

# PARTS & SERVICE NEWS

REF NO.	AA00043
DATE	15, March 2000

**SUBJECT:** BRAKE CABINET AND ACCUMULATOR MOUNTING IMPROVEMENTS

**PURPOSE:** Provide information on revised design

**APPLICATION:** 530M Dump Trucks prior to S/N A30031

**FAILURE CODE:** 43B099

**DESCRIPTION:**

A brake cabinet mount kit (MK4111) has been designed to prevent the brake cabinet from vibrating and becoming loose. The vibration of the brake cabinet may result in the failure of attached hardware inside the cabinet and possible release of hydraulic oil. This kit will require changes to be made internally and externally to the brake cabinet.

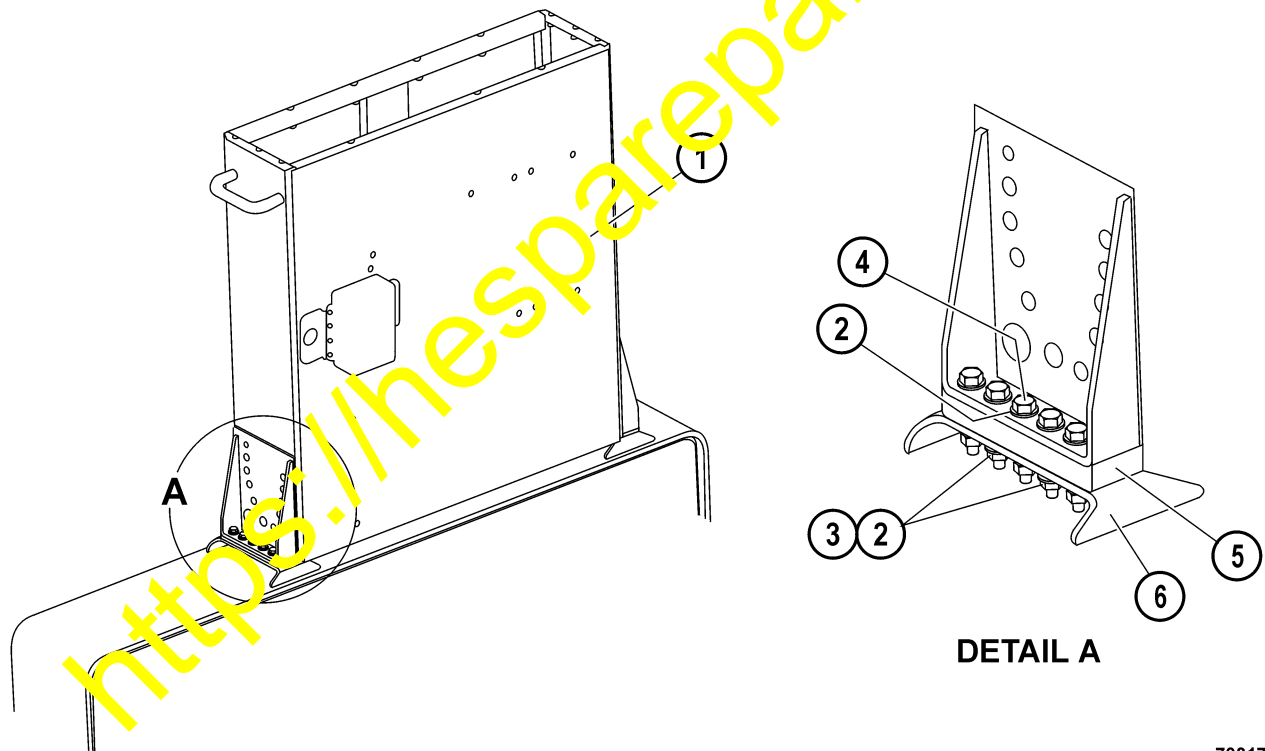


Figure 1. Brake Cabinet Mounting Improvements

- |                  |                         |
|------------------|-------------------------|
| 1. Brake Cabinet | 4. Capscrew             |
| 2. Flat Washer   | 5. Spacer Block Mount   |
| 3. Nut           | 6. Frame Mounting Plate |

70317

**BRAKE CABINET MOUNT KIT (MK4111)**

REF NO.	PART NO.	QTY.	DESCRIPTION
3, Figure 3	0164331032	24	WASHER
2, Figure 1	0164331645	14	WASHER
2, Figure 3	EH9246	4	CLAMP STR
1, Figure 3	EH9247	4	CLAMP BAND
5, Figure 1	EH9249	2	SPACER BLOCK MOUNT
1, Figure 4, 5	EH9250	1	TUBE STR
5, Figure 3	MM0050	8	CAPSCREW
4, Figure 3	MM0056	16	CAPSCREW
4, Figure 1	MM0100	10	CAPSCREW
3, Figure 1	MM0181	4	NUT
	EH9248		SPACER BLOCK MOUNT DRAWING

**EXTERNAL CHANGES**

There are now (5) mounting bolts instead of (3) for the brake cabinet that are longer in length to prevent loosening. The existing bolts are replaced with the longer bolts because of a new block spacer (5, Figure 1) that is added between the frame mounting plates and the brake cabinet. Additional bolts of the same length and size are added for the new holes in the frame mounting plates.

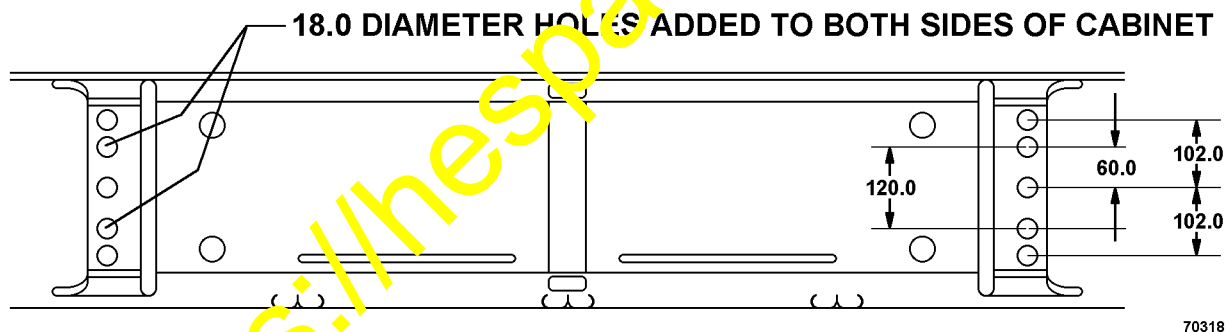


Figure 2. Holes Added to Frame Bracket

**NOTE:** The cabinet needs to be moved to provide clearance for drilling the new holes in both the brake cabinet and frame mount plates.

Loosen the hose clamps securing the hydraulic hoses that enter the lower side areas of the cabinet. Raise cabinet carefully to allow clearance. Drill (4) 18.0 mm holes in the frame mounting plates (Figure 2). **A magnetic drill of adequate size is recommended to do this work.** After drilling is done, insure the surface is flat and free of burrs. Reposition the cabinet on the new spacers and install the new bolts. **If any hoses were disconnected, make sure they are reconnected and the brake system is working properly before returning truck to production.**

## INTERNAL CHANGES

The accumulators used in the brake cabinet are secured in place with circular clamps. These clamps should be replaced with a more sturdier clamp (1 & 2, Figure 3) to prevent breakage. If an existing clamp were to break, the accumulator could move out of position, causing the tube connection to break, resulting in oil spilling into the cabinet and possibly leaking on the truck chassis near the engine.

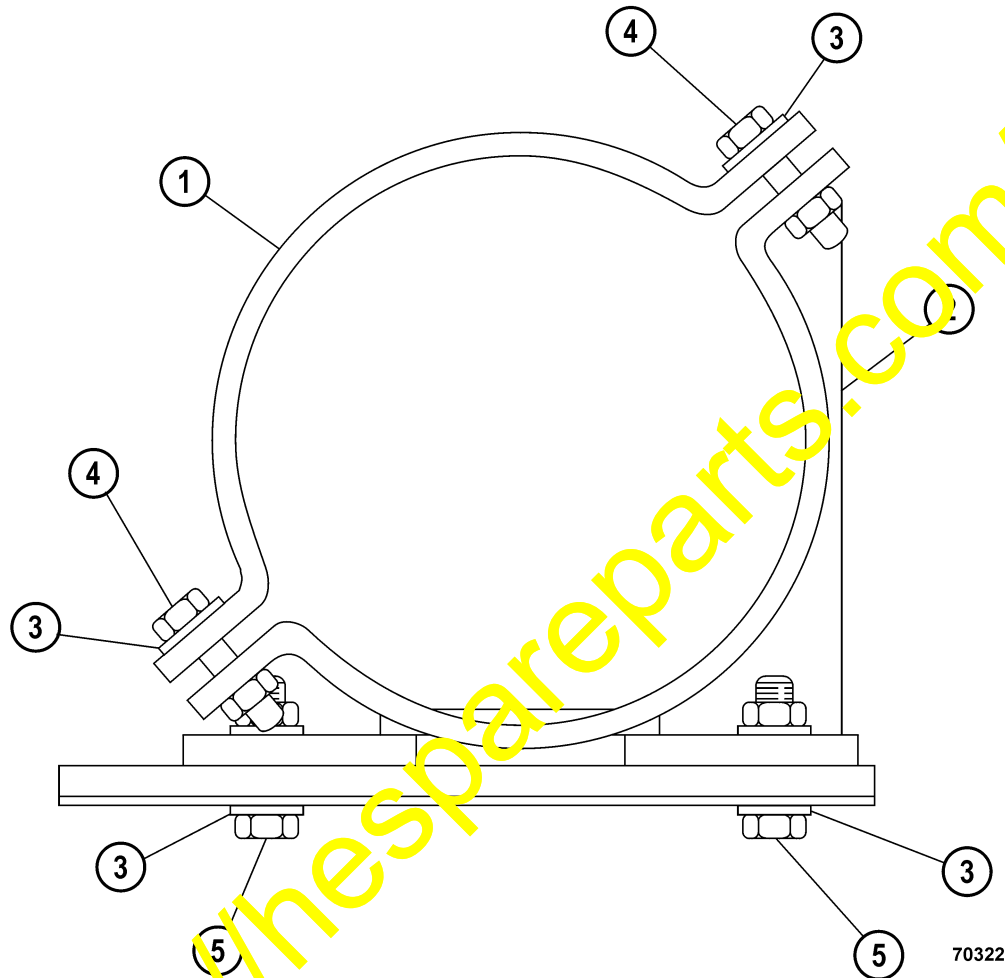
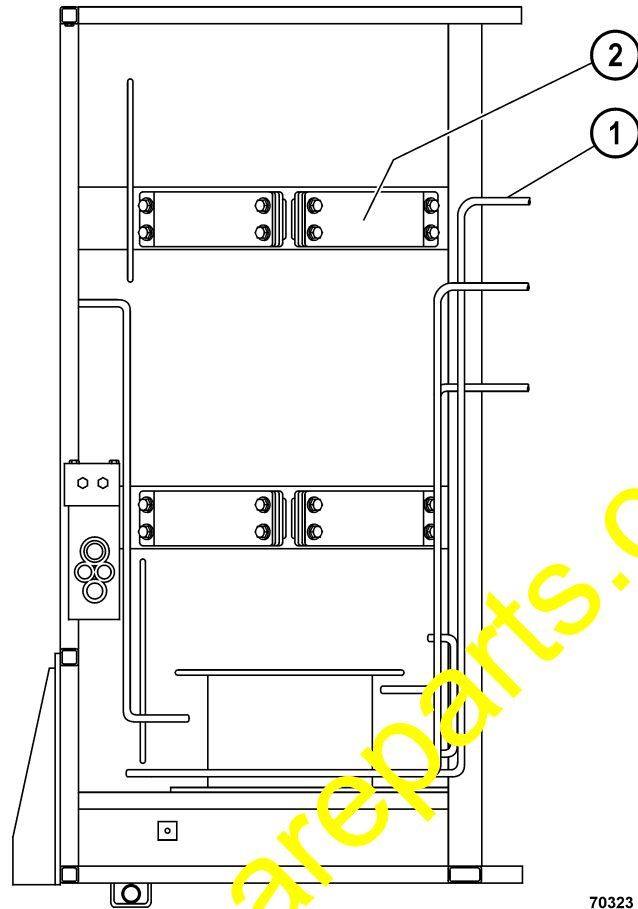


Figure 3. Accumulator Clamps

- |                |             |
|----------------|-------------|
| 1. Clamp Band  | 4. Capscrew |
| 2. Clamp Str   | 5. Capscrew |
| 3. Flat Washer |             |

The accumulators do not have to be removed if caution is used when installing the new clamps. The upper brake cabinet cover has to be removed to deplete the nitrogen pressure on the gas side (upper) accumulators. ***After recharging the accumulators, a brake function check is recommended before returning the truck to production.***

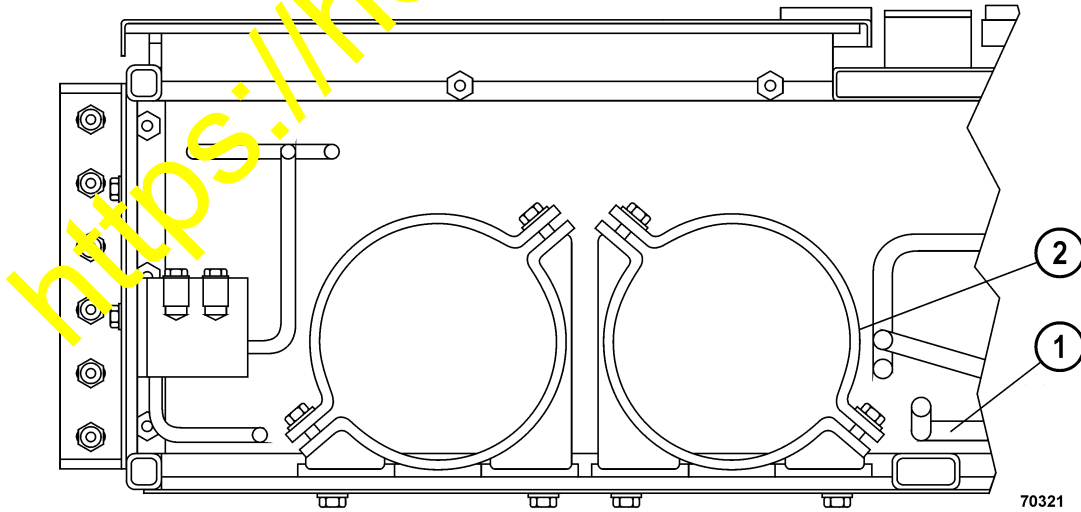
A new tube (EH9250) is to replace the existing tube as part of the accumulator clamp change. The existing tube is associated with the accumulator and can occasionally interfere with a cabinet support gusset under the accumulators. ***NOTE: Be sure to release any trapped pressure before loosening tube connections.*** Before installing the new tube (1, Figure 4, 5), verify that there is not any interference between hydraulic tubes and structural parts of the cabinet. If interference problems exist, slightly bend tubes or use a grinder to allow clearance between the tube and gusset.



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Figure 4. Brake Cabinet (Front View)

- 1. Tube Str
- 2. Clamp



70321

Figure 5. Brake Cabinet (Top View)

- 1. Tube Str
- 2. Clamp

## BRAKE SYSTEM CHECK-OUT PROCEDURE

The brake circuit hydraulic pressure is supplied from the steering circuit at the bleed down manifold. Some brake system problems, such as spongy brakes, slow brake release, or abnormal operation of the "Low Brake Pressure"<sup>a</sup> warning light can sometimes be traced to internal leakage of brake components. If internal leakage is suspected, refer to Brake Circuit Component Leakage Test.

*NOTE: If internal leakage within the steering circuit is excessive, this also may contribute to problems within the brake circuit. Be certain that steering circuit leakage is not excessive before troubleshooting brake circuit. For Steering Circuit Test Procedure, refer to Section "L", Hydraulic System.*

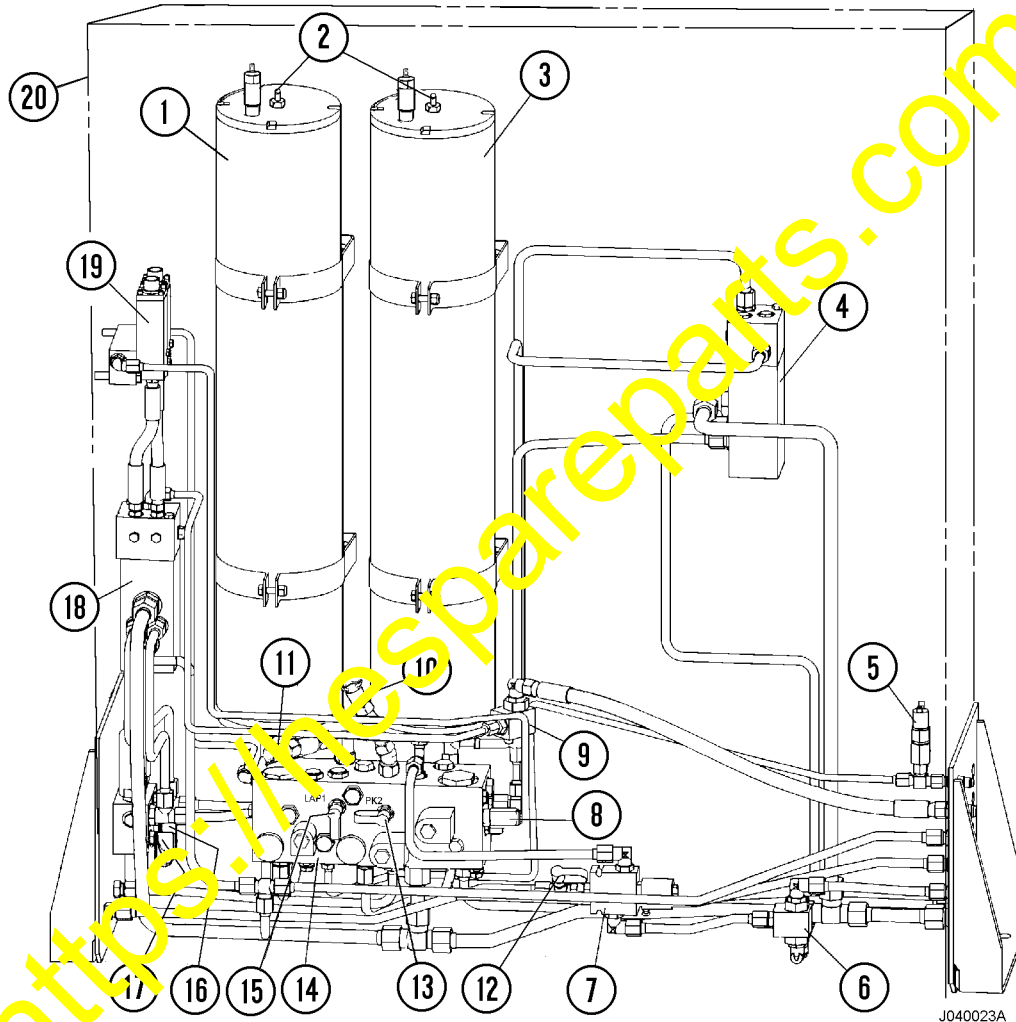


Figure 6 Hydraulic Components Cabinet  
(Brake System Components Only)

- |   |                                     |   |
|---|-------------------------------------|---|
| 1. Rear Brake Accumulator               | 8. Pressure Reducing Valve (PR)     | 15. "LAP1" Pressure Test Port           |
| 2. Charging Valve                       | 9. Shuttle Valve (Rear Relay Valve) | 16. Right Rear Brake Pressure Test Port |
| 3. Front Brake Accumulator              | 10. Park Brake Pressure Switch      | 17. Left Rear Brake Pressure Test Port  |
| 4. Relay Valve (Front)                  | 11. Low Brake Pressure Switch       | 18. Relay Valve (Rear)                  |
| 5. Emergency/Auto Apply Pressure Switch | 12. Front Brake Pressure Test Port  | 19. Proportional Press. Control Valve   |
| 6. Shuttle Valve (Front Relay Valve)    | 13. "PK2" Pressure Test Port        | 20. Brake Cabinet                       |
| 7. Front Brake Cutout Valve             | 14. Brake Manifold                  |   |

The steering circuit can be isolated from the brake circuit by removing the brake supply line from the bleeddown manifold. Plug the brake supply line and cap the port in the bleeddown manifold. (see WARNING below)

**⚠ DANGER**

*Before disconnecting pressure lines, replacing components in the hydraulic circuits, or installing test gauges, ALWAYS bleed down hydraulic steering and brake accumulators. Hydraulic fluid escaping under pressure can have sufficient force to enter a person's body by penetrating the skin and cause serious injury, and possibly death, if proper medical treatment by a physician familiar with this type of injury is not received immediately.*

The steering accumulator will bleed down with engine shut down; turning the key switch "Off", and waiting 90 seconds. Confirm the steering pressure is released by turning the steering wheel; No front wheel movement should occur. Open both bleed down valves on brake manifold to bleed down both brake accumulators.

**⚠ WARNING**

*Before disabling brake circuit, be sure truck wheels are blocked to prevent possible rollaway.*

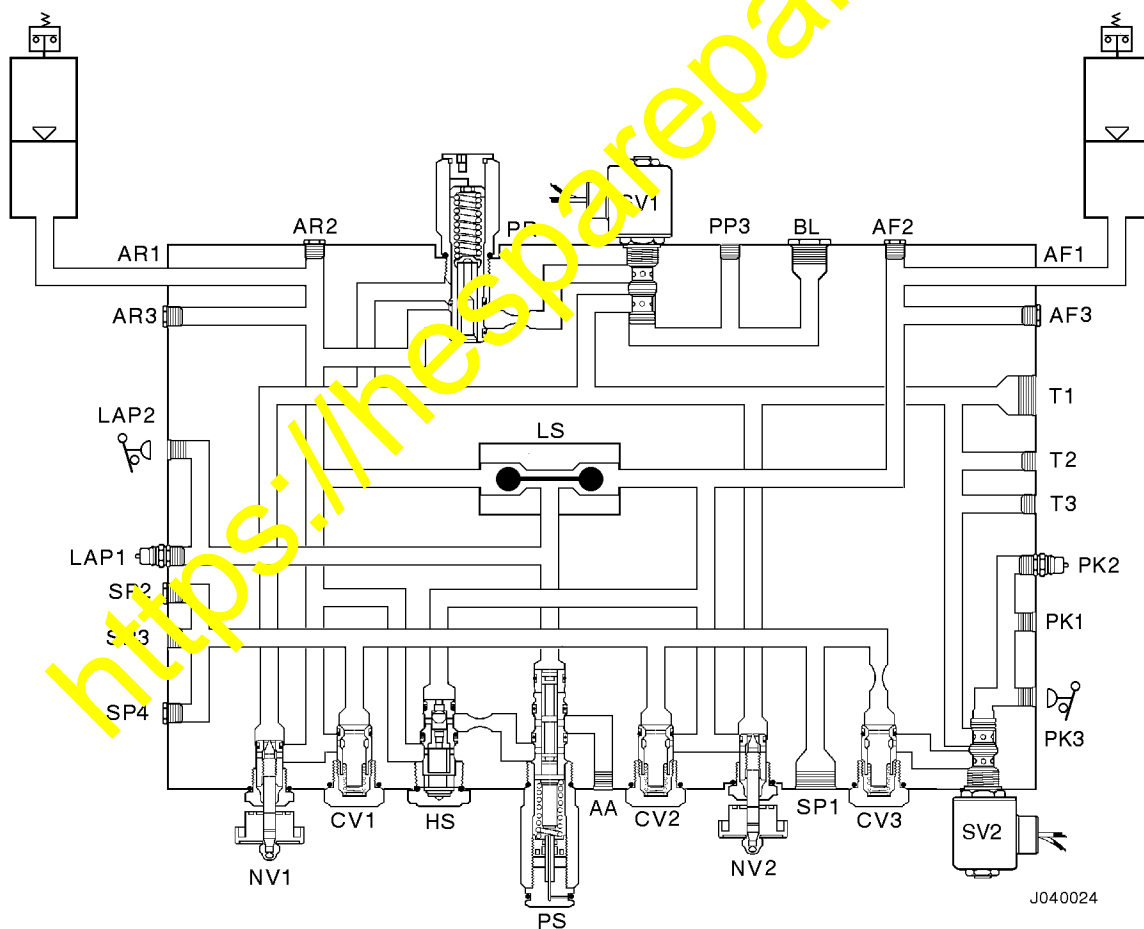


Figure 7. Brake Manifold

BRAKE CIRCUIT ABBREVIATIONS	
AA	Automatic Apply Pressure
AF1	Accumulator, Front Brake
AF2	Plugged
AF3	Plugged
AR1	Accumulator, Rear Brake
AR2	Plugged
AR3	Plugged
BL	Plugged
CP1	Flow Direction Plug (See Note 1)
CV1, CV2, CV3	Check Valve
HS	High Pressure Shuttle Valve
LS	Low Pressure Shuttle Valve
LAP1	Pressure Tap Test Port Low Accumulator Pressure (Diagnostic Coupler)
LAP2	Low Brake Pressure Switch N.C., 130 kg/cm <sup>2</sup> (1850±75 psi)
NV1	Front Accumulator Manual Drain Valve
NV2	Rear Accumulator Manual Drain Valve
PK1	Park Brake Release Pressure
PK2	Park Brake Pressure Tap Test Port (Diagnostic Coupler)
PK3	Park Brake Pressure Switch N.C., 87.9 kg/cm <sup>2</sup> (1290 psi)
PP3	Brake Lock Apply Pressure
PPC	Proportional Pressure Control Valve
PR	Brake Lock Pressure Regulator 141 kg/cm <sup>2</sup> (2000 psi)
PS	Automatic Apply Valve 116 kg/cm <sup>2</sup> (1650 psi)
SP1	Supply C/U Inlet
SP2	Plugged
SP3	Supply To PPC Valves
SP4	Plugged
SV1	Brake Lock Solenoid
SV2	Park Brake Solenoid
T1	Return To Tank
T2	Return To Tank From Front Brake Cutout Valve
T3	Return From Ppc Valves Through Brake Manifold To Tank

## EQUIPMENT REQUIRED

Included on the last page of this module is a data sheet to record the information observed during the hydraulic brake system check-out procedure. The data sheet can be removed, copied, and used during the check-out procedure.

\* Steps indicated in this manner should be recorded on the data sheet for reference.

The following equipment will be necessary to properly check-out the hydraulic brake circuit:

- Hydraulic brake schematic, refer to Section "R" this manual.
- Calibrated pressure gauges: Five 0-350 kg/cm<sup>2</sup> (0-5000 ps ) range.
- One hose long enough to reach from brake cabinet to the inside of the operator's cab for each gauge.
- Accumulator charging kit with gauges and dry nitrogen.

**NOTE:** A gas intensifier pump will be required, if using "T type" nitrogen bottles.

**NOTE 1:** CP1 is a cavity plug which provides directional flow for the ports at that location in the manifold assembly. Physically, it is a drilled plug. Schematically, it is a non-changing direction valve to complete the hydraulic circuits as shown.

## INITIAL SYSTEM SET-UP

Prior to checking the brake system, the hydraulic steering system must be operating properly, have the correct accumulator precharge and be up to normal operating temperatures.

Be certain brakes have been properly bled to remove trapped air. Also, prior to checking the brake system, make certain the parking brake is functioning properly.

1. Apply the parking brake, put the range selector switch in NEUTRAL, turn the key switch OFF to shut down the engine, and allow approximately 90 seconds for the steering accumulators to bleed down. Confirm the steering pressure is released by turning the steering wheel - no movement should occur. Block the truck wheels.
2. Open each brake accumulator bleeddown valve and precharge both brake manifold accumulators (1 & 3, Figure 6) to 98.6 kg/cm<sup>2</sup> (1400 psi). Allow gas temperature to approach ambient temperature before completing precharge process.

\* Record on data sheet.

**NOTE: For best performance, charge accumulators in the ambient conditions in which the machine will be operating.**

3. Close both accumulator bleeddown valves.
4. Refer to Figure 8 for pressure test diagnostic coupler locations in the hydraulic components cabinet. Install a 350 kg/cm<sup>2</sup> (5000 psi) pressure gauge at each of the following:
  - a. Front brake test port (12, Figure 6).
  - b. Left rear brake test port (17).
  - c. Right rear brake test port (16).
  - d. Park brake release pressure port "PK2" (13).
  - e. Low accumulator pressure test port "LAP1" (15).
5. Set park brake. Release brake lock.

6. Start engine. Observe rising brake pressures as system charges. Brakes should release between 95 kg/cm<sup>2</sup> (1350 psi) and 116 kg/cm<sup>2</sup> (1650 psi) front and at approximately 116 kg/cm<sup>2</sup> (1650 psi) for the rear brakes.

\* Record on data sheet.

7. Actuate brake lock. Turn parking brake switch OFF. Rear brake pressure should be 141 ± 7.0 kg/cm<sup>2</sup> (2000 ± 100 psi). Front brake pressure should be zero. Release brake lock.

\* Record on data sheet.

8. Slowly depress brake pedal and note brake valve pressure. If the rear brake or front brake circuit exceeds 148 kg/cm<sup>2</sup> (2100 psi) at the brake pressure test ports, correct the problem before proceeding. The brake valve may require adjustment or a relay valve may be malfunctioning. Refer to repair procedures, this section.

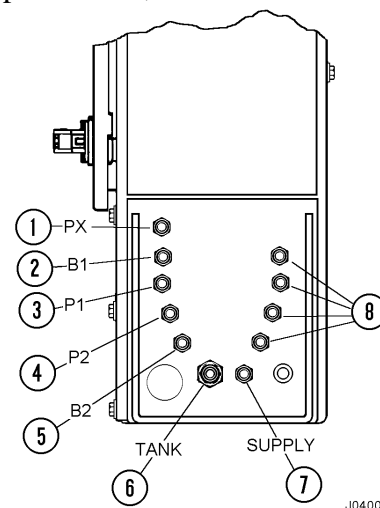


Figure 8. Brake Cabinet Port Identification (Viewed from End of Cabinet)

1. PX: To Brake Valve
2. B1: To Rear Relay Valve (Rear Brake Apply Circuit)
3. P1: From Rear Brake Accumulator
4. P2: From Front Brake Accumulator
5. B2: To Front Relay Valve (Front Brake Apply Circuit)
6. Return to Hydraulic Tank
7. Brake System Supply From Bleeddown Manifold
8. Hoist Valve Control Circuit Ports



**BRAKE SYSTEM CHECKOUT**

**NOTE: Unless otherwise specified, perform the following checks with engine running, park brake ON, brake lock released, and (optional) Slippery Road switch OFF.**

9. Apply brake lock. Turn the parking brake switch to the OFF position:
- Verify park brake indicator lamp is off.
  - Verify park brake pressure ("PK2" gauge) is  $193 \pm 3.5 \text{ kg/cm}^2$  ( $2750 \pm 50 \text{ psi}$ ).

\* Record on data sheet.

10. Be certain the parking brake and automatic slack adjusters are properly adjusted.

11. Cycle park brake several times to assure crisp application and release of oil pressure when switch is ON. With the park brake switch OFF, apply the emergency brake switch:

- Verify emergency brake switch actuates the parking brake (zero pressure at "PK2" gauge).

12. Place parking brake switch in the ON position, emergency brake switch OFF, and release the brake lock.

13. Very slowly depress brake pedal. Force feedback of pedal on foot should be smooth with no abnormal noise or mechanical roughness.

14. Slowly depress brake pedal:

- Verify brake indicator lamp and stop lights illuminate at  $5.3 \pm 0.4 \text{ kg/cm}^2$  ( $75 \pm 5 \text{ psi}$ ) rear brake pressure.

\* Record on data sheet.

15. Quickly and completely depress pedal. Verify that within 1 second after brake is applied:

- Left rear brake pressure reads  $148 \pm 5.3 \text{ kg/cm}^2$  ( $2100 \pm 75 \text{ psi}$ ).
- Right rear brake pressure reads  $148 \pm 5.3 \text{ kg/cm}^2$  ( $2100 \pm 75 \text{ psi}$ ).
- Both pressures must remain above their minimum values for a minimum of 20 seconds.

\* Record on data sheet.

16. Release pedal, assure that each circuit's pressure is zero.

17. Quickly and completely depress pedal. Verify that within 1 second after brake is applied:

- Front brake pressure reads  $148 \pm 5.3 \text{ kg/cm}^2$  ( $2100 \pm 75 \text{ psi}$ ).
- The pressure must remain above the minimum values for a minimum of 20 seconds.

\* Record on data sheet.

18. Release pedal, assure that each circuit's pressure returns to zero within 2 seconds.

19. Fully apply the retarder lever on the steering column. Verify brake pressure:

- Front and rear brake pressure reads  $138 \pm 15 \text{ kg/cm}^2$  ( $1962 \pm 212 \text{ psi}$ ).

\* Record on data sheet.

20. Return retarder lever to the OFF position.

- Verify brake pressures return to zero.

\* Record on data sheet.

**NOTE: Steps 21, 22, & 23 apply only to trucks equipped with the optional Slippery Road switch.**

21. Move the Slippery Road switch to the ON (slippery road) position.

22. Quickly and completely depress pedal. Verify that within 1 second after brake is applied:

- Rear brake pressure reads  $148 \pm 5.3 \text{ kg/cm}^2$  ( $2100 \pm 75 \text{ psi}$ ).
- Front brake pressure should be zero.

\* Record on data sheet.

23. Release the brake pedal. Rear brake pressure should return to zero within 2 seconds.

24. Fully apply the retarder lever on the steering column. Verify brake pressures:

- Rear brake pressure reads  $138 \pm 15 \text{ kg/cm}^2$  ( $1962 \pm 212 \text{ psi}$ ).
- Front brake pressure should remain zero.

\* Record on data sheet.

25. Move the retarder lever to OFF and verify brake pressures are zero. Return the Slippery Road switch to the "dry road" position.

26. Cycle brake lock several times to assure crisp shift of solenoid valve and release of oil pressure. Verify stop lights illuminate when brake lock is ON.

27. Apply brake lock and read rear brake pressure:

- Pressure should be  $141 \pm 7.0 \text{ kg/cm}^2$  ( $2000 \pm 100 \text{ psi}$ ).

\* *Record on data sheet.*

28. If above pressure is not correct, remove plug on end of PR valve and adjust to obtain correct pressure. Reinstall plug after adjustment.

### **Failure Modes Check-Out**

29. Allow the engine to run until the low brake accumulator pressure (LAP1 gauge) stabilizes at or above  $190 \text{ kg/cm}^2$  ( $2700 \text{ psi}$ ).

30. Shut down the engine and allow the steering accumulators to bleed down completely. Install a jumper wire across the steering pressure switch terminals (bottom of rear steering accumulator).

31. Turn the key switch ON. After two minutes, record the low accumulator pressure:

- If LAP1 pressure is below  $148 \text{ kg/cm}^2$  ( $2100 \text{ psi}$ ), system leakage is excessive and must be repaired.

\* *Record on data sheet.*

32. Slowly crack open the front brake accumulator bleeddown valve (NV1) while observing the LAP1 pressure gauge:

- The low brake pressure lamp and buzzer must actuate at  $130 \pm 5.3 \text{ kg/cm}^2$  ( $1850 \pm 75 \text{ psi}$ ).

\* *Record on data sheet.*

- Brake pressures should begin to rise (auto-apply) when LAP1 pressure reaches  $116 \pm 7 \text{ kg/cm}^2$  ( $1550 \pm 100 \text{ psi}$ ).

\* *Record on data sheet.*

- The brake lights and retard lights should turn on at approximately  $70 \text{ kg/cm}^2$  ( $1000 \text{ psi}$ ).

33. Close the front brake accumulator bleeddown valve (NV1).

34. Start the engine and allow the engine to run until the low brake accumulator pressure (LAP1 gauge) stabilizes at or above  $190 \text{ kg/cm}^2$  ( $2700 \text{ psi}$ ).

35. Shut down the engine and allow the steering accumulators to bleed down completely. Turn the key switch ON.

## KOMATSU CHECK-OUT PROCEDURE HYDRAULIC BRAKE SYSTEM DATA SHEET

MACHINE MODEL \_\_\_\_\_ UNIT NUMBER \_\_\_\_\_ SERIAL NUMBER \_\_\_\_\_

### I. INITIAL SYSTEM SET-UP

Operate Hydraulic Steering System to obtain proper operating temperature. Refer to Check-out Procedures.

STEP 2 \_\_\_\_\_ Brake Accumulators charged to 98.4 kg/cm<sup>2</sup> (1400 psi).

STEP 6 \_\_\_\_\_ Front brake pressure when auto-apply releases brakes.  
 \_\_\_\_\_ Left rear brake pressure when auto-apply releases brakes.  
 \_\_\_\_\_ Right rear brake pressure when auto-apply releases brakes

STEP 7 \_\_\_\_\_ Rear brake pressure; park brake released. Front brake pressure; park brake released.

### II. SERVICE BRAKE SYSTEM CHECK-OUT

STEP 9 \_\_\_\_\_ Park brake pressure; brake lock applied. park brake off.

STEP 14 \_\_\_\_\_ Stoplight actuation pressure.

STEP 15 \_\_\_\_\_ Left rear brake pressure (pedal applied).  
 \_\_\_\_\_ Right rear brake pressure (pedal applied).

STEP 17 \_\_\_\_\_ Front brake pressure (pedal applied).

STEP 19 \_\_\_\_\_ Front brake pressure (full retard).  
 \_\_\_\_\_ Left rear brake pressure (full retard).  
 \_\_\_\_\_ Right rear brake pressure (full retard).  
 \_\_\_\_\_ Front brake pressure (retarder off).  
 \_\_\_\_\_ Left rear brake pressure (retarder off).  
 \_\_\_\_\_ Right rear brake pressure (retarder off).

*NOTE: Steps 22 and 24 apply to trucks equipped with Slippery Road option only.*

STEP 22 \_\_\_\_\_ Left rear brake pressure  
 \_\_\_\_\_ Right rear brake pressure  
 \_\_\_\_\_ Front Brake Pressure

STEP 24 \_\_\_\_\_ Left rear brake pressure  
 \_\_\_\_\_ Right rear brake pressure  
 \_\_\_\_\_ Front Brake Pressure

**KOMATSU CHECK-OUT PROCEDURE  
HYDRAULIC BRAKE SYSTEM DATA SHEET**

- STEP 27 \_\_\_\_\_ Left rear brake pressure (brake lock applied)
- \_\_\_\_\_ Right rear brake pressure (brake lock applied)
- \_\_\_\_\_ Front brake pressure (brake lock applied)

**Failure Modes Check-out**

- STEP 31 \_\_\_\_\_ Low accumulator pressure (LAP1) after two minutes.
  
- STEP 32 \_\_\_\_\_ Low accumulator pressure (LAP1) when warning actuates.
- \_\_\_\_\_ Left rear brake pressure after auto-apply.
- \_\_\_\_\_ Right rear brake pressure after auto-apply.
- \_\_\_\_\_ Front brake pressure after auto-apply.
  
- STEP 36 \_\_\_\_\_ Left rear brake pressure after auto-apply.
- \_\_\_\_\_ Right rear brake pressure after auto-apply.
- \_\_\_\_\_ Front brake pressure after auto-apply.
  
- STEP 40 \_\_\_\_\_ Number of applications prior to auto-apply.
  
- STEP 44 \_\_\_\_\_ Rear brake pressure at which the front differential fault occurs.
  
- STEP 47 \_\_\_\_\_ Front brake pressure at which the rear differential fault occurs.

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Name of Mechanic or Inspector Performing Check-Out .....