WSM

WORKSHOP MANUAL
UTILITY VEHICLE

RTV900

Kubota

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KiSC issued 06, 2009 A

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.

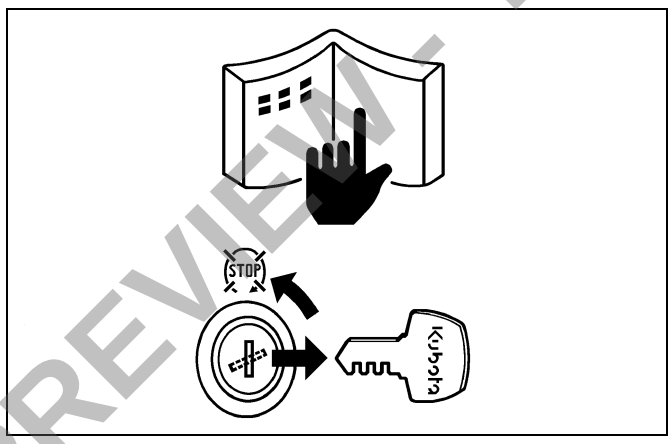
DANGER : Indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.

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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SPECIFICATIONS

Model			General Purpose	Worksite	Turf	Recreational
Engine	Maker		KUBOTA			
	Model		D902-E-UV / D902-E2-UV			
	Type		Indirect Injection. Vertical, water-cooled, 4-cycle diesel			
	Number of cylinders		3			
	Bore and stroke		72 × 73.6 mm (2.83 × 2.90 in.)			
	Total displacement		898 cm^3 (54.8 cu.in.)			
	Engine gross power (DIN)		16.1 kW (21.6 HP)			
	Rated revolution		53.3 r/s [3200 min^{-1} (rpm)]			
	Maximum torque		54.7 N·m (5.6 kgf·m, 40.5 lbf·ft) / 30.0 to 36.7 r/s [1800 to 2200 min^{-1} (rpm)]			
	Battery		12 V, CCA : 535 A, RC : 80 min.			
	Starting system		Electric starting with cell starter, 12 V, 1.2 kW			
	Lubrication 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)			
	Engine crankcase (with filter)		3.1 L (3.3 U.S.qts, 2.7 Imp.qts)			
	Engine coolant (with recovery tank)		4.0 L (4.2 U.S.qts, 3.5 Imp.qts)			
	Transmission case		10.0 L (2.6 U.S.gals, 2.2 Imp.gals)			
	Front axle case		0.6 L (0.63 U.S.qts, 0.52 Imp.qts)			
	Knuckle case		Ref. 0.1 L (0.10 U.S.qts, 0.09 Imp.qts)			
	Brake fluid (reservoir and lines)		0.4 L (0.42 U.S.qts, 0.35 Imp.qts)			
	Hydraulic lift oil (Hydraulic dumping system model)		8.0 L (2.1 U.S.gals, 1.8 Imp.gals)			
	Hydraulic lift oil (Hydraulic PTO model)		7.0 L (1.8 U.S.gals, 1.5 Imp.gals)			
	Power steering oil		5.9 L (1.6 U.S.gals, 1.3 Imp.gals)			
Travelling system	Tires	Front	25 × 10 – 12 Knobby, 6PLY	25 × 10 – 12 HDWS, 6PLY	23 × 10.5 – 12 Turf, 4PLY	25 × 10 – 12 ATV, 6PLY
		Rear	25 × 10 – 12 Knobby, 6PLY	25 × 10 – 12 HKDWS, 6PLY	23 × 10.5 – 12 Turf, 4PLY	25 × 11 – 12 ATV, 6PLY
	Steering		Hydrostatic power			
	Transmission		Continuously variable hydro transmission (VHT)			
	Wheels and drive		4 wheels, rear 2WD or 4WD			
	Gear selection		Hi-Med-Lo range, forward, neutral, reverse			
	Differential lock		Standard; foot operated with mechanical holder			
	Brake	Front / Rear	Wet disc type			
		Parking brake	Rear wheel, hand lever			
	Turning diameter		7.5 m (24.6 feet)			
Suspension	Front		Independent, MacPherson strut-type			
	Rear		Semi-independent, DeDion axle with leaf springs and shock absorber			

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

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4. LUBRICANTS, FUEL AND COOLANT

No.	Place	Capacity	Lubricants, fuel and coolant
1	Fuel tank	28.0 L 7.4 U.S.gals 6.2 Imp.gals	No. 2-D diesel fuel No. 1-D diesel fuel if temperature is below −10 °C (14 °F)
2	Cooling system with recovery tank	4.0 L 4.2 U.S.qts 3.5 Imp.qts	Fresh clean water with anti-freeze
3	Engine crankcase with oil filter	(Oil filter exchanged) 3.1 L 3.3 U.S.qts 2.7 Imp.qts (Oil filter non-exchanged) 2.7 L 2.9 U.S.qts 2.4 Imp.qts	Engine oil : API Service CD, CE or CF Below 0 °C (32 °F) : SAE10W, 10W-30 0 to 25 °C (32 to 77 °F): SAE20, 10W-30 or 15W-40 Above 25 °C (77 °F): SAE30, 10W-30 or 15W-40
4	Transmission case	10.0 L 2.6 U.S.gals 2.2 Imp.gals	KUBOTA UDT or SUPER UDT fluid*
5	Front axle case	0.6 L 0.63 U.S.qts 0.52 Imp.qts	KUBOTA UDT or SUPER UDT fluid*
6	Knuckle case	Ref. 0.15 L Ref. 0.16 U.S.qts Ref. 0.13 Imp.qts	KUBOTA UDT or SUPER UDT fluid*
7	Brake fluid (reservoir and lines)	0.4 L 0.42 U.S.qts 0.35 Imp.qts	KUBOTA DOT3 GENUINE BRAKE FLUID
8	Hydraulic lift oil (Hydraulic dumping system model)	8.0 L 2.1 U.S.gals 1.8 Imp.gals	KUBOTA UDT or SUPER UDT fluid*
	Hydraulic lift oil (Hydraulic PTO model)	7.0 L 1.8 U.S.gals 1.5 Imp.gals	
9	Power steering oil	5.9 L 1.6 U.S.gals 1.3 Imp.gals	

* KUBOTA original transmission hydraulic fluid.

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3. TIGHTENING TORQUES

Tightening torques of screws and nuts on the table below are especially specified.
(For general use screws and nuts : See page G-11.)

Item	Size x Pitch	N·m	kgf·m	lbf·ft
Engine mounting screw	–	17.7 to 20.5	1.8 to 2.1	13.1 to 15.1
Input flange	–	48.1 to 55.8	4.9 to 5.7	35.5 to 41.2
Oil pressure switch	PT 1/8	14.7 to 19.6	1.5 to 2.0	10.8 to 14.5
*Cylinder head cover screw	M6 x 1.0	6.89 to 11.3	0.7 to 1.15	5.1 to 8.3
Injection pipe retaining nut	M12 x 1.5	24.5 to 34.3	2.5 to 3.5	18.1 to 25.3
Overflow pipe retaining nut	M12 x 1.5	19.6 to 24.5	2.0 to 2.5	14.5 to 18.1
Nozzle holder assembly	M20 x 1.5	49.0 to 68.6	5.0 to 7.0	36.2 to 50.6
Glow plug	M8 x 1.0	7.8 to 14.7	0.8 to 1.5	5.8 to 10.8
*Rocker arm bracket screw	M6 x 1.0	9.8 to 11.3	1.00 to 1.15	7.2 to 8.3
*Cylinder head screw	M8 x 1.25	37.3 to 42.1	3.8 to 4.3	27.5 to 31.1
*Fan drive pulley screw	M12 x 1.5	117.7 to 127.5	12.0 to 13.0	86.8 to 94.0
*Idle gear shaft mounting screw	M6 x 1.0	9.8 to 11.3	1.00 to 1.15	7.2 to 8.3
*Idle gear retaining nut	M20 x 1.0	78.4 to 88.2	8.0 to 9.0	57.6 to 64.8
*Connecting rod screw	M7 x 0.75	26.5 to 30.4	2.7 to 3.1	19.5 to 22.4
*Flywheel screw	M10 x 1.25	53.9 to 58.8	5.5 to 6.0	39.8 to 43.4
Bearing case cover mounting screw	M6 x 1.0	9.8 to 11.3	1.00 to 1.15	7.2 to 8.3
*Main bearing case screw 2	M7 x 1.0	26.5 to 30.4	2.7 to 3.1	19.5 to 22.4
*Main bearing case screw 1	M6 x 1.0	12.7 to 15.7	1.3 to 1.6	9.4 to 11.6
Nozzle holder		34.3 to 39.2	3.5 to 4.0	25.3 to 28.9
Seat belt mounting screw		48.1 to 55.8	4.9 to 5.7	35.5 to 41.2

■ **NOTE**

- **In removing and applying the screws and nuts marked with "*", a pneumatic wrench or similar pneumatic tool, if employed, must be used with enough care not to get them seized.**
- **For "*" marked screws and nuts on the table, apply engine oil to their threads and seats before tightening.**
- **The letter "M" in Size x Pitch means that the screw or nut dimension stands for metric. The size is the nominal outside diameter in mm of the threads. The pitch is the nominal distance in mm between two threads.**

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6. MAINTENANCE CHECK LIST

[1] FROM FIRST 50 HOURS TO EVERY 550 HOURS

■ **IMPORTANT**

- **The jobs indicated by ★ must be done after the first 50 hours of operation.**

(To be continued)

No.	Item	Period	Indication on hour meter											Important		Reference page
			50	100	150	200	250	300	350	400	450	500	550			
1	Engine start system	Check	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆			G-30
2	Greasing	Apply	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆			G-31
3	Engine oil	Change	★			☆				☆						G-23
4	Muffler	Clean	★	☆		☆		☆		☆		☆				G-25
5	Wheel screw torque	Check	★	☆		☆		☆		☆		☆				G-25
6	Spark arrester	Clean		☆		☆		☆		☆		☆				G-33
7	Battery condition	Check		☆		☆		☆		☆		☆				G-35
8	Fan belt	Adjust		☆		☆		☆		☆		☆				G-36
9	VHT neutral spring	Check		☆		☆		☆		☆		☆				G-32
10	Toe-in	Adjust		☆		☆		☆		☆		☆				G-38
11	Fuel filter element	Check		☆		☆		☆		☆		☆				G-37
		Replace														–
12	Air cleaner element	Clean		☆		☆		☆		☆		☆				G-34
		Replace														–
13	Fuel line	Check		☆		☆		☆		☆		☆				G-37
		Replace														–
14	Engine oil filter	Replace	★			☆				☆						G-24
15	Transmission oil filter (HST) (Yellow color)	Replace	★			☆				☆						G-27
16	Transmission oil filter (Suction) (Orange color)	Replace	★			☆				☆						G-27
17	Transmission oil	Change								☆						G-26
18	Brake pedal	Adjust	★			☆				☆						G-28
19	Parking brake lever	Adjust	★			☆				☆						G-28
20	Brake light switch	Check	★			☆				☆						G-28
21	Front brake case	Check	★			☆				☆						G-29
22	Power steering oil	Change				☆				☆						G-41
23	Hydraulic lift oil	Change				☆				☆						G-40
24	Radiator hose and clamp	Check				☆				☆						G-39
		Replace														–
25	Power steering oil line	Check				☆				☆						G-40
		Replace														–
26	Intake air line	Check				☆				☆						G-41
		Replace														–
27	Brake hose and pipe	Check	★			☆				☆						G-29
		Replace														–

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1. TROUBLESHOOTING

Symptom	Probable Cause	Solution	Reference Page
Engine Does Not Start	No fuel	Replenish fuel	G-8
	Air in the fuel system	Bleed	G-46
	Water in the fuel system	Change fuel and repair or replace fuel system	–
	Fuel pipe clogged	Clean	G-37
	Fuel filter clogged	Change	G-37
	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-S21
	Incorrect injection timing	Adjust	1-S16
	Fuel camshaft worn	Replace	1-S28
	Injection nozzle clogged	Repair or replace	1-S35
	Injection pump malfunctioning	Replace	1-S26
	Seizure of crankshaft, camshaft, piston, cylinder or bearing	Replace	1-S27, S29,S32
	Compression leak from cylinder	Replace head gasket, tighten cylinder head screw, glow plug and nozzle holder	1-S23
	Improper valve timing	Correct or replace timing gear	1-S27
	Piston ring and cylinder worn	Replace	1-S30
	Excessive valve clearance	Adjust	1-S12
(Starter Does Not Run)	Battery discharged	Charge	G-35
	Starter malfunctioning	Repair or replace	8-S25
	Main switch malfunctioning	Repair or replace	8-S10
	Safety switches malfunctioning	Adjust or replace	8-S14
	Wiring disconnected	Connect	–

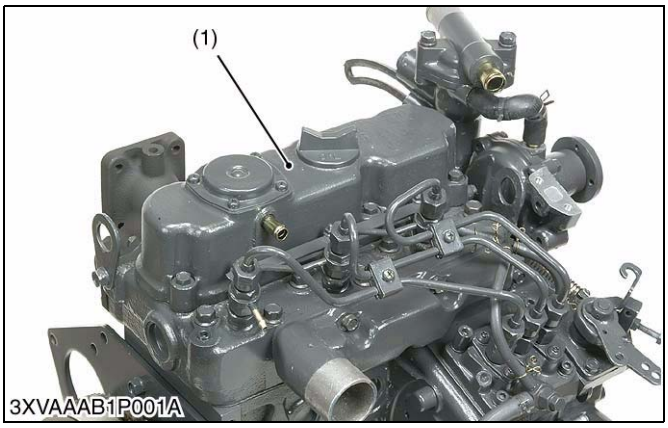
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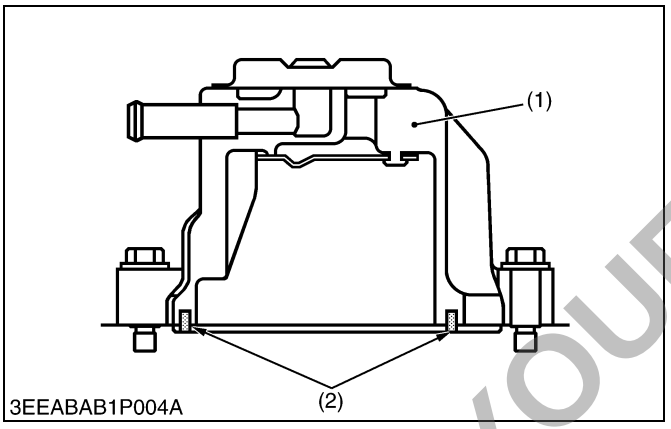
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1. ENGINE BODY

[1] HALF-FLOATING HEAD COVER





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

(1) Cylinder Head Cover (2) Rubber Packing

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[2] GEAR CASE



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

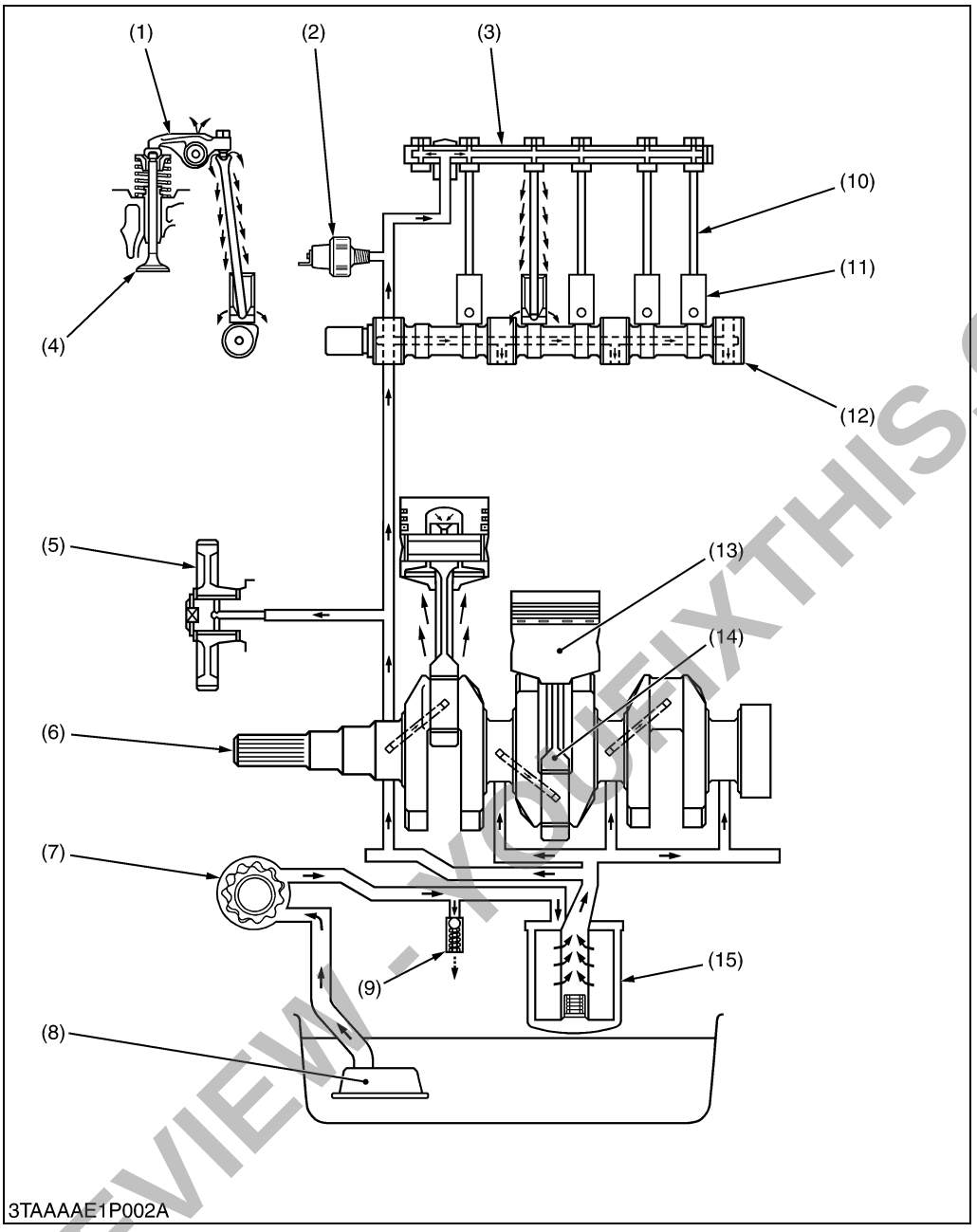
(1) Cooling Fin

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2. LUBRICATING SYSTEM



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(1) Rocker Arm
(2) Oil Pressure Switch
(3) Rocker Arm Shaft
(4) Valve
(5) Idle Gear
(6) Crankshaft
(7) Oil Pump
(8) Oil Strainer
(9) Relief Valve
(10) Push Rod
(11) Tappet
(12) Camshaft
(13) Piston
(14) Connecting Rod
(15) Oil Filter Cartridge

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This engine's lubricating system consists of oil strainer (8), oil pump (7), relief valve (9), oil filter cartridge (15) and oil pressure switch (2).

The oil pump sucks lubricating oil from the oil pan through the oil strainer and the oil flows down to the filter cartridge, where it is further filtered. Then the oil is forced to crankshaft (6), connecting rods (14), idle gear (5), camshaft (12) and rocker arm shaft (3) to lubricate each part.

Some part of oil, splashed by the crankshaft or leaking and dropping from gaps of each part, lubricates these parts: piston (13), cylinders, small ends or connecting rods, tappets (11), push rods (10), inlet and exhaust valves (4) and timing gears.

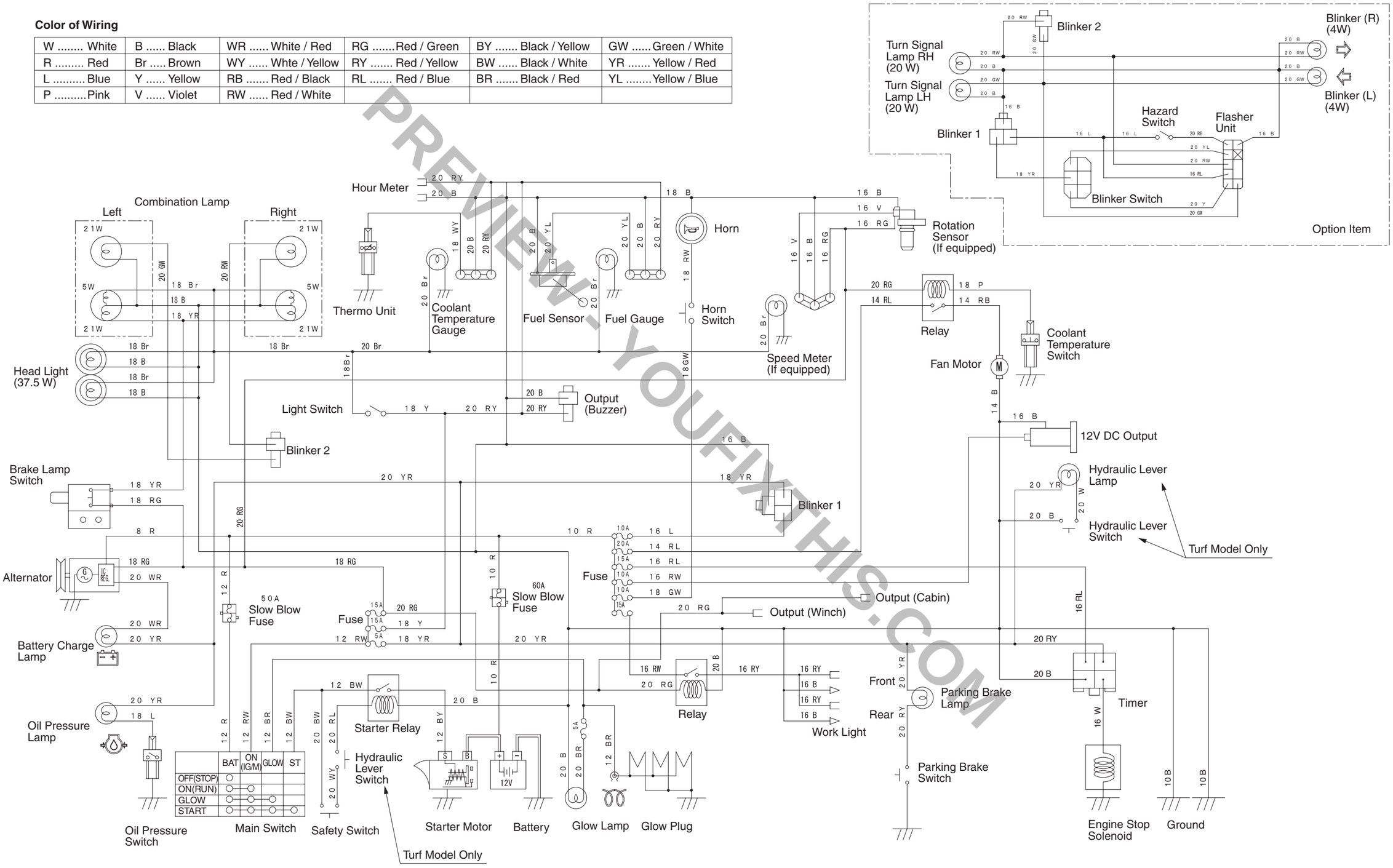
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1. WIRING DIAGRAM

Color of Wiring

W ..... White	B ..... Black	WR ..... White / Red	RG .....Red / Green	BY ..... Black / Yellow	GW .....Green / White
R ..... Red	Br ..... Brown	WY ..... Whte / Yellow	RY ..... Red / Yellow	BW ..... Black / White	YR ..... Yellow / Red
L ..... Blue	Y ..... Yellow	RB ..... Red / Black	RL ..... Red / Blue	BR ..... Black / Red	YL .....Yellow / Blue
P .....Pink	V ..... Violet	RW ..... Red / White			

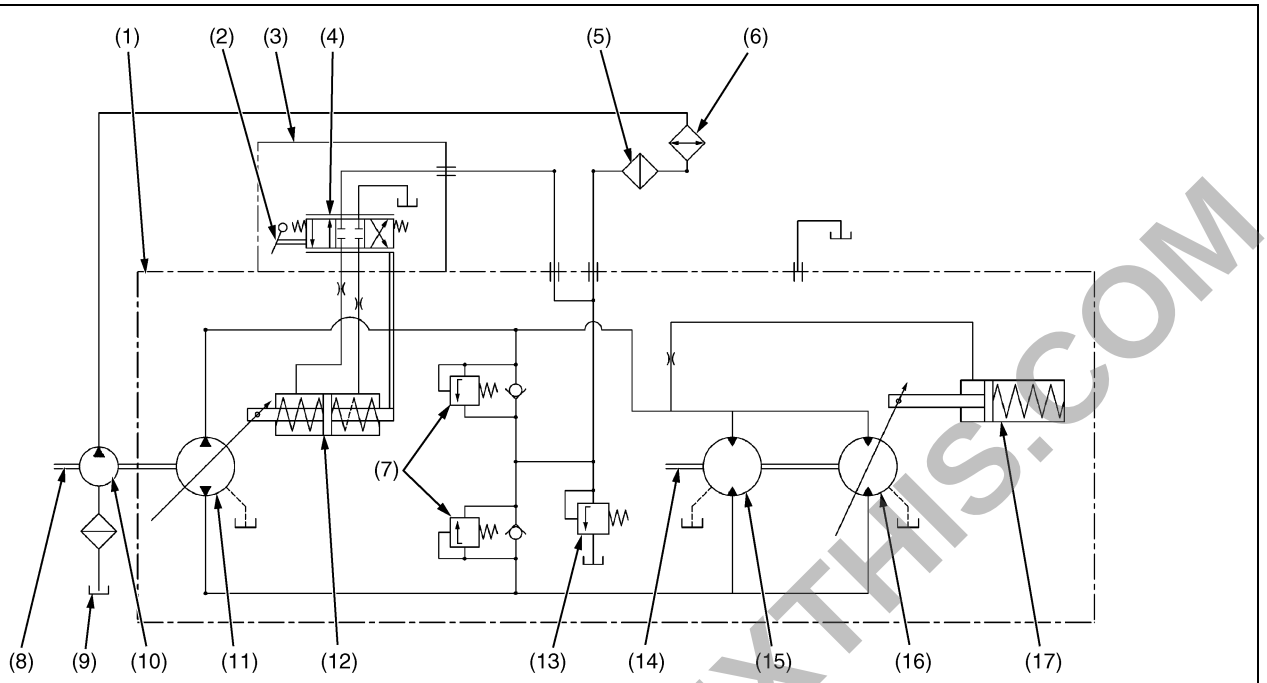


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3XVAAAB9P001A

(2) Oil Flow



3XVAAAB3P005A

(1) HST Assembly
(2) Control Lever (Pedal)
(3) Servo Regulator Assembly
(4) Regulator Valve
(5) Oil Filter Cartridge
(6) Oil Cooler
(7) Check and High Pressure Relief Valve
(8) Input Shaft (Pump Shaft)
(9) Strainer
(10) Charge Pump
(11) Cylinder Block (HST Pump)
(12) Servo Piston
(13) Charge Relief Valve
(14) Output Shaft (Motor Shaft)
(15) Cylinder Block (Stationary Motor)
(16) Cylinder Block (Assist Motor)
(17) Control Piston

A charge pump (10) is used to feed oil to the hydrostatic transmission (HST). The oil coming from the charge pump (10) flows through the oil cooler (6) and oil filter cartridge (5) into the HST main circuit and regulator valve (4). At this time, the servo regulator valve and HST main circuit (that is closed with the control lever at neutral position) are kept at the charge relief valve's (7) set pressure. Step on the pedal, and the regulator valve (4) switches its oil passage to allow the oil into the service port. Being interlocked with the servo piston (12), the swashplate now tilts to activate the variable pump (11). The pressure of oil then force into the stationary motor (15), which in turn is started to keep the oil circulated between the pump and motor.

The heavier the load on the output shaft (14), the higher the pressure of the oil coming from the pump (11). Now the assist motor (16) gets activated to increase the output torque. When the load on the output shaft (14) has dropped and the oil pressure of main circuit also dropped, the assist motor (16) is returned to the original position and the stationary motor (15) alone keeps running the output shaft (14). Now a closed circuit is formed by the pump (11) and stationary motor (15).

(Reference)

- Valve Setting Pressure [Oil temperature : 40 to 60 °C (104 to 140 °F)]
  Charge Relief Valve : 0.52 to 0.72 MPa (5.3 to 7.3 kgf/cm^2, 75 to 104 psi)
  Check and High Pressure Relief Valve : 25.5 to 26.5 MPa (260 to 270 kgf/cm^2, 3698 to 3840 psi)

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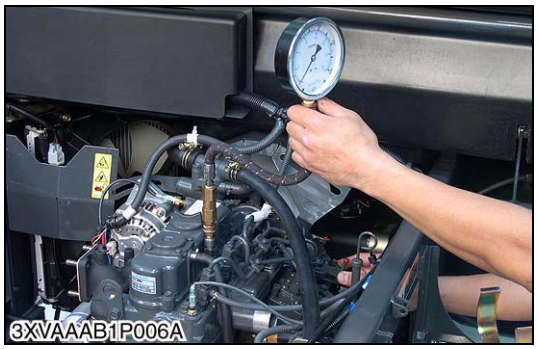
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4. CHECKING, DISASSEMBLING AND SERVICING

[1] CHECKING AND ADJUSTING

CAUTION
- **Be sure to check that the speed is neutrality before the following checks.**
- **When checking, park the machine on flat ground and apply the parking brake.**

(1) Engine Body



Compression Pressure

CAUTION
- **Work by two people when you measure pressure.**

1. Run the engine until it is warmed up.
2. Stop the engine.
3. Remove the air cleaner, the muffler and all glow plugs.
4. Disconnect the accelerator wire.
5. Engage the parking brake.
6. Set a compression tester (Code No. 07909-30208) with the adaptor (Adaptor K, code No. 07909-31301) to the glow plug hole.
7. After making sure that the stop lever is set at the stop position (non-injection), run the engine with the starter and measure the compression pressure.
8. Repeat steps 6 and 7 for each cylinder.
9. If the measurement is below the allowable limit, apply a small amount of oil to the cylinder wall through the glow plug hole and measure the compression pressure again.
10. If the compression pressure is still less than the allowable limit, check the top clearance, valve clearance and cylinder head.
11. If the compression pressure increases after applying oil, check the cylinder wall and piston rings.

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

Compression pressure	Factory spec.	3.53 to 4.02 MPa 36 to 41 kgf/cm^2 512 to 583 psi
	Allowable limit	2.55 MPa 26 kgf/cm^2 370 psi

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SAFETY DECALS

The following safety decals are installed on the machine.
If a decal becomes damaged, illegible or is not on the machine, replace it. The decal parts number is listed in the parts list.

(1) Part No. K7561-6524-1



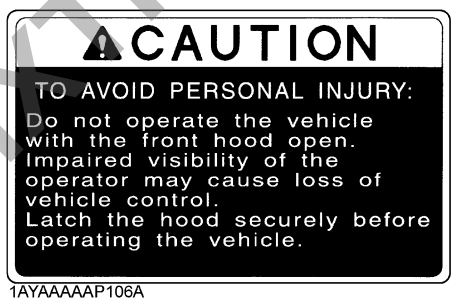
1AYAAAAAP104A

(2) Part No. K7561-6526-1



1AYAAAAAP105A

(4) Part No. K7561-6530-2



1AYAAAAAP106A

(3) Part No. K7561-6541-2



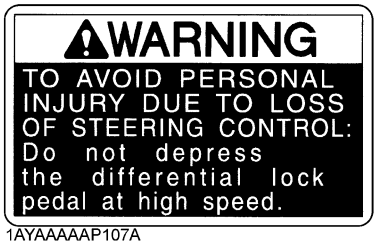
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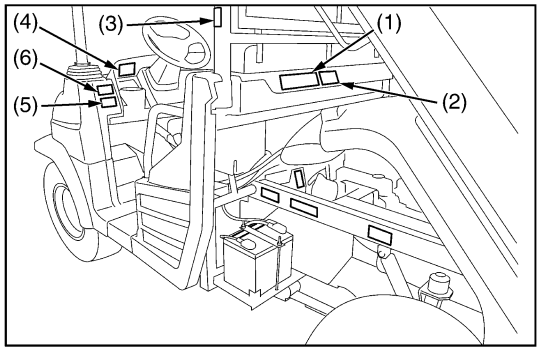


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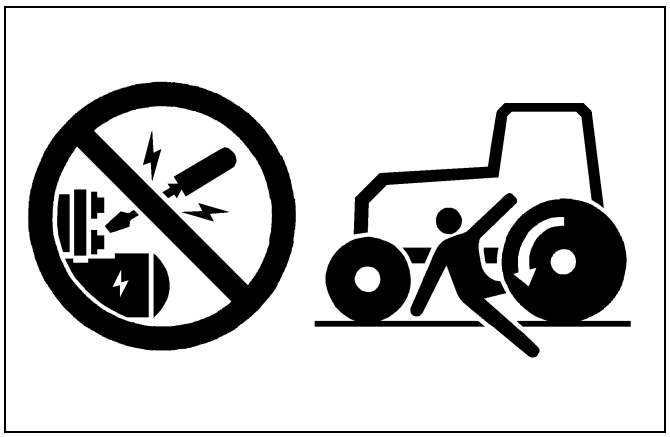
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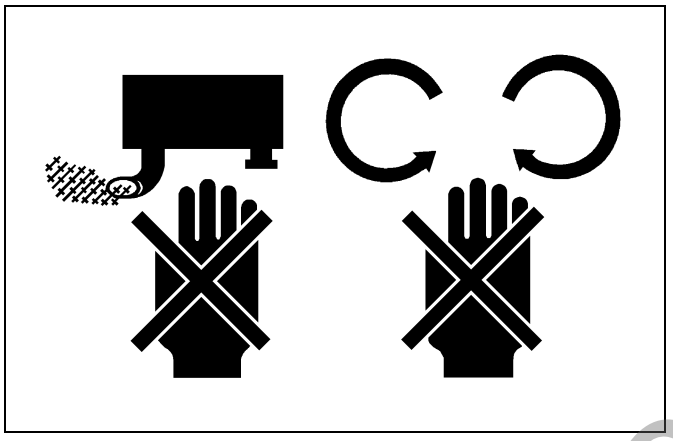
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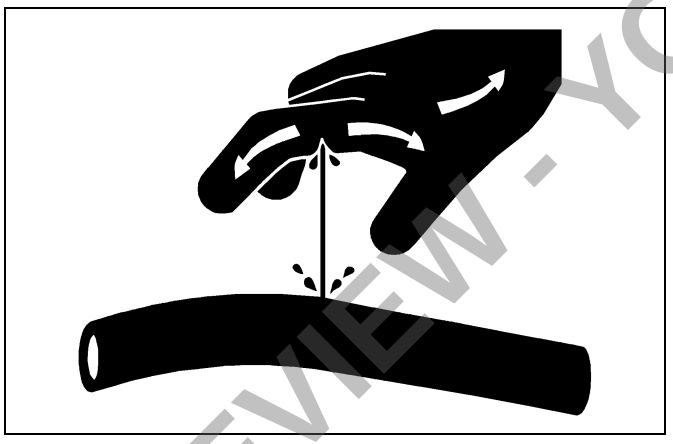
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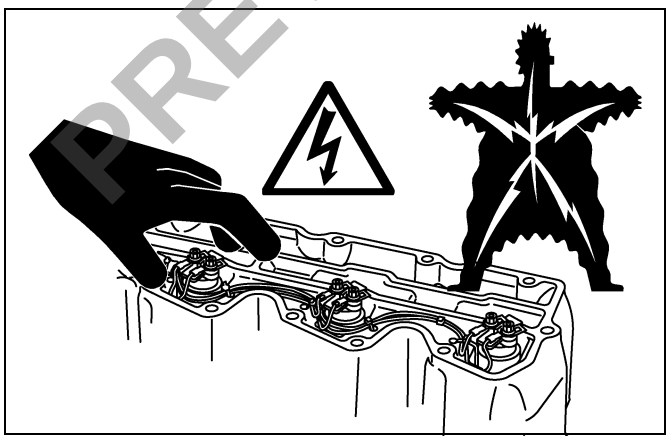


SAFETY STARTING

- 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.





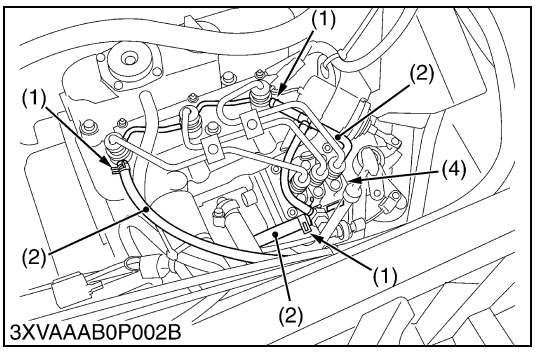


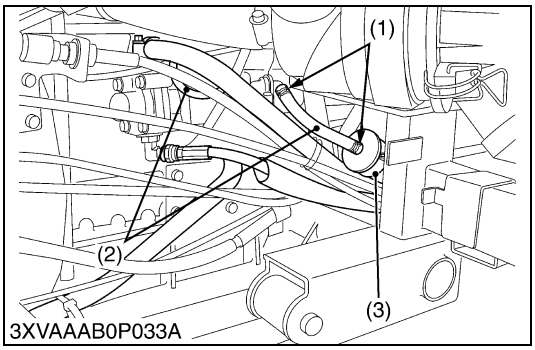
SAFETY WORKING

- 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.
- Do not open high-pressure fuel system.
  High-pressure fluid remaining in fuel lines can cause serious injury. Do not disconnect or attempt 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 is applied to the injector.
  Pay sufficient caution to electric shock when performing work activities.

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Checking Fuel Line and Fuel Filter

CAUTION

- **Be sure to stop the engine and remove the key when attempting to make the following checks and changes.**
- **Never fail to check the fuel lines periodically. The fuel lines are subject to wear and aging. Fuel may leak out onto the running engine, causing a fire.**

The fuel line connections should be checked annually or every 100 service hours, whichever comes first.

1. The fuel line is made of rubber and ages regardless of service period.
2. If the fuel line and clamps are found to be damaged or deteriorated, replace them.
3. Check fuel filter, if it is clogged by debris or contaminated with water, replace it.

IMPORTANT

- **When the fuel line is disconnected for maintenance or repair, close both ends of the fuel line with a piece of clean cloth or paper to prevent dust and dirt from entering. In addition, particular care must be take not to admit dust and dirt into the fuel pump. Entrance of even a small amount of dust or dirt cause premature wear and malfunction of the fuel pump and injector components.**

(1) Pipe Clamp
(2) Fuel Line
(3) Fuel Filter
(4) Fuel Pump

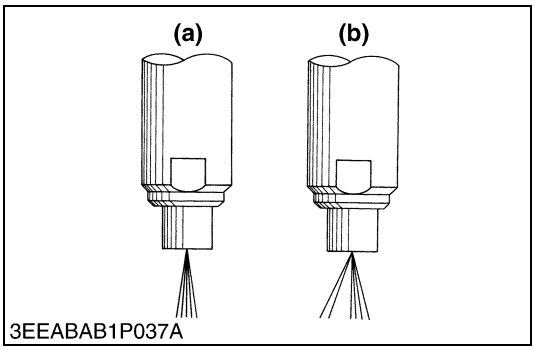
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CAUTION

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



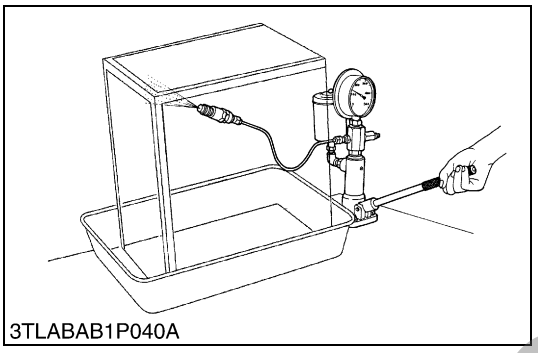
3EEABAB1P037A

Nozzle Spraying Condition

1. Set the injection nozzle to a nozzle tester (Code No. 07909-31361), and check the nozzle spraying condition.
2. If the spraying condition is defective, replace the nozzle piece.

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

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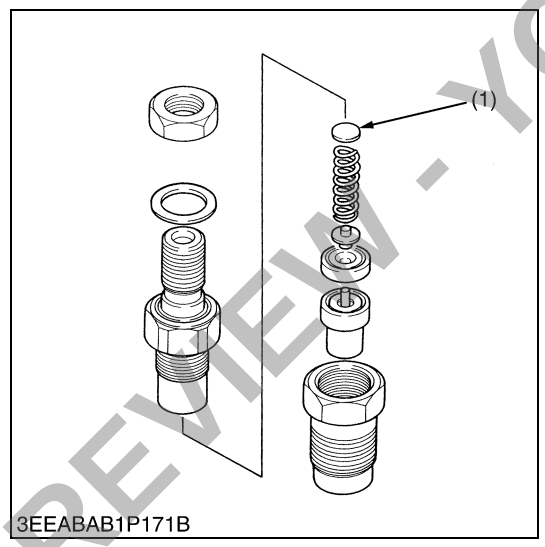

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Fuel Injection Pressure

1. Set the injection nozzle to a nozzle tester (Code No. 07909-31361).
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.

(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)



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Fuel injection pressure	Factory spec.	13.73 to 14.71 MPa 140 to 150 kgf/cm^2 1991 to 2134 psi

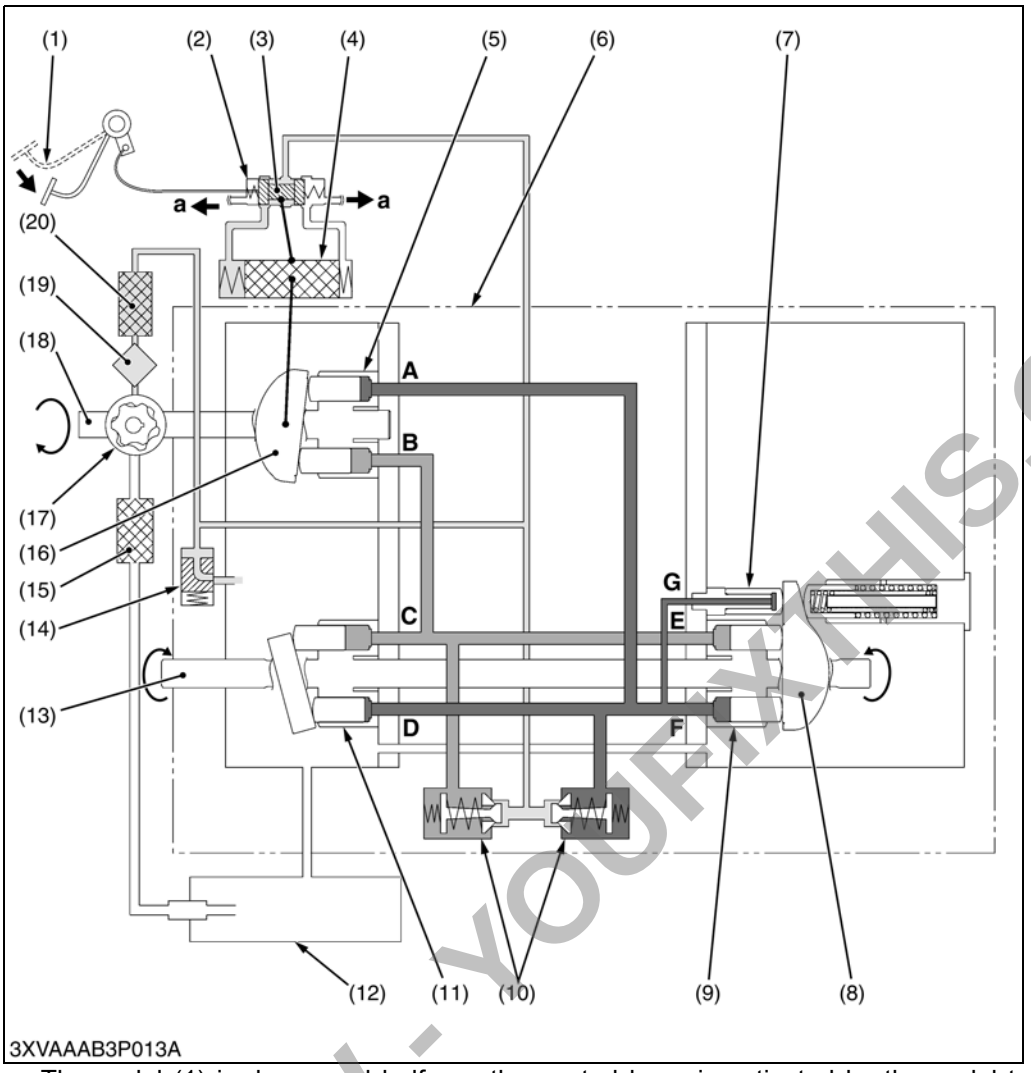
(1) Adjusting Washer

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■ Pedal pressed halfway and under light load



(1) Pedal
(2) Regulator Valve Assembly
(3) Regulator Spool
(4) Servo Piston
(5) Cylinder Block (HST Pump)
(6) HST Housing
(7) Control Piston
(8) Variable Swashplate (Assist Motor)
(9) Cylinder Block (Assist Motor)
(10) Check and High Pressure Relief Valve
(11) Cylinder Block (Stationary Motor)
(12) Transmission Case
(13) Output Shaft
(14) Charge Relief Valve
(15) Oil Filter Cartridge (Suction)
(16) Variable Swashplate (HST Pump)
(17) Charge Pump
(18) Input Shaft
(19) Oil Cooler
(20) Oil Filter Cartridge

a : To HST Housing

The pedal (1) is depressed halfway, the control lever is activated by the pedal to switch the regulator valve's hydraulic circuit. The servo piston (4) is then actuated to tilt the pump's variable swashplate (16) (see the above illustration).

The pump cylinder block (5) is driven by the input shaft (18) to put the oil under high pressure and to feed it out of the pump port **A**. The pressure-fed oil flows into the motor's port **D** along the circuit. The motor's piston is actuated by this pressure oil to push down the stationary swashplate. Then together with the motor's cylinder block (11), the output shaft (13) starts turning.

The output shaft rpm is determined by the delivery rate of the HST pump. Therefore, the rpm can be taken out to the variable.

Then the motor's oil drops to a low pressure and returns through the motor port **C** to the pump port **B**.

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Taper Roller Bearing

1. Check the bearing for abrasion, color change or other damage.
2. If there is any doubt as to the condition of a taper roller bearing, replace it.

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12T-14T Gear Shaft, Gear and Needle Bearing

1. Remove the bearing.
2. Check the needle bearing for abrasion, color, change or other damage.
3. If there is any doubt as to the condition of a needle bearing, replace it.
4. Check both the shaft and the gear surface of the bearing contact point for abrasion, color change or other damage.
5. If there are any doubt as to the condition of shaft and gear.

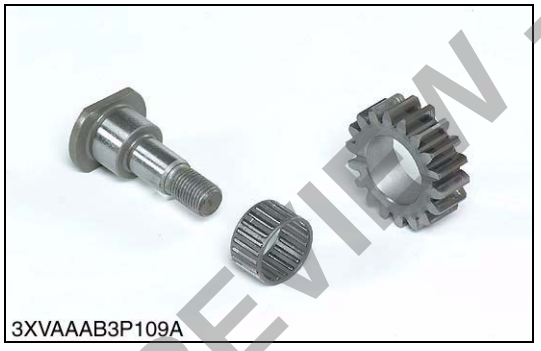
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Back Idle Gear, Shaft and Needle Bearing

1. Check the needle bearing for abrasion, color change, or other damage.
2. If there is any doubt as to the condition of a needle bearing, replace it.
3. Check both the shaft and gear bearing surface.

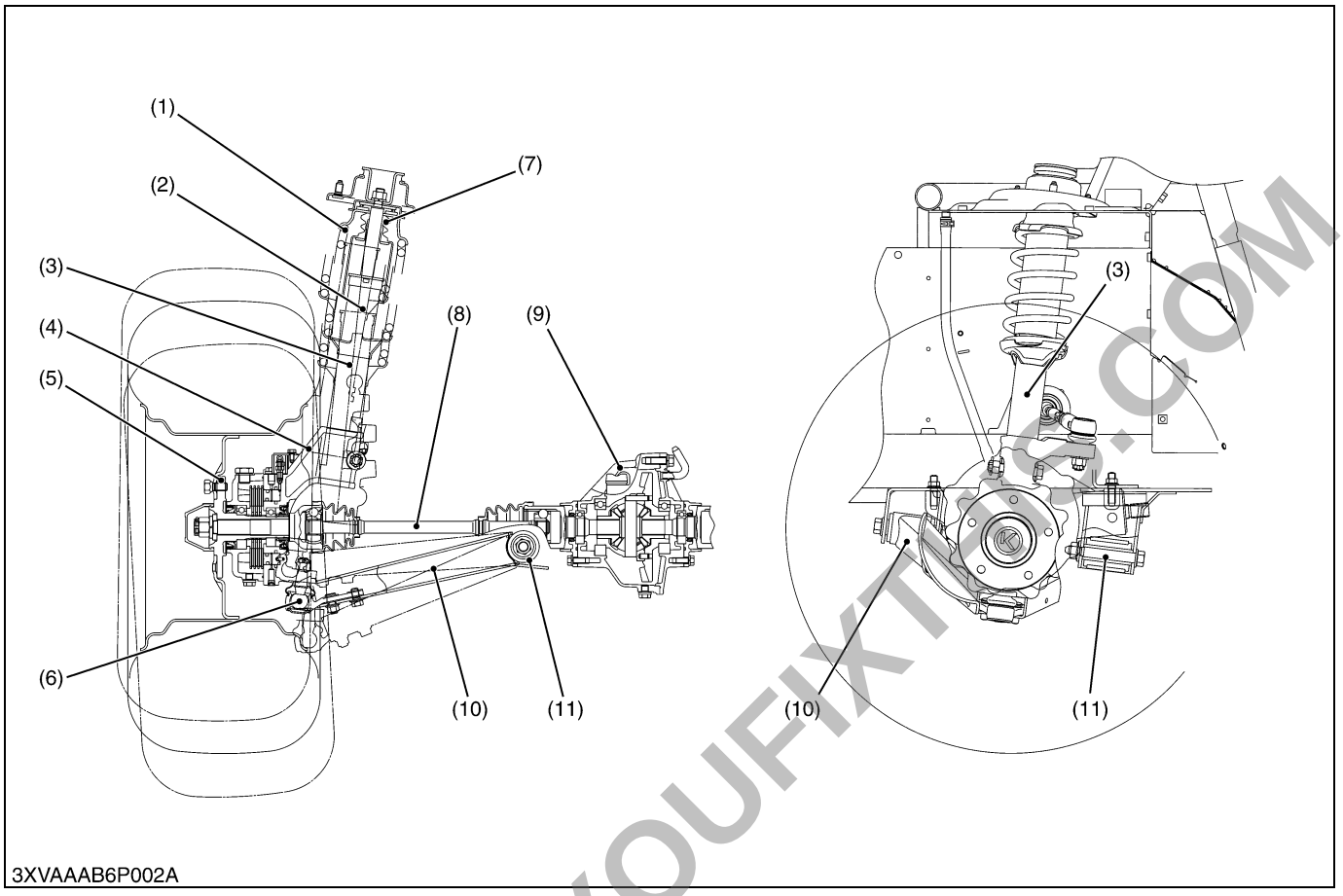
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[2] FRONT SUSPENSION



3XVAAAB6P002A

(1) Spring
(2) Shock Absorber
(3) Strut
(4) Knuckle
(5) Front Axle
(6) Ball Joint
(7) Bump Stopper
(8) Constant Velocity (CV) Joint
(9) Front Case
(10) Lower Arm
(11) Rubber Bushing

The strut type suspension has the shock absorber (2) as a strut (3) for positioning the front wheels. The top of the strut is fixed to the machine body. Its bottom is rigid-coupled with the knuckle (4). The knuckle case is coupled through the ball joint (6) that is located at the end of the Type lower arm (10). This lower arm, on the other hand, is connected at two points via the rubber bushings (11) with the machine body.

(Function)

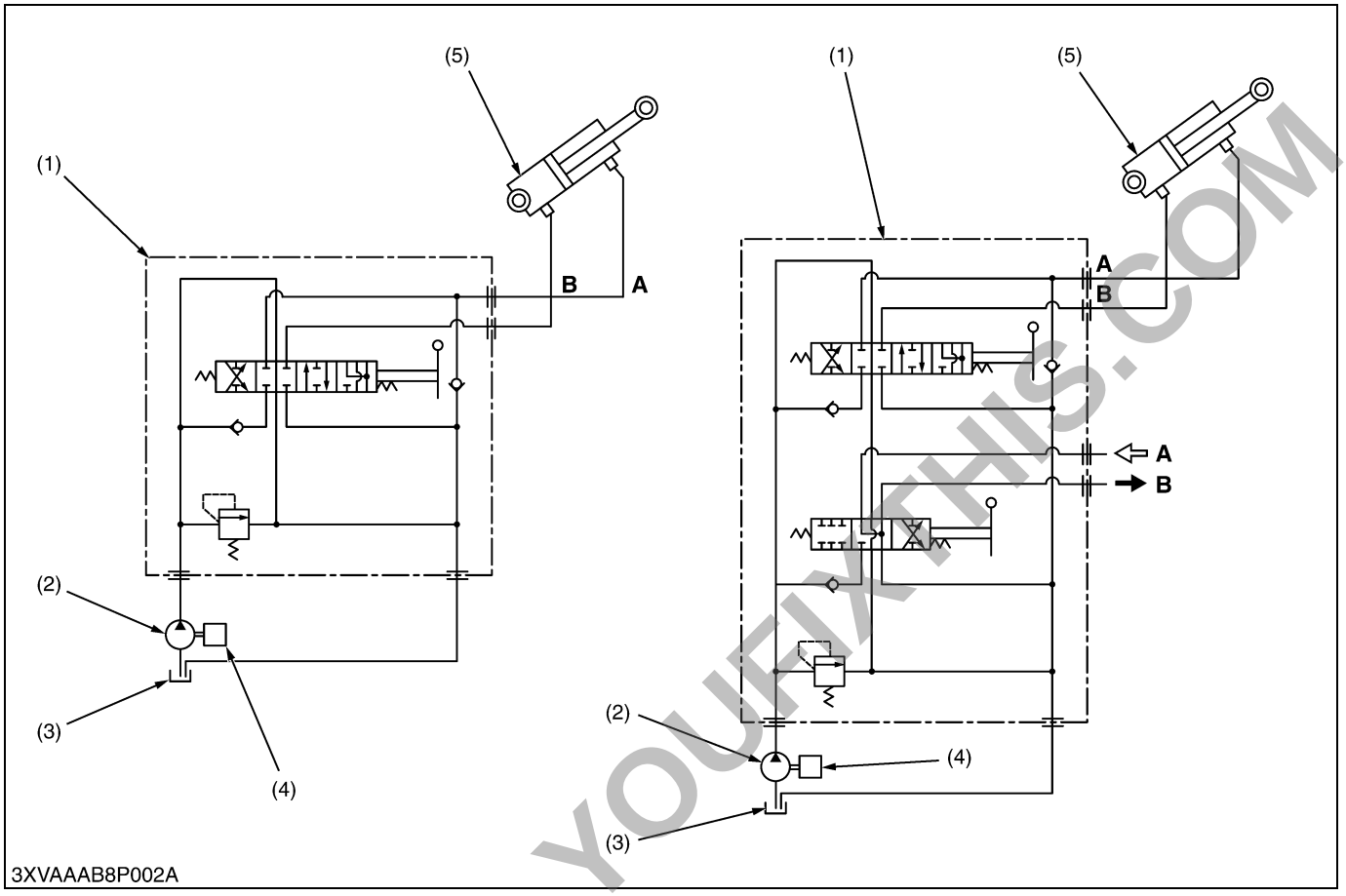
The strut type suspension is a sort of independent suspension. Impacts from the ground are conveyed through the front tires and knuckles (4) and absorbed by the strut (3). The strut not just serves to absorb the shock but withstands the sideway forces. The Type lower arm (10) regulates the to-and-fro as well as sideway movements of the front tires, which maintains a predetermined alignment. This lower arm is constructed with rubber bushings (11) in place, thereby cutting down on vibrations.

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2. HYDRAULIC CIRCUIT

[1] HYDRAULIC CARGO BED LIFT (IF EQUIPPED)



(1) Hydraulic Control Valve
(2) Hydraulic Pump
(3) Oil Tank
(4) Transmission
(5) Hydraulic Cylinder

A : In
B : Out

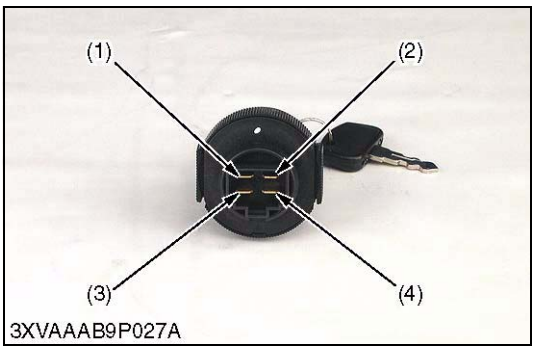
The cargo bed lifting system of RTV900 is composed of the hydraulic pump, control valve, hydraulic cylinder, oil tank and other components as shown in the figure.

This system has the following functions.

1. Oil is supplied by hydraulic pump which is driven by input shaft in the transmission case. As the input shaft is connected to the idle gear, hydraulic pump starts running when engine is started.
2. The hydraulic pump forces out the oil to hydraulic control valve for cargo bed lift system or hydraulic power take off.

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Main Switch Continuity

1) Main Switch Key at OFF Position

1. Set the main switch **OFF** position.
2. Measure the resistance with an ohmmeter across the **B** terminal and the **ACC** terminal, **B** terminal and **ST** terminal, **B** terminal and **G** terminal.
3. If infinity is not indicated, the contacts of the main switch are faulty.

Resistance	**B** terminal - **ACC** terminal	Infinity
	B terminal - **ST** terminal	
	B terminal - **G** terminal	

2) Main Switch Key at ON Position

1. Set the main switch **ON** position.
2. Measure the resistance with an ohmmeter across the **B** terminal and the **ACC** terminal.
3. If 0 ohm is not indicated, the **B** - **ACC** contact of the main switch are faulty.

Resistance	**B** terminal - **ACC** terminal	0 Ω

3) Main Switch Key at PREHEAT Position

1. Set and hold the main switch key at the **PREHEAT** position.
2. Measure the resistance with an ohmmeter across the **B** terminal and the **G** terminal, and measure the resistance across the **B** terminal and the **ACC** terminal.
3. If 0 ohm is not indicated, these contacts of the main switch are faulty.

Resistance	**B** terminal - **G** terminal	0 Ω
	B terminal - **ACC** terminal	

4) Main Switch Key at START Position

1. Set and hold the main switch key at the **START** position.
2. Measure the resistance with an ohmmeter across the **B** terminal and the **G** terminal, across the **B** terminal and the **ST** terminal, and across the **B** terminal and the **ACC** terminal.
3. If 0 ohm is not indicated, these contacts of the main switch are faulty.

Resistance	**B** terminal - **G** terminal	0 Ω
	B terminal - **ST** terminal	
	B terminal - **ACC** terminal	

(1) **G** Terminal
(2) **ACC** Terminal
(3) **ST** Terminal
(4) **B** Terminal

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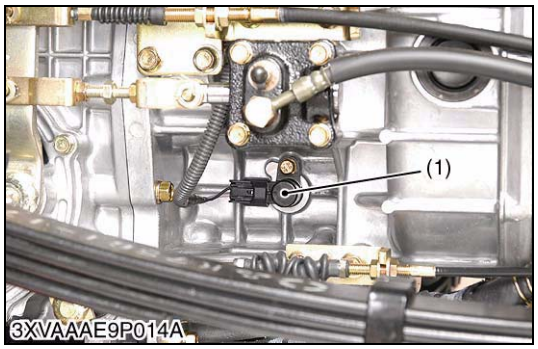
No.	Item \ Period		Indication on hour meter											Important		Reference page
			50	100	150	200	250	300	350	400	450	500	550			
28	Tire wear	Check	★					☆								G-30
29	Front axle case oil	Change								☆						G-42
30	Knuckle axle case oil	Change								☆						G-42
31	Engine valve clearance	Adjust														–
32	Fuel injection nozzle injection pressure	Check														–
33	Injection pump	Check														–
34	Brake master cylinder inner parts	Replace														–
35	Brake fluid	Change														–
36	Remote hydraulic hose (if equipped)	Replace														–
37	Rear brake cylinder seal	Replace														–
38	Front brake seal	Replace														–
39	Cooling system	Flash														–
40	Coolant	Change														–
41	Fuel system	Bleed														–
42	Fuse	Replace														–
43	Light bulb	Replace														–

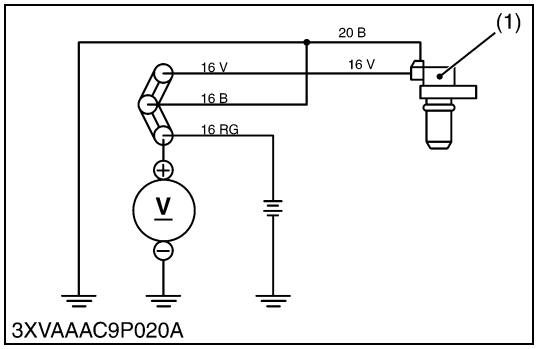
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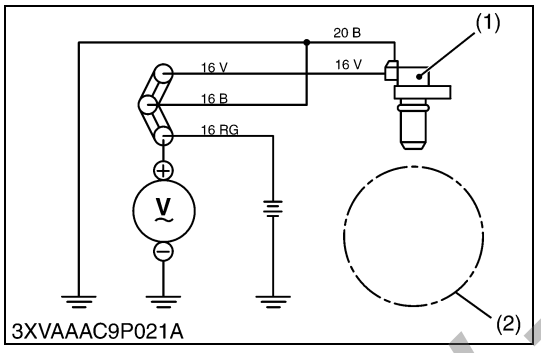
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(3) Gauges







Traveling Speed (Rotation) Sensor

1) Lead Terminal Voltage

1. Disconnect the lead from the speedometer after turning the main switch **OFF**.
2. Turn the main switch **ON** and measure the voltage with a voltmeter across the lead terminal (Red / Green) and the chassis. If the voltage differs from the battery voltage, the wiring harness or fuse is faulty.

Voltage	Lead terminal – Chassis	Approx. battery voltage

2) Output Voltage

1. Lift up and secure with jack stands and choke the front wheels.
2. Remove the rear wheels.
3. Set the 4WD lever to **2WD** position.
4. Start the engine and shift the range shift lever in **L** position.
5. Depress the speed control pedal fully, and measure the output voltage with a voltmeter across the sensor terminal (Violet) and and chassis.
6. If the reference value is not indicated, the sensor is faulty.

Voltage of alternating current	Reference value	Approx. 3.6 V

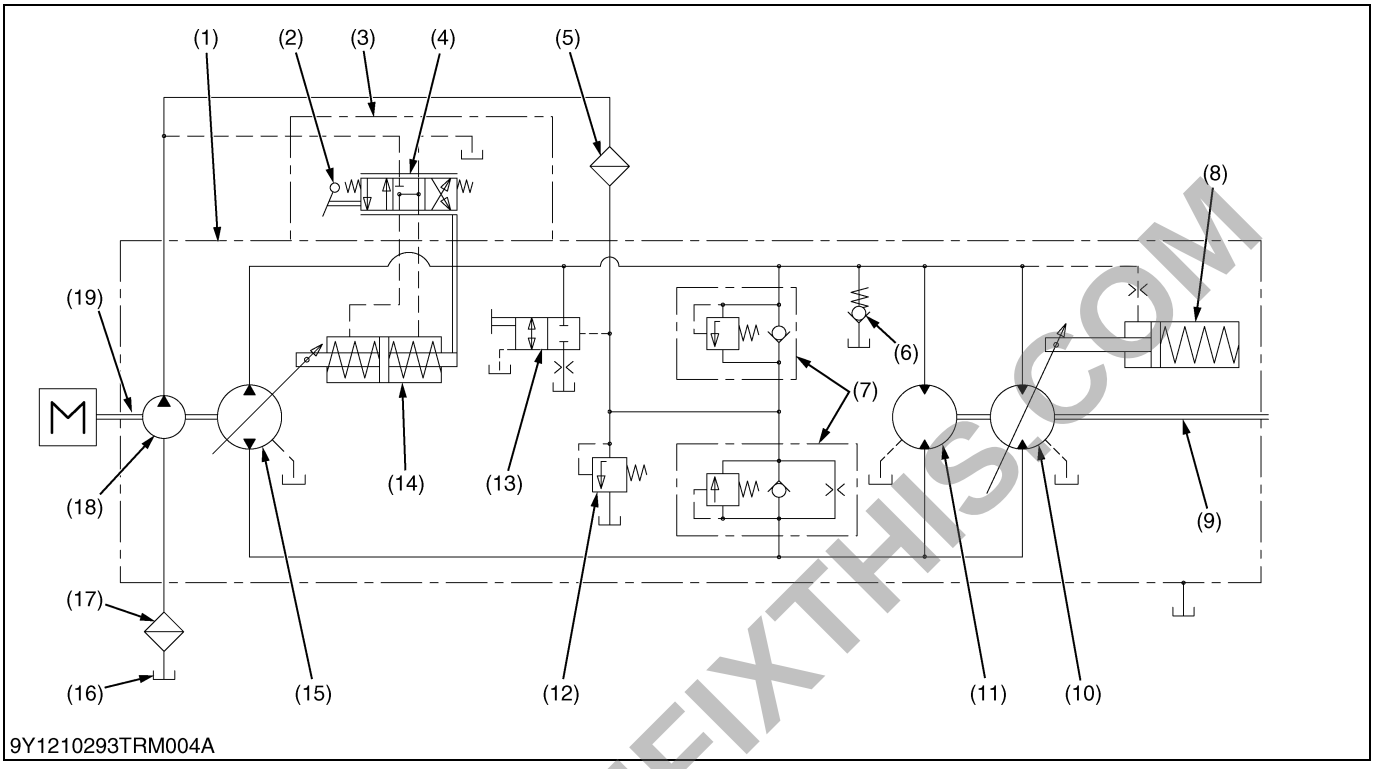
(1) Rotation Sensor (2) Gear

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(2) Oil Flow



(1) HST Assembly
(2) Control Lever (Pedal)
(3) Servo Regulator Assembly
(4) Regulator Valve
(5) Oil Filter Cartridge
(6) Anti-cavitation Valve
(7) Check and High Pressure Relief Valve
(8) Control Piston
(9) Output Shaft (Motor Shaft)
(10) Cylinder Block (Assist Motor)
(11) Cylinder Block (Stationary Motor)
(12) Charge Relief Valve
(13) Unload Valve
(14) Servo Piston
(15) Cylinder Block (HST Pump)
(16) Tank
(17) Oil Filter Cartridge
(18) Charge Pump
(19) Input Shaft (Pump Shaft)

A charge pump (18) is used to feed oil to the hydrostatic transmission (HST). The oil coming from the charge pump (18) flows through the oil filter cartridge (5) into the HST main circuit and regulator valve (4). At this time, the servo regulator valve and HST main circuit (that is closed with the control lever at neutral position) are kept at the charge relief valve (12) set pressure. Step on the pedal, and the regulator valve (4) switches its oil passage to allow the oil into the service port. Being interlocked with the servo piston (14), the swashplate now tilts to activate the variable pump (15). Pressurized oil is then forced into the stationary motor (11), which then rotates to circulate oil between the pump and motor.

The heavier the load on the output shaft (9), the higher the pressure of the oil coming from the pump (15). Now the assist motor (10) is activated to increase the output torque. When the load on the output shaft (9) decreases, the oil pressure in the main circuit also drops and the assist motor (10) returns to its neutral position and just the stationary motor (11) maintains torque to the output shaft (9). Now a closed circuit is formed by the pump (15) and stationary motor (11).

The unload valve (14) is composed of the manual operation spool and the spool that operates in synchronization with the brake.

(Reference)

- Valve Setting Pressure [Oil temperature : 45 to 55 °C (113 to 131 °F)]
  - Engine Speed : 1350 min^{-1} (rpm)
    Charge Relief Valve : 0.52 to 0.71 MPa (5.3 to 7.3 kgf/cm^2, 75 to 100 psi)
  - Engine Speed : 3000 min^{-1} (rpm)
    Check and High Pressure Relief Valve
    (Forward) 22.6 to 26.5 MPa (231 to 270 kgf/cm^2, 3280 to 3840 psi)
    (Reverse) 18.9 to 21.5 MPa (193 to 219 kgf/cm^2, 2750 to 3110 psi)

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