A Few Words About Safety

SERVICE INFORMATION

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

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

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

For Your Customer's Safety

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

⚠WARNING

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

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

For Your Safety

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

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

⚠WARNING

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

Follow the procedures and precautions in this manual carefully.

Important Safety Precautions

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

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

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

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

Gasoline 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

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.

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SERVICE PUBLICATION OFFICE

Date of Issue: March 2010

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.
(○ x ○) (○)	Indicates the diameter, length, and quantity of metric bolts used.
page 1-1	Indicates the reference page.

ABBREVIATIONS

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

Abbrev. term	Full term
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

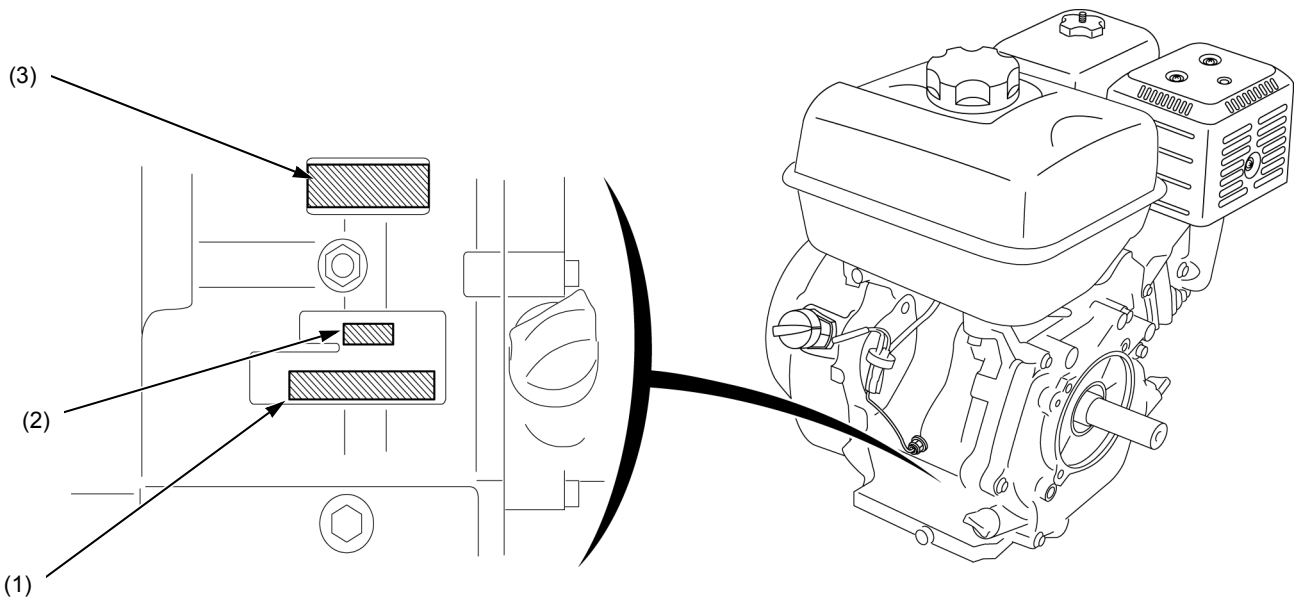
Bl	Black	G	Green	Br	Brown	Lg	Light green
Y	Yellow	R	Red	O	Orange	P	Pink
BU	Blue	W	White	Lb	Light blue	Gr	Gray

1. SPECIFICATIONS

SERIAL NUMBER LOCATION

The engine serial number (1), 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				

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*	-	-	460 mm (18.1 in)
	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*	-	-	448 mm (17.6 in)
	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*	-	-	35.2 kg (77.6 lbs)
	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*	-	-	41.2 kg (90.8 lbs)
	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)

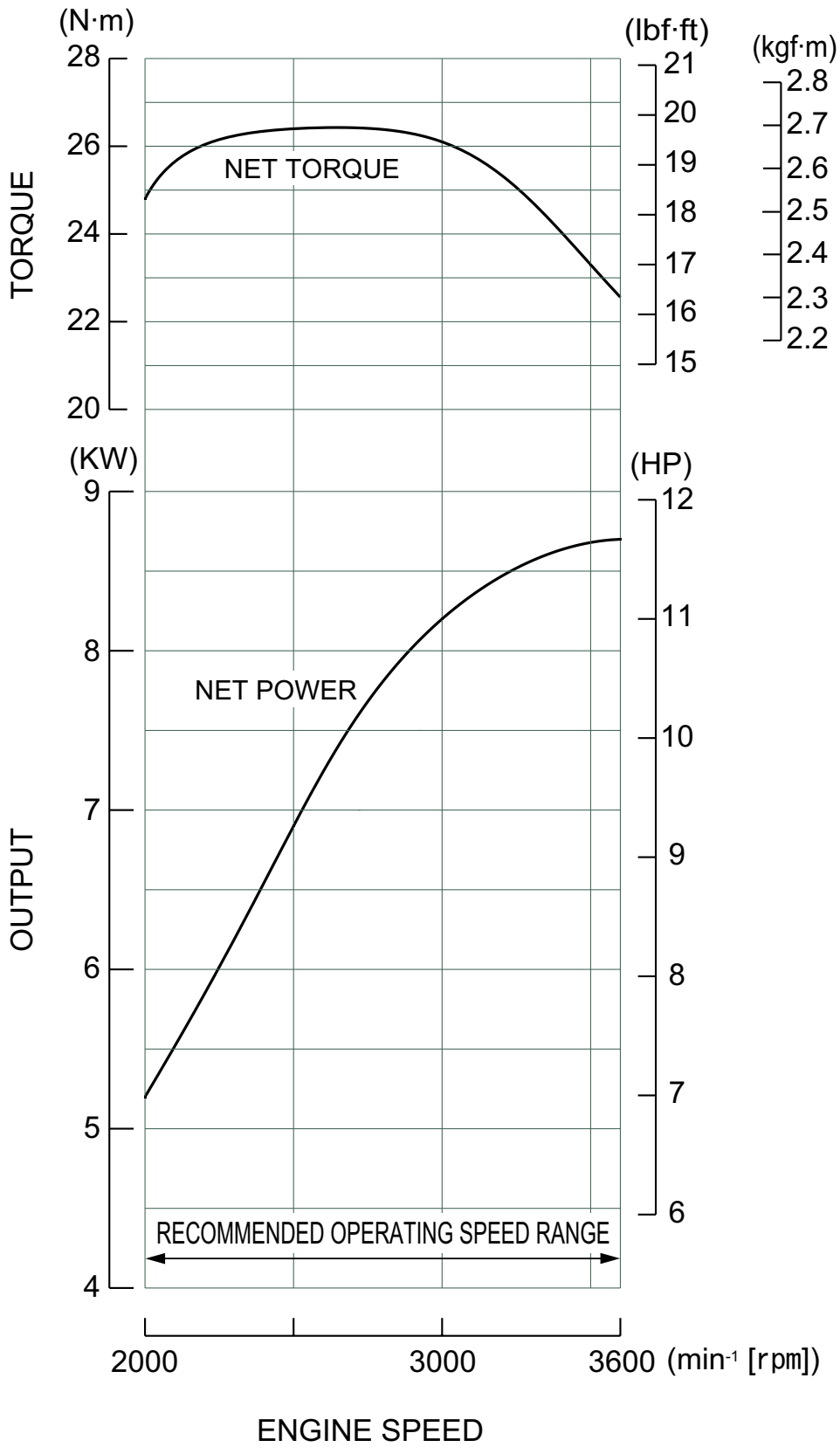
*: P. T. O. type. (page 1-2)

ENGINE SPECIFICATIONS

Model	GX390RT2	GX390T2	GX390UT2
Description code	GCBCT	GCBDT	GCBCT
Type	4 stroke, overhead valve, single cylinder, inclined by 25°		
Displacement	389 cm^3 (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^{-1} (rpm)		
Continuous rated power	7.0 kW (9.4 HP) / 3,600 min^{-1} (rpm)		
Maximum net torque (SAE J1349)*1	26.5 N·m (2.7 kgf·m, 19.5 lbf·ft) / 2,500 min^{-1} (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^{-1} (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.

PERFORMANCE CURVES

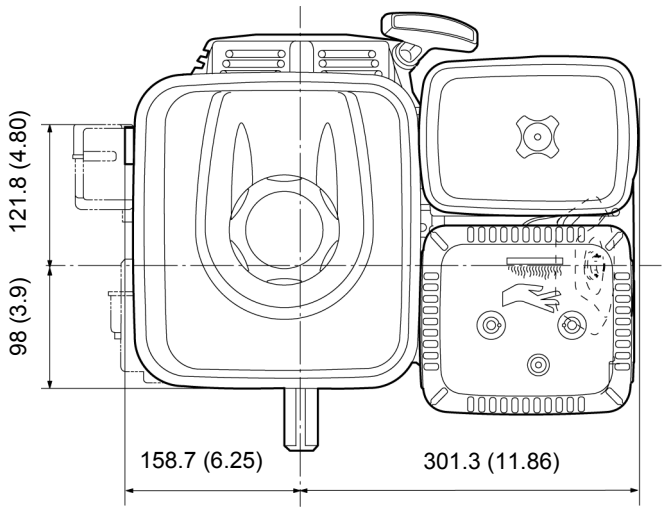


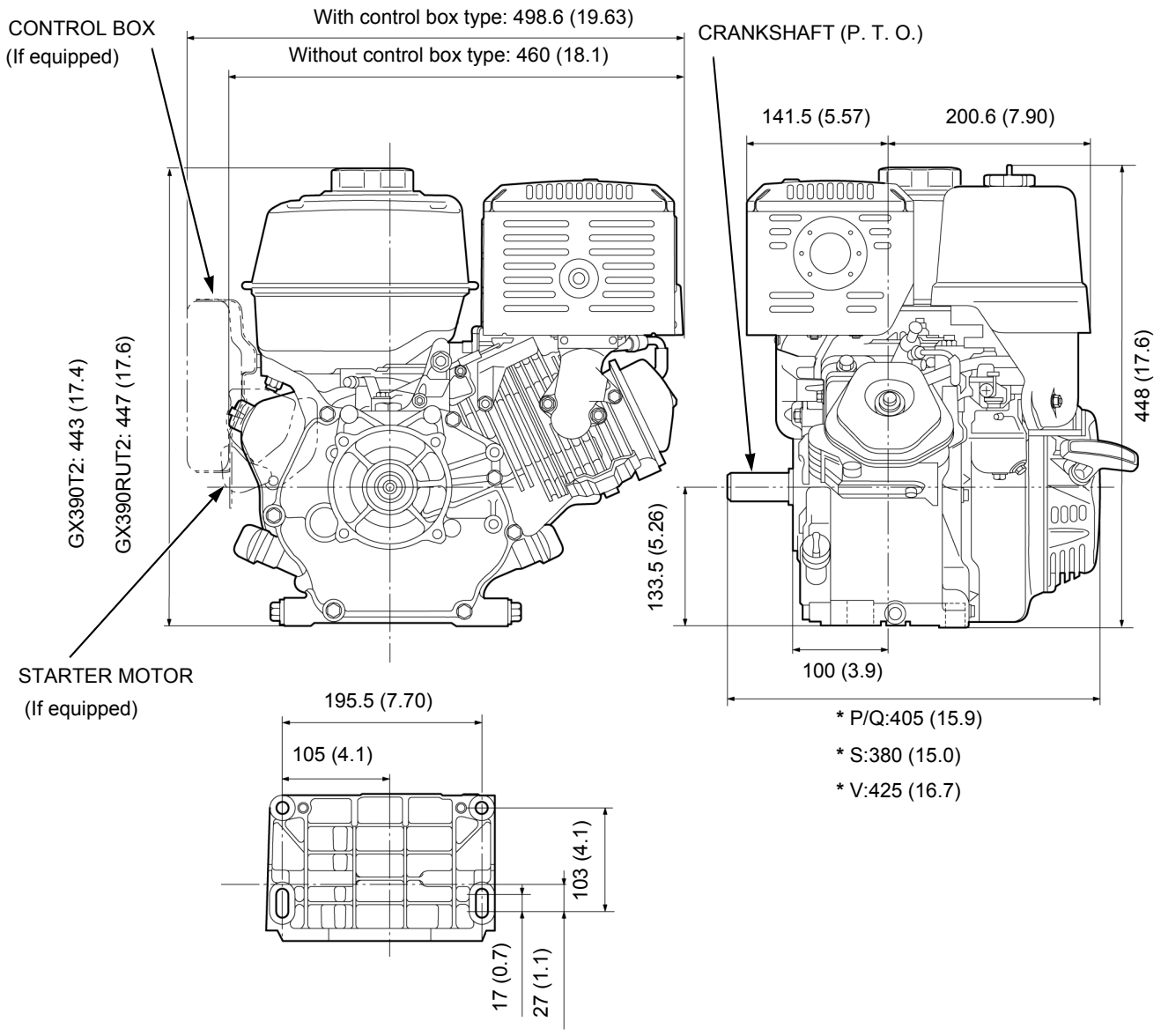
DIMENSIONAL DRAWINGS

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

WITHOUT REDUCTION TYPE

Unit: mm (in)





SPECIFICATIONS

WITH REDUCTION UNIT TYPE

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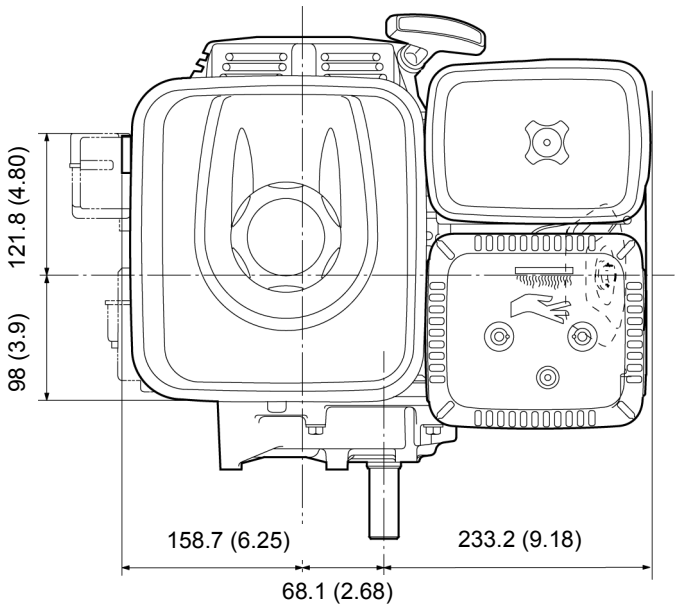
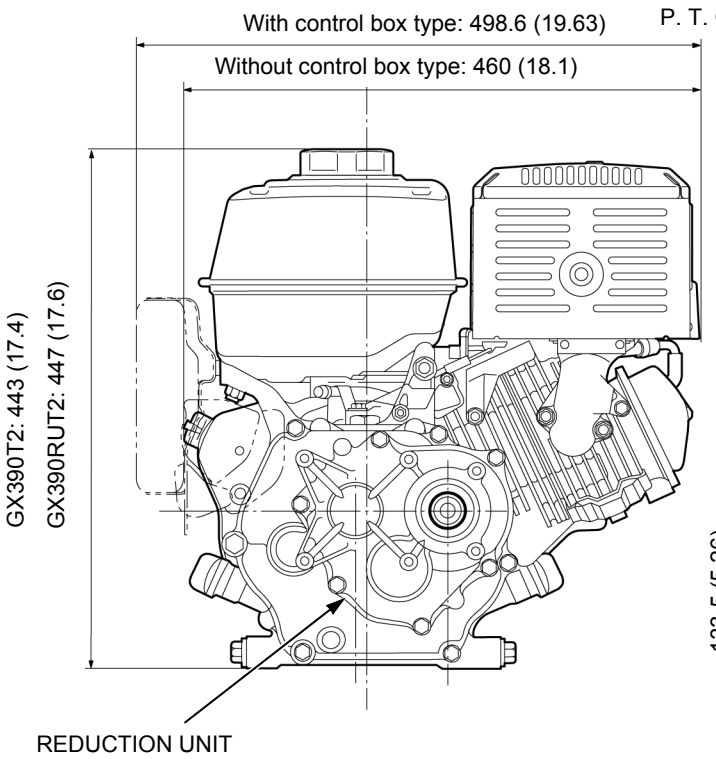
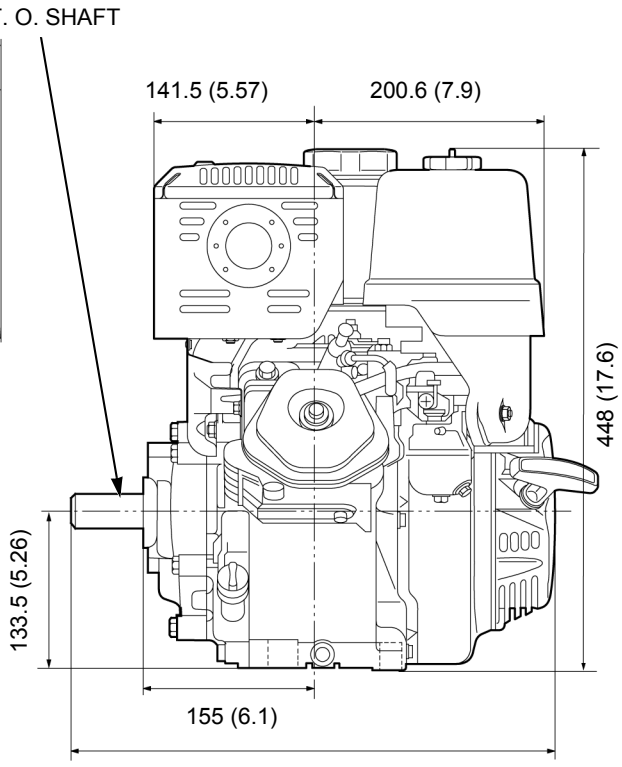
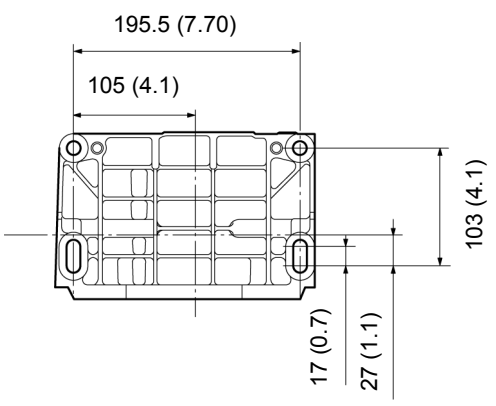






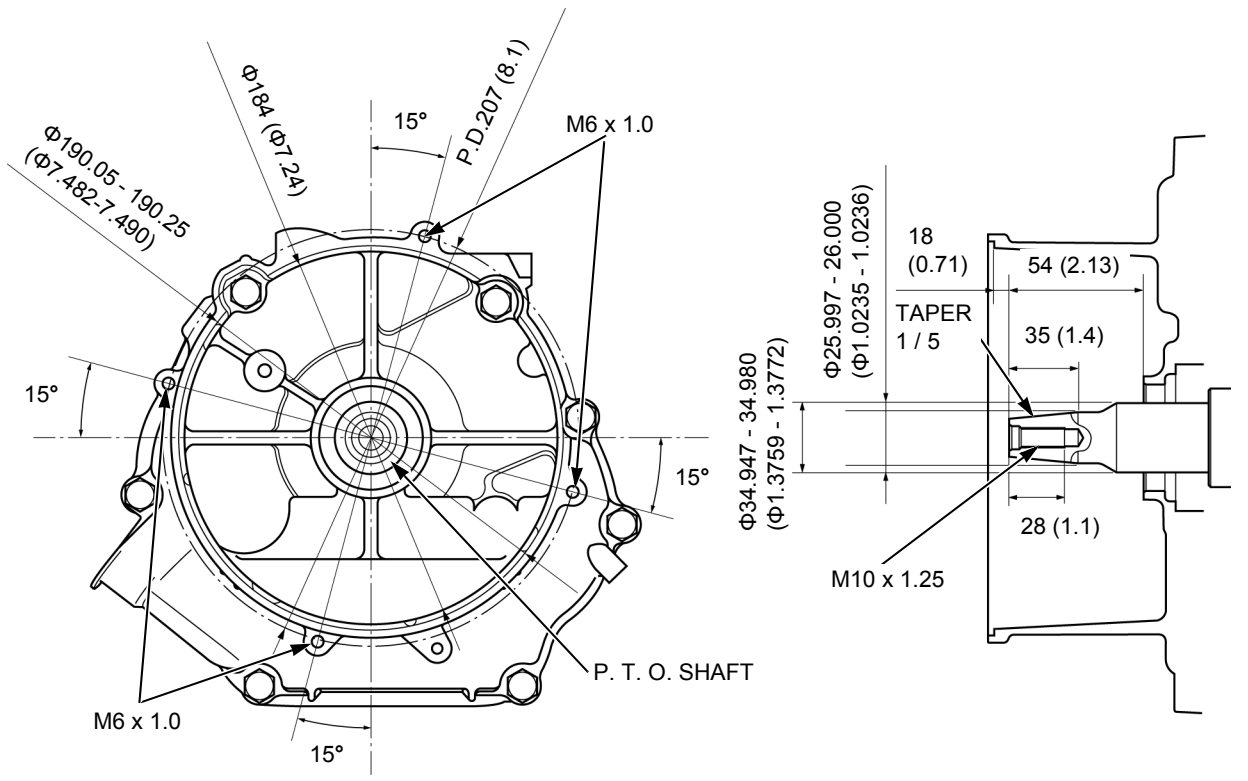


PTO DIMENSIONAL DRAWINGS

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

E TYPE*

Unit: mm (in)



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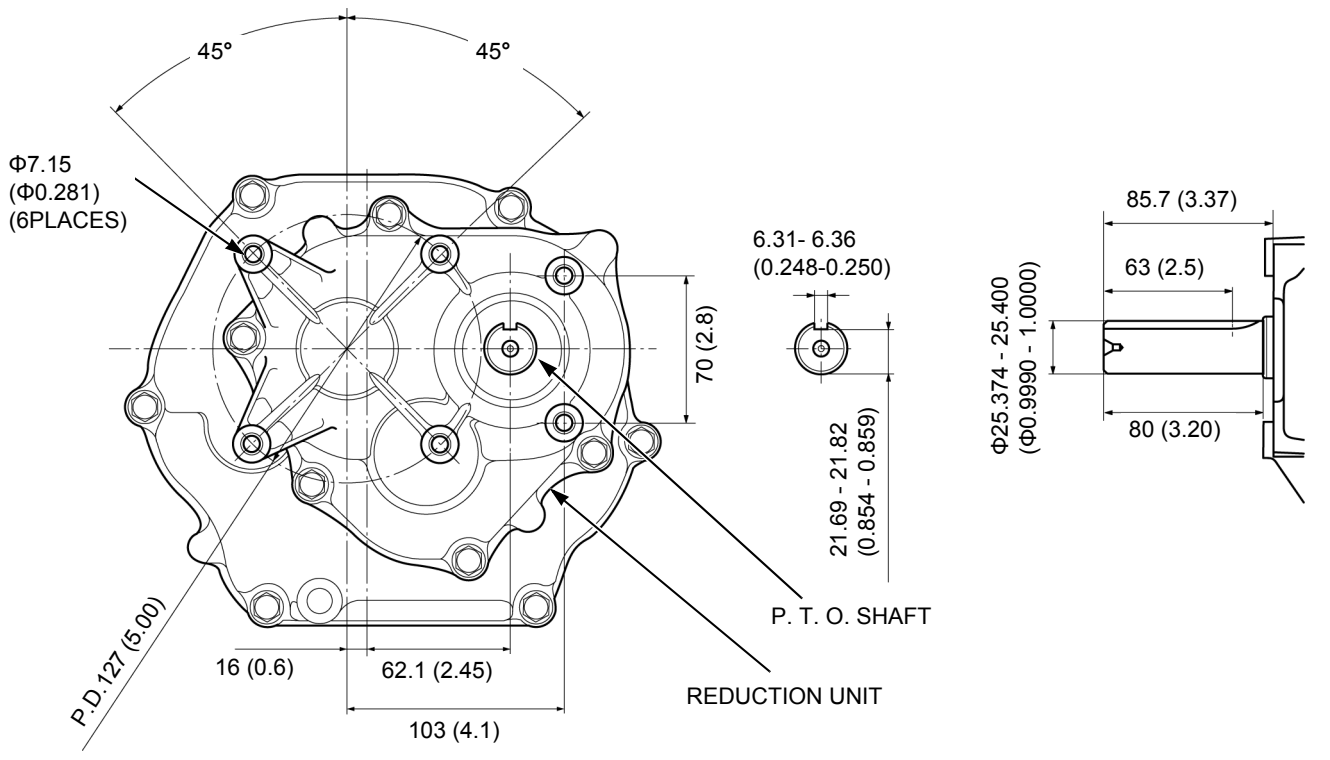

SPECIFICATIONS

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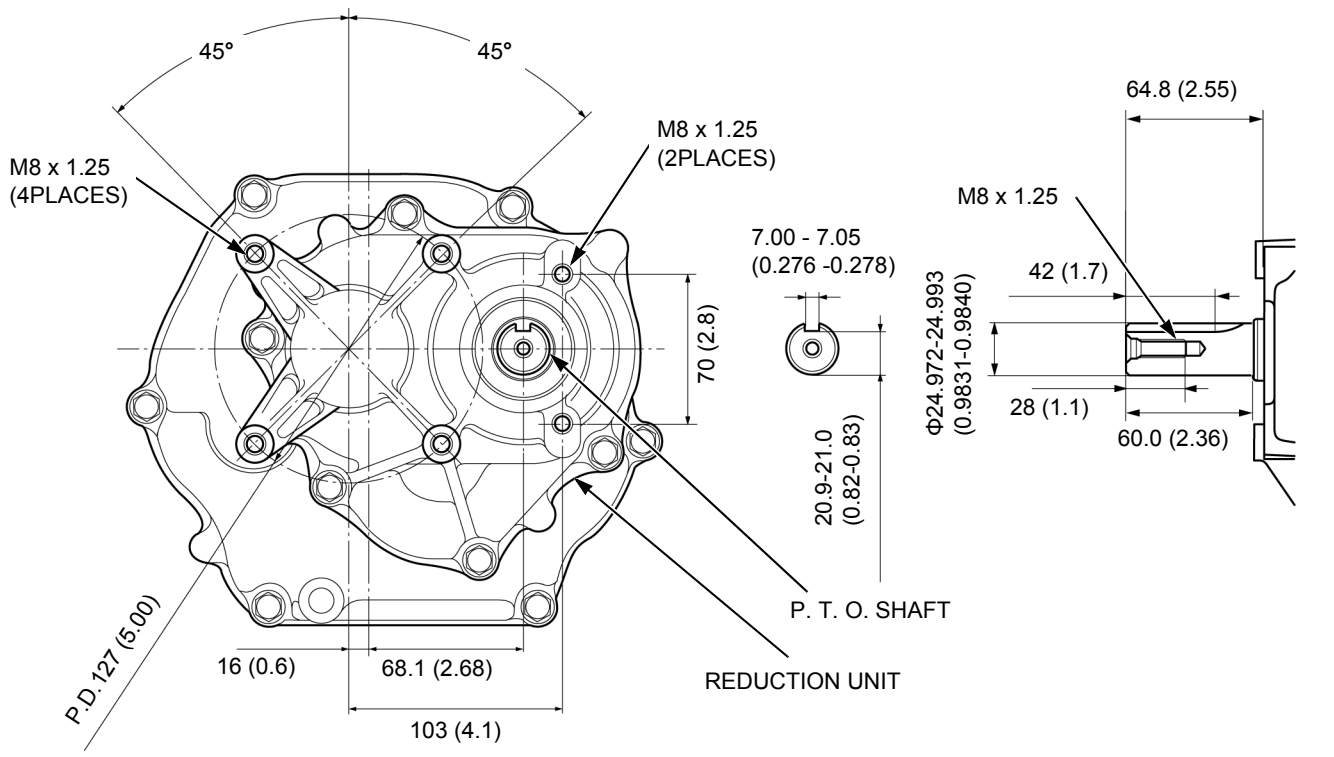

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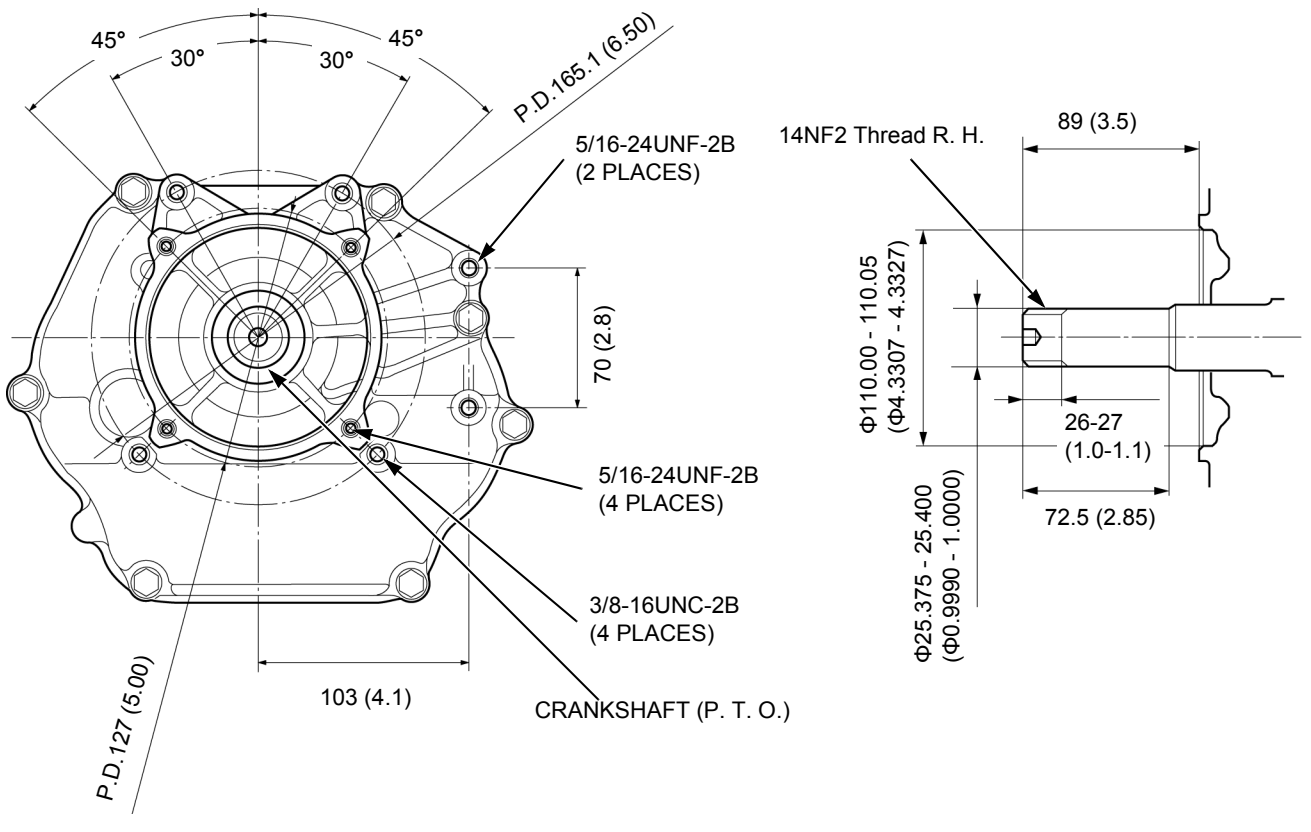
Unit: mm (in)



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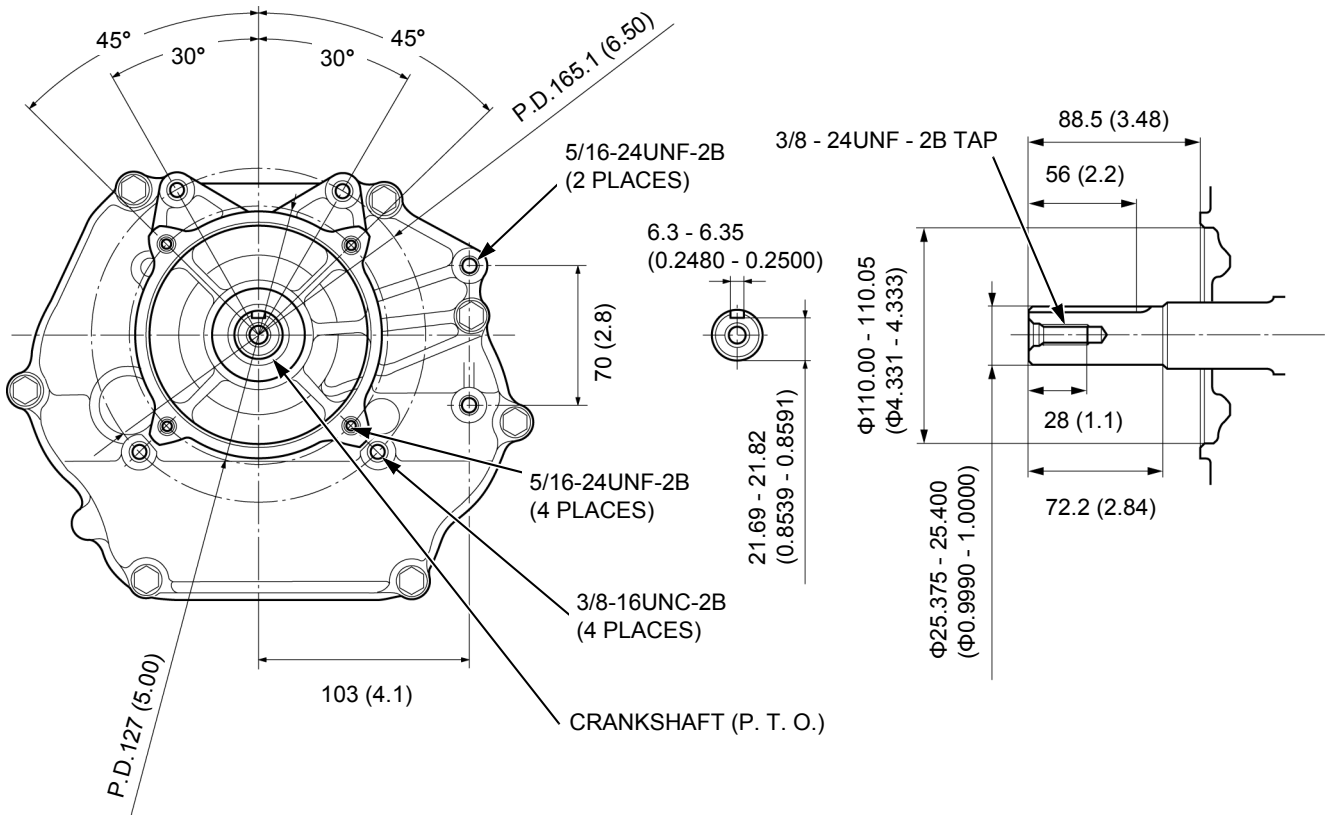

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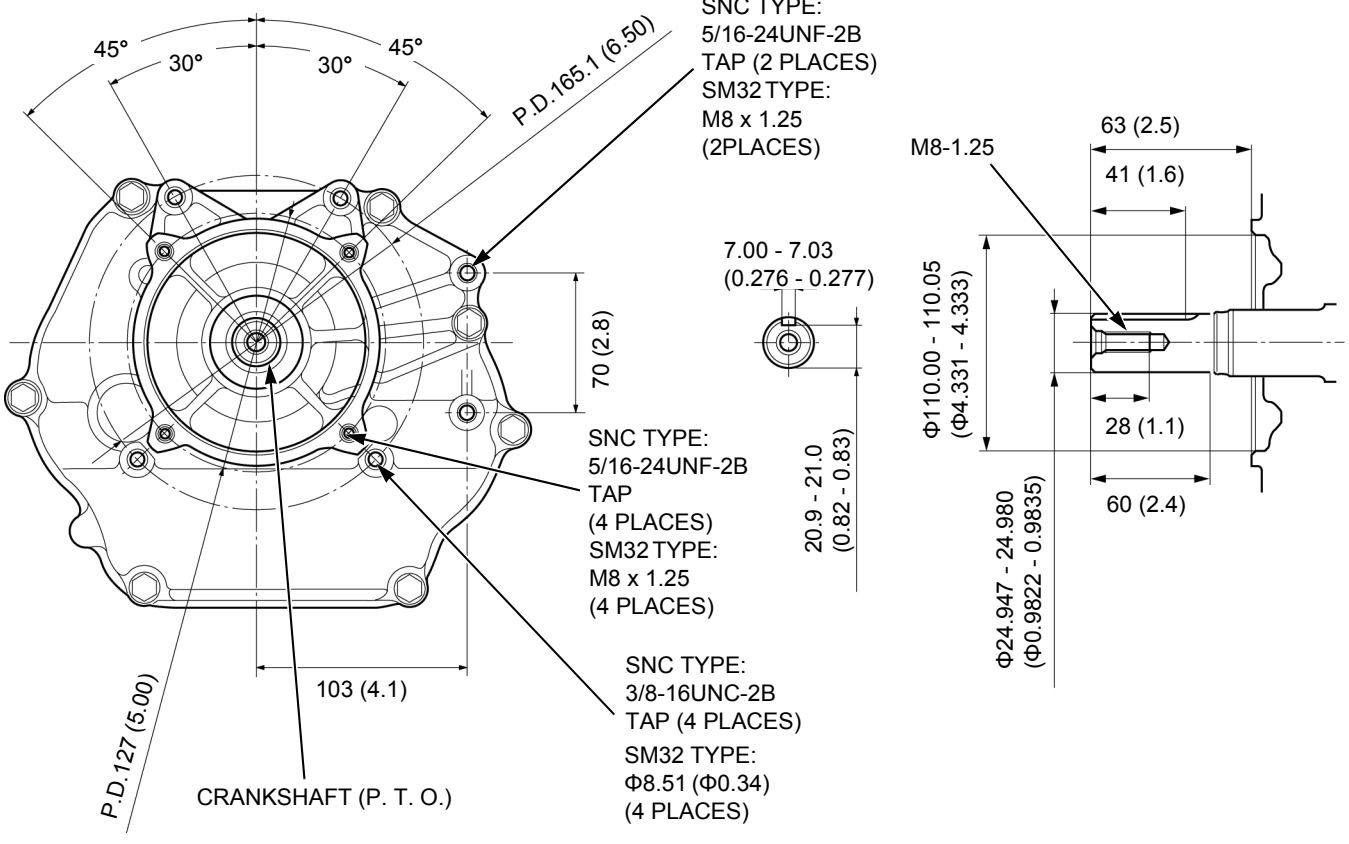

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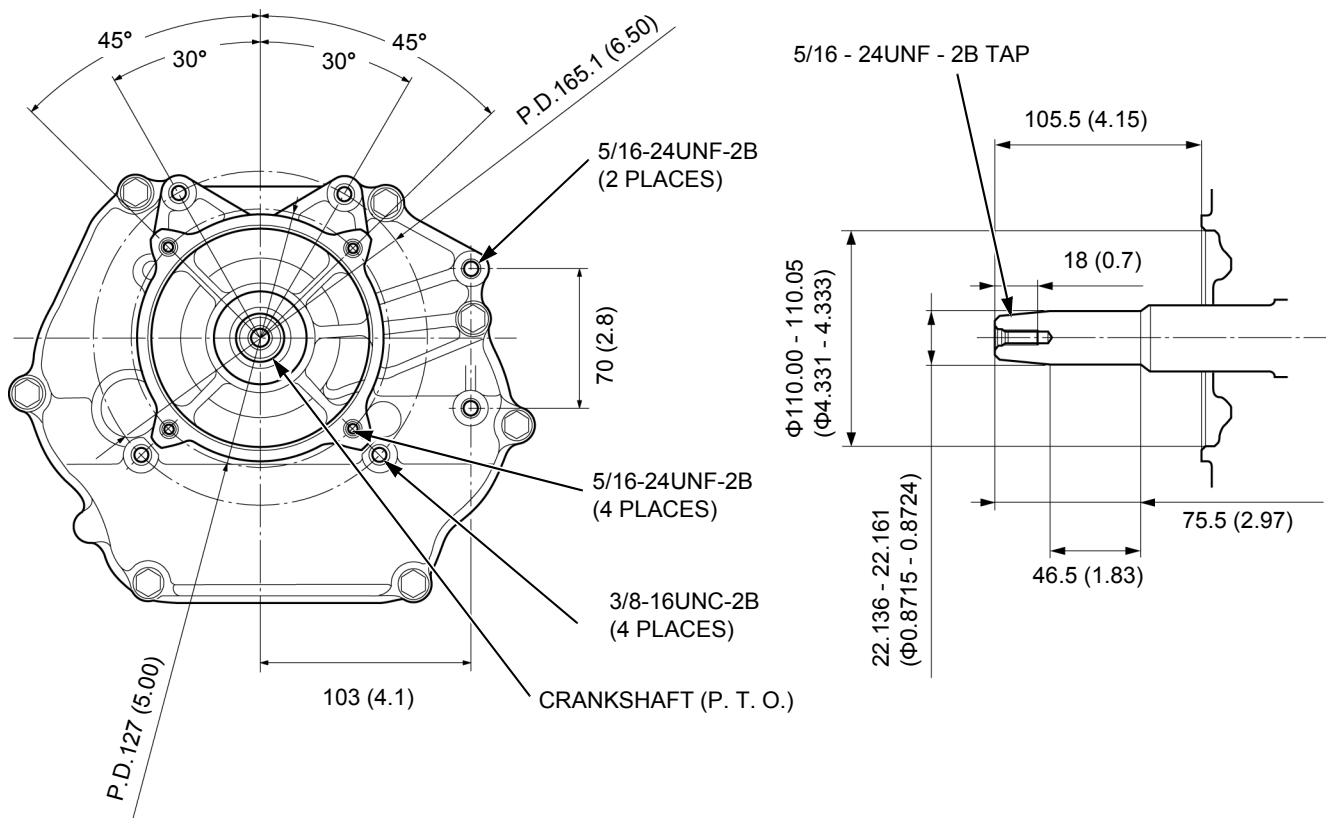


2. SERVICE INFORMATION

MAINTENANCE STANDARDS

Unit: mm (in)

Part	Item		Standard	Service limit
Engine	Maximum speed (at no load)		3,850 ± 150 min^{-1} (rpm)	–
	Idle speed		1,400 ± 150 min^{-1} (rpm)	–
	Cylinder compression		0.51-0.69 MPa (5.2-7.0 kgf/cm^2, 74-100 psi) / 600 min^{-1} (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)

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 Ω	–
		3A	0.62 - 0.93 Ω	–
		10A	0.16 - 0.24 Ω	–
		18A	0.10 - 0.30 Ω	–
Lamp coil	Resistance	12V - 15 W	1.04 - 1.56 Ω	–
		12V - 25 W	0.30 - 0.46 Ω	–
		12V - 50 W	0.29 - 0.44 Ω	–

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

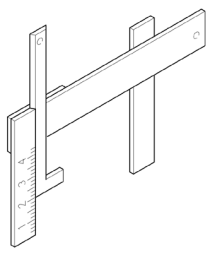
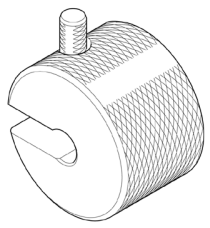
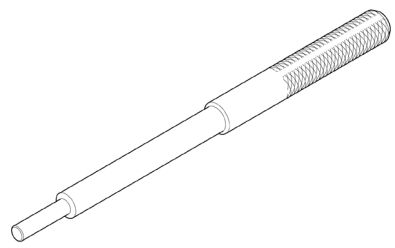
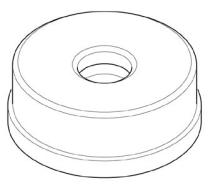
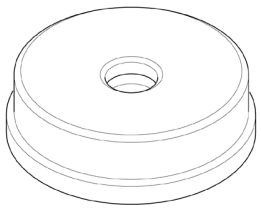
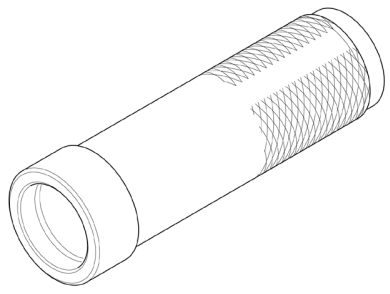
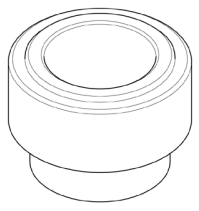
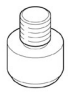
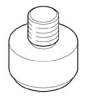
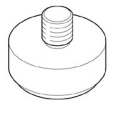
LUBRICATION & SEAL POINT

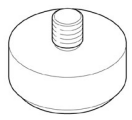
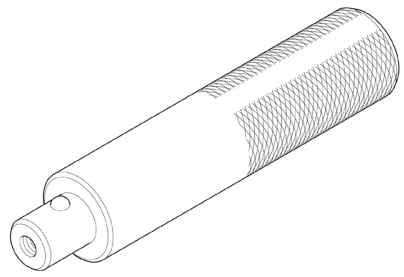
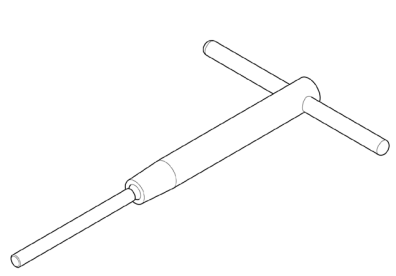
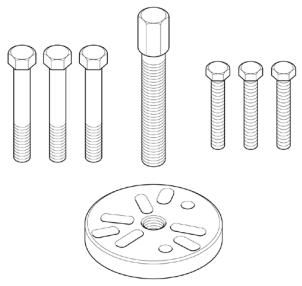
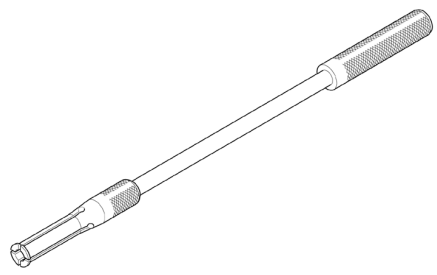
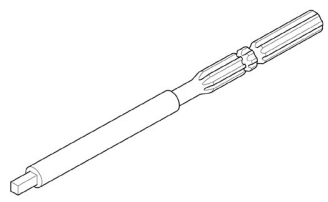
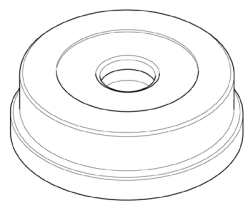
Location	Material	Remarks
Crankshaft pin, journal and gear	Engine oil	
Crankcase bearing		
Crankcase cover bearing		
Piston outer surface and piston pin hole		
Piston pin outer surface		
Piston ring		
Cylinder inner surface		
Connecting rod big and small end bearing		
Connecting rod bolt threads and 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		
Camshaft cam profile	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
Recoil starter center screw threads	Threebond® 2430 or equivalent	

TOOLS

SPECIAL TOOLS

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

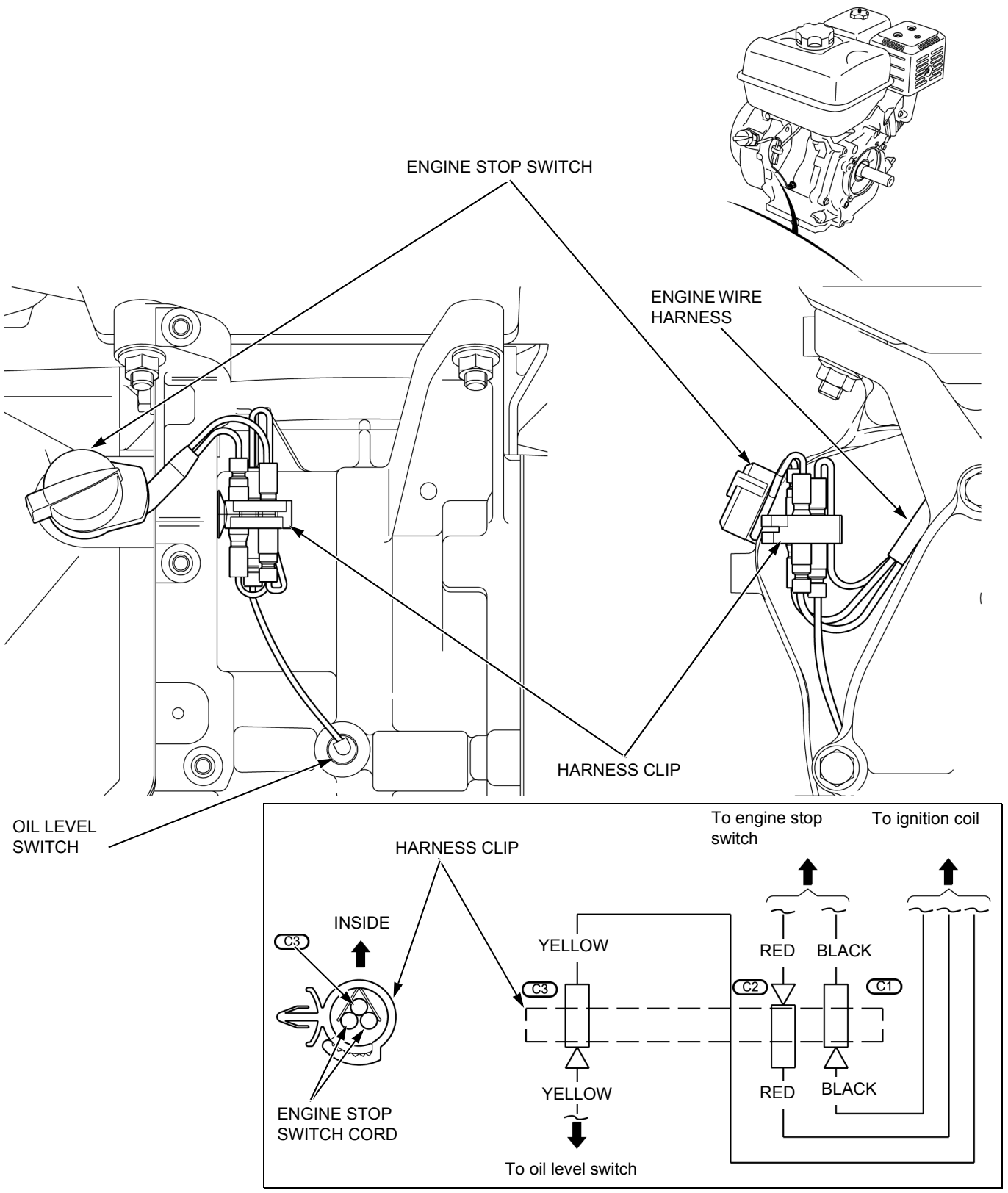
Float level gauge 07401-0010000 	Sliding hammer weight 07741-0010201 	Valve guide driver, 6.45×11 07742-0010200 
Bearing driver attachment, 32×35 [in combination with 07749-0010000] 07746-0010100 	Bearing driver attachment, 42×47 [in combination with 07749-0010000] 07746-0010300 	Bearing driver attachment, 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 

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

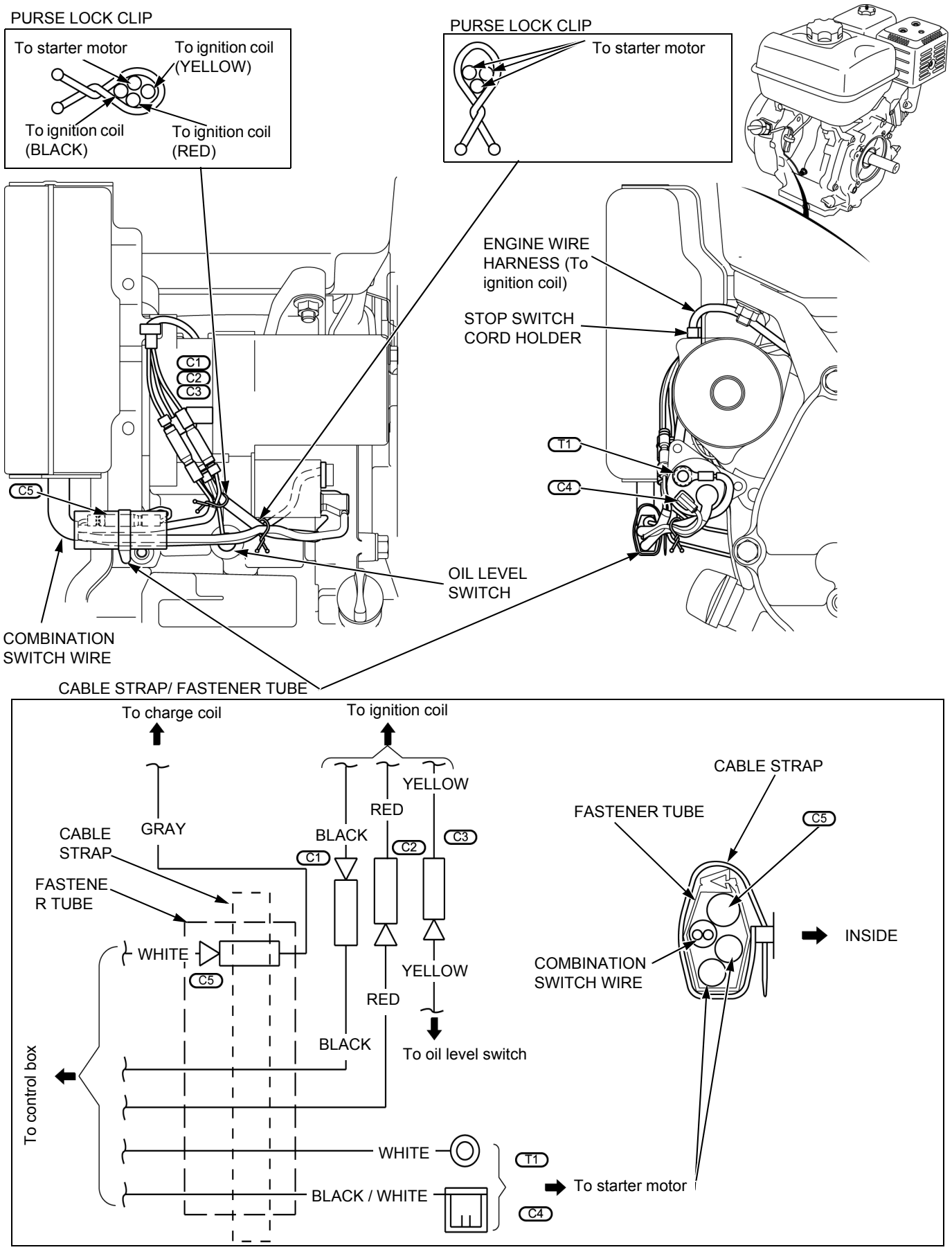
HARNESS AND TUBE ROUTING

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.

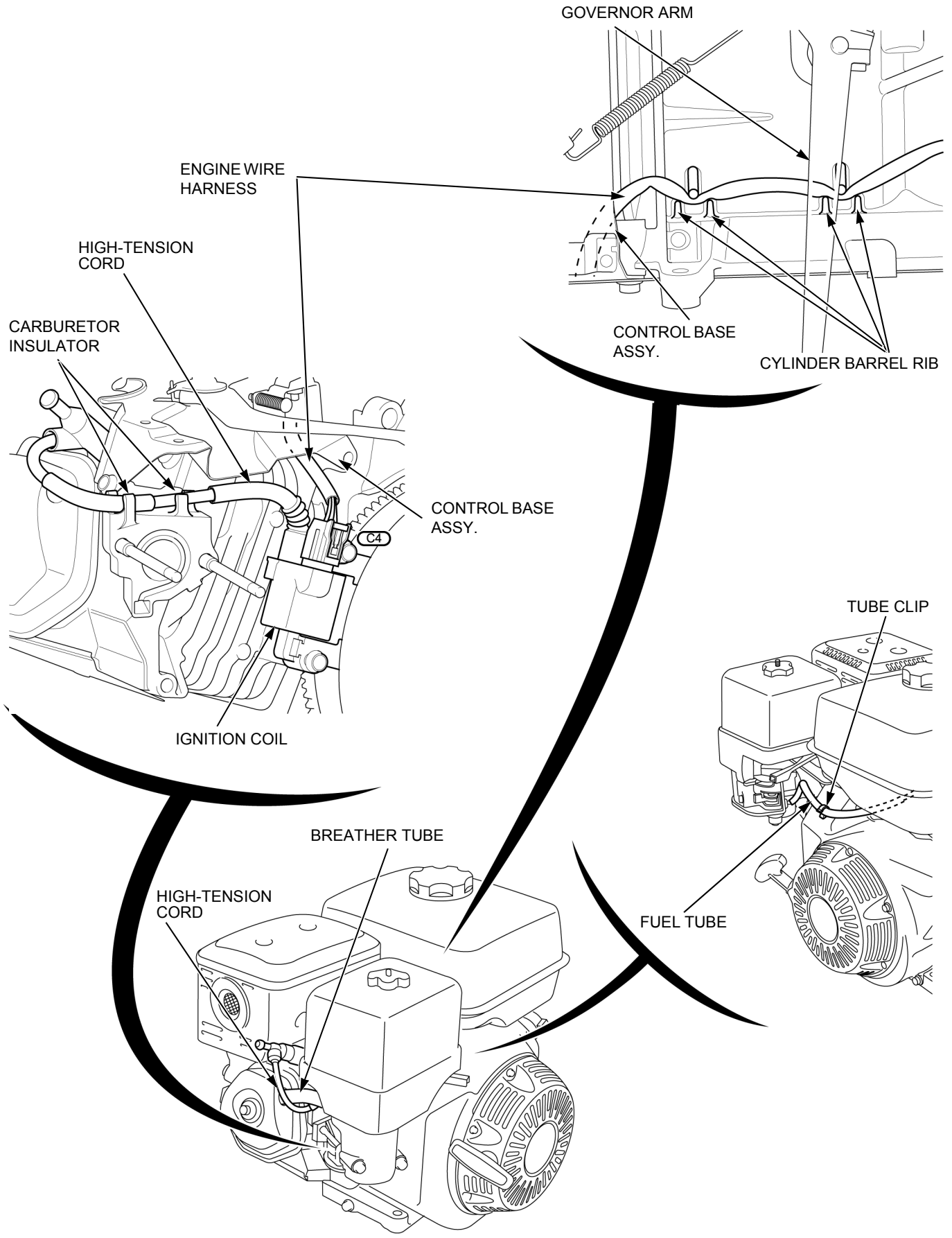
ENGINE STOP SWITCH TYPE



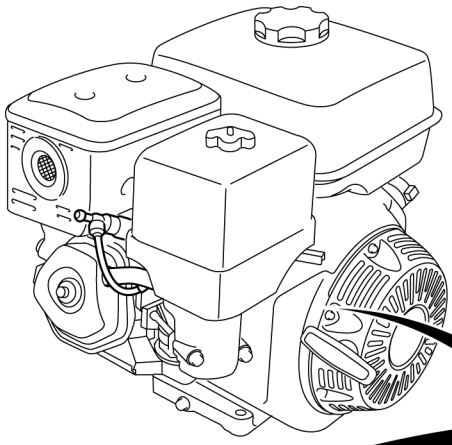
COMBINATION SWITCH (CONTROL BOX) TYPE



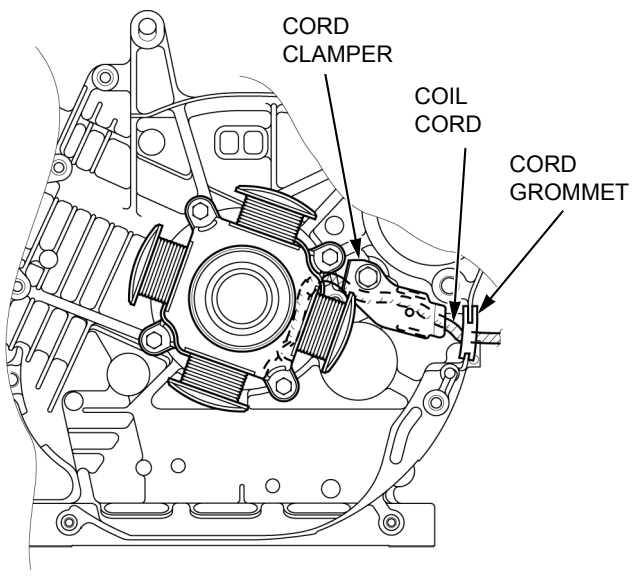
ALL TYPE



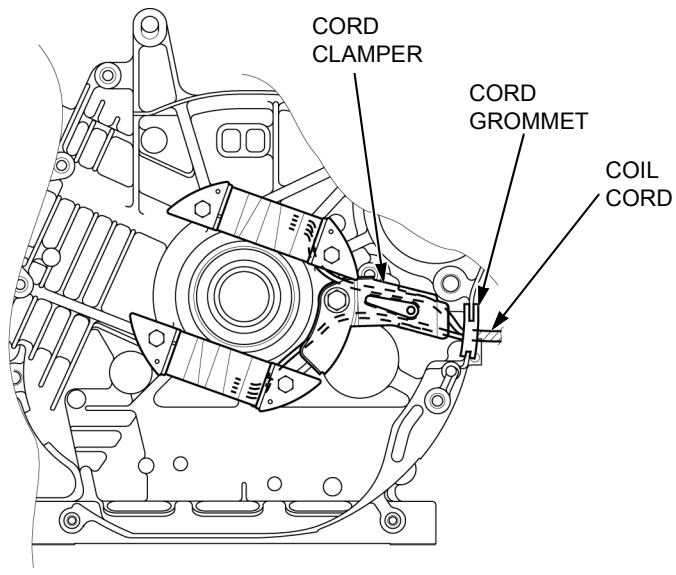
WITH CHARGE COIL / LAMP COIL



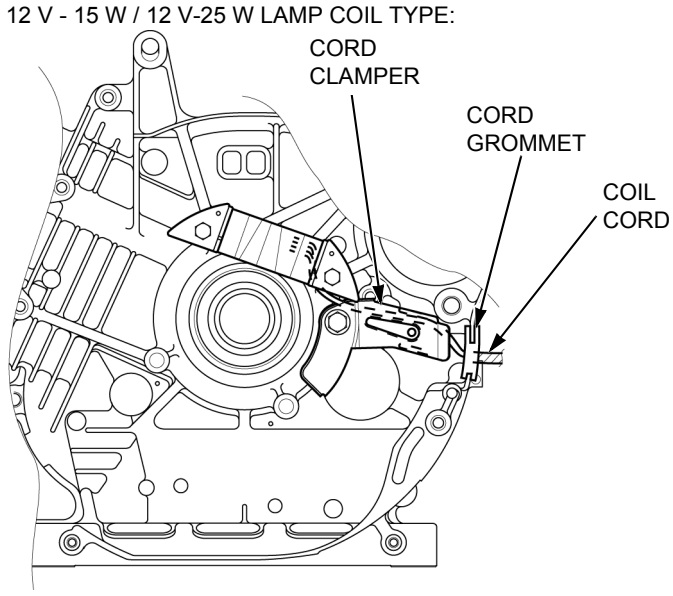
18A CHARGE COIL TYPE:



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

REGULAR SERVICE PERIOD (2) ITEM / Perform at every indicated month or operating hour interval, whichever comes first.		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
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					3-4
	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.

ENGINE OIL LEVEL CHECK

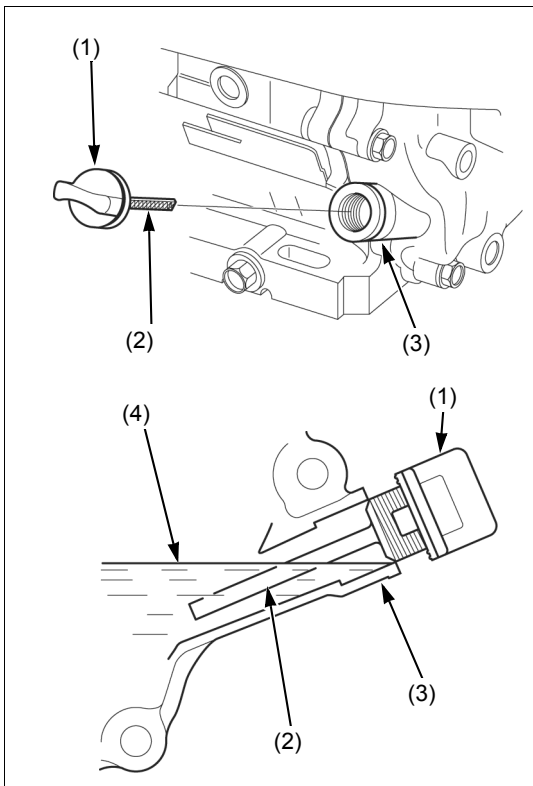
Place the engine on a level surface.

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.

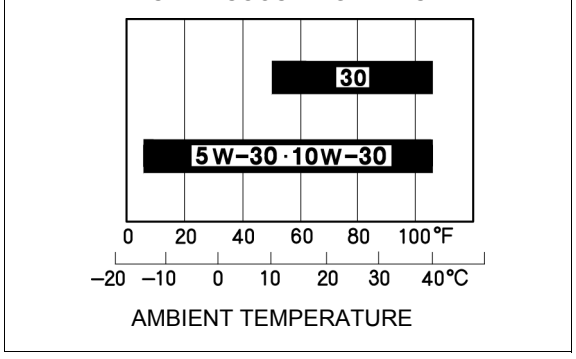
If the oil level is low, fill with recommended oil to the upper level (4) of the oil filler neck.



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.



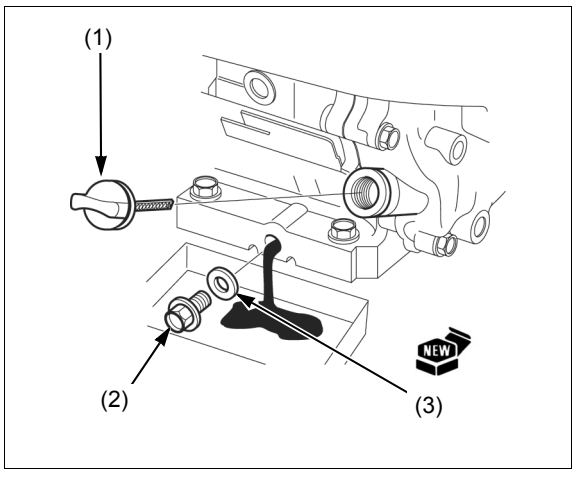
ENGINE OIL CHANGE

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.



⚠ 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.

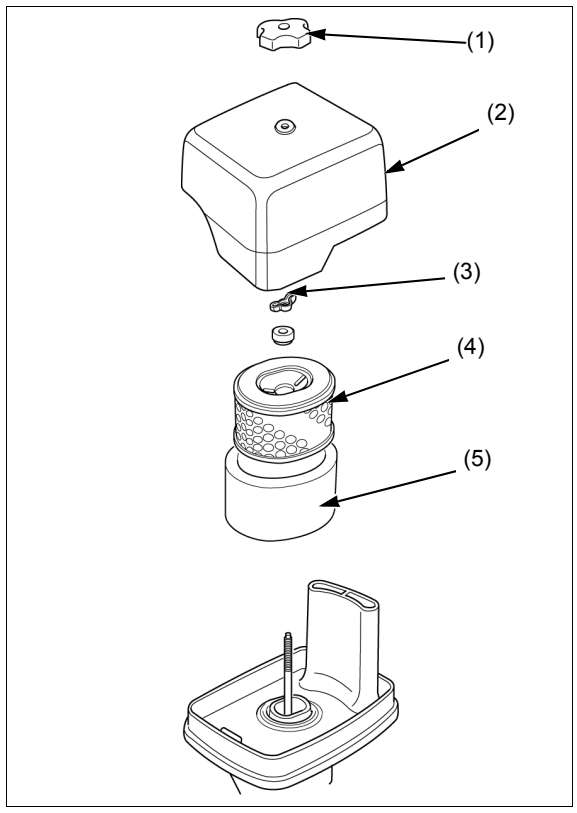
Remove the nut (1) and the air cleaner cover (2).

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).



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.

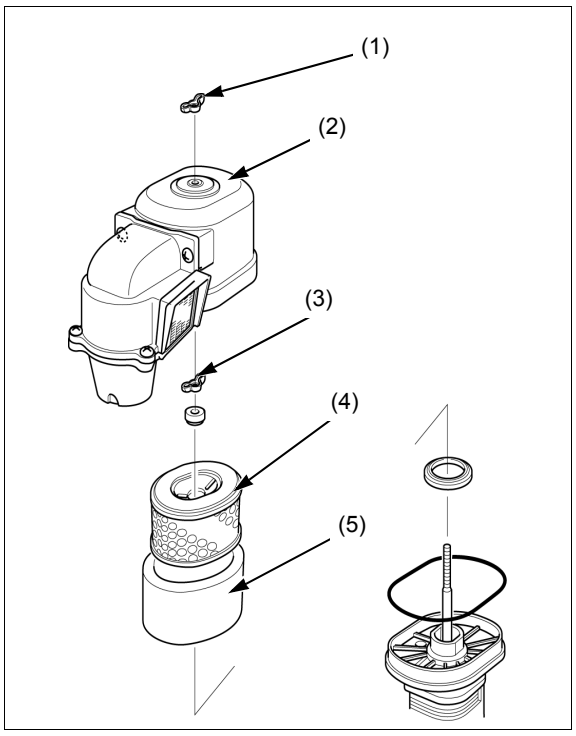
Remove the wing nut (1) and the air cleaner cover (2).

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.

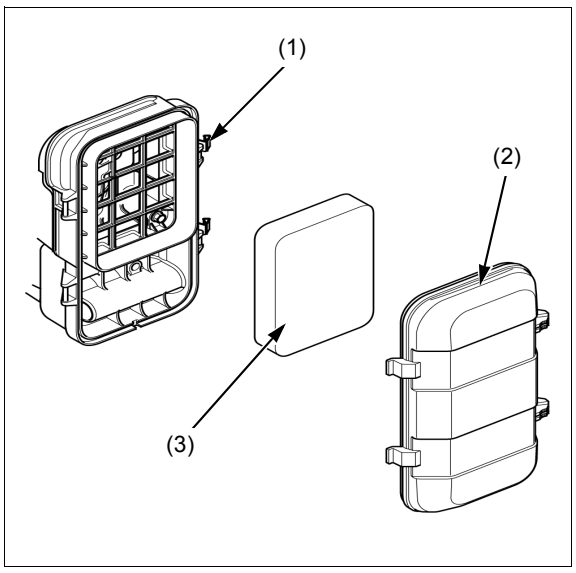
Remove the air cleaner case lid spring (1) and air cleaner cover (2).

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:

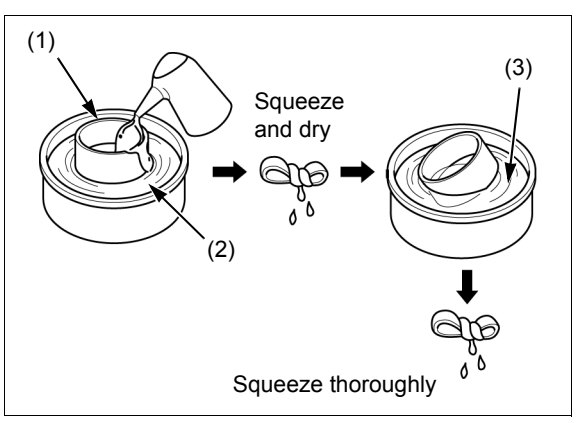
Clean the filter (1) in warm soapy water (2), rinse, and allow to dry thoroughly, or clean with a non-flammable solvent and allow to dry thoroughly.

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.



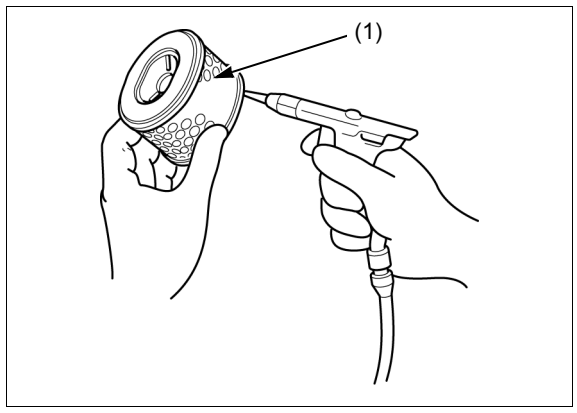
INNER FILTER (PAPER) TYPE:

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^2, 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).

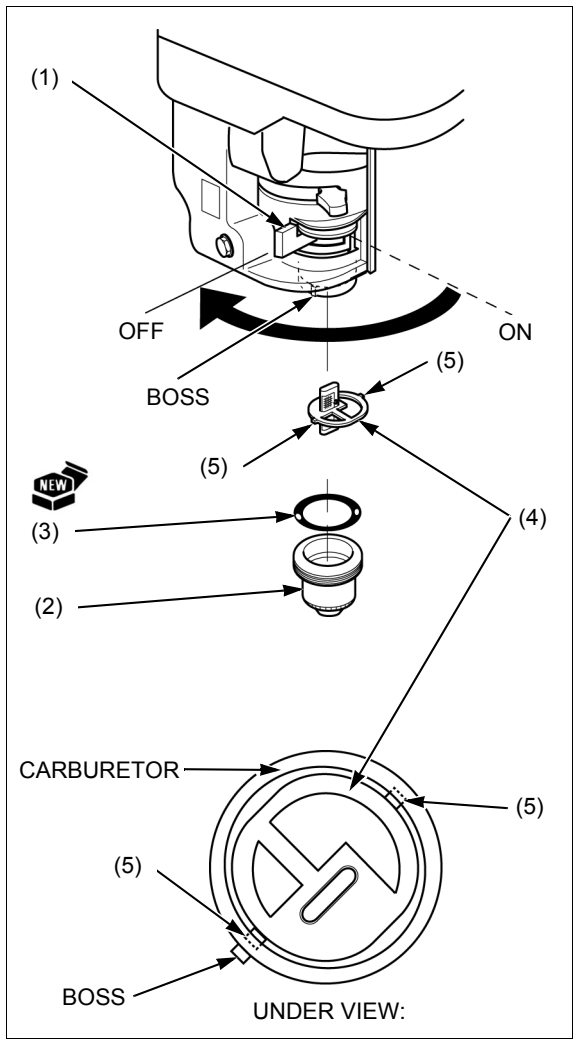
Clean the sediment cup and the cup filter with non-flammable solvent and allow them to dry thoroughly.

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.

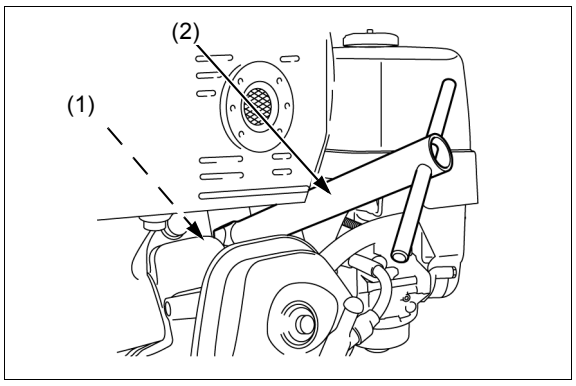


SPARK PLUG CHECK/ADJUSTMENT

⚠ 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).

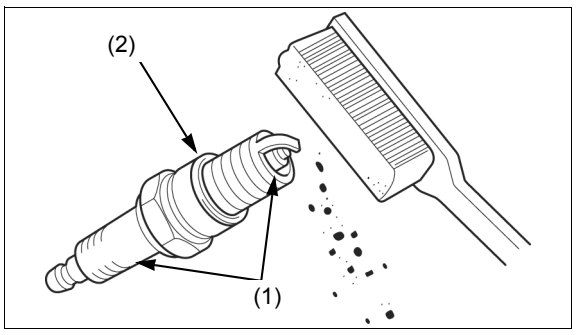


Visually check the spark plug. Replace the plug if the insulator (1) is cracked or chipped.

Check the sealing washer (2) for damage.

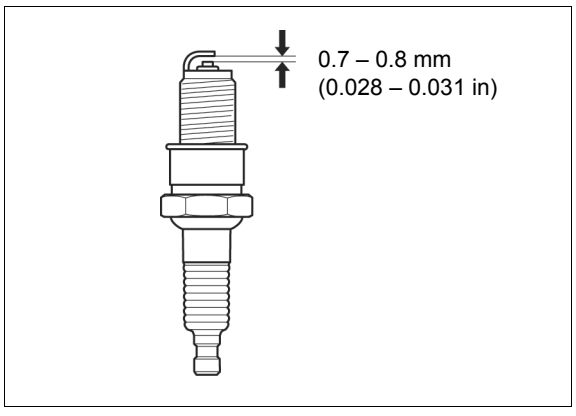
Replace the spark plug if the sealing washer is damaged (page 3-8).

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.

SPARK PLUG REPLACEMENT

⚠CAUTION

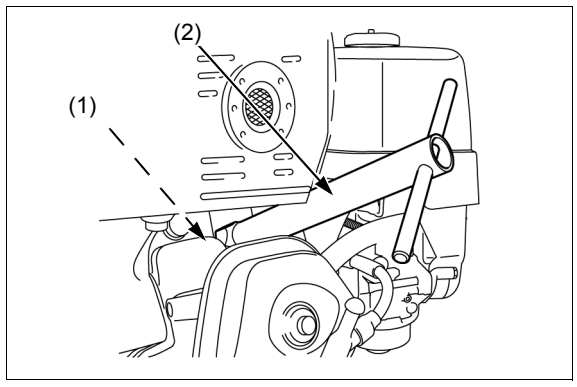
If the engine has been running, the engine will be very hot.Allow it to cool before proceeding.

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

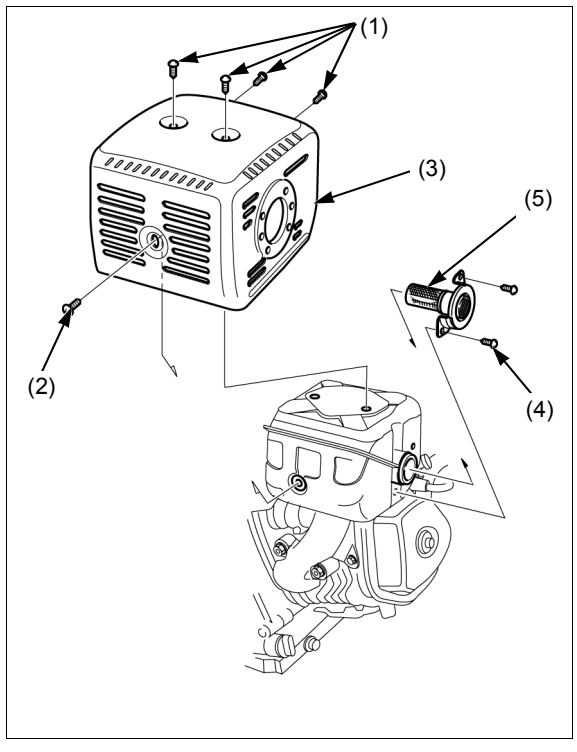
The engine and the muffler becomes very hot during operation and remains hot for a while after stopping the engine. Be careful not to touch the muffler while it is hot. Allow it to cool before proceeding.

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).



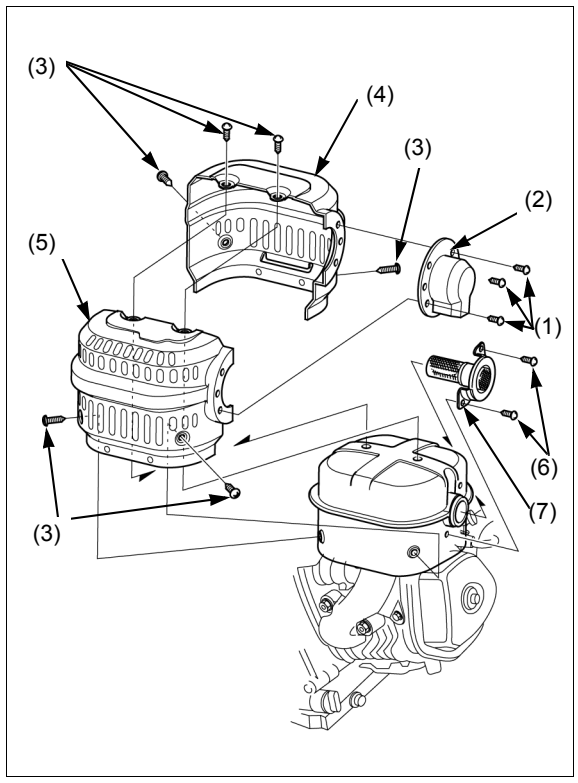
SEPARATED PROTECTOR TYPE

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).

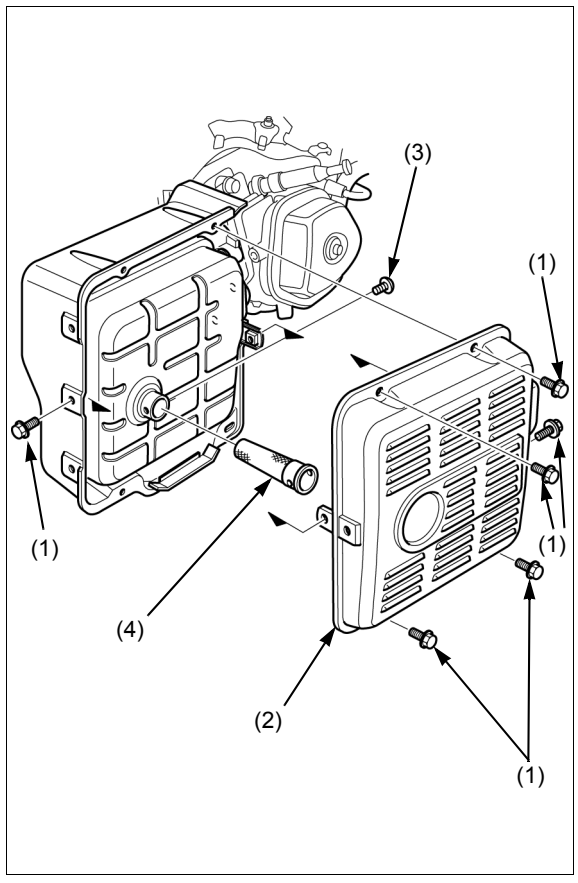
Remove the 5 x 8 mm tapping screws (6) and spark arrester (7).



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).



CLEANING

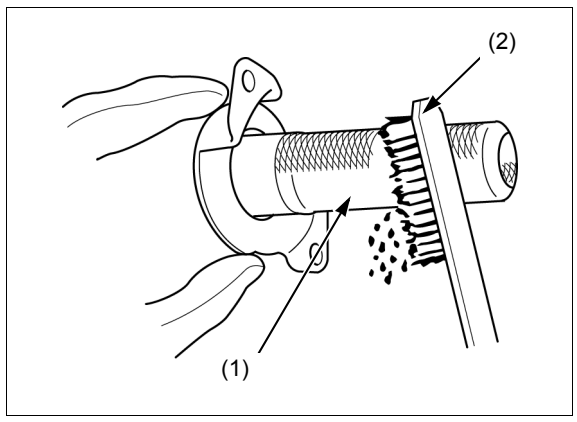
NOTICE

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.

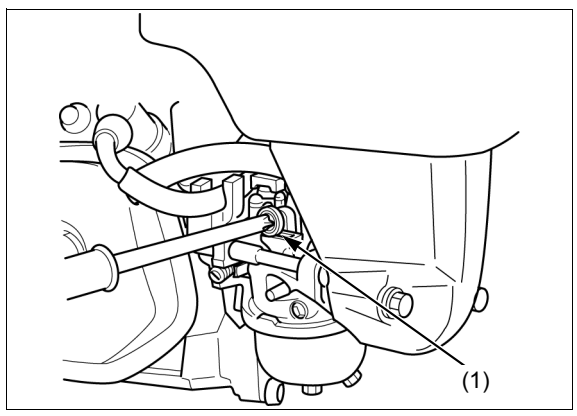


IDLE SPEED CHECK/ADJUSTMENT

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

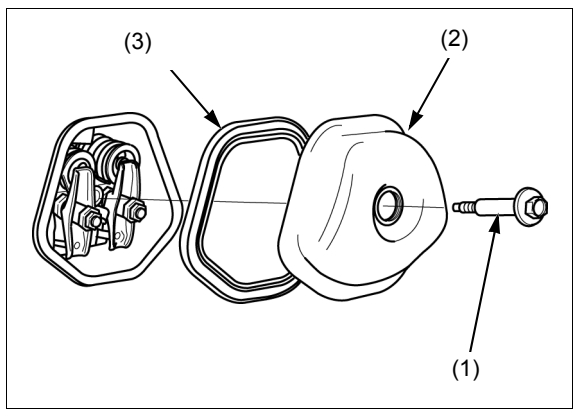
Turn the throttle stop screw (1) to obtain the specified idle speed.

IDLE SPEED: 1,400 ± 150 min^{-1} (rpm)



VALVE CLEARANCE CHECK/ ADJUSTMENT

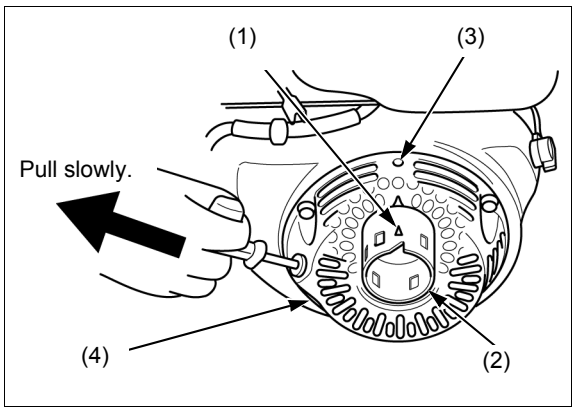
Remove the head cover bolt (1), the head cover (2), and the head cover packing (3).



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).

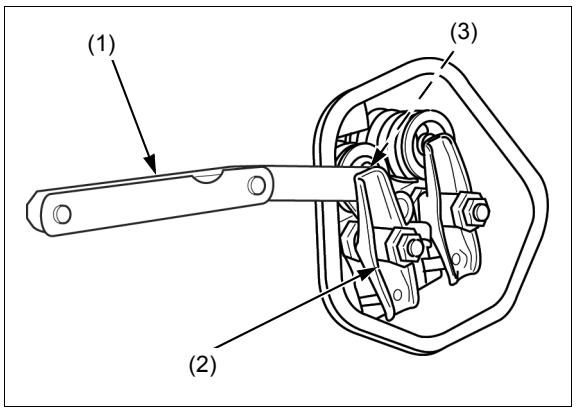
If the exhaust valve is opened, use the recoil starter to turn the crankshaft one additional turn and align the triangle mark on the starter pulley with the top hole on the recoil starter case again.



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 ± 0.02 mm
EX: 0.20 ± 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 ± 0.02 mm
EX: 0.20 ± 0.02 mm

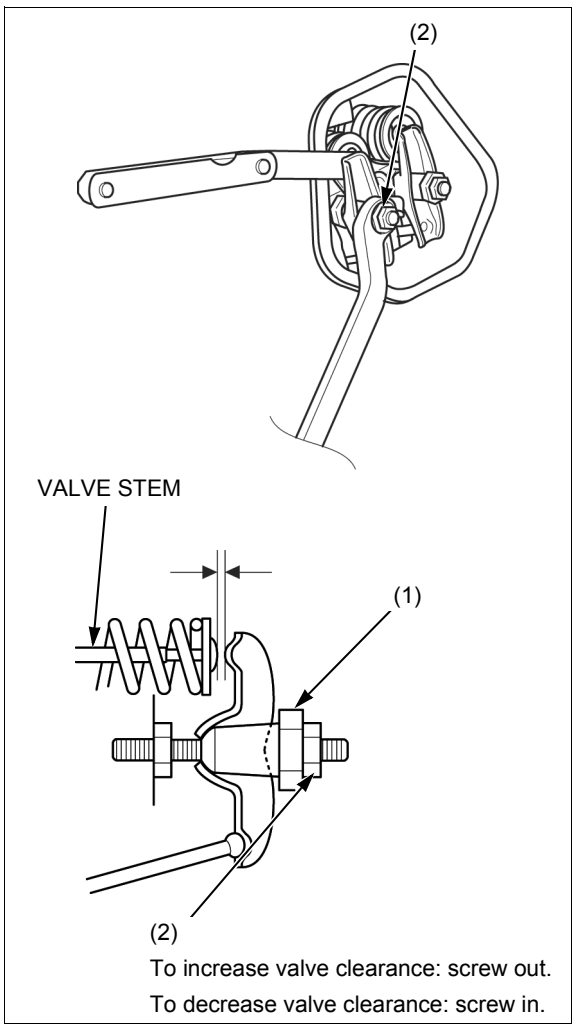
Hold the rocker arm pivot and retighten the pivot adjusting nut to the specified torque.

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.



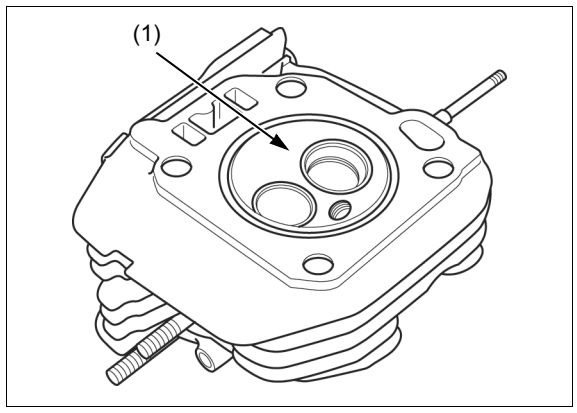
To increase valve clearance: screw out.

To decrease valve clearance: screw in.

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.

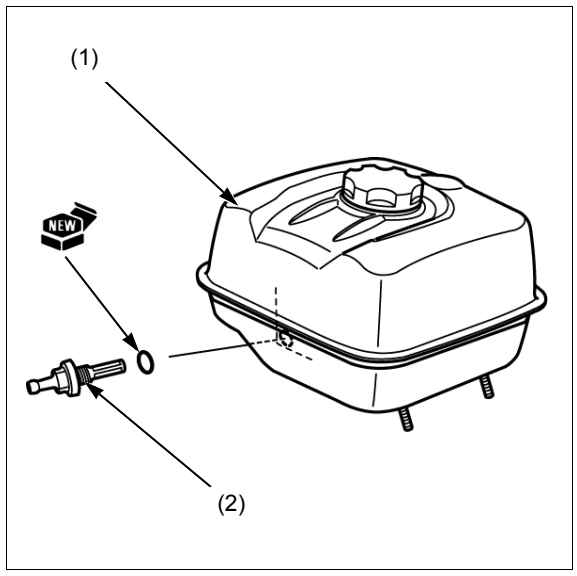
Drain the fuel into a suitable container.

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.

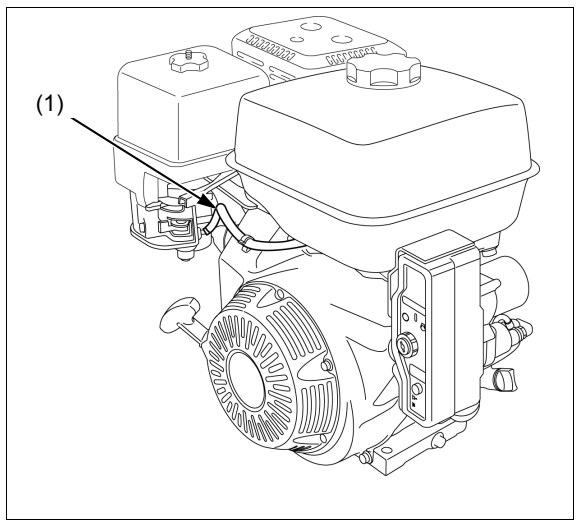


FUEL TUBE CHECK

⚠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.



MEMO

4. TROUBLESHOOTING

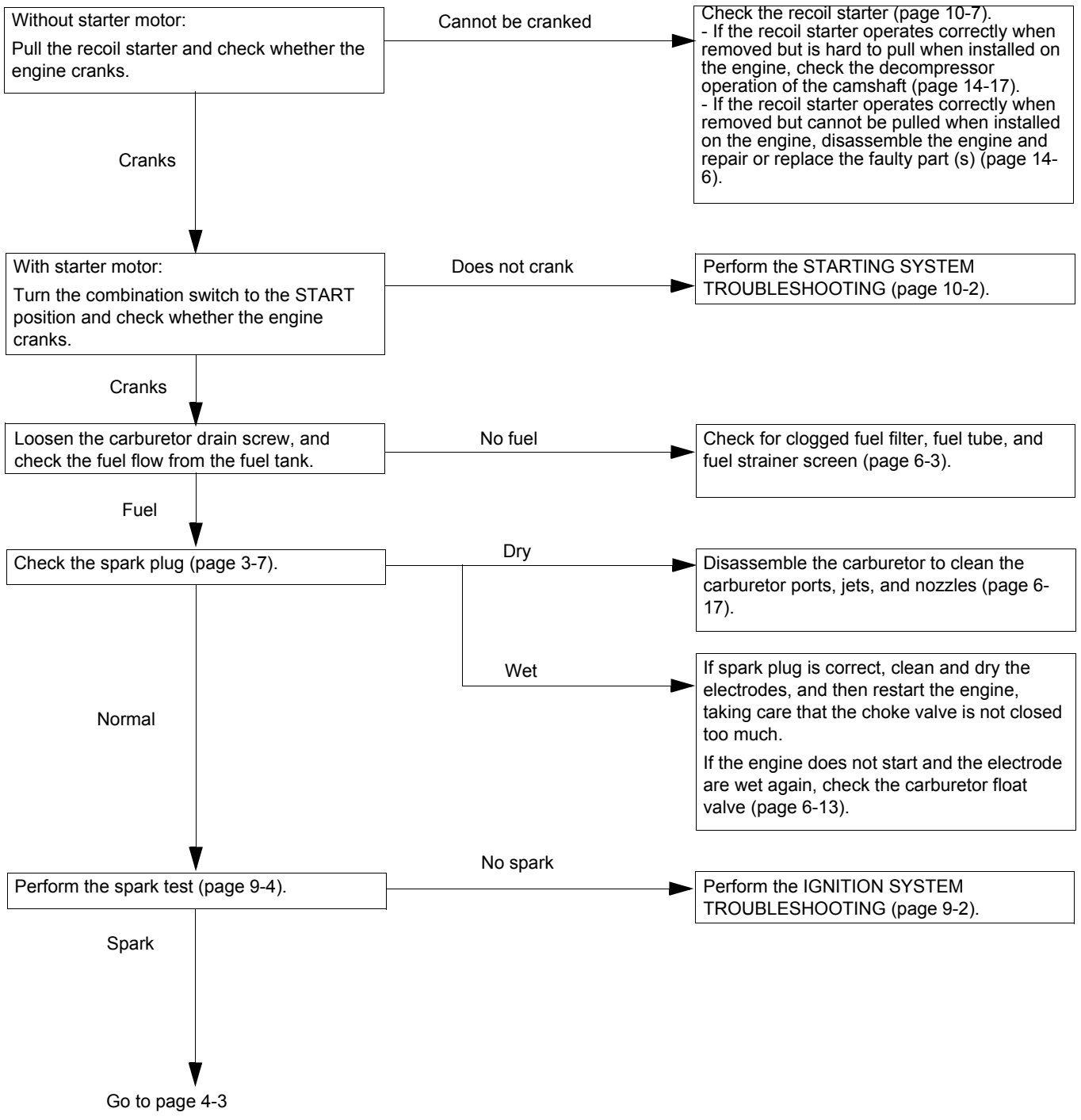
BEFORE TROUBLESHOOTING

- Use a known-good battery for troubleshooting.
- Check that the connectors are connected securely.
- Check for sufficient fresh fuel in the fuel tank.
- Read the circuit tester's operation instructions carefully, and observe the instructions during inspection.
- Disconnect the battery cable before continuity inspection.

TROUBLESHOOTING

HARD STARTING

- Check the engine oil level before troubleshooting.



From page 4-2

Perform the cylinder compression test (page 13-5).

Compression is too high → Check the valve clearance (page 3-10) and then perform the cylinder compression test. If the cylinder compression is too high, remove carbon deposits in the combustion chamber (page 3-12).

Compression is too low → Check the valve clearance (page 3-10), and then perform the cylinder compression test.
If the cylinder compression is too low, perform a leak down test.
If there is no air leakage in the engine, check the following.
- Valve spring free length (page 13-7)
- Valve seat width (page 13-5)
- Valve face irregularly worn (page 13-6)
- Decompressor operation (page 14-17)
- Piston ring side clearance (page 14-13)
- Piston ring width (page 14-14)
- Piston ring end gap (page 14-14)
- Piston skirt O.D. (page 14-12)
- Cylinder sleeve I.D. (page 14-11)

Normal

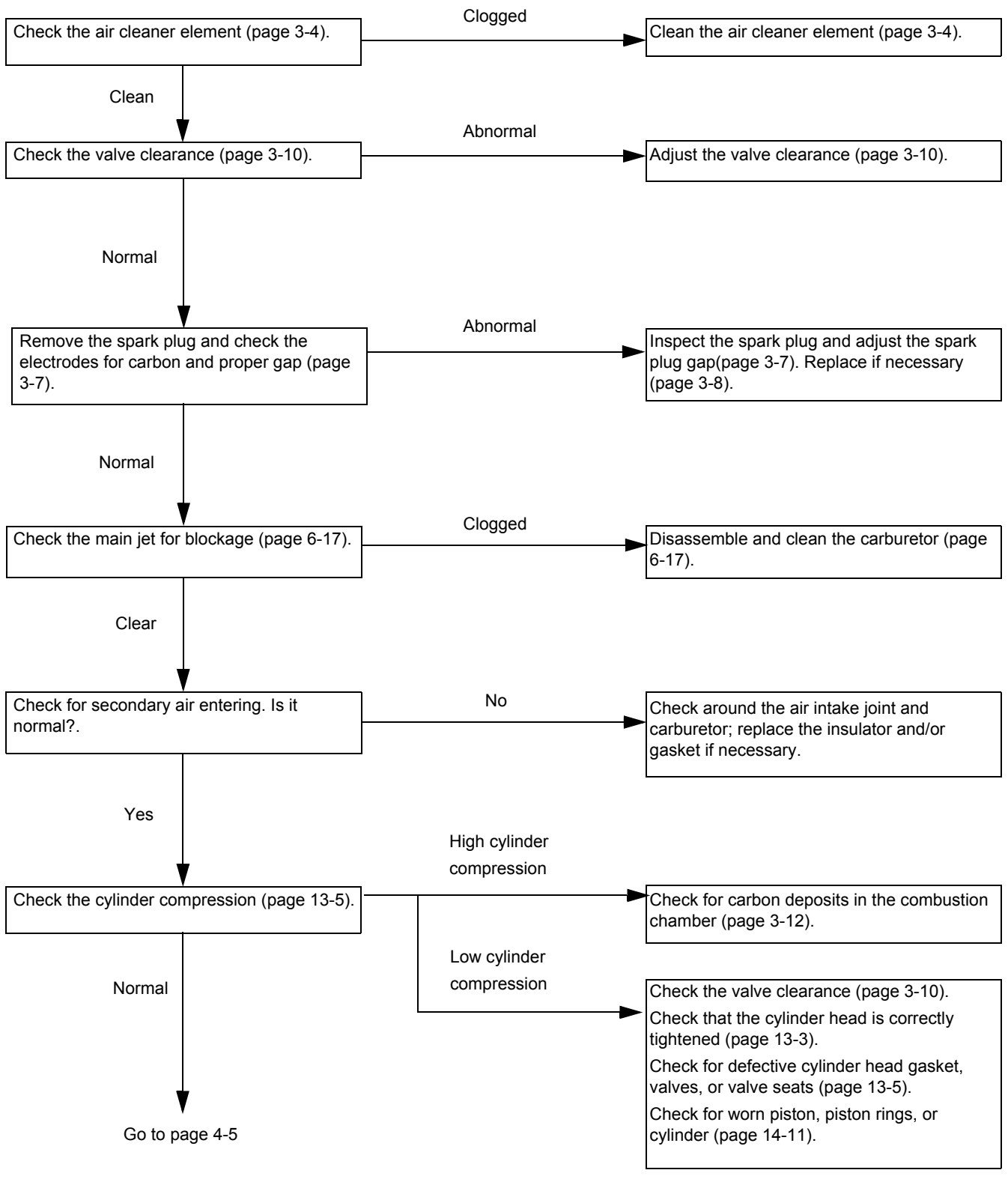
Check for a restricted spark arrester (applicable types).

Restricted → Clean the spark arrester (page 3-8).

Not restricted

Restart the engine according to the starting procedure.

ENGINE SPEED DOES NOT INCREASE OR STABILIZE



From page 4-4

Check the ignition coil air gap (page 9-4).

Abnormal → Adjust the ignition coil air gap (page 9-4).

Normal

Check the ignition coil (page 9-5).

Replace the ignition coil if abnormalities are found, and recheck.

ENGINE DOES NOT STOP WHEN COMBINATION/ ENGINE STOP SWITCH IS TURNED OFF

- Check the engine oil level before troubleshooting.

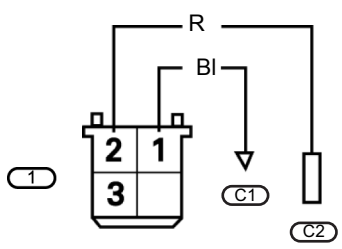
Check the combination/ engine stop switch (page 11-5).

Abnormal → Replace the combination (page 11-3)/ engine stop switch (page 5-2).

Normal

Check the wire harness connecting the combination/ engine stop switch and the ignition for open or short circuit and for proper connection.

ENGINE WIRE HARNESS



Abnormal → Replace or repair the engine wire harness.

Normal

Check the ignition coil (page 9-5).

Replace the ignition coil if abnormalities are found, and recheck.

ENGINE DOES NOT STOP WHEN ENGINE OIL LEVEL IS SLOW

Check the oil level switch (If equipped)(page 11-5).

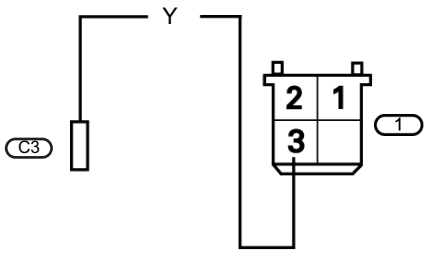
Abnormal → Replace the oil level switch (page 14-6).

Normal ↓

Check the wire harness connecting the oil level switch and ignition coil for open or short circuit and proper connection.

No continuity → Replace or repair the engine wire harness.

ENGINE WIRE HARNESS



Continuity ↓

Check the ignition coil (page 9-5).

Replace the ignition coil if abnormalities are found, and recheck.

5. COVER

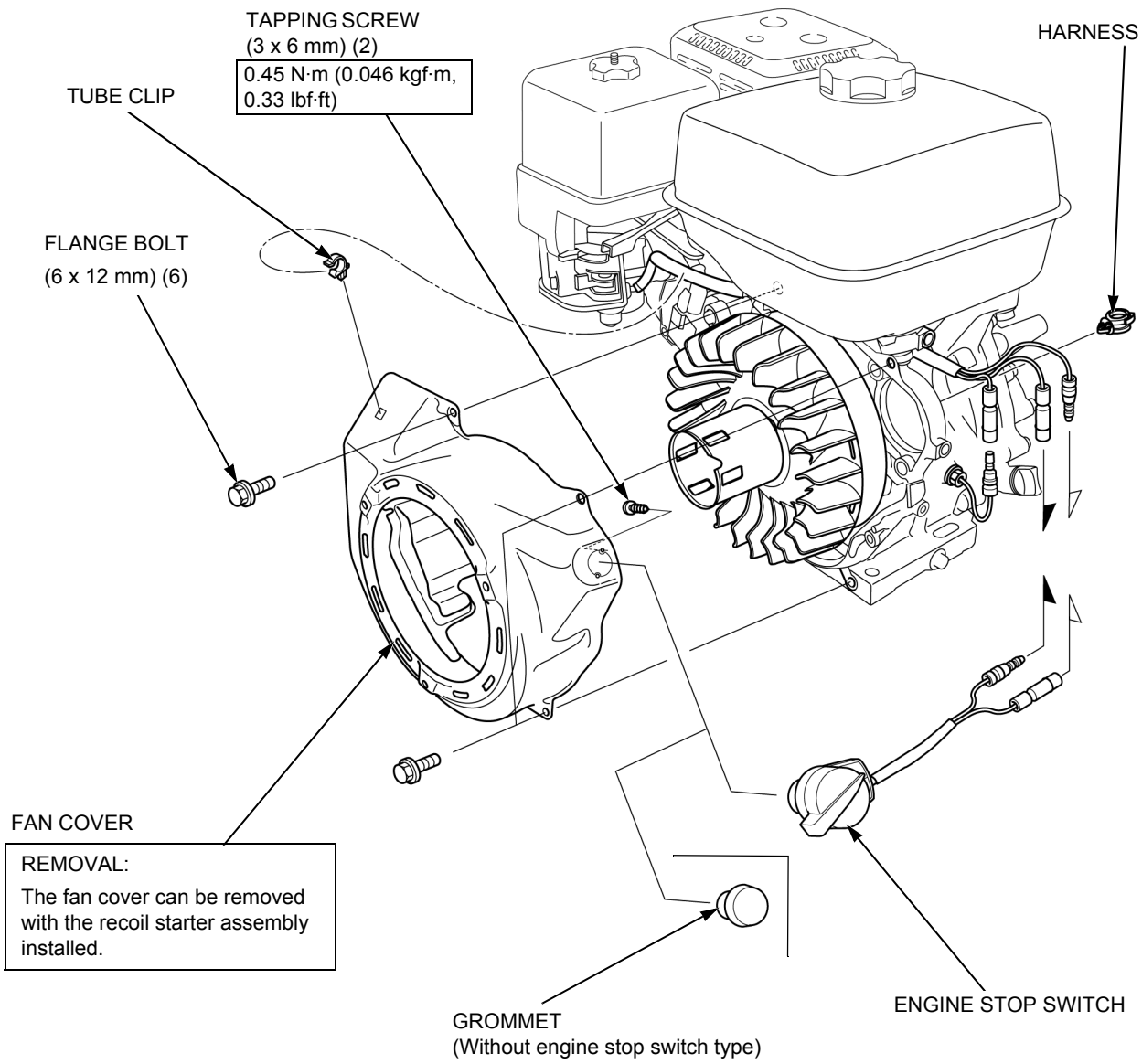
FAN COVER REMOVAL/INSTALLATION

Remove the recoil starter (page 10-3).

Remove the auto throttle (If equipped)(page 7-5).

Open the harness clip and disconnect the engine stop switch connector (Without control box type).

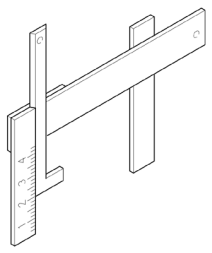
When installing, refer to the HARNESS ROUTING (page 2-8).



6. FUEL SYSTEM

TOOLS

Float level gauge
07401-0010000



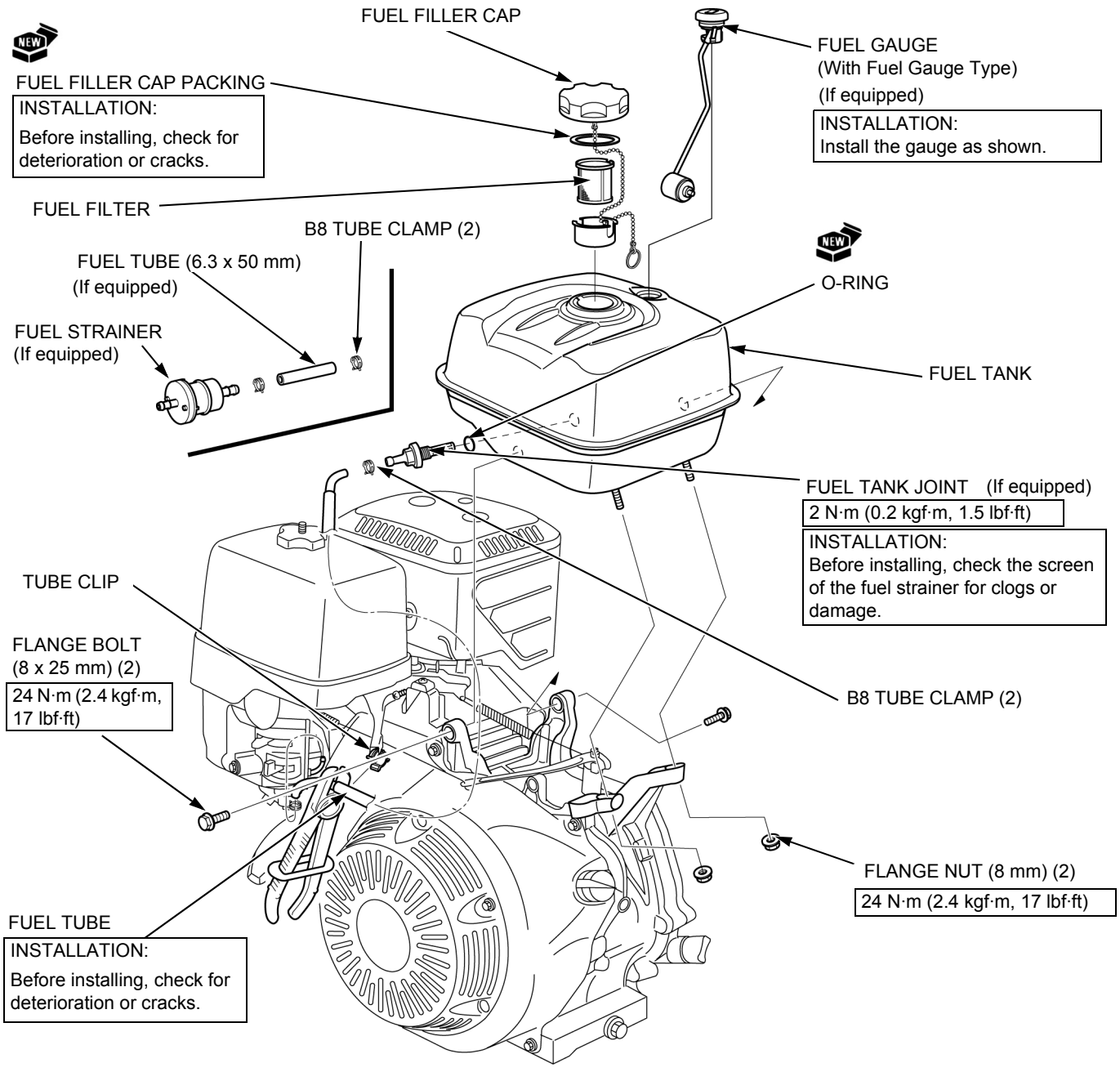
FUEL TANK REMOVAL/INSTALLATION (TYPE A)

⚠ 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 valve lever to the OFF position.

Set a commercially available tube clip to the fuel tube.

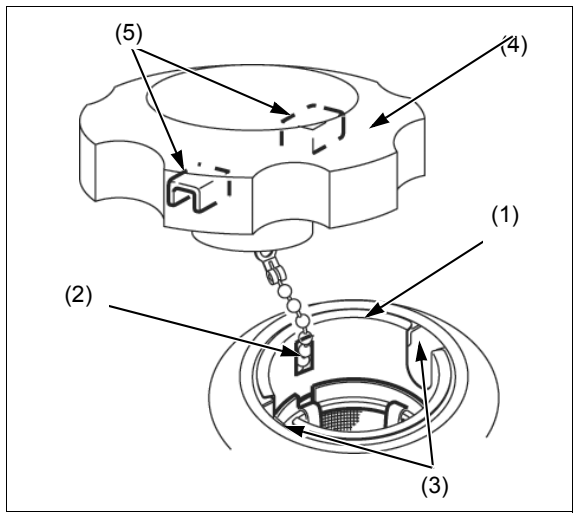


FUEL FILLER CAP REMOVAL/ INSTALLATION

Turn the fuel level gauge (1) to align the fuel filler cap tether hole (2) with the cutout (3) of the fuel filler neck, and then remove the fuel filler cap (4).

Before installing, check the air vent hole of the fuel filler cap for clogs. If necessary, clean it using low-pressure compressed air.

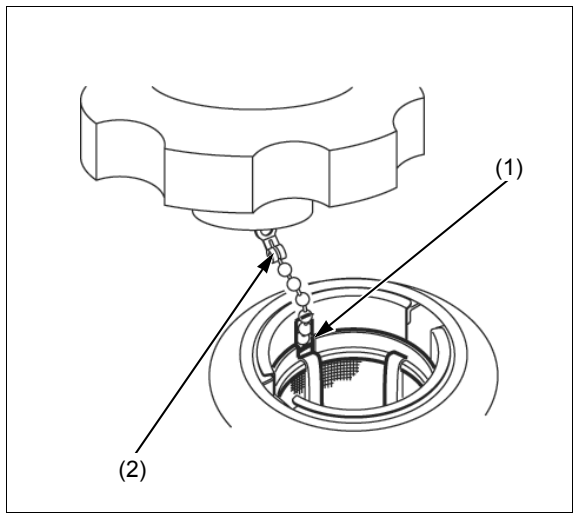
Set the fuel tank cap to the fuel filler neck by aligning the projections (5) of the cap with the cutouts of the fuel filler neck and fuel level gauge, and then turn the fuel tank cap clockwise 180 degrees to lock it.



FUEL FILTER REMOVAL/ INSTALLATION

Remove or install the fuel filter by aligning the cutout (1) of the fuel filter with the fuel filler cap tether (2) as shown.

Before installing, check the screen of the fuel strainer for clogs or damage.



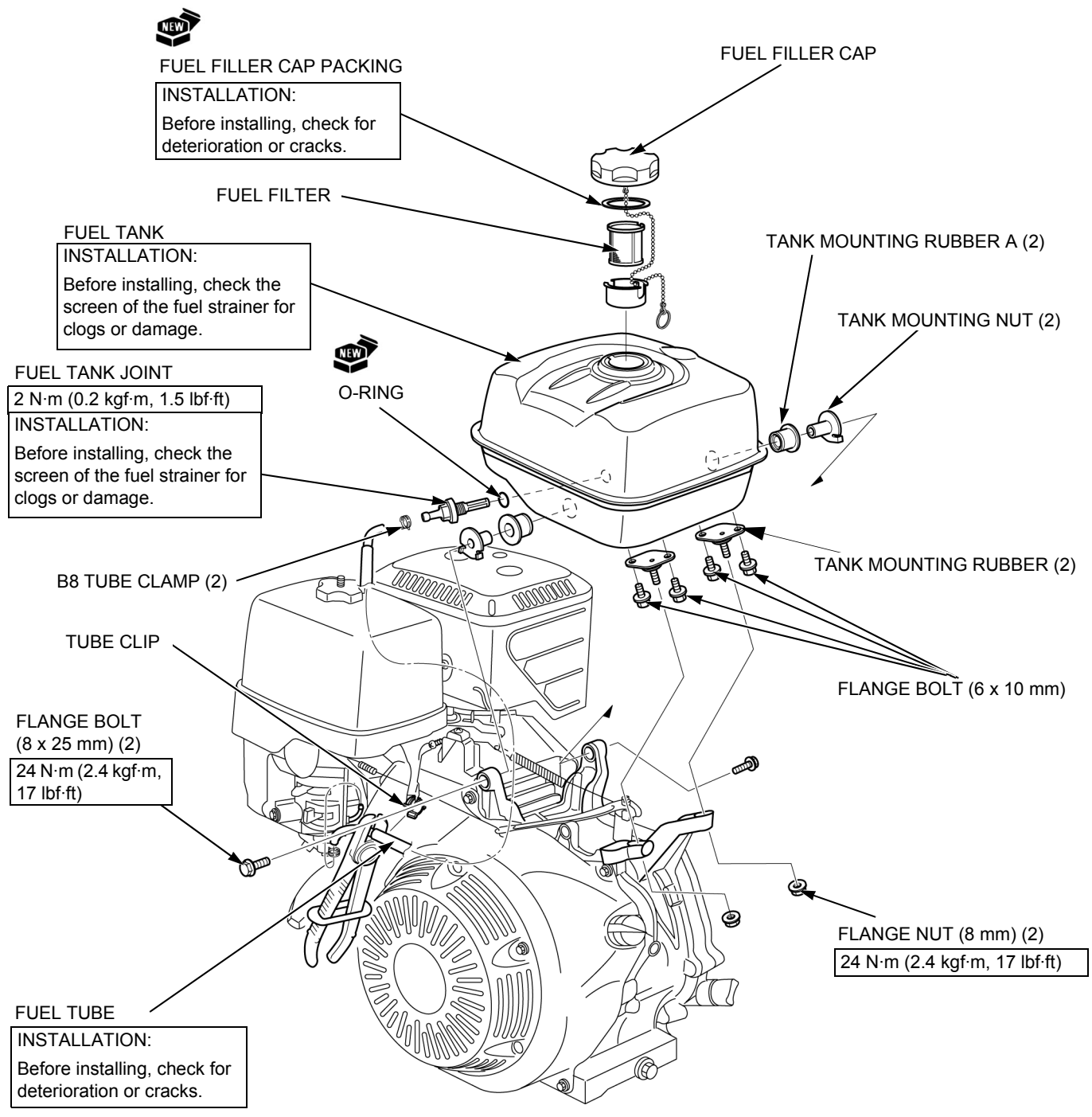
FUEL TANK REMOVAL/INSTALLATION (TYPE B)

⚠ 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 valve lever to the OFF position.

Set a commercially available tube clip to the fuel tube.

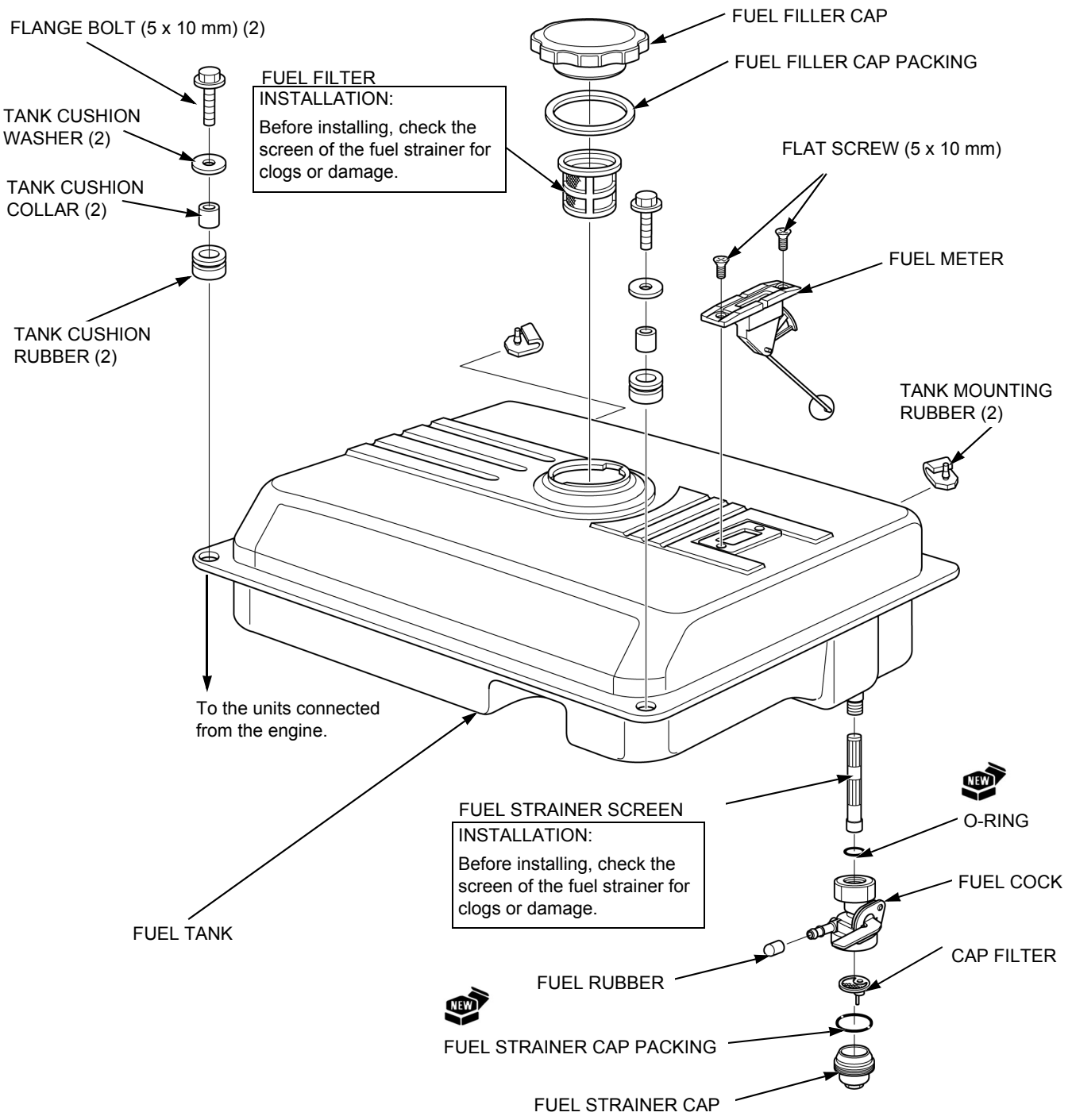


FUEL TANK REMOVAL/INSTALLATION (TYPE C)

⚠WARNING

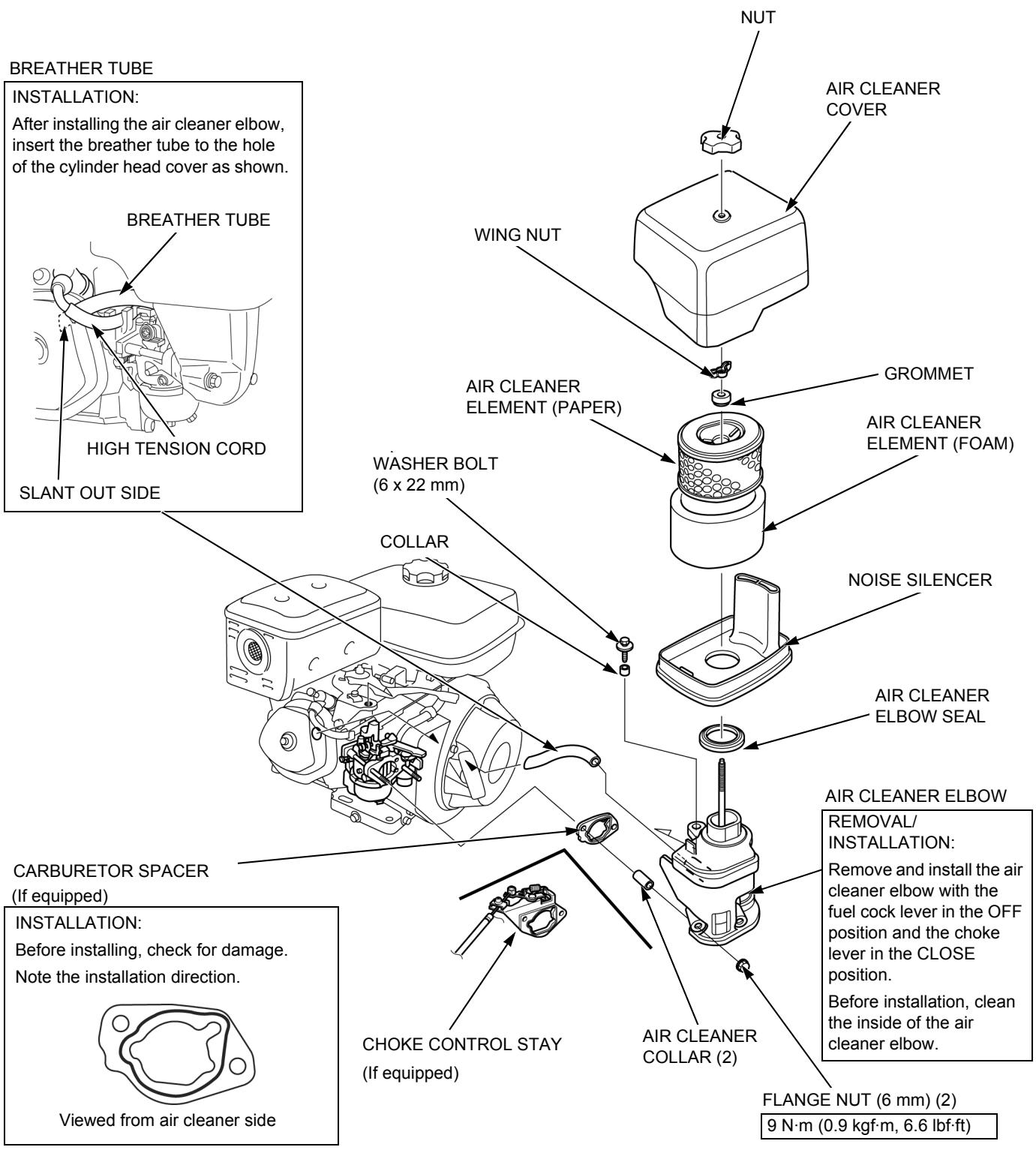
Gasoline is highly flammable and explosive.You can be burned or seriously injured when handling fuel.
- Keep heat, sparks, and flame away.
- Handle fuel only outdoors.
- Wipe up spills immediately.

Turn the fuel cock lever to the OFF position.

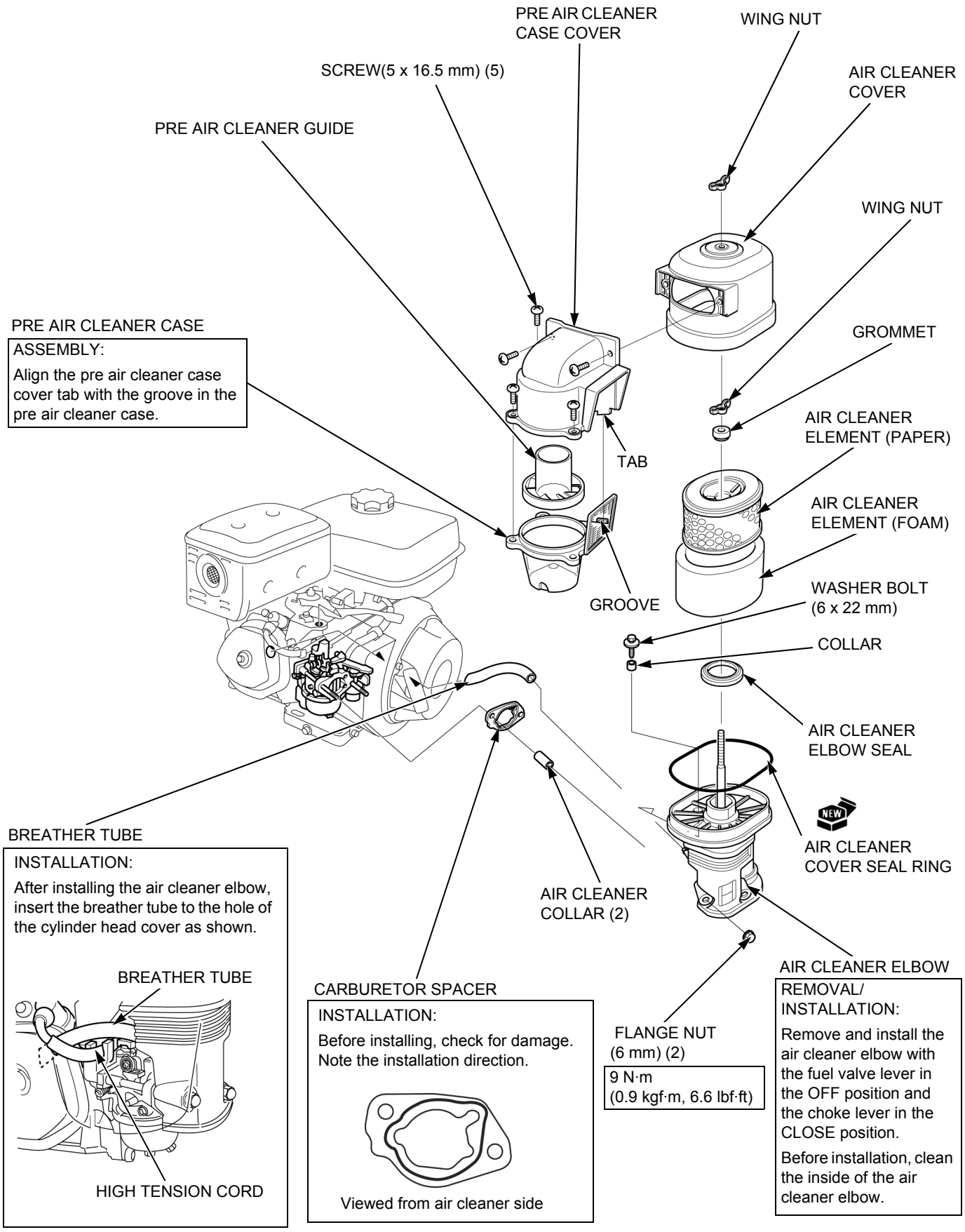


AIR CLEANER REMOVAL/ INSTALLATION

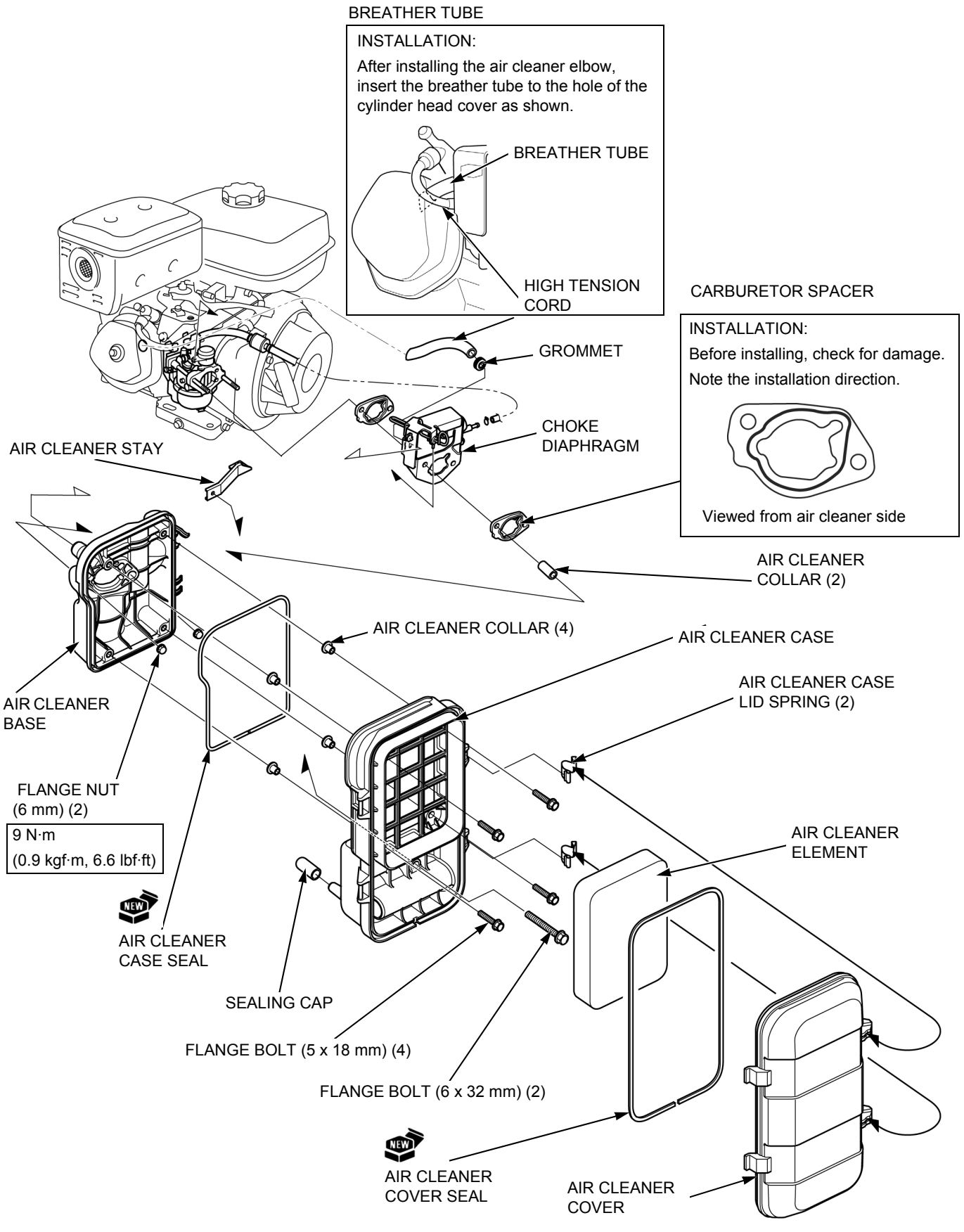
Dual element type:



Cyclone type:

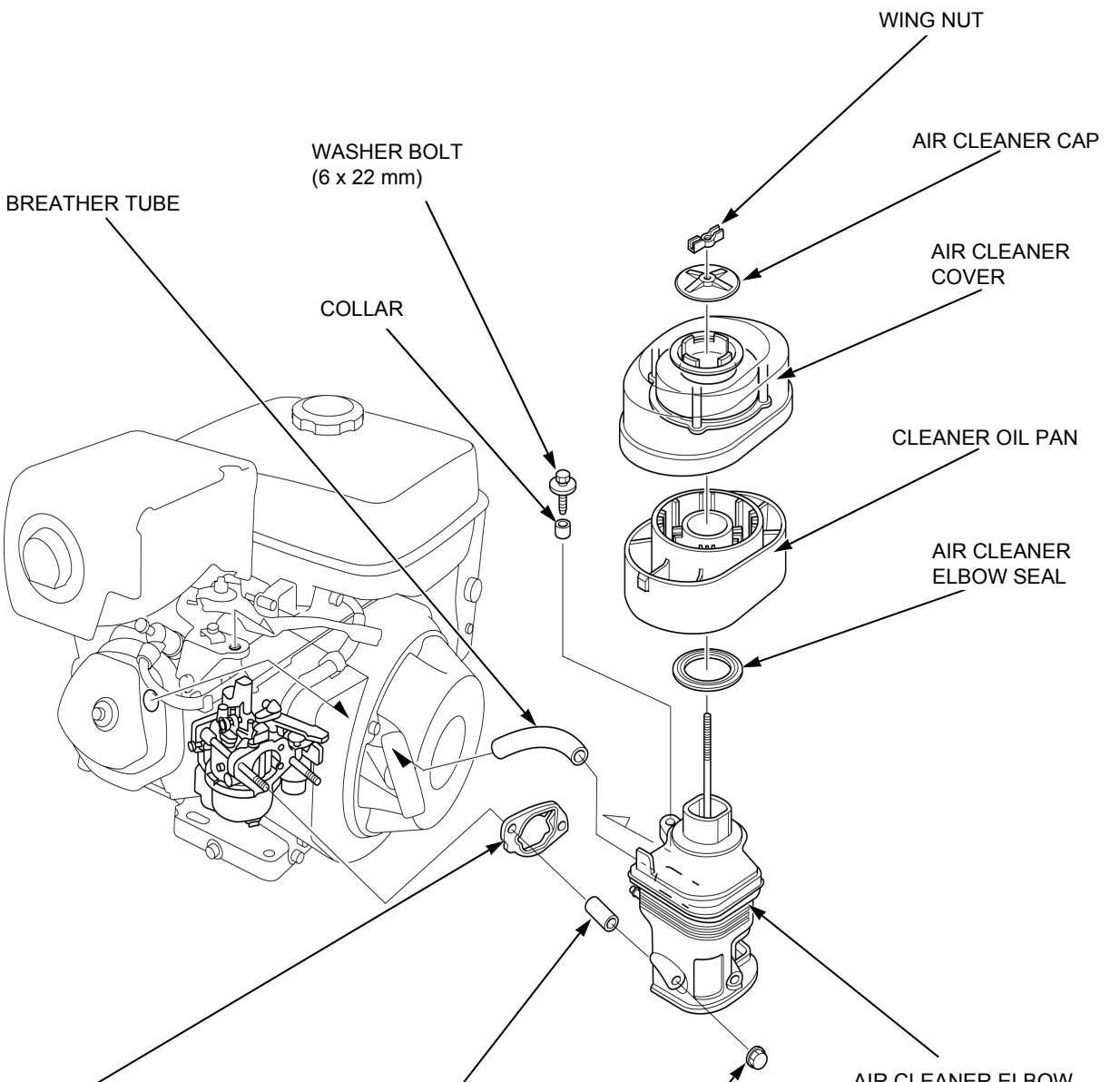


Low profile type:



FUEL SYSTEM

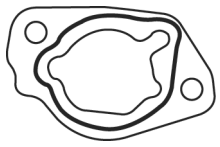
Oil Bath type:



INSTALLATION:

Before installing, check for damage.

Note the installation direction.



Viewed from air cleaner side

REMOVAL/
INSTALLATION:

Remove and install the air cleaner elbow with the fuel cock lever in the OFF position and the choke lever in the CLOSE position.

Before installation, clean the inside of the air cleaner elbow.

CARBURETOR REMOVAL/ INSTALLATION

Dual element or cyclone type air cleaner:

⚠WARNING

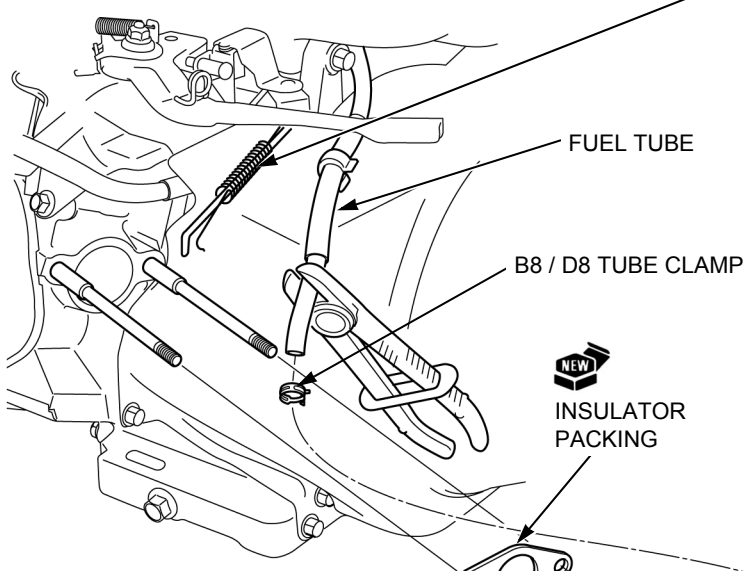
Gasoline is highly flammable and explosive.You can be burned or seriously injured when handling fuel.
- Keep heat, sparks, and flame away.
- Handle fuel only outdoors.
- Wipe up spills immediately.

Turn the fuel valve lever to the OFF position.

Remove the air cleaner (page 6-7).

Set a commercially available tube clip to the fuel tube.
Disconnect the fuel tube from the carburetor.

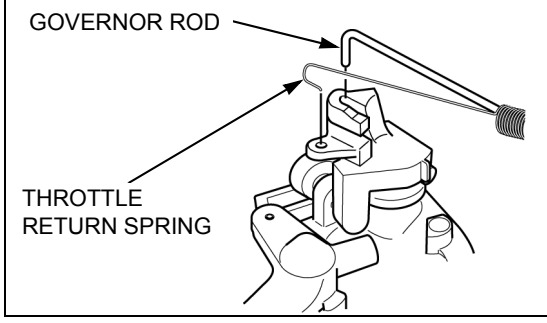
Remove the drain screw of the carburetor to drain completely.



REMOVAL/INSTALLATION:

Pull the carburetor assembly to a point where the groove of the throttle arm lines up with the governor rod, and then lift the governor rod out of the hole of the throttle arm and unhook the throttle return spring.

Installation is in the reverse order of removal.

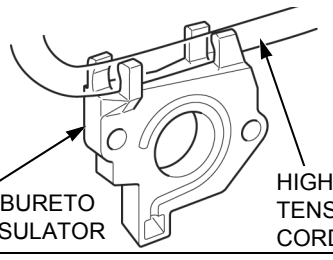


INSTALLATION:

Before installing, clean the passage thoroughly with compressed air.

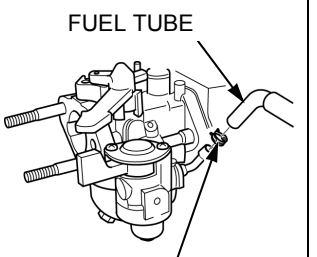
Install the carburetor insulator with the vent groove facing toward the carburetor.

After installing, clamp the high tension cord to the carburetor insulator.



REMOVAL/INSTALLATION:

Remove the fuel tube.



FUEL SYSTEM

Low profile type air cleaner:

⚠WARNING

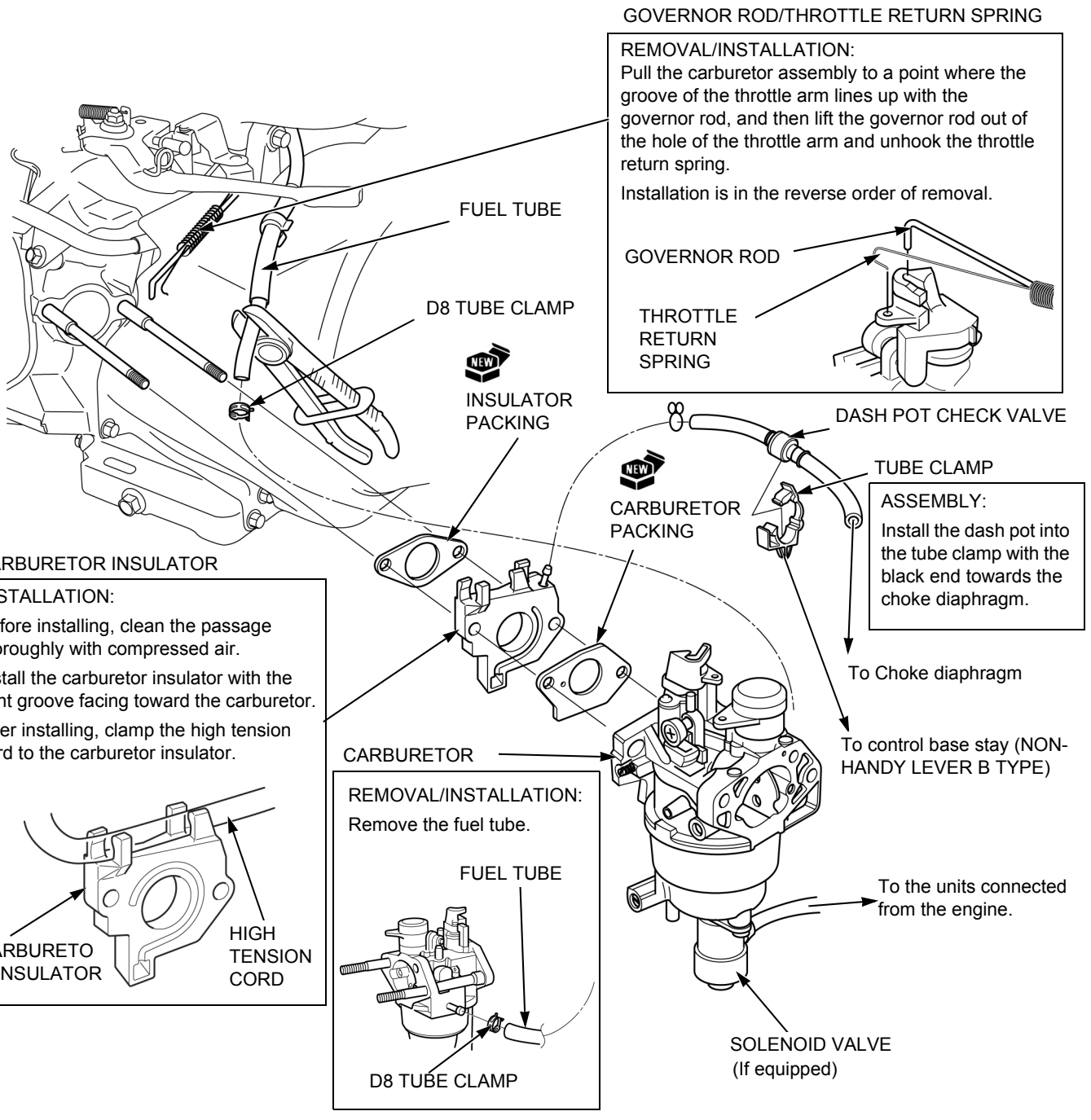
Gasoline is highly flammable and explosive.You can be burned or seriously injured when handling fuel.
- Keep heat, sparks, and flame away.
- Handle fuel only outdoors.
- Wipe up spills immediately.

Turn the fuel valve lever to the OFF position.

Remove the air cleaner (page 6-9).

Set a commercially available tube clip to the fuel tube.
Disconnect the fuel tube from the carburetor.

Remove the drain screw of the carburetor to drain completely.



CARBURETOR DISASSEMBLY/ ASSEMBLY

Dual element or cyclone type air cleaner:

⚠WARNING

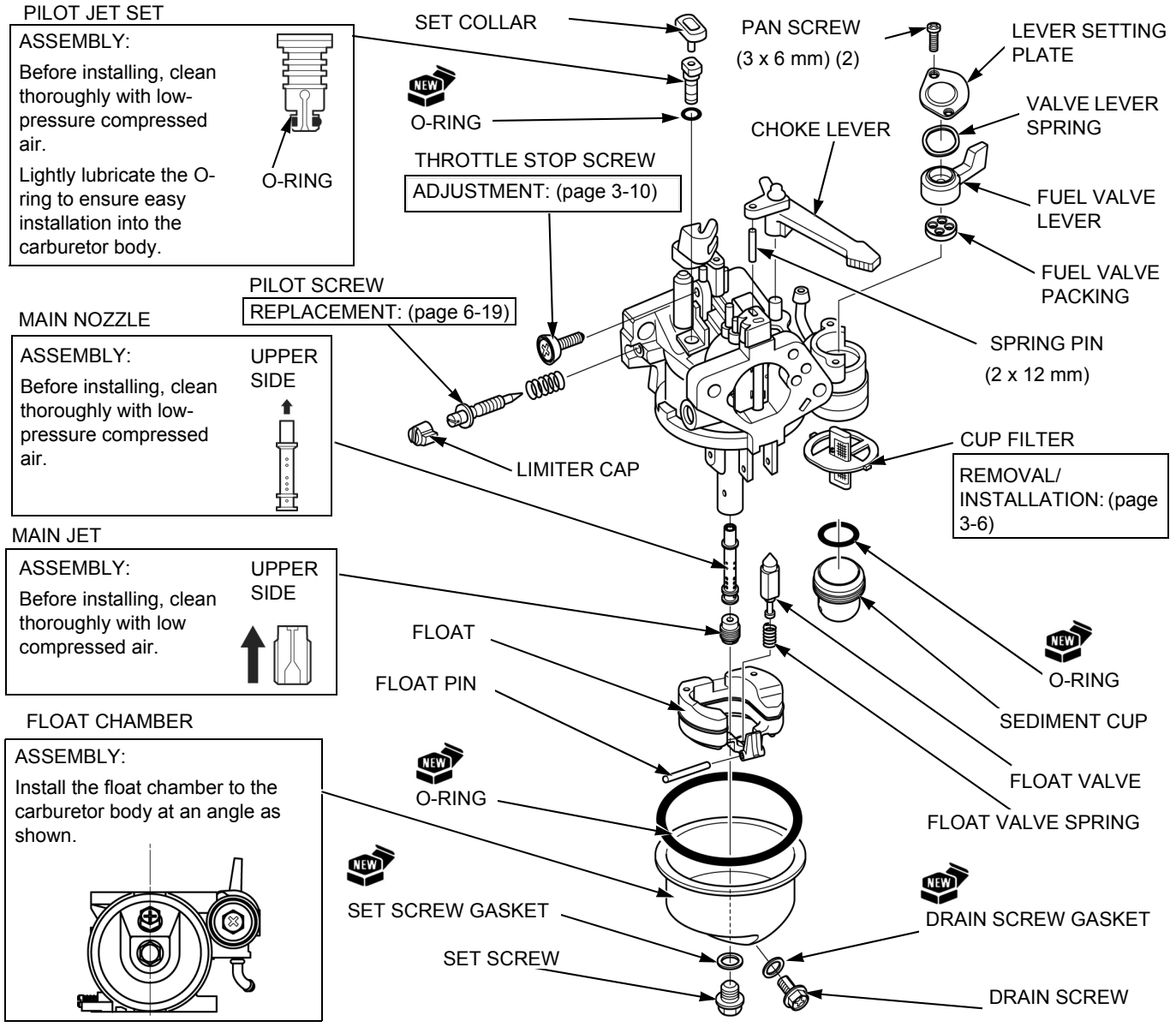
Gasoline is highly flammable and explosive.You can be burned or seriously injured when handling fuel.
- Keep heat, sparks, and flame away.
- Handle fuel only outdoors.
- Wipe up spills immediately.

⚠CAUTION

To prevent serious eye injury, always wear safety goggles or other eye protection when using compressed air.

Remove the carburetor (page 6-11).

Before disassembly, clean the outside of the carburetor.



Low profile type air cleaner:

⚠WARNING

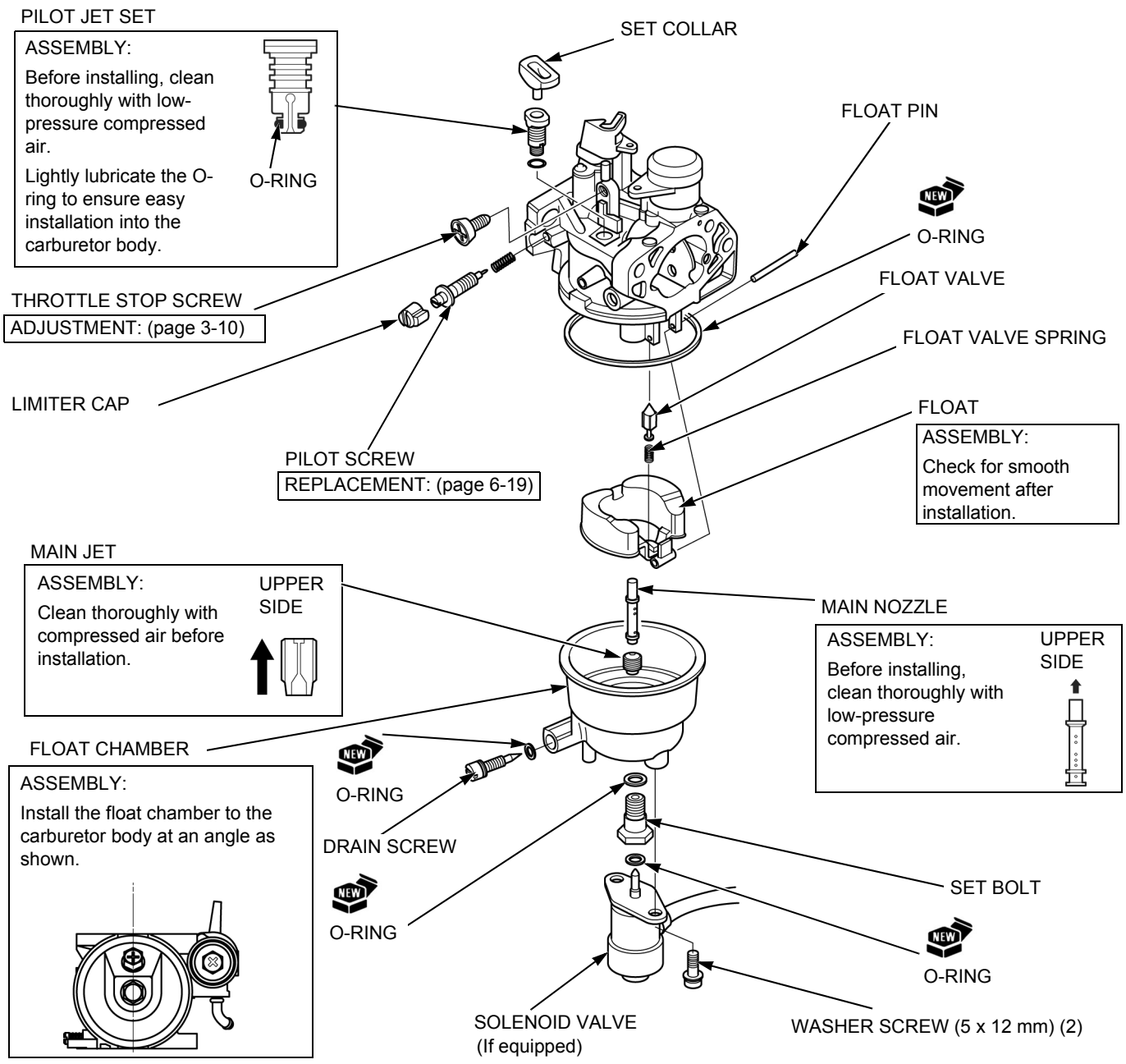
Gasoline is highly flammable and explosive.You can be burned or seriously injured when handling fuel.
- Keep heat, sparks, and flame away.
- Handle fuel only outdoors.
- Wipe up spills immediately.

⚠CAUTION

To prevent serious eye injury, always wear safety goggles or other eye protection when using compressed air.

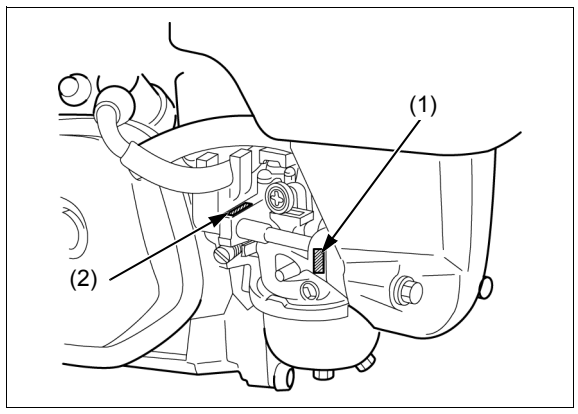
Remove the carburetor (page 6-11).

Before disassembly, clean the outside of the carburetor.



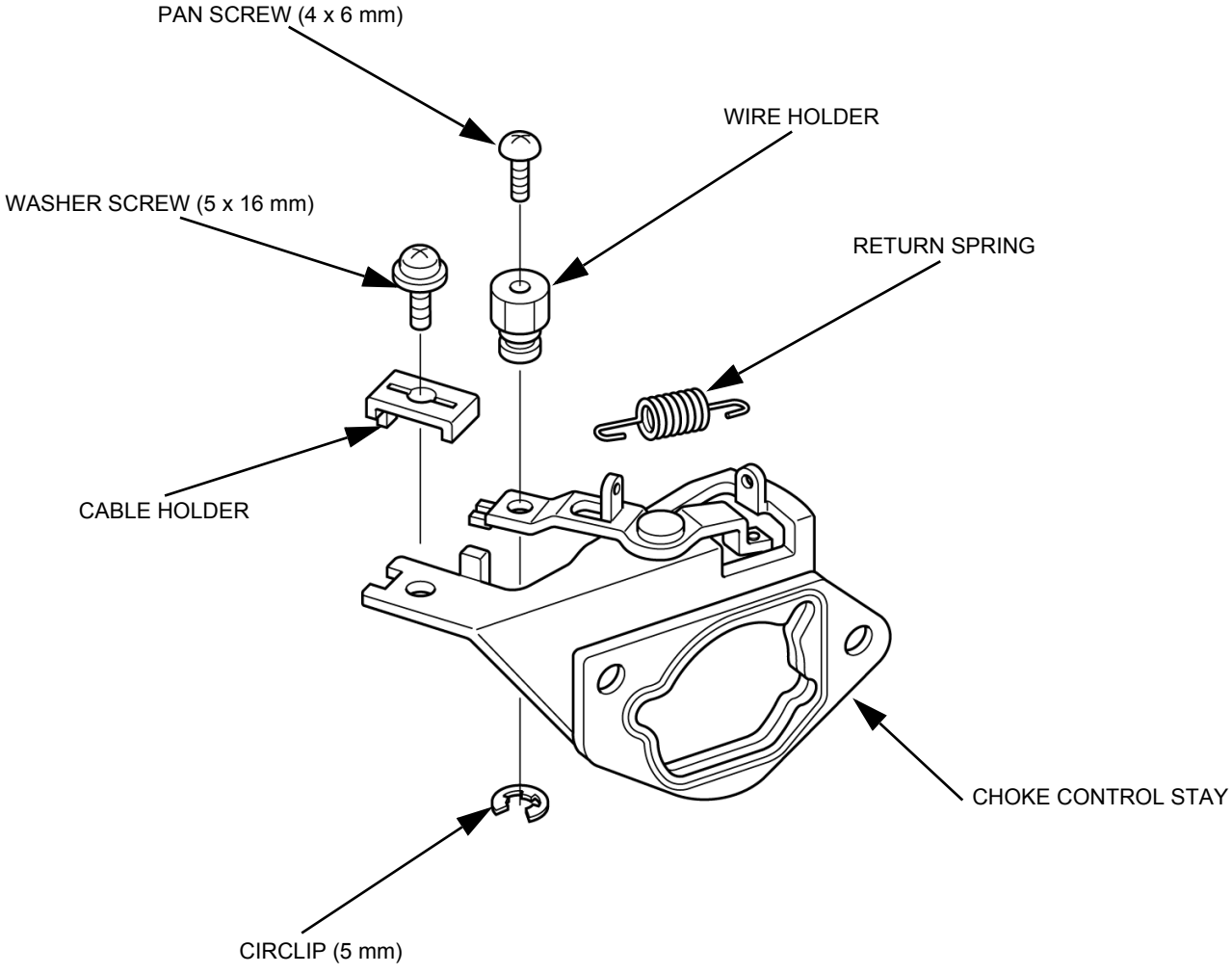
Main jet number

Carburetor identification Number (1) + (2)	Main Jet Number
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

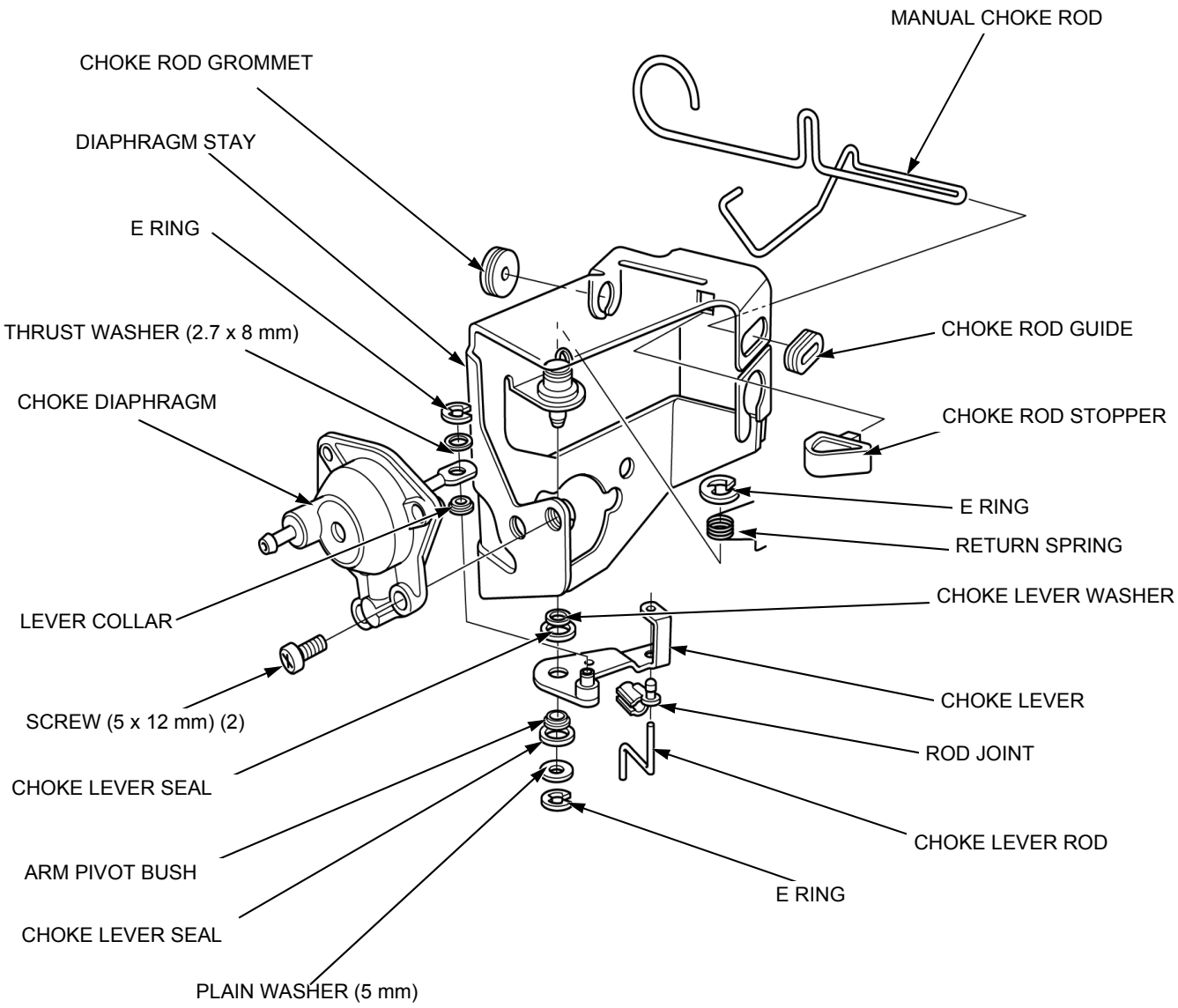


CHOKE CONTROL STAY DISASSEMBLY/ASSEMBLY

Remove the choke diaphragm (page 6-9).



CHOKE DIAPHRAGM DISASSEMBLY/ ASSEMBLY



CARBURETOR BODY CLEANING

⚠ CAUTION

To prevent serious eye injury, always wear safety goggles or other eye protection when using compressed air.

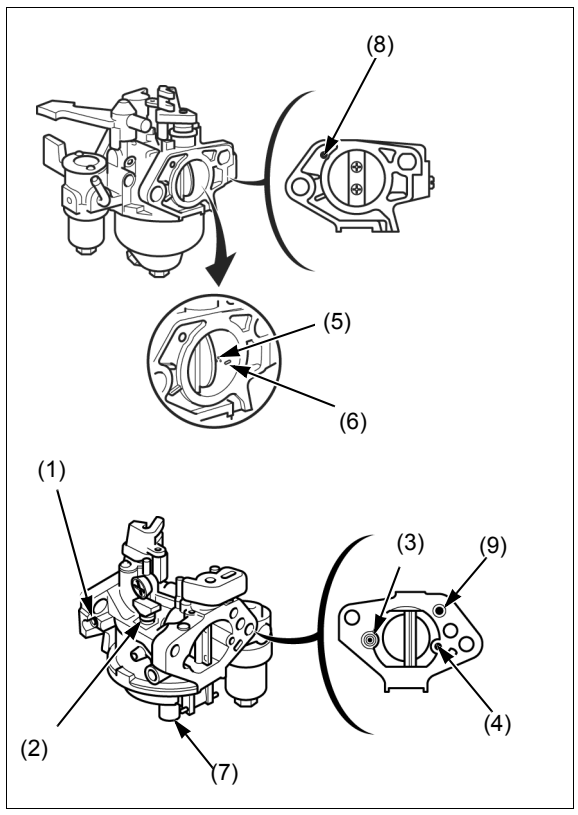
NOTICE

- *Some commercially available chemical cleaners are very caustic. These cleaners may damage plastic parts such as the O-ring, the float and the float seat of the carburetor. Check the container for instructions. If you are in doubt, do not use these products to clean Honda carburetors.*
- *High air pressure may damage the carburetor body. Use low air pressure (30 psi or less) when cleaning passages and ports.*

Clean the carburetor body with non-flammable solvent.

Clean thoroughly the following passages and ports with low-pressure compressed air.

– Pilot screw hole (1)
– Pilot jet hole (2)
– Pilot air jet (3)
– Main air jet (4)
– Transition ports (5)
– Pilot outlet (6)
– Main nozzle holder (7)
– External vent port (8)
– Internal vent port (9)



CARBURETOR INSPECTION

FLOAT LEVEL HEIGHT

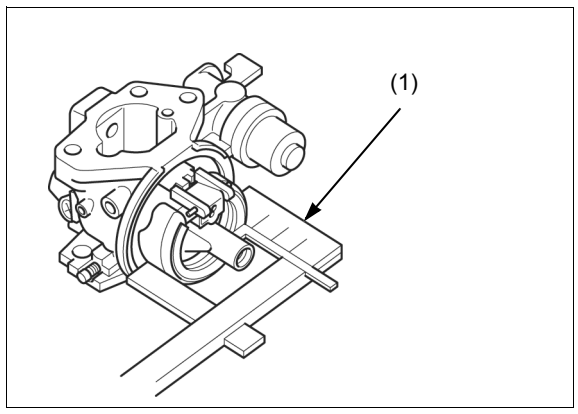
Place the carburetor in the position as shown. Measure the distance between the float top and carburetor body when the float just contacts the seat without compressing the valve spring.

TOOL:
Float level gauge (1) 07401-0010000

FLOAT HEIGHT: 13.2 mm (0.52 in)

If the measured float height is out of specification, check the float valve and the float valve spring (page 6-18).

If the float valve and the float valve spring are normal, replace the float (page 6-13).

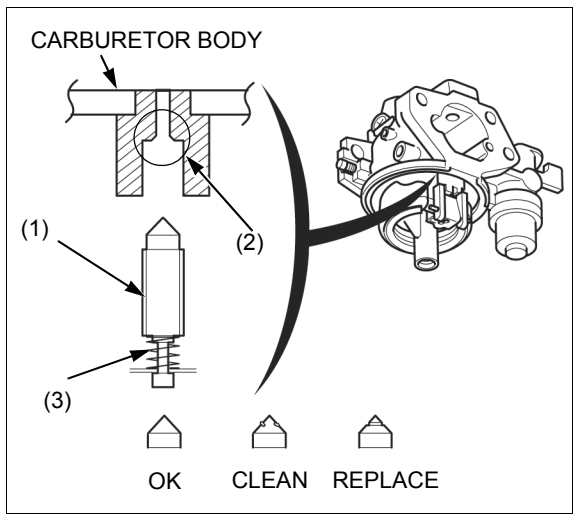


FLOAT VALVE

Check the float valve (1) and its seat (2) for wear or contamination.

Before installation, check for wear or a weak spring (3).

Check the operation of the float valve.

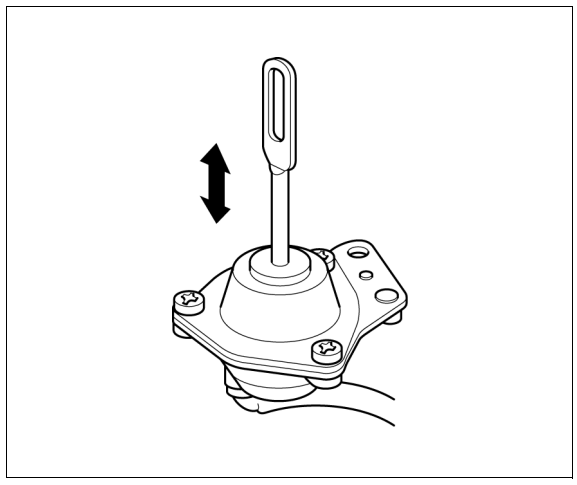


CHOKE DIAPHRAGM INSPECTION

Check for smooth operation by pressing the rod with a finger.

Connect a vacuum pump to the choke diaphragm and apply vacuum.The diaphragm should hold.

Replace the choke diaphragm if necessary.



PILOT SCREW REPLACEMENT

Leave the pilot screw(1) and limiter cap(2) in place during carburetor cleaning. Remove only if necessary for carburetor repair.
Removal of the limiter cap requires breaking the pilot screw. A new pilot screw and limiter cap must be installed.

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

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

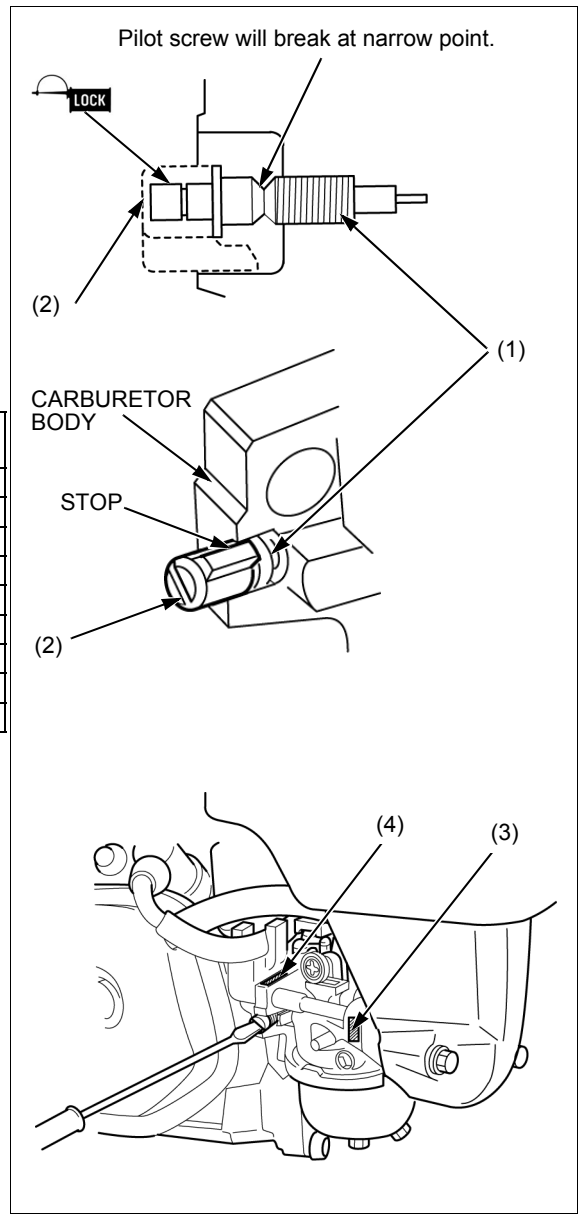
Turn the pilot screw in until it is lightly seated, then turn the screw out the required number of turns.

Carburetor identification Number = (3)+(4)	Pilot screw opening
BE85C B	1-3/4
BE85L A	2
BE85Q A	1 - 7/8
BE85Q A	2 - 1/4
BE89F B	2-1/4
BE89R A	2-1/4
BE89U A	2-1/4
BE94B A	1-3/4
BE94A A	2-1/4

Refer to the appropriate shop manual for carburetor pilot screw initial opening setting.

Apply Loctite® 638 to the inside of the limiter cap, then install the cap so the stop prevents the pilot screw from being turned counterclockwise.

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



CHOKE SET REPLACEMENT

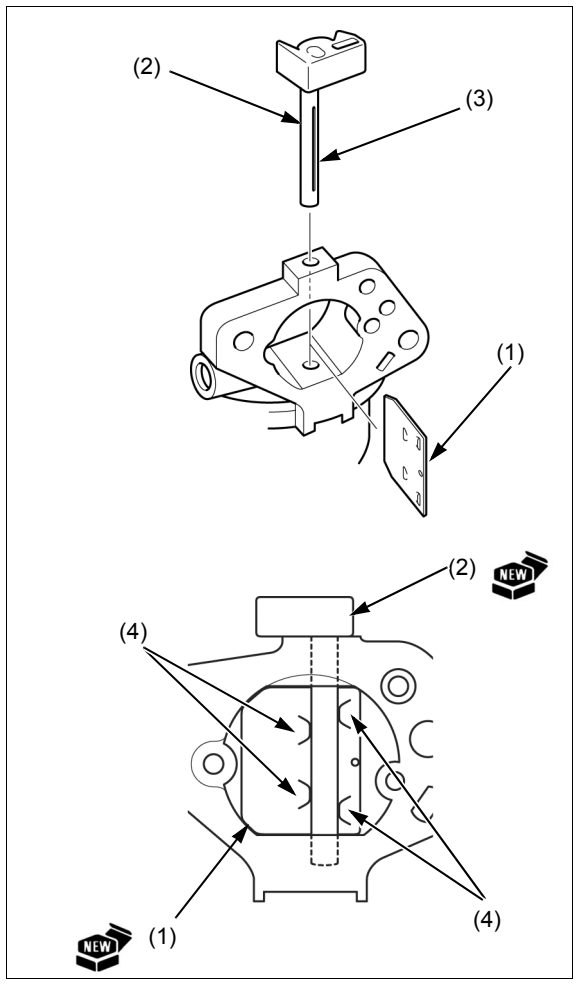
Remove the carburetor (page 6-11).

Pull out the choke valve plate (1).

Remove the choke shaft (2) and install a new choke shaft.

Insert a new choke valve plate into the slit (3) of the choke shaft.

Be sure the choke shaft is in the position between the projections (4) of the choke valve plate.



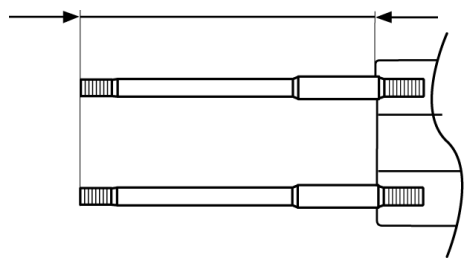
CYLINDER STUD BOLT REPLACEMENT

Thread two nuts onto the stud bolt and tighten them together, and then use a wrench to turn the stud bolt out.

Install new stud bolts.

SPECIFIED LENGTH
STUD BOLT(8 x 106): 90.0 mm (3.54 in)
STUD BOLT(8 x 115): 99.0 mm (3.90 in)
STUD BOLT(8 x 131.5): 115.5 mm (4.55 in)

STUD BOLT (8 x 106): 90.0 mm (3.54 in)
STUD BOLT (8 x 115): 99.0 mm (3.90 in)
STUD BOLT (8 x 131.5): 115.5 mm (4.55 in)



7. GOVERNOR SYSTEM

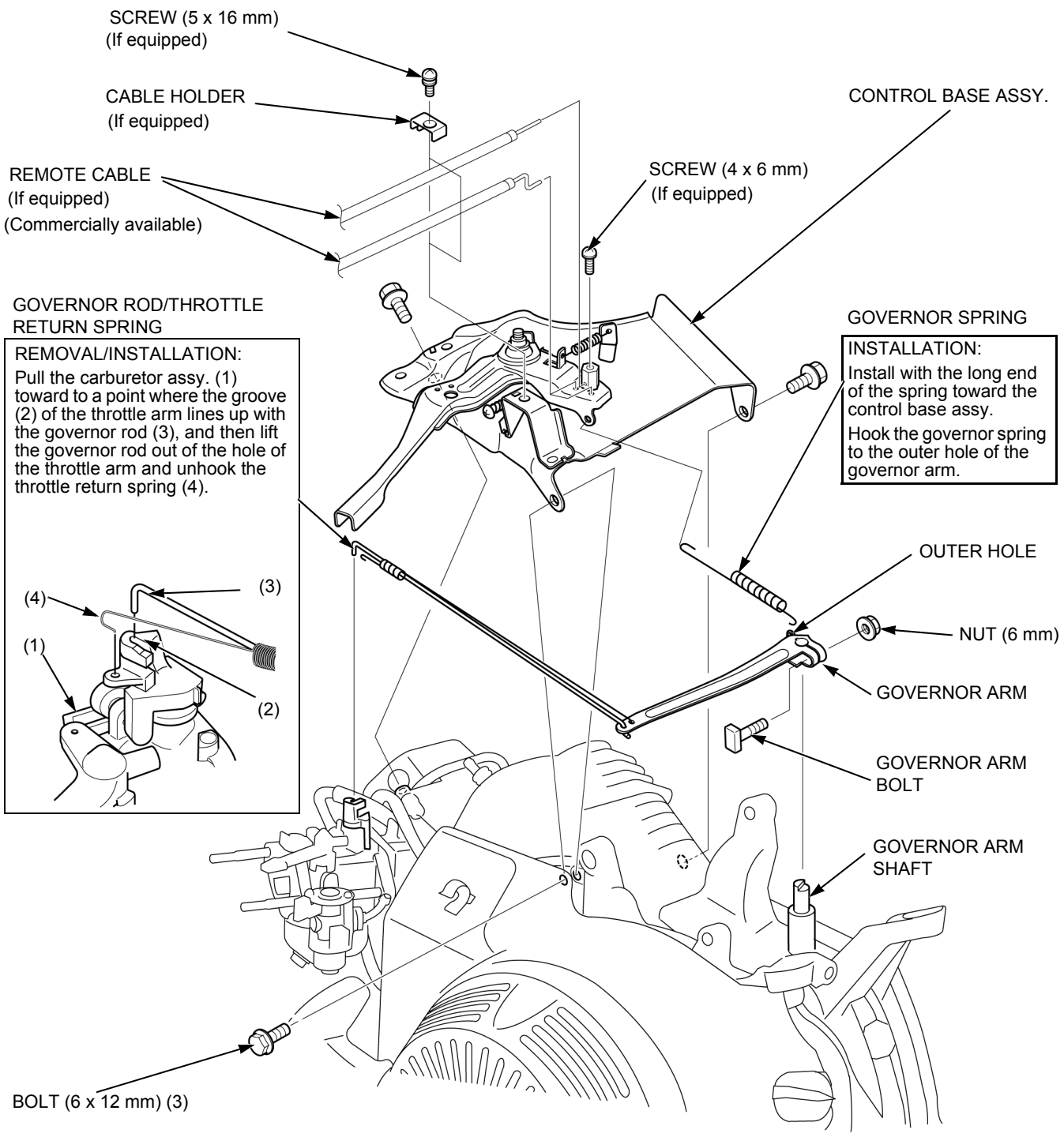
GOVERNOR ARM/CONTROL BASE ASSY. REMOVAL/INSTALLATION

MANUAL OPERATION TYPE

Remove the following parts.

– Air cleaner (page 6-7)
– Muffler (page 12-2)
– Fuel tank (page 6-3)
– Tube clamp (page 6-12)

Installation is in the reverse of removal.
Adjust the maximum speed (page 7-8).

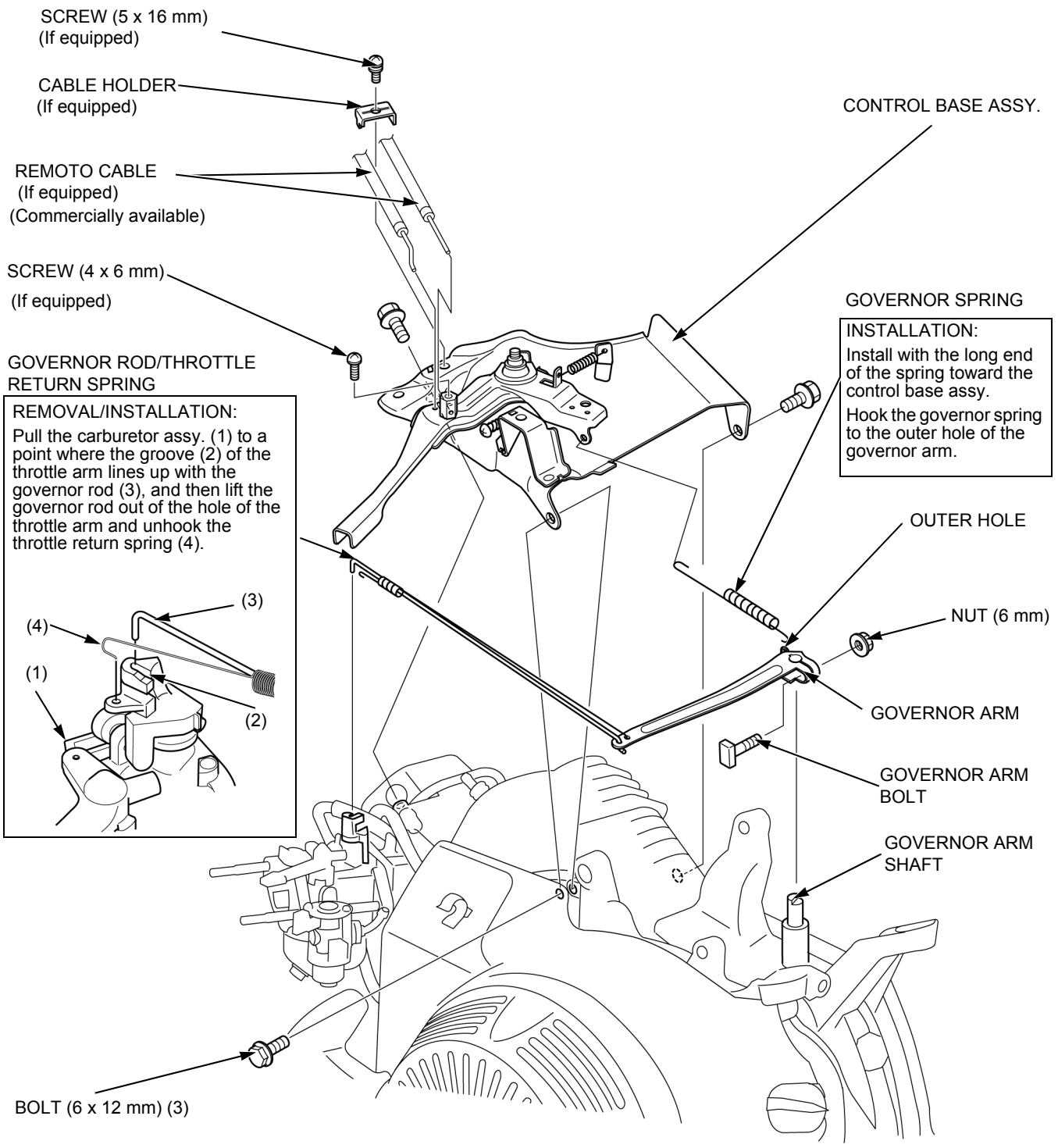


MANUAL OPERATION A TYPE

Remove the following parts.

– Air cleaner (page 6-7)
– Muffler (page 12-2)
– Fuel tank (page 6-3)
– Tube clamp (page 6-12)

Installation is in the reverse of removal.
Adjust the maximum speed (page 7-8).



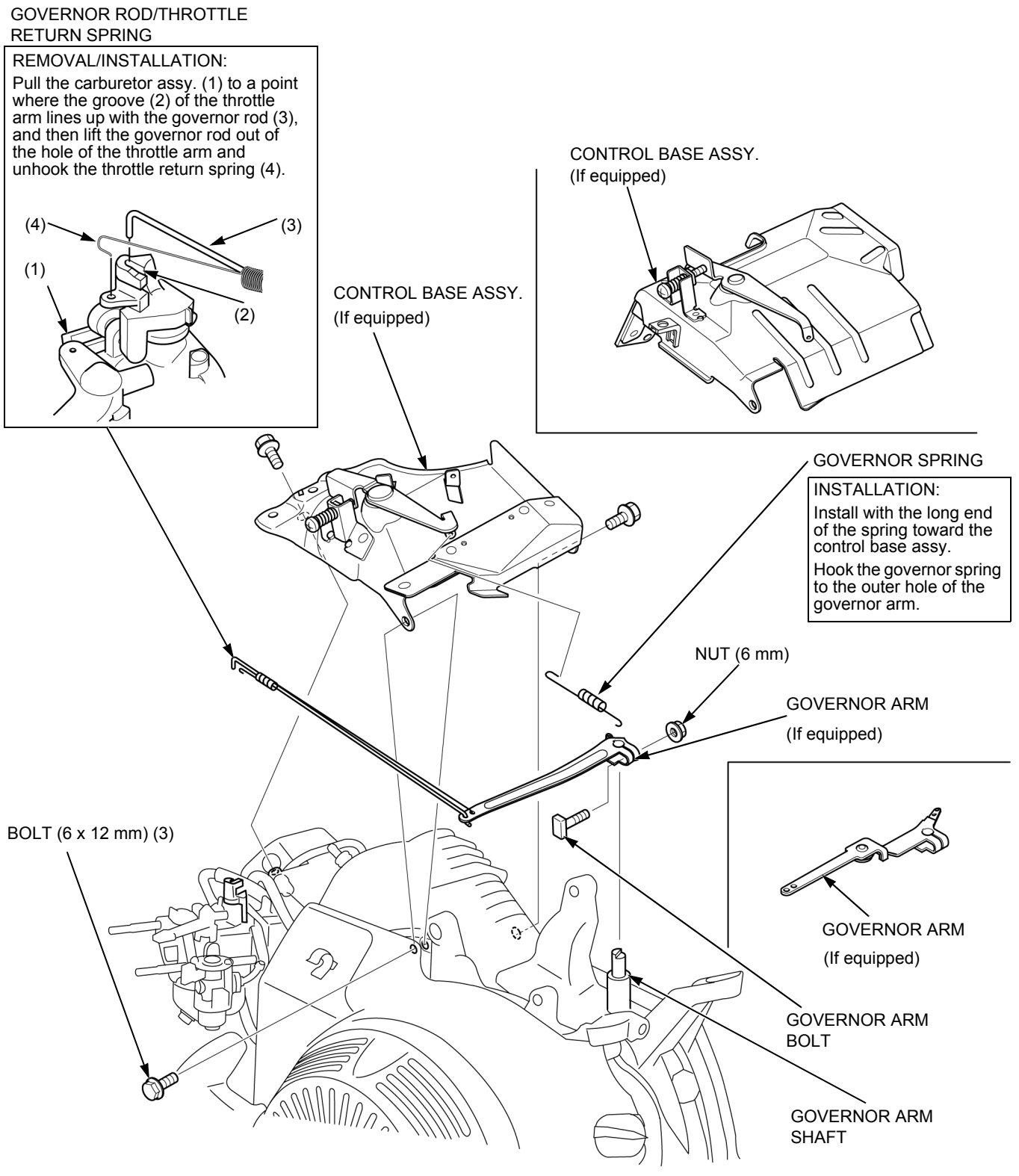
GOVERNOR SYSTEM

EXCEPT MANUAL OPERATION TYPE

Remove the following parts.

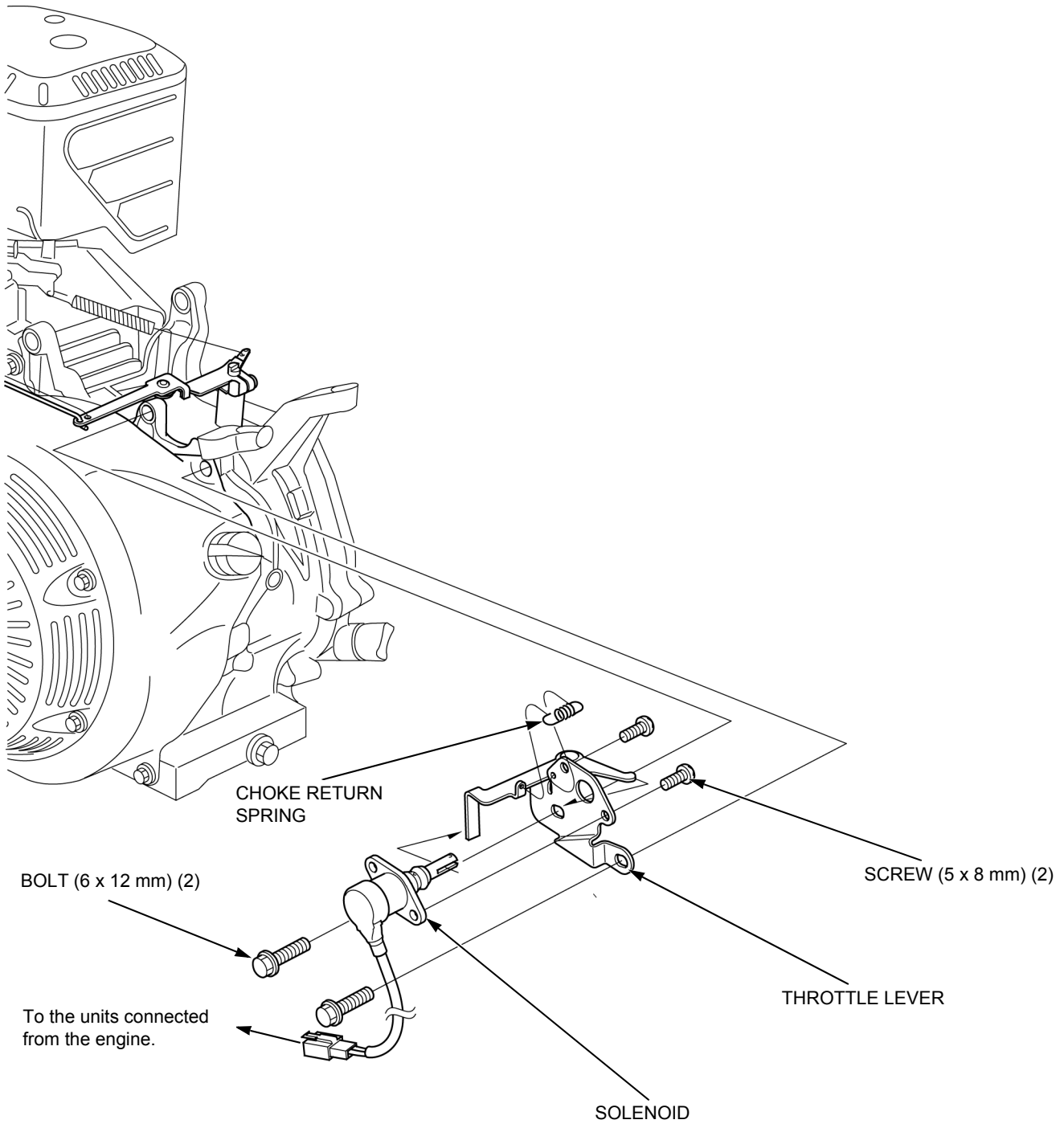
– Air cleaner (page 6-7)
– Muffler (page 12-2)
– Fuel tank (page 6-3)
– Tube clamp (page 6-11) (If equipped)

Installation is in the reverse of removal.
Adjust the governor (page 7-8)



AUTO THROTTLE (IF EQUIPPED) REMOVAL/INSTALLATION

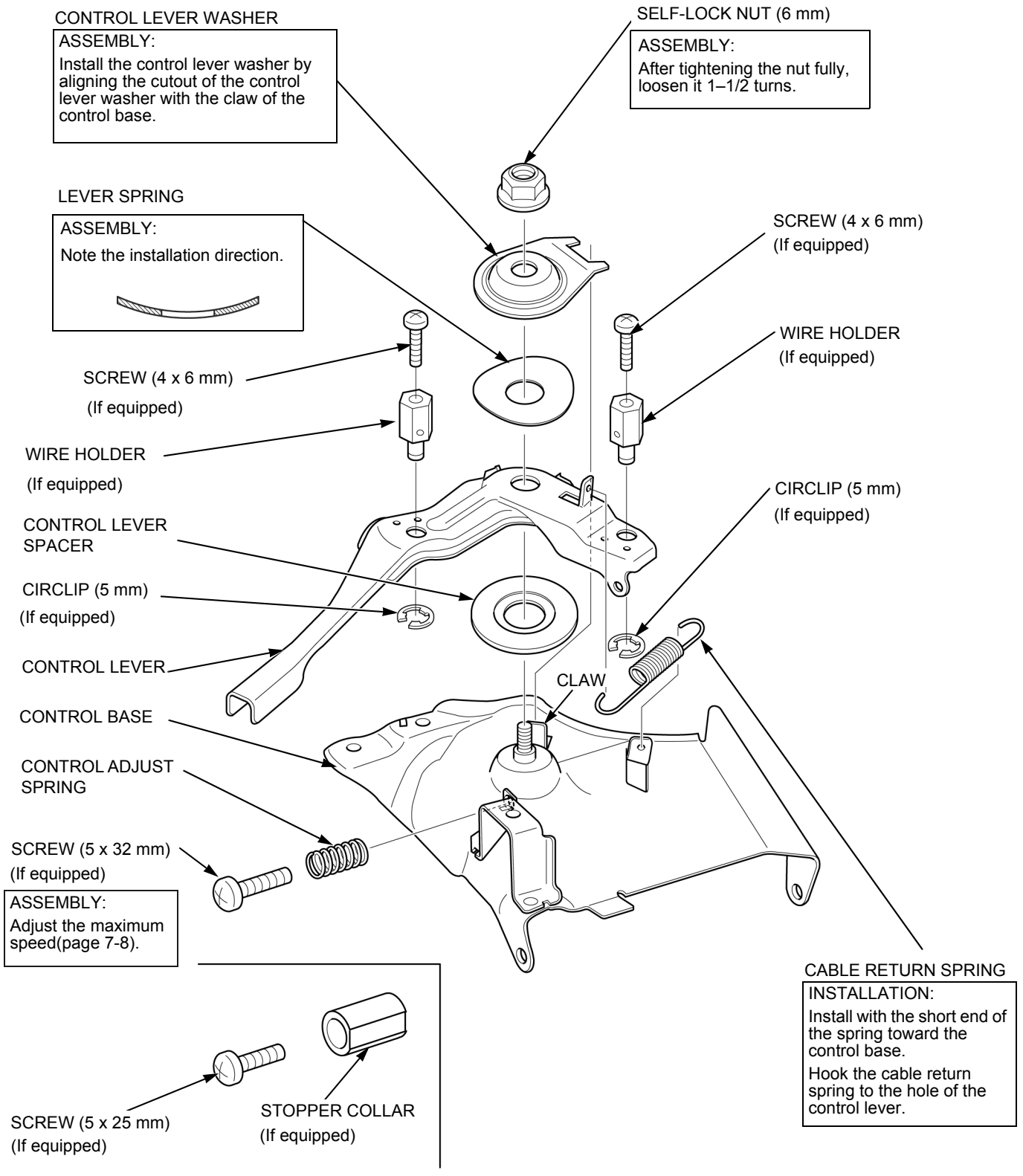
Adjust the fuel tank (page 6-3).



CONTROL BASE ASSY. DISASSEMBLY/ASSEMBLY

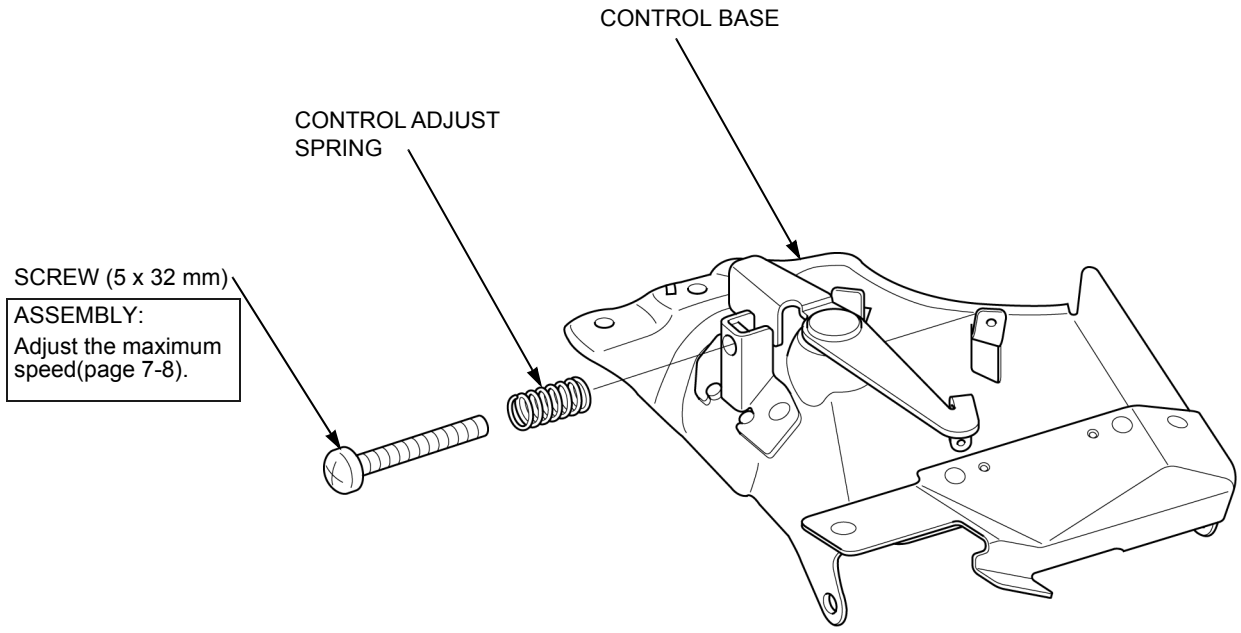
MANUAL OPERATION TYPE

Remove the control base assy (page 7-2).



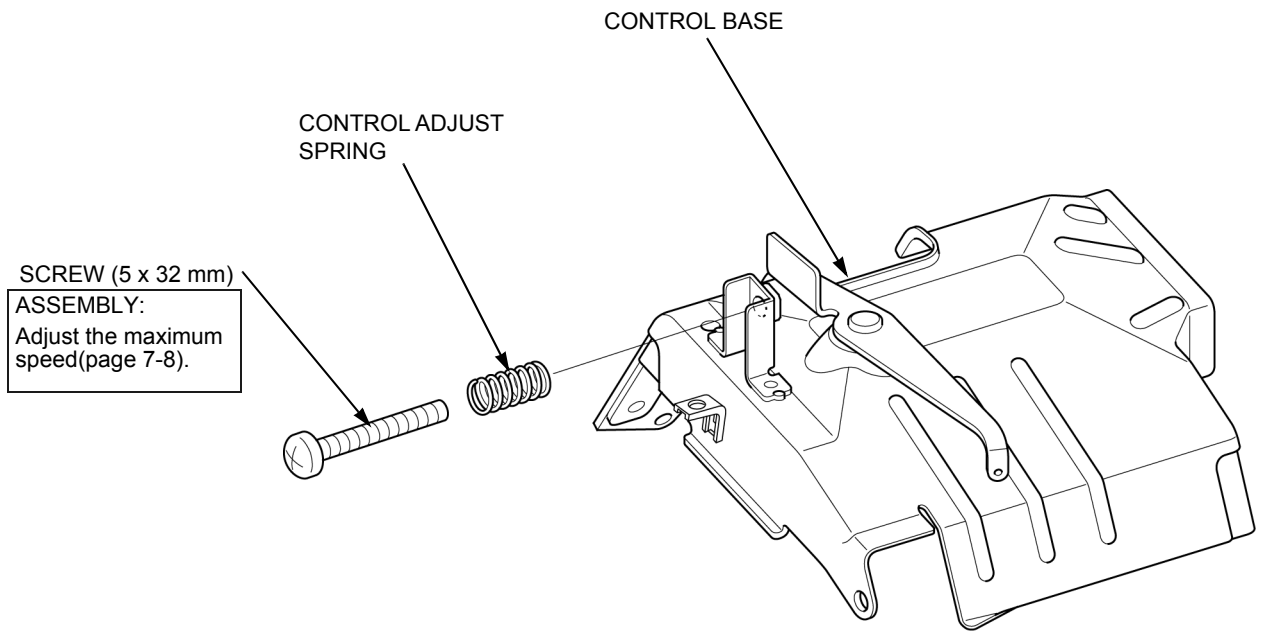
NON-HANDY LEVER A TYPE

Remove the control base assy (page 7-2).



NON-HANDY LEVER B TYPE

Remove the control base assy (page 7-2).



MAXIMUM SPEED ADJUSTMENT

Remove the fuel tank (page 6-3).

Loosen the 6 mm nut (1) of the governor arm.

Turn the governor arm (2) counter clockwise to fully open the carburetor throttle valve (3).

Rotate the governor arm shaft (4) as far as it will go in the same direction the governor arm moved to open the throttle valve.

Tighten the 6 mm nut securely.

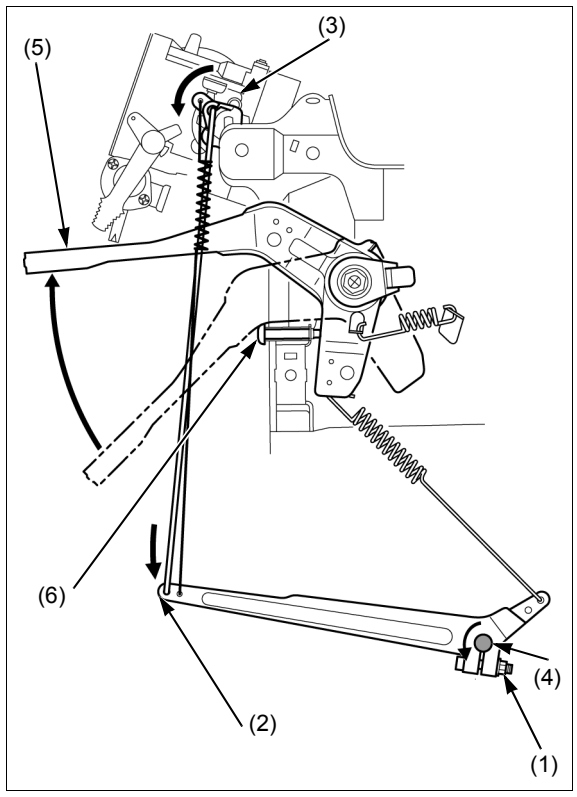
Install the fuel tank (page 6-3).

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

Move the control lever (5) to run the engine at the specified maximum speed, and hold the control lever.

Turn the 5 x 32 mm screw or 5 x 25 mm (6) of the control to obtain the specified maximum speed.

MAXIMUM SPEED: 3,850 ± 150 min^{-1} (rpm)

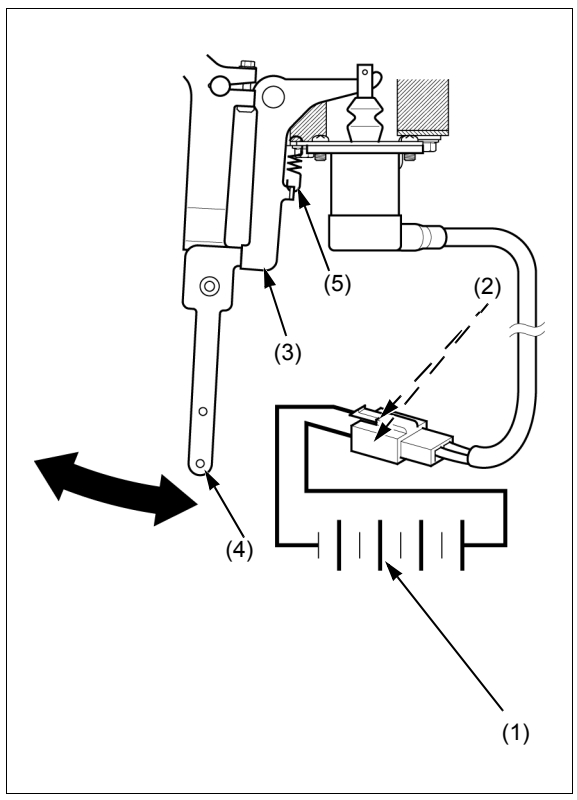


SOLENOID (AUTO THROTTLE) INSPECTION

Remove the fuel tank (page 6-3).

Connect a 12V battery (1) to the solenoid terminals (2) and check for proper operation.

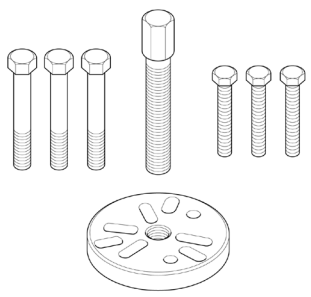
The throttle lever (3) and governor arm (4) should move with the battery connected. The choke return spring (5) should bring the throttle lever and governor arm to its normal position when the battery is removed.



8. CHARGING SYSTEM

TOOLS

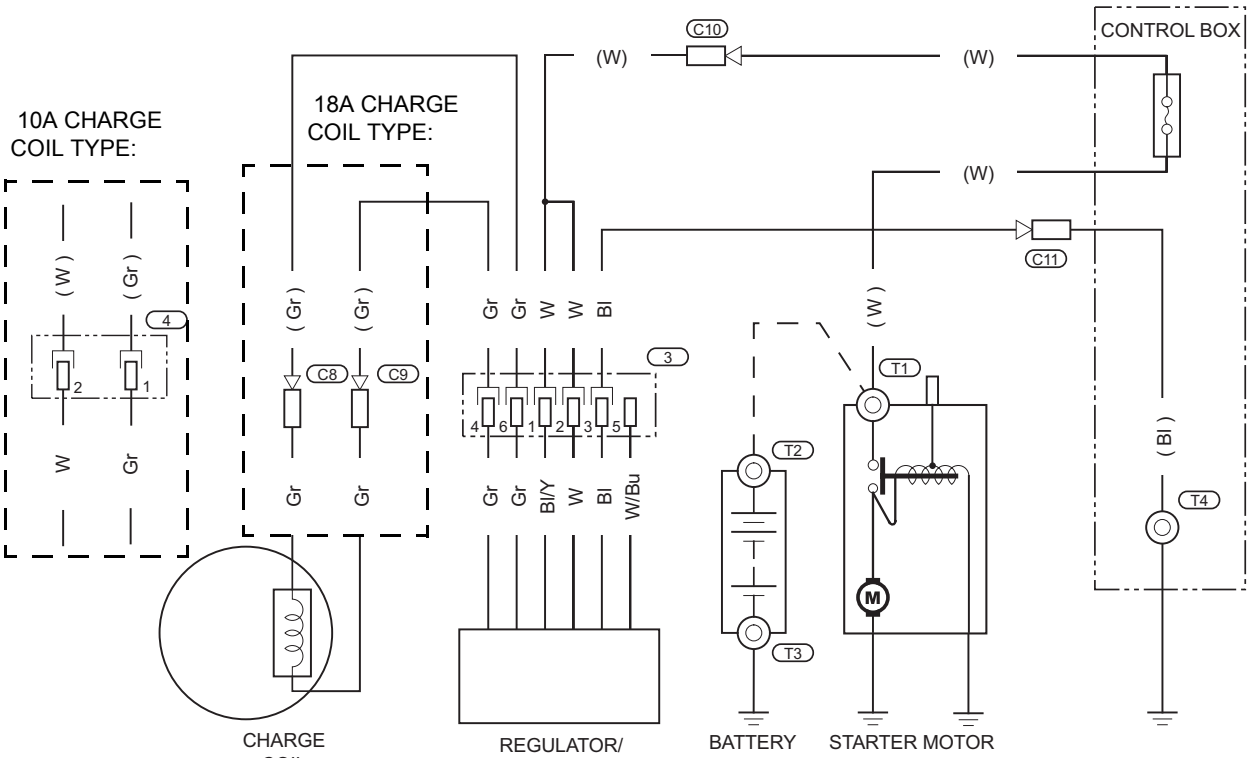
Flywheel puller set
07935-8050004



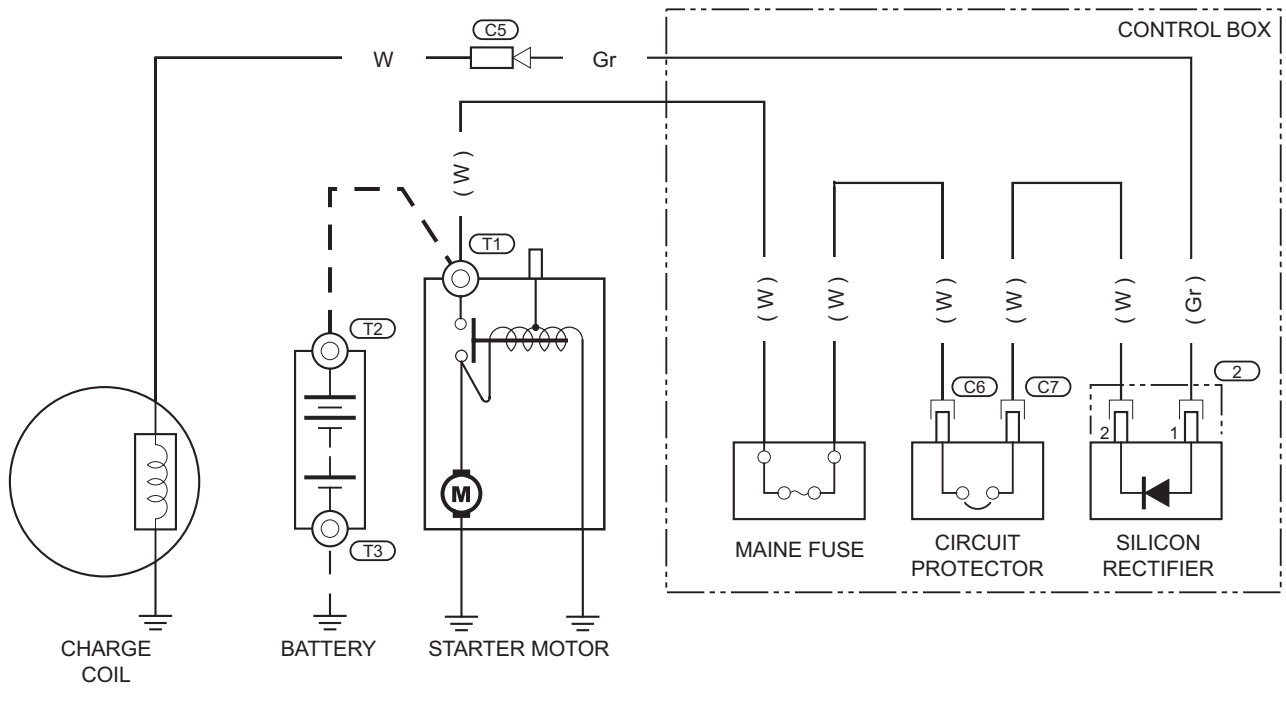
SYSTEM DIAGRAM

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

10A / 18A CHARGE COIL TYPE:



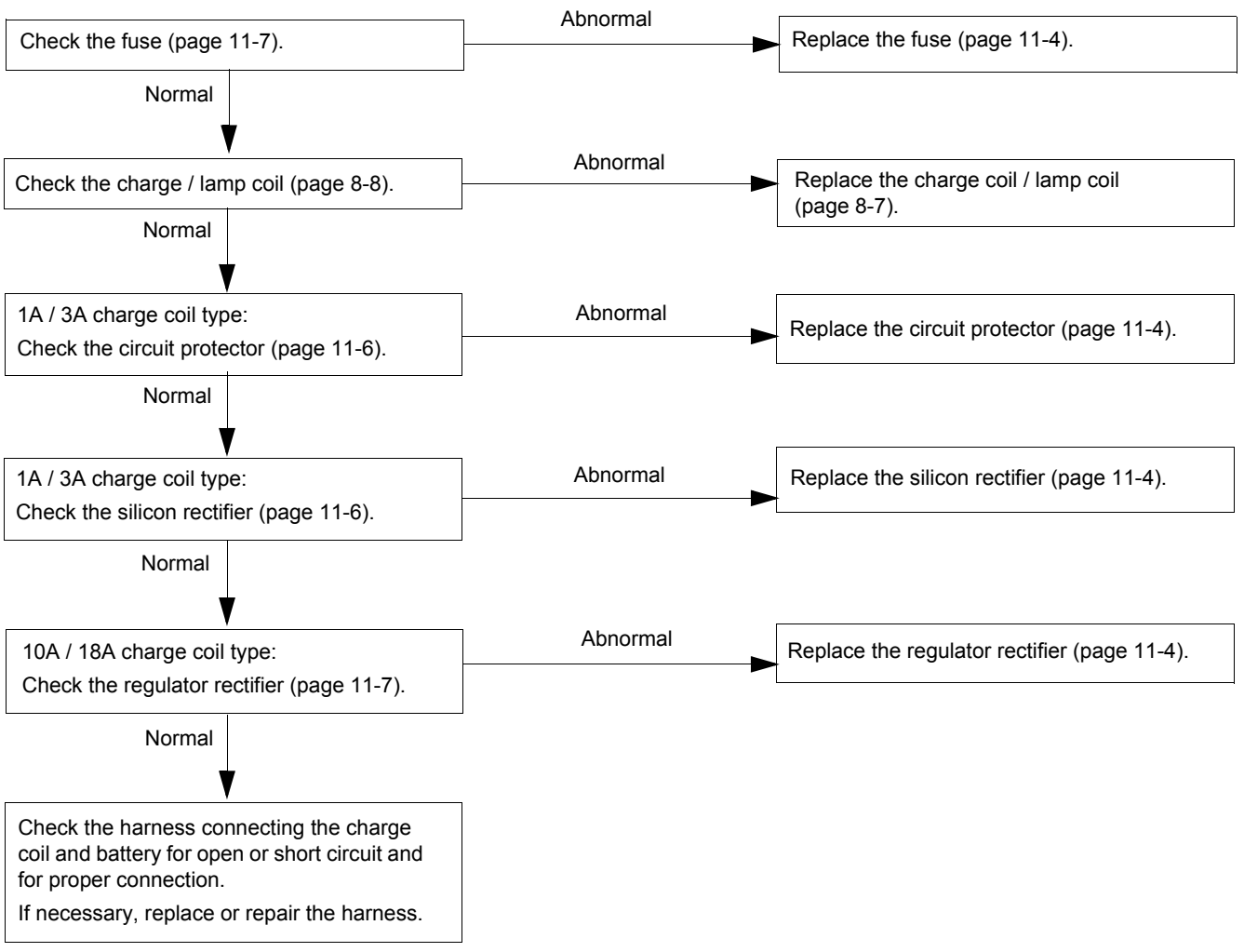
1A / 3A CHARGE COIL TYPE:



BEFORE TROUBLESHOOTING

- Use a known-good battery for troubleshooting.
- Check that the connectors are connected securely.
- Read the circuit tester's operation instructions carefully, and observe the instructions during inspection.
- Disconnect the battery cable before continuity inspection.

CHARGING SYSTEM TROUBLESHOOTING

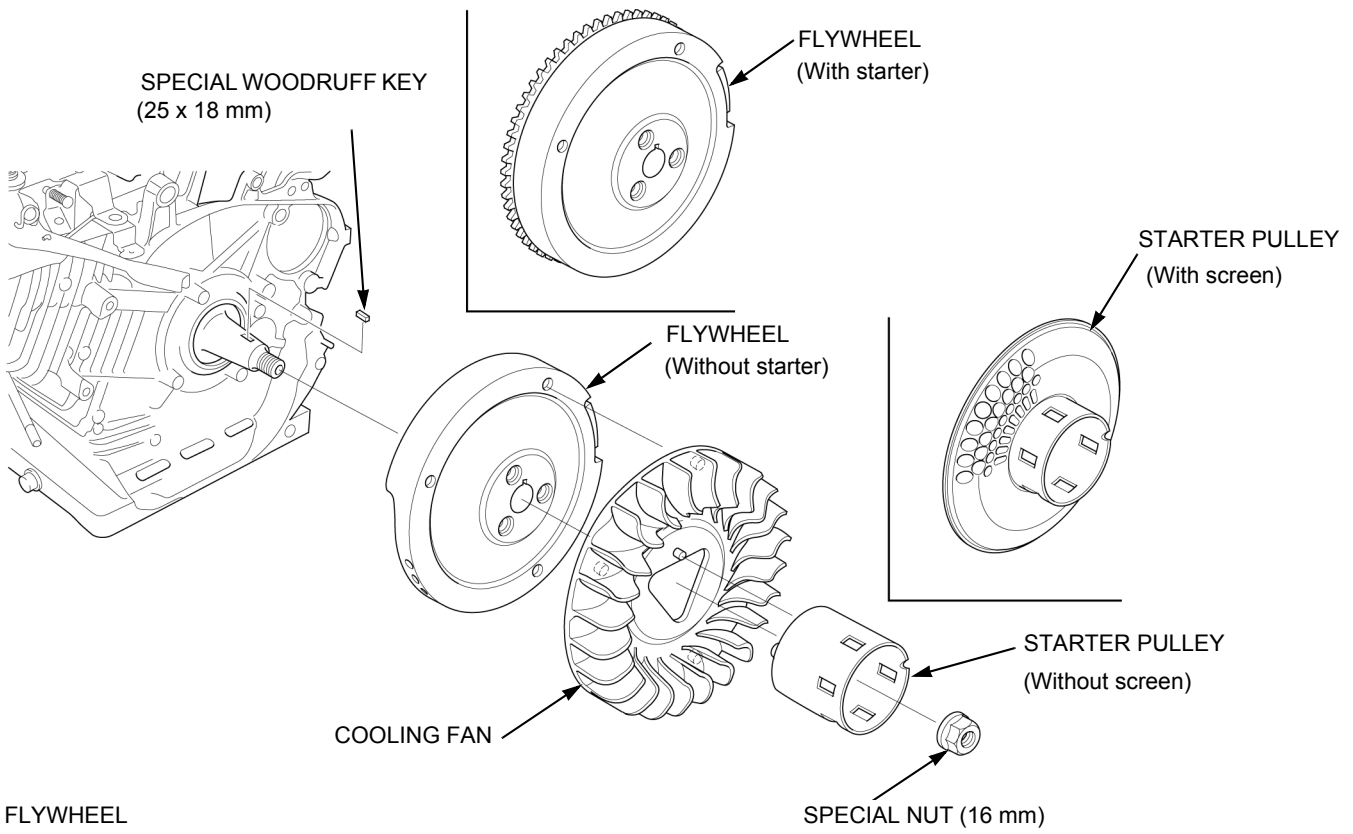


COOLING FAN/FLYWHEEL REMOVAL/ INSTALLATION

REMOVAL

Remove the following parts:

– Fan cover (page 5-2).
– Ignition coil (page 9-3).

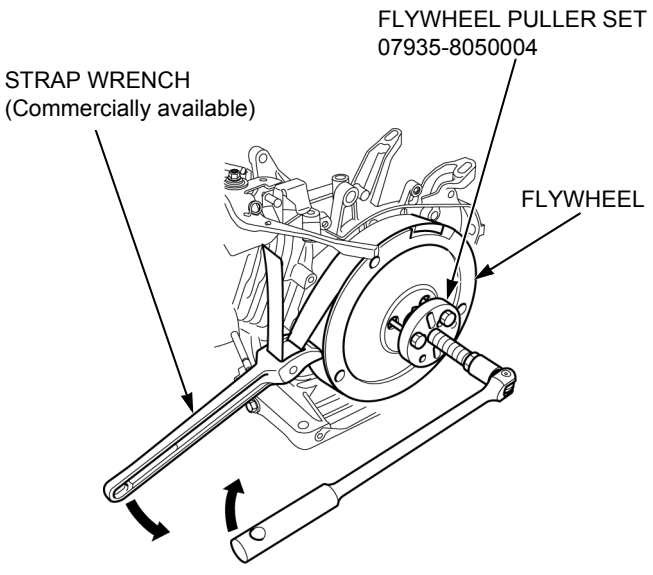


FLYWHEEL

REMOVAL:

Hold the flywheel with a commercially available strap wrench and use the special tool to remove the flywheel.

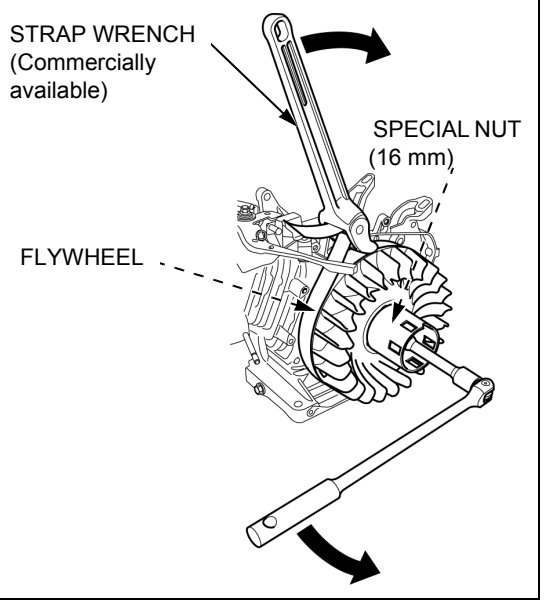
Do not hit the flywheel with a hammer.



REMOVAL:

Hold the flywheel with a commercially available strap wrench and remove the 16 mm special nut.

Take care not to damage the cooling fan.

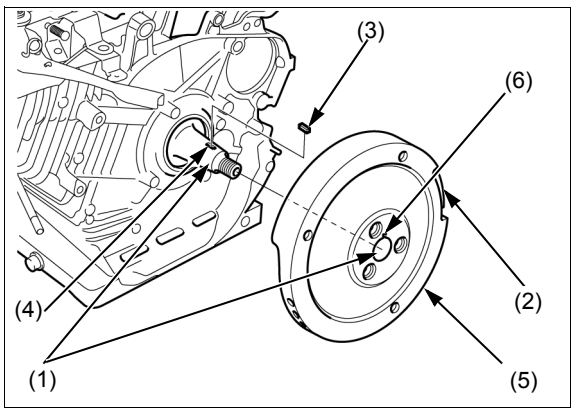


INSTALLATION

Clean the tapered parts (1) of dirt, oil, grease, and other foreign material before installation. Be sure there are no metal parts or other foreign material on the magnet part (2) of the flywheel.

Set the 25 x 18 mm special woodruff key (3) in the key groove (4) of the crankshaft securely.

Set the flywheel (5) by aligning the key slot (6) with special woodruff key on the crankshaft.

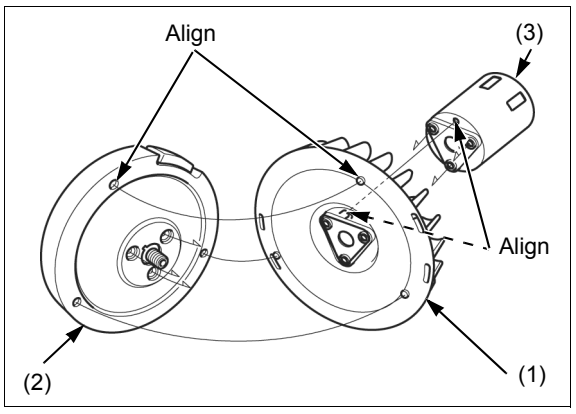


NOTICE

The flywheel may push the 25 x 18 mm special woodruff key out of its slot; check after installation.

Attach the cooling fan (1) to the flywheel (2) by aligning the three projections of the cooling fan with the holes of the flywheel.

Attach the starter pulley (3) by aligning the hole of the pulley with the projection at the center of the cooling fan.



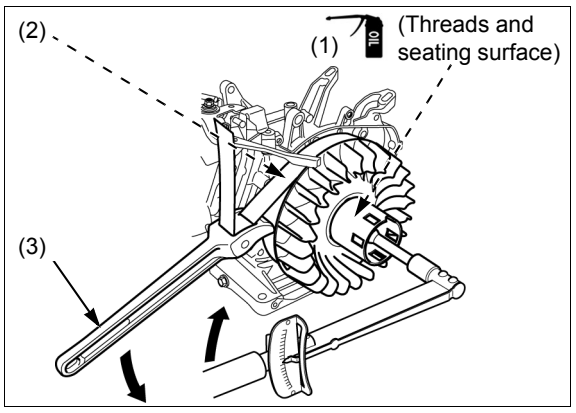
Apply a light coat of oil to the threads and the seating surface of the 16 mm special nut (1), and loosely tighten the nut.

Hold the flywheel (2) with a commercially available strap wrench (3), and tighten the 16 mm special nut to the specified torque.

TORQUE: 170 N·m (17.3 kgf·m,125 lbf·ft)

Install the following parts:

– Ignition coil (page 9-3).
– Fan cover (page 5-2).



CHARGE / LAMP COIL (IF EQUIPPED) REMOVAL/INSTALLATION

Remove the following parts:

– Fan cover (page 5-2).
– Ignition coil (page 9-3).
– Remove the flywheel (page 8-5).

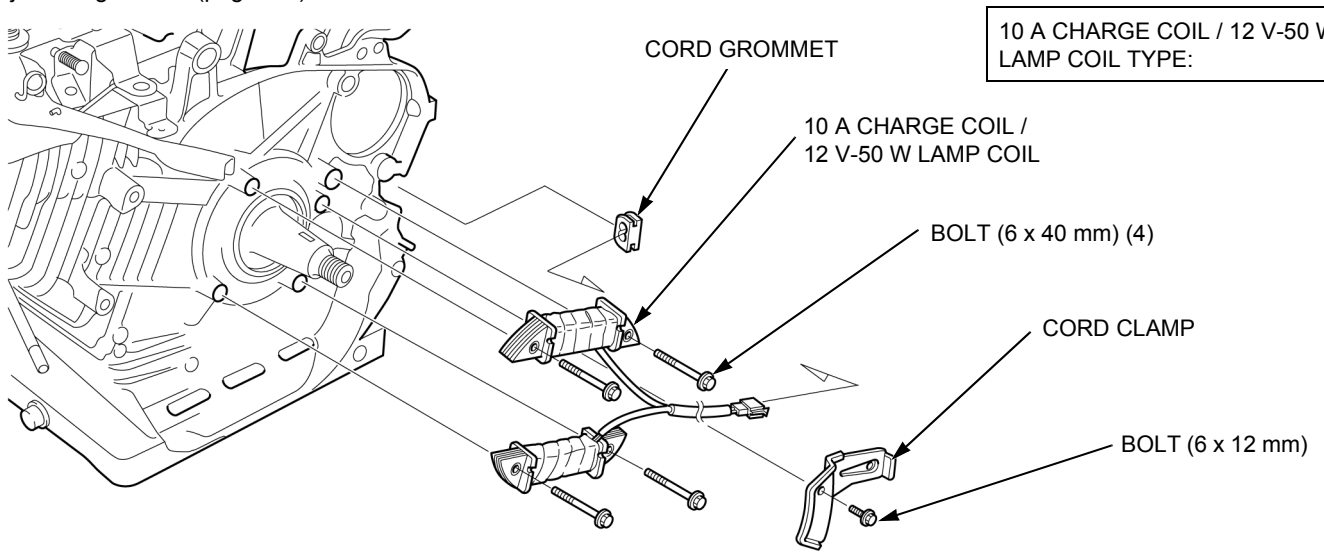
Remove the coil connector or connectors.

Installation is in the reverse of removal.

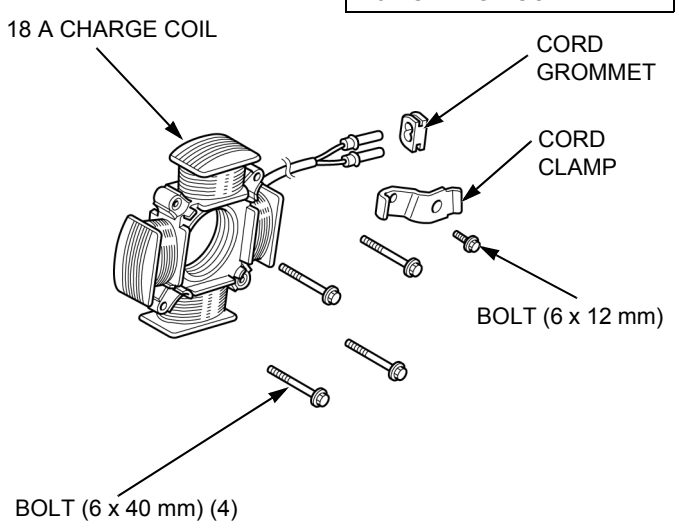
Install the cord clamp. (page 2-8)

Adjust the governor (page 7-8)

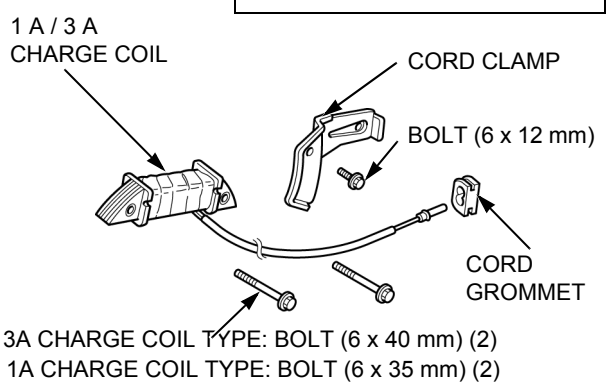
10 A CHARGE COIL / 12 V-50 W LAMP COIL TYPE:



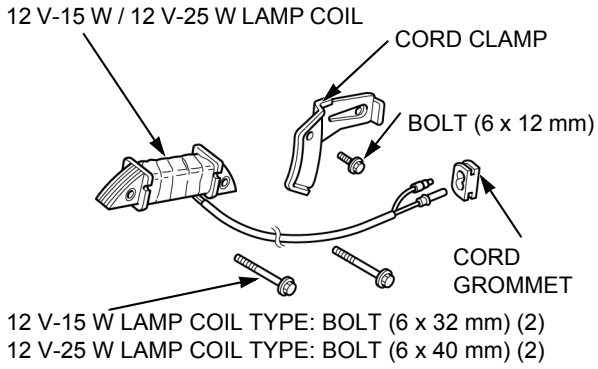
18A CHARGE COIL TYPE:



1 A / 3 A CHARGE COIL TYPE:



12 V-15 W / 12 V-25 W LAMP COIL TYPE:



CHARGE COIL INSPECTION

10 A / 18 A CHARGE COIL /12 V-15W / 12 V-25 W LAMP COIL TYPE

Disconnect the charge/lamp coil connectors.

Measure the resistance between the terminals of the charge/lamp coil.

Resistance:

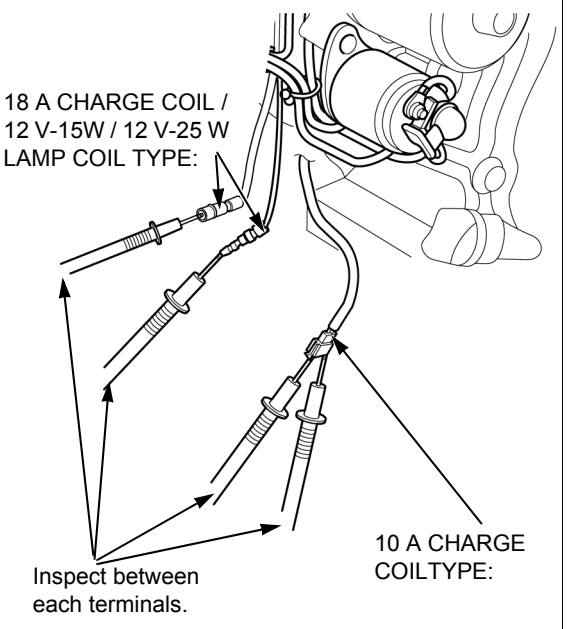
charge coil 10 A:	**0.16 - 0.24 Ω**
charge coil 18 A:	**0.10 - 0.30 Ω**
lamp coil 12 V-15 W:	**1.04 - 1.56 Ω**
lamp coil 12 V-25 W:	**0.30 - 0.46 Ω**

Check for continuity between each terminal and engine ground.

There should be no continuity.

- If the measured resistance is not within the range specification or if any wire has continuity to engine ground, replace the charge coil (page 8-7).
- If the resistance is good and the flywheel is ok, replace the charge coil and retest.

10 A / 18 A CHARGE COIL /12 V-15W / 12 V-25 W LAMP COIL TYPE:



1 A / 3 A CHARGE COIL / 12 V-50 W LAMP COIL TYPE

Disconnect the charge coil connector.

Check for continuity between terminal and engine ground.

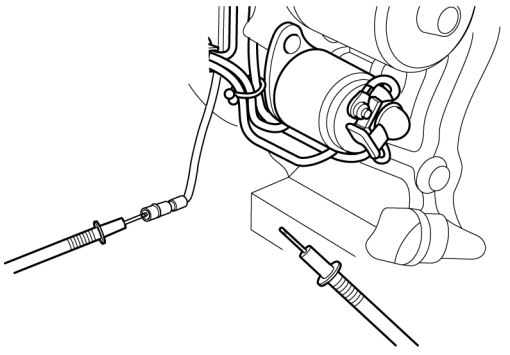
Resistance:

charge coil 1 A:	**3.00 - 4.00 Ω**
charge coil 3 A:	**0.62 - 0.93 Ω**
Lamp coil 12 V-50 W:	**0.29 - 0.44 Ω**

There should be no continuity.

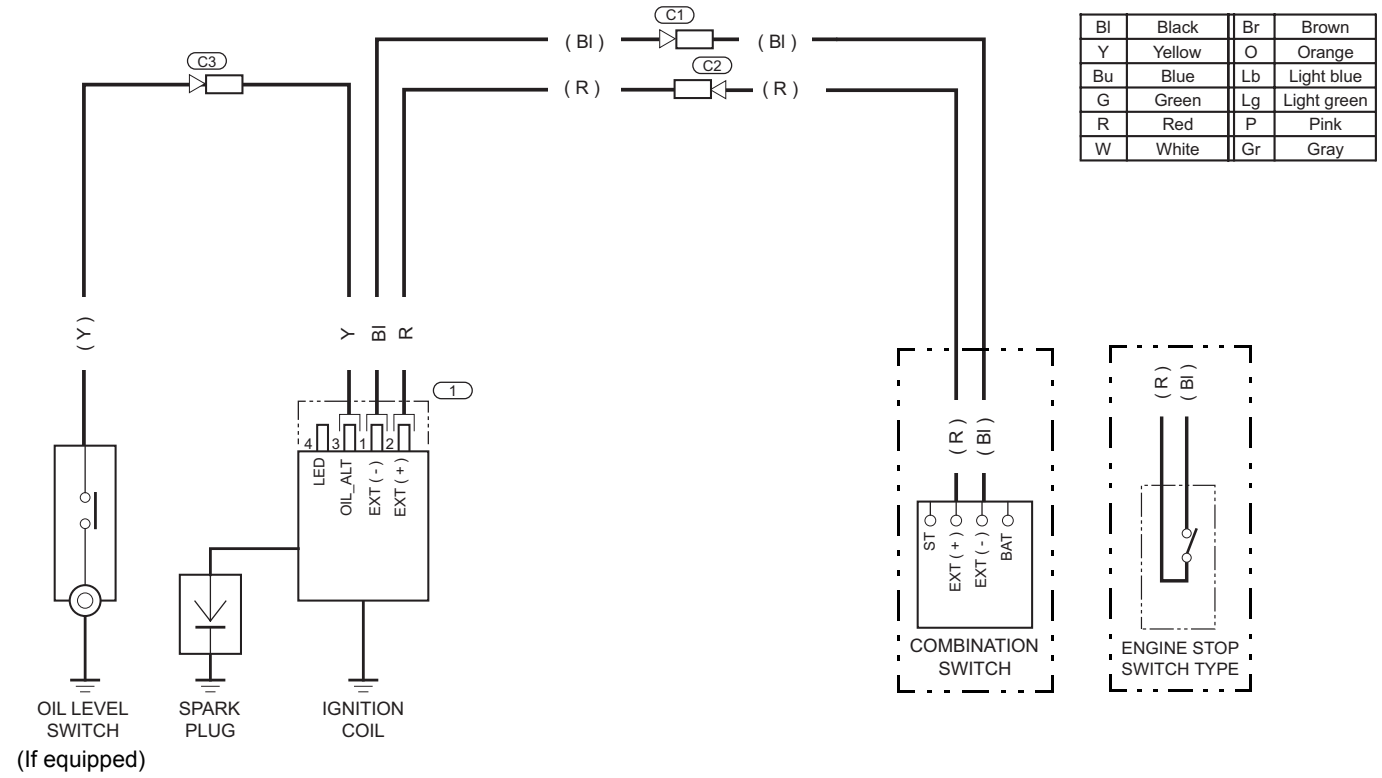
If the resistance is good and the flywheel is ok, replace the charge coil and retest.

1A / 3A CHARGE COIL / 12 V-50 W LAMP COIL TYPE:



9. IGNITION SYSTEM

SYSTEM DIAGRAM

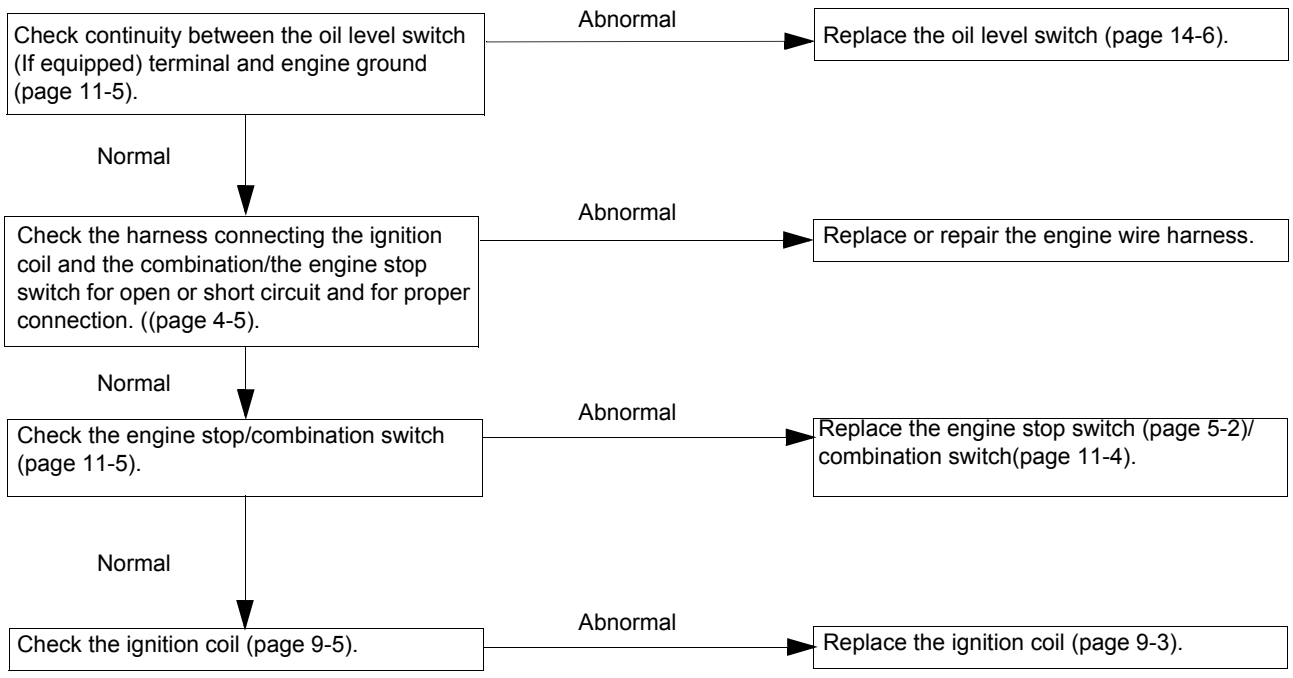


Bl	Black	Br	Brown
Y	Yellow	O	Orange
Bu	Blue	Lb	Light blue
G	Green	Lg	Light green
R	Red	P	Pink
W	White	Gr	Gray

IGNITION SYSTEM TROUBLESHOOTING

NO SPARK AT SPARK PLUG

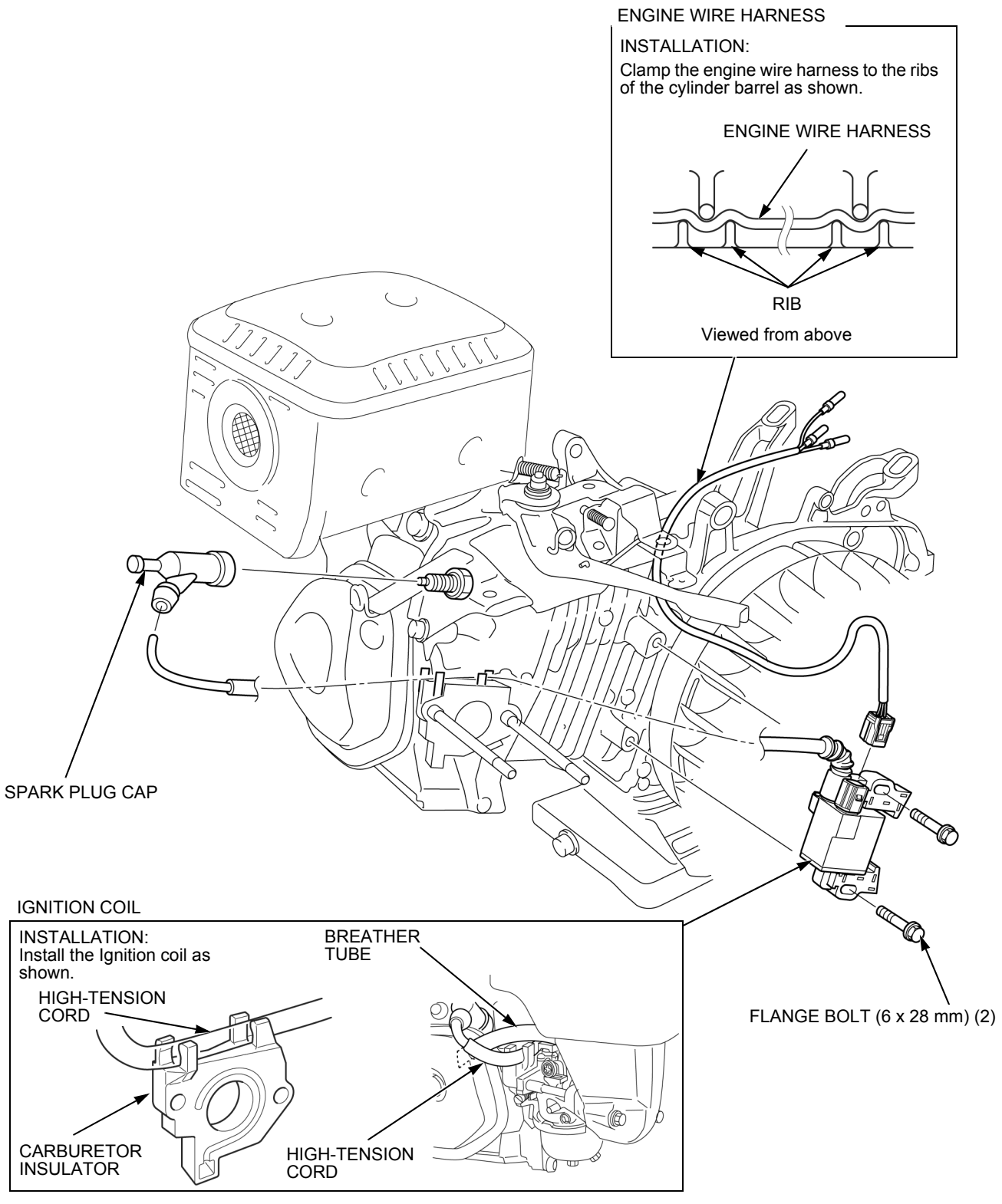
- Check the engine oil level before troubleshooting.



IGNITION COIL REMOVAL/ INSTALLATION

Remove the following parts:

– Air cleaner (page 6-7)
– Fuel tank (page 6-3)
– Fan cover (page 5-2)



IGNITION COIL INSTALLATION

Attach the ignition coil (1) and loosely tighten the two 6 x 28 mm flange bolts (2).

Insert the thickness gauge (3) of proper thickness between the ignition coil and the flywheel.

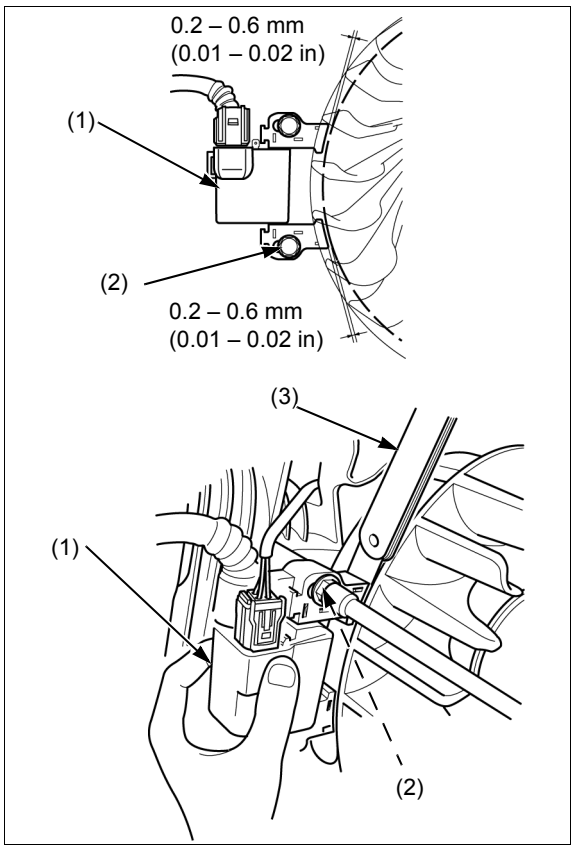
IGNITION COIL AIR GAP:
0.2 – 0.6 mm (0.01 – 0.02 in)

NOTICE

Adjust the ignition coil air gap equally on both sides.

Push the ignition coil firmly against the flywheel and tighten the 6 x 28 mm flange bolts securely.

Remove the thickness gauge.



SPARK TEST

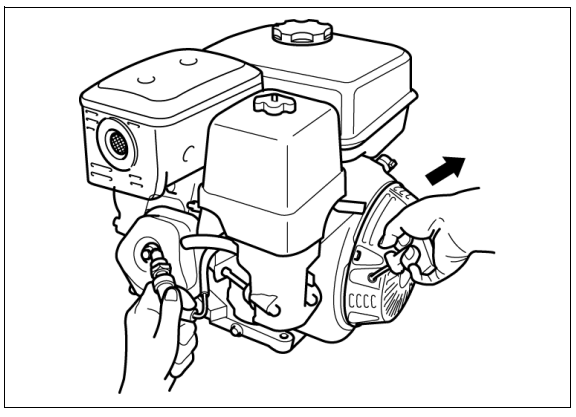
Inspect the following before spark test.

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

Disconnect the spark plug cap from the spark plug.

Connect a known-good spark plug to the spark plug cap and ground the spark plug to the cylinder head.

Crank the engine by pulling the recoil starter forcefully and check whether sparks jump across the electrode.



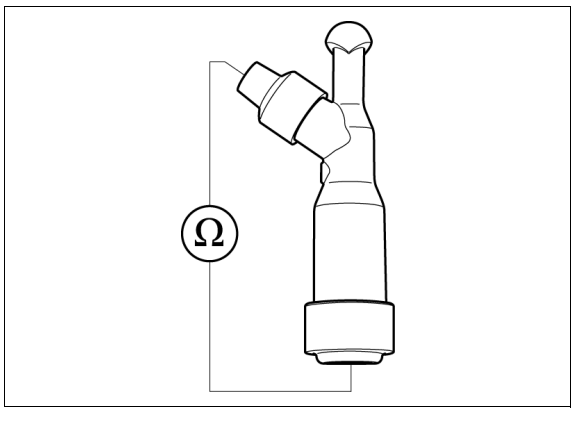
SPARK PLUG CAP INSPECTION

Remove the spark plug cap from the high tension cord.

Attach the tester probes to the terminal connected to the spark plug and terminal connected to the high tension cord of the spark plug cap.

There should be a continuity between the terminals.

If there is no continuity, replace the spark plug cap.



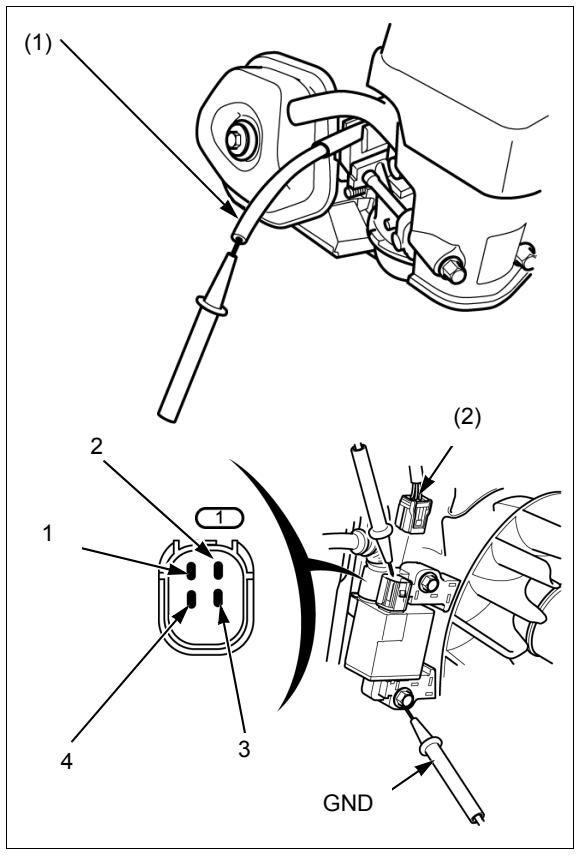
IGNITION COIL INSPECTION

Disconnect the spark plug cap from the spark plug.

Remove the spark plug cap from the high tension cord (1).

Disconnect the engine wire harness connector (2) from the ignition coil.

Measure the resistance between the terminals and be sure that the measurements are within the specifications in the below.



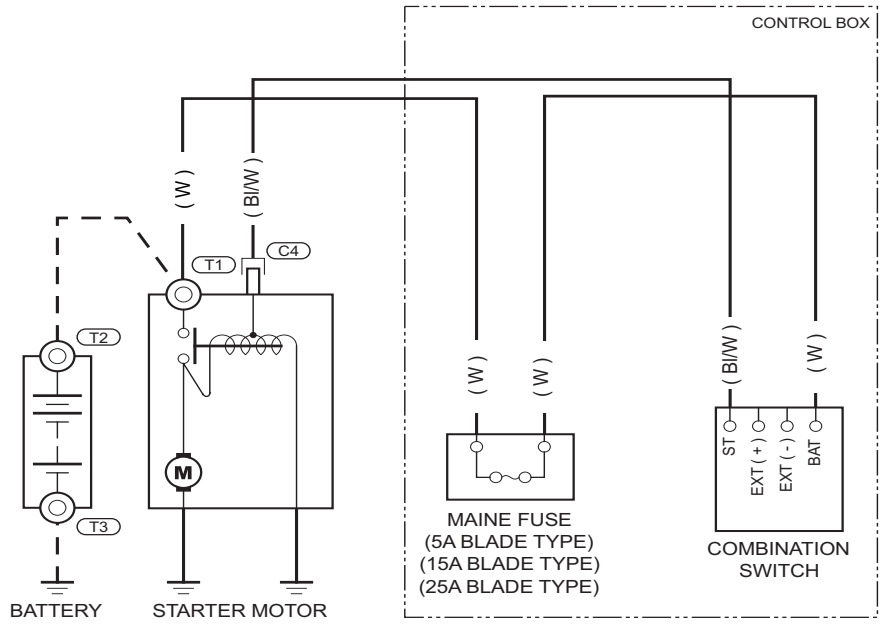
Unit: kΩ

			(+) Prove					
					Terminal number			
			GND	HIGH-TENSION CORD	EXT (+) 2	EXT (-) 1	LED 4	OIL ALT 3
(-) Probe	GND			6-11	1-10	∞	7-45	5-30
	HIGH-TENSION CORD		6-11		7-24	∞	14-72	12-47
	Terminal number	EXT (+) 2	5-14	10-26		∞	15-76	6-26
		EXT (-) 1	∞	∞	∞		∞	∞
		LED 4	∞	∞	∞	∞		∞
		OIL ALT 3	∞	∞	∞	∞	∞	

MEMO

10. STARTING SYSTEM

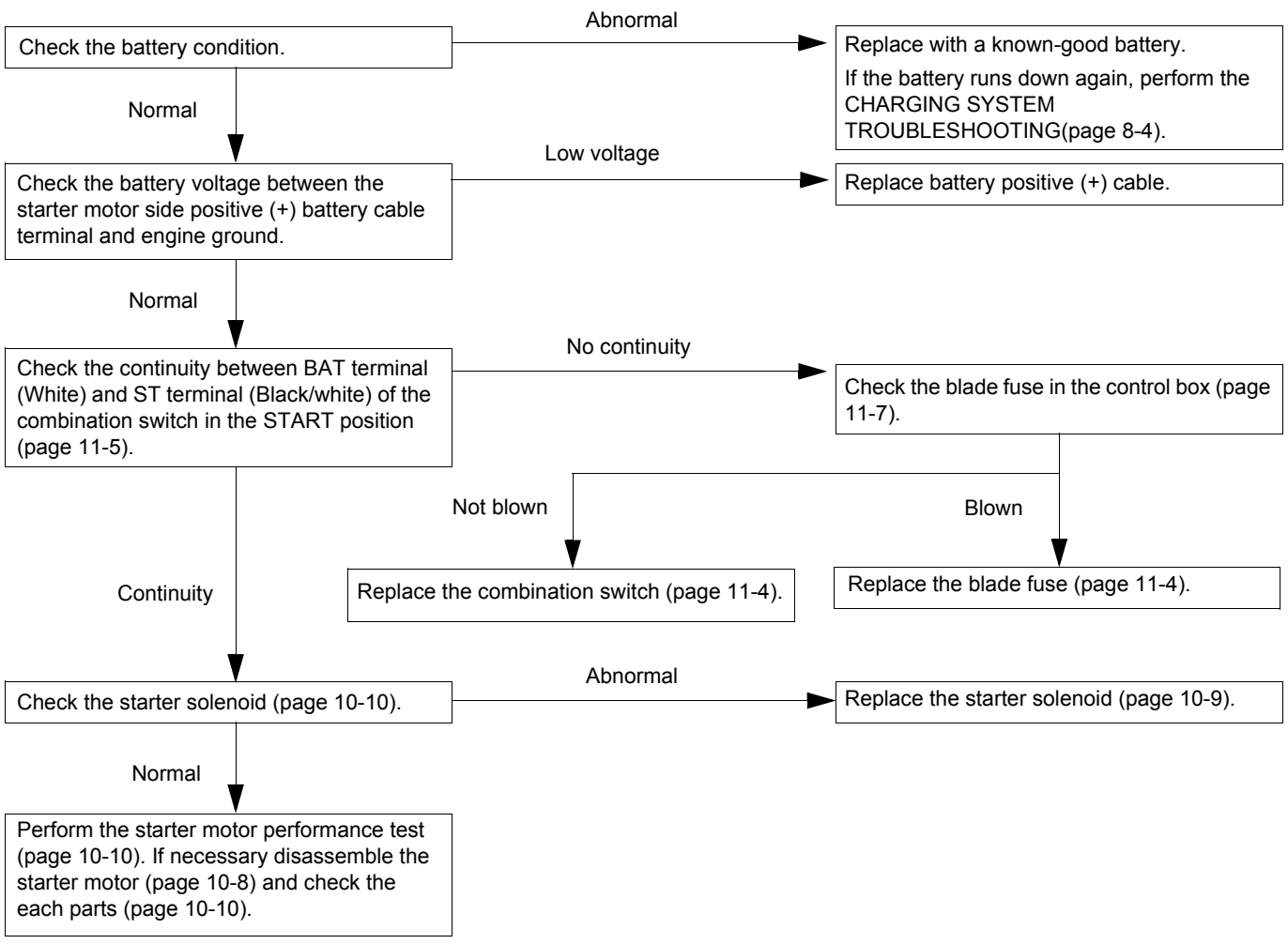
SYSTEM DIAGRAM



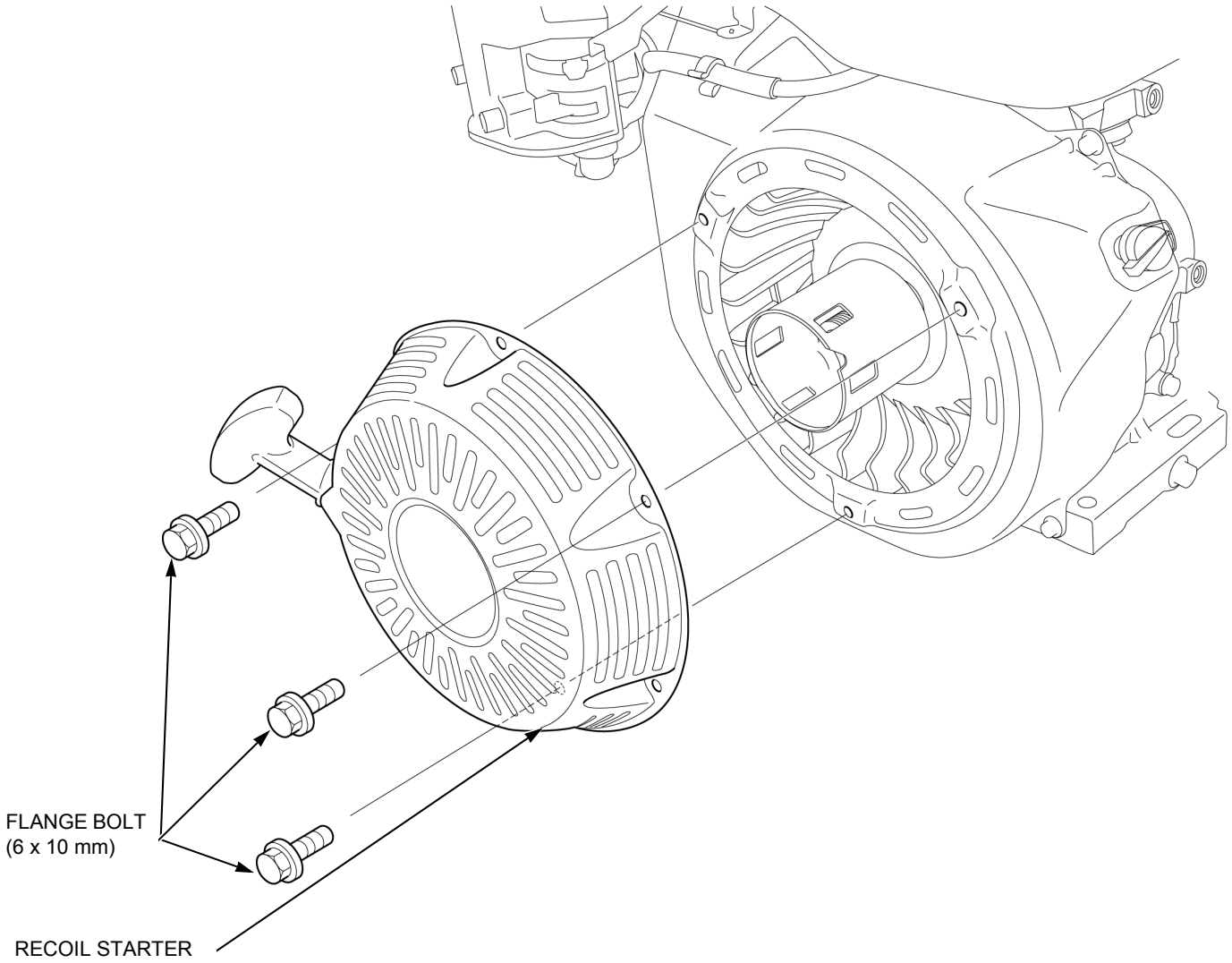
Bl	Black	Br	Brown
Y	Yellow	O	Orange
Bu	Blue	Lb	Light blue
G	Green	Lg	Light green
R	Red	P	Pink
W	White	Gr	Gray

STARTING SYSTEM TROUBLESHOOTING

STARTER MOTOR DOES NOT OPERATE

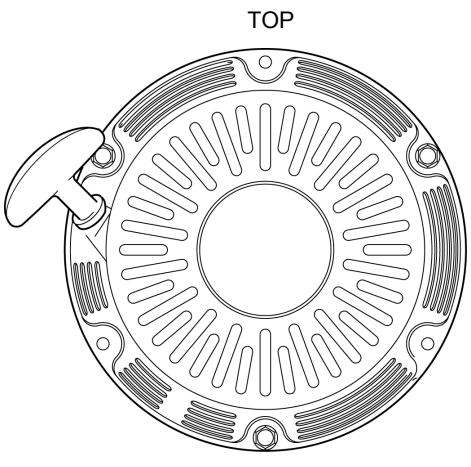


RECOIL STARTER REMOVAL/ INSTALLATION

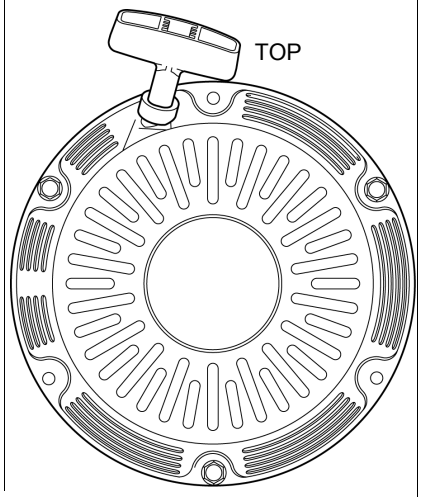


INSTALLATION:
Install the recoil starter as shown.

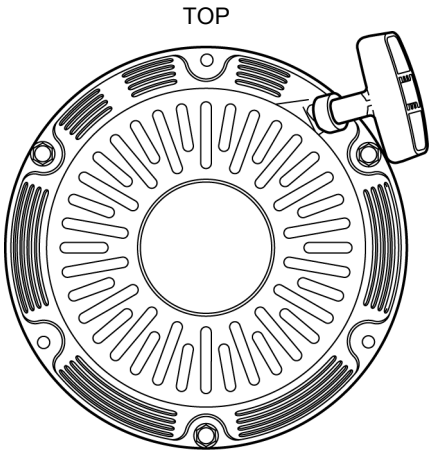
DUAL ELEMENT / CYCLONE AIR CLEANER TYPE:



LOW PROFILE AIR CLEANER TYPE:



QDW9 / QHB4 TYPE:

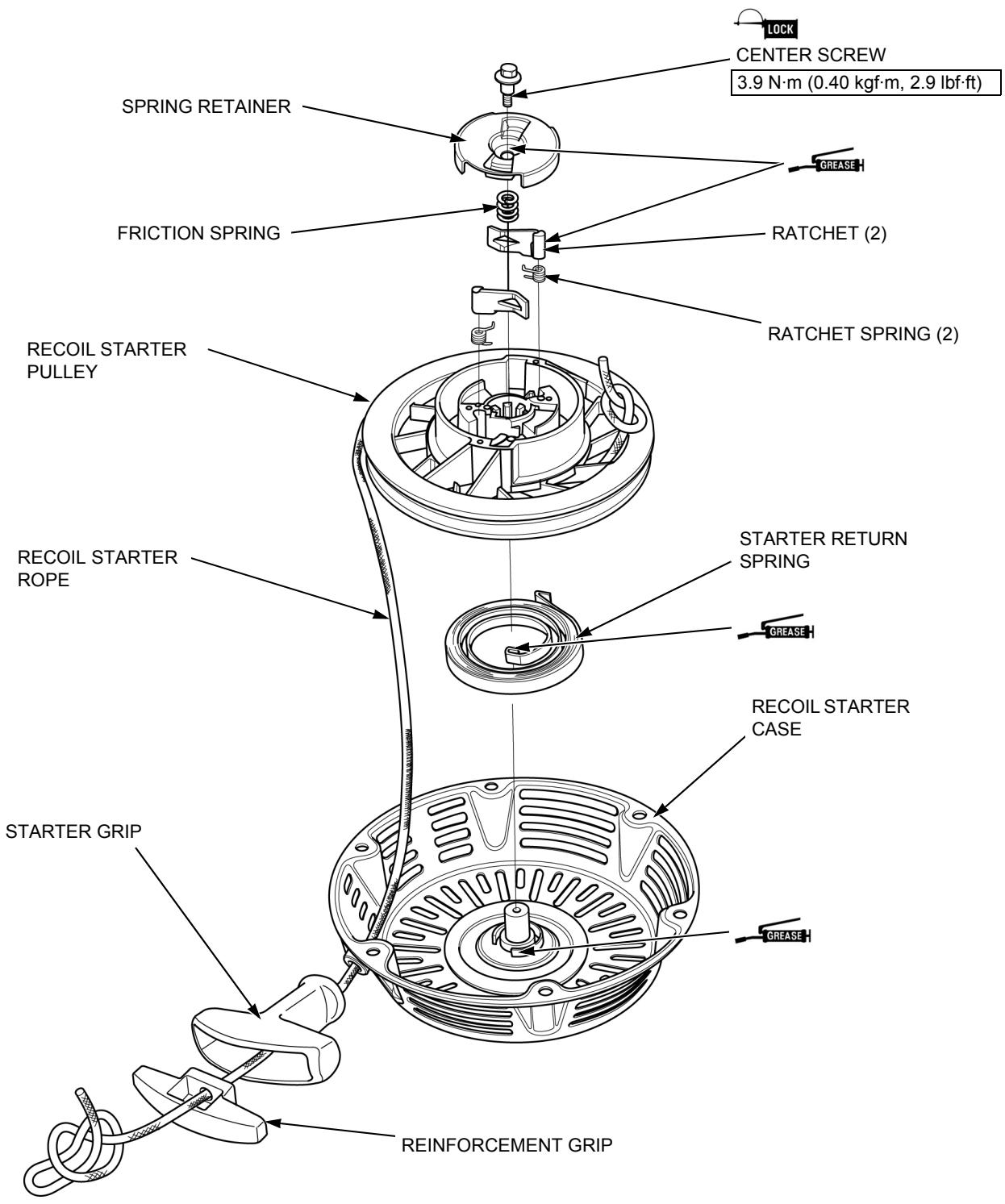


RECOIL STARTER DISASSEMBLY

⚠ CAUTION

To prevent serious eye injury, always wear safety goggles or other eye protection when using compressed air.

Remove the recoil starter (page 10-3).

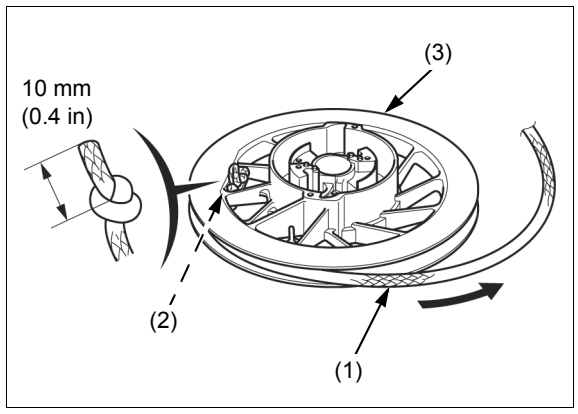


RECOIL STARTER ASSEMBLY

⚠ CAUTION

To prevent serious eye injury, always wear safety goggles or other eye protection when using compressed air.

Pass the recoil starter rope (1) through the hole (2) of the recoil starter pulley (3), and then tie the rope as shown.

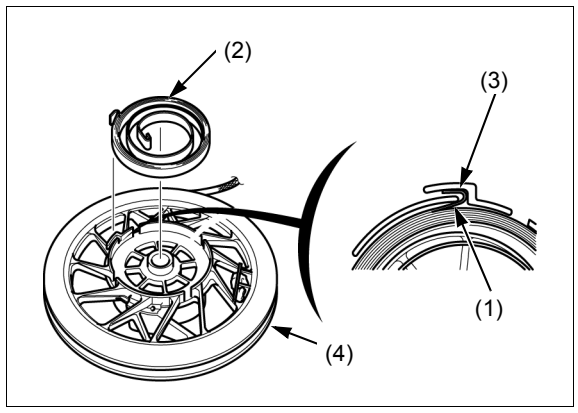


NOTICE

Before installing the recoil starter rope, check for fray or wear.

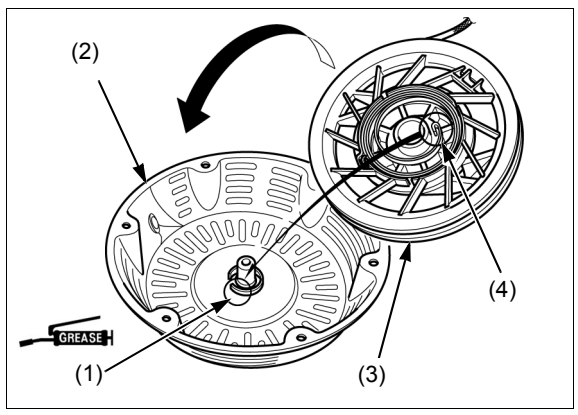
Wind the recoil starter rope onto the recoil starter pulley counterclockwise.

Hook the outer hook (1) of the starter return spring (2) to the groove (3) of the recoil starter pulley (4), and then install the starter return spring by winding it.



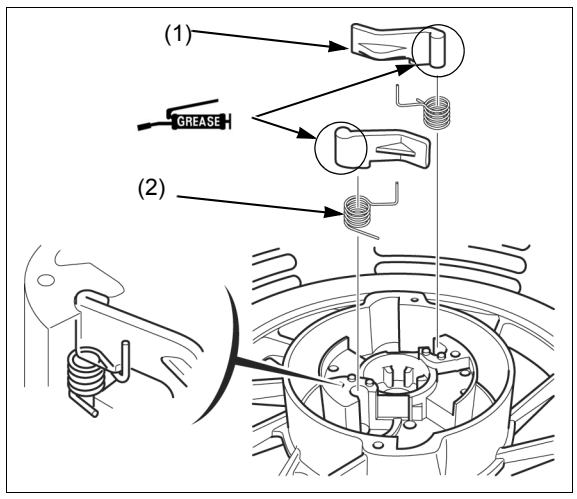
Apply grease to the cutout (1) of the recoil starter case (2).

Set the recoil starter pulley (3) to the recoil starter case by aligning the inner hook (4) of the starter return spring with the cutout of the recoil starter case.



Apply grease to the two ratchets (1).

Install the two ratchets and the two ratchet springs (2) to the recoil starter pulley as shown.



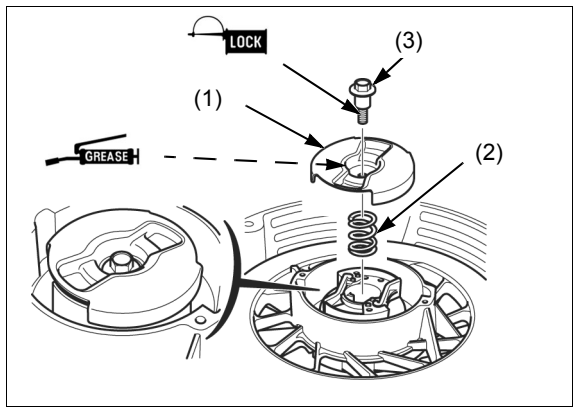
Apply grease to the inside of the spring retainer (1).

Set the friction spring (2) and the spring retainer to the recoil starter pulley in the direction as shown.

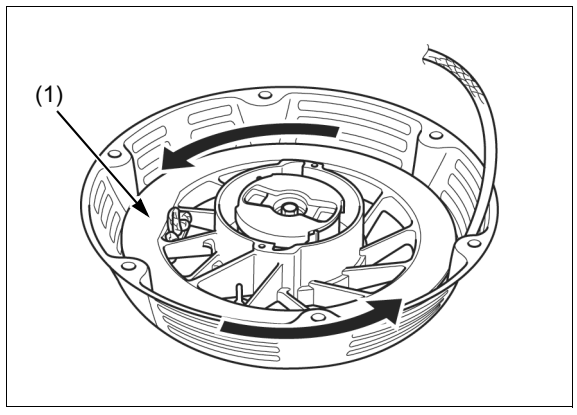
Apply locking agent (Threebond® 2430 or equivalent) to the threads of the center screw (3).

Hold the spring retainer and tighten the center screw to the specified torque.

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

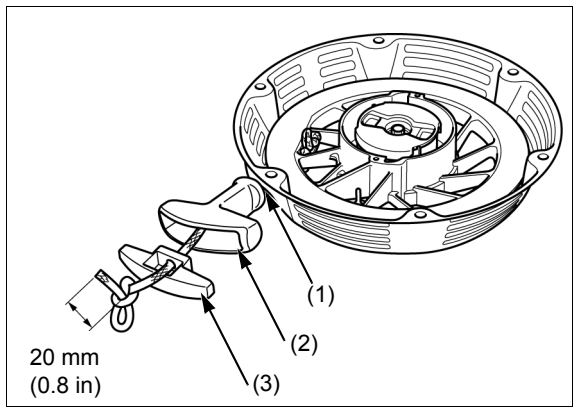


Turn the recoil starter pulley (1) more than 2 turns counterclockwise to preload the starter return spring. Be sure to hold the recoil starter pulley.



Pass the recoil starter rope through hole (1) of the recoil starter case, the starter grip (2), and reinforcement grip (3), and then tie the rope as shown.

Check the recoil starter operation (page 10-7).

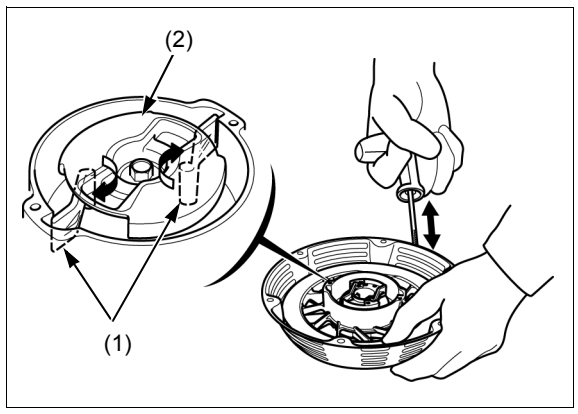


RECOIL STARTER INSPECTION

RECOIL STARTER OPERATION

Remove the recoil starter (page 10-3).

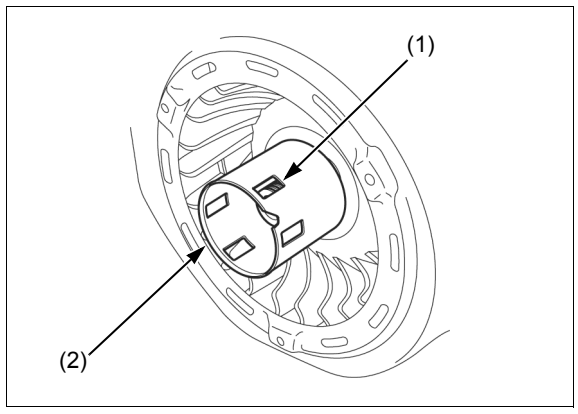
Pull the starter grip several times to inspect that the ratchets (1) are operated properly (the ratchet ends come out from the spring retainer (2).



STARTER PULLEY

Remove the recoil starter (page 10-3).

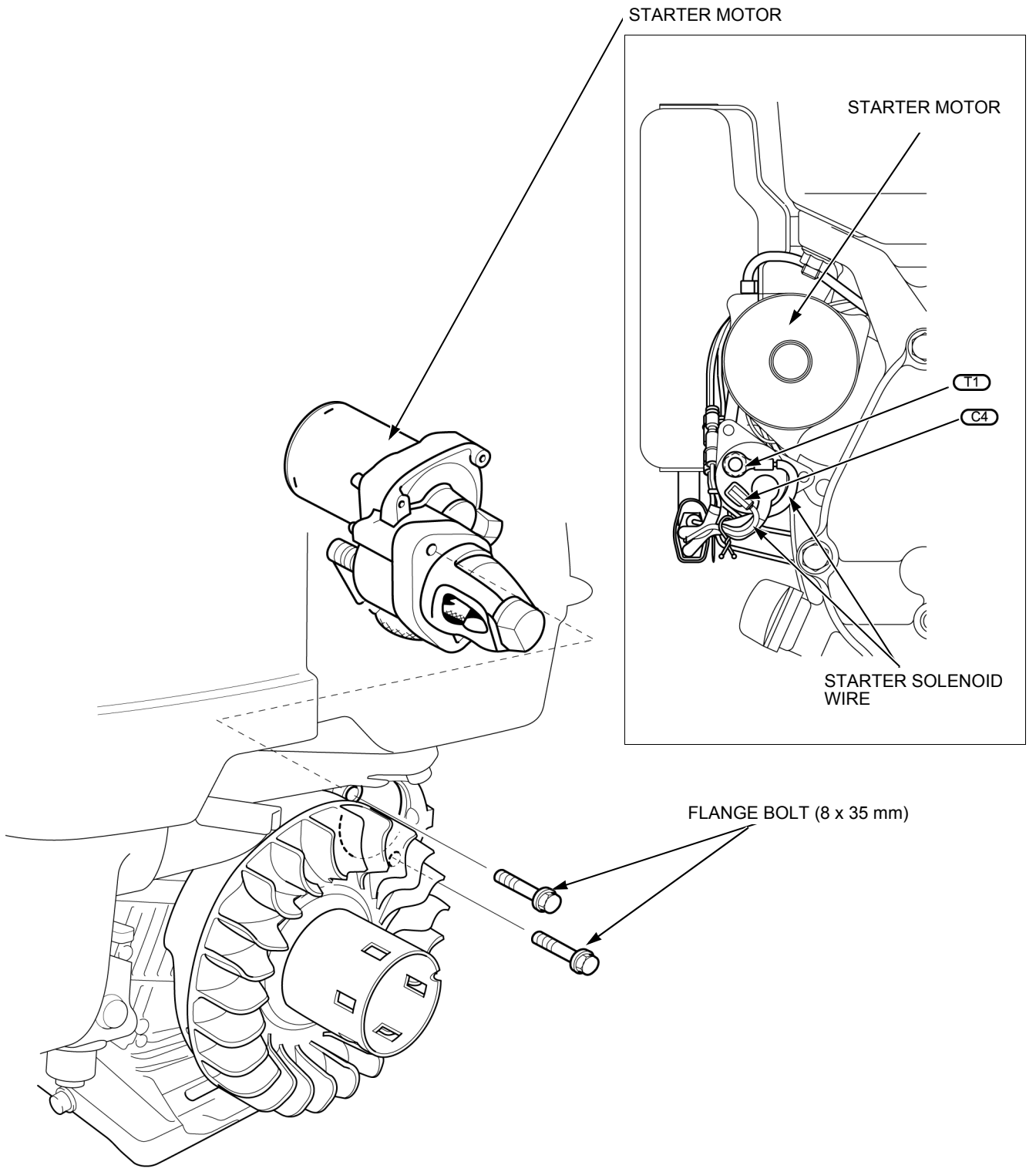
Inspect the square holes (1) of the starter pulley (2) for deformation.



STARTER MOTOR REMOVAL/ INSTALLATION

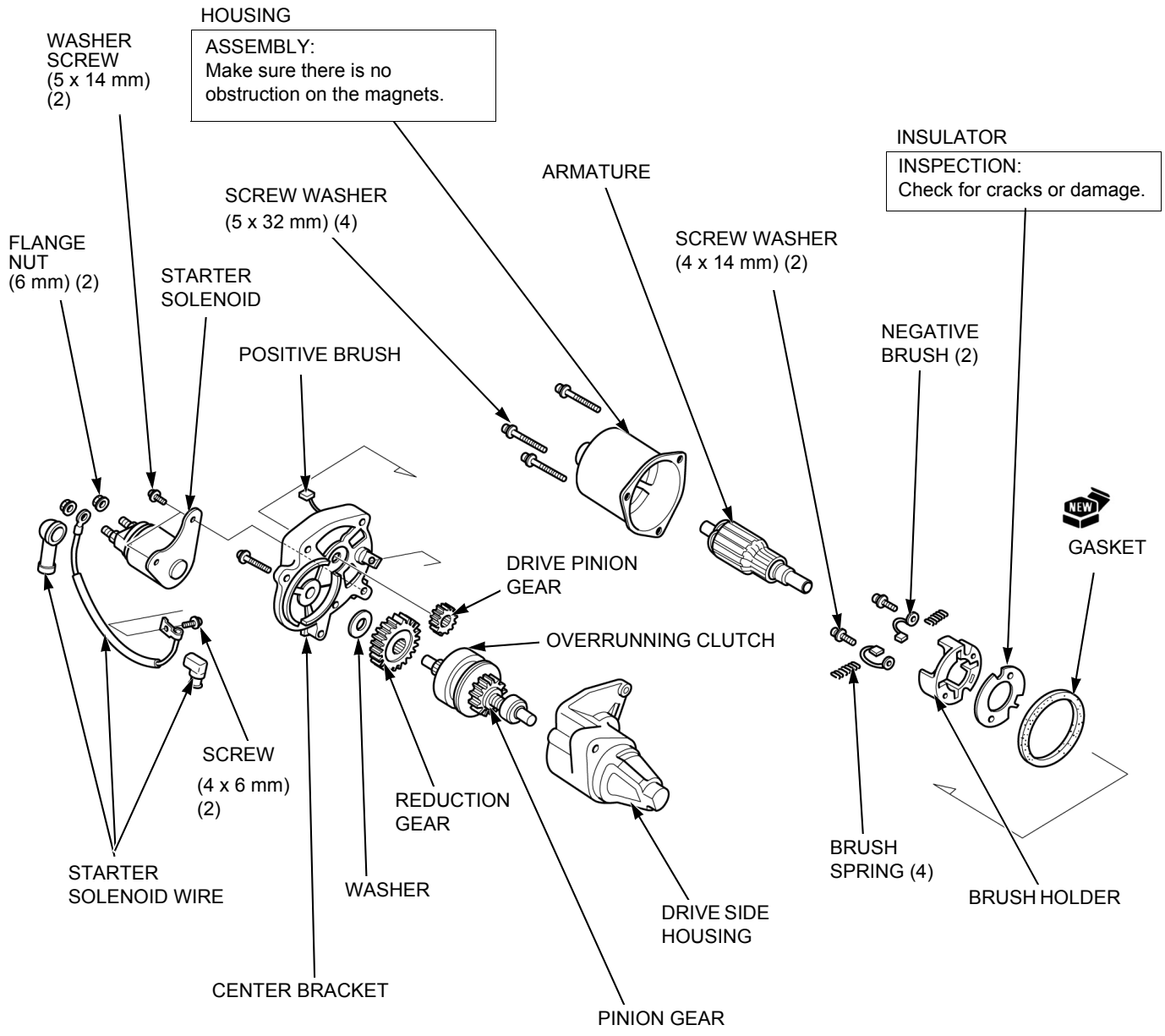
Disconnect the starter motor wires from the starter motor.

Remove the fan cover (page 5-2).



STARTER MOTOR DISASSEMBLY/ ASSEMBLY

Remove the starter motor (page 10-8).

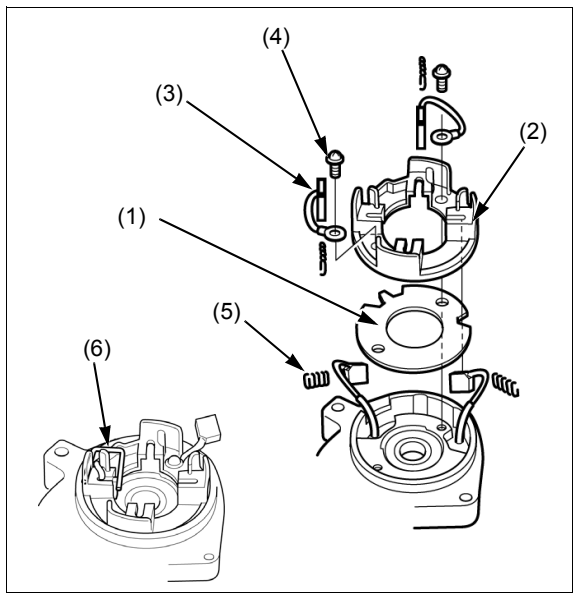


BRUSH HOLDER INSTALLATION

Note the installation direction.

Install the insulator (1), brush holder (2), negative brush terminals (3), and two 4 x 14 mm screws (4) to the center bracket as shown.

Install the brush springs (5) and brushes, and push the brushes in the holders with a suitable wire (6) so that they do not interfere with the commutator.



INSPECTION

PERFORMANCE TEST

Measure starter performance while cranking the engine.

STARTER MOTOR PERFORMANCE:
UNDER LOAD:
CRANKING VOLTAGE: 9.9 V
CRANKING CURRENT: 103 A
ENGINE CRANKING SPEED: 2,300 min^{-1} (rpm) min.
NO LOAD:
CRANKING VOLTAGE: 11.5 V
CRANKING CURRENT: 31 A max.

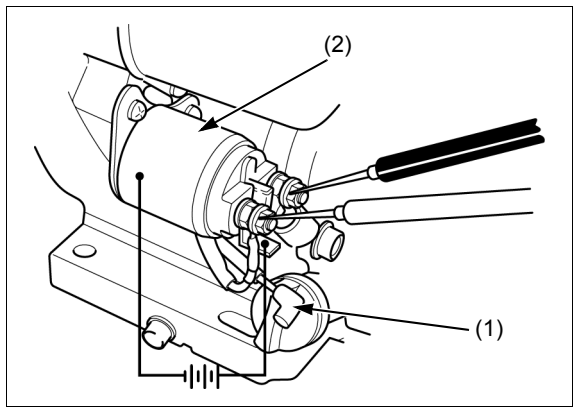
- To get accurate results, the test must be conducted in the normal ambient temperature.
- Battery: 55B24 (12 V 36 AH/5 HR)
- Battery cable: 15 sq. x 1.5 m (4.9 ft.) each for battery positive cable and battery negative cable.

If the measurement is out of specification, disassemble and inspect the starter motor.

STARTER SOLENOID

Remove the starter solenoid wire (1) from the starter solenoid (2).

Connect the positive (+) lead of a 12V battery to the solenoid terminal and the negative (-) lead to the solenoid body. Measure the resistance between the battery and starter motor terminals as shown. Continuity should exist when the battery is connected and not exist when the battery is disconnected.



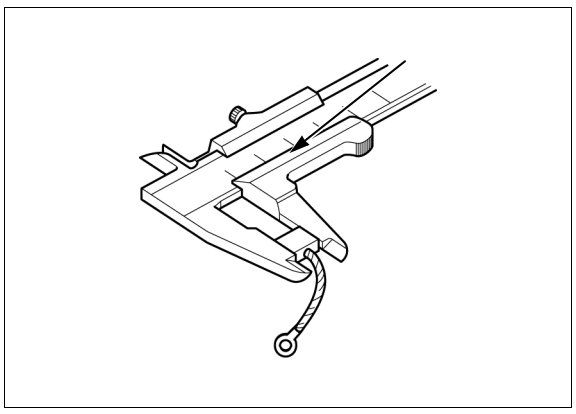
BRUSH LENGTH

Measure the brush length.

If the negative brush length is less than the service limit, replace the brush and brush holder.

If the positive brush length is less than the service limit, replace the center bracket and brush holder.

STANDARD: 7.0 mm (0.28 in)
SERVICE LIMIT: 3.5 mm (0.14 in)



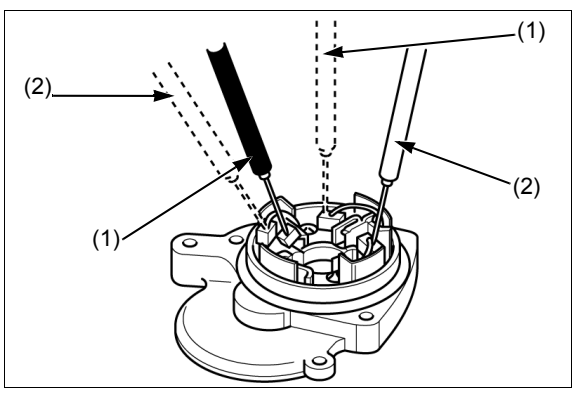
BRUSH CONTINUITY CHECK

Check for continuity between the positive (+) brushes (1) and negative (-) brushes (2).

There should be continuity between both the positive brushes.
There should be continuity between both the negative brushes.
There should be no continuity from either positive brush to either negative brush.

If the correct continuity of the positive (+) brushes is not obtained, replace the center bracket (page 10-9).

If the correct continuity of the negative (-) brushes is not obtain, replace the negative (-) brushes.

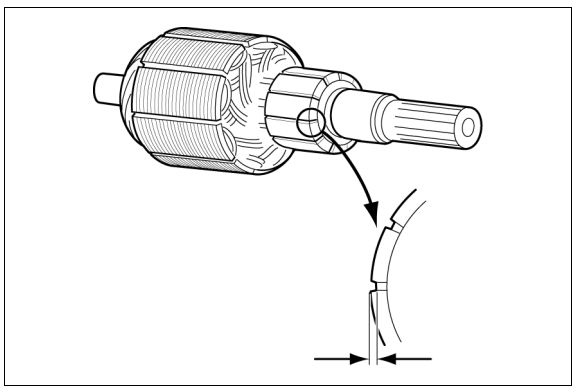


ARMATURE MICA DEPTH

Visually inspect the commutator surface for dust, rust, or other damage. If necessary, wipe it with a clean lint-free cloth. If rusted or damaged, dress with a fine emery cloth.

When the mica is clogged, or its depth is smaller than the service limit value, recut the grooves using a hacksaw blade or a small file.

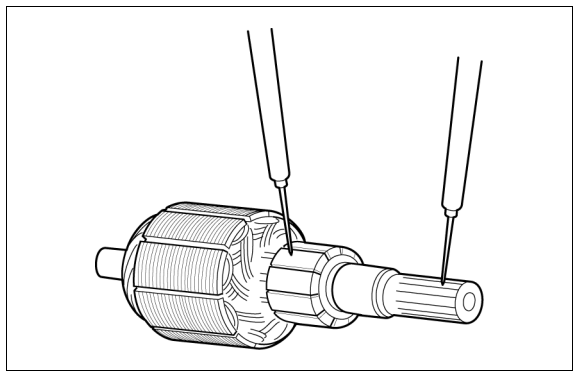
STANDARD: 1.0 mm (0.04 in)
SERVICE LIMIT: 0.2 mm (0.01 in)



ARMATURE CONTINUITY CHECK - COMMUTATOR TO SHAFT

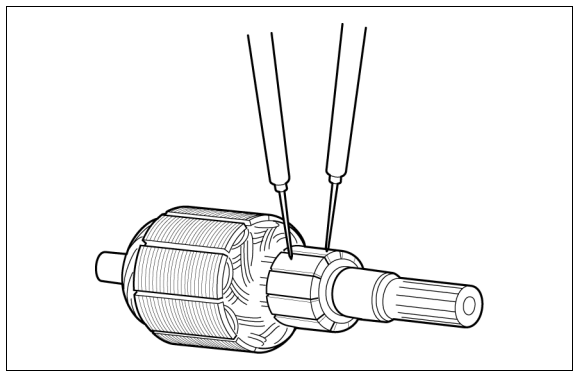
Check for continuity between the commutator and the armature shaft.

Replace the armature if continuity exists between any of the commutator segments and the armature shaft (page 10-9).



ARMATURE CONTINUITY CHECK - COMMUTATOR SEGMENTS

Check for continuity between segments. If an open circuit (no continuity) exists between any two segments, replace the armature (page 10-9).



OVERRUNNING CLUTCH

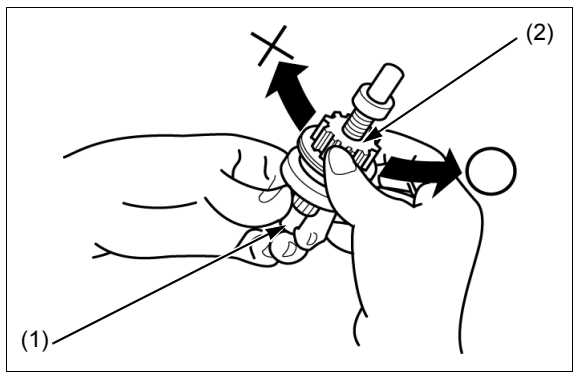
Check the pinion gear shaft (1) for smooth axial movement.

Apply oil or replace the overrunning clutch if necessary.

Check the pinion gear (2) operation by holding the pinion gear shaft and turning the pinion gear. The pinion gear should turn counterclockwise freely and should not turn clockwise.

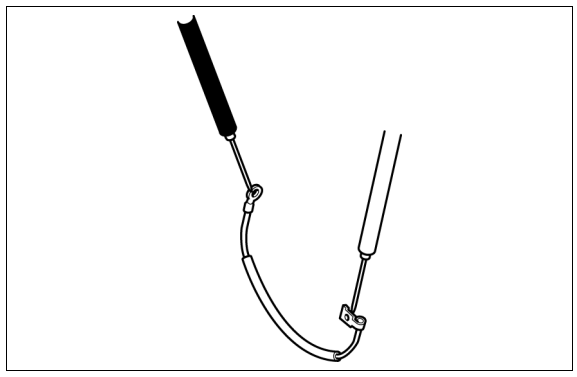
Check the pinion gear for wear or damage, and replace the overrunning clutch if necessary.

If the pinion gear is worn or damaged, the flywheel ring gear must be inspected.



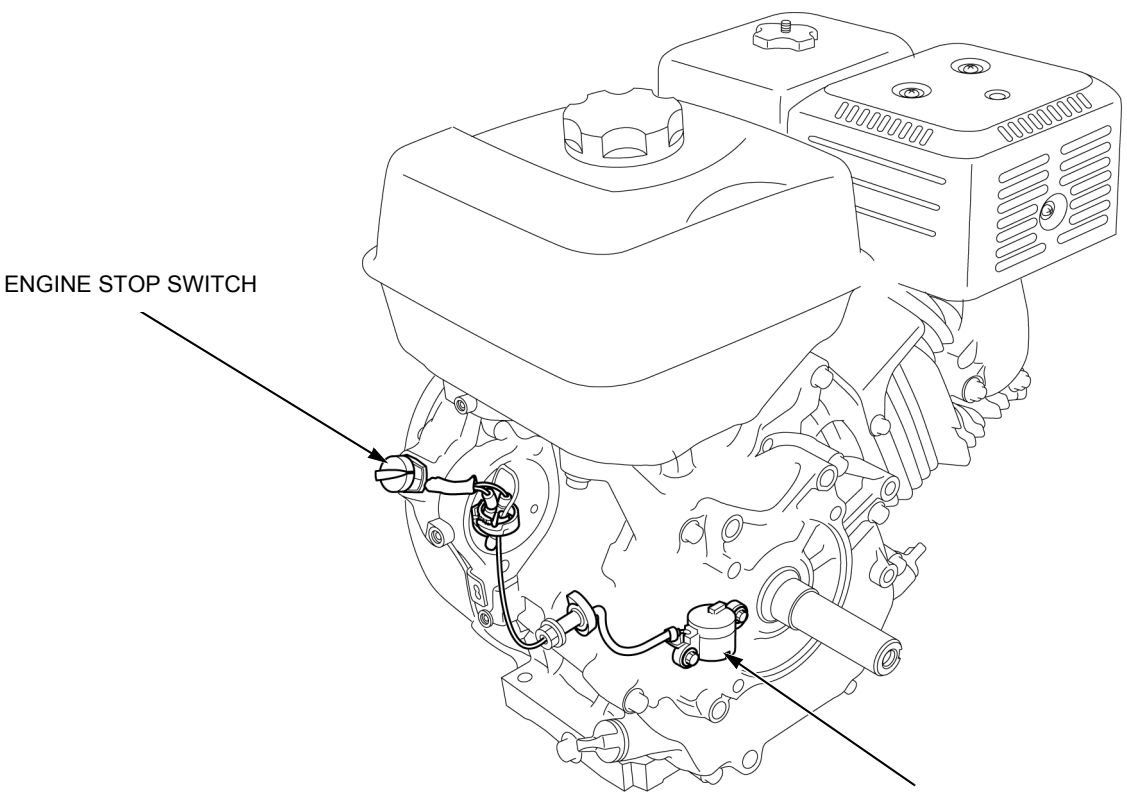
STARTER SOLENOID WIRE

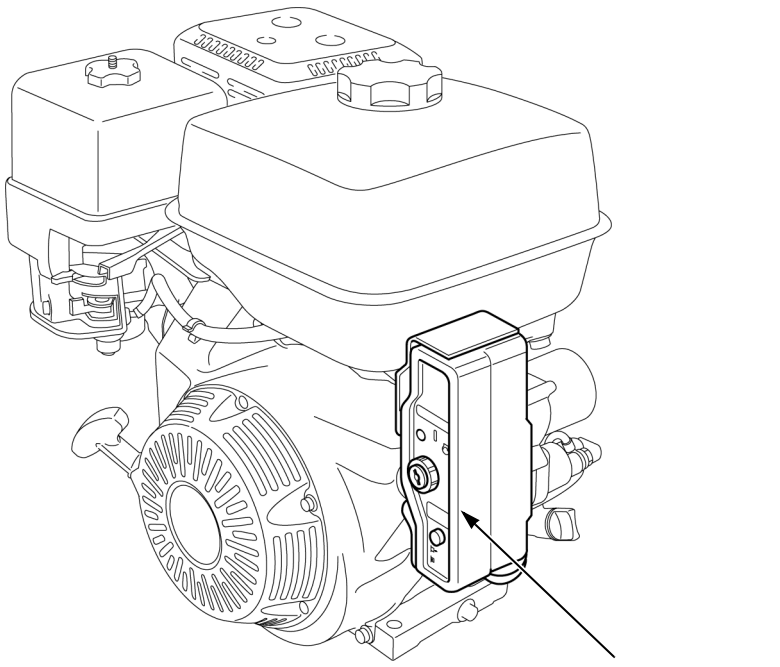
Check the starter solenoid wire for continuity.



11. OTHER ELECTRICAL

COMPONENT LOCATION

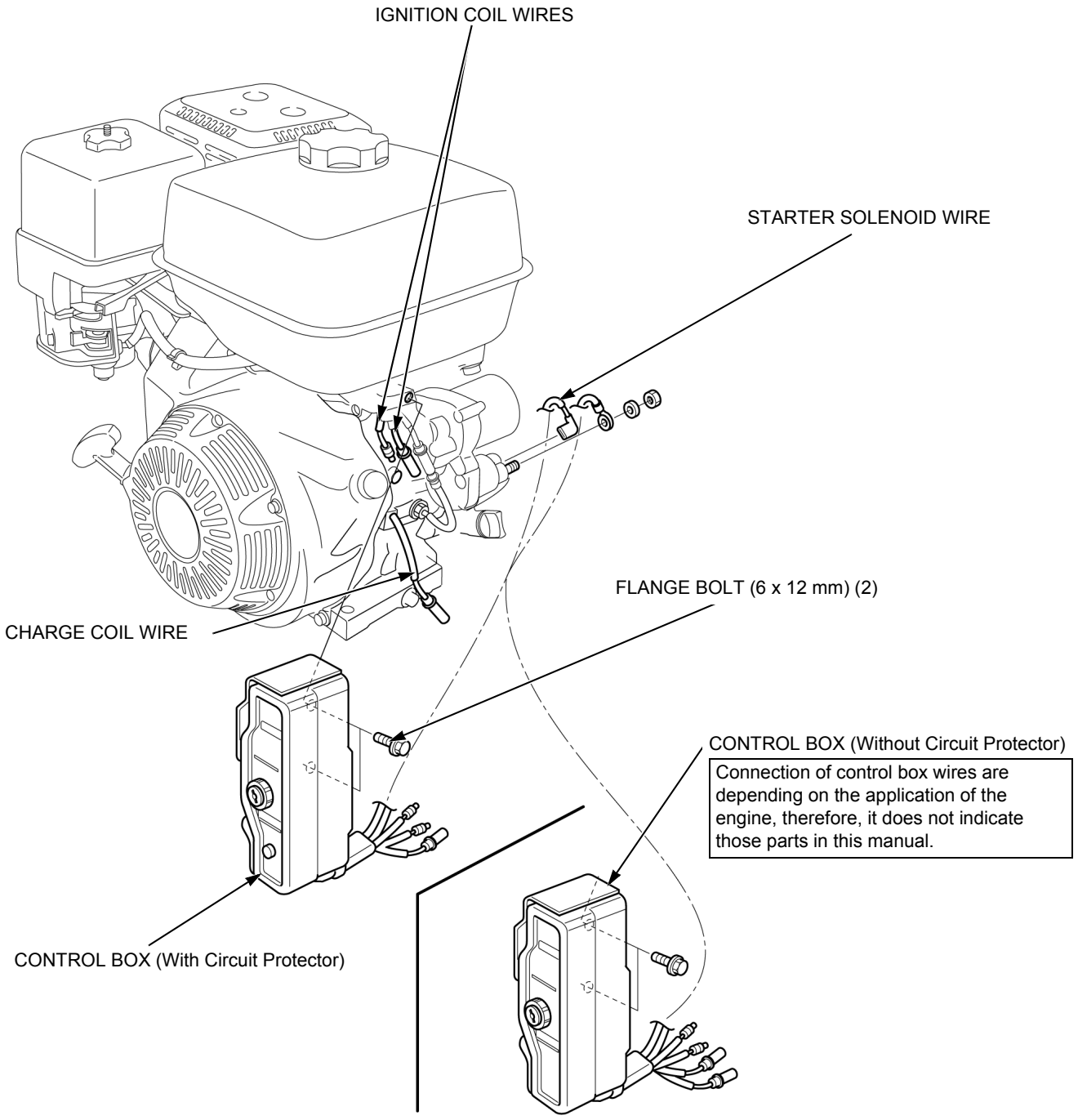




CONTROL BOX REMOVAL/ INSTALLATION

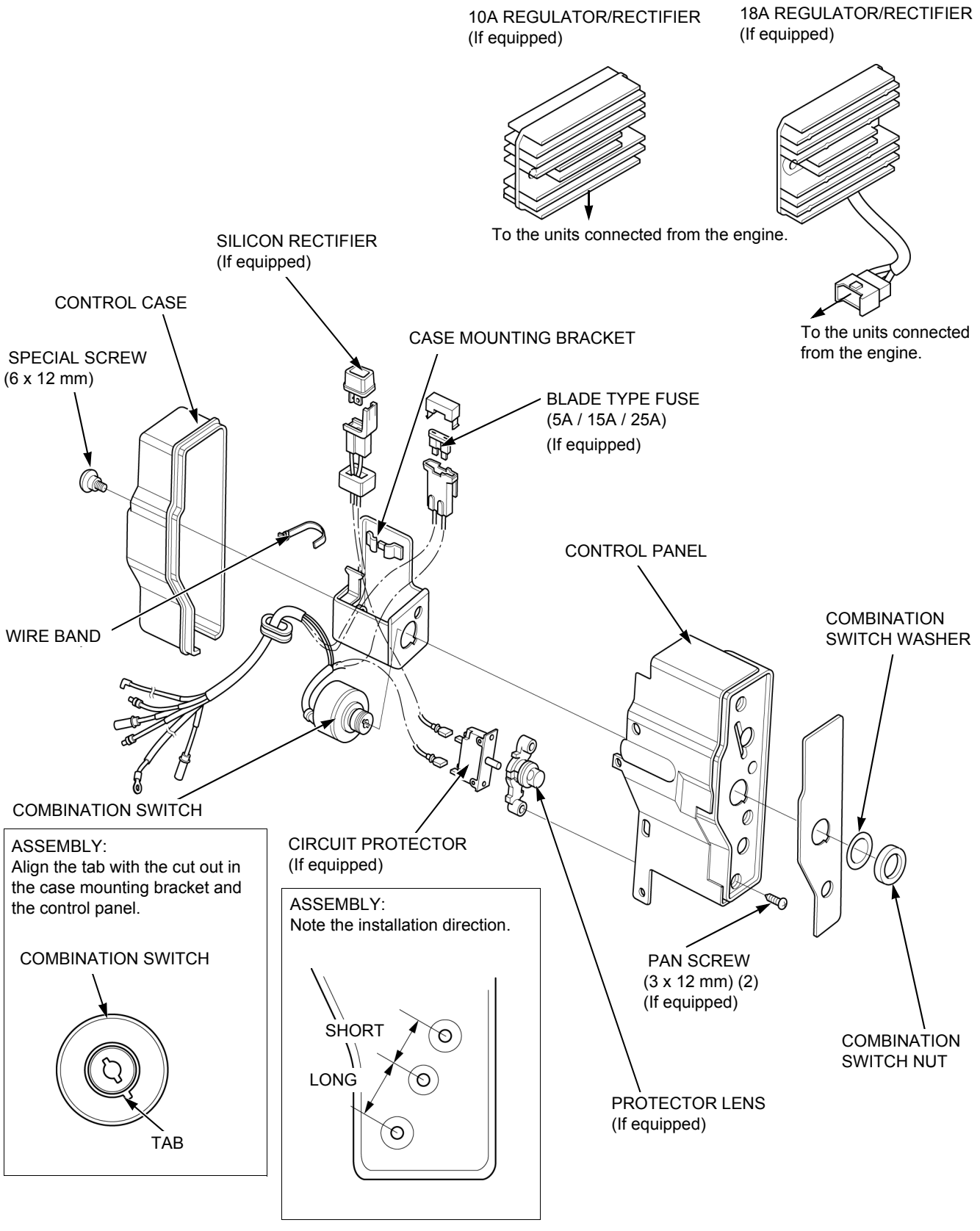
Disconnect the control box wires.

When installing, refer to the HARNESS AND TUBE ROUTING (with circuit protector) (page 2-8).



CONTROL BOX DISASSEMBLY/ ASSEMBLY

Remove the control box (page 11-3).



OIL LEVEL SWITCH INSPECTION

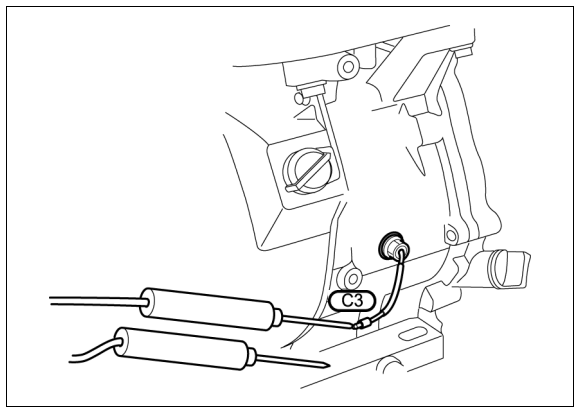
Disconnect the engine wire harness from the oil level switch.

Check continuity between the switch terminal and engine ground.
There should be no continuity when the engine is full of oil.

Drain the engine oil completely (page 3-3).
Check continuity between the switch terminal and engine ground.
There should be continuity.

Check continuity between the switch terminals while filling the engine oil.
The ohmmeter reading should go from continuity to no continuity as the oil is filled.

If the correct continuity is not obtained, replace the oil level switch (page 14-6).



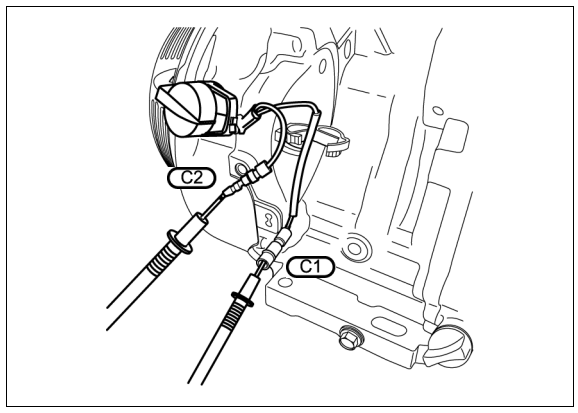
ENGINE STOP SWITCH INSPECTION

Remove the engine stop switch connectors.

Check continuity between the terminals at each switch position.

Switch position	Continuity
ON	Yes
OFF	No

If the correct continuity is not obtained, replace the engine stop switch (page 5-2).

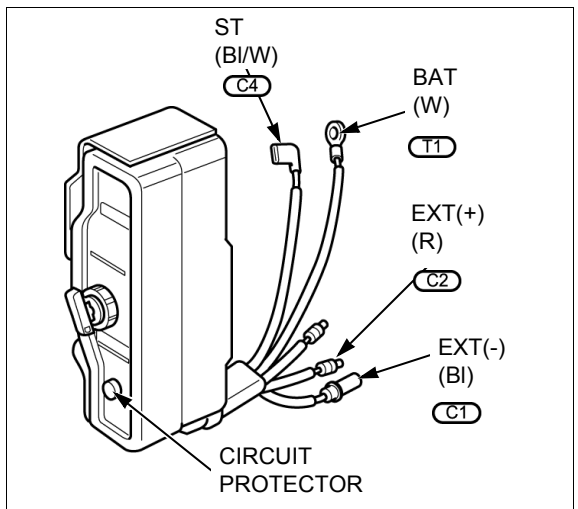


COMBINATION SWITCH INSPECTION

With Circuit Protector

Check continuity between the terminals at each switch position.

If the correct continuity is not obtained, replace the combination switch (page 11-4).

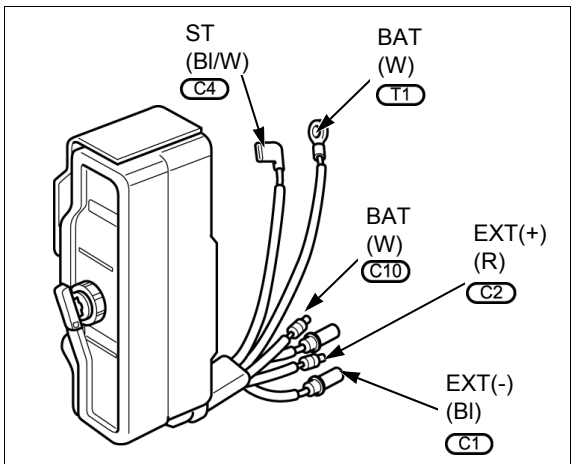


	EXT(+)	EXT(-)	ST	BAT
OFF				
ON	○	○		
START	○	○	○	○

Without Circuit Protector

Check continuity between the terminals at each switch position.

If the correct continuity is not obtained, replace the combination switch (page 11-4).

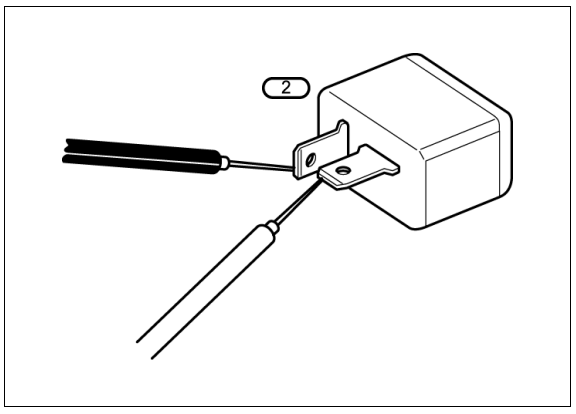


	EXT(+)	EXT(-)	ST	BAT
OFF				
ON	○——	——○		
START	○——	——○	○——	——○

SILICON RECTIFIER INSPECTION

Remove the silicon rectifier (page 11-4).

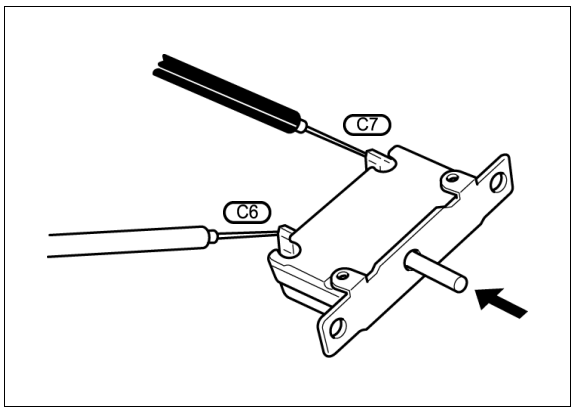
Check continuity between the terminals. There should be continuity in one direction only. Replace the rectifier if there is continuity in both directions or in neither direction.



CIRCUIT PROTECTOR INSPECTION

Remove the circuit protector (page 11-4).

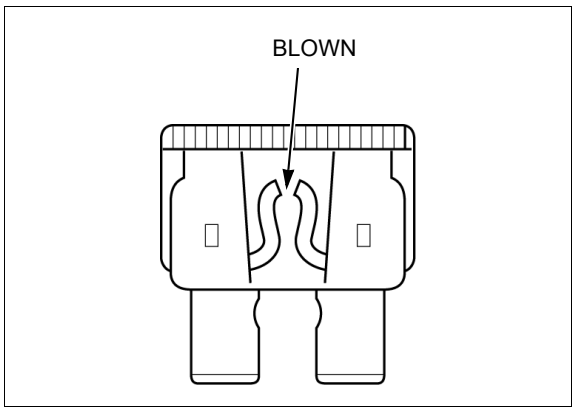
Check continuity between the terminals. There should be continuity in the ON position (button in) and no continuity in the OFF position (button out). Replace the circuit breaker if the correct continuity is not obtained.



FUSE INSPECTION

Remove the blade type fuse (page 11-4).

Visually inspect the fuse to see if it is blown. Check continuity across the two blades. Replace the fuse if it is blown or there is no continuity across the blades.



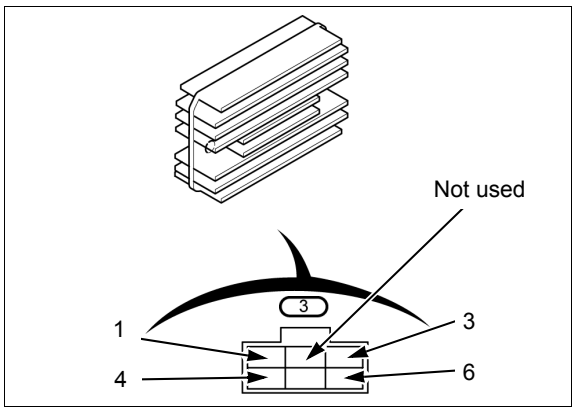
REGULATOR/RECTIFIER INSPECTION

Measure the resistance between the terminals and be sure that the measurements conform to the ranges shown in the table.

10A TYPE

Unit: kΩ

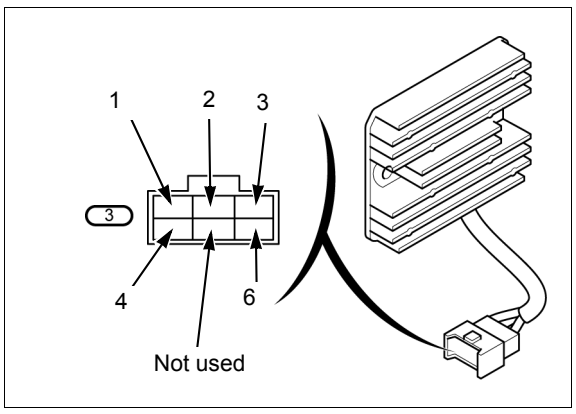
	4	6	1	3
4		∞	∞	∞
6	∞		∞	∞
1	1-200	1-200		0.5-100
3	0.1-50	0.1-50	∞	



18A TYPE

Unit: kΩ

	4	6	1	2	3
4		4 - 400	∞	∞	2 - 230
6	4 - 400		∞	∞	2 - 230
1	∞	∞		∞	∞
2	2 - 230	2 - 230	∞		1 - 600
3	0.09 - 400	0.09 - 400	∞	∞	



Use a tester that is equivalent to or higher than the performance specified, internal resistance: 20 kΩ/VDC, 9 kΩ/VAC

Be careful not to touch the metallic part of the tester probe with your fingers; otherwise, the correct resistance value cannot be obtained.

Read the tester manufacturer‘s operation instructions carefully before operating the tester. Follow the instructions of the Service Manual. Be sure the tester‘s battery is fully charged, and check the meter before using the tester.

MEMO

12. MUFFLER

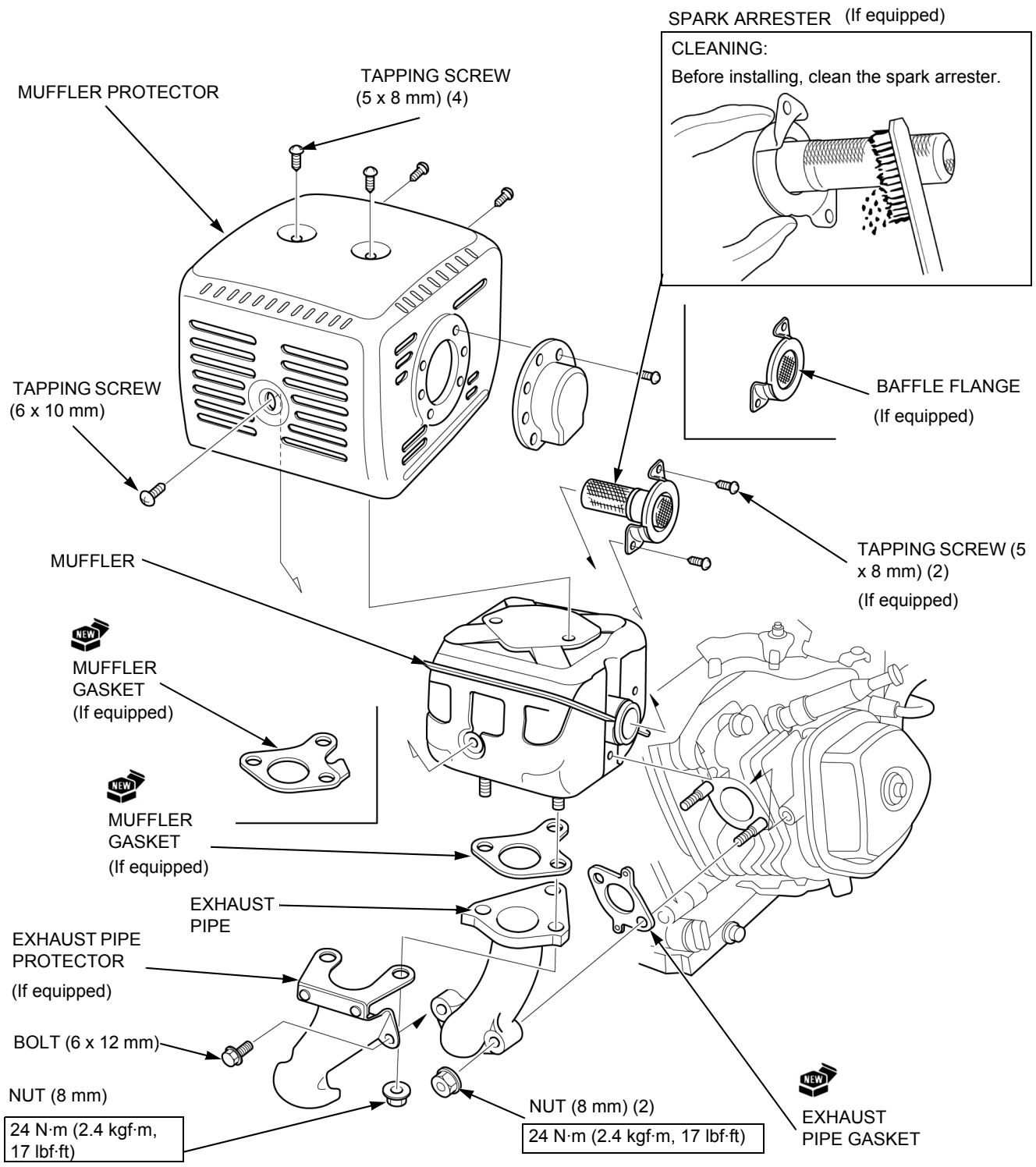
MUFFLER REMOVAL/INSTALLATION

⚠ CAUTION

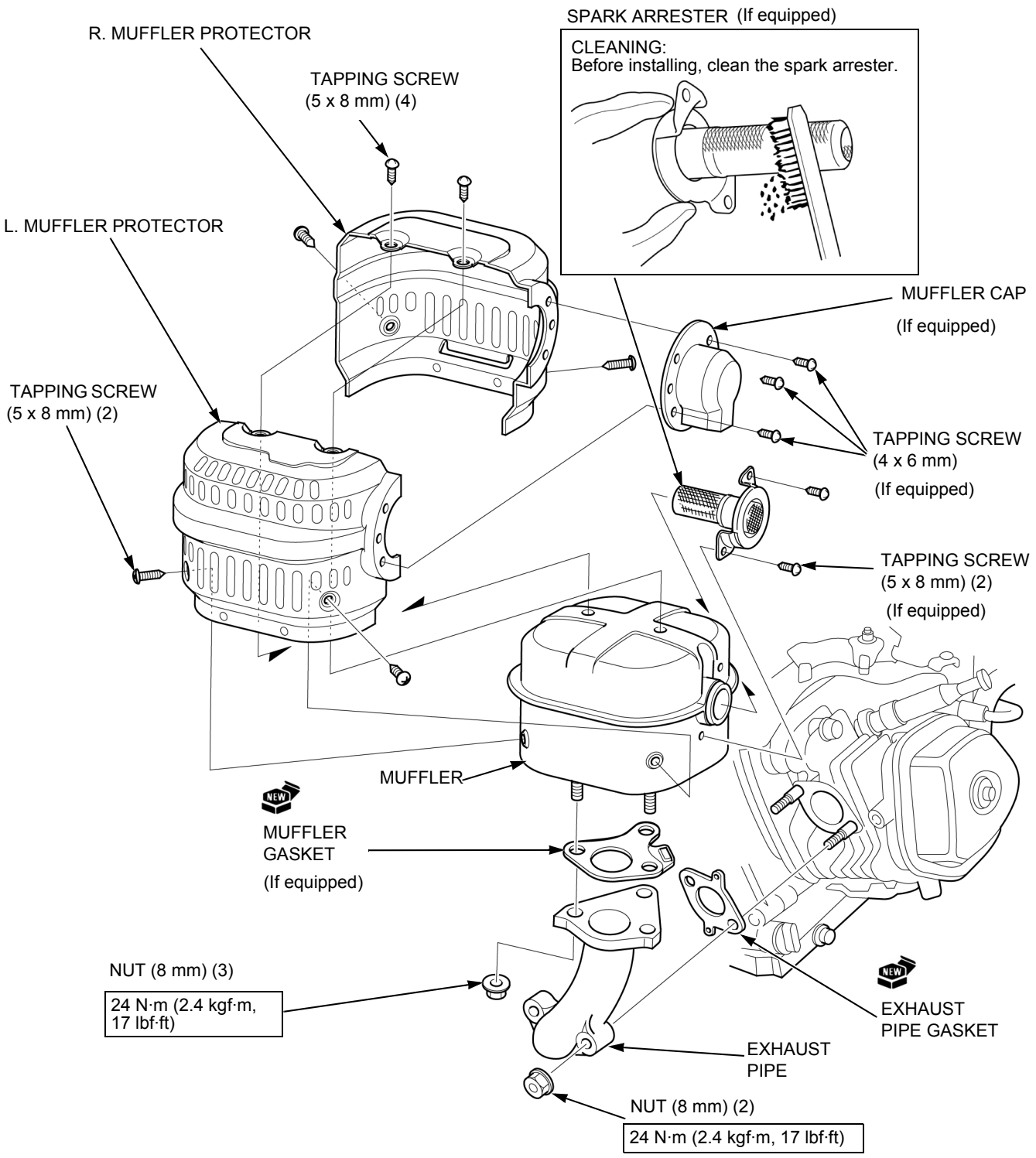
The muffler becomes very hot during operation and remains hot for a while after stopping the engine. Be careful not to touch the muffler while it is hot. Allow it to cool before proceeding.

SOLID PROTECTOR TYPE

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

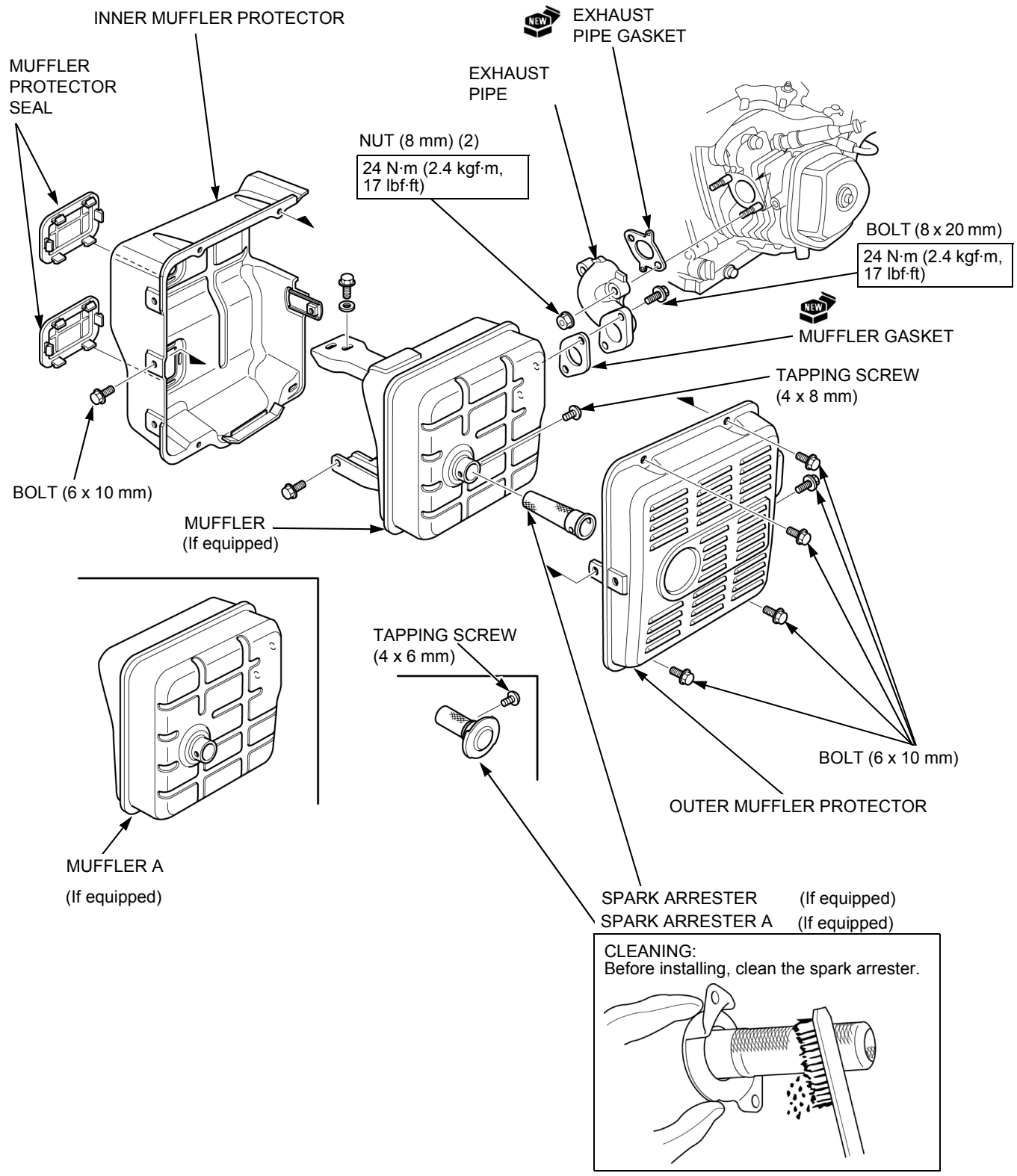


SEPARATED PROTECTOR TYPE

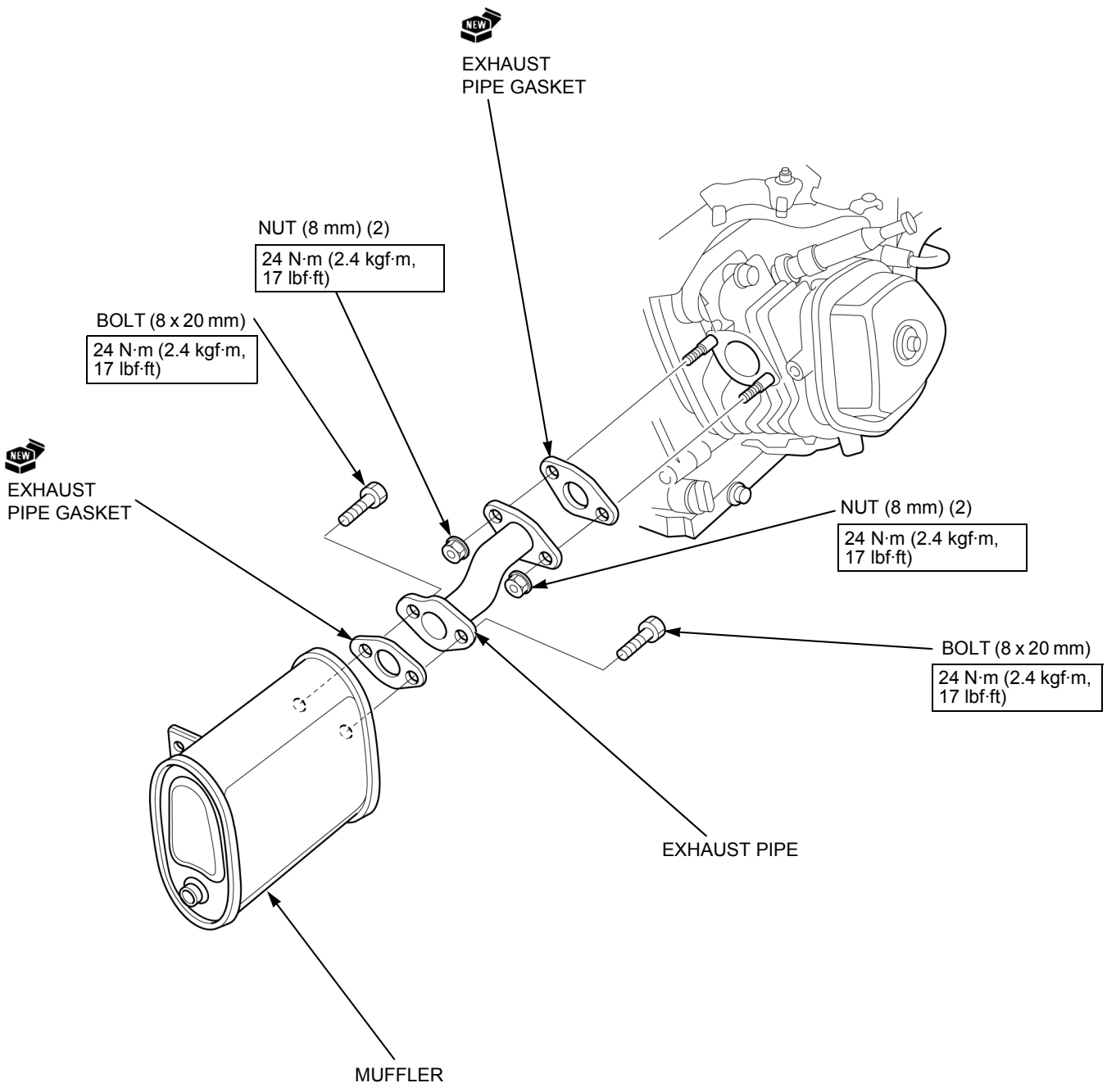


MUFFLER

INNER/OUTER PROTECTOR TYPE



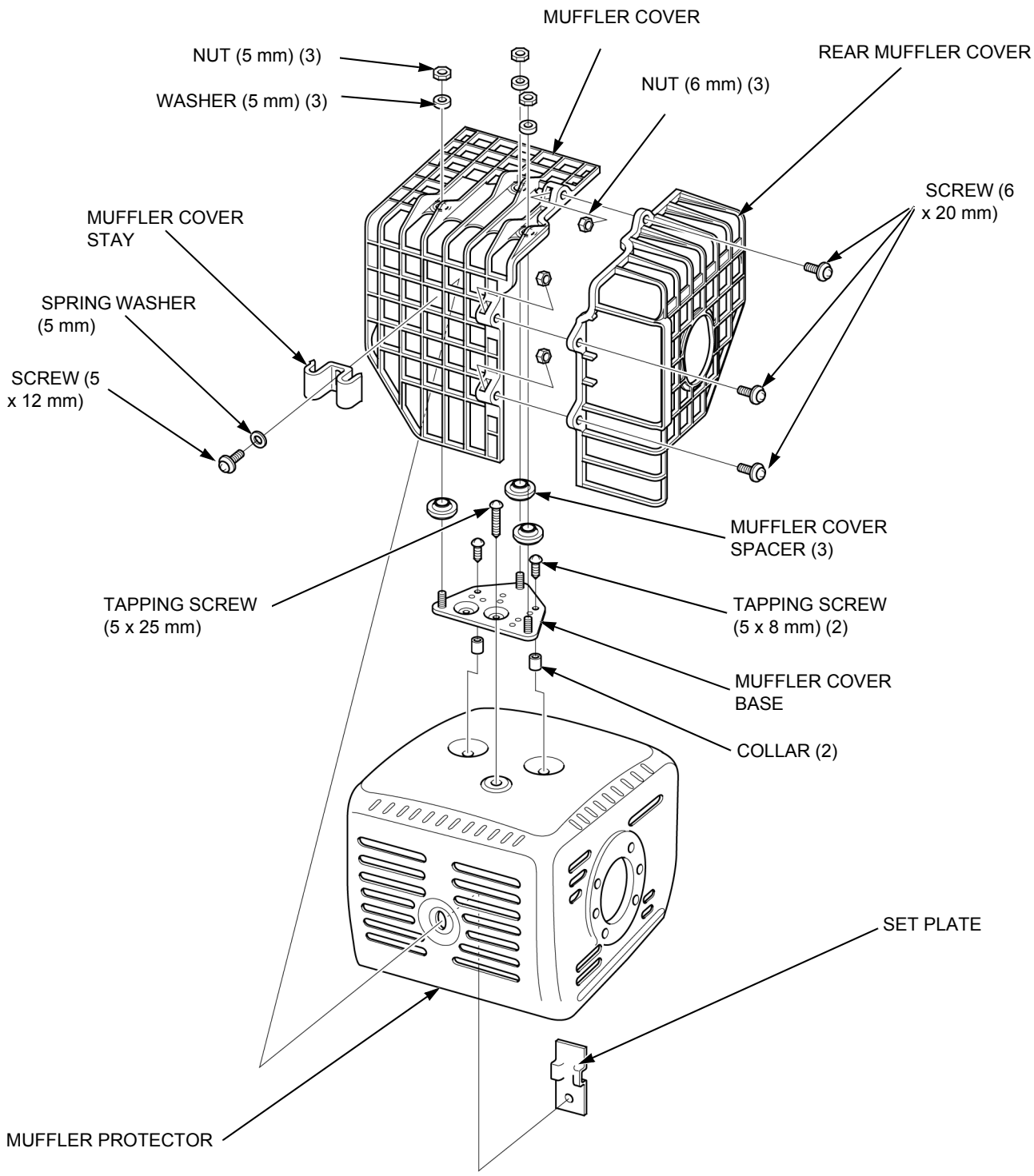
WITHOUT PROTECTOR TYPE



MUFFLER COVER REMOVAL/ INSTALLATION (IF EQUIPPED)

⚠ CAUTION

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

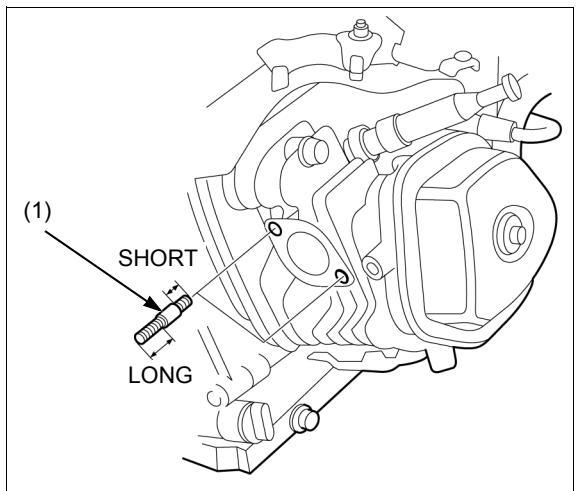


EXHAUST PIPE STUD BOLT REPLACEMENT

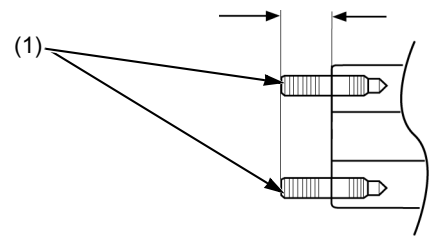
Thread two nuts onto the exhaust pipe stud bolt (1) and tighten them together, then use a wrench to turn the stud bolt out.

Install new stud bolts.

SPECIFIED LENGTH:
STUD BOLT (8 x 38): 22 mm (0.87 in)
STUD BOLT (8 x 41): 25 mm (0.98 in)
STUD BOLT (8 x 48): 32 mm (1.26 in)



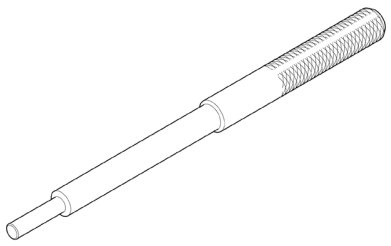
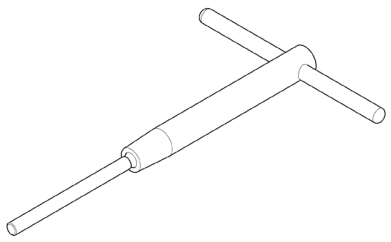
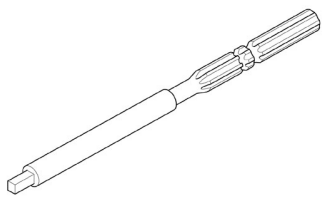
STUD BOLT (8 x 38): 22 mm (0.87 in)
STUD BOLT (8 x 41): 25 mm (0.98 in)
STUD BOLT (8 x 48): 32 mm (1.26 in)



MEMO

13. CYLINDER HEAD/VALVES

TOOLS

Valve guide driver, 6.45×11 07742-0010200 	Seat cutter, 35 07780-0010400 	Seat cutter, 40 07780-0010500 
Flat cutter, 35 07780-0012300 	Flat cutter, 38.5 07780-0012400 	Interior cutter, 37.5 07780-0014100 
Cutter holder, 6.6 07781-0010202 	Valve guide reamer, 6.612 07984-ZE20001 	

CYLINDER HEAD REMOVAL/ INSTALLATION

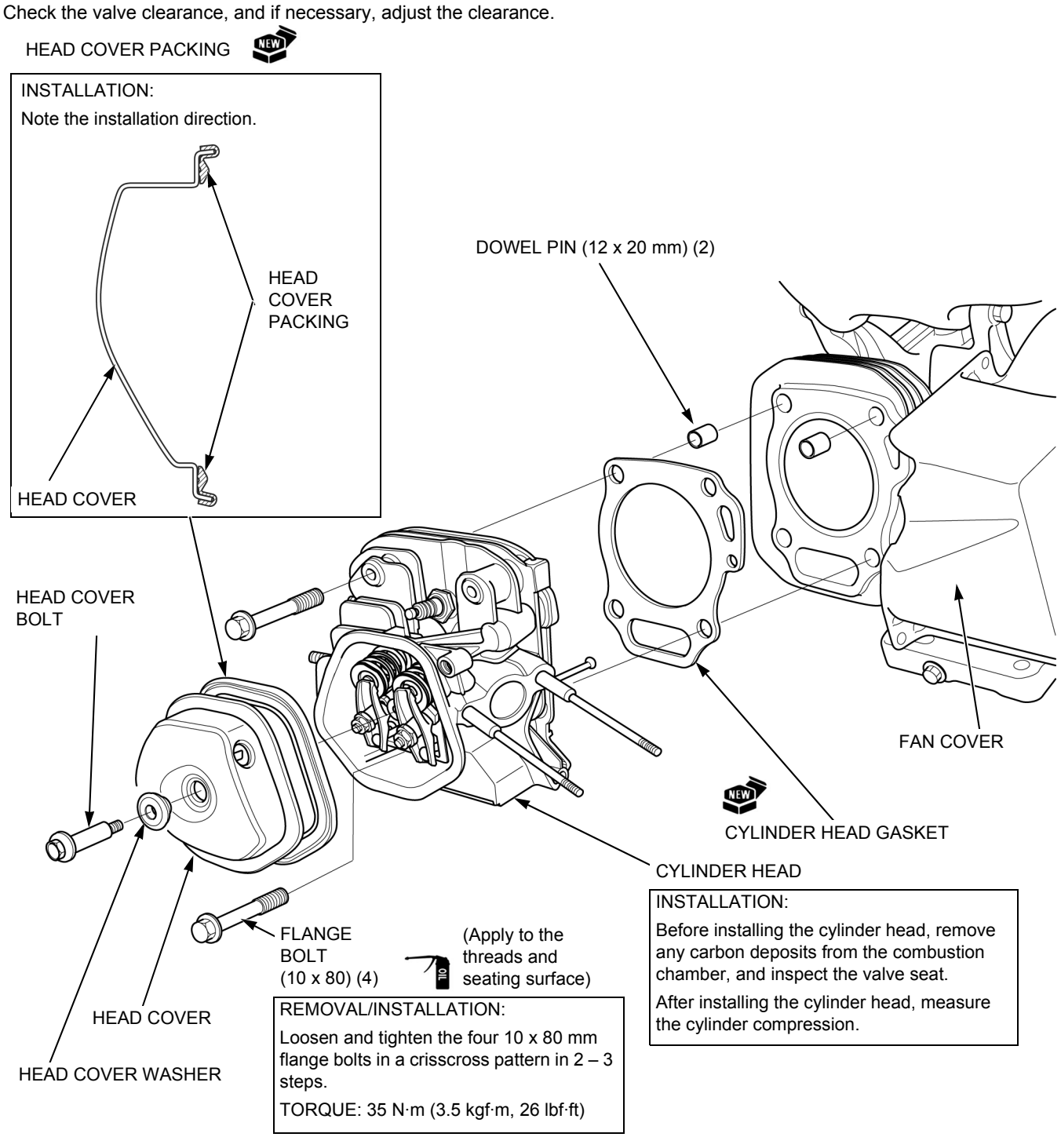
Set the piston at top dead center of the cylinder compression stroke (page 3-11).

Remove the following parts:

– Air cleaner (page 6-7)
– Carburetor (page 6-11)
– Control base assy (page 7-2)
– Muffler (page 12-2)

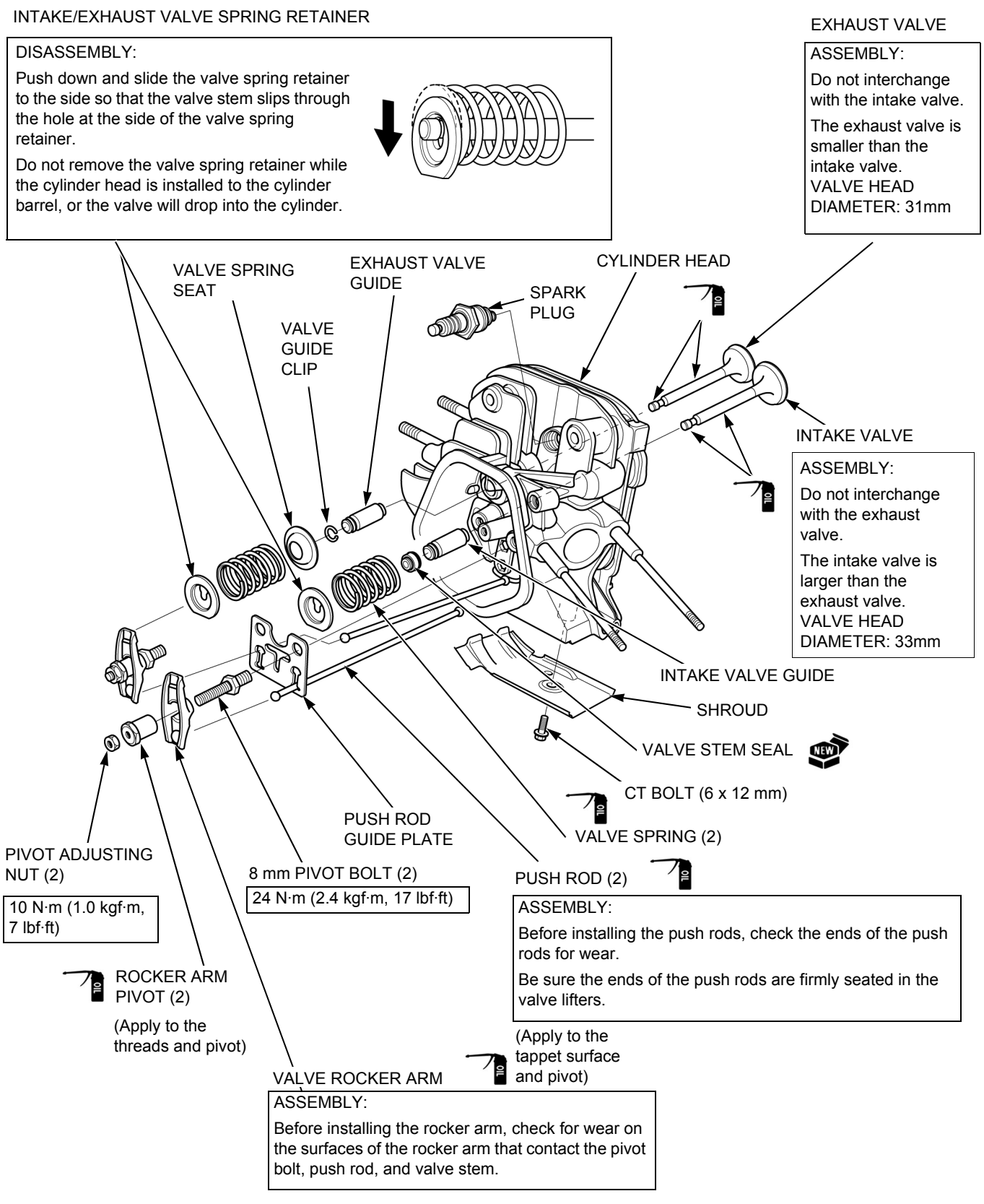
Installation is in the reverse order of removal.

Check the valve clearance, and if necessary, adjust the clearance.



CYLINDER HEAD DISASSEMBLY/ ASSEMBLY

Remove the cylinder head (page 13-3).



CYLINDER HEAD/VALVES INSPECTION

CYLINDER COMPRESSION CHECK

Start the engine and warm up to normal operating temperature.

Turn the fuel valve lever to the OFF position, and then remove the drain screw to drain the carburetor.

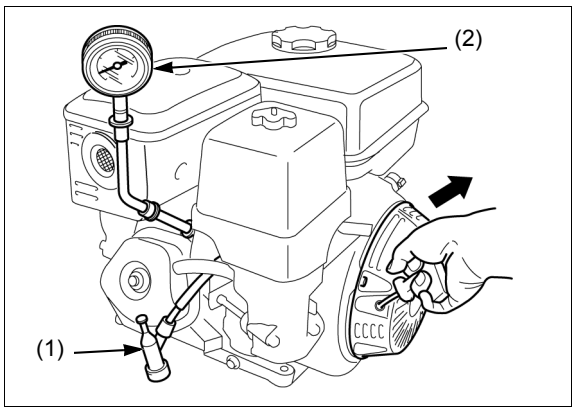
Remove the spark plug cap (1) from the spark plug.

Remove the spark plug using a spark plug wrench.

Pull the recoil starter several times to expel unburned gas.

Attach a commercially available compression gauge (2) to the spark plug hole.

Pull the recoil starter forcefully to measure stable cylinder compression.



CYLINDER COMPRESSION:
0.51 - 0.69 MPa (5.2 - 7.0 kgf/cm^2, 74 - 100 psi) / 600 min^{-1} (rpm)

CYLINDER HEAD WARPAGE

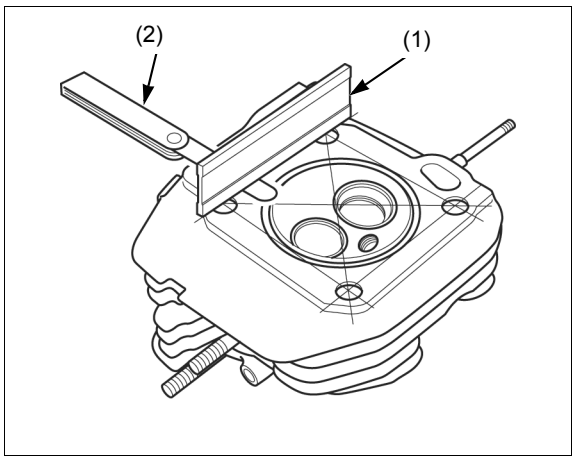
Remove the carbon deposits from the combustion chamber (page 3-12).

Check the spark plug hole and valve areas for cracks.

Check the cylinder head warpage using a straightedge (1) and thickness gauge (2).

SERVICE LIMIT: 0.10 mm (0.004 in)

If the measurement is more than the service limit, replace the cylinder head (page 13-4).



VALVE SEAT WIDTH

Remove the carbon deposits from the combustion chamber (page 3-12).

Inspect each valve for face irregularities.

If necessary, replace the valve (page 13-4).

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

Insert the valve, and snap it closed against its seat several times. Be sure the valve does not rotate on the seat.

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

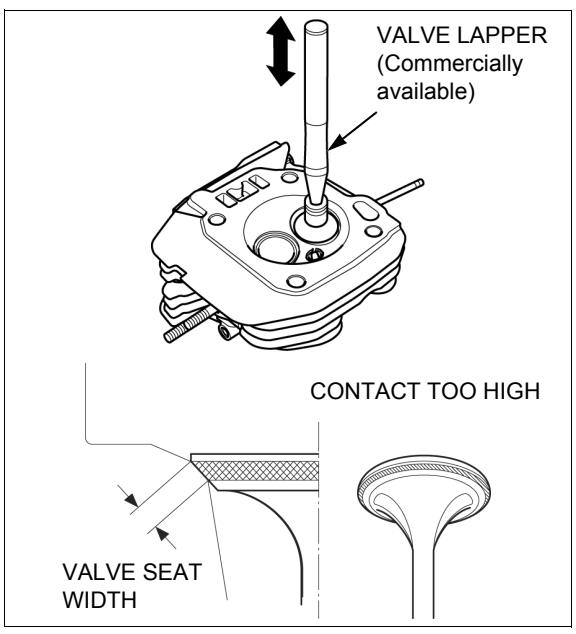
Measure the valve seat width of the cylinder head.

STANDARD: 1.0 – 1.2 mm (0.04 – 0.05 in)
SERVICE LIMIT: 2.0 mm (0.08 in)

If the measurement is more than the service limit, recondition the valve seat (page 13-10).

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

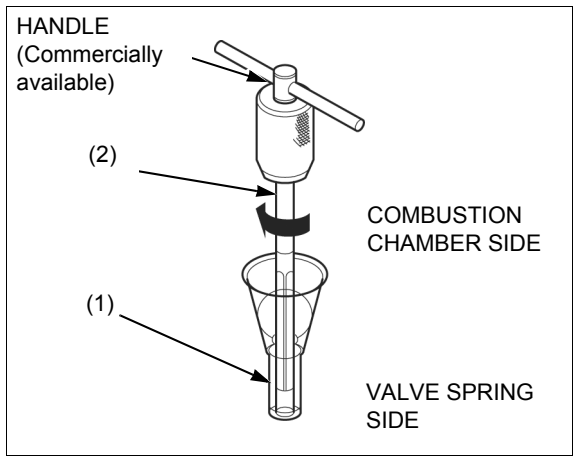
If the valve seat is too high or too low, recondition the valve seat (page 13-10).



VALVE GUIDE I.D.

Ream the valve guide (1) to remove any carbon deposits before measuring.

TOOL:
Valve guide reamer 6.612 (2) 07984-ZE20001



NOTICE

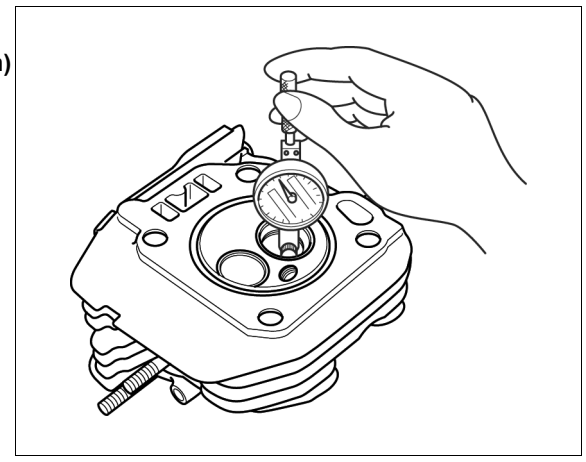
Turn the special tool (Valve guide reamer) clockwise, never counterclockwise.

Continue to rotate the special tool while removing it from the valve guide.

Measure and record each valve guide I.D.

STANDARD: 6.600 – 6.615 mm (0.2598 – 0.2604 in)
SERVICE LIMIT:6.66 mm (0.262 in)

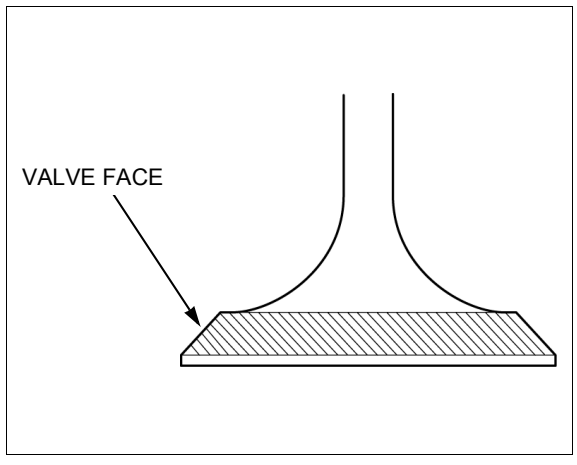
If the measured valve guide I.D. is more than the service limit, replace the valve guide (page 13-8).



VALVE FACE

Inspect each valve for face irregularities.

If necessary, replace the valve (page 13-4).



VALVE STEM O.D.

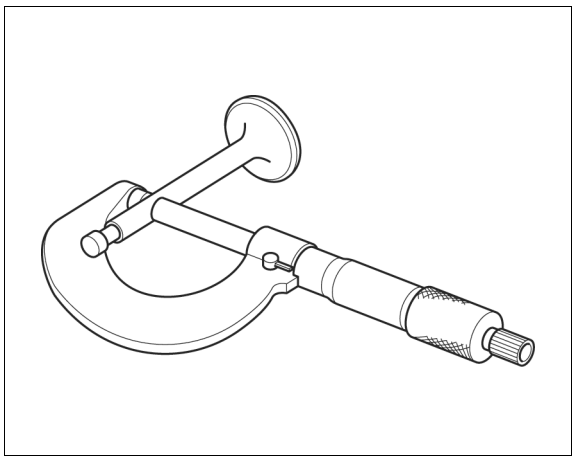
Inspect each valve for bending or abnormal stem wear.

If necessary, replace the valve (page 13-4).

Measure and record each valve stem O.D.

STANDARD:
IN: 6.590 – 6.575 mm (0.2594 – 0.2588 in)
EX: 6.550 – 6.535 mm (0.2578 – 0.2572 in)
SERVICE LIMIT:
IN: 6.44 mm (0.254 in)
EX: 6.40 mm (0.252 in)

If the measurement is less than the service limit, replace the valve (page 13-4).



GUIDE-TO-STEM CLEARANCE

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

STANDARD:
IN: 0.010 – 0.040 mm (0.0004 – 0.0016 in)
EX: 0.050 – 0.080 mm (0.0020 – 0.0032 in)
SERVICE LIMIT:
IN: 0.11 mm (0.004 in)
EX: 0.13 mm (0.005 in)

If the calculated clearance is more than the service limit, replace the following:

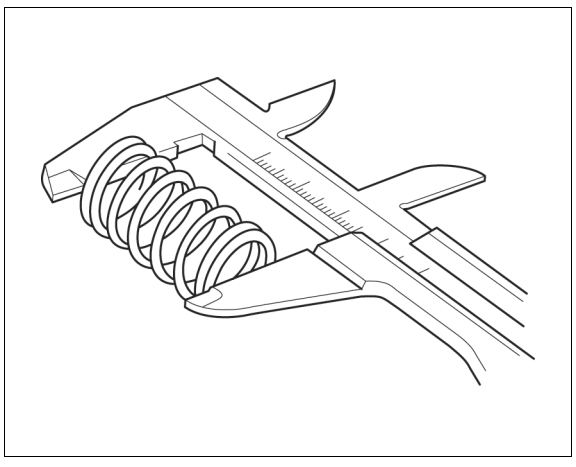
– Valves (page 13-4)
– Valve guide (page 13-8)

VALVE SPRING FREE LENGTH

Measure the valve spring free length.

STANDARD: 39.0 mm (1.54 in)
SERVICE LIMIT: 37.5 mm (1.48 in)

If the measured length is less than the service limit, replace the valve spring (page 13-4).

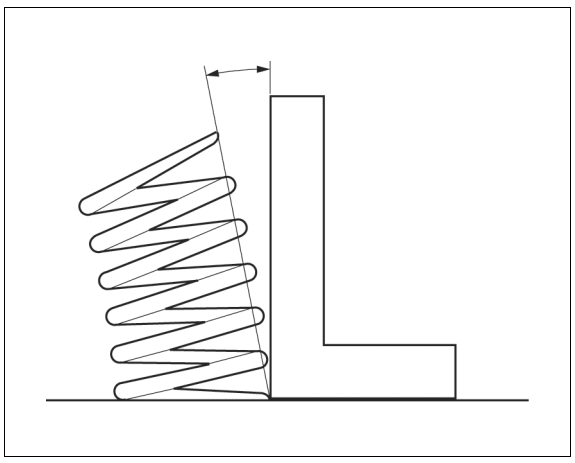


VALVE SPRING PERPENDICULARITY

Measure the valve spring perpendicularity.

SERVICE LIMIT: 1.5°

If the measured perpendicularity is more than the service limit, replace the valve spring (page 13-4).

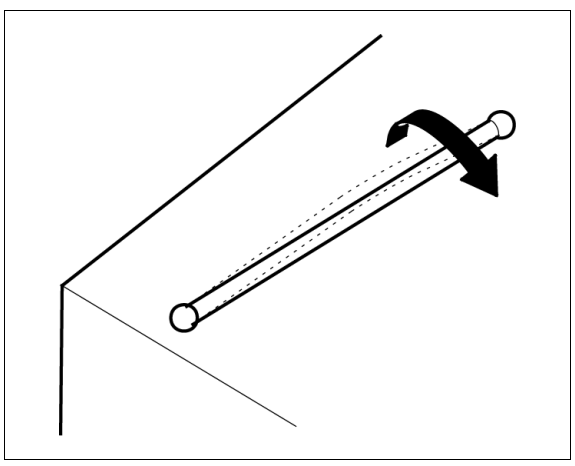


PUSH ROD RUNOUT

Check both ends of the push rod for wear.

Check the push rod for straightness.

If necessary, replace the push rod (page 13-3).



VALVE GUIDE REPLACEMENT

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

Use a hot plate or oven to heat the cylinder head evenly to 150°C (300°F).

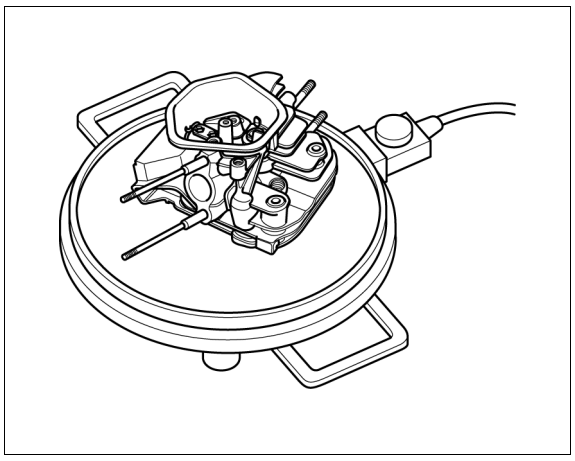
⚠ CAUTION

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

NOTICE

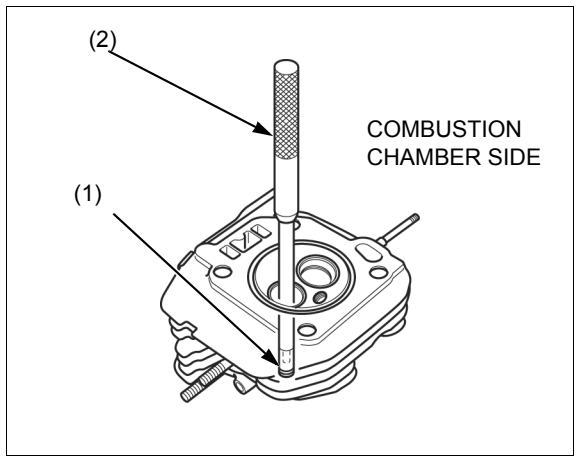
- *Do not use a torch to heat the cylinder head; warpage of the cylinder head may result.*
- *Do not get the cylinder head hotter than 150°C (300°F); excessive heat may loosen the valve seat.*

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



Drive the valve guides (1) out of the cylinder head from the combustion chamber side.

TOOL:
Valve guide driver 6.45 x 11 (2) 07742-0010200



NOTICE

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

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

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

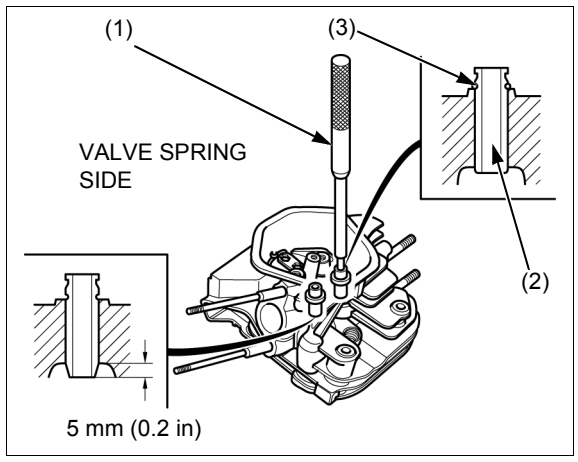
TOOL:
Valve guide driver 6.45 x 11 (1) 07742-0010200

Exhaust valve guide (2):

Drive the exhaust valve guide until the valve guide clip (3) is fully seated as shown.

Intake valve guide (4):

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



IN VALVE INSTALLATION HEIGHT:
5 mm (0.2 in)

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

Replace the valve guide if damaged.

Let the cylinder head cool to room temperature.

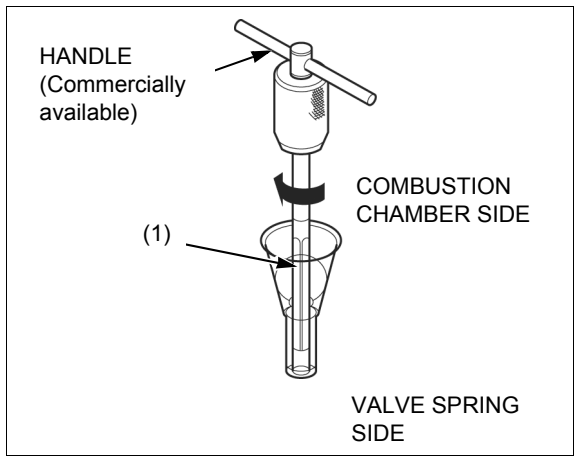
Ream the valve guide.

VALVE GUIDE REAMING

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

Coat the reamer and valve guide with cutting oil.

TOOL:
Valve guide reamer 6.612 (1) 07984-ZE20001



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

NOTICE

Turn the special tool (valve guide reamer) clockwise, never counterclockwise.

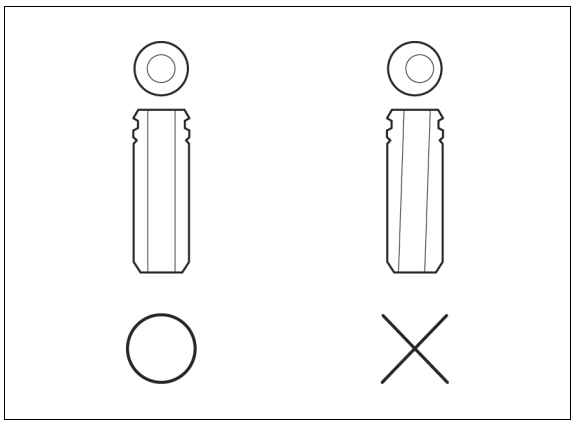
Continue to rotate the special tool while removing it from the valve guide.

Thoroughly clean the cylinder head to remove any cutting residue.

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

Replace the valve guide if it is bent or damaged.

Check the valve guide-to-stem clearance.



VALVE SEAT RECONDITIONING

Thoroughly clean the combustion chamber and valve seats to remove carbon deposits (page 3-12).

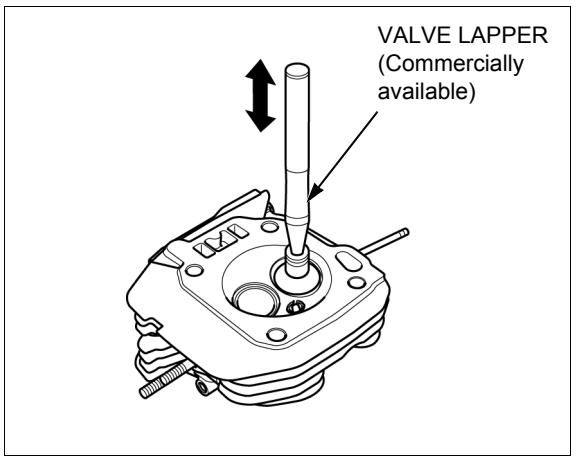
Apply a light coat of Prussian Blue or erasable felt-tipped marker ink to the valve seat.

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

Measure the valve seat width of the cylinder head.

STANDARD: 1.0 – 1.2 mm (0.04 – 0.05 in)
SERVICE LIMIT: 2.0 mm (0.08 in)

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



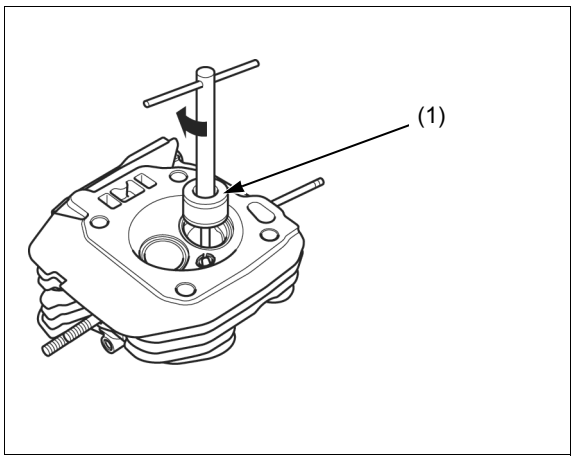
Check whether the valve seat contact area of the valve is too high.

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

Valve seat cutters (1)/grinder or equivalent valve seat refacing equipment is recommended to correct a worn valve seat.

NOTICE

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



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

TOOLS:

Cutter holder 6.6	**07781-0010202**
Flat cutter, 38.5 mm (32° IN)	**07780-0012400**
Flat cutter, 35 mm (32° EX)	**07780-0012300**

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

TOOLS:

Cutter holder 6.6	**07781-0010202**
Interior cutter, 37.5 mm (60° IN/EX)	**07780-0014100**

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

STANDARD: 1.0 – 1.2 mm (0.04 – 0.05 in)
SERVICE LIMIT: 2.0 mm (0.08 in)

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

TOOLS:

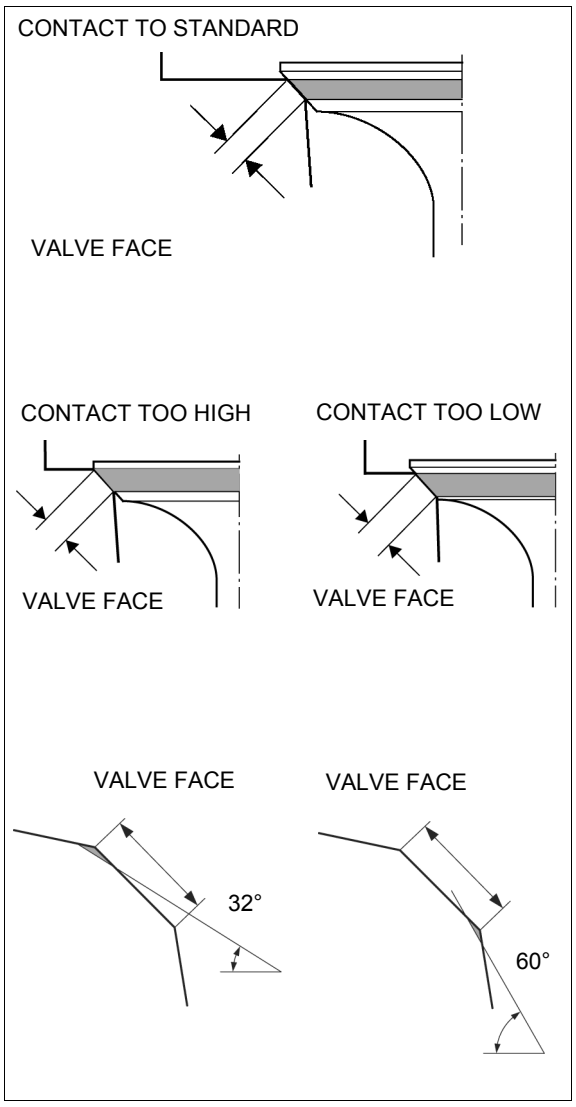
Cutter holder 6.6	**07781-0010202**
Seat cutter, 40 mm (45° IN)	**07780-0010500**
Seat cutter, 35 mm (45° EX)	**07780-0010400**

After resurfacing the seats, inspect for even valve seating.

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

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

Thoroughly clean the cylinder head to remove any cutting residual.



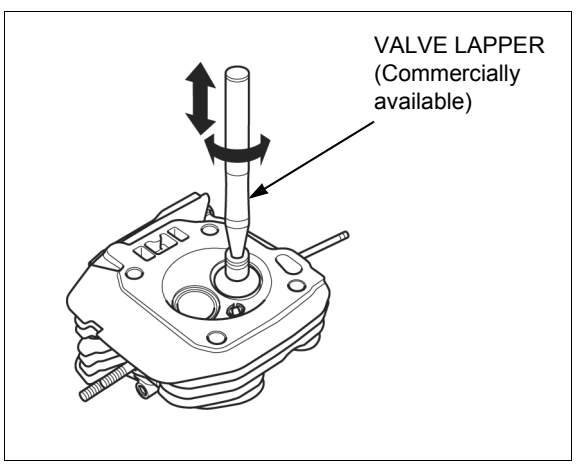
Lap the valves into their seats, using a commercially available valve lapper (1) and lapping compound.

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

NOTICE

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

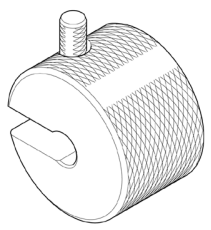
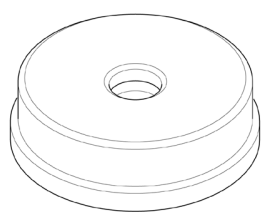
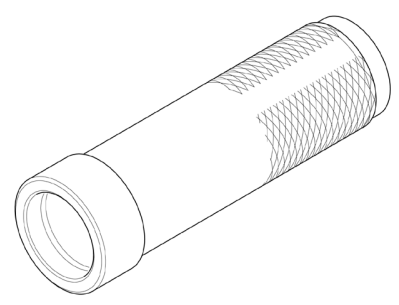
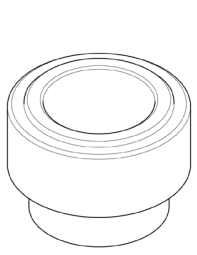
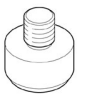
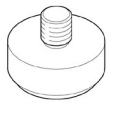
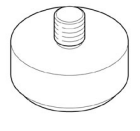
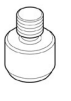
Adjust the valve clearance after assembly (page 3-10).

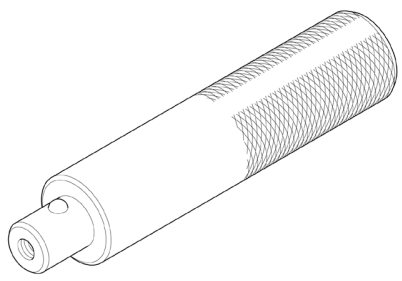
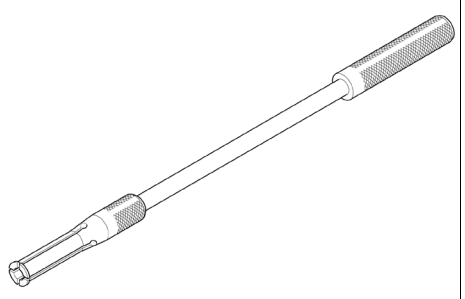
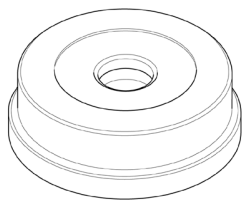


MEMO

14. CRANKCASE

TOOLS

Sliding hammer weight 07741-0010201 	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 	Pilot, 35 [in combination with 07749-0010000] 07746-0040800 	Pilot, 14 [in combination with 07749-0010000] 07746-0041200 

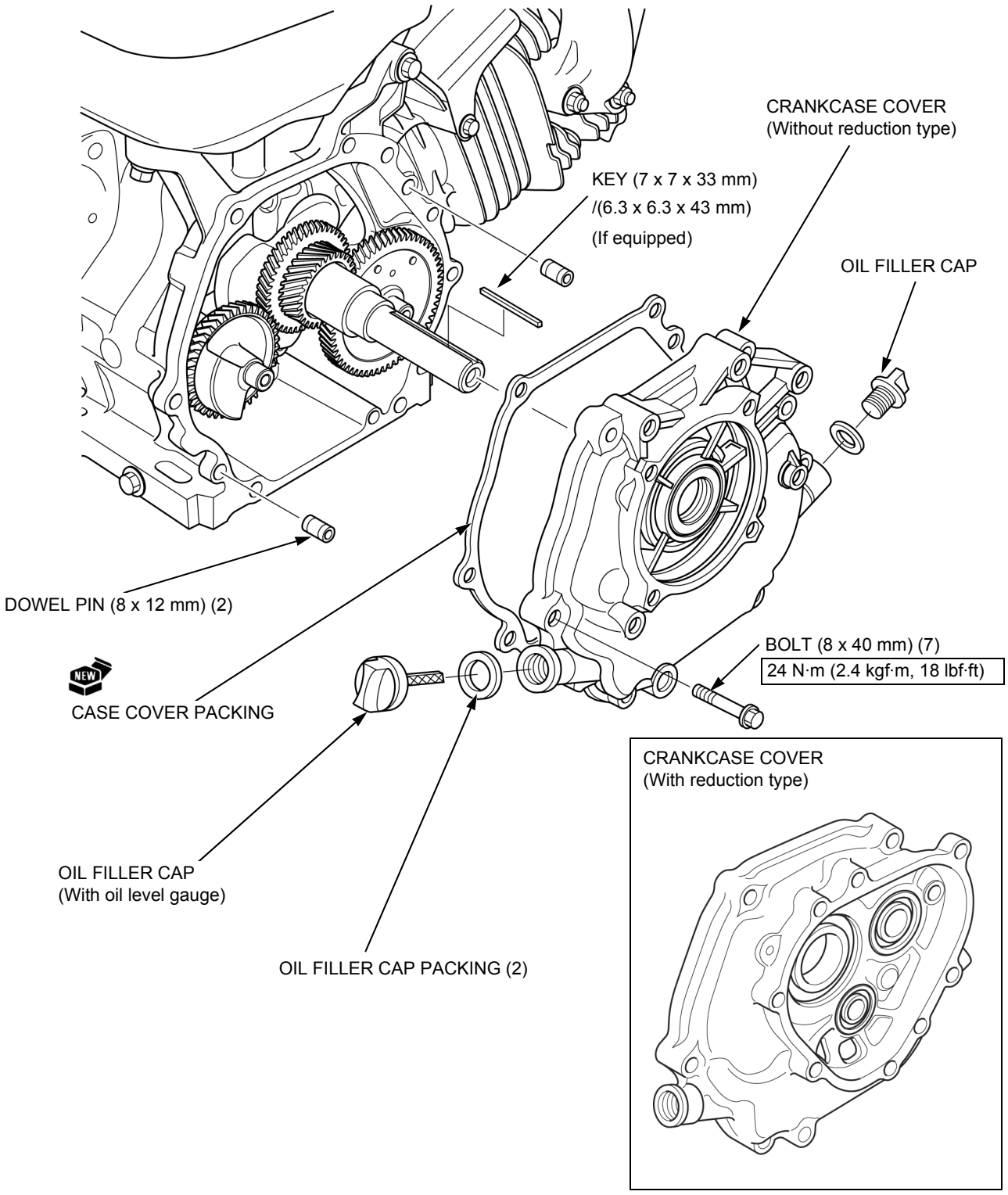
Driver handle, 15×135L 07749-0010000 	Bearing remover shaft, 15 07936-KC10500 	Bearing driver attachment, 45×50 [in combination with 07749-0010000] 07946-6920100 
Bearing driver attachment, 62×64 [in combination with 07749-0010000] 07947-6340400 		

CRANKCASE COVER REMOVAL/ INSTALLATION

EXCEPT E TYPE

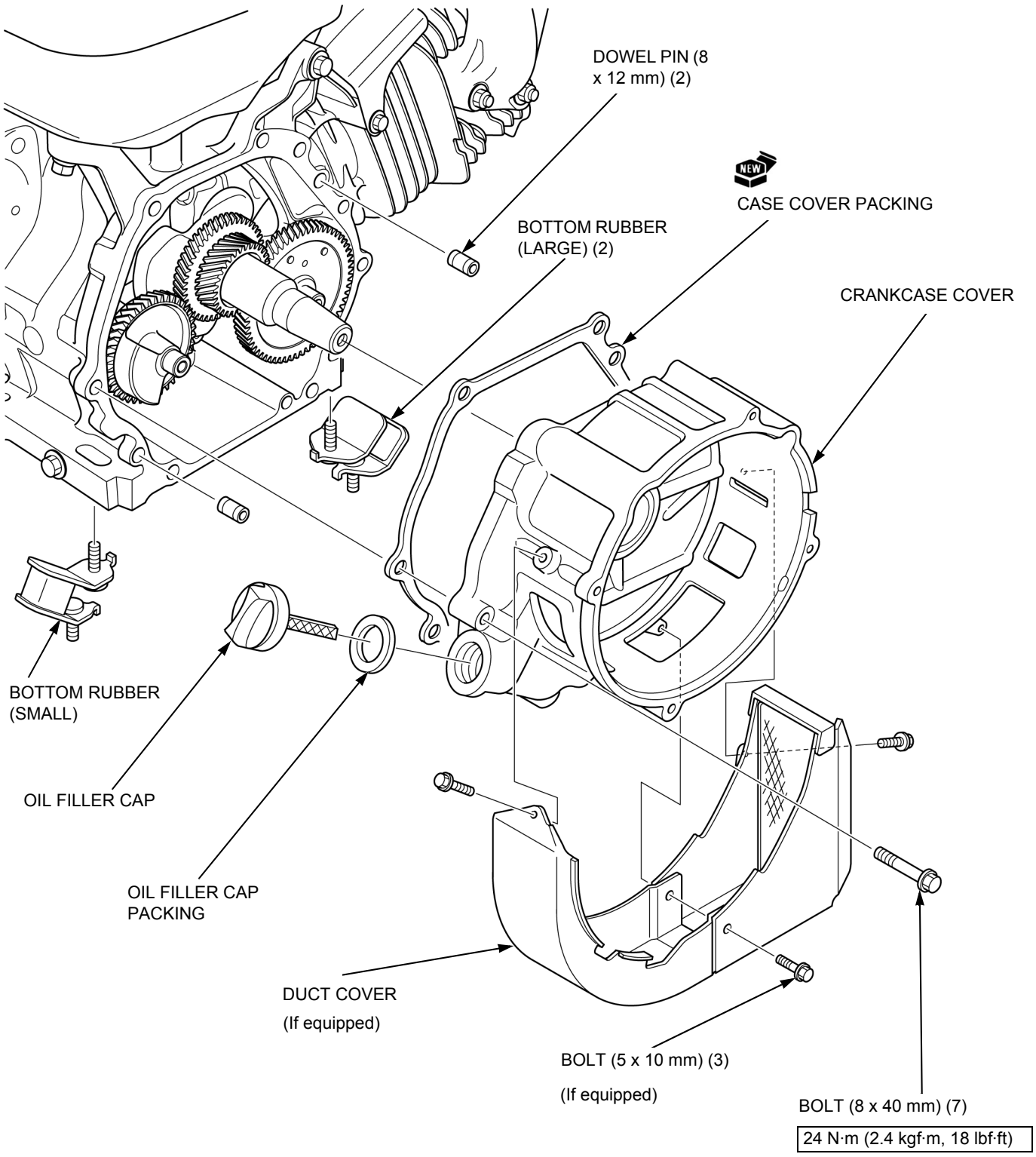
Drain the engine oil (page 3-3).

Remove the key (7 x 7 x 33 mm)/(6.3 x 6.3 x 43 mm) (If equipped).



E TYPE

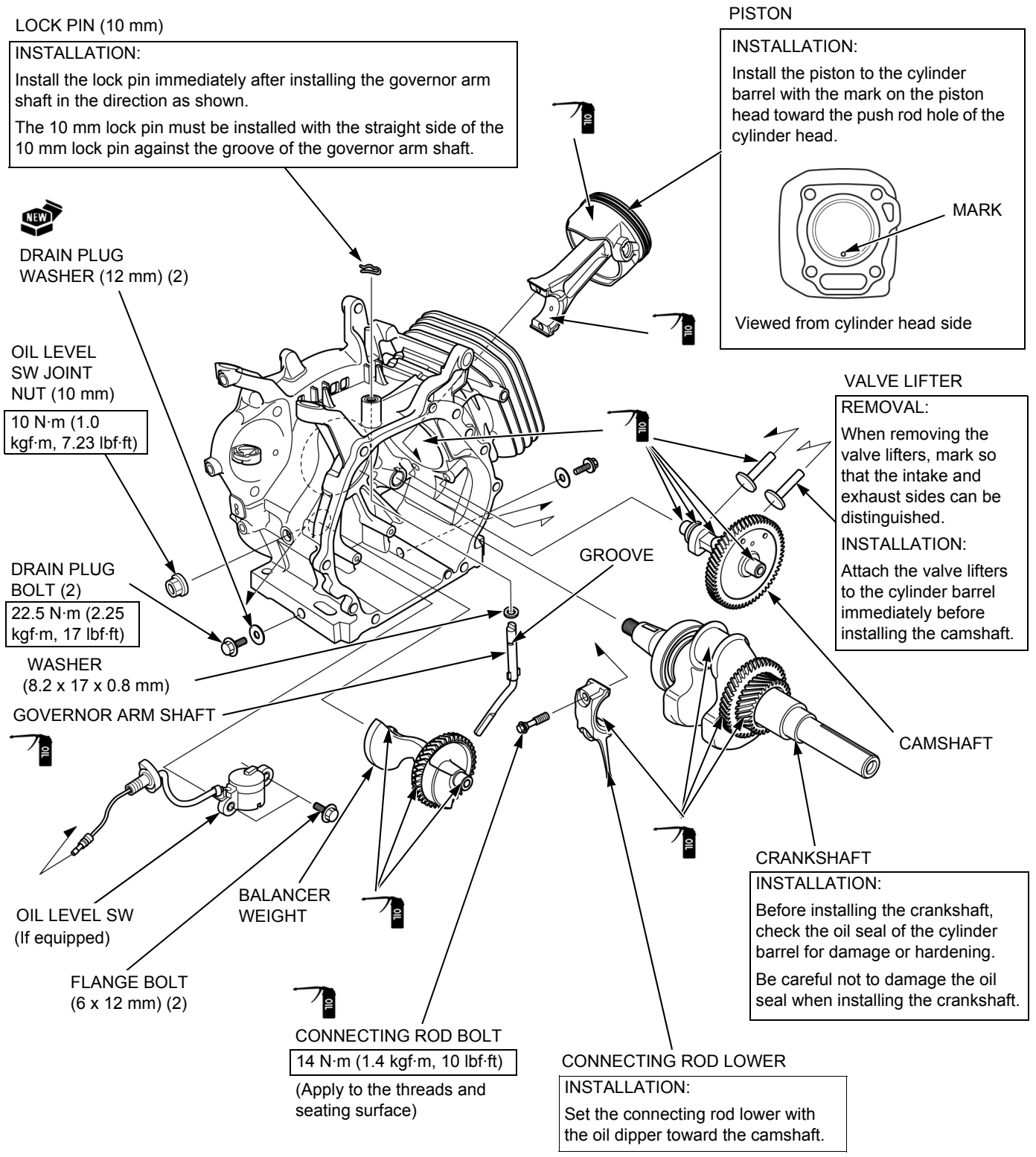
Drain the engine oil (page 3-3).



CRANKSHAFT/BALANCER/PISTON REMOVAL/INSTALLATION

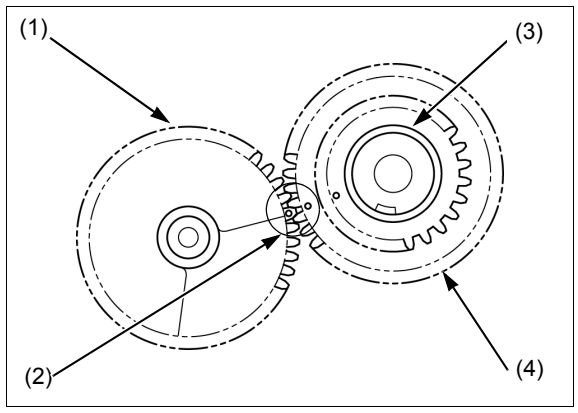
Remove the following:

- Cylinder head (page 13-3)
- Fuel tank (page 6-3)
- Flywheel (page 8-5)

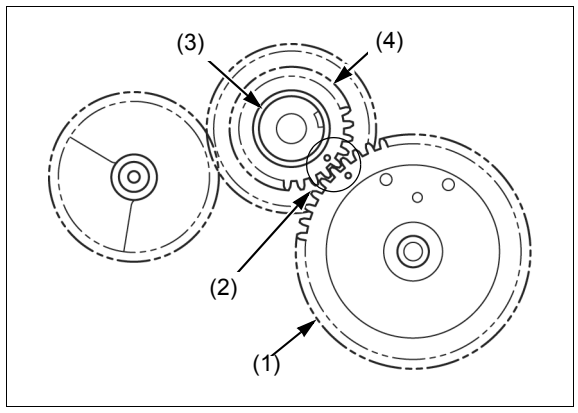


BALANCER WEIGHT/CAMSHAFT INSTALLATION

Install the balancer weight (1) to the cylinder barrel by aligning the punch marks (2) of the balancer weight and the crankshaft (3) (marked on the balancer drive gear (4)).

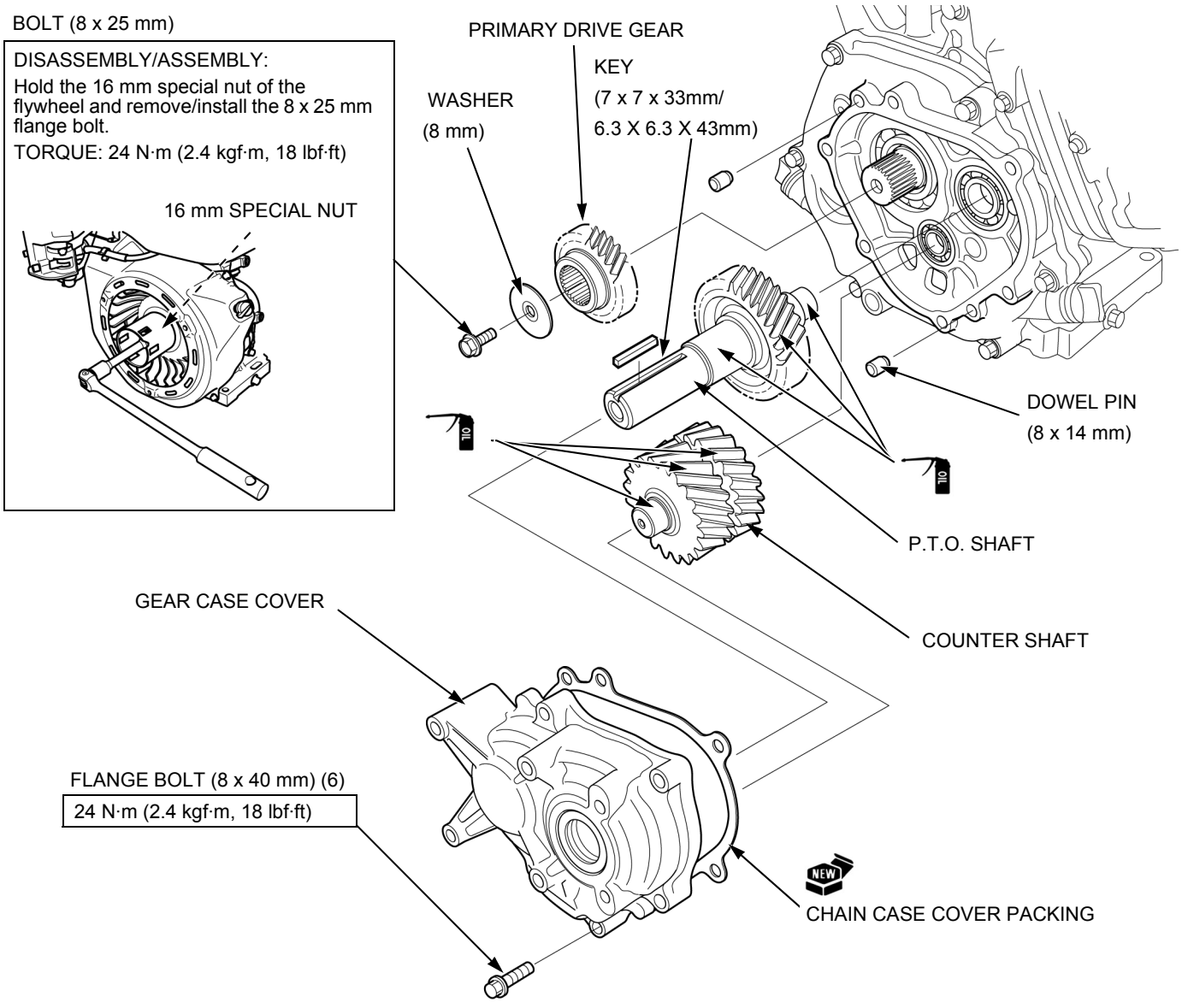


Install the camshaft (1) to the cylinder barrel by aligning the punch marks (2) of the camshaft and the crankshaft (3) (marked on the timing gear (4)).



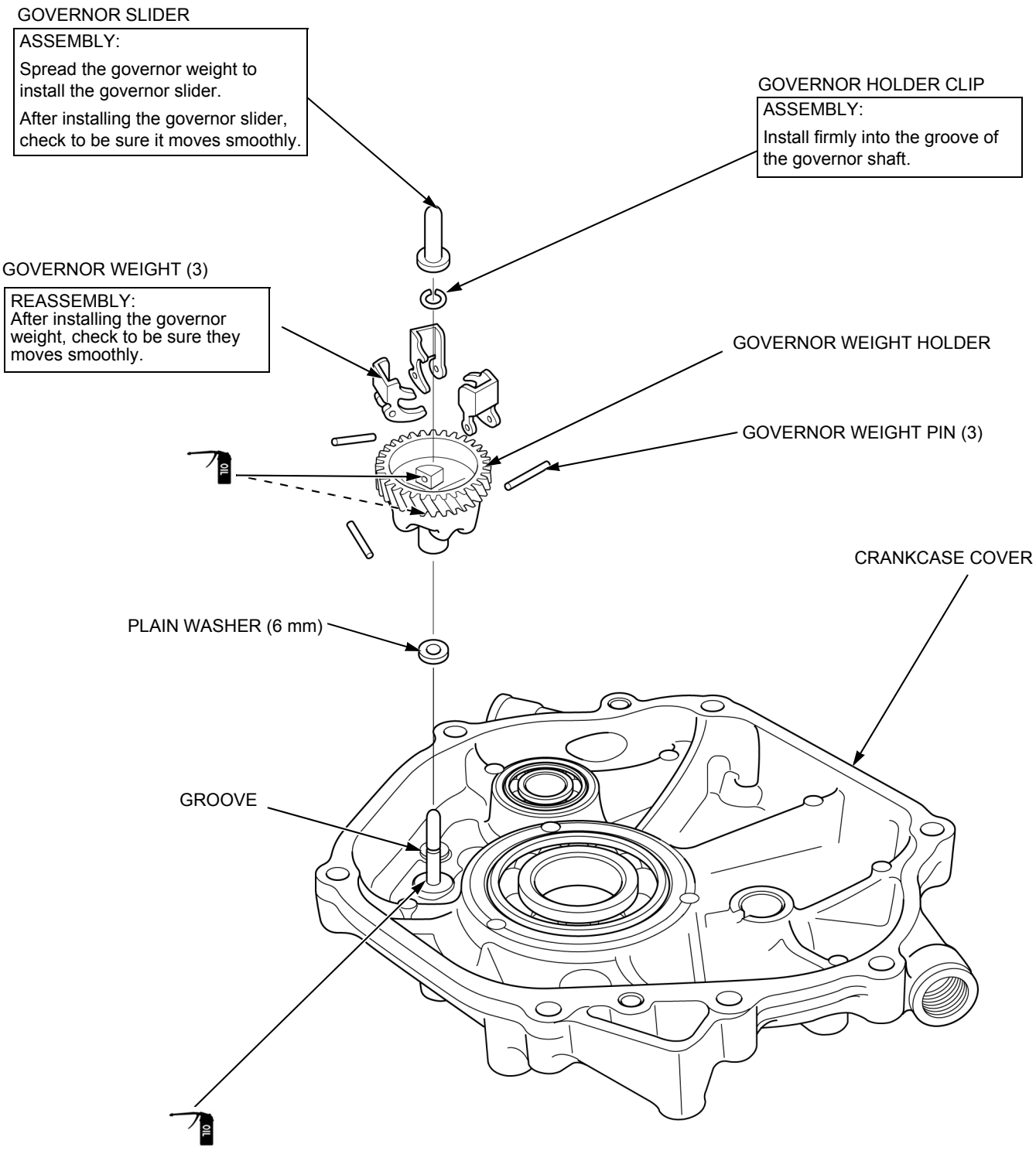
REDUCTION UNIT DISASSEMBLY/ ASSEMBLY

Remove the recoil starter (page 10-3).



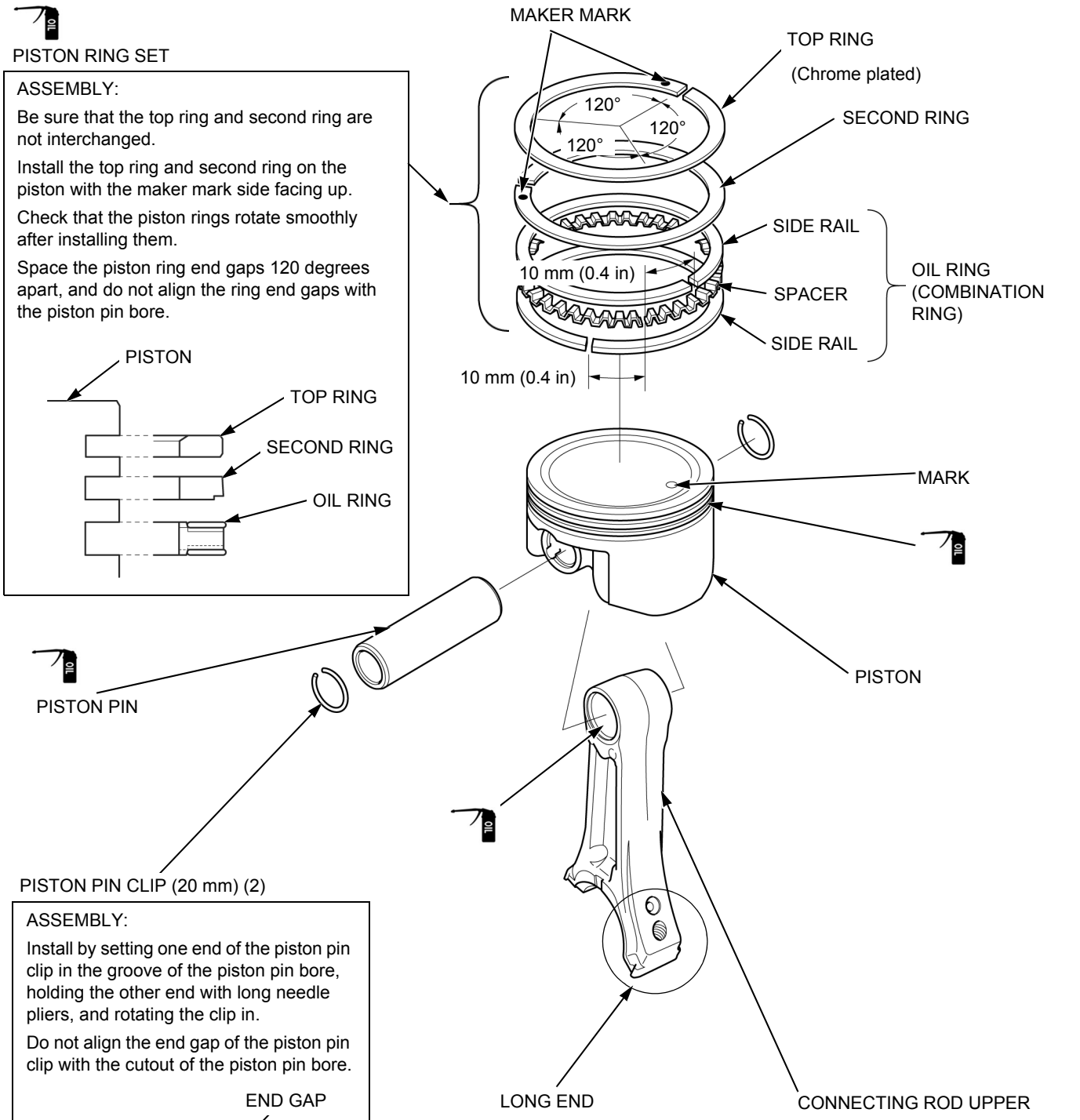
GOVERNOR DISASSEMBLY/ ASSEMBLY

Remove the crankcase cover (page 14-4).



PISTON DISASSEMBLY/ASSEMBLY

Remove the piston(page 14-6).



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

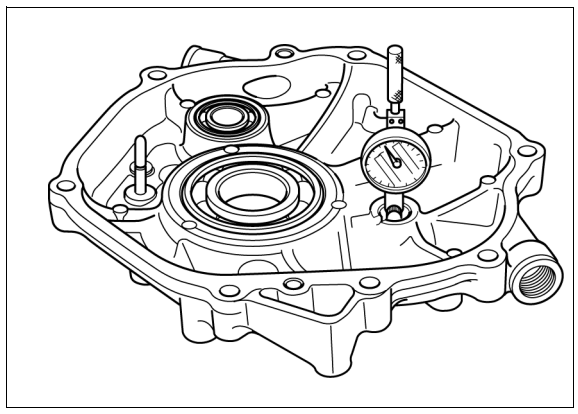
CAM SHAFT HOLDER I.D.: CRANKCASE COVER SIDE

Measure the camshaft holder I.D. of the crankcase cover.

STANDARD: 16.000 – 16.018 mm (0.6299 – 0.6306 in)
SERVICE LIMIT: 16.05 mm (0.632 in)

If the measurement is more than the service limit, replace the crankcase cover (page 14-4).

Inspect the camshaft O.D. with this inspection (page 14-16).



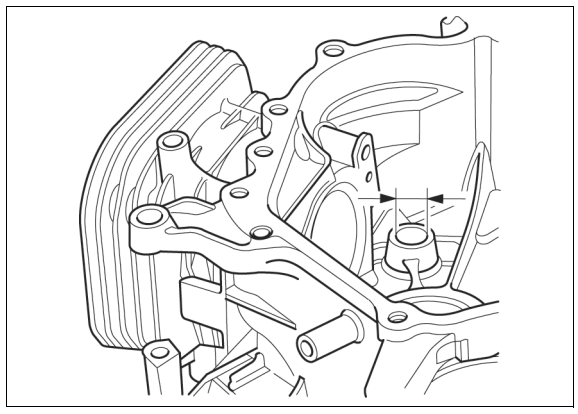
CAMSHAFT HOLDER I.D.: CYLINDER BARREL SIDE

Measure the camshaft holder I.D. of the cylinder barrel assembly.

STANDARD: 16.000 – 16.018 mm (0.6299 – 0.6306 in)
SERVICE LIMIT: 16.05 mm (0.632 in)

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

Inspect the camshaft O.D. with this inspection (page 14-16).



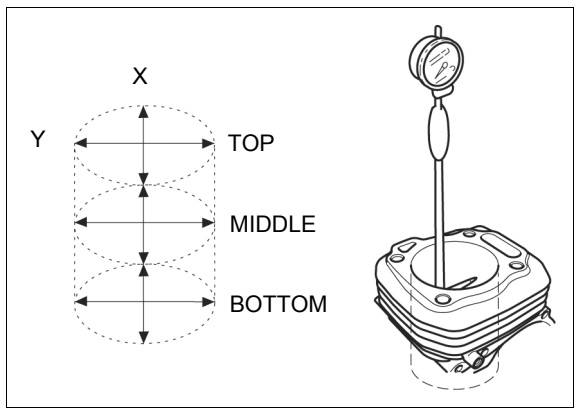
CYLINDER SLEEVE I.D.

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: 88.000 – 88.017 mm (3.4646 – 3.4652 in)
SERVICE LIMIT: 88.17 mm (3.471 in)

If the measurement is more than the service limit, replace the cylinder barrel (page 14-6).

Inspect the piston skirt O.D. with this inspection (page 14-12).



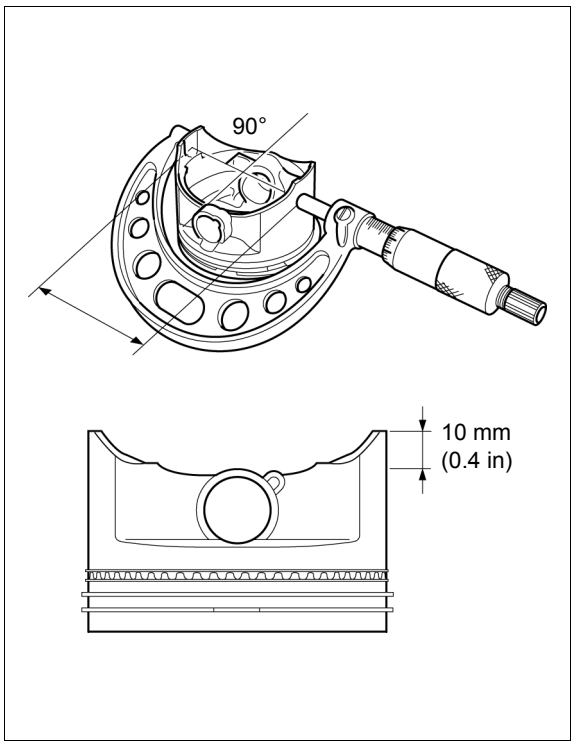
PISTON SKIRT O.D.

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

STANDARD: 87.975 – 87.985 mm (3.4636 – 3.4640 in)
SERVICE LIMIT: 87.85 mm (3.459 in)

If the measurement is less than the service limit, replace the piston (page 14-10).

Inspect the cylinder sleeve I.D. with this inspection (page 14-11).



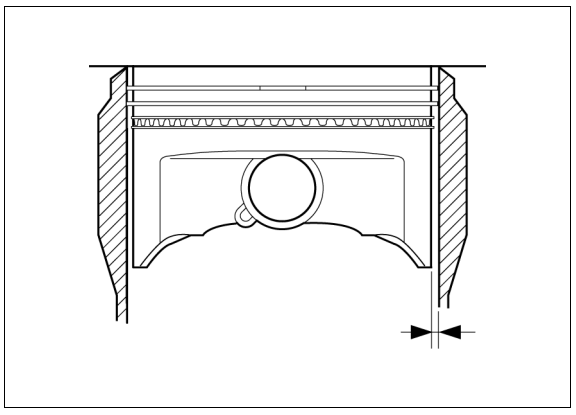
PISTON-TO-CYLINDER CLEARANCE

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

STANDARD: 0.015 – 0.042 mm (0.0006 – 0.0016 in)
SERVICE LIMIT: 0.12 mm (0.005 in)

If the calculated clearance is more than the service limit, replace the piston (page 14-10) and recheck the clearance.

If the clearance is still more than the service limit with the new piston, replace the cylinder barrel (page 14-6).



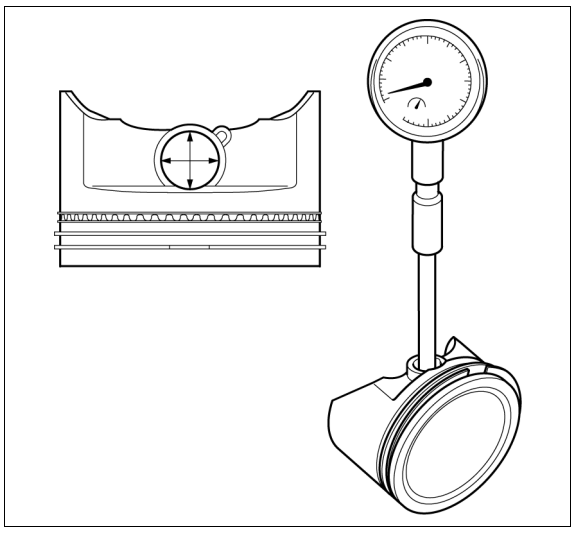
PISTON PIN BORE I.D.

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

STANDARD: 20.002 – 20.008 mm (0.7875 – 0.7877 in)
SERVICE LIMIT: 20.042 mm (0.7891 in)

If the measurement is less than the service limit, replace the piston (page 14-10).

Inspect the piston pin O.D. with this inspection (page 14-13).



PISTON PIN O.D.

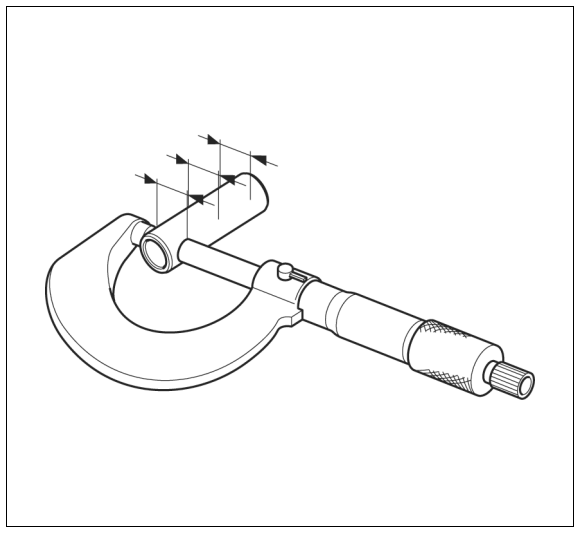
Measure and record the piston pin O.D. at three points (both ends and middle). Take the minimum reading to determine piston pin O.D.

STANDARD: 19.994 – 20.000 mm (0.7872 – 0.7874 in)
SERVICE LIMIT: 19.950 mm (0.7854 in)

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

Inspect the piston pin bore I.D. (page 14-12).

Inspect the connecting rod small end I. D. (page 14-15) with this inspection.



PISTON PIN-TO-PISTON PIN BORE CLEARANCE

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

STANDARD: 0.002 – 0.014 mm (0.0001 – 0.0006 in)
SERVICE LIMIT: 0.08 mm (0.003 in)

If the calculated clearance is more than the service limit, replace the piston pin (page 14-10) and recheck the clearance.

If the clearance is still more than the service limit with the new piston pin, replace the piston (page 14-10).

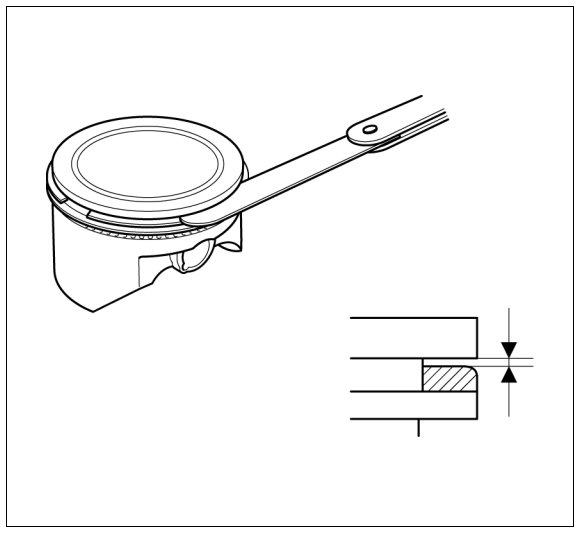
PISTON RING SIDE CLEARANCE

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

STANDARD:
Top: 0.015 – 0.060 mm (0.0006 – 0.0024 in)
Second: 0.030 – 0.060 mm (0.0012 – 0.0024 in)
SERVICE LIMIT:
Top/second: 0.15 mm (0.006 in)

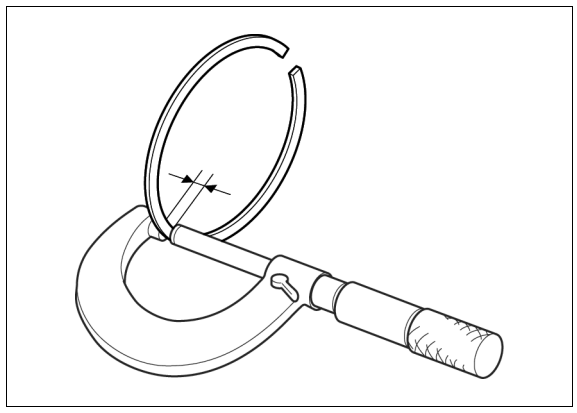
If any of the measurements is more than the service limit, inspect the piston ring width.

If the piston ring width is normal, replace the piston (page 14-10) and reinspect the clearance.
If necessary, replace the piston rings (top, second, oil) as a set (page 14-10) and reinspect the clearance.
If any of the measurements is still more than the service limit with the new piston rings, replace the piston (page 14-10).



PISTON RING WIDTH

Measure each piston ring width.



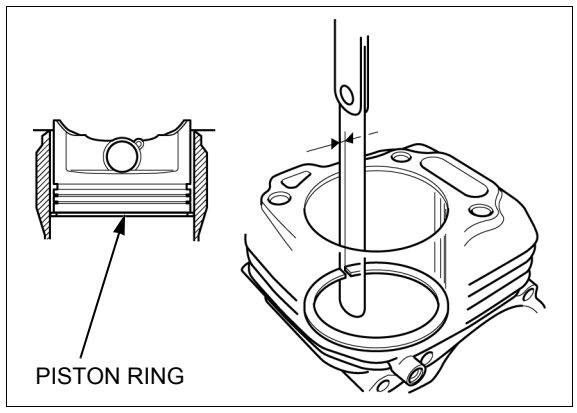
STANDARD:
Top: 1.160 – 1.19 mm (0.0457 – 0.047 in)
Second: 1.160 – 1.175 mm (0.0457 – 0.0463 in)
SERVICE LIMIT:
Top: 1.140 mm (0.0449 in)
Second: 1.150 mm (0.0453 in)

If any of the measurements is less than the service limit, replace the piston rings (top, second, oil) as a set (page 14-10).

PISTON RING END GAP

Before inspection, check whether the cylinder sleeve I.D. is within the specification.

Measure each piston ring end gap using a feeler gauge.

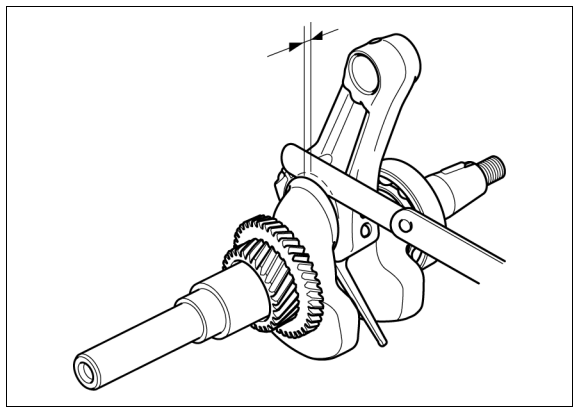


STANDARD:
Top: 0.200 – 0.350 mm (0.0079 – 0.0138 in)
Second: 0.350 – 0.500 mm (0.0138 – 0.0197 in)
Oil (side rail) 0.2 – 0.7 mm (0.01 – 0.03 in)
SERVICE LIMIT:
Top: 1.0 mm (0.04 in)
Second: 1.0 mm (0.04 in)
Oil (side rail) 1.0 mm (0.04 in)

If any of the measurements is more than the service limit, replace the piston rings (top, second, oil) as a set (page 14-10).

CONNECTING ROD BIG END SIDE CLEARANCE

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



STANDARD: 0.1 – 0.4 mm (0.004 – 0.016 in)
SERVICE LIMIT: 1.0 mm (0.04 in)

If the measurement is more than the service limit, replace the connecting rod (page 14-10) and recheck the clearance.

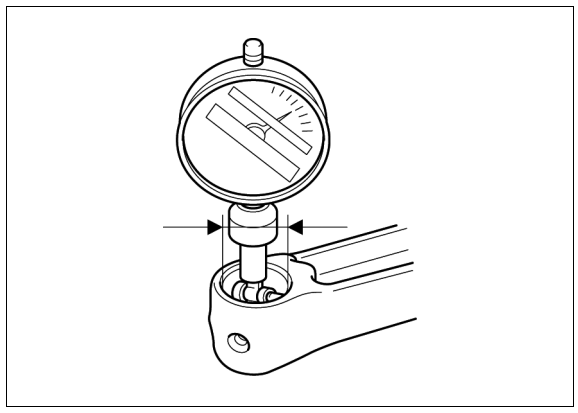
If the clearance is still more than the service limit with the new connecting rod, replace the crankshaft (page 14-6).

CONNECTING ROD SMALL END I.D.

Measure the connecting rod small end I.D.

STANDARD: 20.005 – 20.020 mm (0.7876 – 0.7882 in)
SERVICE LIMIT: 20.07 mm (0.790 in)

If the measurement is more than the service limit, replace the connecting rod (page 14-10).



CONNECTING ROD BIG END I.D.

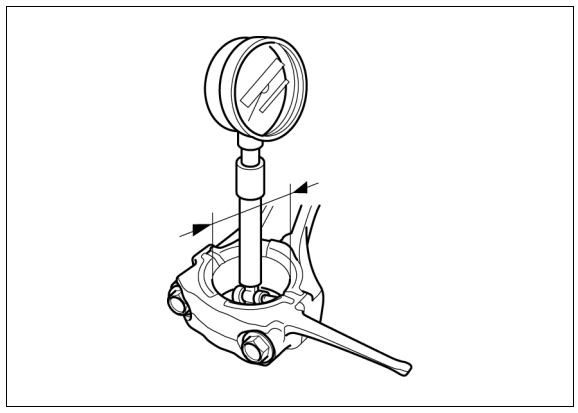
Set the connecting rod lower to the connecting rod upper and tighten the connecting rod bolts to the specified torque.

TORQUE: 14 N·m (1.4 kgf·m, 10 lbf·ft)

Measure the connecting rod big end I.D.

STANDARD: 36.025 – 36.039 mm (1.4183 – 1.4189 in)
SERVICE LIMIT: 36.07 mm (1.420 in)

If the measurement is more than the service limit, replace the connecting rod (page 14-10).

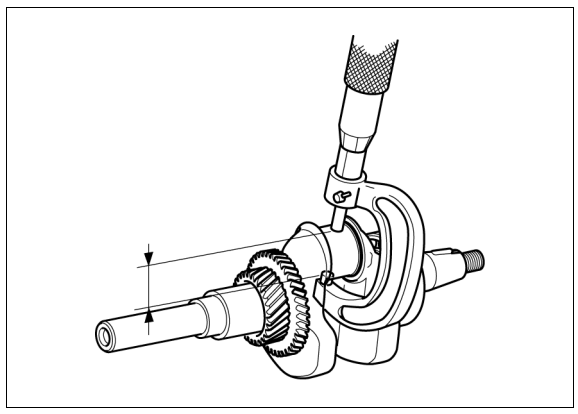


CRANK PIN O.D.

Measure the crank pin O.D. of the crankshaft.

STANDARD: 35.975 – 35.985 mm (1.4163 – 1.4167 in)
SERVICE LIMIT: 35.93 mm (1.415 in)

If the measurement is less than the service limit, replace the crankshaft (page 14-6).



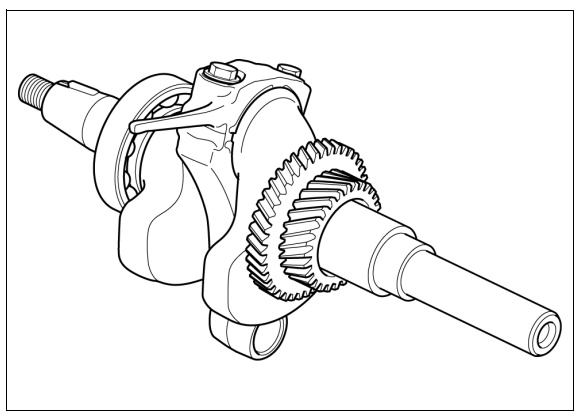
CONNECTING ROD BIG END OIL CLEARANCE

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

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

TORQUE: 14 N·m (1.4 kgf·m, 10 lbf·ft)

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

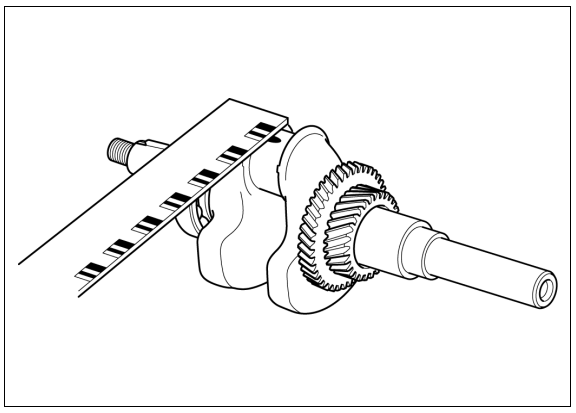


Remove the connecting rod and measure the plastigauge.

STANDARD: 0.040 – 0.064 mm (0.0016 – 0.0025 in)
SERVICE LIMIT: 0.12 mm (0.005 in)

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

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

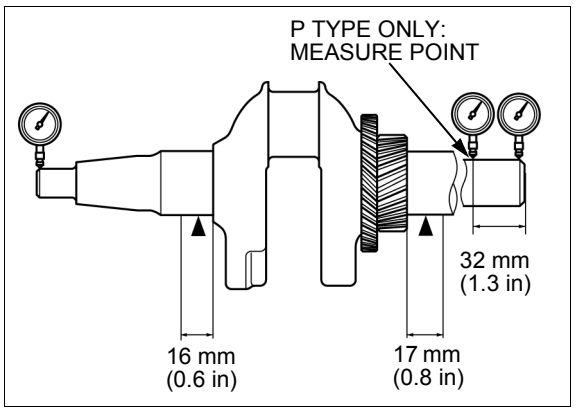


CRANKSHAFT RUNOUT

Set the crankshaft on V-blocks and measure the runout using a dial indicator.

SERVICE LIMIT: 0.1 mm (0.003 in)

If the measured runout is more than the service limit, replace the crankshaft (page 14-6).

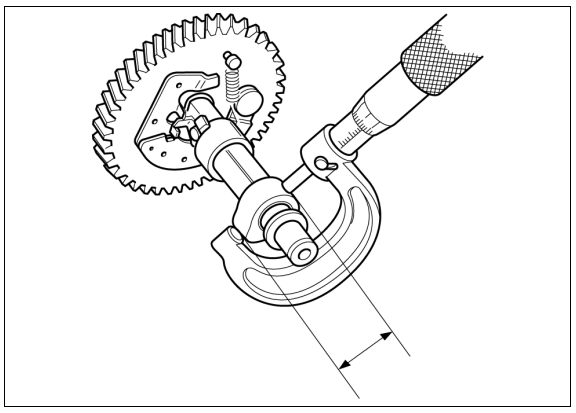


CAMSHAFT CAM HEIGHT

Measure the cam height of the camshaft.

STANDARD:
IN: 32.498 – 32.698 mm (1.2794 – 1.2873 in)
EX: 31.985 – 32.185 mm (1.2592 – 1.2671 in)
SERVICE LIMIT:
IN: 32.198 mm (1.2676 in)
EX: 29.886 mm (1.1766 in)

If the measurement is less than the service limit, replace the camshaft(page 14-6).

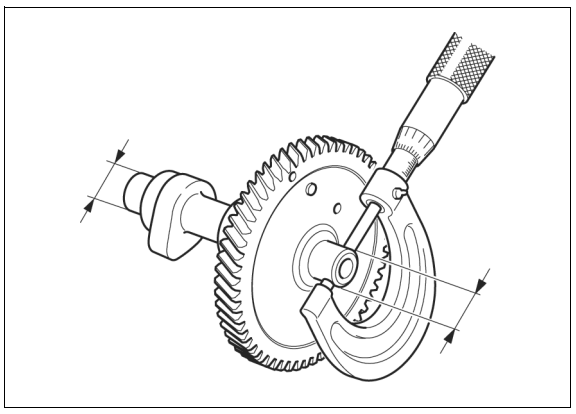


CAMSHAFT O.D.

Measure the camshaft O.D.of the camshaft.

STANDARD: 15.966 – 15.984 mm (0.6286 – 0.6293 in)
SERVICE LIMIT: 15.92 mm (0.627 in)

If the measurement is less than the service limit, replace the camshaft (page 14-6).



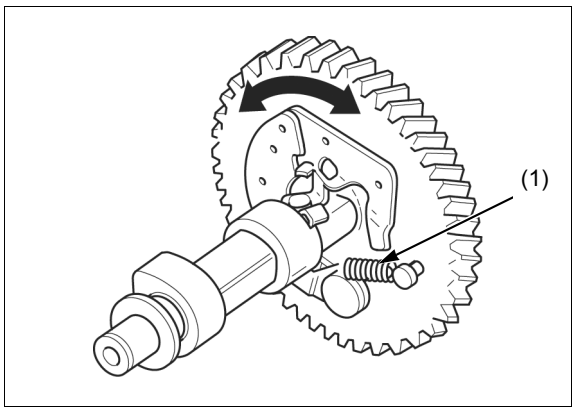
DECOMPRESSOR WEIGHT

Check for worn and weakened spring.

If the return spring (1) is worn or weakened, replace the weight return spring.

Check that the decompressor weight moves smoothly.

If the decompressor weight does not move correctly, replace the camshaft (page 14-6).

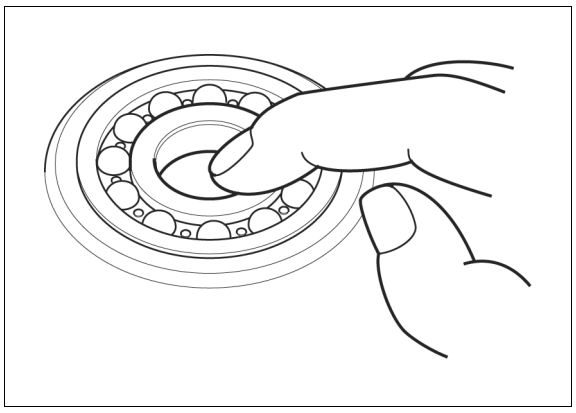


RADIAL BALL BEARING

Clean the bearing with solvent and dry it thoroughly.

Turn the inner race (outer race: cylinder barrel side crankshaft bearing only) of the radial ball bearing with your finger and check for play.

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



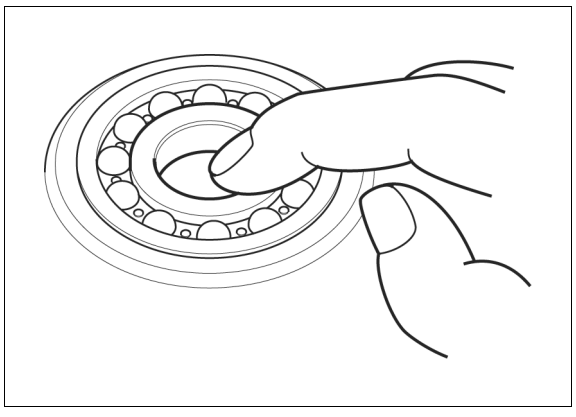
REDUCTION UNIT INSPECTION

RADIAL BALL BEARING

Clean the bearing with solvent and dry it thoroughly.

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

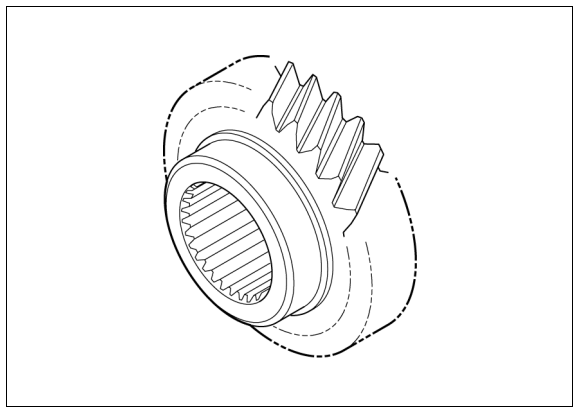
Replace the radial ball bearing if it is noisy or has excessive play.



PRIMARY DRIVE GEAR

Check for worn and weakened primary drive gear.

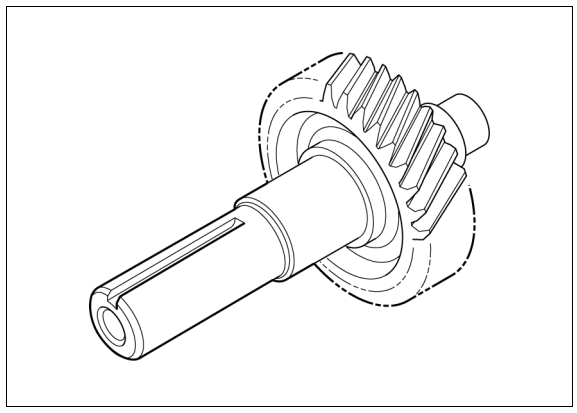
If necessary, replace the primary drive gear (page 14-8).



P.T.O. SHAFT

Check for worn and weakened gear of the P.T.O. shaft.

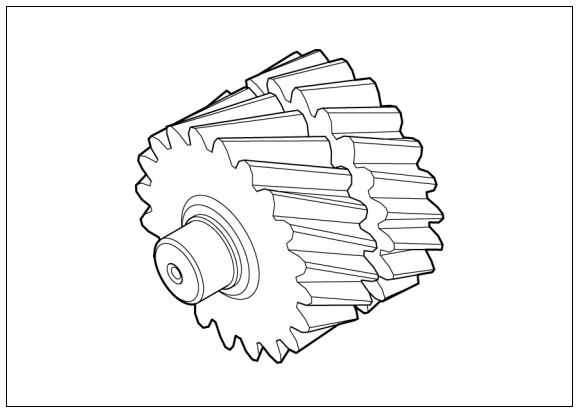
If necessary, replace the P.T.O. shaft (page 14-8).



COUNTER SHAFT

Check for worn and weakened gears of the counter shaft.

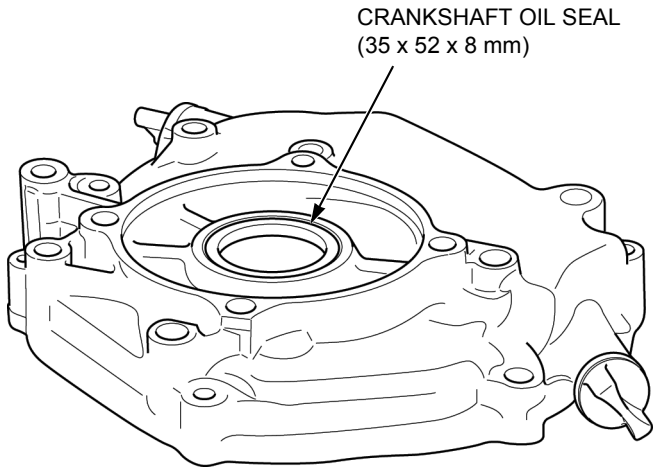
If necessary, replace the counter shaft (page 14-8).



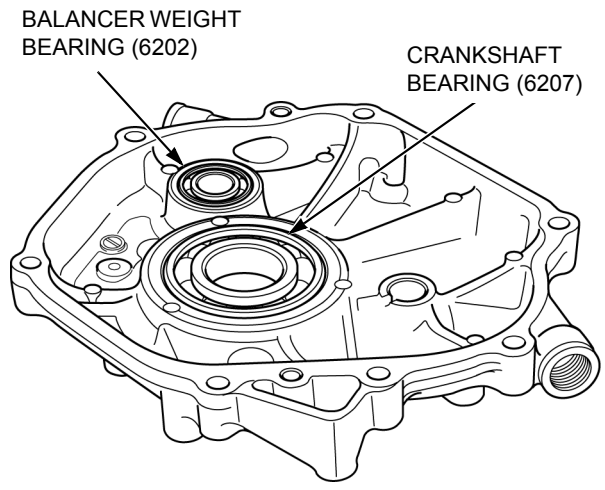
CRANKSHAFT/BALANCER WEIGHT BEARING/OIL SEAL REPLACEMENT (CRANKCASE COVER SIDE)

LOCATION

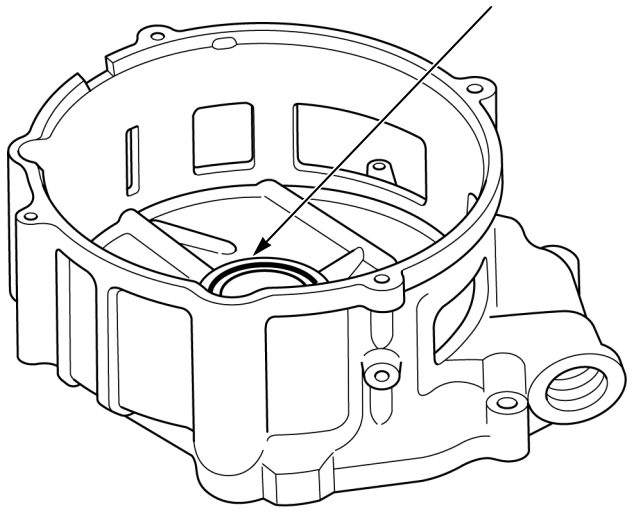
EXCEPT E TYPE: (OUTSIDE)



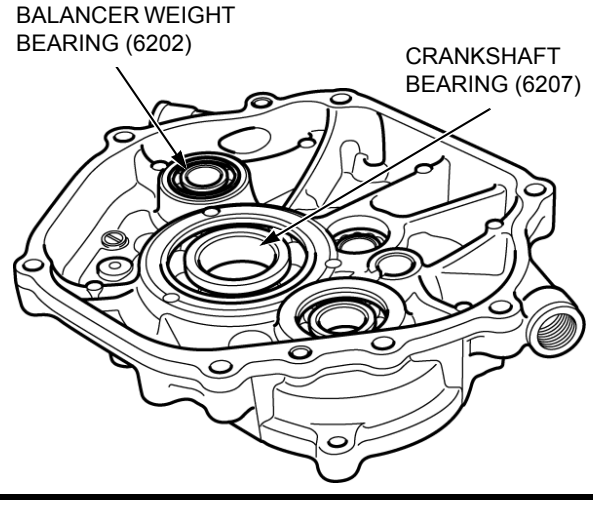
EXCEPT REDUCTION TYPE: (INSIDE)



E TYPE: (OUTSIDE)



REDUCTION TYPE: (INSIDE)



BALANCER WEIGHT BEARING (6202)

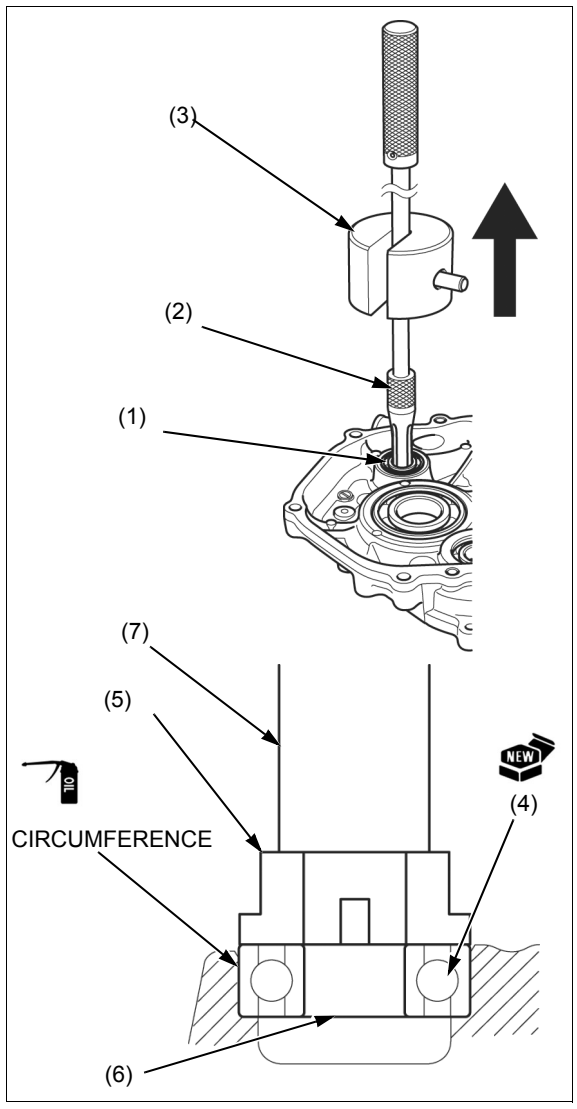
Pull out the radial ball bearing (1) using the special tools.

TOOLS:
Bearing remover shaft set 15 (2) 07936-KC10500
Sliding hammer weight (3) 07741-0010201

Apply oil to the circumference of a new bearing (4).

Drive the radial ball bearing until it is fully seated on the end using the special tools.

TOOLS:
Attachment 32 x 35 (5) 07746-0010100
Pilot 15 (6) 07746-0040300
Driver 15 x 135L (7) 07749-0010000



CRANKSHAFT BEARING (6207)

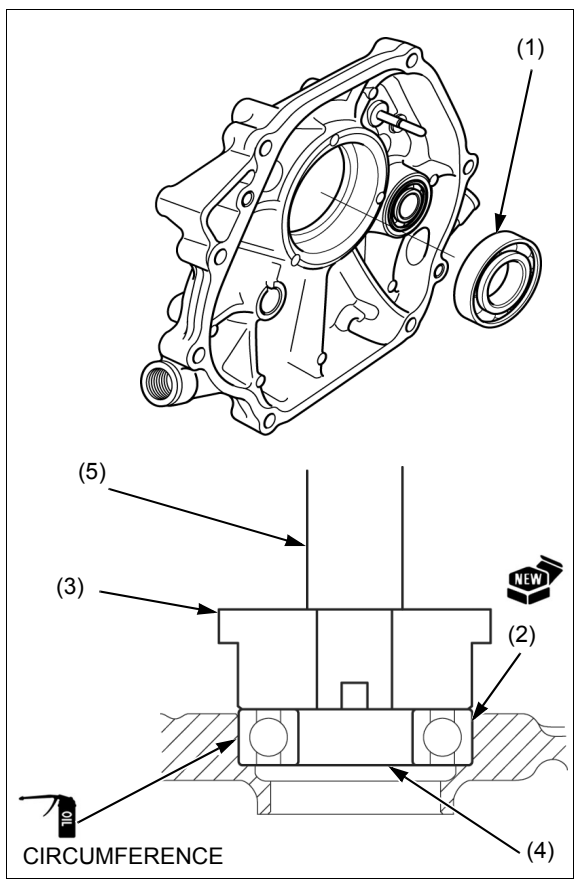
Drive out the radial ball bearing (1).

Apply oil to the circumference of a new bearing (2).

Drive the radial ball bearing until it is fully seated on the end using the special tools.

TOOLS:

Attachment 72 x 75 (3)	**07746-0010600**
Pilot 35 (4)	**07746-0040800**
Driver 15 x 135L (5)	**07749-0010000**



CRANKSHAFT OIL SEAL (35 x 52 x 8 mm)

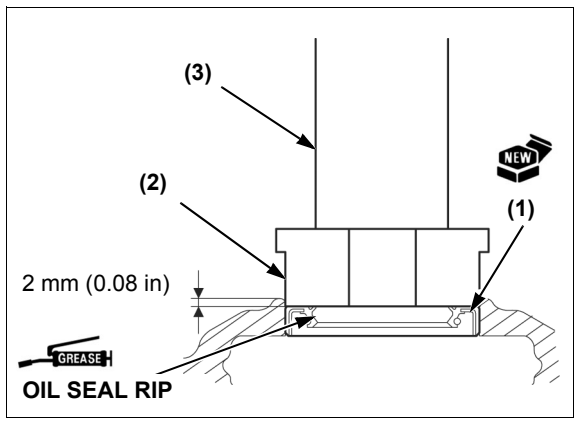
Remove the oil seal from the crankcase cover.

Apply grease to the lip of a new oil seal (1).

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

TOOLS:

Attachment 52 x 55 (2)	**07746-0010400**
Driver 15 x 135L (3)	**07749-0010000**



CRANKSHAFT BEARING REPLACEMENT (CRANKSHAFT SIDE)

CRANKSHAFT BEARING (6207)

Install the 16 mm special nut (1) tightening the flywheel to protect the crankshaft threads.

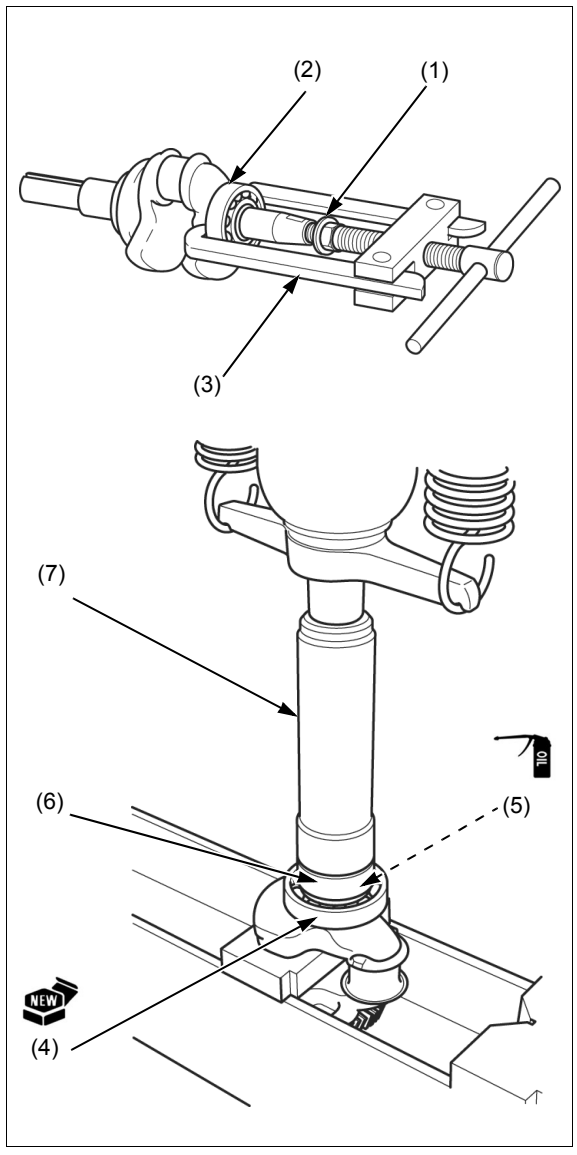
Pull out the radial ball bearing (2) using a commercially available bearing puller (3).

Apply oil to the inner surface of the new bearing (4) inner race (5).

Drive the radial ball bearing until it is fully seated on the end using the special tools and hydraulic press.

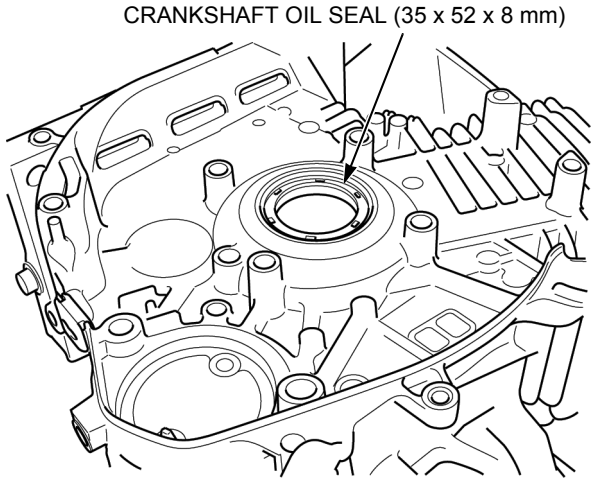
TOOLS:

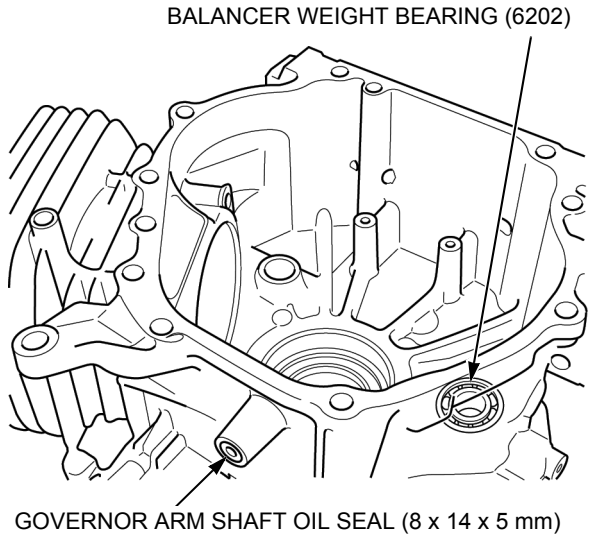
Attachment 35 mm I.D. (6)	**07746-0030400**
Inner driver 40 mm I.D. (7)	**07746-0030100**



CRANKSHAFT/BALANCER WEIGHT BEARING/OIL SEAL REPLACEMENT (CYLINDER BARREL SIDE)

LOCATION





BALANCER WEIGHT BEARING (6202)

Pull out the radial ball bearing (1) using the special tools.

TOOLS:

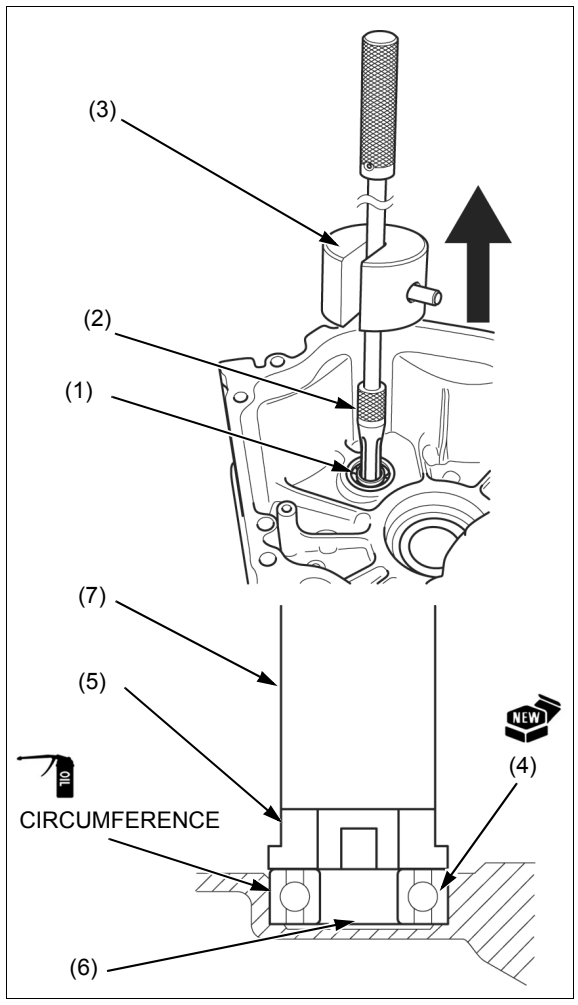
Bearing remover shaft set 15 (2)	**07936-KC10500**
Sliding hammer weight (3)	**07741-0010201**

Apply oil to the circumference of a new bearing (4).

Drive the radial ball bearing until it is fully seated on the end using the special tools.

TOOLS:

Attachment 32 x 35 (5)	**07746-0010100**
Pilot 15 (6)	**07746-0040300**
Driver 15 x 135L (7)	**07749-0010000**



GOVERNOR ARM SHAFT OIL SEAL (8 x 14 x 5 mm)

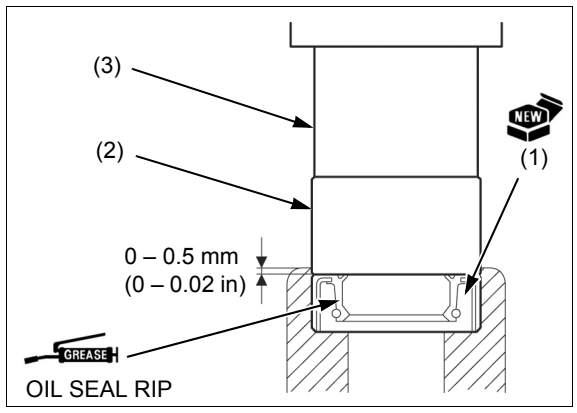
Remove the oil seal from the cylinder barrel.

Apply grease to the lip of a new oil seal (1).

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

TOOLS:

Pilot 14 (2)	**07746-0041200**
Driver 15 x 135L (3)	**07749-0010000**



CRANKSHAFT OIL SEAL (35 x 52 x 8 mm)

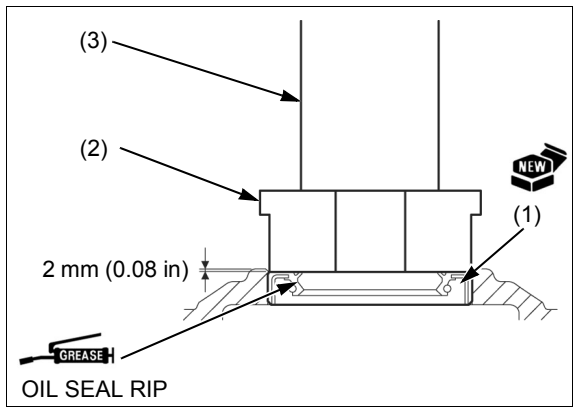
Remove the oil seal from the cylinder barrel.

Apply grease to the lip of a new oil seal (1).

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

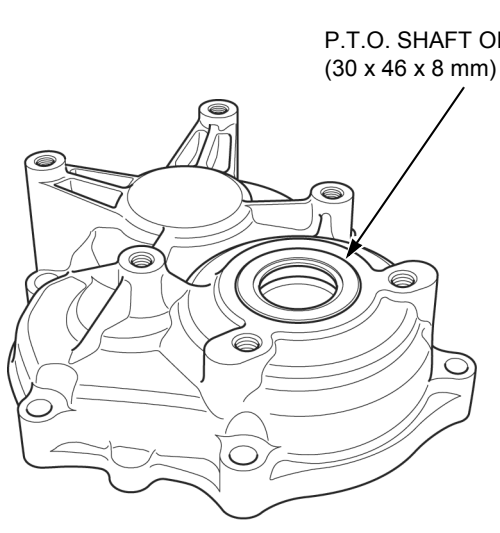
TOOLS:

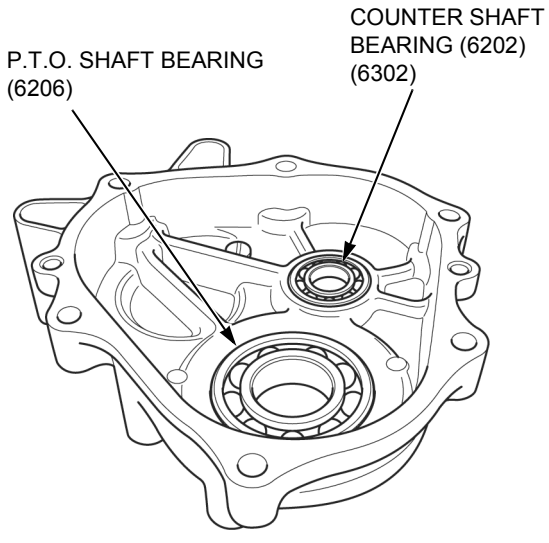
Attachment 52 x 55 (2)	**07746-0010400**
Driver 15 x 135L (3)	**07749-0010000**



COUNTER SHAFT/P.T.O. SHAFT BEARING/OIL SEAL REPLACEMENT (GEAR CASE COVER SIDE)

LOCATION





COUNTER SHAFT BEARING (6202) (6302)

Pull out the radial ball bearing (1) using the special tools.

TOOLS:

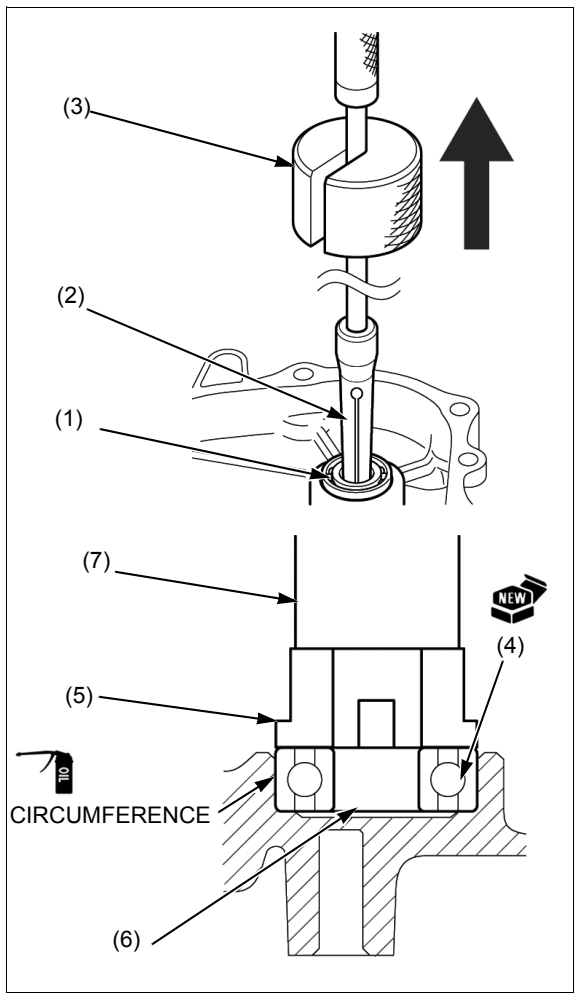
Bearing remover shaft set 15 (2)	**07936-KC10500**
Sliding hammer weight (3)	**07741-0010201**

Apply oil to the circumference of a new bearing (4).

Drive the radial ball bearing until it is fully seated on the end using the special tools.

TOOLS:

Attachment 32 x 35 (5)	**07746-0010100**
Pilot 15 (6)	**07746-0040300**
Driver 15 x 135L (7)	**07749-0010000**



P.T.O. SHAFT BEARING (6206)

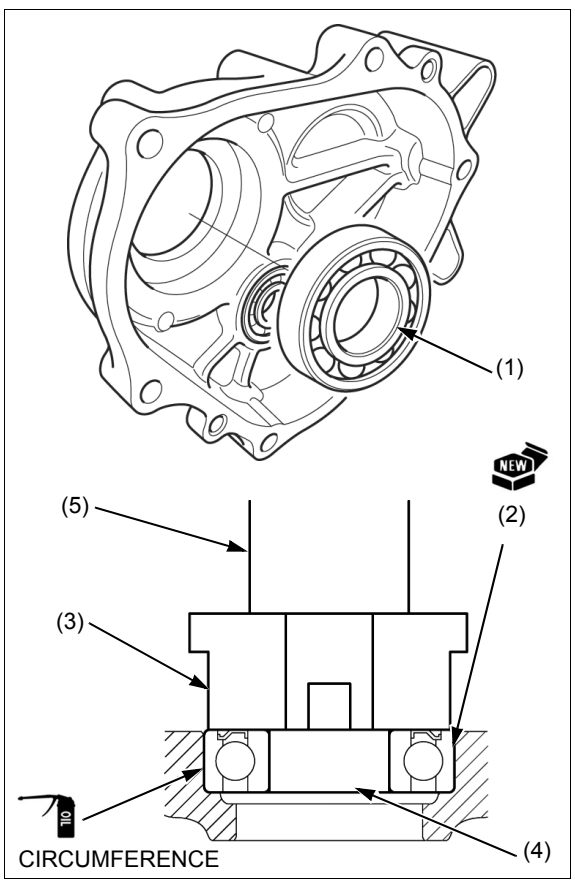
Drive out the radial ball bearing (1).

Apply oil to the circumference of a new bearing (2).

Drive the radial ball bearing until it is fully seated on the end using the special tools.

TOOLS:

Attachment 62 x 64 (3)	**07947-6340400**
Pilot 30 (4)	**07746-0040700**
Driver 15 x 135L (5)	**07749-0010000**



P.T.O. SHAFT OIL SEAL (30 x 46 x 8 mm)

Remove the oil seal from the crankcase cover.

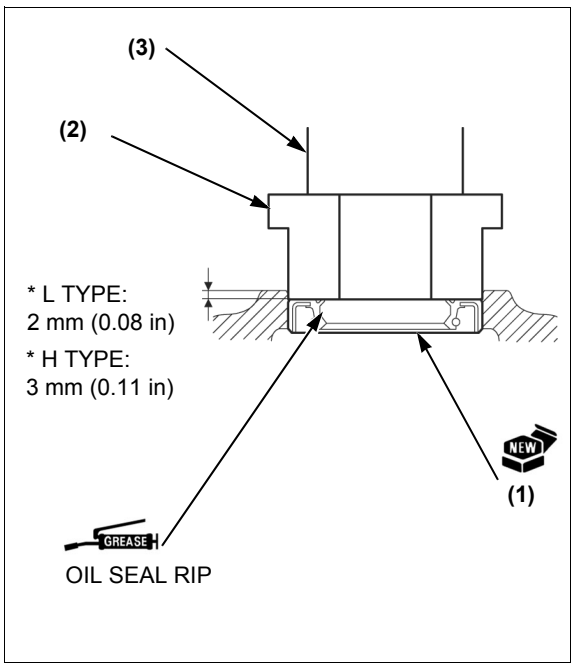
Apply grease to the lip of a new oil seal (1).

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

TOOLS:

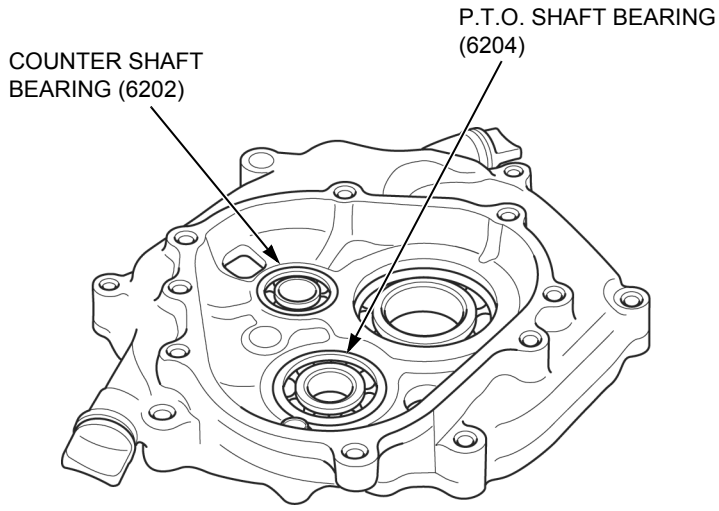
Attachment 45 x 50 (2)	**07946-6920100**
Driver 15 x 135L (3)	**07749-0010000**

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



COUNTER SHAFT/P.T.O. SHAFT BEARING REPLACEMENT (CRANKCASE COVER SIDE)

LOCATION



COUNTER SHAFT BEARING (6202)

Remove the crankcase cover (page 14-4).

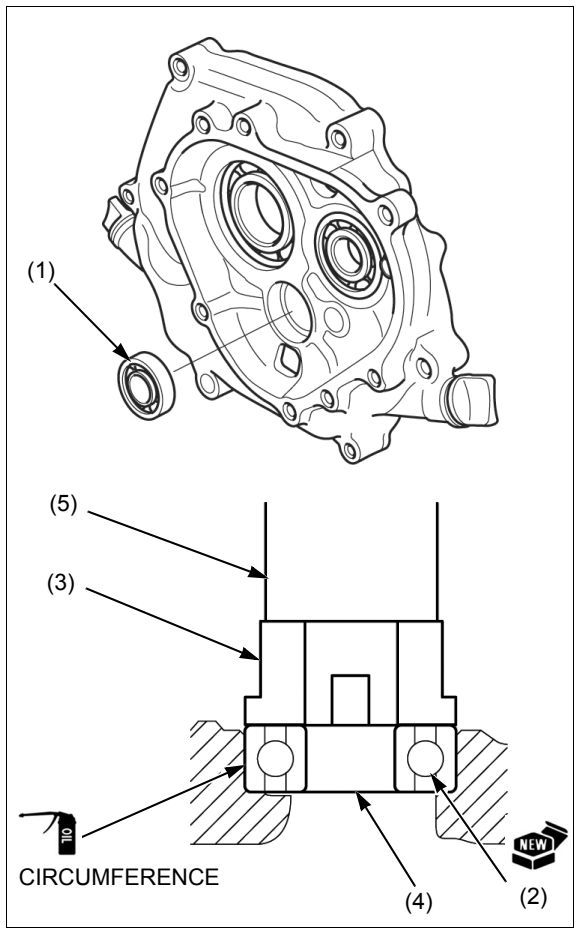
Drive out the radial ball bearing (1) using the special tools.

Apply oil to the circumference of a new bearing (2).

Drive the radial ball bearing until it is fully seated on the end using the special tools.

TOOLS:

Attachment 32 x 35 (3)	**07746-0010100**
Pilot 15 (4)	**07746-0040300**
Driver 15 x 135L (5)	**07749-0010000**



P.T.O. SHAFT BEARING (6204)

Remove the crankcase cover (page 14-4).

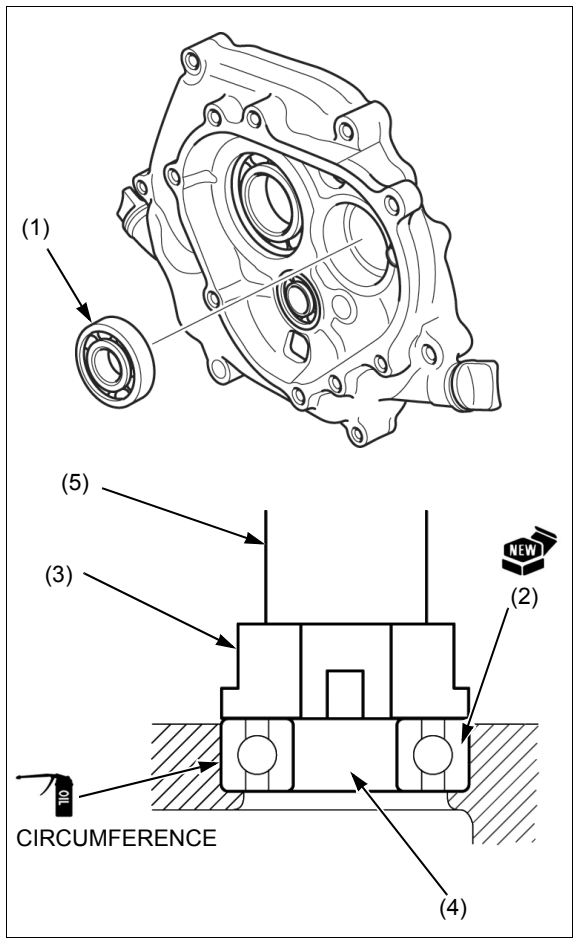
Drive out the radial ball bearing (1).

Apply oil to the circumference of a new bearing (2).

Drive the radial ball bearing until it is fully seated on the end using the special tools.

TOOLS:

Attachment 42 x 47 (3)	**07746-0010300**
Pilot 20 (4)	**07746-0040500**
Driver 15 x 135L (5)	**07749-0010000**



15. WIRING DIAGRAMS

HOW TO READ A WIRING DIAGRAM & RELATED INFORMATION

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

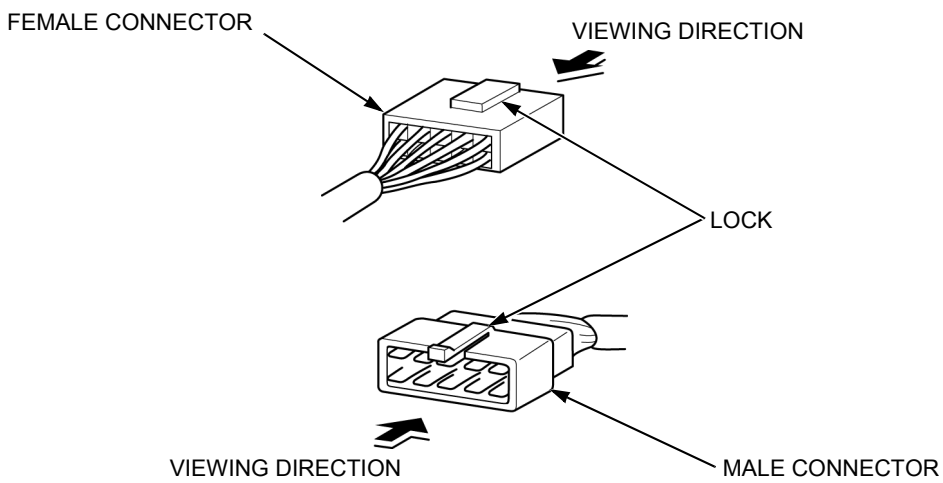
HOW TO READ CONNECTOR DRAWINGS

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

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

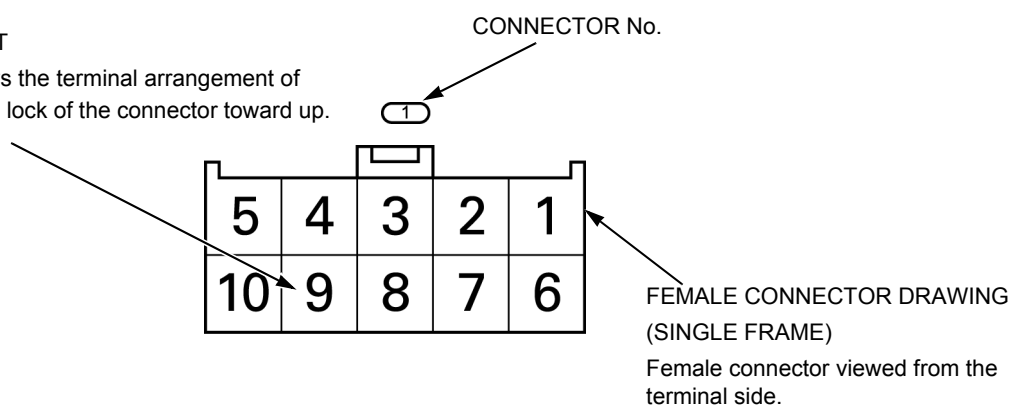
The double frame connectors represent the male connectors and the single frame connectors represent the female connectors.

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



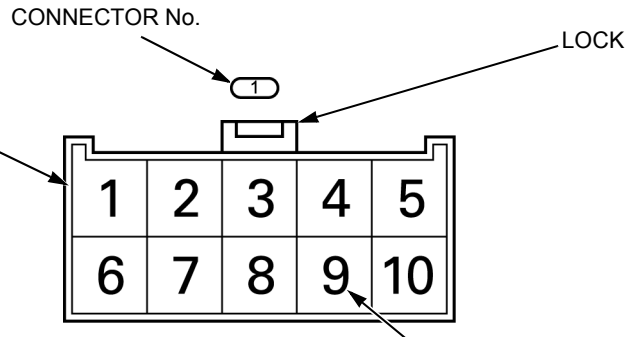
TERMINAL ARRANGEMENT

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



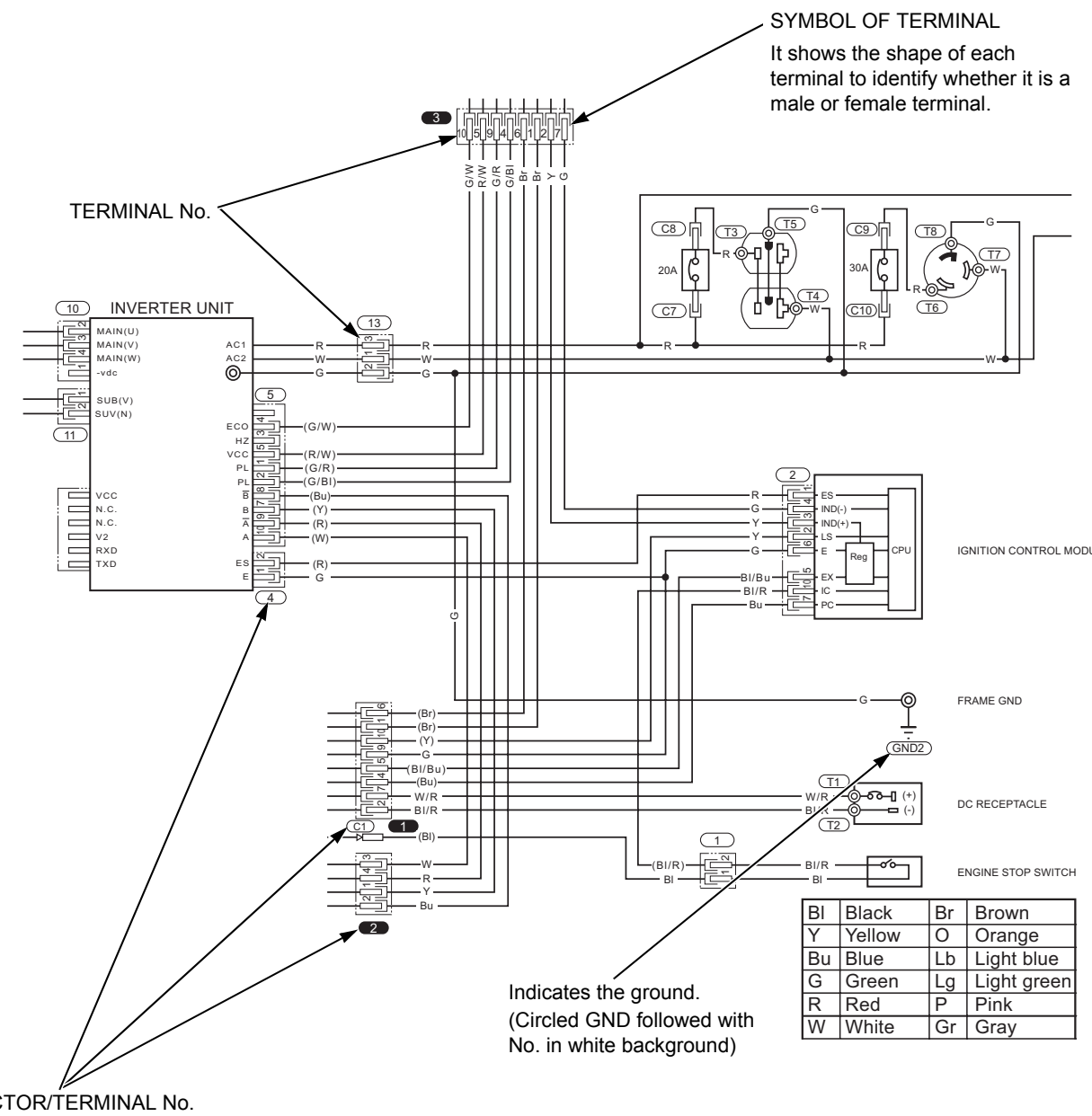
FEMALE CONNECTOR DRAWING
(SINGLE FRAME)
Female connector viewed from the terminal side.

MALE CONNECTOR DRAWING
(DOUBLE FRAME)
Male connector viewed from the terminal side.



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

HOW TO READ WIRING DIAGRAM

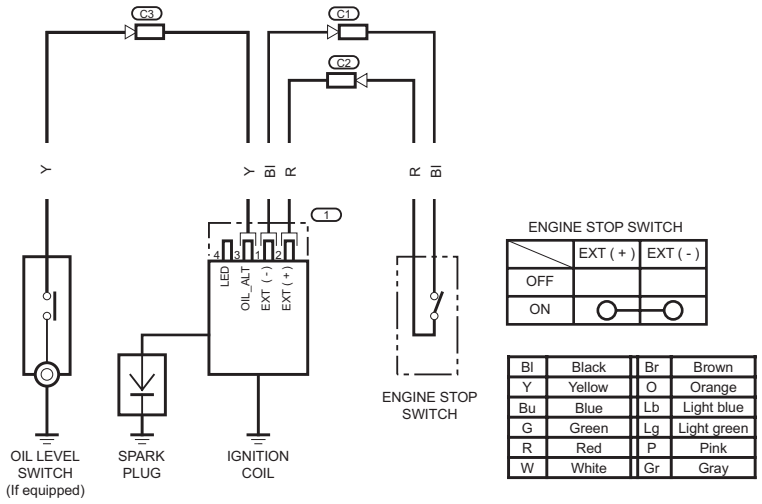


Bl	Black	Br	Brown
Y	Yellow	O	Orange
Bu	Blue	Lb	Light blue
G	Green	Lg	Light green
R	Red	P	Pink
W	White	Gr	Gray

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

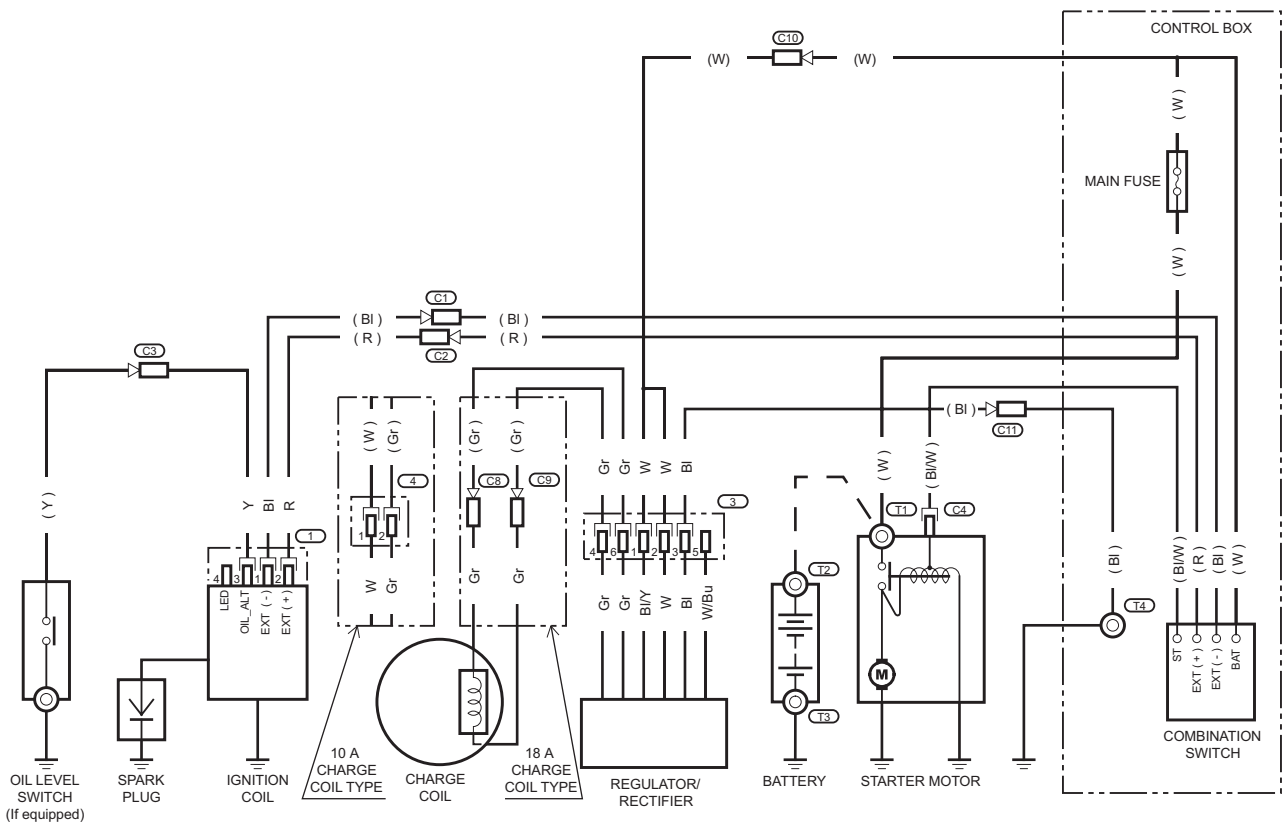
- 1 : Connector that relays from a harness to a harness (Circled No. in black background)
- (1) : Connector that connects to electrical equipment (Circled No. in white background)
- (C1) : Connector (Circled C followed with No. in white background)
- (T1) : Terminal (Circled T followed with No. in white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

NO CHARGE COIL TYPE



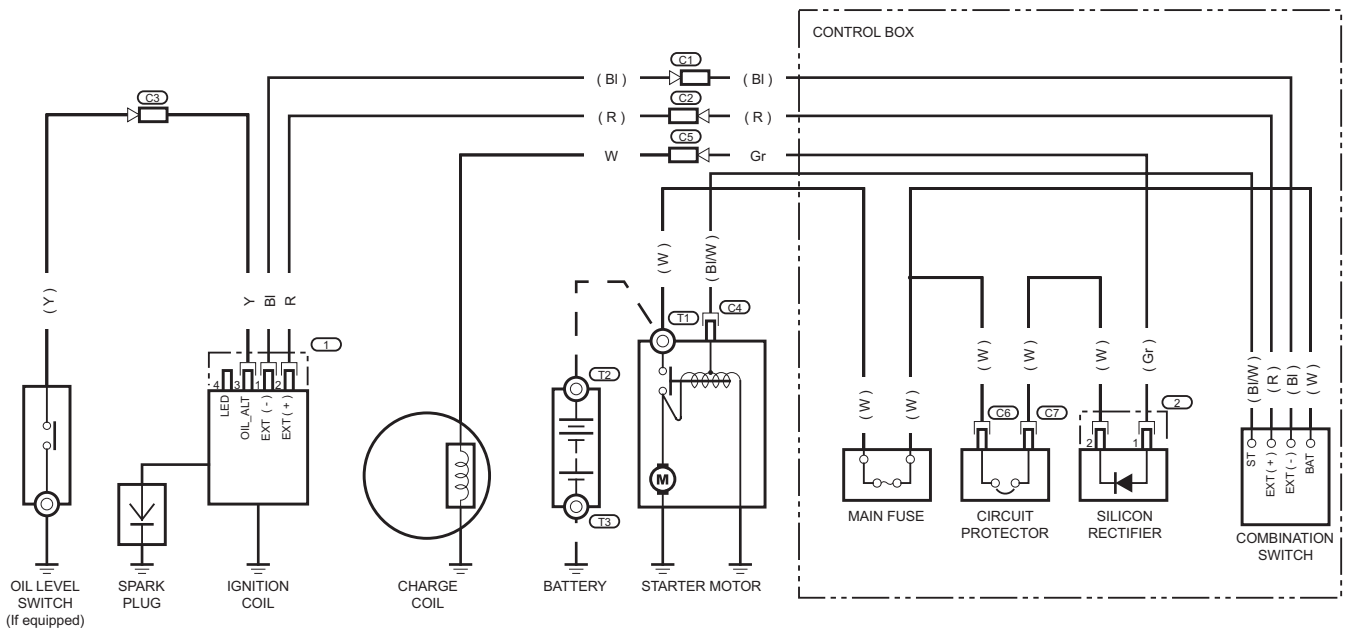
Bl	Black	Br	Brown
Y	Yellow	O	Orange
Bu	Blue	Lb	Light blue
G	Green	Lg	Light green
R	Red	P	Pink
W	White	Gr	Light green

10A / 18A CHARGE COIL TYPE



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

1A / 3A CHARGE COIL TYPE



COMBINATION SWITCH

	EXT (+)	EXT (-)	ST	BAT
OFF				
ON	○	○		
START	○	○	○	○

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

MEMO

INDEX

HONDA

Shop Manual News

ENGINE

Power Equipment

News No.	Issue Data
P/P-431	July 2016

SOME PARTS OF CHANGES

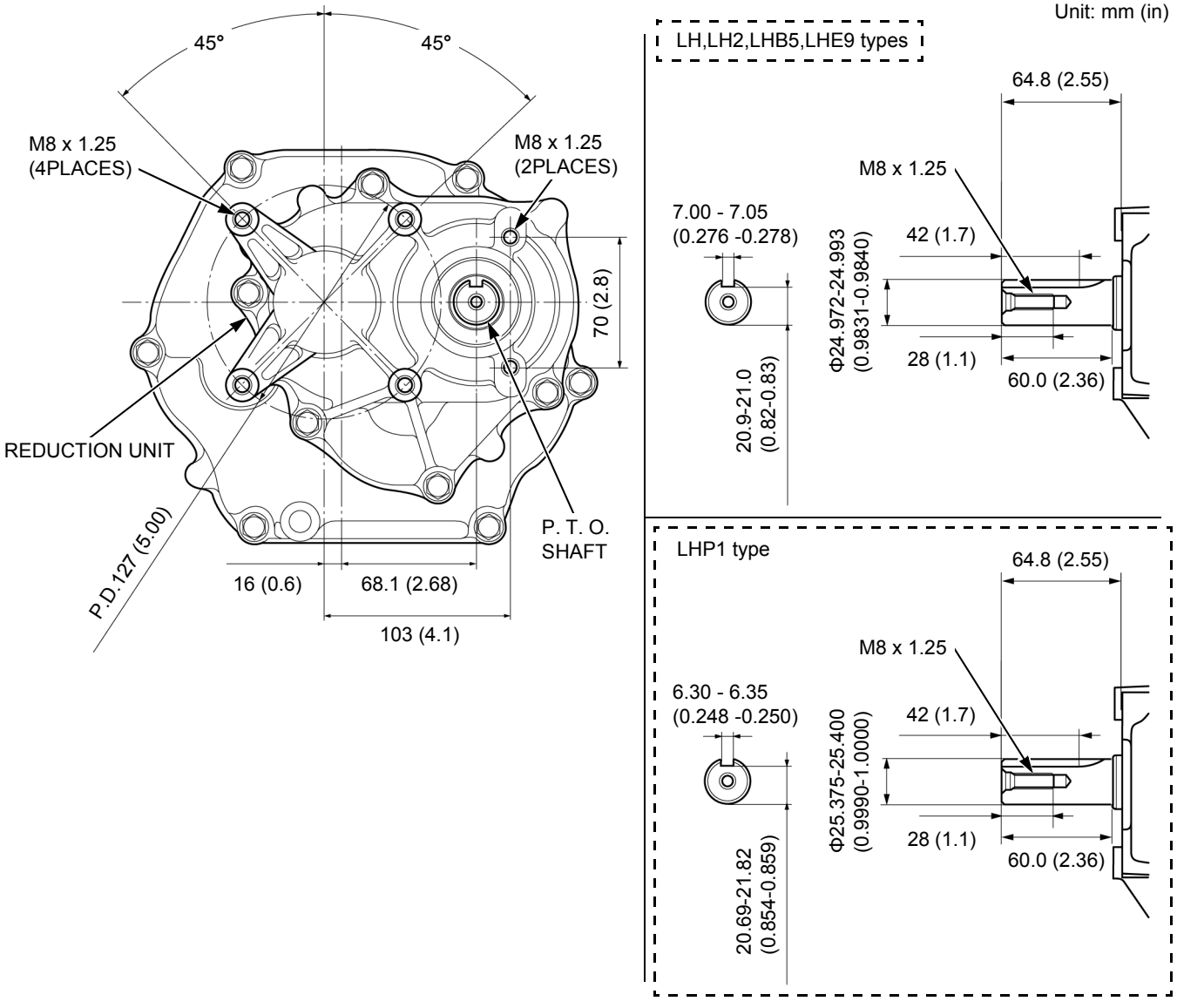
Applicable Information	Publication No.	Applicable Page
GX390RT2/T2/UT2	62Z5F00	1-10, 14-8

CHANGE LOCATIONS

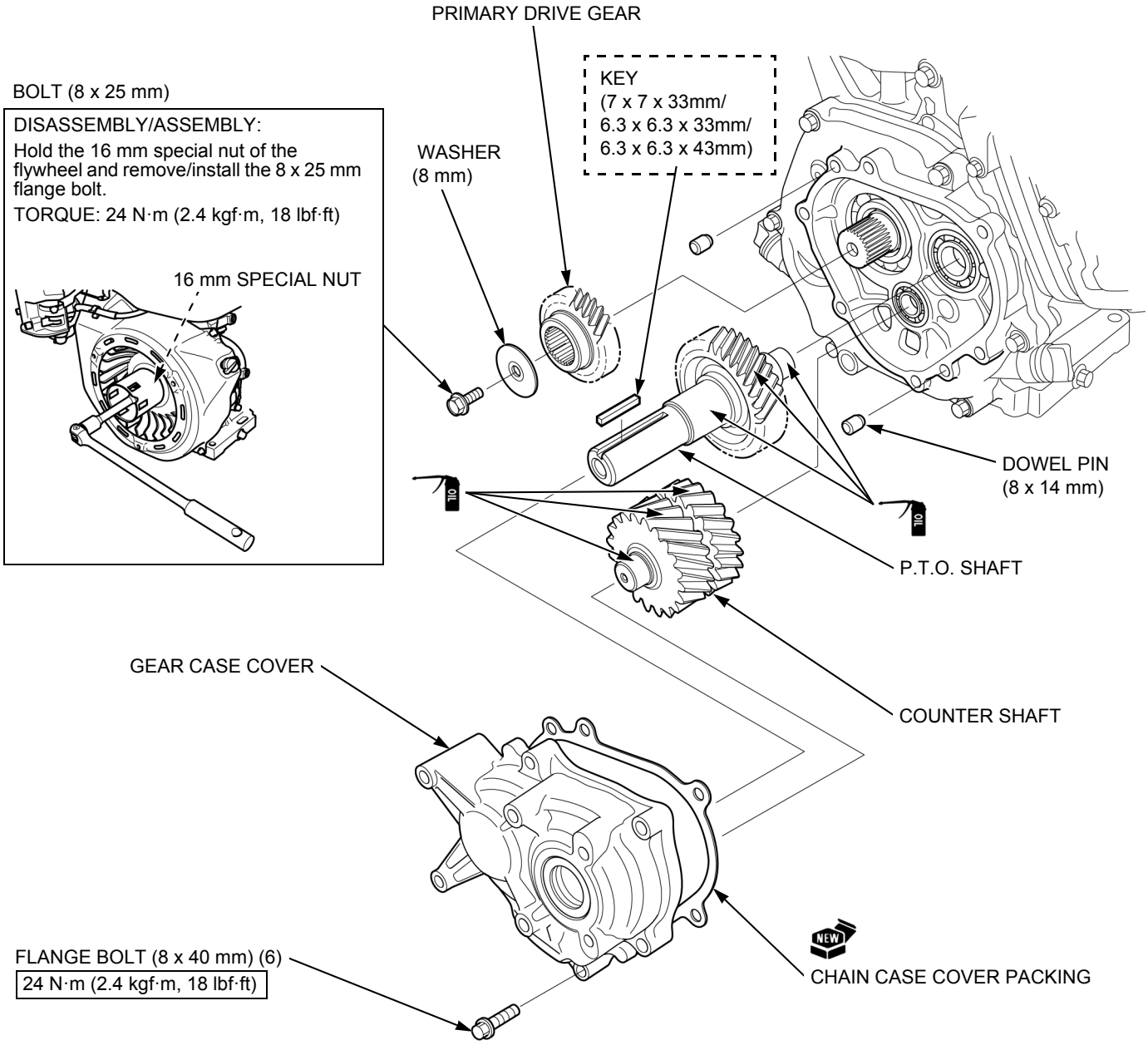
The changed instructions are shown in [ ].

PTO DIMENSIONAL DRAWINGS

L TYPE (WITH REDUCTION)



REDUCTION UNIT
DISASSEMBLY/ASSEMBLY



HONDA

Bulletin du manuel d'atelier

MOTEUR

Produits d'équipement

N° de bulletin	Date de publication
P/P-431	Juillet 2016

CHAMP DES MODIFICATIONS

Informations concernées	N° de publication	Pages concernées
GX390RT2/T2/UT2	63Z5F00	1-10, 14-8

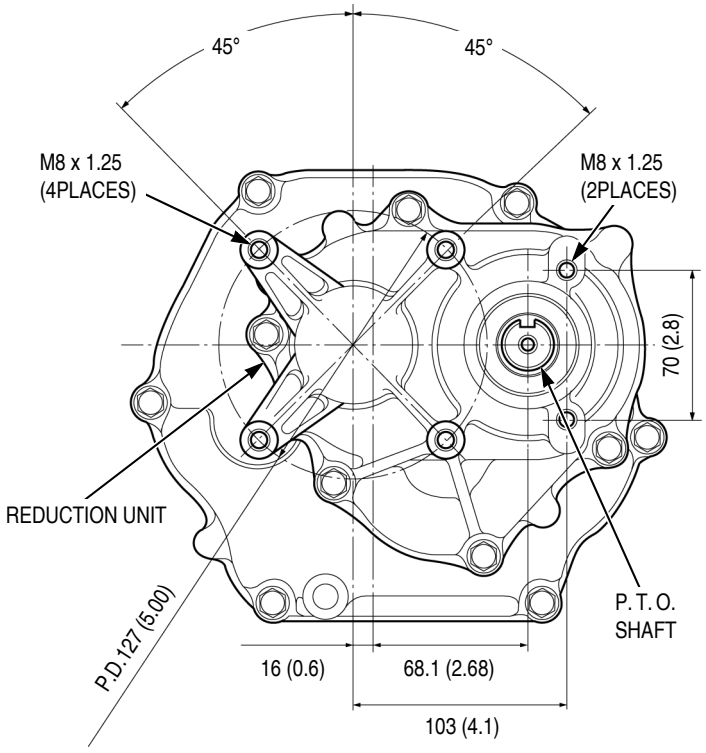
EMPLACEMENT DES MODIFICATIONS

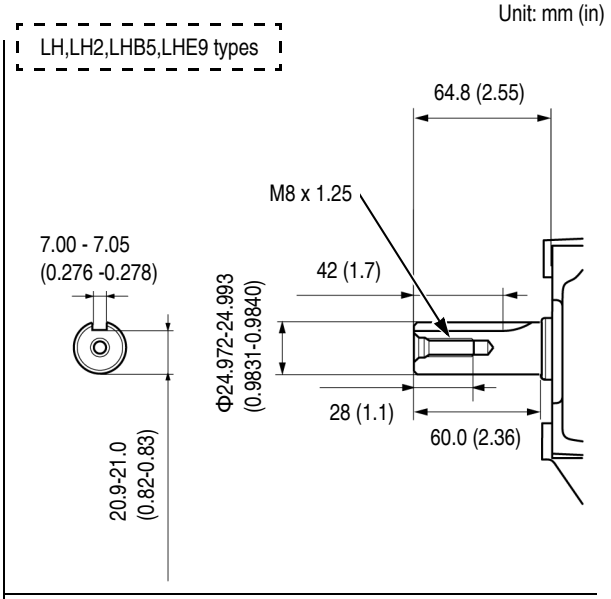
Les instructions modifiées sont indiquées entre [ ].

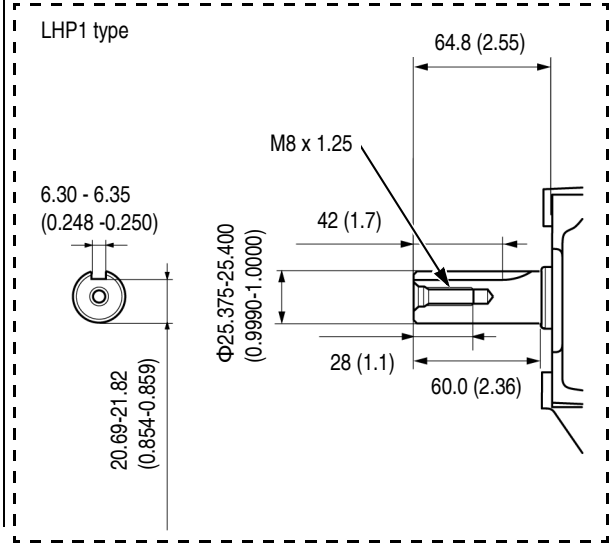
PTO DIMENSIONAL DRAWINGS

L TYPE (WITH REDUCTION)

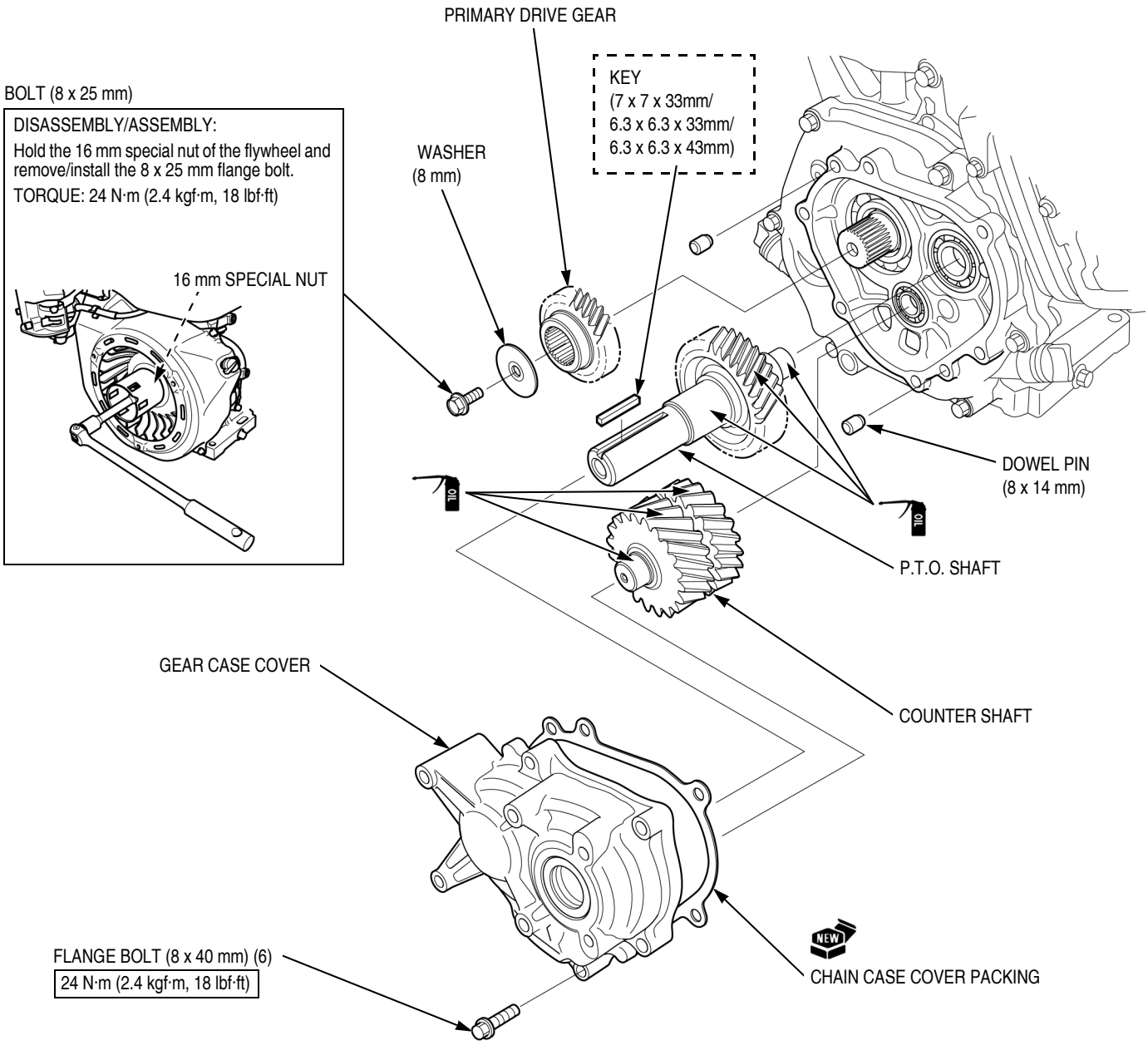
Unit: mm (in)







REDUCTION UNIT
DISASSEMBLY/ASSEMBLY



HONDA

Technische Mitteilung

MOTOR

Motorgetriebene Gerä

Mitteilungsnr.	Ausgabedatum
P/P-431	Juli 2016

ÜBERSICHT ÜBER DIE MODIFIKATIONEN

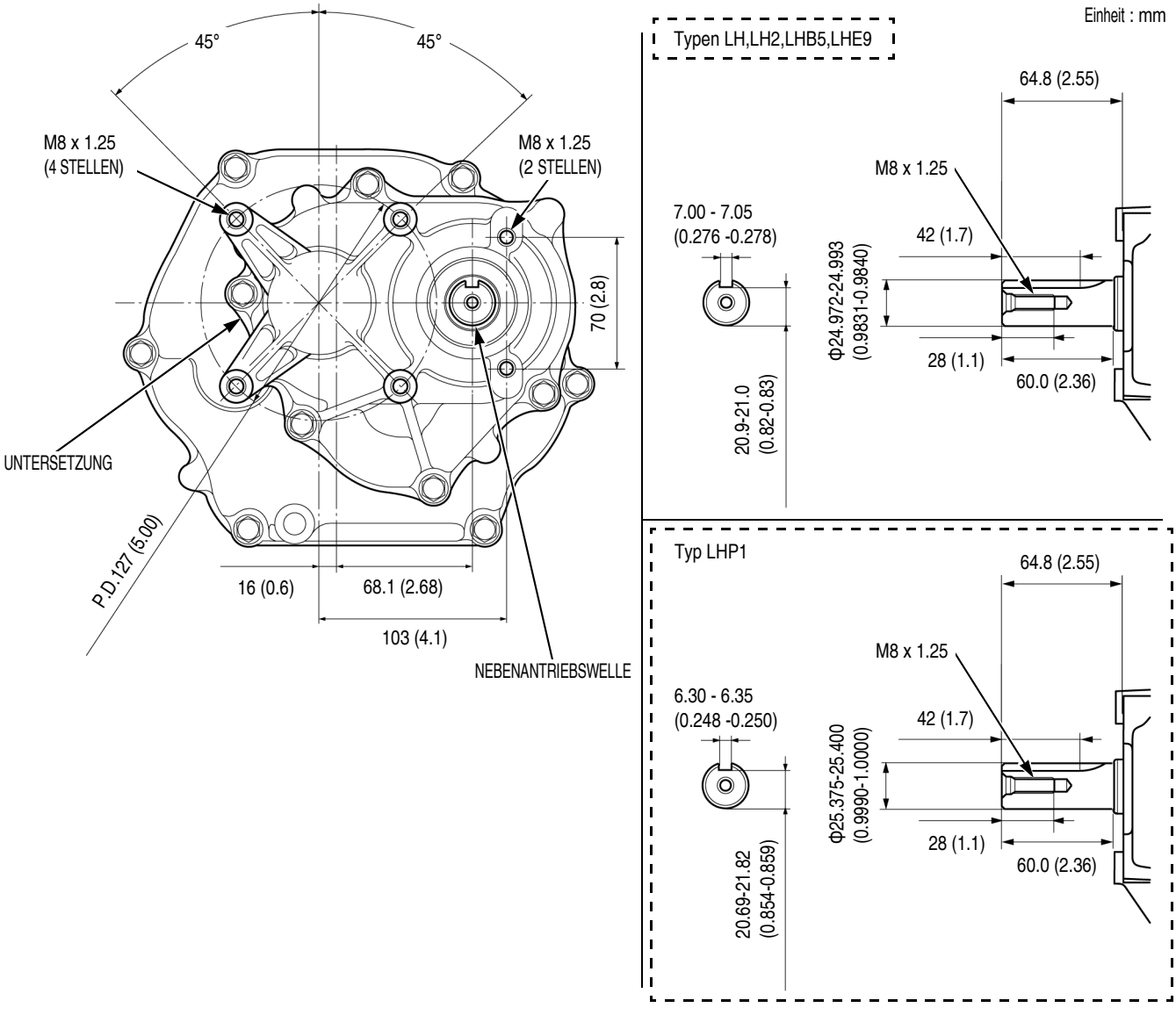
Zutreffende Information	Veröffentlichungsnr.	Bezugsseite
GX390RT2/T2/UT2	64Z5F00	1-10, 14-8

ÄNDERUNGSSTELLE

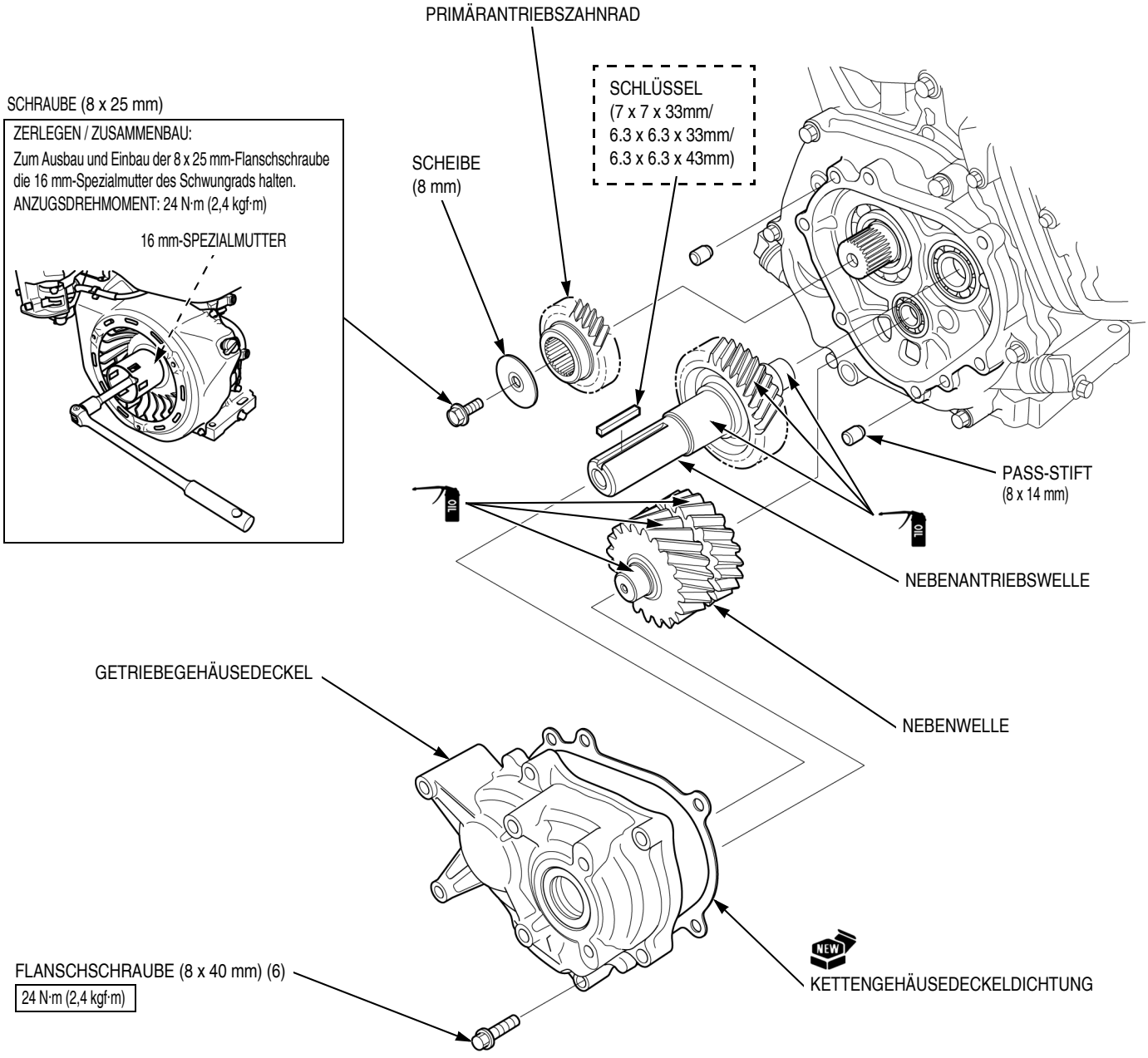
Die von der Modifikation betroffenen Teile sind mit [ ] gekennzeichnet.

MASSZEICHNUNGEN NEBENANTRIEB

AUSFÜHRUNG L (MIT UNTERSETZUNG)



UNTERSETZUNG ZERLEGEN / ZUSAMMENBAU



HONDA

Novedades del manual de taller

MOTOR

Equipo motorizado

N.° de documento	Fecha de edición
P/P-431	Julio 2016

CAMBIO DE ALGUNAS PARTES

Información aplicable	N.° de publicación	Página aplicable
GX390RT2/T2/UT2	65Z5F00	1-10, 14-8

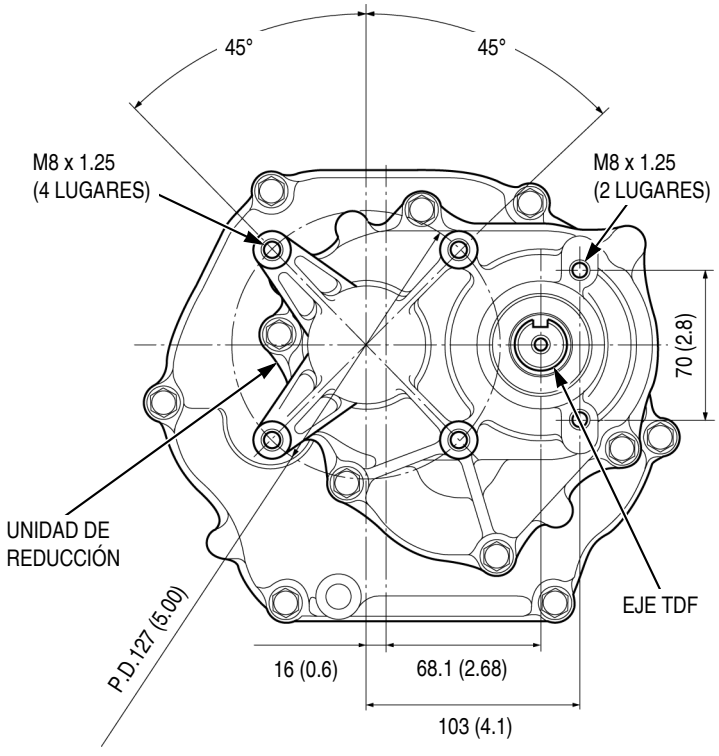
UBICACIÓN DE LOS CAMBIOS

Las instrucciones que han cambiado se muestran dentro de [ ].

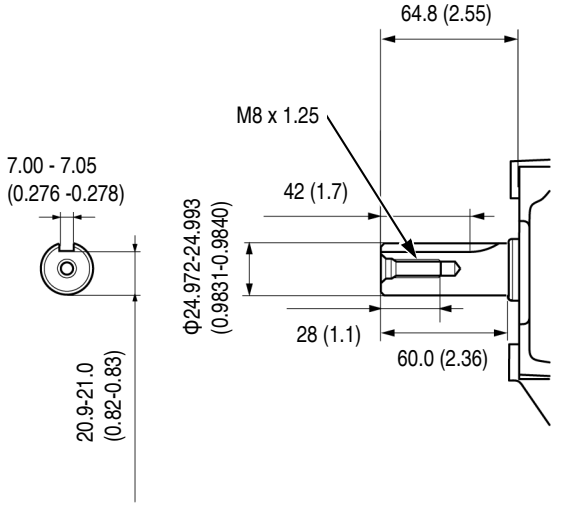
PLANOS DIMENSIONALES DE LA TDF

TIPO L (CON REDUCCION)

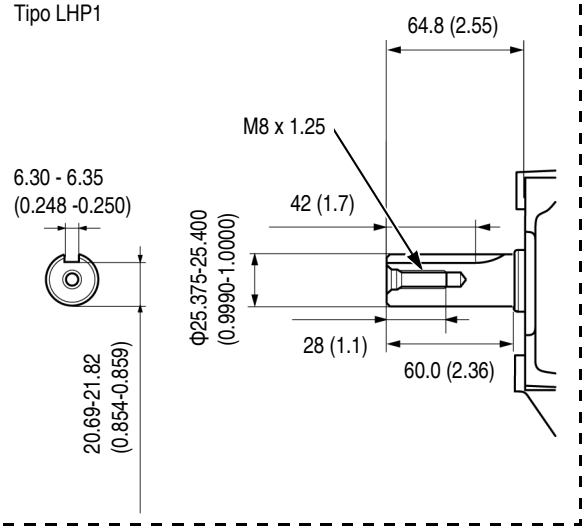
Unidad : mm



[Tipos LH,LH2,LHB5,LHE9]



[Tipo LHP1



]

DESENSAMBLAJE/MONTAJE DE LA UNIDAD DE REDUCCIÓN