INSTALLATION MANUAL

REF NO.	BA03012
DATE	July 14, 2003

SUBJECT: INTRODUCTION OF NEW BRAKE COOLING SYSTEM

PURPOSE: To introduce a new brake cooling system

APPLICATION:
WA500-3 Wheel Loaders, S/N 50001 and up
WA500-3A Wheel Loaders, S/N 50001 and up
WA500-3L Wheel Loaders, S/N A70001 and up
WA500-3LK Wheel Loaders, S/N A71001 and up

FAILURE CODE: 0390B1

DESCRIPTION:

Introduction:

This **Installation Manual** will introduce a new brake cooling system prepared for optional use on the above Wheel Loaders. When locally installing this option, follow the installation procedures as outlined in this Installation Manual.

When the machine is used, for example, for 10 hours continuously (without rest) under the load and carry operation pattern, brake chamber oil may possibly overheat. However, if wheel loader is equipped with this system, just continue use of the machine.

CONTENTS

2. Lists of parts ..... P4 thru 10

3. Precautions when making the installation work
① Precautions when making removal works P11
② Precautions when making installation works P11
③ Lists of tightening torque ranges P12
④ List of special tools ..... P13 and 14

4. Removing the parts which need to be removed
① Removing the front axle assembly ..... P15 and 16
② Removing the rear axle assembly ..... P17 thru 19
③ Removing the engine hood assembly P20
④ Removing the radiator assembly ..... P21 and 22
⑤ Removing the pump P23

5. Reworking procedures
① Reworking with the front frame P24
② Reworking with the rear frame P25
③ Reworking with the radiator P26
④ Reworking with the bracket P26
(Work equipment control valve mounting bracket)
⑤ Reworking with the hood P27
⑥ Reworking with the side panel (LH side panel only) P28

6. Installation procedures
[1] Modification procedures for the axle P29
(The axle is to be modified only by Komatsu Distributors.)
① Removing the front differential assembly ..... P30 and 31
② Removing the rear differential assembly P32
③ Disassembling the differential gear assemblies ..... P33 thru 40
④ Installing the front differential assembly P41
⑤ Installing the rear differential assembly P42

[2] Modification procedures for the brake P43
(The brake is to be modified only by Komatsu Distributors.)
① Removing the brake assemblies (front and rear) P44
② Disassembling the brake assemblies (front and rear) ..... P45 and 46
③ Reassembling the brake assemblies (front and rear) ..... P47 thru 49
④ Installing the brake assembly (installing to the axle) P49

[3] Installation procedures for the axle assemblies
① Installing the front axle assembly P50
② Installing the rear axle assembly P50

[4] Installation procedures for the cooler piping
① Piping arrangement inside the front frame ..... P51 thru 53

② Piping arrangement inside the rear frame ..... P54 thru 56
③ Brake cooler piping arrangement P57
④ Piping arrangement to the pump and its neighborhood P58
⑤ Rear axle piping arrangement P59
⑥ Installation of the cooler and the neighboring parts P60
⑦ Installation of the filter inside the hood P61
(on the LH side of the chassis)
⑧ Installation of the external covers P62

7. Refilling the oil and water ..... P63 thru 65

8. Brake cooling circuit diagram P66

2. Lists of parts

Part No.	Part Name	Q'ty	Remarks
425-22-21120 (425-22-21101)	Carrier & CA (Carrier & CA)	2 (2)	Axle
07030-00252 (07030-01030)	Breather (Breather)	2 (2)	
425-23-23190	Joint	2	
208-06-11220	Nipple	4	
07102-20210	Hose	2	
425-33-21170 (425-33-21141)	Cylinder (Cylinder)	2 (2)	
425-33-21180 (425-33-21151)	Cylinder (Cylinder)	2 (2)	
425-33-21290 (425-33-21230)	Gear (Gear)	4 (4)	
07043-50211	Plug	8	
423-54-11340	Collar	1	
01010-81250	Bolt	1	
425-S05-2230	Door, reworked	1	Side door
04434-52711	Clip	4	Rad. guard hose Mtg.
01435-01016	Bolt	2	
07000-12130	O-ring	2	For the pump
815-95-17380	Tee	1	F axle suction
07230-21034	Union	1	
07002-13324	O-ring	2	
07103-21003	Hose	1	F frame
425-S05-2491	Tube	1	
07283-33442	Clip	2	
01597-01009	Nut	4	
01643-31032	Washer	4	
425-S05-2550	Plate	1	
07102-210A7	Hose	1	Center hinge
425-S05-2460	Tube	1	
07283-33442	Clip	2	

Part No.	Part Name	Q'ty	Remarks
01597-01009	Nut	4	
01643-31032	Washer	4	
425-S05-2640	Bracket	1	Center hinge
01435-01025	Bolt	2	
07102-21005	Hose	1	
425-S05-2421	Tube	1	
07000-13032	O-ring	1	
07372-21035	Bolt	4	
01643-50823	Washer	4	
425-S05-2710	Bracket	1	Pump section F
07283-34949	Clamp	1	
07283-33442	Clamp	1	
01643-31032	Washer	4	
01597-01009	Nut	4	
425-S05-2411	Tube	1	
07000-F3030	O-ring	1	
01010-80845	Bolt	2	
01010-80860	Bolt	2	
01643-51032	Washer	4	Pump discharge F
425-S05-2470	Hose	1	
562-35-11830	Elbow	2	
425-S05-2110	Filter	1	
425-S05-3270	Elbow (752T)	1	
07002-24234	O-ring	1	
205-60-51400	Valve Ass'y	1	
425-64-11820	Union	1	
07002-24234	O-ring	1	Relief valve
07624-20603	Hose	1	
07236-10628	Elbow	1	
07002-22434	O-ring	1	
07626-00626	Hose	1	Filter out

1 place, Ⓒ
1 place, Ⓑ

Part No.	Part Name	Q'ty	Remarks
425-S05-2442	Tube	1	
04434-52711	Clip	1	
01435-01016	Bolt	1	
07283-32738	Clip	1	
01643-31032	Washer	2	
01597-01009	Nut	2	
07621-00608	Hose	1	
07236-10628	Elbow	2	
07002-22434	O-ring	2	
425-S05-2101	Oil cooler	1	
07621-00605	Hose	1	
425-S05-2570	Tube	1	Filter out
04434-52711	Clip	1	
01435-01016	Bolt	2	
07624-00627	Hose	1	
582-35-11170 Ⓑ ~~0443552711~~	Clip	5	
01435-01016	Bolt	5	
425-S05-2451	Tube	1	
07283-32738	Clip	2	
01597-01009	Nut	4	
01643-31032	Washer	4	
425-S05-2421	Bracket	1	
01435-01035	Bolt	2	
425-S05-2561	Guard, reworked	1	Drive shaft guard
07624-00608	Hose	1	Center
425-S05-2510	Tube	1	
07283-32738	Clip	2	
01597-01009	Nut	4	F frame
01643-31032	Washer	4	
425-S05-2541	Bracket	1	
01435-01016	Bolt	2	

Part No.	Part Name	Q'ty	Remarks
07624-00404	Hose	2	F axle
425-S05-2520	Tube	1	
425-S05-2530	Tube	1	
04434-52110	Clip	6	
01435-01016	bolt	2	
07230-20422	Nipple	2	
07002-22034	O-ring	2	
07235-11034	Elbow	1	R axle suction
07002-23334	O-ring	1	
07103-21009	Hose	1	
425-S05-2172	Tube	1	
07000-A3032	O-ring	1	
01643-51032	Washer	4	
01010-81065	Bolt	4	
425-S05-2290	Tube	1	Pump
07000-A3030	O-ring	1	
01643-50823	Washer	4	
01010-80830	Bolt	4	
07623-006A8	Hose	1	Filter in
04434-52711	Clip	1	
01435-01016	Bolt	1	
562-35-11630	Elbow	1	
425-S05-2110	Filter	1	
425-S05-2240	Bracket	1	
01435-01020	Bolt	6	
417-875-1630	Union	1	Filter out
427-S05-3270	Elbow (752T)	1	
07002-24234	O-ring	2	
205-60-51400	Valve ass'y	1	Suction return
425-64-11820	Union	1	

1 place, Ⓒ
1 place, Ⓑ

Part No.	Part Name	Q'ty	Remarks
07621-00610	Hose	1	Suction return
04434-52711	Clip	2	
01435-01020	Bolt	2	
07235-10628	Elbow	1	
07002-22434	O-ring	1	
07623-00610	Hose	1	Cooler in
04434-52711	Clip	2	
01435-01016	Bolt	2	
425-S05-2150	Tube	1	
04434-52711	Clip	1	
01435-01016	Bolt	2	
07621-00605	Hose	1	
07236-10628	Elbow	2	
07002-22434	O-ring	2	
425-S05-2101	Oil Cooler	1	Cooler out
07621-00608	Hose	1	
07283-32738	Clip	1	
01643-31032	Washer	2	
01597-01009	Nut	2	
425-S05-2141	Tube	1	
04434-52711	Clip	1	
01435-01016	Bolt	1	
07621-20608			
04434-52711	Clip	1	
01435-01016	Bolt	1	
425-S05-2221	Tube	1	
01435-01016	Bolt	2	R axle
07621-206A5	Hose	1	
425-S05-2660	Tube	1	
01010-82065	Bolt	2	
425-S05-2181	Tube	1	

Part No.	Part Name	Q'ty	Remarks
425-S05-2191	Tube	1	R axle
425-S05-2210	Plate	2	
04434-52110	Clip	5	
419-62-13390	Spacer	4	
01435-01080	Bolt	4	
195-01-14540	Spacer	1	
01435-01035	Bolt	1	
04434-52110	Clip	1	
07230-20422	Nipple	2	
07002-22034	O-ring	2	
705-52-31130	Pump	2	Pump
421-62-11610	Adapter	1	
07000-13035	O-ring	1	
01252-61025	Bolt	4	
425-S05-2163 △B ~~425-S05-2162~~	Tube	1	S/T tube
07000-13035	O-ring	1	
01010-81070	Bolt	4	
01643-51032	Washer	4	
07000-13035	O-ring	1	Replace parts
07000-02080	O-ring	1	
07000-12060	O-ring	1	
07000-13032 △B ~~07000-13035~~	O-ring	1	
425-S05-2720	Cover	1 △B ~~2~~	Filter cover
425-S05-2731	Cover	1 △B ~~2~~	
01643-51232	Washer	9	
01010-81230	Bolt	8	
425-S05-2311	Plate	2	Cooler Mtg.
425-S05-2670	Plate	1	
425-S05-2680	Plate	1	

1 place, △C
1 place, △B

Part No.	Part Name	Q'ty	Remarks
425-S05-2320	Seal door	4	Cooler Mtg.
425-S05-2330	Sheet	4	
425-S05-2131	Bracket	1	
425-S05-2281	Bracket	1	
01435-01055	Bolt	4	
01435-01016	Bolt	8	
01435-00816	Bolt	8	
425-S05-2380	Plate	1	Side door rework
01010-81220	Bolt	4	
01643-81232	Washer	4	
154-54-18510	Seat	2	F/frame rework
425-03-11420	Plate	1	R/frame rework
154-54-18510	Seat	2	
425-S05-2630	Plate	1	
425-S05-2270	Plate	1	
425-S05-2590	Bracket	1	
01573-20205	Seat	1	
01573-10205	Seat	1	
425-S05-2260	Plate	2	
425-S05-2610	Seat	1	
01571-01016	Seat	9	
01571-01016	Seat	4	Rad rework
01573-20210 △B ~~01571-20210~~	Seat	1	Bracket rework
01571-01016	Seat	2	Hood rework
425-S05-2740	Seat	3	

3. Precautions when making the installation work
(Carefully observe the following general precautions when removing, installing, disassembling and reassembling units and parts.)

① Precautions when making removal works
- Always cover disconnected hose ends, tube ends and mating ports using blind plugs or the sort to prevent entry of dust.
- When draining oil, be sure to prepare an oil pan of sufficient capacity.
- Be sure to provide matchmarks when deemed necessary so as not to make connection errors when making reassembly or reconnection before removing or disconnecting subject parts.
- Tag the disconnecting hoses indicating necessary coding, etc. so as not to make connection errors.
- When hoisting a part or structure, use slings carrying sufficient strength.
- Before removing a unit, always clean the neighborhood and, after removing the unit, cover the hole to prevent entry of foreign substance.

② Precautions when making installation works
- Tighten bolts and nuts at specified (KES) tightening torque.
- When connecting hoses, be careful not to twist them and not to let them interfere with neighboring parts and structures.
- Replace gaskets, O-rings, cotter pins and lock plates with new parts.
- When using cotter pins and lock plates, be sure to bend them fully to secure their effects.
- When applying adhesive, wash and degrease the object part before applying 2 to 3 drops over the thread surface.
- Always clean removed parts and remedy flaws, dents, burrs or rust whenever possible.

③ Lists of tightening torque ranges

a. List of tightening torque ranges for bolts and nuts

★ Unless otherwise specified, tighten metric thread bolts and nuts at the tightening torque ranges listed below (when using a torque wrench).

Thread diameters	Widths across flats		
mm	mm	Nm	kgm
8 10 12	13 17 19	31 ± 3 66 ± 7 113 ± 10	3.2 ± 0.3 6.7 ± 0.7 11.5 ± 1
20	30	549 ± 59	56 ± 6

b. List of tightening torque ranges for hose nuts

★ Unless otherwise specified, tighten hose nuts at the tightening torque ranges listed below.

Codes	Thread diameters	Widths across flats	Tightening torque ranges	
	mm	mm	Nm	kgm
02	14	19	24.5 ± 4.9	2.5 ± 0.5
04	22	27	78.5 ± 19.6	8 ± 2
06 10	30 33	36 41	176.5 ± 29.4 196.1 ± 49	18 ± 3 20 ± 5

c. List of tightening torque ranges for O-ring boss tube fittings

★ Unless otherwise specified, tighten O-ring boss tube fittings at the tightening torque ranges listed below.

Codes	Thread diameters	Widths across flats	Tightening torque ranges	
	mm	mm	Nm	kgm
03, 04 05, 06 10, 12	20 24 33	They differ depending on the types of the tube fittings.	93.1 ± 9.8 142.1 ± 19.6 421.4 ± 58.8	9.5 ± 1 14.5 ± 2 43 ± 6

④ List of special tools

• The following special tools are necessary when disassembling and reassembling the axle.

★ Tools with part numbers reading 79○T-○○○-○○○○ are not available through the spare parts supply channel (they need to be fabricated locally). (Refer to the next page.)

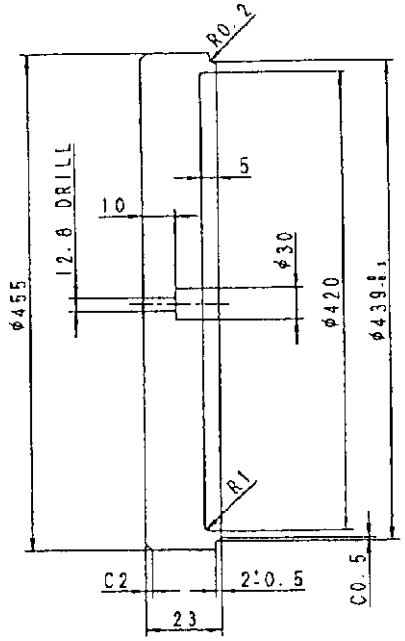
★ Degree of necessity: ■ ..... No substitute is available and the tool marked with this marking definitely needs to be prepared (used).

★ When the schematic diagram column is marked "○", a schematic diagram for the special tool is provided. (Refer to the Section "Schematic diagrams of special tools".)

Assembly names	Codes			Part numbers	Part names	Necessity degree	Q'ty		Schematic diagram	Work contents and remarks
Removal and reinstallation of the differential assembly	H	1	1	793-520-2510	Bracket	■	1			To remove and to install the differential assembly
			2	793-520-2610	Plate	■	1			
Disassembly and reassembly of the differential assembly		2	1	790-501-5000	Repair stand	■	1			
			2	790-901-2110	Bracket	■	1			
			3	793-310-2160	Plate	■	1			
		4	1	792-525-1000	Micrometer	■	1			To adjust the preload for bearings
			2	792-525-1230	Adaptor	■	2			
		5	1	793T-622-1110	Plate	■	1		○	To press-fit the oil seal to the outer drum
			2	790-101-5421	Grip	■	1			
			3	01010-51240	Bolt	■	1			
		6		793T-622-1150	Fixture	■	3		○	To remove and reinstall the wheel hub.
Disassembly and reassembly of the final drive assembly	H	8	1	793-520-2680	Installer	■	1			To install the floating seal (onto the gear side)
			2	791-580-1600	Push tool	■	1			
			3	•791-580-1610	•Plate		1			
			4	•791-580-1620	•Arm		4			
			5	•791-580-1640	•Plate		1			
			6	•791-580-1650	•Plate		4			
			7	•01010-51425	•Bolt		8			
			8	•01541-21670	•Nut		4			
			9	•01640-21426	•Washer		4			
			10	792-530-1630	Stud	■	4			

Schematic diagrams for special tools

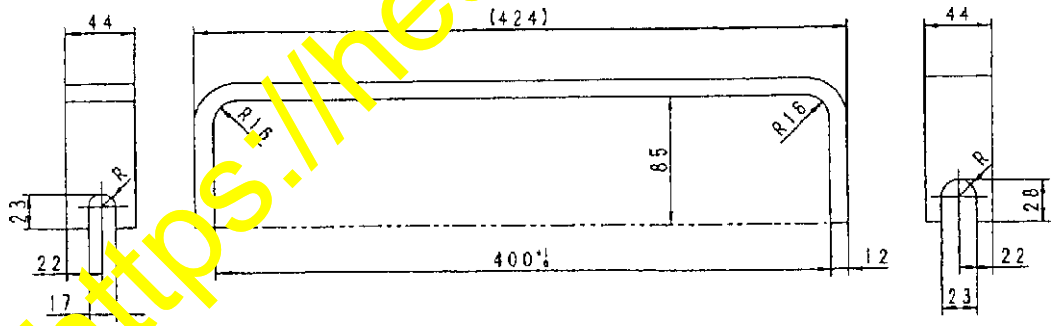
Plate H5-1



CDW01114

HEAT TREATMENT	MATERIAL SS400P
PART NAME PLATE	QTY 1
793T-622-1110 Δ	

Fixture H6



CDW01113

HEAT TREATMENT	MATERIAL SS400F
PART NAME FIXTURE	QTY 3
793T-622-1150 Δ	

4. Removing the parts which need to be removed

① Removing the front axle assembly

⚠ Park the machine on a level surface, set the safety bar to the frame and insert wedges underneath respective tires.

a. Insert blocks ① between the upper surfaces of the LH and RH rear axle housings (1) and the frame (2).

b. Start the engine and, operating the work equipment, raise the front axle to install blocks ② underneath at the LH and RH ends of the front frame before lowering the frame down using the work equipment.
Lower the work equipment to touch the ground after checking and making sure that the front tires are in removable state.

c. Temporarily hoisting the LH or RH tire wheel (3), remove the hub nuts to detach the tire wheel in hoisted state.

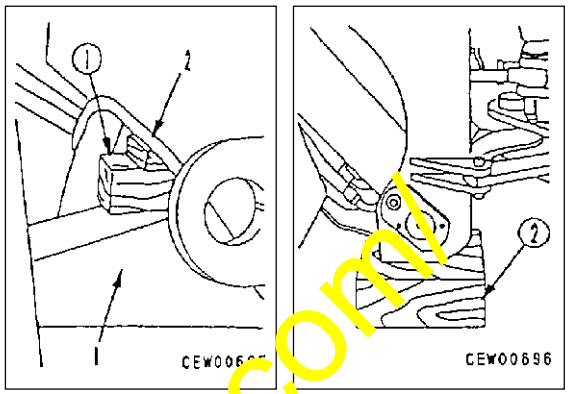
kg Tire wheel: 660 kg ※1

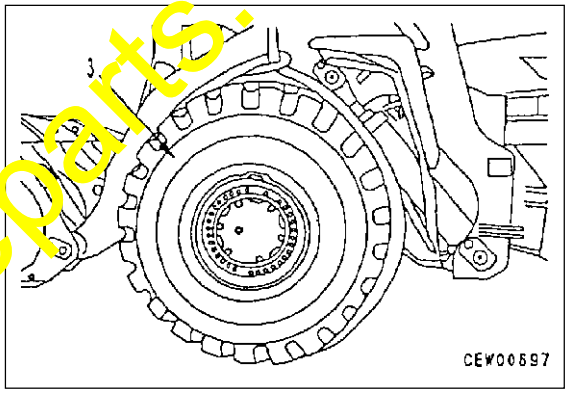
d. Disconnect the front propeller shaft (4) at the differential side end.
★ Provide matchmarks to use as reference marking when reconnecting the propeller shaft. ※2

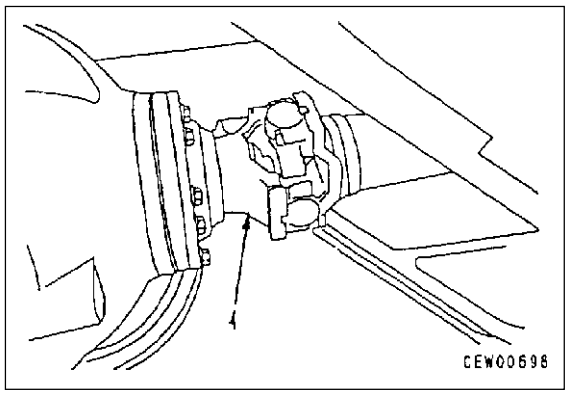
e. Disconnect the brake tube (5) from the slack adjuster.

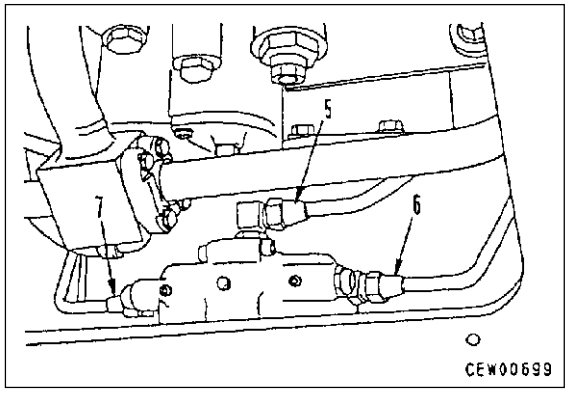
f. Disconnect the brake tubes (6) and (7).
★ Always close the disconnected ends of pipings and mating ports by blind plugs.

※ Release brake oil pressure before staring this removal work.







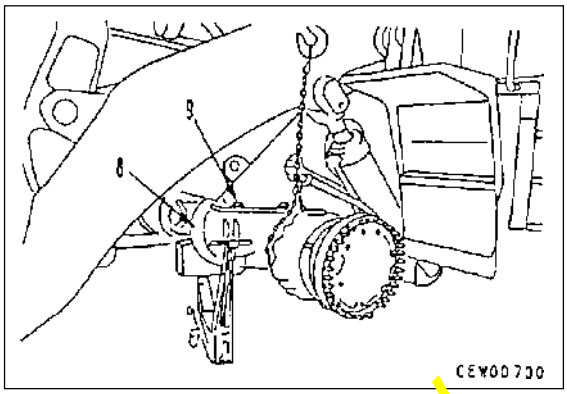


g. Temporarily hoist one end of the front axle assembly (8) and set a garage jack to the other end of the front axle assembly.

h. Remove the mounting bolts (9). ※3

i. Lower the front axle assembly operating the crane and the garage jack.
   ★ When doing this, be careful not to let the slack adjuster located on the upper surface of the axle housing interfere with the frame.
   kg Front axle assembly: 1,850 kg

j. Pull out the front axle assembly from underneath the chassis.

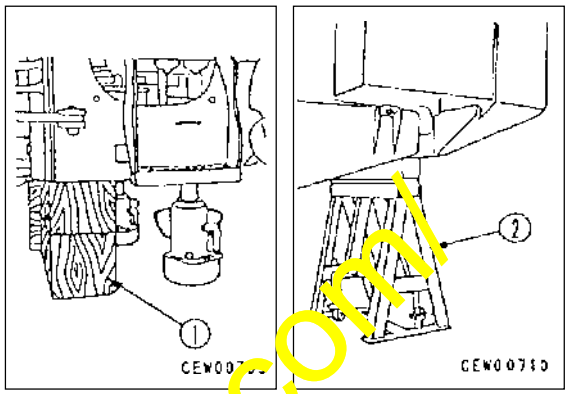


② Removing the rear axle assembly

⚠ Park the machine on a level surface, set the safety bar to the frame and insert wedges underneath respective tires.

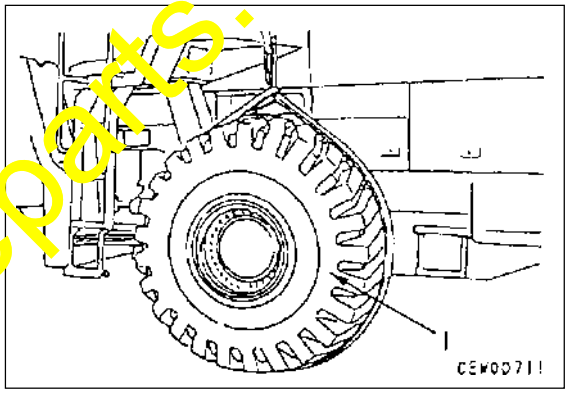
※ Release brake oil pressure before staring this removal work.

a. Jack up the machine body and place a block ① underneath the rear frame and place a support ② underneath the counterweight to support it.



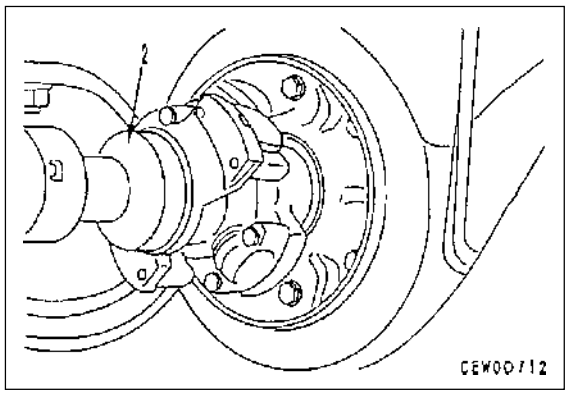
b. Temporarily hoisting the LH or RH tire wheel (1), remove the hub nuts to detach the tire wheel in hoisted state. ※1

kg Tire wheel: 660 kg



c. Disconnect the rear propeller shaft (2) from the rear axle. ※2

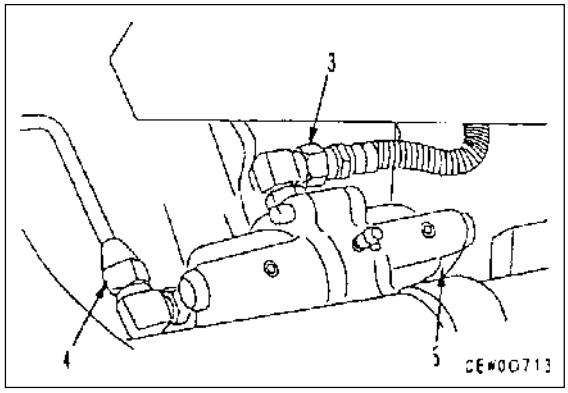
kg Rear propeller shaft: 37 kg



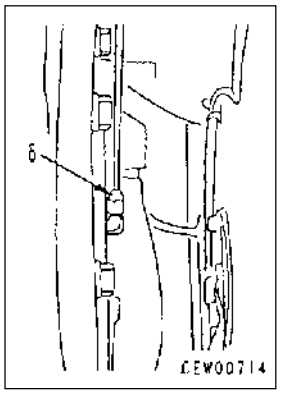
d. Disconnect the hose (3) connecting between the brake pedal and the slack adjuster at the slack adjuster side end.

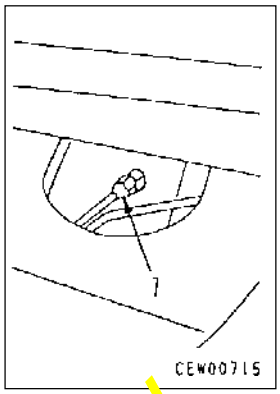
e. Disconnect the tubes (4) and (5) connecting between the slack adjuster and the LH and RH wheel brakes.

★ Be sure to disconnect these tubes since there is a fear of occurrence of flattening with the brake tubes while hoisting the axle to remove it.

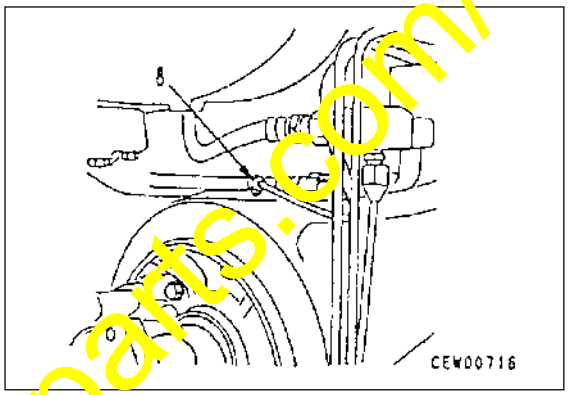


f. Disconnect the grease tubes (6) and (7) from the rear side axle support.

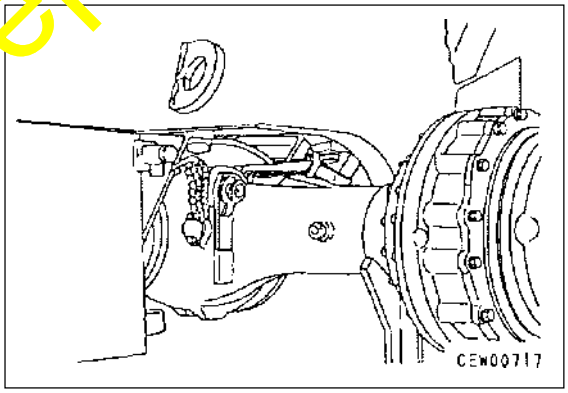




g. Disconnect the grease tube (8) from the front side axle support.
★ Before doing the above, remove the brake hose clamp from the support.



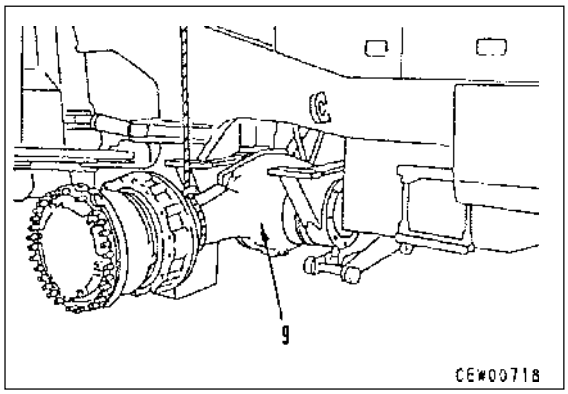
h. Fasten the axle support and rear axle using chains or the sort.



i. Remove the mounting bolts and, using garage jacks, lower the rear axle assembly keeping it level. ※3

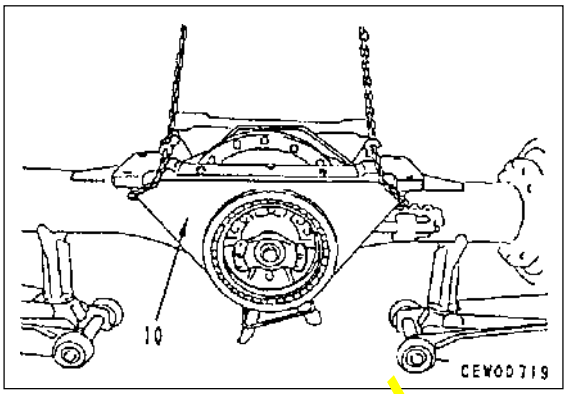
kg Rear axle assembly: 1,710 kg

j. Pull out the rear axle assembly (9) from underneath the chassis.
★ Support both ends of the axle using jacks.



k. Remove the front support (10) from the rear axle assembly.
★ Be careful not to damage the packing.
※4

kg Front support: 95 kg



③ Removing the engine hood assembly

a. Disconnect the exhaust tube (1).

b. Remove the radiator grille (2).
   ★ Detach the baffle plates from both sides of the radiator.

c. Disconnect the head lamp circuit connector (3).

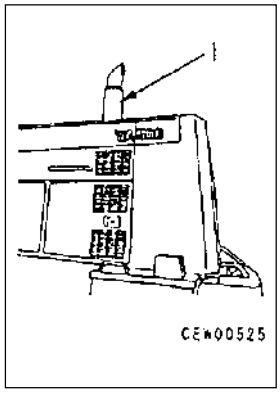
d. Disconnect the water level sensor circuit connector (4).

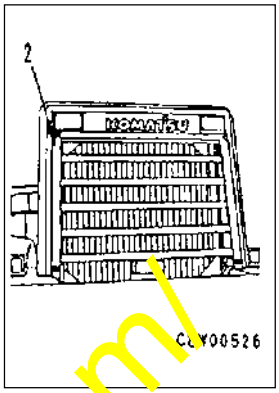
e. Remove the six mounting bolts (5) and four mounting bolts (6).

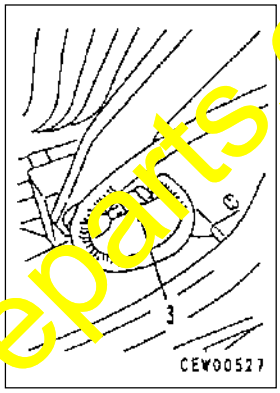
f. Remove the radiator support (7).

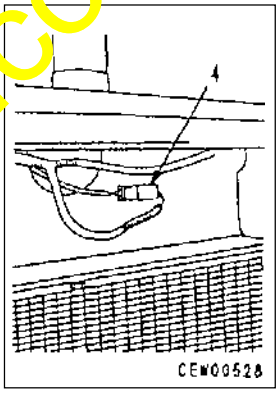
g. Hoist and remove the engine hood (8).
   ★ Before removing the engine hood, release the air conditioner hose clamps located at two places inside at right of the engine hood.
   ★ When removing the engine hood, keep it level using a lever block.

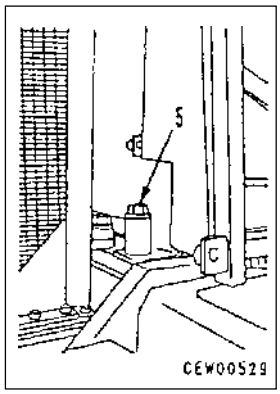
   kg Engine hood assembly: 470 kg

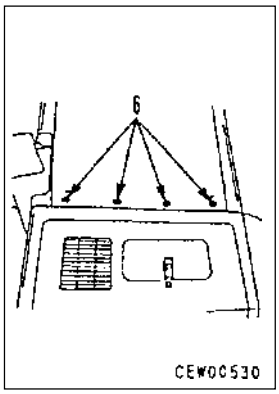


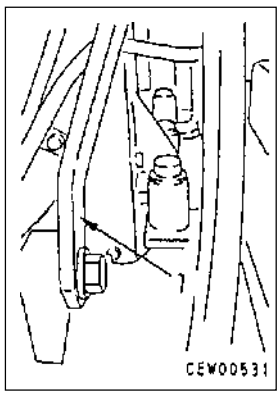


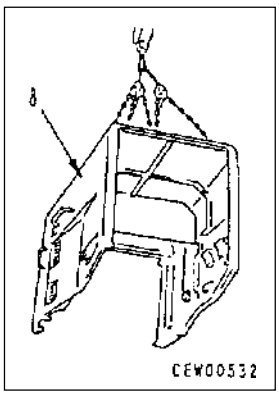










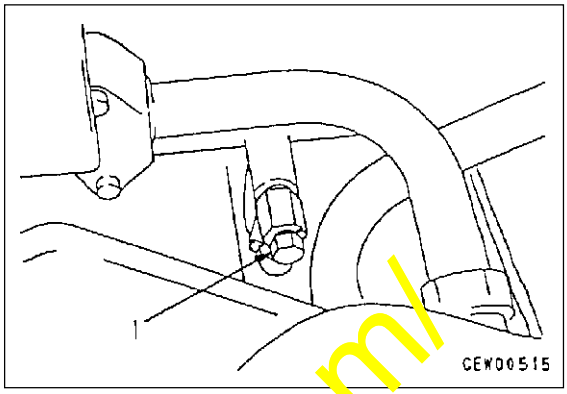


④ Removing the radiator assembly

(Note) Be aware that cooling water temperature is high when the engine operation has just stopped. Never remove the radiator cap until after engine cools.

a. Referring to the Section “Removing the engine hood assembly”, remove the engine hood assembly.

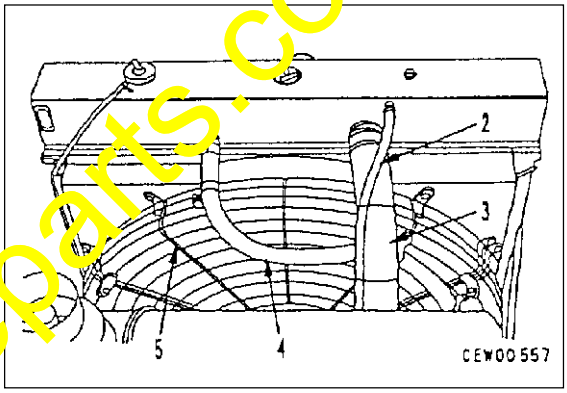
b. Loosen the drain cock (1) to drain the cooling water.



c. Disconnect the aeration hose (2) and return hose (3).

d. Disconnect the make-up line hose (4).

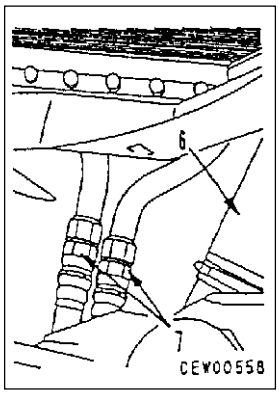
e. Remove the fan guard (5).

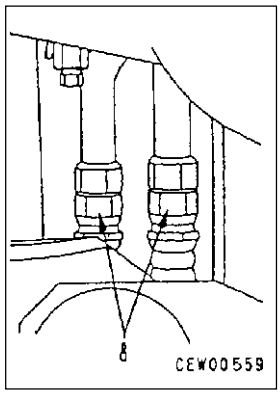


f. Disconnect the radiator outlet hose (6).

g. Disconnect the inlet port hose (7) and outlet port hose (7) of the torque converter cooler.

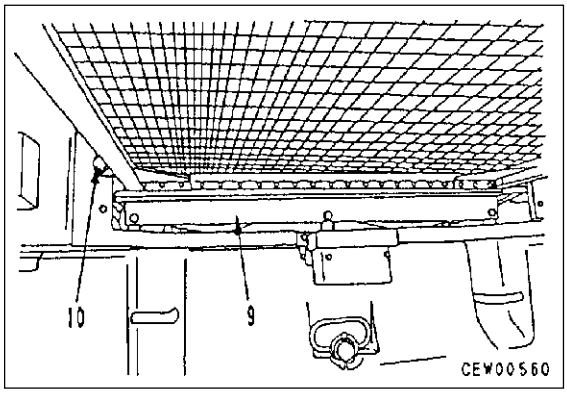
h. Disconnect the inlet port hose (8) and outlet port hose (8) of the hydraulic cooler.
★ Be sure to insert blind plugs to disconnected hose ends and the mating ports.



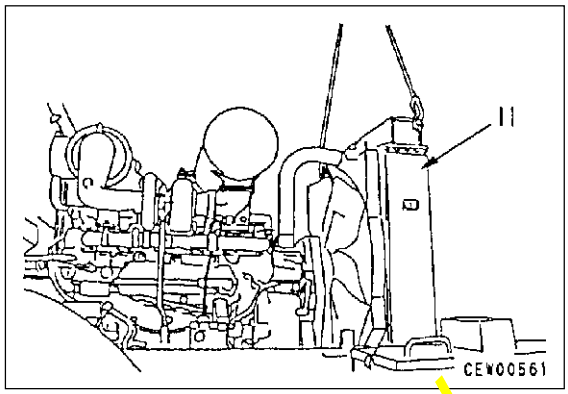


i. Remove the cover (9) located below the front face of the radiator.

j. Loosen the radiator mount bolts (10).

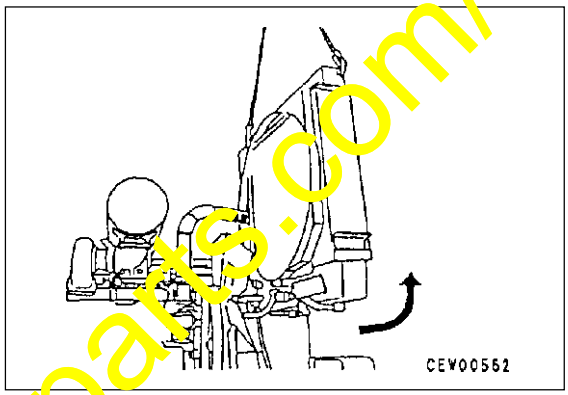


k. Temporarily hoist the radiator assembly (11) to remove the bolts (10).



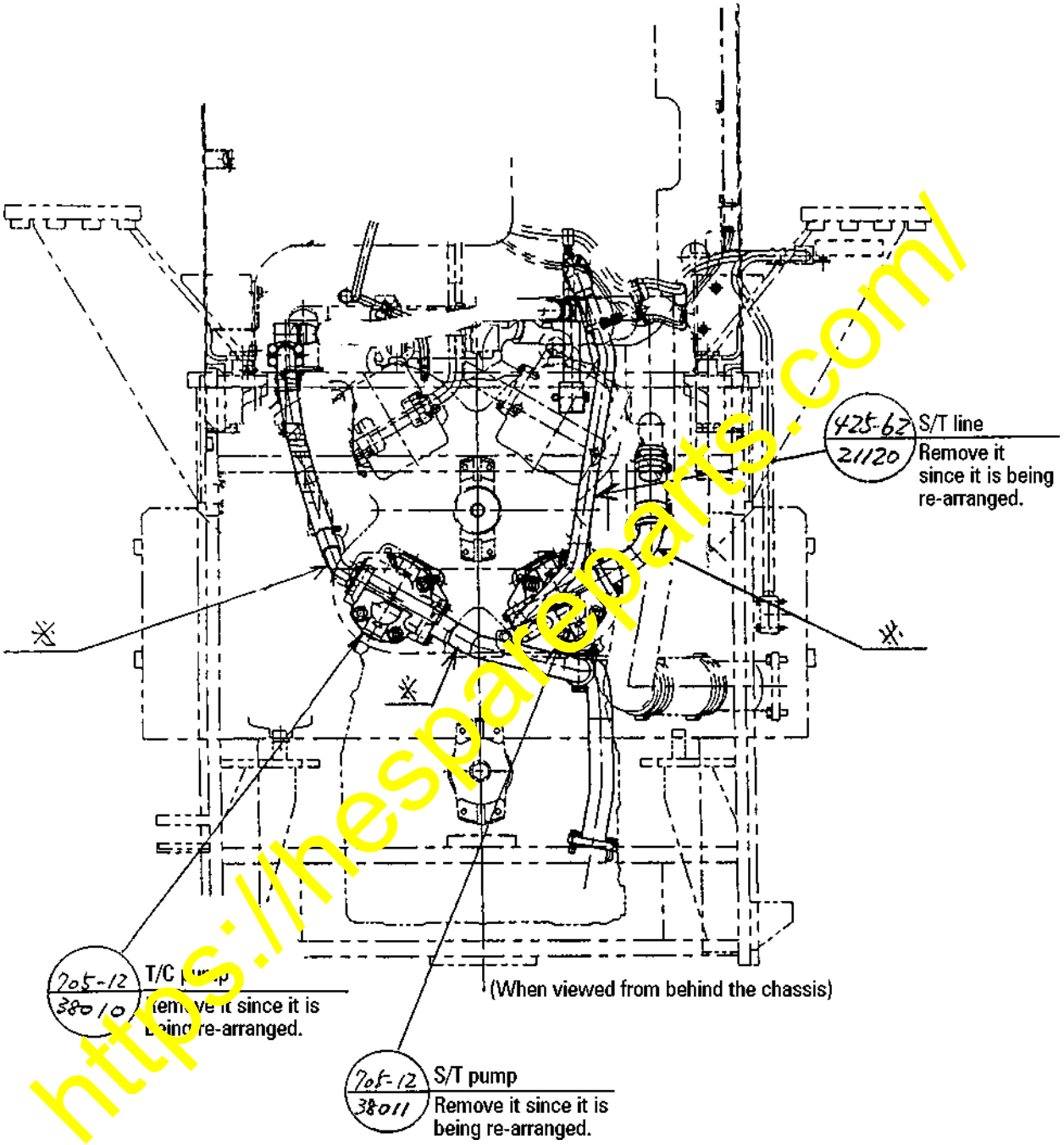
l. Host to remove the radiator assembly.
★ When hoisting the radiator assembly, hoist it moving toward rear.

kg Radiator assembly: 330 kg



⑤ Removing the pump

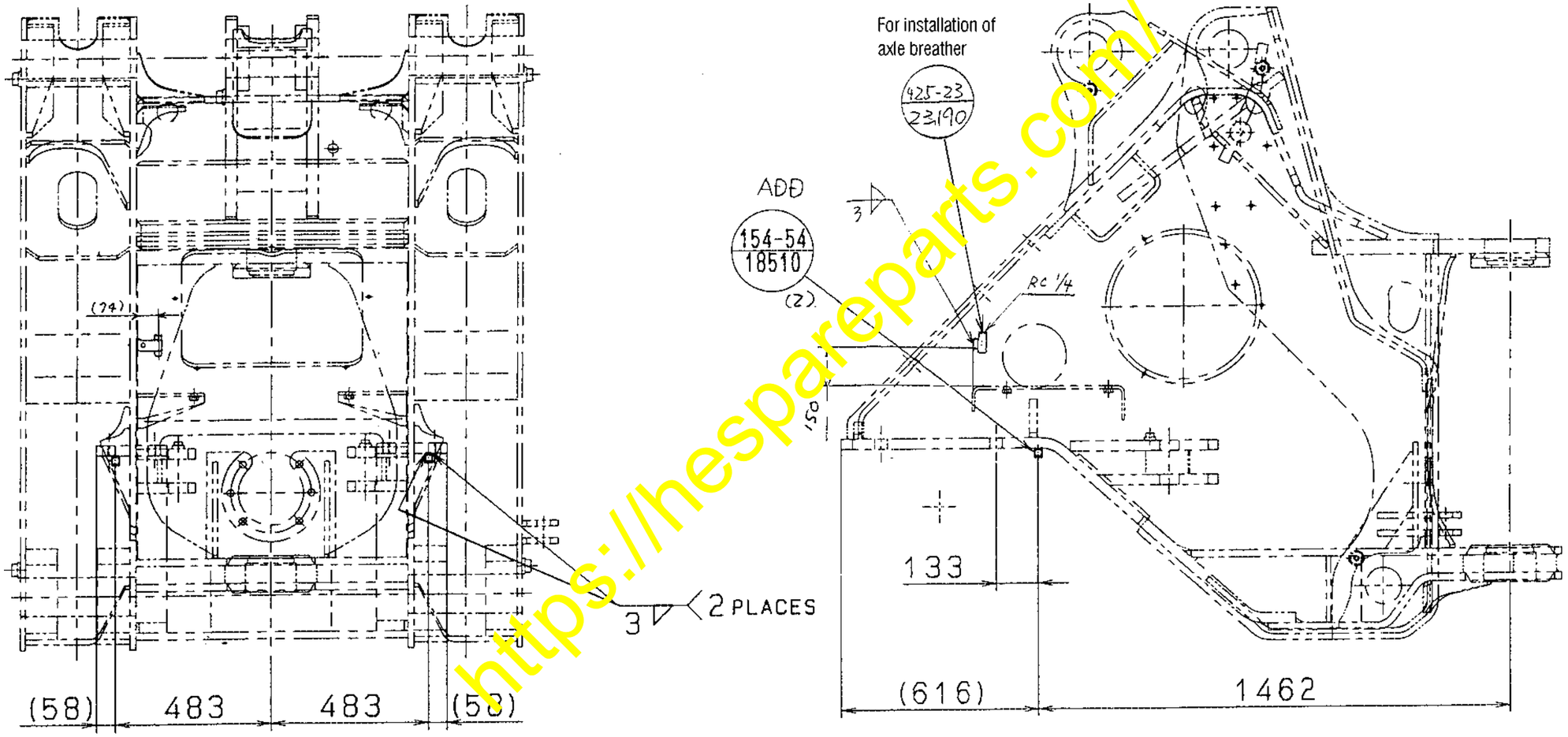
Remove the pump after removing the axle according to the procedures indicated on previous pages.



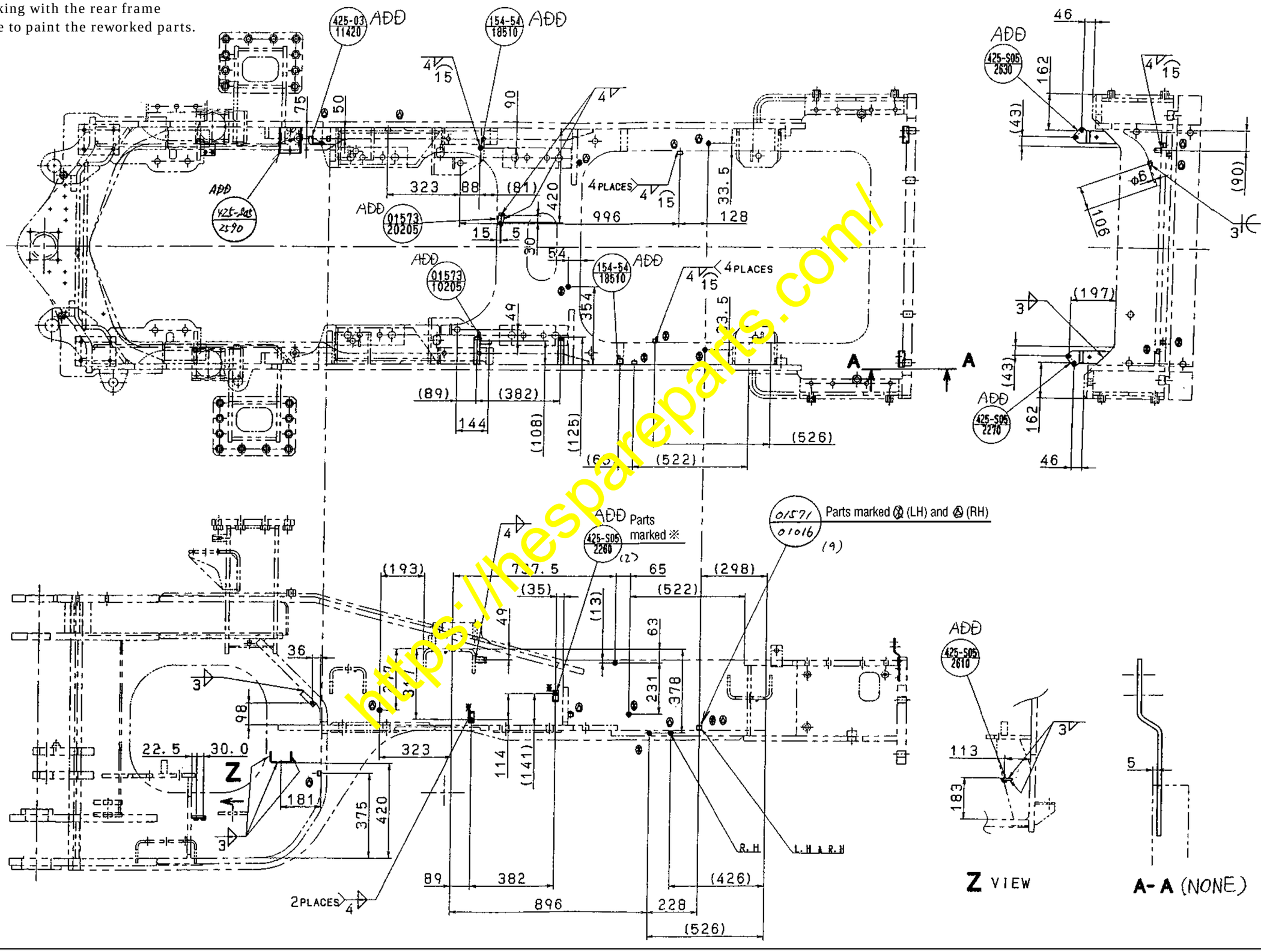
※ All the pipings (pipings marked ※) being removed according the above instruction, except for the S/T line piping (425-62-21120), are being reused when restoring the original state and keep them at a safe place.

5. Reworking procedures

① Reworking with the front frame
Be sure to paint the reworked parts.



② Reworking with the rear frame
Be sure to paint the reworked parts.

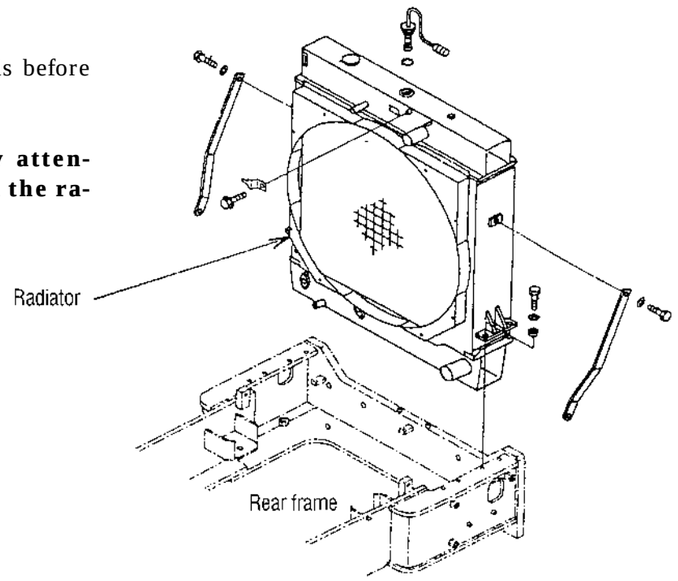


③ Reworking with the radiator

- Remove the radiator from the chassis before making this reworking.

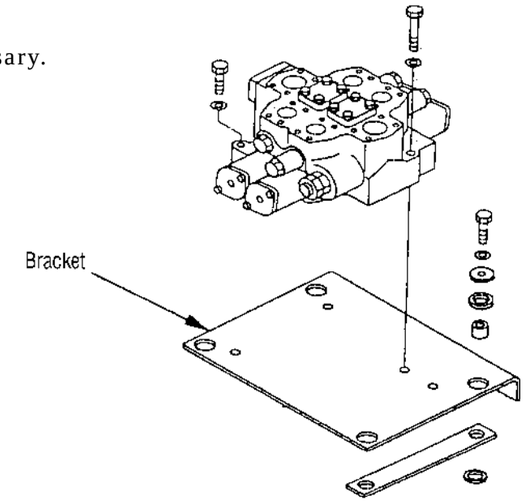
Note) When doing this rework, pay attention not to let spatters nest on the radiator cores.

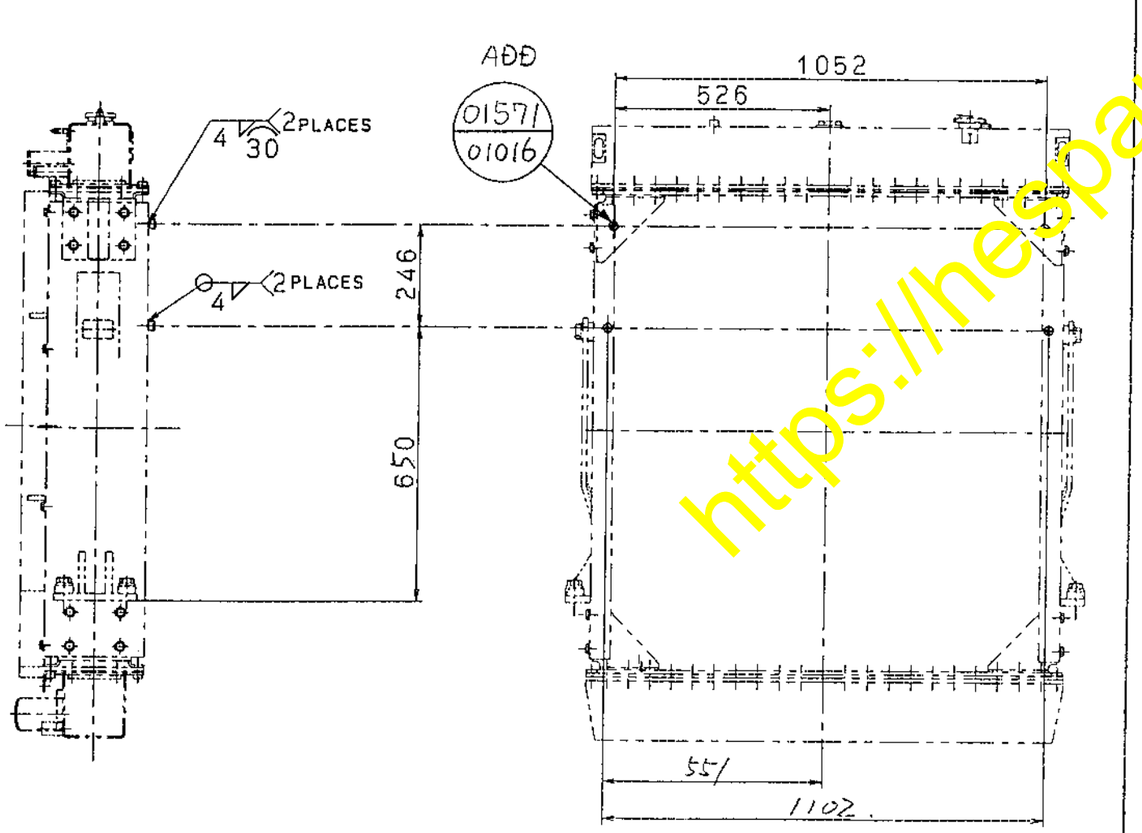
- Be sure to paint the reworked parts.

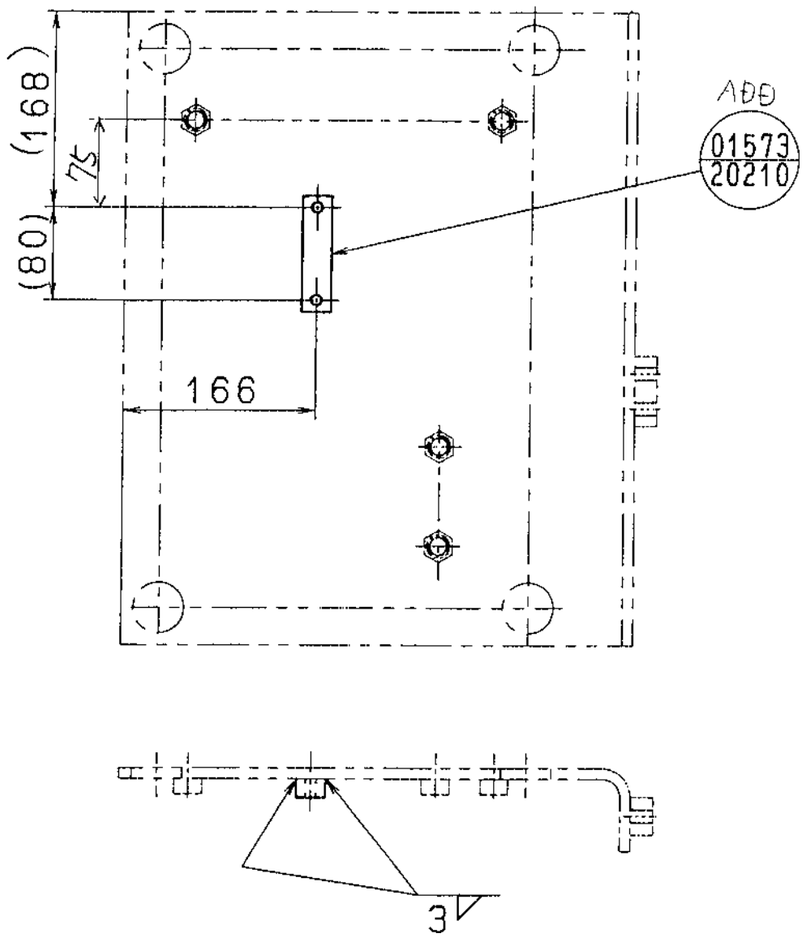


④ Reworking with the bracket (work equipment control valve mounting bracket)

- Its removal from the chassis is not necessary.
- Be sure to paint the reworked parts.

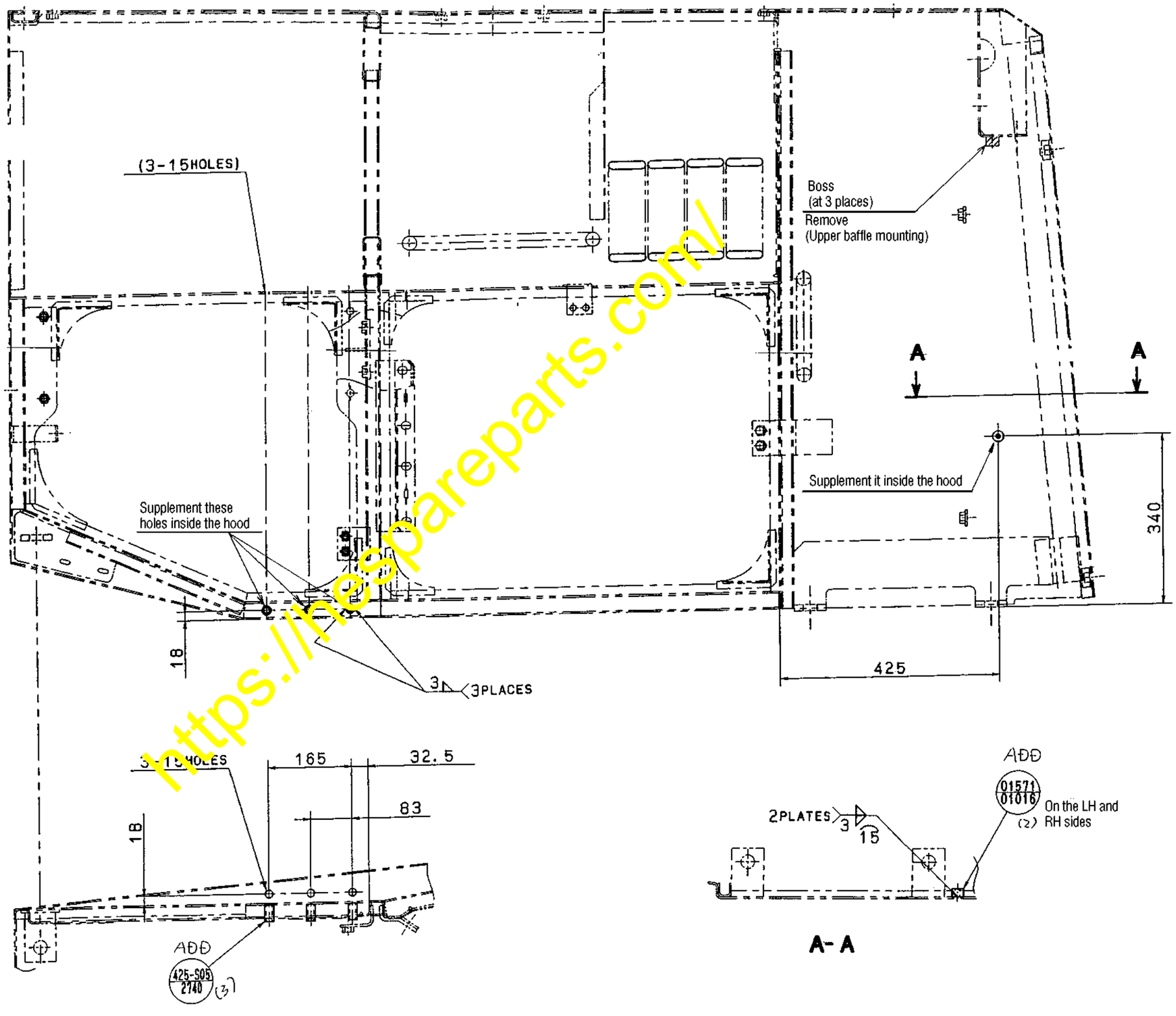




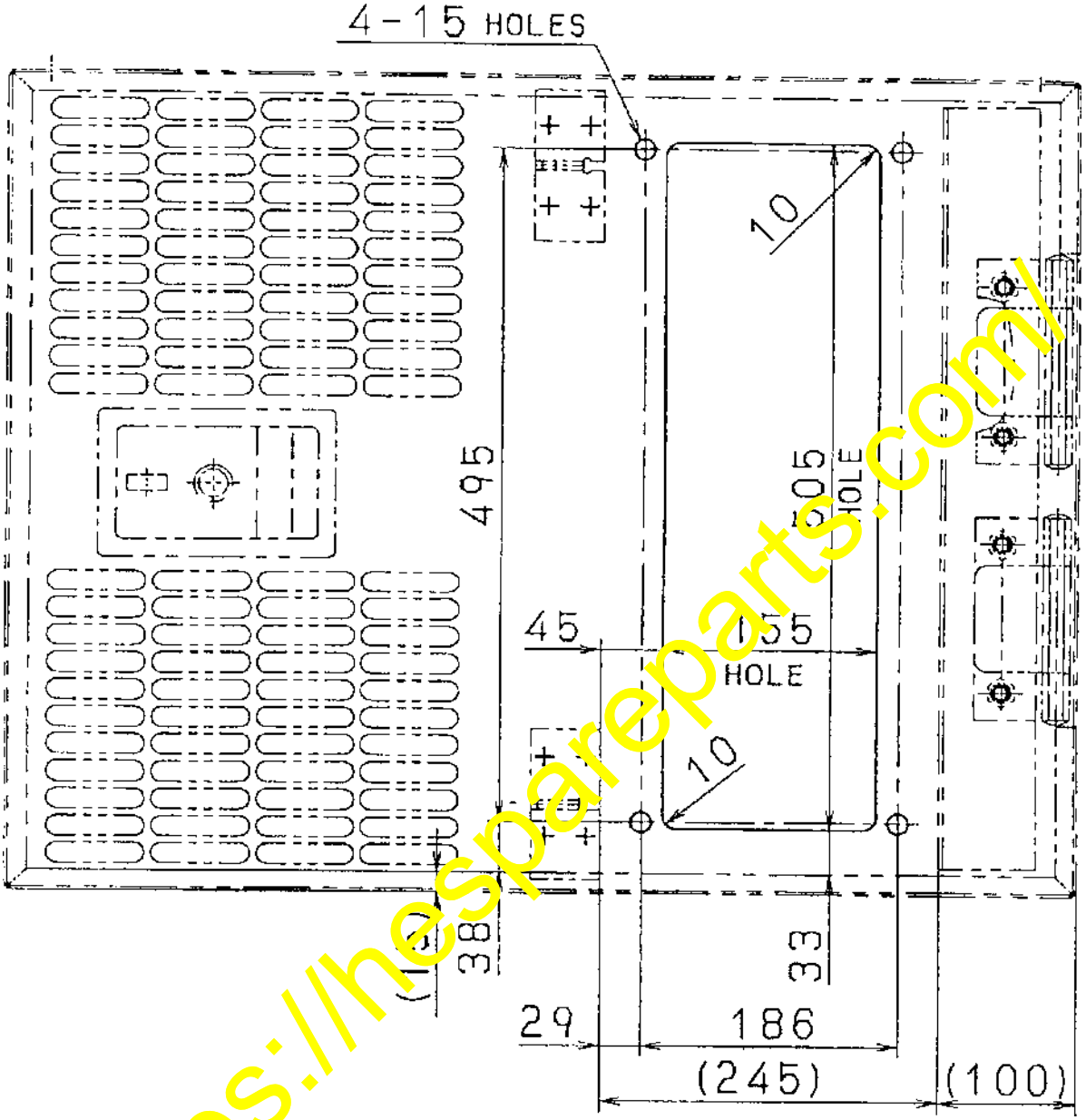


⑤ Reworking with the hood

- Remove the hood from the chassis before making this reworking.
- Be sure to paint the reworked parts.



⑥ Reworking with the side panel (LH side panel only)



Chamfer to remove burrs.

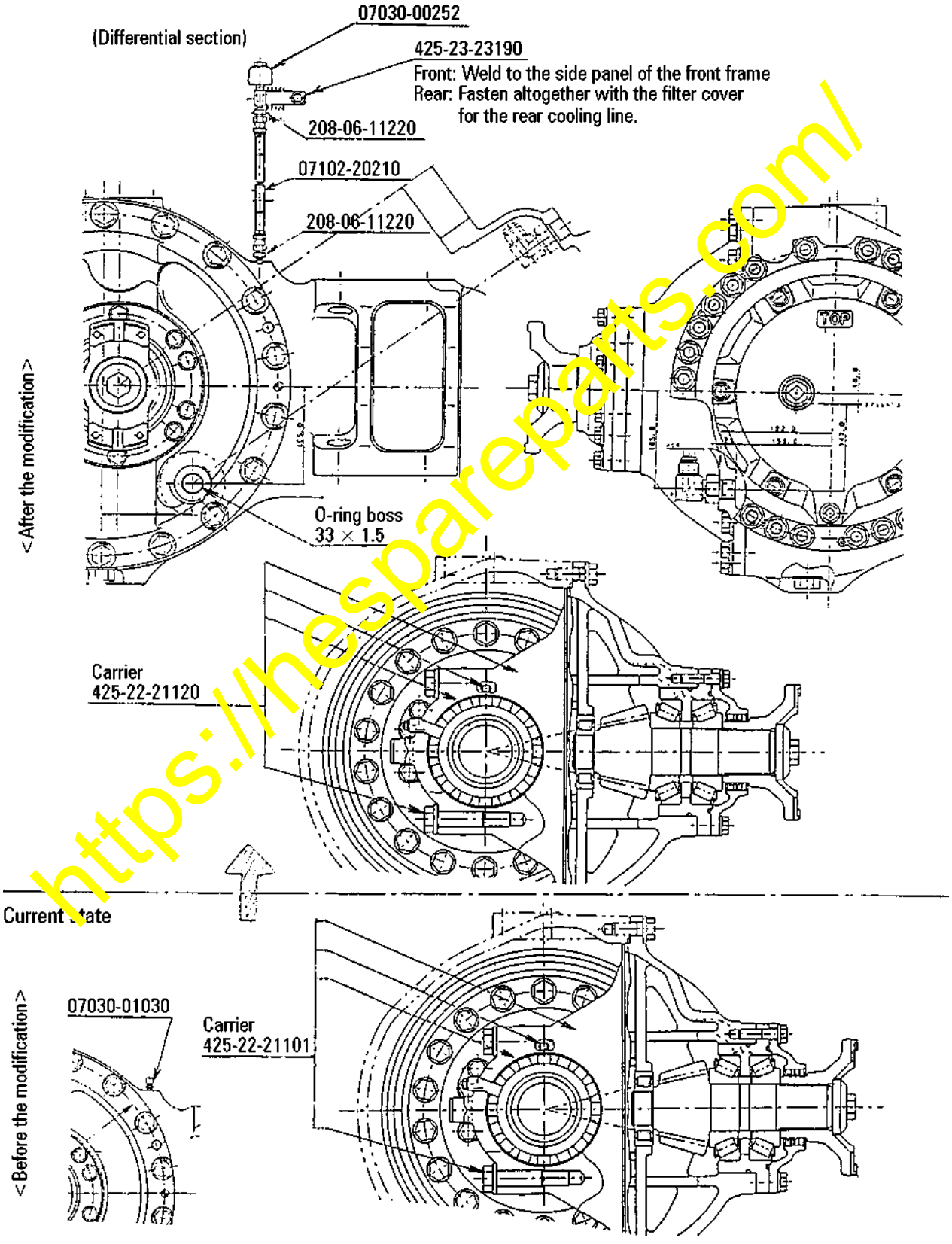
※ Be sure to paint the reworked parts.

6. Installation procedures

[1] Modification procedures for the axle

Replace the current parts with prepared new parts following the designations given in the schematic diagram indicated below. (Replace these parts referring to pages 30 thru 42.)

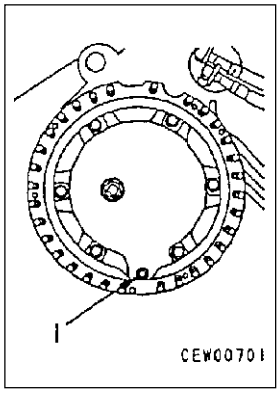
- Replacing the differential carrier and breather

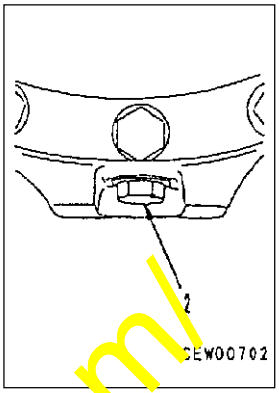


① Removing the front differential assembly
(To replace the current carrier (425-22-21101) with the improved carrier (425-22-21120))

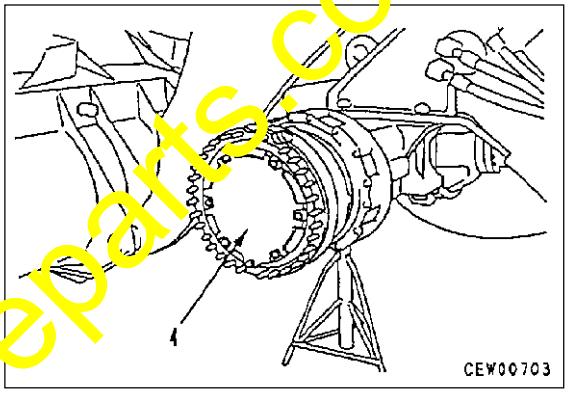
a. Remove the drain plugs (1) and (2) to drain axle oil. ※1

Axle oil: 78 ℓ

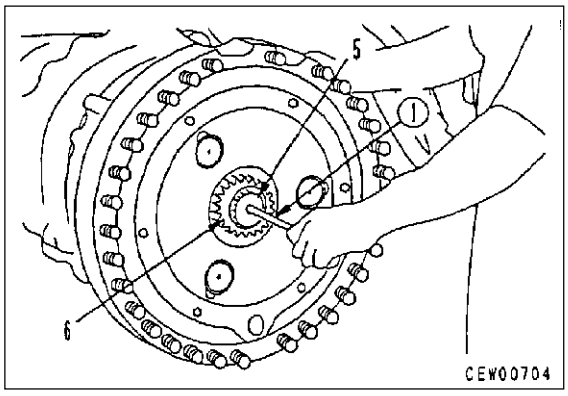




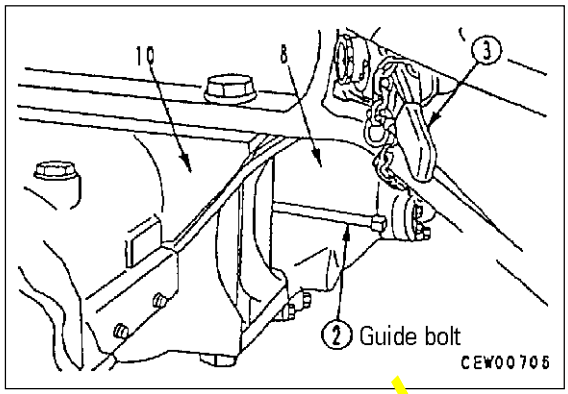
b. Remove the LH and RH final driver covers (4).



c. Using a forcing bolt ①, pull out the driv shaft (5) together with the sun gear (6) by about 200 mm.

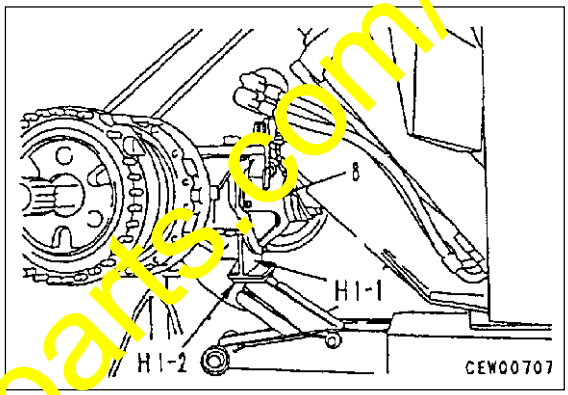


d. Remove two mounting bolts for the differential assembly (8) to install guide bolts ②.
※4
★ Screw-in the guide bolt as far as its threading goes in.
★ First, screw-in the guide bolt and remove the remaining mounting bolts.



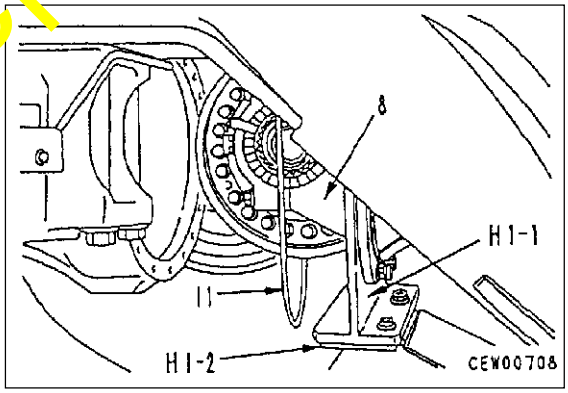
e. Set a lever block ③ to the differential housing not to let the differential assembly collapsed.

f. Along the guide bolt, pull out the differential assembly (8) from the axle housing (10) by about 20 mm.
★ When doing the above, be careful not to damage the O-ring.



g. Setting the Tool H1-1 and Tool H1-2 to a garage jack, insert them between the differential and the axle housing before fastening the differential assembly to the Tool H1-1.

h. Adjusting the height of the lever block and of the jack, gently take out the differential assembly.
kg Differential assembly: 282 kg

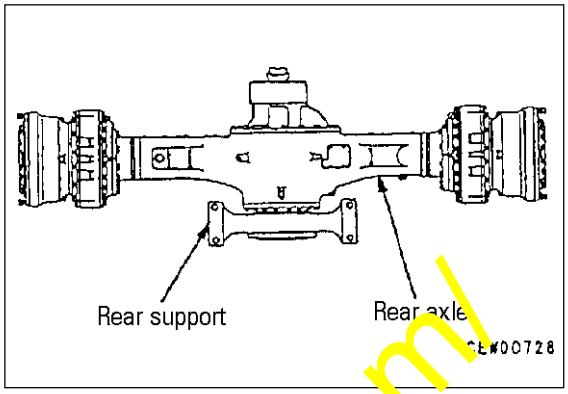


i. Operating the jack, pull out the differential assembly (8) to outside.

j. Remove the O-ring (11).

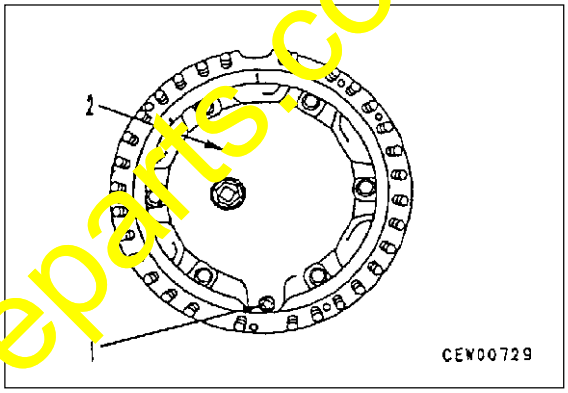
② Removing the rear differential assembly
(To replace the current carrier (425-22-21101) with the improved carrier (425-22-21120))

★ Do not separate the rear support from the rear axle.



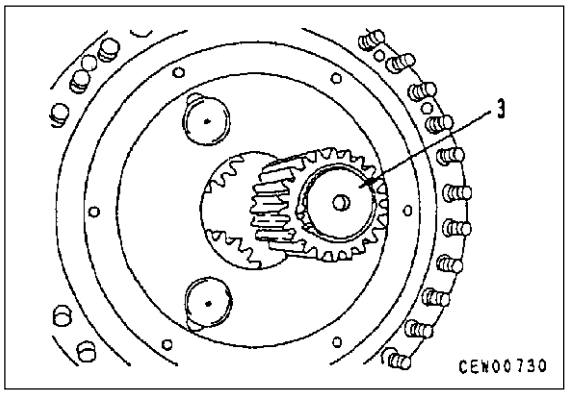
a. Remove the drain plug (1) to drain axle oil.
★ Before doing the above, bring the position of the drain plug at the low end.

Axle oil: 78 ℓ



b. Remove the cover (2).

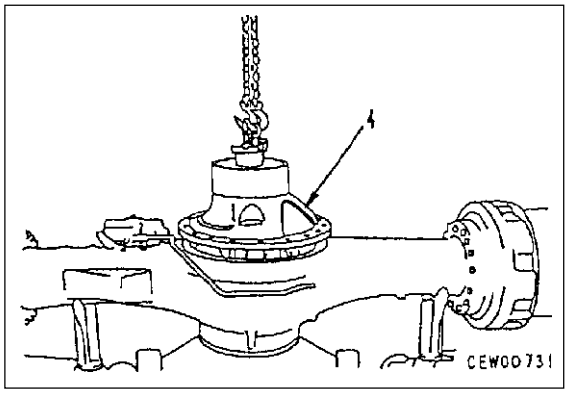
c. Using a forcing bolt, pull out the drive shaft (3).
★ Pull out the drive shaft by about 200 mm.



d. Using a hook bolt, hoist to remove the rear differential assembly (4). ※1

kg Rear differential assembly: 282 kg

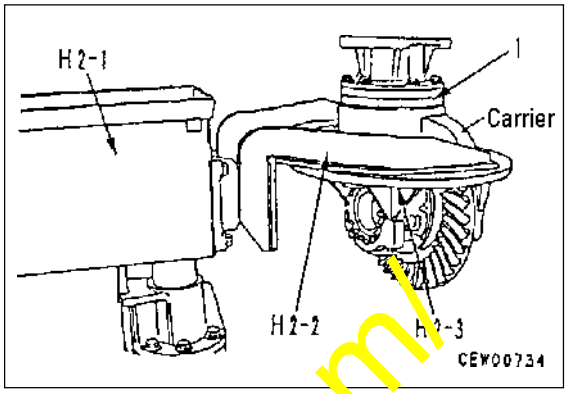
★ Remove the O-ring being used for the mating surface to the housing.



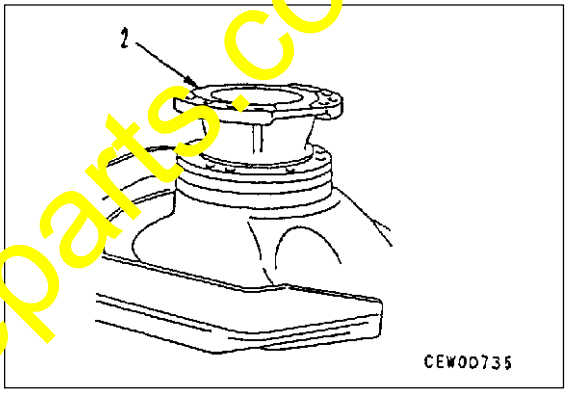
③ Disassembling the differential gear assemblies (front and rear differential assemblies)

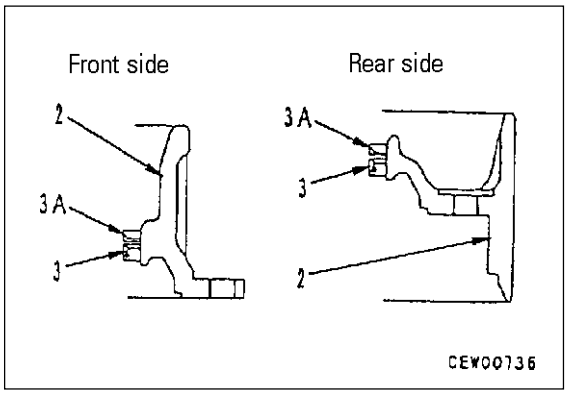
a. Set the differential assembly (1) to the Tools H2-1, H2-2 and H2-3.

kg Differential assembly: 230 kg

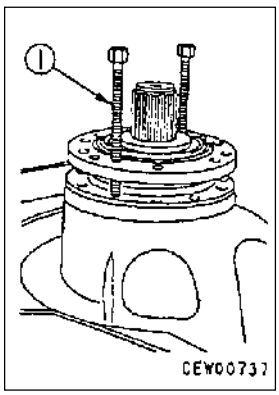


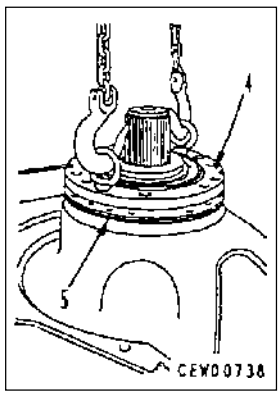
b. Pinion assembly (Being reused for reassembly)
   1) Remove the case (2).
   2) Remove the oil seal (3) and dust seal (3A) from the case.





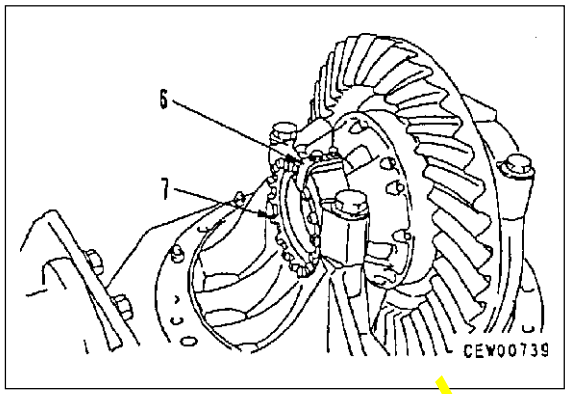
3) Screwing-in the forcing bolts ① (18 mm, P = 1.75), hoist to remove the pinion assembly (4).
   ★ Check and record the quantity of used shims (5).



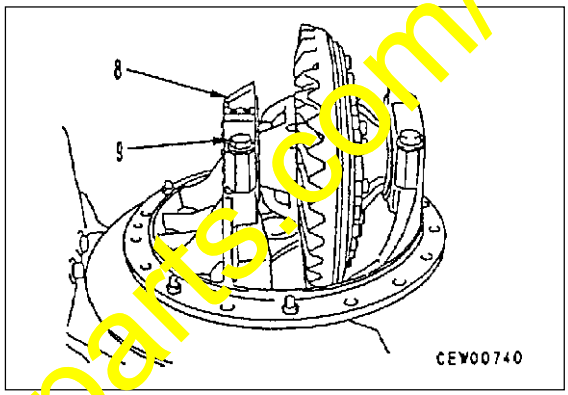


c. Differential gear case assembly (Being re-used for reassembly)

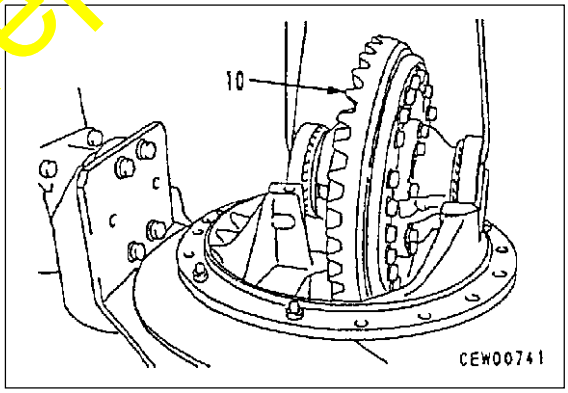
1) Releasing the locks (6) on the LH and RH sides, loosen the nut (7) using a crowbar or the sort as far as it can be turned manually.



2) Remove the mounting bolt (9) for the cap (8).



3) Removing the nut, hoist to remove the differential case assembly (10).



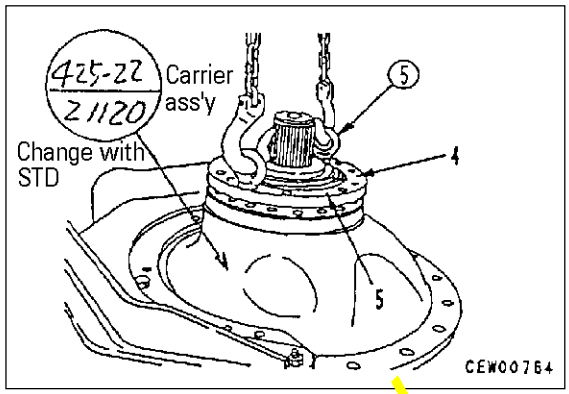
d. Reassembling the differential assembly

★ Set the differential case to the Tools H2-1, H2-2 and H2-3.

ⓐ Pinion assembly (The current pinion assembly is being reused.)

1) Insert the shims (5) which were removed while conducting the disassembly work.
★ Standard shim thickness: 2.1 mm

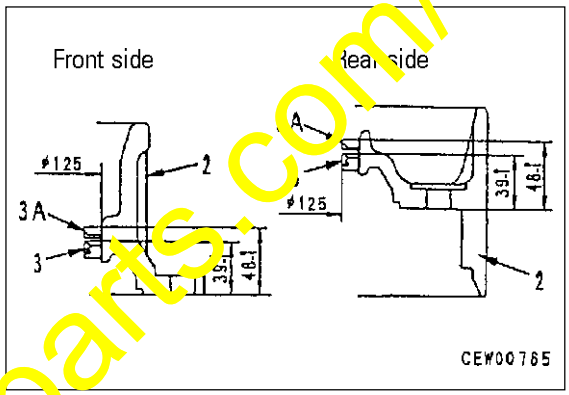
2) Using ring bolts ⑤ (12 mm, P = 1.75), hoist to install the pinion assembly (4).



3) Mount the oil seal (3) and dust seal (3A) to the case.

Oil seal lips: Apply grease (G2-LI).

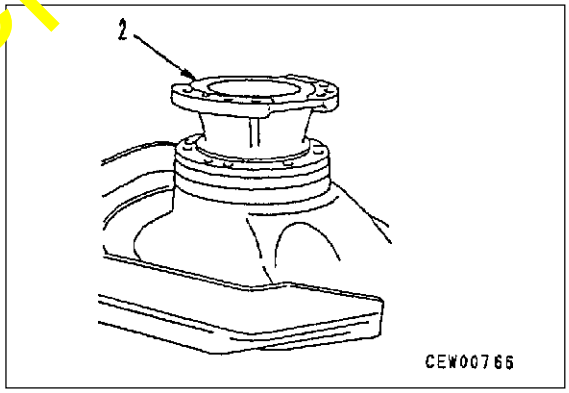
Dust seal lips: Apply grease (G2-LI).



4) Setting the O-ring onto the mating surface, install the case (2).

kg Mounting bolts: 279.3 ± 29.4 Nm {28.5 ± 3.0 kgm}

Mounting bolt: Apply adhesive (LT-2).

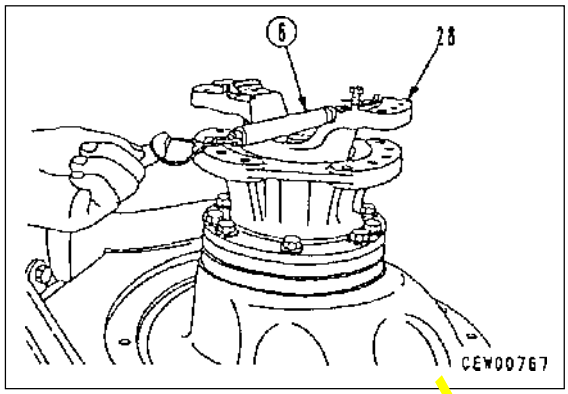


5) Install the coupling (28), set the O-ring and tighten the holder.

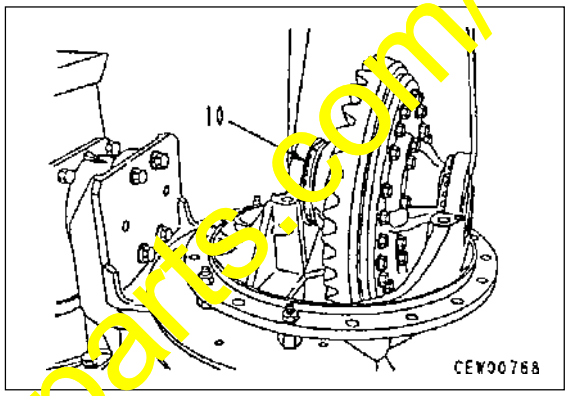
kg Mounting bolts: 921.2 ± 98.0 Nm {94 ± 10 kgm}

Mounting bolts: Apply adhesive (LT-2).

★ Engaging a spring balance ⑥ with the screw section of the coupling, measure the starting-up effort in the tangential direction.
★ Starting-up effort: 50.0 N {5.1 kg} or less



ⓑ Differential assembly (The current differential assembly is being reused.)
Hoist the differential bevel gear assembly (10) to install to the case.

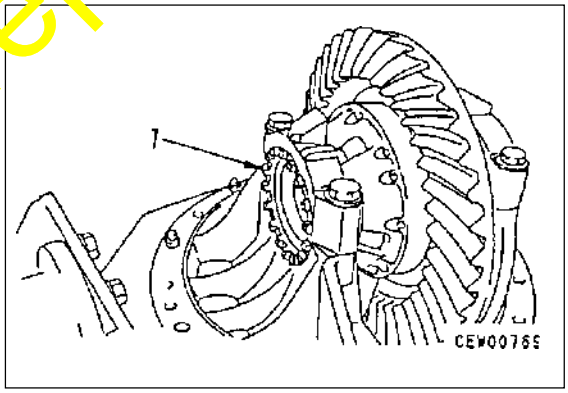


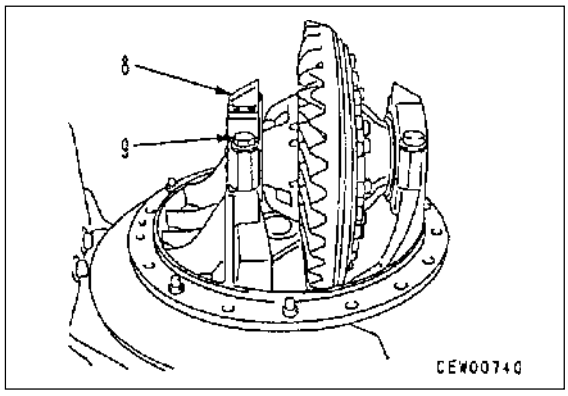
ⓒ Nut and cap
1) Install the nut (7) fitting to the groove provided in the differential case.
2) Setting the cap (8) to its place, tighten the bolt (9).

kg Mounting bolts: 931.6 ± 93.0 Nm {95 ± 10 kgm}

Mounting bolt: Apply adhesive (LT-2).

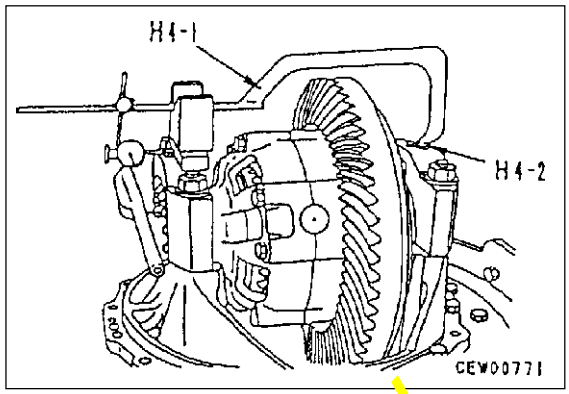
★ Match the matchmarks provided on the bearing cap when making the above installation.
★ Turn the bevel gear by 20 to 30 turns to let the bearing fit itself before tightening the mounting bolts.



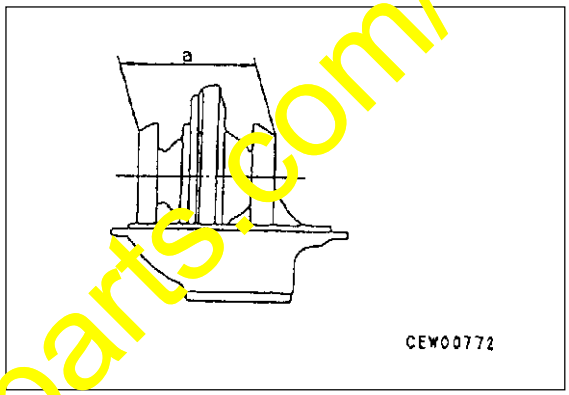


★ Adjust pre-load for the bearing following the procedures outlined below.

1) Set the Tools H4-1 and H4-2 to the caps on both sides.



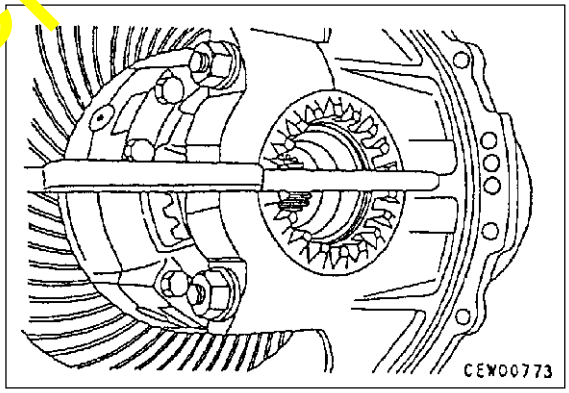
2) Using the Tool H4-1, measure the dimension “a” to the Tool H4-2.



3) Set the scale of the Tool H4-1 to the measured dimension plus 0.26 ± 0.07 mm.

★ The added dimension becomes the deflection of the case between the state before applying the pre-load and the state after applying the pre-load.

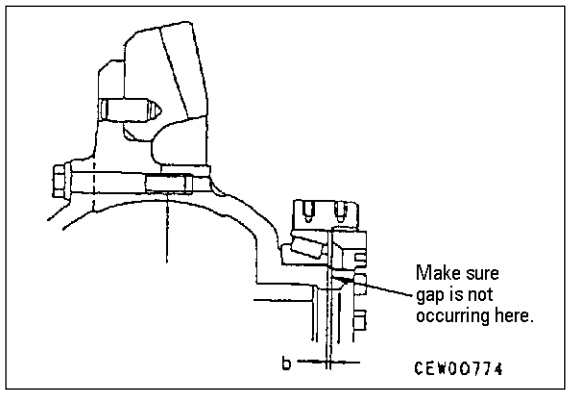
4) Tighten the adjust nut so that the increase may become 0.26 ± 0.07 mm using a crowbar or a similar tool.



★ Precautions when adjusting the pre-load

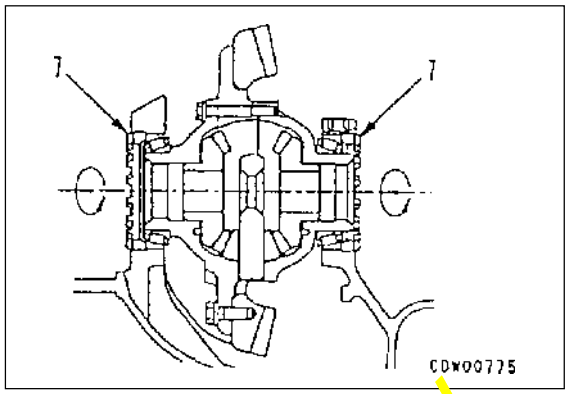
When the increase of the deflection exceeds the above criterion by excessive tightening of the adjust nut, return the adjust nut to the position before starting the adjustment work.

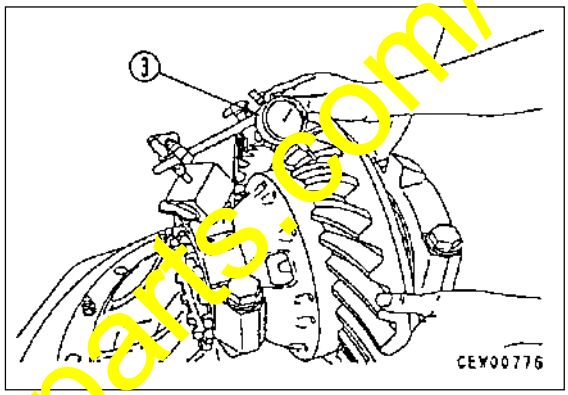
At this time, turning the bevel gear, lightly hit the bearing cap and bevel gear by a plastic hammer or a similar tool to make sure the gap “b” is not occurring at the section illustrated at right before starting the re-adjustment work.



ⓓ Adjusting the tooth contact and backlash
Adjust the backlash and, at the same time, conduct tooth contact adjustment.

1) Adjust the backlash following the procedures outlined below.
   i) Use the adjust nut (7) when moving the position of the bevel gear. When doing this, always turn the adjust nuts on both sides by the same turn and in the same direction, respectively, in order not to change the pre-load having been applied to the bearing.
   ii) Setting a dial gauge ③ perpendicular to the reversing side tooth flank around the outer edge edge section of the bevel gear, adjust the gauge pointer deflection within the range of "0.3 to 0.4 mm" turning the adjust nuts.
      ★ Conduct the above adjustment work at 3 to 4 points and, while making the measurement, hold the pinion gear in standstill.
2) Adjust the tooth contact following the procedures outlined below.
   i) Adjust the in and out positioning of the bevel pinion by changing the shim quantity to insert between the differential case and bearing cage.
   ii) Adjust the tooth contact.
3) Refer to the Section "Adjusting the tooth contact".



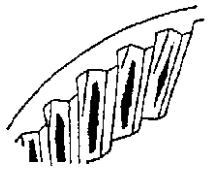
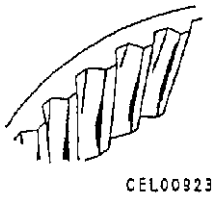
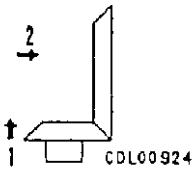
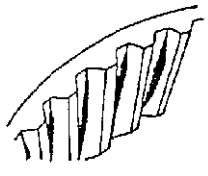
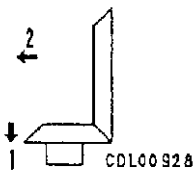
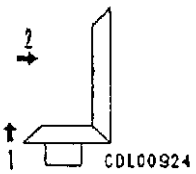
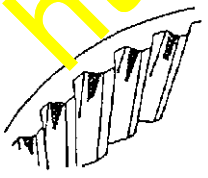
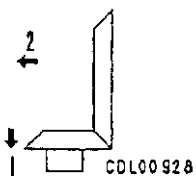


3) Checking the tooth contact

Knead the red lead primer after adding a spindle oil and apply onto the tooth flanks of 7 to 8 ridges of gears.

Holding the driven gear by fingers to exert braking effects, turn the drive pinion gear toward the forward side and reverse side to check the tooth contact.

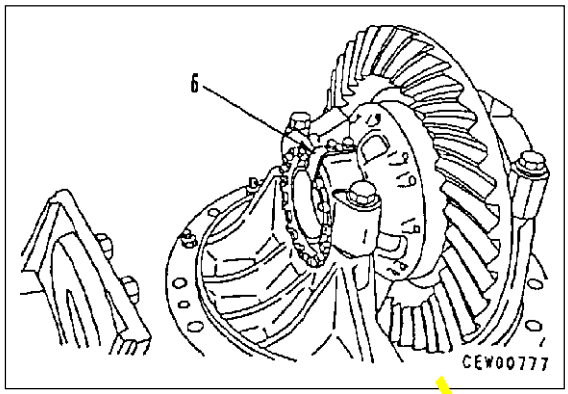
Check contacting state of the tooth and adjust tooth contact according to the adjustment method for respective cases.

Tooth contact	Causes	Adjustment methods
 CEL00922	Proper tooth contact. Leaving a margin of about 5 mm on the toe side, a contact toward the heel side upon 50% of the total tooth length with the pitch line at the center is the proper tooth contact.	Adjust the positioning of the drive pinion by changing the shim quantity for the drive pinion cage. When adjusting the driven gear, follow the same procedures as when adjusting the backlash.
 CEL00923	The drive pinion is too far apart from the driven gear.	1. Lessen the shim quantity for the drive pinion to move it closer to the driven gear. 2. Move the driven gear away from the drive pinion to adjust the backlash correctly.  CDL00924
 CEL00925	The drive pinion is too close to the driven gear.	1. Increase the shim quantity for the drive pinion to move it apart from the driven gear. 2. Move the driven gear closer to the drive pinion to adjust the backlash correctly.  CDL00928
 CEL00926	The driven gear is too close to the drive pinion.	1. Lessen the shim quantity for the drive pinion to move it closer to the driven gear. 2. Move the driven gear away from the drive pinion to adjust the backlash correctly.  CDL00924
 CEL00927	The driven gear is too far apart from the drive pinion	1. Increase the shim quantity for the drive pinion to move it apart from the driven gear. 2. Move the driven gear closer to the drive pinion to adjust the backlash correctly.  CDL00928

★ When adjusting the in and out positioning of the driven gear, always turn the adjust nuts on both sides by the same turn (reading the moving distance of the notch) and in the same direction, respectively, in order not to change the pre-load having been applied to the bearing.

ⓔ Lock
After finishing adjustments of the tooth contact and backlash, install the lock (6).

Mounting bolts:
Apply adhesive (LT-2).



④ Installing the front differential assembly

- Install the front differential assembly in the reversed procedures of its removal procedures.

※1

kg Drain cock tightening toque:
151.9 ± 24.5 Nm {15.5 ± 2.5 kgm}

※4

kg Differential assembly mounting bolts: 548.8 ± 58.8 Nm
{56.0 ± 6.0 kgm}

- Refilling the oil (axle oil)
  Refill axle oil through the oil filler port upto the specified level.

⑤ Installing the rear differential assembly

- Install the rear differential assembly in the reversed procedures of its removal procedures.

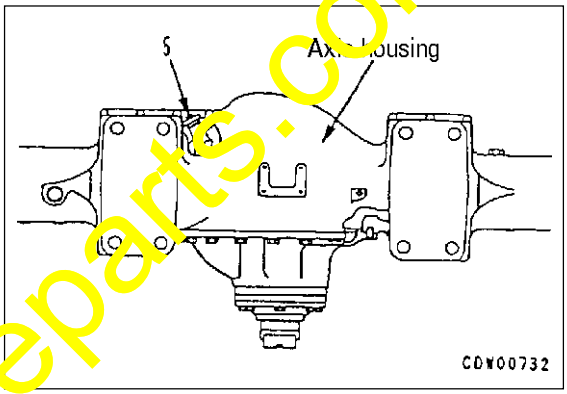
※1

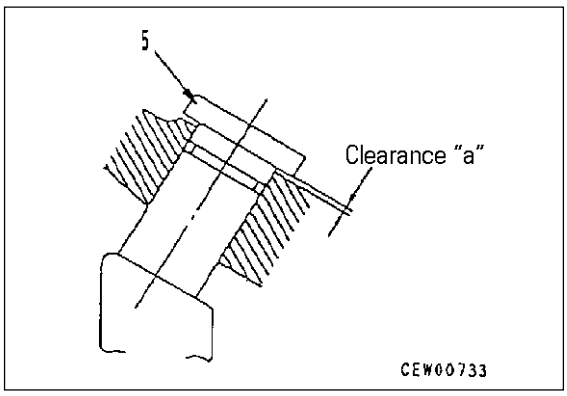
Differential assembly mounting bolts: Apply adhesive (LT-2).

kgm Differential assembly mounting bolts: 548.8 ± 58.8 Nm {56.0 ± 6.0 kgm}

★ Adjusting the shims for the shaft
Conduct adjustment of the shims for the shaft when replacing the differential assembly or the axle housing.

1) Fastening the shaft (5) evenly by the mounting bolts, measure the clearance “a” occurring between the axle housing and the shaft.
(Without insertion of shims, tighten the mounting bolts at a tightening torque of 3.9 ± 0.1 Nm {0.4 ± 0.01 kgm}.)
2) Select a shim quantity equaling to the measured clearance “a” plus 0.1 ± 0.05 mm to insert to their position.
   - Shim thickness: Clearance “a” + (0.1 ± 0.05 mm)
   - Mounting bolt tightening torque: 112.7 + 9.8 Nm {11.5 + 1.0 kgm}

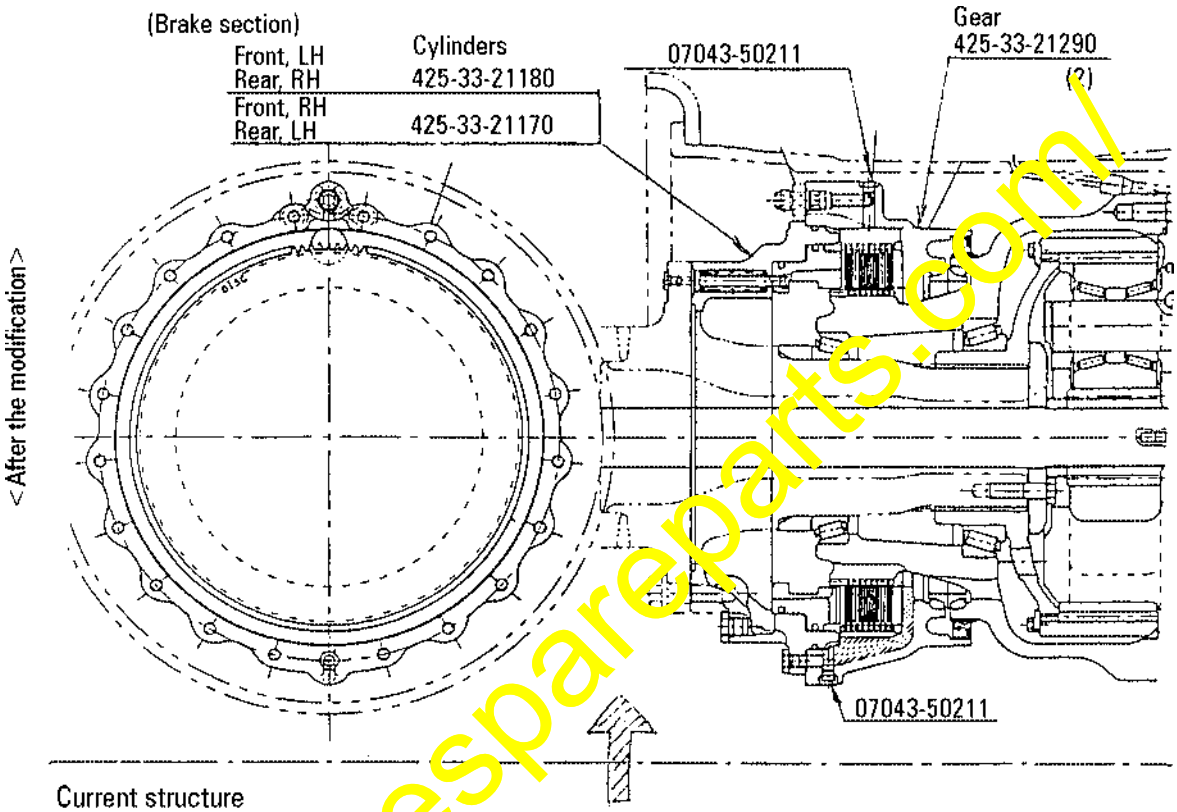


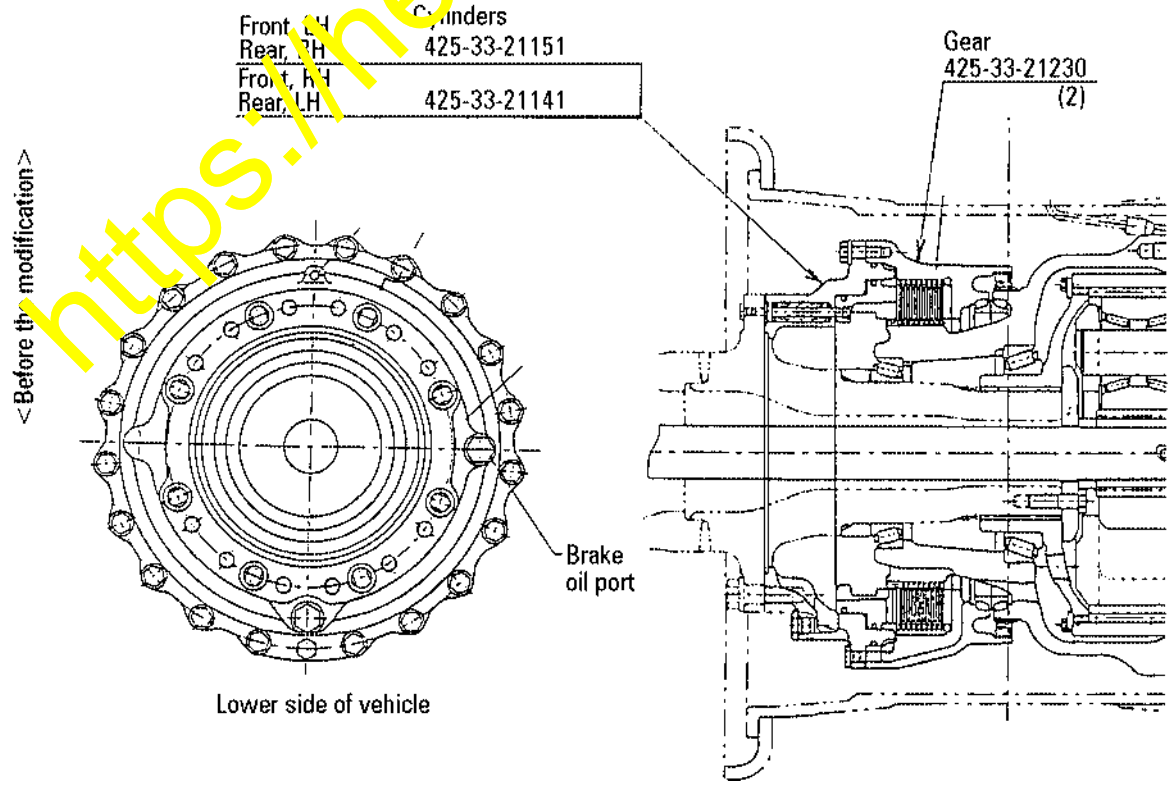


[2] Modification procedures for the brake

Replace the current parts with the prepared new parts following the designations given in the schematic diagrams indicated below. (Perform this replacement work referring to pages 44 thru 49.)

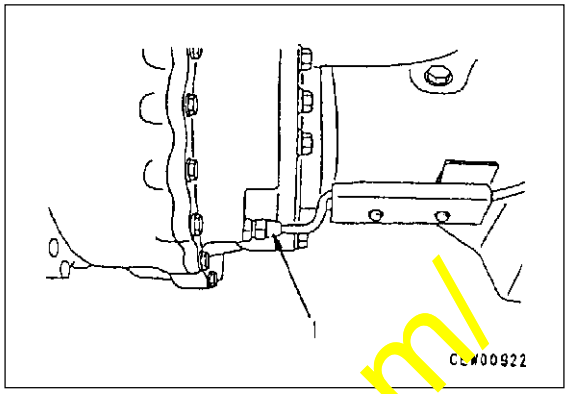
- Replacing the brake gear and cylinder





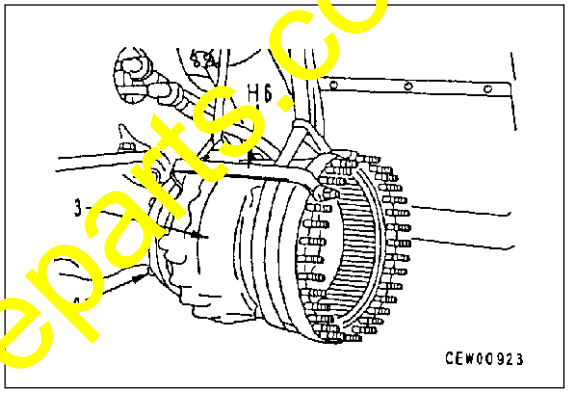
① Removing the brake assemblies (front and rear)

a. Disconnect the brake tube (1). ※1

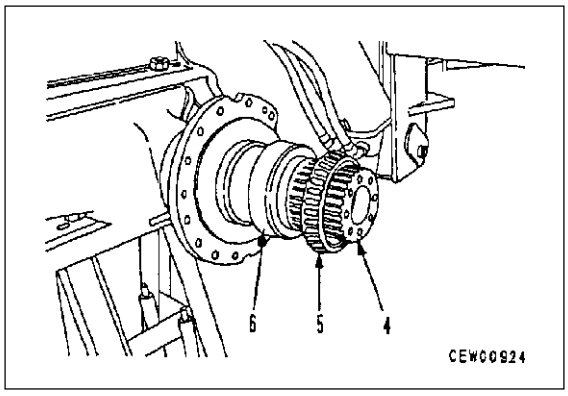


b. Setting the Tool H6, temporarily hoist the brake/wheel-hub assembly and remove the mounting bolts (2) to remove the brake/wheel-hub assembly. ※2

kg Brake/wheel-hub assembly: 280 kg

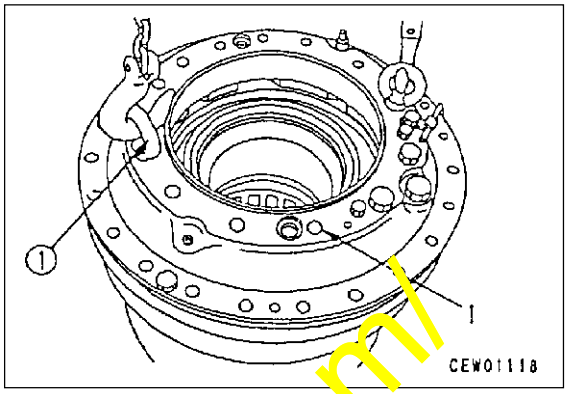


c. Remove the bearing (5) and retainer (6) from the axle (4).

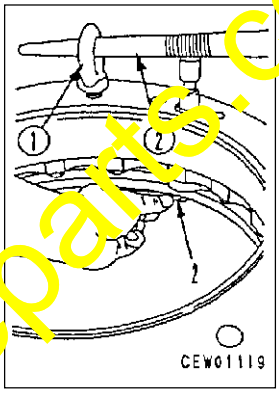


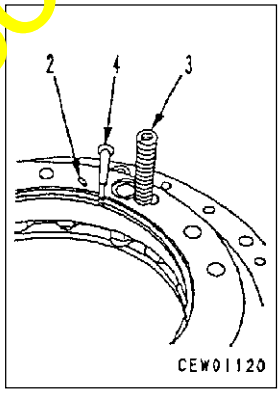
② Disassembling the brake assemblies (front and rear)

a. Cylinder assembly (Replace it with the prepared new cylinder assembly.)
   1) Using ring bolts ① (16 mm, P = 2.0), hoist to remove the cylinder assembly (1).

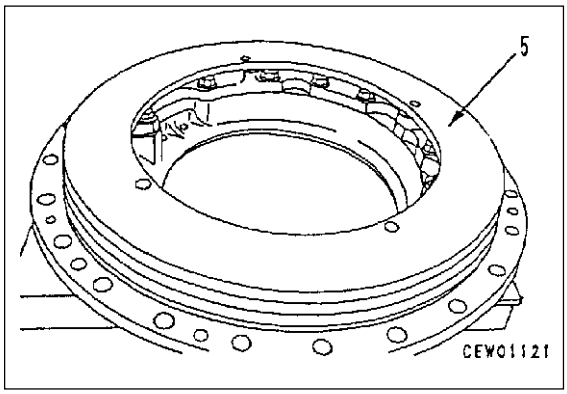


★ Disassemble the cylinder assembly following the procedures outlined below:
   1) Screwing-in the ring bolt ① (16 mm, P = 2.0), push down the spring using a crowbar ② or a similar tool to pull out the pin (2).
   2) Remove the spring (3) and shaft (4).

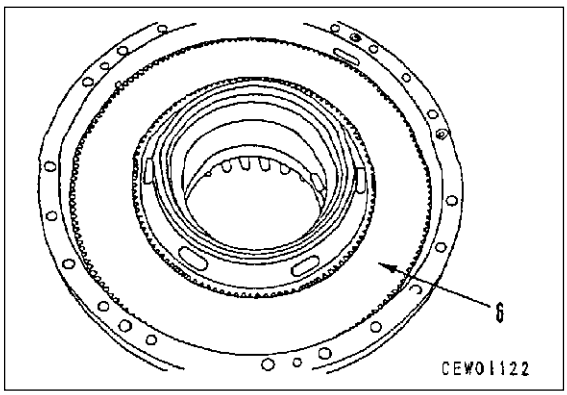




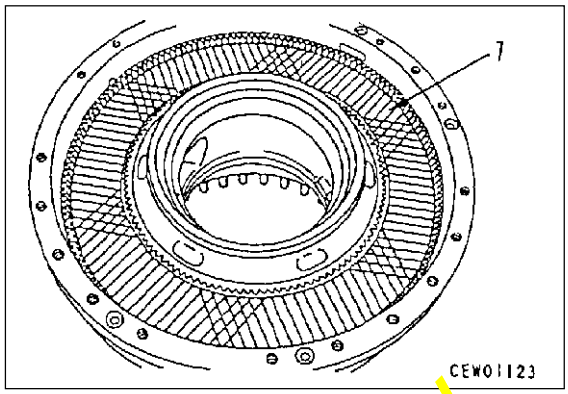
   3) Remove the piston (5).



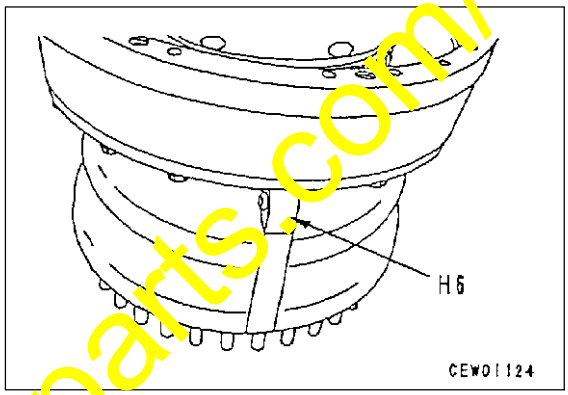
b. Plates and discs
   1) Remove the plate (6).



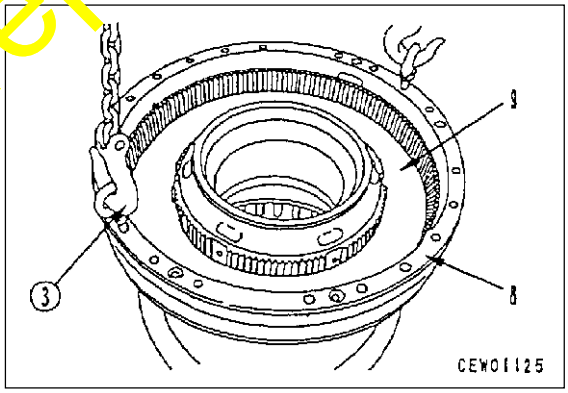
2) Remove the disc (7).
   ★ When removing the discs and plates, provide matchmarks to the inner gear and the disc and to the outer gear and the plate each time before removing the disc and plate.
   ★ Since the disc is made of a soft material, pay attention not to damage discs when removing them.
   ★ Remove discs and plate alternately.



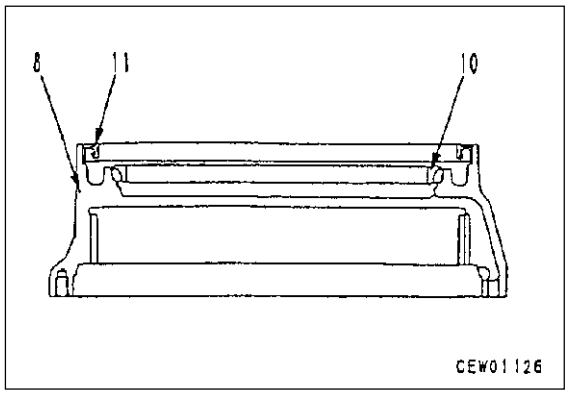
c. Gear assembly (Replace it with the prepared new gear assembly.)
   1) Remove the Tool H6.



   2) Using ring bolts ③ (12 mm, P = 1.75), hoist to remove the gear assembly (8).
   3) Remove the plate (9) from the gear assembly (8).



   4) Remove the floating seal (10) and oil seal (11) from the gear assembly (8).



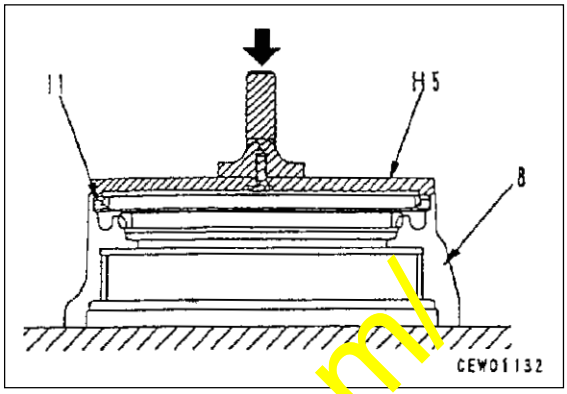
③ Reassembling the brake assemblies (front and rear)

a. Gear assembly (Replace it with the prepared new gear assembly.)
   1) Using the Tool H5, install the oil seal (11) to the gear assembly (8).

      Seal lip surfaces:
      Apply grease (G2-LI).

      Mating surfaces between the oil seal and the hub:
      Apply adhesive (Loctite #648).

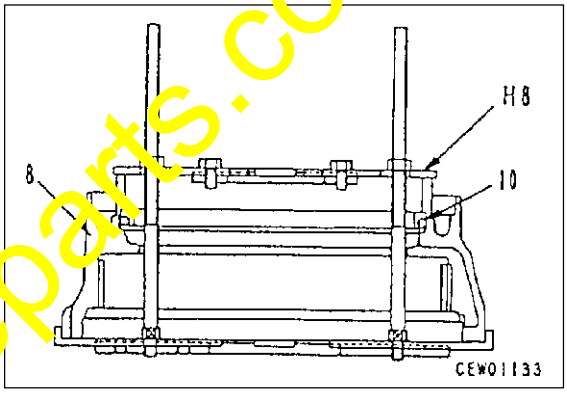
      Part number of the gear assembly:
      425-33-21290

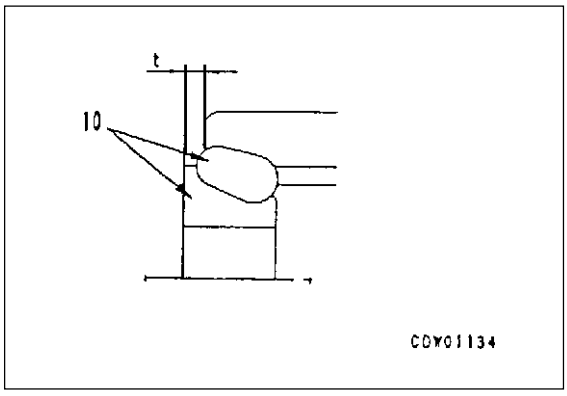


   2) Using the Tool H8, install the floating seal (10) to the gear assembly (8).

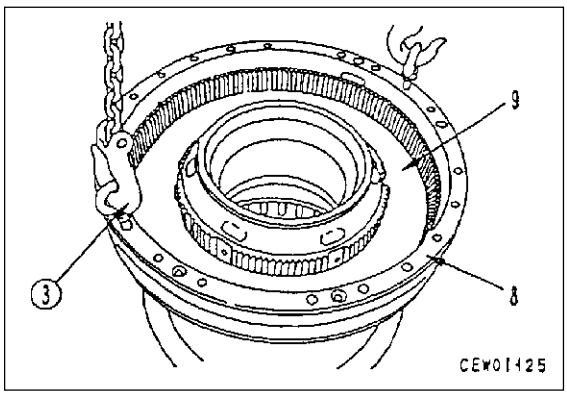
      Contact surface of the seal:
      Apply engine oil (EO30-CD).

      ★ Set the O-ring (10) to the floating seal in advance.
      ★ Wipe to thoroughly remove white powder from the O-ring using alcohol or the sort.
      ★ Thoroughly degrease the contact surface to the O-ring of the floating seal and retainer.
      ★ When setting the O-ring to the floating seal, depress the Tool H8 evenly paying attention not to twist the O-ring and after press-fitting them together, measure the height "t" at 4 points around the periphery to make sure the level difference is within 1 mm.

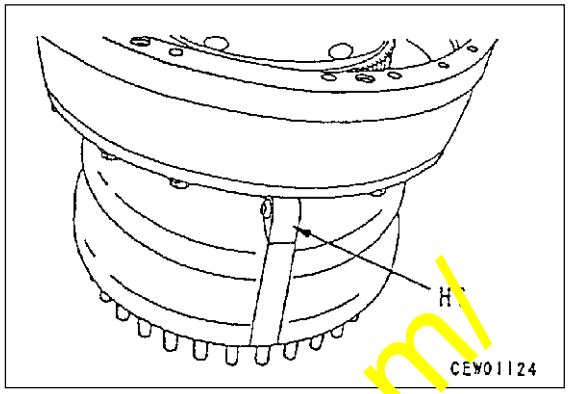




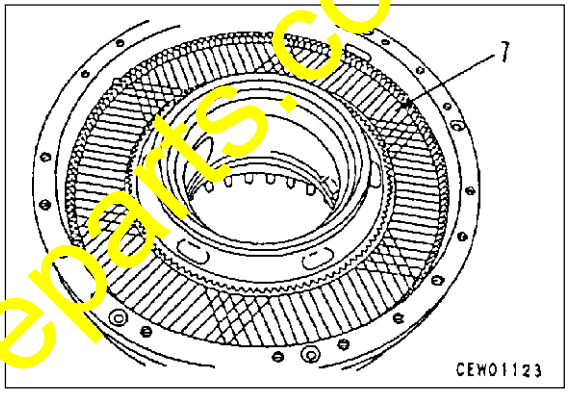
b. Install the plate (9) before hoisting and installing the gear assembly (8) using ring bolts ③ (12 mm, P = 1.75).



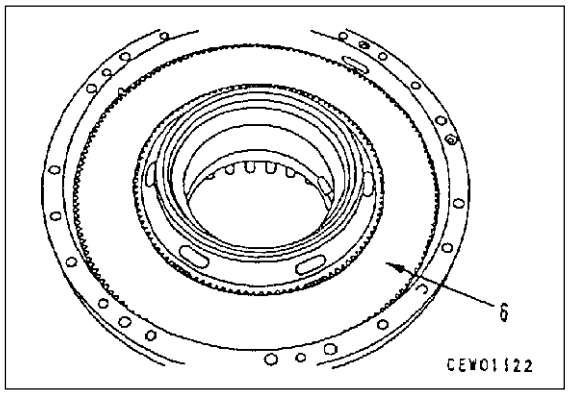
c. Install the Tool H6.



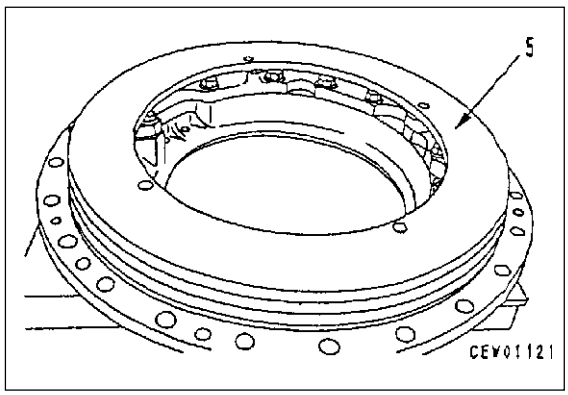
d. Discs and plates
   1) Install the disc (7).



   2) Install the plate (6).
      ★ When installing the plate, align the notch provided at the external tooth section of the plate.
      ★ Matching the match marks having been provided on the discs and the inner gear and to the plates and the outer gear, install the plate and disc alternately.



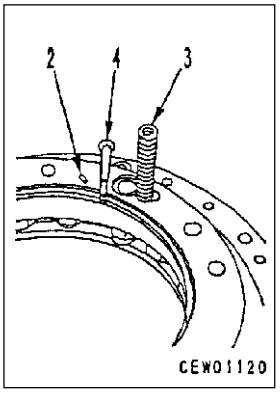
e. Cylinder assemblies (Replace them with the prepared new cylinder assemblies.)
   ★ Reassemble the cylinder assemblies following the procedures outlined below.
   1) Place the piston (5) down below.

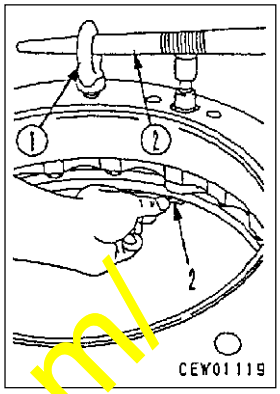


Part numbers of the cylinders:

Front, LH	425-33-21180
Rear, RH	425-33-21180
Front, RH	425-33-21170
Rear, LH	425-33-21170

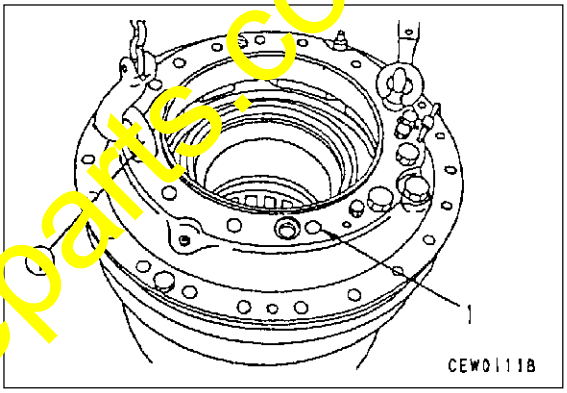
2) Install the shaft (4) and spring (3).
3) Screwing-in the ring bolt ① (16 mm, P = 2.0), push down the spring using a crowbar ② or a similar tool to push in to install the pin (2).





4) Setting the O-ring and using ring bolts ① (16 mm, P = 2.0), hoist to install the cylinder assembly (1) aligning the guide bolt ④.

⊕ kgm Mounting bolts:
18 ± 2.0 kgm {176.5 ± 19.6 Nm}
Ring bolts:
Apply adhesive (LT-2).



④ Installing the brake assembly (installing to the axle)

- Install the brake assembly in reverse of its removal procedure. (Refer to page 44.)

※1

kgm Brake tube:
68.6 ± 9.8 Nm {7.0 ± 1.0 kgm}

※2

Mounting bolts:
Apply adhesive (LT-2).

kgm Brake/wheel-hub mounting bolts:
548.8 ± 58.8 Nm {56.0 ± 6.0 kgm}

[3] Installation procedures for the axle assemblies
(Install the tires after finishing installations of the axle assemblies Refer to page 15.)

① Installing the front axle assembly
- Install the front axle assembly in reverse of its removal procedures.
(Refer to pages 15 and 16.)

※1
⊕ kgm Hub nut: 470.4 ± 49.0 Nm {48.0 ± 5.0 kgm}

※2
kgm Propeller shaft mounting bolts: 110.7 ± 12.7 Nm {11.3 ± 1.3 kgm}

※3
kgm Axle mounting bolts: 2,744.0 ± 294.0 Nm {280.8 ± 30.0 kgm}

② Installing the rear axle assembly
- Install the rear axle assembly in reverse of its removal procedures.
(Refer to pages 17 thru 19.)

※1
kgm Hub nut: 470.4 ± 49.0 Nm {48.0 ± 5.0 kgm}

※2
kgm Propeller shaft mounting bolt: 110.7 ± 12.7 Nm {11.3 ± 1.3 kgm}

※3
kgm Rear support mounting bolts: 1,568.0 ± 196.0 Nm {160.0 ± 20.0 kgm}

★ Wipe the bushing side adhering surface with cloth containing the primer for Loctite's PRISM adhesive.

Rear support side adhering surface:
Apply Loctite's instantaneous setting adhesive PRISM 411 (about 3 g).

★ Adhere the bushing within 5 minutes after applying the primer.
★ Do not mix the primer and the adhesive in advance when making the above adhesion work.
★ Pay attention to the direction of the lips of the packing when making this installation work.

Lip surfaces of the packing: Apply grease (G2-LI).

Mounting section of the rear axle: Apply grease (G2-LI).

※4
kgm Front support mounting bolts: 1,568.0 ± 196.0 Nm {160.0 ± 20.0 kgm}

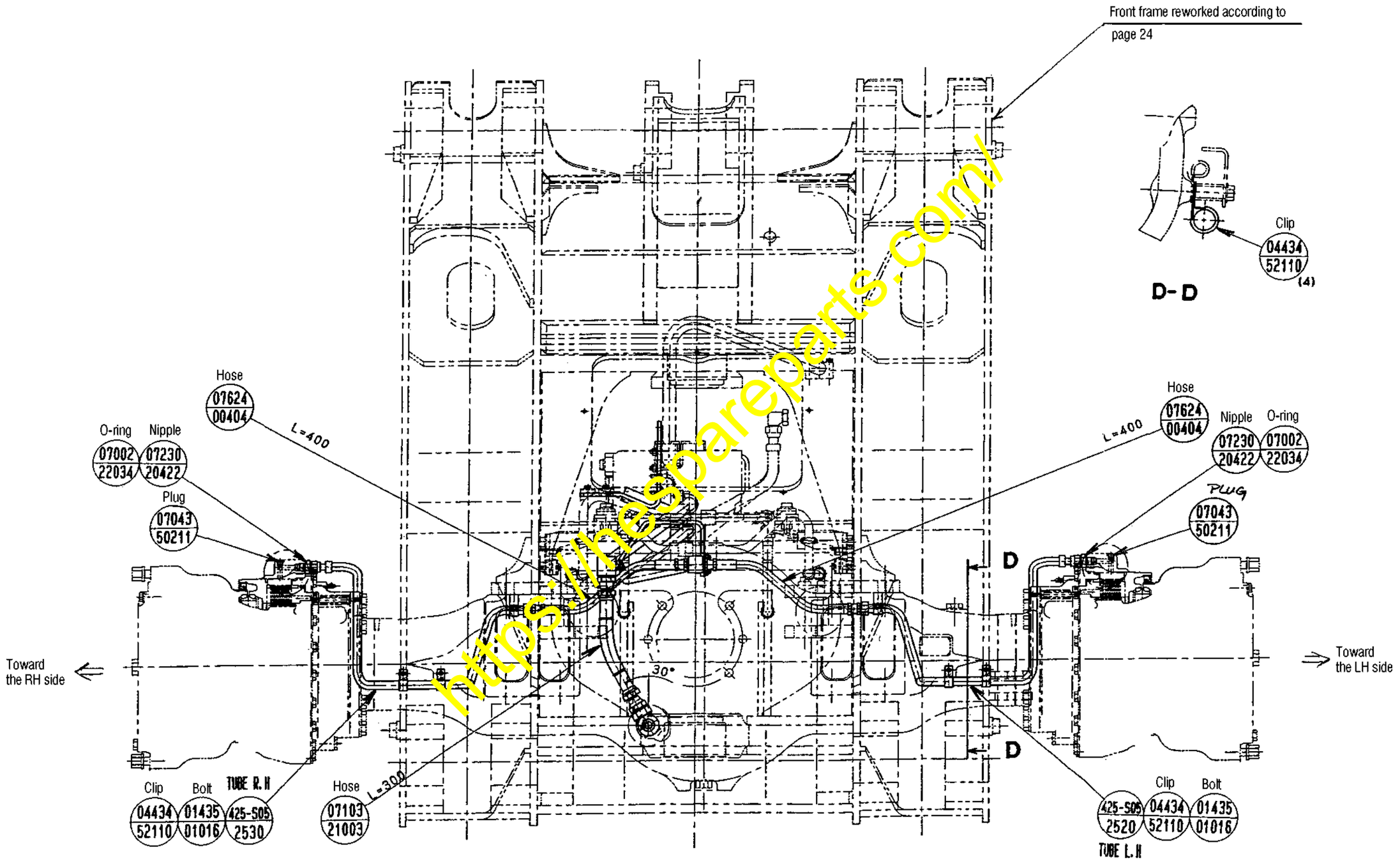
★ Apply the same primer to the bushing in the same way as with the bushing for the rear support.

Lip surfaces of the packing: Apply grease (G2-LI).

Mounting section of the front axle: Apply grease (G2-LI).

[4] Installation procedures for the cooler piping

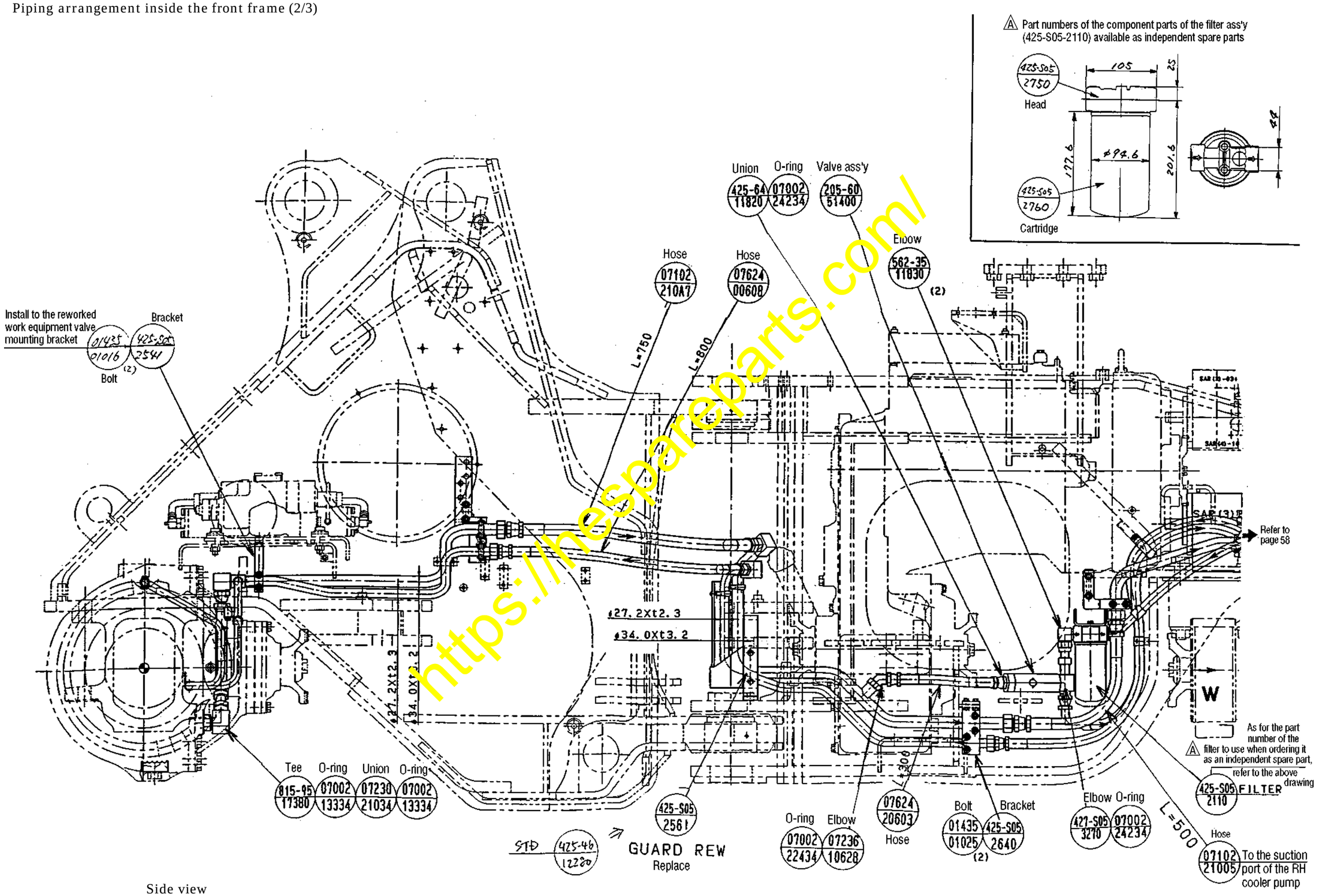
① Piping arrangement inside the front frame (1/3)



When viewed from the front side of the chassis

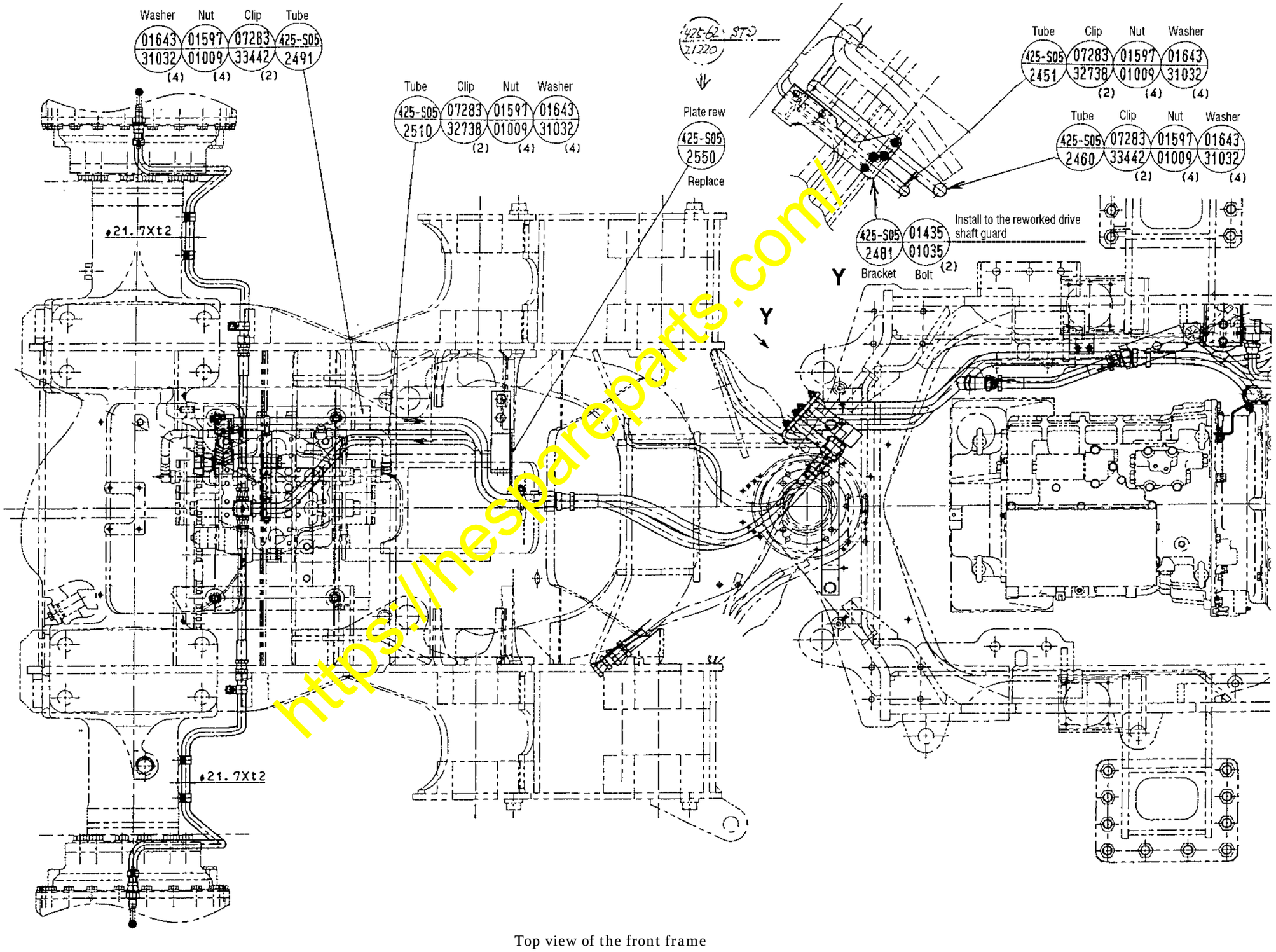
2 places, △

Piping arrangement inside the front frame (2/3)



Side view

Piping arrangement inside the front frame (3/3)



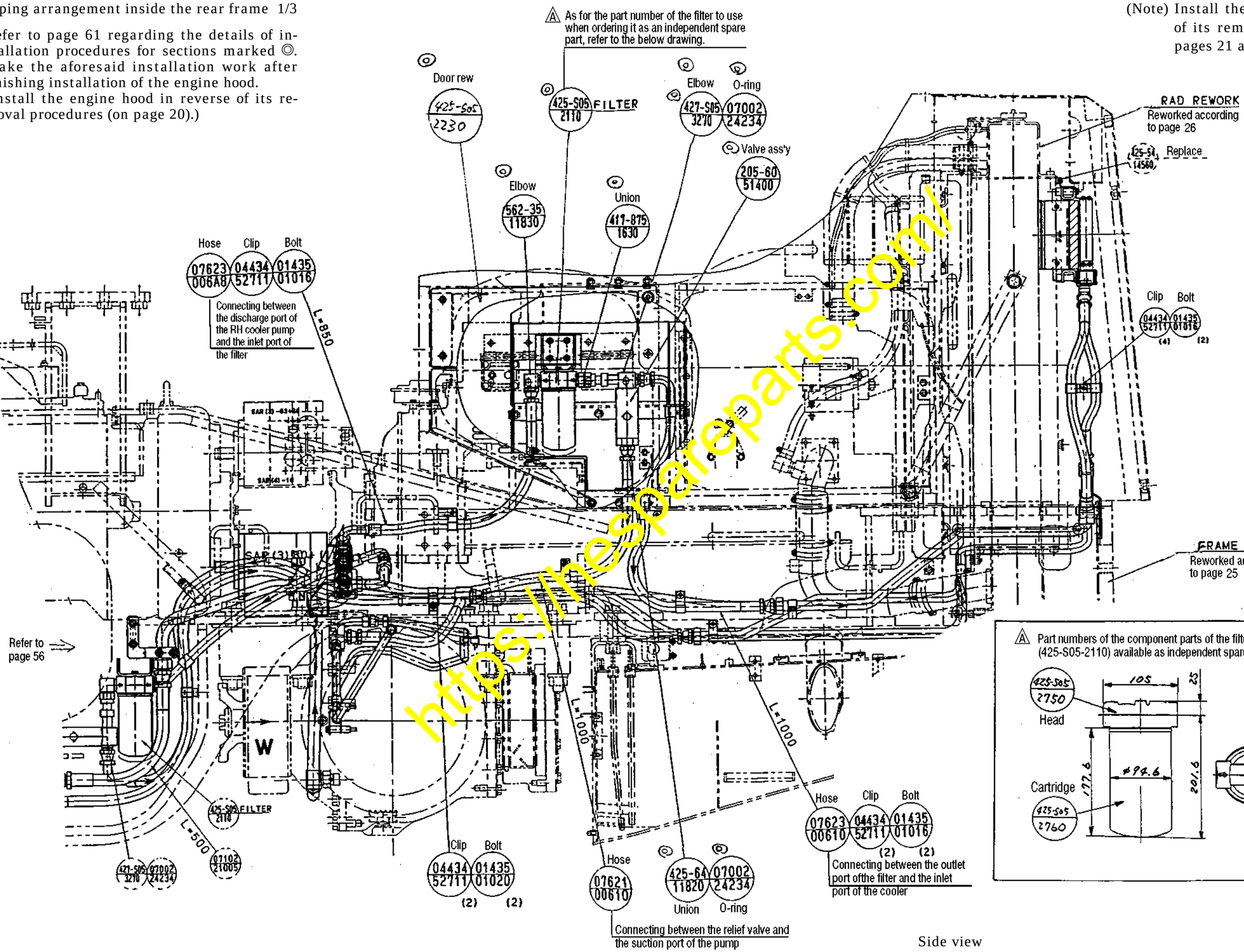
Top view of the front frame

2 places, Ⓐ

② Piping arrangement inside the rear frame 1/3

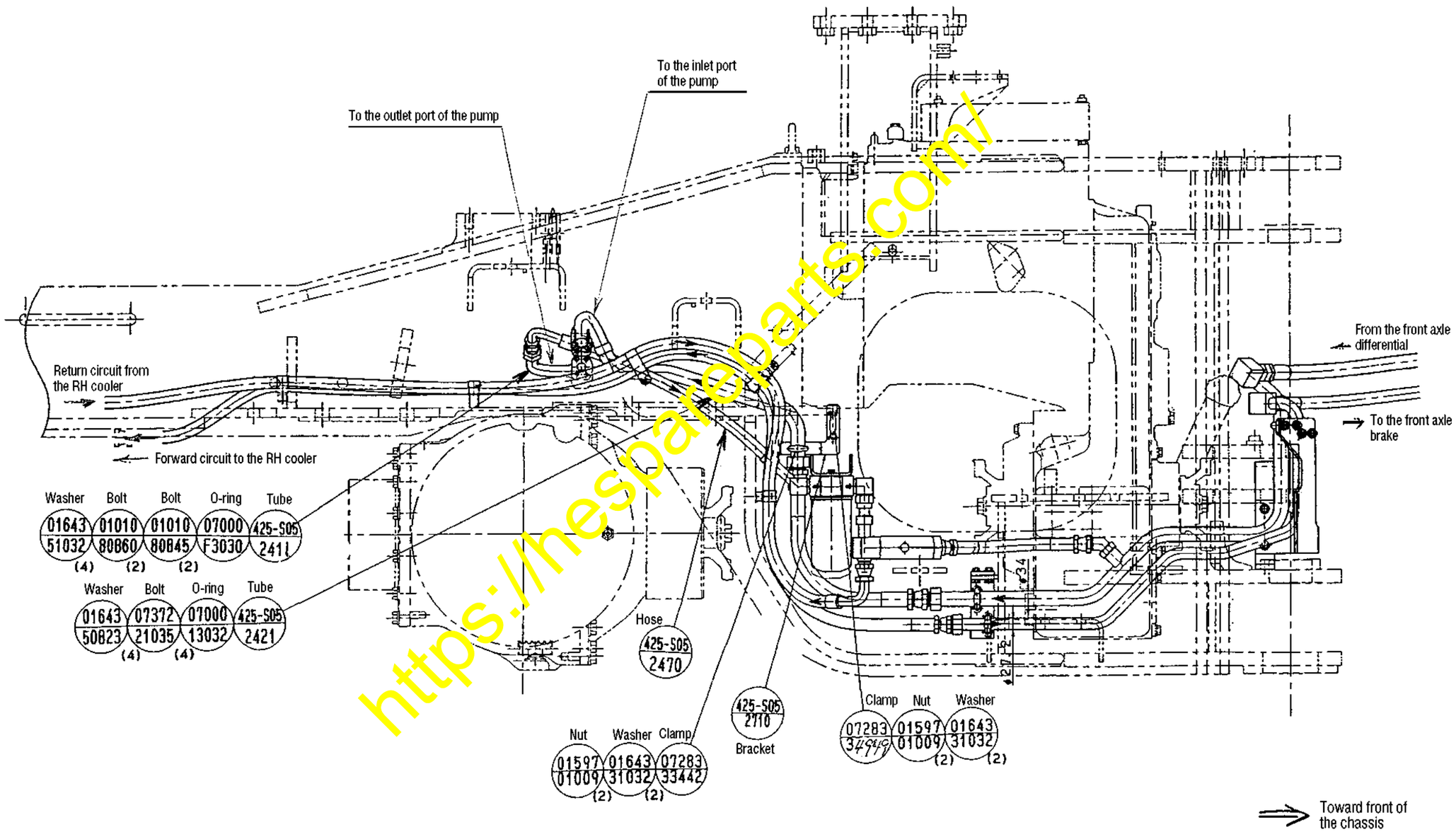
※ Refer to page 61 regarding the details of installation procedures for sections marked ◎. Make the aforesaid installation work after finishing installation of the engine hood. (Install the engine hood in reverse of its removal procedures (on page 20).)

(Note) Install the radiator in reverse of its removal procedures (on pages 21 and 22).



Side view

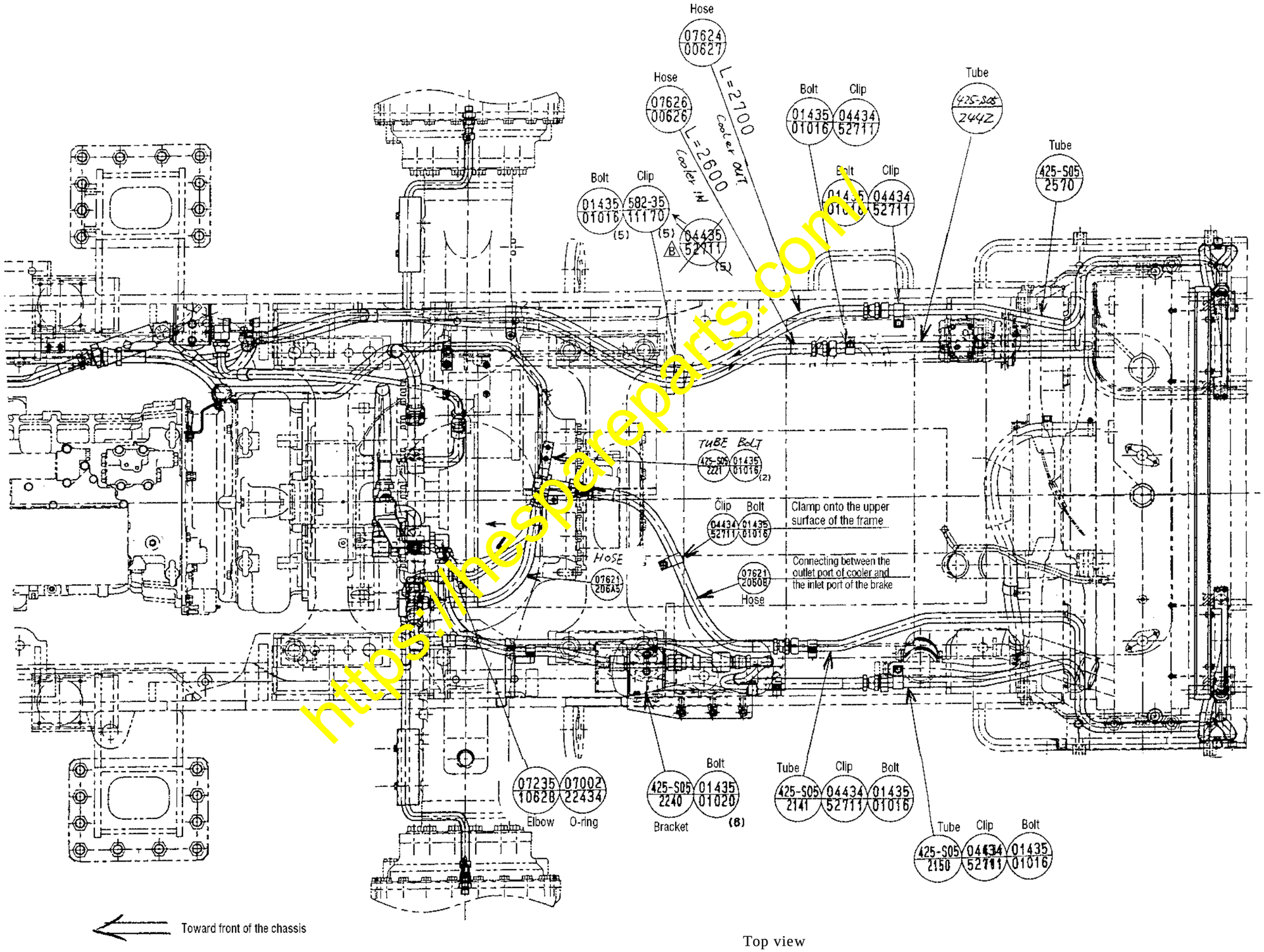
Piping arrangement inside the rear frame (RH side) 2/3



RH side of the machine body

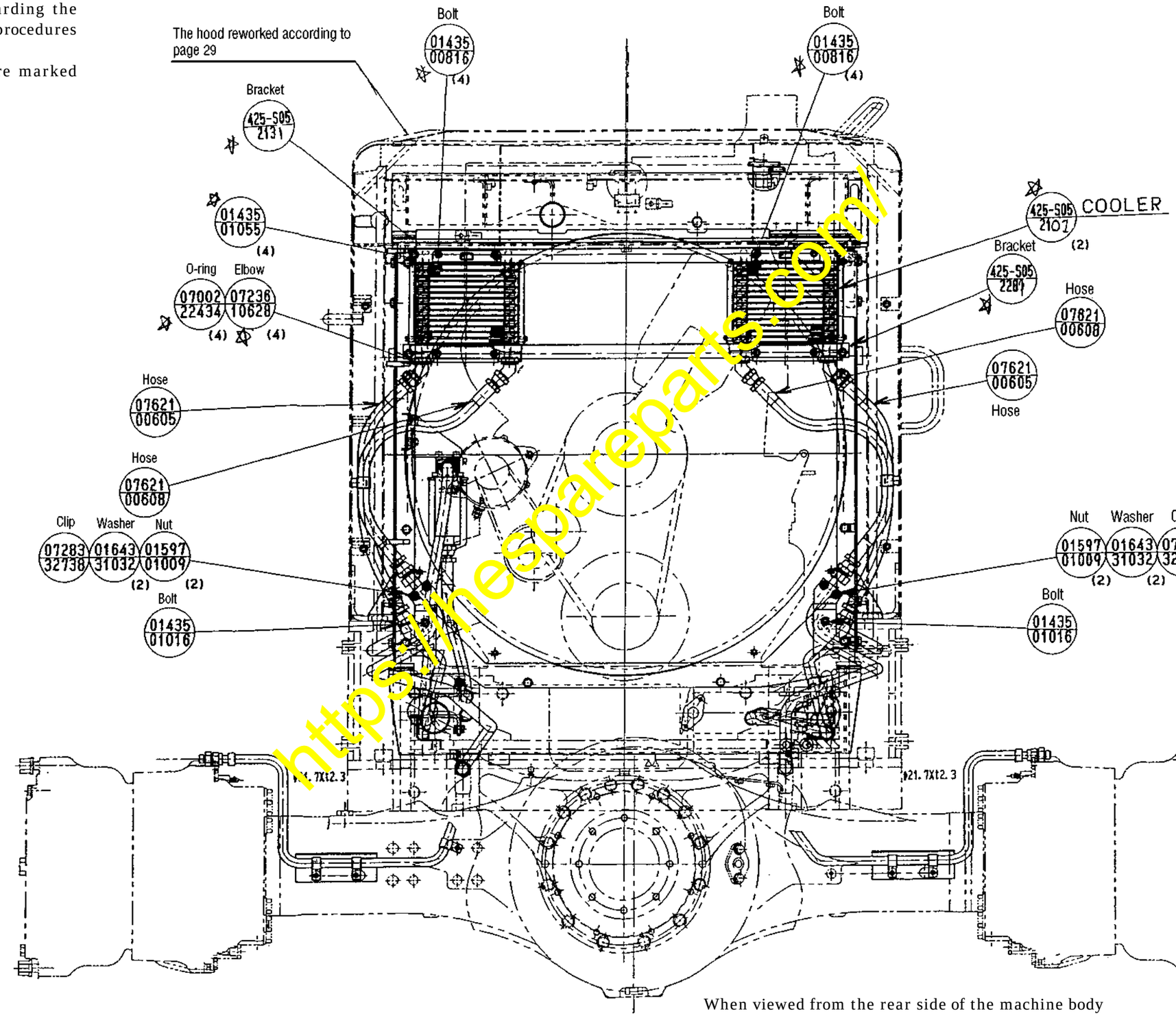
1 place, Ⓑ

Piping arrangement inside the rear frame 3/3



Top view

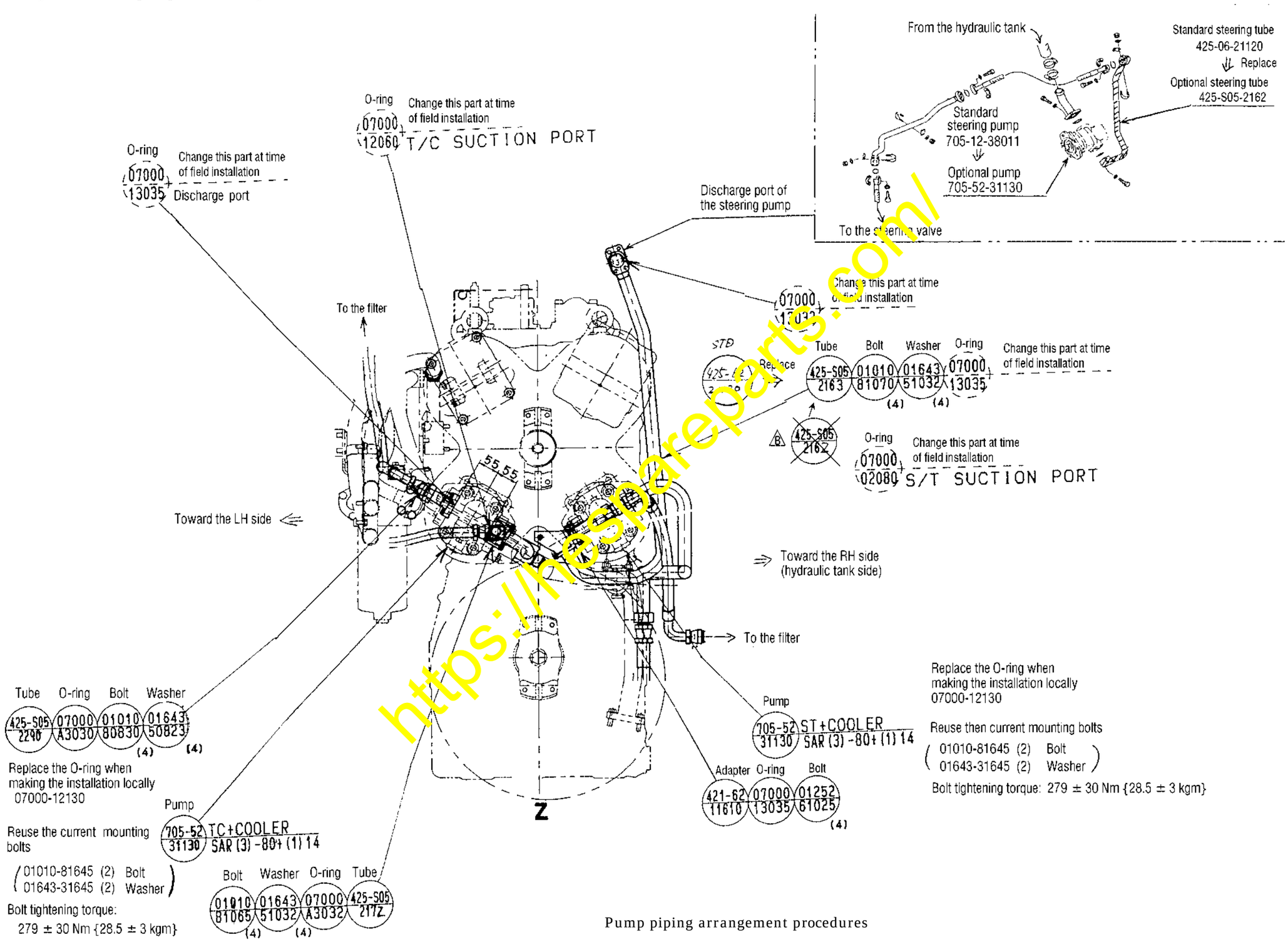
③ Brake cooler piping arrangement
Refer to page 60 regarding the details of installation procedures for the brake cooler.
(Those parts which are marked ☆ on this page)



When viewed from the rear side of the machine body

1 place, Ⓑ

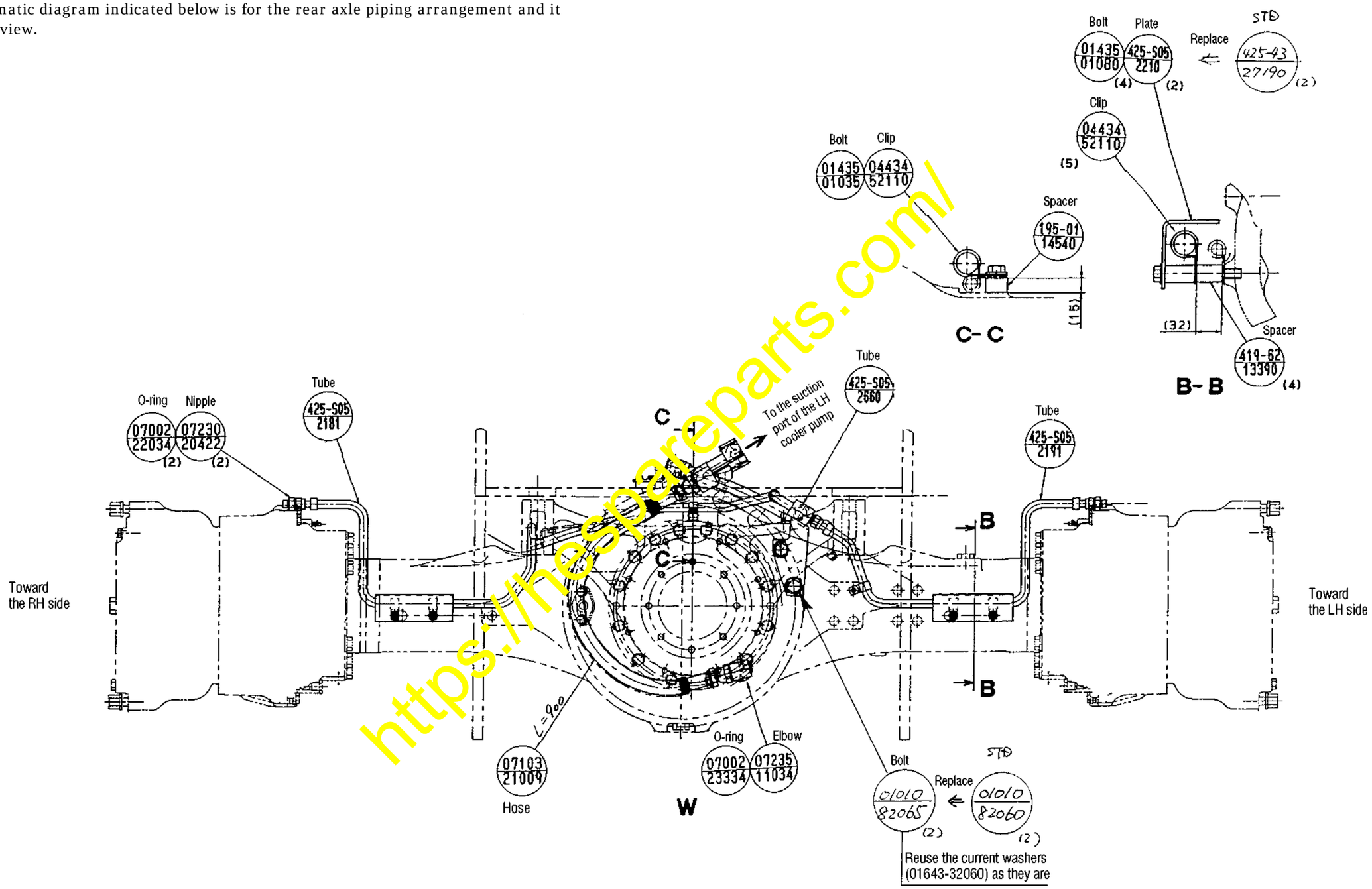
④ Piping arrangement to the pump and its neighborhood



Pump piping arrangement procedures

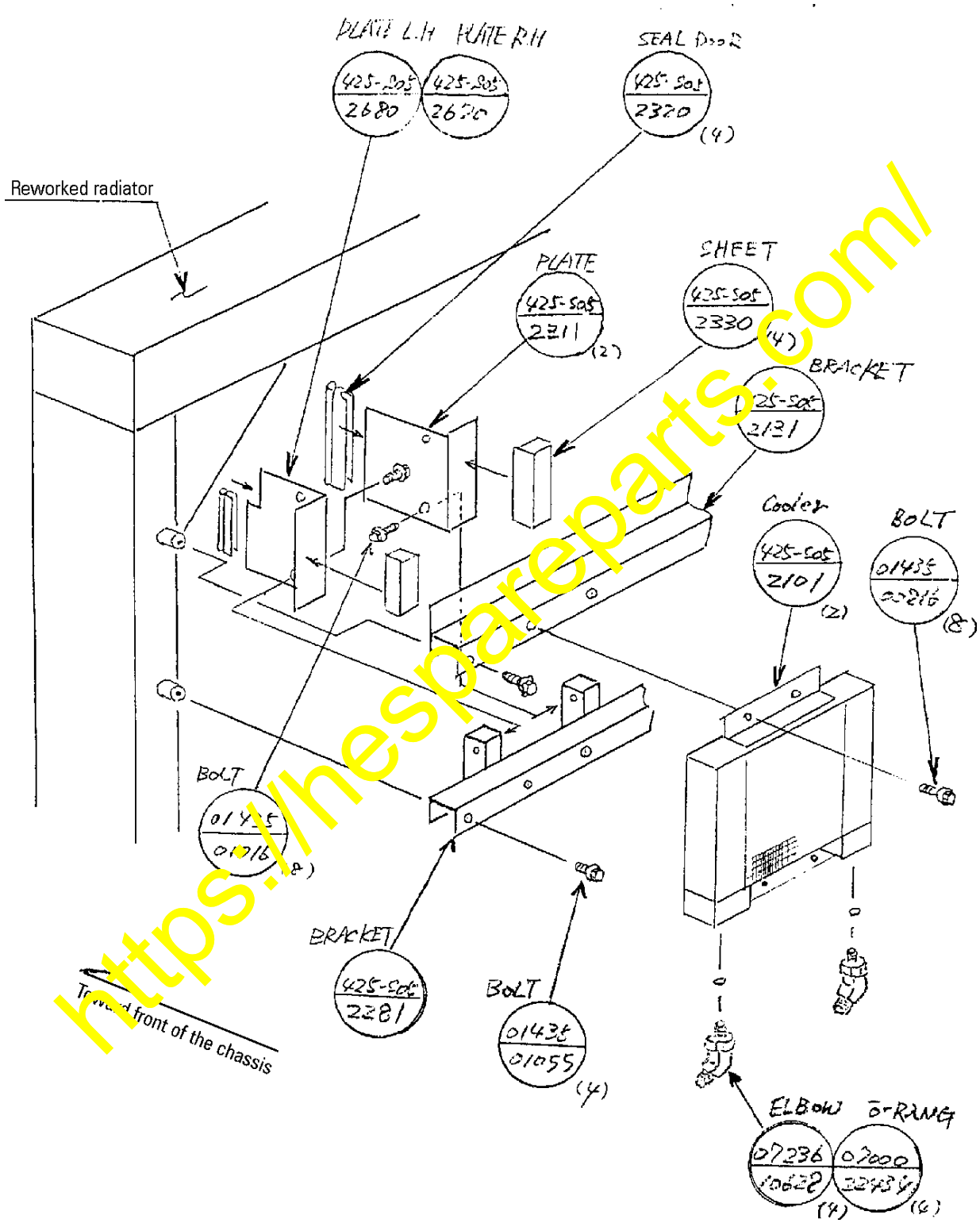
⑤ Rear axle piping arrangement

The schematic diagram indicated below is for the rear axle piping arrangement and it is a front view.

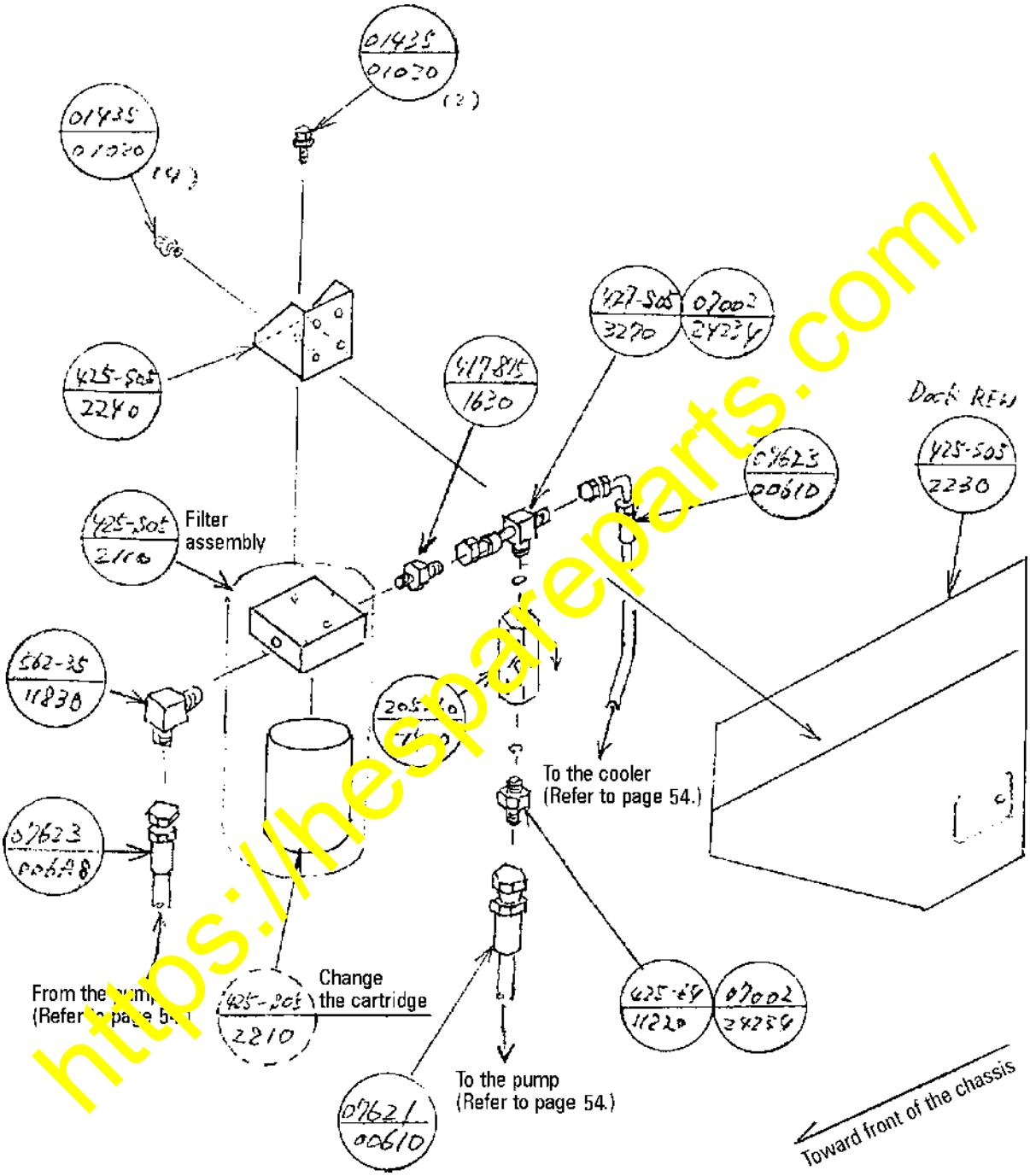


When the rear axle is viewed from the front side of the chassis

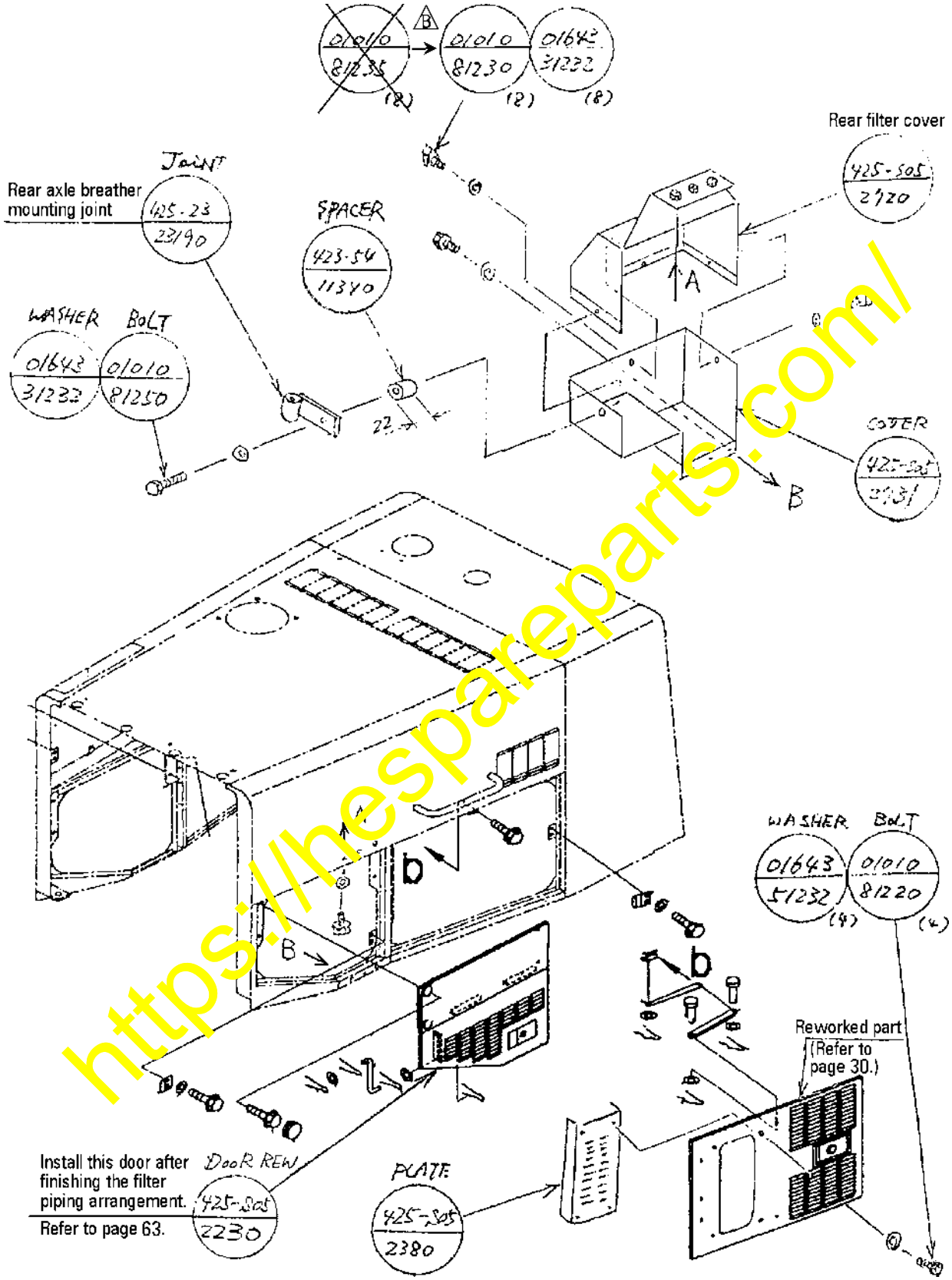
⑥ Installation of the cooler and the neighboring parts
The schematic diagram indicated below is for installation of the LH cooler on the LH side of the chassis. Install the RH side cooler in symmetry to the diagram below.



⑦ Installation of the filter inside the hood (on the LH side of the chassis)
The schematic diagram indicated below is for installation of the filter on the LH side of the chassis.



⑧ Installation of the external covers

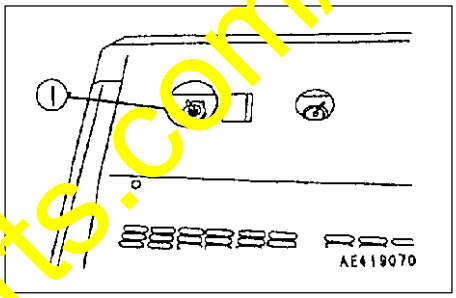


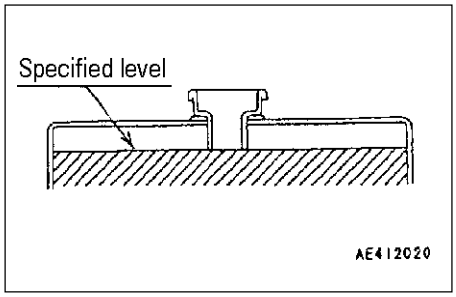
7. Refilling the oil and water
   Refill oil and water after completing the installation work.

   ① Refilling the radiator water

   a. After tightening the drain cock of the radiator, refill water through the water filler port ① upto the specified level.
   (Cooling water: Add KOMATSU's genuine Super-Coolant (AF-ALC).)
   Make sure the water is refilled upto the hatched level illustrated below.

   b. Refill the hydraulic oil and axle oil and start the engine to circulate the cooling water to check the level of the cooling water once again.



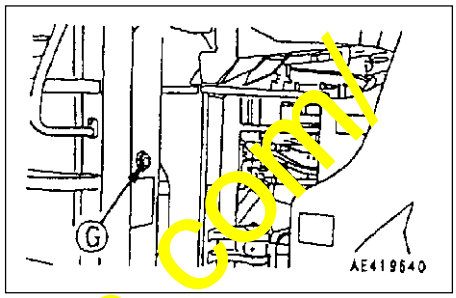


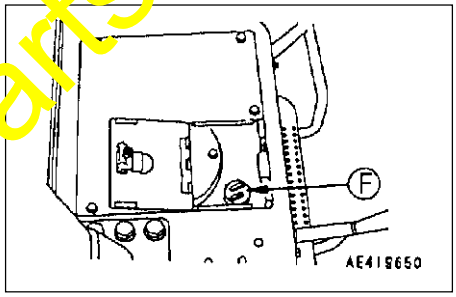
② Refilling the hydraulic oil

a. Open the inspection hole cover located above the step and refill the hydraulic oil through the oil filler port Ⓕ.
(Hydraulic oil: SAE10W CD)

b. The oil quantity is normal if the oil level comes between the Hi and Lo marks on the sight-gauge Ⓖ.

c. Start the engine to circulate the oil and bleed air following the procedures outlined below.

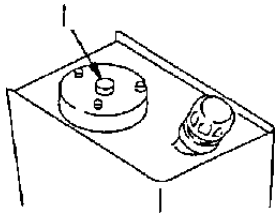




<Air bleeding procedures>

1. Start the engine and run it at the Lo-idling revolution.
2. Operating the work equipment control levers, activate the hydraulic cylinders to stop them at a point about 100 mm before respective stroke ends for 4 to 5 cycles.
3. After that, operate the steering, bucket and boom cylinders, respectively to their stroke ends for 3 to 4 cycles each and stop the engine to loosen the bleeder port plug (1) to bleed air from the hydraulic tank before tightening the plug (1) back to its original state.
4. Then raise the revolution rate of the engine to follow the procedures according to the above Paragraph 3) to bleed air and repeat these procedures until the air does not at all comes out of the bleeder port.
5. After completing the aforementioned air bleeding work, control the engine revolution to normal operation level.

d. After finishing the air bleeding work, check the oil level once again and whenever it is found in short, refill the oil.

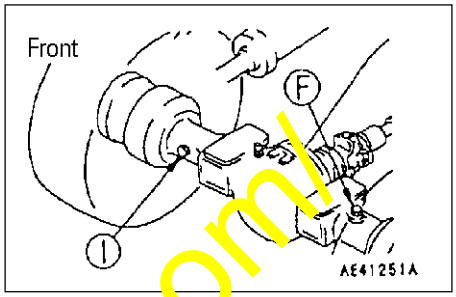


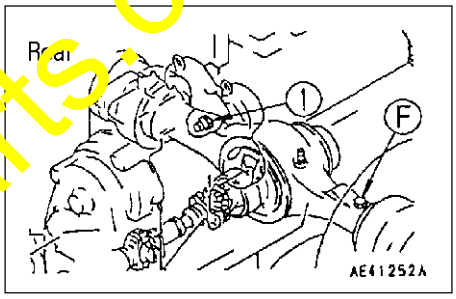
③ Refilling the axle oil

a. Remove the plug ①.

b. Refill the axle oil through the oil filler port Ⓕ.
(Axle oil: AX075S)

c. When the oil level comes up near the lower edge of the plugged hole, tighten the plug ①.
(Plug tightening torque:
152 ± 24.5 Nm {15.5 ± 2.5 kgfm}





d. Start the engine (to run it at the Low idling revolution) to circulate the oil through the brake lines.

(Precaution) Start the engine only after refilling the hydraulic oil and radiator cooling water.

e. Refill the oil once again to make sure the oil level is normal.

8. Brake cooling circuit diagram