

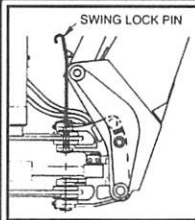
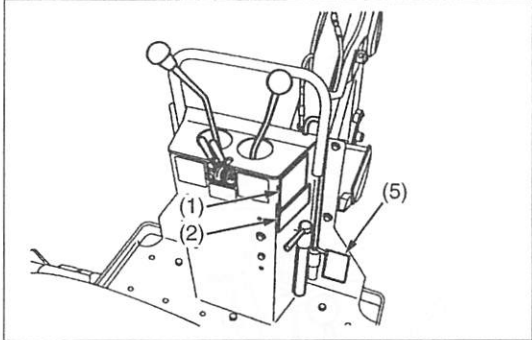

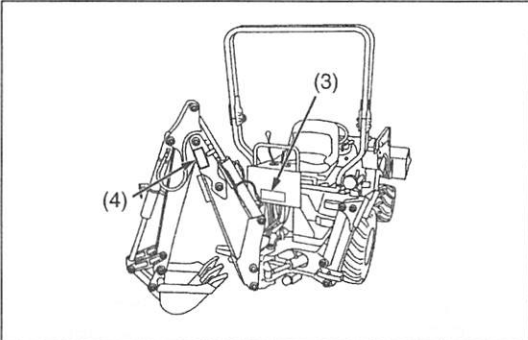
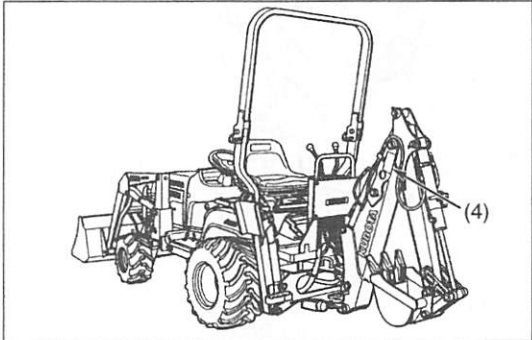


# 8 BACKHOE

# 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.

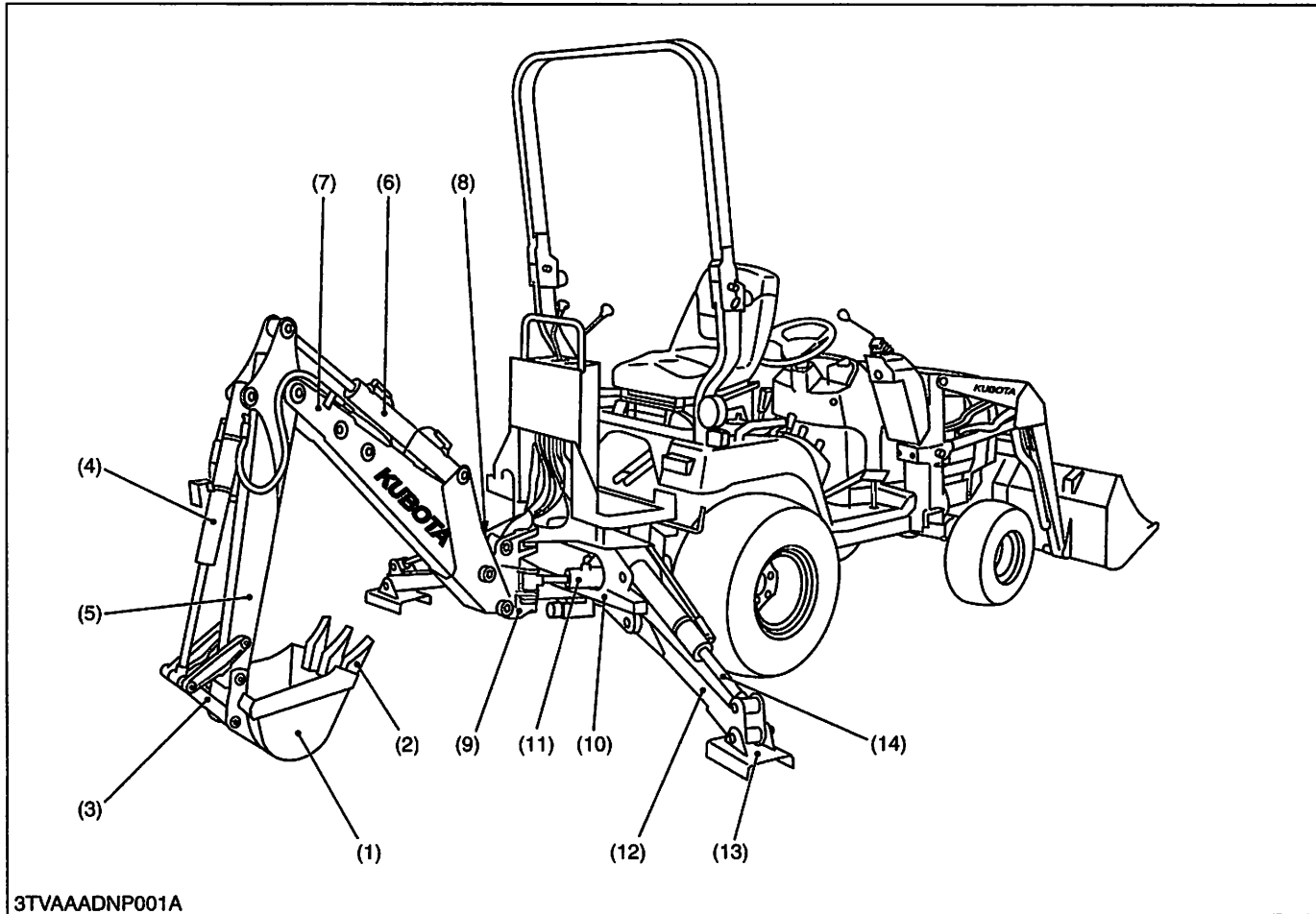
<p>(1) Part No. 75597-7528-1</p> <div style="border: 1px solid black; padding: 5px;"> <p style="text-align: center;"><b>⚠ WARNING</b></p> <p><b>TO AVOID PERSONAL INJURY: WHEN MOUNTING AND DISMOUNTING THE BACKHOE.</b></p> <ol style="list-style-type: none"> <li>1. When starting the engine, always sit in the operator's seat.</li> <li>2. 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.</li> <li>3. Keep hands, feet and body from between tractor and backhoe. Never allow any part of body under the machine.</li> </ol> </div>	<p>(4) Part No. 75595-7517-2</p> <div style="border: 1px solid black; padding: 5px;">  <div style="float: right; border-left: 1px solid black; border-right: 1px solid black; border-bottom: 1px solid black; padding: 5px;"> <p style="text-align: center;"><b>⚠ WARNING</b></p> <p><b>TO AVOID PERSONAL INJURY</b> STAY CLEAR OR OPERATING AREA OF THE BACKHOE.</p> </div> </div>	<p>(5) Part No. 75595-7524-2</p> <div style="border: 1px solid black; padding: 5px;"> <p style="text-align: center;"><b>⚠ WARNING</b></p>  <div style="border-top: 1px solid black; border-right: 1px solid black; border-left: 1px solid black; padding: 5px;"> <p><b>TO AVOID PERSONAL INJURY:</b> KEEP BOTH FEET ON FOOT PLATFORM AND AWAY FROM STABILIZER.</p> </div> </div>
<p>(2) Part No. 75595-7529-3</p> <div style="border: 1px solid black; padding: 5px;">  <div style="float: right; border-left: 1px solid black; border-right: 1px solid black; border-bottom: 1px solid black; padding: 5px;"> <p style="text-align: center;"><b>⚠ WARNING</b></p> <p><b>TO AVOID PERSONAL INJURY:</b> SET THE SWING LOCK PIN, AND LOWER THE BOOM TO THE GROUND WHEN LEAVING THE OPERATOR'S SEAT.</p> </div> </div>		
<p>(3) Part No. 75597-7517-2</p> <div style="border: 1px solid black; padding: 5px;">  <div style="float: right; border-left: 1px solid black; border-right: 1px solid black; border-bottom: 1px solid black; padding: 5px;"> <p style="text-align: center;"><b>⚠ DANGER</b></p> <p><b>TO AVOID SERIOUS CRUSHING INJURY OR DEATH:</b> MAKE SURE BOOM SWING LOCK PIN IS INSTALLED FROM OPERATOR'S SEAT BEFORE ENTERING THIS AREA.</p> </div> </div>		
		

### CARE OF DANGER, WARNING AND CAUTION LABELS

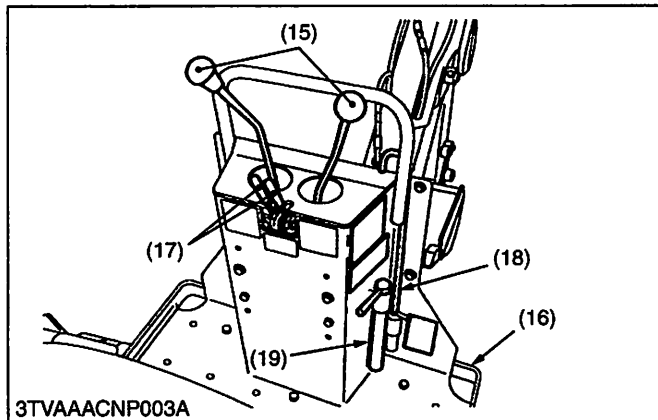
1. Keep danger, warning and caution labels clean and free from obstructing material.
2. Clean danger, warning and caution labels with soap and water, dry with a soft cloth.
3. Replace damaged or missing danger, warning and caution labels with new labels from your local KUBOTA distributor.
4. If a component with danger, warning and caution label(s) affixed is replaced with new part, make sure new label(s) is (are) attached in the same location(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.

3TVAAACNP001A

# BACKHOE TERMINONOLOGY



3TVAAADNP001A

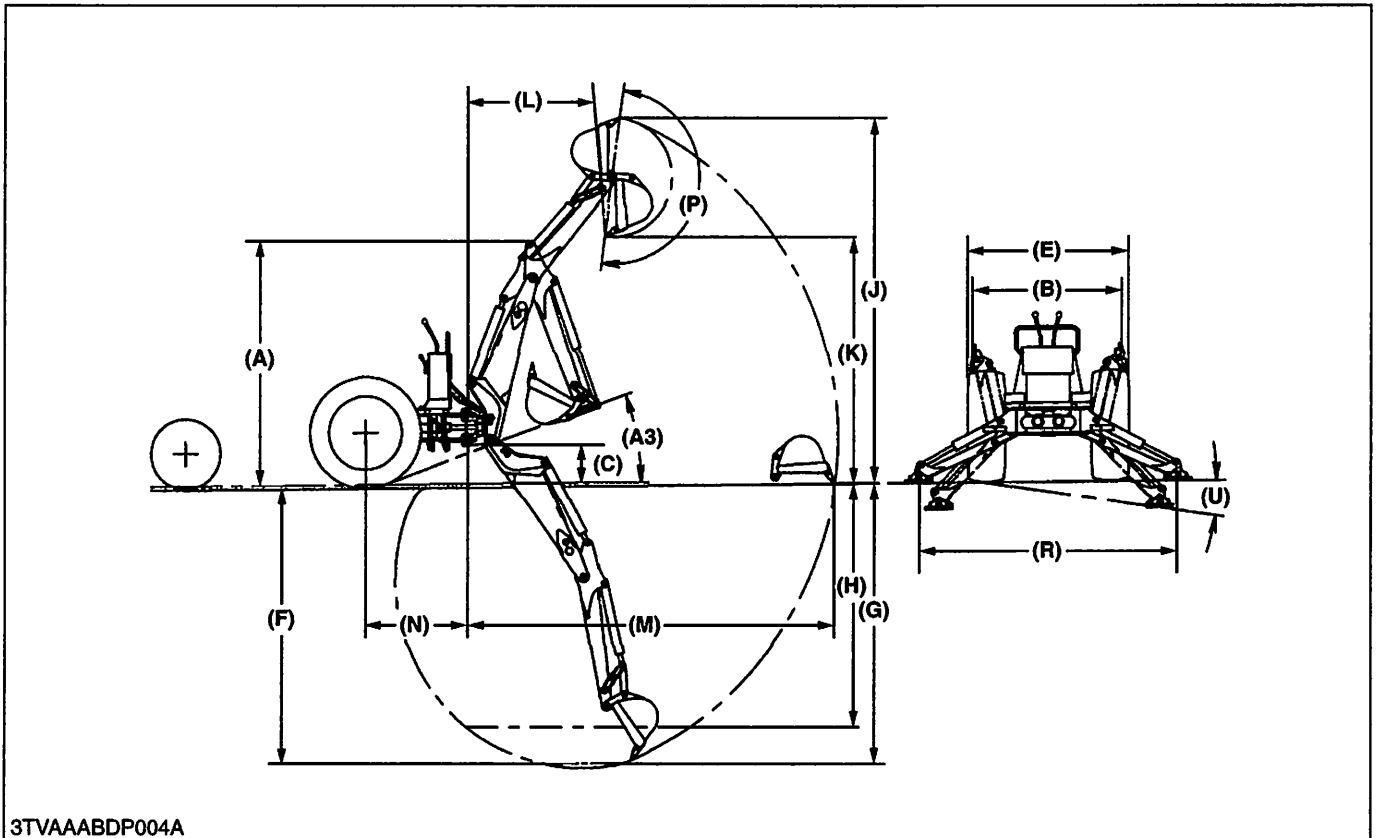


3TVAAACNP003A

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

# SPECIFICATIONS

## ■ Operating Dimensions



3TVAAABDP004A

Model		BT600
(A)	Transport Height	1572 mm (61.9 in.)
(B)	Stabilizer Spread Transport	1360 mm (53.51 in.)
(C)	Ground Clearance	228 mm (9.0 in.)
(E)	Overall Width	1128 mm (44.4 in.)
(F)	Maximum Digging Depth	1882 mm (74.1 in.)
(G)	Digging Depth 2 ft., Flat Bottom	1840 mm (72.4 in.)
(H)	Digging Depth 8 ft., Flat Bottom	1095 mm (43.1 in.)
(J)	Operating Height Fully Raised	2456 mm (96.7 in.)
(K)	Loading Height	1636 mm (64.4 in.)
(L)	Loading Reach	894 mm (35.2 in.)
(M)	Reach from Swing Pivot	2484 mm (97.8 in.)
(N)	Swing Pivot to Rear Axle Center Line	726 mm (28.6 in.)
(P)	Bucket Rotation	180 deg.
(R)	Stabilizer Spread-Operation	1990 mm (78.3 in.)
(A3)	Angle of Departure per SAE J1234	18.3 deg.
(U)	Leveling Angle	9.6 deg.
	Swing Arc	140 deg.

NOTE: The specifications are taken with KUBOTA BX22 tractor. (Tire size : Front 18 × 18.5-8, Rear 26 × 12.00-12)

W1028417

■ Digging Force (Per SAE J49)

Model	BT600
With bucket cylinder	8610 N (1936 lbs)
With dipperstick cylinder	5057 N (1137 lbs)

W1027852

■ Cycle Time (Seconds)

Boom cylinder, extend	4.7
Boom cylinder, retract	3.7
Swing cylinder, from 70 ° to center	1.6
Dipperstick cylinder, extend	4.0
Dipperstick cylinder, retract	3.0
Bucket cylinder, extend	3.1
Bucket cylinder, retract	2.2
Stabilizer cylinders, max. height to ground	2.8
Stabilizer cylinders, ground to max. height	2.2

W1028902

■ Hydraulic Cylinders

	Boom cm (in.)	Dipperstick cm (in.)	Bucket mm (in.)	Stabilizer cm (in.)	Swing cm (in.)
Rod diameter	3.0 (1.18)	3.0 (1.18)	3.0 (1.18)	3.0 (1.18)	3.0 (1.18)
Cylinder bore	6.0 (2.36)	6.0 (2.36)	5.0 (1.97)	6.0 (2.36)	6.0 (2.36)

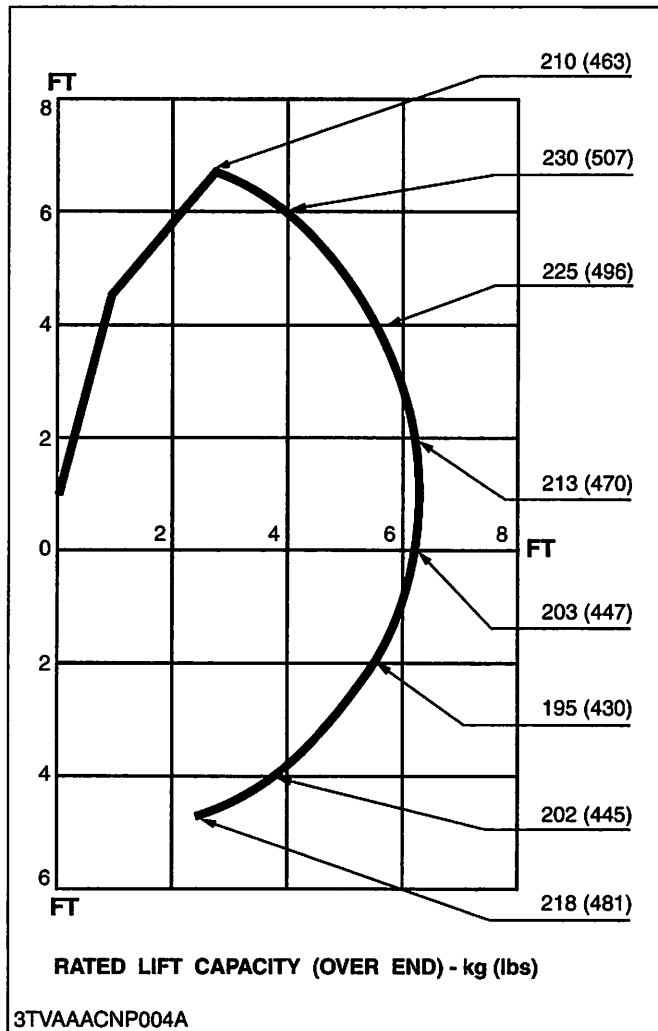
W1028958

■ Bucket Sizes

	Width cm (in.)	SAE Struck Capacity m <sup>3</sup> (cu-ft)	SAE Heaped Capacity m <sup>3</sup> (cu-ft)	Number of Teeth	Weight kg (lbs)
Trenching 10"	25.4 (10)	0.013 (0.459)	0.018 (0.636)	3	17 (37)
Trenching 12"	30.5 (12)	0.016 (0.565)	0.022 (0.777)	3	18 (40)

W1029014

■ Lift Capacity (Per SAE J31)



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

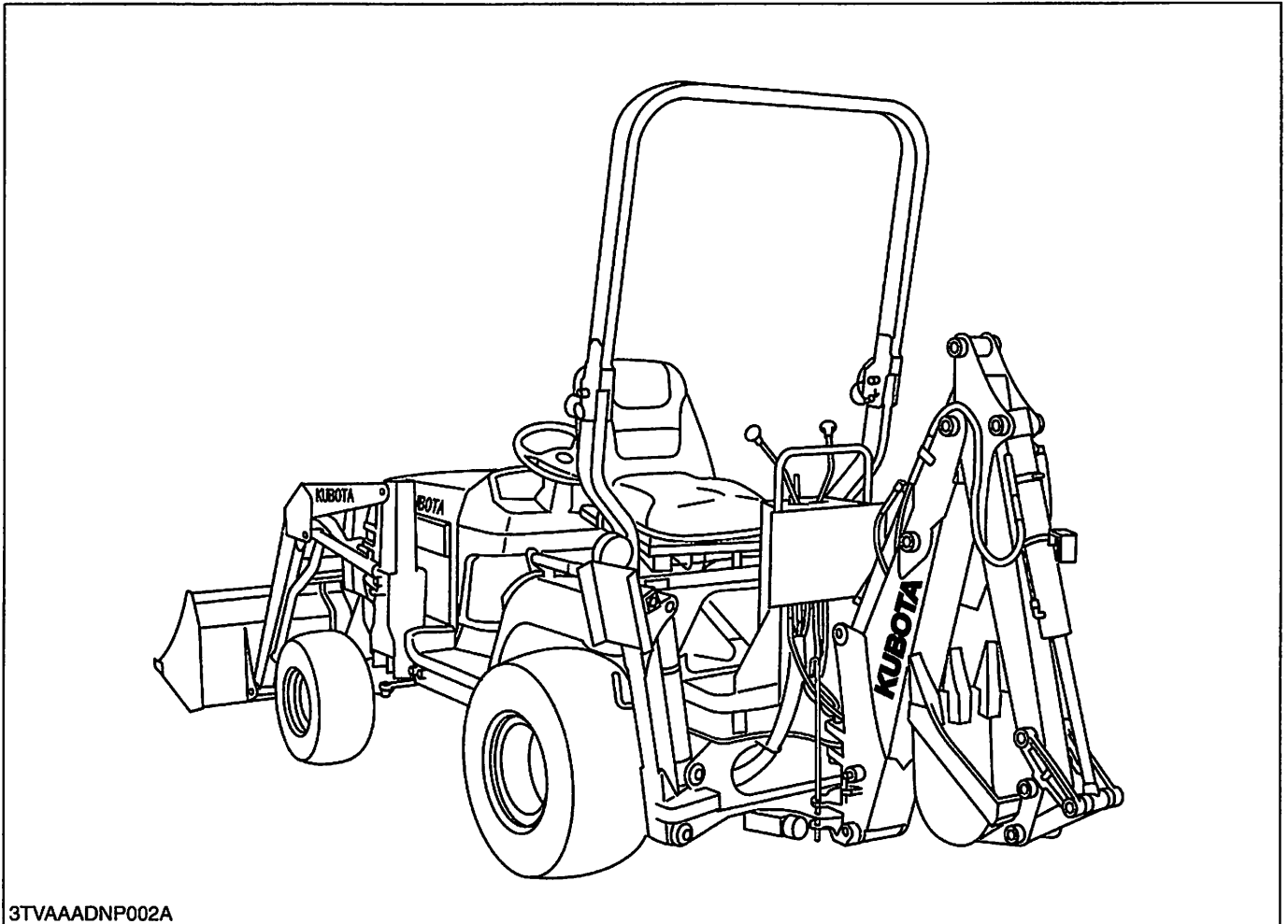
W1029646

# MECHANISM

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# 1. FEATURES



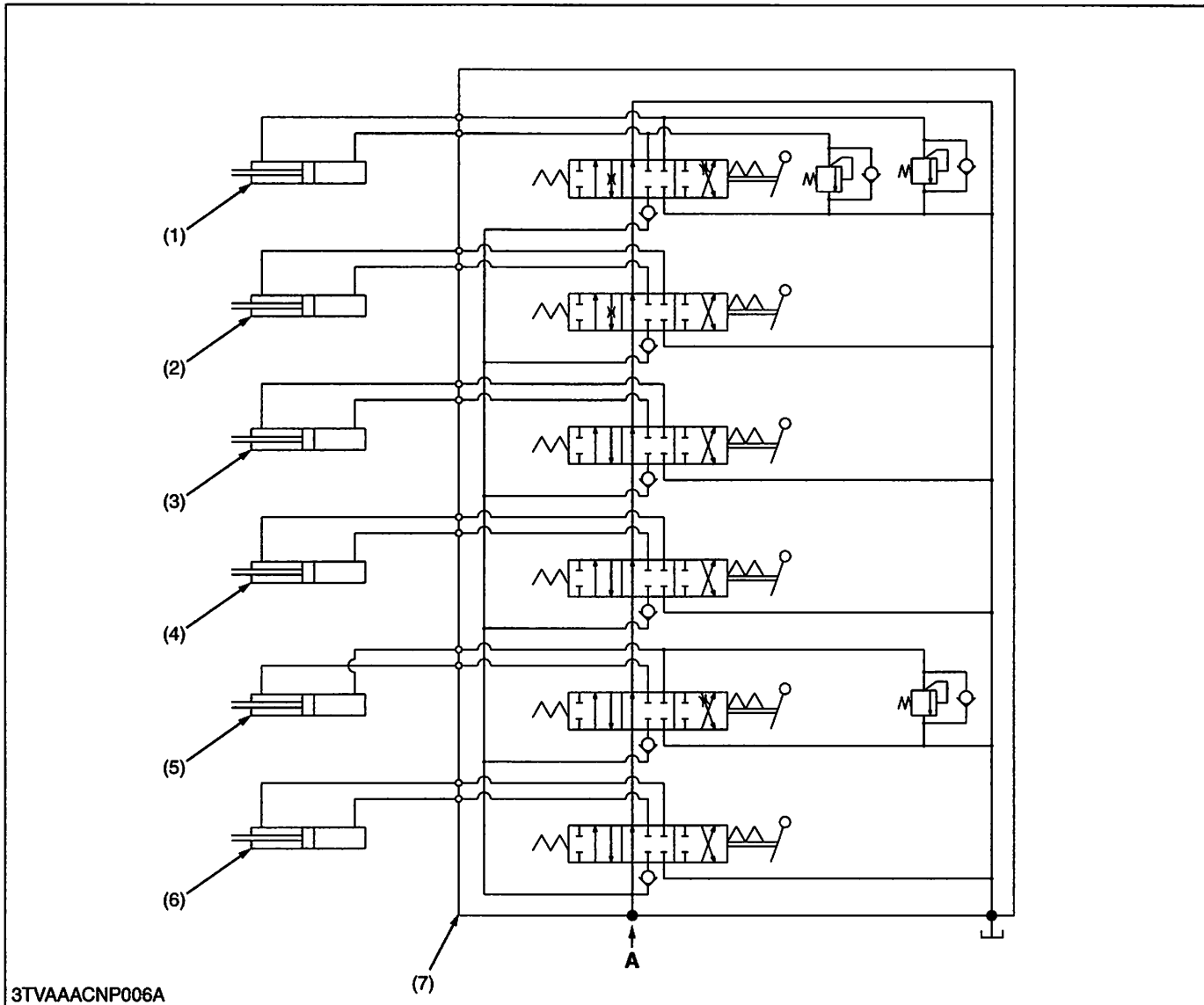
3TVAAADNP002A

1. Backhoe Quick-Attach, Easy-ON and Easy-OFF
2. A Maximum Digging Depth of 6 feet
3. Reversible Stabilizer Flip Pads (Option)
4. Improved Operator Comfort
5. Safety During Transportation



## 2. HYDRAULIC SYSTEM

### [1] HYDRAULIC CIRCUIT



3TVAAACNP006A

(1) Swing Cylinder  
 (2) Boom Cylinder  
 (3) Stabilizer Cylinder LH

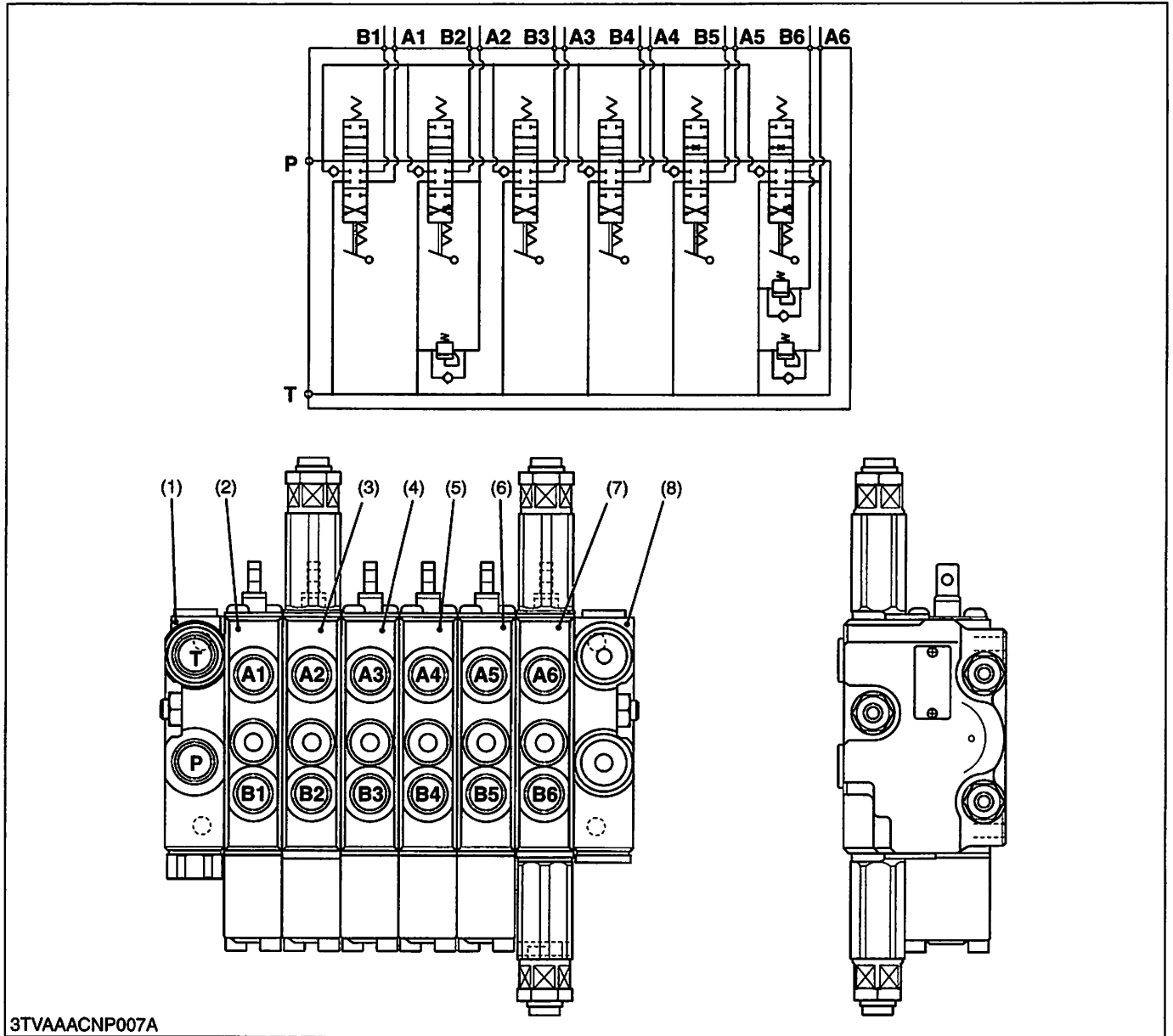
(4) Stabilizer Cylinder RH  
 (5) Dipperstick Cylinder

(6) Bucket Cylinder  
 (7) Backhoe Control Valve

**A : From Hydraulic Pump**  
 (Approx. 14.7 L/min.,  
 3.7 U.S.gals./min.,  
 3.08 Imp.gals./min.)

## [2] CONTROL VALVE

### (1) Structure



3TVAAACNP007A

(1) Inlet Section

(2) Bucket Control Valve

(3) Dipperstick Control Valve

(4) Stabilizer RH Control Valve

(5) Stabilizer LH 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.

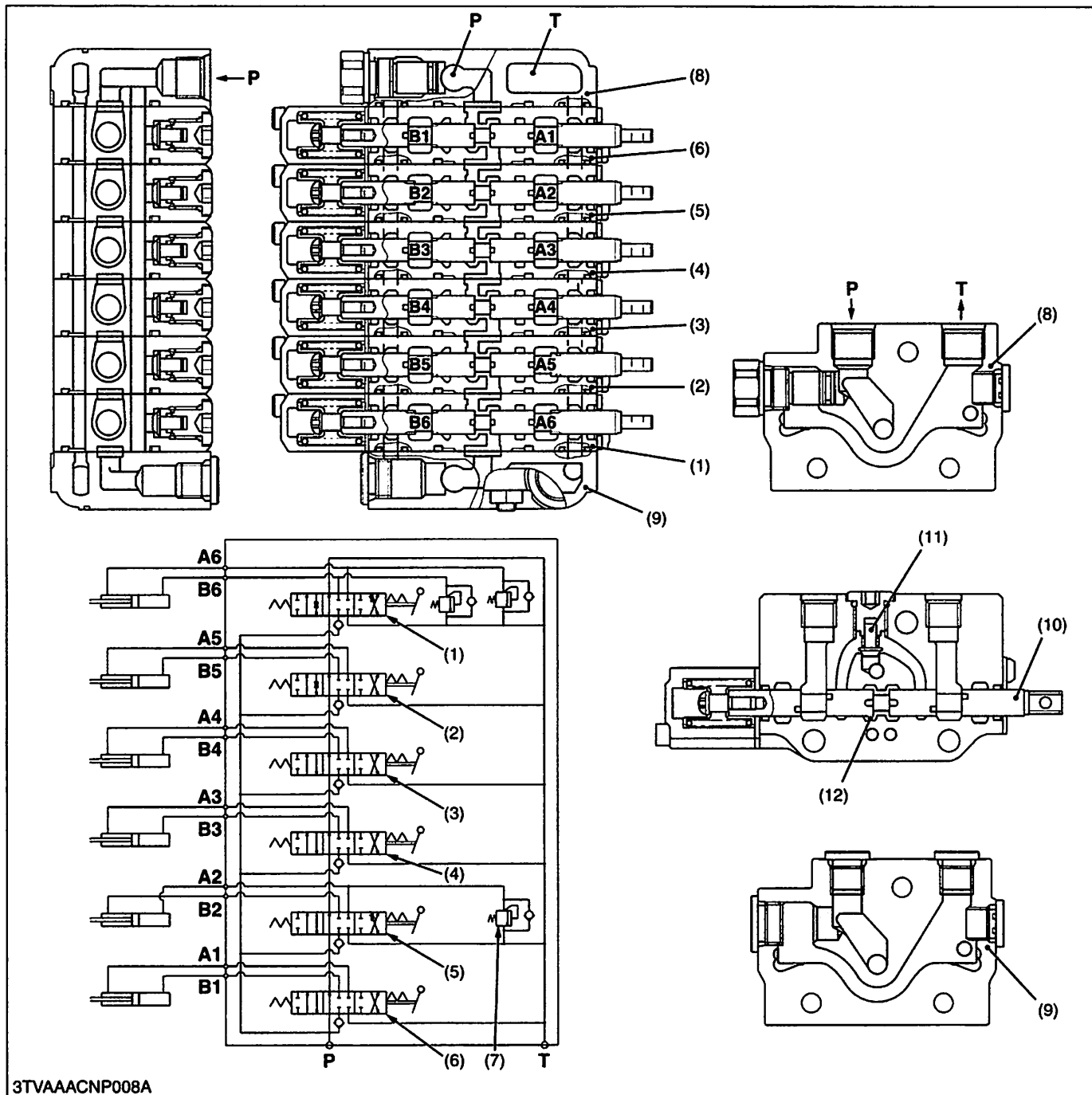
#### (2) Control Valve Section

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

These are consisting of a valve housing, spool, load check valve, overload relief valve, etc..

## (2) Operation

### ■ Neutral

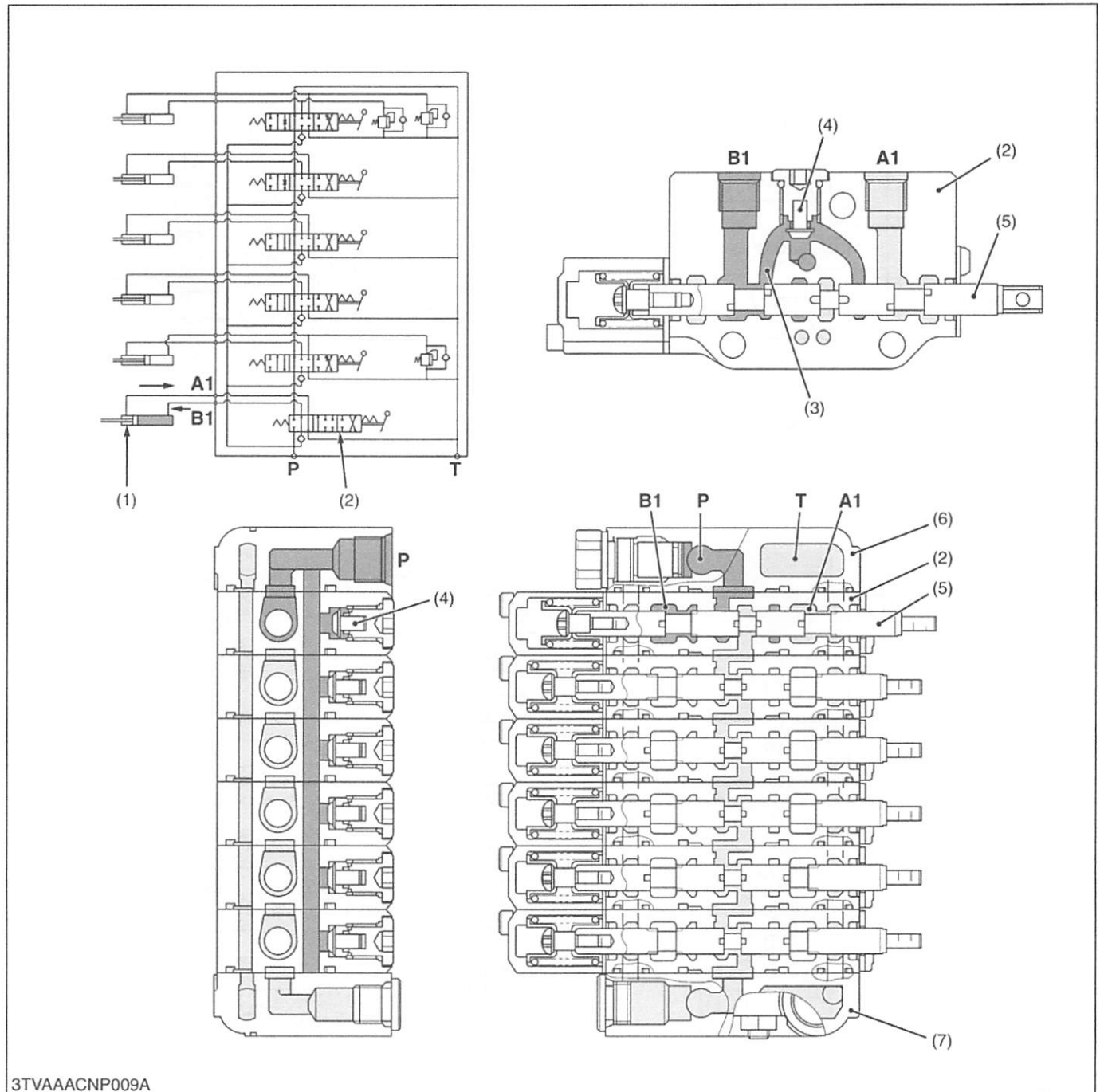


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- |                                 |   |                      |                     |
|---------------------------------|---|----------------------|---------------------|
| (1) Swing Control Valve         | (7) Overload Relief Valve (Port Relief Valve) | <b>P : Pump Port</b> | <b>B1 : B1 Port</b> |
| (2) Boom Control Valve          | (8) Inlet Section                             | <b>T : Tank Port</b> | <b>B2 : B2 Port</b> |
| (3) Stabilizer LH Control Valve | (9) Outlet Section                            | <b>A1 : A1 Port</b>  | <b>B3 : B3 Port</b> |
| (4) Stabilizer RH Control Valve | (10) Spool                                    | <b>A2 : A2 Port</b>  | <b>B4 : B4 Port</b> |
| (5) Dipperstick Control Valve   | (11) Load Check Valve                         | <b>A3 : A3 Port</b>  | <b>B5 : B5 Port</b> |
| (6) Bucket Control Valve        | (12) Neutral Passage                          | <b>A4 : A4 Port</b>  | <b>B6 : B6 Port</b> |
|                                 |   | <b>A5 : A5 Port</b>  |                     |
|                                 |   | <b>A6 : A6 Port</b>  |                     |

Pressure-fed oil from the hydraulic pumps are delivered into **P** port in the inlet section (8).  
 As the load check valves (11) are kept closed in the neutral position, oil flows along the notched section of the spools (10) to the **T** port through the neutral passage (12).  
 Then the oil is fed to the transmission case via the return hose and pipe from the **T** port.

■ Bucket (Roll-back)



3TVAAACNP009A

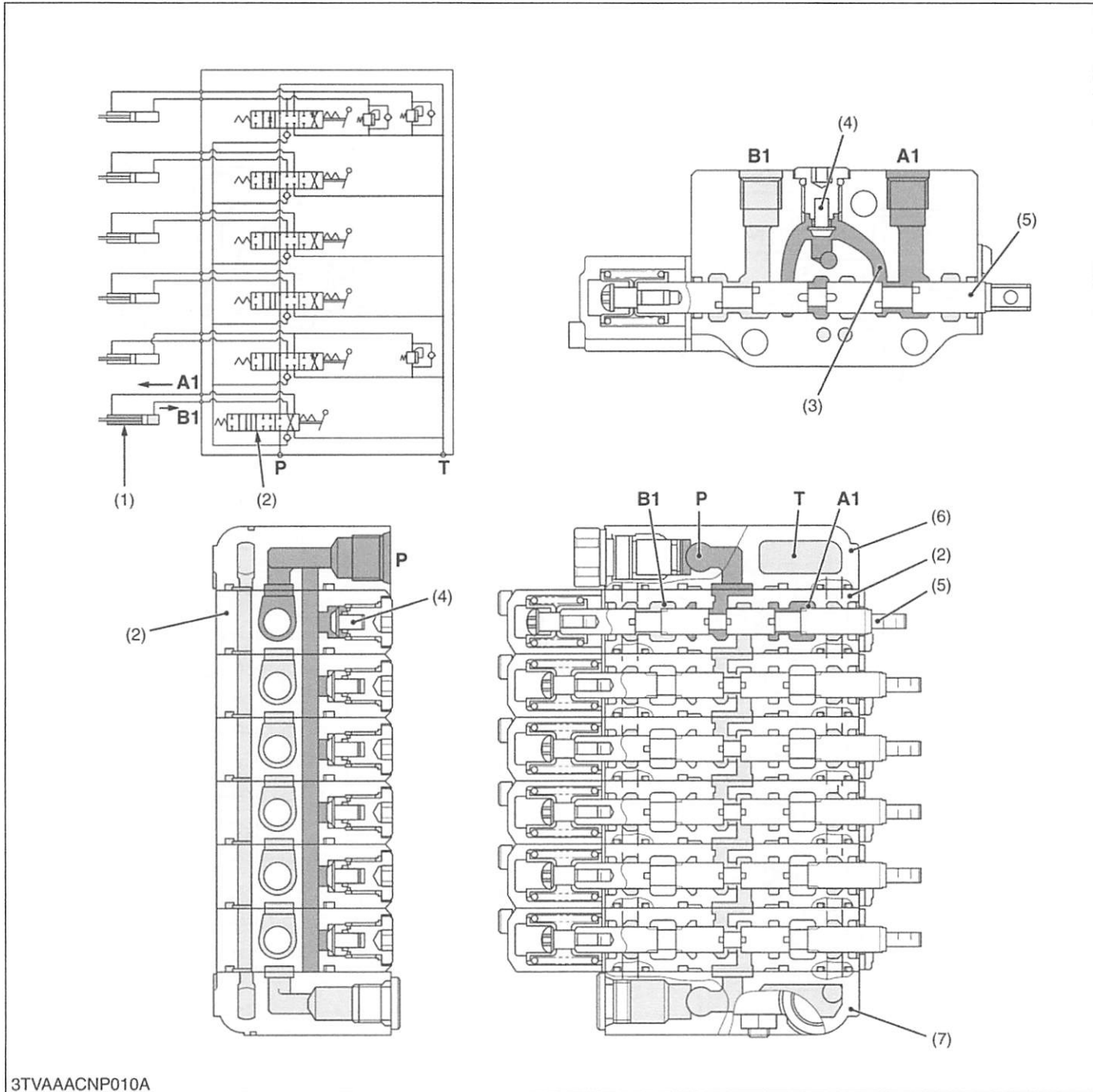
- (1) Bucket Cylinder
- (2) Bucket Control Valve
- (3) Bridge Passage
- (4) Load Check Valve
- (5) Spool
- (6) Inlet Section
- (7) Outlet Section

P : P Port  
T : T Port

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

1. When the dipperstick and bucket lever is moved to the left to set to the “ROLL-BACK” position, the spool (5) of the bucket control valve (2) moves to the right, which forms oil passage between bridge passage (3) and B1 port, and between A1 port and T port.
2. The pressure-fed oil from the P port opens the load check valve (4) 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.

■ Bucket (Dump)



3TVAAACNP010A

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

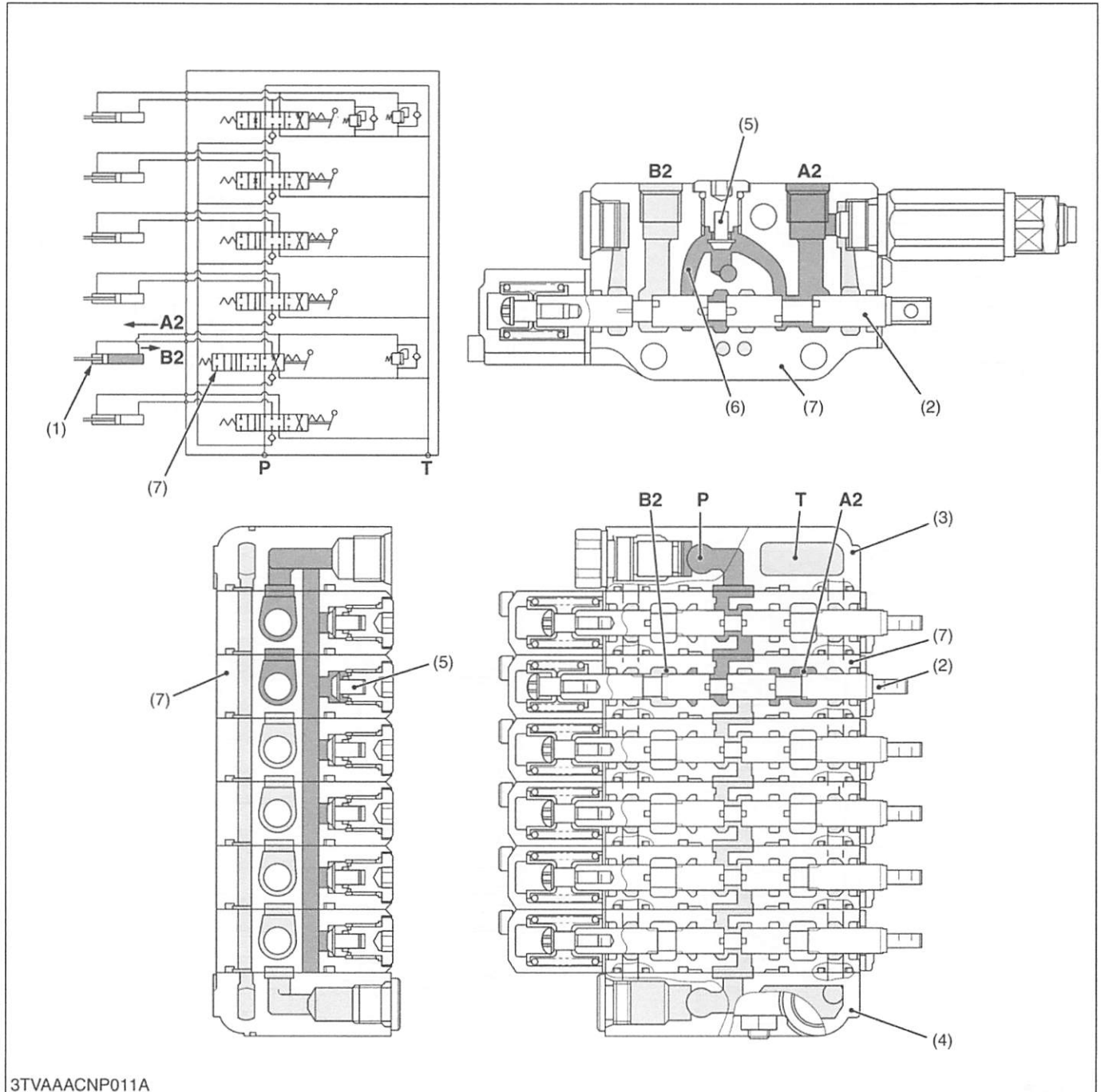
- (5) Spool
- (6) Inlet Section
- (7) Outlet Section

P : P Port  
T : T Port

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

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

■ Dipperstick (Crowd)

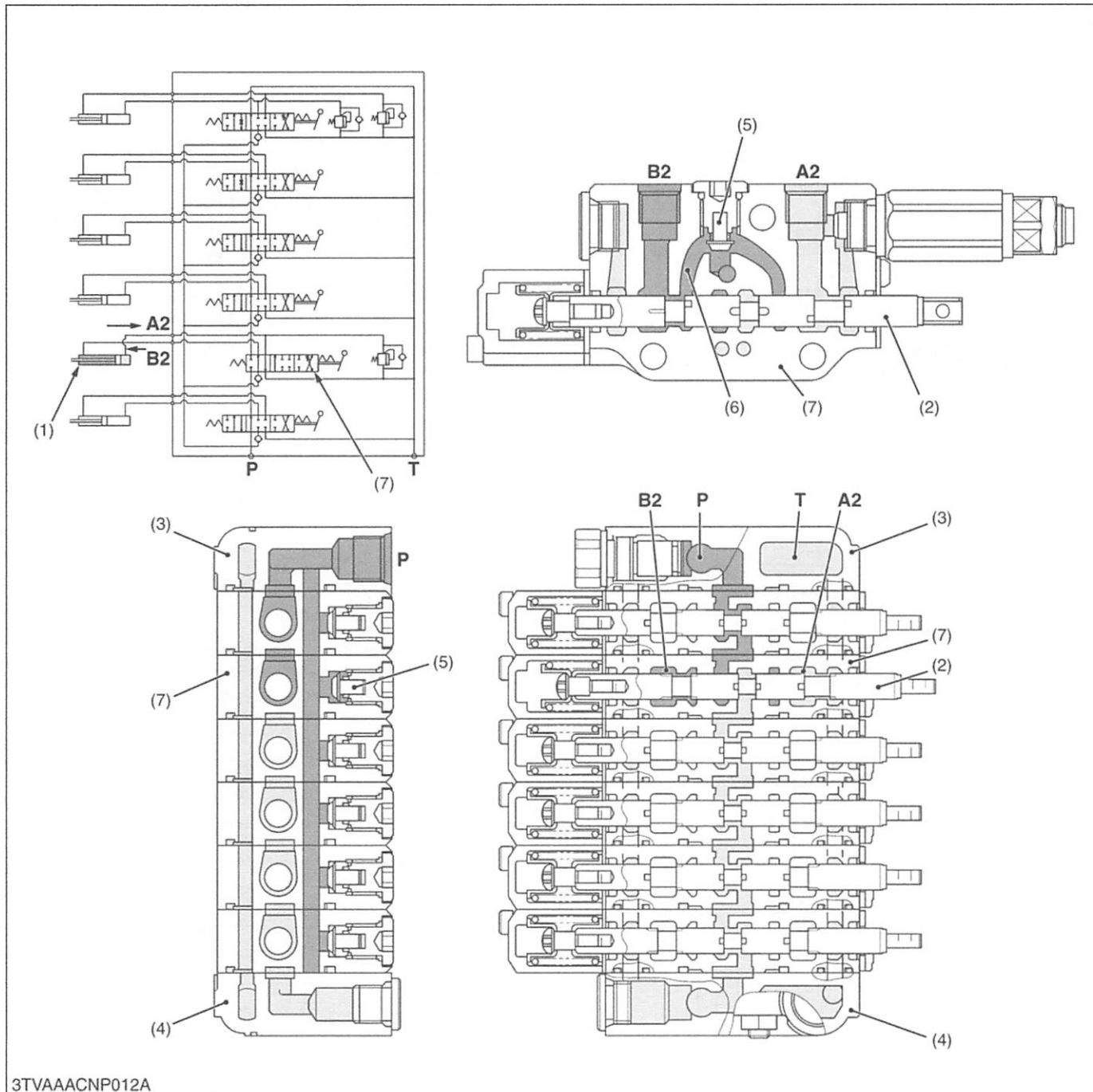


3TVAAACNP011A

- |                          |                               |                   |  |
|--------------------------|-------------------------------|-------------------|--|
| (1) Dipperstick Cylinder | (5) Load Check Valve          | <b>P : P Port</b> | <b>A2 : A2 Port</b><br>(From Dipperstick Cylinder) |
| (2) Spool                | (6) Bridge Passage            | <b>T : T Port</b> | <b>B2 : B2 Port</b><br>(To Dipperstick Cylinder)   |
| (3) Inlet Section        | (7) Dipperstick Control Valve |                   |  |
| (4) Outlet Section       |                               |                   |  |

1. When the dipperstick and bucket lever is pulled to the backward to set to the “**CROWD**” position, the spool (2) of the dipperstick control valve (7) moves to the left, which forms oil passage between bridge passage (6) and **B2** port, and between **A2** port and **T** port.
2. The pressure-fed oil from the **P** port opens the load check valve (5) and flows to **B2** port to extend the dipperstick cylinder.
3. Return oil from the dipperstick cylinder returns to the transmission case through the **A2** port, low pressure passage and **T** port.

■ Dipperstick (Extend)

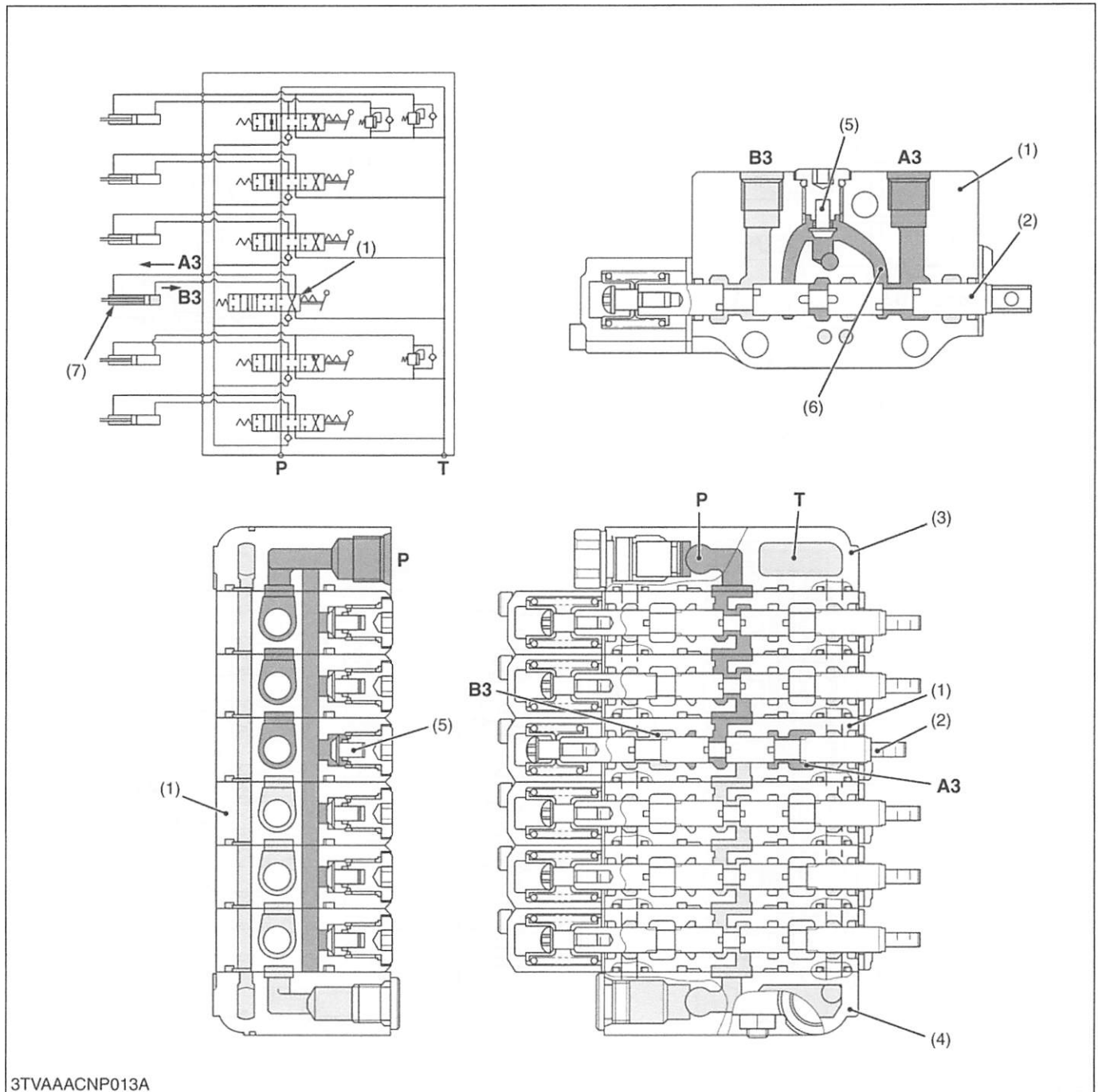


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- |                          |                               |                   |                                    |
|--------------------------|-------------------------------|-------------------|------------------------------------|
| (1) Dipperstick Cylinder | (5) Load Check Valve          | <b>P : P Port</b> | <b>A2 : A2 Port</b>                |
| (2) Spool                | (6) Bridge Passage            | <b>T : T Port</b> | <b>(To Dipperstick Cylinder)</b>   |
| (3) Inlet Section        | (7) Dipperstick Control Valve |                   | <b>B2 : B2 Port</b>                |
| (4) Outlet Section       |                               |                   | <b>(From Dipperstick Cylinder)</b> |

1. When the dipperstick and bucket lever is pushed to the forward to set to the “**EXTEND**” position, the spool (2) of the dipperstick control valve (7) moves to the right, which forms oil passage between bridge passage (6) and **A2** port, and between **B2** port and **T** port.
2. The pressure-fed oil from the **P** port opens the load check valve (5) and flows to **A2** port to retract the dipperstick cylinder.
3. Return oil from the dipperstick cylinder returns to the transmission case through the **B2** port, low pressure passage and **T** port.

■ Stabilizer RH (Shrink)



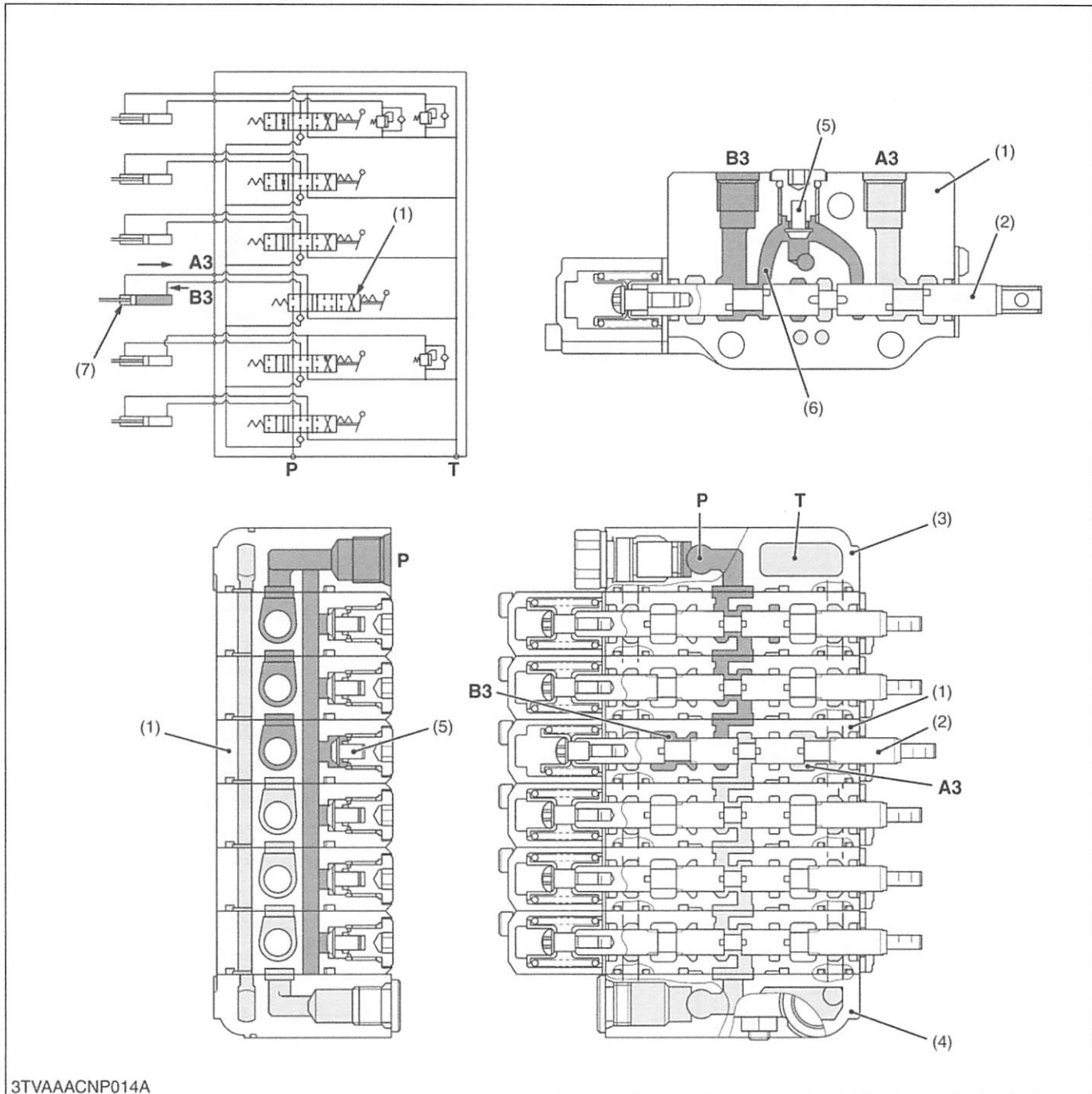
3TVAAACNP013A

- |                                 |                            |                   |   |
|---------------------------------|----------------------------|-------------------|---|
| (1) Stabilizer RH Control Valve | (5) Load Check Valve       | <b>P</b> : P Port | <b>A3</b> : A3 Port (From Stabilizer RH Cylinder) |
| (2) Spool                       | (6) Bridge Passage         | <b>T</b> : T Port | <b>B3</b> : B3 Port (To Stabilizer RH Cylinder)   |
| (3) Inlet Section               | (7) Stabilizer Cylinder RH |                   |   |
| (4) Outlet Section              |                            |                   |   |

1. When the right stabilizer control lever is pushed to the forward to set to the “**SHRINK**” position, the spool (2) of the stabilizer RH control valve (1) moves to the left, which forms oil passage between bridge passage (6) and **B3** port, and between **A3** port and **T** port.
2. The pressure-fed oil from the **P** port opens the load check valve (5), and flows to **B3** port to retract the right stabilizer cylinder.
3. Return oil from the right stabilizer cylinder returns to the transmission case through the **A3** port, low pressure passage and **T** port.



■ Stabilizer RH (Extend)

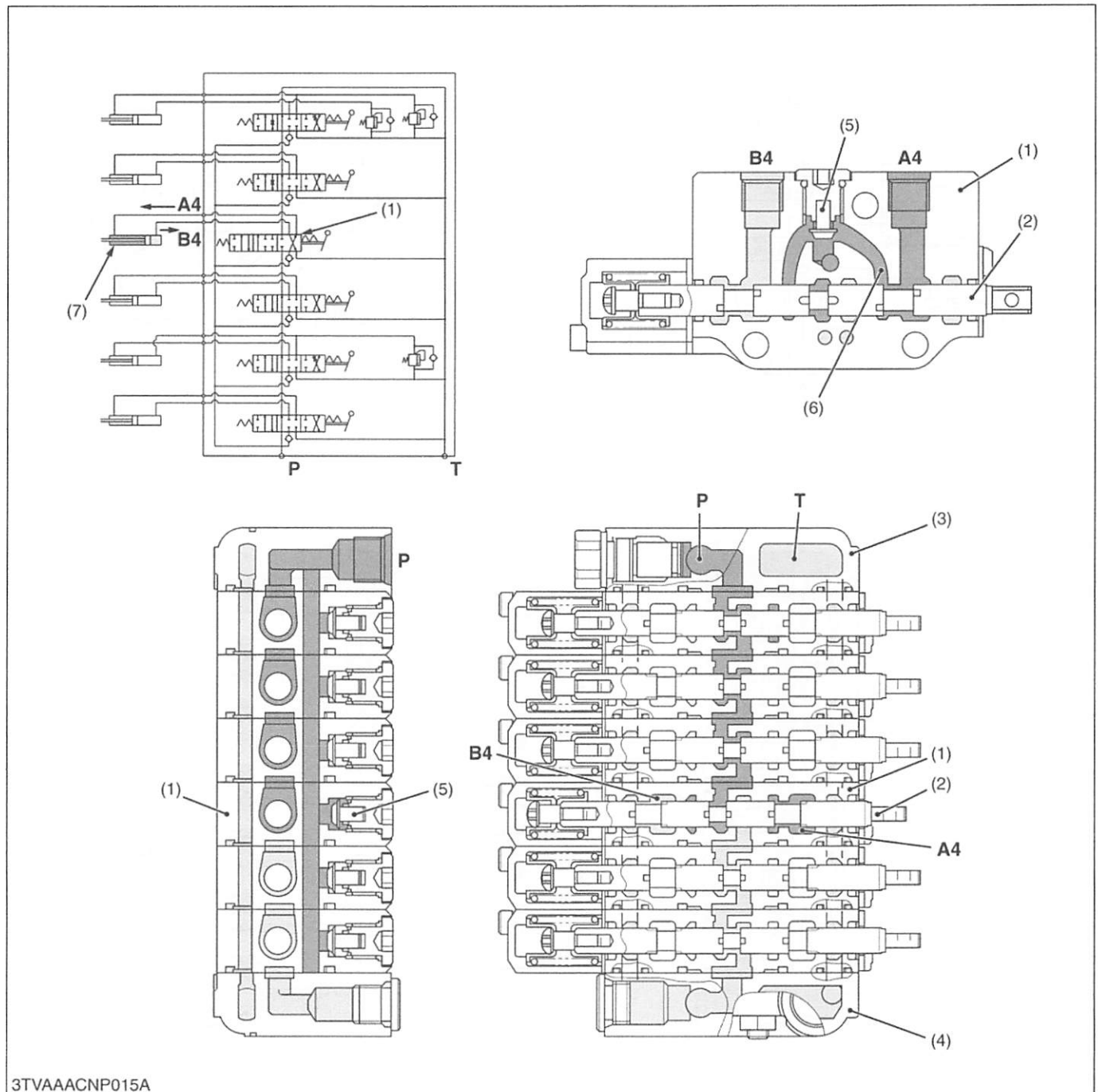


3TVAAACNP014A

- |                                 |                            |                   |   |
|---------------------------------|----------------------------|-------------------|---|
| (1) Stabilizer RH Control Valve | (5) Load Check Valve       | <b>P</b> : P Port | <b>A3</b> : A3 Port                               |
| (2) Spool                       | (6) Bridge Passage         | <b>T</b> : T Port | (To Stabilizer RH Cylinder)                       |
| (3) Inlet Section               | (7) Stabilizer Cylinder RH |                   | <b>B3</b> : B3 Port (From Stabilizer RH Cylinder) |
| (4) Outlet Section              |                            |                   |   |

1. When the right stabilizer control lever is pulled to the downward to set to the “**EXTEND**” position, the spool (2) of the stabilizer RH control valve (1) moves to the right, which forms oil passage between bridge passage (6) and **A3** port, and between **B3** port and **T** port.
2. The pressure-fed oil from the **P** port opens the load check valve (5), and flows to **A3** port to extend the right stabilizer cylinder.
3. Return oil from the right stabilizer cylinder returns to the transmission case through the **B3** port, low pressure passage and **T** port.

■ Stabilizer LH (Shrink)

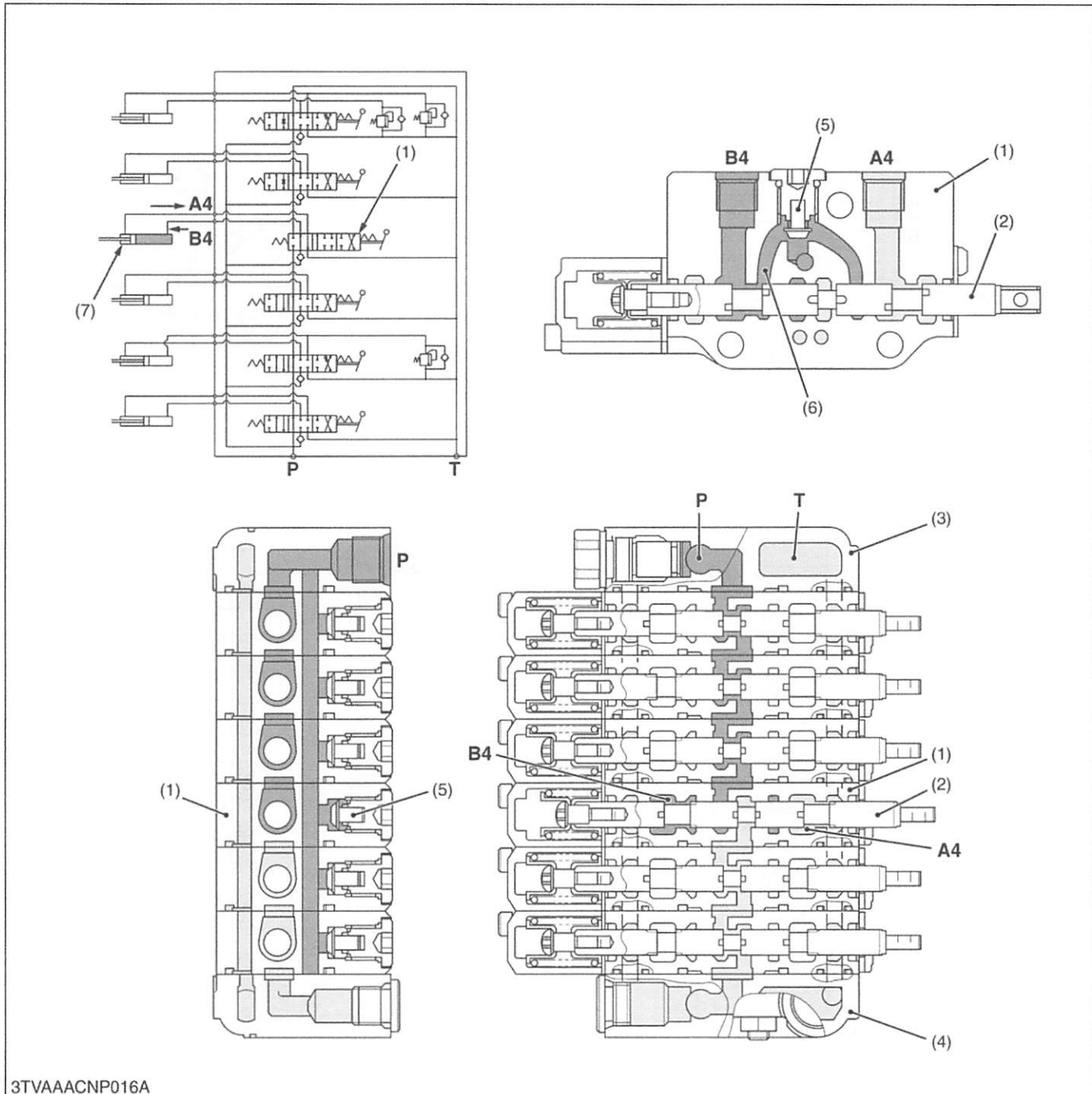


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- |                                 |                            |            |  |
|---------------------------------|----------------------------|------------|--|
| (1) Stabilizer LH Control Valve | (5) Load Check Valve       | P : P Port | A4 : A4 Port (From Stabilizer LH Cylinder) |
| (2) Spool                       | (6) Bridge Passage         | T : T Port | B4 : B4 Port (To Stabilizer LH Cylinder)   |
| (3) Inlet Section               | (7) Stabilizer Cylinder LH |            |  |
| (4) Outlet Section              |                            |            |  |

1. When the right stabilizer control lever is pushed to the forward to set to the “**SHRINK**” position, the spool (2) of the stabilizer LH control valve (1) moves to the left, which forms oil passage between bridge passage (6) and **B4** port, and between **A4** port and **T** port.
2. The pressure-fed oil from the **P** port opens the load check valve (5), and flows to **B4** port to retract the left stabilizer cylinder.
3. Return oil from the left stabilizer cylinder returns to the transmission case through the **A4** port, low pressure passage and **T** port.

■ Stabilizer LH (Extend)

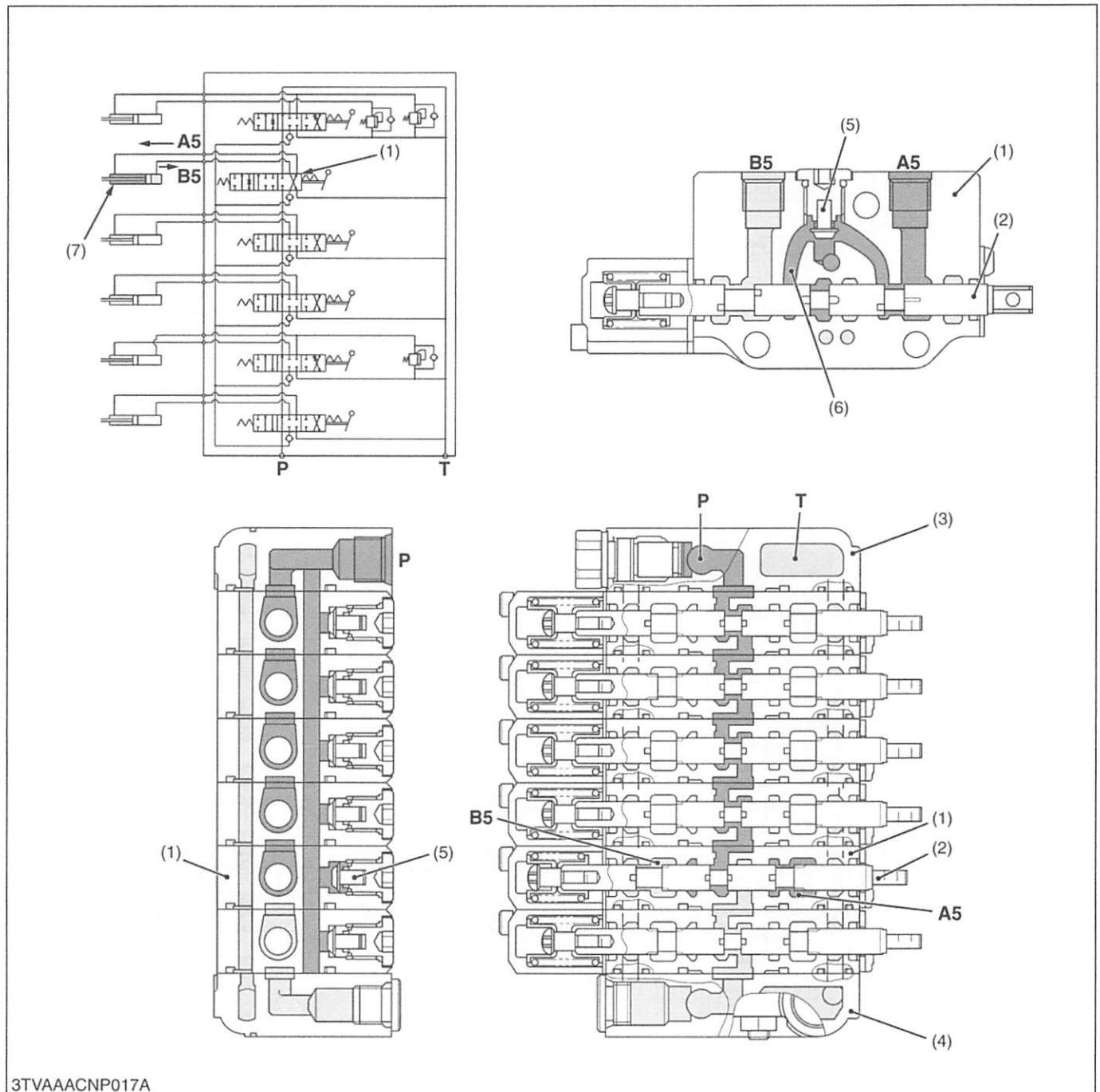


3TVAAACNP016A

- |                                 |                            |                   |   |
|---------------------------------|----------------------------|-------------------|---|
| (1) Stabilizer LH Control Valve | (5) Load Check Valve       | <b>P</b> : P Port | <b>A4</b> : A4 Port                               |
| (2) Spool                       | (6) Bridge Passage         | <b>T</b> : T Port | (To Stabilizer LH Cylinder)                       |
| (3) Inlet Section               | (7) Stabilizer Cylinder LH |                   | <b>B4</b> : B4 Port (From Stabilizer LH Cylinder) |
| (4) Outlet Section              |                            |                   |   |

- When the right stabilizer control lever is pulled to the downward to set to the “**EXTEND**” position, the spool (2) of the stabilizer LH control valve (1) moves to the right, which forms oil passage between bridge passage (6) and **A4** port, and between **B4** port and **T** port.
- The pressure-fed oil from the **P** port opens the load check valve (5), and flows to **A4** port to retract the left stabilizer cylinder.
- Return oil from the left stabilizer cylinder returns to the transmission case through the **B4** port, low pressure passage and **T** port.

■ Boom (Up)



3TVAAACNP017A

- (1) Boom Control Valve
- (2) Spool
- (3) Inlet Section
- (4) Outlet Section

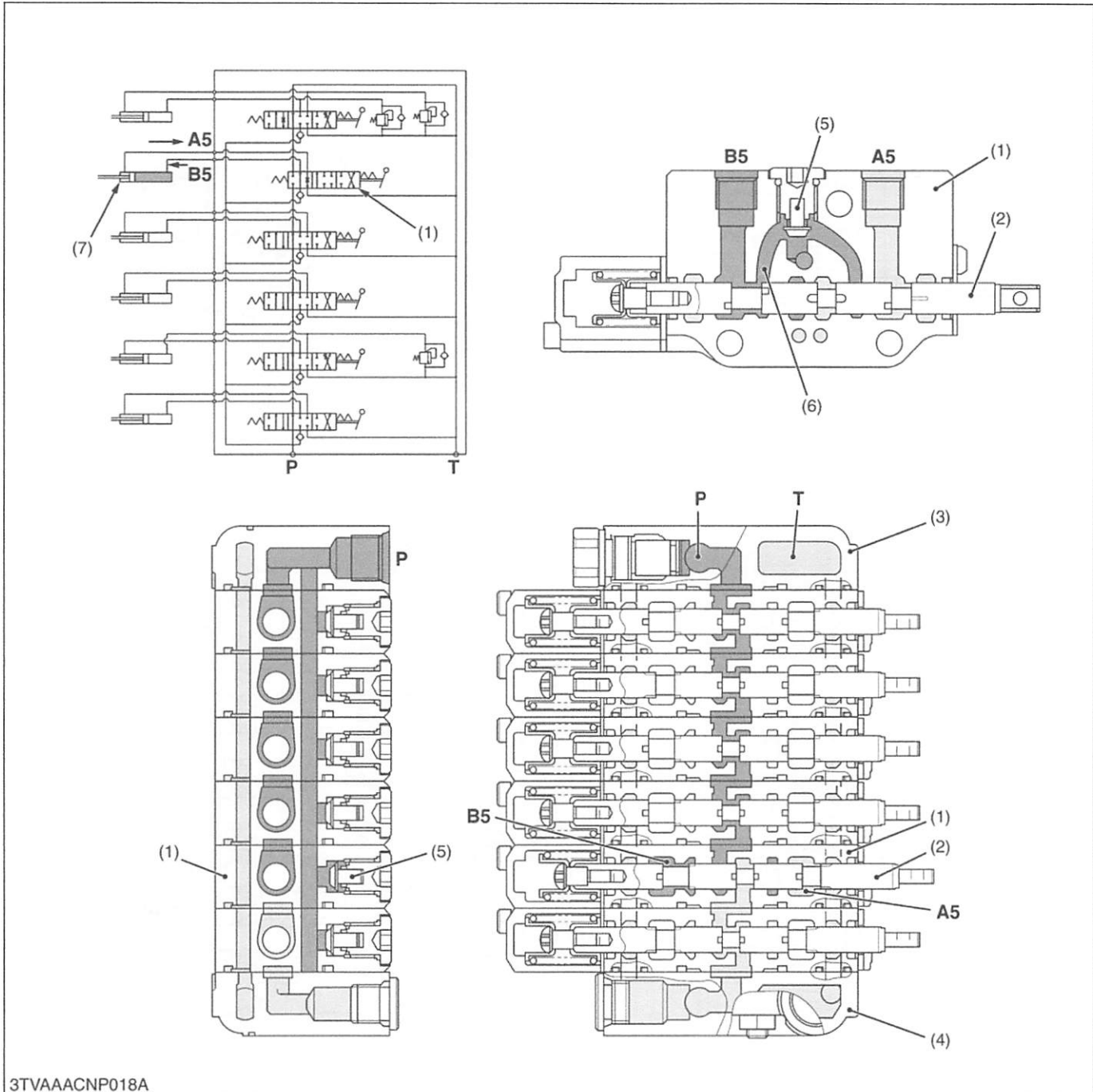
- (5) Load Check Valve
- (6) Bridge Passage
- (7) Boom Cylinder

P : P Port  
T : T Port

A5 : A5 Port  
(From Boom Cylinder)  
B5 : B5 Port  
(To Boom Cylinder)

1. When the boom and swing lever is pulled to the backward to set to the "UP" position, the spool (2) of the boom control valve (1) moves to the left, which forms oil passage between bridge passage (6) and B5 port, and between A5 port and T port.
2. The pressure-fed oil from the P port opens the load check valve (5) and flows to B5 port to retract the boom cylinder.
3. Return oil from the boom cylinder returns to the transmission case through the A5 port, low pressure passage and T port.

■ Boom (Down)

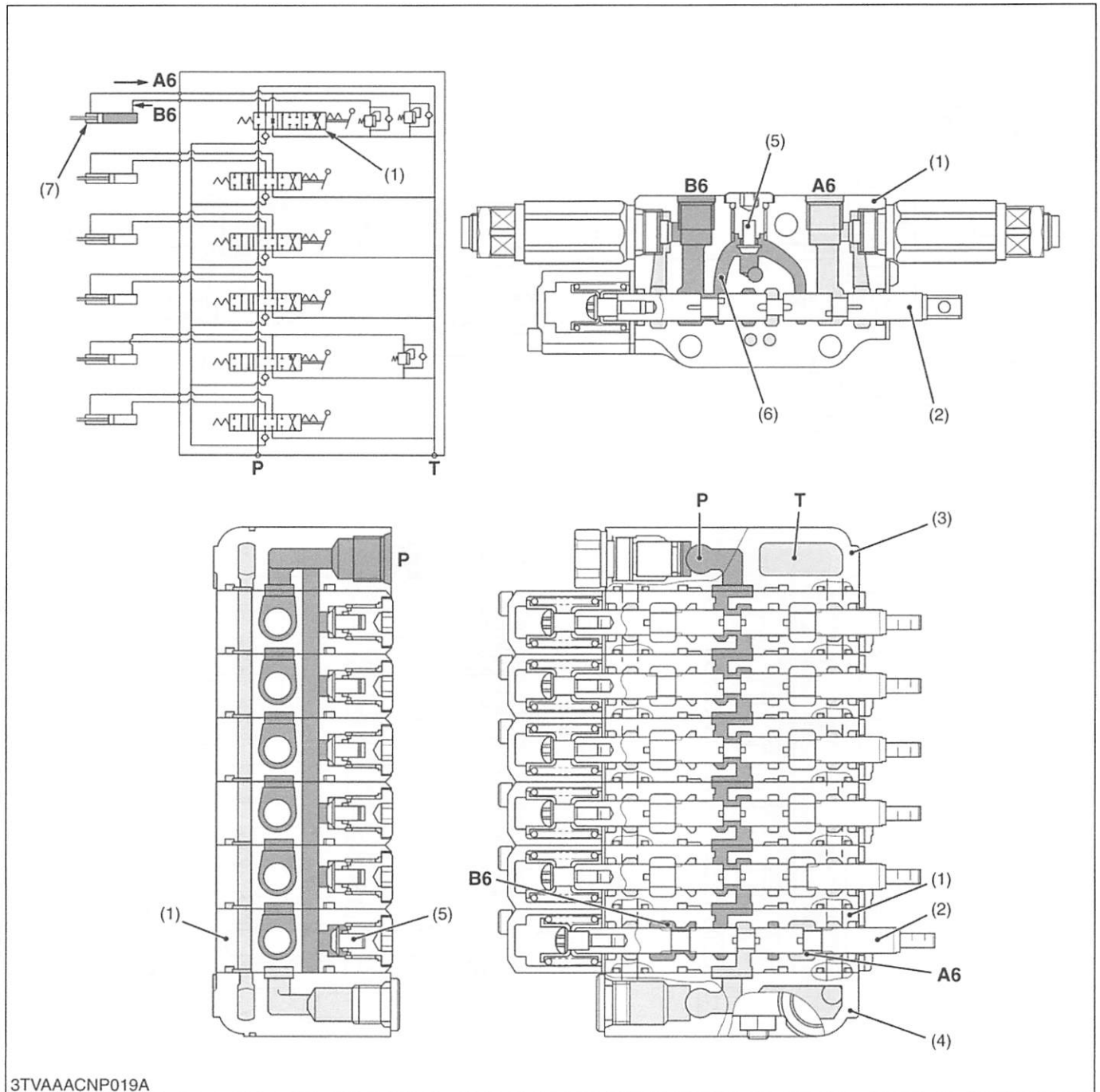


3TVAAACNP018A

- |                        |                      |                   |                             |
|------------------------|----------------------|-------------------|-----------------------------|
| (1) Boom Control Valve | (5) Load Check Valve | <b>P : P Port</b> | <b>A5 : A5 Port</b>         |
| (2) Spool              | (6) Bridge Passage   | <b>T : T Port</b> | <b>(To Boom Cylinder)</b>   |
| (3) Inlet Section      | (7) Boom Cylinder    |                   | <b>B5 : B5 Port</b>         |
| (4) Outlet Section     |                      |                   | <b>(From Boom Cylinder)</b> |

1. When the boom and swing lever is pulled to the forward to set to the "DOWN" position, the spool (2) of the boom control valve (1) moves to the right, which forms oil passage between bridge passage (6) and A5 port, and between B5 port and T port.
2. The pressure-fed oil from the P port opens the load check valve (5) and flows to A5 port to extend the boom cylinder.
3. Return oil from the boom cylinder returns to the transmission case through the B5 port, low pressure passage and T port.

■ Swing (Right)

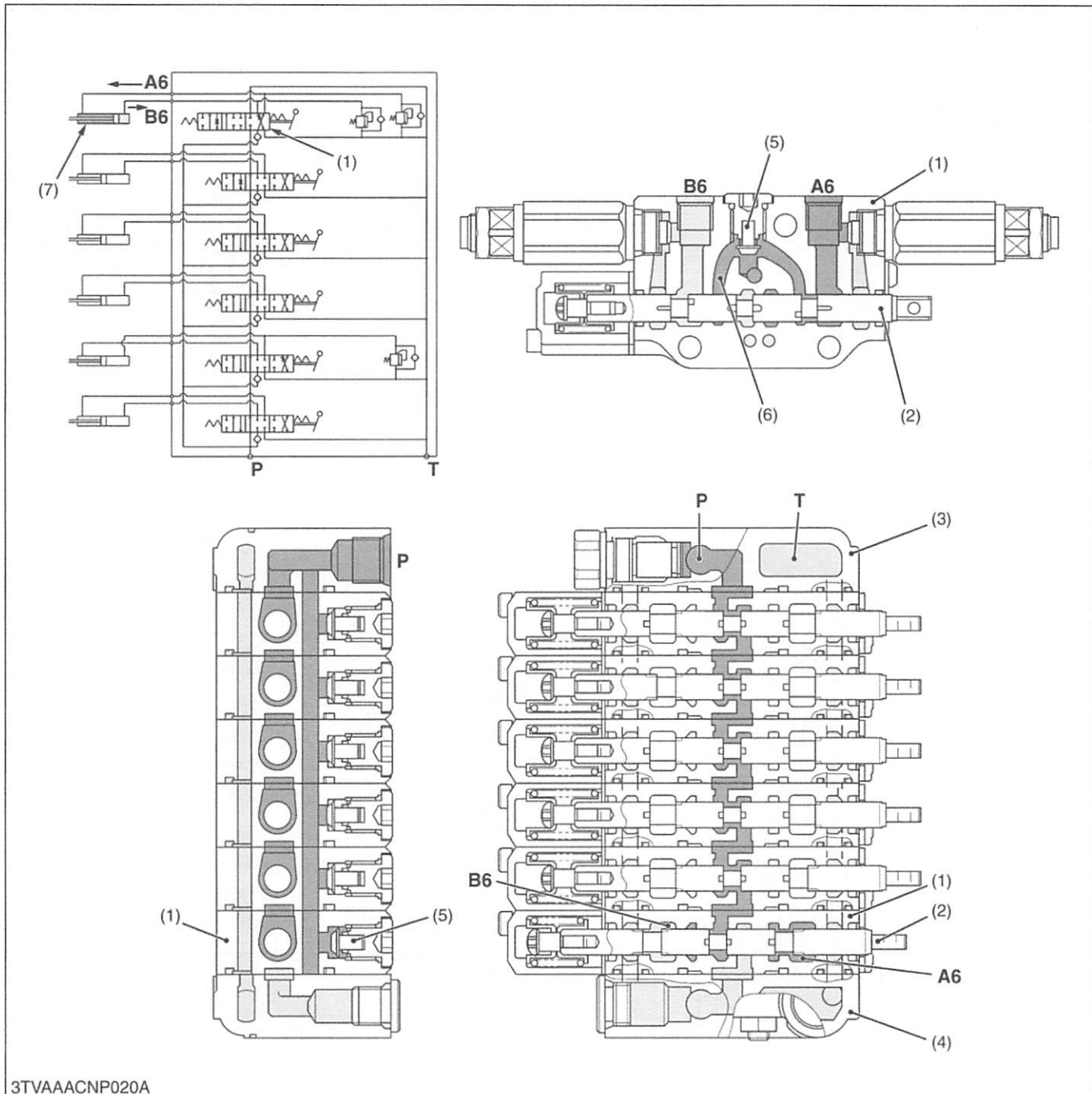


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- |                         |                      |                   |  |
|-------------------------|----------------------|-------------------|--|
| (1) Swing Control Valve | (5) Load Check Valve | <b>P</b> : P Port | <b>A6</b> : A6 Port<br>(To Swing Cylinder)   |
| (2) Spool               | (6) Bridge Passage   | <b>T</b> : T Port | <b>B6</b> : B6 Port<br>(From Swing Cylinder) |
| (3) Inlet Section       | (7) Swing Cylinder   |                   |  |
| (4) Outlet Section      |                      |                   |  |

1. When the boom and swing lever is moved to the right to set to the “RIGHT” position, the spool (2) of the swing control valve (1) moves to the right, which forms oil passage between bridge passage (6) and **A6** port, and between **B6** port and **T** port.
2. The pressure-fed oil from the **P** port opens the load check valve (5) and flows to **B6** port to extend the swing cylinder.
3. Return oil from the swing cylinders return to the transmission case through the **A6** port, low pressure passage and **T** port.

■ Swing (Left)

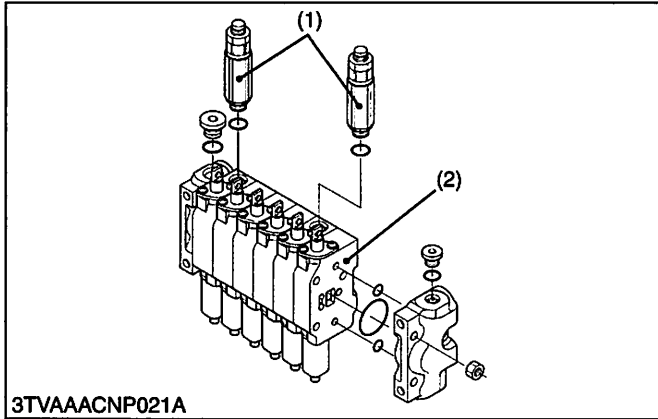


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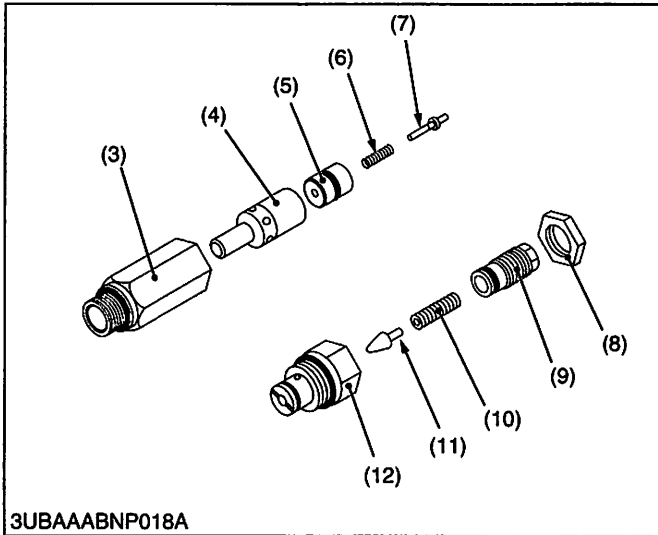
- |                         |                      |                   |                              |
|-------------------------|----------------------|-------------------|------------------------------|
| (1) Swing Control Valve | (5) Load Check Valve | <b>P : P Port</b> | <b>A6 : A6 Port</b>          |
| (2) Spool               | (6) Bridge Passage   | <b>T : T Port</b> | <b>(From Swing Cylinder)</b> |
| (3) Inlet Section       | (7) Swing Cylinder   |                   | <b>B6 : B6 Port</b>          |
| (4) Outlet Section      |                      |                   | <b>(To Swing Cylinder)</b>   |

1. When the boom and swing lever is moved to the left to set to the "LEFT" position, the spool (2) of the swing control valve (1) moves to the left, which forms oil passage between bridge (6) and A6 port, and between B6 port and T port.
2. The pressure-fed oil from the P port opens the load check valve (5) and flows to A6 port to shrink the swing cylinder.
3. Return oil from the swing cylinders return to the transmission case through the B6 port, low pressure passage and T port.

### (3) Overload Relief Valve

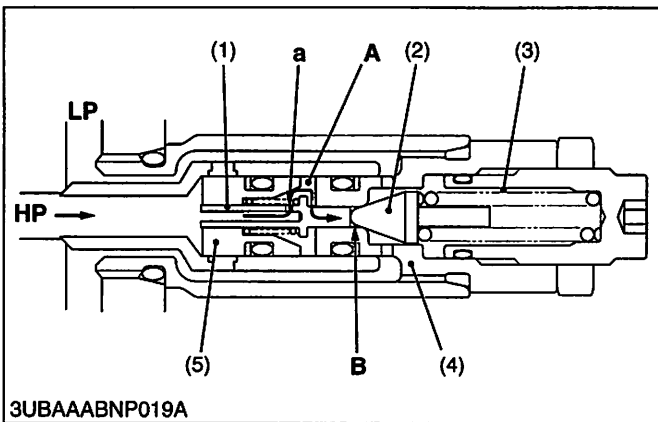


3TVAAACNP021A



3UBAAABNP018A

#### ■ Relief Operation



3UBAAABNP019A

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

W1023498

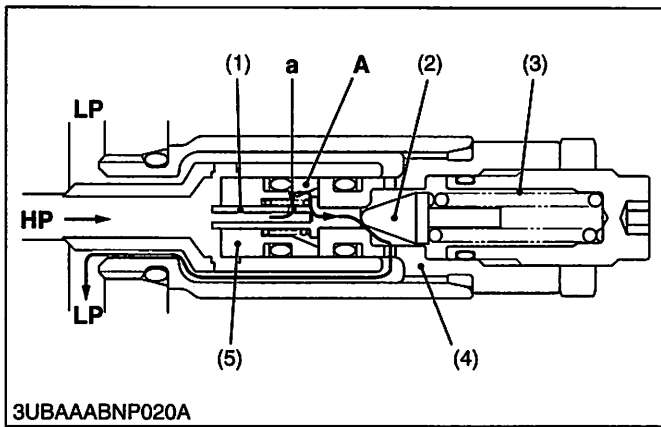
#### [When the actuator port pressure is lower than the setting]

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 (9) 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       | HP :High Pressure |
| (2) Pilot Poppet        | LP :Low Pressure  |
| (3) Piston Spring       | A : Chamber       |
| (4) Adjusting Screw     | B : Seat          |
| (5) Relief Valve Poppet | a : Throttle      |

W1024073





**[When the actuator port pressure is higher than the setting]**

When the cylinder port **HP** has reached the set pressure of the piston spring (5), the pressure oil in the spring chamber **A** opens the pilot poppet (4) 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 (1) to the right. Now the seat of the relief valve poppet (1) gets open. The pressure oil flows then from this seat into the tank, and the circuit pressure is kept at the pressure level set by the overload relief valve.

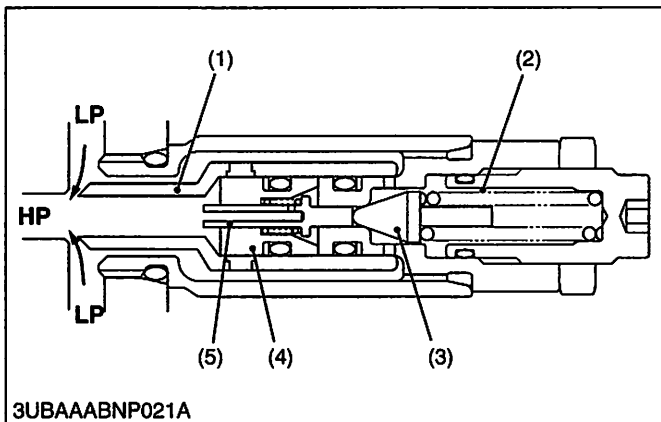
	Relief valve setting pressure
Dipperstick	17.20 to 17.69 MPa 175 to 180 kgf/cm <sup>2</sup> 2489 to 2560 psi
Swing	13.7 to 14.1 MPa 140 to 145 kgf/cm <sup>2</sup> 1991 to 2062 psi

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

- |                         |                          |
|-------------------------|--------------------------|
| (1) Piston Poppet       | <b>HP :High Pressure</b> |
| (2) Pilot Poppet        | <b>LP :Low Pressure</b>  |
| (3) Piston Spring       | <b>A : Chamber</b>       |
| (4) Adjusting Screw     | <b>a : Throttle</b>      |
| (5) Relief Valve Poppet |                          |

W1024163

**■ Anti-cavitation Operation**



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

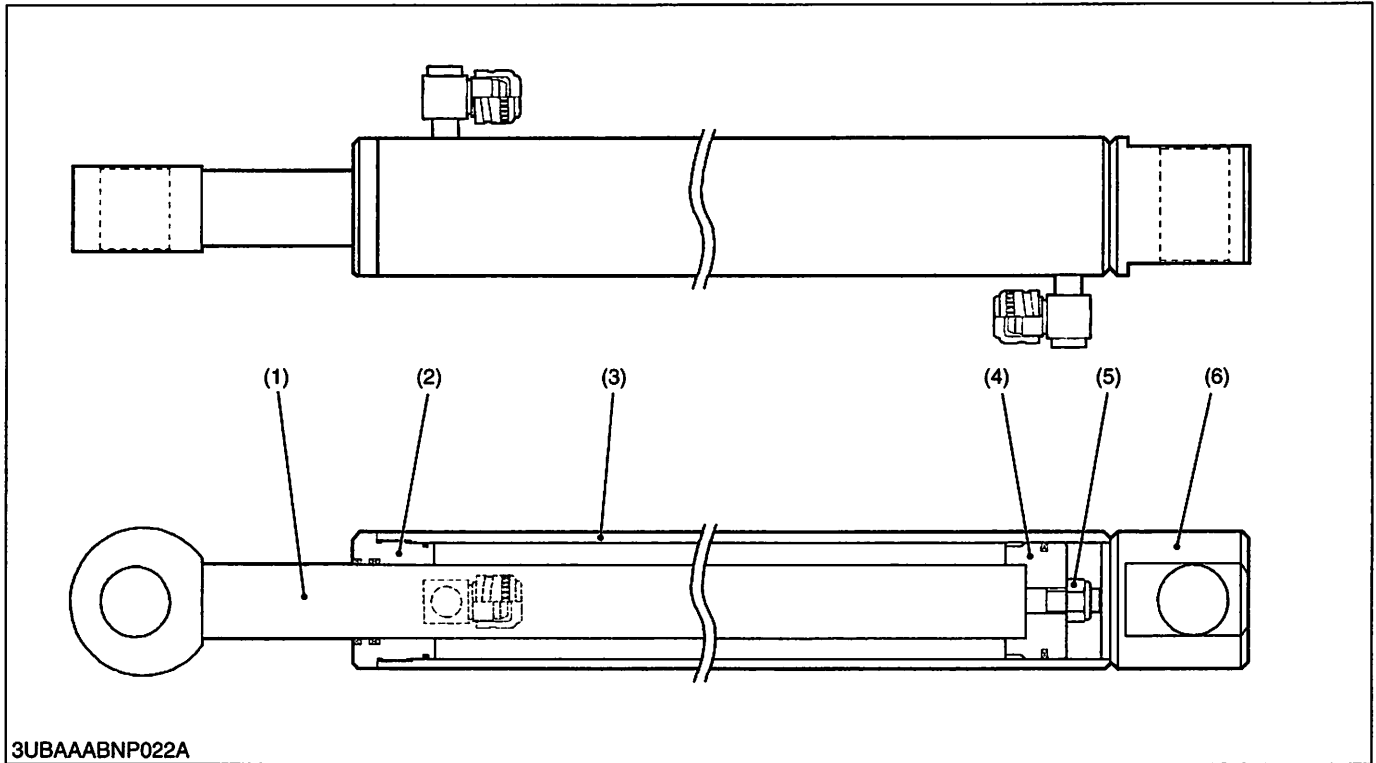
That is, this relief valve is combined an anti-cavitation functions supplying oil.

The pressure oil at the tank port **LH** 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 | (4) Relief Valve Poppet |
| (2) Piston Spring      | (5) Piston Poppet       |
| (3) Pilot Poppet       |                         |

W1024467

### [3] HYDRAULIC CYLINDER



3UBAAABNP022A

- (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

	Bucket Cylinder mm (in.)	Dipperstick Cylinder mm (in.)	Boom Cylinder mm (in.)	Stabilizer Cylinder mm (in.)	Swing Cylinder mm (in.)
Cylinder I.D.	30.0 (1.18)	30.0 (1.18)	30.0 (1.18)	30.0 (1.18)	30.0 (1.18)
Rod O.D.	60.0 (2.36)	60.0 (2.36)	50.0 (1.97)	60.0 (2.36)	60.0 (2.36)
Stroke	364 (14.33)	330 (12.99)	356 (14.02)	272 (10.71)	175 (6.89)

W1025274

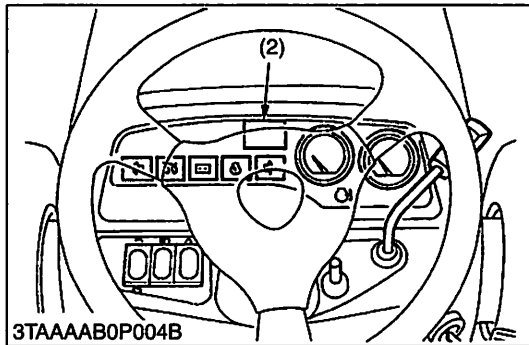
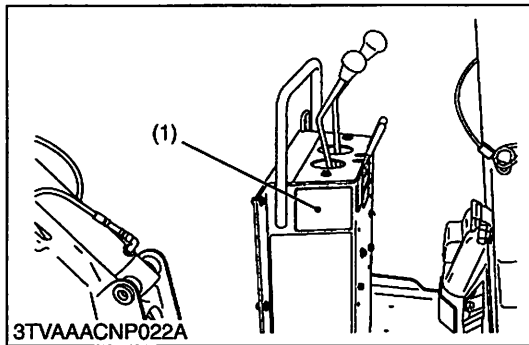
# SERVICING

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# 1. GENERAL

## [1] BACKHOE IDENTIFICATION



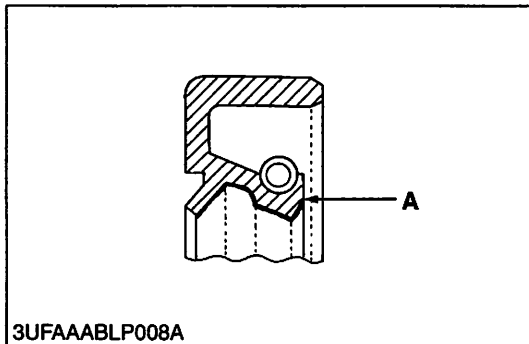
When contacting your local KUBOTA distributor, always specify backhoe serial number and hour meter reading.

(1) Serial Number

(2) Hour Meter

W1010477

## [2] GENERAL PRECAUTION



- 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 seal taped 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

W1010572

### [3] LUBRICANTS

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

Place	Capacity	Lubricants
Transmission case	10.1 L 2.7 U.S.gals. 2.2 Imp.gals.	KUBOTA SUPER UDT fluid*
Grease nipples	Until grease overflows	Moly Ep Type grease

\* KUBOTA original transmission hydraulic fluid

### [4] 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)	<ul style="list-style-type: none"> <li>• Check the transmission fluid level</li> <li>• Retighten the backhoe hardware to torque value</li> <li>• Check the hydraulic hoses</li> </ul>	8-S2 8-S2 8-S2
Every 10 hours	<ul style="list-style-type: none"> <li>• Grease all grease nipples</li> </ul>	8-S3

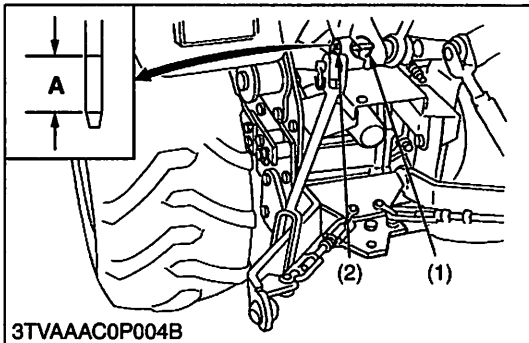
W1013874

### [5] 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.

#### (1) Check Points of Each Use or Daily



#### Checking Transmission Fluid Level

1. Check that the tractor hydraulic fluid level.
2. To check the oil level, remove the dipstick (2), 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 SUPER UDT fluid. Use of other oils may damage the transmission or hydraulic system.  
Refer to "LUBRICANTS".

- (1) Oil Filling Port  
(2) Dipstick

A : Oil level acceptable within this range.

W1011494

#### 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.

W1011636

#### Checking Hydraulic Hoses

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

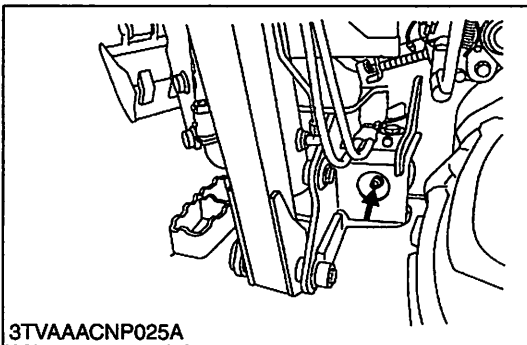
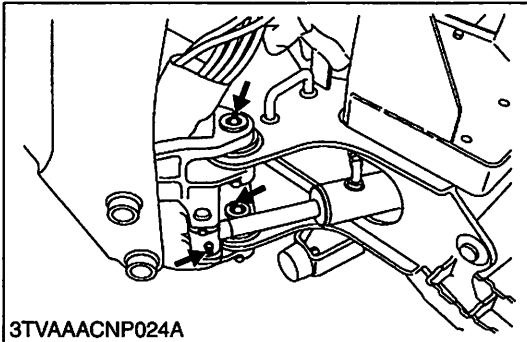
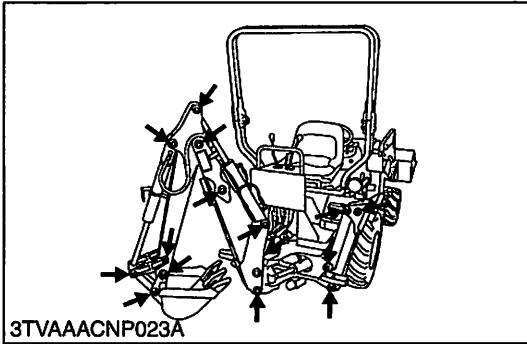
W1011703

## (2) Check Points of Every 10 Hours

### Greasing

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

W1011760



## 2. TROUBLESHOOTING

Symptom	Probable Cause	Solution	Reference Page
<b>All Functions Inoperative (Front Loader Is OK)</b>	<ul style="list-style-type: none"> <li>• Quick coupler disconnected</li> </ul>	Reconnect	–
<b>All Functions Including Front Loader, Are Inoperative</b>	<ul style="list-style-type: none"> <li>• Insufficient transmission fluid</li> <li>• Relief valve spring damaged</li> <li>• Hydraulic pump malfunctioning</li> <li>• Oil filter clogged</li> </ul>	Replenish Replace Repair or replace Replace	8-S2 5-S15 5-S14 G-13
<b>Hydraulic Oil Overheats</b>	<ul style="list-style-type: none"> <li>• Continuous operation against relief</li> <li>• Transmission fluid improper brand and viscosity</li> <li>• Relief valve misadjusted</li> <li>• Insufficient transmission fluid</li> <li>• Oil filter clogged</li> </ul>	Operate properly Use proper fluid  Readjust Replenish Replace	– G-7  5-S15 8-S2 G-13
<b>Individual Cylinder Circuit Weak or Inoperative (Others OK)</b>	<ul style="list-style-type: none"> <li>• Valve spool not moving fully</li> <li>• Valve spool stick (especially when warm)</li> <li>• Overload relief valve misadjusted</li> <li>• Piston seal ring worn or damaged</li> <li>• Cylinder tube worn or damaged</li> <li>• Oil leaks from joint</li> <li>• Hydraulic hose damaged</li> <li>• Dust in overload relief valve</li> </ul>	Adjust linkage Repair or replace Readjust Replace Replace Repair or replace Replace Flush hydraulic line	– 8-S17 – 8-S21 8-S19 – – –
<b>Excessive Cylinder Movement</b>	<ul style="list-style-type: none"> <li>• Piston seal ring worn or damage</li> <li>• Excessive valve spool to bore tolerance</li> <li>• Hydraulic hose or fitting damaged</li> <li>• Hydraulic hose or fitting loose</li> <li>• Cylinder tube worn or damaged</li> </ul>	Replace Replace Replace Retighten Replace	8-S21 8-S17 – – 8-S21
<b>Insufficient Cylinder Speed</b>	<ul style="list-style-type: none"> <li>• Engine rpm too low</li> <li>• Hydraulic pump malfunctioning</li> <li>• Relief valve pressure too low</li> <li>• Insufficient transmission fluid</li> </ul>	Adjust rpm Repair or replace Readjust Replenish	– 5-S14 5-S15 8-S2

W1014322

### 3. SERVICING SPECIFICATIONS

Item		Factory Specification	Allowable Limit
Main Frame Fulcrum Pin to Bushing	Clearance	0.076 to 0.132 mm 0.003 to 0.005 in.	0.5 mm 0.0197 in.
	Main Frame Fulcrum Pin O.D.	39.97 to 40.00 mm 1.574 to 1.575 in.	—
	Bushing I.D.	40.081 to 40.110 mm 1.578 to 1.579 in.	—
Swing Cylinder Rod Pin to Bushing	Clearance	0.108 to 0.259 mm 0.004 to 0.010 in.	1.0 mm 0.0394 in.
	Pin O.D.	24.816 to 25.000 mm 0.977 to 0.984 in.	—
	Bushing I.D.	25.000 to 25.209 mm 0.984 to 0.992 in.	—
Boom Support, Dipperstick Fulcrum Pin to Bushing	Clearance	0.140 to 0.180 mm 0.006 to 0.007 in.	1.0 mm 0.0394 in.
	Pin O.D.	29.820 to 30.000 mm 1.174 to 1.181 in.	—
	Bushing I.D.	30.000 to 30.251 mm 1.181 to 1.191 in.	—
Boom Cylinder Rod Pin to Cylinder Bushing	Clearance	0.139 to 0.281 mm 0.005 to 0.011 in.	1.0 mm 0.0394 in.
	Pin O.D.	29.820 to 30.000 mm 1.174 to 1.181 in.	—
	Bushing I.D.	30.000 to 30.251 mm 1.181 to 1.191 in.	—
Dipperstick Cylinder Rod Pin to Cylinder Bushing	Clearance	0.178 to 0.309 mm 0.007 to 0.012 in.	1.0 mm 0.0394 in.
	Pin O.D.	24.816 to 25.000 mm 0.977 to 0.984 in.	—
	Bushing I.D.	25.000 to 25.209 mm 0.984 to 0.992 in.	—
Bucket Cylinder Rod Pin to Cylinder Bushing	Clearance	0.262 to 0.393 mm 0.010 to 0.015 in.	1.0 mm 0.0394 in.
	Pin O.D.	24.816 to 25.000 mm 0.977 to 0.984 in.	—
	Bushing I.D.	25.000 to 25.209 mm 0.984 to 0.992 in.	—

W1013874



Item		Factory Specification	Allowable Limit	
Pin to Guide Link, Stabilizer Arm, Bucket Fulcrum or Bucket Link Bushing	Clearance	0.149 to 0.184 mm 0.006 to 0.007 in.	1.0 mm 0.0394 in.	
	Pin	O.D.	24.816 to 25.000 mm 0.9777 to 0.984 in.	–
	Bushing	I.D.	25.000 to 25.209 mm 0.984 to 0.992 in.	–
Stabilizer Cylinder Rod Pin to Cylinder Bushing	Clearance	0.127 to 0.253 mm 0.005 to 0.010 in.	1.0 mm 0.0394 in.	
	Pin	O.D.	24.816 to 25.000 mm 0.977 to 0.984 in.	–
	Bushing	I.D.	25.000 to 25.209 mm 0.984 to 0.992 in.	–

W1013089

## 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.

American standard cap screws with UNC or UNF threads				Metric cap screws					
Grade		SAE grade 5 or 8		Grade		Grade 8.8 (Approx. SAE grade 5)			
Size	Unit	N-m	kgf-m	ft-lbs	Size	Unit	N-m	kgf-m	ft-lbs
1/4		9.8 to 11.7	1.0 to 1.2	7.2 to 8.6	M6		9.8 to 11.2	1.0 to 1.1	7.2 to 8.3
5/16		19.0 to 23.1	1.9 to 2.4	14 to 17	M8		23.6 to 27.4	2.4 to 2.8	17.4 to 20.2
3/8		33.9 to 40.7	3.5 to 4.2	25 to 30	M10		48.1 to 55.8	4.9 to 5.7	35.5 to 41.2
1/2		88.1 to 105.8	9.0 to 10.8	65 to 78	M12		77.5 to 90.1	7.9 to 9.2	57.2 to 66.5
9/16		122.0 to 146.4	12.4 to 14.9	90 to 108	M14		124 to 147	12.6 to 15.0	91.2 to 108
5/8		176.3 to 211.5	18.0 to 21.6	130 to 156	M16		196 to 225	20.0 to 23.0	145 to 166

W1012507

### [2] HYDRAULIC HOSES FITTING AND FLARE PIPES

Item	Thread size	Tightening torque		
		N-m	kgf-m	ft-lbs
Adjustable elbow and adapter	9/16	37 to 44	3.7 to 4.6	27 to 33
	3/4	47 to 54	4.8 to 5.5	35 to 40
	7/8	77 to 85	7.9 to 8.7	57 to 63
Hose fitting and flare nut	9/16	22 to 25	2.2 to 2.6	16 to 19
	3/4	47 to 54	4.8 to 5.5	35 to 40
	7/8	43 to 50	4.4 to 5.1	32 to 37
Adapter (NPT)	3/8	39 to 44	3.9 to 4.4	28 to 32
	1/2	49 to 58	5.0 to 5.9	36 to 43
Adapter G (PF) [Equivalent for NPSF]	1/4	25 to 29	2.6 to 2.9	19 to 21
	3/8	49 to 54	5.0 to 5.5	36 to 39

■ **NOTE**

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

W1013389

### [3] TIGHTENING TORQUES OF SCREWS, BOLT AND NUTS ON THE TABLE BELOW ARE ESPECIALLY SPECIFIED

Item	N-m	kgf-m	ft-lbs
Holder plate mounting screw	77.5 to 90.1	7.9 to 9.2	57.2 to 66.5
Cylinder head	245 to 275	25.0 to 28.0	181 to 203
Cylinder piston mounting nut (Boom, stabilizer, dipperstick, bucket)	157 to 196	16.0 to 20.0	116 to 145
Cylinder piston mounting nut (Swing)	216 to 245	22.0 to 25.0	159 to 181

W1012736

# 5. DISMOUNTING AND MOUNTING

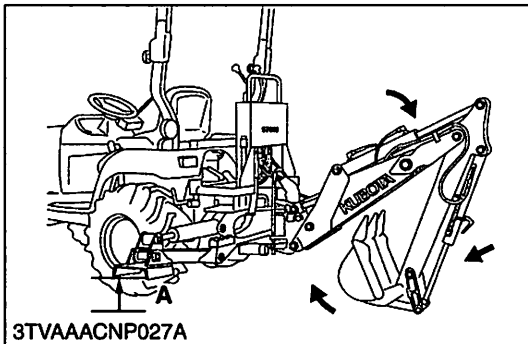
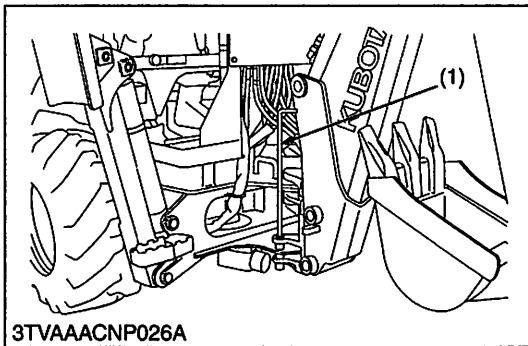
## [1] DISMOUNTING THE BACKHOE

### ⚠ CAUTION

- When starting the engine, always sit in the 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 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 slightly above idle.
- For removing the backhoe, locate the tractor / loader / backhoe on a flat and hard surface, preferably concrete. If the ground surface is soft, place a board on the ground for the contact parts of backhoe such as stabilizer pad, bucket, boom etc.



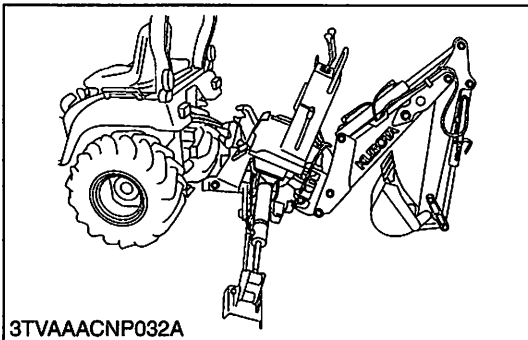
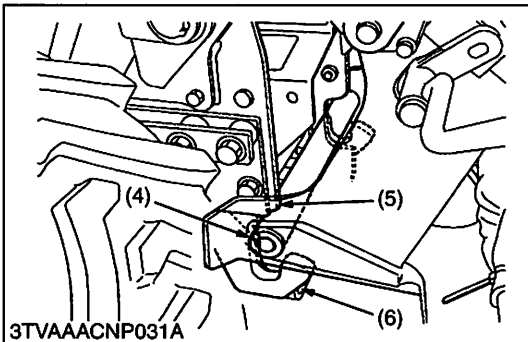
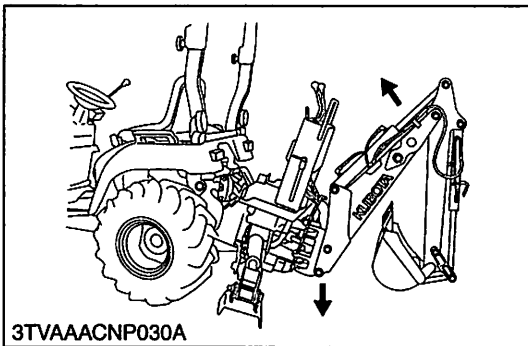
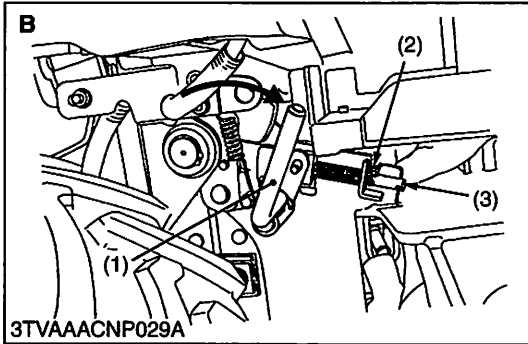
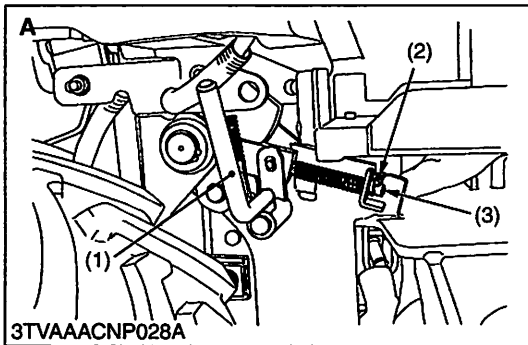
### Preparation

1. Start the engine and lower the front loader to the ground.
2. Set the swing lock pin 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 15 inches high.
5. Raise the rear wheels slightly with the boom.

(1) Swing Lock Pin

A : 380 mm (15 in.)

W1014290



**Mount Lever**

1. Remove the snap ring (2) from the set pins (3). Release the set pins (3) with the mount levers (1). Reinstall the snap pins (2) in the release position.
2. Slowly raise the boom and hold at full height (approx. 5 seconds) to disengage the mount holder from the tractor mount pins.
3. Raise the backhoe by operating the stabilizers to the lowering direction until the mount bars (4) hit to the guide stopper (5) on the support hooks (6).
4. Move the tractor forward from the backhoe about 200 mm (8 in.).

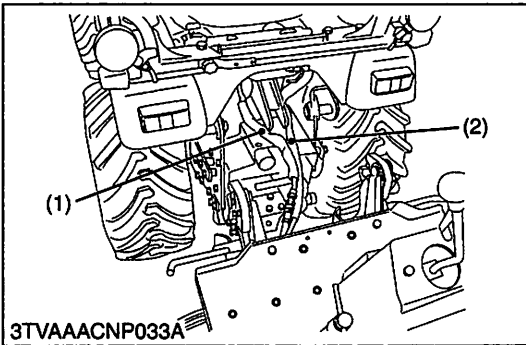
**■ IMPORTANT**

- **Be careful not to damage or break the hoses when moving the tractor.**
5. Lower the main frame and swing frame onto the ground by operating the boom and stabilizer control levers.
  6. Lift up the both sides of stabilizers (if necessary).
  7. Lower the front loader and shut off the engine.

- (1) Mount Lever
- (2) Snap Pin
- (3) Set Pin
- (4) Mount Bar
- (5) Guide Stopper
- (6) Support Hook

- A : Mount Position**
- B : Release Position**

W1013686

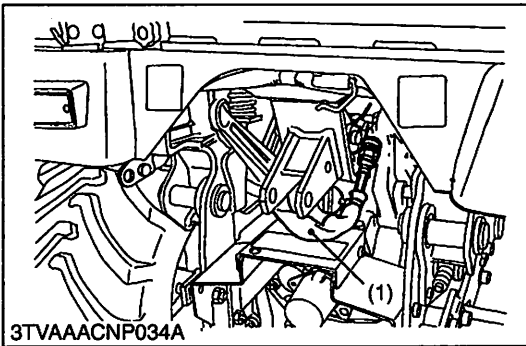


**Hydraulic Hoses**

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

(1) Inlet Hose (2) Return Hose

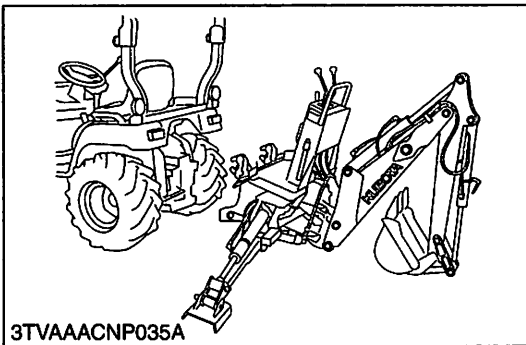
W1014225



**Separation**

1. Start the engine. Slowly move the tractor forward and make sure of the remove of the backhoe. Then drive the tractor / loader slowly away from the backhoe.

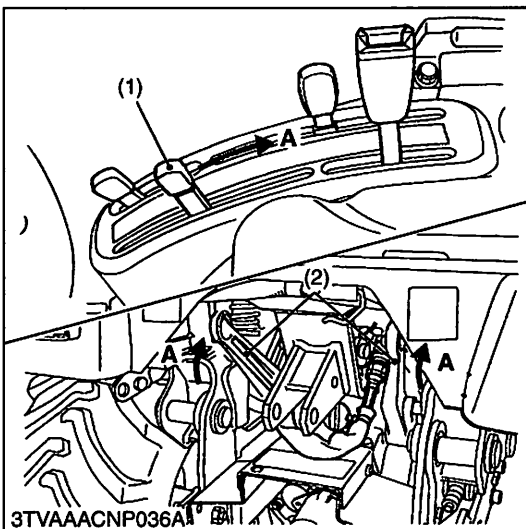
W1014898



**[2] MOUNTING THE BACKHOE TO TRACTOR**

**CAUTION**

- When starting the engine, always sit in the proper operator's seat of the tractor.
- Keep hands, feet and body from between the tractor and the backhoe and under the backhoe.
- When getting off the tractor, make sure that range gear shift lever and PTO lever is in neutral, then set the parking brake.



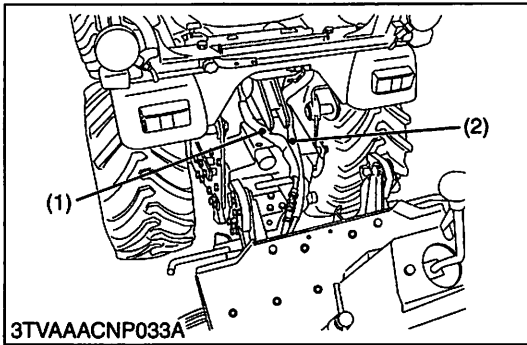
**Preparation**

**CAUTION**

- Make sure the tractor PTO is disengaged.
- IMPORTANT**
- When reinstalling the backhoe, set the engine speed slightly above idle.
1. Remove the 3 point hitch equipments or drawbar from tractor. (If equipped.)
  2. Raise the lift arms (2) of the tractor to the top position.

(1) Position Control Lever (2) Lift Arm A : Up

W1014573



**Hydraulic Hoses**

1. Start the engine and move the tractor backward slowly, centering to the backhoe main frame. Step the tractor 254 to 305 mm (10 to 12 in.) away from the backhoe.
2. Lower the front loader and shut off the engine, then apply parking brake.
3. Connect the hydraulic hoses (1), (2).

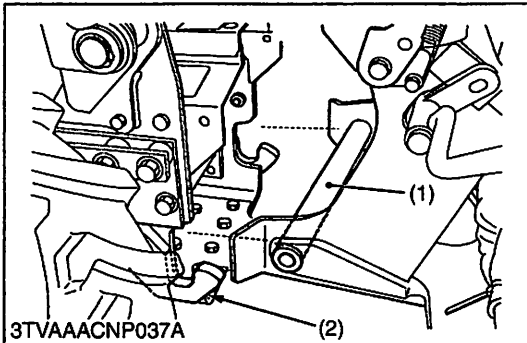
■ **IMPORTANT**

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

(1) Inlet Hose

(2) Return Hose

W1014766



**Mount Lever and Mounting Backhoe**

1. Start the engine and lower the both sides of stabilizer until stabilizer pads contact to the ground slightly. (If the stabilizer had been at up position)
2. Slowly move the boom to raising position until the mount bar (1) on the backhoe main frame are slightly higher than the tractor frame support hooks (2).

⚠ **CAUTION**

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

■ **NOTE**

- **If the support hooks (2) are not parallel to the mount bars, stabilizer is adjusted by lowering so that the support hooks and the mount bars may become parallel.**

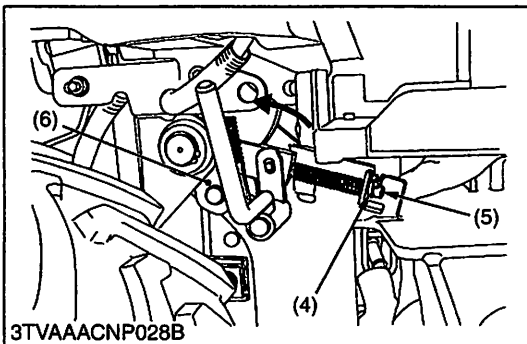
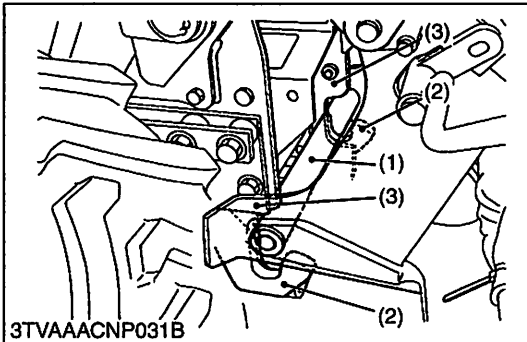
3. Move the tractor backward until the support hooks (2) on the tractor main frame are just beneath the mount bar (1) on the backhoe main frame.
4. Lower the mount bar (1) onto the support hooks (2) by operating the stabilizer and boom control lever.
5. Remove the snap pins (4) on the set pins (5).
6. Move the boom slowly to the lowering direction to engage the mount holders (6) on the backhoe with the tractor mount pins. Set pin (5) are locked automatically. Set the snap pins (4) to the mounted position.

■ **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 cycle all backhoe functions.**
- **If the backhoe has been stored for long period, check and maintain the backhoe.**



(1) Mount Bar

(2) Support Hook

(3) Guide Step

(4) Snap Pin

(5) Set Pin

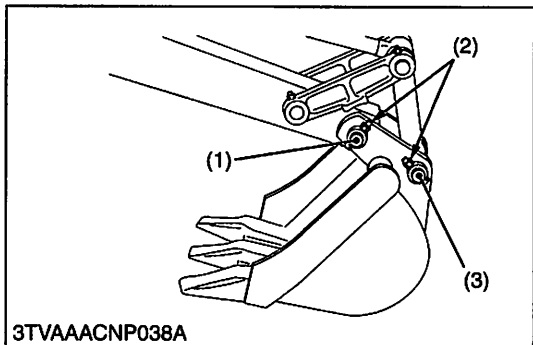
(6) Mount Pin Holder

W1015409

### [3] DISASSEMBLING THE BACKHOE

**■ IMPORTANT**

- When reassembling the pins, bushings and inner rings, apply slight coat of grease to them.
- When tightening the hydraulic hoses, refer to “HYDRAULIC HOSES FITTING AND FLARE PIPES” (Page 8-S7.)



**Bucket**

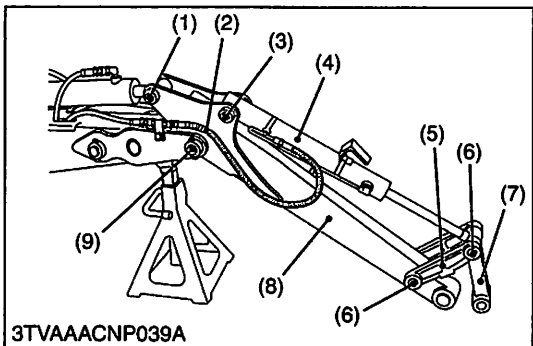
1. Remove the bucket from the dipper stick.

**(When reassembling)**

- Install locking nuts (2) to setting bolts at position where the setting bolt may still be rotated.

- (1) Pin (0.98 × 6.17)
- (2) Locking Nut
- (3) Pin (0.98 × 6.17)

W1015866



**Dipperstick and Bucket Cylinder**

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

**■ NOTE**

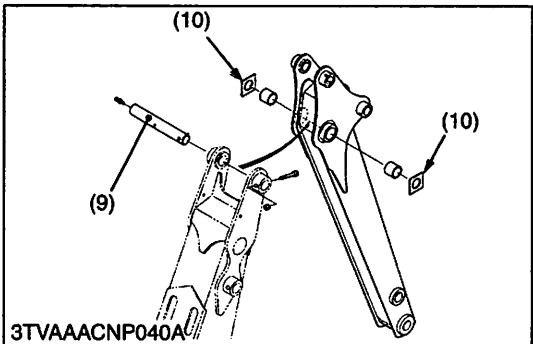
- To prevent from the damage of hydraulic tubes, set the wooden block etc. between dipperstick cylinder and boom.

**(When reassembling)**

- Lock the locking nuts to setting bolts at position where the setting bolt may still be rotated.
- Replace the spacers (10) at their original position.

- (1) Pin (0.98 × 5.39)
- (2) Hydraulic Hose
- (3) Pin (0.98 × 5.39)
- (4) Bucket Cylinder
- (5) Guide Link
- (6) Pin (0.98 × 6.68)
- (7) Bucket Link
- (8) Dipperstick
- (9) Pin (1.18 × 7.96)
- (10) Spacer

W1016036

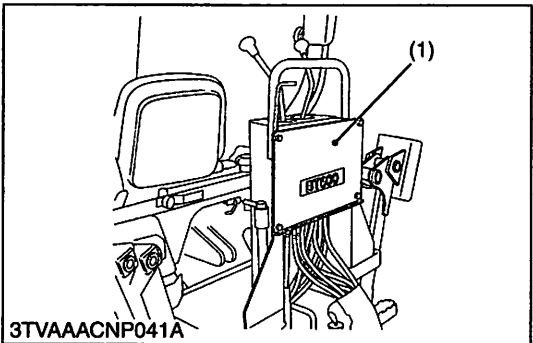


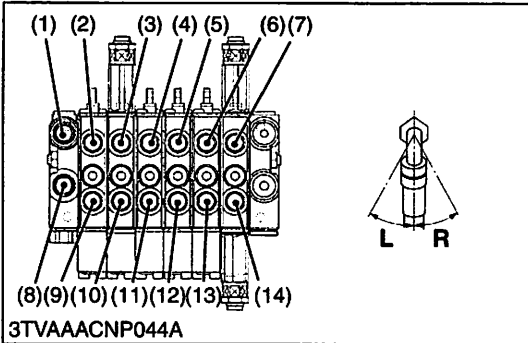
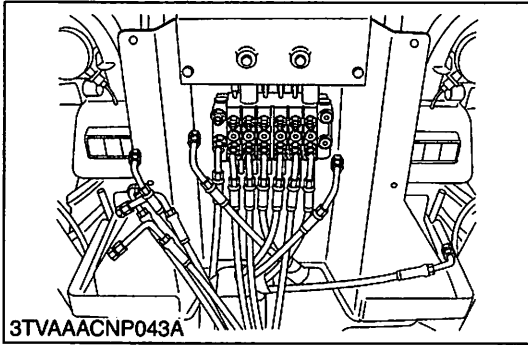
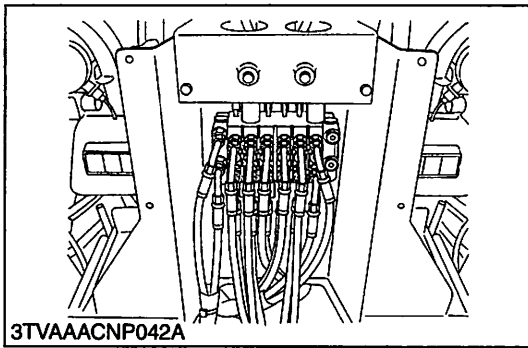
**Valve Cover**

1. Remove the valve cover (1).

- (1) Valve Cover

W1016537





**Hydraulic Hoses**

1. Disconnect the hydraulic hoses from the control valve.

**(When reassembling)**

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

Port	Angle of Bent Tube
T	L 0.227 rad. (L 13 °)
A6	L 0.227 rad. (R 13 °)

**(Reference)**

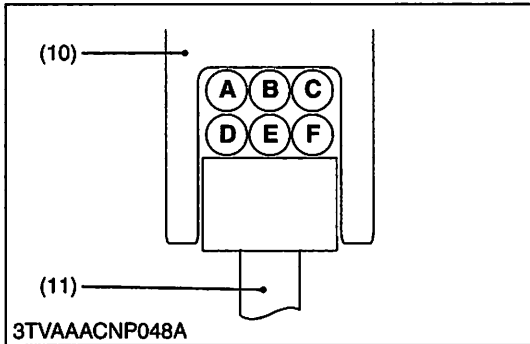
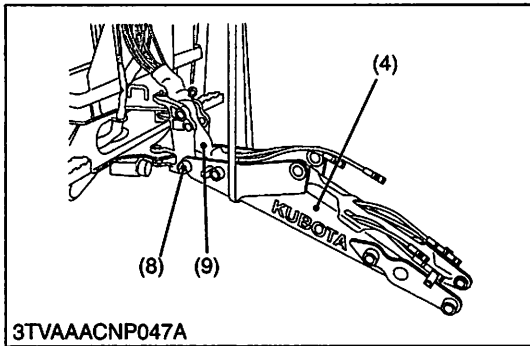
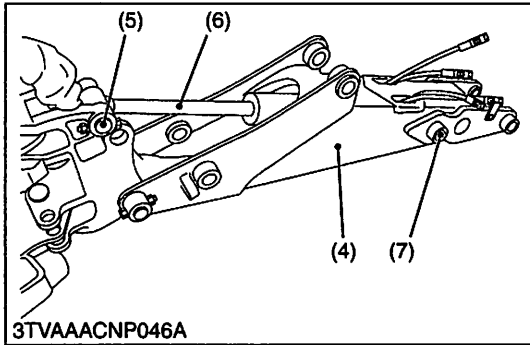
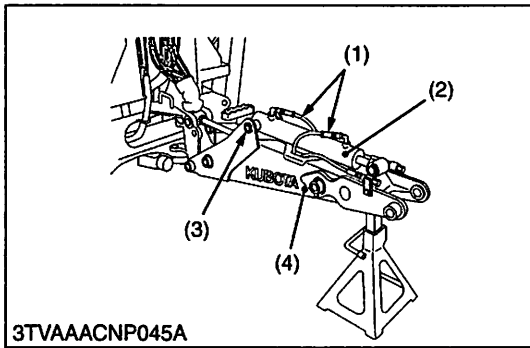
- Color or tape

	Color
P	Blue
A1, B1	Red
A2, B2	Orange
A3, B3	Green
A4, B4	White
A5, B5	Yellow
A6	Light Blue

- |                                 |                                  |
|---------------------------------|----------------------------------|
| (1) T Port (Return)             | (10) B2 Port (for Dipperstick)   |
| (2) A1 Port (for Bucket)        | (11) B3 Port (for Stabilizer RH) |
| (3) A2 Port (for Dipperstick)   | (12) B4 Port (for Stabilizer LH) |
| (4) A3 Port (for Stabilizer RH) | (13) B5 Port (for Boom)          |
| (5) A4 Port (for Stabilizer LH) | (14) B6 Port (for Swing)         |
| (6) A5 Port (for Boom)          |                                  |
| (7) A6 Port (for Swing)         |                                  |
| (8) P Port (Pump)               | <b>L : Installation Angle</b>    |
| (9) B1 Port (for Bucket)        | <b>R : Installation Angle</b>    |

W1016658





**Dipperstick Cylinder, Boom and Boom Cylinder**

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

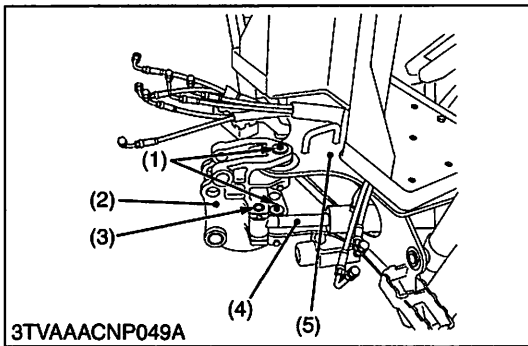
**(When reassembling)**

- Connect the hydraulic hoses at their original positions.
- Lock the locking nuts to setting bolts at position where the mounting bolt may still be rotated.

- (1) Hydraulic Hose
- (2) Dipperstick Cylinder
- (3) Pin (0.98 × 6.22)
- (4) Boom
- (5) Pin (1.18 × 4.72)
- (6) Boom Cylinder
- (7) Pin (1.18 × 7.96)
- (8) Pin (1.18 × 7.96)
- (9) Hose
- (10) Swing Frame
- (11) Boom Cylinder Rod

- Position of Hose**
- A : Bucket Bottom Hose
  - B : Dipper Rod Hose
  - C : Boom Bottom Hose
  - D : Bucket Rod Hose
  - E : Dipper Bottom Hose
  - F : Boom Bottom Hose

W1016286



**Swing Frame**

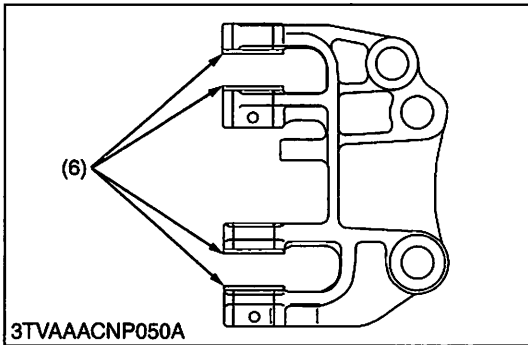
1. Disconnect the swing cylinder rods (4) from swing frame (2).
2. Remove the swing frame (2) from main frame (5).

**(When reassembling)**

- Lock the locking nuts to setting bolts at position where the setting bolt may still be rotated.
- Reinstall the thrust washers (6) at their original positions.

- |                       |                        |
|-----------------------|------------------------|
| (1) Pin (1.57 × 4.29) | (4) Swing Cylinder Rod |
| (2) Swing Frame       | (5) Main Frame         |
| (3) Pin (0.98 × 4.21) | (6) Thrust Washer      |

W1017110

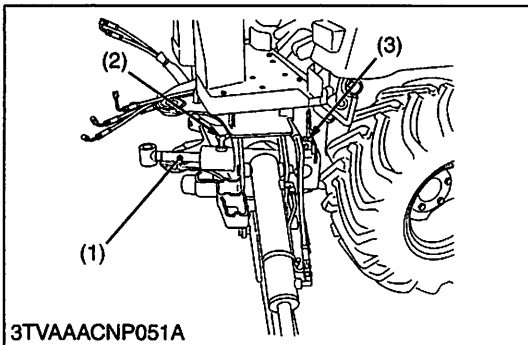


**Swing Cylinder**

1. Remove the swing cylinder bottom pin (3).
2. Disconnect the hydraulic hoses (2).
3. Remove the swing cylinder (1).

- |                    |                       |
|--------------------|-----------------------|
| (1) Swing Cylinder | (3) Pin (0.98 × 6.18) |
| (2) Hydraulic Hose |                       |

W1017745



**Stabilizers and Stabilizer Cylinder**

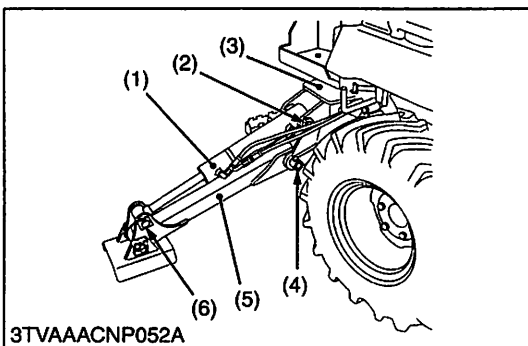
1. Remove the pins (2) (6) and remove the stabilizer cylinder (1) with hydraulic hoses.
2. Remove the pin (4) and remove the stabilizer (5).

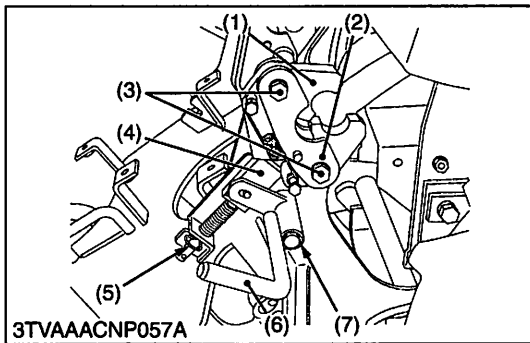
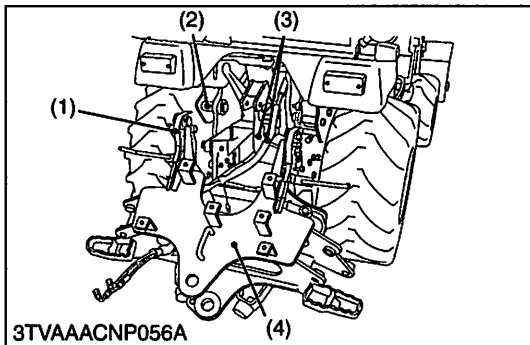
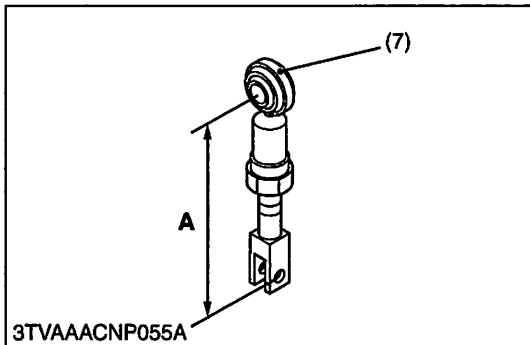
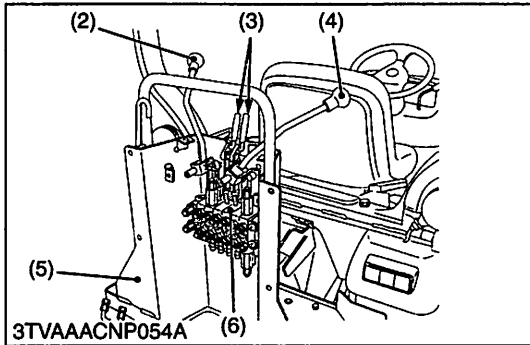
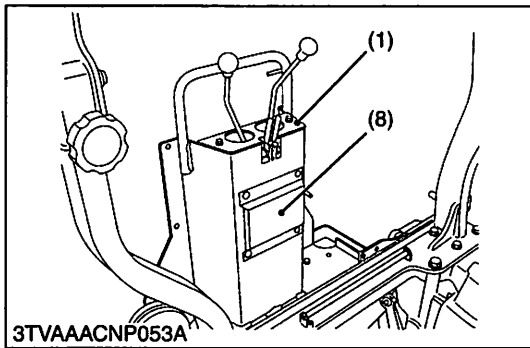
**(When reassembling)**

- Lock the locking nuts to setting bolts at position where the setting bolt may still be rotated.

- |                         |                       |
|-------------------------|-----------------------|
| (1) Stabilizer Cylinder | (4) Pin (0.98 × 6.93) |
| (2) Pin (0.98 × 6.06)   | (5) Stabilizer        |
| (3) Backhoe Main Frame  | (6) Pin (0.98 × 3.90) |

W1017254





**Control Valve and Step**

1. Remove the cover (8).
2. Remove the lever support (1).
3. Remove the control levers (2), (3), (4) from the control valve (6).
4. Remove the control valve (6) from the step (5).
5. Remove the step (5) from the backhoe main frame.

**(When reassembling)**

■ **NOTE**

- **Do not change the length of control lever rods (7). If the length of rod have been changed or replace them adjust the length as below.**

**(Reference)**

- Length of control lever rod A : 72.5 to 73.5 mm  
2.85 to 2.89 in.

- |  |                                |
|--|--------------------------------|
| (1) Lever Support                            | (5) Step                       |
| (2) Control Lever for Bucket and Dipperstick | (6) Control Valve              |
| (3) Control Lever for Stabilizer             | (7) Control Lever Rod Assembly |
| (4) Control Lever for Boom and Swing         | (8) Cover                      |

W1017535

**Backhoe Main Frame and Hydraulic Hose**

1. Hoist the backhoe main frame (4) and disconnect the mount holders (1) from mount pins (2).
2. Remove the three hydraulic hoses (3).
3. Separate the main frame (4) from the tractor frame.

- |                  |                        |
|------------------|------------------------|
| (1) Mount Holder | (3) Hydraulic Hose     |
| (2) Mount Pin    | (4) Backhoe Main Frame |

W1017875

**Holder Plate, Mount Holder and Mount Lever**

1. Remove the holder plate (2) and mount holder (1).
2. Remove the snap pin (5) and external cir-clip (7).
3. Remove the mount lever (6) and set pin (4).

**(When reassembling)**

Tightening torque	Holder plate mounting screw	77.5 to 90.1 N-m 7.9 to 9.2 kgf-m 57.2 to 66.5 ft-lbs
-------------------	-----------------------------	---

- |                  |                       |
|------------------|-----------------------|
| (1) Mount Holder | (5) Snap Pin          |
| (2) Holder Plate | (6) Mount Lever       |
| (3) Screw        | (7) External Cir-clip |
| (4) Set Pin      |                       |

W1018402

## 6. CHECKING, DISASSEMBLING AND SERVICING

### [1] CONTROL VALVE

#### (1) Checking and Adjusting

#### Relief Valve Setting Pressure

■ **NOTE**

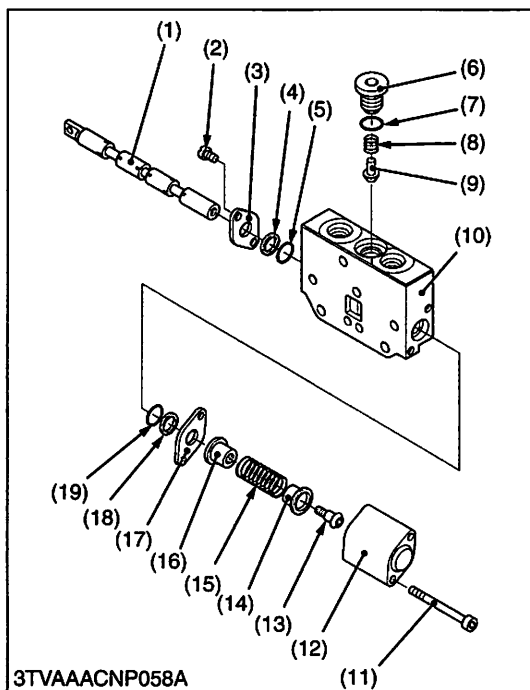
- The relief valve of the tractor hydraulic system is used as a relief valve of the backhoe hydraulic system.

(Reference)

Relief valve pressure	Factory spec.	12.3 to 12.7 MPa 125 to 130 kgf/cm <sup>2</sup> 1778 to 1849 psi
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W1019092

#### (2) Disassembling and Assembling



#### Disassembling Control Valve

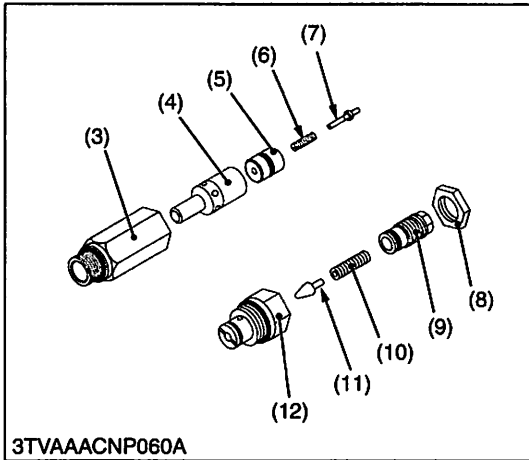
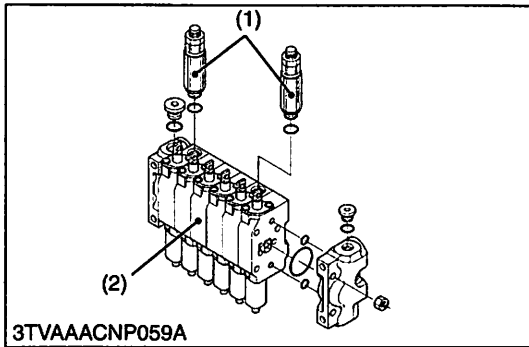
1. Remove the spring and load check valve.
2. Remove the seal plate and wiper ring from valve housing.
3. Remove the cap, seal plate and wiper ring, and draw out the spool from the valve housing.

(When reassembling)

- Clean all parts with a suitable solvent, and dry with a lint-free cloth or air.
- Visually inspect all parts for signs of scoring or damage.
- Install the spool and seal plate to the valve housing, taking care not to damage the O-rings.

- |                      |                    |
|----------------------|--------------------|
| (1) Spool            | (11) Screw         |
| (2) Screw            | (12) Cap           |
| (3) Seal Plate       | (13) Cap Screw     |
| (4) Wiper Ring       | (14) Spring Seat   |
| (5) O-ring           | (15) Return Spring |
| (6) Plug             | (16) Spring Seat   |
| (7) O-ring           | (17) Seal Plate    |
| (8) Spring           | (18) Wiper Ring    |
| (9) Load Check Valve | (19) O-ring        |
| (10) Valve Housing   |                    |

W1036061



**Disassembling Overload Valve (Port Relief Valve)**

1. Remove the overload relief valve (1) from the valve housing (3).
2. Separate the all component parts.

**(When reassembling)**

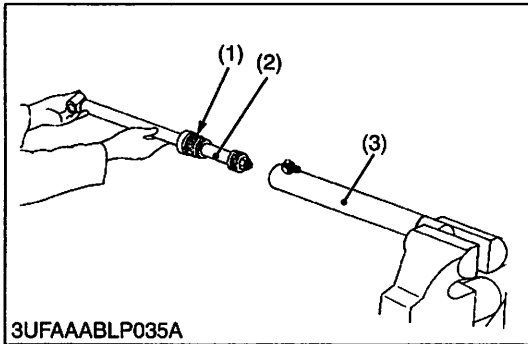
- Clean all parts with a suitable solvent, and dry with a lint-free cloth or air.
- Visually inspect all parts for signs of scoring or damage.
- Install the overload relief valve assembly to the valve housing, using care not to damage the O-ring.

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

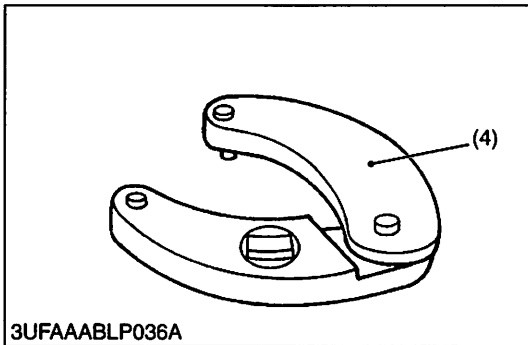
W1021194

## [2] BOOM, DIPPERSTICK, BUCKET, SWING AND STABILIZER CYLINDER

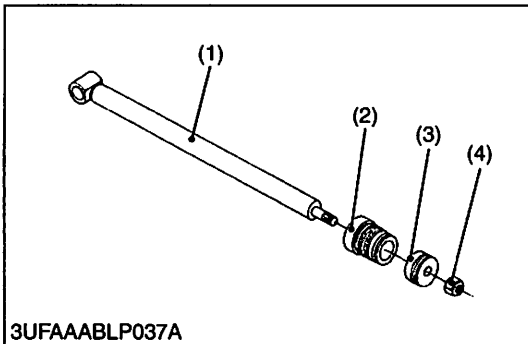
### (1) Disassembling and Assembling



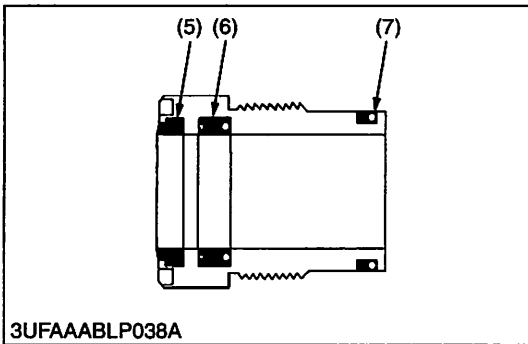
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#### Cylinder Rod Assembly

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, using care not to damage the piston seal on the piston.
- Install the cylinder head to the cylinder tube, using care not to damage the O-ring on the cylinder head.

Tightening torque	Cylinder head	245 to 275 N-m 25.0 to 28.0 kgf-m 181 to 203 ft-lbs
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- (1) Cylinder Head (3) Cylinder Tube  
(2) Piston Rod Assembly (4) Adjustable Gland Wrench

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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).

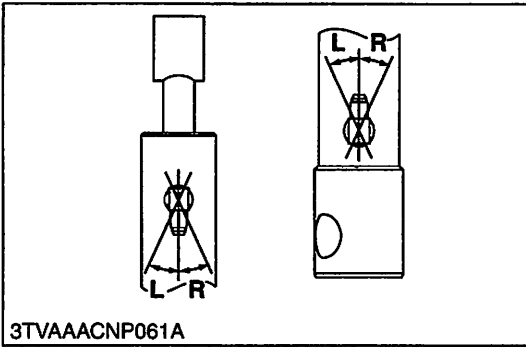
#### (When reassembling)

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

Tightening torque	Bucket cylinder, boom cylinder, stabilizer cylinder and dipperstick cylinder, piston mounting nut	157 to 196 N-m 16.0 to 20.0 kgf-m 116 to 145 ft-lbs
	Swing cylinder piston mounting nut	216 to 245 N-m 22.0 to 25.0 kgf-m 159 to 181 ft-lbs

- (1) Piston Rod (5) Wiper Seal  
(2) Cylinder Head (6) Oil Seal  
(3) Piston (7) O-ring  
(4) Nut

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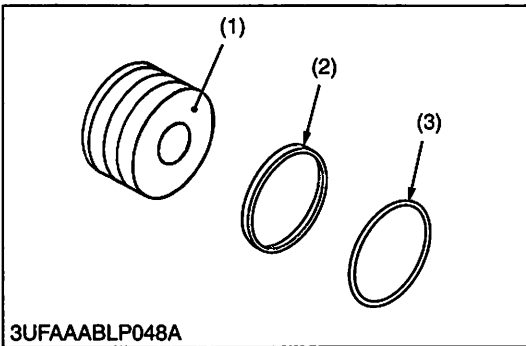


**Cylinder Adaptor Angle**

- Connect the cylinder adaptor at their original positions and be sure to connect the adaptor angle as indicated table below.

Cylinder	Rod Side	Bottom Side
Swing	R70 ±1 (deg.)	R75 ±1 (deg.)
Boom	0 ±1	0 ±1
Dipperstick	R25 ±1	L 25 ±1
Bucket	0 ±1	0 ±1
Stabilizer (LH)	R20 ±1	0 ±1
Stabilizer (RH)	L20 ±1	0 ±1

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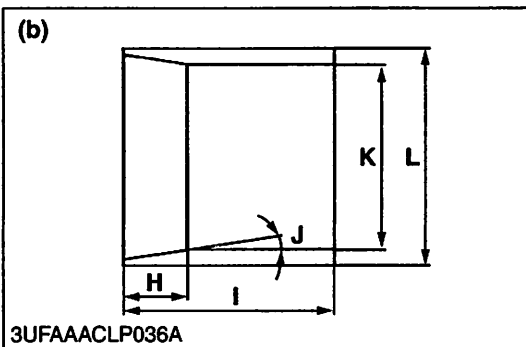
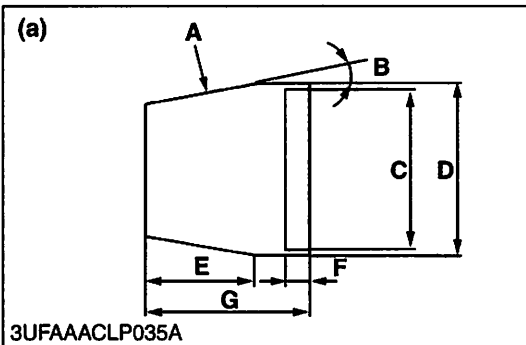


**Piston Seal and O-ring**

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.

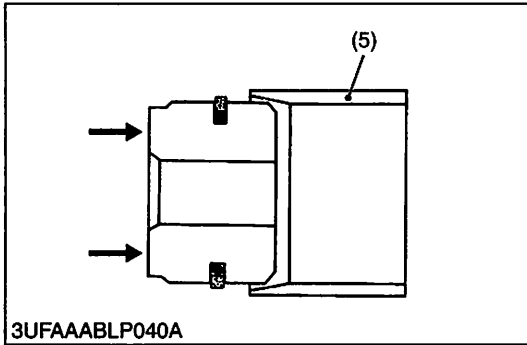
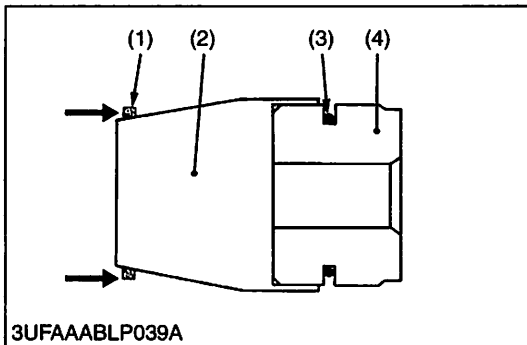


	Bucket, Dipperstick, Swing, Stabilizer Cylinder	Boom Cylinder
A	80 √	80 √
B	0.157 rad. 9°	0.157 rad. 9°
C	60.18 mm 2.369 in.	50.18 mm 1.976 in.
D	61.18 mm 2.409 in.	51.18 mm 2.015 in.
E	42.00 mm 1.654 in.	42.00 mm 1.654 in.
F	10.00 mm 0.394 in.	10.00 mm 0.394 in.
G	58.40 mm 2.299 in.	58.40 mm 2.299 in.
H	14.00 mm 0.551 in.	14.0 mm 0.551 in.
I	35.00 mm 1.378 in.	35.00 mm 1.378 in.
J	0.122 rad. 7°	0.122 rad. 7°
K	60.2 mm 2.370 in.	50.2 mm 1.976 in.
L	69.00 mm 2.717 in.	59.00 mm 2.323 in.

- (1) Piston
- (2) Piston Seal
- (3) O-ring

- (a) Slide Jig
- (b) Correcting Jig

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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).

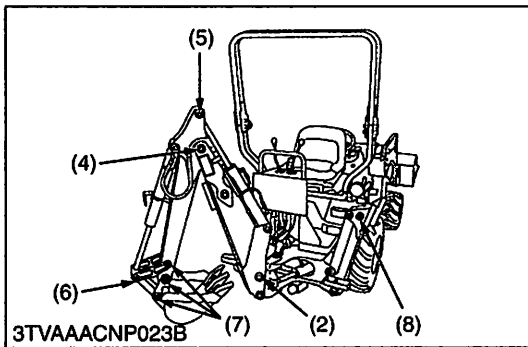
■ **NOTE**

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

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

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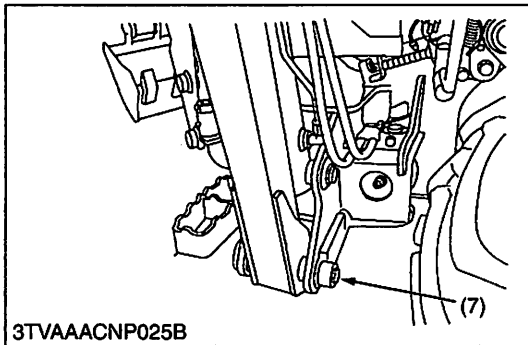
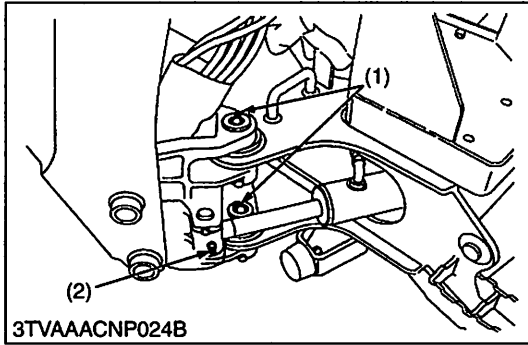


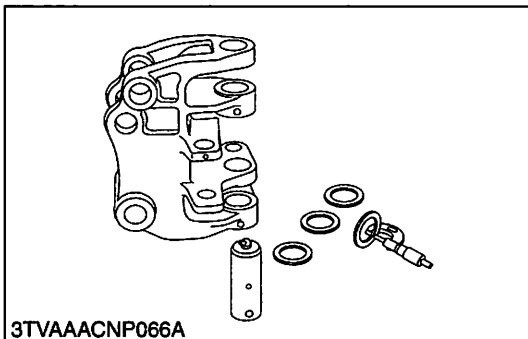
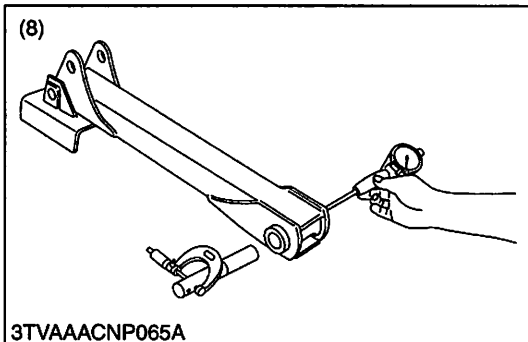
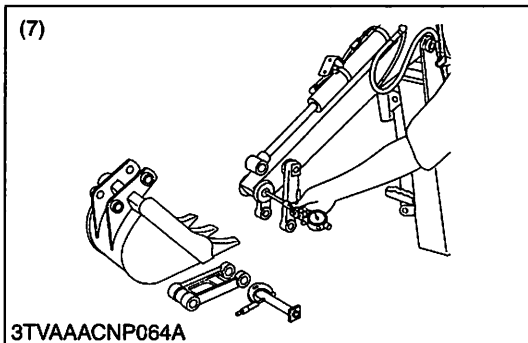
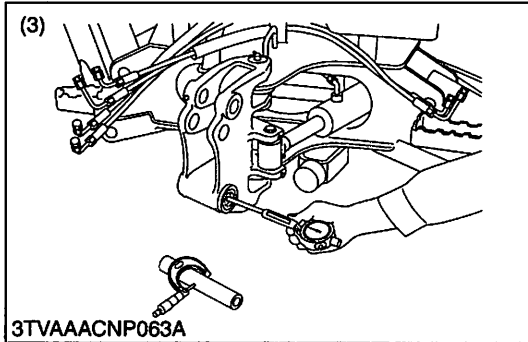
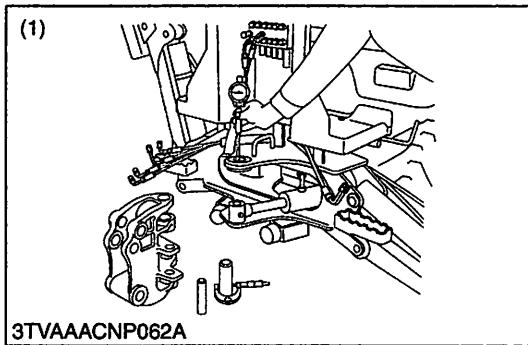


**Clearance between Pin and Bushing**

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

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**Clearance between Pin and Bushing (Continued)**

	Clearance	Factory spec.	Allowable limit
(1)	Main frame fulcrum pin and bushing	0.076 to 0.132 mm 0.003 to 0.005 in.	0.5 mm 0.0197 in.
(2)	Swing cylinder rod pin and cylinder bushing	0.108 to 0.259 mm 0.004 to 0.010 in.	1.0 mm 0.0394 in.
(3)	Boom support pin and bushing, dipperstick fulcrum pin and bushing	0.140 to 0.180 mm 0.006 to 0.007 in.	1.0 mm 0.0394 in.
(4)	Boom cylinder rod pin and cylinder bushing	0.139 to 0.281 mm 0.005 to 0.011 in.	1.0 mm 0.0394 in.
(5)	Dipperstick cylinder rod pin and cylinder bushing	0.178 to 0.309 mm 0.007 to 0.012 in.	1.0 mm 0.0394 in.
(6)	Bucket cylinder rod pin and cylinder bushing	0.262 to 0.393 mm 0.010 to 0.015 in.	1.0 mm 0.0394 in.
(7)	Guide link pin / stabilizer arm pin / bucket fulcrum / bucket link pins and bushing	0.149 to 0.184 mm 0.006 to 0.007 in.	1.0 mm 0.0394 in.
(8)	Stabilizer cylinder rod pin and cylinder bushing	0.127 to 0.253 mm 0.005 to 0.010 in.	1.0 mm 0.0394 in.

Main frame fulcrum pin O.D.	Factory spec.	39.97 to 40.00 mm 1.574 to 1.575 in.
Cylinder pins (swing / bucket / dipperstick / stabilizer), bucket fulcrum / guide link pins and stabilizer arm pins O.D.		24.816 to 25.000 mm 0.977 to 0.984 in.
Cylinder pins (boom), boom support pin and dipperstick fulcrum pin O.D.		29.820 to 30.000 mm 1.174 to 1.181 in.
Main frame fulcrum bushing I.D.		40.081 to 40.110 mm 1.578 to 1.579 in.
Cylinder bushing (swing / bucket / dipperstick / stabilizer), bucket fulcrum / guide link bushing and stabilizer arm bushing I.D.		25.000 to 25.209 mm 0.984 to 0.992 in.
Cylinder bushing (boom), boom support bushing and dipperstick bushing I.D.		30.000 to 30.251 mm 1.181 to 1.191 in.

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**Thrust Washer Wear**

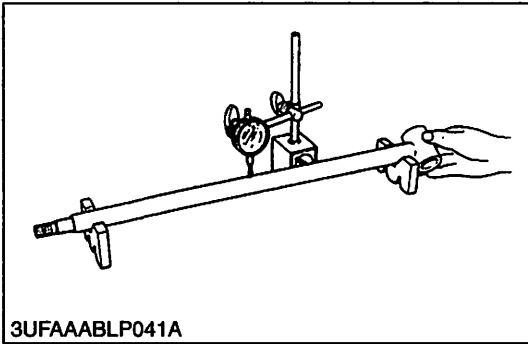
1. Measure the thickness of thrust washer with an outside micrometer.
2. If the wear exceeds the allowable limit, replace it.

■ **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 spec.	2.45 to 2.82 mm 0.0966 to 0.1126 in.
	Allowable limit	1.8 mm 0.0709 in.

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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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