WSM

WORKSHOP MANUAL
FRONT LOADER

LA181·LA211

Kubota

TO THE READER

This Workshop Manual has been prepared to provide servicing personnel with information on the mechanism, service and maintenance of KUBOTA Front Loader LA181 and LA211. It is divided into two parts, “Mechanism” and “Servicing”.

■ **Mechanism**

Information on the construction and function are include. This part should be understood before proceeding with troubleshooting, disassembling and servicing.

■ **Servicing**

Under the heading “General” section comes general precautions, check and maintenance and special tools. Other section, there are troubleshooting, servicing specification lists, checking and adjusting, disassembling and assembling, and servicing which cover procedures, precautions, factory specifications and allowable limits.

All information, illustrations and specifications contained in this manual are based on the latest production information available at the time of publication.

The right is reserved to make changes in all information at any time without notice.

November 2002

SAFETY FIRST

This symbol, the industry's "Safety Alert Symbol", is used throughout this manual and on labels on the machine itself to warn of the possibility of personal injury. Read these instructions carefully.

It is essential that you read the instructions and safety regulations before you attempt to repair or use this unit.

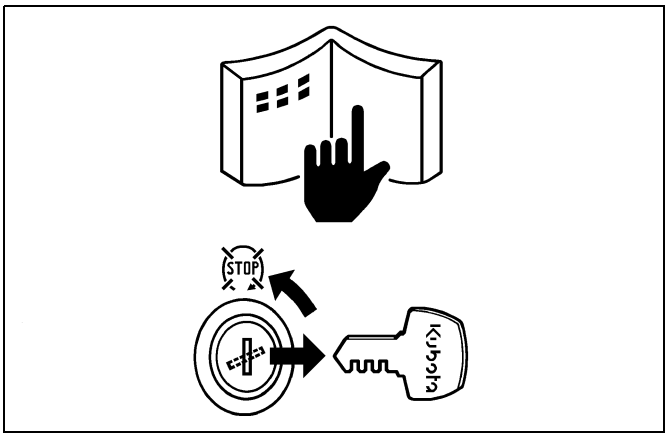
DANGER : Indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.

WARNING : Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.

CAUTION : Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury.

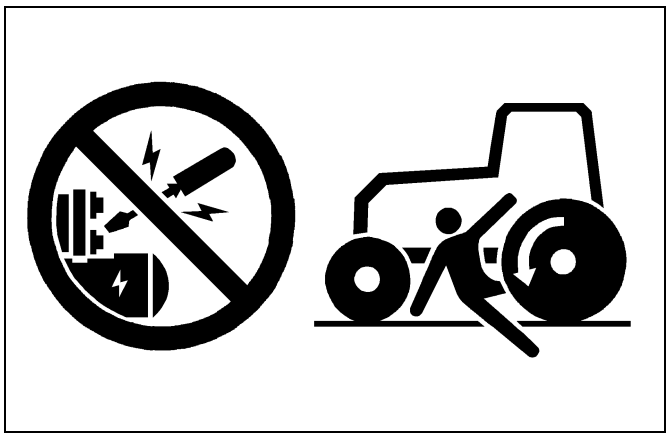
■ IMPORTANT : Indicates that equipment or property damage could result if instructions are not followed.

■ NOTE : Gives helpful information.



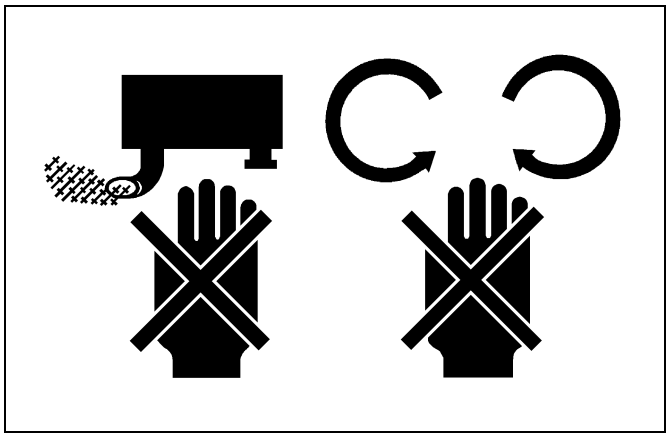
BEFORE SERVICING AND REPAIRING

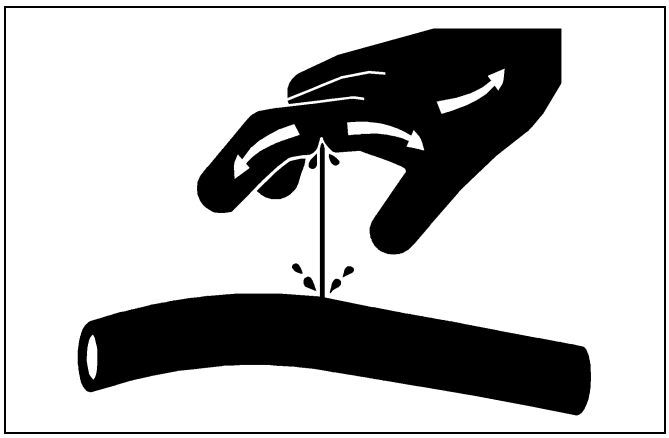
- Read all instructions and safety instructions in this manual and on your machine safety decals.
- Clean the work area and machine.
- Park the machine on a firm and level ground, and set the parking brake.
- Lower the implement to the ground.
- Stop the engine, and remove the key.
- Disconnect the battery negative cable.
- Hang a "**DO NOT OPERATE**" tag in operator station.



SAFETY STARTING

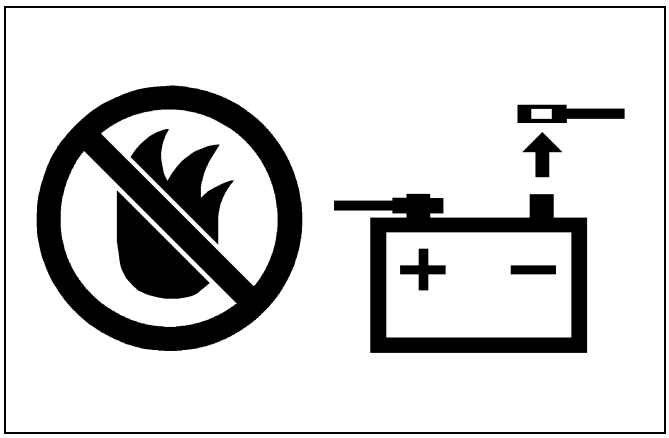
- Do not start the engine by shorting across starter terminals or bypassing the safety start switch.
- Do not alter or remove any part of machine safety system.
- Before starting the engine, make sure that all shift levers are in neutral positions or in disengaged positions.
- Never start the engine while standing on ground. Start the engine only from operator's seat.





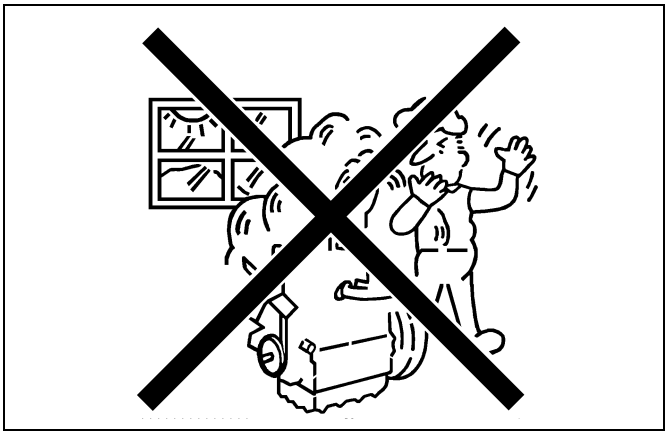
SAFETY WORKING

- Do not work on the machine while under the influence of alcohol, medication, or other substances or while fatigued.
- Wear close fitting clothing and safety equipment appropriate to the job.
- Use tools appropriate to the work. Makeshift tools, parts, and procedures are not recommended.
- When servicing is performed together by two or more persons, take care to perform all work safely.
- Do not work under the machine that is supported solely by a jack. Always support the machine by safety stands.
- Do not touch the rotating or hot parts while the engine is running.
- Never remove the radiator cap while the engine is running, or immediately after stopping. Otherwise, hot water will spout out from radiator. Only remove radiator cap when cool enough to touch with bare hands. Slowly loosen the cap to first stop to relieve pressure before removing completely.
- Escaping fluid (fuel or hydraulic oil) under pressure can penetrate the skin causing serious injury. Relieve pressure before disconnecting hydraulic or fuel lines. Tighten all connections before applying pressure.



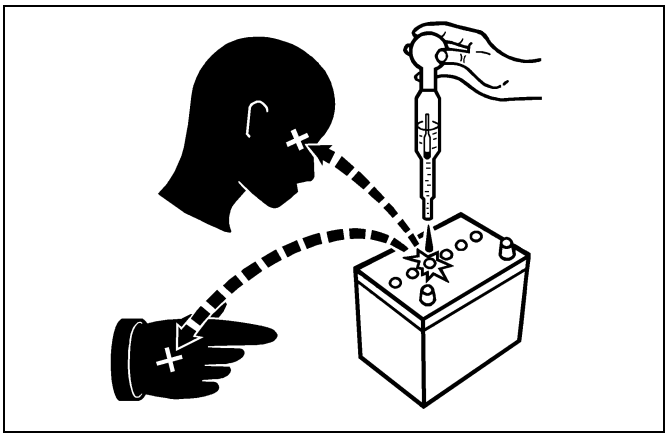
AVOID FIRES

- Fuel is extremely flammable and explosive under certain conditions. Do not smoke or allow flames or sparks in your working area.
- To avoid sparks from an accidental short circuit, always disconnect the battery negative cable first and connect it last.
- Battery gas can explode. Keep sparks and open flame away from the top of battery, especially when charging the battery.
- Mark sure that no fuel has been spilled on the engine.



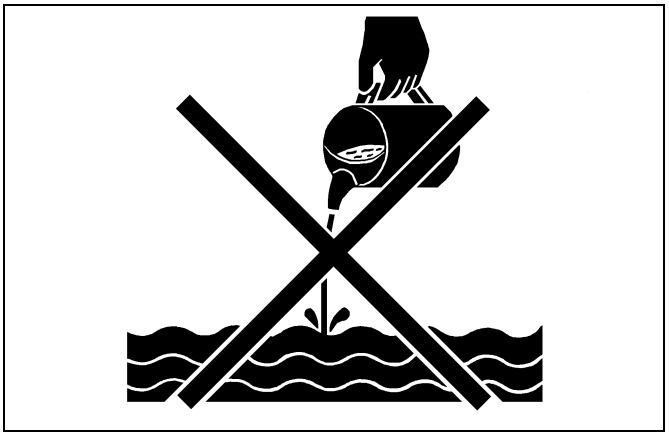
VENTILATE WORK AREA

- If the engine must be running to do some work, make sure the area is well ventilated. Never run the engine in a closed area. The exhaust gas contains poisonous carbon monoxide.



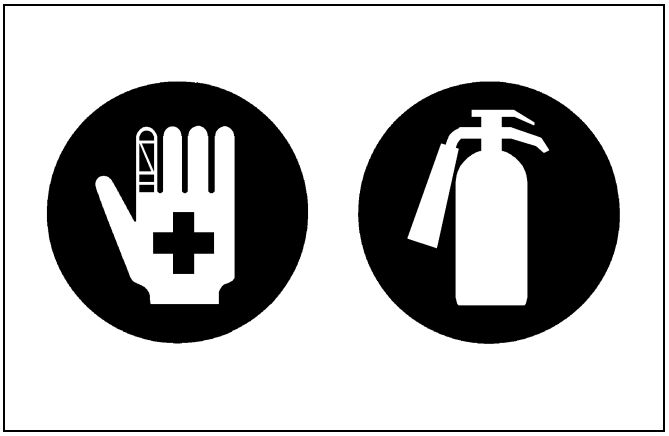
PREVENT ACID BURNS

- Sulfuric acid in battery electrolyte is poisonous. It is strong enough to burn skin, clothing and cause blindness if splashed into eyes. Keep electrolyte away from eyes, hands and clothing. If you spill electrolyte on yourself, flush with water, and get medical attention immediately.



DISPOSE OF FLUIDS PROPERLY

- Do not pour fluids into the ground, down a drain, or into a stream, pond, or lake. Observe relevant environmental protection regulations when disposing of oil, fuel, coolant, electrolyte and other harmful waste.



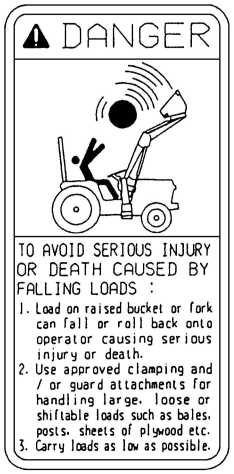
PREPARE FOR EMERGENCIES

- Keep a first aid kit and fire extinguisher handy at all times.
- Keep emergency numbers for doctors, ambulance service, hospital and fire department near your telephone.

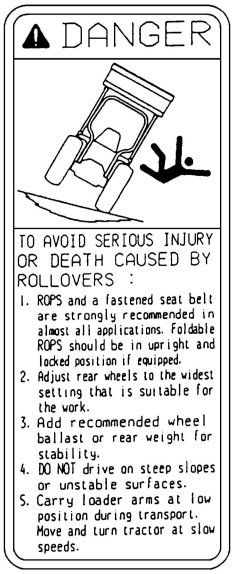
SAFETY DECALS

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.

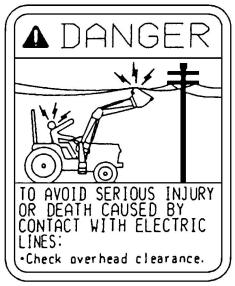
(1) Part No. 75546-56431

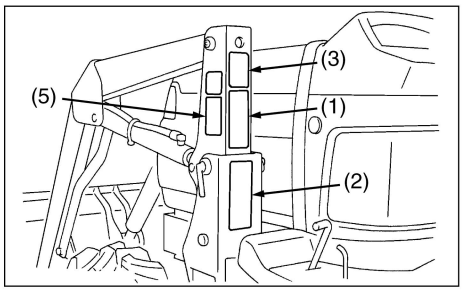


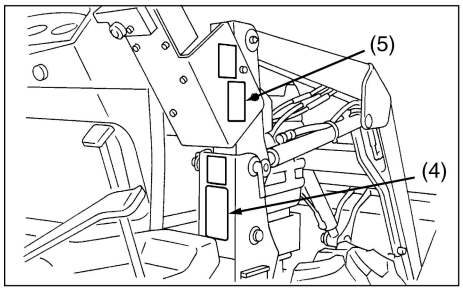
(2) Part No. 75546-56415



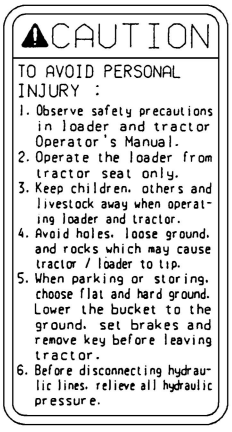
(3) Part No. 75546-56422



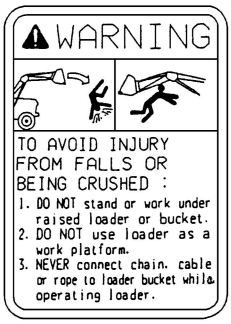




(4) Part No. 75546-56451



(5) Part No. 75567-56441



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 from your local KUBOTA Dealer.
4. If a component with danger, warning and caution label (s) affixed is replaced with new part, make sure new label (s) is (are) attached in the same locations (s) as the replaced component.
5. Mount new danger, warning and caution labels by applying on a clean dry surface and pressing any bubbles to outside edge.

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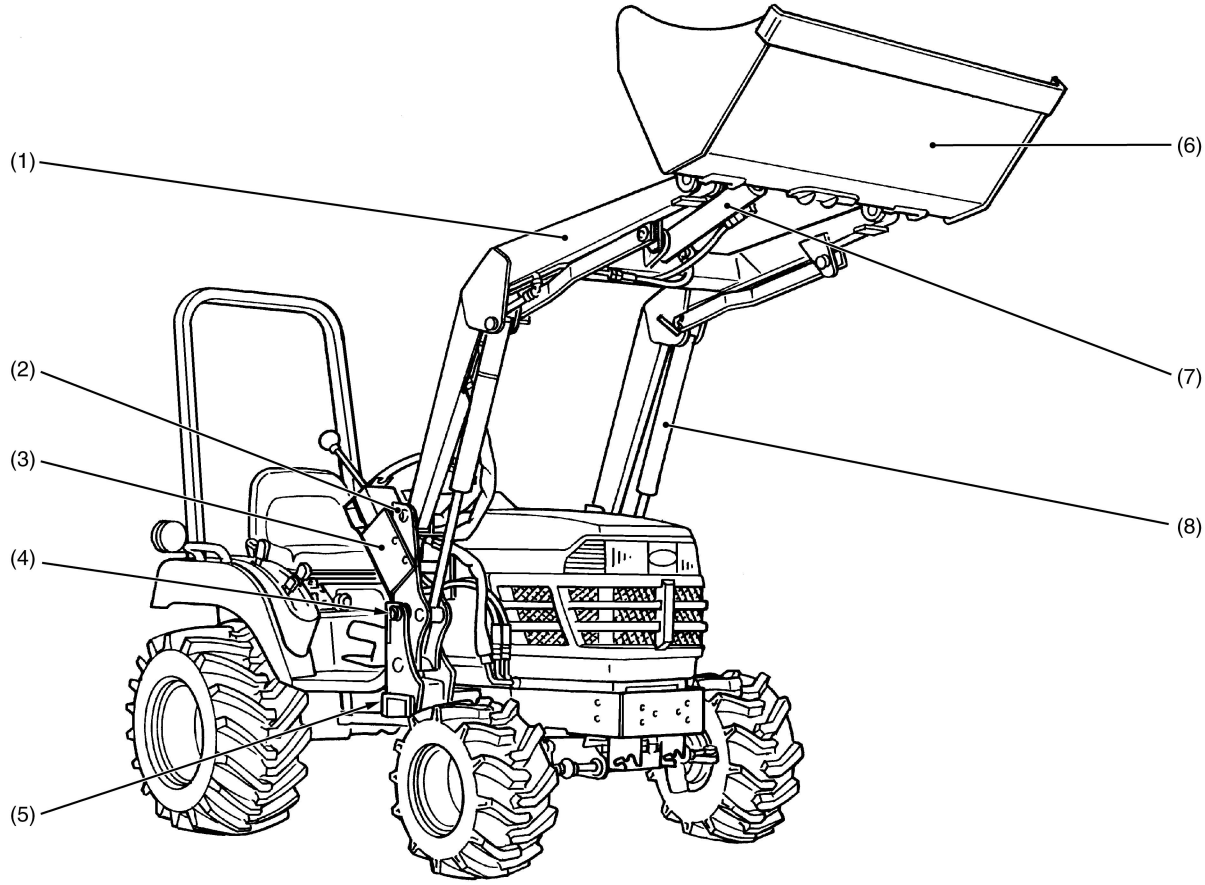
TERMINOLOGY



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(1) Boom
(2) Side Frame
(3) Hydraulic Control Valve
(4) Mounting Pin
(5) Main Frame
(6) Bucket
(7) Bucket Cylinder
(8) Boom Cylinder

SPECIFICATIONS

LOADER SPECIFICATIONS

Model		LA181	LA211
ASAE Rated Lift Capacity		180 kg (400 lbs)	210 kg (460 lbs)
ASAE Rated Brakeout Force		3430 N (770 lbs)	4200 N (950 lbs)
Boom Cylinder	Bore	35 mm (1.38 in.)	38 mm (1.50 in.)
	Stroke	340 mm (13.39 in.)	325 mm (12.77 in.)
Bucket Cylinder	Bore	55 mm (2.17 in.)	57 mm (2.25 in.)
	Stroke	200 mm (7.96 in.)	
Control Valve	3 Position Bucket Control Valve Type	One Detent Float Position, Power Beyond Circuit	
	4 Position Bucket Control Valve Type	One Detent Float Position, Two Stage Bucket Dump, Power Beyond Circuit	
Relief Valve Setting Pressure		12.3 to 12.7 MPa, 125 to 130 kgf/cm^2, 1778 to 1849 psi	
Net Weight (Approx.)		185 kg (408 lbs)	195 kg (430 lbs)

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BUCKET SPECIFICATIONS

Model		LA181	LA211
Type		Square 48	
Width		1220 mm (48.0 in.)	
Length		455 mm (17.9 in.)	495 mm (19.5 in.)
Heigh		445 mm (17.5 in.)	165 mm (18.2 in.)
Capacity	Struck	0.12 m^3 (4.2 cu.ft)	0.14 m^3 (5.0 cu.ft)
	Heaped	0.14 m^3 (4.9 cu.ft)	0.17 m^3 (6.1 cu.ft)
Weight		56 kg (123 lbs)	60 kg (132 lbs)

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OPERATING DIMENSIONS

Model / Item	LA181	LA211
	BX1500	BX1800D, BX2200D
Maximum Lifting Height (A)	1810 mm (71.3 in.)	
Clearance with Bucket Dumped (B)	1330 mm (52.4 in.)	1300 mm (51.2 in.)
Reach at Maximum Height (C)	745 mm (29.3 in.)	760 mm (29.9 in.)
Maximum Dump Angle (D)	45 deg.	
Reach with Bucket on Ground (E)	1240 mm (48.8 in)	1310 mm (51.6 in)
Bucket Roll-back Angle (F)	25 deg.	
Digging Depth (G)	75 mm (3.0 in.)	120 mm (4.7 in.)
Overall Height in Carring Position (H)	1070 mm (42.1 in)	1070 mm (42.1 in)

BX1800 and BX2200 with 18 × 18.50 – 8 Front Tires and 26 × 12.00 – 12 Rear Tires.

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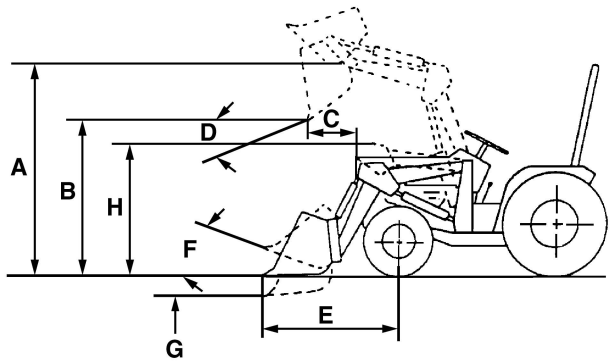

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PERFORMANCE RATINGS (NO LOAD)

Item \ Model	LA181	LA211
Raise to Full Height	2.7 sec.	2.9 sec.
Lowering Time	2.2 sec.	2.9 sec.
Attachment Roll-back Time	1.5 sec.	
Attachment Dump Time	1.3 sec.	1.4 sec.

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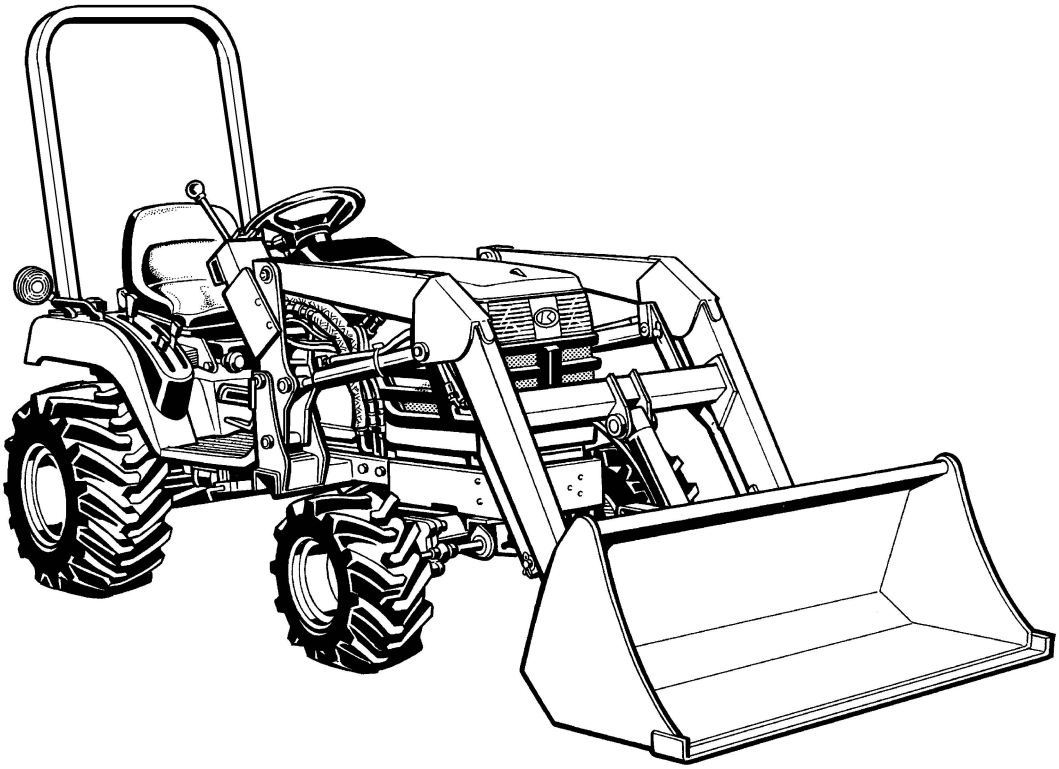
MECHANISM

CONTENTS

1. FEATURES



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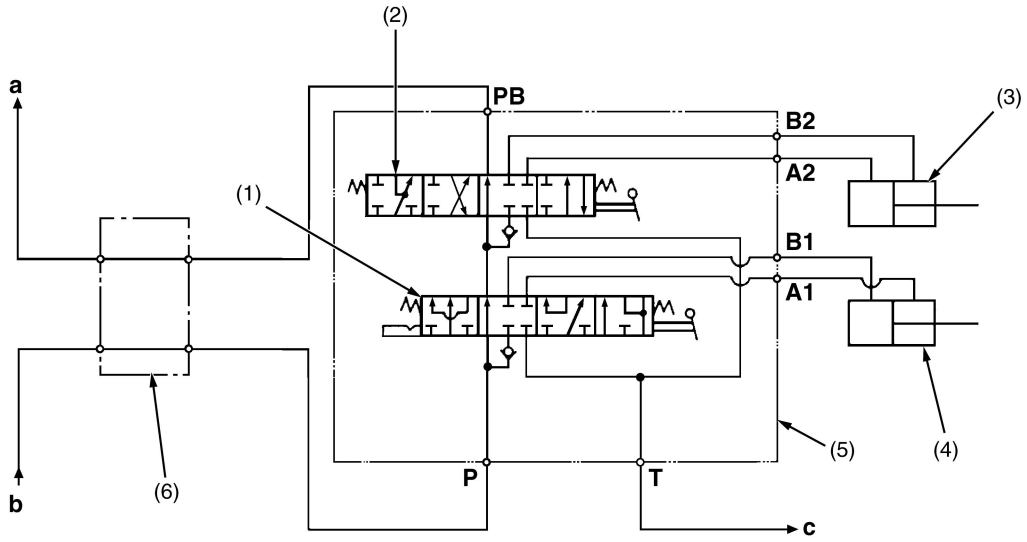
1. Huge Hoisting and Scooping Power
2. Fast Cycle Time
3. One-Lever Operation
4. Heavy-Duty Bucket
5. Long Arm Reach
6. Series Circuit Hydraulic Control Valve

2. HYDRAULIC CIRCUIT

A



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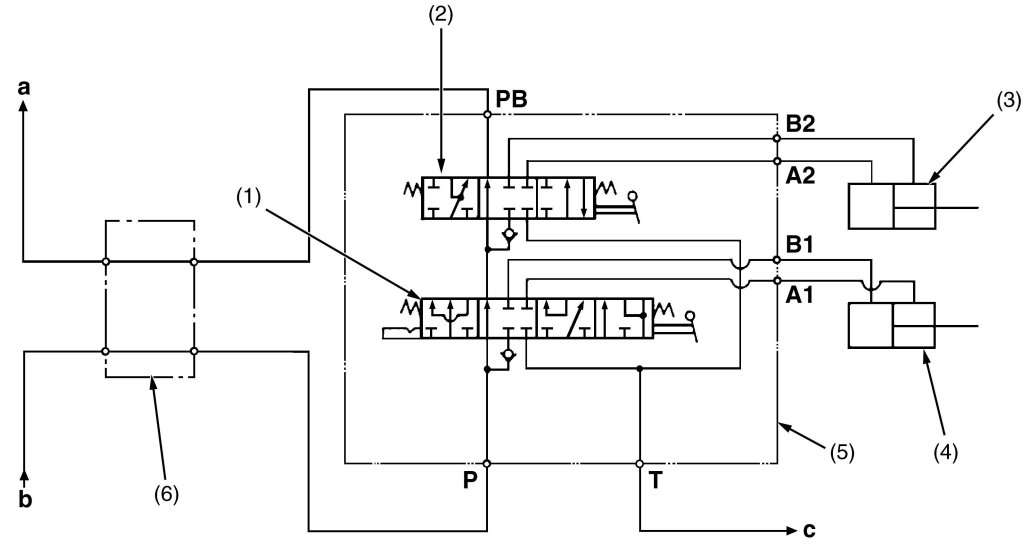
B



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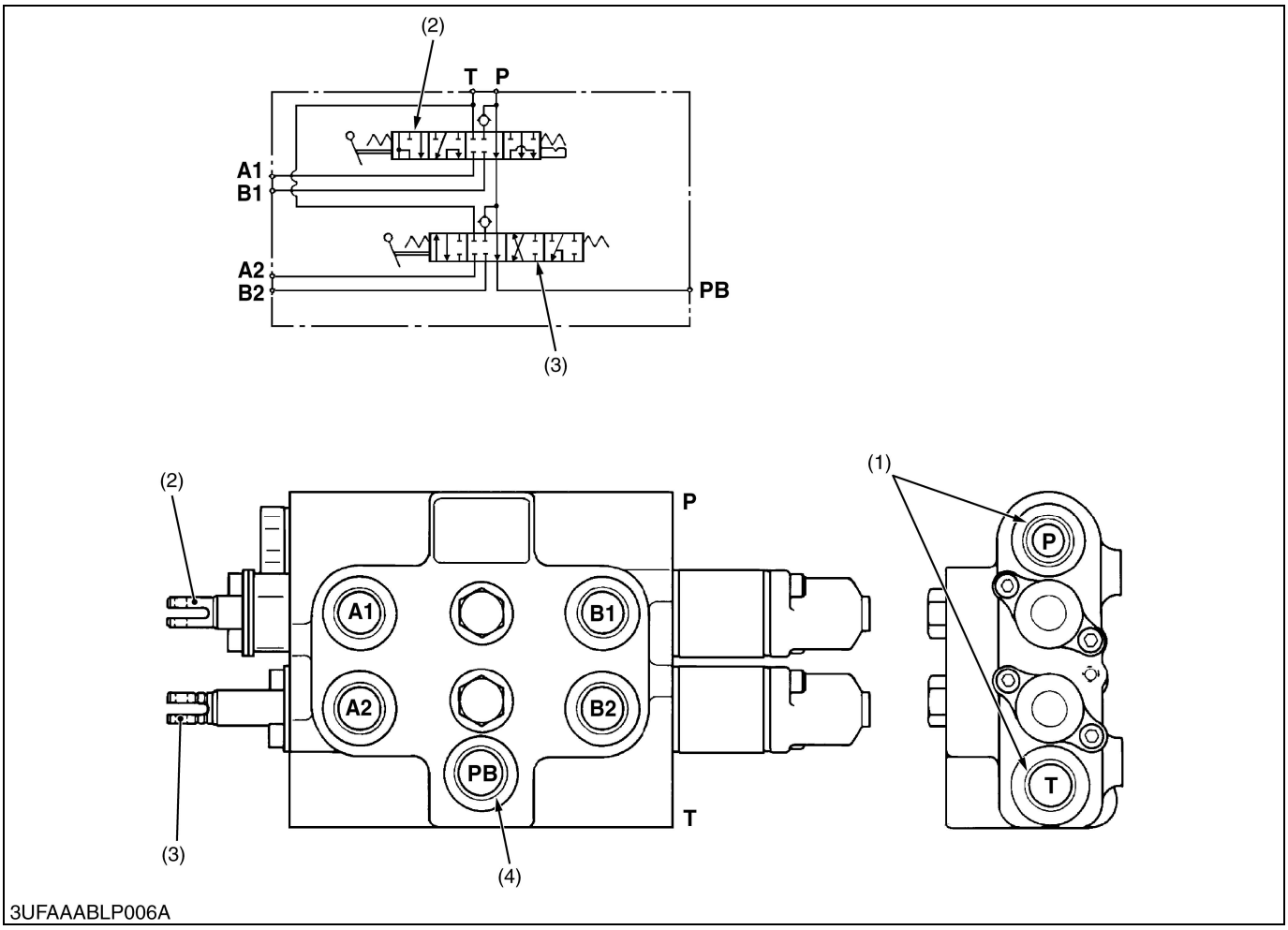
(1) Boom Control Valve
(2) Bucket Control Valve
(3) Bucket Cylinder
(4) Boom Cylinder
(5) Control Valve Assembly
(6) Hydraulic Block

A : 4 Position Bucket Control
B : 3 Position Bucket Control

a : To 3-Point Hydraulic System
b : From Hydraulic Pump
c : To Transmission Case

3. CONTROL VALVE ASSEMBLY

[1] 4 POSITION BUCKET CONTROL



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(1) Inlet and Outlet Section
(2) Boom Control Valve
(3) Bucket Control Valve
(4) Power Beyond

P : P Port **T : T Port** **A1 : A1 Port** **A2 : A2 Port** **B1 : B1 Port** **B2 : B2 Port** **PB : PB Port**

The control valve assembly is composed of one casting block and four major section as shown above.

(1) Inlet and Outlet Section

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

The **P** port is connected to the **OUTLET** port of hydraulic block by the hydraulic hose.

The **T** port is connected to the **TANK** port of hydraulic block by the hydraulic hose.

(2) Boom Control Section

The boom control valve is of 4-position, 6-connection, detent, spring center type, consisting of a mono block valve housing, spool, load check valve, etc. This valve has **A1** and **B1** ports and controls oil flow to the boom cylinder.

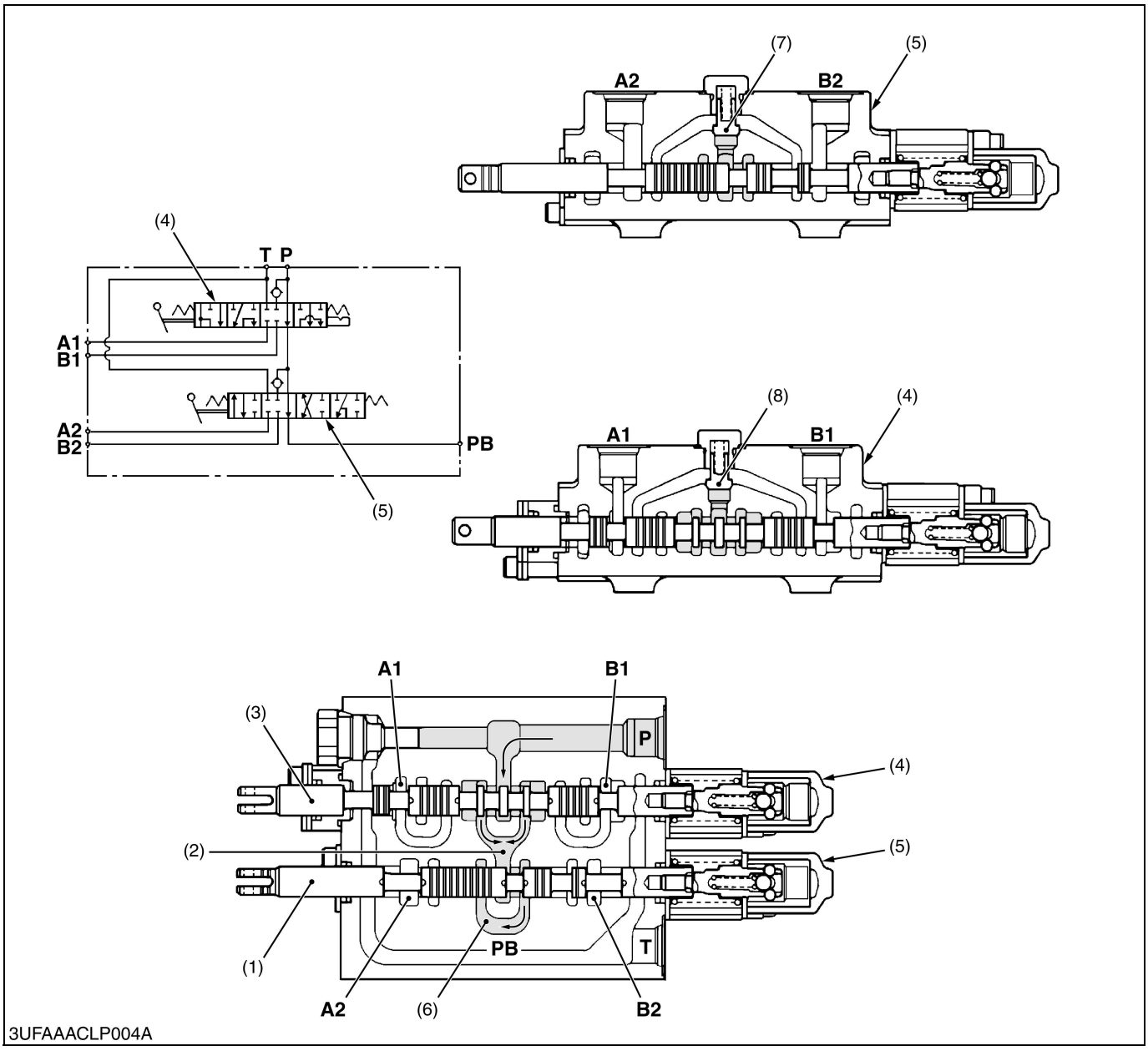
(3) Bucket Control Section

The bucket control valve is of 4-position, 6-connection, no detent, spring center type, consisting of a mono block valve housing, spool, load check valve, etc. This valve has **A2** and **B2** ports and controls oil flow to the bucket cylinder.

(4) Power Beyond

This section has **PB** port which is connected to the **INLET** port of hydraulic block by the hydraulic hose, and feeds oil to the three point hydraulic control valve.

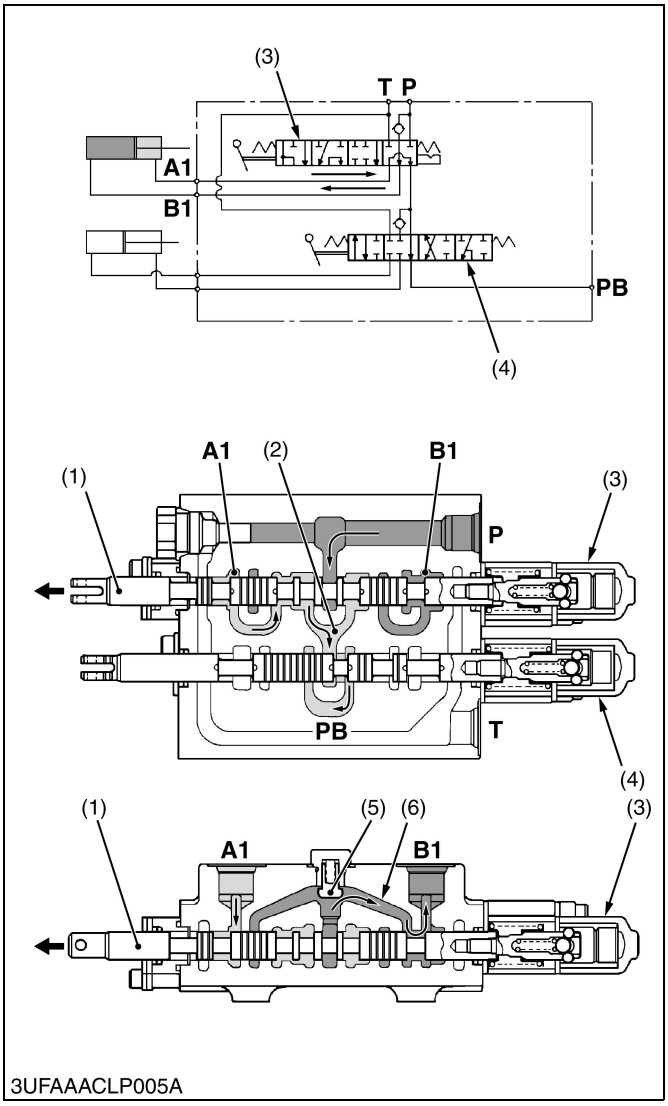
■ Neutral



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

P : P Port (From OUTLET Port of Hydraulic Block)
T : T Port (To TANK Port of Hydraulic Block)
A1 : A1 Port
A2 : A2 Port
B1 : B1 Port
B2 : B2 Port
PB : PB Port (To INLET Port of Hydraulic Block)

1. Pressure-fed oil from the hydraulic pump is delivered into **P** port.
2. As the load check valve (7), (8) are kept closed in the neutral position, oil flows along the notched section of the spools (1), (3) to the **PB** port through the **PB** passage 1 (2) and 2 (6).
3. Then the oil is fed to the three point hydraulic system from the **PB** port.



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■ Up

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

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

P : P Port
T : T Port
A1 : A1 Port (From Boom Cylinder)
B1 : B1 Port (To Boom Cylinder)
PB : PB Port

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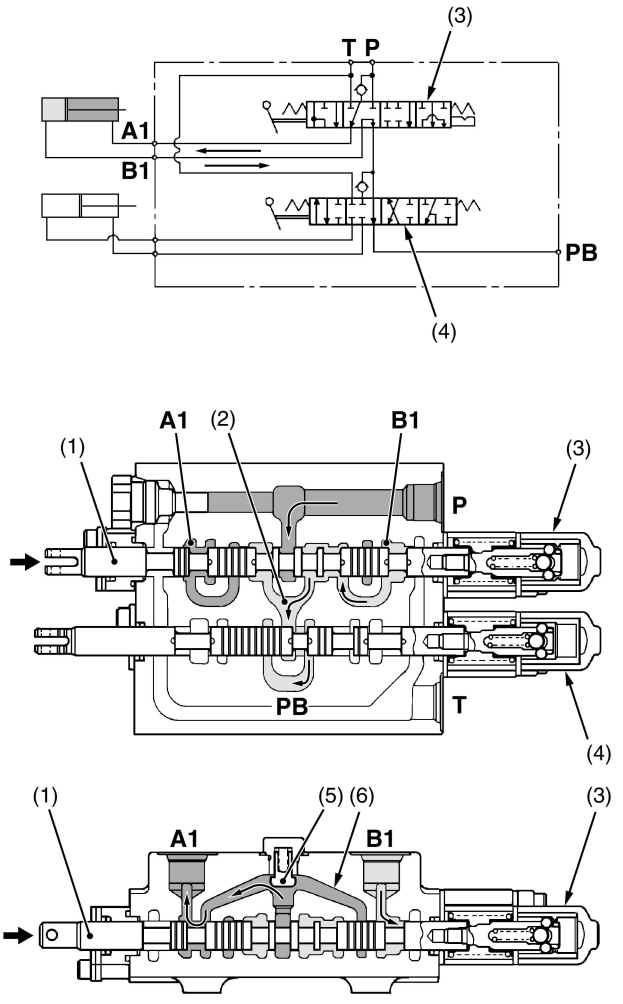

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■ Down

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

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

P : P Port
T : T Port
A1 : A1 Port (To Boom Cylinder)
B1 : B1 Port (From Boom Cylinder)
PB : PB Port

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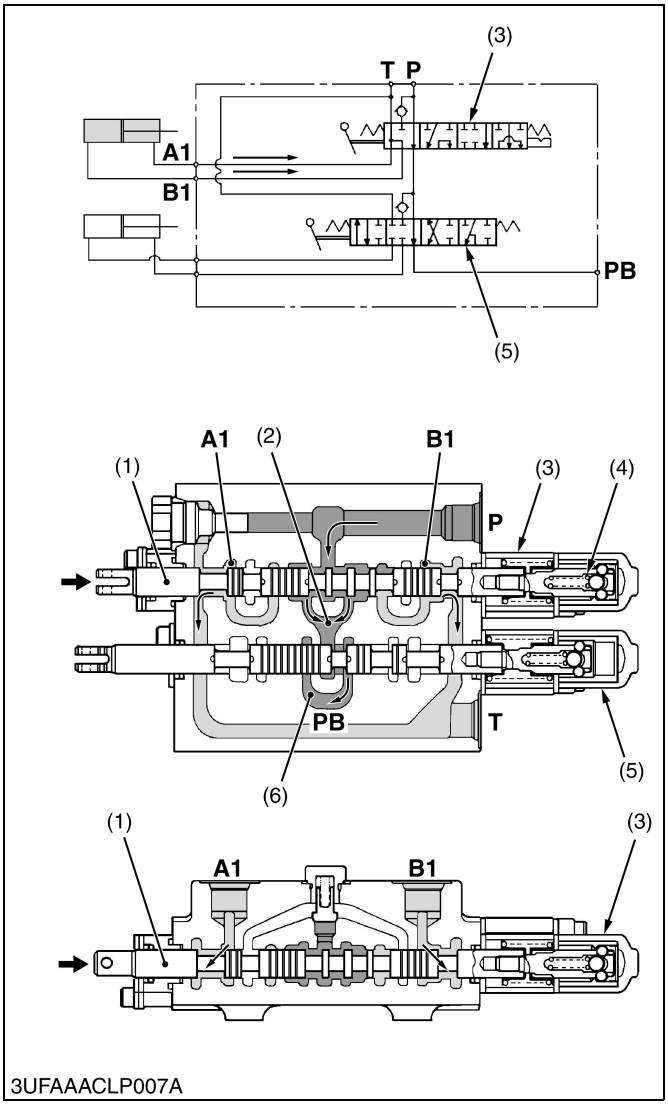

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■ Floating

1. When the hydraulic control lever is set to the **"FLOAT"** position, the spool (1) moves to the right from the **"DOWN"** position and is retained by the detent mechanism (4).
2. This forms oil passages among the **A1** port, **B1** port and **T** port. As a result, oil in the boom cylinder flows freely from the **A1** port and **B1** port through the **T** port to the transmission case.
3. Oil entering the **P** port flows to the **PB** port via the **PB** passage 1 (2) and 2 (6).
   Then the oil flows to the three point hydraulic system.

(1) Spool
(2) **PB** Passage 1
(3) Boom Control Section
(4) Detent Mechanism
(5) Bucket Control Section
(6) **PB** Passage 2

P : P Port
T : T Port
A1 : A1 Port (From Boom Cylinder)
B1 : B1 Port (To Boom Cylinder)
PB : PB Port

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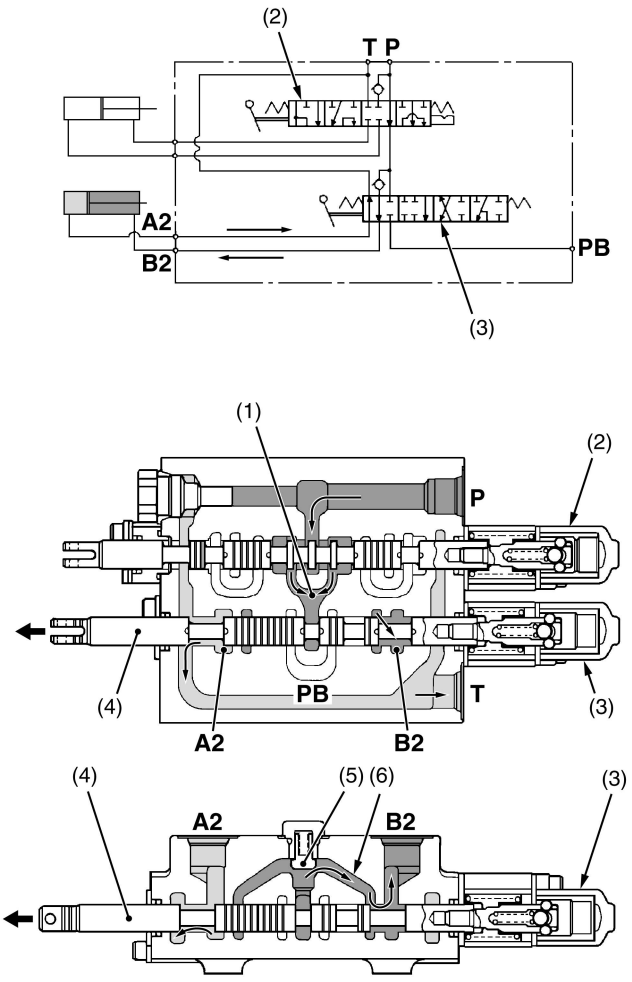

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■ Roll-back

1. When the hydraulic control lever is set to the **"ROLL-BACK"** position, the spool (4) of the bucket control section (3) moves to the left, which forms oil passages between passage 2 (6) and **B2** port, and between **A2** port and **T** port.
2. The pressure-fed oil from the **P** port flows through the boom control section (2), opens the load check valve (5), and flows through the notched section of the spool (4) and **B2** port to retract the bucket cylinder.
3. Return oil from the bucket cylinder flows to the transmission case through the **A2** port and **T** port.

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

P : P Port
T : T Port
A2 : A2 Port (From Bucket Cylinder)
B2 : B2 Port (To Bucket Cylinder)
PB : PB Port

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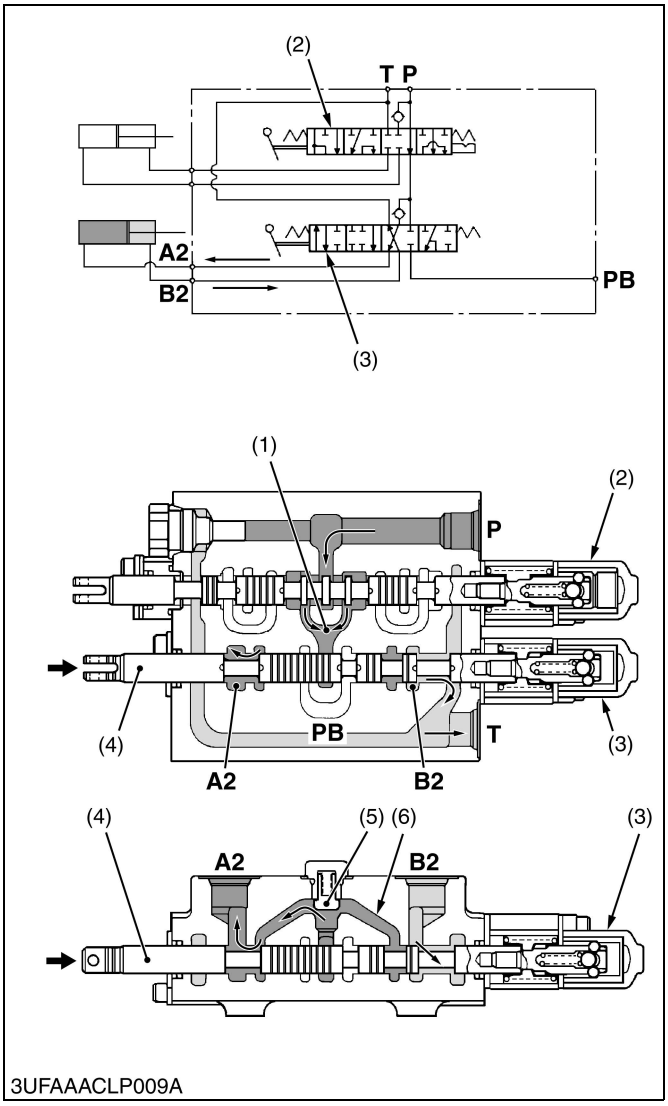

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■ Dump 1

1. When the hydraulic control lever is set to the **"DUMP 1"** position, the spool (4) of the bucket control section (3) moves to the right, which forms oil passages between passage 2 (6) and **A2** port, and between **B2** port and **T** port.
2. The pressure-fed oil from the **P** port flows through the boom control section (2), opens the load check valve (5), and flows to the bucket cylinder to extend the cylinder through the notched section of the spool (4) and **A2** port.
3. Return oil from the bucket cylinder flows to the transmission case through the **B2** port and **T** port.

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

P : P Port
T : T Port
A2 : A2 Port (To Bucket Cylinder)
B2 : B2 Port (From Bucket Cylinder)
PB : PB Port

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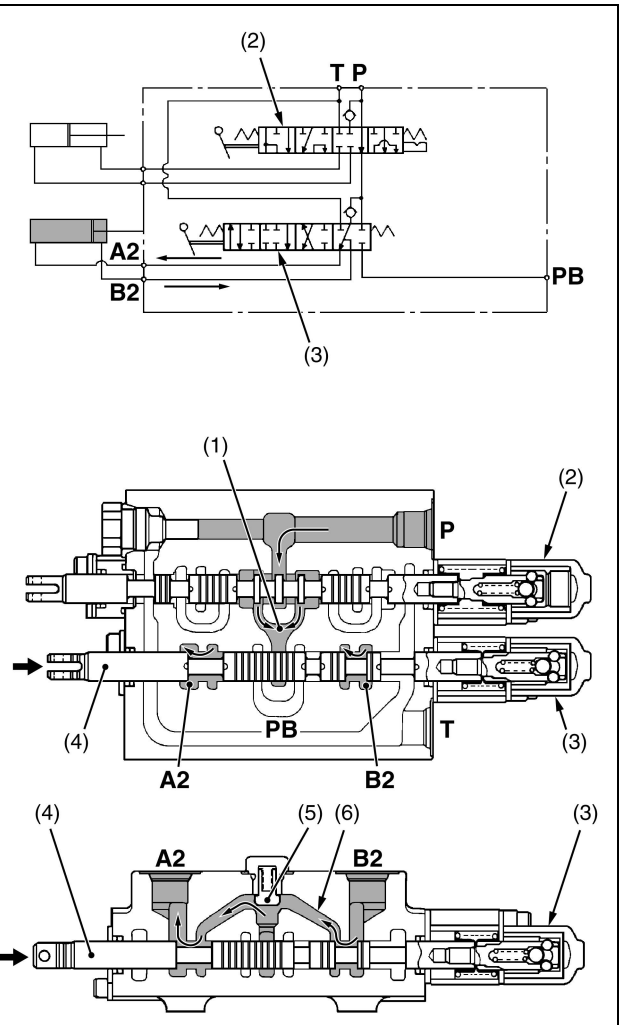

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■ Dump 2

1. When the hydraulic control lever is set to the **"DUMP 2"** position, the spool (4) of the bucket control section (3) moves to the right, which forms oil passages among passage 2 (6), **A2** port and **B2** port.
2. The pressure-fed oil from the **P** port flows through the boom control section (2), opens the load check valve (5), and flows to the bucket cylinder to extend the cylinder through the notched section of the spool (4) and **A2** port.
3. Return oil from the bucket cylinder flows from the **B2** port to the passage 2 (6), and flows together with the pressure-fed oil from the **P** port.
   As a result, the dump speed of this front loader is increased.

(Reference)

- The oil pressure of the **A2** port and **B2** port is identical, but the bucket cylinder extend by the difference of received pressure area (cylinder rod part).

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

P : P Port
T : T Port
A2 : A2 Port (To Bucket Cylinder)
B2 : B2 Port (From Bucket Cylinder)
PB : PB Port

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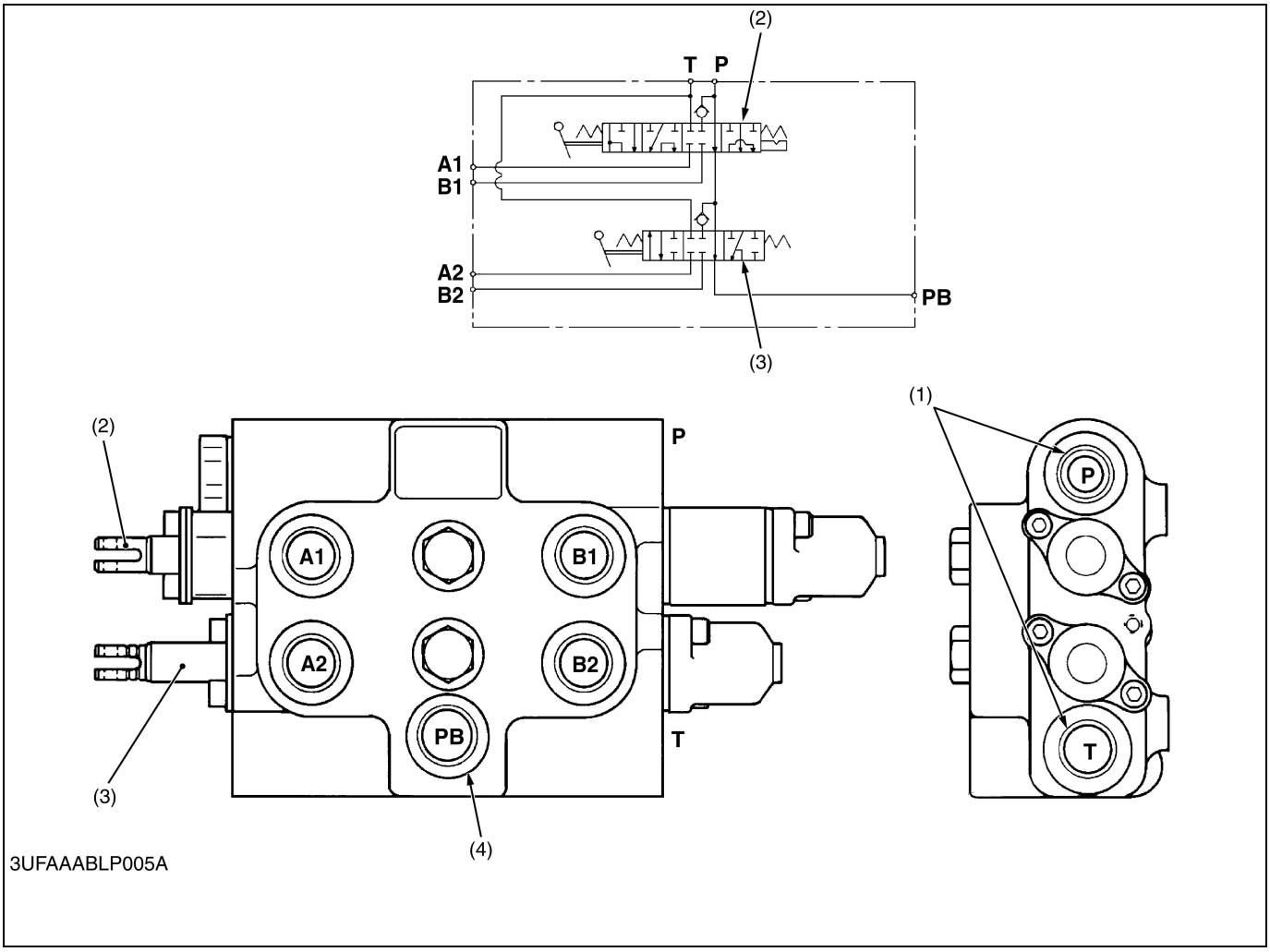
[2] 3 POSITION BUCKET CONTROL



(1) Inlet and Outlet Section
(2) Boom Control Valve
(3) Bucket Control Valve
(4) Power Beyond

P : P Port **T : T Port** **A1 : A1 Port** **A2 : A2 Port** **B1 : B1 Port** **B2 : B2 Port** **PB : PB Port**

The control valve assembly is composed of one casting block and four major section as shown above.

(1) Inlet and Outlet Section

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

The **P** port is connected to the **OUTLET** port of hydraulic block by the hydraulic hose.

The **T** port is connected to the **TANK** port of hydraulic block by the hydraulic hose.

(2) Boom Control Section

The boom control valve is of 4-position, 6-connection, detent, spring center type, consisting of a mono block valve housing, spool, load check valve, etc. This valve has **A1** and **B1** ports and controls oil flow to the boom cylinder.

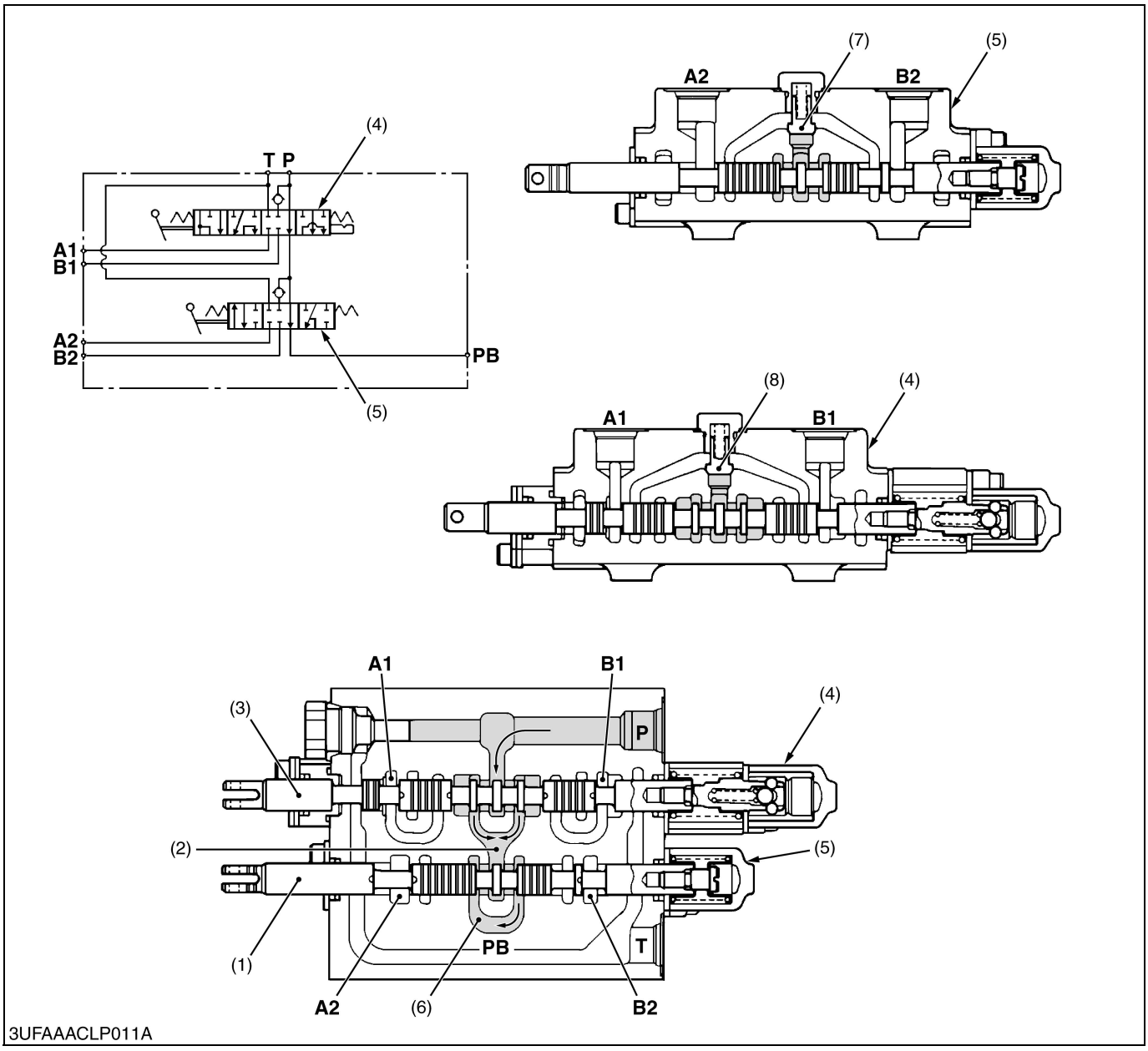
(3) Bucket Control Section

The bucket control valve is of 3-position, 6-connection, no detent, spring center type, consisting of a mono block valve housing, spool, load check valve, etc. This valve has **A2** and **B2** ports and controls oil flow to the bucket cylinder.

(4) Power Beyond

This section has **PB** port which is connected to the **INLET** port of hydraulic block by the hydraulic hose, and feeds oil to the three point hydraulic control valve.

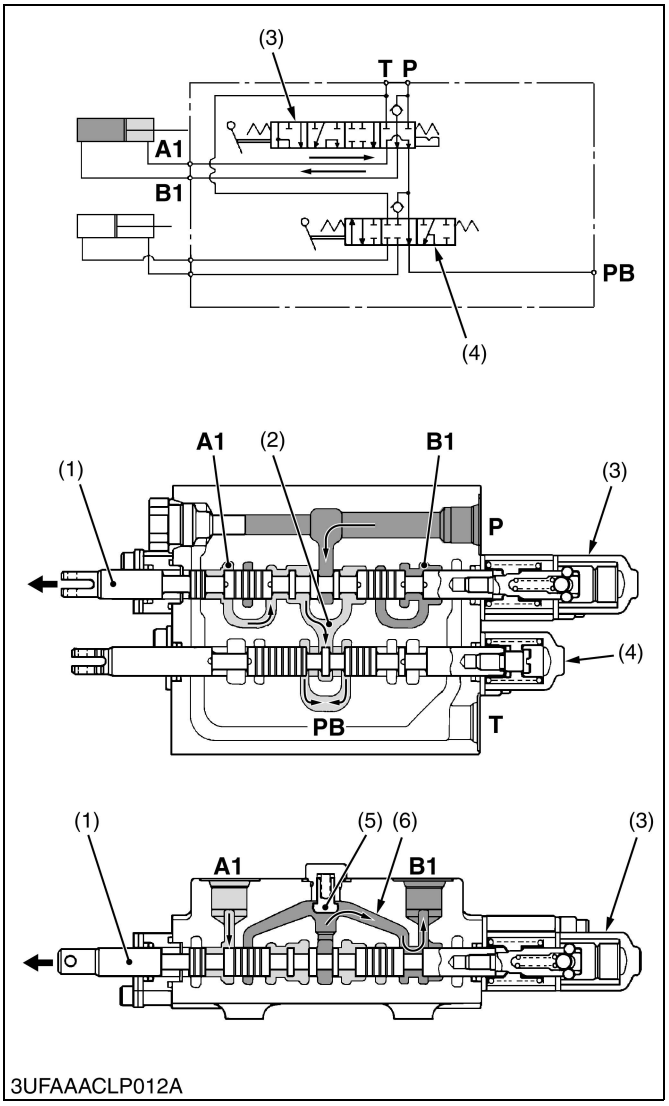
■ Neutral



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

P : P Port (From OUTLET Port of Hydraulic Block)
T : T Port (To TANK Port of Hydraulic Block)
A1 : A1 Port
A2 : A2 Port
B1 : B1 Port
B2 : B2 Port
PB : PB Port (To INLET Port of Hydraulic Block)

1. Pressure-fed oil from the hydraulic pump is delivered into **P** port.
2. As the load check valve (7), (8) are kept closed in the neutral position, oil flows along the notched section of the spools (1), (3) to the **PB** port through the **PB** passage 1 (2) and 2 (6).
3. Then the oil is fed to the three point hydraulic system from the **PB** port.



■ Up

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

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

P : P Port
T : T Port
A1 : A1 Port (From Boom Cylinder)
B1 : B1 Port (To Boom Cylinder)
PB : PB Port

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