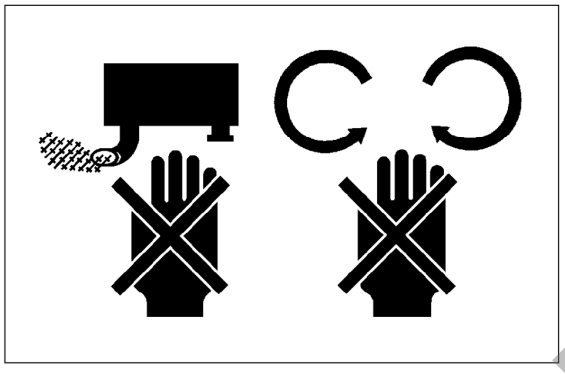
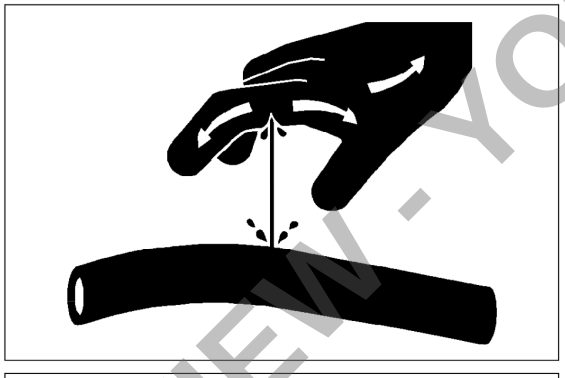
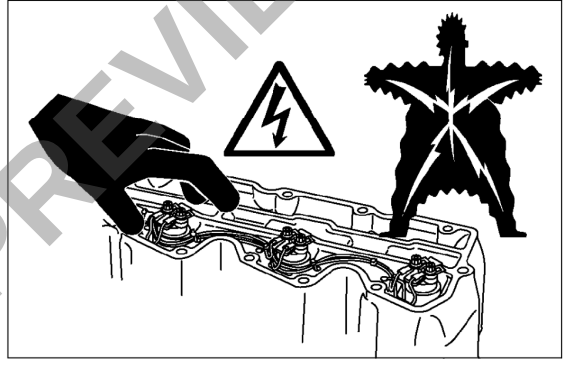


SAFETY STARTING

- 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.







SAFETY WORKING

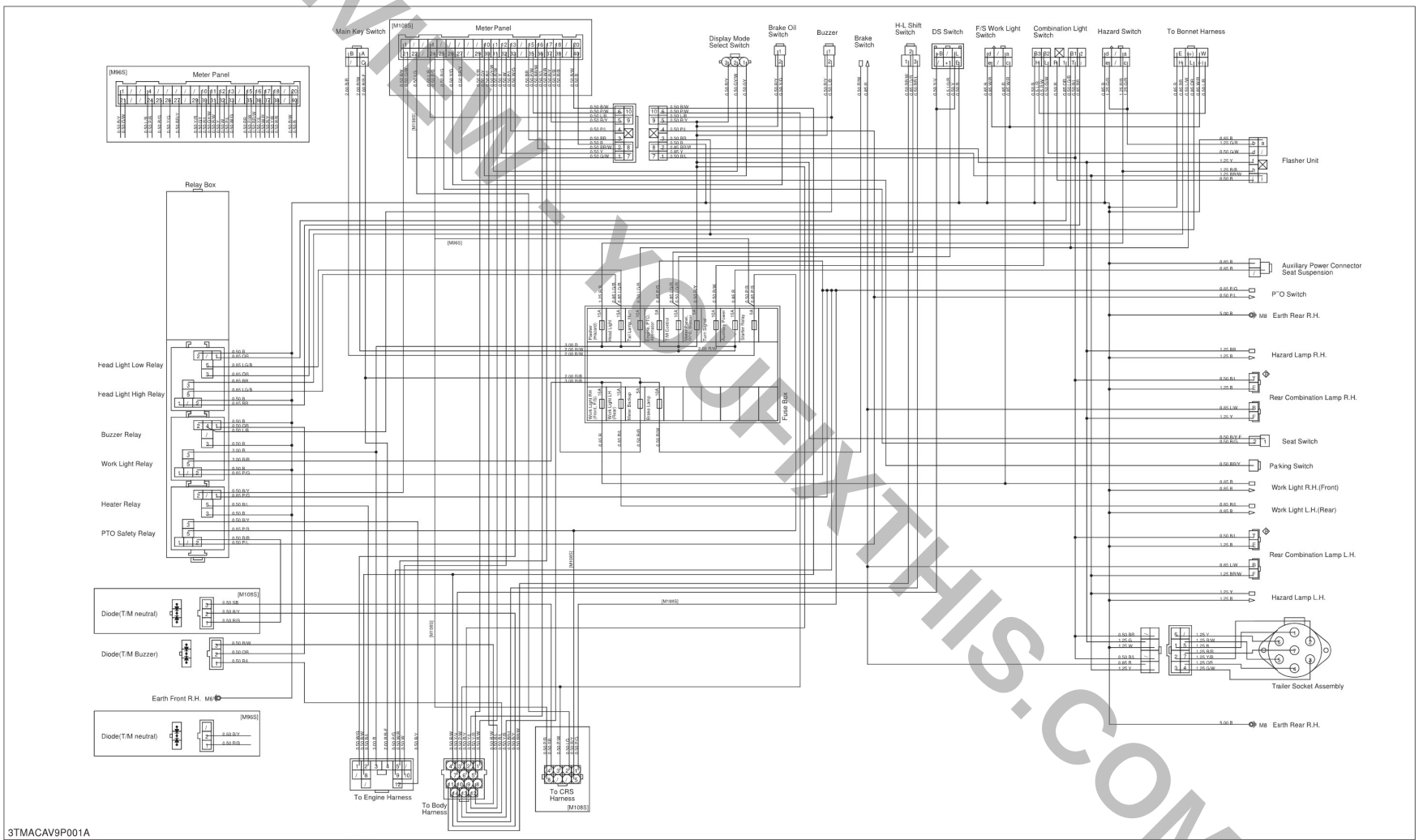
- Do not work on the machine while under the influence of alcohol, medication, or other substances or while fatigued.
- Wear close fitting clothing and safety equipment appropriate to the job.
- Use tools appropriate to the work. Makeshift tools, parts, and procedures are not recommended.
- When 2 or more persons do servicing, make sure that you do it 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.
- Do not open high-pressure fuel system.
  High-pressure fluid remaining in fuel lines can cause serious injury. Do not disconnect or attempt to repair fuel lines, sensors, or any other components between the high-pressure fuel pump and injectors on engines with high pressure common rail fuel system.
- High voltage exceeding 100 V is generated in the ECU and injector.
  Pay sufficient caution to electric shock when performing work activities.

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1. WIRING DIAGRAM

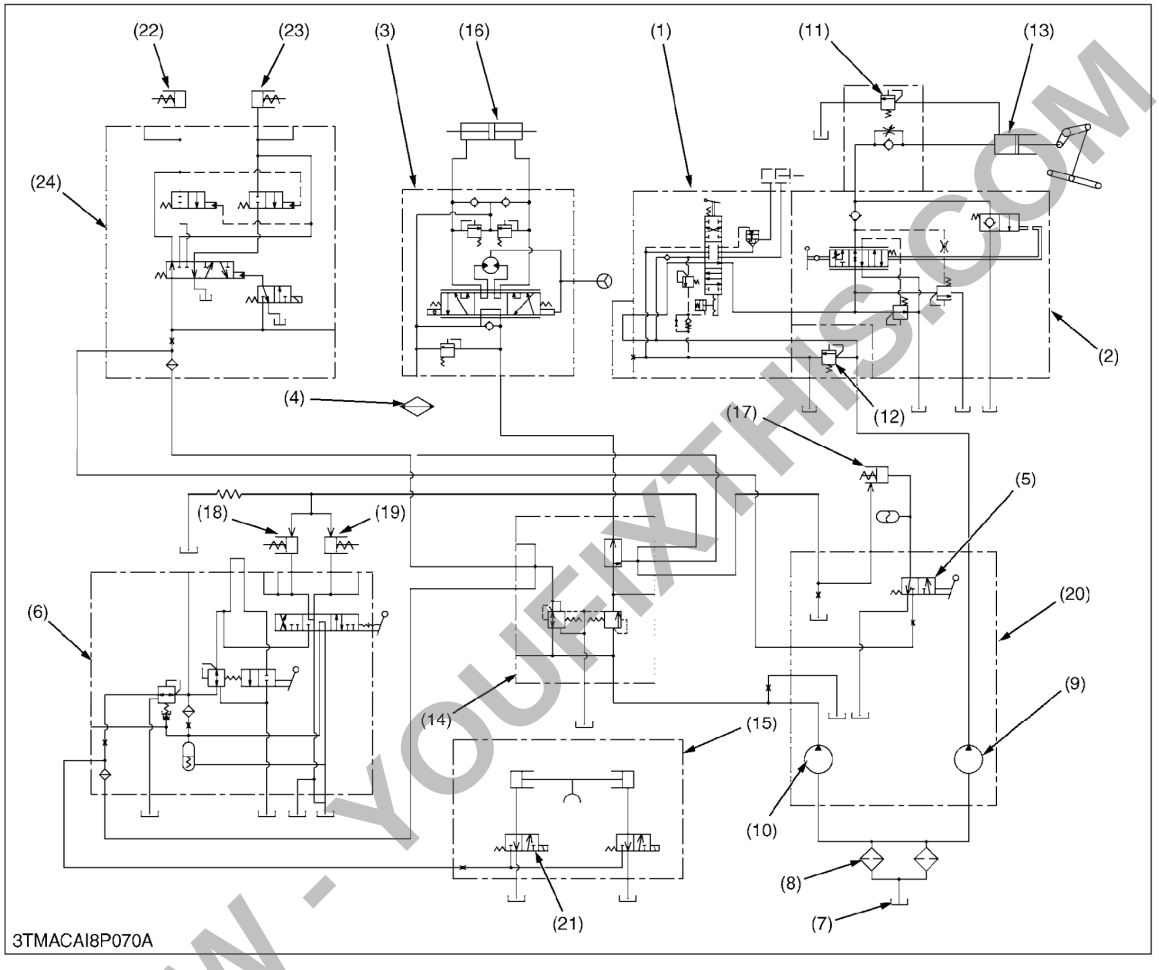
[1] MAIN HARNESS (ROPS MODEL)



3TMACAV9P001A

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2. HYDRUALIC CIRCUIT



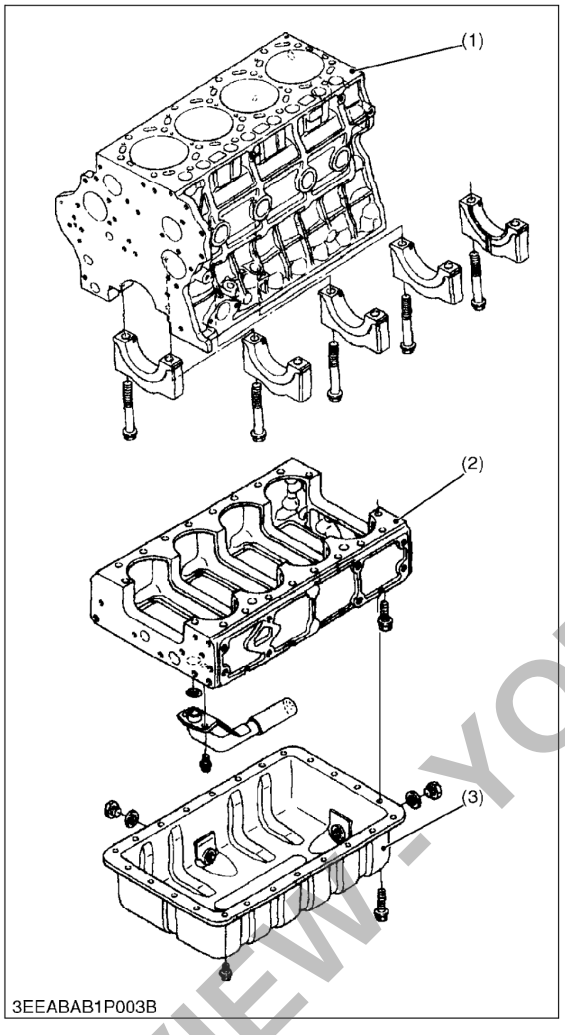
(1) Auxiliary Control Valve
(2) Control Valve for 3P
(3) Power Steering Controller
(4) Oil Cooler
(5) PTO Valve
(6) Shuttle Valve
(7) Oil Tank (Transmission Case)
(8) Hydraulic Oil Filter Cartridge
(9) Hydraulic Pump (for 3P)
(10) Hydraulic Pump (PTO Clutch, Shuttle Clutch, Swing Shift, Dual Speed)
(11) Cylinder Safety Valve
(12) Relief Valve for 3P
(13) Hydraulic Cylinder
(14) Regulator Valve
(15) Swing Shift
(16) Steering Cylinder
(17) PTO Clutch
(18) Shuttle Clutch **R**
(19) Shuttle Clutch **F**
(20) Pump Base
(21) Solenoid Valve
(22) Dual Speed Clutch **HI** (DS Model Only)
(23) Dual Speed Clutch **LO** (DS Model Only)
(24) Dual Speed Valve (DS Model Only)

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2. ENGINE BODY

[1] CYLINDER BLOCK



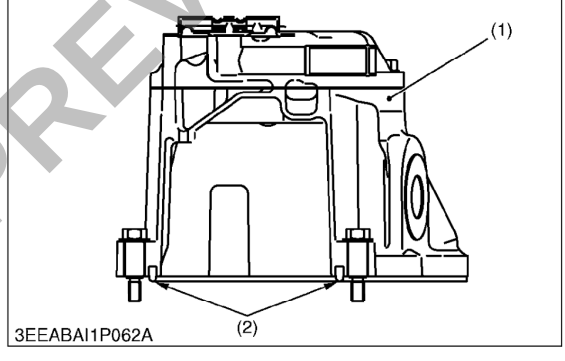
This engine employs separate type crankcases - the crankcase 1 (1) with combustion part and the crankcase 2 (2) which supports the crankcase 1 (1) and reduces noise.

Since it is a hanger type, you can easily assemble / disassemble it. The cylinder is a linerless type which enables good cooling operation, less strain and good abrasion resistance.

(1) Crankcase 1
(2) Crankcase 2
(3) Oil Pan

W1013119

[2] HALF-FLOATING HEAD COVER



The rubber packing is fitted in to maintain the head cover 0.5 mm (0.02 in.) or so off the cylinder head. This arrangement helps reduce noise coming from the cylinder head.

(1) Cylinder Head Cover
(2) Rubber Packing

W1013327

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5. TIGHTENING TORQUES

[1] GENERAL USE SCREWS, BOLTS AND NUTS

Screws, bolts, and nuts whose tightening torques are not specified in this Workshop Manual should be tightened according to the table below.

Indication on top of bolt	⬡ 4 No-grade or 4T						⬡ 7 7T						⬡ 9 9T		
Material of bolt	SS400, S20C						S43C, S48C						SCr435, SCM435		
Material of opponent part	Ordinariness			Aluminum			Ordinariness			Aluminum			Ordinariness		
Unit / Diameter	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 (6 mm, 0.24 in.)	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 (8 mm, 0.31 in.)	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 (10 mm, 0.39 in.)	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 (12 mm, 0.47 in.)	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 (14 mm, 0.55 in.)	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 (16 mm, 0.63 in.)	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 (18 mm, 0.71 in.)	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 (20 mm, 0.79 in.)	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

W1034542

[2] STUD BOLTS

Material of opponent part	Ordinariness			Aluminum		
Unit / Diameter	N·m	kgf·m	lbf·ft	N·m	kgf·m	lbf·ft
M8 (8 mm, 0.31 in.)	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 (10 mm, 0.39 in.)	25 to 31	2.5 to 3.2	18 to 23	20 to 25	2.0 to 2.6	15 to 18
M12 (12 mm, 0.47 in.)	29.5 to 49.0	3.0 to 5.0	21.7 to 36.1	31.4	3.2	23.1
M14 (14 mm, 0.55 in.)	62 to 73	6.3 to 7.5	46 to 54	–	–	–
M16 (16 mm, 0.63 in.)	98.1 to 112	10.0 to 11.5	72.4 to 83.1	–	–	–
M18 (18 mm, 0.71 in.)	172 to 201	17.5 to 20.5	127 to 148	–	–	–

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1. TROUBLESHOOTING

■ **NOTE**

- **This troubleshooting shows only mechanical failures. Regarding the failures of common rail system (CRS), please refer to the diagnosis manual "COMMON RAIL SYSTEM ENGINE".**

Symptom	Probable Cause	Solution	Reference Page
Engine Does Not Start	No fuel	Fill fuel	–
	Air in the fuel system	Vent air	G-41, 42
	Water in the fuel system	Drain the water in fuel system	G-8, 28
	Electric fuel feed pump malfunctioning	Replace	–
	Fuel hose clogged	Clean or replace	G-22
	Fuel filter clogged	Replace	G-32
	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-S46, 70
	Injector clogged	Repair or replace	1-S50, 51
	Supply pump malfunctioning	Repair or replace	1-S45
	Seizure of crankshaft, camshaft, piston, cylinder or bearing	Repair or replace	–
	Compression leak from cylinder	Replace head gasket, tighten cylinder head screw	1-S53, 73
	Improper valve timing	Correct or replace timing gear	1-S58, 89
	Piston ring and cylinder worn	Replace	1-S106, 110
	Excessive valve clearance	Adjust	1-S16, 21
Starter Does Not Run	Battery discharged	Charge or replace	G-21
	Starter malfunctioning	Repair or replace	9-S18
	Key switch malfunctioning	Replace	9-S14, 15
	Wiring disconnected	Connect	–

W1014322

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(At rated engine rpm)

Model				M108S		
Tire size (Rear)				18.4-34		
Transmission type				without Dual speed	with Dual speed	
Shuttle shift lever	Range gear shift lever	Main gear shift lever		km/h (mph)	Hi km/h (mph)	Lo km/h (mph)
Reverse	CREEP (option)		1	0.38 (0.24)	0.38 (0.24)	0.31 (0.19)
			2	0.48 (0.30)	0.48 (0.30)	0.40 (0.25)
			3	0.59 (0.37)	0.59 (0.37)	0.49 (0.30)
			4	0.73 (0.45)	0.73 (0.45)	0.60 (0.37)
			1	0.93 (0.58)	0.93 (0.58)	0.77 (0.48)
			2	1.19 (0.74)	1.19 (0.74)	0.98 (0.61)
			3	1.46 (0.91)	1.46 (0.91)	1.21 (0.75)
			4	1.79 (1.11)	1.79 (1.11)	1.48 (0.92)
	L		1	2.11 (1.31)	2.11 (1.31)	1.75 (1.08)
			2	2.69 (1.67)	2.69 (1.67)	2.22 (1.38)
			3	3.31 (2.06)	3.31 (2.06)	2.74 (1.70)
			4	4.06 (2.52)	4.06 (2.52)	3.36 (2.09)
			1	5.19 (3.23)	5.19 (3.23)	4.29 (2.67)
			2	6.61 (4.11)	6.61 (4.11)	5.47 (3.40)
			3	8.15 (5.06)	8.15 (5.06)	6.74 (4.19)
			4	9.99 (6.21)	9.99 (6.21)	8.26 (5.13)
	H		1	7.38 (4.58)	7.38 (4.58)	6.10 (3.79)
			2	9.39 (5.84)	9.39 (5.84)	7.77 (4.83)
			3	11.57 (7.19)	11.57 (7.19)	9.57 (5.94)
			4	14.18 (8.81)	14.18 (8.81)	11.73 (7.29)
			1	18.15 (11.28)	18.15 (11.28)	15.00 (9.32)
			2	23.11 (14.36)	23.11 (14.36)	19.11 (11.87)
			3	28.47 (17.69)	28.47 (17.69)	23.53 (14.62)
			4	37.58 (23.35)*	37.58 (23.35)*	28.85 (17.93)

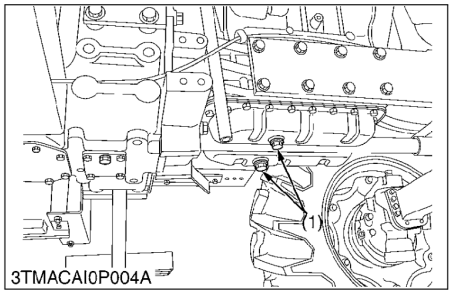
The company reserves the right to change the specifications without notice.
* At maximum engine rpm.

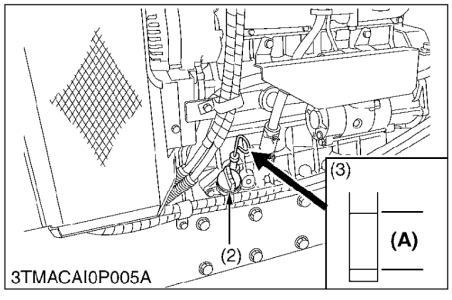
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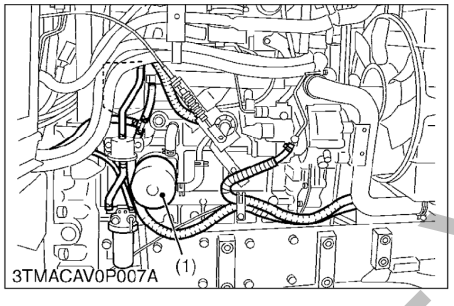
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[2] CHECK POINTS OF INITIAL 50 HOURS







Changing Engine Oil

CAUTION

- **Before changing oil, be sure to stop the engine.**
- **Allow engine to cool down sufficiently, oil can be hot and can burn.**

1. To drain the used oil, remove the drain plugs (1) at the bottom of the engine and drain the oil completely into the oil pan. All the used oil can be drained out easily when the engine is still warm.
2. After draining reinstall the drain plugs (1).
3. Fill with the new oil up to the upper notch on the dipstick. Refer to "4. LUBRICANTS, FUEL AND COOLANT" in this section.

Engine oil	Capacity	10.7 L 11.3 U.S.qts 9.41 Imp.qts

(1) Drain Plug
(2) Oil Inlet Plug
(3) Dipstick
(A) Oil level is acceptable within this range.

W1039461

Replacing Engine Oil Filter

CAUTION

- **Be sure to stop the engine before changing oil filter cartridge.**
- **Allow engine to cool down sufficiently, oil can be hot and can burn.**

1. Remove the oil filter (1).
2. Put a film of clean engine oil on rubber seal of new filter.
3. Tighten the filter quickly until it contacts the mounting surface. Tighten filter by hand an additional 1/2 turn only.
4. After the new filter has been replaced, the engine oil normally decreases a little. Make sure that the engine oil does not leak through the seal and be sure to check the oil level on the dipstick. Then, fill the engine oil up to the prescribed level.

■ IMPORTANT

- **To prevent serious damage to the engine, use only a KUBOTA genuine filter.**

(1) Engine Oil Filter

W1040148

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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.

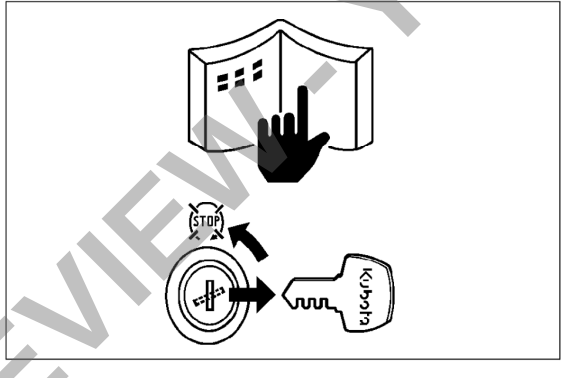
DANGER : Indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.

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 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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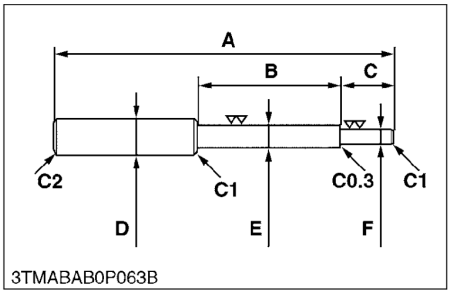
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No.	Items		Indication on hour meter														Since then every	Impor -tant	Refer- ence page
			50	100	150	200	250	300	350	400	450	500	550	600	650	700			
21	Intake air line	Check				☆				☆				☆			200 hrs		G-29
		Replace															2 years		G-29
22	Engine oil	Check	★					☆						☆			300 hrs		G-16
23	Greasing (2WD front wheel hub)	–								☆							400 hrs		G-32
24	Water separator	Clean								☆							400 hrs		G-32
25	Fuel filter	Replace								☆							400 hrs		G-32
26	Engine oil filter	Replace	★											☆			600 hrs		G-16
27	Transmission fluid	Change	★											☆			600 hrs		G-17
28	Front differential case oil	Change	★											☆			600 hrs		G-18
29	Front axle gear case	Change	★											☆			600 hrs		G-18
30	King-pin pivot	Adjust												☆			600 hrs		G-34
31	Brake oil	Change												☆			600 hrs		G-33
32	Front axle pivot	Adjust												☆			600 hrs		G-34
33	Engine valve clearance	Adjust															800 hrs		1-S16, 21
34	Turbo charger	Check															3000 hrs		1-S28
35	Intake air heater	Check															3000 hrs		9-S17, 18
36	Cooling system	Flush															2 years		G-37
37	Coolant	Change															2 years		G-37
38	Parking brake cable	Replace															2 years		G-40
39	Brake hose	Replace															2 years		G-40
40	Master cylinder kit	Replace															2 years		5-S9
41	Equalizer kit	Replace															2 years		5-S10
42	Brake seal 1 and 2	Replace															2 years		5-S15, 17
43	Fuel system	Bleed	Service as required																G-41
44	Brake system	Bleed																	G-43
45	Clutch housing water	Drain																	G-42
46	Fuse	Replace																	G-44, 45
47	Light bulb	Replace																	G-46

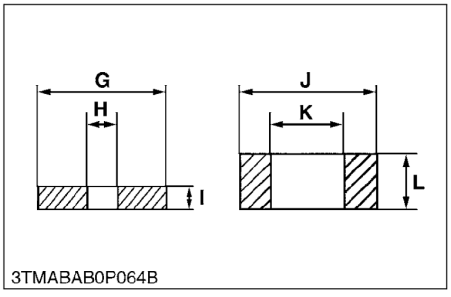
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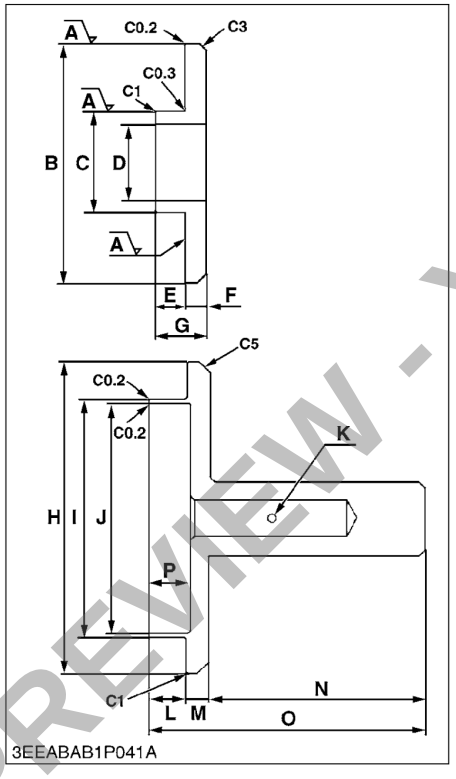
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3TMABAB0P064B



3EEABAB1P041A

Valve Guide Replacing Tool

Application: Use to press out and press fit the valve guide.

A	225 mm (8.86 in.)
B	70 mm (2.8 in.)
C	45 mm (1.8 in.)
D	20 mm dia. (0.79 in dia.)
E	11.7 to 11.9 mm dia. (0.461 to 0.468 in. dia.)
F	6.50 to 6.60 mm dia. (0.256 to 0.259 in. dia.)
G	25 mm dia. (0.98 in. dia.)
H	6.70 to 7.00 mm dia. (0.264 to 0.275 in. dia.)
I	5.0 mm (0.20 in.)
J	20 mm dia. (0.79 in.dia.)
K	12.5 to 12.8 mm dia. (0.493 to 0.503 in. dia.)
L	8.90 to 9.10 mm (0.351 to 0.358 in.)
C1	Chamfer 1.0 mm (0.039 in.)
C2	Chamfer 2.0 mm (0.079 in.)
C0.3	Chamfer 0.3 mm (0.01 in.)

W1038887

Auxiliary Socket for Fixing Crankshaft Sleeve

Application: Use to fix the crankshaft sleeve of the diesel engine.

A	Rmax = 12.5 S
B	94.5 to 95.0 mm dia. (3.72 to 3.74 in. dia.)
C	40 mm dia. (1.6 in. dia.)
D	30 mm dia. (1.2 in. dia.)
E	12 mm (0.47 in.)
F	7.90 to 8.10 mm (0.311 to 0.318 in.)
G	20 mm (0.79 in.)
H	130 mm dia. (5.12 in. dia.)
I	99.40 to 99.60 mm dia. (3.914 to 3.921 in. dia.)
J	95.05 to 95.20 mm dia. (3.743 to 3.748 in. dia.)
K	3.0 mm dia. (0.12 in.dia.)
L	15 mm (0.59 in.)
M	10 mm (0.39 in.)
N	90 mm (3.5 in.)
O	115 mm (4.53 in.)
P	16.9 to 17.1 mm (0.666 to 0.673 in.)
C1	Chamfer 1.0 mm (0.039 in.)
C3	Chamfer 3.0 mm (0.12 in.)
C5	Chamfer 5.0 mm (0.20 in.)
C0.2	Chamfer 0.2 mm (0.008 in.)
C0.3	Chamfer 0.3 mm (0.01 in.)

W1041815

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MECHANISM

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1. FEATURE 1-M1
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   [2] HALF-FLOATING HEAD COVER 1-M2
   [3] CYLINDER HEAD 1-M3
   [4] CENTER DIRECT INJECTION SYSTEM (E-CDIS) 1-M3
   [5] PISTON 1-M5
   [6] BUILT-IN DYNAMIC BALANCER 1-M5
3. LUBRICATING SYSTEM 1-M6
   [1] OIL COOLER 1-M6
4. COOLING SYSTEM 1-M7
   [1] THERMOSTAT 1-M7
   [2] BOTTOM BYPASS SYSTEM 1-M8
5. FUEL SYSTEM 1-M9
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   [2] V3800-DI-T 1-M10
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      (2) 2-Stage DI Nozzle 1-M12
      (3) Injection Pump with F.S.P. 1-M13
      (4) Automatic Timer 1-M13
6. INTAKE AND EXHAUST SYSTEM 1-M14
   [1] INTAKE AIR HEATER 1-M14
   [2] TURBOCHARGER 1-M14
   [3] INTERCOOLER 1-M15
7. COMMON RAIL SYSTEM (CRS) 1-M16
   [1] GENERAL 1-M16
   [2] SUPPLY PUMP 1-M18
   [3] RAIL 1-M21
   [4] INJECTOR 1-M22
   [5] ENGINE CONTROL SYSTEM 1-M25
      (1) Engine Control System Diagram 1-M25
      (2) Engine ECU (Electronic Control Unit) 1-M26
      (3) Sensors 1-M27
8. EXHAUST GAS RECIRCULATION (EGR) SYSTEM 1-M30
   [1] GENERAL 1-M30
   [2] EGR VALVE 1-M31
   [3] REED VALVE 1-M32

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2. SERVICING SPECIFICATIONS

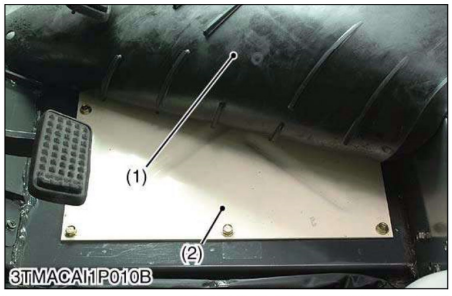
ENGINE BODY

Item		Factory Specification	Allowable Limit
Cylinder Head Surface	Flatness	–	0.05 mm 0.002 in.
Top Clearance		0.72 to 0.90 mm 0.029 to 0.035 in.	–
Compression	V3800-CR-TI	3.09 to 3.29 MPa / 200 min^{-1} (rpm) 31.5 to 33.5 kgf/cm^2 / 200 min^{-1} (rpm) 449 to 477 psi / 200 min^{-1} (rpm)	2.41 MPa / 200 min^{-1} (rpm) 24.6 kgf/cm^2 / 200 min^{-1} (rpm) 350 psi / 200 min^{-1} (rpm)
	V3800-DI-TI	3.47 MPa / 250 min^{-1} (rpm) 35.4 kgf/cm^2 / 250 min^{-1} (rpm) 504 psi / 250 min^{-1} (rpm)	2.56 MPa / 250 min^{-1} (rpm) 26.1 kgf/cm^2 / 250 min^{-1} (rpm) 371 psi / 250 min^{-1} (rpm)
Variance Among Cylinders		–	10 % or less
Valve Seat	Angle (Intake)	1.0 rad 60°	–
	Angle (Exhaust)	0.79 rad 45°	–
	Width (Intake)	1.6 to 2.0 mm 0.063 to 0.078 in.	–
	Width (Exhaust)	2.3 to 2.6 mm 0.091 to 0.10 in.	–
Valve Face	Angle (Intake)	1.0 rad 60°	–
	Angle (Exhaust)	0.79 rad 45°	–
Valve Recessing	Intake	0.60 to 0.80 mm 0.024 to 0.031 in.	1.2 mm 0.047 in.
	Exhaust	0.850 to 1.05 mm 0.0335 to 0.0413 in.	1.2 mm 0.047 in.

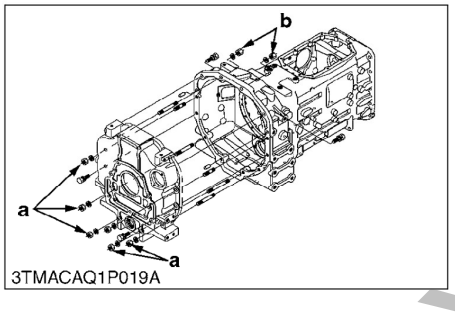
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Separating Engine from Clutch Housing

1. Remove the floor mat (1) and inspection plate (2).
2. Lift the engine by hoist and chain.
3. Remove the engine mounting screws and nuts, and separate the engine from the clutch housing.

(When reassembling)

- Apply molybdenum disulphide (Three Bond 1901 or equivalent) to the splines of clutch disc boss.
- Apply liquid gasket (Three Bond 1141, 1211 or equivalent) to joint face of the engine and clutch housing.

Tightening torque	Engine and clutch housing mounting screw, nut (standard type)	124 to 147 N·m 12.6 to 15.0 kgf·m 91.2 to 108 lbf·ft
	Engine and clutch housing mounting nut (wide type)	167 to 196 N·m 17.0 to 20.0 kgf·m 123 to 144 lbf·ft
	Engine and clutch housing mounting stud bolt	39 to 45 N·m 3.9 to 4.6 kgf·m 29 to 33 lbf·ft

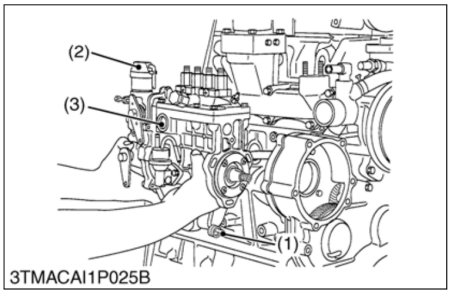
(1) Floor Mat
(2) Inspection Plate

a: Standard Type Nut (7T)
b: Wide Type Nut (9T)

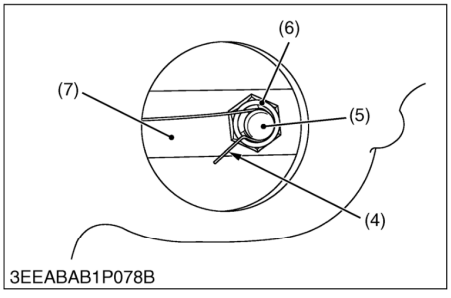
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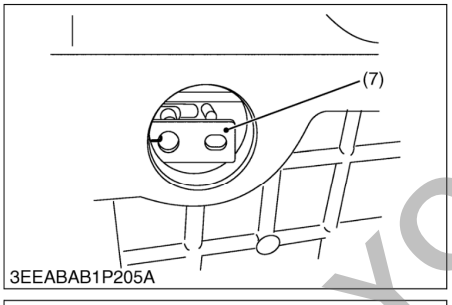
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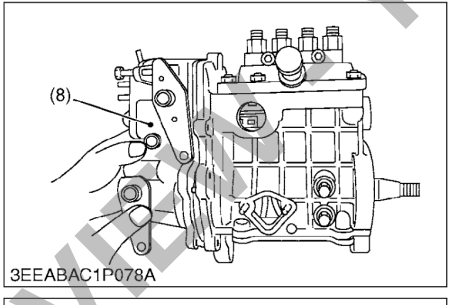
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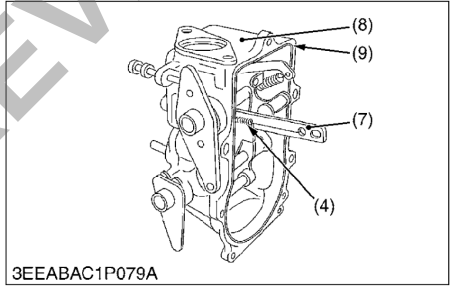
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Governor Housing Assembly

1. Remove the injection pump unit from the engine. (See the “Injection Pump Unit”.)
2. Remove the governor lubricating pipe (1).
3. Remove the stop solenoid (2).
4. Remove the sight cover (3) from the injection pump unit.
5. Unhook the start spring (4) from the rack pin (5) of injection pump assembly.
6. Remove the nut (6).

■ **NOTE**

- **Be careful not to drop the nut inside.**

7. Slide off the governor connecting rod (7) from the rack pin of injection pump assembly.
8. For convenient sake, temporarily hook the start spring on the rack pin hole of the governor connecting rod.
9. Remove the governor housing mounting screws.
10. Remove the governor housing assembly (8) from the injection pump unit.

(When reassembling)

- When reassembling the inside parts, put the oil on each inside part slightly.
- After sliding on the governor connecting rod to the rack pin, tighten the nut with the specified torque with using the jig for keeping the governor connecting rod horizontal. (See the Replacing Injection Pump Assembly.)
- After tightening the nut, hook the start spring on the rack pin.
- Check the movement of control rack of injection pump assembly by the stop lever.

■ **NOTE**

- **When installing the governor housing assembly to the injection pump unit, be careful not to damage O-ring (9).**
- **When linking the governor connecting rod to the rack pin of injection pump, use the jig for keeping the governor connecting rod horizontal. Otherwise the control rack may be stuck, and causes to be difficult to start the engine or hunting of governor. (See the Replacing Injection Pump Assembly).**

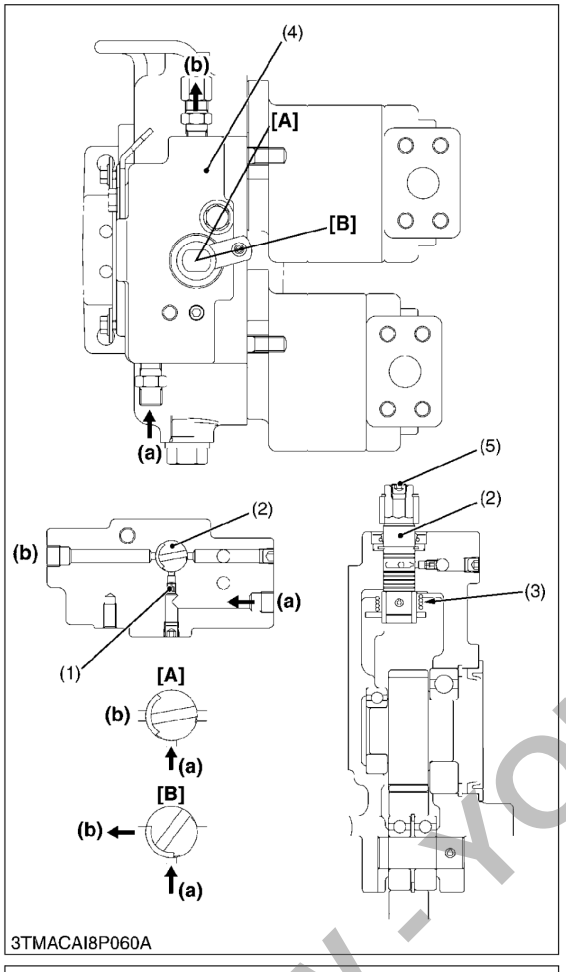
Tightening torque	Governor housing mounting screw	9.81 to 11.2 N·m 1.00 to 1.15 kgf·m 7.24 to 8.31 lbf·ft
	Anti-rotation nut	2.9 to 4.0 N·m 0.29 to 0.41 kgf·m 2.1 to 2.9 lbf·ft

(1) Governor Lubricating Pipe
(2) Stop Solenoid
(3) Sight Cover
(4) Start Spring
(5) Rack Pin
(6) Anti-rotation Nut
(7) Governor Connecting Rod
(8) Governor Housing Assembly
(9) O-ring

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[2] OPERATION



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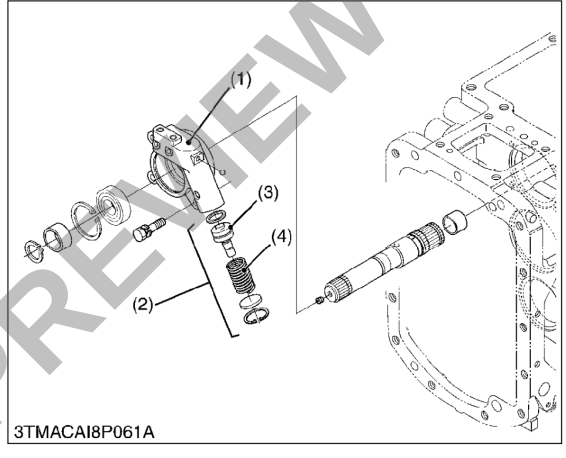
■ **PTO Valve**

This valve change the oil flow to PTO clutch. This is rotated by the PTO operation lever via to PTO clutch cable. The oil from the regulator valve passes through orifice (1) and flow to the PTO clutch.

(1) Orifice
(2) Rotary Valve
(3) Return Spring
(4) Pump Base
(5) Check Port Plug

[A] PTO Clutch "Disengaged"
[B] PTO Clutch "Engaged"
(a) From Regulator Valve
(b) To PTO Clutch

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■ **Accumulator (Modulating Valve)**

The accumulator (2) is built into the PTO clutch support (1).

When PTO clutch shift lever is set at the "Engaged" position, oil flows through the rotary valve into the accumulator and the clutch pack.

The accumulating action absorbs shock according to the spring tension and the size of piston at the engaging the PTO clutch.

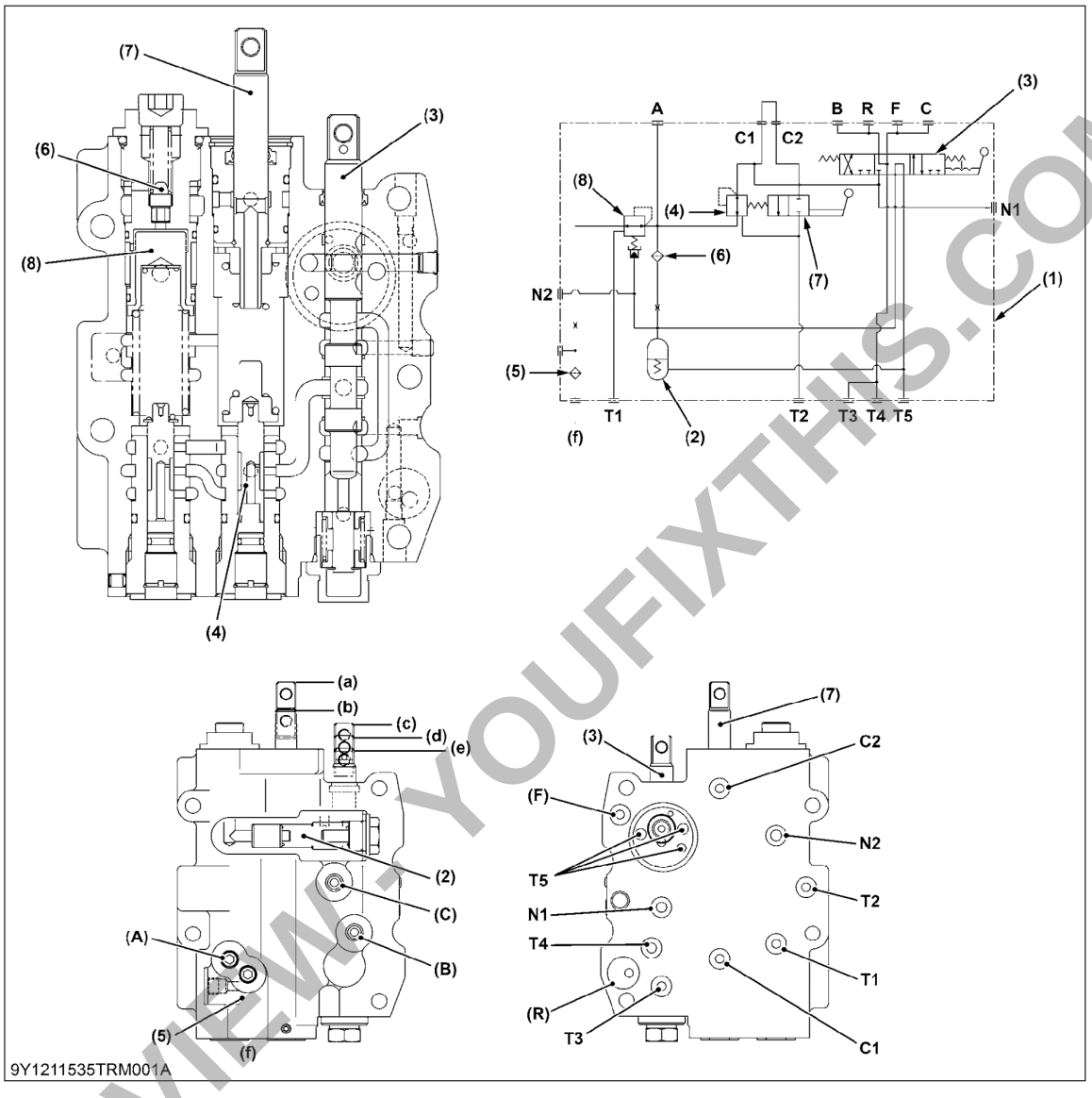
(1) PTO Clutch Support
(2) Accumulator
(3) Piston
(4) Spring

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New valve



(1) Shuttle Valve
(2) Accumulator
(3) Shuttle Shift Spool (Forward, Reverse)
(4) Proportionally Reducing Valve
(5) Line Filter
(6) Filter
(7) Inching Valve Spool
(8) Modulating Valve

(a) Clutch Pedal Released Position
(b) Clutch Pedal Depressed Position
(c) Shuttle Forward Position
(d) Shuttle Neutral Position
(e) Shuttle Reverse Position
(f) Oil from Regulator Valve

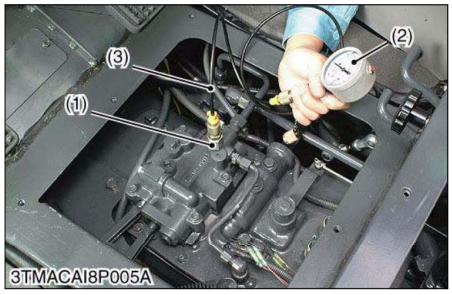
A: Pressure Check Port (Modulation)
B: Pressure Check Port (Reverse)
C: Pressure Check Port (Forward)
F: To Clutch Body (Forward)
R: To Clutch Body (Reverse)

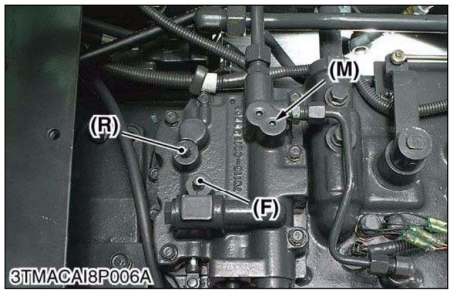
C1: Connection port
C2: Connection port
N1: Port N1
N2: Port N2
T1: Tank Port
T2: Tank Port
T3: Tank Port
T4: Tank Port
T5: Tank Port

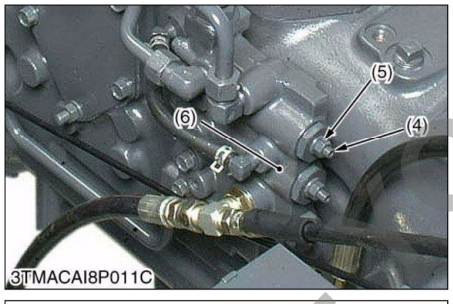
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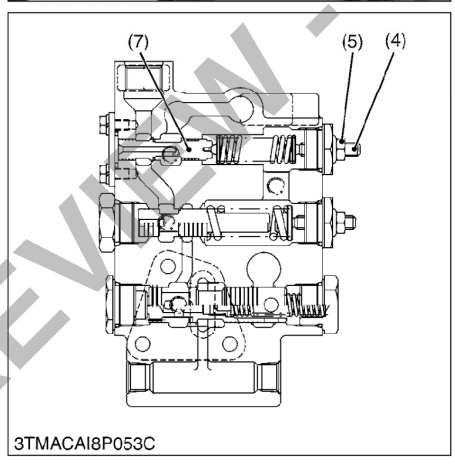
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[4] HYDRAULIC SHUTTLE OPERATING PRESSURE









Checking of System Pressure

1. Remove the floor mat and inspection plate under the mat.
2. Remove the each plugs of **F**, **R**, **M** and set the adaptor **D** (1), threaded joint (4), cable (3), and pressure gauge (Code No.: 07916-52961) (2).
3. Start the engine and measure the pressure of each port and each shuttle lever position as the pressure table.
4. Operating oil is distributed from regulator valve to shuttle clutch (**M** port pressure), PTO clutch, swing shift and dual speed. Therefore, all the operating pressure are set with regulator valve in the same pressure.
5. If the **M** port measurement is not within the factory specifications, loosen the lock nut (5) and turn the screw (4) on the regulator valve (6) to adjust.

Condition

- Engine speed..... Maximum
- Oil temperature... 45 to 55 °C (113 to 131 °F)

Shuttle Lever	Clutch Pedal	**F** Port pressure	**R** port pressure	**M** port pressure
Forward	Fully pressed	0	0	1.97 to 2.10 MPa 20.0 to 21.5 kgf/cm^2 285 to 305 psi
	Free	1.67 to 1.86 MPa 17.0 to 19.0 kgf/cm^2 242 to 270 psi	0	
Reverse	Fully pressed	0	0	
	Free	0	1.67 to 1.86 MPa 17.0 to 19.0 kgf/cm^2 242 to 270 psi	
Neutral	Free	0	0	0.27 to 0.28 MPa 2.7 to 2.9 kgf/cm^2 39 to 41 psi

■ **NOTE**

- **Use valve adaptor (refer to "8. SPECIAL TOOLS" at "G. GENERAL" section) to inspect the port F and R.**
- **Pressure gauge is 4.9 MPa (50 kgf/cm^2, 710 psi) full scale.**
- **Apply Three Bond 1324N or equivalent to the plugs F, R and M, when install them.**
- **The supply oil to a shuttle clutch, a PTO clutch, a swing shift and dual speed clutch has distributed the oil from regulator valve. Check each system, when fault occurs using same time with other systems.**

(1) Adaptor **D**
(2) Pressure Gauge
(3) Cable
(4) Adjusting Screw
(5) Lock Nut
(6) Regulator Valve Assembly
(7) Spool (Pressure Reducing Valve)

Plug F: Operation Oil Pressure (For Forward)
Plug R: Operation Oil Pressure (For Reverse)
Plug M: Operation Oil Pressure (For Modulation Valve)

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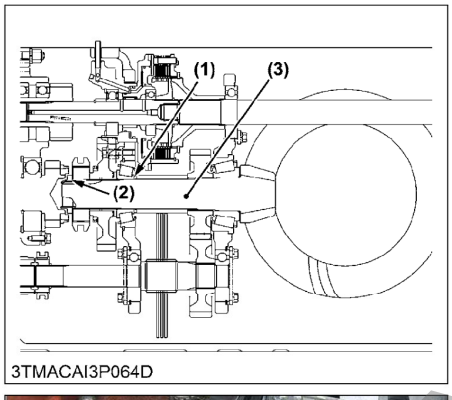
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[5] DIFFERENTIAL GEAR

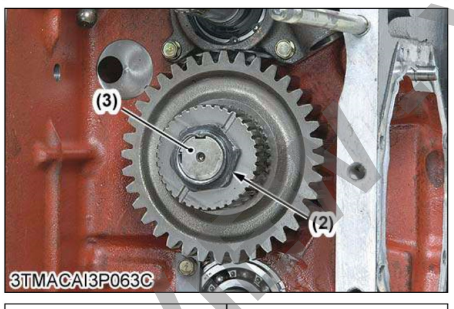
■ **IMPORTANT**

- **When reassembling spiral bevel pinion shaft and differential assembly, be sure to adjust the following.**
- **Turning torque of spiral bevel pinion shaft only.**
- **Turning torque of spiral bevel pinion shaft and differential assembly combined.**
- **Backlash and tooth contact between spiral bevel pinion shaft and spiral bevel gear.**

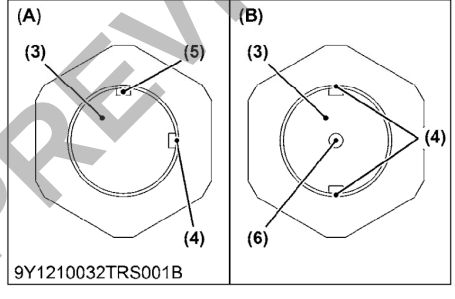

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3TMACAI3P063C



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Turning Torque of Spiral Bevel Pinion Shaft Only

1. Reassemble the spiral bevel pinion shaft and tighten the staking nut (2) with locking wrench and turning wrench.
2. After striking the bevel pinion shaft to the front and rear, retighten the staking nut (2) to specified torque.
3. Measure the turning torque of spiral bevel pinion shaft.
4. If the measurement is not within the factory specifications, adjust the tightening torque of staking nut (2).

Turning torque of spiral bevel pinion shaft only	Factory specification	1.5 to 2.0 N·m 0.15 to 0.20 kgf·m 1.1 to 1.4 lbf·ft

(When reassembling)

Tightening torque	Staking nut	275 to 343 N·m 28 to 35 kgf·m 203 to 253 lbf·ft

(Reference)

- Thickness of adjusting collar (1)
  1.0 mm (0.0394 in.) [Code No. 33251-32450]
  1.5 mm (0.0591 in.) [Code No. 33251-32460]
  1.7 mm (0.0669 in.) [Code No. 33251-32470]
  1.75 mm (0.0689 in.) [Code No. 33251-32480]
  1.8 mm (0.0709 in.) [Code No. 33251-32490]
  1.9 mm (0.0748 in.) [Code No. 33251-32510]
  2.0 mm (0.0787 in.) [Code No. 33251-32520]
  2.1 mm (0.0827 in.) [Code No. 33251-32530]
  2.2 mm (0.0866 in.) [Code No. 33251-32540]
  2.25 mm (0.0886 in.) [Code No. 33251-32550]
  2.3 mm (0.0906 in.) [Code No. 33251-32560]

■ **NOTE**

- **Stake the staking nut after performing adjustment described in the following pages.**
- **For the old type spiral bevel pinion shaft has two grooves, and staking groove is right side groove seen from front.**
- **For the new type spiral bevel pinion shaft, either of the two grooves is used for staking.**

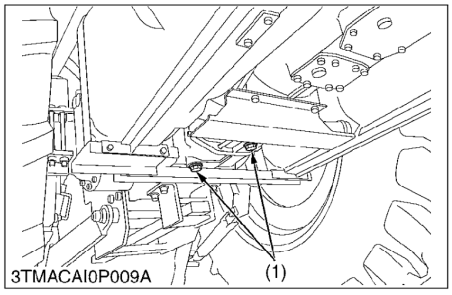
(1) Collar 1
(2) Staking Nut
(3) Bevel Gear Shaft
(4) Staking Groove
(5) Lubrication Groove
(6) Hole for Lubrication

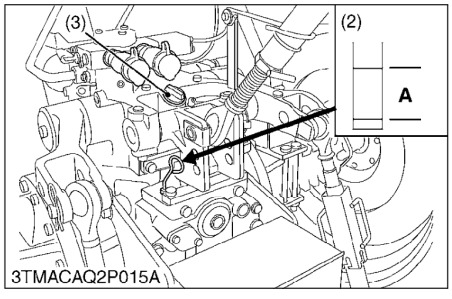
(A) Old type pinion shaft
(B) New type pinion shaft

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(3) Removing Brake Case (ROPS Model)





Draining Transmission Fluid

1. Place oil pan underneath the transmission case.
2. Remove the drain plugs (1).
3. Drain the transmission fluid.
4. Reinstall the drain plugs (1).

(When reassembling)

- Fill up from filling port (3) after removing the filling plug up to the upper notch on the dipstick (2).
- After running the engine for few minutes, stop it and check the fluid level again, add the fluid to prescribed level if it is not correct level.

Capacity	Transmission fluid	60.0 L 63.4 U.S.qts. 52.7 Imp.qts.

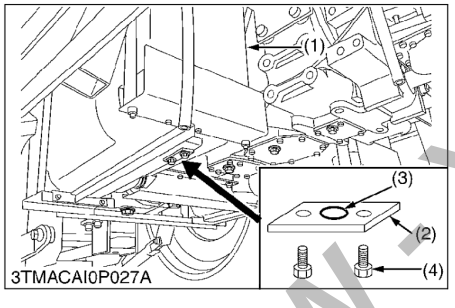
■ **IMPORTANT**

- **Use only KUBOTA SUPER UDT fluid. Use of other oil may damage the transmission or hydraulic system.**
- **Refer to "4. LUBRICANTS, FUEL AND COOLANT" at "G. GENERAL" section.**
- **Do not mixed different brands fluid together.**

(1) Drain Plug
(2) Dipstick
(3) Filling Port

A: Oil level is acceptable with this range.

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Draining Fuel

(When remove the brake case LH)

1. Place an oil pan under the right side fuel tank (1).
2. Remove the drain cover (2).
3. Drain the fuel.

(When reassembling)

- Be sure to fix the O-ring (3) on the drain cover (2).
- Bleed the fuel system.

■ **IMPORTANT**

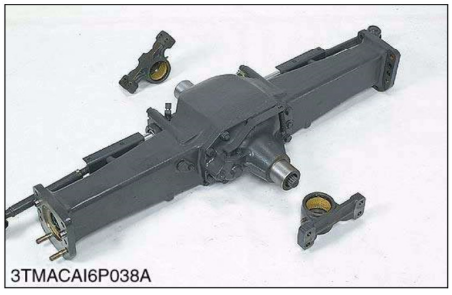
- **The fuel tank is made of plastic. Be careful not to over tighten the screws.**

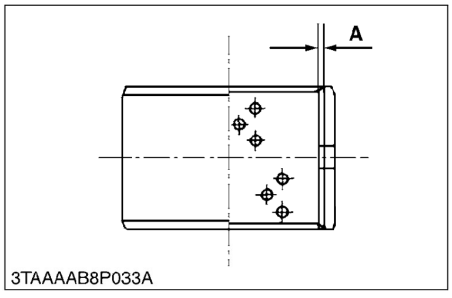
(1) Fuel Tank
(2) Drain Cover
(3) O-ring
(4) Screw

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Front Bracket and Rear Bracket Bushing

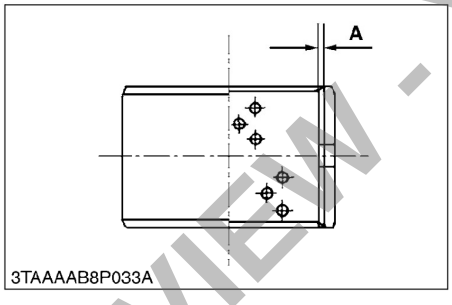
1. Visually inspect the DX bushing for signs of wear or damage. (The DX bushing tends to show concentrated wear.)
2. If the DX bushing is worn beyond the alloy portion (**A**), replace it.

Front bracket and rear bracket bushing	Alloy thickness (**A**)	0.57 mm 0.022 in.

Pinion bearing case O.D.	Factory specification	64.970 to 65.000 mm 2.5579 to 2.5590 in.
Front differential case boss O.D.	Factory specification	64.970 to 65.000 mm 2.5579 to 2.5590 in.

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Bearing Retainer and Front Wheel Case Support Bushing

1. Visually inspect the DX bushing for signs of wear or damage. (The DX bushing tends to show concentrated wear.)
2. If the DX bushing is worn beyond the alloy portion (**A**), replace it.

Front wheel case support bushing	Alloy thickness (**A**)	0.57 mm 0.022 in.

Bearing retainer O.D.	Factory specification	64.970 to 65.000 mm 2.5579 to 2.5590 in.

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3. TIGHTENING TORQUES

Tightening torques of screws, bolts and nuts on the table below are especially specified.
(For general use screws, bolts and nuts: Refer to “5. TIGHTENING TORQUES” at “G.GENERAL” section.)

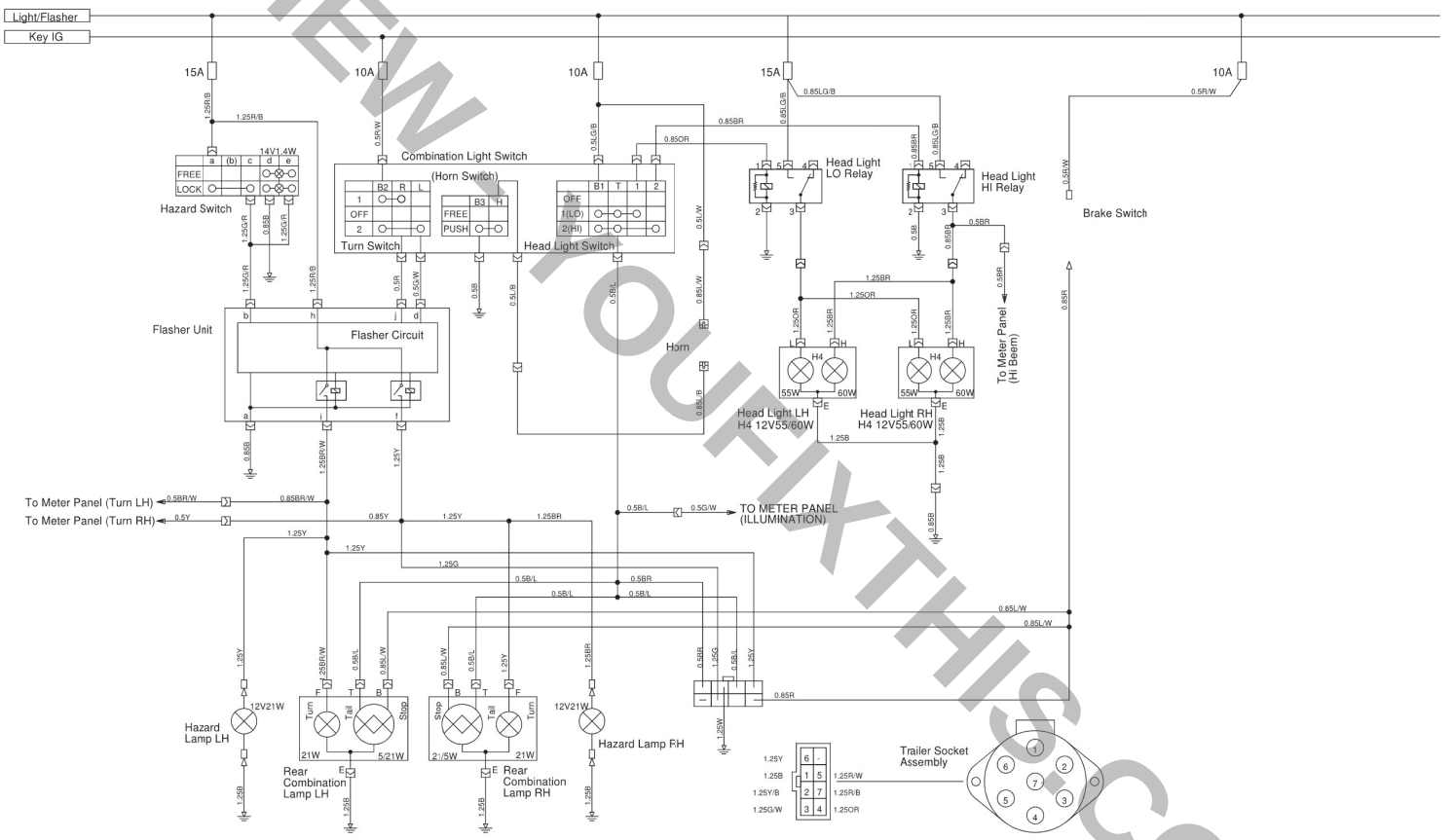
Item	N·m	kgf·m	lbf·ft
Cylinder safety valve assembly	40 to 49	4.0 to 5.0	29 to 36
Cylinder safety valve lock nut	59 to 78	6.0 to 8.0	44 to 57
Delivery pipe 1 and 2 retaining nut	108 to 117	11.0 to 12.0	79.6 to 86.7
Pump base mounting nut	78 to 90	7.9 to 9.2	58 to 66
Hydraulic pump mounting screw	78 to 90	7.9 to 9.2	58 to 66
Housing cover mounting screw	89 to 93	9.0 to 9.5	65 to 68
Relief valve for three point hydraulic system	35 to 39	3.5 to 4.0	26 to 28
Hydraulic cylinder assembly mounting screw and nut	78 to 90	7.9 to 9.2	58 to 66
Control valve mounting screw	20 to 23	2.0 to 2.4	15 to 17
Seat plug 1	40 to 58	4.0 to 6.0	29 to 43
Seat plug 2	40 to 58	4.0 to 6.0	29 to 43
Seat plug for poppet valve	40 to 58	4.0 to 6.0	29 to 43
Lock nut for spool	16 to 19	1.6 to 2.0	12 to 14
Seat plug for check valve	30 to 49	3.0 to 5.0	22 to 36
Bracket guide mounting screw	24 to 27	2.4 to 2.8	18 to 20
Hydraulic arm setting screw	40 to 45	4.0 to 4.6	29 to 33
Lift lever mounting screw	40 to 45	4.0 to 4.6	29 to 33
Cylinder cover mounting screw	197 to 225	20.0 to 23.0	145 to 166
Lift arm mounting screw	124 to 147	12.6 to 15.0	91.2 to 108

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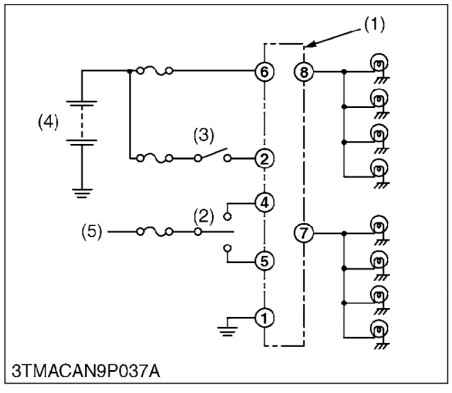
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[6] LIGHTING SYSTEM (ROPS MODEL)



3TMACAV9P030A

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Functional Check

1. Turn on the turn signal switch (2) or hazard switch (3).
2. Count the number of blinking.
3. If the factory specification is not indicated, replace the flusher unit.

Times of blinking light	Factory specification	60 to 80 times / minutes

(1) Flasher Unit
(2) Turn Signal Switch
(3) Hazard Switch
(4) Battery
(5) ACC

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(5) Front Work Light Switch (ROPS Model)



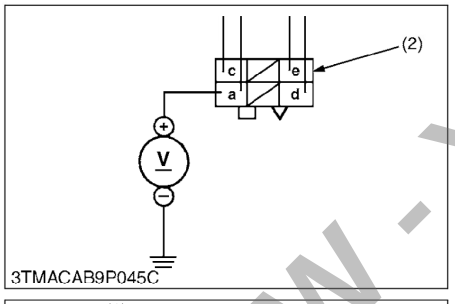
Checking Connector Voltage

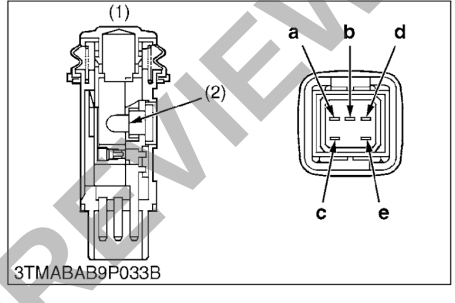
1. Turn the main switch to **ON** position.
2. Measure the voltage with a voltmeter across the terminal a and chassis.
3. If the voltage differ from the battery voltage, the wiring harness or fuse is faulty.

Voltage	Terminal **a** – Chassis	Approx. battery voltage

(1) Hazard Switch
(2) **6P** Connector (Wire Harness Side)

W1035385





Checking Hazard Switch Continuity

1. Measure the resistance with ohmmeter across the terminal **a** and terminal **c**, and across the terminal **d** and terminal **e**.
2. If the measurement is not following below, the switch or the bulb are faulty.

Resistance (Switch at **OFF**)	Terminal **a** – Terminal **c**	Infinity
Resistance (Switch at **ON**)	Terminal **a** – Terminal **c**	0 Ω
Resistance (Bulb)	Terminal **d** – Terminal **e**	Approx. 13 Ω

(1) Front Work Light Switch
(2) Bulb

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4. PRECAUTIONS AT REPAIRING REFRIGERANT CYCLE

When checking or repairing the air conditioning system, the following precautions and rules must be observed. And it is of first importance that no other personnel than a well-trained serviceman should be allow to handle the refrigerant.

⚠ CAUTION

- **Since direct contact of the liquid refrigerant with your skin will cause frostbite, always be careful when handling the refrigerant. Always wear goggles to protect your eyes when working around the system.**
- **The refrigerant service container has a safe strength. However, if handled incorrectly, it will explode. Therefore, always follow the instructions on the label. In particular, never heat the refrigerant container above 40 °C (104 °F) or drop it from a high height.**
- **Do not steam clean on the system, especially condenser since excessively high pressure will build up in the system, resulting in explosion of the system.**
- **If you improperly connect the hose between the service valve of compressor and gauge manifold, or incorrectly handle the valves, the refrigerant service container or charging hose will explode. When connecting the hose or handling the valve, be sure to check the high pressure side or low pressure side.**
- **In case the refrigerant is charged while the compressor is operated, do not open the high pressure valve of the gauge manifold.**
- **Beware of the toxicity of the gas. The gas is harmless and nontoxic in its original state, however it produces a toxic substance when it comes in contact with high temperature parts and decomposes.**
- **Do not heat the service can unless necessary. When it has to be heated, use warm water of 40 °C (104 °F) or lower. Do not heat using boiling water.**

■ IMPORTANT

- **If the refrigerant, O-rings, etc. for R12 are used in the R134a air conditioner system, problems such as refrigerant leakage or cloudiness in the sight glass may occur. Therefore, in order to prevent charging of refrigerant or erroneous connections, the shapes of the piping joint as well as the shapes of the service valve and the service tools have been changed.**
- **Always keep the working place clean and dry and free from dirt and dust. Wipe off water from the line fittings with a clean cloth before disconnecting.**
- **Use only for R134a refrigerant service tool.**
- **Use for R134a refrigerant recovery and recycling machine when discharging the refrigerant.**
- **Before attaching the charging hose to the can tap valve of the refrigerant container, check each packing for clogging.**
- **When disconnecting the charging hose from the charging valve of compressor and receiver, remove it as quick as possible so that gas leakage can be minimized.**
- **Be sure to charge the specified amount of refrigerant, but not excessively. Over-charging of the refrigerant in particular may cause insufficient cooling, etc.**
- **Since the charging hose can be connected to can tap valve by hand, do not use a pliers for tightening it.**
- **Keep refrigerant containers in a cool and dark place avoiding such place which are subject to strong sunlight or high temperature.**
- **R134a compressor oil absorbs moisture easily, so that be sure to seal after disconnecting the each parts.**
- **Do not use old-type refrigerant R12a or compressor oil for old-type refrigerant.**
- **When replacing the condenser, evaporator and receiver, etc., fill the compressor oil to compressor according to the table below.**

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