WSM

WORKSHOP MANUAL
BACKHOE

BH77

Kubota

KiSC issued 09, 2010 A

TO THE READER

This Workshop Manual tells the servicing personnel about the mechanism, servicing and maintenance of the KUBOTA Backhoe BH77. It contains 4 parts: **"Information"**, **"General"**, **"Mechanism"** and **"Servicing"**.

■ **Information**

This section contains information below.

- Safety First
- Safety Decals
- Terminology
- Specification

■ **General**

This section contains information below.

- Backhoe Identification
- General Precautions
- Lubricants
- Tightning Torques
- Maintenance Check List
- Check and Maintenance
- Special Tools

■ **Mechanism**

This section contains information on the structure and the function of the unit. Before you continue with the subsequent sections, make sure that you read this section.

■ **Servicing**

This section contains information below.

- Troubleshooting
- Servicing Specifications
- Tightening Torques
- Dismounting and Mounting
- Checking, Disassembling and Servicing

All illustrations, photographs and specifications contained in this manual are of the newest information available at the time of publication.

KUBOTA reserves the right to change all information at any time without notice.

Since this manual includes many models, information or illustrations and photographs can show more than one model.

September, 2010

I INFORMATION

INFORMATION

CONTENTS

1. SAFETY FIRST

⚠ 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.**

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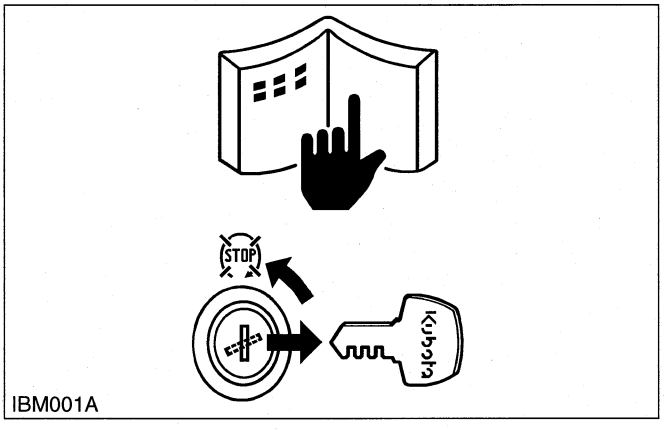

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BEFORE YOU START SERVICE

- 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 stable and level ground, and set the parking brake.
- Lower the implement to the ground.
- Stop the engine, then remove the key.
- Disconnect the battery negative cable.
- Hang a **"DO NOT OPERATE"** tag in the operator station.

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START SAFELY

- Do not do the procedures below when you start the engine.
  - short across starter terminals
  - bypass the safety start switch
- Do not alter or remove any part of machine safety system.
- Before you start the engine, make sure that all shift levers are in neutral positions or in disengaged positions.
- Do not start the engine when you stay on the ground. Start the engine only from operator's seat.

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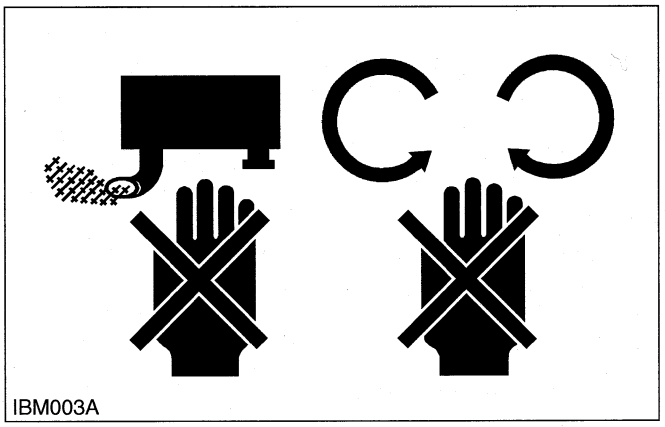
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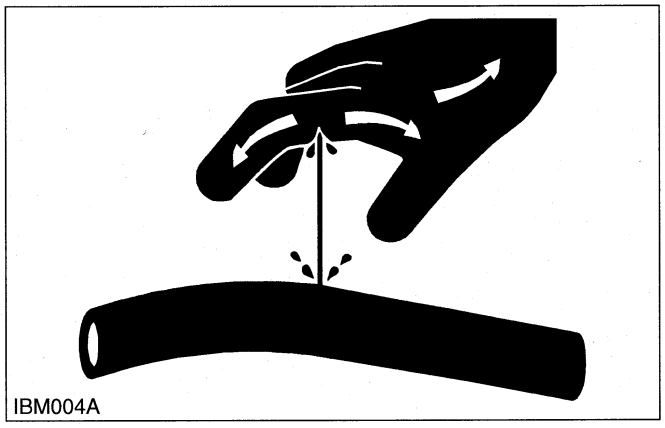
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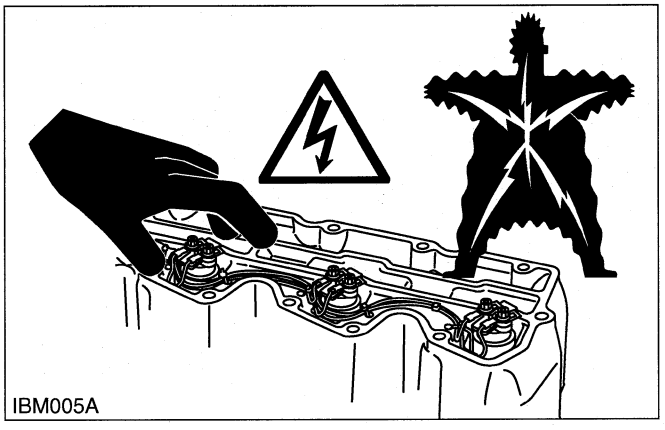
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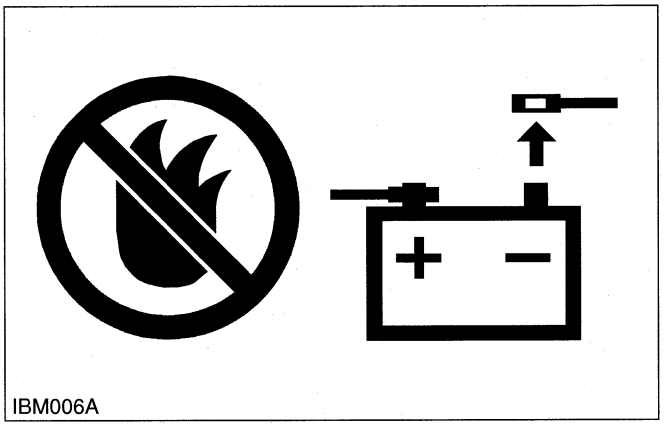
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OPERATE SAFELY

- 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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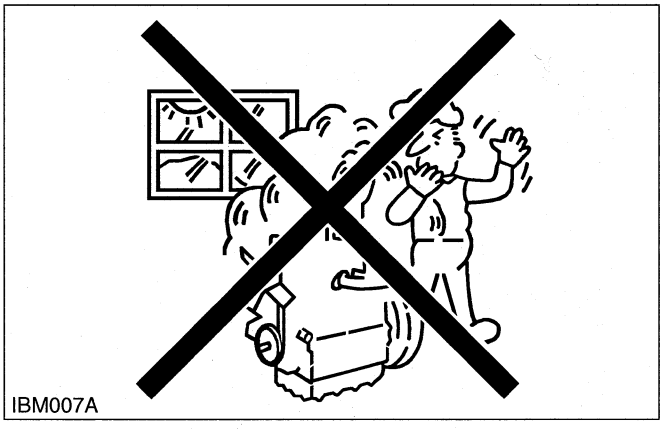
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KEEP A GOOD AIRFLOW IN THE WORK AREA

- If the engine is in operation, make sure that the area has good airflow. Do not operate the engine in a closed area. The exhaust gas contains poisonous carbon monoxide.

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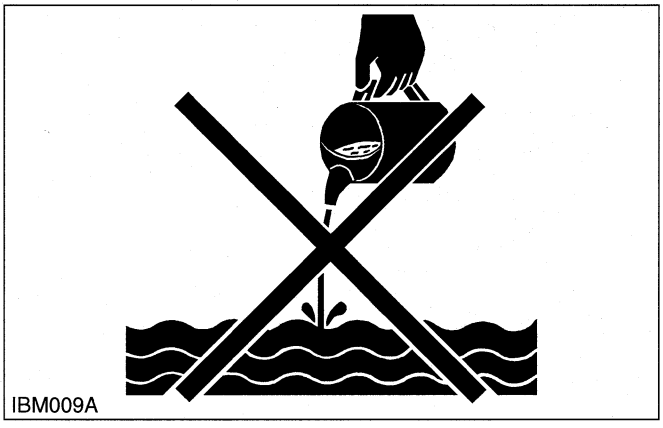
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DISCARD FLUIDS CORRECTLY

- Do not discard fluids on the ground, down the drain, into a stream, pond, or lake. Obey related environmental protection regulations when you discard oil, fuel, coolant, electrolyte and other dangerous waste.

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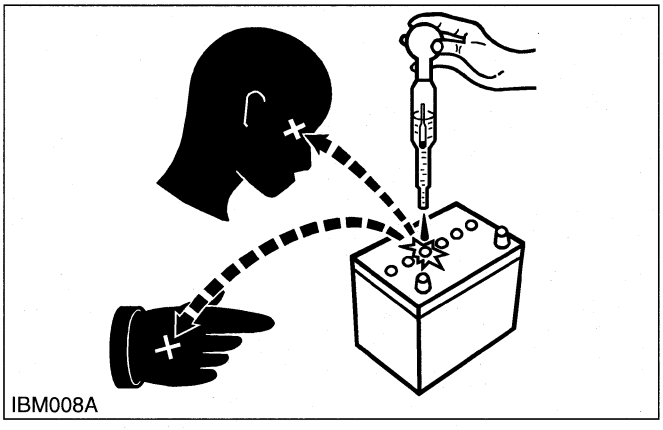
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PREVENT ACID BURNS

- Keep electrolyte away from your eyes, hands and clothing. Sulfuric acid in battery electrolyte is poisonous and it can burn your skin and clothing and cause blindness. If you spill electrolyte on yourself, clean yourself with water, and get medical aid immediately.

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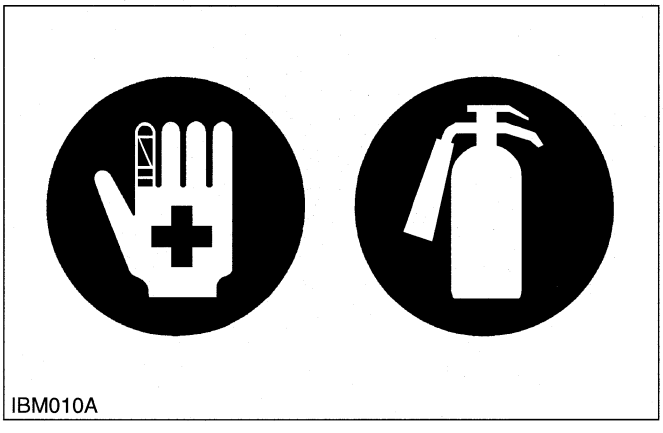
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PREPARE FOR EMERGENCIES

- Keep a first aid kit and fire extinguisher ready at all times.
- Keep the emergency contact telephone numbers near your telephone at all times.

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2. 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 part number is listed in the parts list.

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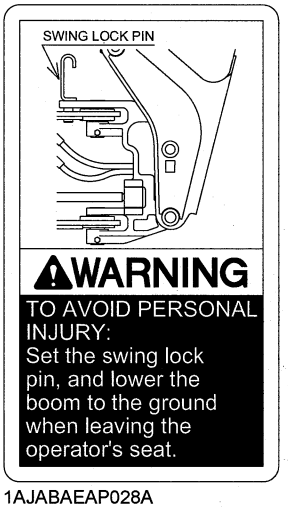
(1) Part No. 75597-7528-0

1AJABAAAP064A

(2) Part No. 7K501-7529-0



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(3) Part No. 75595-7524-0

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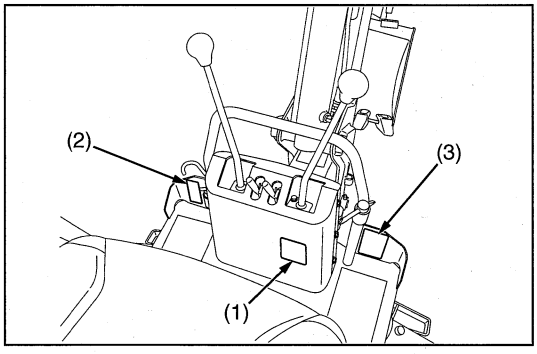

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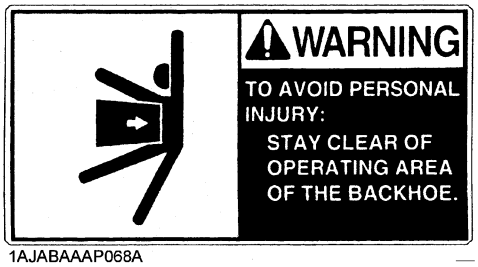
(1) Part No. 75595-7517-0 (Both sides)



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(2) Part No. 7K500-7531-0

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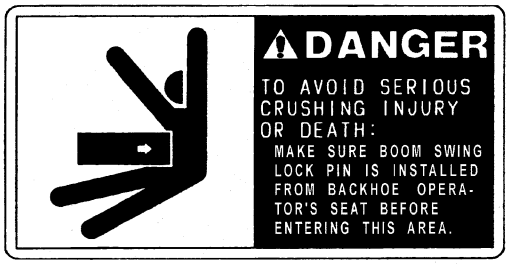
(3) Part No. 75597-7517-0



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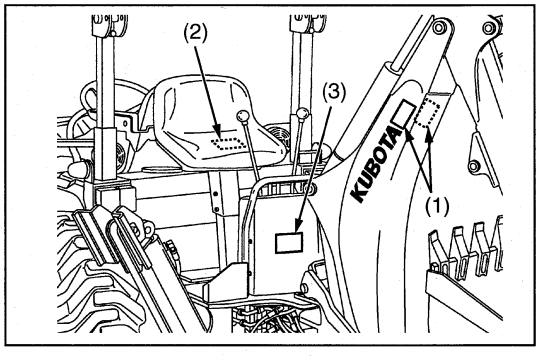

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CARE OF DANGER, WARNING AND CAUTION LABELS

1. Keep danger, warning and caution labels clean and free from obstructing material.
2. Clean danger, warning and caution labels with soap and water, dry with a soft cloth.
3. Replace damaged or missing danger, warning and caution labels with new labels.
4. If a component with danger, warning and caution label(s) affixed is replace with new part, make sure new label(s) is (are) attached in the same location(s) as the replace component.
5. Mount new danger, warning and caution labels by applying on a clean dry surface and pressure any bubbles to outside edge.

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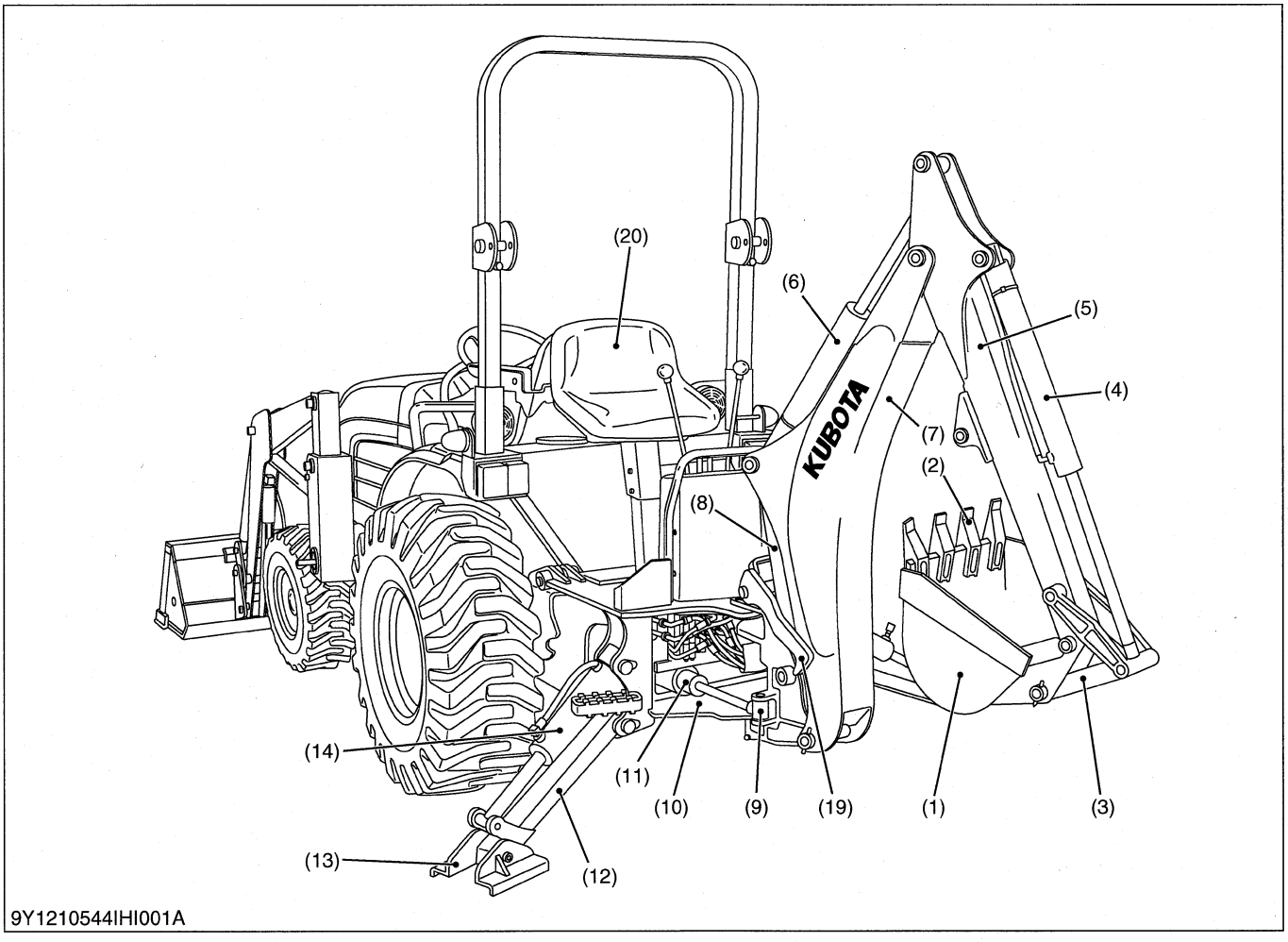
3. TERMINOLOGY



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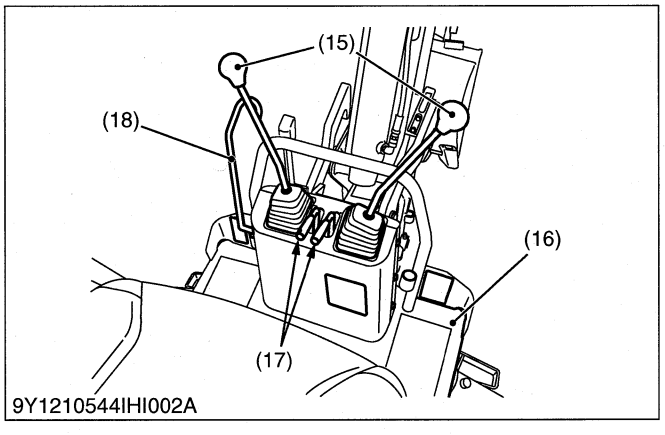

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(1) Backhoe Bucket
(2) Bucket Teeth
(3) Link, Bucket
(4) Cylinder, Bucket
(5) Dipperstick
(6) Cylinder, Dipperstick
(7) Boom
(8) Cylinder, Boom
(9) Swing Frame
(10) Main Frame
(11) Cylinder, Swing
(12) Stabilizer
(13) Stabilizer Pad
(14) Cylinder, Stabilizer
(15) Joystick Control
(16) Step
(17) Stabilizer Control
(18) Swing Lock Pin
(19) Boom Lock
(20) Seat

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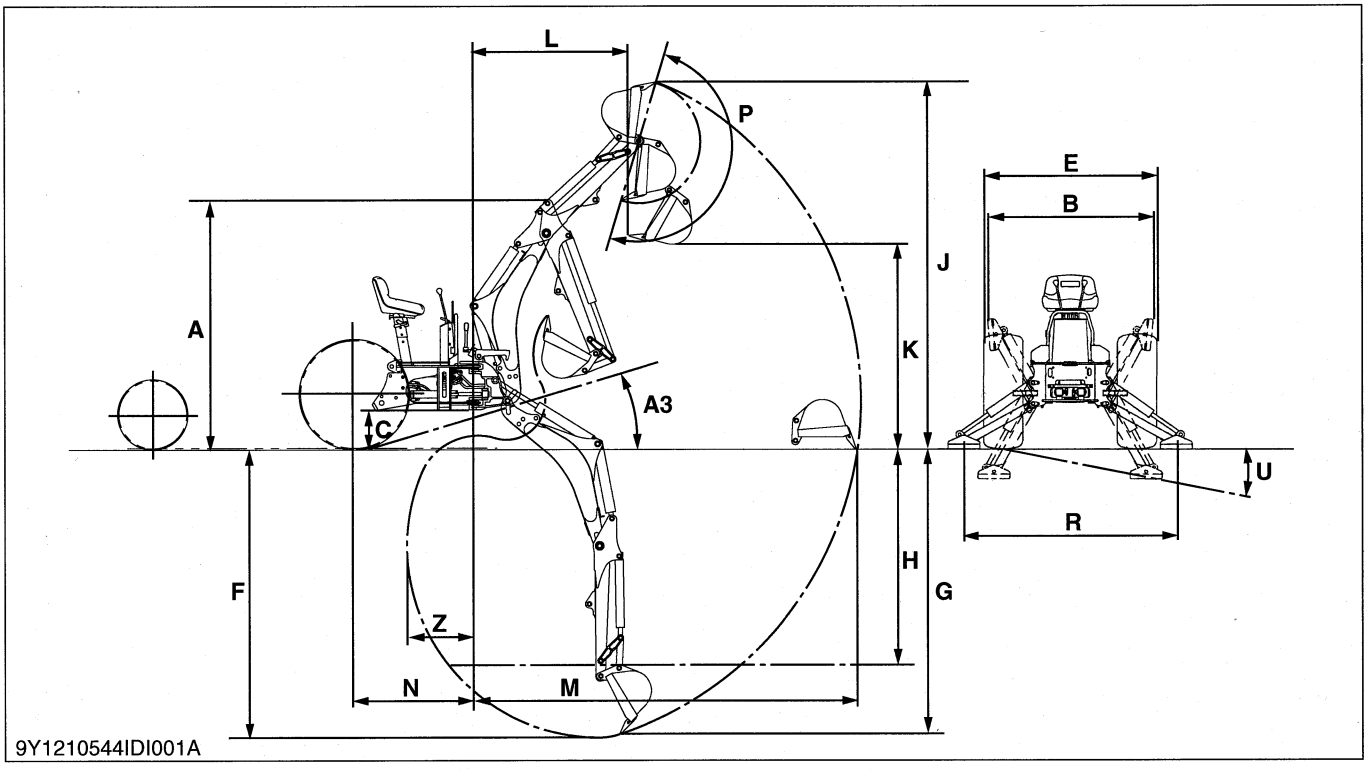
4. SPECIFICATIONS

Operating Dimensions



	Model	BH77
A	Transport Height	2051 mm (80.75 in.)
B	Stabilizer Spread Transport	1315 mm (51.772 in.)
C	Ground Clearance	319 mm (12.6 in.)
E	Overall Width	1394 mm (54.88 in.)
F	Maximum Digging Depth	2378 mm (93.62 in.)
G	Digging Depth 2 ft. Flat Bottom	2331 mm (91.77 in.)
H	Digging Depth 8 ft. Flat Bottom	1758 mm (69.21 in.)
J	Operating Height, Fully Raised	3029 mm (119.3 in.)
K	Loading Height	1693 mm (66.65 in.)
L	Loading Reach	1290 mm (50.79 in.)
M	Reach from Swing Pivot	3165 mm (124.6 in.)
N	Swing Pivot to Rear Axle Center Line	976 mm (38.4 in.)
P	Bucket Rotation	180 deg.
R	Stabilizer Spread-Operation	1717 mm (67.60 in.)
A3	Angle of Departure per SAE J1234	17.3 deg.
U	Levelling angle	10.2 deg.
Z	Undercut	534 mm (21.0 in.)
	Swing Arc	180 deg.

■ **NOTE**

- **The specifications are taken with KUBOTA B3030 tractor. (Tire size : Front 7-12, Rear 12.4-16)**

Digging Force (Per SAE J49)

With bucket cylinder	15220 N (3421 lbf)
With dipperstick cylinder	9738 N (2190 lbf)

Cycle Time (Seconds)

Boom cylinder, extend	3.5
Boom cylinder, retract	3.1
Swing cylinder, from 90 ° to center	2.1
Dipperstick cylinder, extend	4.9
Dipperstick cylinder, retract	3.4
Bucket cylinder, extend	3.2
Bucket cylinder, retract	2.5
Stabilizer cylinder, max. height to ground	2.4
Stabilizer cylinder, ground to max. height	2.0

Hydraulic Cylinders

	Boom cm (in.)	Dipperstick cm (in.)	Bucket cm (in.)	Stabilizer cm (in.)	Swing cm (in.)
Rod diameter	3.5 (1.4)	3.5 (1.4)	3.5 (1.4)	3.0 (1.2)	2.5 (0.98)
Cylinder bore	7.0 (2.8)	7.0 (2.8)	5.5 (2.2)	6.5 (2.6)	5.0 (2.0)

Bucket Alternative (Option)

	Width cm (in.)	SAE Struck Capacity m^3 (cu-ft)	SAE Heaped Capacity m^3 (cu-ft)	Number of Teeth	Weight kg (lbs)
Trenching 10"	25.4 (10.0)	0.017 (0.60)	0.021 (0.74)	3	29.0 (63.9)
Trenching 16"	30.5 (12.0)	0.022 (0.78)	0.027 (0.95)	3	32.0 (70.5)
Trenching 18"	40.6 (16.0)	0.031 (1.1)	0.039 (1.4)	4	38.0 (83.8)
Trenching 24"	61.0 (24.0)	0.048 (1.7)	0.064 (2.3)	5	47.0 (104)

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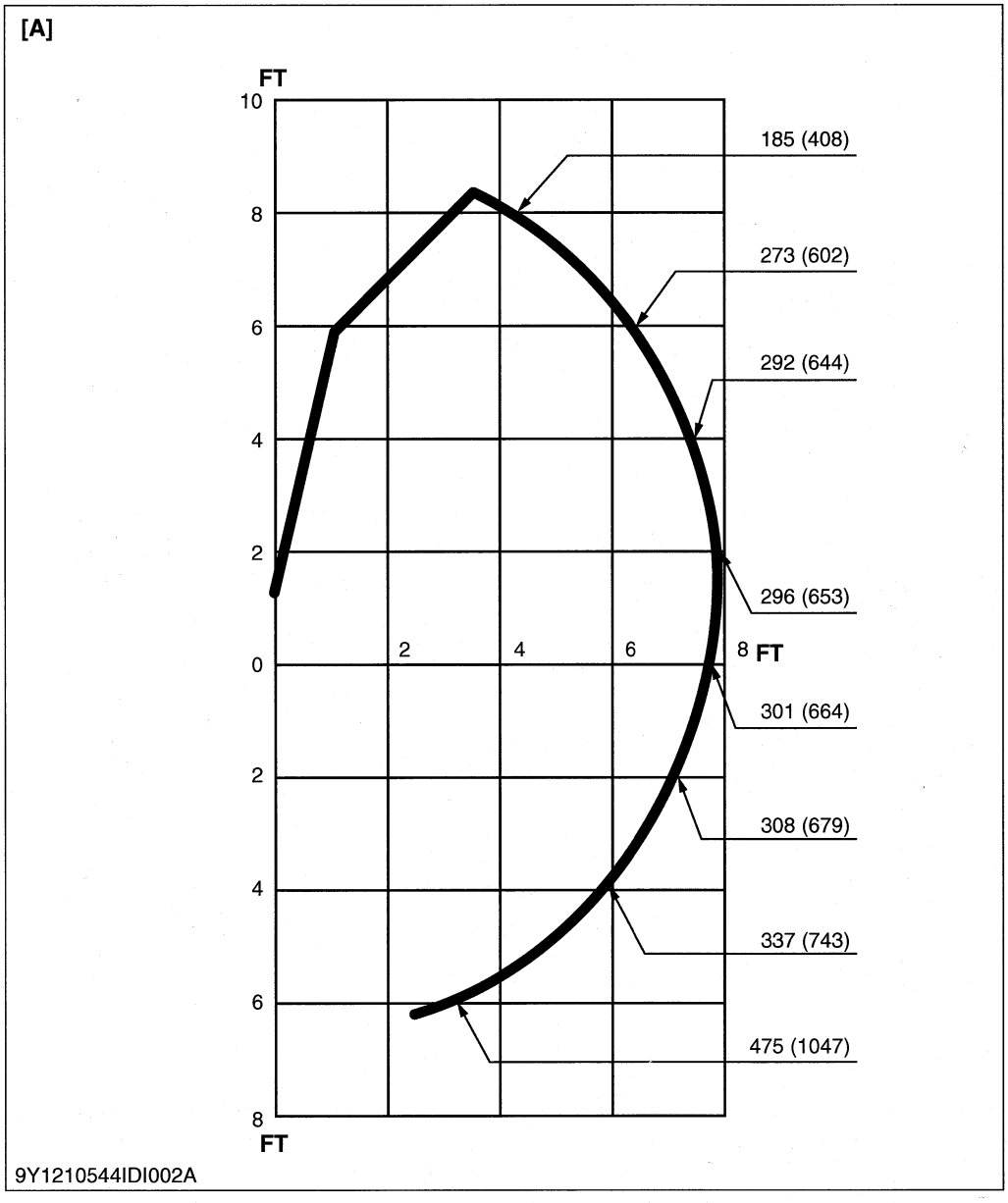
Lift Capacity (Per SAE J31)



[A] Rated Lift Capacity (Over End)-kg (lbs)

Lift capacities shown are 87 % of maximum lift force, according to SAE definition.

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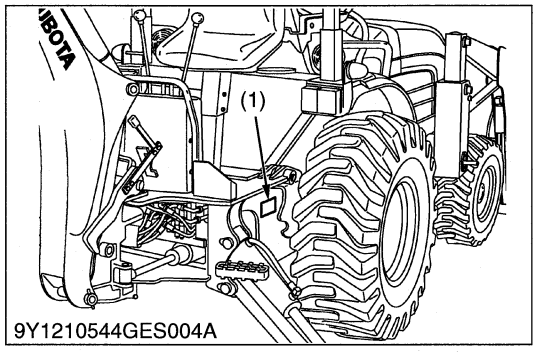
G GENERAL

GENERAL

CONTENTS

1. BACKHOE IDENTIFICATION



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When contacting your local KUBOTA distributor, always specify backhoe serial number.

(1) Serial Number

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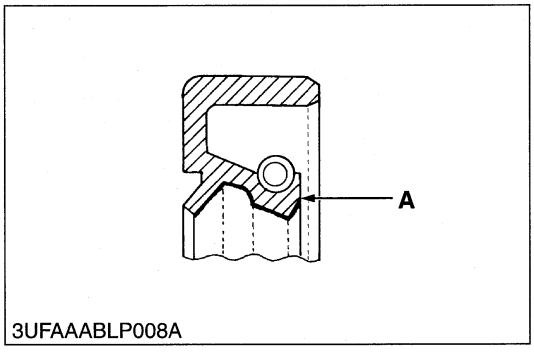
2. GENERAL PRECAUTIONS



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- During disassembly, carefully arrange removed parts in a clean area to prevent later confusion. Screws, bolts and nuts should be replaced in their original positions to prevent reassembly errors.
- When special tools are required, use genuine KUBOTA tools. Special tools which are not used frequently should be made according to the drawings provided.
- Clean parts before measuring them.
- Use only genuine KUBOTA parts for parts replacement to maintain backhoe performance and to assure safety.
- O-rings and oil seals must be replaced during reassembly. Apply grease to new O-rings or oil seals before reassembling.
- Nipples must be tightened to the specified torque. Excessive torque may cause damages hydraulic units or nipples, and insufficient torque will result in oil leaks.
- When using a new hose or pipe, tighten nuts to the specified torque once, then loosen them (approx. by 45 °) to allow hose or pipe to settle before retightening to the specified torque (except sealtaped parts).
- When removing both ends of a pipe, remove the lower end first.
- Use two pliers in removal and reinstallation; one to hold the static side, and the other to turn the side being removed to avoid twisting.
- Check to see that sleeves of flareless connectors and tapered sections of hoses are free of dust and scratches.
- After tightening nipples, clean the joint and apply the maximum working pressure 2 to 3 times to check for oil leak.

A : Grease

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3. LUBRICANTS

To prevent serious damage to hydraulic systems, use only specified fluid or its equivalent.

Place	Capacity			Lubricants, type of grease
	B3200 B3300SU	**B2630 B3030**	**L3240(-3) L3540(3)**	
Transmission case	14.5 L 3.83 U.S.gals 3.19 Imp.gals	15 L 4.0 U.S.gals 3.3 Imp.gals	42 L 11 U.S.gals 9.2 Imp.gals	KUBOTA UDT or SUPER UDT fluid*
Grease nipples	Until grease overflows			Moly Ep type grease**

Place	Capacity			Lubricants, type of grease
	L2800 L3400 L3200 L3800 [2WD Model]	**L2800 L3400 L3200 L3800 [4WD Model]**	**L2800 L3400 L3700SU L3200 L3800 [HST Model]**	
Transmission case	27 L 7.1 U.S.gals 5.9 Imp.gals	27.5 L 7.3 U.S.gals 6.1 Imp.gals	23.5 L 6.2 U.S.gals 5.2 Imp.gals	KUBOTA UDT or SUPER UDT fluid*
Grease nipples	Until grease overflows			Moly Ep type grease**

* KUBOTA original transmission hydraulic fluid

** "Extreme pressure" and containing Molybdenum disulfide is recommended. This grease may specify "Moly Ep" on it's label.

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4. TIGHTENING TORQUES

[1] GENERAL USE SCREWS, BOLTS AND NUTS

Screws, bolts and nuts whose tightening torques are not specified in this Workshop Manual should be tightened according to the table below.

Indication on top of bolt	⬡ 4 No-grade or 4T						⬡ 7 8.8 7T or Property class 8.8						⬡ 9 10.9 9T or Property class 10.9		
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 (6 mm, 0.24 in.)	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	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 (8 mm, 0.31 in.)	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 (10 mm, 0.39 in.)	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 (12 mm, 0.47 in.)	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 12.0	76.0 to 86.7
M14 (14 mm, 0.55 in.)	108 to 125	11.0 to 12.8	79.6 to 92.5	–	–	–	124 to 147	12.6 to 15.0	91.2 to 108	–	–	–	167 to 196	17.0 to 20.0	123 to 144
M16 (16 mm, 0.63 in.)	167 to 191	17.0 to 19.5	123 to 141	–	–	–	197 to 225	20.0 to 23.0	145 to 166	–	–	–	260 to 304	26.5 to 31.0	192 to 224
M18 (18 mm, 0.71 in.)	246 to 284	25.0 to 29.0	181 to 209	–	–	–	275 to 318	28.0 to 32.5	203 to 235	–	–	–	344 to 402	35.0 to 41.0	254 to 296
M20 (20 mm, 0.79 in.)	334 to 392	34.0 to 40.0	246 to 289	–	–	–	368 to 431	37.5 to 44.0	272 to 318	–	–	–	491 to 568	50.0 to 58.0	362 to 419

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[2] STUD BOLTS

Material of opponent part	Ordinariness			Aluminum		
Unit	N·m	kgf·m	lbf·ft	N·m	kgf·m	lbf·ft
M8 (8 mm, 0.31 in.)	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 (10 mm, 0.39 in.)	25 to 31	2.5 to 3.2	18 to 23	20 to 25	2.0 to 2.6	15 to 18
M12 (12 mm, 0.47 in.)	30 to 49	3.0 to 5.0	22 to 36	31	3.2	23
M14 (14 mm, 0.55 in.)	62 to 73	6.3 to 7.5	46 to 54	–	–	–
M16 (16 mm, 0.63 in.)	98.1 to 112	10.0 to 11.5	72.4 to 83.1	–	–	–
M18 (18 mm, 0.71 in.)	172 to 201	17.5 to 20.5	127 to 148	–	–	–

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[3] AMERICAN STANDARD SCREWS, BOLTS AND NUTS WITH UNC OR UNF THREADS

Grade	SAE GR.5			SAE GR.8		
Unit	N·m	kgf·m	lbf·ft	N·m	kgf·m	lbf·ft
1/4	11.7 to 15.7	1.20 to 1.60	8.63 to 11.5	16.3 to 19.7	1.67 to 2.00	12.0 to 14.6
5/16	23.1 to 27.7	2.36 to 2.82	17.0 to 20.5	33 to 39	3.4 to 3.9	25 to 28
3/8	48 to 56	4.9 to 5.7	36 to 41	61 to 73	6.3 to 7.4	45 to 53
1/2	110 to 130	11.3 to 13.2	81.2 to 95.8	150 to 178	15.3 to 18.1	111 to 131
9/16	150 to 178	15.3 to 18.1	111 to 131	217 to 260	22.2 to 26.5	160 to 191
5/8	204 to 244	20.8 to 24.8	151 to 179	299 to 357	30.5 to 36.4	221 to 263

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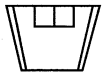
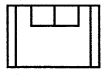
[4] PLUGS

Shape	Size	Material of opponent part					
		Ordinariness			Aluminum		
		N·m	kgf·m	lbf·ft	N·m	kgf·m	lbf·ft
Tapered screw 	R1/8	13 to 21	1.3 to 2.2	9.4 to 15	13 to 19	1.3 to 2.0	9.4 to 14
	R1/4	25 to 44	2.5 to 4.5	18 to 32	25 to 34	2.5 to 3.5	18 to 25
	R3/8	49 to 88	5.0 to 9.0	37 to 65	49 to 58	5.0 to 6.0	37 to 43
	R1/2	58.9 to 107	6.00 to 11.0	43.4 to 79.5	59 to 78	6.0 to 8.0	44 to 57
Straight screw 	G1/4	25 to 34	2.5 to 3.5	18 to 25	–	–	–
	G3/8	62 to 82	6.3 to 8.4	46 to 60	–	–	–
	G1/2	49 to 88	5.0 to 9.0	37 to 65	–	–	–

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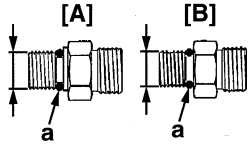
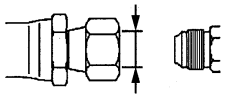
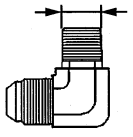
[5] HYDRAULIC FITTINGS

(1) Adaptors, Elbows and Others

Item	Shape	Thread size	Tightening torque		
			N·m	kgf·m	lbf·ft
Adjustable elbow, Adapter (O-ring port) (UNF)	 [A] Nut Type [B] No Nut Type a : O-ring	9/16	37 to 44	3.8 to 4.4	28 to 32
		3/4	48 to 54	4.9 to 5.5	36 to 39
		7/8	77 to 85	7.9 to 8.6	57 to 62
Hose fitting, Flare nut (UNF)		9/16	22 to 25	2.3 to 2.5	17 to 18
		3/4	36 to 40	3.7 to 4.0	27 to 29
		7/8	43 to 50	4.4 to 5.0	32 to 36
Adapter (NPT)		1/4	30 to 50	3.1 to 5.0	23 to 36
		3/8	39 to 60	4.0 to 6.1	29 to 44
		1/2	49 to 58	5.0 to 5.9	37 to 42

■ **NOTE**

- **When connecting a hose with flare nut, after tightening the nut with specified torque, return it approximately 45 degrees (0.79 rad) and re-tighten it to specified torque.**

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5. MAINTENANCE CHECK LIST

To keep the machine working in good condition as well as to avoid any accident and trouble, carry out periodic inspection and maintenance. Check the following points before use.

Service Interval	Check Points	Reference page
Daily (Each use)	Check the transmission fluid level	G-7, G-8
	Retighten the backhoe hardware to torque value	G-8
	Check the hydraulic hoses	G-8
Every 10 hours	Grease all grease nipples	G-9

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6. CHECK AND MAINTENANCE

CAUTION
- **When checking and repairing, park the tractor on flat ground and apply the parking brake.**
- **When checking and repairing, lower the bucket and stabilizers, and stop the engine.**

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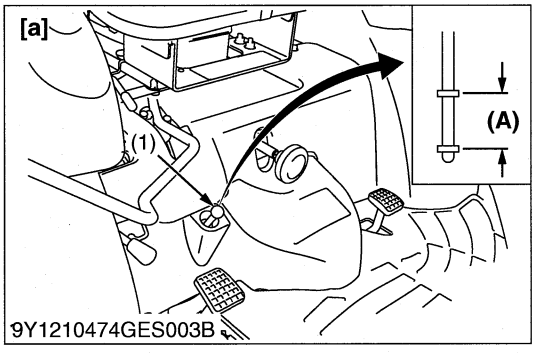
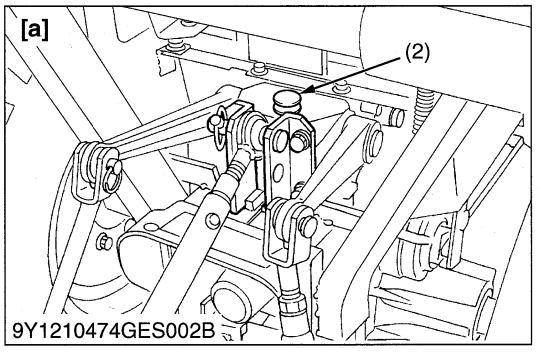
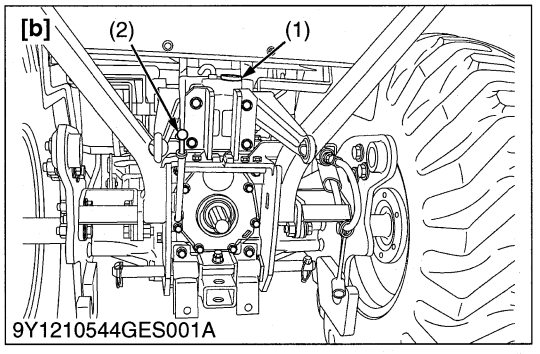
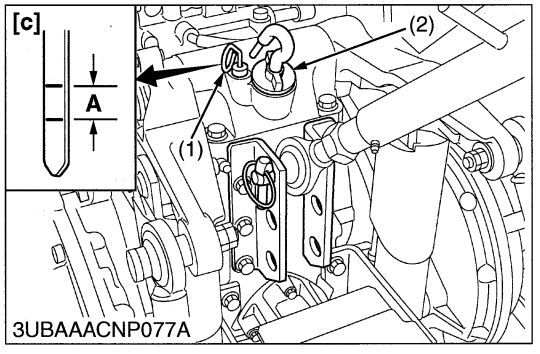
[1] CHECK POINTS OF EACH USE OR DAILY









Checking Transmission Fluid Level [B3200, B3300SU, B2630, B3030, L3240(-3) and L3540(-3)]

1. Check that the tractor hydraulic fluid level.
2. To check the oil level, remove the dipstick (1), wipe it clean, replace it, and remove it again.
   Check that the oil level is between the two notches.
3. If the level is too low, replenish new oil.

■ **IMPORTANT**
- **Use only KUBOTA UDT or SUPER UDT fluid. Use of other oils may damage the transmission or hydraulic system. Refer to "3. LUBRICANTS".**

(1) Dipstick
(2) Oil Filling Port

(A) Oil level acceptable within this range.
[a] B3200, B3300SU
[b] B2630, B3030
[c] L3240(-3), L3540(-3)

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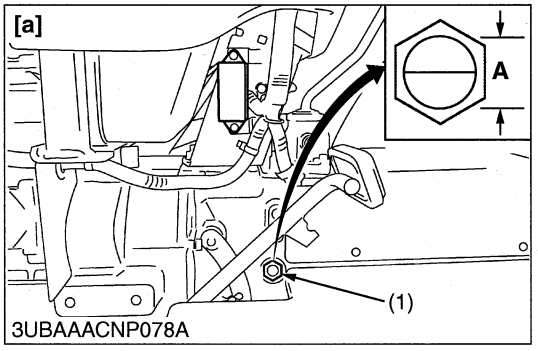

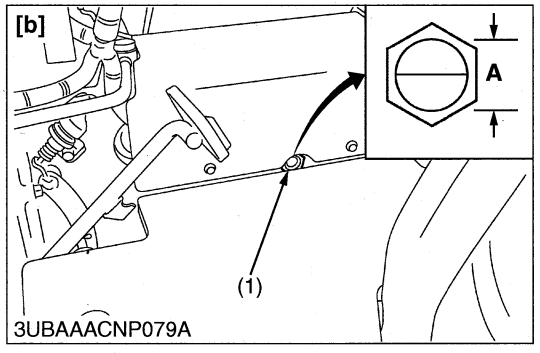

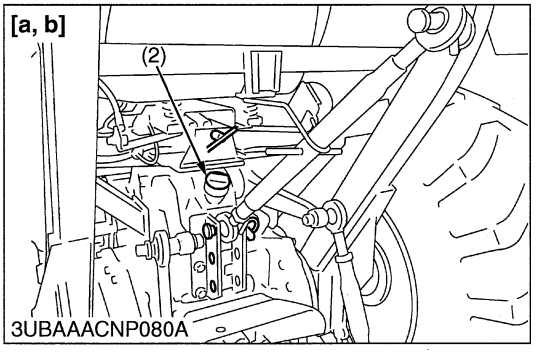

Checking Transmission Fluid Level [L2800,L3400, L3700SU, L3200 and L3800]

1. Check that the tractor hydraulic fluid level.
2. View the fluid level through the fluid level gauge (1).
3. If the level is too low, replenish new oil.

■ **IMPORTANT**

- **Use only KUBOTA UDT or SUPER UDT fluid. Use of other oils may damage the transmission or hydraulic system. Refer to "3. LUBRICANTS".**

(1) Gauge
(2) Oil Filling Port

A : Oil level acceptable within this range.
[a] Manual Transmission
[b] HST Transmission

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Retightening Backhoe Hardware

1. Check all hardware before daily operation.
2. If the screws, bolts and nuts are loosen, retighten them to the specified torque.

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Checking Hydraulic Hoses

1. Check all hydraulic hoses for cuts or wear.
2. If defects are found, replace them.

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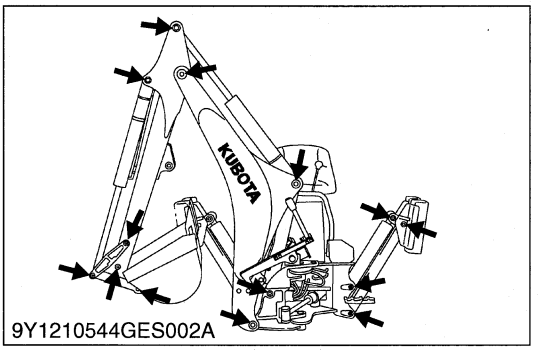
[2] CHECK POINT OF EVERY 10 HOURS



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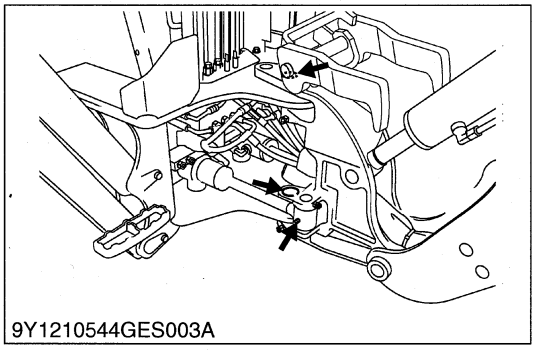
9Y1210544GES003A

Greasing

1. Inject grease all grease nipples with a hand grease gun.

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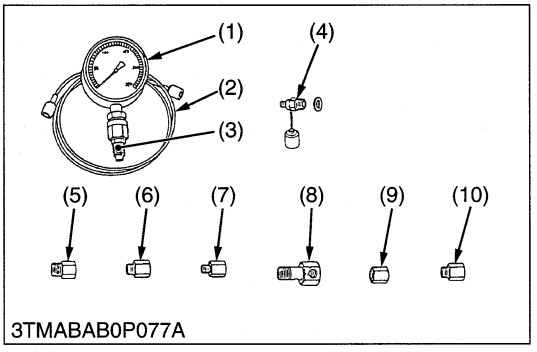
7. SPECIAL TOOLS



3TMABAB0P077A

Relief Valve Pressure Tester

Code No.

- 07916-50045

Application

- This allows easy measurement of relief set pressure.

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

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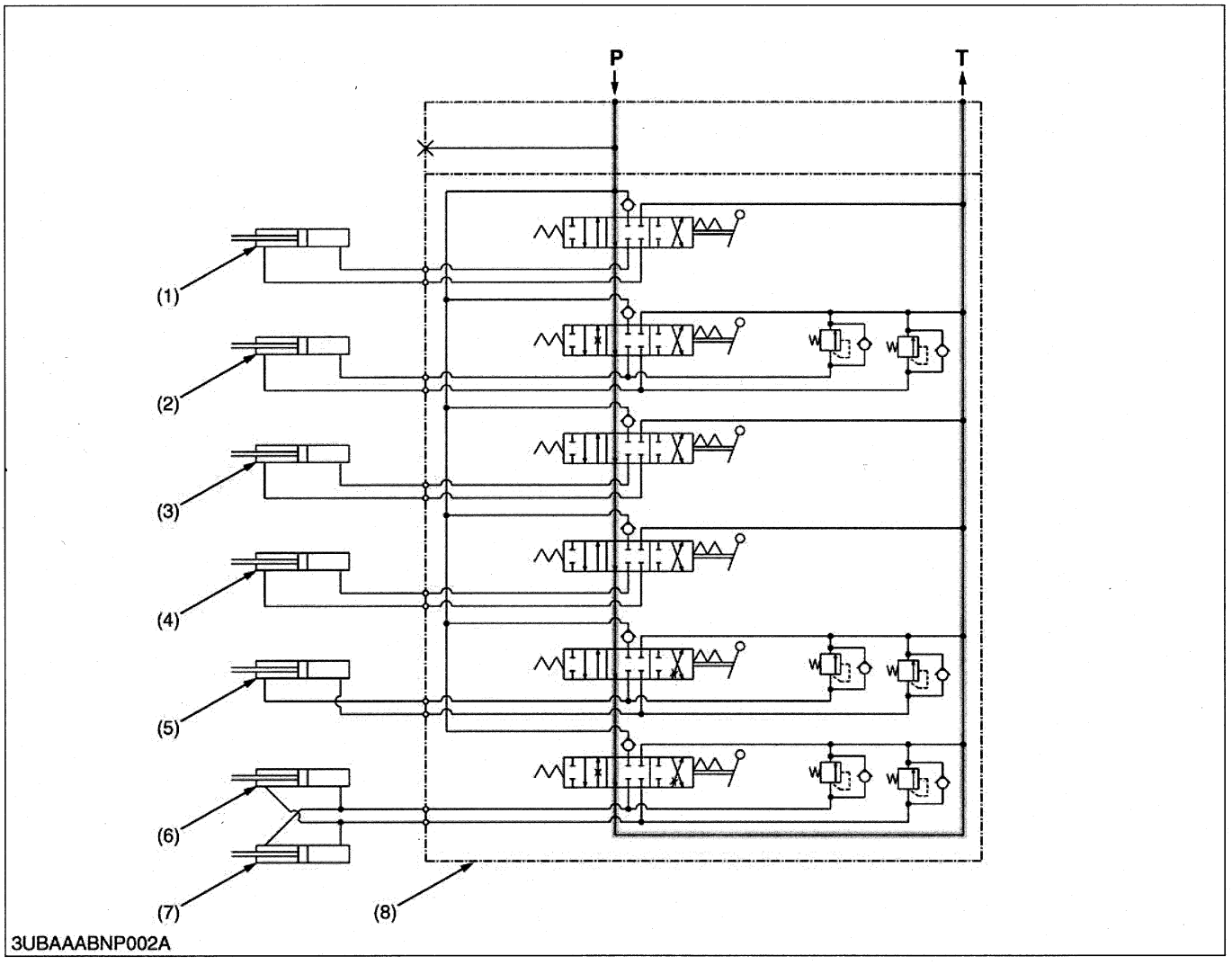
1 BACKHOE

MECHANISM

CONTENTS

1. HYDRAULIC CIRCUIT



3UBAAABNP002A

(1) Bucket Cylinder
(2) Dipperstick Cylinder
(3) Stabilizer Cylinder R.H.
(4) Stabilizer Cylinder L.H.
(5) Boom Cylinder
(6) Swing Cylinder L.H.
(7) Swing Cylinder R.H.
(8) Backhoe Control Valve

P : From Hydraulic Pump
T : To Tank Port

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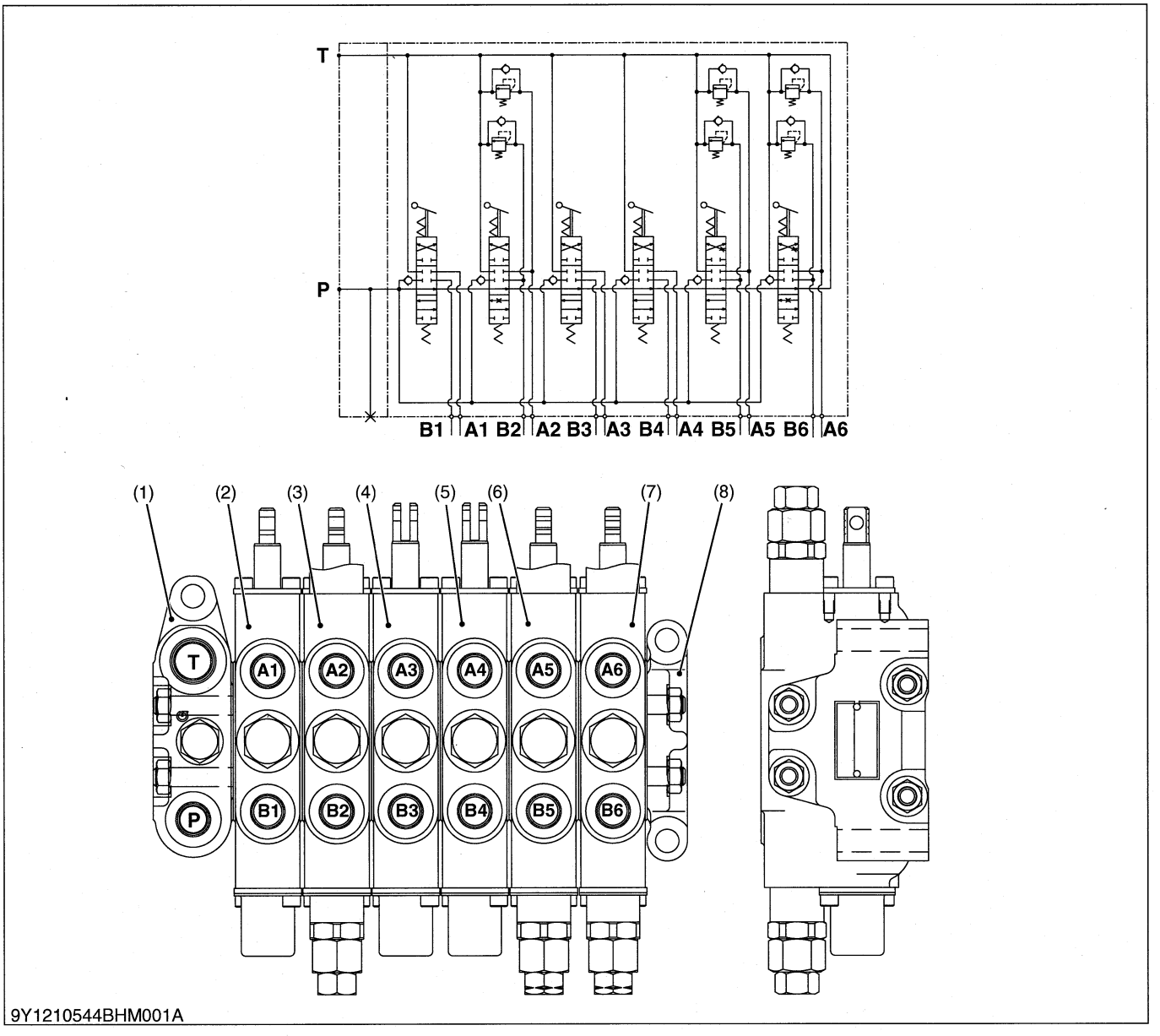
2. CONTROL VALVE

[1] STRUCTURE



9Y1210544BHM001A

(1) Inlet Section
(2) Bucket Control Valve
(3) Dipperstick Control Valve
(4) Stabilizer R.H. Control Valve
(5) Stabilizer L.H. Control Valve
(6) Boom Control Valve
(7) Swing Control Valve
(8) Outlet Section

P : Pump Port
T : Tank Port

A1 : A1 Port
A2 : A2 Port
A3 : A3 Port
A4 : A4 Port
A5 : A5 Port
A6 : A6 Port

B1 : B1 Port
B2 : B2 Port
B3 : B3 Port
B4 : B4 Port
B5 : B5 Port
B6 : B6 Port

(1) Inlet / Outlet Section

This section has **P** and **T** ports.

The **P** port is connected to the **OUTLET** port of tractor connected by the quick coupler.

The **T** port is connected to the **RETURN** port of tractor connected by the quick coupler.

(2) Control Valve Section

The control valves are 3 positions, 6 connections, no detent and spring center type. These valves have **A** and **B** ports and control oil flow to each cylinder.

These valves consist of valve housing, spool, load check valve, overload relief valve, etc..

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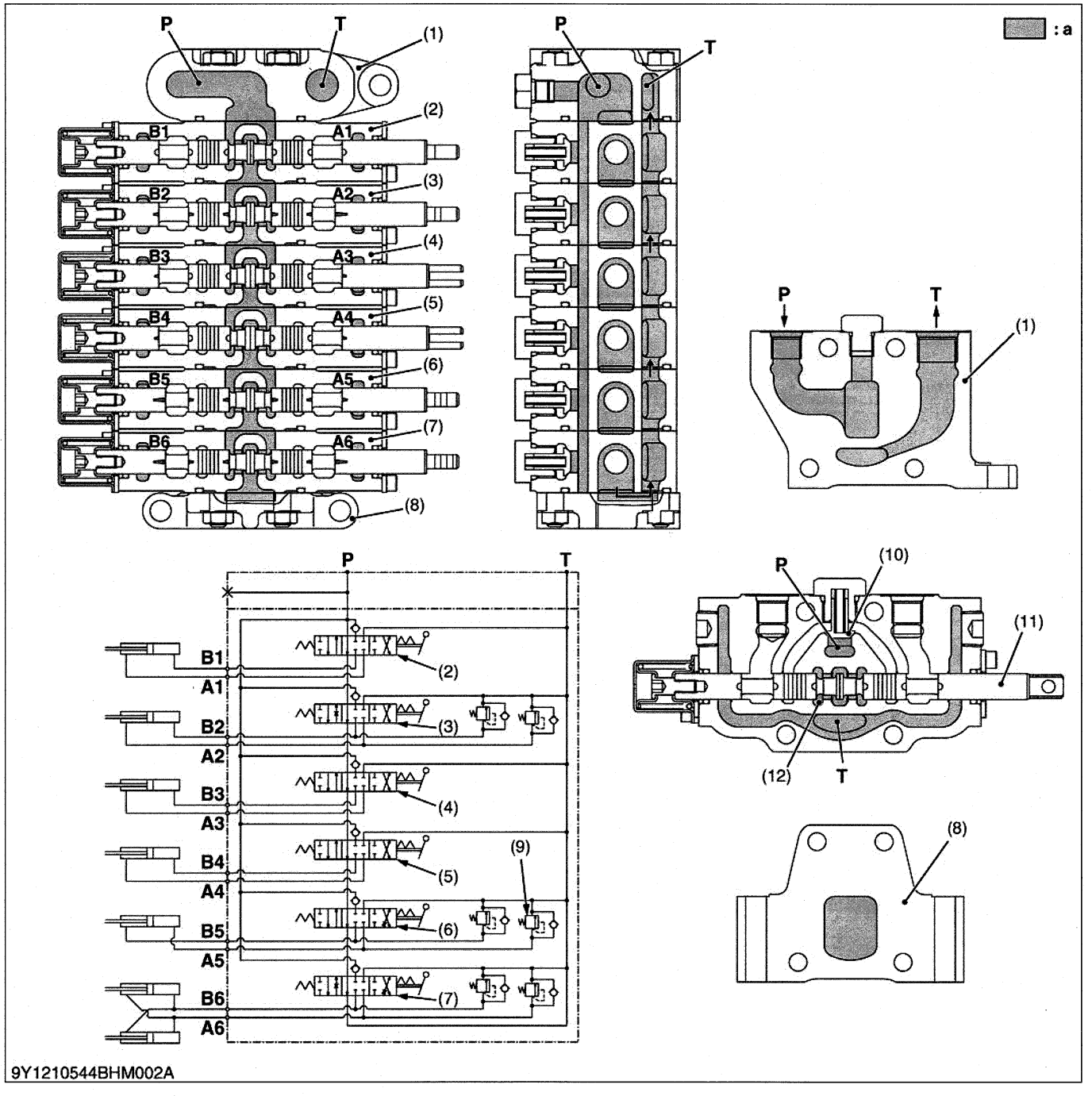
[2] OPERATION

(1) Neutral



(1) Inlet Section	(9) Overload Relief Valve (Port Relief Valve)	**A1 : A1 Port**	**B1 : B1 Port**
(2) Bucket Control Valve		**A2 : A2 Port**	**B2 : B2 Port**
(3) Dipperstick Control Valve	(10) Load Check Valve	**A3 : A3 Port**	**B3 : B3 Port**
(4) Stabilizer R.H. Control Valve	(11) Spool	**A4 : A4 Port**	**B4 : B4 Port**
(5) Stabilizer L.H. Control Valve	(12) Neutral Passage	**A5 : A5 Port**	**B5 : B5 Port**
(6) Boom Control Valve		**A6 : A6 Port**	**B6 : B6 Port**
(7) Swing Control Valve	**P : Pump Port**		**a : Low Pressure**
(8) Outlet Section	**T : Tank Port**		

Oil from the hydraulic pump is delivered into **P** port in the inlet section (1).

All load check valves (10) keep closing in the neutral positions. Oil flows through the neutral passage (12) formed by the notched section of the spools (11) to the **T** port.

Then oil flows from the **T** port to the transmission case via the return hose and pipe.

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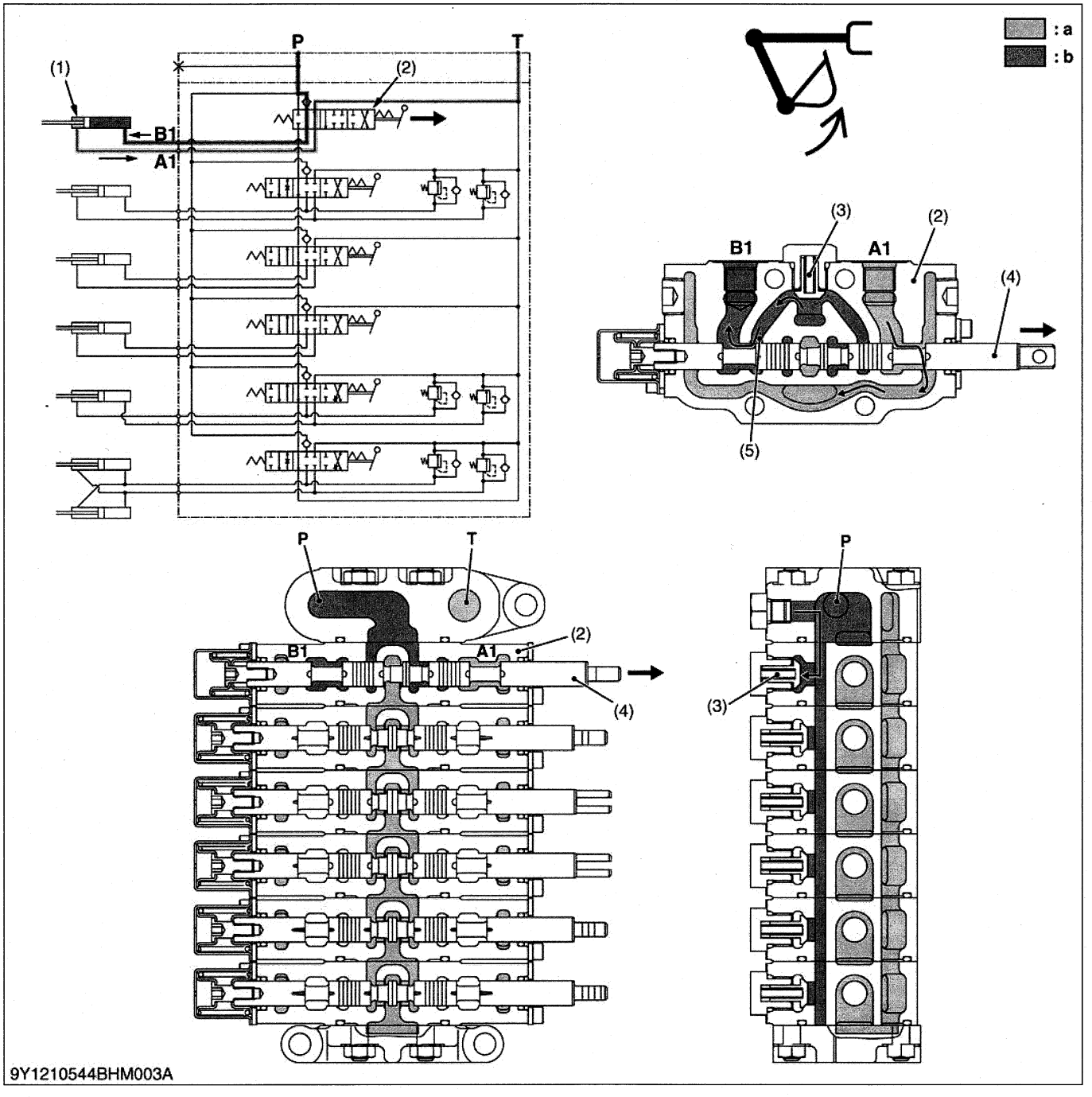
(2) Bucket

Roll-back



(1) Bucket Cylinder
(2) Bucket Control Valve
(3) Load Check Valve
(4) Spool
(5) Bridge Passage

P : P Port
T : T Port
a : Low Pressure
b : High Pressure
A1 : A1 Port (From Bucket Cylinder)
B1 : B1 Port (To Bucket Cylinder)

1. When the lever of dipperstick and bucket is moved to the left to set to the **"ROLL-BACK"** position, the spool (4) of the bucket control valve (2) moves to the right. This movement forms oil passage between bridge passage (5) also **B1** port, also between **A1** port and **T** port.
2. The pressurized oil from the **P** port opens the load check valve (3) and flows to **B1** port to extend the bucket cylinder (1).
3. Return oil from the bucket cylinder (1) returns to the transmission case through the **A1** port, low pressure passage and **T** port.

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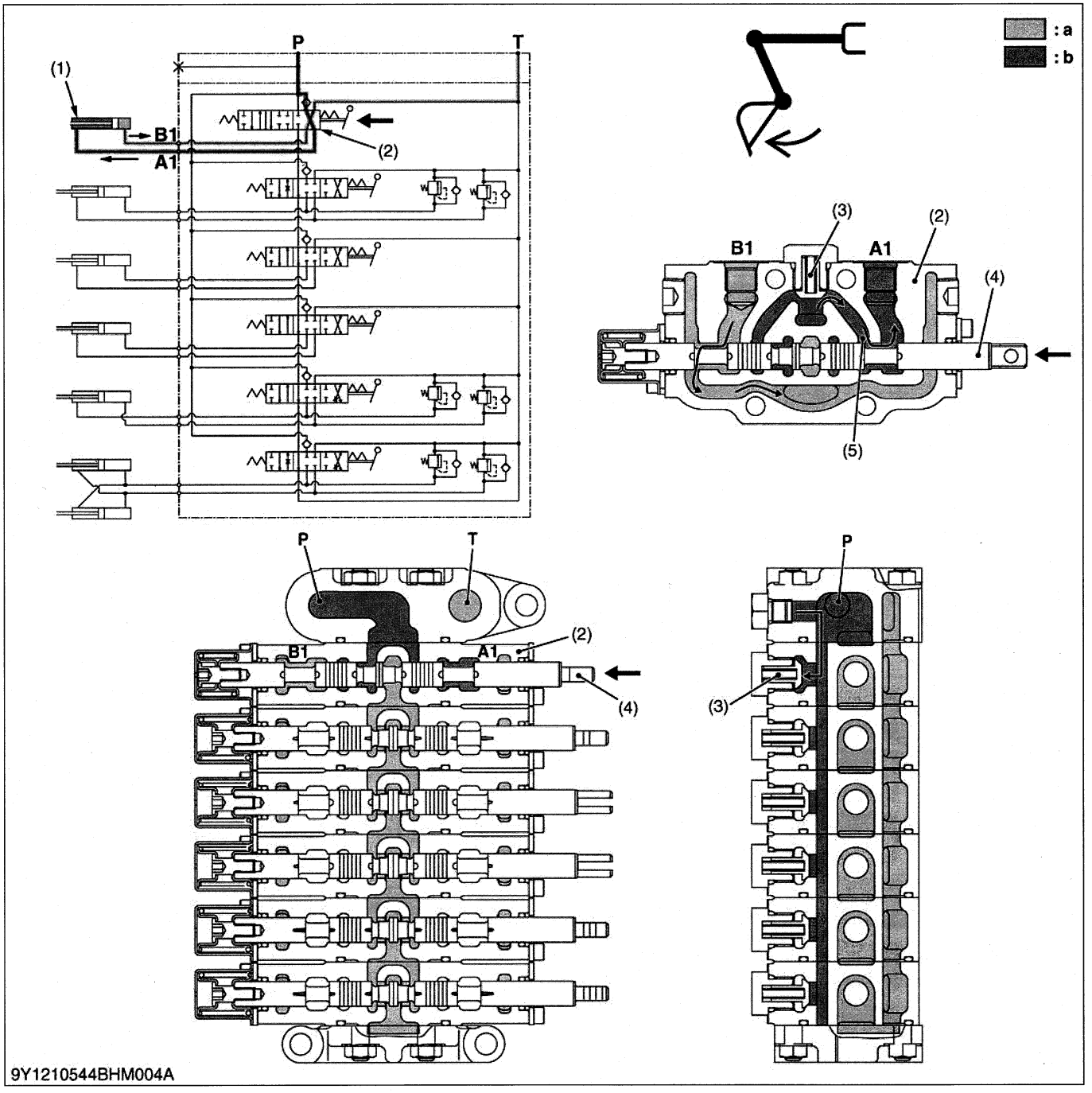
Dump



(1) Bucket Cylinder
(2) Bucket Control Valve
(3) Load Check Valve
(4) Spool
(5) Bridge Passage

P : P Port
T : T Port
a : Low Pressure
b : High Pressure

A1 : A1 Port (To Bucket Cylinder)
B1 : B1 Port (From Bucket Cylinder)

1. When lever of the dipperstick and bucket is moved to the right to set to the **"DUMP"** position, the spool (4) of the bucket control valve (2) moves to the left. This movement forms oil passage between bridge passage (5) and **A1** port, also between **B1** port and **T** port.
2. The pressurized oil from the **P** port opens the load check valve (3) and flows to **A1** port to retract the bucket cylinder (1).
3. Return oil from the bucket cylinder (1) returns to the transmission case through the **B1** port, low pressure passage and **T** port.

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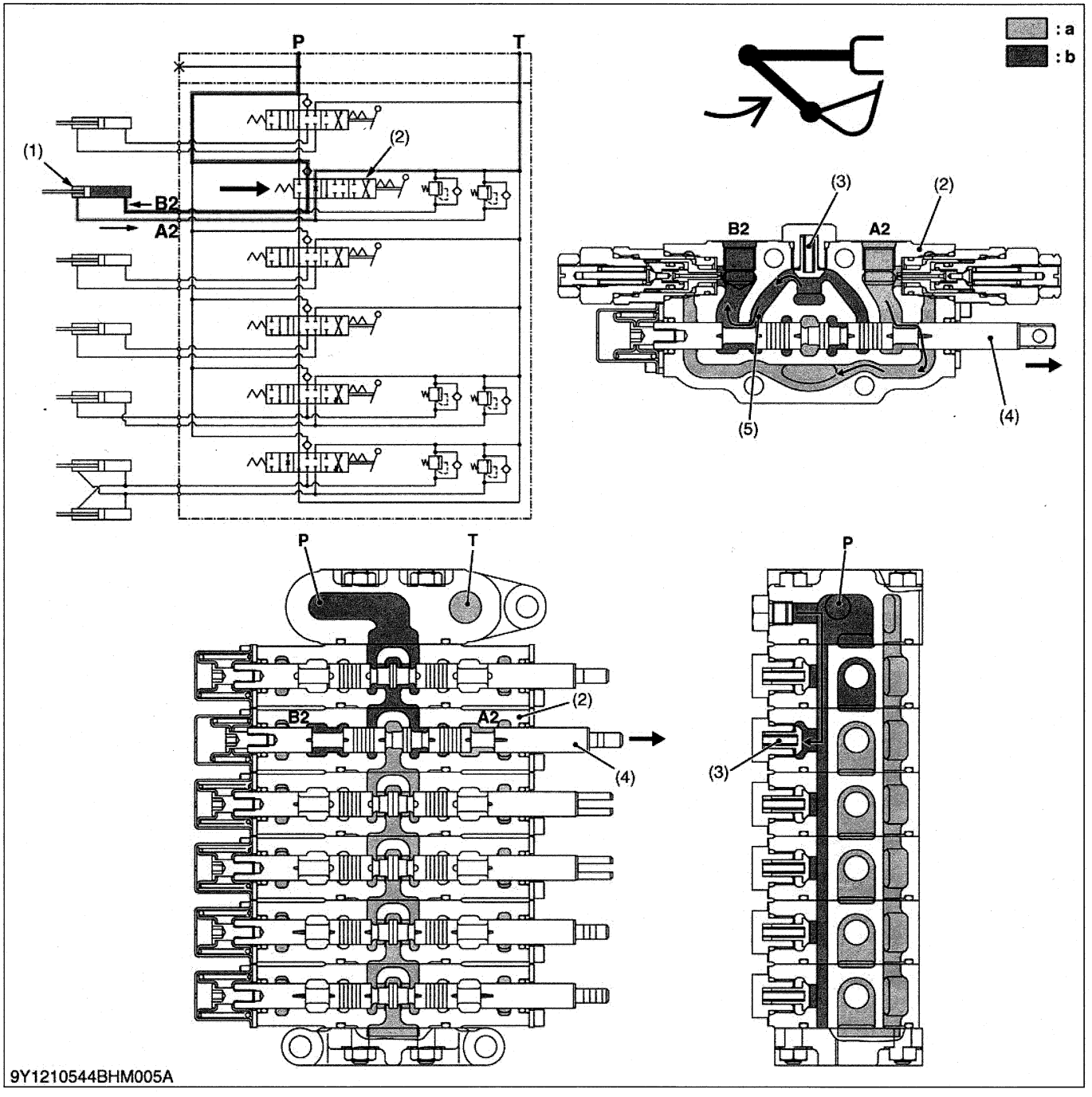
(3) Dipperstick

Crowd



(1) Dipperstick Cylinder
(2) Dipperstick Control Valve
(3) Load Check Valve
(4) Spool
(5) Bridge Passage

P : P Port
T : T Port
a : Low Pressure
b : High Pressure
A2 : A2 Port (From Dipperstick Cylinder)
B2 : B2 Port (To Dipperstick Cylinder)

1. When the lever of dipperstick and bucket is pulled to the backward to set to the **"CROWD"** position, the spool (4) of the dipperstick control valve (2) moves to the right. This movement forms oil passage between bridge passage (5) and **B2** port, also between **A2** port and **T** port.
2. The pressurized oil from the **P** port opens the load check valve (3) and flows to **B2** port to extend the dipperstick cylinder (1).
3. Return oil from the dipperstick cylinder (1) returns to the transmission case through the **A2** port, low pressure passage and **T** port.

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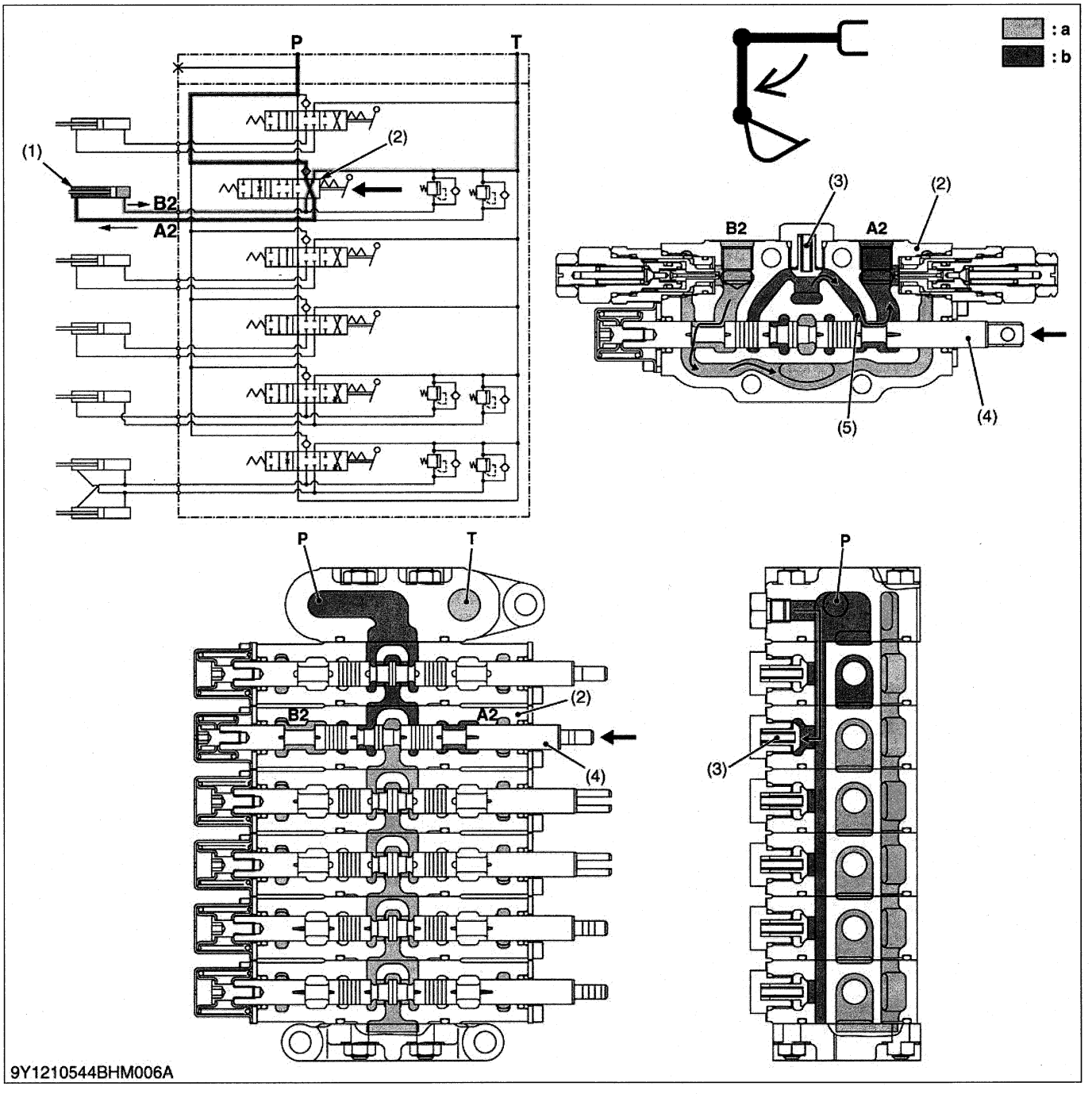
Extend



(1) Dipperstick Cylinder
(2) Dipperstick Control Valve
(3) Load Check Valve
(4) Spool
(5) Bridge Passage

P : P Port
T : T Port
a : Low Pressure
b : High Pressure
A2 : A2 Port (To Dipperstick Cylinder)
B2 : B2 Port (From Dipperstick Cylinder)

1. When the lever of dipperstick and bucket is pushed to the forward to set to the **"EXTEND"** position, the spool (4) of the dipperstick control valve (2) moves to the left. This movement forms oil passage between bridge passage (5) and **A2** port, also between **B2** port and **T** port.
2. The pressurized oil from the **P** port opens the load check valve (3) and flows to **A2** port to retract the dipperstick cylinder (1).
3. Return oil from the dipperstick cylinder (1) returns to the transmission case through the **B2** port, low pressure passage and **T** port.

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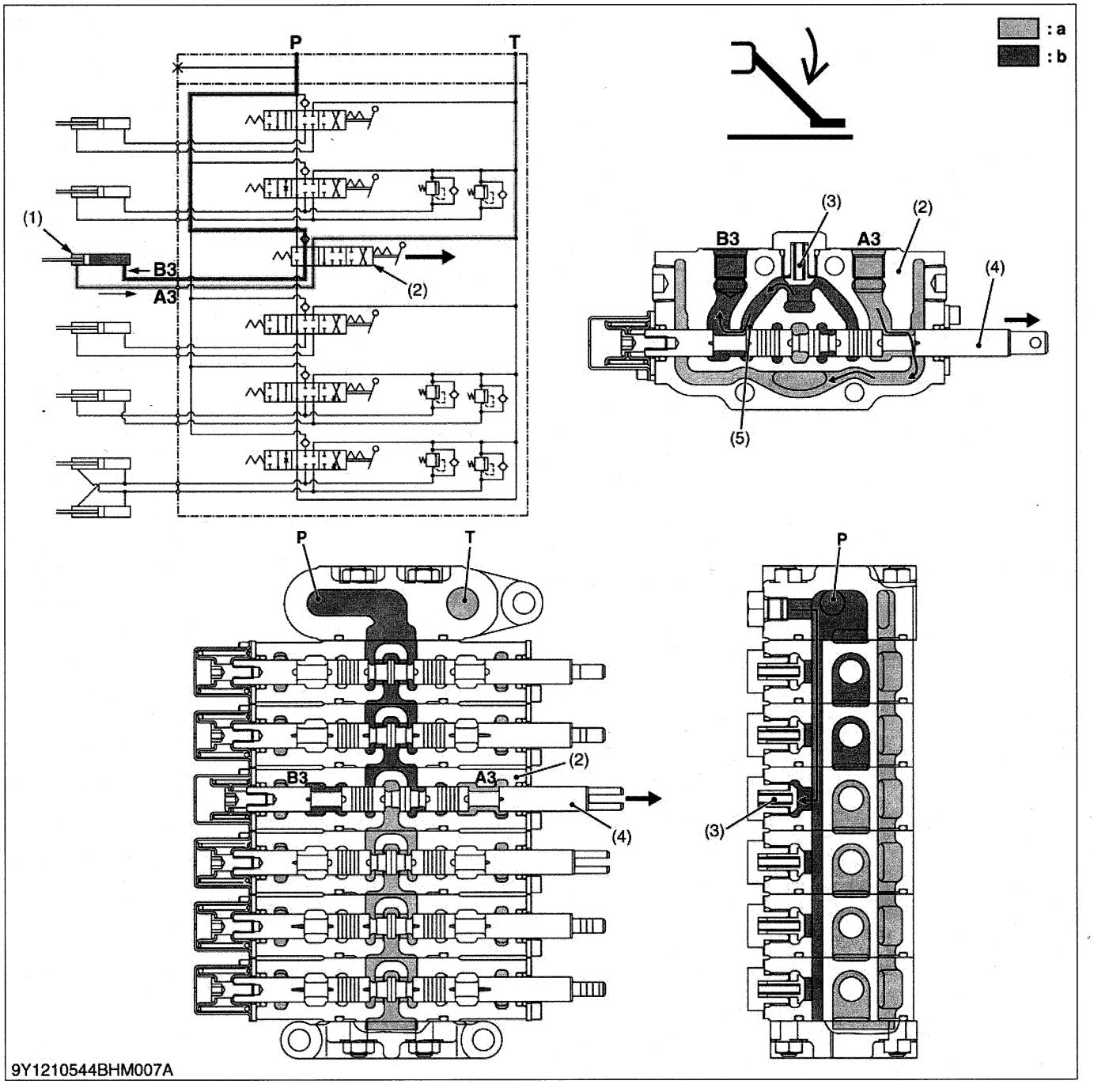
(4) Stabilizer R.H.

Extend



(1) Stabilizer Cylinder R.H.
(2) Stabilizer R.H. Control Valve
(3) Load Check Valve
(4) Spool
(5) Bridge Passage

P : P Port
T : T Port
a : Low Pressure
b : High Pressure
A3 : A3 Port (From Stabilizer R.H. Cylinder)
B3 : B3 Port (To Stabilizer R.H. Cylinder)

1. When the right stabilizer control lever is pulled to the downward to set to the **"EXTEND"** position, the spool (4) of the stabilizer R.H. control valve (2) moves to the right. This movement forms oil passage between bridge passage (5) and **B3** port, also between **A3** port and **T** port.
2. The pressurized oil from the **P** port opens the load check valve (3), and flows to **B3** port to extend the stabilizer cylinder R.H. (1).
3. Return oil from the stabilizer cylinder R.H. (1) returns to the transmission case through the **A3** port, low pressure passage and **T** port.

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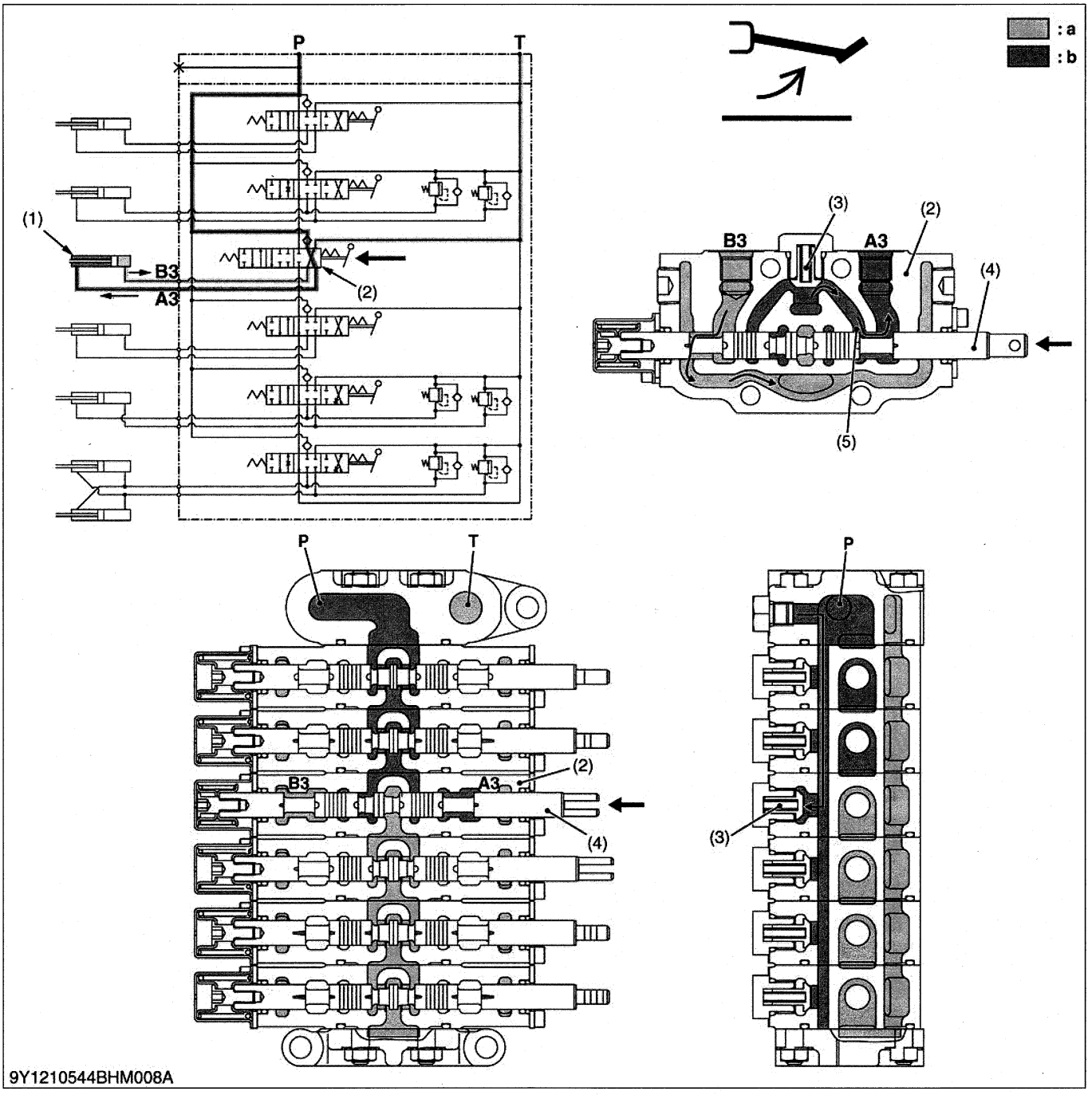
Shrink



(1) Stabilizer Cylinder R.H.
(2) Stabilizer R.H. Control Valve
(3) Load Check Valve
(4) Spool
(5) Bridge Passage

P : P Port
T : T Port
a : Low Pressure
b : High Pressure
A3 : A3 Port (To Stabilizer R.H. Cylinder)
B3 : B3 Port (From Stabilizer R.H. Cylinder)

1. When the right stabilizer control lever is pushed to the forward to set to the **"SHRINK"** position, the spool (4) of the stabilizer R.H. control valve (2) moves to the left. This movement forms oil passage between bridge passage (5) and **A3** port, also between **B3** port and **T** port.
2. The pressurized oil from the **P** port opens the load check valve (3), and flows to **A3** port to retract the stabilizer cylinder R.H. (1).
3. Return oil from the stabilizer cylinder R.H. (1) returns to the transmission case through the **B3** port, low pressure passage and **T** port.

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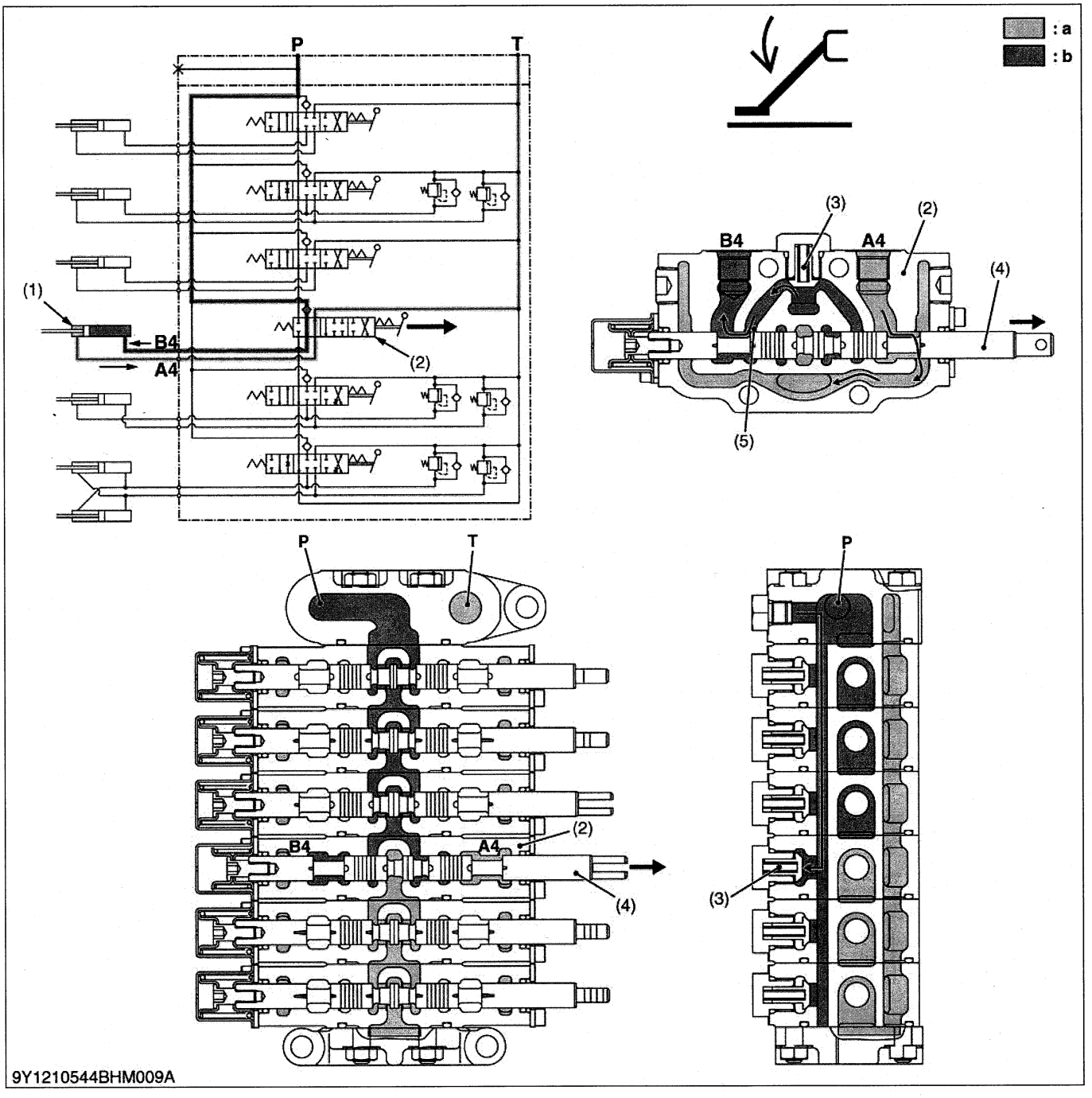
(5) Stabilizer L.H.

Extend



(1) Stabilizer Cylinder L.H.
(2) Stabilizer L.H. Control Valve
(3) Load Check Valve
(4) Spool
(5) Bridge Passage

P : P Port
T : T Port
a : Low Pressure
b : High Pressure
A4 : A4 Port (From Stabilizer L.H. Cylinder)
B4 : B4 Port (To Stabilizer L.H. Cylinder)

1. When the left stabilizer control lever is pulled to the downward to set to the **"EXTEND"** position, the spool (4) of the stabilizer L.H. control valve (2) moves to the right. This movement forms oil passage between bridge passage (5) and **B4** port, also between **A4** port and **T** port.
2. The pressurized oil from the **P** port opens the load check valve (3), and flows to **B4** port to extend the stabilizer cylinder L.H. (1).
3. Return oil from the stabilizer cylinder L.H. (1) returns to the transmission case through the **A4** port, low pressure passage and **T** port.

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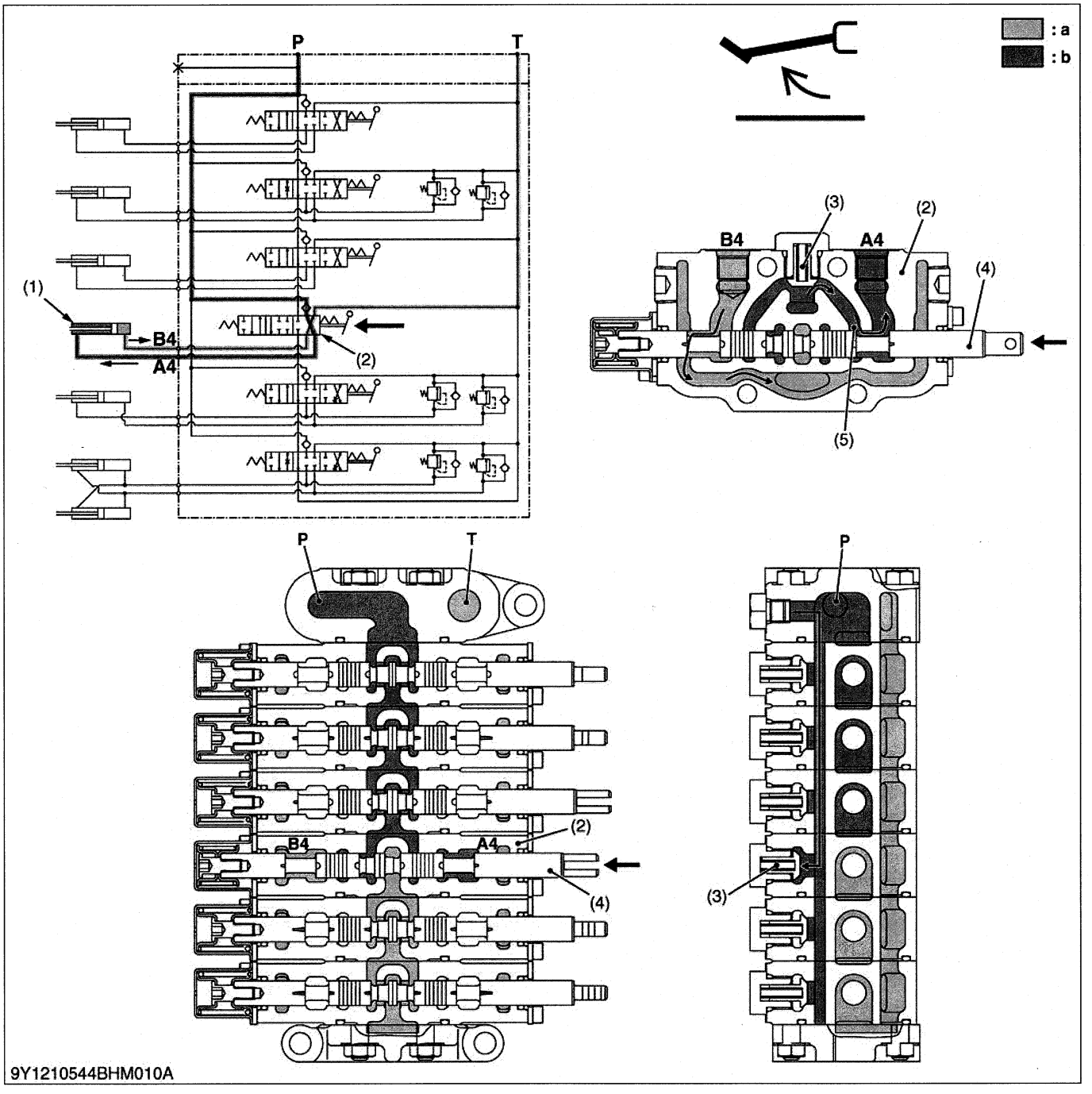
Shrink



(1) Stabilizer Cylinder L.H.
(2) Stabilizer L.H. Control Valve
(3) Load Check Valve
(4) Spool
(5) Bridge Passage

P : P Port
T : T Port
a : Low Pressure
b : High Pressure
A4 : A4 Port (To Stabilizer L.H. Cylinder)
B4 : B4 Port (From Stabilizer L.H. Cylinder)

1. When the left stabilizer control lever is pushed to the forward to set to the **"SHRINK"** position, the spool (4) of the stabilizer L.H. control valve (2) moves to the left. This movement forms oil passage between bridge passage (5) and **A4** port, also between **B4** port and **T** port.
2. The pressurized oil from the **P** port opens the load check valve (3), and flows to **A4** port to retract the stabilizer cylinder L.H. (1).
3. Return oil from the stabilizer cylinder L.H. (1) returns to the transmission case through the **B4** port, low pressure passage and **T** port.

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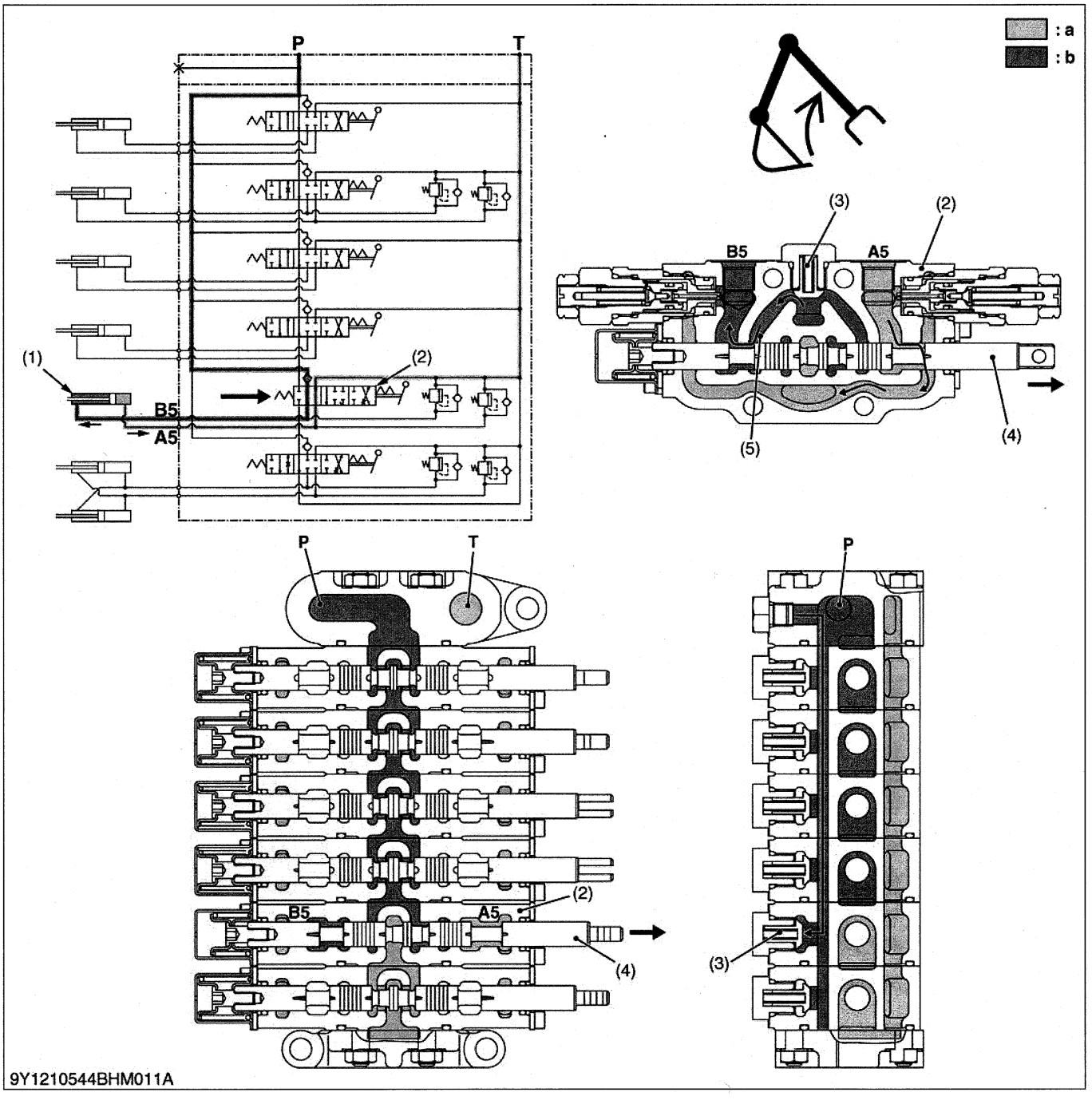
(6) Boom

Up



(1) Boom Cylinder
(2) Boom Control Valve
(3) Load Check Valve
(4) Spool
(5) Bridge Passage

P : P Port
T : T Port
a : Low Pressure
b : High Pressure
A5 : A5 Port (From Boom Cylinder)
B5 : B5 Port (To Boom Cylinder)

1. When the lever of boom and swing is pulled to the backward to set to the **"UP"** position, the spool (4) of the boom control valve (2) moves to the right. This movement forms oil passage between bridge passage (5) and **B5** port, also between **A5** port and **T** port.
2. The pressurized oil from the **P** port opens the load check valve (3) and flows to **B5** port to retract the boom cylinder (1).
3. Return oil from the boom cylinder (1) returns to the transmission case through the **A5** port, low pressure passage and **T** port.

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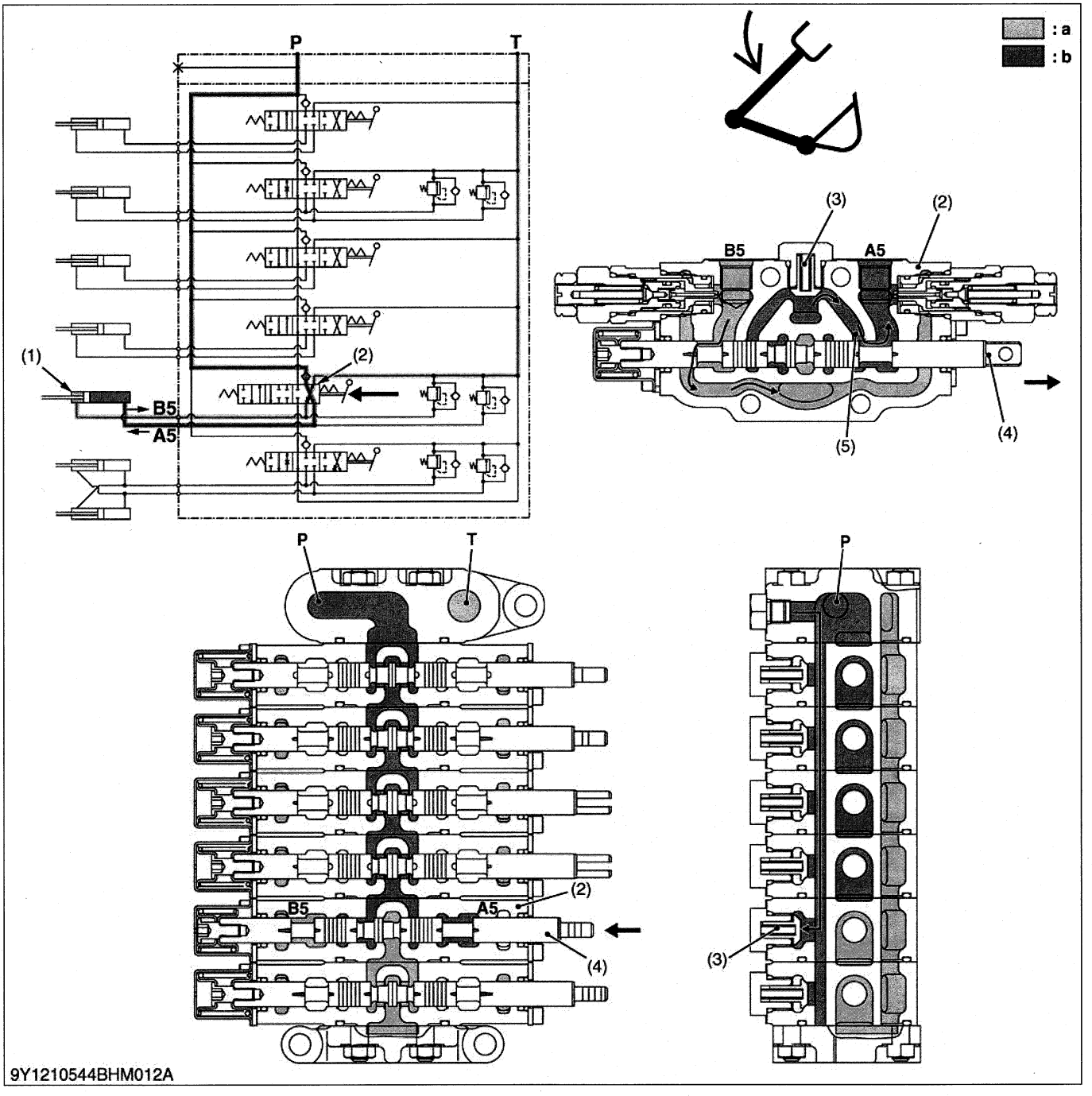
Down



(1) Boom Cylinder
(2) Boom Control Valve
(3) Load Check Valve
(4) Spool
(5) Bridge Passage

P : P Port
T : T Port
a : Low Pressure
b : High Pressure
A5 : A5 Port (To Boom Cylinder)
B5 : B5 Port (From Boom Cylinder)

1. When the lever of boom and swing is pushed to the forward to set to the **"DOWN"** position, the spool (4) of the boom control valve (2) moves to the left. This movement forms oil passage between bridge passage (5) and **A5** port, also between **B5** port and **T** port.
2. The pressurized oil from the **P** port opens the load check valve (3) and flows to **A5** port to extend the boom cylinder (1).
3. Return oil from the boom cylinder (1) returns to the transmission case through the **B5** port, low pressure passage and **T** port.

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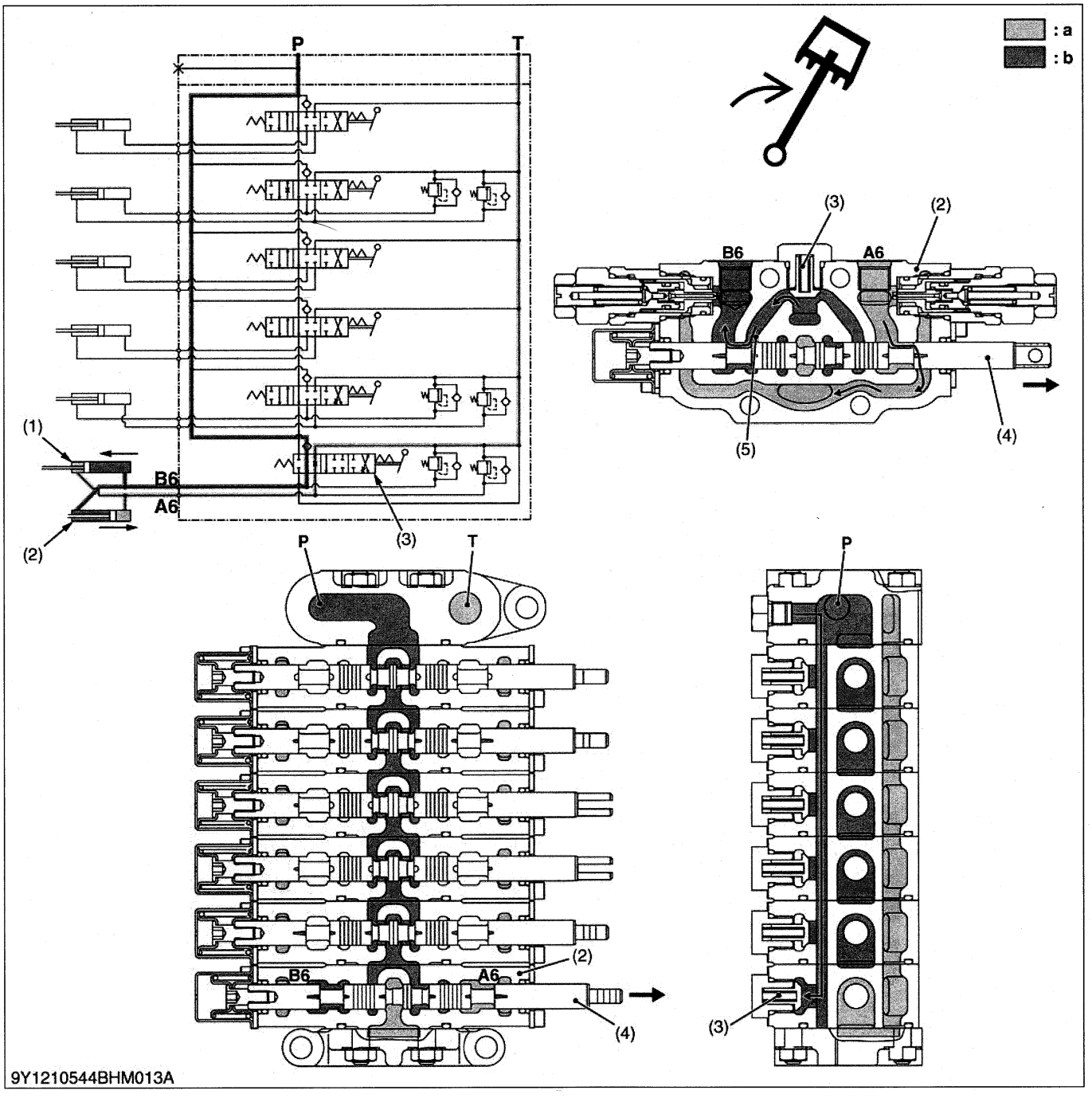
(7) Boom Swing

Right



(1)	Swing Cylinder L.H.	(4)	Load Check Valve	**P :**	**P Port**
(2)	Swing Cylinder R.H.	(5)	Spool	**T :**	**T Port**
(3)	Swing Control Valve	(6)	Bridge Passage	**a :**	**Low Pressure**
				b :	**High Pressure**

A6 : A6 Port (From Swing Cylinder)
B6 : B6 Port (To Swing Cylinder)

1. When the lever of boom and swing is moved to the right to set to the **"RIGHT"** position, the spool (5) of the swing control valve (3) moves to the right. This movement forms oil passage between bridge passage (6) and **B6** port, also between **A6** port and **T** port.
2. The pressurized oil from the **P** port opens the load check valve (4) and flows to **B6** port to extend the swing cylinder L.H. (1) (retract the swing cylinder R.H. (2)).
3. Return oil from the swing cylinders returns to the transmission case through the **A6** port, low pressure passage and **T** port.

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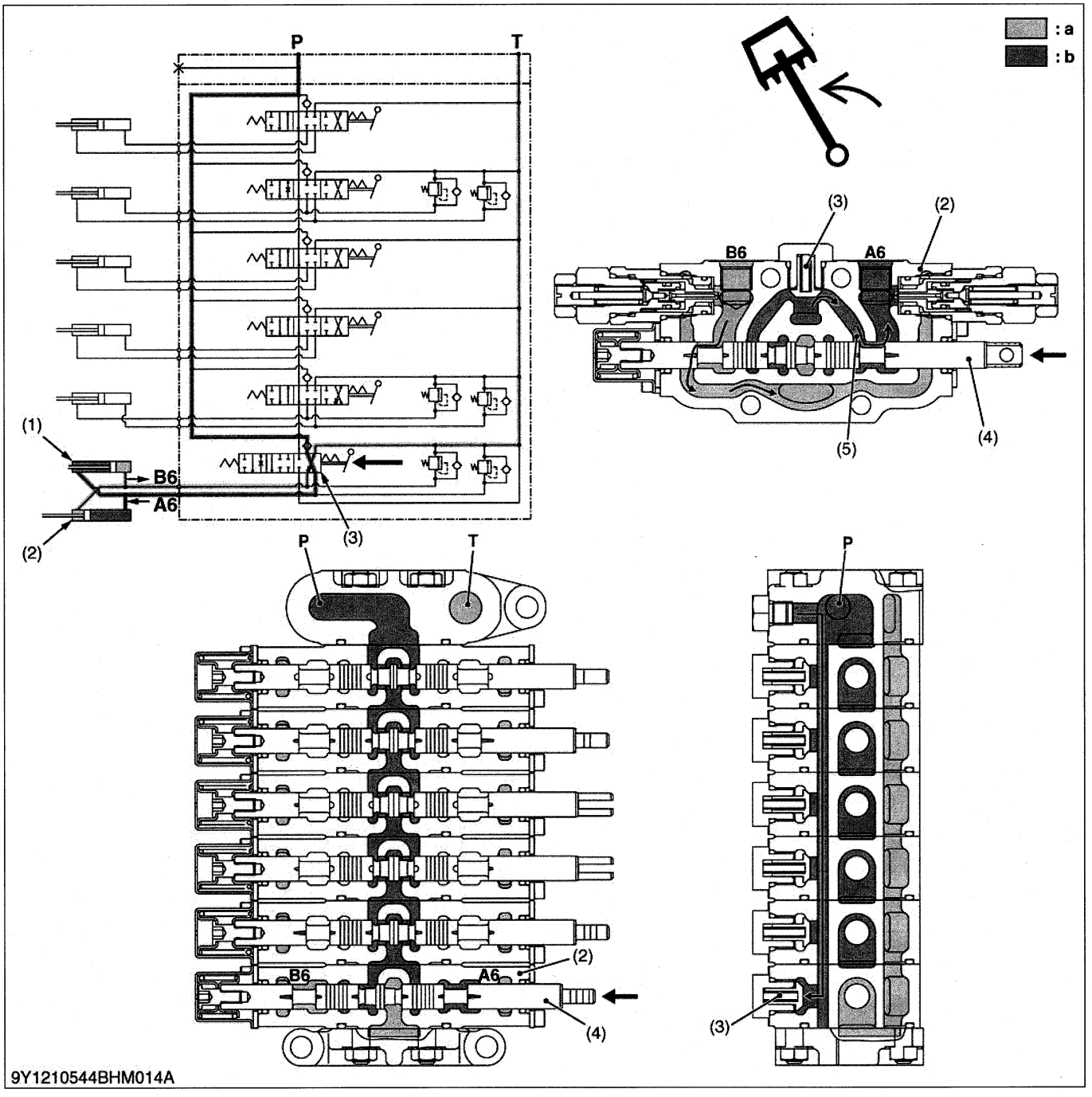
Left



(1) Swing Cylinder L.H.
(2) Swing Cylinder R.H.
(3) Swing Control Valve
(4) Load Check Valve
(5) Spool
(6) Bridge Passage

P : P Port
T : T Port
a : Low Pressure
b : High Pressure
A6 : A6 Port (To Swing Cylinder)
B6 : B6 Port (From Swing Cylinder)

1. When the lever of boom and swing is moved to the left to set to the **"LEFT"** position, the spool (5) of the swing control valve (3) moves to the left. This movement forms oil passage between bridge passage (6) and **A6** port, also between **B6** port and **T** port.
2. The pressurized oil from the **P** port opens the load check valve (4) and flows to **A6** port to extend the swing cylinder R.H. (2) (retract the swing cylinder L.H. (1)).
3. Return oil from the swing cylinders returns to the transmission case through the **B6** port, low pressure passage and **T** port.

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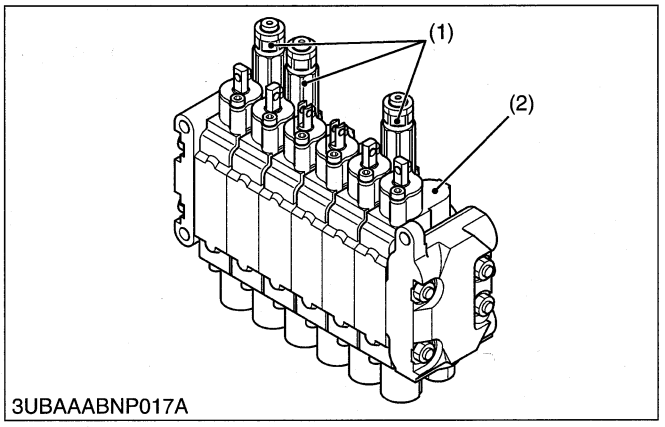
[3] OVERLOAD RELIEF VALVE



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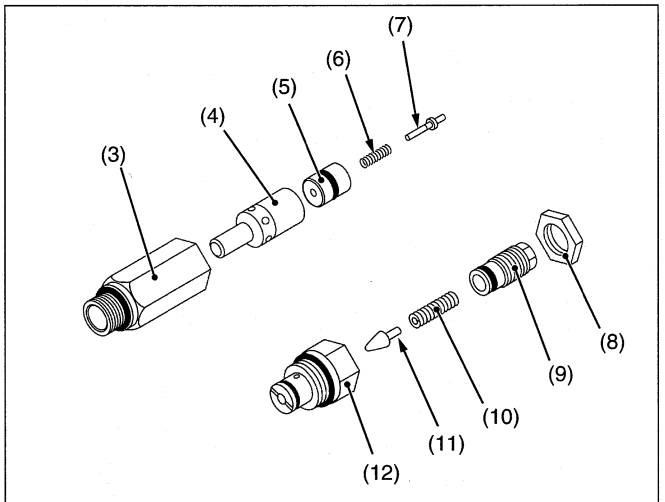

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Overload relief valve in this control valve is a combination valve combining a relief operation and anti-cavitation operation.

■ **Relief Operation**

When the control valve is in the neutral position, both cylinder ports of control valve are blocked by the spool. If an external load is imposed on the cylinder, pressure builds in the circuit.

When the pressure exceeds the set level of the overload relief valve, the relief valve opens and the oil returns to tank. In this way, the hydraulic circuit and actuator are protected from excessive pressures.

■ **Anti-cavitation Operation**

Overload relief valve also has anti-void function. If a negative pressure takes place in the circuit, the oil is fed from the tank to eliminate the negative pressure.

(1) Overload Relief Valve
(2) Control Valve
(3) Housing
(4) Check Valve Poppet
(5) Relief Valve Poppet
(6) Piston Spring
(7) Piston Poppet
(8) Lock Nut
(9) Adjusting Screw
(10) Pilot Spring
(11) Pilot Poppet
(12) Pilot Section

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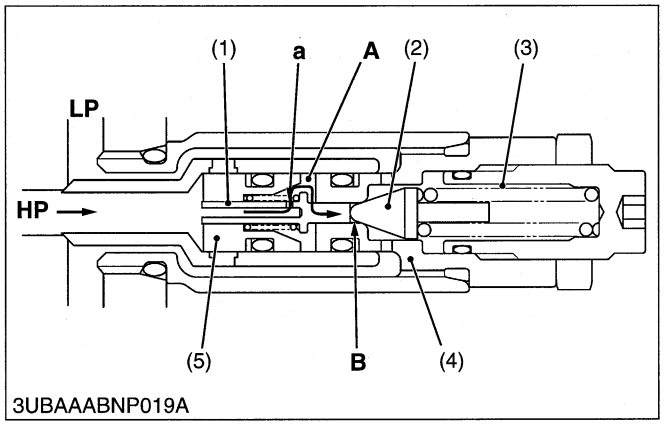
(1) Relief Operation



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When the Actuator Port Pressure is Lower Than the Setting

The cylinder port **HP** is applied to the seat **B** in the following route : first through the throttle **a** of the piston poppet (1) built in the relief valve poppet (5), second through the spring chamber **A**, and then through the circular clearance between the adjusting screw (4) and the piston poppet (1). This cylinder port **HP** works to open the pilot poppet (2). Because the piston spring (3) has not reached the set pressure, however, the valve stays shut. In this way the seat remains intact and the relief valve poppet (5) stays shut.

(1) Piston Poppet
(2) Pilot Poppet
(3) Piston Spring
(4) Adjusting Screw
(5) Relief Valve Poppet

HP : High Pressure
LP : Low Pressure
A : Chamber
B : Seat
a : Throttle

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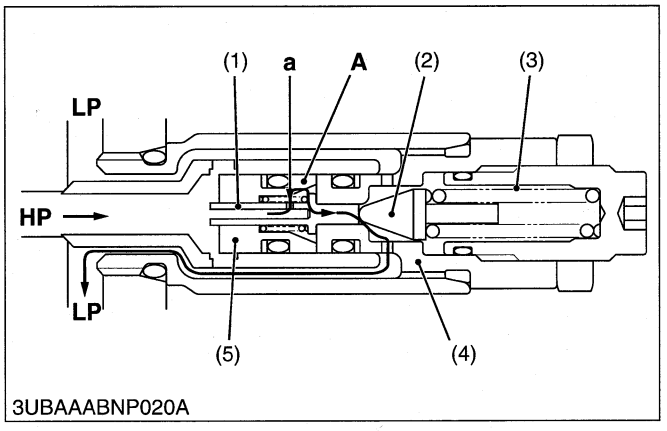

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When the Actuator Port Pressure is Higher Than the Setting

When the cylinder port **HP** has reached the set pressure of the piston spring (3), the pressurized oil in the spring chamber **A** opens the pilot poppet (2) and flows through the drain passage into the tank passage. This lowers the pressure in the spring chamber **A**, and the pressure difference across the throttle **a** moves the relief valve poppet (5) to the right. Now the seat of the relief valve poppet (5) gets open. The pressurized oil then flows from this seat into the tank, and the circuit pressure is kept at the pressure level set by the overload relief valve.

	Relief valve setting pressure
Dipperstick (**A2** port side) Boom (**A5**, **B5** port side)	20.6 to 21.0 MPa 210 to 215 kgf/cm^2 2990 to 3050 psi
Dipperstick (**B2** port side) Swing (**A6**, **B6** port side)	18.2 to 18.6 MPa 185 to 190 kgf/cm^2 2640 to 2700 psi

- Oil temperature : 45 to 55 °C (113 to 131 °F)

(1) Piston Poppet
(2) Pilot Poppet
(3) Piston Spring
(4) Adjusting Screw
(5) Relief Valve Poppet

HP : High Pressure
LP : Low Pressure
A : Chamber
a : Throttle

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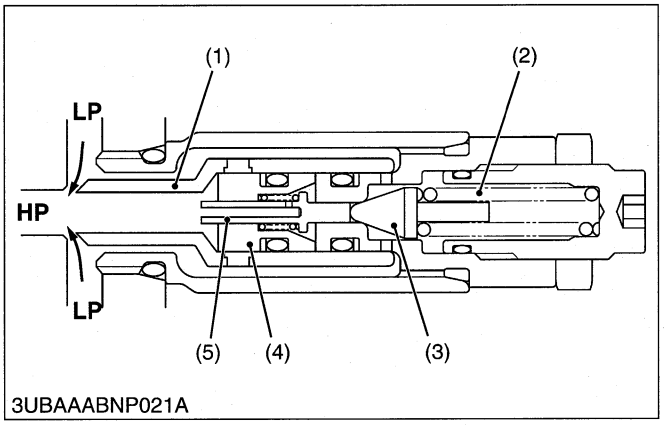
(2) Anti-cavitation Operation



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This valve, in operation, prevents a condition – so called cavitation – that arises in the cylinder port **HP** where fluid is not entirely filling out.

That is, this relief valve is combined an anti-cavitation function supplying oil.

The oil at the tank port **LP** opens the check valve poppet, allowing oil to flow through the tank port to prevent negative pressure from being generated in the cylinder.

(1) Check Valve Poppet
(2) Piston Spring
(3) Pilot Poppet
(4) Relief Valve Poppet
(5) Piston Poppet

HP : High Pressure
LP : Low Pressure

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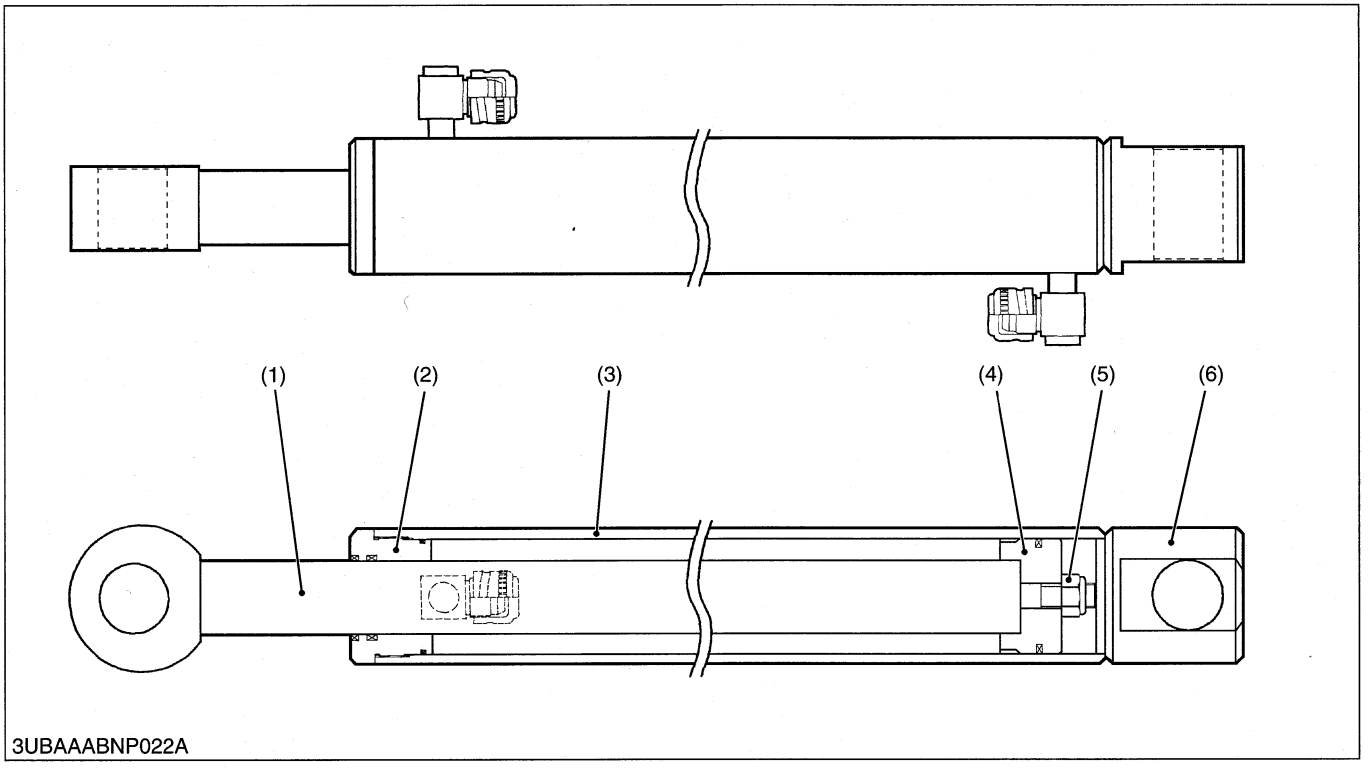
3. HYDRAULIC CYLINDER



(1) Rod
(2) Head
(3) Cylinder Tube
(4) Piston
(5) Nut
(6) Tube End

Bucket, dipperstick, boom, swing, and stabilizer cylinder consists of cylinder head (2), piston rod (1), cylinder tube (3), piston (4) and other parts as shown in the figure above.

They are single-rod double-acting cylinders in which the reciprocating motion of the piston is controlled by hydraulic force applied to both of its ends.

Cylinder Specifications

	Boom Cylinder mm (in.)	Dipperstick Cylinder mm (in.)	Bucket Cylinder mm (in.)	Stabilizer Cylinder mm (in.)	Swing Cylinder mm (in.)
Rod O.D.	35.0 (1.38)	35.0 (1.38)	35.0 (1.38)	30.0 (1.18)	25.0 (0.984)
Cylinder I.D.	70.0 (2.76)	70.0 (2.76)	55.0 (2.17)	65.0 (2.56)	50.0 (1.97)
Stroke	364 (14.3)	416 (16.4)	451 (17.8)	298 (11.7)	247 (9.72)

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SERVICING

CONTENTS

1. TROUBLESHOOTING

Symptom	Probable Cause	Solution	Reference Page
All Functions Inoperative (Front Loader Is OK)	Quick coupler disconnected	Reconnect	–
All Functions Including Front Loader, Are Inoperative	Insufficient transmission fluid	Replenish	G-7, G-8
	Relief valve spring damaged	Replace	1-S21
	Hydraulic pump malfunctioning	Repair or replace	–
	Oil filter clogged	Replace	–
Hydraulic Oil Overheats	Continuous operation against relief	Operate properly	G-3
	Transmission fluid improper brand and viscosity	Use proper fluid	–
	Relief valve misadjusted	Readjust	1-S21
	Insufficient transmission fluid	Replenish	G-7, G-8
	Oil filter clogged	Replace	–
Individual Cylinder Circuit Weak or Inoperative (Others OK)	Valve spool not moving fully	Adjust linkage	–
	Valve spool stick (especially when warm)	Repair or replace	–
	Piston seal ring worn or damaged	Replace	1-S25
	Cylinder tube worn or damaged	Replace	1-S23
	Oil leaks from joint	Repair or replace	–
	Hydraulic hose damaged	Replace	–
	Dust in overload relief valve	Flush hydraulic line	–
Excessive Cylinder Movement	Piston seal ring worn or damage	Replace	1-S25
	Excessive valve spool to bore tolerance	Replace	–
	Hydraulic hose or fitting damaged	Replace	–
	Hydraulic hose or fitting loose	Retighten	–
	Cylinder tube worn or damaged	Replace	1-S23
Insufficient Cylinder Speed	Engine rpm too low	Adjust rpm	–
	Hydraulic pump malfunctioning	Repair or replace	–
	Relief valve pressure too low	Readjust	1-S21
	Insufficient transmission fluid	Replenish	G-7, G-8

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2. SERVICING SPECIFICATIONS

Item		Factory Specification	Allowable Limit
Relief Valve Hydraulic Main Circuit	Setting Pressure B3200 (Tractor)	13.3 to 14.3 MPa 136 to 145 kgf/cm^2 1960 to 2070 psi	–
	B3200, B3300SU (Front Loader)	14.4 to 15.2 MPa 147 to 154 kgf/cm^2 2090 to 2200 psi	–
	B2630, B3030 (Front Loader)	15.8 to 16.5 MPa 161 to 169 kgf/cm^2 2290 to 2400 psi	–
	L2800, L3400, L3700SU, L3200, L3800 (Tractor)	15.7 to 16.1 MPa 160 to 165 kgf/cm^2 2280 to 2340 psi	–
	L3240(-3), L3540(-3) (Tractor)	17.1 to 18.1 MPa 175 to 184 kgf/cm^2 2480 to 2620 psi	–
Swing Frame Fulcrum Pin to Bush	Clearance	0.200 to 0.269 mm 0.00788 to 0.0105 in.	1.0 mm 0.039 in.
• Swing Frame Fulcrum Pin	O.D.	39.970 to 40.000 mm 1.5737 to 1.5748 in.	–
• Bush	I.D.	40.20 to 40.24 mm 1.5768 to 1.5779 in.	–
Swing Cylinder Trunnion Boss to Cylinder Support Bush	Clearance	0.100 to 0.225 mm 0.00394 to 0.00885 in.	1.0 mm 0.039 in.
• Swing Cylinder Trunnion Boss	O.D.	29.950 to 29.975 mm 1.1792 to 1.1803 in.	–
• Cylinder Support Bush	I.D.	30.075 to 30.175 mm 1.1841 to 1.1974 in.	–
Swing Cylinder Rod Pin to Bush	Clearance	0.128 to 0.259 mm 0.00504 to 0.0101 in.	1.0 mm 0.039 in.
• Swing Cylinder Rod	O.D.	24.95 to 24.98 mm 0.9823 to 0.9834 in.	–
• Bush	I.D.	25.108 to 25.209 mm 0.9885 to 0.9925 in.	–
Boom Support Pin to Bush	Clearance	0.100 to 0.180 mm 0.00394 to 0.00708 in.	1.0 mm 0.039 in.
• Boom Support Pin	O.D.	29.82 to 29.85 mm 1.174 to 1.175 in.	–
• Bush	I.D.	29.95 to 30.00 mm 1.180 to 1.181 in.	–

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Item		Factory Specification	Allowable Limit
Boom Cylinder Rod Pin to Bush	Clearance	0.139 to 0.281 mm 0.00548 to 0.0110 in.	1.0 mm 0.039 in.
• Boom Cylinder Rod Pin	O.D.	29.97 to 30.00 mm 1.180 to 1.181 in.	–
• Bush	I.D.	30.139 to 30.251 mm 1.1866 to 1.1909 in.	–
Dipperstick Fulcrum Pin to Bush	Clearance	0.100 to 0.180 mm 0.00394 to 0.00708 in.	1.0 mm 0.039 in.
• Dipperstick Fulcrum Pin	O.D.	29.82 to 29.85 mm 1.174 to 1.175 in.	–
• Bush	I.D.	29.95 to 30.00 mm 1.180 to 1.181 in.	–
Dipperstick Cylinder Rod to Bush	Clearance	0.178 to 0.309 mm 0.00701 to 0.0121 in.	1.0 mm 0.039 in.
• Dipperstick Cylinder Rod	O.D.	24.90 to 24.93 mm 0.9804 to 0.9814 in.	–
• Bush	I.D.	25.108 to 25.209 mm 0.9885 to 0.9925 in.	–
Bucket Link Pin and Bush	Clearance	0.100 to 0.180 mm 0.00394 to 0.00708 in.	1.5 mm 0.059 in.
• Bucket Link Pin	O.D.	24.82 to 24.85 mm 0.9772 to 0.9783 in.	–
• Bush	I.D.	24.95 to 25.00 mm 0.9823 to 0.9842 in.	–
Bucket Cylinder Rod Pin and Bush	Clearance	0.100 to 0.180 mm 0.00394 to 0.00708 in.	1.5 mm 0.059 in.
• Bucket Cylinder Rod Pin	O.D.	24.82 to 24.85 mm 0.9772 to 0.9783 in.	–
• Bush	I.D.	24.95 to 25.00 mm 0.9823 to 0.9842 in.	–
Stabilizer Arm Fulcrum Pin to Bush	Clearance	0.020 to 0.10 mm 0.00079 to 0.0039 in.	1.0 mm 0.039 in.
• Stabilizer Arm Fulcrum Pin	O.D.	24.90 to 24.93 mm 0.9804 to 0.9814 in.	–
• Bush	I.D.	24.95 to 25.00 mm 0.9823 to 0.9842 in.	–
Thrust Washer	Thickness	2.45 to 2.82 mm 0.0965 to 0.111 in.	1.8 mm 0.071 in.
Piston Rod	Bend	–	0.25 mm 0.0098 in.

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3. TIGHTENING TORQUES

Tightening torques of screws, bolts and nuts on the table below are especially specified.
(For general use screws, bolts and nuts : See page G-4.)

[All Model]

Item	N·m	kgf·m	lbf·ft
Seat support mounting screw	78 to 90	7.9 to 9.2	58 to 66
Step mounting screw	48 to 55	4.9 to 5.7	36 to 41
Swing cylinder support mounting screw and nut	48 to 55	4.9 to 5.7	36 to 41
Swing cylinder head	353 to 431	36.0 to 44.0	261 to 318
Swing cylinder piston nut	309 to 377	31.5 to 38.5	228 to 278
Boom cylinder head	486 to 593	49.5 to 60.5	358 to 437
Boom cylinder piston nut	353 to 431	36.0 to 44.0	261 to 318
Dipperstick cylinder head	486 to 593	49.5 to 60.5	358 to 437
Dipperstick cylinder piston nut	353 to 431	36.0 to 44.0	261 to 318
Bucket cylinder head	371 to 453	37.8 to 46.2	274 to 334
Bucket cylinder piston nut	353 to 431	36.0 to 44.0	261 to 318
Stabilizer cylinder head	486 to 593	49.5 to 60.5	358 to 437
Stabilizer cylinder piston nut	309 to 377	31.5 to 38.5	228 to 278
Control valve mounting nut	16.7 to 17.6	1.70 to 1.80	12.3 to 13.0

[B3200, B3300SU]

Item	N·m	kgf·m	lbf·ft
Rear wheel mounting nut	167 to 191	17.0 to 19.5	123 to 141
Rear wheel mounting screw	196 to 225	20.0 to 23.0	145 to 166
Connecting plate mounting screw and nut M16	196 to 225	20.0 to 23.0	145 to 166
Sub frame mounting screw and M16	196 to 225	20.0 to 23.0	145 to 166
Sub frame mounting screw M12 Pitch 1.75	63 to 72	6.4 to 7.4	47 to 53

[B2630, B3030]

Item	N·m	kgf·m	lbf·ft
Rear wheel mounting nut	167 to 191	17.0 to 19.5	123 to 141
Rear wheel mounting screw	196 to 225	20.0 to 23.0	145 to 166
Coupler joint mounting screw	24 to 27	2.4 to 2.8	18 to 20
Connecting plate mounting screw and nut M16	196 to 225	20.0 to 23.0	145 to 166
Sub frame mounting screw and nut M16	196 to 225	20.0 to 23.0	145 to 166
Sub frame mounting screw M12 Pitch 1.75	63 to 72	6.4 to 7.4	47 to 53
Frame Bracket mounting screw M16	196 to 225	20.0 to 23.0	145 to 166

[L2800, L3400, L3700SU, L3200, L3800]

Item	N·m	kgf·m	lbf·ft
Rear wheel mounting screw and nut	215	22.0	160
Coupler joint mounting screw	24 to 27	2.4 to 2.8	18 to 20
Connecting plate mounting screw and nut M12	78 to 90	7.9 to 9.2	58 to 66
Frame bracket mounting screw M14	124 to 147	12.6 to 15.0	91.5 to 108
Sub frame mounting screw and nut M16	196 to 225	20.0 to 23.0	145 to 166
Sub frame mounting screw and nut M12	78 to 90	7.9 to 9.2	58 to 66

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[L3240(-3), L3540(-3)]

Item	N·m	kgf·m	lbf·ft
Rear wheel mounting screw and nut	215	22.0	160
Connecting plate mounting screw and nut M16	196 to 225	20.0 to 23.0	145 to 166
Frame support mounting screw M16	196 to 225	20.0 to 23.0	145 to 166
Rear bracket mounting screw and nut M16	196 to 225	20.0 to 23.0	145 to 166
Sub frame mounting screw and nut M16	196 to 225	20.0 to 23.0	145 to 166

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4. DISMOUNTING AND MOUNTING

[1] DISMOUNTING BACKHOE

⚠ CAUTION

- **When starting the engine, always sit on the tractor operator's seat.**
- **When getting off the tractor, make sure that PTO lever is off and range gear shift lever is in neutral. Then set the parking brake.**
- **Keep hands, feet and body from between tractor and backhoe. Never allow any part of body under the machine.**
- **When leaving the backhoe operator's seat, fully lower the boom to the ground.**
- **When removing the backhoe, set the swing lock pin.**

■ IMPORTANT

- **When removing the backhoe, set the engine speed at low idle.**
- **For removing the backhoe, locate the tractor / loader / backhoe on a flat level and hard surface, preferably concrete.**
  If the surface is soft, place a board on the ground for the bucket and stabilizers.

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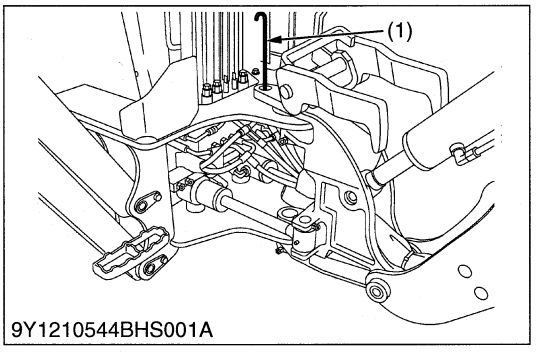

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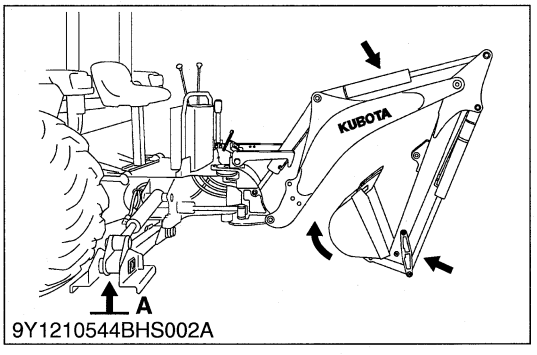

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Preparation

1. Start the engine and lower the front loader to the ground.
2. Set the swing lock pin (1) to prevent the pivoting of the boom before removing the backhoe.
3. Stand beside the rear tire, fully close the dipperstick, curl the bucket and lower the boom until the back of bucket contacts the ground.
4. Keep the stabilizer pads at about 380 mm (15 in.) high.

(1) Swing Lock Pin **A : 380 mm (15 in.)**

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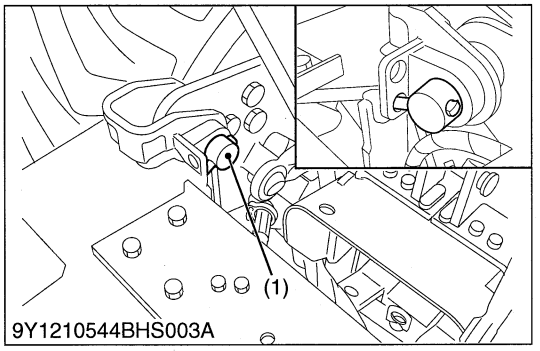

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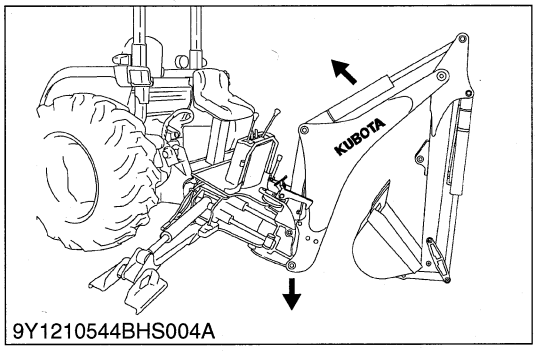

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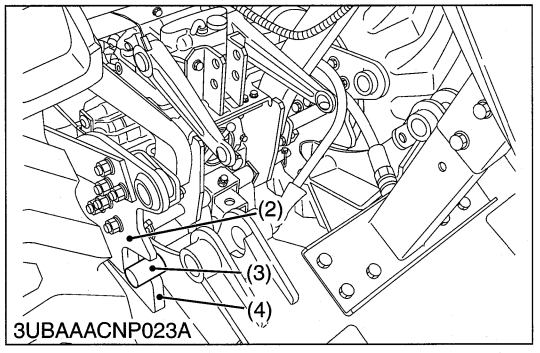

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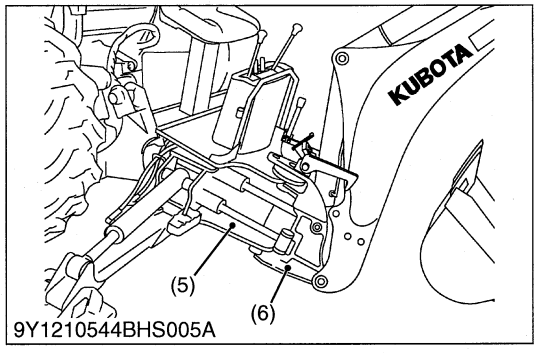

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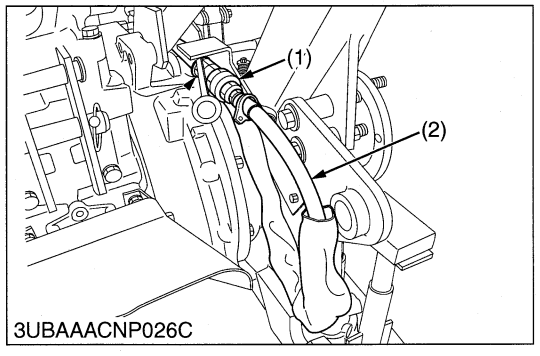

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Mounting Pin

1. Raise the rear wheels slightly with the boom and remove the mounting pins (1).
2. Slowly raise the boom to disengage the backhoe from the tractor.
3. Raise the backhoe by operating the stabilizers to the lowering direction until the mount bars (3) hit to the guide stopper (2) on the support hooks (4).
4. Move the tractor forward from the backhoe about 200 mm (8 in.).

■ **IMPORTANT**

- **Be careful not to damage or break the hoses when moving the tractor.**

5. Lower the main frame (5) and swing frame (6) onto the ground by operating the boom and stabilizer control levers.
6. Shut off the engine and set the parking brake.

(1) Mounting Pin
(2) Guide Stopper
(3) Mount Bar
(4) Support Hook
(5) Main Frame
(6) Swing Frame

9Y1210544BHS0006US0

Hydraulic Hoses

1. Slowly release all hydraulic pressure by moving the backhoe hydraulic control levers in all directions.
2. Disconnect the inlet and outlet hoses from the tractor.
3. Connect tractor outlet hose to the coupler of return hose.

(1) Outlet Hose (Tractor)
(2) Return Hose (Tractor)

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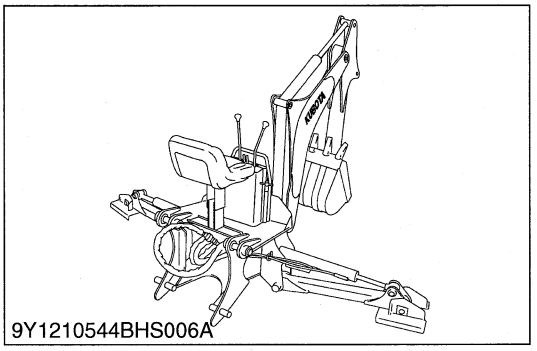
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Separation

1. Start the engine.
   Then drive the tractor / loader slowly from the backhoe.
2. Shut off the engine and remove the key from the tractor. Set the parking brake.

■ **NOTE**

- **The entire three point hitch can now be reinstalled on the tractor for use with other rear mount implements.**
- **Be sure that there is sufficient ballast in the rear tires and an implement is attached to the three point hitch before using the loader with backhoe removed.**

9Y1210544BHS0008US0

[2] MOUNTING BACKHOE TO TRACTOR

⚠ CAUTION

- **When starting the engine, always sit on the operator's seat.**
- **When getting off the tractor, make sure that PTO lever is off and range gear shift lever is in neutral. Set the parking brake.**
- **When getting off the tractor, make sure that PTO lever is off and range gear shift lever is in neutral. Set the parking brake.**

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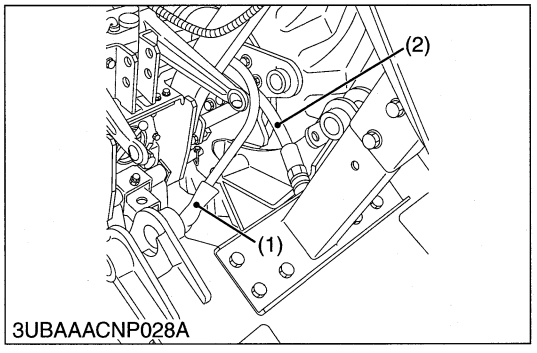

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Hydraulic Hose

⚠ CAUTION

- **Make sure the tractor PTO is disengaged.**

■ **IMPORTANT**

- **When mounting the backhoe, set the engine speed at low idle.**

1. Remove the 3 point hitch and drawbar from tractor. (If equipped.)
2. Make sure the swing lock pin is installed.
3. Start the engine and move the tractor backward slowly, centering to the backhoe main frame. Stop the tractor 250 to 300 mm (10 to 12 in.) away from the backhoe.
4. Lower the front loader and shut off the engine, then set the parking brake.
5. Connect the inlet (1) and outlet (2) hoses of the backhoe to the outlet hose and return hose of the tractor.

■ **IMPORTANT**

- **Make sure both hoses are firmly connected before starting the engine.**

(1) Inlet Hose (2) Outlet Hose

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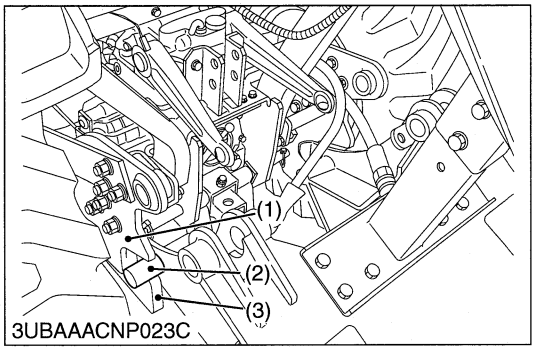

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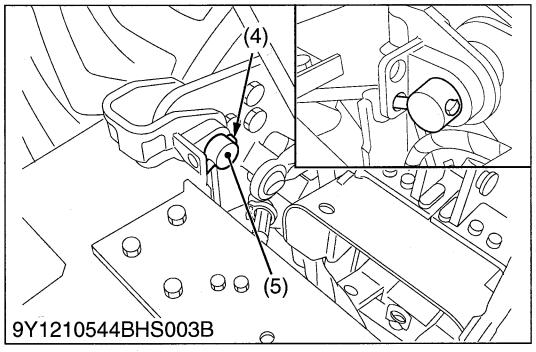

9Y1210544BHS003B

Mounting Pin and Mounting Backhoe

CAUTION

- **Do not move the joystick control lever to the swing position.**

1. Start the engine.
2. Stand beside the rear wheel. Move the boom to fully raising position and raise the backhoe by operating the stabilizers. Raise the backhoe until the mount bar on the backhoe main frame are slightly higher than the tractor main frame support hooks.

NOTE

- **If the support hooks are not parallel to the mount bars, adjust with the stabilizers.**

3. Move the tractor backward until the support hooks on the tractor main frame are just beneath the mount bar on the backhoe main frame.
4. Lower the mount bar onto the support hooks by operating the stabilizer and boom control levers.
5. Move the boom slowly to the lowering position, and engage the guide plates of the main frame to the bosses of sub frame. Then raise the rear wheels slightly by operating the boom to the lowering direction.
6. Shut off the engine. Reinstall the mounting pins, and insert the slide bar of the mounting pins to the lower hole of the main frame.

IMPORTANT

- **Be careful not to catch the hydraulic hoses between backhoe frame and tractor while mounting the backhoe.**

NOTE

- **Move the tractor / loader / backhoe to an open area and repeat all backhoe functions. This will check their operation.**
- **If the backhoe has been stored for long period, check and maintain the backhoe.**

(1) Guide Stopper
(2) Mount Bar
(3) Support Hook
(4) Slide Bar
(5) Mounting Pin

9Y1210544BHS0011US0

[3] DISASSEMBLING BACKHOE

■ **IMPORTANT**

- **When reassembling the pins, bushes and inner rings, apply slight coat of grease to them.**
- **When tightening the hydraulic hoses, refer to "HYDRAULIC FITTINGS" in GENERAL section.**

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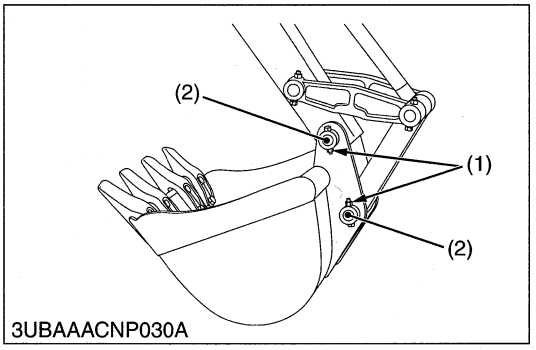

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Bucket

1. Remove the bucket from the dipperstick.

(When reassembling)

- Install locking nut (2) until setting bolt can still be rotated.

(1) Locking Nut
(2) Pin (25 × 157 mm)

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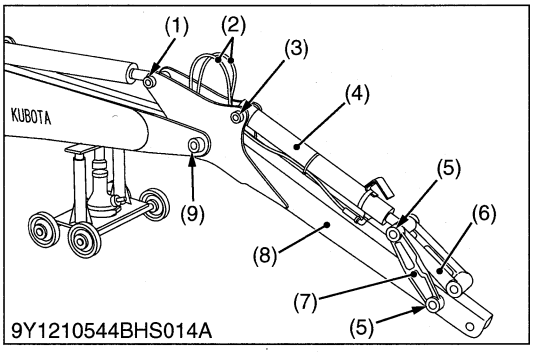

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Dipperstick and Bucket Cylinder

1. Remove the pins (5) and remove the bucket link (6) and guide link (7).
2. Disconnect the hydraulic hoses (2) and remove the bucket cylinder (4).
3. Remove the pins (1), (9) and remove the dipperstick (8).

(When reassembling)

- Lock the locking nut until setting bolt can still be rotated.
- Replace the spacers (10) to their original positions.

(1) Pin (25 × 137 mm)
(2) Hydraulic Hose
(3) Pin (25 × 137 mm)
(4) Bucket Cylinder
(5) Pin (25 × 170 mm)
(6) Bucket Link
(7) Guide Link
(8) Dipperstick
(9) Pin (1.18 × 7.96 in.)
(10) Spacer

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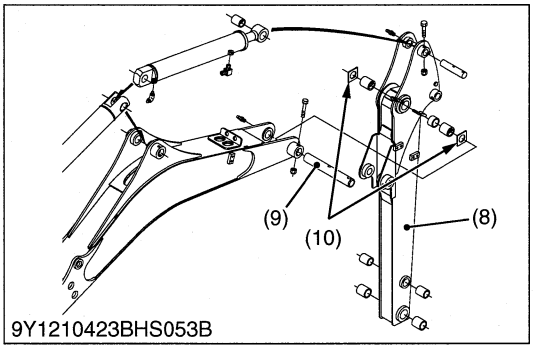

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Valve Cover

1. Remove the valve cover (1).

(1) Valve Cover

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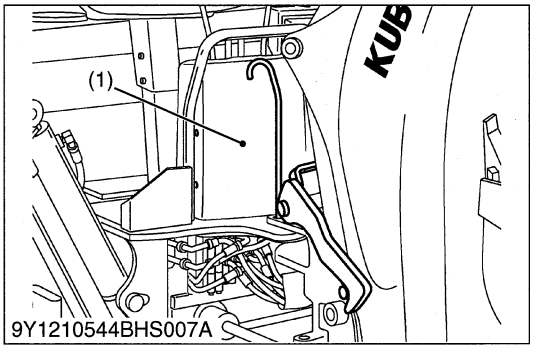

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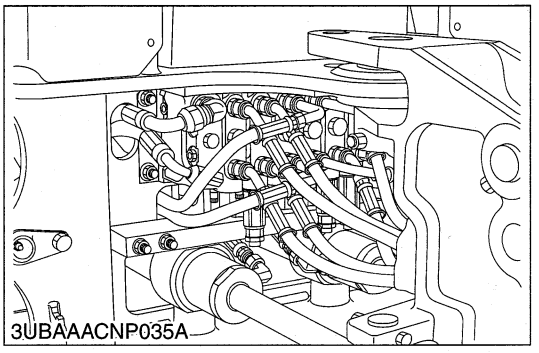
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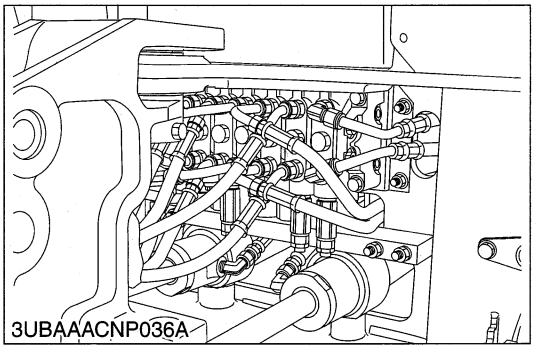
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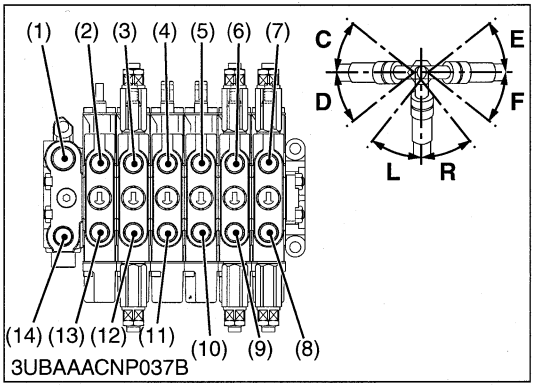

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Hydraulic Hoses

1. Disconnect the hydraulic hoses from the control valve and remove the hydraulic hoses.

(When reassembling)

- Connect the hydraulic hoses to their original positions and be sure to connect the hose angle as indicated table below.

Port	Angle of Bent Tube
A1, B1 **A2, B2**	R 10 ° (0.17 rad)
A3, B3	L 75 ° (1.3 rad)
A4, B4	R 75 ° (1.3 rad)
A5, B5	L 10 ° (0.17 rad)
T	D 15 ° (0.26 rad)
P	C 15 ° (0.26 rad)
A6	F 15 ° (0.26 rad)
B6	E 15 ° (0.26 rad)

(Reference)

- Color of tape

	Color
A1, B1	Red
A2, B2	Orange
A3, B3	Green
A4, B4	Green
A5, B5	Yellow

(1) **T** Port (Return)
(2) **A1** Port (for Bucket)
(3) **A2** Port (for Dipperstick)
(4) **A3** Port (for Stabilizer R.H.)
(5) **A4** Port (for Stabilizer L.H.)
(6) **A5** Port (for Boom)
(7) **A6** Port (for Swing)
(8) **B6** Port (for Swing)
(9) **B5** Port (for Boom)
(10) **B4** Port (for Stabilizer L.H.)
(11) **B3** Port (for Stabilizer R.H.)
(12) **B2** Port (for Dipperstick)
(13) **B1** Port (for Bucket)
(14) **P** Port (Pump)

L : Installation Angle
R : Installation Angle
C : Installation Angle
D : Installation Angle
E : Installation Angle
F : Installation Angle

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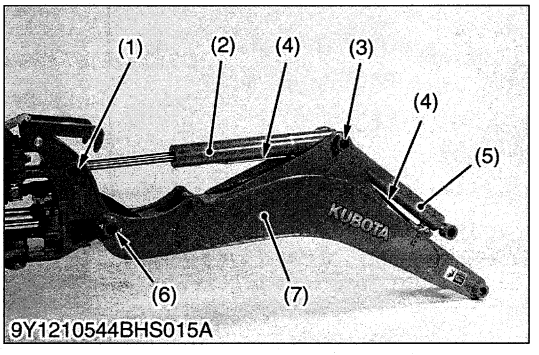

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Dipperstick Cylinder, Boom and Boom Cylinder

1. Disconnect the hydraulic hoses (4) and remove the pin (3).
2. Remove the dipperstick cylinder (5).
3. Hoist the boom.
4. Remove the pins (1) and remove the boom cylinder (2).
5. Remove the pin (6) and remove the boom (7).

(When reassembling)

- Connect the hydraulic hoses to their original positions.
- Lock the locking nut until setting bolt can still be rotated.

(1) Pin (30 × 150 mm)
(2) Boom Cylinder
(3) Pin (30 × 180 mm)
(4) Hydraulic Hose
(5) Dipperstick Cylinder
(6) Pin (1.18 × 7.96 in.)
(7) Boom

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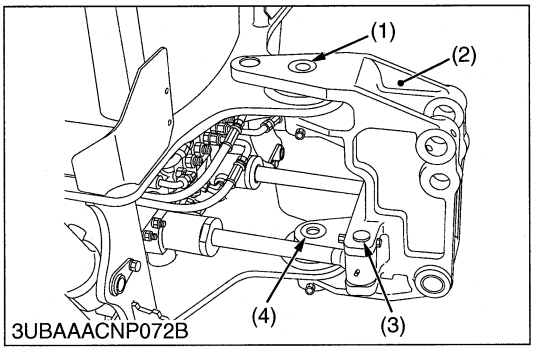

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Swing Frame

1. Disconnect the swing cylinder rods from swing frame (2).
2. Remove the swing frame (2) from main frame.

(When reassembling)

- Lock the locking nut until setting bolt can still be rotated.
- Reinstall the thrust washers (5) to their original positions.

(1) Pin (40 × 102 mm)
(2) Swing Frame
(3) Pin (25 × 95 mm)
(4) Pin (40 × 102 mm)
(5) Thrust Washer

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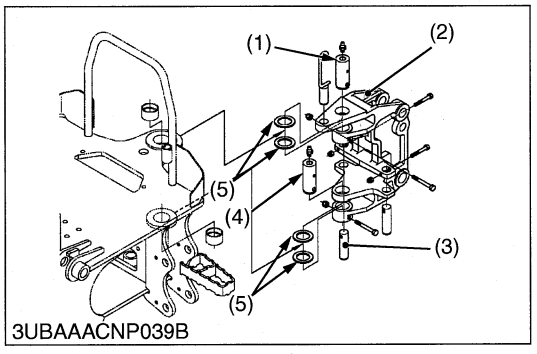

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Stabilizers and Stabilizer Cylinder

1. Remove the hydraulic hoses (3) and remove the pins (1), (4).
2. Remove the stabilizer cylinder (2).
3. Remove the pin (5) and remove the stabilizer (6).

(When reassembling)

- Lock the locking nut until setting bolt can still be rotated.

(1) Pin (25 × 84 mm)
(2) Stabilizer Cylinder
(3) Hydraulic Hose
(4) Pin (25 × 126 mm)
(5) Pin (25 × 126 mm)
(6) Stabilizer

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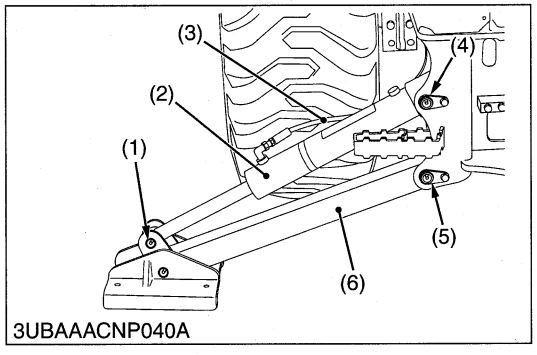

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Seat and Seat Support

1. Remove the seat (1) with seat support (2).

Tightening torque	Seat support mounting screw	78 to 90 N·m 7.9 to 9.2 kgf·m 58 to 66 lbf·ft

(1) Seat
(2) Seat Support

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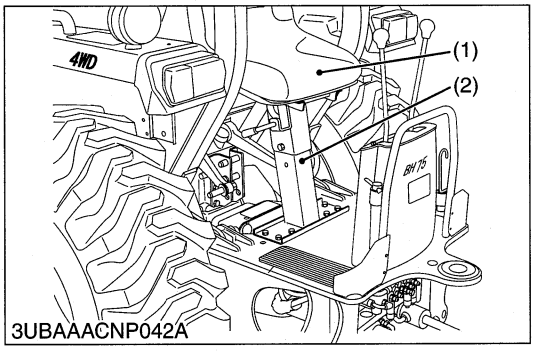

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Control Lever and Cover

1. Remove the control levers (1), (2).
2. Disconnect the valve rods.
3. Remove the cover (3) from the backhoe main frame.

Tightening torque	Step mounting screw	48 to 55 N·m 4.9 to 5.7 kgf·m 36 to 41 lbf·ft

(1) Control Valve Lever
(2) Control Valve Lever
(3) Cover

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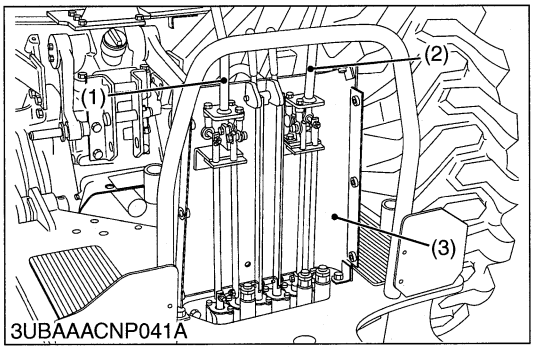

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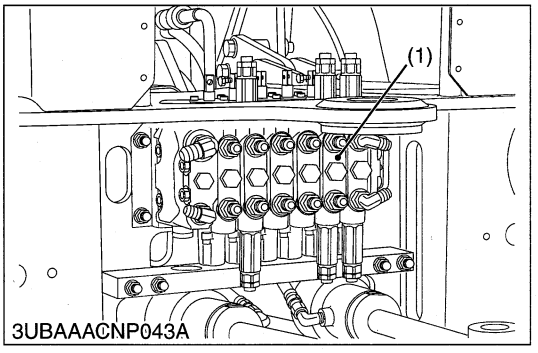

Control Valve

1. Remove the control valve assembly (1).

(1) Control Valve Assembly

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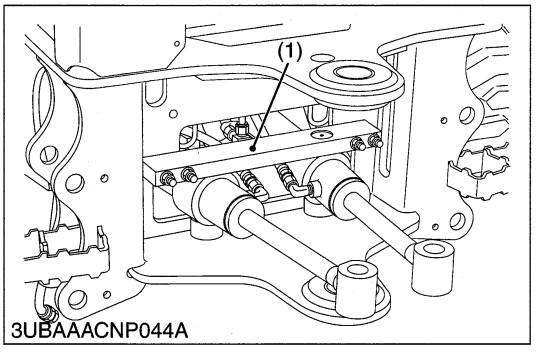


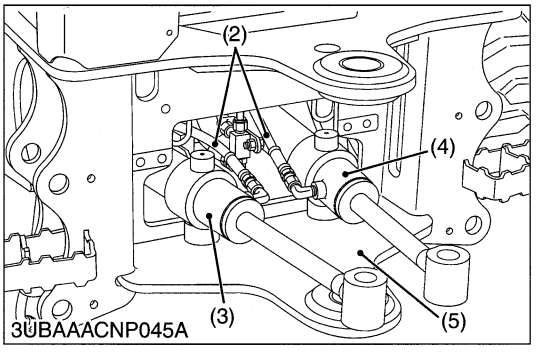
Swing Cylinder and Hydraulic Hoses

1. Remove the swing cylinder support (1).
2. Disconnect the hydraulic hoses (2).
3. Remove the swing cylinder R.H. (3) and swing cylinder L.H. (4) from the backhoe main frame (5).

(When reassembling)

- Connect the hydraulic hoses (2) to their original positions.

Tightening torque	Swing cylinder support mounting screw and nut	48 to 55 N·m 4.9 to 5.7 kgf·m 36 to 41 lbf·ft



(1) Swing Cylinder Support
(2) Hydraulic Hose
(3) Swing Cylinder R.H.
(4) Swing Cylinder L.H.
(5) Main Frame

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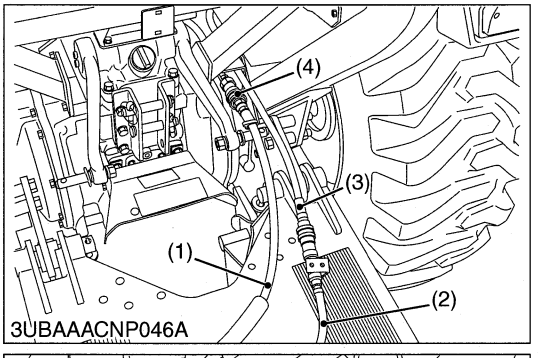

Hydraulic Hose

1. Remove the hydraulic hose (1), (2).
2. Connect the hydraulic hose (3) to the coupler (4) of return hose.

(1) Hydraulic Hose
(2) Hydraulic Hose
(3) Hydraulic Hose
(4) Coupler

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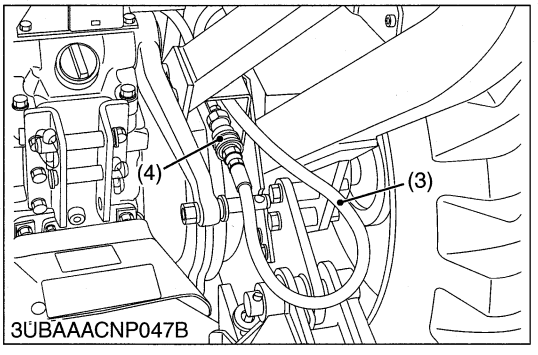
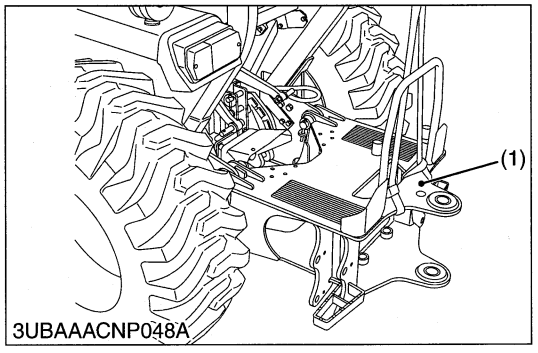
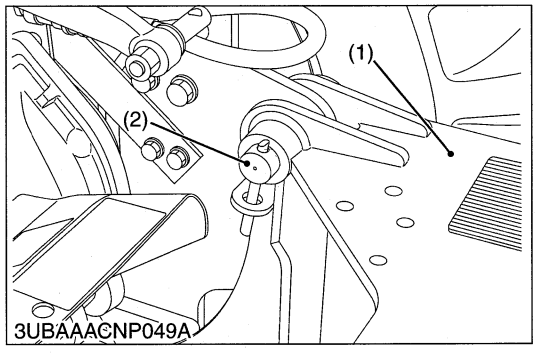
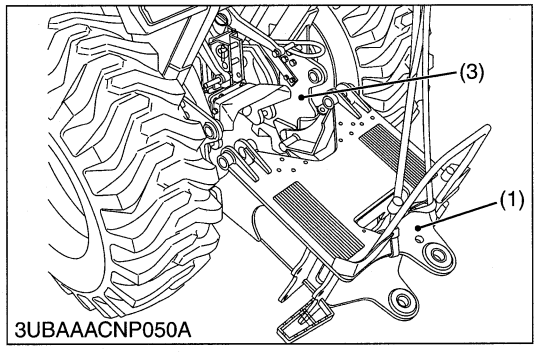








Tractor Main Frame

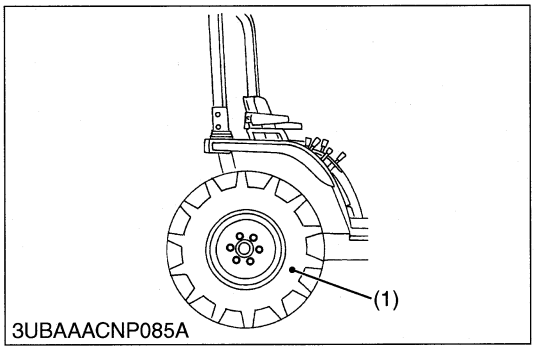
1. Hoist the backhoe main frame (1) and remove the pins (2) from tractor sub frame.
2. Separate the backhoe main frame (1) from the tractor sub frame (3).

(1) Backhoe Main Frame
(2) Pin
(3) Tractor Sub Frame

9Y1210544BHS0025US0

[4] DISASSEMBLING AND ASSEMBLING SUB FRAME

(1) B3200 and B3300SU Model



Rear Wheel

1. Place disassembling stand under the tractor frame, and support it with a jack.
2. Remove the rear wheels (1).
3. After removing the rear wheels, support it on both sides of rear axle by stand.

(When reassembling)

Tightening torque	Rear wheel mounting nut	167 to 191 N·m 17.0 to 19.5 kgf·m 123 to 141 lbf·ft
	Rear wheel mounting screw	196 to 225 N·m 20.0 to 23.0 kgf·m 145 to 166 lbf·ft

(1) Rear Wheel

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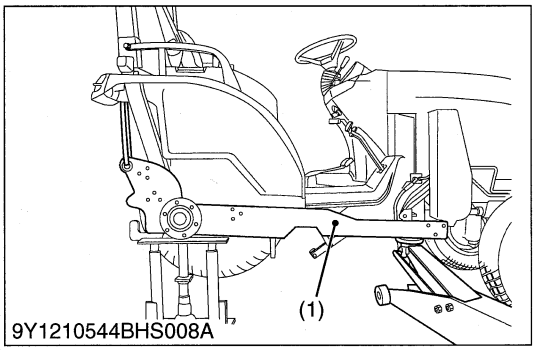

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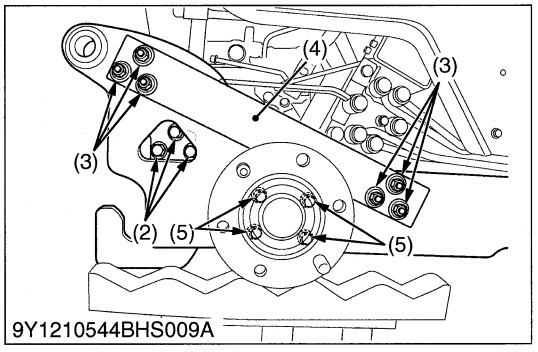

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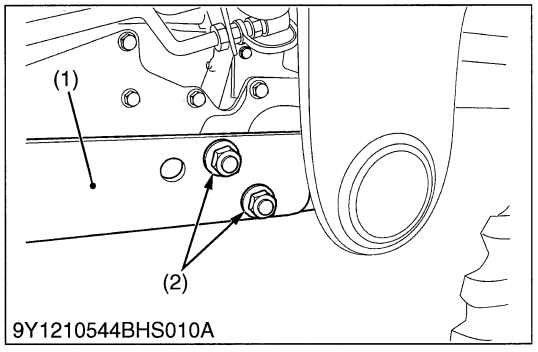

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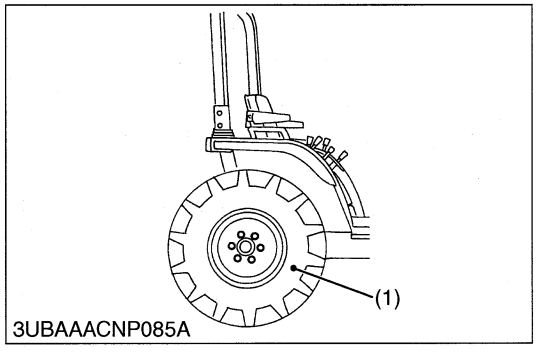
(2) B2630 and B3030 Model



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Connecting Plate and Sub Frame

1. Hoist the rear side of sub frame (1) by jack and place hydraulic jack as show in the figure.
2. Remove the connecting plate (4).
3. Remove the sub frame mounting screws and nuts.
4. Slowly lower the sub frame by jack and hoist to separate the sub frame (1).

(When reassembling)

Tightening torque	Connecting plate mounting screw and nut M16	196 to 225 N·m 20.0 to 23.0 kgf·m 145 to 166 lbf·ft
	Sub frame mounting screw and nut M16	196 to 225 N·m 20.0 to 23.0 kgf·m 145 to 166 lbf·ft
	Sub frame mounting screw M12 Pitch 1.75	63 to 72 N·m 6.4 to 7.4 kgf·m 47 to 53 lbf·ft

(1) Sub Frame
(2) Screw and Nut (M16)
(3) Screw and Nut (M16)
(4) Connecting Plate
(5) Screw (M12 Pitch 1.75)

9Y1210544BHS0027US0

Rear Wheel

1. Place disassembling stand under the tractor frame, and support it with a jack.
2. Remove the rear wheels (1).
3. After removing the rear wheels, support it on both sides of rear axle by stand.

(When reassembling)

Tightening torque	Rear wheel mounting nut	167 to 191 N·m 17.0 to 19.5 kgf·m 123 to 141 lbf·ft
	Rear wheel mounting screw	196 to 225 N·m 20.0 to 23.0 kgf·m 145 to 166 lbf·ft

(1) Rear Wheel

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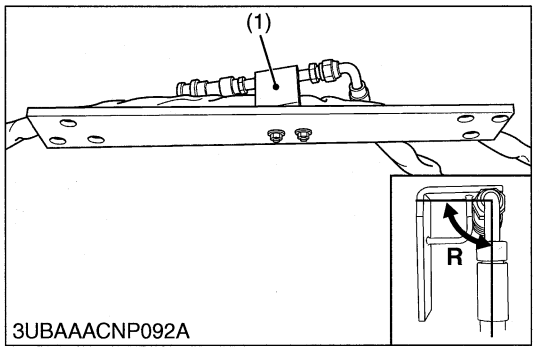

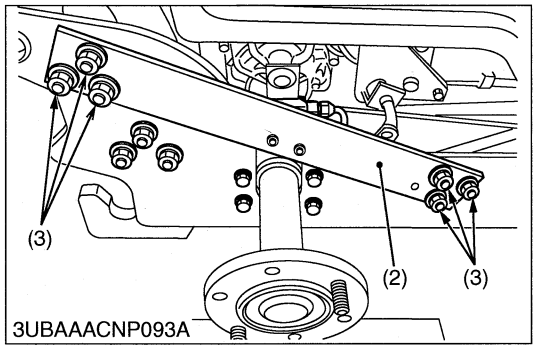

Connecting Plate

1. Disconnect the coupler joint (1).
2. Remove the connecting plate (2).

(When reassembling)

Tightening torque	Coupler joint mounting screw	24 to 27 N·m 2.4 to 2.8 kgf·m 18 to 20 lbf·ft
	Connecting plate mounting screw and nut M16	196 to 225 N·m 20.0 to 23.0 kgf·m 145 to 166 lbf·ft

(1) Coupler Joint
(2) Connecting Plate
(3) Screw and Nut (M16)

R : 1.6 rad (90 °)

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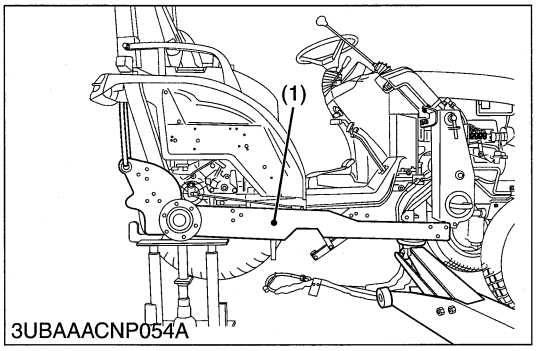
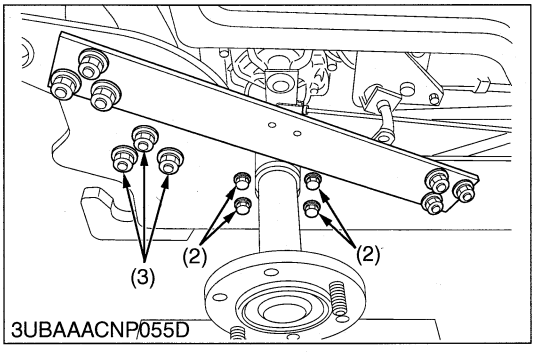
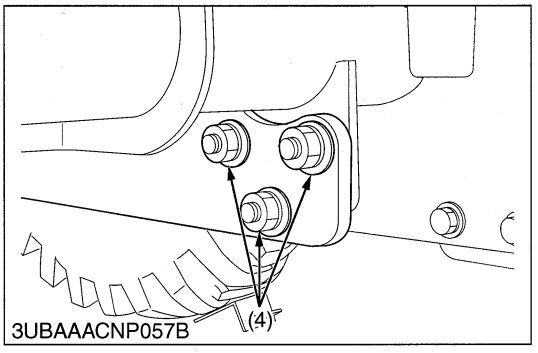
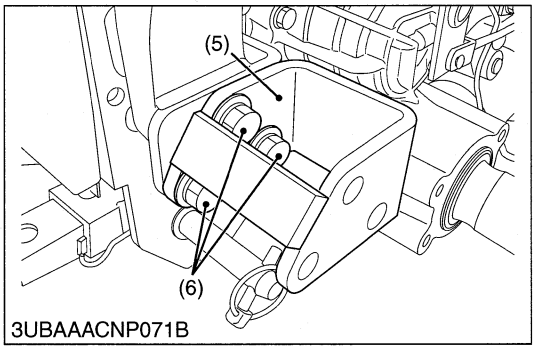








Sub Frame and Frame Bracket

1. Hoist the rear side frame (1) by jack and place hydraulic jack as shown figure.
2. Remove the sub frame mounting screws and nuts.
3. Slowly lower the sub frame by jack and hoist to separate the sub frame (1).
4. Remove the frame bracket (5).

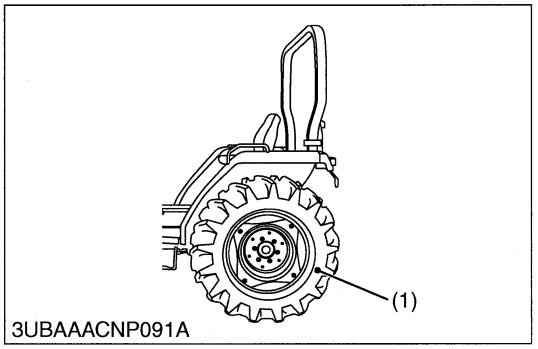
(When reassembling)

Tightening torque	Sub frame mounting screw and nut M16	196 to 225 N·m 20.0 to 23.0 kgf·m 145 to 166 lbf·ft
	Sub frame mounting screw M12 Pitch 1.75	63 to 72 N·m 6.4 to 7.4 kgf·m 47 to 53 lbf·ft
	Frame bracket mounting screw M16	196 to 225 N·m 20.0 to 23.0 kgf·m 145 to 166 lbf·ft

(1) Sub Frame
(2) Screw (M12 Pitch 1.75)
(3) Screw and Nut (M16)
(4) Screw and Nut (M16)
(5) Frame Bracket
(6) Screw (M16)

9Y1210544BHS0029US0

(3) L2800, L3400, L3700SU, L3200 and L3800 Model



Rear Wheel

1. Place disassembling stand under the tractor frame, and support it with a jack.
2. Remove the rear wheels.
3. After removing the wheels, support it on both sides of rear axle by stand.

(When reassembling)

Tightening torque	Rear wheel mounting screw and nut	215 N·m 22.0 kgf·m 160 lbf·ft

(1) Rear Wheel

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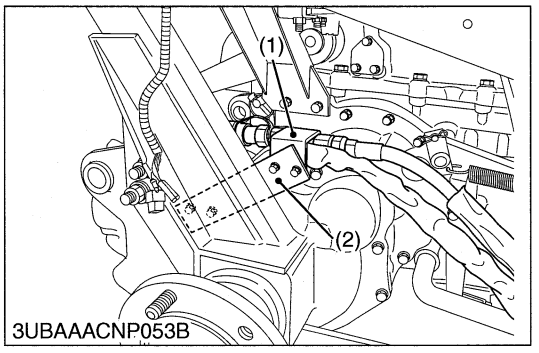

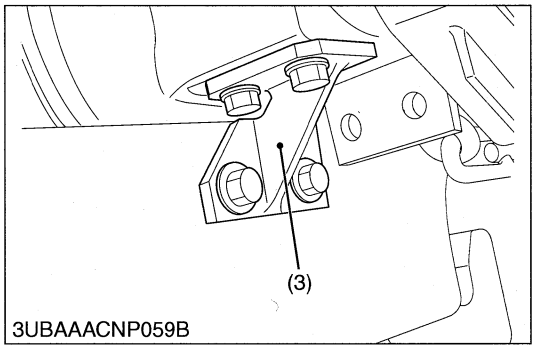

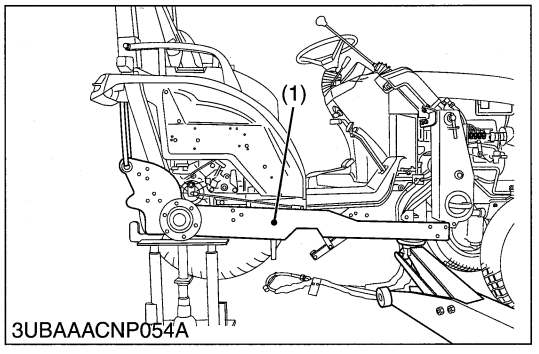

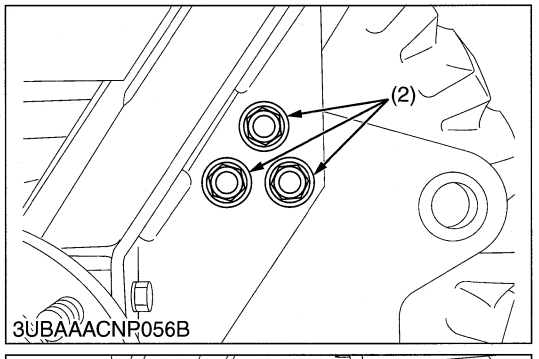

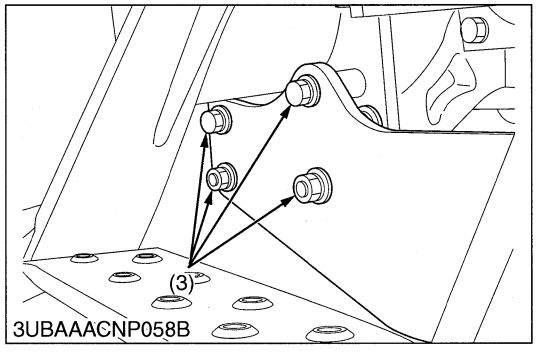

Connecting Plate and Frame Bracket

1. Disconnect the coupler joint (1).
2. Remove the connecting plate (2).
3. Remove the frame bracket (3).

(When reassembling)

Tightening torque	Coupler joint mounting screw	24 to 27 N·m 2.4 to 2.8 kgf·m 18 to 20 lbf·ft
	Connecting plate mounting screw and nut M12	78 to 90 N·m 7.9 to 9.2 kgf·m 58 to 66 lbf·ft
	Frame Bracket mounting screw M14	124 to 147 N·m 12.6 to 15.0 kgf·m 91.5 to 108 lbf·ft

(1) Coupler Joint
(2) Connecting Plate
(3) Frame Bracket

9Y1210544BHS0031US0

Sub Frame

1. Hoist the rear side of sub frame (1) by jack and place hydraulic jack as shown figure.
2. Remove the sub frame mounting screws and nuts.
3. Slowly lower the sub frame by jack and hoist to separate the sub frame (1).

(When reassembling)

Tightening torque	Sub frame mounting screw and nut M16	196 to 225 N·m 20.0 to 23.0 kgf·m 145 to 166 lbf·ft
	Sub frame mounting screw and nut M12	78 to 90 N·m 7.9 to 9.2 kgf·m 58 to 66 lbf·ft

(1) Sub Frame
(2) Screw and Nut (M16)
(3) Screw and Nut (M12)

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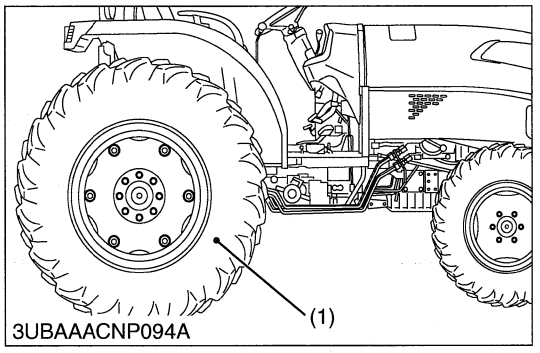
(4) L3240(-3) and L3540(-3) Model



Rear Wheel

1. Place disassembling stand under the tractor frame, and support it with a jack.
2. Remove the rear wheels (1).
3. After removing the rear wheels, support it on both sides of rear axle by stand.

(When reassembling)

Tightening torque	Rear wheel mounting screw and nut	215 N·m 22 kgf·m 160 lbf·ft

(1) Rear Wheel

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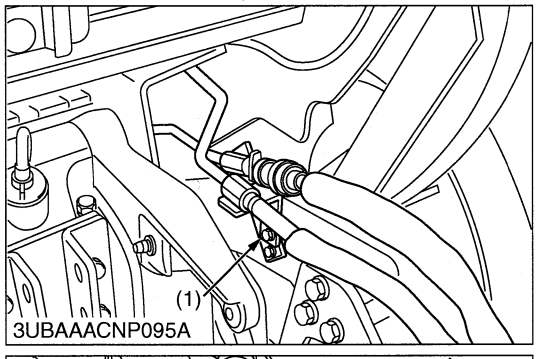
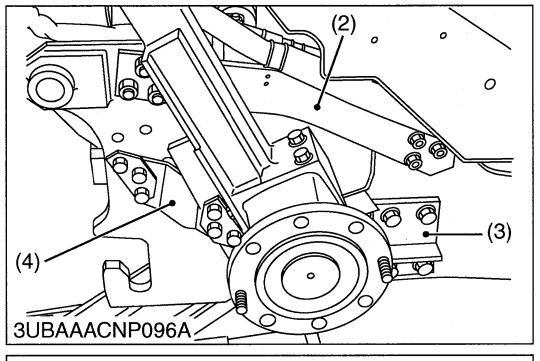


Connecting Plate and Rear Bracket

1. Disconnect the coupler joint (1).
2. Remove the connecting plate (2).
3. Remove the frame support (4).
4. Remove the rear bracket (3).

■ **NOTE**

- **On the L3240(-3) and L3540(-3), remove the rear bracket, then attach the collar (5).**



Tightening torque	Connecting plate mounting screw and nut M16	196 to 225 N·m 20.0 to 23.0 kgf·m 145 to 166 lbf·ft
	Frame support mounting screw and nut M16	196 to 225 N·m 20.0 to 23.0 kgf·m 145 to 166 lbf·ft
	Rear bracket mounting screw and nut M16	196 to 225 N·m 20.0 to 23.0 kgf·m 145 to 166 lbf·ft

(1) Coupler Joint
(2) Connecting Plate
(3) Rear Bracket
(4) Frame Support
(5) Collar

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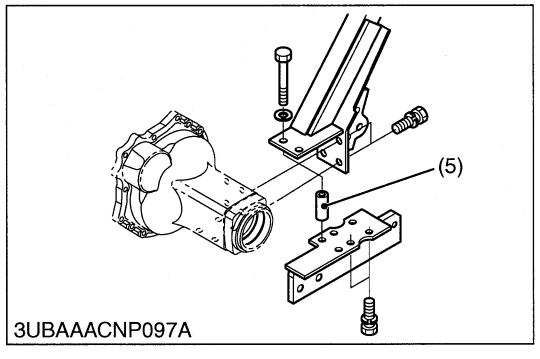
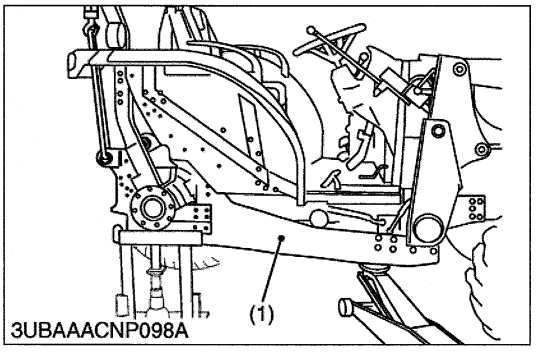
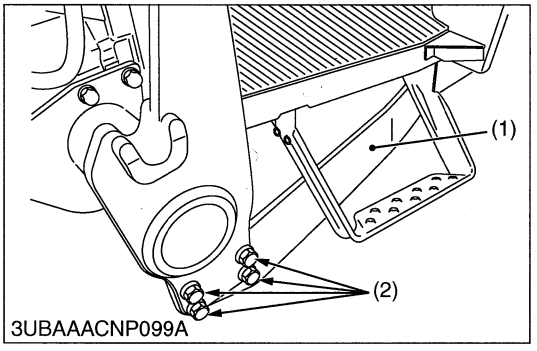






Sub Frame

1. Hoist the rear side of sub frame (1) by jack and place hydraulic jack as shown figure.
2. Remove the sub frame mounting bolt and nut.
3. Slowly lower the sub frame by jack and hoist to separate the sub frame (1).

(When reassembling)

Tightening torque	Sub frame mounting screw and nut M16	196 to 225 N·m 20.0 to 23.0 kgf·m 145 to 166 lbf·ft

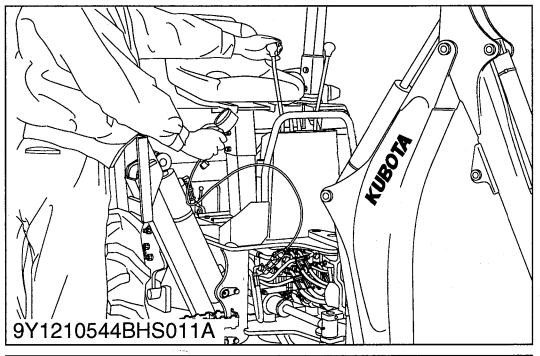
(1) Sub Frame (2) Screw and Nut (M16)

9Y1210544BHS0035US0

5. CHECKING, DISASSEMBLING AND SERVICING

[1] CHECKING AND ADJUSTING

(1) Control Valve



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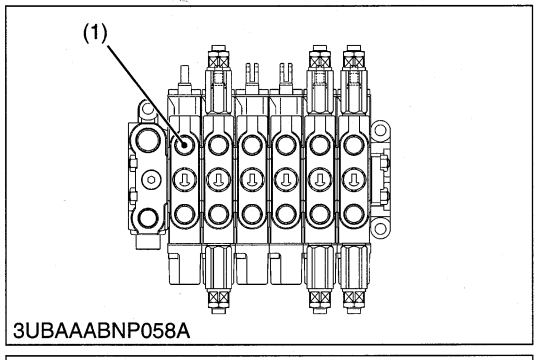

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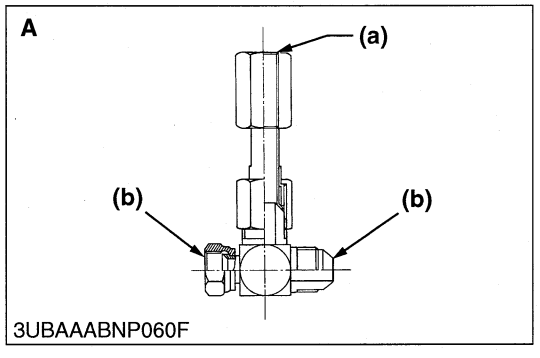

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Relief Valve Setting Pressure (for Tractor and Front Loader)

1. Remove the control valve cover.
2. Disconnect the hydraulic hose from **A1** port (1) of the control valve.
3. Install the adaptor **A** between control valve and hydraulic hose.
4. Set the relief valve setting pressure tester (Code No.: 07916-50045) to the adaptor **A**.
5. Start the engine, warm it up at idle speed, then set the engine speed at maximum.
6. Move the bucket and dipperstick lever to **"BUCKET-DUMP"** position and read the pressure gauge indication when sound indicating the relief valve operation is heard.

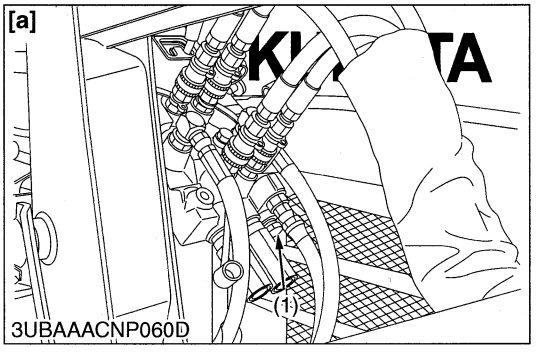
(1) **A1** Port

A : Backhoe Adaptor A
(a) Connect Pressure Gauge
(b) Size 9/16-18

(To be continued)

(Continued)

[a]



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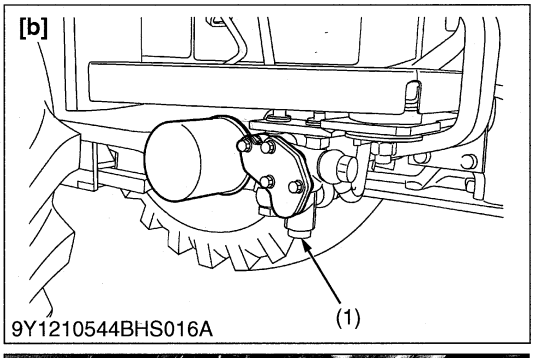
[b]



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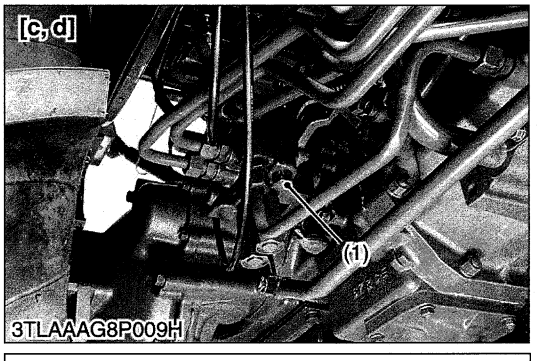
[c, d]



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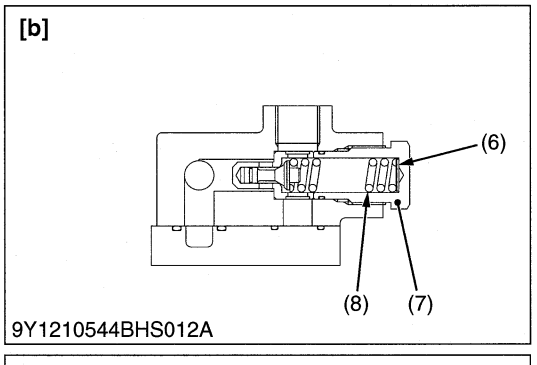

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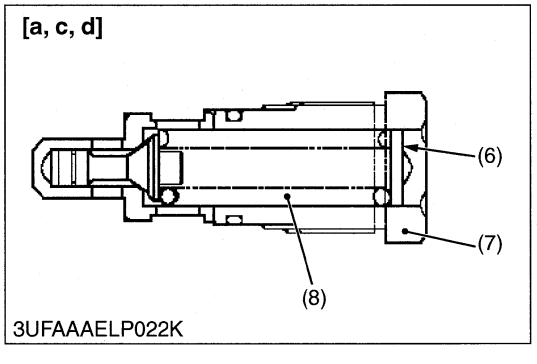
[a, c, d]



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7. If the pressure is not within the factory specifications, remove the relief plug (7) and adjust with the adjusting shims (6).

■ **NOTE**

- **The relief valve of the tractor hydraulic system is used as a relief valve of the backhoe hydraulic system. When the backhoe is not attached onto the tractor, check relief valve pressure by the method same as the tractor.**

Relief valve setting pressure	Factory specification	B3200 (Tractor)	13.3 to 14.3 MPa 136 to 145 kgf/cm^2 1960 to 2070 psi
		B3200 B3300SU (Front Loader)	14.4 to 15.2 MPa 147 to 154 kgf/cm^2 2090 to 2200 psi
		B2630 B3030 (Front Loader)	15.8 to 16.5 MPa 161 to 169 kgf/cm^2 2290 to 2400 psi
		L2800 L3400 L3700SU L3200 L3800 (Tractor)	15.7 to 16.1 MPa 160 to 165 kgf/cm^2 2280 to 2340 psi
		L3240(-3) L3540(-3) (Tractor)	17.1 to 18.1 MPa 175 to 184 kgf/cm^2 2480 to 2620 psi

Condition

- Engine speed :
  L2800, L3400, L3700SU, L3200, L3800 : Maximum
  B3200, B3300SU : 2700 min^{-1} (rpm)
  B2630 : 2800 min^{-1} (rpm)
  B3030 : 2600 min^{-1} (rpm)
  L3240(-3), L3540(-3) : Rated speed
- Oil temperature : 45 to 55 °C (113 to 131 °F)

(Reference)

- Thickness of shims (2) :
  0.1 mm (0.004 in.)
  0.2 mm (0.008 in.)
  0.4 mm (0.02 in.)
- Pressure change per 0.1 mm (0.004 in.) shim :
  Approx. 260 kPa (2.7 kgf/cm^2, 38 psi)

(1) Relief Valve
(2) Relief Plug
(3) Block
(4) Shim
(5) Washer
(6) Shim
(7) Relief Plug
(8) Spring

[a] B2630, B3030
[b] L2800, L3400, L3700SU, L3200, L3800
[c] L3240(-3), L3540(-3)
[d] B3200, B3300SU

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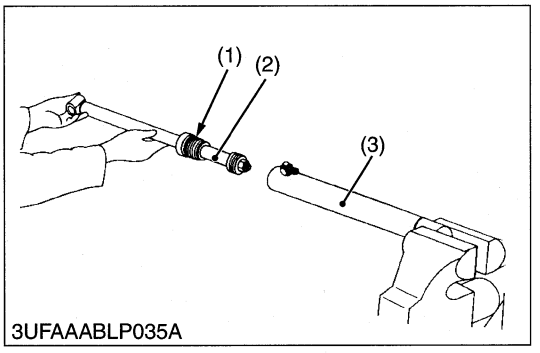
(2) Boom, Dipperstick, Bucket, Swing and Stabilizer Cylinder



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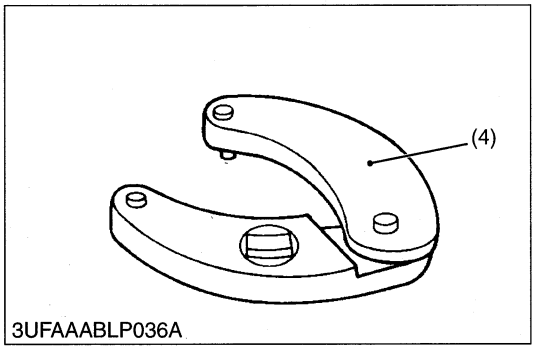

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Cylinder Rod Assembly

1. Drain hydraulic oil from the cylinder, and secure the tube end of the cylinder in a vise.
2. Unscrew the cylinder head (1) with the adjustable gland nut wrench (4).
3. Pull out the piston rod assembly (2) from the cylinder tube (3).

(When reassembling)

- Visually inspect the cylinder tube for signs of scoring or damage.
- Insert the piston rod assembly to the cylinder tube, taking care not to damage the piston seal on the piston.
- Install the cylinder head to the cylinder tube, taking care not to damage the O-ring on the cylinder head.

(1) Cylinder Head
(2) Piston Rod Assembly
(3) Cylinder Tube
(4) Adjustable Gland Wrench

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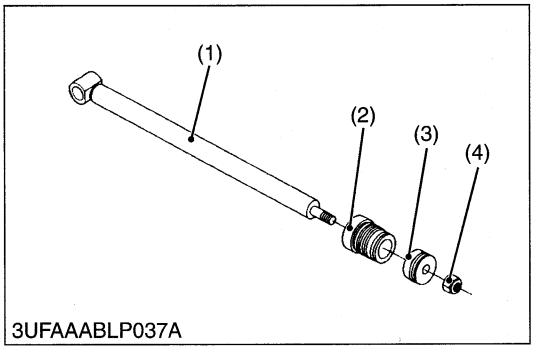

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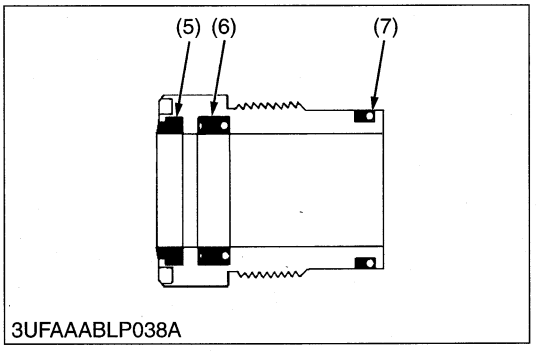

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Cylinder Head, Piston and Nut

1. Secure the rod end in a vise.
2. Unscrew the nut (4), and remove the piston (3) and cylinder head (2) from the piston rod (1).

(When reassembling)

- Visually inspect all parts for signs of scoring or damage.
- Insert the piston rod to the cylinder head, taking care not to damage the dust seal (5) and U-packing (6).

Tightening torque	Swing cylinder head	353 to 431 N·m 36.0 to 44.0 kgf·m 261 to 318 lbf·ft
	Swing cylinder piston nut	309 to 377 N·m 31.5 to 38.5 kgf·m 228 to 278 lbf·ft
	Boom cylinder head	486 to 593 N·m 49.5 to 60.5 kgf·m 358 to 437 lbf·ft
	Boom cylinder piston nut	353 to 431 N·m 36.0 to 44.0 kgf·m 261 to 318 lbf·ft
	Dipperstick cylinder head	486 to 593 N·m 49.5 to 60.5 kgf·m 358 to 437 lbf·ft
	Dipperstick cylinder piston nut	353 to 431 N·m 36.0 to 44.0 kgf·m 261 to 318 lbf·ft
	Bucket cylinder head	371 to 453 N·m 37.8 to 46.2 kgf·m 274 to 334 lbf·ft
	Bucket cylinder piston nut	353 to 431 N·m 36.0 to 44.0 kgf·m 261 to 318 lbf·ft
	Stabilizer cylinder head	486 to 593 N·m 49.5 to 60.5 kgf·m 358 to 437 lbf·ft
	Stabilizer cylinder piston nut	309 to 377 N·m 31.5 to 38.5 kgf·m 228 to 278 lbf·ft

(1) Piston Rod
(2) Cylinder Head
(3) Piston
(4) Nut
(5) Dust Seal
(6) U-packing
(7) O-ring

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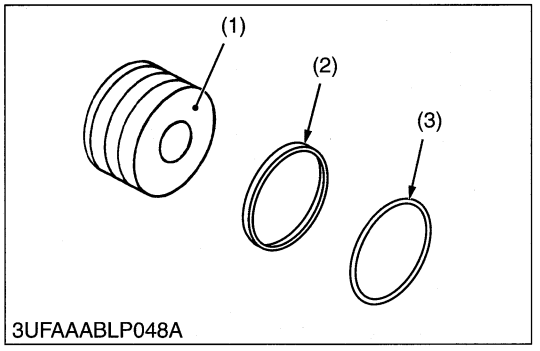

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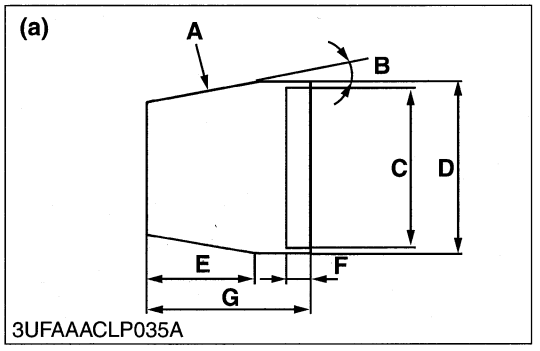

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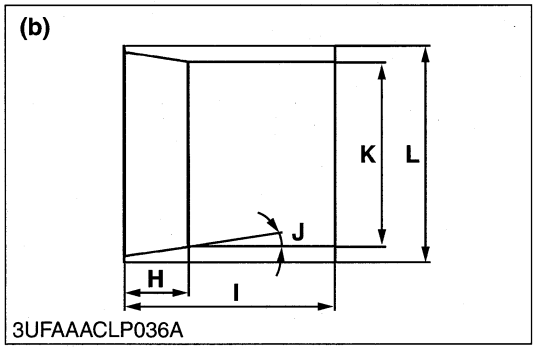

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Piston Seal and O-ring

1. Remove the piston seal (2) and O-ring (3) from the piston (1).

■ **IMPORTANT**

- **When installing the O-ring (3) and piston seal (2) to the piston (1), use the slide jig and correcting jig as shown in the figure.**

	Stabilizer Cylinder	Boom Cylinder, Dipperstick Cylinder	Swing Cylinder	Bucket Cylinder
A	80 µm 0.0031 in.	80 µm 0.0031 in.	80 µm 0.0031 in.	80 µm 0.0031 in.
B	0.157 rad 9 °	0.157 rad 9 °	0.157 rad 9 °	0.157 rad 9 °
C	65.18 mm 2.566 in.	70.18 mm 2.763 in.	50.18 mm 1.976 in.	55.18 mm 2.172 in.
D	66.18 mm 2.606 in.	71.18 mm 2.802 in.	51.18 mm 2.015 in.	56.18 mm 2.212 in.
E	42 mm 1.65 in.	42 mm 1.65 in.	42 mm 1.65 in.	42 mm 1.65 in.
F	10 mm 0.4 in.	10 mm 0.4 in.	10 mm 0.4 in.	10 mm 0.4 in.
G	58.5 mm 2.30 in.	58.5 mm 2.30 in.	58.5 mm 2.30 in.	58.5 mm 2.30 in.
H	14 mm 0.55 in.	14 mm 0.55 in.	14 mm 0.55 in.	14 mm 0.55 in.
I	35 mm 1.38 in.	35 mm 1.38 in.	35 mm 1.38 in.	35 mm 1.38 in.
J	0.122 rad 7 °	0.122 rad 7 °	0.122 rad 7 °	0.122 rad 7 °
K	65.20 mm 2.567 in.	70.20 mm 2.760 in.	50.20 mm 1.976 in.	55.20 mm 2.173 in.
L	73.9 mm 2.909 in.	78.9 mm 3.110 in.	58.9 mm 2.319 in.	63.9 mm 2.516 in.

(1) Piston
(2) Piston Seal
(3) O-ring
(a) Slide Jig
(b) Correcting Jig

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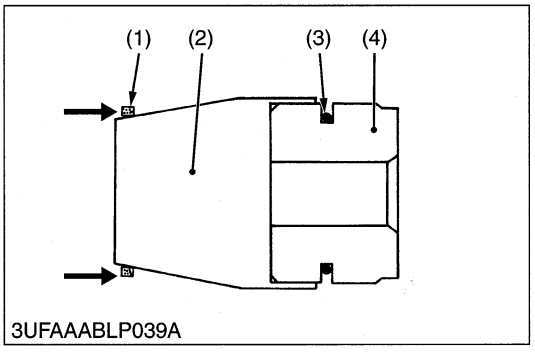

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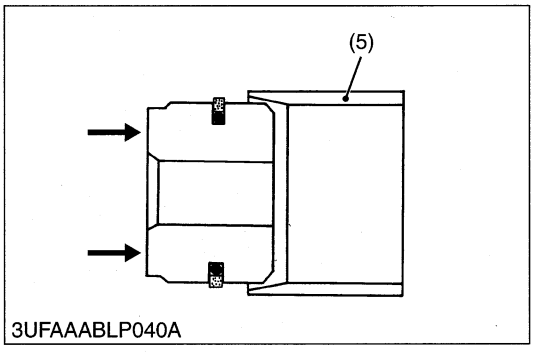

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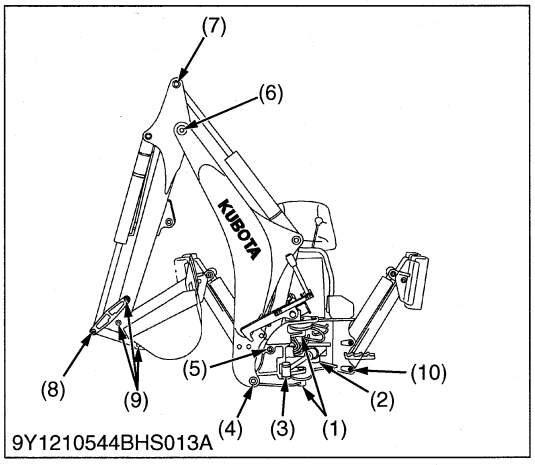

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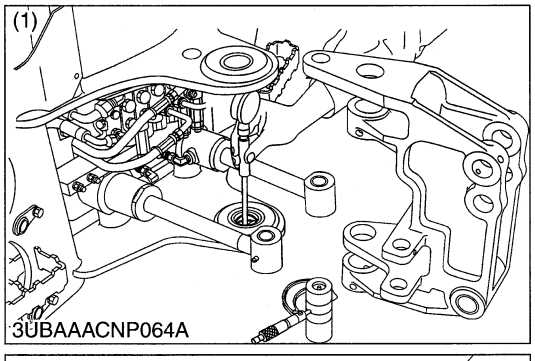

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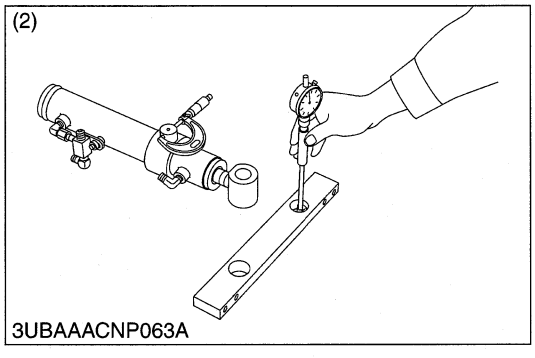

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Installing O-ring and Piston Seal

1. Place the slide jig (2) on the piston (4).
2. Install the O-ring (3) on the piston using the slide jig.
3. Install the piston seal (1) over the O-ring using the slide jig.
4. Compress the piston seal to the correct size by installing the piston into the correcting jig (5).

■ **NOTE**

- **Do not turn (roll) the piston seal when you install it.**

(1) Piston Seal
(2) Slide Jig
(3) O-ring
(4) Piston
(5) Correcting Jig

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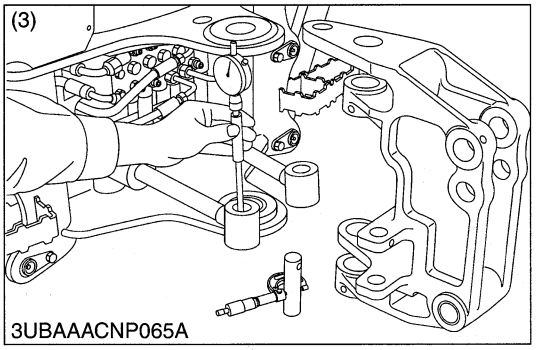
Clearance between Pin and Bush

1. Measure the pins O.D. with an outside micrometer.
2. Measure the bushes I.D. with a cylinder gauge.
3. If the clearance exceeds the allowable limit, replace pin or bush.

(To be continued)

(Continued)

(3)



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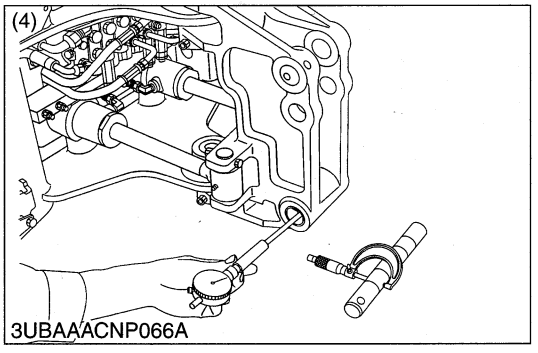
(4)



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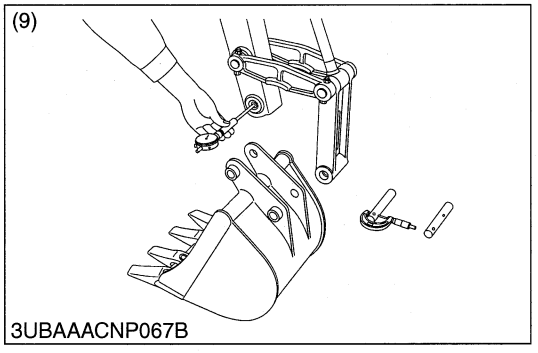

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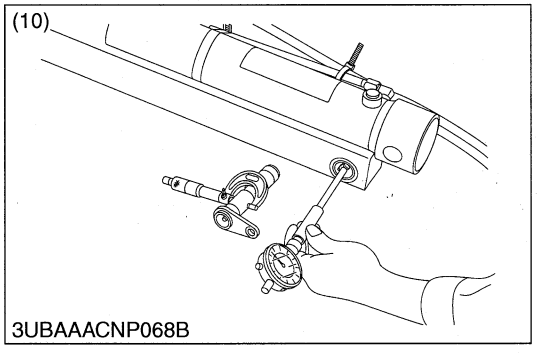

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	Clearance	Factory specification	Allowable limit
(1)	Swing frame fulcrum pin and bush	0.200 to 0.269 mm 0.00788 to 0.0105 in.	1.0 mm 0.039 in.
(2)	Swing cylinder trunnion boss and support bush	0.100 to 0.225 mm 0.00394 to 0.00885 in.	1.0 mm 0.039 in.
(3)	Swing cylinder rod pin and bush	0.128 to 0.259 mm 0.00504 to 0.0101 in.	1.0 mm 0.039 in.
(4)	Boom support pin and bush	0.100 to 0.180 mm 0.00394 to 0.00708 in.	1.0 mm 0.039 in.
(5)	Boom cylinder rod pin and bush	0.139 to 0.281 mm 0.00548 to 0.0110 in.	1.0 mm 0.039 in.
(6)	Dipperstick fulcrum pin and bush	0.100 to 0.180 mm 0.00394 to 0.00708 in.	1.0 mm 0.039 in.
(7)	Dipperstick cylinder rod pin and bush	0.178 to 0.309 mm 0.00701 to 0.0121 in.	1.0 mm 0.039 in.
(8)	Bucket cylinder rod pin and bush	0.100 to 0.180 mm 0.00394 to 0.00708 in.	1.0 mm 0.039 in.
(9)	Bucket link pin and bush	0.100 to 0.180 mm 0.00394 to 0.00708 in.	1.5 mm 0.059 in.
(10)	Stabilizer arm fulcrum pin and bush	0.020 to 0.10 mm 0.00079 to 0.0039 in.	1.0 mm 0.039 in.

Swing frame fulcrum pin O.D.	Factory specification	39.970 to 40.000 mm 1.5737 to 1.5748 in.
Swing cylinder trunnion boss O.D.		29.950 to 29.975 mm 1.1792 to 1.1801 in.
Swing cylinder rod pin O.D.		24.95 to 24.98 mm 0.9823 to 0.9834 in.
Boom support and dipperstick fulcrum pin O.D.		29.82 to 29.85 mm 1.174 to 1.175 in.
Boom cylinder rod pin O.D.		29.97 to 30.00 mm 1.180 to 1.181 in.
Dipperstick cylinder rod pin O.D.		24.90 to 24.93 mm 0.9804 to 0.9814 in.
Bucket guide link, bucket link and bucket cylinder rod pin O.D.		24.82 to 24.85 mm 0.9772 to 0.9783 in.
Stabilizer pad, stabilizer arm, stabilizer cylinder rod and bottom pin O.D.		24.90 to 24.93 mm 0.9804 to 0.9814 in.
Swing frame bush I.D.		40.20 to 40.24 mm 1.5827 to 1.5841 in.
Swing cylinder support bush I.D.		30.075 to 30.415 mm 1.1841 to 1.1974 in.
Swing cylinder rod bush and dipperstick cylinder rod bush I.D.		25.108 to 25.209 mm 0.9885 to 0.9925 in.
Boom support bush and dipperstick fulcrum bush I.D.		29.95 to 30.00 mm 1.180 to 1.181 in.
Boom cylinder rod bush I.D.		30.139 to 30.251 mm 1.1866 to 1.1909 in.
Bucket link bush, bucket cylinder rod bush and stabilizer arm fulcrum bush I.D.		24.95 to 25.00 mm 0.9823 to 0.9842 in.

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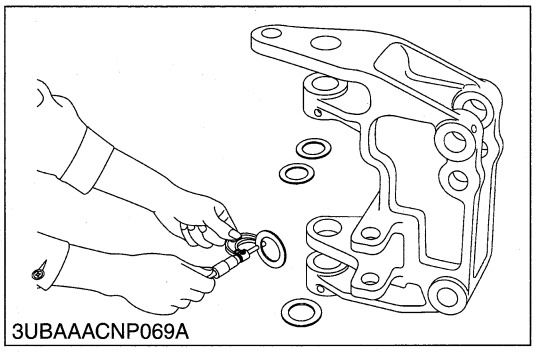
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Thrust Washer Wear

1. Measure the thickness of thrust washer with an outside micrometer.
2. If the wear exceeds the allowable limit, replace it.

■ **NOTE**

- **Visually inspect the thrust washer for signs of scoring or damage not only on the thrust washer but also on the main frame and swing frame contact surface.**

Thrust washer thickness	Factory specification	2.45 to 2.82 mm 0.0965 to 0.111 in.
	Allowable limit	1.8 mm 0.071 in.

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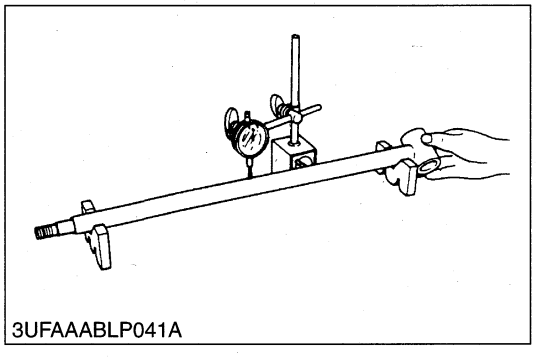
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Piston Rod Bend

1. Place piston rod on V blocks.
2. Set a dial indicator on the center of the rod.
3. Turn the piston rod and read the dial indicator.
4. If the measurement exceeds the allowable limit, replace it.

Piston rod bend	Allowable limit	0.25 mm 0.0098 in.

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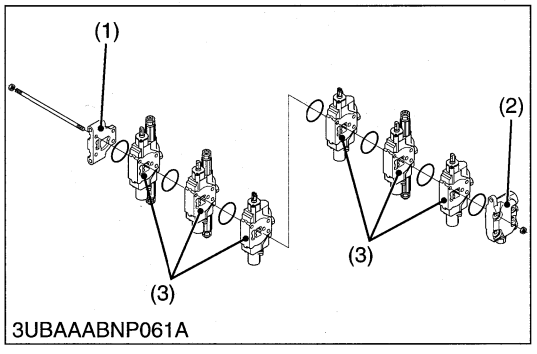
[2] DISASSEMBLING AND ASSEMBLING

(1) Control Valve



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Separation of Section

1. Unscrew the nuts, and separate each section.

(When reassembling)

- Take care not to damage the O-ring.

Tightening torque	Control valve mounting nut	16.7 to 17.6 N·m 1.70 to 1.80 kgf·m 12.3 to 13.0 lbf·ft

(1) Outlet Section
(2) Inlet Section
(3) Control Valve Section

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