

INSTALLATION MANUAL

REF NO.	BA01006
DATE	April 6, 2001

SUBJECT: INTRODUCTION OF IMPROVED ECSS (OPTION)

PURPOSE: To introduce new ECSS (an option) for use on WA600-3 wheel loaders

APPLICATION: WA600-3A Wheel Loaders with existing ECSS
 WA600-3D Wheel Loaders with existing ECSS
 WA600-3L Wheel Loader Serial Number A52001 through A52192

FAILURE CODE: DW5050

DESCRIPTION:

1-1.Introduction

This Installation Manual introduces the improved Electronic Controlled Suspension System (ECSS) which is very effective in suppressing vibration and shock applied to the chassis while traveling on bumpy surfaces for the WA600-3 wheel loaders already equipped with the existing ECSS.

If a customer with a WA600-3 wheel loader already equipped with the existing ECSS wants to improve the ECSS performance further, install this new ECSS following the procedures outlined in this Installation Manual.

1-2.Revised places:

37 places ①	Feb. 23, 2001	Added measures to avoid installation troubles
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- 1. Lists of parts Pg 2 - 5
- 2. Disassembly procedures Pg. 6 - 14
- 3. Reworking with the frame Pg. 15 - 17
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- 10. Electric circuit diagram. Pg. 31
- 11. Hydraulic circuit diagram Pg. 32

1 place, ①

Part Number	Description	Qty	Remarks
1959797610	Seat	6	For ECSS solenoid valve mounting
4185413151	Cushion	12	
4185413161	Cushion	6	
4185413220	Washer	12	
4210612380	Clip	① 2 3	Wire clip for harness
4286415110	Collar	6	
0101081035	Bolt	8	
0101081060	Bolt	4	
0101081230	Bolt	6	
0101181220	Bolt	1	
0143501220	Bolt	1	
0143501025	Bolt	4	
0143501045	Bolt	2	
0143501220	Bolt	1	
0143501270	Bolt	6	
0143501280	Bolt	2	
0157101218	Seat	2	For cut off valve mounting
0157320205	Seat	2	Above steering cylinder pin
0157320207	Seat	1	
0158011210	Nut	6	
0158401210	Nut	1	
0159701009	Nut	8	
0164331032	Washer	12	
0164331232	Washer	13	
0164351032	Washer	44	
0443453412	Clip	1	
07000F3024	O-ring	2	
07000F3032	O-ring	10	
Part Number	Description	Qty	Remarks

07000F3035	O-ring	4	
07000F3038	O-ring	3	
07000F3045	O-ring	5	
07000F3048	O-ring	7	
0700212034	O-ring	2	
0700212434	O-ring	11	
0708801006	Hose	1	
0708801007	Hose	1	
0709410518	Clamp	2	
0709410620	Clamp	2	
0709500524	Cushion	1	
0709500627	Cushion	1	
0709500628	Cushion	1	
0723510522	Elbow	1	
0723510628	Elbow	2	
0723510630	Elbow	2	
0723610522	Elbow	2	Refer to page 26 when the 3-spool valve is installed, use 07230-20522 for 3-spool valve.
0723610628	Elbow	3	
0728333442	Clip	2	
0728334354	Clip	2	
0737131049	Flange	16	
0737221035	Bolt	32	
0737221045	Bolt	4	
07627005A5	Hose	1	
07627005A3	Hose	1	Refer to page 26 when the 3-spool valve is installed; use 07629-00505 for 3-spool valve.
0762700605	Hose	1	
0762700606	Hose	2	
07627006A5	Hose	1	
07629006A6	Hose	1	

3 places, ①

Part Number	Description	Qty	Remarks
0803420519	Band	10	
0805301512	Clip	1	
22W6213110	Nipple	1	
421S992390	Valve	1	
425S992530	Valve	2	
426S992542	Tube	1	
426S992552	Tube	1	
426S992560	Hose	1	
426S992573	Hose	1	
426S992621	Plate	2	
426S992632	Plate	1	
426S992662 or 426S992663	Tube	1	Either tube will work
426S992672	Hose	1	
426S992683	Wiring Harness	1	ECSS wiring harness
426S992811	Tube	1	
426S992831	Tube	1	
426S992840	Plate	1	
426S992850	Tee	1	
4156413120	Washer	4	
4156413130	Cushion	2	
4194317930	Cushion	2	
4216218560	Spacer	2	
2080619170	Clip	1	
0805301512 ①	Clip	1	
0143501016 ①	Bolt	1	
23B6014470 ①	Seat	1	For reworking
20R6214330	Nipple	1	
4266223492	Plate	1	
Part Number	Description	Qty	Remarks

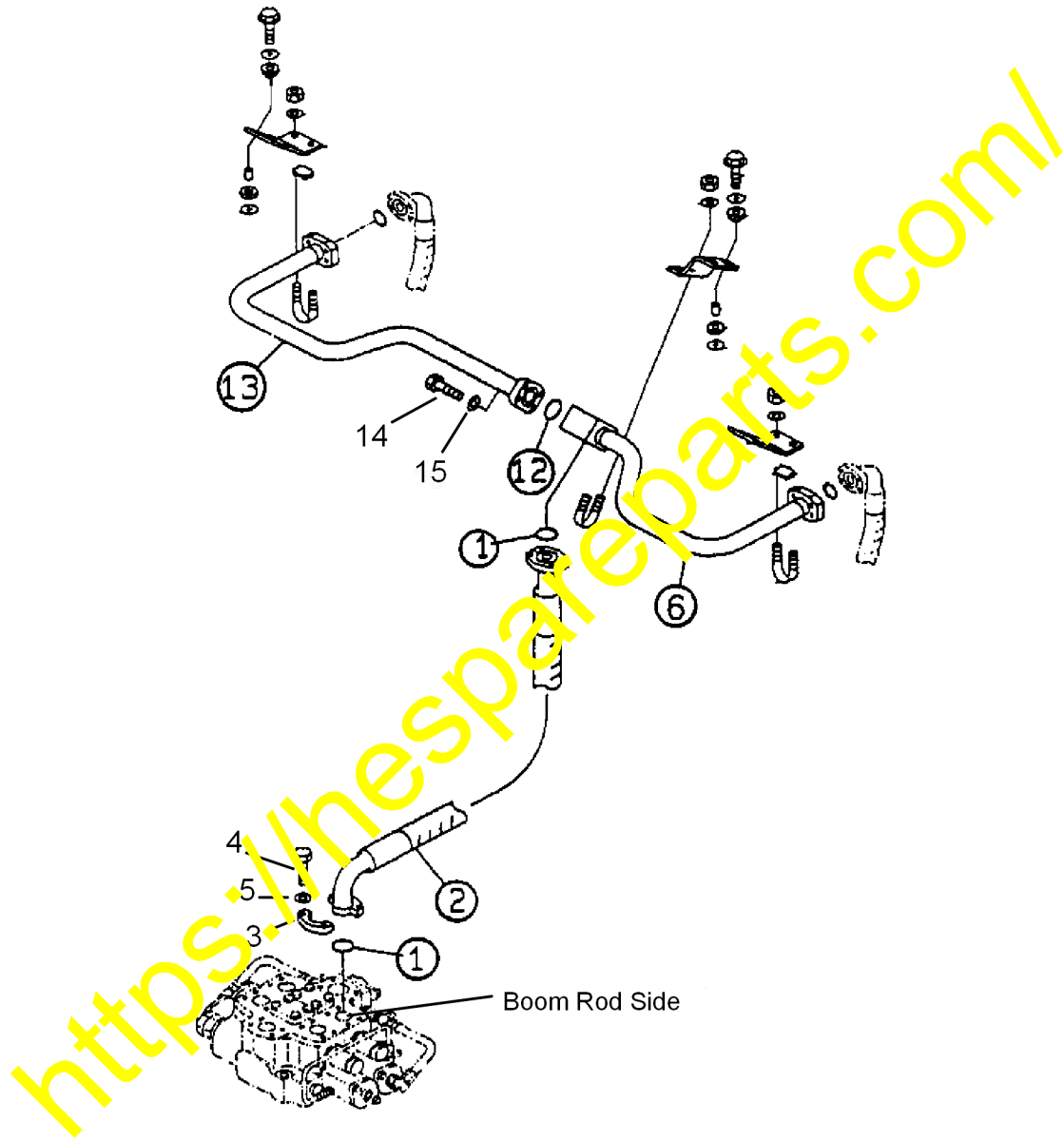
4266223552	Tube	1	
4266223562	Tube	1	
426S992290	Plate	1	
426S992370	Plate	1	
426S992380	Hose	1	
426S992390	Hose	1	
426S992413	Tube	1	Refer to page 24 when the 3-spool valve is installed; use 426-599-2711 for 3-spool valve.
426S992960	Tube	1	
426S992970	Tube	1	
426S992980	Elbow	1	
426S992990	Elbow	1	
0704270108	Plug	2	
0704902734	Plug	2	

Remarks:

- 1) In the event the 3-spool valve is installed, order 426-599-2711 instead of 426-S99-2413 as instructed on page 24 of this document.
- 2) If the 3-spool valve is installed, order 07230-10522 instead of 07236-10522 as instructed on page 26 of this document.
- 3) In case the 3-spool valve is installed, order 07629-00505 instead of 07627-005A3 as instructed on page 26 of this document.
- 4) If the load meter is installed, order 426-U94-2271 instead of 426-S99-2542 as instructed on page 24 of this document.

2. Disassembly procedures

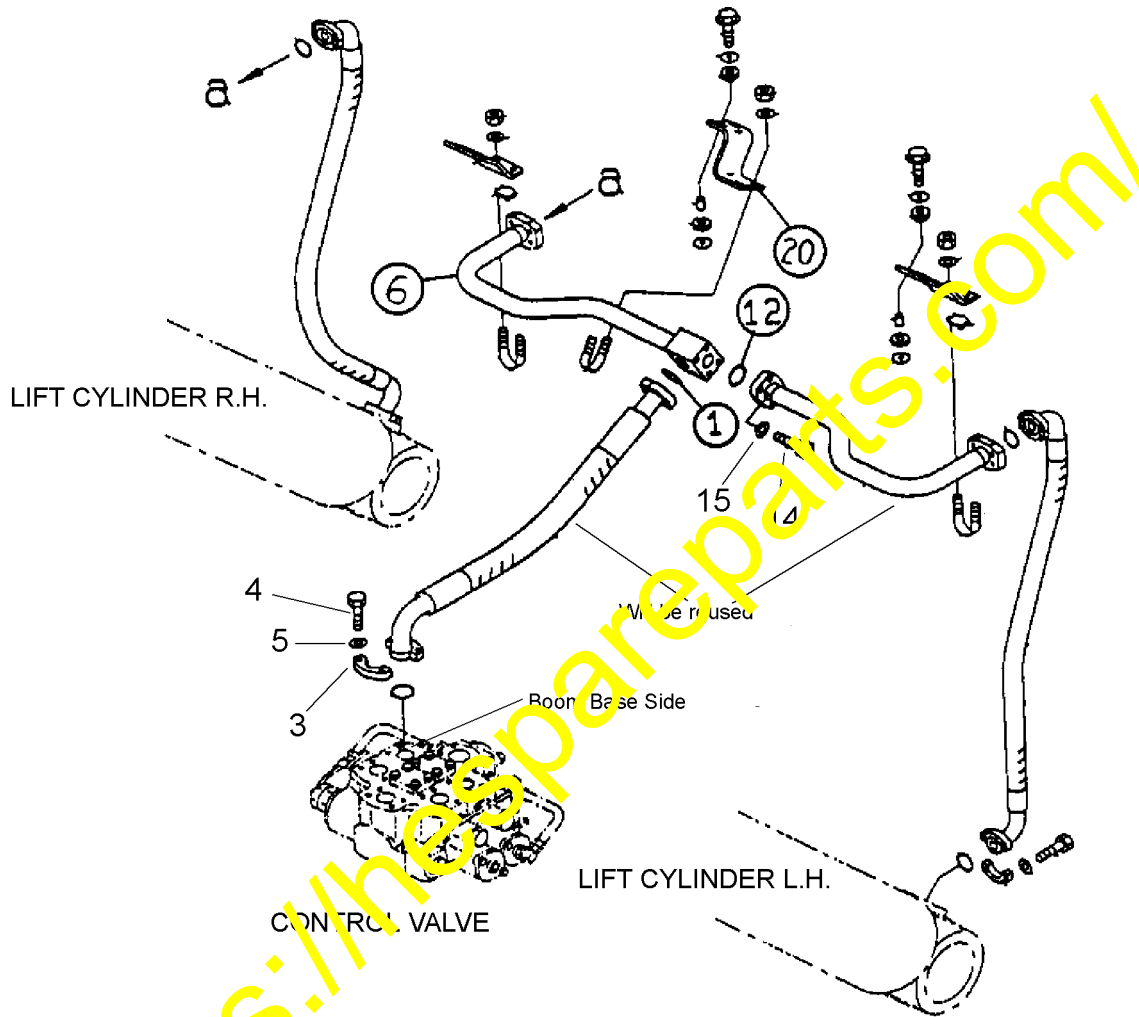
2-1 Remove the parts with circled code numbers shown in the schematic diagram indicated below and dispose of them after removal. Other parts will be reused. Wash the parts to be reused and keep them free from dust and dirt.



VLPS0103

3	07371-31465 Flange	(2)	14	01010-81240 Bolt	(4)
4	07372-21240 Bolt	(4)	15	01643-31232 Washer	(4)
5	01643-51232 Washer	(4)			

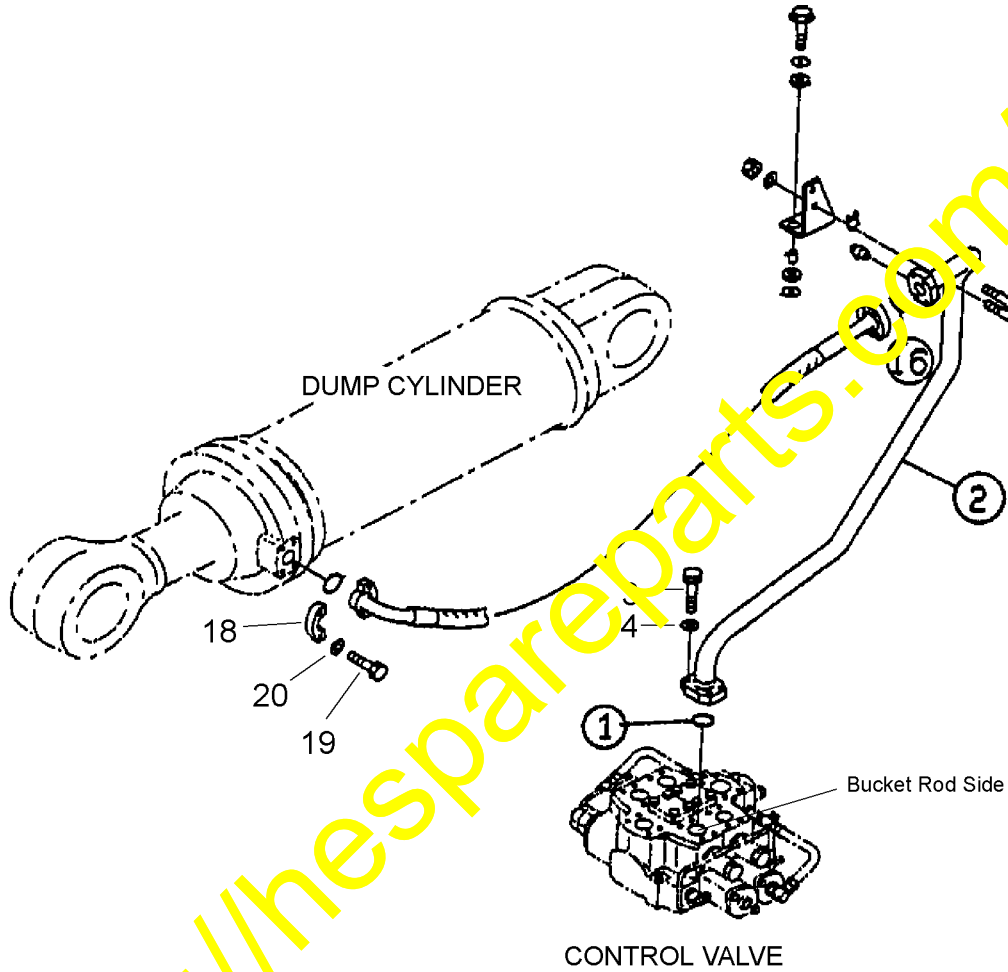
2-2 Remove the parts with circled code numbers shown in the schematic diagram indicated below and dispose of them after removal. Other parts will be reused. Wash the parts to be reused and keep them free from dust and dirt.



VLPS0104

3	07371-31465 Flange	(2)	14	01010-81240 Bolt	(4)
4	07372-21240 Bolt	(4)	15	01643-31232 Washer	(4)
5	01643-51232 Washer	(4)			

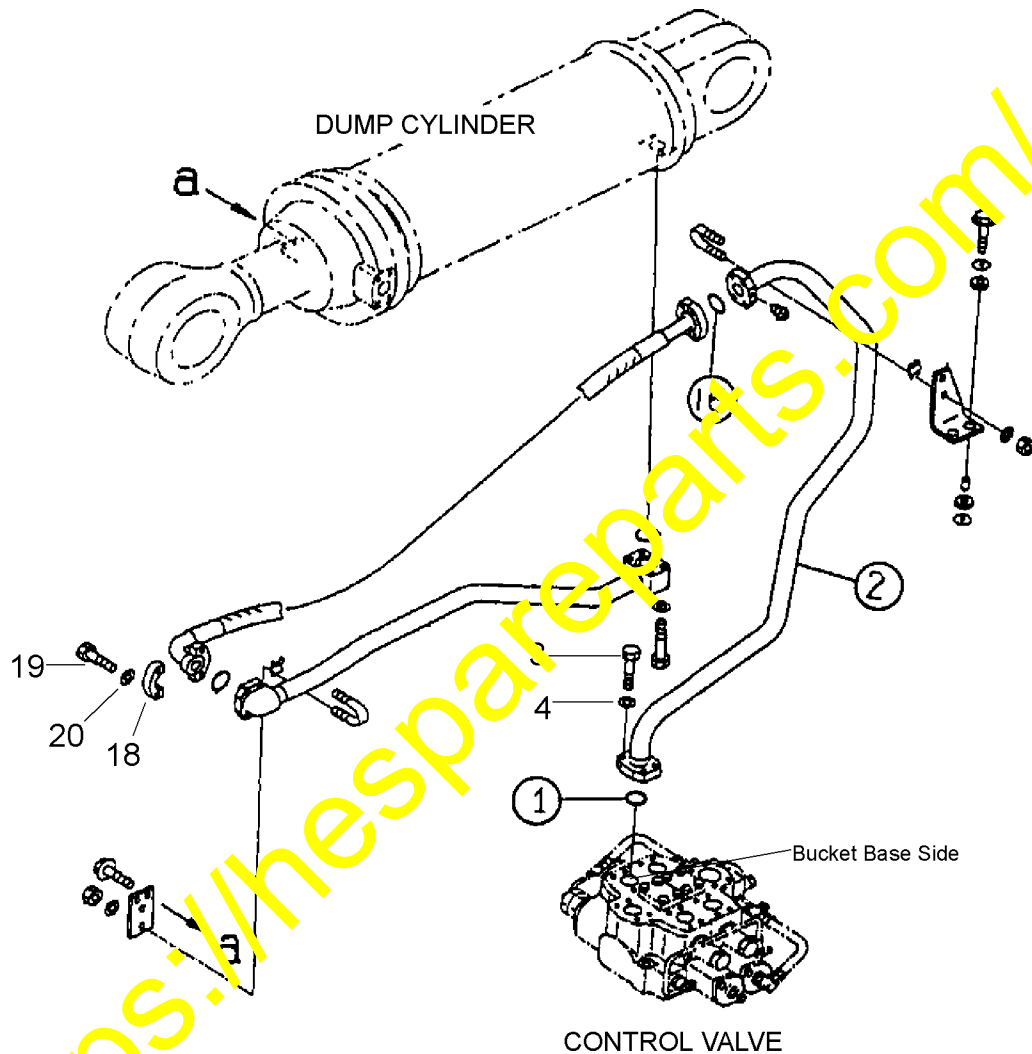
2-3 Remove the parts with circled code numbers shown in the schematic diagram indicated below and dispose of them after removal. Other parts will be reused. Wash the parts to be reused and keep them free from dust and dirt.



VLPS0105

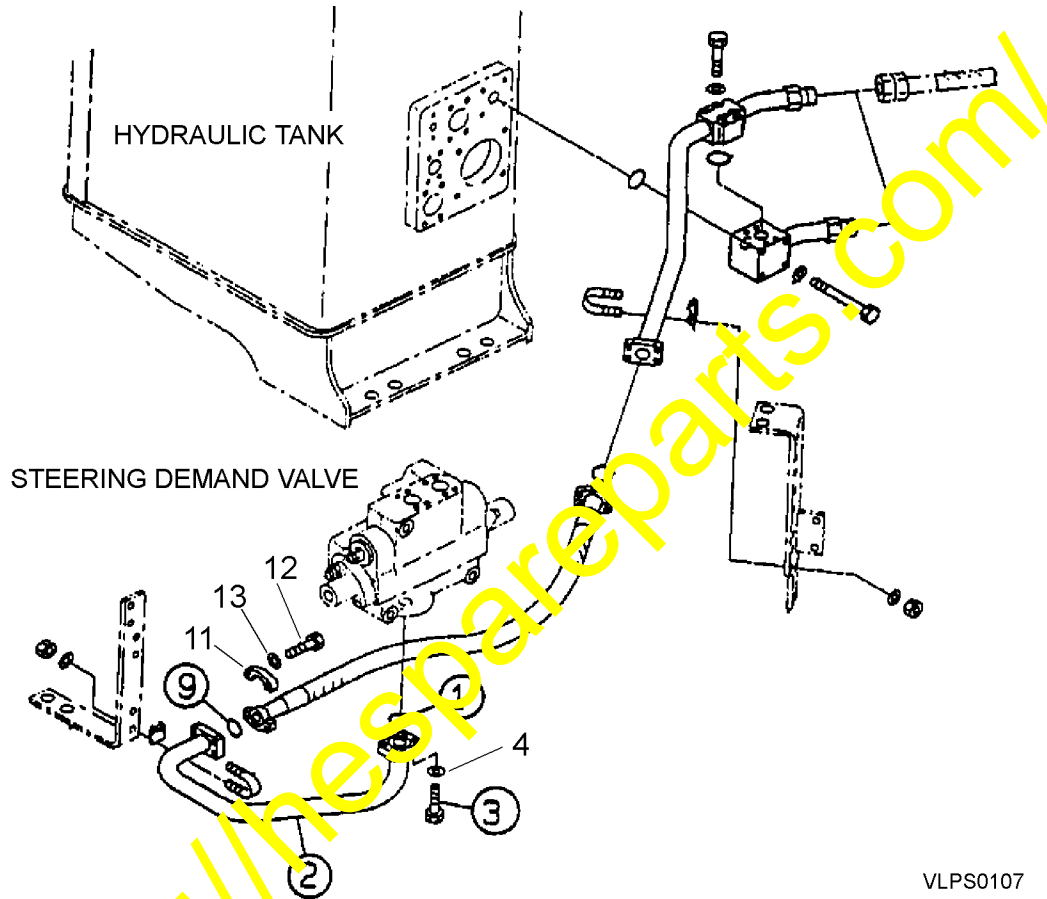
3	01010-81245 Bolt	(4)	19	07372-21240 Bolt	(2)
4	01643-51232 Washer	(4)	20	01643-31232 Washer	(2)
18	07371-31465 Flange	(2)			

2-4 Remove the parts with circled code numbers shown in the schematic diagram indicated below and dispose of them after removal. Other parts will be reused. Wash the parts to be reused and keep them free from dust and dirt.



3	01010-81245 Bolt	(4)	19	07372-21240 Bolt	(2)
4	01643-51232 Washer	(4)	20	01643-31232 Washer	(2)
18	07371-31465 Flange	(2)			

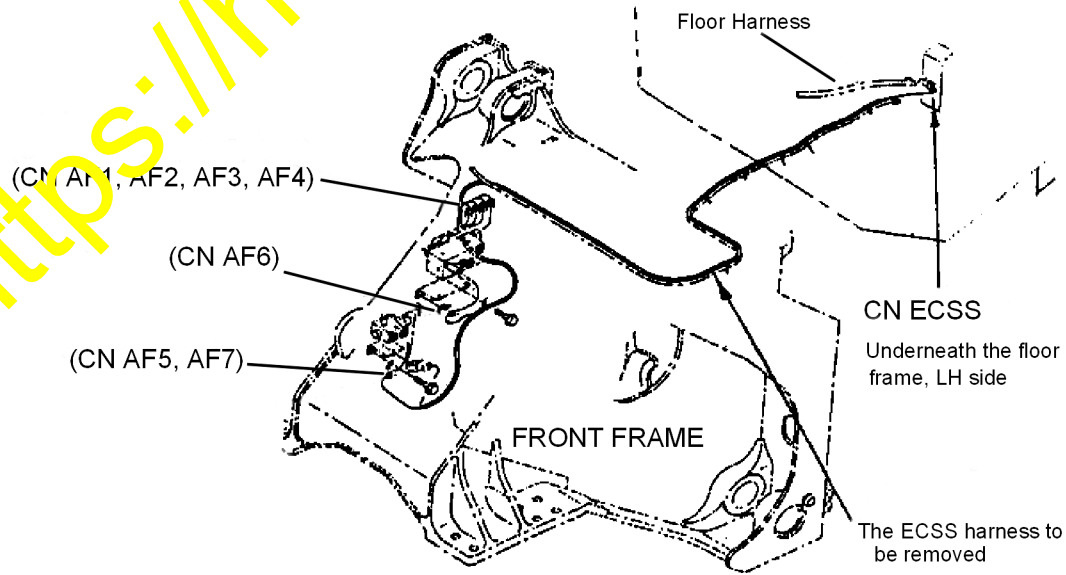
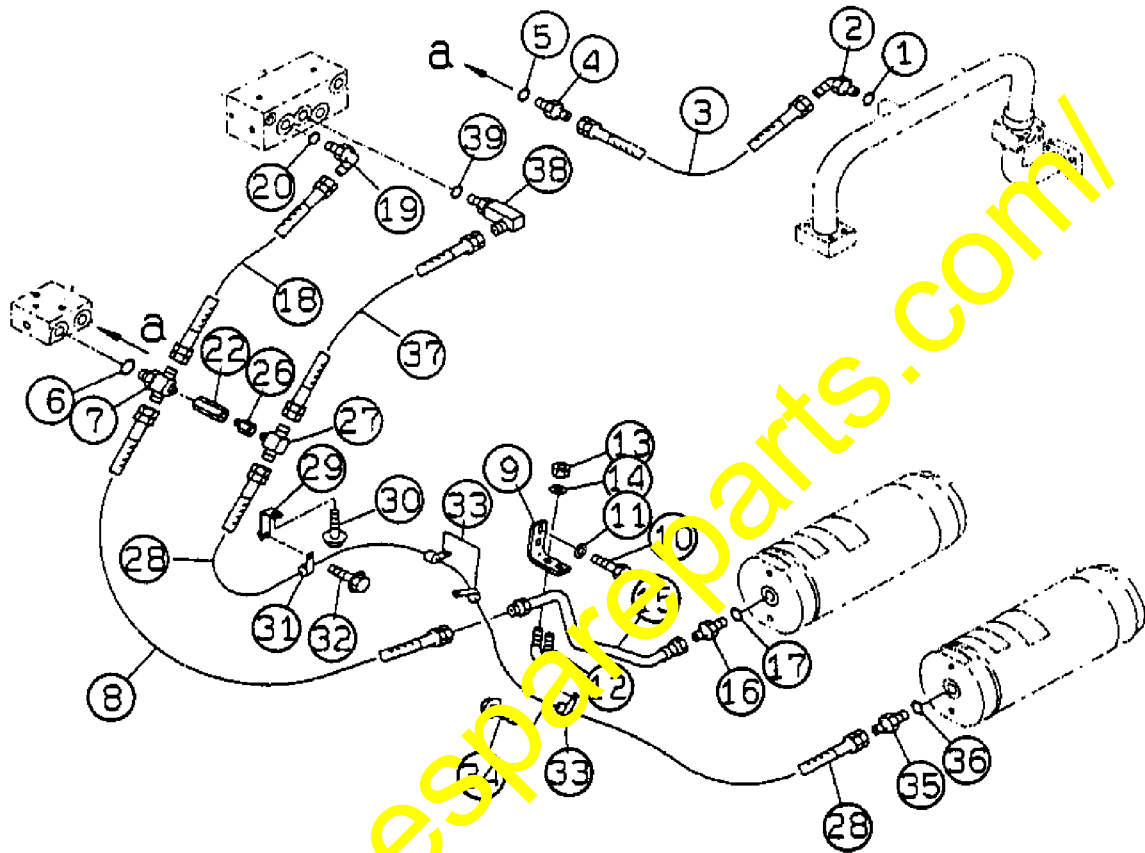
2-5 Remove the parts with circled code numbers shown in the schematic diagram indicated below and dispose of them after removal. Other parts will be reused. Wash the parts to be reused and keep them free from dust and dirt.



VLPS0107

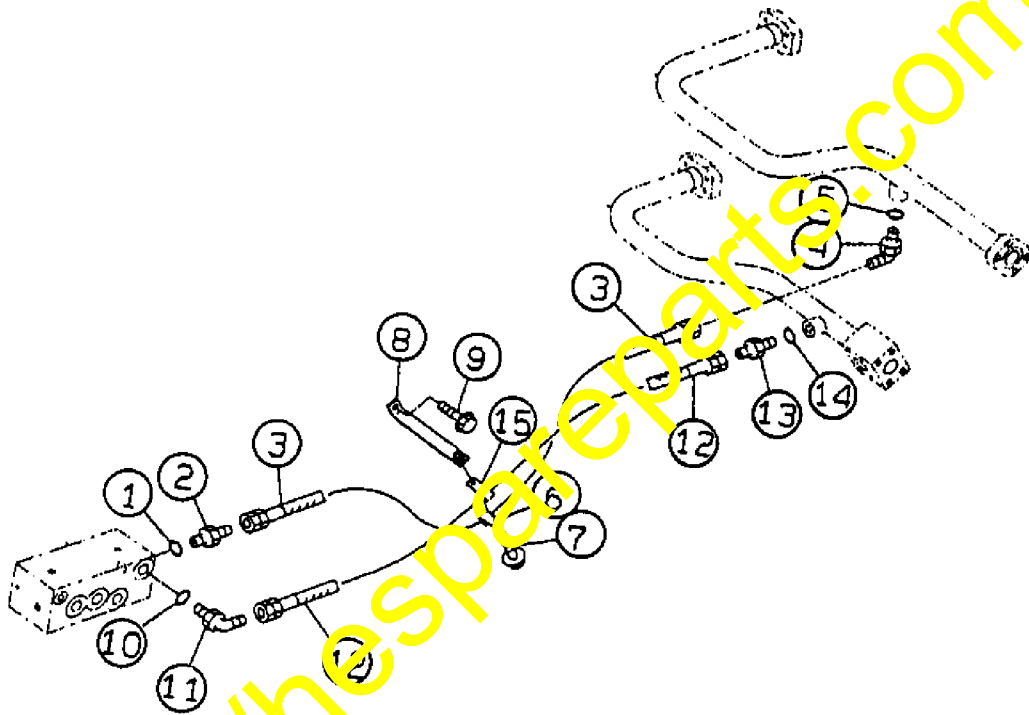
11	07371-31049 Flange	(2)	13	01643-31032 Washer	(2)
12	07372-21035 Bolt	(2)	4	01643-31032 Washer	(4)

2-6 Remove the parts with circled code numbers shown in the schematic diagram indicated below and dispose of them after removal. Other parts will be reused. Wash the parts to be reused and keep them free from dust and dirt.



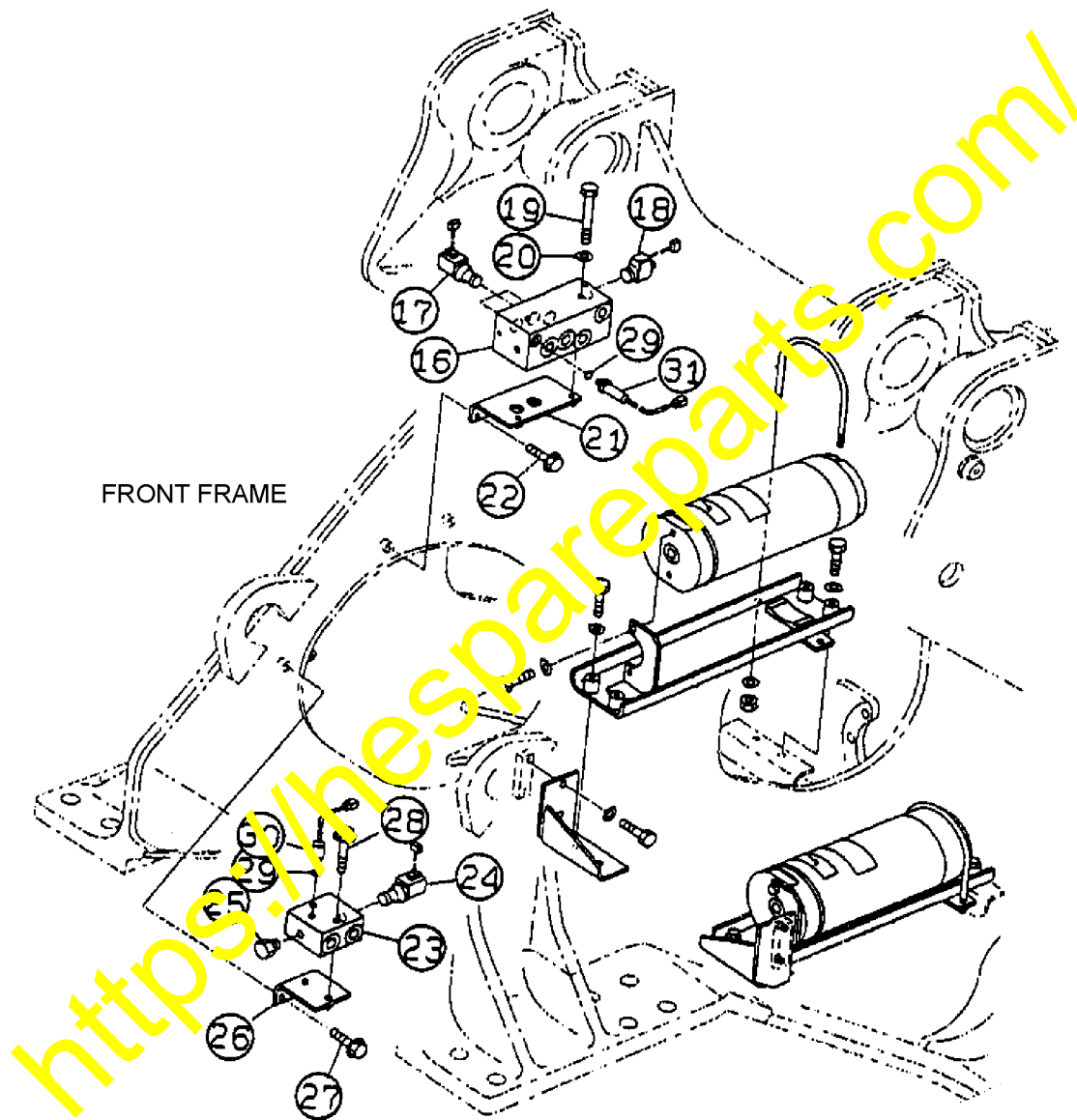
VLPS0108

2-7 Remove the parts with circled code numbers shown in the schematic diagram indicated below and dispose of them after removal. Other parts will be reused. Wash the parts to be reused and keep them free from dust and dirt.



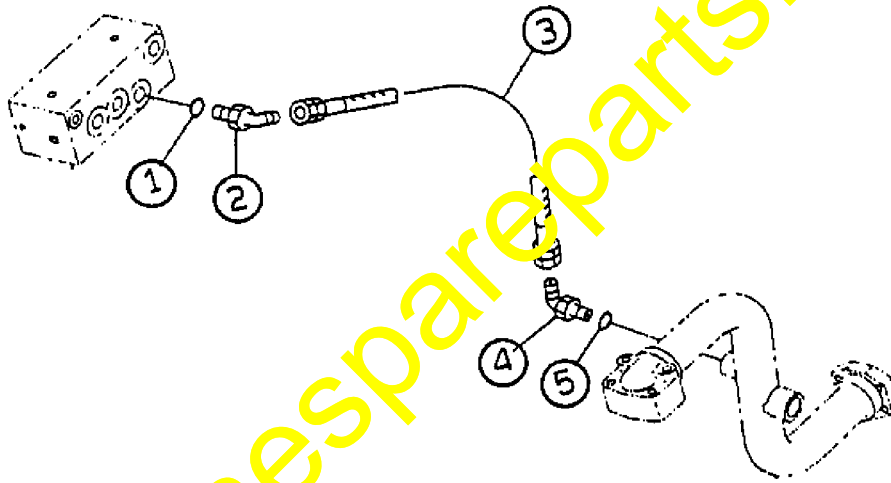
VLPS0109

2-8 Remove the parts with circled code numbers shown in the schematic diagram indicated below and dispose of them after removal. Other parts will be reused. Wash the parts to be reused and keep them free from dust and dirt.



VLPS0110

2-9 Remove the parts with circled code numbers shown in the schematic diagram indicated below and dispose of them after removal. Other parts will be reused. Wash the parts to be reused and keep them free from dust and dirt.

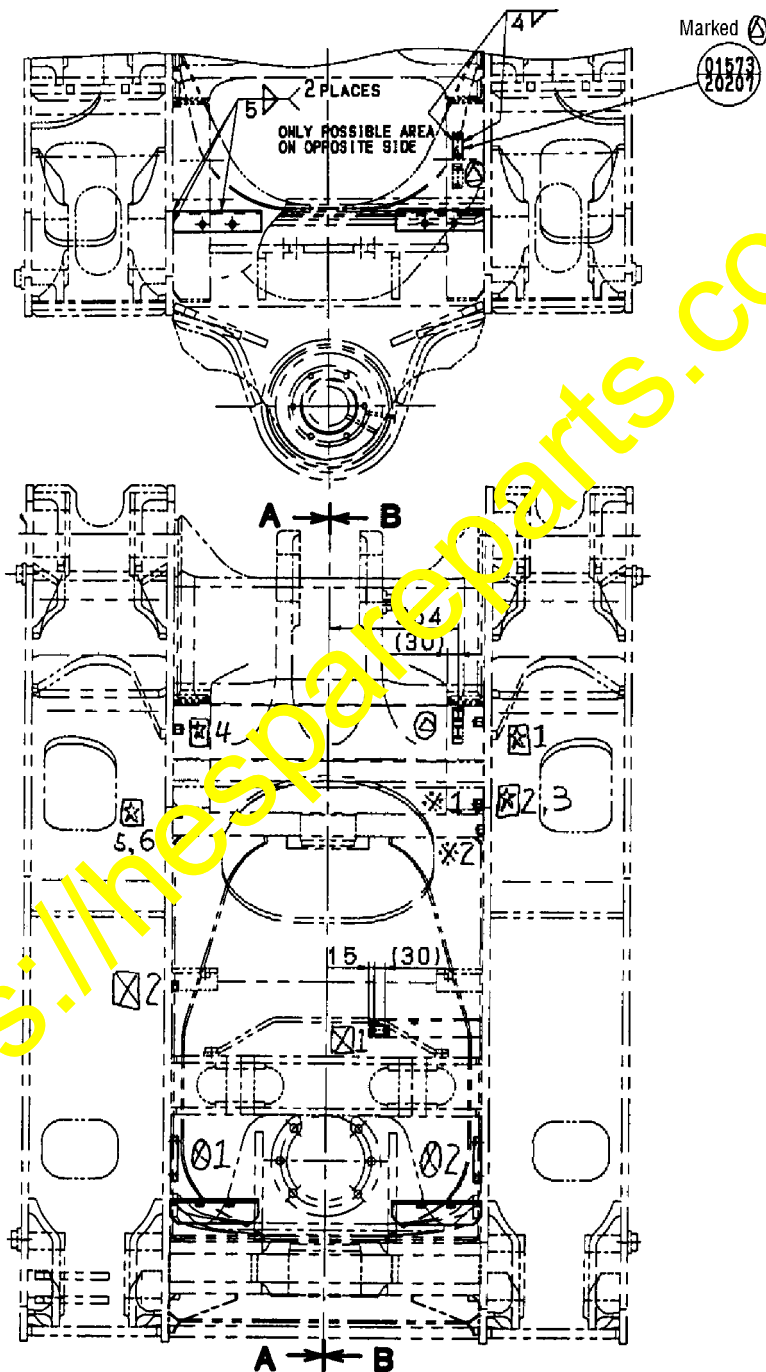


VLPS0111

3. Reworking with the frame

3-1 Weld the seat and plate to the front frame.

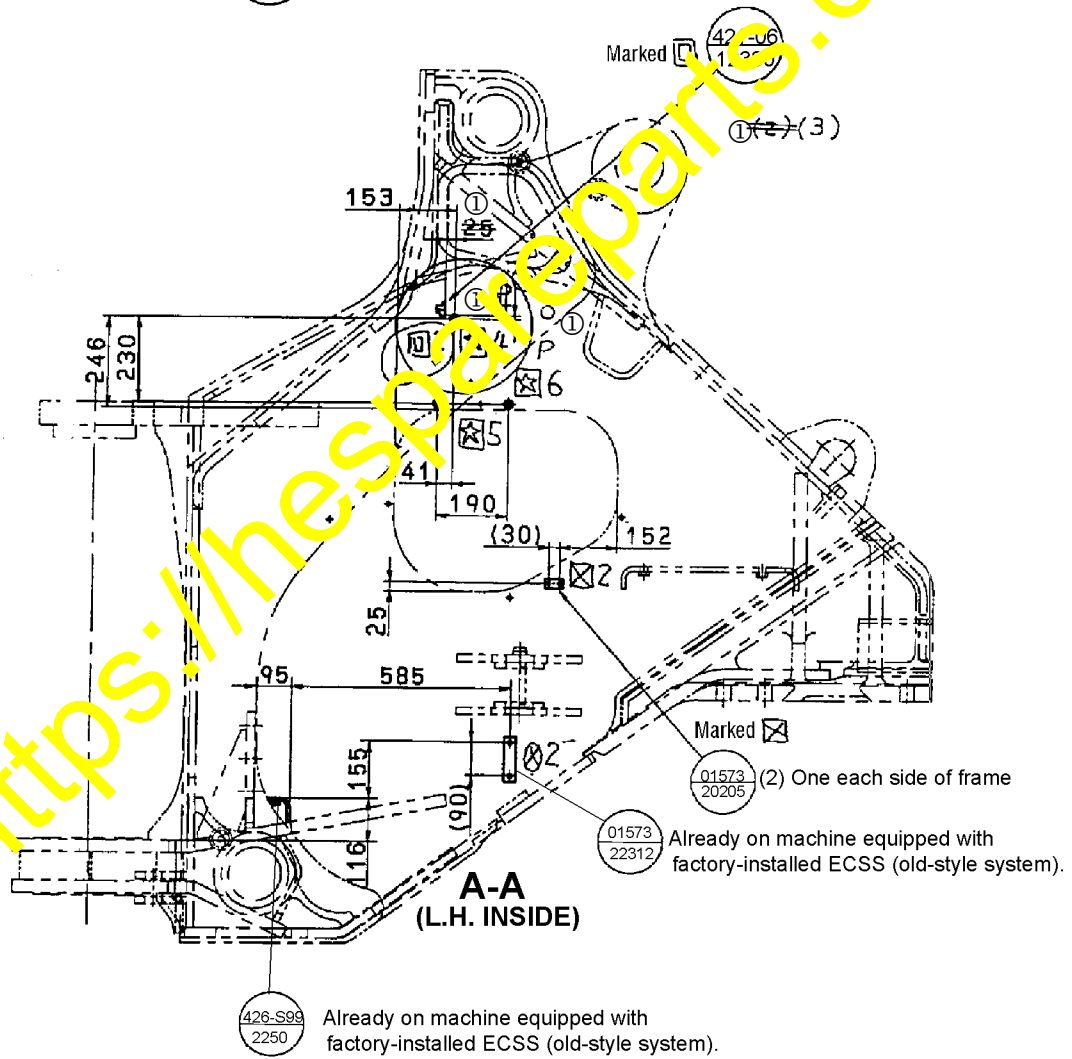
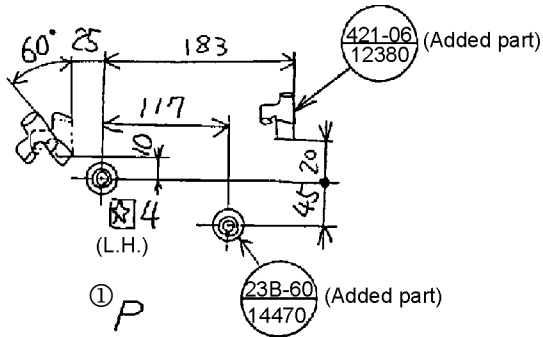
3-2 Paint the reworked section. (Paint color: Komatsu Yellow)



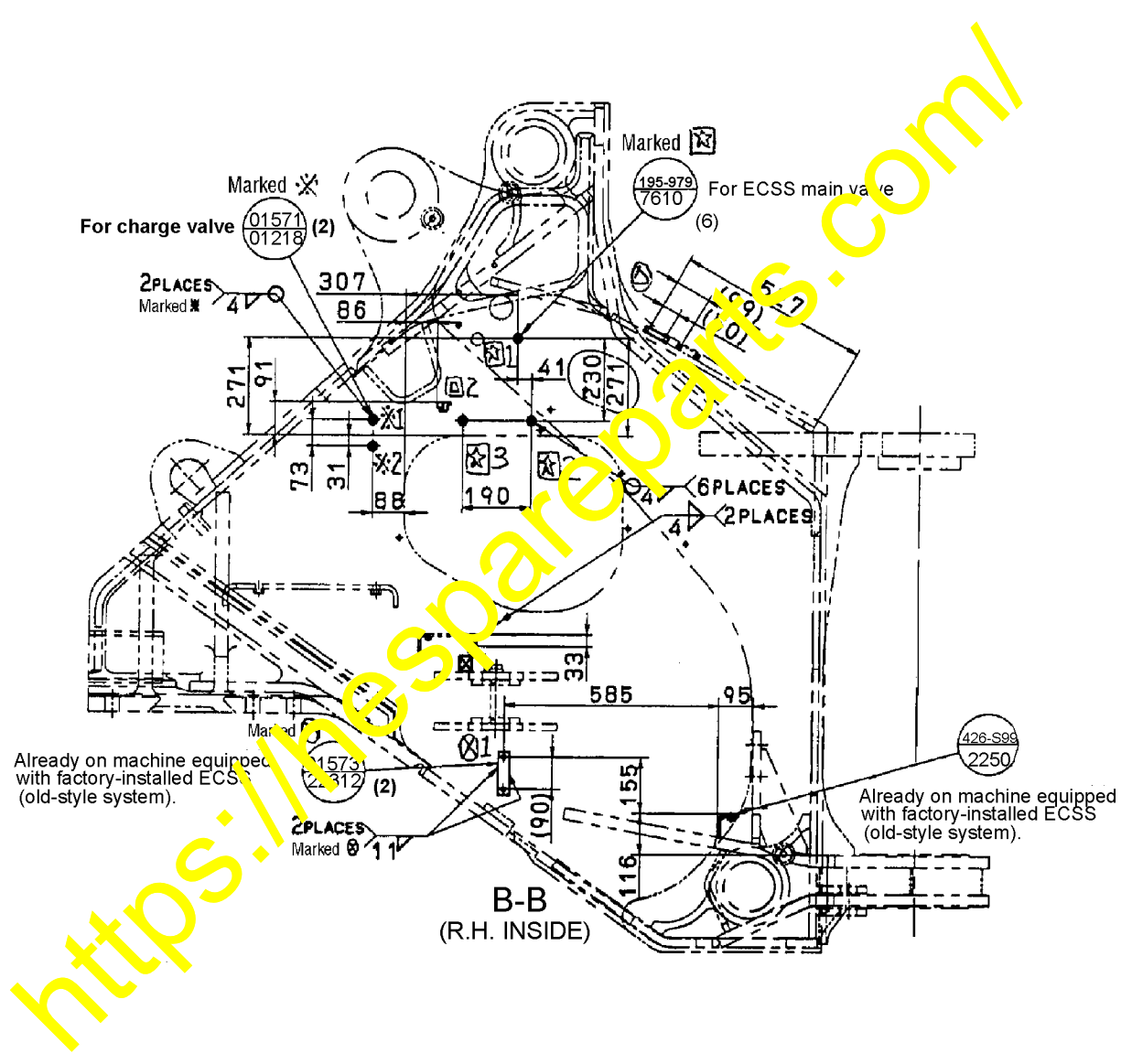
VLPS0112

BA01006

5 places, ①



VLPS0113



VLPS0114

4. Reworking with the accumulator

Rework both accumulators being carried by the subject machine.

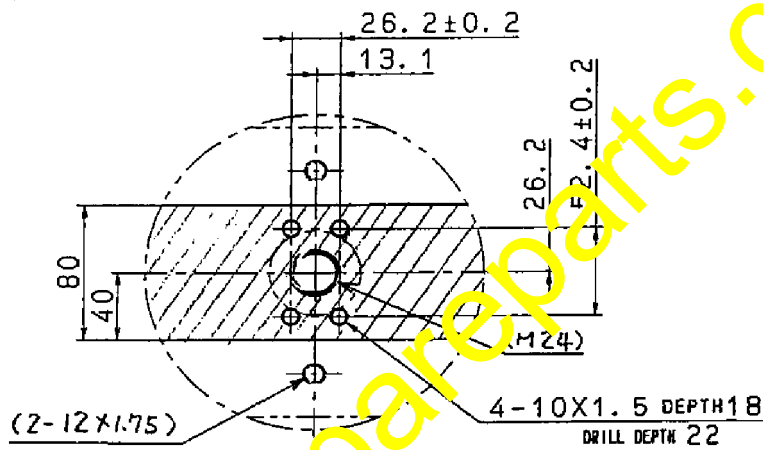
4-1 Plug the M24 oil filler port using a cork or rubber plug (07049-02734).

4-2 Wash the outside surfaces of the accumulators.

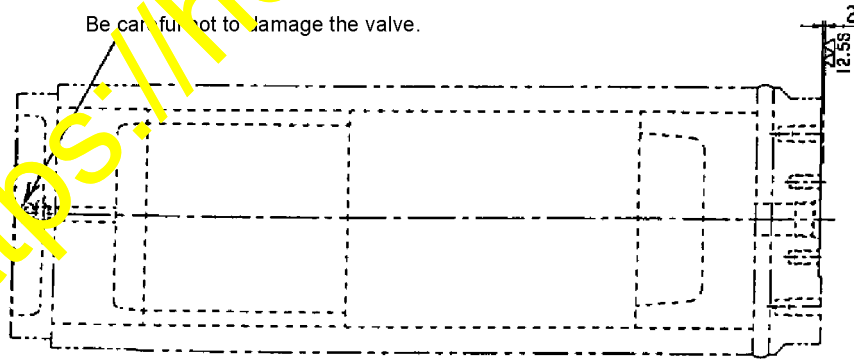
4-3 Mill the oil filler port surface using a milling machine (the hatched section).

4-4 Drill and tap at four places according to the instructions given below.

NOTE: When reworking is not feasible, order two new accumulators (721-32-15140) to install to the machine. In this case, Section 6, "N2 gas charging" becomes unnecessary.



Be careful not to damage the valve.



Be sure depth of new surface facing is deep enough to remove the old o-ring chamfer.

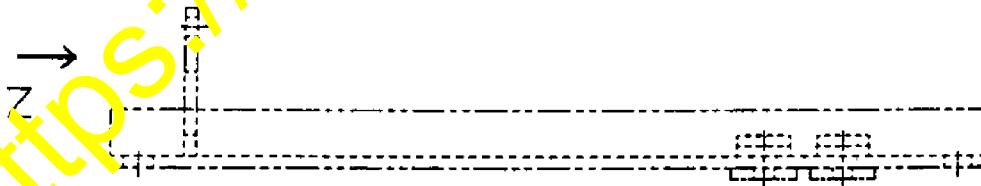
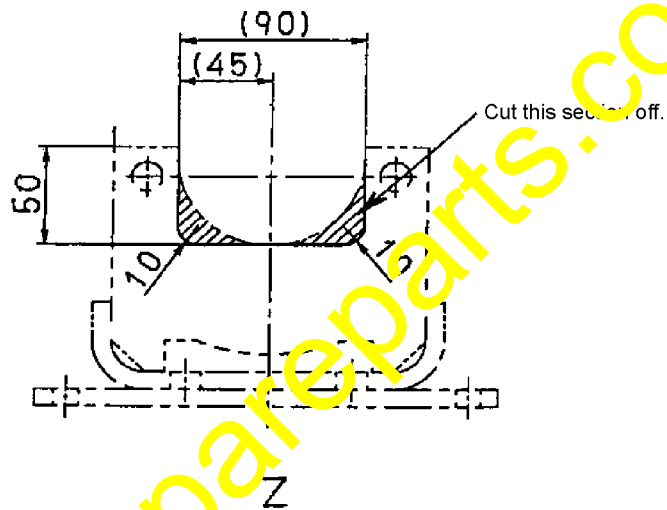
VLPS0115

5. Reworking with the accumulator mounting bracket

Rework both accumulator mounting brackets installed to the subject machine. (Refer to page 13.)

5-1 Cut the hatched sections off.

5-2 Paint the reworked sections. (Paint color: Komatsu Yellow)



VLPS0116

6. Nitrogen gas (N2) charge

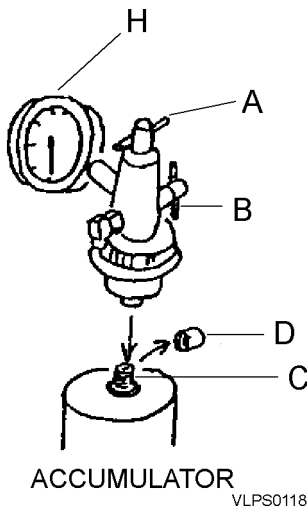
WARNING! Handle the accumulators carefully.

Qualification may be necessary when charging the N2 gas.

N2 gas charging work should be done by a qualified person.

6-1 N2 gas charging procedures

- a. Introduction of gas charge valve (Part No. 792-610-1700)



Description

1. Charge valve assembly
 2. Charge valve body
 3. Handle (Adjust screw)
 4. Handle (Vent plug)
 5. Gas valve
 6. Union nut
 7. Joint
 8. Pressure gauge
 9. Hose assembly
 10. Reducing joint
- (Refer to the list indicated below)

Part Numbers

792-610-1700

NOTE:

Some charge kits may require valve stem extension, Part Number TH0216, to charge the accumulator.

The types of the nitrogen gas cylinder joints differ by countries or regions. The part numbers of the reducing joints fitting to respective countries or regions are as follows:

Part Numbers

Types

- | | |
|--------------|--------------------------|
| 792-610-1260 | Type "B" in Japan |
| 792-610-1310 | Russia |
| 792-610-1320 | "CGA" tank in the U.S.A. |
| 792-610-1330 | "ASA" tank in the U.S.A. |
| 792-610-1340 | France |
| 792-610-1350 | Germany |
| 792-610-1360 | U.K. |

Type "A" in Japan is not necessary

6-2 Gas charging procedure

Use the charge valve assembly (792-610-1700) when charging N2 gas.

Check and make sure that oil has been totally drained from inside the accumulators.

Refer to Section 9-2 regarding the pressure releasing procedures (oil draining procedures).

N2 gas charging should be performed under an ambient temperature of 15 to 25°C.

Before installing the charge valve to the accumulator, perform the following:

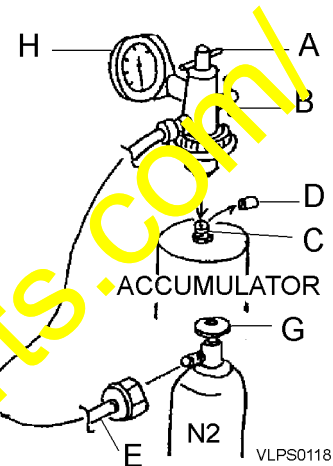
- a. Turn the handles "A" and "B" counter-clockwise as far as they go.
- b. Remove the cap "D" from the valve "C".
- c. Install the charge valve assembly to the accumulator.
- d. Connect the N2 gas cylinder and the charge valve assembly by the hose "E".

The reducing joint currently installed to the hose assembly "E" is the JIS Type "A" joint.

Select the proper joint fitting to the N2 gas cylinder from the above list to use for this N2 gas charging.

- e. After connecting the hose, slowly open the valve "G". Do not open it abruptly. The N2 gas starts flowing through the handle "B" when the drop in N2 gas pressure reaches the range of 0.2 to 0.3 MPa. If gas leakage occurs while doing the above, turn the handle "B" clockwise.

- f. Turn the handle "A" to depress the piston of the valve "C" down. The N₂ gas starts flowing through the handle "B" when the drop in N₂ gas pressure reaches the range of 0.2 to 0.3 MPa. If gas leakage occurs while doing the above, turn the handle "B" clockwise.
- g. Turn the handle "A" very slowly in the clockwise direction to depress the piston of the valve "C" down. Since the piston shaft of the valve "C" is very weakly structured, be careful not to bend the piston shaft by turning the handle "A" excessively.
- h. Open the valve "G" slowly to charge the N₂ gas into the accumulator. While doing this, close the valve "G" once in a while to check the gas pressure on the pressure gauge "H".
- i. Close the valve "G" when the gas pressure has reached 2.5 ± 0.1 MPa. If the gas pressure has exceeded 2.7 MPa, close the valve "G" and turn the handle "B" in the clockwise direction to release the N₂ gas.
- j. Turn the handle "A" in the counter-clockwise direction to let the piston inside the valve "C" return to the original position.
- k. Turn the handle "B" in the counter-clockwise direction to let the piston inside the valve "C" return to the original position.
- l. Remove the charge valve assembly from the accumulator.
- m. Pour soapy water around valve "C" to check that gas leakage is not occurring.
- n. Install the cap "D" to the valve "C".



6-2 Periodical inspections of the N₂ gas pressure

Use the charge valve assembly (792-610-1700) when inspecting the N₂ gas pressure.

Before installing the charge valve to the accumulator, check the following points:

If the handle "A" has been turned in the counter-clockwise direction as far as it goes.

If the handle "B" has been turned in the clockwise direction as far as it goes.

- a. Drain oil from inside the accumulator.
Refer to Section 9-2 regarding the pressure reducing procedures for the oil.
- b. Remove the cap "D" from the valve "C".
- c. Install the charge valve assembly to the valve "C" of the accumulator.
- d. Turn the handle "A" very slowly in the clockwise direction to depress the piston of the valve "C" down until the pointer of the pressure gauge "H" starts moving and indicates the current gas pressure.

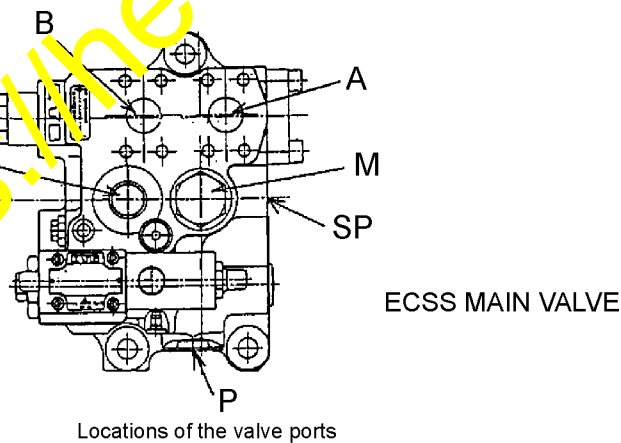
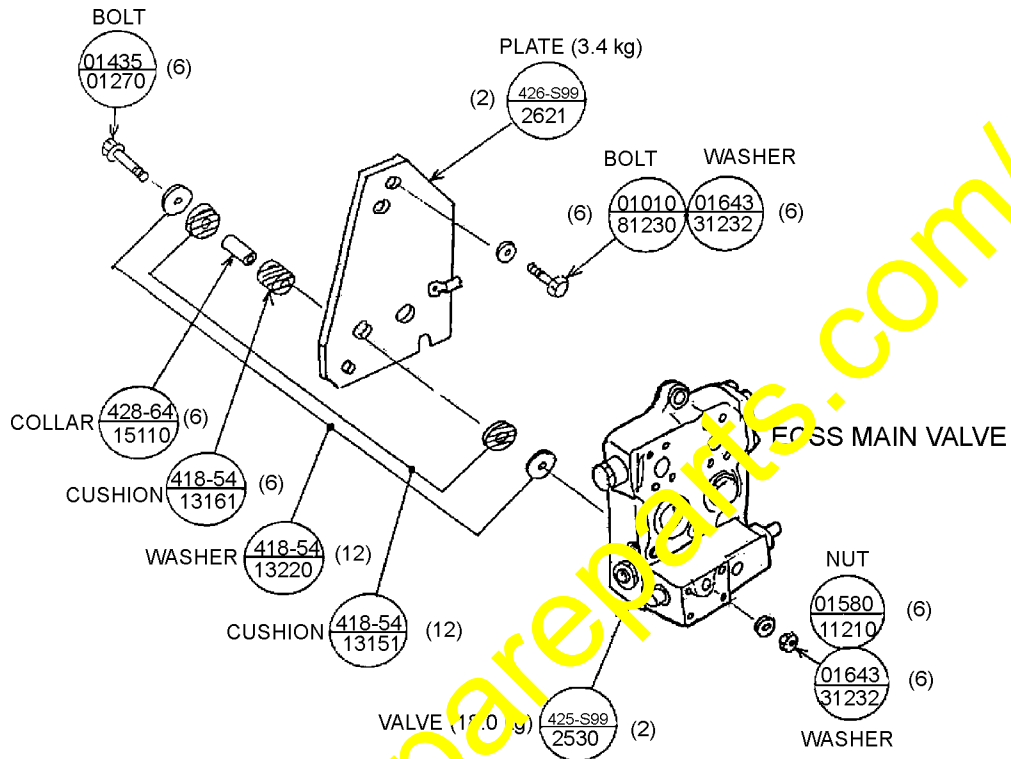
Since the piston shaft of the valve "C" is very weakly structured, be careful not to bend the piston shaft by turning the handle "A" excessively.

It is not necessary to perform N₂ gas change when the gas pressure remains within the range of 2.5 ± 0.1 MPa.

When the gas pressure is found to be out of the above range, perform N₂ gas charge following the procedures according to the above Section 6-1.

7. Installing the valve pipings

Refer to the Shop Manual regarding the specified tightening torque ranges.



Locations of the valve ports

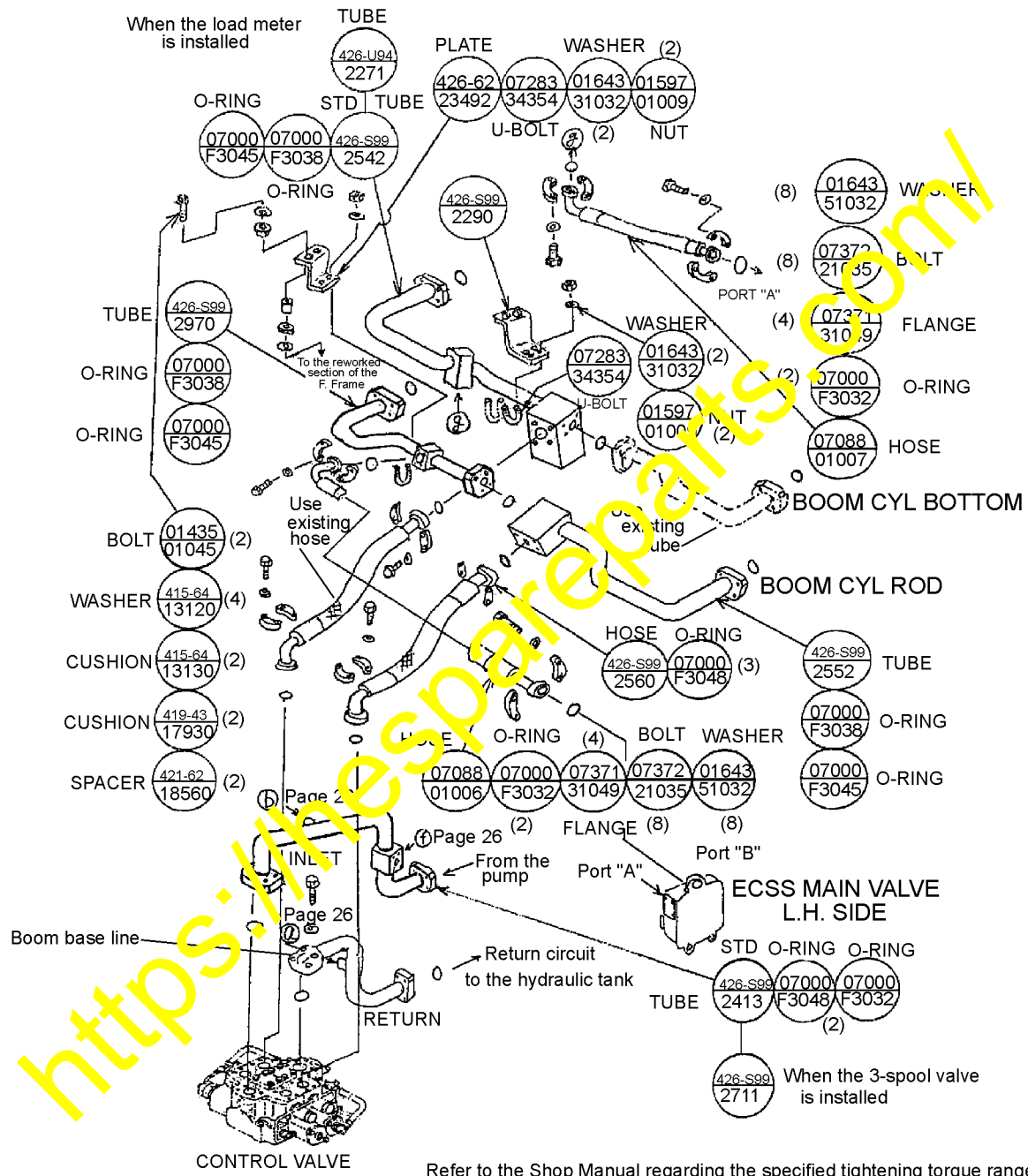
7-1 Installation Sequence

The sequence below does not include all of the steps necessary to install this kit, however, installing these components in this order will reduce the assembly time.

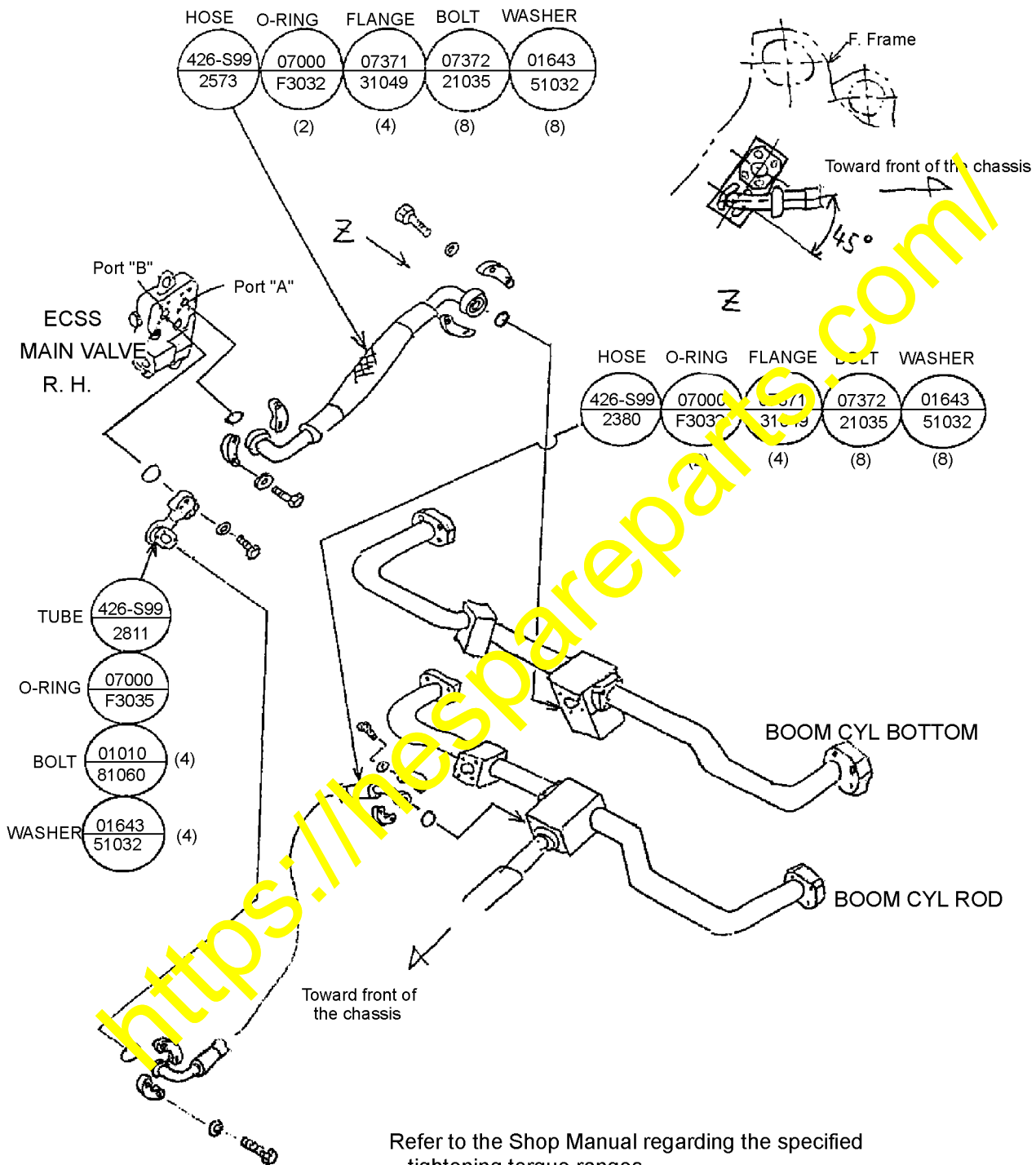
After all the components from the old system are removed, proceed in the following order:

- a. Weld in ECSS and charge valve mounting bosses, mount preassembled valves.
- b. Install both bucket cylinder tubes.
- c. Install all boom base and boom rod tubes.
- d. Install all (4) large hoses from ECSS valve to boom base and rod side tubes.
- e. Install new steering return tube.
- f. Install new MCV inlet tube.
- g. Install accumulators and tubes. It will be necessary to remove the mounting bolts and inside hose from the brake slack adjuster to install the right hand accumulator tube.
- h. Install all small hoses on ECSS and charge valves.
- i. Install boom hoses from MCV to rear tube.
- j. Install all remaining hoses, wiring, clamps and hardware.

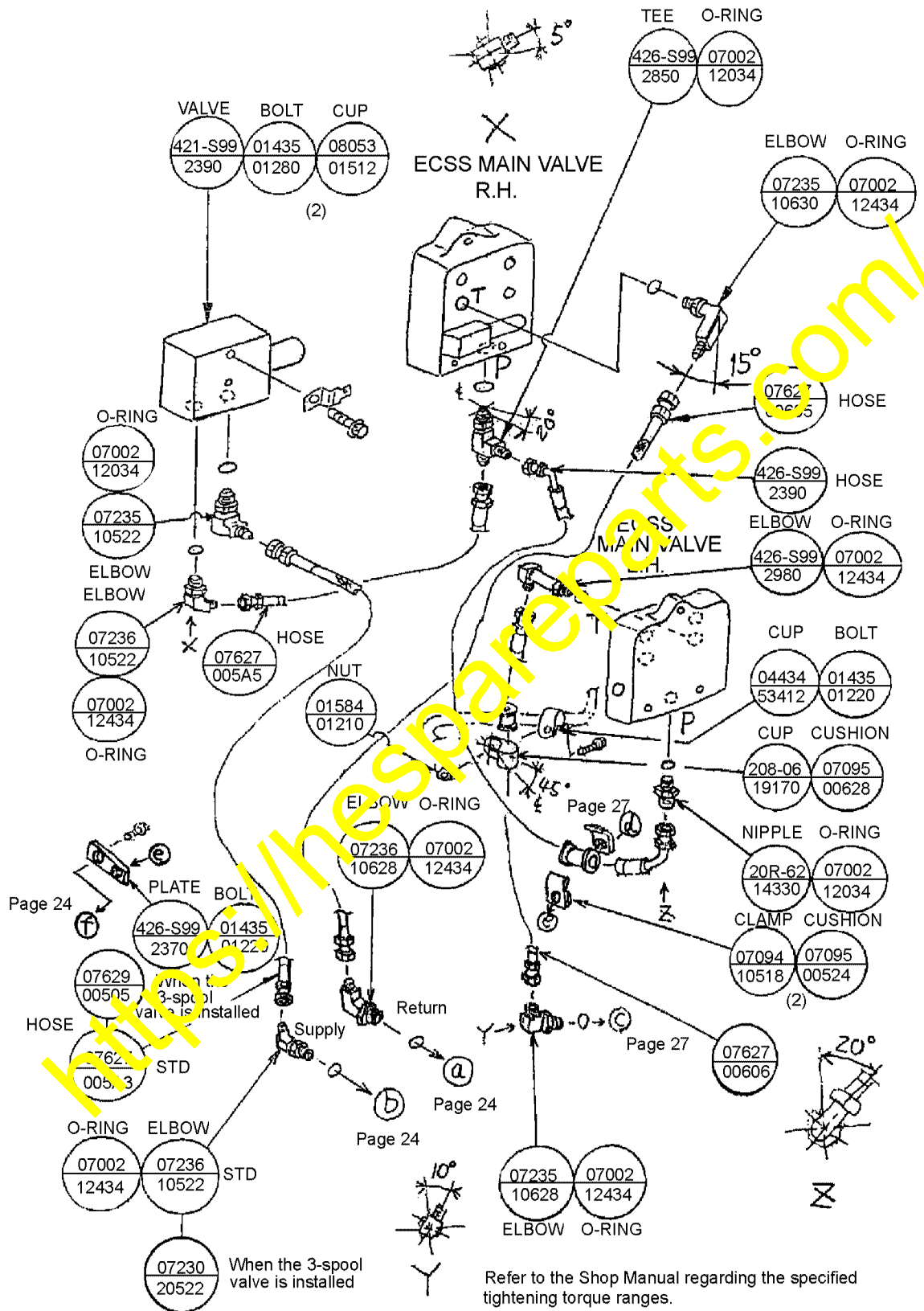
<https://hespareparts.com/>



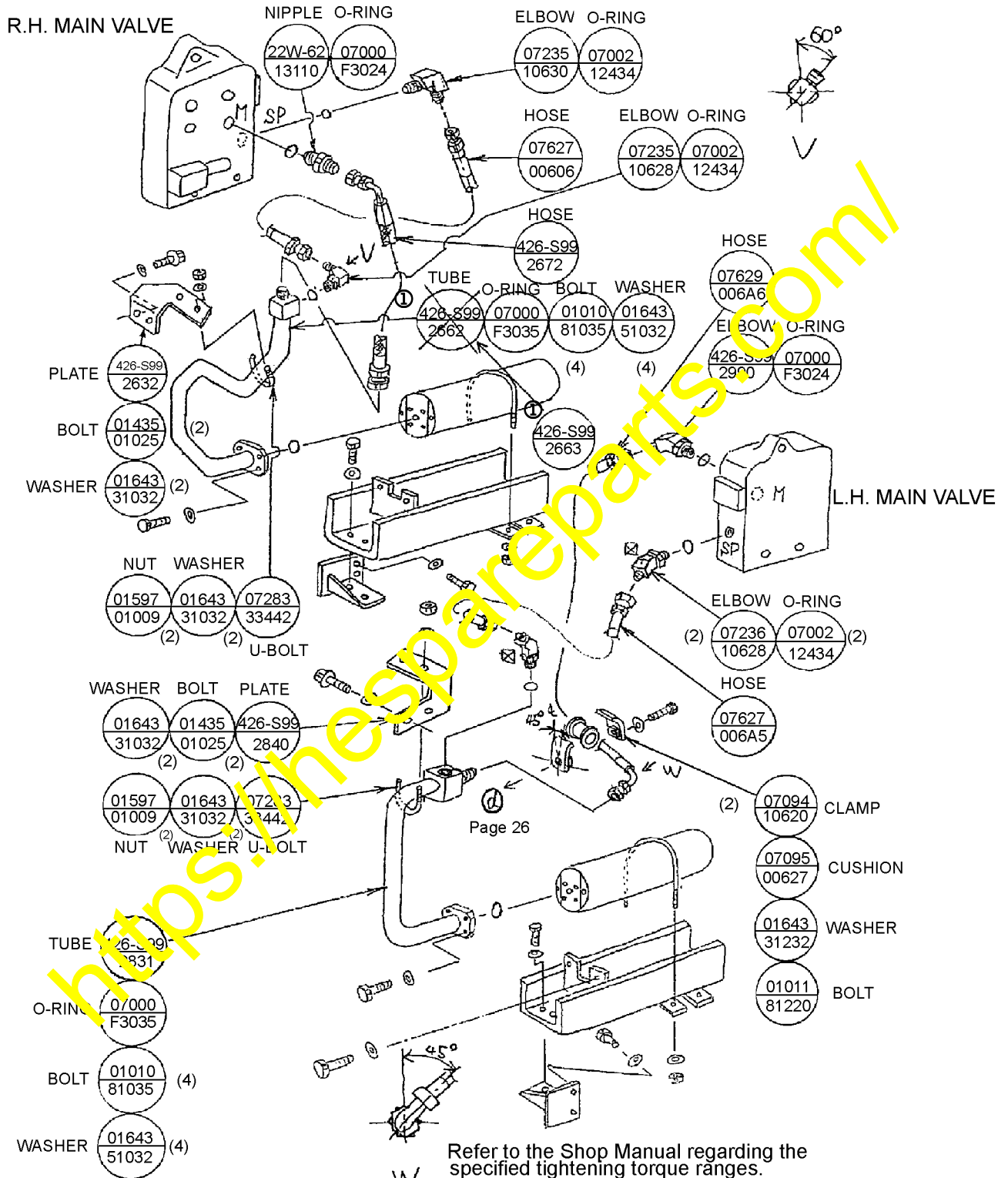
VLPS0120



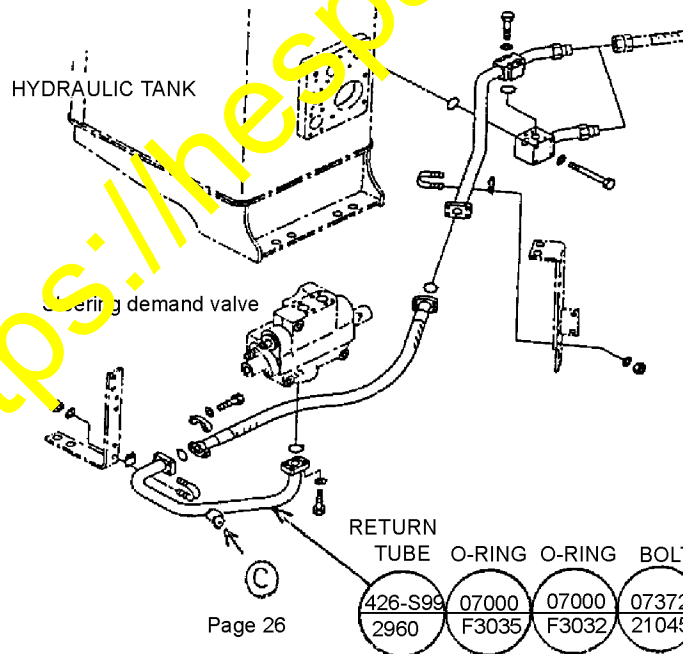
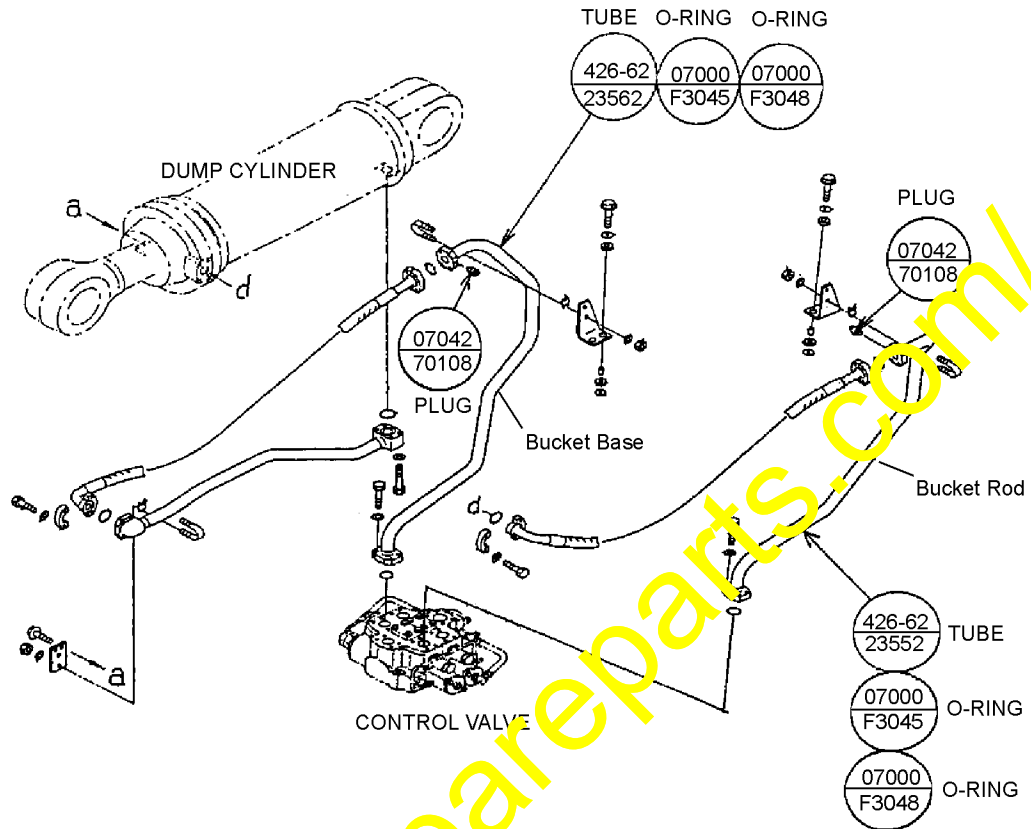
VLPS0121



2 places, ①



VLPS0123



Page 26

Refer to the Shop Manual regarding the specified tightening torque ranges.

VLPS0124

19 places, ①

8. Connecting the ECSS harness

8-1 Connect the connectors CN SOL1 and CN SOL2 of the wire harness 426-S99-2681 ① 2683 to the main valve of the ECSS and to the charge valve of the ECSS.

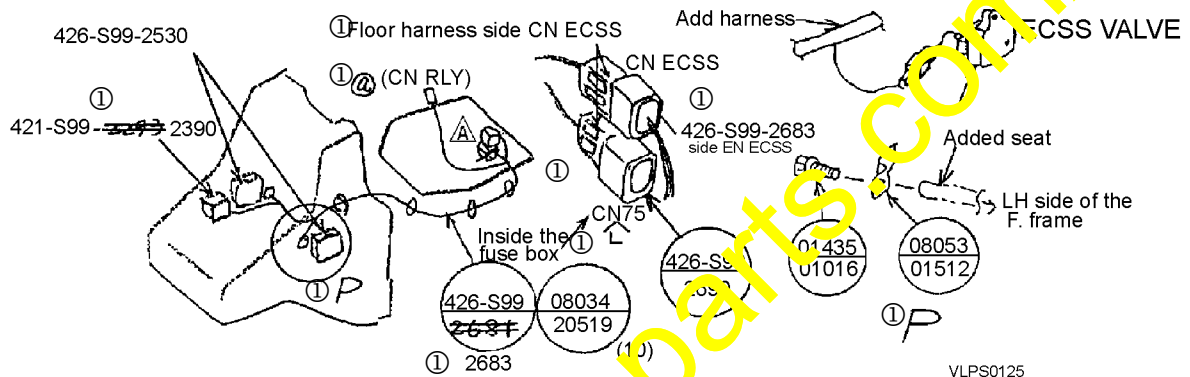
SOL1.....ECSS Main control valve (425-S99-2530)

SOL2.....ECSS Charge control valve (425-S99-2390)

8-2 Lead the new wire harness 426-S99-2681 ① 2683 along the existing front frame harness and bundle them together using the straps 08034-20519.

8-3 Connect the connector CN ECSS of the wire harness 426-S99-2681 ① 2683 to the connector of the same "CN number" located underneath the cab floor.

8-4 Install the cap 426-S99-2690 to the connector CN ① CNL 75 located underneath the cab floor of the floor harness ① inside the fuse box.

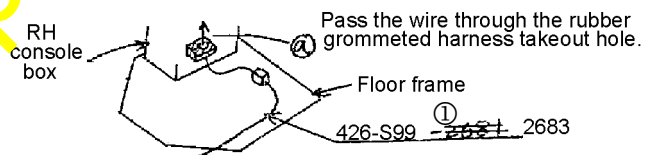


VLPS0125

8-5 Lead the single lead colored "Yellow/Red" of the wire harness 426-S99-2681 ① 2683 into the RH console box.

- ① Remove vinyl tape and connector body from the connector marked (a).

(Use an extra small screwdriver to release the terminal lock.)



VLPS0126

8-6 Connect the single lead of the wire harness 426-S99-2681 ① 2683 which has been led into the RH console box according to 8-5 above to the No. 6 pin on the ECSS relay connector. (See page 20-225 of Shop Manual for ECSS relay location). Check the location of the relay of the decal being applied to the rear surface of the RH console box cover.

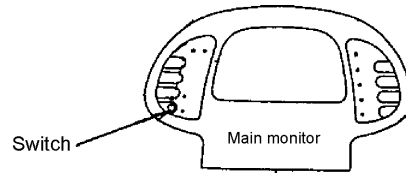


VLPS0127

8-7 Install the RH console cover.

9. Operation and adjustment.

- 9-1 The ECSS switch is located at the lower left section of the main monitor. When the lamp beside the switch is not lit, the ECSS is not working. The ECSS is activated when the pilot lamp is lit, when the travel speed is 5 km/h or more and, at the same time, when the current speed stage is at the 2nd speed or higher.



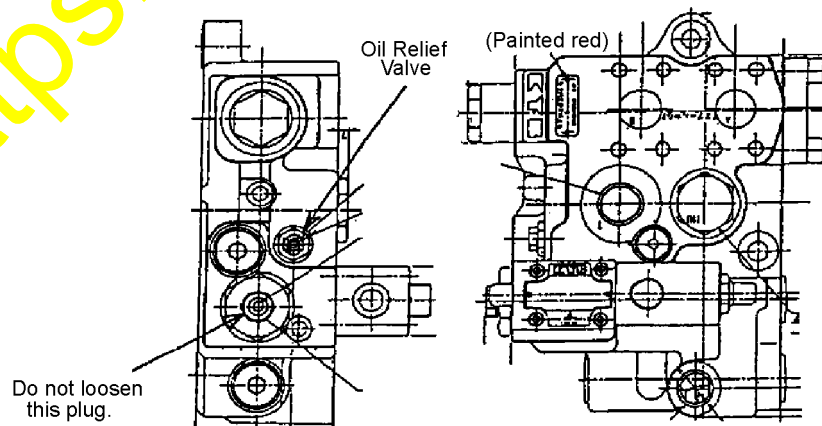
VLPS0128

WARNING! The ECSS valve is activated by the oil pressure accumulated inside the accumulator. If a machine is left unused for a long period of time and when the residual pressure inside the accumulator has dropped to "0" MPa, hydraulic pressure will not be fed to the ECSS valve and the ECSS will not be activated. In this case, operate the work equipment for 5 seconds keeping the machine in a stopped state before starting to travel.

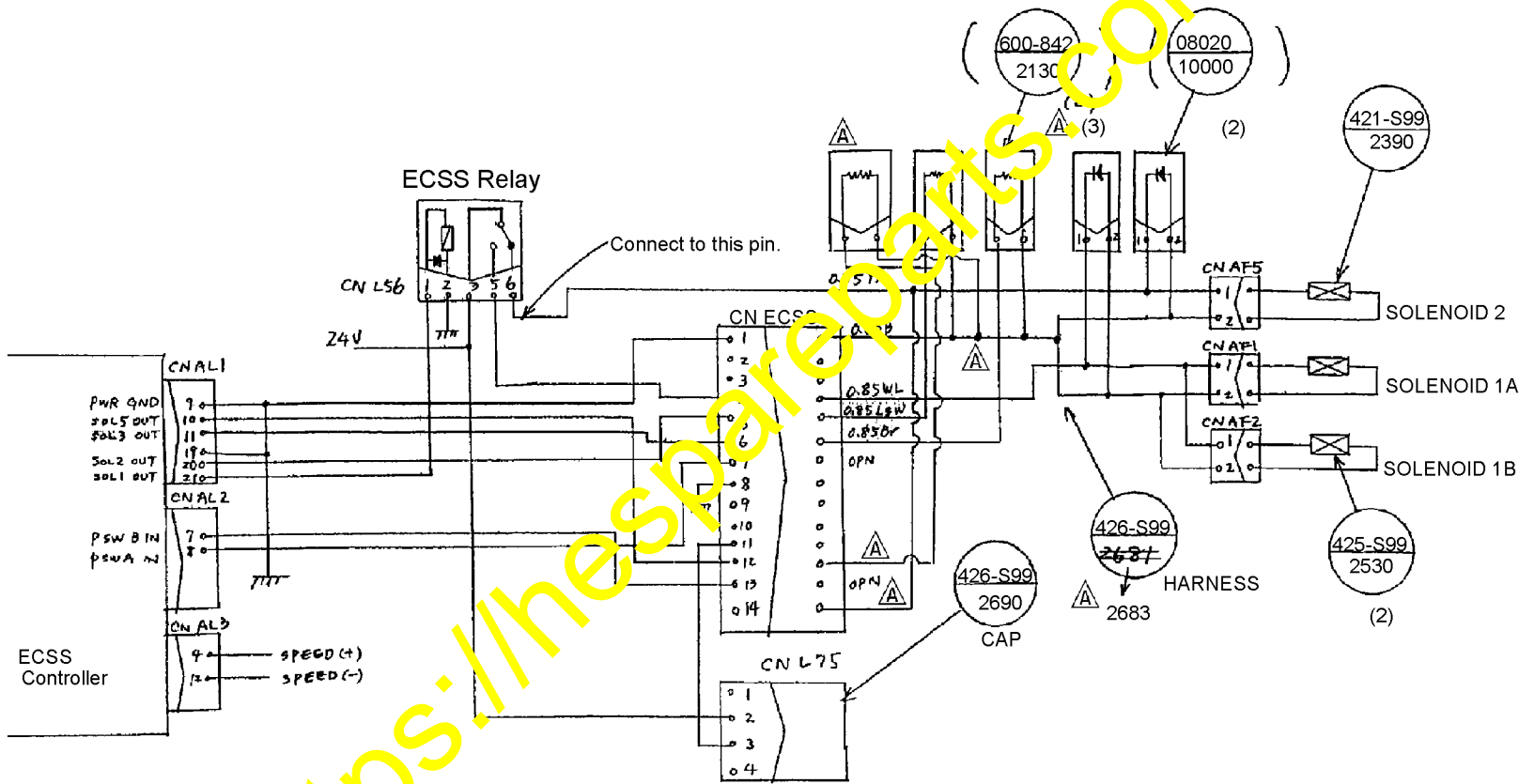
9-2 Releasing the hydraulic pressure from inside the accumulator.

The main valve of the ECSS is equipped with a drain cock. Release the oil pressure from inside the accumulator under the following circumstances.

- * When disconnecting the piping connecting between the ECSS valve and the accumulator
 - * When checking the N2 gas pressure inside the accumulator
 - * When charging the N2 gas into the accumulator
- a. Remove the LH front fender and the front frame LH side cover.
 - b. Loosen the locknut of the red plug of the ECSS valve.
 - c. Loosen the hexagon socketed head plug (Size 4). (If oil pressure remains inside the accumulator, you will hear an oil flowing sound.)
 - d. When the oil flowing sound has disappeared, tighten the hexagon socketed head plug.
 - e. Tighten the locknut at a tightening torque of 13 ± 0.06 Nm.
 - f. Install the frame cover and the fender.



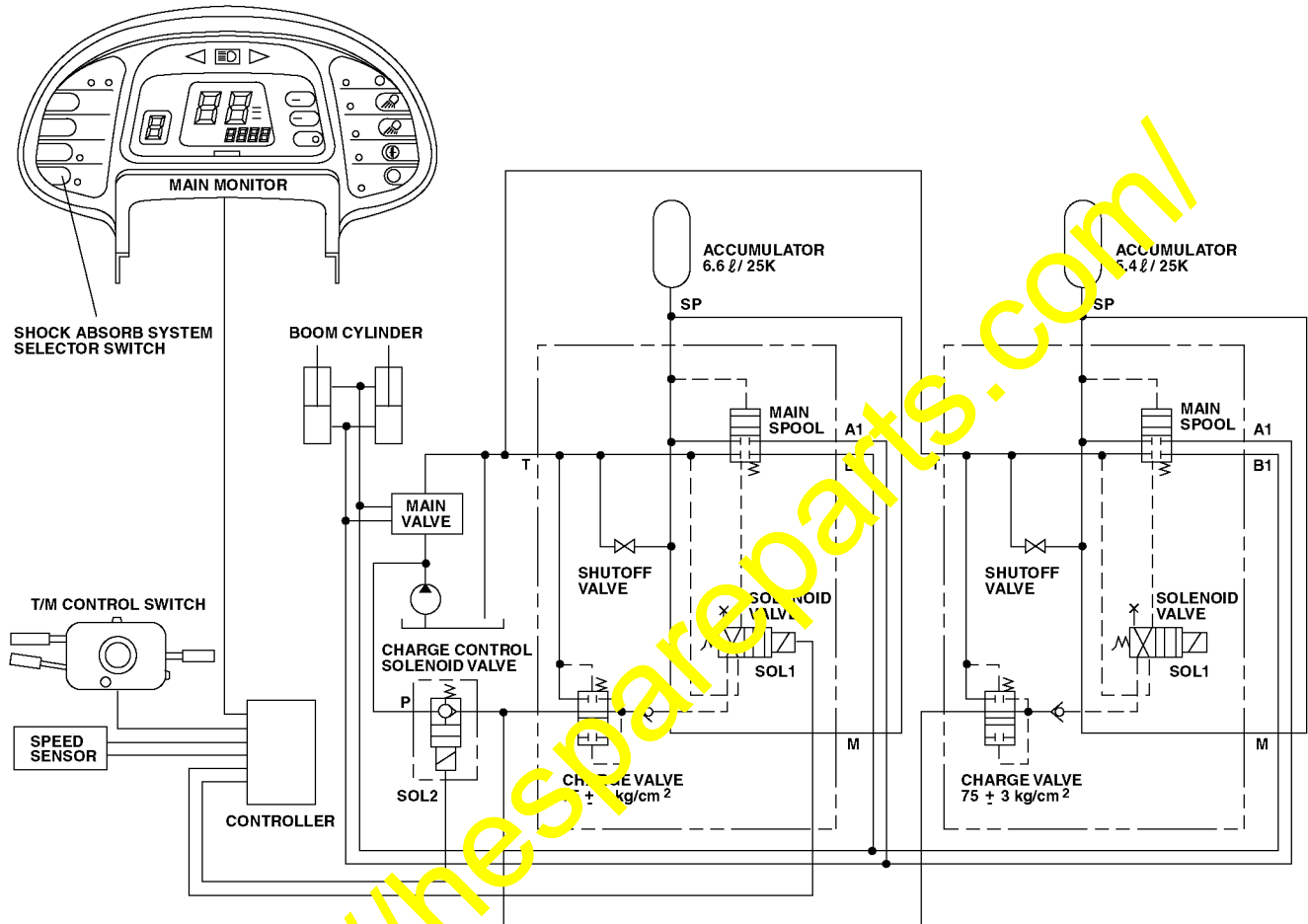
VLPS0129



Accumulator pressure release switch located behind seat is now (capped) taped back.

<https://thespareparts.com/>

11. Hydraulic circuit diagram



SPEED GEAR	TRAVEL SPEED (km/h)	SOL1 A SOL1 B	SOL2	REMARKS
1	0 – MAX.	OFF	ON	NOT FUNCTION
2 – 4	0 – 5	OFF	ON	NOT FUNCTION
	5 – MAX.	ON	OFF	ACC FUNCTION

VLPS0131