

# **SERVICE MANUAL**

**HONDA GXV-50 ENGINE**

**HONDA GCV-135 ENGINE**

**HONDA GCV-160 ENGINE**

FOR THE 416H, 418H-4.5 AND 418H-5.5  
ALLEN HOVER MOWER

GCV135 (GJAF-1000001-FORWARD)

## SPECIFICATIONS

Model	GCV135
Type	4-stroke, overhead camshaft single cylinder
Displacement	135 cm <sup>3</sup> (8.2 cu-in)
Bore x stroke	64 x 42 mm (2.5 x 1.7 in)
Maximum horsepower	3.3 kW (4.5 HP) at 3,600 rpm
Maximum torque	9.7 N·m (0.99 kgf·m, 7.2 lbf·ft) at 2,500 rpm
Compression ratio	8.5 : 1
Fuel consumption	313g/kWh (230g / HPh, 0.51 lb/HPh)
Cooling system	Forced-air
Ignition system	Transistorized magneto ignition
Ignition timing	20° B. T. D. C.
Spark plug	BPR6ES (NGK)
Carburetor	Horizontal type, butterfly valve
Air cleaner	Dry (Paper) type
Governor	Centrifugal mechanical governor
Lubrication system	Splash
Oil capacity	0.55 ℓ (0.58 US qt, 0.48 imp qt)
Recommended operating ambient temperature	-5 °C -40 °C (23 °F - 104 °F)
Starting system	Recoil starter
Stopping system	Ignition primary circuit ground
Fuel used	Unleaded gasoline with a pump octane number 86 or higher
Fuel tank capacity	0.9 ℓ (0.24 US gal, 0.20 imp gal)
PTO shaft rotation	Counterclockwise (from PTO shaft side)

GCV135 (SJAF-1000001-FORWARD)

### DIMENSIONS AND WEIGHTS

GCV135:

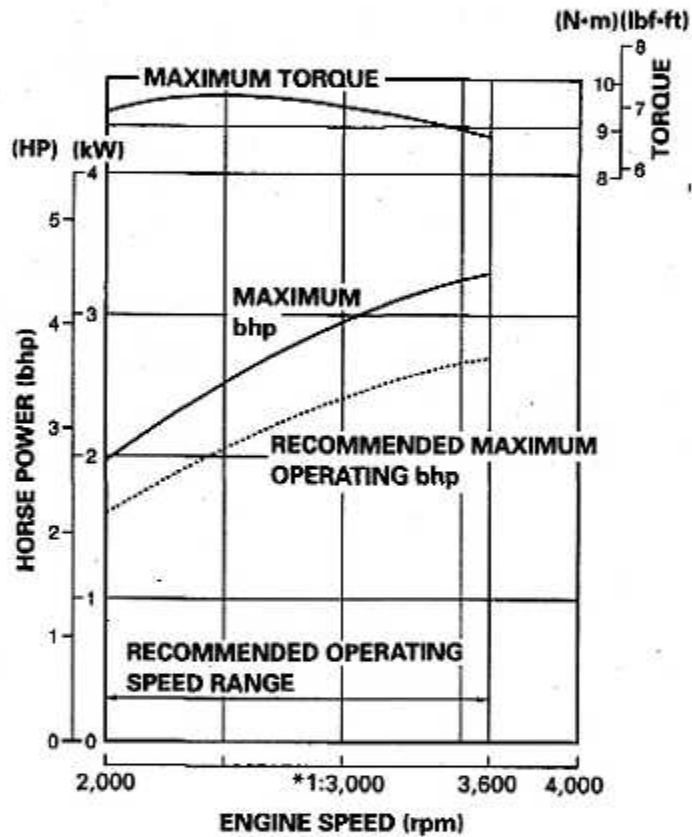
Item	PTO type	
	N1	N2
Overall length	351 mm (13.8 in)	
Overall width	331 mm (13.0 in)	
Overall height	353 mm (13.9 in)	340 mm (13.4 in)
Dry weight	9.5 kg (20.9 lbs)	
Operating weight	10.8 kg (23.8 lbs)	

# PERFORMANCE CURVES

GCV135 (GJAF-1000001-FORWARD)

Power curves are according to SAE standard No. J-1995. For practical operations, the bhp load and engine speed should not exceed the limit defined by the "Recommended Maximum Operating bhp" curve. Continuous operation should not exceed 80% of the "Maximum bhp".

GCV135:

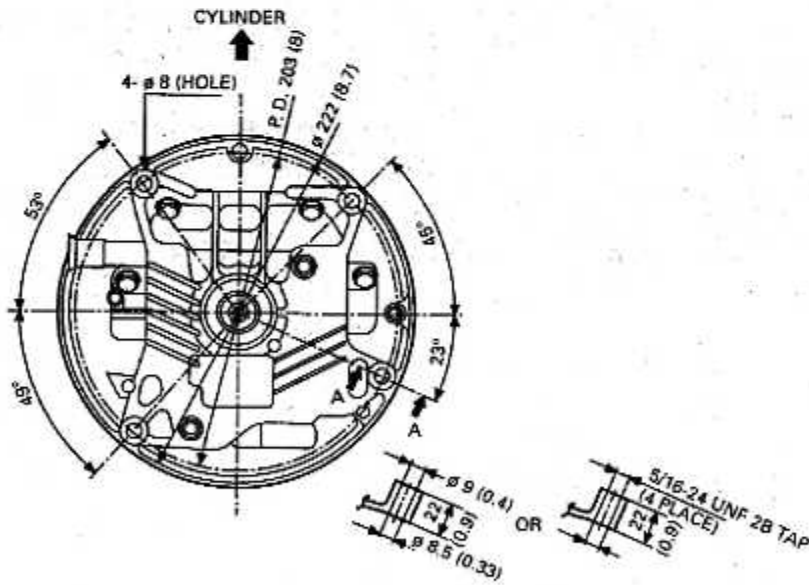
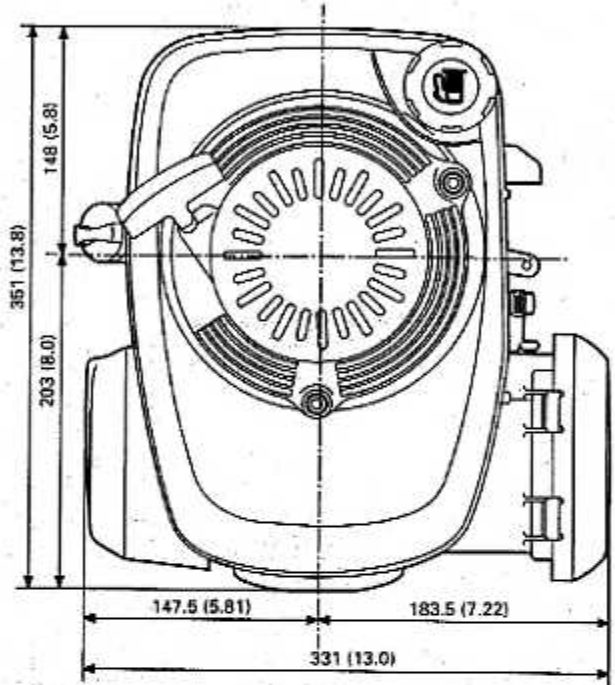
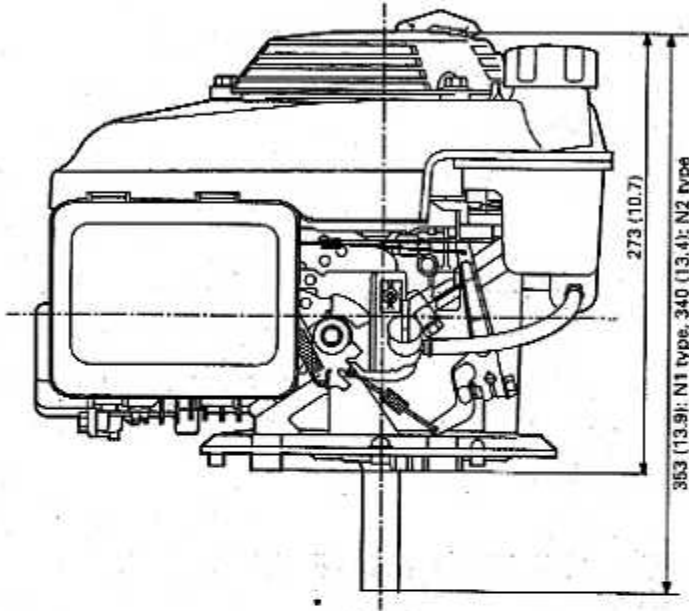


\*1: Rated speed

# DIMENSIONAL DRAWINGS

GCV135 (GJAF-1000001-FORWARD)

Unit : mm (in)



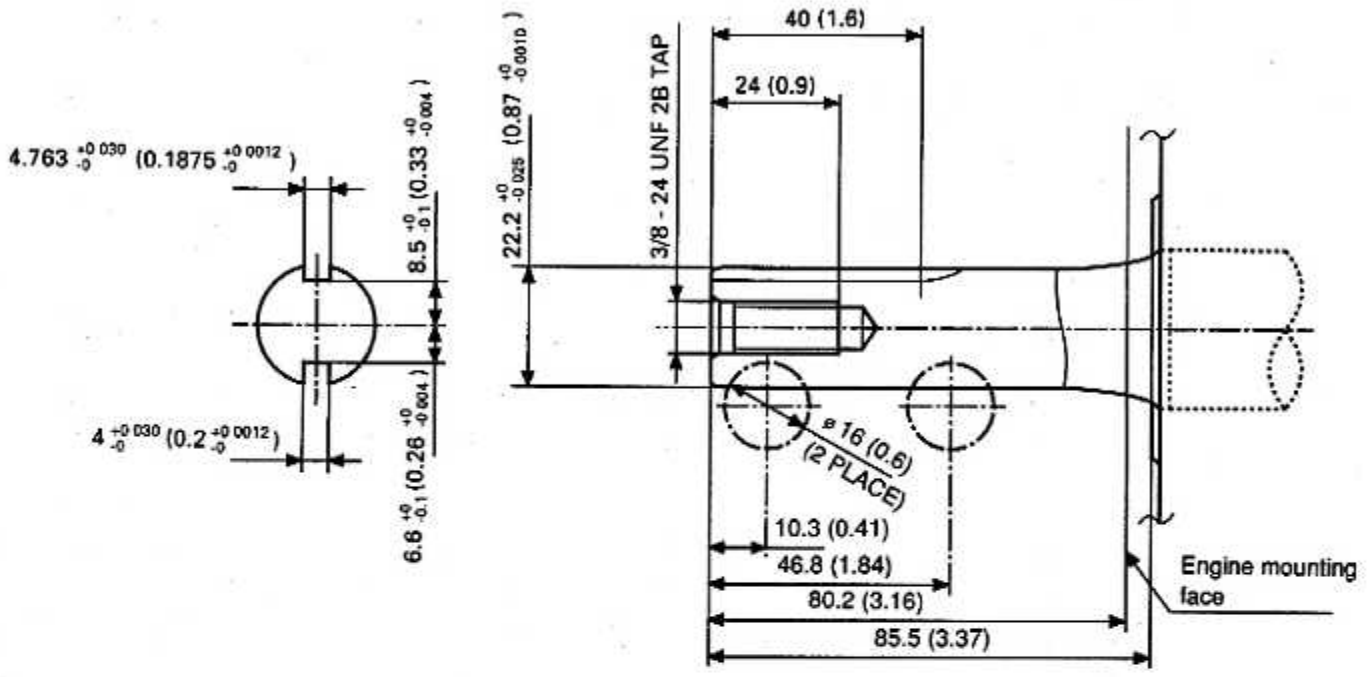
SECTION A-A

# PTO DIMENSIONAL DRAWINGS

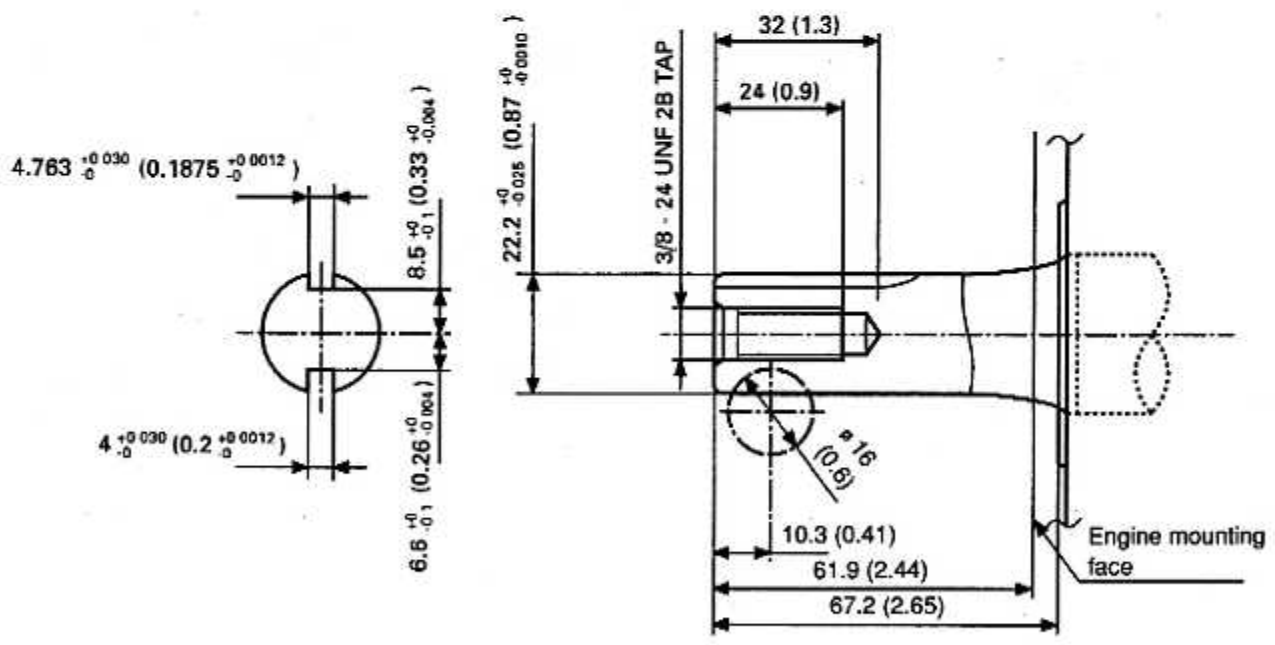
GCV135 (GJAF-1000001-FORWARD)

• N1 type

Unit : mm (in)



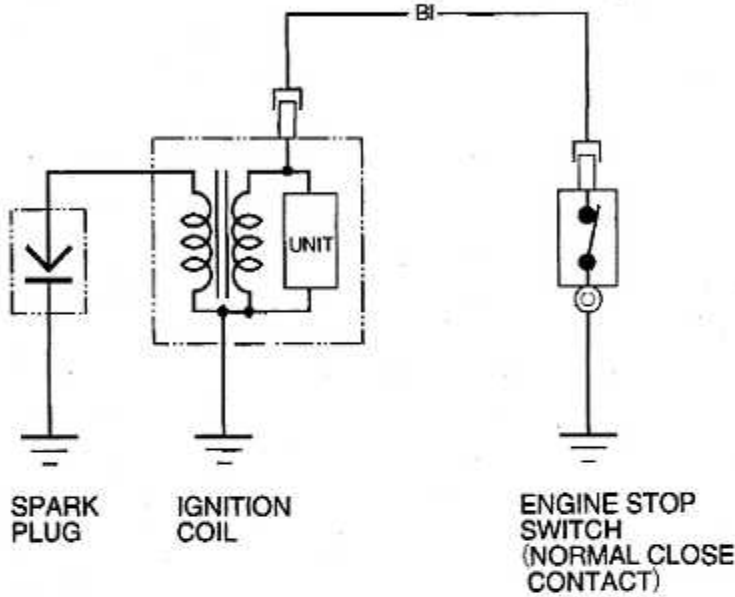
• N2 type



# WIRING DIAGRAMS

GCV135 (GJAF-1000001-FORWARD)

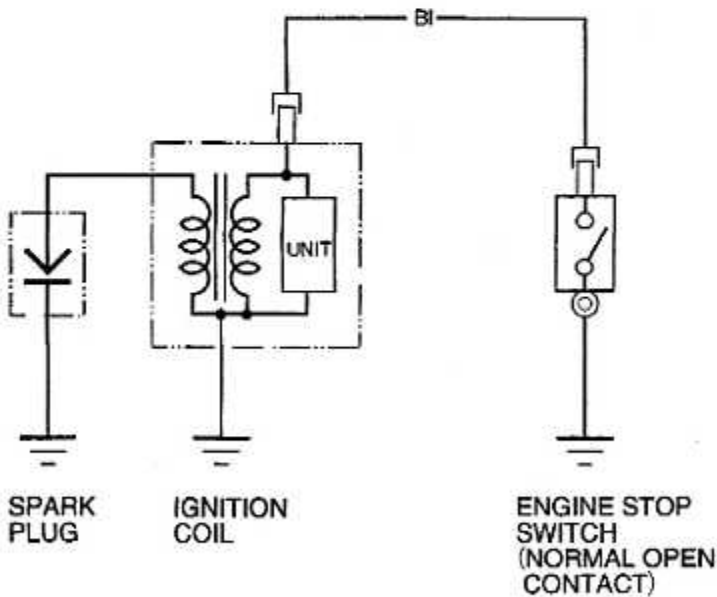
## • With flywheel brake



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

ENGINE	SWITCH CONTACT
RUN	OPEN
STOP	CLOSE

## • Without flywheel brake



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

ENGINE	SWITCH CONTACT
RUN	OPEN
STOP	CLOSE

# 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.



## THE IMPORTANCE OF PROPER SERVICING

GCV135 (GJAF-1000001-FORWARD)

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.

## 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

GCV135 (G-JAF-1000001-FORWARD)

Part	Item	Standard	Service limit
Engine	Maximum speed	3,100 ± 150 rpm	---
	Idle speed	1,700 ± 150 rpm	---
	Cylinder compression	0.49 MPa (5.0 kgf/cm <sup>2</sup> , 71 psi) at 600 rpm	---
Carburetor	Main jet	GCV135: #60	---
	Float height	9.2 mm (0.36 in)	---
	Pilot screw opening	GCV135: 1 - 5/8 turns out	---

GCV135 (GJAF-1000001-FORWARD)

## MAINTENANCE STANDARDS

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

GCV135 (GJAF-1000001-FORWARD)

## MAINTENANCE STANDARDS

Part	Item	Standard	Service limit	
Valves	Valve clearance (cold)	IN	—	
		EX	—	
	Stem O. D.	IN	0.15 ± 0.04 mm 0.20 ± 0.04 mm	5.318 mm (0.2094 in)
		EX	5.48 mm (0.216 in)	5.275 mm (0.2077 in)
	Guide I. D.	IN/EX	5.44 mm (0.214 in)	5.572 mm (0.2194 in)
		IN/EX	5.50 mm (0.217 in)	1.8 mm (0.07 in)
	Seat width	IN/EX	0.7 mm (0.028 in)	32.5 mm (1.28 in)
		IN/EX	34.0 mm (1.34 in)	—
	Spring free length	IN	25.0 mm (0.98 in)	—
		EX	24.0 mm (0.94 in)	—
Valve head diameter	IN	—	—	
	EX	—	—	

**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.	27.993 mm (1.1021 in)	27.933 mm (1.0997 in)
	Flywheel side Crank pin O. D.	25.393 mm (0.9997 in) 25.98 mm (1.023 in)	25.333 mm (0.9974 in) 25.92 mm (1.020 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)
Flywheel brake	Brake shoe thickness	—	3.0 mm (0.12 in)

GCV135 (GJAF-1000001-FORWARD)

## MAINTENANCE STANDARDS

Part	Item	Standard	Service limit
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)
	Top/second 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)
	Top	0.20 - 0.35 mm (0.008 - 0.014 in)	1.0 mm (0.04 in)
	Second Oil	0.30 - 0.45 mm (0.012 - 0.018 in)	1.0 mm (0.04 in)
Cylinder	Sleeve I. D.	64.0 mm (2.52 in)	64.165 mm (2.5262 in)
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)
Oil pan	Main journal I. D.	28.020 mm (1.1031 in)	28.066 mm (1.1050 in)

**TORQUE VALUES**

Item	Thread Dia. (mm)	Torque		
		N·m	kgf·m	lbf·ft
Oil pan bolt	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
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	10	1.0	7
Recoil starter nut	M6 x 1.0 (CT)	12	1.2	9
Fan cover stud bolt	M6 x 1.0	8.5	0.85	6.1
Fuel valve bracket screw	M5 x 0.8	3	0.3	2.2
Governor holder bolt	M6 x 1.0	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.

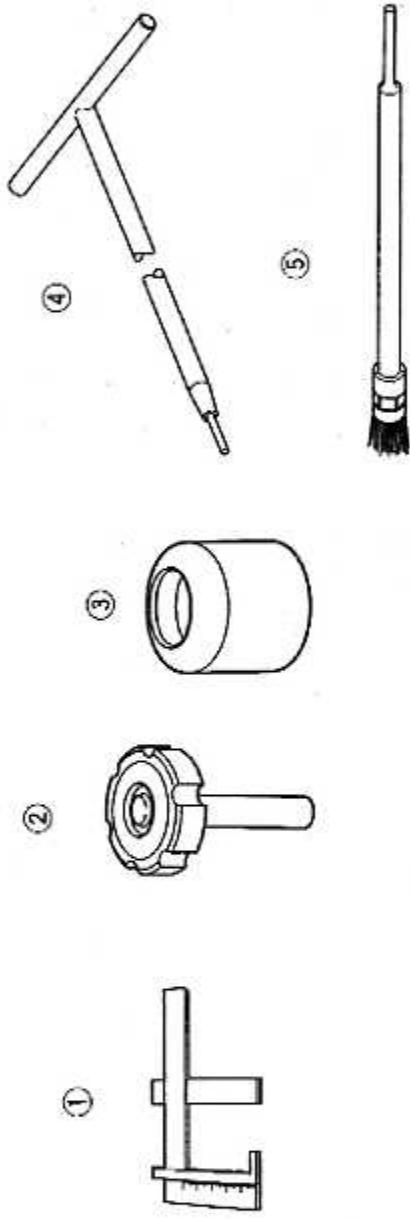
**• STANDARD TORQUE VALUE**

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



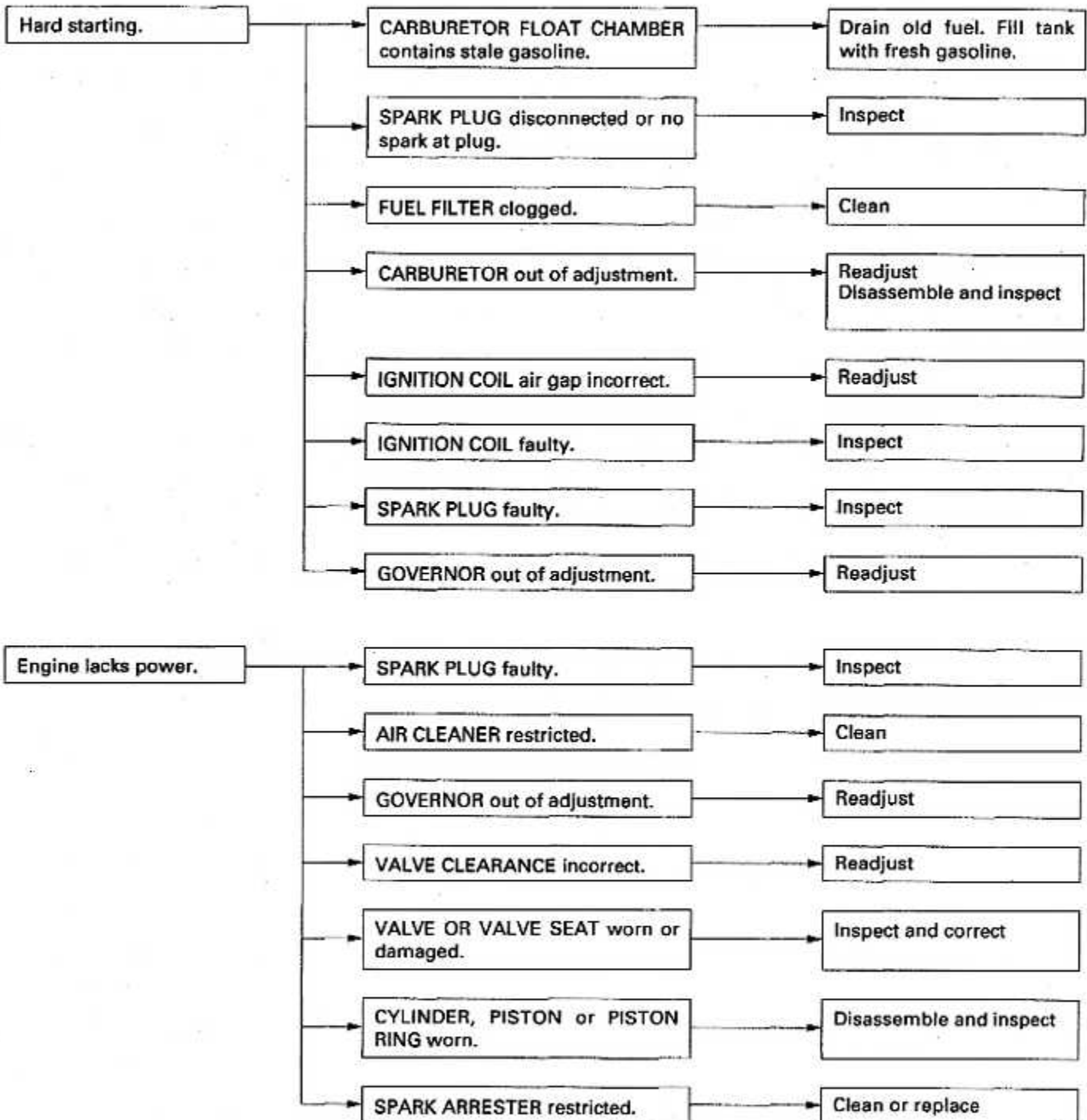
**SPECIAL TOOLS**

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. Valve seat cutter 45° ø27.2	07780-0010200	Valve seat reconditioning (IN/EX)
4. Cutter holder	07981-VA20100 or 07981-VA20101	Valve seat reconditioning
5. Cleaning brush	07998-VA20100	Combustion chamber cleaning

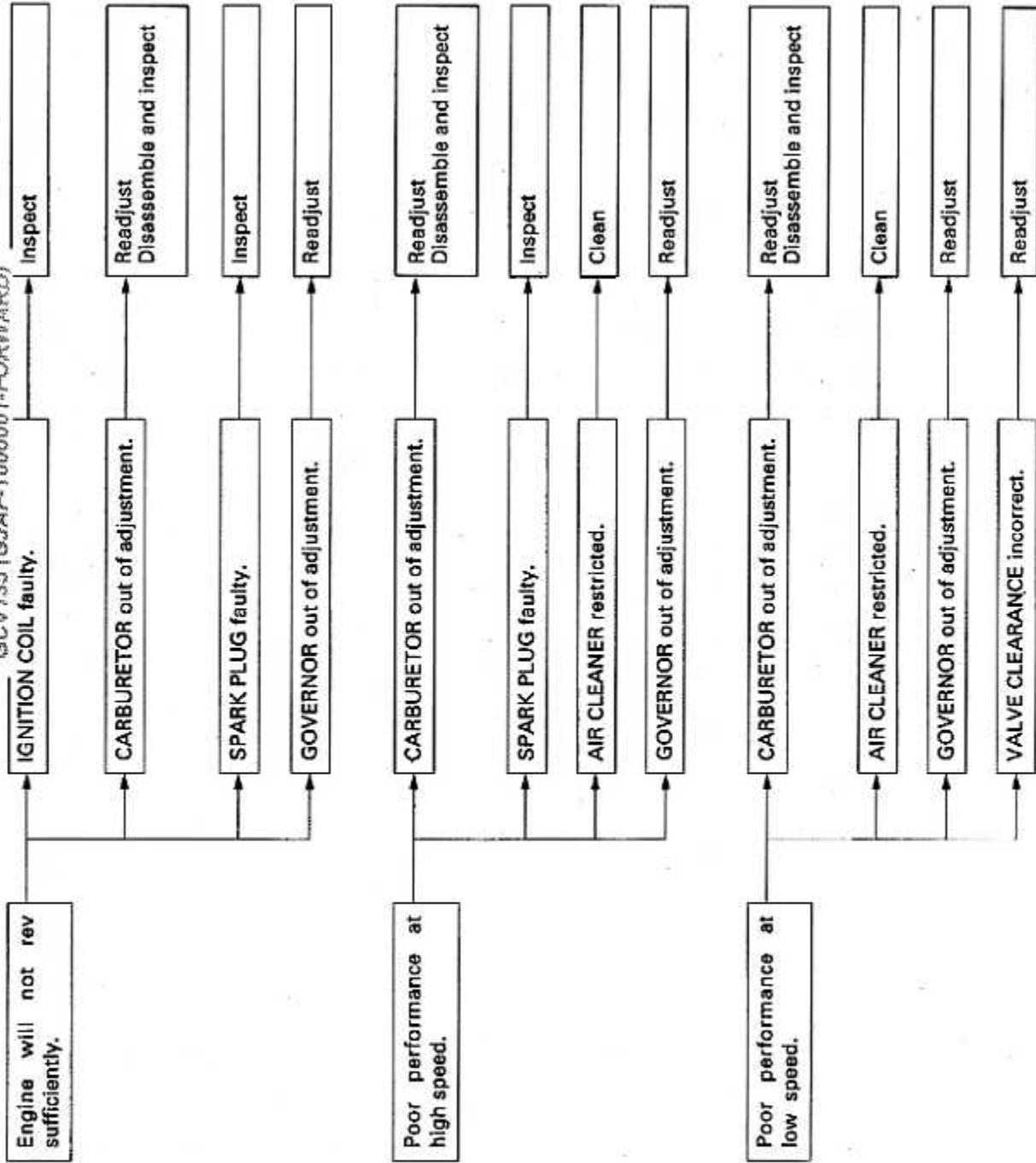


# TROUBLESHOOTING

## GENERAL SYMPTOMS AND POSSIBLE CAUSES

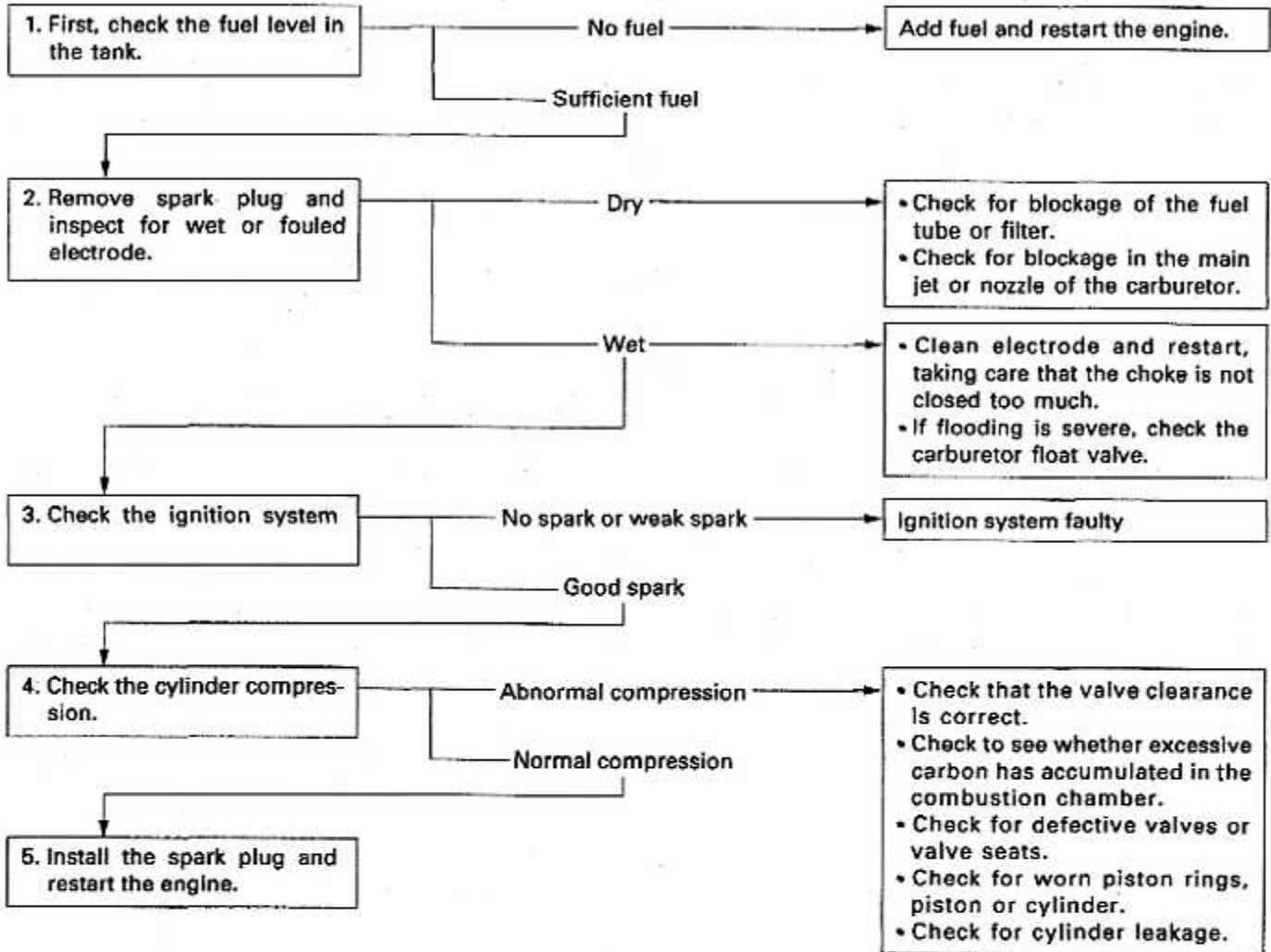


GCV135 (GJAF-1000001-FORWARD)



## HARD STARTING

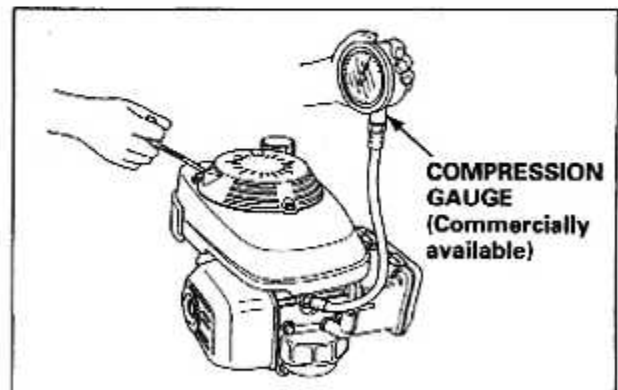
Move the fuel valve to the ON position.

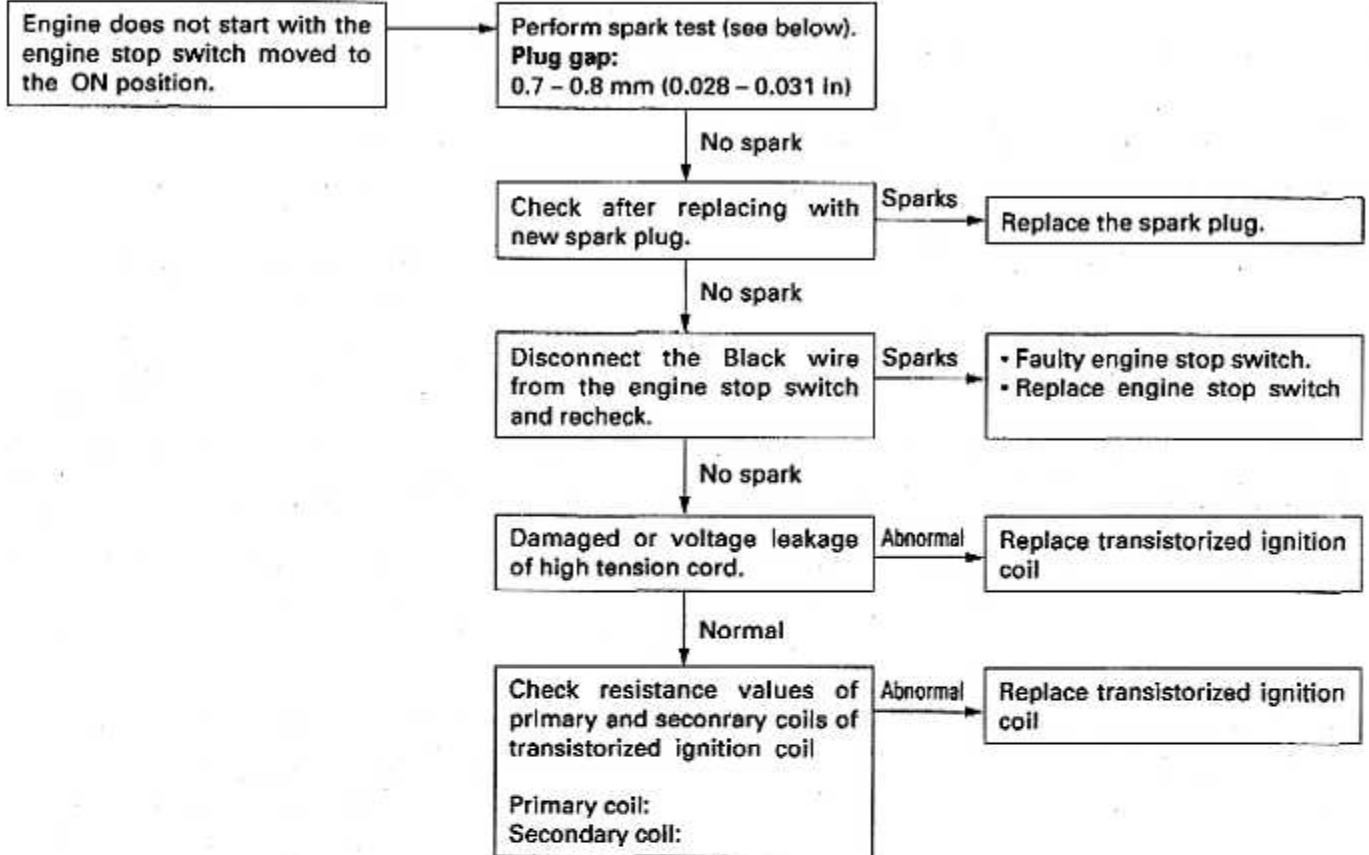


## CYLINDER COMPRESSION CHECK

- 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



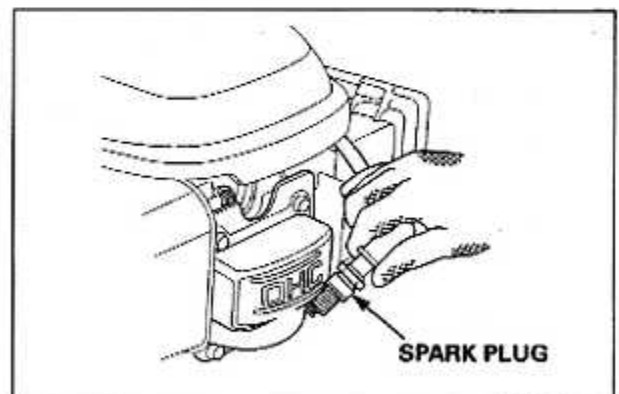
**IGNITION SYSTEM****SPARK PLUG TEST**

- 1) Remove the spark plug, attach it to the spark plug cap, and ground the side electrode against the cylinder head cover.
- 2) Pull the flywheel brake lever to the RUN position (with flywheel brake) or move the control lever to the SLOW position (without flywheel brake), pull the recoil starter and check to see if sparks jump across the electrodes.

**⚠ WARNING**

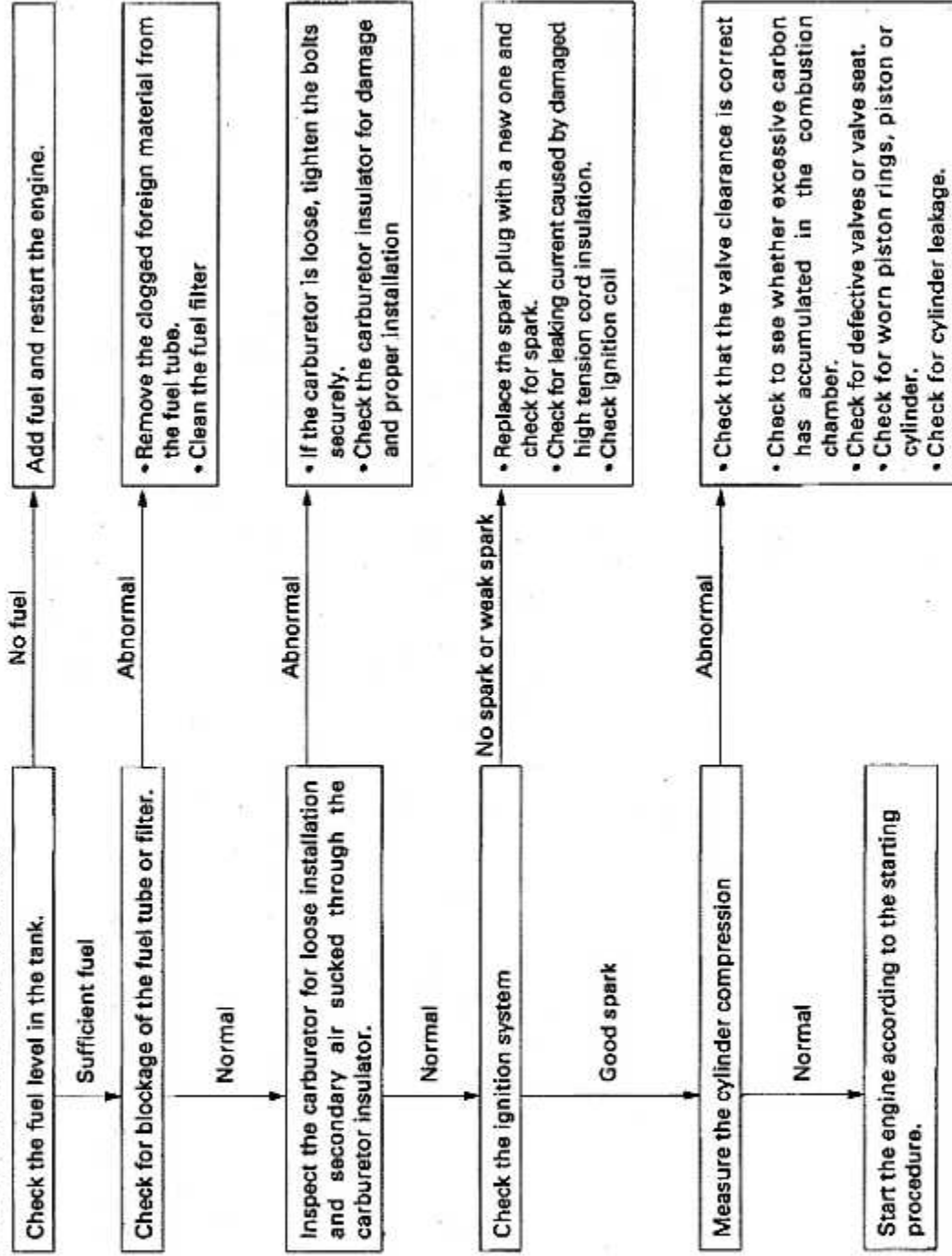
Gasoline is highly flammable and explosive.  
 If ignited, gasoline can burn you severely.

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

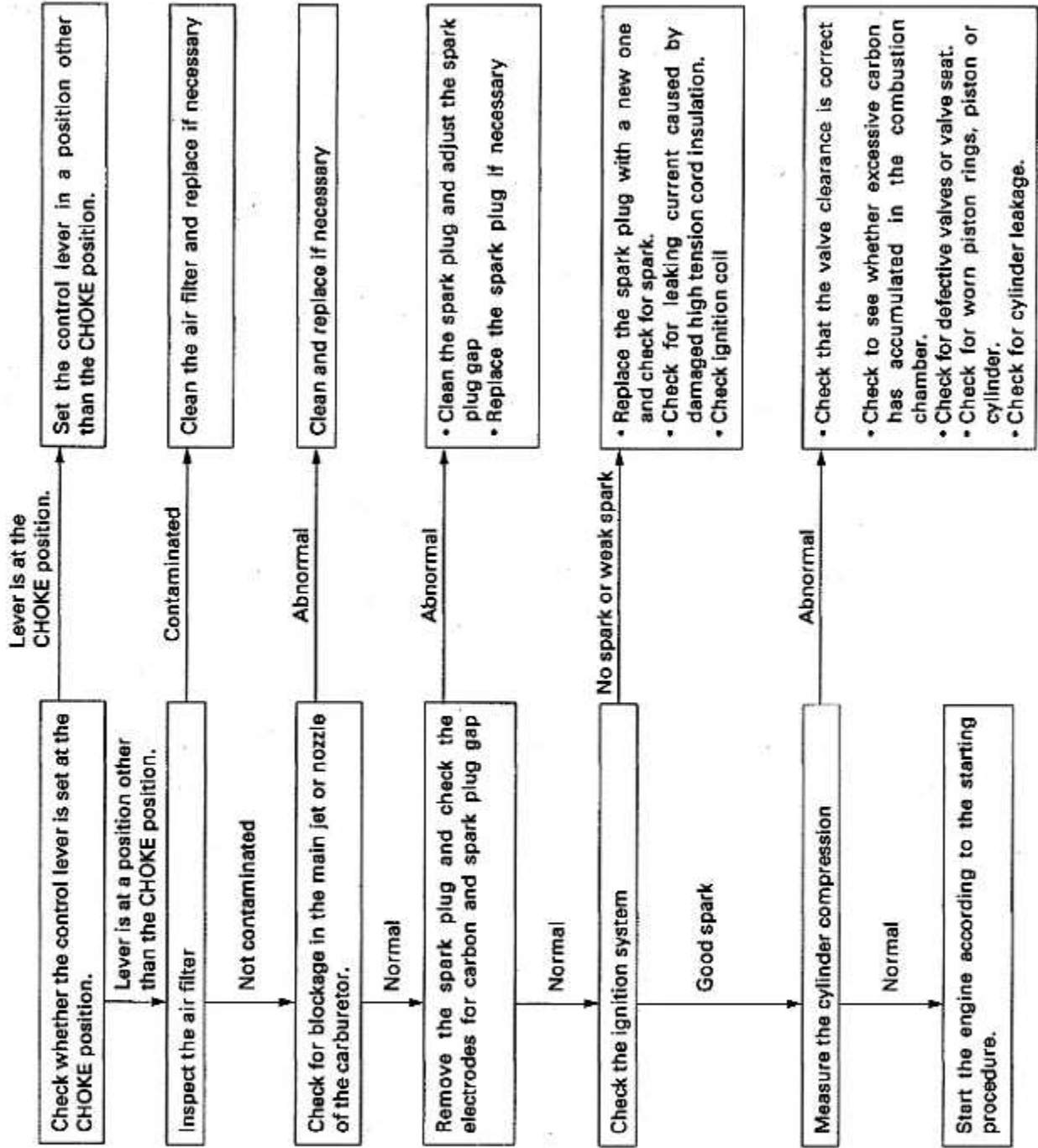


## ENGINE STARTS BUT THEN STALLS

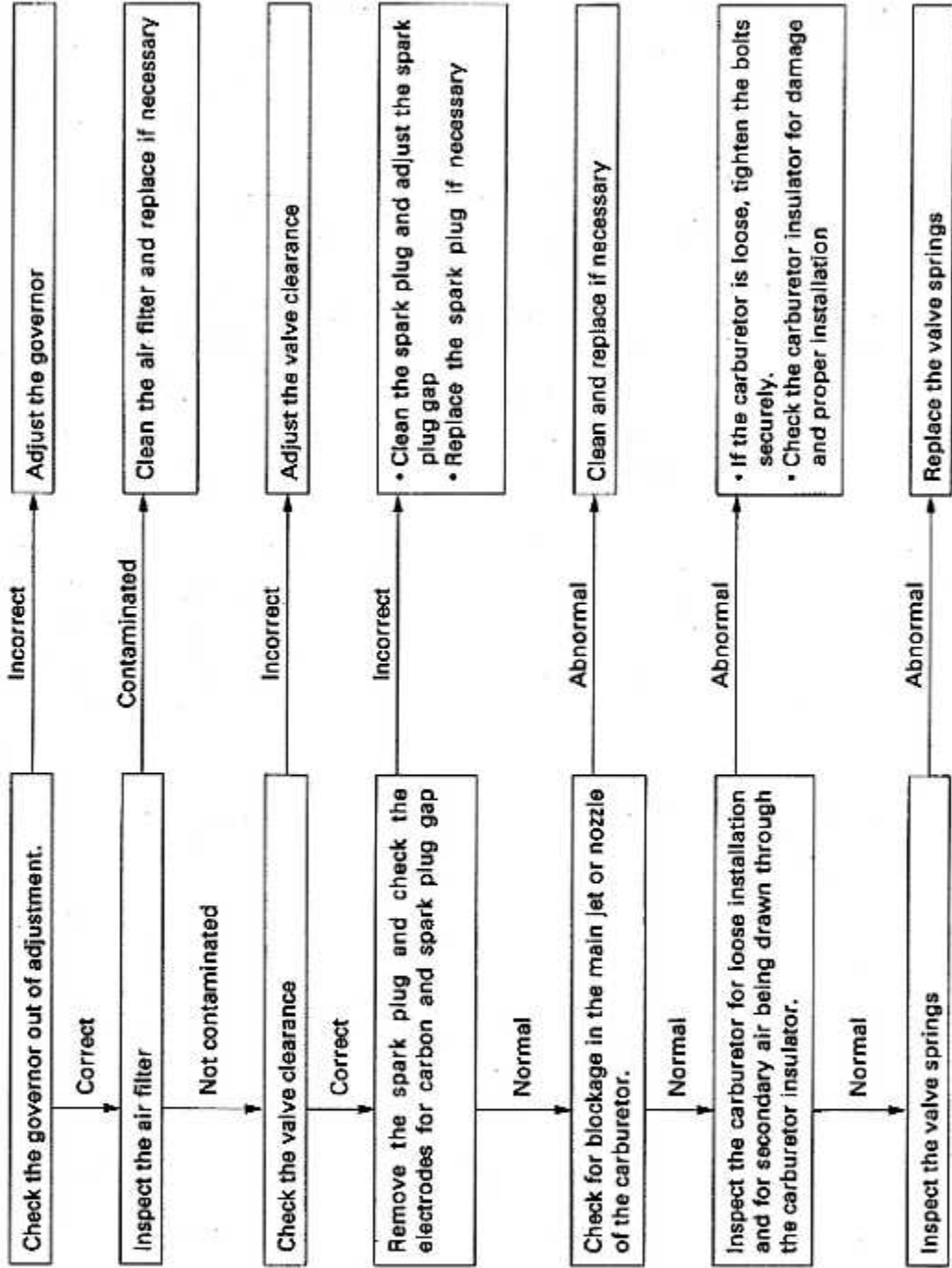
Move the fuel valve to the ON position.



## ENGINE LACKS POWER



### ENGINE SPEED DOES NOT INCREASE

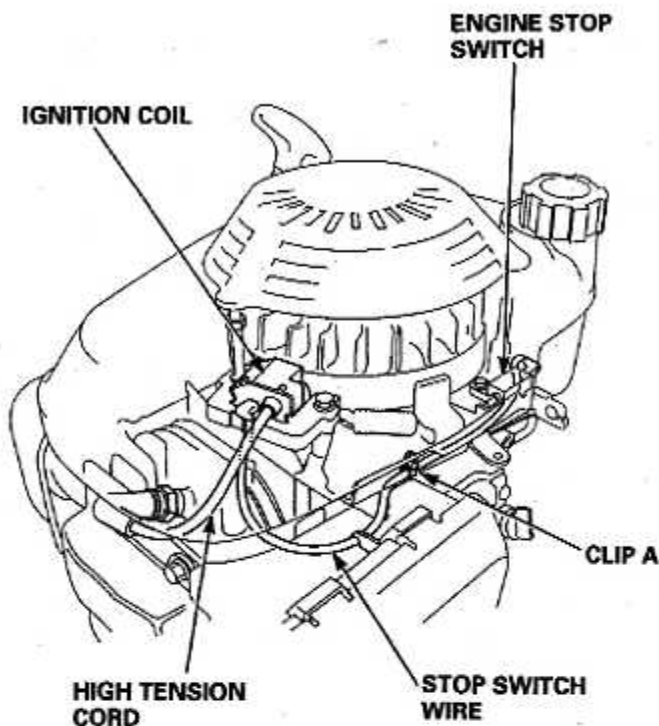
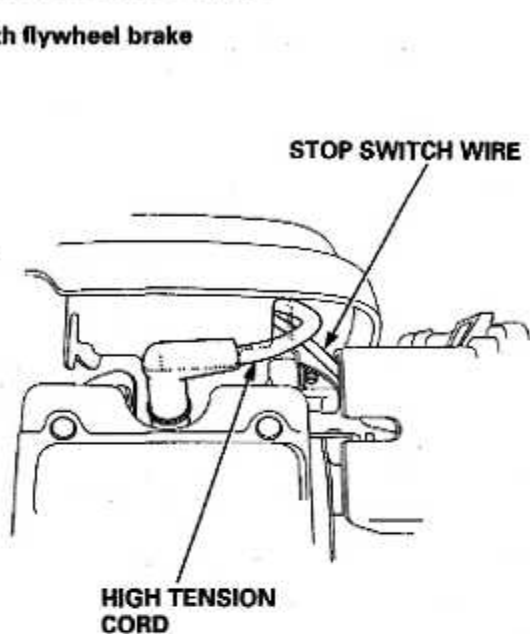




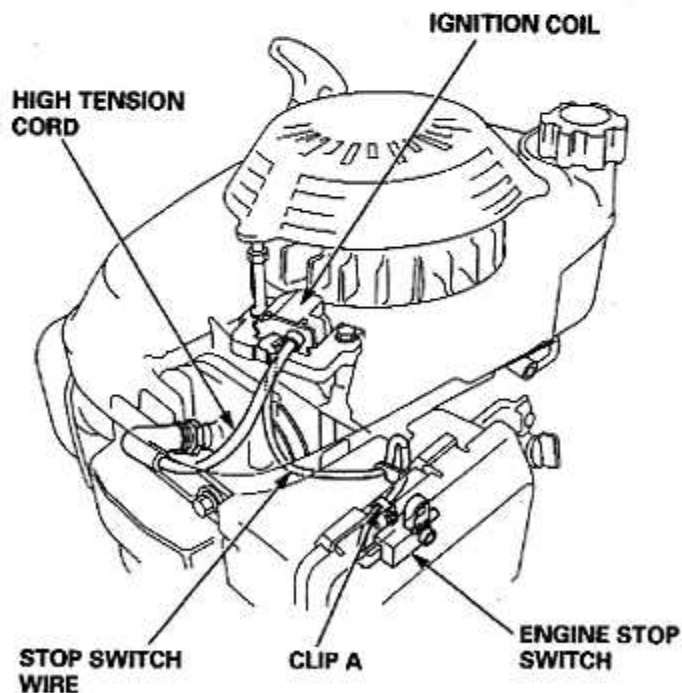
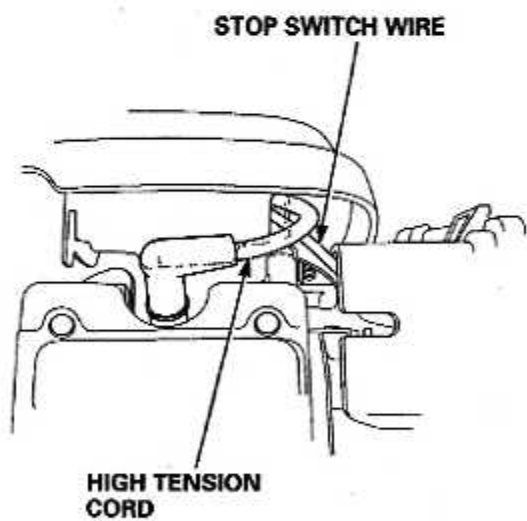
# HARNESS ROUTING

GCV135 (GJAF-1000001-FORWARD)

- With flywheel brake



- Without flywheel brake



**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)
Flywheel brake shoe	Check				<input type="radio"/>		
● Spark plug	Check-Clean					<input type="radio"/>	
	Replace						<input type="radio"/> (200HRS)
Spark arrester (Optional part)	Clean					<input type="radio"/>	
● Fuel tank and filter	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 Level Check:

Check the engine oil level with the engine stopped and the 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 near or below the lower limit mark on the dipstick, fill with the recommended oil to the upper limit mark. Do not overfill.
- 4) Tighten the oil filler cap securely.

### Oil Change:

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

- 1) Remove the oil filler cap.  
Tilt the engine toward the oil filter cap side and drain the used oil into a suitable container.

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

#### CAUTION:

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

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

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

- 2) With the engine on a level surface, refill with the recommended oil to the upper limit mark.

Engine oil capacity

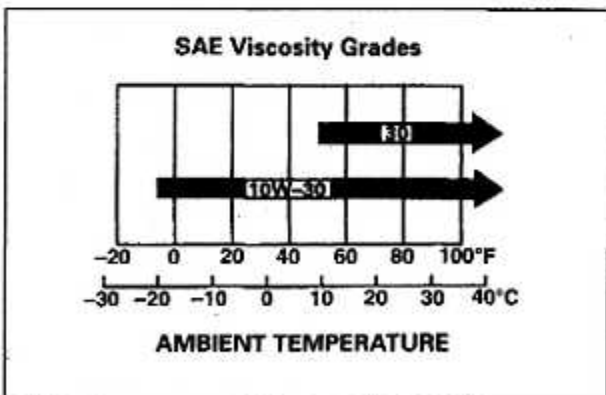
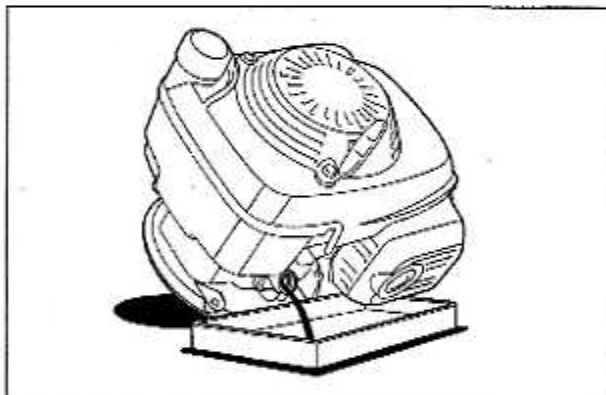
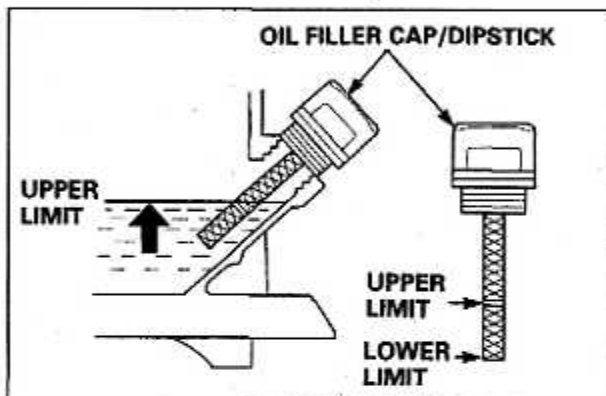
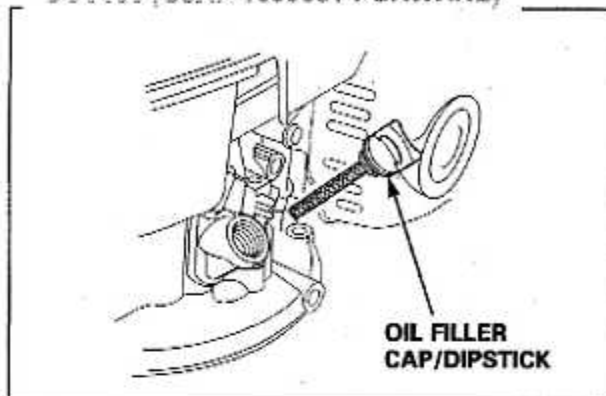
Recommended operating ambient temperature

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.

- 3) Tighten the oil filler cap securely.

GCV135 (GJAF-1000001-FORWARD)



## AIR CLEANER

### Cleaning:

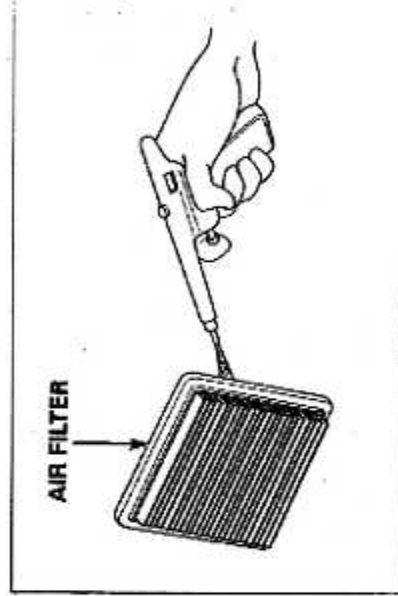
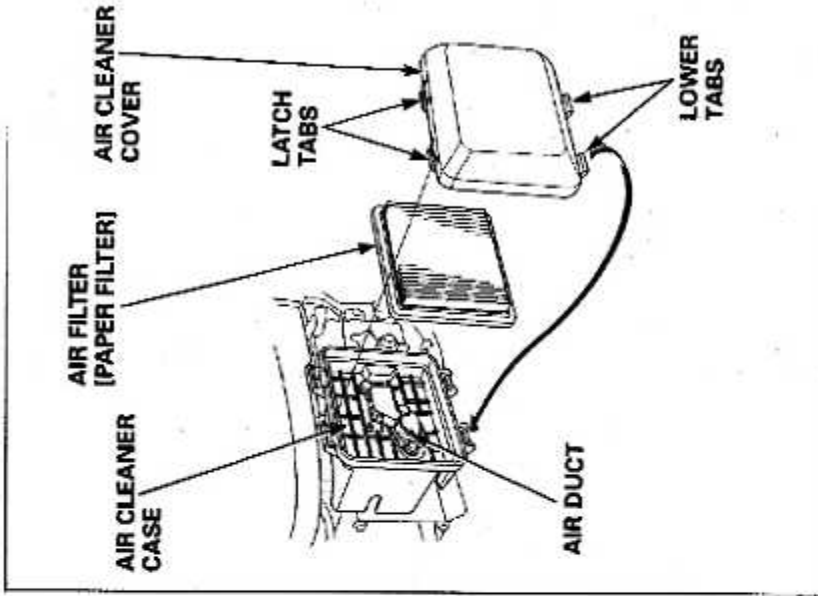
A dirty air filter will restrict air flow to the carburetor, reducing engine performance. If the filter is operated in dusty areas, clean the air filter more often than specified in the MAINTENANCE SCHEDULE.

### 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 top 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/cm<sup>2</sup>, 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

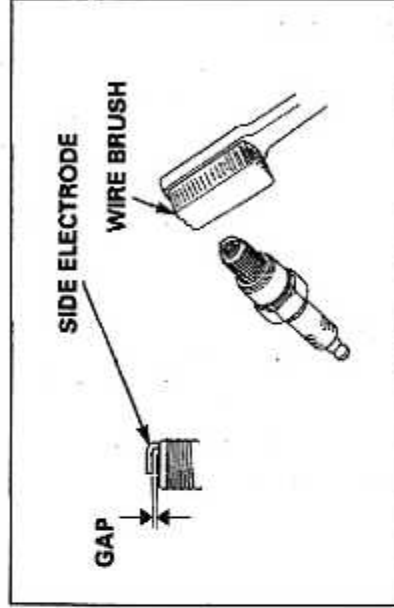
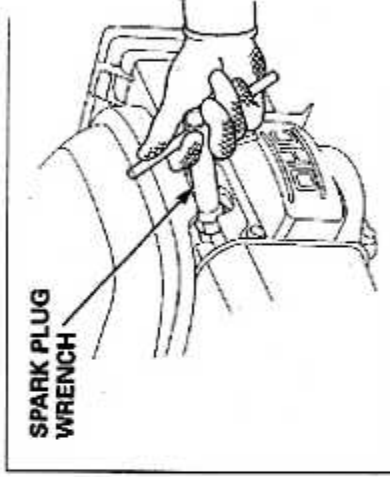
- 1) Clean any dirt from around the spark plug.
- 2) Remove the plug cap, and use a spark plug wrench to remove the plug.
- 3) Visually inspect the spark plug. Discard the plug if the insulator is cracked or chipped.
- 4) Remove carbon or other deposits with a stiff wire brush.
- 5) Measure the plug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

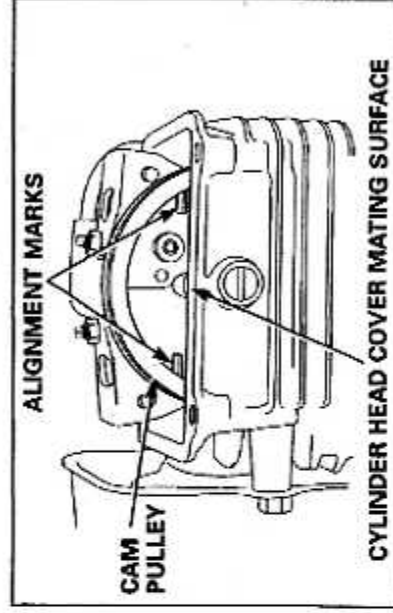
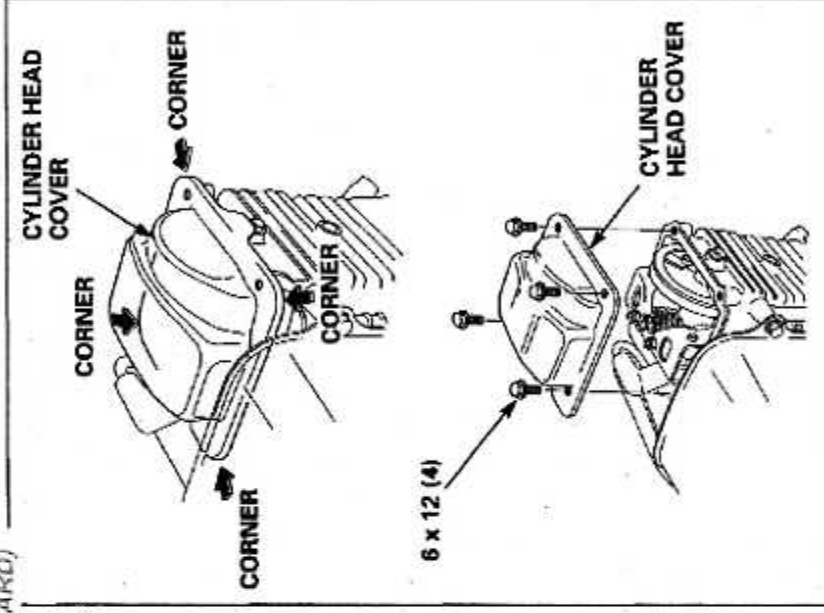
- 1) Place the engine upright with the cylinder head cover facing up.
- 2) Remove the four 6 x 12 mm flange bolts.
- 3) When removing the cylinder head cover, pry off slowly at each corner of the head cover.

**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.

- 4) 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.



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

Standard valve clearance

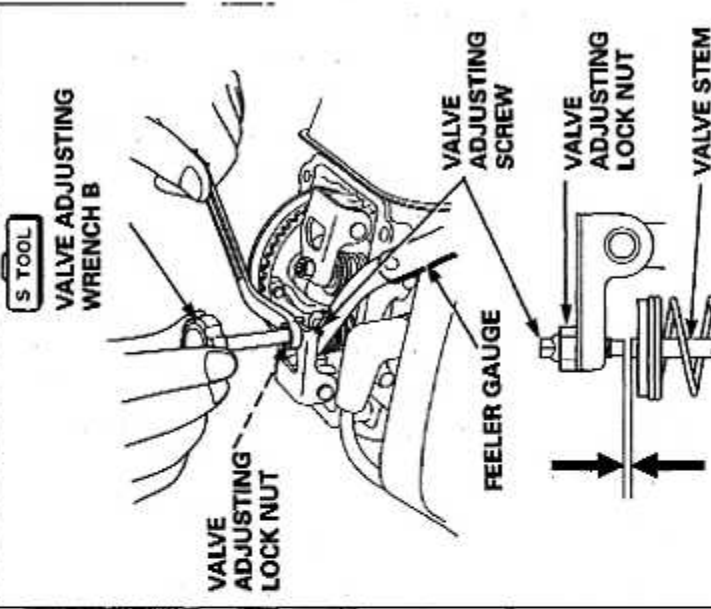
6) If adjustment is necessary, proceed as follows:

- a. Hold the adjusting screw using the special tool, and loosen the lock nut.
- b. Turn the adjusting screw to obtain the specified intake and exhaust valve clearance.
- c. Hold the adjusting screw using the special tool, and tighten the lock nut.

**TOOL:**  
Valve adjusting wrench B

- 7) Recheck valve clearance after tightening the lock nut.
- 8) 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

GCV135 (GJAF-100)001-FORWARD)



To increase valve clearance, screw out.  
To decrease valve clearance, screw in.

## CARBURETOR

GCV135 (GJAF-1000001-FORWARD)

### 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.

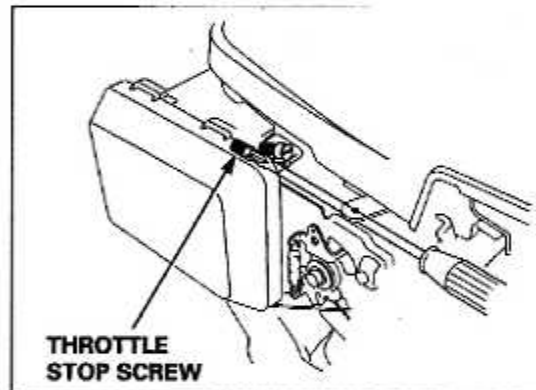
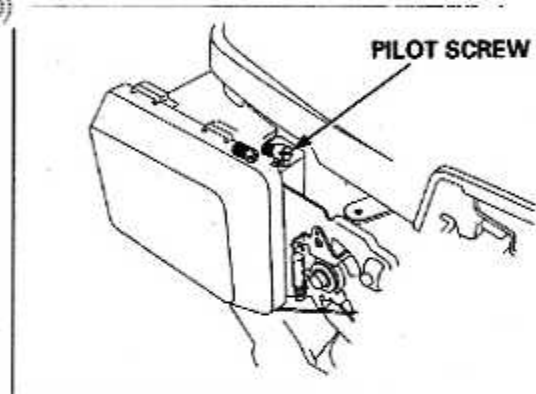
Do not attempt to remove the limiter cap for pilot screw adjustment. The limiter cap cannot be removed without breaking the pilot screw.

Pilot screw adjustment must be performed only when it is disassembled.

### Throttle stop screw:

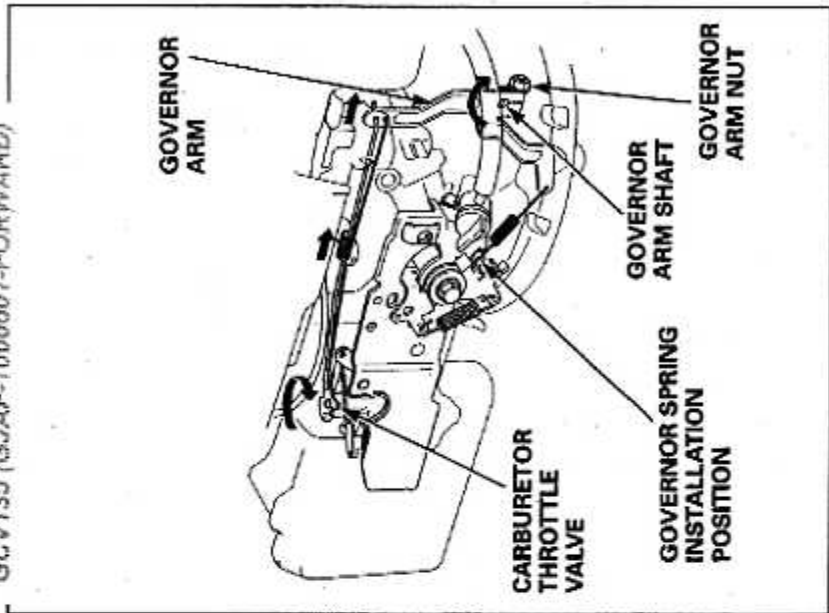
- 1) Start the engine and allow it to warm up to normal operating temperature.
- 2) With the engine idling, turn the throttle stop screw to obtain the standard idle speed.

Standard idle speed





GCV135 (SJA-F-1000001-FORWARD)



## GOVERNOR

### Adjustment:

- 1) Loosen the governor arm nut on the governor arm.
- 2) Push the governor arm away from the carburetor, and open the carburetor throttle valve fully.
- 3) Holding the carburetor throttle valve fully open, turn the governor arm shaft clockwise fully, and tighten the governor arm nut to the specified torque.
- 4) Check to see whether the governor arm and the carburetor throttle valve operate smoothly.
- 5) 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)

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

## FUEL TANK/FUEL FILTER

### Cleaning:

#### **WARNING**

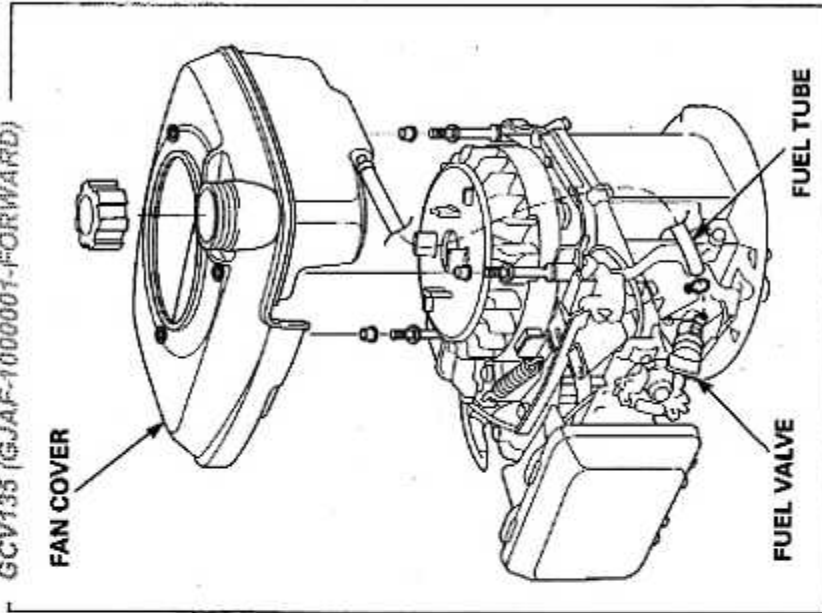
Gasoline is highly flammable and explosive.

You can be burned or seriously injured when handling fuel.

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

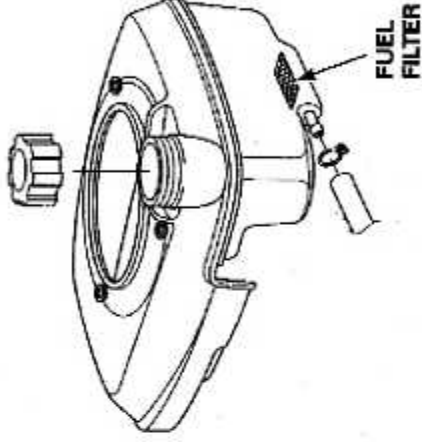
- 1) Move the fuel valve to the OFF position, and drain the fuel into a suitable container.
- 2) Remove the recoil starter
- 3) Disconnect the fuel tube from the fuel valve.
- 4) Remove the fan cover.

GCV135 (GJAF-1000001-FORWARD)



- 5) Clean the fuel tank. Remove dust and foreign material from the filter in the fuel tank and check the filter for tears.
- 6) Connect the fuel tube to the fuel outlet, and install the fan cover.
- 7) Connect the fuel tube to the fuel valve.  
After assembly, check for fuel leaks.

GCV135 (GJAF-1000001-FORWARD)



## FUEL LINE

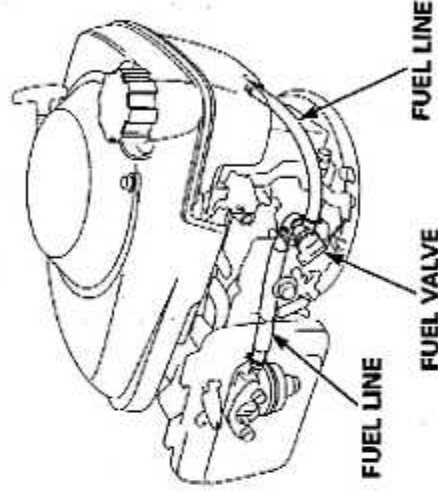
### Check:

#### **⚠ WARNING**

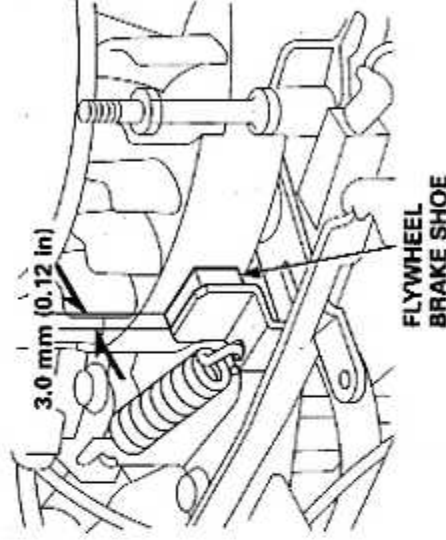
Gasoline is highly flammable and explosive. You can be burned or seriously injured when handling fuel.

- 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) Drain the fuel into a suitable container.
- 3) Replace the fuel lines as necessary.



GCV135 (GJAF-1000001-FORWARD)



## FLYWHEEL BRAKE (if equipped)

### Brake shoe thickness inspection:

- 1) Remove the recoil starter
- 2) Remove the fan cover
- 3) Measure the thickness of the brake shoe.  

Service limit
---------------
- 4) If brake shoe thickness is less than the service limit, replace the flywheel brake

## 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.

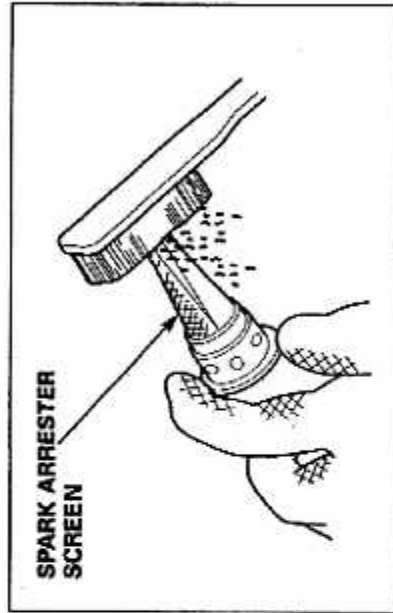
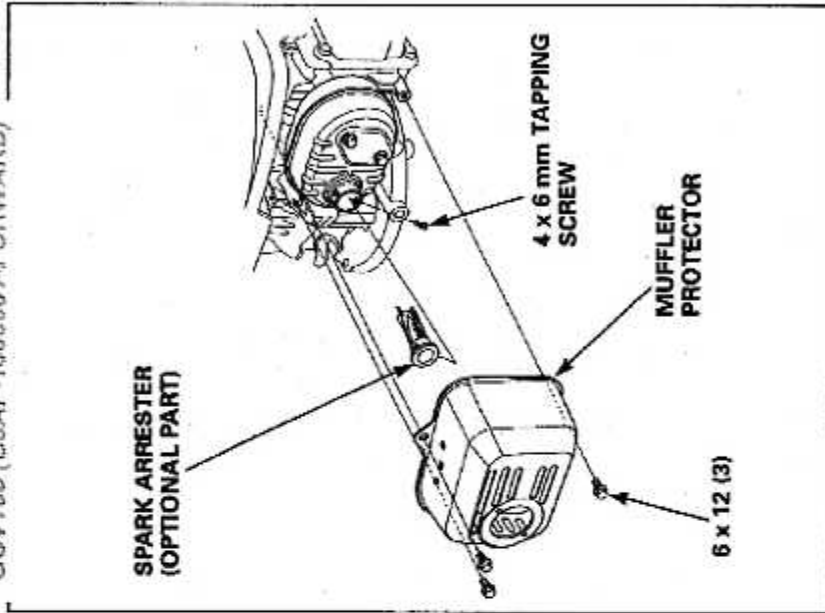
#### **CAUTION:**

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.

GCV135 (SJAIF-1000001-FORWARD)



# MUFFLER

## REMOVAL/INSTALLATION

**WARNING**

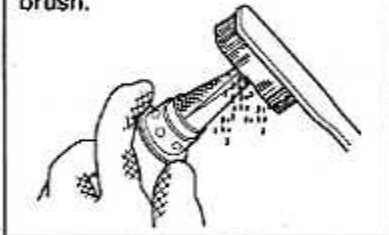
The engine and muffler become very hot during operation and they remain hot for a while after operation. Be sure that the engine is cold before muffler removal/installation.

**SPARK ARRESTER  
[OPTIONAL PART]**

**CLEAN**

**INSTALLATION:**

Install after removing the carbon from the screen with a wire brush.



**4 x 6 mm TAPPING  
SCREW  
[OPTIONAL PART]**

**6 x 12 (3)**

**MUFFLER  
PROTECTOR**

**6 x 79 (2)  
TORQUE**

**ARRESTER  
NUMBER PLATE  
[OPTIONAL PART]**

**MUFFLER GASKET  
[OPTIONAL PART]**

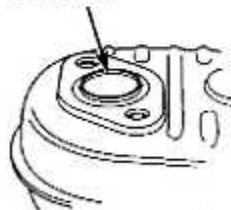
Do not reuse.

**MUFFLER**

**INSTALLATION:**

- After removing any carbon deposits from the muffler install using a plastic hammer.
- Do not tap on the muffler seal flange or damage this part. If the seal flange is dented or damaged, replace the muffler.
- Check the cylinder barrel exhaust port for damage.

**MUFFLER SEAL  
FLANGE**



**EXHAUST PORT**

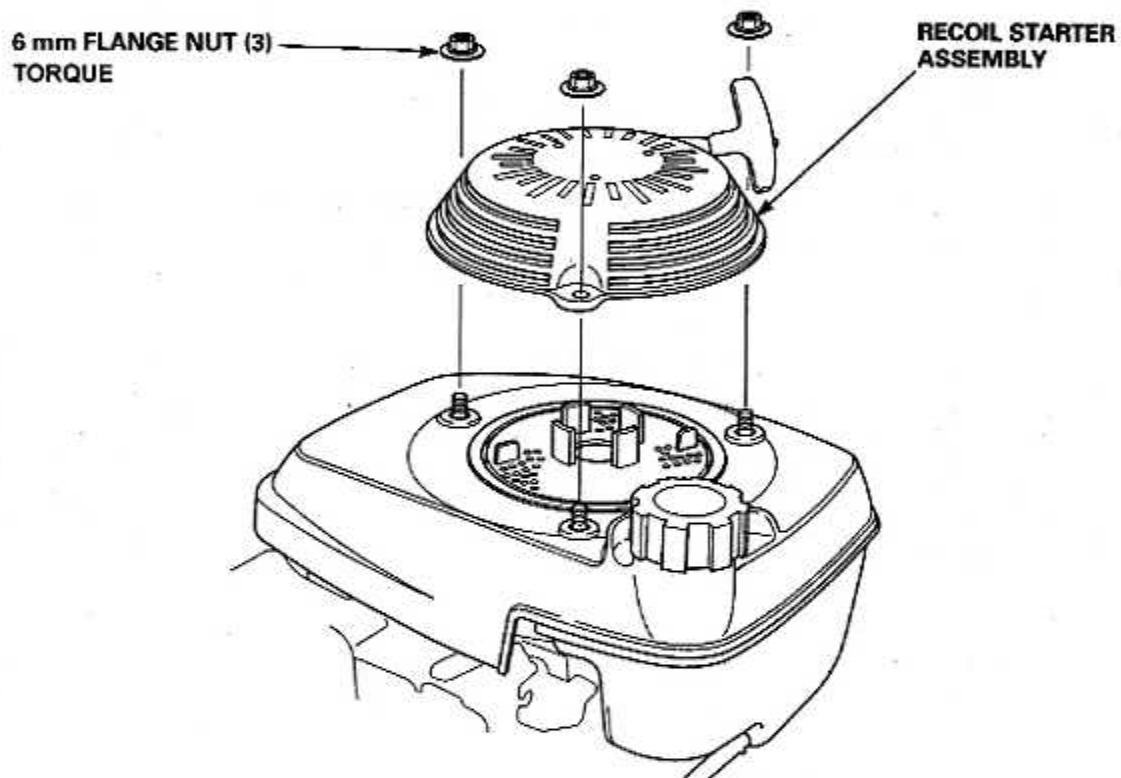
# RECOIL STARTER

GCV135 (GJAF-1000001-FORWARD)

## REMOVAL/INSTALLATION

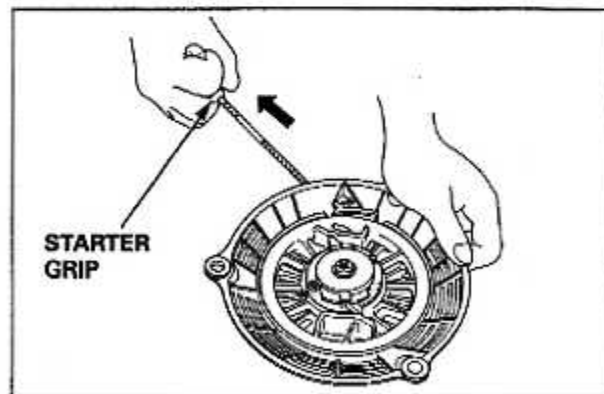
### NOTE:

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

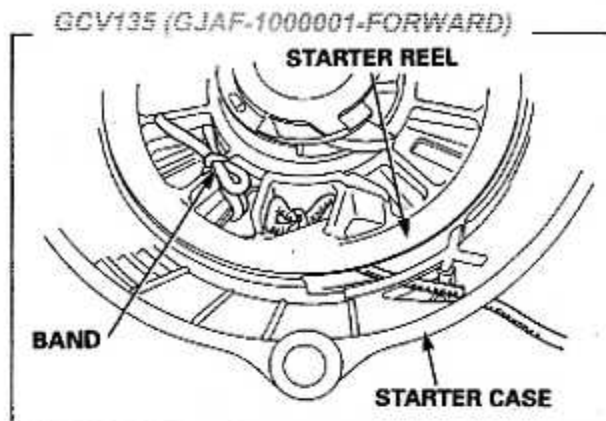


## STARTER ROPE REPLACEMENT

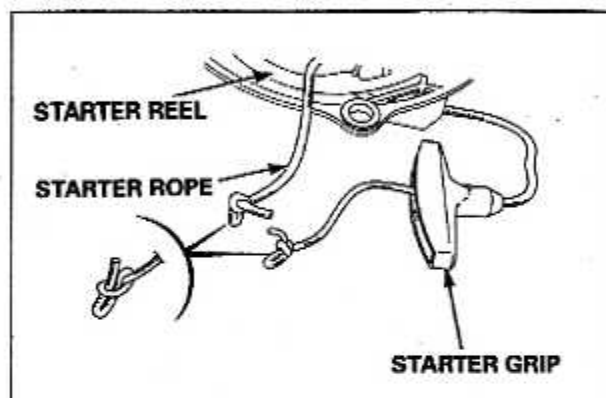
- 1) Pull the starter grip fully (until the starter rope is pulled out fully).



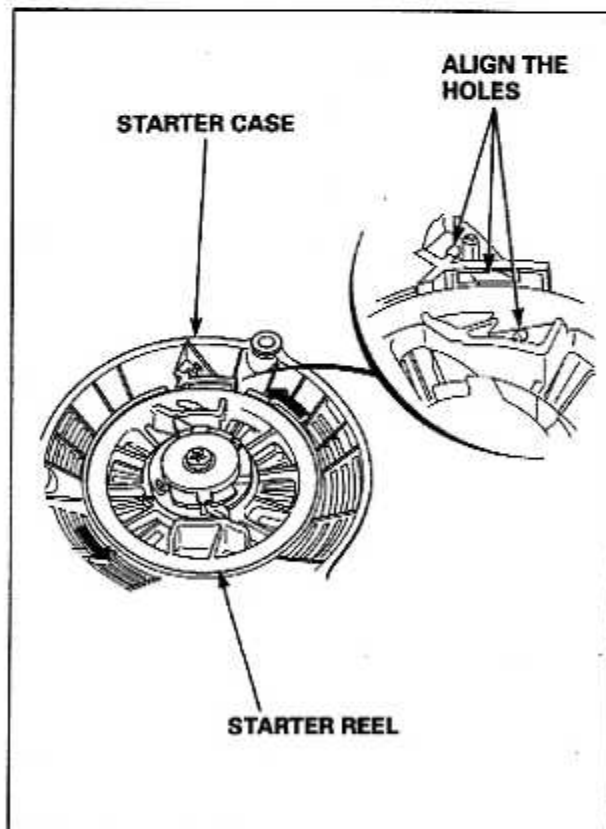
- 2) To prevent the starter reel from rewinding, hold the starter reel and starter case with a band or equivalent material as shown.



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

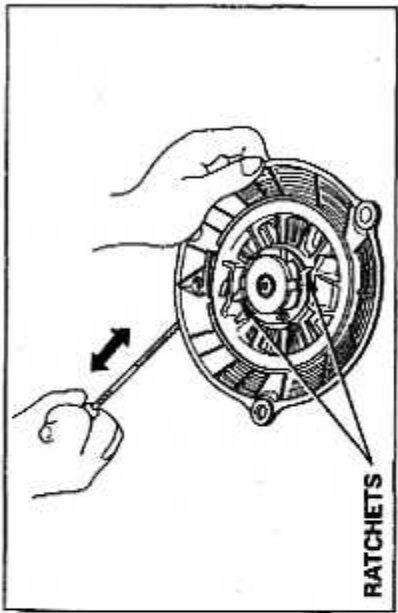
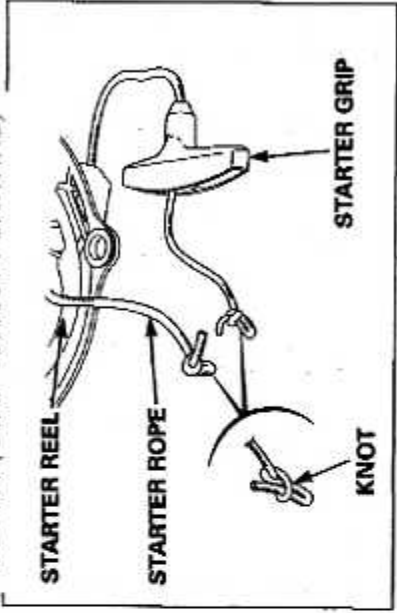


- 4) When the starter rope has broken or the starter reel has re-wound, align the rope hole in the starter case with the rope hole in the starter reel by turning the starter reel 5 turns in the direction of the arrow.





GCV135 (GJAF-1000001-FORWARD)



- 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.

# AIR CLEANER/CARBURETOR

GCV135 (GJAF-1000001-FORWARD)

## REMOVAL/INSTALLATION

Before removal, completely drain the carburetor.

### WARNING

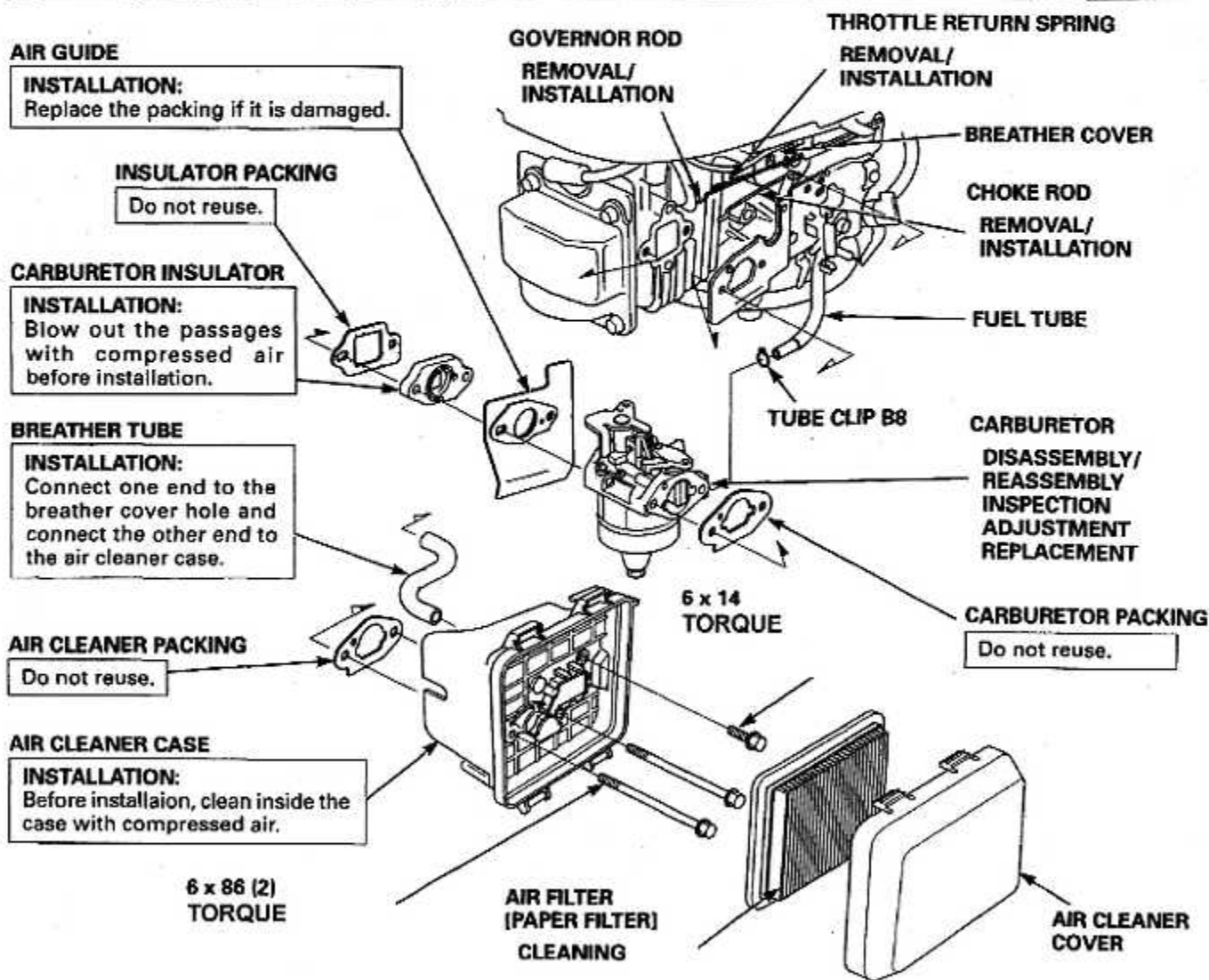
Gasoline is highly flammable and explosive.

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.



# PISTON

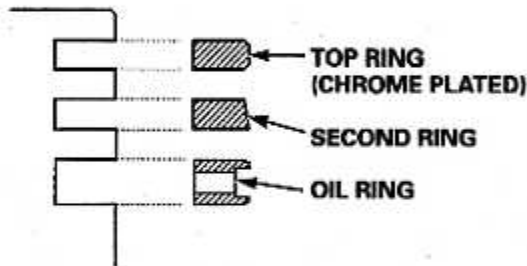
GCV135 (GJAF-1000001-FORWARD)

## DISASSEMBLY/REASSEMBLY

### PISTON RINGS

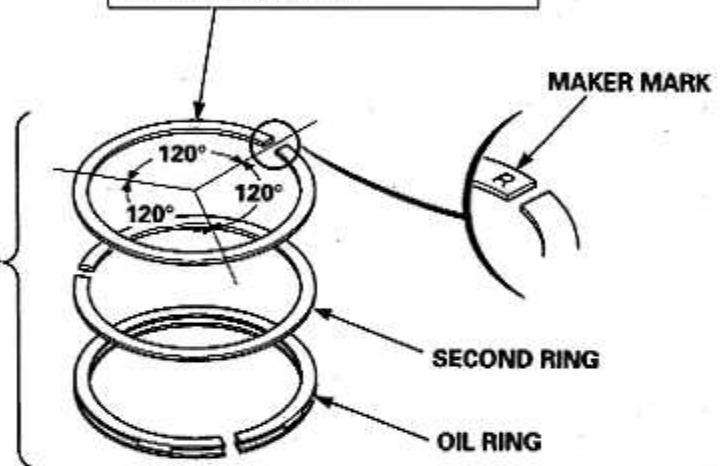
#### INSPECTION REASSEMBLY:

- 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

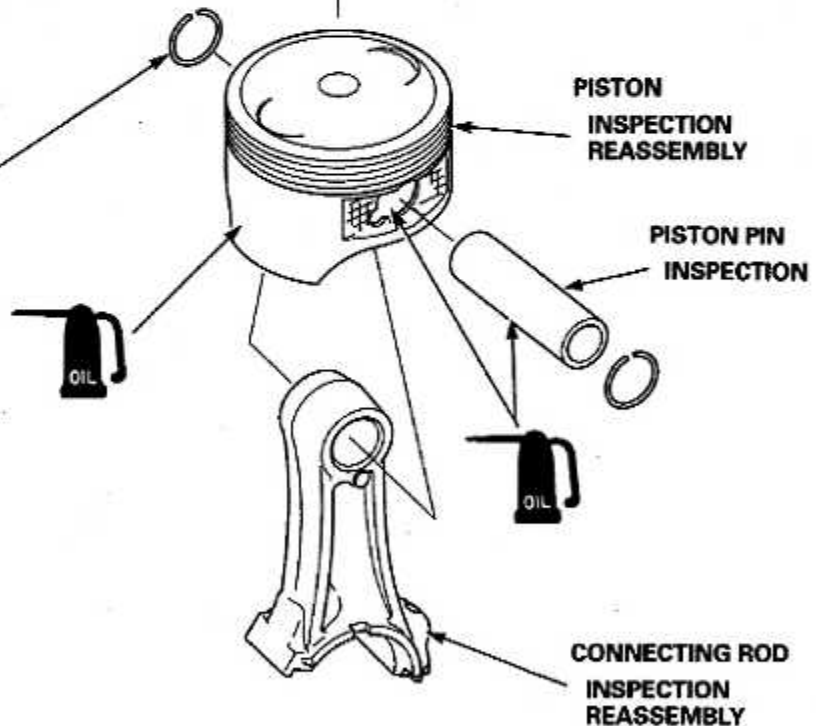
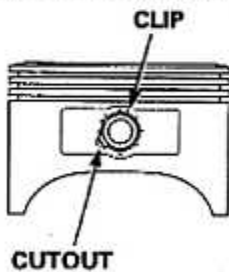
REASSEMBLY:  
Chrome plated. Do not interchange with SECOND RING.



### PISTON PIN CLIP (2)

#### REASSEMBLY:

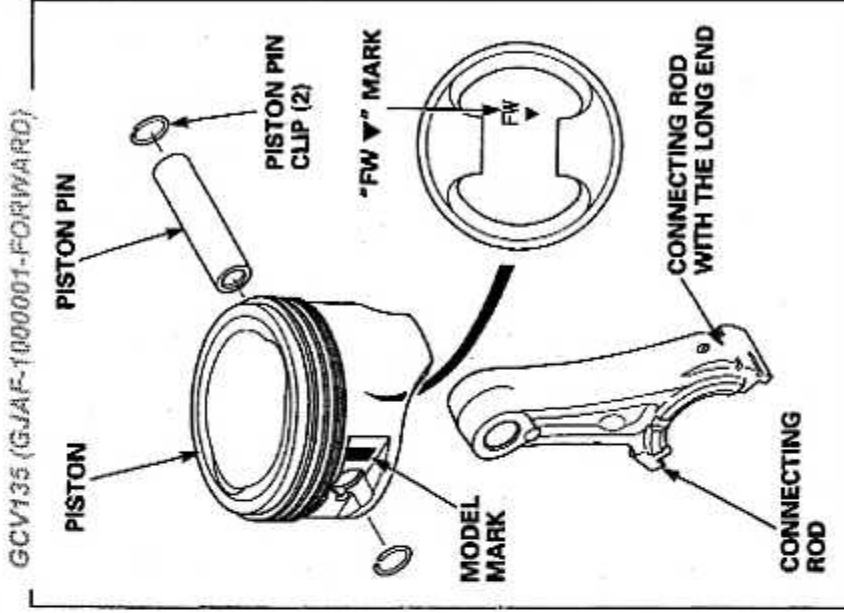
- Install by setting one end of the clip in the piston groove, holding the other end with longnosed pliers, and rotating the clip in.
- Do not align the end gap of the clip with the cutout in the piston pin bore.



## ● 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

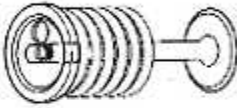
## DISASSEMBLY/REASSEMBLY

Remove the oil pan, 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

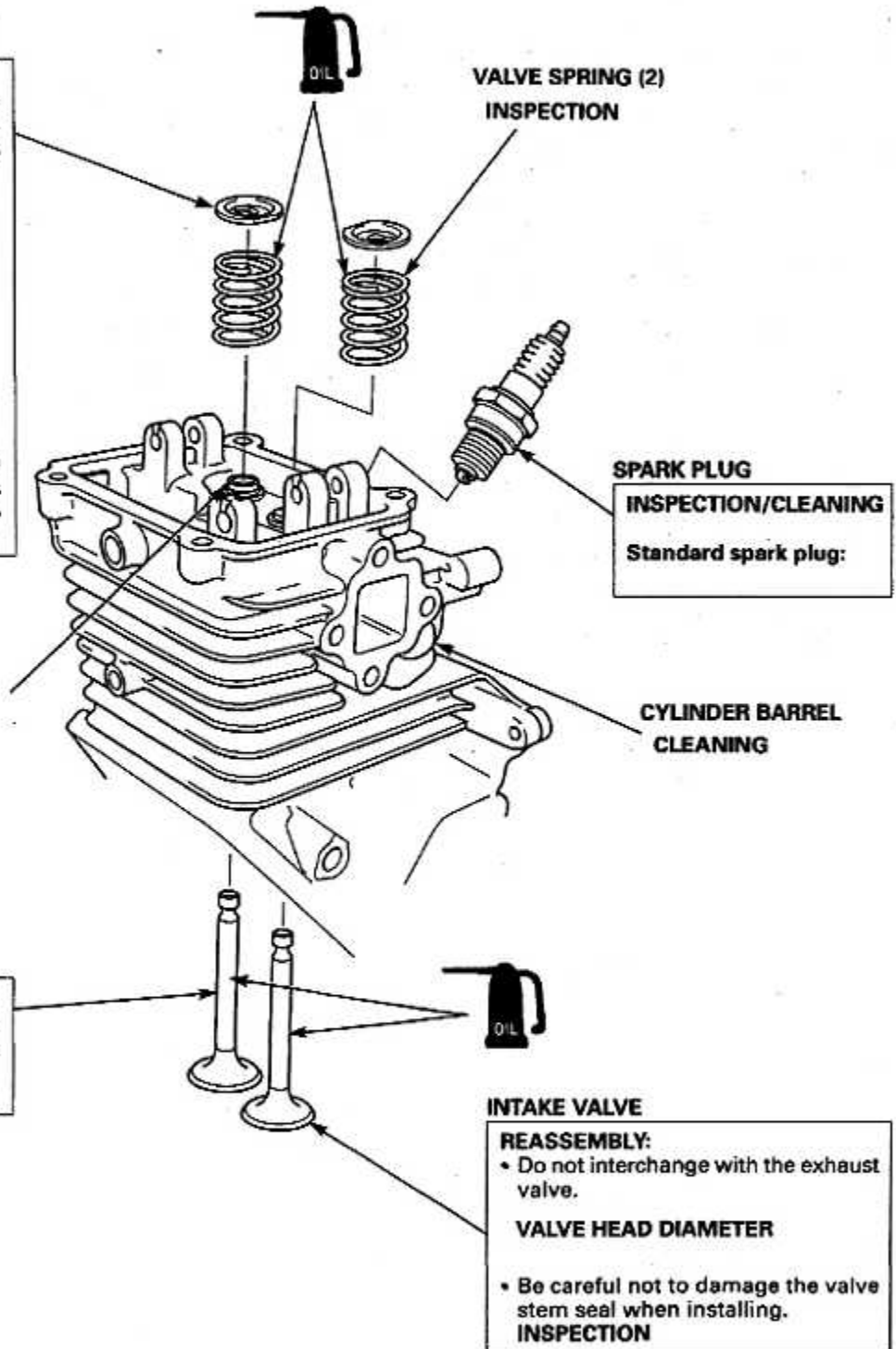
**REASSEMBLY:**

- 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

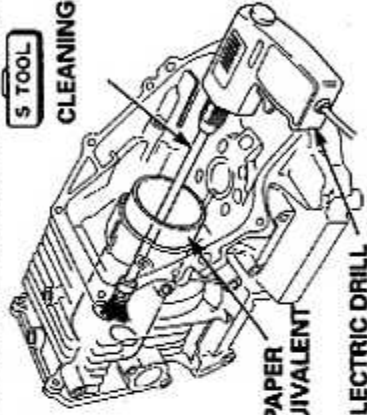
### CAUTION:

- 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.

GCV135 (GJAF-1000001-FORWARD)

S TOOL

CLEANING BRUSH



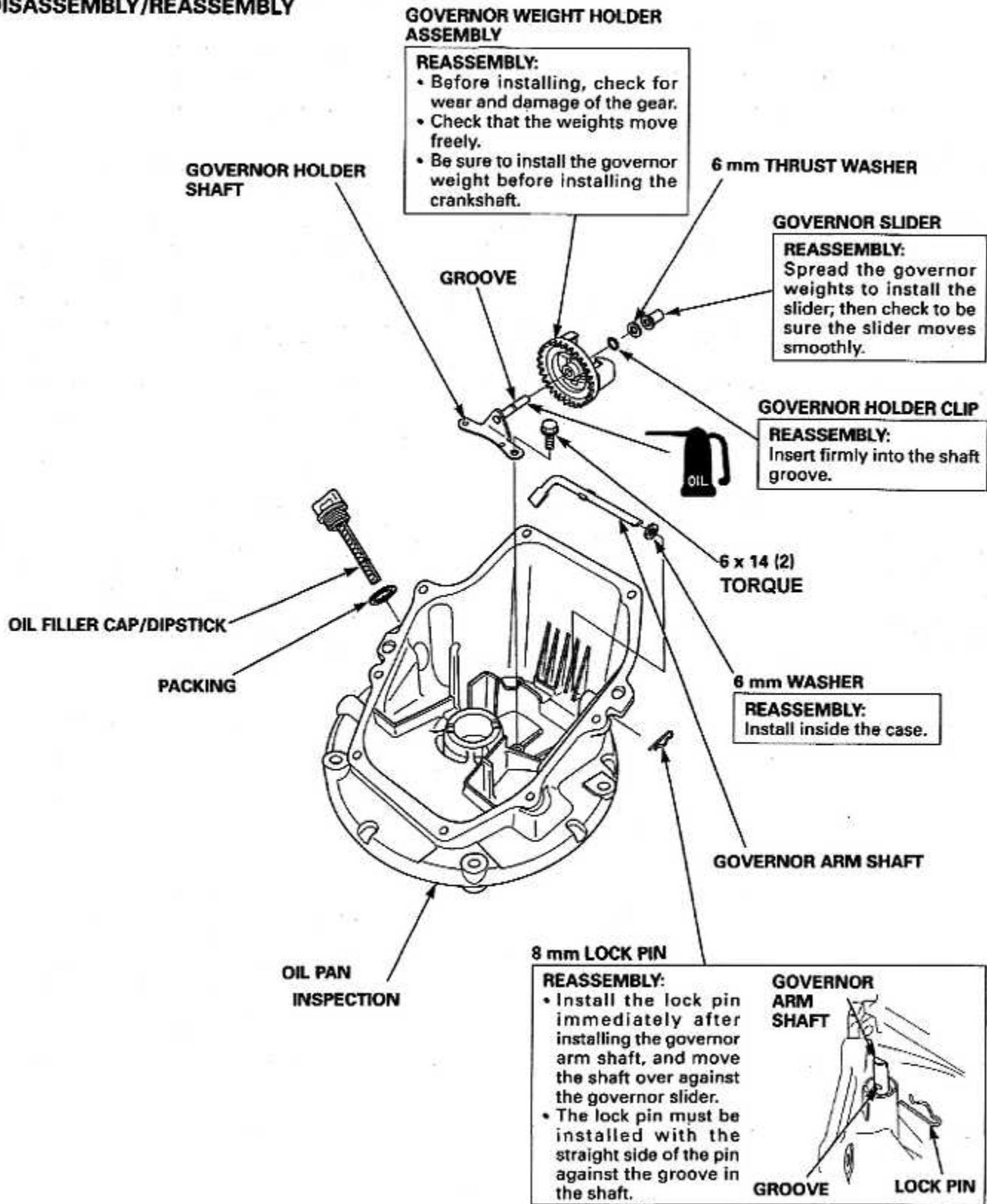
THICK PAPER  
OR EQUIVALENT

ELECTRIC DRILL

# GOVERNOR

GCV135 (GJAF-1000001-FORWARD)

## DISASSEMBLY/REASSEMBLY

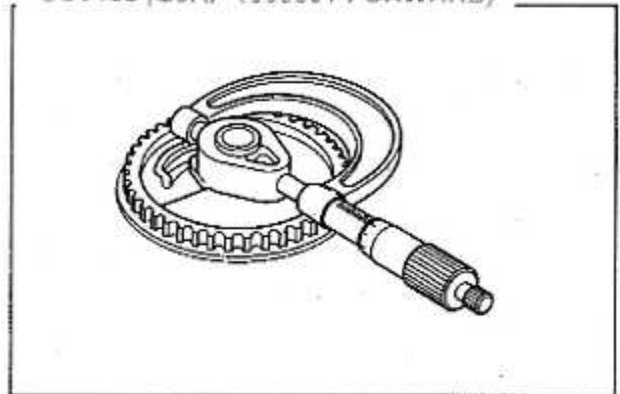


# INSPECTION

## ● CAM PULLEY CAM HEIGHT

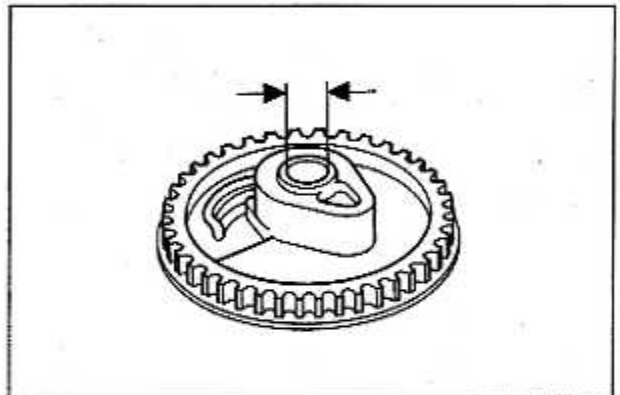
Standard	Service limit
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GCV135 (GJAF-1000001-FORWARD)



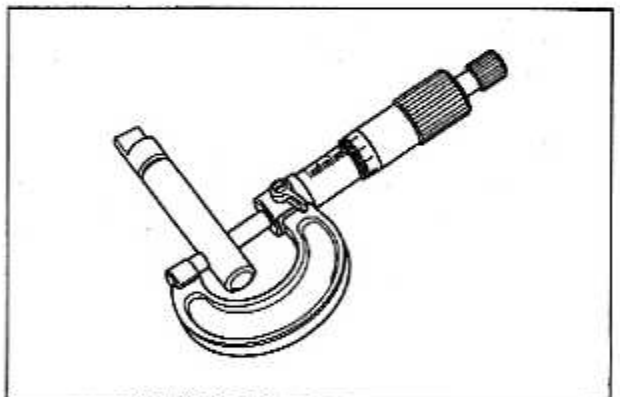
## ● CAM PULLEY I.D. (BEARING)

Standard	Service limit
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## ● CAM PULLEY SHAFT O.D.

Standard	Service limit
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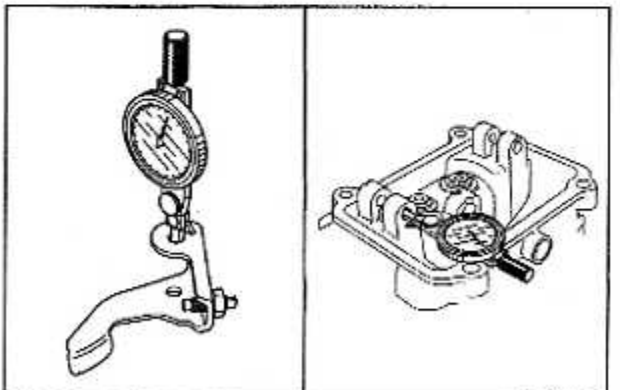


## ● ROCKER ARM I.D.

Standard	Service limit
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## ● ROCKER ARM SHAFT BEARING I.D.

Standard	Service limit
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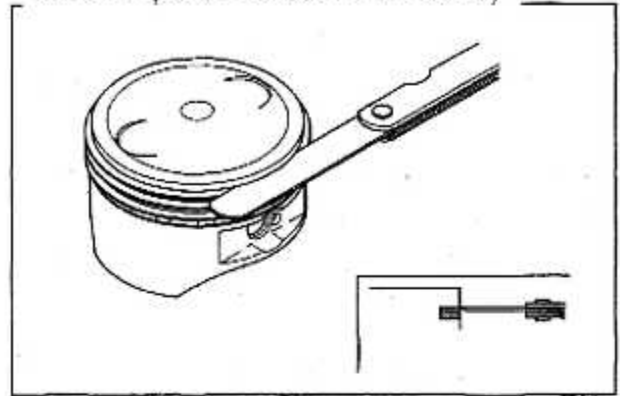




● **PISTON RING SIDE CLEARANCE**

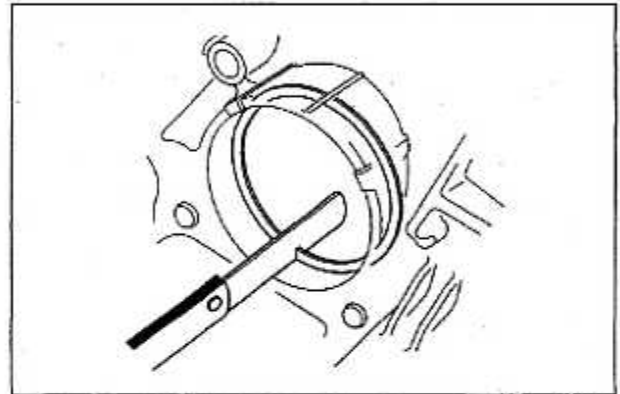
Standard	Service limit
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GCV135 (GJAF-1000001-FORWARD)



● **PISTON RING END GAP**

Standard	Service limit
----------	---------------

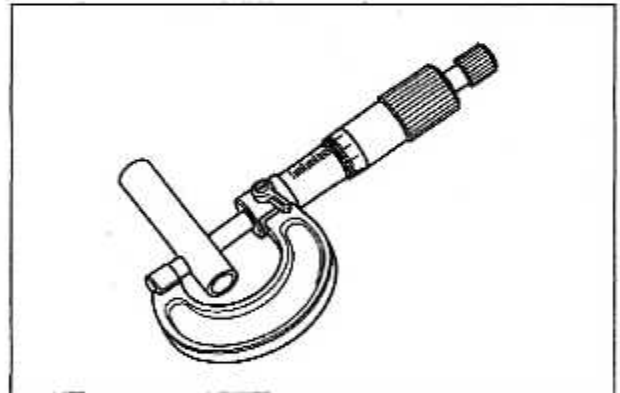


**NOTE:**

Use the top of the piston to position the ring horizontally in the cylinder.

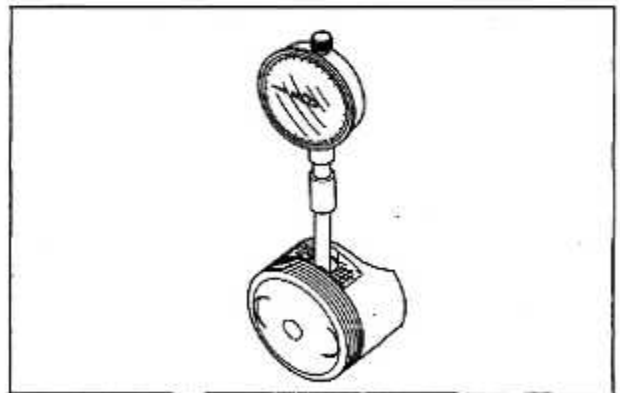
● **PISTON PIN O.D.**

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

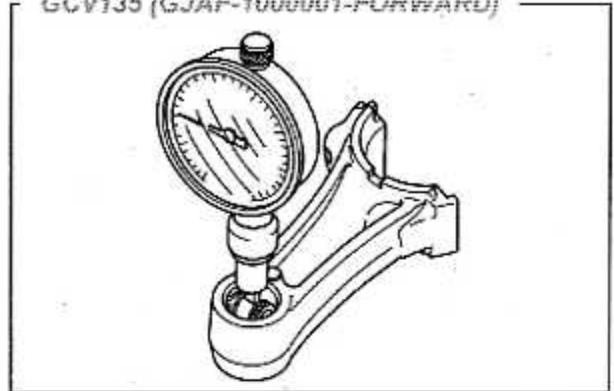
Standard	Service limit
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● **CONNECTING ROD SMALL END I.D.**

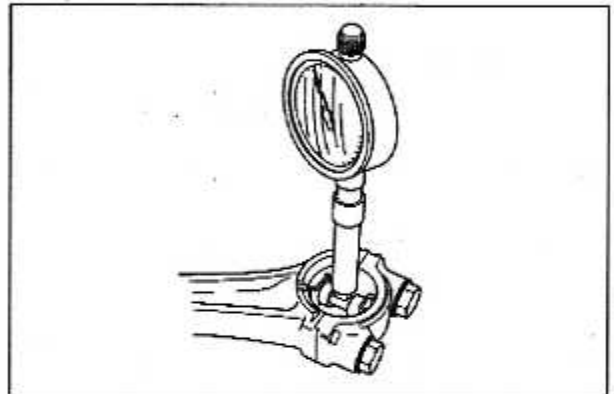
Standard	Service limit
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GCV135 (GJAF-1000001-FORWARD)



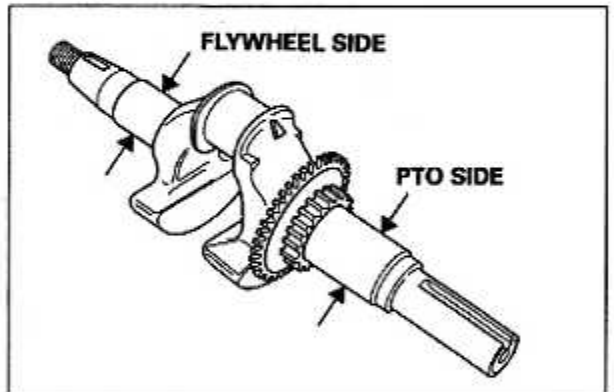
● **CONNECTING ROD BIG END I.D.**

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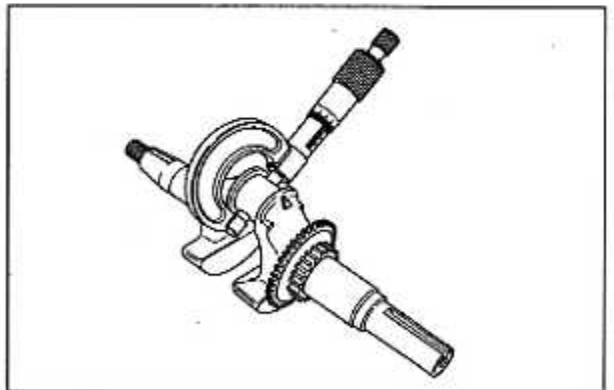
● **CRANKSHAFT MAIN JOURNAL O.D.**

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

Standard	Service limit
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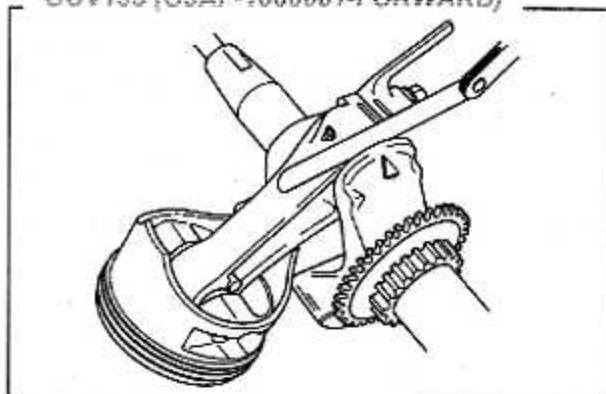


● **CONNECTING ROD BIG END AXIAL CLEARANCE**

Measure the clearances with a feeler gauge.

Standard	Service limit
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GCV135 (GJAF-1000001-FORWARD)



● **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**

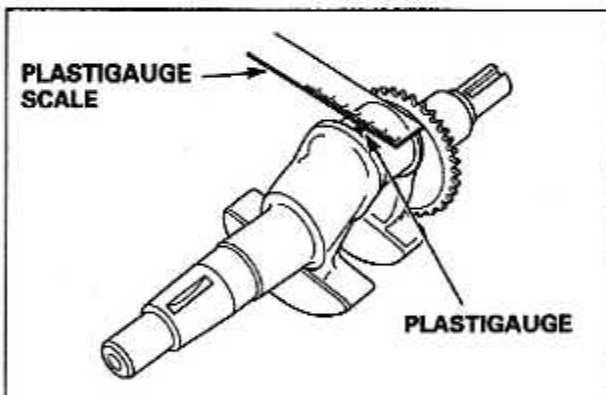
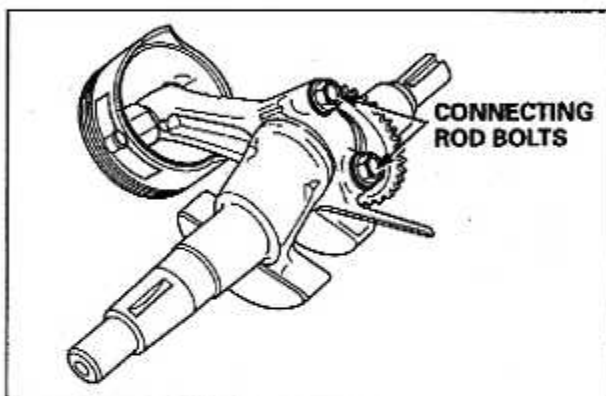
**NOTE:**

- 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.

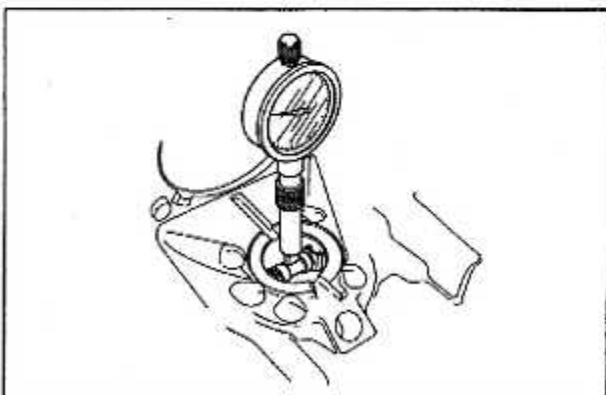
Standard	Service limit
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- 4) If the clearance exceeds the service limit, replace the connecting rod and recheck the clearance.



● **CYLINDER BARREL MAIN JOURNAL I.D.**

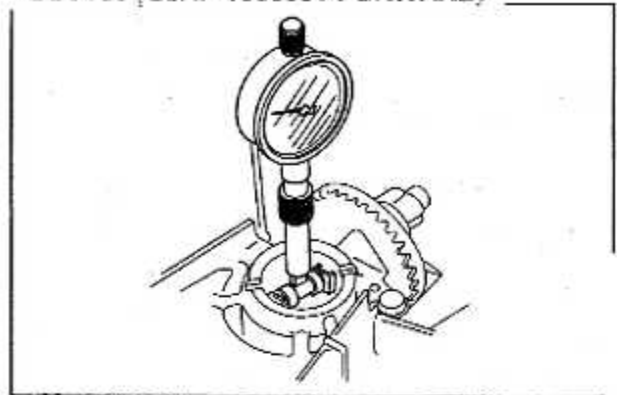
Standard	Service limit
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● **OIL PAN MAIN JOURNAL I.D.**

Standard	Service limit
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GCV135 (GJAF-1000001-FORWARD)



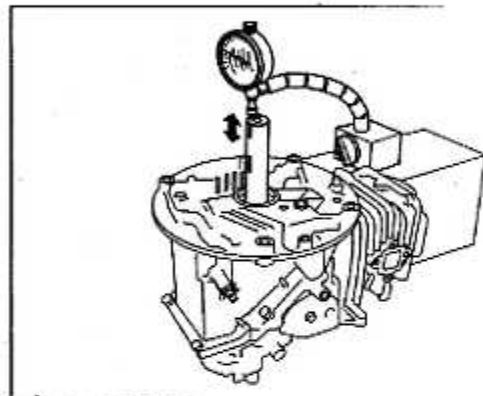
● **CRANKSHAFT AXIAL CLEARANCE**

Measure the crankshaft axial runout before removing the oil pan, 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 oil pan and cylinder barrel.

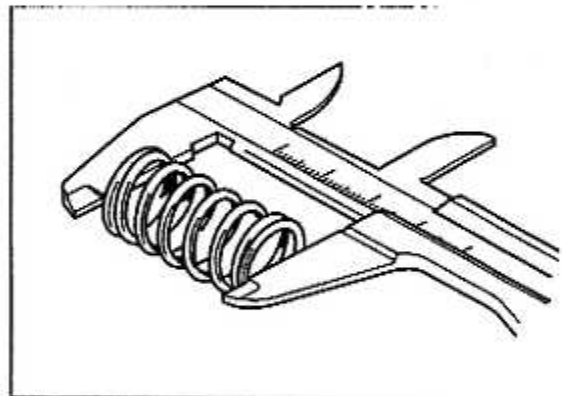


● **VALVE SPRING FREE LENGTH**

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.



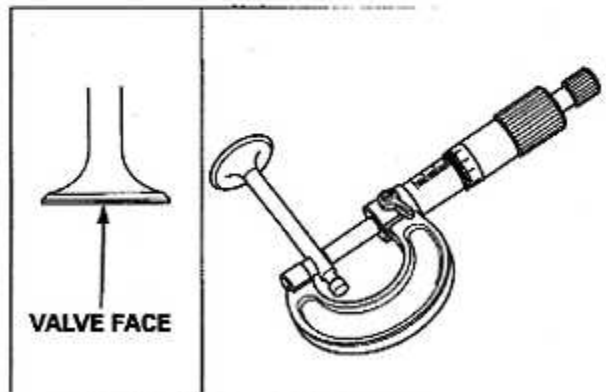
● **VALVE FACE / STEM O.D.**

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.

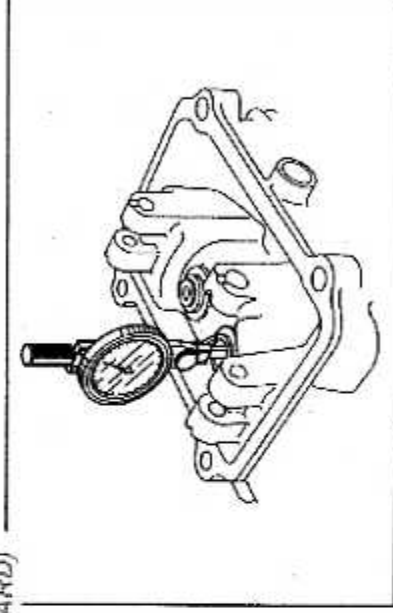


● **VALVE GUIDE I.D.** GCV135 (GJAF-1000001-FORWARD)

Measure and record each valve guide I.D.

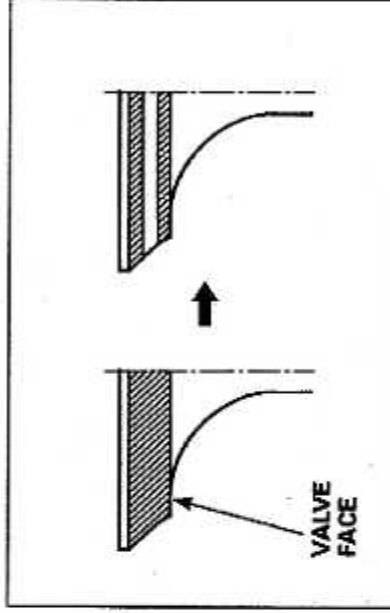
Standard	Service limit
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Replace the cylinder barrel if they are over the service limit



● **VALVE SEAT WIDTH**

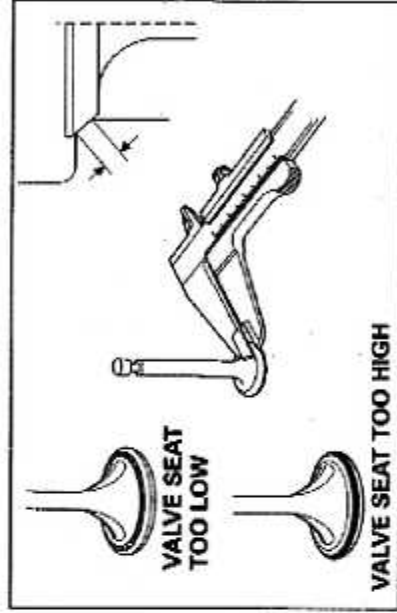
- 1) Thoroughly clean the combustion chambers and valve seats to remove carbon deposits
- 2) Apply a light coat of Prussian Blue compound or erasable felt-tipped marker ink to the valve faces.
- 3) Insert the valves, and then lift them and snap them closed against their seats several times. Be sure the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

- 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



● **GOVERNOR ROD/THROTTLE RETURN SPRING/  
CHOKE ROD**

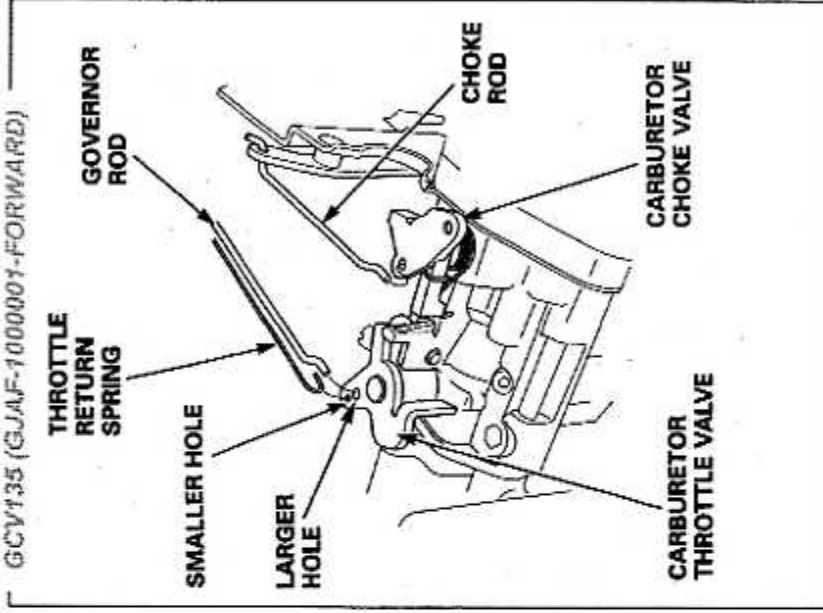
**REMOVAL:**

- 1) Unhook the throttle return spring.
- 2) Remove the two 6 x 86 mm flange bolts and the 6 x 14 mm flange bolt from the air cleaner case
- 3) Remove the air cleaner case, air cleaner packing, carburetor packing, air guide, carburetor insulator and insulator packing
- 4) Unhook the choke rod and governor rod from the carburetor.

**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, carburetor, carburetor packing, air cleaner packing and air cleaner case
- 4) Install the two 6 x 86 mm flange bolts and 6 x 14 mm flange bolt

GCV135 (GJAF-1000001-FORWARD)



## DISASSEMBLY/REASSEMBLY

### ⚠ WARNING

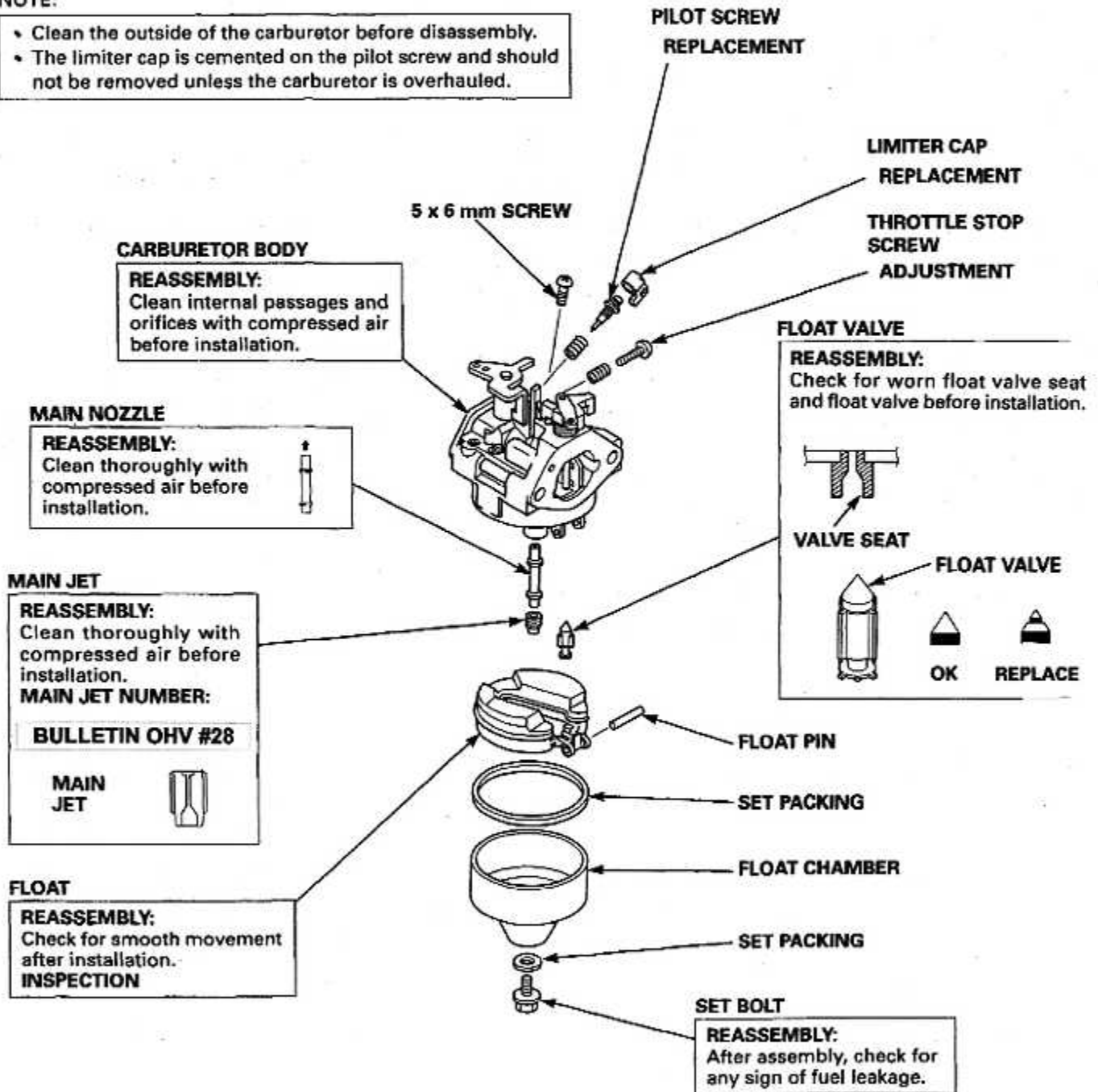
Gasoline is highly flammable and explosive.

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.



## 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.

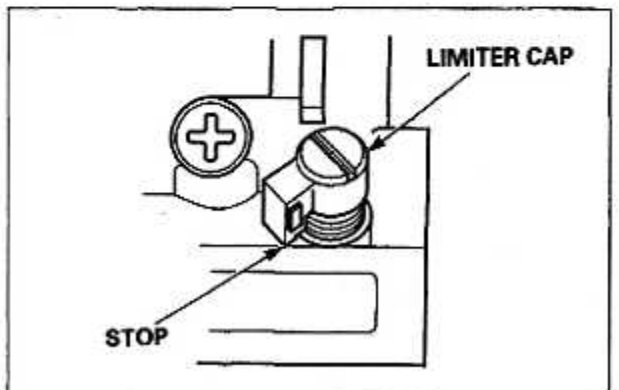
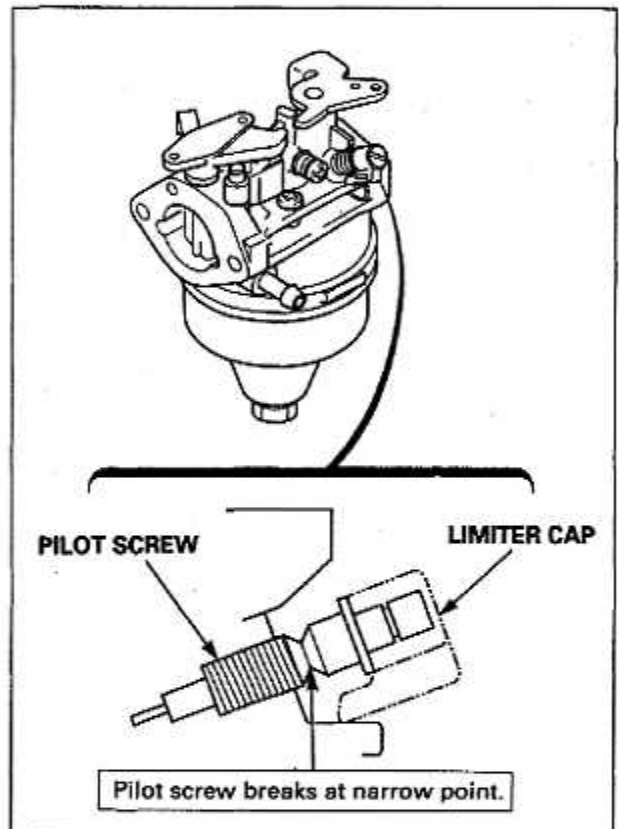
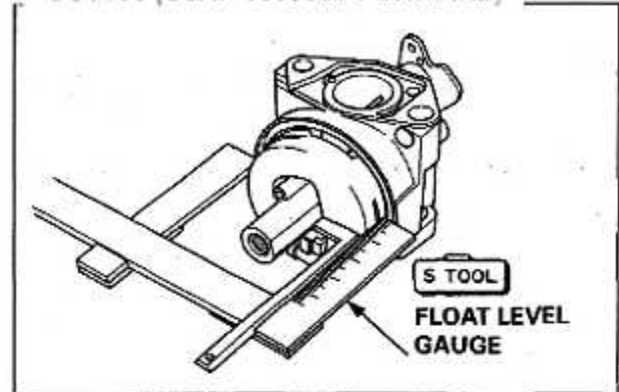
- 1) When the limiter cap has been broken off, remove the broken pilot screw.
- 2) Place the spring on the replacement pilot screw, and install it on the carburetor.
- 3) Turn the pilot screw in until it is lightly seated, then turn the screw out the required number of turns.

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.

GCV135 (GJAF-1000001-FORWARD)



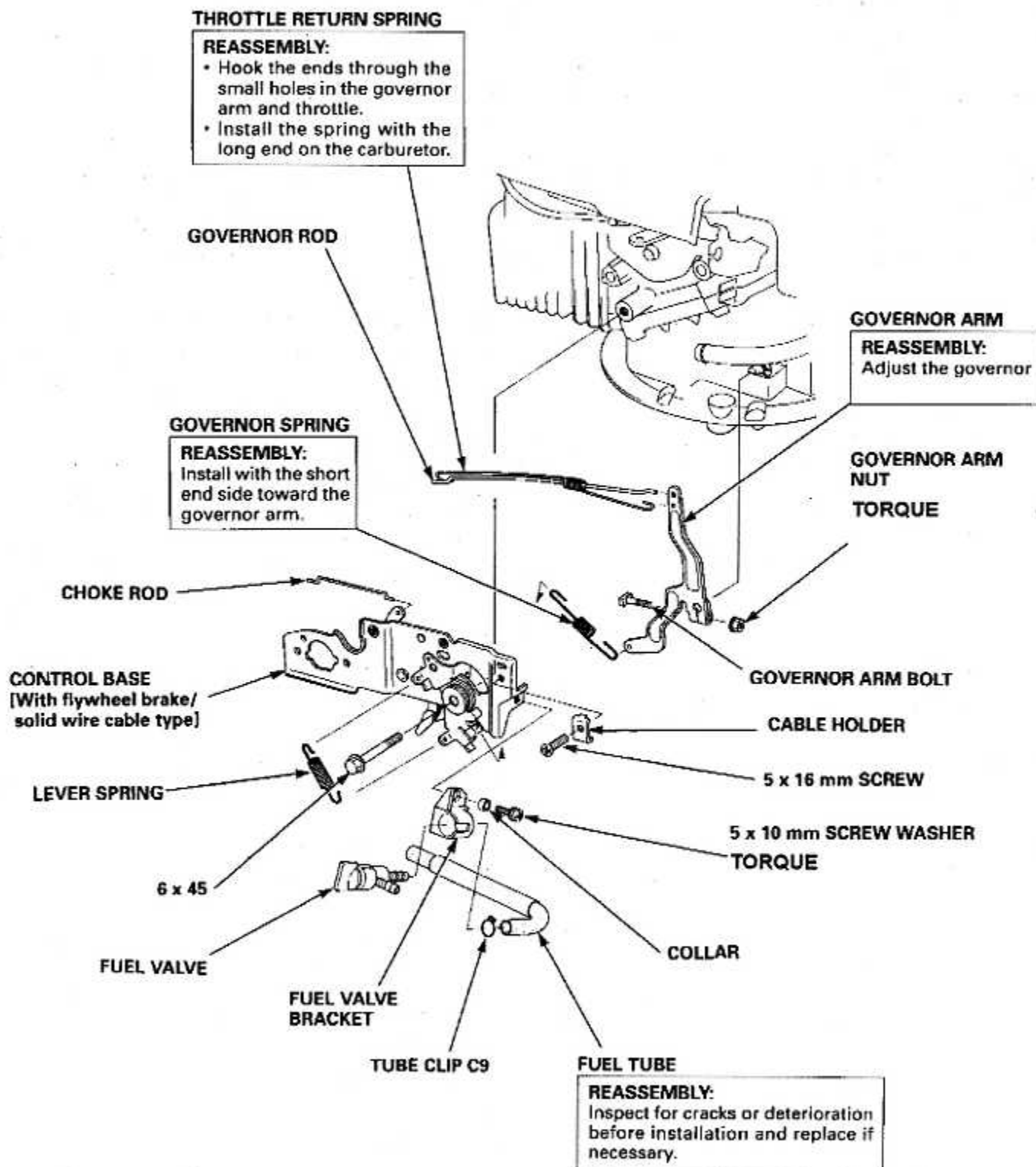


# CONTROL BASE/GOVERNOR ARM

GCV135 (GJAF-1000001-FORWARD)

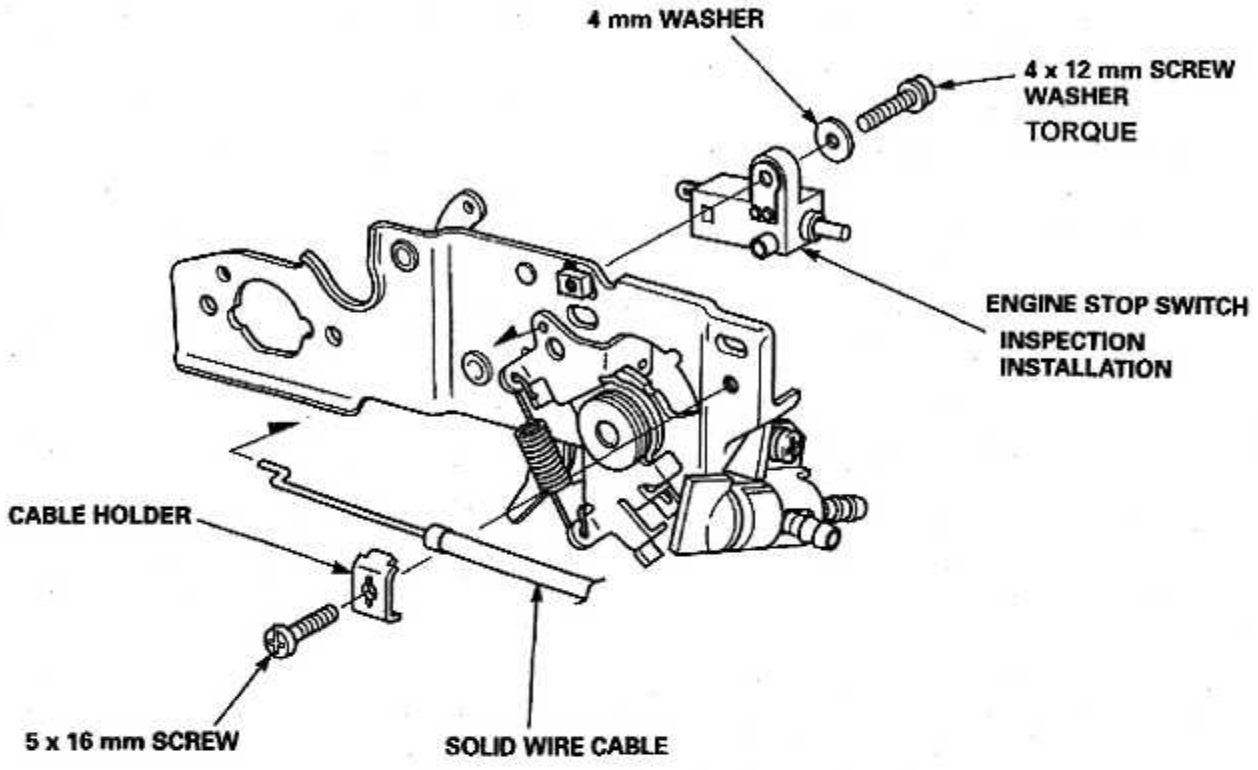
## DISASSEMBLY/REASSEMBLY

Remove the air cleaner and carburetor

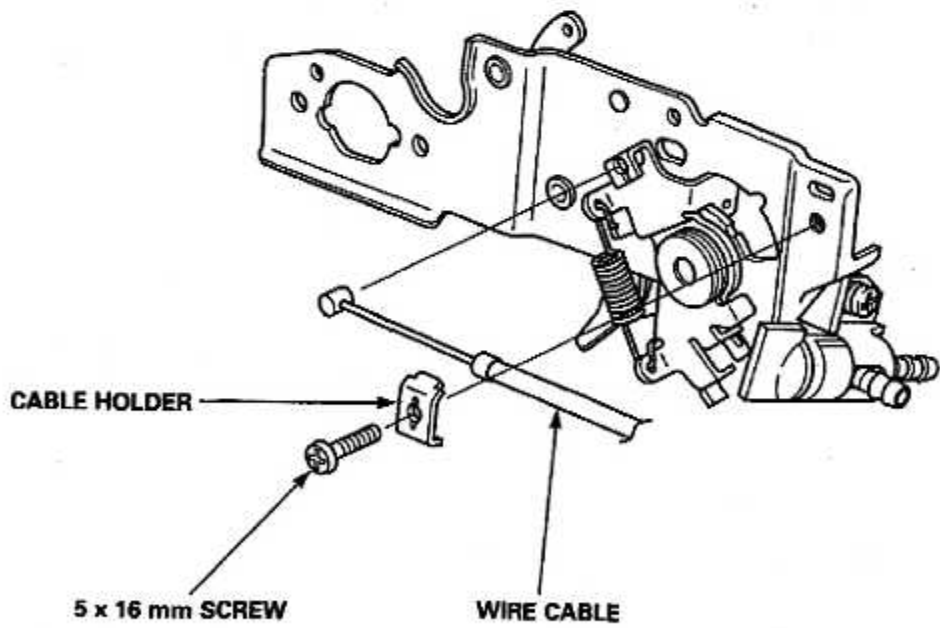


● Without flywheel brake/solid wire cable type

GCV135 (GJAF-1000001-FORWARD)



● Without engine stop switch/wire cable type



# FAN COVER

GCV135 (GJAF-1000001-FORWARD)

## REMOVAL/INSTALLATION

- 1) Before disassembly, completely drain the fuel tank and fuel line.
- 2) Remove the recoil starter

### ⚠ 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 CAP

#### REASSEMBLY:

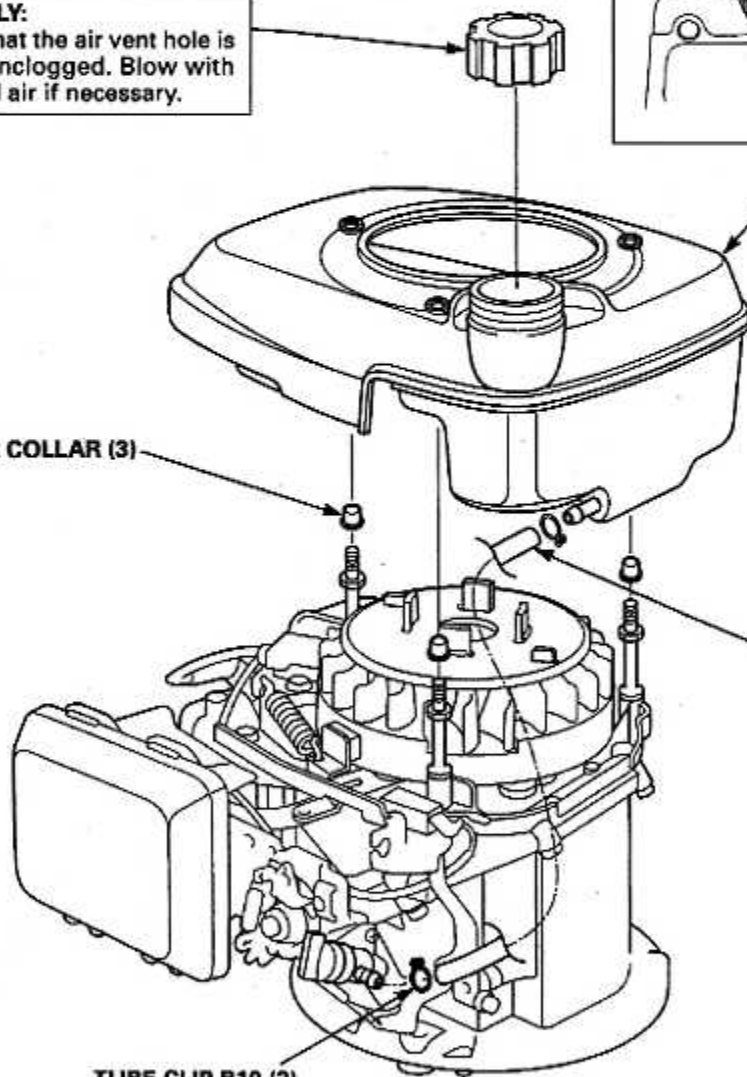
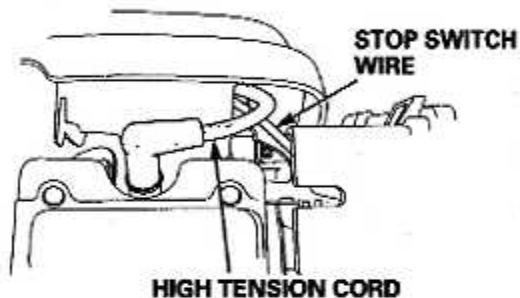
Make sure that the air vent hole is clean and unclogged. Blow with compressed air if necessary.

### FAN COVER

#### FUEL CAPACITY:

#### CLEANING INSTALLATION:

- Wash with solvent to remove the sediment, and dry thoroughly before installing.
- Check whether the high tension cord and the stop switch wire are securely set in the groove in the fan cover as shown.



### 5.3 x 135 mm FUEL TUBE

#### REASSEMBLY:

Inspect for cracks or deterioration before installation and replace if necessary.

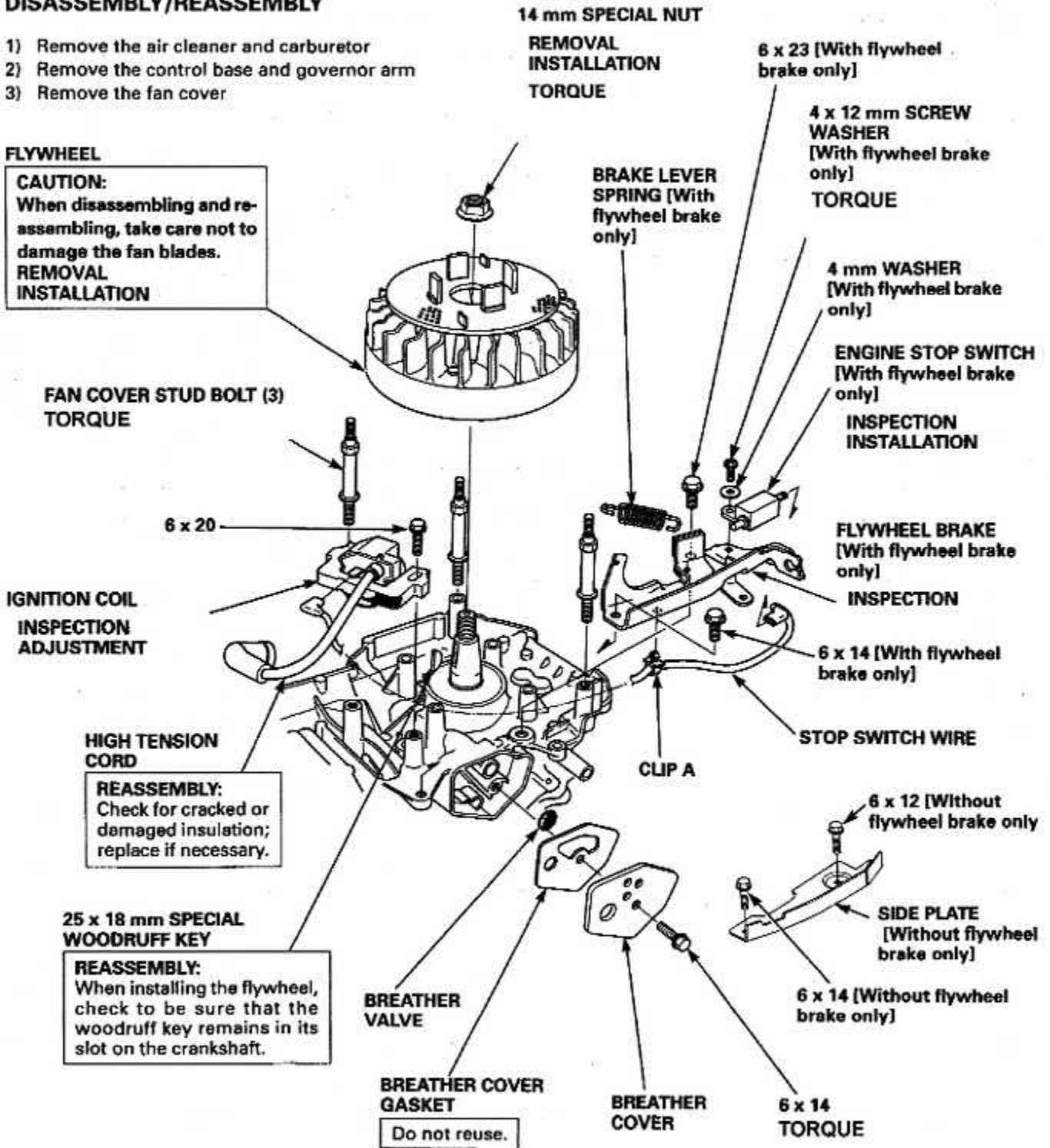
# FLYWHEEL/IGNITION COIL/FLYWHEEL BRAKE

## DISASSEMBLY/REASSEMBLY

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

### FLYWHEEL

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



● **14 mm SPECIAL NUT/FLYWHEEL**

**REMOVAL:**

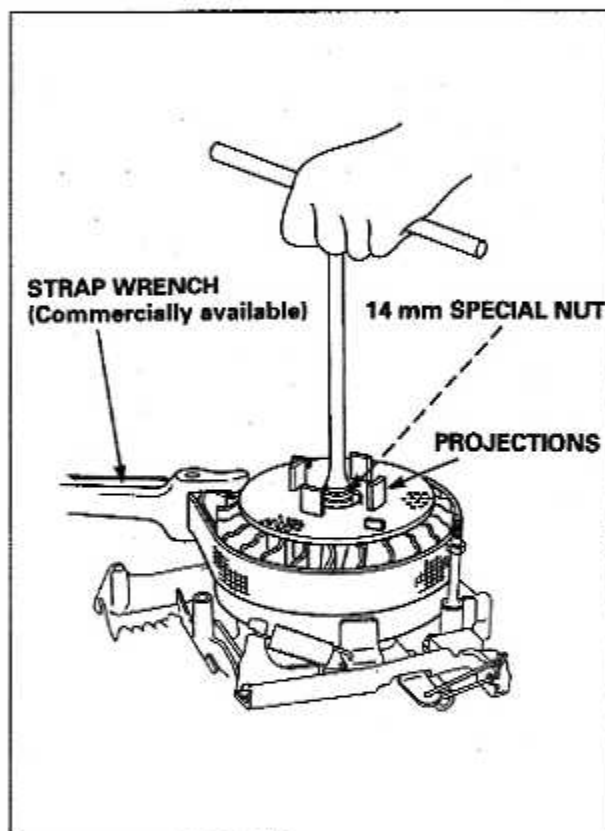
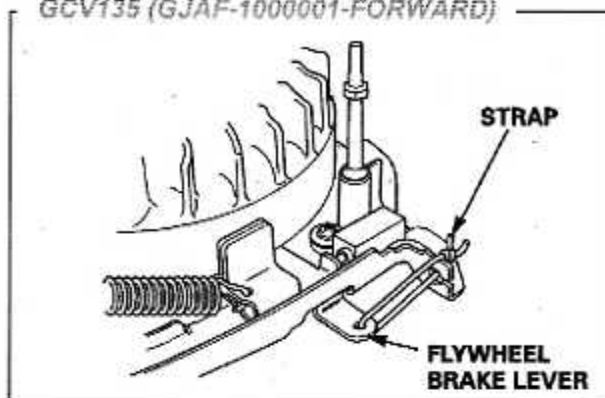
- 1) Remove the ignition coil
- 2) Pull the flywheel brake lever and secure the lever with a strap or equivalent material as shown (with flywheel brake only).

- 3) Holding the flywheel with a commercially available strap wrench, remove the 14 mm special nut.

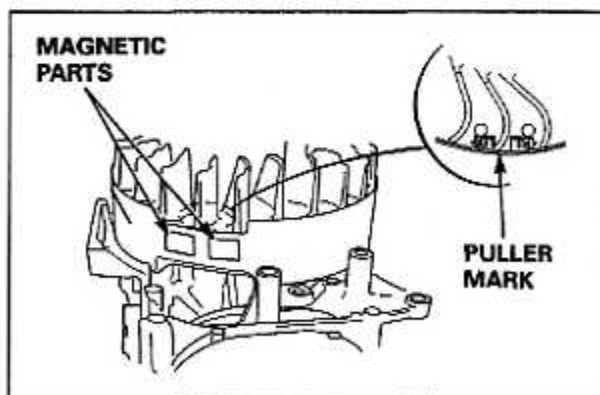
**CAUTION:**

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

GCV135 (GJAF-1000001-FORWARD)



- 4) Set the magnetic parts (i.e, identified by the PULLER mark) of the flywheel in the position shown.



- Set the commercially available 6-inch flywheel puller on the flywheel; specifically, set at the part under the magnetic parts (i.e, identified by the PULLER mark) on the flywheel.

**NOTE:**

- Do not set the flywheel puller at any parts other than under the magnetic parts (i.e, identified by the PULLER mark).
- Set a shop towel or equivalent cloth between the flywheel and the puller.

- 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.

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

**TORQUE**

- Remove the strap or equivalent material from the flywheel brake lever (with flywheel brake only).

● **ENGINE STOP SWITCH**

**INSTALLATION:**

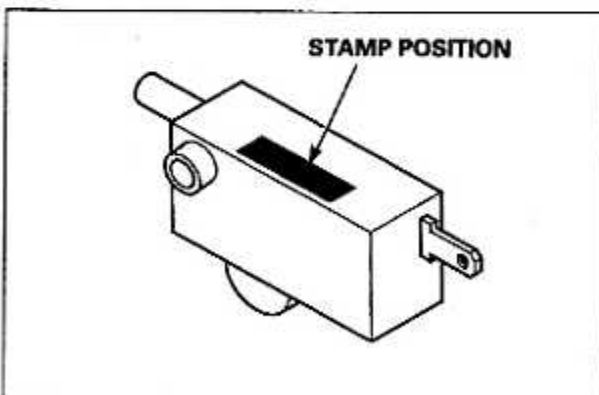
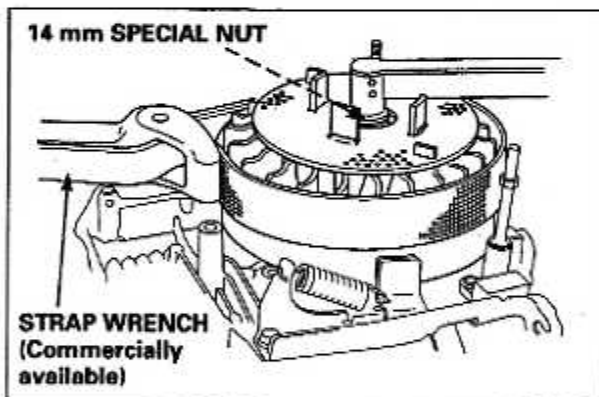
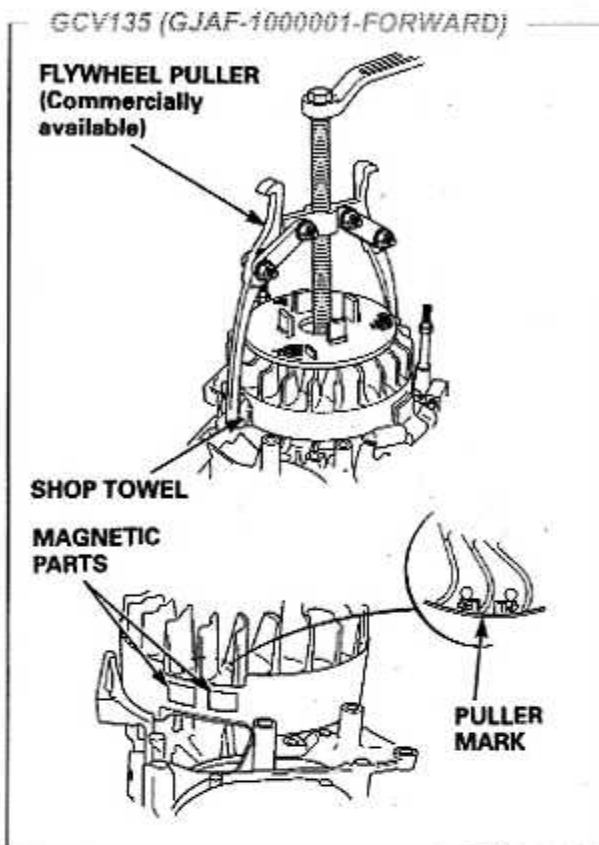
Note that the engine stop switch is different between the type with flywheel brake and the type without the flywheel brake.

Install the engine stop switch properly.

< **Type identification** >

With flywheel brake: Stamped as "N CL"

Without flywheel brake: Stamped as "N OP"



## 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.

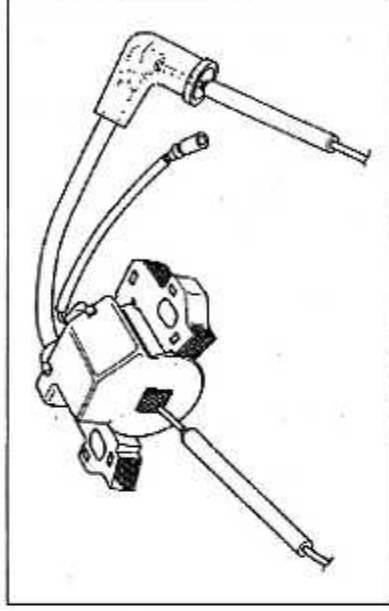
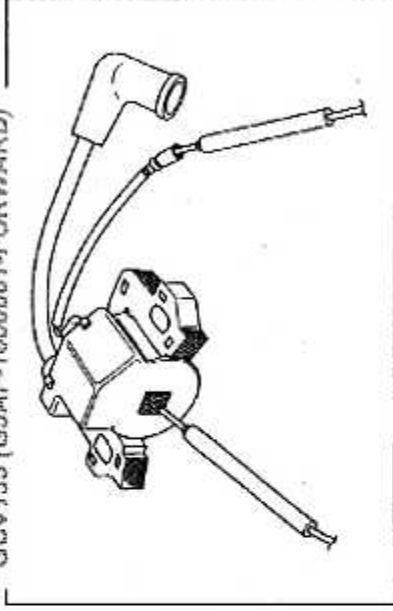
Primary side resistance

#### < 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

GCV135 (GJAF-1000001-FORWARD)



### ● ENGINE STOP SWITCH

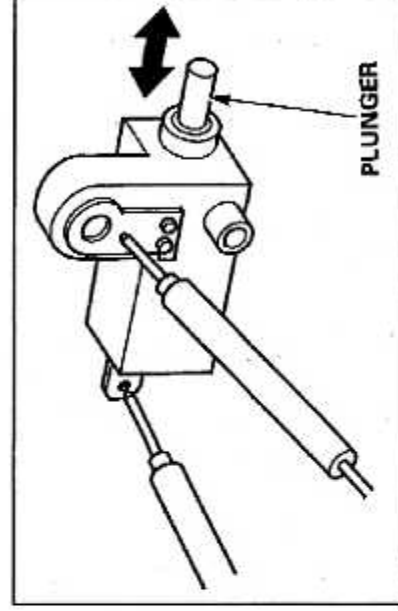
#### With flywheel brake:

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

#### Without flywheel brake:

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.



## 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.

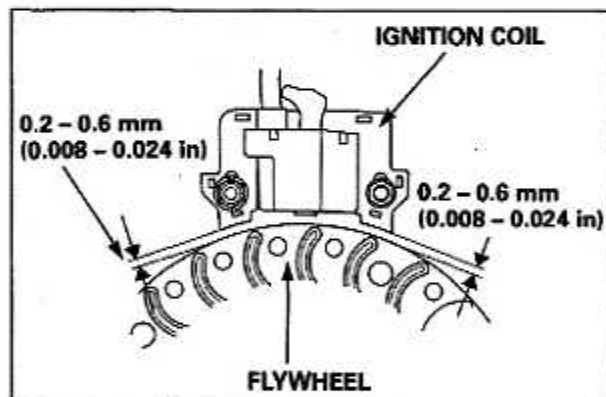
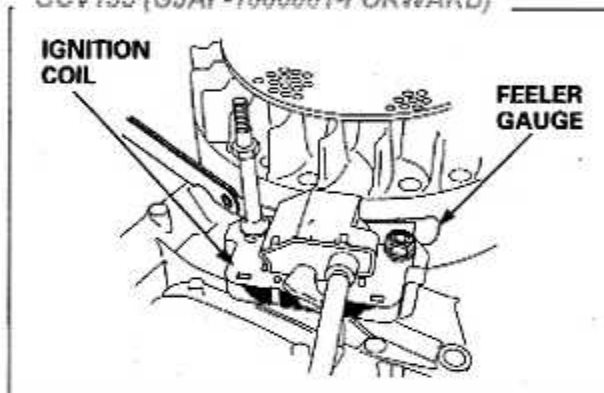
- 3) Push the ignition coil firmly toward the flywheel and tighten the bolts.

Specified clearance

#### NOTE:

Avoid the magnet part of the flywheel when adjusting.

GCV135 (GJAF-1000001-FORWARD)

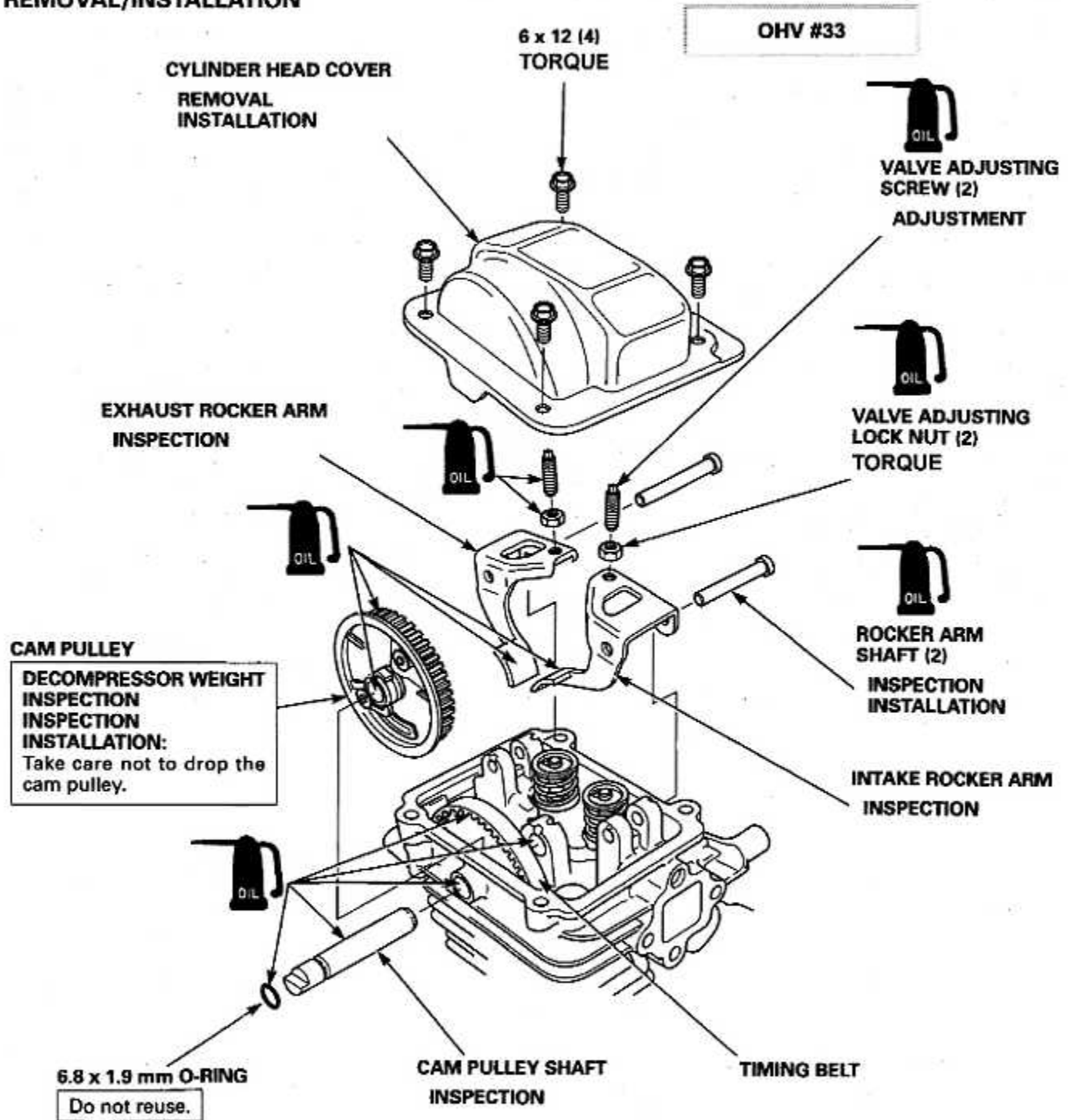




# CAM PULLEY/ROCKER ARM

GCV135 (GJAF-1000001-FORWARD)

## REMOVAL/INSTALLATION



## ● CAM PULLEY

### DECOMPRESSOR WEIGHT INSPECTION:

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

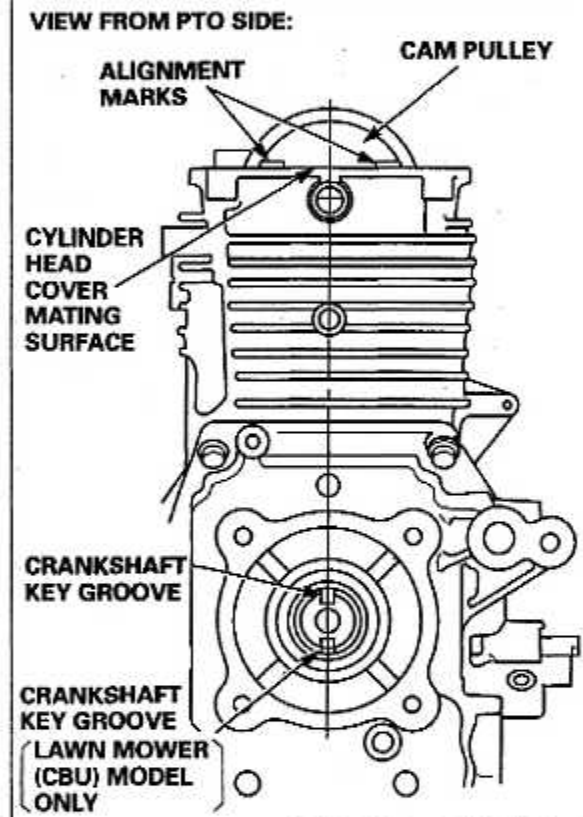
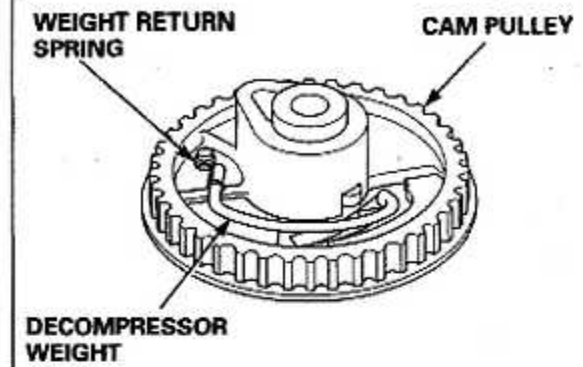
### INSTALLATION:

- 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.

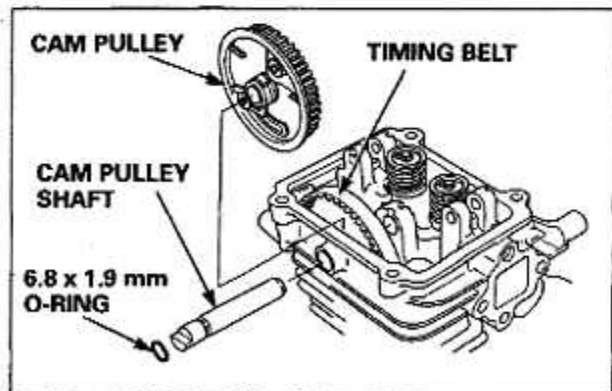
### NOTE:

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

GCV135 (GJAF-1000001-FORWARD)



- 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.

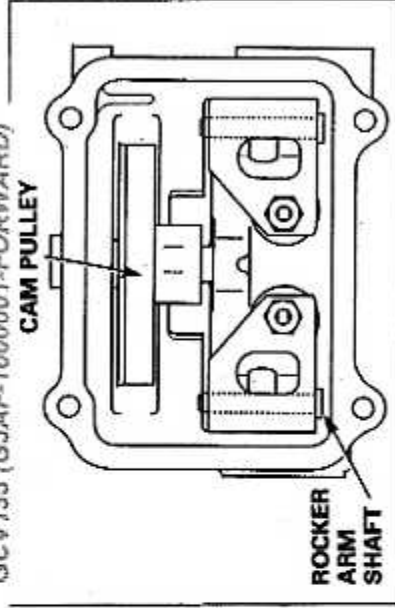


- **ROCKER ARM SHAFT**

**INSTALLATION:**

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

GCV135 (GJAF-1000001-FORWARD)



- **CYLINDER HEAD COVER**

**INSTALLATION:**

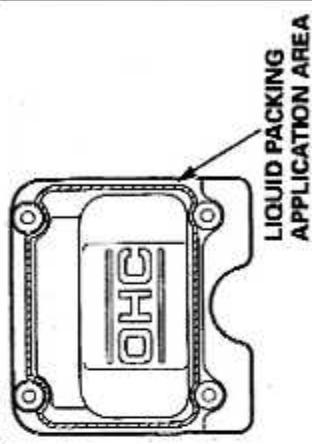
- 1) Clean the mating surfaces of the cylinder head cover and the cylinder barrel using a degreasing cleaning agent or a clean shop towel.
- 2) Apply a liquid packing (Three Bond 1207 Honda Bond #4 or equivalent) to the cylinder head cover; specifically to the inner wall of the groove and bolt hole in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

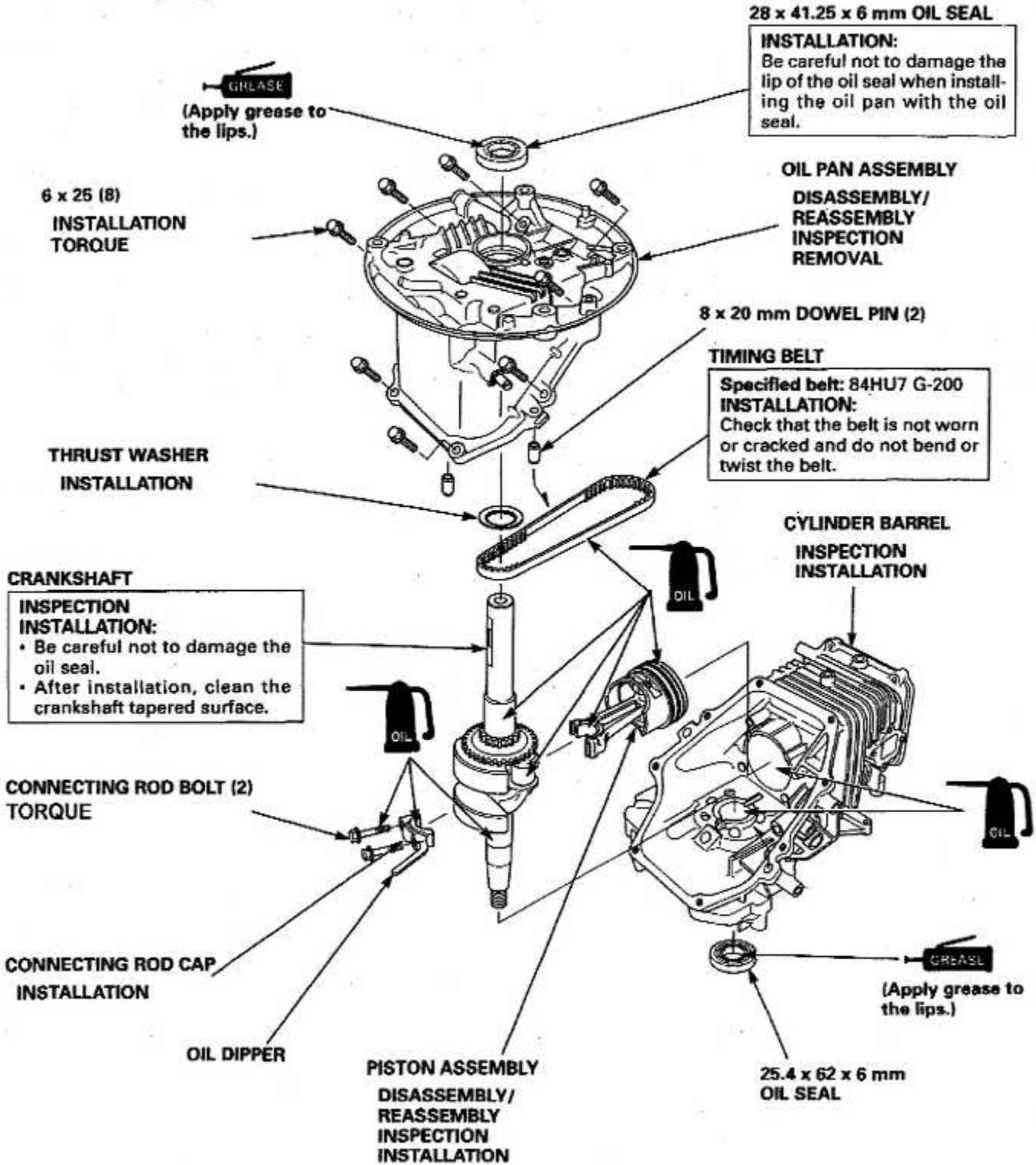
**CYLINDER HEAD COVER VIEWED FROM BACK SIDE:**



# OIL PAN/CRANKSHAFT/CYLINDER BARREL

## REMOVAL/INSTALLATION

Remove the cam pulley and rocker arm

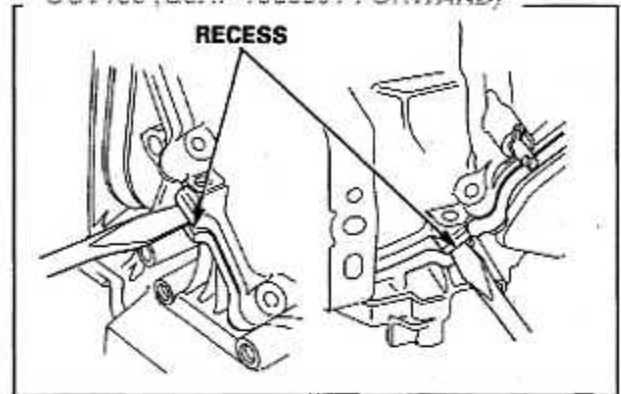


## ● OIL PAN

### REMOVAL:

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

GCV135 (GJAF-1000001-FORWARD)



## ● PISTON ASSEMBLY/CONNECTING ROD CAP

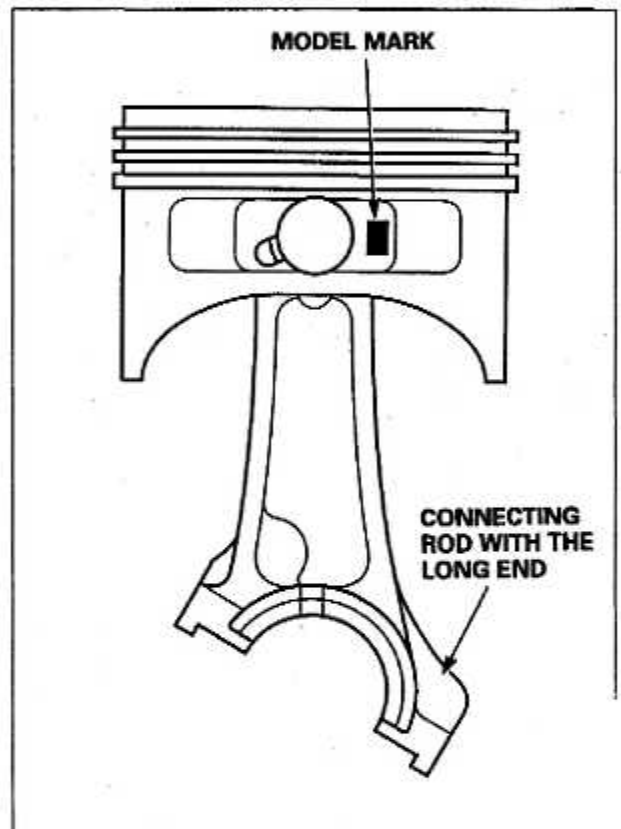
### INSTALLATION:

- 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:

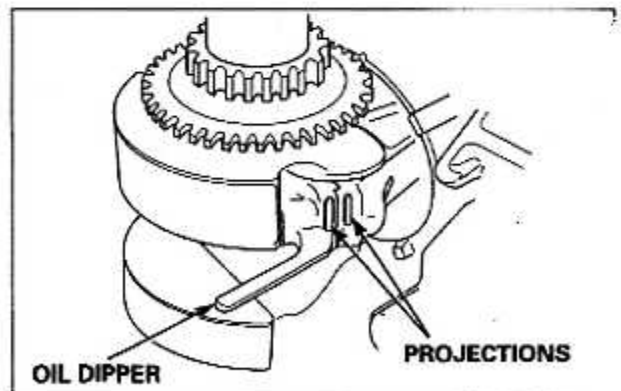
Take care not to break the piston ring when installing the piston assembly in the cylinder.

- 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



## 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
----------	---------------

- 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

GCV135 (GJAF-1000001-FORWARD)

