

# **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 (GJAF-1000001-FORWARD)

### DIMENSIONS AND WEIGHTS

GCV135:

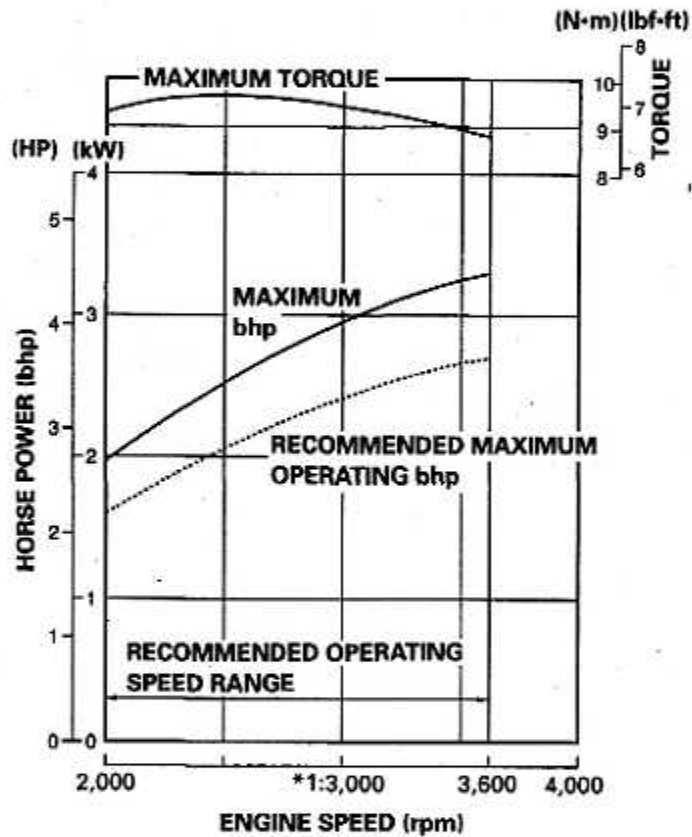
Item	PTO type	
	N1	N2
Overall length	351 mm (13.8 in)	
Overall width	331 mm (13.0 in)	
Overall height	353 mm (13.9 in)	340 mm (13.4 in)
Dry weight	9.5 kg (20.9 lbs)	
Operating weight	10.8 kg (23.8 lbs)	

# 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:

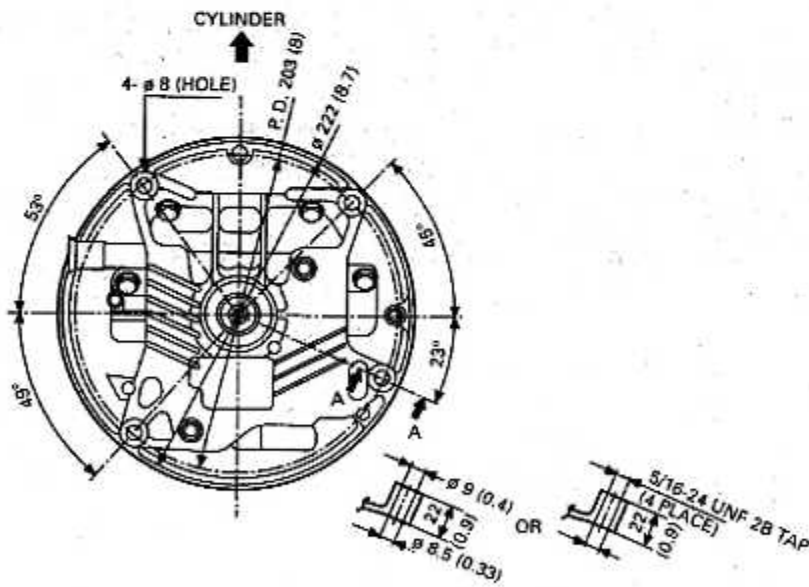
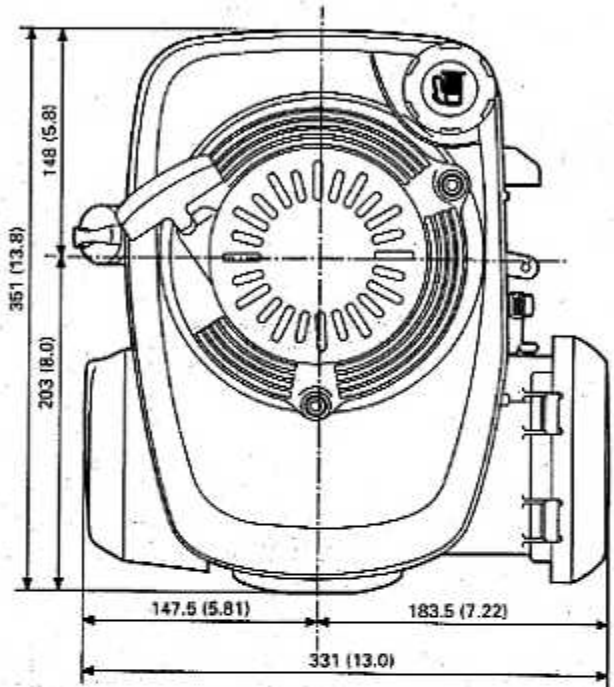
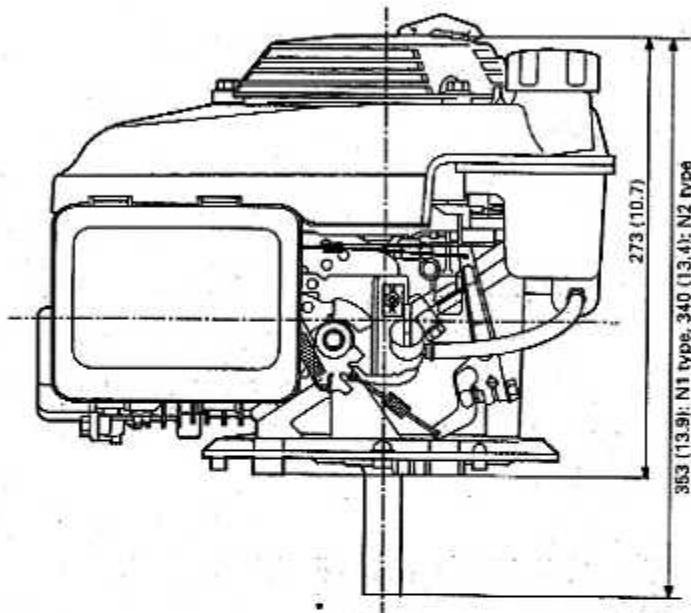


\*1: Rated speed

# DIMENSIONAL DRAWINGS

GCV135 (GJAF-1000001-FORWARD)

Unit : mm (in)



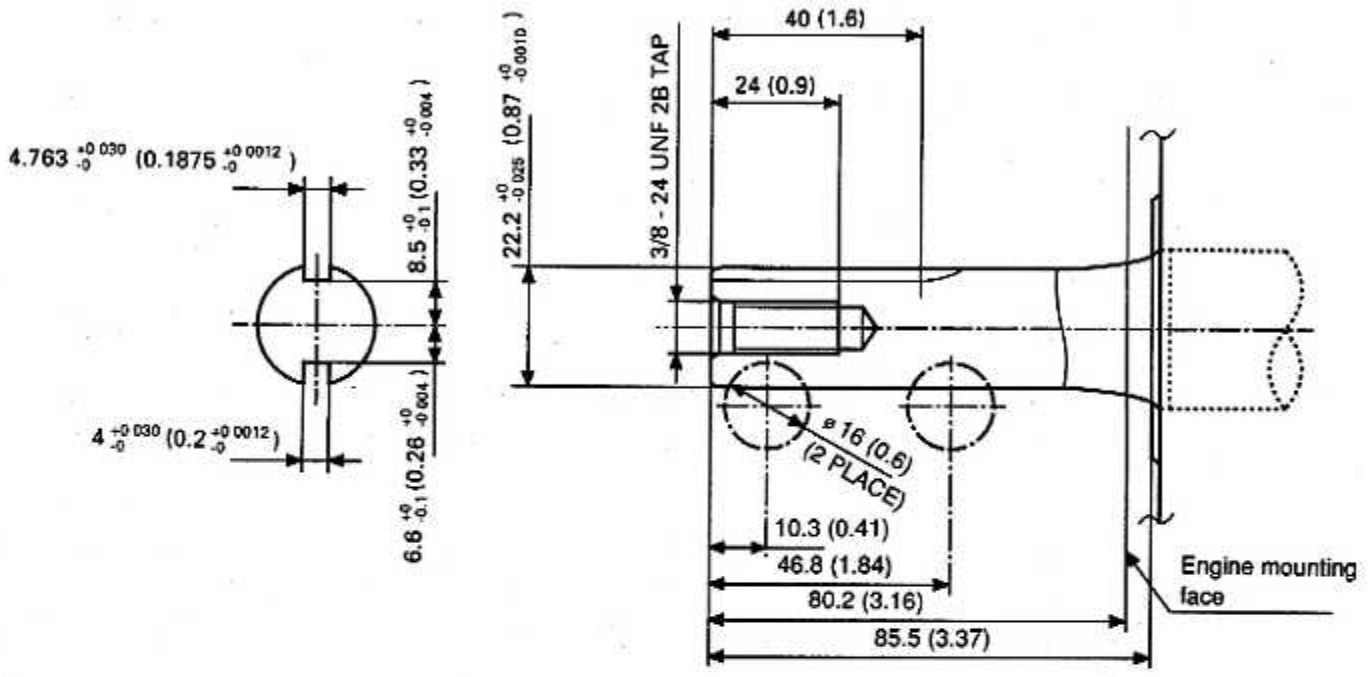
SECTION A-A

# PTO DIMENSIONAL DRAWINGS

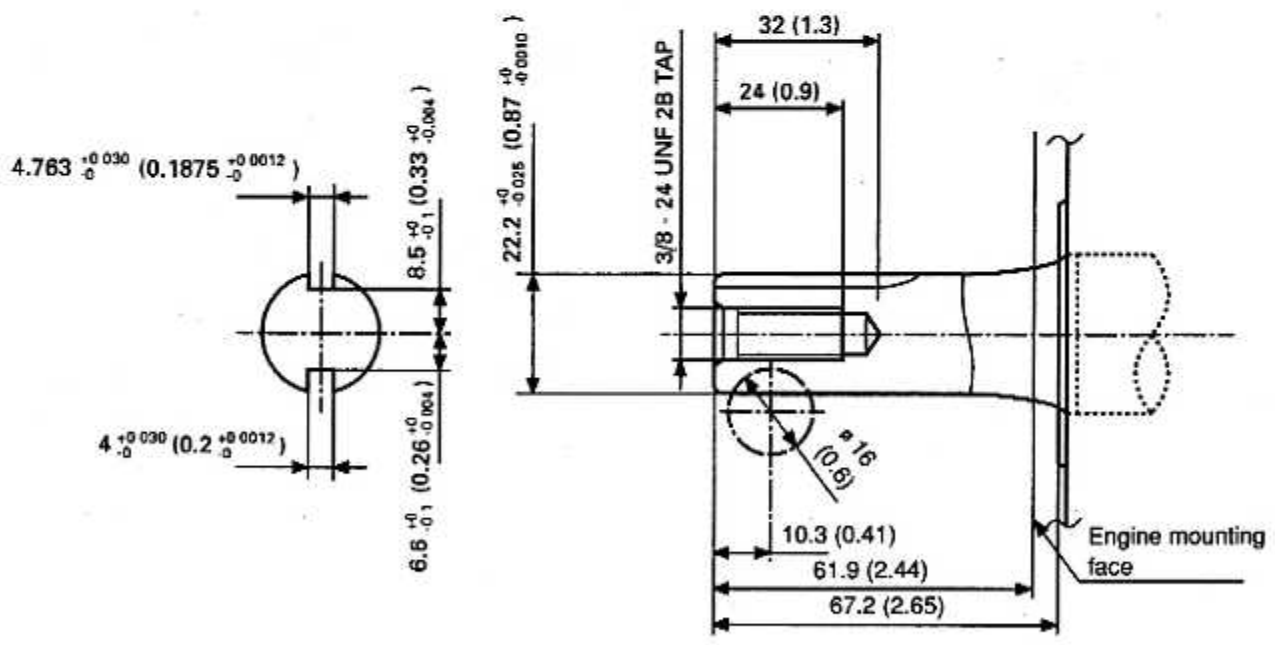
GCV135 (GJAF-1000001-FORWARD)

• N1 type

Unit : mm (in)



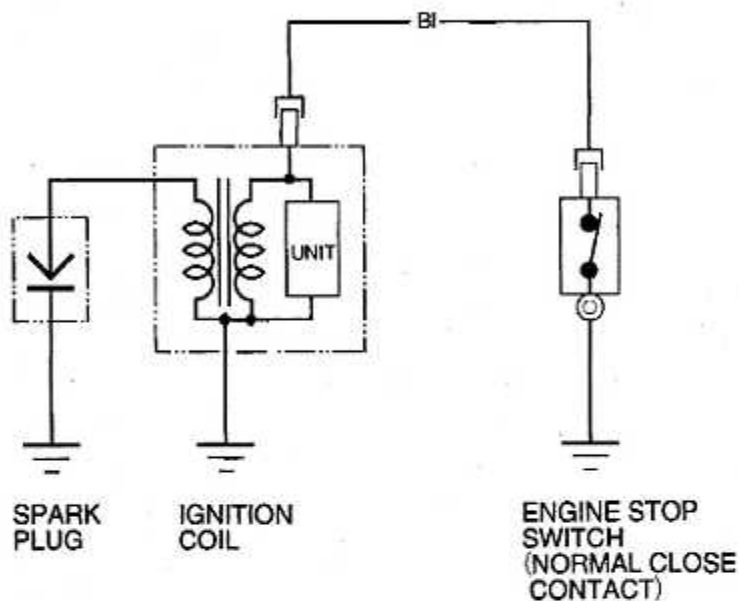
• N2 type



# WIRING DIAGRAMS

GCV135 (GJAF-1000001-FORWARD)

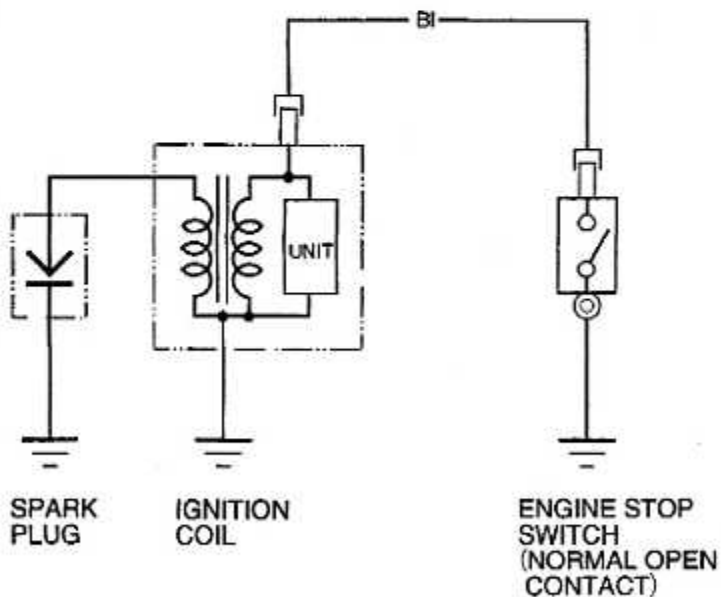
## • With flywheel brake



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 $\Omega$ 10.6 - 12.8 k $\Omega$	— —
	Air gap	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



