

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 the engine or create an unsafe condition.

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

If you need to replace a part, use genuine Honda 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 the engine. Any error or oversight while servicing an engine can result in faulty operation, damage to the engine, or injury to others.

For Your Safety

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

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

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 any time you hammer, drill, grind, or work around pressurized air or liquids, and 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.
- Make sure the engine is off before you begin any servicing procedures, unless the instruction tells you to do otherwise. This will help eliminate several potential hazards:
 - Carbon monoxide poisoning from engine exhaust. Be sure there is adequate ventilation whenever you run the engine.
 - Burns from hot parts. Let the engine and exhaust system cool before working in those areas.
 - Injury from moving parts. If the instruction tells you to run the engine, be sure your hands, fingers, and clothing are out of the way.
- Gasoline vapors are 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 drain or store gasoline in an open container.
 - Keep all cigarettes, sparks, and flames away from all fuel-related parts.

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.

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.

PREFACE

This manual covers the construction, function and servicing procedures for the Honda GXV160UH2 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 the engine, 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 engines. You must use your own good judgment.

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

- **Safety Labels** — on the engine.
- **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 engines correctly and safely.

Honda Motor Co., Ltd.
Service Publications Office

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1. SPECIFICATIONS

• DIMENSIONS AND WEIGHTS

Model	GXV160UH2		
PTO types	L/M	N4*	N5*
Overall length	420 mm (16.5 in)	420 mm (16.5 in)	420 mm (16.5 in)
Overall width	365 mm (14.4 in)	365 mm (14.4 in)	365 mm (14.4 in)
Overall height	345 mm (13.6 in)	357 mm (14.1 in)	322 mm (12.7 in)
Dry weight	15.1 kg (33.3 lbs)	14.5 kg (32.0 lbs)	14.5 kg (32.0 lbs)
Operating weight	17.3 kg (38.1 lbs)	16.7 kg (36.8 lbs)	16.7 kg (36.8 lbs)

Model	GXV160UH2		
PTO types	N1	N1*	HR215
Overall length	420 mm (16.5 in)	420 mm (16.5 in)	420 mm (16.5 in)
Overall width	365 mm (14.4 in)	365 mm (14.4 in)	365 mm (14.4 in)
Overall height	357 mm (14.1 in)	357 mm (14.1 in)	357 mm (14.1 in)
Dry weight	15.1 kg (33.3 lbs)	14.5 kg (32.0 lbs)	15.1 kg (33.3 lbs)
Operating weight	17.3 kg (38.1 lbs)	16.7 kg (36.8 lbs)	17.3 kg (38.1 lbs)

*: With flywheel brake types

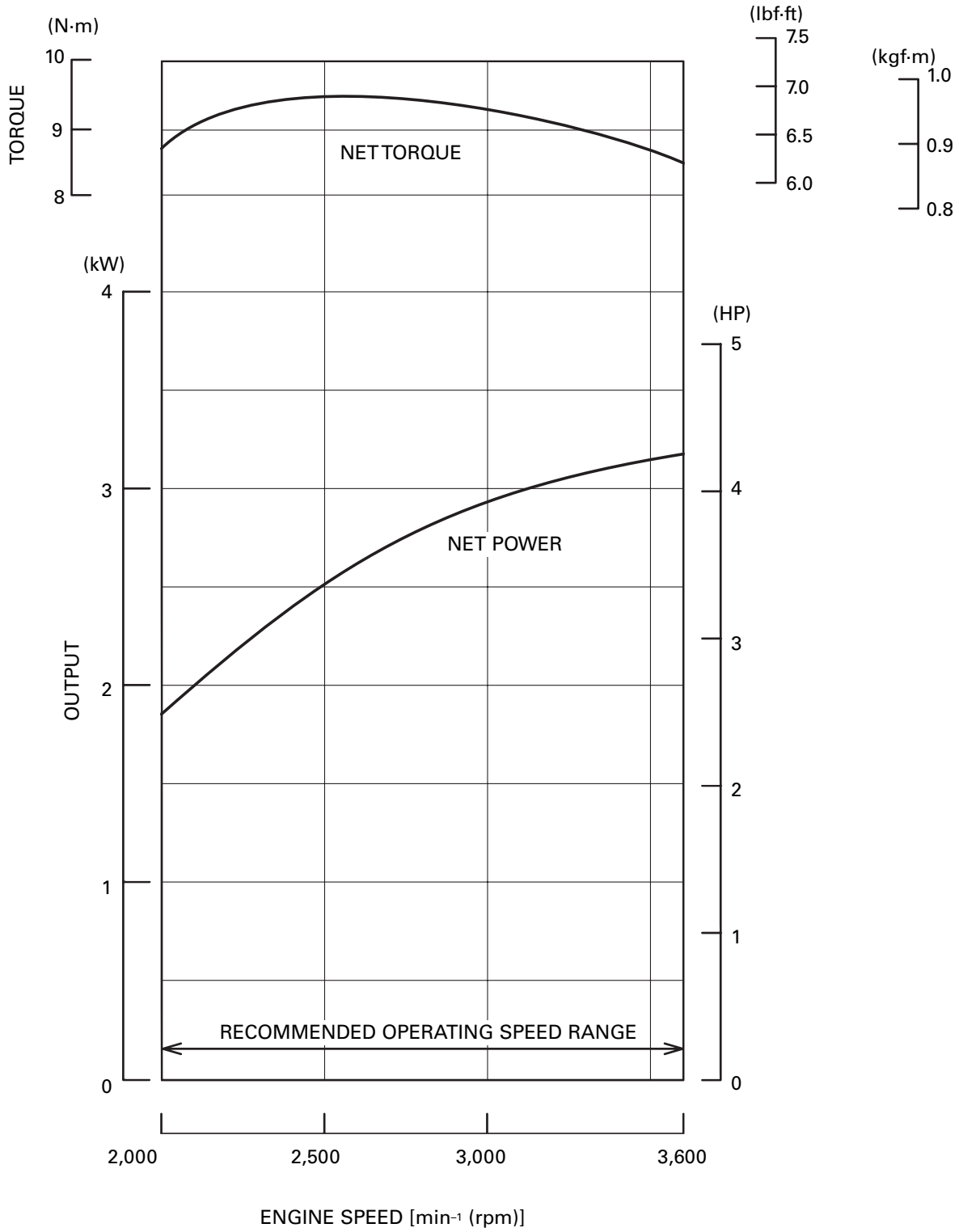
ENGINE

Model	GXV160UH2
Description code	GJABH
Type	4-stroke, overhead valve, single cylinder
Total displacement	163 cm ³ (9.9 cu-in)
Bore and stroke	68 x 45 mm (2.7 x 1.8 in)
Maximum net power (SAE J1349)*	3.2 kW (4.3 HP) at 3,600 min ⁻¹ (rpm)
Maximum net torque (SAE J1349)*	9.6 N·m (0.98 kgf·m, 7.1 lbf·ft) at 2,500 min ⁻¹ (rpm)
Compression ratio	8.0 : 1
Fuel consumption (at rated output)	1.1 ℓ/h (0.29 US gal/h)
Cooling system	Forced-air
Ignition system	Transistorized magneto ignition
Ignition timing	20 ± 3° B.T.D.C.
Spark plug	BPR5ES (NGK), W16EPR-U (DENSO)
Carburetor	Horizontal type, butterfly valve
Air cleaner	Dual element type
Governor	Centrifugal mechanical governor
Lubrication system	Forced splash type
Oil capacity	0.65 ℓ (0.69 US qt, 0.53 Imp qt)
Starting system	Recoil starter
Stopping system	Ignition primary circuit ground
Fuel used	Unleaded gasoline with a pump octane number 86 or higher
Fuel tank capacity	1.4 ℓ (0.37 US gal, 0.31 Imp gal)

*: The power rating of the engine indicated in this table is the net power output tested on a production engine for the engine model and measured in accordance with SAE J1349 at 3,600 min⁻¹ (rpm) (Net power) and at 2,500 min⁻¹ (rpm) (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.

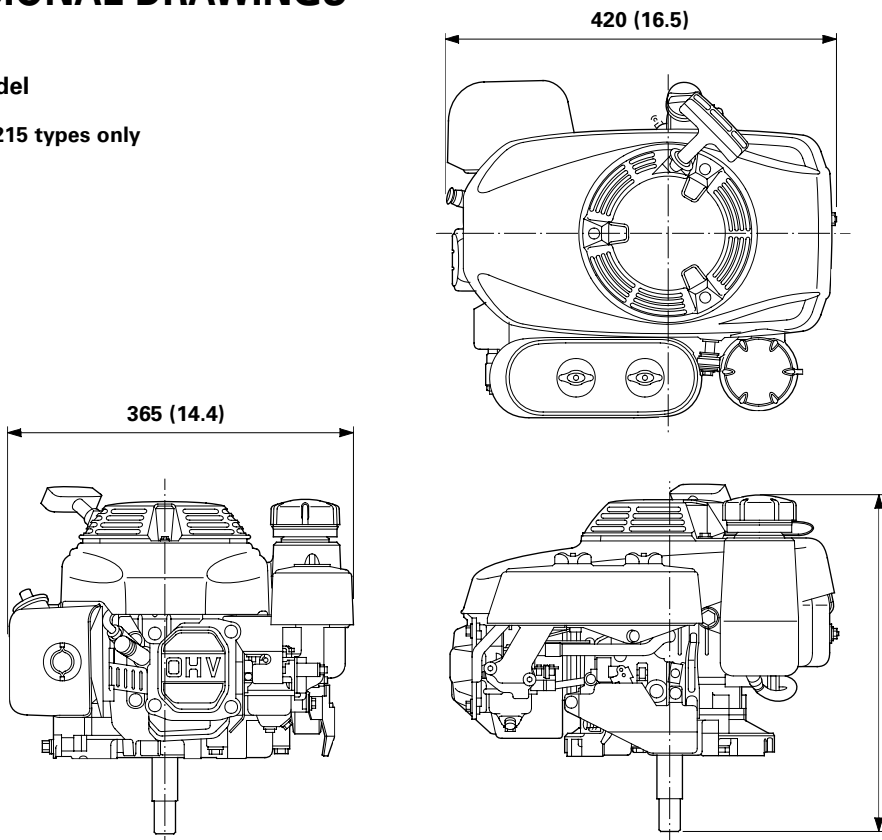
2. PERFORMANCE CURVES



3. DIMENSIONAL DRAWINGS

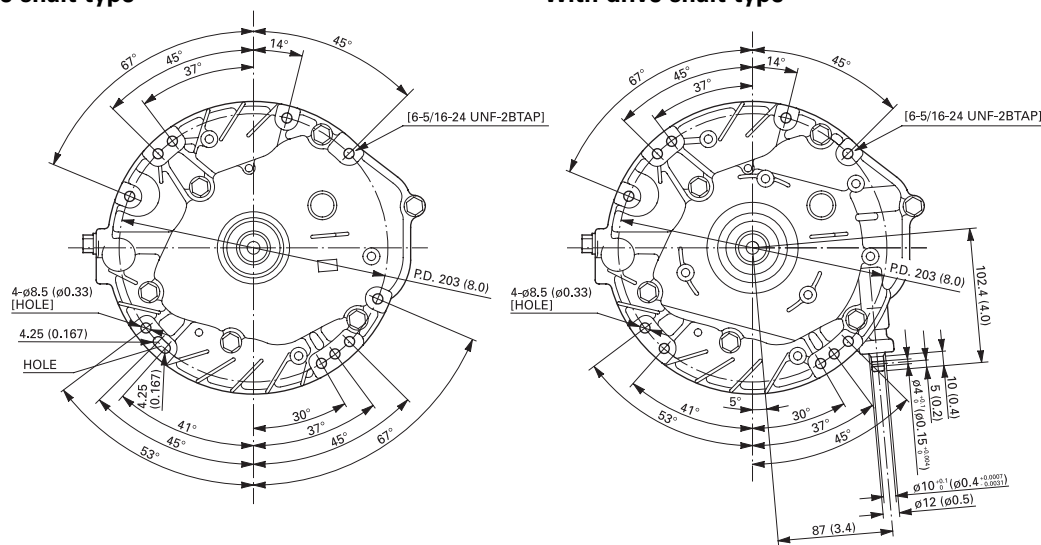
GXV160UH2 model
 *1: L/M type only
 *2: N1, N4 and HR215 types only
 *3: N5 type only

Unit: mm (in)



•Without drive shaft type

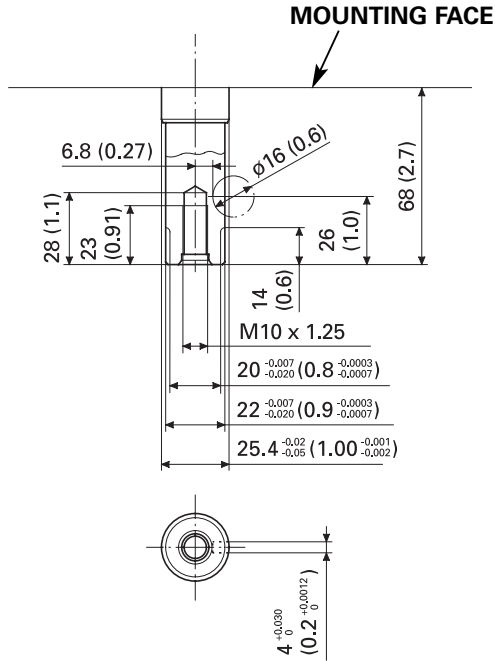
•With drive shaft type



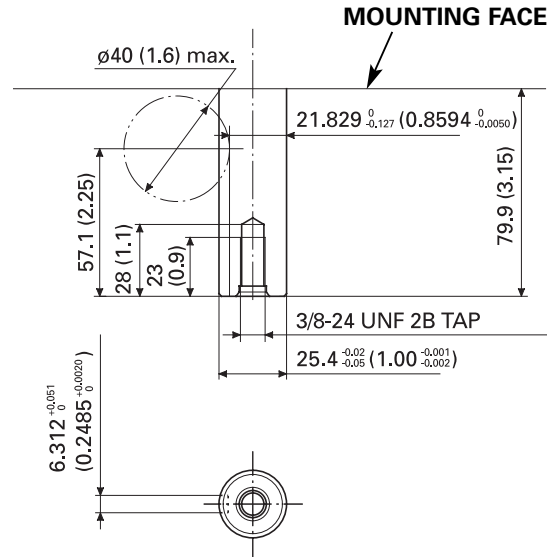
4. PTO DIMENSIONAL DRAWINGS

Unit: mm (in)

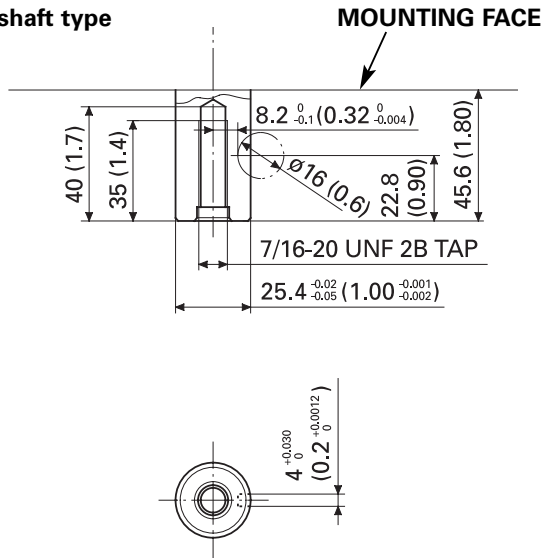
L/M shaft type



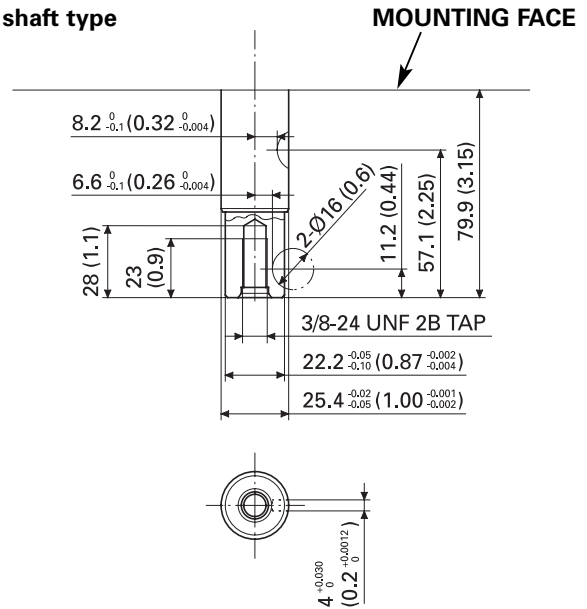
N4 shaft type



N5 shaft type

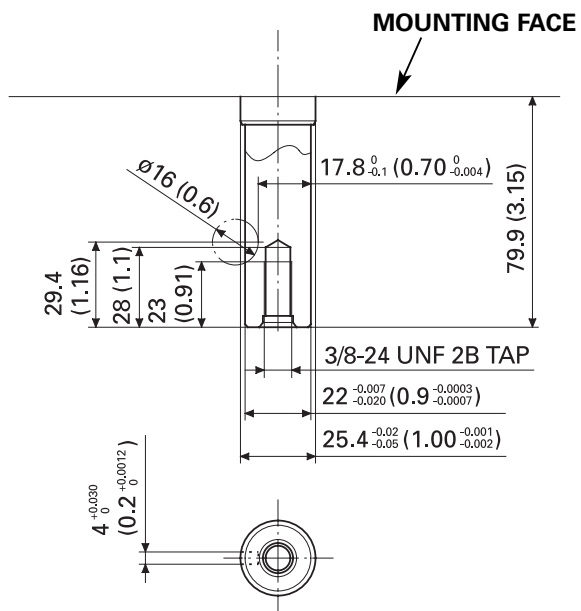


N1 shaft type



HR215 shaft type

Unit: mm (in)



1. SYMBOLS USED IN THIS MANUAL**2. SERIAL NUMBER LOCATION****3. MAINTENANCE STANDARDS****4. TORQUE VALUES****5. TOOLS****6. TROUBLESHOOTING**

1. SYMBOLS USED IN THIS MANUAL

As you read this manual, you may find the following symbols with the instructions.



A special tool is required to perform the procedure.



Apply grease.



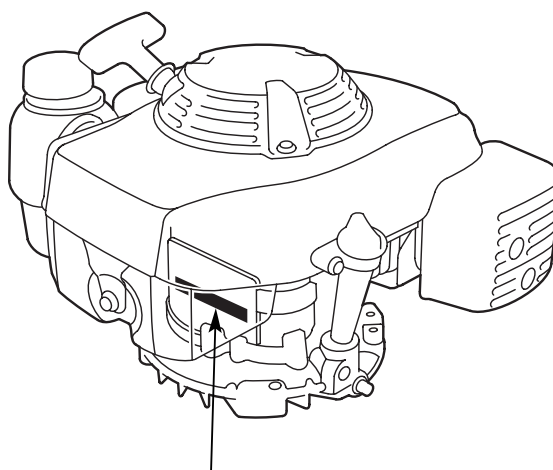
Apply oil.

○ x ○ (○) Indicates the diameter, length, and quantity of metric flange bolts used.

P. ○-○ Indicates the reference page.

2. SERIAL NUMBER LOCATION

The engine serial number is stamped on the cylinder barrel. Refer to this when ordering parts or making technical inquiries.



ENGINE SERIAL NUMBER

3. MAINTENANCE STANDARDS

Unit: mm (in)

Parts	Item	Standard	Service limit	
Engine	Maximum speed (No load)	3,600 ± 150 min ⁻¹ (rpm)	————	
	Idle speed	1,700 ± 150 min ⁻¹ (rpm)	————	
	Cylinder compression	0.49 - 0.69 MPa (5.0 - 7.0 kgf/cm ² , 71 - 100 psi) at 600 min ⁻¹ (rpm)	————	
Cylinder head	Warpage	————	0.10 (0.004)	
Cylinder	Sleeve I.D.	68.0 (2.68)	68.165 (2.6837)	
Piston	Skirt O.D.	67.985 (2.6766)	67.845 (2.6711)	
	Piston-to-cylinder clearance	0.015 - 0.050 (0.0006 - 0.0020)	0.12 (0.005)	
	Piston pin bore I.D.	18.002 - 18.008 (0.7087 - 0.7090)	18.048 (0.7105)	
Piston pin	Piston pin O.D.	17.994 - 18.000 (0.7084 - 0.7087)	17.954 (0.7068)	
	Piston pin-to-piston pin bore clearance	0.002 - 0.014 (0.0001 - 0.0006)	0.08 (0.003)	
Piston rings	GXV160UH2: Up to GJABH-1036455			
	Ring side clearance	Top/second	0.030 - 0.065 (0.0012 - 0.0023)	0.15 (0.006)
	Ring end gap	Top/second	0.2 - 0.4 (0.008 - 0.016)	1.0 (0.04)
	Ring width	Top/second	1.5 (0.06)	1.37 (0.054)
	GXV160UH2: GJABH-1036456 and subsequent			
	Ring side clearance	Top	0.035 - 0.070 (0.0014 - 0.0028)	0.15 (0.006)
		Second	0.045 - 0.080 (0.0018 - 0.0031)	0.15 (0.006)
	Ring end gap	Top	0.20 - 0.35 (0.008 - 0.014)	1.0 (0.04)
		Second	0.35 - 0.50 (0.014 - 0.020)	1.0 (0.04)
	Ring width	Oil (side rail)	0.20 - 0.70 (0.008 - 0.028)	1.0 (0.04)
Top		0.95 - 0.97 (0.037 - 0.038)	0.93 (0.037)	
Second	0.94 - 0.96 (0.037 - 0.038)	0.92 (0.036)		
Connecting rod	Small end I.D.	18.005 - 18.020 (0.7089 - 0.7094)	18.052 (0.7107)	
	Big end I.D.	30.020 - 30.033 (1.1819 - 1.1824)	30.066 (1.1837)	
	Big end oil clearance	0.040 - 0.063 (0.0016 - 0.0025)	0.12 (0.005)	
	Big end side clearance	0.1 - 0.7 (0.004 - 0.028)	1.1 (0.043)	
Crankshaft	Crank pin O.D.		29.970 - 29.980 (1.1799 - 1.1803)	29.92 (1.1780)
	Valve	Valve clearance	IN	0.15 ± 0.02
		EX	0.20 ± 0.02	————
Stem O.D.		IN	5.468 - 5.480 (0.2153 - 0.2157)	5.318 (0.2094)
		EX	5.435 - 5.450 (0.2140 - 0.2146)	5.275 (0.2077)
Valve guides	Guide I.D.	IN/EX	5.500 - 5.512 (0.2165 - 0.2170)	5.562 (0.2190)
	Stem-to-guide clearance	IN	0.020 - 0.044 (0.0008 - 0.0017)	0.10 (0.004)
		EX	0.050 - 0.077 (0.0020 - 0.0030)	0.12 (0.005)
	Seat width	IN/EX	0.8 (0.03)	2.0 (0.08)
Valve springs	Free length	IN/EX	34.0 (1.339)	32.5 (1.280)
Camshaft	Cam height	IN	27.70 (1.091)	27.45 (1.081)
		EX	27.75 (1.093)	27.50 (1.083)
	Journal O.D.		13.966 - 13.984 (0.5498 - 0.5506)	13.916 (0.5479)

GXV160UH

Unit: mm (in)

Parts	Item	Standard	Service limit
Carburetor	Main jet	#68	———
	Pilot jet	#35	———
	Float height	13.7 (0.54)	———
	Pilot screw opening	2 – 1/4 turns out	———
Oil pan	Camshaft holder I.D.	14.0 (0.55)	14.048 (0.5531)
Spark plug	Gap	0.7 – 0.8 (0.028 – 0.031)	———
Spark plug cap	Resistance	3.75 – 6.25 kΩ	———
Ignition col	Resistance	Primary coil	0.8 – 1.0Ω
		Secondary coil	5.9 – 7.2 kΩ
	Air gap (at flywheel)		0.4 ± 0.2 (0.016 ± 0.008)

4. TORQUE VALUES

Item	Thread dia. (mm) and pitch (length)	Torque		
		N·m	kgf·m	lbf·ft
Cylinder head bolt	M8 x 1.25	24	2.4	17
Oil pan bolt	M8 x 1.25	24	2.4	17
Connecting rod bolt	M7 x 1.0	12	1.2	9
Rocker arm pivot bolt	M8 x 1.25 (Special bolt)	24	2.4	17
Rocker arm pivot lock nut	M6 x 0.5 (Special nut)	10	1.0	7
Head cover bolt	M6 x 1.0	8.5	0.85	6.1
Breather cover bolt	M6 x 1.0	8.5	0.85	6.1
Flywheel nut (AL)	M14 x 1.5 (Special nut)	52	5.3	38
(FC)	M14 x 1.5 (Special nut)	74	7.5	54
Muffler nut	M6 x 1.0	10	1.0	7
Muffler stud bolt	M6 x 1.0	10	1.0	7
Air cleaner elbow nut	M6 x 1.0	8.5	0.85	6.1
Carburetor stud bolt	M6 x 1.0	10	1.0	7
Oil filler extension bolt	M6 x 1.0 (CT bolt)	8.5	0.85	6.1
Guide plate bolt	M6 x 1.0	10	1.0	7
Recoil starter bolt	M6 x 1.0	10	1.0	7
Control base bolt	M6 x 1.0	10	1.0	7
Control protector bolt	M6 x 1.0	10	1.0	7
Governor arm nut	M6 x 1.0	10	1.0	7
Ignition coil bolt	M6 x 1.0	10	1.0	7
Oil drain bolt	M10 x 1.25	17.5	1.75	13
Fan cover nut	M6 x 1.0	8.5	0.85	6.1
Fuel tank stay bolt	M8 x 1.25	24	2.4	17
Fuel tank bolt	M6 x 1.0 (CT bolt)	10	1.0	7
Spark plug	M14 x 1.25	20	2.0	14

NOTE:

- AL: Aluminum flywheel
- FC: Cast iron flywheel
- CT bolt: Self-tapping bolt
- Use standard torque values for fasteners that are not listed in this table.

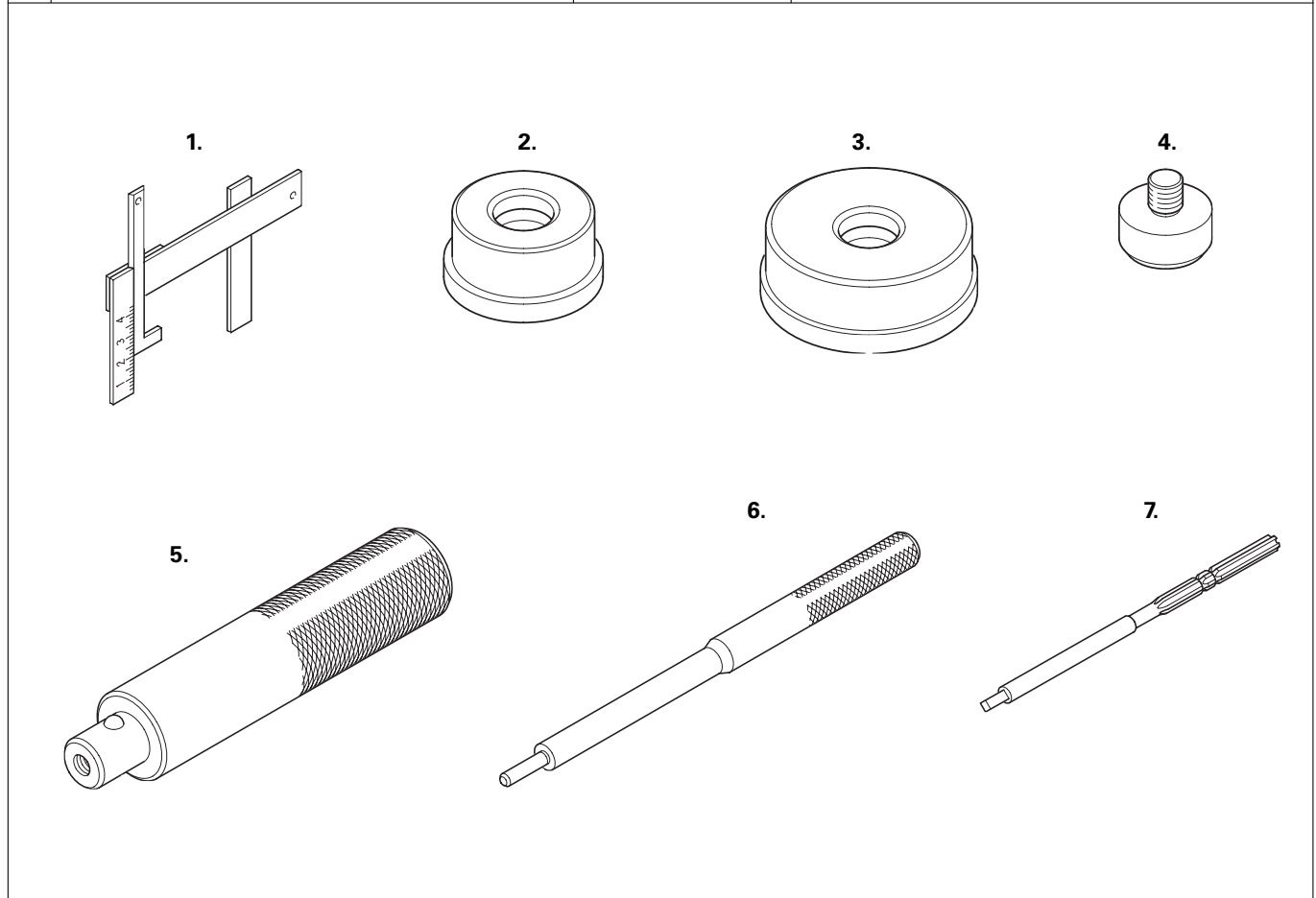
STANDARD TORQUE VALUES

Item	Thread dia. (mm)	Torque		
		N·m	kgf·m	lbf·ft
Bolt and nut	5 mm	5	0.5	3.6
	6 mm	10	1.0	7
	8 mm	21	2.1	15
	10 mm	34	3.5	25
	12 mm	59	6.0	43
Flange bolt and nut	6 mm	11	1.1	8
	8 mm	22	2.2	16
	10 mm	39	4.0	29
	12 mm	59	6.0	43

5. TOOLS

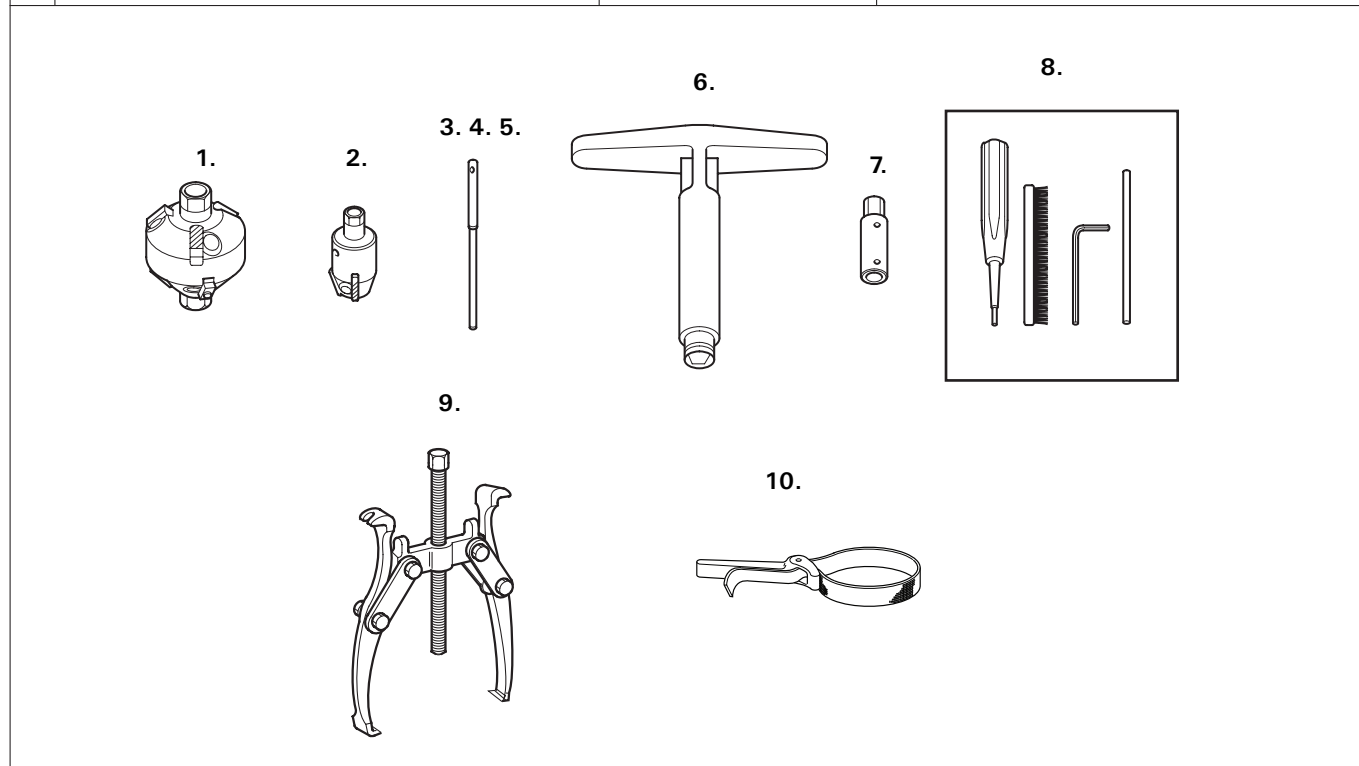
a. SPECIAL TOOLS

	Tool name	Tool number	Application
1.	Float level gauge	07401-0010000	Carburetor float level inspection
2.	Attachment, 37 x 40 mm	07746-0010200	25.4 x 40 x 7 mm oil seal, 25 x 38 x 7 mm oil seal installation
3.	Attachment, 52 x 55 mm	07746-0010400	Crankshaft bearing installation
4.	Pilot, 25 mm	07746-0040600	Crankshaft bearing installation
5.	Driver	07749-0010000	Driver for 2 through 4
6.	Valve guide driver, 5.5 mm	07942-8920000	Valve guide removal/installation
7.	Valve guide reamer, 5.5 mm	07984-200000D	Valve guide I.D. reaming



b. COMMERCIALLY AVAILABLE TOOLS

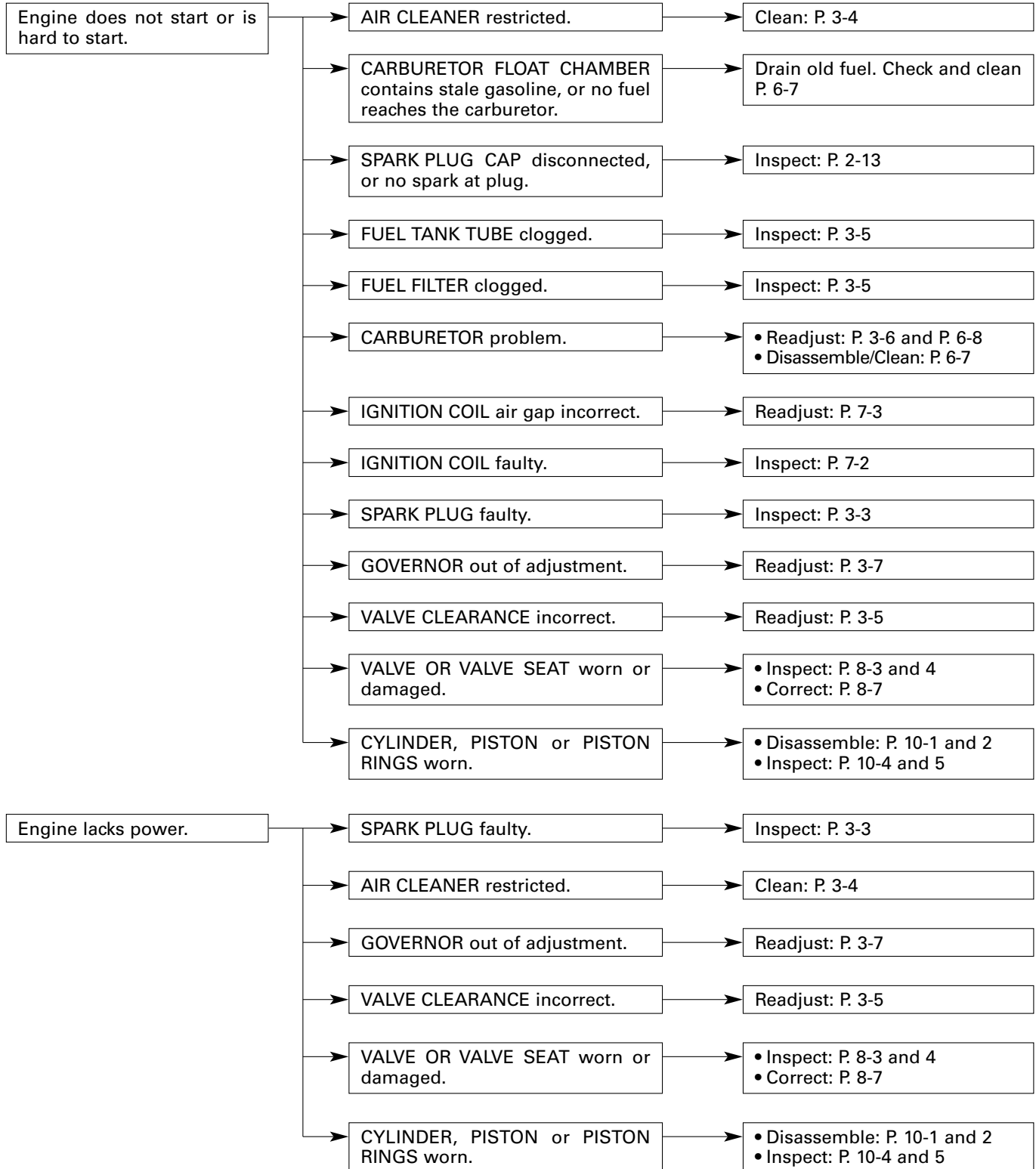
No.	Tool name	Tool number	Application
1.	Valve seat cutter, #128 30° x 45°	NWY-CU128	} Valve seat reconditioning
2.	Valve seat cutter, #144 60°	NWY-CU144	
3.	Solid pilot bar, 5.50 mm	NWY-PM10055SH	
4.	Solid pilot bar, 5.52 mm	NWY-PM100552S	
5.	Solid pilot bar, 5.55 mm	NWY-PM100555S	
6.	T-wrench, #505	NWY-TW-505	} Flywheel removal
7.	T-wrench adapter, #503-1	NWY-TW-503-1	
8.	Accessory package #246	NWY-KACC246	} Flywheel removal
9.	Flywheel puller	OTC-1035	
10.	Strap wrench	STV-S-17	

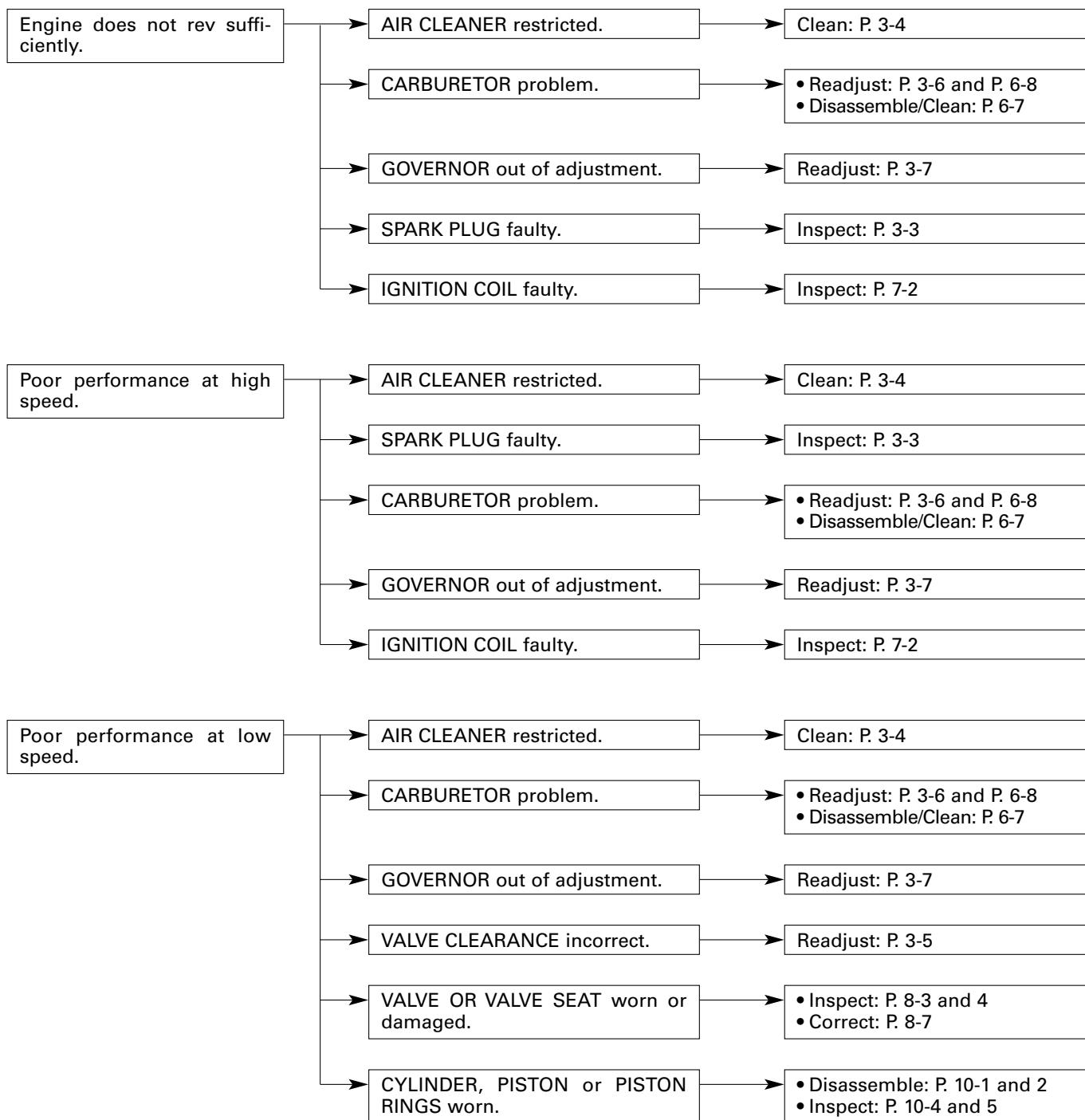


Commercially available tools are distinguished by the words (commercially available). They are not available through the American Honda Parts Department. Most commercially available tools shown in this shop manual can be ordered through the Tool and Equipment program by calling (888) 424-6857. Refer to the Tool and Equipment program catalog for a complete tool listing.

6. TROUBLESHOOTING

a. GENERAL SYMPTOMS AND POSSIBLE CAUSES

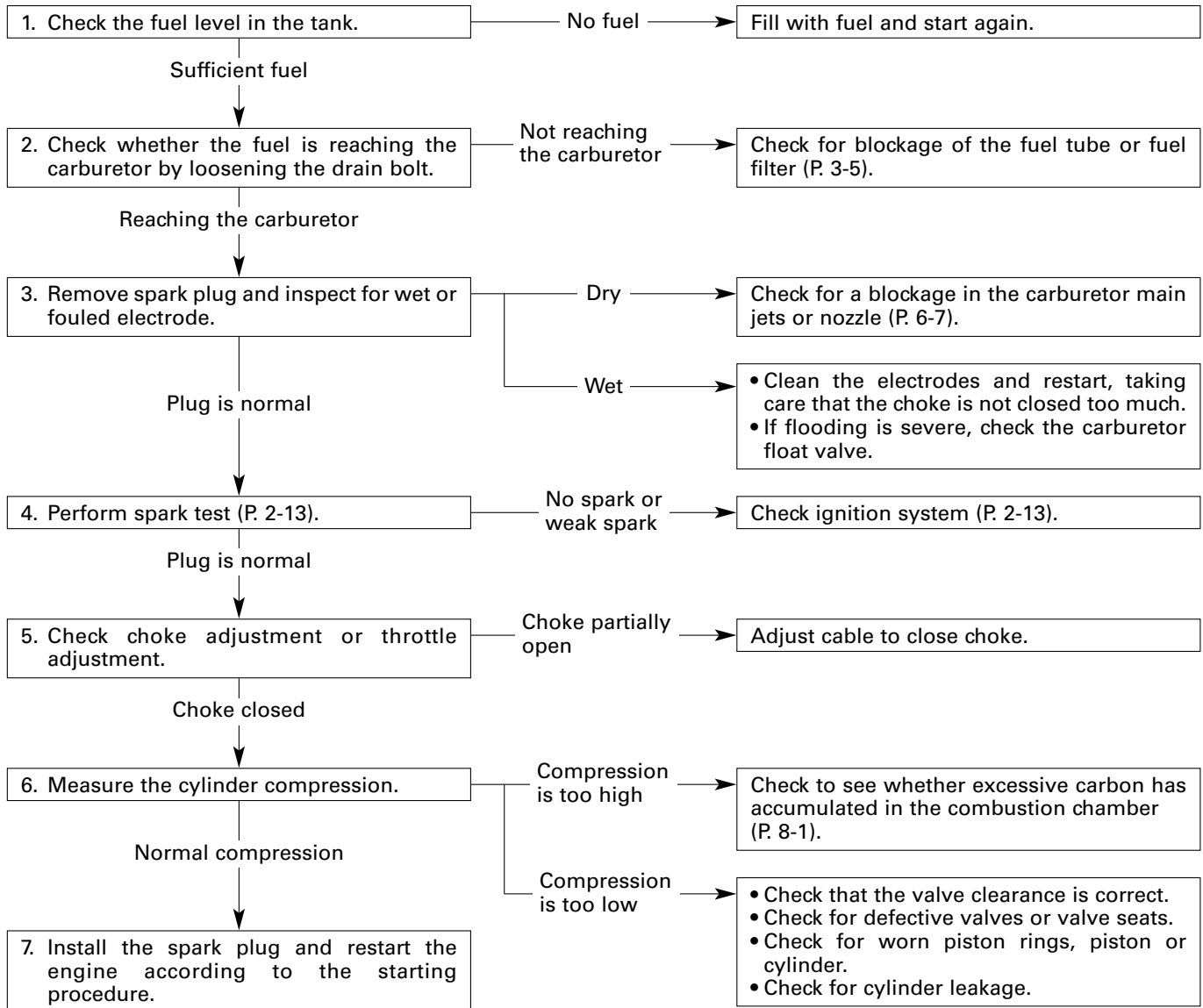




GXV160UH

b. ENGINE

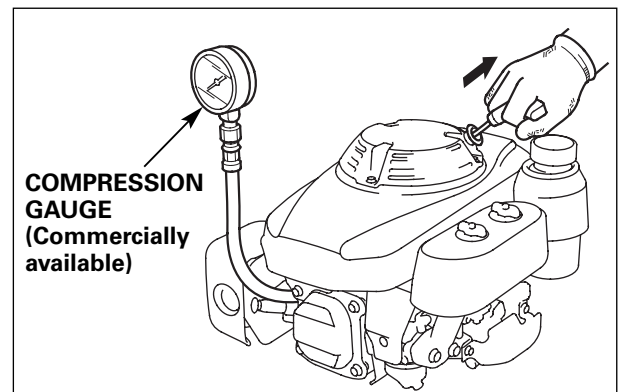
• Hard Starting



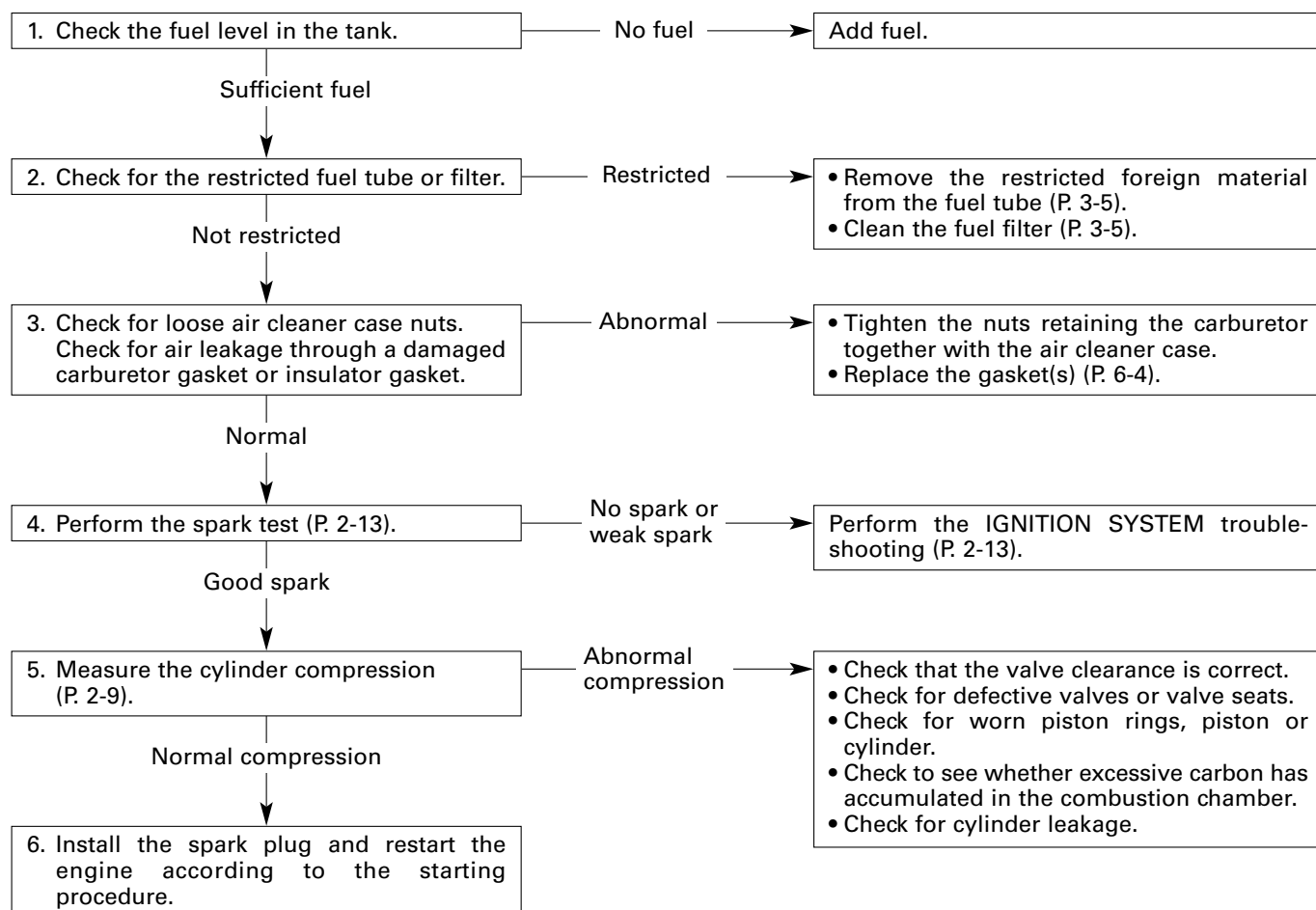
• CYLINDER COMPRESSION CHECK

- 1) Drain the fuel tank.
- 2) Drain the gasoline by loosening the carburetor drain screw.
- 3) Remove the spark plug cap and spark plug, and install a compression gauge in the spark plug hole.
- 4) Pull the recoil starter several times with force and measure the cylinder compression.

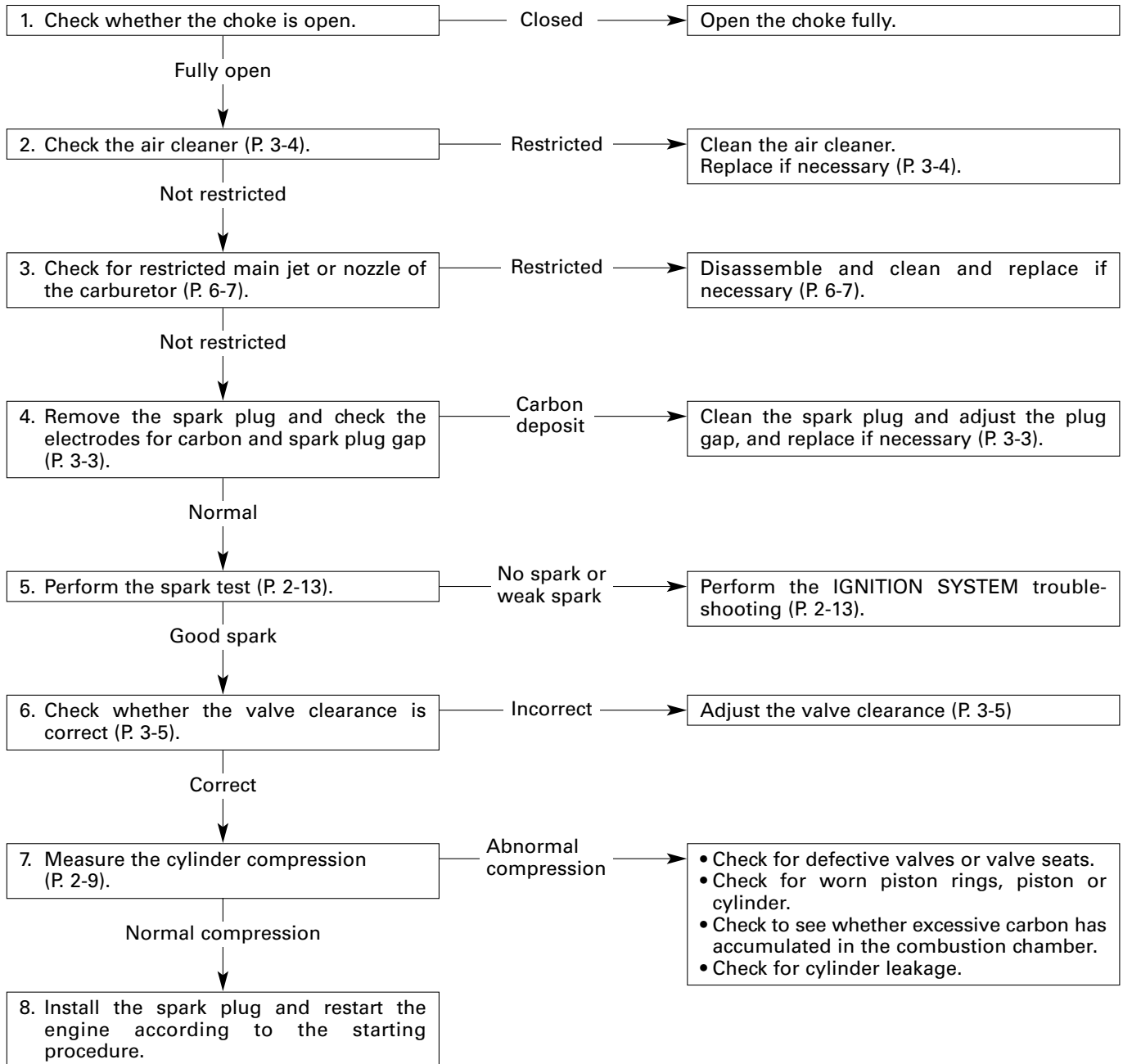
Cylinder compression	0.49 - 0.69 MPa (5.0 - 7.0 kgf/cm ² , 71 - 100 psi) at 600 min ⁻¹ (rpm)
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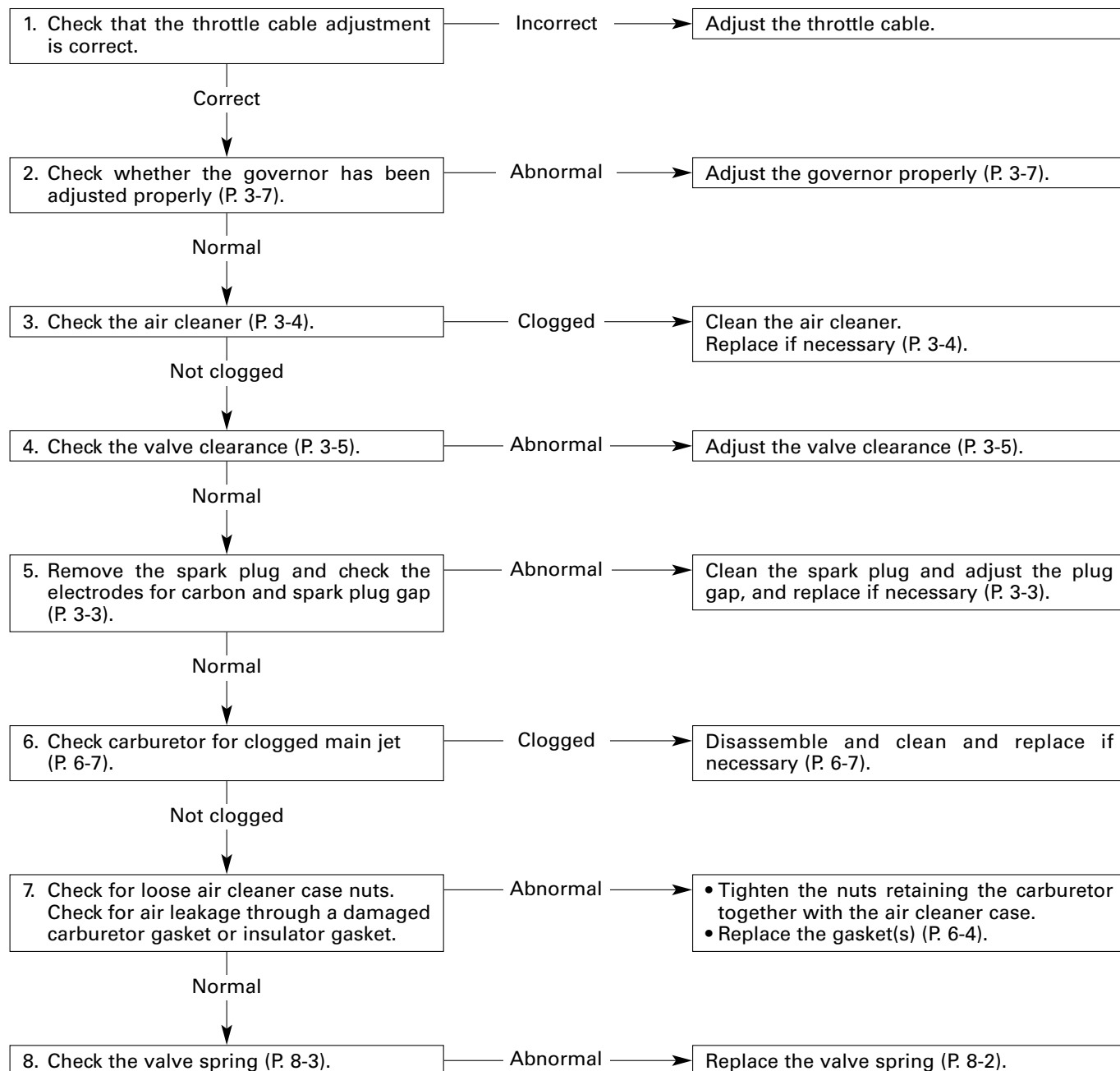
• **Engine Starts But Then Stalls**



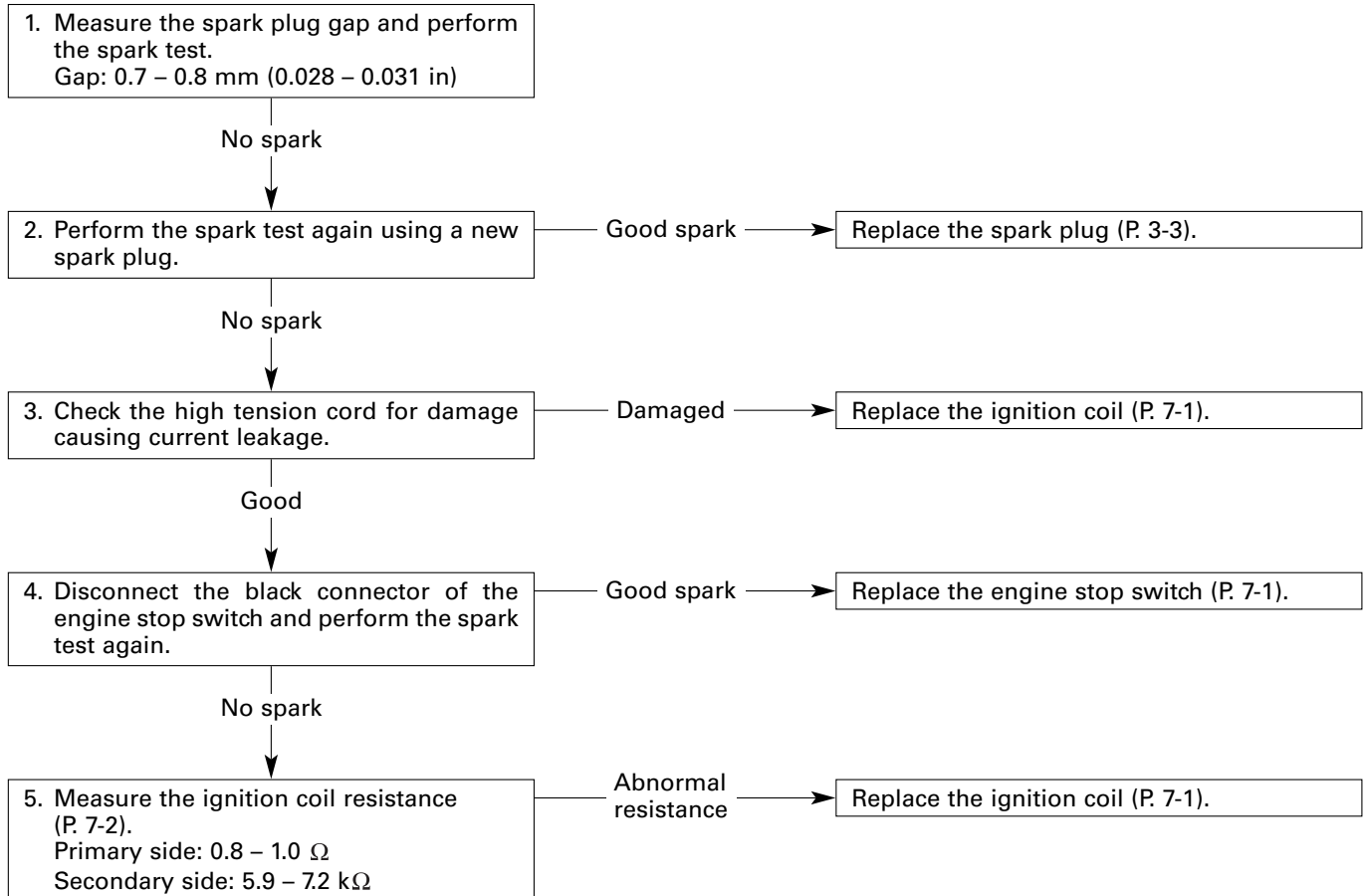
• Engine Lacks Power



• Engine Speed Does Not Increase



c. IGNITION SYSTEM



• SPARK TEST

⚠ WARNING

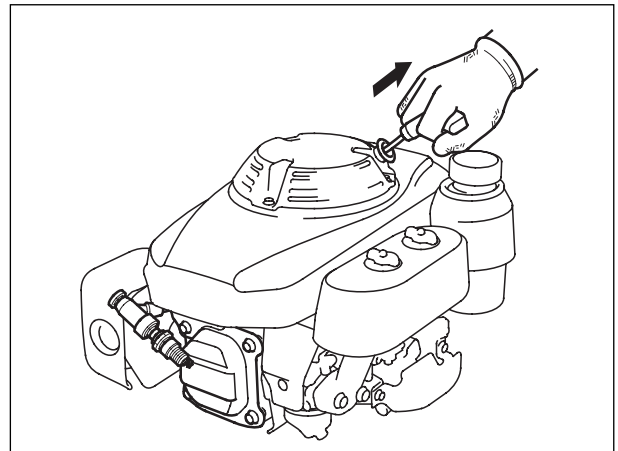
Gasoline is highly flammable and explosive.
If ignited, gasoline can burn you severely.

- Be sure there is no spilled fuel near the engine.
- Place the spark plug away from the spark plug hole.

Unburnt gas can ignite if it is left in the cylinder.

- Loosen the carburetor drain bolt to drain the carburetor thoroughly. Pull the recoil starter several times to release the unburnt gas from the cylinder before testing.

- 1) Turn the fuel valve to OFF and drain the gasoline from the carburetor.
- 2) Remove the spark plug cap and spark plug.
- 3) Pull the recoil starter several times to release the unburnt gas from the cylinder.
- 4) Attach the removed spark plug to the plug cap.
- 5) Pull the brake cam to the RUN position (Type equipped with flywheel brake only) or move the control lever to the SLOW position.
- 6) Ground the negative (-) electrode (i.e. threaded part) of the spark plug against the cylinder head cover bolt and pull the recoil starter rope to check whether sparks jump across the electrodes.



1. MAINTENANCE SCHEDULE	7. CARBURETOR
2. ENGINE OIL	8. GOVERNOR
3. SPARK PLUG	9. MAXIMUM ENGINE SPEED
4. AIR CLEANER	10. FLYWHEEL BRAKE [EQUIPPED TYPE ONLY]
5. FUEL TANK/FUEL FILTER/FUEL TUBE	11. SPARK ARRESTER [OPTIONAL PARTS]
6. VALVE CLEARANCE	

1. MAINTENANCE SCHEDULE

Item	REGULAR SERVICE PERIOD (1)		Each use	First month or 20 Hrs.	Every 3 months or 50 Hrs.	Every 6 months or 100 Hrs.	Every year or 200 Hrs.	Refer to page
	Perform at every indicated month or operating hour interval, whichever comes first.							
Engine oil	Check level		<input type="radio"/>					3-2
	Change			<input type="radio"/>		<input type="radio"/>		
Air cleaner	Check		<input type="radio"/>					3-4
	Clean				<input type="radio"/> (2)			
	Replace						<input type="radio"/> (3)	
Flywheel brake operation (Equipped type only)	Check				<input type="radio"/>			-
Flywheel brake pad (Equipped type only)	Check-adjust			<input type="radio"/>		<input type="radio"/>		3-8
Spark plug	Check-adjust					<input type="radio"/>		3-3
	Replace						<input type="radio"/>	
Spark arrester (Optional parts)	Clean					<input type="radio"/>		3-8
Idle speed	Check-adjust						<input type="radio"/>	3-7
Valve clearance	Check-adjust						<input type="radio"/>	3-5
Combustion chamber	Clean	After every 250 Hrs						8-1
Fuel tank & filter	Clean						<input type="radio"/>	3-5
Fuel tube	Check	Every 2 years (Replace if necessary)						3-5

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

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

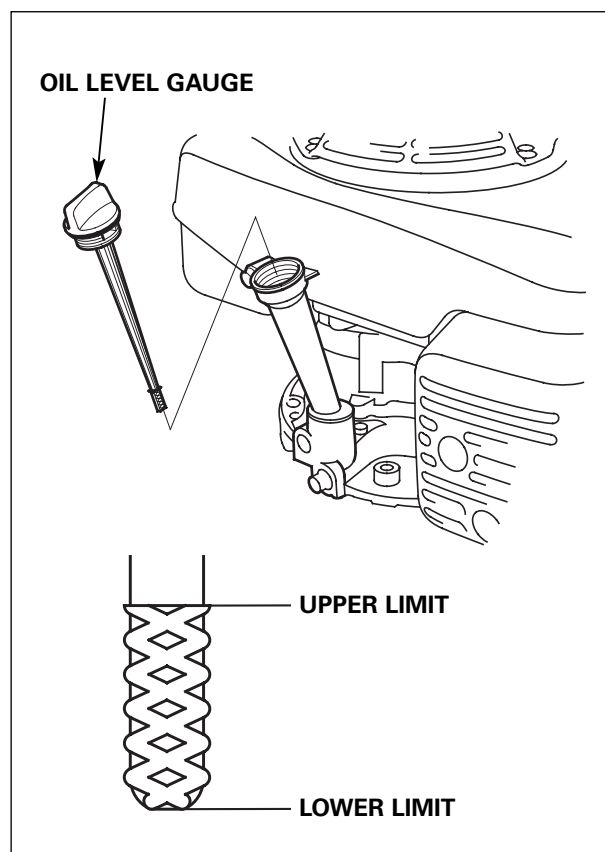
(3) Replace paper element type only.

2. ENGINE OIL

Oil level check:

Check the engine oil level with the engine stopped and the engine on a level surface.

- 1) Remove the oil level gauge, and wipe the oil level gauge clean.
- 2) Insert and remove the oil level gauge without screwing it into the oil filler neck. Check the oil level shown on the oil level gauge.
- 3) If the oil level is near or below the lower limit mark on the oil level gauge, fill with the recommended oil (P. 3-3) to the upper limit mark.
- 4) Reinstall the oil level gauge securely.



Oil change:

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

CAUTION

Used engine oil contains substances that have been identified as carcinogenic.

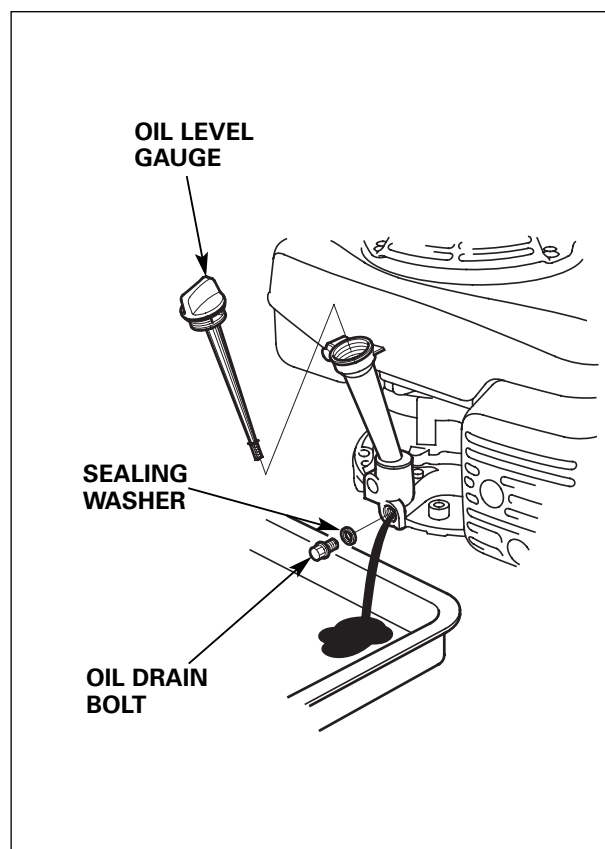
If repeatedly left in contact with the skin for prolonged periods, it may cause skin cancer.

Wash your hands thoroughly with soap and water as soon as possible after contact with used engine oil.

- 1) Place a suitable container under the oil drain bolt.
- 2) Remove the oil level gauge and oil drain bolt, and drain the oil into the container.
- 3) Retighten the oil drain bolt to the specified torque.

TORQUE: 17.5 N·m (1.75 kgf·m, 13 lbf·ft)

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 pour it down a drain.



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Refill with new engine oil:

- 1) Refill with the recommended engine oil and check the level.

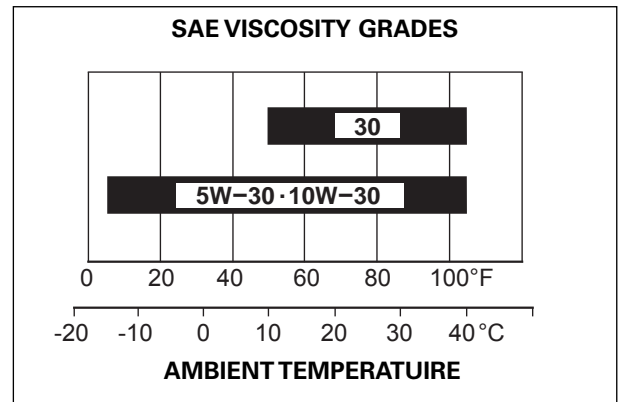
Engine oil capacity	0.65 ℓ (0.69 US qt, 0.53 Imp qt)
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Recommended oil	SAE 10W-30 API Service category: SJ or higher
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- 2) If the oil level is near or below the lower limit mark on the oil level gauge, fill with the recommended oil to the upper limit mark (P. 3-2).

When a new oil filter has been installed, recheck the engine oil level after running the engine for a few minutes.

- 3) Reinstall the oil level gauge securely.



3. SPARK PLUG

Inspection:

- 1) Using a spark plug wrench, remove the spark plug. Visually inspect the spark plug. Discard the plug if the insulator is cracked, chipped, or fouled.
- 2) Measure the plug gap with a wire-type feeler gauge.

Standard spark plug	NGK	BPR5ES
	DENSO	W16EPR-U

Spark plug gap	0.7 – 0.8 mm (0.028 – 0.031 in)
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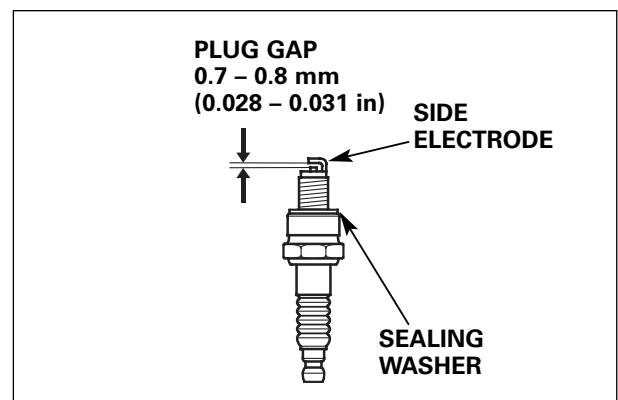
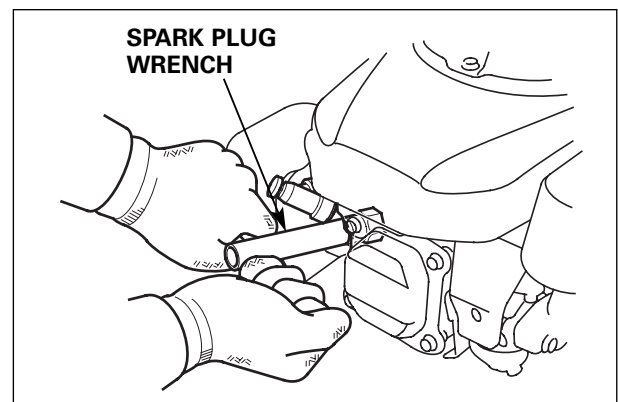
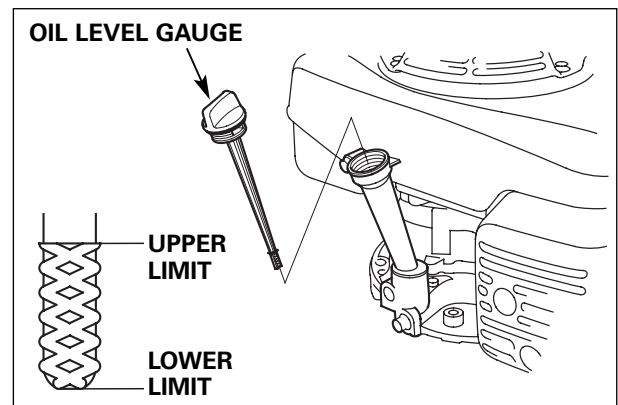
If necessary, adjust the gap by bending the side electrode.

- 3) Make sure the sealing washer is in good condition; replace the plug if necessary.
- 4) Install the plug finger-tight to seat the washer, then tighten with a plug wrench (an additional 1/2 turn if a new plug) to compress the sealing washer. If you are reusing a plug, tighten 1/8 – 1/4 turn after the plug seats.

TORQUE: 20 N·m (2.0 kgf·m, 14 lbf·ft)

NOTICE

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



4. AIR CLEANER

Cleaning:

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.

- 1) Remove the two air cleaner nuts and remove the air cleaner cover.
- 2) Take out the air cleaner elements and separate the foam and paper elements.
- 3) Inspect both elements and replace if necessary.
- 4) Clean both elements if they are to be reused.

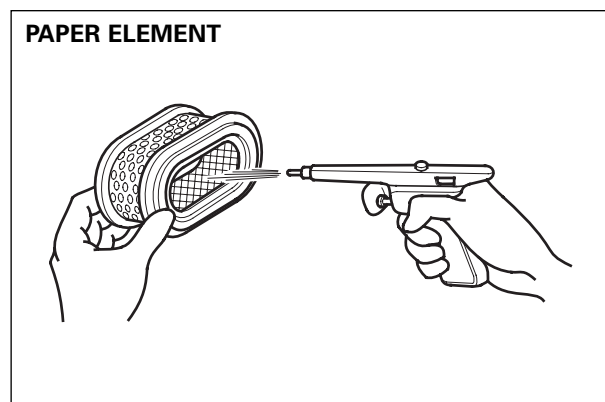
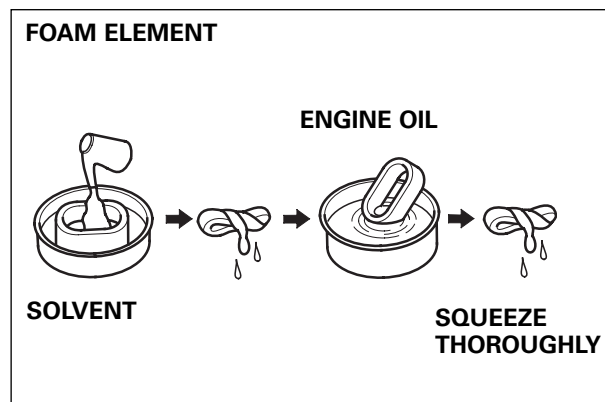
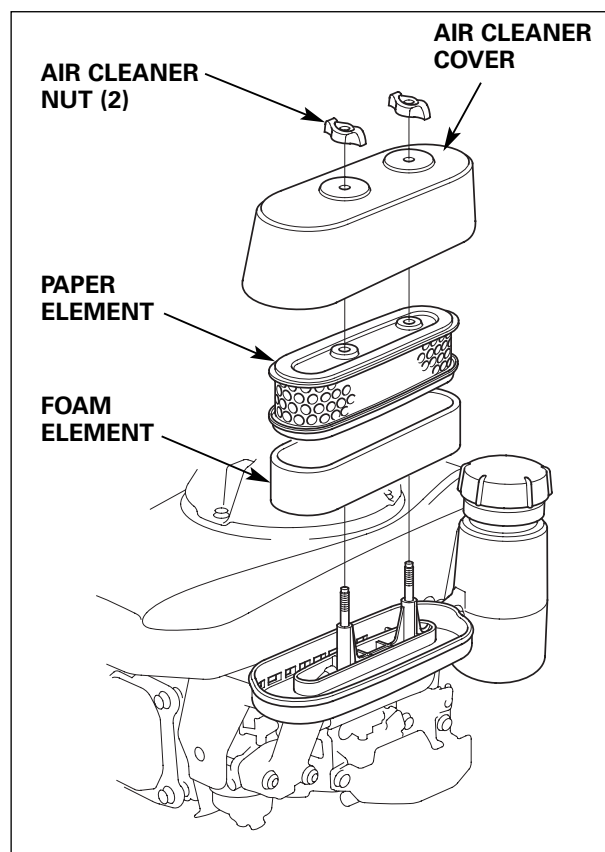
Foam element: Clean in warm soapy water, rinse and allow to dry. Or, clean in non-flammable solvent and allow to dry. Dip the element in clean engine oil, then squeeze out excess oil.

NOTICE

- *Do not allow the element to soak overnight or for long periods of time in solvent; this may cause damage to the element.*
- *Excess oil will restrict air flow through the foam element and may transfer to the paper element, soaking and clogging it.*

Paper element: Tap the element several times on a hard surface to remove dirt, or blow compressed air (not exceeding 207 kPa, 2.1 kgf/cm², 30 psi) through the element from the inside. Never try to brush off dirt; brushing will force dirt into the paper fibers.

- 5) Wipe dirt from the inside of the air cleaner case and cover, using a moist rag. Be careful to prevent dirt from entering the air duct that leads to the carburetor.
- 6) Place the foam element over the paper element, and install the assembled element onto the air cleaner case. Reinstall the air cleaner cover and tighten the two air cleaner nuts securely.



5. FUEL TANK/FUEL FILTER/ FUEL TUBE

⚠ WARNING

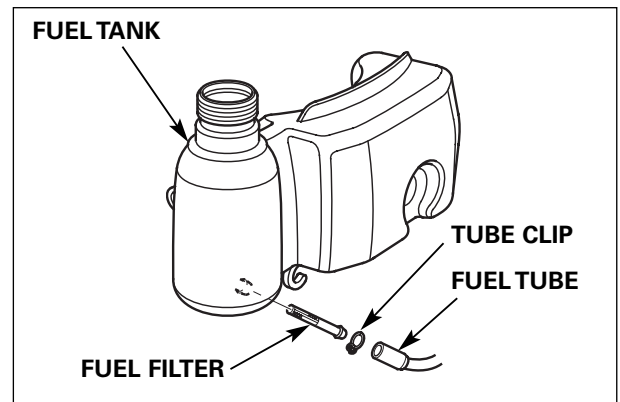
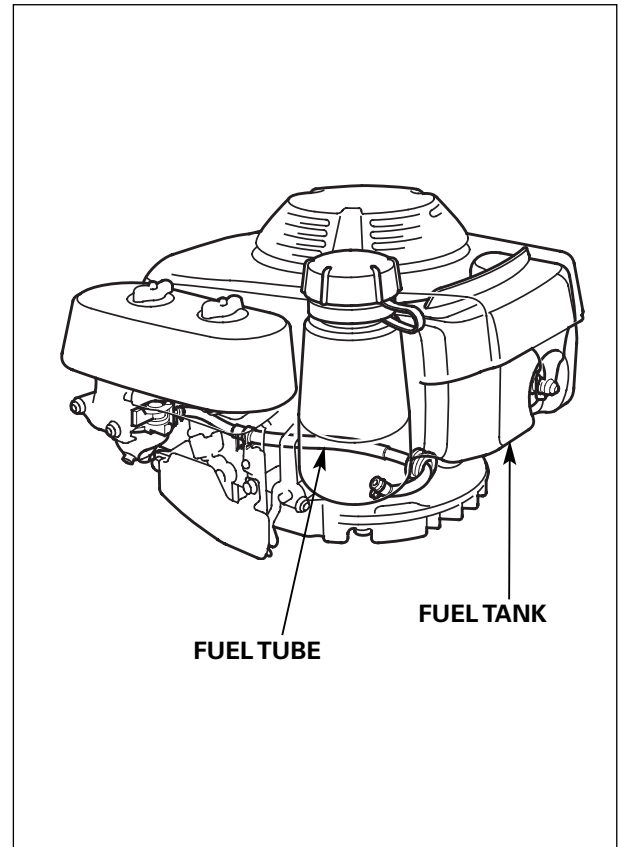
Gasoline is highly flammable and explosive.

You can be burned or seriously injured when handling fuel.

- Keep heat, sparks, and flame away.
- Handle fuel only outdoors.
- Wipe up spills immediately.

Cleaning:

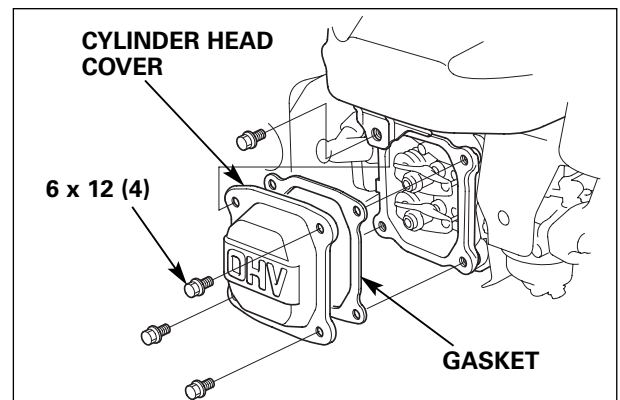
- 1) Check the fuel tube for deterioration, cracks or signs of leakage.
- 2) Turn the fuel valve to the "OFF" position.
- 3) Drain the fuel into a suitable container.
- 4) Remove the air cleaner cover (P. 3-4) and recoil starter/fan cover (P. 5-1).
- 5) Remove the fuel tube clip and fuel tube from the fuel tank. Remove the fuel filter from the fuel tube. Remove the fuel tank (P. 6-2).
- 6) Clean the filter with solvent, and check to be sure the filter screen is undamaged.
- 7) Clean the fuel tank with solvent, and allow the fuel tank to dry thoroughly.
- 8) After cleaning, set the fuel filter in the fuel tank and connect the fuel tube.
- 9) Install the fuel tank (P. 6-2) and check for fuel leakage from the fuel tube.
- 10) Install the recoil starter/fan cover and the air cleaner cover (P. 3-4).



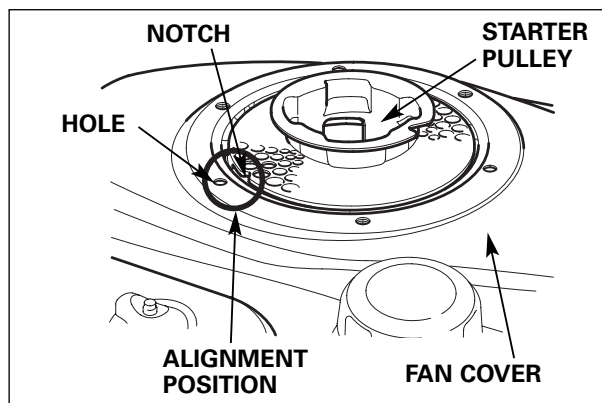
6. VALVE CLEARANCE

Inspection/Adjustment:

- Valve clearance inspection and adjustment must be performed with the engine cold.
- 1) Remove the spark plug (P. 3-3) and recoil starter (P. 5-1). Remove the 6 x 32 mm flange bolt from the oil filler extension (P. 5-1).
 - 2) Remove the four 6 x 12 mm flange bolts from the head cover and gasket.
 - After the cylinder head cover is removed, engine oil may spill. Be sure to wipe up any spilled oil.



3) Set the piston at top dead center of the compression stroke (both valves fully closed).
Align the notch in the starter pulley with the hole in the fan cover as shown.

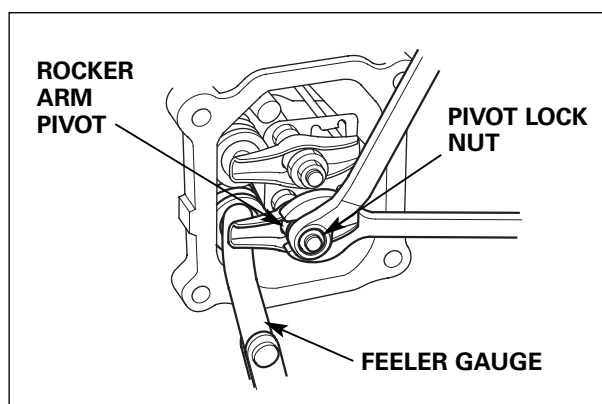


4) Insert a feeler gauge between the rocker arm and valve to measure the valve clearance.

Standard valve clearance	IN	0.15 ± 0.02 mm
	EX	0.20 ± 0.02 mm

- 5) If adjustment is necessary, proceed as follows:
- Hold the rocker arm pivot and loosen the rocker arm pivot lock nut.
 - Turn the rocker arm pivot to obtain the specified clearance.
 - Tighten the rocker arm pivot lock nut while holding the rocker arm pivot.

TORQUE: 10 N·m (1.0 kgf·m, 7 lbf·ft)



- Recheck the valve clearance.
- 6) Set the new gasket aligning the projection of the new gasket with the projection of the cylinder head (P. 8-1), and loosely install the four 6 x 12 mm cylinder head cover bolts.

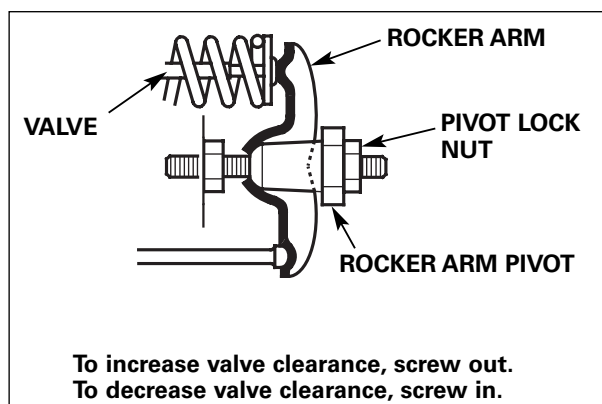
7) Loosely tighten the oil filler extension with the 6 x 32 mm flange bolt.

8) Tighten the four 6 x 12 mm cylinder head cover bolts to the specified torque.

TORQUE: 8.5 N·m (0.85 kgf·m, 6.1 lbf·ft)

9) Tighten the 6 x 32 mm flange bolt securely.

10) Install the spark plug (P. 3-3) and recoil starter (P. 5-1).



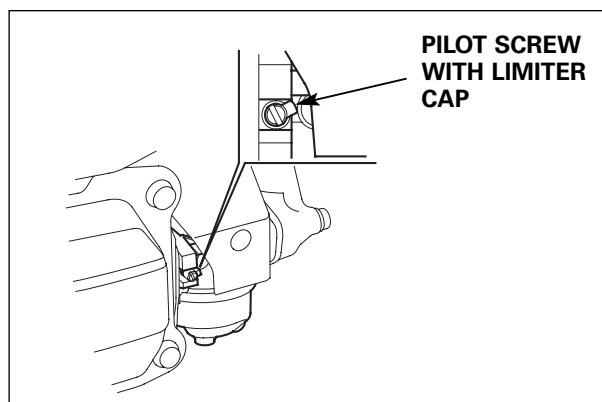
7. CARBURETOR

Pilot screw:

The pilot screw is fitted with a limiter cap that prevents excessive enrichment of the air-fuel mixture in order to comply with emission regulations.

Do not attempt to remove the limiter cap for pilot screw adjustment. The limiter cap cannot be removed without breaking the pilot screw.

Pilot screw adjustment must be performed only when the carburetor is disassembled and the pilot screw is replaced (P. 6-8).



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Idle speed adjustment:

- 1) Start the engine and allow it to warm up to normal operating temperature.
- 2) With the engine idling, turn the throttle stop screw to obtain the standard idle speed.

Standard idle speed	1,700 ± 150 min ⁻¹ (rpm)
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8. GOVERNOR

Adjustment:

- 1) Remove the control protector (P. 6-4).
- 2) Loosen the governor arm nut. Be sure that the carburetor throttle valve is fully open (fully to the right).
- 3) Rotate the governor arm shaft fully to the right, and retighten the governor arm nut to the specified torque.

TORQUE: 10 N·m (1.0 kgf·m, 7 lbf·ft)

- 4) Check to see that the governor arm and throttle valve move freely.
- 5) Check the maximum engine speed and confirm that it is correct.

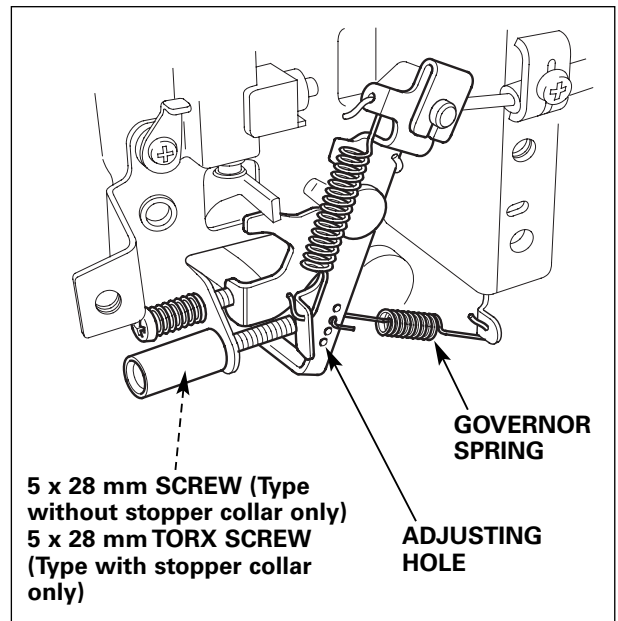
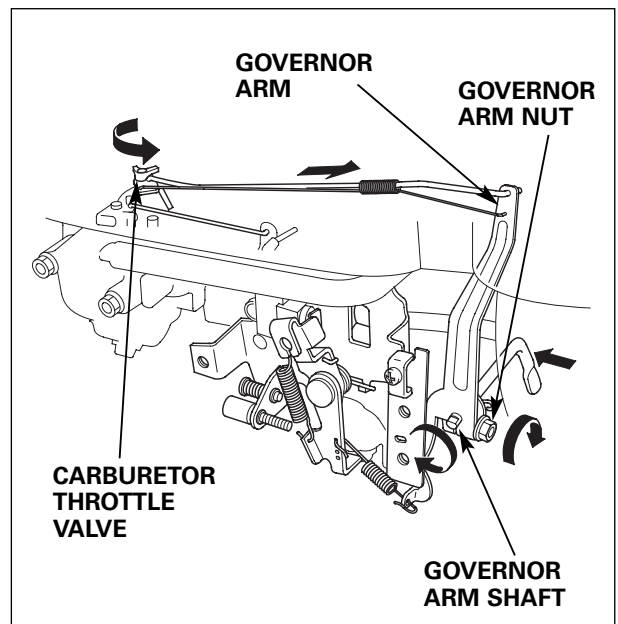
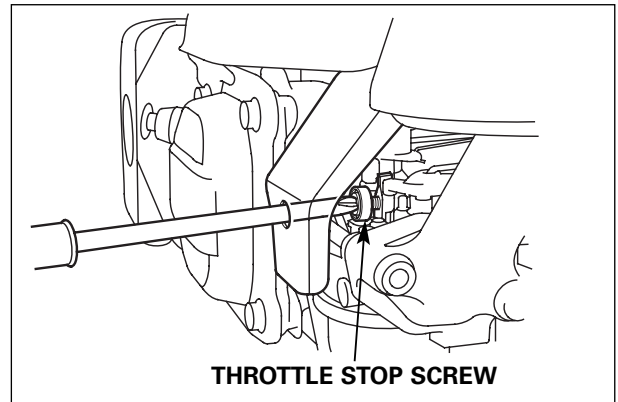
9. MAXIMUM ENGINE SPEED

Adjustment:

- 1) Check the throttle cable adjustment (P. 6-6).
- 2) Start the engine and allow it to warm up to normal operating temperature.
- 3) Move the control lever to the maximum engine speed position and check the maximum engine speed.

Maximum engine speed (no load)	3,600 ± 150 min ⁻¹ (rpm)
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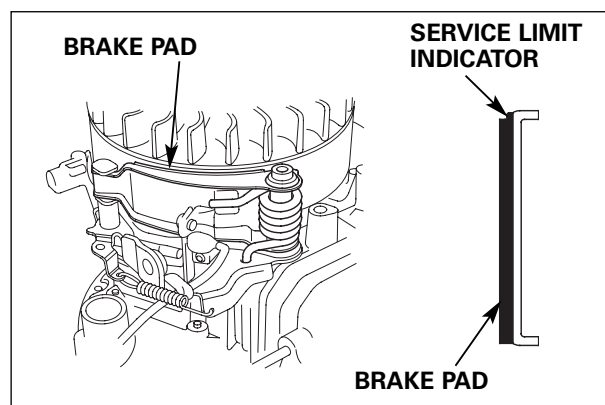
- 4) If the maximum engine speed is out of specification, change the governor spring hook position and readjust. The second of the four holes is the standard hook position. When the maximum engine speed is too low, move the spring to a lower hole to adjust. When the maximum engine speed is too high, turn the 5 x 28 mm screw in to adjust (type without stopper collar only). When the maximum engine speed is too high, adjust by turning the 5 x 28 mm torx screw using a commercially available torx® bit driver (T25) (type with stopper collar only).



10. FLYWHEEL BRAKE [EQUIPPED TYPE ONLY]

Adjustment:

- 1) Remove the recoil starter/fan cover (P. 5-1).
- 2) Visually check the brake pad for wear.
- 3) Replace the brake shoe if the pad is worn to the service limit. The service limit is indicated by a shoulder cut in the edge of the brake pad.



11. SPARK ARRESTER [OPTIONAL PARTS]

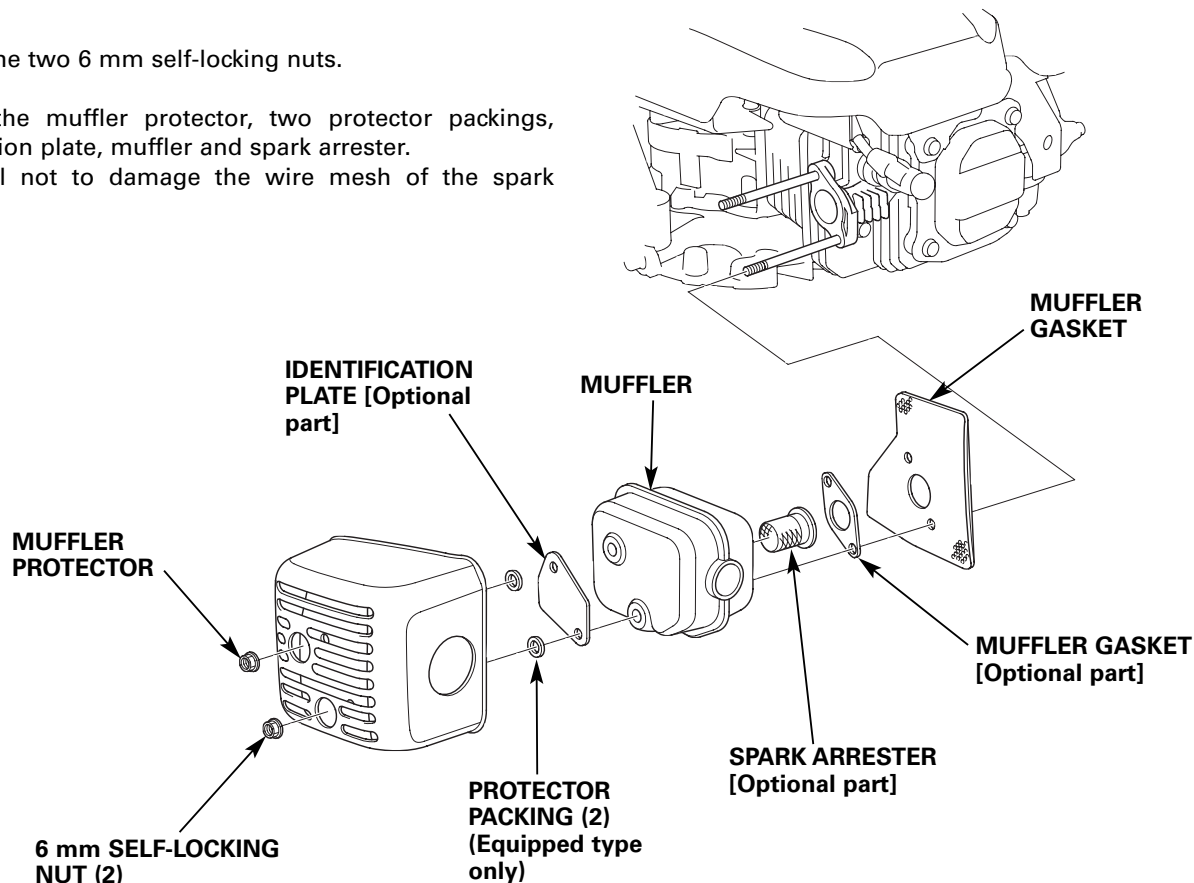
⚠ WARNING

The engine and muffler become very hot during operation and they remain hot for a while after operation. Be sure that the engine is cool before muffler removal/installation.

The spark arrester must be serviced every 100 hours to maintain its efficiency.

Cleaning:

- 1) Remove the two 6 mm self-locking nuts.
- 2) Remove the muffler protector, two protector packings, identification plate, muffler and spark arrester. Be careful not to damage the wire mesh of the spark arrester.



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- 3) Check for carbon deposits around the exhaust port and spark arrester. Clean, if necessary, with a wire brush.
- 4) Replace the spark arrester if there are any breaks or tears.
- 5) Install the spark arrester and muffler in the reverse order of disassembly using a new muffler gasket.
- 6) Tighten the 6 mm nuts to the specified torque.

TORQUE: 10 N·m (1.0 kgf·m, 7 lbf·ft)



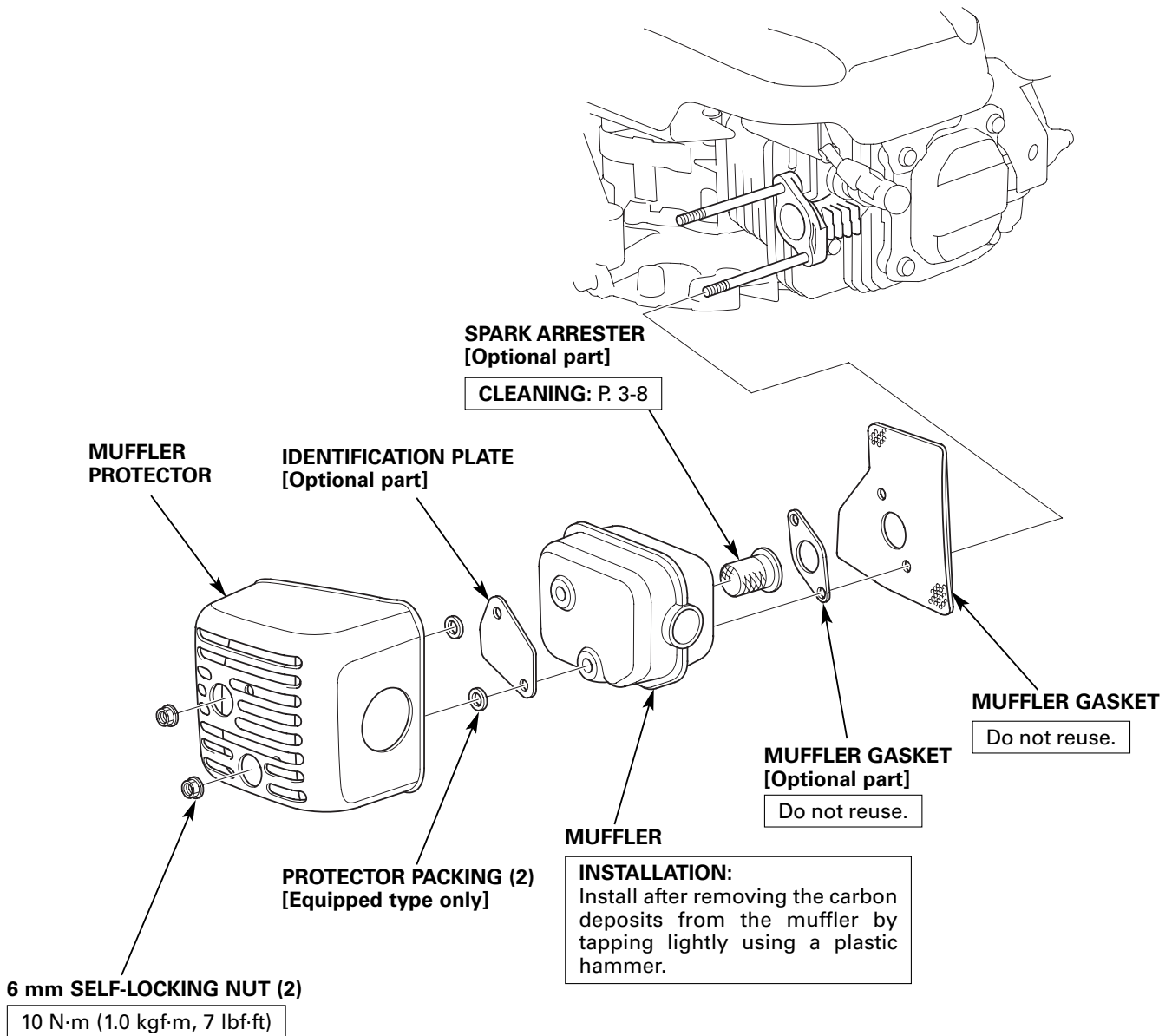
1. MUFFLER

1. MUFFLER

a. REMOVAL/INSTALLATION

⚠ WARNING

The engine and muffler become very hot during operation and they remain hot for a while after operation. Be sure that the engine is cool before muffler removal/installation.

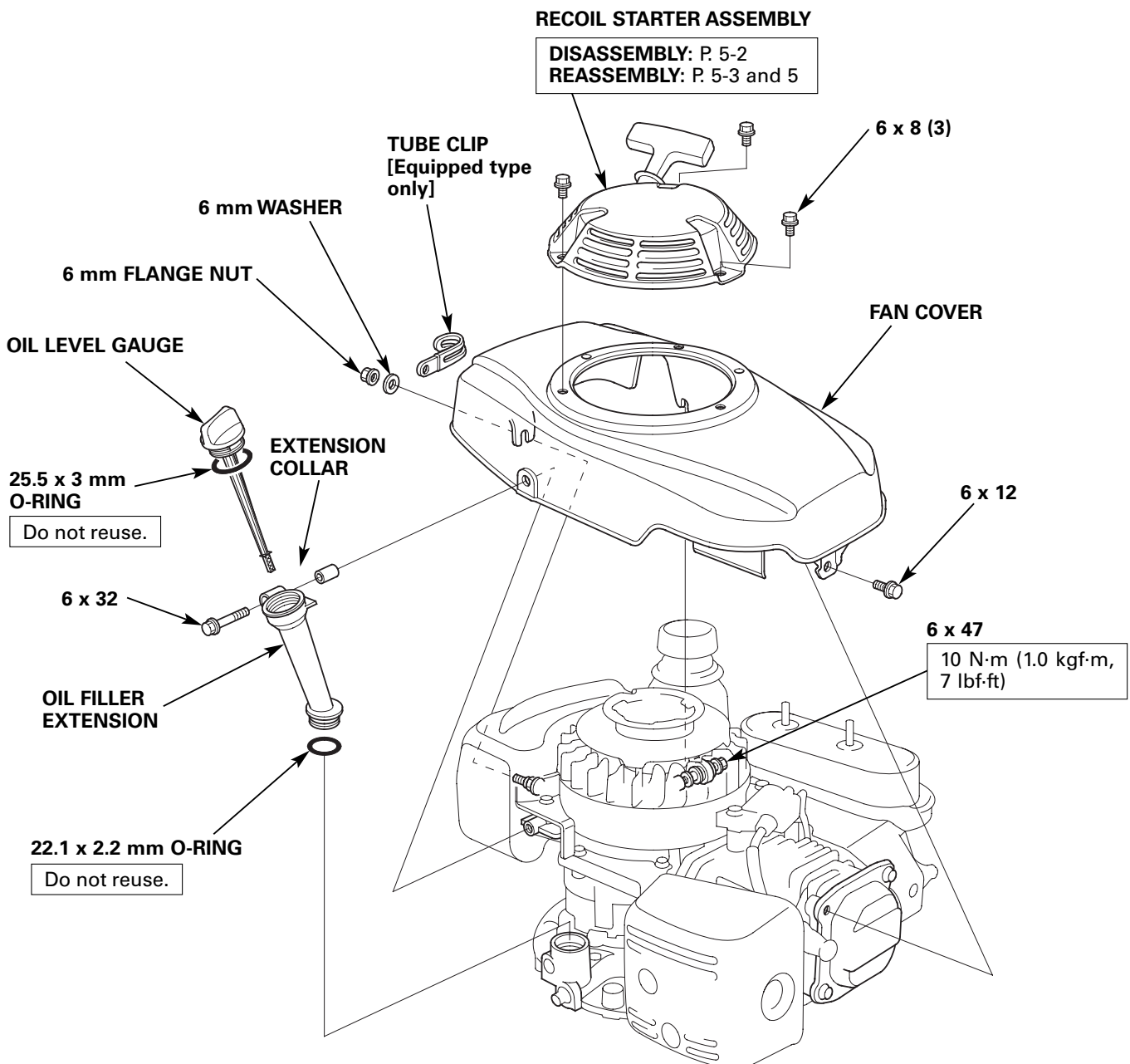


1. RECOIL STARTER/FAN COVER

1. RECOIL STARTER/FAN COVER

a. REMOVAL/INSTALLATION

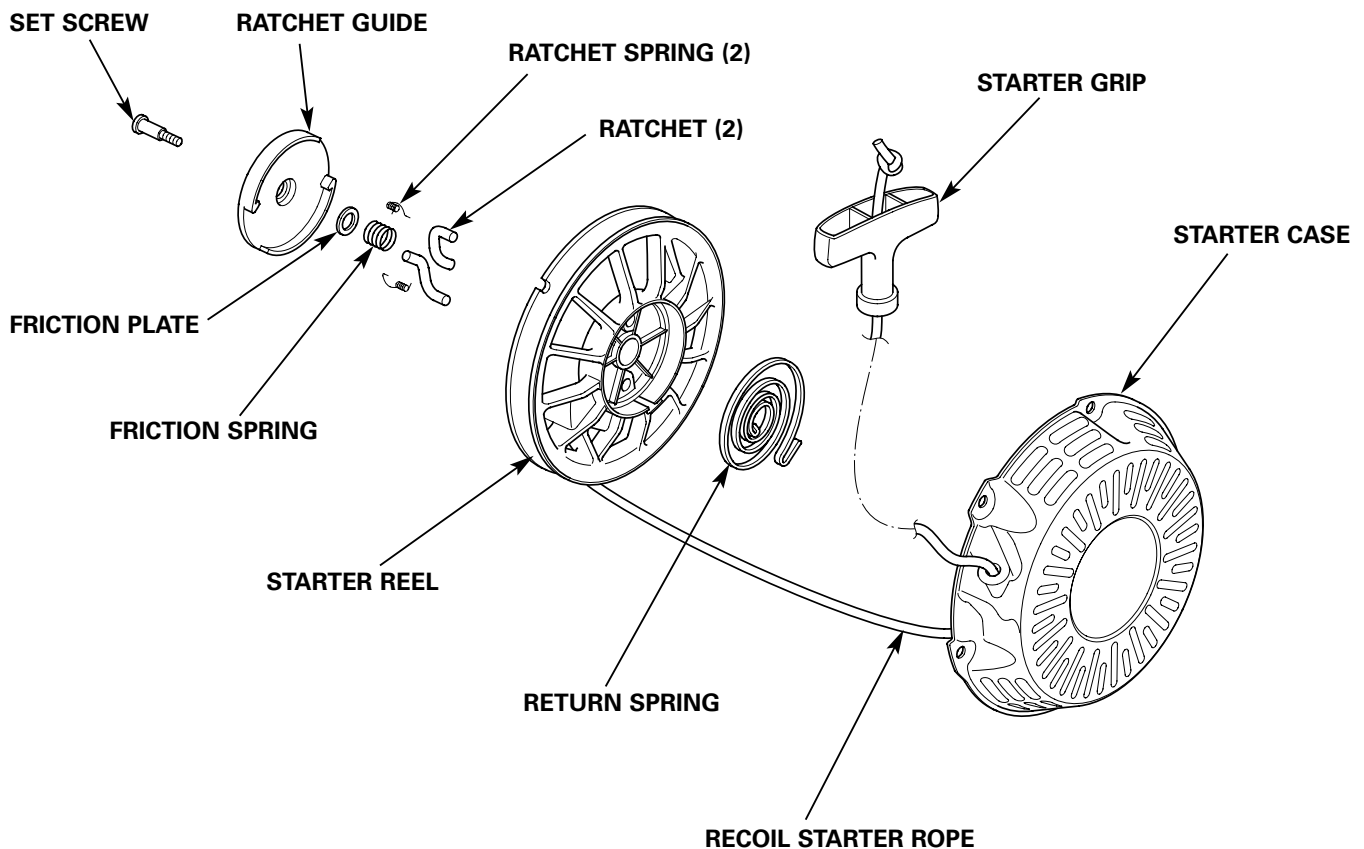
- 1) Remove the air cleaner cover (P. 6-1).
- 2) Remove the three 6 x 8 mm flange bolts and remove the recoil starter assembly.
- 3) Remove the 6 x 32 mm and 6 x 12 mm flange bolts.
- 4) Loosen the 6 x 47 mm flange bolt and 6 mm flange nut, and remove the fan cover.



b. RECOIL STARTER DISASSEMBLY

⚠ CAUTION

- Wear gloves and eye protection.
- During assembly, take care not to allow the return spring to come out.



REASSEMBLY:
Check the rope for fraying or wear before installation.

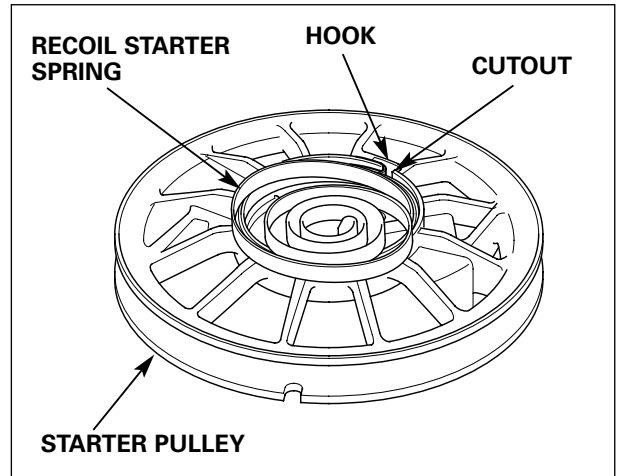
GXV160UH

c. REASSEMBLY

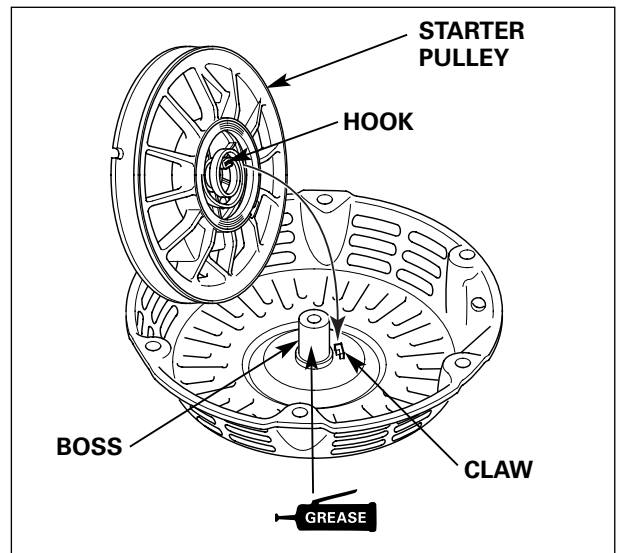
CAUTION

- Wear gloves and eye protection.
- During assembly, take care not to allow the return spring to come out.

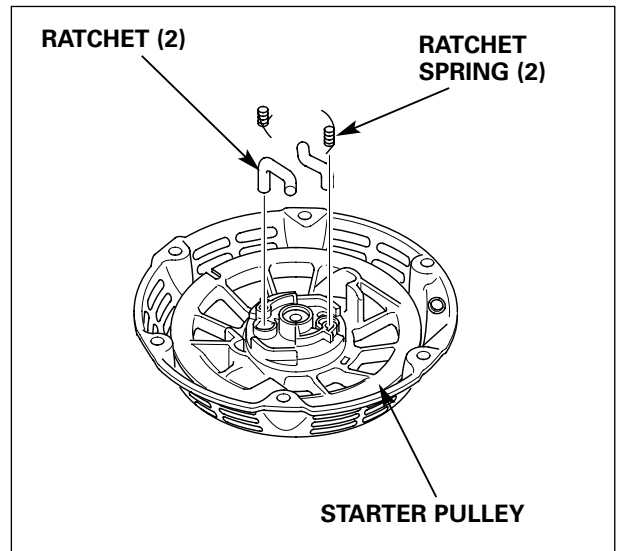
1) Align the outer hook of the recoil starter spring to the cutout of the starter case, and wind it in the starter reel.



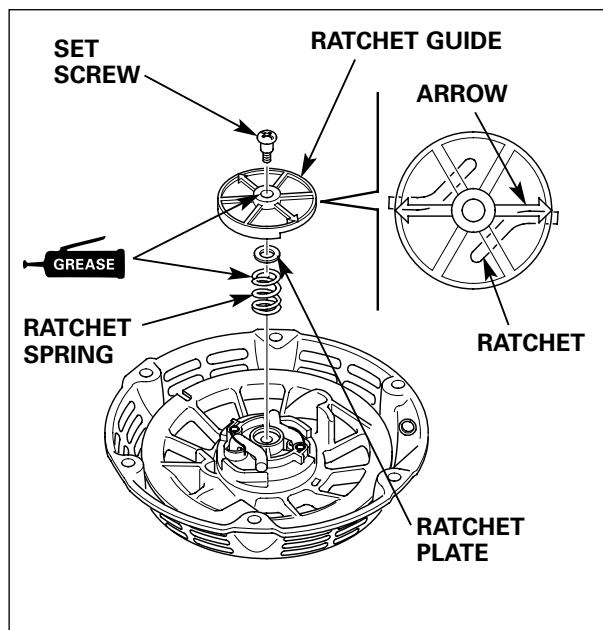
2) Apply grease to the boss of the starter case. Align the spring inner hook to the case claw on the case by turning the reel counterclockwise.



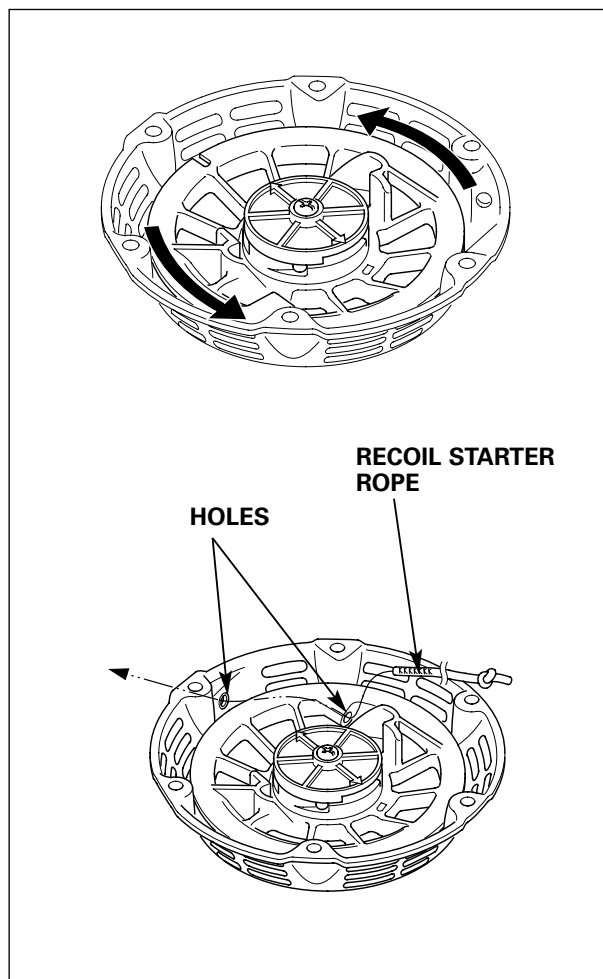
3) Install the ratchet springs and ratchets onto the starter pulley as shown.



- 4) Apply grease to the friction spring and hole of the ratchet guide.
- 5) Install the friction spring and friction plate, and install the ratchet guide with the arrow marks facing the ratchets as shown.
- 6) Apply LOCTITE® to the thread of the set screw and tighten it securely.

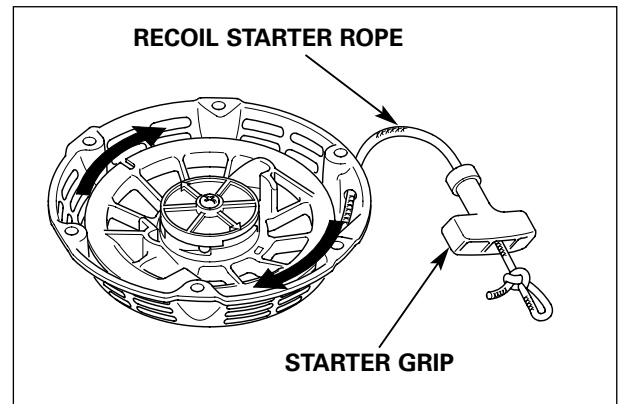


- 7) Make sure that the inner hook of the recoil starter spring engages with the case claw by turning the reel counterclockwise slowly, then return the reel slowly.
- 8) Turn the reel two turns counterclockwise to preload the return spring, and then line up the rope holes of the reel and recoil starter case as shown, and hold the starter reel at this position.
- 9) Pass the starter rope through the starter reel hole and starter case hole, and knot the end of the rope as shown.

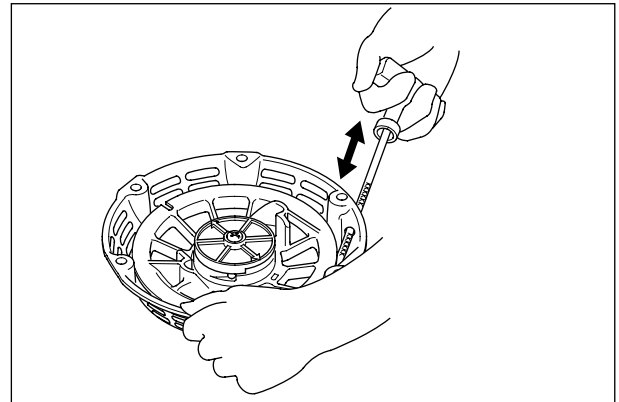


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- 10) Pass the rope through the starter grip, and knot the end of the rope as shown.
- 11) Release the starter reel, and wind the starter rope to the reel.



- 12) Check the operation of the ratchet by pulling the starter rope out several times.



- 1. AIR CLEANER
- 2. FUEL TANK

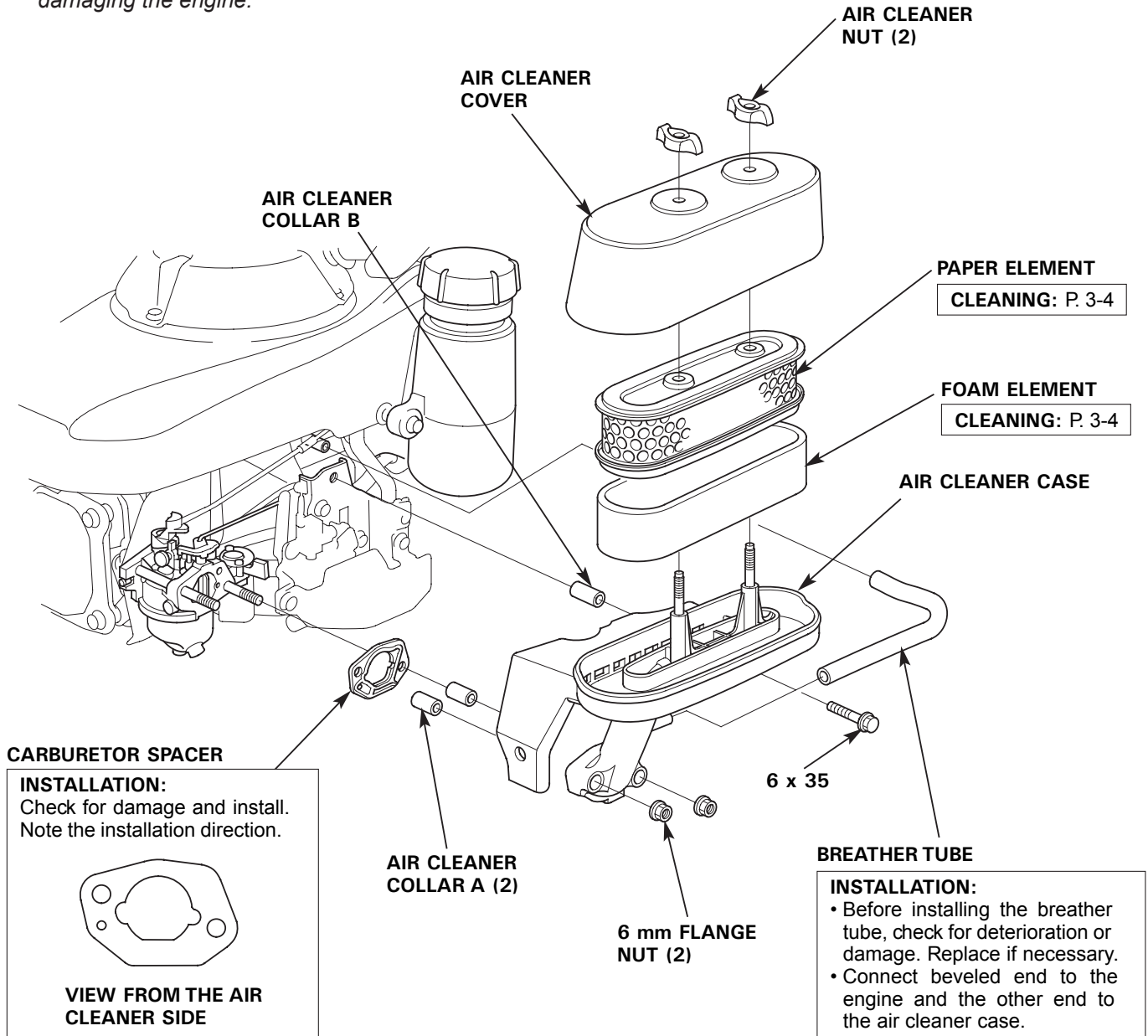
- 3. CARBURETOR/CONTROL BASE

1. AIR CLEANER

a. REMOVAL/INSTALLATION

NOTICE

If these parts are left out, dirt will enter the intake system, damaging the engine.



2.FUEL TANK

a. REMOVAL/INSTALLATION

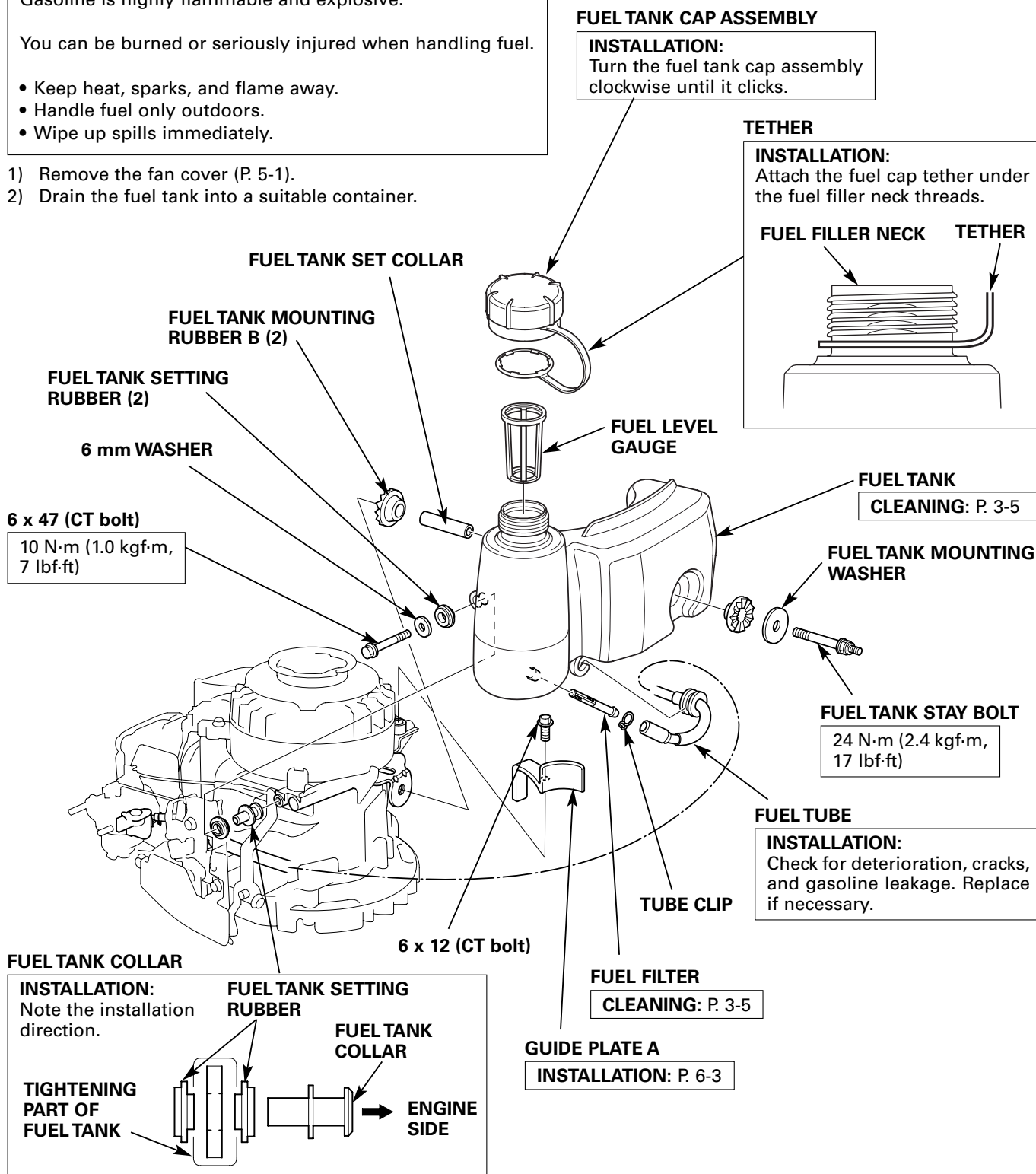
⚠ WARNING

Gasoline is highly flammable and explosive.

You can be burned or seriously injured when handling fuel.

- Keep heat, sparks, and flame away.
- Handle fuel only outdoors.
- Wipe up spills immediately.

- 1) Remove the fan cover (P. 5-1).
- 2) Drain the fuel tank into a suitable container.

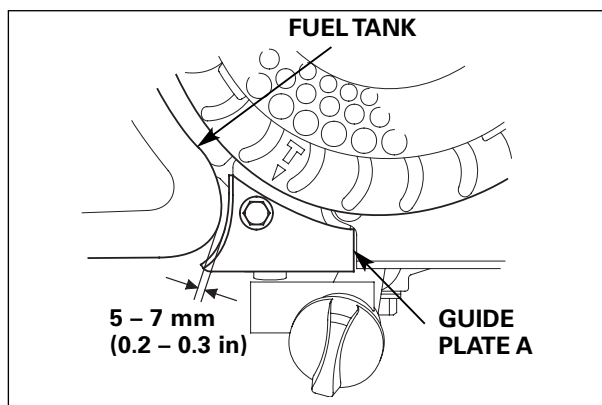
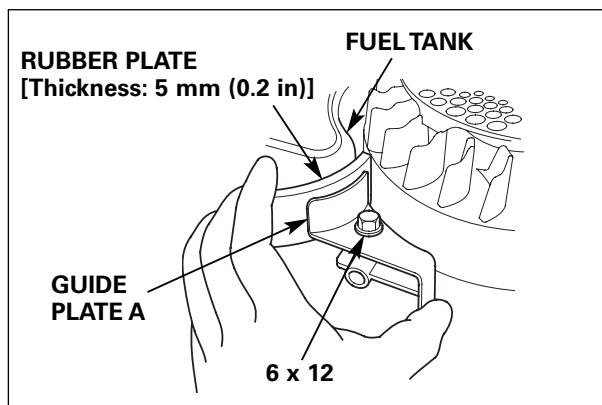


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• GUIDE PLATE A

INSTALLATION:

- 1) Install the fuel tank (P. 6-2).
- 2) Set a 5 mm (0.2 in) thick rubber plate in the clearance between guide plate A and the fuel tank, and push guide plate A toward the fuel tank.
- 3) Tighten the 6 x 12 mm flange bolt while pushing guide plate A toward the fuel tank.
- 4) After installation, remove the rubber plate and check that the clearance between guide plate A and the fuel tank is 5 – 7 mm (0.2 – 0.3 in).



3. CARBURETOR/CONTROL BASE

a. REMOVAL/INSTALLATION

Before removal, completely drain the fuel line.

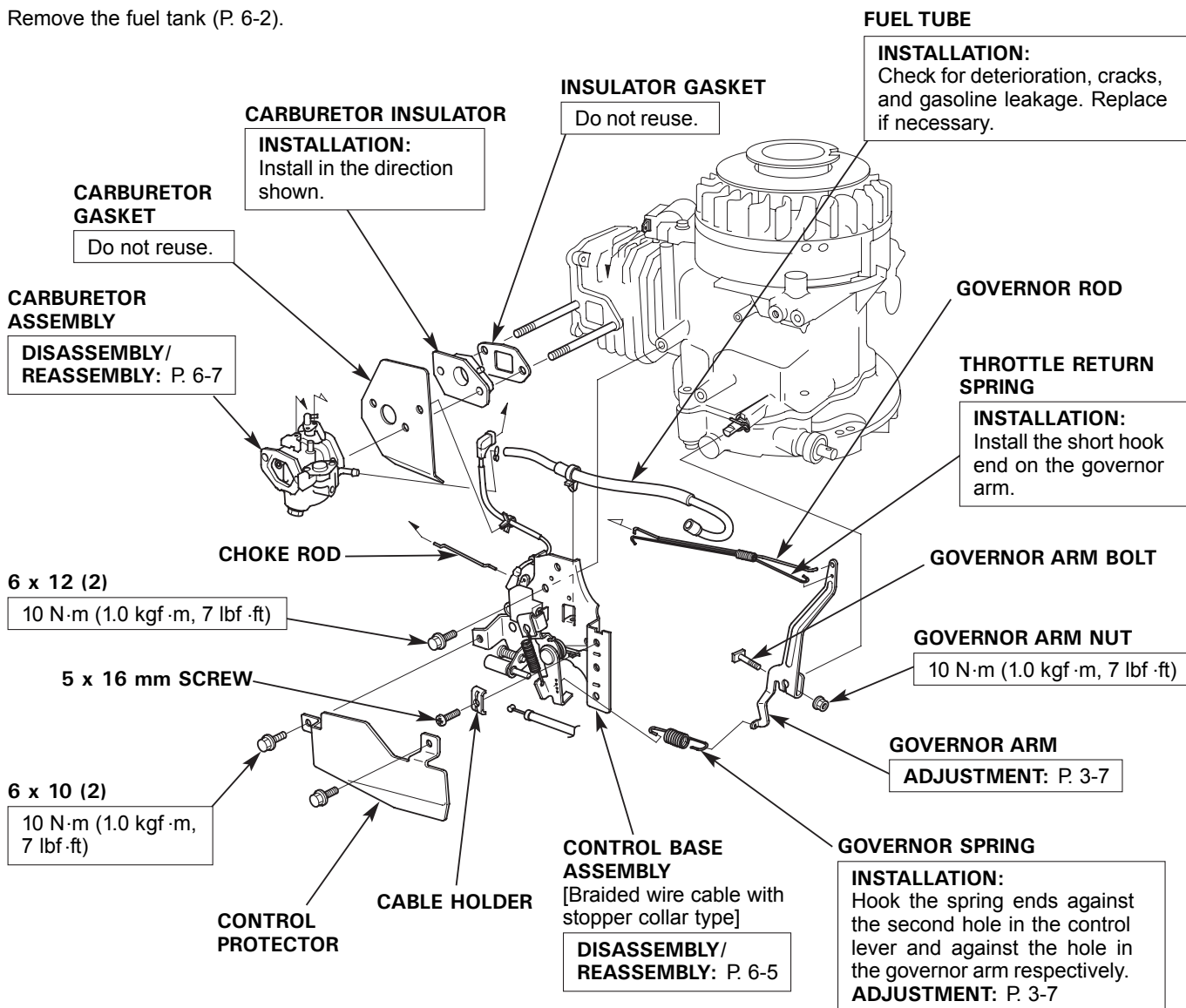
⚠ WARNING

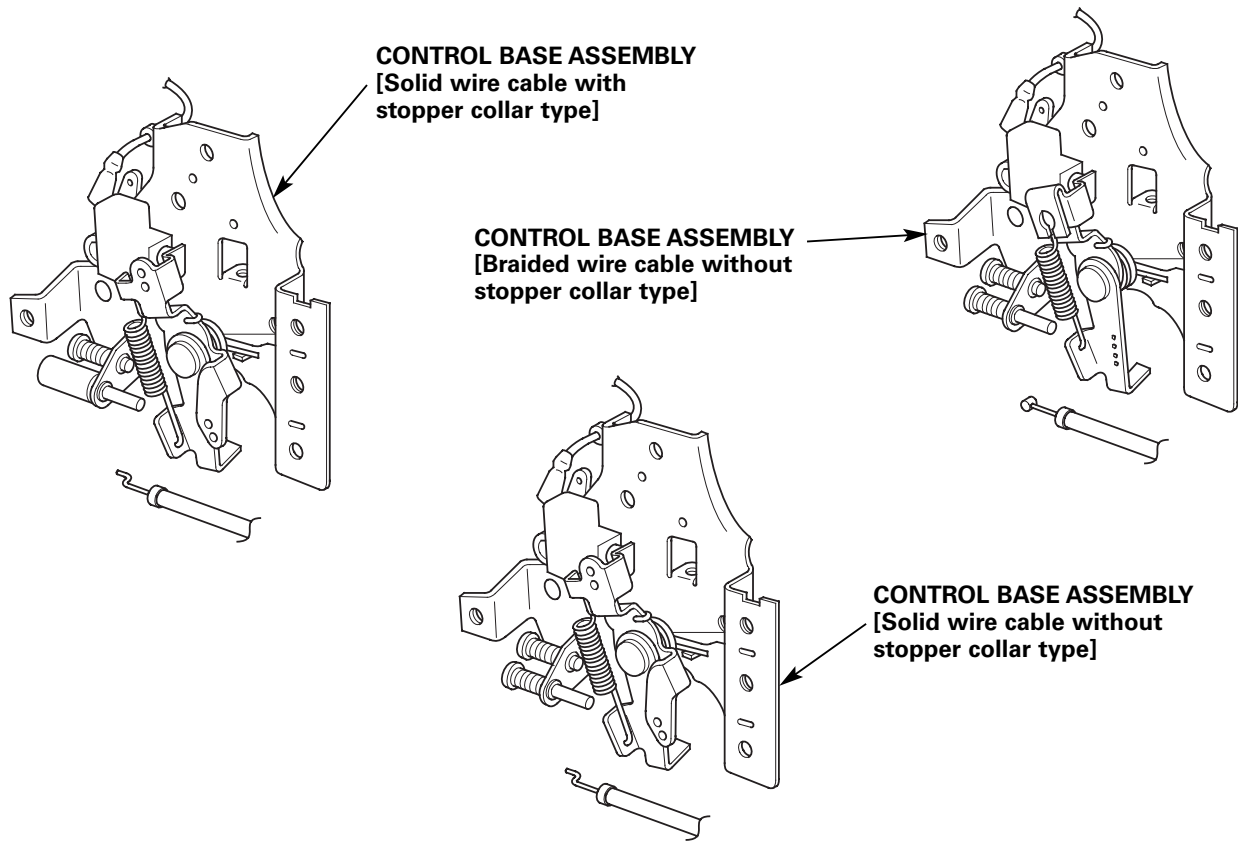
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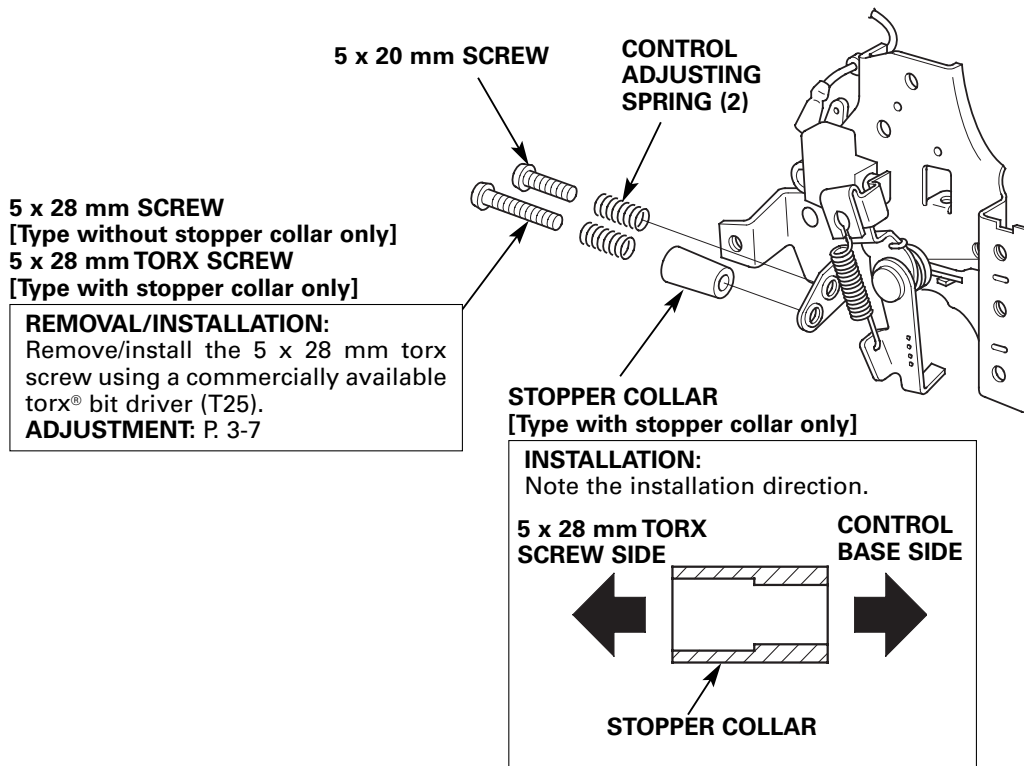
- Keep heat, sparks, and flame away.
- Handle fuel only outdoors.
- Wipe up spills immediately.

Remove the fuel tank (P. 6-2).





• CONTROL BASE DISASSEMBLY/REASSEMBLY



• CONTROL BASE ASSEMBLY

Solid wire cable type:

CONTROL LEVER POSITION IN "STOP"

Make sure that the control lever is depressing the engine stop switch knob.

CONTROL LEVER POSITION IN "SLOW"

Make sure that the control lever is not touching the engine stop switch knob.

CONTROL LEVER POSITION IN "FAST"

Make sure that the control lever is not depressing the choke lever and be sure to maintain a gap of 0.2 mm (0.008 in) between the choke lever and control lever.

ENGINE STOP SWITCH

CHOKE LEVER

CONTROL LEVER

CONTROL LEVER POSITION IN "CHOKE"

Make sure that the control lever pushes the choke lever up.

THROTTLE CABLE

To install the throttle cable at the upper side, install it through the upper hole in the control lever. To install the throttle cable at the lower side, install it through the lower hole in the control lever.

Braided wire cable type:

CONTROL LEVER POSITION IN "STOP"

Make sure that the control lever is depressing the engine stop switch knob.

CONTROL LEVER POSITION IN "SLOW"

Make sure that the control lever is not touching the engine stop switch knob.

CONTROL LEVER POSITION IN "FAST"

Make sure that the control lever is not depressing the choke lever and be sure to maintain a gap of 0.2 mm (0.008 in) between the choke lever and control lever.

ENGINE STOP SWITCH

CHOKE LEVER

CONTROL LEVER

CONTROL LEVER POSITION IN "CHOKE"

Make sure that the control lever pushes the choke lever up.

THROTTLE CABLE

Install the throttle cable as shown.

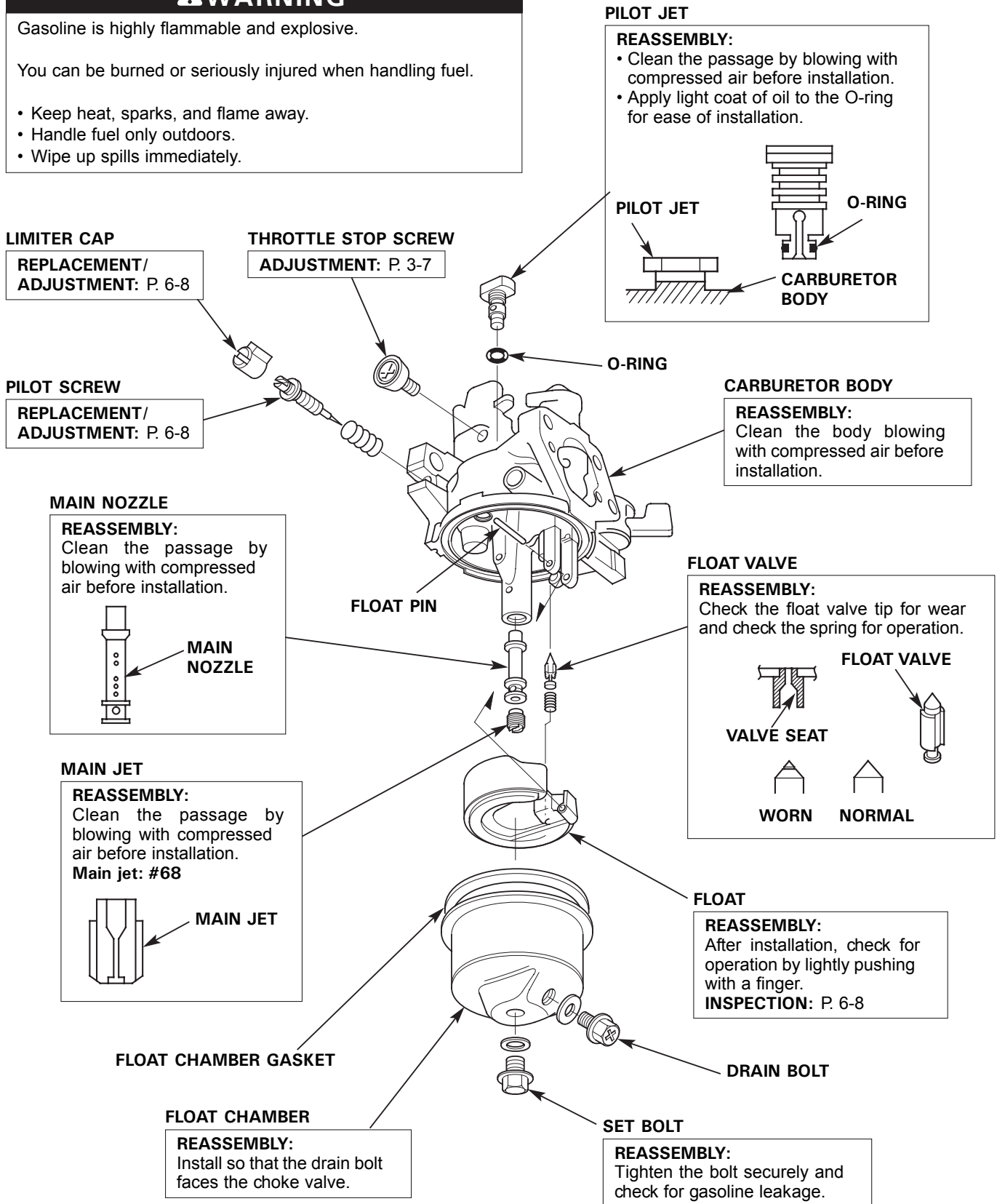
b. CARBURETOR DISASSEMBLY/REASSEMBLY

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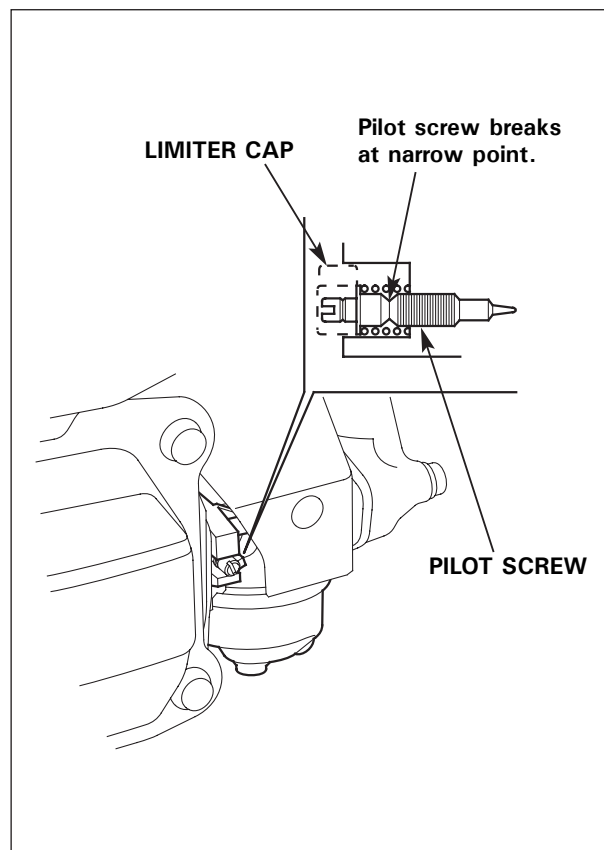
c. REPLACEMENT/ADJUSTMENT
• PILOT SCREW AND LIMITER CAP

Leave the pilot screw and limiter cap 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.

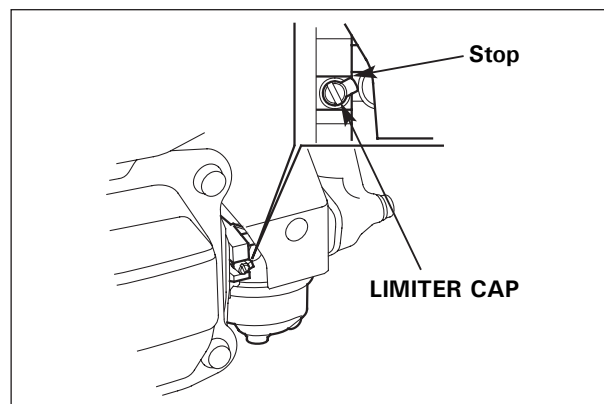
- 1) When the limiter cap has been broken off, remove the broken pilot screw from the carburetor body.
- 2) Place the spring on the replacement pilot screw, and install it on the carburetor.
- 3) Turn the pilot screw in until it is lightly seated, then turn the screw out the required number of turns.

Standard pilot screw opening	2-1/4 turns out
------------------------------	-----------------



- 4) Apply LOCTITE® 638 to the inside of the new limiter cap, then install the cap so its stop prevents the pilot screw from turning counterclockwise.

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



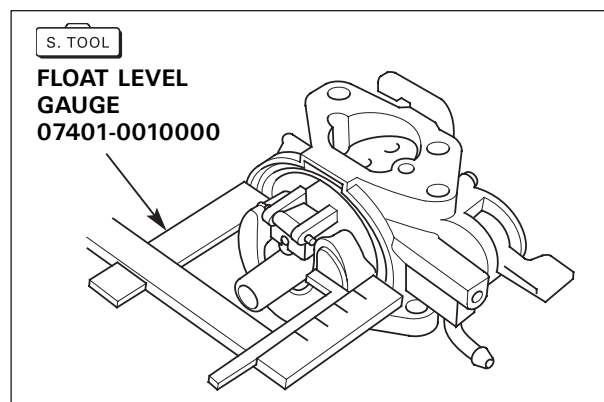
d. INSPECTION
• FLOAT LEVEL HEIGHT

Place the carburetor in the position as shown and measure the distance between the float top and carburetor body when the float just contacts the seat without compressing the valve spring.

Standard float height	13.7 mm (0.54 in)
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If the height is out of specification, replace the float and/or the float valve. Recheck the float height.

TOOL:
 Float level gauge 07401-0010000



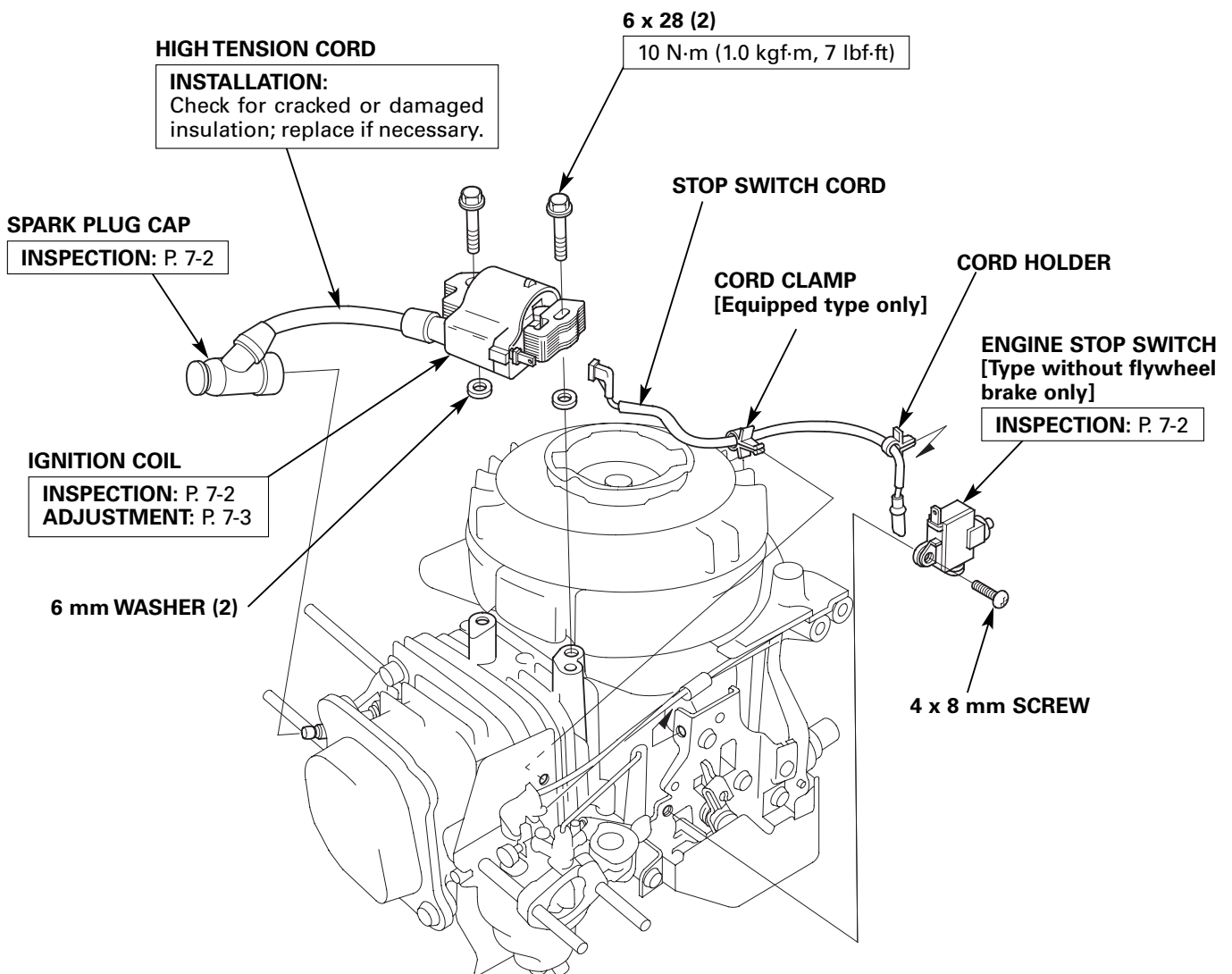
- 1. IGNITION COIL
- 2. FLYWHEEL

- 3. FLYWHEEL BRAKE [EQUIPPED TYPE ONLY]

1. IGNITION COIL

a. REMOVAL/INSTALLATION

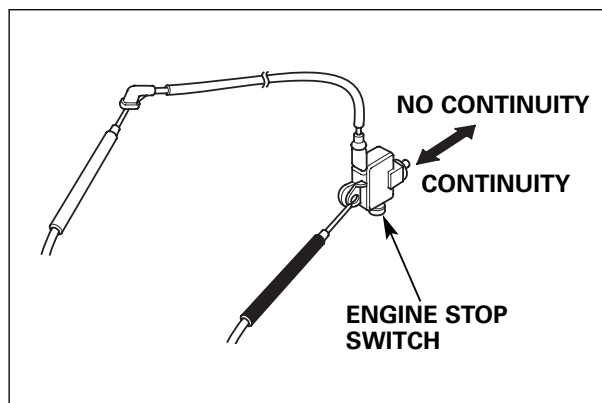
- 1) Remove the recoil starter and the fan cover (P. 5-1).
- 2) Remove the air cleaner (P. 6-1).



b. INSPECTION
• ENGINE STOP SWITCH

There should be continuity when the engine stop switch knob is pushed in. There should be no continuity when the knob is released.

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

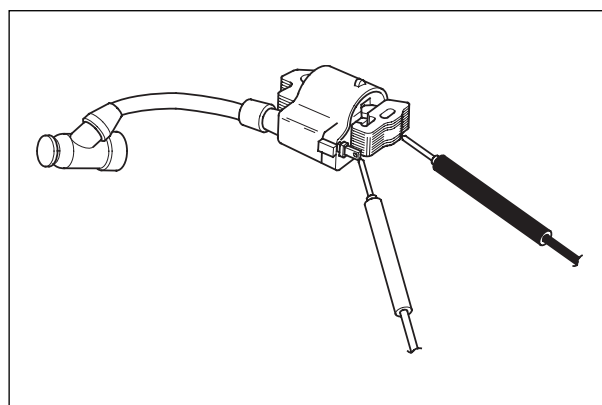


• IGNITION COIL

<Primary side>

Measure the resistance of the primary coil by attaching one ohmmeter lead to the ignition coil's primary terminal while touching the other test lead to the iron core.

Primary side resistance value	0.8 – 1.0 Ω
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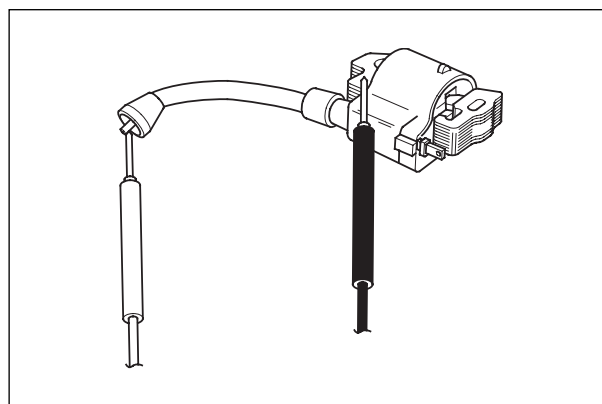
<Secondary side>

Measure the resistance of the secondary side of the coil with the spark plug cap removed, touching one test lead to the high tension cord while touching the other test lead to the coil's iron core.

Secondary side resistance value	5.9 – 7.2 kΩ
---------------------------------	--------------

NOTICE

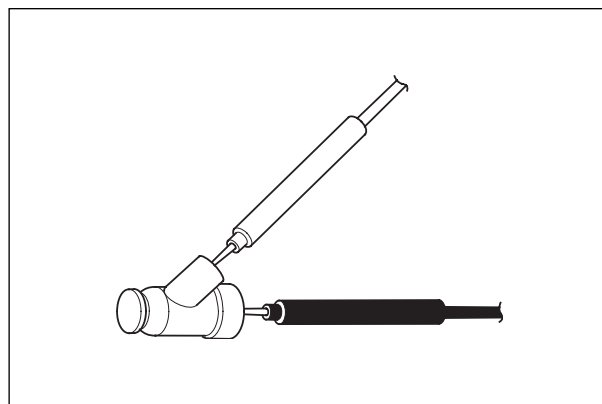
A false reading will result if the spark plug cap is not removed.



• SPARK PLUG CAP

Remove the spark plug cap from the high tension cord. Measure the resistance of the spark plug cap by attaching one ohmmeter lead to the wire end of the plug cap while touching the other test lead to the spark plug end.

Resistance	3.75 – 6.25 kΩ
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GXV160UH

c. ADJUSTMENT

• IGNITION COIL AIR GAP

Adjustment is required only when the ignition coil or the flywheel has been removed.

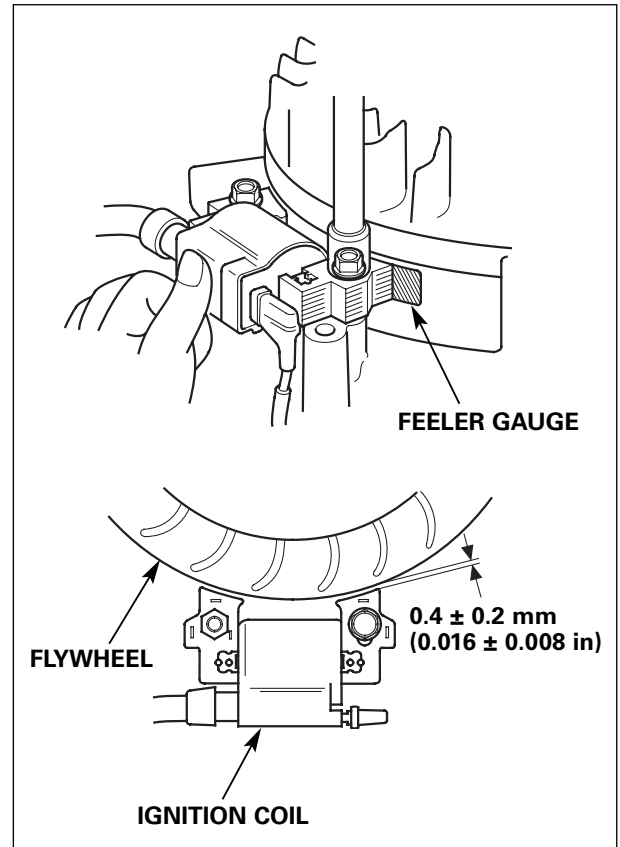
- 1) Loosen the ignition coil bolts.
- 2) Insert a long feeler gauge or a piece of paper of the proper thickness between the ignition coil and the flywheel. Both gaps should be adjusted simultaneously.
- 3) Press the ignition coil firmly toward the flywheel and tighten the bolts.

Specified clearance	0.4 ± 0.2 mm (0.016 ± 0.008 in)
---------------------	--

NOTICE

Avoid the magnet part of the flywheel when adjusting.

TORQUE: 10 N·m (1.0 kgf·m, 7 lbf·ft)



2. FLYWHEEL

a. REMOVAL/INSTALLATION

NOTICE

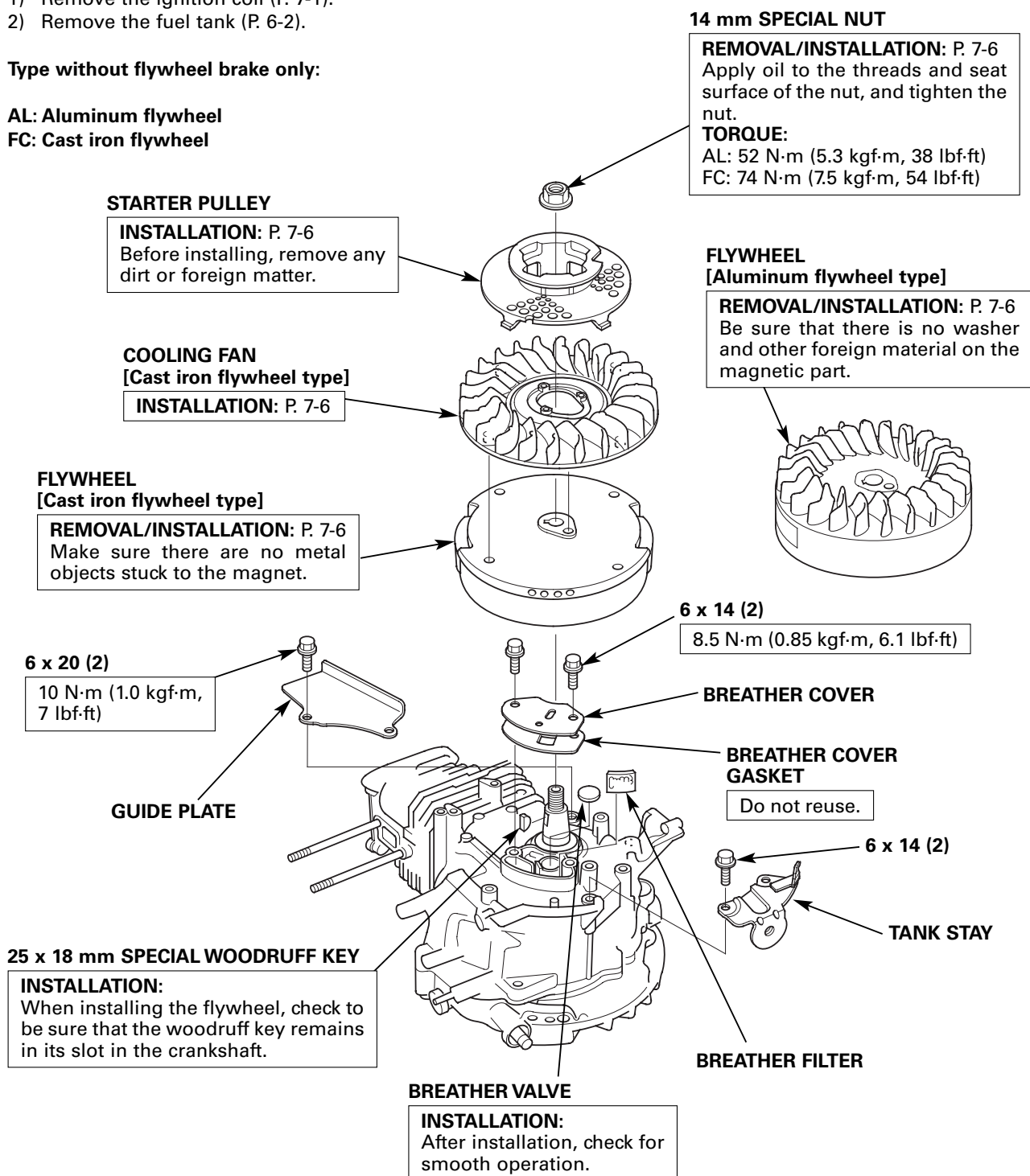
Take care not to damage the fan blades during removal and installation of the flywheel.

- 1) Remove the ignition coil (P. 7-1).
- 2) Remove the fuel tank (P. 6-2).

Type without flywheel brake only:

AL: Aluminum flywheel

FC: Cast iron flywheel



GXV160UH

Type equipped with flywheel brake only:

14 mm SPECIAL NUT

REMOVAL/INSTALLATION: P. 7-6
Apply oil to the threads and seat surface of the nut, and tighten the nut.
TORQUE:
52 N·m (5.3 kgf·m, 38 lbf·ft)

STARTER PULLEY

INSTALLATION: P. 7-6
Before installing, remove any dirt or foreign matter.

FLYWHEEL

[Aluminum flywheel]

REMOVAL/INSTALLATION: P. 7-6
Make sure there are no metal objects stuck to the magnet.

6 x 14 (2)

8.5 N·m (0.85 kgf·m, 6.1 lbf·ft)

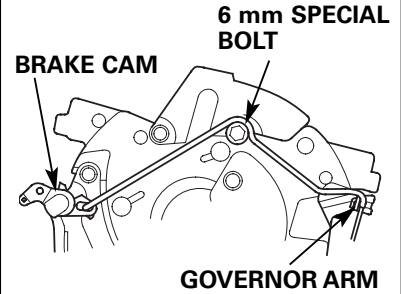
BREATHER COVER

BREATHER COVER GASKET

Do not reuse.

THROTTLE RETURN ROD

INSTALLATION:
Check for correct installation and operation.



6 mm SPECIAL BOLT

6 x 14

TANK STAY

BREATHER VALVE

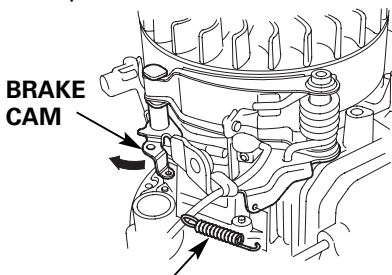
INSTALLATION:
Check for damage. Replace if necessary.

BREATHER FILTER

BRAKE RETURN SPRING

REMOVAL:

Disconnect the brake return spring from the brake cam, then rotate the cam to force the shoe away from the flywheel.



BRAKE RETURN SPRING

FLYWHEEL BRAKE

DISASSEMBLY/ REASSEMBLY: P. 7-7

25 x 18 mm SPECIAL WOODRUFF KEY

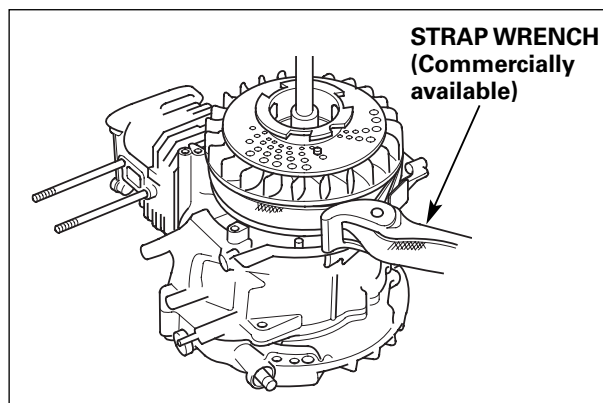
INSTALLATION:

When installing the flywheel, check to be sure that the woodruff key remains in its slot in the crankshaft.

• **14 mm SPECIAL NUT/STARTER PULLEY/
COOLING FAN [Cast iron flywheel type only]/
FLYWHEEL**

REMOVAL:

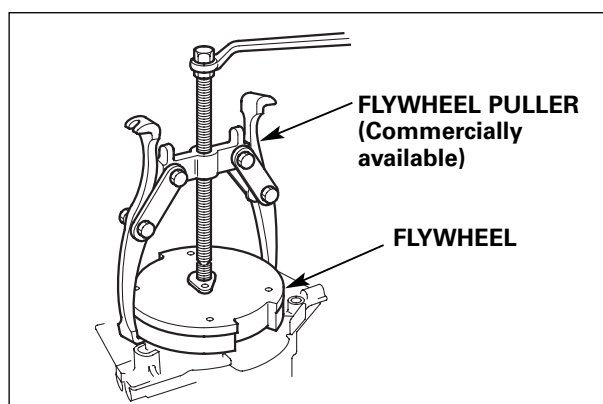
- 1) Holding the flywheel with a commercially available strap wrench, remove the 14 mm special nut.
- 2) Remove the starter pulley and cooling fan.



- 3) Remove the flywheel with a commercially available flywheel puller as shown.

NOTICE

- Do not hit the flywheel with a hammer.
- Avoid the magnet section when attaching the puller.



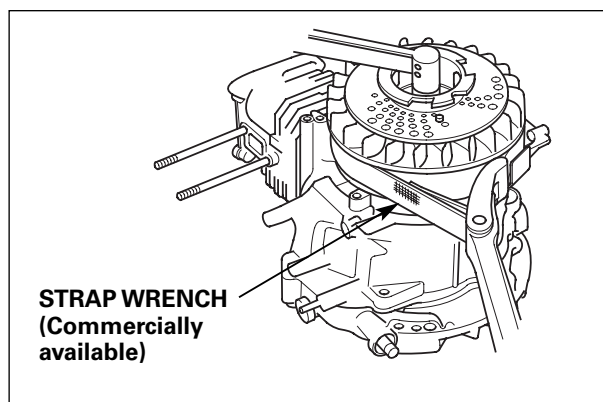
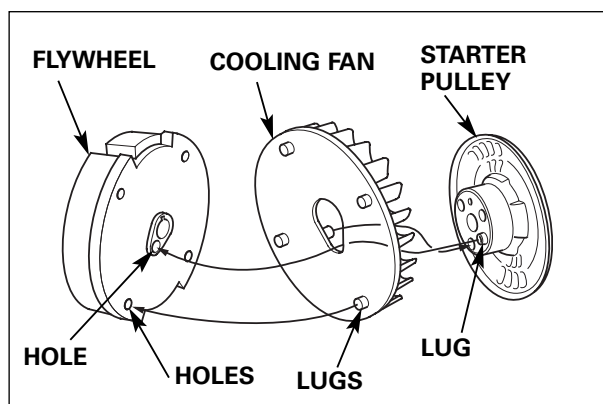
INSTALLATION:

- 1) Clean the tapered part of dirt, oil, grease and other foreign material before installation. Make sure there are no metal objects stuck to the magnet.
- 2) Set the 25 x 18 mm special woodruff key in the key groove securely (P. 7-4 and 5).
- 3) Install the flywheel over the crankshaft.

NOTICE

The flywheel may push the key out of its slot; check after installation.

- 4) Attach the cooling fan by aligning the four lugs on the rear side of the cooling fan with the four small holes in the flywheel [Cast iron flywheel type only].
- 5) Attach the starter pulley by aligning the lug on the rear side of the starter pulley with the small hole at the center of the flywheel.
- 6) Apply a light coat of oil to the threads and the seating surface of the 14 mm special nut, and install the nut loosely.
- 7) Holding the flywheel with a commercially available strap wrench, tighten the 14 mm special nut to the specified torque.



TORQUE:

AL: 52 N·m (5.3 kgf·m, 38 lbf·ft)

FC: 74 N·m (7.5 kgf·m, 54 lbf·ft)

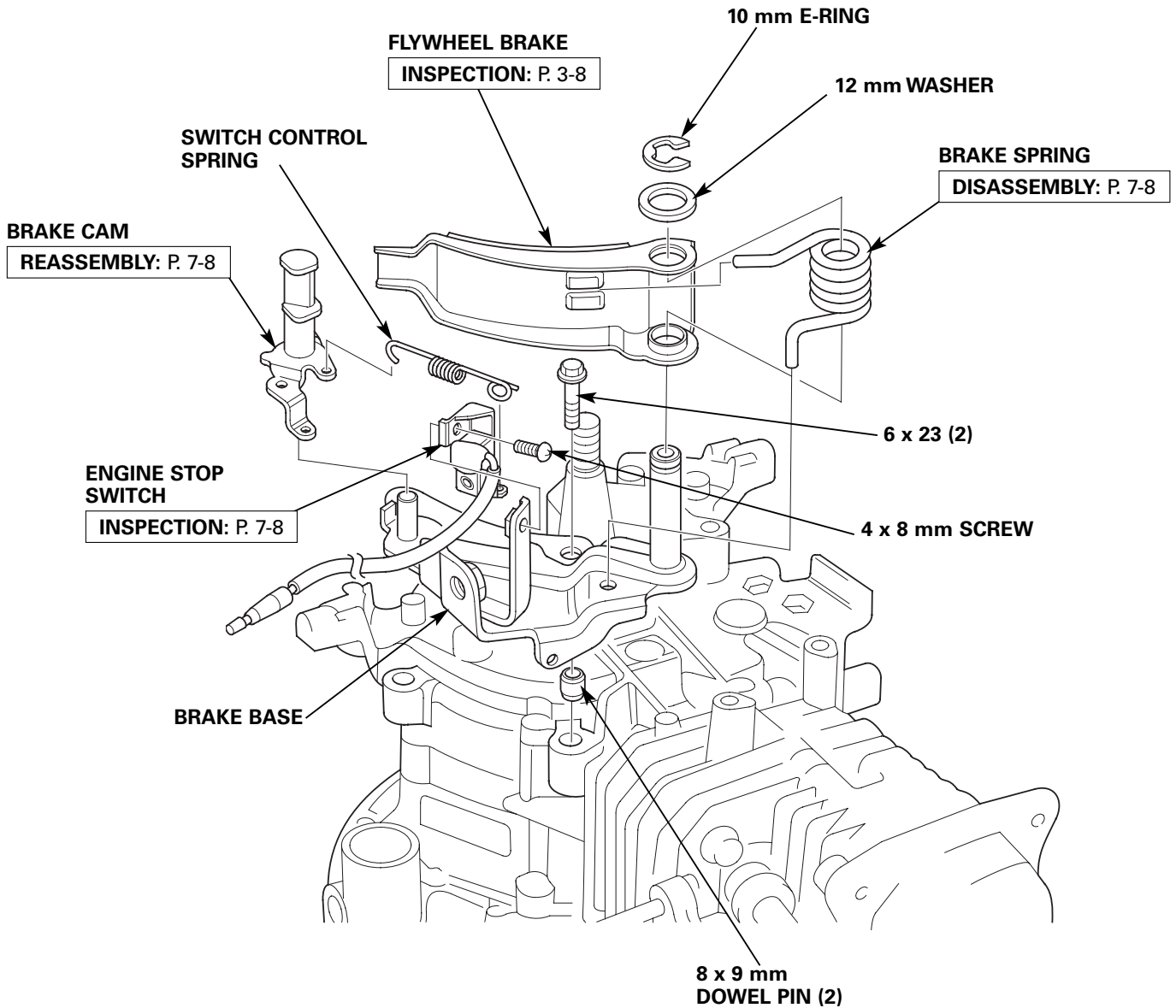
AL: Aluminum flywheel

FC: Cast iron flywheel

3. FLYWHEEL BRAKE [EQUIPPED TYPE ONLY]

a. DISASSEMBLY/REASSEMBLY

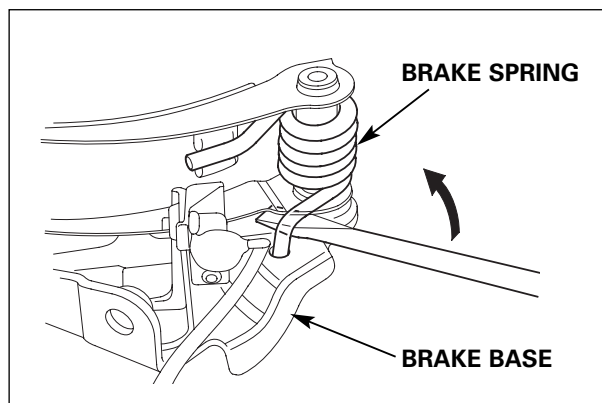
Remove the flywheel (P. 7-4).



• BRAKE SPRING

DISASSEMBLY:

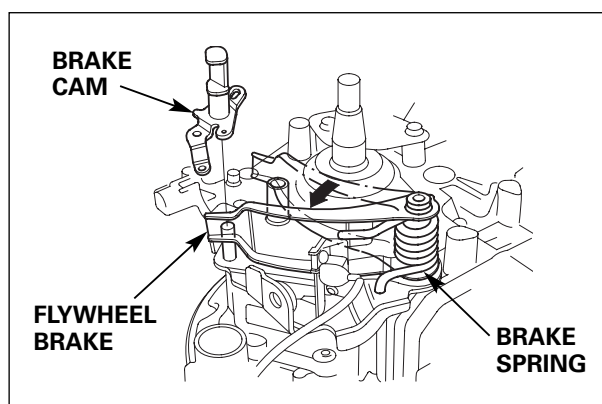
Remove the brake base first (P. 7-7). After removing the 10 mm E-ring and 12 mm washer, pry the lower end of the spring out of the base with a screwdriver.



• BRAKE CAM

REASSEMBLY:

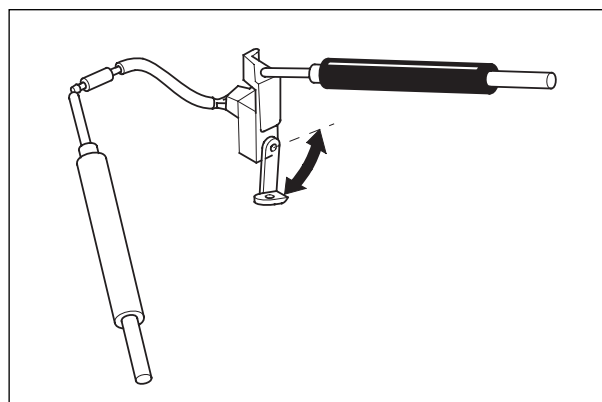
With the brake base installed, insert the lower end of the spring in the retaining hole. Install the brake cam while pulling the shoe out clear of the brake cam as shown.



b. INSPECTION

• ENGINE STOP SWITCH

There should be no continuity when the arm is moved fully counterclockwise, against its spring tension. There should be continuity when the arm is released and its spring moves the arm fully clockwise. Replace the engine stop switch if the correct continuity test results are not obtained.



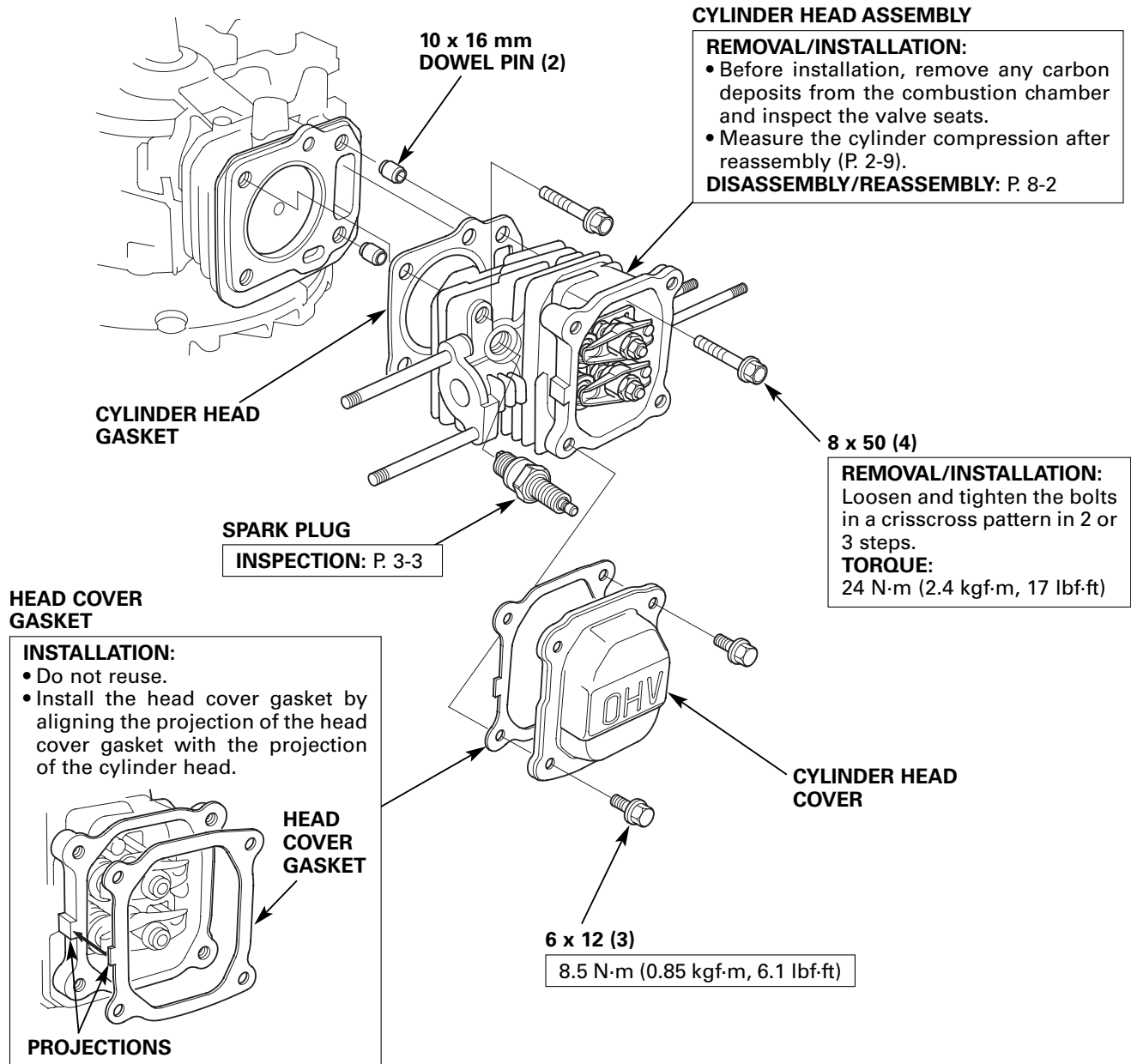
1. CYLINDER HEAD
2. VALVES
3. INSPECTION

4. VALVE GUIDE REPLACEMENT
5. VALVE SEAT RECONDITIONING

1. CYLINDER HEAD

a. REMOVAL/INSTALLATION

- 1) Remove the muffler (P. 4-1).
- 2) Remove the air cleaner (P. 6-1).
- 3) Remove the recoil starter and the fan cover (P. 5-1).
- 4) Remove the ignition coil (P. 7-1).
- 5) Remove the fuel tank (P. 6-2).
- 6) Remove the carburetor and control base (P. 6-4).



2. VALVES

a. DISASSEMBLY/REASSEMBLY

INTAKE VALVE

REASSEMBLY:

- Do not interchange with the exhaust valve.
- Before installation, remove carbon deposits and inspect the valve.

VALVE HEAD DIAMETER:

IN: 25 mm (0.98in)

EX: 24 mm (0.94in)

- Be careful not to damage the valve stem when installing.

INSPECTION: P.8-3

CYLINDER HEAD

REASSEMBLY:

- Before installation, remove carbon deposits from the combustion chamber.

INSPECTION: P.8-4

PUSH ROD (2)

REASSEMBLY:

- Check both ends for wear and check the rod for straightness. Be sure the rod ends are **firmly** seated in the lifters.

PUSH ROD GUIDE

ROCKER ARM PIVOT BOLT (2)

24 N•m (2.4 kgf-m, 17 lbf-ft)

ROCKER ARM (2)

REASSEMBLY:

- Before installing, check for wear on the surfaces that contact the pivot bolt, the push rod, and the rocker arm pivot.

ROCKER ARM PIVOT (2)

ROCKER ARM PIVOT LOCK NUT (2)

10 N•m (1.0 kgf-m, 7 lbf-ft)

EXHAUST VALVE

REASSEMBLY:

- Before installation, remove carbon deposits and inspect the valve.

INSPECTION: P.8-3

INTAKE VALVE GUIDE

REPLACEMENT: P. 8-5

EXHAUST VALVE GUIDE

REPLACEMENT: P. 8-5

REASSEMBLY:

- Clips are necessary on the EX side only.

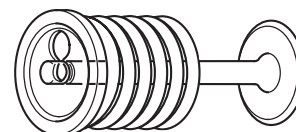
VALVE SPRING (2)

INSPECTION: P.8-3

VALVE SPRING RETAINER (2)

REASSEMBLY:

- Push down on the valve spring and move the retainer to the side so that the valve stem slips through the side hole.



Do not remove the valve spring retainers while the cylinder head is attached to the cylinder, or the valves will drop into the cylinder.

VALVE STEM SEAL
[Intake valve only]

VALVE GUIDE CLIP
[Exhaust valve only]

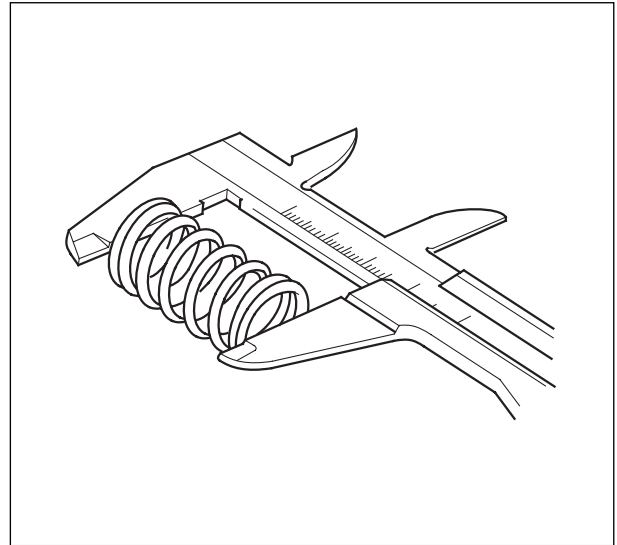
3. INSPECTION

• **VALVE SPRING FREE LENGTH**

Measure the free length of the valve springs.

Standard	Service limit
34.0 mm (1.339 in)	32.5 mm (1.280 in)

Replace the springs if they are shorter than the service limit.



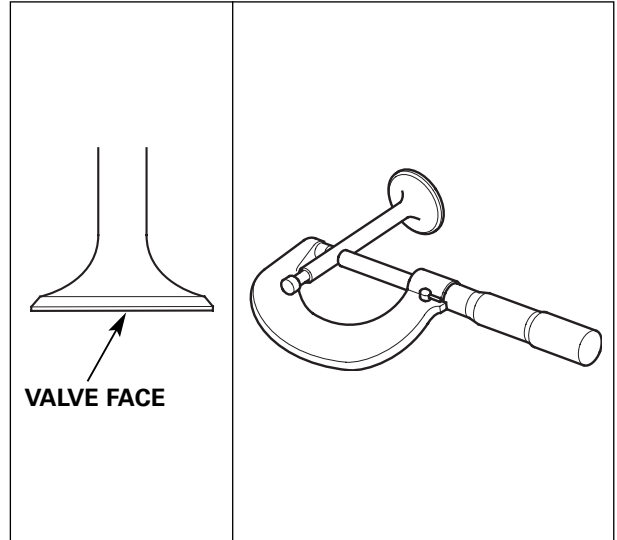
• **VALVE FACE/STEM O.D.**

Inspect each valve face for pitting or wear irregularities. Inspect each valve stem for bending or abnormal stem wear. Replace the valve if necessary.

Measure and record each valve stem O.D.

	Standard	Service limit
IN	5.468 – 5.480 mm (0.2153 – 0.2157 in)	5.318 mm (0.2094 in)
EX	5.435 – 5.450 mm (0.2140 – 0.2146 in)	5.275 mm (0.2077 in)

Replace the valves if their O.D. is smaller than the service limit.



• **VALVE GUIDE I.D.**

Using the valve guide reamer (special tool), ream the valve guides to remove any carbon deposits before measuring.

TOOL:

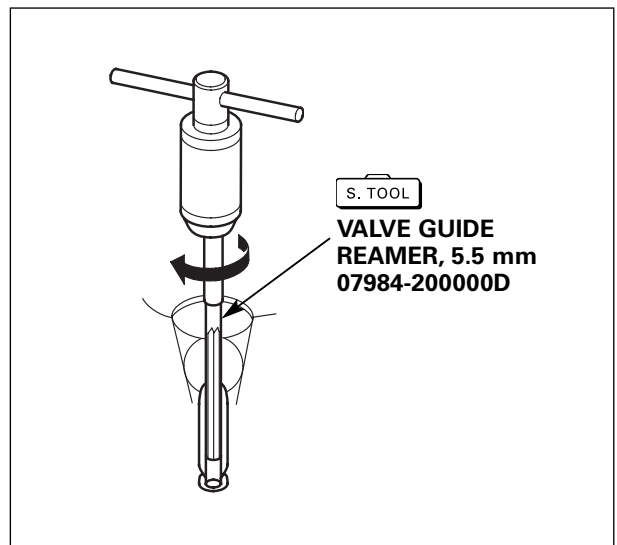
Valve guide reamer, 5.5 mm

07984-20000D

Measure and record each valve guide I.D.

	Standard	Service limit
IN/EX	5.500 – 5.512 mm (0.2165 – 0.2170 in)	5.562 mm (0.2190 in)

Replace the guides if they are over the service limit (P. 8-5).



• VALVE STEM-TO-GUIDE CLEARANCE

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

	Standard	Service limit
IN	0.020 – 0.044 mm (0.0008 – 0.0017 in)	0.10 mm (0.004 in)
EX	0.050 – 0.077 mm (0.0020 – 0.0030 in)	0.12 mm (0.005 in)

If the stem-to-guide clearance exceeds the service limit, determine if the new guide with standard dimensions would bring the clearance within tolerance. If so, replace any guide as necessary and ream to fit. If the stem-to-guide clearance exceeds the service limit with new guides, replace the valves as well.

Recondition the valve seats whenever the valve guides are replaced (P. 8-5).

• VALVE SEAT WIDTH

Measure the valve seat width.

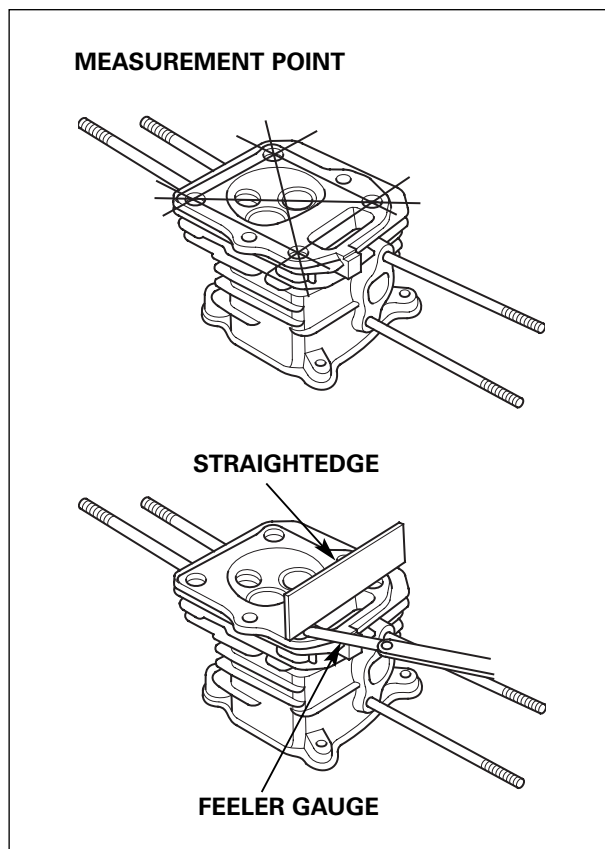
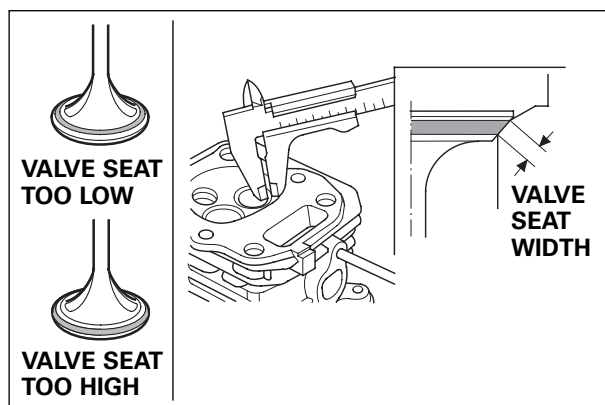
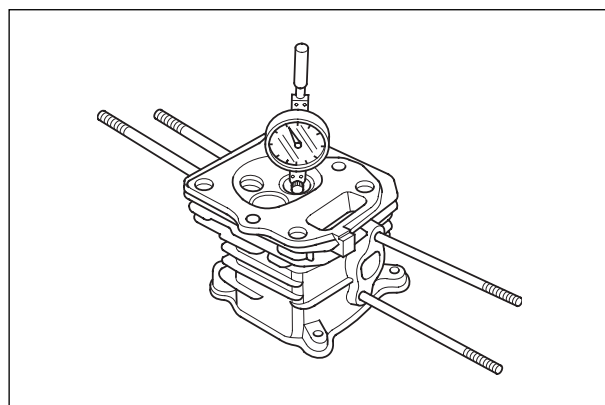
	Standard	Service limit
IN/EX	0.8 mm (0.03 in)	2.0 mm (0.08 in)

If the valve seat width is under the standard, or over the service limit, or if the valve seat is too high/low, recondition the valve seat (P. 8-7).

• CYLINDER HEAD

- 1) Remove the carbon deposits from the combustion chamber.
Clean off any gasket material from the cylinder head surface.
- 2) Check the spark plug hole and valve areas for cracks.
- 3) Check the cylinder head for warpage using a straightedge and a feeler gauge.

Service limit	0.10 mm (0.004 in)
---------------	--------------------



4. VALVE GUIDE REPLACEMENT

- 1) Chill the replacement valve guides in the freezer section of a refrigerator for about an hour.
- 2) Use a hot plate or oven to heat the cylinder head evenly to 150°C (300°F).

CAUTION

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

NOTICE

- Do not use a torch to heat the cylinder head; warpage of the cylinder head may result.
- Do not heat the head to a temperature greater than 150°C (300°F); excessive heat may loosen the valve seats.

- 3) Remove the heated cylinder head from the hot plate and support it with wooden blocks. Drive the valve guides out of the head from the combustion chamber side.

NOTICE

When driving the valve guides out, be careful not to damage the head.

SPECIAL TOOL:

Valve guide driver, 5.5 mm **07942-8920000**

- 4) Remove the new valve guides from the freezer one at a time as needed.

- 5) Install the new valve guides from the valve spring side of the cylinder head.

SPECIAL TOOL:

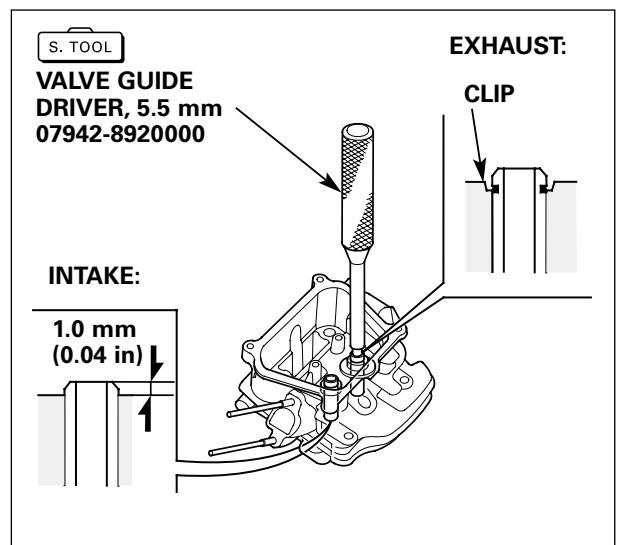
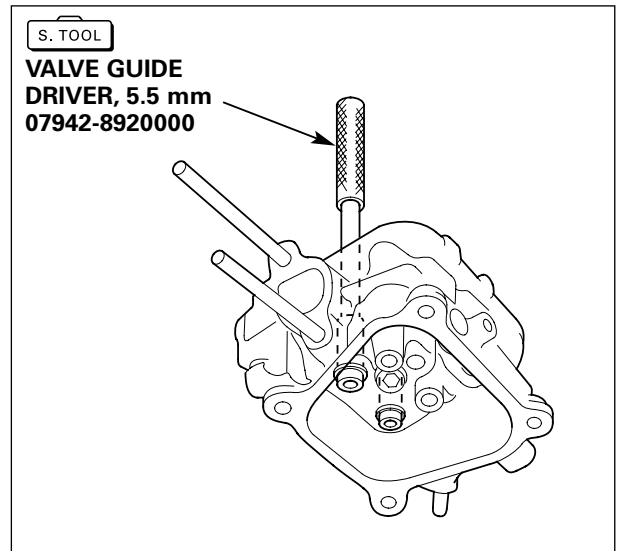
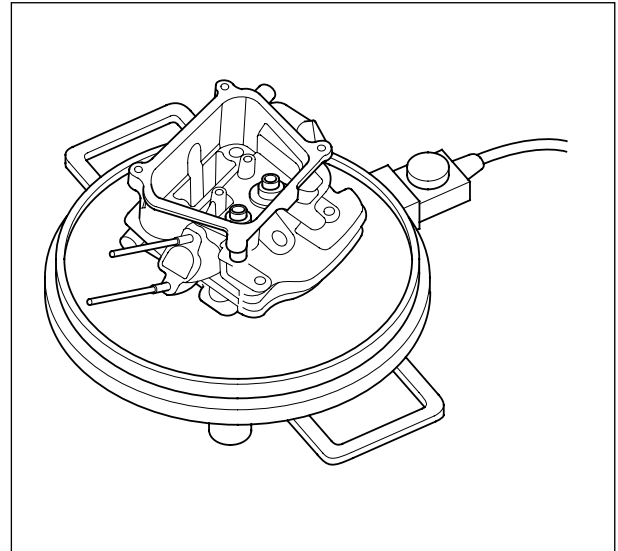
Valve guide driver, 5.5 mm **07942-8920000**

Exhaust side: Drive the exhaust valve guide until the clip is fully seated as shown.

Intake side: Drive the intake valve guide to the specified height (measured from the top of the valve guide to the cylinder head casting as shown).

IN valve guide installation height	1.0 mm (0.04 in)
------------------------------------	------------------

- 6) After installation, inspect the valve guide for damage. Replace the guide if damaged.



• VALVE GUIDE REAMING

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

- 1) Coat the reamer and valve guide with cutting oil.
- 2) Rotate the reamer clockwise through the valve guide the full length of the reamer.
- 3) Continue to rotate the reamer clockwise while removing it from the valve guide.

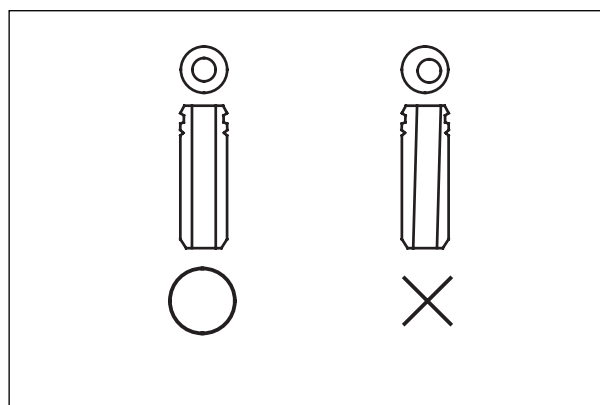
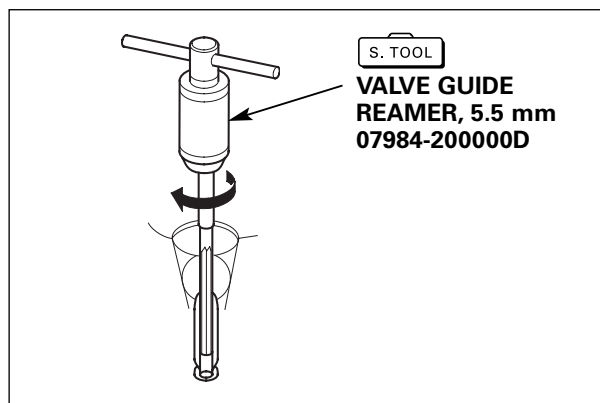
SPECIAL TOOL:

Valve guide reamer, 5.5 mm **07984-20000D**

NOTICE

Turn the special tool (valve guide reamer, 5.5 mm) clockwise; never turn it counterclockwise. Continue to turn it clockwise as you lift it from the valve guide.

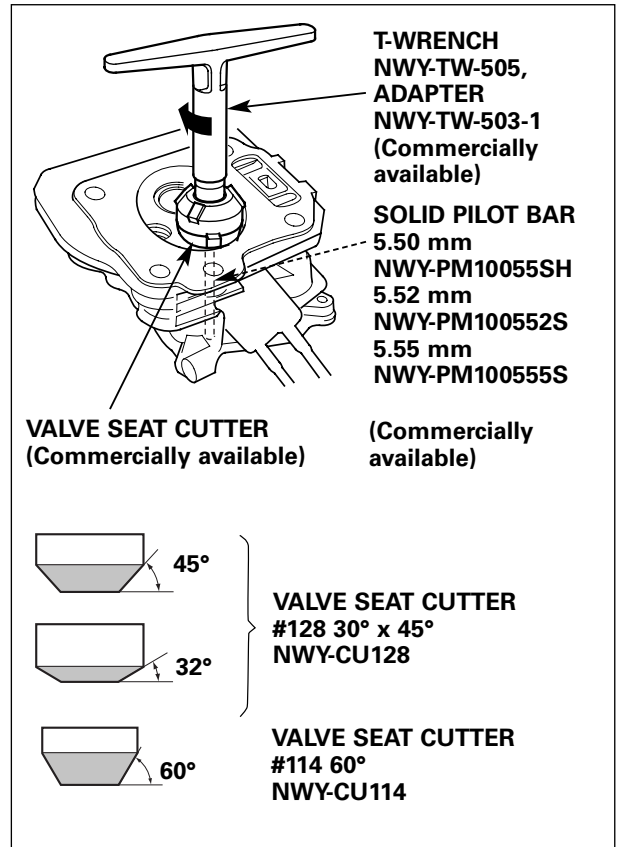
- 4) Thoroughly clean the cylinder head to remove any cutting residue.
- 5) Check the valve guide bore; it should be straight, round, and centered in the valve guide. Insert the valve and check operation. If the valve does not operate smoothly, the guide may have been bent during installation. Replace the valve guide if it is bent or damaged.
- 6) Check the valve guide-to-stem clearance (P. 8-4).



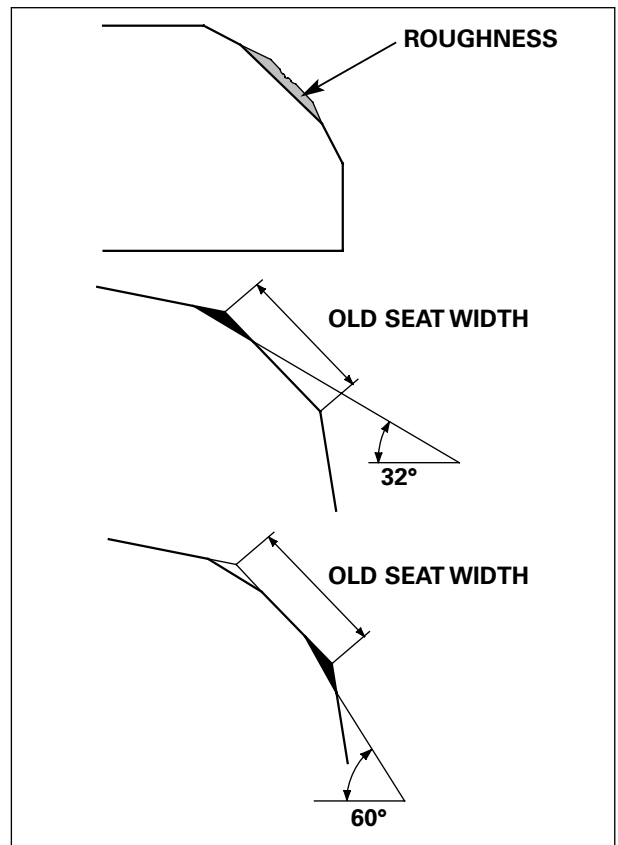
5. VALVE SEAT RECONDITIONING

Recondition the valve seat using valve seat cutters, T-wrench, and solid pilot bar, 5.5 (commercially available).

Follow the instructions of the valve seat cutter manufacturer.

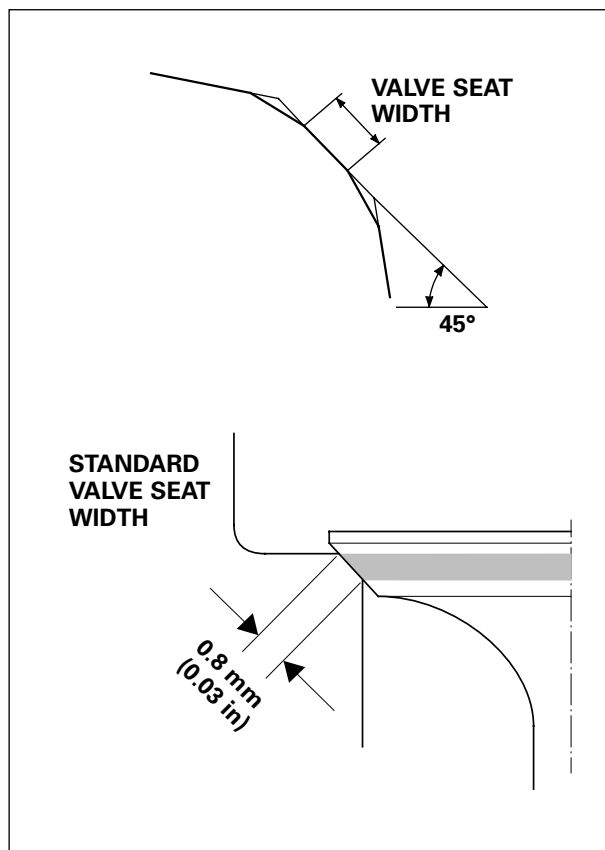


- 1) Remove enough material to produce a smooth surface using the 45° cutter.
- 2) Using the 32° flat cutter, remove 1/4 of the existing valve seat material.
- 3) Using the 60° interior cutter, remove 1/4 of the existing valve seat material.



4) Using the 45° seat cutter, cut the seat to the proper width.

Standard	Service limit
0.8 mm (0.03 in)	2.0 mm (0.08 in)

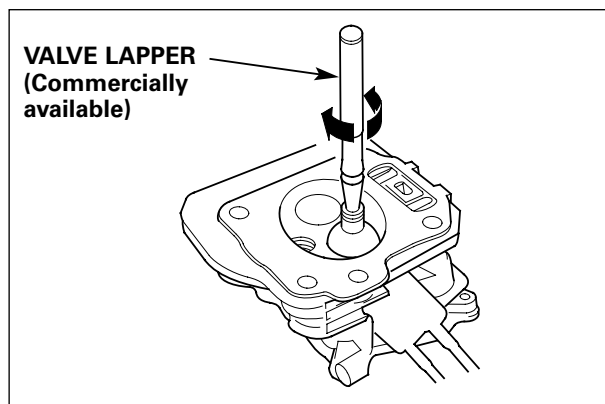


5) After reconditioning the valve seat, apply a light coat of lapping compound and lap the valve using the valve lapper (commercially available).

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.

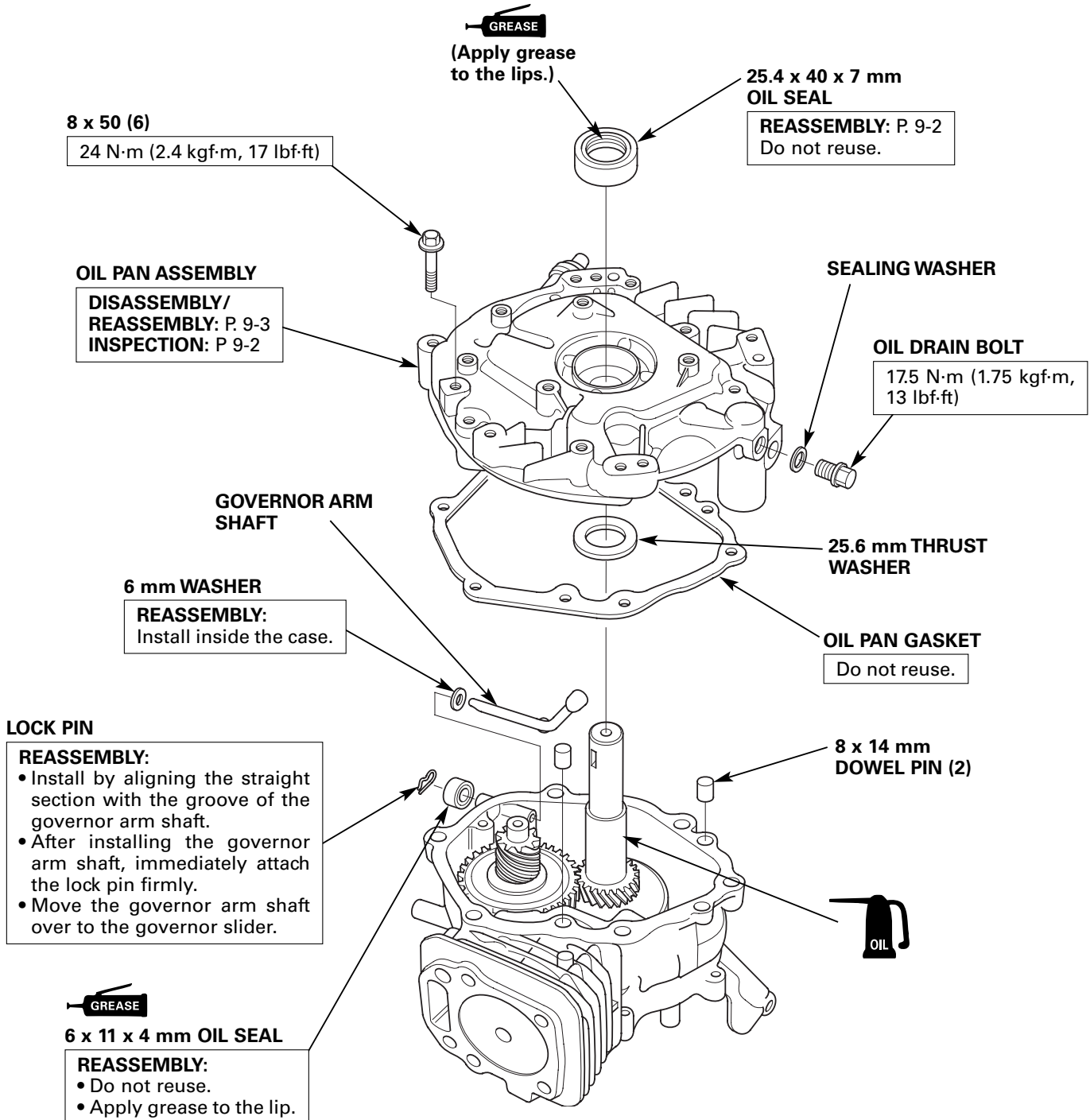
6) After lapping, clean the cylinder head and valves. Recheck the valve seat contact condition (P. 8-4).



1. OIL PAN	2. DRIVE SHAFT [EQUIPPED TYPE ONLY]/GOVERNOR
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1. OIL PAN

a. DISASSEMBLY/REASSEMBLY



• 25.4 x 40 x 7 mm OIL SEAL

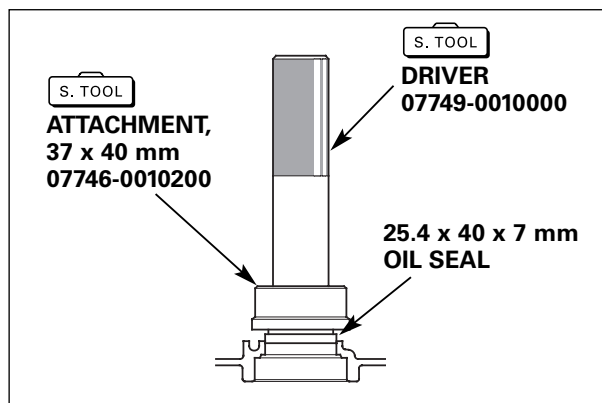
REASSEMBLY:

- 1) Apply oil to the circumference of a new oil seal.
- 2) Install the new oil seal in the oil pan using the special tools.

TOOLS:

Driver 07749-0010000
 Attachment, 37 x 40 mm 07746-0010200

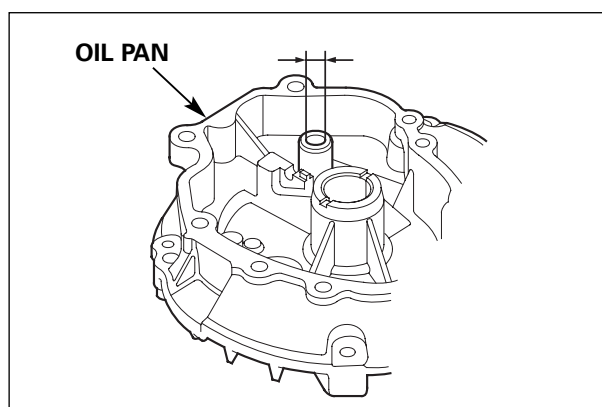
- 3) After installation, apply grease to the lip.



b. INSPECTION

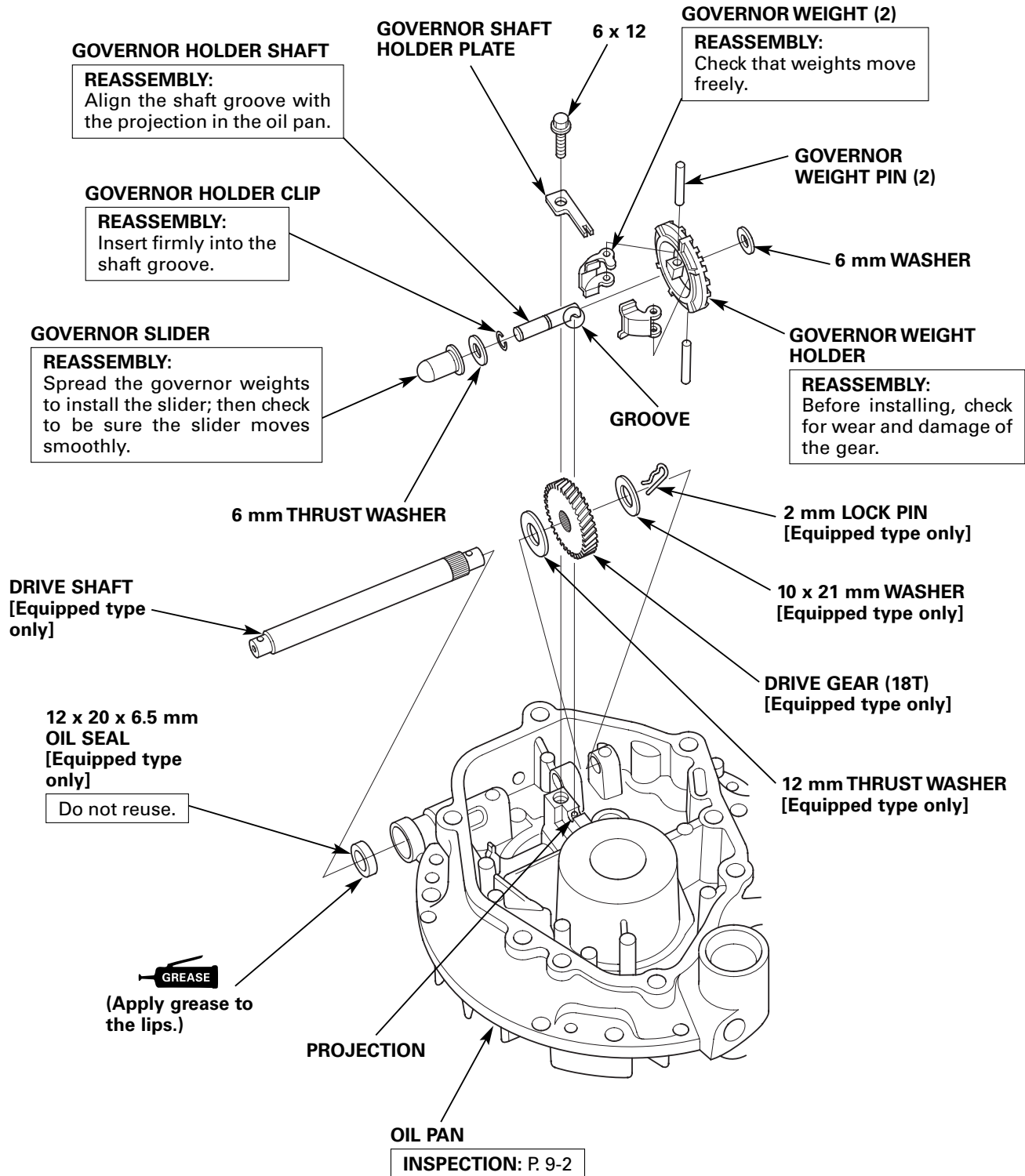
• CAMSHAFT HOLDER I.D.

Standard	Service limit
14.0 mm (0.55 in)	14.048 mm (0.5531 in)



2. DRIVE SHAFT [EQUIPPED TYPE ONLY]/GOVERNOR

a. DISASSEMBLY/REASSEMBLY



10. CRANKSHAFT/CAMSHAFT/PISTON

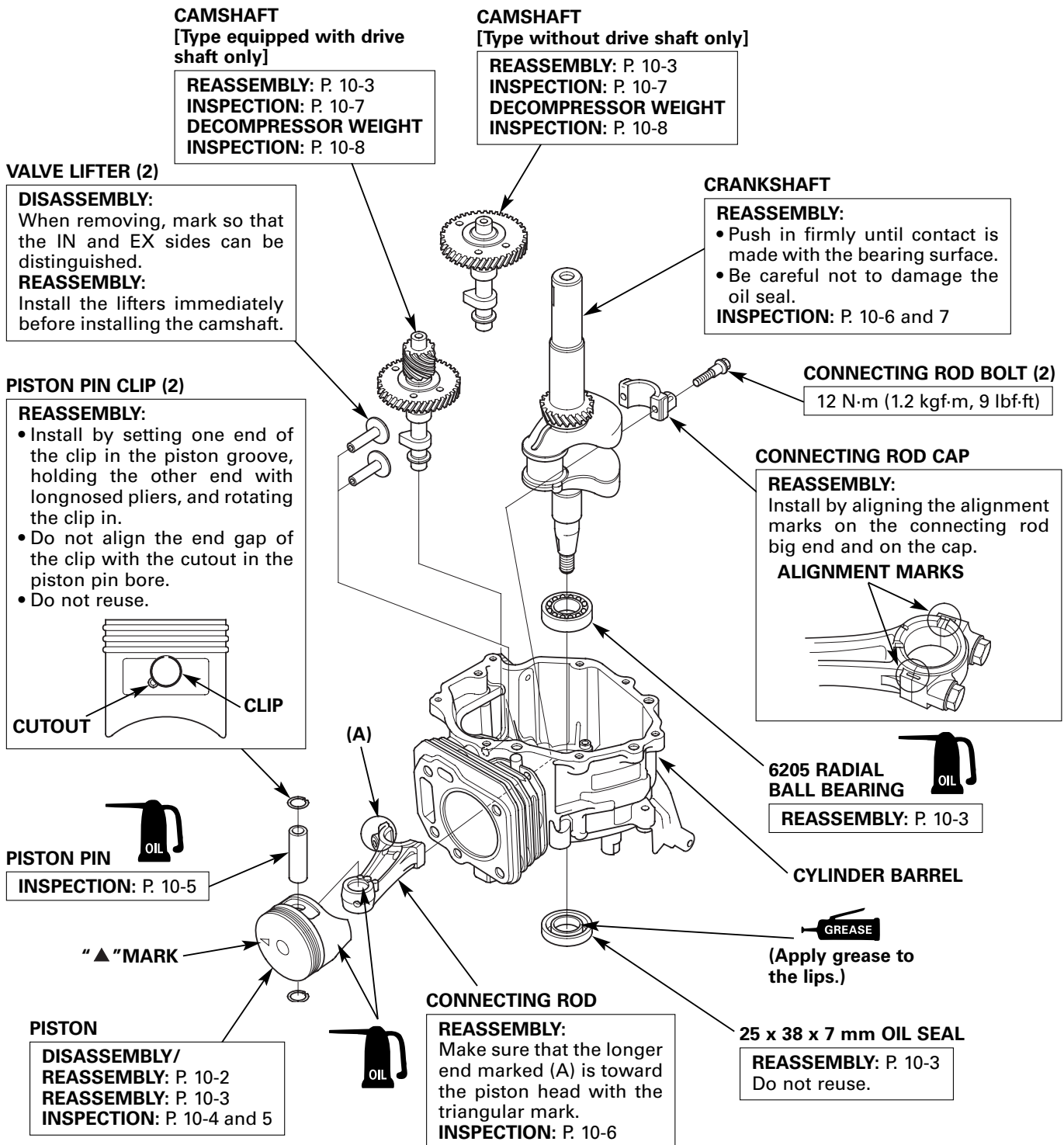
GXV160UH

1. CRANKSHAFT/CAMSHAFT/PISTON

2. INSPECTION

1. CRANKSHAFT/CAMSHAFT/PISTON

a. DISASSEMBLY/REASSEMBLY



• PISTON

DISASSEMBLY/REASSEMBLY:

PISTON RINGS

INSPECTION: P. 10-4 and 5

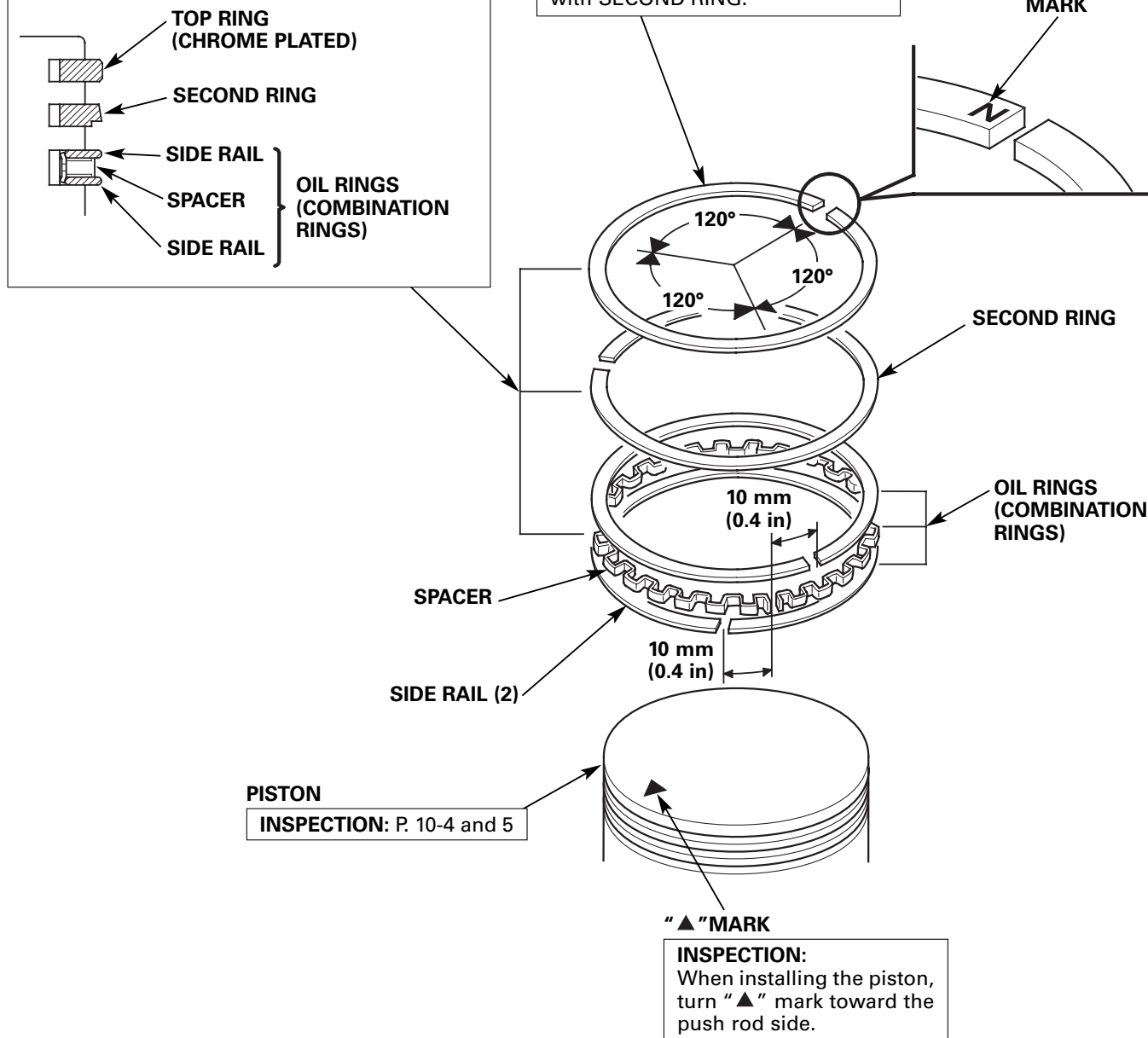
REASSEMBLY:

- Install with the mark facing upward as shown.
- Do not interchange the top ring and the second ring.
- After assembly, check for smooth movement of the piston ring.
- Stagger the piston ring end gaps 120° apart. Do not align with the piston pin.
- Space the side rail end gaps at least 10 mm (0.4 in) apart. Coat the oil ring with oil after assembly.

TOP RING

REASSEMBLY:

Chrome plated. Do not interchange with SECOND RING.



GXV160UH

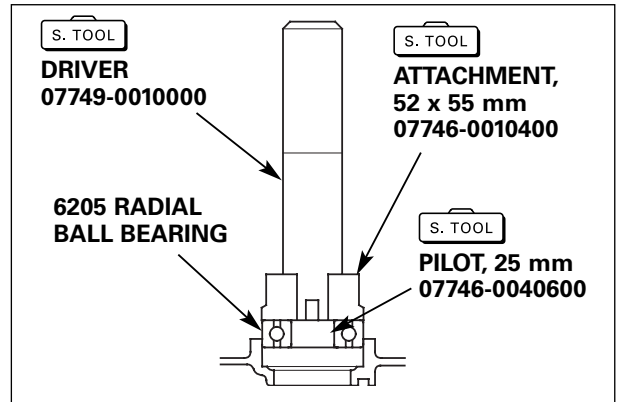
• 6205 RADIAL BALL BEARING (CRANKSHAFT BEARING)

REASSEMBLY:

- 1) Apply oil to the circumference of a new ball bearing.
- 2) Drive the ball bearing in the cylinder barrel using the special tools.

TOOLS:

Driver **07749-0010000**
Attachment, 52 x 55 mm **07746-0010400**
Pilot, 25 mm **07746-0040600**



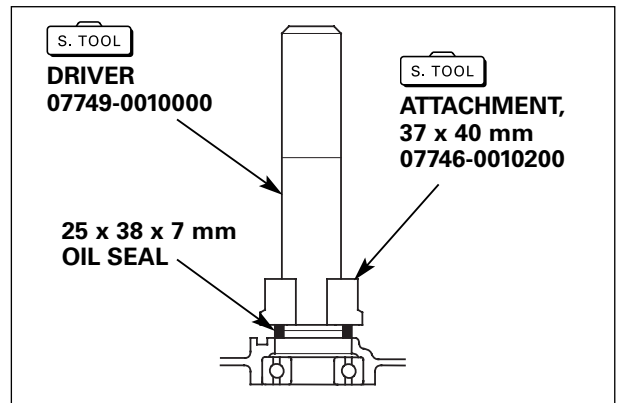
• 25 x 38 x 7 mm OIL SEAL

REASSEMBLY:

- 1) Apply oil to the circumference of a new oil seal.
- 2) Install the new oil seal in the cylinder barrel using the special tools.

TOOLS:

Driver **07749-0010000**
Attachment, 37 x 40 mm **07746-0010200**

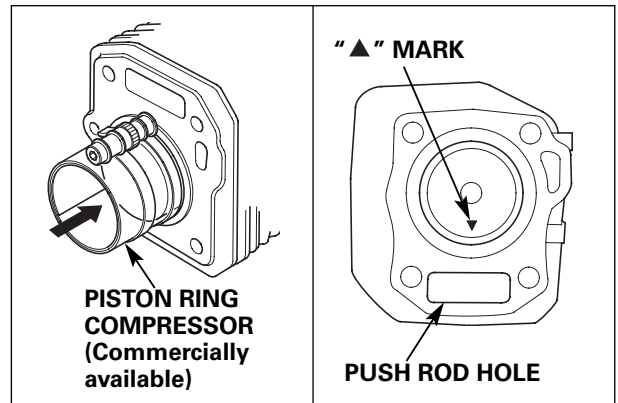


- 3) After installation, apply grease to the lip.

• PISTON

REASSEMBLY:

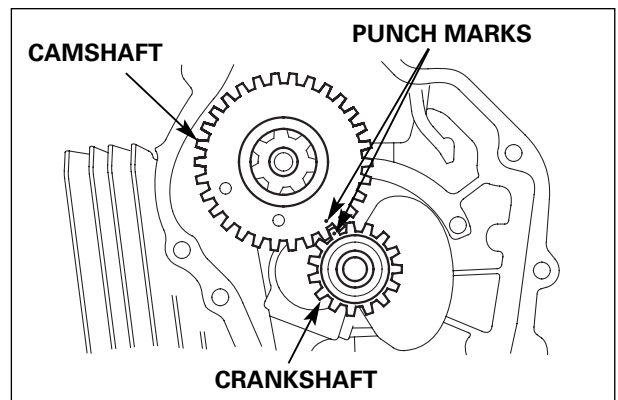
- 1) Apply oil to the piston and cylinder.
- 2) Using a commercially available piston ring compressor, install the piston with the "▲" mark on the piston head toward the push rod hole side.



• CAMSHAFT (VALVE TIMING)

REASSEMBLY:

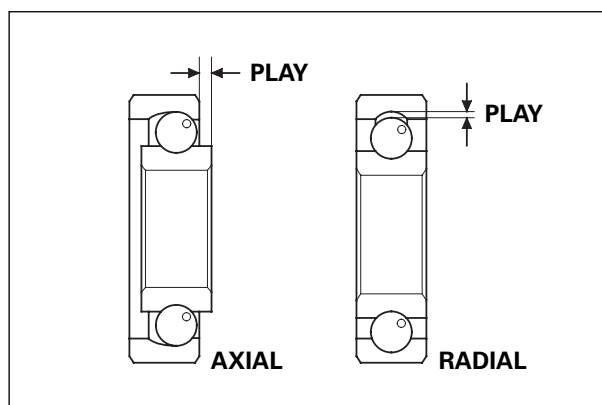
With the crankshaft in place, align the timing punch mark on the cam gear with the punch mark on the crankshaft's cam drive gear.



2. INSPECTION

• CRANKSHAFT BEARING FREE PLAY

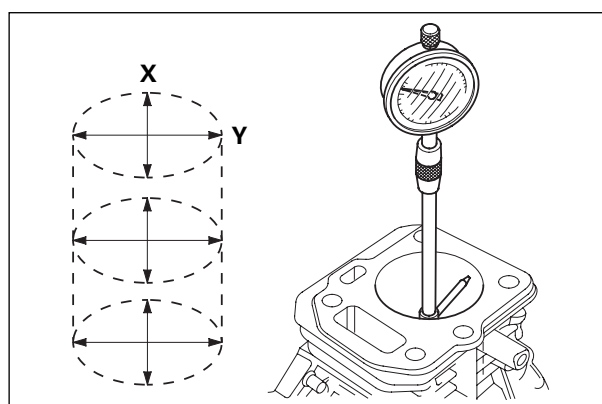
- 1) Clean the bearing in solvent and dry it.
- 2) Spin the bearing by hand and check for play. Replace the bearing if it is noisy or has excessive play.



• CYLINDER SLEEVE I.D.

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

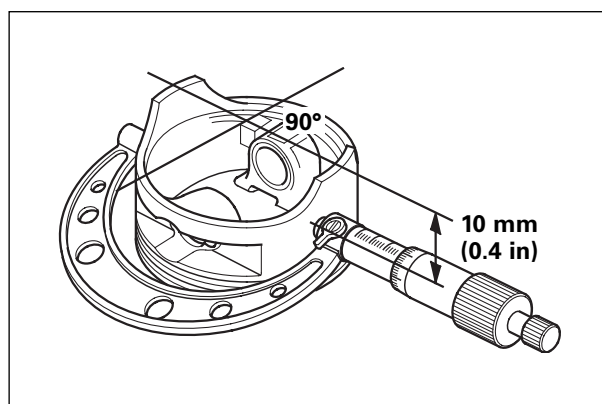
Standard	Service limit
68.0 mm (2.68 in)	68.165 mm (2.6837 in)



• PISTON O.D.

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

Standard	Service limit
67.985 mm (2.6766 in)	67.845 mm (2.6711 in)



• PISTON-TO-CYLINDER CLEARANCE

Standard	Service limit
0.015 – 0.050 mm (0.0006 – 0.0020 in)	0.12 mm (0.005 in)

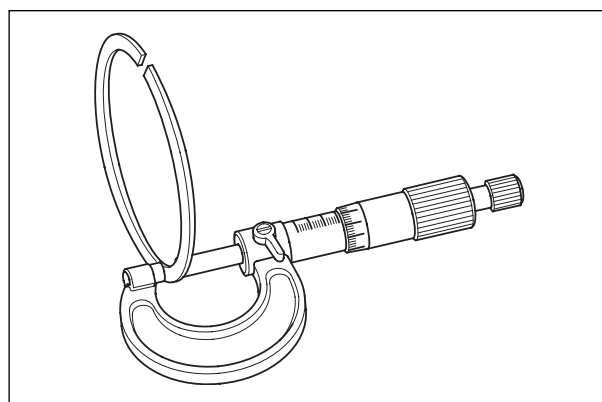
• PISTON RING WIDTH

GXV160UH2: Up to GJABH-1036455

	Standard	Service limit
Top/second	1.5 mm (0.06 in)	1.37 mm (0.054 in)

GXV160UH2: GJABH-1036456 and subsequent

	Standard	Service limit
Top	0.95 – 0.97 mm (0.037 – 0.038 in)	0.93 mm (0.037 in)
Second	0.94 – 0.96 mm (0.037 – 0.038 in)	0.92 mm (0.036 in)



GXV160UH

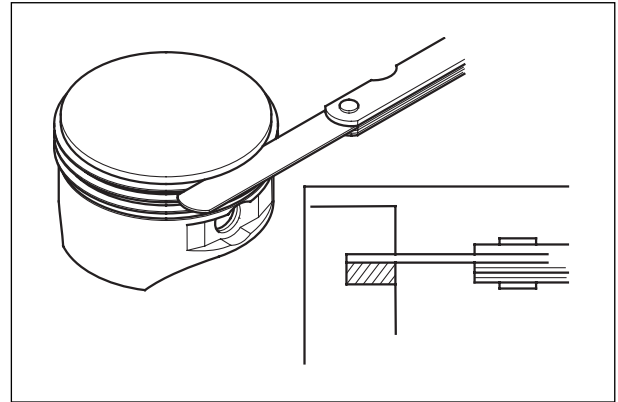
• PISTON RING SIDE CLEARANCE

GXV160UH2: Up to GJABH-1036455

	Standard	Service limit
Top/second	0.030 – 0.065 mm (0.0012 – 0.0023 in)	0.15 mm (0.006 in)

GXV160UH2: GJABH-1036456 and subsequent

	Standard	Service limit
Top	0.035 – 0.070 mm (0.0014 – 0.0028 in)	0.15 mm (0.006 in)
Second	0.045 – 0.080 mm (0.0018 – 0.0031 in)	0.15 mm (0.006 in)



• PISTON RING END GAP

Before measurement, be sure to set the ring in the cylinder securely using the piston.

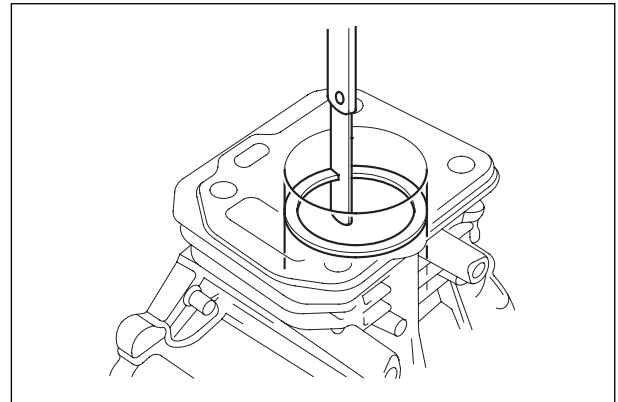
GXV160UH2: Up to GJABH-1036455

	Standard	Service limit
Top/second	0.2 – 0.4 mm (0.008 – 0.016 in)	1.0 mm (0.04 in)

GXV160UH2: GJABH-1036456 and subsequent

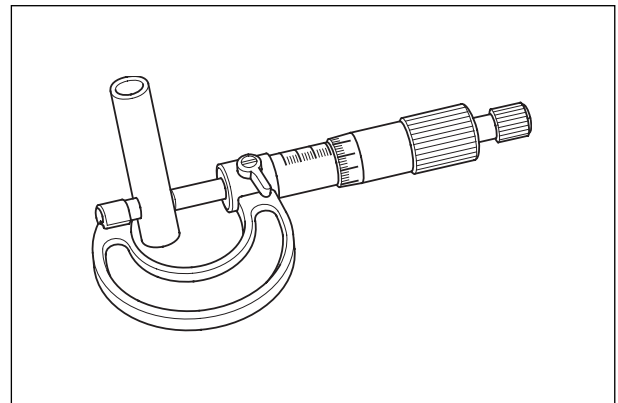
	Standard	Service limit
Top	0.20 – 0.35 mm (0.008 – 0.014 in)	1.0 mm (0.04 in)
Second	0.35 – 0.50 mm (0.014 – 0.020 in)	1.0 mm (0.04 in)
Oil (side rail)	0.20 – 0.70 mm (0.008 – 0.028 in)	1.0 mm (0.04 in)

If the measurement is too large, install a new piston ring and measure again. Then, measure the cylinder sleeve I.D. (P. 10-4).



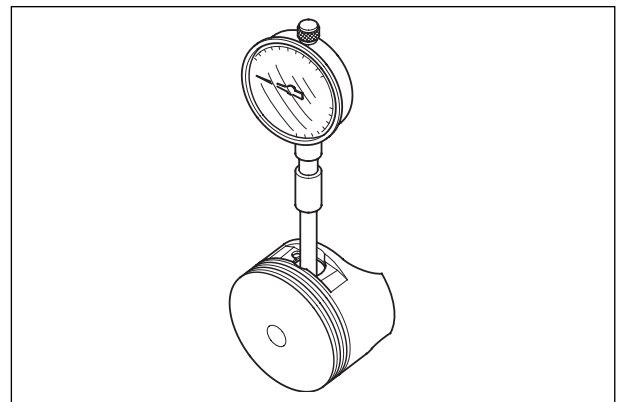
• PISTON PIN O.D.

Standard	Service limit
17.994 – 18.000 mm (0.7084 – 0.7087 in)	17.954 mm (0.7068 in)



• PISTON PIN BORE I.D.

Standard	Service limit
18.002 – 18.008 mm (0.7087 – 0.7090 in)	18.048 mm (0.7105 in)

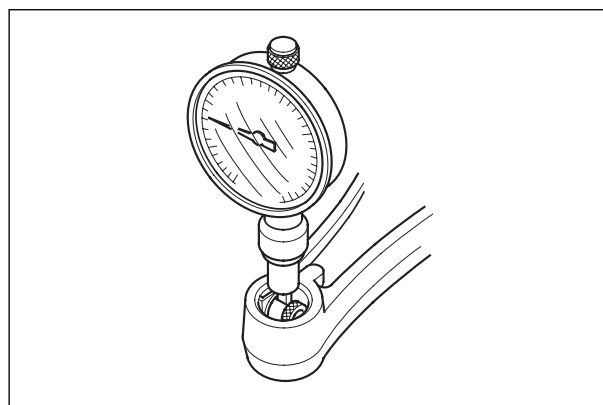


• PISTON PIN-TO-PISTON PIN BORE CLEARANCE

Standard	Service limit
0.002 – 0.014 mm (0.0001 – 0.0006 in)	0.08 mm (0.003 in)

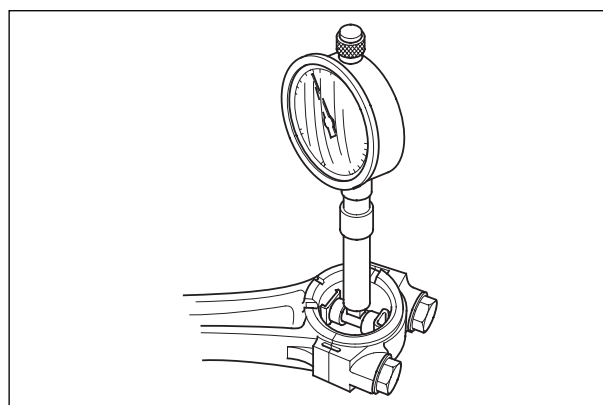
• **CONNECTING ROD SMALL END I.D.**

Standard	Service limit
18.005 – 18.020 mm (0.7089 – 0.7094 in)	18.052 mm (0.7107 in)



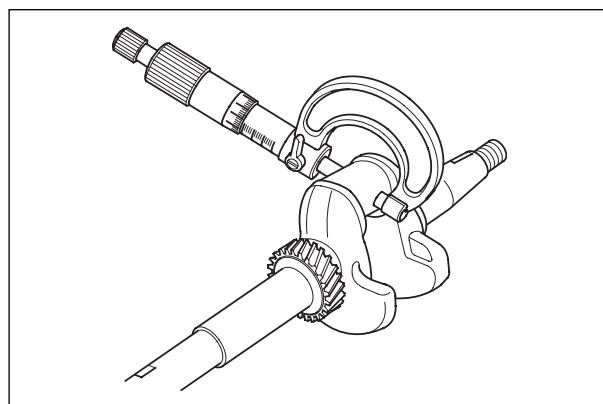
• **CONNECTING ROD BIG END I.D.**

Standard	Service limit
30.020 – 30.033 mm (1.1819 – 1.1824 in)	30.066 mm (1.1837 in)



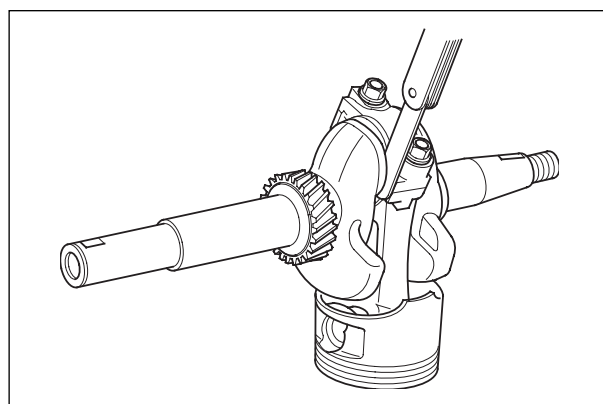
• **CRANK PIN O.D.**

Standard	Service limit
29.970 – 29.980 mm (1.1799 – 1.1803 in)	29.92 mm (1.1780 in)



• **CONNECTING ROD BIG END SIDE CLEARANCE**

Standard	Service limit
0.1 – 0.7 mm (0.004 – 0.028 in)	1.1 mm (0.043 in)



GXV160UH

• CONNECTING ROD BIG END OIL CLEARANCE

- 1) Wipe oil off the crank pin and connecting rod bearing mating surface.
- 2) Place the plastigauge on the crank pin. Set the connecting rod and cap, and tighten the connecting rod bolts to the specified torque.

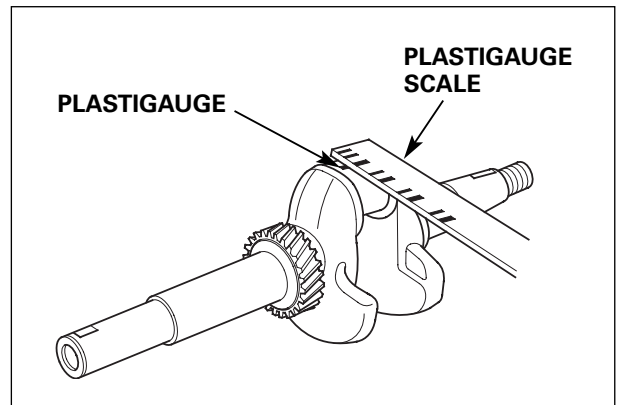
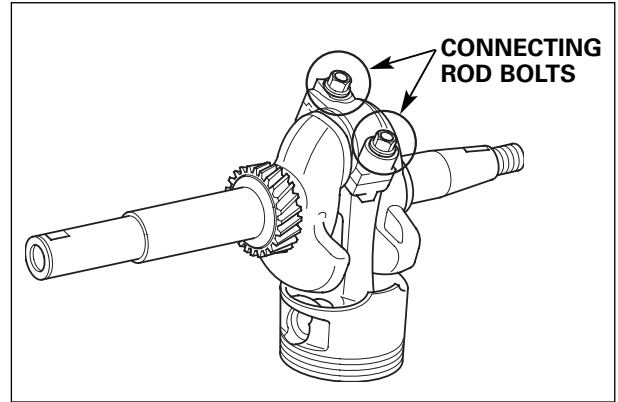
TORQUE: 12 N·m (1.2 kgf·m, 9 lbf·ft)

NOTICE

- Place the plastigauge axially.
 - Tighten the two bolts equally while holding the crankshaft to keep it from turning.
- 3) Remove the connecting rod cap and measure the plastigauge with the scale.

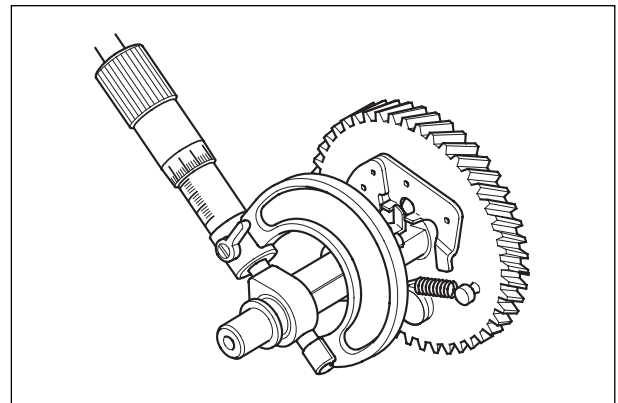
Standard	Service limit
0.040 – 0.063 mm (0.0016 – 0.0025 in)	0.12 mm (0.005 in)

- 4) If the clearance exceeds the service limit, replace the connecting rod and recheck the clearance.



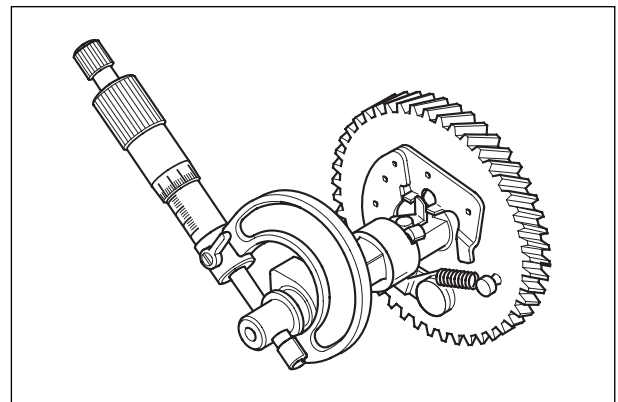
• CAMSHAFT CAM HEIGHT

	Standard	Service limit
IN	27.70 mm (1.091 in)	27.45 mm (1.081 in)
EX	27.75 mm (1.093 in)	27.50 mm (1.083 in)



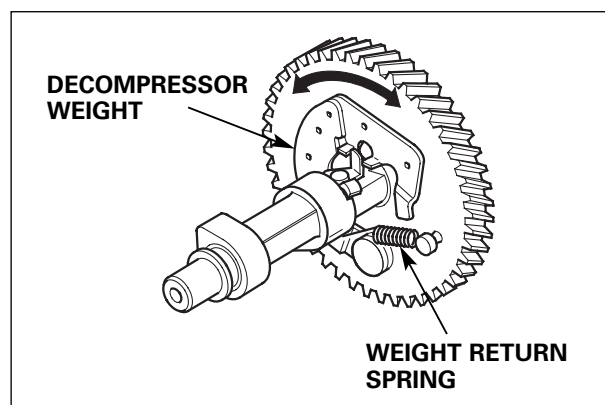
• CAMSHAFT JOURNAL O.D.

Standard	Service limit
13.966 – 13.984 mm (0.5498 – 0.5506 in)	13.916 mm (0.5479 in)



• DECOMPRESSOR WEIGHT

Before installing, inspect for a worn or weakened spring, and check that the decompressor weight moves smoothly.



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NOTE