

# PARTS & SERVICE NEWS

REF NO.	AA03067
DATE	May 13, 2003

- SUBJECT:** RETARD LEVER CHANGE AND DIFFERENTIAL PRESSURE FAULT COUNTERMEASURE
- PURPOSE:** To announce availability of new retard lever kit and RCM software upgrade.
- APPLICATION:** Komatsu Mechanical Drive Dump Trucks:  
 530M: A30001 - A30038, 32628;  
 HD1500: A30039 - A30069
- FAILURE CODE:** 452EPB
- DESCRIPTION:** Retard Lever Upgrade Kit (XK0207) and Brake System Checkout Procedure

Some 530M and HD1500 dump trucks in service have experienced faults caused by a loss of adjustment in the retard lever. Specifically, the adjustment in the relative position of the retard lever and the potentiometer is lost due to loosening of the internal adjustment in the retard lever.

A new retard lever upgrade kit (XK0207) is available as a product improvement. The components of the new kit are illustrated in Figure 1. Refer to installation drawing (EK5574) for full installation details.

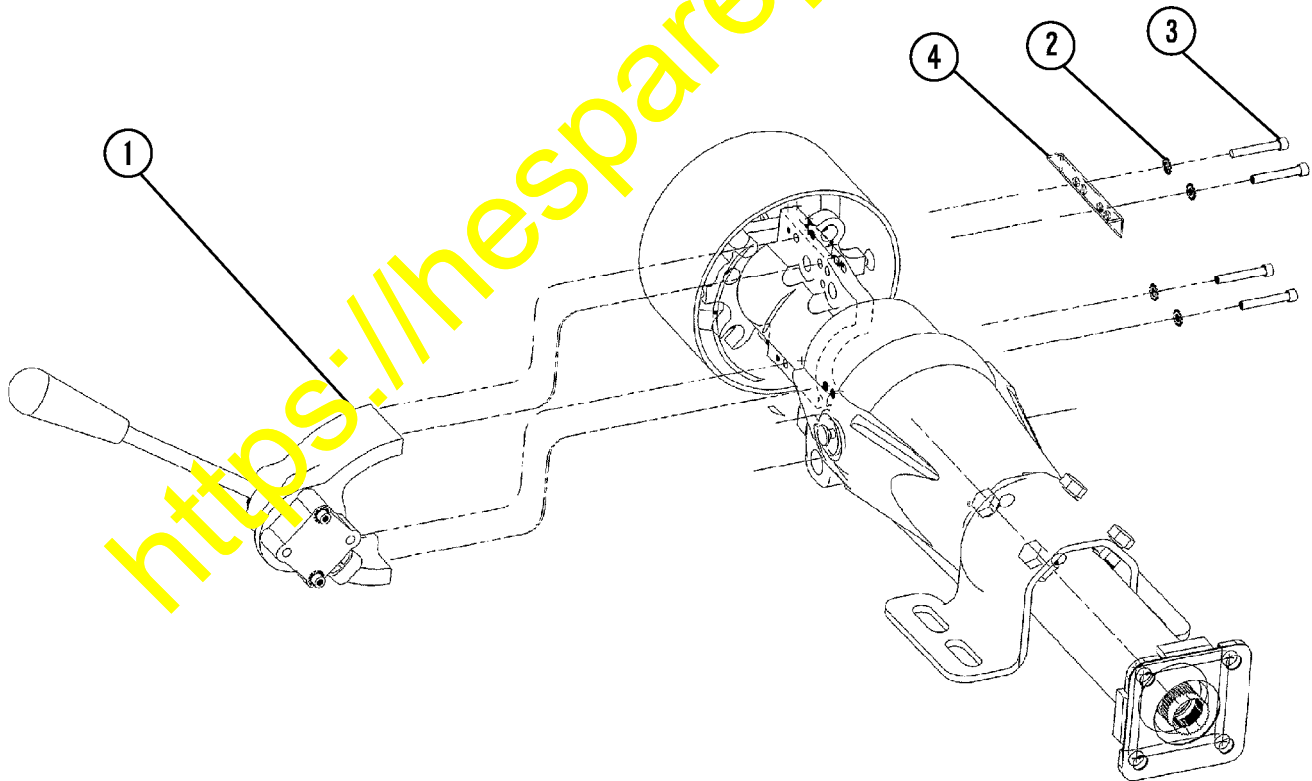
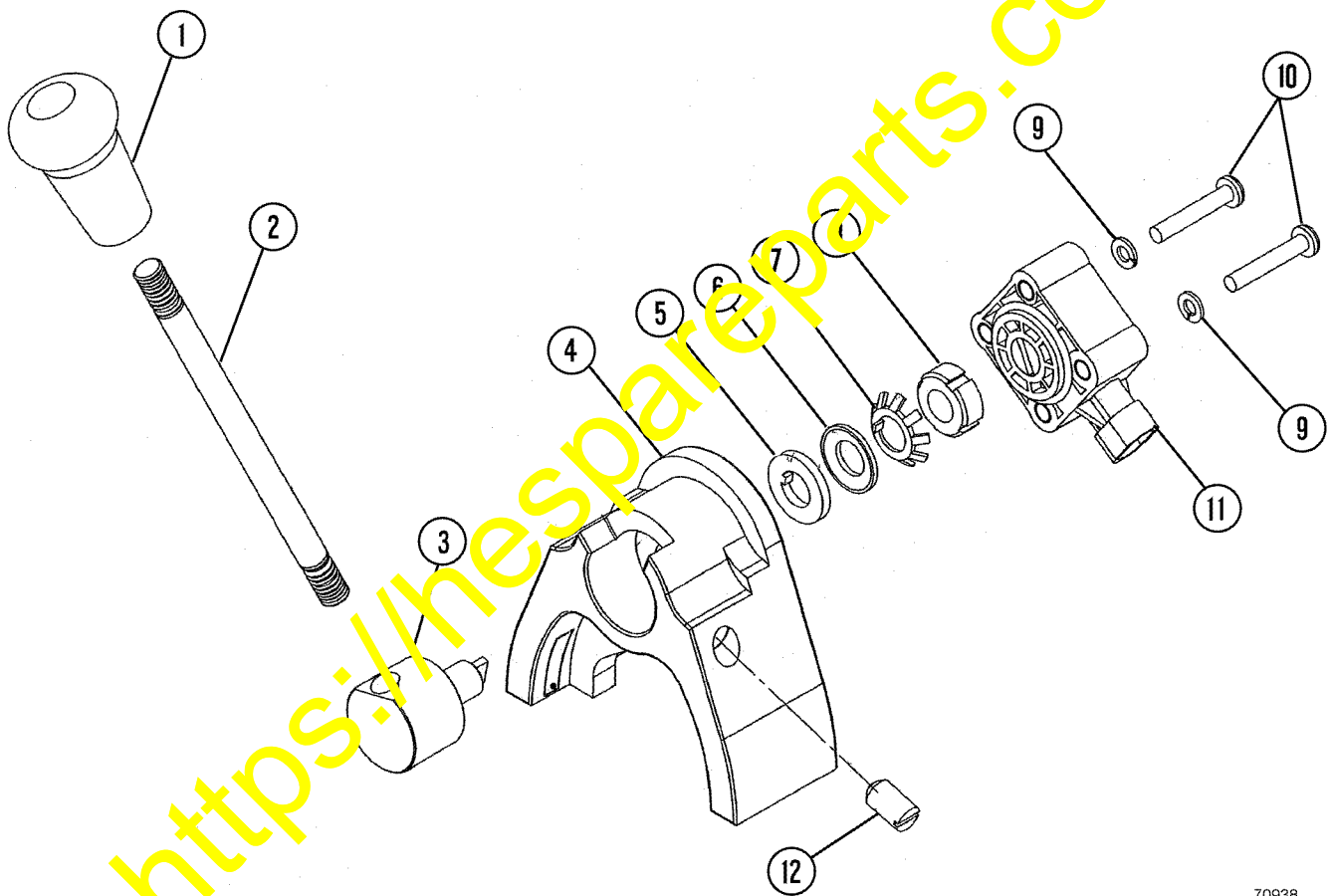


FIGURE 1. Retard Lever Upgrade Kit (XK0207)

- |                                   |                           |
|-----------------------------------|---------------------------|
| 1. Retard Lever Assembly (PC1443) | 3. Machine Screw (HD6007) |
| 2. Lock Washer (SD4245)           | 4. Angle Formed (EK4275)  |

The potentiometer in the new lever (PC1443) is not adjustable. Instead, the new lever has a detent at the OFF position. The new lever requires a change in RCM software in order to allow the lever to travel completely through the detent before any retard pressure is applied to the brakes. Consult your Komatsu Area Service Manager to obtain new RCM software and installation instructions for re-programming the RCM.

The improved RCM software also eliminates the function of the brake pedal differential pressure switch. FMEA (Failure Modes and Effects Analysis) has established that the function of the switch can be eliminated without compromising safety, and no regulation requires the switch. This change eliminates brake differential pressure faults (J003). It is permissible to use the improved RCM software to eliminate differential pressure faults without converting to the new retard lever (PC1443). Since the differential pressure function is eliminated in the new software, the brake checkout procedure has been rewritten to eliminate the steps taken to test the function of the differential pressure switch. Refer to the brake checkout procedure in this Parts & Service News.



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FIGURE 2. RETARD LEVER (PC1443)

- |                     |                    |
|---------------------|--------------------|
| 1. Knob             | 7. Lock Washer     |
| 2. Input Lever      | 8. Lock Nut        |
| 3. Drive Shaft      | 9. Split Washer    |
| 4. Housing Assembly | 10. Pan Head Screw |
| 5. Tongued Washer   | 11. Potentiometer  |
| 6. Spring Washer    | 12. Ball Plunger   |

## BRAKE SYSTEM CHECKOUT PROCEDURE

### Necessary Equipment:

1. Brake checkout procedure and system schematic (EH1946-1, page 10).
2. Accumulator charging outfit with properly calibrated gauges and either K type bottles of dry nitrogen or T type bottles with a gas intensifier.
3. Clear plastic hose and bucket for bleeding brakes of air.
4. If truck is only partially assembled and this checkout is done without brakes installed, brake simulators are required in order to simulate the brake volumes.
5. At least 4 calibrated gauges with quick disconnect couplings, capable of measuring up to 3000 psi. A hose for each gauge long enough to reach from the brake cabinet to inside the cab.
6. One calibrated gauge with quick disconnect couplings, capable of measuring up to 5000 psi.

### Assumptions:

1. All components within the brake system are performing to specification.
2. Any parts that do not function as described must be replaced or adjusted. (Notify Komatsu Quality Control Department in the event of problems or to obtain adjusting procedures for individual components.)
3. The hydraulic source for the brake system (steering system) is in proper operating condition and the pressure compensator has been adjusted.

*Note: Refer to steering and hoist checkout procedures and specifications in the appropriate shop manual.*

*Note: ( \*) Asterisk denotes item to be recorded to Checkout Data Sheet.*

### Initial System Setup:

1. Install pressure measuring instrument at:
  - a. Front brake test port (brake cabinet)(2000 psi gauge)
  - b. Two rear brake test ports (brake cabinet)(3000 psi gauge)
  - c. Test port LAP1 (brake manifold)(5000 psi gauge)
2. Open each brake accumulator bleed down valve and precharge both accumulators to 1400 psi. Allow gas temperature to approach ambient temperature before completing precharge process.

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

3. Close both accumulator bleed down valves. If brakes have not been assembled to truck when checkout is performed, attach a brake simulator to each of the brake application lines.
4. \* Start engine to fill accumulators with oil. Observe rising brake pressure as system charges. Brake pressure should begin to fall when the auto apply valve releases. The brake pressures when auto apply releases should be approximately 1350 to 1650 psi front and rear. Record the brake pressures at auto apply release.
5. Partially depress brake pedal and bleed air from each brake or brake simulator. Refer to section "J" Brake Systems in the appropriate shop manual for procedure.

### Parking Brake:

*Note: Move the pressure measuring instrument from the LAP1 test port to the park brake or PK2 port on the brake manifold.*

6. Make sure that parking brake and automatic slack adjusters are properly adjusted. Refer to section "J" Brake Systems in the appropriate shop manual for procedure.
7. \* Apply brake lock. Release parking brake with park brake switch. Verify that park brake status light indicates parking brake is released. Record parking brake release pressure. Pressure should be  $2750 \pm 50$  psi.
8. Cycle park brake switch several times to assure crisp applications and release of pressure and proper function of status light.
9. \* Release park brake with the park brake switch. Apply emergency brake switch and ensure that this switch actuates park brake and service brakes. Record park brake pressure, which should be zero, front brake pressure, left rear brake pressure, and right rear brake pressure. Release emergency brake, set park brake with the park brake switch, and release brake lock.

*Note: Return the pressure measuring device to the LAP1 port from where it was removed. If the truck is equipped with optional slippery road switch, put the switch in the DRY ROAD position.*

10. \* Quickly and completely depress pedal and check to see that front brake pressure is  $2100 \pm 75$  psi and that rear brake pressure is  $2100 \pm 75$  psi within one second. Record front and rear brake pressures. Holding pedal fully applied; both pressures should remain above their minimum values for a minimum of 20 seconds.
11. \* Release pedal. Brake pressure should return to zero within two seconds and there should be no residual pressure trapped in the brakes. Record pressures.

*Note: Steps 12 and 13 apply only to trucks equipped with the optional front brake cut switch. If the truck is equipped with optional front brake switch, put switch into the ON position.*

12. \* Quickly and completely depress pedal and check to see that rear brake pressure is  $2100 \pm 75$  psi within one second. Front brake pressure should remain at zero. Record front and rear brake pressures.
13. \* Release pedal. Rear brake pressure should return to zero within two seconds and there should be no residual pressure trapped in the brakes. Record front and rear brake pressures.

#### **Brake Lock:**

14. \* Apply brake lock. Rear brake pressure should be 2000 psi and front brake pressure should be zero. Record brake pressures.
15. Cycle brake lock several times to assure crisp application and release of pressure.

#### **Low-Brake Pressure and Auto-Apply**

16. Allow engine to run until low brake accumulator pressure stabilizes at or above 2700 psi.
17. \* Shut engine down. Allow the steering accumulator to bleed completely down. Disable the steering pressure switch, located beneath the steering accumulator, by placing a jumper wire across the pressure switch. Turn key switch to the ON position. After two minutes, record the low accumulator pressure at LAP1 port. If LAP1 pressure is below 2100 psi, then leakage in the system is excessive and needs to be identified.
18. \* Slowly crack open the front brake accumulator bleed down valve and observe LAP1 pressure. The low brake pressure lamp and buzzer must actuate at  $1850 \pm 75$  psi. Record this value. Brake pressures should begin to rise (auto apply) when LAP1 reaches  $1650 \pm 100$  psi, and brake lights and retard lights should energize. Brake lights and retard lights energizing confirms operation of 1000 psi NC pressure switch. Close front brake accumulator bleed down valve.
19. \* Record front and rear brake pressures when auto apply is actuated.

20. Start engine to recharge hydraulic system. Allow engine to run until low brake accumulator pressure stabilizes at or above 2700 psi.
21. \* Shut engine down. Allow the steering accumulator to bleed completely down. Turn key switch to the ON position. Slowly crack open the rear brake accumulator bleed down valve and observe LAP1 pressure. Verify that the low brake pressure lamp and buzzer, and auto apply set points are within 100 psi of those recorded in Step 20. Close the rear brake accumulator bleed down valve.
22. \* Record front and rear brake pressures when auto apply is actuated. Enable the steering pressure switch by removing the jumper.

### Reapplications

23. Start engine to recharge hydraulic system. Allow engine to run until low brake accumulator pressure stabilizes at or above 2700 psi.
24. \* Shut engine down, but leave key switch in the ON position. Do not allow steering accumulator to bleed down. Make repeated slow, complete brake applications every 15 seconds until low brake accumulator pressure warning comes on. Record the number of brake applications prior to activation of low brake accumulator pressure warning. Low brake accumulator pressure warning must not come on before the sixth brake application.

### RCM Calibration

#### Purpose of Calibration

1. This procedure will calibrate the RCM brake controller to minimize brake application pressure differences between the left rear and right rear brakes initiated in the hydraulic valves. Due to tolerances in the hydraulic valves, there may be occasions where the LH and RH rear brake pressure will not be equal for a given retard command. To minimize this inequality, the RCM can be calibrated to adjust the retard command to each PPC valve in order to produce consistent brake output pressure from the valves.
2. This procedure will calibrate the RCM brake controller to the installed retard lever. Due to tolerances and adjustment of the retard lever, there may be cases where a given retard lever cannot reach the high (100%) or low (0%) extremes of its intended travel. The calibration procedure will set the high and low points based on the physical limits of the installed lever.

#### When to Perform Calibration

This routine is intended to be performed on the truck by the mechanic after any of the following occurs:

- |  |  |
|--|--|
| a. PPC manifold assembly is replaced     | f. Abnormality of the retard lever assembly is suspected |
| b. Rear brake relay valve is replaced    | g. Initial delivery of the truck to a customer           |
| c. Retard lever assembly is replaced     | h. RCM is reprogrammed or replaced                       |
| d. Brake pressure transducer is replaced |  |
| e. Abnormality of the PPC is suspected   |  |

25. Install calibrated gauges at the following ports; BR, BL, C-1, and C-2. The ports, BR and BL, are located in the manifold where the right rear and left rear brake pressure transducers are located. Ports C-1 and C-2 are located on the PPC valve. Port C-1 is right brake PPC pressure and C-2 is left brake PPC pressure.
26. Using the MOM display, select the BRAKE CONTROLLER menu, and then the REALTIME DATA menu. Use the FWD button to move forward to the screen displaying real-time pressure and current.

27. Watching the 'AMT. OF RE. LE. OP' line on the MOM display, move the retard lever to apply approximately 20% retard. Using the diagnostic ports on the PPC valve, C-1 and C-2, bleed air from hydraulic line between PPC and relay valve. Both ports, C-1 and C-2, will need to be bled.

### **How to Perform Calibration**

28. This procedure must be followed in the exact order as given. There is a 30 second window after turning ignition key switch ON in which to initiate the calibration routine, after which it can not be activated. If the sequence below is not followed closely, initiation will likely not occur.
29. Insure key switch is in the OFF position.
30. Activate the auxiliary brake switch located on the lower right of the instrument panel by pushing the red knob forward into the dash.
31. Put the brake lock switch located on the center console into the APPLIED/ON position, which is with the right hand portion of the switch pushed inward.
32. Make sure brake pedal is fully up with no brake pedal switch actuation.
33. Make sure the retard handle is at the FULL RELEASE position, which is with the lever in the fully upward position, turned as far as possible counter-clockwise (up).
34. Turn the key switch to the ON position and wait for the MOM to display OK to Start Engine.
35. Simultaneously turn OFF (pull out) the auxiliary brake switch and press the brake lock switch to the OFF (left) position. At this point, the LH dash amber colored brake light will blink at a quick rate of approximately 3 times per second. If the dash brake light does not begin blinking, repeat the procedure from Step 28 above.
36. While the amber dash brake light is blinking, move the retard handle to FULL APPLY (down) and back to FULL RELEASE (up) four times. The lamp will now blink at a slower rate of approximately 1 time per second.
37. Now start the engine and leave at idle. After approximately 30 seconds, the controller will begin application of the brakes to calibrate itself to the PPC system. This process will take approximately 1 minute. The pressure command can be observed on the BRAKE CONTROLLER - REAL-TIME DATA screen of the MOM display.
38. After the pressure cycling has completed, the brake light will stop blinking and the system will return to normal operation.

*Note 1: At any time during the calibration process, pressing the brake foot pedal or moving the truck will cause the RCM to abort the calibration. If the calibration process is aborted, the RCM will revert to the previous calibration stored in its internal memory.*

*Note 2: If the RCM detects an error condition during the calibration process, a calibration fault (J019 or J021) will be reported to the MOM. If a calibration fault occurs, the RCM will abort the calibration process and will use the default calibration stored in its internal memory.*

39. Using the MOM display, select the BRAKE CONTROLLER menu, and then the REALTIME DATA menu. Use the FWD button to move forward to the screen displaying real-time pressure and current.
40. \* Watching the 'AMT. OF RE. LE. OP' line on the MOM, move the retard lever to the OFF (up) position. Record percent retard. Move the retard lever to the full ON position (down), record the percent retard. Move the retard lever to apply percent retard values in the table and record the pressure values specified in the table. When all data is collected, complete the graph for Calibration.
41. Open each brake accumulator bleed down valve and bleed down the entire brake system.



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## 530M/HD1500 HYDRAULIC BRAKE SYSTEM CHECKOUT DATA SHEET

Step 4      \_\_\_\_\_      Front brake pressure when auto apply releases  
                  \_\_\_\_\_      Left rear brake pressure when auto apply releases  
                  \_\_\_\_\_      Right rear brake pressure when auto apply releases

### PARKING BRAKE SYSTEM

Step 7      \_\_\_\_\_      Park brake release pressure  
 Step 9      \_\_\_\_\_      Park brake pressure with emergency brake applied  
                  \_\_\_\_\_      Front brake pressure with emergency brake applied  
                  \_\_\_\_\_      Left rear brake pressure with emergency brake applied  
                  \_\_\_\_\_      Right rear brake pressure with emergency brake applied

### SERVICE BRAKE SYSTEM/RETARDER

Step 10     \_\_\_\_\_     Front brake pressure (pedal applied)  
                  \_\_\_\_\_     Left rear brake pressure (pedal applied)  
                  \_\_\_\_\_     Right rear brake pressure (pedal applied)  
 Step 11     \_\_\_\_\_     Front brake pressure (pedal released)  
                  \_\_\_\_\_     Left rear brake pressure (pedal released)  
                  \_\_\_\_\_     Right rear brake pressure (pedal released)

Note: Steps 12 & 13 apply to trucks equipped with optional front brake cut switch

Step 12     \_\_\_\_\_     Front brake pressure (pedal applied)  
                  \_\_\_\_\_     Left rear brake pressure (pedal applied)  
                  \_\_\_\_\_     Right rear brake pressure (pedal applied)  
 Step 13     \_\_\_\_\_     Front brake pressure (pedal released)  
                  \_\_\_\_\_     Left rear brake pressure (pedal released)  
                  \_\_\_\_\_     Right rear brake pressure (pedal released)

**BRAKE LOCK**

- Step 14      \_\_\_\_\_      Front brake pressure (brake lock applied)
- \_\_\_\_\_      Left rear brake pressure (brake lock applied)
- \_\_\_\_\_      Right rear brake pressure (brake lock applied)

**LOW BRAKE PRESSURE AND AUTO APPLY**

- Step 17      \_\_\_\_\_      LAP pressure after two minutes
- Step 18      \_\_\_\_\_      LAP pressure when low brake pressure fault occurs
- \_\_\_\_\_      LAP pressure when auto apply occurs
- Step 19      \_\_\_\_\_      Front brake pressure after auto apply
- \_\_\_\_\_      Right rear brake pressure after auto apply
- \_\_\_\_\_      Left rear brake pressure after auto apply
- Step 21      \_\_\_\_\_      LAP pressure when low brake pressure fault occurs
- \_\_\_\_\_      LAP pressure when auto apply occurs
- Step 22      \_\_\_\_\_      Front brake pressure after auto apply
- \_\_\_\_\_      Right rear brake pressure after auto apply
- \_\_\_\_\_      Left rear brake pressure after auto apply

**REAPPLICATIONS**

- Step 24      \_\_\_\_\_      Number of applications to LAP pressure warning
- Step 40      \_\_\_\_\_      After Calibration, complete the table and graph on page 9.

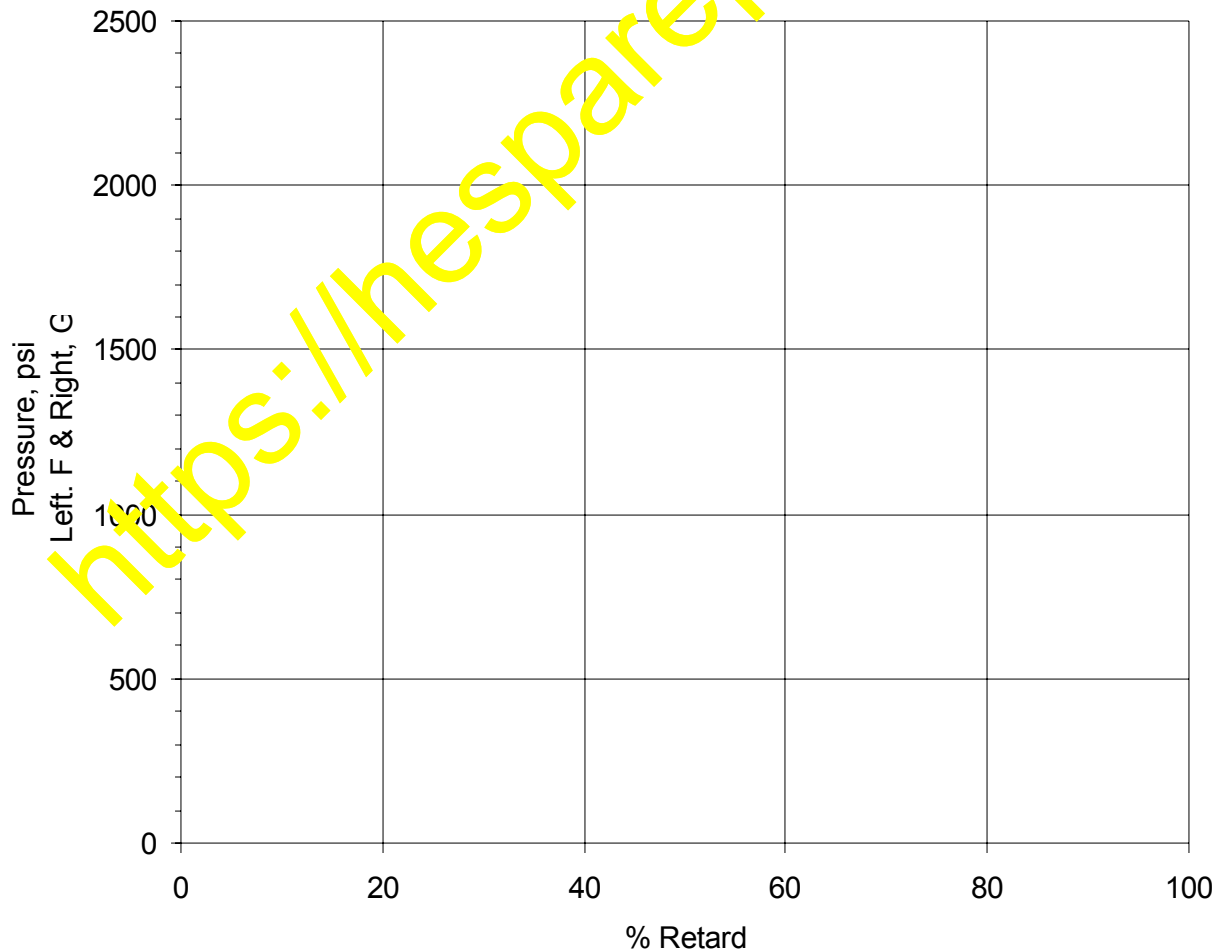
Machine \_\_\_\_\_ Unit No. \_\_\_\_\_ S/N \_\_\_\_\_

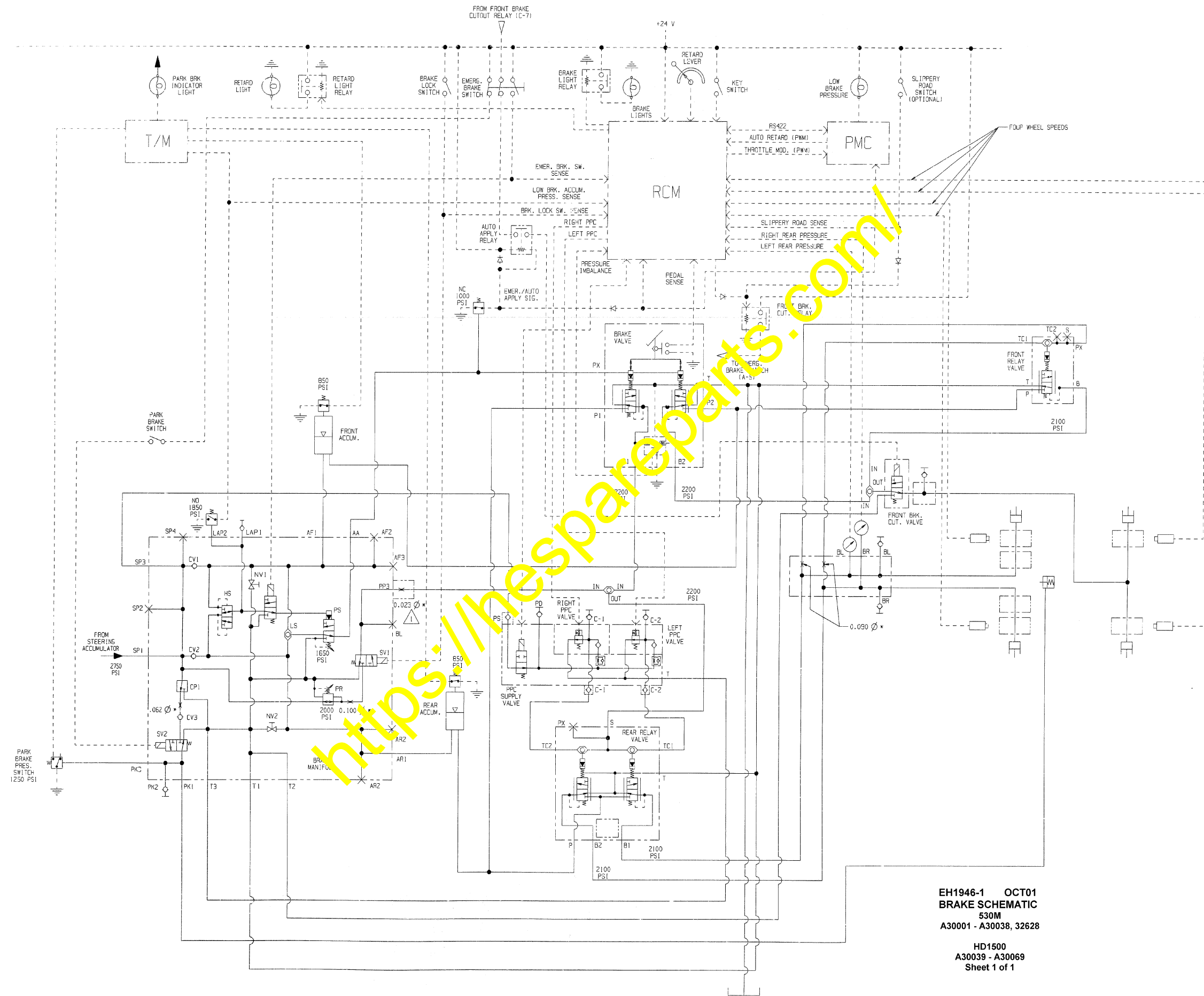
Name of Mechanic or Inspector Responsible for Checkout \_\_\_\_\_



Retarder Lever		% Retard, E	
Off	Up Position		
On	Down Position		
		F MOM Left Brake Pressure, psi	G MOM Right Brake Pressure, psi
After Calibration attempt: on/off solenoid valve and ppc's plugged in	% Retard		
	0		
	20		
	40		
	60		
	80		
	100		

Calibration





EH1946-1 OCT01  
BRAKE SCHEMATIC  
530M  
A30001 - A30038, 32628  
  
HD1500  
A30039 - A30069  
Sheet 1 of 1