

## How to use this manual

# A Few Words About Safety

## SERVICE INFORMATION

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

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

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

## For Your Customer's Safety

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

### ▲ WARNING

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

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

## For Your Safety

Because this manual is intended for the professional service technician, we do not provide warnings about many basic shop safety practices (e.g., Hot parts-wear gloves). If you have not received shop safety training or do not feel confident about your knowledge of safe servicing 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 vapors and hydrogen gasses from battery are explosive. To reduce the possibility of a fire or explosion, be careful when working around gasoline or batteries.

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

---

## CONTENTS

<b>SPECIFICATIONS</b>	<b>1</b>
<b>SERVICE INFORMATION</b>	<b>2</b>
<b>MAINTENANCE</b>	<b>3</b>
<b>TROUBLESHOOTING</b>	<b>4</b>
<b>COVER</b>	<b>5</b>
<b>FUEL SYSTEM</b>	<b>6</b>
<b>GOVERNOR SYSTEM</b>	<b>7</b>
<b>CHARGING SYSTEM</b>	<b>8</b>
<b>IGNITION SYSTEM</b>	<b>9</b>
<b>STARTING SYSTEM</b>	<b>10</b>
<b>OTHER ELECTRICAL</b>	<b>11</b>
<b>MUFFLER</b>	<b>12</b>
<b>CYLINDER HEAD/VALVES</b>	<b>13</b>
<b>CRANKCASE</b>	<b>14</b>
<b>WIRING DIAGRAMS</b>	<b>15</b>
<b>INDEX</b>	

## How to use this manual

### INTRODUCTION

This manual covers the service and repair procedures for Honda GX390RT2/T2/UT2.

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

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

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

### SAFETY MESSAGES

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

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

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

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

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

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

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

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

© Honda Motor Co., Ltd.  
SERVICE PUBLICATION OFFICE

Date of Issue: March 2010

## How to use this manual

### 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 molybdenum oil solution (mixture of the engine oil and molybdenum grease in a ratio of 1:1).
	Use multi-purpose grease (lithium based multi-purpose grease NLGI #2 or equivalent).
	Use water resistant molybdenum disulfide grease (containing more than 3% molybdenum disulfide, NLGI #2 or equivalent). Example: UNILITE M No.2 manufactured by KYODO YUSHI, Japan
	Apply a locking agent. Use a medium strength locking agent unless otherwise specified.
	Apply sealant.
	Use automatic transmission fluid.
(O x O) (O)	Indicates the diameter, length, and quantity of metric bolts used.
page 1-1	Indicates the reference page.

## How to use this manual

### ABBREVIATIONS

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

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

BI	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

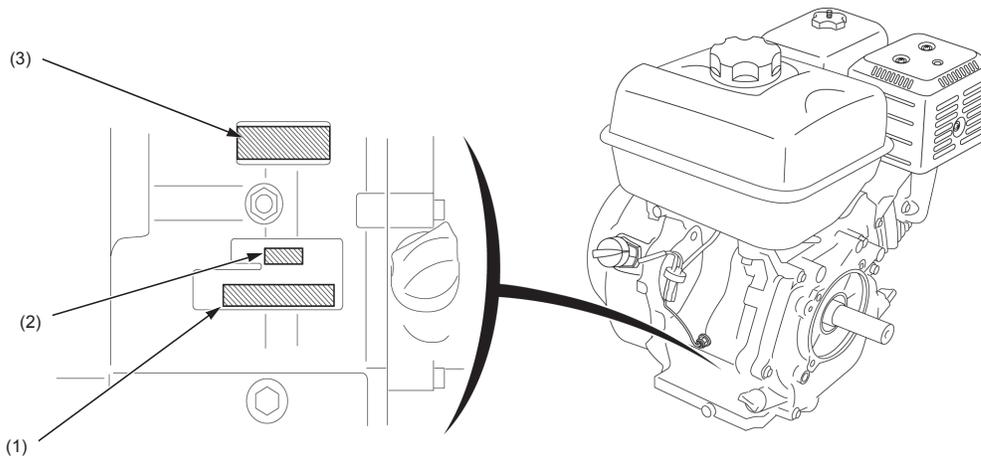
<b>SERIAL NUMBER LOCATION</b> .....	<b>1-2</b>	<b>ENGINE SPECIFICATIONS</b> .....	<b>1-5</b>
<b>TYPE CODE</b> .....	<b>1-2</b>	<b>PERFORMANCE CURVES</b> .....	<b>1-6</b>
<b>DIMENSIONS AND WEIGHTS SPECIFICATIONS</b> .....	<b>1-4</b>	<b>DIMENSIONAL DRAWINGS</b> .....	<b>1-7</b>
		<b>PTO DIMENSIONAL DRAWINGS</b> .....	<b>1-9</b>

## SPECIFICATIONS

### SERIAL NUMBER LOCATION

The engine serial number (1), type (2) and model (3) is stamped on the crankcase.

Refer to it when ordering parts or making technical inquiries.



### TYPE CODE

Model	GX390RT2				
Type	QWA2	VAA1	VEP9	VKE4	VKX4
P. T. O.	Q type		V type		

Model	GX390RT2				
Type	VPE5	VPE9	VPX4	VPX9	VSD4
P. T. O.	V type				

Model	GX390RT2				GX390T2
Type	VTH4	VWC	VWC9	VWT4	ES2
P. T. O.	V type				E type

Model	GX390T2				
Type	LH	LH2	LHB5	LHP1	LXE9
P. T. O.	L type				

Model	GX390T2				
Type	PX	QAPW	QBE1	QH	QHB1
P. T. O.	P type		Q type		

Model	GX390T2				
Type	QHB3	QHB5	QHP1	QMH	QN
P. T. O.	Q type				

## SPECIFICATIONS

Model	GX390T2				
Type	QP	QTD	QX	QXE	QXEK
P. T. O.	Q type				
Model	GX390T2				
Type	QXK	SH	SWE2	SWX	SWX2
P. T. O.	Q type	S type			
Model	GX390T2				
Type	SX	SXC	VMQ3	VMT	VMT2
P. T. O.	S type		V type	E type	
Model	GX390T2				
Type	VMT3	VS4	VS6	VSB3	VSB4
P. T. O.	E type	V type			
Model	GX390T2				
Type	VSP	VTE5	VX	VXE	VXK
P. T. O.	V type				
Model	GX390T2	GX390UT2			
Type	VXU1	HA2	LKE	LX2	LXE4
P. T. O.	V type	H type	L type		
Model	GX390UT2				
Type	LXE8	LXQ4	LXU	PA2	PAE2
P. T. O.	L type			P type	
Model	GX390UT2				
Type	PXD8	PXE8	PXU	QA26	QA4
P. T. O.	P type			Q type	
Model	GX390UT2				
Type	QAA6	QAE2	QAE4	QAE6	QC2
P. T. O.	Q type				
Model	GX390UT2				
Type	QDW9	QE	QHB4	QK4	QKA4
P. T. O.	Q type				
Model	GX390UT2				
Type	QME0	QNE2	QNE6	QNE8	QNR2
P. T. O.	Q type				
Model	GX390UT2				
Type	QNR6	QWC4	QXB7	QXB9	QXC4
P. T. O.	Q type				
Model	GX390UT2				
Type	QXC6	QXC9	QXCU	QXE4	QXE6
P. T. O.	Q type				
Model	GX390UT2				
Type	QXE7	QXE8	QXE9	QXER	QXQ4
P. T. O.	Q type				
Model	GX390UT2				
Type	QXS4	QXU	QXUZ	SCK4	SHQ4
P. T. O.	Q type			S type	
Model	GX390UT2				
Type	SHQ5	SM32	SMC1	SMD3	SME0
P. T. O.	S type				

## SPECIFICATIONS

Model	GX390UT2				
Type	SME6	SNC	STC4	SWA4	SXB7
P. T. O.	S type				

Model	GX390UT2				
Type	SXE4	SXE8	SXQ4	SXU	VA2
P. T. O.	S type				V type

Model	GX390UT2				
Type	VM2	VN27	VSD7	VSD9	VX8
P. T. O.	V type				

Model	GX390UT2				
Type	VXB7	VXB9	VXE2	VXE6	VXE7
P. T. O.	V type				

Model	GX390UT2		
Type	VXE8	VXE9	VXQ4
P. T. O.	V type		

## DIMENSIONS AND WEIGHTS SPECIFICATIONS

Model		GX390RT2	GX390T2	GX390UT2
Overall length	H type*	-	-	452 mm (17.8 in)
	L type*	-	440 mm (17.3 in)	440 mm (17.3 in)
	P type*	-	405 mm (15.9 in)	405 mm (15.9 in)
	Q type*	-	405 mm (15.9 in)	-
	S type*	-	380 mm (15.0 in)	380 mm (15.0 in)
	V type*	425 mm (16.7 in)	425 mm (16.7 in)	425 mm (16.7 in)
	Overall width	H type*	-	-
L type*		-	460 mm (18.1 in)	460 mm (18.1 in)
P type*		-	460 mm (18.1 in)	460 mm (18.1 in)
Q type*		458 mm (18.0 in)	460 mm (18.1 in)	460 mm (18.1 in)
S type*		-	460 mm (18.1 in)	460 mm (18.1 in)
V type*		458 mm (18.0 in)	460 mm (18.1 in)	460 mm (18.1 in)
Overall height		H type*	-	-
	L type*	-	448 mm (17.6 in)	448 mm (17.6 in)
	P type*	-	448 mm (17.6 in)	448 mm (17.6 in)
	Q type*	-	448 mm (17.6 in)	448 mm (17.6 in)
	S type*	-	448 mm (17.6 in)	448 mm (17.6 in)
	V type*	-	448 mm (17.6 in)	448 mm (17.6 in)
	Dry weight	H type*	-	-
L type*		-	35.2 kg (77.6 lbs)	35.2 kg (77.6 lbs)
P type*		-	31.7 kg (69.9 lbs)	31.7 kg (69.9 lbs)
Q type*		29.9 kg (65.9 lbs)	31.7 kg (69.9 lbs)	31.7 kg (69.9 lbs)
S type*		-	31.7 kg (69.9 lbs)	31.7 kg (69.9 lbs)
V type*		29.9 kg (65.9 lbs)	31.7 kg (69.9 lbs)	31.7 kg (69.9 lbs)
Operating weight		H type*	-	-
	L type*	-	41.2 kg (90.8 lbs)	41.2 kg (90.8 lbs)
	P type*	-	37.8 kg (83.3 lbs)	37.8 kg (83.3 lbs)
	Q type*	31.4 kg (69.2 lbs)	37.8 kg (83.3 lbs)	37.8 kg (83.3 lbs)
	S type*	-	37.8 kg (83.3 lbs)	37.8 kg (83.3 lbs)
	V type*	31.4 kg (69.2 lbs)	37.8 kg (83.3 lbs)	37.8 kg (83.3 lbs)

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

## SPECIFICATIONS

## ENGINE SPECIFICATIONS

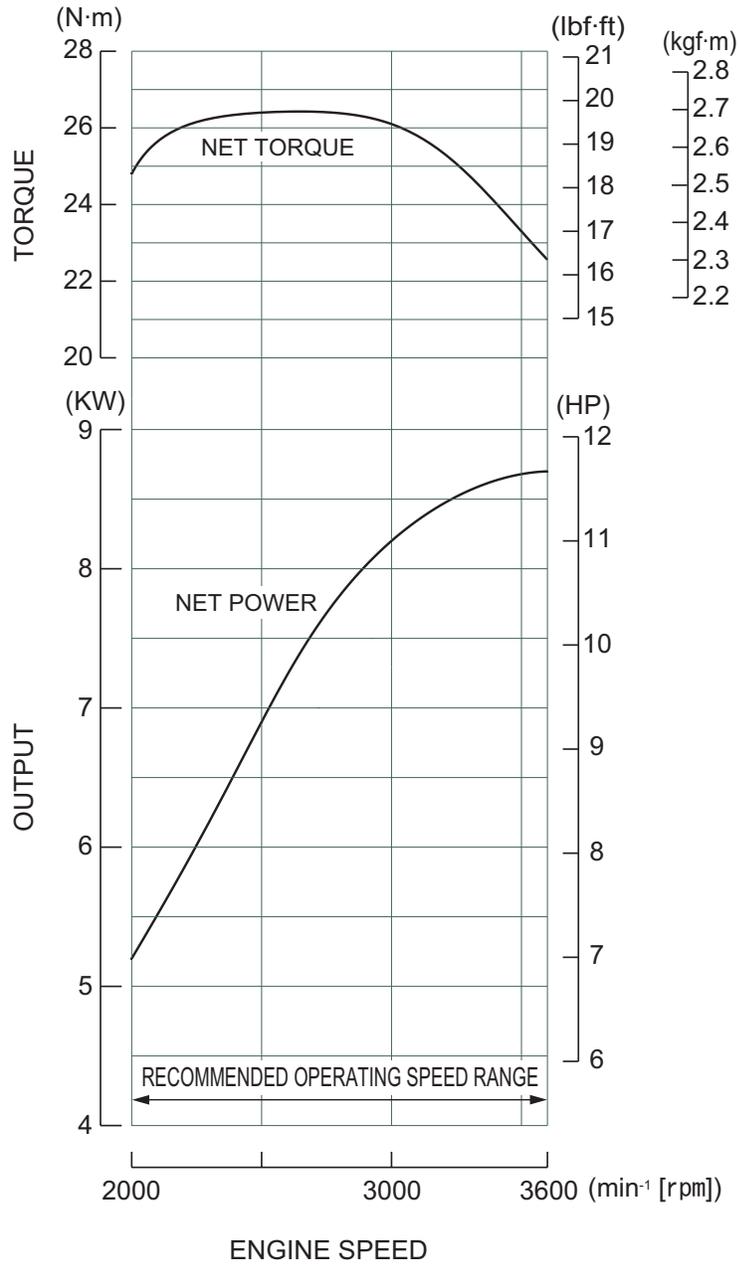
Model	GX390RT2	GX390T2	GX390UT2
Description code	GCBCT	GCBDT	GCBCT
Type	4 stroke, overhead valve, single cylinder, inclined by 25°		
Displacement	389 cm <sup>3</sup> (23.7 cu-in)		
Bore x stroke	88.0 x 64.0 mm (3.5 x 2.5 in)		
Net power (SAE J1349)*1	8.7 kW (11.7 HP) / 3,600 min <sup>-1</sup> (rpm)		
Continuous rated power	7.0 kW (9.4 HP) / 3,600 min <sup>-1</sup> (rpm)		
Maximum net torque (SAE J1349)*1	26.5 N·m (2.7 kgf·m, 19.5 lbf·ft) / 2,500 min <sup>-1</sup> (rpm)		
Compression ratio	8.2 ± 0.2: 1		
Fuel consumption (at continuous rated power)	3.5 Liters (0.92 US gal, 0.77 Imp gal) / h		
Ignition system	C.D.I.(Capacitor Discharge Ignition) type magneto ignition		
Ignition timing	B.T.D.C. 10° / 1,400min <sup>-1</sup> (rpm)		
Spark advancer performance	B.T.D.C. 10° - 22°		
Spark plug	BPR6ES (NGK) / W20EPR-U (DENSO)		
Lubrication system	Forced splash		
Oil capacity	1.1 Liters (1.16 US qt, 0.97 Imp qt)		
Recommended oil	SAE 10W-30 API service classification SE or later		
Cooling system	Forced air		
Starting system	Recoil, Recoil and Starter motor		
Stopping system	Ignition exciter coil circuit open		
Carburetor	Horizontal type, butterfly valve		
Air cleaner	Dual element type, Cyclone type, Oil bath type, Low profile type		
Governor	Mechanical centrifugal		
Breather system	Reed valve type		
Fuel used	Unleaded gasoline with a pump octane rating 86 or higher		

\*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.

## SPECIFICATIONS

---

### PERFORMANCE CURVES



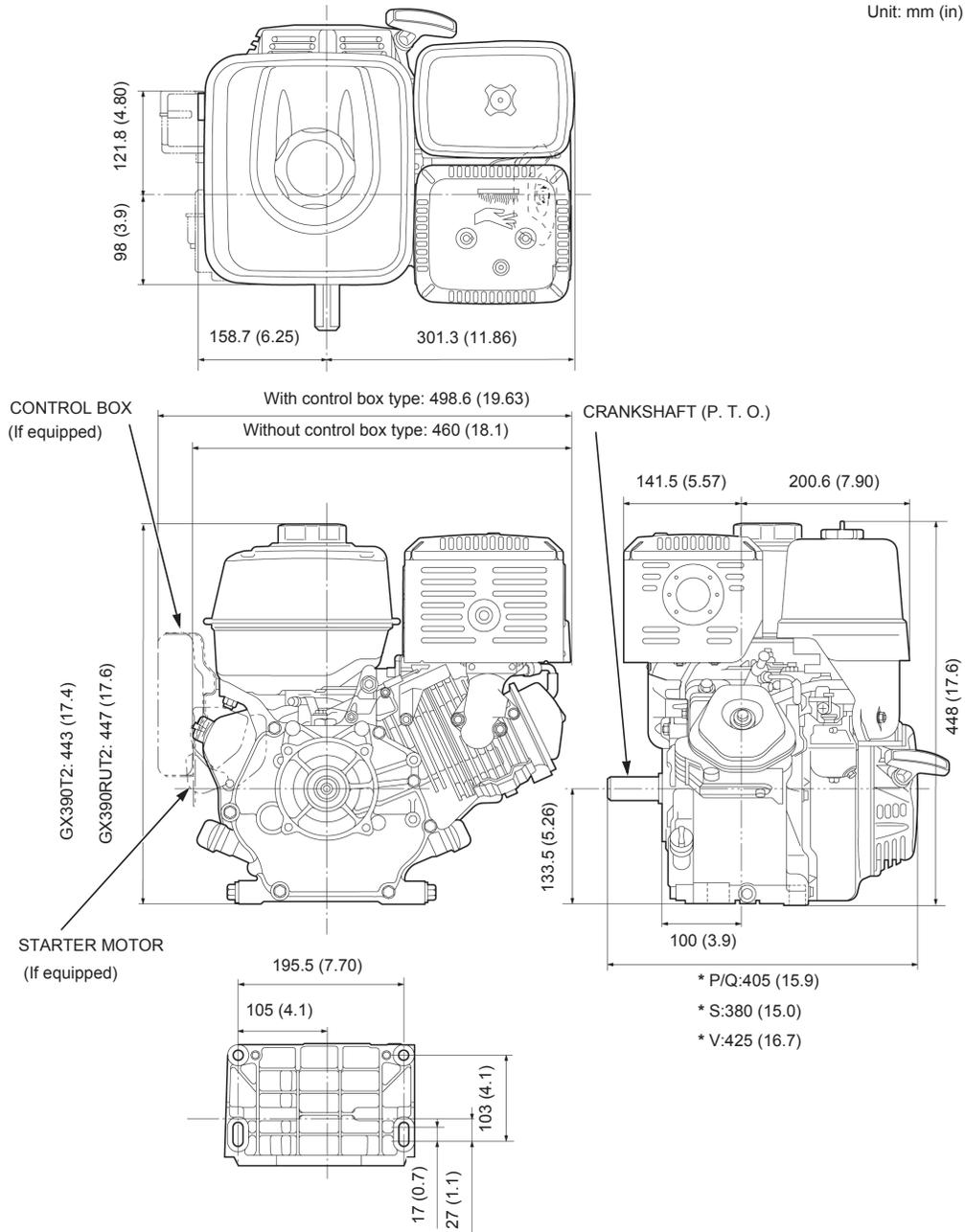
## SPECIFICATIONS

### DIMENSIONAL DRAWINGS

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

#### WITHOUT REDUCTION TYPE

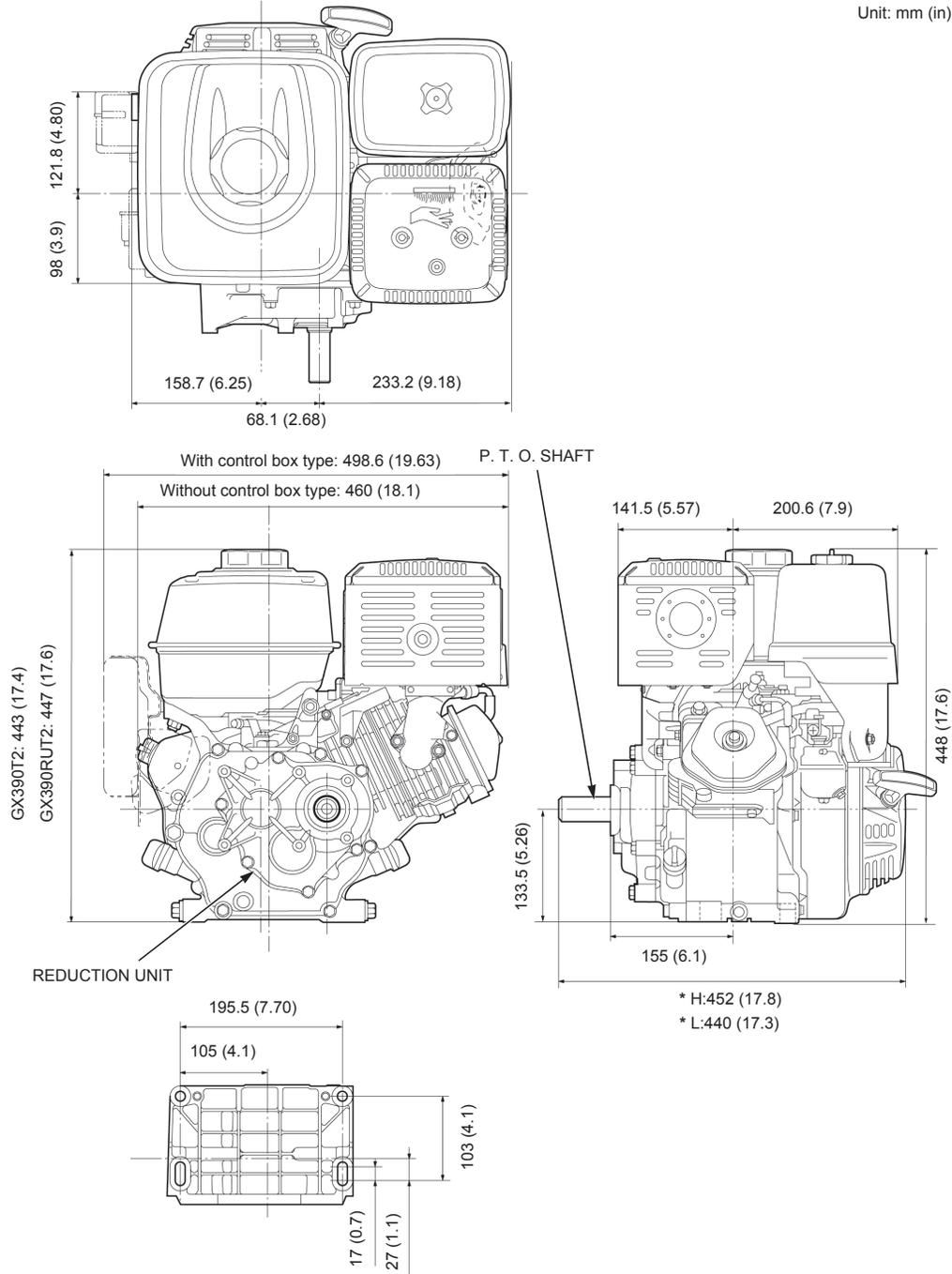
Unit: mm (in)



## SPECIFICATIONS

### WITH REDUCTION UNIT TYPE

Unit: mm (in)



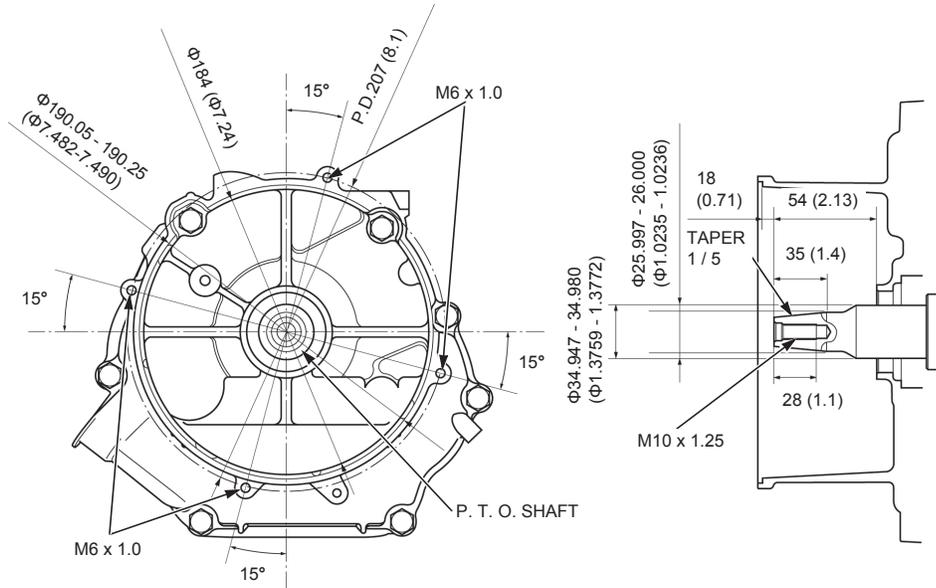
**SPECIFICATIONS**

**PTO DIMENSIONAL DRAWINGS**

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

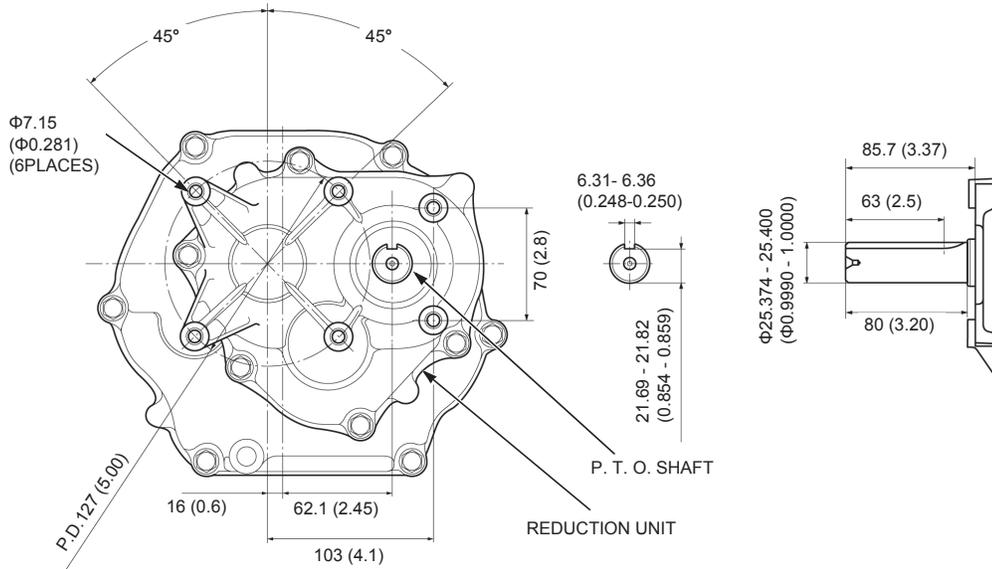
**E TYPE\***

Unit: mm (in)



**H TYPE\* (WITH REDUCTION)**

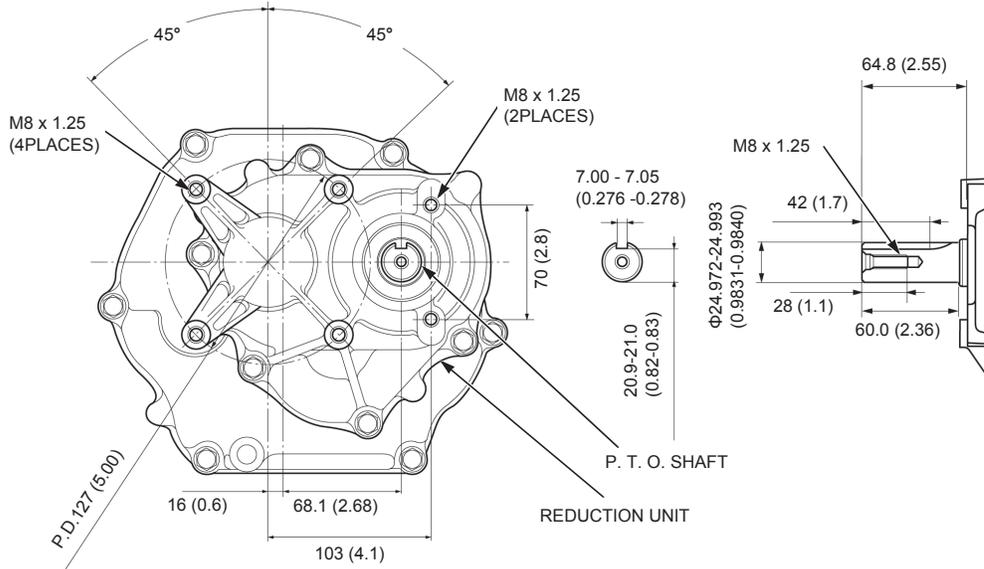
Unit: mm (in)



## SPECIFICATIONS

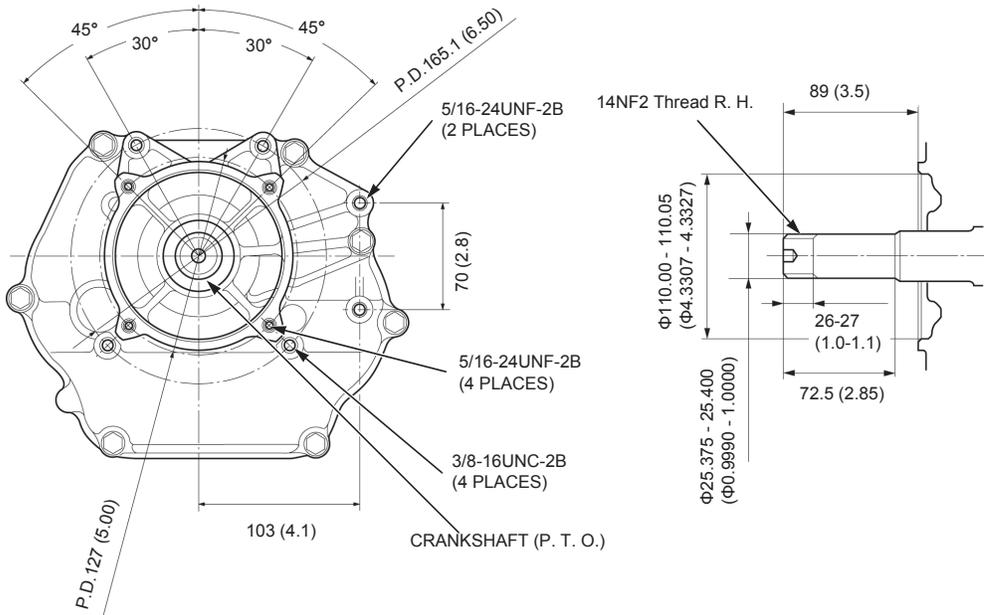
### L TYPE\* (WITH REDUCTION)

Unit: mm (in)



### P TYPE\*

Unit: mm (in)

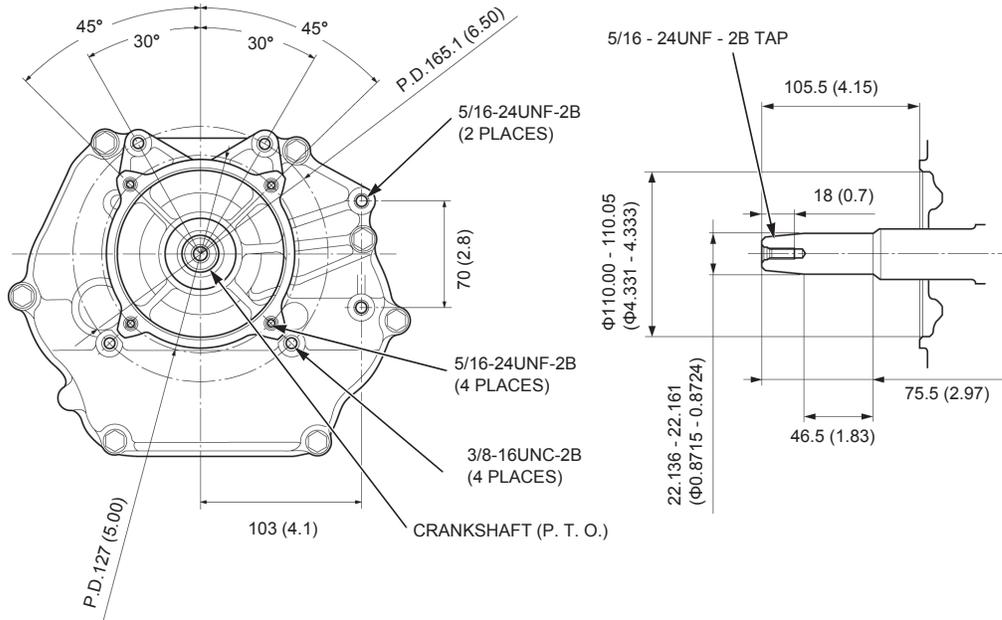




## SPECIFICATIONS

### V TYPE\*

Unit: mm (in)



## 2. SERVICE INFORMATION

---

MAINTENANCE STANDARDS .....	2-2	TOOLS .....	2-6
TORQUE VALUES .....	2-4	HARNES AND TUBE ROUTING .....	2-8
LUBRICATION & SEAL POINT .....	2-5		

**SERVICE INFORMATION****MAINTENANCE STANDARDS**

Unit: mm (in)

Part	Item		Standard	Service limit
Engine	Maximum speed (at no load)		3,850 ± 150 min <sup>-1</sup> (rpm)	—
	Idle speed		1,400 ± 150 min <sup>-1</sup> (rpm)	—
	Cylinder compression		0.51-0.69 MPa (5.2-7.0 kgf/cm <sup>2</sup> , 74-100 psi) / 600 min <sup>-1</sup> (rpm)	—
Cylinder head	Warpage		—	0.10 (0.004)
Cylinder	Sleeve I.D.		88.000 – 88.017 (3.4646 – 3.4652)	88.170 (3.4710)
Piston	Skirt O.D.		87.975 – 87.985 (3.4635 – 3.4640)	87.85 (3.459)
	Piston-to-cylinder clearance		0.015 – 0.042 (0.0006 – 0.0016)	0.12 (0.005)
	Piston pin bore I.D.		20.002 – 20.008 (0.7875 – 0.7877)	20.042 (0.7891)
Piston pin	Pin O.D.		19.994 – 20.000 (0.7872 – 0.7874)	19.950 (0.7854)
	Piston pin-to-piston pin bore clearance		0.002 – 0.014 (0.0001 – 0.0006)	0.08 (0.003)
Piston rings	Ring side clearance	Top	0.015 – 0.060 (0.0006 – 0.0024)	0.15 (0.006)
		Second	0.030 – 0.060 (0.0012 – 0.0024)	0.15 (0.006)
	Ring end gap	Top	0.200 – 0.350 (0.0079 – 0.0138)	1.0 (0.04)
		Second	0.350 – 0.500 (0.0138 – 0.0197)	1.0 (0.04)
		Oil (side rail)	0.2 – 0.7 (0.01 – 0.03)	1.0 (0.04)
	Ring width	Top	1.160 – 1.190 (0.0457 – 0.047)	1.140 (0.0449)
Second		1.160 – 1.175 (0.0457 – 0.0463)	1.140 (0.0449)	
Connecting rod	Small end I.D.		20.005 – 20.020 (0.7876 – 0.7882)	20.07 (0.790)
	Big end side clearance		0.1 – 0.4 (0.004 – 0.016)	1.0 (0.04)
	Big end I.D.		36.025 – 36.039 (1.4183 – 1.4189)	36.07 (1.420)
	Big end oil clearance		0.040 – 0.064 (0.0016 – 0.0025)	0.12 (0.005)
Crankshaft	Crank pin O.D.		35.975 – 35.985 (1.4163 – 1.4167)	35.93 (1.415)
	Crankshaft runout		—	0.1 (0.003)
Cylinder barrel (Crankcase)	Camshaft bearing I.D.		16.000 – 16.018 (0.6299 – 0.6306)	16.05 (0.632)
Crankcase cover	Camshaft bearing I.D.		16.000 – 16.018 (0.6299 – 0.6306)	16.05 (0.632)
Valves	Valve clearance	IN	0.15 ± 0.02	—
		EX	0.20 ± 0.02	—
	Valve stem O.D.	IN	6.575 – 6.590 (0.2588 – 0.2594)	6.44 (0.254)
		EX	6.535 – 6.550 (0.2572 – 0.2578)	6.40 (0.252)
	Valve guide I.D.	IN/EX	6.600 – 6.615 (0.2598 – 0.2604)	6.66 (0.262)
	Guide-to-stem clearance	IN	0.010 – 0.040 (0.0004 – 0.0016)	0.11 (0.004)
		EX	0.050 – 0.080 (0.0020 – 0.0032)	0.13 (0.005)
	Valve seat width		1.0 – 1.2 (0.04 – 0.05)	2.0 (0.08)
Valve spring free length		39.0 (1.54)	37.5 (1.48)	
Valve spring perpendicularity		—	1.5° max.	
Camshaft	Cam height	IN	32.498 – 32.698 (1.2794 – 1.2873)	32.198 (1.2676)
		EX	31.985 – 32.185 (1.2592 – 1.2671)	29.886 (1.1766)
	Camshaft O.D.		15.966 – 15.984 (0.6286 – 0.6293)	15.92 (0.627)

## SERVICE INFORMATION

Part	Item	Standard	Service limit	
Carburetor	Main jet	BE85C B: #100 BE85L A: #95 BE85Q A: #92 BE85Q A: #102 BE89F B: #108 BE89R A: #102 BE89U A: #108 BE94B A: #100 BE94A A: #115	-	
	Pilot screw opening	BE85C B: 1 - 3/4 turns out BE85L A: 2 turns out BE85Q A: 1 - 7/8 turns out BE85Q A: 2 - 1/4 turns out BE89F B: 2 - 1/4 turns out BE89R A: 2 - 1/4 turns out BE89U A: 2 - 1/4 turns out BE94B A: 1 - 3/4 turns out BE94A A: 2 - 1/4 turns out	-	
	Float height	13.2 (0.52)	-	
Spark plug	Gap	0.7 - 0.8 (0.028 - 0.031)	-	
Ignition coil	Air gap	0.2 - 0.6 (0.01 - 0.02)	-	
Starter motor	Brush length	7.0 (0.28)	3.5 (0.14)	
	Mica depth	1.0 (0.04)	0.2 (0.01)	
Charge coil	Resistance	1A	3.00 - 4.00 $\Omega$	-
		3A	0.62 - 0.93 $\Omega$	-
		10A	0.16 - 0.24 $\Omega$	-
		18A	0.10 - 0.30 $\Omega$	-
Lamp coil	Resistance	12V - 15 W	1.04 - 1.56 $\Omega$	-
		12V - 25 W	0.30 - 0.46 $\Omega$	-
		12V - 50 W	0.29 - 0.44 $\Omega$	-

**SERVICE INFORMATION****TORQUE VALUES****ENGINE TORQUE VALUES**

Item	Tread Dia. (mm)	Torque values		
		N·m	kgf·m	lbf·ft
Crankcase cover bolt	M8 x 1.25	24	2.4	17
Cylinder head bolt	M10 x 1.25	35	3.5	26
Oil drain plug bolt	M12 x 1.5	22.5	2.25	17
Connecting rod bolt	M8 x 1.25 (Special bolt)	14	1.4	10
Rocker arm pivot bolt	M8 x 1.25 (Special bolt)	24	2.4	17
Rocker arm pivot adjusting nut	M6 x 0.5	10	1.0	7
Oil level switch nut	M10 x 1.25	10	1.0	7
Flywheel nut	M16 x 1.5 (Special nut)	170	17.3	125
Fuel tank nut/bolt	M8 x 1.25	24	2.4	17
Fuel tank joint	M10 x 1.25	2	0.2	1.5
Air cleaner elbow nut	M6 x 1.0	9	0.9	6.6
Muffler nut	M8 x 1.25	24	2.4	17
Exhaust pipe nut	M8 x 1.25	24	2.4	17
Gear case cover bolt (With reduction)	M8 x 1.25	24	2.4	17
Primary drive gear bolt (With reduction)	M8 x 1.25	24	2.4	17
Engine stop switch tapping screw	M3 x 1.06	0.45	0.046	0.33
Recoil starter center screw	M5 x 0.8 (Special bolt)	3.9	0.40	2.9
Fuel strainer cup	M24 x 1.0	3.9	0.40	2.9

**STANDARD TORQUE VALUES**

Item	Tread Dia. (mm)	Torque values		
		N·m	kgf·m	lbf·ft
Screw	4 mm	2.1	0.21	1.5
	5 mm	4.3	0.43	3.1
	6 mm	9.0	0.90	6.6
Bolt and nut	5 mm	5.3	0.53	3.9
	6 mm	10	1.0	7
	8 mm	22	2.2	16
	10 mm	34	3.5	25
	12 mm	54	5.5	40
Flange bolt and nut	5 mm	5.4	0.55	3.9
	6 mm	12	1.2	9
	8 mm	23	2.3	17
	10 mm	40	4.0	30
SH (Small head) flange bolt	6 mm	9.0	0.90	6.6
CT (Cutting threads) flange bolt (Retightening)	5 mm	5.4	0.55	4.0
	6 mm	12	1.2	9

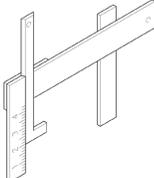
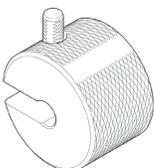
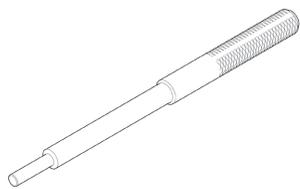
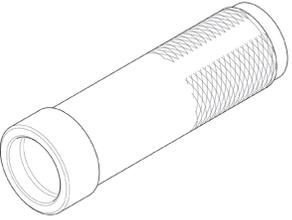
## SERVICE INFORMATION

## LUBRICATION &amp; SEAL POINT

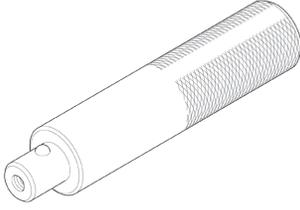
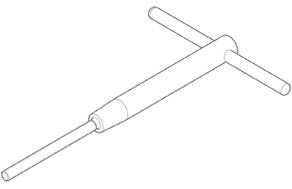
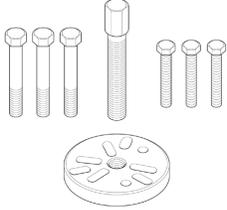
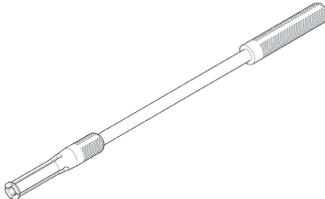
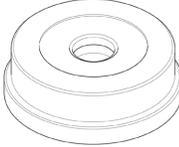
Location	Material	Remarks
Crankshaft pin, journal and gear	Engine oil	
Crankcase bearing		
Crankcase cover bearing		
Piston outer surface and piston pin hole		
Piston pin outer surface		
Piston ring		
Cylinder inner surface		
Connecting rod big and small end bearing		
Connecting rod bolt threads and seating surface		
Camshaft cam profile, bearing, decompressor and gear		
Valve lifter shaft and slipper		
Valve stem seal contact area of seal lip		
Valve stem sliding surface and stem end		
Valve spring		
Push rod end		
Tappet adjusting screw and nut threads and seating surface		
Rocker arm shaft		
Flywheel nut threads and seating surface		
Governor weight holder gear and journal		
Governor holder shaft		
Governor slider		
Governor arm shaft		
Cylinder head bolt threads and seating surface		
Rocker arm pivot threads and pivot		
Balancer shaft bearing and gear		
P.T.O. shaft bearing and gear		
Counter shaft bearing and gears		
Oil seal lip	Multi-purpose grease	
O-ring		
Recoil starter case cutout		
Recoil starter ratchet sliding surface		
Recoil starter spring retainer inside	Use molybdenum solution (mixture of the engine oil and molybdenum grease with the ratio 100 g grease: 70 cc oil)	When installing a new camshaft
Camshaft cam profile		
Recoil starter center screw threads	Threebond® 2430 or equivalent	

**SERVICE INFORMATION****TOOLS****SPECIAL TOOLS**

Special tools used in this manual can be ordered using normal American Honda parts ordering procedures.

Float level gauge 07401-0010000 	Sliding hammer weight 07741-0010201 	Valve guide driver, 6.45×11 07742-0010200 
Bearing driver attachment, 32×35 [in combination with 07749-0010000] 07746-0010100 	Bearing driver attachment, 42×47 [in combination with 07749-0010000] 07746-0010300 	Bearing driver attachment, 52×55 [in combination with 07749-0010000] 07746-0010400 
Bearing driver attachment, 72×75 [in combination with 07749-0010000] 07746-0010600 	Inner driver handle, 40 07746-0030100 	Inner bearing driver attachment, 35 [in combination with 07746-0030100] 07746-0030400 
Pilot, 15 [in combination with 07749-0010000] 07746-0040300 	Pilot, 20 [in combination with 07749-0010000] 07746-0040500 	Pilot, 30 [in combination with 07749-0010000] 07746-0040700 

**SERVICE INFORMATION**

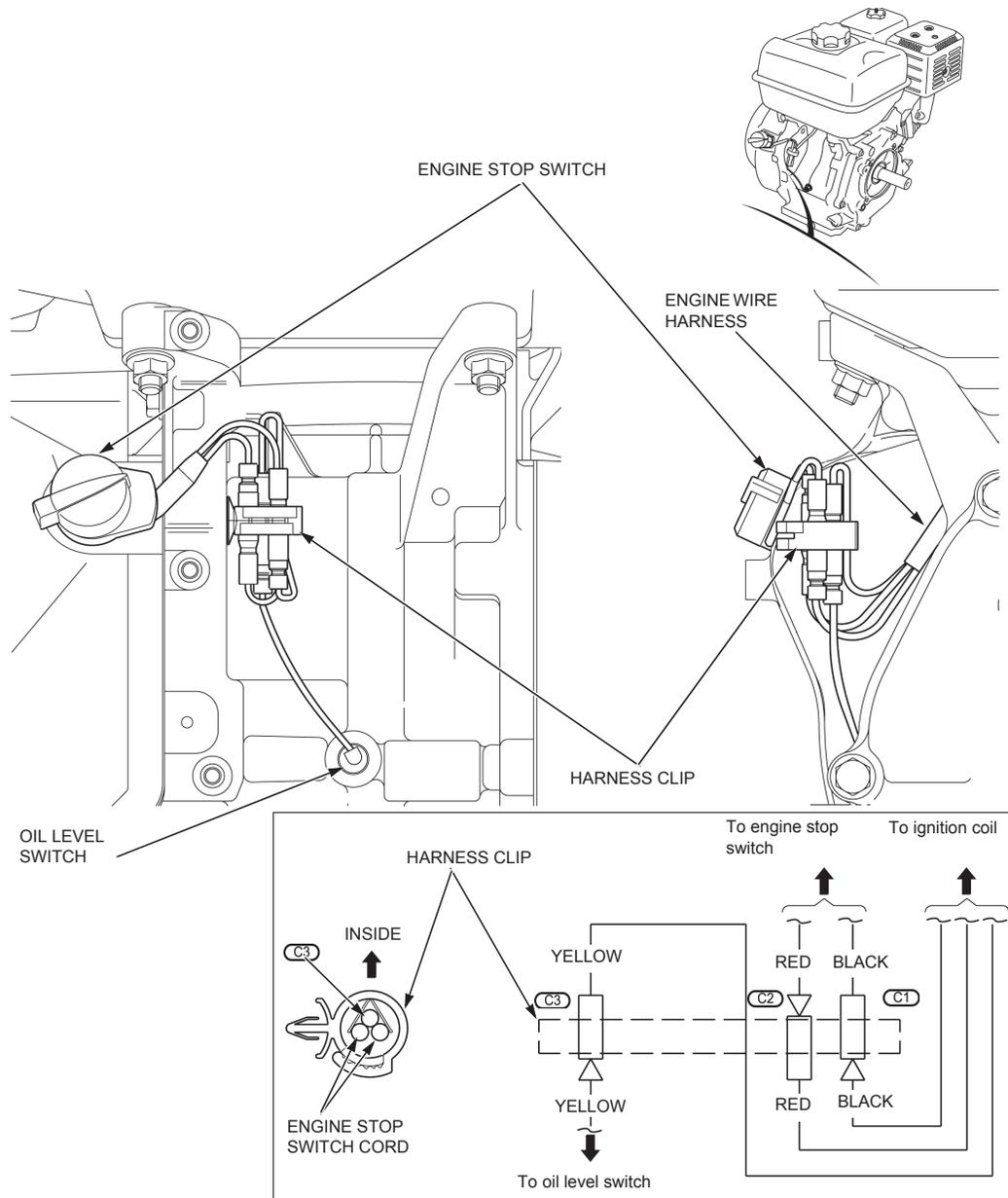
<p>Pilot, 35 [in combination with 07749-0010000] 07746-0040800</p> 	<p>Pilot, 14 [in combination with 07749-0010000] 07746-0041200</p> 	<p>Driver handle, 15×135L 07749-0010000</p> 
<p>Seat cutter, 35 07780-0010400</p> 	<p>Seat cutter, 40 07780-0010500</p> 	<p>Flat cutter, 35 07780-0012300</p> 
<p>Flat cutter, 38.5 07780-0012400</p> 	<p>Interior cutter, 37.5 07780-0014100</p> 	<p>Cutter holder, 6.6 07781-0010202</p> 
<p>Flywheel puller set 07935-8050004</p> 	<p>Bearing remover shaft, 15 07936-KC10500</p> 	<p>Valve guide reamer, 6.612 07984-ZE20001</p> 
<p>Bearing driver attachment, 45×50 [in combination with 07749-0010000] 07946-6920100</p> 	<p>Bearing driver attachment, 62×64 [in combination with 07749-0010000] 07947-6340400</p> 	

## SERVICE INFORMATION

### HARNESS AND TUBE ROUTING

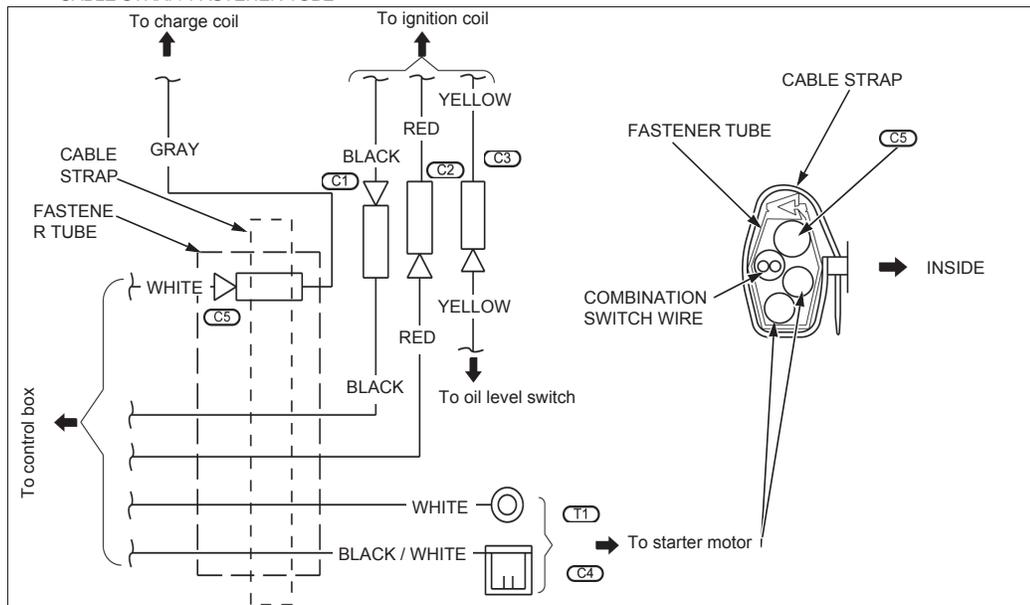
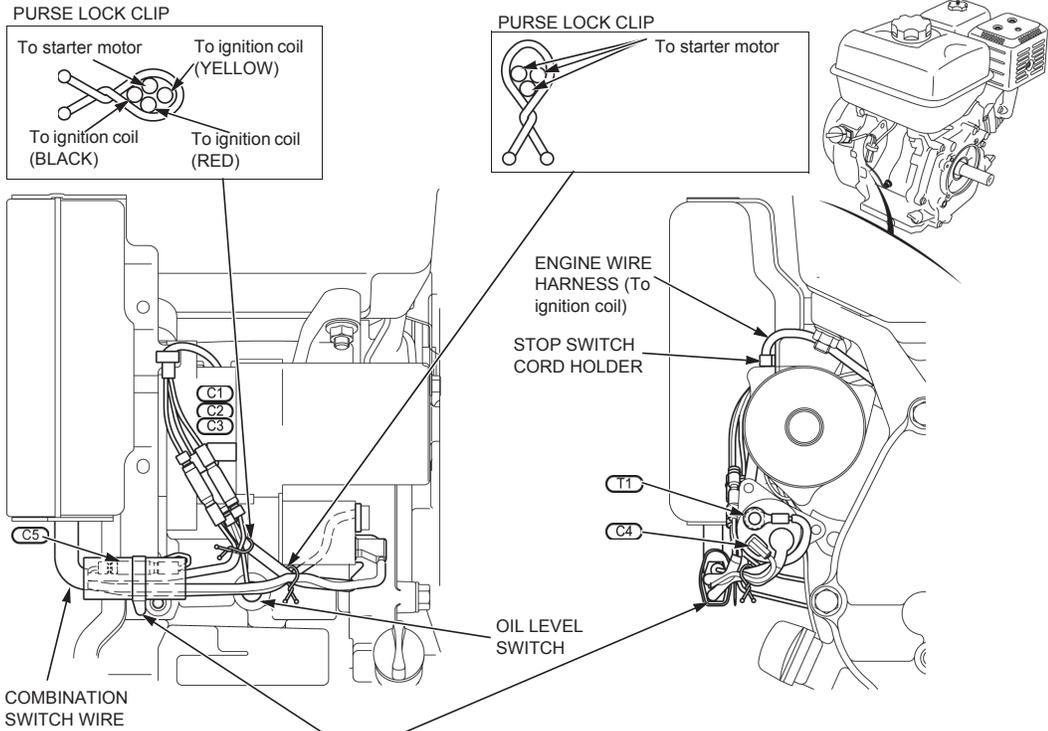
Connection of regulator/rectifier, charge/lamp coil, sub wire harness, and auto throttle solenoid are depending on the application of the engine, therefore, it does not indicate those parts in this manual.

#### ENGINE STOP SWITCH TYPE



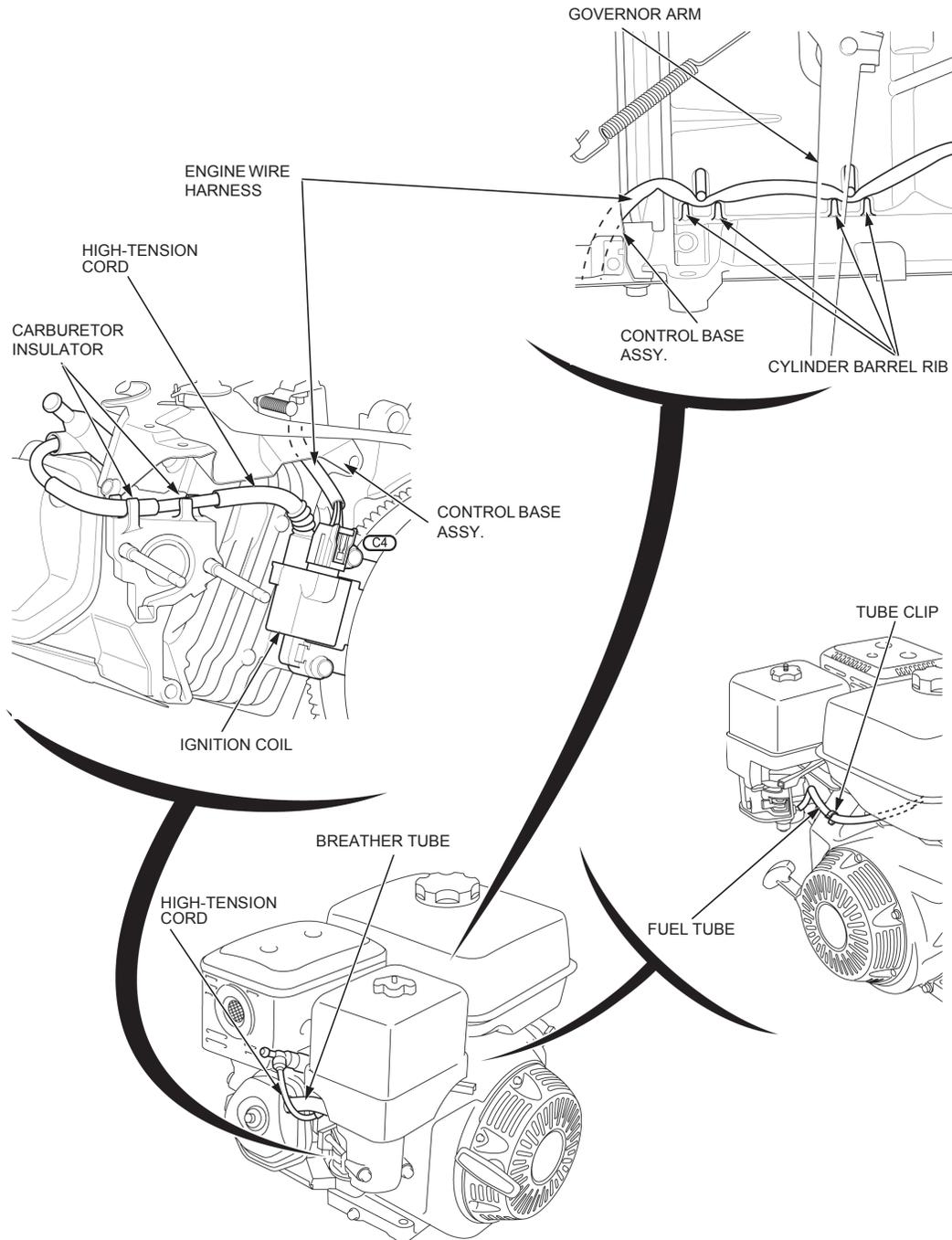
**SERVICE INFORMATION**

**COMBINATION SWITCH (CONTROL BOX) TYPE**



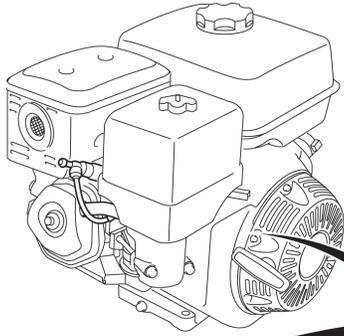
## SERVICE INFORMATION

### ALL TYPE

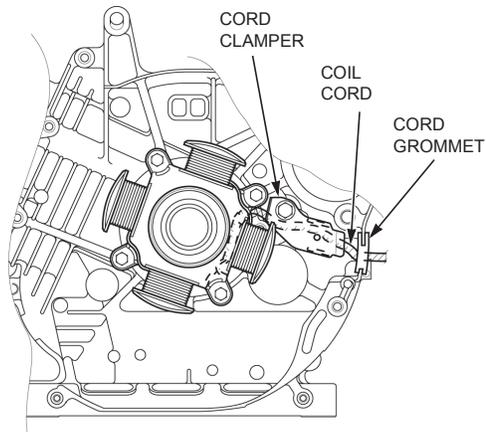


**SERVICE INFORMATION**

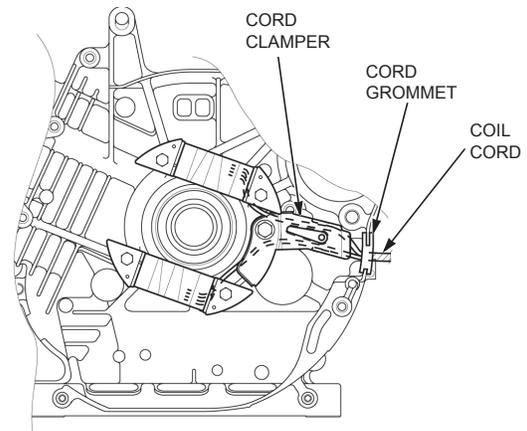
**WITH CHARGE COIL / LAMP COIL**



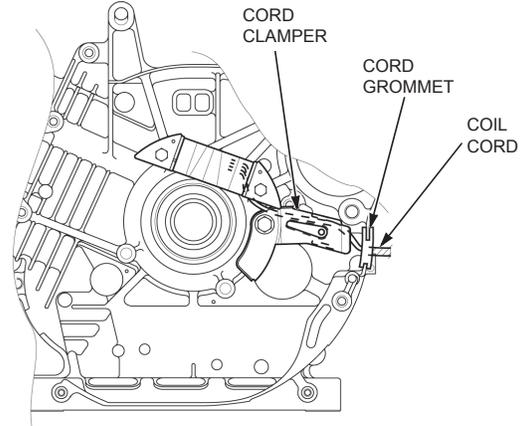
18A CHARGE COIL TYPE:

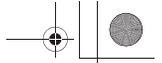


10A CHARGE COIL TYPE:  
12 V-50 W LAMP COIL TYPE:

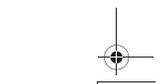


1 A / 3 A CHARGE COIL TYPE:  
12 V - 15 W / 12 V-25 W LAMP COIL TYPE:





**MEMO**



## 3. MAINTENANCE

MAINTENANCE SCHEDULE .....	3-2	SPARK ARRESTER CLEANING .....	3-8
ENGINE OIL LEVEL CHECK .....	3-3	IDLE SPEED CHECK/ADJUSTMENT .....	3-10
ENGINE OIL CHANGE .....	3-3	VALVE CLEARANCE CHECK/ ADJUSTMENT .....	3-10
AIR CLEANER CHECK/CLEANING/ REPLACEMENT .....	3-4	COMBUSTION CHAMBER CLEANING .....	3-12
SEDIMENT CUP CLEANING .....	3-6	FUEL TANK AND FILTER CLEANING .....	3-12
SPARK PLUG CHECK/ADJUSTMENT .....	3-7	FUEL TUBE CHECK .....	3-13
SPARK PLUG REPLACEMENT .....	3-8		

**MAINTENANCE****MAINTENANCE SCHEDULE**

REGULAR SERVICE PERIOD (2)		Each use	First month or 20 hrs.	Every 3 months or 50 hrs.	Every 6 months or 100 hrs.	Every year or 300 hrs.	Refer to page
ITEM	Perform at every indicated month or operating hour interval, whichever comes first.						
Engine oil	Check level	○					3-3
	Change		○		○		3-3
Air cleaner	Check	○					3-4
	Clean			○ (1)	○ (*) (1)		3-4
		(Cyclone type) Every 6 months or 150 hours					
	Replace					○ (**)	3-4
(Cyclone type) Every 2 years or 600 hours						3-4	
Sediment cup	Clean				○		3-6
Spark plug	Check-adjust				○		3-7
	Replace					○	3-8
Spark arrester (If equipped)	Clean				○		3-8
Idle speed	Check-adjust					○	3-10
Valve clearance	Check-adjust					○	3-10
Combustion chamber	Clean		After every 500 hours				3-12
Fuel tank and filter	Clean				○		3-12
Fuel tube	Check		Every 2 years (Replace if necessary)				3-13

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

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

(\*) Internal vent carburetor with dual element type only.

(\*\*) Replace paper element type only.

## MAINTENANCE

### ENGINE OIL LEVEL CHECK

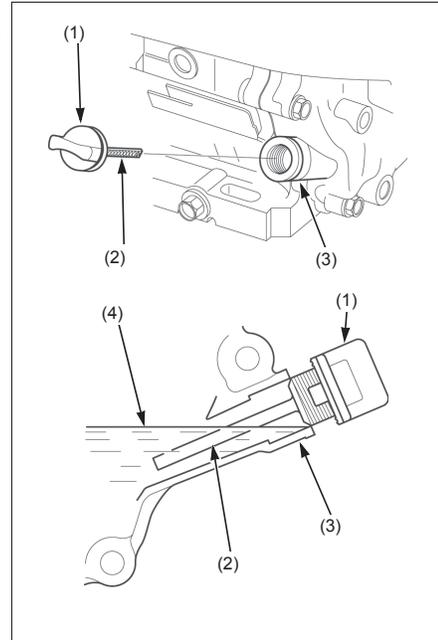
Place the engine on a level surface.

Remove the oil filler cap (1), and wipe the oil level gauge (2) clean.

Insert the oil filler cap without screwing it into the oil filler neck (3).

Remove the oil filler cap and check oil level shown on the oil level gauge.

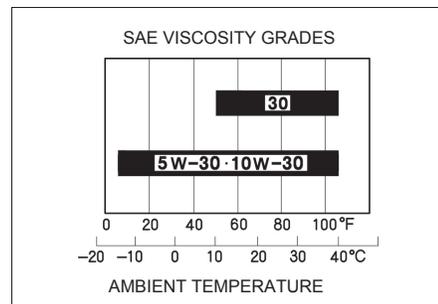
If the oil level is low, fill with recommended oil to the upper level (4) of the oil filler neck.



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.

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

Tighten the oil filler cap securely.



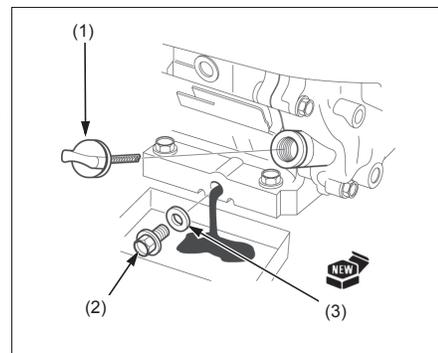
### ENGINE OIL CHANGE

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

Place the engine on a level surface, and place a suitable container under the drain plug bolt.

Remove the oil filler cap (1), drain plug bolt (2), and drain plug washer (3) to drain the oil into the suitable container.

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



## MAINTENANCE

### ⚠ 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.

Install a new drain plug washer (3) and tighten the drain plug bolt (2) to the specified torque.

**TORQUE: 22.5 N·m (2.25 kgf·m, 17 lbf·ft)**

Fill with recommended oil to the upper level mark of the oil level dipstick (page 3-3).

Engine oil capacity: 1.1 ℓ (1.16 US gal, 0.97 Imp gal)

Tighten the oil filler cap securely.

## AIR CLEANER CHECK/CLEANING/ REPLACEMENT

### DUAL ELEMENT TYPE:

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

### NOTICE

*Operating the engine without the air filters or with the filter installed loosely will allow dirt to enter the engine, causing rapid engine wear. Install the air filters securely.*

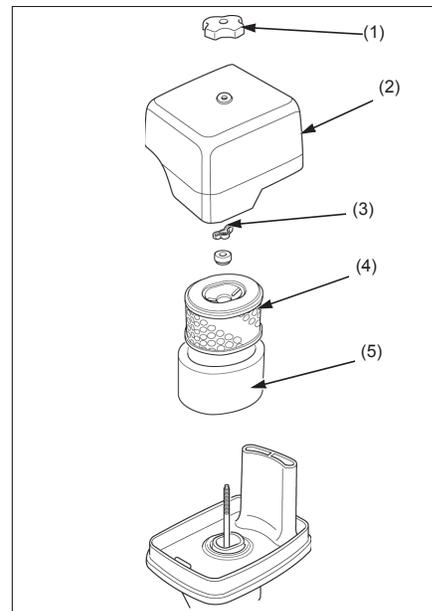
Remove the nut (1) and the air cleaner cover (2).

Remove the wing nut (3) and air filter assembly (4)(5).

Separate the inner filter (Paper) (4) from the outer filter (Foam) (5). Carefully check both filters for holes or tears and replace if damaged.

Clean the filters if they are to be reused.

Install the elements in the reverse order of removal (page 3-5).



**MAINTENANCE****CYCLONE TYPE:**

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

**NOTICE**

*Operating the engine without the air filters or with the filter installed loosely will allow dirt to enter the engine, causing rapid engine wear. Install the air filters securely.*

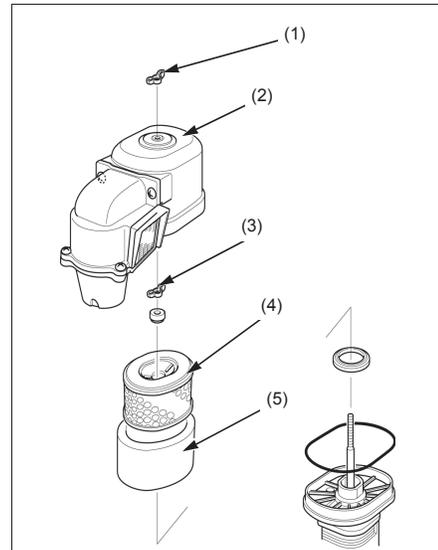
Remove the wing nut (1) and the air cleaner cover (2).

Remove the wing nut (3) and air filter assembly (4)(5).

Separate the inner filter (Paper) (4) from the outer filter (Foam) (5). Carefully check both filters for holes or tears and replace if damaged.

Clean the filters if they are to be reused.

Install the elements in the reverse order of removal.

**LOW PROFILE TYPE:**

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

**NOTICE**

*Operating the engine without the air filters or with the filter installed loosely will allow dirt to enter the engine, causing rapid engine wear. Install the air filters securely.*

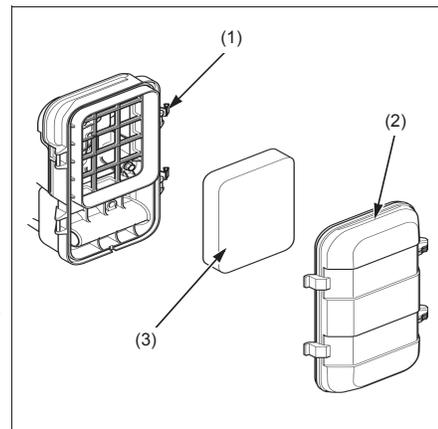
Remove the air cleaner case lid spring (1) and air cleaner cover (2).

Remove the air cleaner element (3).

Carefully check air cleaner element and replace if damaged.

Clean the filter if it is to be reused (page 3-5).

Install the element in the reverse order of removal.

**FILTER (FOAM) TYPE:**

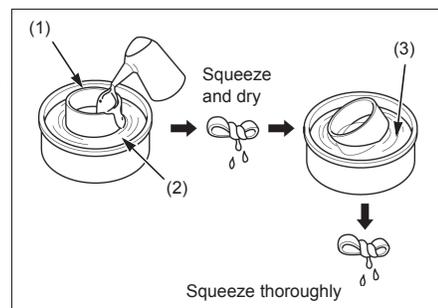
Clean the filter (1) in warm soapy water (2), rinse, and allow to dry thoroughly, or clean with a non-flammable solvent and allow to dry thoroughly.

Dip the filter in clean engine oil (3), and squeeze out all the excess oil.

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

Check the air cleaner case packing for deterioration or damage. Make sure the air cleaner packing is installed securely.

Install the cleaner in the reverse order of removal.



## MAINTENANCE

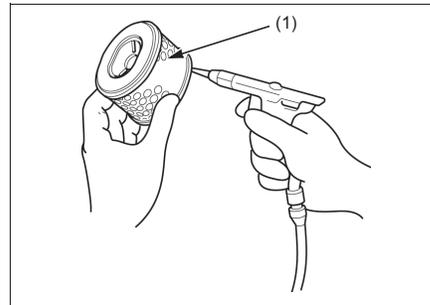
### INNER FILTER (PAPER) TYPE:

Tap the inner filter (1) lightly several times on a hard surface to remove excess dirt, or blow compressed air lightly (207 kPa (2.11 kgf/cm<sup>2</sup>, 30 psi) or less) through the paper filter from the inside out. Never try to brush the dirt off; brushing will force dirt into the fibers.

Wipe dirt from the inside of the air cleaner case and the air cleaner cover, using a rag.

Check the air cleaner case packing for deterioration or damage. Make sure the air cleaner packing installed securely.

Install the cleaner in the reverse order of removal.



## SEDIMENT CUP CLEANING

### ⚠ WARNING

Gasoline is highly flammable and explosive. You can be burned or seriously injured when handling fuel.

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

Turn the fuel cock lever (1) to the OFF position.

Remove the sediment cup (2) and the O-ring (3).

Remove the cup filter (4) while releasing the tabs (5).

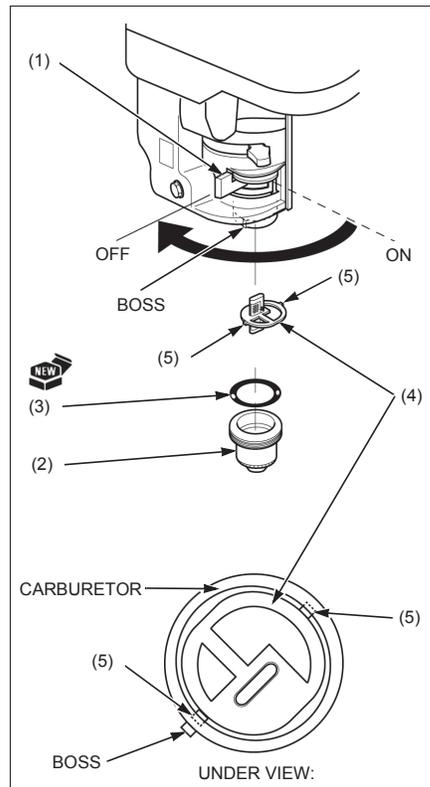
Clean the sediment cup and the cup filter with non-flammable solvent and allow them to dry thoroughly.

Install the cup filter as the direction shown in the illustration.

Install a new O-ring and tighten the sediment cup to the specified torque.

**TORQUE: 3.9 N·m (0.40 kgf·m, 2.9 lbf·ft)**

Check the installation part of the sediment cup for any sign of fuel leakage.

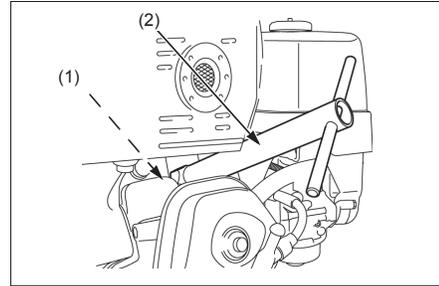


## SPARK PLUG CHECK/ADJUSTMENT

### ⚠ CAUTION

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

Remove the spark plug cap, and then remove the spark plug (1) using a spark plug wrench (2).

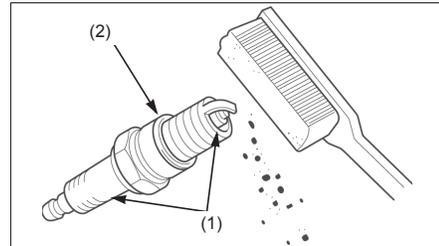


Visually check the spark plug. Replace the plug if the insulator (1) is cracked or chipped.

Check the sealing washer (2) for damage.

Replace the spark plug if the sealing washer is damaged (page 3-8).

**SPARK PLUG: BPR6ES (NGK) W20EPR-U (DENSO)**



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

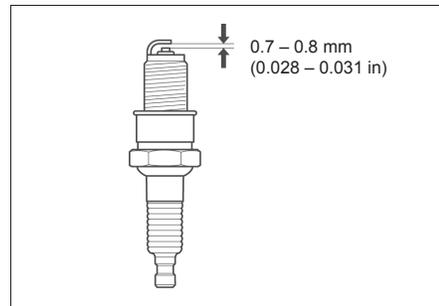
**PLUG GAP: 0.7 – 0.8 mm (0.028 – 0.031 in)**

Install the spark plug finger-tight to seat the washer, and then tighten 1/8 – 1/4 turn with a spark plug wrench.

### NOTICE

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

Install the spark plug cap securely.



## MAINTENANCE

### SPARK PLUG REPLACEMENT

#### ⚠ CAUTION

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

Remove the spark plug cap, and then remove the spark plug (1) using a spark plug wrench (2).

Verify the new spark plug gap is correct (page 3-7).

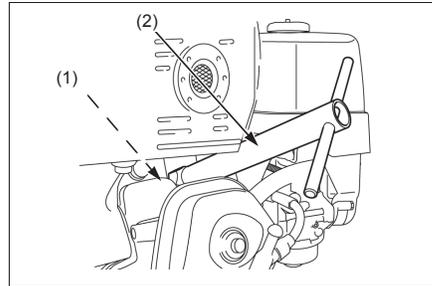
Install a new spark plug finger-tight to seat the washer, and then tighten 1/2 turn with a spark plug wrench.

**SPARK PLUG: BPR6ES (NGK)W20EPR-U(DENSO)**

#### NOTICE

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

Install the spark plug cap securely.



### SPARK ARRESTER CLEANING

#### ⚠ CAUTION

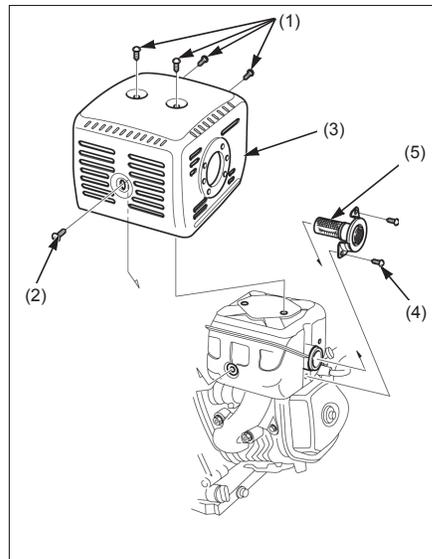
The engine and the muffler becomes very hot during operation and remains hot for a while after stopping the engine. Be careful not to touch the muffler while it is hot. Allow it to cool before proceeding.

#### SOLID PROTECTOR TYPE

Remove the muffler cover (page 12-6), if equipped.

Remove the 5 x 8 mm tapping screws (1), 6 x 10 mm tapping screw (2), and muffler protector (3).

Remove the 5 x 8 mm tapping screws (4) and spark arrester (5).



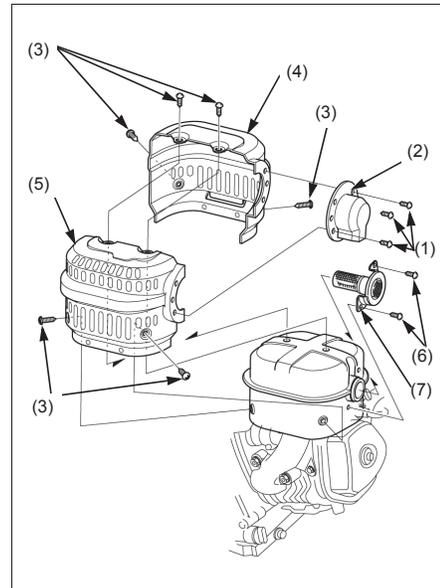
**MAINTENANCE****SEPARATED PROTECTOR TYPE**

Remove the muffler cover (page 12-6), If equipped.

Remove the 4 x 6 mm tapping screws (1), and muffler cap (2), If equipped.

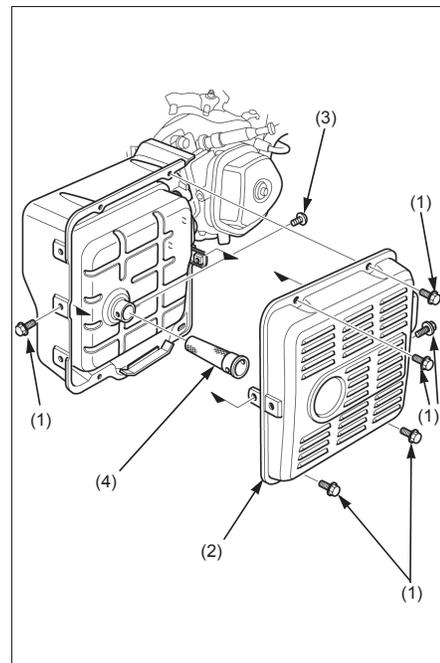
Remove the 5 x 8 mm tapping screws (3), R. muffler protector (4), and L. muffler protector (5).

Remove the 5 x 8 mm tapping screws (6) and spark arrester (7).

**INNER/OUTER PROTECTOR TYPE**

Remove the 6 x 10 mm bolts (1), and outer muffler protector (2).

Remove the 4 x 8 mm tapping screw (3), and spark arrester (4).



## MAINTENANCE

### CLEANING

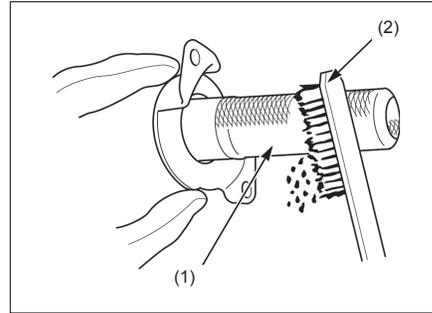
#### NOTICE

*Be careful to avoid damaging the screen.*

Clean the carbon deposits from the spark arrester screen (1) with a wire brush (2).

Check the spark arrester screen for damage. If the screen is damaged, replace the spark arrester.

Install the spark arrester in the reverse order of removal.

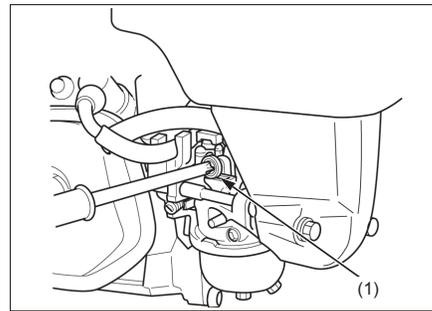


### IDLE SPEED CHECK/ADJUSTMENT

Start the engine and allow it to warm up to normal operating temperature.

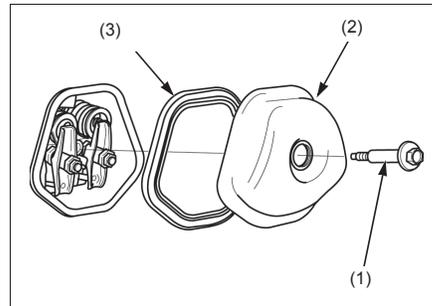
Turn the throttle stop screw (1) to obtain the specified idle speed.

**IDLE SPEED:**  $1,400 \pm 150 \text{ min}^{-1} \text{ (rpm)}$



### VALVE CLEARANCE CHECK/ADJUSTMENT

Remove the head cover bolt (1), the head cover (2), and the head cover packing (3).

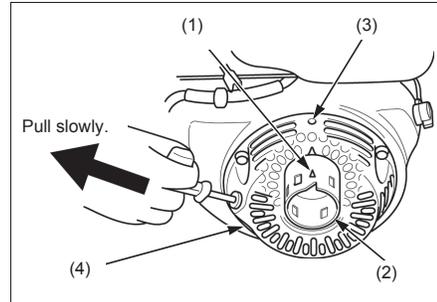


## MAINTENANCE

Disconnect the spark plug cap from the spark plug.

Set the piston near top dead center of the cylinder compression stroke (both valves fully closed) by pulling the recoil starter slowly. When the piston is near top dead center of the compression stroke, the triangle mark (1) on the starter pulley (2) will align with the top hole (3) on the recoil starter case (4).

If the exhaust valve is opened, use the recoil starter to turn the crankshaft one additional turn and align the triangle mark on the starter pulley with the top hole on the recoil starter case again.



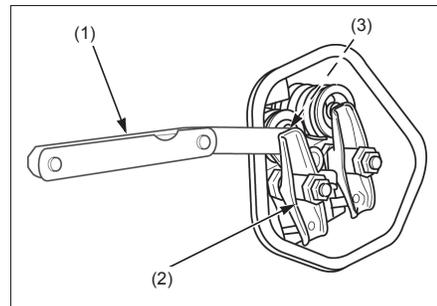
Insert a thickness gauge (1) between the valve rocker arm (2) and valve stem (3) to measure the valve clearance.

**VALVE CLEARANCE:**

**IN:  $0.15 \pm 0.02$  mm**

**EX:  $0.20 \pm 0.02$  mm**

If adjustment is necessary, proceed as follows.



Hold the rocker arm pivot (1) and loosen the pivot adjusting nut (2).

Turn the rocker arm pivot to obtain the specified clearance.

**VALVE CLEARANCE:**

**IN:  $0.15 \pm 0.02$  mm**

**EX:  $0.20 \pm 0.02$  mm**

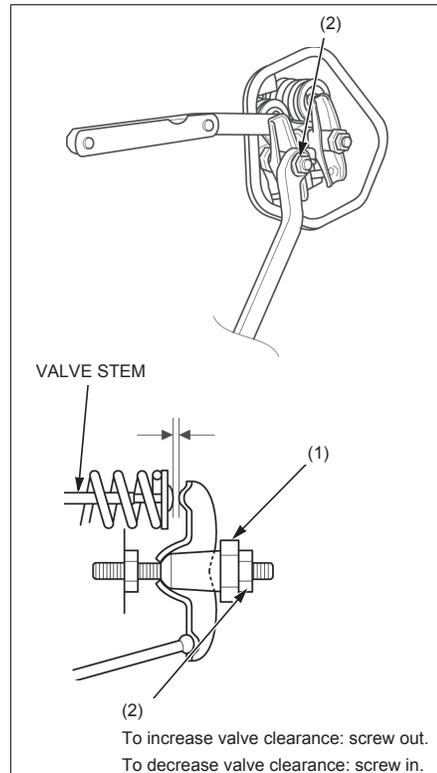
Hold the rocker arm pivot and retighten the pivot adjusting nut to the specified torque.

**TORQUE: 10 N·m (1.0 kgf·m, 7 lbf·ft)**

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

Check the head cover packing for damage or deterioration, and install it to the head cover.

Attach the cylinder head cover to the cylinder head, and tighten the head cover bolt securely.

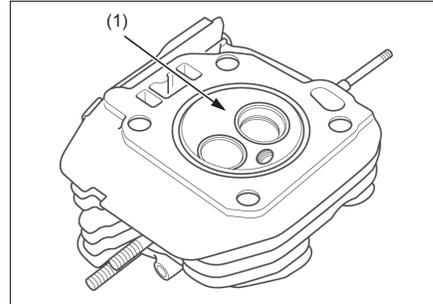


## MAINTENANCE

### COMBUSTION CHAMBER CLEANING

Remove the cylinder head (page 13-3).

Clean any carbon deposits from the combustion chamber (1).



### FUEL TANK AND FILTER CLEANING

#### ⚠ WARNING

Gasoline is highly flammable and explosive. You can be burned or seriously injured when handling fuel.

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

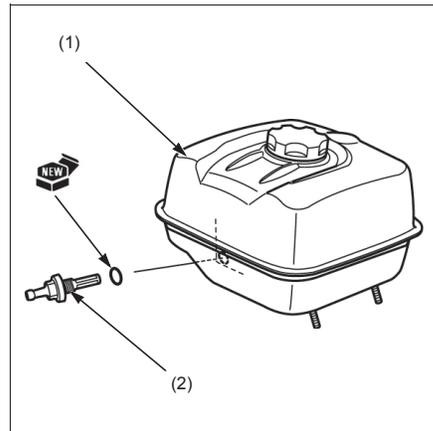
Drain the fuel into a suitable container.

Remove the fuel tank (1) and fuel tank joint (2) (page 6-3).

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

Install the fuel tank (page 6-3).

Check the installation part of the fuel tank for any sign of fuel leakage.



## FUEL TUBE CHECK

### **▲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.

Check the fuel tube (1) for deterioration, cracks or signs of leakage.

