WSM

WORKSHOP MANUAL
GASOLINE ENGINE

GH SERIES

Kubota

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CONTENTS

SPECIFICATIONS 1
PERFORMANCE CURVES 2
DIMENSIONS 4

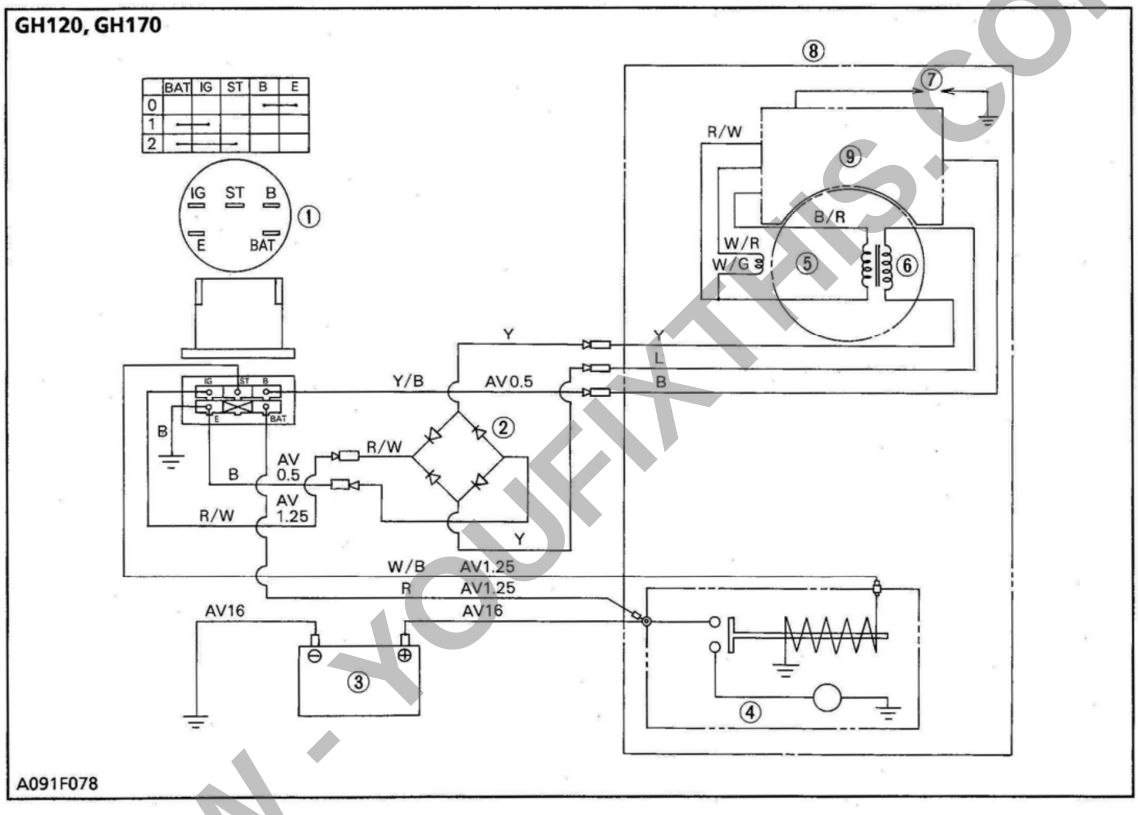
M. MECHANISM

F. FEATURE M-1
[1] CROSS SECTION M-1
(1) High Output and Low Fuel Consumption M-1
(2) Low Vibration and Low Noise M-1
[2] CONTRAST BETWEEN D.Q.P.S.G.I. TYPES AND R TYPE M-2
1. ENGINE BODY M-3
[1] MECHANICAL DECOMPRESSION SYSTEM M-3
2. LUBRICATING SYSTEM M-4
[1] OIL PUMP (GH400 Only) M-4
[2] RELIEF VALVE (GH400 Only) M-4
3. FUEL SYSTEM M-5
[1] CARBURETTOR M-5
(1) Main Carburettor System M-5
(2) Slow System M-5
(3) Float M-6
[2] GOVERNOR M-7
4. IGNITION SYSTEM M-8
[1] TRANSISTOR MAGNET IGNITION TYPE M-8
[2] CDI MAGNET IGNITION TYPE M-9
5. STARTING SYSTEM M-11
[1] STARTER M-11
(1) Except for GH340, GH400 M-11
(2) GH340, GH400 Only M-12

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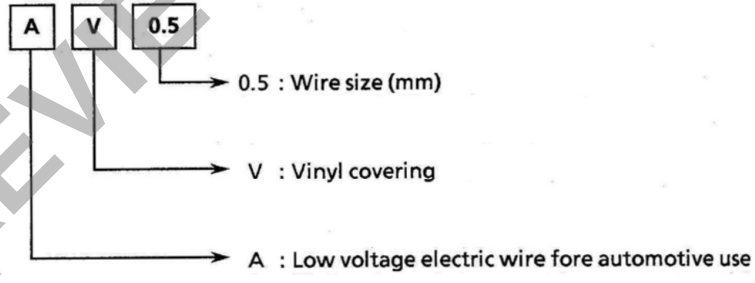
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6 ENGINE CIRCUIT DIAGRAM



■ **NOTE**

- **Wire size and color indetification**

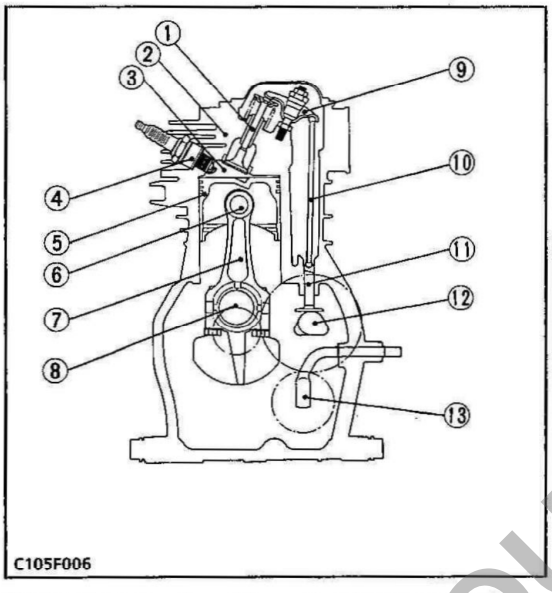


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F FEATURE

[1] CROSS SECTION



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This engine is an OHV type vertical air-cooled, 4 cycle, single cylinder gasoline engine with horizontal shaft. The OHV (for Over Head Valve) type refers to one in which the intake and exhaust valve are located directly above the piston.

It is somewhat more complicated in construction than the conventional SV (for Side Valve) type in that a push rod, rocker arm, etc. are required, but it is more advantageous in performance, as described below.

(1) Valve
(2) Cylinder Head
(3) Combustion Chamber
(4) Spark Plug
(5) Piston
(6) Piston Pin
(7) Connecting Rod
(8) Crankshaft
(9) Rocker Arm
(10) Push Rod
(11) Tappet
(12) Camshaft
(13) Governor Lever Shaft

(1) High Output and Low Fuel Consumption

With the OHV type, where the intake and exhaust valves are located directly above the piston in the cylinder head, the combustion chamber is more compact, and high compression ratio is available. (In the SV type, which has a sort of flat combustion chamber, if the compression ratio is raised, abnormal combustion can result, and the ratio can not be raised so much.)

With this feature, the OHV type accomplishes adequate intake and exhaust at a high compression ratio for high out put. It is also supplied with optimum air-fuel mixture at all times, and provides high combustion efficiency for low fuel consumption.

(2) Low Vibration and Low Noise

The OHV type provides high output with small displacement, and its bore, stroke, and component parts are small. This translates into low vibration and reduced mechanical sound, resulting in low noise.

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[5] TIGHTENING TORQUES

Screws, bolts and nut must be tightened to the specified torque wrench. Several screws, bolts and nut such as those used on the cylinder head must be tightened in proper sequence and at the proper torque.

(1) Tightening Torques for Special Use Screws, Bolts and Nuts

Item	Size x Pitch	N·m	kgf·m	ft-lbs
Spark Plug	M14 x 1.25	9.8 to 24.5	1.0 to 2.5	7.2 to 18.1
Rotor Mounting Nut				
GH120 · GH130	M12 x 1.25	29.4 to 49.0	3.0 to 5.0	21.7 to 36.2
GH170 · GH170-1	M14 x 1.5	58.8 to 73.6	6.0 to 7.5	43.4 to 54.2
GH250 · GH280	M14 x 1.5	68.6 to 83.4	7.0 to 8.5	50.6 to 61.5
GH340	M18 x 1.5	98.1 to 117.7	10 to 12	72.3 to 86.8
GH400	M18 x 1.5	98.1 to 127.5	10 to 13	72.3 to 94.0
* Cylinder Head Screws				
GH120 · GH130 · GH170 · GH170-1	M8 x 1.25	24.5 to 35.3	2.5 to 3.6	18.1 to 26.0
GH250 · GH280	M8 x 1.25	21.6 to 30.4	2.2 to 3.1	15.9 to 22.4
	M10 x 1.5	41.2 to 50.0	4.2 to 5.1	30.4 to 36.9
GH340	M8 x 1.25	24.5 to 32.4	2.5 to 3.3	18.1 to 23.9
(EX. side)	M8 x 1.25	30.4 to 38.2	3.1 to 3.9	22.4 to 28.2
	M10 x 1.5	41.2 to 50.0	4.2 to 5.1	30.4 to 36.9
GH400	M8 x 1.25	17.7 to 23.5	1.8 to 2.4	13.0 to 17.4
	M10 x 1.5	41.2 to 50.0	4.2 to 5.1	30.4 to 36.9
Crankcase 2 Screws				
GH120 · GH130 · GH170-1	M6 x 1.0	9.8 to 14.7	1.0 to 1.5	7.2 to 10.8
GH170 · GH250 · GH280 · GH340 GH400	M8 x 1.25	13.7 to 19.6	1.4 to 2.0	10.1 to 14.5
* Connecting Rod Screws				
GH120 · GH130 · GH170 · GH170-1	M7 x 1.0	13.7 to 19.6	1.4 to 2.0	10.1 to 14.5
GH250 · GH280 · GH340 · GH400	M8 x 1.25	23.5 to 29.4	2.4 to 3.0	17.4 to 21.7
Rocker Arm Rock Nut				
GH120 · GH130 · GH170 · GH170-1	M6 x 0.5	7.8 to 12.7	0.8 to 1.3	5.8 to 9.4
GH250 · GH280 · GH340	M7 x 0.75	10.8 to 16.7	1.1 to 1.7	8.0 to 12.3
Governor Lever Screw				
GH120 · GH130 · GH170 · GH170-1	M6 x 1.0	6.9 to 15.7	0.7 to 1.6	5.1 to 11.6
GH250 · GH280 · GH340	M8 x 1.25	10.8 to 24.5	1.1 to 2.5	8.0 to 18.1
GH400	M8 x 1.25	10.8 to 19.6	1.1 to 2.0	8.0 to 14.5

■ **NOTE**

- **For * marked screws, bolts and nuts on the table, apply engine oil to their threads and seats before tightening.**
- **The letter "M" in Size x Pitch means that the screw, bolt or nut dimension stands for metric. The size is the nominal outside diameter in mm of the threads. The pitch is the nominal distance in mm between two threads.**

(2) Tightening Torques for General Use Screws, Bolts and Nuts

When the tightening torques are not specified, tighten the screws, bolts and nuts according to the table below.

Grade / Nominal Diameter	* No-grade or 4T			* 7T		
	N·m	kgf·m	ft-lbs	N·m	kgf·m	ft-lbs
M 5	2.45 to 3.92	0.25 to 0.40	1.82 to 2.89	3.9 to 6.9	0.4 to 0.7	2.9 to 5.1
M 6	4.41 to 7.85	0.45 to 0.80	3.25 to 5.79	6.9 to 13.7	0.7 to 1.4	5.1 to 10.1
M 8	10.8 to 19.6	1.1 to 2.0	8.0 to 14.5	17.7 to 32.4	1.8 to 3.3	13.0 to 23.9
M10	22.6 to 41.2	2.3 to 4.2	16.6 to 30.4	37.3 to 68.6	3.8 to 7.0	27.5 to 50.6

* The figures on the table above are indicated the top of screw or bolt.

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[3] TROUBLESHOOTING

(1) Typical Troubles and Their Causes

The engine malfunctions can result from a large number of cause. The following describes symptoms that are encountered relatively more often than others, their major causes and remedies.

Symptom	Probable Cause	Solution	Reference Page
Does not start with ease	• Troubleshooting in cause of (2) Difficulty with engine starting		–
Starter does not run (for engine with starter)	• Battery discharged • Insufficient battery capacity • Defective main switch • Defective starter	Charge Replace Replace Repair or replace	– – – –
Improper low-speed running and idling	• Defective ignition coil (Disconnection) • Improper spark plug (Spark failure) • Defective carburetor • Defective intake or exhaust valve (Timing and clearance) • Defective governor (Malfunction)	Replace Adjust or replace Adjust Adjust Adjust	S-111,113 S-37,109 S-107 S-61 S-105
Improper high-speed running	• Defective ignition coil (Disconnection) • Improper spark plug (Spark failure) • Defective governor (Malfunction)	Replace Adjust or replace Adjust	S-111,113 S-37,109 S-105
Engine speed does not increase	• Defective carburetor • Defective ignition coil (Disconnection)	Adjust Replace	S-107 S-111,113
Insufficient output	• Improper intake or exhaust valve sealing (Compression pressure too low) • Improper spark plug • Improper valve clearance • Worn piston, piston ring or cylinder	Repair Adjust or replace Adjust Replace	S-97 S-37,109 S-47 S-75,77, 79,81
Occur abnormal combustion	• Improper valve clearance • Improper spark plug (wrong plug type, knocking) • Loose rotor tightening nut	Adjust Adjust or replace Retighten	S-47 S-37,109 S-53

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SPECIFICATIONS

Model	GH120		GH130		GH170		GH170-1		GH250		GH280		GH340		GH400	
Type	Vertical, air-cooled, 4-cycle OHV gasoline engine															
Total Displacement cm³ (cu. in.)	121 (7.38)		125 (7.63)		169 (10.31)				247 (15.07)		274 (16.72)		340 (20.75)		389 (23.74)	
Bore x Stroke mm (in.)	60 x 43 (2.36 x 1.69)		61 x 43 (2.40 x 1.69)		67 x 48 (2.64 x 1.89)				75 x 56 (2.95 x 2.20)		79 x 56 (3.11 x 2.20)		81 x 66 (3.19 x 2.60)		84.2 x 70 (3.31 x 2.76)	
Continuous Horsepower kW/rpm (HP/rpm)	2.1/3600 (2.8/3600)	2.1/1800 (2.8/1800)	2.1/3600 (2.8/3600)	2.1/1800 (2.8/1800)	3.2/3600 (4.3/3600)	3.2/1800 (4.3/1800)	3.2/3600 (4.3/3600)	3.2/1800 (4.3/1800)	4.5/3600 (6.0/3600)	4.5/1800 (6.0/1800)	4.9/3600 (6.6/3600)	4.9/1800 (6.6/1800)	6.0/3600 (8.0/3600)	6.0/1800 (8.0/1800)	6.7/3600 (9.0/3600)	6.7/1800 (9.0/1800)
Maximum Horsepower kW (HP)	2.8 (3.7)	2.8 (3.7)	2.9 (3.9)	2.9 (3.9)	4.1 (5.5)	4.1 (5.5)	4.1 (5.5)	4.1 (5.5)	6.0 (8.0)	6.0 (8.0)	6.7 (9.0)	6.7 (9.0)	8.2 (11.0)	8.2 (11.0)	9.7 (13.0)	9.7 (13.0)
Maximum Torque N.m/rpm kgf.m/rpm ft-lbs/rpm	6.86/3200 0.7/3200 5.06/3200	13.7/1600 1.4/1600 10.1/1600	7.65/2800 0.78/2800 5.64/2800	15.2/1400 1.56/1400 11.3/1400	10.8/3200 1.1/3200 7.96/3200	21.6/1600 2.2/1600 15.9/1600	10.8/2800 1.1/2800 7.96/2800	21.6/1400 2.2/1400 15.9/1400	16.7/2800 1.7/2800 12.3/2800	33.3/1400 3.4/1400 24.6/1400	18.6/2800 1.9/2800 13.7/2800	37.3/1400 3.8/1400 27.5/1400	24.5/2500 2.5/2500 18.1/2500	49.0/1250 5.0/1250 36.0/1250	25.5/2400 2.6/2400 18.8/2400	51.0/1200 5.2/1200 37.6/1200
No-load Maximum Speed rpm	4000	2000	4000	2000	4000	2000	4000	2000	4000	2000	4000	2000	4000	2000	4000	2000
No-load Minimum Speed rpm	1500	750	1500	750	1500	750	1500	750	1500	750	1500	750	1500	750	1400	700
Compression ratio	8.0		8.2		8.3				8.1				8.2		8.5	
Fuel	Non-leaded Automobile Gasoline															
Fuel Tank Capacity	3.0 ℓ 3.2 U.S.qts. 2.64 Imp.qts.				3.6 ℓ 3.8 U.S.qts. 3.17 Imp.qts.				6.0 ℓ 6.3 U.S.qts. 5.28 Imp.qts.							
Ignition System	Non-contact Magnet Ignition															
Ignition Timing	0.44 rad (25°) before T.D.C.		0.37 rad (21°) before T.D.C.				0.44 rad (25°) before T.D.C.						0.40 rad (23°) before T.D.C.			
Spark Plug	BP6HS												BP6ES		BP4HS-10	
Carburetor	Transversal Butterfly Atmospheric Relief Type															
Governor	Centrifugal Weight System															
Lubrication System	Splash Lubrication														Trochoid Pump	
Engine Oil Type	Class SE / SF (API), SAE 10W-30, 10W-40															
Engine Oil Capacity	0.55 ℓ 0.58 U.S.qts. 0.484 Imp.qts.				0.6 ℓ 0.63 U.S.qts. 0.528 Imp.qts.				0.9 ℓ 0.95 U.S.qts. 0.792 Imp.qts.				1.2 ℓ 1.27 U.S.qts. 1.056 Imp.qts.		1.1 ℓ 1.17 U.S.qts. 0.968 Imp.qts.	
Reduction System	Direct Coupling or 1/2 Camshaft Reduction															
Starting System (V, kW)	Recoil Starter (With Mechanical Decompression System) or Cell Starter Electric Starting with Starter (12, 0.4 : GH130, GH170-1) (12, 0.6 : GH120, GH170, GH250, GH280, GH340, GH400)															
Battery	12 V, 12 or 24 AH equivalent (GH120, GH170, GH250, GH280), 12 V, 10 AH equivalent (GH130, GH170-1)												12 V, 24 AH equivalent			
Weight (Dry)	13.0 kg, 28.7 lbs.				15.0 kg, 33.1 lbs.				25.0 kg, 55.1 lbs.				31.0 kg, 68.3 lbs.		38.0 kg, 83.8 lbs.	

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[6] MAINTENANCE CHECK LIST

To maintain long-lasting and safe engine performance, make it a rule to carry out regular inspections by following the table below.
(The schedule applies to an engine in use under normal conditions)

Service Interval	Check Points	Reference Page
Daily	Clean each part and screw up	–
Every 8 hours	Check and replenish the engine oil	S-35
Initial 20 hours	Change the engine oil	S-35
Every 50 hours	Clean the air cleaner element	S-37
Every 100 hours	Change the engine oil	S-35
	Clean the spark plug	S-37
	Clean the fuel filter element and pot	S-39
	Check the fuel filter (Cartridge type filter)	–
	Check the battery fluid	–
Every 200 hours	Check the spark plug clearance	S-37
	Clean the carburetor and fuel tank	–
	Clean the oil strainer (GH400)	S-35
Every 500 hours	Correct the valve clearance	S-39
	Clean the cylinder head (Removal of deposited carbon)	S-41
	Check the valve seat and lap the valve	S-97
	Change the fuel filter (Cartridge type filter)	–
Yearly	Change the air cleaner element	S-37
	Change the fuel pipes	–
Every 2 years	Change the battery	–

[7] LONG TERM STORAGE

The following procedure must be followed when the engine is to be stored over a long period (longer than a month).

1. Wipe off dirt or oil on exposed parts.
2. Clean the air cleaner element and fuel cook.
3. Change the engine oil in the crank room.
4. Drain gasoline from the fuel tank, fuel filter pot and float chamber in the carburetor.
5. Remove the spark plug, fill 5 to 10 cc (0.31 to 0.61 c.in.) of engine oil, turn the crankshaft of the recoil starter several times, and then install the spark plug, this is needed to prevent corrosion.
6. Pull the recoil starter slowly, and stop at a point where the resistance becomes the greatest (compression point).
7. Put the engine in a place free of moisture, dust or high temperature, and then put a cover the engine.

[Air Cleaner]

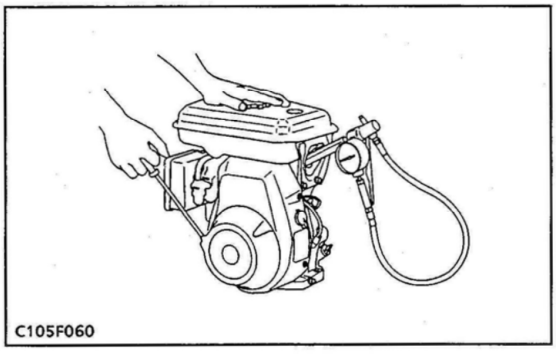
- If the air cleaner is used in a soiled or clogged condition, it is bound to harm the engine's life.
- Therefore, it should be cleaned every 50 hours, more frequently in dusty conditions, as described in the section "Preparation for operation".
- Replace the elements after 6 cleanings, latest after one year.

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1 ENGINE BODY

CHECKING AND ADJUSTING


C105F060

Compression Pressure

■ **NOTE**
- **Before making compression test be sure to turn off the start switch.**

A. During the operation of the Mechanical Decompression System
1. Remove the spark plug and fit a pressure gauge to the spark plug hole.
2. Pull the recoil starter briskly a few times and check the maximum reading of the pressure gauge.

B. When the Mechanical Decompression System is released
1. Remove the exhaust rocker arm and push rod.
2. Remove the spark plug and install a pressure gauge in the spark plug hole.
3. Pull the recoil starter briskly a few times and check the maximum reading of the pressure gauge.

During the operation of the mechanical decompression system	Factory spec.	GH120 · GH130 GH170 GH170-1 GH250 · GH280 GH340	196 to 392 kPa 2 to 4 kgf/cm² 28.4 to 56.9 psi
		GH400	392 to 588 kPa 4 to 6 kgf/cm² 56.9 to 85.3 psi
When the mechanical decompression system is released	Factory spec.	GH120 · GH130 GH170 GH170-1 GH250 · GH280 GH340	490 to 686 kPa 5 to 7 kgf/cm² 71.1 to 99.6 psi
		GH400	784 to 1078 kPa 8 to 11 kgf/cm² 113.8 to 156.5 psi

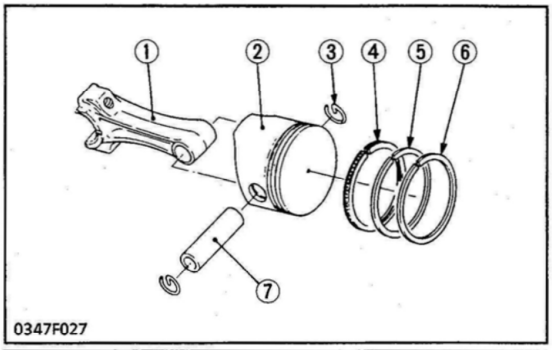
Tightening torque	Spark plug	9.8 to 24.5 N·m 1.0 to 2.5 kgf-m 7.2 to 18.1 ft-lbs

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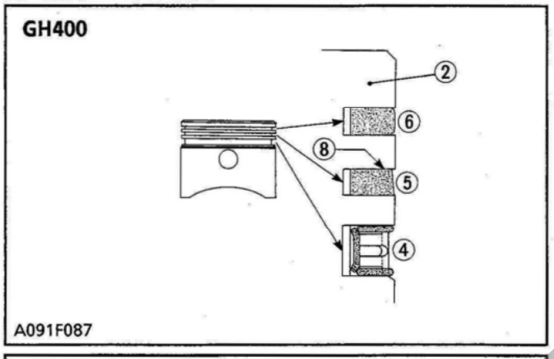
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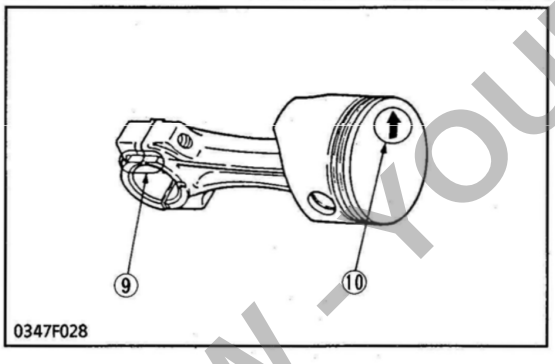


0347F027

GH400



A091F087



0347F028

Piston Rings and Piston Pin

1. Remove the piston rings using a piston ring tool (Code No. 07909-32121).
2. Put the parting mark (for example, ↑) (10) on the piston head as shown in the figure.
3. Remove the piston pin snap ring (3), and push out the piston pin (7).

(When reassembling)

- When installing the piston rings, assemble them so that the manufacturer's mark (8) near the gap faces the top of the piston.
- Apply engine oil to the piston pin.
- Immerse the piston in 100°C (212°F) oil for 10 to 15 minutes, and insert the piston pin into the piston pin hole and connecting rod small end.
- When installing the connecting rod to the piston, align the machined surface (9) on the connecting rod to the parting mark (10).

(1) Connecting Rod
(2) Piston
(3) Piston Pin Snap Ring
(4) Oil Ring
(5) Second Ring
(6) Top Ring
(7) Piston Pin
(8) Manufacturer's Mark
(9) Machined Surface
(10) Parting Mark

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