GENERAL

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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.

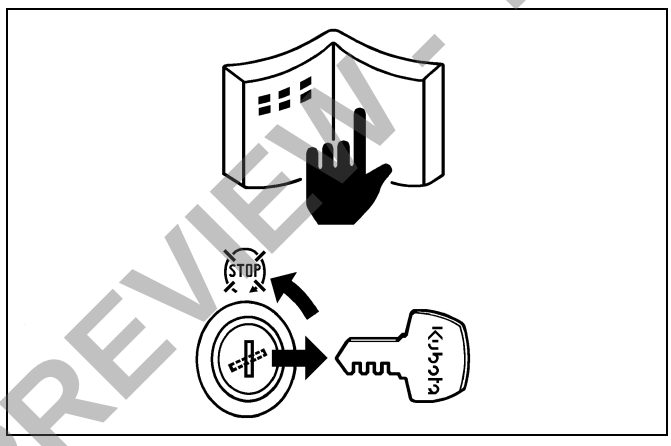
DANGER : Indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.

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

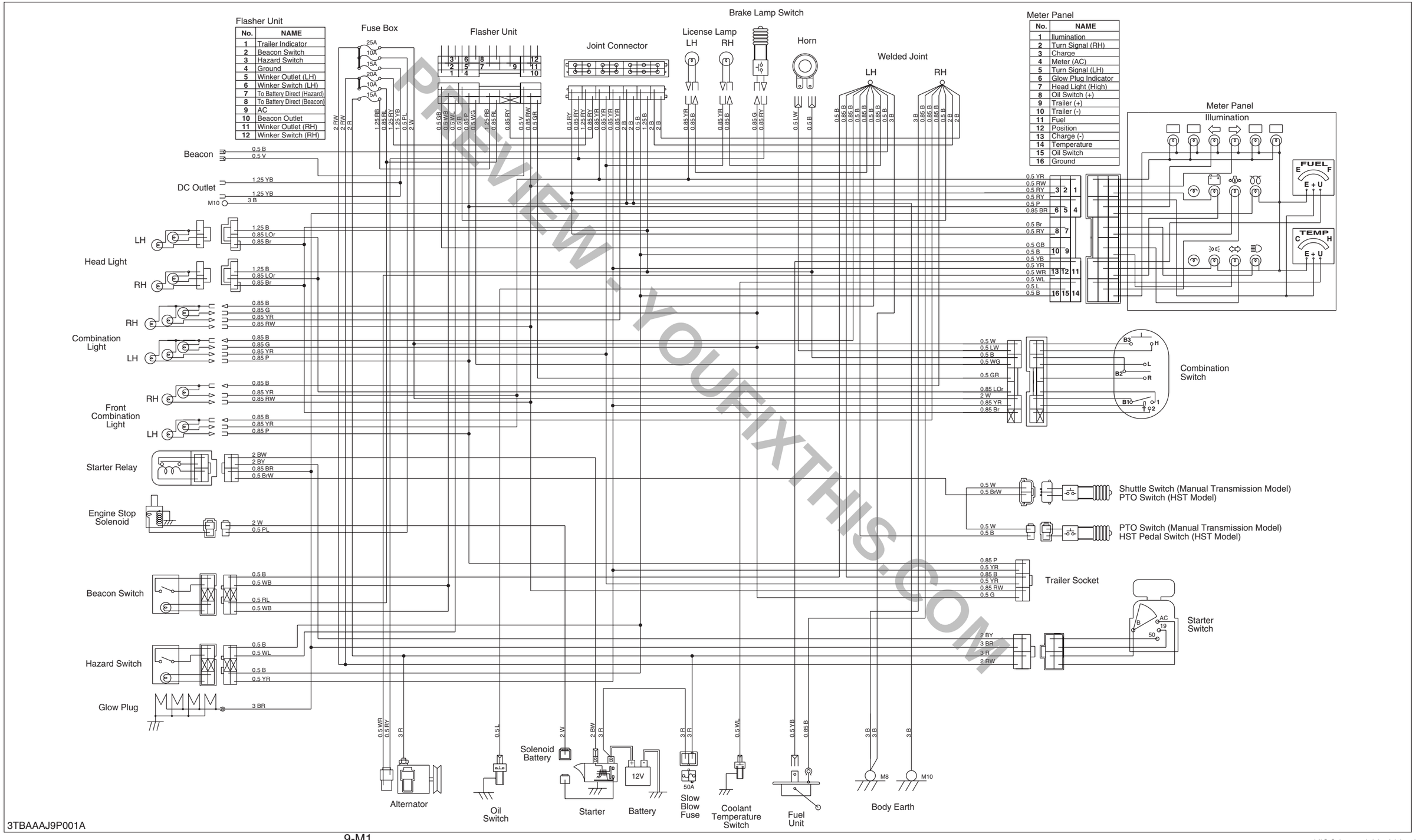
- Read all instructions and safety instructions in this manual and on your machine safety decals.
- Clean the work area and machine.
- Park the machine on a firm and level ground, and set the parking brake.
- Lower the implement to the ground.
- Stop the engine, and remove the key.
- Disconnect the battery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

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1. WIRING DIAGRAM

[1] ROPS

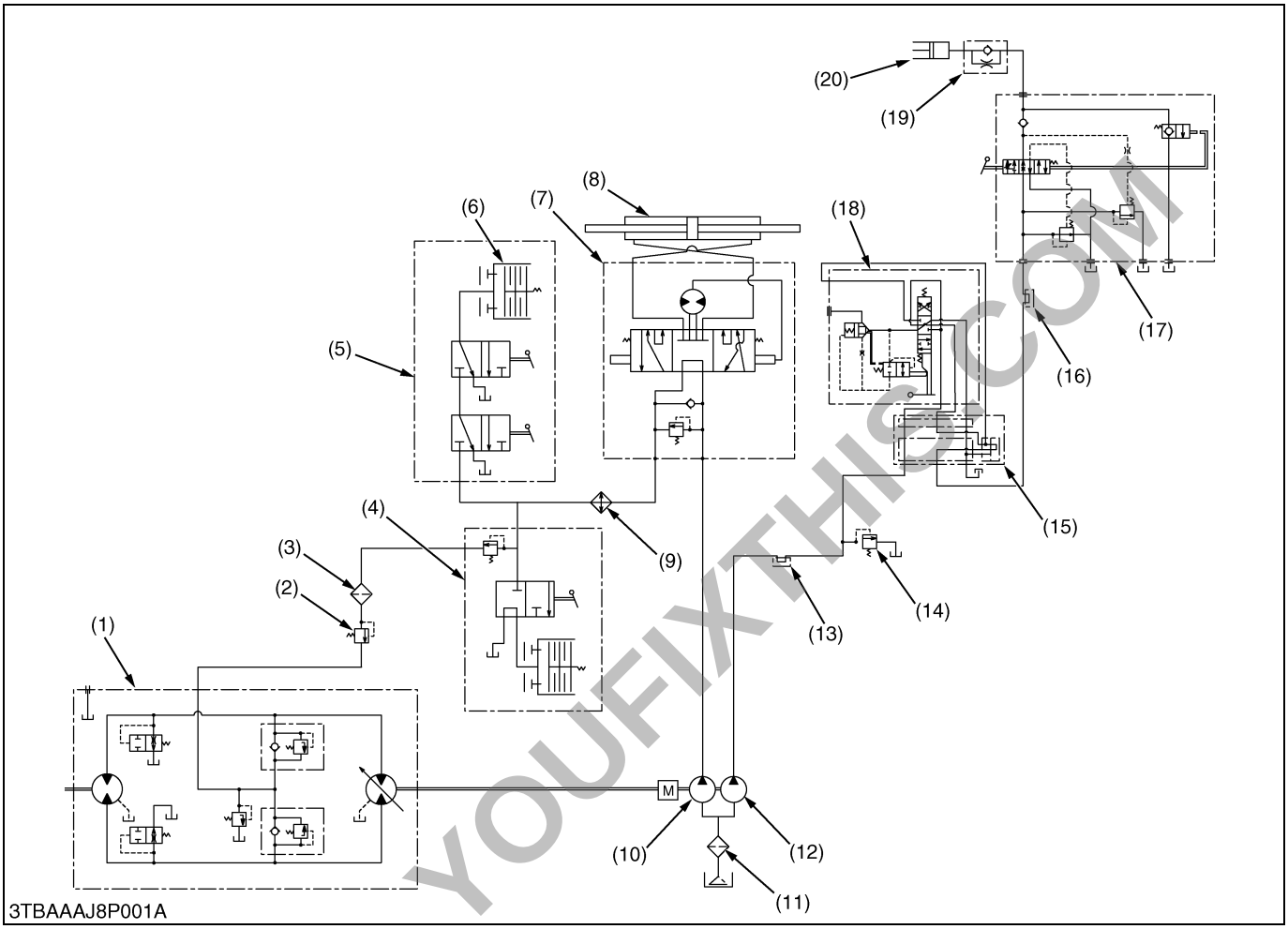


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1. HYDRAULIC CIRCUIT



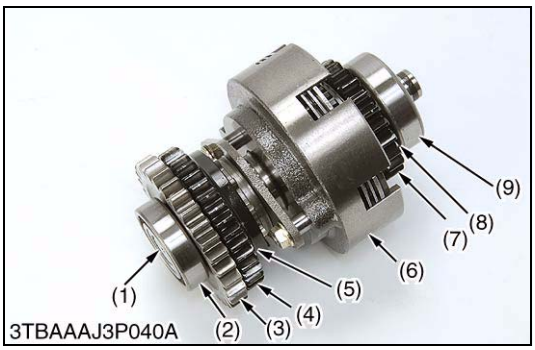
(1) Hydrostatic Transmission (HST)
(2) Relief Valve
(3) Oil Filter Cartridge
(4) Independent PTO Control Valve
(5) Bi-Speed Turn Valve and Clutch
(6) Bi-Speed Turn Clutch
(7) Power Steering Controller
(8) Power Steering Cylinder
(9) Oil Cooler
(10) Hydraulic Pump (for Power Steering, Bi-Speed Turn, Independent PTO and HST)
(11) Oil Filter
(12) Hydraulic Pump
(13) Hydraulic Block
(14) Relief Valve
(15) Rear Outlet
(16) Hydraulic Block
(17) Control Valve
(18) Remote Control Valve
(19) Lowering Speed Adjusting Valve
(20) Hydraulic Cylinder

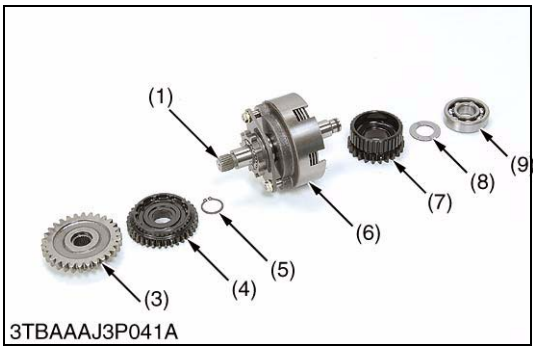
The hydraulic system are composed of hydraulic pumps (10) (12), power steering, independent PTO, HST (1), and 3-points hitch and other components.

1. Hydraulic power take off from the hydraulic block type outlet to operate the implements such as a front loader, front blade, rear blade and etc..
2. Hydraulic oil operates power steering, independent PTO clutch, HST and 3-point hitch.

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Disassembling Bi-Speed Turn Clutch Assembly 1

1. Remove the bearings (2).
2. Remove the 30T gear (3), the 35T gear (4) and the cir-clip (5).
3. Remove the bearing 9).
4. Remove the thrust collar (8) and the 23T gear (7).

(When assembling)

- Check the seal ring for damage.

(1) Bi-Speed Turn Clutch Shaft (Front Wheel Drive Shaft 2)
(2) Bearing
(3) 30T Gear
(4) 35T Gear
(5) Cir-clip
(6) Bi-Speed Turn Clutch Case
(7) 23T Gear
(8) Thrust Collar
(9) Bearing

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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.)	7.85 to 9.31	0.80 to 0.95	5.79 to 6.87	7.85 to 8.82	0.80 to 0.90	5.79 to 6.50	9.81 to 11.2	1.00 to 1.15	7.24 to 8.31	7.85 to 8.82	0.80 to 0.90	5.79 to 6.50	12.3 to 14.2	1.25 to 1.45	9.05 to 10.4
M8 (8 mm, 0.31 in.)	17.7 to 20.5	1.8 to 2.1	13.1 to 15.1	16.7 to 19.6	1.7 to 2.0	12.3 to 14.4	23.6 to 27.4	2.4 to 2.8	17.4 to 20.2	17.7 to 20.5	1.8 to 2.1	13.1 to 15.1	29.5 to 34.3	3.0 to 3.5	21.7 to 25.3
M10 (10 mm, 0.39 in.)	39.3 to 45.1	4.0 to 4.6	29.0 to 33.2	31.4 to 34.3	3.2 to 3.5	23.2 to 25.3	48.1 to 55.8	4.9 to 5.7	35.5 to 41.2	39.3 to 44.1	4.0 to 4.5	29.0 to 32.5	60.9 to 70.6	6.2 to 7.2	44.9 to 52.0
M12 (12 mm, 0.47 in.)	62.8 to 72.5	6.4 to 7.4	46.3 to 53.5	–	–	–	77.5 to 90.2	7.9 to 9.2	57.2 to 66.5	62.8 to 72.5	6.4 to 7.4	46.3 to 53.5	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

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[2] STUD BOLTS

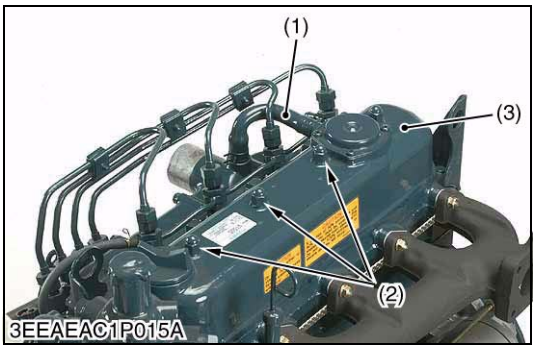
Material of opponent part	Ordinariness			Aluminum		
Unit / Diameter	N·m	kgf·m	lbf·ft	N·m	kgf·m	lbf·ft
M8 (8 mm, 0.31 in.)	11.8 to 15.6	1.2 to 1.6	8.68 to 11.5	8.82 to 11.8	0.90 to 1.2	6.51 to 8.67
M10 (10 mm, 0.39 in.)	24.6 to 31.3	2.5 to 3.2	18.1 to 23.1	19.7 to 25.4	2.0 to 2.6	14.5 to 18.8
M12 (12 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

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(2) Cylinder Head and Valve and Oil Pan



Cylinder Head Cover

1. Disconnect the breather hose (1).
2. Remove the head cover nut (2).
3. Remove the cylinder head cover (3).

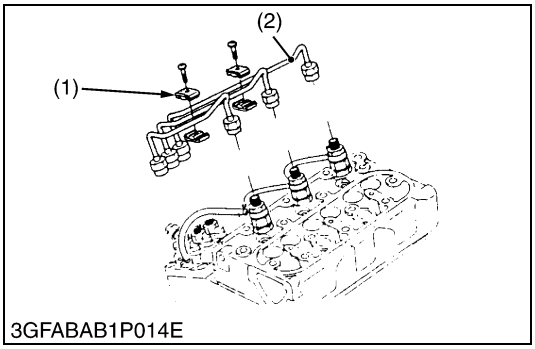
(When reassembling)

- Check to see if the cylinder head cover gasket is not defective.

Tightening torque	Cylinder head cover nut	6.9 to 8.8 N·m 0.70 to 0.90 kgf·m 5.1 to 6.5 lbf·ft

(1) Breather Hose
(2) Head Cover Screws
(3) Cylinder Head Cover

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Injection Pipes

1. Loosen the screws on the pipe clamp (1).
2. Detach the injection pipes (2).

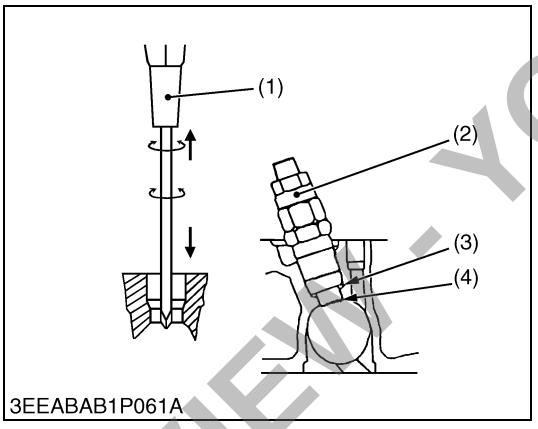
(When reassembling)

- Sent compressed air into the pipes to blow out dust. Then, reassemble the pipes in the reverse order.

Tightening torque	Injection pipe retaining nut	24.5 to 34.3 N·m 2.5 to 3.5 kgf·m 18.1 to 25.3 lbf·ft

(1) Pipe Clamp
(2) Injection Pipe

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Nozzle Heat Seal Service Removal Procedure

■ **IMPORTANT**

- **Use a plus (phillips head) screw driver that has a Dia. which is bigger than the heat seal hole (Approx. 6 mm (1/4 in.)).**

1. Drive screw driver lightly into the heat seal hole.
2. Turn screw driver three or four times each way.
3. While turning the screw driver, slowly pull the heat seal out together with the injection nozzle gasket.

If the heat seal drops, repeat the above procedure. Heat seal and injection nozzle gasket must be changed when the injection nozzle is removed for cleaning or for service

(1) Plus Screw Driver
(2) Injection Nozzle
(3) Injection Nozzle Packin
(4) Heat Seal

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1. TROUBLESHOOTING

Symptom	Probable Cause	Solution	Reference Page
Engine Does Not Start	No fuel	Replenish fuel	G-7
	Air in the fuel system	Bleed	G-40
	Water in the fuel system	Change fuel and repair or replace fuel system	–
	Fuel hose clogged	Clean	G-24, 36
	Fuel filter clogged	Change	G-30
	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	–
	Incorrect injection timing	Adjust	1-S16
	Injection nozzle clogged	Repair or replace	1-S17, S18
	Injection pump malfunctioning	Replace	1-S44
	Seizure of crankshaft, camshaft, piston, cylinder or bearing	Repair	1-S45 to S50
	Compression leak from cylinder	Replace head gasket, tighten cylinder head screw, glow plug and nozzle holder	1-S41 to S42
	Improper valve timing	Correct or replace timing gear	1-S45
	Piston ring and cylinder worn	Replace	1-S48, S66
	Excessive valve clearance	Adjust	1-S12, S13
	ST terminal lead not connected	Connect	1-S37
	Stop solenoid lead not connected	Connect	1-S37
Engine Revolution Is Not Smooth	Fuel filter clogged or dirty	Replace	G-30
	Air cleaner clogged	Clean or replace	G-21
	Fuel leak due to loosing injection pipe retaining nut	Tighten retaining nut	1-S39
	Injection pump malfunctioning	Replace	1-S44
	Incorrect nozzle injection pressure	Adjust	1-S18
	Injection nozzle stuck or clogged	Repair or replace	1-S18
	Governor malfunctioning	Repair	–
Either White or Blue Exhaust Gas Is Observed	Excessive engine oil	Reduce to specified level	G-13
	Piston ring and cylinder worn or stuck	Repair or replace	1-S48, S66
	Incorrect injection timing	Adjust	1-S16
	Deficient compression	Repair	1-S11, S61, S66

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SPECIFICATIONS

[HST Model]

Model			B2230	B2530	B3030
PTO power			12.5 kW (17.0 PS)*	14.0 kW (19.0 PS)*	16.9 kW (23.0 PS)*
Engine	Maker		KUBOTA		
	Model		D1105-E2-D21-EU	D1105-E2-D21-EU	V1505-E2-D21-EU
	Type		E-TVCS, water-cooled, 4-cycle diesel		
	Number of cylinders		3		4
	Bore and stroke		76 × 73.6 mm (3.0 × 2.9 in.)	78 × 78.4 mm (3.1 × 3.1 in.)	78 × 78.4 mm (3.1 × 3.1 in.)
	Total displacement		1001 cm^3 (61.1 cu.in.)	1123 cm^3 (68.5 cu.in.)	1498 cm^3 (91.4 cu.in.)
	Engine gross power		16.2 kW (22.0 PS)*	18.4 kW (25.0 PS)*	22.1 kW (30.0 PS)*
	Rated revolution		2700 min^{-1} (rpm)		2600 min^{-1} (rpm)
	Maximum torque		62 N·m (6.3 kgf·m, 13.9 lbf·ft)	72 N·m (7.3 kgf·m, 16.2 lbf·ft)	92 N·m (9.4 kgf·m, 20.7 lbf·ft)
	Battery		12 V, RC : 79 min, CCA : 433 A		
	Starting system		Electric starting with cell starter 12 V, 1.4 kW		
	Lubricating system		Forced lubrication by trochoidal pump		
	Cooling system		Pressurized radiator, forced circulation with water pump		
	Fuel		Diesel fuel No. 2-D [above –10 °C (14 °F)], Diesel fuel No. 1 [below –10 °C (14 °F)]		
Capacities	Fuel tank		28 L (7.4 U.S.gals, 6.2 Imp.gals)		31 L (8.1 U.S.gals, 6.8 Imp.gals)
	Engine crankcase (with filter)		3.0 L (3.2 U.S.qts, 2.6 Imp.qts)		4.1 L (4.3 U.S.qts, 3.6 Imp.qts)
	Engine coolant		5.2 L (5.5 U.S.qts, 4.6 Imp.qts)		
	Transmission case		17 L (4.5 U.S.gals, 3.7 Imp.qts)		
	Front axle case		3.7 L (3.9 U.S.qts, 3.3 Imp.qts)		4.7 L (5.0 U.S.qts, 4.1 Imp.qts)
	Tire		Farm		Turf			Farm	Turf
		Front	6 - 12B	6 - 12	6.00- 2	7.00-12	22 x 8.50-12	24 x 8.5-12	7-12	24 x 8.5-12
		Rear	8 - 16	9.5 - 16	9.5 - 18	10.5-18	31 x 13.5-15	315/ 75D-15	12.4-16	13.6-16
Dimensions	Overall length (with 3P)	ROPS	2735 mm (107.7 in.)						2900 mm (114.2 in.)	
		CABIN	2835 mm (111.6 in.)						3010 mm (118.6 in.)	
	Overall width (min. tread)		1105 mm (43.5 in.)			1095 mm (43.1 in.)			1365 mm (53.7 in.)	
	Overall height	ROPS	2260 mm (89.0 in.)			2290 mm (90.2 in.)			2320 mm (91.3 in.)	
		CABIN	2060 mm (81.1 in.)			2090 mm (82.3 in.)			2125 mm (83.7 in.)	
	Wheel base		1500 mm (59.1 in.)						1666 mm (65.6 in.)	
	Minimum ground clearance		240 mm (9.5 in.)			270 mm (10.6 in.)			315 mm (12.4 in.)	
	Tread	Front	835 mm (32.9 in.)						935 mm (36.8 in.)	
		Rear	855 to 1075 mm (33.7 to 42.3 in.)			850 to 1095 mm (33.5 to 43.1 in.)			1050 mm (41.3 in.)	
Weight	ROPS		745 kg (1643 lbs)			750 kg (1654 lbs)			840 kg (1852 lbs)	
	CABIN		955 kg (2106 lbs)			960 kg (2117 lbs)			1035 kg (2282 lbs)	
Travelling system	Clutch		N/A							
	Steering		Hydrostatic power steering							
	Transmission		Main-hydrostatic transmission, 3 range gear shift (3 forward and 3 reverse)							
	Brake		Wet disk type							
	Min. turning radius (with brake)		2.1 m (6.9 feet)							
	Differential		Bevel gear							

NOTE: * Manufacture's estimate
The company reserves the right to change the specifications without notice.

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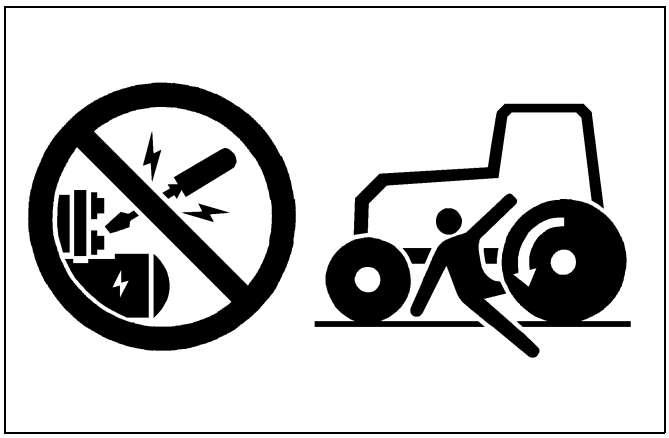
6. MAINTENANCE CHECK LIST

No.	Item \ Period		Service Interval														Interval	Important		Reference page
			Daily	50	100	150	200	250	300	350	400	450	500	550	600	650				
1	Clogging of air conditioner condenser screen ▲	Clean	☆														Daily			G-12
2	Engine oil	Change		★	☆		☆		☆		☆		☆		☆		every 100 Hr			G-13, G-19
3	Engine oil filter	Replace		★			☆				☆				☆		every 200 Hr			G-13, G-26
4	Transmission oil filter	Replace		★					☆						☆		every 300 Hr			G-14, G-30
5	Transmission fluid	Change		★					☆						☆		every 300 Hr			G-15, G-29
6	Front axle case oil	Change							☆						☆		every 300 Hr			G-30
7	Front axle pivot	Adjust									☆						every 400 Hr			G-31
8	Engine start system	Check		☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	every 50 Hr			G-17
9	Greasing	–		☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	every 50 Hr			G-18
10	Wheel bolt torque	Check		☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	every 50 Hr			G-18
11	Battery condition	Check			☆		☆		☆		☆		☆		☆		every 100 Hr	*4		G-20
12	Air cleaner element [Double element type] Primary element	Clean			☆		☆		☆		☆		☆		☆		every 100 Hr	*1	@	G-22
		Replace															every 1 year	*2		G-35
	Air cleaner element [Double element type] Secondary element	Replace															every 1 year			G-35
13	Fuel filter element	Check			☆		☆		☆		☆		☆		☆		every 100 Hr		@	G-23
		Replace									☆						every 400 Hr			G-31
14	Fan belt	Adjust			☆		☆		☆		☆		☆		☆		every 100 Hr			G-23
15	Clutch	Adjust		★	☆		☆		☆		☆		☆		☆		every 100 Hr			G-16 G-19
16	Brake	Adjust			☆		☆		☆		☆		☆		☆		every 100 Hr			G-24
17	Parking brake	Adjust			☆		☆		☆		☆		☆		☆		every 100 Hr			G-24
18	Radiator hose and clamp	Check					☆				☆				☆		every 200 Hr			G-26
		Replace															every 2 years			G-37
19	Fuel line	Check			☆		☆		☆		☆		☆		☆		every 100 Hr		@	G-25
		Replace															every 2 years	*3		G-37
20	Intake air line	Check					☆				☆				☆		every 200 Hr		@	G-27
		Replace															every 2 years	*3		G-37

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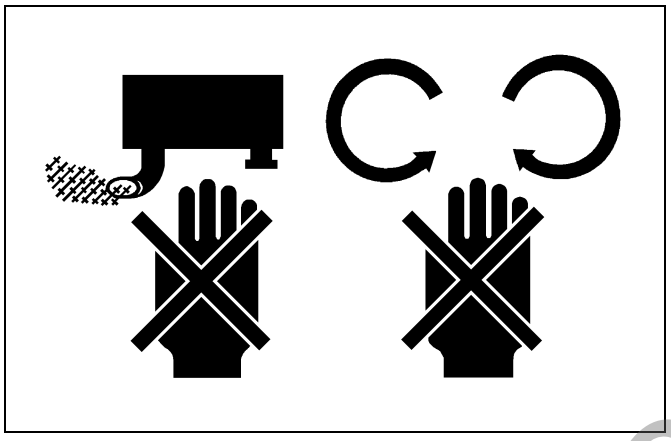
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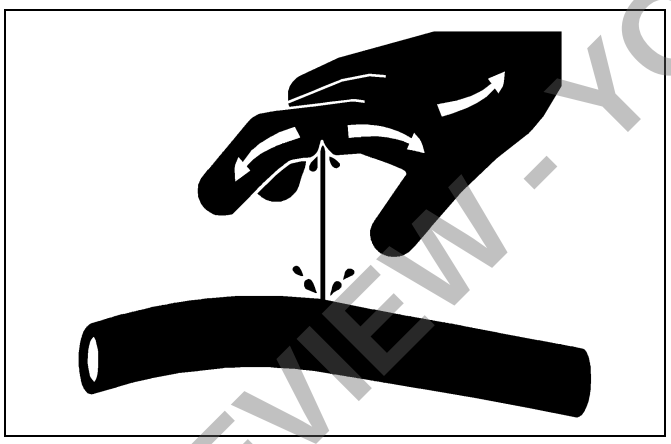
SAFETY STARTING

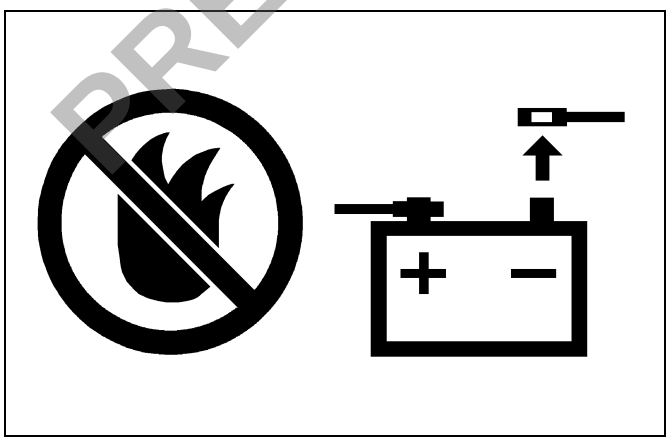
- Do not start the engine by shorting across starter terminals or bypassing the safety start switch.
- Do not alter or remove any part of machine safety system.
- Before starting the engine, make sure that all shift levers are in neutral positions or in disengaged positions.
- Never start the engine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



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.



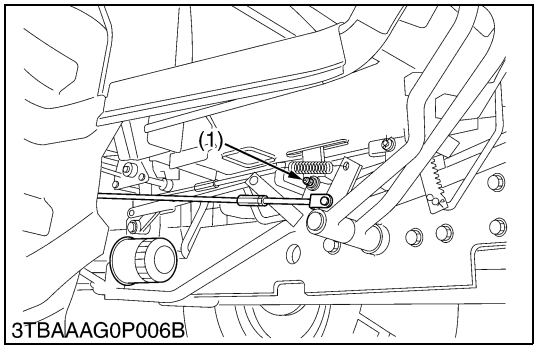


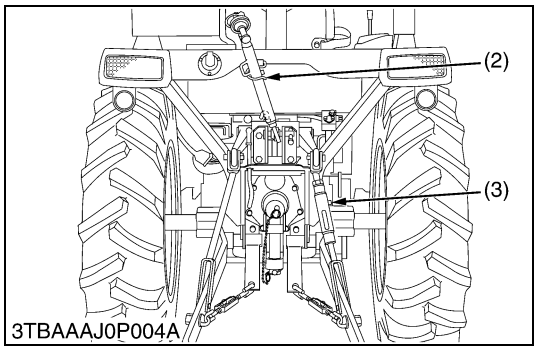
AVOID FIRES

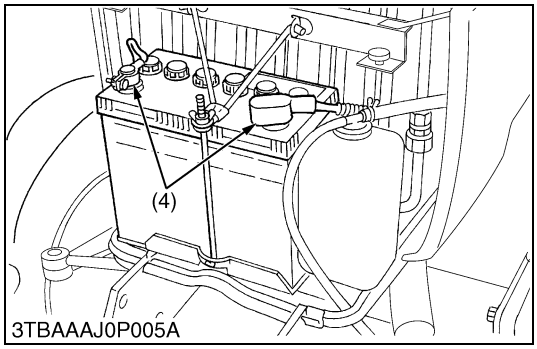
- Fuel is extremely flammable and explosive under certain conditions. Do not smoke or allow flames or sparks in your working area.
- To avoid sparks from an accidental short circuit, always disconnect the battery negative cable first and connect it last.
- Battery gas can explode. Keep sparks and open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

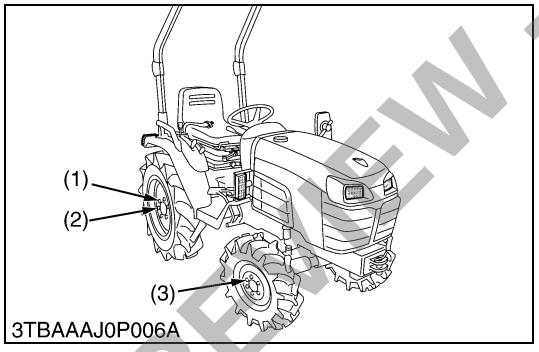
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Greasing

1. Apply a small amount of multipurpose grease to the positions as shown in the figures.

(1) Speed Control Pedal (HST Pedal)
(2) Top Link
(3) Lifting Rod (RH)
(4) Battery Terminal

W1015242

Checking Wheel Mounting Bolts and Nuts Tightening Torques

CAUTION

- **Never operate tractor with a loose rim, wheel, or axle.**
- **Any time bolts and nuts are loosened, retighten to specified torque.**
- **Check all bolts and nuts frequently and keep them tight.**

1. Check wheel bolts and nuts regularly especially when new. If they are loose, tighten them as follows.

Tightening torque	Front wheel mounting nut	77 to 90 N·m 7.9 to 9.2 kgf·m 57 to 67 lbf·ft
	Rear wheel mounting bolt	196 to 225 N·m 20 to 23 kgf·m 145 to 166 lbf·ft
	Rear wheel mounting nut	167 to 191 N·m 17 to 19.5 kgf·m 123 to 141 lbf·ft

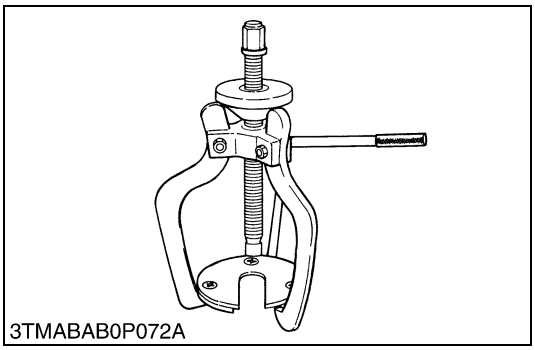
(1) Rear Wheel Mounting Bolt
(2) Rear Wheel Mounting Nut
(3) Front Wheel Mounting Nut

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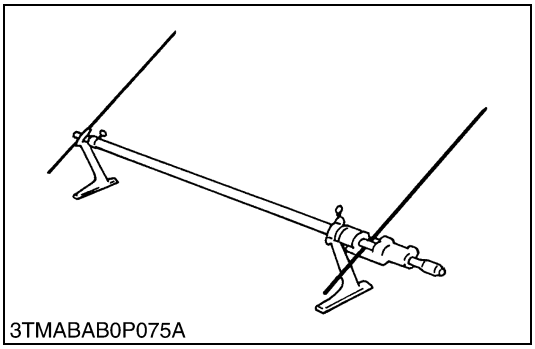
[2] SPECIAL TOOLS FOR TRACTOR


3TMABAB0P072A

Steering Wheel Puller

Code No: 07916-51090
Application: Use for removing the steering wheel without damaging the steering shaft.

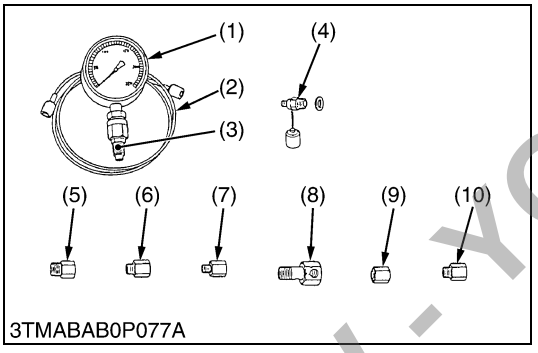
W10265330


3TMABAB0P075A

Toe-in Gauge

Code No: 07909-31681
Application: This allows easy measurement of toe-in for all machine models.

W10266890



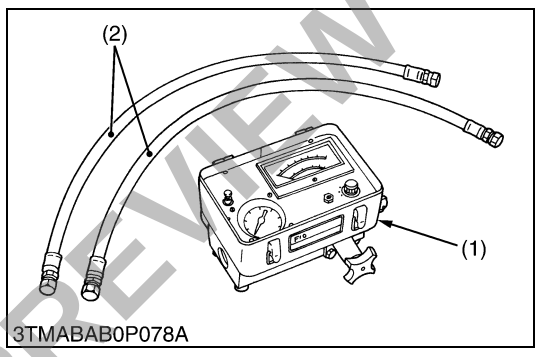
3TMABAB0P077A

Relief Valve Pressure Tester

Code No.: 07916-50045
Application: This allows easy measurement of relief set pressure.

(1) Gauge (07916-50322)
(2) Cable (07916-50331)
(3) Threaded Joint (07916-50401)
(4) Threaded Joint (07916-50341)
(5) Adaptor **B** (M18 × P1.5) (07916-50361)
(6) Adaptor **C** (PS3/8) (07916-50371)
(7) Adaptor **D** (PT1/8) (07916-50381)
(8) Adaptor **E** (PS3/8) (07916-50392)
(9) Adaptor **F** (PF1/2) (07916-62601)
(10) Adaptor **58** (PT1/4) (07916-52391)

W1026741



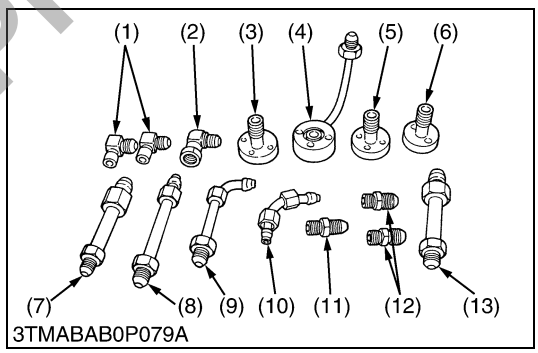
3TMABAB0P078A

Flow Meter

Code No: 07916-52791 (Flow Meter)
07916-52651 (Hydraulic Test Hose)
Application: This allows easy testing of hydraulic system.

(1) Flow Meter
(2) Hydraulic Test Hose

W10313180



3TMABAB0P079A

Adaptor Set for Flow Meter

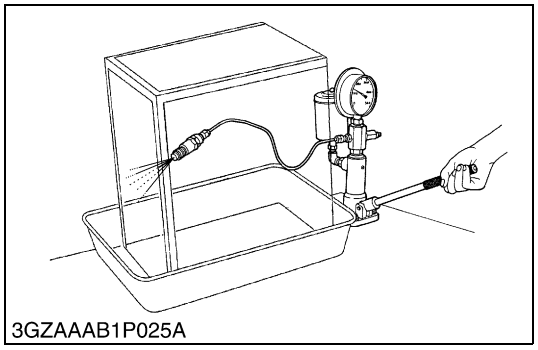
Code No: 07916-54031
Application: Use for testing the hydraulic system.

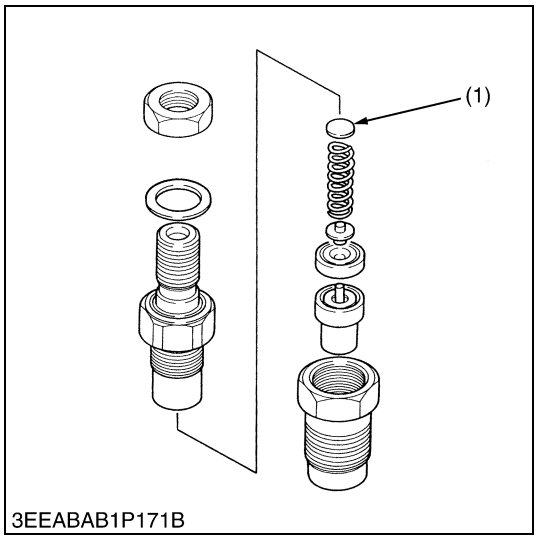
(1) Adaptor **52**
(2) Adaptor **53**
(3) Adaptor **54**
(4) Adaptor **61**
(5) Adaptor **62**
(6) Adaptor **63**
(7) Adaptor **64**
(8) Adaptor **65**
(9) Adaptor **66**
(10) Adaptor **67**
(11) Adaptor **68**
(12) Adaptor **69**
(13) Hydraulic Adaptor **1**

W10313960

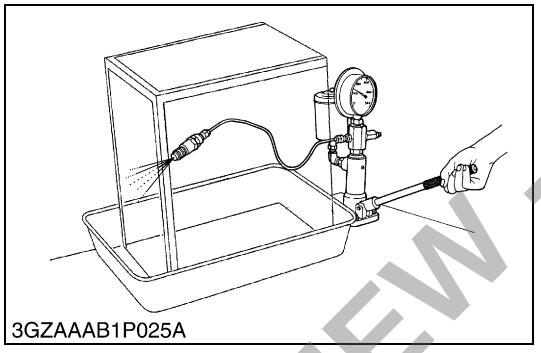
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3GZAAAB1P025A



3EEABAB1P171B


3GZAAAB1P025A

Fuel Injection Pressure

1. Set the injection nozzle to a nozzle tester.
2. Slowly move the tester handle to measure the pressure at which fuel begins jetting out from the nozzle.
3. If the measurement is not within the factory specifications, replace the adjusting washer (1) in the nozzle holder to adjust it.

Fuel injection pressure	Factory spec.	13.73 to 14.71 MPa 140 to 150 kgf/cm^2 1990 to 2130 psi

(Reference)

- Pressure variation with 0.01 mm (0.0004 in.) difference of adjusting washer thickness
  Approx. 235 kPa (2.4 kgf/cm^2, 34 psi)
- Pressure with 0.01 mm (0.0004 in.) difference of adjusting washer thickness varies approx. 235 KPa (2.4 kgf/cm^2, 34 psi)

(1) Adjusting Washer

W1056842

Valve Seat Tightness

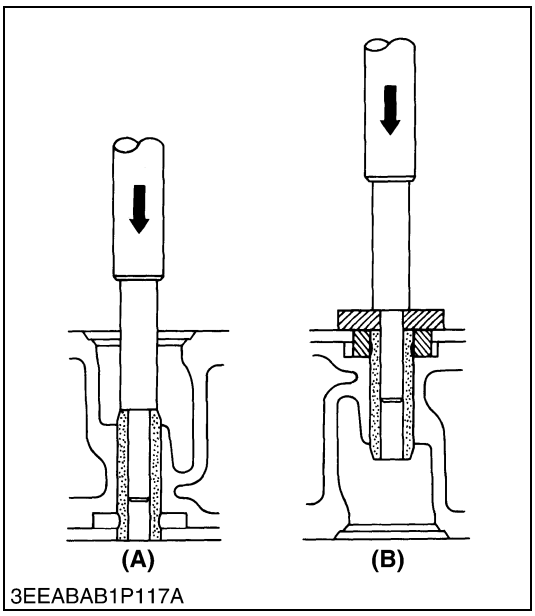
1. Set the injection nozzle to a nozzle tester.
2. Raise the fuel pressure, and keep at 12.75 MPa (130 kgf/cm^2, 1849 psi) for 10 seconds.
3. If any fuel leak is found, replace the nozzle piece.

Valve seat tightness	Factory spec.	No fuel leak at 12.75 MPa 130 kgf/cm^2 1849 psi

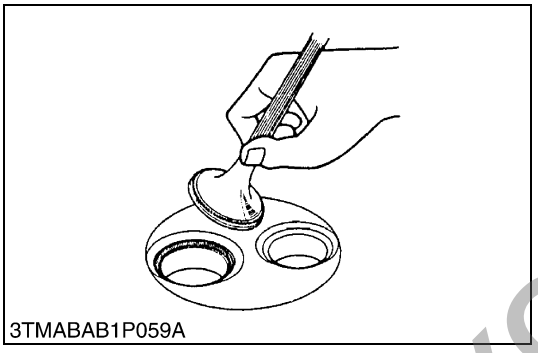
W10581240

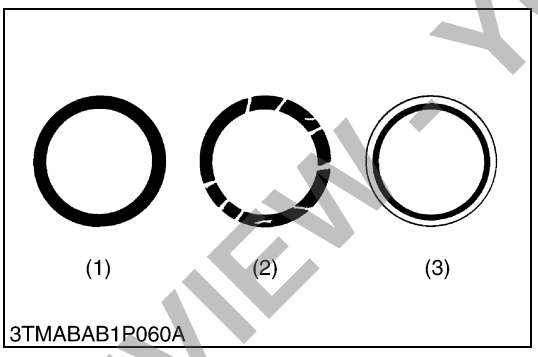
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3EEABAB1P117A


3TMABAB1P059A



3TMABAB1P060A

Replacing Valve Guide

(When removing)

1. Press out the used valve guide using a valve guide replacing tool. (See page **"SPECIAL TOOLS"**.)

(When installing)

1. Clean a new valve guide and valve guide bore, and apply engine oil to them.
2. Press in a new valve guide using a valve guide replacing tool.
3. Ream precisely the I.D. of the valve guide to the specified dimension.

Valve guide I.D. (Intake and exhaust)	Factory spec.	7.010 to 7.025 mm 0.2760 to 0.2765 in.

■ **IMPORTANT**

- **Do not hit the valve guide with a hammer during replacement.**

(A) When Removing **(B) When Installing**

W10278890

Valve Seating

1. Coat the valve face lightly with prussian blue and put the valve on its seat to check the contact.
2. If the valve does not seat all the way around the valve seat or the valve contact is less than 70 %, correct the valve seating as follows.
3. If the valve contact does not comply with the reference value, replace the valve or correct the contact of valve seating.

Valve seat width	Factory spec.	2.12 mm 0.0835 in.

(1) Correct
(2) Incorrect
(3) Incorrect

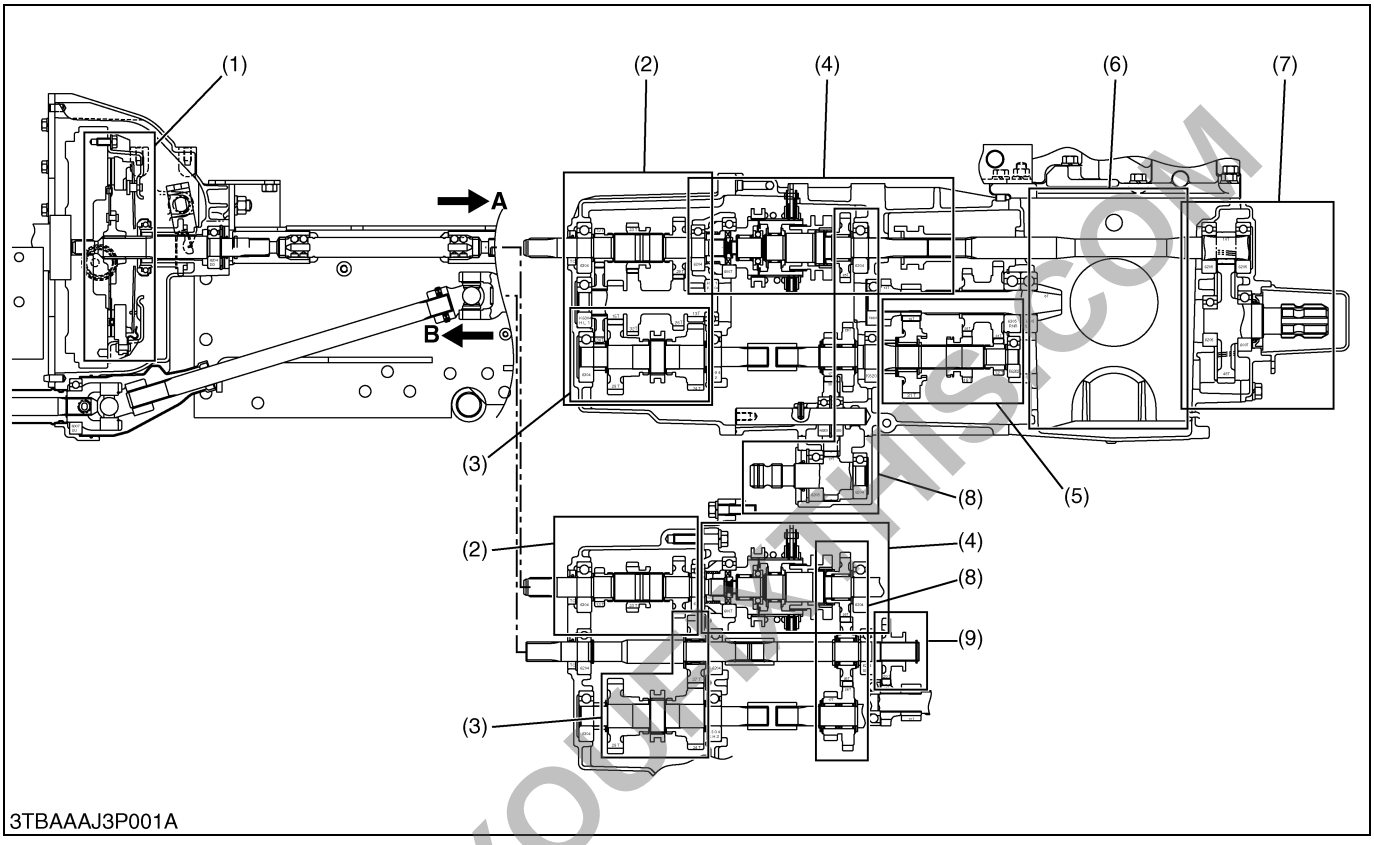
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1. STRUCTURE

[1] MANUAL TRANSMISSION (WITHOUT BI-SPEED TURN MODEL)



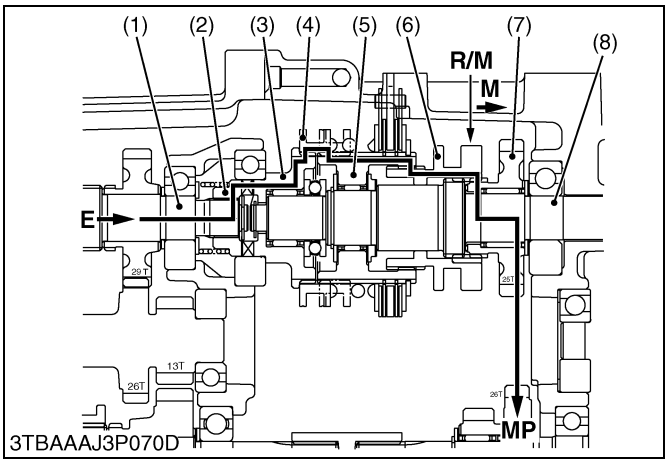
(1) Main Clutch Section
(2) Main Gear Shift Section
(3) Shuttle Shift Section
(4) Mechanical PTO Clutch Section
(5) Range Gear Shift Section
(6) Differential Gear Section
(7) Rear PTO Gear Section
(8) Mid-PTO Gear Section
(9) Front Wheel Drive Gear Section

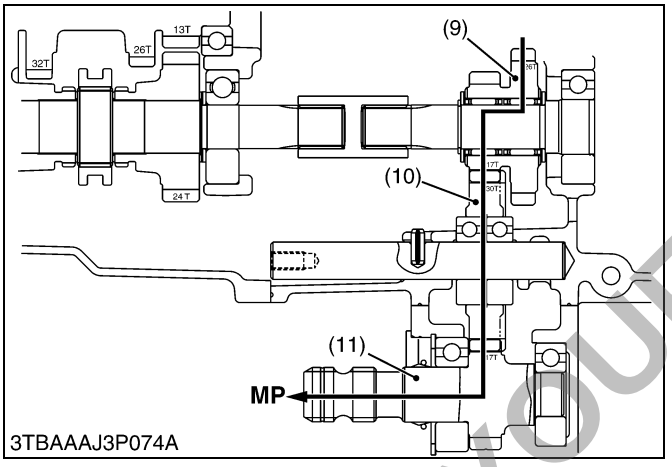
A : From Front Case
B : To Front Axle

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[4] MID-PTO SECTION





When the PTO shift lever is set to "**Mid-PTO**" position, the PTO shifter (6) slides to "**Mid-PTO**" position (**M**).

The PTO shifter meshes to the spline of the 25T mid-gear (7).

The power is transmitted from the first shift shaft (1) to the mid-PTO as shown in the figure.

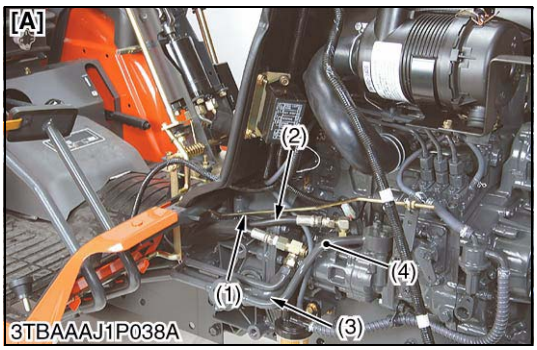
(1) First Shift Shaft
(2) One-way Clutch Cam
(3) One-way Clutch Spline Boss
(4) Shifter (PTO ON/OFF)
(5) PTO Brake Spline Boss
(6) PTO Shifter
(7) 25T Mid Gear
(8) PTO Clutch Shaft
(9) 17T-26T Mid PTO Gear
(10) 30T Gear
(11) Mid Gear Shaft

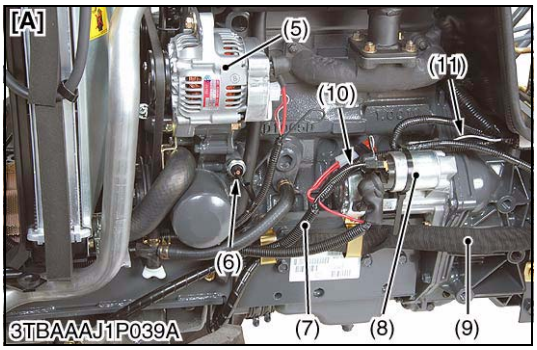
R/M :REAR PTO / MID PTO Position
M : MID-PTO Position
E : Power from Engine
MP :Power to Mid-PTO Implement

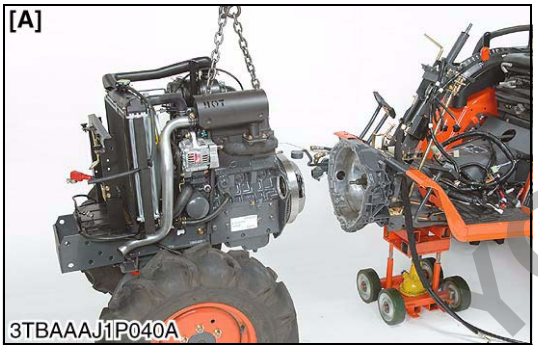
W1033664

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Separating Engine with Front Axle

1. Reinstall the rear tires.
2. Support the transmission with a disassembling stand.
3. Hook the engine with a hoist.
4. Place the disassembling stand under the main frame.
5. Disconnect the power steering hoses (2).
6. Loose the hydraulic inlet hose band. Disconnect the hydraulic inlet hose (3) from the hydraulic pump.
   Disconnect the hydraulic delivery pipe (4) from the hydraulic pump.
7. Disconnect the wiring leads from the alternator (5), the engine oil pressure switch (6) and the starter motor (8).
   Disconnect the wiring harness (7) and the power steering hoses (9) from the engine body.
8. Remove the docking bolts between the engine and the front case.

(When reassembling)

- Align the spline between the front wheel drive shaft and the universal joint securely.
- Tighten the docking bolts between the engine and the front case securely.

Tightening torque	Engine and front case mounting bolt and nut (M8)	17.7 to 20.5 N·m 1.8 to 2.1 kgf·m 13.1 to 15.1 lbf·ft
	Engine and front case mounting stud bolt (M10)	48.1 to 55.8 N·m 4.9 to 5.7 kgf·m 35.5 to 41.2 lbf·ft

(1) Accelerator Rod
(2) Power Steering Hose
(3) Hydraulic Inlet Hose
(4) Hydraulic Delivery Pipe
(5) Alternator
(6) Engine Oil Pressure Switch
(7) Wiring Harness
(8) Starter Motor
(9) Power Steering Hoses
(10) ST Terminal Lead
(11) Stop Solenoid Lead

[A] ROPS, Manual Transmission Model

W1093199

Separating Front Axle from Engine

1. Remove the exhaust pipe.
2. Disconnect the radiator hoses.
3. Remove the front axle frame mounting bolts.
4. Separate the front axle from the engine.
5. Remove the steering post assembly (1).

(When reassembling)

Tightening torque	Engine and front axle frame mounting bolt (M10)	48.1 to 55.8 N·m 4.9 to 5.7 kgf·m 35.5 to 41.2 lbf·ft

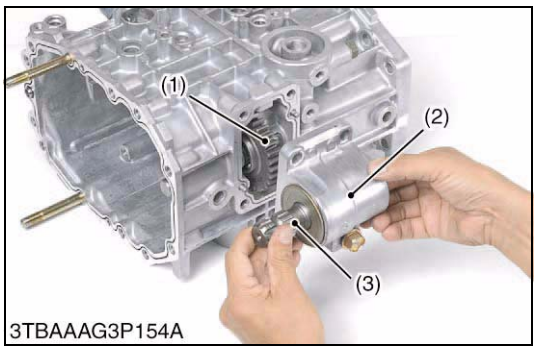
(1) Steering Post Assembly

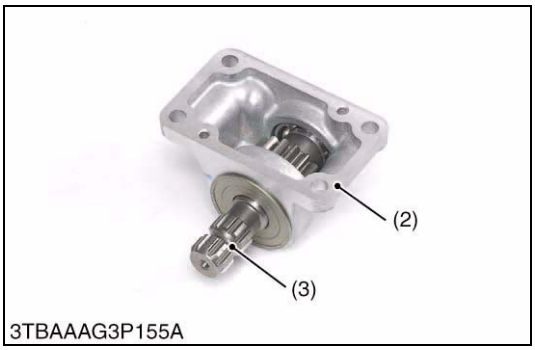
[A] ROPS, Manual Transmission Model

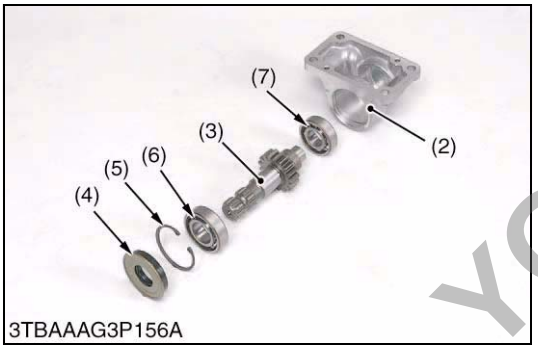
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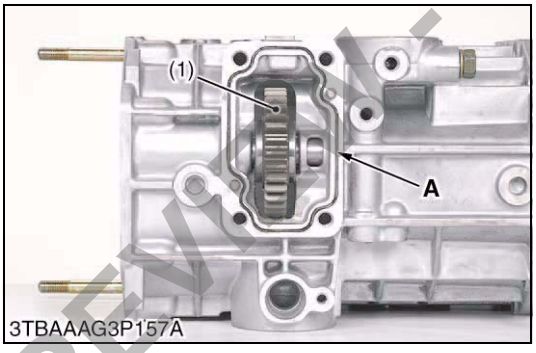
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Mid-PTO Case and Mid-gear Shaft (Mid-PTO Model)

1. Remove the mid-PTO case mounting bolts.
2. Remove the mid-PTO case from the transmission case.
3. Remove the mid-PTO oil seal (4) from the mid-PTO case (2) using a screw driver not to damage it.
4. Remove the internal cir-clip (5).
5. Remove the mid-gear shaft (3) with the ball bearings (6) (7).
6. Remove the bearing (6) (7) from the mid-gear shaft (3).

(When reassembling)

- If the mid-PTO oil seal (4) is defective, worn or scratched, replace it.
- Apply grease to the lip and the outer of the mid-PTO oil seal (4).
- Apply liquid gasket (Three Bond 1206D or equivalent) to the joint surface A of the transmission case and the mid-PTO case (2).

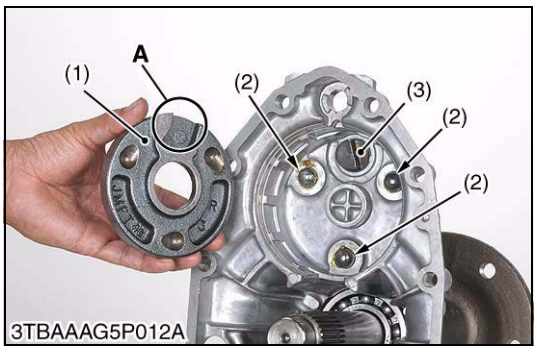
(1) 30T Mid-gear
(2) Mid-PTO Case
(3) Mid-gear Shaft
B1830, B2230, B2530 : 18T
B3030 : 17T
(4) Mid-PTO Oil Seal
(5) Internal Cir-clip
(6) Ball Bearing
(7) Ball Bearing

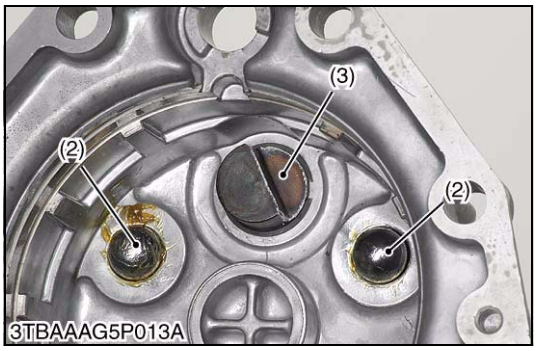
A : Joint Surface

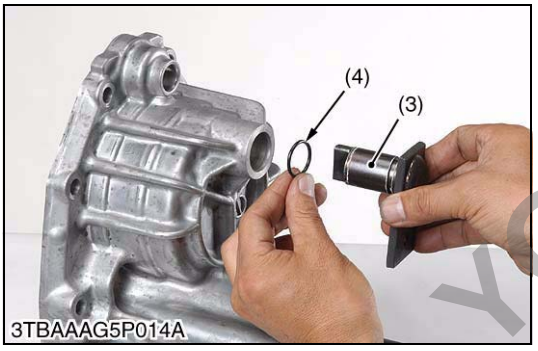
W1100165

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Brake Cam Plate and Brake Cam Lever

1. Remove the brake cam plate (1) and the balls (3).

(When reassembling)

- Apply grease to the balls (3).
- If O-ring (4) is defective, change it.
- Install the brake cam lever (3) to the brake cam plate (1) securely.
- Move the brake cam lever (3) by hand to check the movement. If the movement is heavy, refine the brake cam plate (1) with emery paper.

(1) Brake Cam Plate
(2) Ball
(3) Brake Cam Lever
(4) O-ring
(5) Brake Shaft

A : Portion to the Brake Cam Lever

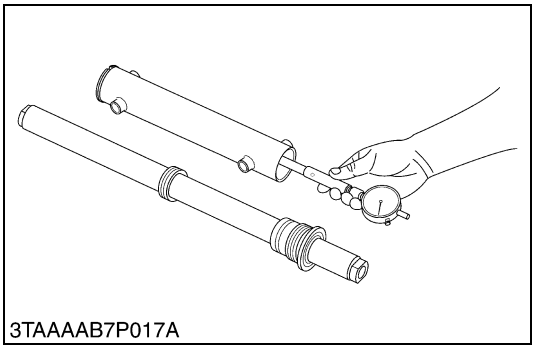
W1015481

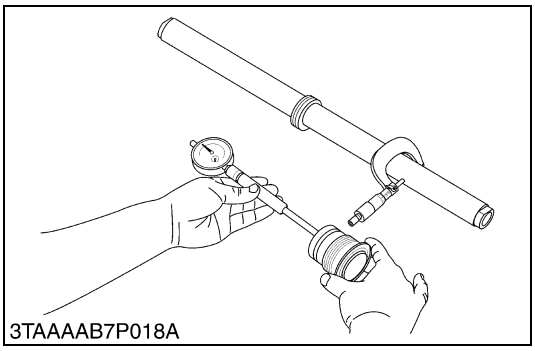
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[3] SERVICING

(1) Power Steering Cylinder


3TAAAAB7P017A


3TAAAAB7P018A

Steering Cylinder I.D.

1. Measure the steering cylinder I.D. with a cylinder gauge.
2. If the cylinder I.D. exceed the allowable limit, replace the cylinder barrel.

Steering cylinder I.D.	Factory spec.	40.000 to 40.062 mm 1.57480 to 1.57724 in.
	Allowable limit	40.100 mm 1.57874 in.

W1011546

Clearance between Rod and Guide

1. Measure the rod guide I.D. with a cylinder gauge.
2. Measure the rod O.D. with an outside micrometer, and calculate the clearance.
3. If the clearance exceeds the allowable limit, replace as a unit.

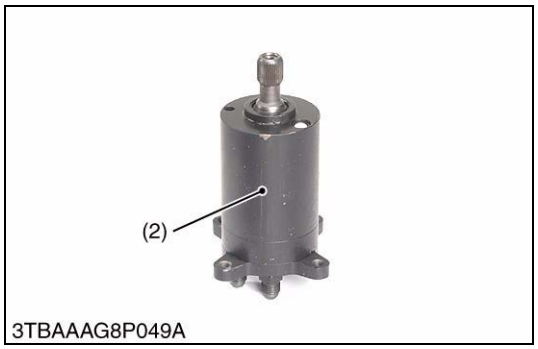
Clearance between rod and guide	Factory spec.	0.020 to 0.070 mm 0.00079 to 0.00276 in.
	Allowable limit	0.200 mm 0.00787 in.

W1016514

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(2) Power Steering Controller



Power Steering Controller

1. Remove the steering wheel.
2. Remove the bonnet, panel board, panel under cover.
3. Disconnect the power steering hoses and the hydraulic pipes.
4. Remove the steering post as an assembly.
5. Remove the bolts.

(When reassembling)

Tightening torque	Steering post mounting bolt (M10)	48.1 to 55.8 N·m 4.9 to 5.7 kgf·m 35.5 to 41.2 lbf·ft

(1) Steering Post
(2) Power Steering Controller
(3) Bolt

W1028839

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1. TROUBLESHOOTING

FUSE AND WIRING

Symptom	Probable Cause	Solution	Reference Page
All Electrical Equipment Do Not Operate	Battery discharged or defective	Recharge or Replace	G-19
	Battery positive cable disconnected or improperly connected	Repair or Replace	–
	Battery negative cable disconnected or improperly connected	Repair or Replace	–
	Slow blow fuse blown	Replace	G-41
Fuse Blown Frequently	Short-circuited	Repair or Replace	–

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BATTERY

Battery Discharges Too Quickly	Battery defective	Recharge or Replace	9-S6
	Alternator defective	Repair or Replace	9-S23, S27
	Regulator defective	Replace	9-S28
	Wiring harness disconnected or improperly connected (between battery positive terminal and regulator **B** terminal)	Repair or Replace	–
	Cooling fan belt slipping	Adjust tension	G-22

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STARTING SYSTEM

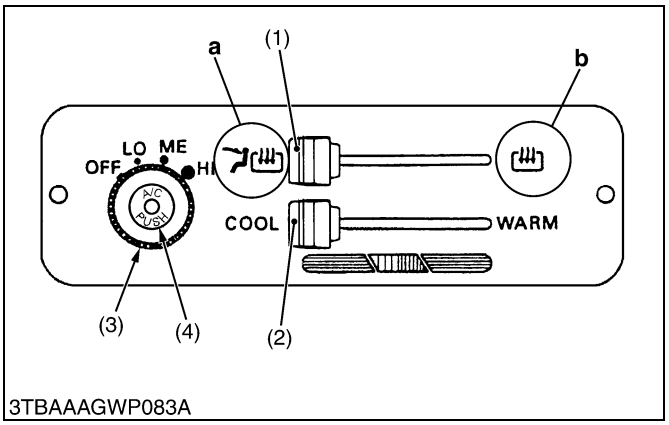
Starter Motor Does Not Operate	Battery discharged or defective	Recharge or Replace	G-19
	Slow blow fuse blown	Replace	G-41
	Safety switch improperly adjusted or defective	Repair or replace	9-S12
	Wiring harness disconnected or improperly connected (between main switch **50** terminal and operator presence controller, between main switch **50** terminal and starter relay, between safety switches and operator presence controller, between safety switches and starter relay, between battery positive terminal and starter motor)	Repair or replace	–
	Starter relay defective	Replace	9-S11
	Starter motor defective	Repair or replace	9-S26
	Main switch defective	Replace	9-S8, S9
Pre-heat indicator Lamp Does Not Light When Main Switch Is in Pre-heat Position	Battery discharged or defective	Recharge or Replace	G-19
	Slow blow fuse blown	Replace	–
	Wiring harness disconnected or improperly connected (between main switch **19** terminal and pre-heat indicator, between pre-heat indicator and glow plugs)	Repair or Replace	9-S10
	Main switch defective	Replace	9-S8, S9
	Glow plug indicator defective	Replace	9-S20, S21

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[4] CONTROL PANEL



3TBAAAGWP083A

■ **Mode Lever**

Set the mode lever to the desired position.

a : Air is blown from the front and side air outlets.

b : Air is blown from only the front air outlets.

■ **Temperature Control Lever**

Set this lever at the desired position to obtain the optimum air temperature. Move the lever to the right to obtain warmer air. Move it to the left to obtain cooler air.

■ **Blower Switch**

Air volume can be changed in three steps. At the "**HI**" position, the largest air volume is obtained.

■ **Air Conditioner Switch**

Push this switch to activate the air conditioner. An indicator light will light up when the switch is set to "**ON**". Push switch again to turn air conditioner off, in which case the indicator light will be off.

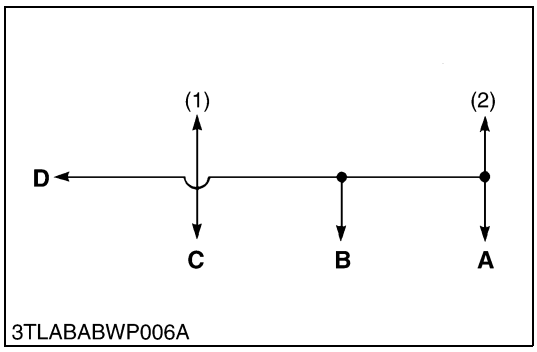
(1) Mode Lever
(2) Temperature Control Lever
(3) Blower Switch
(4) Air Conditioner Switch with Indicator Light

a : Front and Side Air Outlet Position
b : Front Air Outlet Position

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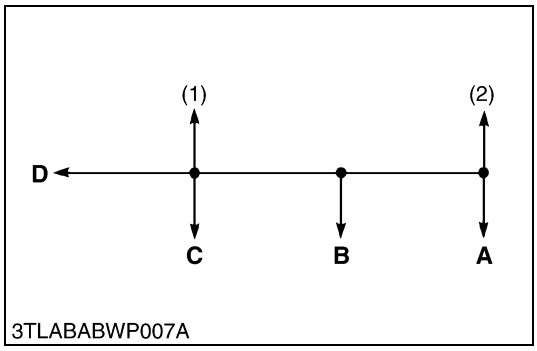


3TLABABWP006A

■ **When LO Valve is Closed and HI Valve is Opened**
Two circuits are established.
Port (**C**) → **HI** pressure gauge (2)
→ Port (**B**)
→ Port (**D**) (Schrader valve must be opened)
Port (**A**) → **LO** pressure gauge (1)

■ **NOTE**
- **Schrader valve (D) must be opened.**

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■ **When LO and HI Valve is Opened**
Two circuits are established.
Port (**A**) → **HI** pressure gauge (2)
→ **LO** pressure gauge (1)
→ Port (**B**)
→ Port (**C**)
→ Port (**D**) (Schrader valve must be opened)

■ **NOTE**
- **Schrader valve (D) must be opened.**

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