WSM

WORKSHOP MANUAL
KUBOTA EXCAVATOR

KX018-4

Kubota

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KiSC issued 06, 2012 A

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TO THE READER

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TO THE READER

This Workshop Manual provides service personnel with information about the mechanisms, service and maintenance of the construction machinery. This Workshop Manual is divided into 3 sections, General, Mechanisms and Service.

■ General

This section contains information such as engine and equipment ID numbers, general precautions, maintenance schedules, inspections and maintenance items and special tools.

■ Mechanisms

This section describes the structure of mechanisms and explains their functions.Be sure that you fully understand this Mechanisms section prior to performing any service work, such as troubleshooting or when performing any disassembly or assembly work.

■ Service

This section contains information and procedures for performing maintenance on the backhoe, such as troubleshooting, service specification tables, torque specifications, items to be inspected and adjusted, disassembly and assembly procedures, as well as precautions, maintenance standard values and usage limits.

All of the illustrations, specifications and other information in this manual were created based on the latest model at the time of publication.

Please be aware that changes to the content may be made without prior notice.

■ NOTE

- **Corresponding model list**

Machine Model		Engine Model
KX016-4	For AUTSTRALIA	D782-BH-5
KX018-4	For North America (UNITED STATES and CANADA)	D902-E3-BH-3
	For AUTSTRALIA	D902-BH-2

■ IMPORTANT

- **Refer to the information of the engine below.**
- Engine model : D782-E3B, D902-E3B
- Web PDF-Code : No.9Y111-00133
- Hard Copy-Code : No.9Y121-00133
- CD-ROM-Code : No.9Y131-00133

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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		KX018-4	
Type		Canopy	Cabin
Machine weight		1620 kg 3571 lbs	1720 kg 3792 lbs
Operating weight		1695 kg 3737 lbs	1795 kg 3957 lbs
Standard bucket	Volume (CECE)	0.040 m^3 (0.24 cu.in.)	
	Width (with side cutter)	452 mm (472 mm) 17.8 in. (18.6 in.)	
Engine	Type (water cooled 4 cycle Diesel)	3 cylinder	
	Model name	D902-BH-2, D902-E3-BH-3	
	Total displacement	898 cm^3 (54.8 cu.in.)	
	Output (ISO 9249)	11.8 kW, 11.6 kW	
	Rated speed	2300 rpm	
Performance	Swing speed	9.1 rpm	
	Travel speed	2.2 km / h / 4.0 km / h 1.4 mph / 2.5 mph	
	Ground pressure	25.5 kPa 0.26 kgf/cm^2 3.69 psi	26.5 kPa 0.27 kgf/cm^2 3.83 psi
	Climbing angle	30 deg	
Blade (width and height)		990 / 1300 x 230 mm 39 / 51.2 x 9.1 in.	
Boom swing angle	Left	1.27 rad 75 deg	
	Right	0.99 rad 60 deg	
Pressure connection for attachments	Max. displacement (Theoretical)	27.7 L/min (7.13 USgal)	
	Max. pressure	21.6 MPa 220.0 kgf/cm^2 3130 psi	
Fuel tank capacity		21 L (5.55 USgal)	

■ **NOTE**
- **Above dimensions are based on the machine with JPN bucket.**
  JPN = made in Japan
- **Above dimensions are based on the machine with rubber crawlers.**
- **Machine weight : with 35 kg (77 lbs) standard bucket and fully served.**
- **Operating weight : with 75 kg (165 lbs) operator, 35 kg (77 lbs) standard bucket and fully served.**
- **Specifications subject to change without notice.**

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6. OIL AND WATER CAPACITY TABLE

Item			Notes
Engine Oil (When changing filter)		3.6 L (0.95 U.S.gal)	Shell Havella T10 W30 D10W30 Super
Coolant	Canopy	2.7 L (0.71 U.S.gal)	Anti-freeze Esso G03-11BVLK
	Cabin	2.9 L (0.77 U.S.gal)	
	Reserve Tank	0.56 L (0.15 U.S.gal)	
Fuel		21 L (5.55 U.S.gal)	Diesel
Hydraulic Fluid	Total oil capacity	28 L (7.40 U.S.gal)	Nuto H46
	Inside tank (middle of gauge)	15.5 L (4.09 U.S.gal)	
Travel Motor		330 ml (20.1 cu.in.)	Shell Spirax MA 80W
Idler Assembly		30 ml (1.8 cu.in.)	Engine Oil SAE #30CD
Track Roller		40 ml (2.4 cu.in.)	Engine Oil SAE #30CD

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7. MAINTENANCE INTERVALS

[1] OPERATOR SERVICING

No.	Check points			Hour meter indicator																	Interval	
				50	100	150	200	250	300	350	400	450	500	550	600	650	700	750	800	1000		
1	Coolant		check	Daily check																		
2	Fuel		check	Daily check																		
3	Engine oil		check	Daily check																		
4	Hydraulic oil		check	Daily check																		
5	Lubrication points		–	Daily check																		
6	Radiator and oil cooler		check	Daily check																		
7	Engine and electrical wiring		check	Daily check																	every year	
8	Washer liquid		–	Daily check																		
9	Fuel tank, Fuel filter		drain	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍	every 50 hrs	
10	Battery condition		check	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍	every 50 hrs	
11	Greasing swing bearing teeth		–	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍	every 50 hrs	
12	Fan belt tension		check	Daily check																		
13	Radiator hoses and clamps		check				❍				❍				❍				❍	❍	every 200 hrs	
			replace																		every 2 years	
14	@ Air filter element	Outer element	clean				❍				❍				❍				❍	❍	every 200 hrs	*1
			replace																	❍	every 1000 hrs	*1 *2
		Inner element	replace																	❍	every 1000 hrs	*1 *2
15	Greasing swing ball bearings		–				❍				❍				❍				❍	❍	every 200 hrs	
16	Radiator system		rinse																		every 2 years	
17	@ Fuel line and Intake air line		check				❍				❍				❍				❍	❍	every 200 hrs	

■ **IMPORTANT**

- ***1 : Clean and replace the air filter more frequently if used under dusty conditions. When the filter is very dirty from dusty conditions, replace the filter.**
- ***2 : The maintenance identified with "*2" is appeared on the meter panel at each specified maintenance hours.**

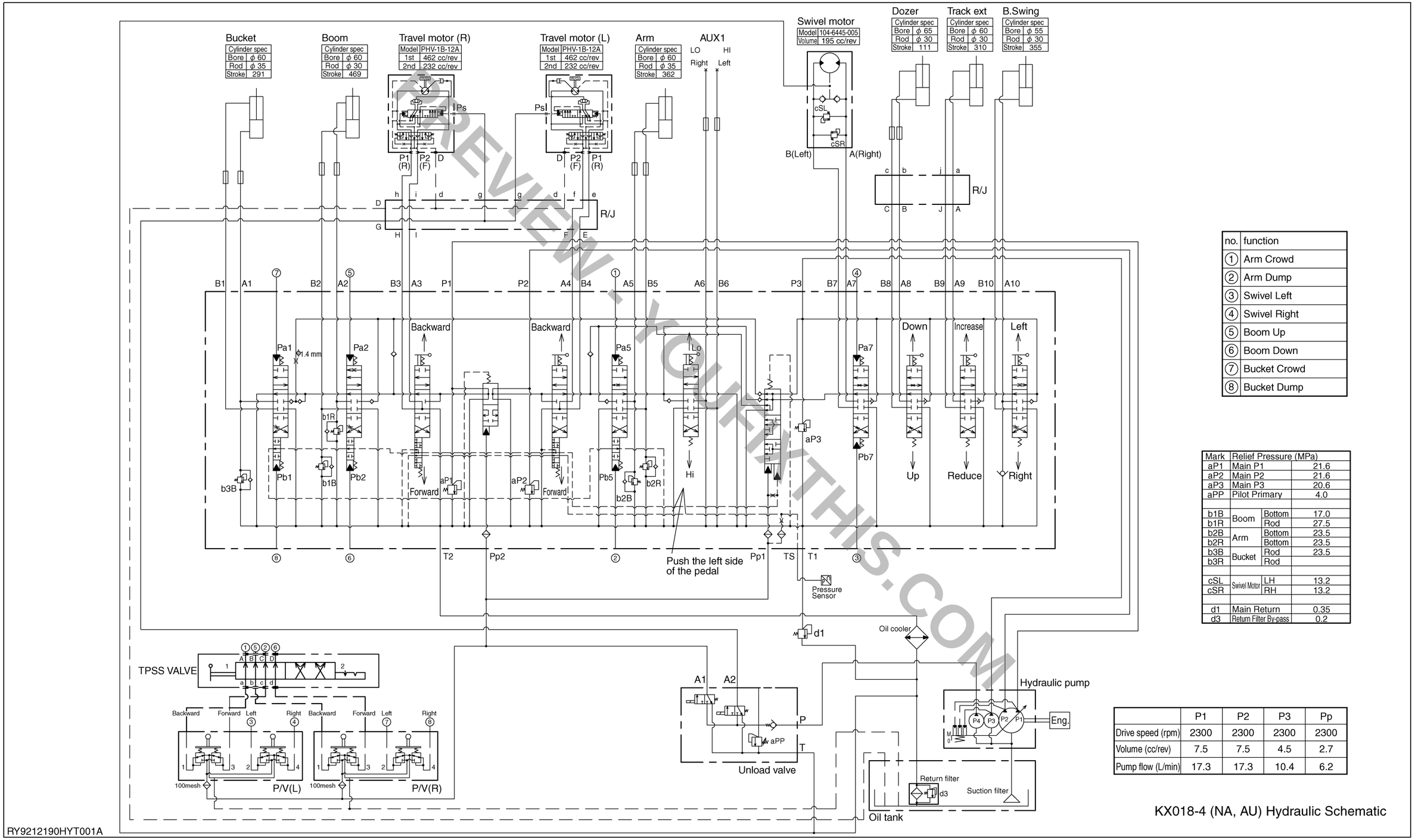
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1. DIAGRAM OF HYDRAULIC CIRCUIT

[1] DIAGRAM OF HYDRAULIC CIRCUIT



no.	function
①	Arm Crowd
②	Arm Dump
③	Swivel Left
④	Swivel Right
⑤	Boom Up
⑥	Boom Down
⑦	Bucket Crowd
⑧	Bucket Dump

Mark	Relief Pressure (MPa)		
aP1	Main P1		21.6
aP2	Main P2		21.6
aP3	Main P3		20.6
aPP	Pilot Primary		4.0
b1B	Boom	Bottom	17.0
b1R		Rod	27.5
b2B	Arm	Bottom	23.5
b2R		Bottom	23.5
b3B	Bucket	Rod	23.5
b3R		Rod	
cSL	Swivel Motor	LH	13.2
cSR		RH	13.2
d1	Main Return		0.35
d3	Return Filter By-pass		0.2

	P1	P2	P3	Pp
Drive speed (rpm)	2300	2300	2300	2300
Volume (cc/rev)	7.5	7.5	4.5	2.7
Pump flow (L/min)	17.3	17.3	10.4	6.2

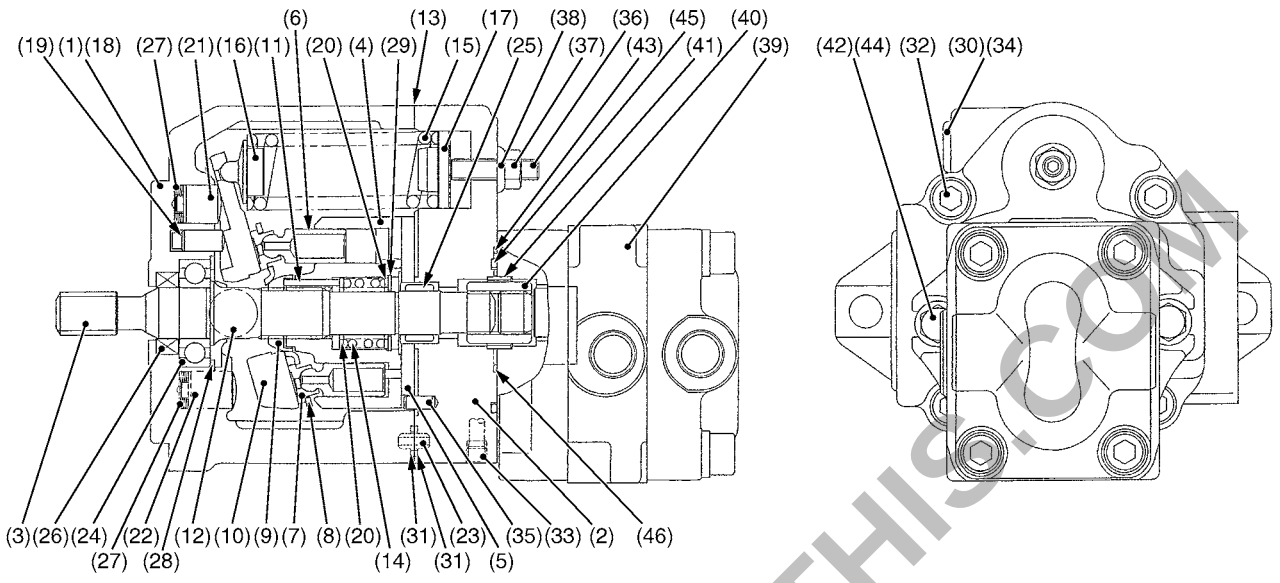
KX018-4 (NA, AU) Hydraulic Schematic

RY9212190HYT001A

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[2] COMPONENTS



RY9212091HYM003A

No.	Parts Name	Q'ty	Remarks	No.	Parts Name	Q'ty	Remarks
(1)	Body-S	1		(24)	Bearing	1	
(2)	Body-H	1		(25)	Needle Bearing	1	
(3)	Shaft	1		(26)	Oil Seal	1	
(4)	Cylinder Barrel	1		(27)	Coned Disk Springs	8	
(5)	Valve Plate	1		(28)	Snap Ring	1	JIS B 2804 42 Hole
(6)	Piston	10		(29)	Snap Ring	1	JIS B 2804 28 Hole
(7)	Shoe	10		(30)	O-ring	1	JIS B 2401, 1B, P11
(8)	Shoe Holder	1		(31)	O-ring	2	JIS B 2401, 1B, P8
(9)	Barrel Holder	1		(32)	Screw	4	JIS B 1176 M10 × 40 12T
(10)	Swash Plate	1		(33)	Plug	4	
(11)	Needle	3		(34)	Plug	1	
(12)	Ball	2		(35)	Spring Pin	1	JIS B 2808 5 × 12 AW
(13)	Packing	1		(36)	Screw	1	JIS B 1177 M8 × 30
(14)	Spring C	1		(37)	Nut	1	JIS B 1181 M8
(15)	Spring T	1		(38)	Seal Washer	1	
(16)	Spring Holder	1		(39)	Gear Pump Kit	1	
(17)	Spring Guide	1		(40)	Coupling	1	
(18)	Pin	1		(41)	Collar	1	
(19)	Rod G	1		(42)	Screw	2	JIS B 1180 M8 × 25 11T
(20)	Retainer	2		(43)	O-ring	1	JIS B 2401, 1B, P7
(21)	Stopper Pin A	1		(44)	Washer	2	JIS B 2401, 1B, G55
(22)	Stopper Pin B	1		(45)	O-ring	1	JIS B 2401, 1B, P8
(23)	Pin	1		(46)	O-ring	1	

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1. PUMP

[1] PUMP DISASSEMBLY/ASSEMBLY

CAUTION

- **When removing a hydraulic device after operating the mini-excavator, lower the bucket and blade to the ground and turn off the engine.**
- **Each of the devices and the hydraulic oil are hot and under high pressure immediately after operating the mini-excavator. If the hydraulic oil reached a high operating temperature, it may cause a burn.**
- **Oil gushing out under pressure has enough force to pierce your skin and may cause you injury. Always allow the temperature to drop and relieve any remaining pressure prior to working to remove any hydraulic equipment.**

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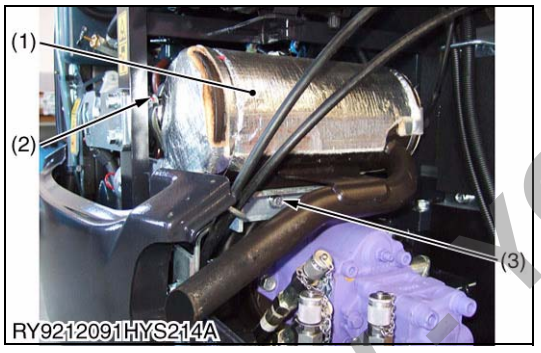


Removing the Right Engine Cover

1. Remove the four right engine cover mounting bolts, the fuel tank cap and then the right engine cover.

(1) Cap ASSY
(2) Bolt
(3) Engine Cover

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Removing the Muffler

1. Loosen the muffler clamp, then remove the two muffler bracket mounting bolts and the muffler.

(1) Muffler
(2) Muffler Clamp
(3) Bolt

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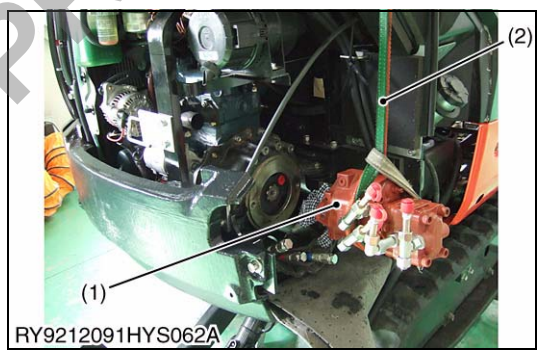


Removing the Main Pump

1. Remove all hoses from the pump and fit plugs to the adapter and disconnected hoses.
2. Loosen the suction hose tightening clamp and remove the suction hose from the pump.

(1) Piston Pump ASSY
(2) Hose Clamp
(3) Suction Hose

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3. Suspend the pump by a nylon sling and support it with a crane. Remove the bolts in two locations,and pull the shaft of the pump suspended by the crane from the coupling.

Tightening torque	Pump	77.5 to 90.2 N·m 7.9 to 9.2 kgf·m 5.72 to 66.5 lbf·ft

(1) Piston Pump ASSY
(2) Nylon Sling

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Torque

			Notes
Boom Cylinder	Cylinder head	200 to 300 N·m 20.4 to 30.5 kgf·m 148 to 221 lbf/ft	
	Piston	230 to 340 N·m 23.5 to 34.6 kgf·m 170 to 250 lbf/ft	
	Set screw	20 N·m 2.0 kgf·m 15 lbf·ft	
Arm Cylinder	Cylinder head	250 to 300 N·m 25.5 to 30.5 kgf·m 185 to 221 lbf/ft	
	Piston	310 to 460 N·m 31.7 to 46.9 kgf·m 229 to 339 lbf/ft	
	Set screw	20 N·m 2.0 kgf·m 15 lbf·ft	
Bucket Cylinder	Cylinder head	250 to 300 N·m 25.5 to 30.5 kgf·m 185 to 221 lbf/ft	
	Piston	310 to 460 N·m 31.7 to 46.9 kgf·m 229 to 339 lbf/ft	
	Set screw	20 N·m 2.0 kgf·m 15 lbf·ft	
Swing Cylinder	Cylinder head	250 to 300 N·m 25.5 to 30.5 kgf·m 185 to 221 lbf/ft	(Loctite 222)
	Piston	280 to 315 N·m 28.6 to 32.1 kgf·m 207 to 232 lbf/ft	(Loctite 262)
Blade Cylinder	Cylinder head	350 to 400 N·m 35.7 to 40.7 kgf·m 259 to 295 lbf/ft	(Loctite 222)
	Piston	280 to 315 N·m 28.6 to 32.1 kgf·m 207 to 232 lbf/ft	(Loctite 262)
Track Cylinder	Cylinder head	250 to 300 N·m 25.5 to 30.5 kgf·m 185 to 221 lbf/ft	(Loctite 222)
	Piston	280 to 315 N·m 28.6 to 32.1 kgf·m 207 to 232 lbf/ft	(Loctite 262)

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12. TROUBLESHOOTING

Front System Troubleshooting

All front operations slow or not moving

Cause	Inspection point	Remedy	Reference page
Defect of the engine itself	Engine speed measurement	Adjust each engine part	
Insufficient hydraulic fluid volume or oil deterioration	Check hydraulic tank oil level and oil quality	Replenish the hydraulic fluid supply or change the oil	
Suction line (suction filter) blockage	Inspect the suction line (suction filter)	Clean the suction line Replace the suction line	
Pilot relief valve faulty operation or poor pilot pump performance	Test pilot primary pressure	Adjust, clean or replace pilot relief valve Replace pilot pump	
Poor main relief valve operation or seating	Measure main relief valve pressure	Adjust, clean or replace main relief valve	
Defective pump installation coupling	Pump installation coupling inspection	Replace pump coupling	
Pump drive shaft breakage	Pump drive shaft inspection	Replace shaft	
Wear or damage to internal pump parts	Pump inspection	Repair or replace pump	

Either pilot valve right or left front does not move or is slow

Cause	Inspection point	Remedy	Reference page
Pilot valve line filter blockage	Pilot valve line filter blockage inspection	Clean pilot filter line filter	
Defective pilot valve	Measure the pilot secondary pressure of the corresponding cylinder	Pilot valve disassembly, cleaning or replacement	

Low power in entire hydraulic system

Cause	Inspection point	Remedy	Reference page
Pilot relief valve faulty operation or poor pilot pump performance	Test pilot primary pressure	Adjust, clean or replace pilot relief valve Replace pilot pump	
Poor main relief valve operation or seating	Measure main relief valve pressure	Adjust, clean or replace main relief valve	

Only a certain cylinder fails to move or is slow

Cause	Inspection point	Remedy	Reference page
The corresponding pilot valve is faulty	Measure the pilot secondary pressure of the corresponding cylinder	Pilot valve disassembly, cleaning or replacement	
Defective specified pressure of overload relief valve	Inspect overload relief valve of applicable cylinder	Clean overload relief valve seat surface or replace	
Control valve spool sticks	Inspect control valve spool of applicable cylinder	Control valve spool disassembly and cleaning	

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[4] SERVICE DEALER MODE

(1) Table of Diagnostic / Setting Items

	Number	Item	Display	Remarks
[A] Tester (SET-1)	1	Engine RPM	1:OOOO	rpm
	2	Battery voltage	2:OO.O	V
	3	Engine oil	3:ON OFF	
	4	Charge	4:ON OFF	
	5	Starter position	5:ON OFF	
	6	Worklight	6:ON OFF	
	7	Water temperature voltage	7:O.OO	V
	8	Water temperature	8:OO	°C
	9	Fuel voltage	9:O.OO	V
	10	Fuel resistance	10:OOO	Ω
	11★	Fuel supply SW	11:ON OFF	
	12	2-speed SW	12:ON OFF	
	13	2-speed solenoid	13:ON OFF	
	14	Lever lock SW	14:ON OFF	
	15	Lever lock solenoid	15:ON OFF	
	16	Travel alarm pressure sensor / AUX knob (current value)	16:O.OO	V
	17★	AUX knob (left setting value)	17:O.OO	V
	18★	AUX knob (neutral setting value)	18:O.OO	V
	19★	AUX knob (right setting value)	19:O.OO	V
	20★	AUX amperage	20:O.O	A
	21★	AUX hold SW	21:ON OFF	
	22★	AUXSW	22:ON OFF	
	23★	AUX R setting value	23:OO	x 10mA
	24★	AUX L setting value	24:OO	x 10mA
	25★	Key type	25:O	Unknown: 0, red:1, black:2, yellow:3, green:4
	26★	Key matches	26:ON OFF	
	27★	Anti-theft mode	27:ON OFF	
	28★	Key presence	28:ON OFF	
	29★	Anti-theft antenna	29:ON OFF	
[B] Read Error History (SET-2)			E:OOO	Error item
[C] Clear Entire History (SET-3)			3: Y N	Y: YES, N: NO

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Electrical Circuit Diagram (KX018-4 NA, AU)

I INFORMATION

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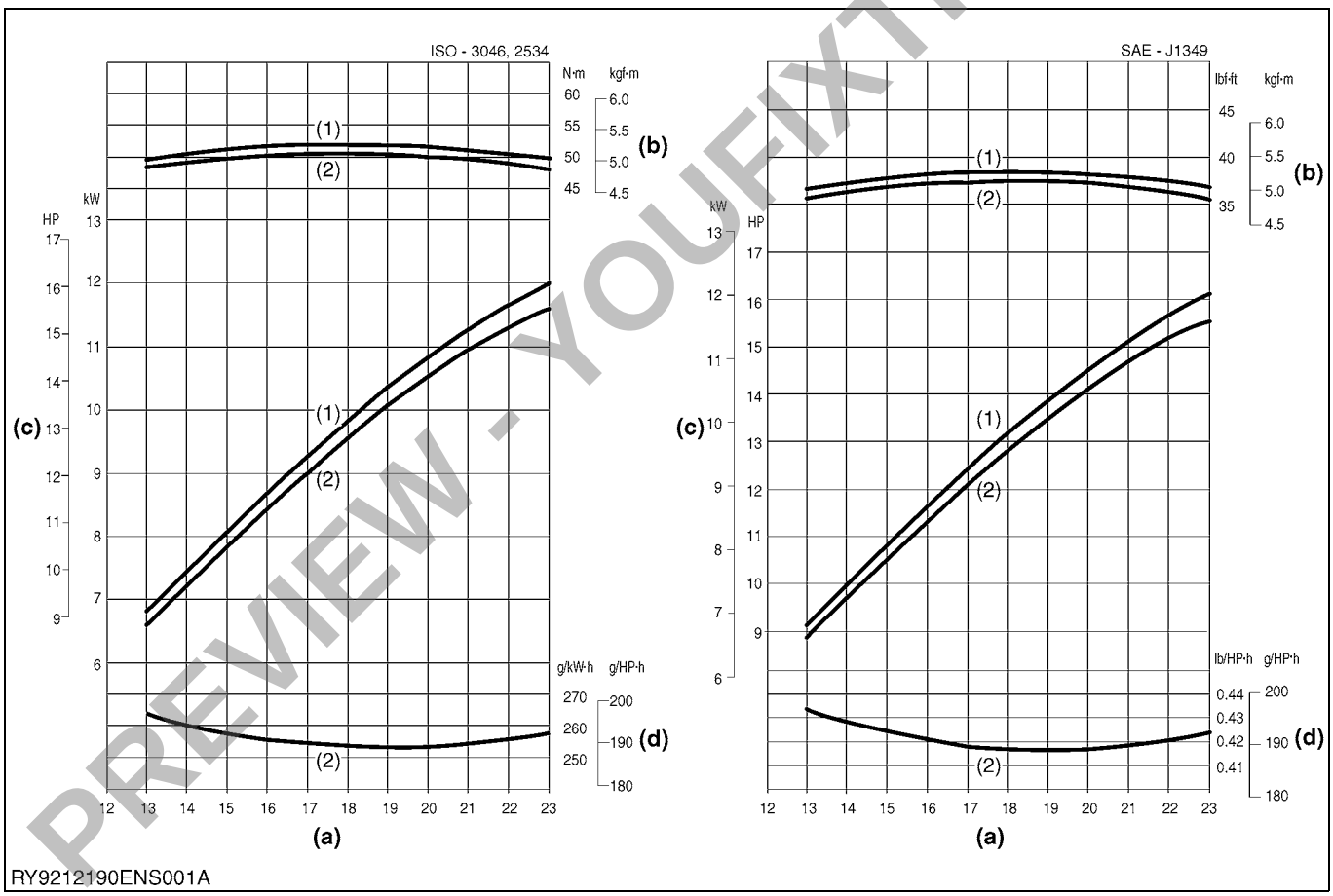
		KX016-4 (For AU)	KX018-4 (For NA)	KX018-4 (For AU)
Alternator		12 V (480 W)		
Charging current		40 A		
Regulation voltage		14.2 to 14.8 V		
Battery	ETN	545 024 030		
	DIN	54524		
	JIS	12V45AH, 55B24R		
Electrolyte gravity		1.28 ± 0.01		
Starter		12 V (1.2 kW)	12 V (1.4 kW)	
Grow plug		0.9 Ω		

CAUTION
- **Actual measured values may vary with the machine.**

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[2] PERFORMANCE CURVE

D902-E3-BH-3



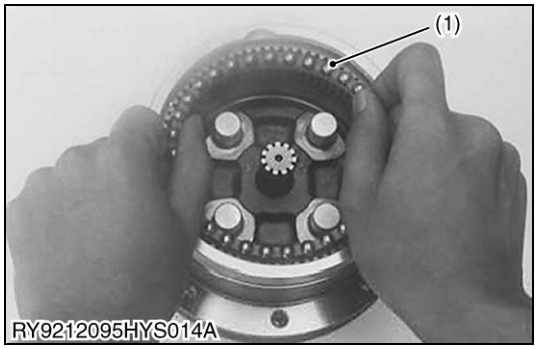
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(1) Gross int.
(2) Net int.
(a) Engine Speed (rpm × 100)
(b) Torque
(c) Brake Horsepower
(d) Specific Fuel Consumption

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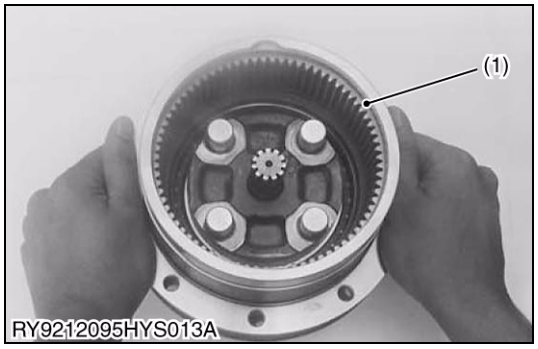


13. Remove the steel balls with retainer and the internal ring of bearing from the speed reducer.

■ **IMPORTANT**
- **Pay attention not to lose the balls from retainer.**

(1) Steel Balls with Retainer

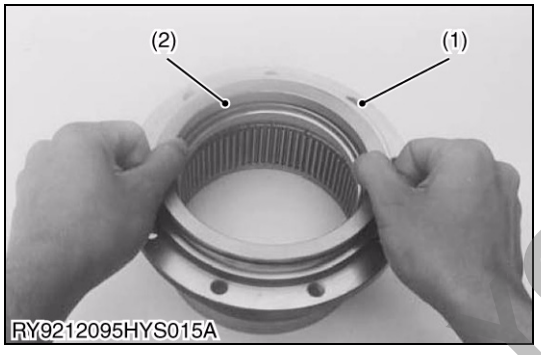
RY9212095HYS0023US0



14. Remove the speed reducer.

(1) Speed Reducer

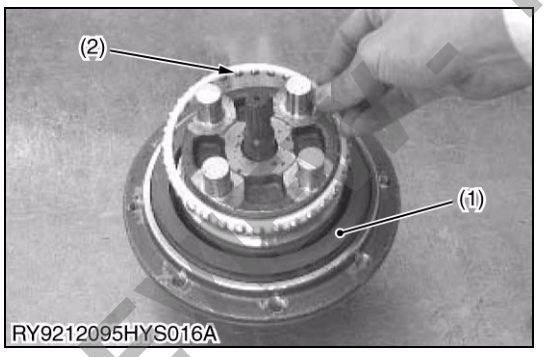
RY9212095HYS0024US0



15. Remove the seal ring from the speed reducer.

(1) Speed Reducer (2) Seal Ring

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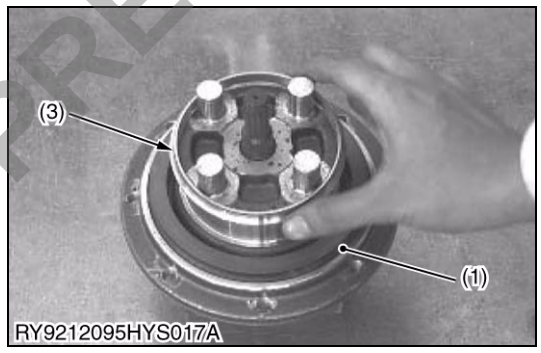


16. Remove the steel balls with retainer and the internal ring of bearing from the hydraulic motor.

■ **IMPORTANT**
- **Pay attention not to lose the balls from retainer.**

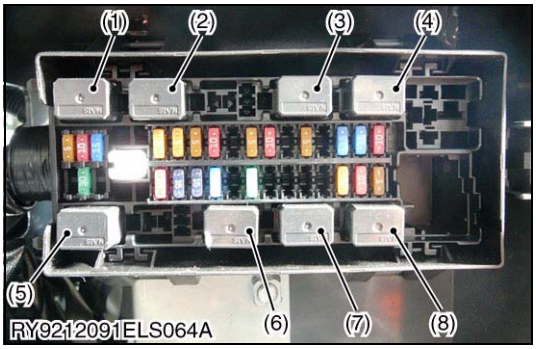
(1) Hydraulic Motor (3) Internal Ring of Bearing
(2) Steel Balls with Retainer

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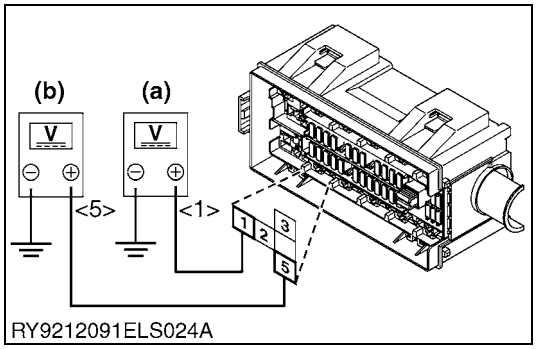
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Relay capacities and circuits

(1) Beacon (20 A)
(2) Work light (20 A)
(3) Cab (20 A)
(4) Auto release (20 A)
(5) Horn (20 A)
(6) Glow (20 A)
(7) Engine stop (20 A)
(8) Heater (20 A)

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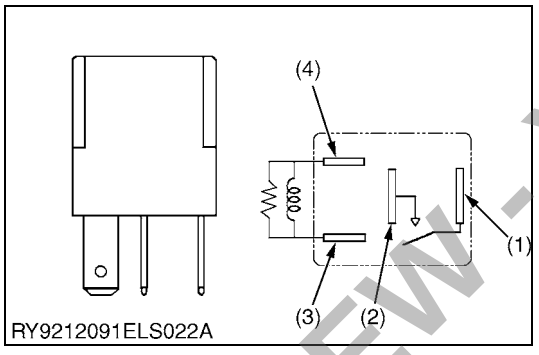
Auto-Release Relay Voltage Test

1. Remove the auto-release relay.
2. Key Switch: START
3. Measure the voltage based on the table below.

Measurement	Connector Name (+ terminal side)	Pin No.	Connector Name (– terminal side)	Pin No.	Assessment Results
(a)	Auto-release relay fusebox side	<1>	Body GND	–	
(b)	Auto-release relay fusebox side	<5>	Body GND	–	

Std. Value: 11 to 14 V (battery voltage) OK
Outside Std. Val.: NG

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Auto-release Relay Inspection

1. Key Switch: STOP
2. Remove the auto-release relay.
3. Measure the resistance based on the table below.

Measurement	Relay Terminal (+ terminal side)	Relay Terminal (– terminal side)	Assessment Results
(a)	(3)	(4)	

Std. Val.: 108 to 132 Ω : OK
Outside Std. Val.: NG

4. Test the continuity based on the table below.

Measurement	Relay Terminal (+ terminal side)	Relay Terminal (– terminal side)	Assessment Results
(a)	(1)	(2)	

Std. Val.: Not continuous: OK
Outside Std. Val.: Continuous: NG

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