


INSTALLATION MANUAL

REF NO.	BT98011C
DATE	Apr. 10, 2002

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This INSTALLATION MANUAL supersedes the previous issue No. BT98011B dated Mar. 23, 1999, which should be discarded.

SUBJECT: INTRODUCTION OF AUTO RETARDER ON HD465-5/HD605-5 (OPTION) 


PURPOSE: To introduce a new, optional auto retarder for installation on HD465-5 and HD605-5 dump trucks. 

APPLICATION: HD465-5 Dump Trucks, Serial Nos. 4407 and up
 HD605-5 Dump Trucks, Serial Nos. 1001 and up

FAILURE CODE: 452F99

DESCRIPTION:

1-1. Introduction

 This Installation Manual will introduce a new, optional auto retarder to control the travel speed of the HD465-5 and HD605-5 dump truck, when the vehicle is going downhill. The travel speed can be preset by the operator. When installing this optional system, follow the procedures outlined in this Installation Manual.


Meanwhile, with those vehicles which are not equipped with the auto suspension controller or the payload meters, it becomes necessary to install pressure sensors to the rear suspension. In such a case, install the parts coded "96 through 101" indicated in the lists of necessary parts referring to the previously issued Installation Manual B940005.

- When installing the auto retarder, we recommend that you install the air drier (to prevent deterioration of the pneumatic equipment and parts being caused by moisture and oil).










If the vehicle is not equipped with the air drier, install it referring to the previously issued Service News B940013A "Introduction of the air drier".




- The auto retarder cannot be installed to vehicles carrying the ABS system or the ABS + ASR system.








1-2. Revised places:




4 places 	Apr. 10, 2002	Added HD605-5 and reviewed the contents.
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2. List of parts







No.	Part No.	Part Name	Q'ty	Remarks
1	 7818-91-2001 7818-91-2000	Controller	1	
2	 01435-00820 01010-80820	Bolt	4	
 3	01643-30823	Washer	4	
4	 566-88-6H351 566-88-6H350	Wiring harness	1	Refer to page 5.  HD465 #4626 – HD605 #1013 –
5	566-88-6H130	Switch	1	
6	566-88-6H222	Bracket	1	
7	01023-70614	Screw	3	
8	01023-70620	Screw	2	
9	566-88-6H181	Bracket	1	
10	566-88-6H231	Screw	4	
11	566-88-6H150	Display	1	
12	566-88-6H210	Bracket	1	
13	01023-20306	Screw	4	
14	566-88-6H160	Lamp, green	1	
15	566-88-6H170	Lamp, red	1	
16	566-88-6H140	Switch	1	
17	569-88-61850	Bracket	1	
18	569-06-61960	Replay	2	
19	569-06-61970	Replay	1	
20	569-06-61180	Bracket	1	
21	01023-20616	Screw	2	
22	561-88-66890	Bracket	1	
23	01435-01025	Bolt	4	
24	 04434-32216 04434-52216	Clip	1	
25	01435-01016	Bolt	1	
26	08020-10000	Diode	3	
27	561-86-67950	Resister	1	
28	600-842-2060	Resister	1	
29	569-88-61810	Bracket	1	
30	01010-81020	Bolt	4	
31	01643-31032	Washer	4	
32	 411-44-11470 07325-10400	 Tee Nipple	1	
 33	07324-10400	Elbow	1	

No.	Part No.	Part Name	Q'ty	Remarks
 34	411-44-11860	Nipple	1	
35	07822-00805	Tube	1	
36	 566-88-6H261 566-88-6H260	Valve	1	
37	01010-80875	Bolt	2	
38	01643-30823	Washer	2	
39	281-35-19540	Elbow	1	
40	07834-00613	Elbow	2	
41	07832-00614	Nut	2	
42	07831-00612	Sleeve	2	
43	07822-00605	Tube	1	
44	569-06-61810	Switch	2	
45	07042-70211	Plug	1	
46	07836-00613	Connector	2	
47	07831-00612	Sleeve	2	
48	07832-00614	Nut	2	
49	07822-00604	Tube	1	
50	561-88-65510	Valve	1	
51	01010-80865	Bolt	2	
52	01643-30823	Washer	2	
53	07834-00613	Elbow	2	
54	07831-00612	Sleeve	2	
55	07832-00614	Nut	2	
56	 07325-30300 07325-10300	Nipple	1	
57	281-34-12300	Check valve	1	
58	07834-00613	Elbow	2	
59	07832-00614	Nut	2	
60	07831-00612	Sleeve	2	
61	07822-00671	Tube	1	
62	07837-00614	Union	1	
63	07831-00612	Sleeve	2	
64	07832-00614	Nut	2	
65	07822-00605	Tube	1	
66	569-88-61830	Wiring harness	1	
67	08036-01214	Clip	1	
68	08053-01510	Clip	2	
69	01010-81020	Bolt	2	

No.	Part No.	Part Name	Q'ty	Remarks.
70	01643-31032	Washer	2	
71	569-88-61820	Cover	1	
72	01010-81025	Bolt	2	
73	01643-31032	Washer	2	
74	08036-02514	Clip	14	
75	565-04-11420	Spiral tube	3	
76	281-40-13480	Spiral tube	1	
77	08034-20519	Band	10	
78	561-88-66880  561-88-66882	Bracket	1	
79	561-86-6L310  561-86-6L311	Seat	1	
80	561-86-6L320	Bracket	1	
81	01010-80820	Bolt	4	
82	01643-30823	Washer	4	
83	04205-11232	Pin	2	
84	01641-21223	Washer	2	
85	04050-13022	Pin, cotter	2	
86	01010-81035	Bolt	2	
87	01580-11008	Nut	2	
88	09450-00000	Catch	2	
89	09450-00002	Pin	2	
90	04050-11610	Pin, cotter	2	
91	01010-81225	Bolt	4	
92	01643-31232	Washer	4	
93	566-88-6H270  566-88-6H271	Plate	1	 Refer to page 5.
94	566-88-6H281	Plate	1	
95	566-88-6H291	Plate	1	Nameplate in English
96	561-82-1620	Sensor	2	Refer to page 5.  HD465-5 #4626 – HD605-5 #1013 –
97	01010-51016  01010-81016	Bolt	2	
98	01643-31032	Washer	2	
99	08053-01512	Clip	2	
100	561-86-67700	Valve	2	Refer to page 5.  HD465-5 #4626 – HD605-5 #1013 –
101	561-50-63191	Grommet	2	
103	01573-20206	Seat	2	Rarts to be installed by welding

No.	Part No.	Part Name	Q'ty	Remarks.
4	566-88-6H110	Wiring harness	1	}  HD465-5 #4407 – #4625 HD605-5 #1001 – #1012
96	7861-92-1530	Sensor	2	
100	561-86-67500	Valve	2	
102	561-86-67950	Resistor	2	
104	421-06-11960	Resistor	1	
 93	566-88-6H380	Plate	1	} For MPH display
 105	561-87-61340	Connector	1	

When ordering these parts through the sales channel:

Sales code	Unit No.	Serial numbers of the applicable vehicles
6HC34-B	X23-109-1740	 HD465-5 #4407 – #4625  HD605-5 #1001 – #1012
6HC34-D  (km display)	X23-109-1741	 HD465-5 #4626 and up  HD605-5 #1013 and up
 6HC34A-D (MPH display)	X25-033-8130	

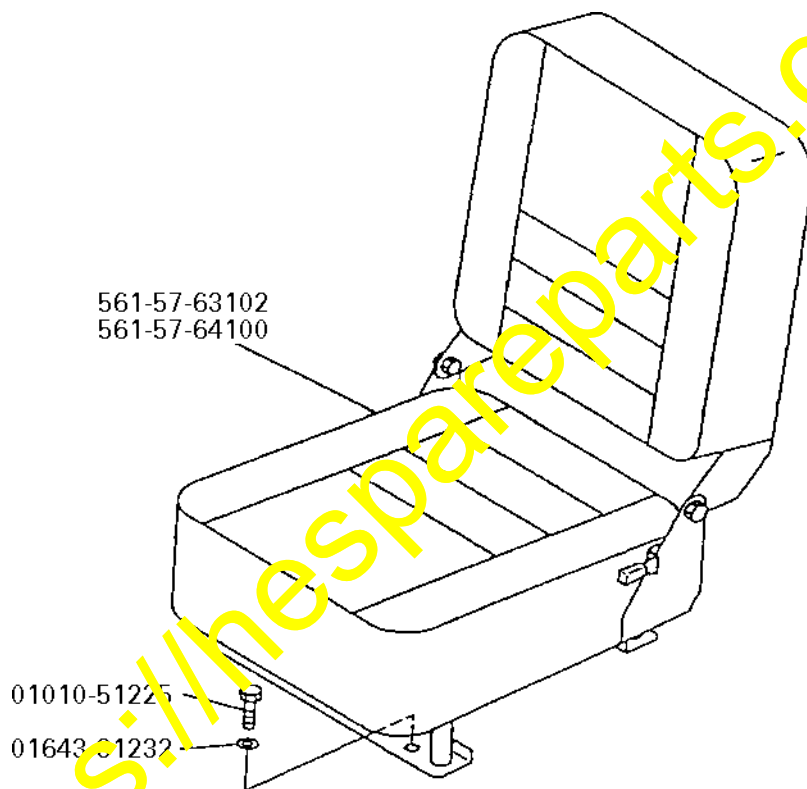
3. Installation procedures

3.1 Preparations

3.1.1 Removing parts

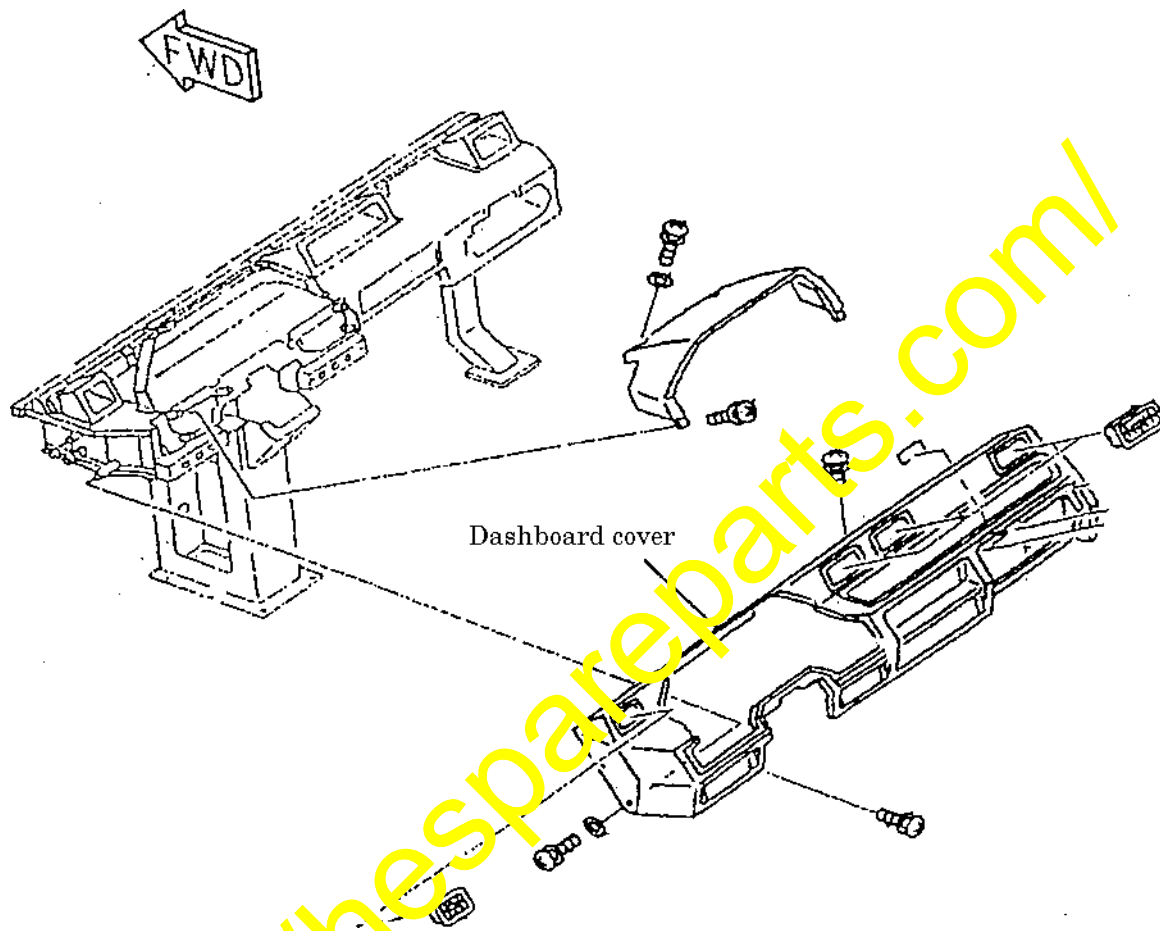
Removing the assistant operator's seat

Remove the assistant operator's seat, it will not be reused.



Removing the dashboard cover

This dashboard cover is reused after removal making the rework according to Section 3.2.1. of this Installation Manual.

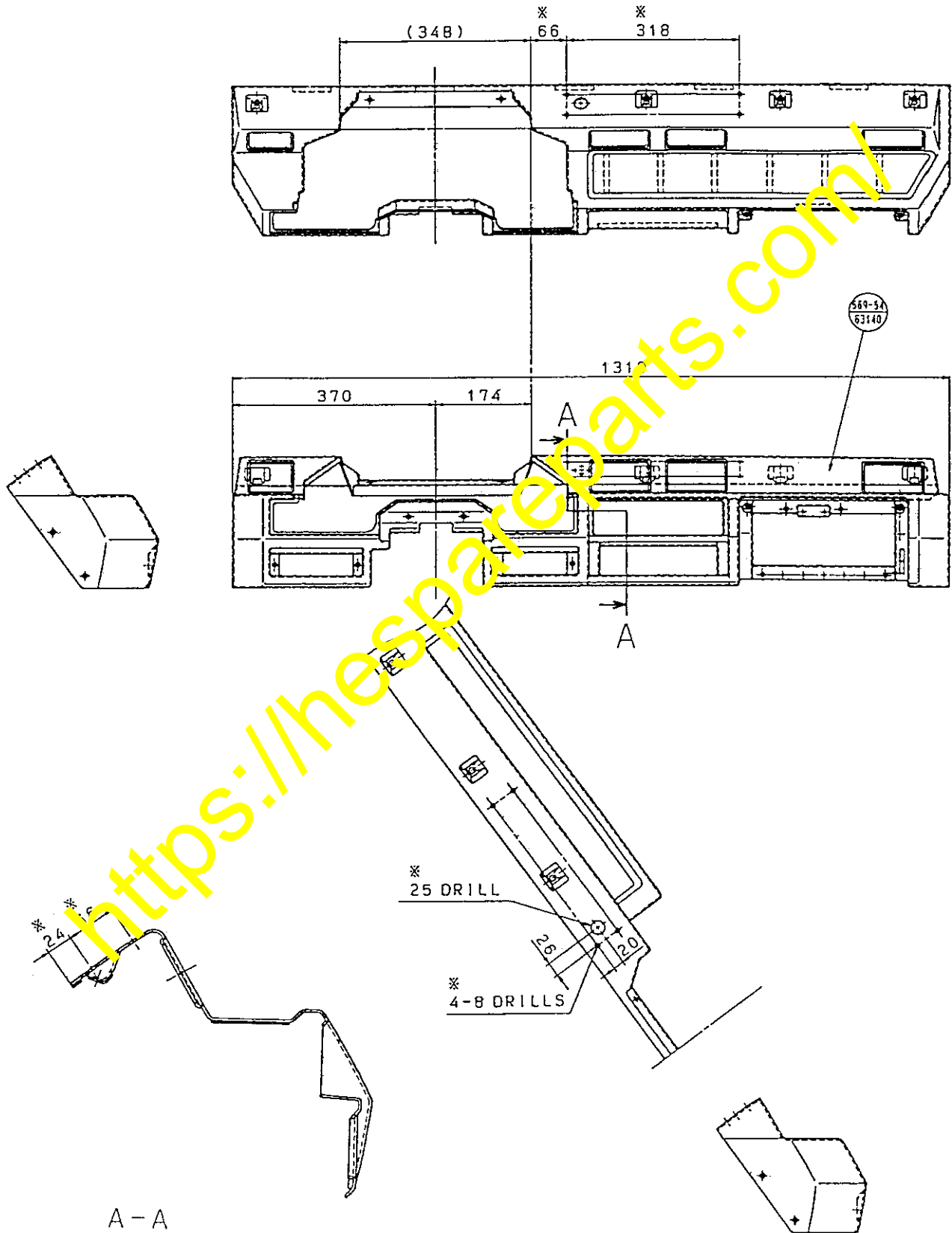


Also, remove the center console, floor mat etc. as needed when arranging the supplementary harness.

3.2 Reworking

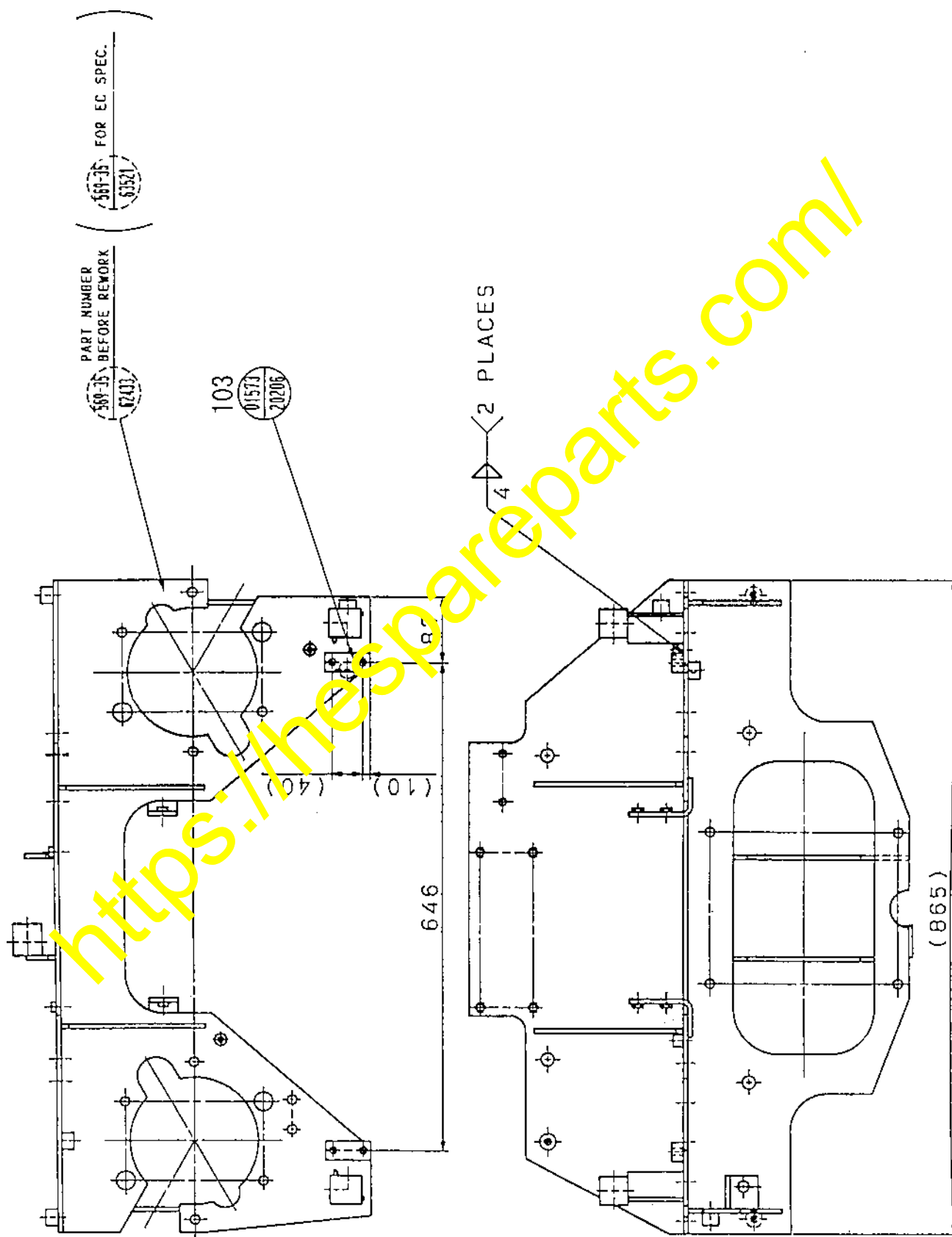
3.2.1 Reworking with the dashboard cover

Supplement drilled holes marked ※ in the schematic diagrams given below (4 - $\phi 8$ drilled holes and a $\phi 25$ drilled hole) in the dashboard 569-54-63140.

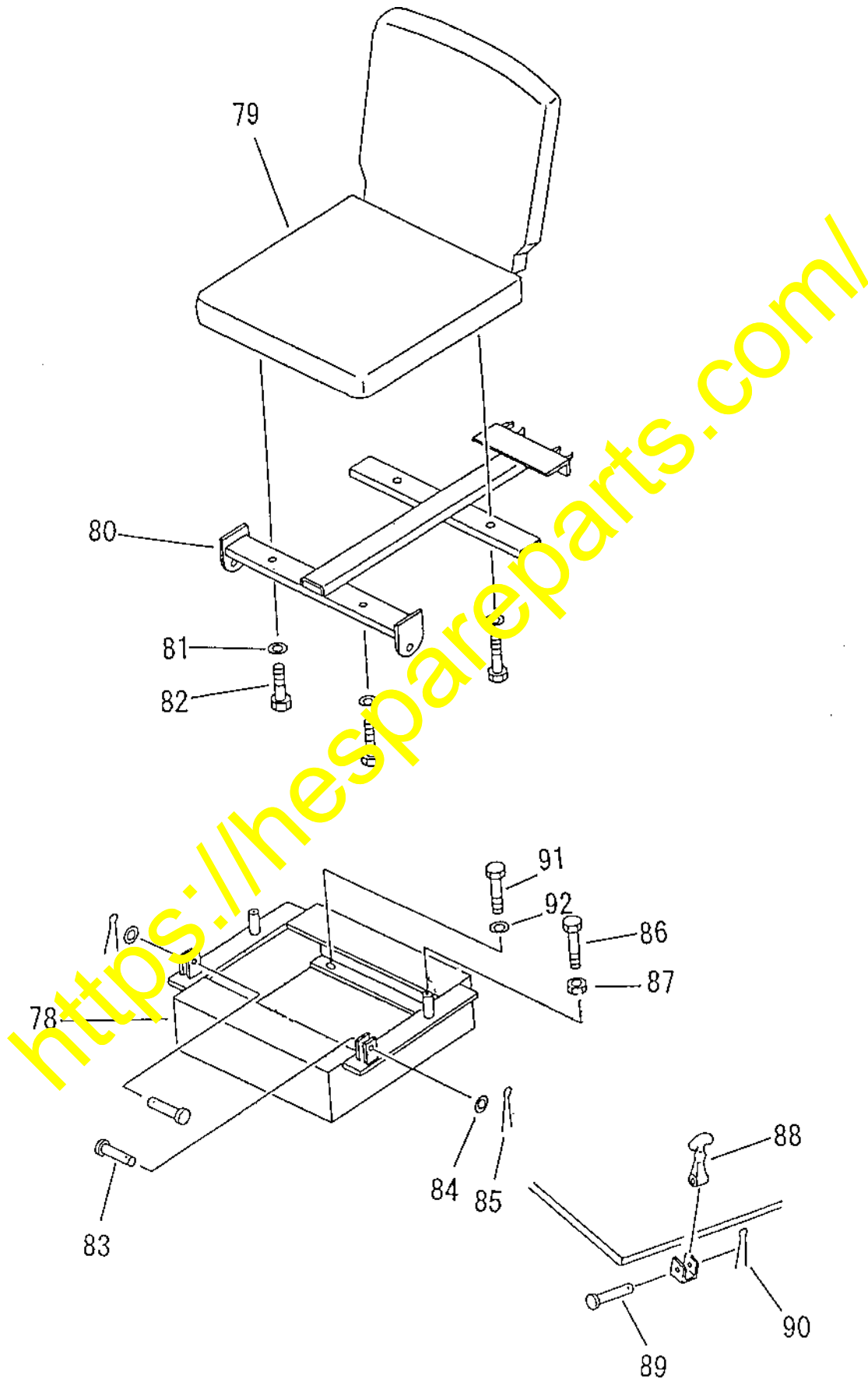


3.2.2 Reworking with the rear brake chamber bracket (569-35-62432)

Weld the seat 01573-20206 according to the designations given in the schematic diagram given below.

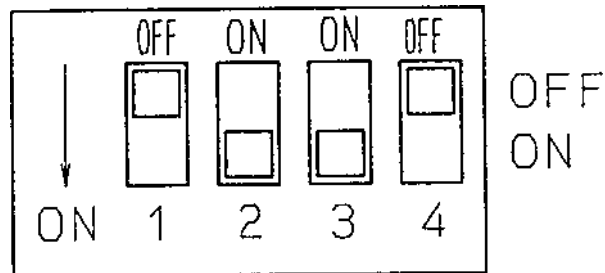


3.2.3 Sub-assembling the assistant operator's seat which also functions as the controller bracket



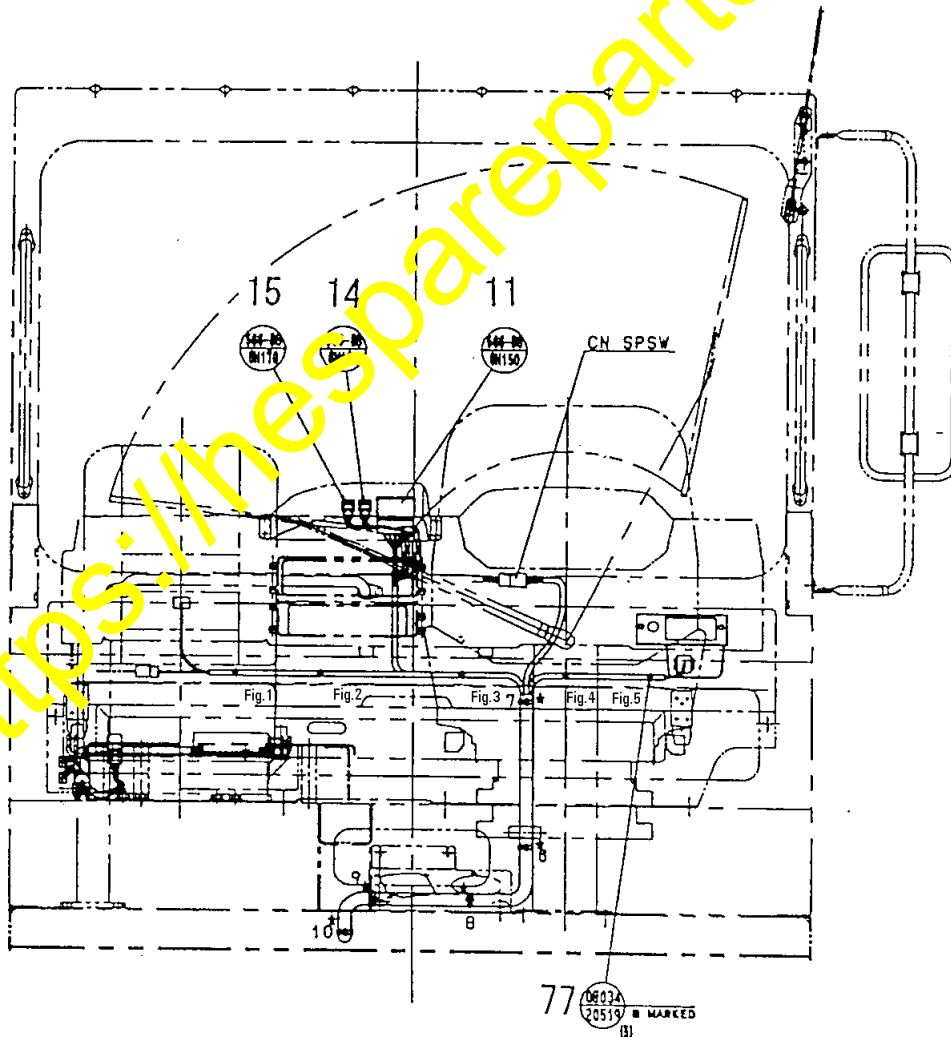
3.2.4 Setting the speed indicator

Set the dip switches of the speed indicator (Display 566-88-6H150) according to the designations given in the schematic diagram below.

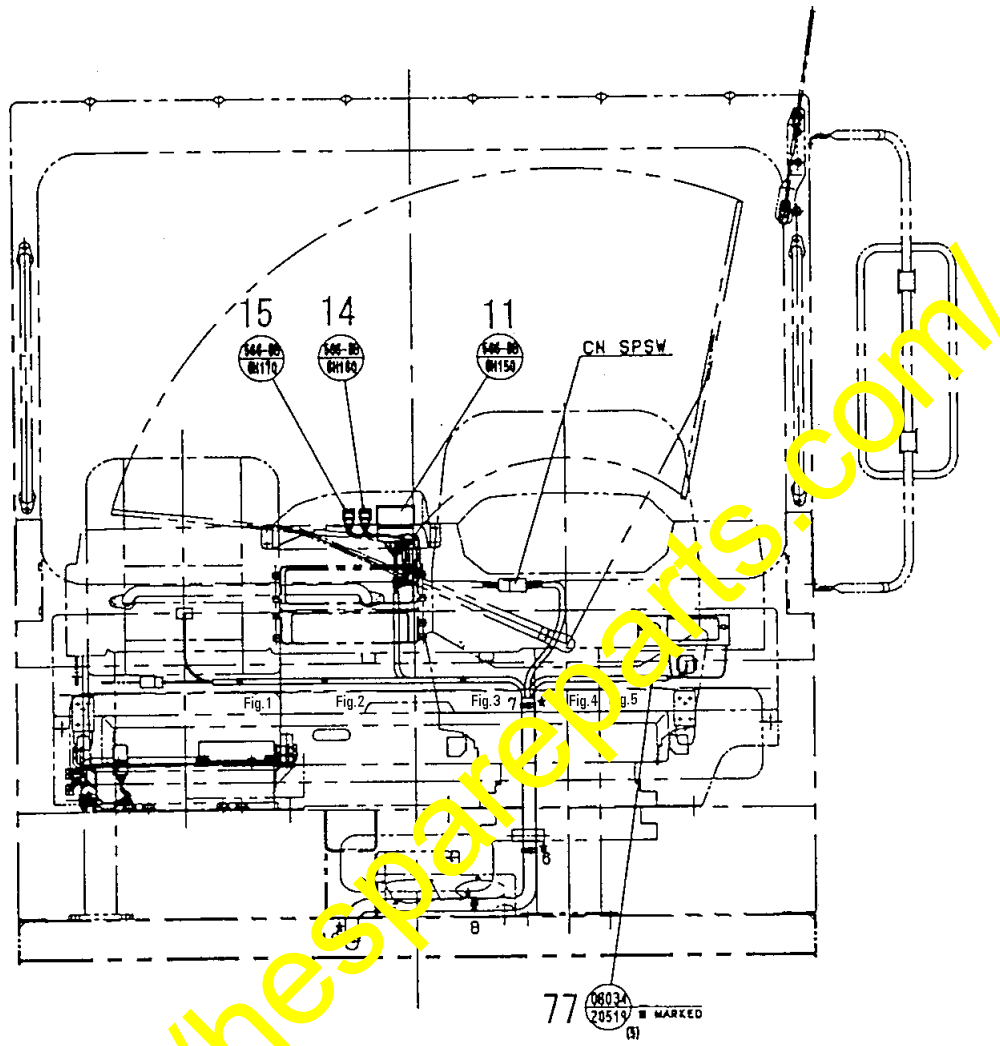


3.3 Assemblies and installations

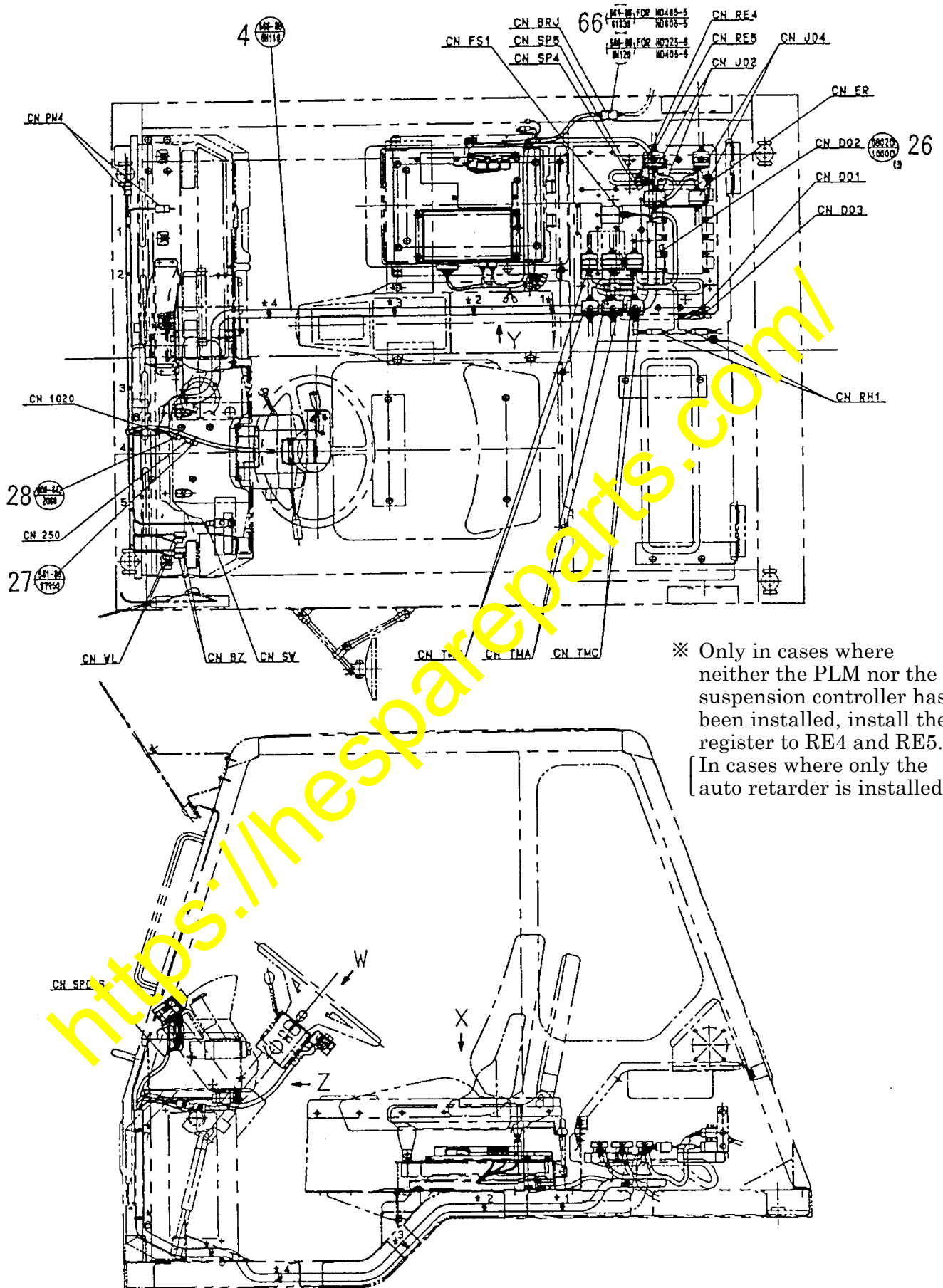
3.3.1 Installations to be made inside the operator's cab



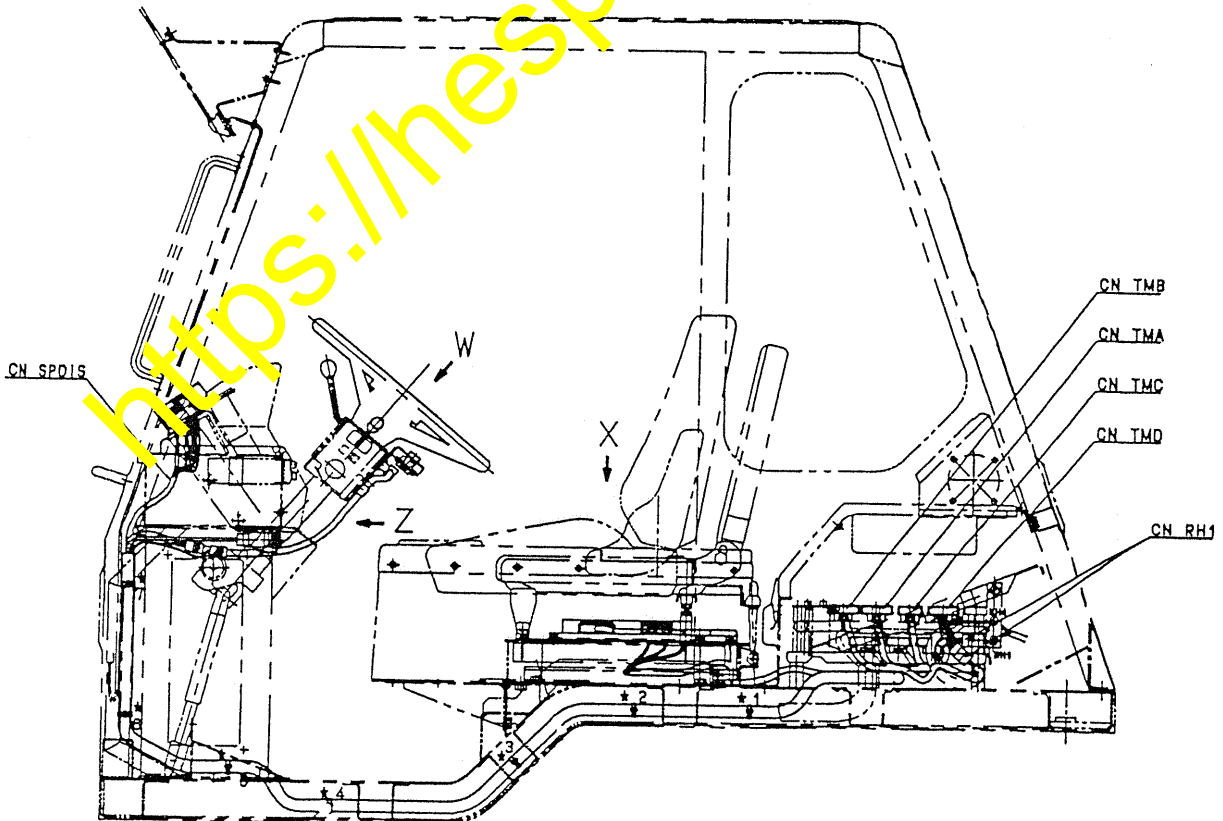
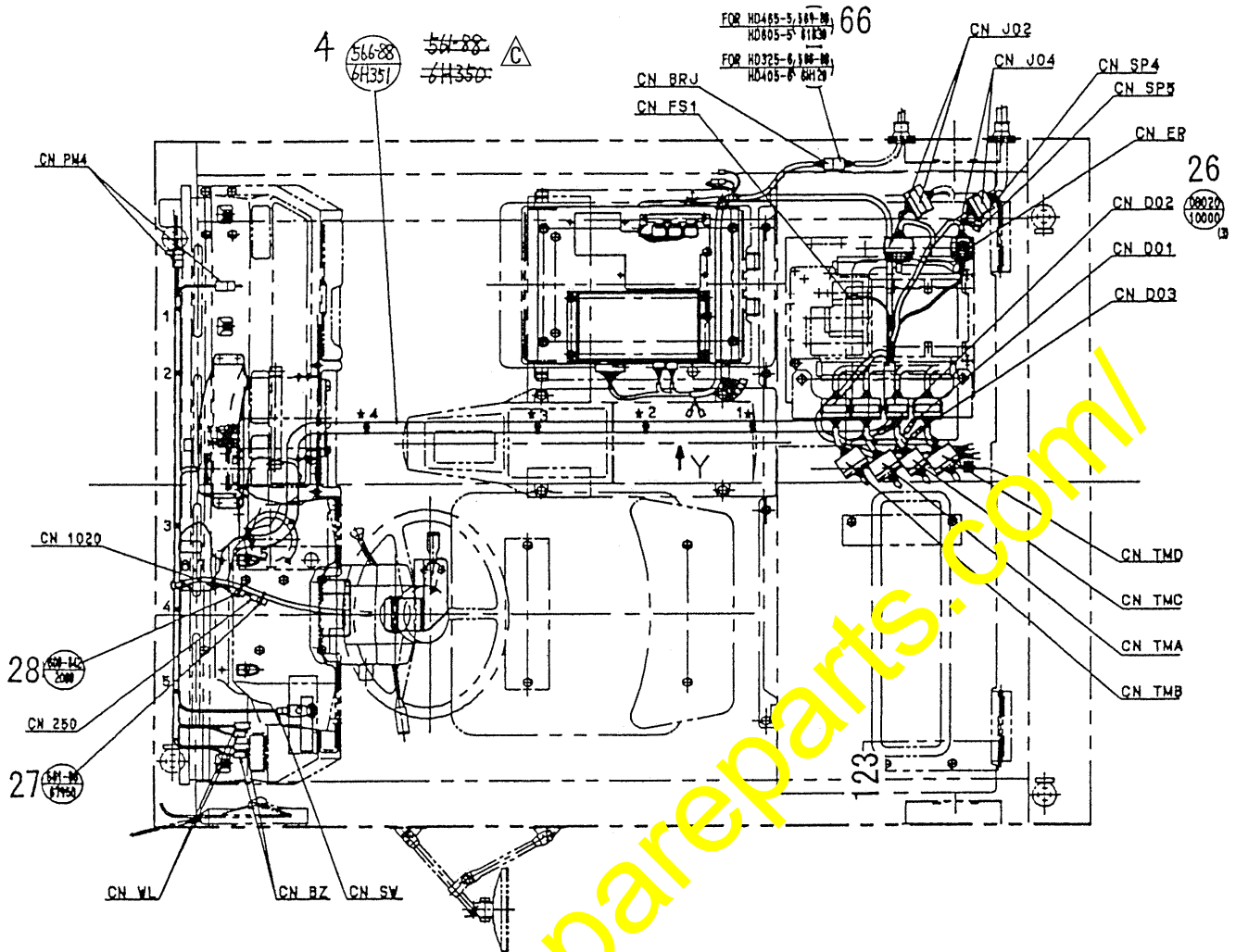
Front view (#4407 ~ #4625)



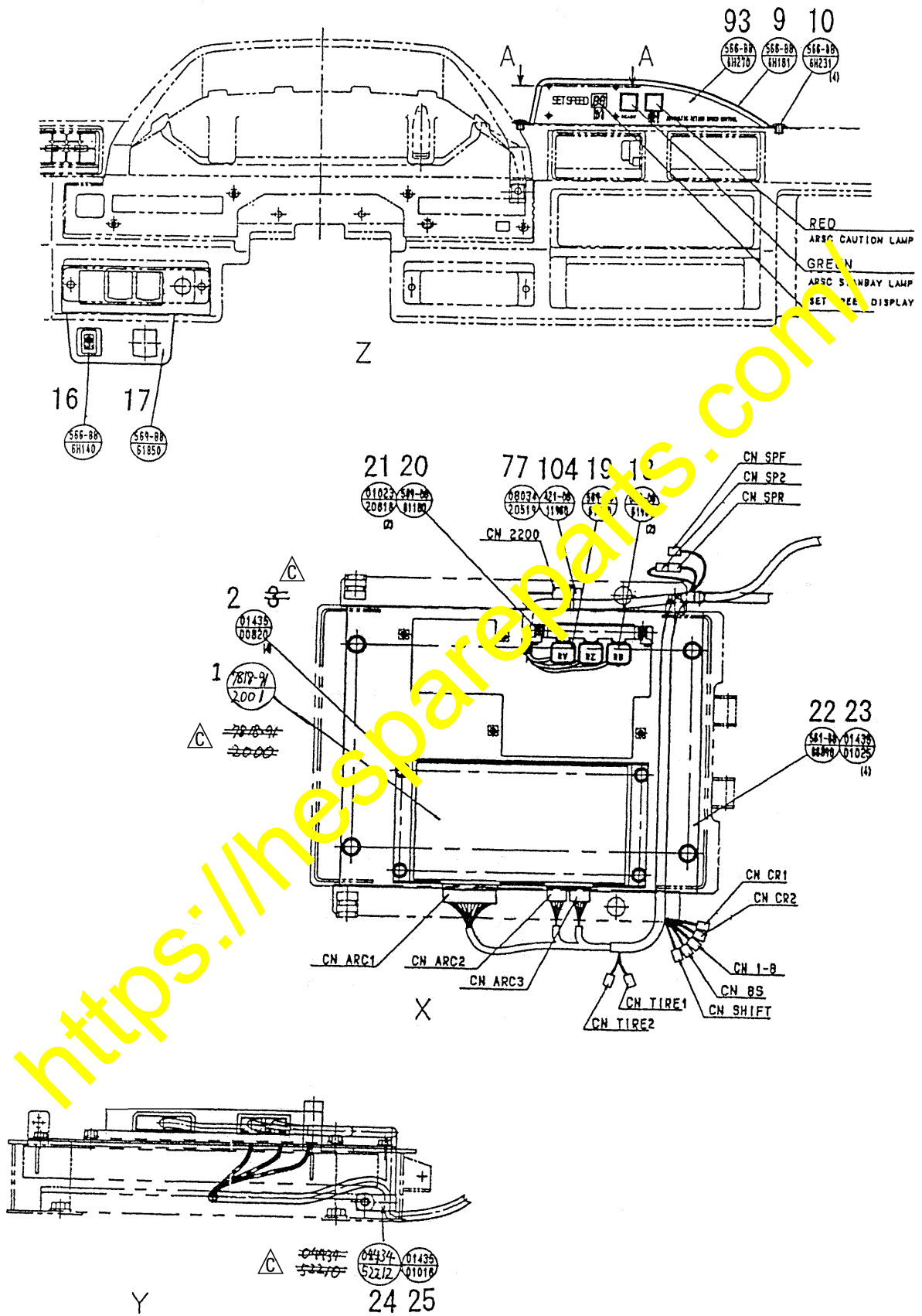
Front view (#4626 ~)



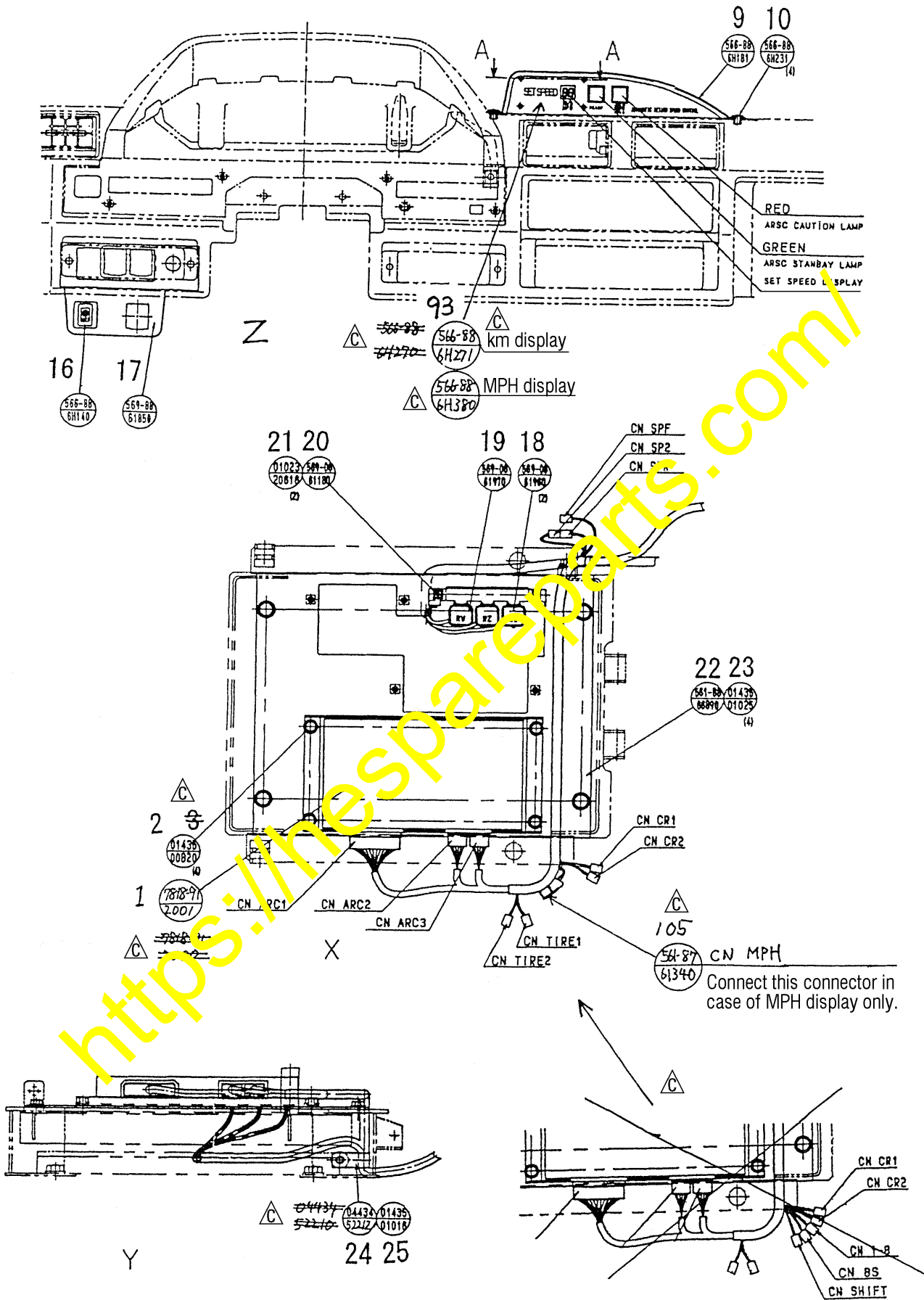
Top view and L.H side view (#4407 ~ #4625)



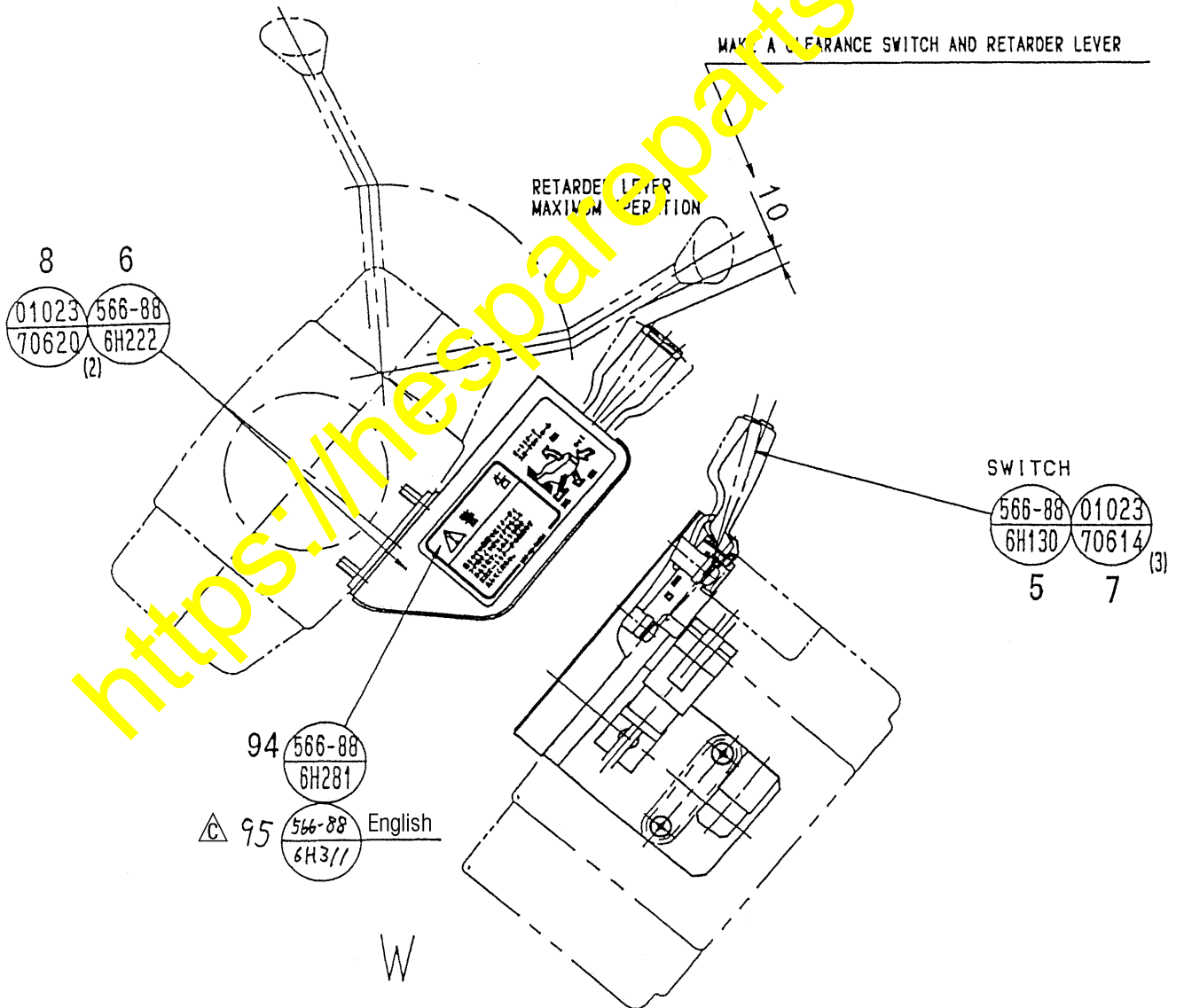
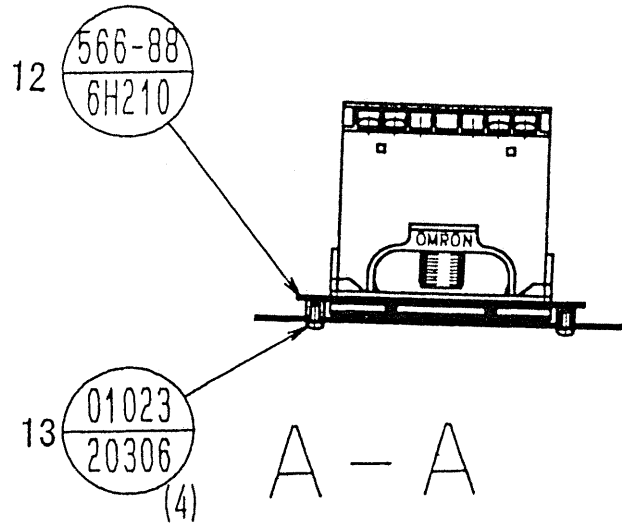
Top view and L.H side view (#4626 ~)



Dashboard and bracket for the assistant operator's seat (#4407 ~ #4625)

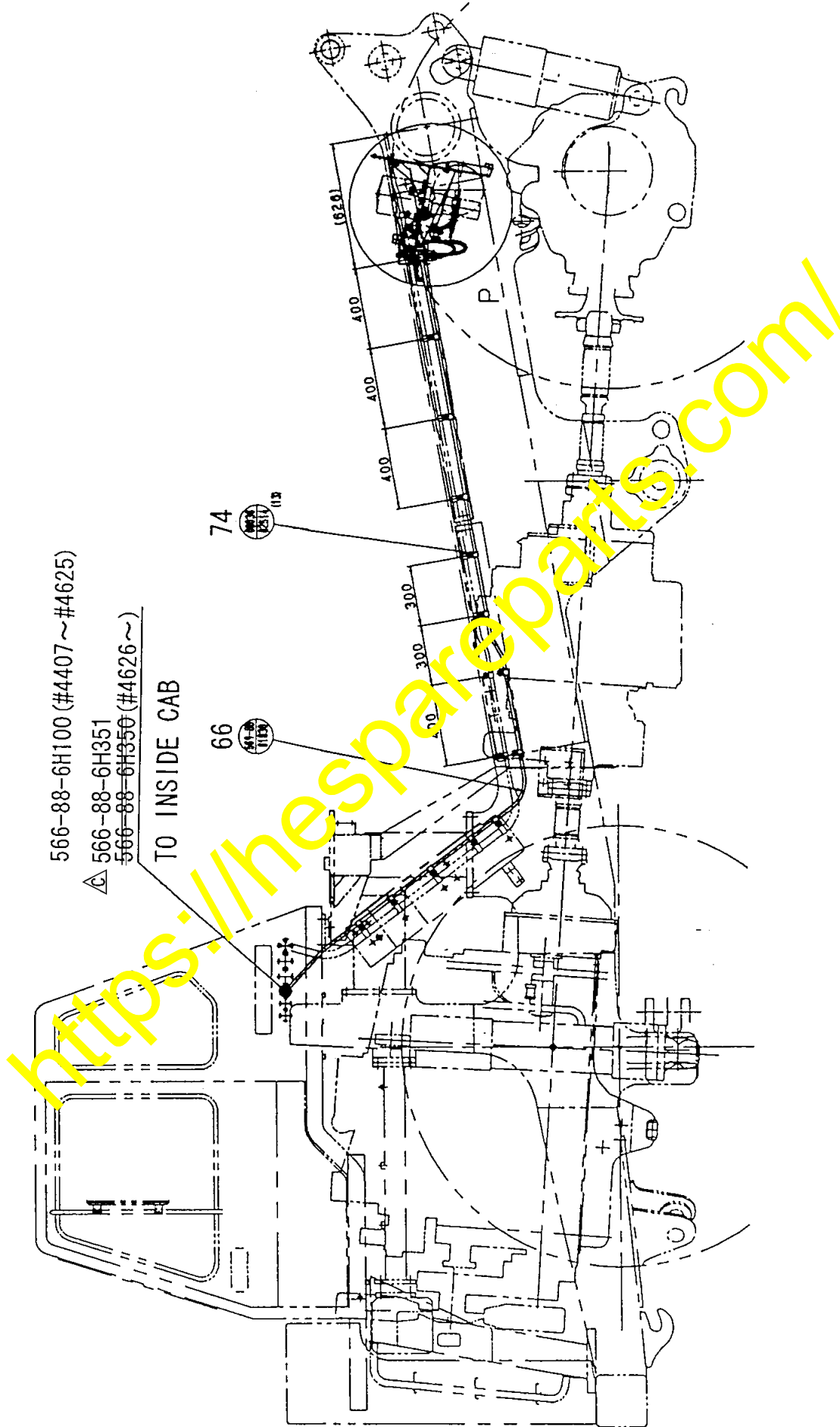


Dashboard and bracket for the assistant operator's seat (#4626 ~)

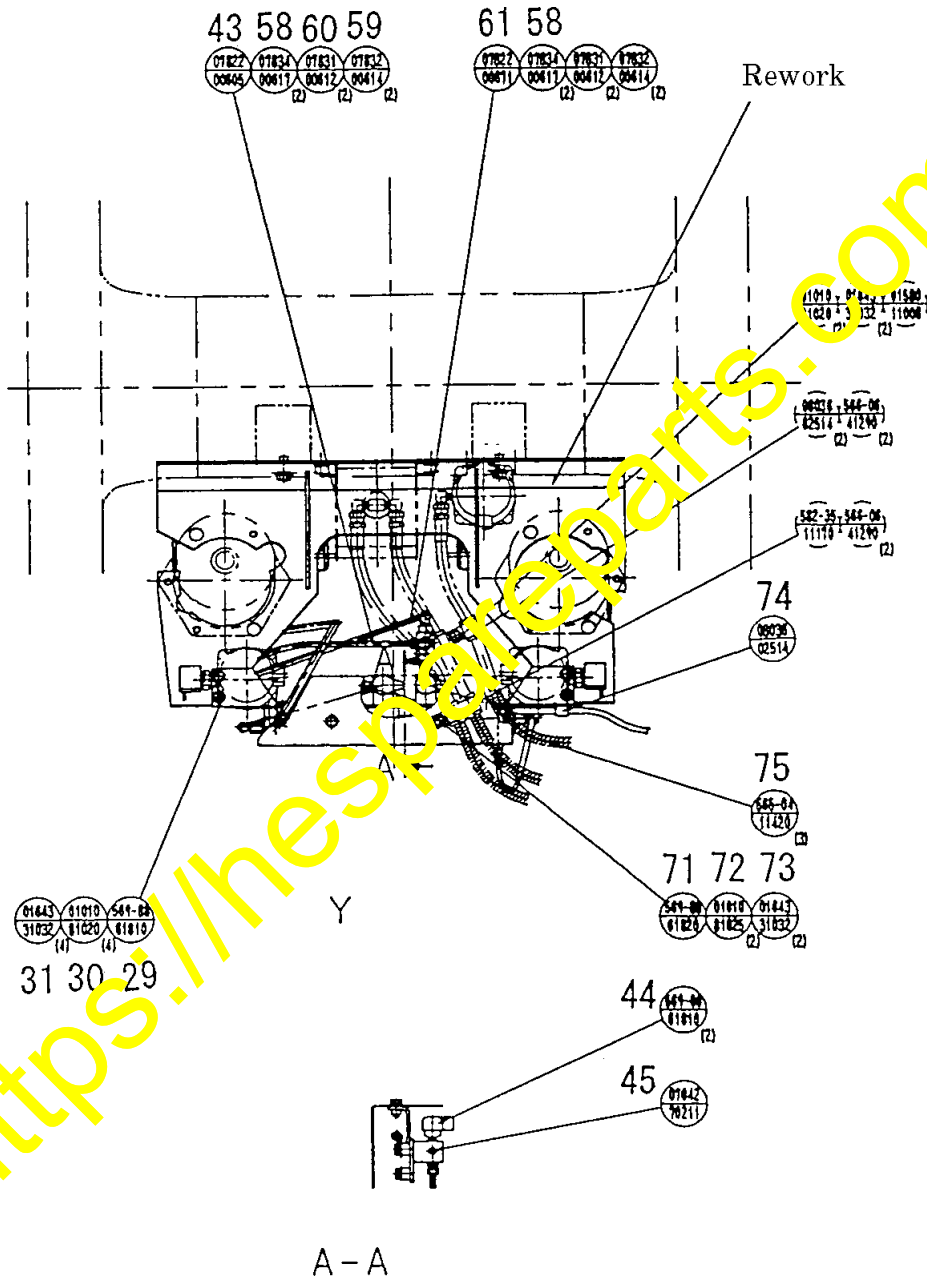


Detail drawing

3.3.2. Installing the pneumatic equipment and devices



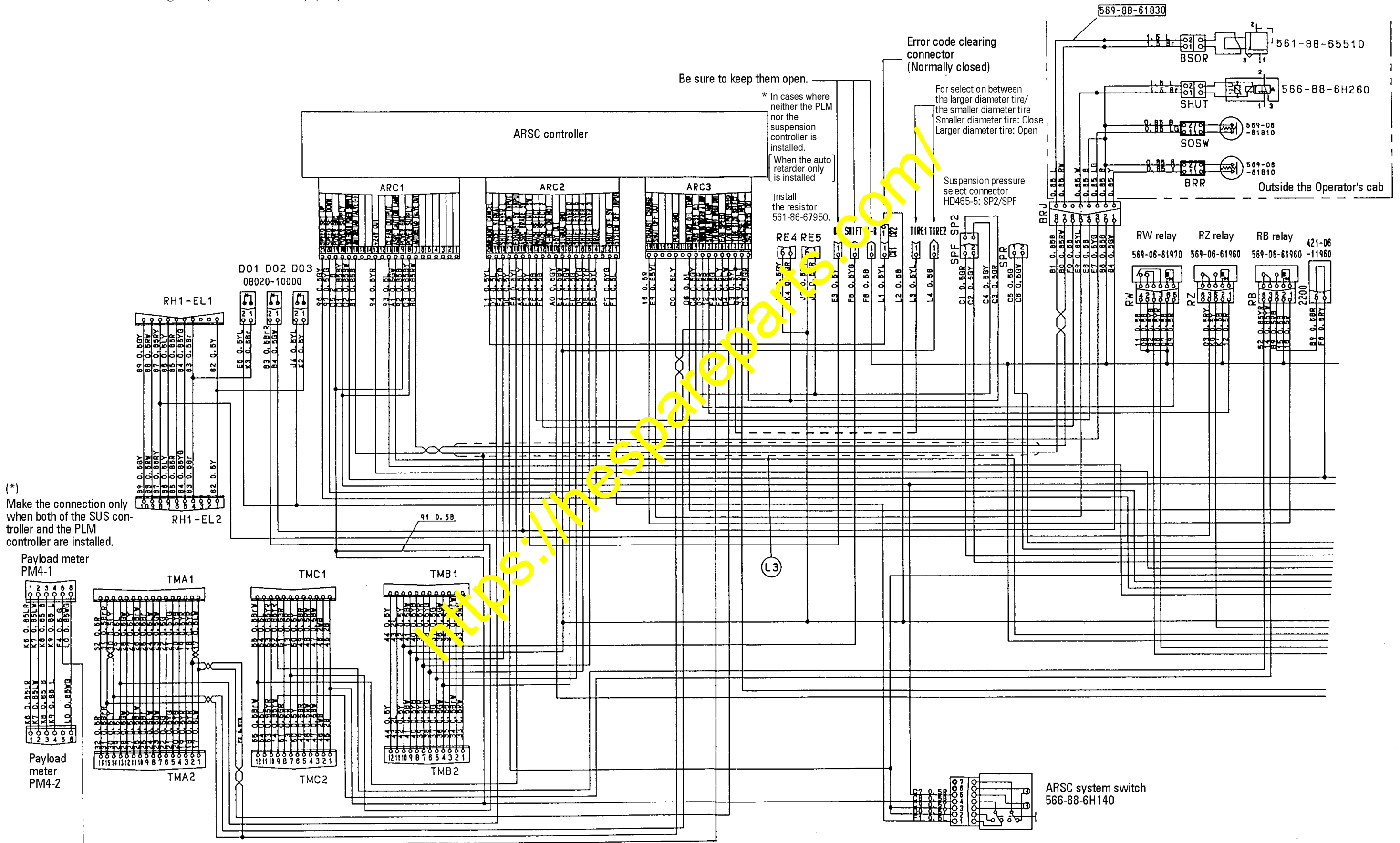
L.H side view of the chassis



Detail drawing

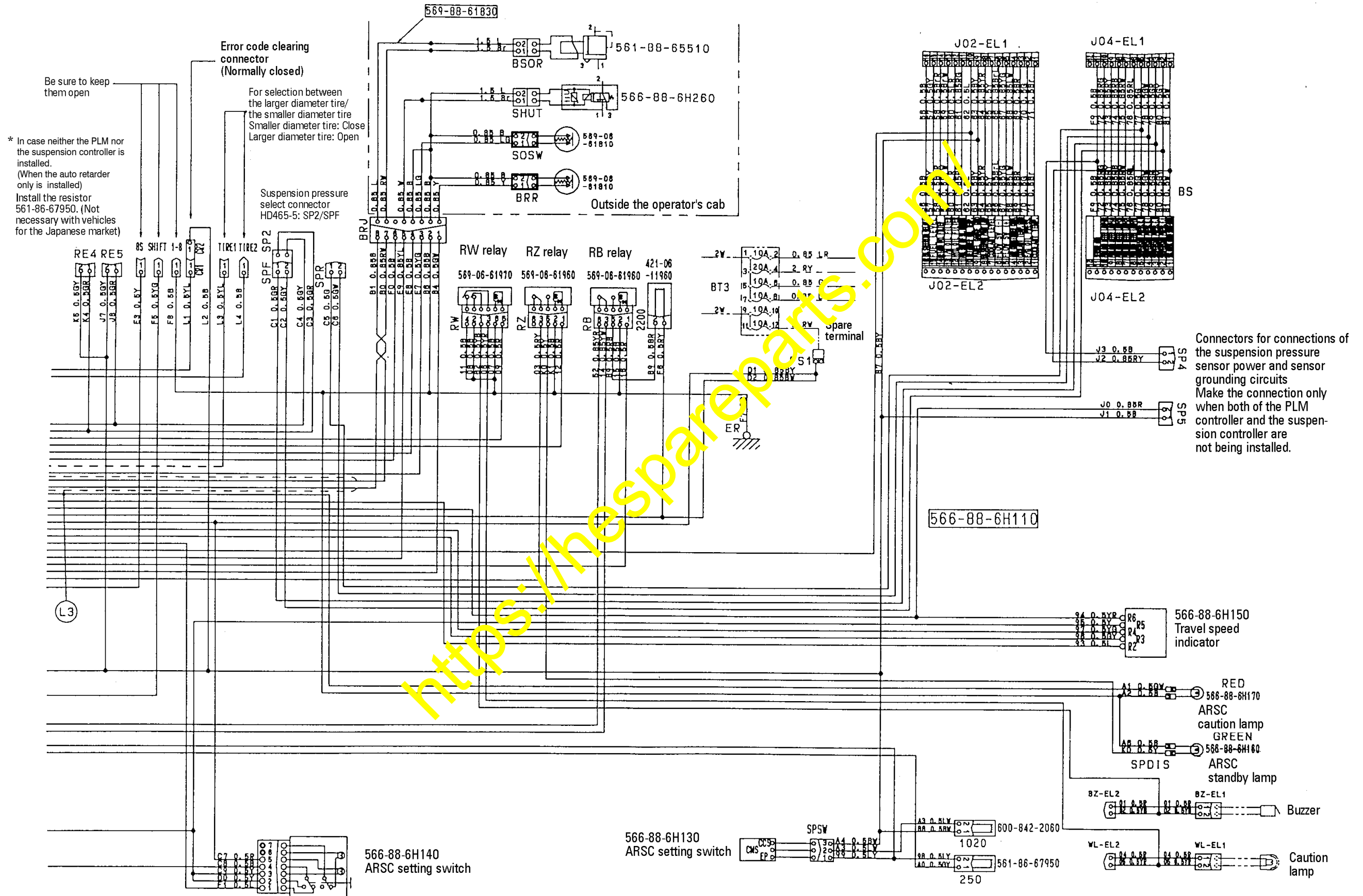
3.3.3. Electric circuit diagram

Electric circuit diagram (#4407 ~ #4625) (1/2)



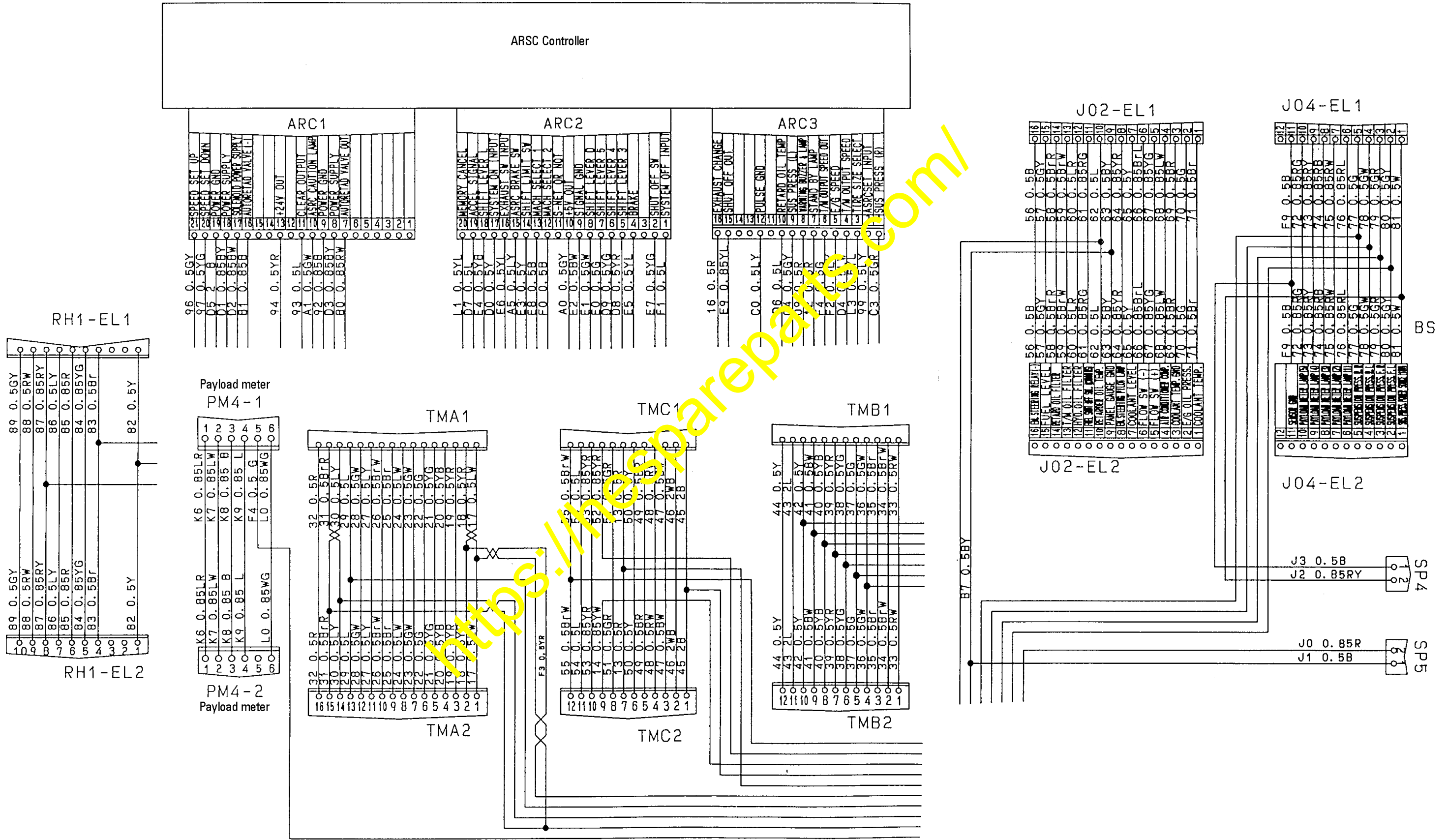
Circuit diagram

Electric circuit diagram (#4407 ~ #4625) (2/2)

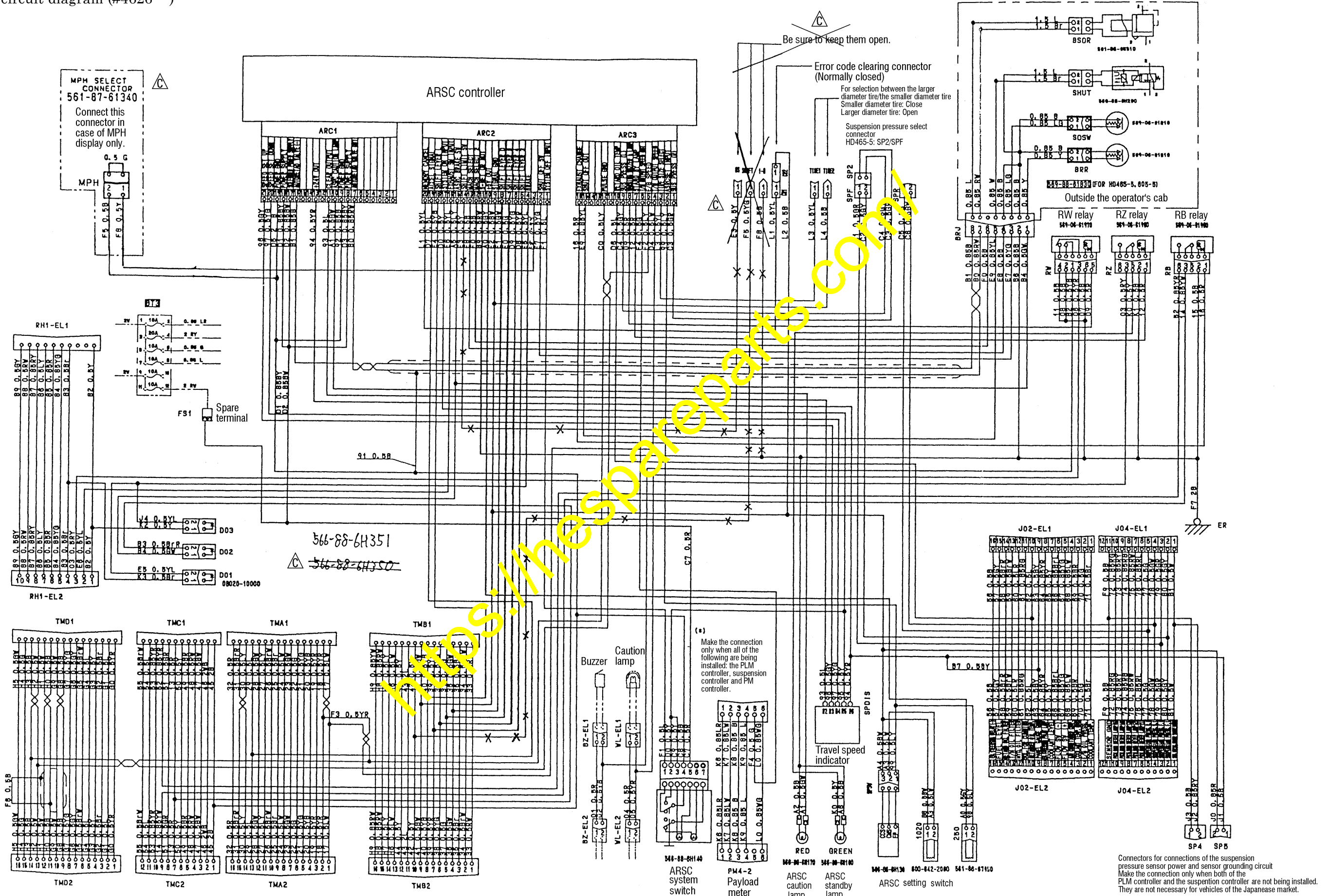


Electric circuit diagram

Electric circuit diagram (#4407 ~ #4625) (Detailed diagrams for connectors)

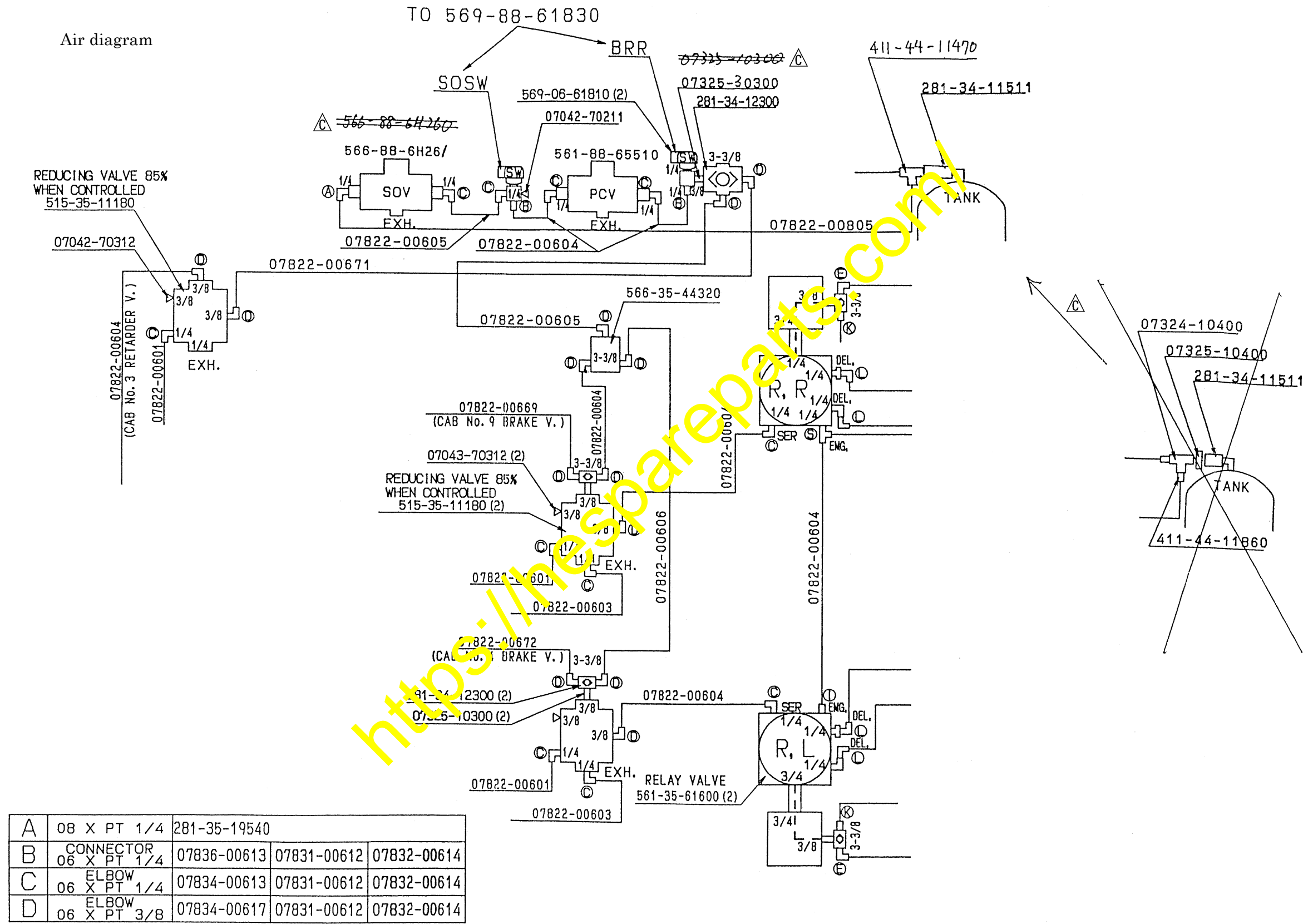


Electric circuit diagram (#4626 ~)



Circuit diagram

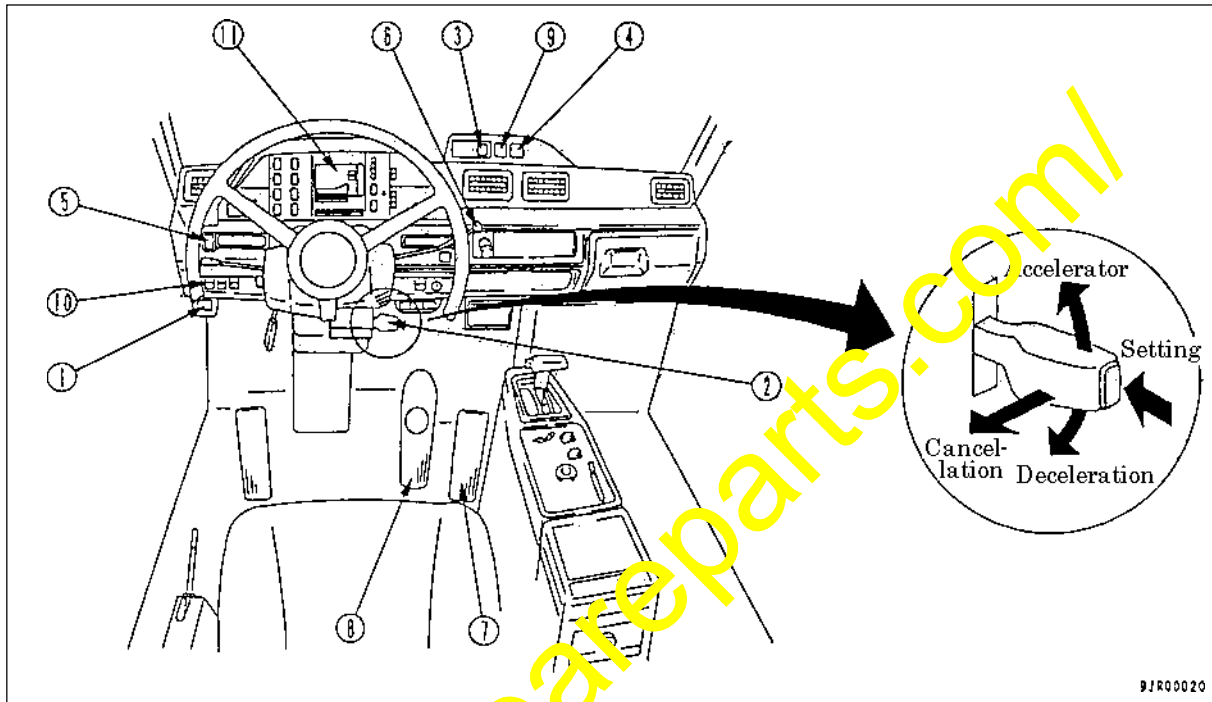
3.3.4. Pneumatic circuit diagram



4. Handling of the automatic retard speed control system (ARSC)

When the vehicle is going downhill, press the system switch when the travel speed reaches the desired level and the retarder automatically works to prevent the vehicle from exceeding the preset travel speed thus eliminating the need for operating the retarder each time the travel speed exceeds a certain level.

Names and functions of respective function parts



- | | |
|-----------------------------------|---------------------------|
| (1) System switch | (7) Accelerator pedal |
| (2) ARSC set lever | (8) Brake pedal |
| (3) Preset travel speed indicator | (9) READY lamp |
| (4) ARSC caution lamp | (10) Exhaust brake switch |
| (5) Centralized caution lamp | (11) Lockup pilot lamp |
| (6) Retarder control lever | |

System switch

Use this switch (1) to turn on or to turn off the ARSC system.

ARSC set lever

Press the tip end switch on this lever (2) to preset the travel speed for activation of the retarder.

Operate this lever to raise or lower the travel speed setting in fine controls. (Tap up/tap down)

Activate this lever to the designated direction to cancel the preset travel speed.

Preset travel speed indicator:

This indicator (3) shows the travel speed setting (Km/h).

It turns off when the system switch is turned off.

It indicates "0" when the travel speed setting is cancelled.

When the equipment start switch is turned on or when the system switch is turned on, it indicates "--" and then "0".

ARSC caution lamp:

This lamp (4) flashes when a functional error occurs with the ARSC system while the system switch is turned on.

It also lights up for 3 seconds when the equipment start switch is turned on to tell the operator that the lamp is functioning properly.

Concentrated warning lamp:

This lamp (5) lights when a serious functional error occurs with the ARSC system at the same time as the ARSC caution lamp flashes, while the system switch is being turned on.

Retarder control lever:

Operate this lever (6) to control the retarder which works as the rear brake when going downhill.

The more the lever is pulled toward this side, the larger the braking force becomes.

Accelerator pedal:

Use this pedal (7) to adjust the engine revolution.

It works to adjust the engine revolution freely, from Low-Idling to Full-Speed.

Brake pedal:

Step on this pedal (8) to activate the wheel brakes.

READY lamp:

When this lamp is lit, the ARSC is ready to work with the travel speed setting duly registered to the system. When this lamp is not lit, the ARSC will not work.

It also lights up for 3 seconds when the equipment start switch is turned on to tell the operator that the lamp is functioning properly.

Exhaust brake switch:

Use this switch (10) to select the operation mode of the exhaust brake.

Press the switch to turn on its backlight and press it again to turn the backlight off.

When the backlight is lit: The exhaust brake will be activated when the operator lifts his foot from the accelerator pedal while the torque converter is being locked up.

When the backlight is not lit: The exhaust brake will not work while the ARSC is in operation.

The exhaust brake will be activated when the operator steps on the foot brake pedal while the ARSC is in operation or when the operator operates the retarder control lever while the torque converter is being locked up.

Lockup pilot lamp:

This lamp (11) lights when the torque converter is being locked up and while the drive mode is under the direct drive mode.

Operations

Operation of the ARSC system:

The ARSC system will work when the system switch is turned on.

Press the tip end switch on the grip of the ARSC set lever to preset the current travel speed as the downhill speed.

The retarder is activated automatically when the travel speed of the vehicle begins to exceed the preset speed vehicle.

The preset travel speed is memorized and indicated on the preset travel speed indicator.

When the accelerator pedal is stepped on while the ARSC is in operation, the ARSC will be cancelled and the travel speed will be accelerated.

Applying the foot brake pedal or operating the retarder control lever while the ARSC is in operation will work to decelerate the travel speed or to stop the vehicle.

Travel speed setting:

Selectable travel speed settings in conjunction with the current positioning of the speed shift lever are as follows:

While the speed shift lever is being set to the D, 5, 4, 3 or L position:

Selectable travel speed setting ranges: 10km/h through 55km/h.

Travel speed setting will not work while the speed shift lever is set to the N or R position.

When the actual travel speed when the tip end switch on the grip of the ARSC set lever is pressed to preset the travel speed is lower the 10Km/h, the speed setting is made to 10Km/h.

Otherwise, the current travel speed as is will be registered as the speed setting.

Fine adjustment of the travel speed settings:

Push the ARSC set lever forward once to bring up the travel speed setting by 1Km/h.

Pull the ARSC set lever backward once to bring down the travel speed setting by 1Km/h.

Supplement:

Always release the ARSC set lever when a travel speed setting change is finished.

When the setting switch at the tip end of the grip of the ARSC set lever is depressed and, simultaneously, when the ARSC set lever is activated toward the "cancellation" position, the priority will be given to the "cancellation".

When the setting switch is depressed and, simultaneously, when the "tap-up operation" of the ARSC set lever is made, the priority will be given to the "tap-up operation".

When the setting switch is depressed and, simultaneously, when the "tap-down operation" of the ARSC set lever is made, the priority will be given to the "tap-down operation".

The "tap-up operation" and the "tap-down operation" are for fine adjustments of the travel speed settings.

While the vehicle is traveling under the ARSC mode (while the accelerator pedal is released), the aforesaid fine adjustments of the travel speed settings are workable within the range of ± 5 Km of the preset travel speed.

If the accelerator pedal is stepped on, the ARSC is cancelled and the travel speed settings can be made freely within the range of 10Km/h through 55Km/h.

To update the travel speed setting to a faster speed level:

To update the travel speed setting to a faster speed level, step on the accelerator pedal to accelerate the actual travel speed, and when the vehicle speed reaches the desired level, press the setting switch at the tip end of the grip of the ARSC set lever.

Then, the travel speed setting will be updated to the new setting.

To update the travel speed setting toward a slower speed level:

To update the travel speed setting toward a slower speed level, operate the retarder control lever to decelerate the actual travel speed and when the vehicle speed is decelerated to the desired level, press the setting switch at the tip end of the grip of the ARSC set lever.

Then, the travel speed setting will be updated to the new setting.

Supplement:

Always return the retarder control lever to its original position when deceleration of the vehicle speed and updating of the travel speed setting has been finished.

When repeating a downhill travel under a previous travel speed setting:

When descending the same downhill repeatedly, presetting the travel speed just once will be just enough to let the ARSC work properly for the next downhill travel and after of the same downhill road without need for a new presetting operation.

Before the vehicle reaches the starting point of the downhill slope, decelerate the vehicle speed to a level below the travel speed setting being indicated on the travel speed indicator and leave the accelerator pedal untouched to let the READY lamp (green) turn on and to let the ARSC work automatically when the vehicle starts the downhill travel.

Supplement:

When the vehicle is traveling at a speed beyond the travel speed setting indicated on the travel speed indicator, the ARSC will not work, even if the accelerator pedal is left untouched. At this time, the READY lamp (green) will also not go on.

Therefore, always decelerate the vehicle speed to a level below the travel speed setting being indicated on the travel speed indicator before the vehicle reaches the starting point of the downhill slope to make sure the READY lamp (green) is lit.

Canceling the preset speed traveling:

Method 1: Activate the ARSC set lever toward the "cancellation" position to hold it at the position for at least about a second to cancel controls of the ARSC. After this, the travel speed indicator will show "0".

Method 2: Turn off the system switch to cancel controls of the ARSC. At this time, the travel speed indicator will turn off.

Supplement:

As for the method 1 outlined above, unlike switches for other functions, activating the ARSC set lever toward the "cancellation" position and holding it at the position for at least a second will only work to cancel the controls of the ARSC to prevent accidental cancellation otherwise occurring when the ARSC set lever is moved toward the "cancellation" position by an error.

Correlation with the exhaust brake:

When the backlight of the exhaust brake switch is lit, the exhaust brake will be activated when the operator lifts his foot from the accelerator pedal while the torque converter is being locked up normally. The ARSC will work when the travel speed begins to exceed the preset speed.

When the backlight of the exhaust brake switch is not lit, the exhaust brake will not work while the ARSC is in operation.

The exhaust brake will be activated as usual when the operator steps on the foot brake pedal while the ARSC is in operation or when the operator operates the retarder control lever.

Meanwhile, when a downhill slope is moderate enough and if the engine brake or exhaust brake works sufficiently, the vehicle speed will not reach the preset travel speed and, consequently, the ARSC will not start working.

Recommended travel speed settings:

Make the travel speed setting at a speed level where the engine revolution exceeds 1,800rpm and run the vehicle so that the retarder oil temperature gauge pointer remains within the green range.

When the retarder oil temperature begins to overheat, the ARSC caution lamp turns on to lower the travel speed setting automatically.

- For more information, refer to the Chapter for handling of the automatic retarder speed control (ARS"C) and to the Chapter for optional parts and attachments in the Operation and Maintenance Manual.

<https://hespareparts.com/>

5. Inspections

When the installation work has been finished, inspect respective brakes and the auto retarder system before starting operating the vehicle following the inspection procedures outlined below.

5-1. Inspections of respective brakes

Check if the foot brake, retarder brake, parking brake and the emergency brake work normally, and if respective braking capacities of these brakes are normal.

When anything has been found abnormal, check if the air piping is connected properly.

5-2. Inspections of the auto retarder system

Make the following checks to see if the auto retarder system is functioning normally.

- 1) Check if the ARSC caution lamp (red lamp) and the READY lamp (green lamp) light for 3 seconds when the starter switch is turned on.
- 2) Check if the LED's for the auto retarder controller turn on in the following sequence when the starter switch is turned on:

All the LED's turn on → 78 → B. - → Error code → 0. 0

- 3) Check if the LED indications on the controller are:
"0. 0" when the accelerator pedal is stepped on and
"0. 0. " when the accelerator pedal is not stepped on.
- 4) Check if the speed indicator shows "--" and then "0" when the ARSC switch is turned on.
- 5) Check if air is drained through the pressure control valve when the starter switch is turned on.
- 6) Check if the travel speed settings are workable only when the speed shift lever is set to the "D", "5", "4", "3" or "L" positions and not workable when the speed shift lever is set to "N" or "R".
- 7) Check if the current travel speed appears on the travel speed setting indicator when the speed setting switch is pressed.
Travel speed settings will be registered at the current speed when the speed setting switch is pressed while the current travel speed is within the range of 10 – 55km/h, and at 10km/h when the speed setting switch is pressed while the current travel speed is less than 10km/h.

- 8) Check if the travel speed setting rises by 1km/h when the ARSC setting lever is pulled up once.
- 9) Check if the travel speed setting decreases by 1km/h when the ARSC setting lever is pushed down once.
- 10) Check if the ARSC setting lever works to register the travel speed setting at a new speed setting of ± 5 km/h of the current travel speed setting when the speed setting switch at the tip end of the ARSC setting lever is pressed while the accelerator pedal is released and at the current travel speed regardless of the previous speed setting when the speed setting switch is pressed while the accelerator pedal is stepped on, namely, within the range of 10 – 50km/h.
- 11) Check if the ARSC setting lever is activated toward the canceling direction (and if held there for more than about a second will cancel the ARSC controls) and if the travel speed setting indicator will indicate "0".
- 12) Check if the preset travel speed is memorized unless the starter switch is turned off or the system switch is turned off.
Once either of these switches is turned off, the travel speed setting indicator will indicate "0".
- 13) Check if the auto retarder works automatically to retard the travel speed when the travel speed of the vehicle reaches the registered travel speed setting while the vehicle is traveling downhill (with the accelerator pedal released).
- 14) Check if the ARSC control is interrupted when the accelerator pedal is stepped on while the ARSC is in operation. At this time, the READY lamp will turn off.
- 15) Check if the ARSC control will be resumed when the accelerator pedal is released. At this time, the READY lamp will turn on.
- 16) Check if the foot brake or the (manual) retarder brake will work even while the ARSC is in operation when these brakes are activated.
- 17) Check if the error codes memorized by the controller can be cleared from the memory by following the procedures listed below.
 - ① Disconnect the connections of the connectors CR1 and CR2 located underneath the assistant operator's seat
(At this time, the LED indication will change to "--").
 - ② The indication "--" changes from flashing to continuous lighting (for 3 seconds).
 - ③ This concludes the clearing procedures.
 - ④ Re-connect the connectors CR1 and CR2 back to their original statuses.
- 18) Check if the ARSC setting lever is interfering with the setting lever cover.
Try to move the ARSC setting lever upward and downward or forward and backward to make sure there is no interference.
- 19) Check if the manual retarder lever interferes with the ARSC setting lever when the manual retarder lever is activated to its stroke end.