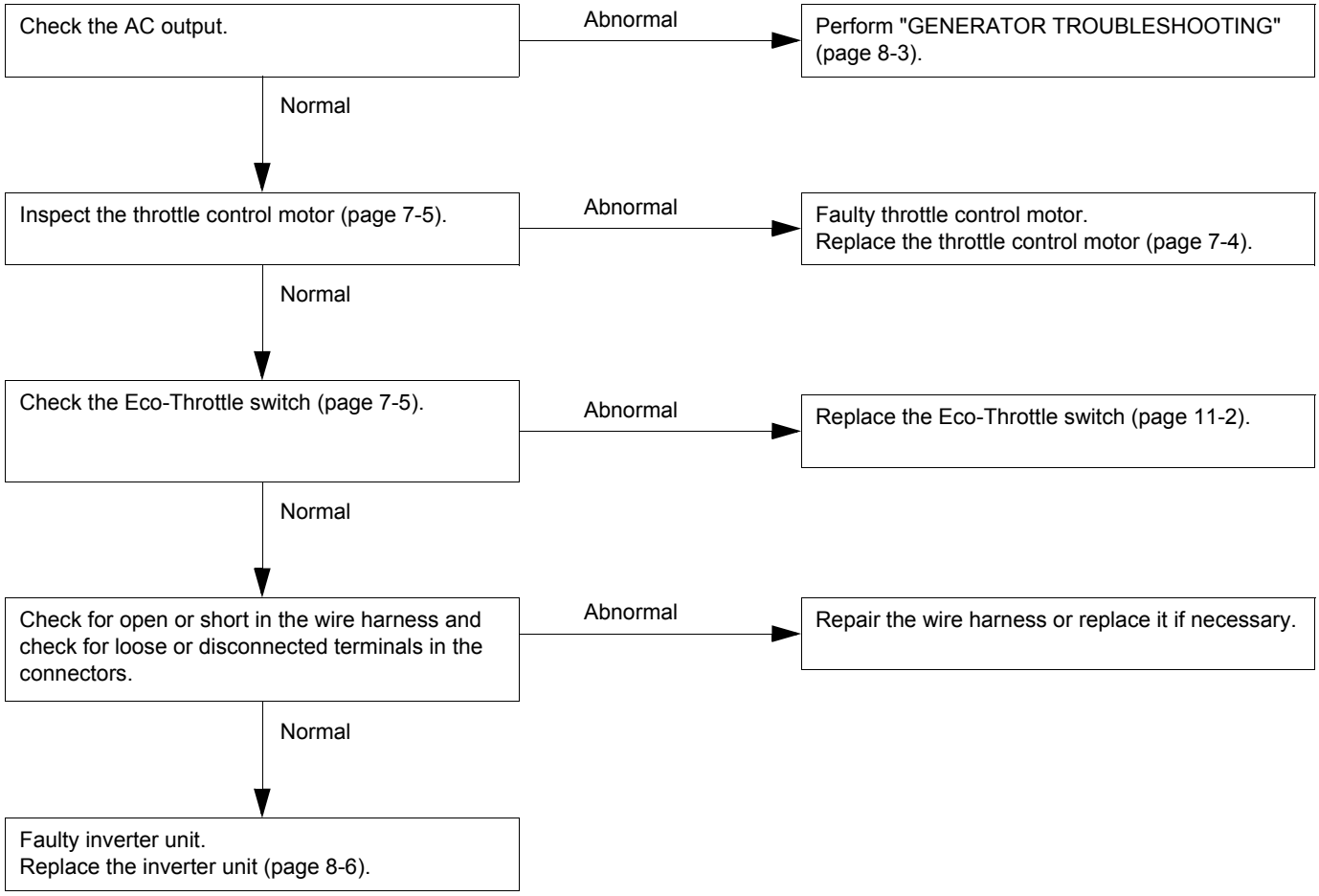
Engine Speed is Too High, Unstable



LOW ENGINE SPEED



Engine Speed Does Not Increase With ECO Throttle System OFF Under No Load
Engine Speed Does Not Decrease With ECO Throttle System ON Under No Load
Engine Speed Does Not Increase by Connecting Load With ECO Throttle System ON

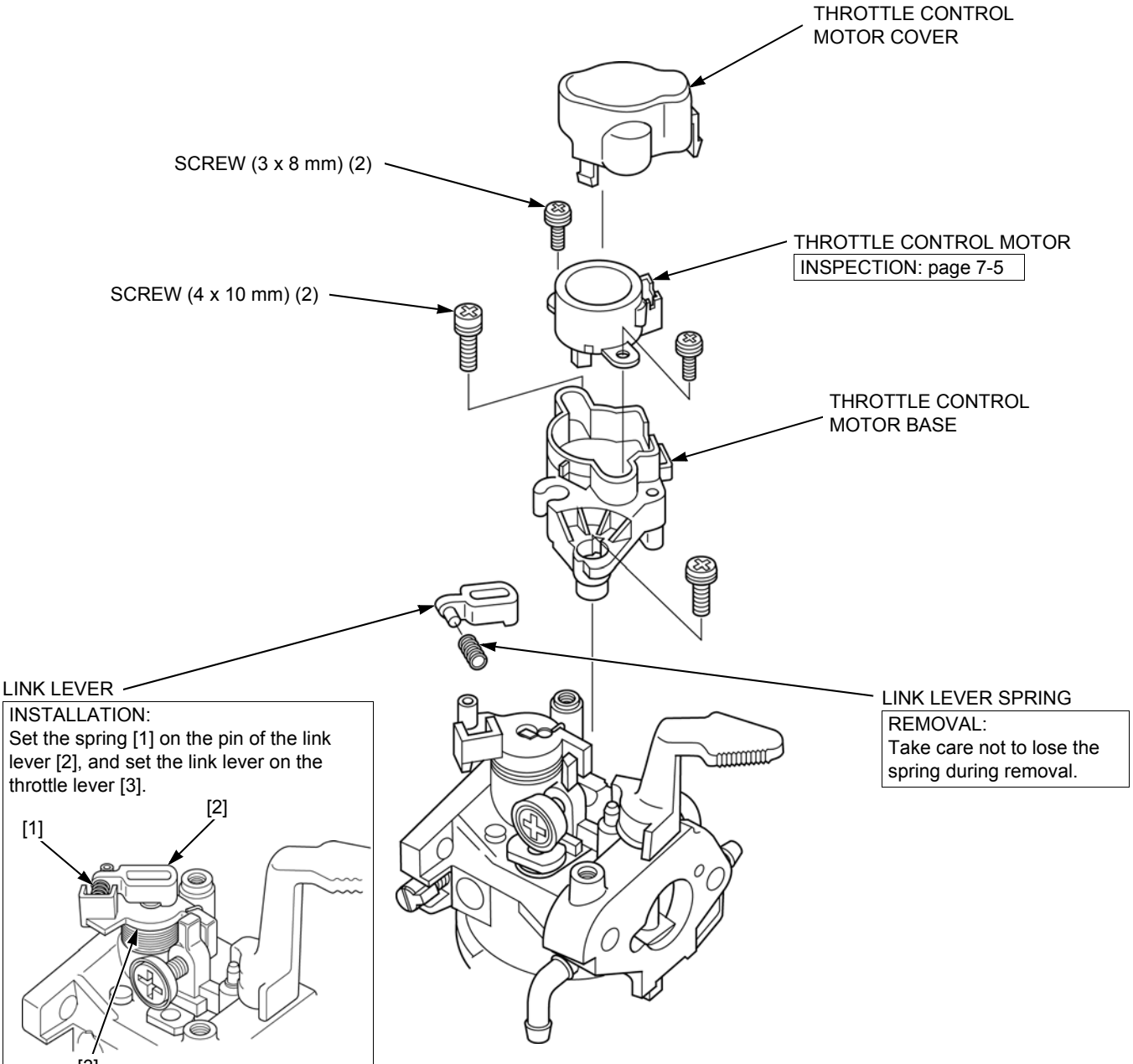


THROTTLE CONTROL MOTOR REMOVAL/INSTALLATION

⚠WARNING

Gasoline is highly flammable and explosive. You can be burned or seriously injured when handling fuel.
- Keep heat, sparks, and flame away.
- Handle fuel only outdoors.
- Wipe up spills immediately.

Remove the carburetor (page 6-5).



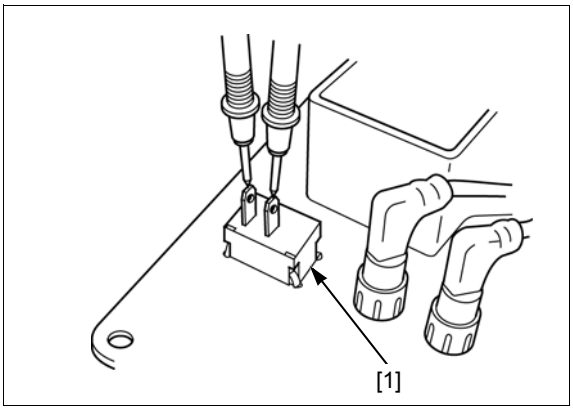
Eco-Throttle SWITCH INSPECTION

Remove the control panel (page 8-6).

Disconnect the connectors from the Eco-Throttle switch [1].

Check for continuity between the Eco-Throttle switch terminals.

There must be no continuity with the switch turned ON, and continuity with the switch turned OFF.



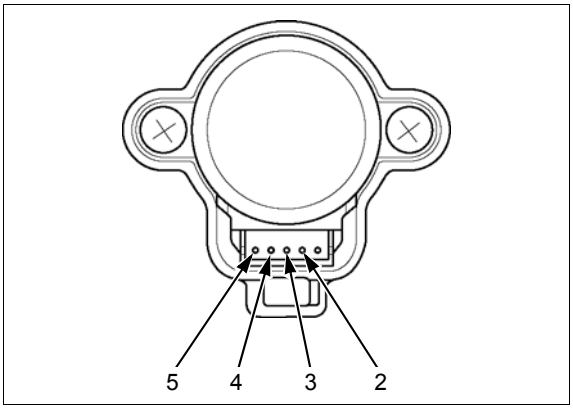
THROTTLE CONTROL MOTOR INSPECTION

Remove the throttle control motor cover (page 7-4).

Measure the resistance between the throttle control motor connector terminals.

Terminal	Standard resistance
2 – 4	50 – 70 Ω
3 – 5	

If the resistance is outside the specification, replace the throttle control motor (page 7-4).

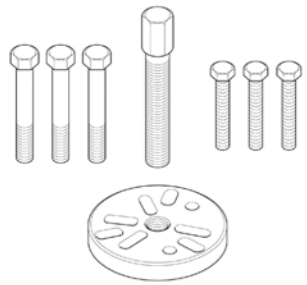


MEMO

8. GENERATOR/CHARGING SYSTEM

TOOL

Flywheel puller
07935-8050004



GENERATOR TROUBLESHOOTING

No or low AC output

Check that the output indicator (green) is ON.

ON → Go to page 8-4

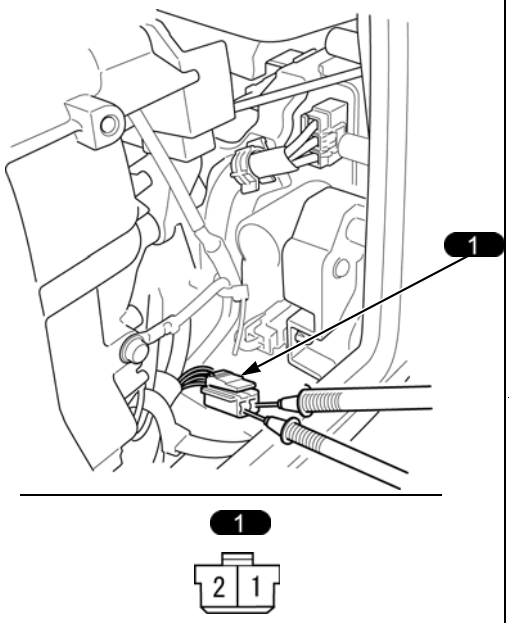
OFF

Check that the engine speed is normal.
Engine speed: 4,000 – 4,500 min^{-1} (rpm) with Eco-Throttle switch OFF.

Abnormal → Perform "THROTTLE CONTROL SYSTEM TROUBLESHOOTING" (page 7-2).

Normal

Stop the engine and remove air cleaner case. Disconnect the 2P connector from the inverter unit. Pull the recoil starter with force, and measure the AC voltage of the sub winding between the Pink and Gray wire terminals of the 2P connector.
Voltage: 1.0 – 2.0 VAC



No voltage → Check the generator wire harness between the inverter unit and stator for an open or short circuit. If it is normal, replace the stator (page 8-13).

Low voltage → Replace the rotor (page 8-13).

Normal

Replace the inverter unit (page 8-6).

From page 8-3

Start the engine and check the overload indicator light (red) ON.

ON → Disconnect the load, and restart the engine and recheck the AC output.

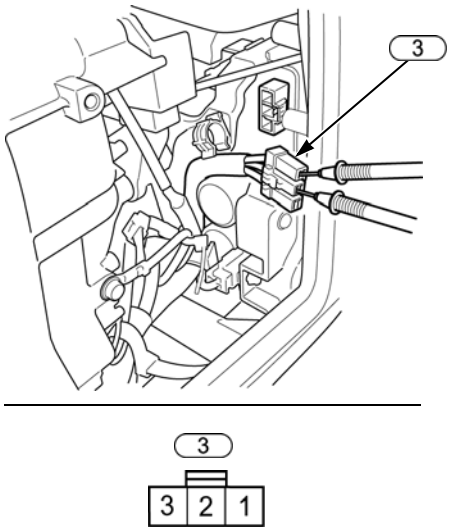
OFF

Stop the engine and check the AC receptacle (page 11-10).

Abnormal → Replace the AC receptacle (page 11-2).

Normal

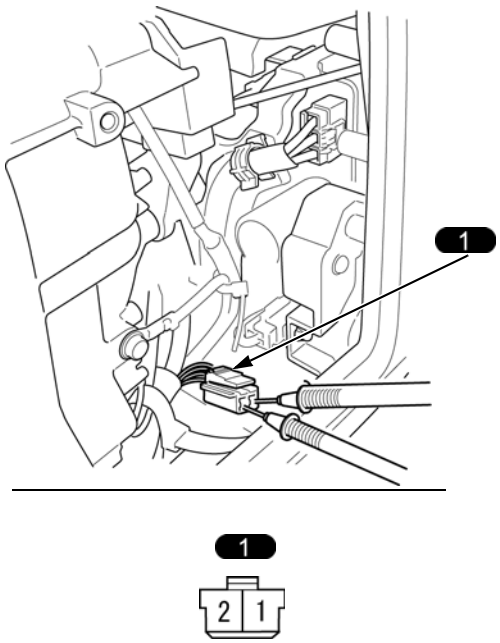
Stop the engine and remove air cleaner case.
Disconnect the 3P connector from the inverter unit.
Pull the recoil starter with force, and measure the main winding AC voltage.
Voltage:
B type
Terminal number: 1 – 2 Voltage: 20 – 40 VAC
Terminal number: 1 – 3 Voltage: 20 – 40 VAC
Terminal number: 2 – 3 Voltage: 20 – 40 VAC
Except B types
Terminal number: 1 – 2 Voltage: 30 – 70 VAC
Terminal number: 1 – 3 Voltage: 30 – 70 VAC
Terminal number: 2 – 3 Voltage: 30 – 70 VAC



No voltage → Check the generator wire harness between the inverter unit and stator for an open or short circuit. If it is normal, replace the stator (page 8-13).

Normal

Low voltage → Pull the recoil starter with force, and measure the AC voltage of the sub-winding between the Pink and Gray wire terminals of the 2P connector.
Voltage: 1.0 – 2.0 VAC



Normal → Replace the inverter unit (page 8-6).

Low voltage → Replace the rotor (page 8-13).

No DC output

Check that the engine speed is normal.
Engine speed: 4,000 – 4,500 min^{-1} (rpm) with Eco-Throttle switch OFF.

Abnormal → Perform "THROTTLE CONTROL SYSTEM TROUBLESHOOTING" (page 7-2).

Normal ↓

Stop the engine and check the DC receptacle (page 11-10).

Abnormal → Replace the DC receptacle (page 11-2).

Normal ↓

Check the rectifier (page 8-17).

Abnormal → Replace the rectifier (page 8-12).

Normal ↓

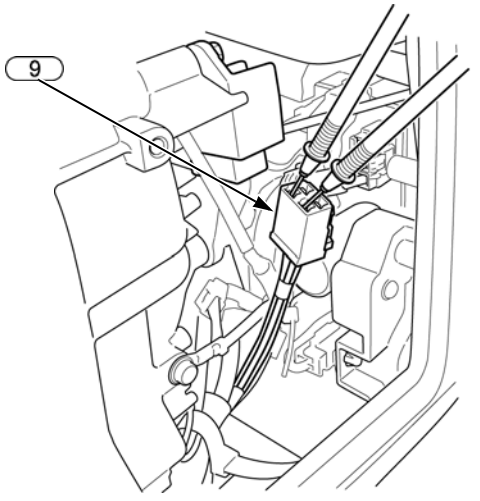
Check the DC winding resistance (page 8-16).

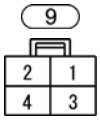
Abnormal → Check the generator wire harness between the inverter unit and stator for an open or short circuit. If it is normal, replace the stator (page 8-13).

Normal ↓

Install the air cleaner case.

Start the engine and measure the DC winding DC voltage.
Terminal number: 3 – 4 Voltage: 19 – 23 VAC





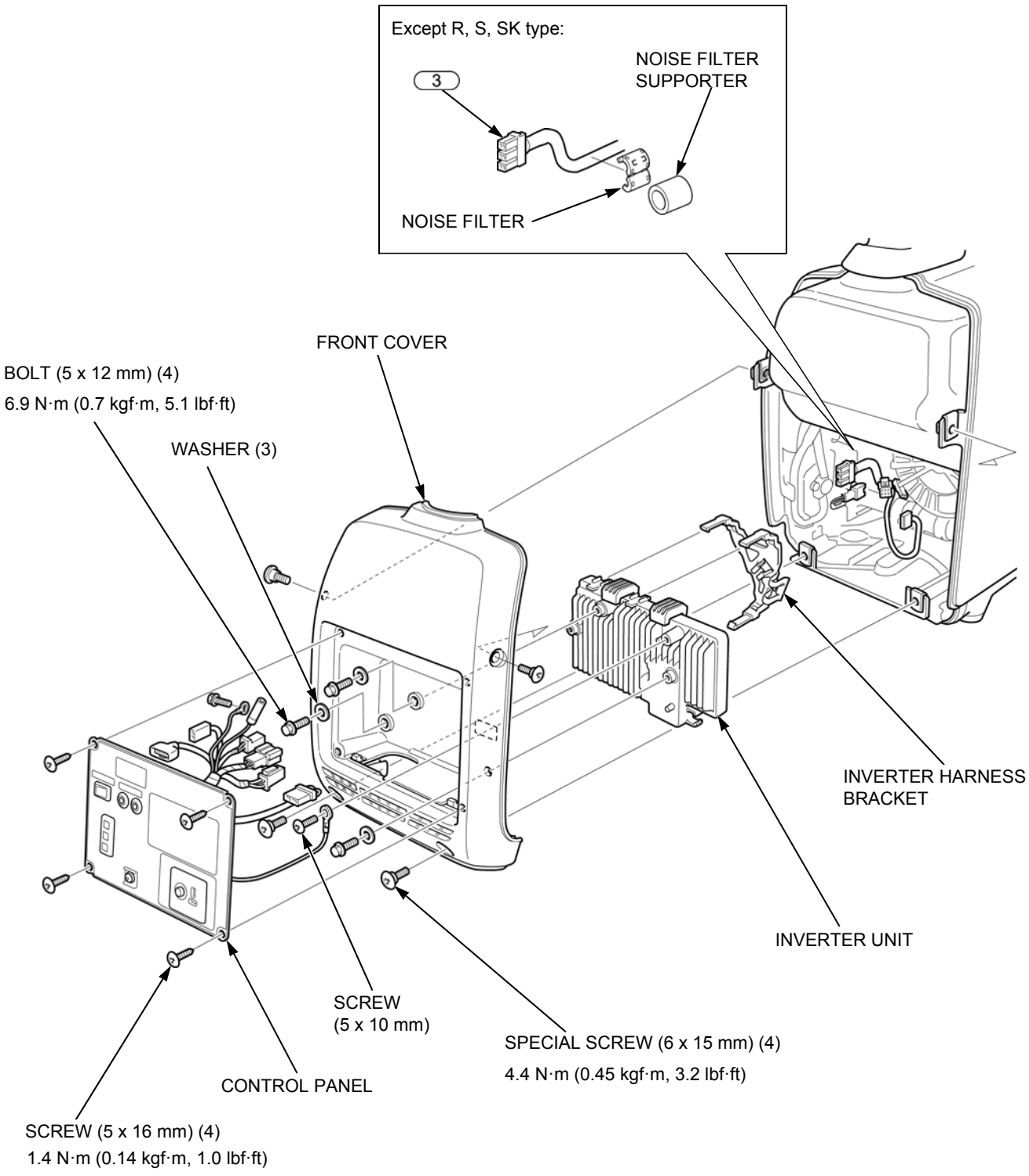
Abnormal → Rotor magnet weak.
Replace the rotor (page 8-13).

Normal ↓

Repair or replace the generator wire harness between the rectifier and DC receptacle.

CONTROL PANEL/FRONT COVER/INVERTER UNIT REMOVAL/ INSTALLATION

Remove the air cleaner case (page 6-4).



REMOVAL

Remove the air cleaner case (page 6-4).

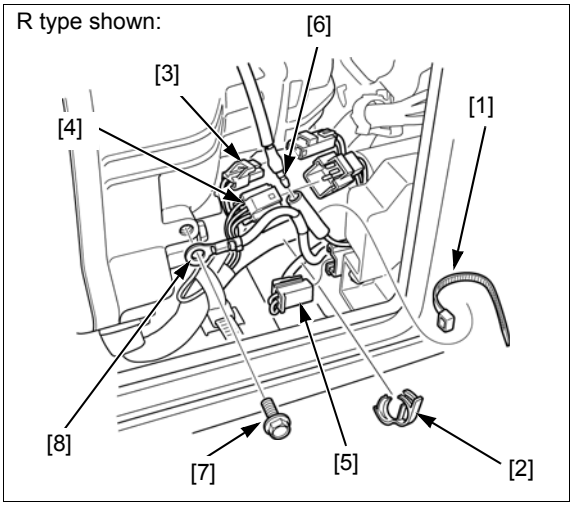
R, S, SK type: Remove the wire band [1] and wire clip [2].

Except R, S, SK type: Remove the wire band.

Disconnect the following:

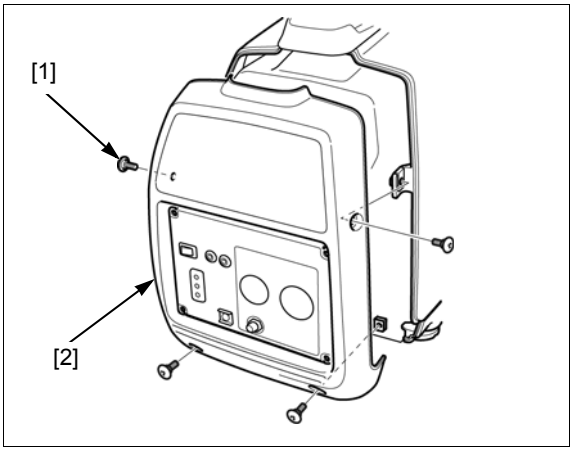
- Generator wire harness 2P connector [3]
- Generator wire harness 6P connector [4]
- Engine stop switch 2P connector [5]
- Ignition coil wire connector [6]

Remove the bolt [7] and ground terminal [8].



Remove the special screws [1].

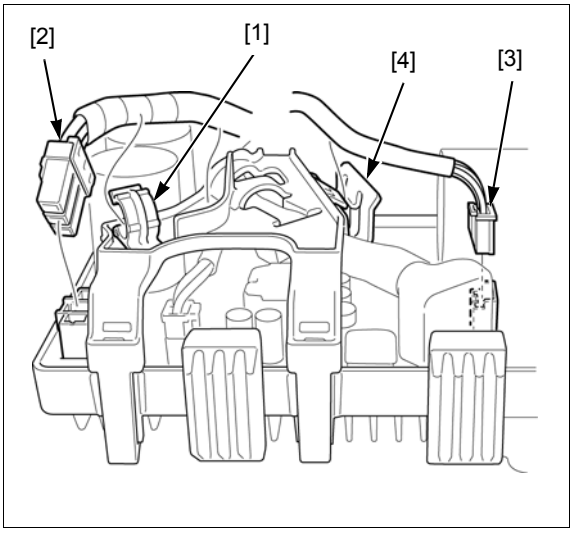
Pull out the front cover [2].



Release the generator wire harness from the wire clamp [1].

Disconnect the generator wire harness 3P connector [2] and throttle control motor wire harness 4P connector [3].

Release the throttle control motor wire harness from the inverter harness bracket [4].

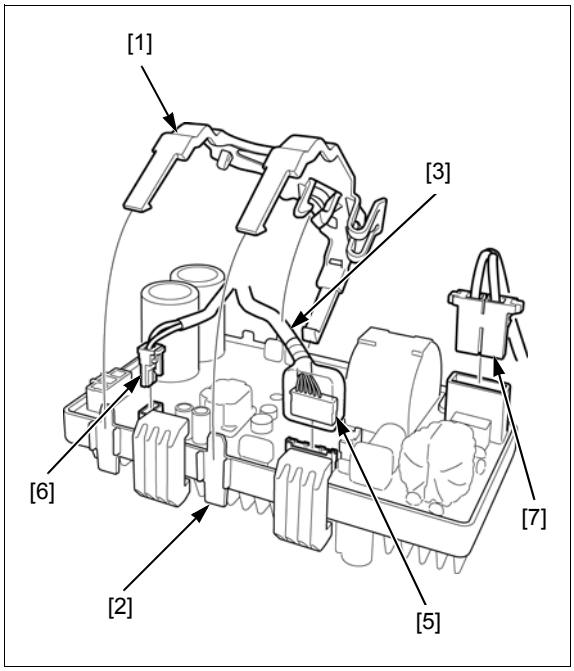


Remove the inverter harness bracket [1] from the inverter unit [2].

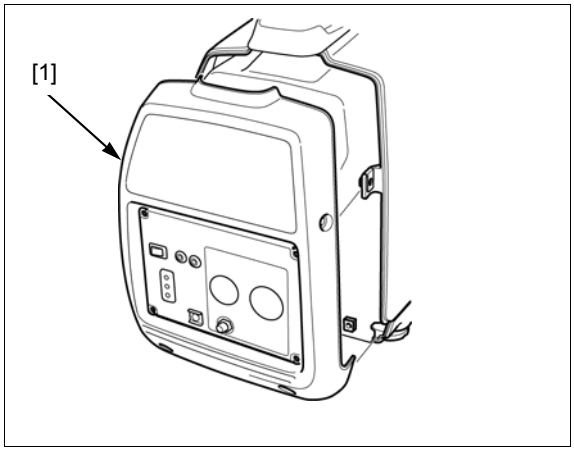
Release the control wire harness [3] from the inverter harness bracket.

Disconnect the following:

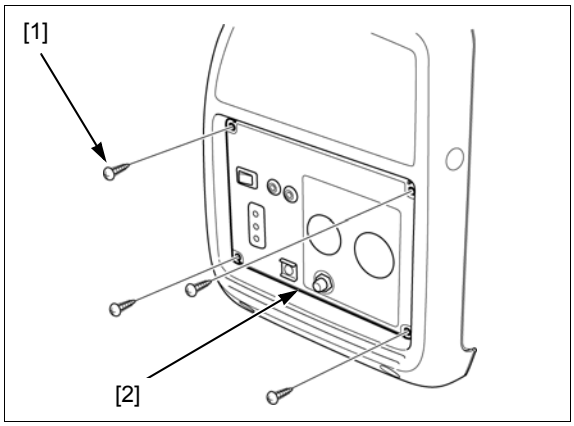
– Control wire harness 8P connector [5]
– Control wire harness 2P connector [6]
– Sub wire harness 2P connector [7]



Remove the front cover [1].



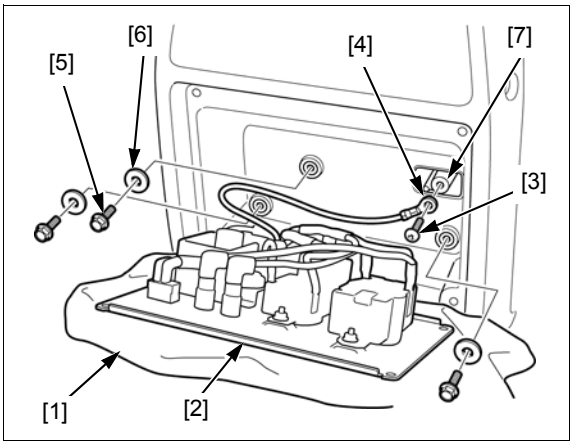
Remove the screws [1] and control panel [2].



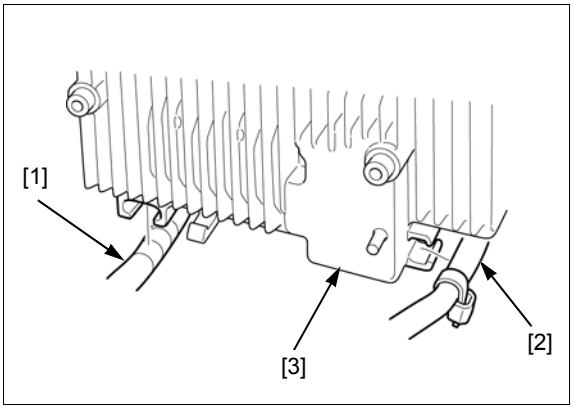
Place a shop towel [1] around the control panel [2] to prevent damaging the front cover.

Remove the following:

– Screw [3]
– Ground terminal [4]
– Bolts [5]
– Washers [6]
– Inverter unit [7]



Release the control wire harness [1] and sub wire harness [2] from the inverter unit [3].



INSTALLATION

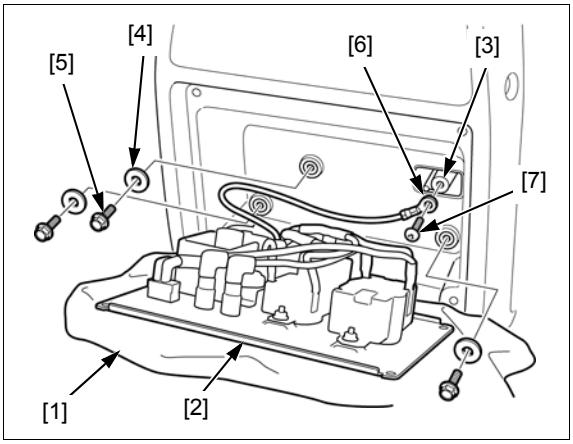
NOTE:

• When installing, route the wire harness properly (page 2-7).

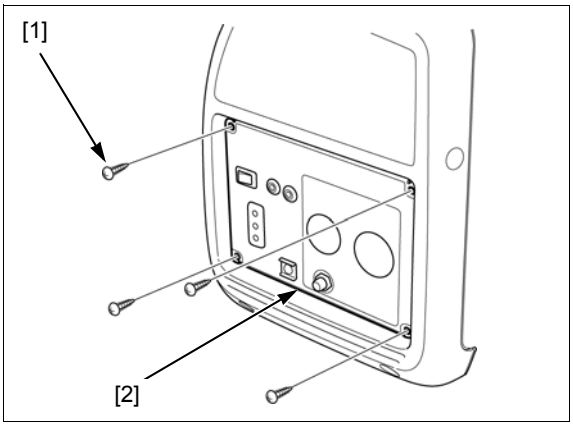
Place a shop towel [1] around the control panel [2] to prevent damaging the front cover.

Install the following:

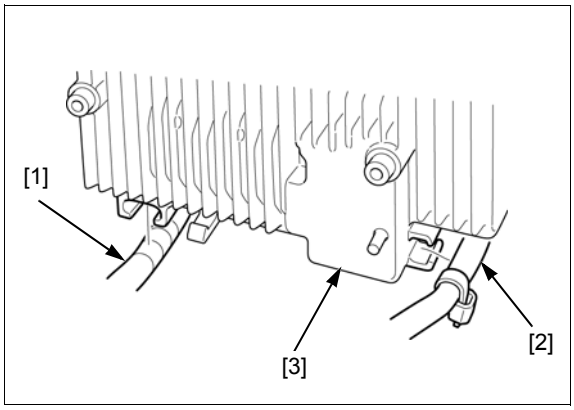
– Inverter unit [3]
– Washers [4]
– Bolts [5]
– Ground terminal [6]
– Screw [7]



Install the screws [1] and control panel [2].



Install the control wire harness [1] and sub wire harness [2] to the inverter unit [3].

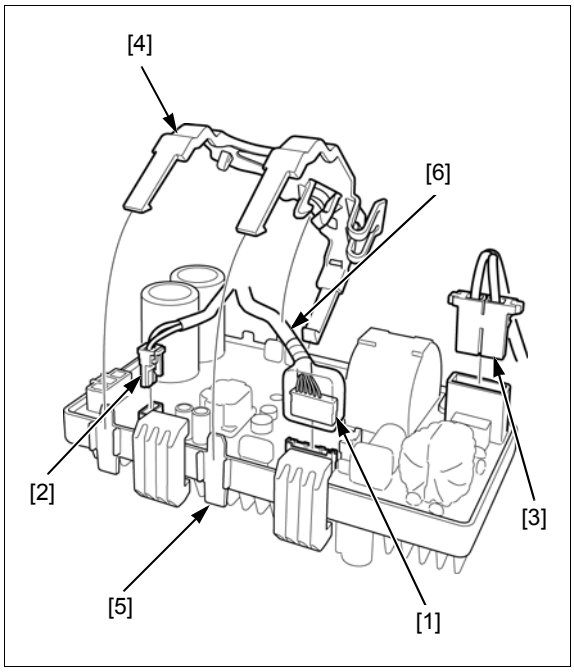


Connect the following:

– Control wire harness 8P connector [1]
– Control wire harness 2P connector [2]
– Sub wire harness 2P connector [3]

Install the inverter harness bracket [4] to the inverter unit [5].

Install the control wire harness [6] to the inverter harness bracket.

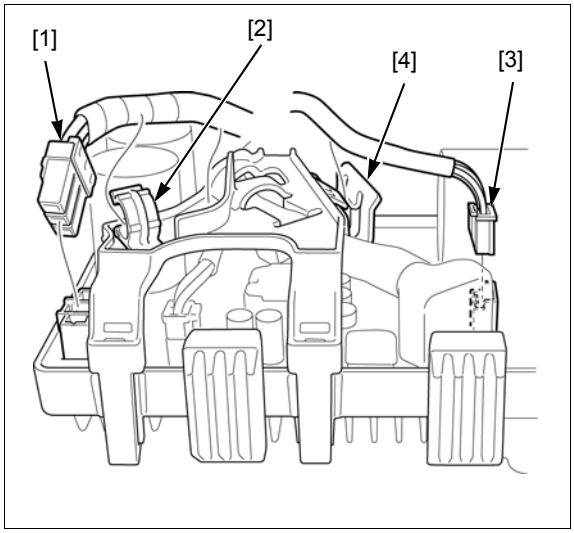


R, S, SK type: Connect the generator wire harness 3P connector [1].

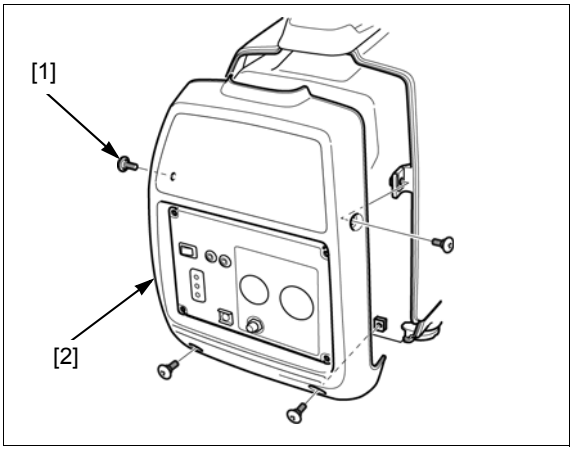
install the generator wire harness to the wire clamp [2]

Connect the throttle control motor wire harness 4P connector [3].

Install the throttle control motor wire harness to the inverter harness bracket [4].

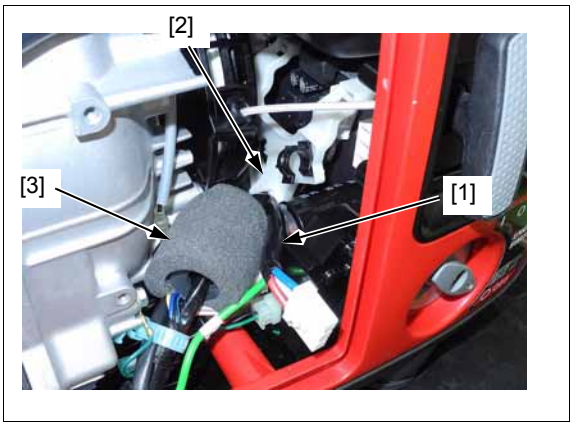


Install the special screws [1] and front cover [2].



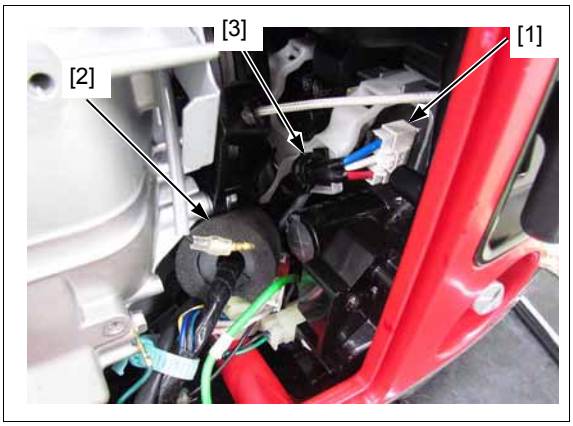
Except R, S, SK type: Push in the generator wire harness [1] below the rib [2] of the inverter harness bracket while bending it toward the direction of the side cover.

Push in the noise filter [3] against the bent part of the generator wire harness.



Except R, S, SK type: Connect the generator wire harness 3P connector [1] while holding the noise filter [2] in place.

Install the generator wire harness to the wire clamp [3] as shown.



Connect the following:

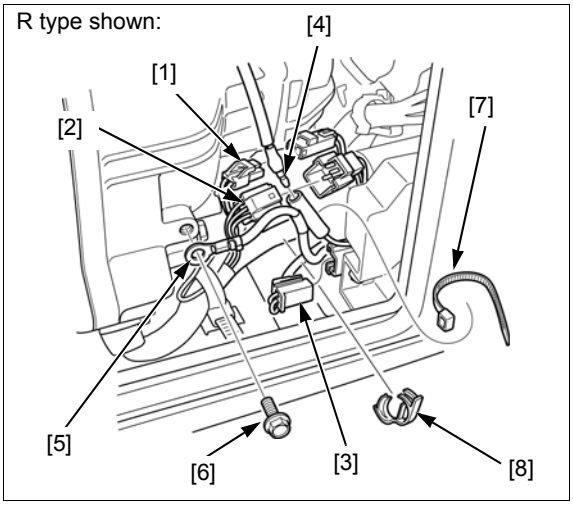
- Generator wire harness 2P connector [1]
- Generator wire harness 6P connector [2]
- Engine stop switch 2P connector [3]
- Ignition coil wire connector [4]

Install the ground terminal [5] and bolt [6].

R, S, SK type: Install the wire band [7] and wire clip [8].

Except R, S, SK type: Install the wire band.

Install the air cleaner case (page 6-4).

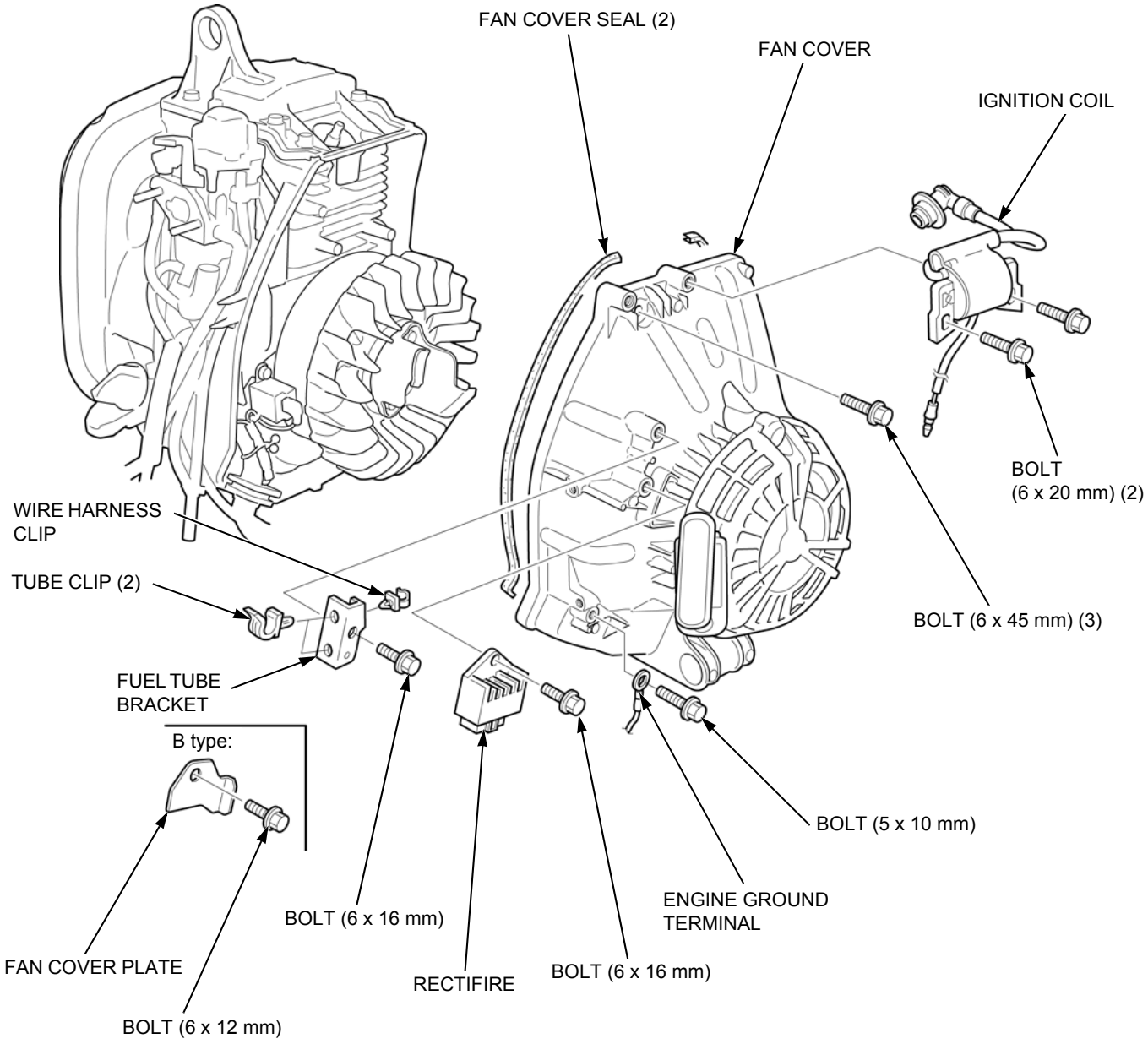


FAN COVER REMOVAL/INSTALLATION

Remove the front frames/under cover (page 5-4).

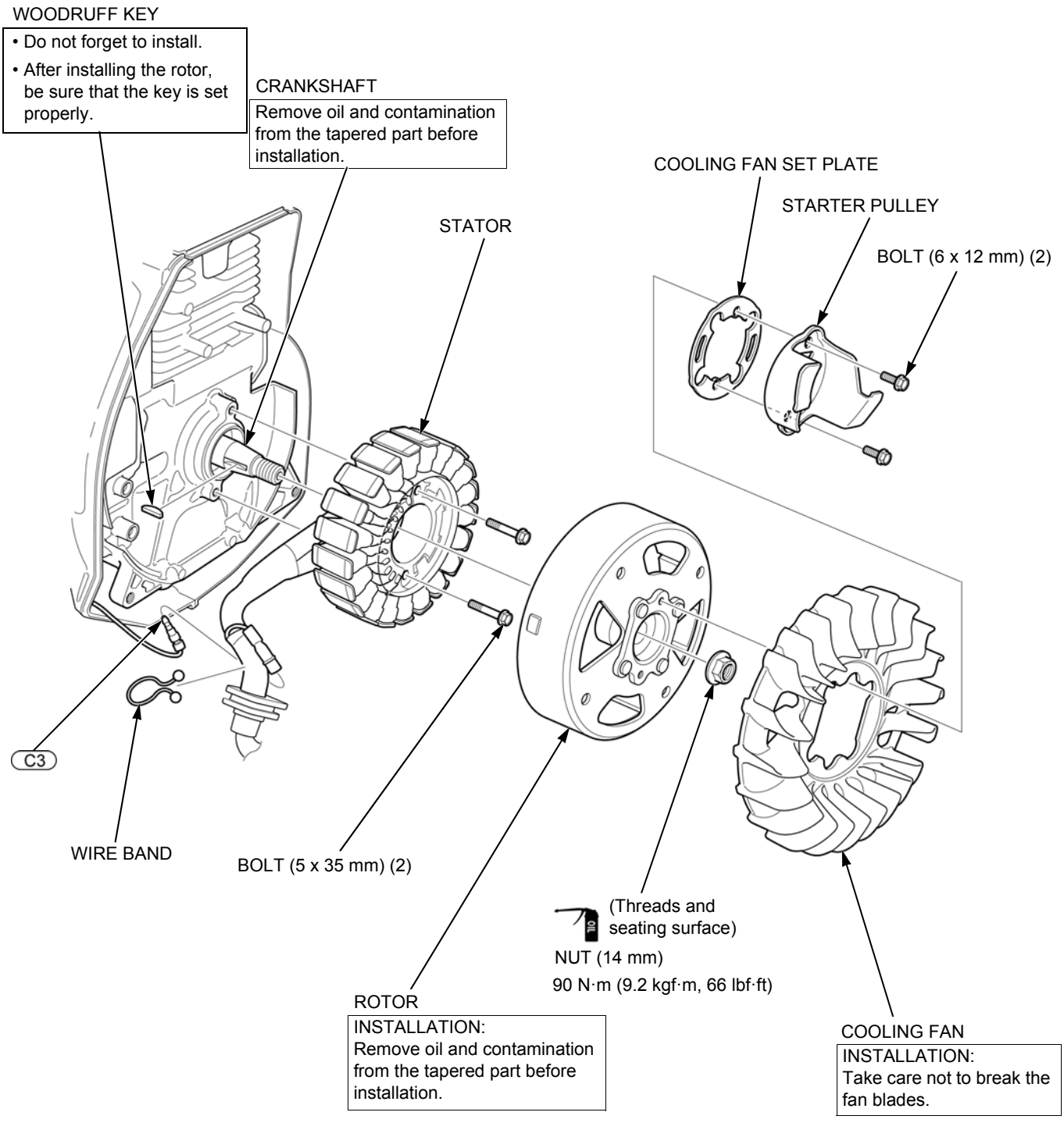
NOTE:

- When installing, route the wire harness properly (page 2-7).



GENERATOR REMOVAL/ INSTALLATION

Remove the ignition pulse generator (page 9-3).



ROTOR REMOVAL

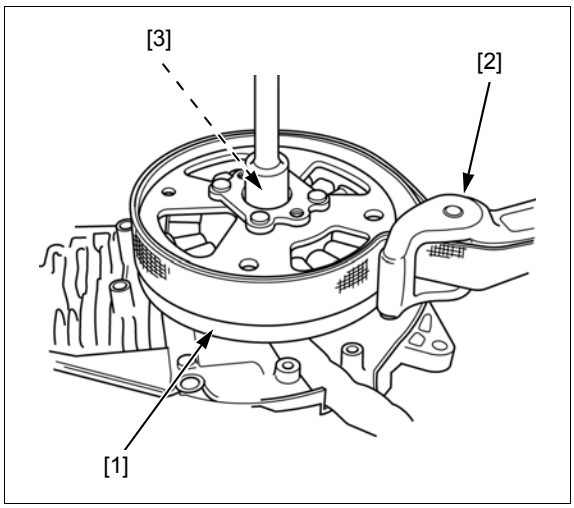
NOTICE

- *Do not strike any part of the rotor when removing it. The rotor may be damaged.*

Remove the ignition pulse generator (page 9-3).

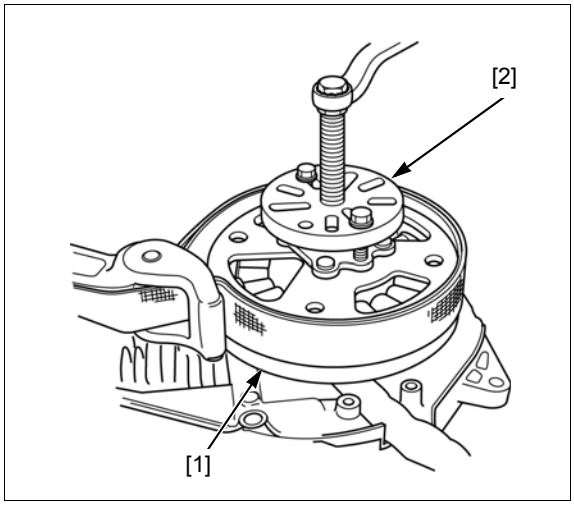
Hold the rotor [1] with a commercially available strap wrench [2].

Remove the nut (14 mm) [3].



Remove the rotor [1] using the special tool.

TOOL:
FLYWHEEL PULLER [2] 07935-8050004



ROTOR INSTALLATION

Clean any oil from the tapered portions of the rotor and crankshaft.

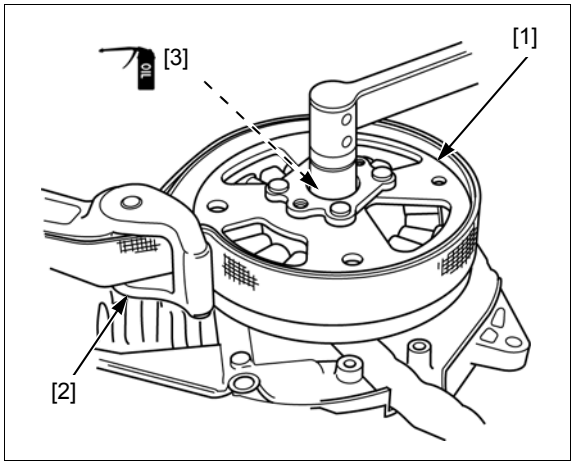
Check for any foreign material attracted to the inside of the rotor before installation.

Install the rotor [1] by aligning the key slot with the woodruff key on the crankshaft.

Hold the rotor with a commercially available strap wrench [2].

Apply a light coat of engine oil to the threads and seating surface of the rotor nut (14 mm) [3], and tighten it to the specified torque.

TORQUE: 90 N·m (9.2 kgf·m, 66 lbf·ft)



GENERATOR INSPECTION

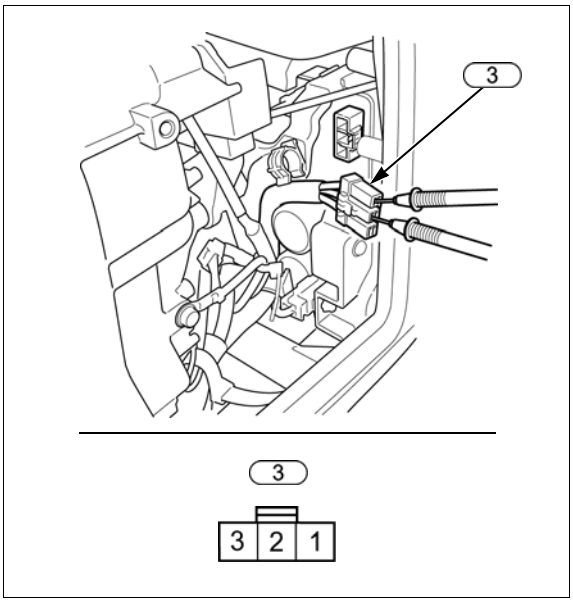
MAIN WINDING

Remove the maintenance cover (page 5-2).

Disconnect the generator wire harness 3P connector (3) from the inverter unit.

Measure the resistance between the terminals of the connector (3) according to the table below.

Terminal number		Resistance
1 – 2	B type	1.0 – 1.8 Ω
	Except B type	5.0 – 6.0 Ω
1 – 3	B type	1.0 – 1.8 Ω
	Except B type	5.0 – 6.0 Ω
2 – 3	B type	1.0 – 1.8 Ω
	Except B type	5.0 – 6.0 Ω



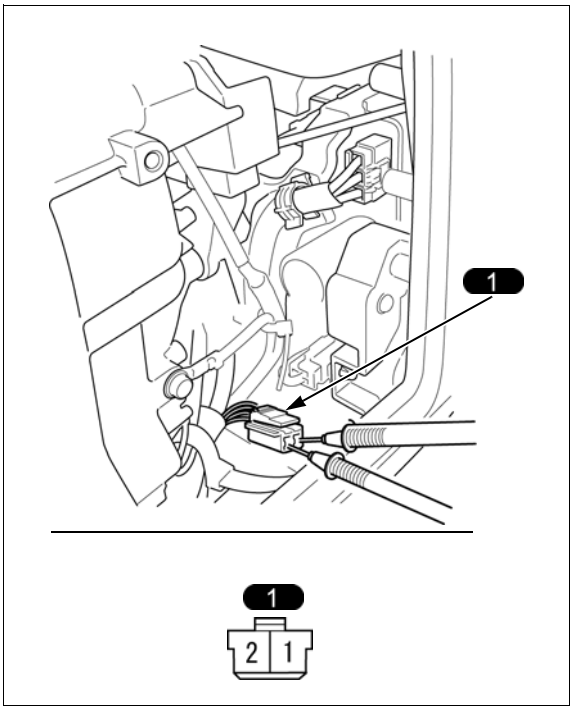
SUB WINDING

Remove the maintenance cover (page 5-2).

Disconnect the generator wire harness 2P connector (1) from the inverter unit.

Measure the resistance between the terminals of the connector (1) according to the table below.

Terminal number	Resistance
1 – 2	0.1 – 0.2 Ω

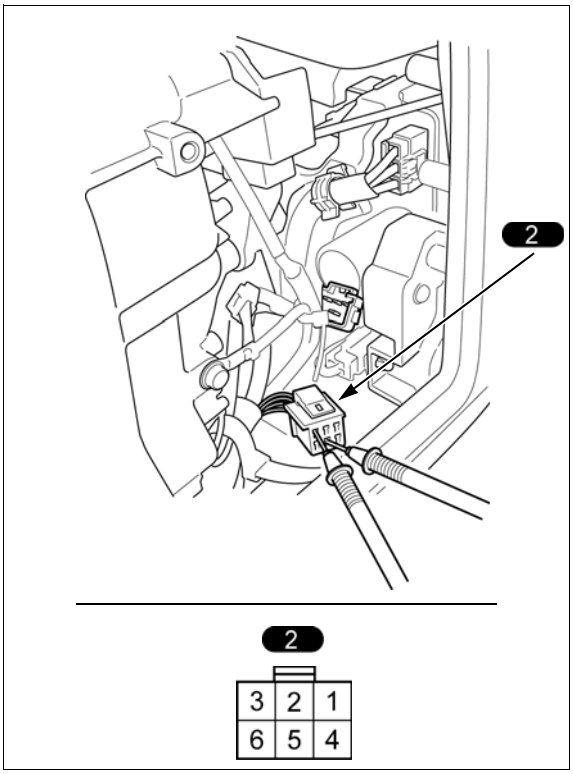


EXCITER WINDING

Remove the maintenance cover (page 5-2).

Measure the resistance between the terminals of the connector 2 according to the table below.

Terminal number	Resistance
3 – 5	0.2 – 0.3 Ω

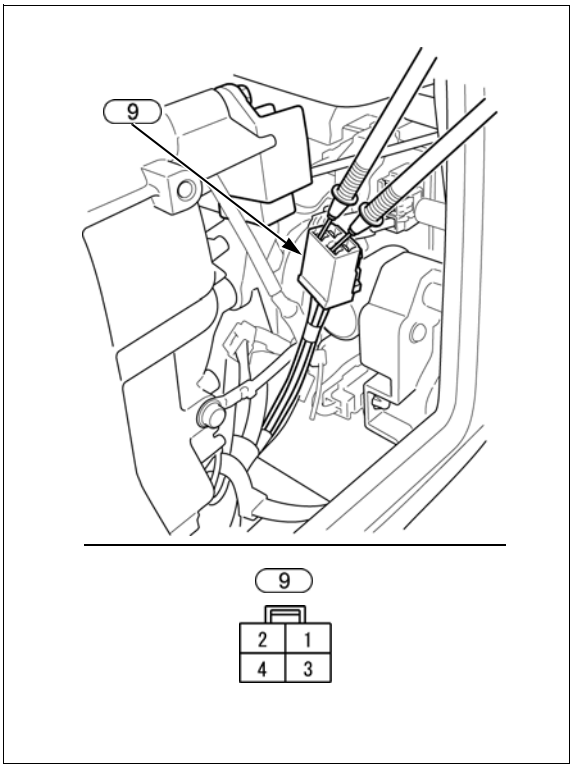


DC WINDING

Remove the maintenance cover (page 5-2).

Measure the resistance between the terminals of the connector 9 according to the table below.

Terminal number	Resistance
3 – 4	0.1 – 0.2 Ω



RECTIFIER INSPECTION

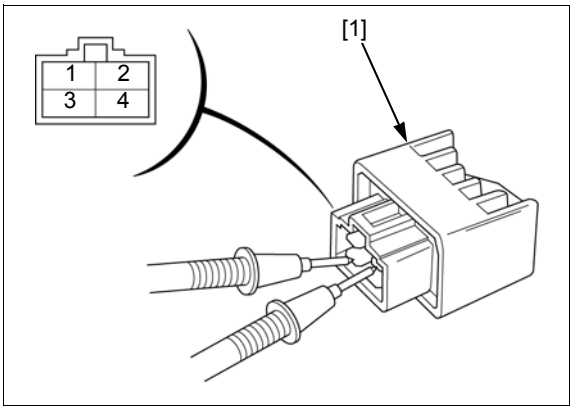
Remove the rectifier (page 8-12)

Check for continuity between the terminals according to the table below.

		Tester probe (+)			
		1	2	3	4
Tester probe (–)	1	–	∞	∞	∞
	2	Continuity	–	Continuity	Continuity
	3	Continuity	∞	–	∞
	4	Continuity	∞	∞	–

NOTE:

- The polarity is reversed on some testers. Read the tester manufacturer's instructions.

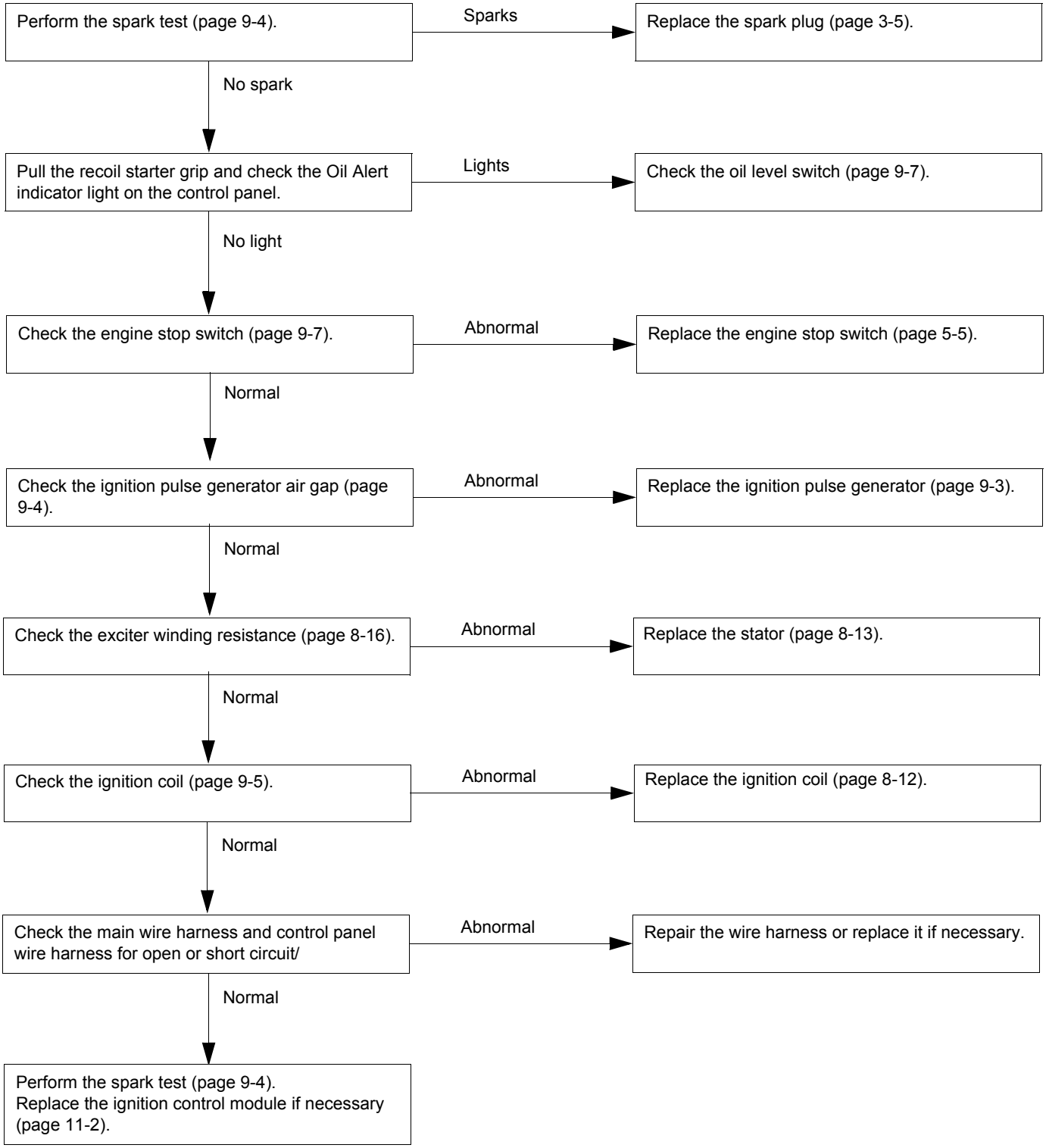


MEMO

9. IGNITION SYSTEM

IGNITION SYSTEM TROUBLESHOOTING

Engine does not start with sufficient oil in the crankcase

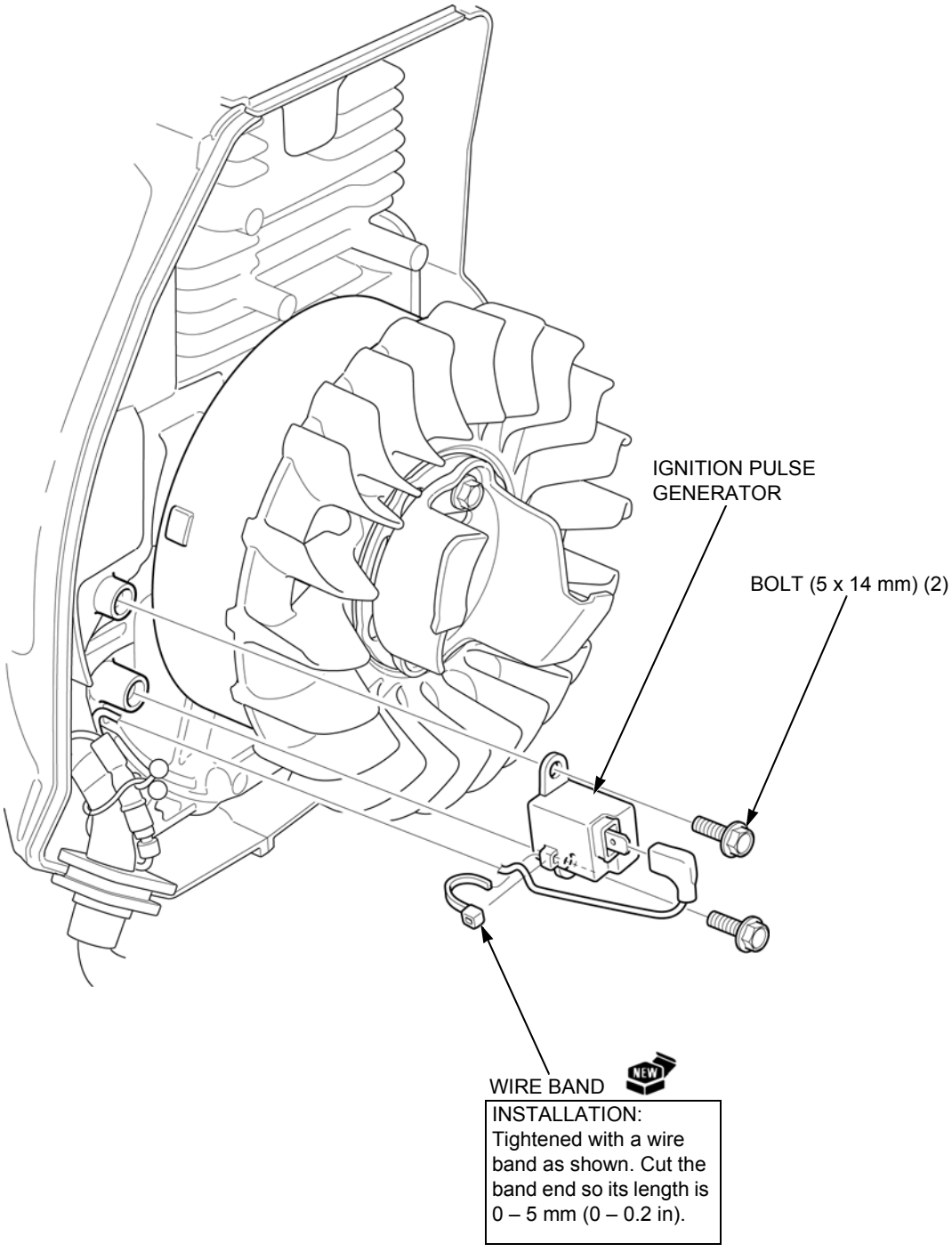


IGNITION PULSE GENERATOR REMOVAL/INSTALLATION

Remove the fan cover (page 8-12).

NOTE:

- When installing, route the wire harness properly (page 2-7).

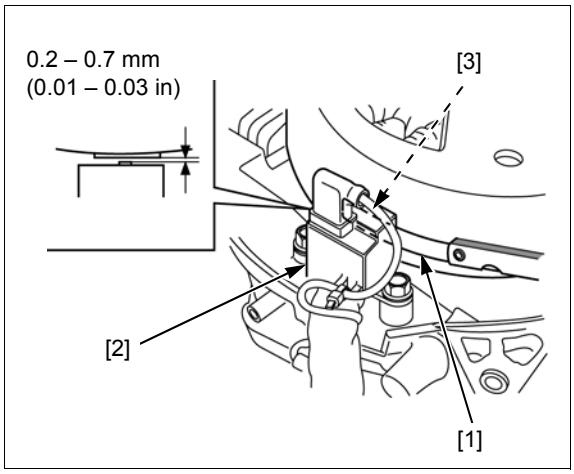


IGNITION PULSE GENERATOR AIR GAP ADJUSTMENT

Insert a feeler gauge [1] between the ignition pulse generator [2] and the rotor projection [3].

IGNITION PULSE GENERATOR AIR GAP:
0.2 – 0.7 mm (0.01 – 0.03 in)

If the air gap is out of specification, loosen the bolts (5 x 14 mm) [4] and push the ignition pulse generator firmly toward the rotor and tighten the bolts to the specified torque.



SPARK TEST

⚠ CAUTION

Never hold the high-tension cord with wet hands while performing this test.

Check for the following before conducting the spark test.

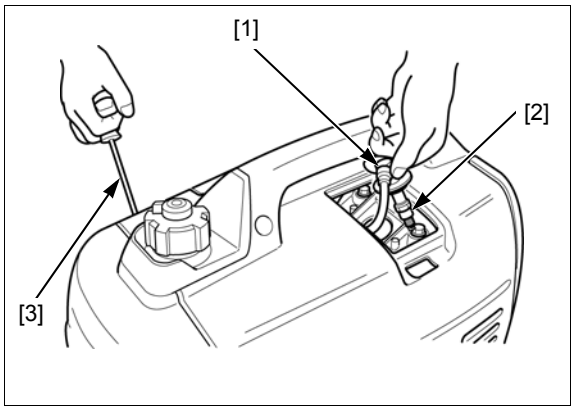
- Faulty spark plug
- Loose spark plug cap
- Water in the spark plug cap (leaking ignition coil secondary voltage)

Remove the spark plug maintenance cover (page 3-5), and disconnect the spark plug cap [1].

Connect a known-good spark plug [2] to the spark plug cap and ground the spark plug to the frame.

Turn the engine stop switch to the ON position.

Crank the engine by pulling the recoil starter [3] and check whether sparks jump across the electrodes.



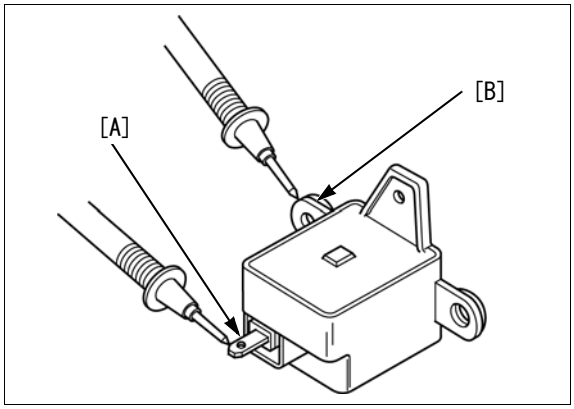
IGNITION PULSE GENERATOR INSPECTION

Remove the ignition pulse generator (page 9-3).

Measure the resistance between the terminals A and B shown.

RESISTANCE: 300 – 360 Ω

If measured resistance is out of specification, replace the ignition pulse generator.



IGNITION COIL INSPECTION

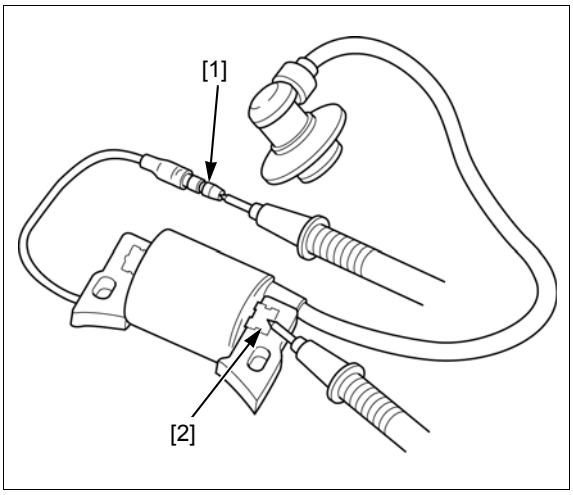
PRIMARY SIDE

Remove the ignition coil (page 8-12).

Measure the resistance of the primary coil by attaching one ohmmeter probe to the ignition coil wire terminal [1] and the other to the ignition coil ground terminal [2].

RESISTANCE: 0.7 – 1.1 Ω

If measured resistance is out of specification, replace the ignition coil.

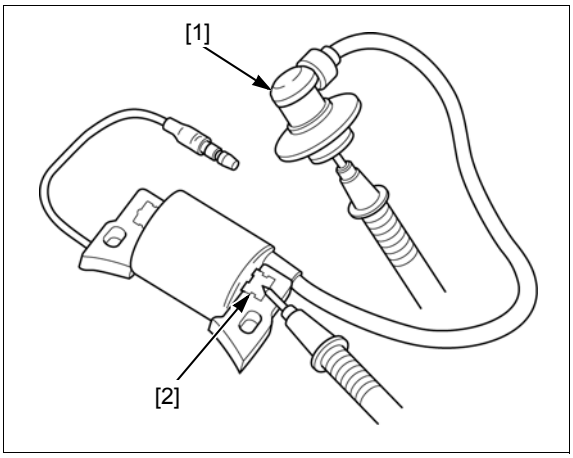


SECONDARY SIDE

Measure the resistance of the secondary coil by attaching one ohmmeter probe to the spark plug cap [1] and the other to the ignition coil ground terminal [2].

RESISTANCE: 12 – 21 kΩ

If measured resistance is out of specification, replace the ignition coil.



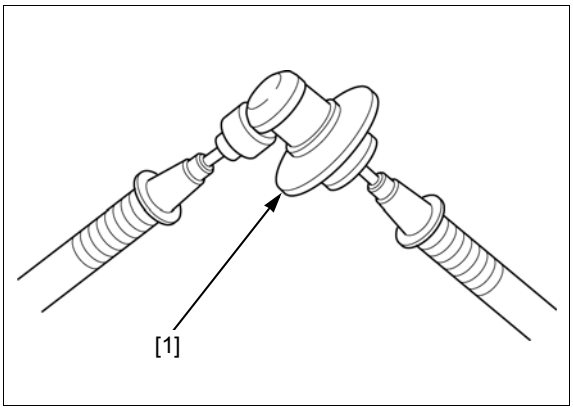
SPARK PLUG CAP

Remove the spark plug cap [1].

Measure the resistance of the spark plug cap by attaching one ohmmeter probe as shown.

RESISTANCE: 7.5 – 12.5 kΩ

If measured resistance is out of specification, replace the spark plug cap.



IGNITION CONTROL MODULE INSPECTION

Do not disconnect the connector and terminal during inspection.

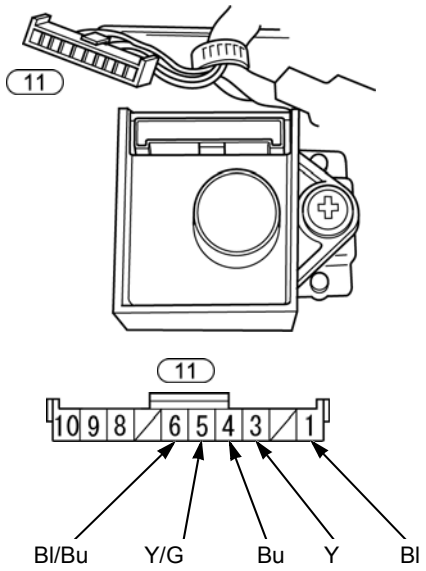
Remove the control panel (page 8-6).

Disconnect the 10P connector (11) from the ignition control module.

Turn the engine stop switch to the ON position.

Test the wire harness according to the table below.

If it is normal, replace the ignition control module.



Terminal number	Circuit	Test and result
1	Primary coil	Measure the resistance to engine ground. Resistance: 0.7 – 1.1 Ω
3	Oil level switch	Check for continuity to engine ground. There should be no continuity with correct oil level.
4	Ignition pulse generator	Measure the resistance to engine ground. Resistance: 300 – 360 Ω
5	Ground	Check for continuity to engine ground. There should be continuity.
6	Exciter winding	Measure the resistance to engine ground. Resistance: 0.2 – 0.3 Ω

OIL LEVEL SWITCH INSPECTION

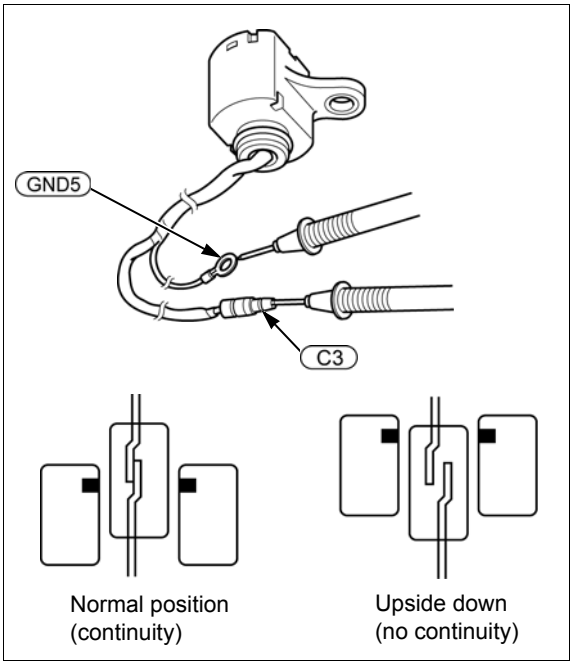
Remove the oil level switch (page 15-7).

Check continuity between the oil level switch wire connector (C3) and ground terminal (GND5).

The oil level switch is normal if there is no continuity with the switch set upside down.

There must be continuity between the wires with the switch set right side up.

Suspend the switch in a container filled with oil and check the float operation.
The switch is normal if there is continuity between the wires initially, and no continuity when the switch is immersed in the oil.



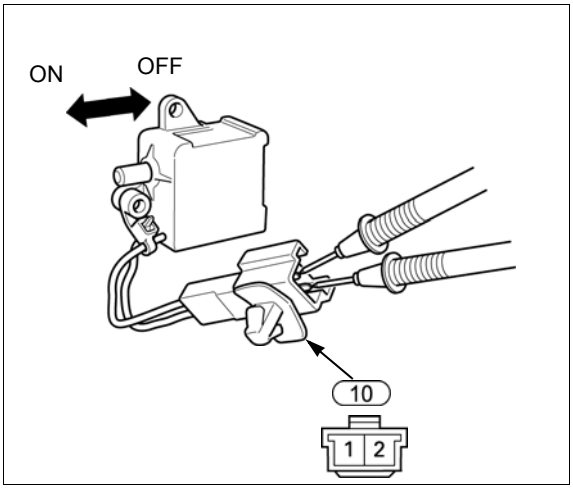
ENGINE STOP SWITCH INSPECTION

Remove the maintenance cover (page 5-2).

Disconnect the engine stop switch 2P connector (10).

Check the continuity between the terminals at each switch position.

	Switch position	
Terminal	ON	OFF
1 – 2	No continuity	Continuity

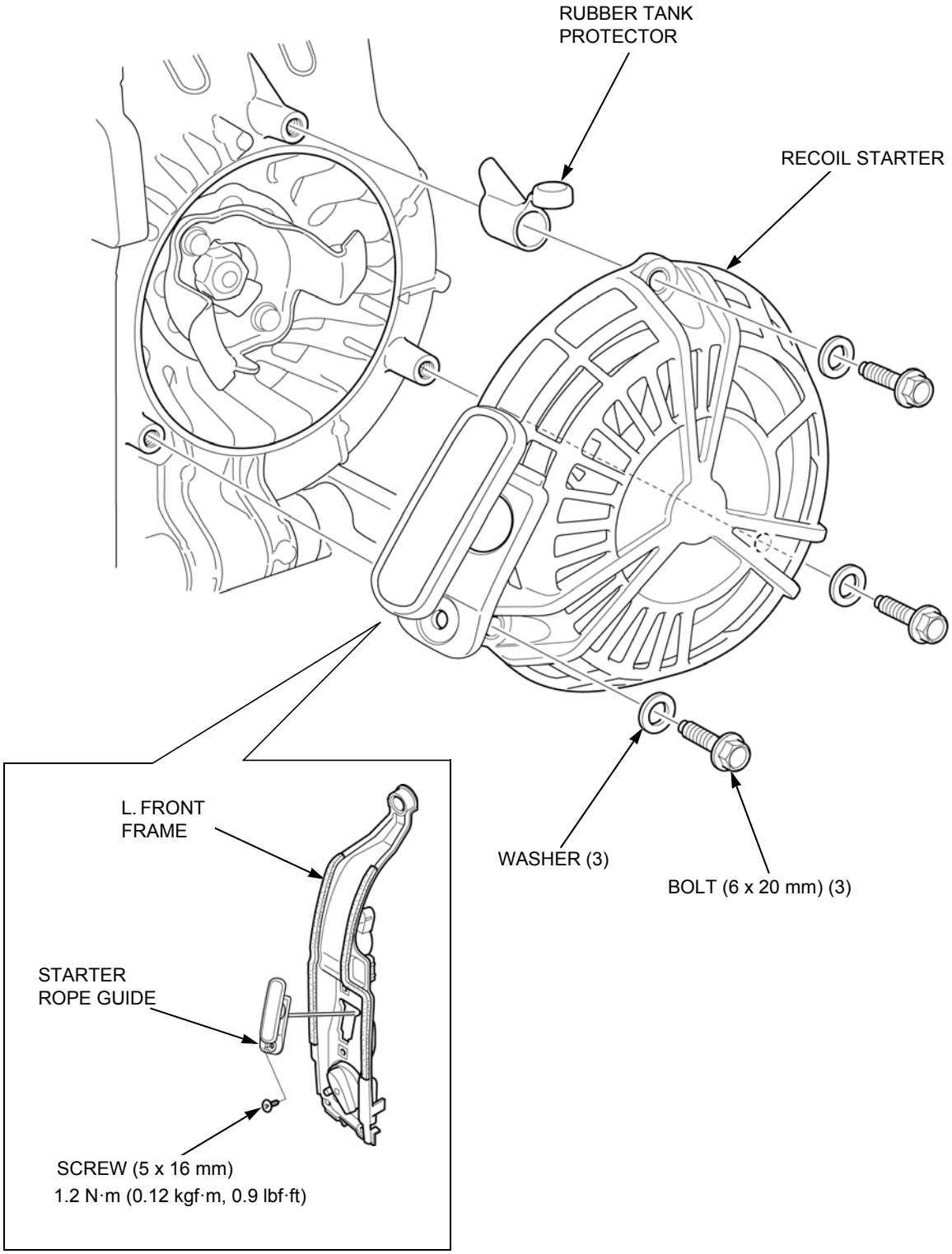


MEMO

10. STARTING SYSTEM

RECOIL STARTER REMOVAL/INSTALLATION

Remove the fuel tank (page 6-3).

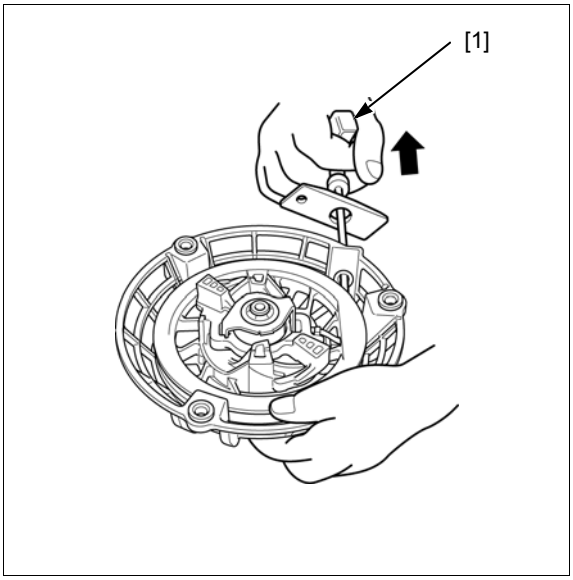


STARTER ROPE REPLACEMENT

⚠ CAUTION

- Wear gloves and eye protection.

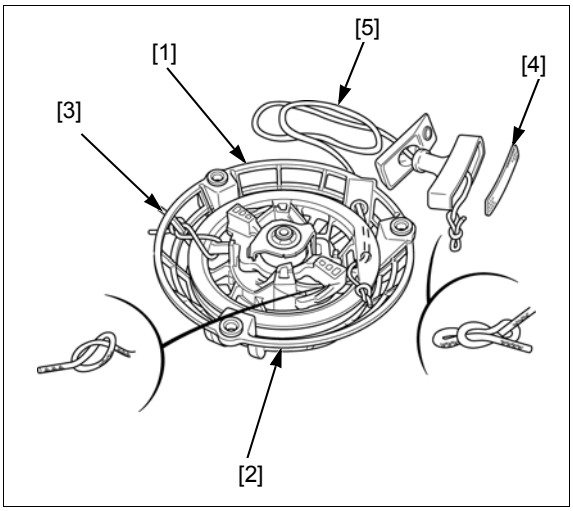
Pull the starter grip [1] fully (until the starter rope is pulled out fully.)



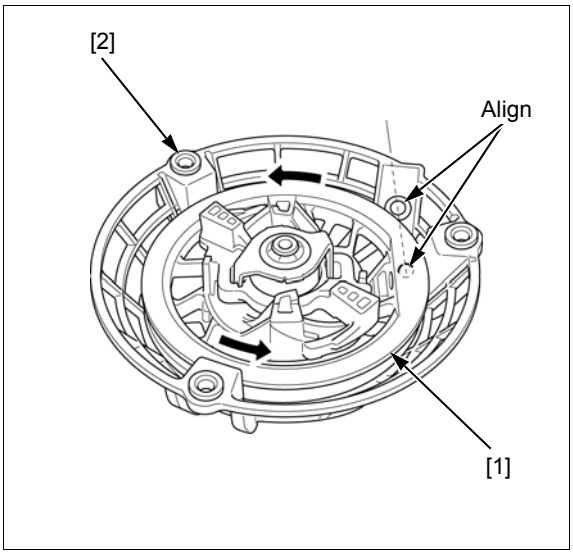
To prevent the starter reel [1] from rewinding. hold the starter reel and starter case [2] with a band [3] or equivalent material as shown.

Remove the grip cover [4] by inserting a bar from the hole in the grip to route the starter rope [5] and pushing it.

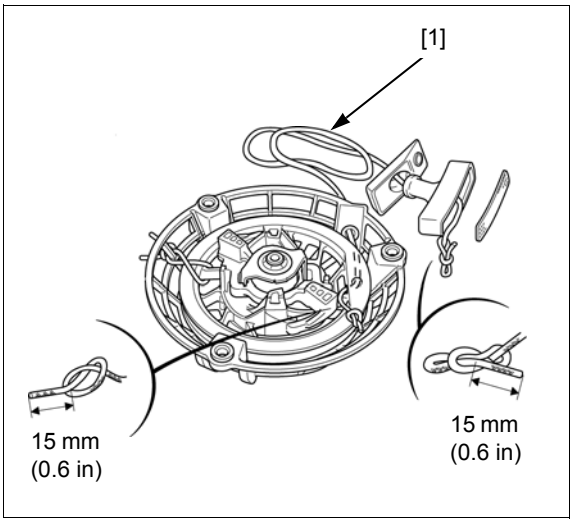
Untie the knots of the starter rope at the starter grip side and the starter reel side, and remove the starter rope.



When the starter rope has broken or the starter reel [1] has rewound, align the rope hole in the starter case [2] with the rope hole in the starter reel by turning the starter reel 3 turns in the direction of the arrow.

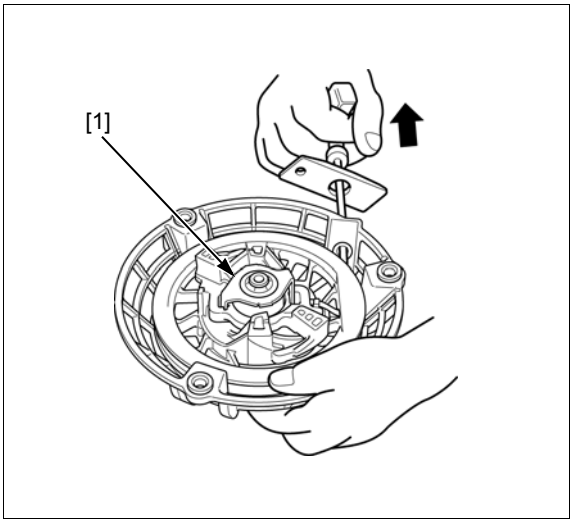


Make a knot at the ends of the starter rope [1], i.e. at the reel side end the starter grip side end, as shown at 15 mm (0.6 in) from the ends of the rope.



Wind the starter rope slowly on the starter reel.

Check the operation of the ratchet [1] by pulling the starter rope several times.

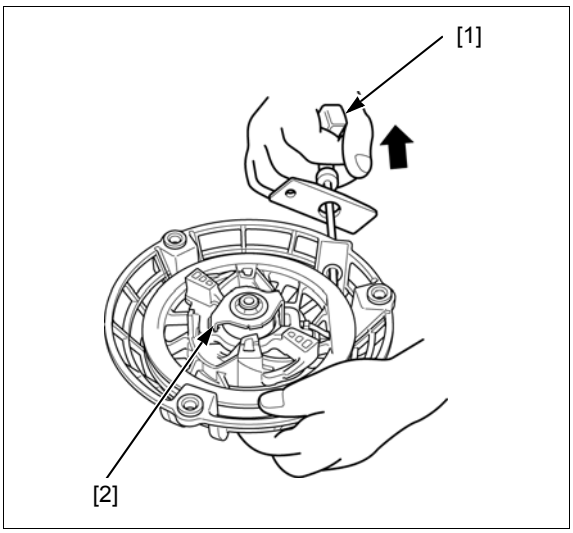


RECOIL STARTER INSPECTION

RECOIL STARTER OPERATION

Remove the recoil starter (page 10-2).

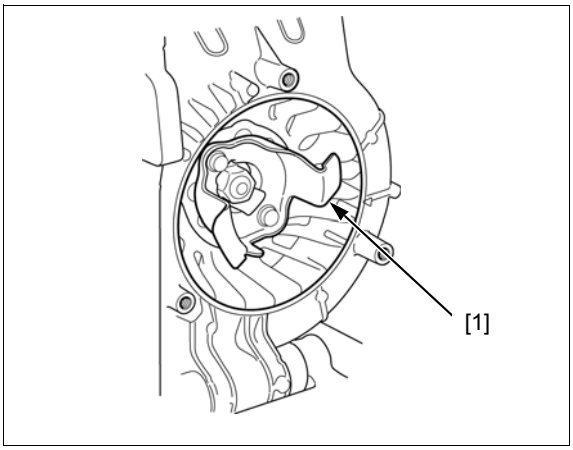
Pull the starter grip [1] several times to inspect that the ratchet [2] are operated properly.



STARTER PULLEY

Remove the recoil starter (page 10-2).

Inspect the starter pulley [1] for deformation and the swing arm contacting areas for wear.



MEMO

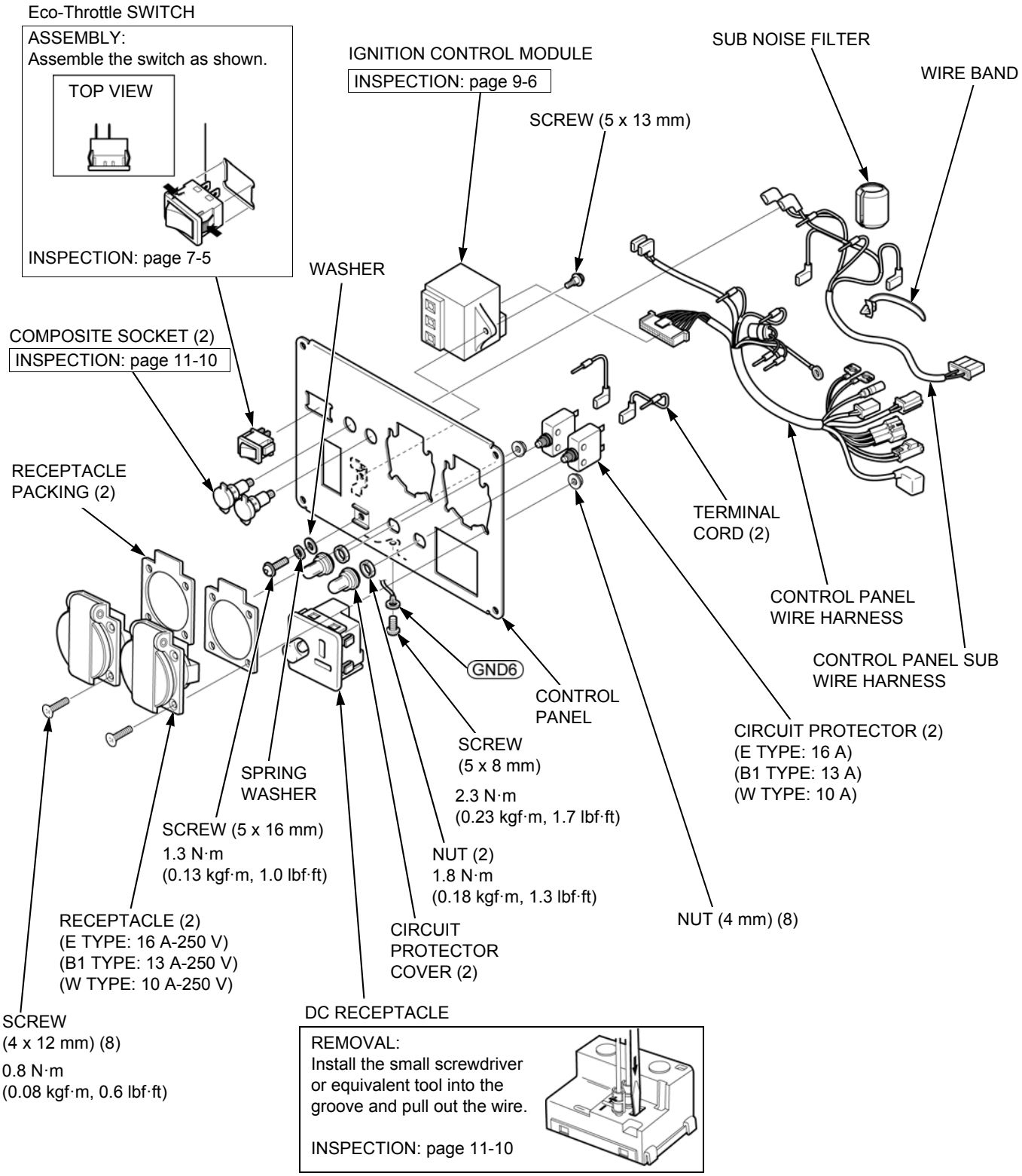
CONTROL PANEL DISASSEMBLY/ASSEMBLY

Remove the control panel (page 8-6)

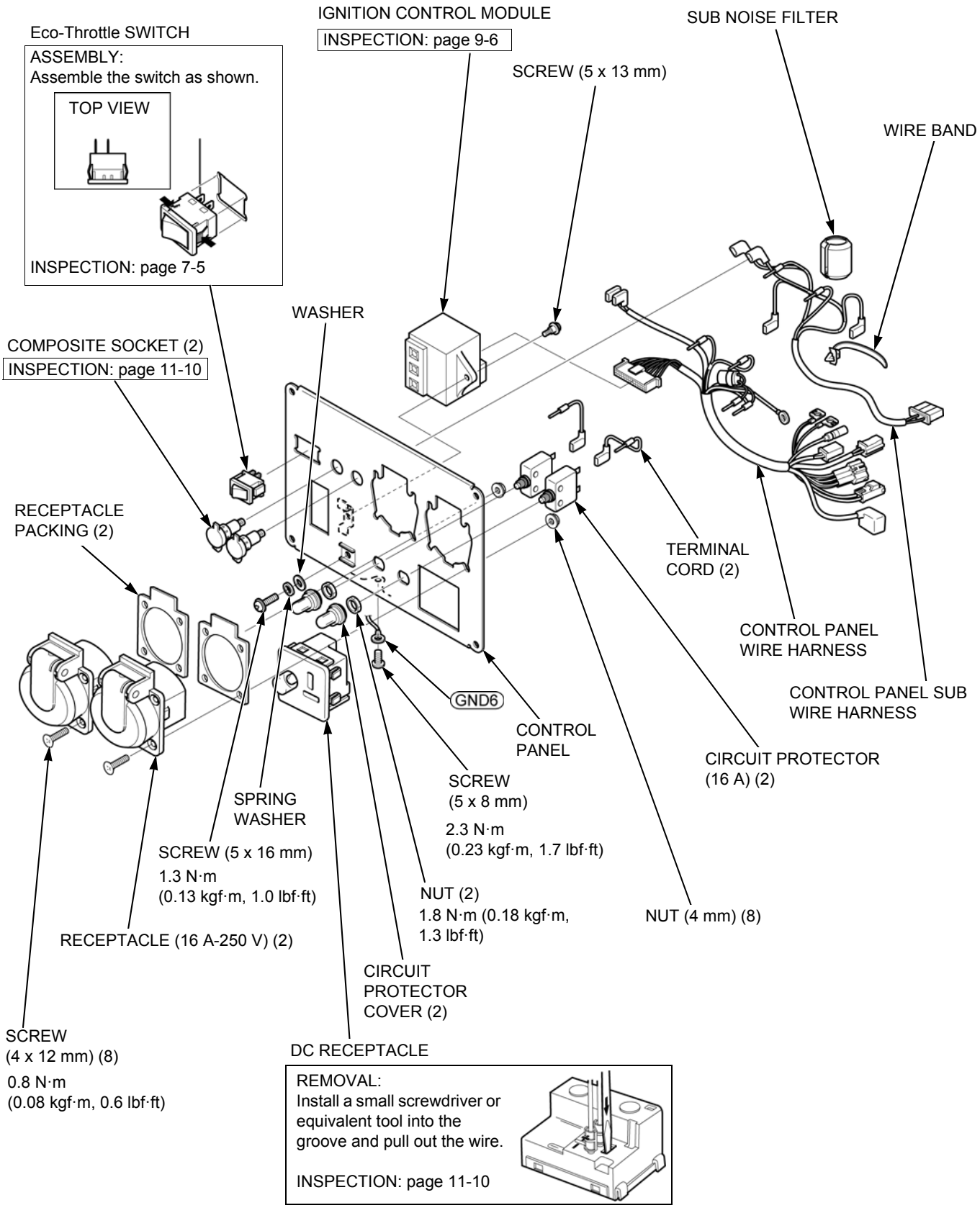
NOTE:

- When installing, route the wire harness properly (page 2-7).

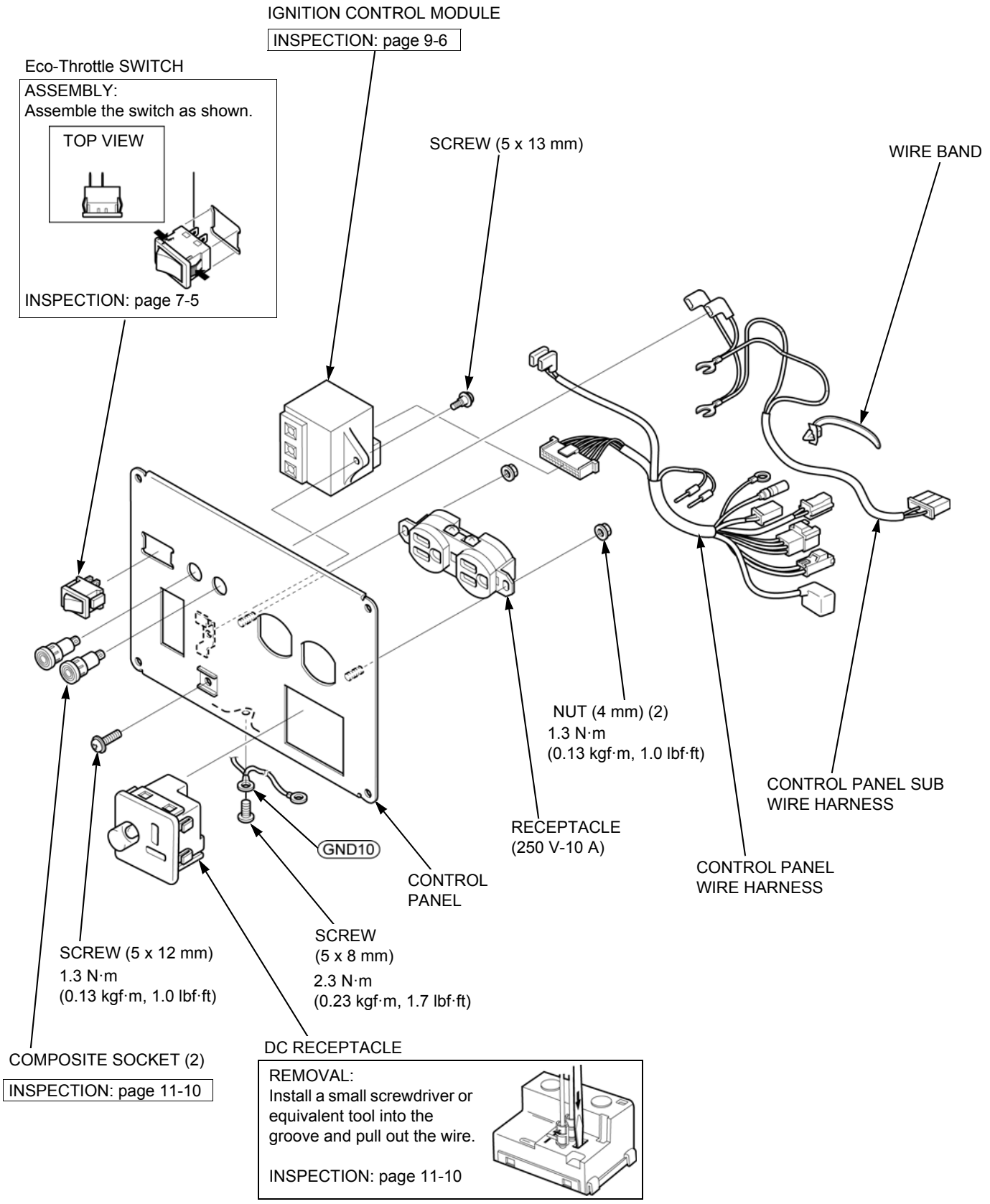
E, B1, W TYPE



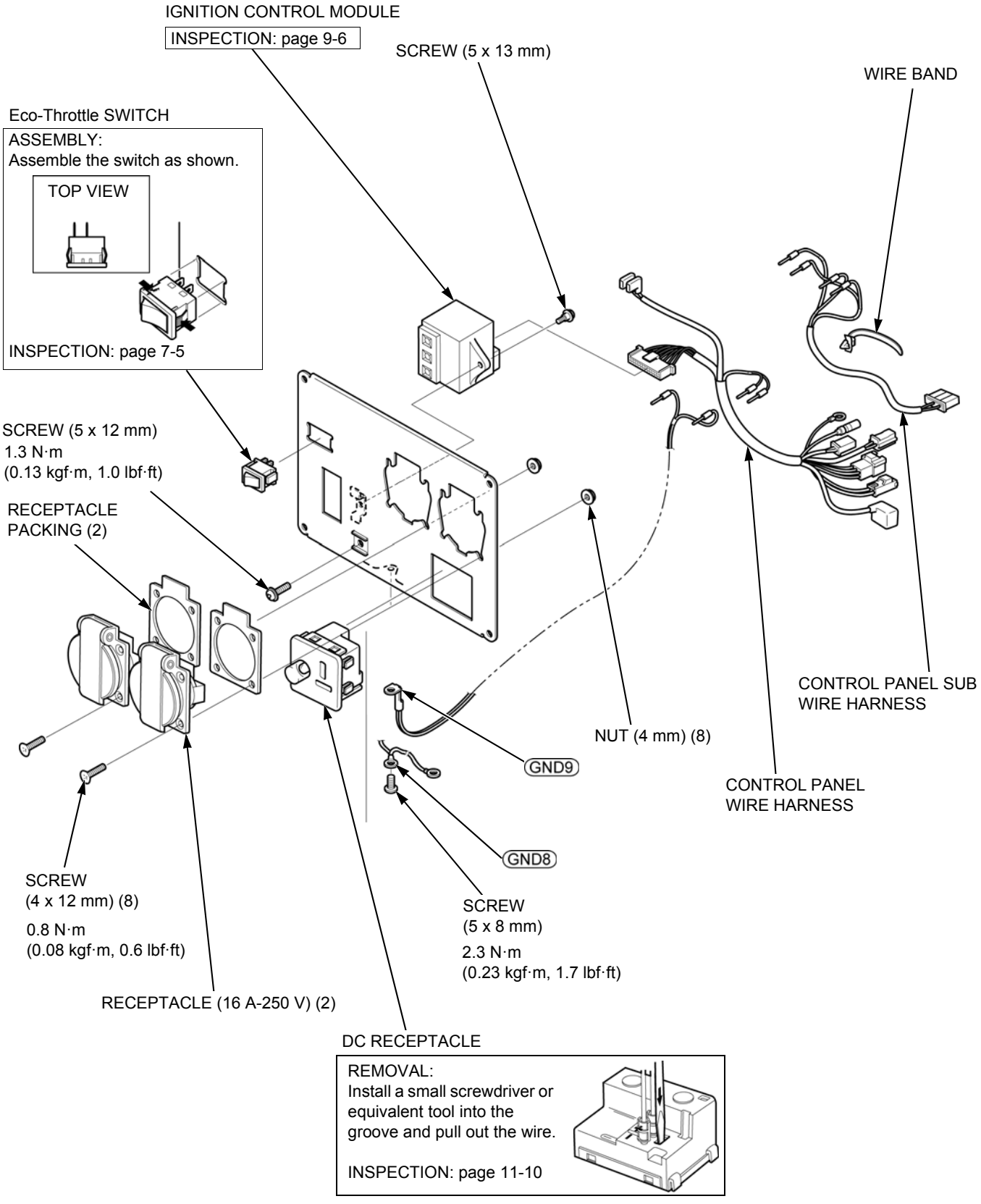
F, G TYPE


Eco-Throttle SWITCH
ASSEMBLY:
Assemble the switch as shown.
TOP VIEW
INSPECTION: page 7-5
IGNITION CONTROL MODULE
INSPECTION: page 9-6
SCREW (5 x 13 mm)
SUB NOISE FILTER
WIRE BAND
WASHER
COMPOSITE SOCKET (2)
INSPECTION: page 11-10
RECEPTACLE PACKING (2)
TERMINAL CORD (2)
CONTROL PANEL WIRE HARNESS
CONTROL PANEL SUB WIRE HARNESS
GND6
CONTROL PANEL
CIRCUIT PROTECTOR (16 A) (2)
SCREW (5 x 8 mm)
2.3 N·m (0.23 kgf·m, 1.7 lbf·ft)
SPRING WASHER
SCREW (5 x 16 mm)
1.3 N·m (0.13 kgf·m, 1.0 lbf·ft)
NUT (2)
1.8 N·m (0.18 kgf·m, 1.3 lbf·ft)
NUT (4 mm) (8)
RECEPTACLE (16 A-250 V) (2)
CIRCUIT PROTECTOR COVER (2)
SCREW (4 x 12 mm) (8)
0.8 N·m (0.08 kgf·m, 0.6 lbf·ft)
DC RECEPTACLE
REMOVAL:
Install a small screwdriver or equivalent tool into the groove and pull out the wire.
INSPECTION: page 11-10

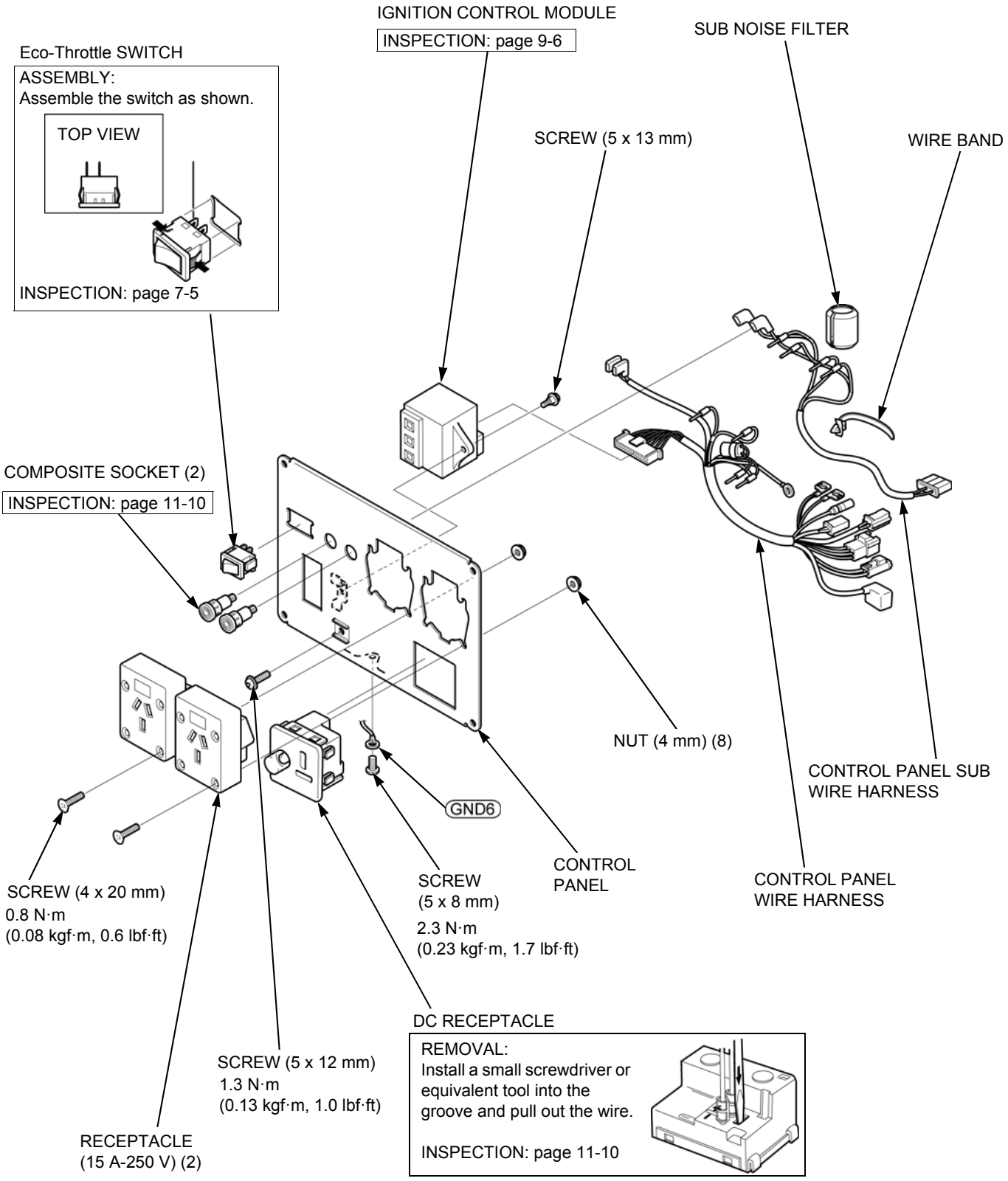
S, R TYPE


IGNITION CONTROL MODULE
INSPECTION: page 9-6
Eco-Throttle SWITCH
ASSEMBLY:
Assemble the switch as shown.
TOP VIEW
INSPECTION: page 7-5
SCREW (5 x 13 mm)
WIRE BAND
NUT (4 mm) (2)
1.3 N·m
(0.13 kgf·m, 1.0 lbf·ft)
CONTROL PANEL SUB WIRE HARNESS
RECEPTACLE
(250 V-10 A)
CONTROL PANEL WIRE HARNESS
GND10
CONTROL PANEL
SCREW (5 x 12 mm)
1.3 N·m
(0.13 kgf·m, 1.0 lbf·ft)
SCREW
(5 x 8 mm)
2.3 N·m
(0.23 kgf·m, 1.7 lbf·ft)
COMPOSITE SOCKET (2)
INSPECTION: page 11-10
DC RECEPTACLE
REMOVAL:
Install a small screwdriver or equivalent tool into the groove and pull out the wire.
INSPECTION: page 11-10

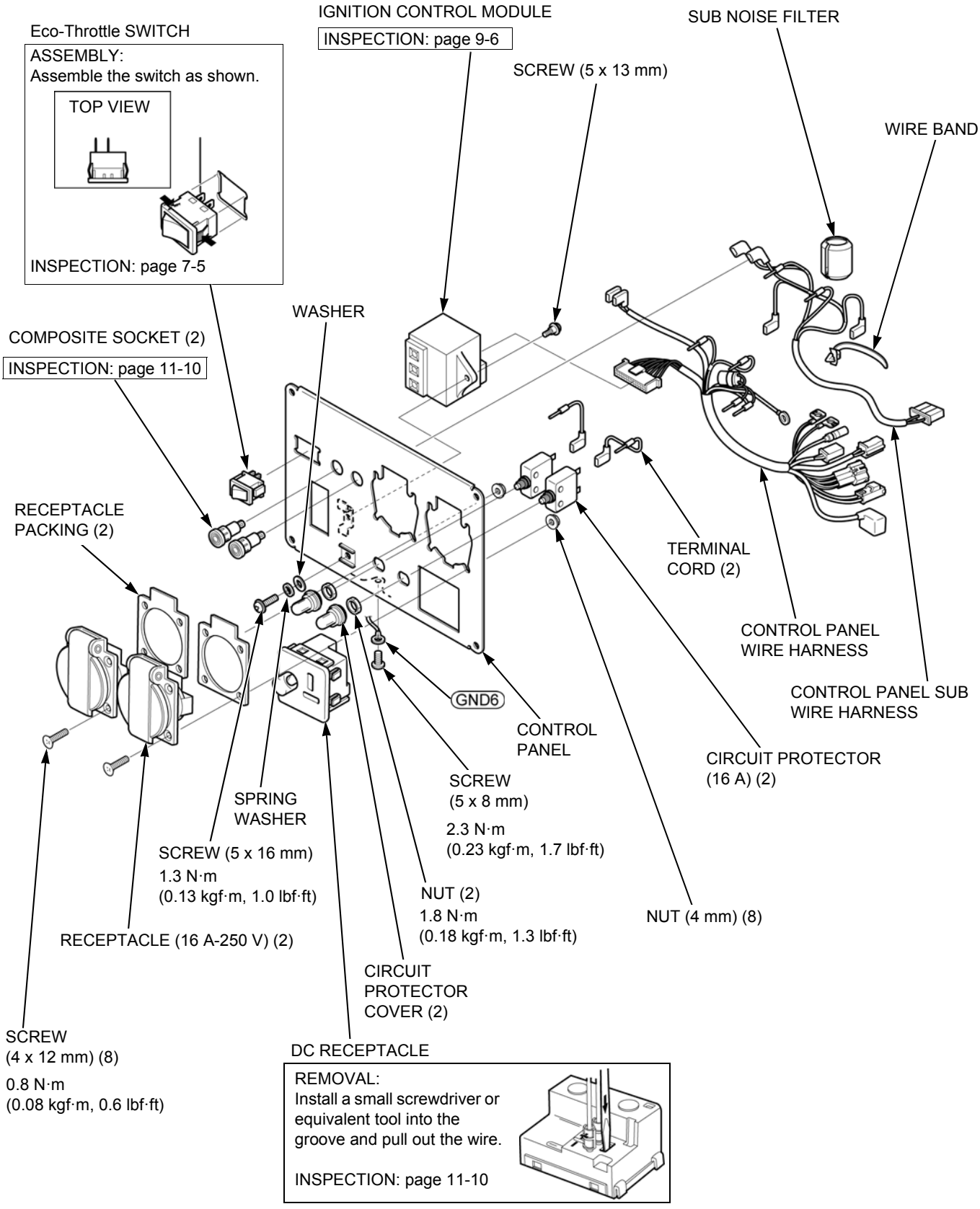
SK TYPE


IGNITION CONTROL MODULE
INSPECTION: page 9-6
SCREW (5 x 13 mm)
WIRE BAND
Eco-Throttle SWITCH
ASSEMBLY:
Assemble the switch as shown.
TOP VIEW
INSPECTION: page 7-5
SCREW (5 x 12 mm)
1.3 N·m
(0.13 kgf·m, 1.0 lbf·ft)
RECEPTACLE
PACKING (2)
CONTROL PANEL SUB
WIRE HARNESS
NUT (4 mm) (8)
GND9
CONTROL PANEL
WIRE HARNESS
GND8
SCREW
(4 x 12 mm) (8)
0.8 N·m
(0.08 kgf·m, 0.6 lbf·ft)
SCREW
(5 x 8 mm)
2.3 N·m
(0.23 kgf·m, 1.7 lbf·ft)
RECEPTACLE (16 A-250 V) (2)
DC RECEPTACLE
REMOVAL:
Install a small screwdriver or
equivalent tool into the
groove and pull out the wire.
INSPECTION: page 11-10

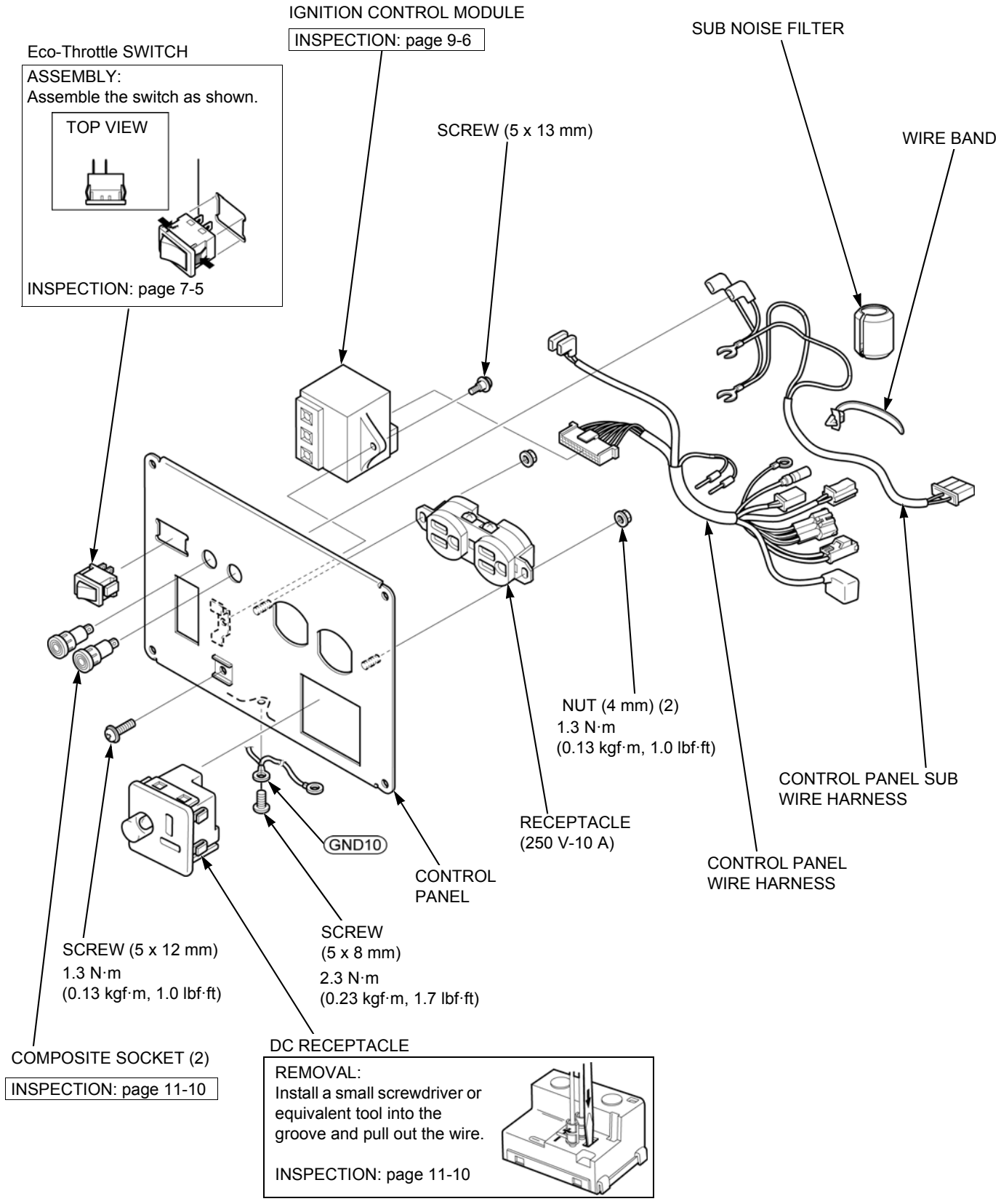
U TYPE


IGNITION CONTROL MODULE
INSPECTION: page 9-6
SUB NOISE FILTER
Eco-Throttle SWITCH
ASSEMBLY:
Assemble the switch as shown.
TOP VIEW
INSPECTION: page 7-5
SCREW (5 x 13 mm)
WIRE BAND
COMPOSITE SOCKET (2)
INSPECTION: page 11-10
NUT (4 mm) (8)
CONTROL PANEL SUB WIRE HARNESS
GND6
CONTROL PANEL
CONTROL PANEL WIRE HARNESS
SCREW (4 x 20 mm)
0.8 N·m
(0.08 kgf·m, 0.6 lbf·ft)
SCREW
(5 x 8 mm)
2.3 N·m
(0.23 kgf·m, 1.7 lbf·ft)
DC RECEPTACLE
REMOVAL:
Install a small screwdriver or equivalent tool into the groove and pull out the wire.
INSPECTION: page 11-10
SCREW (5 x 12 mm)
1.3 N·m
(0.13 kgf·m, 1.0 lbf·ft)
RECEPTACLE
(15 A-250 V) (2)

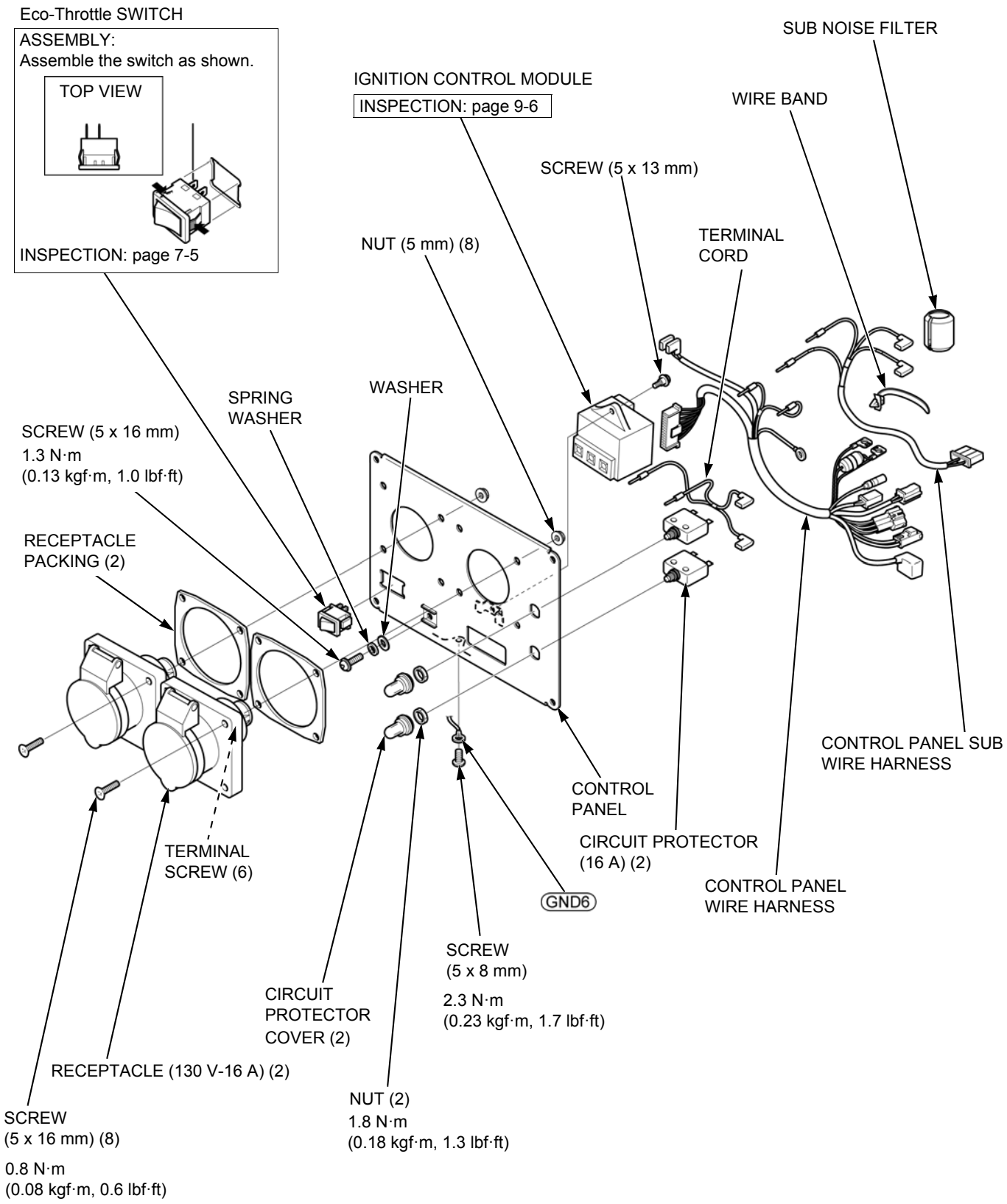
RG TYPE


Eco-Throttle SWITCH
ASSEMBLY:
Assemble the switch as shown.
TOP VIEW
INSPECTION: page 7-5
IGNITION CONTROL MODULE
INSPECTION: page 9-6
SCREW (5 x 13 mm)
SUB NOISE FILTER
WIRE BAND
WASHER
COMPOSITE SOCKET (2)
INSPECTION: page 11-10
RECEPTACLE PACKING (2)
TERMINAL CORD (2)
CONTROL PANEL WIRE HARNESS
CONTROL PANEL SUB WIRE HARNESS
GND6
CONTROL PANEL
CIRCUIT PROTECTOR (16 A) (2)
SCREW (5 x 8 mm)
2.3 N·m
(0.23 kgf·m, 1.7 lbf·ft)
SPRING WASHER
SCREW (5 x 16 mm)
1.3 N·m
(0.13 kgf·m, 1.0 lbf·ft)
NUT (2)
1.8 N·m
(0.18 kgf·m, 1.3 lbf·ft)
NUT (4 mm) (8)
RECEPTACLE (16 A-250 V) (2)
CIRCUIT PROTECTOR COVER (2)
SCREW (4 x 12 mm) (8)
0.8 N·m
(0.08 kgf·m, 0.6 lbf·ft)
DC RECEPTACLE
REMOVAL:
Install a small screwdriver or equivalent tool into the groove and pull out the wire.
INSPECTION: page 11-10

RH TYPE

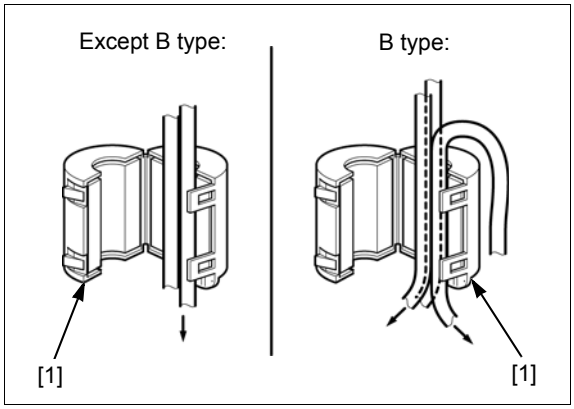

IGNITION CONTROL MODULE
INSPECTION: page 9-6
SUB NOISE FILTER
Eco-Throttle SWITCH
ASSEMBLY:
Assemble the switch as shown.
TOP VIEW
INSPECTION: page 7-5
SCREW (5 x 13 mm)
WIRE BAND
NUT (4 mm) (2)
1.3 N·m
(0.13 kgf·m, 1.0 lbf·ft)
CONTROL PANEL SUB
WIRE HARNESS
RECEPTACLE
(250 V-10 A)
CONTROL PANEL
WIRE HARNESS
GND10
CONTROL
PANEL
SCREW (5 x 12 mm)
1.3 N·m
(0.13 kgf·m, 1.0 lbf·ft)
SCREW
(5 x 8 mm)
2.3 N·m
(0.23 kgf·m, 1.7 lbf·ft)
COMPOSITE SOCKET (2)
INSPECTION: page 11-10
DC RECEPTACLE
REMOVAL:
Install a small screwdriver or
equivalent tool into the
groove and pull out the wire.
INSPECTION: page 11-10

B TYPE


Eco-Throttle SWITCH
ASSEMBLY:
Assemble the switch as shown.
TOP VIEW
INSPECTION: page 7-5
IGNITION CONTROL MODULE
INSPECTION: page 9-6
SUB NOISE FILTER
WIRE BAND
SCREW (5 x 13 mm)
NUT (5 mm) (8)
TERMINAL CORD
WASHER
SPRING WASHER
SCREW (5 x 16 mm)
1.3 N·m
(0.13 kgf·m, 1.0 lbf·ft)
RECEPTACLE PACKING (2)
CONTROL PANEL SUB WIRE HARNESS
CONTROL PANEL
CIRCUIT PROTECTOR (16 A) (2)
CONTROL PANEL WIRE HARNESS
GND6
TERMINAL SCREW (6)
SCREW (5 x 8 mm)
2.3 N·m
(0.23 kgf·m, 1.7 lbf·ft)
CIRCUIT PROTECTOR COVER (2)
RECEPTACLE (130 V-16 A) (2)
NUT (2)
1.8 N·m
(0.18 kgf·m, 1.3 lbf·ft)
SCREW
(5 x 16 mm) (8)
0.8 N·m
(0.08 kgf·m, 0.6 lbf·ft)

SUB NOISE FILTER INSTALLATION

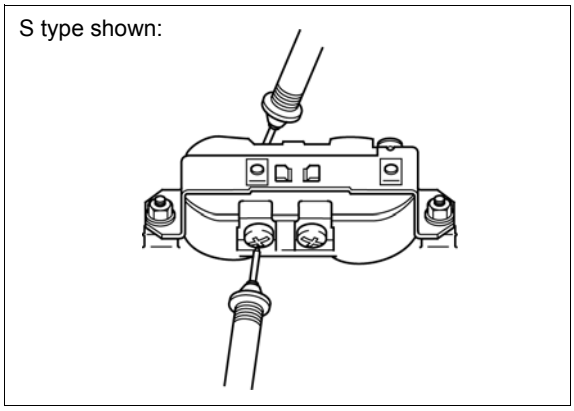
Wind the inverter unit wire harness to the noise filter [1] and install the noise filter.



AC RECEPTACLE INSPECTION

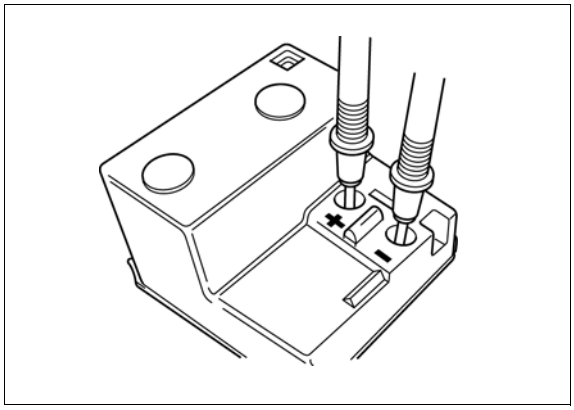
Connect both terminals of the receptacle with a jumper wire to short. There must be continuity between the lead wire terminals.

There must be continuity between the ground terminal of the receptacle and the receptacle installation fitting.



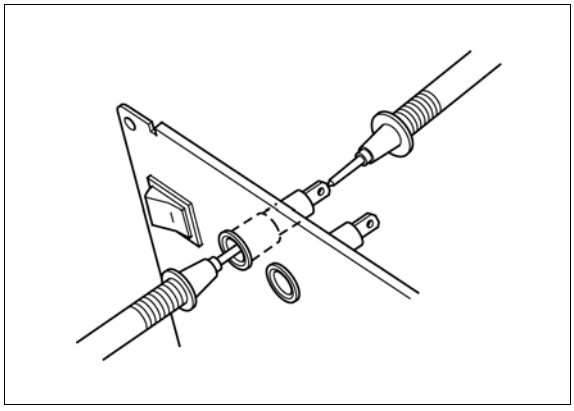
DC RECEPTACLE INSPECTION

Connect both terminals of the receptacle with a jumper wire to short. There must be continuity between the lead wire terminals with the circuit protector ON.



COMPOSITE SOCKET INSPECTION

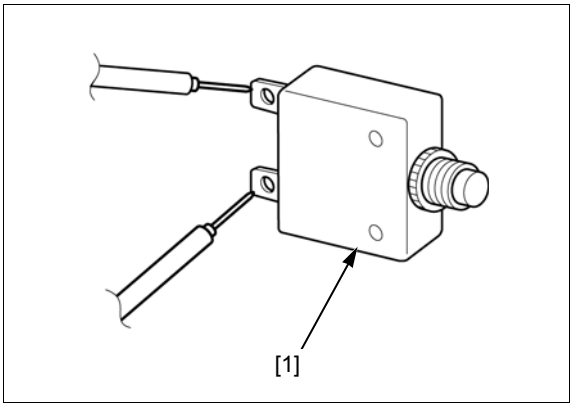
There must be continuity between the outlet and terminal.



CIRCUIT PROTECTOR INSPECTION

Remove the circuit protector [1] (page 11-2).

There should be continuity in the ON position (button in). Replace the circuit protector if the correct continuity is not obtained.



MEMO

12. MUFFLER

MUFFLER REMOVAL/INSTALLATION

⚠CAUTION

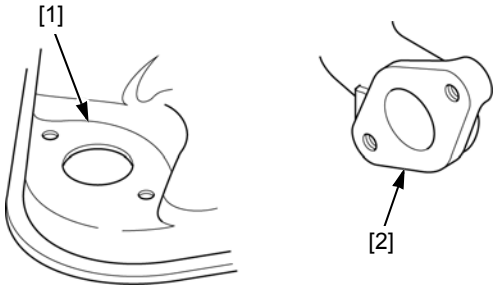
The muffler becomes very hot during operation and remains hot for a while after stopping the engine.

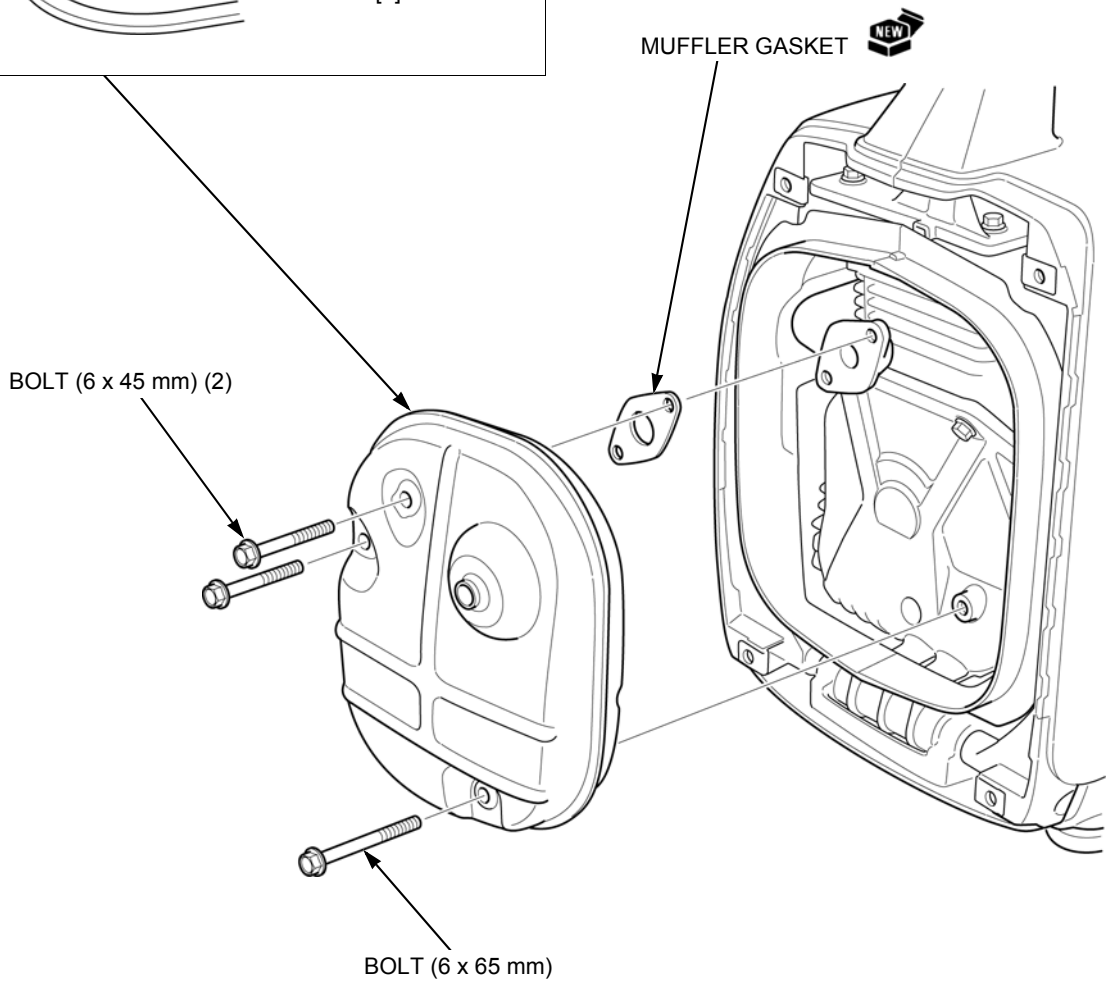
Be careful not to touch the muffler while it is hot. Allow it to cool before proceeding.

Remove the rear cover (page 5-2).

MUFFLER

INSTALLATION:
Remove the carbon deposits by lightly tapping the outer flange with a plastic hammer before installation.
Be careful not the damage the muffler seal part [1].
If the muffler seal part is damaged, replace the muffler.
Check the exhaust manifold mating surface [2].





13. GENERATOR/ENGINE REMOVAL/INSTALLATION

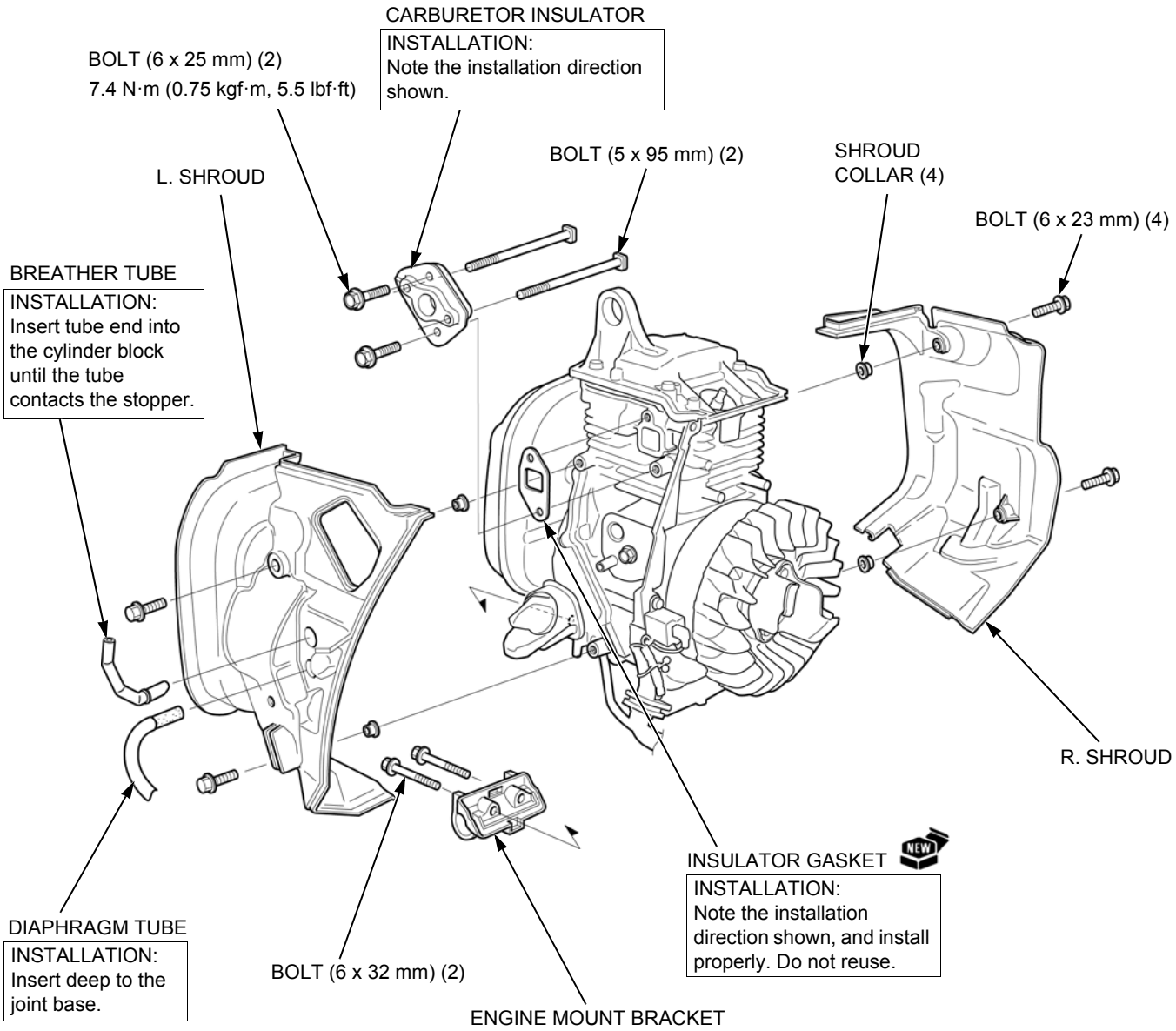
SHROUD REMOVAL/INSTALLATION

Remove the following:

– Carburetor (page 6-5)
– Fan cover (page 8-12)

NOTE:

• When installing, route the tubes properly (page 2-25).



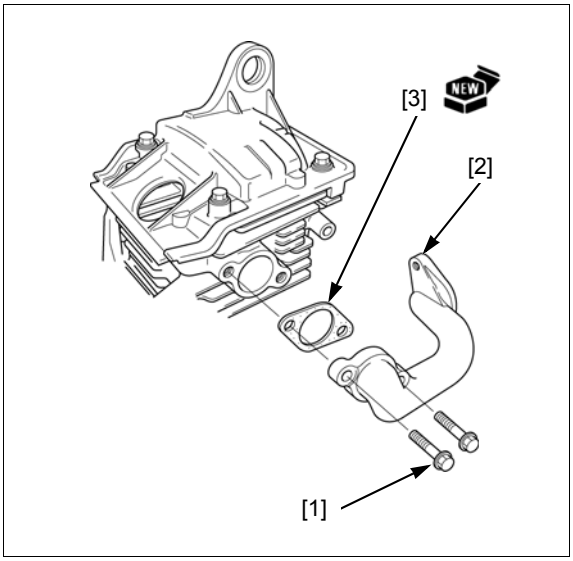
EXHAUST MANIFOLD REMOVAL/ INSTALLATION

Remove the muffler (page 12-2).

Remove the two bolts (6 x 23 mm) [1], exhaust manifold [2] and gasket [3].

Remove the carbon deposits inside of the exhaust manifold.

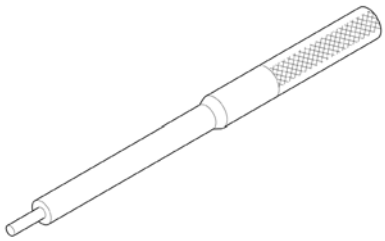
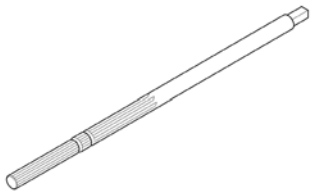
Install a new gasket and exhaust manifold, then install and tighten the two bolts (6 x 23 mm) securely.



MEMO

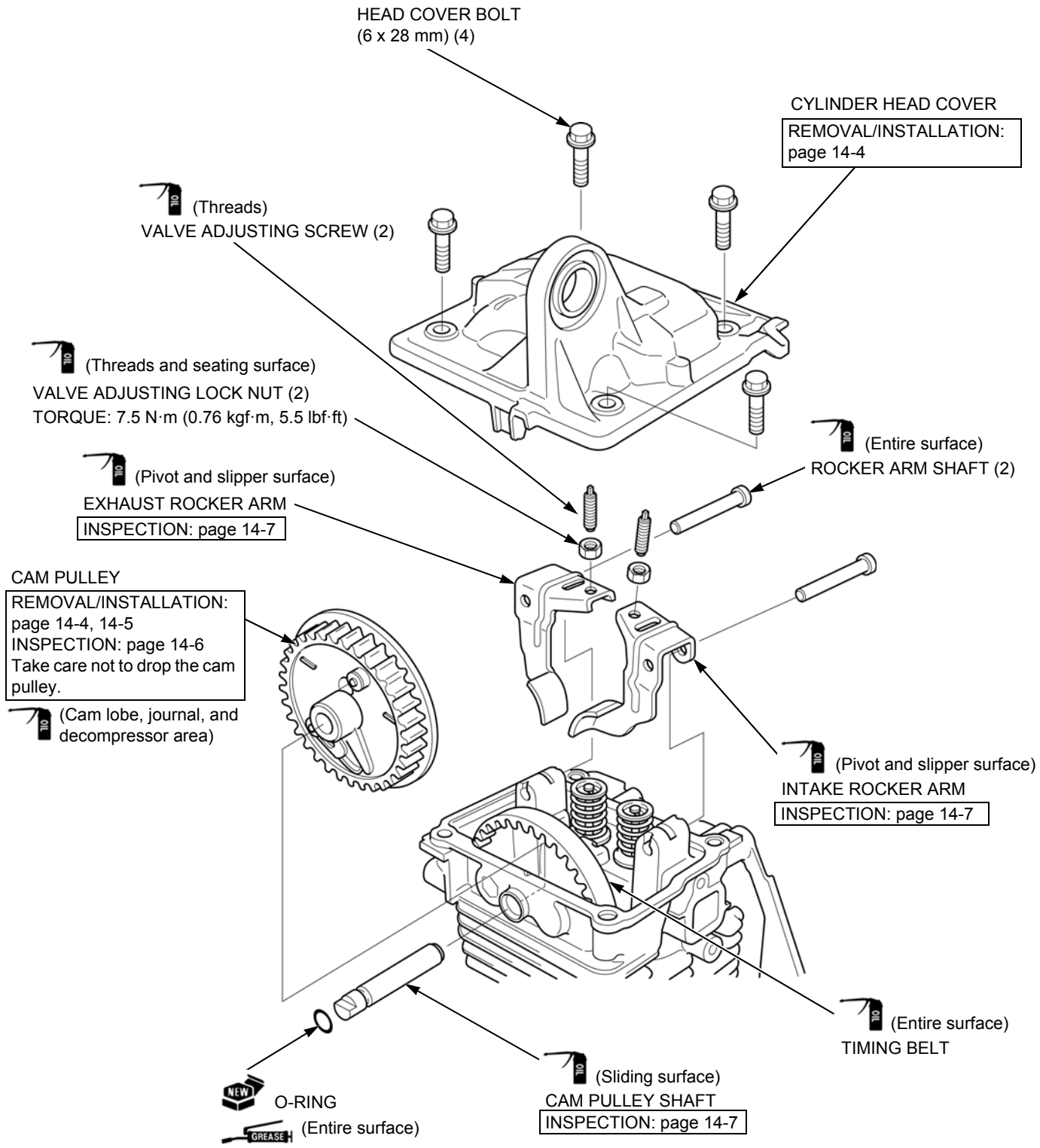
14. CAM PULLEY/ROCKER ARM/VALVE

TOOLS

Valve guide driver, 3.6 x 8.0 07JMD-KY20100 	Valve guide reamer, 4.008 07MMH-MV90100 

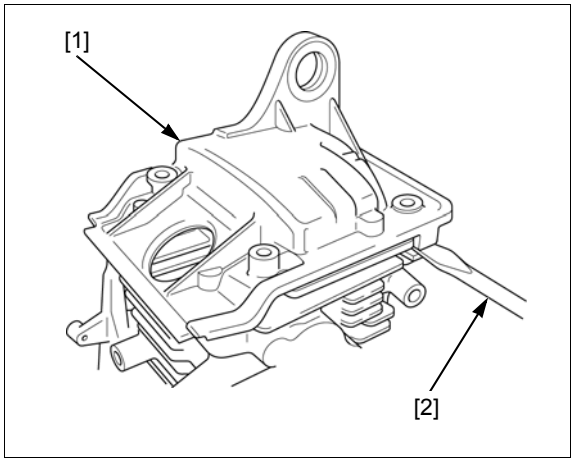
CAM PULLEY REMOVAL/ INSTALLATION

Remove the recoil starter (page 10-2).



CYLINDER HEAD COVER REMOVAL/ INSTALLATION

Remove the cylinder head cover [1] slowly using a screwdriver [2] or equivalent tool.



NOTE:

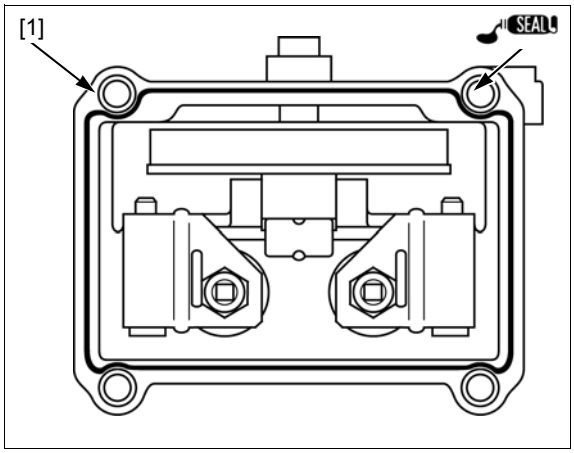
- Be careful not the damage the mating surface.

NOTICE

- *Using too much force can deform the cylinder head cover. The cylinder head cover must be replaced if it is deformed.*

Clean the mating surfaces of the cylinder head cover [1] and cylinder of old liquid sealant, oil and other foreign material.

Apply a liquid sealant (Threebond® TB1207B or equivalent) to the mating surface of the cylinder head cover shown.



Install the cylinder head cover.

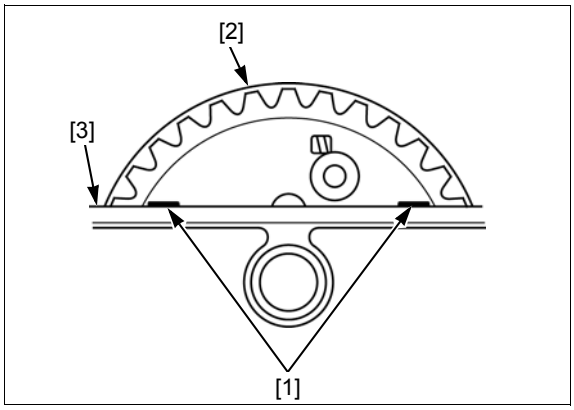
NOTE:

- Wait for approximately 20 minutes after assembly before filling with engine oil and starting the engine.

CAM PULLEY REMOVAL

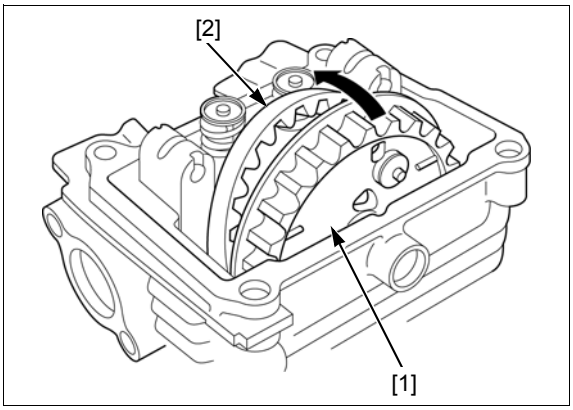
Set the piston at the top dead center of the cylinder compression stroke.

Align the alignment marks [1] on the cam pulley [2] so that they are in line with the head cover mating surface [3].



Push the cam pulley [1] into the cylinder a little.

Detach the timing belt [2] from the flange side of the cam pulley as shown, and remove the cam pulley.



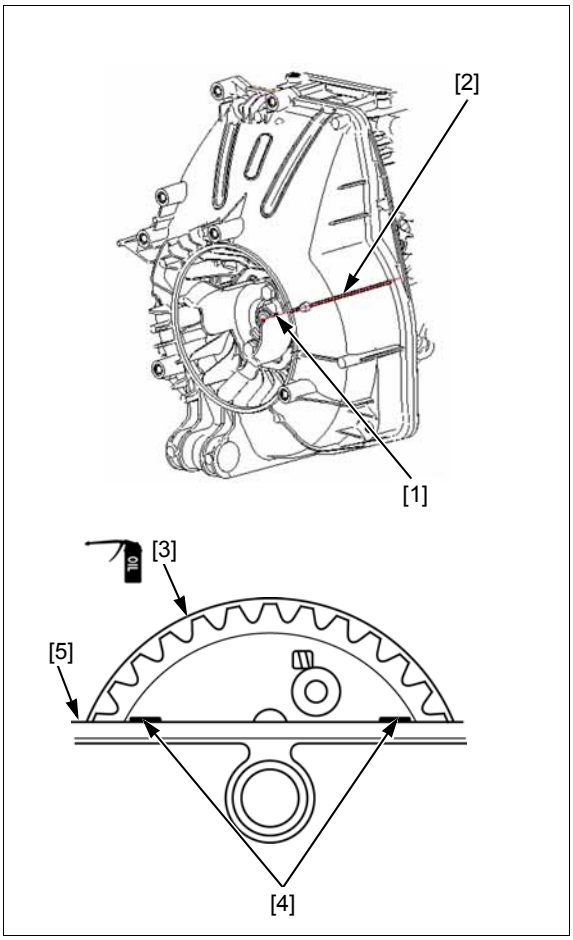
CAM PULLEY INSTALLATION

Set the piston top dead center of the compression stroke (both valves fully closed).

Align the alignment point [1] (plain of the starter pulley) with the rib [2] on the fan cover.

Apply engine oil to the cam pulley [3] cam lobe, journal and decompressor area.

Align the alignment marks [4] on the cam pulley so that they are in line with the head cover mating surface [5].

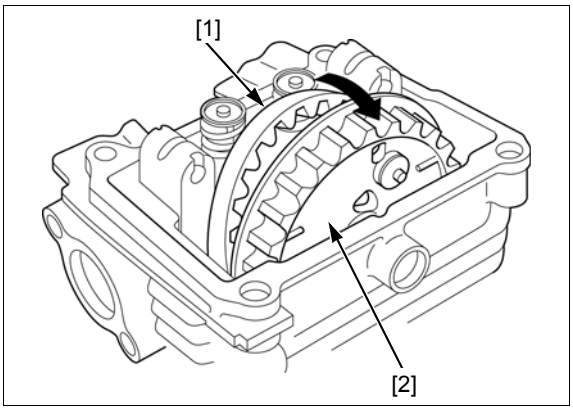


Apply engine oil to the timing belt [1].

Set the timing belt on the cam pulley [2] from the flange side of the cam pulley.

NOTE:

- Be careful to avoid turning the crankshaft when installing.



CAM PULLEY/CAM PULLEY SHAFT/ ROCKER ARM/ROCKER ARM SHAFT INSPECTION

DECOMPRESSOR WEIGHT

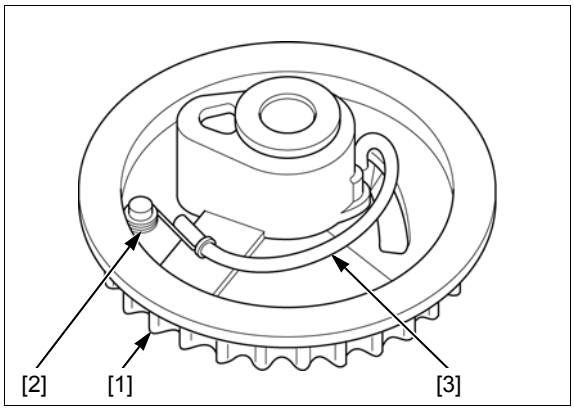
Check the teeth [1] for wear or damage and replace the cam pulley if necessary.

Check for worn and weakened weight return spring [2].

If the spring is worn or weakened, replace the cam pulley.

Check that the decompressor weight [3] moves smoothly.

If the decompressor weight does not move correctly, replace the cam pulley.



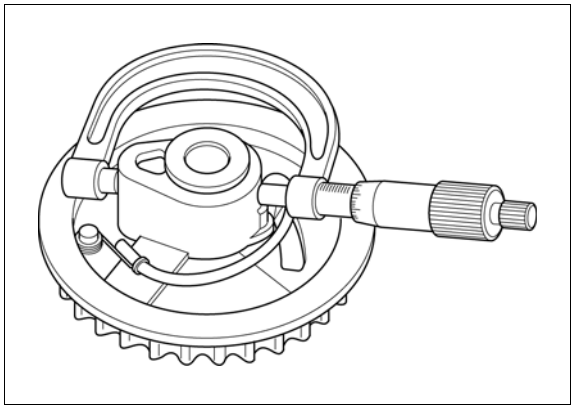
CAM PULLEY CAM HEIGHT

Check the cam lobe surfaces for scoring or evidence of insufficient lubricant.

Measure the height of the cam lobe.

STANDARD: 36.283 – 36.683 mm (1.4285 – 1.4442 in)
SERVICE LIMIT: 35.483 mm (1.3970 in)

If the measurement is less than the service limit, replace the cam pulley.

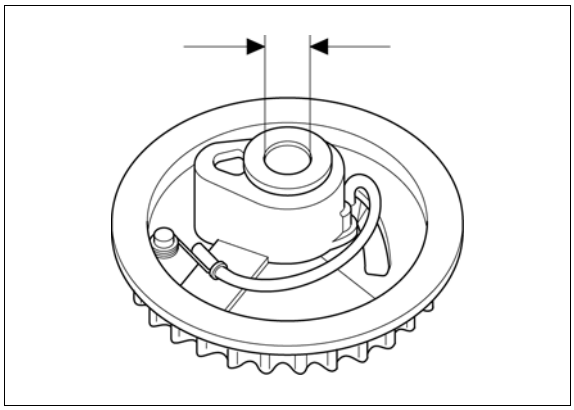


CAM PULLEY I.D.

Measure the cam pulley I.D.

STANDARD: 10.057 – 10.087 mm (0.3959 – 0.3971 in)
SERVICE LIMIT: 10.105 mm (0.3978 in)

If the measurement is more than the service limit, replace the cam pulley.

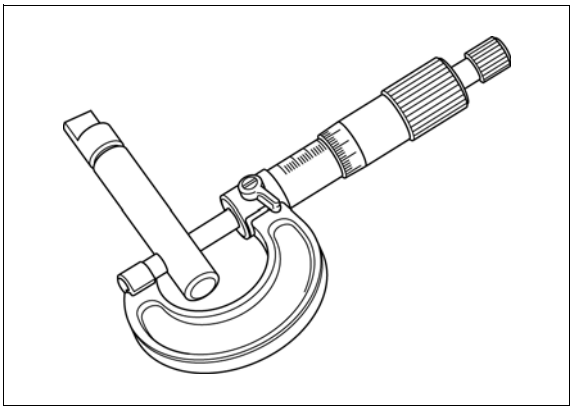


CAM PULLEY SHAFT O.D.

Measure the cam pulley shaft O.D.

STANDARD: 9.972 – 9.987 mm (0.3926 – 0.3932 in)
SERVICE LIMIT: 9.920 mm (0.3906 in)

If the measurement is less than the service limit, replace the cam pulley shaft.

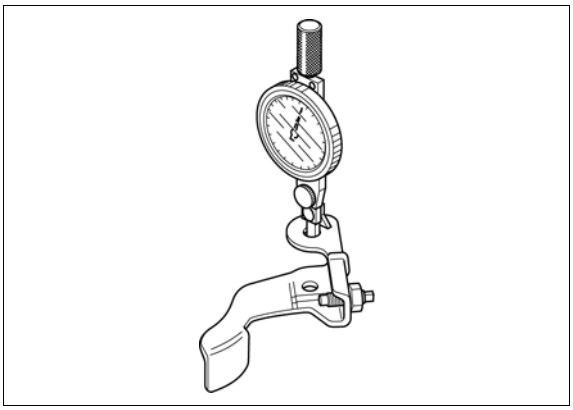


ROCKER ARM I.D.

Measure the rocker arm I.D.

STANDARD: 6.000 – 6.030 mm (0.2362 – 0.2374 in)
SERVICE LIMIT: 6.043 mm (0.2379 in)

If the measurement is more than the service limit, replace the rocker arm.

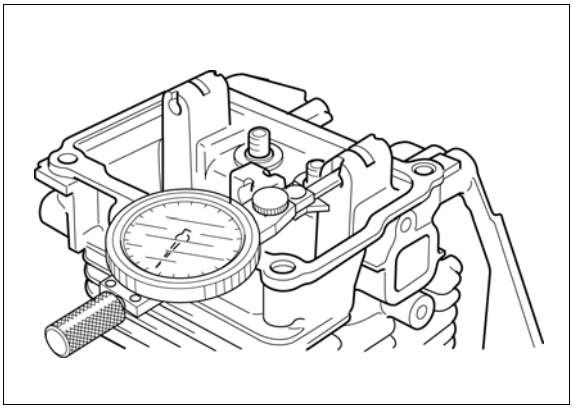


ROCKER ARM SHAFT JOURNAL I.D.

Measure the rocker arm shaft journal I.D.

STANDARD: 6.000 – 6.018 mm (0.2362 – 0.2369 in)
SERVICE LIMIT: 6.043 mm (0.2379 in)

If the measurement is more than the service limit, replace the cylinder.

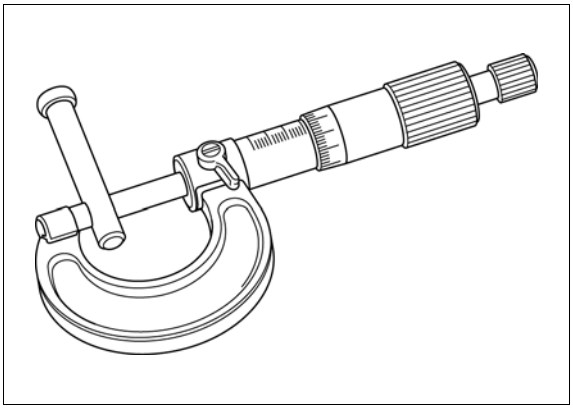


ROCKER ARM SHAFT O.D.

Measure the rocker arm shaft O.D.

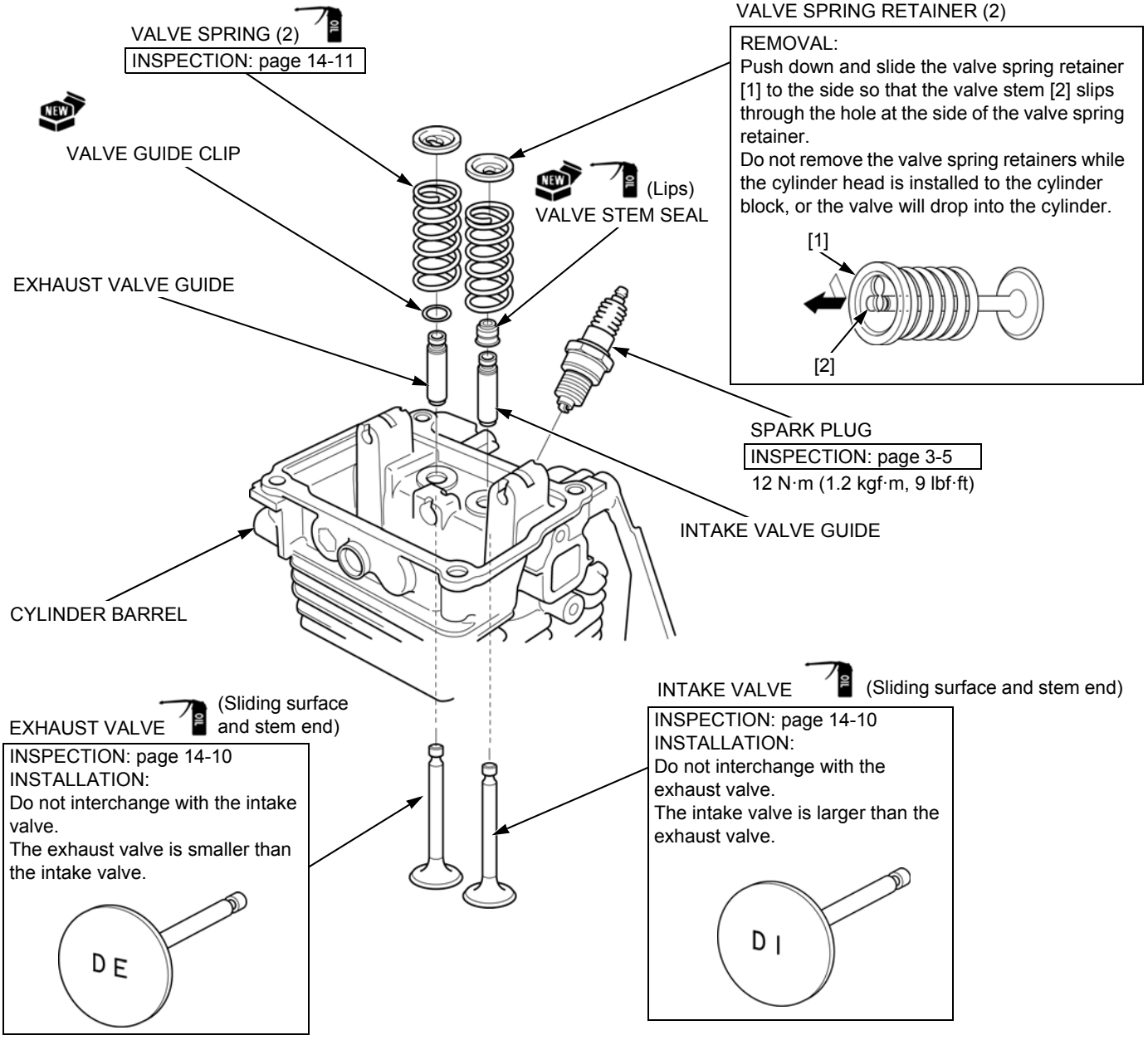
STANDARD: 5.960 – 5.990 mm (0.2346 – 0.2358 in)
SERVICE LIMIT: 5.953 mm (0.2344 in)

If the measurement is less than the service limit, replace the rocker arm shaft.



VALVE REMOVAL/INSTALLATION

Remove the crankcase cover/crankshaft/piston (page 15-3).



VALVES INSPECTION

CYLINDER COMPRESSION CHECK

Start the engine and warm up to normal operating temperature.

Turn off the engine stop switch/combination switch to stop the engine.

Turn the fuel valve lever to the OFF position, and then loosen the drain screw of the carburetor to drain the fuel completely.

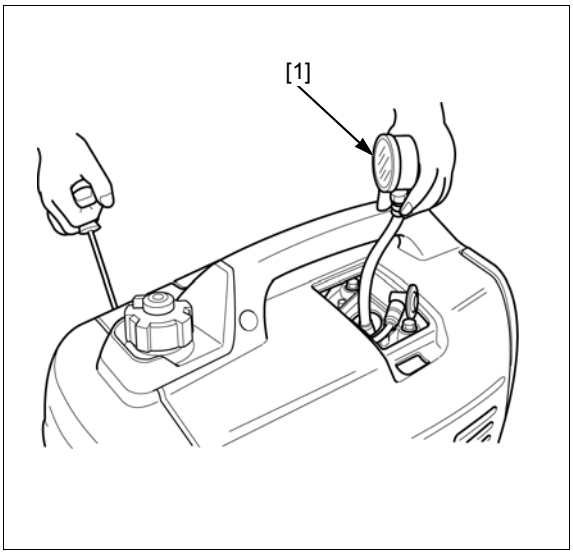
Remove the spark plug (page 3-5).

Pull the recoil starter several times to expel unburned gas.

Attach a commercially available compression gauge [1] to the spark plug hole.

Pull the recoil starter forcefully to measure stable cylinder compression.

CYLINDER COMPRESSION:
0.50 MPa (5.1 kgf/cm^2, 73 psi)/700 min^{-1} (rpm)



VALVE SEAT WIDTH

Inspect each valve face for irregularities.

If necessary, replace the valve.

Apply a light coat of Prussian Blue or erasable felt-tipped marker ink to the each valve seat.

Insert the valve, and snap it closed against its seat several times using a 4 mm tube [1]. Be sure the valve does not rotate on the seat.

The transferred marking compound will show any area of the valve face that is not concentric.

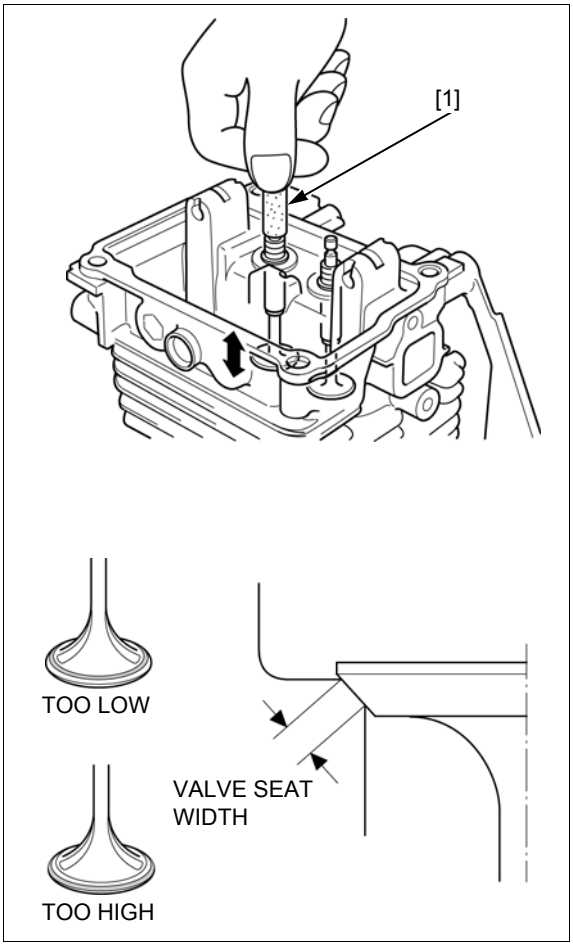
Measure the valve seat width.

STANDARD: 0.60 – 0.80 mm (0.0236 – 0.0315 in)
SERVICE LIMIT: 1.800 mm (0.0709 in)

If the measurement is more than the service limit, replace the cylinder barrel.

Check whether the valve seat contact area of the valve is too high.

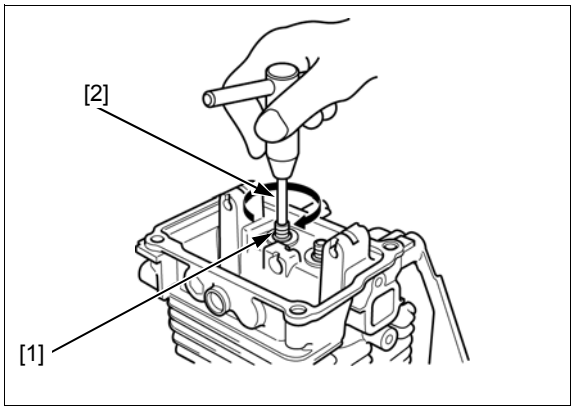
If the valve seat is too high or too low, replace the cylinder barrel.



VALVE GUIDE I.D.

Ream the valve guide [1] to remove any carbon deposits before measuring.

TOOL:
Valve guide reamer, 4.008 [2] 07MMH-MV90100

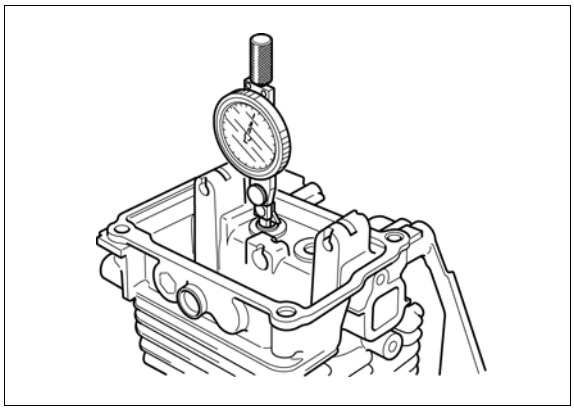


NOTICE

- *Turn the valve guide reamer (special tool) clockwise, never counterclockwise.*
- *Continue to rotate the special tool while removing it from the valve guide.*

Measure and record each valve guide I.D.

STANDARD: 4.000 – 4.018 mm (0.1575 – 0.1582 in)
SERVICE LIMIT: 4.060 mm (0.1598 in)



If the measured valve guide I.D. is more than the service limit, replace the valve guide (page 14-11).

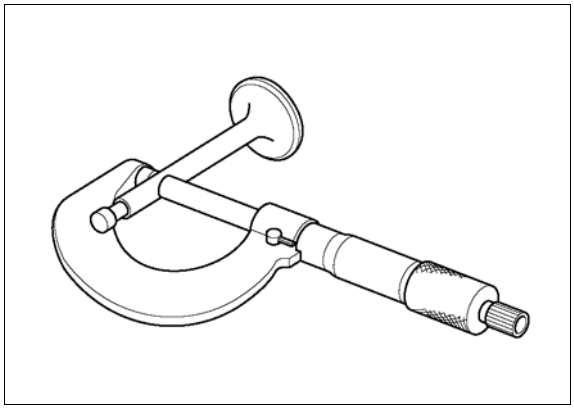
VALVE STEM O.D.

Inspect each valve for bending or abnormal stem wear.

If necessary, replace the valve.

Measure and record each valve stem O.D.

STANDARD:
IN: 3.970 – 3.985 mm (0.1563 – 0.1569 in)
EX: 3.935 – 3.950 mm (0.1549 – 0.1555 in)
SERVICE LIMIT:
IN: 3.900 mm (0.1535 in)
EX: 3.880 mm (0.1528 in)



If the measurement is less than the service limit, replace the valve.

GUIDE-TO-STEM CLEARANCE

Subtract each valve stem O.D. from the corresponding valve guide I.D. to obtain the stem-to-guide clearance.

STANDARD:
IN: 0.015 – 0.048 mm (0.0006 – 0.0019 in)
EX: 0.050 – 0.083 mm (0.0020 – 0.0033 in)
SERVICE LIMIT:
IN: 0.098 mm (0.0039 in)
EX: 0.120 mm (0.0047 in)

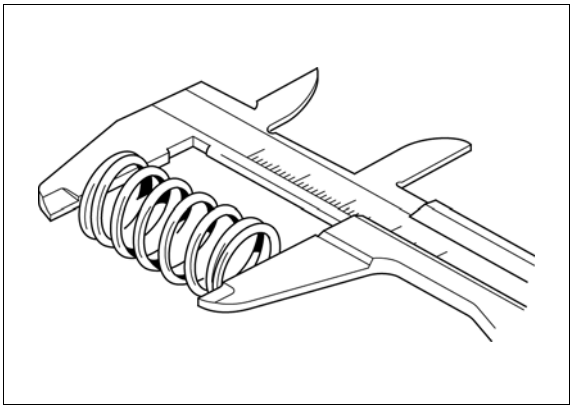
If the calculated clearance is more than the service limit, replace the valve and valve guide at a set (page 14-11).

VALVE SPRING FREE LENGTH

Measure the free length of the valve spring.

STANDARD: 25.8 mm (1.02 in)
SERVICE LIMIT: 24.9 mm (0.98 in)

If the measured length is less than the service limit, replace the valve spring.

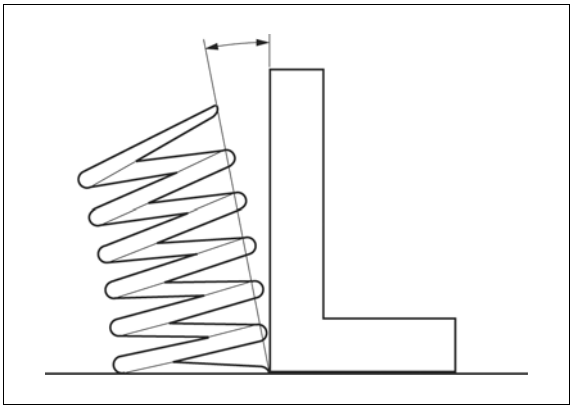


VALVE SPRING PERPENDICULARITY

Measure the valve spring perpendicularity.

SERVICE LIMIT: 2.0° max.

If the measured perpendicularity is more than the service limit, replace the valve spring.



VALVE GUIDE REPLACEMENT

Chill the replacement valve guides in the freezer section of a refrigerator for about an hour.

Use a hot plate or oven to heat the cylinder block evenly to 150°C (302°F).

⚠ CAUTION

To avoid burns, use heavy gloves when handling the heated cylinder head.

NOTICE

- *Do not use a torch to heat the cylinder block; warpage of the cylinder block may result.*
- *Do not get the cylinder block hotter than 150°C (302°F); excessive heat may loosen the valve seats.*

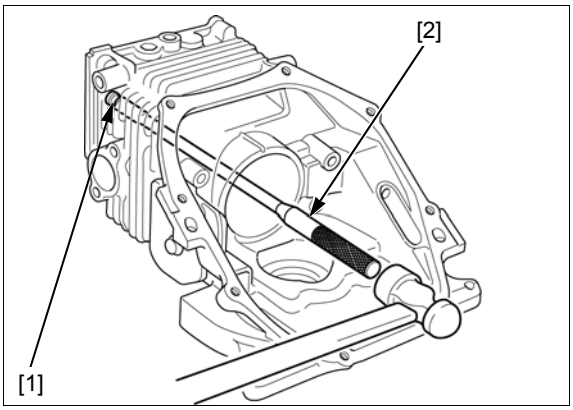
Remove the heated cylinder block from the hot plate and support it with wooden blocks.

Drive the valve guides [1] out of the cylinder block from the combustion chamber side.

TOOL:
Valve guide driver, 3.6 x 8.0 [2] 07JMD-KY20100

NOTICE

- *When driving the valve guides out, be careful not to damage the cylinder block.*



Remove new valve guides [1] from the refrigerator one at a time as needed.

Install the valve guides from the valve spring side of the cylinder block.

TOOL:
Valve guide driver, 3.6 x 8.0 [2] 07JMD-KY20100

EX: Drive the exhaust valve guide until a new valve guide clip [3] is fully seated as shown.

IN: Drive the intake valve guide to the specified height (measured from the end of the valve guide to the cylinder block as shown).

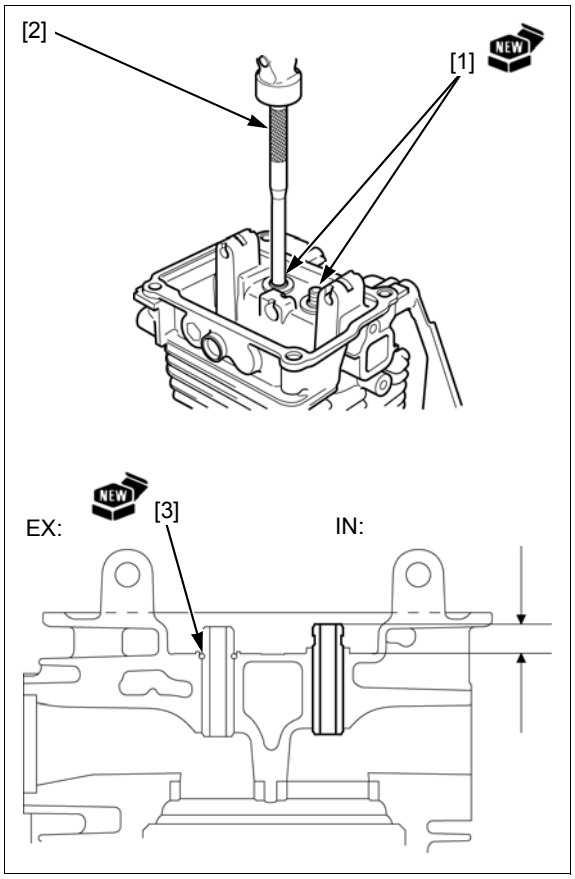
INTAKE VALVE GUIDE INSTALLATION HEIGHT:
7.5 mm (0.30 in)

After installing the valve guide, check the guide for damage.

Replace the valve guide if damaged.

Let the cylinder block cool to room temperature.

Perform valve guide reaming (page 14-12).



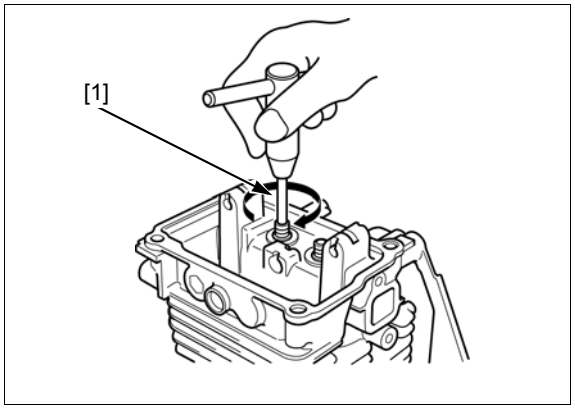
VALVE GUIDE REAMING

For best results, be sure the cylinder block is at room temperature before reaming valve guides.

Coat the reamer and valve guide with cutting oil.

Rotate the reamer clockwise through the valve guide the full length of the reamer.

TOOL:
Valve guide reamer, 4.008 [1] 07MMH-MV90100



NOTICE

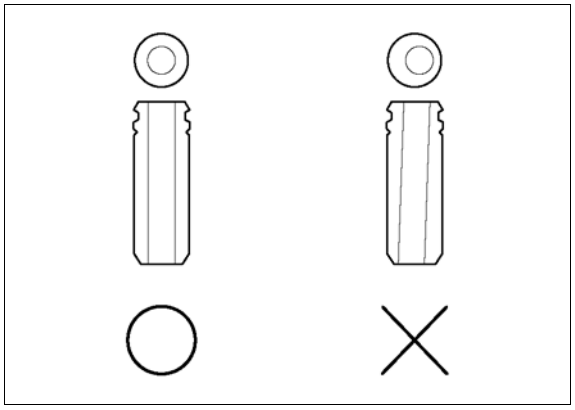
- *Turn the valve guide reamer (special tool) clockwise, never counterclockwise.*
- *Continue to rotate the special tool while removing it from the valve guide.*

Thoroughly clean the cylinder block to remove any cutting residue.

Check the valve guide bore; it should be straight, round and centered in the valve guide. Insert the valve and check operation. If the valve does not operate smoothly, the guide may have been bent during installation.

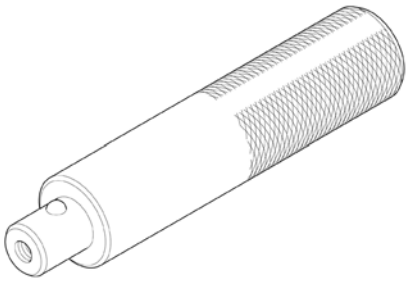
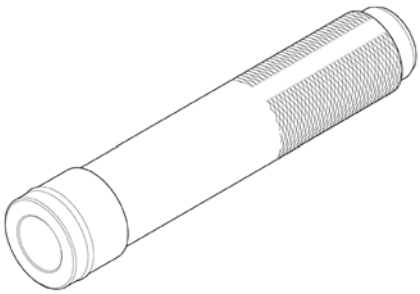
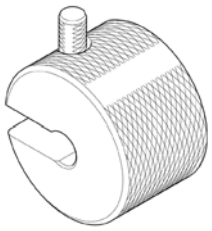
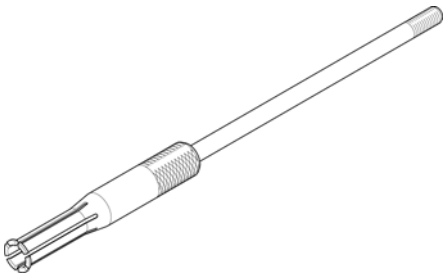
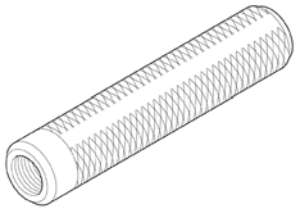
Replace the valve guide if it is bent or damaged (page 14-11).

Check the valve guide-to-stem clearance (page 14-10).



15. CRANKSHAFT/PISTON/CYLINDER BARREL

TOOLS

Driver 07749-0010000 	Inner driver handle, 22 07746-0020100 	Attachment, 42 x 47 07746-0010300 
Attachment, 32 x 35 07746-0010100 	Pilot, 22 07746-0041000 	Remover weight 07741-0010201 
Bearing remover, 22 mm 070MC-MFR0100 	Bearing remover shaft handle 07936-3710100 	

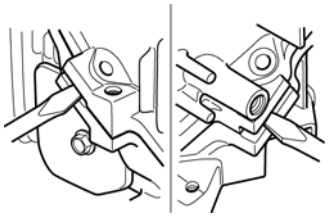
CRANKCASE COVER/CRANKSHAFT/CYLINDER BARREL REMOVAL/INSTALLATION

Drain the engine oil (page 3-3).

Remove the cam pulley (page 14-4).

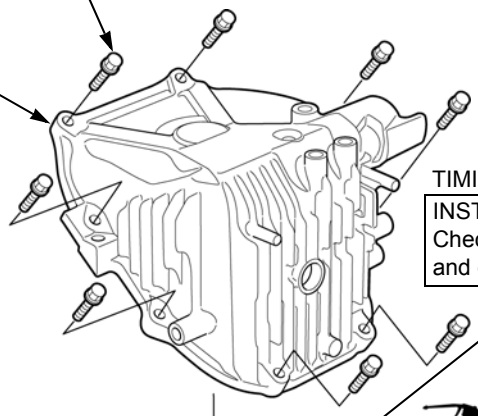
CRANKCASE COVER Assy.

REMOVAL:
Insert a screwdriver into the recess at the positions shown, and remove the oil case.



BOLT (6 x 25 mm) (8) OIL

INSTALLATION: page 15-5

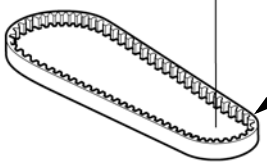


TIMING BELT OIL (Entire surface)

INSTALLATION: page 15-4
Check that the belt is not worn or cracked and do not bend or twist the belt.

PISTON OIL
(Outer surface and big end inner surface)

DISASSEMBLY/ASSEMBLY: page 15-6
INSPECTION: page 15-8, 15-9
INSTALLATION: page 15-4



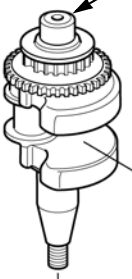
CRANKSHAFT OIL
(Pin and gear teeth)

INSPECTION: page 15-11, 15-12
INSTALLATION: 15-4
Be careful not to damage the oil seal lips.

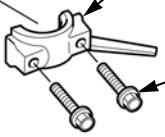
CONNECTING ROD CAP OIL
(Big end inner surface)

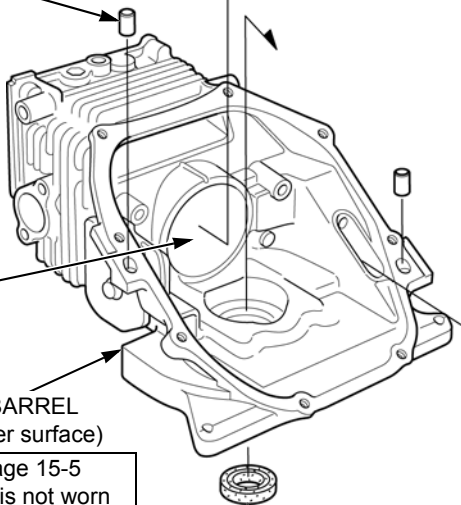
INSTALLATION: page 15-4

DOWEL PIN
(8 x 20 mm) (2)



CONNECTING ROD BOLT OIL
(6 x 32 mm) (2)
(Threads and seating surface)
9.8 N·m (1.0 kgf·m, 7.2 lbf·ft)





NEW OIL (Rotating area)
CRANKSHAFT BEARING (62/22)

INSPECTION: page 15-2
REMOVAL/INSTALLATION: page 15-13

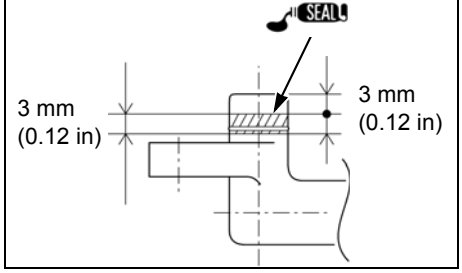
OIL

CYLINDER BARREL OIL
(Cylinder inner surface)

INSTALLATION: page 15-5
Check that the belt is not worn or cracked and do not bend or twist the belt.

BREATHER PIPE

Apply sealant to the breather pipe as shown.



BREATHER PIPE BOLT
(4 x 10 mm)
3.5 N·m (0.36 kgf·m, 2.6 lbf·ft)

NEW GREASE (Lips)
OIL SEAL (22 x 35 x 6 mm)

INSTALLATION: page 15-14

PISTON INSTALLATION

Apply engine oil to the big end inner surface of the connecting rod [1] and connecting rod cap [2].

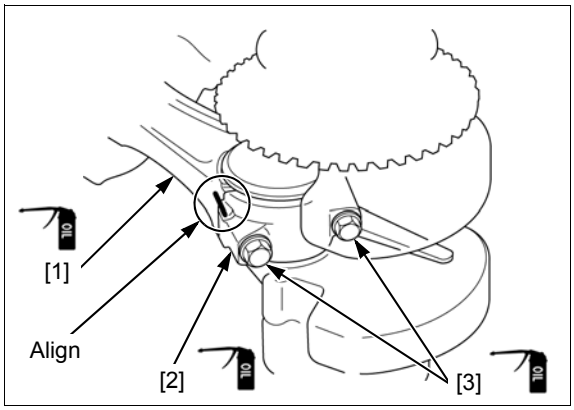
Install the crankshaft in the cylinder block (page 15-4).

Install the connecting rod cap to the connecting rod big end by aligning the marks on the connecting rod cap and the connecting rod big end.

Apply engine oil to the thread and seating surface of the two connecting rod bolts [3] and install them.

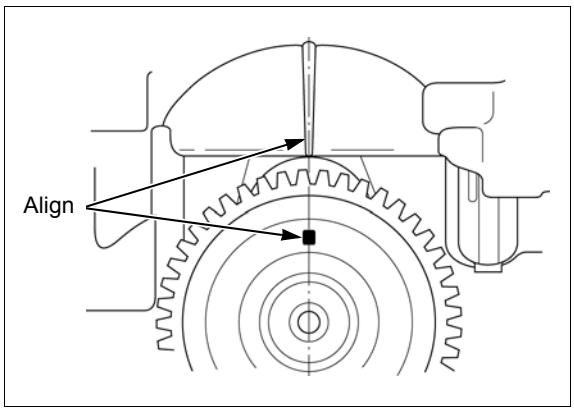
Tighten the bolts to the specified torque.

TORQUE: 9.8 N·m (1.0 kgf·m, 7.2 lbf·ft)



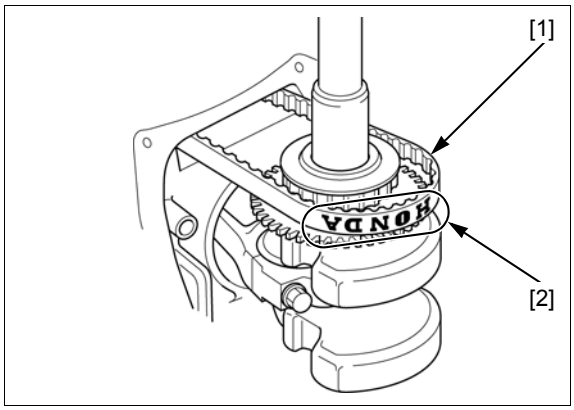
CRANKSHAFT INSTALLATION

Align the marks on the cylinder block with the crankshaft.



Apply engine oil to the timing belt [1].

Set the timing belt on the timing belt drive pulley so that the marks [2] on the timing belt is upside down as shown.



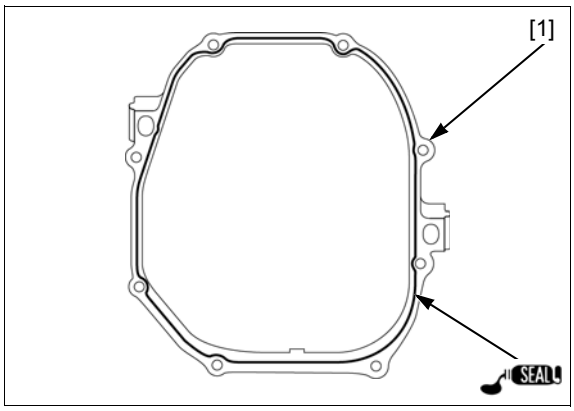
CRANKCASE COVER INSTALLATION

Clean the mating surfaces of the cylinder barrel [1] and crankcase cover of old liquid sealant, oil, and other foreign material.

Apply a liquid sealant (Threebond® 1207B, or equivalent) to the mating surface of the cylinder block as shown.

NOTICE

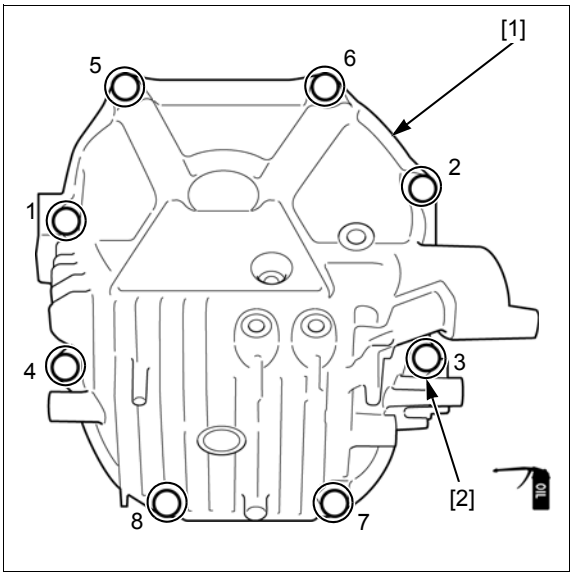
- *To prevent leaks, do not install the parts if 10 minutes or more have elapsed since applying the liquid sealant. Instead, reapply liquid sealant after removing the old residue.*
- *After assembly, wait at least 20 minutes before filling the engine with oil.*



Install the crankcase cover [1] on the cylinder barrel.

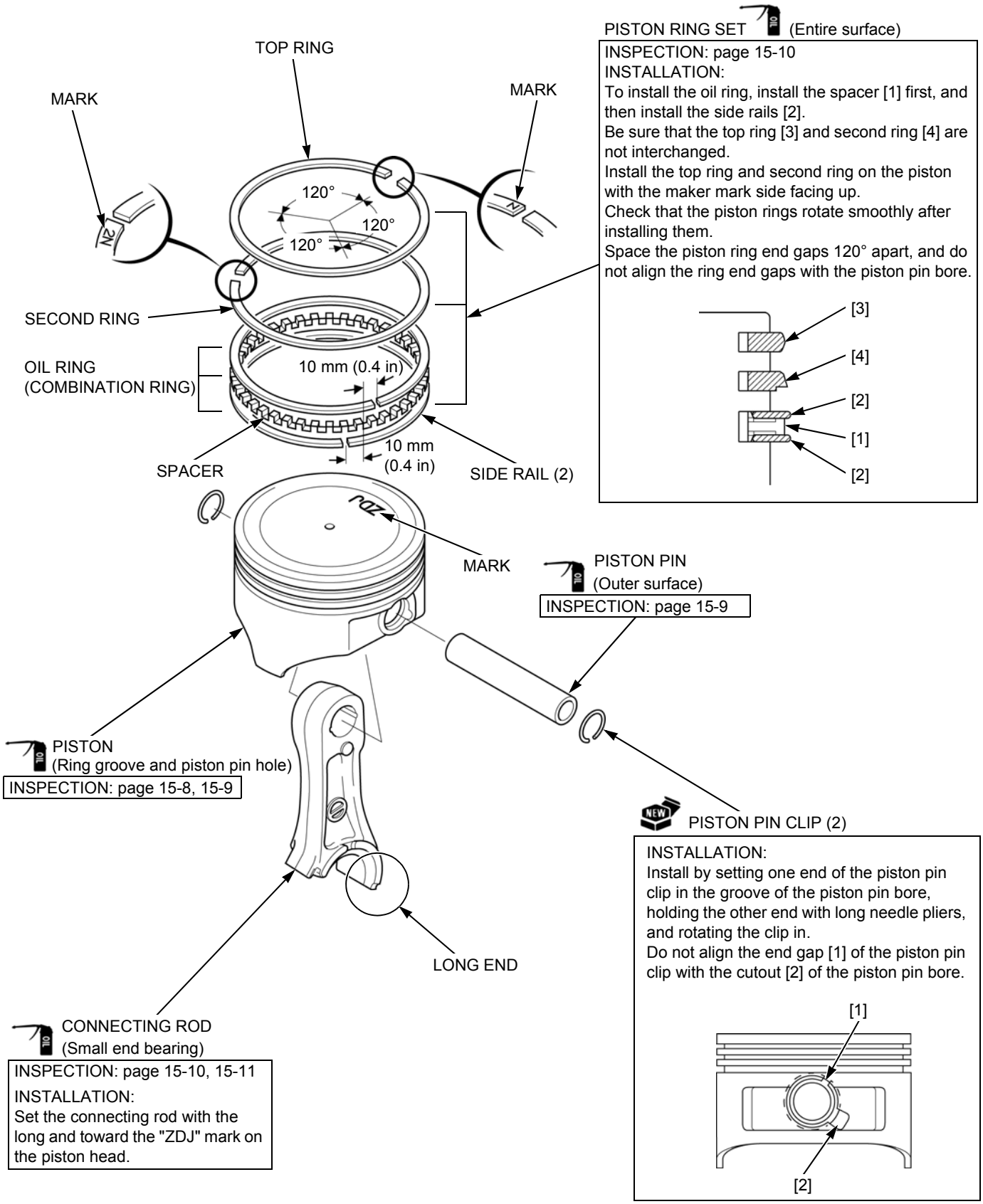
Apply engine oil to the thread and seating surface of the crankcase cover bolts [2].

Install the bolts and hand tighten them.
Tighten the bolts in the numbered sequence as shown.



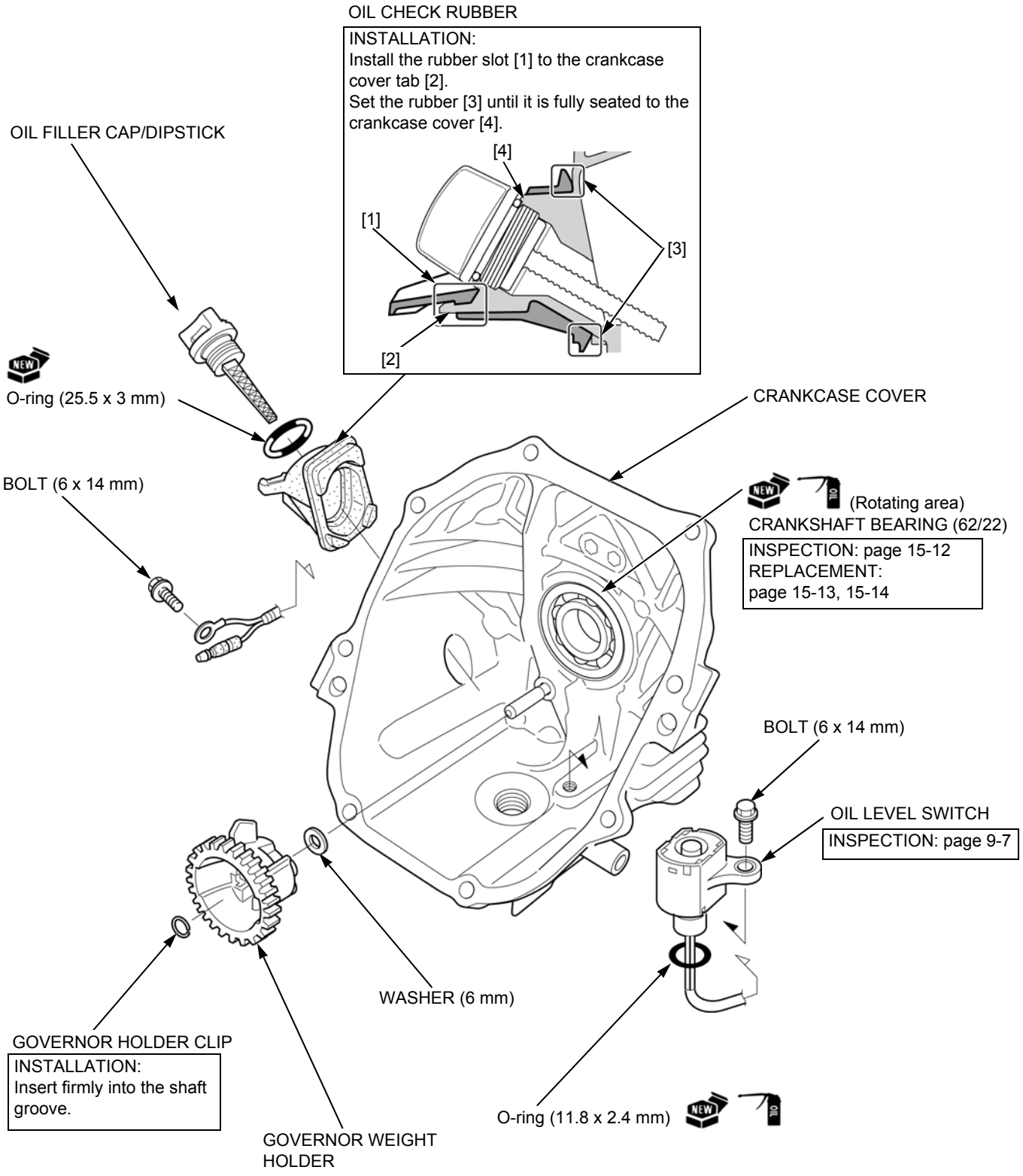
PISTON/CONNECTING ROD DISASSEMBLY/ASSEMBLY

Remove the piston (page 15-3).



CRANKCASE COVER DISASSEMBLY/ ASSEMBLY

Remove the crankcase cover (page 15-3).



CRANKCASE COVER/CYLINDER BARREL/PISTON/CONNECTING ROD/ CRANKSHAFT INSPECTION

CYLINDER SLEEVE I.D.

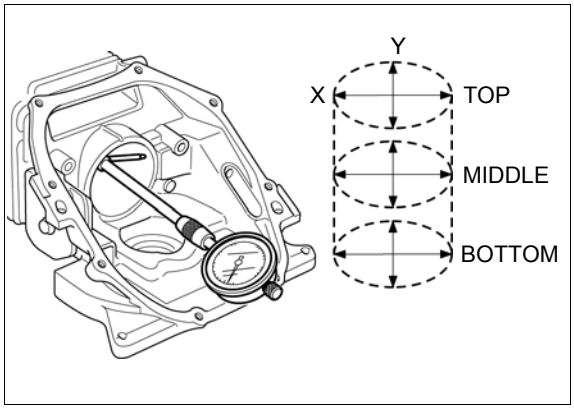
Measure and record the cylinder I.D. at three levels in both the "X" axis (perpendicular to crankshaft) and the "Y" axis (parallel to crankshaft). Take the maximum reading to determine cylinder wear and taper.

STANDARD: 60.000 – 60.015 mm (2.3622 – 2.3628 in)

SERVICE LIMIT: 60.165 mm (2.3687 in)

If the measurement is more than the service limit, replace the cylinder barrel.

Inspect the piston skirt O.D. (page 15-8).



PISTON SKIRT O.D.

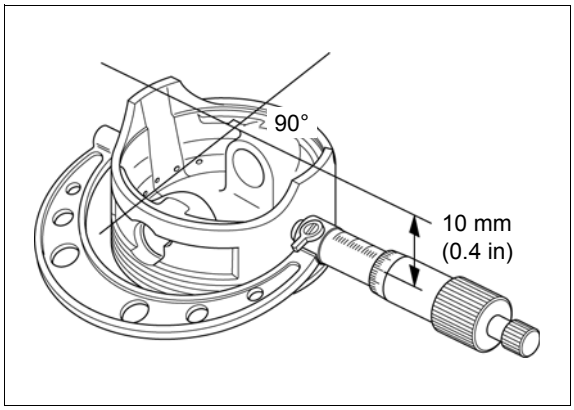
Measure and record the piston skirt O.D. at a point 10 mm (0.4 in) from the bottom of the skirt and 90° to the piston pin bore.

STANDARD: 59.971 – 59.985 mm (2.3611 – 2.3616 in)

SERVICE LIMIT: 59.870 mm (2.3571 in)

If the measurement is less than the service limit, replace the piston.

Inspect the cylinder sleeve I.D. (page 15-8).



PISTON-TO-CYLINDER CLEARANCE

Subtract the piston skirt O.D. from the cylinder sleeve I.D. to obtain the piston-to-cylinder clearance.

STANDARD: 0.015 – 0.044 mm (0.0006 – 0.0017 in)

SERVICE LIMIT: 0.100 mm (0.0039 in)

If the calculated clearance is more than the service limit, replace the piston and recheck the clearance.

If the clearance is still more than the service limit with a new piston, replace the cylinder barrel.

PISTON PIN BORE I.D.

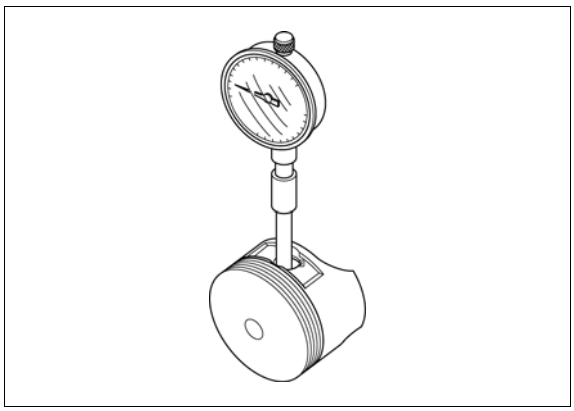
Measure and record the piston pin bore I.D. of the piston.

STANDARD: 13.002 – 13.012 mm (0.5119 – 0.5123 in)

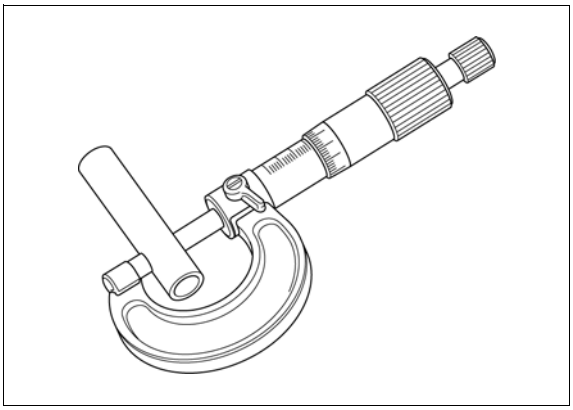
SERVICE LIMIT: 13.048 mm (0.5137 in)

If the measurement is more than the service limit, replace the piston.

Inspect the piston pin O.D. (page 15-9).



PISTON PIN O.D.



Measure and record the piston pin O.D. at three points (both ends and middle). Take the minimum reading to determine piston pin O.D.

STANDARD: 12.994 – 13.000 mm (0.5116 – 0.5118 in)

SERVICE LIMIT: 12.954 mm (0.5100 in)

If the measurement is less than the service limit, replace the piston pin.

Inspect the piston pin bore I.D. (page 15-8).

Inspect the connecting rod small end I. D. (page 15-10).

PISTON PIN-TO-PISTON PIN BORE CLEARANCE

Subtract the piston pin O.D. from the piston pin bore I.D. to obtain the piston pin-to-piston pin bore clearance.

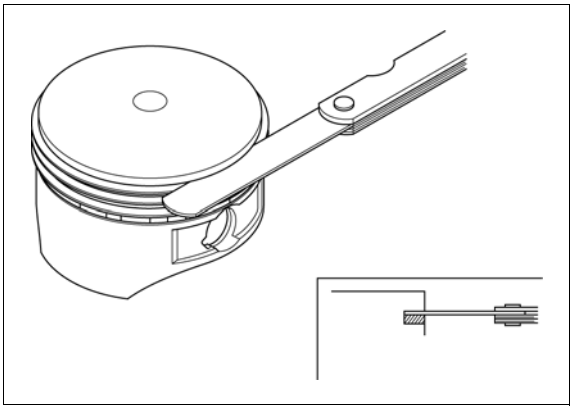
STANDARD: 0.002 – 0.018 mm (0.0001 – 0.0007 in)

SERVICE LIMIT: 0.080 mm (0.0031 in)

If the calculated clearance is more than the service limit, replace the piston pin and recheck the clearance.

If the clearance is still more than the service limit with a new piston pin, replace the piston.

PISTON RING SIDE CLEARANCE



Measure the clearance between each piston ring and ring groove of the piston using a feeler gauge.

STANDARD:
Top: 0.015 – 0.054 mm (0.0006 – 0.0021 in)
Second: 0.030 – 0.069 mm (0.0012 – 0.0027 in)

SERVICE LIMIT:
Top: 0.12 mm (0.0047 in)
Second: 0.14 mm (0.0055 in)

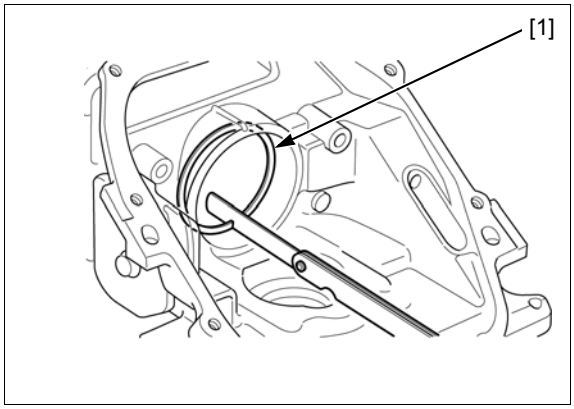
If any of the measurements is more than the service limit, inspect the piston ring width.

If the piston ring width is normal, replace the piston and reinspect the clearance.
If necessary, replace the piston rings (top, second, oil) as a set and reinspect the clearance.
If any of the measurements is still more than the service limit with the piston rings, replace the piston.

PISTON RING END GAP

Before inspection, check whether the cylinder sleeve I.D. is within the specification (page 15-8).

Measure each piston ring [1] end gap using a feeler gauge.



STANDARD:

Top:	**0.15 – 0.25 mm (0.0059 – 0.0098 in)**
Second:	**0.40 – 0.55 mm (0.0157 – 0.0217 in)**
Oil (side rail):	**0.1 – 0.4 mm (0.004 – 0.016 in)**

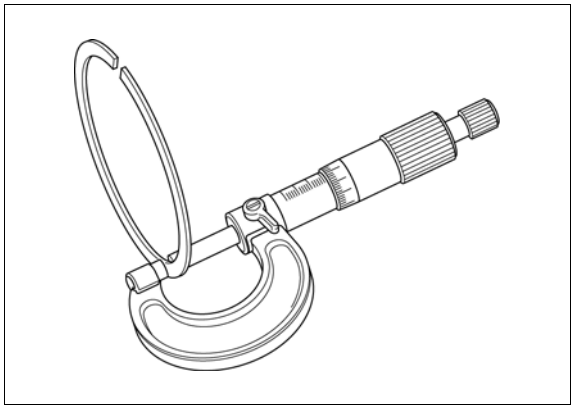
SERVICE LIMIT:

Top:	**0.55 mm (0.0217 in)**
Second:	**0.85 mm (0.0335 in)**
Oil (side rail):	**0.70 mm (0.0276 in)**

If any of the measurements is more than the service limit, replace the piston rings (top, second, oil) as a set.

PISTON RING WIDTH

Measure each piston ring width.



STANDARD:

Top:	**0.970 – 0.990 mm (0.0382 – 0.0390 in)**
Second:	**1.155 – 1.175 mm (0.0455 – 0.0463 in)**

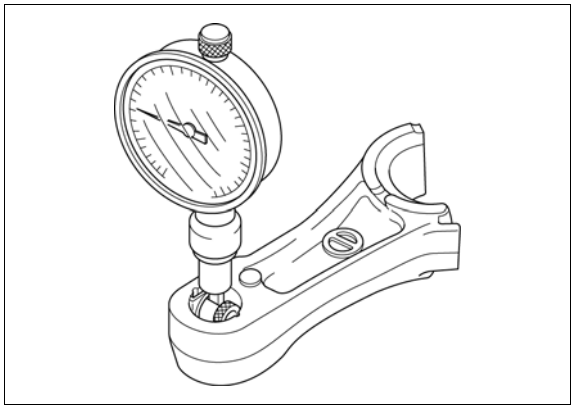
SERVICE LIMIT:

Top:	**0.940 mm (0.0370 in)**
Second:	**1.125 mm (0.0443 in)**

If any of the measurements is less than the service limit, replace the piston rings (top, second, oil) as a set.

CONNECTING ROD SMALL END I.D.

Measure the connecting rod small end I.D.



STANDARD: 13.005 – 13.020 mm (0.5120 – 0.5126 in)

SERVICE LIMIT: 13.070 mm (0.5146 in)

If the measurement is more than the service limit, replace the connecting rod.

Inspect the piston pin O.D. (page 15-9).

CONNECTING ROD BIG END I.D.

Apply engine oil to the connecting rod bolt [1] threads and seating surface.

Set the connecting rod lower to the connecting rod upper and tighten the connecting rod bolts to the specified torque.

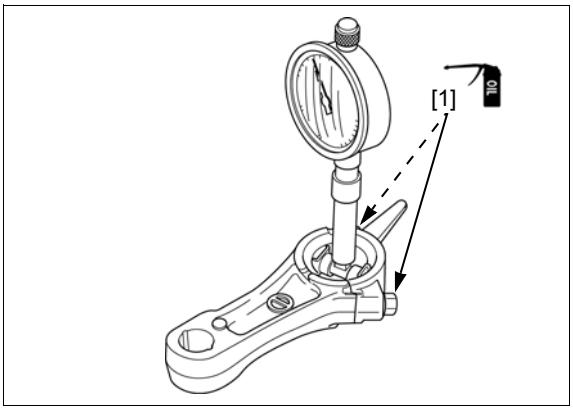
TORQUE: 9.8 N·m (1.0 kgf·m, 7.2 lbf·ft)

Measure the connecting rod big end I.D.

STANDARD: 26.020 – 26.033 mm (1.0244 – 1.0249 in)

SERVICE LIMIT: 26.06 mm (1.0260 in)

If the measurement is more than the service limit, replace the connecting rod (page 15-6).



CONNECTING ROD BIG END SIDE CLEARANCE

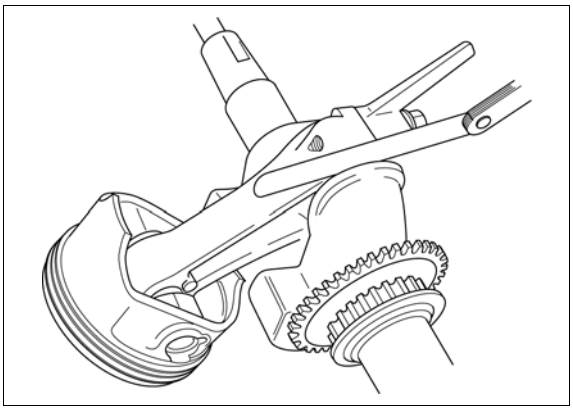
Measure the clearance between the connecting rod big end and crankshaft using a feeler gauge.

STANDARD: 0.1 – 0.5 mm (0.004 – 0.020 in)

SERVICE LIMIT: 0.90 mm (0.0354 in)

If the measurement is more than the service limit, replace the connecting rod (page 15-6) and recheck the clearance.

If the clearance is still more than the service limit with a new connecting rod, replace the crankshaft.



CONNECTING ROD BIG END OIL CLEARANCE

Clean all oil from the crankpin and connecting rod big end surface.

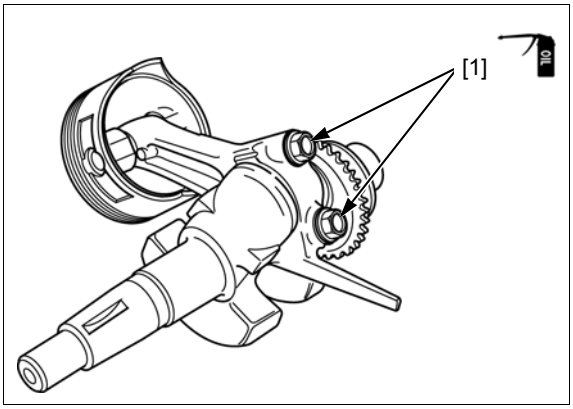
Apply engine oil to the connecting rod bolt (6 x 32 mm) [1] threads and seating surface.

Place a piece of plastigauge on the crankpin, install the connecting rod upper and the connecting rod lower, and tighten the connecting rod bolts to the specified torque.

TORQUE: 9.8 N·m (1.0 kgf·m, 7.2 lbf·ft)

NOTE:

Do not rotate the crankshaft while the plastigauge is in place.



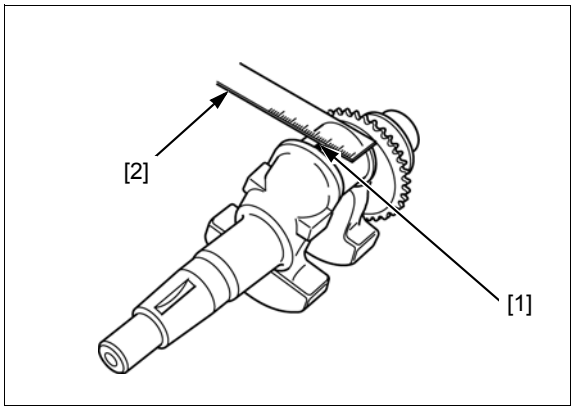
Remove the connecting rod and measure the compressed width of the plastigauge [1] using the scale printed on the bag [2] of the plastigauge.

STANDARD: 0.040 – 0.063 mm (0.0016 – 0.0025 in)

SERVICE LIMIT: 0.12 mm (0.005 in)

If the clearance is more than the service limit, inspect the connecting rod big end I.D. and the crankpin O.D.

If necessary replace the part that is not within the service limit and reinspect the clearance.



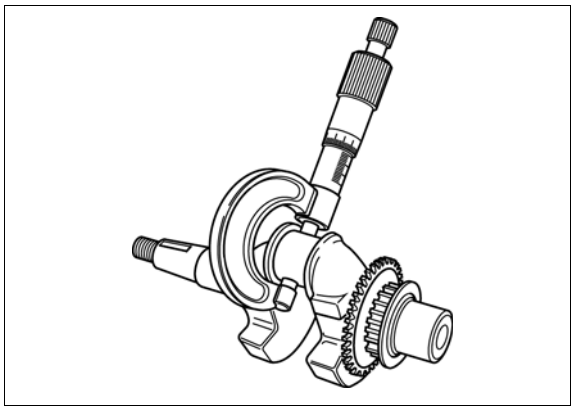
CRANKPIN O.D.

Measure the crankpin O.D. of the crankshaft.

STANDARD: 25.970 – 25.980 mm (1.0224 – 1.0228 in)

SERVICE LIMIT: 25.920 mm (1.0205 in)

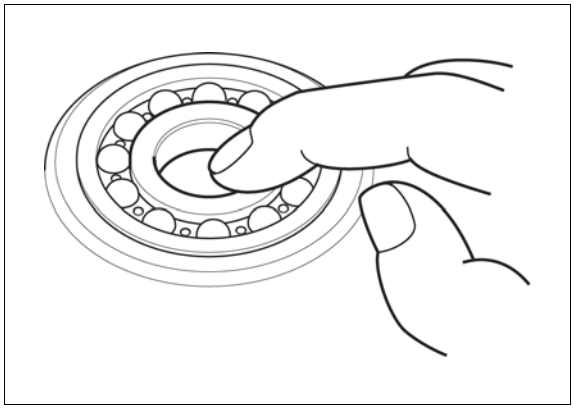
If the measurement is less than the service limit, replace the crankshaft.



CRANKSHAFT BEARING

Turn the inner race of the bearing with your finger and check for play.

Replace the bearing if it is noisy or has excessive play.

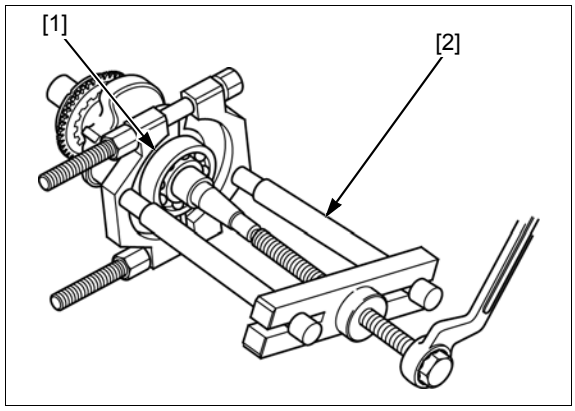


CRANKSHAFT BEARING/OIL SEAL REPLACEMENT

CRANKSHAFT BEARING

CYLINDER BLOCK SIDE

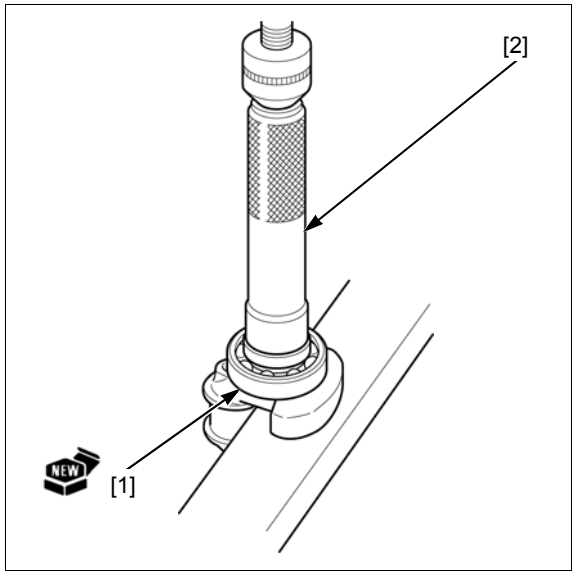
Pull the crankshaft bearing [1] off the crankshaft, using a commercially available bearing puller [2].



Press a new crankshaft bearing [1] until it is fully seated onto the crankshaft using the special tools.

TOOL:

Inner driver handle, 22 [2]	**07746-0020100**

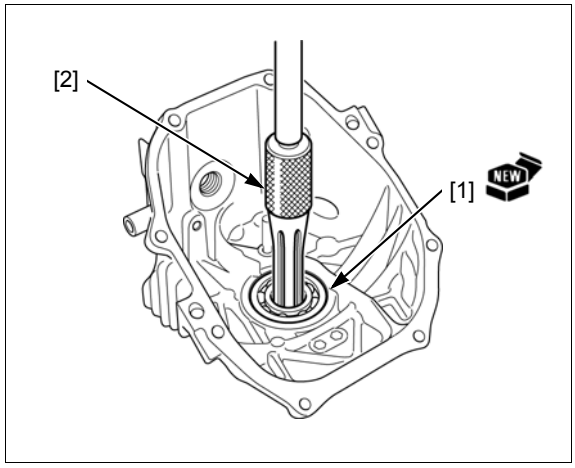


CRANKCASE COVER SIDE

Pull out the bearing [1] using the special tools.

TOOLS:

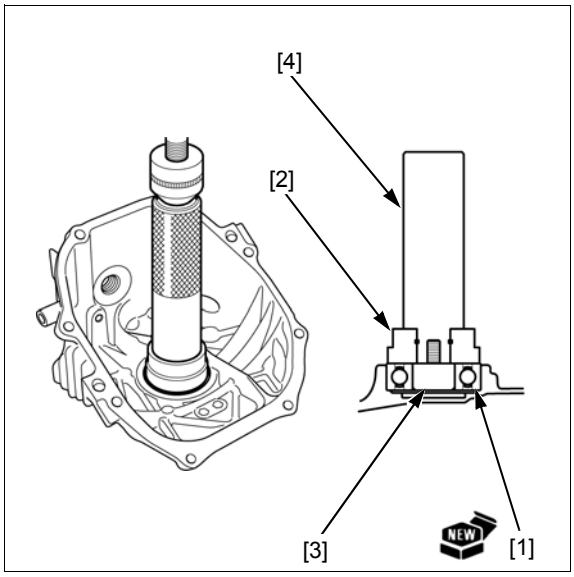
Bearing remover, 22 mm [2]	**070MC-MFR0100**
Remover weight	**07741-0010201**
Bearing remover shaft handle	**07936-3710100**



Press a new crankshaft bearing [1] until it is fully seated into the crankcase cover using the special tools.

TOOLS:

Attachment, 42 x 47 [2]	**07746-0010300**
Pilot, 22 [3]	**07746-0041000**
Driver [4]	**07749-0010000**



CRANKSHAFT OIL SEAL

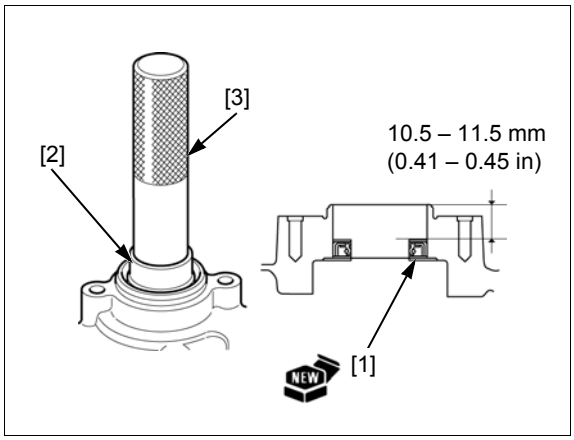
Remove the oil seal [1].

Drive a new oil seal in the position as shown using the special tools.

INSTALLATION HEIGHT: 10.5 – 11.5 mm (0.41 – 0.45 in)

TOOLS:

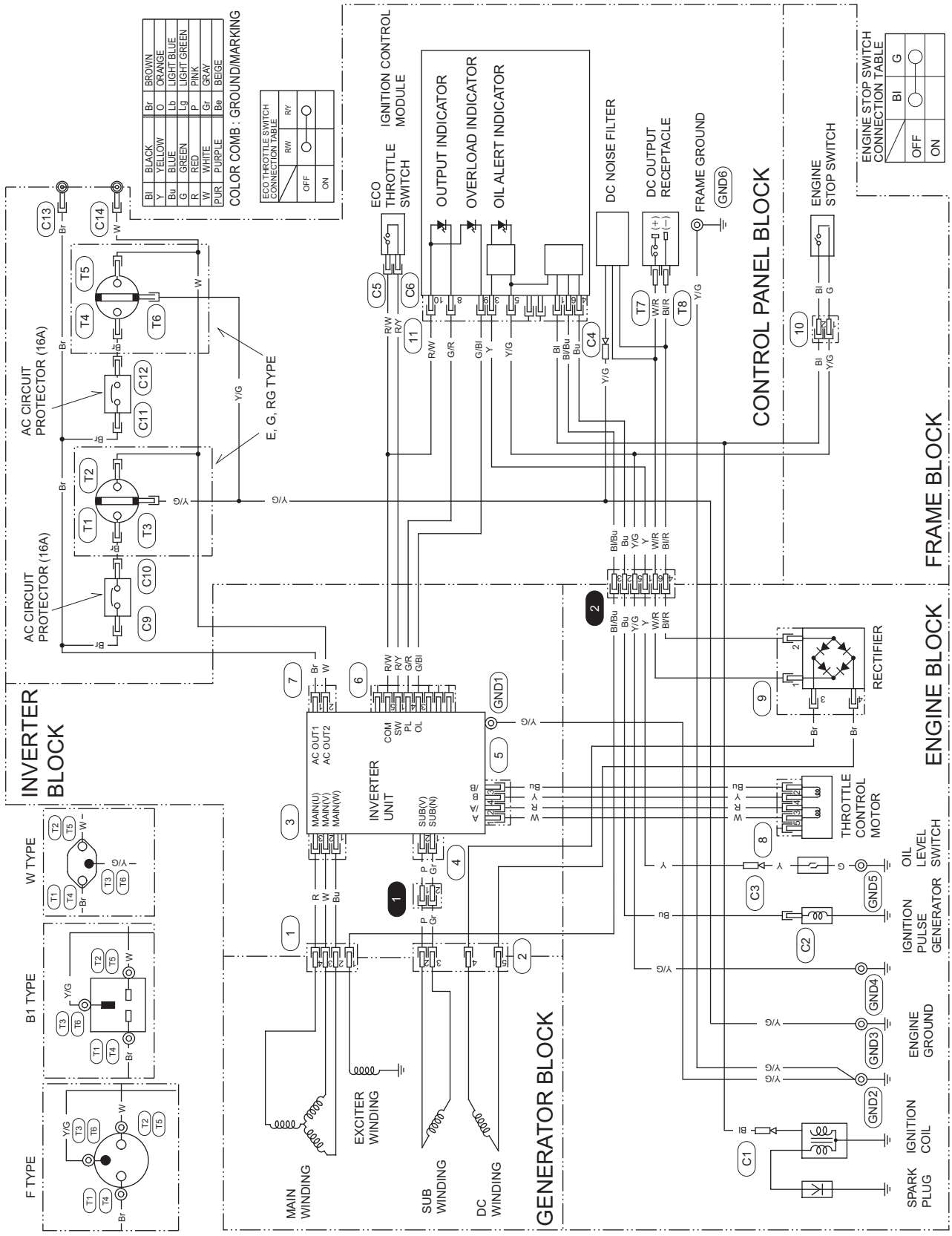
Attachment, 32 x 35 [2]	**07746-0010100**
Driver [3]	**07749-0010000**



16. WIRING DIAGRAM

WIRING DIAGRAM

E, F, G, B1, W, RG TYPES:



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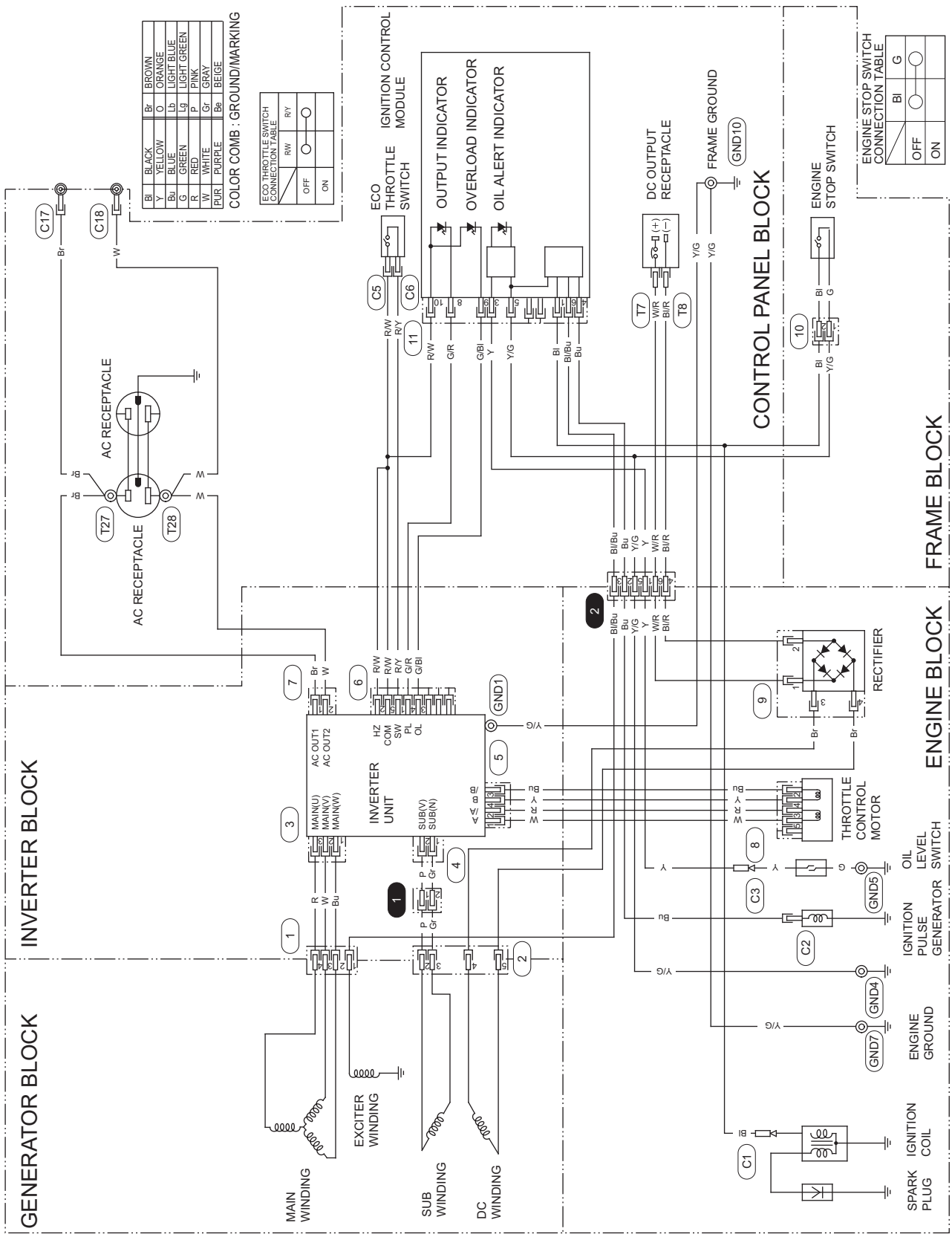
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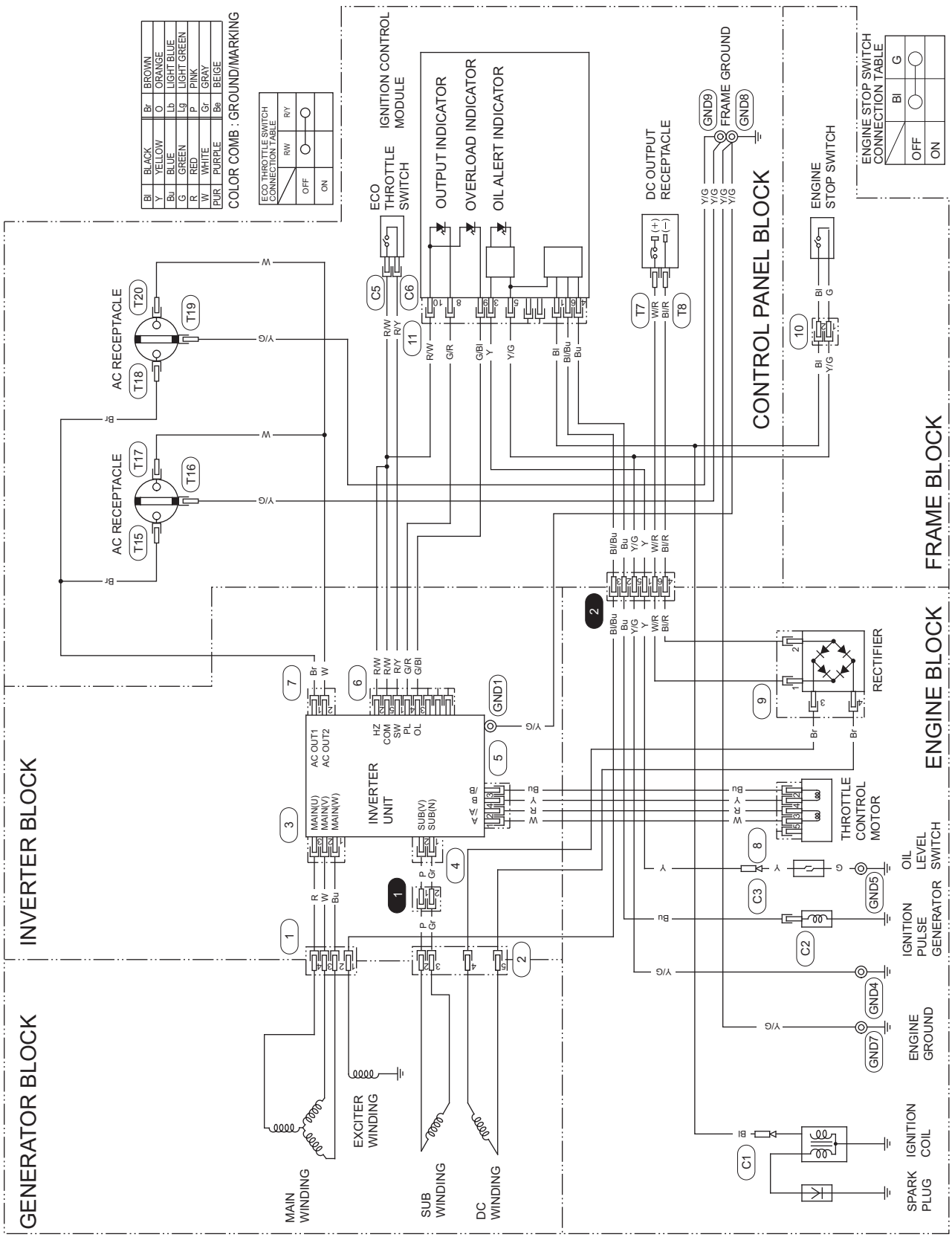
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MAIN(W)
SUB(V)
SUB(N)
HZ
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SW
PL
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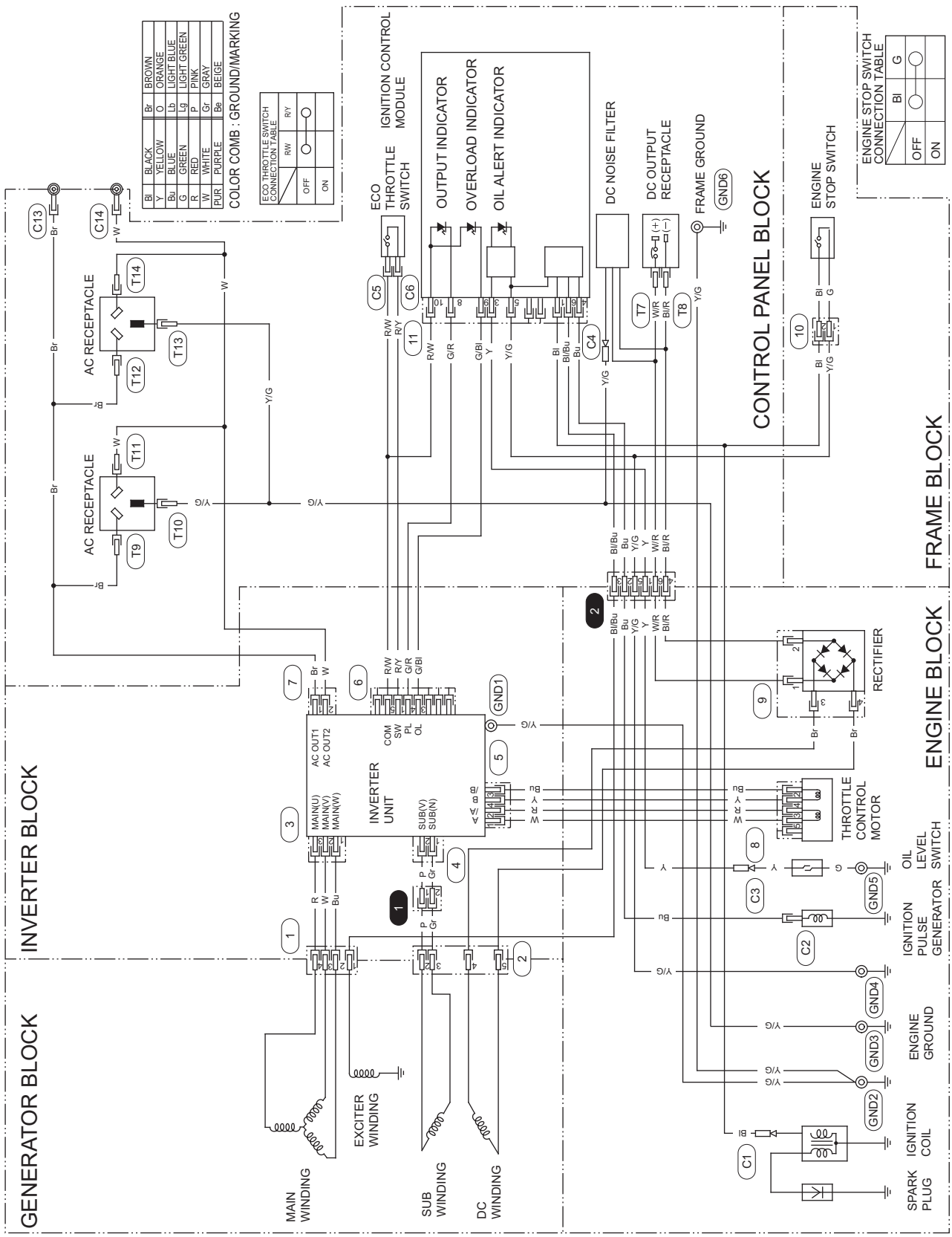
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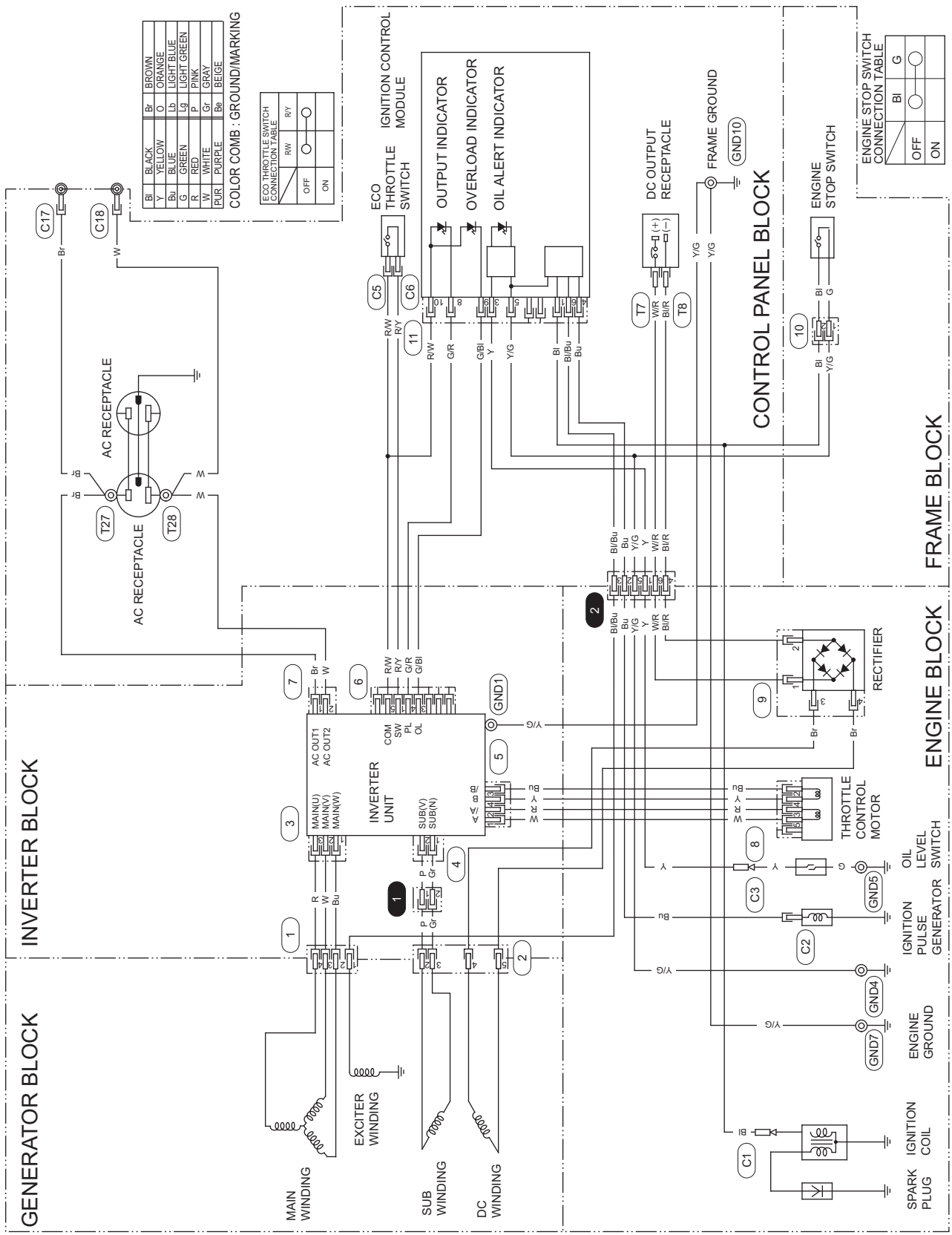
RH, R TYPES: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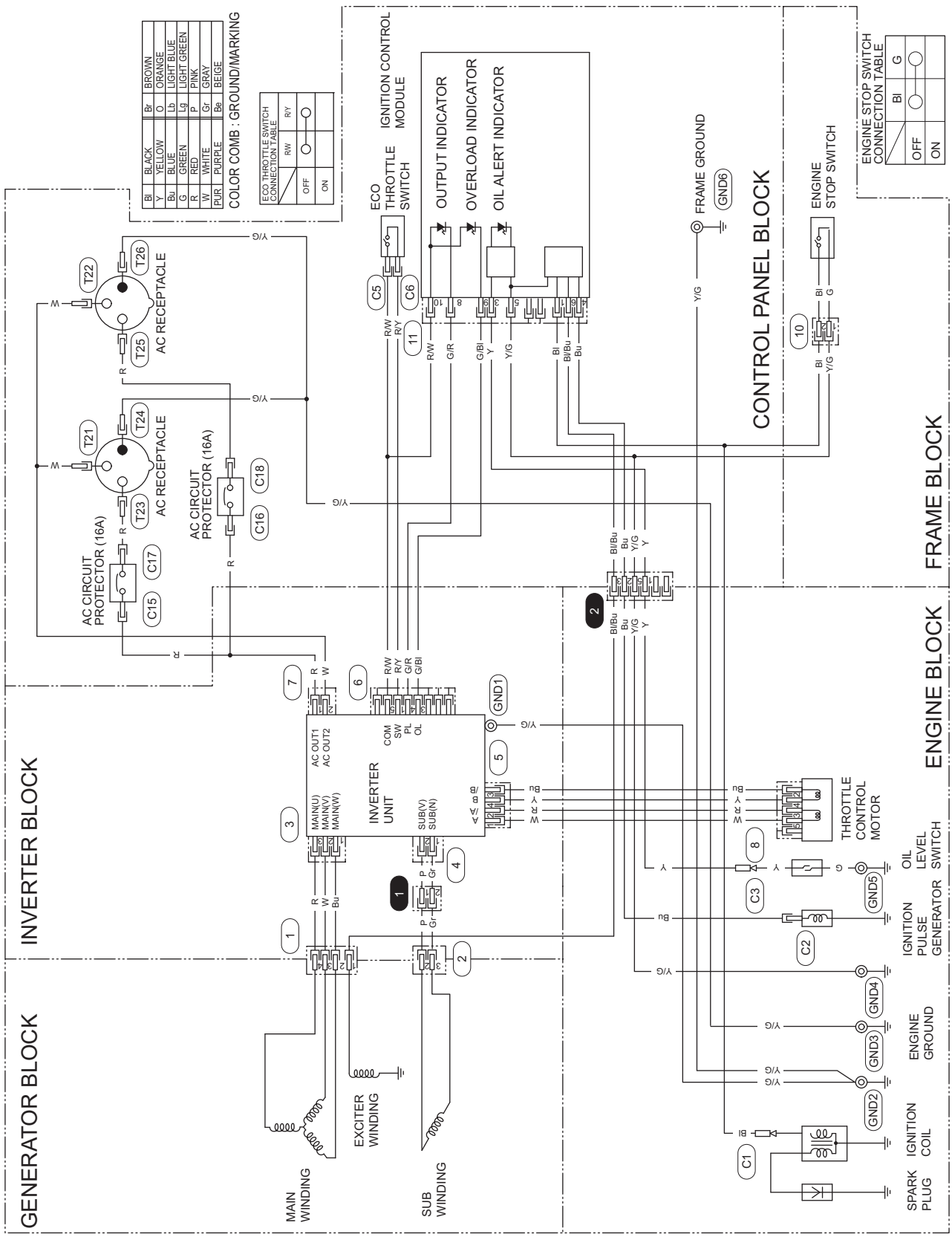
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OIL LEVEL SWITCH
IGNITION PULSE GENERATOR
ENGINE GROUND
IGNITION COIL
SPARK PLUG
MAIN WINDING
EXCITER WINDING
SUB WINDING

MEMO

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