

INSTALLATION MANUAL

REF NO.	BT99031A
DATE	Mar. 15, 2000

Page 1 of 22

This INSTALLATION MANUAL supersedes the previous issue No. BT99031 dated Aug. 16, 1999 which should be discarded.

SUBJECT: INSTALLATION MANUAL OF HEATERS ON WA800/900-3 WORKING IN COLD AREA

PURPOSE: To introduce procedures for modifying the standard WA800/WA900-3 wheel loaders into the "cold area A (-30°C) specification" machines

APPLICATION: WA800-3 Wheel Loaders, Serial Nos. 50001 and up
WA900-3 Wheel Loaders, Serial Nos. 50001 and up

FAILURE CODE: DCH099

DESCRIPTION:

1-1. Introduction

This is to introduce our optional setting of machines to be operated in cold area A (-30°C). Please follow this manual when modifying machines of the standard specification into those suitable for operation in cold area A.

[The machines of the cold area A specification are provided with engine oil pan heater, coolant heater, hydraulic oil heater and transmission oil heater in addition to standard machines, and their engines can start easily in cold weather.]

1-2. Revised places:



9 places 	Mar. 15, 2000	Corrected the wrong part numbers.
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2. List of parts

Part No.	Part Name	Q'ty	Remarks
427-Z91-2110	Wiring harness	1	
04434-51910	Clip	3	
427-Z91-1190	Bracket	1	
01435-01016	Bolt	2	
426-06-11650	Cap	1	
01023-10316	Screw	4	
01601-20307	Washer	4	
01580-10302	Nut	4	
427-Z91-2120	Wiring harness	1	
04434-51910	Clip	7	
04434-51410	Clip	5	
04434-51710	Clip	12	
01435-01016	Bolt	13	
426-06-11630	Cap	1	
427-Z91-2130	Wiring harness	1	
 427-Z91-2190	Plate	1	Changed the part number to 425-S62-2360 and added on page 5.
04434-51910	Clip	6	
08036-92514	Clip	1	
01435-01016	Bolt	1	
01643-31032	Washer	1	
01580-11008	Nut	1	
600-815-8750	Heater, water	1	Engine coolant
08053-01510	Clip	1	
600-815-8750	Heater, water	1	Engine coolant
08053-01510	Clip	1	
01435-01016	Bolt	1	
600-815-8460	Heater	4	Engine oil pan
08034-00519	Band	4	
 427-Z91-2190	Plate	2	Changed the part number to 425-S62-2360 and added on page 5.
6131-12-5920	Spacer	1	

Part No.	Part Name	Q'ty	Remarks
01011-81010	Bolt	1	
01643-31032	Washer	1	
01435-01020	Bolt	1	
427-Z91-2140	Box	1	
01435-01016	Bolt	4	
08037-02512	Grommet	2	
426-Z91-1110	Fuse holder	10	
425-Z91-1220	Fuse (15A)	10	
01023-60520	Screw	10	
427-Z91-2150	Rubber	1	
427-Z91-2160	Plate	1	
209-62-11810	Spacer	6	
01435-00816	Bolt	5	
600-815-8460	Heater	5	Hydraulic tank
08053-01510	Clip	5	
01435-01016	Bolt	5	
425-Z91-1180	Boss	5	} Hydraulic tank rework
01571-01016	Seat	4	
01571-01016	Seat	16	} Rear frame rework
01573-20206	Seat	1	
600-815-8320	Heater	4	Transmission
08053-01510	Clip	4	
01643-20210	Washer	4	
01643-30623	Washer	4	
01220-40612	Screw	4	
21T-60-13680	Plate	3	
07063-41187	Element	3	
427-60-15320	Element	1	
20Y-60-21510	Element	3	
427-60-15320	Element	1	
 205-60-51210	Element	1	

Part No.	Part Name	Q'ty	Remarks
 205-60-51270	Element	1	
 425-S62-2360	Plate	3	

This page covers engine-related parts.

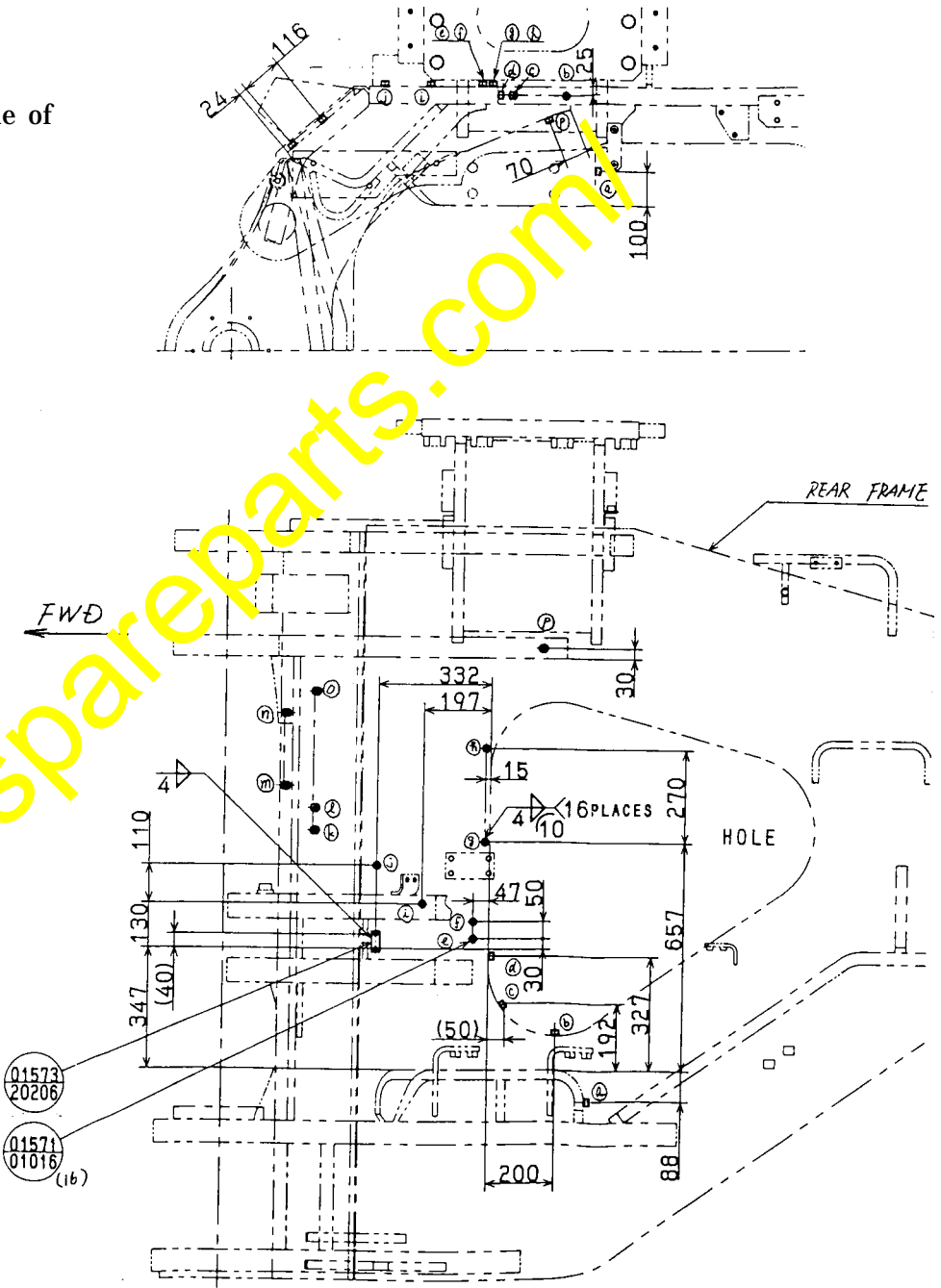
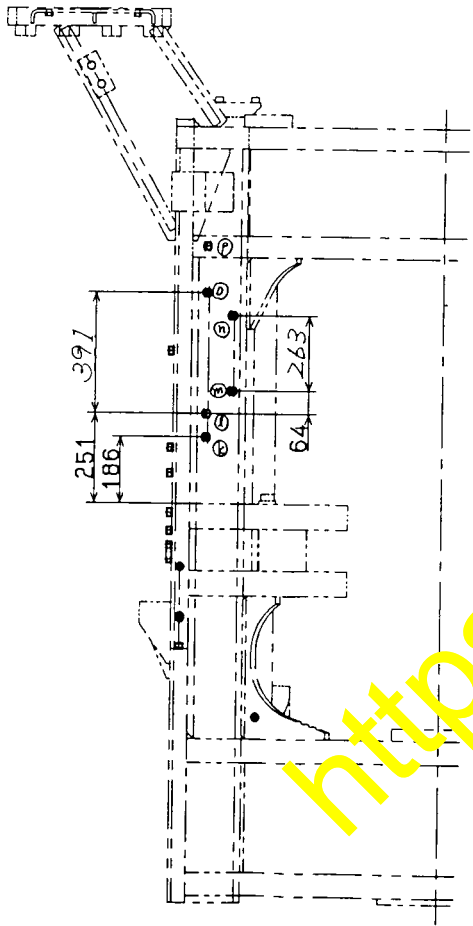
Part No.	Part Name	Q'ty	Remarks
6215-61-8820	Plate	1	
600-815-8750	Heater	1	
6150-21-1190	O-ring	1	
6212-61-6661	Gasket	1	
6215-21-5910	Oil pan	1	#50001 thru •
600-815-8460	Heater	1	
6215-21-5820	Gasket	1	
07000-63025	O-ring	1	
07005-01412	Gasket	4	
07005-01412	Gasket	4	
6215-61-2700	Oil cooler	1	
600-815-8750	Heater	1	
6150-21-1190	O-ring	1	
6215-61-2812	Gasket	1	
07000-63040	O-ring	1	
6161-61-6340	O-ring	2	
07000-63045	O-ring	2	
07000-73045	O-ring	1	
07000-73040	O-ring	2	
07005-01012	Gasket	2	
07005-01412	Gasket	6	
07005-00812	Gasket	4	

3. Reworking Procedures

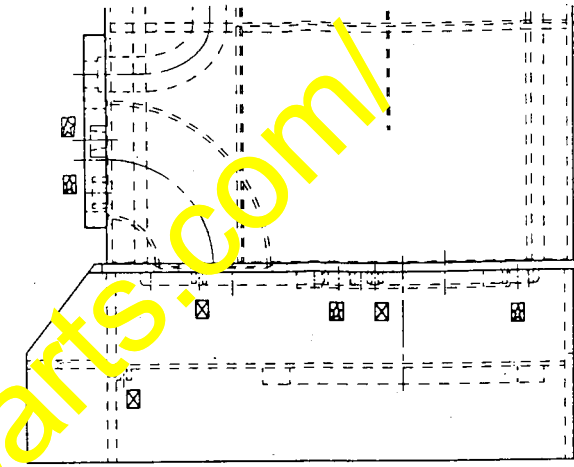
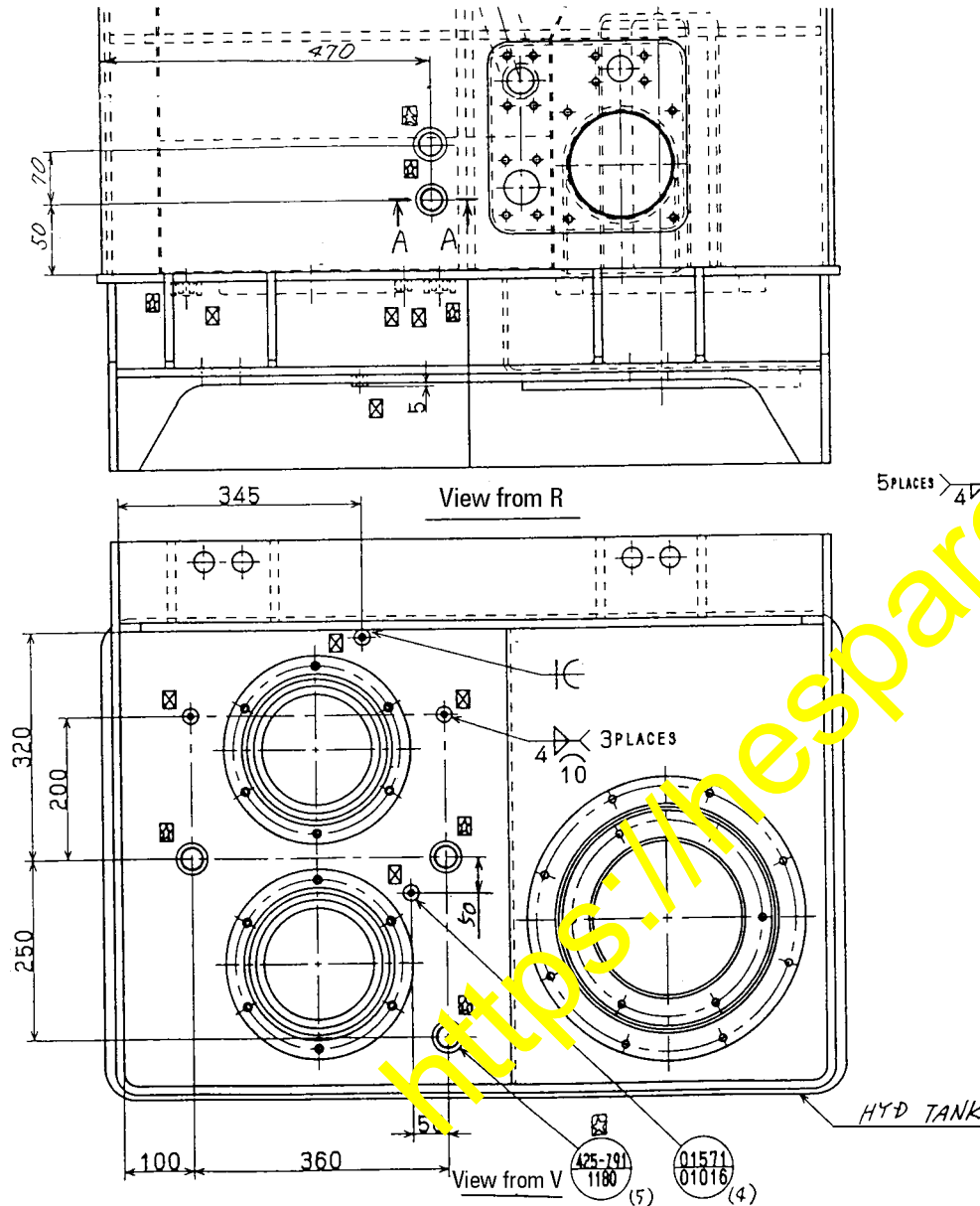
① Rear Frame Rework

Weld the arranged seats to the rear frame. (Right side of machine body)

(Note) Correct the painting after the rework.



② Hydraulic Tank Rework



① Drain oil from the hydraulic reservoir. For pressure relief before the oil draining, refer to the Shop Manual. Remove the cover, the suction strainer, etc. from the bottom.

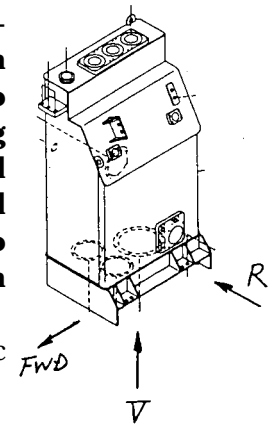
② Drill $\phi 32$ mm holes at five places marked \star in the drawing.

Note: Take the after-rework measures so that no chips remain inside the tank according to the Hydraulic Tank Flushing Procedures on Pages 17 and 18. (Keep this in mind throughout the whole work to prevent damage to the piston pump.)

③ Weld the arranged parts to the hydraulic tank.

④ After the rework, correct the painting.

⑤ Set the strainer, cover, etc. removed in Procedure ① to the original positions.

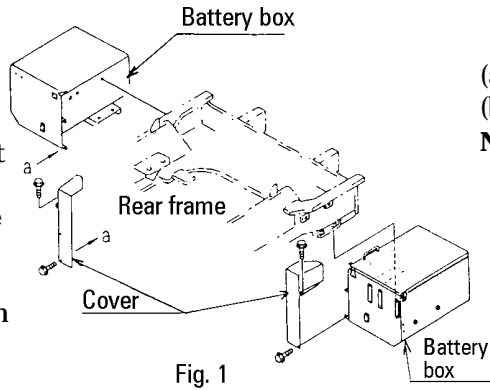


4. Assembling Procedures

(1) Installation of Oil Pan Heater

① Removal of Fuel Tank

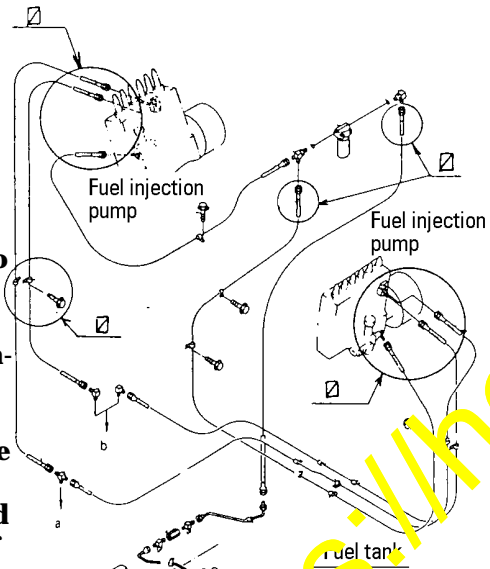
- (a) Remove the front covers from the battery boxes shown in Fig. 1.



- (b) Remove the fuel hose (marked ☒) and the cover.

Note :

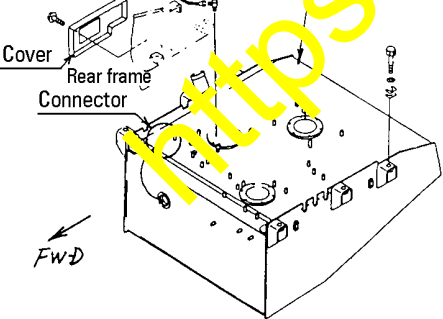
- Place some kind of mark on the hose to prevent mistakes at the time of assembling.
- Put fastening parts in a safe place as they will be reused at the time of assembling.



- (c) Remove the fuel tank from the machine body.

Note :

- Remove the connector of the fuel sensor.



② Replacement of Oil Pan (Note : Drain the engine oil.)

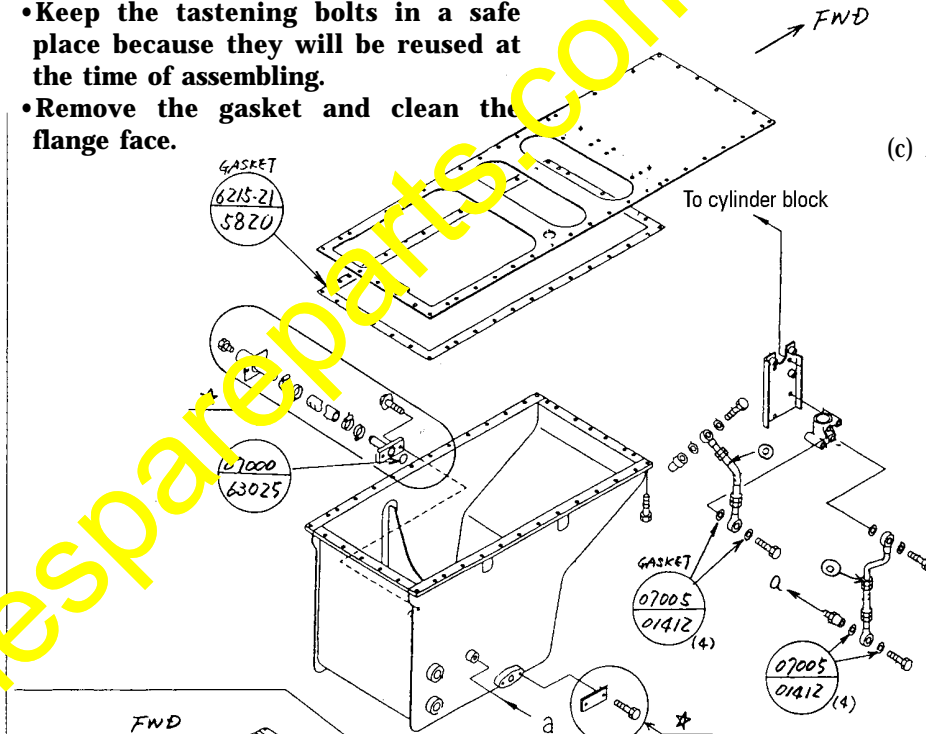
☆ Applicable to 5001 - • (i.e. applicable to serial 50001 and up to a certain serial no.)

For •-, that is, for machines of a certain serial no. and up, the replacement of the parts marked ☆ is not necessary because the oil pan has been changed to a new type as the standard procedures.

- (a) Remove the tubes (marked ◎) connected to the oil pan.
- (b) Remove the oil pan.

Note :

- Keep the fastening bolts in a safe place because they will be reused at the time of assembling.
- Remove the gasket and clean the flange face.



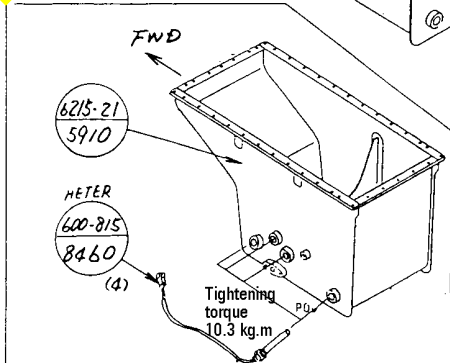
- (c) Assemble the oil pan heaters (600-815-8460 : 4 pcs.) and the parts marked ☆ removed from the removed oil pan to the oil pan (6215-21-5910) newly prepared.

- (d) Stick a gasket (6215-21-5820) to the oil pan, and assemble the oil pan to the engine.

Note :

- Since the gasket is of split type, match the gasket to the oil pan thread holes when sticking it.

- (e) Assemble the tubes removed in Procedure (a) by using the gasket (07005-01412) newly prepared.



Note : • Wind sealing tape around heater thread sections.

- ③ Assembling of Fuel Tank and Pipe Cover
Assemble the fuel tank and the pipe cover removed in Procedure ①.

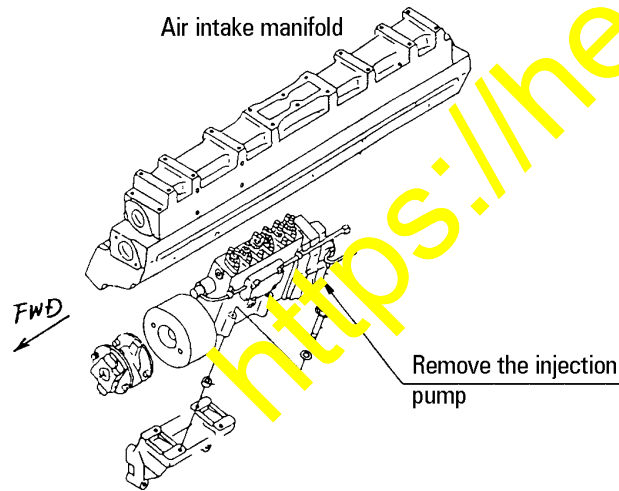
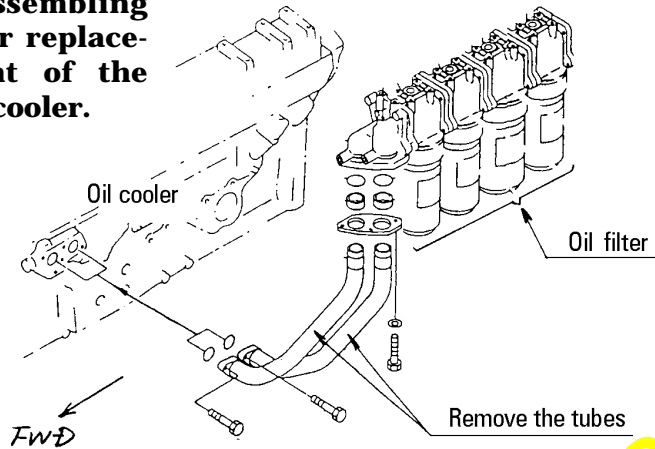
(2) Installation of Coolant Heater

• Oil Cooler

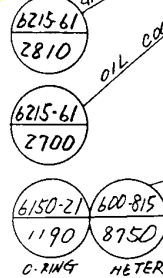
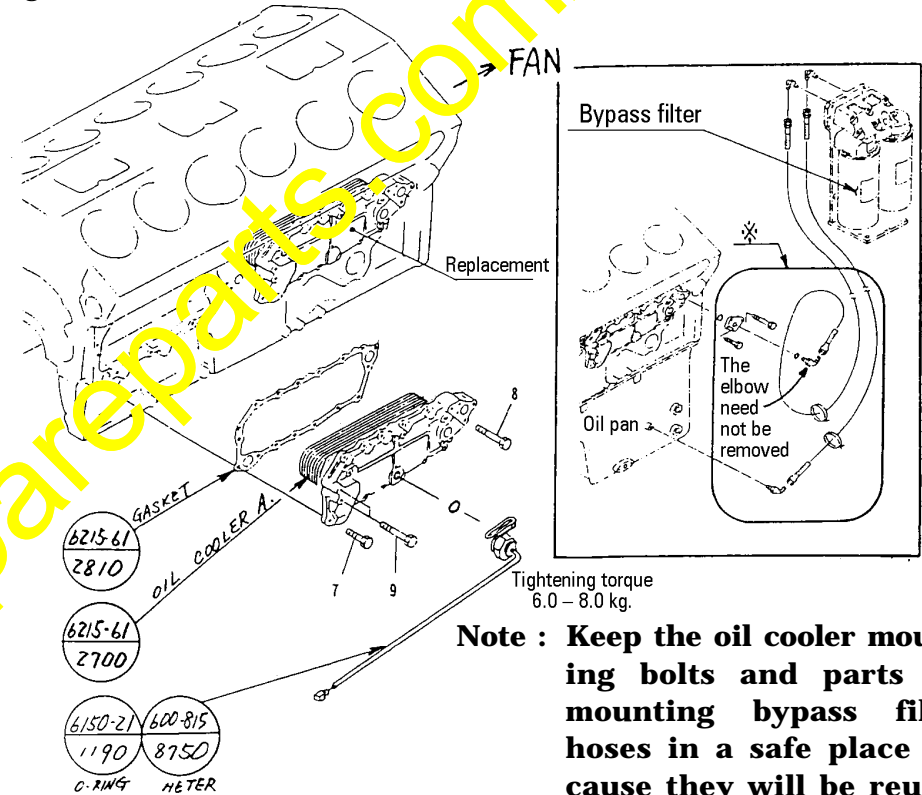
- ① Drain coolant from the engine.
- ② Remove the injection pump and the oil filter tubes from the engine.

Note :

- **Keep the injection pump and piping parts in a safe place for reassembling after replacement of the oil cooler.**



- ③ Removed the bypass filter hoses (marked ※) connected to the oil cooler and the oil pan.
- ④ Loosen the oil cooler mounting bolts (Nos. 7, 8 and 9) and remove the oil cooler assembly for replacement. Also, remove the gasket and clean the flange face.

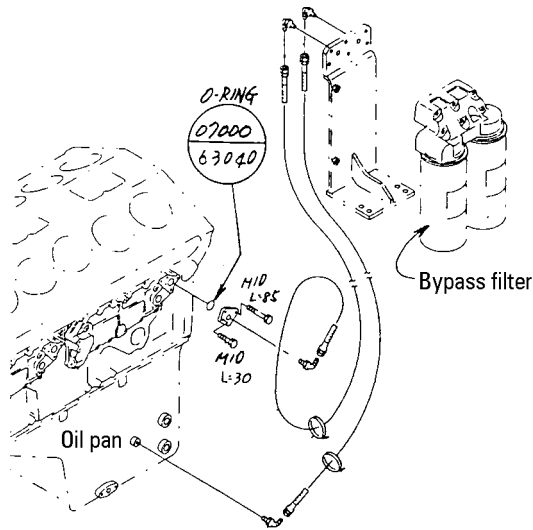


Bolt tightening torque

	kgm	Nm
M10	6.0 - 7.5	59.0 - 74.0

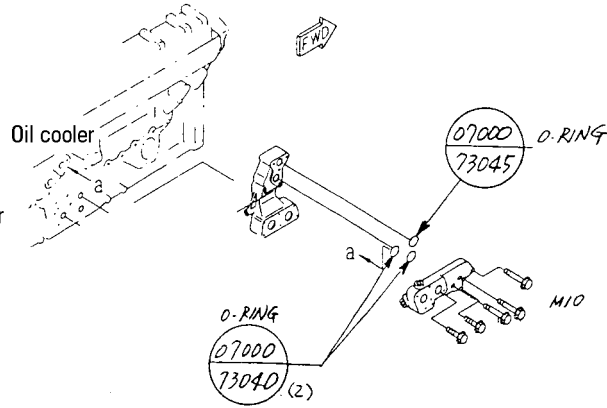
- ⑤ Mount the coolant heater (600-815-8750) to the new oil cooler assy (6215-61-2700). (For heater tightening torque, see the note in above figure.)
- ⑥ Assemble the oil cooler with heater to the engine. Use the gasket (6215-61-2810) newly prepared.
- ⑦ Assemble the injection pump and the oil filter tubes removed in Procedure ②.

Note : When assembling the injection pump piping and the oil filter tubes, use the O-rings and the gaskets shown on the next page.



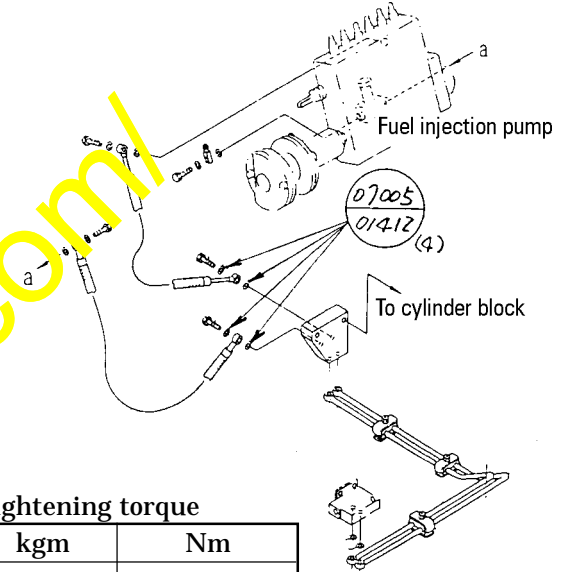
Bolt tightening torque

	kgm	Nm
M10	6.0 - 7.5	59.0 - 74.0



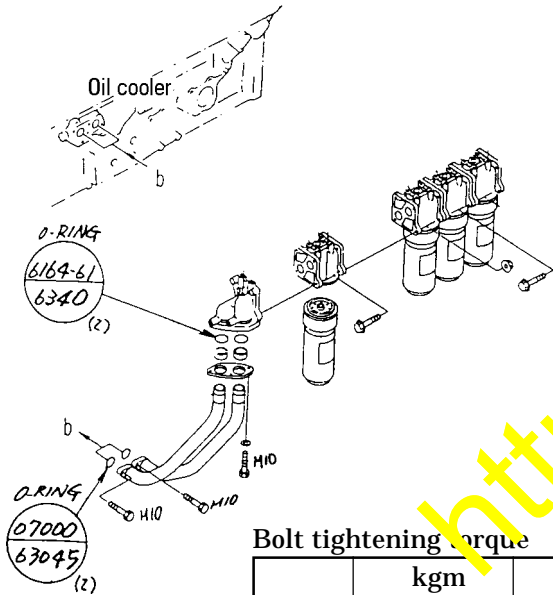
Bolt tightening torque

	kgm	Nm
M10	6.0 - 7.5	59.0 - 74.0



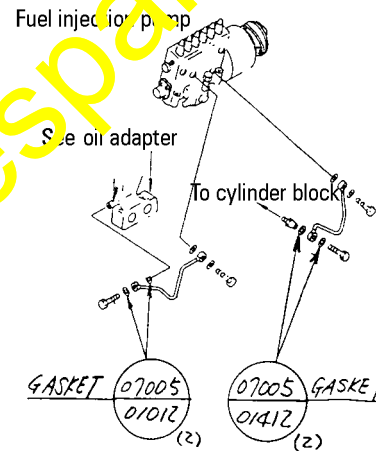
Joint bolt tightening torque

	kgm	Nm
M10	1.0 - 1.3	9.8 - 12.7



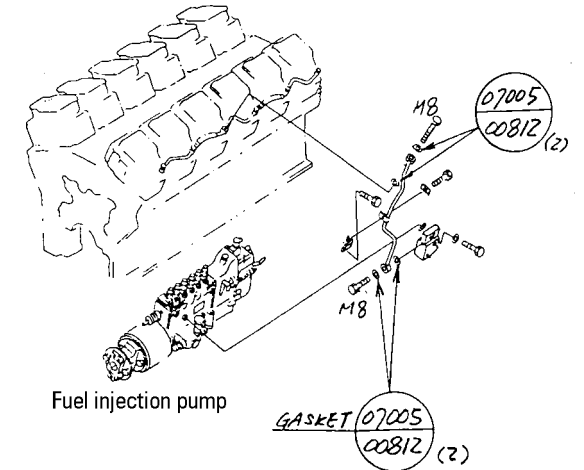
Bolt tightening torque

	kgm	Nm
M10	6.0 - 7.5	59.0 - 74.0



Joint bolt tightening torque

	kgm	Nm
M10	1.0 - 1.3	9.8 - 12.7



Joint bolt tightening torque

	kgm	Nm
M10	0.8 - 1.0	7.8 - 9.8

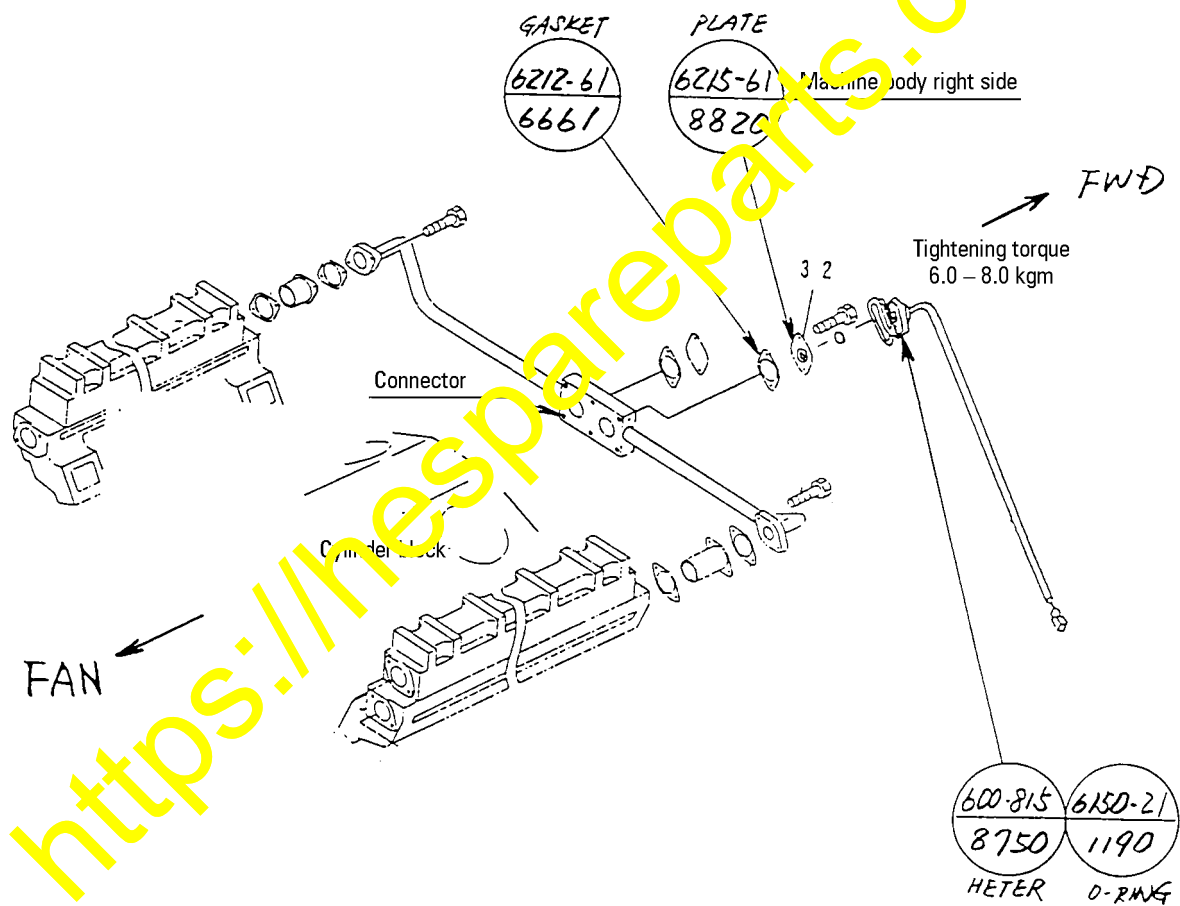
<https://thespareparts.com/>

- Intake Manifold (Upper Part of Flywheel Housing)

- ① Remove the plate (No. 32) from flywheel upper connector. (Keep the mounting bolts in a safe place because they will be reused at the time of assembling.) Also, remove the gasket and clean the flange face.
- ② Mount the coolant heater (600-815-8750) on the newly procured plate (6215-61-8820). (For the heater tightening torque, see the note in figure below.)
- ③ Assemble the plate with heater to the connector. Use the gasket (6212-61-6661) newly obtained.

Bolt tightening torque

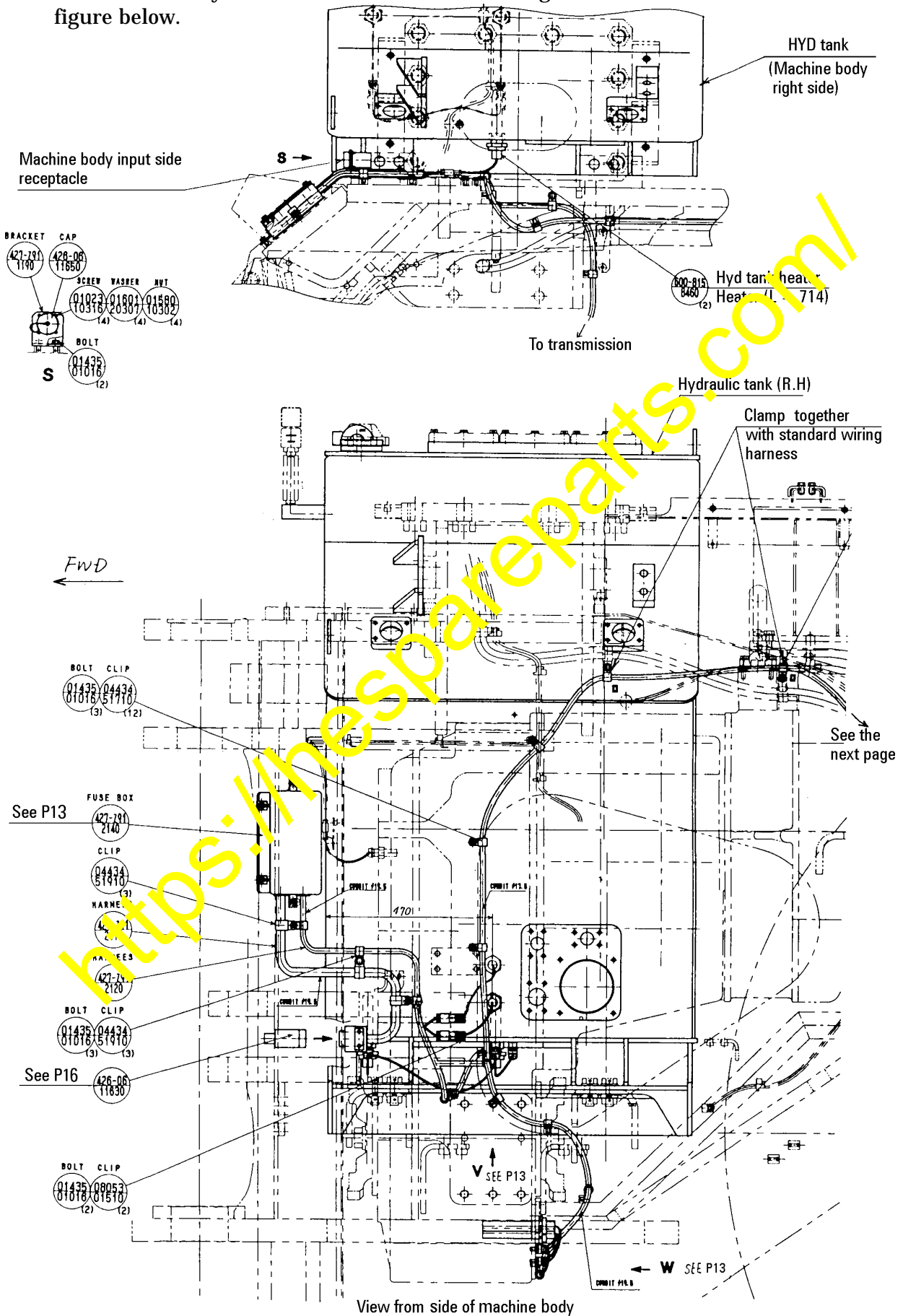
	kgm	Nm
M10	6.0 - 7.5	59.0 - 74.0



(3) Assembly of Chassis-side Heaters and Wiring Harness

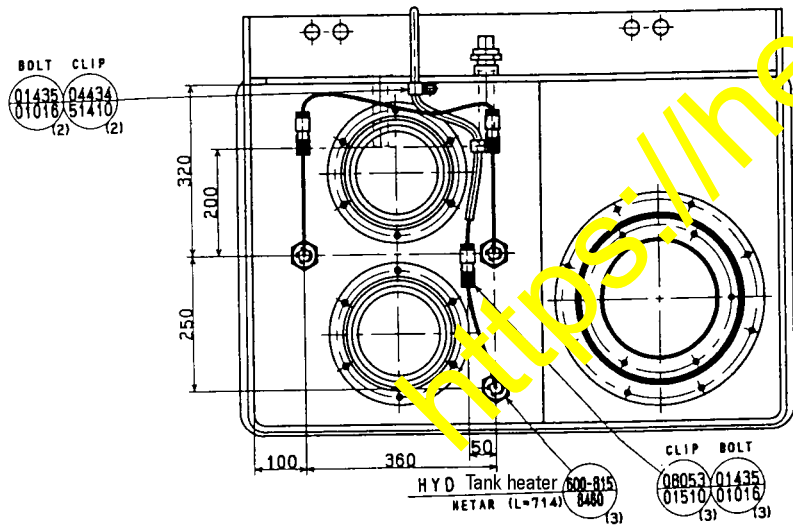
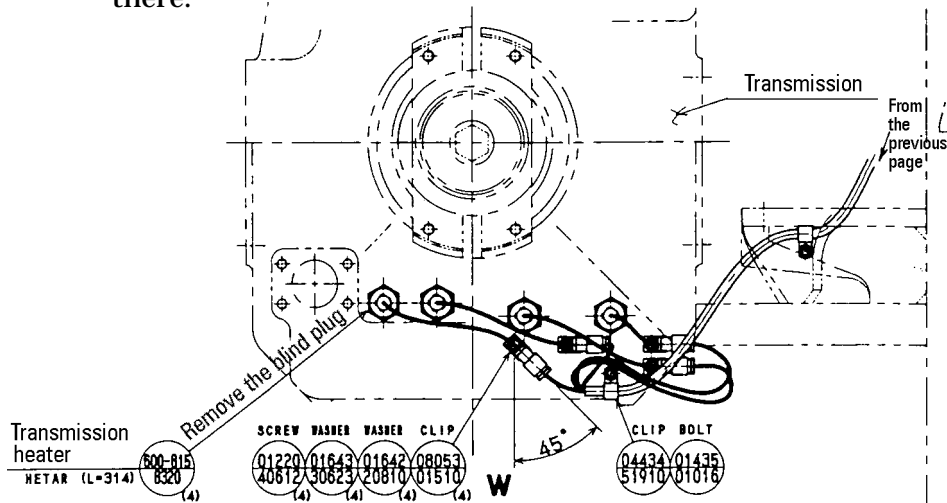
① Assembly of Hydraulic Tank Heaters and Wiring Harness

Assemble the hydraulic tank heaters and wiring harness as shown in the figure below.



② Assembly of Transmission Heaters

- Remove the four plugs from the rear side of the transmission transfer housing and assemble the heaters there.

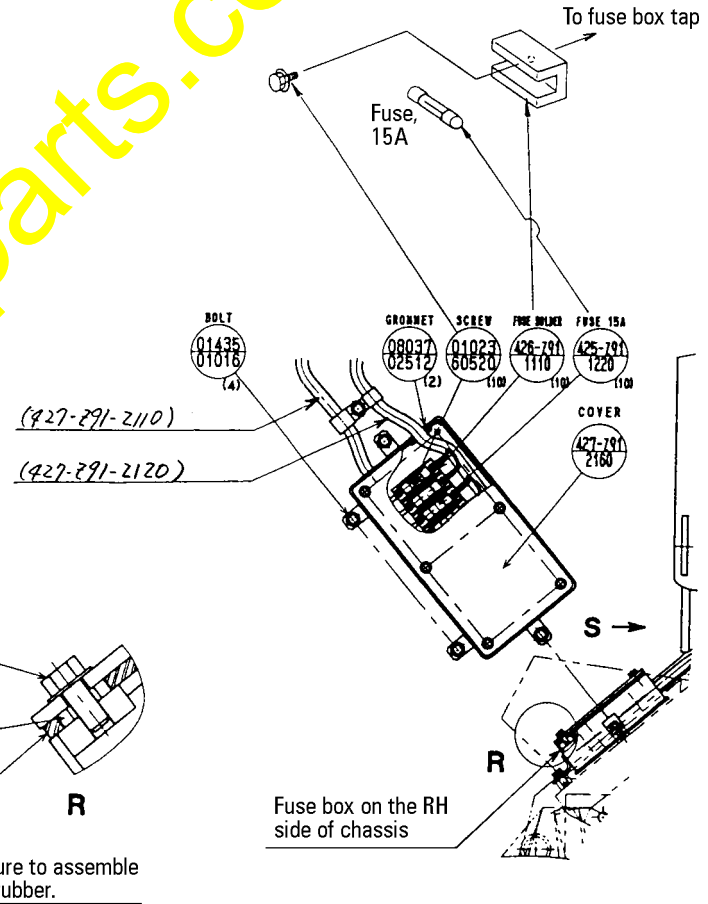


Bottom View of Hydraulic Tank

V

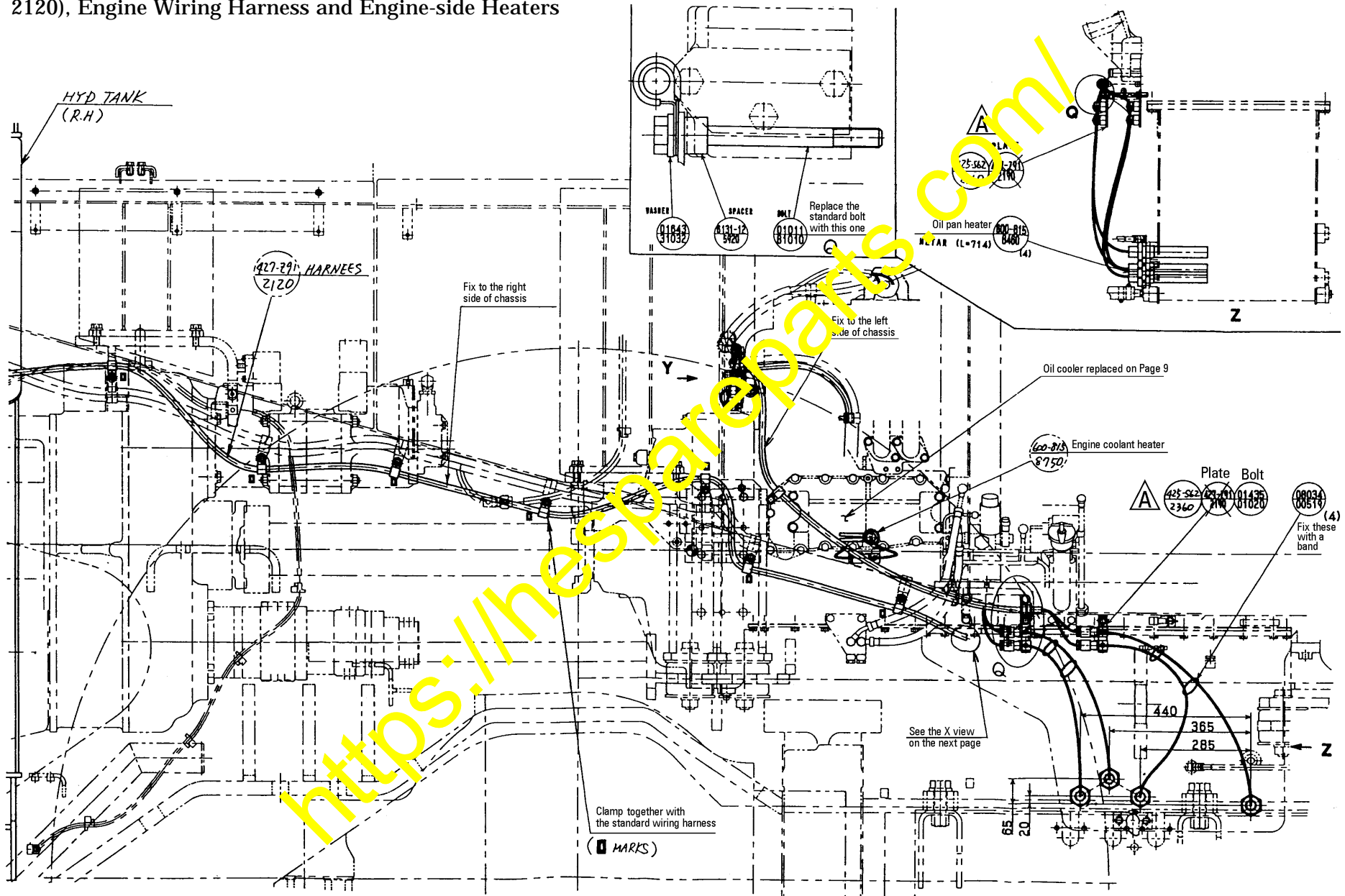
③ Assembly of Fuse Box

- Assemble the fuse box as shown in the figure and mount it to the rear frame. Assemble the wiring harnesses (427-Z91-2110, 427-Z91-2120) shown on the previous page to the fuse box at the time.

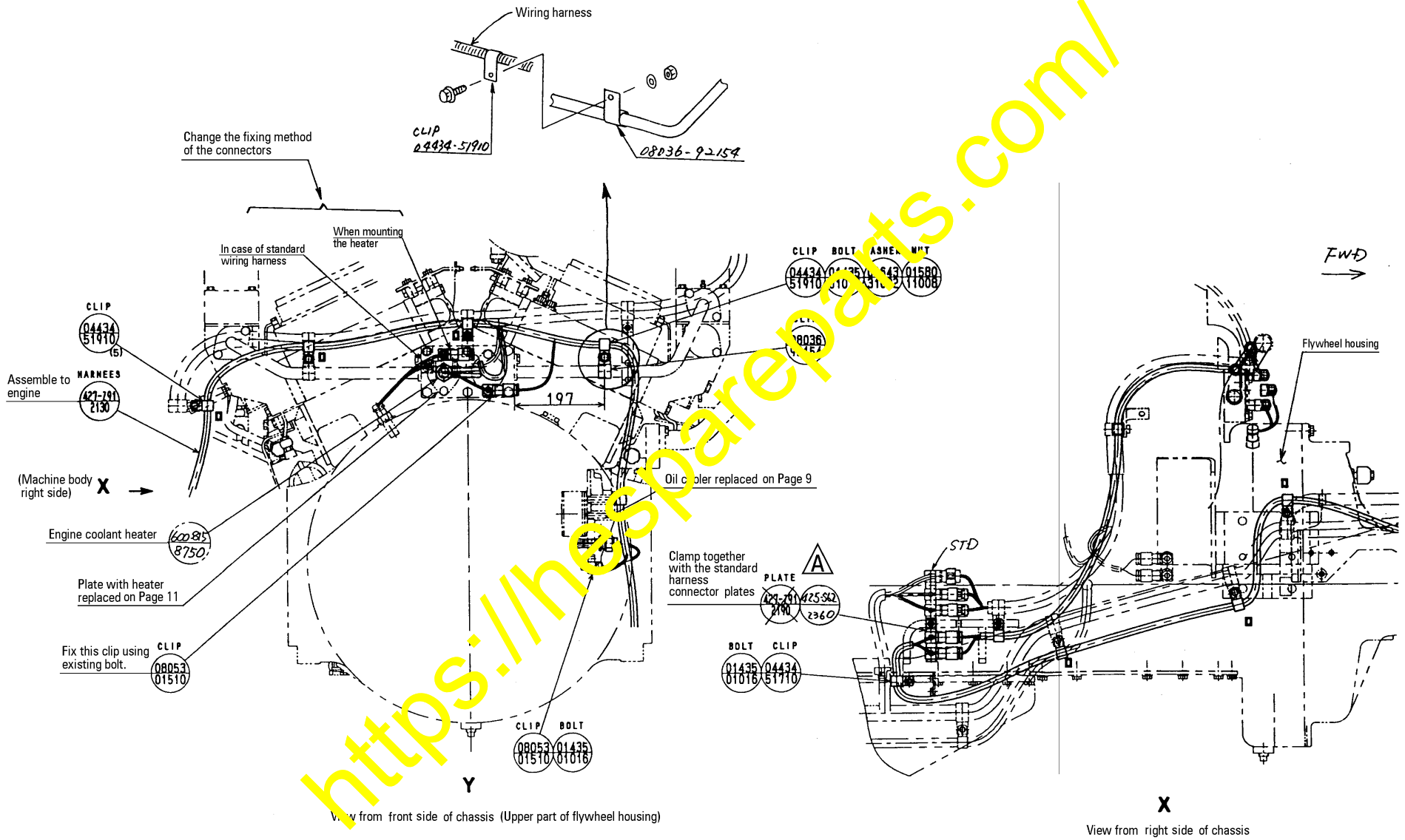


Fuse box on the RH side of chassis

④ Connection of Chassis-side Wiring Harness (427-Z91-2120), Engine Wiring Harness and Engine-side Heaters

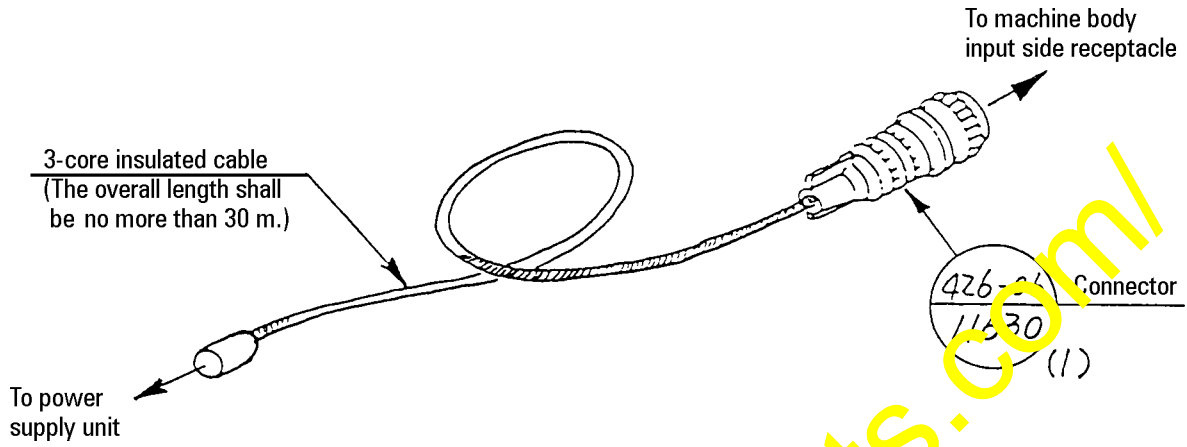


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⑤ Preparation of External Power Supply Input Cable

Prepare the following cable by using the newly obtained connector. For details, see Pages 19 and 20.



5. Hydraulic Tank Restoration and Flushing Procedures

- (1) Replace the flushing element of the hydraulic tank filter with a new standard element.
- (2) Replace the bypass circuit blocking plate with a bypass valve.
- (3) Replace the suction strainer with a new one.
- (4) Replace the PPC strainer with a new one.
- (5) Fill hydraulic oil to the specified level of the hydraulic tank.

Replacement of Hydraulic Tank Element

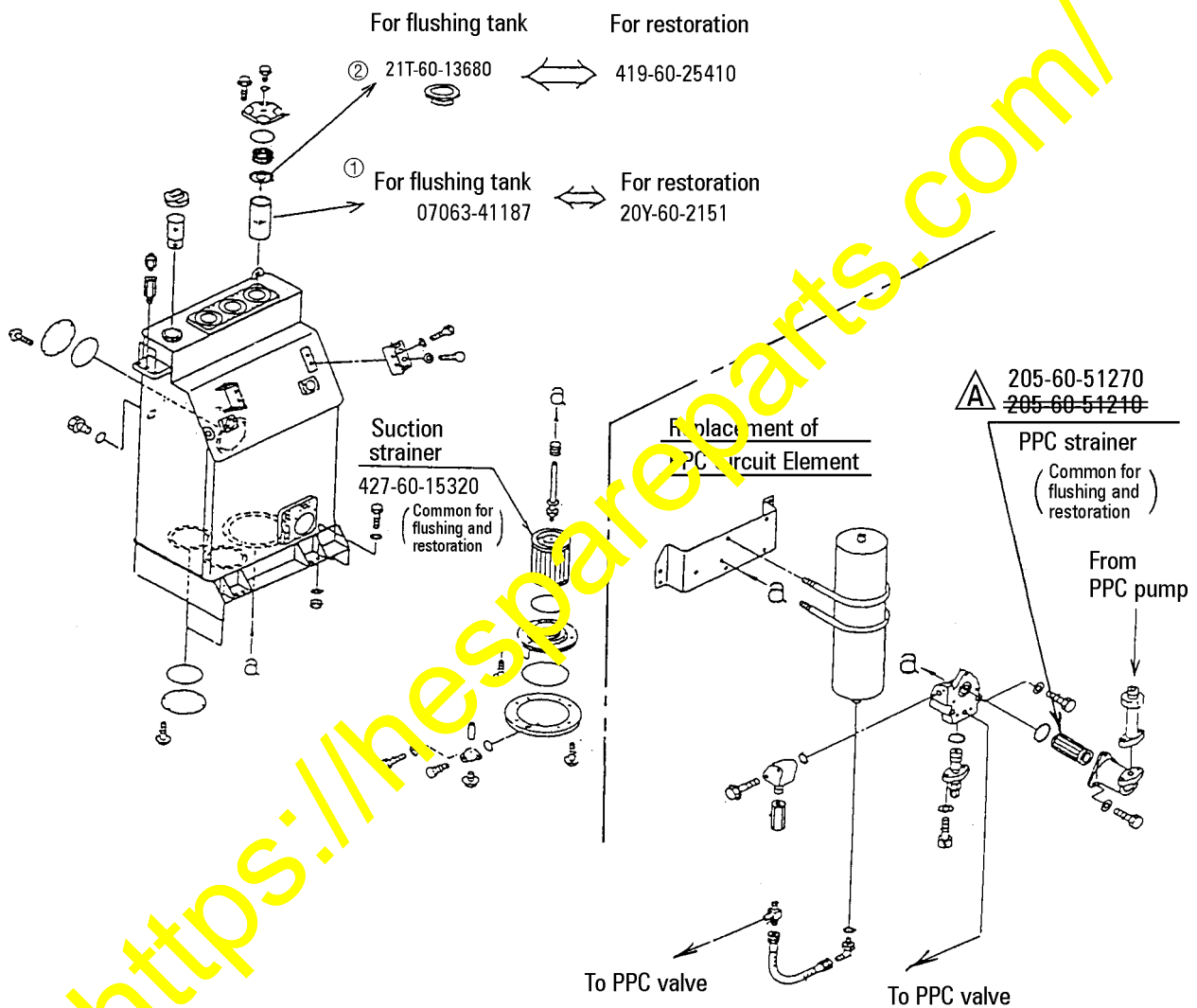


Fig. 2

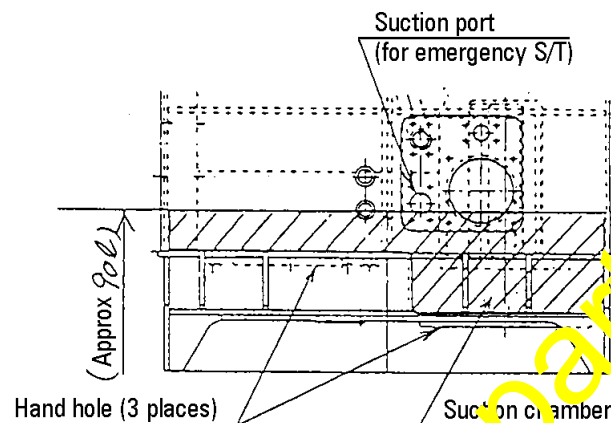
When flushing the tank as illustrated, replace the tank filter element and the valve with

- ① Flushing element (07063-41187) and
- ② Bypass circuit blocking plate (21T-60-13680).

Hydraulic Tank Flushing Procedures

After reworking the hydraulic tank, clean it as follows:

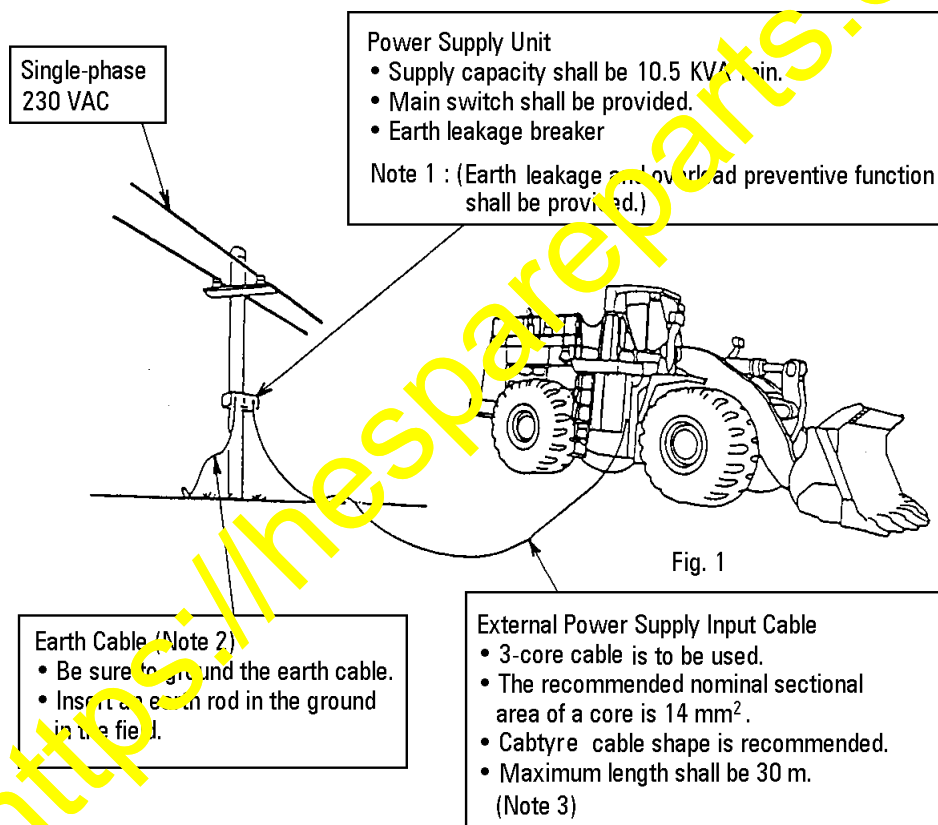
1. After drilling holes, deburr the tank inside using file, etc.
2. After welding the bosses, remove spatter and scales using a wire brush.
3. Rake out debris such as chips fallen inside the tank from hand hole at the bottom of the tank.
4. Attach the hand hole cover without strainer to the bottom of the tank, pour used oil in the tank until the oil overflows through the suction port (approx. 90 ℓ). Then, drain the oil through the drain cock and remove the hand hole cover to rake out debris.



5. Repeat Procedure 4 two or three times, and clean the suction chamber from the hand holes.
6. Restore the tank and mount it on the machine, then prepare for flushing as follows:
 - (1) Replace the hydraulic tank filter element with the flushing element. (See Fig. 2.)
 - (2) Replace the filter bypass valve with the bypass circuit blocking plate. (See Fig. 2.)
 - (3) Add fresh oil to the used oil in the hydraulic tank up to the specified level.
7. Flushing
 - (1) Start the engine and idle it low without operating the work equipment and the steering until the hydraulic oil temperature rises to 40 or 50°C.
 - (2) Run the engine at the medium speed for 20 minutes.
 - (3) Inspection of Element
After one cycle of (1) and (2), check the element. When it is soiled, clean it and conduct one cycle of the flushing again.

6. External Power Unit Installation Procedures for External Power Supply Type Electric Heaters

- ① Before using the electric heater, the following external power supply unit should be installed. For the detail, see ④.
 - Electricity type : Single-phase AC current
 - Voltage : 230 V
 - Supply capacity : 10.5 KVA min.
- ② It is necessary for you at your side to prepare the cable to lead the above electricity to the receiving port on the machine from the external power unit. For the preparation procedures, see ③.
- ③ Preparation of External Power Supply Input Cable
The external power supply input cable leads electricity from an AC power supply in the field to the input side receptacle on the machine. Connect the cable as shown in Fig. 1, and operate the electric heater.



Note 1 : The earth leakage breaker is provided to prevent electric shock to workers in case of leakage of the power supplied to the machine.

Note 2 : The earth cable is grounded for the same reason as Note 1.

Note 3 : For consideration of voltage drop prevention.

Though the external power supply input cable is prepared in the field so as to suit the field situations, it does not mean that any type is acceptable. Please prepare it paying attention to the following procedures and precautions:

<Preparing Procedures>

(a) Purchase a 3-core cable, Class 2 EP Rubber Insulated Cable (chloroprene sheathed cabtyre cable), referring to the following specification:

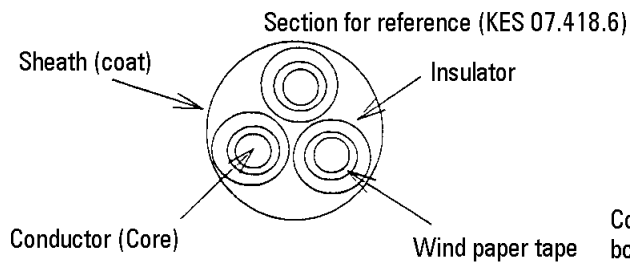


Fig. 2

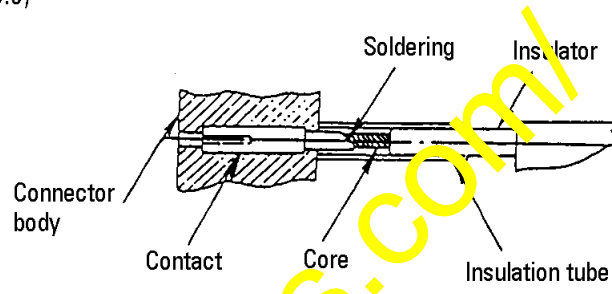


Fig. 3

- The appropriate nominal sectional area of a core is 14 mm².
- Withstand voltage : 3000 V, a minute
- Cable length: 30 m or less to prevent voltage drop

(b) Connect a machine body input side connector (426-06-11630 to be supplied alone) to an end of the cable.

Connect the three cores of the cable to the three connector contacts marked A, B and C as follows:

Contact symbols	Cores to be connected
A	Earth circuit line
B	} Power circuit line
C	

} Supply circuit

(Precautions)

- ① Connect the cores to the contacts by soldering.
- ② Insulate each contact with rubber tube or tape to prevent short-circuits due to conductor interference.
- ③ Be sure to use the connector 426-06-11630. Other connector does not allow connecting to the external power supply input side receptacle.

(c) Rework the other end of the cable so that it can be connected to the power supply unit shown in Fig. 1. When the rework ends, the external power supply input cable is completed.

④ Installation of Power Unit

The use of the preheating devices herein introduced require a power unit as shown in Fig. 1. The power unit is the equipment which serves to supply AC voltage from a substation or a generator to the preheaters and should be structured to easily accept the external power supply input cable.

You may select any shape, size and installation method, but observe the following specifications:

Specification of Power Unit

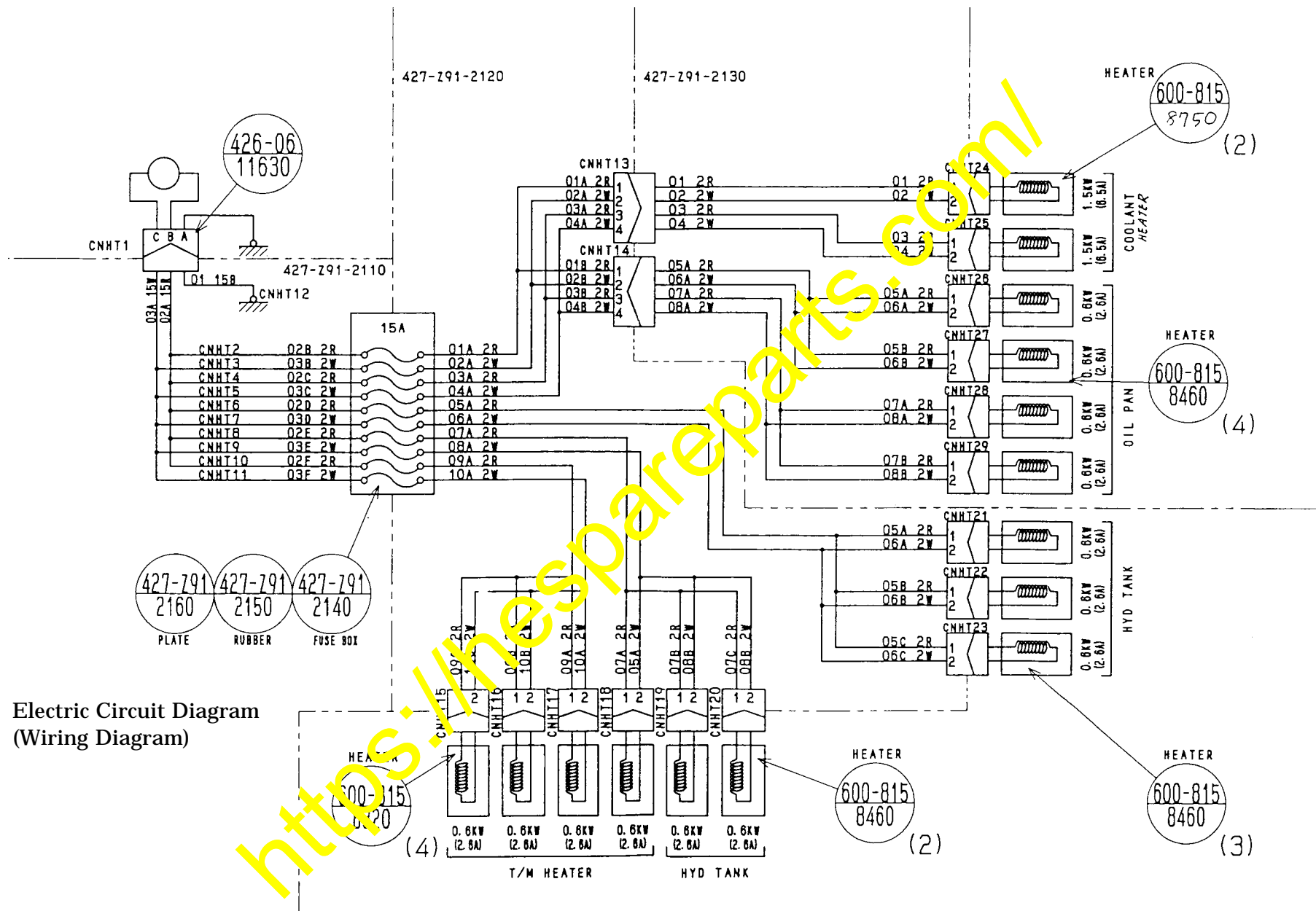
- (1) Output electricity type : Single-phase AC current
- (2) Output voltage : 230 VAC
- (3) Supply capacity : 10.5 KVA
- (4) A main switch shall be provided.
- (5) An earth leakage breaker shall be provided.
- (6) An earth circuit shall be provided.

Note : Ask a local contractor to construct the power unit according to procedures satisfying local laws and regulations in the area.

The above covers all the installation work.

The electric circuit diagram is shown on the next page for your reference.

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7. Electric Circuit Diagram (Wiring Diagram)