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 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 practice, 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 engine-power equipment up 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 vapor is explosive. To reduce the possibility of a fire or explosion, be careful when working around gasoline.

- 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 all fuel-related parts.

INTRODUCTION

This manual covers the service and repair procedures for Honda GCV170 and GCV200 general purpose engines.

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 judgment.

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. American Honda Motor Co., Inc. 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.

SERVICE RULES

- Use genuine Honda 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 reassembly.
- After reassembly, 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 would be explained specifically in the text without the use of the symbols.

	Replace the part(s) with new one(s) before assembly.
	Use the recommend 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.

ABBREVIATIONS

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

Abbrev. term	Full term
API	American Petroleum institute
Approx.	Approximately
Assy.	Assembly
ATDC	After Top Dead Center
ATT	Attachment
BDC	Bottom Dead Center
BTDC	Before Top Dead Center
CKP	Crankshaft Position
Comp.	Complete
CMP	Camshaft Position
CYL	Cylinder
EX	Exhaust
F	Front or Forward
GND	Ground
I.D.	Inside diameter
IG or IGN	Ignition
IN	Intake
L.	Left
O.D.	Outside Diameter
OP	Optional Part
P/N	Part Number
Qty	Quantity
R.	Right
SAE	Society of Automotive Engineers
STD	Standard
SW	Switch
TDC	Top Dead Center

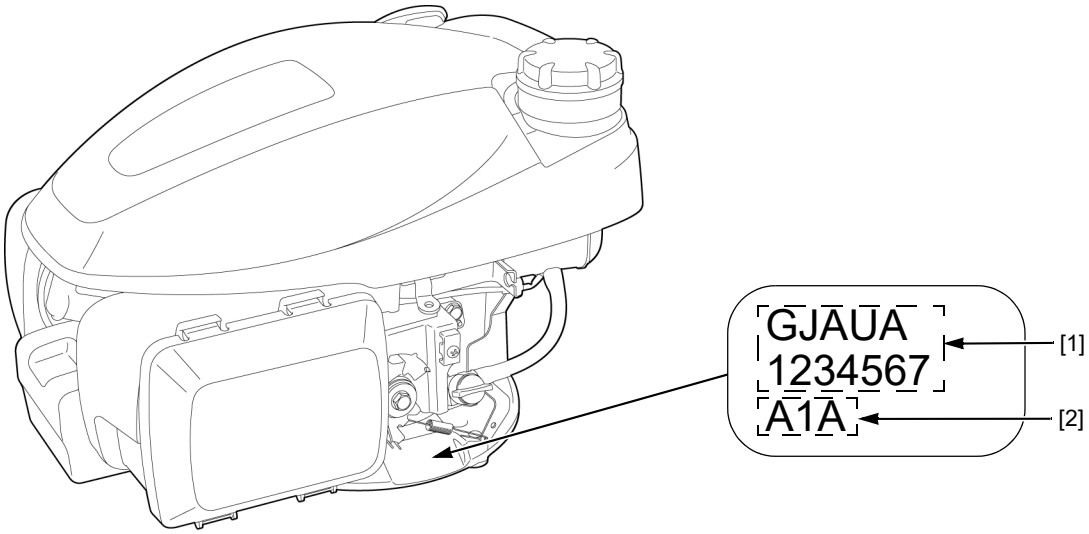
Bl	Black	G	Green	Br	Brown	Lg	Light green
Y	Yellow	R	Red	O	Orange	P	Pink
Bu	Blue	W	White	Lb	Light blue	Gr	Gray

1. SPECIFICATIONS

SERIAL NUMBER LOCATION

The engine serial number [1] and type [2] are stamped on the crankcase below the fuel valve assembly.

Refer to them when using this manual, ordering parts, or making technical inquiries.



P.T.O. TYPE VARIATION

P.T.O. type	N1	N3		N5	
Type	A1A	S3B S3C	S3L	G5B	G5BR
Top cover type	Standard	Standard	Optional	Standard, vented	Rotated, vented
Flywheel type	Light (with flywheel brake)	Light (with flywheel brake)		Heavy (without flywheel brake)	
Choke type	Manual	Automatic		Automatic	
Throttle type	Manual (remote, adjustable)	Fixed (constant speed)		Fixed (constant speed)	

DIMENSIONS AND WEIGHTS SPECIFICATIONS

GCV170

Type	A1A	S3B	G5B G5BR
P.T.O. type	N1	N3	N5
Overall length	415 mm (16.3 in)	415 mm (16.3 in)	415 mm (16.3 in)
Overall width	330 mm (13.0 in)	330 mm (13.0 in)	330 mm (13.0 in)
Overall height	359 mm (14.1 in)	359 mm (14.1 in)	324 mm (12.8 in)
Dry mass (weight)	10.0 kg (22.0 lbs)	10.1 kg (22.3 lbs)	10.0 kg (22.0 lbs)
Operating mass (weight)	11.1 kg (24.5 lbs)	11.2 kg (24.7 lbs)	11.1 kg (24.5 lbs)

GCV200

Type	S3C S3L	G5B G5BR
P.T.O. type	N3	N5
Overall length	415 mm (16.3 in)	415 mm (16.3 in)
Overall width	330 mm (13.0 in)	330 mm (13.0 in)
Overall height	359 mm (14.1 in)	324 mm (12.8 in)
Dry mass (weight)	10.1 kg (22.3 lbs)	10.0 kg (22.0 lbs)
Operating mass (weight)	11.2 kg (24.7 lbs)	11.1 kg (24.5 lbs)

EQUIPMENT VARIATION

Indicated with difference compared with values of P.T.O. variation above.

Variation	Evaporative emission type	Remote type	No top cover type	Heavy flywheel type	Deflector type
Overall length difference	± 0 mm (0.0 in)	± 0 mm (0.0 in)	- 9 mm (0.35 in)	± 0 mm (0.0 in)	± 0 mm (0.0 in)
Overall width difference	± 0 mm (0.0 in)	± 0 mm (0.0 in)	± 0 mm (0.0 in)	± 0 mm (0.0 in)	+ 15 mm (0.59 in)
Overall height difference	+ 9 mm (0.35 in)	± 0 mm (0.0 in)	± 0 mm (0.0 in)	± 0 mm (0.0 in)	± 0 mm (0.0 in)
Dry mass (weight) difference	± 0 kg (0.0 lbs)	+ 0.1 kg (0.2 lbs)	- 0.3 kg (0.7 lbs)	+ 1.6 kg (3.5 lbs)	± 0 kg (0.0 lbs)
Operating mass (weight) difference	± 0 kg (0.0 lbs)	+ 0.1 kg (0.2 lbs)	- 0.3 kg (0.7 lbs)	+ 1.6 kg (3.5 lbs)	± 0 kg (0.0 lbs)

ENGINE SPECIFICATIONS

GCV170

Model	GCV170
Description code	GJAUA
Type	4 stroke, overhead valve, single cylinder, horizontal
Displacement	165 cm^3 (10.1 cu-in)
Bore x stroke	60.0 x 59.0 mm (2.36 x 2.32 in)
Net power (SAE J1349) *1	3.6 kW (4.8 HP)/3,600 rpm
Continuous rated power	2.4 kW (3.2 HP)/3,000 rpm
Maximum net torque (SAE J1349) *1	11.1 N•m (1.13 kgf•m, 8.2 lbf-ft)/2,500 rpm
Compression ratio	8.0
Fuel consumption (at continuous rated power)	1.2 Liters (0.32 US gal, 0.26 Imp gal)/h
Ignition system	Transistor type magneto ignition
Ignition timing	B.T.D.C. 20 °
Recommended spark plug	BPR5ES (NGK)
Lubrication system	Forced spray system
Oil capacity	0.40 Liters (0.42 US qt, 0.35 Imp qt)
Recommended oil	SAE 10W-30 API service classification SN or later
Cooling system	Forced air
Starting system	Recoil starter
Stopping system	Ignition primary circuit ground
Carburetor	Butterfly valve
Air cleaner	Dry type (paper)
Governor	Centrifugal weight system
Breather system	Reed valve type
Fuel used	Unleaded gasoline (E10)
Fuel tank capacity	0.91 Liters (0.24 US gal, 0.20 Imp gal)

*1: The power rating of the engine indicated in this document is the net power output tested on a production engine for the engine model and measured in accordance with SAE J1349 at 3,600 rpm (net power) and at 2,500 rpm (max net torque). Mass production engines may vary from this value. Actual power output for the engine installed in the final machine will vary depending on numerous factors, including the operating speed of the engine in application, environmental conditions, maintenance, and other variables.

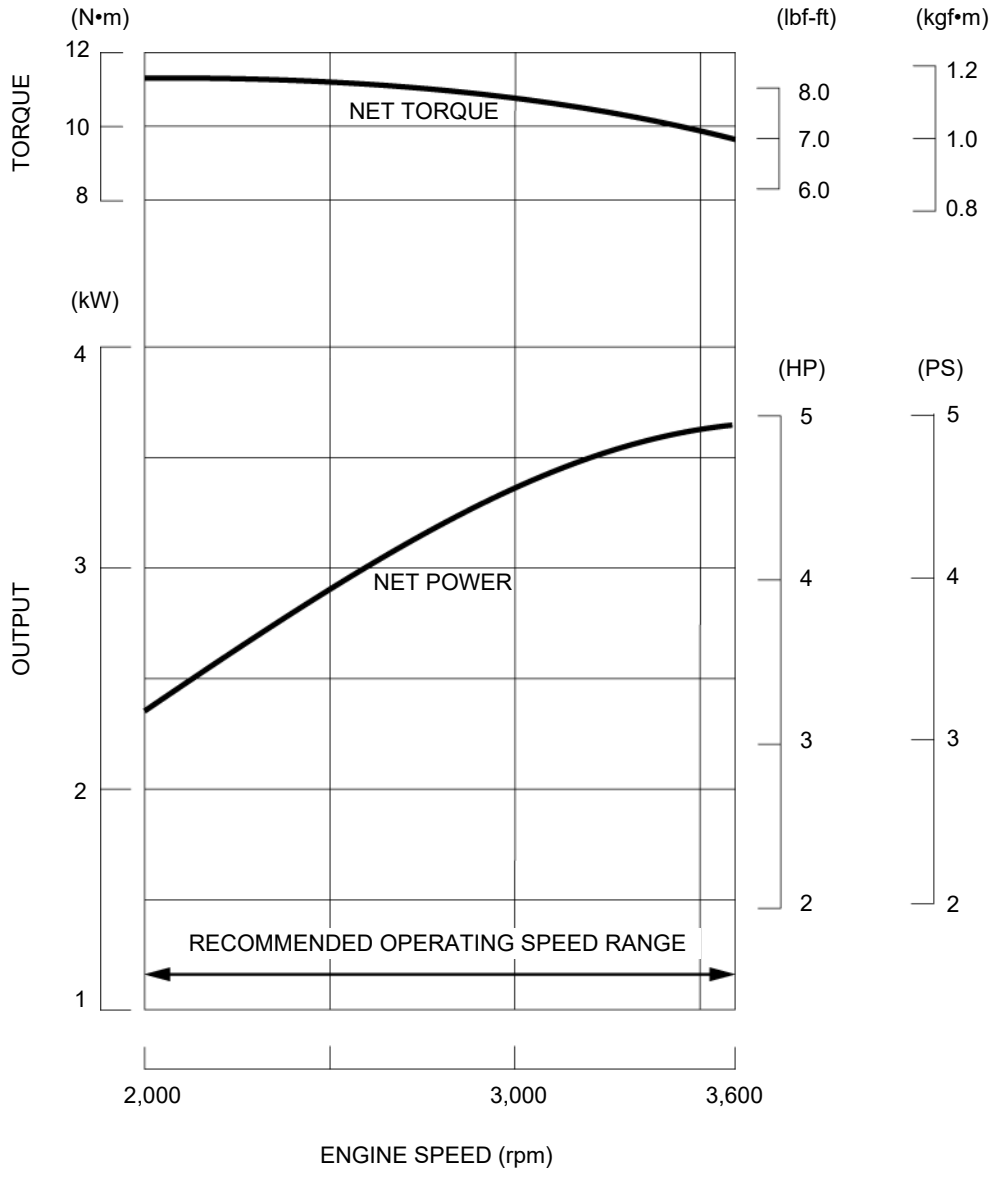
GCV200

Model	GCV200
Description code	GJAVA
Type	4 stroke, overhead valve, single cylinder, horizontal
Displacement	201 cm^3 (12.3 cu-in)
Bore x stroke	66.0 x 59.0 mm (2.60 x 2.32 in)
Net power (SAE J1349) *1	4.2 kW (5.6 HP)/3,600 rpm
Continuous rated power	2.8 kW (3.8 HP)/3,000 rpm
Maximum net torque (SAE J1349) *1	12.7 N•m (1.30 kgf•m, 9.4 lbf-ft)/2,500 rpm
Compression ratio	8.0
Fuel consumption (at continuous rated power)	1.4 Liters (0.37 US gal, 0.31 Imp gal)/h
Ignition system	Transistor type magneto ignition
Ignition timing	B.T.D.C. 20 °
Recommended spark plug	BPR5ES (NGK)
Lubrication system	Forced spray system
Oil capacity	0.40 Liters (0.42 US qt, 0.35 Imp qt)
Recommended oil	SAE 10W-30 API service classification SN or later
Cooling system	Forced air
Starting system	Recoil starter
Stopping system	Ignition primary circuit ground
Carburetor	Butterfly valve
Air cleaner	Dry type (paper)
Governor	Centrifugal weight system
Breather system	Reed valve type
Fuel used	Unleaded gasoline (E10)
Fuel tank capacity	0.91 Liters (0.24 US gal, 0.20 Imp gal)

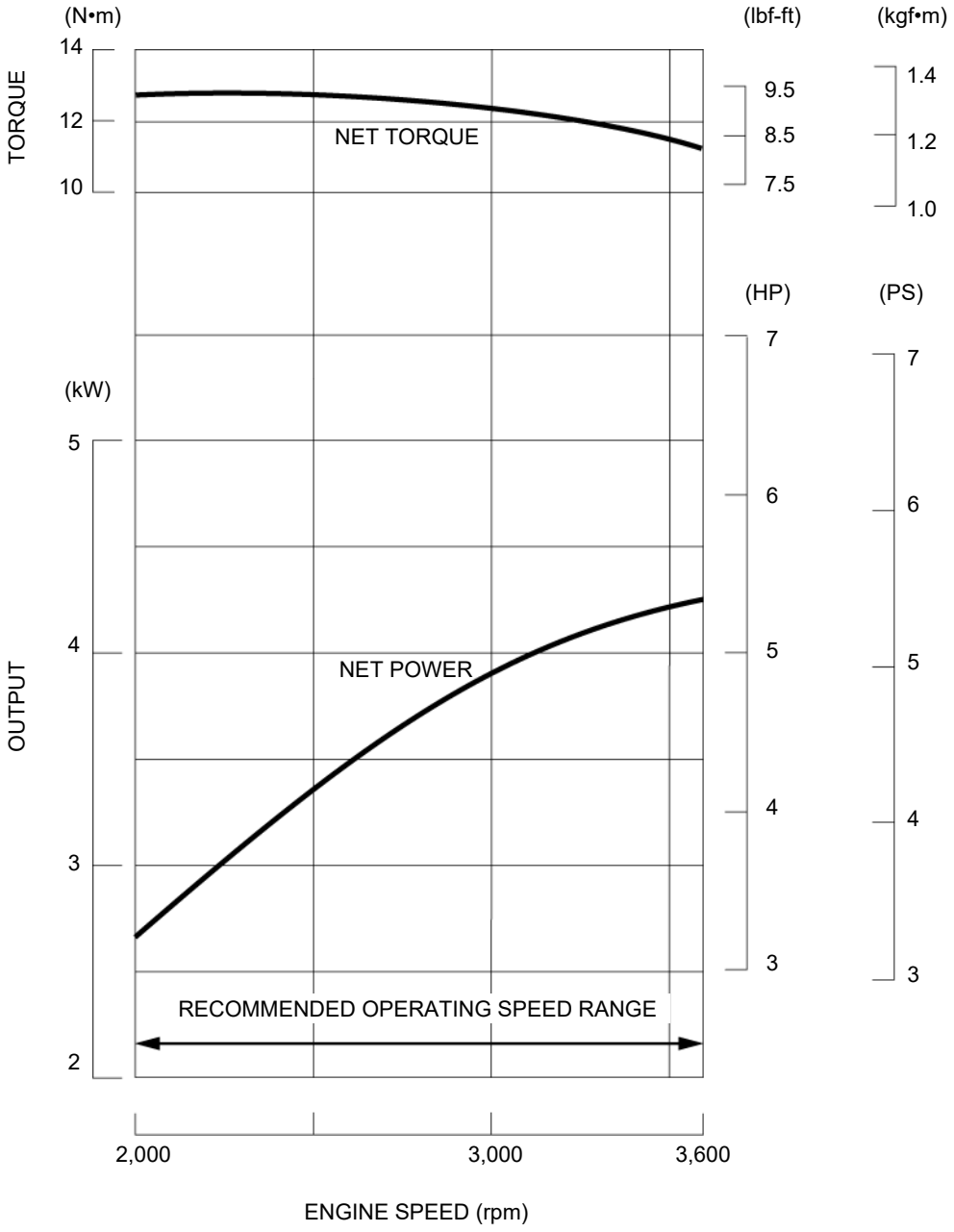
*1: The power rating of the engine indicated in this document is the net power output tested on a production engine for the engine model and measured in accordance with SAE J1349 at 3,600 rpm (net power) and at 2,500 rpm (max net torque). Mass production engines may vary from this value. Actual power output for the engine installed in the final machine will vary depending on numerous factors, including the operating speed of the engine in application, environmental conditions, maintenance, and other variables.

PERFORMANCE CURVES

GCV170



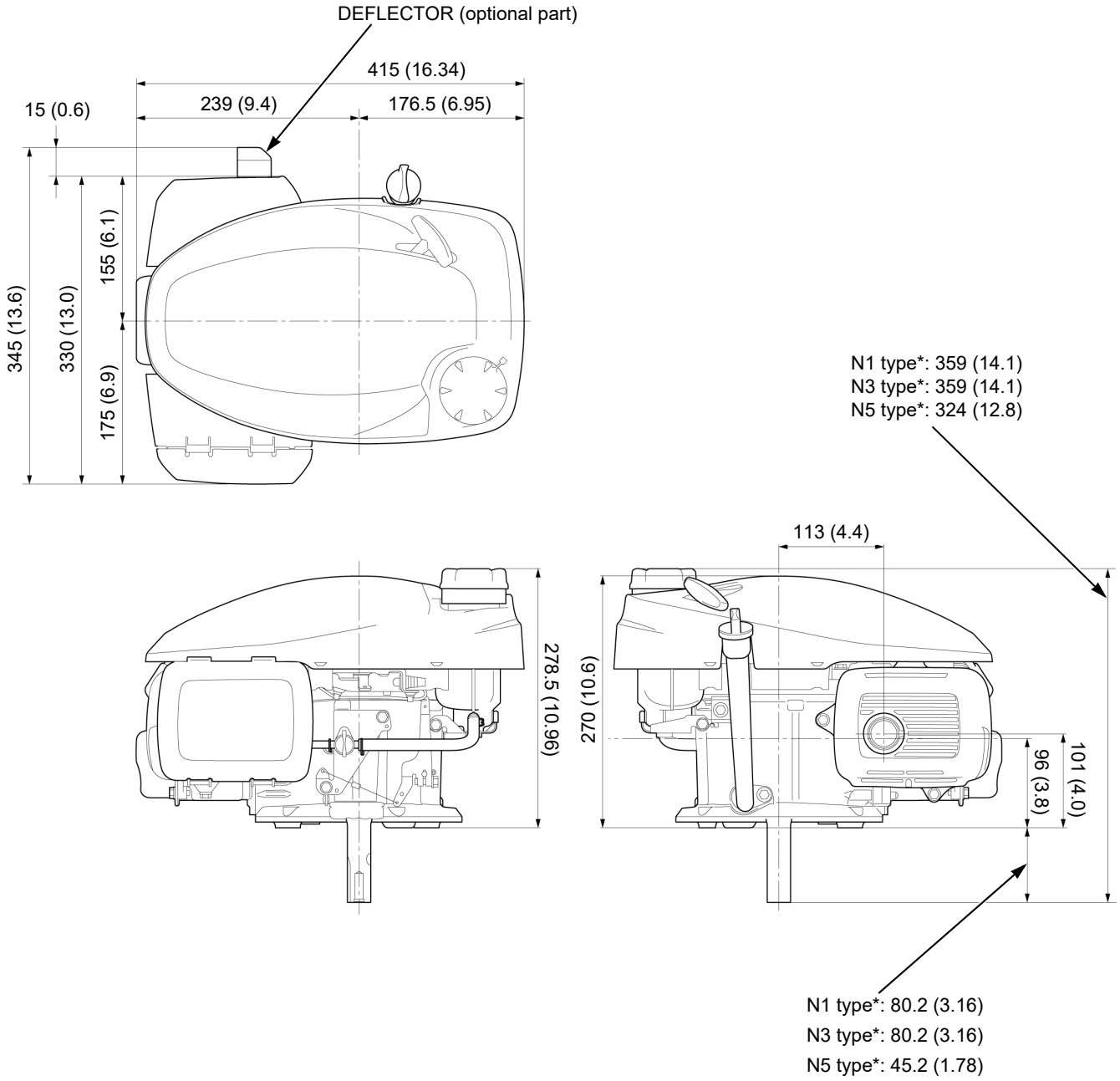
GCV200


(N•m)
(lbf-ft)
(kgf•m)
14
12
10
TORQUE
NET TORQUE
9.5
8.5
7.5
1.4
1.2
1.0
(HP)
(PS)
(kW)
7
6
5
4
3
OUTPUT
NET POWER
RECOMMENDED OPERATING SPEED RANGE
2
2,000
3,000
3,600
ENGINE SPEED (rpm)

DIMENSIONAL DRAWINGS

*: P.T.O. type. (page 1-2)

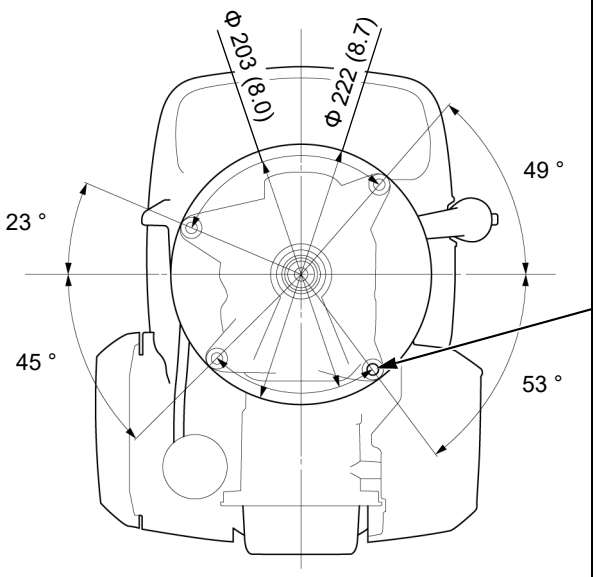
Unit: mm (in)



P.T.O. DIMENSIONAL DRAWINGS

*: P.T.O. type. (page 1-2)

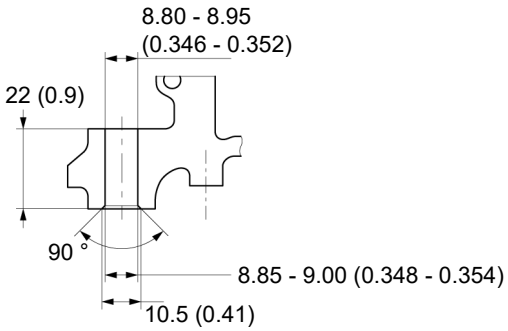
Unit: mm (in)

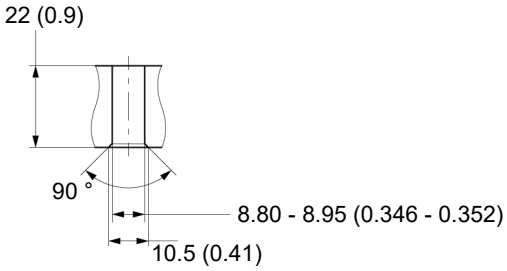


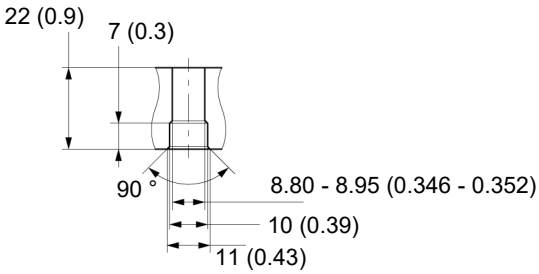
(View shown from bottom side of engine)

ENGINE MOUNTING BOSS SHAPE

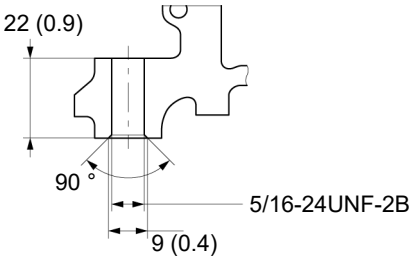
Thru type (either shape)





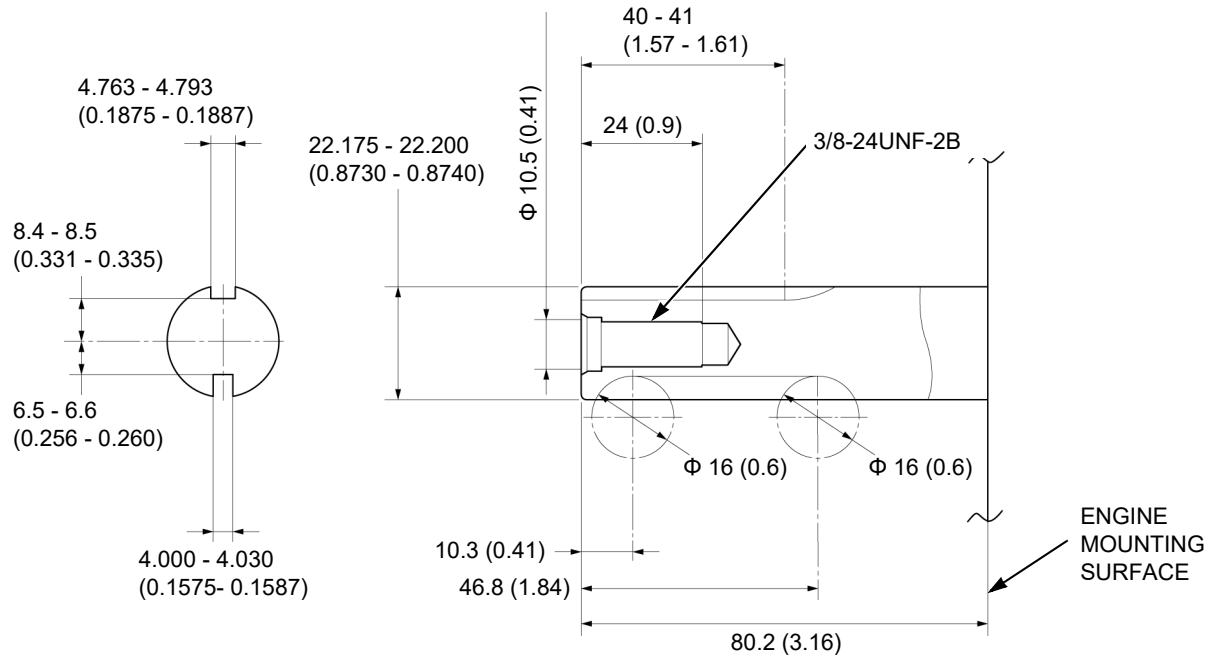


Threaded type



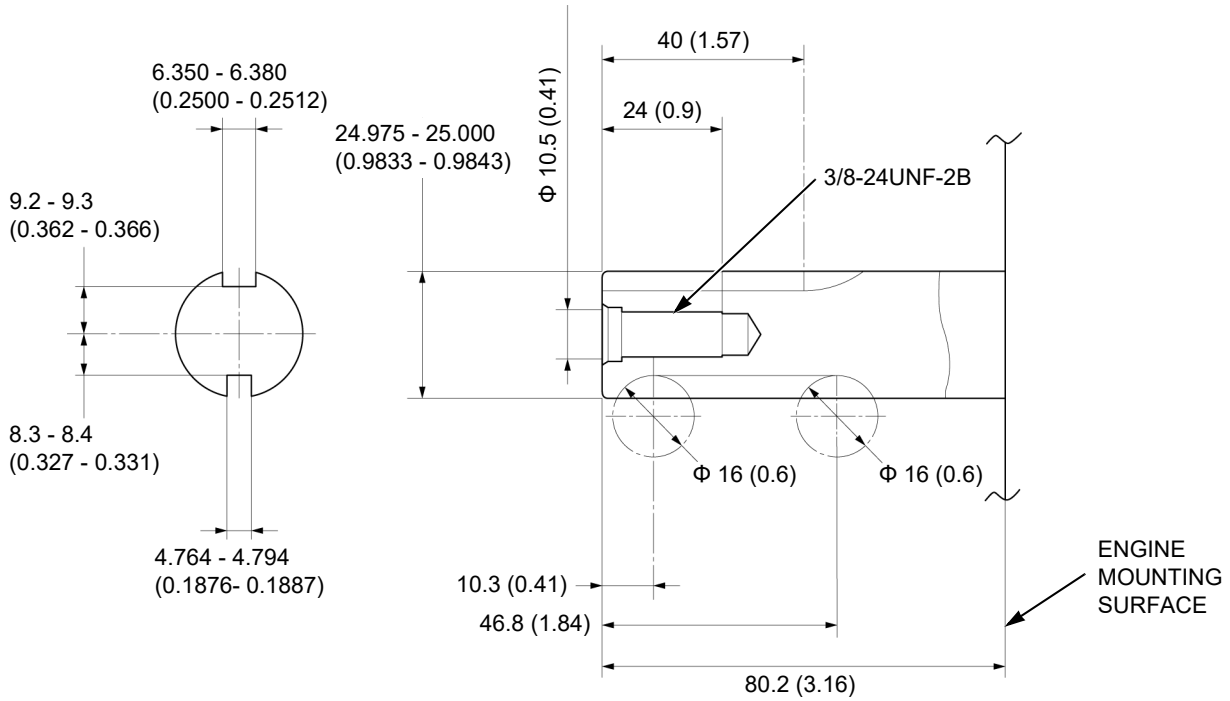
N1 type

Unit: mm (in)



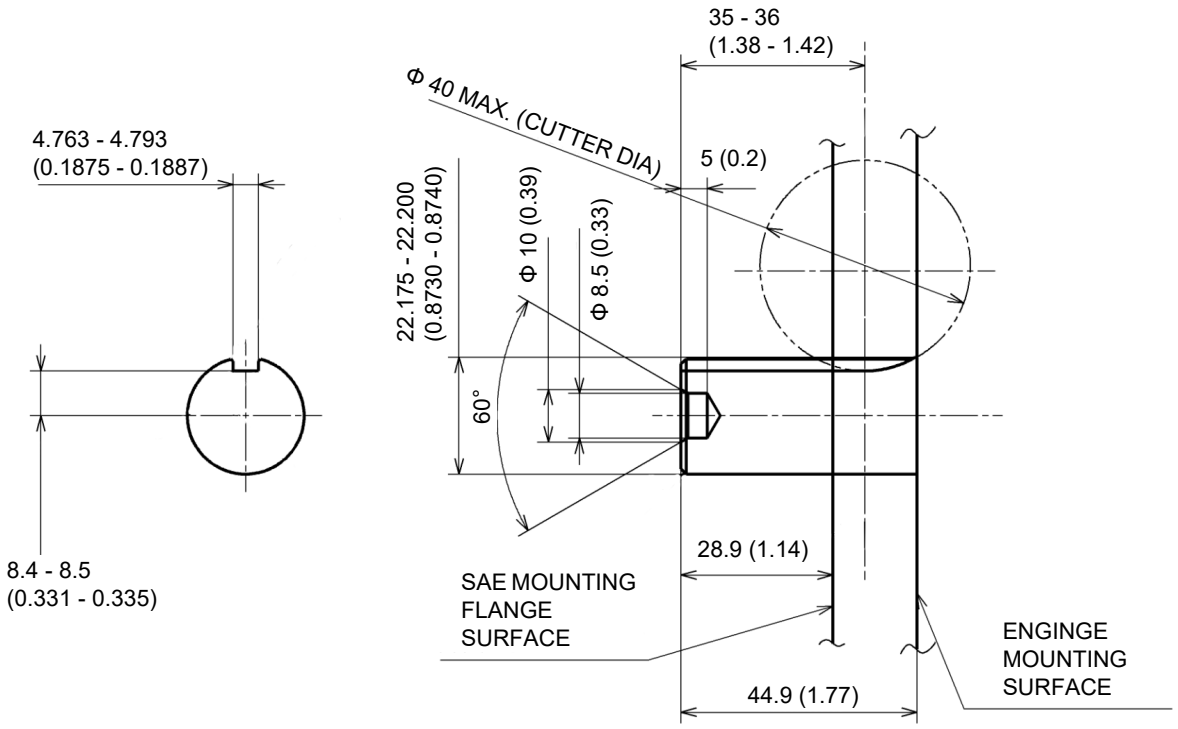
N3 type

Unit: mm (in)



N5 type

Unit: mm (in)



2. SERVICE INFORMATION

MAINTENANCE STANDARDS

GCV170/GCV200

Unit: mm (in)

Part	Item		Standard	Service limit
Engine	Maximum governed speed	GCV170 (A1A, S3B types)	3,100 ± 150 rpm	-
		GCV200 (S3C, S3L types)	3,050 ± 150 rpm	-
		GCV170/200 (G5B, G5BR)	3,700 ± 150 rpm	-
	Idle speed	GCV170 (A1A type)	1,700 ± 150 rpm	-
	Cylinder compression		0.50 MPa (5.0 kgf/cm^2, 71 psi)/600 rpm	-
Valves	Valve clearance	IN/EX	0.08 - 0.12 (0.003 - 0.005)	-
	Valve stem O.D.	IN/EX	5.465 - 5.480 (0.2152 - 0.2157)	5.318 (0.2094)
	Valve guide I.D.	IN	5.500 - 5.512 (0.2165 - 0.2170)	5.572 (0.2194)
		EX	5.540 - 5.552 (0.2181 - 0.2186)	5.612 (0.2209)
	Seat width	IN/EX	0.7 - 0.9 (0.03 - 0.04)	1.8 (0.07)
	Valve spring free length	IN/EX	30.5 (1.20)	29.0 (1.14)
Camshaft	Cam height	GCV170 IN/EX	33.779 - 34.179 (1.3299 - 1.3456)	33.754 (1.3289)
		GCV200 IN	34.253 - 34.653 (1.3485 - 1.3643)	34.228 (1.3476)
		GCV200 EX	34.258 - 34.658 (1.3487 - 1.3645)	34.233 (1.3478)
	Camshaft I.D.		10.090 - 10.120 (0.3972 - 0.3984)	10.140 (0.3992)
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 bearing I.D.		6.000 - 6.018 (0.2362 - 0.2369)	6.043 (0.2379)
Cylinder	Sleeve I.D.	GCV170	60.000 - 60.015 (2.3622 - 2.3628)	60.165 (2.3687)
		GCV200	66.000 - 66.015 (2.5984 - 2.5990)	66.165 (2.6049)
Piston	Skirt O.D.	GCV170	59.970 - 59.990 (2.3610 - 2.3618)	59.85 (2.3563)
		GCV200	65.970 - 65.990 (2.5972 - 2.5980)	65.85 (2.5925)
	Piston-to-cylinder clearance		0.010 - 0.045 (0.0004 - 0.0018)	0.085 (0.0033)
	Piston pin bore I.D.		13.002 - 13.016 (0.5119 - 0.5124)	13.048 (0.5137)
Piston pin	Pin O.D.		12.994 - 13.000 (0.5116 - 0.5118)	12.954 (0.5100)
Piston rings	Ring width	Top	0.935 - 0.950 (0.0368 - 0.0374)	0.890 (0.0350)
		Second	0.975 - 0.990 (0.0384 - 0.0390)	0.930 (0.0366)
		Oil	2.380 - 2.460 (0.0937 - 0.9685)	2.370 (0.0933)
	Ring side clearance	Top	0.055 - 0.089 (0.0022 - 0.0035)	0.190 (0.0075)
		Second	0.015 - 0.049 (0.0006 - 0.0019)	0.15 (0.006)
		Oil	0.045 - 0.144 (0.0018 - 0.0057)	0.240 (0.0094)
	Ring end gap	Top	0.20 - 0.30 (0.008 - 0.012)	1.0 (0.04)
		Second	0.30 - 0.40 (0.012 - 0.016)	1.0 (0.04)
		Oil (side rail)	0.20 - 0.45 (0.008 - 0.018)	1.0 (0.04)
Connecting rod	Small end I.D.		13.005 - 13.020 (0.5120 - 0.5126)	13.07 (0.515)
	Big end I.D.		28.020 - 28.033 (1.1031 - 1.1036)	28.066 (1.1050)
	Big end oil clearance		0.040 - 0.063 (0.0016 - 0.0025)	0.120 (0.0047)
	Big end axial clearance		0.10 - 0.50 (0.004 - 0.020)	0.80 (0.031)
Crankshaft	Main journal O.D. (PTO side)		27.980 - 27.993 (1.1016 - 1.1021)	27.933 (1.0997)
	Main journal O.D. (Flywheel side)		25.380 - 25.393 (0.9992 - 0.9997)	25.333 (0.9974)
	Crank pin O.D.		27.970 - 27.980 (1.1012 - 1.1016)	27.920 (1.0992)
Case Cover	Main journal I.D.		25.420 - 25.441 (1.0008 - 1.0016)	25.466 (1.0026)
	Crankshaft axial clearance		0.15 - 0.70 (0.006 - 0.028)	1.0 (0.04)
Crank Case	Main journal I.D.		28.020 - 28.041 (1.1031 - 1.1040)	28.066 (1.1050)
Spark plug	Gap		0.70 - 0.80 (0.028 - 0.031)	-
Ignition coil	Resistance	Primary coil	0.4 - 0.6 Ω	-
		Secondary coil	8.3 - 12.5 kΩ	-
	Air gap (at flywheel)		0.30 - 0.50 (0.012 - 0.020)	-
Flywheel brake	Brake shoe thickness		See page 3-7	3.0 (0.12)

TORQUE VALUES

Item	Thread Dia. (mm)	Torque values		
		N•m	kgf•m	lbf-ft
Air cleaner case nut	M6 x 1.0	8.5	0.9	6.3
Connecting rod bolt	M7 x 1.0	12	1.2	9
Crankcase cover bolt	M8 x 1.25	24	2.4	18
Cylinder bolt	M8 x 1.25	24	2.4	18
Cylinder bolt	M8 x 1.25	24	2.4	18
Engine cover spring nut screw	M5 x 0.8	1	0.1	0.7
Engine stop switch screw	M4 x 0.7	1.8	0.2	1.3
Flywheel nut (Light flywheel type)	M14 x 1.5	55	5.6	41
Flywheel nut (Heavy flywheel type)	M14 x 1.5	75	7.6	55
Fuel cock screw	Tapping screw	2.5	0.3	1.8
Governor holder shaft bolt	M6 x 1.0	12	1.2	9
Oil extension bolt	M6 x 1.0	12	1.2	9
Recoil starter bolt	M6 x 1.0	8.5	0.9	6.3
Spark plug	M14 x 1.25	20	2.0	15
Valve adjusting lock nut	M5 x 1.0	8	0.8	5.9
Valve lifter bolt	M6 x 1.0	10	1.0	7

STANDARD TORQUE VALUES

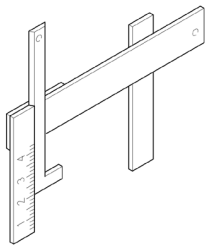
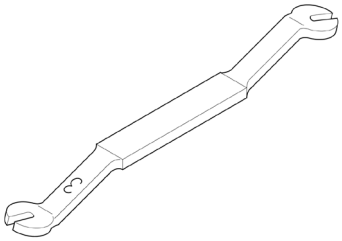
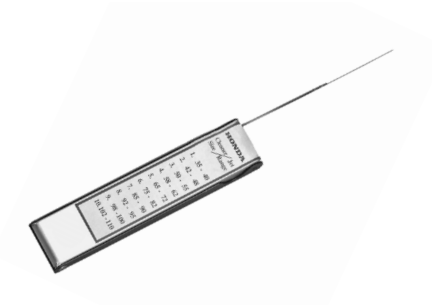
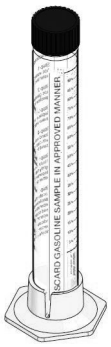
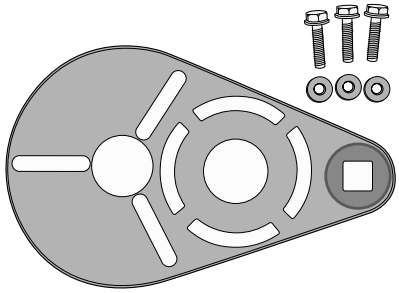
Item	Thread Dia. (mm)	Torque values		
		N•m	kgf•m	lbf-ft
Screw	M5	4.2	0.4	3.1
	M6	9	0.9	6.6
Bolt and nut	M5	5.2	0.5	3.9
	M6	10	1.0	7
	M8	22	2.2	16
	M10	34	3.5	25
	M12	54	5.5	40
Flange bolt and nut	M5	5.5	0.6	4.1
	M6	12	1.2	9
	M8	27	2.8	20
	M10	39	4.0	29
CT (Cutting threads) flange bolt (Retightening)	M6	12	1.2	9

LUBRICATION & SEAL POINTS

Material	Location
Engine oil	Crankshaft journal
	Crankshaft pin
	Crankcase bearing area
	Crankcase cover bearing area
	Piston outer surface and piston pin hole
	Piston pin outer surface
	Piston ring entire surface
	Cylinder inner surface
	Connecting rod big and small end bearing area
	Connecting rod bolt threads and seating surface
	Camshaft bearing, cam profile and decompressor
	Valve stem sliding surface and stem end
	Valve spring whole surface
	Rocker arm sliding surface
	Rocker arm shaft whole surface
	Valve adjusting screw threads
	Valve adjusting lock nut threads and seating surface
	Flywheel nut threads and seating surface
	Governor holder shaft journal
	Governor arm shaft journal
	Timing gear teeth
	Valve lifter sliding surface
	Valve lifter bolt shaft journal
	Thrust washer both sides
Multi-purpose grease	Oil seal lips
	O-ring
Hondabond HT, Threebond® 1216E, LOCTITE® 5900 or equivalent	Cylinder and cylinder head cover mating surface
	Cylinder and crankcase mating surface
	Crankcase and crankcase cover mating surface
	Thermo-wax square end

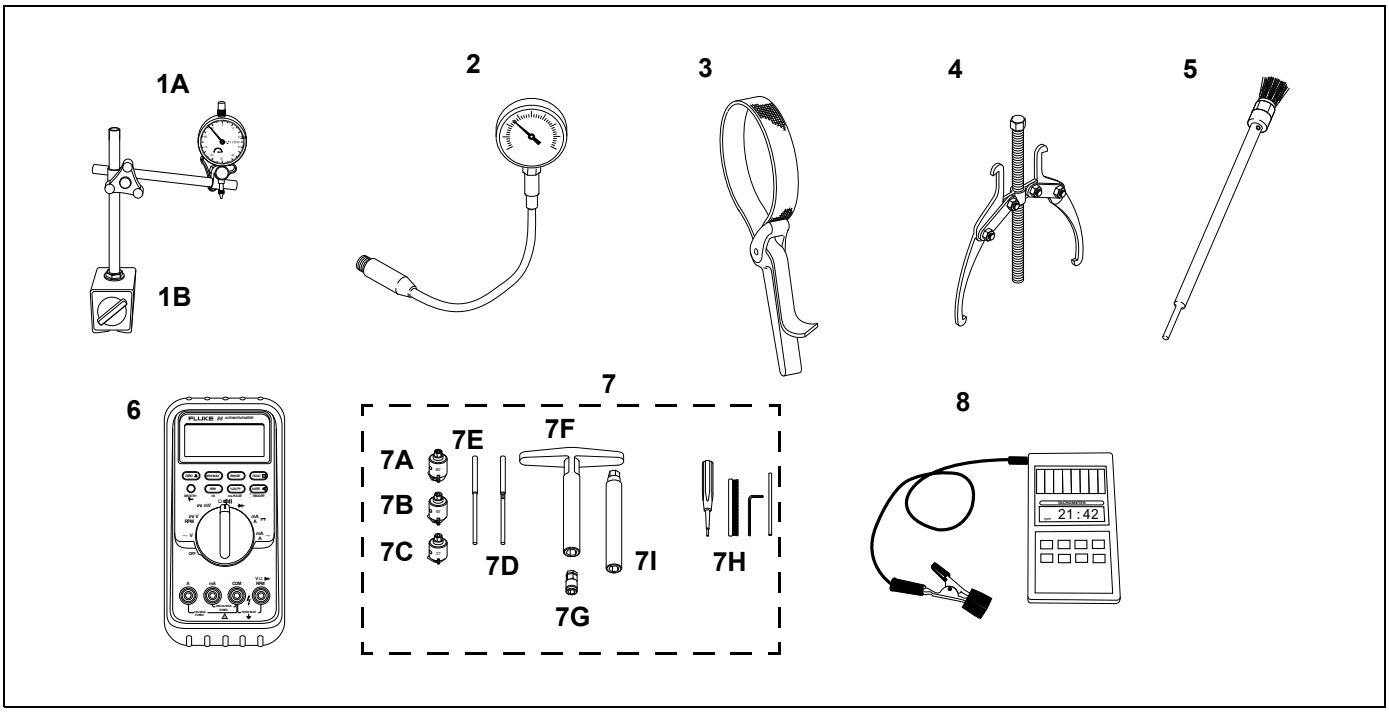
TOOLS

SPECIAL TOOLS

Float level gauge 07401-0010000 	Valve adjusting wrench 07908-KE90000 	Jet Cleaner 07JPZ-001010B 
Fuel Alcohol Tester° 07AAJ-E85A100 	Flywheel Holder (Multi-use) 07APB-Z28A101 	

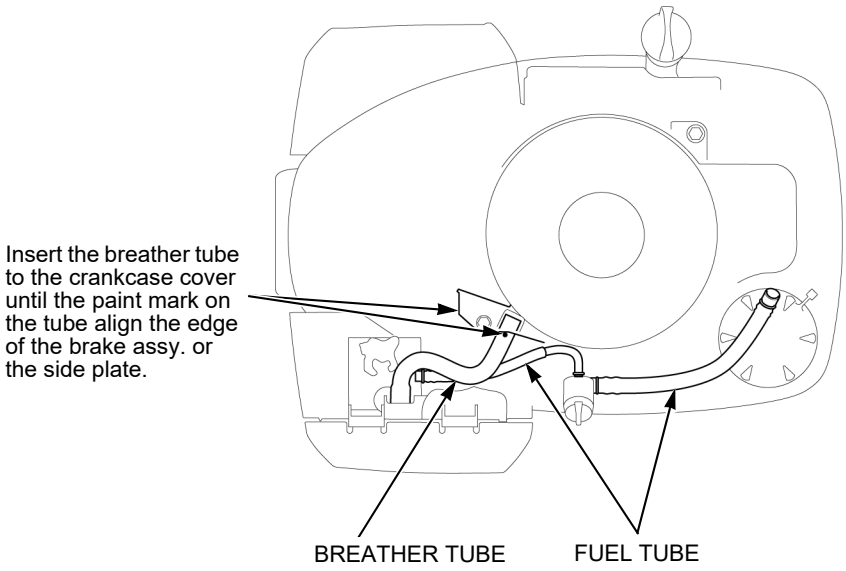
COMMERCIALLY AVAILABLE TOOLS

ITEM	TOOL NAME	TOOL NUMBER	APPLICATION
1A	Dial indicator and magnetic base	FPL-72-520-300	Crankshaft runout check and crankshaft axial clearance check
1B	Dial indicator magnetic base	FFL-72-585-010	
2	Compression gauge	EEPV503	Cylinder compression test
3	Strap wrench	STV-S-17	Flywheel removal
4	Flywheel puller	OTC-1035	Flywheel removal
5	Cleaning brush	—	Cleaning combustion chamber
6	Digital multimeter	FLU-88	Electrical component testing
7A	Valve seat cutter, 31°	NWY CU 115	Valve seat reconditioning
7B	Valve seat cutter, 45°	NWY CU 122	
7C	Valve seat cutter, 60°	NWY CU 111	
7D	Solid pilot bar, 5.50 mm	NWY PM 10055SH	
7E	Solid pilot bar, 5.51 mm	NWY PM 100552S	
7F	T-wrench, #505	NWY TW 505	
7G	T-wrench adapter, #503-1	NWY TW 503-1	
7H	Accessory package #246	NWY KACC 246	
7I	T-wrench extension, 6 in	NWY TW 503-6H	
8	Tachometer	KE-1-5	Measuring engine speed

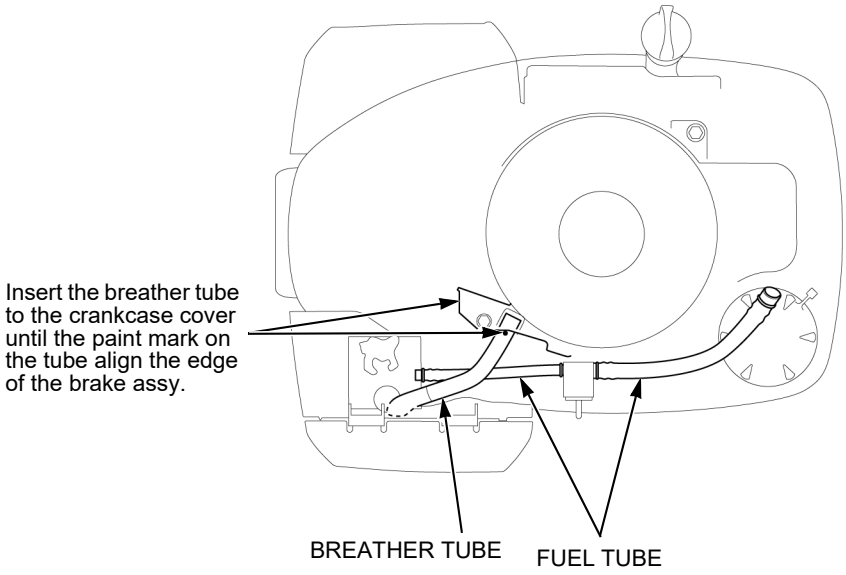


HARNESS AND TUBE ROUTING

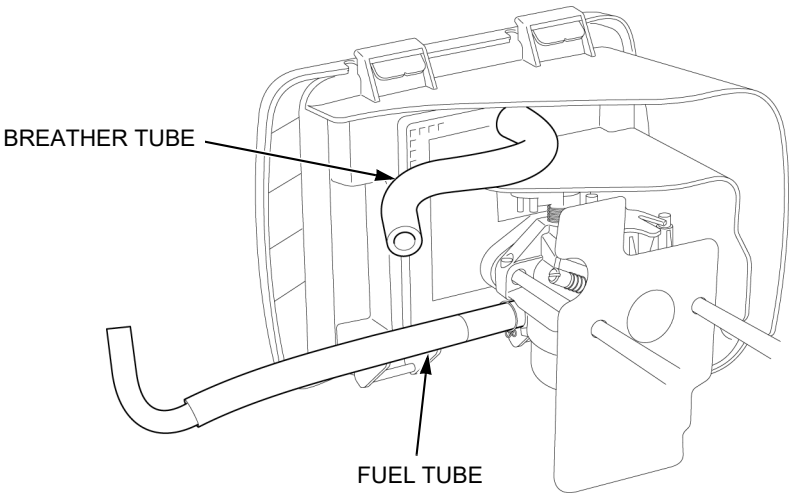
A1A type (Manual choke and manual throttle)



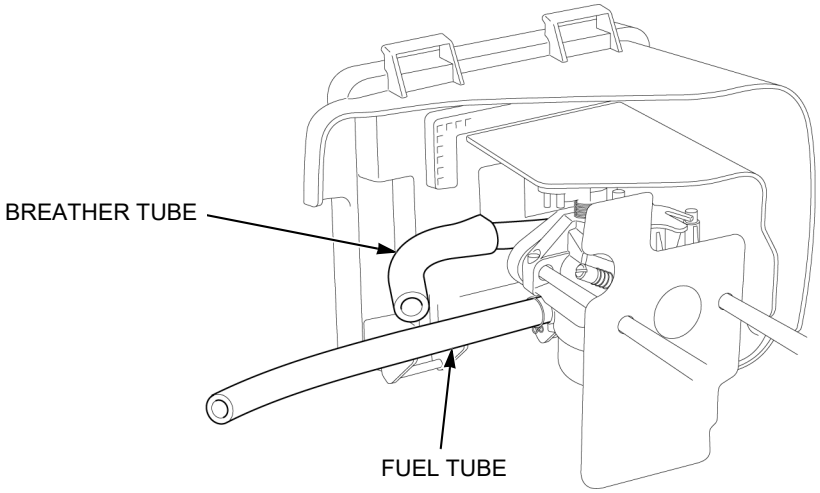
S3B, S3C, S3L, G5B, G5BR types (Automatic choke and fixed throttle)



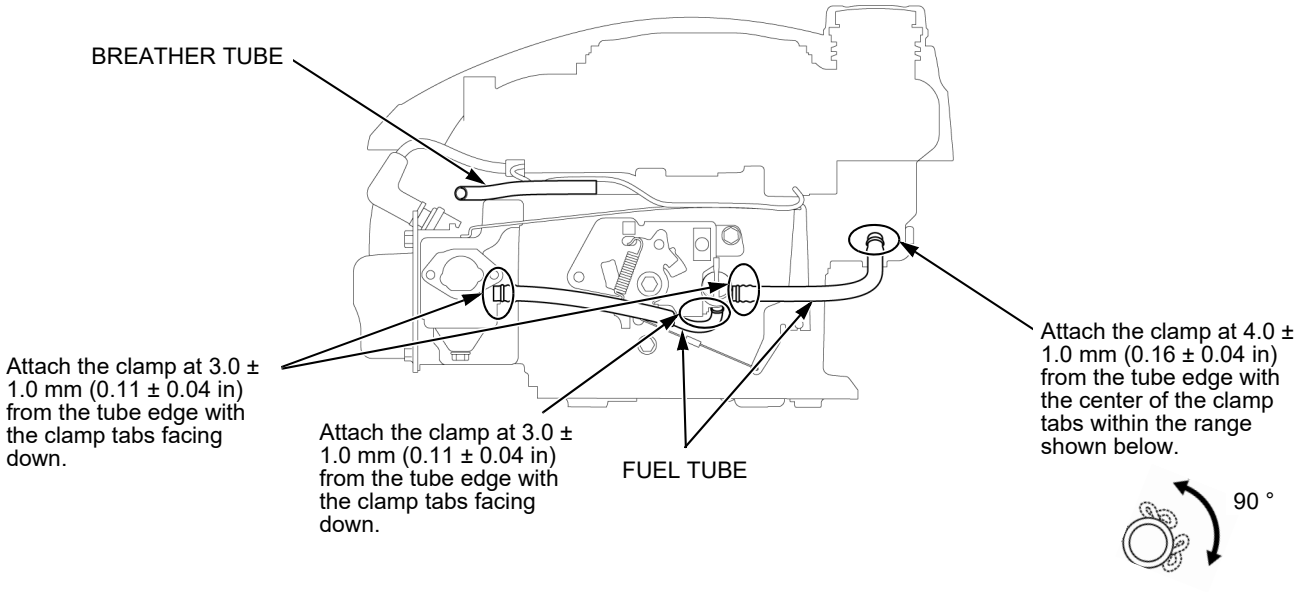
A1A type (Manual choke and manual throttle)



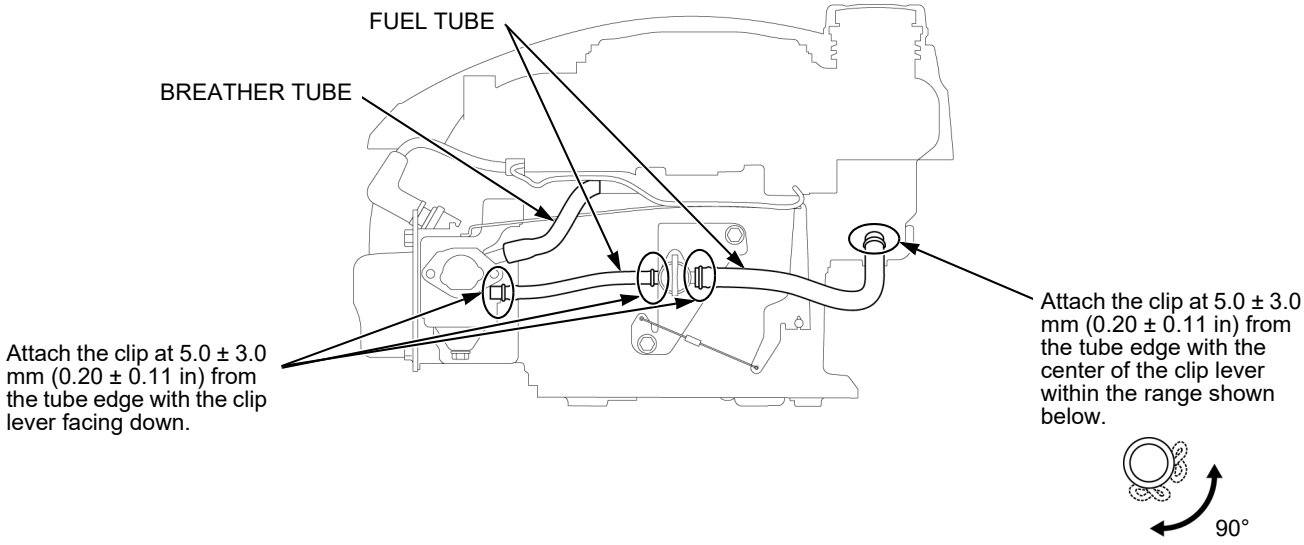
S3B, S3C, S3L, G5B, G5BR types (Automatic choke and fixed throttle)



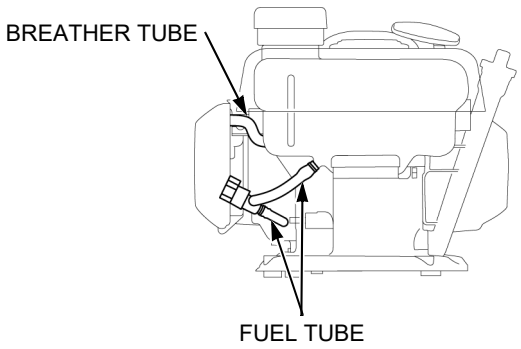
A1A type (Manual choke and manual throttle)



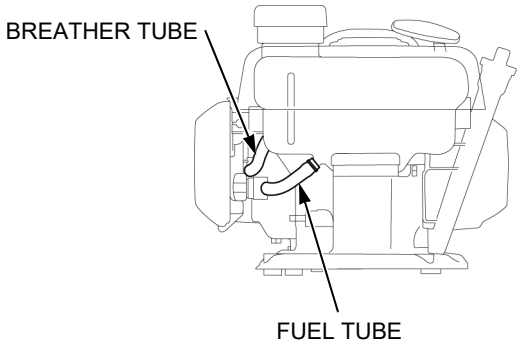
S3B, S3C, S3L, G5B, G5BR types (Automatic choke and fixed throttle)



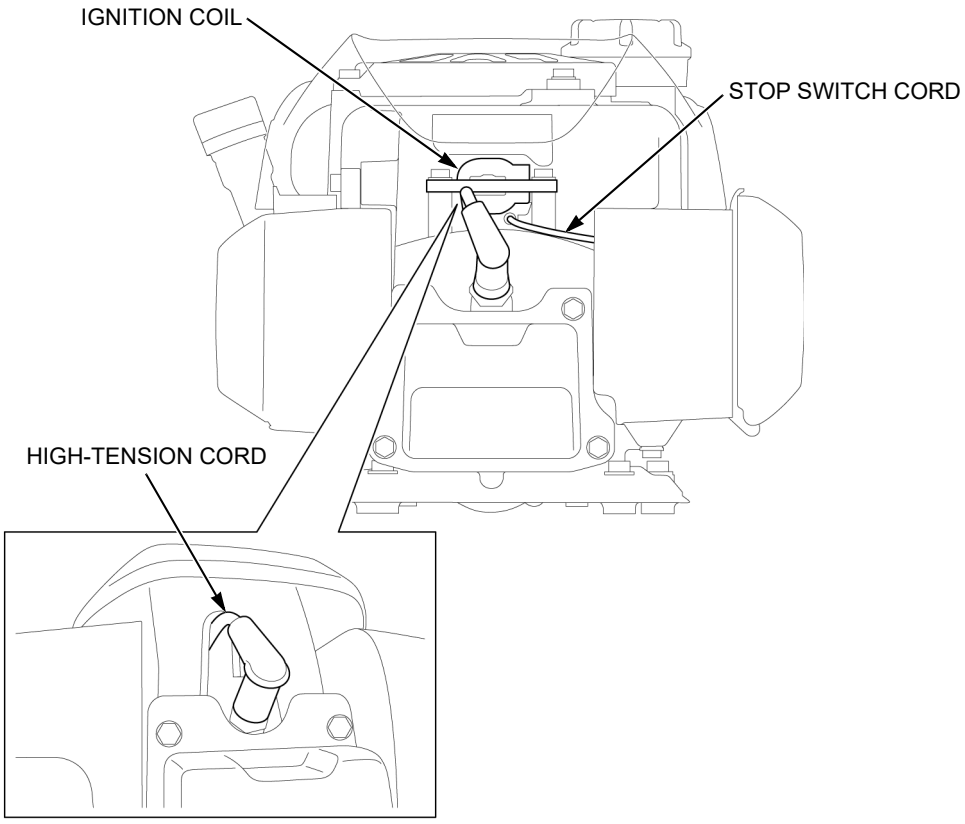
A1A type (Manual choke and manual throttle)



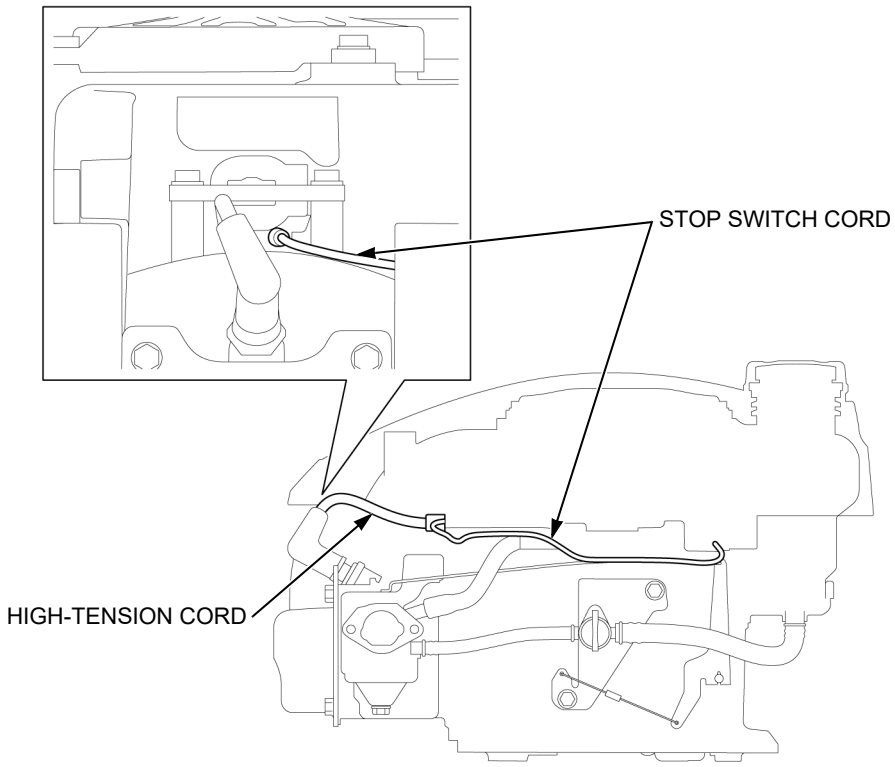
S3B, S3C, S3L, G5B, G5BR types (Automatic choke and fixed throttle)



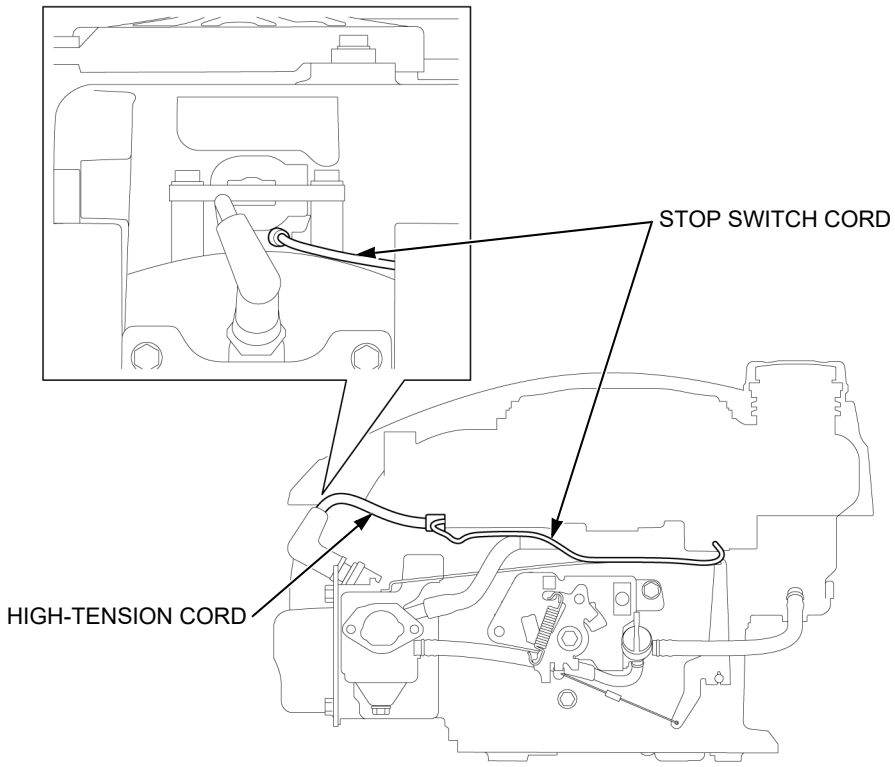
All types



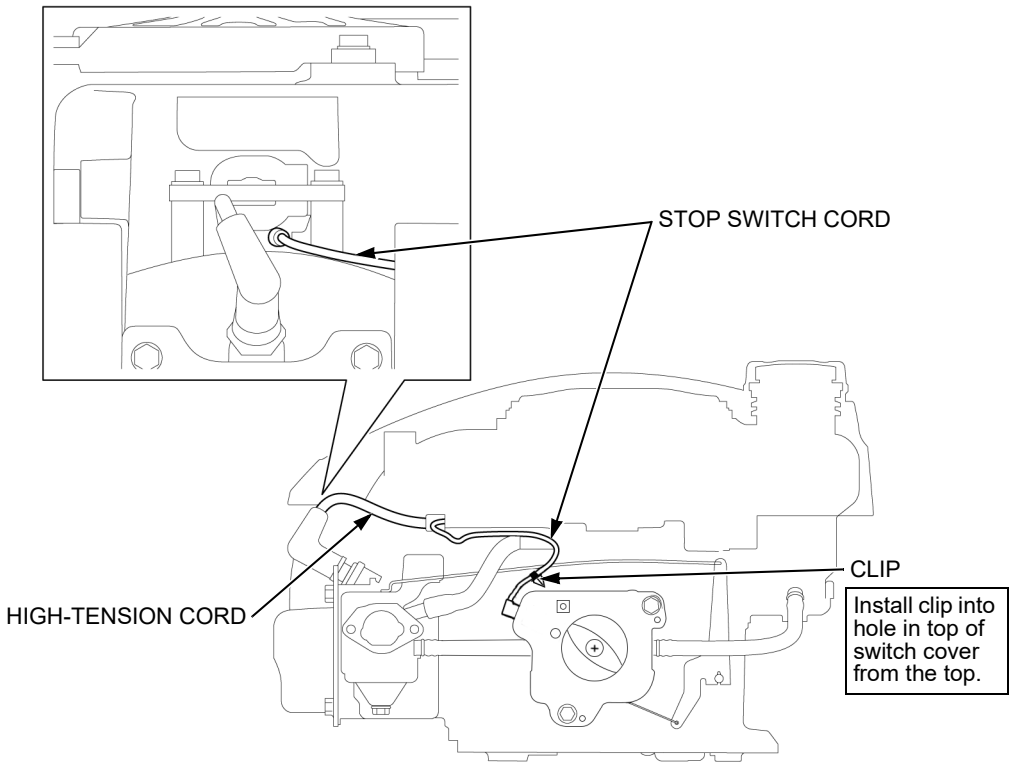
S3B, S3C, S3L types



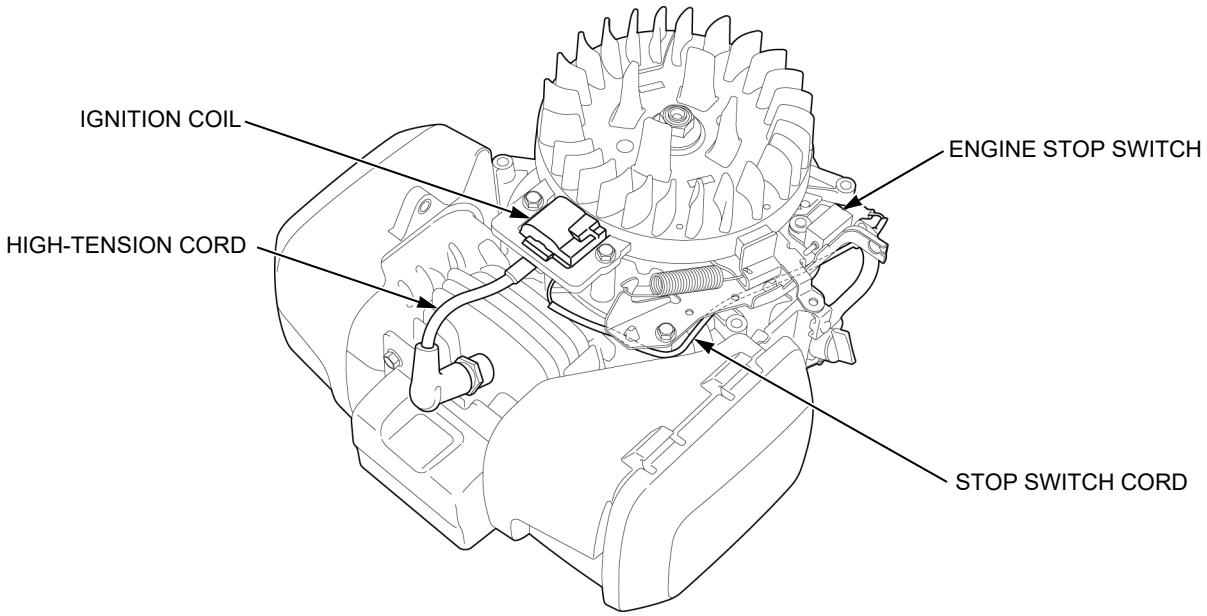
A1A type



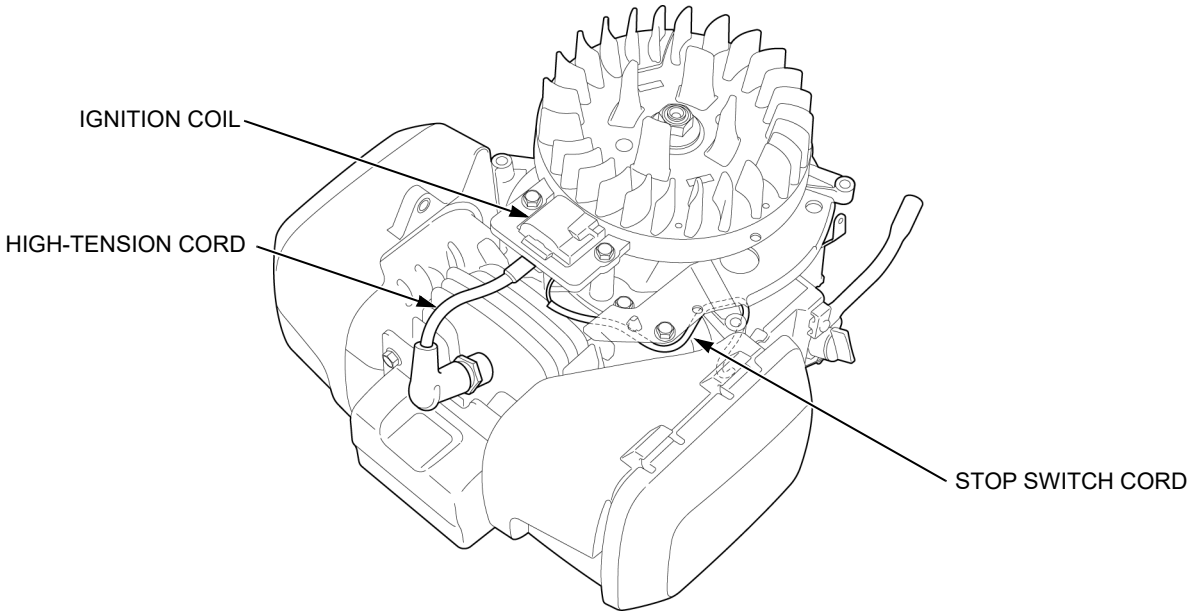
G5B, G5BR types



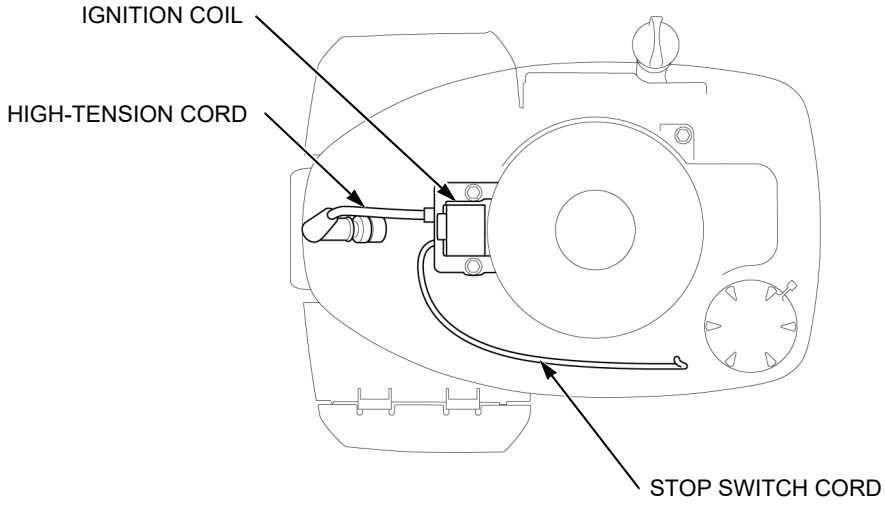
A1A, S3B, S3C, S3L types



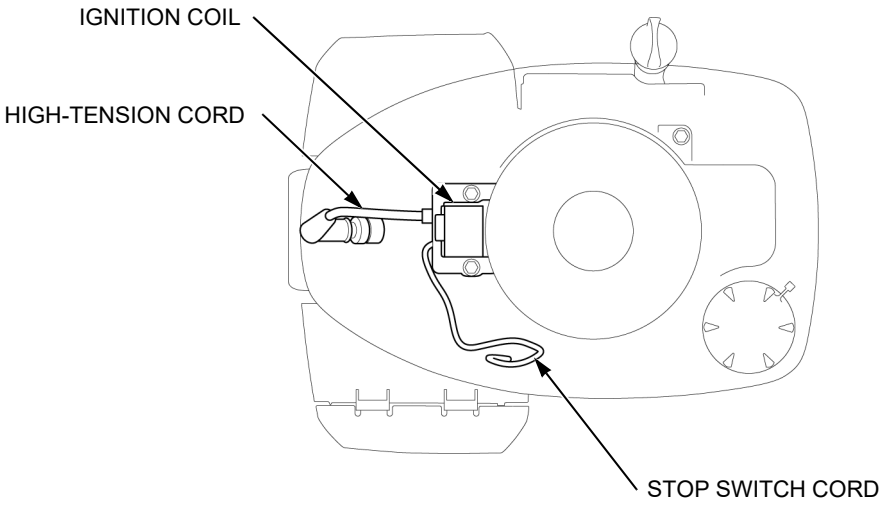
G5B, G5BR types



A1A, S3B, S3C, S3L types



G5B, G5BR types



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 5 hrs.	Every 3 months or 25 hrs.	Every 6 months or 50 hrs.	Every year or 100 hrs.	Every 2 years or 250 hrs.	
Engine oil	Check level	○						3-3
	Change		○		○ (2)			3-4
Air cleaner	Check	○						3-5
	Clean			○ (3)				3-5
	Replace						○	3-5
Flywheel brake shoe (applicable types)	Check				○			3-7
Spark plug	Check-adjust					○		3-6
	Replace						○	3-6
Spark arrester (if equipped)	Clean					○		3-7
Idle speed	Check					○		7-5
Fuel tank and filter	Clean					○		3-9
Valve clearance	Check-adjust					○		3-7
Combustion chamber	Clean	After every 250 hrs.						3-9
Fuel tube	Check	Every 2 years (Replace if necessary)						3-10

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

(2) Change engine oil every 25 hours when used heavy load or in high ambient temperature.

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

Failure to follow this maintenance schedule could result in non-warrantable failures.

ENGINE OIL LEVEL CHECK/CHANGE

CHECK

Place the engine on a level surface.

Remove the oil filler cap [1] and wipe the dipstick [2] clean.

Insert the dipstick in the oil filler neck, but do not screw it in.
Remove the dipstick and check the oil level.

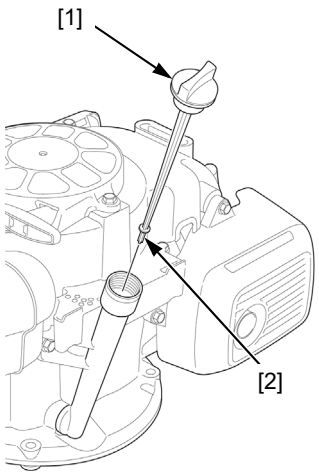
If the oil level is near or below the lower limit mark [3] on the dipstick, fill with the recommended oil to the upper limit mark [4]. Do not overfill.

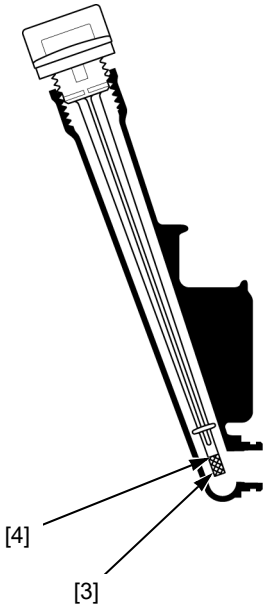
RECOMMENDED ENGINE OIL:
SAE 10W-30
API Service classification SN or later

Oil is a major factor affecting performance and service life. Use 4-stroke automotive detergent oil.

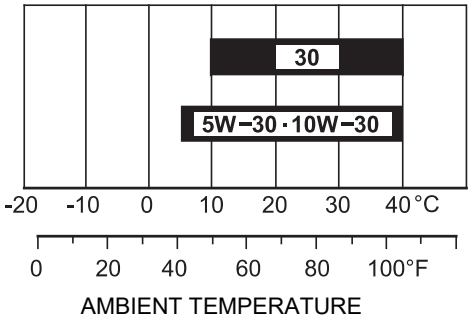
SAE 10W-30 is recommended for general use. Other viscosities shown in the chart may be used when the average temperature in your area is within the recommended range.

Reinstall the oil filler cap securely.

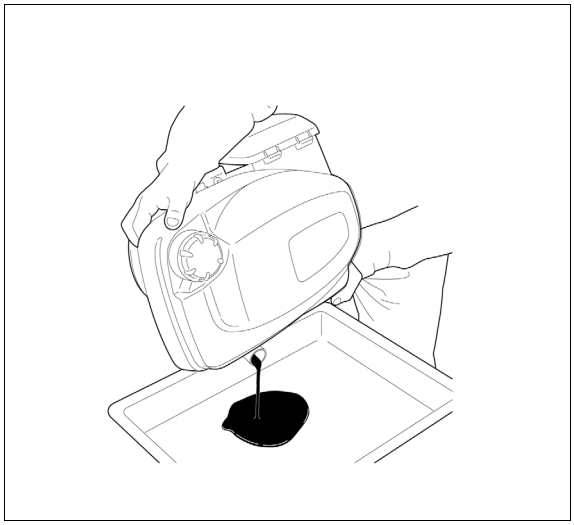




SAE VISCOSITY GRADES



CHANGE



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

Turn the fuel valve OFF position and check that the fuel tank cap is tightened securely.

Remove the oil filler cap.
Tilt the engine toward the oil filler extension side and drain the used engine oil into a 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 on the ground, or 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.

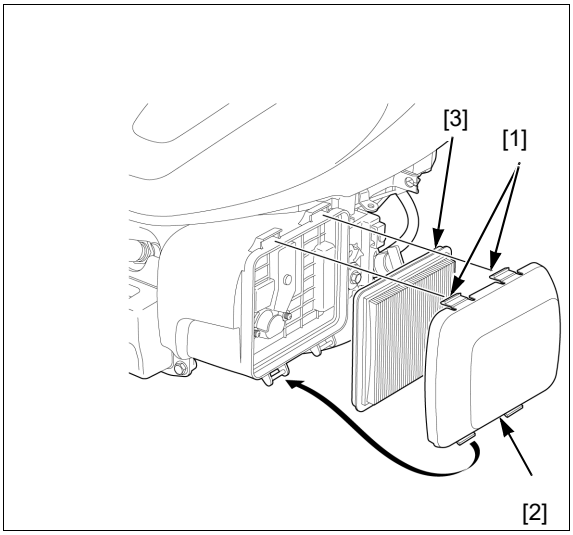
With the engine on a level surface, refill with the recommended engine oil to the upper limit mark on the dipstick. Always use the dipstick to confirm the oil level is correct.

ENGINE OIL CAPACITY:
0.40 Liters (0.42 US qt, 0.35 Imp qt)

Tighten the oil filler cap securely.

AIR CLEANER CHECK/CLEANING/REPLACEMENT

A dirty air cleaner element will restrict air flow to the carburetor, reducing engine performance. If the engine is operated in dusty areas, clean the air cleaner element more often than specified in the MAINTENANCE SCHEDULE.



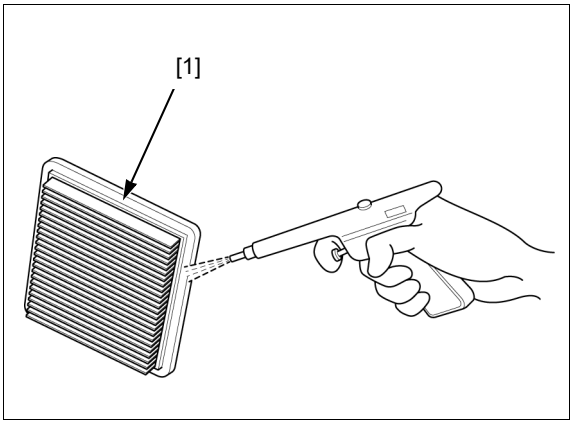
NOTICE

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.

Press the latch tabs [1] on the top of the air cleaner cover [2], and remove the cover.
Remove the paper element [3] from the air cleaner case.

Inspect the air cleaner element, and replace if it is damaged. It is recommended to always use a genuine Honda air cleaner element.

ELEMENT CLEANING



Tap the element [1] several times on a hard surface to remove dirt, or blow compressed air (not exceeding 200 kPa (2.0 kgf/cm^2, 29 psi)) through the element from the inside.

Never try to brush off dirt; brushing will force dirt into the paper fibers.

Wipe dirt from the inside of the air cleaner cover and air cleaner case, using a moist rag.
Be careful to prevent dirt from entering the air duct that leading to the carburetor.

Install the air cleaner element and air cleaner cover.

SPARK PLUG CHECK/ADJUSTMENT

Remove the spark plug (page 3-6).

Clean the spark plug [1] electrodes with a wire brush [2] or special plug cleaner.

Check the following and replace if necessary.

– Insulator [3] and sealing washer [4] for damage
– Center electrode [5] and side electrode [6] for wear
– Burning condition, coloration

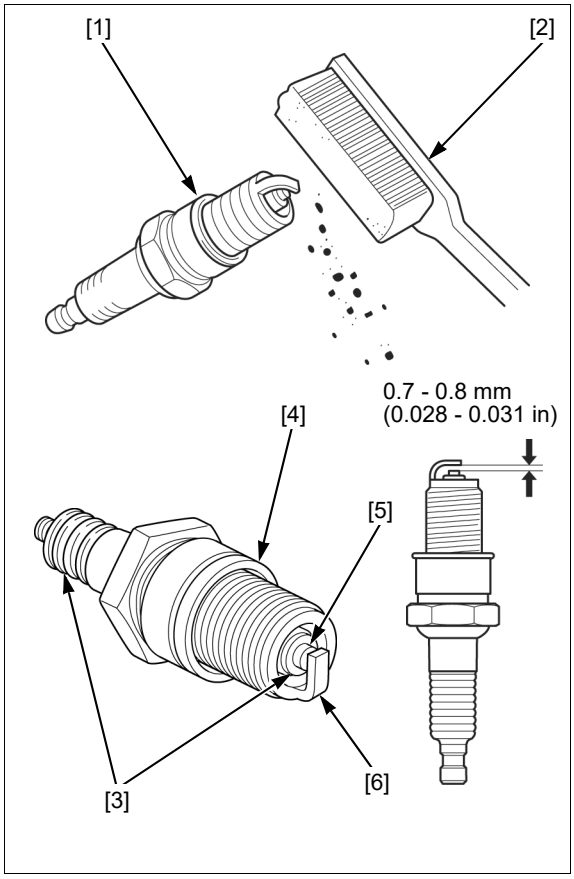
RECOMMENDED SPARK PLUG:
BPR5ES (NGK)

Measure the plug gap with a wire-type feeler gauge.

PLUG GAP: 0.70 – 0.80 mm (0.028 – 0.031 in)

If the measurement is out of the specification, adjust by bending the side electrode.

Install the spark plug (page 3-6).



SPARK PLUG REPLACEMENT

REMOVAL

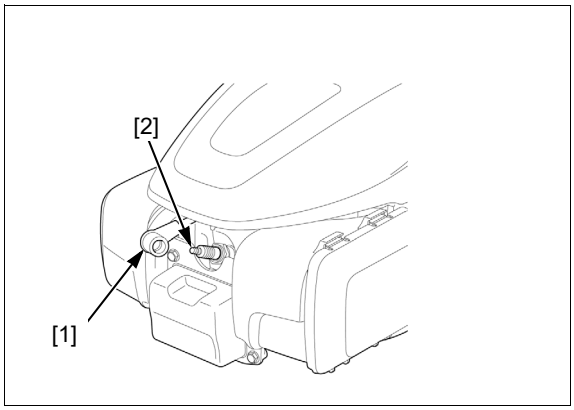
⚠CAUTION

The engine and 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.

Disconnect the spark plug cap [1] and remove the spark plug [2].

NOTE:

- Clean around the spark plug base with compressed air before removing the spark plug and be sure that no debris is allowed to enter into the combustion chamber.



INSTALLATION

Install and hand tighten the spark plug to the cylinder head.

RECOMMENDED SPARK PLUG:
BPR5ES (NGK)

Tighten the spark plug to the specified torque.

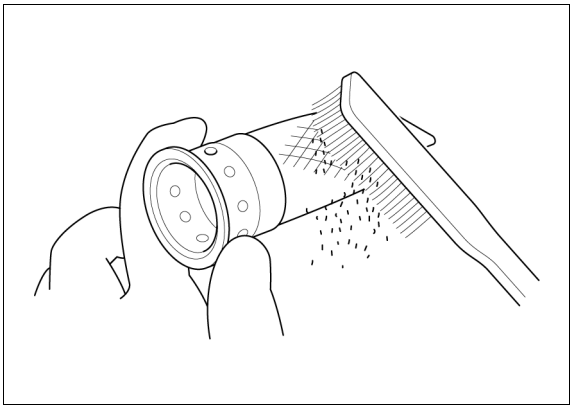
TORQUE: 20 N•m (2.0 kgf•m, 15 lbf-ft)

Connect the spark plug cap.

SPARK ARRESTER CLEANING (IF EQUIPPED)

⚠ CAUTION

The engine and the muffler becomes very hot during operation and remains hot for a while after stopping the engine. Hot metal parts can burn you. Be careful not to touch the muffler while it is hot and allow it to cool before proceeding.



Remove the spark arrester (page 11-2).

Clean the carbon deposits from the spark arrester screen with a wire brush.

NOTICE

Be careful to avoid damaging the screen.

Check the spark arrester screen for damage.

Replace the spark arrester if it is damaged.

Install the spark arrester (page 11-2).

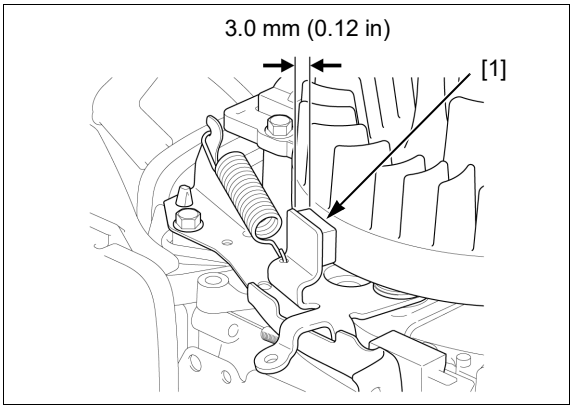
FLYWHEEL BRAKE SHOE CHECK (LIGHT FLYWHEEL TYPE)

Remove the fan cover (page 5-3).

Measure the thickness of the brake shoe lining [1].

SERVICE LIMIT: 3.0 mm (0.12 in)

If the brake shoe lining thickness is less than the service limit, replace the brake assy. (page 10-5).



VALVE CLEARANCE CHECK/ADJUSTMENT

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

CHECK

Applicable types: Remove the top cover (page 5-2).

Remove the cylinder head cover (page 12-5).

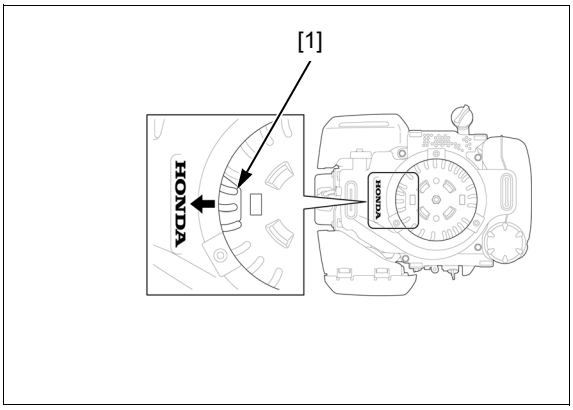
NOTICE

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

Rotate the flywheel clockwise until the magnet inside the flywheel [1] faces toward the cylinder head.

If it is hard to rotate the flywheel, remove the spark plug.

This will either set the piston at top dead center (TDC) of the compression stroke (both valves are fully closed) or it will set the piston at TDC of valve overlap (valves partially open). The engine must be at TDC of the compression stroke. If the valves are not fully closed, rotate the flywheel 360 degrees again so that the engine is at TDC of the compression stroke.



Insert a thickness gauge [1] between the valve adjusting screw [2] and valve stem [3] while pushing the rocker arm shaft [4] to measure the valve clearance.

VALVE CLEARANCE:
IN: 0.08 – 0.12 mm (0.003 – 0.005 in)
EX: 0.08 – 0.12 mm (0.003 – 0.005 in)

If adjustment is necessary, proceed as follows.

ADJUSTMENT

Hold the valve adjusting screw using the special tool and loosen the valve adjusting lock nut [5].

TOOL:
Valve adjusting wrench, 3 mm [6] 07908-KE90200

Turn the adjusting screw to obtain the specified clearance.

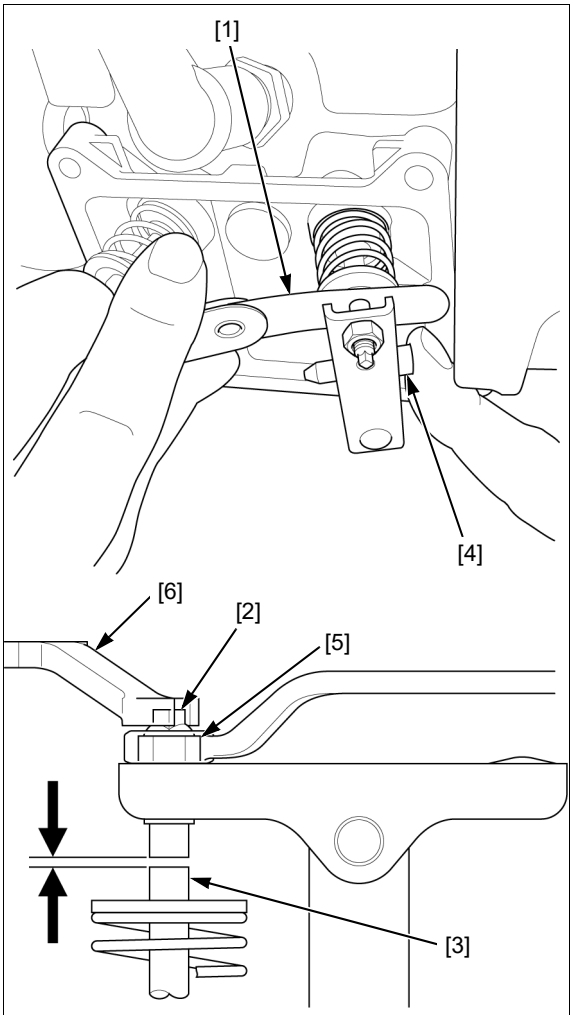
Hold the valve adjusting screw and retighten the valve adjusting lock nut to the specified torque.

TORQUE:
Valve adjusting lock nut:
8 N•m (0.8 kgf•m, 5.9 lbf-ft)

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

Apply liquid gasket to the cylinder head cover installation surface (page 12-7).

Installation is in the reverse order of removal.



To increase valve clearance, screw out.

To decrease valve clearance, screw in.

COMBUSTION CHAMBER CLEANING

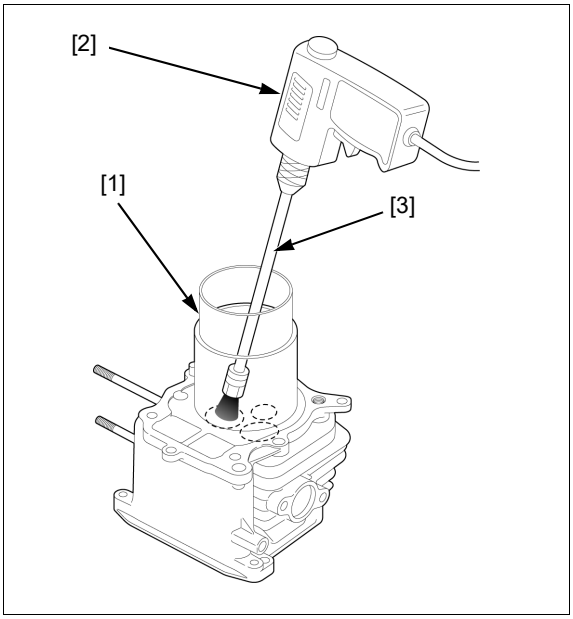
Remove the cylinder (page 12-5).

Prepare a cylinder of thick paper or equivalent material [1], with a large enough diameter to fit against the inner wall of the cylinder.

Insert thick paper into the cylinder to protect the inner wall of the cylinder when cleaning the combustion chamber.

Attach the cleaning brush to an electric drill [2] and clean the combustion chamber.

TOOL:
Cleaning brush [3] **07998-VA20100**



NOTICE

- *Clean the combustion chamber when the valves have been installed in the cylinder.*
- *Do not press the cleaning brush with force against the combustion chamber.*

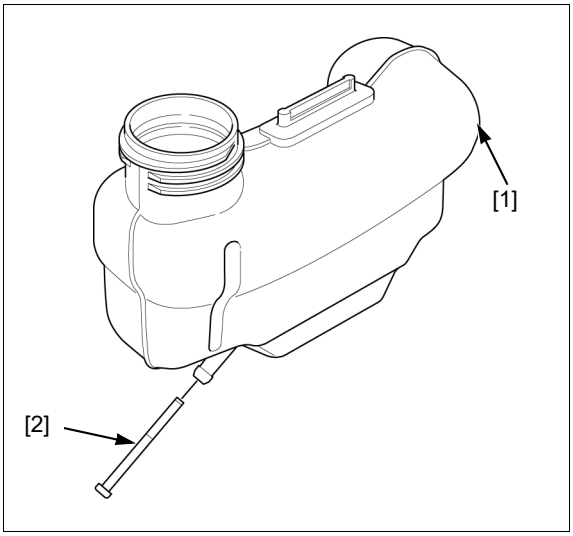
FUEL TANK AND STRAINER CLEANING

⚠WARNING

Gasoline is highly flammable and explosive. You can be burned or seriously injured when handling fuel.
- Stop the engine and let it cool.
- Keep heat, sparks and flames away.
- Handle fuel only outdoors.
- Wipe up spills immediately.

Remove the fuel tank (page 6-2).

Drain the fuel from the fuel tank [1].
Wash inside the fuel tank with nonflammable solvent to remove any foreign material and water from the tank.
Remove the dust and foreign material from the strainer [2] by running solvent through the outlet tube.



FUEL TUBE CHECK

⚠WARNING

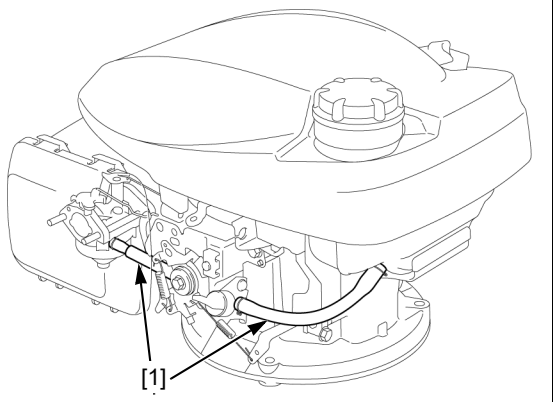
Gasoline is highly flammable and explosive.
You can be burned or seriously injured when handling fuel.
- Stop the engine and let it cool.
- Keep heat, sparks, and flames away.
- Wipe up spills immediately.
- Handle fuel only outdoors.

Check the fuel tubes [1] for damage, fuel leakage, corrosion, and other abnormalities. Check that the tubes are not interfering with the neighboring parts.

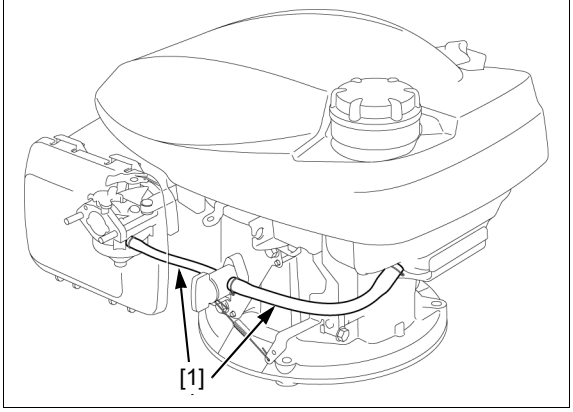
Start the engine and check for fuel leakage.

Replace the tube if there is damage, fuel leakage, corrosion, etc.

Manual throttle type



Fixed throttle type



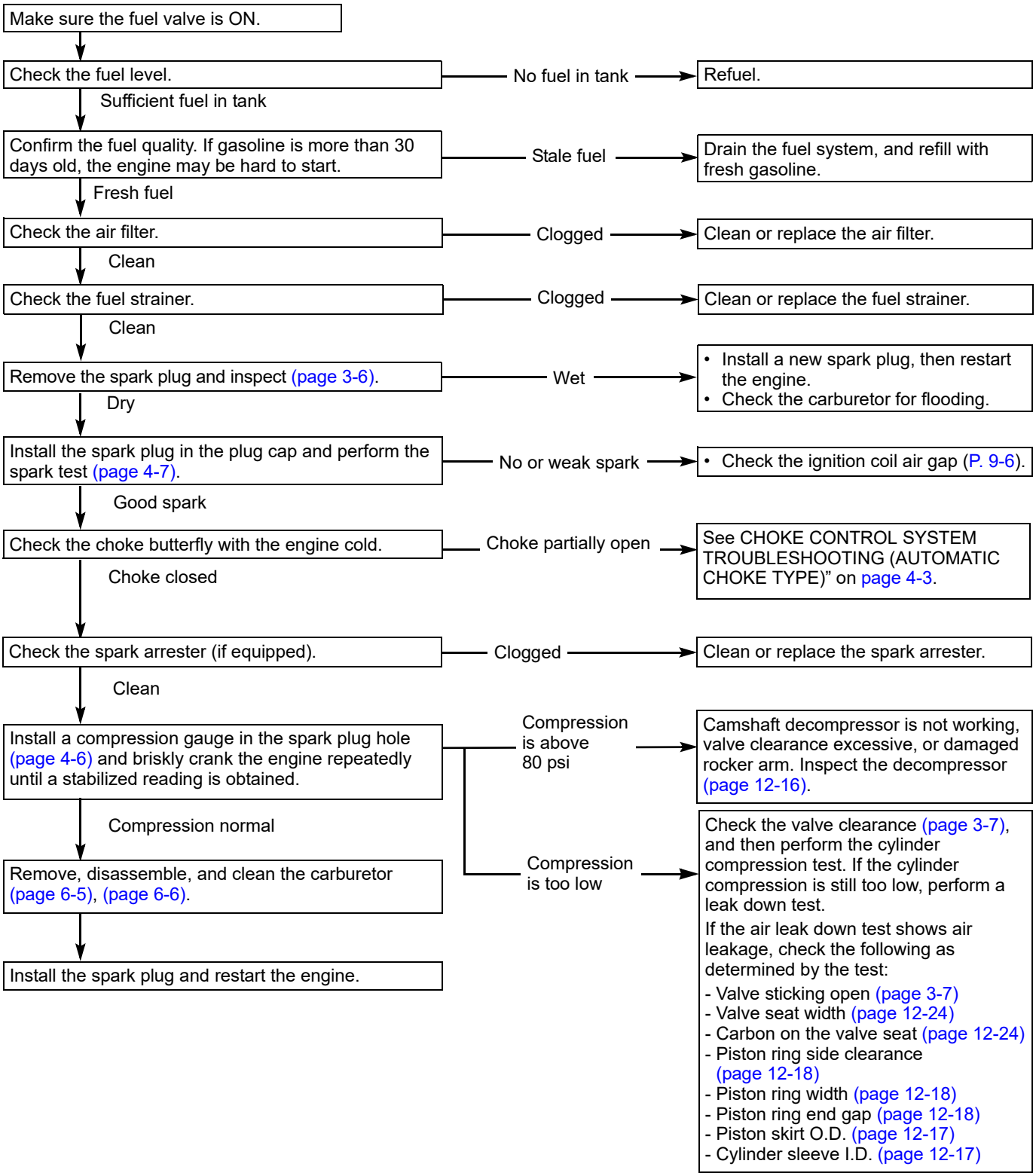
4. TROUBLESHOOTING

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.

TROUBLESHOOTING

ENGINE DOES NOT START, IS HARD TO START, OR POOR ENGINE PERFORMANCE

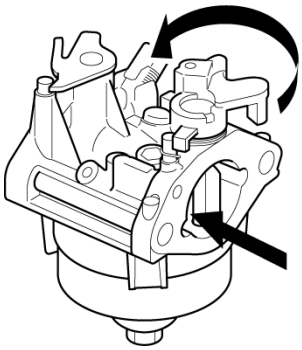


CHOKE CONTROL SYSTEM TROUBLESHOOTING (AUTOMATIC CHOKE TYPE)

With the engine cold, remove the paper filter element and check the choke valve.

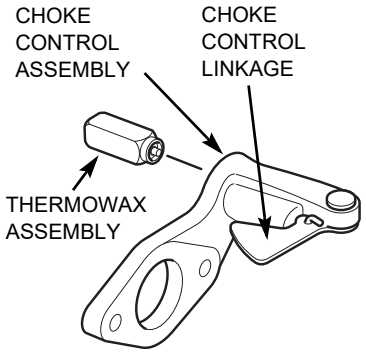
Partially or totally open

Remove the air cleaner case. Push the choke valve open, and let it go. Check that the choke valve snaps back to the choke CLOSED position.



Normal

Inspect the choke control assembly linkage for smooth operation. If it operates properly, replace the thermowax (page 6-11). Inspect operation of the choke control (see below).



Abnormal

Replace the carburetor (page 6-3).

Closed

Start the engine and check to see if the choke opens within 3 minutes.

Opens too slowly or does not open

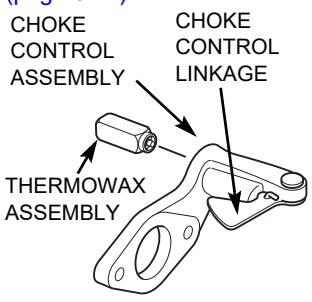
Allow the engine to cool. Push the choke valve open and release it. The choke should open smoothly and snap closed when released.

Hard to move

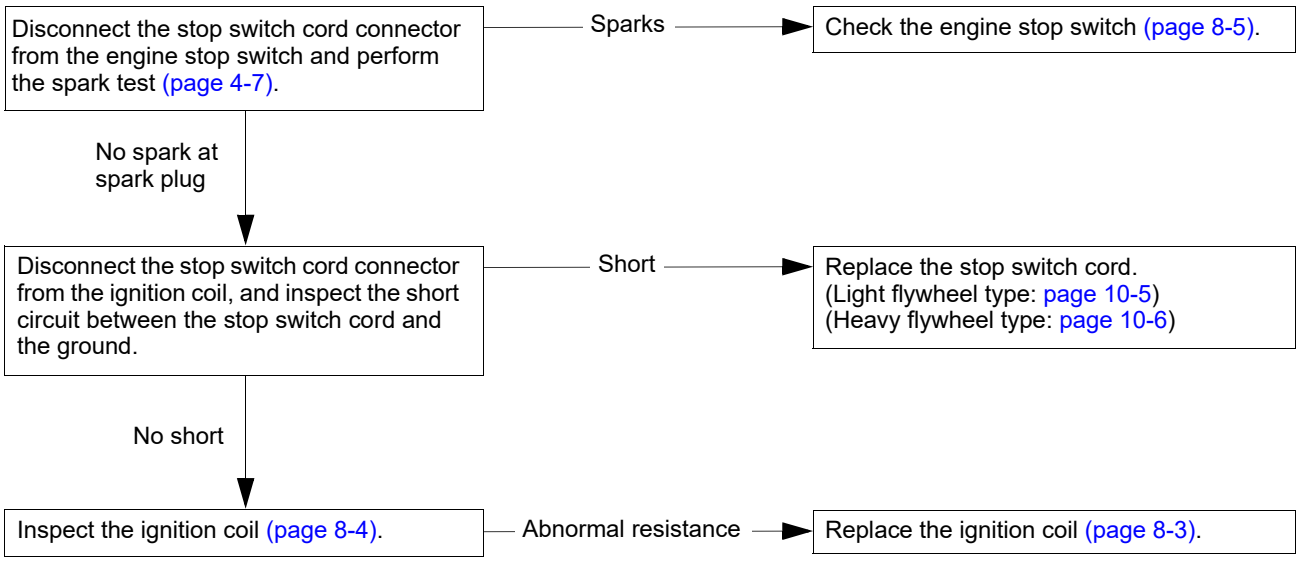
Replace the carburetor assembly (page 6-3) and the spark plug (page 3-6).

Normal

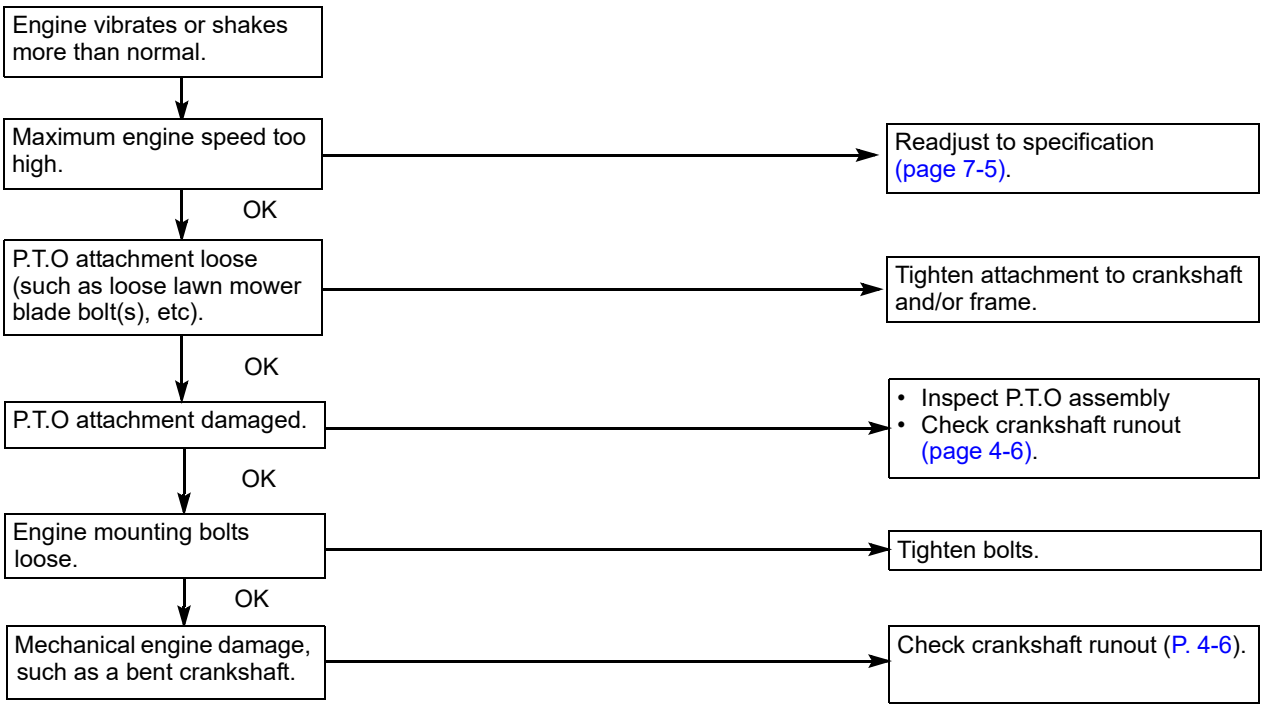
Remove the carburetor and inspect the choke control assembly linkage for smooth operation. If it operates properly, replace the thermowax assembly (page 6-11).



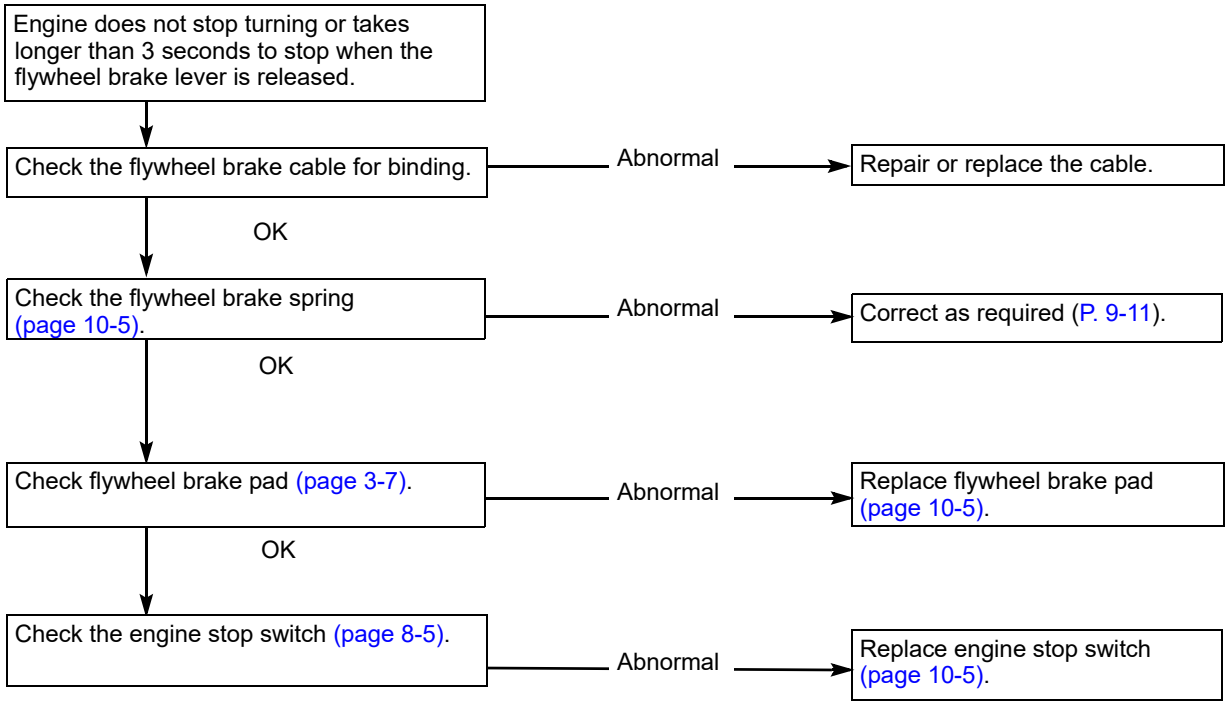
NO SPARK AT SPARK PLUG



VIBRATION PROBLEMS



FLYWHEEL BRAKE



TROUBLESHOOTING TECHNIQUES

CYLINDER COMPRESSION CHECK

Start the engine and warm up to normal operating temperature.

Turn the fuel valve lever to the OFF position. Remove the fuel from the carburetor bowl by running the engine until the engine stops from lack of fuel, or by manually draining the fuel from the carburetor bowl if the engine will not run.

Remove the spark plug cap from the spark plug.

Remove the spark plug using a spark plug wrench.

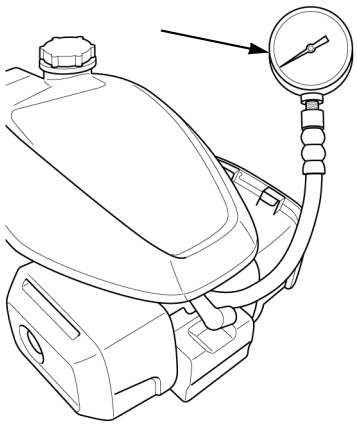
Pull the recoil starter several times to expel unburned gasoline.

Thread a commercially available compression gauge into the spark plug hole.

For flywheel brake types, hold the flywheel brake lever with a strap or engage the flywheel brake control.

Briskly and repeatedly pull the recoil starter 4 or 5 times to measure stable cylinder compression.

COMPRESSION GAUGE
EEPV503 (commercially available)



CYLINDER COMPRESSION:
0.50 MPa (5.0 kgf/cm^2, 71 psi) / 600 rpm

Due to variations in cranking rpm, manufacturing tolerances, engine wear, and/or carbon buildup over time, the cylinder compression reading may be lower or higher than the indicated specification. A compression reading that measures slightly outside of the indicated specification does not mean there is an immediate problem that requires repair.

CRANKSHAFT RUNOUT CHECK

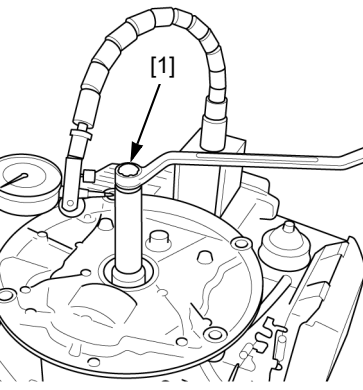
NOTICE

When checking the crankshaft runout, do not allow the dial indicator tip to drop into the keyway.

Use the bolt [1] to rotate the crankshaft.
Record the runout.

CRANKSHAFT RUNOUT: 0.20 mm (0.008 in)

If the crankshaft runout exceeds the service limit, replace the crankshaft.



SPARK TEST

This test is for checking that the ignition coil is providing a spark to the spark plug. An assistant is required during this test.

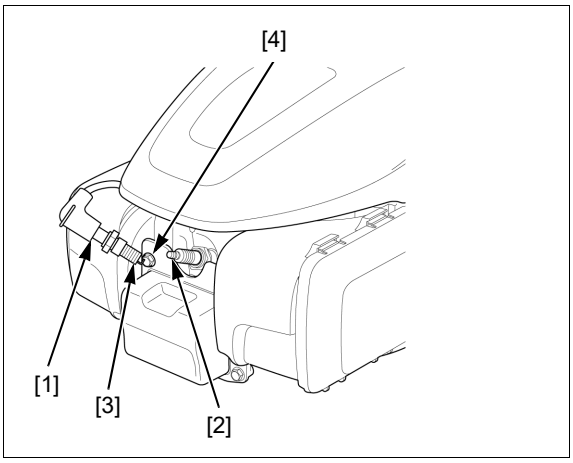
Inspect the following before performing the spark test.

- Faulty spark plug
- Loose spark plug cap
- Water in the spark plug cap (Leaking the ignition coil secondary voltage)
- Loose ignition coil connector.

Disconnect the spark plug cap [1] from the spark plug [2].

Connect a known-good spark plug [3] to the spark plug cap and ground the spark plug to the cylinder head cover bolt [4].

Crank the engine by briskly pulling the recoil starter several times and check whether sparks jump across the electrode.



SPARK PLUG TEST

This test is for checking that a spark plug is working correctly. An assistant is required during this test.

Turn the fuel valve lever to the OFF position, and then drain the gasoline from the carburetor.

Disconnect the spark plug cap [1] from the spark plug [2].

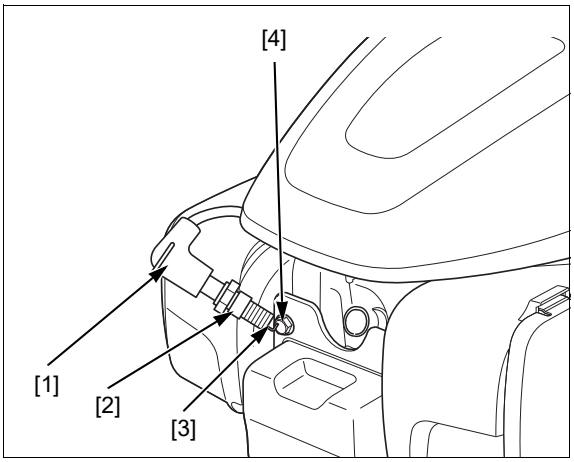
Remove the spark plug using a spark plug wrench

Pull the recoil starter several times to expel unburned gasoline.

Attach the spark plug [2] to the spark plug cap [1], and ground the side electrode [3] against the cylinder head bolt [4].

For applicable flywheel brake models, have an assistant pull and hold the flywheel brake control, and then briskly pull the recoil starter several times.

Check to see if sparks jump across the electrodes.



MEMO

TOP COVER REMOVAL/INSTALLATION (APPLICABLE TYPES)

Remove the fuel tank cap before removing the top cover.

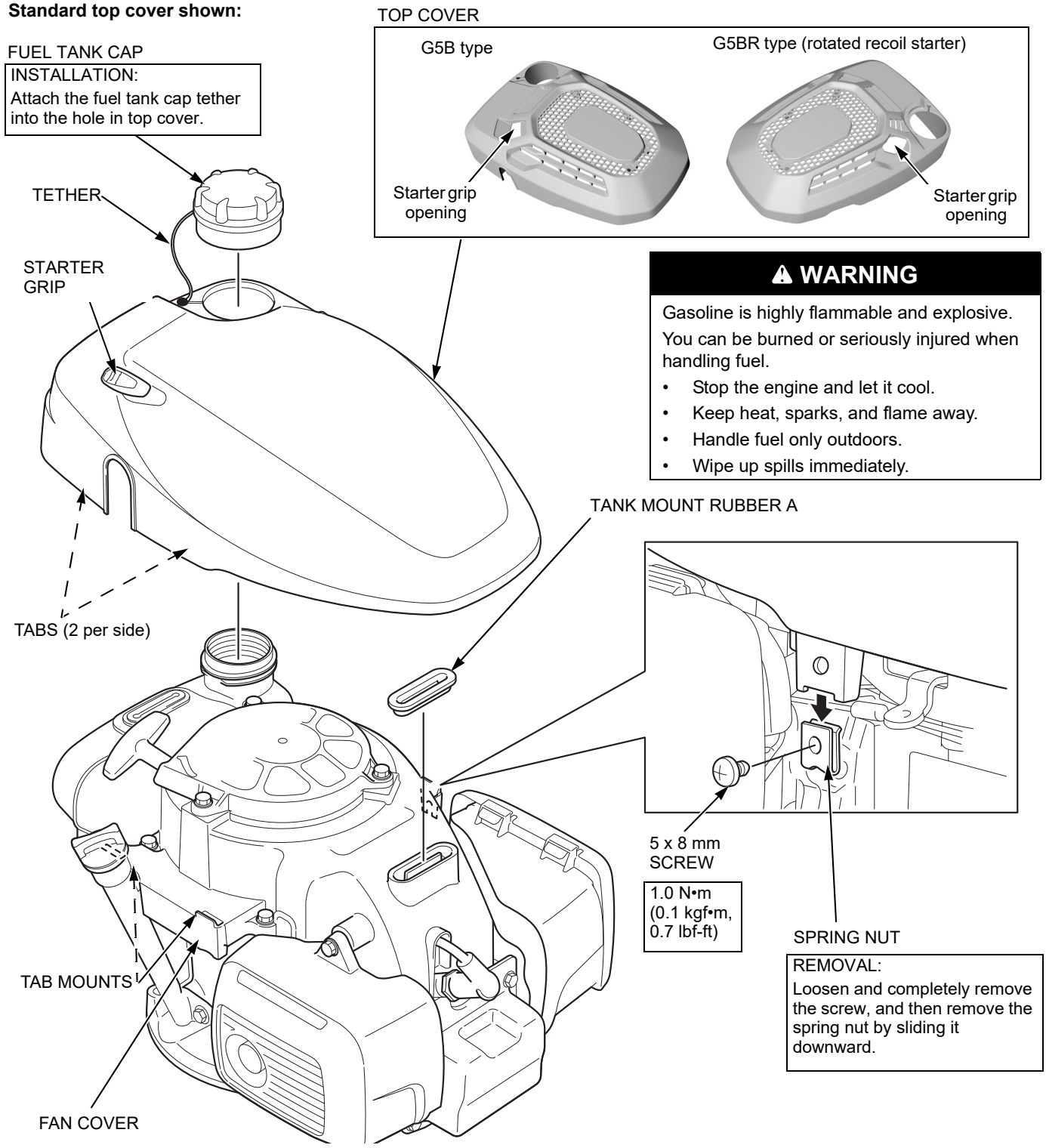
Loosen the 5 x 8 mm screw, and then remove the spring nut, as shown below.

Pull outward on the two red tabs on each side of the top cover to unlatch the top cover from the fan cover.Reinstall the fuel cap onto the fuel tank until it is time for reassembly.

Reassembly is the reverse order of removal. Be sure the top cover is securely latched to the fan cover, and the recoil starter grip is pulled through the hole in the top cover.

Note: G5B and G5BR type fan covers remove and install the same way.

Standard top cover shown:



⚠ WARNING

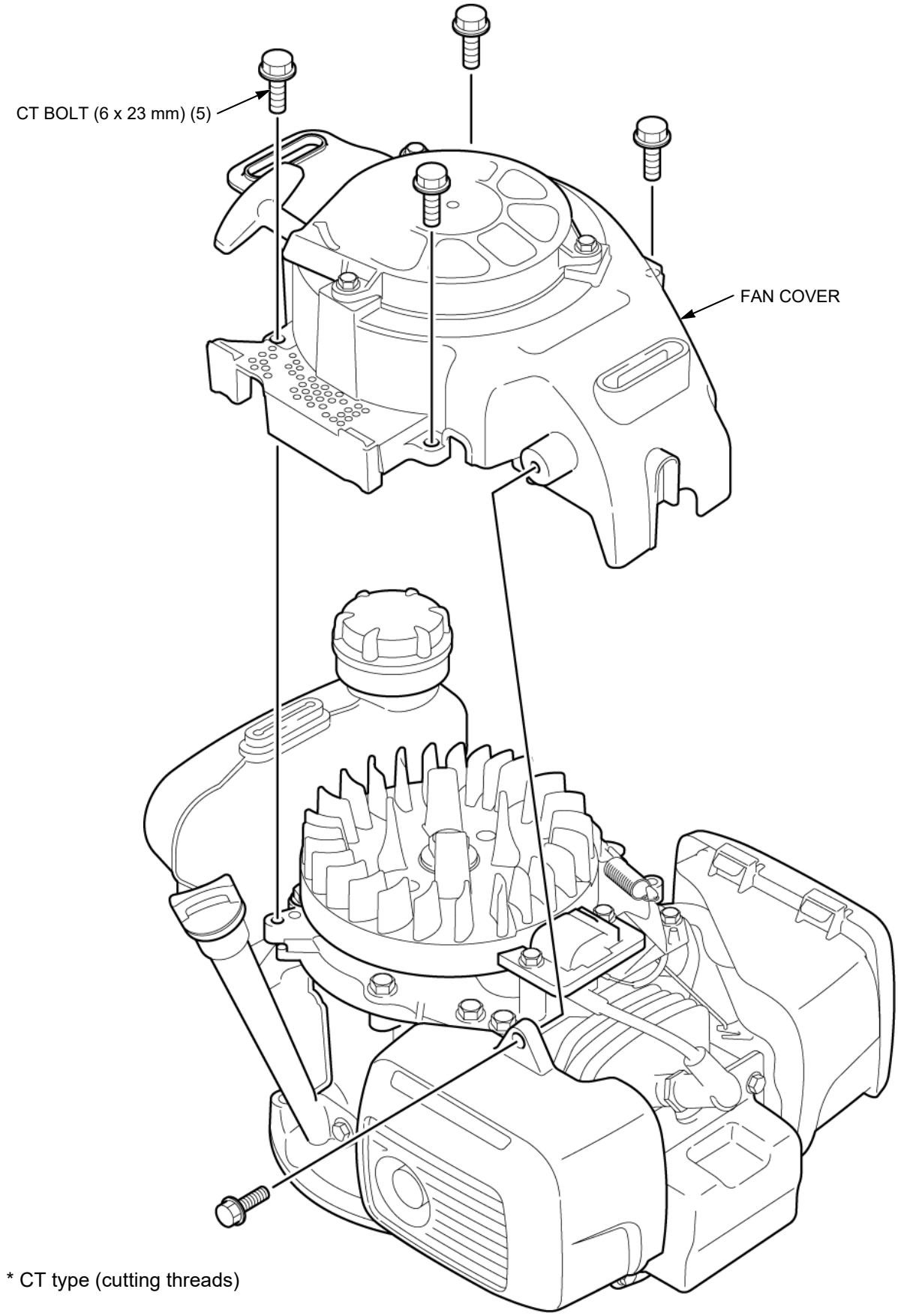
Gasoline is highly flammable and explosive.

You can be burned or seriously injured when handling fuel.

- Stop the engine and let it cool.
- Keep heat, sparks, and flame away.
- Handle fuel only outdoors.
- Wipe up spills immediately.

FAN COVER REMOVAL/INSTALLATION

Applicable types: Remove the top cover (page 5-2).



* CT type (cutting threads)

MEMO

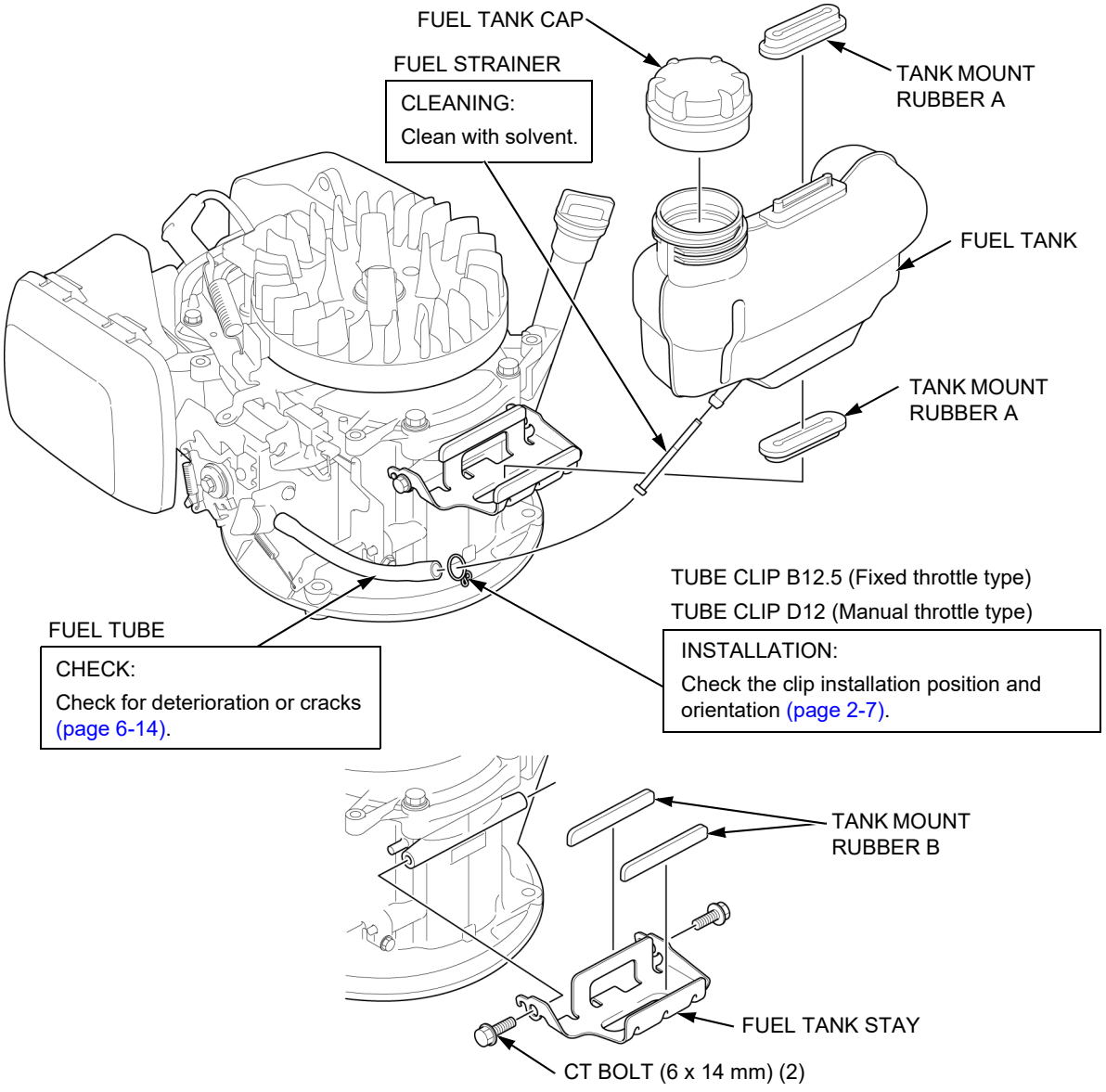
FUEL TANK REMOVAL/INSTALLATION

⚠WARNING

Gasoline is highly flammable and explosive. You can be burned or seriously injured when handling fuel.
- Stop the engine and let it cool.
- Keep heat, sparks and flames away.
- Handle fuel only outdoors.
- Wipe up spills immediately.

Before removal, drain the gasoline into an approved container.

Remove the fan cover (page 5-3).



AIR CLEANER/CARBURETOR REMOVAL/INSTALLATION

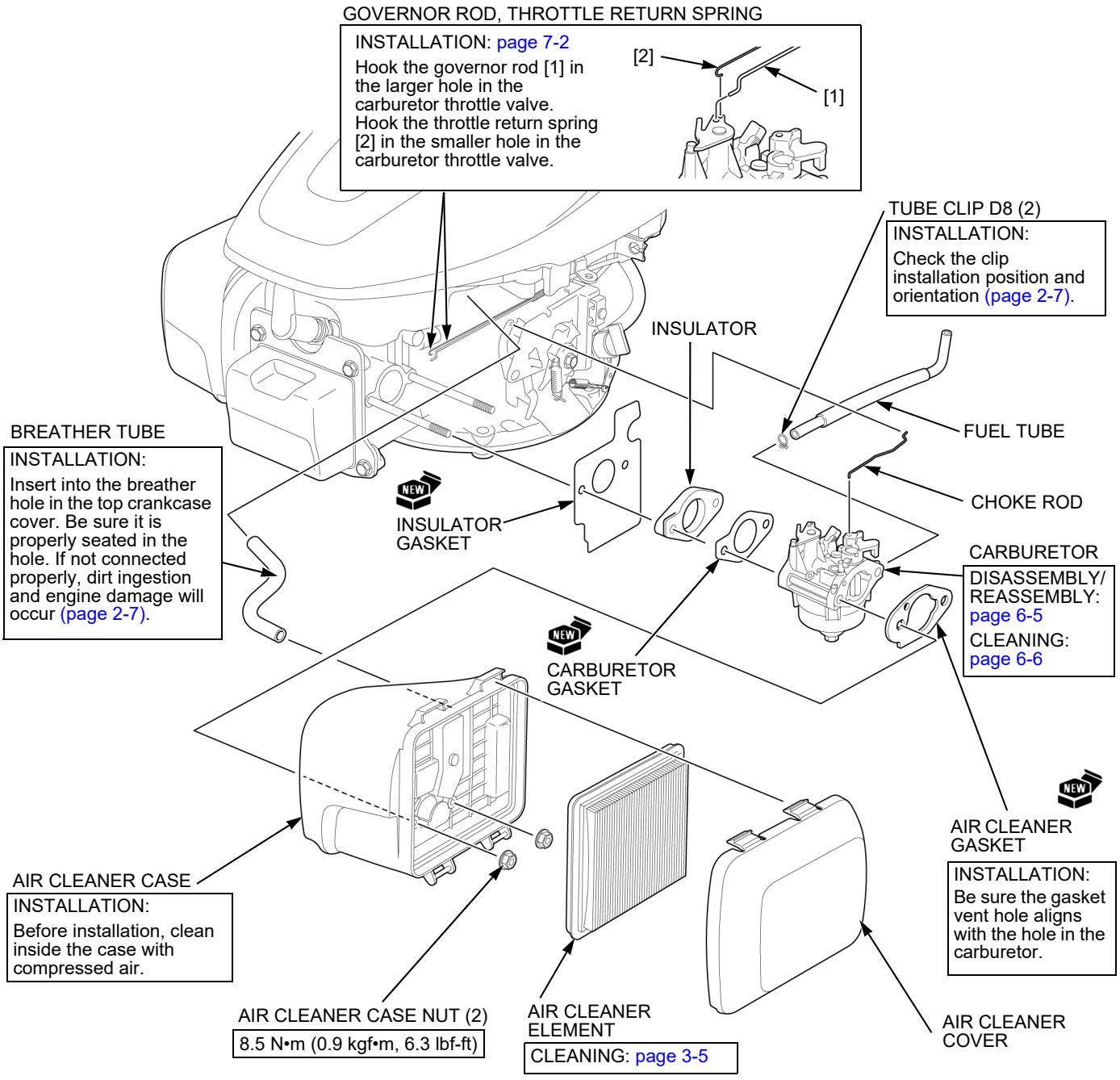
MANUAL CHOKE TYPE

⚠WARNING

Gasoline is highly flammable and explosive. You can be burned or seriously injured when handling fuel.
- Stop the engine and let it cool.
- Keep heat, sparks and flames away.
- Handle fuel only outdoors.
- Wipe up spills immediately.

Before removal, completely drain the carburetor (page 3-9).

Be sure to install all gaskets exactly as shown. Otherwise, the gaskets may not align with the intake port.



AUTOMATIC CHOKE TYPE

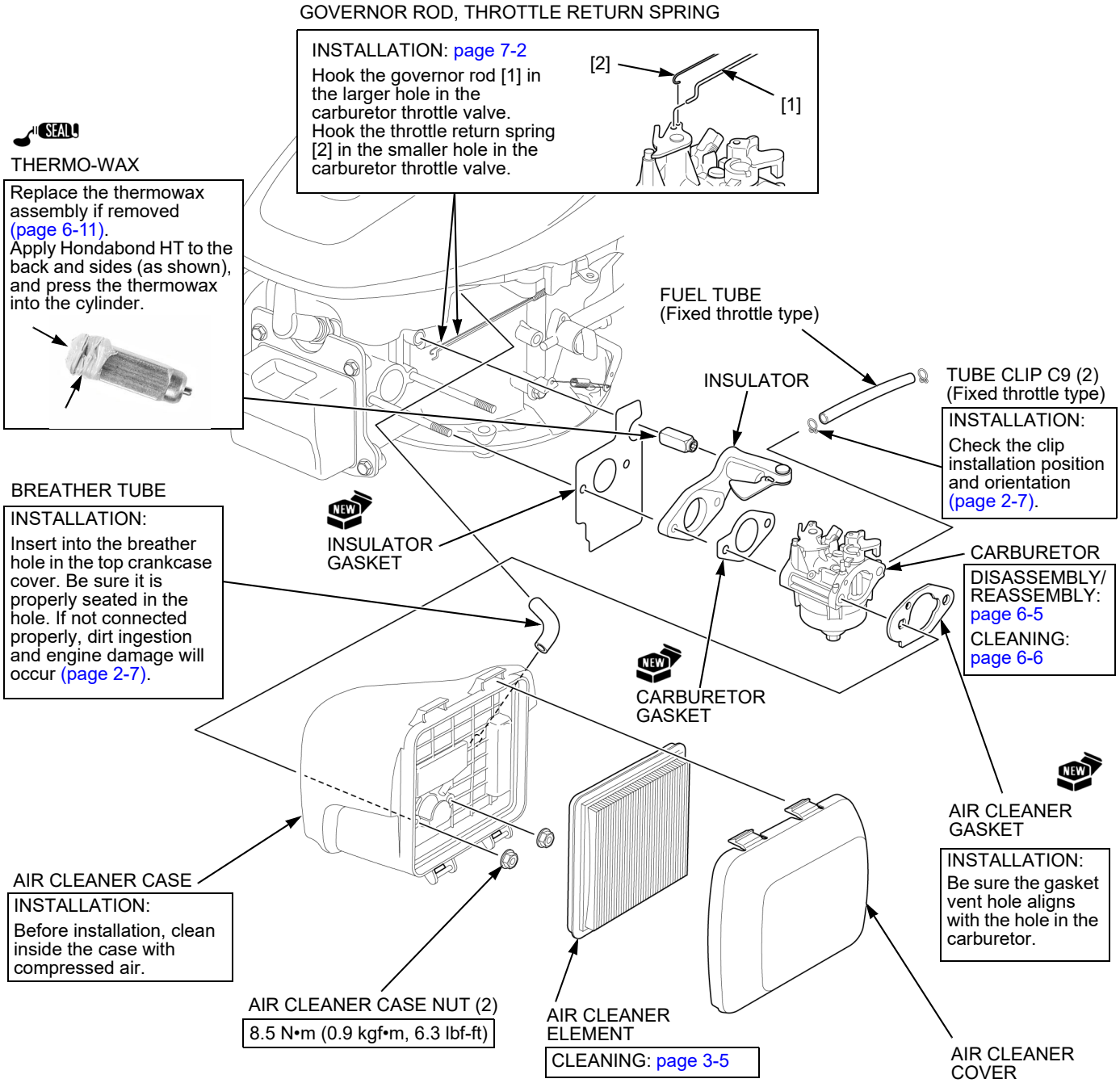
⚠WARNING

Gasoline is highly flammable and explosive. You can be burned or seriously injured when handling fuel.
- Stop the engine and let it cool.
- Keep heat, sparks and flames away.
- Handle fuel only outdoors.
- Wipe up spills immediately.

Before removal, completely drain the carburetor (page 3-9).

Be sure the engine is cooled to room temperature before removing the carburetor. This is necessary to ensure the thermowax fully retracts.

Be sure to install all gaskets exactly as shown. Otherwise, the gaskets may not align with the intake port.



CARBURETOR DISASSEMBLY/ASSEMBLY

⚠WARNING

Gasoline is highly flammable and explosive. You can be burned or seriously injured when handling fuel.
- Stop the engine and let it cool.
- Keep heat, sparks and flames away.
- Handle fuel only outdoors.
- Wipe up spills immediately.

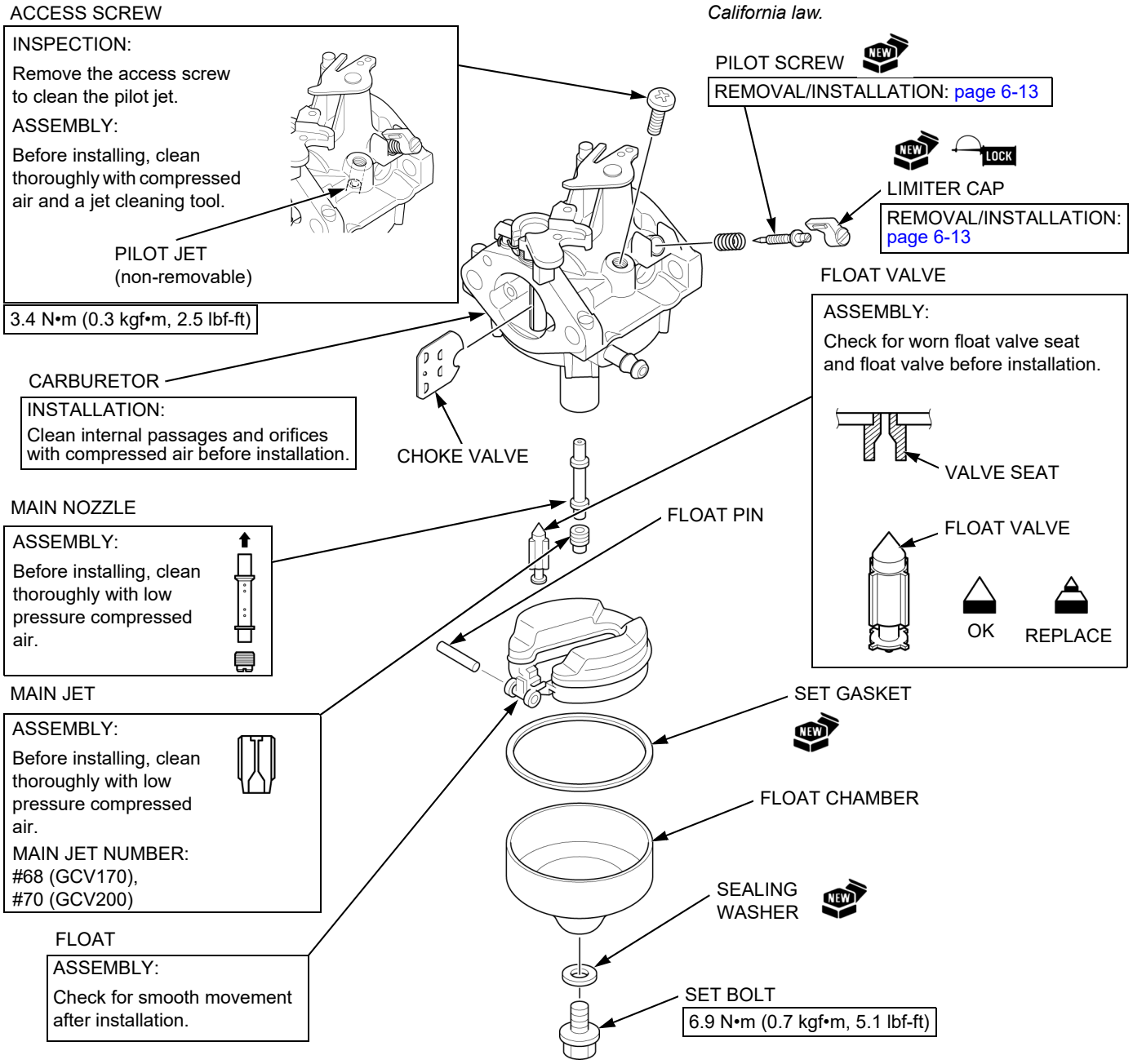
Remove the carburetor (page 6-3).

Clean the outside of the carburetor before disassembly.

The limiter cap is cemented on the pilot screw and should not be removed unless the carburetor is overhauled. Pilot screw removal is normally not required to clean the carburetor.

NOTICE

Tampering is a violation of federal and California law.



CARBURETOR BODY CLEANING

Use Honda Carburetor Cleaner (P/N 08732-CC000) with its plastic spray nozzle to clean the carburetor ports.

Some commercially available chemical carburetor cleaners are very caustic. These cleaners may damage plastic parts such as O-rings, floats, choke valves, and float valve seats. Check the container for instructions. If you are in doubt, do not use these products to clean Honda carburetors.

Completely disassemble the carburetor (page 6-5).

⚠CAUTION

Applying pressure into small passages can cause fluid, debris, and air to shoot back into your face.

You can be injured by flying debris or fluid or pressurized air.

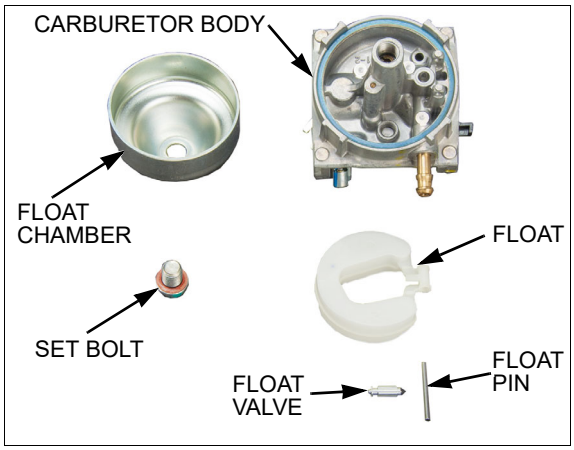
Always wear a face shield or safety glasses when using carburetor cleaner or compressed air.

Thoroughly clean the outside of the carburetor body using carburetor cleaner and compressed air.

Inspect the carburetor body, throttle and choke levers, and pilot screw (including limiter cap) for damage. If any damage exists, carburetor replacement may be necessary.

Remove the set bolt, float chamber, float pin, float valve, and float.

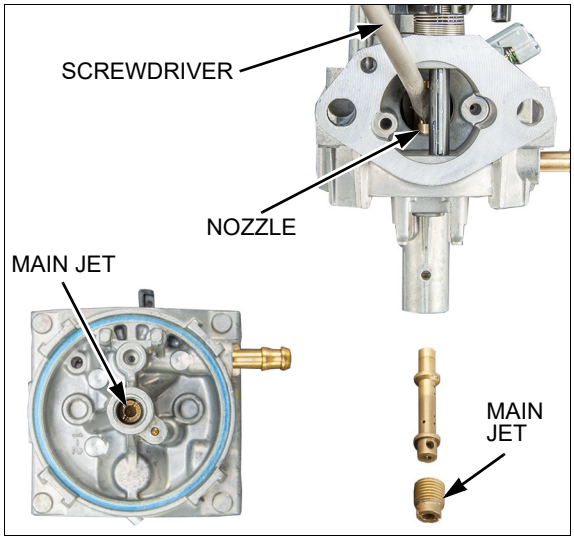
Clean and then inspect the float valve tip for damage and replace if necessary.



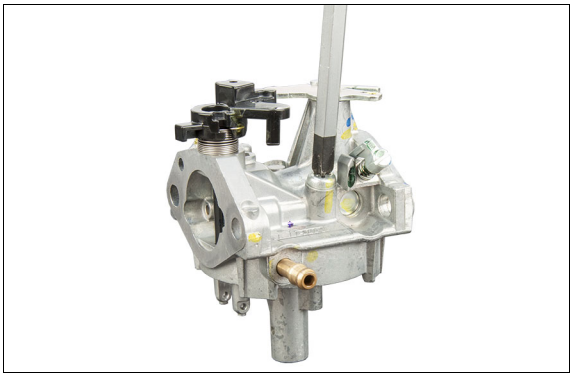
Remove the main jet and the main nozzle.

With the main jet removed, push down on the top of the main nozzle with a screwdriver.

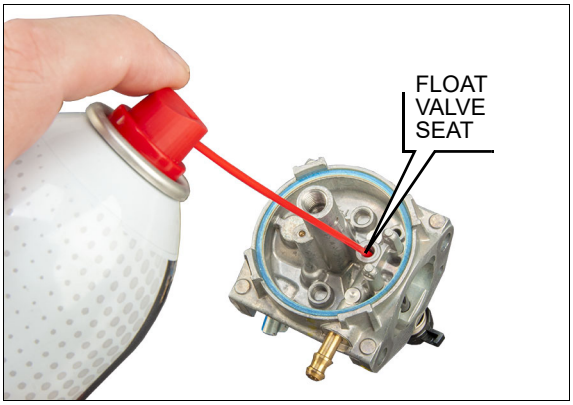
If the nozzle does not come out, spray carburetor cleaner around the nozzle to loosen it and tap the carburetor on the workbench.



Remove the 5 x 6 mm screw covering the pilot jet.



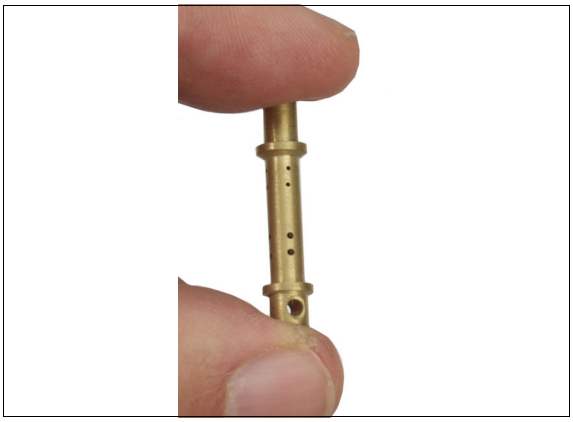
Clean the float valve seat using carburetor cleaner and compressed air.



Clean the main nozzle thoroughly using carburetor cleaner, appropriate size jet cleaning tool, and compressed air. Do not use a welding tip cleaning needle.

NOTICE

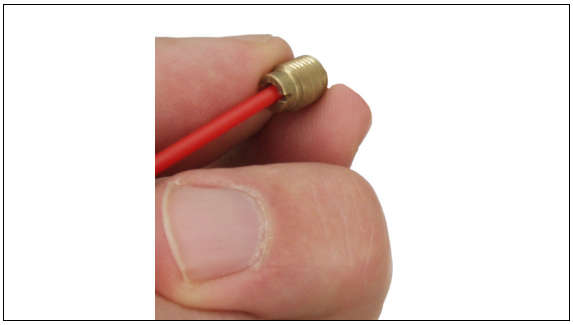
Using a welding tip cleaning needle or a jet needle that is too large may damage the carburetor. Never force a needle, and never use a needle with a bent or damaged tip.



Inspect the center and side holes for damage or contamination by holding the main nozzle up to a light to verify they are clean.

TOOL: Jet cleaner 07JPZ-001010B

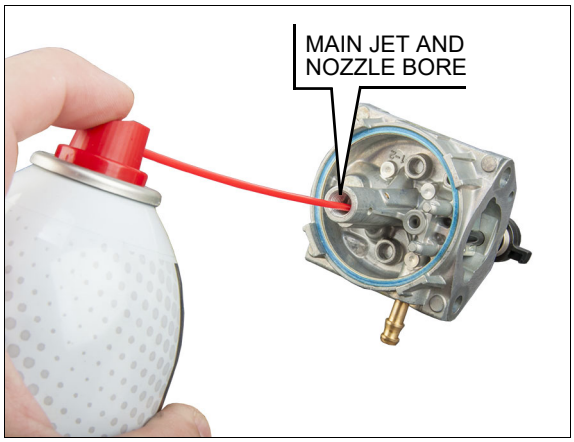
Clean the main jet by spraying carburetor cleaner through the jet and using the appropriate size jet cleaning tool and compressed air. Do not use a welding tip cleaning needle.



Carefully inspect the main jet for damage or contamination.

Clean the main jet and nozzle bore thoroughly using carburetor cleaner and compressed air.

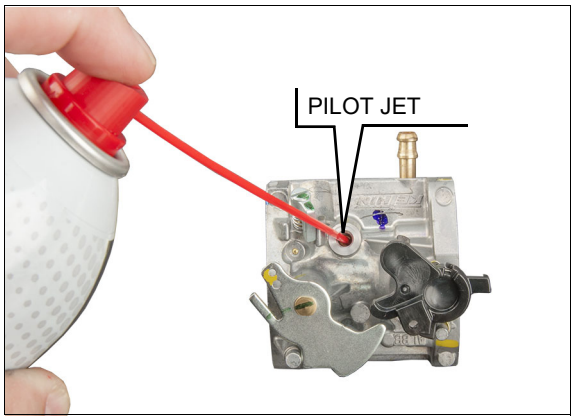
Inspect the inside of the bore for contamination.



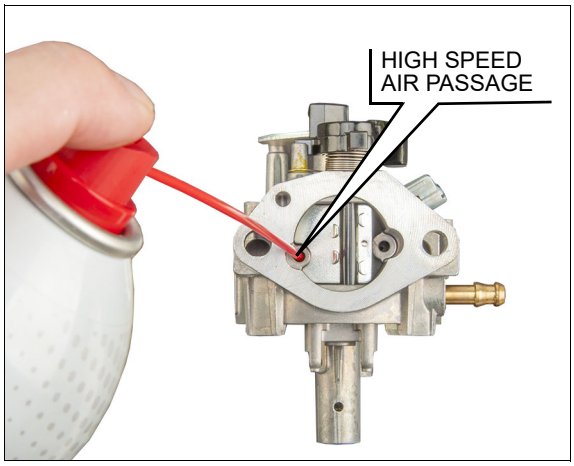
Clean the pilot jet thoroughly by using the appropriate size jet cleaning tool, carburetor cleaner, and compressed air.

The passage is small and easily obstructed, so repeat several times.

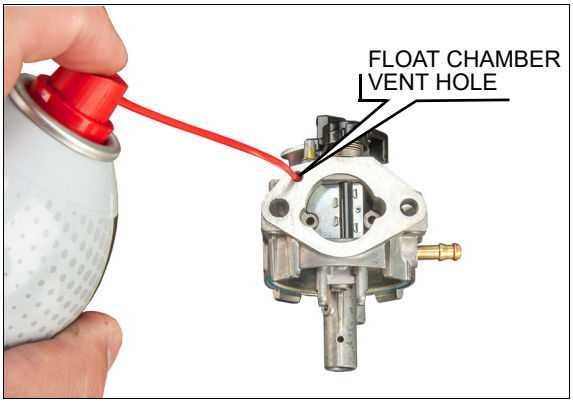
It is not necessary to remove the pilot screw at this point.



Clean the high speed air passage with carburetor cleaner and compressed air.



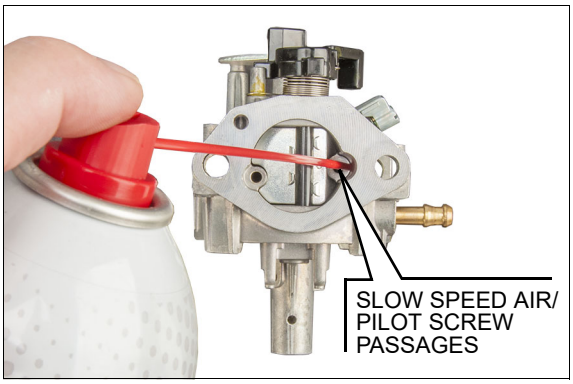
Clean the float chamber vent hole with carburetor cleaner and compressed air.



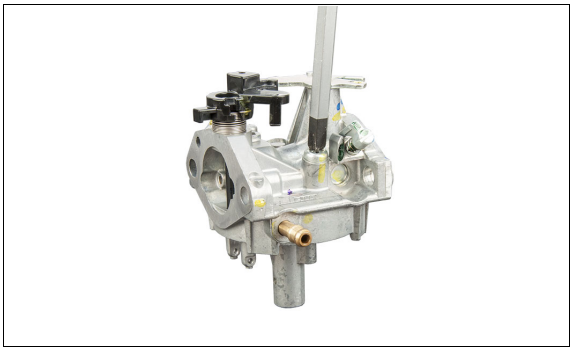
Clean the slow speed air/pilot screw passages.

Spray carburetor cleaner and compressed air through the slow speed air passage.

The passages are small, so repeat several times.



Reinstall the 5 x 6 mm screw covering the pilot jet.

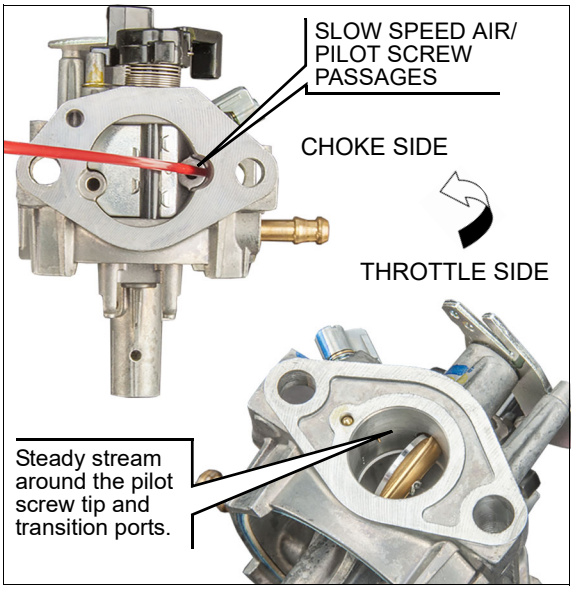


Check the slow speed air/pilot screw channels for obstructions.

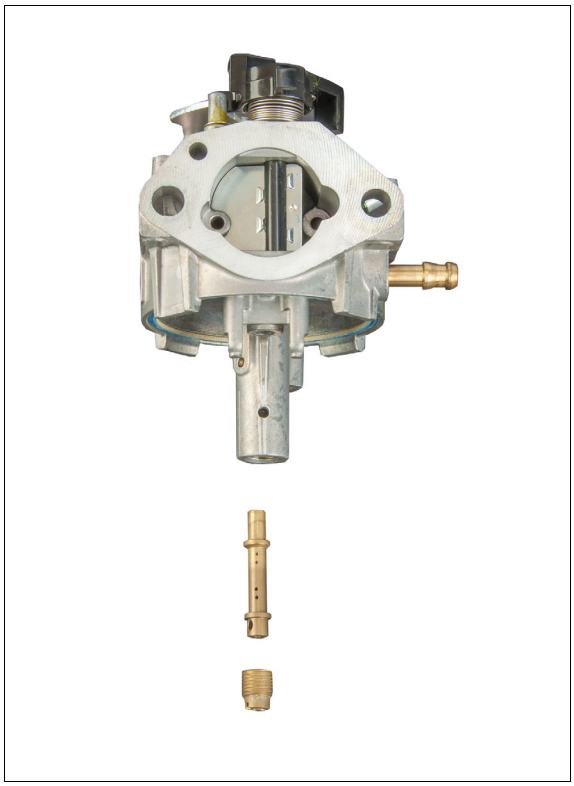
Spray carburetor cleaner through the slow speed air passage.

From the opposite end, confirm that a steady stream of carburetor cleaner sprays out from around the pilot screw tip and transition ports.

If it does not flow around the pilot screw tip, remove the pilot screw and clean the passage. The pilot screw must be destroyed and replaced if it is removed. It may be more cost-effective to replace the carburetor.



Reinstall the main nozzle and main jet, making sure the nozzle long end extends into the venturi.



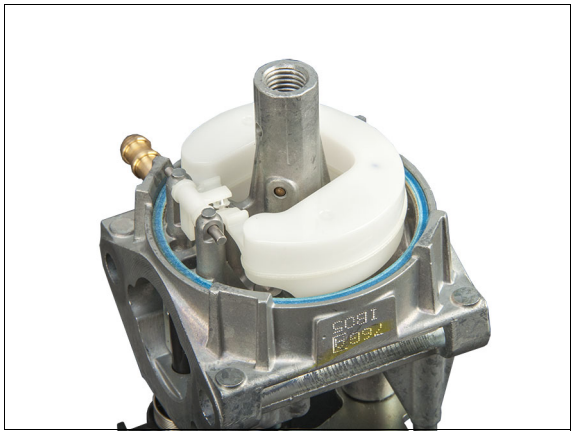
Install the float valve, float, and float chamber.

• Make sure the float valve is properly attached to the float.

• Ensure the float chamber is installed correctly, making a good seal with the gasket.

Reinstall the carburetor on the engine, turn the fuel valve on, and check for fuel leaks.

Start the engine and allow it to warm up for several minutes. Check the maximum no load engine speed.



THERMOWAX REMOVAL/ INSTALLATION

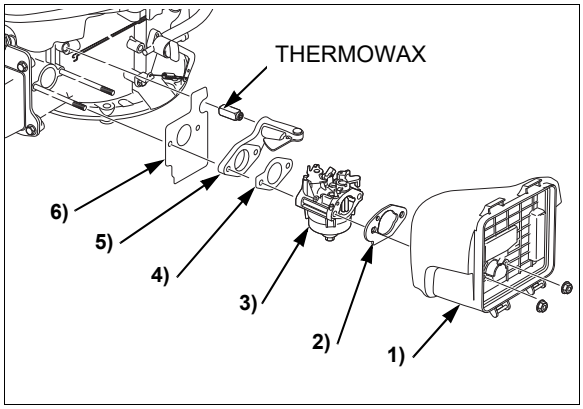
REMOVAL

Turn the fuel valve OFF and drain the fuel from the carburetor float chamber into an approved container.

Remove the air cleaner cover and air cleaner element.

Remove the following parts in the order shown below.

1) Air cleaner case
2) Air cleaner gasket
3) Carburetor
4) Carburetor gasket
5) Auto choke control assembly
6) Insulator gasket

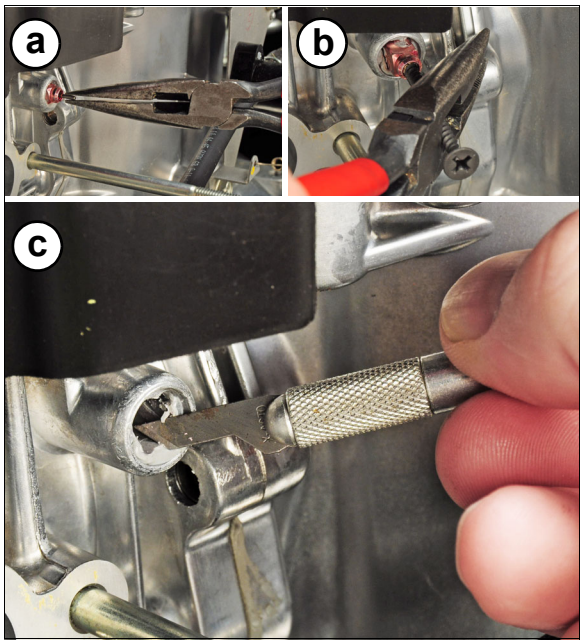


Remove the existing thermowax from the cylinder barrel.

Using small pliers or wire cutters, pull the center pin out of the thermowax (a). If you cannot grab the center pin, apply heat to the thermowax using a heat gun until the center pin extends.

Screw a No. 6 sheet metal or drywall screw into the thermowax body, and then carefully pry the thermowax out (b). Use the side of the cylinder as a prying surface, as shown. Do not pry against the intake port gasket sealing surface.

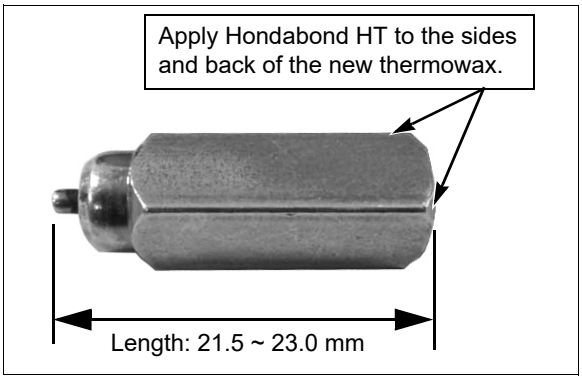
Use a small scraper, brake cleaner, and compressed air to remove the remaining sealant from the cavity (c). Remove as much sealant as possible, especially from the back of the cavity.



INSTALLATION

Measure the overall length of the new thermowax before installing. The length must be 21.5 - 23.0 mm. Do not install the thermowax if the length is outside this range.

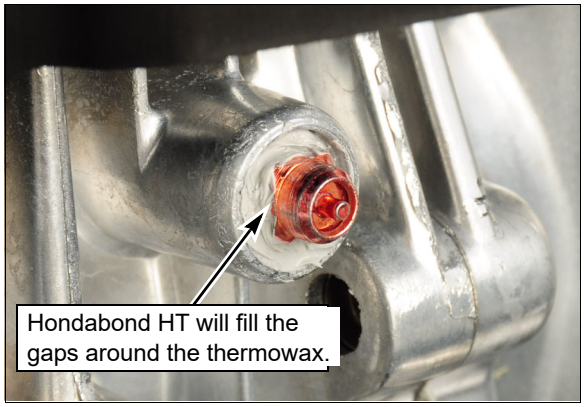
Apply a small amount of Hondabond HT (or equivalent) to the lower one-third of the new thermowax. Do not apply too much.



Insert the new thermowax into the cylinder barrel and push it into the cavity until fully seated.

The Hondabond HT will fill any gaps between the cylinder barrel and thermowax.

Remove any Hondabond HT from the front of the thermowax after installation.



Inspect the carburetor gasket, insulator gasket, and air cleaner gasket. Replace any gasket that appears damaged.

Install the following parts in the order shown below onto the carburetor mounting studs on the engine.

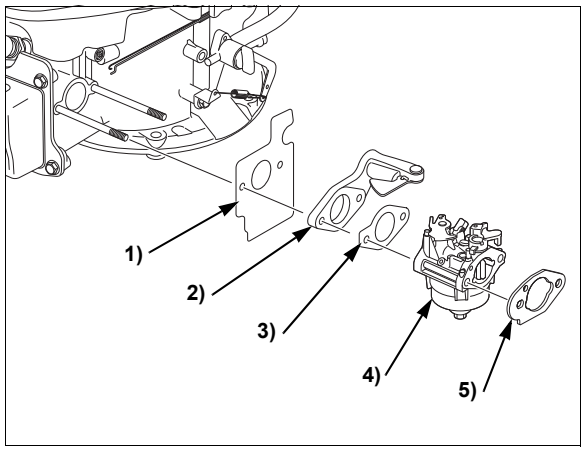
1) Insulator gasket

2) Auto choke control assembly

3) Carburetor gasket
   • Install in the correct direction to ensure the gasket aligns with the port.

4) Carburetor

5) Air cleaner gasket
   • Be sure the vent hole in the air cleaner gasket aligns with the hole in the carburetor.



Install the crankcase breather tube so that the paint mark is even with the edge of the flywheel brake assembly. Ensure the tube is securely inserted into the hole in the crankcase, and onto the air cleaner case.

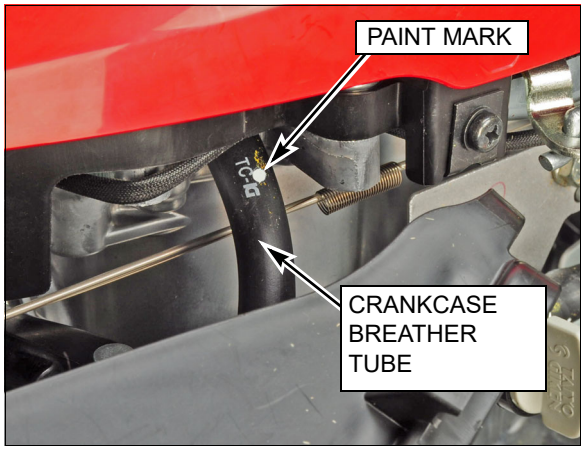
NOTICE

Failure to properly connect the breather tube will result in dirt ingestion and engine damage.

Install the air cleaner case, and then install and tighten the two 6 mm air cleaner case nuts evenly in multiple steps to the proper torque.

TORQUE: 8.5 N•m (0.9 kgf•m, 75 in•lb)

Install the air cleaner element and air cleaner cover.



CARBURETOR INSPECTION

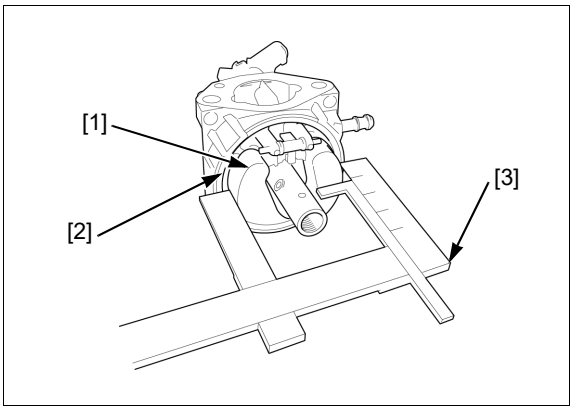
FLOAT LEVEL HEIGHT

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

TOOL:
Float level gauge [3] 07401-0010000

Standard float height: 10.2 mm (0.40 in)

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



PILOT SCREW REPLACEMENT

Leave the pilot screw [1] and limiter cap [2] in place during carburetor cleaning. Remove only if necessary for carburetor repair.

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.

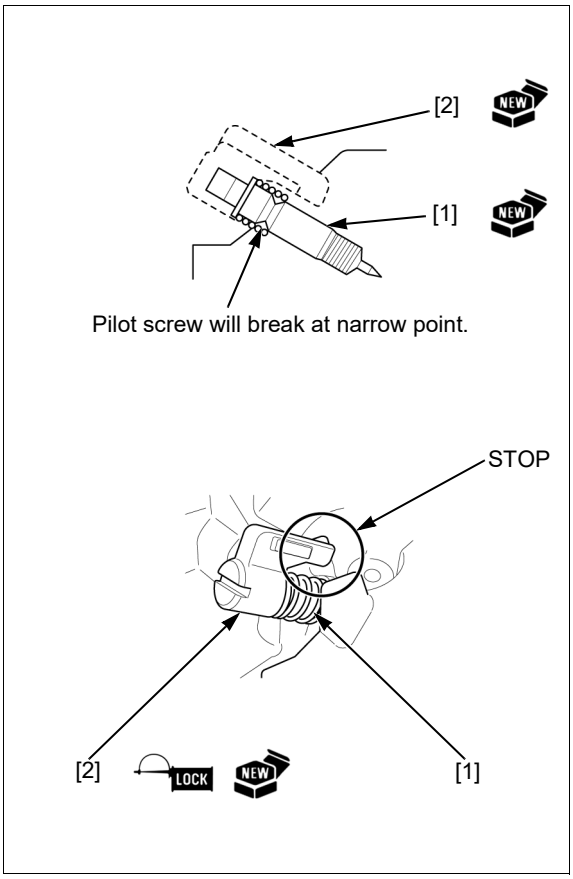
Turn the pilot screw in until it is lightly seated and then turn the screw out the required number of turns.

Model	Pilot screw opening
GCV170	2-1/8 turns out
GCV200	1-5/8 turns out

Refer to the table above for carburetor pilot screw initial opening setting.

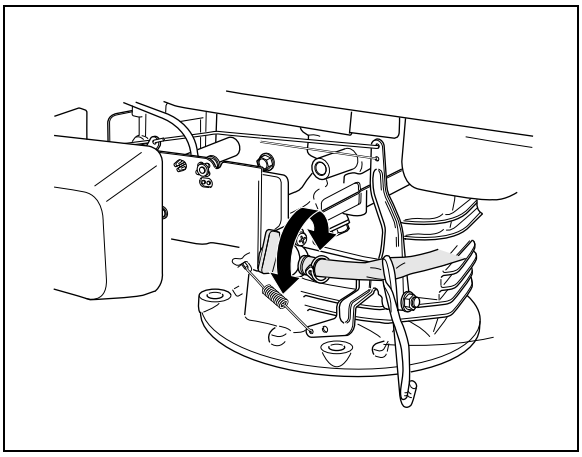
Apply LOCTITE® 638 or equivalent to the inside of the limiter cap and then install the cap so the stop prevents the pilot screw from being turned counterclockwise.

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



FUEL TUBE

REMOVAL/INSTALLATION



It is recommended to drain the fuel from the fuel tank using the carburetor drain bolt prior to removing the tubes. A fuel tube clamp tool may also be used to prevent fuel from spilling depending on the situation.

Use pliers to open the fuel clip/clamp.

Rotate the fuel tube while it is on the fuel valve fitting to help release the tube.

Gently pull the fuel tube from the valve. Do not pry against the fuel valve with a screwdriver or other tool when removing the fuel tube.

If the fuel tube is pried from the fuel valve with a tool, the fuel valve may become damaged.

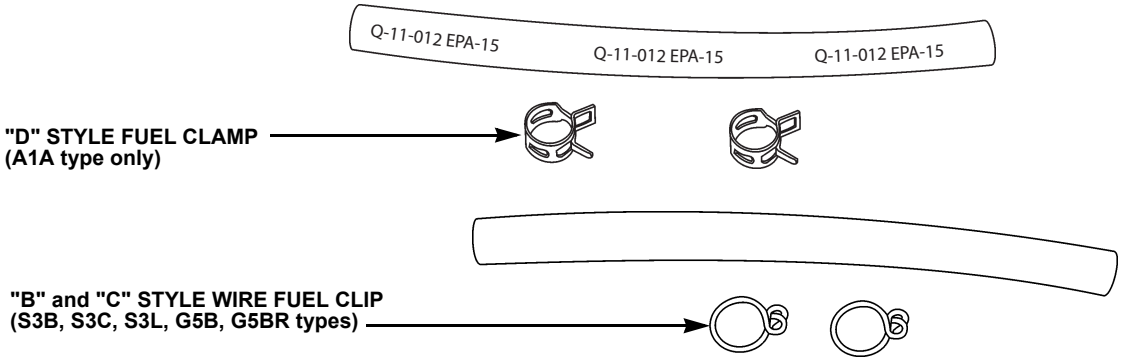
Installation is the reverse order of removal. Be sure the clips/clamps are positioned properly (page 2-7).

Check for fuel leaks after installation and repair as necessary.

FUEL TUBE AND CLAMP CHANGES

All Honda Power Equipment manufactured after January 1, 2009, uses low-permeable fuel line. The low-permeable fuel line is easy to spot by the CARB Executive Order (for example: Q-11-012 EPA-15) printed on it. This CARB Executive order number may vary from this example depending on the date a fuel tube was manufactured. Only use the correct hose with the proper executive number when replacing.

The type of clamps used vary depending on type. Always use the same style and sizes of clamps as the engine was originally equipped with.



7. GOVERNOR SYSTEM

GOVERNOR ARM REMOVAL/INSTALLATION

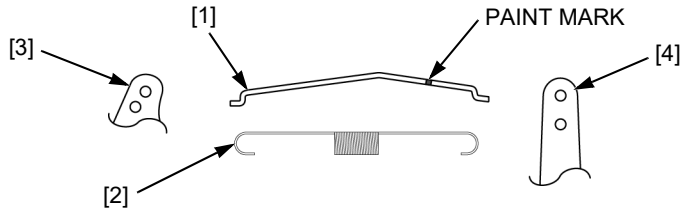
Remove the carburetor (page 6-3).

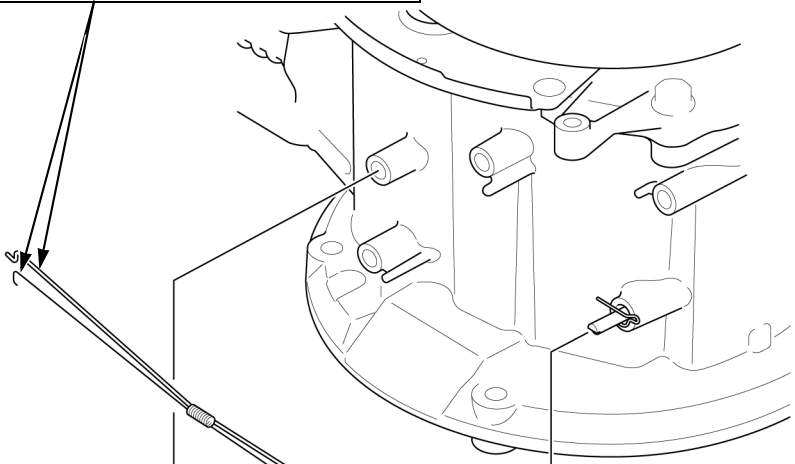
Manual throttle type (A1A type)

GOVERNOR ARM/THROTTLE RETURN SPRING

INSTALLATION:

Install the governor rod [1] through the throttle return spring [2] as shown.
Hook the governor rod in the larger hole of the carburetor throttle valve [3] and the upper hole of the governor arm [4].
Hook the throttle return spring in the smaller hole of the carburetor throttle valve and the lower hole of the governor arm.





GOVERNOR SPRING

INSTALLATION:

Install the governor spring of the orientation shown.

GOVERNOR ARM BOLT

GOVERNOR ARM

ADJUSTMENT: page 7-5

GOVERNOR ARM NUT

12 N•m (1.2 kgf•m, 9 lbf-ft)

CONTROL BASE
(This illustration shows the type with choke lever.)

SCREW (5 mm)

4.5 N•m (0.5 kgf•m, 3.3 lbf-ft)

FUEL TUBE

TUBE CLAMP D8

INSTALLATION:

Check the clip installation position and orientation (page 2-7).

CT BOLT (6 x 14 mm)

12 N•m (1.2 kgf•m, 9 lbf-ft)

TUBE CLAMP D10

INSTALLATION:

Check the clip installation position and orientation (page 2-7).

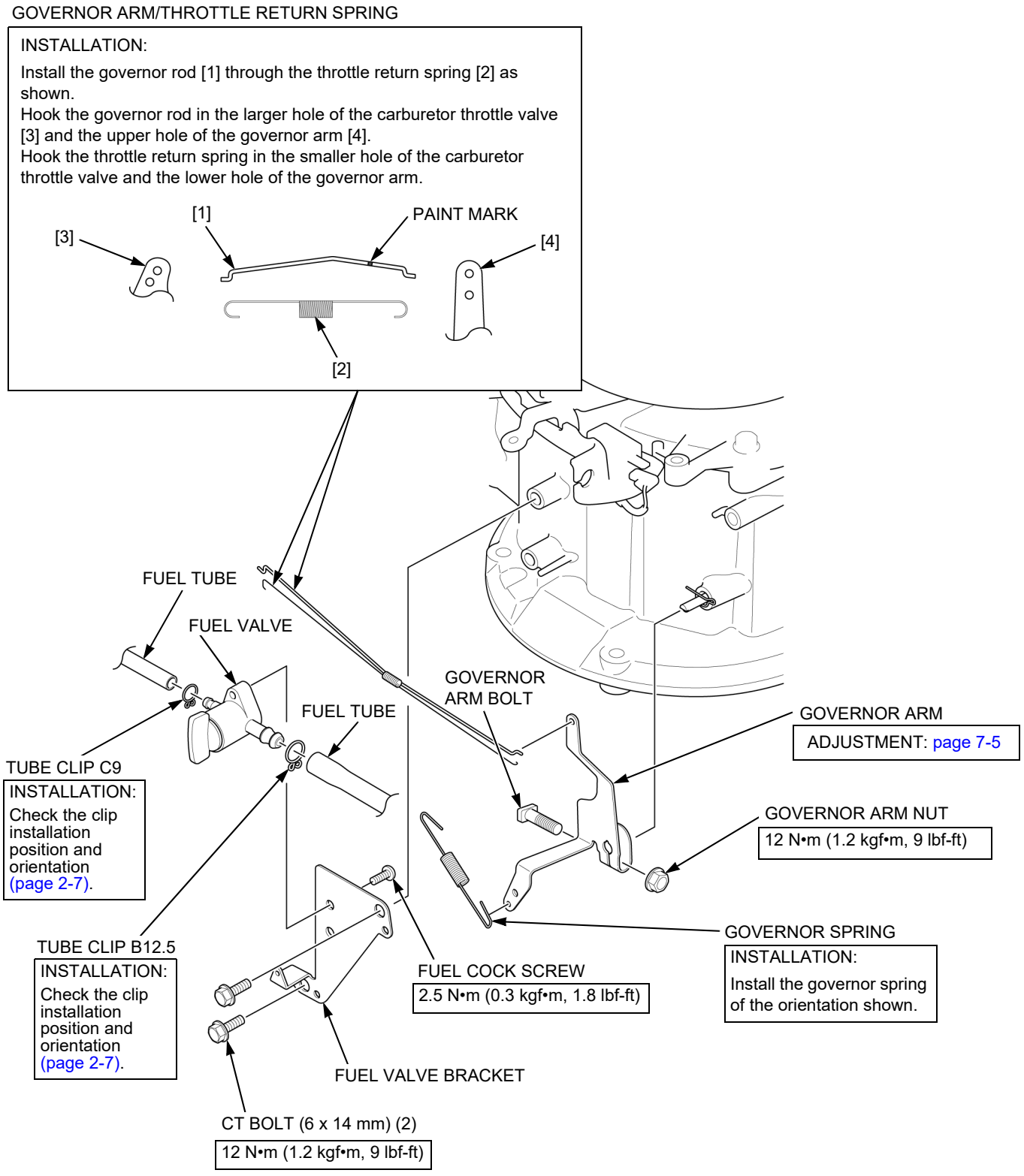
CT BOLT (6 x 50 mm)

12 N•m (1.2 kgf•m, 9 lbf-ft)

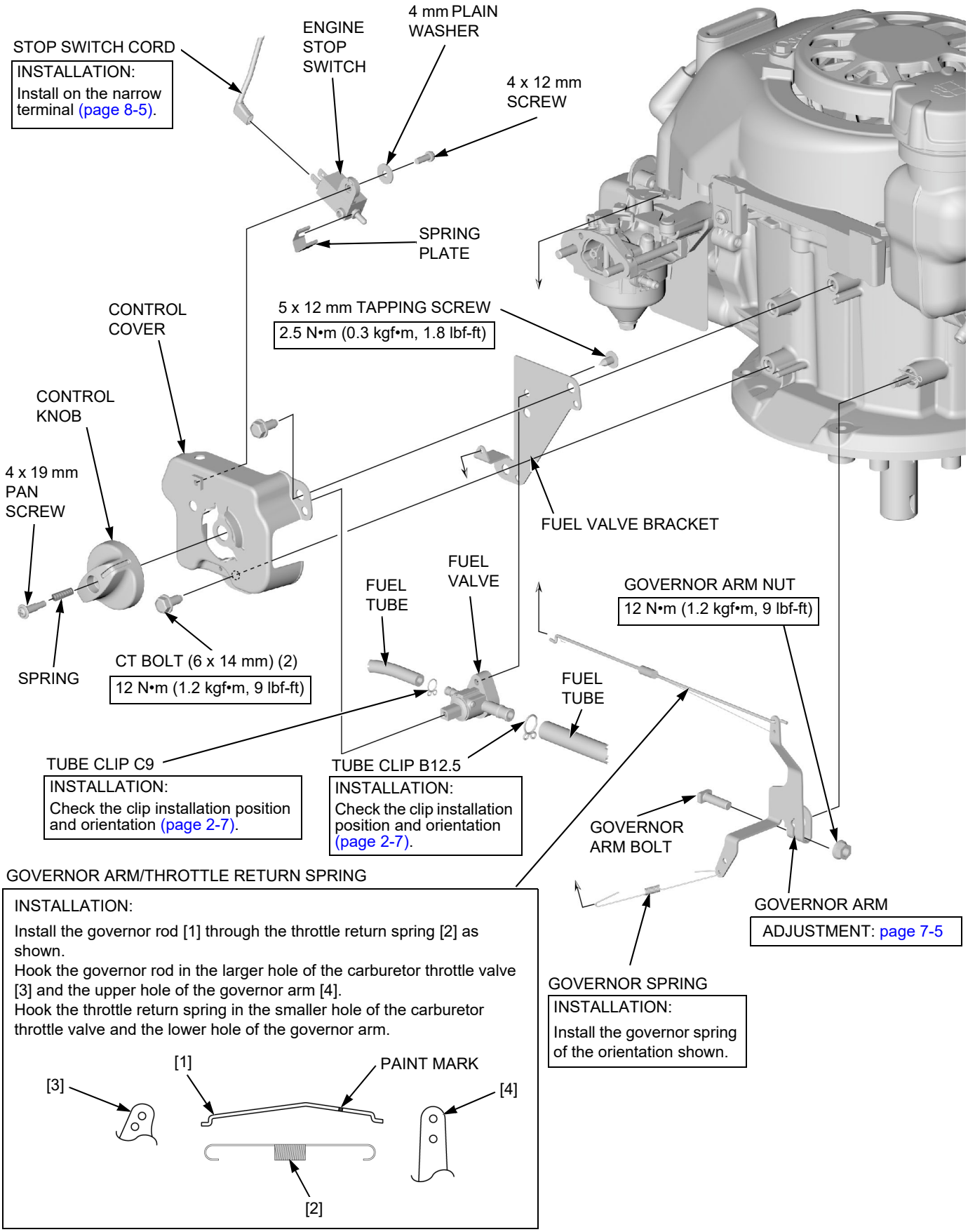
FUEL VALVE

FUEL TUBE

Fixed throttle types (S3B, S3C, S3L types)



Fixed Throttle type (G5B, G5BR types)



GOVERNOR ADJUSTMENT

With the engine stopped, loosen the governor arm nut [1].

Push the governor arm [2] away from the carburetor to fully open the carburetor throttle valve.
Hold the governor arm and carburetor throttle valve in the fully open position, and turn the governor arm shaft [3] fully clockwise, then tighten the governor arm nut to the specified torque.

TORQUE: 12 N•m (1.2 kgf•m, 9 lbf-ft)

Check to make sure the governor arm and the carburetor throttle valve operate smoothly.

Start the engine and warm it up to the normal operating temperature. For flywheel brake models, you may require an assistant to engage and hold the flywheel brake control while you perform your adjustment. For lawn mower applications, the cutting blade(s) must be installed before checking or adjusting the engine speed.

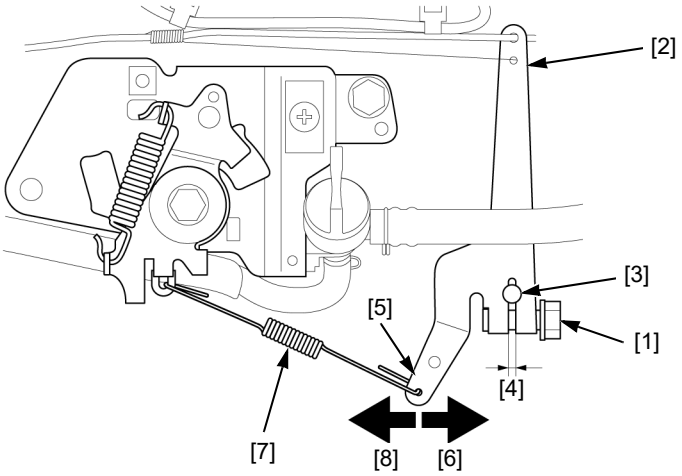
NOTE: Depending on the engine's final application, the end product manufacturer may have reset the engine speed to a different value than what is shown below. Use these values only if there is no information specified otherwise.

MAXIMUM GOVERNED SPEED:
GCV170 (A1A, S3B types): 3,100 ± 150 rpm
GCV200 (S3C, S3L types): 3,050 ± 150 rpm
GCV170/200 (G5B, G5BR types): 3,700 ± 150 rpm

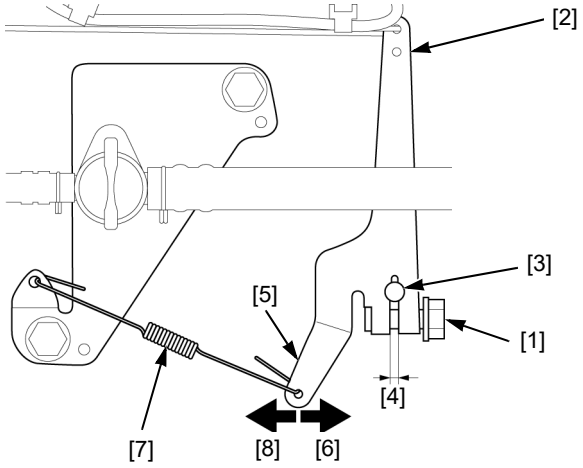
If the engine speed is not within the specification, adjust the engine speed as necessary by bending the governor spring tab [5] on the governor arm. Be careful not to distort the governor arm so that it does not clamp to the shaft properly.

- Moving the tab to the right [6] increases governor spring [7] tension and engine speed.
- Moving the tab to the left [8] decreases governor spring tension and engine speed.

Manual throttle type (GCV170 A1A)

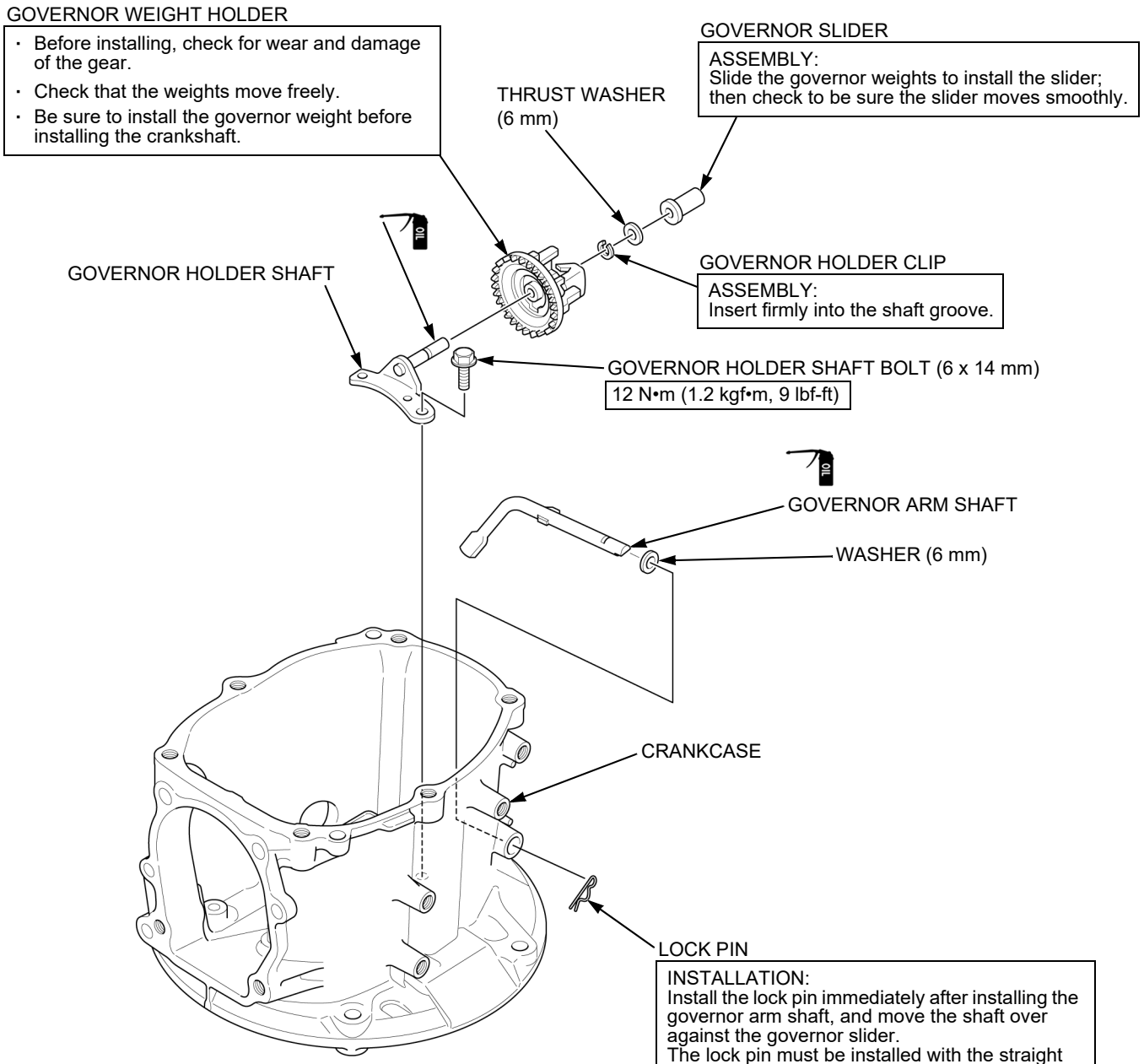


Fixed throttle type (GCV170 S3B, G5B, G5BR) (GCV200 S3C, S3L, G5B, B5BR)



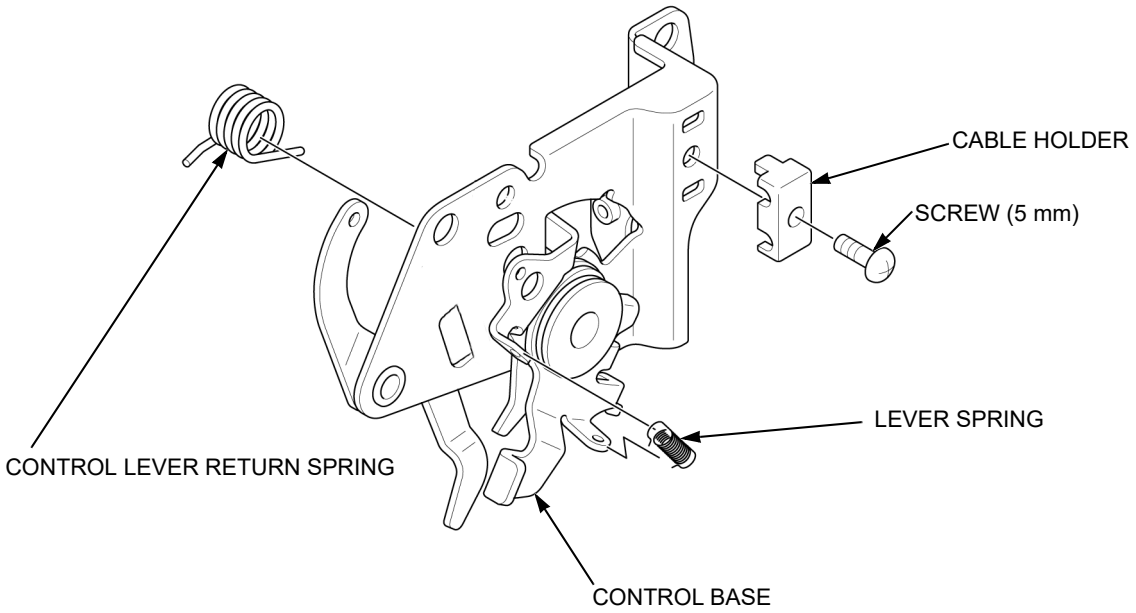
GOVERNOR REMOVAL/INSTALLATION

Remove the crankshaft (page 12-9).



CONTROL BASE DISASSEMBLY/ASSEMBLY (MANUAL THROTTLE TYPE)

Remove the control base (page 7-2).



MEMO

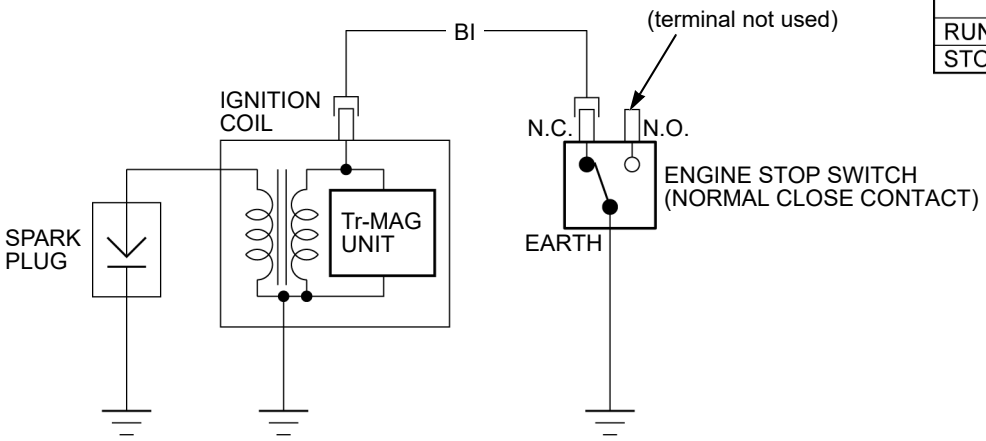
8. IGNITION SYSTEM

IGNITION SYSTEM DIAGRAM

S3B, S3C, S3L, G5B, G5BR types (flywheel brake type)

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

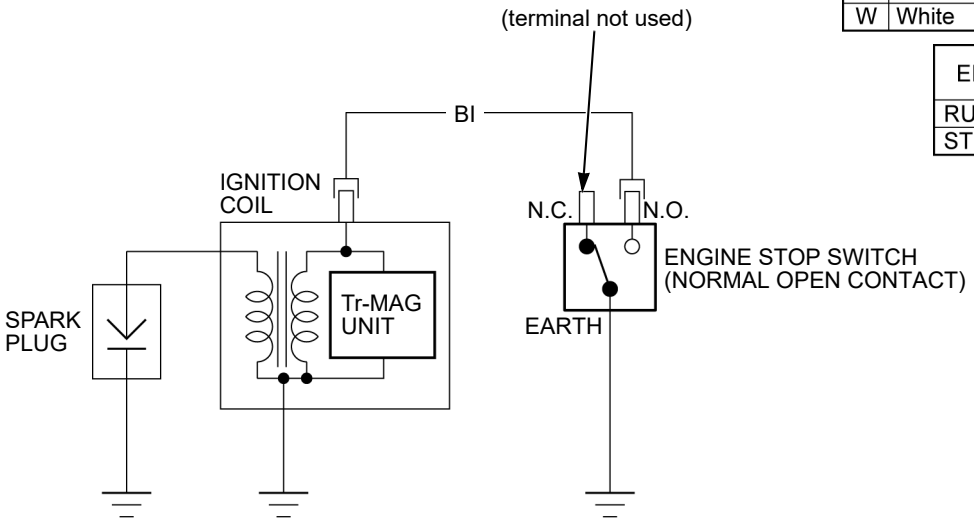
ENGINE	SWITCH CONTACT
RUN	OPEN
STOP	CLOSE



A1A type (remote type):

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

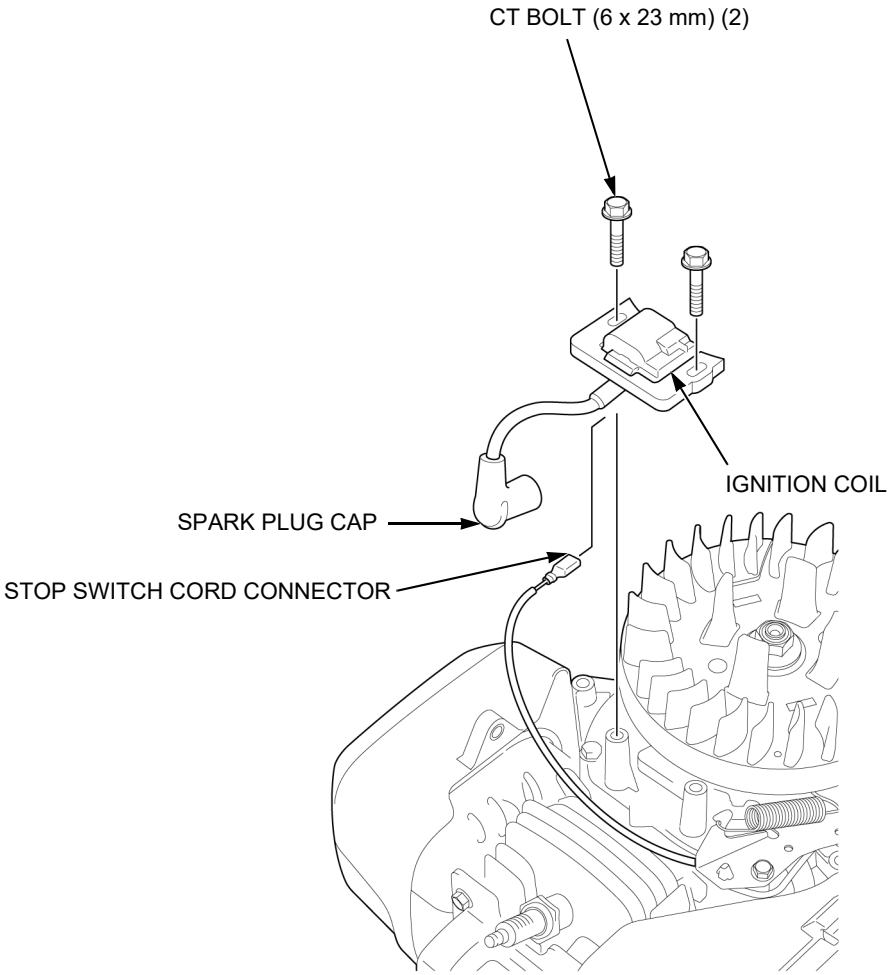
ENGINE	SWITCH CONTACT
RUN	OPEN
STOP	CLOSE



IGNITION COIL REMOVAL/INSTALLATION

Remove the fan cover (page 5-3).

After installation, adjust the ignition coil air gap (page 8-4).



IGNITION COIL AIR GAP ADJUSTMENT

Remove the fan cover (page 5-3).

Attach the ignition coil [1] and loosely tighten two bolts [2].

Insert the feeler gauge [3] between the ignition coil and flywheel.

IGNITION COIL AIR GAP:
0.30 mm (0.012 in)

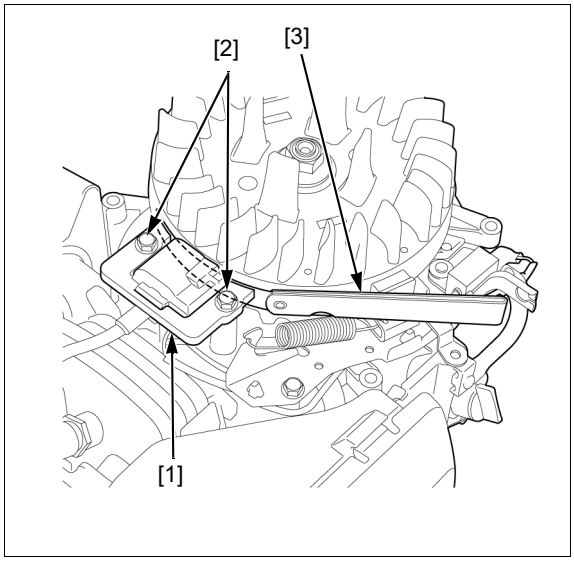
NOTICE

Adjust the ignition coil air gap equally on both sides.

Push the ignition coil firmly against the flywheel and tighten the two bolts securely.

Remove the feeler gauge.

Install the fan cover (page 5-3).



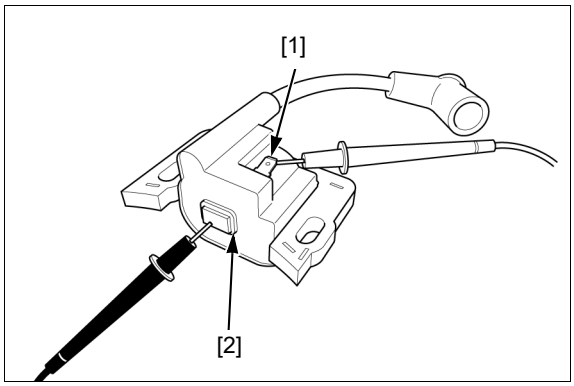
IGNITION COIL INSPECTION

PRIMARY SIDE

Remove the ignition coil (page 8-3).

Measure the resistance of the primary coil by attaching the ohmmeter leads to the ignition coil terminal [1] and the iron core [2].

Resistance: **0.4 – 0.6 Ω**

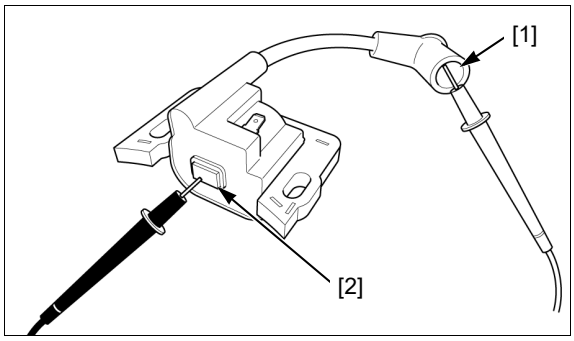


SECONDARY SIDE

Remove the ignition coil (page 8-3).

Measure the resistance of the secondary coil by attaching the ohmmeter leads to the inside of the spark plug cap [1] and the iron core [2].

Resistance: **8.3 – 12.5 kΩ**



ENGINE STOP SWITCH INSPECTION

Remove the engine stop switch (A1A, S3B, S3C, S3L types: page 10-5, G5B, G5BR types: page 7-4).

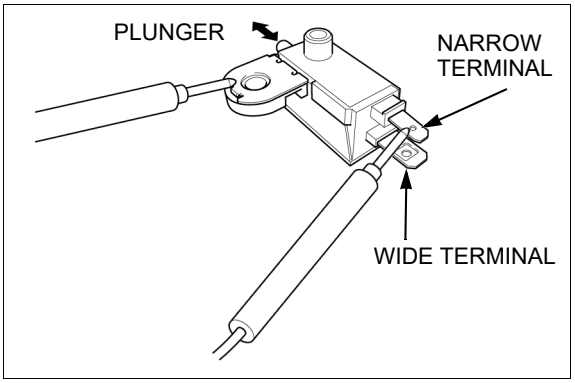
S3B, S3C, S3L, G5B, G5BR TYPES

Narrow terminal:

– There should be no continuity when the plunger is pushed in.
– There should be continuity when the plunger is released.

Wide terminal is not used.

Replace the engine stop switch if the correct continuity test results are not obtained.



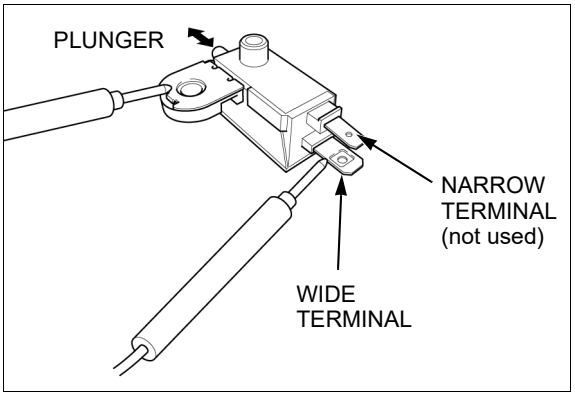
A1A TYPE

Narrow terminal is not used.

Wide terminal:

– There should be continuity when the plunger is pushed in completely.
– There should be no continuity when the plunger is released.

Replace the engine stop switch if the correct continuity test results are not obtained.



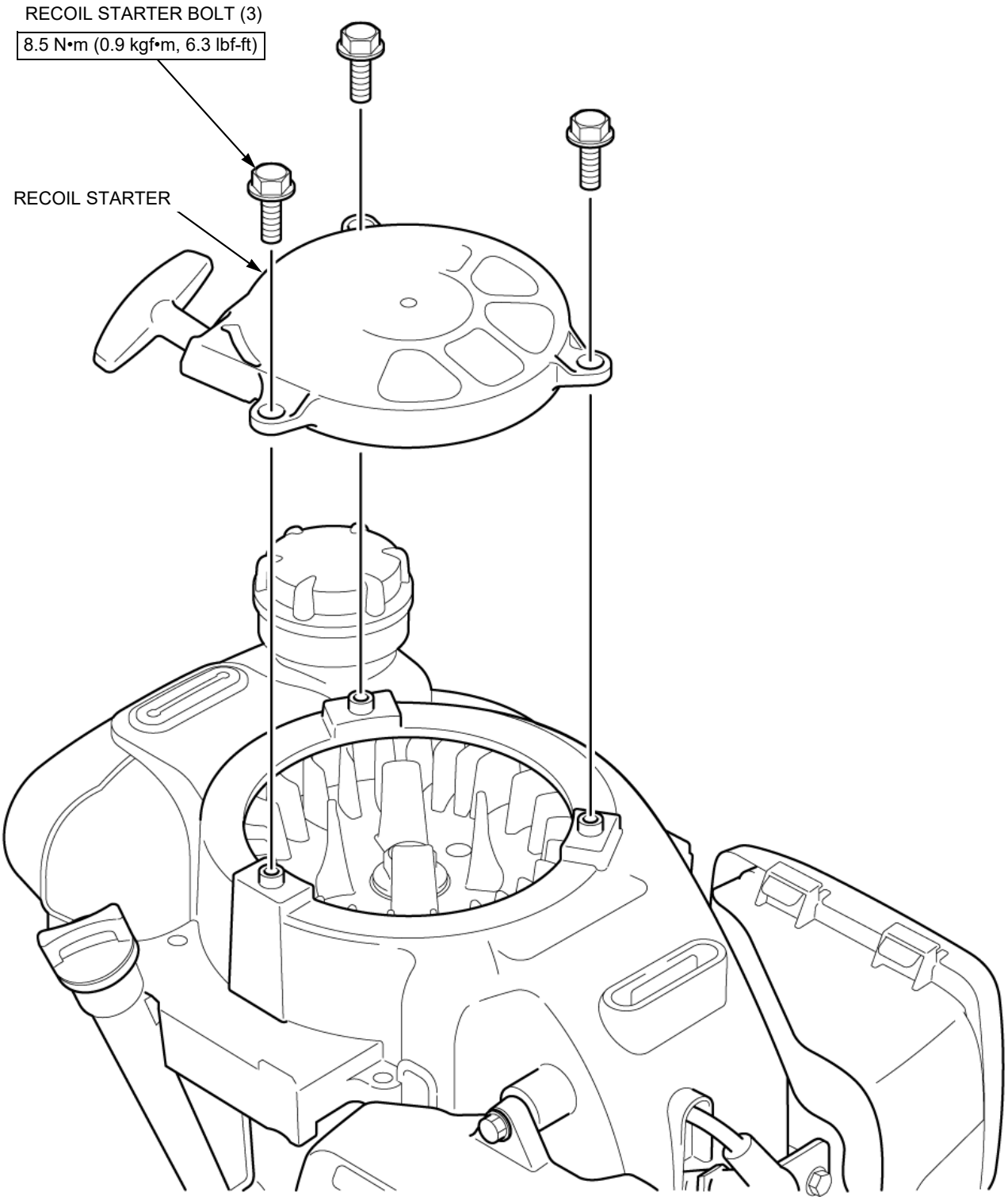
MEMO

9. STARTING SYSTEM

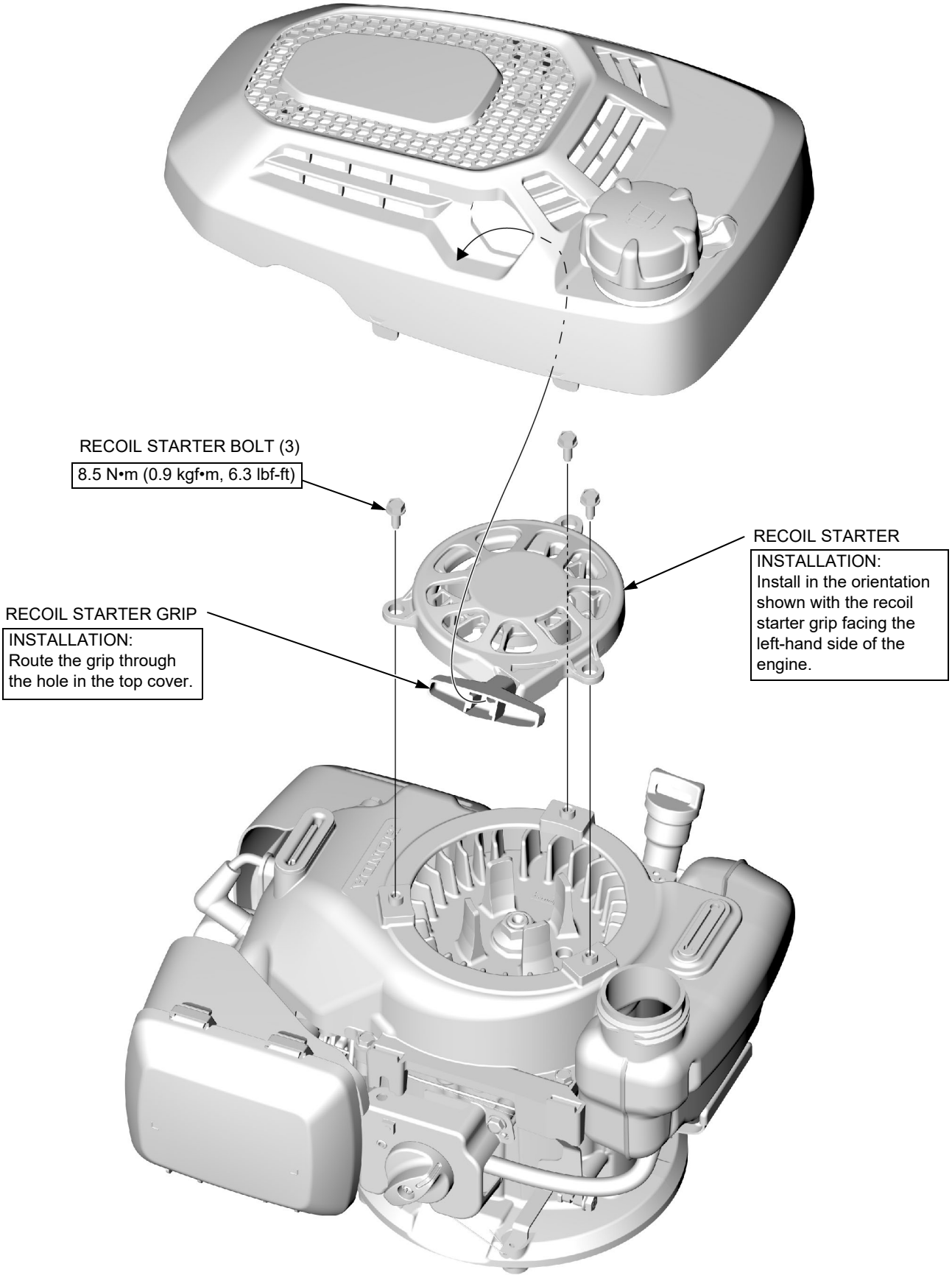
RECOIL STARTER REMOVAL/INSTALLATION

Remove the top cover (page 5-2).

STANDARD MOUNTING DIRECTION (all types except G5BR)
(Starter grip is pulled in a rearward direction)



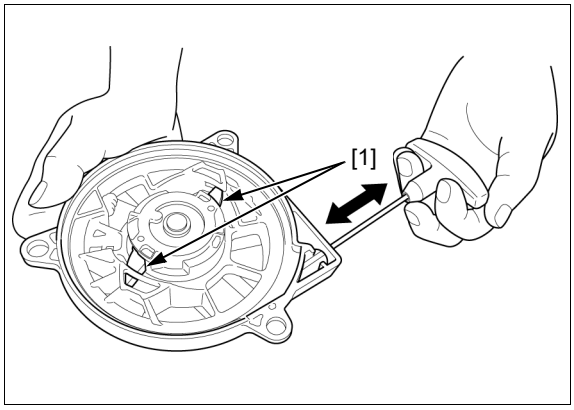
ROTATED MOUNTING DIRECTION (G5BR type only)
(Starter grip is pulled from engine's left side)



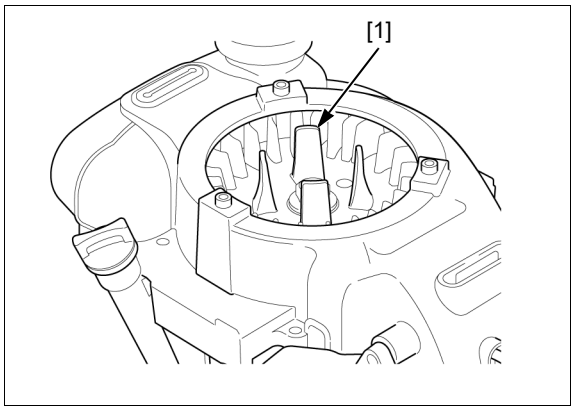
RECOIL STARTER INSPECTION

Remove the recoil starter (page 9-2).

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



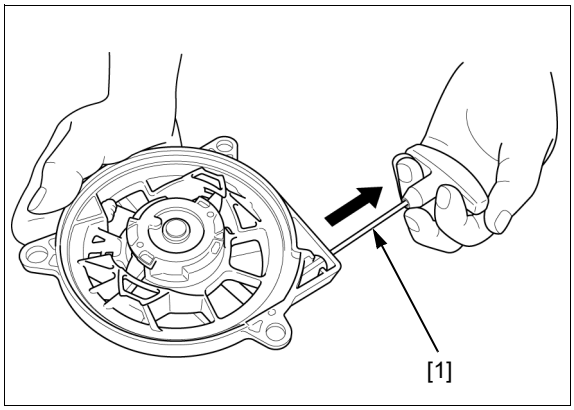
Check the tabs [1] on the cooling fan.



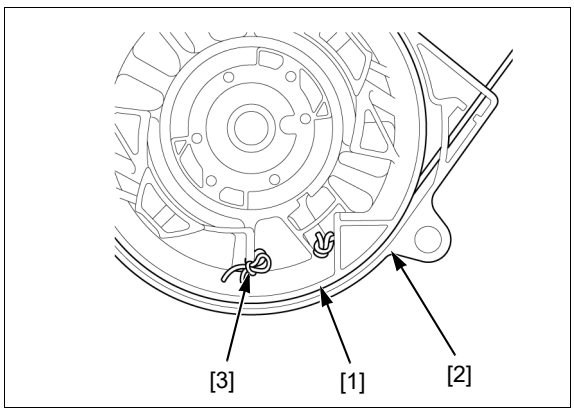
RECOIL STARTER ROPE REPLACEMENT

Remove the recoil starter (page 9-2).

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



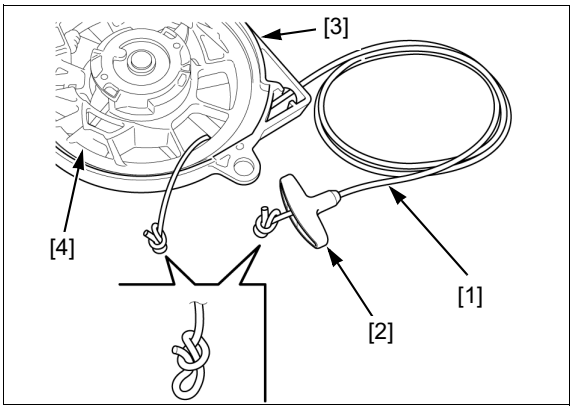
To prevent the starter reel [1] from rewinding, hold the starter reel and starter case [2] with a band or equivalent material [3] as shown.



Untie the knots of the starter rope [1] at the starter grip side and the starter reel side, and remove the starter rope.

Pass the starter rope through the starter grip [2] and make a slip knot at the end of the rope.

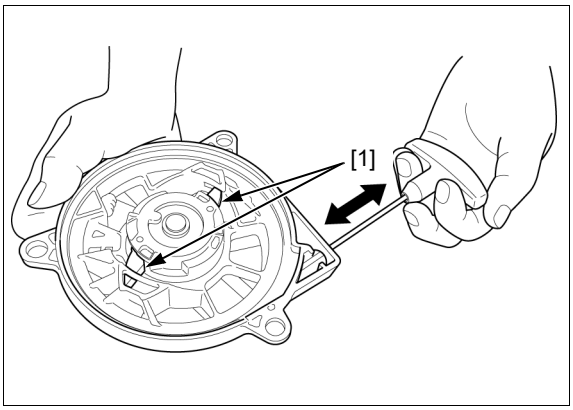
Pass the other end of the starter rope through the rope hole in the starter case [3] and through the rope hole in the starter reel [4], and make a slip knot at the end of the rope.



Remove the band holding the starter reel and carefully allow the starter reel to rewind.

Check the operation or the ratchets [1] by pulling the starter rope several times.

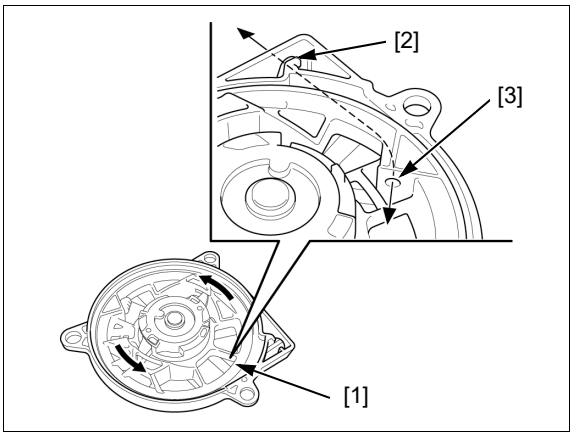
Install the recoil starter (page 9-2).



RECOIL STARTER ROPE BROKEN OR REEL UNWOUND

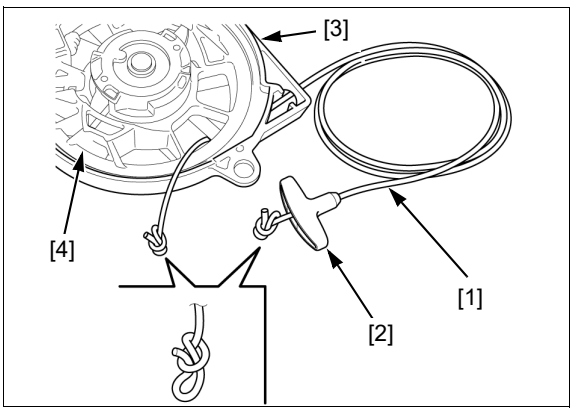
Remove the recoil starter (page 9-2).

Turn the starter reel [1] in the direction of the arrow six turns.
Align the rope hole in the starter case [2] with the rope hole in the starter reel [3].



Pass the starter rope [1] through the starter grip [2] and make a slip knot at the end of the rope.

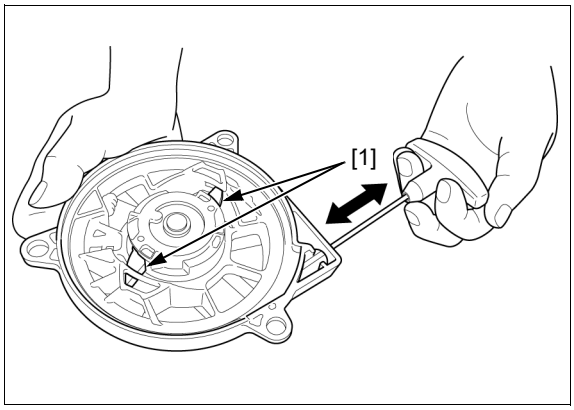
Pass the other end of the starter rope through the rope hole in the starter case [3] and through the rope hole in the starter reel [4], and make a slip knot at the end of the rope.



Carefully allow the starter reel to rewind.

Check the operation or the ratchets [1] by pulling the starter rope several times.

Install the recoil starter (page 9-2).



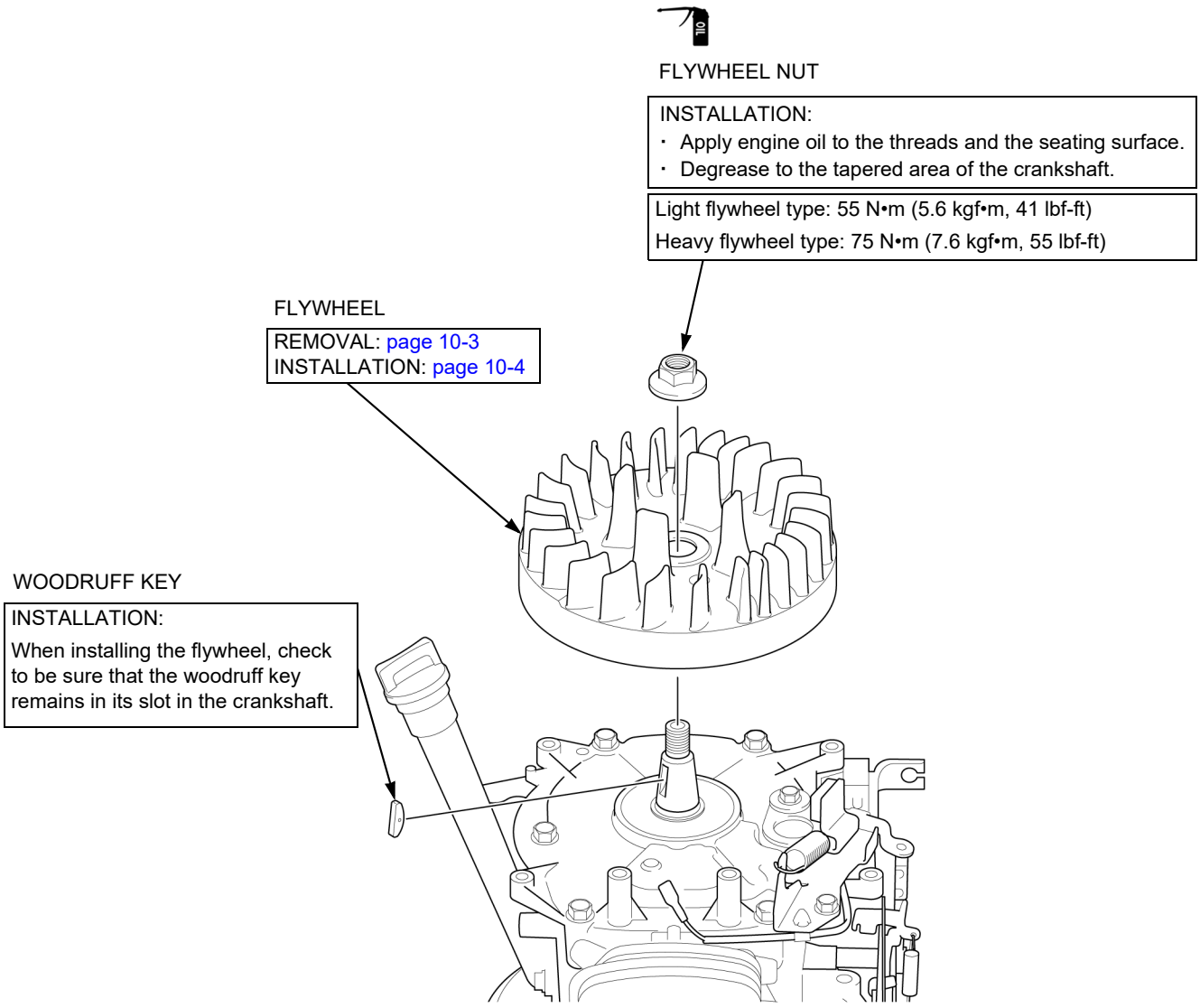
FLYWHEEL / COOLING FAN REMOVAL/INSTALLATION

NOTICE

Take care not to damage the fan blades during removal and installation of the flywheel.

Remove the following:

– Fan cover (page 5-3)
– Ignition coil (page 8-3)

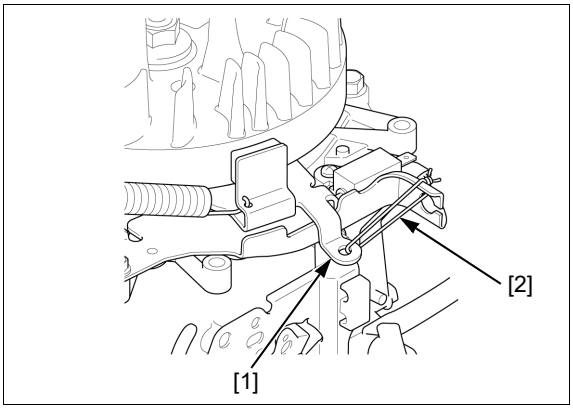


REMOVAL

Remove the following parts:

– Fan cover (page 5-3)
– Ignition coil (page 8-3)

Light flywheel type: Pull the flywheel brake lever [1] and secure the lever with a strap [2] or equivalent material as shown.

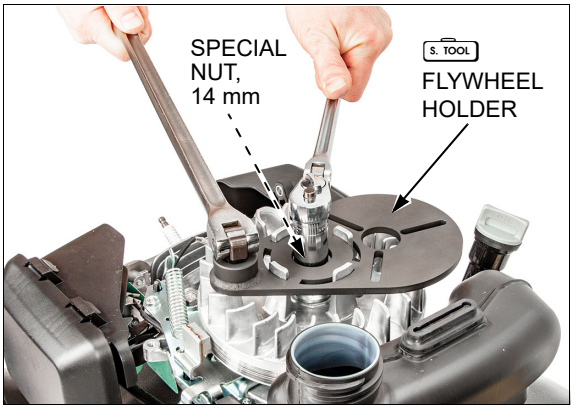


Holding the flywheel with the flywheel holder special tool or a commercially available strap wrench, remove the 14 mm special nut.

TOOL:
FLYWHEEL HOLDER **07APB-Z28A101**

NOTICE

Inserting a rod or screwdriver in the fan blades can damage the blades or the aluminum casting projections.



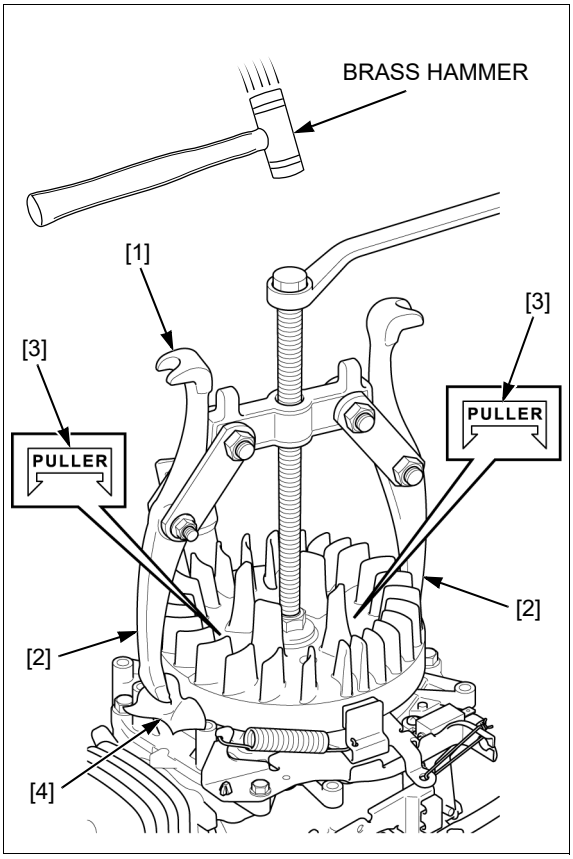
Position a commercially available 6-inch flywheel puller [1] to align the puller jaws [2] with the PULLER marks [3] on the flywheel as shown.

Set a shop towel or equivalent cloth [4] between the flywheel and the puller.

Tighten the flywheel puller and then tap the end of the puller with a heavy brass hammer to remove the flywheel.

NOTICE

Do not use an impact wrench when removing the flywheel. The flywheel may break if too much force is applied.



INSTALLATION

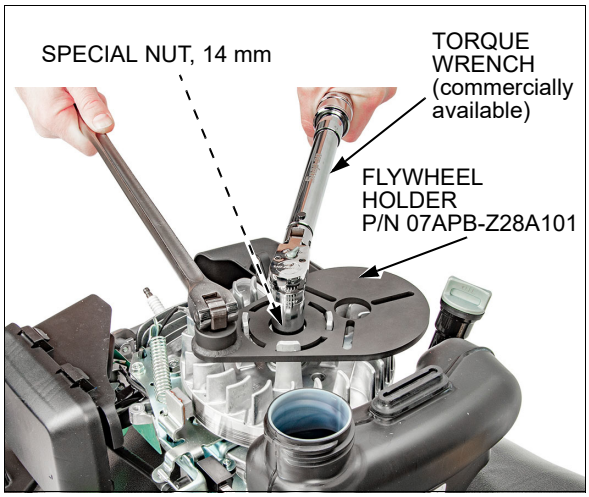
Clean the tapered part of dirt, oil, grease, and other foreign material before installation.

Be sure the woodruff key is set in the keyway properly (page 10-2).

Install the flywheel.

Apply engine oil to the flywheel nut threads and seating surface [1].

Holding the flywheel with the flywheel holder special tool or a commercially available strap wrench, tighten the 14 mm special nut to the specified torque.



TOOL:
FLYWHEEL HOLDER 07APB-Z28A101

TORQUE:
Light flywheel type: 55 N•m (5.5 kgf•m, 41 lbf-ft)
Heavy flywheel type: 75 N•m (7.6 kgf•m, 55 lbf-ft)

Light flywheel models:
Remove the strap holding the flywheel brake lever or control.

Install the ignition coil (page 8-3).

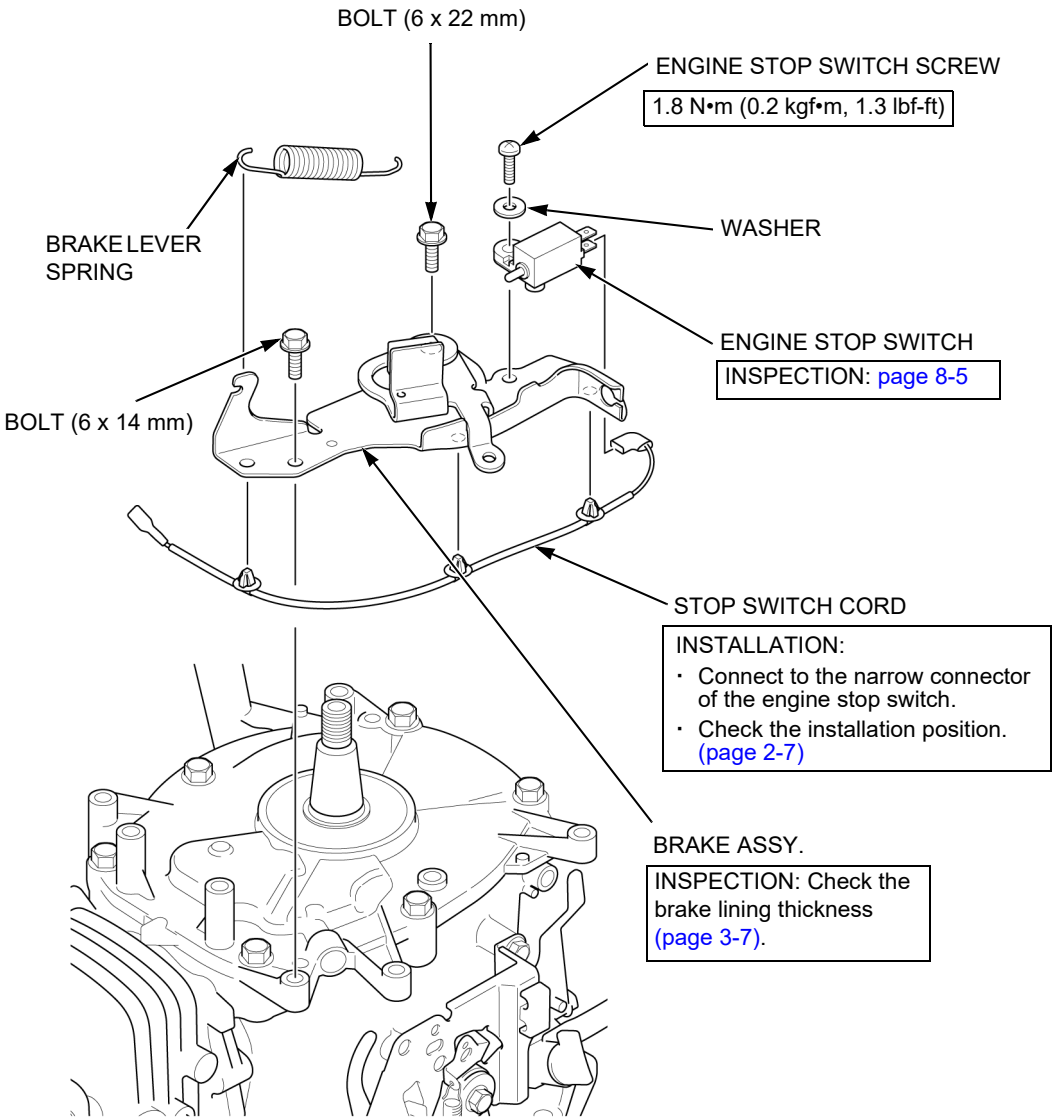
Install the fan cover and top cover (page 5-3).

Check for proper operation.

BRAKE ASSY. / ENGINE STOP SWITCH REMOVAL/INSTALLATION (LIGHT FLYWHEEL TYPE)

Remove the flywheel (page 10-2).

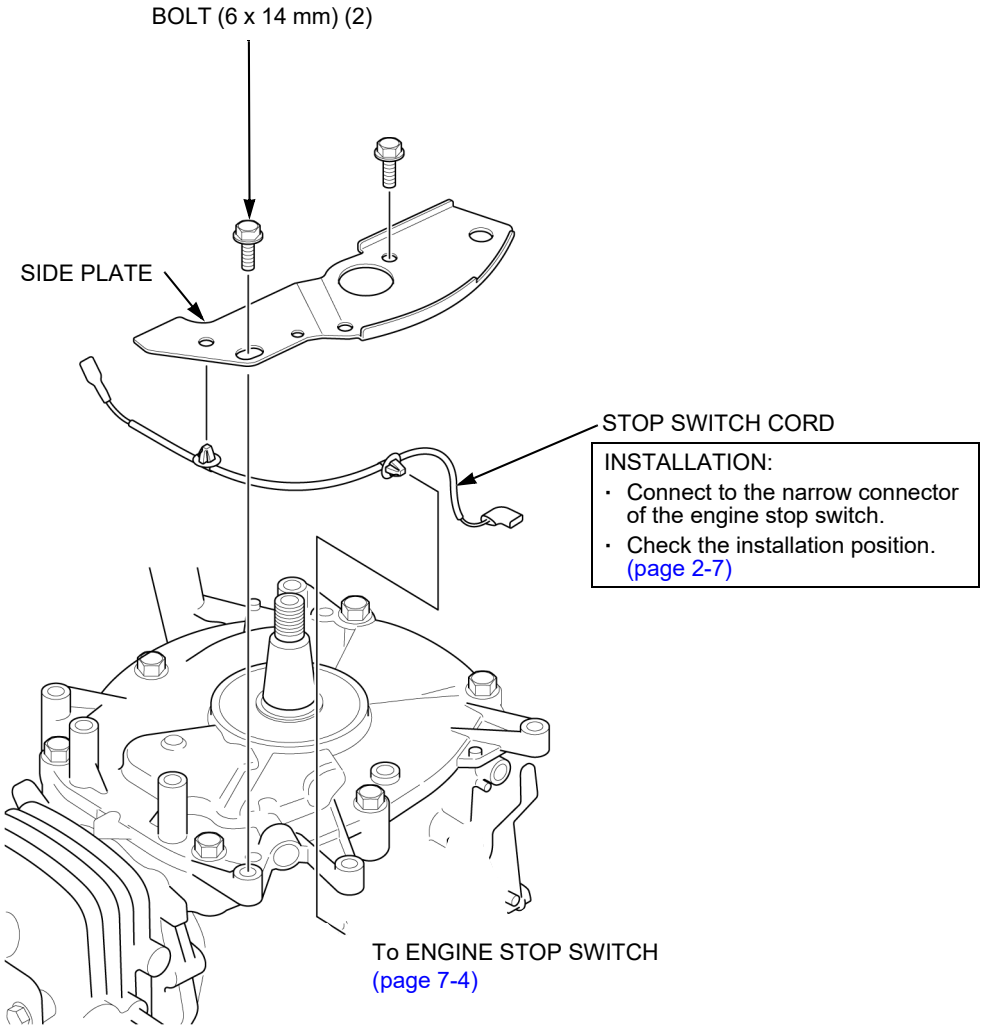
A1A, S3B, S3C, S3L types



SIDE PLATE REMOVAL/INSTALLATION (HEAVY FLYWHEEL TYPE)

Remove the flywheel (page 10-2).

G5B and G5BR types



11. MUFFLER

MUFFLER REMOVAL/INSTALLATION

⚠CAUTION

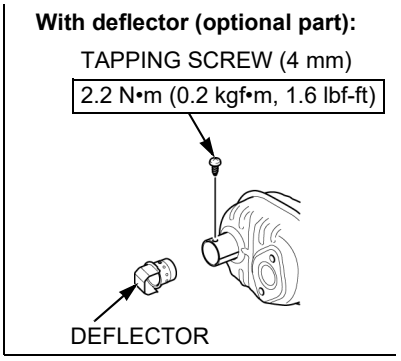
The muffler becomes very hot during operation and remains hot for a while after operation.

A hot engine or muffler can burn you.

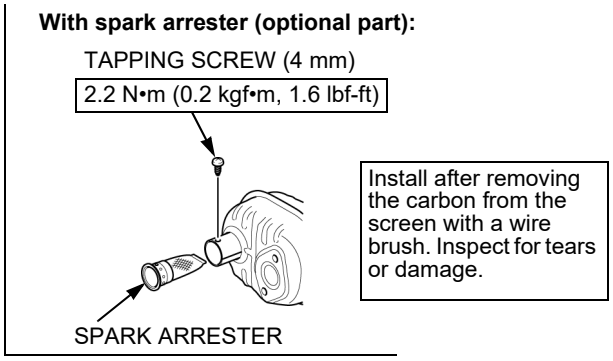
Be sure that the engine is cold before muffler removal/installation.

Remove the top cover (page 5-2).

With deflector (optional part):

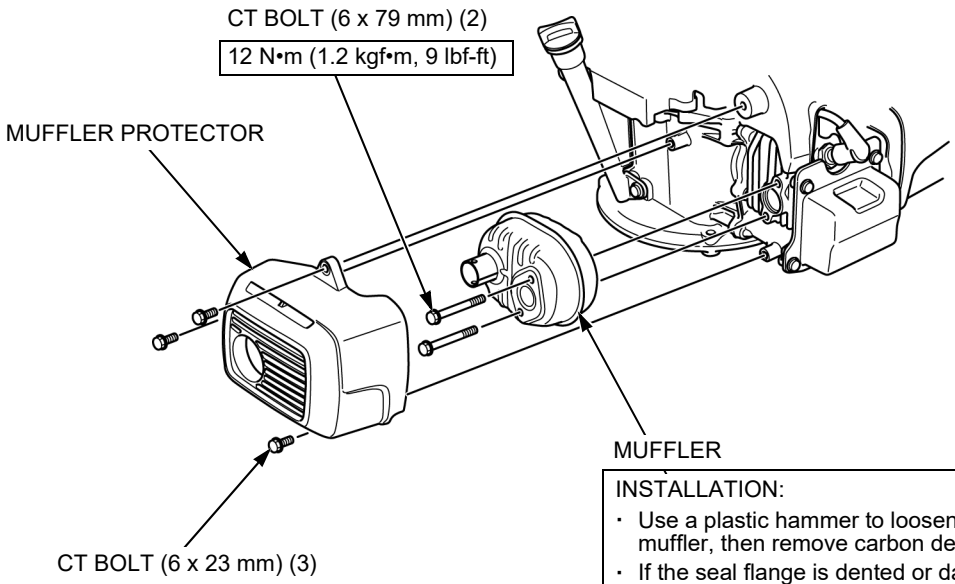


With spark arrester (optional part):



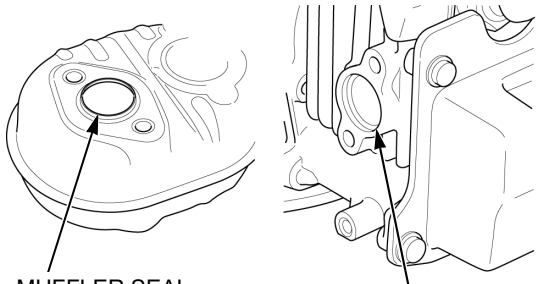
Install after removing the carbon from the screen with a wire brush. Inspect for tears or damage.

Without deflector and spark arrester:



INSTALLATION:

- Use a plastic hammer to loosen carbon deposits from the muffler, then remove carbon deposits from muffler.
- If the seal flange is dented or damaged, replace the muffler.
- Check the cylinder exhaust port for damage.
- Do not tap on the muffler seal flange and do not damage this part.



12. CRANKSHAFT/PISTON/VALVES

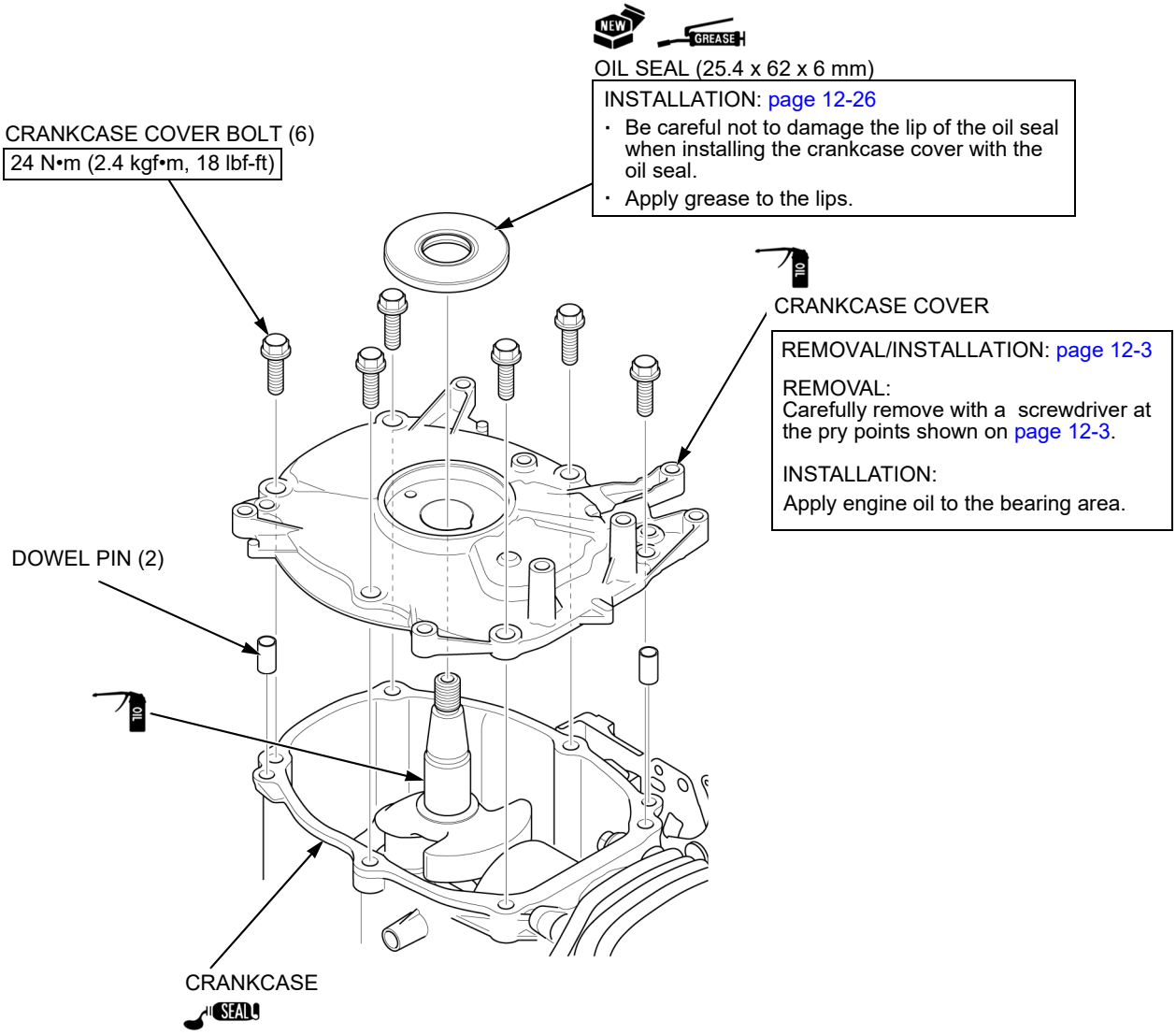
CRANKCASE COVER REMOVAL/INSTALLATION

Remove the flywheel (page 10-2).

Be sure to reconnect the breather tube to the cover after installation.

Light flywheel type: Remove the brake assy. (page 10-5).

Heavy flywheel type: Remove the side plate (page 10-6).

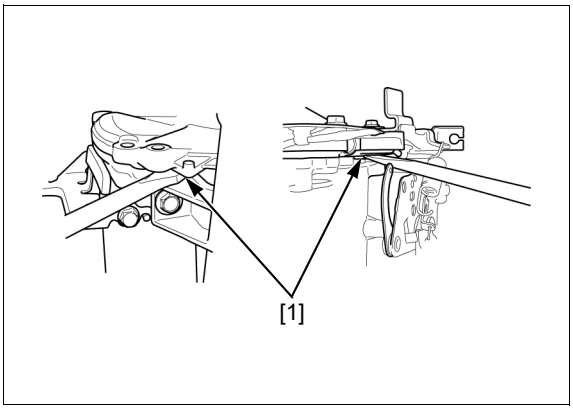


REMOVAL

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

Remove the six crankcase cover bolts.

Insert a screw driver or equivalent tool into the recesses [1] as shown, and remove the crankcase cover.



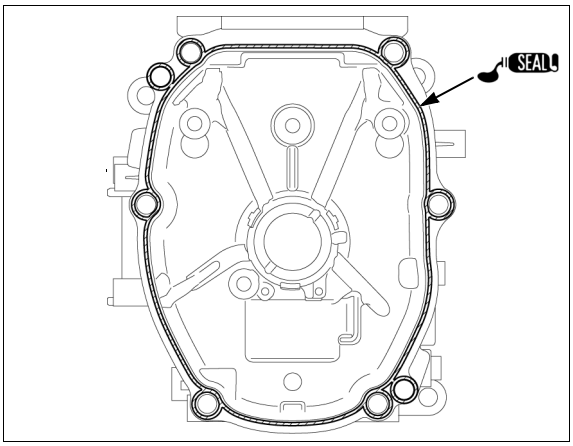
INSTALLATION

Clean the mating surfaces of the crankcase cover and the crankcase using a degreasing cleaning agent or a clean shop towel.

Apply a bead [Ø 1.0 – 2.0 mm (Ø 0.04 – 0.08 in)] of liquid gasket (Hondabond HT or LOCTITE® 5900 or equivalent) to the crankcase.

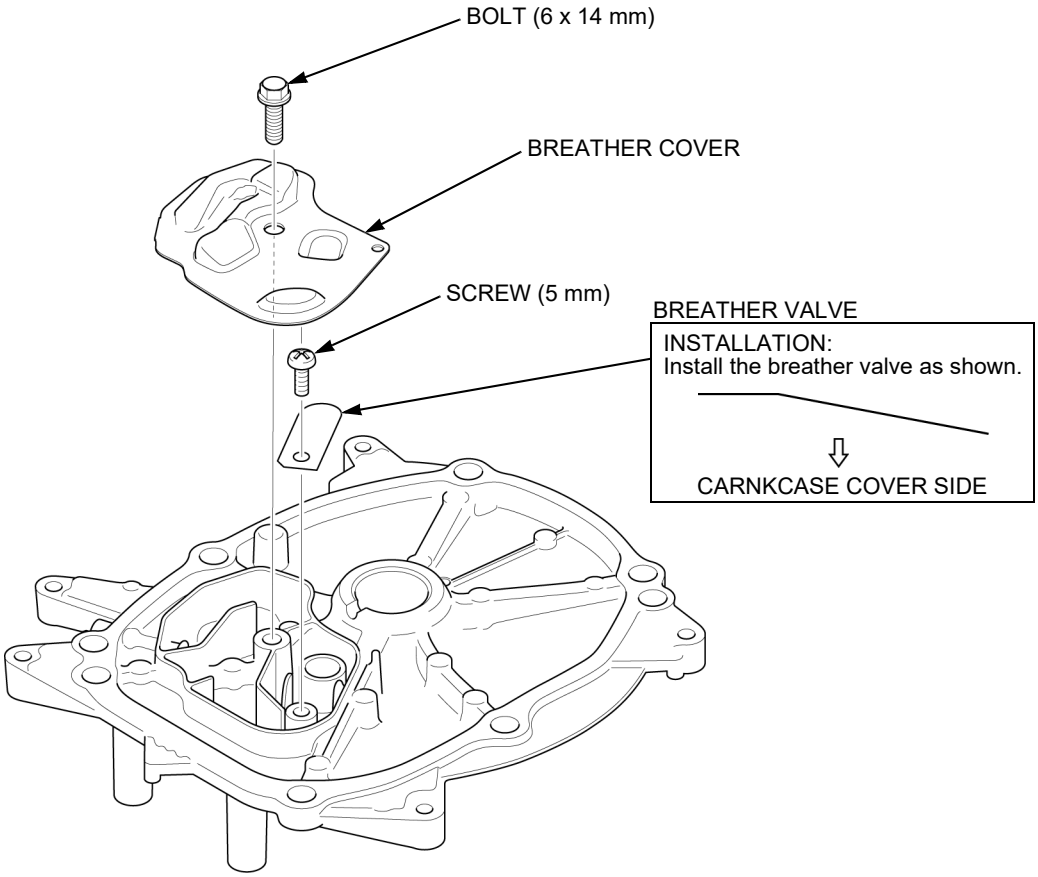
Assemble within 3 minutes after applying the liquid gasket.

Wait for approximately 30 minutes after assembly and before filling oil and starting the engine.



BREATHER COVER REMOVAL/INSTALLATION

Remove the crankcase cover (page 12-2).



CYLINDER REMOVAL/INSTALLATION

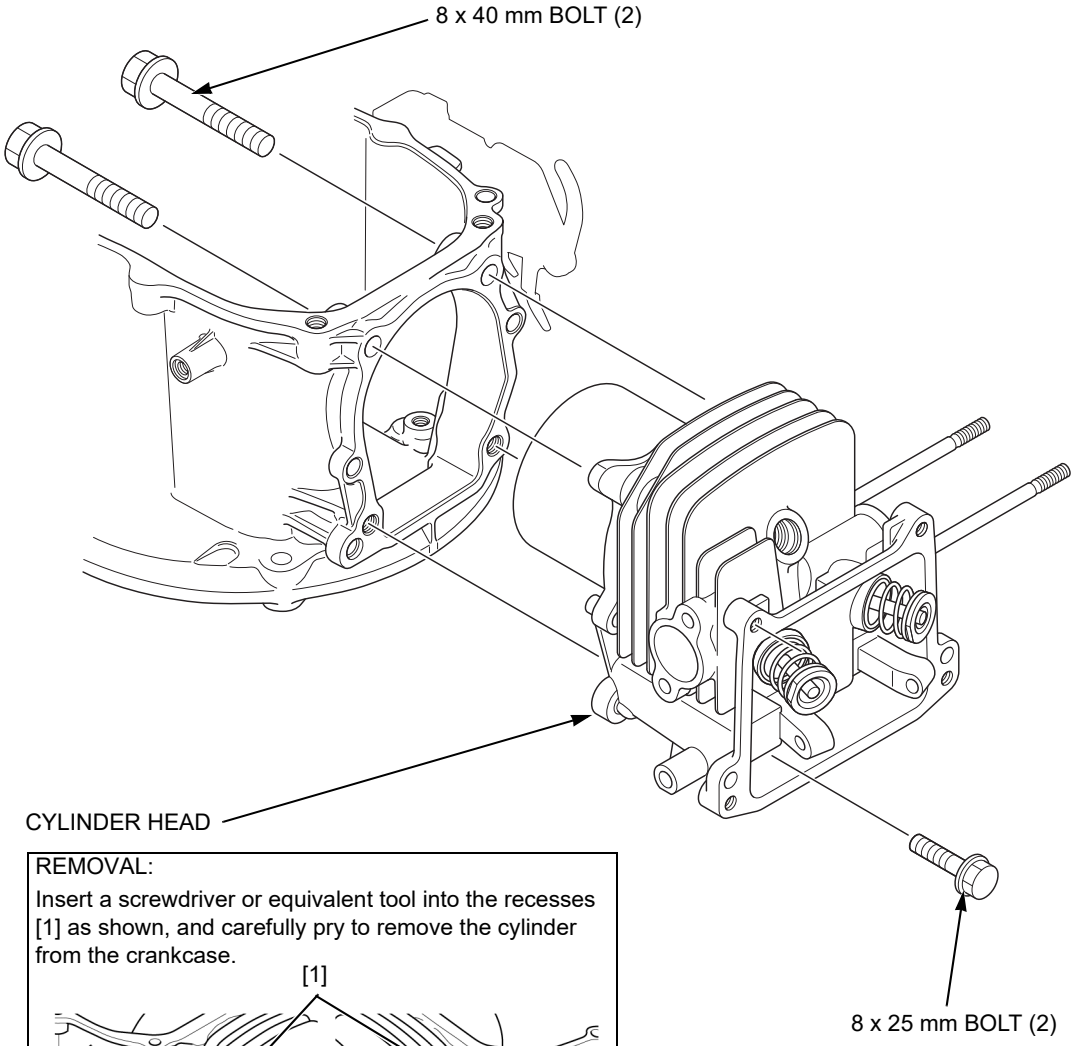
REMOVAL

Drain the engine oil (page 3-4).

Remove the following:

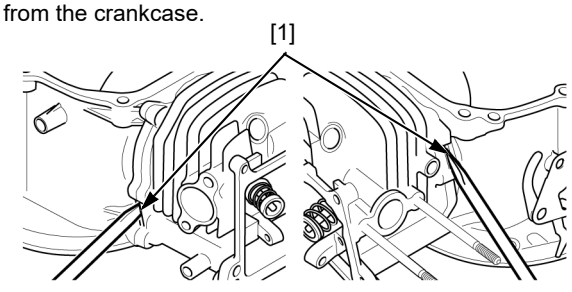
- Crankcase cover (page 12-2)
- Carburetor (page 6-3)
- Muffler (page 11-2)
- Rocker arms and push rods (page 12-12)

(the piston and connecting rod are shown removed for clarity)



REMOVAL:

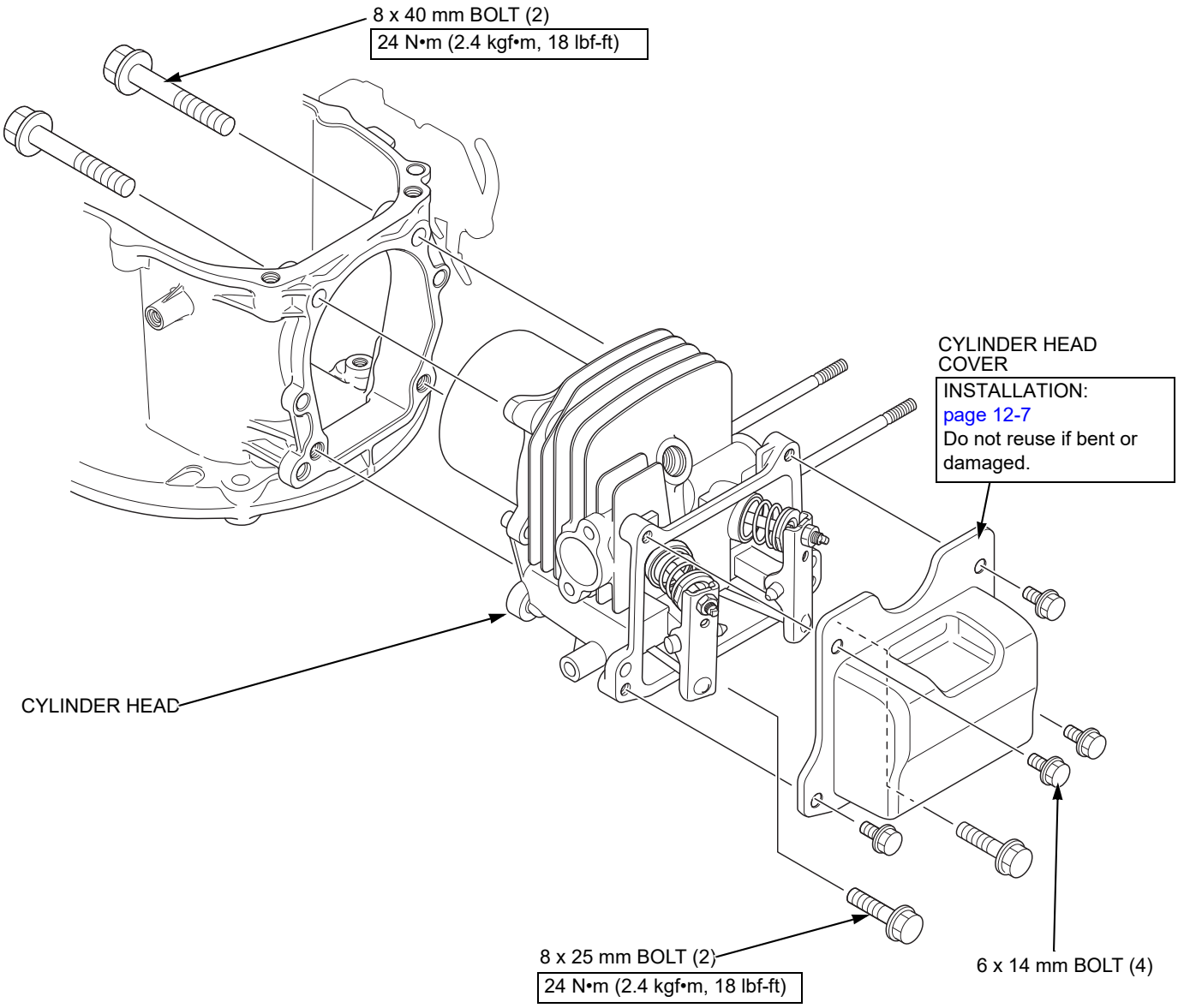
Insert a screwdriver or equivalent tool into the recesses [1] as shown, and carefully pry to remove the cylinder from the crankcase.



INSTALLATION

Install the camshaft and lifters before installing the cylinder (page 12-9).

After installation, check and adjust the valve clearance if necessary (page 3-7).

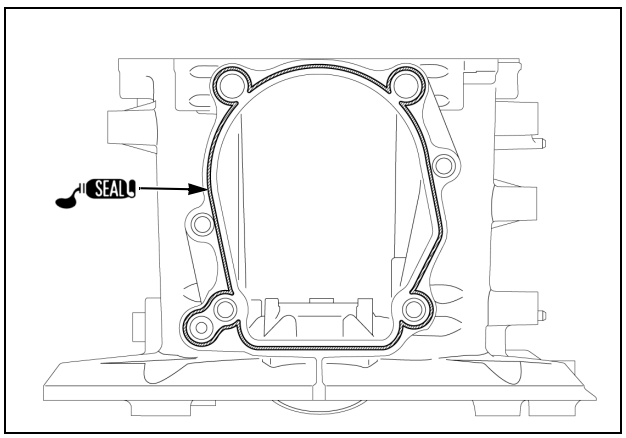


Clean the mating surfaces of the cylinder and the crankcase using a degreasing cleaning agent and a clean shop towel.

Apply a bead [Ø 1.0 - 2.0 mm (Ø 0.04 - 0.08 in) in diameter] of liquid gasket (Hondabond HT, Loctite 5900, or equivalent).

Assemble within 3 minutes after applying the liquid gasket.

Wait for approximately 30 minutes after assembly and before filling with oil and starting the engine.

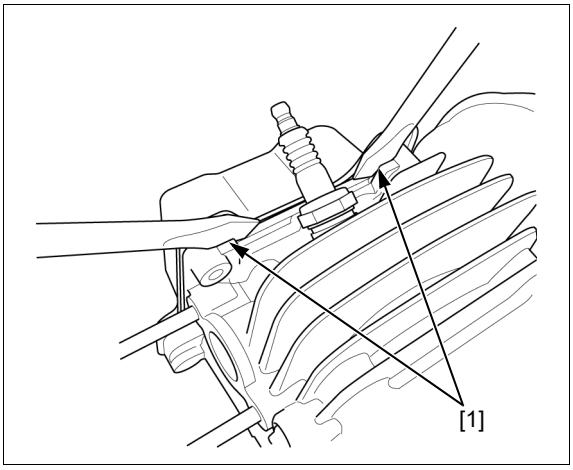


CYLINDER HEAD COVER

REMOVAL:

Remove the four bolts.

Insert a screw driver or equivalent tool into the recesses [1] as shown, and remove the cylinder head cover from the cylinder.



INSTALLATION:

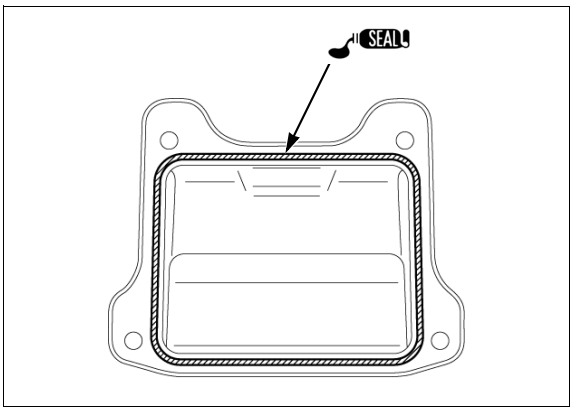
- Do not reuse the original cover if it is bent or damaged.

Clean the mating surfaces of the cylinder head cover and the cylinder using a degreasing cleaning agent or a clean shop towel.

Apply a bead [Ø 1.5 – 2.5 mm (Ø 0.06 – 0.10 in)] of liquid gasket (Hondabond HT or equivalent) to the cylinder head cover.

Assemble within 3 minutes after applying the liquid gasket.

Wait for approximately 30 minutes after assembly and before filling oil and starting the engine.

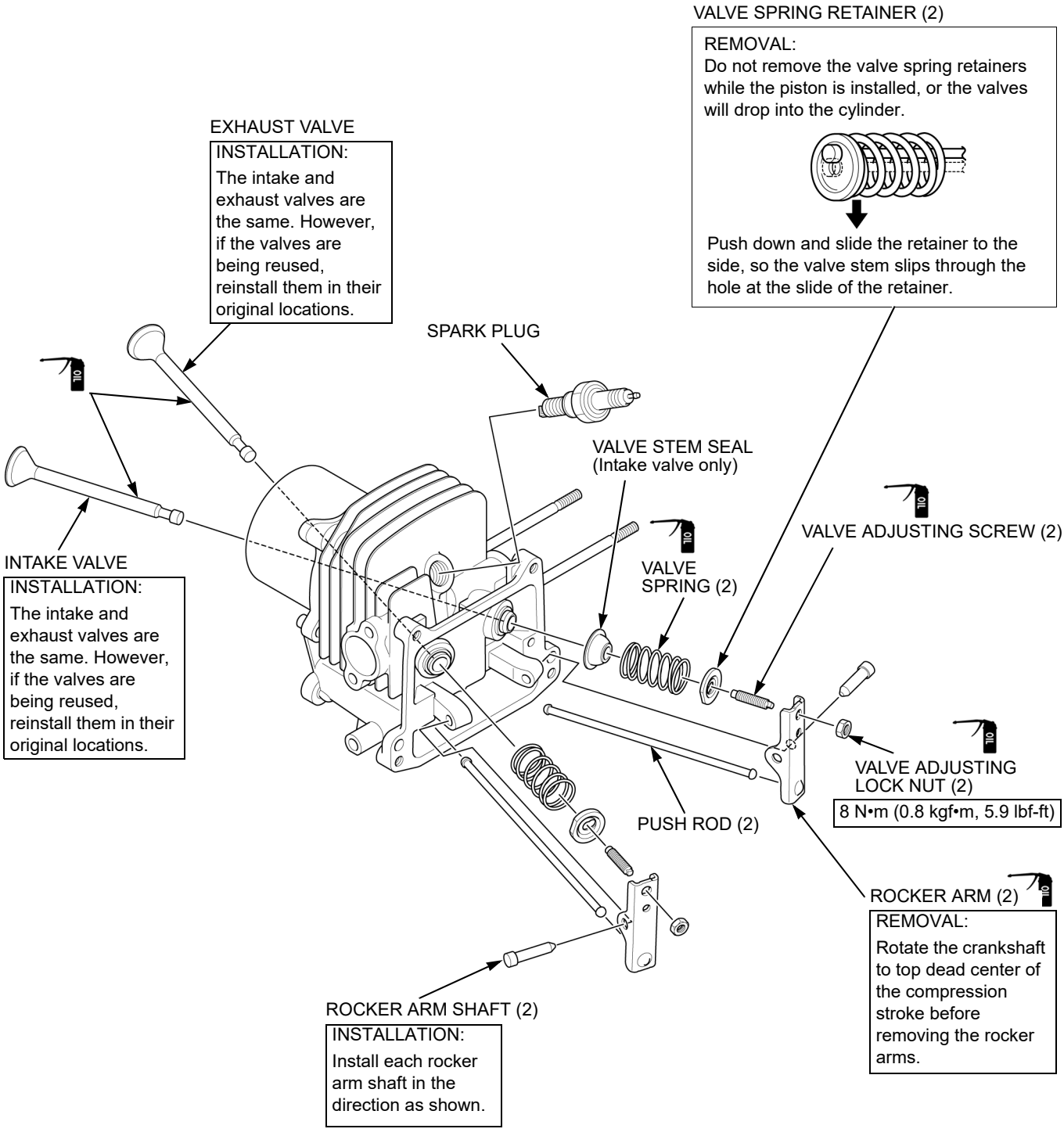


CYLINDER DISASSEMBLY/ASSEMBLY

Remove the cylinder (page 12-5).

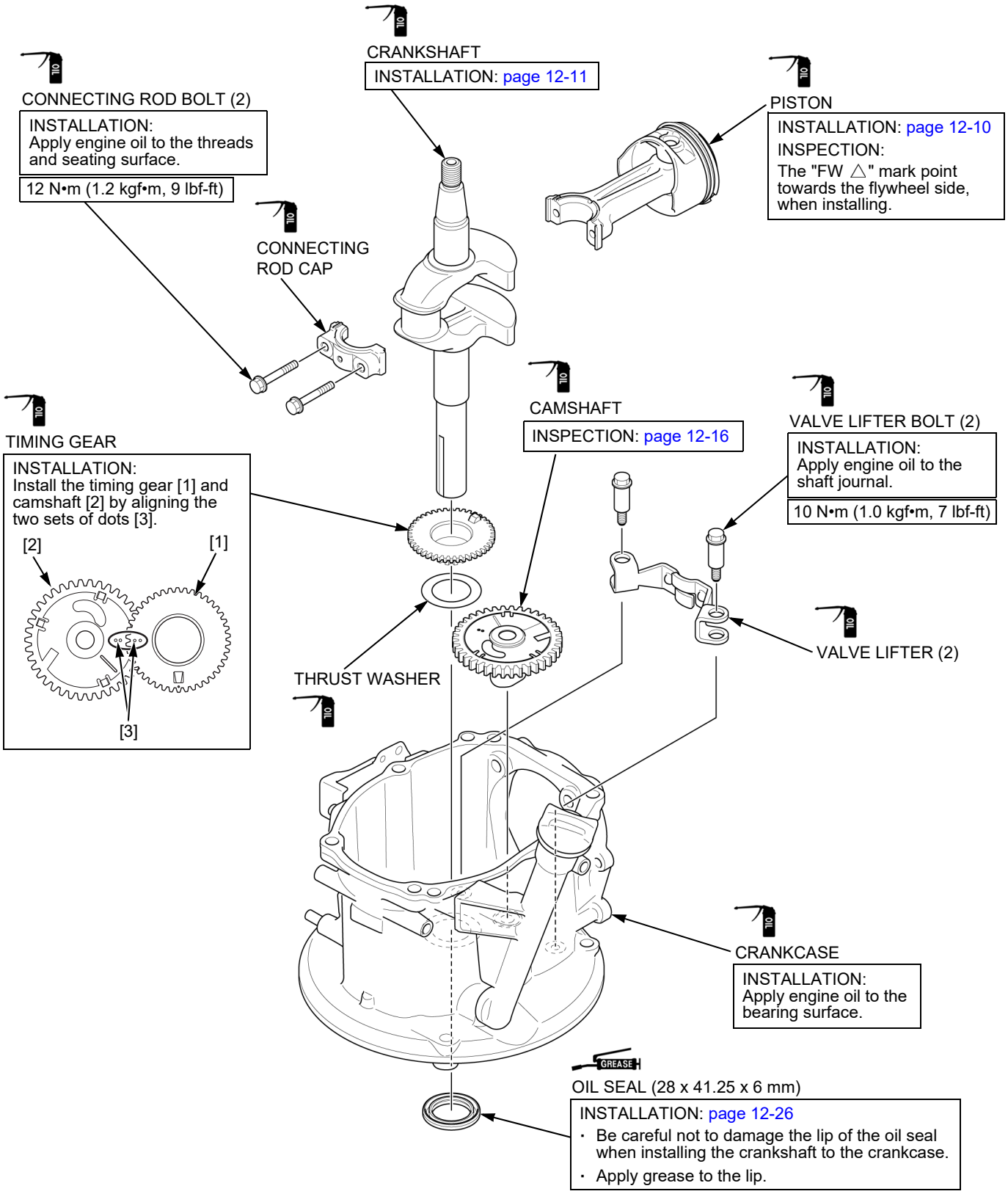
Note: Rocker arm and push rod removal does not require cylinder removal.

After assembly, readjust the valve clearance.



CRANKSHAFT / CAMSHAFT / PISTON REMOVAL/INSTALLATION

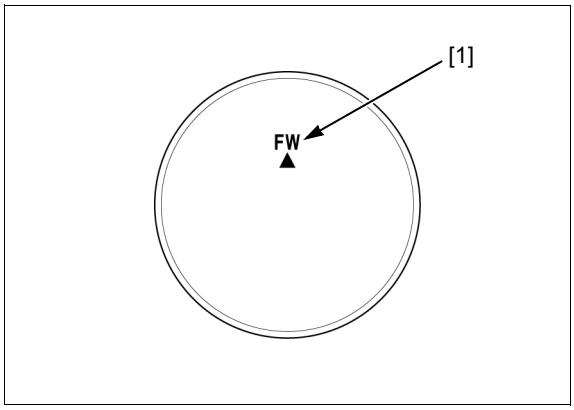
Remove the cylinder (page 12-5).



PISTON/CONNECTING ROD CAP INSTALLATION

Apply engine oil to the crank pin of the crankshaft and the big end of the connecting rod.

Attach the piston/connecting rod to the crankshaft so that the "FW △" mark [1] embossed on the piston crown points toward the flywheel side.

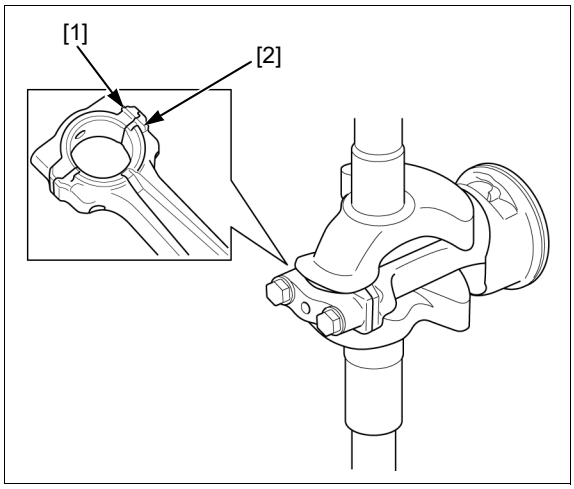


Install the connecting rod cap so that the projection [1] and the projection [2] on the connecting rod are aligned.

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

Tighten the two connecting rod bolts to the specified torque.

TORQUE: 12 N•m (1.2 kgf•m, 9 lbf-ft)



CRANKSHAFT INSTALLATION

If the cylinder and piston/connecting rod are already installed, remove the spark plug, and then set the piston at top dead center.

Rotate the camshaft until the two alignment dots face the crankshaft bore hole in the crankcase.

Apply engine oil to the keyway in the crankshaft and timing gear projection, as well as the thrust washer.

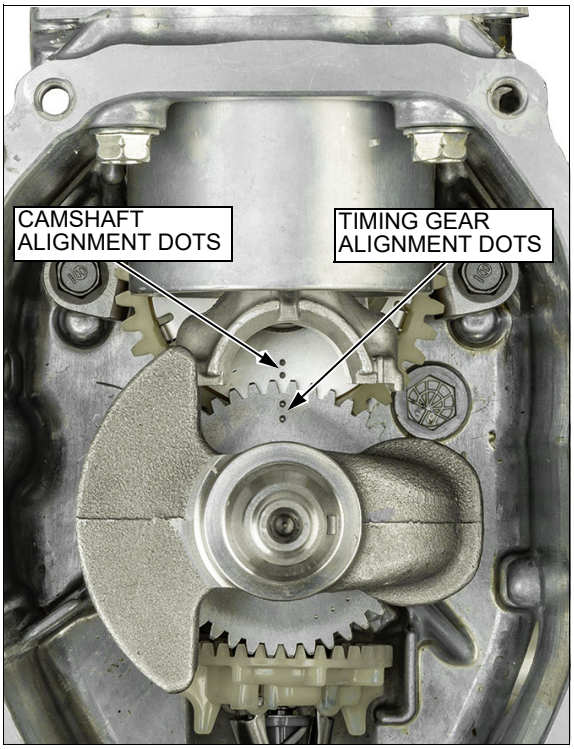
Install the timing gear onto the crankshaft and ensure the projection on the timing gear is fully seated into the keyway in the crankshaft.

Place the thrust washer into position in the crankcase (page 12-9).

Carefully install the crankshaft and timing gear into the crankcase while aligning the two dots on the timing gear and the two dots on the camshaft.

IMPORTANT: Be sure that the crankshaft is fully seated against the timing gear, and that the two dots on the camshaft still line up with the two dots on the timing gear.

Rotate the crankshaft two revolutions and confirm the alignment dots on the camshaft and timing gear are still aligned.



CAM TIMING INSPECTION

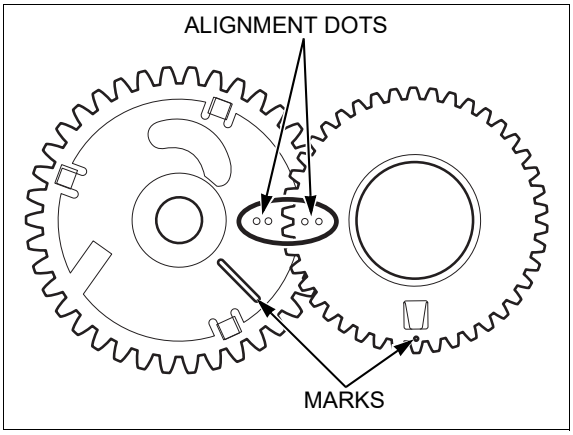
Remove the spark plug and crankcase cover (page 12-2).

Rotate the crankshaft until the two dots on the timing gear and the two dots on the camshaft align with each other.

If the dots align, the cam timing is set properly.

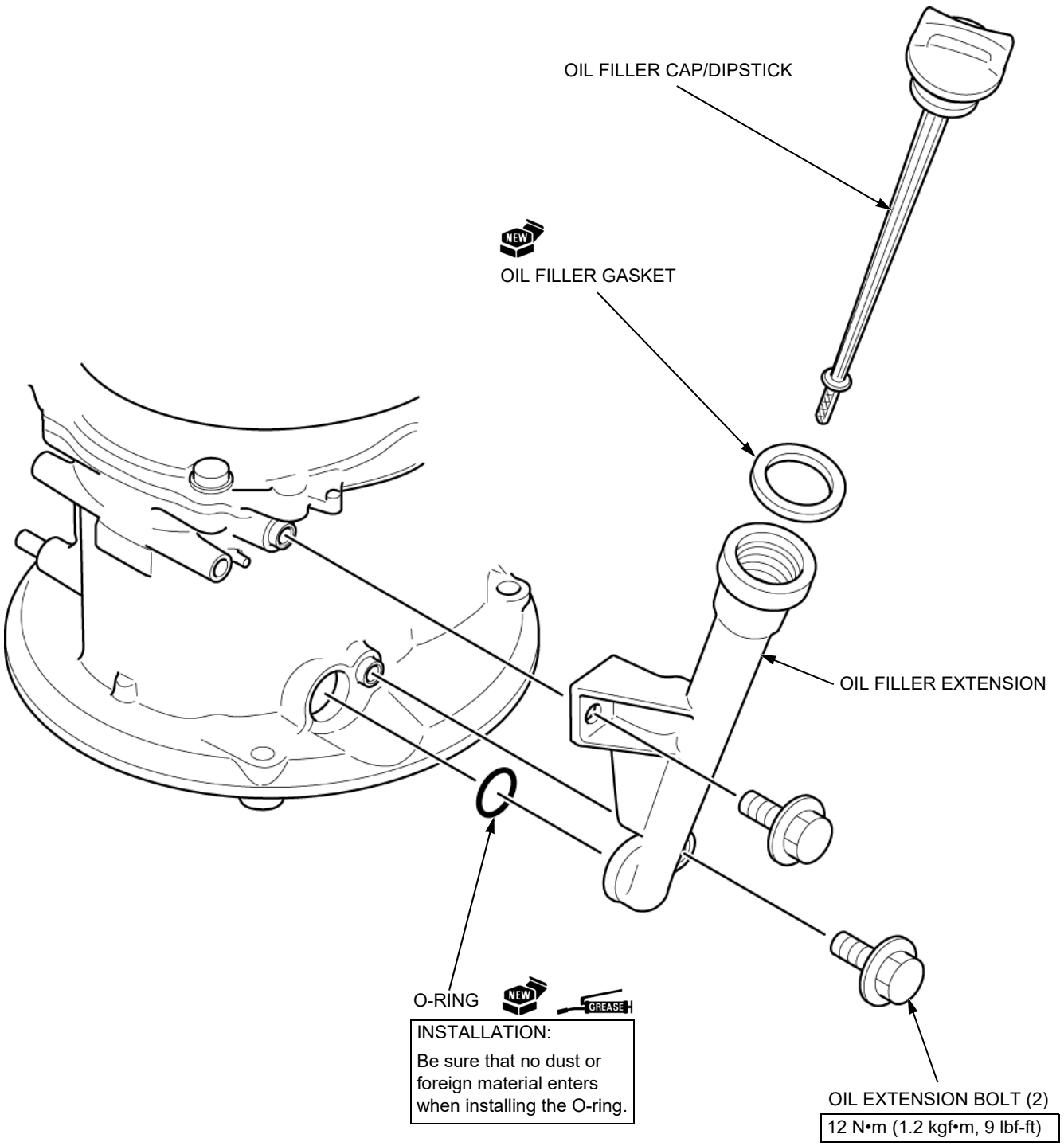
If the dots never align, the cam timing is incorrectly set.

To correct the cam timing, remove the crankshaft and timing gear from the crankcase, and then follow the *CRANKSHAFT INSTALLATION* procedure shown above.



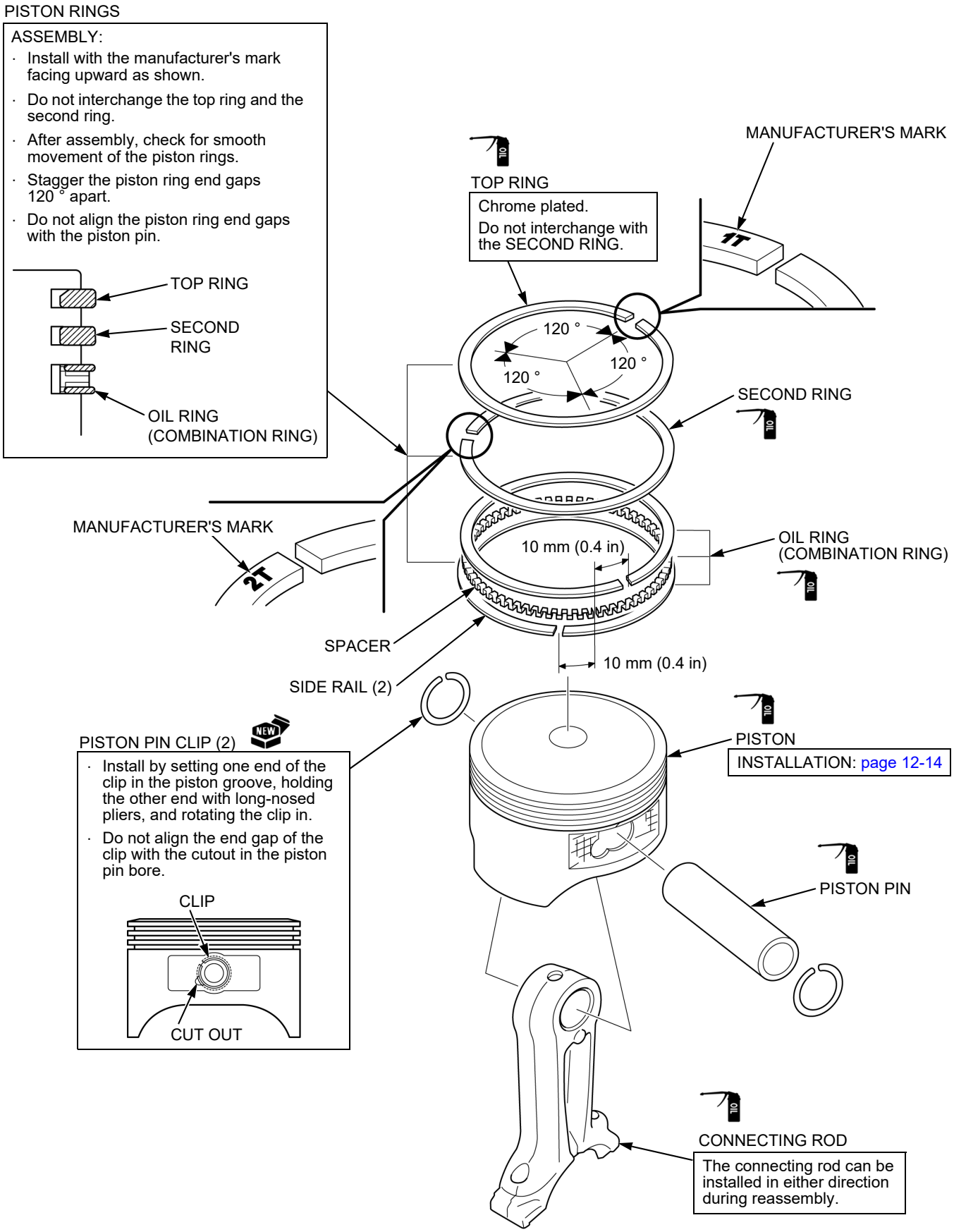
OIL FILLER CAP / EXTENSION REMOVAL/INSTALLATION

Drain the engine oil (page 3-4).



PISTON / CONNECTING ROD DISASSEMBLY/ASSEMBLY

Remove the piston/connecting rod (page 12-9).



PISTON INSTALLATION

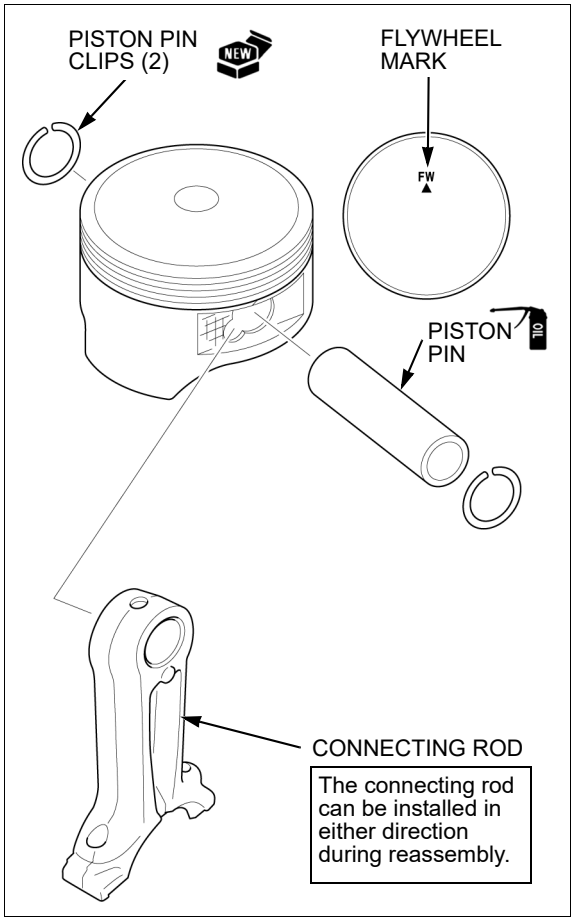
Apply engine oil to the piston pin bore and the connecting rod small end.

Apply engine oil to the piston pin [1] and install it in the piston.

Install the new piston pin clips [2].

Install the piston/connecting rod into the cylinder (page 12-9).

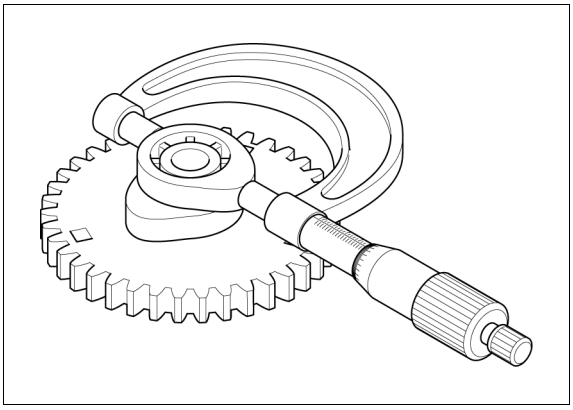
During installation, be sure to position the piston so that the "FW" stamped at the front of the piston points up toward the flywheel.



CAMSHAFT / CYLINDER / PISTON / VALVE INSPECTION

CAM LOBE HEIGHT

Measure the cam lobe height.



GCV170 IN/EX
STANDARD: 33.779 – 34.179 mm (1.3299 – 1.3456 in)
SERVICE LIMIT: 33.754 mm (1.3289 in)

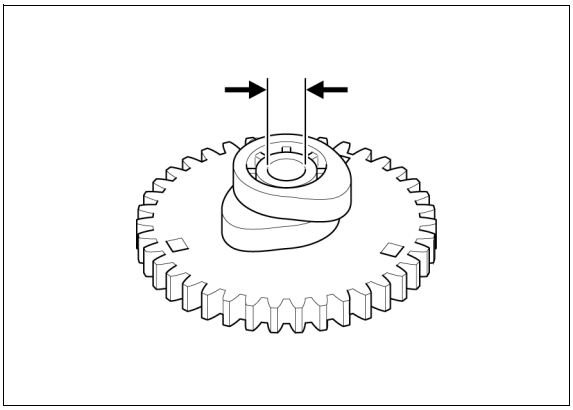
GCV200 IN
STANDARD: 34.253 – 34.653 mm (1.3485 – 1.3643 in)
SERVICE LIMIT: 34.228 mm (1.3476 in)

GCV200 EX
STANDARD: 34.258 – 34.658 mm (1.3487 – 1.3645 in)
SERVICE LIMIT: 34.233 mm (1.3478 in)

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

CAMSHAFT BORE I.D.

Measure the camshaft I.D.

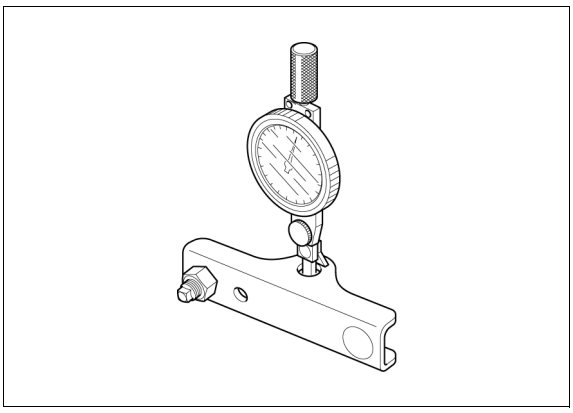


STANDARD: 10.090 – 10.120 mm (0.3972 – 0.3984 in)
SERVICE LIMIT: 10.140 mm (0.3992 in)

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

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)

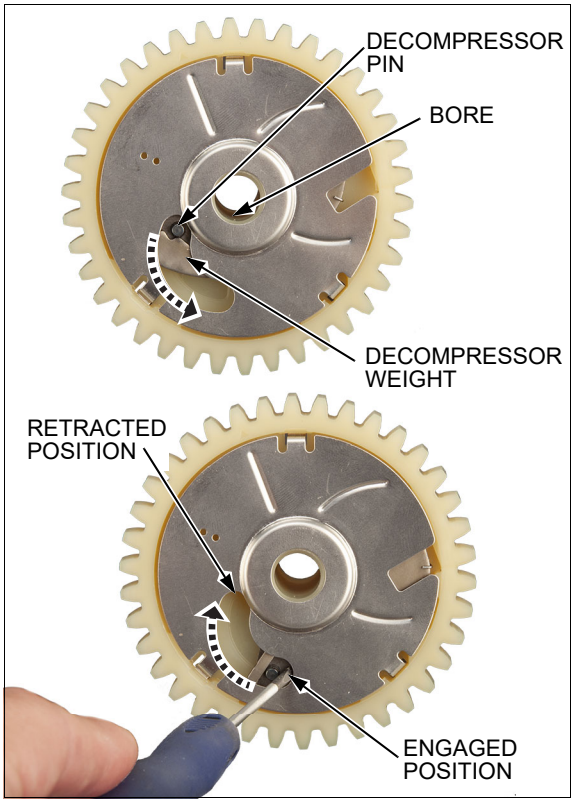
If the measurement is more than the service limit, replace the rocker arm.

CAMSHAFT DECOMPRESSOR

Carefully inspect the decompressor weight position and confirm that it is fully retracted. The retracted position is where the decompressor pin is on the side of the slot closest to the camshaft bore.

If the weight is fully retracted, operate the decompressor by using a pick tool to move the decompressor weight to the opposite end of the slot, and then gently releasing. Do not push on the decompressor pin with the pick tool. Only push on the decompressor weight. It is normal for the decompressor to lock up when pushing on the pin and not the weight.

Repeat several times. If the weight fails to completely return on its own at any time (by spring force), replace the camshaft and properly set the cam timing.

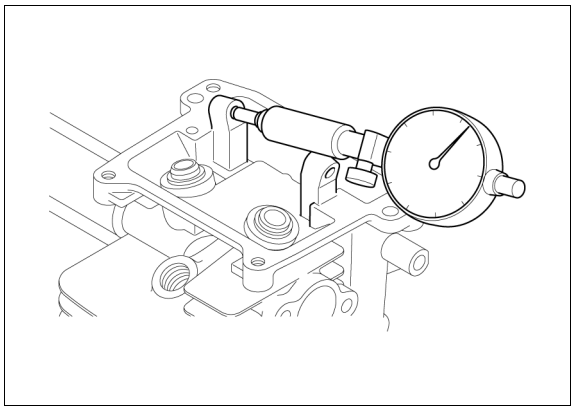


ROCKER ARM SHAFT BEARING I.D.

Measure the rocker arm shaft bearing 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.

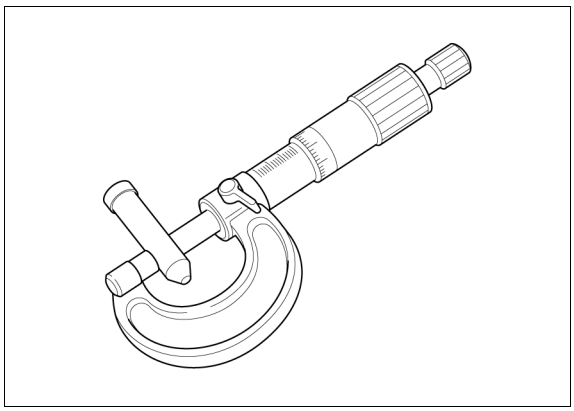


ROCKER ARM SHAFT O.D.

Measure the rocker arm shaft O.D.

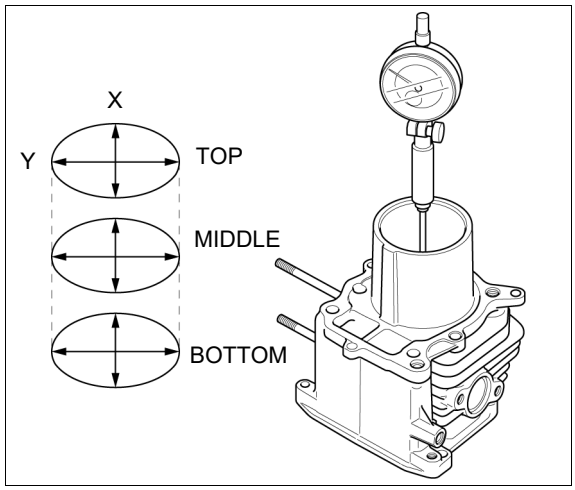
STANDARD: 5.960 – 5.990 mm (0.2346 – 0.2358 in)
SERVICE LIMIT: 5.953 mm (0.2344 in)

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



CYLINDER SLEEVE I.D.

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

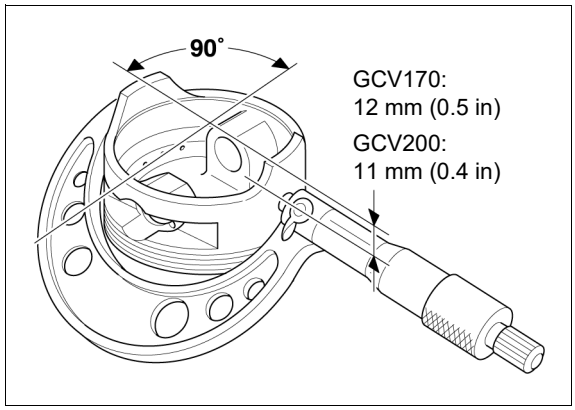


GCV170
STANDARD: 60.000 – 60.015 mm (2.3622 – 2.3628 in)
SERVICE LIMIT: 60.165 mm (2.3687 in)
GCV200
STANDARD: 66.000 – 66.015 mm (2.5984 – 2.5990 in)
SERVICE LIMIT: 66.165 mm (2.6049 in)

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

PISTON SKIRT O.D.

Measure and record the piston O.D. at a point 11 mm (0.4 in) (GCV200)/12 mm (0.5 in) (GCV170) from the bottom of the skirt and 90 degrees to the piston pin bore.



GCV170
STANDARD: 59.970 – 59.990 mm (2.3610 – 2.3618 in)
SERVICE LIMIT: 59.850 mm (2.3563 in)

GCV200
STANDARD: 65.970 – 65.990 mm (2.5972 – 2.5980 in)
SERVICE LIMIT: 65.850 mm (2.5925 in)

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

PISTON-TO-CYLINDER CLEARANCE

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

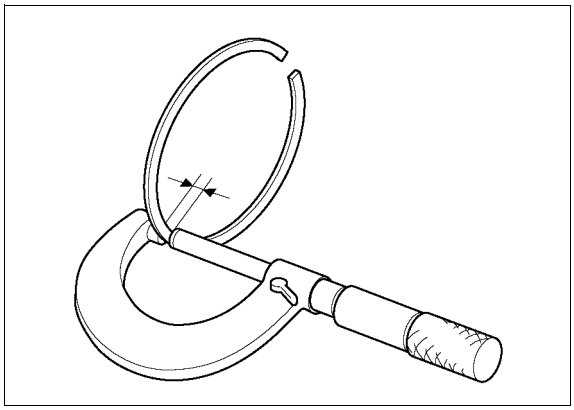
STANDARD: 0.010– 0.045 mm (0.0004 – 0.0018 in)
SERVICE LIMIT: 0.085 mm (0.0033 in)

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 the new piston, replace the cylinder.

PISTON RING WIDTH

Measure each piston ring width.



STANDARD:

Top:	**0.935 – 0.950 mm (0.0368 – 0.0374 in)**
Second:	**0.975 – 0.990 mm (0.0384 – 0.0390 in)**
Oil:	**2.380 – 2.460 mm (0.0937 – 0.0969 in)**

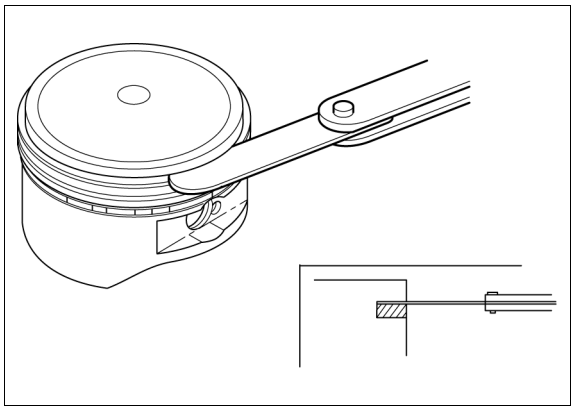
SERVICE LIMIT:

Top:	**0.890 mm (0.0350 in)**
Second:	**0.930 mm (0.0366 in)**
Oil:	**2.370 mm (0.0933 in)**

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

PISTON RING SIDE CLEARANCE

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



STANDARD:

Top:	**0.055 – 0.089 mm (0.0022 – 0.0035 in)**
Second:	**0.015 – 0.049 mm (0.0006 – 0.0019 in)**
Oil:	**0.045 – 0.144 mm (0.0018 – 0.0057 in)**

SERVICE LIMIT:

Top:	**0.190 mm (0.0075 in)**
Second:	**0.15 mm (0.006 in)**
Oil:	**0.240 mm (0.0094 in)**

If the calculated clearance is more than the service limit, replace the piston rings (top, second, oil) as a set and recheck the clearance.

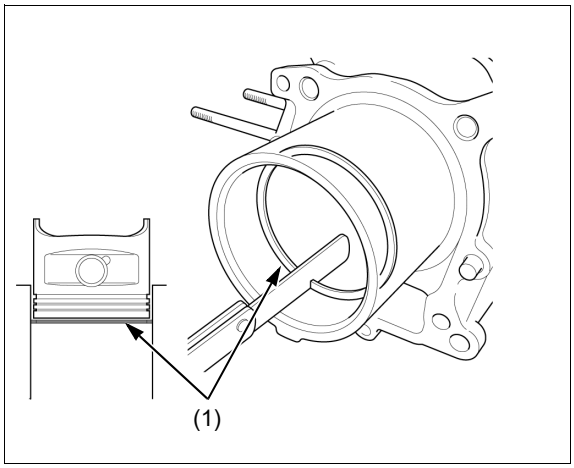
If the clearance is still more than the service limit with the new piston ring, replace the piston.

PISTON RING END GAP

Before inspection, check whether the cylinder sleeve I.D. is within the specification (page 12-17).

Put the piston ring in the cylinder and then use the piston crown to push the ring down.
This will make the piston ring horizontal so ring end gap can be measured.

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



STANDARD:

Top:	**0.20 – 0.30 mm (0.008 – 0.012 in)**
Second:	**0.30 – 0.40 mm (0.012 – 0.016 in)**
Oil (side rail):	**0.20 – 0.45 mm (0.008 – 0.018 in)**

SERVICE LIMIT:

Top/Second/oil:	**1.0 mm (0.04 in)**

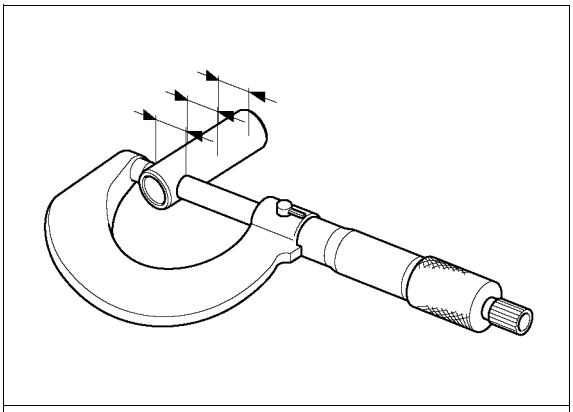
If any of the measurements is more than the service limit, replace the piston rings (top, second, oil) as a set.

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.

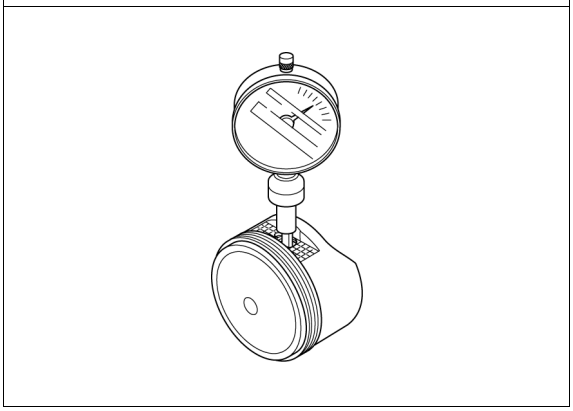


PISTON PIN BORE I.D.

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

STANDARD: 13.002 – 13.016 mm (0.5119 – 0.5124 in)
SERVICE LIMIT: 13.048 mm (0.5137 in)

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



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 – 0.022 mm (0.0001 – 0.0009 in)
SERVICE LIMIT: 0.070 mm (0.0028 in)

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

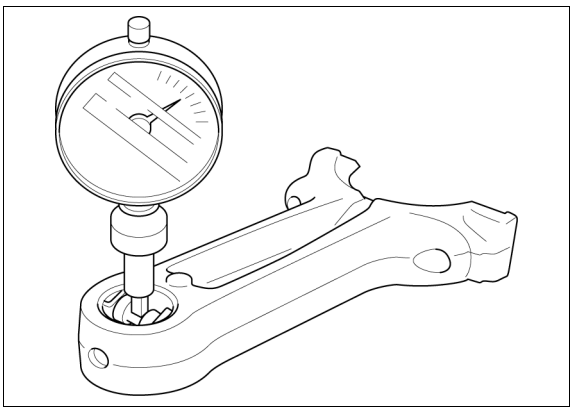
If the clearance is still more than the service limit with the new piston pin, replace the piston.

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: 13.07 mm (0.515 in)

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



CONNECTING ROD BIG END I.D.

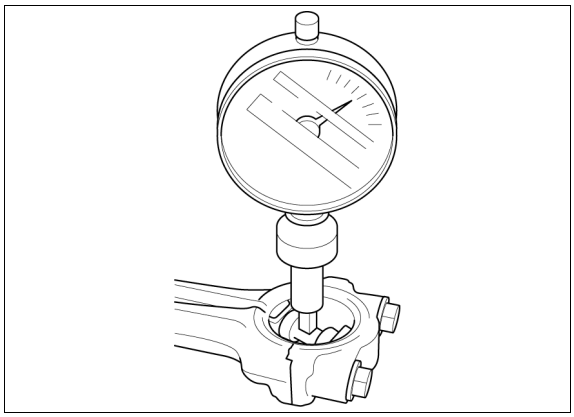
Set the connecting rod cap to the connecting rod.
Apply engine oil to the connecting rod bolt threads and seating surface.
Tighten the connecting rod bolts to the specified torque.

TORQUE: 12 N•m (1.2 kgf•m, 9 lbf-ft)

Measure the connecting rod big end I.D.

STANDARD: 28.020 – 28.033 mm (1.1031 – 1.1036 in)
SERVICE LIMIT: 28.066 mm (1.1050 in)

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



CRANKSHAFT MAIN JOURNAL O.D.

Measure the crankshaft main journal O.D.

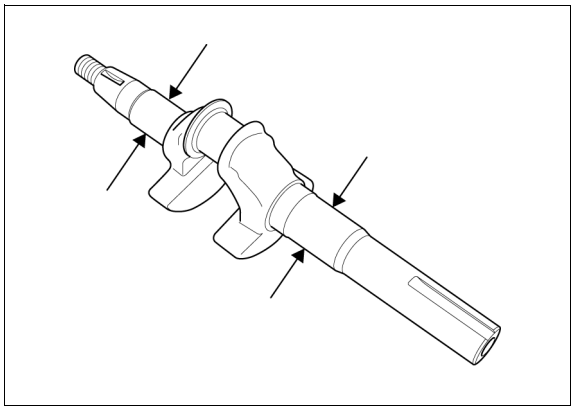
PTO side:

STANDARD: 27.980 – 27.993 mm (1.1016 – 1.1021 in)
SERVICE LIMIT: 27.933 mm (1.0997 in)

Flywheel side:

STANDARD: 25.380 – 25.393 mm (0.9992 – 0.9997 in)
SERVICE LIMIT: 25.333 mm (0.9974 in)

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

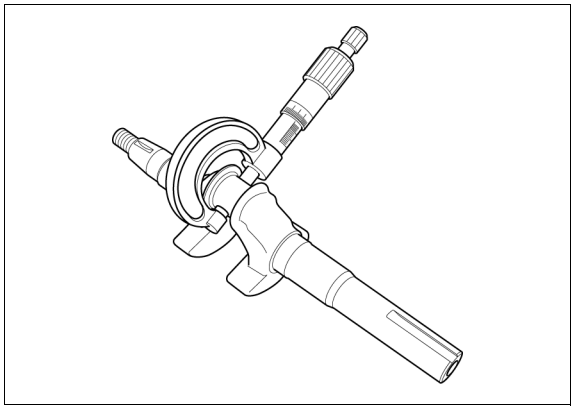


CRANKPIN O.D.

Measure the crankpin O.D. of the crankshaft.

STANDARD: 27.970 – 27.980 mm (1.1012 – 1.1016 in)
SERVICE LIMIT: 27.920 mm (1.0992 in)

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



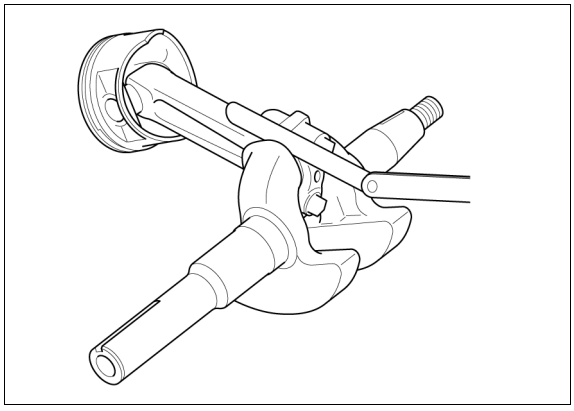
CONNECTING ROD BIG END AXIAL CLEARANCE

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

STANDARD: 0.10 – 0.50 mm (0.004 – 0.020 in)
SERVICE LIMIT: 0.80 mm (0.031 in)

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

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



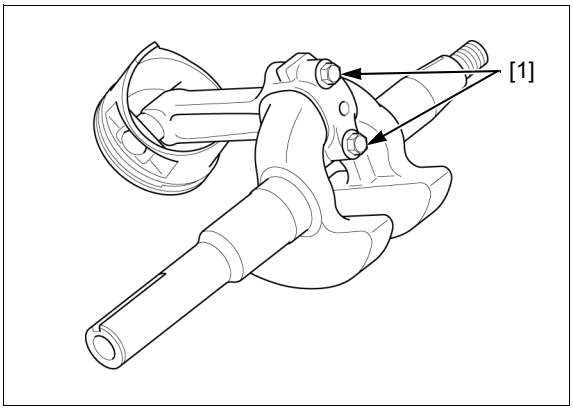
CONNECTING ROD BIG END OIL CLEARANCE

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

Place a piece of Plastigauge® on the crank pin axially, install the connecting rod and the connecting rod cap.
Apply engine oil to the connecting rod bolt [1] threads and seating surface.
Tighten the connecting rod bolts to the specified torque.

TORQUE: 12 N•m (12 kgf•m, 9 lbf-ft)

- Do not rotate the crankshaft while the Plastigauge is in place.



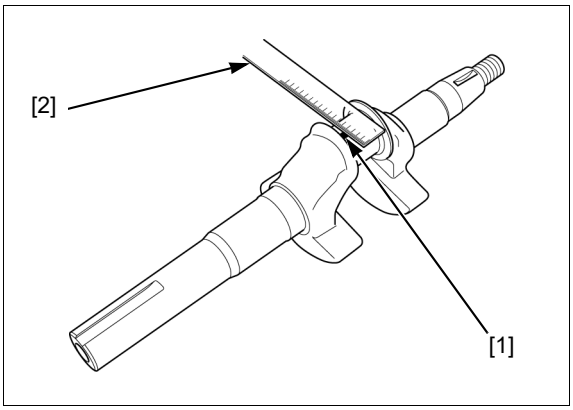
Remove the connecting rod cap and measure the Plastigauge [1] using a Plastigauge scale [2].

STANDARD: 0.040 – 0.063 mm (0.0016 – 0.0025 in)
SERVICE LIMIT: 0.120 mm (0.0047 in)

If the clearance is more than the service limit, inspect the following:

– Connecting rod big end I.D. (page 12-20)
– Crank pin O.D. (page 12-20)

If the part that is not less than the service limit, replace a new one, reinspect the clearance.

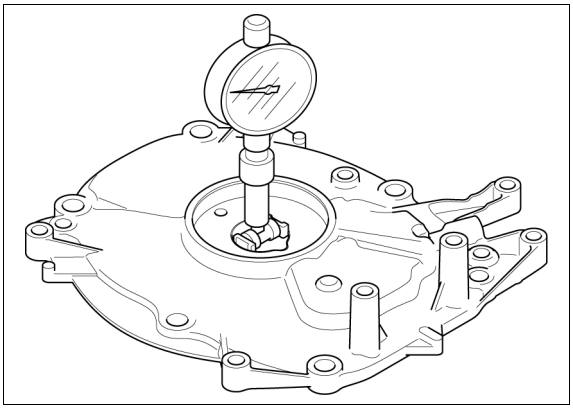


CRANKCASE COVER MAIN JOURNAL I.D.

Measure the crankcase cover main journal I.D.

STANDARD: 25.420 – 25.441 mm (1.0008 – 1.0016 in)
SERVICE LIMIT: 25.466 mm (1.0026 in)

If the measurement is more than the service limit, replace the crankcase cover.

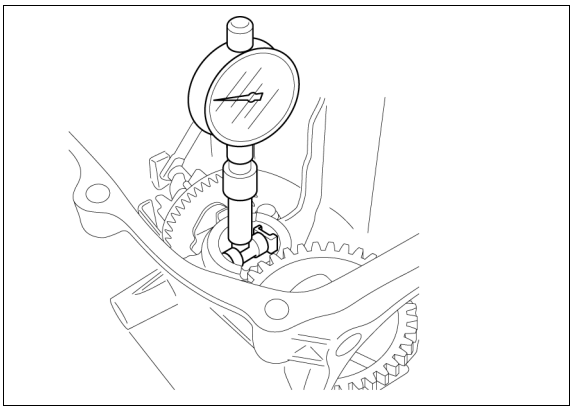


CRANKCASE MAIN JOURNAL I.D.

Measure the crankcase main journal I.D.

STANDARD: 28.020 – 28.041 mm (1.1031 – 1.1040 in)
SERVICE LIMIT: 28.066 mm (1.1050 in)

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



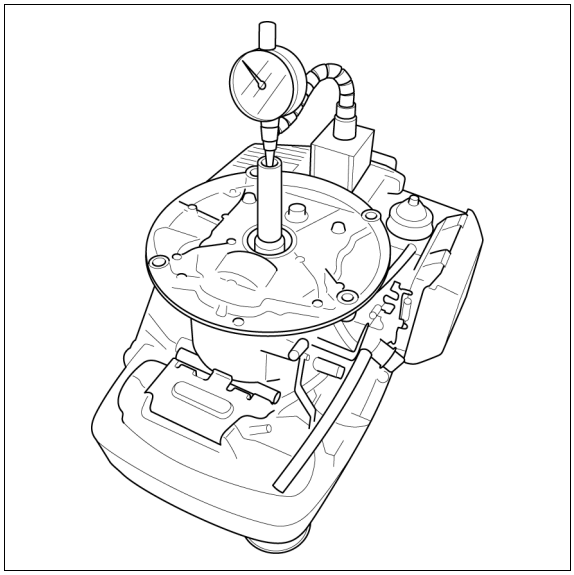
CRANKSHAFT AXIAL CLEARANCE

Measure the crankshaft axial play before removing the oil pan, crankshaft, and piston.

STANDARD: 0.15 – 0.70 mm (0.006 – 0.028 in)
SERVICE LIMIT: 1.0 mm (0.04 in)

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

If the clearance is still more than the service limit with the new crankshaft, replace the crankcase and crankcase cover.



VALVE SPRING FREE LENGTH/ PERPENDICULARITY

Measure the valve spring free length.

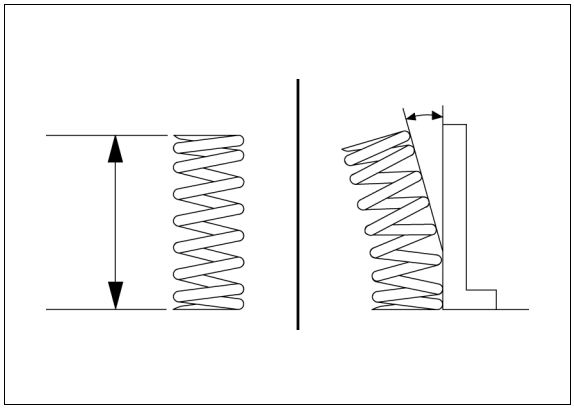
STANDARD: 30.5 mm (1.20 in)
SERVICE LIMIT: 29.0 mm (1.14 in)

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

Measure the valve spring perpendicularity.

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

SERVICE LIMIT: 2 ° max.



VALVE FACE/VALVE STEM O.D.

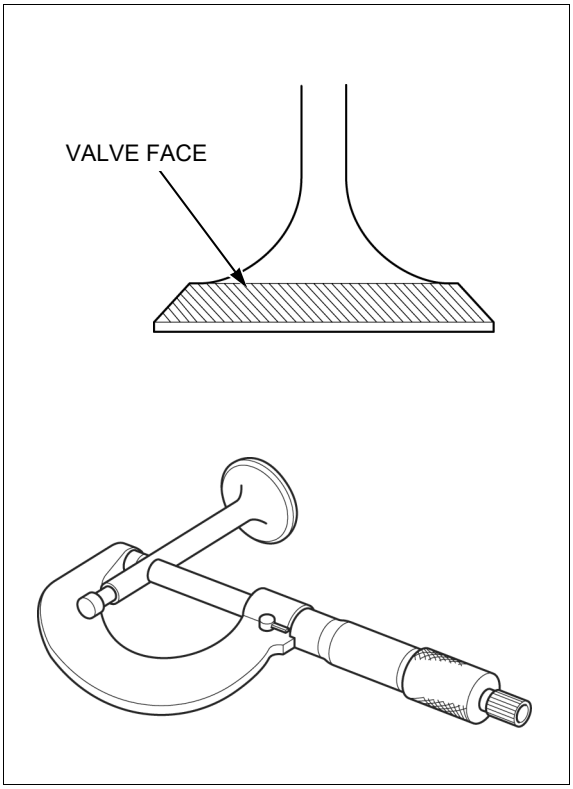
Inspect each valve for face irregularities.
If necessary, replace the valve.

Inspect each valve for bending or abnormal stem wear.
If necessary, replace the valve.

Measure and record each valve stem O.D.

STANDARD: **IN/EX: 5.465 – 5.480 mm (0.2152 – 0.2157 in)**
SERVICE LIMIT: **IN/EX: 5.318 mm (0.2094 in)**

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

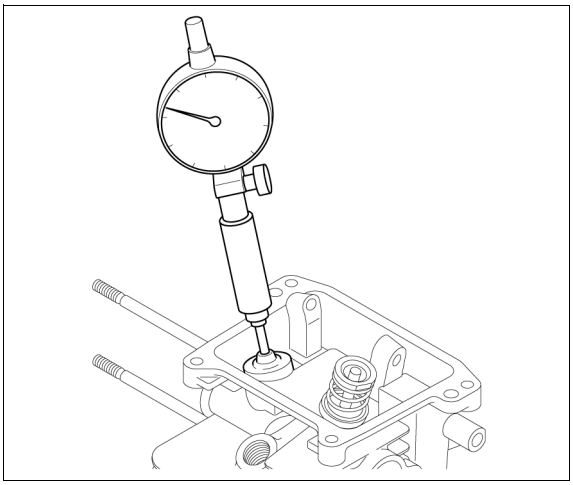


VALVE GUIDE I.D.

Measure and record valve guide I.D.

STANDARD: **IN: 5.500 – 5.512 mm (0.2165 – 0.2170 in)**
EX: 5.540 – 5.552 mm (0.2181 – 0.2186 in)
SERVICE LIMIT: **IN: 5.572 mm (0.2194 in)**
EX: 5.612 mm (0.2209 in)

If the measured valve guide I.D. is more than the service limit, replace the cylinder.



GUIDE-TO-STEM CLEARANCE

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

STANDARD:
IN: 0.020 – 0.047 mm (0.0008 – 0.0019 in)
EX: 0.060 – 0.087 mm (0.0024 – 0.0034 in)

SERVICE LIMIT:
IN: 0.10 mm (0.004 in)
EX: 0.12 mm (0.005 in)

If the calculated clearance is more than the service limit, replace the valve and the cylinder.

VALVE SEAT WIDTH

Remove the carbon deposits from the combustion chamber (page 3-9).

Inspect each valve for face irregularities.
If necessary, replace the valve.

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

Insert the valve, and snap it closed against its seat several times. 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.

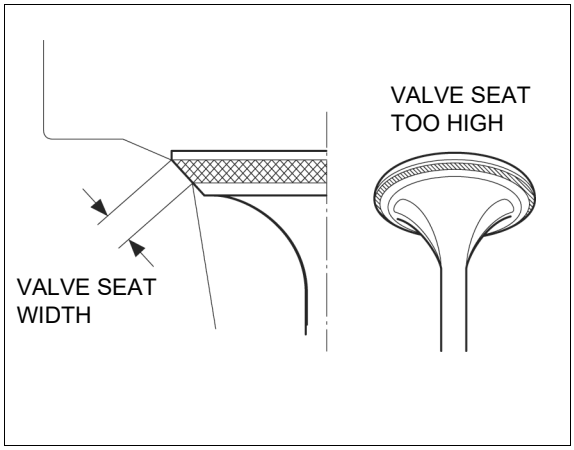
Measure the valve seat width of the cylinder.

STANDARD: 0.7 – 0.9 mm (0.03 – 0.04 in)
SERVICE LIMIT: 1.8 mm (0.07 in)

If the measurement is more than the service limit, recondition the valve seat (page 12-24).

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

If the valve seat is too high or too low, recondition the valve seat (page 12-24).



VALVE SEAT RECONDITIONING

Thoroughly clean the combustion chamber and valve seats to remove carbon deposits (page 3-9).

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

Insert the valve, and snap it closed against its seat several times. Be sure the valve does not rotate on the seat. The transferred marking compound will show any area of the seat that is not concentric.

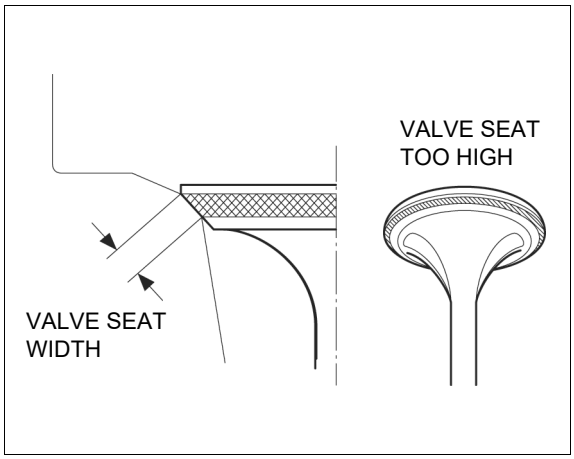
Measure the valve seat width of the cylinder.

STANDARD: 0.7 – 0.9 mm (0.03 – 0.04 in)
SERVICE LIMIT: 1.8 mm (0.07 in)

If the measurement is more than the service limit, recondition the valve seat.

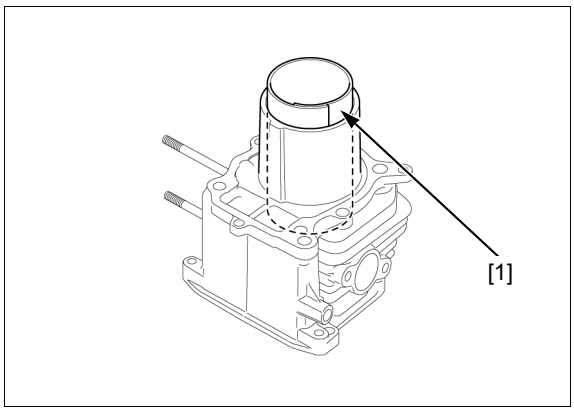
Check whether the valve seat contact area of the valve is too high.

If the valve seat is too high, recondition the valve seat.

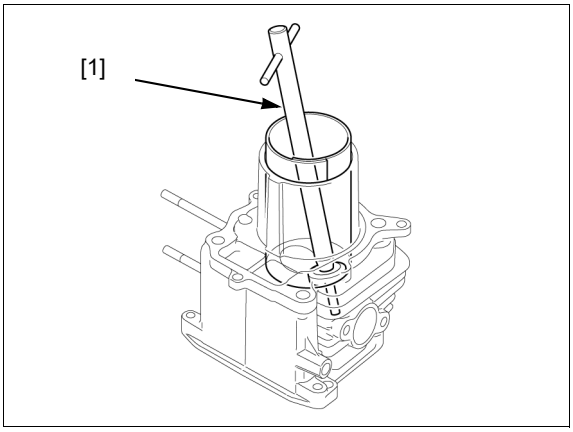


Prepare a thick paper cylinder or equivalent material [1] with a large enough diameter to fit against the cylinder wall of the cylinder.

Insert the thick paper into the cylinder to protect the cylinder wall during valve seat reconditioning.



Valve seat cutters [1]/grinder or equivalent valve seat re-facing equipment is recommended to correct a worn valve seat.



NOTICE

Turn the cutter clockwise, never counterclockwise. Continue to turn the cutter as you lift it from the valve seat.

The 32 ° cutter removes material from the top edge (contact too high).

TOOLS:

Cutter holder 5.5 mm	**NWY TW 505** (Commercially available)
Flat cutter, 30 mm (31 ° IN/EX)	**NWY CU 115** (Commercially available)

The 60 ° cutter removes material from the bottom edge (contact too low).

TOOLS:

Cutter holder 5.5 mm	**NWY TW 505** (Commercially available)
Interior cutter, 30 mm (60 ° IN/EX)	**NWY CU 122** (Commercially available)

Be sure that the width of the finished valve seat is within specification.

STANDARD: **0.7 – 0.9 mm (0.03 – 0.04 in)**
SERVICE LIMIT: **1.8 mm (0.07 in)**

Make a light pass with the 45 ° cutter to remove any possible burrs at the edge of the seat.

TOOLS:

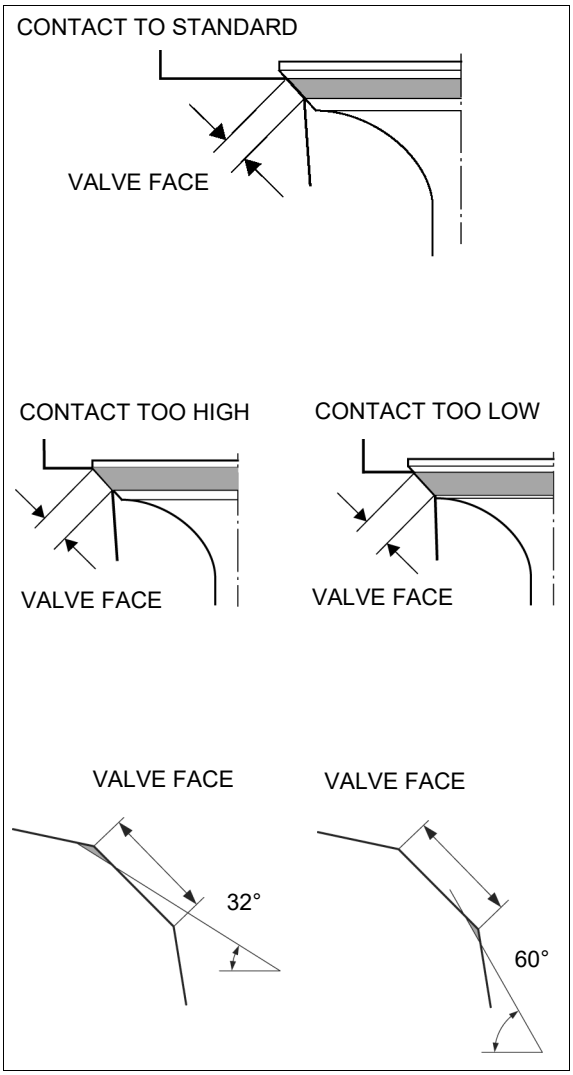
Cutter holder 5.5 mm	**NWY TW 505** (Commercially available)
Seat cutter, 27.5 mm (45 ° IN/EX)	**NWY CU 111** (Commercially available)

After resurfacing the seats, inspect for even valve seating.

Apply Prussian Blue compound or erasable felt-tipped marker ink to the valve seat. Insert the valve, and snap it closed against its seat several times. Be sure the valve does not rotate on the seat.

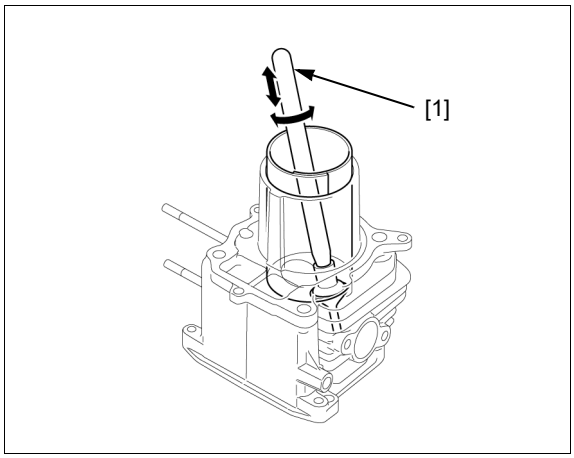
The seating surface, as shown by the transferred marking compound, should have good contact all the way around.

Thoroughly clean the cylinder to remove any cutting residual.



Lap the valves into their seats, using a commercially available valve lapper [1] and lapping compound.

After lapping, wash all residual compound off the cylinder and valve.



NOTICE

- *Do not push the valve against the seat with force during lapping. Apply a light pass with the valve lapper.*
- *Avoid lapping the valve in the same position as it causes uneven wear. Lap the valve by turning the lapper slowly.*
- *Take care not to allow the lapping compound to enter the gap between the stem and guide.*

Adjust the valve clearance after assembly (page 3-7).

CRANKSHAFT OIL SEAL

CRANKCASE COVER SIDE (25.4 x 62 x 6 mm)

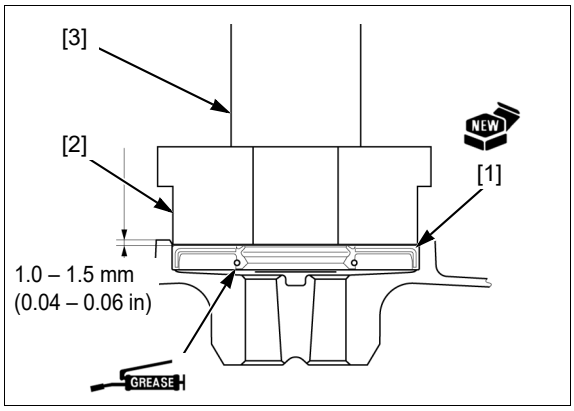
Remove the oil seal.

Drive a new oil seal [1] in the position as shown using the special tools.

INSTALLATION HEIGHT: 1.0 – 1.5 mm (0.04 – 0.06 in)

TOOLS:

Bearing driver attachment, 62 x 64 mm [2]	**07947-6340400**
Driver handle [3]	**07749-0010000**



CRANKCASE SIDE (28 x 41.25 x 6 mm)

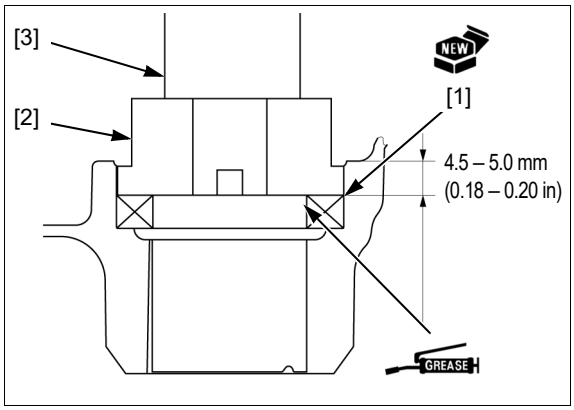
Remove the oil seal.

Drive a new oil seal [1] in the position as shown using the special tools.

INSTALLATION HEIGHT: 4.5 – 5.0 mm (0.18 – 0.20 in)

TOOLS:

Bearing driver attachment, 37 x 40 mm [2]	**07746-0010200**
Driver handle [3]	**07749-0010000**



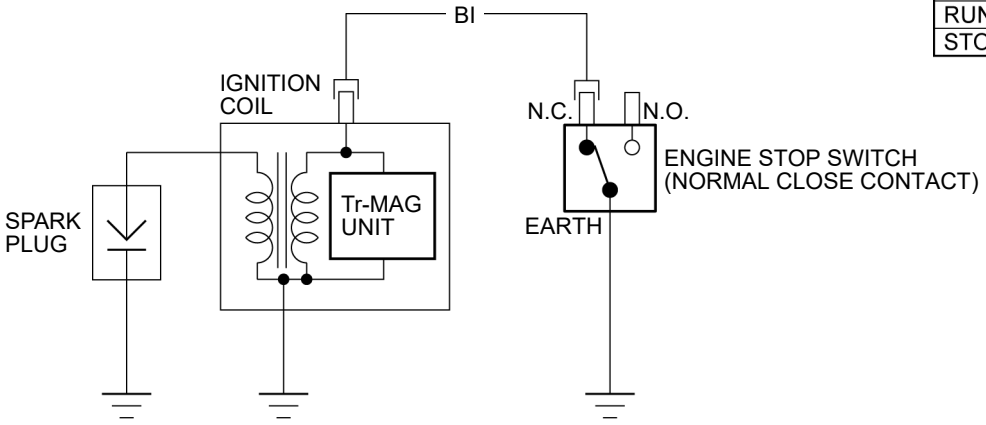
13. WIRING DIAGRAMS

WIRING DIAGRAMS

S3B, S3C, S3L, G5B, G5BR types (flywheel brake type)

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

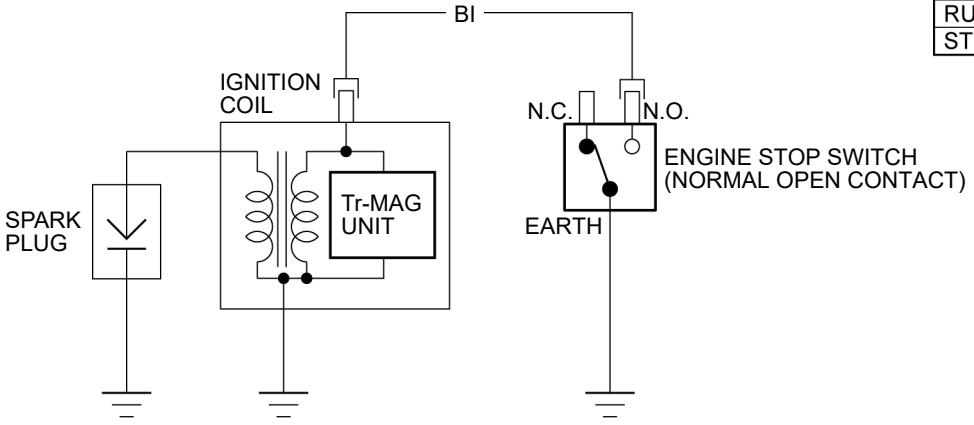
ENGINE	SWITCH CONTACT
RUN	OPEN
STOP	CLOSE



A1A type (remote type):

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

ENGINE	SWITCH CONTACT
RUN	OPEN
STOP	CLOSE



14. INDEX

MEMO