WSM

WORKSHOP MANUAL
KUBOTA EXCAVATOR

KX040-4

Kubota

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KiSC issued 02, 2013 A

CONTENTS

TO THE READER
TO THE READER

I INFORMATION
CONTENTS
INFORMATION
1. SAFETY FIRST I-1
2. IN THE INTEREST OF WORK SAFETY I-2
3. LABELS DISPLAYED TO PROMOTE WORK SAFETY I-6
4. MAIN SPECIFICATIONS I-13
5. DIMENSIONS I-14

G GENERAL
CONTENTS
GENERAL
1. CHECKING EXCAVATOR IDENTIFICATION G-1
2. ENGINE IDENTIFICATION G-2
3. MUFFLER FULL ASSEMBLY IDENTIFICATION G-5
4. GENERAL PRECAUTIONS G-7
5. HANDLING PRECAUTIONS FOR ELECTRICAL PARTS AND WIRING G-11
6. TIGHTENING TORQUES G-16
7. OIL AND WATER CAPACITY TABLE G-20
8. MAINTENANCE INTERVALS G-21

1 MACHINE BODY
CONTENTS
SERVICING
1. FRONT 1-S1
2. SWIVEL FRAME 1-S5
3. TRACK FRAME 1-S18
4. MEASURING MACHINE PERFORMANCE 1-S30
5. SWIVEL GEAR BACKLASH PERFORMANCE 1-S32

2 ENGINE
CONTENTS
GENERAL
1. SPECIFICATIONS 2-G1
2. DIMENSIONS 2-G2
3. PERFORMANCE CURVES 2-G3

3 HYDRAULIC SYSTEM
CONTENTS
MECHANISM
1. HYDRAULIC CIRCUIT DIAGRAM 3-M1
2. PUMP 3-M4
3. CONTROL VALVES 3-M12
4. SWIVEL MOTOR 3-M25
5. TRAVEL MOTOR 3-M29
6. HYDRAULIC CYLINDER 3-M38
7. PILOT VALVE 3-M41
8. SOLENOID VALVE 3-M51
SERVICING
1. PUMP 3-S1
2. CONTROL VALVE 3-S4
3. SWIVEL MOTOR 3-S6
4. SWIVEL JOINT 3-S15
5. TRAVEL MOTOR 3-S22
6. HYDRAULIC CYLINDER 3-S40
7. PILOT VALVE (CONTROL) 3-S42
8. SOLENOID VALVE 3-S77
9. ROUTING OF HYDRAULIC HOSES 3-S80
10. MEASURING HYDRAULIC DEVICE PERFORMANCE 3-S103
11. HYDRAULIC DEVICE PERFORMANCE STANDARDS 3-S127
12. TROUBLESHOOTING 3-S133

4 ELECTRICAL SYSTEM
CONTENTS
SERVICING
1. ELECTRICAL DEVICE LAYOUT AND WIRING CIRCUIT 4-S1
2. METER PANEL OPERATION 4-S3
3. INSPECTIONS 4-S37
4. TROUBLESHOOTING (START-UP EQUIPMENT VERSION) 4-S43
5. METHODS FOR DIAGNOSING ERRORS 4-S44
6. TROUBLESHOOTING (METER PANEL VERSION) 4-S46

5 CABIN
CONTENTS
MECHANISM
1. AIR CONDITIONING SYSTEM 5-M1
2. WIPER 5-M17
SERVICING
1. TROUBLESHOOTING 5-S1
2. MAINTENANCE AND SERVICE RELATED SPECIFICATIONS 5-S4
3. TORQUE 5-S5
4. PRECAUTIONS WHEN REPAIRING THE REFRIGERANT SYSTEM 5-S6
5. INSPECTING AND CHARGING THE REFRIGERANT SYSTEM 5-S11
6. INSPECTION AND DISASSEMBLY 5-S20
7. WINDOW WASHER 5-S35
8. REMOVAL AND INSTALLATION OF GLASS 5-S37
9. FRONT WINDOW 5-S42

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1. SAFETY FIRST

⚠ SAFETY FIRST

- **This "Safety Alert Symbol" is used in this manual and on labels on equipment to indicate important issues and warn of the danger of personal injury. Read and follow these warnings carefully.**
- **It is important that you thoroughly read these instructions and safety rules prior to working on the equipment and that you always follow them.**

⚠ DANGER
- **Indicates that failure to follow the warning will result in serious injury or death.**

⚠ WARNING
- **Indicates that failure to follow the warning may result in serious injury or death.**

⚠ CAUTION
- **Indicates that failure to follow the warning may result in injury.**

■ IMPORTANT
- **Indicates that failure to follow the warning may result in damage to or a breakdown of the equipment.**

■ NOTE
- **Indicates supplementary explanations that will be helpful when using the equipment.**

[NOTE]
- Indicates other supplementary information to take note of.

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4. MAIN SPECIFICATIONS

			KUBOTA EXCAVATOR			
Model name			KX040-4			
Type			CANOPY	CAB	Angle Blade type	
					CANOPY	CAB
Operating weight (including operator's weight)			4170 kg 9193 lbs	4310 kg 9502 lbs	4330 kg 9546 lbs	4470 kg 9855 lbs
Engine	Type		Water cooled 4 cycle diesel engine with 3 cylinder			
	Model name		D1803-CR-TE4 -BH1	D1803-CR-TE4 -BH2	D1803-CR-TE4 -BH1	D1803-CR-TE4 -BH2
	Total displacement		1826 cc (111.4 cu.in.)			
	Engine power SAE J1955 gross		30.1 kW (40.4 Hp)			
	Rated speed		2200 rpm			
	Low idling speed		1150 rpm			
Performance	Unit swing speed		9.2 rpm			
	Travel speed	Fast	5.0 km / h (3.1 mph)			
		Slow	2.9 km / h (1.8 mph)			
	Ground pressure (With operator)		30.4 kPa (0.310 kgf/cm^2) 4.41 psi	31.4 kPa (0.320 kgf/cm^2) 4.55 psi	31.7 kPa (0.323 kgf/cm$^{2)}$ 4.60 psi	32.7 kPa (0.334 kgf/cm^2) 4.75 psi
	Max. climbing angle		*36 % (20 deg)			
	Angle in case of crossing slope		*27 % (15 deg)			
Blade	Width x Height		1700 x 350 mm 66.9 x 13.8 in.		1700 x 385 mm 66.9 x 15.2 in.	
	Max swing	Left	–		0.44 rad (25 deg)	
		Right	–		0.44 rad (25 deg)	
Boom swing angle		Left	1.20 rad (70 deg)			
		Right	0.96 rad (55 deg)			
Pressure connection for attachments	Max. displacement (Theoretical)		65 L (17 U.S.gal) / min (AUX1 port) 37 L (9.8 U.S.gal) / min (Thumb port)			
	Max. pressure		17.2 MPa (175 kgf/cm^2, 2500 psi) (AUX1 port) 17.2 MPa (175 kgf/cm^2, 2500 psi) (Thumb port)			
Fuel tank capacity			64 L (17 U.S.gal)			

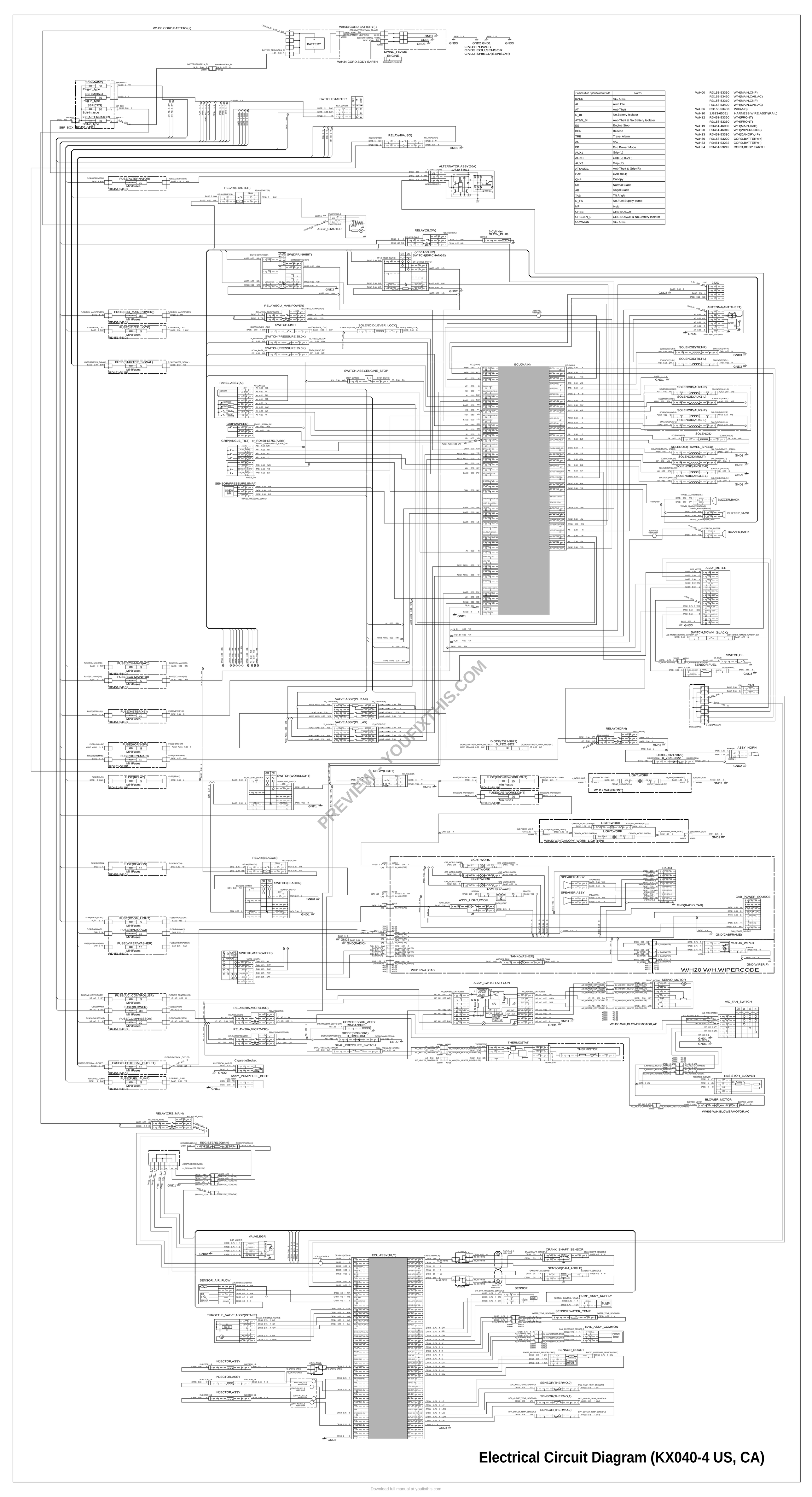
■ **NOTE**

- **Above dimensions are based on the machine with QUICK HITCH BUCKET.**
- **Above dimensions are based on the machine with rubber track.**
- **Specifications subject to change without notice.**
- **With unloaded digging bucket.**
- **Firm compacted soil.**
- **Operators must exercise extra caution and follow instructions in the operator's manual.**
- **Worse condition or heavier attachment to the above will decrease climbing angle.**
- **ROPS/FOPS structure complies with ISO 3471, ISO 3449 and OSHA regulations.**

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Composition Specification Code	Notes
BASE	ALL-USE
AI	Auto Idle
AT	Anti-Theft
N_BI	No Battery Isolator
AT&N_BI	Anti-Theft & No Battery Isolator
ES	Engine Stop
BCN	Beacon
TWB	Travel Alarm
AC	A/C
EP	Eco Power Mode
AUX1	Grip (L)
AUXC	Grip (L) (CAP)
AUX2	Grip (R)
AT&AUX1	Anti-Theft & Grip (R)
CAB	CAB (8+4)
CNP	Canopy
NB	Normal Blade
AB	Angel Blade
TAB	Tilt Angle
N_FS	No Fuel Supply-pump
MF	Multi
CRSB	CRS-BOSCH
CRSB&N_BI	CRS-BOSCH & No Battery Isolator
COMMON	ALL-USE

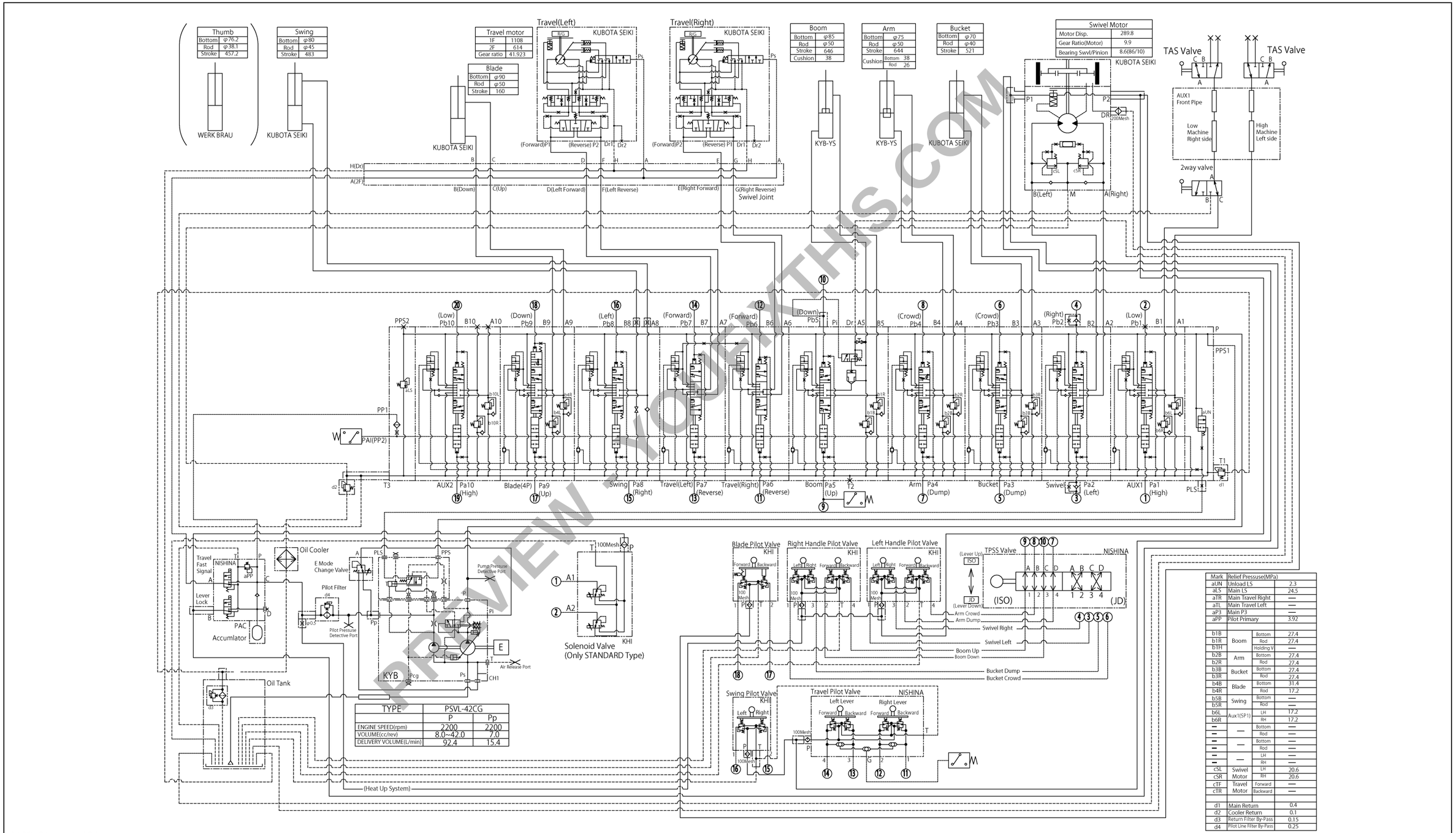
W/H00	RD158-53330	W/H(MAIN,CNP)
	RD158-53430	W/H(MAIN,CAB,AC)
	RD158-53310	W/H(MAIN,CNP)
	RD158-53420	W/H(MAIN,CAB,AC)
W/H06	RD158-5348K	W/H(AIC)
W/H10	13613-65091	HARNESS,WIRE,ASSY(RAIL)
W/H12	RD451-53360	W/H(FRONT)
	RD158-53360	W/H(FRONT)
W/H19	RD451-46900	W/H(MAIN,CAB)
W/H20	RD451-46910	W/H(WIPERCODE)
W/H23	RD451-53380	W/H(CANOPY,CAP)
W/H30	RD158-53220	CORD,BATTERY(+)
W/H33	RD451-53232	CORD,BATTERY(-)
W/H34	RD451-53242	CORD,BODY EARTH

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1. HYDRAULIC CIRCUIT DIAGRAM

[1] HYDRAULIC CIRCUIT DIAGRAM (KX040-4 STANDARD SPECIFICATIONS (AUX1)



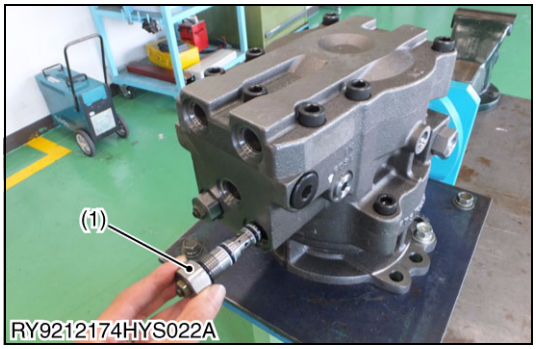
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[2] SWIVEL MOTOR ASSEMBLY AND DISASSEMBLY

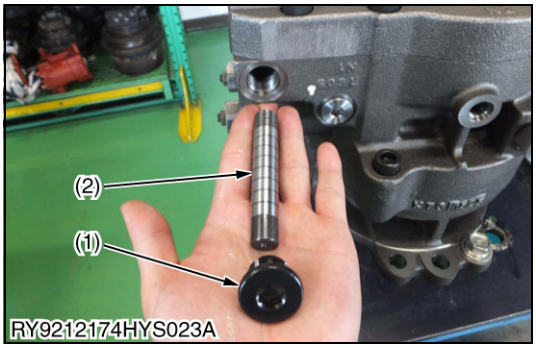
(1) Disassembly



1. Mount the swivel motor on an assembly platform.
2. Remove the relief valve.
   - Tool to use: 26 mm socket

(1) Relief valve

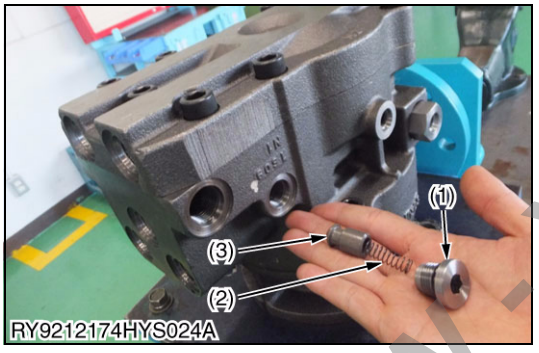
RY9212174HYS0093US0



3. Remove the plug and then the shockless piston.
   - Tool to use: 10 mm hex socket

(1) Plug
(2) Shockless piston

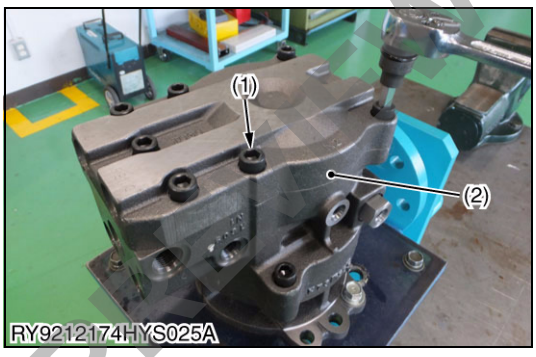
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4. Remove the plug, spring and poppet in order.
   - Tool to use: 8 mm hex socket

(1) Plug
(2) Spring
(3) Poppet

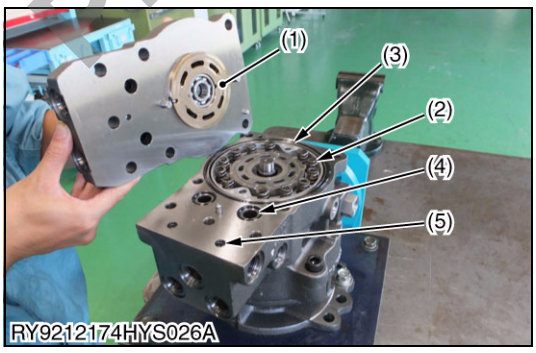
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5. Remove the hex socket bolts and then the cover.
   - Tool to use: 10 mm hex socket

(1) Hex socket bolt
(2) Cover

RY9212174HYS0023US0



6. Remove the valve plate, springs and O-rings.
   - Tool to use: 12 mm hex socket

(1) Valve plate
(2) Spring
(3) O-ring
(4) O-ring
(5) O-ring

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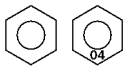
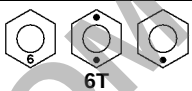
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6. TIGHTENING TORQUES

[1] TORQUES FOR GENERAL USE NUTS AND BOLTS

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	 No-grade or 4T						 7T						 9T		
Indication on top of nut	 No-grade or 4T												 6T		
Material of opponent part	Ordinariness			Aluminum			Ordinariness			Aluminum			Ordinariness		
Unit	N·m	kgf·m	lbf·ft	N·m	kgf·m	lbf·ft	N·m	kgf·m	lbf·ft	N·m	kgf·m	lbf·ft	N·m	kgf·m	lbf·ft
M6	7.9 to 9.3	0.8 to 0.95	5.8 to 6.8	7.9 to 8.8	0.8 to 0.9	5.8 to 6.5	9.81 to 11.2	1.0 to 1.15	7.24 to 8.31	7.9 to 8.8	0.8 to 0.9	5.8 to 6.5	12.3 to 14.2	1.25 to 1.45	9.05 to 10.4
M8	18 to 20	1.8 to 2.1	13 to 15	17 to 19	1.7 to 2.0	13 to 14	24 to 27	2.4 to 2.8	18 to 20	18 to 20	1.8 to 2.1	13 to 15	30 to 34	3.0 to 3.5	22 to 25
M10	40 to 45	4.0 to 4.6	29 to 33	32 to 34	3.2 to 3.5	24 to 25	48 to 55	4.9 to 5.7	36 to 41	40 to 44	4.0 to 4.5	29 to 32	61 to 70	6.2 to 7.2	45 to 52
M12	63 to 72	6.4 to 7.4	47 to 53	–	–	–	78 to 90	7.9 to 9.2	58 to 66	63 to 72	6.4 to 7.4	47 to 53	103 to 117	10.5 to 12	76 to 86.7
M14	108 to 125	11 to 12.8	79.6 to 92.5	–	–	–	124 to 147	12.6 to 15	91.2 to 108	–	–	–	167 to 196	17 to 20	123 to 144
M16	167 to 191	17 to 19.5	123 to 141	–	–	–	197 to 225	20 to 23	145 to 166	–	–	–	260 to 304	26.5 to 31	192 to 224
M18	246 to 284	25 to 29	181 to 209	–	–	–	275 to 318	28 to 32.5	203 to 235	–	–	–	344 to 402	35 to 41	254 to 296
M20	334 to 392	34 to 40	246 to 289	–	–	–	368 to 431	37.5 to 44	272 to 318	–	–	–	491 to 568	50 to 58	362 to 419

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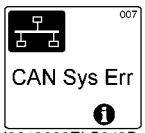
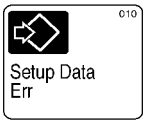
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[6] TABLE OF METER PANEL MESSAGES AND ERROR HISTORY LIST

(1) Red Warning Lamp Lit

When needed, pressing switch 4 ⓘ displays a detailed description.

No.	Screen display	Pressing SW4 ⓘ	Message in fail record	Reason detected/steps to take
1	 RY9212032ELS044B	–	[Meter] Engine oil pressure error	a)Engine oil pressure low b)Oil switch always ON c)Short in harness
2	 RY9212032ELS045B	–	[Meter] Overheated	Engine overheated [120°C (248°F)--automatically goes to idle]
3	 RY9212032ELS046B	–	[Meter] Charging System Error	Low alternator voltage detected a)Alternator faulty b)Fan belt loose/off c)Break in harness d)Fuse blown (10A)
4	 RY9212032ELS047B	–	[Meter] Fuel Sensor Error	a)Connector disconnected b)Break in harness
5	 RY9212032ELS049B	CANSys (main)	[Meter] CAN Sys (Main)	a)Connector disconnected b)ECU (+B) fuse blown (5A) c)Break or short in harness
		CANSys (CRS)	[Meter] CAN Sys (CRS)	a)Connector disconnected b)Slow blow fuse (CRS) blown (30A) c)Engine ECU relay faulty d)Break or short in harness
6	 RY9212148ELS043A	–	[Meter] Setup Data Error	Go through the model setup again. If this doesn't fix it, it's a faulty meter.
7	 RY9212148ELS060A	–	[Main ECU] Water mixed with fuel	a) Water mixed with fuel in the fuel filter [Reference value:80 to 130 ml (0.07 to 0.11 Imp·qts, 0.08 to 0.14 U.S.qts)] b)Short in the fuel filter line
8	 RY9212032ELS051B	2-speed solenoid	[Main ECU] 2-speed SOL	a)2-speed solenoid line short
9	 RY9212148ELS040A	AUX1 knob	[Main ECU] AUX1 knob	a)AUX1 knob connector disconnected b)Break or short in harness
		AUX1 right SOL	[Main ECU] AUX1 right SOL	a)AUX1 right solenoid connector disconnected b)Break or short in harness
		AUX1 left SOL	[Main ECU] AUX1 left solenoid	a)AUX1 left solenoid connector disconnected b)Break or short in harness

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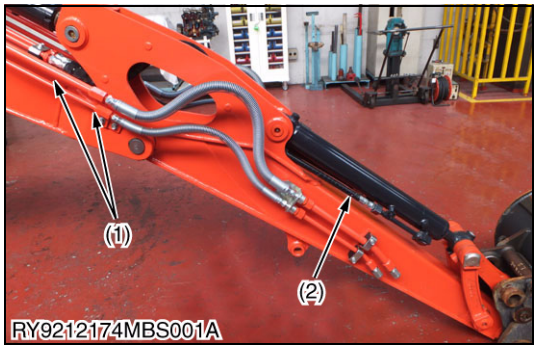
1. FRONT

[1] BOOM ASSEMBLY/DISASSEMBLY

CAUTION

- **Wear protective gear, such as a helmet, eye protection, etc., during assembly/disassembly.**
- **For group work, decide on signals for communication, make sure everyone understands and uses them and be very careful about safety.**
- **Never put your finger in the pin hole when aligning the pin with the hole.**
- **When hoisting anything heavy, always determine its center of gravity before hoisting it.**
- **When working with a sling, use a cloth or the like in places that may be hit hard by the nylon sling.**

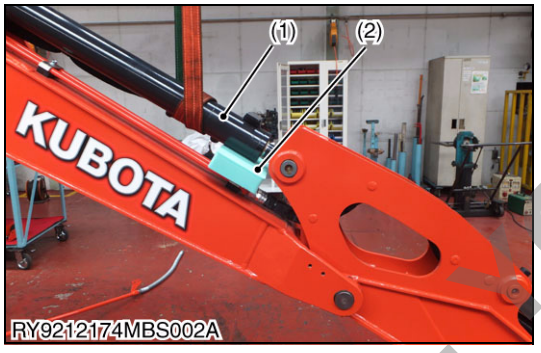
RY9212148MBS0012US0



1. Lower the front to the ground.
   Disconnect the bucket cylinder hose.
   Disconnect the AUX hoses and remove the AUX lines from the bracket.

(1) AUX line (2) Bucket cylinder hose

RY9212174MBS0001US0



2. Suspend the arm cylinder temporarily and remove the pin on the rod side.
   Operate the crane and lower the arm cylinder onto a block on top of the boom.

(1) Arm cylinder (2) Block

RY9212174MBS0002US0



3. Suspend the arm and bucket temporarily with the crane, then remove the linkage pin between the arm and the boom and then remove the bucket and the arm.

Weight	Approx. 305kg (672lbs)

(1) Pin

RY9212174MBS0003US0



4. Set the end of the boom on the ground.
   Suspend the boom cylinder temporarily and remove the pin on the rod side.
   Operate the crane and lower the boom cylinder onto a stand.

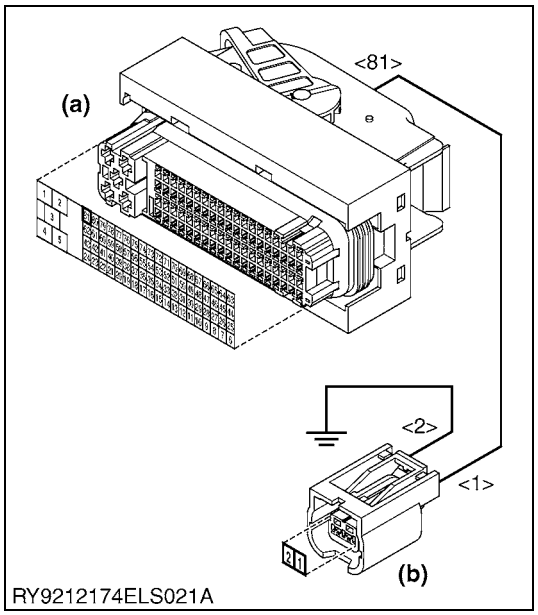
(1) Pin (2) Cylinder stand

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[C] Testing with a Circuit Tester



RY9212174ELS021A

1. Voltage check (2-speed solenoid)

[Measurement Conditions]

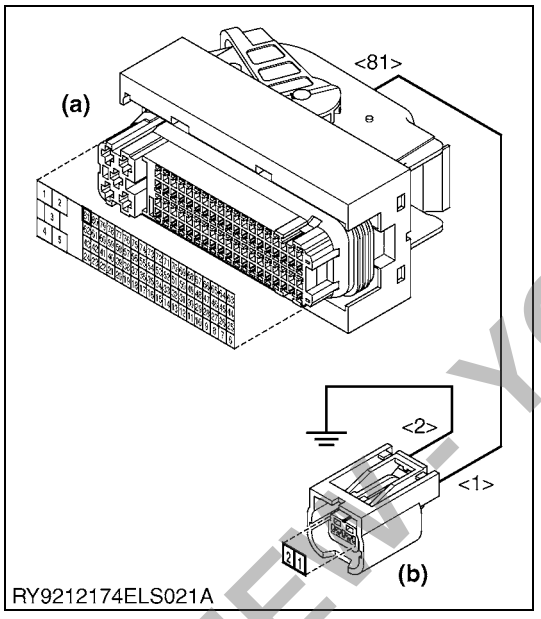
1. Disconnect the travel 2-speed solenoid connector.
2. Key switch : ON
3. Put the machinery operation lever lock in the [Unlock] position and press the 2-speed switch.
4. Measure the voltage based on the table below.

Measurement	Connector Name (+ terminal side)	Pin No.	Connector Name (- terminal side)	Pin No.
(1)	2-speed solenoid	<1>	2-speed solenoid	<2>
(2)	2-speed solenoid	<1>	Body GND	–

Regular : 12 V
Irregular : Large discrepancy from 12 V

(a) Main ECU Connector **(b) 2-speed Solenoid Connector**

RY9212174ELS0048US0



RY9212174ELS021A

2. Continuity check (2-speed solenoid)

[Measurement Conditions]

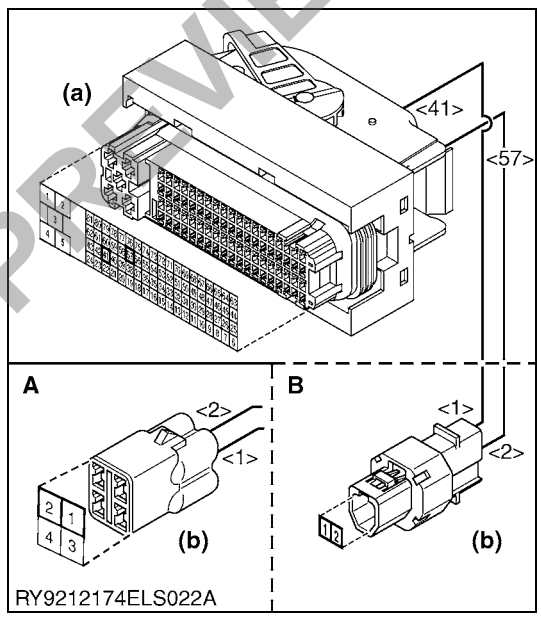
1. Key switch : OFF
2. Disconnect the travel 2-speed solenoid connector.
3. Disconnect the ECU connector.
4. Put the machinery operation lever lock in the [Unlock] position and press the 2-speed switch.
5. Test the continuity based on the table below.

Measurement	Connector Name (+ terminal side)	Pin No.	Connector Name (- terminal side)	Pin No.
(1)	2-speed solenoid	<1>	ECU	<81>

Regular : Continuity
Irregular : No continuity

(a) Main ECU Connector **(b) 2-speed Solenoid Connector**

RY9212174ELS0049US0



RY9212174ELS022A

3. Voltage check (2-speed switch)

[Measurement Conditions]

1. Disconnect the 2-speed switch connector.
2. Key switch : ON
3. Put the machinery operation lever lock in the [Unlock] position and press the 2-speed switch.
4. Measure the voltage based on the table below.

Measurement	Connector Name (+ terminal side)	Pin No.	Connector Name (- terminal side)	Pin No.
(1)	2-speed switch	<2>	2-speed switch	<1>
(2)	2-speed switch	<1>	Body GND	–

Regular : 12 V
Irregular : Large discrepancy from 12 V

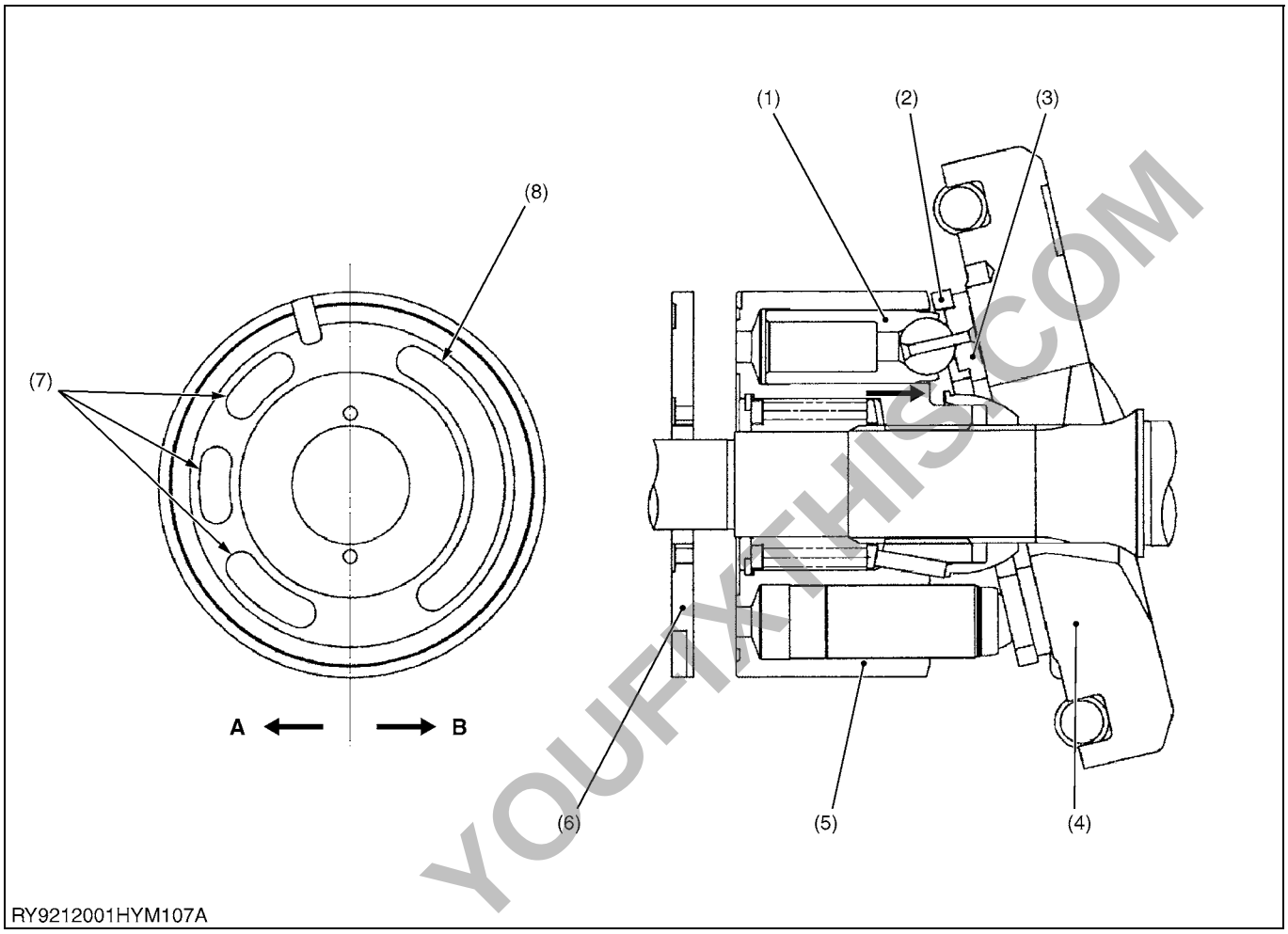
(a) Main ECU Connector **A : Angle Specification**
(b) 2-speed Switch Connector **B : Standard Specification**

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[2] FUNCTION AND STRUCTURE
(1) Operating Principles



(1) Piston
(2) Retainer plate
(3) Shoe
(4) Swash plate
(5) Cylinder block
(6) Valve plate
(7) Discharge port
(8) Suction port
A : Discharge side
B : Suction side

There are nine pistons(1) built into the cylinder block(5) and it is coupled to the axle via a spline.

Also, one end of the cylinder block is in contact with a valve plate (6), which has two half-moon shaped ports (kidney ports); these two kidney ports are connected to suction and discharge ports respectively, so when the cylinder block rotates, the pistons are connected to the passage on the suction side for an interval of 180 degrees and to the discharge side for the remaining interval.

The shoes(3) are crimped so they can rotate freely against the ball on the end of the piston, and the retainer plate (2) presses them against the swash-plate(4).

As a result, the shoes are always in contact with the swash-plate as it moves, so as the angle of the swash-plate changes, that translates into changes in the stroke of the piston and ultimately alters the amount of discharge from the pump.

As a result of the cylinder block rotation, the side that is pressed into the cylinder block by the piston via the swash-plate is the discharge path.

At that point, the compressed chambers of the cylinder block are connected to the kidney ports on the discharge side **A** and the side where the pistons are being withdrawn become the suction path and are connected to the suction side kidney port.

As a consequence, during the interval of one revolution of the cylinder block, each piston alternately provides suction at the suction port and then discharge at the discharge port. Thus smooth pump operation is achieved by having nine pistons constantly alternating between suction and discharge.

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4. TROUBLESHOOTING (START-UP EQUIPMENT VERSION)

Engine does not start

Checkpoint	Cause	Solution
Check whether "Wrong Key" is displayed when it is in the start position. Determine whether it is the registered key or not in the tester mode.	The engine was not started with the registered key.	Start the engine with the registered key.
Check slow-blow and other fuses.	Slow-blow and/or other fuses are blown.	After determining the cause of slow-blow and/or other fuses blowing, replace them.
Check whether GND wire(s) are securely connected to the body.	Ground defective	Tighten GND wire bolt(s).
Check battery voltage and specific gravity.	Battery fault	Recharge or replace the battery.
Check continuity between key switch terminals.	Key switch faulty	Replace the key switch.
Measure the voltage at terminal B of the starter.	Break in continuity of the harness or starter relay.	Repair the harness. Replace the harness, starter relay and/or fuses.
Measure the voltage at terminal S of the starter.	Break in continuity in the harness, starter relay and/or fuses.	Repair the harness. Replace the harness, starter relay and/or fuses.

The engine fails to start sometimes.

Checkpoint	Cause	Solution
Is the key on a metal keyring or have a metal fob?	The key fob and/or keyring are interfering with communication between the key and the antenna.	Get rid of the key fob and/or ring.

Engine starts even with unregistered keys

Checkpoint	Cause	Solution
Check whether the anti-theft system is "OFF" or not initialized.	As the anti-theft function is not working, even unregistered keys can start the engine.	Please contact Kubota service.

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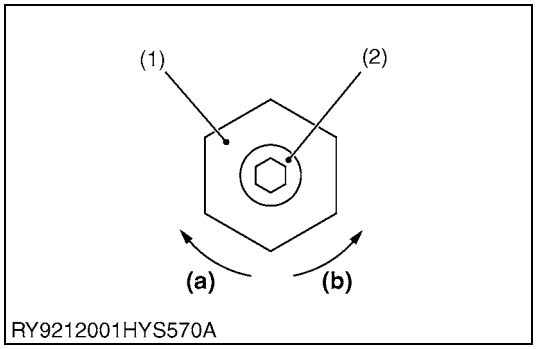
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Adjusting the Main Relief Valve

CAUTION

- **Only adjust the valve if the pressure setting of the main relief valve is lower than specification.**
- **If the pressure is raised above the setting value, it may cause damage to equipment, so never raise the pressure above the setting value.**



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1. Loosen the relief valve lock nut.
2. Use a hexagonal wrench to turn the adjuster screw, and tighten the lock nut.
3. After setting the pressure, always check the setting according to the section Measuring the Main Relief Valve Pressure.

(1) Lock Nut
(2) Adjuster Screw
(a) Pressure Increase
(b) Pressure Decrease

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Pressure Change/Turn for Main Relief Valve (Reference Values)

Amount adjuster screw turned	1/4	1/2	3/4	1
• Main LS valve	4.4 MPa 45.1 kgf/cm^2 642 psi	8.9 MPa 90.8 kgf/cm^2 1291 psi	13.3 MPa 135.4 kgf/cm^2 1925 psi	17.7 MPa 180.5 kgf/cm^2 2567 psi
• Pilot primary pressure relief valve	0.2 MPa 2.0 kgf/cm^2 29 psi	0.4 MPa 4.1 kgf/cm^2 58 psi	0.6 MPa 6.1 kgf/cm^2 87 psi	0.8 MPa 8.2 kgf/cm^2 116 psi

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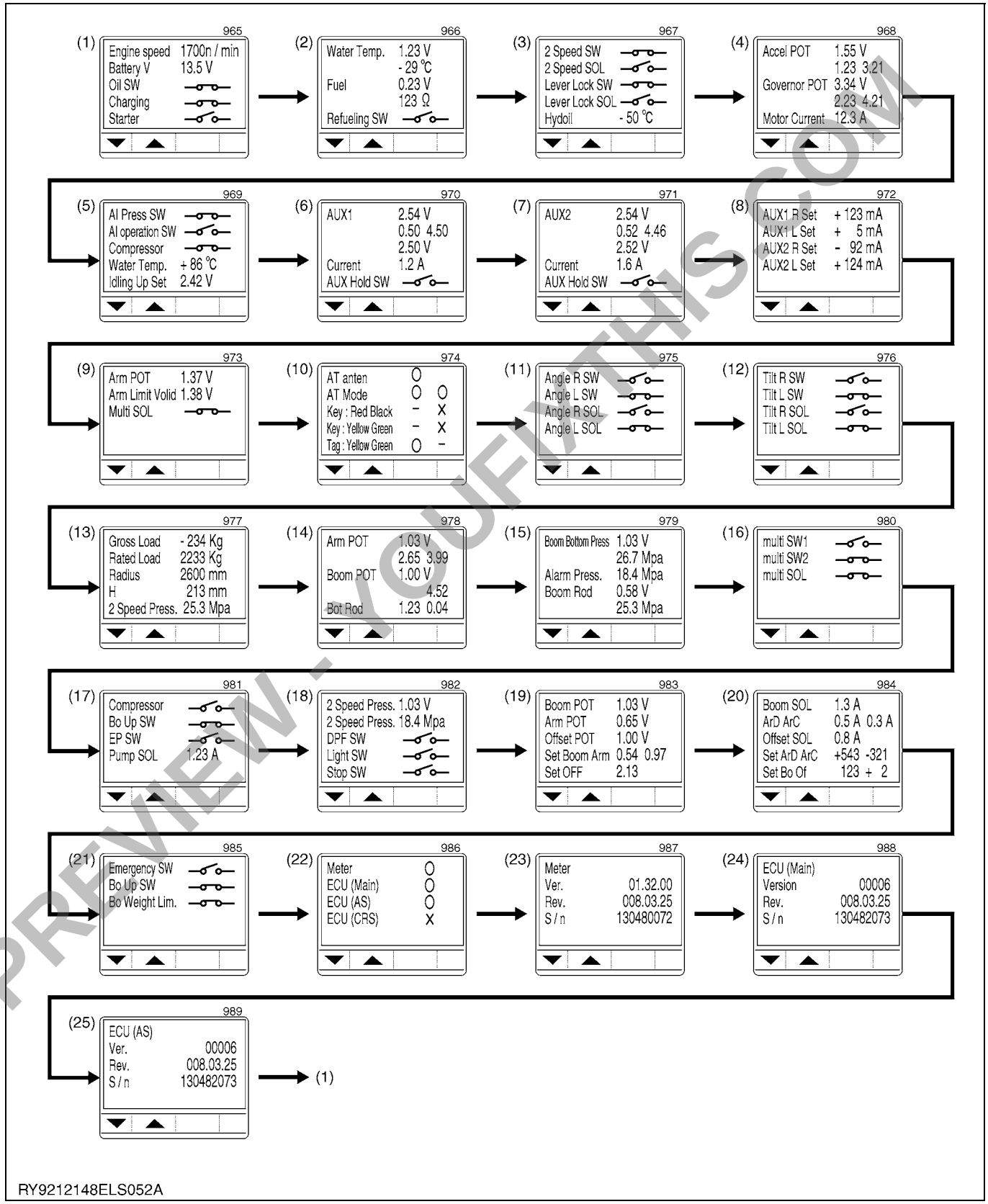
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(1) Diagnosis

[A] Tester

- Makes it possible to check the data from each sensor and switch.
- Determines when a setting is outside parameters and when a switch or solenoid is irregular in terms of continuity.
- Selecting Diagnosis → Tester puts it into this diagnosis mode.

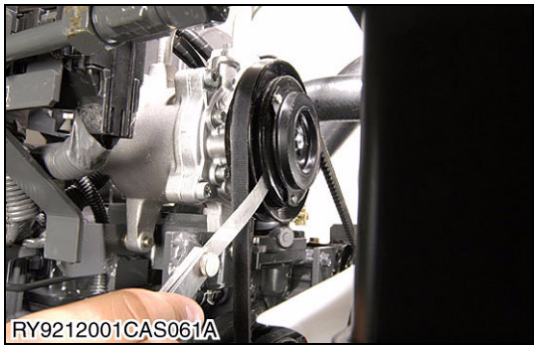


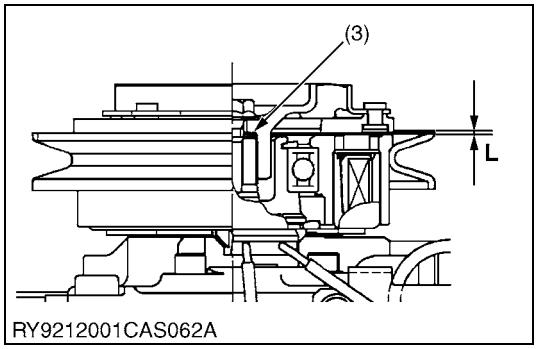
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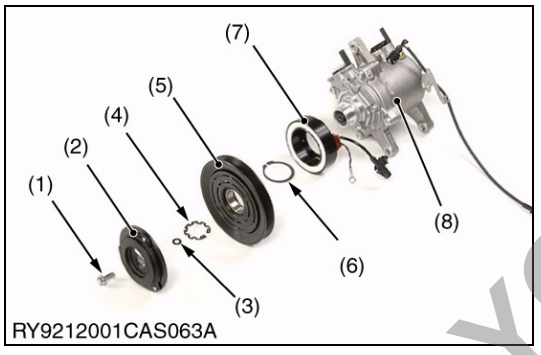
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Adjusting clearance

1. Use a feeler gauge to check the clearance.
2. If the measurement is outside the factory specification, adjust the clearance.

Clearance	Factory specification	0.30 to 0.65 mm 0.0118 to 0.0255 in.

[NOTE]

Shim Thickness	Part No.
0.10 mm (0.0039 in.)	T1065-87340
0.15 mm (0.0059 in)	T1065-87350
0.40 mm (0.016 in.)	T1065-87360
0.60 mm (0.024 in.)	T1065-87370
1.0 mm (0.0394 in.)	T1065-87380

(1) Magnetic Clutch Mounting Screw
(2) Hub Plate
(3) Shim
(4) Snap Ring
(5) Rotor
(6) Snap Ring
(7) Stator
(8) Compressor Body

L : Clearance

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8. MAINTENANCE INTERVALS

No.	Check points		Measures	Hour meter indication																			Interval		
				50	100	150	200	250	300	350	400	450	500	550	600	650	700	750	800	1000	1500	3000			
1	Coolant		check	Daily check																					
			change																				every 2 years		
2	Fuel		check	Daily check																					
3	Engine oil		check	Daily check																					
			change										❍							❍	❍	❍	every 500 hrs		
4	Hydraulic oil		check	Daily check																					
			change																	❍		❍	every 1000 hrs	*1	
5	Grease front attachments	Bucket and bucket link pin / Dozer angle pin and angle cylinder boss	–	Daily check																					
		Boom swing fulcrum	–	Daily check																					
		Others	–	Daily check																					
6	Radiator and oil cooler		check	Daily check																					
7	Washer liquid		check	Daily check																					
8	Engine and electrical wiring		check	Daily check																					
9	Fuel tank, Water separator		drain	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍	every 50 hrs		
10	Battery condition		check	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍	every 50 hrs		
11	Greasing swing bearing teeth		–	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍	every 50 hrs		
12	V-belt tension		check	Daily check																					
			adjust				❍				❍				❍				❍	❍		❍	every 200 hrs		
13	Radiator hoses and clamps		check				❍				❍				❍				❍	❍		❍	every 200 hrs		
			replace																				every 2 years		
14	Air filter element	Outer element	clean				❍				❍				❍				❍	❍		❍	every 200 hrs	*2	
			replace																	❍		❍	every 1000 hrs	*2	@
		Inner element	replace																	❍		❍	every 1000 hrs	*2	
15	Greasing swing ball bearing		–				❍				❍				❍				❍	❍		❍	every 200 hrs		
16	Evacuator valve		clean				❍				❍				❍				❍	❍		❍	every 200 hrs		
17	DPF muffler		check				❍				❍				❍				❍	❍		❍	every 200 hrs		
18	Fuel filter cartridge		replace										❍							❍	❍	❍	every 500 hrs		@
19	Engine oil filter		replace										❍							❍	❍	❍	every 500 hrs		
20	Drive unit oil		change	●									❍							❍	❍	❍	every 500 hrs		
21	Breather filter		change										❍							❍	❍	❍	every 500 hrs		
22	Hydraulic return filter element		replace																	❍		❍	every 1000 hrs		
23	Hydraulic suction filter element		replace																	❍		❍	every 1000 hrs		

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7. OIL AND WATER CAPACITY TABLE

Item		KX040-4	Notes
Engine oil		5.0 L (1.3 U.S.gals)	API type, CJ-4
Coolant	Canopy	6.7 L (1.8 U.S.gals)	Antifreeze Kubota LLC-N-50F Mixture ratio 50%
	Cabin	7.0 L (1.8 U.S.gals)	
Reserve tank		1.1 L (0.3 U.S.gals)	
Fuel (Full)		65.3 L (17.3 U.S.gals)	JIS #3 diesel
Hydraulic Fluid	Total oil capacity	67 L (17.7 U.S.gals)	Tellus oil S2M46
	Inside tank (middle of gauge)	42.5 L (211.2 U.S.gals)	
Travel motor		0.65 L (0.2 U.S.gals)	Gear oil SAE #90 (API GL-4)
Idler assy		80 ml (4.88 cu.in.)	Engine oil SAE #30CD (monograde)
Track roller			
Carrier roller			
Grease		–	EP2

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