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.**

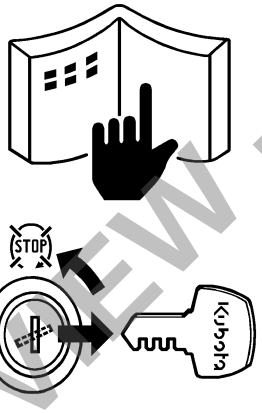
WARNING
- **Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.**

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.**

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BEFORE SERVICING AND REPAIRING

- Read all instructions and safety instructions in this manual and on your machine safety decals.
- Clean the work area and machine.
- Park the machine on a firm and level ground, and set the parking brake.
- Lower the implement to the ground.
- Stop the engine, and remove the key
- Disconnect the battery negative cable
- Hang a **"DO NOT OPERATE"** tag in operator station.

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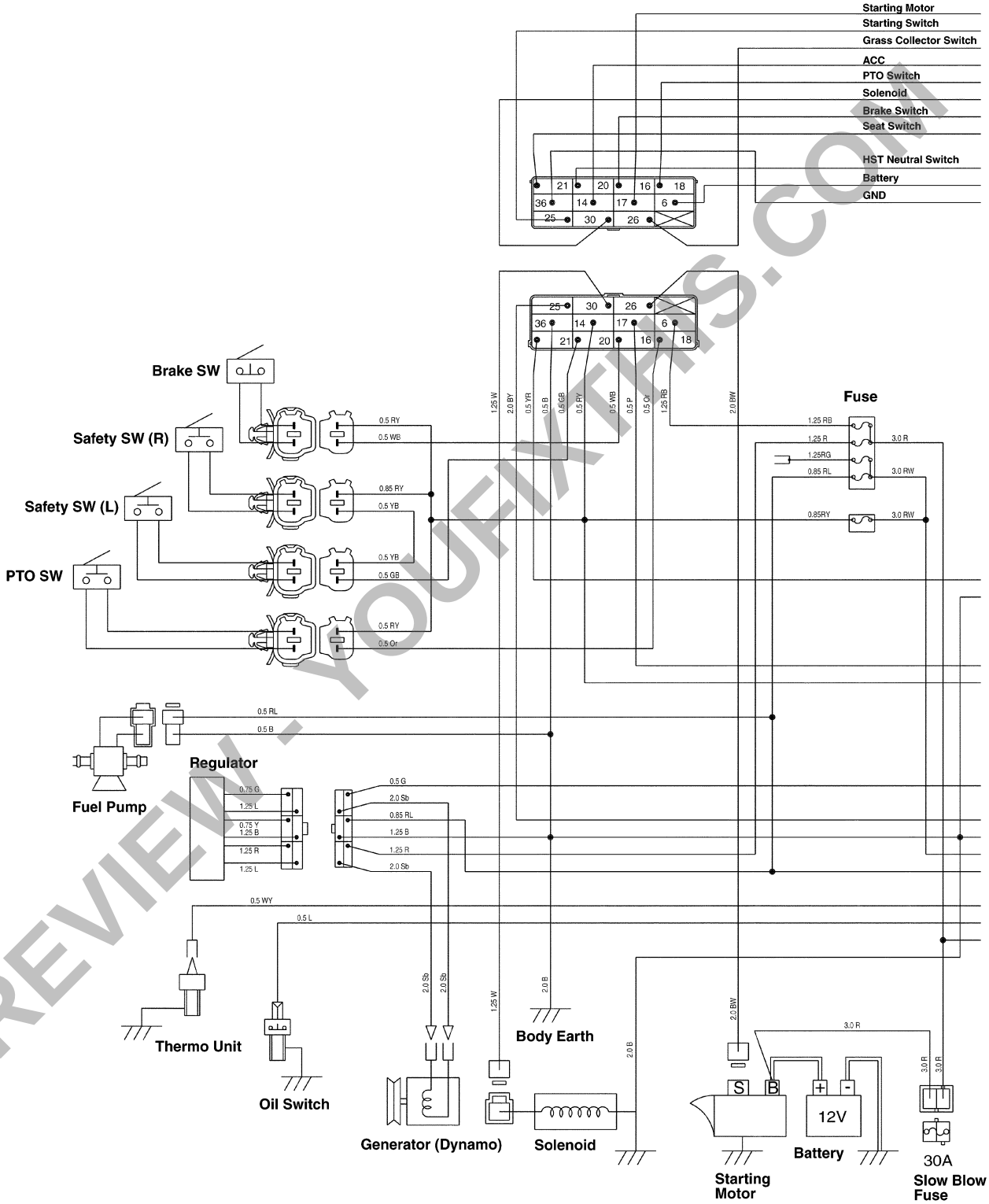
SAFETY STARTING

- Do not start the engine by shorting across starter terminals or bypassing the safety start switch.
- Do not alter or remove any part of machine safety system.
- Before starting the engine, make sure that all shift levers are in neutral positions or in disengaged positions.
- Never start the engine while standing on ground. Start the engine only from operator's seat.

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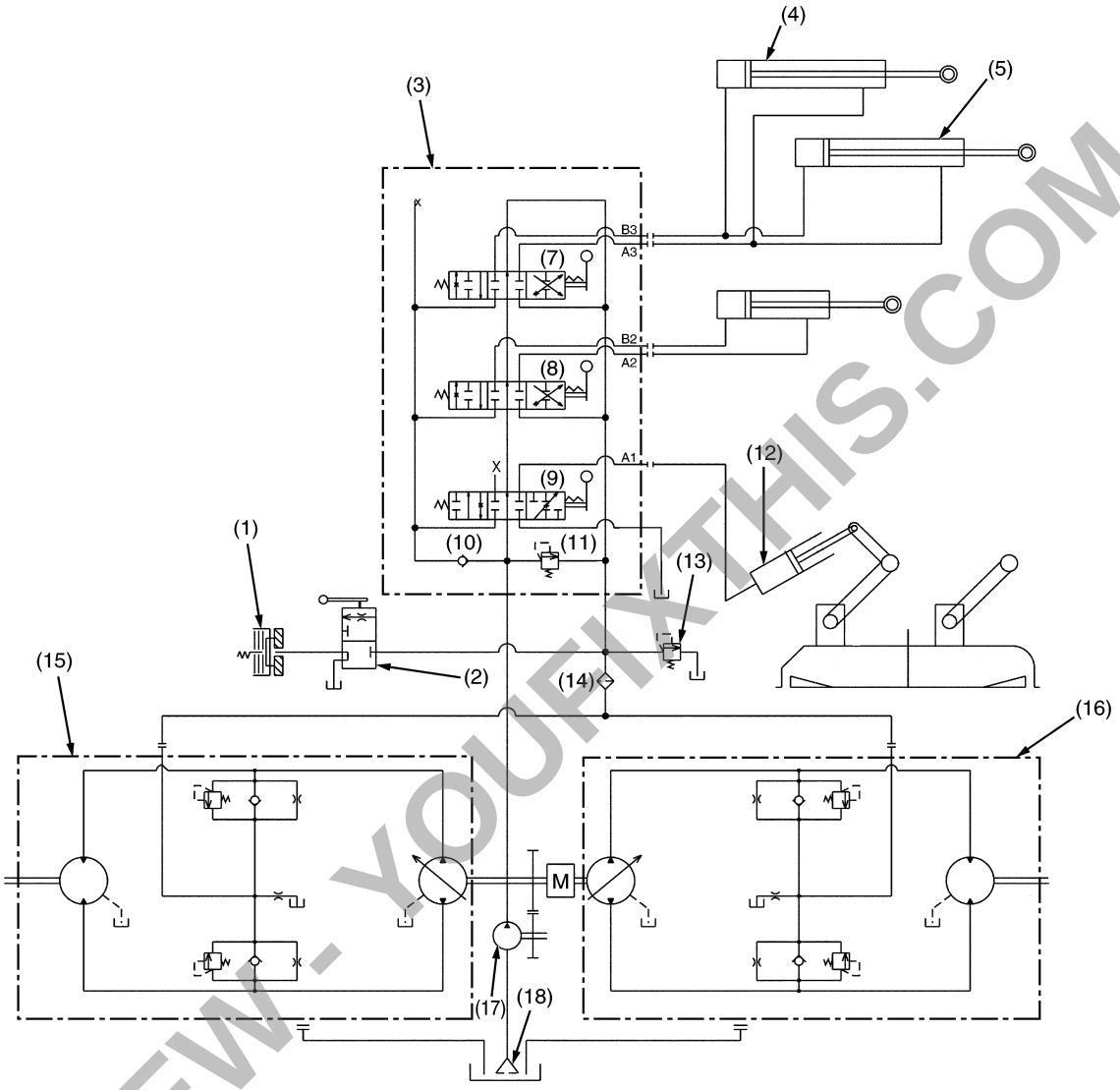
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1. HYDRAULIC CIRCUIT



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(1)	PTO Clutch	(5)	Grass Collector Lift Cylinder (LH)	(8)	Grass Collector Dumping Control Valve	(13)	Regulator Valve
(2)	PTO Clutch Valve					(14)	Oil Filter
(3)	Hydraulic Control Valve Assembly	(6)	Grass Collector Dump Cylinder	(9)	Mower Lifting Control Valve	(15)	HST (LH)
				(10)	Check Valve	(16)	HST (RH)
(4)	Grass Collector Lift Cylinder (RH)	(7)	Grass Collector Lifting Control Valve	(11)	Relief Valve	(17)	Hydraulic Pump
				(12)	Mower Lift Cylinder	(18)	Oil Strainer

The hydraulic system of this machine is composed of a hydraulic pump (17), control valve assembly (3), grass collector lift cylinder (4), (5) and other components.

This system has the following functions.

Oil is supplied by hydraulic pump (17) which is driven by engine.

Power from the input shaft (pump shaft) is distributed right and left with the bevel gears and drives each hydrostatic transmission (15), (16).

Moreover, oil from the hydraulic pump (17) is sent to the transmission centre case through the control valve. On the other hand, oil is regulated with the regulator valve (13) to constant pressure and sent to the hydrostatic transmission (15), (16) and PTO clutch (1).

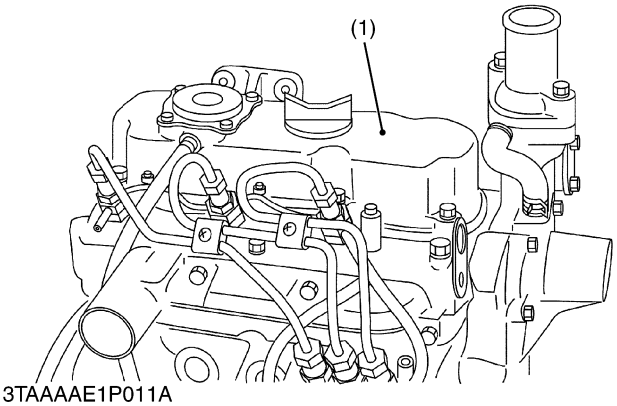
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1. ENGINE BODY

[1] HALF-FLOATING HEAD COVER

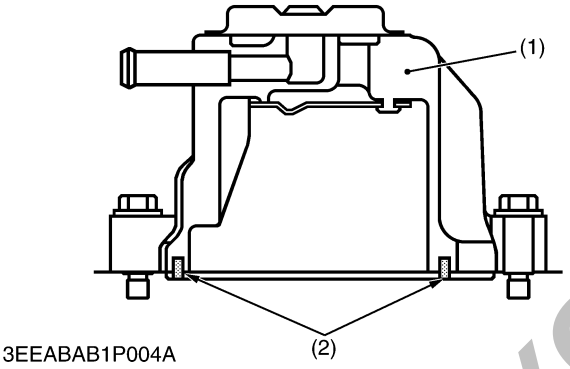


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The rubber packing is fitting in to maintain the head cover 0.5 mm or so off the cylinder head. This arrangement helps reduce noise coming from the cylinder head.

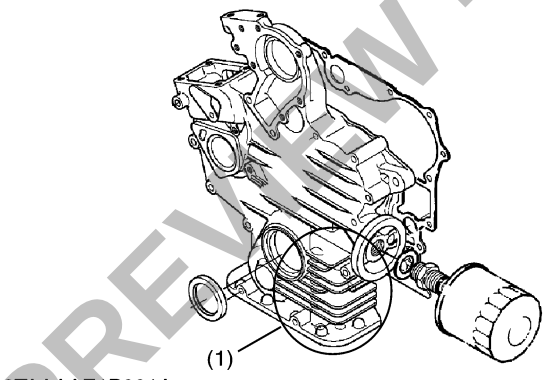
(1) Cylinder Head Cover (2) Rubber Packing

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[2] GEAR CASE



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The engine has a gear case where the cooling fins are set up around the oil passage. Therefore, the temperature of engine oil is decreased by the wind generated by the cooling fan.

(1) Cooling Fins

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3. TIGHTENING TORQUES

Tightening torques of screws and nuts on the table below are especially specified.
(For general use screws and nuts : See page G-9.)

Item	Size x Pitch	N·m	kgf·m	ft-lbs
Under cover mounting screw and nut	M6 x 1	7.8 to 8.8	0.8 to 0.9	5.8 to 6.5
Front coupling mounting screw	M8 x 1.25	23.5 to 27.4	2.4 to 2.8	17.3 to 20.2
Engine mounting nut	M8 x 1.25	23.5	2.4	17.3
Cushion mounting nut	M8 x 1.25	23.5	2.4	17.3
Air cleaner stay screw	M8 x 1.25	23.5 to 27.4	2.4 to 2.8	17.4 to 20.3
Engine support screw	M10 x 1.25	48.0 to 55.9	4.9 to 5.7	35.4 to 41.2
*Cylinder head cover screw	M6 x 1	6.86 to 11.3	0.7 to 1.15	5.1 to 8.3
Injection pipe retaining nut	M12 x 1.5	24.5 to 34.3	2.5 to 3.5	18.1 to 25.3
Overflow pipe retaining nut	M12 x 1.5	19.6 to 24.5	2.0 to 2.5	14.5 to 18.1
Nozzle holder assembly	M20 x 1.5	49.0 to 68.6	5.0 to 7.0	36.2 to 50.6
Glow plug	M8 x 1	7.85 to 14.7	0.8 to 1.5	5.8 to 10.8
*Rocker arm bracket screw	M6 x 1	9.8 to 11.3	1.00 to 1.15	7.2 to 8.3
*Cylinder head screw	M8 x 1.25	37.3 to 42.2	3.8 to 4.3	27.5 to 31.1
*Fan drive pulley screw	M12 x 1.5	98.0 to 107.8	10.0 to 11.0	72.3 to 79.5
*Idle gear shaft mounting screw	M6 x 1	9.8 to 11.3	1.00 to 1.15	7.2 to 8.3
*Connecting rod screw	M7 x 0.75	26.5 to 30.4	2.7 to 3.1	19.5 to 22.4
*Flywheel screw	M10 x 1.25	53.9 to 58.8	5.5 to 6.0	39.8 to 43.4
Bearing case cover mounting screw	M6 x 1	9.8 to 11.3	1.00 to 1.15	7.2 to 8.3
*Main bearing case screw 2	M7 x 1	26.5 to 30.4	2.7 to 3.1	19.5 to 22.5
*Main bearing case screw 1	M6 x 1	12.7 to 15.7	1.3 to 1.6	9.37 to 11.6
Nozzle holder	-	34.3 to 39.2	3.5 to 4.0	25.3 to 28.9
Oil pressure switch	PT 1/8	14.7 to 19.6	1.5 to 2.0	10.8 to 14.5

■ NOTE

- **In removing and applying the screws and nuts marked with "*", a pneumatic wrench or similar pneumatic tool, if employed, must be used with enough care not to get them seized.**
- **For "*" marked screws 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 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.**

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1. TROUBLESHOOTING

Symptom	Probable Cause	Solution	Reference Page
Engine Does Not Start	● No fuel	Replenish fuel	G-15
	● Air in the fuel system	Bleed	G-42
	● Water in the fuel system	Change fuel and repair or replace fuel system	G-30, 42
	● Fuel pipe clogged	Clean	G-30
	● Fuel filter clogged	Change	G-36
	● Excessively high viscosity of fuel or engine oil at low temperature	Use specified fuel or engine oil	G-7
	● Fuel with low cetane number	Use specified fuel	G-7
	● Fuel leak due to loose injection pipe retaining nut	Tighten retaining nut	1-S24
	● Incorrect injection timing	Adjust	1-S56
	● Fuel camshaft worn	Replace	—
	● Injection nozzle clogged	Repair or replace	1-S59
	● Injection pump malfunctioning	Replace	—
	● Seizure of crankshaft, camshaft, piston, cylinder or bearing	Repair or replace	—
	● Compression leak from cylinder	Replace head gasket, tighten cylinder head screw, glow plug and nozzle holder	1-S16
	● Improper valve timing	Correct or replace timing gear	1-S25
	● Piston ring and cylinder worn	Replace	1-S42, S49
	● Excessive valve clearance	Adjust	1-S18
(Starter Does Not Run)	● Battery discharged	Charge	G-32, 33
	● Starter malfunctioning	Repair or replace	5-S13 to S15
	● Main switch malfunctioning	Repair or replace	—
	● Safety switches malfunctioning	Adjust or replace	5-S10 to S11
	● Wiring disconnected	Connect	—

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SPECIFICATIONS

Model		GZD15-LD	GZD15-HD
Maximum gross power		11.2 kW (15 HP) *1	
Engine	Model	Z602-GZD15	
	Type	Indirect injection. Vertical, water-cooled, 4-cycle diesel engine	
	Number of cylinder	2	
	Bore and stroke	72.0 x 73.6 mm (2.83 x 2.90 in.)	
	Total displacement	599 cm^3 (36.6 cu.in.)	
	Rated revolution	3000 rpm	
	Combustion chamber	Spherical type (E-TVCS)	
	Fuel injection pump	Bosh MD type mini pump	
	Governor	Centrifugal ball mechanical governor	
	Injection nozzle	Bosh throttle type	
	Injection timing	0.30 to 0.33 rad. (17° to 19°) before T.D.C.	
	Injection order	1-2	
	Injection pressure	13.73 MPa (140 kgf/cm^2, 1990 psi)	
	Lubricating system	Forced lubrication by gear pump	
	Cooling system	Pressurized radiator, forced circulation with water pump	
	Lubricating oil	API Service classification CD, CE or CF, below 0 ℃ (32 ℉) : SAE 10W, 10W-30 or 10W-40, 0 to 25 ℃ (32 to 77 ℉) : SAE 20, 10W-30 or 10W-40, above 25 ℃ (77 ℉) :SAE 30, 10W-30 or 10W-40	
	Starting system	Electrical starter (12 V, 1.1 kW)	
	Battery	65D23L (12V, 52A.H. at 5H.R.)	
	Fuel	No.2-D Diesel fuel (ASTM D975) [No. 1-D diesel fuel, if temperature is below -10 ℃ (14 ℉)]	
Capacities	Fuel tank	20 L (5.3 U.S.gals, 4.4 lmp.gals)	
	Engine crankcase	2.1 L (2.2 U.S.qts, 1.8 lmp.qts)	
	Engine coolant	1.4 L (1.5 U.S.qts, 1.2 lmp.qts)	
	Recovery tank	0.25 L (0.26 U.S.qts., 0.22 lmp.qts.)	
	Transmission case & rear axle gear case (RH & LH)	10.0 L (10.6 U.S.qts., 8.8 lmp.qts.)	
	Front PTO case	0.13 L (0.14 U.S.gals, 0.11 lmp.gals)	
	Mower gear case oil	0.15 L (0.16 U.S.qts, 0.13 lmp.qts)	
Tyres	Front	15 x 6.0 - 6 (4 PR) Rib	
	Rear	20 x 10.0 - 12 (4 PR) Turf	
Traveling speeds	Forward	0 to 13.5 km/h (0 to 8.4 mph)	
	Reverse	0 to 10.0 km/h (0 to 6.3 mph)	

NOTE:
*1 Manufacture's estimate

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4. LUBRICANTS, FUEL AND COOLANT

No.	Place		Capacity		Lubricants, fuel and coolant
			GZD15-LD	GZD15-HD	
1	Fuel tank		20 L 5.3 U.S.gals. 4.4 lmp.gals.		No. 2-D diesel fuel No. 1-D diesel fuel if temperature is below -10 ℃ (14 ℉)
2	Coolant	Cooling system	1.4 L 1.5 U.S.qts. 1.2 lmp.qts.		Fresh clean water with anti-freeze
		Recovery tank	0.25 L 0.26 U.S.qts. 0.22 lmp.qts.		
3	Engine crankcase		2.1 L 2.2 U.S.qts. 1.8 lmp.qts.		Engine oil: API service classification CD, CE or CF Below 0 ℃ (32 ℉) : SAE10W, 10W-30 or 10W-40 0 to 25 ℃ (32 to 77 ℉) : SAE20, 10W-30 or 10W-40 Above 25 ℃ (77 ℉) : SAE30, 10W-30 or 10W-40
4	Transmission case and rear axle gear case (RH and LH)		10.0 L 2.6 U.S.gals. 2.2 lmp.gals.		KUBOTA UDT or SUPER UDT fluid**
5	Mower gear box		0.15 L 0.16 U.S.qts. 0.13 lmp.qts.		
6	Front PTO case		0.13 L 0.14 U.S.qts. 0.11 lmp.qts.		

*Oil amount when the oil level is at the upper of the oil level gauge.
**KUBOTA original transmission hydraulic fluid.

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6. MAINTENANCE

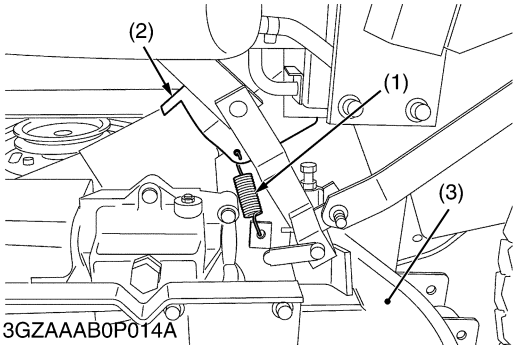
No.	Item \ Period		Indication on hour meter												After since	Reference page	
			50	100	150	200	250	300	350	400	450	500	550	600			
1	Engine oil	Change	★	☆		☆		☆		☆		☆		☆	every 100Hr	G-19	
2	Engine oil filter	Replace	★			☆				☆				☆	every 200Hr	G-20	
3	Transmission and Rear axle gear case (RH and LH) fluid	Change	★			☆				☆				☆	every 200Hr	G-21	
4	Transmission oil filter	Replace	★			☆				☆				☆	every 200Hr	G-20	
5	Transmission strainer	Clean	★			☆				☆				☆	every 200Hr	G-23	
6	Front PTO case fluid	Check	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	every 50Hr	G-29	
		Change			☆			☆			☆			☆	every 150Hr	G-29	
7	Front axle pivot	Adjust		★		☆				☆				☆	every 200Hr	G-24	*2
8	Safety device	Check	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	every 50Hr	G-25	
9	Oiling	-	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	every 50Hr	G-28	
10	Greasing (without mower)	-	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	every 50Hr	G-27	
11	Mower gear box oil	Check	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	every 50Hr	G-26	
		Change			☆			☆			☆			☆	every 150Hr	G-34	
12	Air cleaner element	Clean	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	every 50Hr	G-26	*1
		Replace													every 1 year	G-36	
13	Battery condition	Check	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	every 50Hr	G-32	
14	Fan belt	Adjust		☆		☆		☆		☆		☆		☆	every 100Hr	G-31	
15	Parking brake	Adjust		☆		☆		☆		☆		☆		☆	every 100Hr	G-31	*2
16	Fuel filter element	Check		☆		☆		☆		☆		☆		☆	every 100Hr	G-30	
		Replace								☆					every 400Hr	G-36	*2
17	Fuel line	Check		☆		☆		☆		☆		☆		☆	every 100Hr	G-30	
		Replace													every 2 years	G-39	*2

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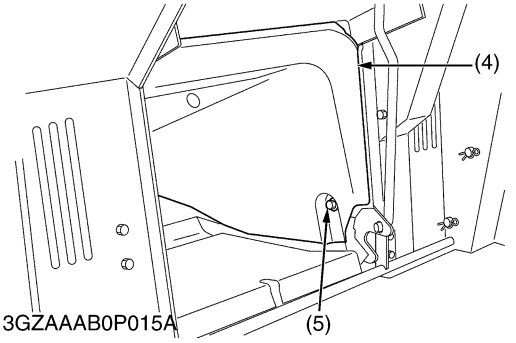
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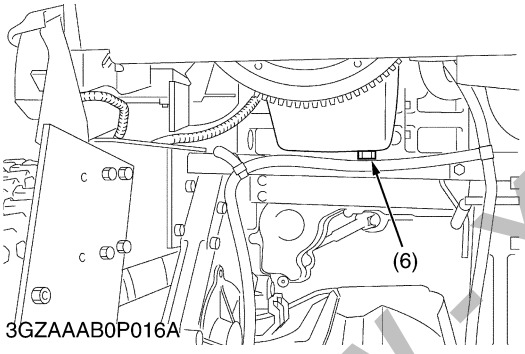
[2] CHECK POINTS OF INITIAL 50 HOURS



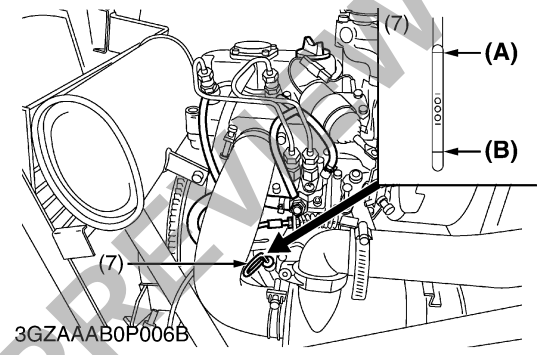
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Changing Engine Oil

CAUTION

- **Be sure to stop the engine before changing oil.**

1. Raise the grass collector from the machine.
2. Remove the spring (1) connecting the cover duct (2) and the mower deck (3).
3. Remove the bolts (5) and duct (4).
4. To change the used oil, remove the drain plug at the bottom of the engine and drain the oil completely. The used oil can be drained out more easily if the engine is warm.
5. Fill with the new oil up to the upper notch on the dipstick (7).
6. To check the oil level, remove the dipstick (7), wipe it clean, insert it and draw it out again. Check to see that the oil level is between two marks.

IMPORTANT

- **When using an oil of different manufacture or viscosity from the previous one, remove all of the oid oil.**
- **Never mix two different type of oil.**
- **Use the proper SAE engine oil according to ambient temperatures.**
  Refer to "LUBRICANTS, FUEL AND COOLANT". (See page G-7.)

Engine oil capacity	2.1 L 2.2 U.S.qts. 1.8 lmp.qts

(1) Spring
(2) Cover Duct
(3) Mower Deck
(4) Duct
(5) Bolt
(6) Drain Plug
(7) Oil Level Dipstick

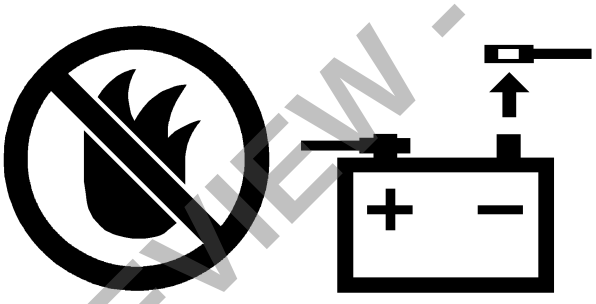
A: Upper Level
B: Lower Level

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SAFETY WORKING

- Do not work on the machine while under the influence of alcohol, medication, or other substances or while fatigued.
- Wear close fitting clothing and safety equipment appropriate to the job.
- Use tools appropriate to the work. Makeshift tools, parts, and procedures are not recommended.
- When servicing is performed together by two or more persons, take care to perform all work safely.
- Do not work under the machine that is supported solely by a jack. Always support the machine by safety stands.
- Do not touch the rotating or hot parts while the engine is running.
- Never remove the radiator cap while the engine is running, or immediately after stopping. Otherwise, hot water will spout out from radiator. Only remove radiator cap when cool enough to touch with bare hands. Slowly loosen the cap to first stop to relieve pressure before removing completely.
- Escaping fluid (fuel or hydraulic oil) under pressure can penetrate the skin causing serious injury. Relieve pressure before disconnecting hydraulic or fuel lines. Tighten all connections before applying pressure.

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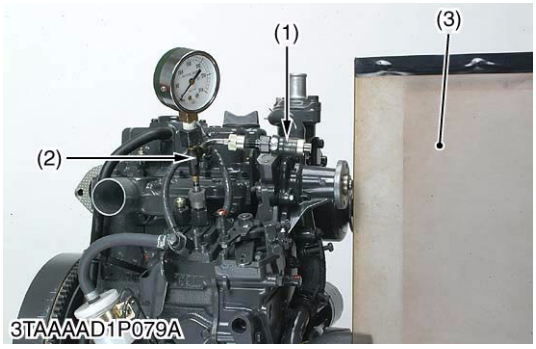
AVOID FIRES

- Fuel is extremely flammable and explosive under certain conditions. Do not smoke or allow flames or sparks in your working area.
- To avoid sparks from an accidental short circuit, always disconnect the battery negative cable first and connect it last.
- Battery gas can explode. Keep sparks and open flame away from the top of battery, especially when charging the battery.
- Make sure that no fuel has been spilled on the engine.

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Fuel Tightness of Pump Element

1. Remove the engine stop solenoid.
2. Remove the injection pipes and glow plugs.
3. Install the injection pump pressure tester to the injection pump.
4. Install the injection nozzle (1) jetted with the proper injection pressure to the injection pump pressure tester (2). (Refer to the figure.)
5. Set the speed control lever to the maximum speed position.
6. Run the starter to increase the pressure.
7. If the pressure can not reach the allowable limit, replace the pump with new one or repair with a Kubota-authorized pump service shop.

Fuel tightness of pump element	Allowable limit	13.7 MPa 140 kgf/cm^2 1990 psi

■ **NOTE**

- **Never try to disassemble the injection pump assembly. For repairs, you are strongly requested to contact a Kubota-authorized pump service shop.**

(1) Injection Nozzle
(2) Injection Pump Pressure Tester
(3) Protection Cover for Jetted Fuel

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