WSM

WORKSHOP MANUAL
GASOLINE ENGINE

GZ410,GZ460

Kubota

KiSC issued 02, 2007 A

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SERVICING

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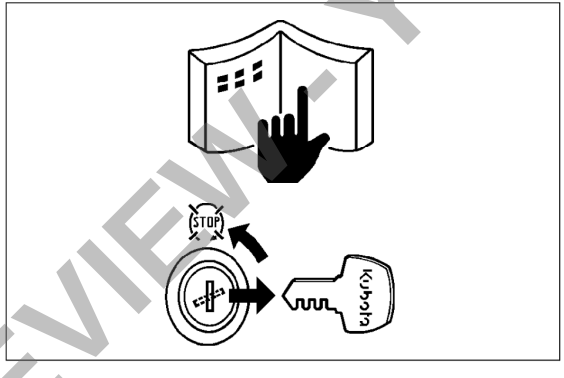
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SAFETY FIRST

This symbol, the industry's "Safety Alert Symbol", is used throughout this manual and on labels on the machine itself to warn of the possibility of personal injury. Read these instructions carefully.

It is essential that you read the instructions and safety regulations before you attempt to repair or use this unit.

DANGER	**: Indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.**
WARNING	**: Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.**
CAUTION	**: Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury.**
IMPORTANT	**: Indicates that equipment or property damage could result if instructions are not followed.**
NOTE	**: Gives helpful information.**



BEFORE SERVICING AND REPAIRING

- Read all instructions and safety instructions in this manual and on your engine safety decals.
- Clean the work area and engine.
- Park the machine on a firm and level ground.
- Allow the engine to cool before proceeding.
- Stop the engine, and remove the key.
- Disconnect the battery negative cable.

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SPECIFICATIONS

Model	GZ410	GZ460
Type	Vertical, water cooled, 4-cycle OHC Gasoline engine	
Number of Cylinders	2	
Bore × Stroke	65 × 61 mm (2.56 × 2.40 in.)	69 × 61 mm (2.72 × 2.40 in.)
Total Displacement	404 cm^3 (24.65 cu.in.)	456 cm^3 (27.83 cu.in.)
SAE Net Cont.	7.7 kW (10.3 HP) / 3600 rpm	8.5 kW (11.4 HP) / 3600 rpm
SAE Net Intermittent	9.6 kW (12.8 HP) / 3600 rpm	11.0 kW (14.8 HP) / 3600 rpm
SAE Gross Intermittent	10.7 kW (14.3 HP) / 3600 rpm	12.1 kW (16.3 HP) / 3600 rpm
Maximum Bare Speed	3850 to 3950 rpm	
Minimum Idling Speed	1400 to 1600 rpm	
Cylinder Head	Overhead Camshaft	
Combustion Chamber	Pent roof	
Ignition System	Full-Transistor	
Governor	Centrifugal Mechanical Governor	
Direction of Rotation	Counter-Clockwise (viewed From Flywheel side)	
Spark Plug	NGK BKR4E	
Ignition Timing	0.38 rad. (22°) before T.D.C.	
Firing Order	1-2	
Compression Ratio	9.2 : 1	
Lubricating System	Forced Lubrication by Trochoid Pump	
Oil Pressure Indication	Electrical Type Switch	
Lubricating Filter	Full Flow Paper Filter (Cartridge Type)	
Cooling System	Pressurized Radiator (not included in the basic model), Forced Circulation with Water Pump	
Starting System	Electric Starting with Cell Starter	
	12 V, 0.6kW	
Battery	12 V, 24AH or equivalent	
Fuel	Unleaded Automobile Gasoline	
Lubricating Oil	Better than SH Class (API)	
Lubricating Oil Capacity	1.4 L (1.48 u.s. qts)	
Weight (Dry)	37 kg (81.59 lbs)	

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[4] TROUBLESHOOTING

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
Starter Does Not Run	• Insufficient battery capacity • Improper or imperfect wiring • Defective main switch • Defective starter or contactor	Charge or replace Check the wiring Repair or replace Repair or replace	– – – S-41
Engine Does Not Start	• No gasoline in the fuel tank. • Clogged air cleaner • Clogged fuel filter • Spark plug electrodes are wet with gasoline	Add. gasoline Clean or replace Clean or replace Dry electrode and restart, being careful not to close choke excessively Check to see if there is no overflow from carburetor, if affirmative, disassembled and clean carburetor.	– S-13 S-13 – S-39
	• No spark forms in spark plug • Only weak spark forms	Disconnected cord and wrong wiring Defective ignition coil Defective ignition control unit	M-12 S-40 S-40
	• Insufficient compression	Check the valve clearance Check degree of contact of intake and exhaust valves with their seat Check the tightening torque on cylinder head screws Check the wear of piston ring, piston and cylinder	S-16 S-33 S-22 S-27, 28
Improper Low-Speed Running and Idling	• Improper spark plug • Defective ignition coil • Defective carburetor	Repair or replace Replace Clean or replace	S-15 S-40 S-39
Engine Speed Does Not Increase	• Defective carburetor • Defective governor	Repair or replace Adjust	S-39 S-38
Improper High-Speed Running	• Defective spark plug • Defective ignition coil • Defective carburetor	Repair or replace Replace Repair or replace	S-15 S-40 S-39
Insufficient Output	• Defective spark plug • Improper valve clearance • Improper intake or exhaust valve sealing • Worn piston, piston ring or cylinder	Repair or replace Adjust Repair or replace Replace	S-15 S-16 S-33 S-27, 28
Occur abnormal combustion	• Improper valve clearance • Improper spark plug (Wrong plug type, knocking)	Adjust Replace	S-16 S-15

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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-13
	Check the fuel filter pot and fuel piece	S-13
	Clean the air cleaner element	S-13
	Check the coolant and radiator hose	S-14
	Check the battery fluid	–
Initial 20 hours	Change the engine oil	S-14
Every 50 hours	Clean the air cleaner element	S-15
Every 200 hours	Change the engine oil	S-15
	Change the oil filter cartridge	S-15
	Check the spark plug	S-15
Every 500 hours	Cleaning and adjusting the spark plug	S-16
	Check the timing belt	S-16
	Correct the valve clearance	S-16
	Clean the cylinder head (Remove of deposited carbon)	S-16
Every 1000 hours	Change the timing belt	S-17
Every 2 years	Change the fuel pipe	–
	Change the air cleaner element	S-17
	Change the coolant and radiator hose	S-17

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[7] LONG TERM STORAGE

The following procedure must be followed when the engine is to be stored over a 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 cu.in.) of engine oil, turn the crankshaft of the starter several times, and then install the spark plug, this is needed to prevent corrosion.
6. 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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[3] TIGHTENING TORQUES

Screws, bolts and nuts must be tightened to the specified torque using a torque wrench, several screws, bolts and nuts such as those used on the cylinder head must be tightened in proper sequence and the proper torque.

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

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 means that the screw, bolt or nut dimension stands for metric. The size is the nominal outside diameter in mm of the threads.**

Item	Size	N·m	kgf·m	ft-lbs
* Rocker arm lock nut	M6	7.8 to 12.7	0.8 to 1.3	5.8 to 9.4
* Cylinder head bolt	M8	24.5 to 32.4	2.5 to 3.3	18.1 to 23.9
* Connecting rod bolt	M8	23.5 to 29.4	2.4 to 3.0	17.4 o 21.7
Drain plug (Oil pan)	M12	32.4 to 37.3	3.3 to 3.8	23.9 to 27.5
Plug (Crankcase cover)	M14	19.6 to 22.6	2.0 to 2.3	14.5 to 16.6
* Oil filter cartridge		14.7 to 20.6	1.5 to 2.1	10.8 to 15.2
Spark plug		24.5 to 29.4	2.5 to 3.0	18.1 to 21.7
Oil switch	PT 1/8	14.7 to 19.6	1.5 to 2.0	10.8 to 14.5
Governor lever set bolt	M8	10.8 to 24.5	1.1 to 2.5	8.0 to 18.1
Bearing case bolt	M7	13.7 to 19.6	1.4 to 2.0	10.1 to 14.5
Fly wheel mounting nut	M20	107.9 to 137.3	11 to 14	79.6 to 101.3
Crankshaft nut	M20	107.9 to 137.3	11 to 14	79.6 to 101.3

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(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 / Unit	Standard Screw and Bolt ④			Special Screw and Bolt ⑦		
	N·m	kgf·m	ft-lbs	N·m	kgf·m	ft-lbs
M6	7.9 to 9.3	0.80 to 0.95	5.8 to 6.9	9.8 to 11.3	1.00 to 1.15	7.23 to 8.32
M8	17.7 to 20.6	1.8 to 2.1	13.0 to 15.2	23.5 to 27.5	2.4 to 2.8	17.4 to 20.3
M10	39.2 to 45.1	4.0 to 4.6	28.9 to 33.3	49.0 to 55.9	5.0 to 5.7	36.2 to 41.2
M12	62.8 to 72.6	6.4 to 7.4	46.3 to 53.5	77.5 to 90.2	7.9 to 9.2	57.1 to 66.5

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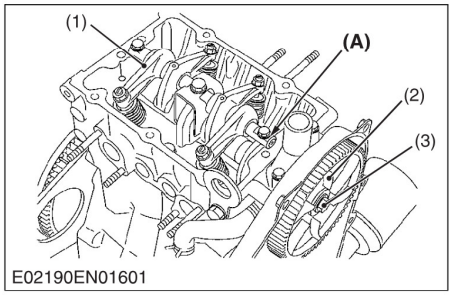
Screws and bolt material grades are shown by numbers punched on the screw and bolt heads. Prior to tightening, be sure to check out the numbers as shown below.

Punched number	Screw and bolt material grade
None or 4	Standard screw and bolt SS400, S20C
7	Special screw and bolt S43C, S48C (Refined)

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Rocker Arm

1. Remove the cam pulley mounting bolt (3) and the cam pulley (2).
2. Remove the rocker arm mounting bolt and the rocker arm assembly (1).

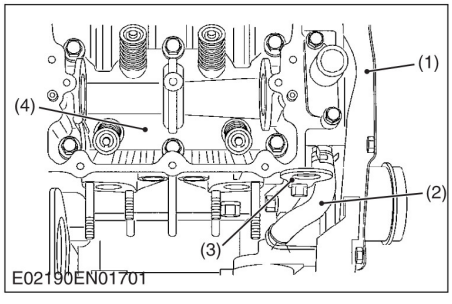
(When reassembling)

- Align the spring pin on the cylinder head with the groove **(A)** in the end of the rocker arm shaft and tighten the bolt on the opposite side first.
- Apply engine oil to the sliding portion of the rocker arm, valve stem and cam shaft stopper.
- Reinstall the rocker arm and adjust the valve clearance.

Valve clearance	Factory spec.	0.08 to 0.12 mm 0.0031 to 0.0047 in.

(1) Rocker Arm Assembly
(2) Cam Pulley
(3) Cam Pulley Mounting Bolt
(A) Groove

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Cylinder Head

1. Remove the belt cover support (1), return hose (2) and engine hook (3).
2. The cylinder head bolts (4) must be loosened from outside.
3. Remove the cylinder head gasket.

(When reassembling)

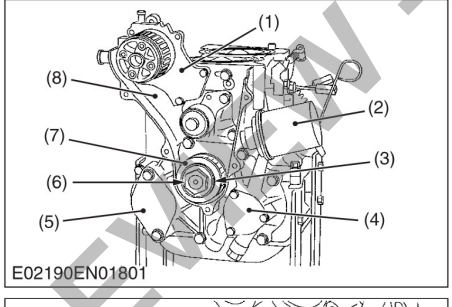
- Replace the cylinder head gasket with a new one.
- Tighten the cylinder head bolts after applying sufficient oil.
- The cylinder head bolts must be tightened gradually and diagonally from center.

Tightening torque	Cylinder head bolt	24.5 to 32.3 N·m 2.5 to 3.3 kgf·m 18.1 to 23.9 ft-lbs

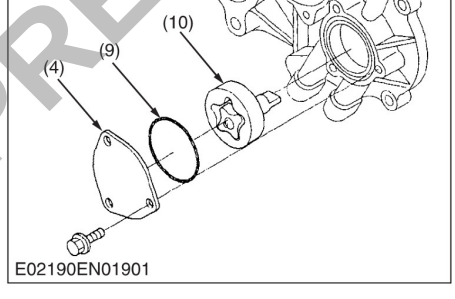
(1) Belt Cover Support
(2) Return Hose
(3) Engine Hook
(4) Cylinder Head

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(4) Crankcase Cover



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Crankcase Cover

1. Remove the water pump (1), oil filter (2) and balancer cover (5).
2. Remove the oil pump cover (4) and the oil pump (10).
3. Lock the flywheel. Remove the crankshaft nut (6) and remove the crank pulley (7) and the oil slinger (3).
4. Remove the crankcase cover (8).

(When reassembling)

- When reinstalling the water pump, make sure that the O-ring is fitted correctly in the O-ring groove.

Tightening torque	Crankshaft nut	107.9 to 137.3 N·m 11 to 14 kgf·m 79.6 to 101.3 ft-lbs

(1) Water Pump
(2) Oil Filter
(3) Oil Slinger
(4) Oil Pump Cover
(5) Balancer Cover
(6) Crankshaft Nut
(7) Crank Pulley
(8) Crankcase Cover
(9) O-ring
(10) Oil Pump

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