

PARTS & SERVICE NEWS

REF NO.	AA02160
DATE	July 8, 2002

SUBJECT: PREVENTION OF PRESSURE SPIKES IN HYDRAULIC COOLING LINE

PURPOSE: To introduce a counter-measure for pressure spikes in the hydraulic cooling line.

APPLICATION: WA600-3L Wheel Loader Serial Number A52001 thru A52192

FAILURE CODE: 036CAA

DESCRIPTION: In units equipped with joystick steering, pressure spikes occur at the inlet port section of the hydraulic oil cooler when an abrupt changeover of joystick steering is made. This Parts & Service News provides a list of parts and procedure for upgrading the joystick steering system to reduce these pressure spikes.

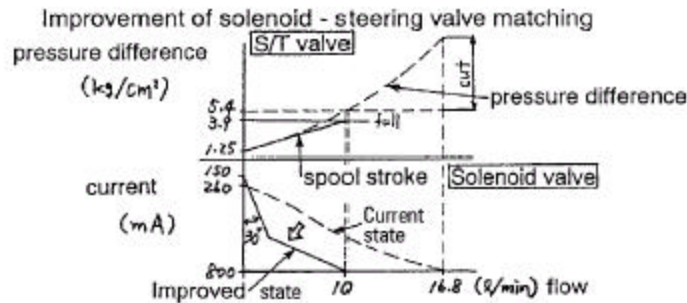
List of Parts:

Part No.	Part Name	Q'ty	Remarks
426-60-21100 (427-S33-1912)	Valve Ass'y (Valve Ass'y)	1 (1)	
7823-16-1003 (7823-16-1002)	Controller (Controller)	1 (1)	
426-64-25310	Spool Kit	1	Flow controlling spool for the steering valve
426-62-25910	Flange	1	
07373-21050 (07372-21035)	Bolt (Bolt)	4 (4)	
07000-13032	O-Ring	2	
426-S33-1860	Back-up ring	1	For replacement of the flow controlling spool
427-S33-1850	O-ring	1	
426-S33-1850	O-Ring	1	

Contents of the modification

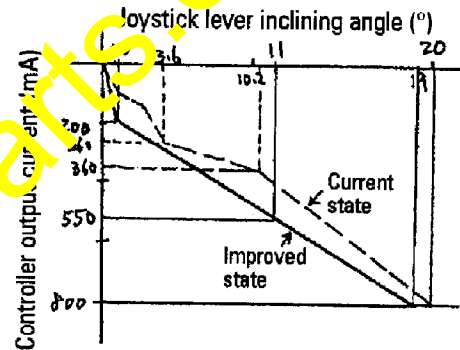
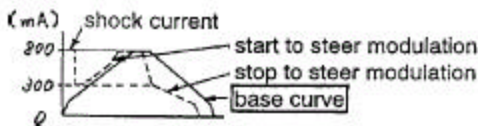
ι Improving the fine control performance

1. By lessening the discharge (16.8 > 10 L/min.) of the steering solenoid valve and by changing its flow rate gradient, matching between the solenoid valve and steering valve has been improved.



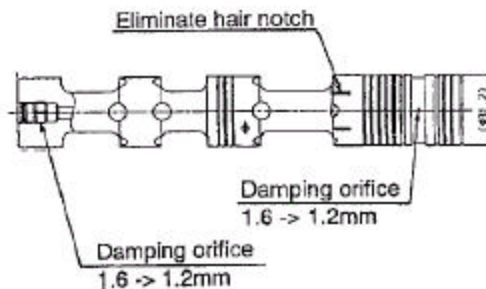
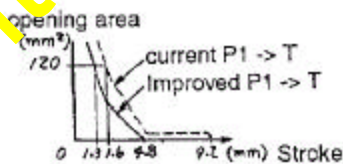
2. By modification of the controller software, Time-lag has been improved.

- The modulation current and shock current have been eliminated.
- Neutral switch signal detection means has been changed.
- Output current map has been modified.



ι Suppressing the peak pressure occurring at the inlet port section of the hydraulic oil cooler

1. A $\varnothing 10$ mm orifice has been supplemented to the return circuit port of the steering valve (without office: $\varnothing 24.5$ mm).
 2. Opening characteristics of the flow control spool for the steering valve have been changed.
- To lessen the opening area as against the spool stroke.
 - To narrow the damping orifice diameter. ($\varnothing 1.6$ mm > $\varnothing 1.2$ mm)

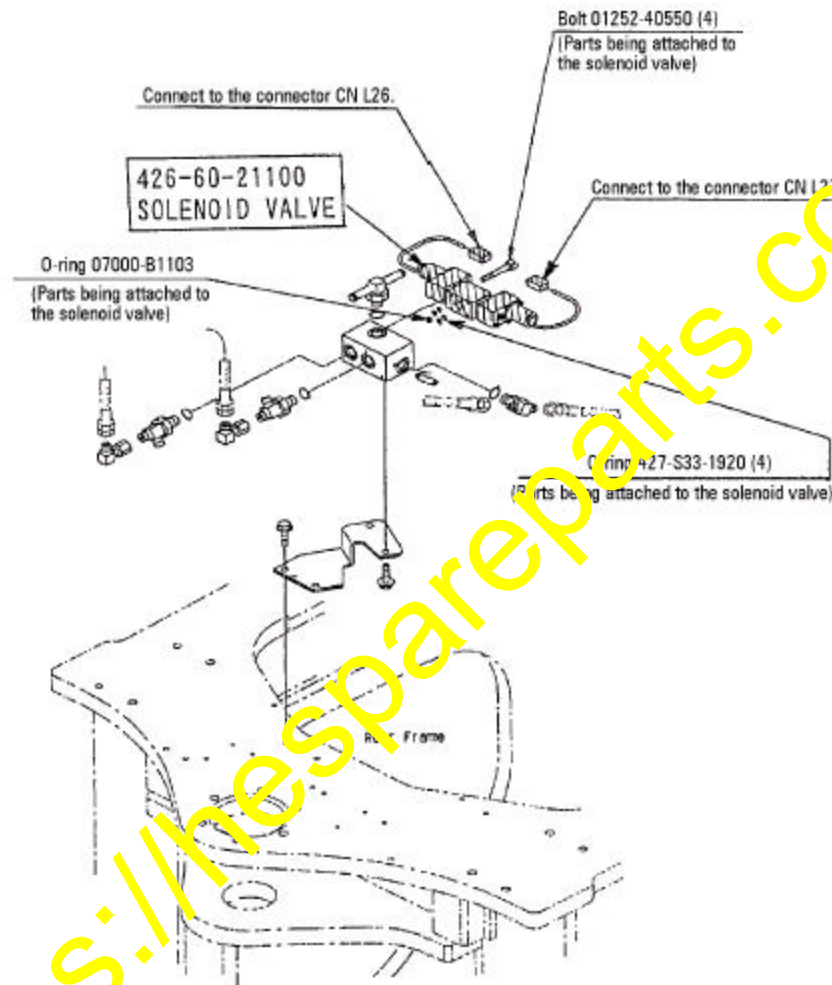


4. Modification procedures

Replacing the solenoid valve, remove the rear access panel behind the cab.

- 1) Remove the current solenoid valve.
- 2) Install the new solenoid valve (426-60-21100) using the attached four bolts.
- 3) Connect the connectors.

The part in box is the newly prepared part.

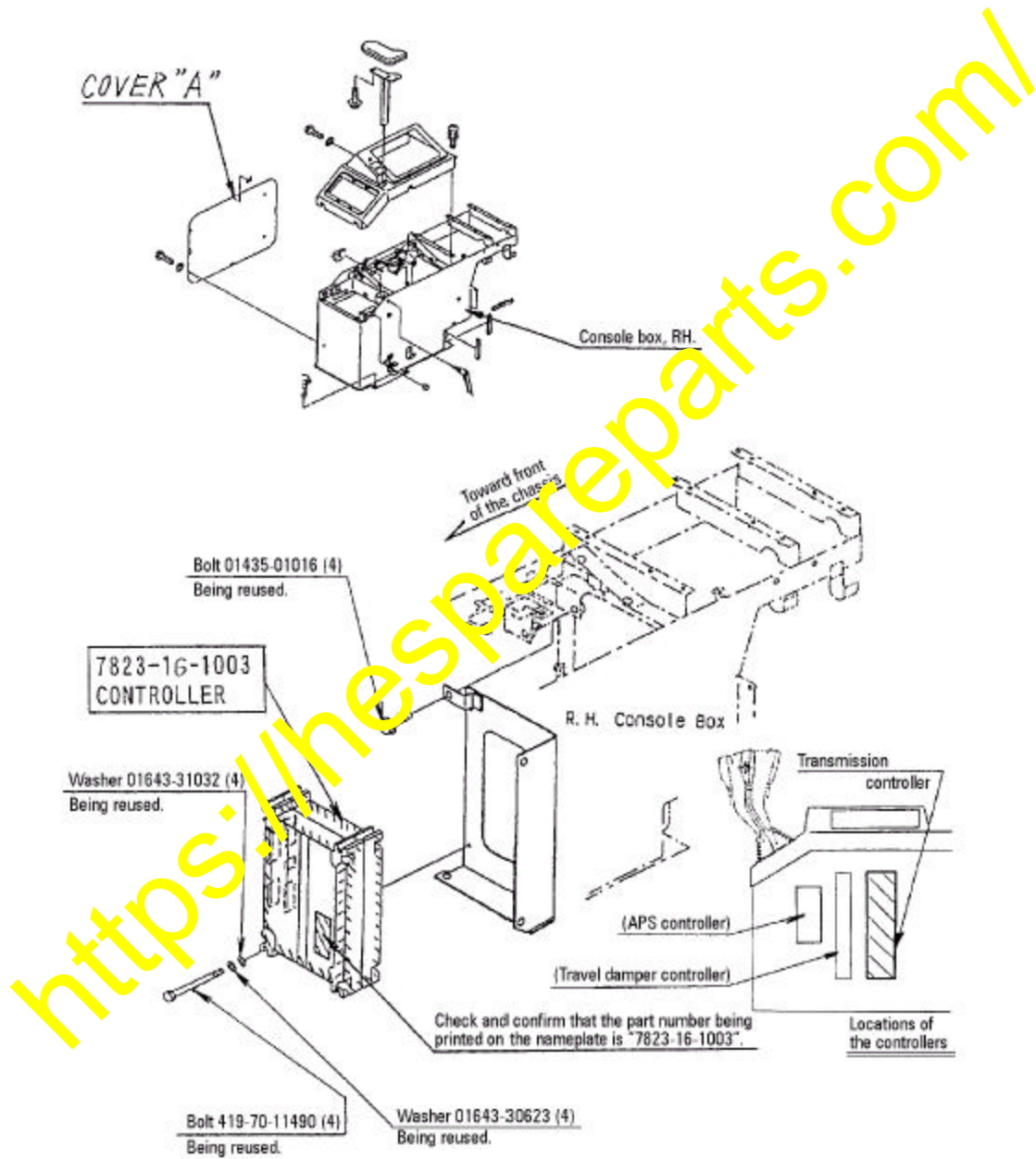


Note) Refer to "Working Precautions" in the Shop Manual when making this replacement work.
(Namely, preventing entry of dust and bleeding the air)

j Replacing the controller

1. Remove the cover "A" from the console box, RH.
2. Remove the current transmission controller from inside the console box, RH. Carefully keep the mounting bolts and nuts since they are being reused.
3. Install the new controller (7823-16-1003).
4. Connect the harness connectors to the controller.
5. Install the cover "A" back to the console box, RH.

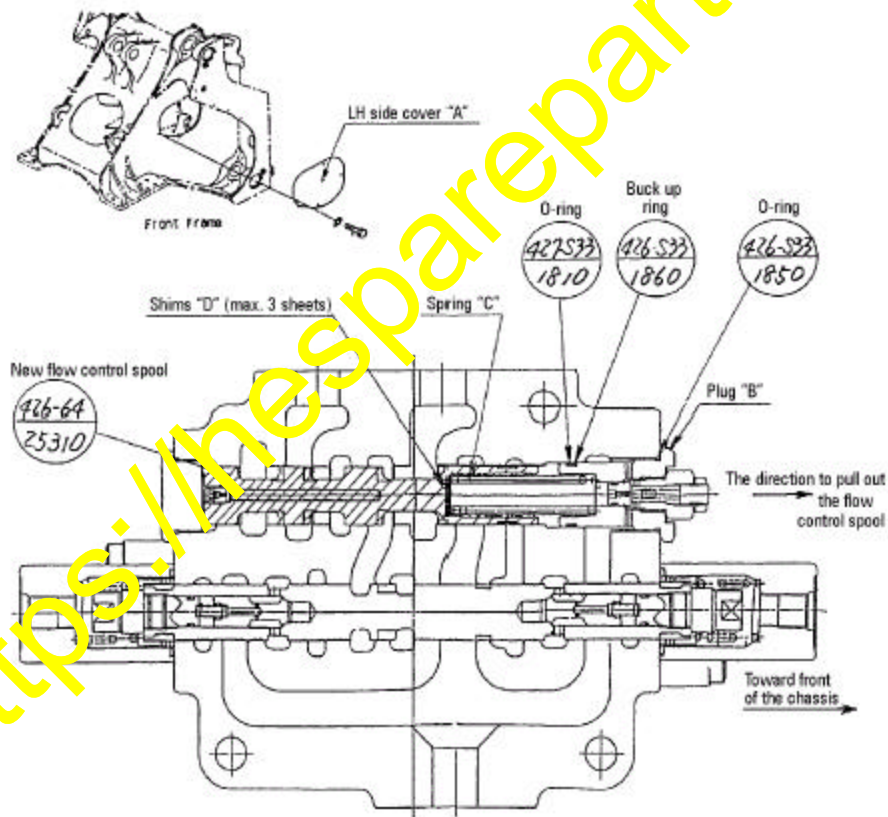
The part in box is the newly prepared part.



Replacing the flow control spool for the steering valve

1. Remove the LH side cover "A" of the front frame and remove left hand fender..
2. Remove the plug "B" from the steering valve and pull out the current flow control spool. When doing this, be careful not to drop the spring "C" and shims "D" (maximum 3 sheets) being installed in the space between the plug and the spool.
3. Set the currently used shims "D" and spring "C" as they are to the new spool (426-64-25310). Apply oil to the shims before setting them to the new spool in order not to let them drop easily.
4. Replace the O-rings (426-S33-1850 and 427-S33-1810) and backup ring (426-S33-1860) with new parts, respectively.
5. After applying oil over the surfaces of the new spool, insert it into the steering valve before tightening back the plug "B".
6. Check the steering relief pressure and if the pressure is found to be out of the specification, adjust the relief valve to bring the relief pressure into the specified range (207– 220 k cm^2). Refer to "Inspection and adjustment of the steering oil pressure" pages of this document.
7. Install the LH side cover "A" of the front frame back to its original position.

(Note) Refer to "Working Precautions" in the Shop Manual when making the above replacement work. After finishing the replacement work, bleed air from the steering circuit.



Inspection and adjustment of the steering oil pressure

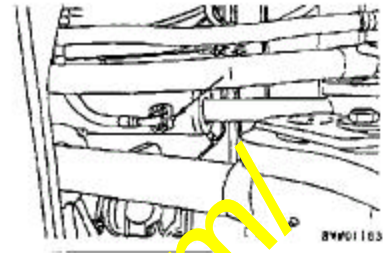
H Hydraulic oil temperature: 45 - 55°

Measurements

1. Measuring the steering relief pressure

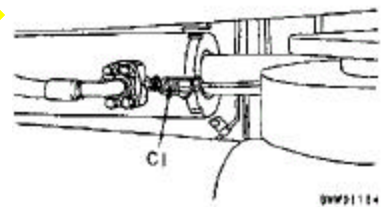


WARNING! Loosen the oil filler port cap to release the internal pressure from the hydraulic tank before turning the steering wheel for 2 to 3 times to release residue pressure from inside the circuit pipings.



WARNING! Install the safety bar to the frame.

Remove the oil pressure measuring port plug (PT 1/8) from the RH steering cylinder head side flange to install the oil pressure gauge C1 (39 Mpa 400 kg/cm²)



Start the engine and running the engine at Hi-idling revolution, turn the steering wheel rightward and measure the oil pressure when the pressure is relieved.

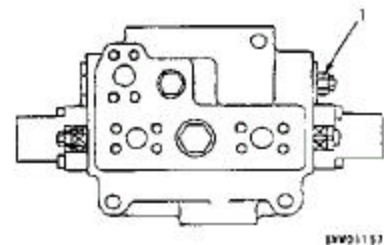
H In case the oil pressure measuring port plug on the LH steering cylinder is removed, turn the steering wheel leftward.

Adjustment



WARNING! Stop the engine when adjusting the hydraulic pressure.

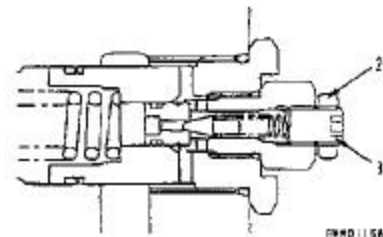
Adjusting the steering relieve valve. Loosen the locknut (2) of the steering relief valve (1) before turning the adjust nut (3) to adjust the hydraulic pressure.



Regarding the turning direction of the adjust screw:

- Turn the adjust screw rightward (clockwise) to raise the pressure.
- Turn the adjust screw leftward (counter-clockwise) to lower the pressure.

H Adjustable pressure per a turn of the adjust screw (a reference value): 14.2 MPa (145 kg/cm² 2 kgm)



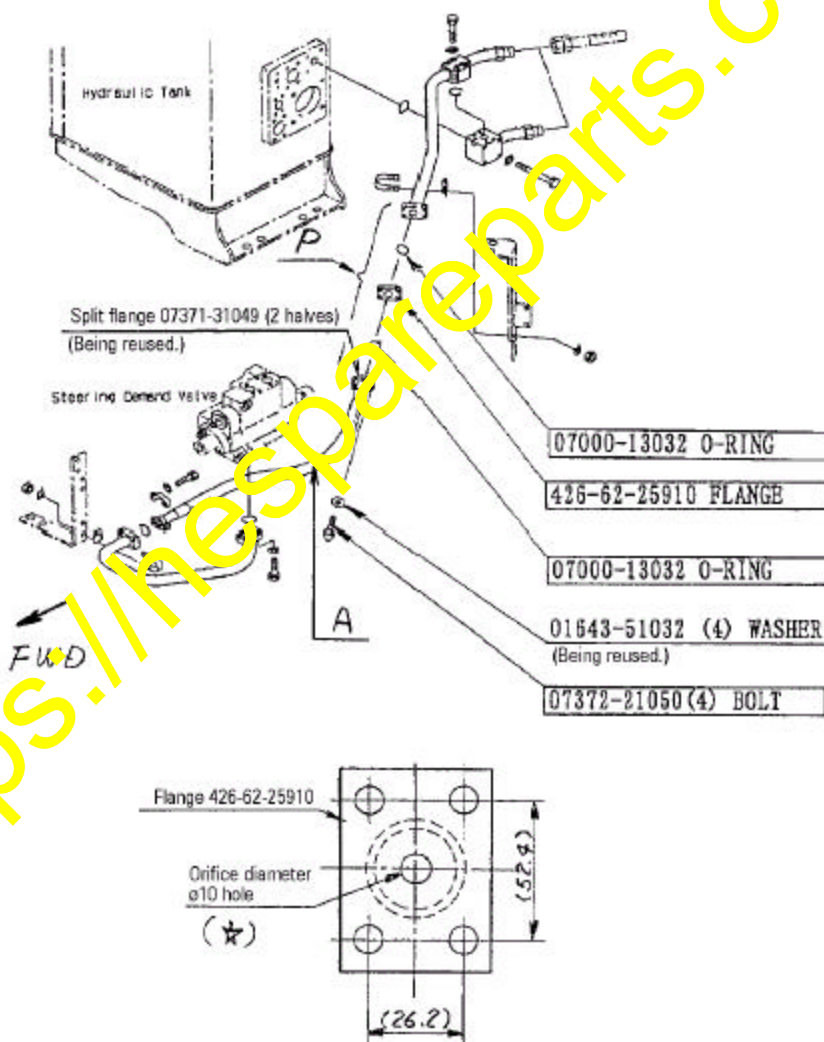
D Supplementing a flange (orificed flange) to the return circuit port of the steering valve

1. Remove the parts being used in the area "P" designated below of the steering valve return circuit center hose "A". Carefully keep the split flange and washers since they are being reused.
2. Inserting the flange (426-62-25910) and 2 units of O-rings (07000-13032) in the area "P", fasten the hose "A" using 4 bolts (07372-21050). Reuse the split flange and washers.

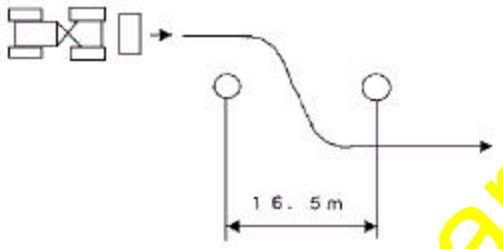
Note 1) Check and confirm that the diameter of the orifice being opened in the flange(426-62-25910) is 10 mm (Marked I).

Note 2) Refer to "Working Precautions" in the Shop Manual when making the above supplementation work. After finishing the supplementation work, bleed air from the steering circuit.

The parts in the box are the newly prepared parts.



5. Performance checks to make after finishing this modification work. After finishing modification of the joystick steering system, check the following points.

Items	Measurement conditions	Determination Criteria
Lock to lock Steering effecting time	<ul style="list-style-type: none"> Hydraulic oil temperature: 45-55°C Test ground to have flat, level and dry surface 	Low-Idling: 5.4 + 0.4 sec. or less Hi-Idling: 3.8+ 0.3 sec. or less
Straight traveling restoration ability (After lane changes)	<ul style="list-style-type: none"> Vehicle to travel in full speed using F4 gear. Travel lane to be changed. 	Restoration of straight traveling should be made with ease.

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