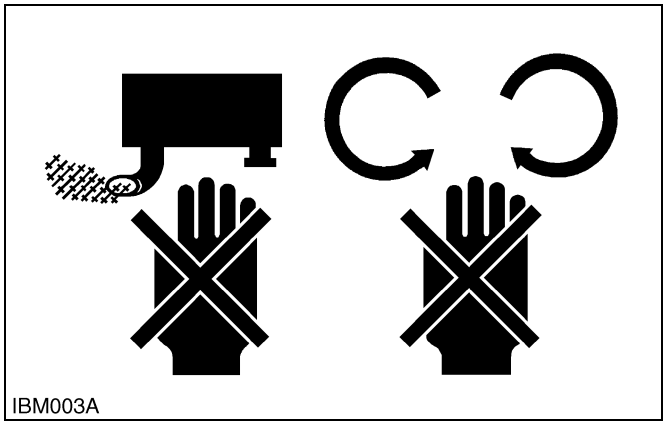
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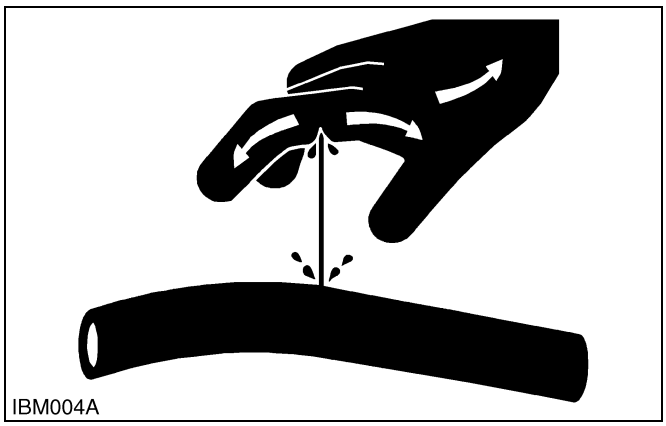
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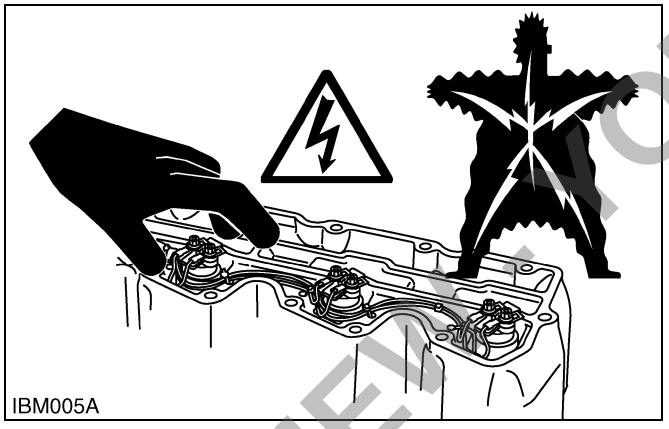
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   [2] BATTERY G-5
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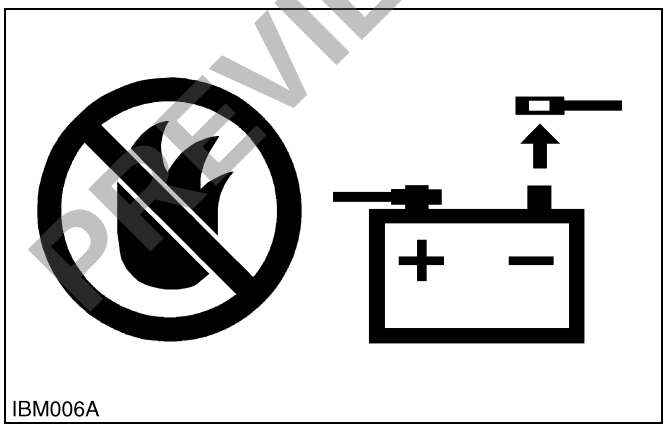
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OPERATE SAFELY

- Do not use the machine after you consume alcohol or medication or when you are tired.
- Put on applicable clothing and safety equipment.
- Use applicable tools only. Do not use alternative tools or parts.
- When 2 or more persons do servicing, make sure that you do it safely.
- Do not operate below the machine that only a jack holds. Always use a safety stand to hold the machine.
- Do not touch the hot parts or parts that turn when the engine operates.
- Do not remove the radiator cap when the engine operates, or immediately after it stops. If not, hot water can spout out from the radiator. Only remove the radiator cap when it is at a sufficiently low temperature to touch with bare hands. Slowly loosen the cap to release the pressure before you remove it fully.
- Released fluid (fuel or hydraulic oil) under pressure can cause damage to the skin and cause serious injury. Release the pressure before you disconnect hydraulic or fuel lines. Tighten all connections before you apply the pressure.
- Do not open a fuel system under high pressure. The fluid under high pressure that stays in fuel lines can cause serious injury. Do not disconnect or repair the fuel lines, sensors, or any other components between the fuel pump and injectors on engines with a common rail fuel system under high pressure.
- Put on an applicable ear protective device (earmuffs or earplugs) to prevent injury against loud noises.
- Be careful about electric shock. The engine generates a high voltage of more than DC100 V in the ECU and is applied to the injector.

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PREVENT A FIRE

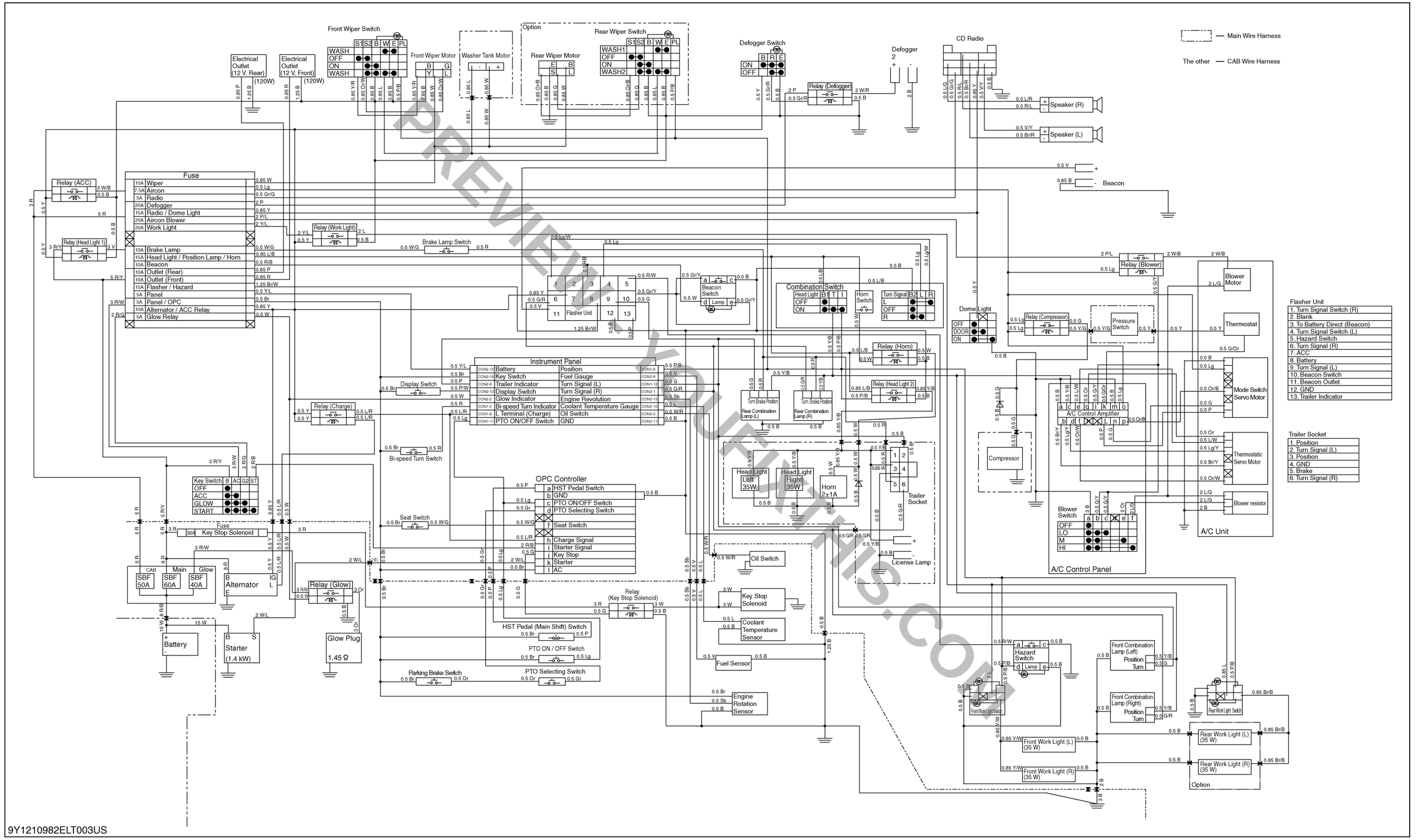
- Fuel is very flammable and explosive under some conditions. Do not smoke or let flames or sparks in your work area.
- To prevent sparks from an accidental short circuit, always disconnect the battery negative cable first and connect it last.
- The battery gas can cause an explosion. Keep the sparks and open flame away from the top of battery, especially when you charge the battery.
- Make sure that you do not spill fuel on the engine.

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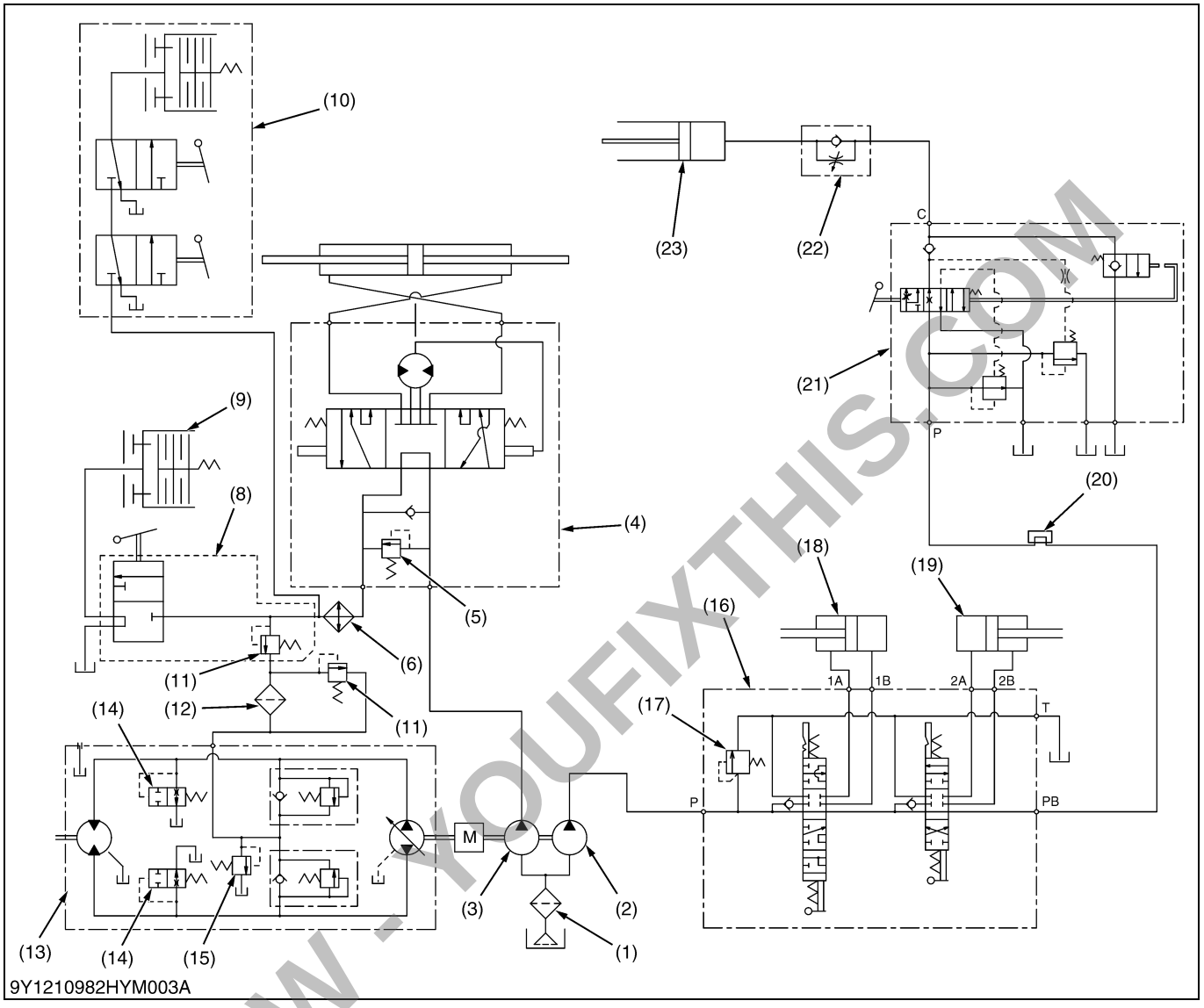
[3] CABIN MODEL



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[3] HST MODEL



(1) Oil Filter
(2) Hydraulic Pump (For 3-point Hitch)
(3) Hydraulic Pump (For Power Steering and Bi-speed Turn)
(4) Power Steering
(5) Relief Valve (Power Steering Controller)
(6) Oil Cooler
(7) Regulating Valve (Bi-speed Turn and Independent PTO Clutch)
(8) Control Valve for Independent PTO
(9) Independent PTO Clutch
(10) Bi-speed Turn Valve and Clutch
(11) Relief Valve for Oil Filter
(12) Oil Filter
(13) HST
(14) Check and High Pressure Relief Valve
(15) Charge Relief Valve
(16) Front Loader Control Valve
(17) Relief Valve (For 3-point Hitch System and Front Loader System)
(18) Boom Cylinder
(19) Bucket Cylinder
(20) Rear Hydraulic Outlet
(21) Position Control Valve
(22) Lowering Speed Adjusting Valve
(23) Hydraulic Cylinder

Operating Pressure

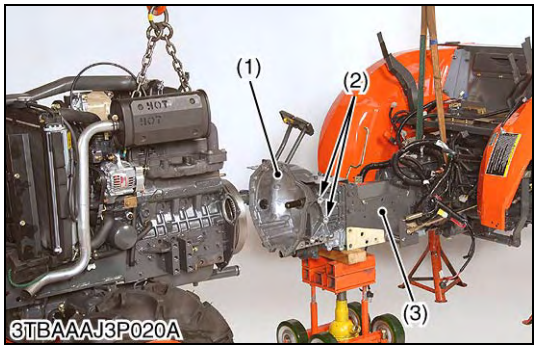
(2)	Hydraulic Pump (For 3-point Hitch) Above 18.7 L/min. (4.94 U.S. gals/min., 4.11 Imp. gals/min.)	(14)	Check and High Pressure Relief Valve (For HST) 33 to 35 MPa (340 to 350 kgf/cm^2, 4800 to 5000 psi)
(3)	Hydraulic Pump (For Power Steering) Above 14.1 L/min. (3.72 U.S. gals/min., 3.10 Imp. gals/min.)	(15)	Charge Relief Valve (For HST) 0.4 to 0.6 MPa (4.1 to 6.1 kgf/cm^2, 17.4 to 20.2 psi)
(5)	Relief Valve (For Power Steering Controller) 11.5 to 12.5 MPa (118 to 127 kgf/cm^2, 1670 to 1810 psi)	(17)	Relief Valve (3-point Hitch System and Front Loader System) 16.5 to 16.9 MPa (169 to 172 kgf/cm^2, 2400 to 2450 psi)
(7)	Regulating Valve (For Bi-speed Turn and Independent PTO) 1.1 to 1.5 MPa (11.2 to 15.3 kgf/cm^2, 160 to 218 psi)		

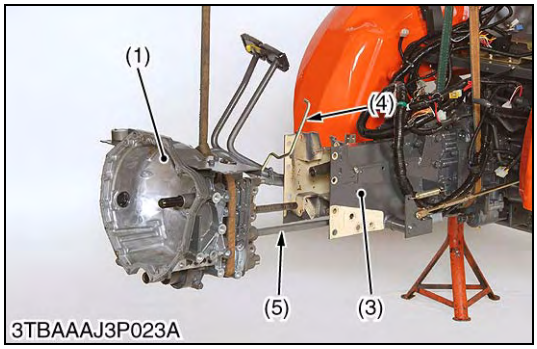
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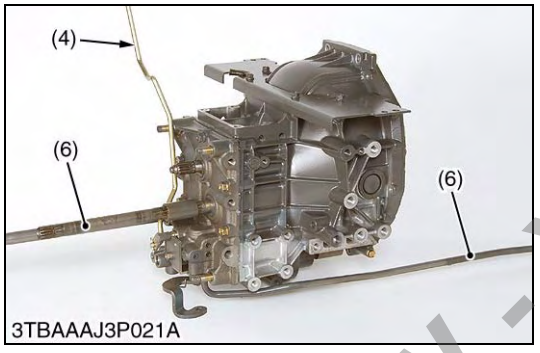
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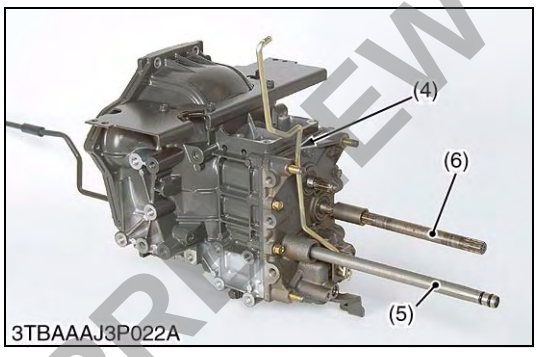
[3] DISASSEMBLING AND ASSEMBLING

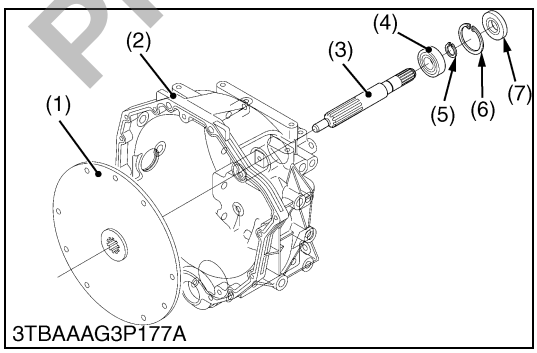
(1) Front Case











Front Case Assembly

1. Support the engine securely.
2. Remove the front case mounting bolts (1).
3. Remove the front case (1) from the frame (3).

(When reassembling)

- Apply liquid gasket (Three Bond 1206D or equivalent) to the joint face of the engine and the front case.

Tightening torque	Front case mounting bolt for aluminum (M10)	39.3 to 44.1 N·m 4.0 to 4.5 kgf·m 29.0 to 32.5 lbf·ft

(1) Front Case
(2) Bolt
(3) Frame
(4) Bi-Speed Rod 1
(5) Delivery Pipe
(6) Propeller Shaft

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Clutch Shaft and Ball Bearing

1. Remove the oil seal (7).
2. Remove the cir-clip (6).
3. Remove the clutch shaft (3) from the front case (2).

(1) Steal Plate
(2) Front Case
(3) Clutch Shaft
(4) Ball Bearing
(5) External Cir-clip
(6) Internal Cir-clip
(7) Oil Seal

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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	4 No-grade or 4T			7 7T			9 9T		
Indication on top of nut	04 No-grade or 4T						6 6T		
Material of opponent part	Ordinariness			Aluminum			Ordinariness		
Unit	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
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
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
M12	63 to 72	6.4 to 7.4	47 to 53	–	–	–	78 to 90	7.9 to 9.2	58 to 66
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
M16	167 to 191	17.0 to 19.5	123 to 141	–	–	–	197 to 225	20.0 to 23.0	145 to 166
M18	246 to 284	25.0 to 29.0	181 to 209	–	–	–	275 to 318	28.0 to 32.5	203 to 235
M20	334 to 392	34.0 to 40.0	246 to 289	–	–	–	368 to 431	37.5 to 44.0	272 to 318

Material of opponent part	Aluminum			Ordinariness		
Unit	N·m	kgf·m	lbf·ft	N·m	kgf·m	lbf·ft
M6	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	30 to 34	3.0 to 3.5	22 to 25
M10	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	103 to 117	10.5 to 12.0	76.0 to 86.7
M14	–	–	–	167 to 196	17.0 to 20.0	123 to 144
M16	–	–	–	260 to 304	26.5 to 31.0	192 to 224
M18	–	–	–	344 to 402	35.0 to 41.0	254 to 296
M20	–	–	–	491 to 568	50.0 to 58.0	362 to 419

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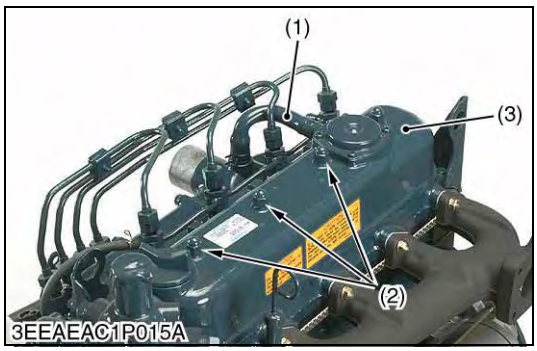
[2] STUD BOLTS

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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(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).

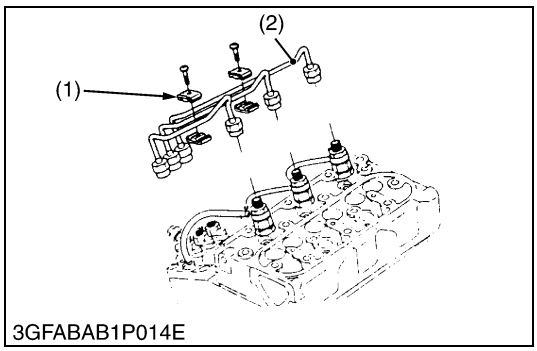
(When reassembling)

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

Tightening torque	Cylinder head cover nut	D1105, V1505	7 to 8 N·m 0.7 to 0.9 kgf·m 5 to 6 lbf·ft
		D1305	9.81 to 11.2 N·m 1.00 to 1.15 kgf·m 7.24 to 8.31 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. Remove the injection pipes (2).

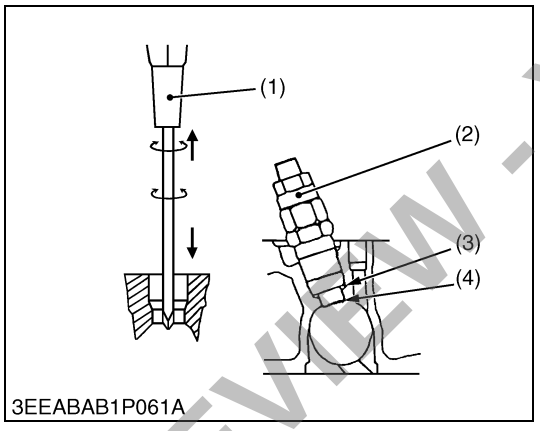
(When reassembling)

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

Tightening torque	Injection pipe retaining nut	25 to 34 N·m 2.5 to 3.5 kgf·m 18 to 25 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 and Checking Procedure	Solution	Reference Page
Engine Does Not Start	1. No fuel	Check fuel	G-8
	2. Air in the fuel system	Bleed air	G-39
	3. Water in the fuel system	Solution order 1. Repair or replace fuel system	1-S19
		2. Change fuel	G-8
	4. Fuel hose clogged	Clean or replace fuel hose	G-28
	5. Fuel filter clogged	Solution order 1. Replace fuel filter	G-26
		2. Check or change fuel	G-8
	6. Excessively high viscosity of fuel or engine oil at low temperature	Check fuel or engine oil	G-8
	7. Fuel with low cetane number	Check fuel	G-8
	8. Fuel leak due to loose injection pipe retaining nut	Repair retaining nut	1-S32
	9. Incorrect injection timing	Solution order 1. Check injection timing	1-S19
		2. Adjust injection timing	
	10. Fuel camshaft worn	Solution order 1. Inspect cam shaft	1-S37
		2. Replace cam shaft	
	11. Injection nozzle clogged	Solution order 1. Inspect injection nozzle	1-S19
		2. Replace or clean injection nozzle	1-S22
	12. Injection pump malfunctioning	Repair or replace injection pump	1-S36
	13. Seizure of crankshaft, camshaft, piston, cylinder or bearing	Solution order 1. Inspect crankshaft, camshaft, piston, cylinder or bearing	1-S50 to 1-S61
		2. Replace crankshaft, camshaft, piston, cylinder or bearing	1-S37 to 1-S43

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3. SPECIFICATIONS

[ROPS and CAB HST Type]

Model			B2350	B2650	B3150
PTO power *1			12.5 kW (17.0 PS)	14.6 kW (19.9 PS)	17.4 kW (23.6 PS)
Engine	Maker		KUBOTA		
	Model		D1105	D1305	V1505
	Type		Indirect Injection. Vertical, water-cooled,4cycle diesel		
	Number of cylinders		3		4
	Bore and stroke		78 × 78.4 mm (3.07 × 3.08 in.)	78 × 88 mm (3.07 × 3.46 in.)	78 × 78.4 mm (3.07 × 3.08 in.)
	Total displacement		1123 cm^3 (68.53 cu.in.)	1261 cm^3 (76.95 cu.in.)	1498 cm^3 (91.41 cu.in.)
	Engine gross power *1		15.9 kW (21.6 PS)	18.5 kW (25.2 PS)	21.8 kW (29.6 PS)
	Rated revolution		2500 min^{-1} (rpm)		
	Maximum torque		71.3 N·m (7.27 kgf·m, 52.6 lbf·ft)	84.0 N·m (8.57 kgf·m, 62.0 lbf·ft)	97.9 N·m (9.98 kgf·m, 72.2 lbf·ft)
	Battery		12 V, RC : 80 min, CCA (SAE) : 430 A, CCA (EN) : 360 A		
	Fuel		Diesel fuel No.2 [above −10 °C (14 °F)], Diesel fuel No.1 [below −10 °C (14 °F)]		
Capacities	Fuel tank		27 L (7.1 U.S.gals, 5.9 Imp.gals)		
	Engine crankcase (with filter)		3.1 L (3.3 U.S.qts, 2.7 Imp.qts)	4.0 L (4.2 U.S.qts, 3.5 Imp.qts)	
	Engine coolant		4.6 L (4.9 U.S.qts, 4.0 Imp.qts)		
	Transmission case		17.0 L (4.49 U.S.gals, 3.74 Imp.gals)		
Dimensions	Overall length (with 3P)	ROPS	2730 mm (107.5 in.)		2937 mm (115.6 in.)
		CAB	2887 mm (113.7 in.)		3007 mm (118.4 in.)
	Overall width (min. tread)		1249 mm (49.17 in.)		1365 mm (53.74 in.)
	Overall height	Rear ROPS	2353 mm (92.64 in.)		2327 mm (91.61 in.)
		CAB	2112 mm (83.15 in.)		2140 mm (84.25 in.)
	Wheel base	ROPS	1500 mm (59.06 in.)		1666 mm (65.59 in.)
		CAB	1560 mm (61.42 in.)		1666 mm (65.59 in.)
	Minimum ground clearance		290 mm (11.4 in.)		318 mm (12.5 in.)
	Tread	Front	830 mm (32.7 in.)		936 mm (36.8 in.)
		Rear	1006 mm (39.61 in.)		1050 mm (41.34 in.)
Weight	Rear ROPS		839 to 865 kg (1850 to 1900 lbs)		908 to 934 kg (2010 to 2050 lbs)
	CAB		1082 to 1108 kg (2386 to 2442 lbs)		1124 to 1150 kg (2478 to 2535 lbs)
Clutch			N/A		
Traveling system	Tires	Front	6.00-12		180/85D12
		Rear	9.5-18		12.4-16
	Steering		hydraulic power steering		
	Transmission		Main-hydrostatic transmission, 3 range gear shift		
	Brake		Wet disk type		
	Minimum turning radius (with brake)		2.1 m (6.9 feet)		
Hydraulic unit	Hydraulic control system		Position Control		
	Pump capacity		3P : 18.9 L/min (4.99 gals/min), Power steering : 14.2 L/min (3.75 gals/min)		
	3-point hitch		SAE Category 1		
	Max. lift force	At lift points	970 kg (2138 lbs)		
		600 mm behind lift point	760 kg (1676 lbs)		
	Remote hydraulic control		2 Standard		
	Remote control valve coupler		Hose connection type outlet		
PTO	Rear-PTO		SAE 1-3/8, 6 splines		
		PTO / Engine speed	540 min^{-1} (rpm) / 2400 min^{-1} (rpm)		
	Mid-PTO		USA No.5 (KUBOTA 10-tooth) involute spline		
		PTO / Engine speed	2500 min^{-1} (rpm) / 2500 min^{-1} (rpm)		

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6. MAINTENANCE CHECK LIST

No.	Item		Indication on hour meter															Interval	Refer-ence page	
			50	100	150	200	250	300	350	400	450	500	550	600	650	700	800			
1	Clogging of air conditioner condenser screen [CAB only]	Clean																Daily	G-16	
2	Engine oil	Change	★			☆				☆				☆			☆	every 200 Hr	G-29	
3	Engine oil filter	Replace	★			☆				☆				☆			☆	every 200 Hr	G-29	
4	Transmission oil filters [HST}	Replace	★			☆				☆				☆			☆	every 200 Hr	G-30	
5	Hydraulic oil filter	Replace	★							☆							☆	every 400 Hr	G-35	
6	Transmission fluid	Change								☆							☆	every 400 Hr	G-34	
7	Front axle case oil	Change								☆							☆	every 400 Hr	G-35	
8	Front axle pivot	Adjust								☆							☆	every 400 Hr	G-36	
9	Engine start system	Check	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	every 50 Hr	G-18	
10	Greasing	–	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	every 50 Hr	G-20	
11	Wheel bolt torque	Check	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	every 50 Hr	G-21	
12	Battery condition	Check		☆		☆		☆		☆		☆		☆		☆	☆	every 100 Hr	G-22	*4
13	Air cleaner element [Single type]	Clean		☆		☆		☆		☆		☆		☆		☆	☆	every 100 Hr	G-24	*1
		Replace																every 1 year	G-24	*2
14	Air cleaner element [Double element type] Primary element	Clean		☆		☆		☆		☆		☆		☆		☆	☆	every 100 Hr	G-25	*1
		Replace																every 1 year	G-25	*2
	Air cleaner element [Double element type] Secondary element	Replace																every 1 year	G-25	
15	Fuel filter element	Clean		☆		☆		☆		☆		☆		☆		☆	☆	every 100 Hr	G-26	
		Replace								☆							☆	every 400 Hr	G-26	
16	Fan belt	Adjust		☆		☆		☆		☆		☆		☆		☆	☆	every 100 Hr	G-26	
17	Clutch	Adjust	★	☆		☆		☆		☆		☆		☆		☆	☆	every 100 Hr	G-28	
18	Brake	Adjust		☆		☆		☆		☆		☆		☆		☆	☆	every 100 Hr	G-27	
19	Parking brake	Adjust		☆		☆		☆		☆		☆		☆		☆	☆	every 100 Hr	G-28, 5-S5	
20	Tension of air conditioner drive belt [CAB only]	Adjust				☆				☆				☆			☆	every 200 Hr	G-32	
21	Clogging of inner air filter [CAB only]	Clean				☆				☆				☆			☆	every 200 Hr	G-32	
22	Clogging of fresh air filter [CAB only]	Clean				☆				☆				☆			☆	every 200 Hr	G-33	
23	Clogging of air conditioner condenser [CAB only]	Clean				☆				☆				☆			☆	every 200 Hr	G-33	
24	Power steering oil line	Check				☆				☆				☆			☆	every 200 Hr	G-32	
		Replace																every 2 years	G-32	

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INFORMATION

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1. SAFETY FIRST I-1
2. SAFETY DECALS I-4
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4. TRAVELING SPEEDS I-11
5. DIMENSIONS I-13

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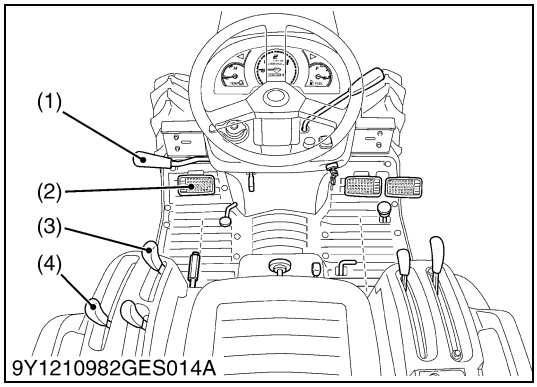
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Checking Movable Parts

1. If any of the movable parts, such as levers and pedals, is not smoothly moved because of rust or anything sticky, do not attempt to force it into motion.
   In the above case, remove the rust or sticky thing, and apply oil lor grease on the relevant spot.
   Otherwise, the machine may get damaged.

9Y1210982GEG0021US0

[2] CHECK POINTS OF EVERY 50 HOURS



Checking Engine Start System [ROPS Manual Transmission Type]

WARNING

To avoid personal injury or death:

- **Do not allow anyone near the tractor while testing.**
- **If the tractor does not pass the test do not operate the tractor.**
- **Detach an implement before testing.**

■ **Preparation before testing.**

1. Sit on operator's seat.
2. Set the parking brake and stop the engine.
3. Shift the range gear shift lever to **"NEUTRAL"** position.
4. Shift the shuttle shift lever in **"NEUTRAL"** position.
5. Shift the PTO ON-OFF lever to **"OFF"** position.
6. Fully depress the clutch pedal.

■ **Test : Switch for the shuttle shift lever.**

1. Shift the shuttle shift lever to the forward position.
2. Fully depress the clutch pedal and turn the key to **"START"** position.
3. The engine must not crank.
4. Reverse position of the shuttle shift lever checks similarly.

■ **Test : Switch for the PTO ON-OFF lever.**

1. Shift the PTO ON-OFF lever to **"ON"** position.
2. Shift the shuttle shift lever to the **"NEUTRAL"** position.
3. Fully depress the clutch pedal and turn the key to **"START"** position.
4. The engine must not crank.

■ **Test : Switches for the operator's seat and the PTO ON-OFF lever.**

1. Sit on the operator's seat.
2. Start the engine.
3. Fully depress the clutch pedal.
4. Shift the PTO ON-OFF lever to **"ON"** position.
5. Release the clutch pedal and parking brake.
6. Stand up. (Do not get off the machine.)
7. The engine must shut off after approximately 1 second.

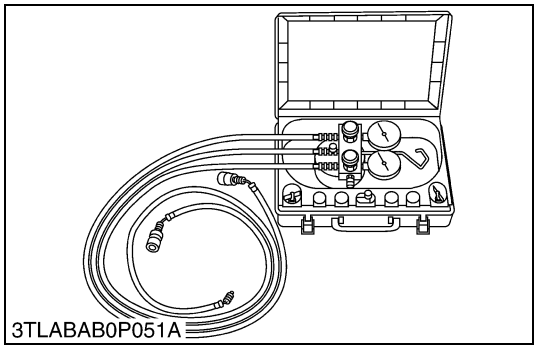
(1) Shuttle Shift Lever
(2) Clutch Pedal
(3) PTO ON-OFF Lever
(4) Range Gear Shift Lever

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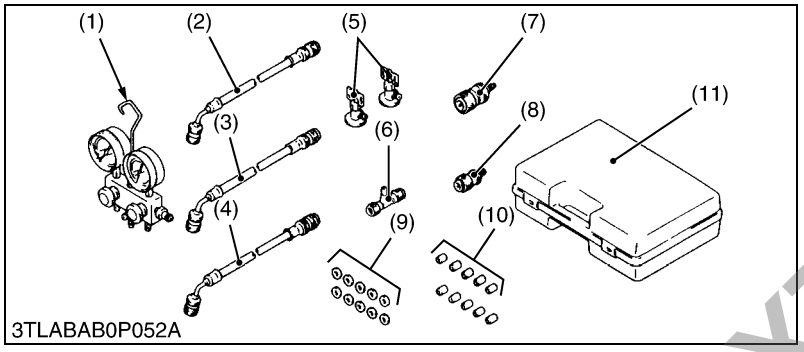
[3] SPECIAL TOOLS FOR CABIN


3TLABAB0P051A

Air Conditioner Service Tool

Code No.
- DENSO 95048-00063

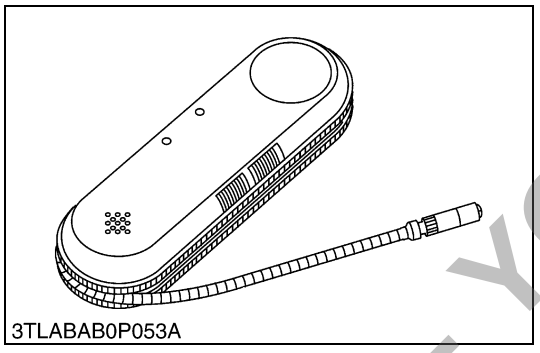
Application
- Use for charge, test or discharge of the air conditioning system.



3TLABAB0P052A

(1) Manifold Gauge Assembly (95048-10090)
(2) Charging Hose (Red: HI) (95948-10270)
(3) Charging Hose (Blue: LO) (95948-10280)
(4) Charging Hose (Green) (95948-10260)
(5) Can Tap Valve (95048-10150)
(6) T Joint (95048-10160)
(7) Quick Coupler (HI) (95048-10130)
(8) Quick Coupler (LO) (95048-10140)
(9) Service Valve Packing (95906-10310)
(10) Charging Hose Packing (95906-10300)
(11) Tool Case (95949-10610)

WSM000001GEG0042US0

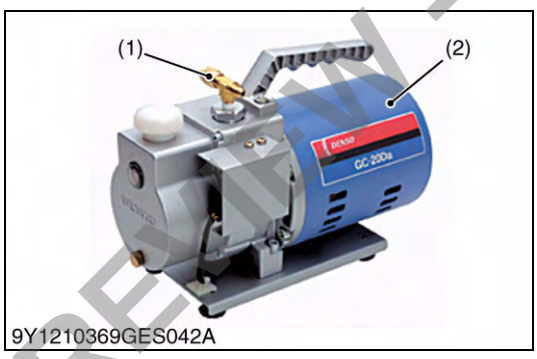

3TLABAB0P053A

Electric Gas Leak Tester

Code No.
- DENSO 95146-00060

Application
- Use for gas leak test of the air conditioning system.

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9Y1210369GES042A

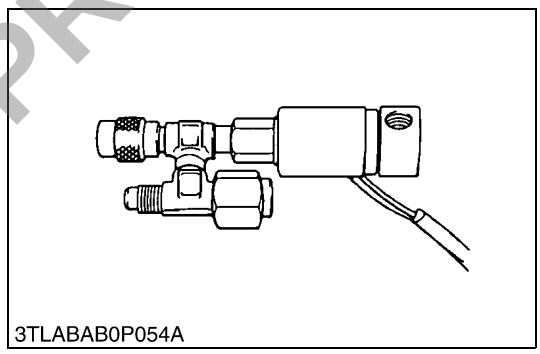
Vacuum Pump

Code No.
- DENSO 95046-00130 (AC220V)
- DENSO 95046-00140 (AC240V)

Application
- Use to evacuate the air conditioning system.

(1) Adaptor (For 134a) (2) Vacuum Pump

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3TLABAB0P054A

Adaptor (For R134a)

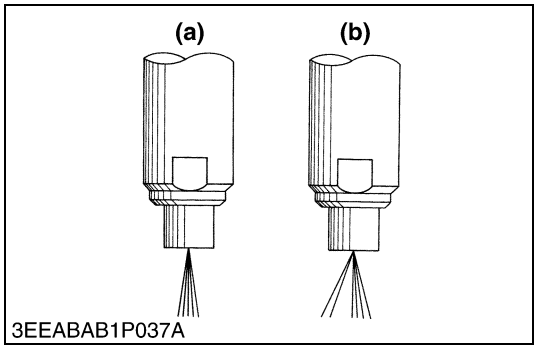
Code No.
- DENSO 95048-10190 (AC220V)
- DENSO 95048-10200 (AC240V)

Application
- Use to evacuate the air conditioning system.

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Nozzle Spraying Condition

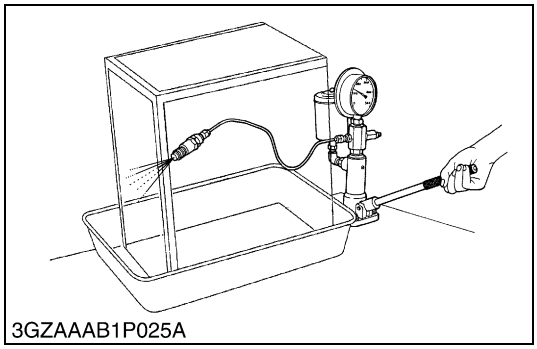
CAUTION

- **Check the injection pressure and condition after you make sure that there is nobody standing in the direction the fume goes.**
- **If the fume from the nozzle directly injects the human body, cells may be destroyed and blood poisoning may be caused.**

1. Set the injection nozzle to a nozzle tester, and check the nozzle spraying condition.
2. If the spraying condition is damaged, replace the nozzle piece.

(a) Good **(b) Bad**

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3GZAAAB1P025A

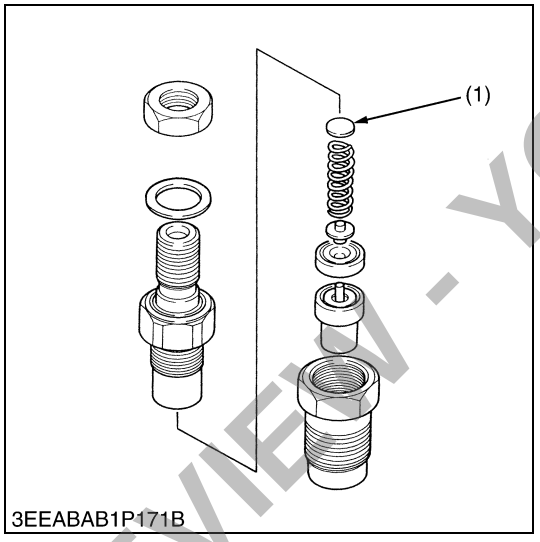
Fuel Injection Pressure

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 specification	13.73 to 14.71 MPa 140 to 150 kgf/cm^2 1990 to 2130 psi

(Reference)

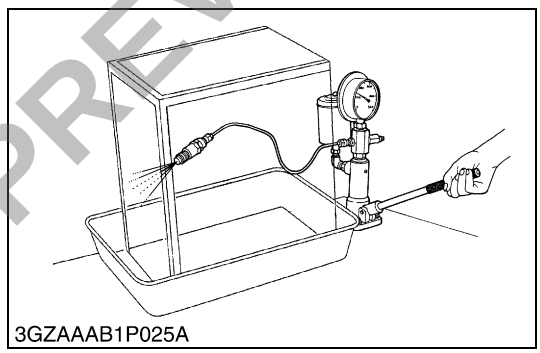
- Pressure variation with 0.01 mm (0.0004 in.) difference of adjusting washer thickness:
  Approx. 235 kPa (2.4 kgf/cm^2, 34 psi)



3EEABAB1P171B

(1) Adjusting Washer

9Y1210982ENS0020US0


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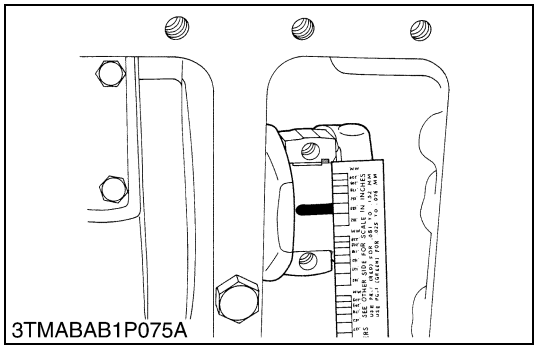
Valve Seat Tightness

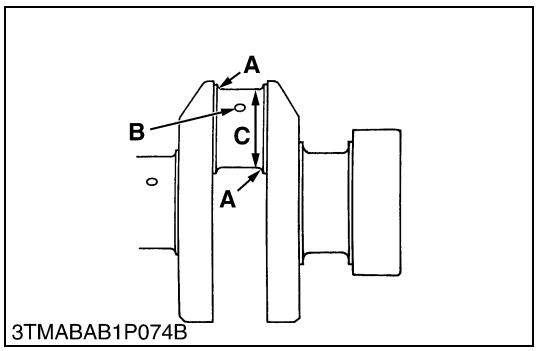
1. Set the injection nozzle to a nozzle tester.
2. Raise the fuel pressure, and keep at 12.75 MPa (130 kgf/cm^2, 1849 psi) for 10 seconds.
3. If any fuel leak is found, replace the nozzle piece.

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

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3TMABAB1P075A



3TMABAB1P074B

Oil Clearance between Crankpin and Crankpin Bearing

1. Clean the crankpin and crankpin bearing.
2. Put a strip of plastigauge on the center of the crankpin.
3. Install the connecting rod cap and tighten the connecting rod screws to the specified torque, and remove the cap again.
4. Measure the amount of the flattening with the scale, and get the oil clearance.
5. If the oil clearance exceeds the allowable limit, replace the crankpin bearing.
6. If the same size bearing is useless because of the crankpin wear, replace it with an undersize one referring to the table and figure.

■ **NOTE**
- **Never insert the plastigauge into the crankpin oil hole.**
- **Be sure not to move the crankshaft while the connecting rod screws are tightened.**

Oil clearance between crankpin and crankpin bearing	Factory specification	0.029 to 0.091 mm 0.0011 to 0.0036 in.
	Allowable limit	0.20 mm 0.0079 in.

Crankpin O.D.	Factory specification	39.959 to 39.975 mm 1.5732 to 1.5738 in.
Crankpin bearing I.D.	Factory specification	40.004 to 40.050 mm 1.5750 to 1.5767 in.

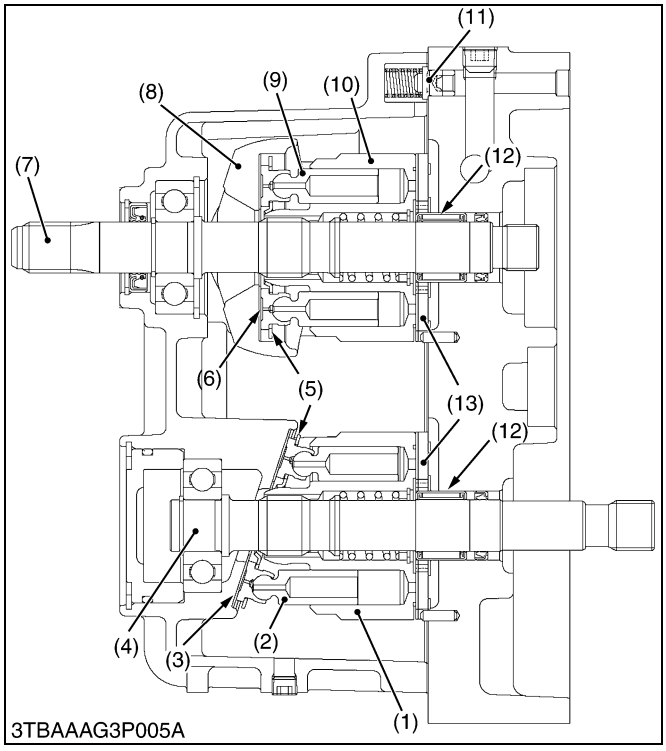
(Reference)
- Undersize dimensions of crankpin

Undersize	**0.20 mm 0.0079 in.**	**0.40 mm 0.016 in.**
Dimension **A**	2.8 to 3.2 mm radius 0.11 to 0.12 in. radius	2.8 to 3.2 mm radius 0.11 to 0.12 in. radius
*Dimension **B**	1.0 to 1.5 mm relief 0.040 to 0.059 in. relief	1.0 to 1.5 mm relief 0.040 to 0.059 in. relief
Dimension **C**	39.759 to 39.775 mm dia. 1.5654 to 1.5659 in. dia.	39.559 to 39.575 mm dia. 1.5575 to 1.5580 in. dia.
The crankpin must be fine-finished to higher than Rmax = 0.8S. *Holes to be de-burred and edges rounded with 1.0 to 1.5 mm (0.040 to 0.059 in.) relief.		

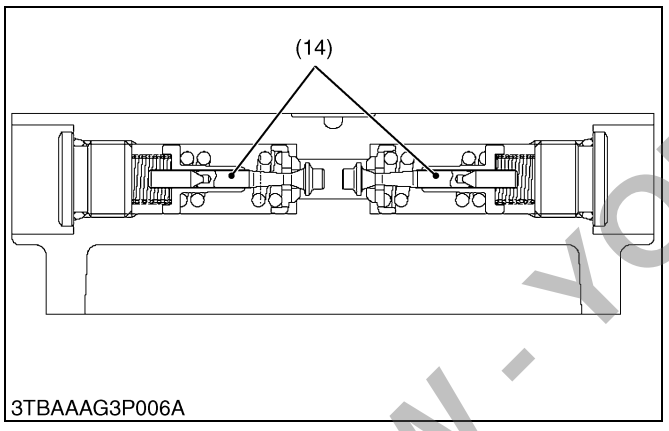
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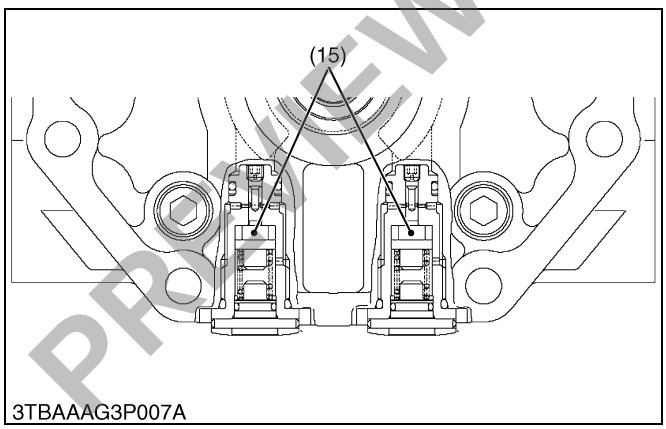
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3TBAAAG3P005A



3TBAAAG3P006A



3TBAAAG3P007A

(1) Cylinder Block (Motor)
(2) Piston
(3) Thrust Collar
(4) Motor Shaft
(5) Retainer Plate
(6) Thrust Collar
(7) Pump Shaft
(8) Variable Swashplate
(9) Piston
(10) Cylinder Block (Pump)
(11) Charge Relief Valve
(12) Needle Bearing
(13) Valve Plate
(14) Check and High Pressure Relief Valve
(15) Neutral Valve

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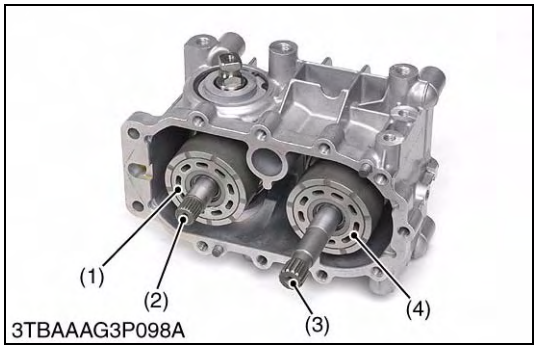
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INDEPENDENT PTO

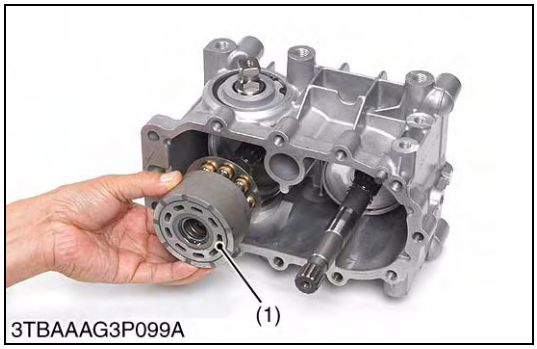
Symptom	Probable Cause and Checking Procedure	Solution	Reference Page
PTO Clutch Slip	1. Operating pressure is low	Solution order 1. Check PTO control valve setting pressure	3-S14
		2. Inspect clutch disc or plate	3-S62
		3. Replace PTO clutch or other parts	3-S50
	2. Independent PTO control valve malfunctioning	Solution order 1. Check PTO control valve setting pressure	3-S14
		2. Inspect or replace poppet or PTO control valve	3-S14
	3. Clutch disc or drive plate excessively worn	Solution order 1. Check PTO control valve setting pressure	3-S14
		2. Inspect or replace clutch disc or plate	3-S62
	4. Deformation of piston or return plate	Solution order 1. Inspect return plate or piston	3-S62
		2. Replace return plate or piston	3-S51
PTO Shaft Does Not Rotate	1. PTO clutch malfunctioning	Solution order 1. Check PTO control valve setting pressure	3-S14
		2. Replace PTO clutch or other parts	3-S50
PTO Clutch Operating Pressure is Low	1. Transmission oil improper or insufficient	Check transmission oil	G-8
	2. Relief valve malfunctioning	Solution order 1. Check PTO control valve setting pressure	3-S14
		2. Replace poppet	3-S14
PTO Clutch Drags	1. Brake plate excessively worn	Replace brake plate	3-S51
	2. Return spring weaken or broken	Inspect or replace return spring	3-S51

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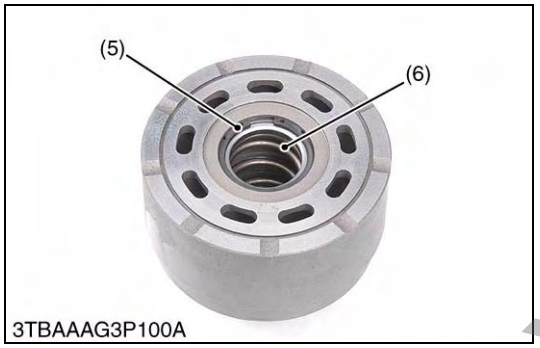
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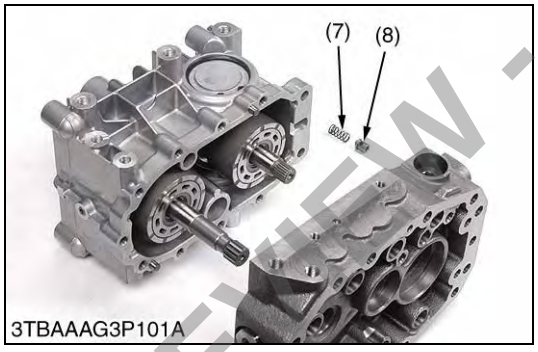
3TBAAAG3P098A



3TBAAAG3P099A



3TBAAAG3P100A



3TBAAAG3P101A

HST Housing Case Cylinder Blocks

1. Remove the cylinder blocks (1) and (4) from the pump shaft (2) and the motor shaft (3).
2. Remove the cir-clip (5) and spring (6) from the cylinder block.

(When reassembling)

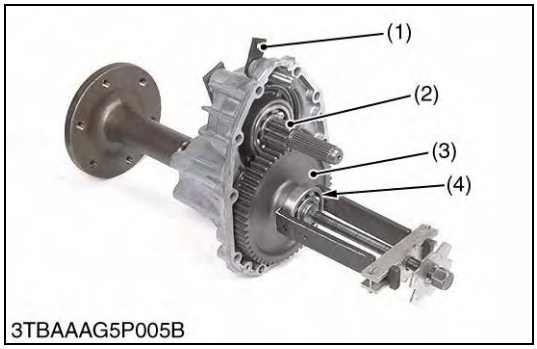
- Install the poppet (8) to the center section, not to drop it.
- Install the spring (7) to the HST housing side.

(1) Cylinder Block (Pump)
(2) Pump Shaft
(3) Motor Shaft
(4) Cylinder Block (Motor)
(5) Cir-clip
(6) Spring
(7) Spring
(8) Poppet

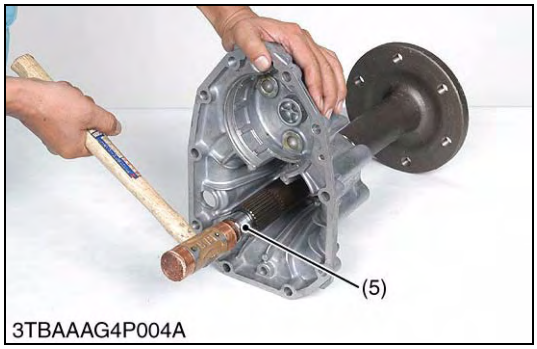
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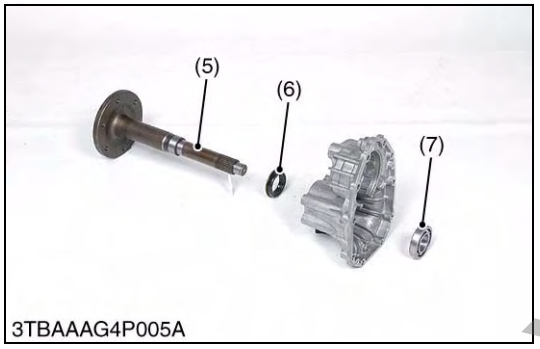
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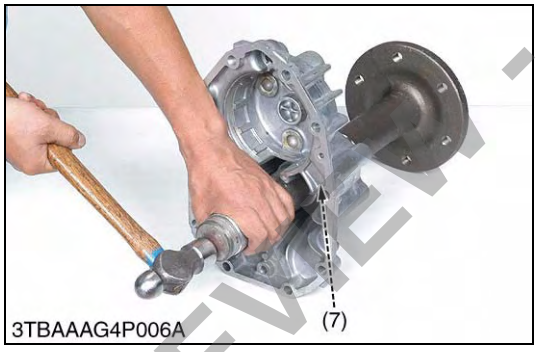
3TBAAAG5P005B



3TBAAAG4P004A



3TBAAAG4P005A



3TBAAAG4P006A

Rear Axle Shaft

1. Remove the fork rod (1).
2. Remove the ball bearing (4) with a puller.
3. Remove the gear (3).
4. Remove the brake shaft assembly (2).
5. Tap out the rear axle shaft (5) with a rubber hammer to the outside.

(When reassembling)

- Tap in the ball bearing to the rear axle case.

(1) Fork Rod
(2) Brake Shaft Assembly
(3) 57T Gear
(4) Ball Bearing
(5) Rear Axle Shaft
(6) Oil Seal
(7) Ball Bearing

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[2] SERVICING


3TBAAAG4P007A

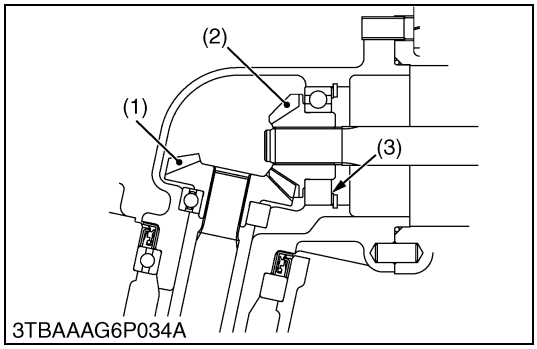
Checking Ball Bearing

1. Hold the inner race, and push and pull the outer race in all directions to check for wear and roughness.
2. Apply transmission fluid to the bearing, and hold the inner race. Then, turn the outer race to check rotation.
3. If there is any problem, replace it.

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Backlash between 10T or 11T Bevel Gear and 16T Bevel Gear

1. Stick a strip of fuse to three spots on the 16T bevel gear (1) with grease.
2. Fix the front axle case, bevel gear case and front gear case.
3. Turn the axle.
4. Remove the bevel gear case from front axle case and measure the thickness of the fuses with an outside micrometer.
5. If the backlash is not within the factory specifications, adjust with shim (3).

Backlash between bevel gear and bevel gear (16T)	Factory specification	0.10 to 0.30 mm 0.0040 to 0.011 in.

(Reference)

- Thickness of adjusting shims (3):
  0.8 mm (0.031 in.)
  1.0 mm (0.039 in.)
  1.2 mm (0.047 in.)
  1.4 mm (0.055 in.)
- Tooth contact: More than 35%

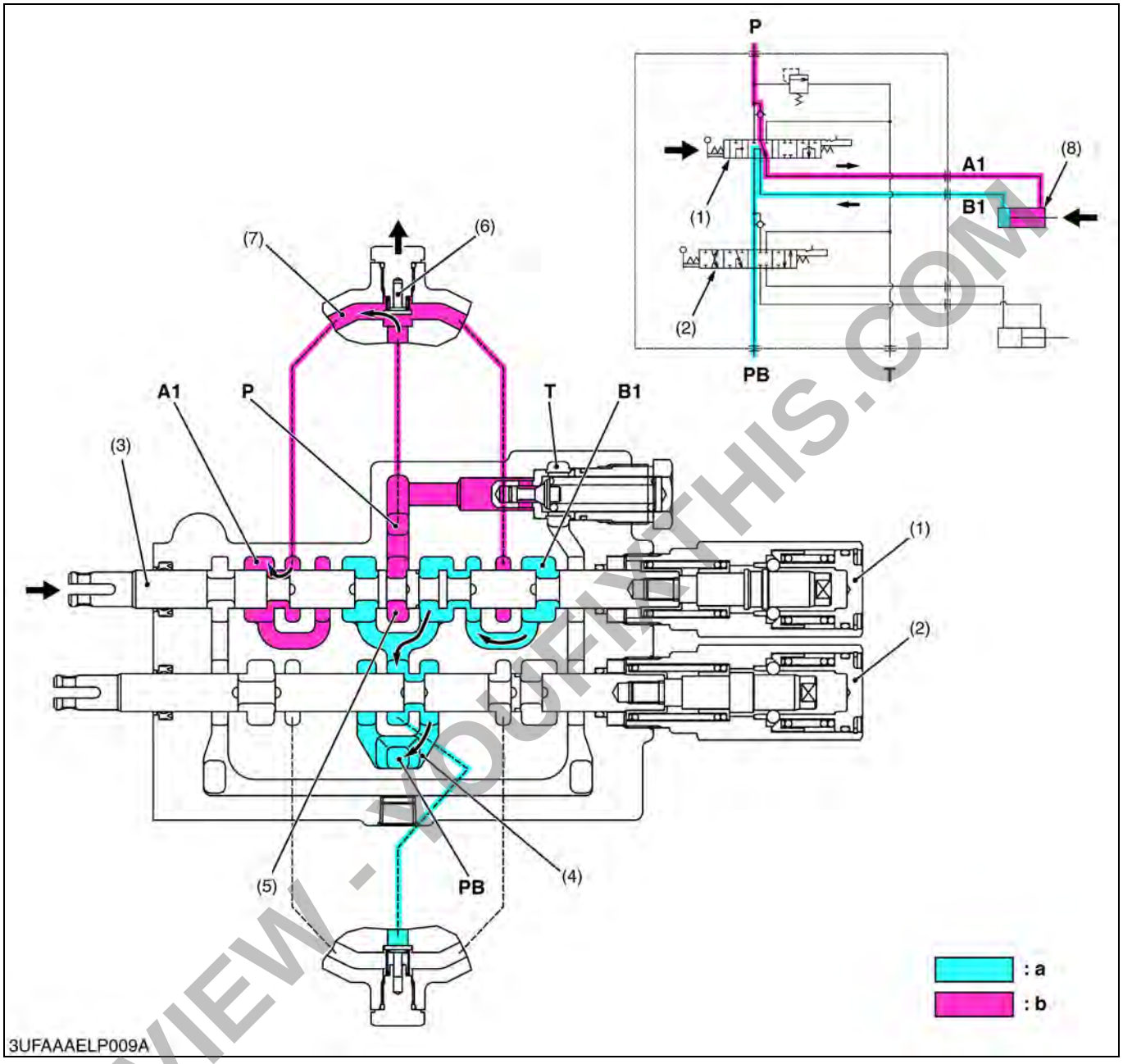
(1) Bevel Gear
(2) Bevel Gear
(3) Shim

9Y1210982FAS0022US0

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Down



(1) Boom Control Section
(2) Bucket Control Section
(3) Spool
(4) **PB** Passage 1
(5) Neutral Passage 1
(6) Load Check Valve
(7) Passage 1
(8) Boom Cylinder

P: P Port
T: T Port

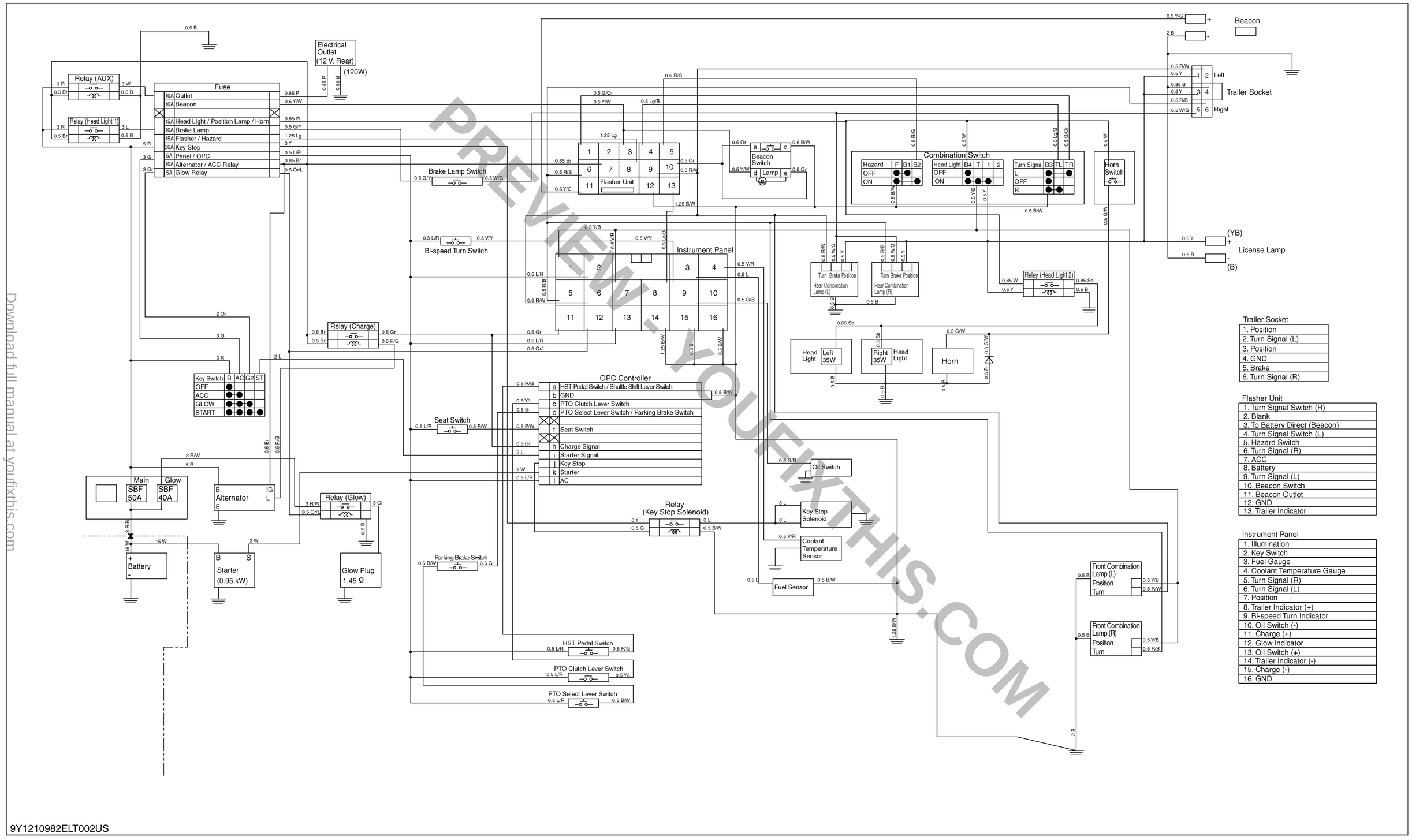
A1: A1 Port (To Boom Cylinder)
B1: B1 Port (From Boom Cylinder)
PB: PB Port
a: Low Pressure
b: High Pressure

1. When the hydraulic control lever is set to the **"DOWN"** position, the spool (3) moves to the right, which forms oil passages between passage 1 (7) and **A1** port, and between **B1** port and **PB** passage 1 (4).
2. As the oil passage from the neutral passage 1 (5) to the **PB** passage 1 (4) is closed by the spool (3), the pressure-fed oil from the **P** port opens the load check valve (6) and flows through the notched section of the spool (3) and **A1** port to retract the boom cylinder (8).
3. Return oil from the boom cylinder (8) flows from the **B1** port through the passage in the spool (3) and **PB** passage 1 (4) to the bucket control section (2).

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[2] B3150 ROPS



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1. TROUBLESHOOTING

FUSE AND WIRING

Symptom	Probable Cause and Checking Procedure	Solution	Reference Page
All Electrical Equipment Do Not Operate	1. Battery discharged or damaged	Check or recharge battery	9-S10
	2. Battery positive cable disconnected or improperly connected	Repair or replace battery positive cable	9-S9
	3. Battery negative cable disconnected or improperly connected	Repair or replace negative cable	9-S9
	4. Slow blow fuse blown	Repair main harness or glow, ECU harness	9-M1 to 9-M3
Fuse Blown Frequently	1. Short-circuited	Repair or replace fuse	G-40

BATTERY

Symptom	Probable Cause and Checking Procedure	Solution	Reference Page
Battery Discharges Too Quickly	1. Battery damaged	Recharge or replace battery	9-S10
	2. Alternator damaged	Repair or replace alternator	9-S40
	3. Regulator damaged	Replace regulator	9-M18
	4. Wiring harness disconnected or improperly connected	Repair or replace connector and wire harness	9-M1 to 9-M3
	5. Cooling fan belt slipping	Adjust fan belt	G-26

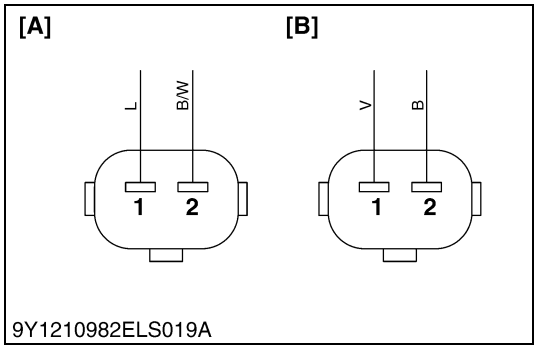
STARTING SYSTEM

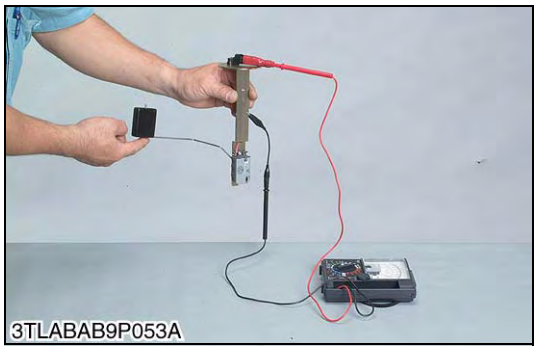
Symptom	Probable Cause and Checking Procedure	Solution	Reference Page
Starter Motor Does Not Operate	1. Battery discharged or damaged	Recharge or replace battery	9-S10
	2. Slow blow fuse blown	Replace main harness or other	9-M1 to 9-M3
	3. Safety switch improperly adjusted or damaged	Repair or replace safety switch	9-S17
	4. Wiring harness disconnected or improperly connected	Repair or replace connector and wire harness	9-M1 to 9-M3
	5. Starter relay damaged	Replace starter relay	9-S11
	6. Starter motor damaged	Solution order 1. Check starter motor	9-S40
		2. Replace starter motor	9-S40
	7. Main switch damaged	Check or replace main switch	9-S22

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(6) Fuel Sensor





Fuel Sensor

1) Connector Voltage

1. Disconnect the connector and turn the key switch **"ON"** position.
2. Measure the voltage with a voltmeter across the terminals shown in the table below.
3. If the reference value is not indicated as shown in the table below, check the relating electric circuit.

Voltage	Key switch at **"ON"**	Terminal **1** – chassis	Approx. 5 V

2) Sensor Continuity

1. Remove the fuel lever sensor from the fuel tank.
2. Measure the resistance across the sensor terminal and its body.
3. If the reference value are not indicated, the sensor is damaged.

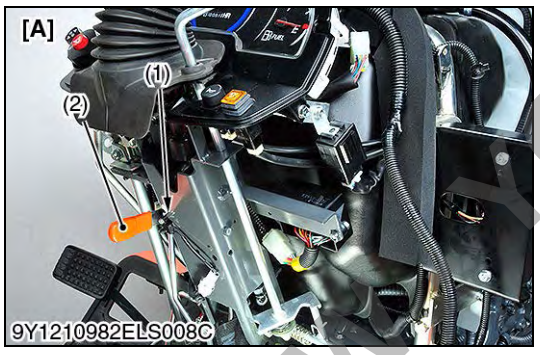
Resistance (Sensor terminal – its body)	Reference value	Float at upper-most position	2 to 4 Ω
		Float at lower-most position	109 to 111 Ω

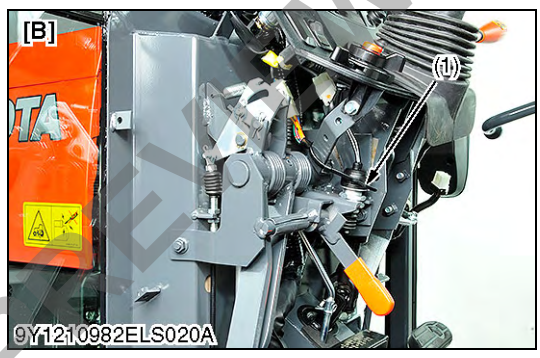
(1) Fuel Sensor Connector (Harness Side)

[A] ROPS Model
[B] CABIN Model

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(7) Bi-speed Turn Switch





Bi-speed Turn Switch Continuity

1. Disconnect the switch connector.
2. Connect the circuit tester to the switch connector.
3. Measure the resistance between terminals.
4. If the switch is damaged, replace it.

Bi-speed turn switch	When bi-speed turn lever is at normal 4WD position	Infinity
	When bi-speed turn lever is at bi-speed turn 4WD position	0 Ω

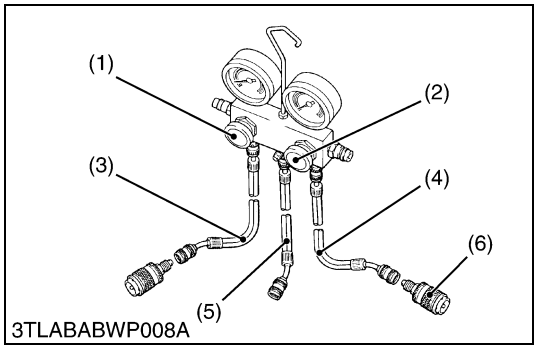
(1) Bi-speed Turn Switch

[A] ROPS Model
[B] CABIN Model

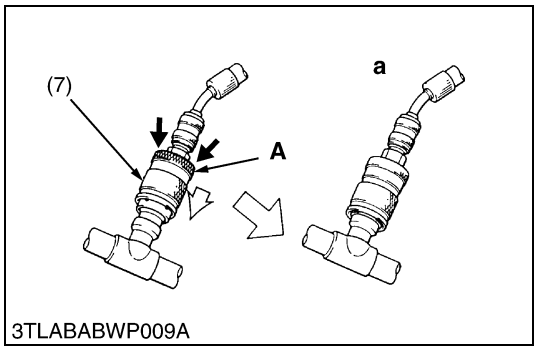
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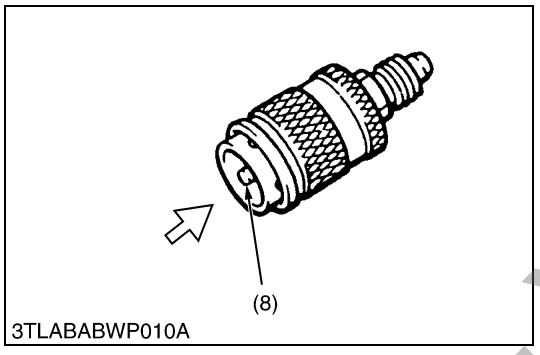
(2) Refrigerant Charging Hose



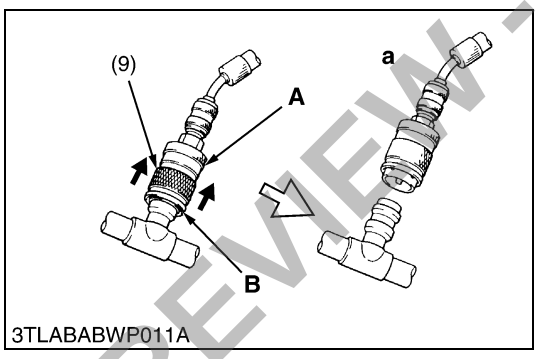
3TLABABWP008A



3TLABABWP009A



3TLABABWP010A



3TLABABWP011A

The charging hoses are classified into three colors. Each charging hose must be handled as follows:

- The air conditioner manufacture recommends that the blue hose (3) is used for the **LO** pressure side (suction side), the green hose (5) for refrigeration side (center connecting port) and the red hose (4) for **HI** pressure side (discharged side).

(When connecting)

- Push the quick disconnect adaptor (6) into the charging valve, and push on part **A** until a click is heard.

■ **NOTE**

- **When connecting, push carefully so the pipe doesn't bend.**
- **When connecting the quick disconnect connector, should the sleeve (7) move before the quick link connector can be connected to the charging valve, move the quick sleeve to its original position and try again.**
- **When some refrigerant remains in the charging hose at the time of connections, it may be difficult to connect the quick link connector. In this case, perform the operation after removing any residual pressure in the hose. (Remove the residual pressure by pushing the pusher (8).)**

(When reassembling)

- While holding on to part **A** of the quick disconnect adaptor, slide part **B** up.

■ **NOTE**

- **After removing the adaptor, ensure to cap the quick disconnect adaptor service valve.**

(1) **LO** Pressure Side Valve
(2) **HI** Pressure Side Valve
(3) Blue Hose
(4) Red Hose
(5) Green Hose
(6) Quick Disconnect Adaptor
(7) Sleeve
(8) Pusher
(9) Sleeve

a: CLICK

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