

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 or others. It could also damage the engine or create an unsafe condition.

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

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

For Your Customer's Safety

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

For Your Safety

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

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

Important Safety Precautions

- Make sure you have a clear understanding of all basic shop safety practices and that you are wearing appropriate clothing and using safety equipment. When performing any service task, be especially careful of the following:
 - Read all of the instructions before you begin, and make sure you have the tools, the replacement or repair parts, and the skills required to perform the tasks safely and completely.
 - Protect your eyes by using proper safety glasses, goggles, or face shields any time you hammer, drill, grind, or work around pressurized air or liquids, and springs or other stored-energy components. If there is any doubt, put on eye protection.
 - Use other protective wear when necessary, for example, gloves or safety shoes. Handling hot or sharp parts can cause severe burns or cuts. Before you grab something that looks like it can hurt you, stop and put on gloves.
- Make sure the engine is off before you begin any servicing procedures, unless the instructions tell you to do otherwise. This will help eliminate several potential hazards:
 - Carbon monoxide poisoning from engine exhaust. Be sure there is adequate ventilation whenever you run the engine.
 - Burns from hot parts. Let the engine and exhaust system cool before working in those areas.
 - Injury from moving parts. If the instruction tells you to run the engine, be sure your hands, fingers, and clothing are out of the way.
- Gasoline vapors are explosive. To reduce the possibility of a fire or explosion, be careful when working around gasoline.
 - Use only a nonflammable solvent, not gasoline, to clean parts.
 - Never drain or store gasoline in an open container.
 - Keep all cigarettes, sparks, and flames away from all fuel-related parts.

WARNING

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

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

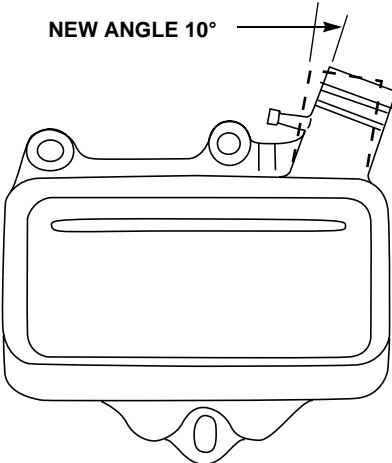
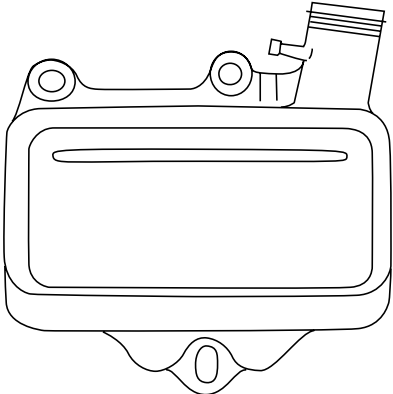
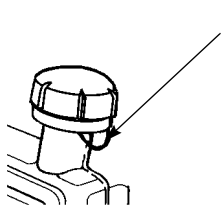
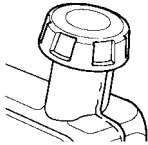
WARNING

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

Follow the procedures and precautions in this manual carefully.

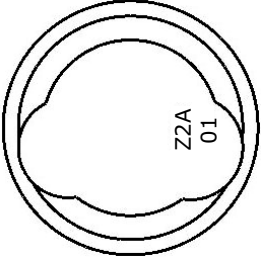
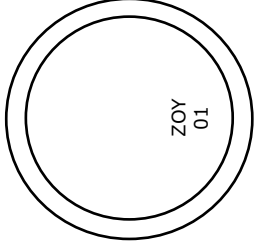
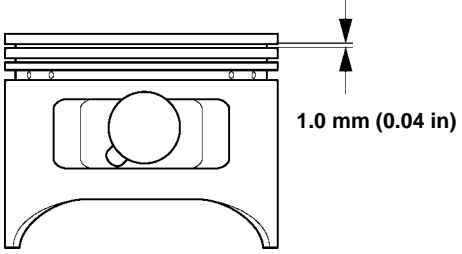
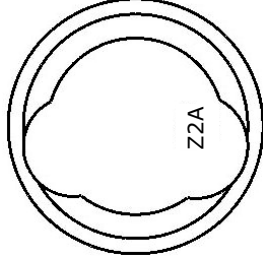
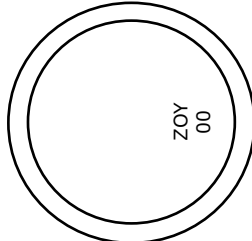
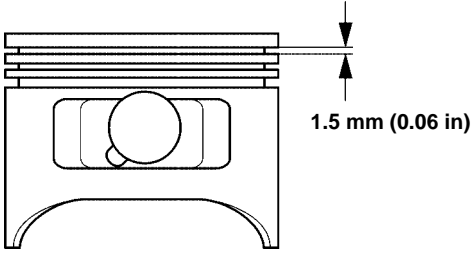
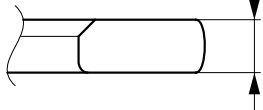
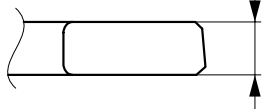
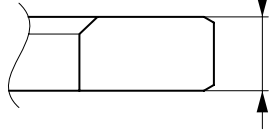
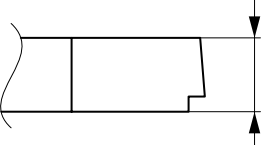
GC160 GC190 • GS190

OUTLINE OF CHANGES

Item	Model GC160LA • GC190LA • GS190LA 2007 emission components	GC160 • GC190 • GS190
<p>FUEL TANK</p> <ul style="list-style-type: none"> Redesigned fuel filler neck 	<p>NEW ANGLE 10°</p> 	
<p>FUEL TANK CAP</p> <ul style="list-style-type: none"> Fuel cap has a charcoal filter, tether, and ratchet mechanism 	<p>TETHER</p> 	

GC160

GC190 • GS190

Item \ Model	GC160LA • GC190LA • GS190LA 2007 emission components	GC160 • GC190 • GS190
PISTON <ul style="list-style-type: none"> • Changed identification markings • Ring landings changed to accept thinner top and second rings 	<p>GC160LA</p>  <p>GC/GS190LA</p>  <p>TOP RING:</p>  <p>1.0 mm (0.04 in)</p>	<p>GC160</p>  <p>GC/GS190</p>  <p>TOP RING:</p>  <p>1.5 mm (0.06 in)</p>
PISTON RINGS <ul style="list-style-type: none"> • Thickness changed • Material changed from cast iron to steel 	<p>TOP RING:</p> <p>GC160LA: 0.93 - 0.95 mm (0.036 - 0.037 in)</p> <p>GC/GS190LA: 0.95 - 0.97 mm (0.037 - 0.038 in)</p>  <p>SECOND RING:</p> <p>0.97 - 0.99 mm (0.038 - 0.039 in)</p> 	<p>TOP RING:</p> <p>1.50 mm (0.06 in)</p>  <p>SECOND RING:</p> <p>1.50 mm (0.06 in)</p> 

GC160

GC190 • GS190

1. SPECIFICATIONS

1. SPECIFICATIONS..... 1-1 2. PERFORMANCE CURVES.....1-2

1. SPECIFICATIONS

Model	GC160LA	GC190LA	GS190LA
Type	4-stroke, overhead camshaft single cylinder		
Displacement	160 cc (9.8 cu-in)	187 cc (11.4 cu-in)	
Bore x stroke	64 x 50 mm (2.5 x 2.0 in)	69 x 50 mm (2.71 x 1.97 in)	
Net power * (in accordance with SAE J1349)	3.4 kW (4.6 hp) at 3,600 rpm	3.9 kW (5.2 hp) at 3,600 rpm	
Max. net torque * (in accordance with SAE J1349)	9.4 N•m (6.9 lbf•ft) at 2,500 rpm	11.2 N•m (8.3 lbf•ft) at 2,500 rpm	
Compression ratio	8.5 : 1		
Fuel consumption	1.5 ℓ/hr at 3,600 rpm	1.6 ℓ/hr at 3,600 rpm	
Cooling system	Forced-air		
Ignition system	Transistorized magneto ignition		
Ignition timing	20° B.T.D.C.		
Spark plug (NGK)	BPR6ES (NGK brand)		
Carburetor	Horizontal type, butterfly valve		
Governor	Centrifugal mechanical governor		
Lubrication system	Splash		
Oil capacity	0.58 ℓ (0.61 US qt)	0.55 ℓ (0.58 US qt)	
Recommended operating ambient temperature	-15 ~ 40°C (5 ~ 104°F)		-5 ~ 40°C (23 ~ 104°F)
Starting system	Recoil starter		
Stopping system	Ignition primary circuit ground		
Fuel used	Unleaded gasoline with a pump octane rating of 86 or higher		
Fuel tank capacity	1.8 ℓ (1.9 US qt)		
PTO shaft rotation	Counterclockwise (from PTO shaft side)		

* 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.

DIMENSIONS AND WEIGHTS

GC160:

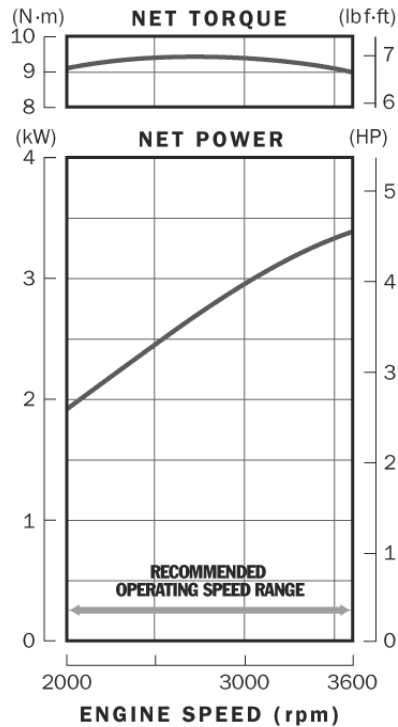
Item	PTO type	Q	V	P
Overall length		337 mm (13.3 in)	347 mm (13.6 in)	337 mm (13.3 in)
Overall width		369 mm (14.5 in)		
Overall height		331 mm (13.0 in)		
Dry weight		11.5 kg (25.4 lbs)		
Operating weight		13.5 kg (29.8 lbs)		

GC160

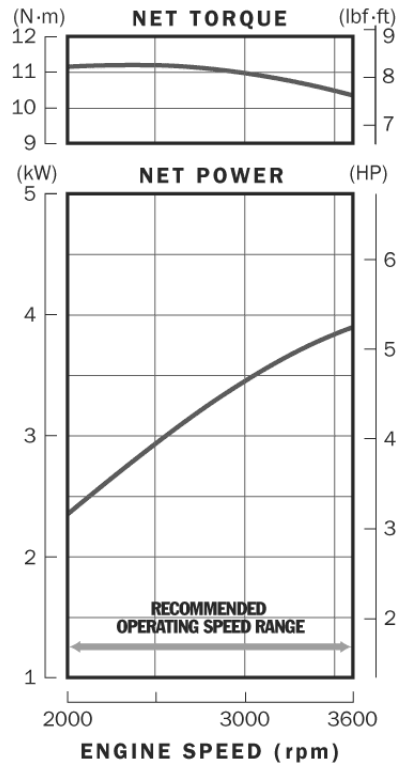
GC190 • GS190

2. PERFORMANCE CURVES

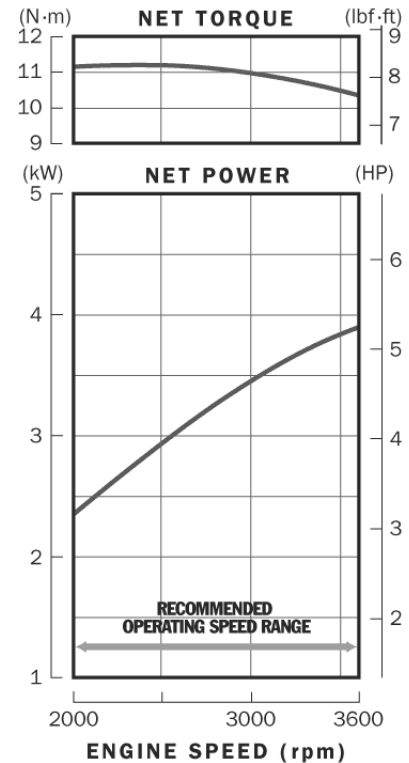
GC160LA



GC190LA



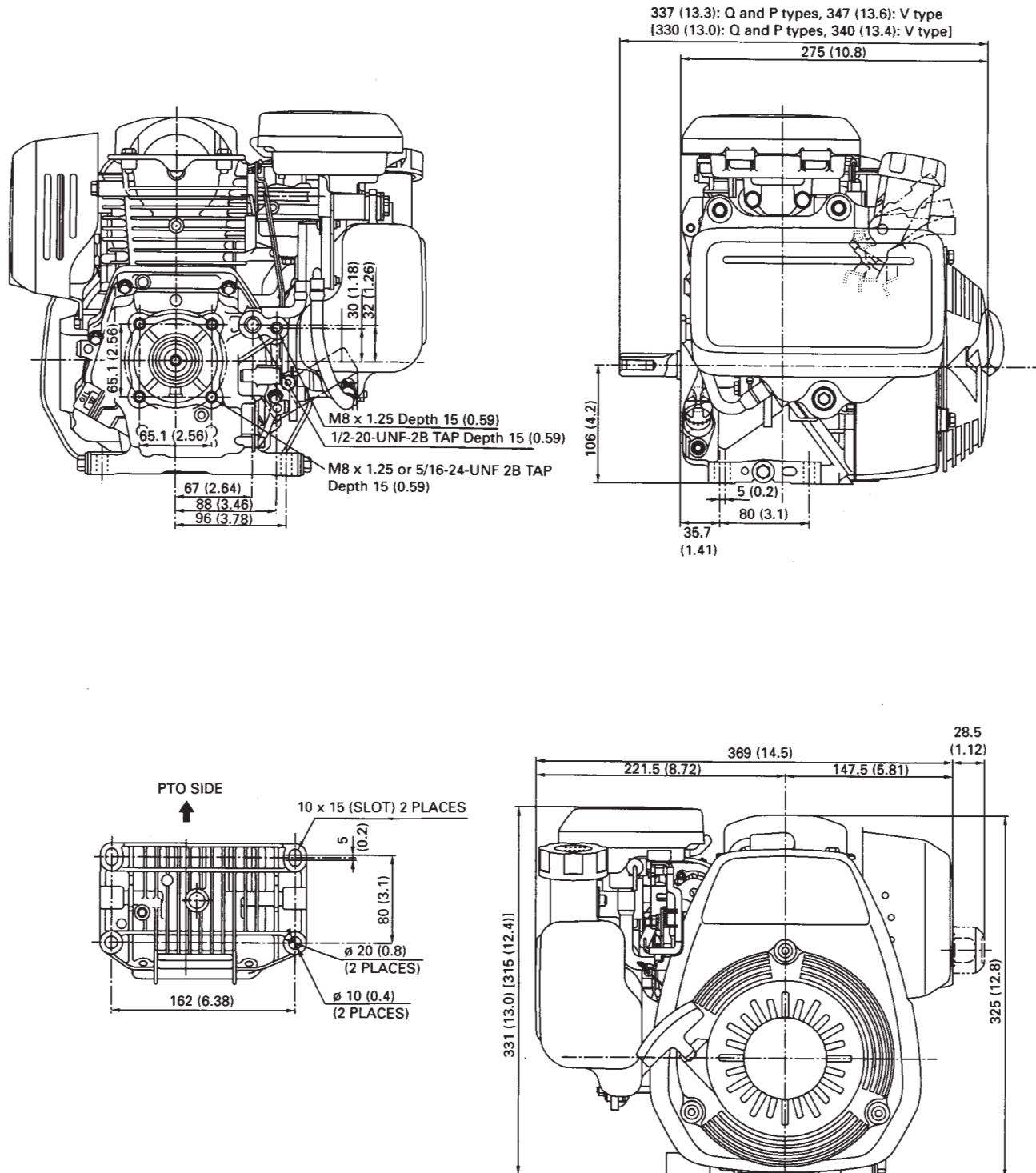
GS190LA



4. DIMENSIONAL DRAWINGS

[] : GC135

unit: mm (in)



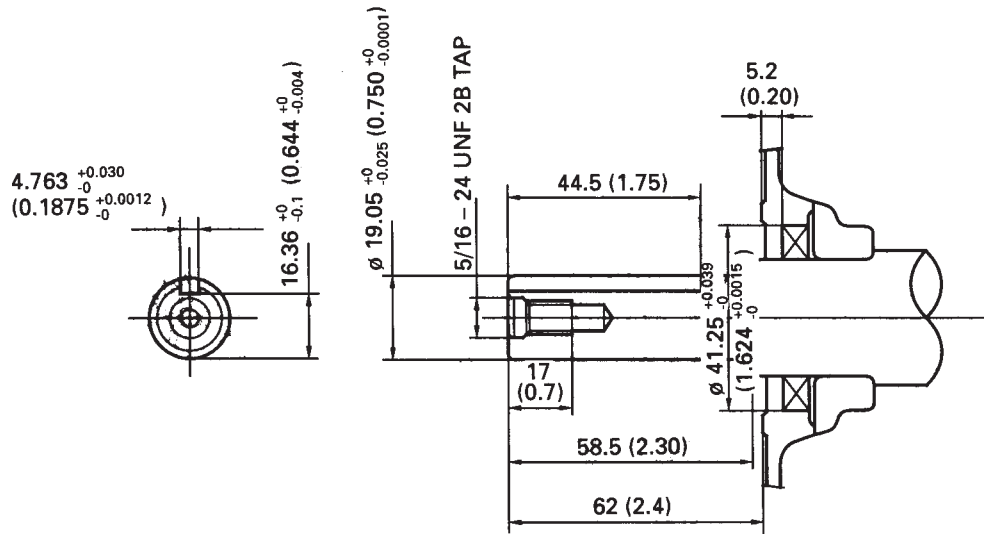
HONDA

GC135 • GC180

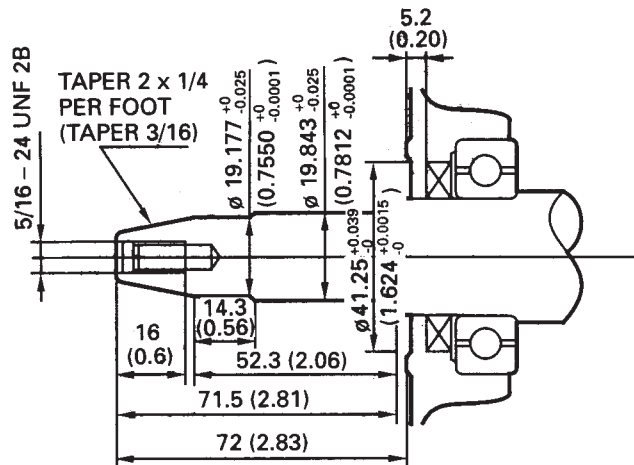
5. PTO DIMENSIONAL DRAWINGS

Unit: mm (in)

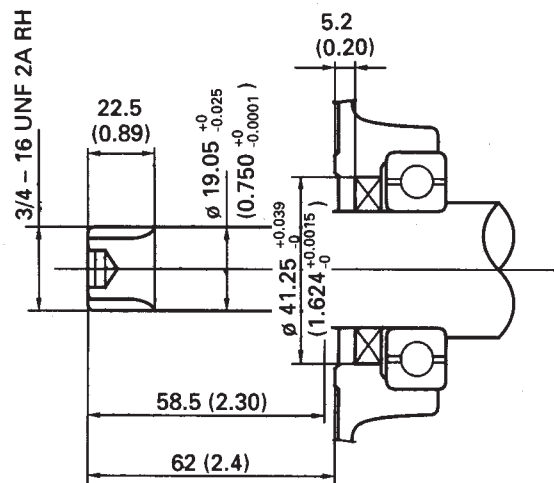
- Q type



- V type



- P type

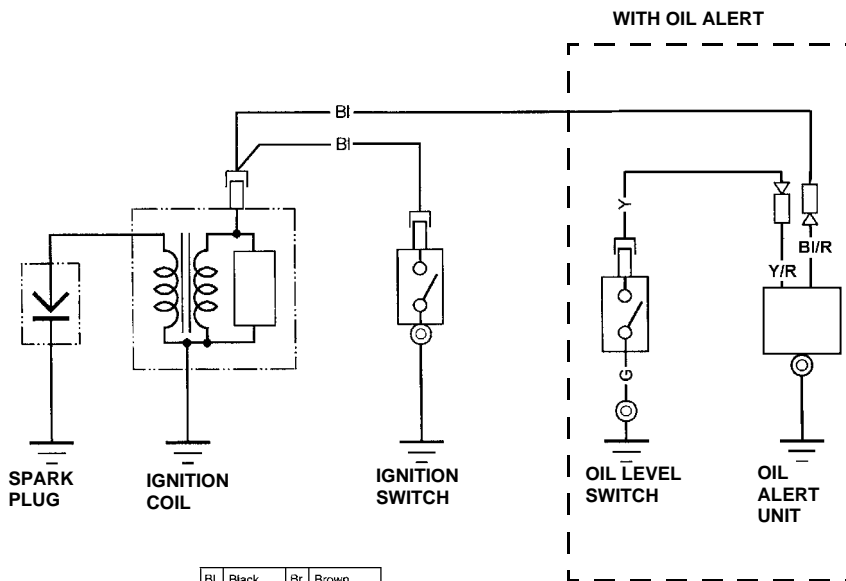


GC160 • GC190 • GS190

1. SPECIFICATIONS

1. WIRING DIAGRAM 1-1	2. WIRE ROUTING 1-2
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1. 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

ENGINE	SWITCH POSITION
RUN	OPEN
STOP	CLOSED

OIL LEVEL	SWITCH POSITION	ENGINE
NORMAL	OPEN	RUN
LOW LEVEL	CLOSED	STOP

THE IMPORTANCE OF PROPER SERVICING

Proper servicing is essential to the safety of the operator and the reliability of the engine. Any error or oversight made by the technician while servicing can easily result in faulty operation, damage to the engine or injury to the operator.

WARNING

Improper servicing can cause an unsafe condition that can lead to serious injury or death. Follow the procedures and precautions in this shop manual carefully.

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

WARNING

Failure to follow maintenance instructions and precautions can cause you to be seriously hurt or killed. Follow the procedures and precautions in this shop manual carefully.

IMPORTANT SAFETY PRECAUTIONS

Be sure you have a clear understanding of all basic shop safety practices and that you are wearing appropriate clothing and safety equipment. When performing maintenance or repairs, be especially careful of the following:

- **Read the instructions before you begin, and be sure you have the tools and skills required to perform the tasks safely.**

Be sure the engine is off before you begin any maintenance or repairs. This will reduce the possibility of several hazards:

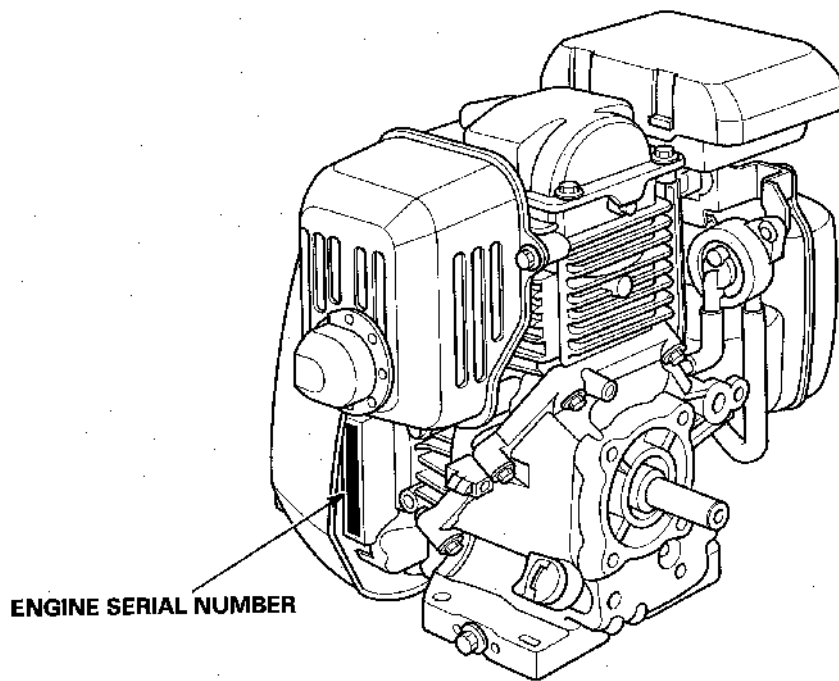
- **Carbon monoxide poisoning from engine exhaust.**
Be sure there is adequate ventilation whenever you run the engine.
- **Burns from hot parts.**
Let the engine cool before you touch it.

- **Injury from moving parts.**
Do not run the engine unless the instruction tells you to do so. Even then, keep your hands, fingers, and clothing away.

To reduce the possibility of a fire or explosion, be careful when working around gasoline. Use only a nonflammable solvent, not gasoline, to clean parts. Keep all cigarettes, sparks, and flames away from all fuel-related parts.

SERIAL NUMBER LOCATION

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

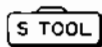


SERVICE RULES

1. Use genuine Honda or Honda-recommended parts and lubricants or their equivalents. Parts that do not meet Honda's design specifications may damage the engine.
2. Use the special tools designed for the product.
3. Install new gaskets, O-rings, etc. when reassembling.
4. 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.
5. Clean parts in cleaning solvent upon disassembly. Lubricate any sliding surfaces before reassembly.
6. After reassembly, check all parts for proper installation and operation.
7. 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.
8. Use only metric tools when servicing this engine. Metric bolts, nuts and screws are not interchangeable with nonmetric fasteners. The use of incorrect tools and fasteners will damage the engine.
9. Follow the instructions represented by these symbols when they are used:



:Apply grease



:Use special tool



:Apply oil

○ x ○ (○): Indicates the diameter, length, and number of the flange bolt used.

MAINTENANCE STANDARDS

Part	Item	Standard	Service limit
Engine	Maximum speed	3,850 ± 150 rpm	—
	Idle speed	1,400 ± 150 rpm	—
	Cylinder compression	0.49 MPa (5.0 kgf/cm ² , 71 psi) at 600 rpm	—
Carburetor	Main jet	GC160: #65	—
	Float height	9.2 mm (0.36 in)	—
	Pilot screw opening	GC160: 1-3/4 turns out	—

MAINTENANCE STANDARDS

Part	Item	Standard	Service limit
Spark plug	Gap	0.7 – 0.8 mm (0.028 – 0.031 in)	—
Ignition coil	Resistance	Primary coil	1.0 – 1.2 Ω
		Secondary coil	10.6 – 12.8 k Ω
	Air gap	(at flywheel)	0.2 – 0.6 mm (0.008 – 0.024 in)

MAINTENANCE STANDARDS

Part	Item		Standard	Service limit
Valves	Valve clearance (cold)	IN	0.15 ± 0.04 mm	—
		EX	0.20 ± 0.04 mm	—
	Stem O. D.	IN	5.48 mm (0.216 in)	5.318 mm (0.2094 in)
		EX	5.44 mm (0.214 in)	5.275 mm (0.2077 in)
	Guide I. D.	IN/EX	5.50 mm (0.217 in)	5.572 mm (0.2194 in)
	Seat width	IN/EX	0.7 mm (0.028 in)	1.8 mm (0.07 in)
	Spring free length	IN/EX	34.0 mm (1.34 in)	32.5 mm (1.28 in)
	Valve head diameter	IN	25 mm (0.98 in)	
EX		24 mm (0.94 in)		

MAINTENANCE STANDARDS

Part	Item	Standard	Service limit
Connecting rod	Small end I. D.	13.005 mm (0.5120 in)	13.07 mm (0.515 in)
	Big end I. D.	26.02 mm (1.024 in)	26.066 mm (1.0262 in)
	Big end oil clearance	0.040 – 0.063 mm (0.0016 – 0.0025 in)	0.12 mm (0.005 in)
	Big end axial clearance	0.1 – 0.4 mm (0.004 – 0.016 in)	0.8 mm (0.031 in)
Crankshaft	Main journal O. D. PTO side	27.993 mm (1.1021 in)	27.933 mm (1.0997 in)
	Flywheel side	25.393 mm (0.9997 in)	25.333 mm (0.9974 in)
	Crank pin O. D.	25.98 mm (1.023 in)	25.92 mm (1.020 in)
	Axial clearance	0.15–0.75 mm (0.006–0.030 in)	1.0 mm (0.04 in)
Crankcase cover	Main journal I. D.	28.020 mm (1.1031 in)	28.066 mm (1.1050 in)
Cam pulley	Cam height	37.394 mm (1.4722 in)	37.369 mm (1.4712 in)
	Cam pulley I. D. (Bearing)	10.027 mm (0.3948 in)	10.075 mm (0.3967 in)
	Cam pulley shaft O. D.	9.987 mm (0.3932 in)	9.920 mm (0.3906 in)
Rocker arm	Rocker arm I. D.	6.000 mm (0.2362 in)	6.043 mm (0.2379 in)
	Rocker arm shaft O. D.	5.990 mm (0.2358 in)	5.953 mm (0.2344 in)
	Rocker arm shaft bearing I. D.	6.000 mm (0.2362 in)	6.043 mm (0.2379 in)
	Rocker arm shaft bearing-to-rocker arm shaft clearance	0.010–0.058 mm (0.0004–0.0023 in)	0.07 mm (0.003 in)

MAINTENANCE STANDARDS

Part	Item	Standard	Service limit
Cylinder	Sleeve I. D.	64.0 mm (2.52 in)	64.165 mm (2.5262 in)
Piston	Skirt O. D.	63.969 mm (2.5185 in)	63.829 mm (2.5129 in)
	Piston-to-cylinder clearance	0.031 – 0.070 mm (0.0012 – 0.0028 in)	0.12 mm (0.005 in)
	Piston pin bore I. D.	13.002 mm (0.5119 in)	13.048 mm (0.5137 in)
	Pin O. D.	13.000 mm (0.5118 in)	12.954 mm (0.5100 in)
Piston ring	Ring width	1.5 mm (0.06 in)	1.37 mm (0.054 in)
	Oil	2.5 mm (0.10 in)	2.37 mm (0.093 in)
	Ring side clearance	0.015 – 0.045 mm (0.0006 – 0.0018 in)	0.15 mm (0.006 in)
	Ring end gap	0.20 – 0.35 mm (0.008 – 0.014 in)	1.0 mm (0.04 in)
	Top	0.30 – 0.45 mm (0.012 – 0.018 in)	1.0 mm (0.04 in)
	Second	0.15 – 0.35 mm (0.006 – 0.014 in)	1.0 mm (0.04 in)
	Oil		
Cylinder barrel	Main journal I. D.	25.420 mm (1.0008 in)	25.466 mm (1.0026 in)
	Crankshaft axial clearance	0.15 – 0.75 mm (0.006 – 0.030 in)	1.0 mm (0.04 in)

• PISTON RING WIDTH

	Standard	Service limit
Top ring (GC160LA)	0.93 ~ 0.95 mm (0.036 ~ 0.037 in)	0.91 mm (0.035 in)
Top ring (GC/GS190LA)	0.95 ~ 0.97 mm (0.037 ~ 0.038 in)	0.93 mm (0.036 in)
Second ring	0.97 ~ 0.99 mm (0.038 ~ 0.039 in)	0.95 mm (0.037 in)

• PISTON RING SIDE CLEARANCE

	Standard	Service limit
Top ring (GC160LA)	0.055 ~ 0.089 mm (0.002 ~ 0.004 in)	0.150 mm (0.006 in)
Top ring (GC/GS190LA)	0.035 ~ 0.069 mm (0.001 ~ 0.003 in)	0.150 mm (0.006 in)
Second ring	0.015 ~ 0.049 mm (0.0006 ~ 0.0019 in)	0.150 mm (0.006 in)

• PISTON RING END GAP

	Standard	Service limit
Top ring	0.20 ~ 0.35 mm (0.008 ~ 0.014 in)	1.00 mm (0.040 in)
Second ring	0.35 ~ 0.50 mm (0.014 ~ 0.020 in)	1.00 mm (0.040 in)
Oil ring	0.20 ~ 0.70 mm (0.008 ~ 0.030 in)	1.00 mm (0.040 in)

TORQUE VALUES

Item	Thread Dia. (mm)	Torque		
		N•m	kgf•m	lbf•ft
Crankcase cover	M6 x 1.0 (CT)	12	1.2	9
Connecting rod bolt	M7 x 1.0	12	1.2	9
Valve adjusting lock nut	M5 x 0.5	8	0.8	5.8
Cylinder head cover bolt	M6 x 1.0	12	1.2	9
Oil drain plug bolt	M12 x 1.5	24	2.4	17
Flywheel nut	M14 x 1.5	52	5.3	38
Governor arm nut	M6 x 1.0	10	1.0	7
Breather cover bolt	M6 x 1.0	12	1.2	9
Air cleaner case bolt	M6 x 1.0 (CT)	10	1.0	7
Muffler bolt	M6 x 1.0 (CT)	12	1.2	9
Recoil starter nut	M6 x 1.0	8.5	0.85	6.1
Fan cover stud bolt	M6 x 1.0	12	1.2	9
Fuel tank stud bolt	M6 x 1.0	12	1.2	9
bolt, nut	M6 x 1.0	10	1.0	7
Fuel pump screw	M5 x 0.8	3	0.3	2.2
Oil level switch bolt (With oil level switch only)	M6 x 1.0	12	1.2	9
Oil filler extension bolt	M6 x 1.0 (CT)	12	1.2	9
Spark plug	M14 x 1.25	20	2.0	14

NOTE:

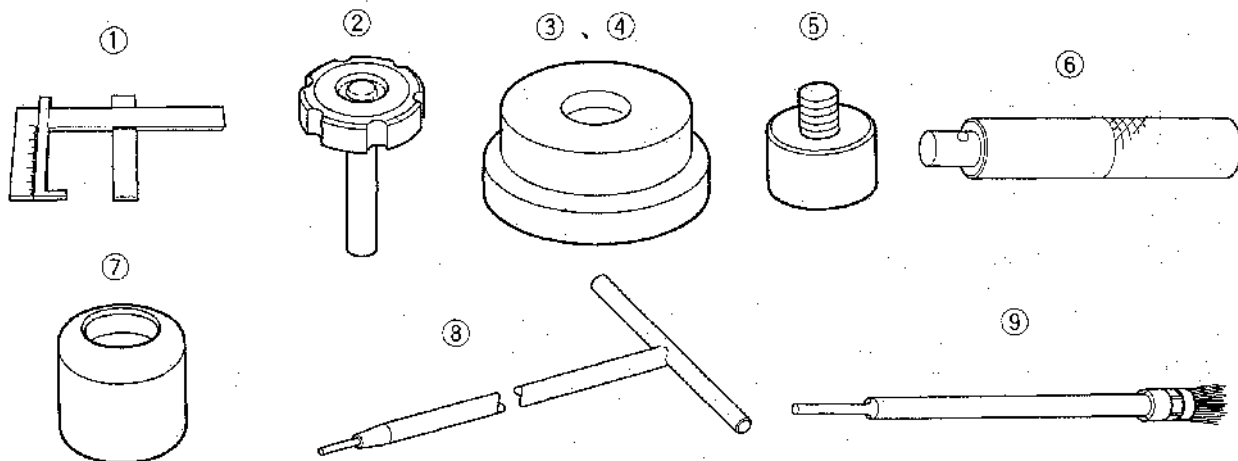
- Use standard torque values of fasteners that are not listed in this table.
- (CT) indicates a self-tapping bolt.

• STANDARD TORQUE VALUE

Item	Thread Dia. (mm)	Torque		
		N•m	kgf•m	lbf•ft
Screw	5 mm	4	0.4	2.9
	6 mm	9	0.9	6.5
Bolt and nut	5 mm	5	0.5	3.6
	6 mm	10	1.0	7
	8 mm	21	2.1	15
	10 mm	34	3.5	25
	12 mm	54	5.5	40
Flange bolt and nut	6 mm	12	1.2	9
	8 mm	26	2.7	20
	10 mm	39	4.0	29
SH bolt	6 mm	9	0.9	6.5

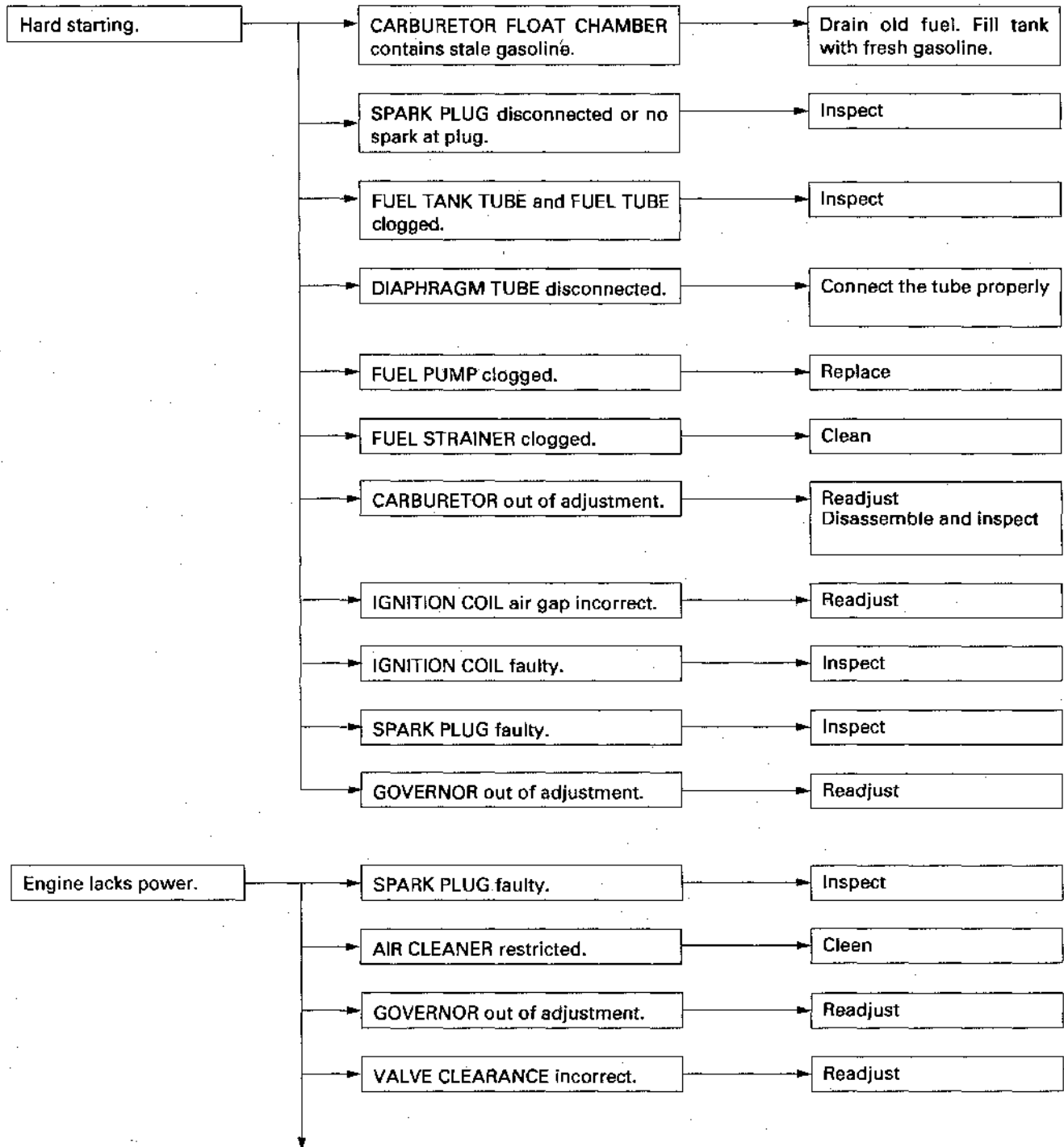
SPECIAL TOOLS

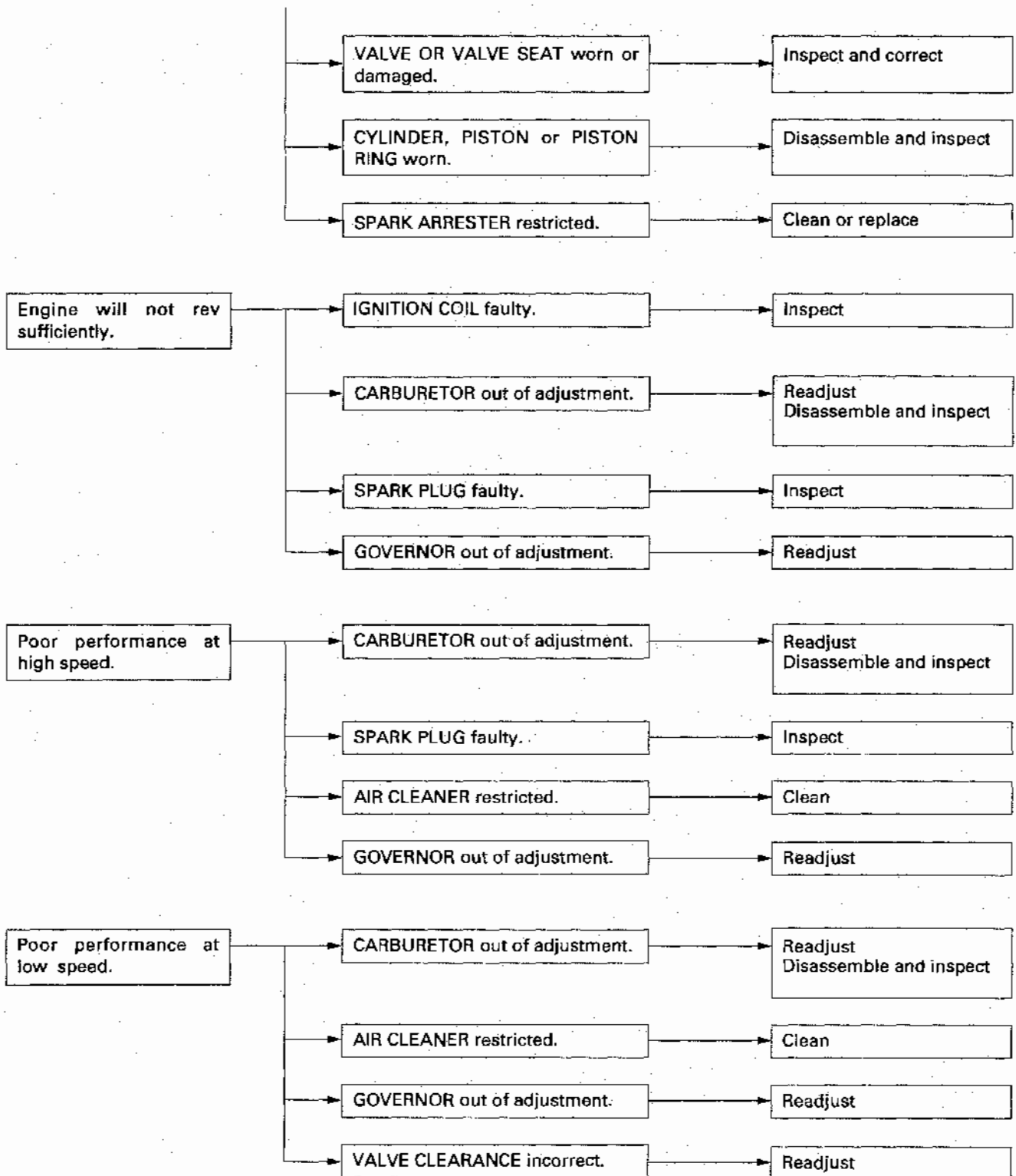
Tool name	Tool number	Application
1. Float level gauge	07701-0010000	Carburetor float level inspection
2. Valve adjusting wrench B	07708-0030400	Valve clearance adjustment
3. Attachment, 32 x 35 mm	07746-0010100	62/28 radial ball bearing removal (V and P types only)
4. Attachment, 52 x 55 mm	07746-0010400	62/28 radial ball bearing installation (V and P types only)
5. Pilot, 28 mm	07746-0041100	62/28 radial ball bearing removal/installation (V and P types only)
6. Driver	07749-0010000	Driver for tools 3, 4 and 5
7. Valve seat cutter, 45° \varnothing 27.2	07780-0010200	Valve seat reconditioning (IN/EX)
8. Cutter holder	07981-VA20100 or 07981-VA20101	Valve seat reconditioning
9. Cleaning brush	07998-VA20100	Combustion chamber cleaning



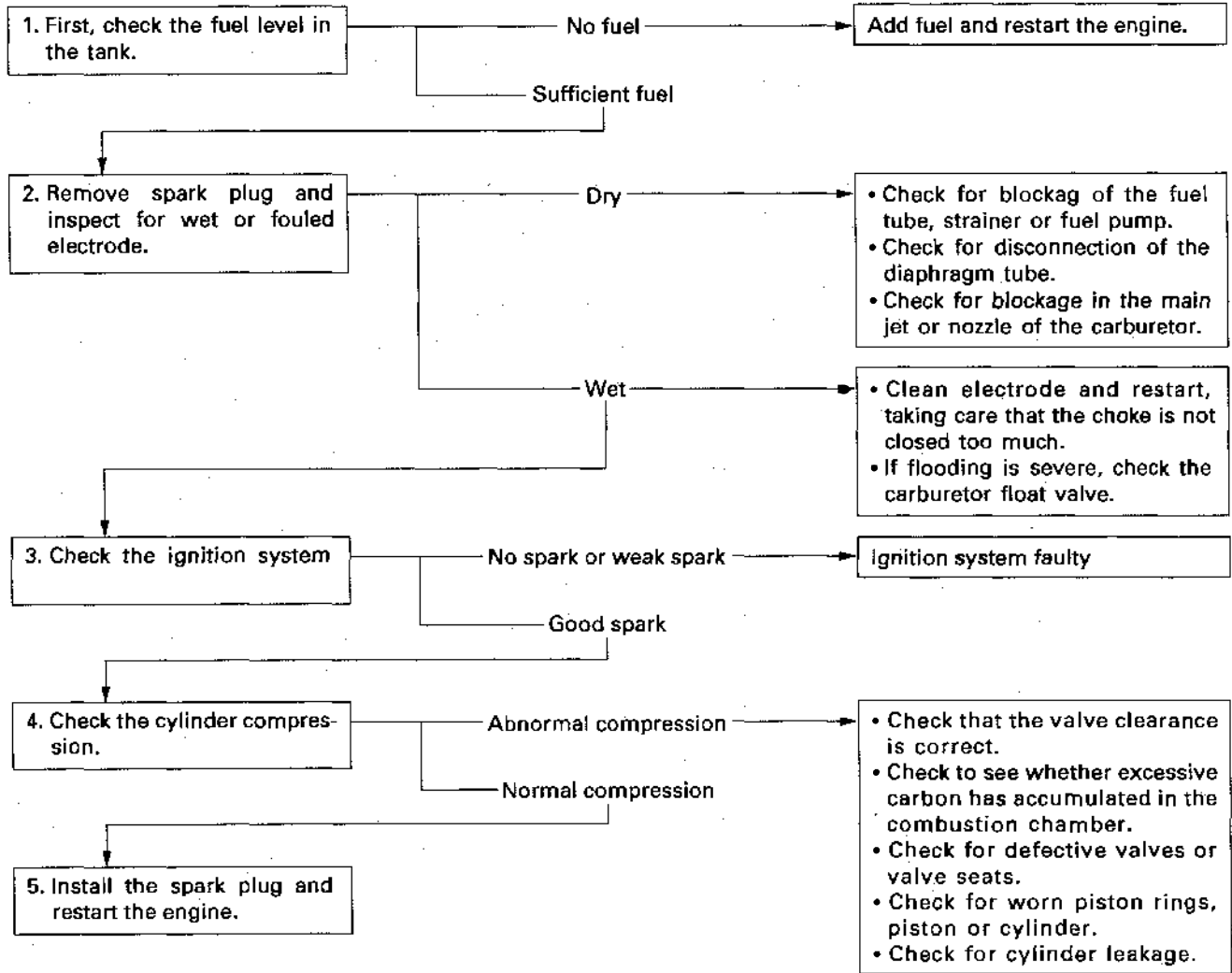
TROUBLESHOOTING

GENERAL SYMPTOMS AND POSSIBLE CAUSES





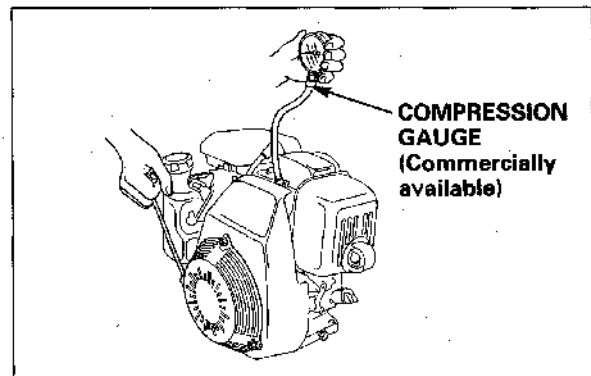
HARD STARTING



CYLINDER COMPRESSION CHECK

- 1) Remove the spark plug and install a compression gauge in the spark plug hole.
- 2) Pull the recoil starter several times with force and measure the cylinder compression.

Compression



GC160 • GC190 • GS190 2. SERVICE INFORMATION

1. TROUBLESHOOTING 2-1

1. TROUBLESHOOTING

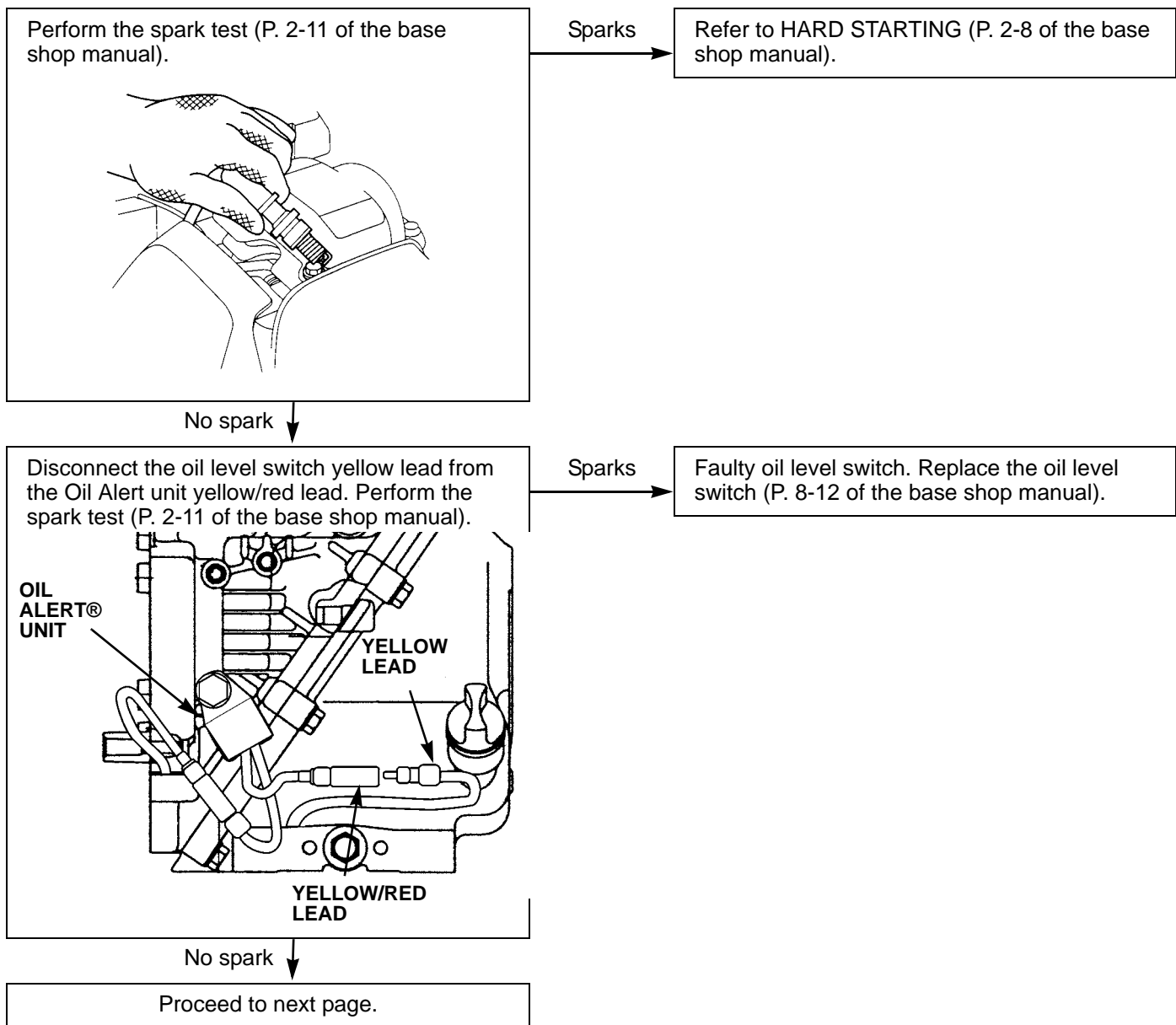
OIL ALERT® SYSTEM

NOTICE

Never start the engine when the oil has been drained.

Engine does not start with the engine switch ON.

Check the oil level before proceeding. Add the recommended engine oil if necessary.



GC160 • GC190 • GS190

Disconnect the Oil Alert unit black/red lead from the engine switch black lead. Perform the spark test (P. 2-11 of the base shop manual).

OIL ALERT UNIT
BLACK LEAD

OIL ALERT UNIT
BLACK/
RED LEAD

OIL ALERT UNIT

Sparks →

Oil Alert unit faulty. Replace the Oil Alert unit (P. 8-1).

No spark ↓

Disconnect the engine stop switch black lead from the ignition coil. Perform the spark test (P. 2-11 of the base shop manual).

ENGINE STOP SWITCH
BLACK LEAD

IGNITION COIL

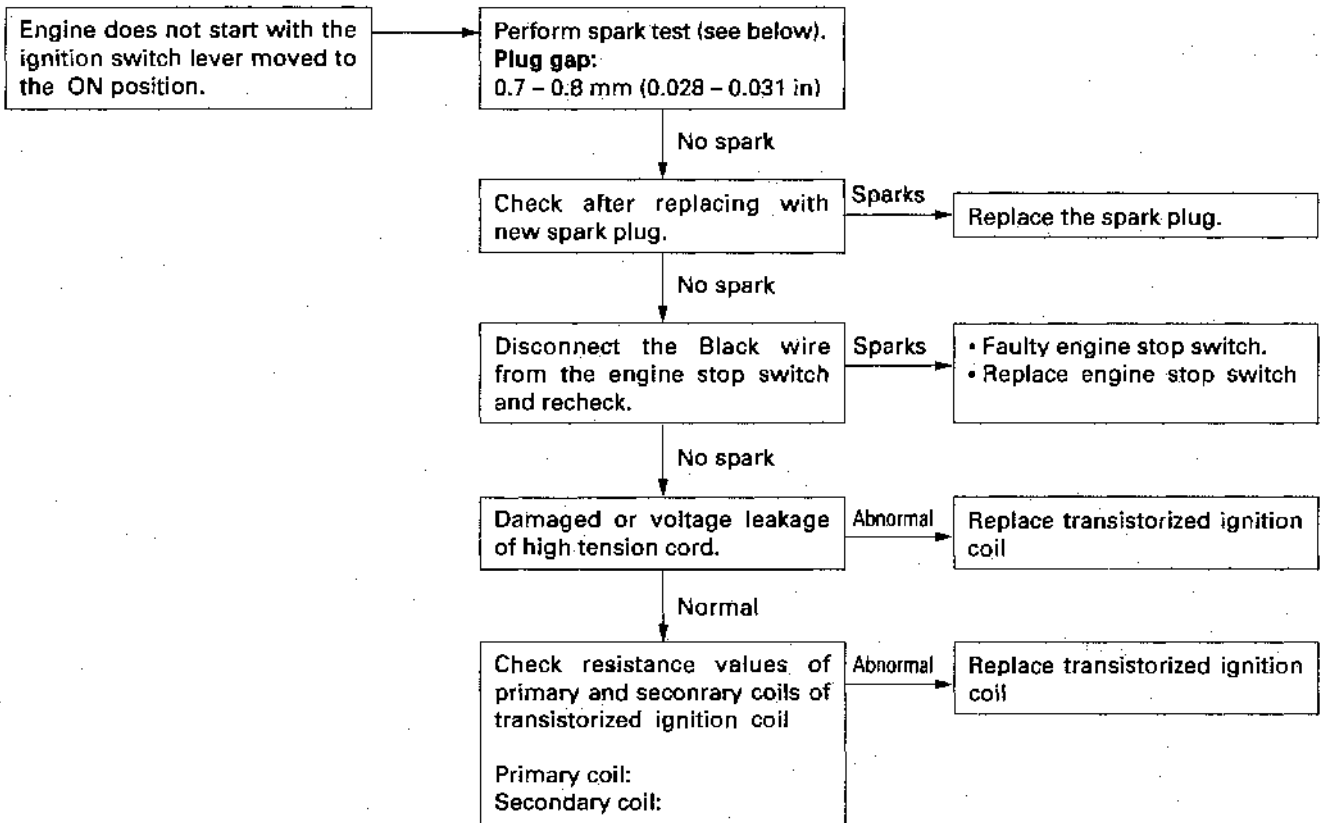
Sparks →

Faulty engine stop switch or stop switch lead. Replace the engine stop switch (P. 6-8 of the base shop manual) or stop switch lead (P. 7-1).

No spark ↓

See IGNITION SYSTEM troubleshooting (P. 2-11 of the base shop manual).

IGNITION SYSTEM



SPARK PLUG TEST

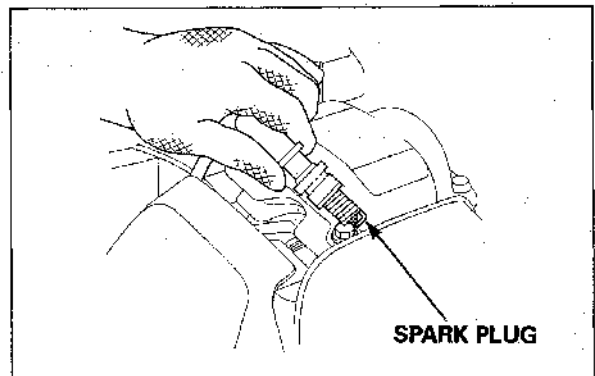
- 1) Remove the spark plug, attach it to the spark plug cap, and ground the side electrode against the cylinder head cover bolt.
- 2) Move the ignition switch lever to the ON position, pull the recoil starter and check to see if sparks jump across the electrodes.

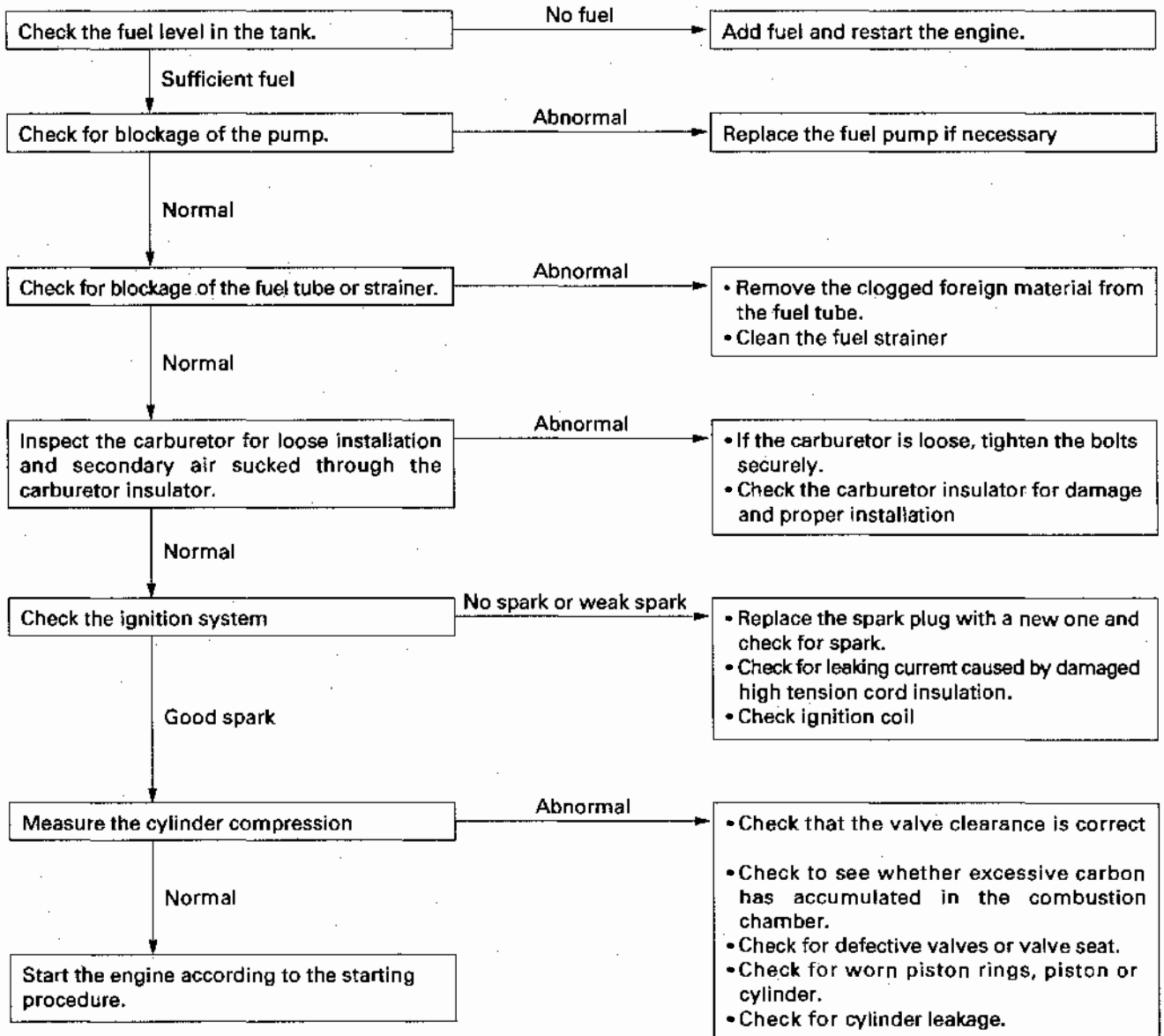
⚠ WARNING

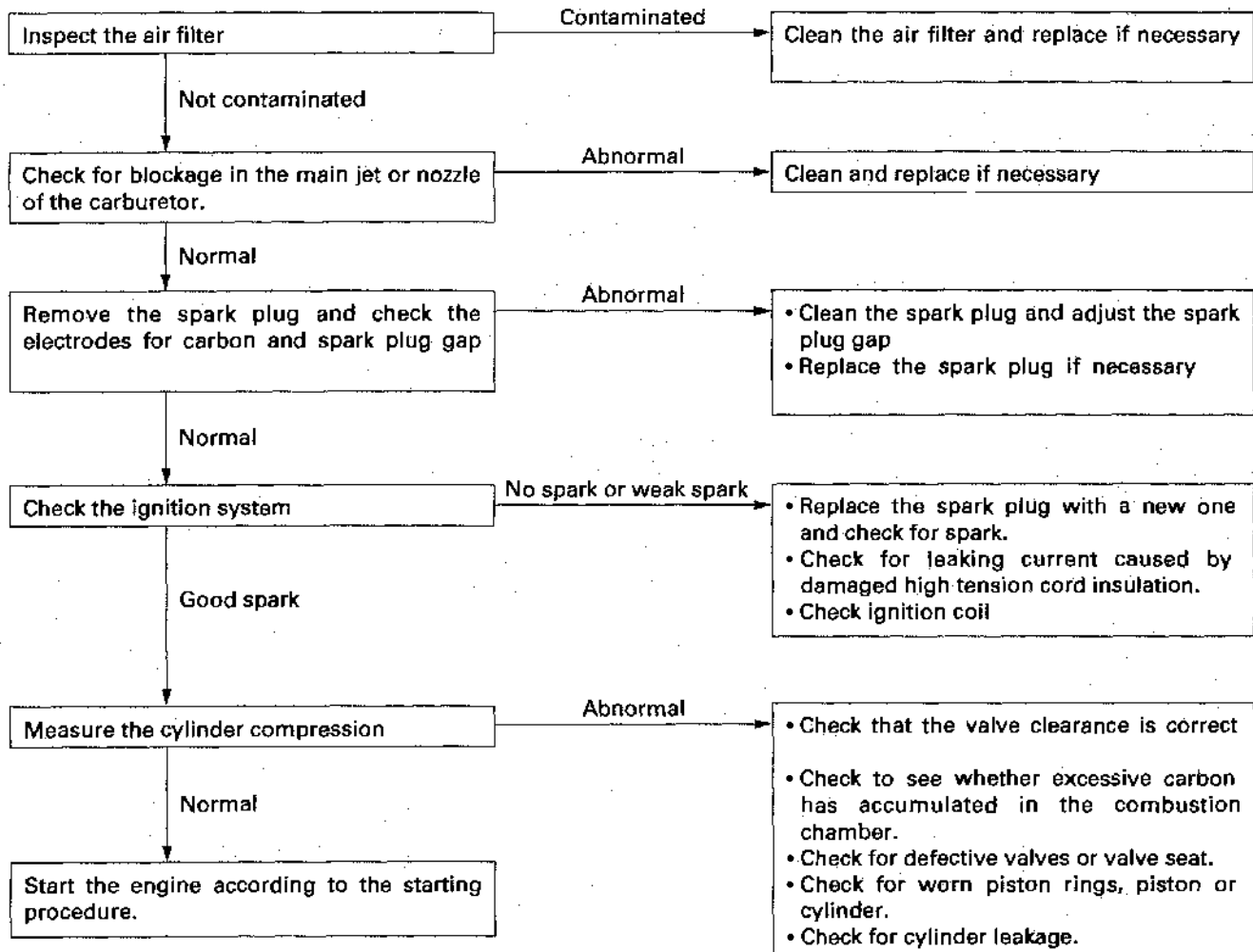
Gasoline is highly flammable and explosive.

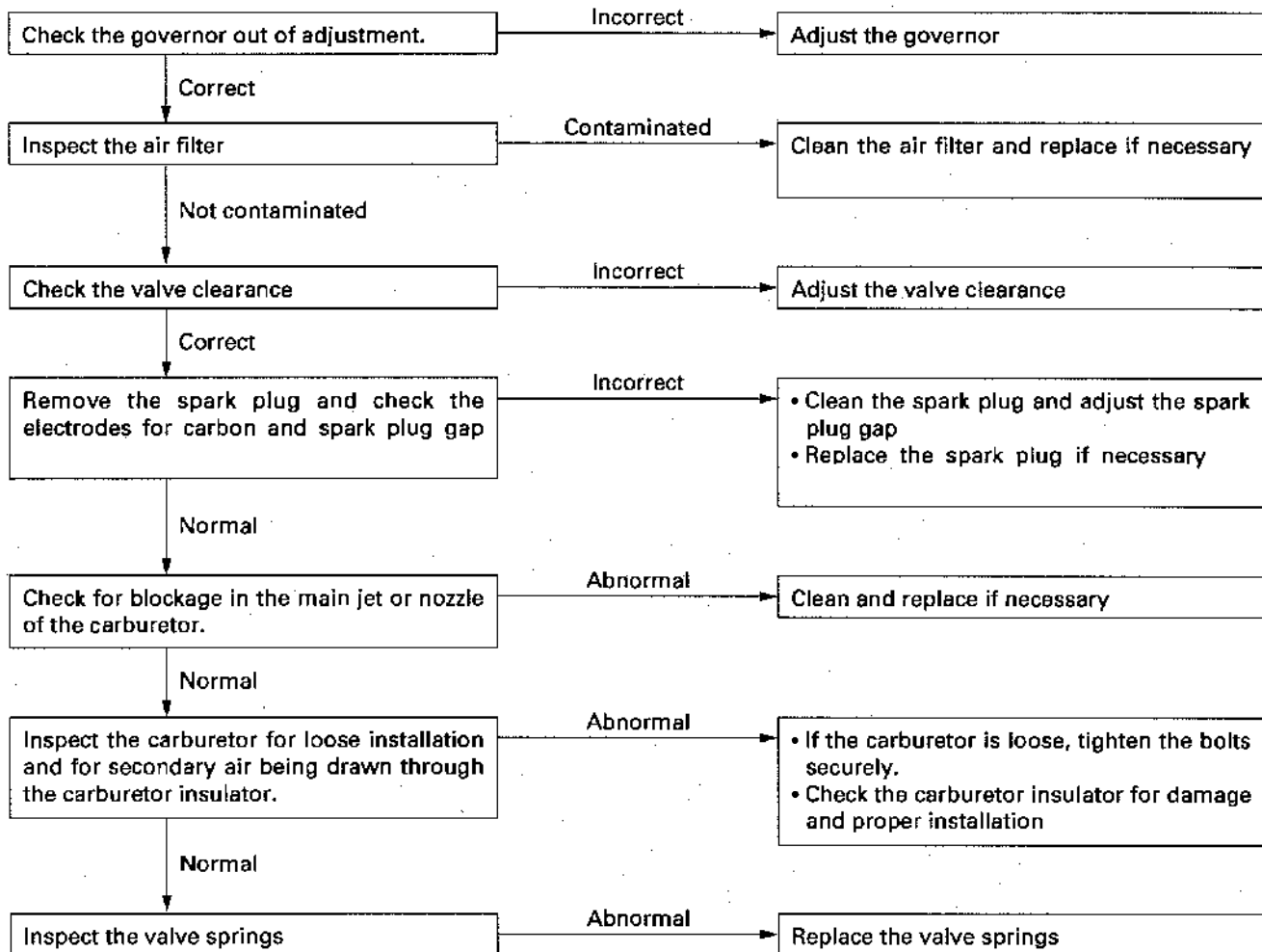
If ignited, gasoline can burn you severely.

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

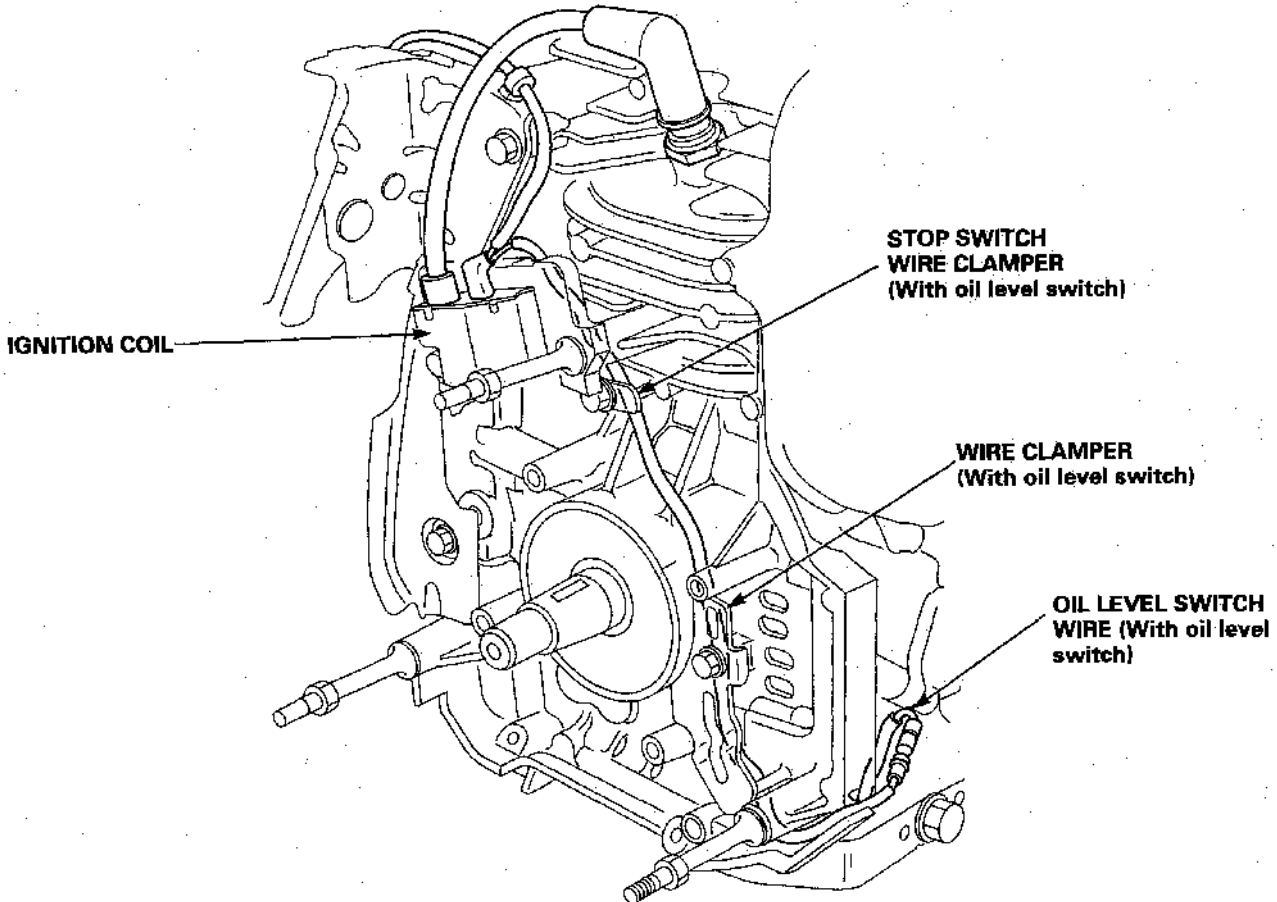
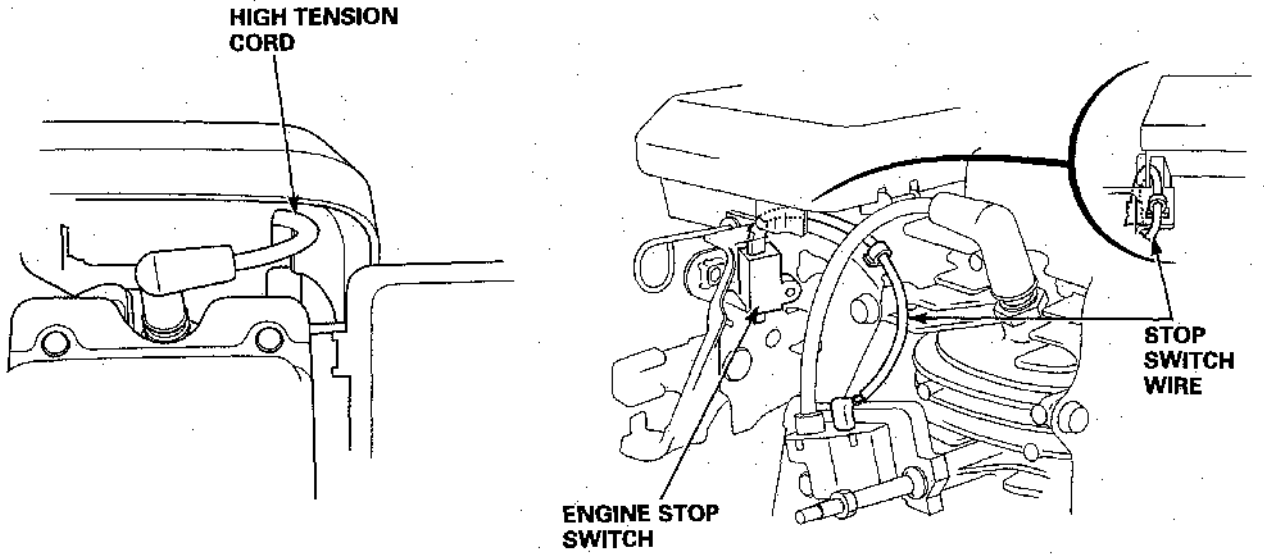


ENGINE STARTS BUT THEN STALLS

ENGINE LACKS POWER

ENGINE SPEED DOES NOT INCREASE

HARNES ROUTING



MAINTENANCE SCHEDULE

REGULAR SERVICE PERIOD		BEFORE USE	FIRST MONTH OR 5 HRS	EVERY SEASON OR 25 HRS	EVERY SEASON OR 50 HRS	EVERY 100 HRS	EVERY 150 HRS	
● Engine oil	Check	<input type="radio"/>						
	Change		<input type="radio"/>		<input type="radio"/> (1)			
● Air cleaner	Check	<input type="radio"/>						
	Clean			<input type="radio"/> (2)				
	Change						<input type="radio"/> (200HRS)	
● Fuel tank and strainer	Clean				<input type="radio"/>			
● Spark plug	Check-Clean					<input type="radio"/>		
	Replace						<input type="radio"/> (200HRS)	
Spark arrester (Optional part)	Clean				<input type="radio"/>			
● Idle speed	Check-Adjust						<input type="radio"/>	
● Valve clearance	Check-Adjust						<input type="radio"/>	
● Fuel line	Check (Replace if necessary)	Every 2 years						

● Emission related items.

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

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

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

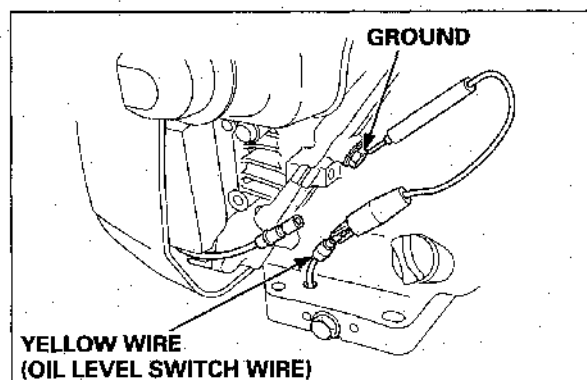
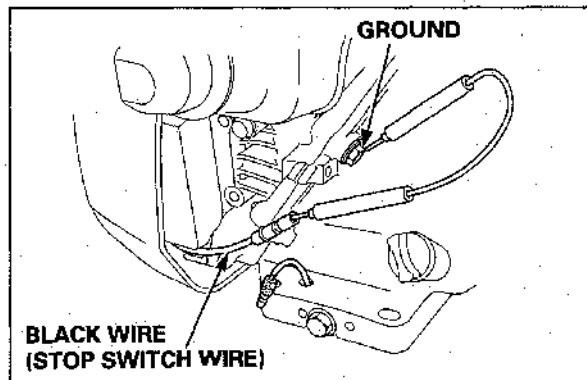
ENGINE OIL

Oil alert (with oil level switch only):

NOTE:

For convenience, perform this test in conjunction with the engine oil change.

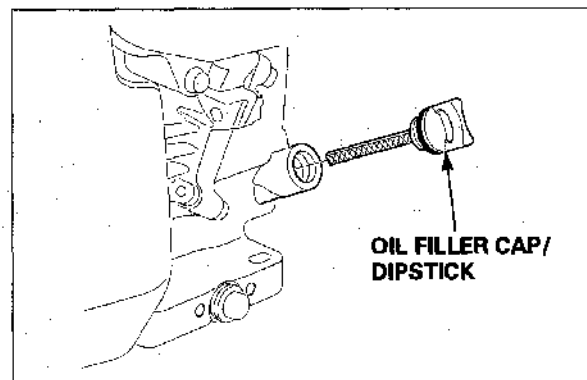
- 1) With the engine running, disconnect the black wire from the stop switch wire, and ground the wire against the engine. The engine should stop.
- 2) With the engine stopped, the crankcase filled with oil, and the oil level switch wires disconnected, check continuity between the yellow oil level switch wire and ground. There should be no continuity.
- 3) With the engine stopped, the oil drained from the crankcase, and the oil level switch wires disconnected, check continuity between the yellow oil level switch wire and ground. There should be continuity.



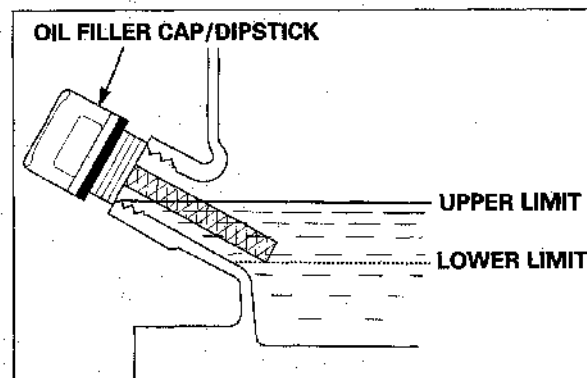
Oil level check:

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

- 1) Remove the oil filler cap, and wipe the dipstick clean.



- 2) Insert the dipstick in the oil filler neck, but do not screw it in. Remove the dipstick and check the oil level.
- 3) If the oil level is low, fill to the top of the oil filler neck with the recommended oil. Do not overfill.
- 4) Tighten the oil filler cap securely.



HONDA

GC135 • GC160

Oil change:

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

- 1) Place a suitable container under the oil drain plug bolt.
- 2) Remove the oil filter cap and drain plug bolt, and drain the oil into the suitable container.

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

CAUTION:

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

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

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

- 3) Reinstall the drain plug bolt, and tighten it securely.

TORQUE: 24 N·m (2.4 kgf·m, 17 lbf·ft)

- 4) With the engine on a level surface, refill with the recommended oil to the top of the oil filter neck.

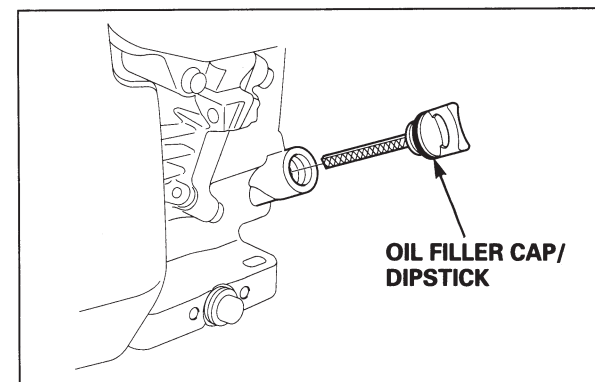
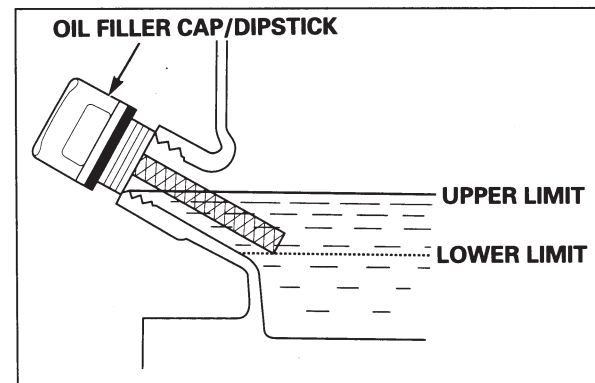
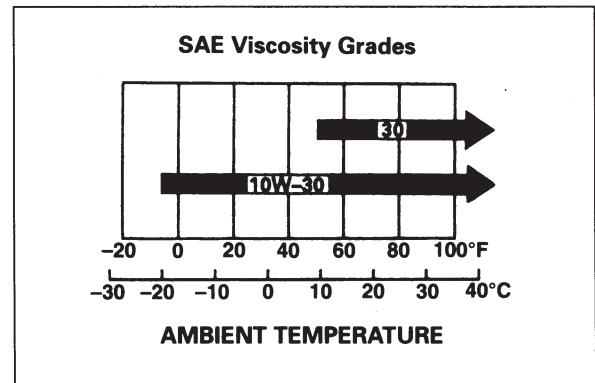
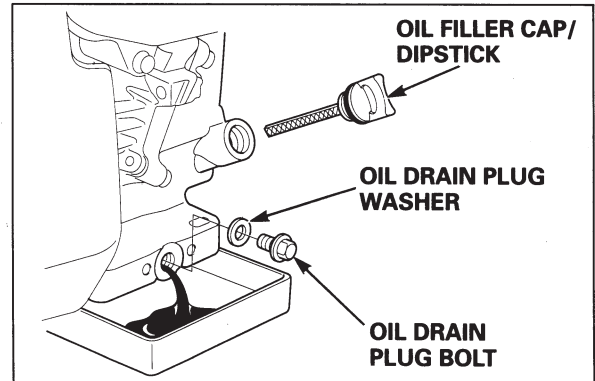
Engine oil capacity	0.58 l (0.61 US qt, 0.51 Imp qt)
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Recommended operating ambient temperature	- 15°C – 40°C (5°F – 104°F)
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Oil is a major factor affecting performance and service life. Use 4-stroke automotive detergent oil.

SAE 10W-30 is recommended for general use. Other viscosities shown in the chart may be used when the average temperature in your area is within the recommended range. The SAE oil viscosity and service classification are in the API label on the oil container. Honda recommends that you use API SERVICE category SF or SG oil.

- 5) Reinstall the dipstick, and tighten the oil filter cap securely.



AIR CLEANER

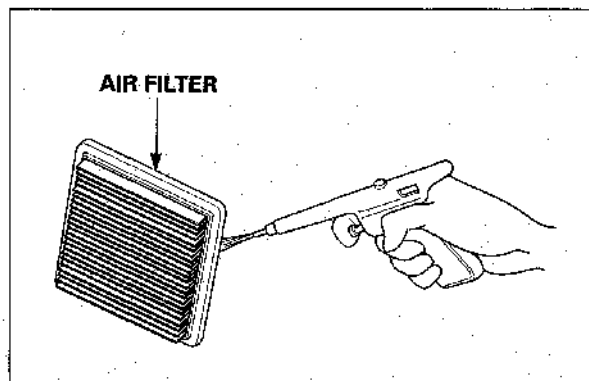
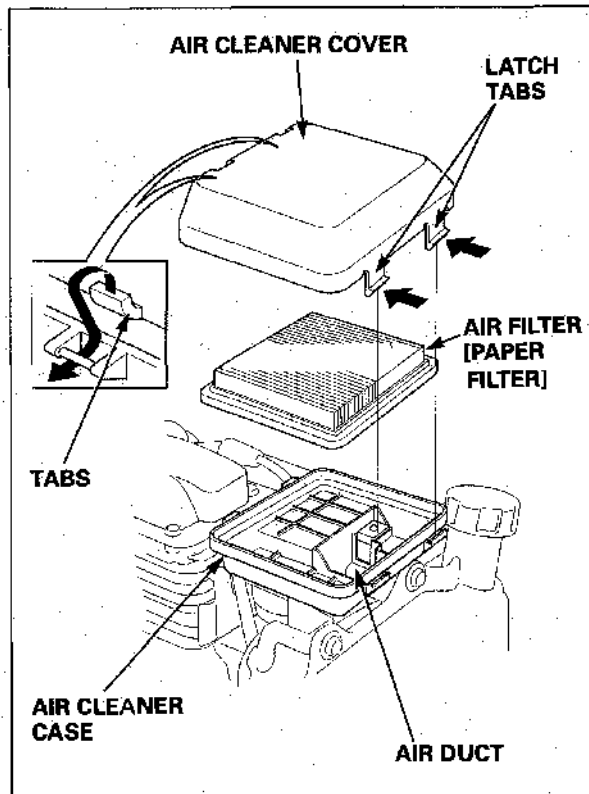
Cleaning:

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

CAUTION:

Operating the engine without an air filter or with a damaged air filter, will allow dirt to enter the engine, causing rapid engine wear. This type of damage is not covered by the Distributor's Limited Warranty.

- 1) Press the latch tabs on the fuel tank side of the air cleaner cover, and remove the cover.
- 2) Inspect the air filter, and replace if damaged.
- 3) Tap the filter several times on a hard surface to remove dirt, or blow compressed air [not exceeding 207 kPa (2.1 kgf/cm², 30 psi)] through the filter from the clean side that faces the engine. Never try to brush off dirt; brushing will force dirt into the fibers.
- 4) Wipe dirt from the inside of the air cleaner cover and air cleaner case, using a moist rag. Be careful to prevent dirt from entering the air duct that leads to the carburetor.
- 5) Reinstall the filter and air cleaner cover.



SPARK PLUG

Inspection/Cleaning:

Standard spark plug

- 1) Clean any dirt from around the spark plug.
- 2) Remove the plug cap, and use a spark plug wrench to remove the plug.
- 3) Visually inspect the spark plug. Discard the plug if the insulator is cracked or chipped.
- 4) Remove carbon or other deposits with a stiff wire brush.
- 5) Measure the plug gap with a wire-type feeler gauge.

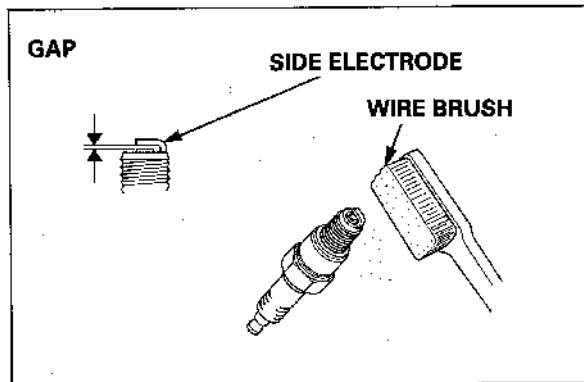
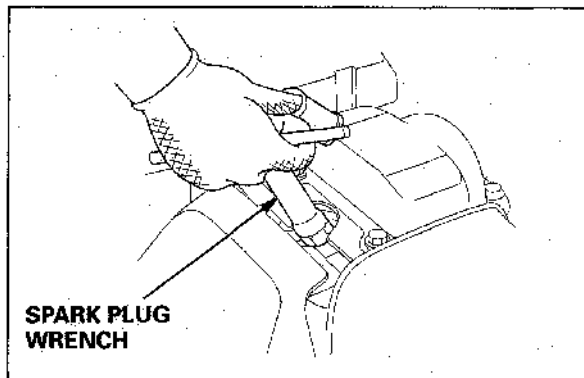
Spark plug gap

If necessary, adjust the gap by bending the side electrode.

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

CAUTION:

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



VALVE CLEARANCE

Inspection/Adjustment:

NOTE:

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

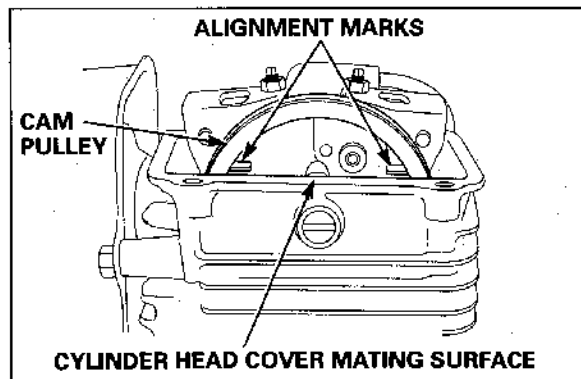
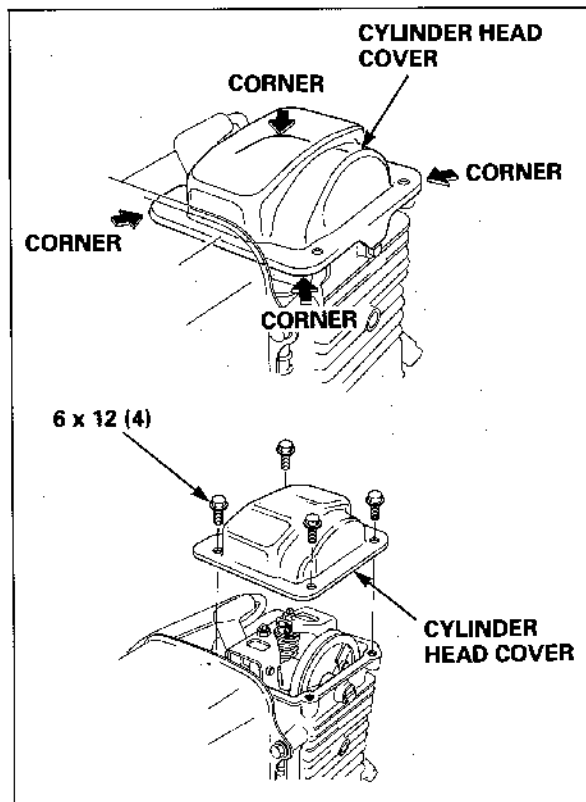
- 1) Remove the four 6 x 12 mm flange bolts.
- 2) When removing the cylinder head cover, pry off slowly at each corner of the head cover.

CAUTION:

- Do not remove the cylinder head cover with force. It can deform the cylinder head cover.
- Replace the cylinder head cover if it is deformed.

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

Top dead center of the compression stroke is in the position where the cylinder head cover mating surface is in line with the cam pulley alignment marks.



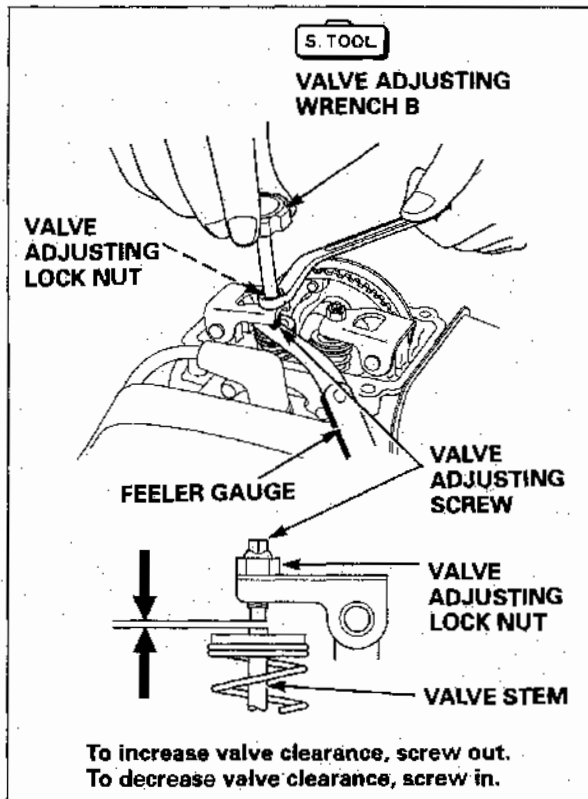
- 4) Insert a feeler gauge between the valve stem and the adjusting screw on the rocker arm.

Standard valve
clearance

- 5) If adjustment is necessary, proceed as follows:
- Hold the adjusting screw using the special tool, and loosen the lock nut.
 - Turn the adjusting screw to obtain the specified intake and exhaust valve clearance.
 - Hold the adjusting screw using the special tool, and tighten the lock nut.

TORQUE

- 6) Recheck valve clearance after tightening the lock nut.
- 7) Apply a liquid packing (Three Bond 1207 Honda Bond #4 or equivalent) to the cylinder head cover installation surface, and install the cylinder head cover



CARBURETOR

Pilot screw:

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

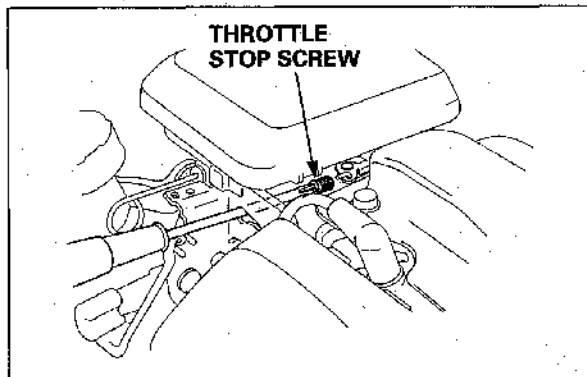
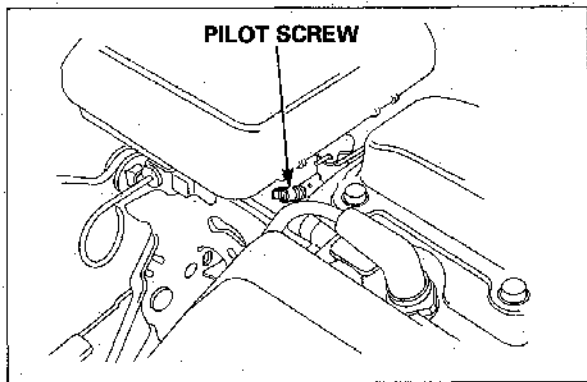
Do not attempt to remove the limiter cap for pilot screw adjustment. The limiter cap cannot be removed without breaking the pilot screw.

Pilot screw adjustment must be performed only when it is disassembled

Throttle stop screw:

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

Standard idle speed



GOVERNOR

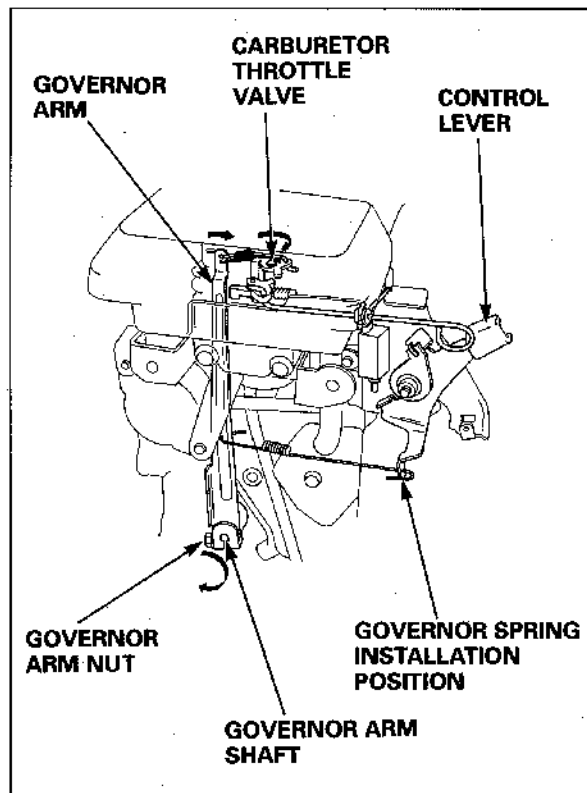
Adjustment:

- 1) Remove the fuel tank.
- 2) Move the control lever to the **FAST** position.
- 3) Loosen the governor arm nut on the governor arm.
- 4) Pushing the governor arm toward the carburetor side, open the carburetor throttle valve fully.
- 5) Holding the carburetor throttle valve fully open, turn the governor arm shaft clockwise fully, and tighten the governor arm nut to the specified torque.

TORQUE

- 6) Move the control lever to the **SLOW** position.
- 7) With the control lever in the **SLOW** position, check to see whether the carburetor throttle valve is fully closed.
- 8) Check to see whether the governor arm and the carburetor throttle valve operate smoothly.
- 9) Start the engine and warm it up to the normal operating temperature. Move the control lever to the maximum engine speed position, and check the maximum engine speed.

Maximum speed (no load)



- 10) Adjustment is made at the governor spring installation position of the control lever.

FUEL TANK/FUEL STRAINER

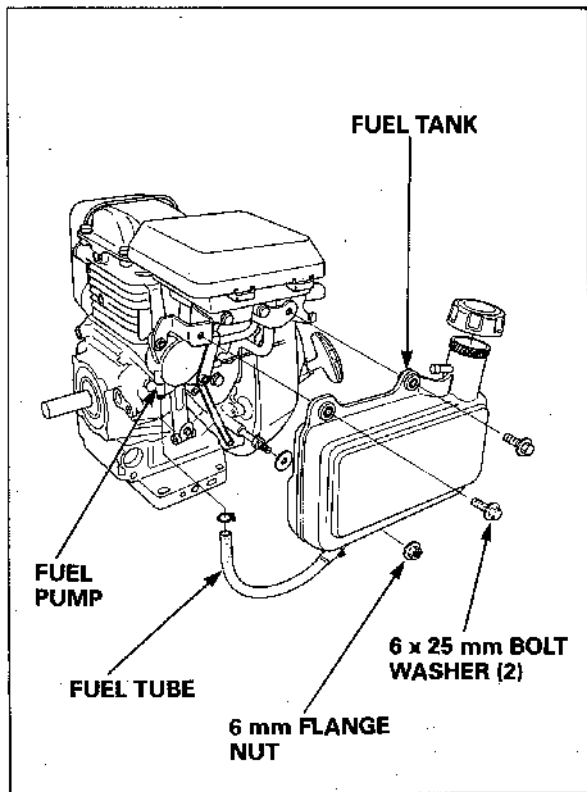
Cleaning:

⚠ 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.

- 1) Drain the fuel into a suitable container, and remove the fuel tank.



- 2) Disconnect the fuel line, and unscrew the fuel strainer from the tank.
- 3) Clean the strainer with solvent, and check to be sure the strainer screen is undamaged.
- 4) Insert the fuel strainer in the fuel tank. Connect the fuel tube to the fuel tank.
- 5) Install the fuel tank.
- 6) After assembly, check for fuel leaks.

FUEL LINE

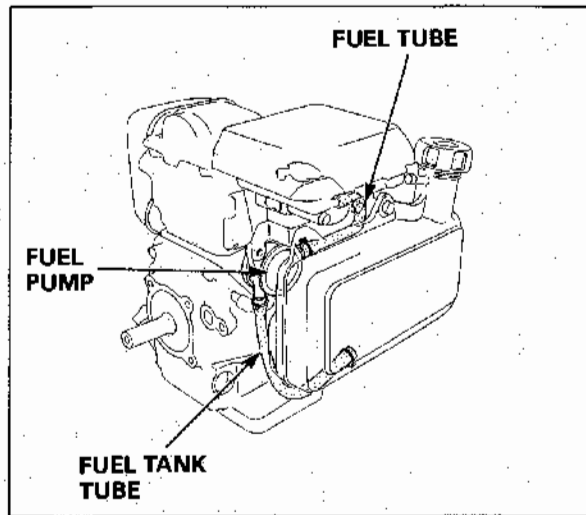
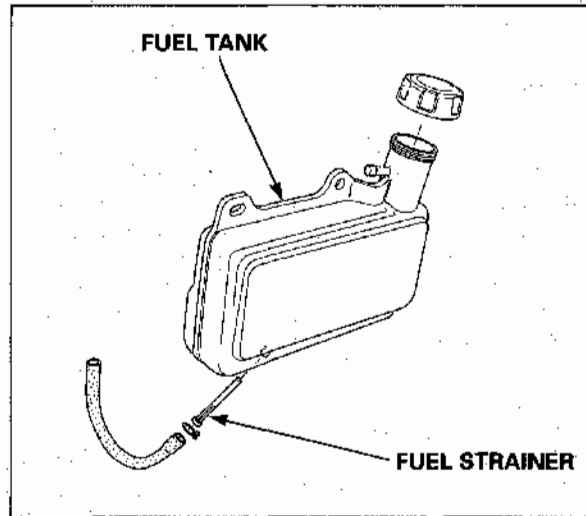
Check:

⚠ 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.

- 1) Check the fuel lines for deterioration, cracks or signs of leakage.
- 2) Check the fuel pump for dirt and other foreign material.
- 3) Drain the fuel into a suitable container.
- 4) Replace the fuel lines and fuel pump as necessary.



SPARK ARRESTER (OPTIONAL PART)

Cleaning:

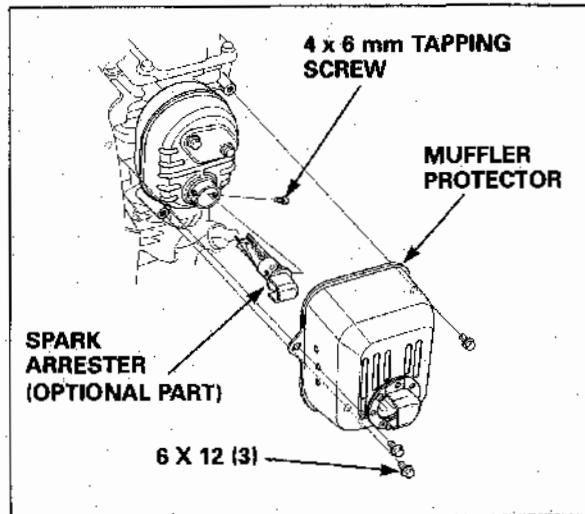
⚠ WARNING

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.

CAUTION:

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

- 1) Remove the three 6 x 12 mm flange bolts from the muffler protector, and remove the muffler protector.
- 2) Remove the 4 x 6 mm tapping screw from the spark arrester, and remove the spark arrester from the muffler.
- 3) Check for carbon deposits around the exhaust port and spark arrester. Clean, if necessary, with a wire brush.
- 4) Replace the spark arrester if there are any breaks or tears.
- 5) Install the spark arrester and muffler protector in the reverse order of removal.



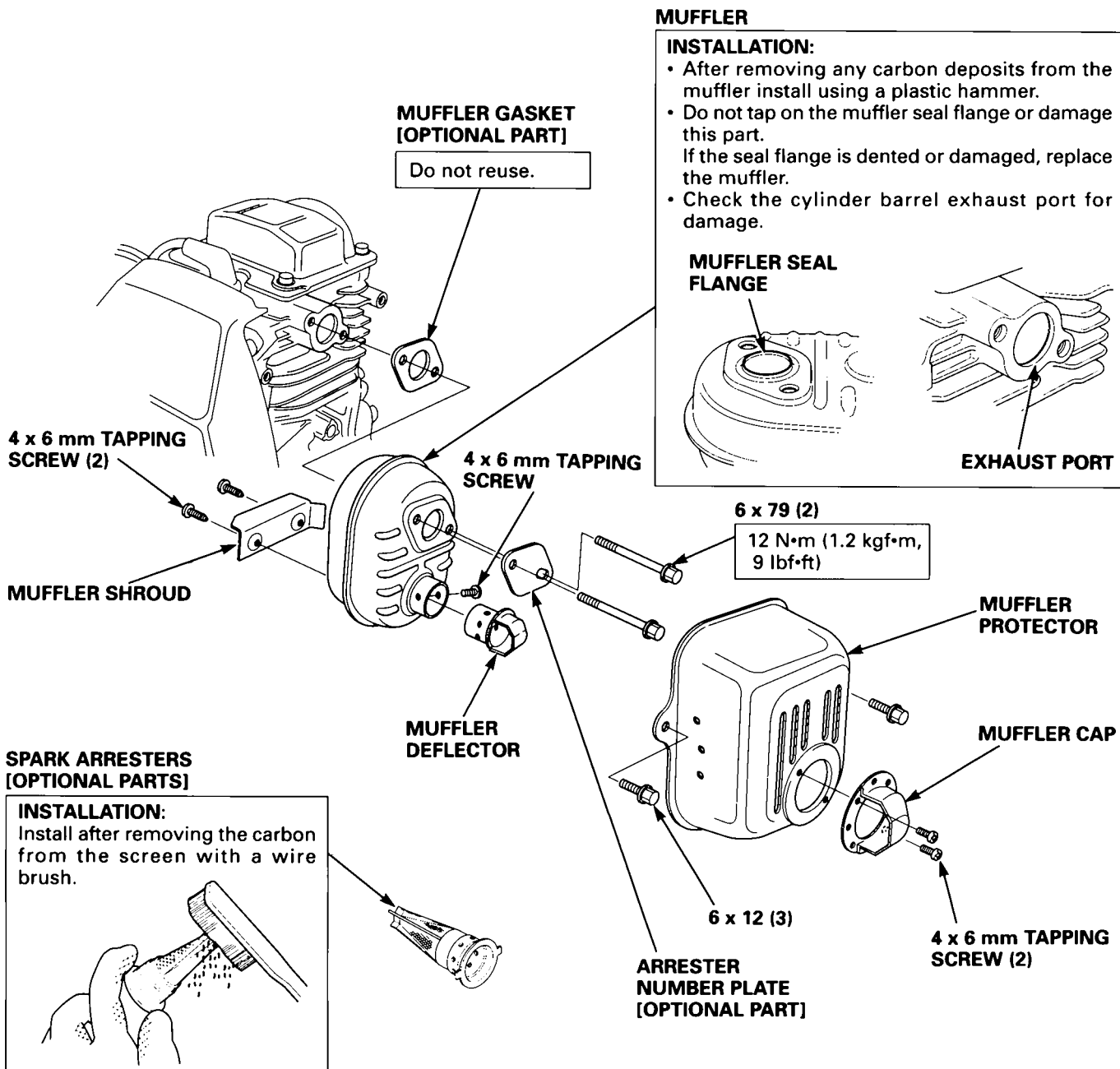
1. MUFFLER

1. MUFFLER

a. REMOVAL/INSTALLATION

⚠ WARNING

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



RECOIL STARTER/FAN COVER

REMOVAL/INSTALLATION

NOTE:

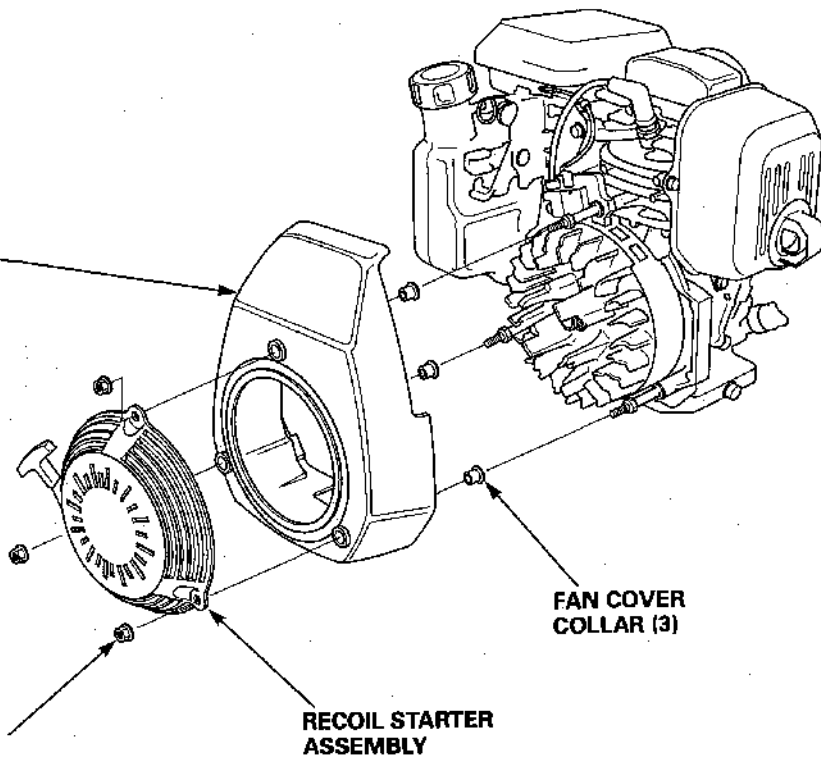
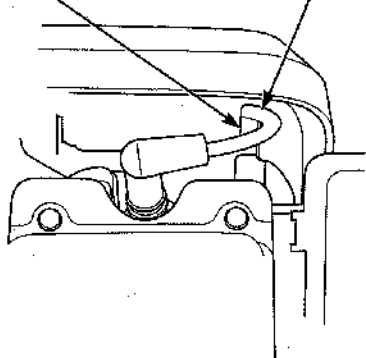
- If the starter rope has been frayed or worn out, replace the starter rope.
- Do not disassemble the recoil starter assembly.

FAN COVER

INSTALLATION:

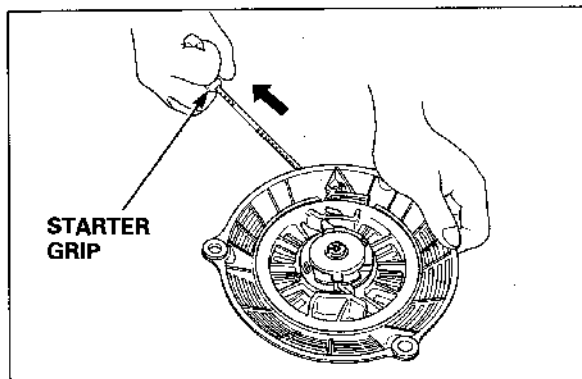
Check whether the high tension cord is securely set in the groove in the fan cover as shown.

GROOVE HIGH TENSION CORD

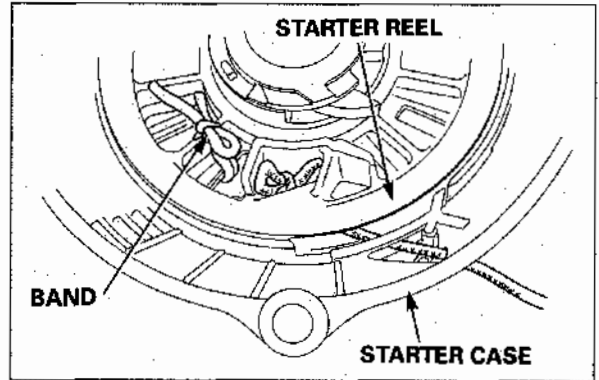


STARTER ROPE REPLACEMENT

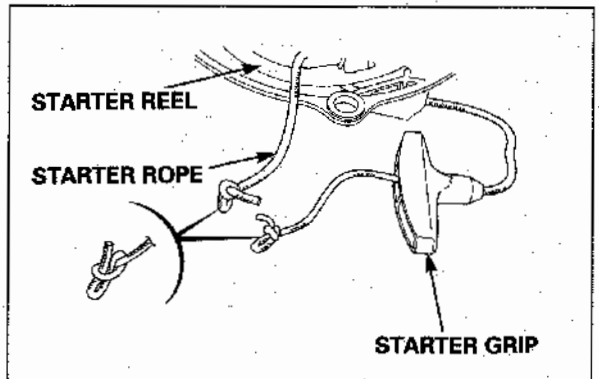
- 1) Pull the starter grip fully (until the starter rope is pulled out fully).



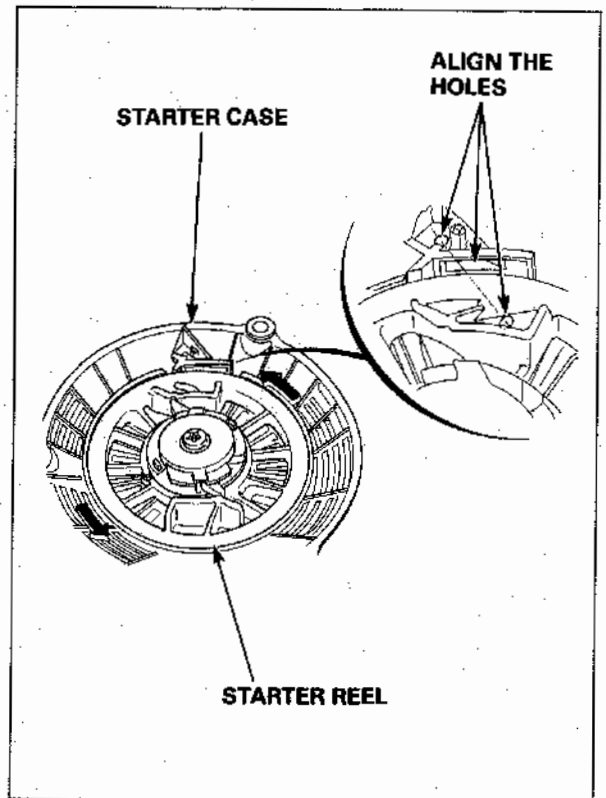
- 2) To prevent the starter reel from rewinding, hold the starter reel and starter case with a band or equivalent material as shown.



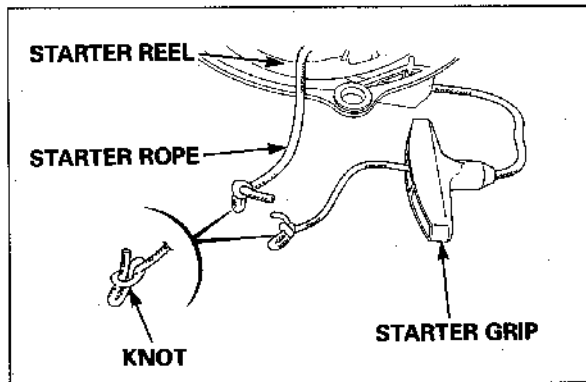
- 3) Untie the knots of the starter rope at the starter grip side and the starter reel side, and remove the starter rope.



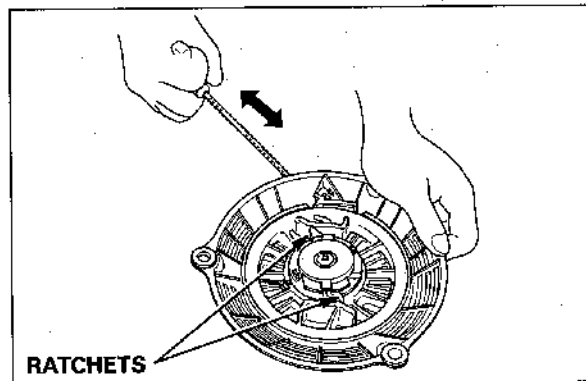
- 4) When the starter rope has broken or the starter reel has re-wound, align the rope hole in the starter case with the rope hole in the starter reel by turning the starter reel 5 turns in the direction of the arrow.



- 5) Pass the starter rope through the starter grip, and make a slip knot at the end of the rope.
- 6) Pass the other end of the starter rope through the rope hole in the starter case and through the rope hole in the starter reel, and make a slip knot at the rope end.



- 7) Wind the starter rope slowly on the starter reel.
- 8) Check the operation of the ratchets by pulling the starter rope several times.



FUEL TANK

REMOVAL/INSTALLATION

Before removal, completely drain the carburetor.

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.

FUEL TANK

FUEL CAPACITY:

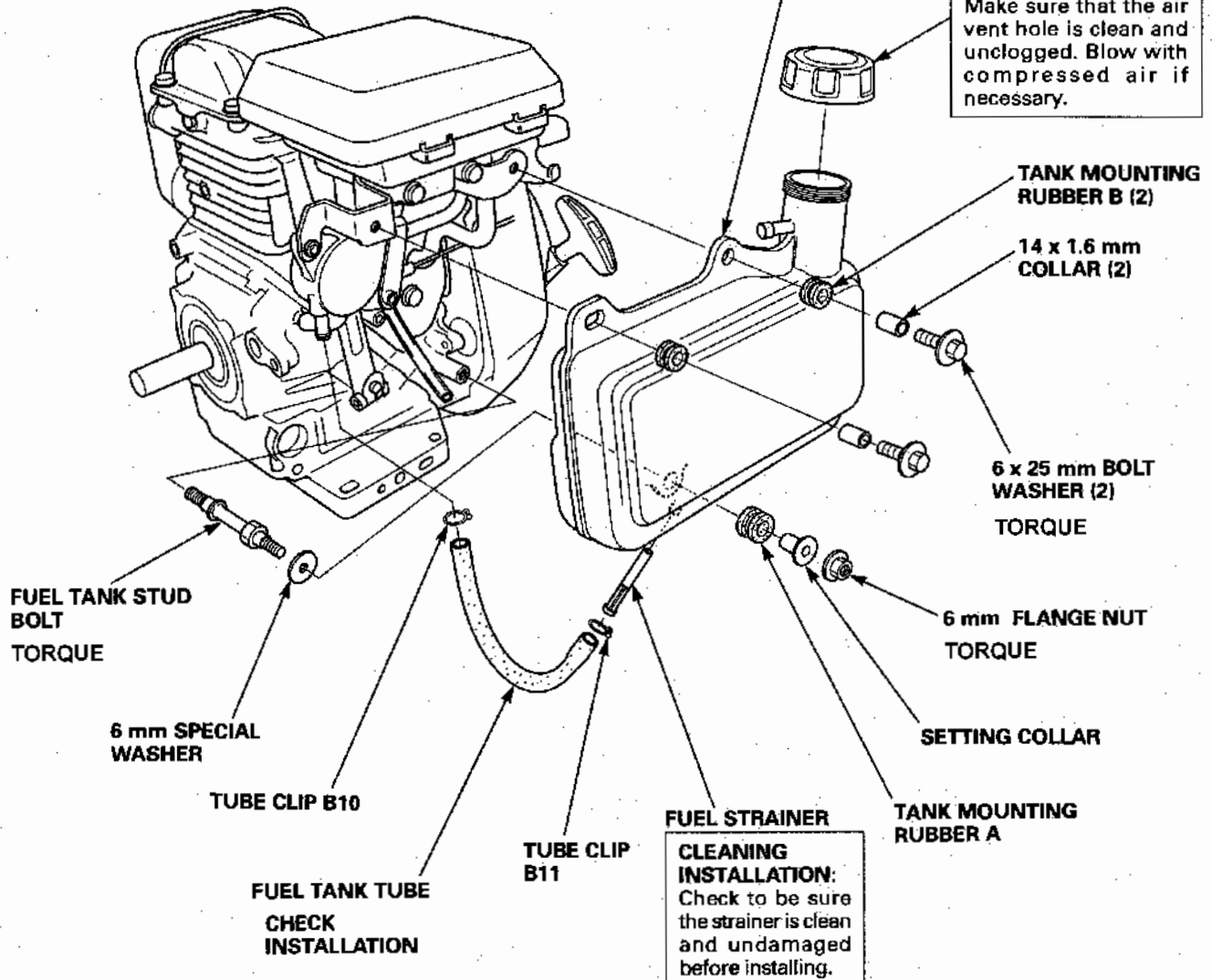
CLEANING INSTALLATION:

Wash with solvent to remove the sediment, and dry thoroughly before installing.

FUEL TANK CAP

REASSEMBLY:

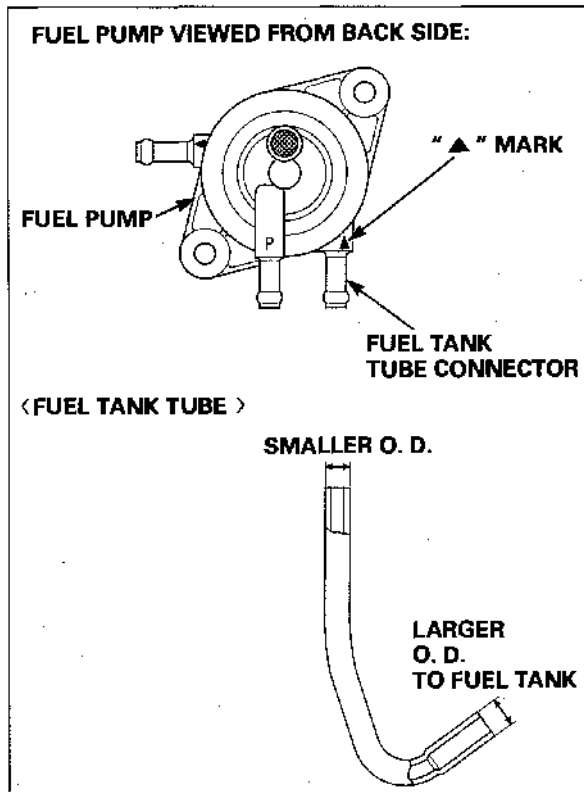
Make sure that the air vent hole is clean and unclogged. Blow with compressed air if necessary.



● FUEL TANK TUBE

INSTALLATION:

- 1) Connect the larger diameter end of the fuel tank tube to the fuel tank.
- 2) Connect the smaller diameter end of the fuel tank tube to the fuel pump on the side marked with "▲".



AIR CLEANER/CARBURETOR

REMOVAL/INSTALLATION

Before removal, completely drain the carburetor.

WARNING

Gasoline is highly flammable and explosive.

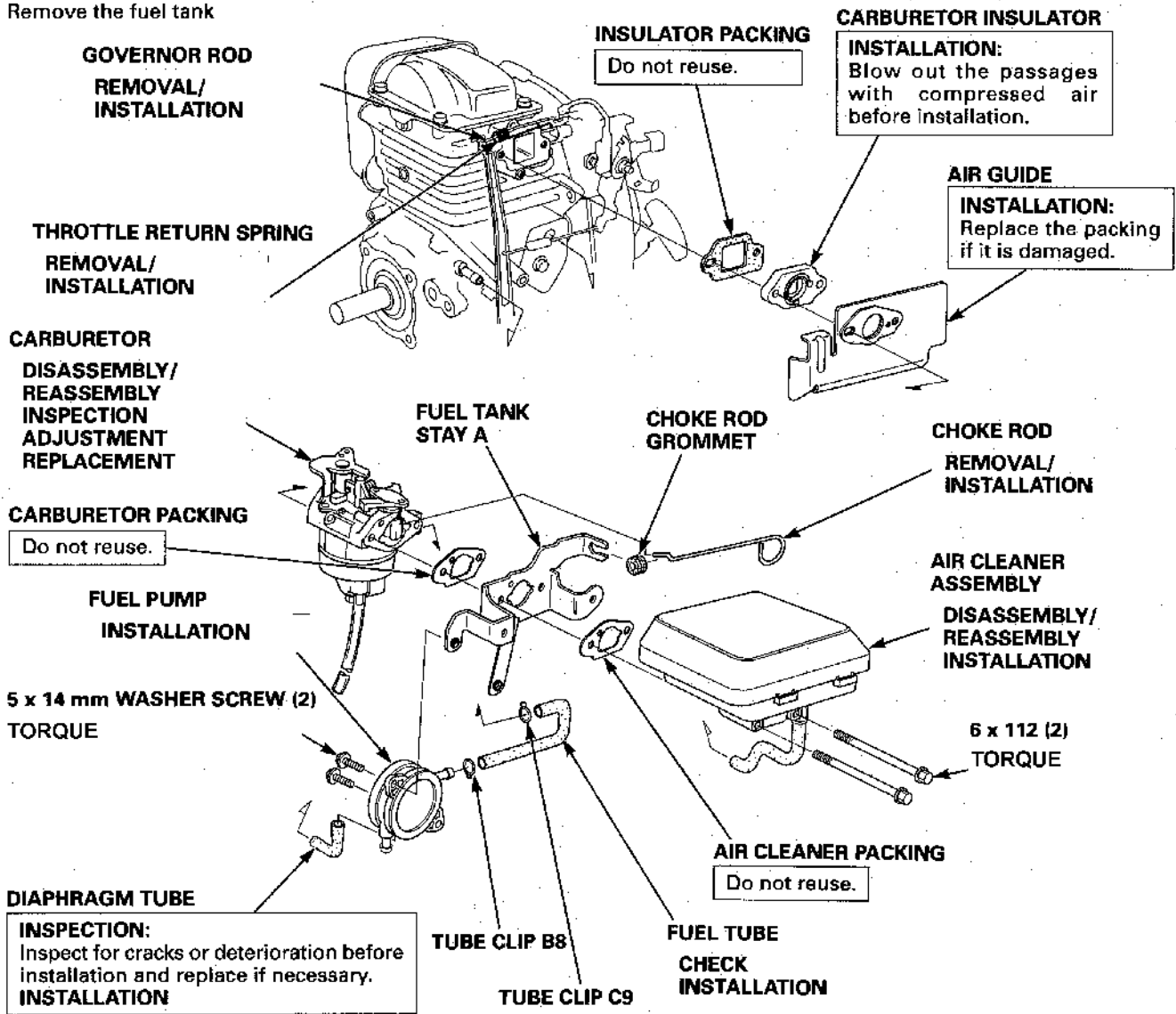
You can be burned or seriously injured when handling fuel.

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

CAUTION:

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

Remove the fuel tank



CARBURETOR DISASSEMBLY/REASSEMBLY

Before disassembly, loosen the drain screw and drain the carburetor.

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.

NOTE:

- Clean the outside of the carburetor before disassembly.
- The limiter cap is cemented on the pilot screw and should not be removed unless the carburetor is overhauled.

CARBURETOR BODY

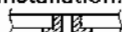
REASSEMBLY:

Clean internal passages and orifices with compressed air before installation.

FLOAT VALVE

REASSEMBLY:

Check for worn float valve seat, float valve or weak spring before installation.



VALVE SEAT



FLOAT VALVE



OK



REPLACE

FLOAT

REASSEMBLY:

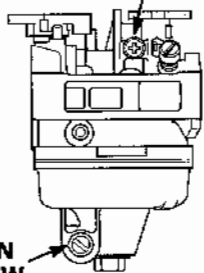
Check for smooth movement after installation.
INSPECTION

FLOAT CHAMBER

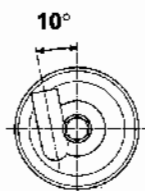
REASSEMBLY:

Install so that the drain screw faces to the throttle stop screw side.

THROTTLE STOP SCREW



DRAIN SCREW



5 x 6 mm
SCREW

PILOT SCREW
REPLACEMENT

LIMITER CAP
REPLACEMENT

THROTTLE STOP SCREW
ADJUSTMENT

MAIN NOZZLE

REASSEMBLY:

Clean thoroughly with compressed air before installation.



MAIN JET

REASSEMBLY:

Clean thoroughly with compressed air before installation.

MAIN JET NUMBER:

MAIN
JET



FLOAT PIN

SET PACKING

O-RING

DRAIN SCREW

SET BOLT

REASSEMBLY:
After assembly, check for any sign of fuel leakage.

4 x 7 x 150 mm TUBE

INSPECTION

● FLOAT LEVEL HEIGHT

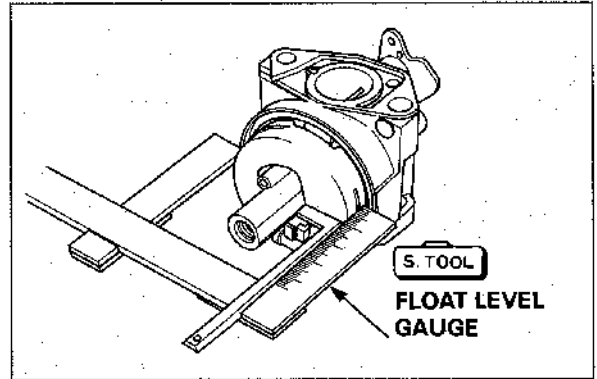
Place the carburetor in the position as shown and measure the distance between the float top and carburetor body when the float just contacts the seat without compressing the valve spring.

TOOL:

Float level gauge

Standard float height

If the height is out of specification, replace the float and/or the float valve. Recheck the float height.



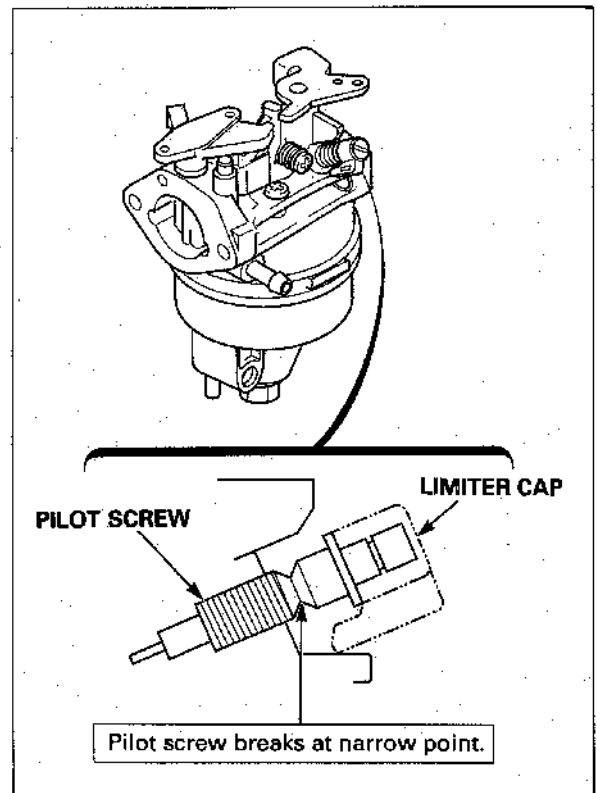
PILOT SCREW AND LIMITER CAP REPLACEMENT

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

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

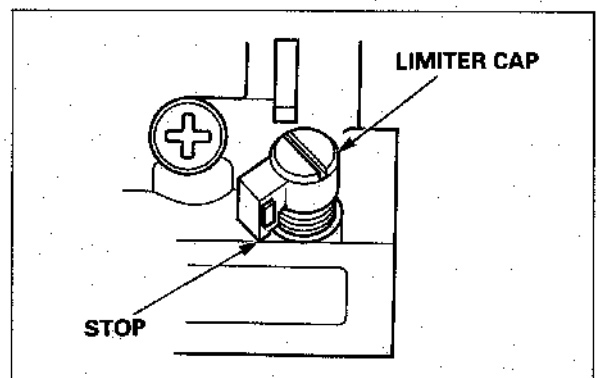
- 1) When the limiter cap has been broken off, remove the broken pilot screw.
- 2) Place the spring on the replacement pilot screw, and install it on the carburetor.
- 3) Turn the pilot screw in until it is lightly seated, then turn the screw out the required number of turns.

Pilot screw opening

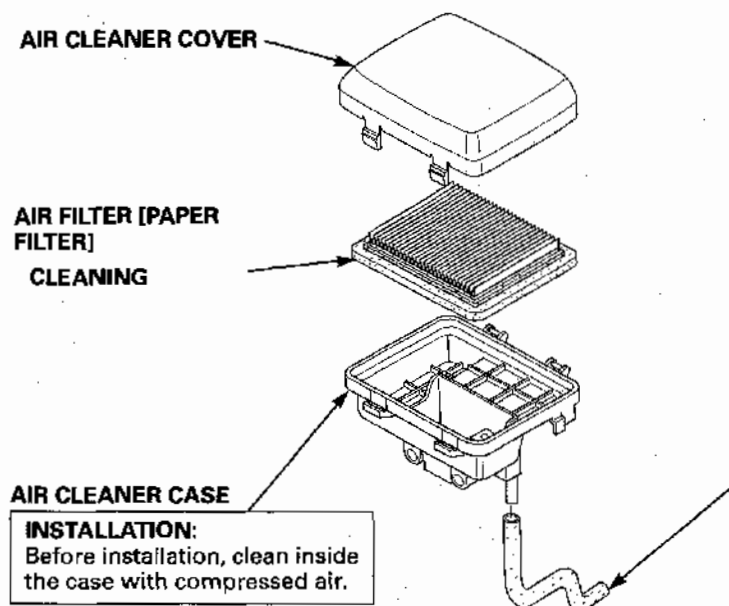


- 4) Apply LOCTITE® 638 to the inside of the limiter cap, then install the cap so its stop prevents the pilot screw from being turned counterclockwise.

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



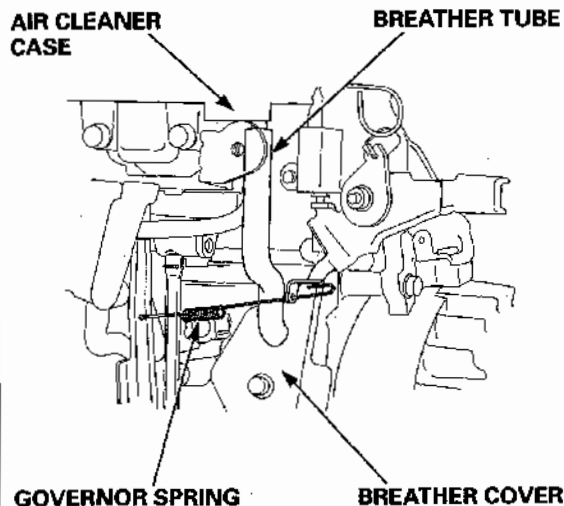
AIR CLEANER DISASSEMBLY/REASSEMBLY



BREATHER TUBE

INSTALLATION:

- Connect one end to the breather cover hole and connect the other end to the air cleaner case.
- Be sure that the breather tube passes inside the governor spring with adequate clearance.



REMOVAL/INSTALLATION

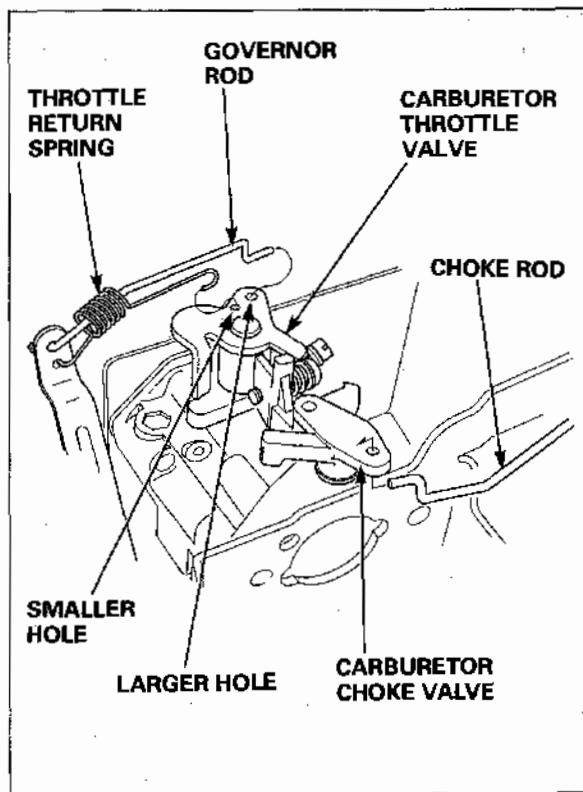
• GOVERNOR ROD/THROTTLE RETURN SPRING/CHOKE ROD

REMOVAL:

- 1) Unhook the throttle return spring.
- 2) Remove the two 6 x 112 mm flange bolts from the air cleaner case
- 3) Disconnect the choke rod grommet from the fuel tank stay A, and remove the choke rod from the carburetor choke valve.
- 4) Remove the air cleaner assembly, air cleaner packing, air guide, carburetor insulator and insulator packing
- 5) Unhook the governor rod from the carburetor throttle valve.

INSTALLATION:

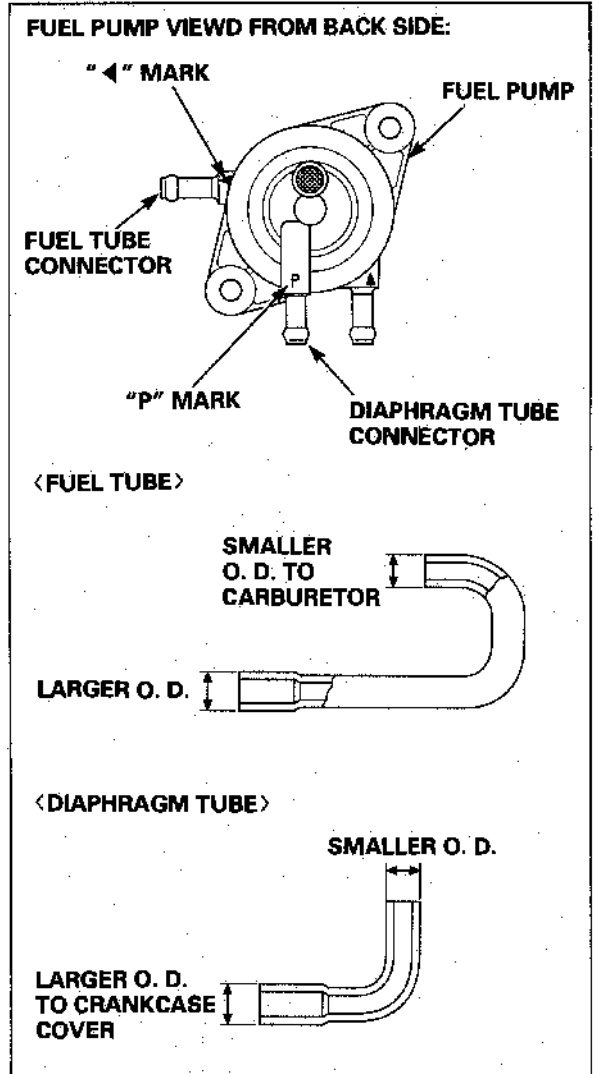
- 1) Set the choke rod on the carburetor choke valve.
- 2) Hook the governor rod in the larger hole in the carburetor throttle valve.
Hook the throttle return spring in the smaller hole in the carburetor throttle valve.
- 3) Install the insulator packing, carburetor insulator, air guide, fuel tank stay A, carburetor packing, air cleaner packing and air cleaner assembly



● FUEL PUMP/FUEL TUBE/DIAPHRAGM TUBE

INSTALLATION:

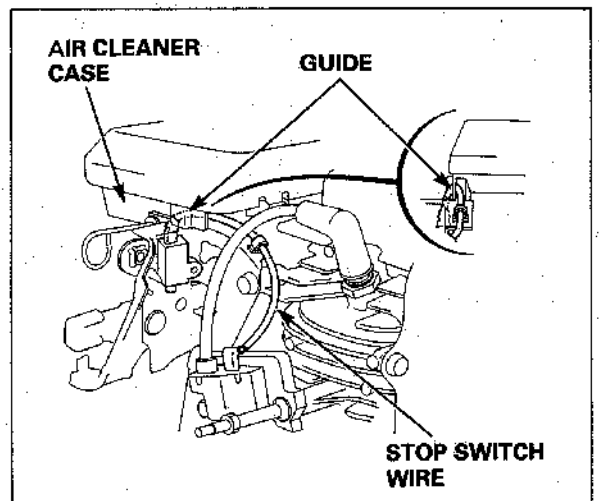
- 1) Install the fuel pump on the fuel tank stay A with the fuel tube installation part of the tank facing to the left-hand side.
- 2) Connect the larger diameter end of the fuel tube to the fuel pump of the side marked with "◀".
- 3) Connect the smaller diameter end of the fuel tube to the carburetor.
- 4) Connect the smaller diameter end of the diaphragm tube to the fuel pump of the side marked with "P".
- 5) Connect the larger diameter end of the diaphragm tube to the crankcase cover.



● AIR CLEANER

INSTALLATION:

Install the air cleaner so that the stop switch wire passes through the guide on the air cleaner case.

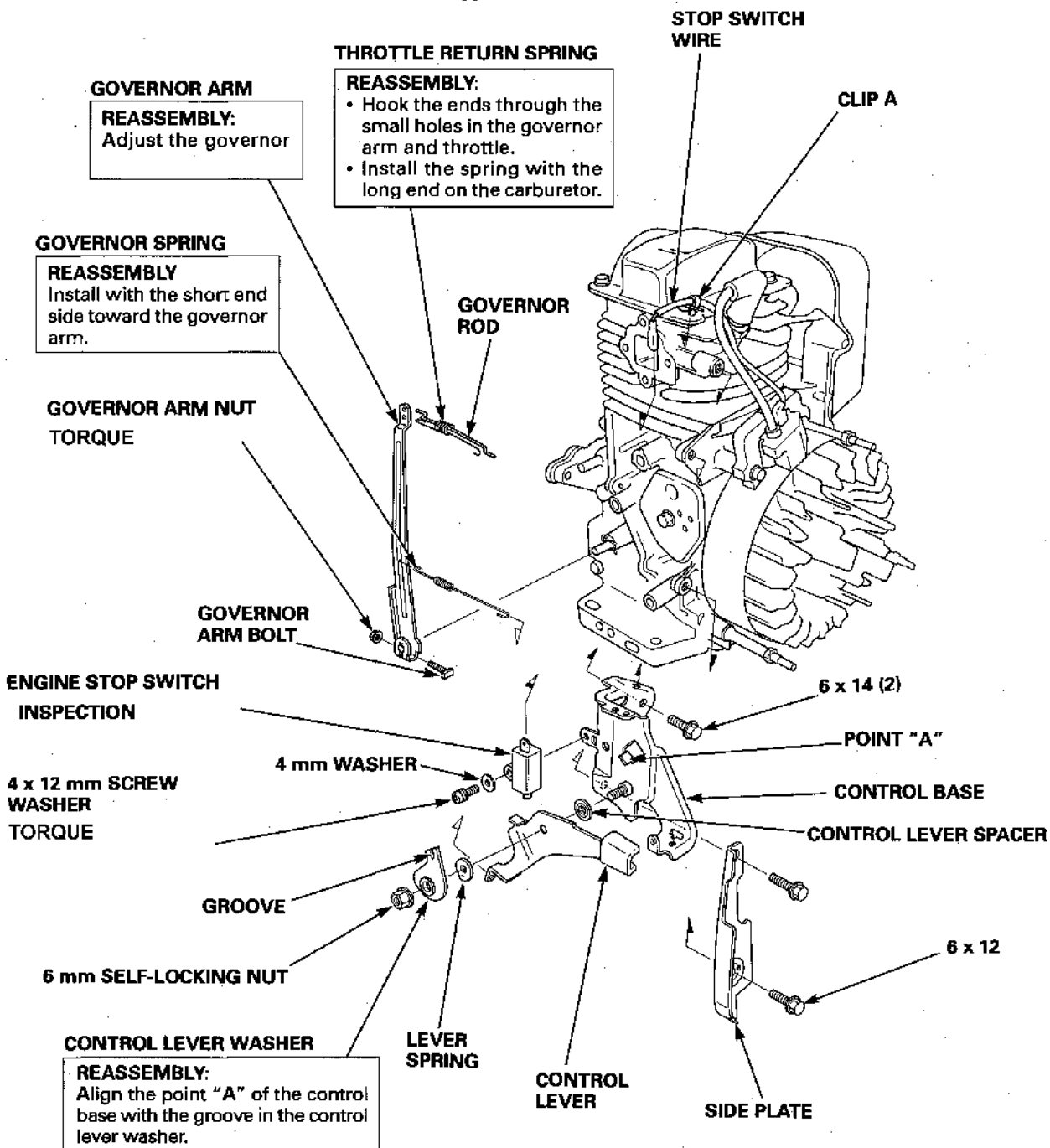


CONTROL BASE/GOVERNOR ARM

DISASSEMBLY/REASSEMBLY

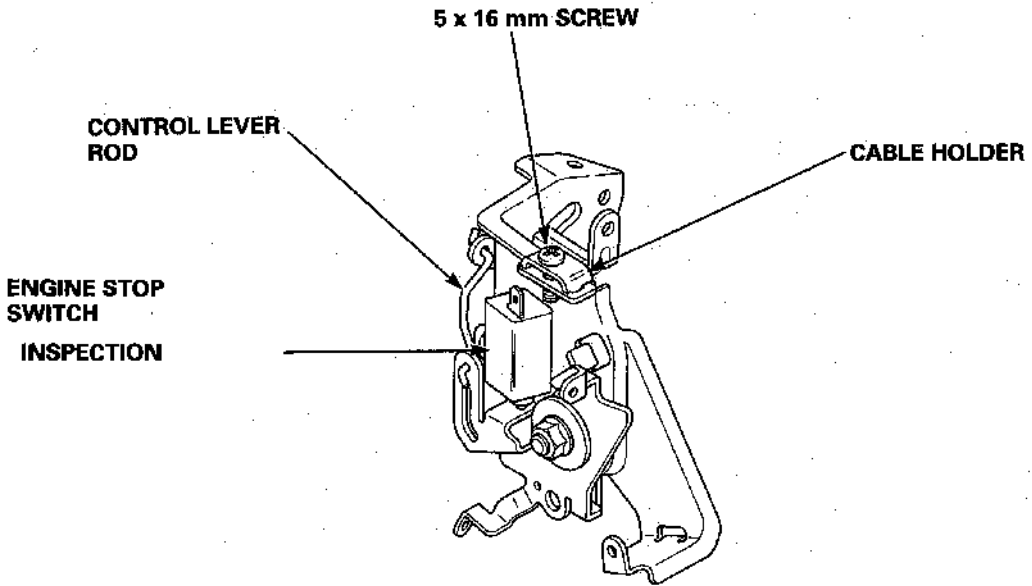
- 1) Remove the air cleaner and carburetor
- 2) Remove the recoil starter and fan cover

● MANUAL THROTTLE TYPE [Q and P types]

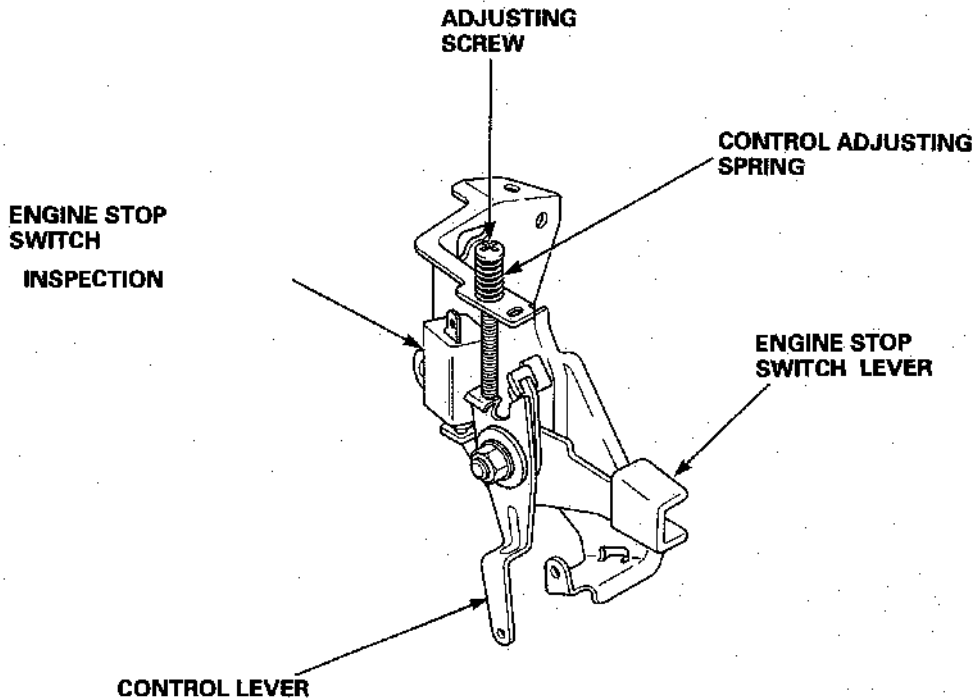


• **REMOTE THROTTLE TYPE [Q type]**

〈Solid wire cable〉



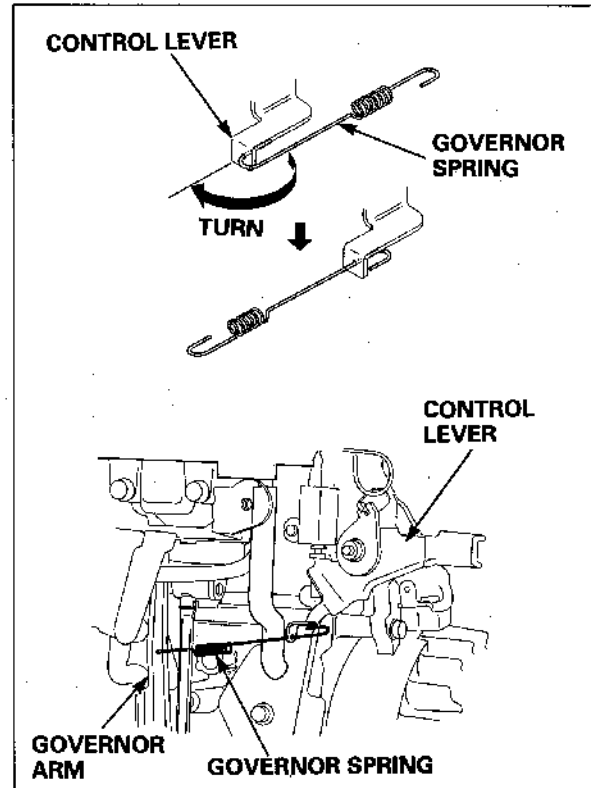
• **MANUAL THROTTLE [V type]**



● GOVERNOR SPRING

REASSEMBLY:

- 1) Set the longer straight side of the governor spring in the hole in the control lever.
- 2) With the governor spring set in the hole in the control lever, turn the spring toward the governor arm side and set the spring on the control lever as shown.
- 3) Set the shorter straight side of the governor spring on the governor arm.

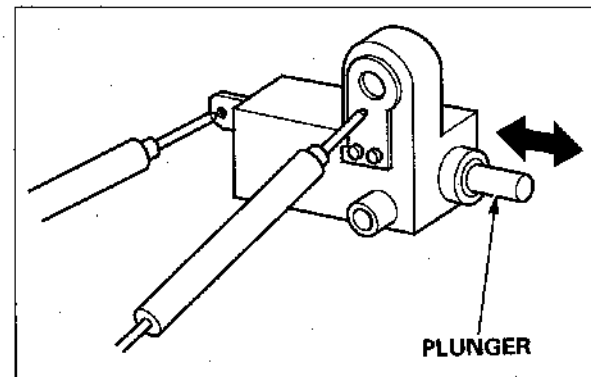


INSPECTION

● ENGINE STOP SWITCH

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

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



FLYWHEEL/IGNITION COIL

DISASSEMBLY/REASSEMBLY

- 1) Remove the recoil starter and fan cover
- 2) Remove the air cleaner and carburetor
- 3) Remove the control base and governor arm

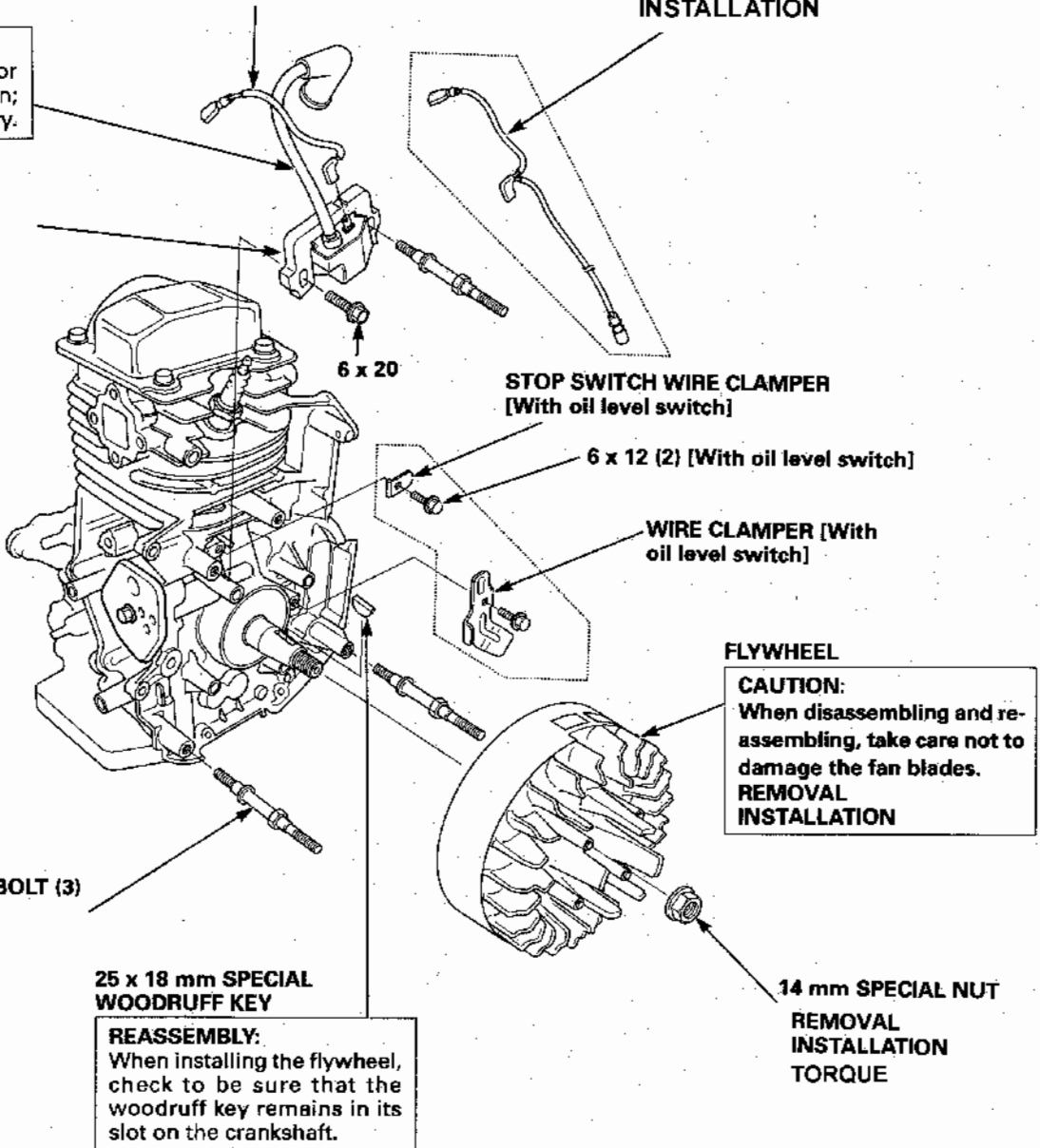
HIGH TENSION CORD

REASSEMBLY:
Check for cracked or damaged insulation; replace if necessary.

IGNITION COIL INSPECTION ADJUSTMENT

STOP SWITCH WIRE
[Without oil level switch]

STOP SWITCH WIRE
[With oil level switch]
INSTALLATION



FLYWHEEL

CAUTION:
When disassembling and re-assembling, take care not to damage the fan blades.
**REMOVAL
INSTALLATION**

25 x 18 mm SPECIAL
WOODRUFF KEY

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

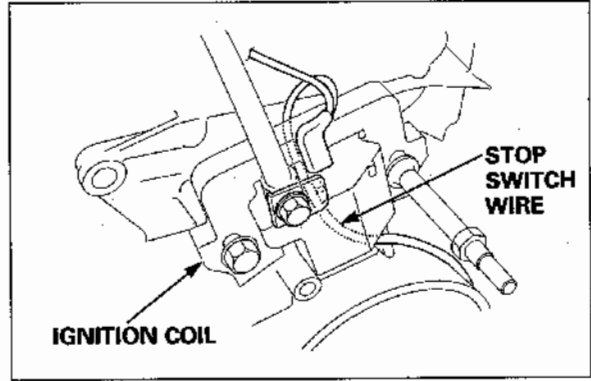
14 mm SPECIAL NUT
REMOVAL
INSTALLATION
TORQUE

FAN COVER STUD BOLT (3)
TORQUE

● STOP SWITCH WIRE [With oil level switch]

INSTALLATION:

Pass the stop switch wire through the back side of the ignition coil as shown.



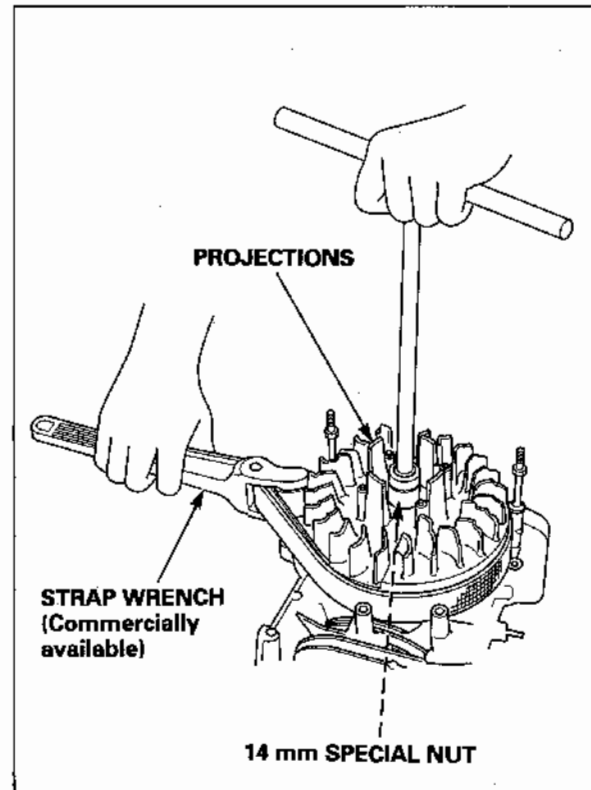
● 14 mm SPECIAL NUT/FLYWHEEL

REMOVAL:

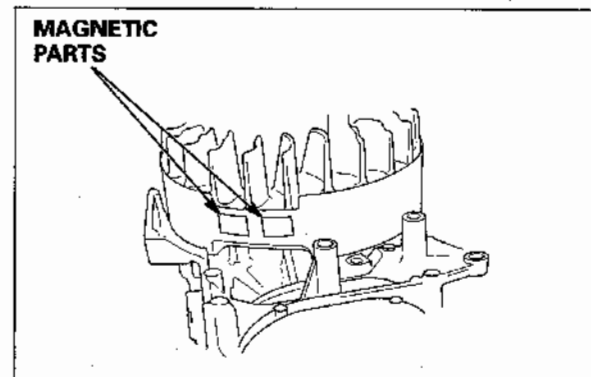
- 1) Remove the ignition coil
- 2) Holding the flywheel with a commercially available strap wrench, remove the 14 mm special nut.

CAUTION:

Do not loosen the nut by using a screw driver or equivalent tool on the fan blade or projection.



- 3) Set the magnetic parts of the flywheel in the position shown.



- 4) Use a commercially available 6 - inch flywheel puller on the flywheel; plate the jaws of the puller so they are at the part under the magnetic parts of the flywheel.

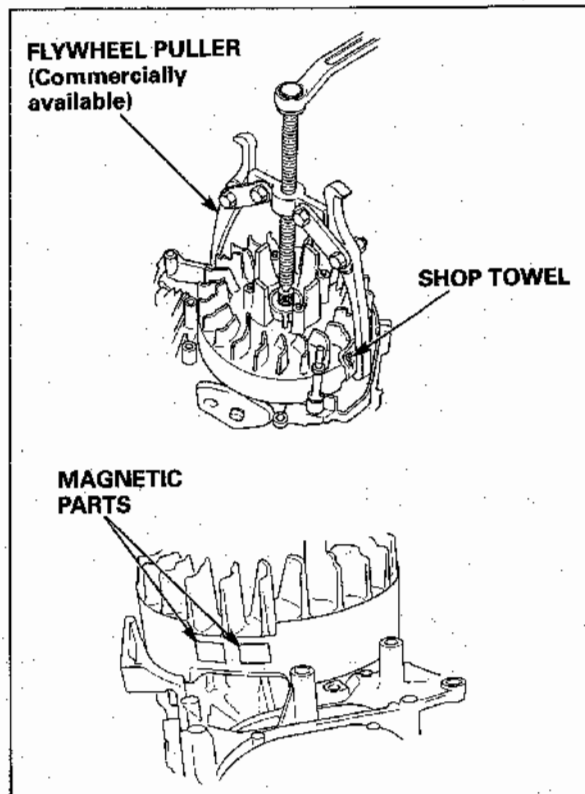
NOTE:

- Do not set the flywheel puller at any parts other than under the magnetic parts.
- Set a shop towel or equivalent cloth between the flywheel and the puller.

- 5) Tighten the flywheel puller and remove the flywheel.

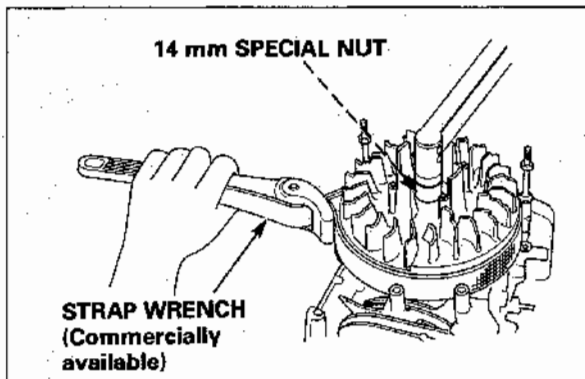
CAUTION:

Do not hit the flywheel with a hammer.

**INSTALLATION:****CAUTION:**

- Make sure the tapered part is free of dirt, oil, grease and other foreign material before installation.
- Make sure that there is no washer or foreign material on the magnetic part.

- 1) Be sure that the woodruff key is set in the key groove properly.
- 2) Install the flywheel.
- 3) Apply oil to the threads.
- 4) Holding the flywheel with a commercially available strap wrench, tighten the 14 mm special nut to the specified torque.

TORQUE

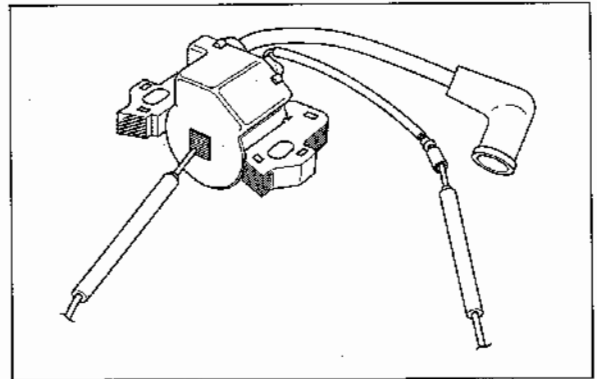
INSPECTION

● IGNITION COIL

< Primary side >

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

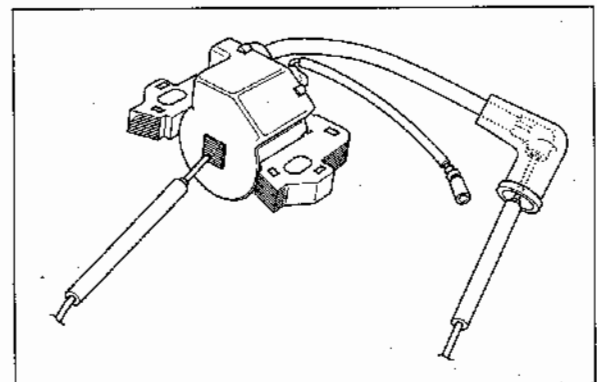
Primary side resistance



< Secondary side >

Attach a tester lead between the spark plug cap and iron core, and measure the resistance of the secondary coil.

Secondary side resistance



ADJUSTMENT

● IGNITION COIL AIR GAP

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

- 1) Loosen the ignition coil bolts.
- 2) Insert a long feeler gauge of the proper thickness between the ignition coil and the flywheel.

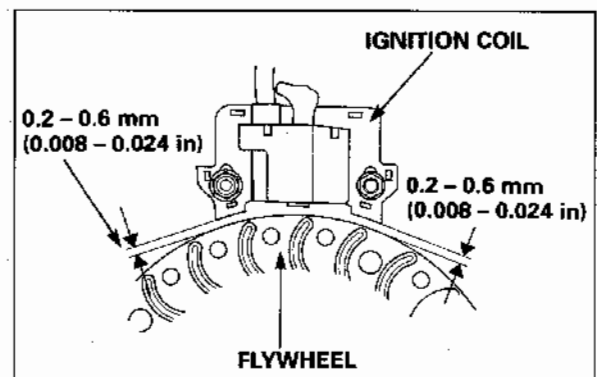
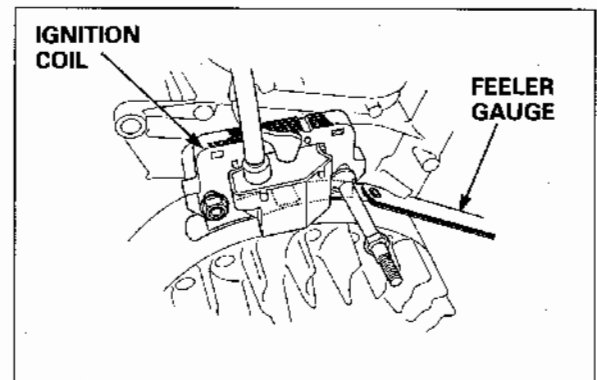
Both gaps should be adjusted simultaneously.

- 3) Push the ignition coil firmly toward the flywheel and tighten the bolts.

Specified clearance

NOTE:

Avoid the magnet part of the flywheel when adjusting.



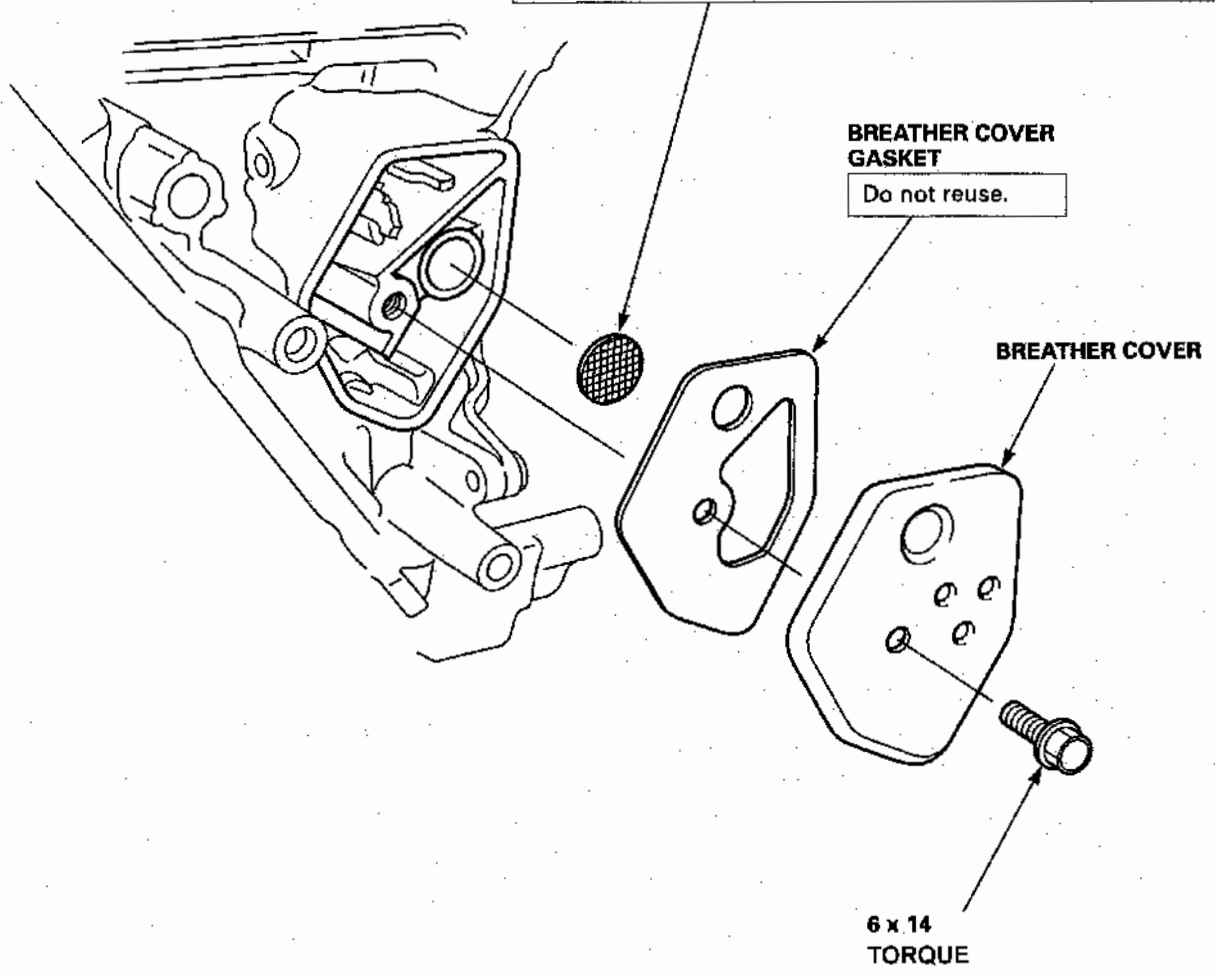
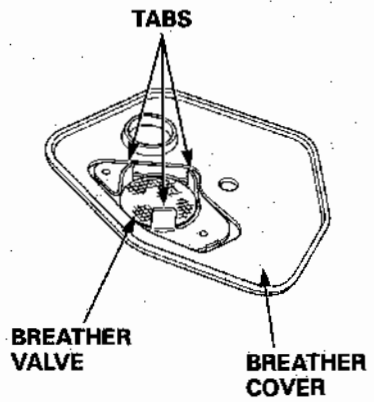
BREATHER VALVE

REMOVAL/INSTALLATION

- 1) Remove the air cleaner and carburetor
- 2) Remove the governor spring

BREATHER VALVE

INSTALLATION:
Be sure that the breather valve is set inside the three tabs of the breather cover as shown.



CAM PULLEY/ROCKER ARM

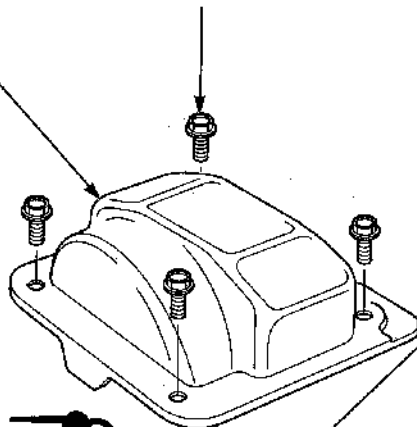
REMOVAL/INSTALLATION

CYLINDER HEAD COVER
REMOVAL
INSTALLATION

6 x 12 (4)
TORQUE

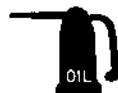


VALVE ADJUSTING
SCREW (2)
ADJUSTMENT



VALVE ADJUSTING
LOCK NUT (2)
TORQUE

EXHAUST ROCKER ARM
INSPECTION

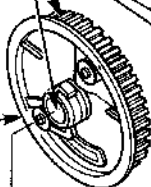


ROCKER ARM
SHAFT (2)
INSPECTION
INSTALLATION

CAM PULLEY

DECOMPRESSOR WEIGHT
INSPECTION
INSPECTION
INSTALLATION

Take care not to drop the
cam pulley.



INTAKE ROCKER ARM
INSPECTION

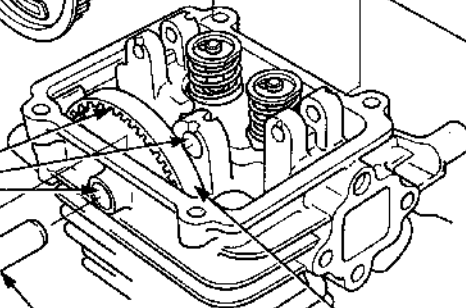


6.8 x 1.9 mm O-RING

Do not reuse.

CAM PULLEY SHAFT
INSPECTION

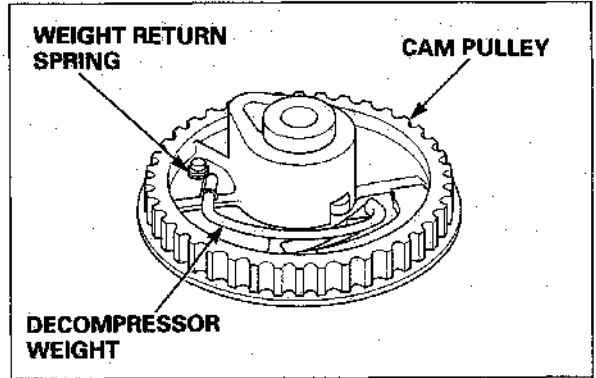
TIMING BELT



● CAM PULLEY

DECOMPRESSOR WEIGHT INSPECTION:

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

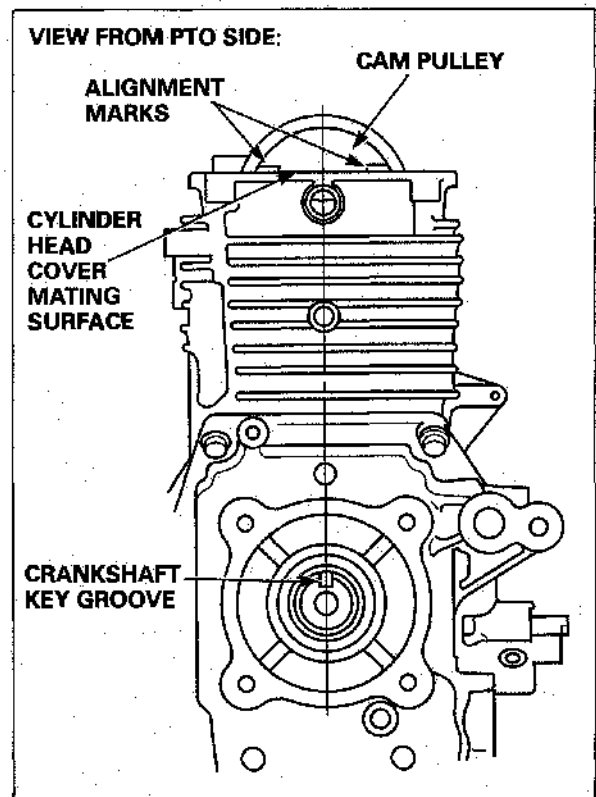


INSTALLATION:

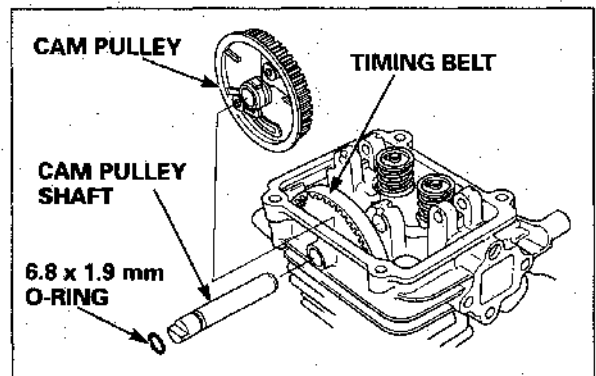
- 1) Turn the crankshaft so that the crankshaft key groove (PTO side) faces up as shown.
- 2) Install the cam pulley on the timing belt so that the cam pulley alignment marks are in line with the cylinder head cover mating surface.

NOTE:

Install the cam pulley on the timing belt with care not to turn the crankshaft.



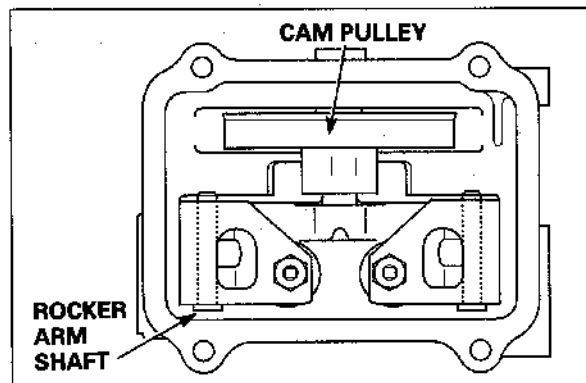
- 3) Apply oil to the 6.8 x 1.9 mm O-ring and install it on the cam pulley shaft.
- 4) Install the cam pulley shaft in the cylinder barrel.
- 5) Holding the cam pulley alignment marks in line with the cylinder head cover mating surface, check again whether the crankshaft key groove is facing up.
- 6) If the key groove is not facing up, repeat the procedure from the step 1.



● ROCKER ARM SHAFT

INSTALLATION:

Install the rocker arm shaft from the opposite side of the cam pulley as shown.



● CYLINDER HEAD COVER

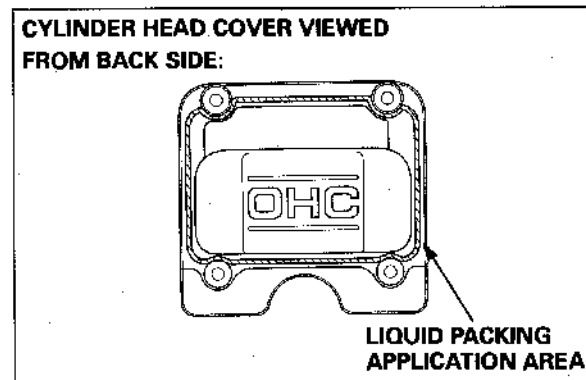
INSTALLATION:

- 1) Clean the mating surfaces of the cylinder head cover and the cylinder barrel using a degreasing cleaning agent or a clean shop towel.
- 2) Apply a liquid packing (Three Bond 1207 Honda Bond #4 or equivalent) to the cylinder head cover; specifically to the inner wall of the groove and bolt hole in the cylinder head cover.

NOTE:

Assemble within 10 minutes after applying the liquid packing.

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



8. CAM PULLEY/CRANKSHAFT/ GC160 • GC190 • GS190 PISTON/CYLINDER BARREL

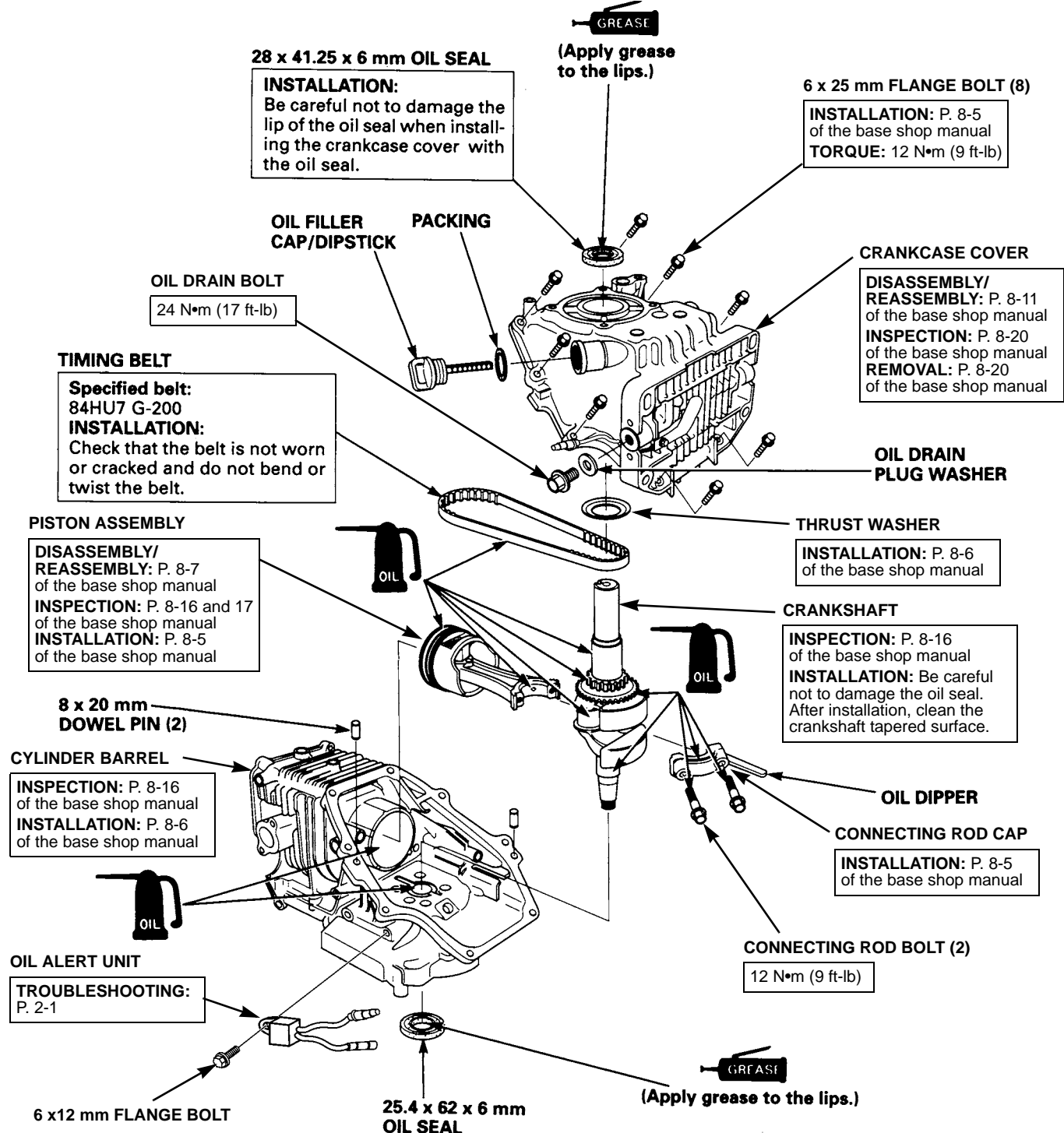
1. CRANKCASE COVER/CRANKSHAFT/CYLINDER BARREL 8-1

1. CRANKCASE COVER/CRANKSHAFT/CYLINDER BARREL

a. REMOVAL/INSTALLATION

Oil Alert Unit Type

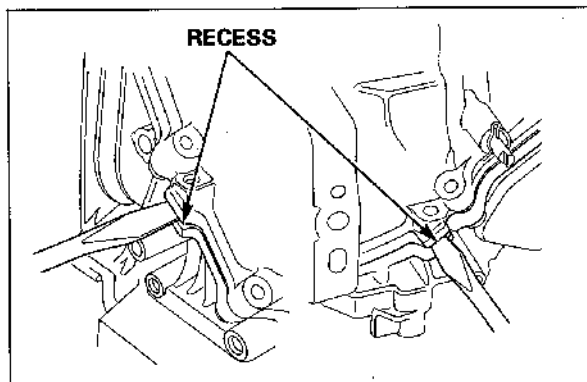
Remove the cam pulley and rocker arm (P. 8-1 of the base shop manual).



● CRANKCASE COVER

REMOVAL:

Insert a screw driver or equivalent tool into the recess as shown, and remove the crankcase cover from the cylinder barrel.



● PISTON ASSEMBLY/CONNECTING ROD CAP

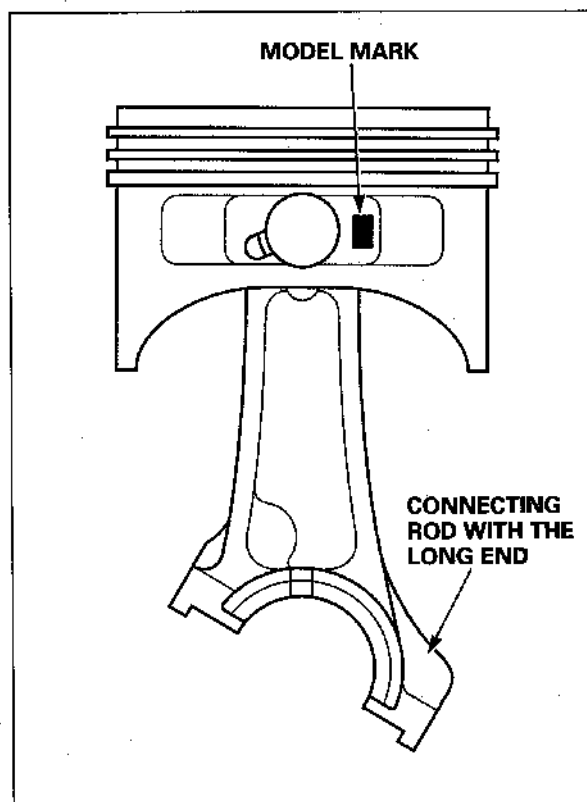
INSTALLATION:

- 1) Apply oil to the inner wall of the cylinder and to the outer surface of the piston.
- 2) Install the piston assembly in the cylinder so that the model mark (ZL8) by the piston pin hole and the longer side of the connecting rod big end are at the right side. (The crankshaft must be at the top dead center of the compression stroke.)

CAUTION:

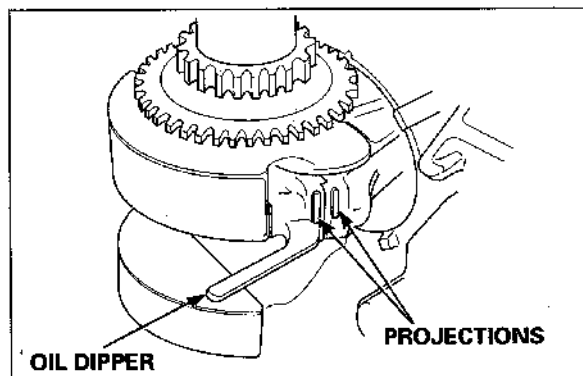
Take care not to break the piston ring when installing the piston assembly in the cylinder.

- 3) Install the crankshaft in the cylinder barrel
- 4) Apply oil to the connecting rod big end bearing and the crank pin, then connect the connecting rod to the crank pin.



- 5) Apply oil to the connecting rod cap bearing.
- 6) Install so that the projection by the oil dipper and the projection of the connecting rod face in the same direction. Note that the oil dipper must be on the right hand side at this time.
- 7) Tighten the connecting rod bolts to the specified torque.

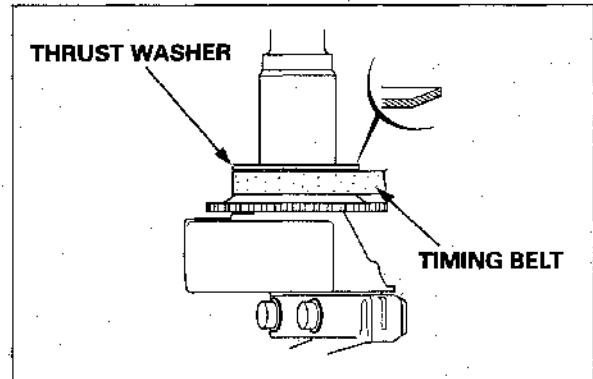
TORQUE



● THRUST WASHER

INSTALLATION:

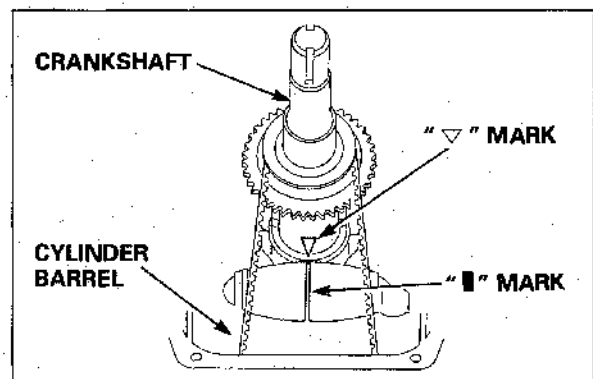
- 1) Install the timing belt on the timing belt pulley.
- 2) Note the installation direction



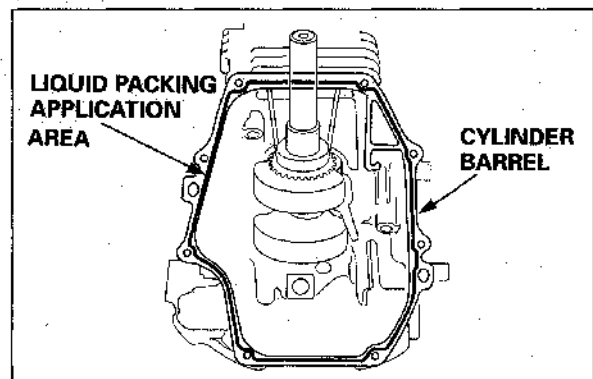
● CYLINDER BARREL/6 x 25 mm FLANGE BOLT

INSTALLATION:

- 1) Align the "I" mark on the cylinder barrel with the "▽" mark on the crankshaft.
- 2) Install the cam pulley



- 3) Clean the mating surfaces of the cylinder barrel and the crankcase cover using a degreasing cleaning agent or a clean shop towel.
- 4) Set the two 8 x 20 mm dowel pins on the cylinder barrel.
- 5) Apply a bead [\varnothing 1.5 - 2.0 mm (\varnothing 0.06 - 0.08 in)] of liquid packing (Three Bond 1207, Honda Bond #4, or equivalent) to the crankcase cover mating surface of the cylinder barrel.



- 6) Install the crankcase cover on the cylinder barrel.

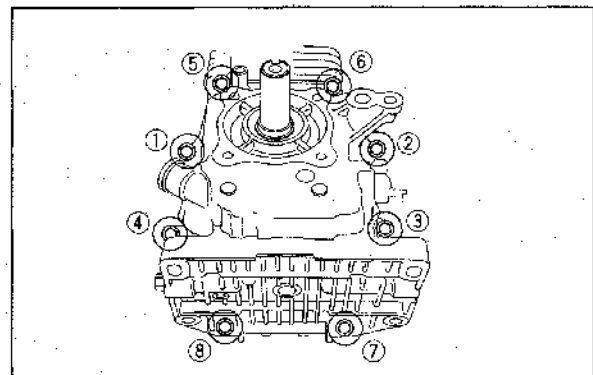
NOTE:

- Assemble within 10 minutes after applying the liquid packing.
- If it is hard to install the crankcase cover securely, assemble by turning the crankshaft a little.

- 7) Loosely tighten each 6 x 25mm flange bolt, then tighten to the specified torque in the numbered sequence.

TORQUE

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



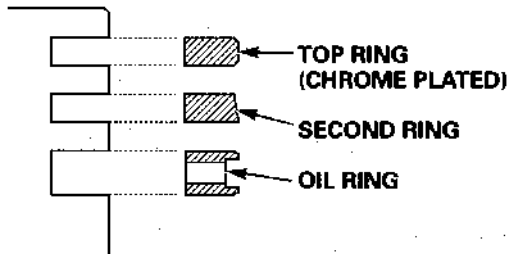
PISTON

DISASSEMBLY/REASSEMBLY

PISTON RINGS

INSPECTION REASSEMBLY:

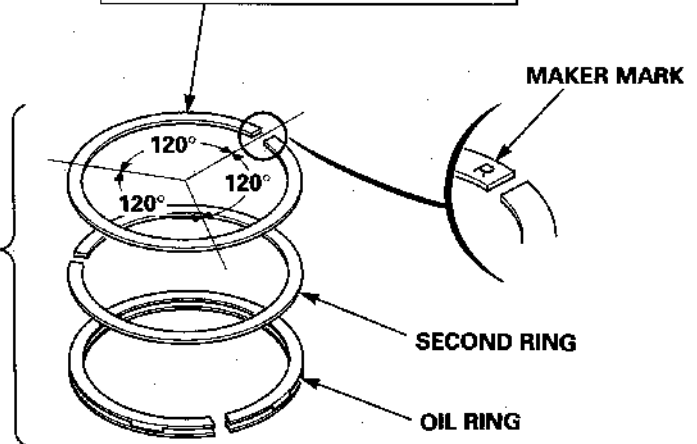
- Install with the maker mark facing upward as shown.
- Do not interchange the top ring and the second ring.
- After assembly, check for smooth movement of the piston ring.
- Stagger the piston ring end gaps 120° apart. Do not align with the piston pin.



TOP RING

REASSEMBLY:

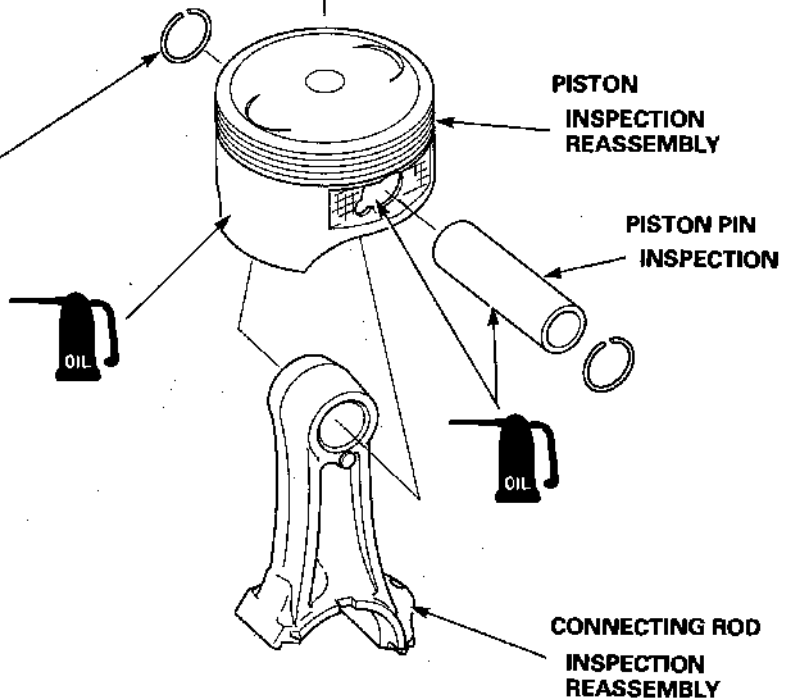
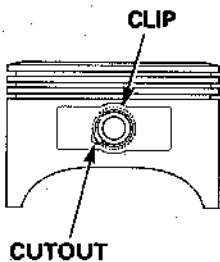
Chrome plated. Do not interchange with SECOND RING.



PISTON PIN CLIP (2)

REASSEMBLY:

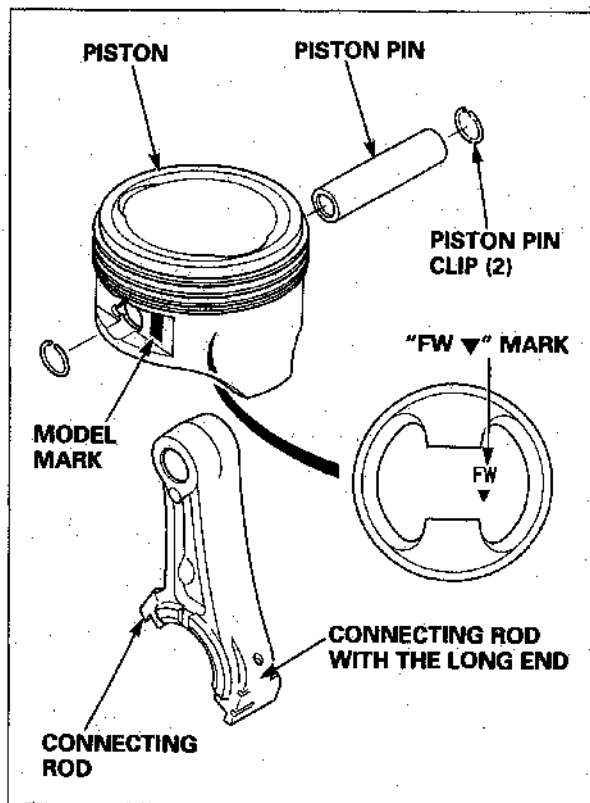
- Install by setting one end of the clip in the piston groove, holding the other end with longnosed pliers, and rotating the clip in.
- Do not align the end gap of the clip with the cutout in the piston pin bore.



● PISTON/CONNECTING ROD

REASSEMBLY:

- 1) Apply oil to the piston pin, piston pin hole and the connecting rod small end.
- 2) Set the piston so that the "▼" of the "FW ▼" mark stamped at the back of the piston points down.
- 3) Set the connecting rod in the piston so that the model mark by the piston pin hole and the longer side of the connecting rod large end face to the right-hand side.
- 4) Apply oil to the piston pin and install it in the piston.
- 5) Install new piston pin clips.
- 6) Install the piston/connecting rod assembly in the cylinder barrel



VALVES

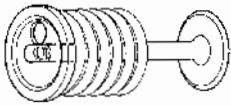
DISASSEMBLY/REASSEMBLY

Remove the crankcase cover, crankshaft and cylinder barrel

VALVE SPRING RETAINER (2)

DISASSEMBLY:

Push down and slide the retainer to the side, so the valve stem slips through the hole at the side of the retainer.



CAUTION:

Do not remove the valve spring retainer while the piston is installed, or the valves will drop into the cylinder.

VALVE SPRING (2) INSPECTION

SPARK PLUG

INSPECTION/CLEANING:

Standard spark plug:

VALVE GUIDE INSPECTION

CYLINDER BARREL CLEANING

EXHAUST VALVE

REASSEMBLY:

Before installation, remove carbon deposits and inspect the valve.

INSPECTION

INTAKE VALVE

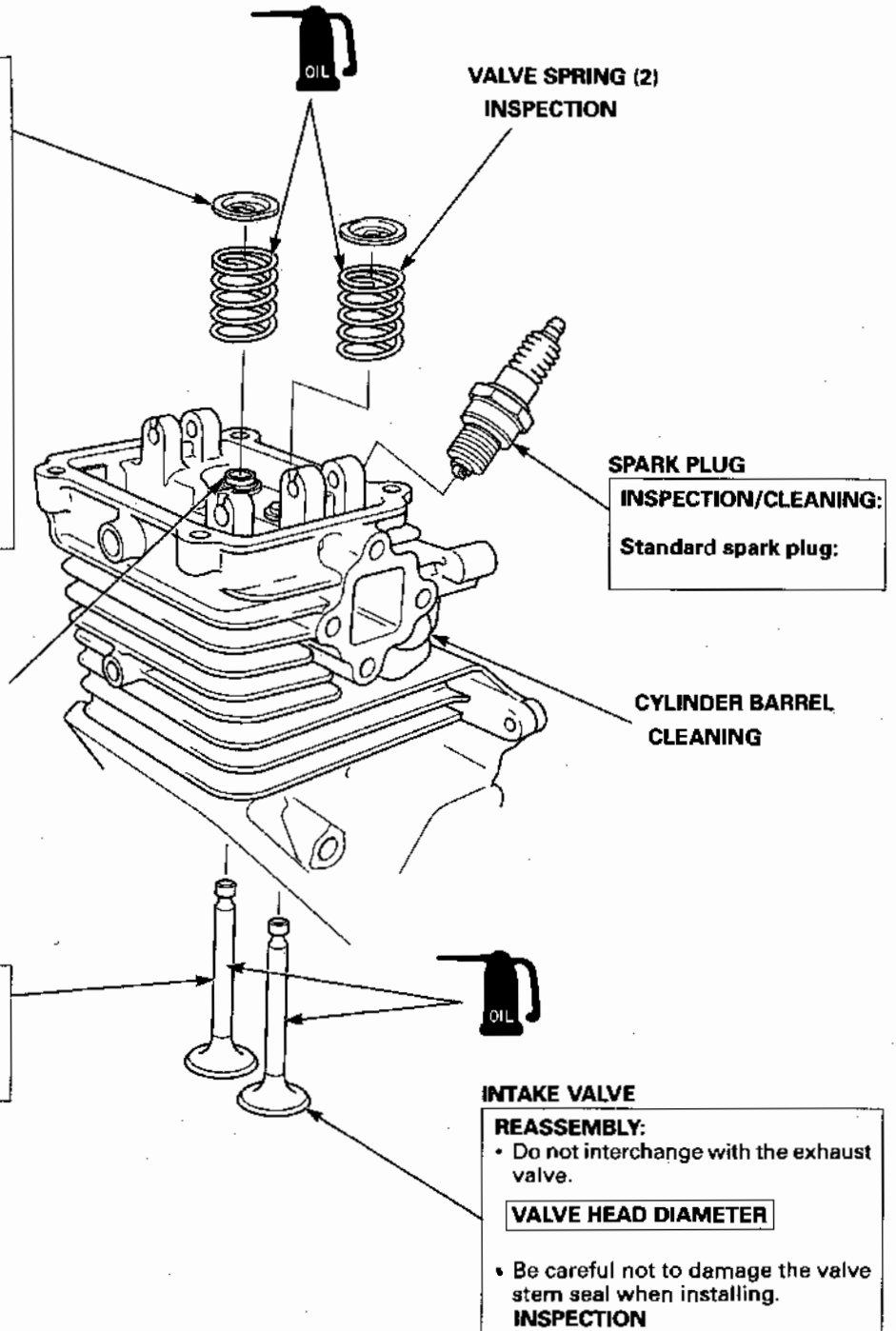
REASSEMBLY:

- Do not interchange with the exhaust valve.

VALVE HEAD DIAMETER

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

INSPECTION



● CYLINDER BARREL

Combustion chamber cleaning:

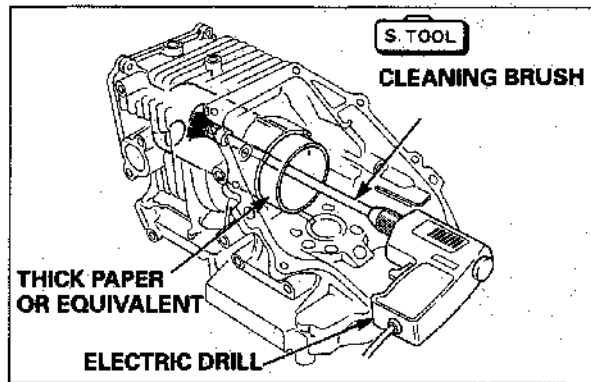
- 1) Prepare a cylinder of thick paper or equivalent material, with a diameter large enough to fit against the inner wall of the cylinder, and insert it into the cylinder for protection.
- 2) Attach the cleaning brush (special tool) to an electric drill and clean the combustion chamber.

TOOL:

Cleaning brush

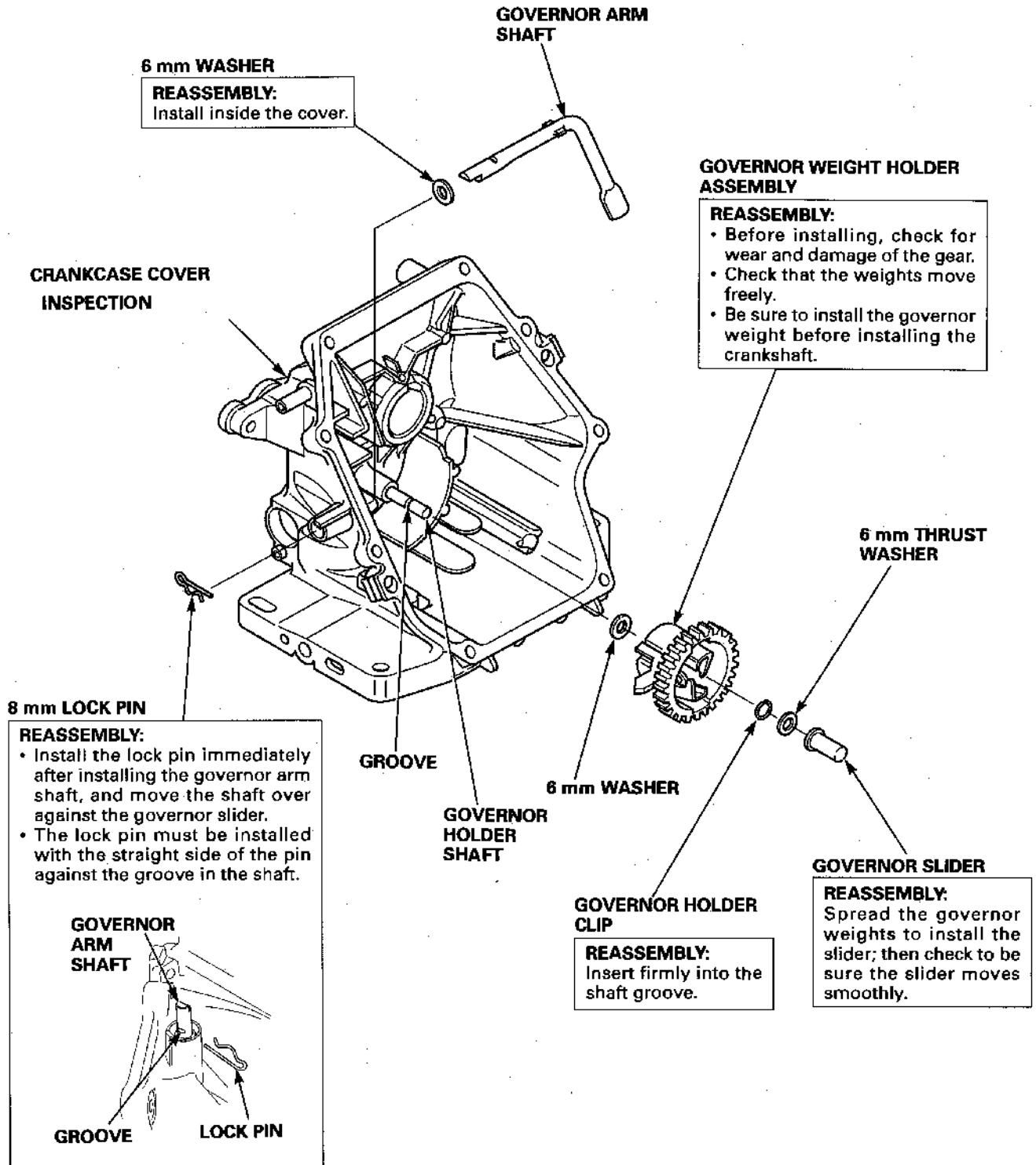
CAUTION:

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

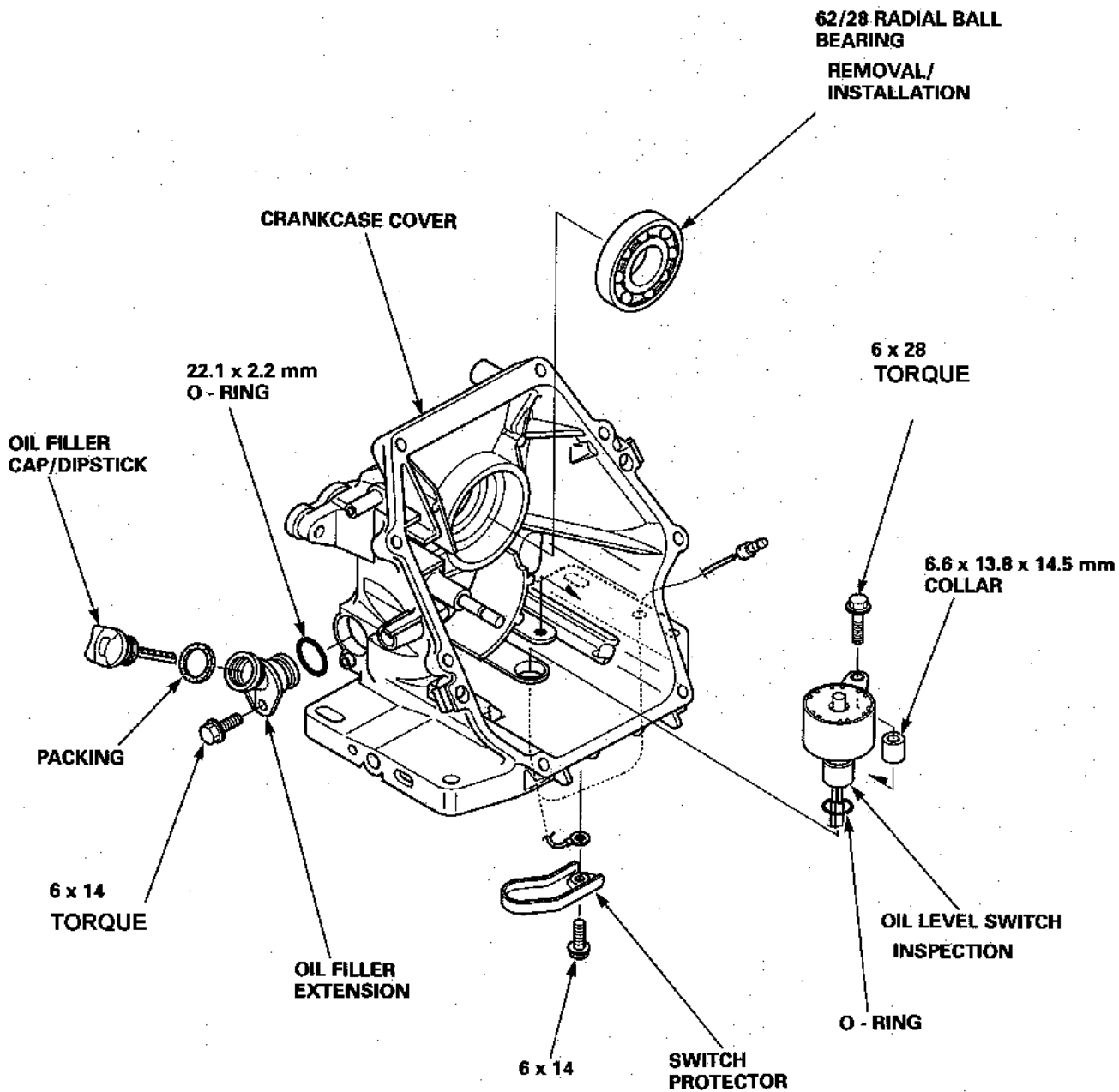


GOVERNOR

DISASSEMBLY/REASSEMBLY



- With oil level switch, oil filler extension and bearing only.



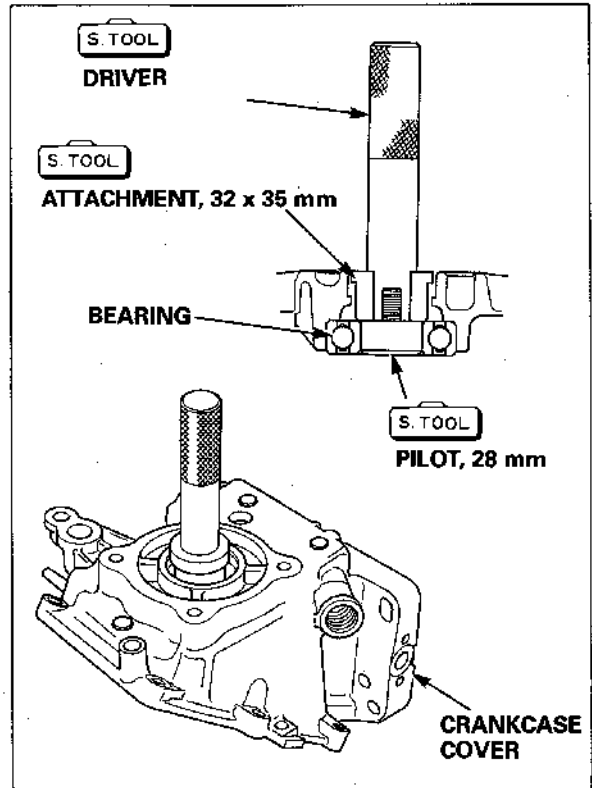
● 62/68 RADIAL BALL BEARING

REMOVAL:

Remove the 62/28 radial ball bearing using the special tools as shown.

TOOLS:

Driver
Attachment, 32 x 35 mm
Pilot, 28 mm

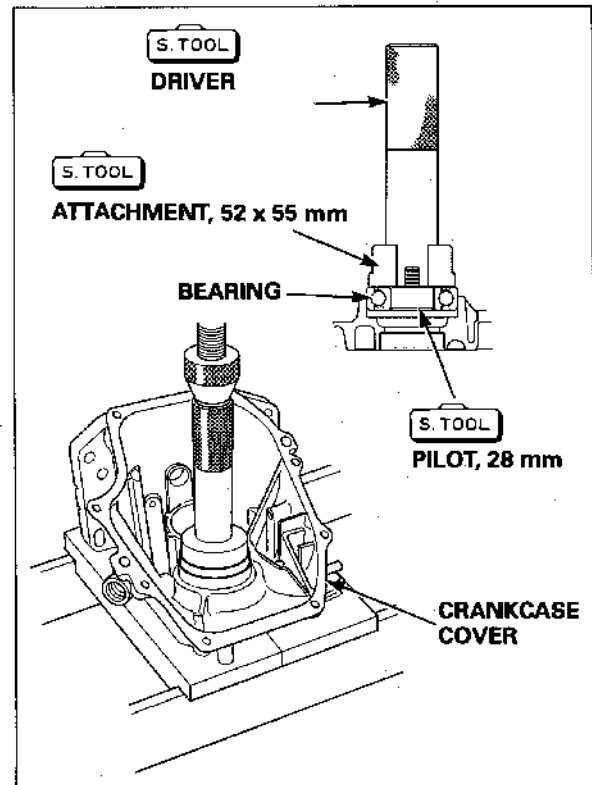


INSTALLATION:

- 1) Apply engine oil to the circumference of a new radial ball bearing.
- 2) Install the 62/28 radial ball bearing in the crankcase cover using the special tools as shown.

TOOLS:

Driver
Attachment, 52 x 55 mm
Pilot, 28 mm

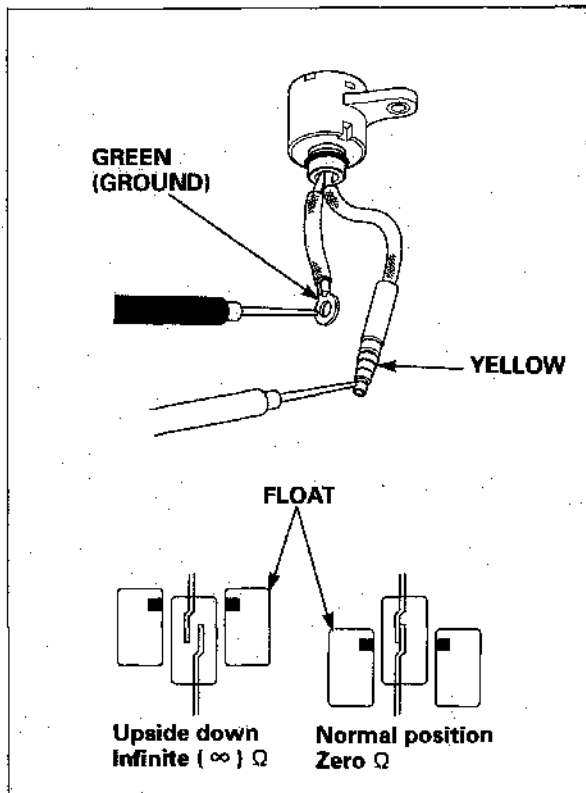


INSPECTION

● OIL LEVEL SWITCH

Check continuity between the yellow switch wire and ground with an ohmmeter.

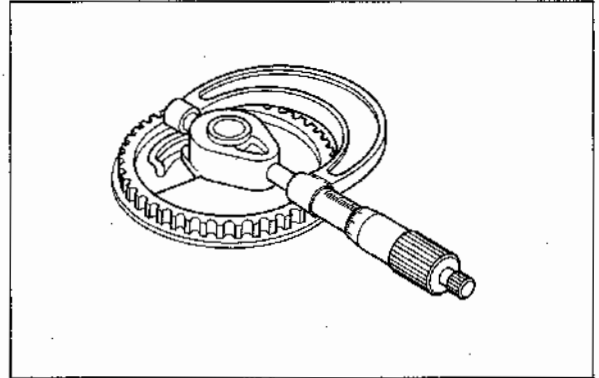
- 1) Hold the switch in its normal position. The ohmmeter should read zero resistance.
- 2) Hold the switch upside down. The ohmmeter should read infinite (∞) resistance.
- 3) Inspect the float by dipping the switch into a container of oil. The ohmmeter reading should go from zero to infinity as the switch is lowered.



INSPECTION

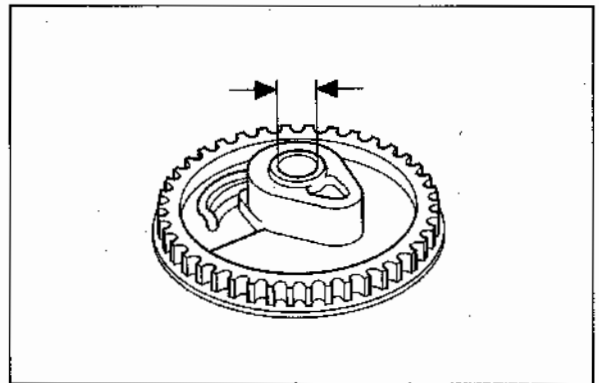
● CAM PULLEY CAM HEIGHT

Standard	Service limit



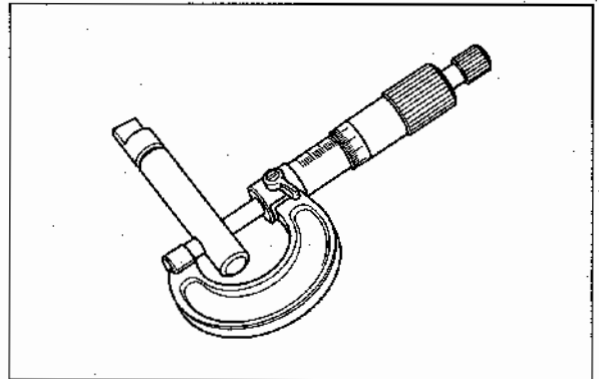
● CAM PULLEY I.D. (BEARING)

Standard	Service limit



● CAM PULLEY SHAFT O.D.

Standard	Service limit

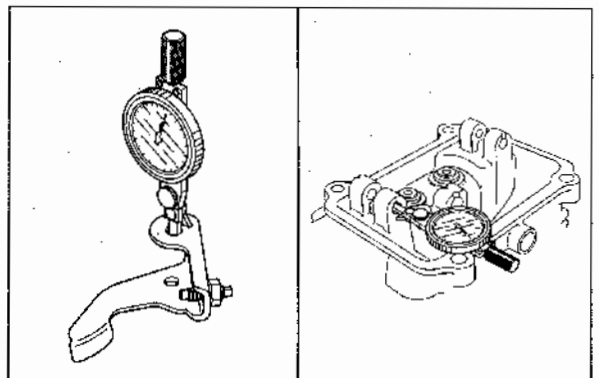


● ROCKER ARM I.D.

Standard	Service limit

● ROCKER ARM SHAFT BEARING I.D.

Standard	Service limit



HONDA

GC135 • GC160

● ROCKER ARM SHAFT O.D.

Standard	Service limit
5.990 mm (0.2358 in)	5.953 mm (0.2344 in)

● ROCKER ARM-TO-ROCKER ARM SHAFT CLEARANCE

● ROCKER ARM SHAFT BEARING-TO-ROCKER ARM SHAFT CLEARANCE

Standard	Service limit
0.010 – 0.058 mm (0.0004 – 0.0023 in)	0.07 mm (0.003 in)

● CYLINDER I.D.

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

Standard	Service limit
64.0 mm (2.52 in)	64.165 mm (2.5262 in)

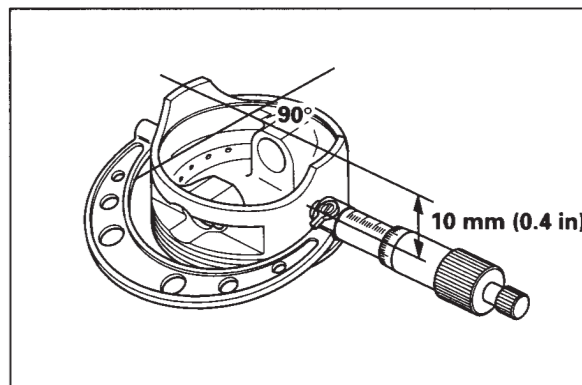
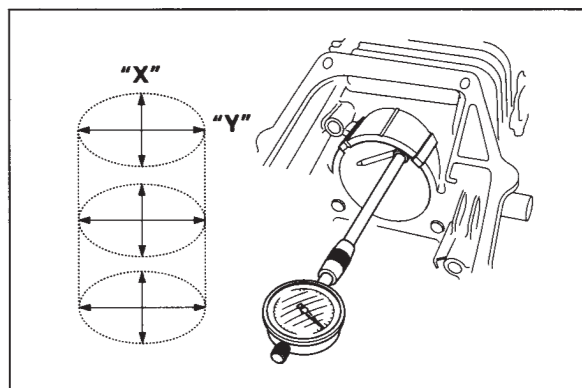
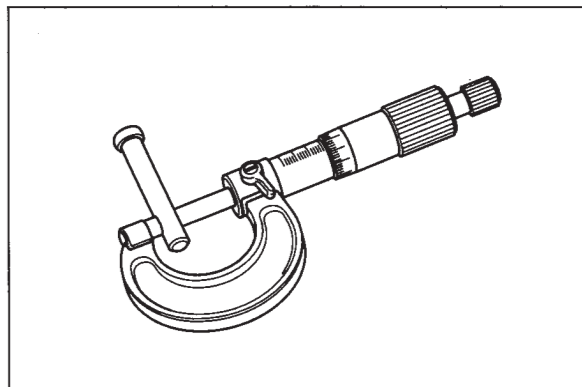
● PISTON SKIRT O.D.

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

Standard	Service limit
63.969 mm (2.5185 in)	63.829 mm (2.5129 in)

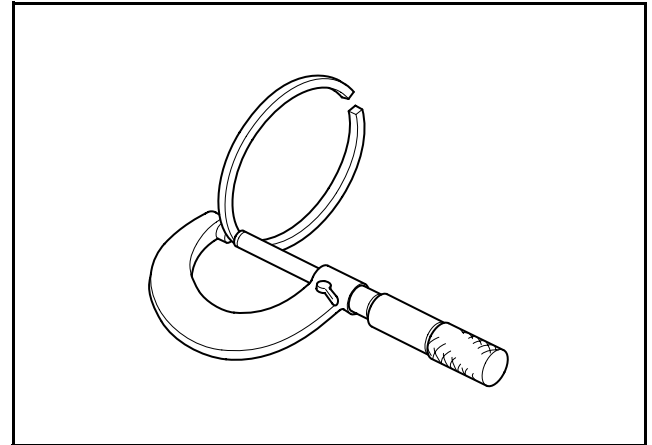
● PISTON-TO-CYLINDER CLEARANCE

Standard	Service limit
0.013 – 0.070 mm (0.0012 – 0.0028 in)	0.12 mm (0.005 in)



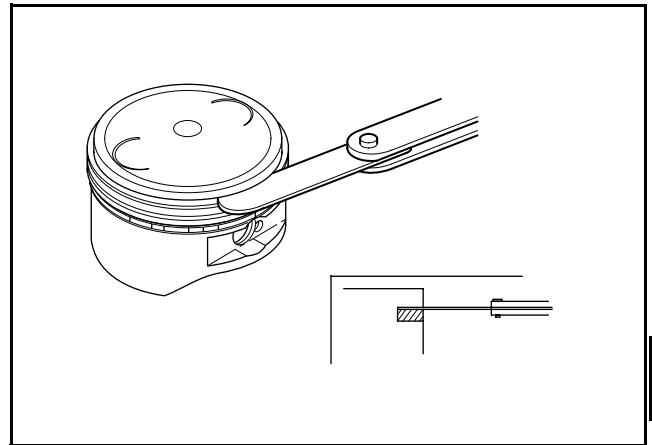
• PISTON RING WIDTH

	Standard	Service limit
Top ring (GC160LA)	0.93 ~ 0.95 mm (0.036 ~ 0.037 in)	0.91 mm (0.035 in)
Top ring (GC/GS190LA)	0.95 ~ 0.97 mm (0.037 ~ 0.038 in)	0.93 mm (0.036 in)
Second ring	0.97 ~ 0.99 mm (0.038 ~ 0.039 in)	0.95 mm (0.037 in)



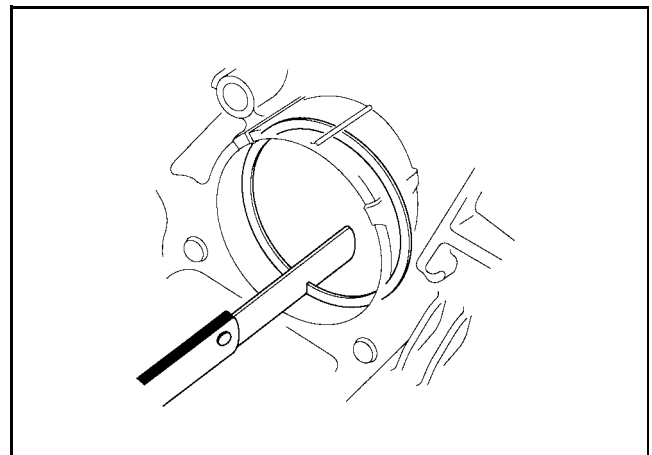
• PISTON RING SIDE CLEARANCE

	Standard	Service limit
Top ring (GC160LA)	0.055 ~ 0.089 mm (0.002 ~ 0.004 in)	0.150 mm (0.006 in)
Top ring (GC/GS190LA)	0.035 ~ 0.069 mm (0.001 ~ 0.003 in)	0.150 mm (0.006 in)
Second ring	0.015 ~ 0.049 mm (0.0006 ~ 0.0019 in)	0.150 mm (0.006 in)



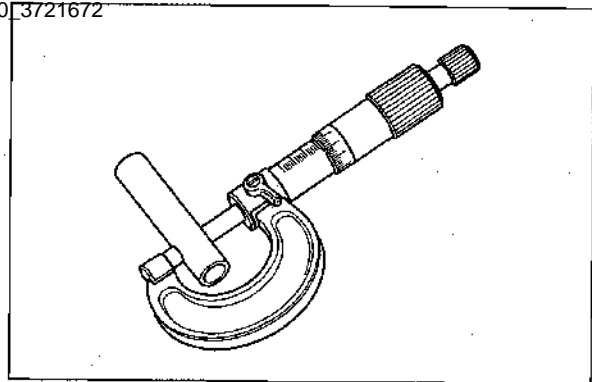
• PISTON RING END GAP

	Standard	Service limit
Top ring	0.20 ~ 0.35 mm (0.008 ~ 0.014 in)	1.00 mm (0.040 in)
Second ring	0.35 ~ 0.50 mm (0.014 ~ 0.020 in)	1.00 mm (0.040 in)
Oil ring	0.20 ~ 0.70 mm (0.008 ~ 0.030 in)	1.00 mm (0.040 in)

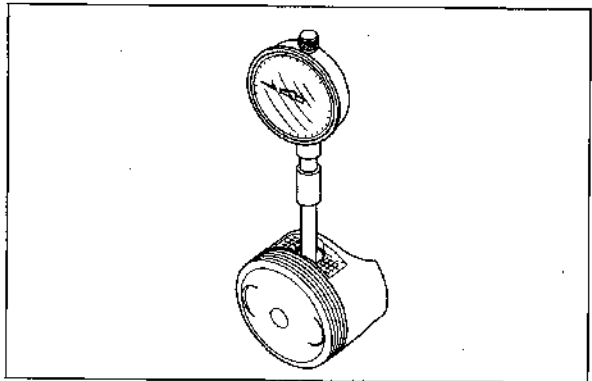


● PISTON PIN O.D.

Standard	Service limit
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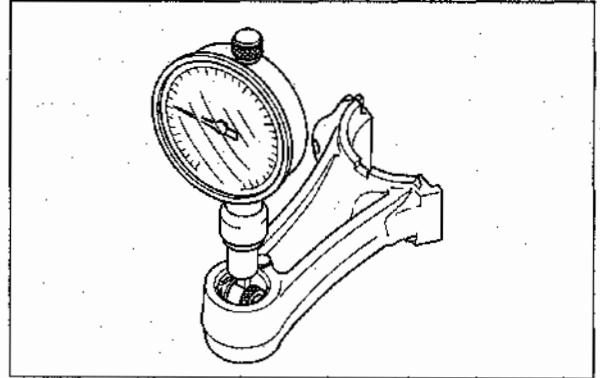
**● PISTON PIN BORE I.D.**

Standard	Service limit
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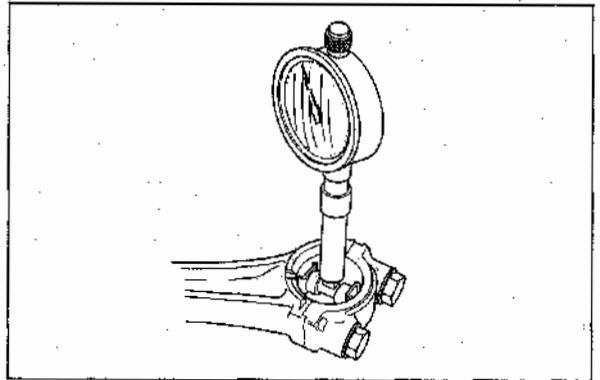
● **CONNECTING ROD SMALL END I.D.**

Standard	Service limit
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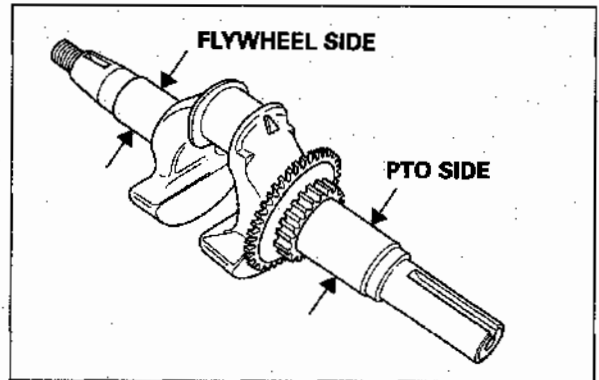
● **CONNECTING ROD BIG END I.D.**

Standard	Service limit
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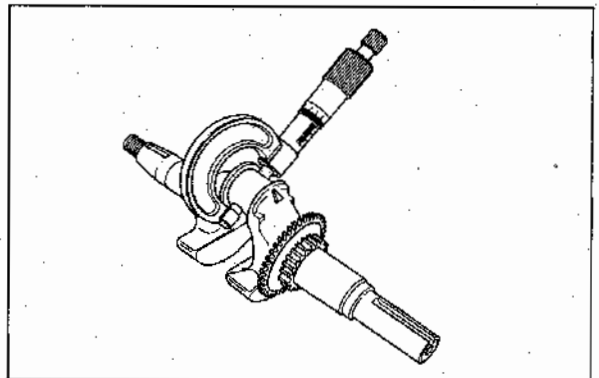
● **CRANKSHAFT MAIN JOURNAL O.D.**

Standard	Service limit
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● **CRANK PIN O.D.**

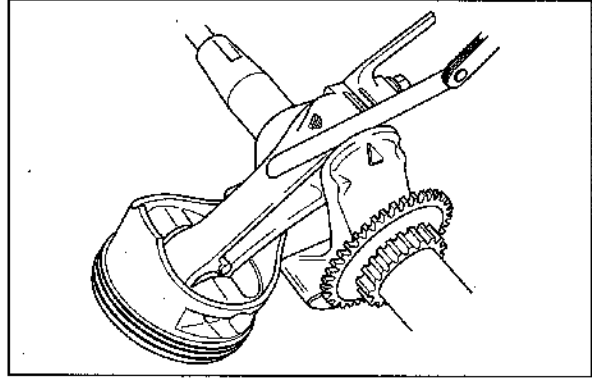
Standard	Service limit
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● CONNECTING ROD BIG END AXIAL CLEARANCE

Measure the clearances with a feeler gauge.

Standard	Service limit
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● CONNECTING ROD BIG END OIL CLEARANCE

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

TORQUE

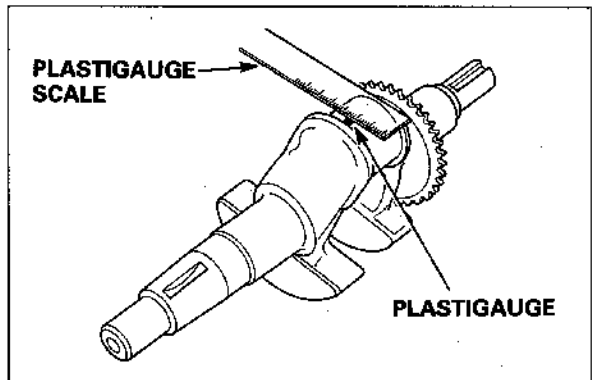
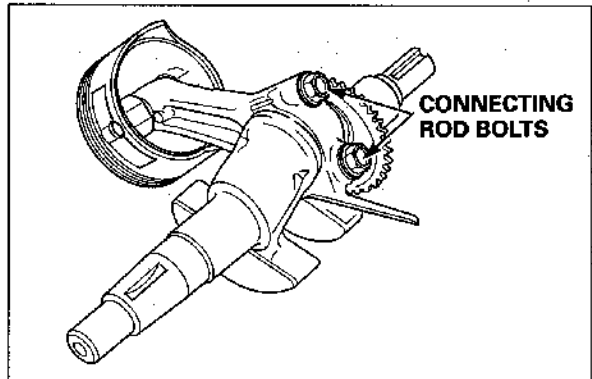
NOTE:

- Place the plastigauge axially.
- Tighten the two bolts equally while holding the crankshaft to keep it from turning.

- 3) Remove the connecting rod cap and measure the plastigauge with the scale.

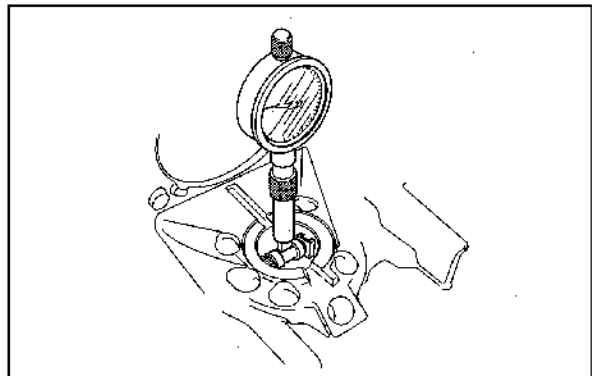
Standard	Service limit
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- 4) If the clearance exceeds the service limit, replace the connecting rod and recheck the clearance.



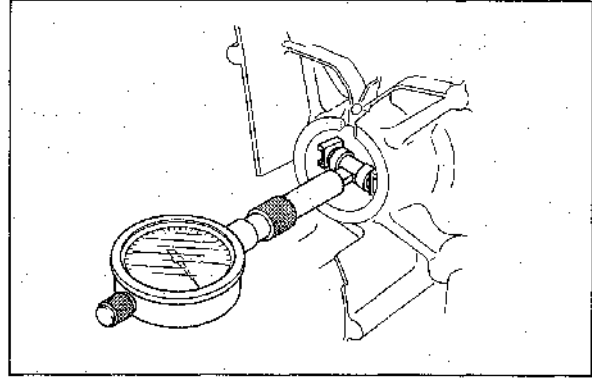
● CYLINDER BARREL MAIN JOURNAL I.D.

Standard	Service limit
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● CRANKCASE COVER MAIN JOURNAL I. D.

Standard	Service limit
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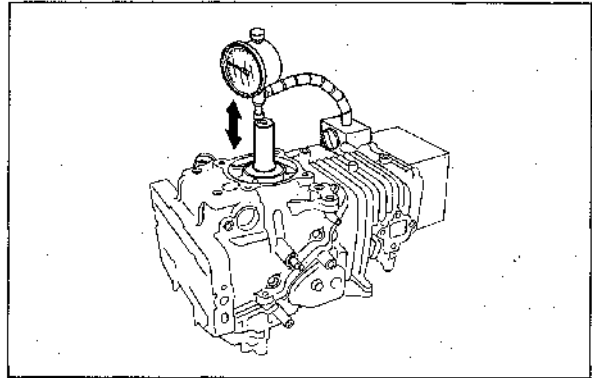
● CRANKSHAFT AXIAL CLEARANCE

Measure the crankshaft axial runout before removing the crankcase cover, crankshaft and piston.

Standard	Service limit
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Replace the crankshaft if the measurement is above the service limit.

Install the new crankshaft and recheck the axial clearance. If it exceeds the service limit, replace the crankcase cover and cylinder barrel.

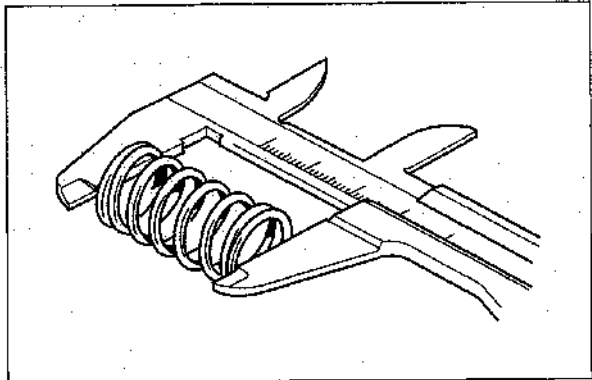


● VALVE SPRING FREE LENGTH

Measure the free length of the valve springs.

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



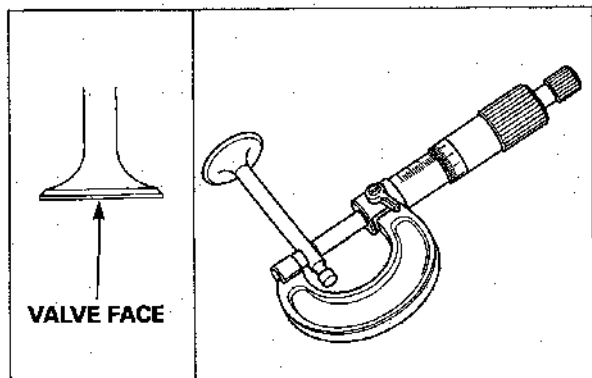
● VALVE FACE / STEM O.D.

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

Measure and record each valve stem O.D.

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

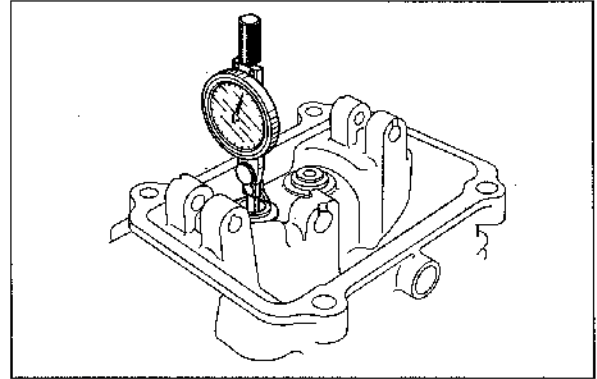


● VALVE GUIDE I.D.

Measure and record each valve guide I.D.

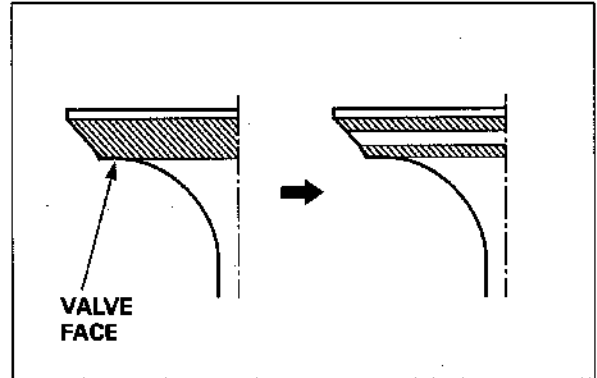
Standard	Service limit
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Replace the cylinder barrel if they are over the service limit



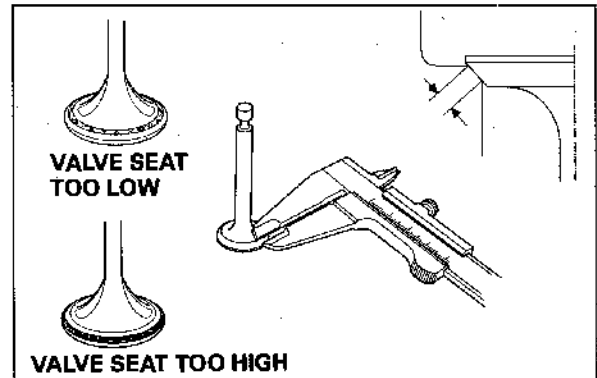
● VALVE SEAT WIDTH

- 1) Thoroughly clean the combustion chambers and valve seats to remove carbon deposits
- 2) Apply a light coat of Prussian Blue compound or erasable felt-tipped marker ink to the valve faces.
- 3) Insert the valves, and then lift them and snap them closed against their seats 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.
- 4) Measure the valve seat width.



Standard	Service limit
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- 5) If the valve seat width is under the standard, or over the service limit, or if the valve seat is too high/low, recondition the valve seat



VALVE SEAT RECONDITIONING

- 1) Thoroughly clean the combustion chambers and valve seats to remove carbon deposits
- 2) Apply a light coat of Prussian Blue compound or erasable felt-tipped marker ink to the valve faces.
- 3) Insert the valves, and then lift them and snap them closed against their seats 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.

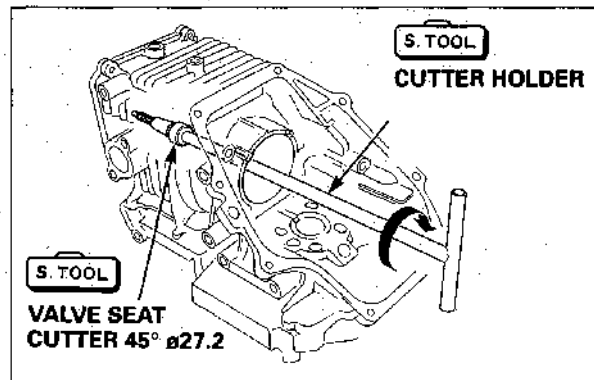
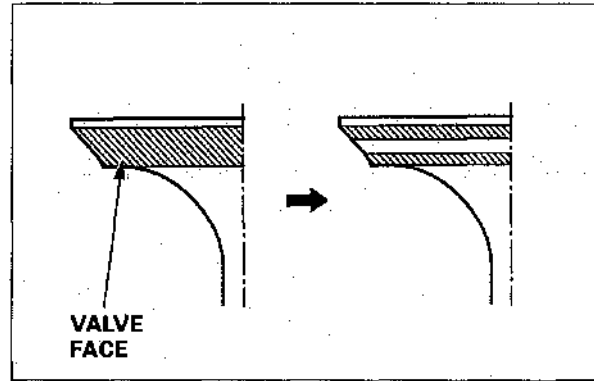
NOTE:

Follow the instructions of the valve seat cutter manufacturer.

- 4) Using a 45° cutter, remove enough material to produce a smooth and concentric seat. Follow the Valve Seat Cutter Manufacturer's Instructions. Turn the cutter clockwise, never counterclockwise. Continue to turn the cutter as you lift it from the valve seat.

TOOLS:

Valve seat cutter, 45° $\varnothing 27.2$
Cutter holder



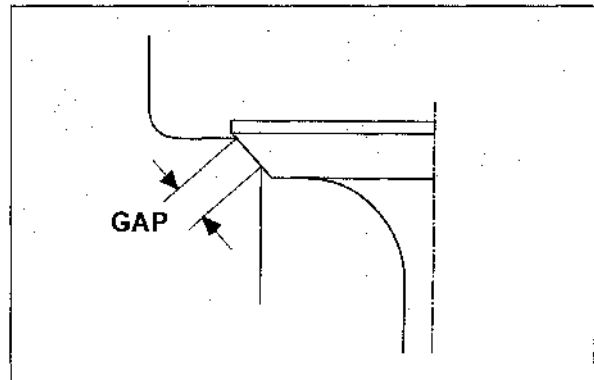
• VALVE SEAT WIDTH

Standard	Service limit
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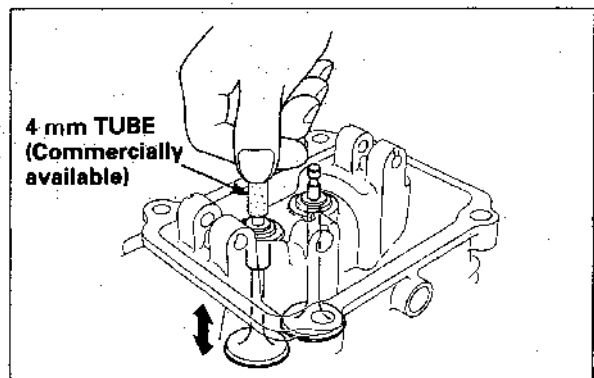
- 5) After resurfacing the seats, inspect for even valve seating. Apply Prussian Blue compound or erasable felt-tipped marker ink to the valve faces. Insert the valves, and then lift them and snap them closed against their seats several times. Be sure the valve does not rotate on the seat. The seating surface, as shown by the transferred marking compound, should have good contact all the way around.
- 6) Lap the valves into their seats, using a 4 mm tube as shown and lapping compound (commercially available).

CAUTION:

To avoid severe engine damage, be sure to remove all lapping compound from the cylinder barrel before assembly.



- 7) Check valve clearance after assembly



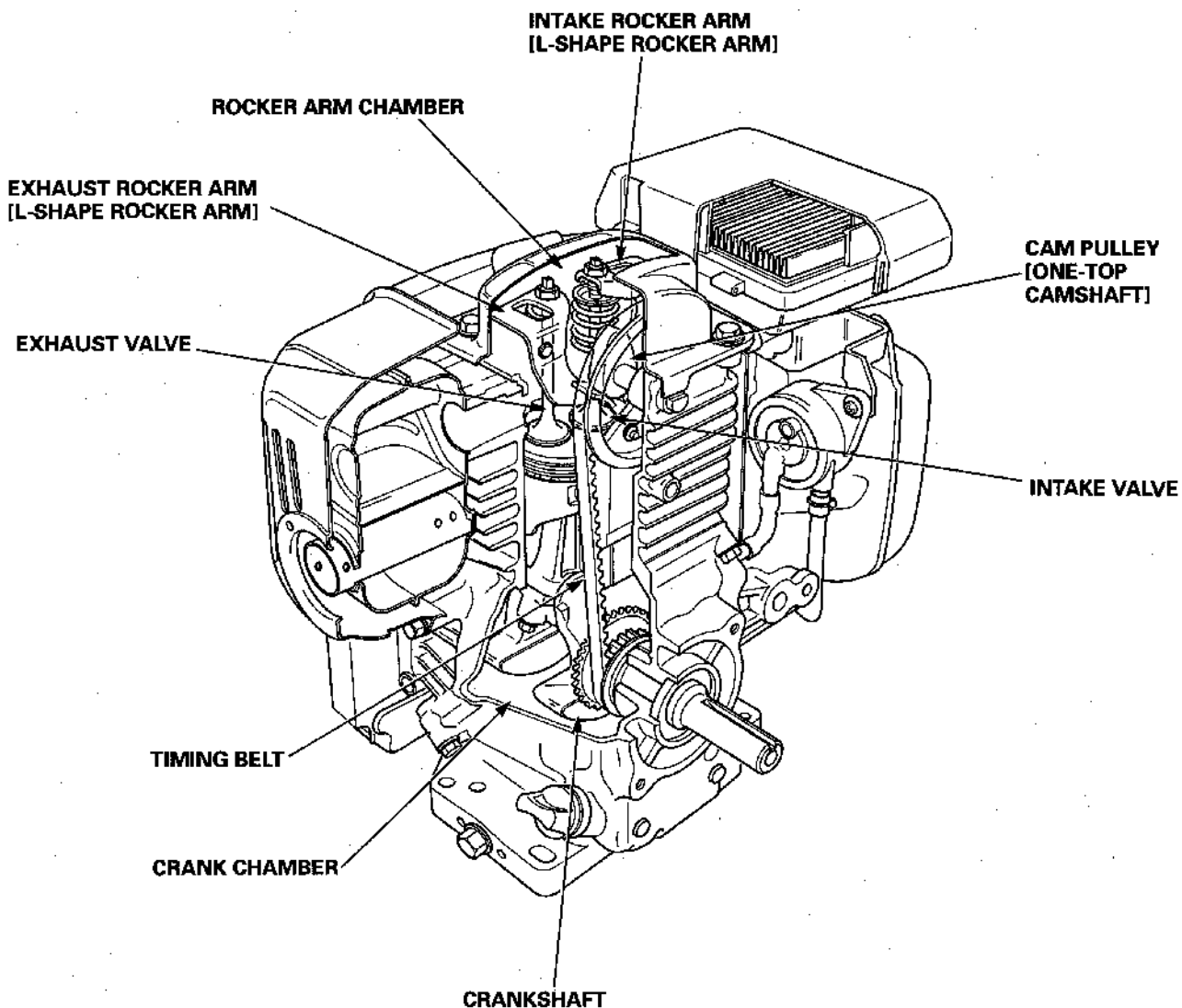
BUILT-IN TIMING BELT

The built-in timing belt is adopted on this model to reduce the mechanical noise.
Note that this timing belt also functions to lubricate oil to the cam and rocker arm chamber.

<Operation>

When the crankshaft turns, the timing belt rotates the single lobe cam which cause the L-shaped rocker arms to operate the valves.

The engine oil in the crank chamber gets on the timing belt surface which is then transmitted to the rocker arm chamber.



GC160

GC190 • GS190

6. FUEL SYSTEM

1. FUEL TANK CAP..... 6-1

1. FUEL TANK CAP

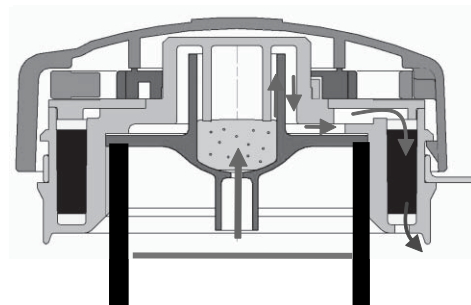
EVAPORATIVE EMISSION CONTROL SYSTEM

These engines have an EVAPORATIVE EMISSION CONTROL CANISTER built into the fuel tank cap to prevent the escape of gasoline vapors into the atmosphere.

PRINCIPLE

CHARGING:

Gasoline vapor produced in the fuel tank at high ambient temperature is absorbed and stored by the charcoal in the canister, which is built into the fuel tank cap.



PURGING:

When the pressure in the fuel tank decreases because of low ambient temperature or consumption of gasoline, the air drawn through the canister releases the stored gasoline vapor from the charcoal. The released gasoline vapor returns to the fuel tank.

