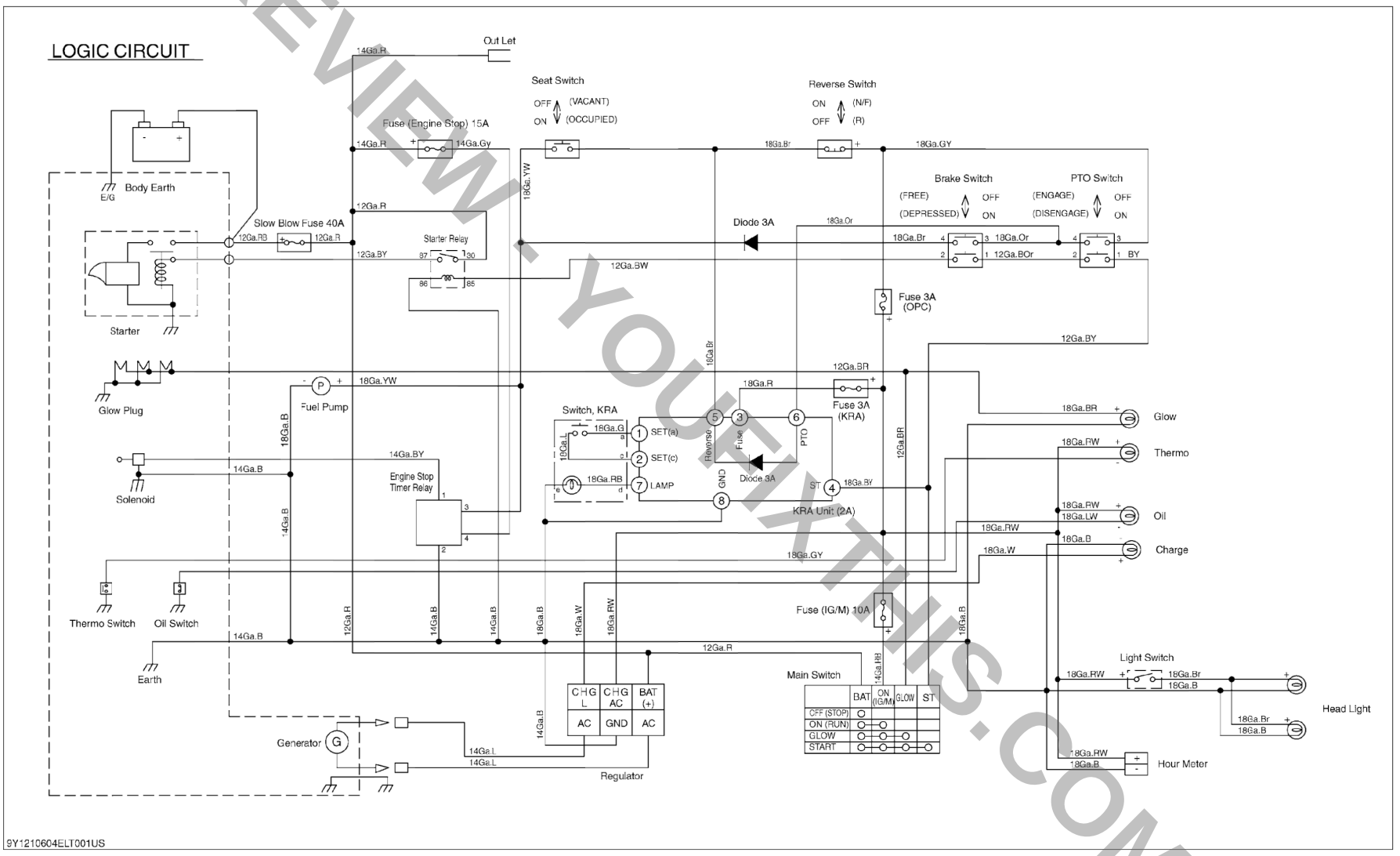
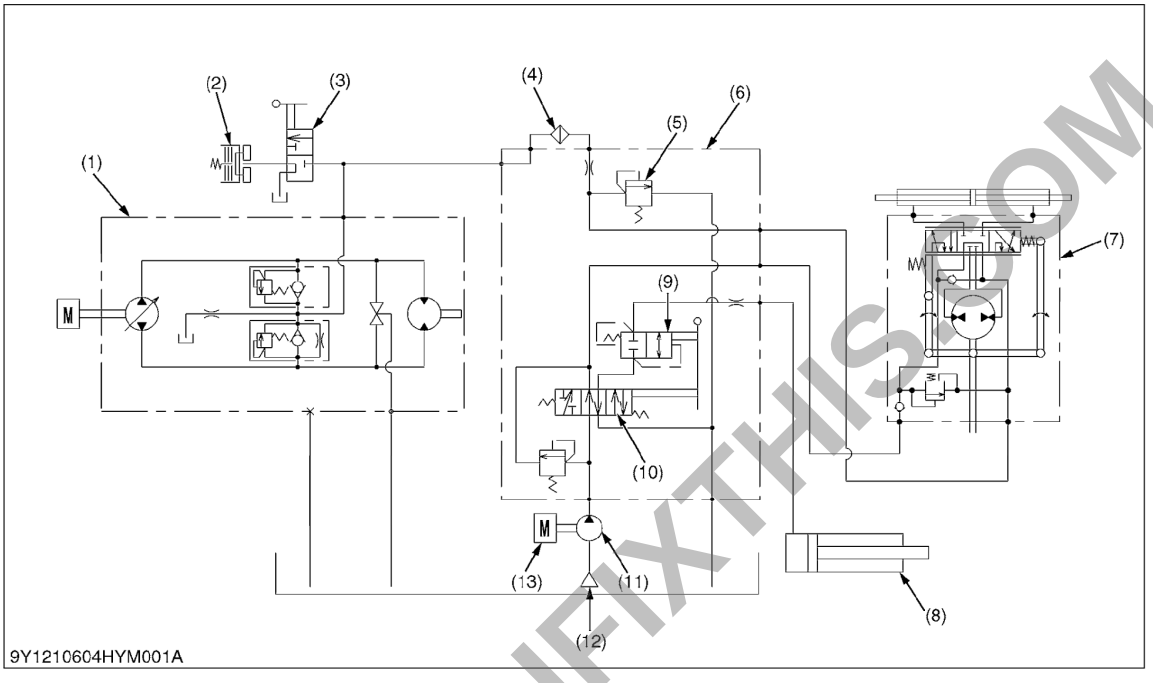
1. WIRING DIAGRAM



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1. HYDRAULIC CIRCUIT



(1) Hydrostatic Transmission
(2) PTO Clucth Pack
(3) PTO Control Valve
(4) Oil Filter Cartridge
(5) HST Relief Valve
(6) Hydraulic Control Valve Assembly
(7) Steering Controller
(8) Mower Lift Cylinder
(9) Check Valve
(10) Control Valve
(11) Hydraulic Pump
(12) Oil Strainer
(13) Main Relief Valve

The hydraulic system of this machine consists of a hydraulic pump (11), hydraulic control valve assembly (6), mower lift cylinder (8) and other components as shown in the above hydraulic circuit.

1. The oil is supplied by the hydraulic pump (11) which is driven by pump drive shaft in the transaxle case. As the pump drive shaft is engaged with the input shaft which connected to the propeller shaft, the hydraulic pump (11) starts running when engine is started.
2. The hydraulic pump forces out the oil to the hydraulic control valve assembly (6), steering controller (7) and hydrostatic transmission (1).

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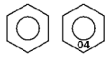
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5. TIGHTENING TORQUES

[1] GENERAL USE SCREWS, BOLTS AND NUTS

Tighten screws, bolts and nuts whose tightening torques are not specified in this Workshop Manual according to the table below.

Indication on top of bolt	 No-grade or 4T						 7T						 9T		
Indication on top of nut	 No-grade or 4T												 6T		
Material of opponent part	Ordinariness			Aluminum			Ordinariness			Aluminum			Ordinariness		
Unit	N·m	kgf·m	lbf·ft	N·m	kgf·m	lbf·ft	N·m	kgf·m	lbf·ft	N·m	kgf·m	lbf·ft	N·m	kgf·m	lbf·ft
M6	7.9 to 9.3	0.80 to 0.95	5.8 to 6.8	7.9 to 8.8	0.80 to 0.90	5.8 to 6.5	9.81 to 11.2	1.00 to 1.15	7.24 to 8.31	7.9 to 8.8	0.80 to 0.90	5.8 to 6.5	12.3 to 14.2	1.25 to 1.45	9.05 to 10.4
M8	18 to 20	1.8 to 2.1	13 to 15	17 to 19	1.7 to 2.0	13 to 14	24 to 27	2.4 to 2.8	18 to 20	18 to 20	1.8 to 2.1	13 to 15	30 to 34	3.0 to 3.5	22 to 25
M10	40 to 45	4.0 to 4.6	29 to 33	32 to 34	3.2 to 3.5	24 to 25	48 to 55	4.9 to 5.7	36 to 41	40 to 44	4.0 to 4.5	29 to 32	61 to 70	6.2 to 7.2	45 to 52
M12	63 to 72	6.4 to 7.4	47 to 53	–	–	–	78 to 90	7.9 to 9.2	58 to 66	63 to 72	6.4 to 7.4	47 to 53	103 to 117	10.5 to 12.0	76.0 to 86.7
M14	108 to 125	11.0 to 12.8	79.6 to 92.5	–	–	–	124 to 147	12.6 to 15.0	91.2 to 108	–	–	–	167 to 196	17.0 to 20.0	123 to 144
M16	167 to 191	17.0 to 19.5	123 to 141	–	–	–	197 to 225	20.0 to 23.0	145 to 166	–	–	–	260 to 304	26.5 to 31.0	192 to 224
M18	246 to 284	25.0 to 29.0	181 to 209	–	–	–	275 to 318	28.0 to 32.5	203 to 235	–	–	–	344 to 402	35.0 to 41.0	254 to 296
M20	334 to 392	34.0 to 40.0	246 to 289	–	–	–	368 to 431	37.5 to 44.0	272 to 318	–	–	–	491 to 568	50.0 to 58.0	362 to 419

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[2] STUD BOLTS

Material of opponent part	Ordinariness			Aluminum		
Unit	N·m	kgf·m	lbf·ft	N·m	kgf·m	lbf·ft
M8	12 to 15	1.2 to 1.6	8.7 to 11	8.9 to 11	0.90 to 1.2	6.5 to 8.6
M10	25 to 31	2.5 to 3.2	18 to 23	20 to 25	2.0 to 2.6	15 to 18
M12	30 to 49	3.0 to 5.0	22 to 36	31	3.2	23
M14	62 to 73	6.3 to 7.5	46 to 54	–	–	–
M16	98.1 to 112	10.0 to 11.5	72.4 to 83.1	–	–	–
M18	172 to 201	17.5 to 20.5	127 to 148	–	–	–

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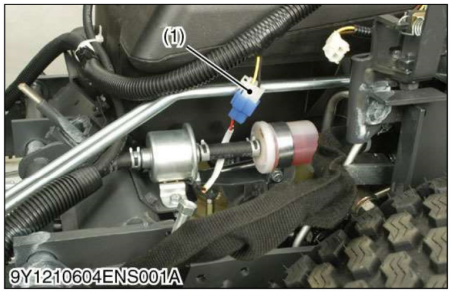
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4. CHECKING, DISASSEMBLING AND SERVICING

[1] CHECKING AND ADJUSTING

(1) Engine Body





Compression Pressure

1. Run the engine until it is warmed up.
2. Stop the engine.
3. Disconnect the **2P** connector (1) from the fuel pump.
4. Remove the air cleaner, the muffler and all injection nozzles.
5. Disconnect the accelerator wire.
6. Engage the parking brake.
7. Set a compression tester (Code No.: 07909-30208) with the adaptor (Adaptor **H**, Code No.: 07909-31231) to the nozzle hole.
8. While cranking the engine with the starter, measure the compression pressure.
9. Repeat steps 7 and 8 for each cylinder.
10. If the measurement is below the allowable limit, apply a small amount of oil to the cylinder wall through the nozzle hole and measure the compression pressure again.
11. If the compression pressure is still less than the allowable limit, check the top clearance, valve clearance and cylinder head.
12. If the compression pressure increases after applying oil, check the cylinder wall and piston rings.

■ **NOTE**

- **Check the compression pressure with the specified valve clearance.**
- **Always use a fully charged battery for performing this test.**
- **Variances in cylinder compression values should be under 10 %.**

Compression pressure	Factory specification	2.85 to 3.23 MPa 29.0 to 33.0 kgf/cm^2 413 to 469 psi
	Allowable limit	2.26 MPa 23.0 kgf/cm^2 327 psi

(1) **2P** Connector

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1. TROUBLESHOOTING

Symptom	Probable Cause	Solution	Reference Page
Engine Does Not Start	No fuel	Fill fuel	G-8
	Air in the fuel system	Bleed	G-49
	Water in the fuel system	Change fuel and repair or replace fuel system	G-8
	Fuel pipe clogged	Clean	G-38
	Fuel filter clogged	Change	G-43
	Excessively high viscosity of fuel or engine oil at low temperature	Use specified fuel or engine oil	G-8
	Fuel with low cetane number	Use specified fuel	G-8
	Fuel leak due to loose injection pipe retaining nut	Tighten retaining nut	1-S23
	Incorrect injection timing	Adjust	1-S16
	Fuel camshaft worn	Replace	1-S30
	Injection nozzle clogged	Repair or replace	1-S18, 1-S24
	Injection pump malfunctioning	Replace	1-S28
	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-S10 1-S24, 1-S25
	Improper valve timing	Correct or replace timing gear	1-S29
	Piston ring and cylinder worn	Replace	1-S45, 1-S46, 1-S50
	Excessive valve clearance	Adjust	1-S12
(Starter Does Not Run)	Battery discharged	Charge	G-35
	Starter malfunctioning	Repair or replace	7-S18
	Main switch malfunctioning	Replace	7-S7
	PTO switch damaged	Replace	7-S10
	Brake switch damaged	Replace	7-S11
	Seat switch damaged	Replace	7-S11
	Slow blow fuse blown	Replace	G-50
	Wiring disconnected	Connect	–
Engine Revolution Is Not Smooth	Fuel filter clogged or dirty	Replace	G-43
	Air cleaner clogged	Clean or replace	G-32
	Fuel leak due to loose injection pipe retaining nut	Tighten retaining nut	1-S23
	Injection pump malfunctioning	Replace	1-S28
	Incorrect nozzle opening pressure	Adjust	1-S18
	Injection nozzle stuck or clogged	Repair or replace	1-S24
	Governor malfunctioning	Repair	–

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3. SPECIFICATIONS

Model				GR2120	GR2120AU
Engine	Model			D782-E3-GX / D782-E4-GX-1	
	Type			Liquid-cooled Diesel	
	Total displacement			778 cm^3 (47.5 cu.in.)	
	Gross power			12.7kW (17.0 HP)*	
	Rated revolution			3000 min^{-1} (rpm)	
	Low idling revolution			1200 to 1350 min^{-1} (rpm)	
	No. of cylinders			3	
	Starter			Electric starter with battery	
	Battery			51R (12 V, 475CCA)	
	Fuel			Diesel fuel No.1 (below −10 °C (14 °F)) Diesel fuel No.2 (above −10 °C (14 °F))	
	Preheating system			Super glow	
	Engine stop			Key stop	
Capacity	Fuel tank			18 L (4.8 U.S.gals, 4.0 Imp.gals)	
	Engine oil			2.8 L (3.0 U.S.qts, 2.5 Imp.qts)	
	Radiator coolant			2.1 L (2.2 U.S.qts, 1.8 Imp.qts)	
	Hydrostatic transmission oil			3.3 L (3.5 U.S.qts, 2.9 Imp.qts)	
Machine	PTO			Shaft drive	
	PTO clutch			Hydraulic Wet Multi Discs	
	PTO brake			Wet Multi Discs	
	Tires	Front	Size	16 × 7.50 - 8	
			Type	Turf, Bar	Turf
		Rear	Size	23 × 10.50 - 12	
			Type	Turf, Bar	Turf
	Steering type			Full hydraulic power steering (Glide Steer)	
	Brake			Internal expanding brake	
	Travel speed control			Foot pedal	
	Transmission			Hydrostatic	
	Traveling speeds	Forward		0 to 10 km/h (0 to 6.2 mph)	
		Reverse		0 to 5 km/h (0 to 3.1 mph)	
Mower deck	Model			RCK48GR	RCK54GR / RCK48GR
Dimensions	Overall length			1990 mm (78.3 in.)	
	Overall width (with mower deck)			1550 mm (61.0 in.)	1700 mm (66.9 in.) / 1550 mm (61.0 in.)
	Overall height			1290 mm (50.8 in.)	
	Wheel base			1280 mm (50.4 in.)	
	Tread	Front		825 mm (32.5 in.)	
		Rear		820 mm (32.3 in.)	
	Weight (with mower deck)			435 kg (959 lbs)	440 kg (970 lbs) / 435 kg (959 lbs)
Grass catcher				Option	–

Model			RCK48GR	RCK54GR
Mower	Cutting width		1219 mm (48.0 in.)	1372 mm (54.0 in.)
	Cutting height		25 to 102 mm (1.0 to 4.0 in.)	
	Adjustment of cutting height		Dial gauge	
	Mounting method		Quick joint, Parallel linkage	
	Weight (Approx.)		75 kg (165.3 lbs)	80 kg (176.4 lbs)
	Dimensions	Total length	900 mm (35.4 in.)	905 mm (35.6 in.)
		Total width	1550 mm (61.0 in.)	1700 mm (66.9 in.)
		Total height	290 mm (11.4 in.)	
	Discharge direction		Right	
	Gear box oil		0.15 L (0.16 U.S.qts, 0.13 Imp.qts)	

(To be continued)

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6. MAINTENANCE CHECK LIST

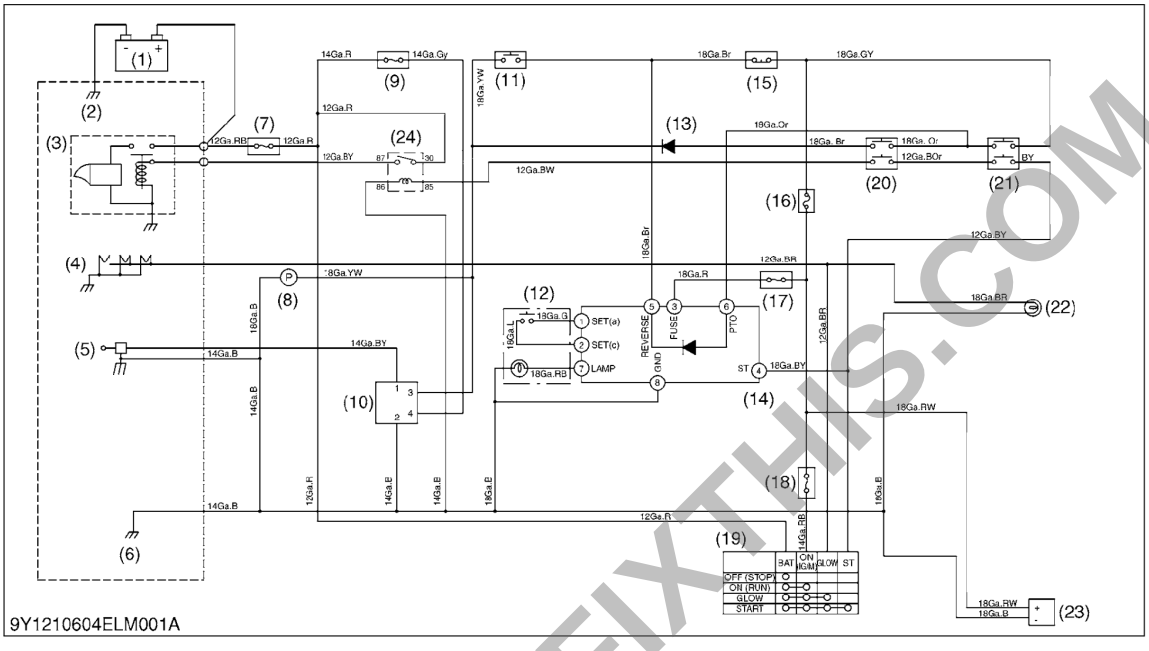
The following servicing tasks should be carried out on the machine at the stated running-time intervals.

No.	Item		Indication on hour meter (Hr)												Interval	Reference page	Important	
			50	100	150	200	250	300	350	400	450	500	550	600				
1	Engine oil	Change	★			☆				☆				☆	every 200 Hr	G-39	*3	
2	Engine oil filter	Replace	★			☆				☆				☆	every 200 Hr	G-38	*3	
3	Transmission fluid	Change								☆					every 400 Hr	G-41		
4	Transmission oil filter	Replace	★			☆				☆				☆	every 200 Hr	G-40	*3	
5	Transmission strainer	Clean								☆					every 400 Hr	G-42		
6	Front axle cases oil	Change								☆					every 400 Hr	G-42		
7	Front axle pivot	Adjust		★		☆				☆				☆	every 200 Hr	G-40	*4	
8	Engine start system	Check	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	every 50 Hr	G-26		
9	OPC system	Check	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	every 50 Hr	G-26		
10	PTO control system	Check	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	every 50 Hr	G-26		
11	Oiling	–	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	every 50 Hr	G-28		
12	Greasing	–	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	every 50 Hr	G-30		
13	Mower gear box oil	Check	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	every 50 Hr	G-31		
		Change	★		☆			☆			☆			☆	every 150 Hr	G-37	*3	
14	Air cleaner element	Clean	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	every 50 Hr	G-31	*1	@
		Replace													every 1 year	G-45		
15	Battery condition	Check	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	every 50 Hr	G-32		
16	HST neutral spring	Adjust		☆		☆		☆		☆		☆		☆	every 100 Hr	G-35	*7	
17	Brake	Check		☆		☆		☆		☆		☆		☆	every 100 Hr	G-35		
18	Fan drive belt	Check		☆		☆		☆		☆		☆		☆	every 100 Hr	G-36		
19	Fuel filter element	Check		☆		☆		☆		☆		☆		☆	every 100 Hr	G-37	*6	@
		Replace								☆					every 400 Hr	G-42	*6	
20	Fuel injection nozzle injection pressure	Check													every 1500 Hr	G-43		@
21	Injection pump	Check													every 3000 Hr	G-45		@
22	Radiator	Clean													every 2000 Hr or 2 years	G-43	*5	
23	Coolant	Change													every 2000 Hr or 2 years	G-43	*5	

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2. STARTING SYSTEM



(1) Battery
(2) Body Earth
(3) Starter Motor
(4) Glow Plug
(5) Engine Stop Solenoid
(6) Body Earth
(7) Slow Blow Fuse (40 A)
(8) Fuel Feed Pump
(9) Fuse (Engine Stop) (15 A)
(10) Engine Stop Time Relay
(11) Seat Switch
(12) KRA system Switch
(13) Diode (3 A)
(14) KRA system Unit
(15) Reverse Switch
(16) Fuse (OPC) (3 A)
(17) Fuse (KRA) (3 A)
(18) Fuse (IG/M) (10 A)
(19) Main Switch
(20) Brake Switch
(21) PTO Switch
(22) Glow Plug Lamp
(23) Hour Meter
(24) Starter Relay

When the main switch (19) is turned to the **PREHEAT** position, the terminal **BAT** is connected to the terminals **GLOW** and **ON**. The glow plugs (4) become red-hot, and the glow plug (preheat indicator) lamp (22) also lights on while preheating.

When the main switch (19) is then turned to the **START** position with the brake switch (20) on and PTO switch (21) on, the terminal **BAT** is connected to the terminals **START** and **ON**. Consequently, battery current flows to the starter motor (3) and start the engine.

The main switch (19) automatically returns to the **ON** position, the terminal **BAT** is connected only to the terminal **ON**, thereby causing the starting circuit to be opened, stopping the starter motor (3).

When the main switch (19) turned from the **ON** position to the **OFF** position, the engine stop solenoid (5) moves the fuel injection pump control rack to the **"No Fuel Injection"** position and stop the engine.

This machine is equipped with the operator presence control (OPC) system which automatically stops the engine when operator stands from the seat while shifting the PTO lever.

This machine is also equipped with the KUBOTA reverse awareness (KRA) system which automatically stops the engine when operator depress the speed charge pedal to the reverse while shifting the PTO lever.

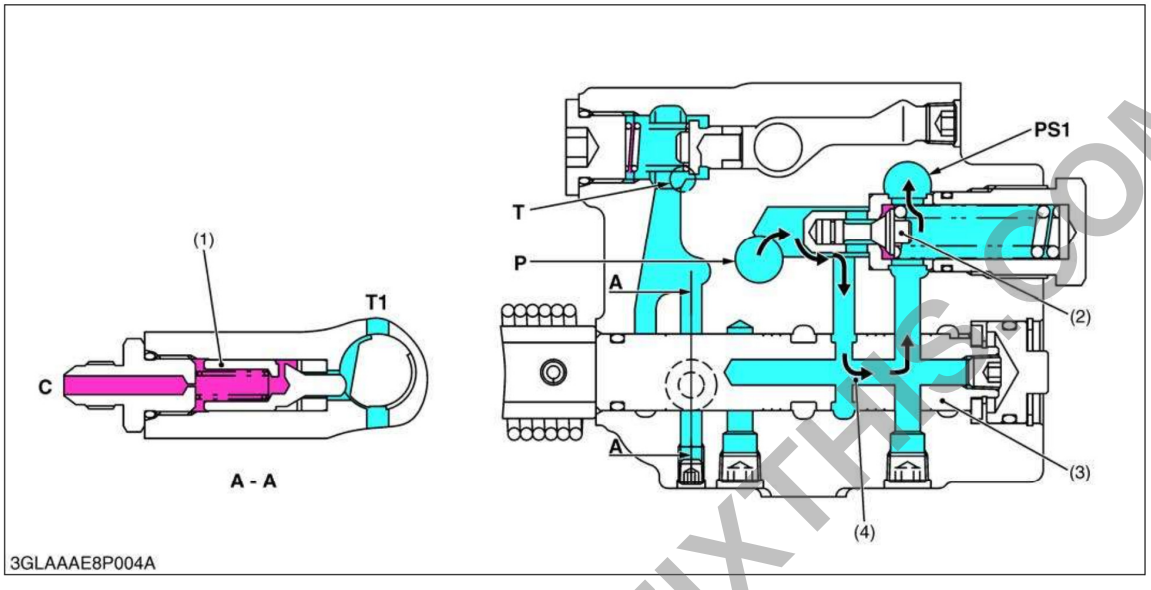
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[1] MOWER LIFT CIRCUIT

Neutral



(1) Check Valve
(2) Main Relief Valve
(3) Spool
(4) Oil Passage

P: Pump Port
T: Tank Port (To Transaxle Case)
T1: Tank Port (To T Port)
C: Cylinder Port
PS1: Power Steering Port (To Power Steering Controller)

The oil is forced into the hydraulic control valve assembly through **P** port.

When the hydraulic lift lever is set to the **"NEUTRAL"** position, the spool (3) keeps still its original position. The oil flows through oil passage (4) in spool to **PS1** port, then flows to power steering controller.

Since the oil does not flow through oil passage (4) in spool to check valve (1), **C** port is closed by check valve (1). Therefore, the oil in mower lift cylinder does not flow out through **C** port and the mower keeps its position.

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[3] HYDRAULIC FITTINGS

(1) Hydraulic Hose Fittings

Hose size	Thread size	Tightening torque		
		N·m	kgf·m	lbf·ft
02	1/8	13.8 to 15.6	1.40 to 1.60	10.2 to 11.5
03	1/4	22.6 to 27.4	2.30 to 2.80	16.7 to 20.2
04				
05	3/8	45.2 to 52.9	4.60 to 5.40	33.3 to 39.0
06				

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(2) Hydraulic Pipe Cap Nuts

Pipe size	Tightening torque		
	N·m	kgf·m	lbf·ft
ϕ4 × t1.0	19.7 to 29.4	2.00 to 3.00	14.5 to 21.6
ϕ6 × t1.0	24.6 to 34.3	2.50 to 3.50	18.1 to 25.3
ϕ8 × t1.0	29.5 to 39.2	3.00 to 4.00	21.7 to 28.9
ϕ10 × t1.0	39.3 to 49.0	4.00 to 5.00	29.0 to 36.1
ϕ12 × t1.5	49.1 to 68.6	5.00 to 7.00	36.2 to 50.6
ϕ15 × t1.6	108 to 117	11.0 to 12.0	79.6 to 86.7
ϕ18 × t1.6	108 to 117	11.0 to 12.0	79.6 to 86.7

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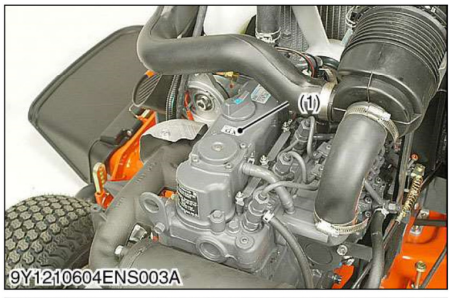
(3) Adaptors, Elbows and Others

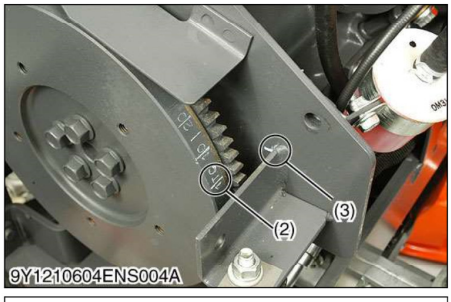
Item	Thread size	Tightening torque		
		N·m	kgf·m	lbf·ft
Fitting with O-ring	G 1/8	45 to 53	4.5 to 5.5	33 to 39
	G 1/4	74 to 83	7.5 to 8.5	55 to 61
	G 3/8	93.2 to 102	9.50 to 10.5	68.8 to 75.9
	G 1/2	113 to 122	11.5 to 12.5	83.2 to 90.4
Elbow with O-ring	G 1/8	23 to 26	2.3 to 2.7	17 to 19
	G 1/4	36 to 43	3.6 to 4.4	26 to 31
	G 3/8	54 to 63	5.5 to 6.5	40 to 47
	G 1/2	73 to 83	7.4 to 8.5	54 to 61
Adaptor	G 1/8	9.8 to 14	1.0 to 1.5	7.3 to 10
	G 1/4	30 to 34	3.0 to 3.5	22 to 25
	G 3/8	49 to 68	5.0 to 7.0	37 to 50
	G 1/2	69 to 88	7.0 to 9.0	51 to 65

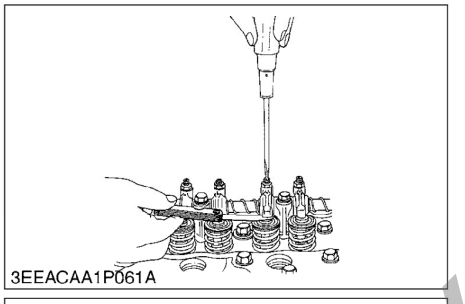
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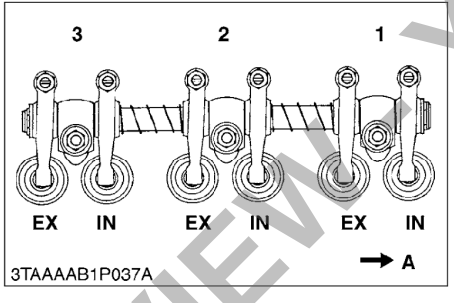
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Checking Valve Clearance

■ **IMPORTANT**

- **The valve clearance must be checked and adjusted when engine is cold.**

1. Remove the cylinder head cover (1) and the glow plugs.
2. Align the **"1TC"** mark (2) on the flywheel and alignment mark (3) on the rear end plate so that the No. 1 piston comes to the compression top dead center.
3. Check the following valve clearance marked with "★" using a thickness gauge.
4. If the clearance is not within the factory specifications, adjust with the adjusting screw.
5. Then turn the flywheel 6.28 rad (360°), and align the **"1TC"** mark (2) on the flywheel and alignment mark (3) on the rear end plate so that the No.1 piston comes to the overlap position.
6. Check the following valve clearance marked with "☆" using a thickness gauge.

Cylinder No.	No.1	No.2	No.3
Intake valve	★	☆	★
Exhaust valve	★	★	☆

★: When No.1 piston is at the compression top dead center position.

☆: When No.1 piston is at the overlap position.

7. If the clearance is not within the factory specifications, adjust with the adjusting screw.

Intake and exhaust valve clearance (Cold)	Factory specification	0.145 to 0.185 mm 0.00571 to 0.00728 in.

■ **NOTE**

- **The sequence of cylinder numbers is given as No.1, No.2 and No.3 starting from the gear case side.**
- **After adjusting the valve clearance, secure the adjusting screw with the lock nut.**

(1) Cylinder Head Cover
(2) **"1TC"** Mark
(3) Alignment Mark

A: Gear Case Side

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Symptom	Probable Cause	Solution	Reference Page
Either White or Blue Exhaust Gas Is Observed	Excessive engine oil	Reduce to specified level	G-8
	Piston ring and cylinder worn or stuck	Repair or replace	1-S45, 1-S46,
	Incorrect injection timing	Adjust	1-S16
	Damaged compression	Adjust top clearance	1-S11
Either Black or Dark Gray Exhaust Gas Is Observed	Overload	Reduce the road	–
	Low grade fuel used	Use specified fuel	G-8
	Fuel filter clogged	Replace	G-43
	Air cleaner clogged	Clean or replace	G-32
	Deficient nozzle injection	Repair or replace nozzle	1-S18, 1-S24
Deficient Output	Incorrect injection timing	Adjust	1-S16
	Engine's moving parts seem to be seizing	Repair or replace	–
	Uneven fuel injection	Replace injection pump	1-S28
	Deficient nozzle injection	Repair or replace nozzle	1-S18, 1-S24
	Compression leak	Replace head gasket, tighten cylinder head screw, glow plug and nozzle holder	1-S10, 1-S24, 1-S25
Excessive Lubricant Oil Consumption	Piston ring's gap facing the same direction	Shift ring gap direction	1-S31
	Oil ring worn or stuck	Replace	1-S32
	Piston ring groove worn	Replace piston	1-S32
	Valve stem and valve guide worn	Replace	1-S26, 1-S38
	Crankshaft bearing and crank pin bearing worn	Replace	1-S35, 1-S47
	Oil leaking due to damaged seals or packing	Replace	–
Fuel Mixed into Lubricant Oil	Injection pump's plunger worn	Replace injection pump	1-S28
	Deficient nozzle injection	Repair or replace nozzle	1-S18, 1-S24
	Injection pump broken	Replace	1-S28
Water Mixed into Lubricant Oil	Head gasket damaged	Replace	1-S25
	Cylinder block or cylinder head flawed	Check and replace	1-S25, 1-S37

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2. SERVICING SPECIFICATIONS

ENGINE BODY

Item		Factory Specification	Allowable Limit
Compression Pressure		2.85 to 3.23 MPa 29.0 to 33.0 kgf/cm^2 413 o 469 psi	2.26 MPa 23.0 kgf/cm^2 327 psi
Variance Among Cylinder			10 % or less
Top Clearance		0.50 to 0.70 mm 0.020 to 0.027 in.	–
Valve Clearance (Cold)		0.145 to 0.185 mm 0.00571 to 0.00728 in.	–
Cylinder Head Surface	Flatness	–	0.05 mm 0.002 in.
Valve Recessing	Intake and Exhaust	−0.10 to 0.10 mm −0.0039 to 0.0039 in.	0.30 mm 0.012 in.
Valve Stem to Valve Guide	Clearance	0.030 to 0.057 mm 0.0012 to 0.0022 in.	0.10 mm 0.0039 in.
• Valve Stem	O.D.	5.968 to 5.980 mm 0.2350 to 0.2354 in.	–
• Valve Guide	I.D.	6.010 to 6.025 mm 0.2367 to 0.2372 in.	–
Valve Seat	Width	2.12 mm 0.0835 in.	– –
	Angle	0.79 rad 45°	
Valve Face	Angle	0.79 rad 45°	–
Valve Spring	Free Length	31.3 to 31.8 mm 1.24 to 1.25 in.	28.4 mm 1.118 in.
	Tilt	–	1.2 mm 0.047 in.
	Setting Load	65 N 6.6 kgf 15 lbf	55 N 5.6 kgf 12 lbf
	Setting Length	27.0 mm 1.06 in.	–
Rocker Arm Shaft to Rocker Arm Shaft	Clearance	0.016 to 0.045 mm 0.00063 to 0.0017 in.	0.15 mm 0.0059 in.
• Rocker Arm Shaft	O.D.	10.473 to 10.484 mm 0.41233 to 0.41275 in.	–
• Rocker Arm	I.D.	10.500 to 10.518 mm 0.41339 to 0.41409 in.	–
Push Rod	Alignment	–	0.25 mm 0.0098 in.

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No.	Item		Indication on hour meter (Hr)												Interval	Reference page	Important	
			50	100	150	200	250	300	350	400	450	500	550	600				
24	Fuel line	Check													every 1 year	G-47	*6 *R	@
		Replace													every 4 years	G-48	*6	
25	Hydraulic hose	Check													every 1 year	G-46	*R	
		Replace													every 4 years	G-48		
26	Radiator hose and clamp	Check													every 1 year	G-46	*R	
		Replace													every 4 years	G-48		
27	Intake air line	Check													every 1 year	G-47	*R	@
		Replace													every 4 years	G-48	*2	
28	Mower gear box oil seal	Check													every 1 year	G-47	*R	
		Replace													every 4 years	G-48		
29	Engine breather hose	Check													every 1 year	G-47	*R	
		Replace													every 4 years	G-48		
30	Fuel system	Bleed													Service as Required	G-48		
31	Fuse	Replace														G-49		
32	Blade	Replace														G-51		
33	Mower belt	Replace														G-52		

■ **IMPORTANT**

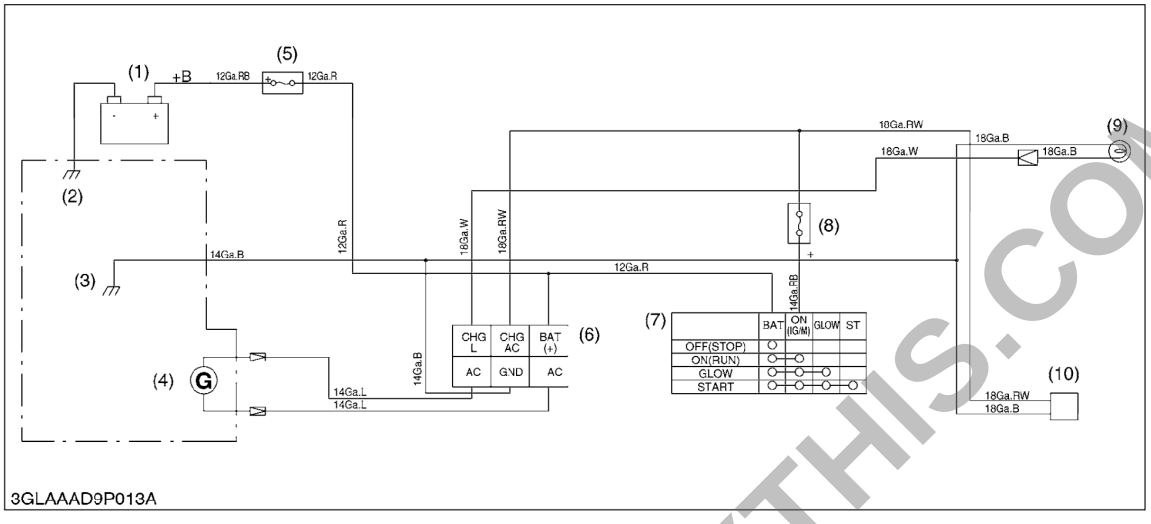
- **The jobs indicated by ★ must be done initially.**
- ***1: This maintenance should be done daily more often in dusty conditions than in normal conditions. Suggested cleaning interval is every 100 hours in normal conditions.**
  ***2: Replace only if necessary.**
  ***3: The initial 50 hours should not be a replacement (changing) cycle.**
  ***4: The initial 100 hours should not be an adjustment cycle.**
  ***5: Every 2000 hours or every 2 years whichever comes faster.**
  ***6: See "LUBRICANTS, FUEL AND COOLANT" in "MAINTENANCE" section when you use Biodiesel Fuel (BDF).**
  ***7: Only certain machines need maintenance.**
  ***R: Replace if any deterioration (crack, hardening, scar, or deformation) or damage occurred.**
- **The items listed above (@ marked) are registered as emission related critical parts by KUBOTA in the U.S.EPA nonroad emission regulation. As the engine owner, you are responsible for the performance of the required maintenance on the engine according to the above instruction.**
  See the Warranty Statement for complete details.
- **When using biodiesel, be sure to check the maintenance requirements of biodiesel fuel as the intervals will change in some of the items.**

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3. CHARGING SYSTEM



(1) Battery
(2) Body Earth
(3) Body Earth
(4) Dynamo
(5) Slow Blow Fuse (40 A)
(6) Regulator
(7) Main Switch
(8) Fuse (10 A)
(9) Charge Lamp
(10) Hour Meter

The charging system supplies electric power for various electrical devices and also charges the battery while the engine runs.

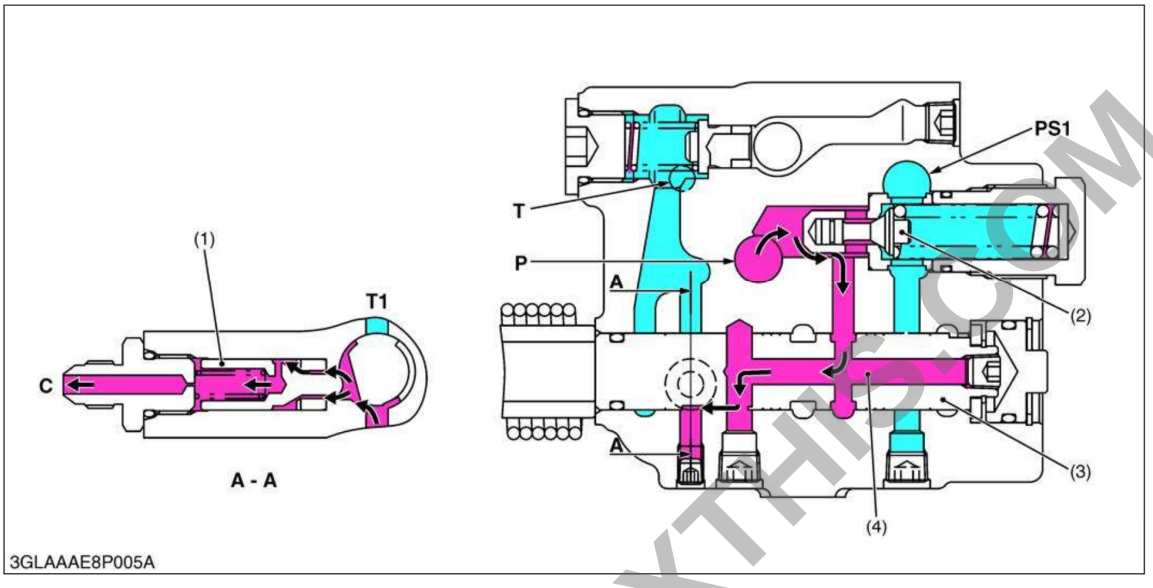
It consists of a dynamo (4) and a regulator (6).

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Lift



(1) Check Valve
(2) Main Relief Valve
(3) Spool
(4) Oil Passage

P: Pump Port
T: Tank Port (To Transaxle Case)
T1: Tank Port (To T Port)
C: Cylinder Port
PS1: Power Steering Port (To Power Steering Controller)

When the hydraulic lift lever is set to the **"LIFT"** position, the spool (3) is rotated counterclockwise in view of left side of the machine.

The oil flows through passage (4) in spool to check valve (1), and opens the check valve (1).

The oil flows through **C** port to mower lift cylinder. Therefore, the mower is lifted.

While the hydraulic lift lever is set to the **"LIFT"** position, the oil does not flow through oil passage (4) in spool to **PS1** port.

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[4] METRIC SCREWS, BOLTS AND NUTS

Grade	8.8 Property class 8.8			10.9 Property class 10.9		
Unit	N·m	kgf·m	lbf·ft	N·m	kgf·m	lbf·ft
M8	24 to 27	2.4 to 2.8	18 to 20	30 to 34	3.0 to 3.5	22 to 25
M10	48 to 55	4.9 to 5.7	36 to 41	61 to 70	6.2 to 7.2	45 to 52
M12	78 to 90	7.9 to 9.2	58 to 66	103 to 117	10.5 to 12.0	76.0 to 86.7
M14	124 to 147	12.6 to 15.0	91.2 to 108	167 to 196	17.0 to 20.0	123 to 144
M16	197 to 225	20.0 to 23.0	145 to 166	260 to 304	26.5 to 31.0	192 to 224

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[5] AMERICAN STANDARD SCREWS, BOLTS AND NUTS WITH UNC OR UNF THREADS

Grade	SAE GR.5			SAE GR.8		
Unit	N·m	kgf·m	lbf·ft	N·m	kgf·m	lbf·ft
1/4	11.7 to 15.7	1.20 to 1.60	8.63 to 11.5	16.3 to 19.7	1.67 to 2.00	12.0 to 14.6
5/16	23.1 to 27.7	2.36 to 2.82	17.0 to 20.5	33 to 39	3.4 to 3.9	25 to 28
3/8	48 to 56	4.9 to 5.7	36 to 41	61 to 73	6.3 to 7.4	45 to 53
1/2	110 to 130	11.3 to 13.2	81.2 to 95.8	150 to 178	15.3 to 18.1	111 to 131
9/16	150 to 178	15.3 to 18.1	111 to 131	217 to 260	22.2 to 26.5	160 to 191
5/8	204 to 244	20.8 to 24.8	151 to 179	299 to 357	30.5 to 36.4	221 to 263

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[6] PLUGS

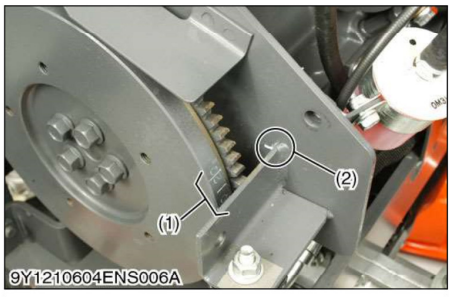
Shape	Size	Material of opponent part					
		Ordinariness			Aluminum		
		N·m	kgf·m	lbf·ft	N·m	kgf·m	lbf·ft
Tapered screw 	R1/8	13 to 21	1.3 to 2.2	9.4 to 15	13 to 19	1.3 to 2.0	9.4 to 14
	R1/4	25 to 44	2.5 to 4.5	18 to 32	25 to 34	2.5 to 3.5	18 to 25
	R3/8	49 to 88	5.0 to 9.0	37 to 65	49 to 58	5.0 to 6.0	37 to 43
	R1/2	58.9 to 107	6.00 to 11.0	43.4 to 79.5	59 to 78	6.0 to 8.0	44 to 57
Straight screw 	G1/4	25 to 34	2.5 to 3.5	18 to 25	–	–	–
	G3/8	62 to 82	6.3 to 8.4	46 to 60	–	–	–
	G1/2	49 to 88	5.0 to 9.0	37 to 65	–	–	–

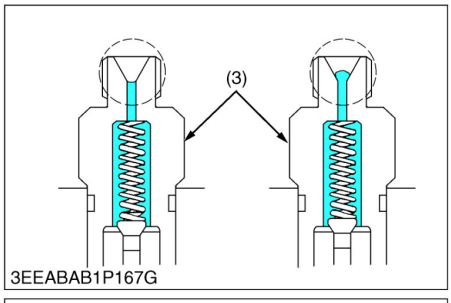
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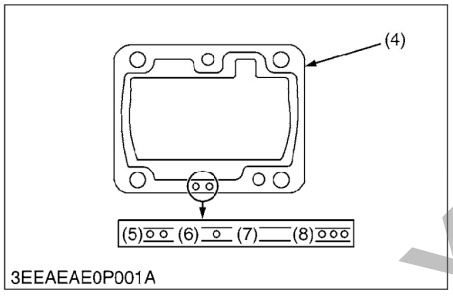
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(4) Fuel System







Injection Timing

1. Remove the injection pipes.
2. Remove the engine stop solenoid.
3. Turn the flywheel counterclockwise (viewed from flywheel side) until the fuel fills up to the hole of the delivery valve holder (3) for No.1 cylinder.
4. After the fuel fills up to the hole of the delivery valve holder for No.1 cylinder, turn back (clockwise) the flywheel around 1.6 rad (90°).
5. Turn the flywheel counterclockwise to set at round 0.44 rad (25°) before T.D.C..
6. Slowly turn the flywheel counterclockwise and stop turning when the fuel begins to come up, to get the present injection timing.
7. Check to see the degree on flywheel.
   The flywheel has mark **"1TC"**, **"10"** and **"20"** for the crank angle before the top dead center of No.1 cylinder.
8. Check to see if the timing angle on the flywheel is aligned with the alignment mark (2).
9. If injection timing is out of adjustment, readjust the timing with shims.

Injection timing	Factory specification	0.2837 to 0.3097 rad (16.25 to 17.75°) before T.D.C.

■ **NOTE**

- **The liquid gasket is not required for assembling.**
- **Shims are available in thickness of 0.20 mm (0.0079 in.), 0.25 mm (0.0098 in.), 0.30 mm (0.012 in.), 0.35 mm (0.014 in.) and 0.175 mm (0.00689 in.). Combine these shims for adjustments.**
- **Addition or reduction of shim (0.025 mm, 0.00098 in.) delays or advances the injection timing by approx. 0.0044 rad (0.25°)**
- **In disassembling and replacing the injection pump, be sure to use the same number of new shims with the same thickness.**
- **The 0.175 mm (0.00689 in.) thick shim is coated only on the lower face. Therefore, do not use the 0.175 mm (0.00689 in.) thick shim as the top shim of the combination (injection pump side), because this can cause oil leakage.**
- **Refer to figure of the shim to check the thickness of the shims.**
- **The injection timing might be changed by the application.**

(1) Timing Line
(2) Alignment Mark
(3) Delivery Valve Holder
(4) Shim (Soft Metal Gasket Shim)
(5) Two-holes: 0.20 mm (0.0079 in.)
Two-holes: 0.175 mm (0.00689 in.)
(6) One-holes: 0.25 mm (0.0098 in.)
(7) Without hole: 0.30 mm (0.0118 in.)
(8) Three-hole: 0.35 mm (0.014 in.)

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