

PARTS & SERVICE NEWS

REF NO.	A920171
DATE	Dec. 4, 1992

Page 1 of 23

SUBJECT: INTRODUCTION OF COOLANT AND OIL HEATER FOR ENGINE

PURPOSE: To introduce coolant and oil heater for engine on the WA700-1

APPLICATION: WA700-1 Wheel Loaders, Serial Nos. 10001 and up

DESCRIPTION:

1. **Introduction**

This **PARTS & SERVICE NEWS** introduces electric engine coolant and oil heaters which can be utilized to improve engine startability in cold climates. These heaters draw power, 230 VAC single phase, from an external power source. Recommendations are for use when temperatures drop to -15°C ($+5^{\circ}\text{F}$) or below. Use should always be as described in this Parts and Service News.

NOTE: Also perform modifications entitled "Improving hard starting of WA700-1" found in Parts and Service News A910152A revised October 30, 1992 when installing these coolant and oil heaters.

<https://hespareparts.com/>

2. Parts to be obtained (Part 1) - Engine parts

2.1 Obtain the following parts:

No.	Part No.	Part Name	Q'ty	Purpose of part	Remarks
①	600-815-8360	Heater	2		Block heater
②	600-815-6330	Heater	1		Oil pan heater
3	6162-63-2311 (6162-63-2271)	Cover (Cover)	1 (1)		Oil cooler cover
④	6162-63-6770	Plate	1		Block heater mounting
⑤	6162-63-6730	Gasket	1		Block heater mounting
6	01010-30825	Bolt	6		Block heater mounting
7	01602-00825	Washer	6		Block heater mounting
⑧	08036-31210	Clip	1		Block heater mounting
⑨	08084-00310	Band	1		Block heater mounting
10	6127-61-2420	Gasket	1		Oil cooler cover blind
11	6162-63-2280	Gasket	2		Oil cooler element
12	6162-63-2290	O-ring	2		Oil cooler element
13	6167-61-5170	Gasket	1		Oil cooler element
14	6162-63-2131	Gasket	1		Oil cooler housing
15	6162-63-2140	Gasket	1		Oil cooler cover
16	6162-63-2160	Gasket	1		Oil cooler water inlet
18	07000-02075	Cap	1		Water pump outlet

The oil cooler cover with hole for mounting block heater is installed on the machines with Engine Number 15760 and up. For these engines, order only the part numbers with a circle in the number column.

2.2 Parts to be obtained (Part 2) - Chassis parts

Obtain the following parts.

Part No.	Part Name	Q'ty	Purpose of part	Remarks
175-54-86260	Boss	3		} Parts for rework
428-Z91-1170	Plate	1		
01571-01016	Seat	5		
154-54-23160	Seat	2		
426-06-11650	Cap	1		
01220-40320	Screw	4		
01641-20305	Washer	4		
01580-10302	Nut	4		
01601-20307	Washer	4		
426-06-11630	Cap	1		
428-Z91-1110	Harness	1		
428-Z91-1120	Harness	1		
08034-00536	Band	14		
427-Z91-1320	Box	1		
426-Z91-1110	Fuse holder	1		
01220-40516	Screw	1		
01641-20508	Washer	3		
425-Z91-1220	Fuse (15A)	4		
427-Z91-1330	Cover	1		
209-62-11810	Spacer	8		
01010-50825	Bolt	8		
01643-30823	Washer	8		
428-Z91-1220	Plate	1		
08036-02514	Clip	2		A-A, B-B
01641-20308	Washer	2		J-J
01135-01016	Bolt	10		A-A, B-B, E-E, F-F, G-G, H-
03036-03014	Clip	4		E-E
08052-12411	Clip	1		F-F
08052-11711	Clip	1		K-K
08052-01711	Clip	2		J-J
08036-01814	Clip	3		G-G, H-H
426-Z91-1180	Plate	1		J-J

2.3 Parts to be obtained (Part 3) - Chassis parts

Part No.	Part Name	Q'ty	Purpose of part	Remarks
01010-51225	Bolt	1		J-J
01643-31232	Washer	1		
01220-40608	Screw	2		Blind Plug for unused harness connectors
08050-02200	O-ring	6		
08050-02010	Body	6		
08050-02300	Grommet	6		
08050-00600	Plug	12		

<https://hespareparts.com/>

PROCEDURAL INSTRUCTIONS

- 3.0 Installing block heater (For engine coolant)
- 3.1 Drain engine coolant as described in the operation Manual. (Approx. cap. 200 ℓ)
- 3.2 Install the oil cooler cover with hole for mounting block heater as described on Fig. 1 (See **NOTE 1**).
- 3.3 Install block heater. Tighten block heater securing nut to 50 - 78 Nm (5-8 kgm) (37 - 58 Ft. Lbs.) torque.



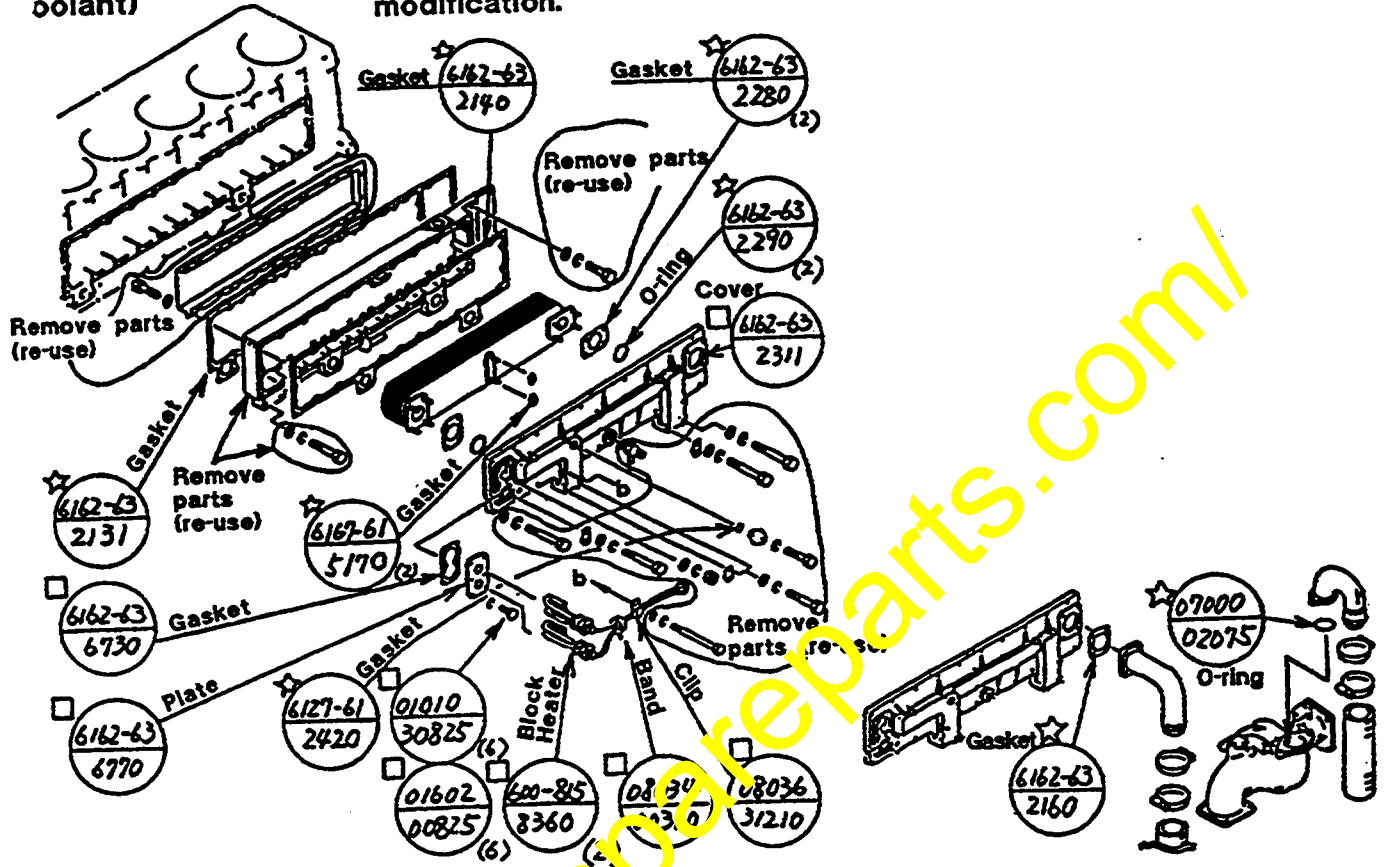
- 3.4 Refill previously drained coolant, step 3.1 after installing the block heater.
- NOTE 1.:** An oil cooler cover with hole for mounting the block heater is already installed on machines with Engine No. 15760 and up.

- 4.0 Installing oil pan heater (for engine oil)
- 4.1 Drain engine oil as described in the Operation Manual (Cap. 63 ℓ)
- 4.2 Install oil pan heater as described on figure 2.
- 4.3 Refill oil drained in 4.1 after installing oil pan heater.
- 5.0 Procedures for installing the additional wiring of electric heaters on chassis and for their operation
- 5.1 Perform additional wiring as described in the procedures in pages 8 thru 19
- 5.2 Operation procedure when the electric heater is installed is described in pages 22 and 23
- 6.0 Trial run
- 6.1 Perform daily inspection according to the procedure in the Operation Manual.
- 6.2 Start the engine to verify that oil or water does not leak anywhere, especially where modified. Also check for loosened electric wiring connectors and harness interference while the engine is at low idle running.
- 7.0 General matters for modification
- 7.1 Tightening torque of bolts and nuts shall conform to the standard torque as described in the Shop Manual, unless otherwise specified.

After Electric Heater is Installed

Block heater
(Engine
oilant)

Mark denotes newly installed parts
Mark ☆ denotes consumable parts for
modification.



Before Electric Heater is Installed

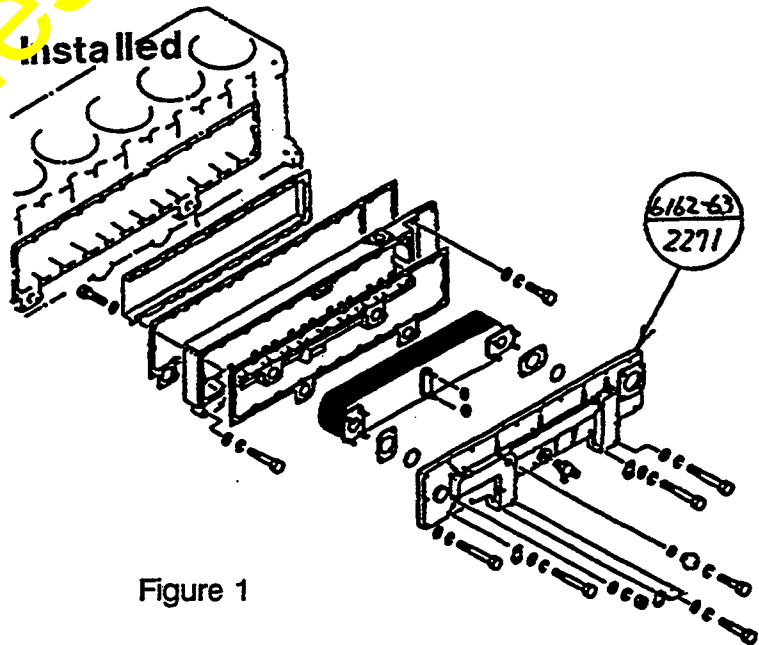


Figure 1

Oil pan heater
(Engine oil)

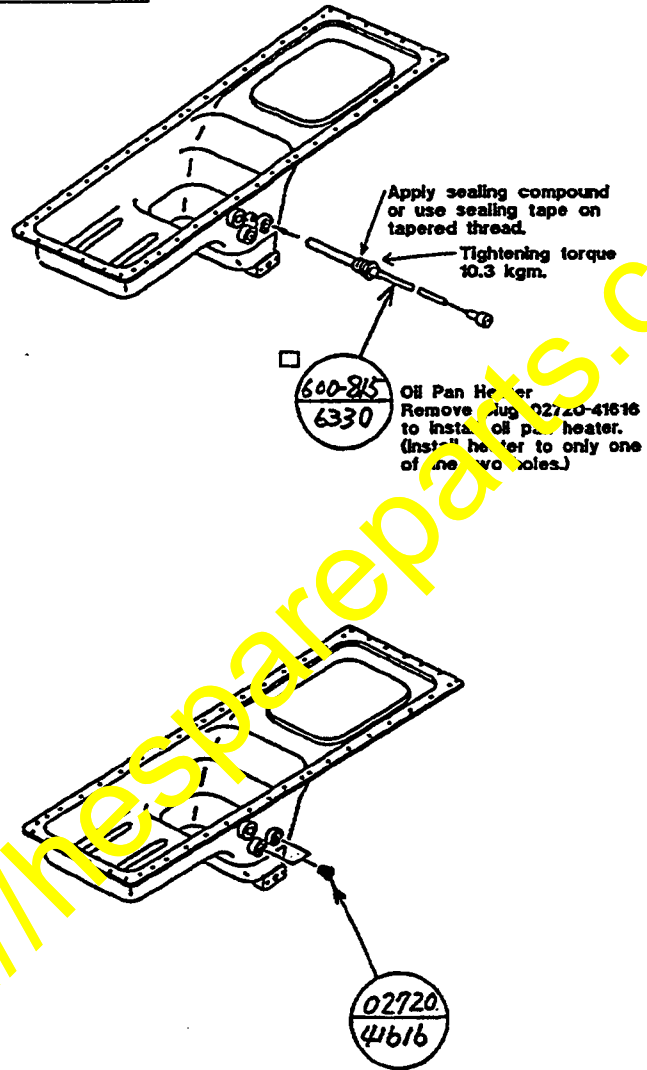
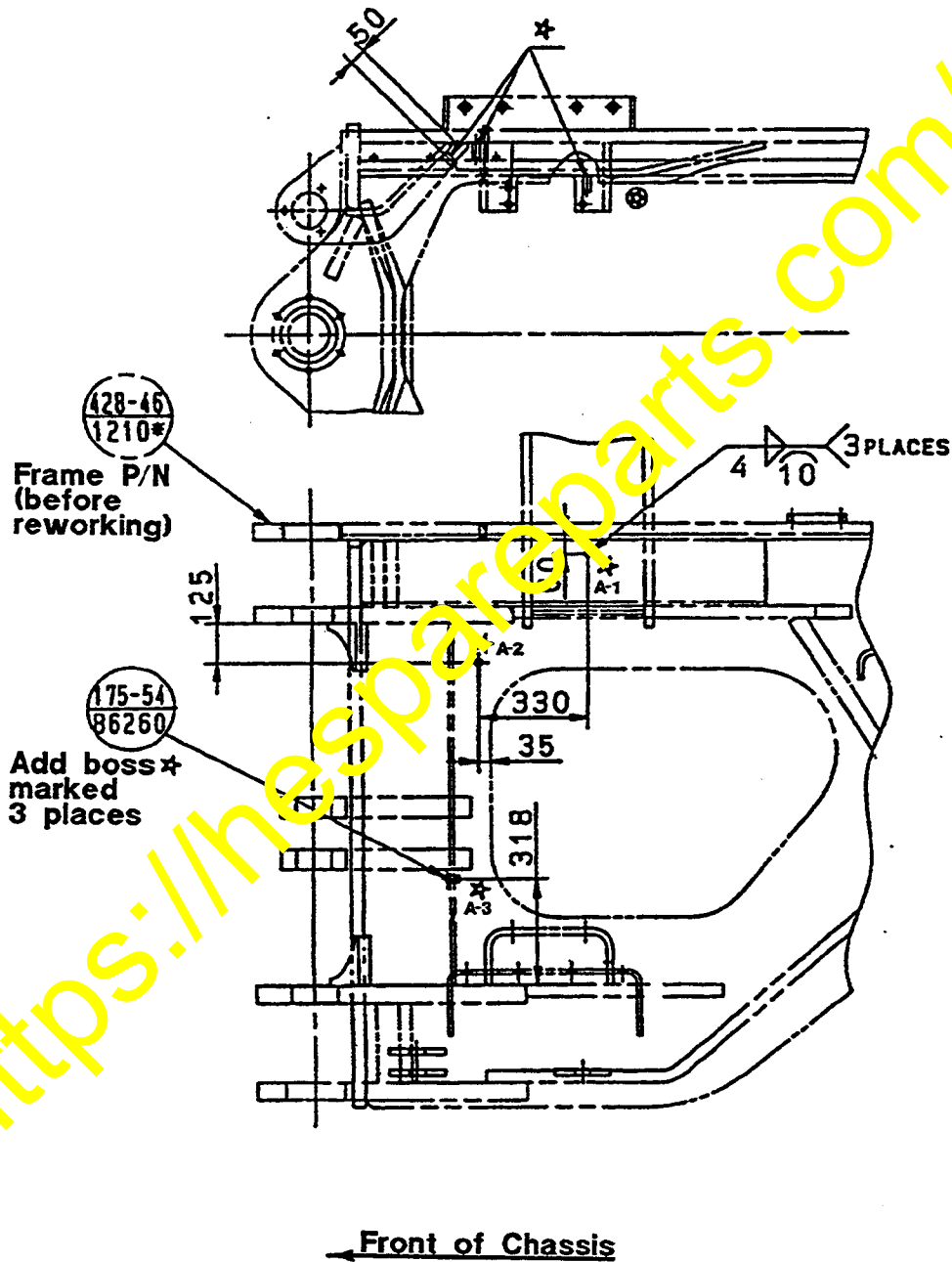


Figure 2

8.0 Rework procedures

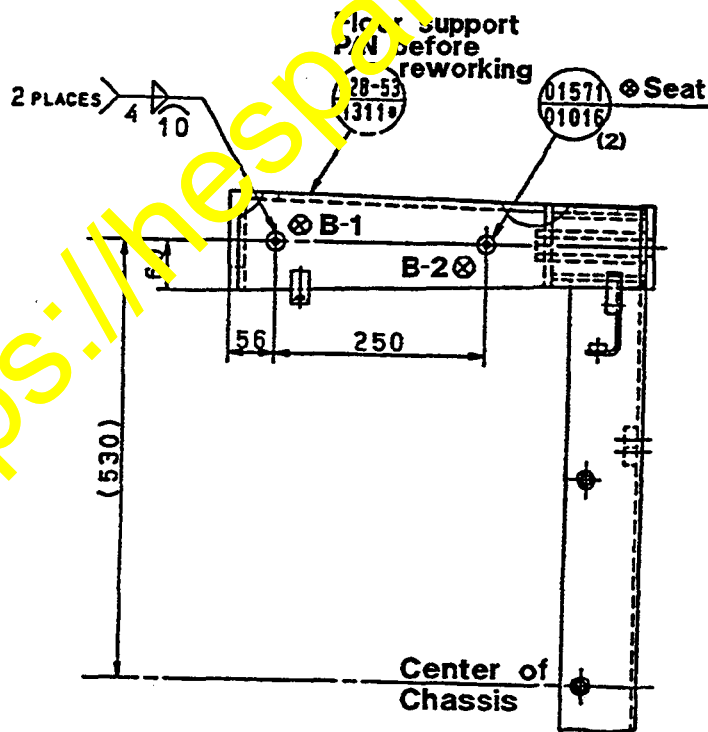
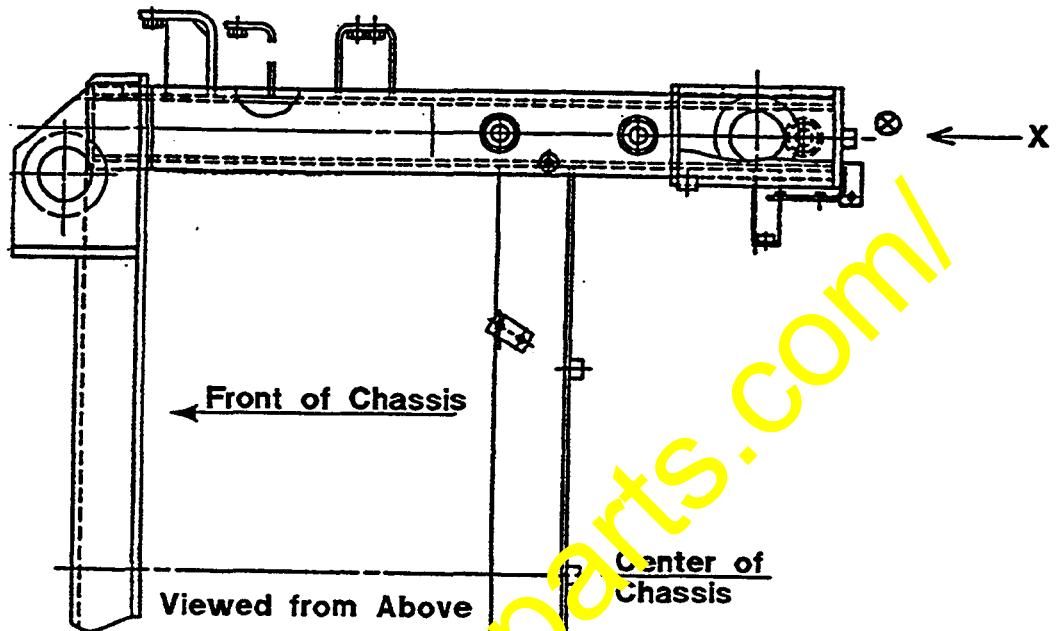
8.1 Rework right frame.

8.1.1 Add Bosses. 3 Harness Clamp Attaching, See locations A1, A2, and A3 below.



8.2 Rework floor support.

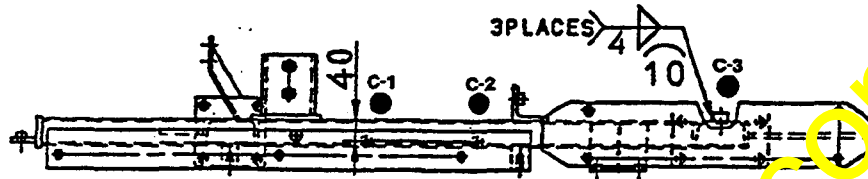
8.2.1. Add two harness clamp attaching seats, See locations B1, B2 below.



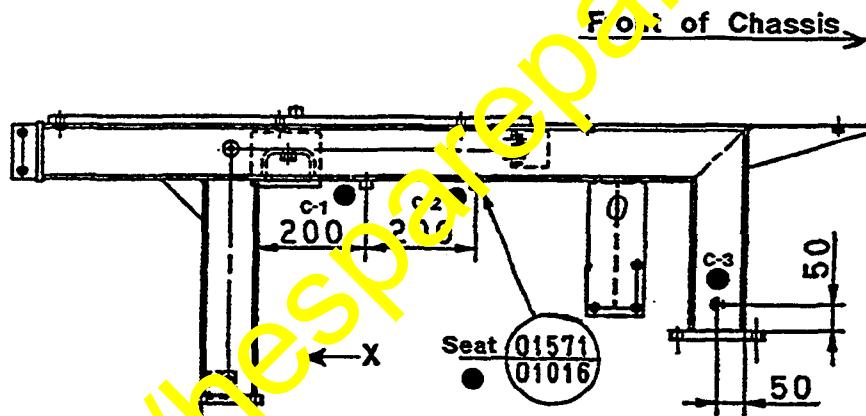
Location X Viewed from Rear

8.3 Reworking platform mount bracket, right side.

8.3.1. Add 3 harness clamp attaching seats, See locations C1, C2 and C3 below.



View from Above



View from Right Side

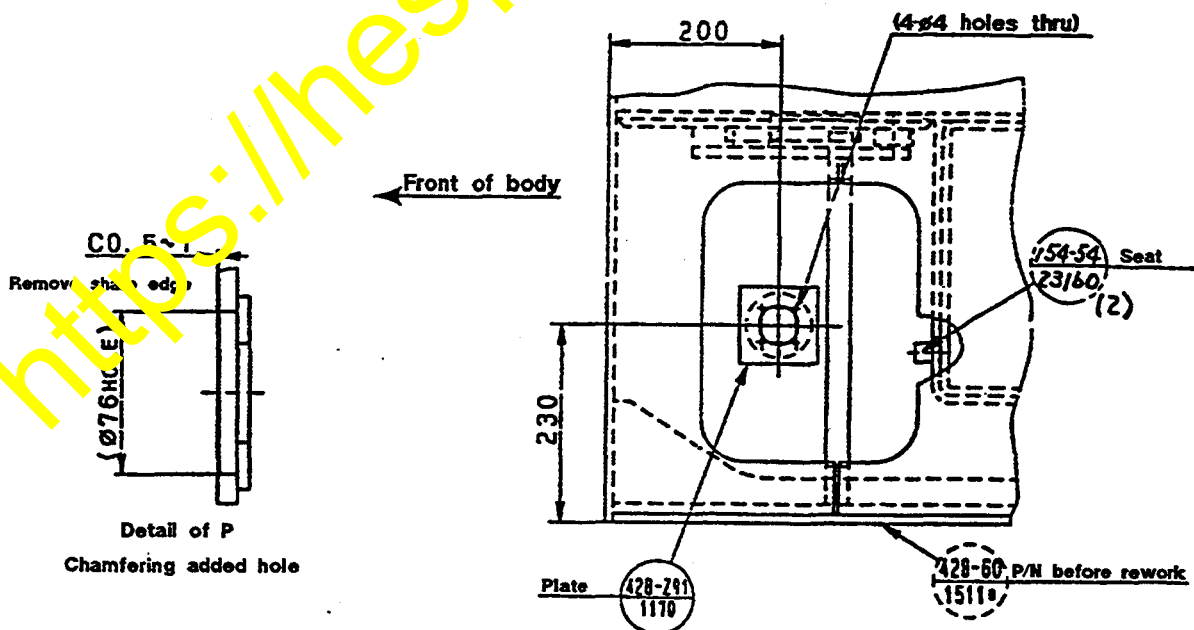
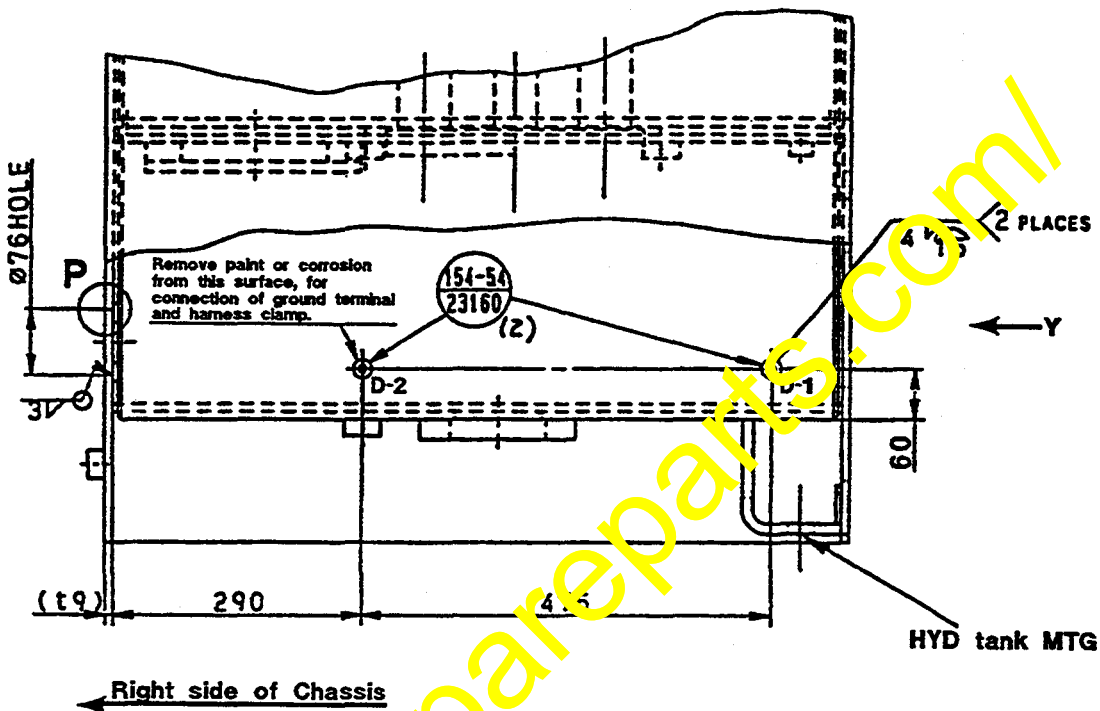
NOTE: Refer to drawing, page 11, for location of bracket (RH).

<https://mespareparts.com/>

8.4 Rework HYD tank (bottom)

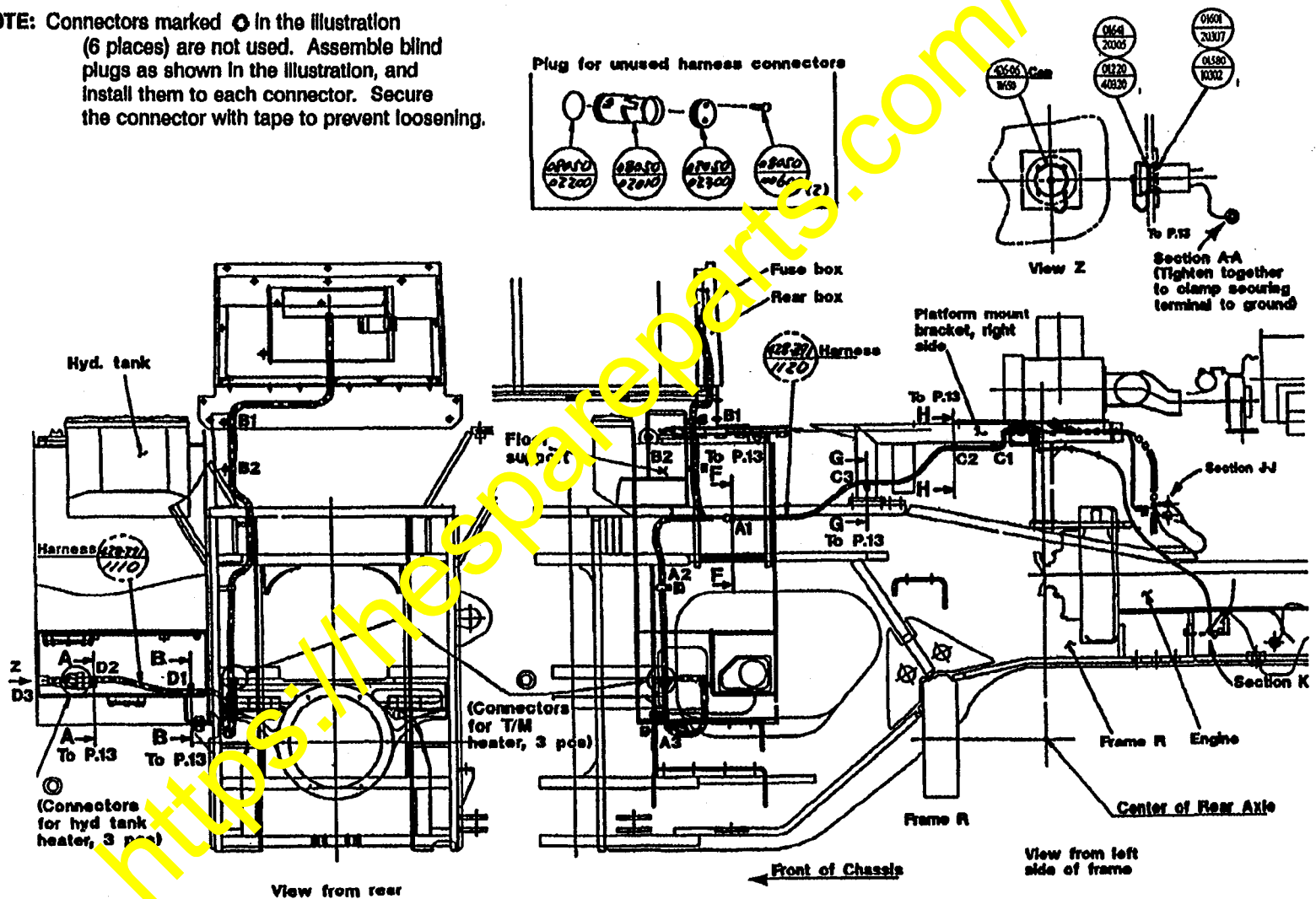
8.4.1 Add two harness clamp attaching seats D-1, D-2 at locations shown below.

8.4.2 Make $\varnothing 76$ hole P with quantity 4 - $\varnothing 4$ mount bolt holes as shown.

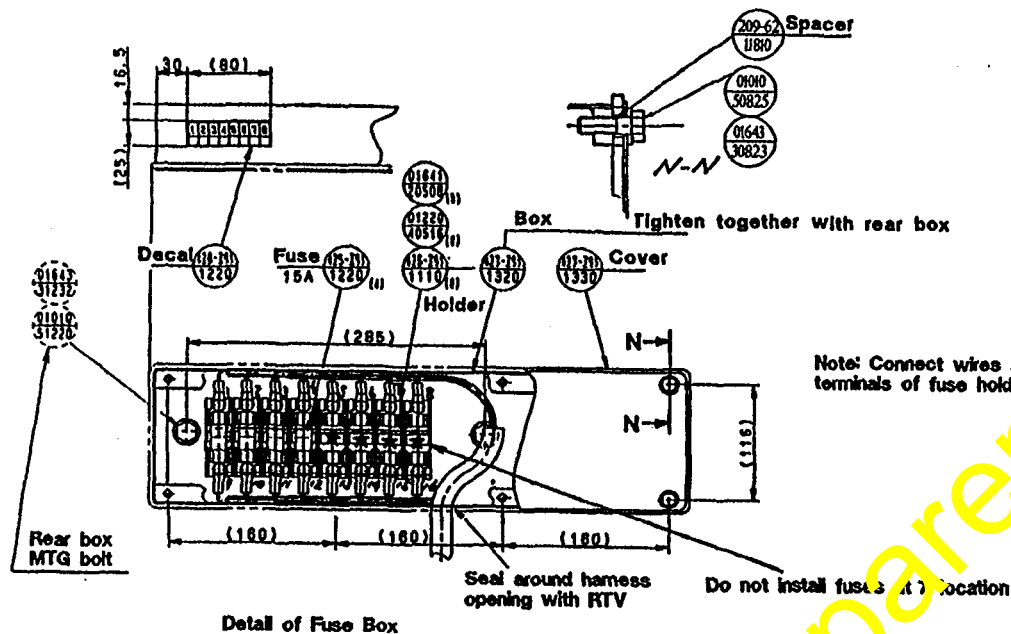


8.4.3 Assembly procedure. Perform assembly as shown in the following:

NOTE: Connectors marked **⊙** in the illustration (6 places) are not used. Assemble blind plugs as shown in the illustration, and install them to each connector. Secure the connector with tape to prevent loosening.



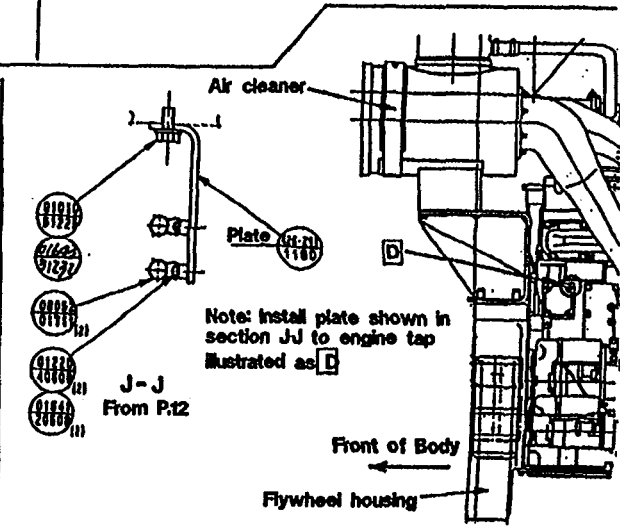
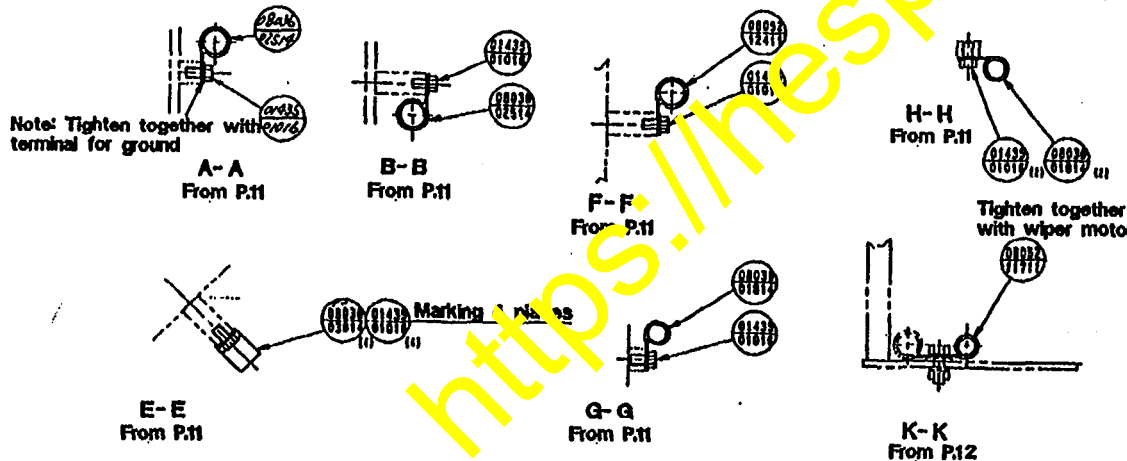
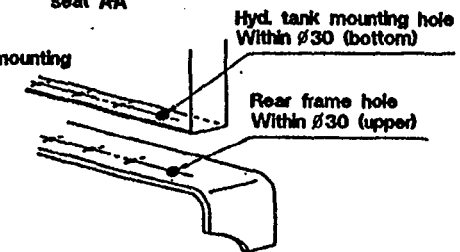
- Note:
1. Tightening torque of bolts shall conform to the standard as described in the Shop Manual.
 2. Apply LT-2 to bolts when installing clips for mounting connectors.
 3. Apply paint lock on ring terminals of M5 and below.
 4. Do not coat ground terminal. Remove paint before assembling, if any. (1 and 2 in illustration below)

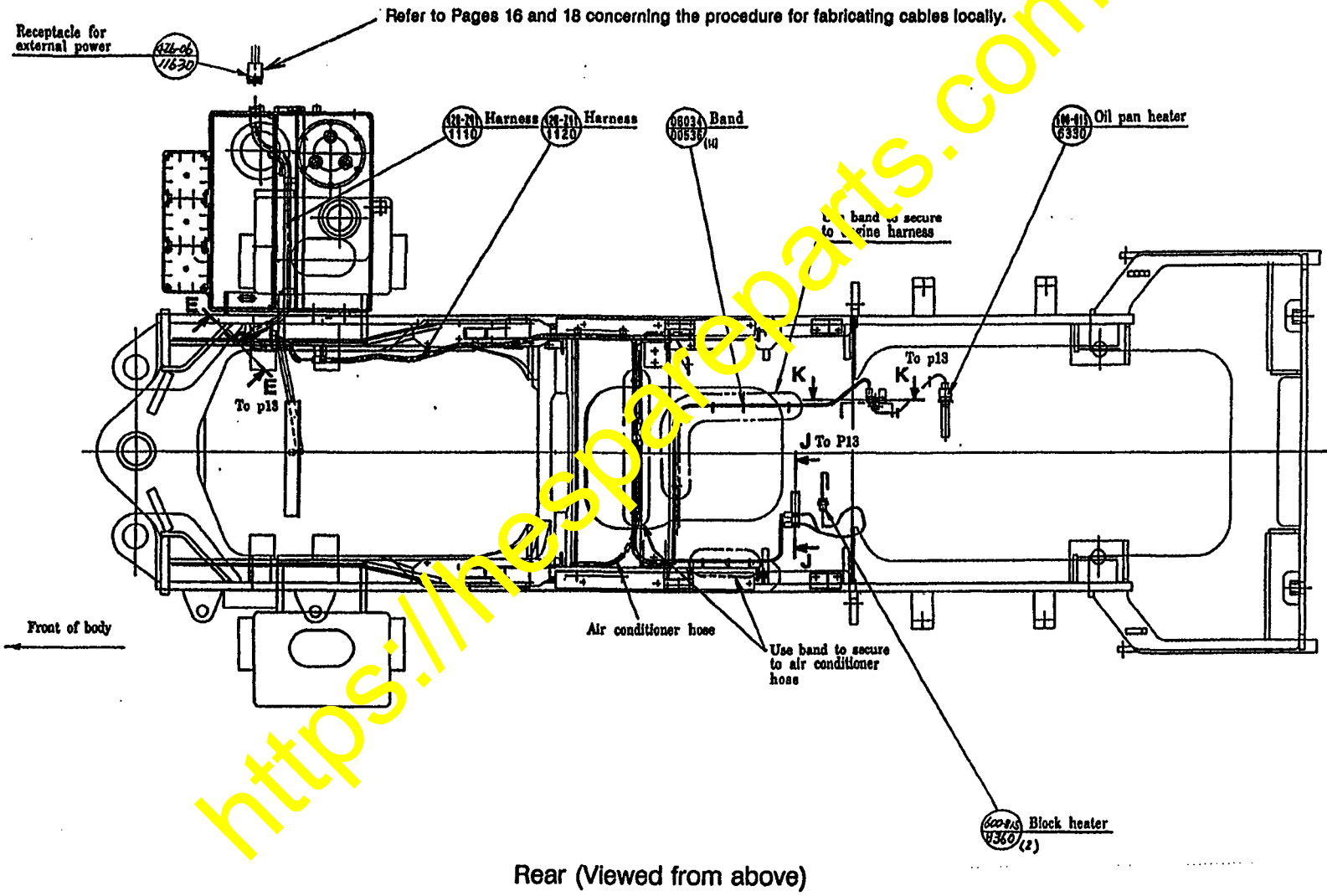


(1) Harness grounding



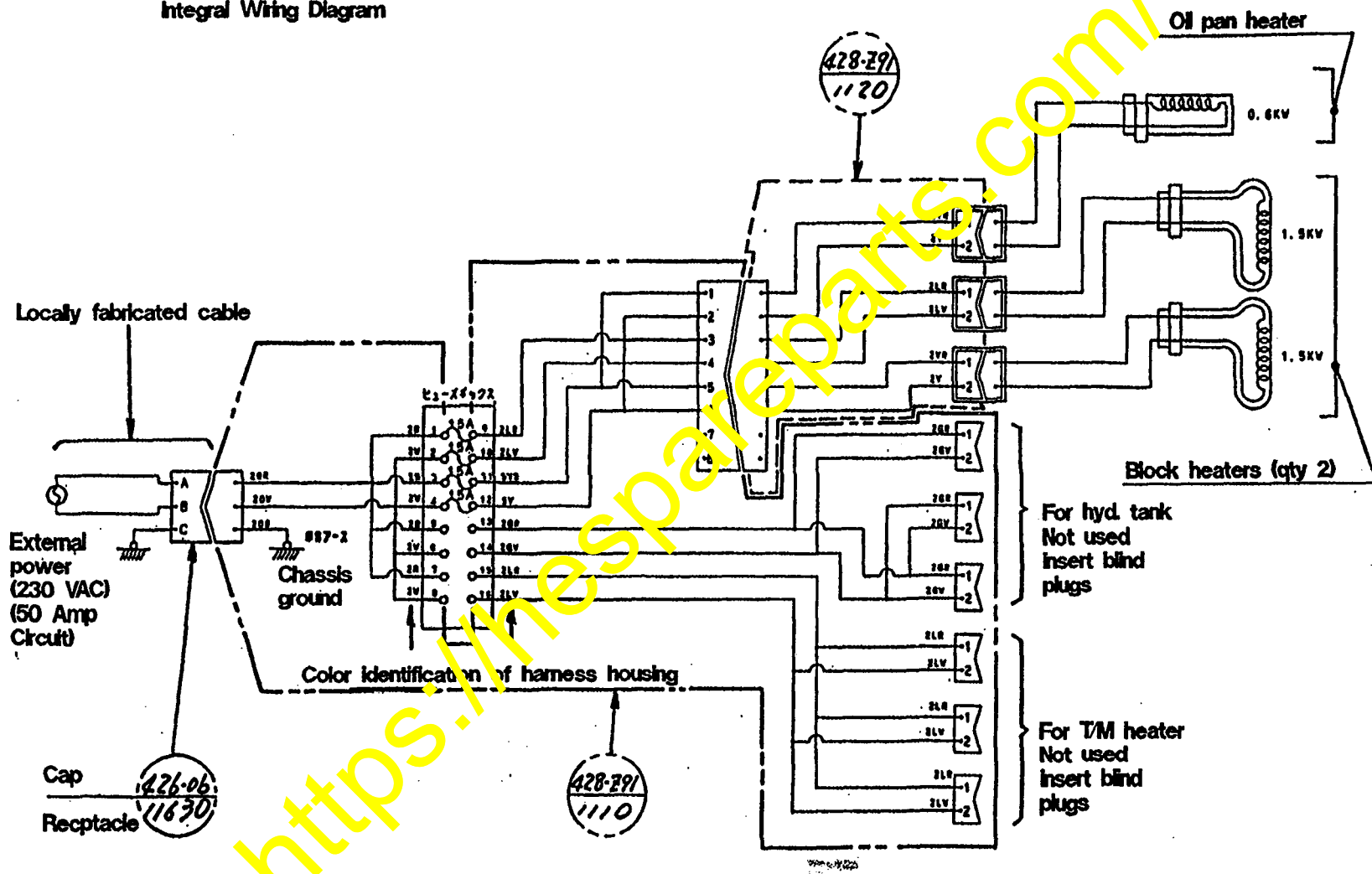
(2) Hyd. tank mounting





<https://www.espartparts.com/>

Integral Wiring Diagram



9.0 Electrical supply and cable requirements

Electric coolant and oil heaters are made available to improve engine startability in cold climates. These heaters are designed to operate on power received from an external source. They operate by warming oil in the engine oil pan, also by warming coolant in the crankcase thereby creating flow by means of thermal conduction.

9.1 The following external power is required to utilize these electric heaters.

Type: Single phase current

Voltage: 230 VAC

Supply Capacity: 8 KVA mm (8Kw minimum)

Circuit requirements: 50 amp

9.2 A cable (electric wire) must be fabricated to deliver the electricity from the power source receptacle to the heater receptacle on the loader. Refer to Cable fabrication procedure for details of local fabrication, external connections are described on Fig. 6.

9.3 Electrical power source requirements to use these preheating heaters. The power equipment described on figure 6 is required. This power equipment is used to supply AC voltage which is fed from a transformer station or a generator to the preheating heater. Therefore, it must be structured to easily connect the cable for receiving external power. Form, size and installation method may be determined locally, but they shall conform to the specifications as follows:

Specification of power equipment

- (1) Type of output power: Single phase AC
- (2) Output voltage: 230-V
- (3) Supply capacity: 8KVA (8Kw)
- (4) Main switch should be provided.
- (5) Ground Fault breaker should be provided.
- (6) Ground Circuit should be provided.
- (7) A 50 amp circuit is required.

NOTE: Installation procedures for electric equipment shall conform to the related rules and laws governing the work site and the equipment shall be installed by authorized persons.

Operation concerning installation of external power equipment will be furnished as described above.

Schematic flow diagram (Figure 7 on Page 19) and an integral wiring diagram, (Page 15) are provided for operational reference.

9.4 Local fabricating procedure for external power cable.

The external power cable should be fabricated locally depending upon the actual situation of the local area, however, its fabrication must be governed by some standards.

The following fabrication procedure and precautions should be observed in fabricating the cable.

<https://hespareparts.com/>

CABLE FABRICATION PROCEDURE

(a) Three-core chloroprene sheathed cable or equivalent should be purchased locally with reference to the following specification:

- Proper nominal cross-section of a single core is 14 mm².
- Withstand voltage should be 3000V per minute.
- Length of the cable should be no more than 30m (98 Ft.) to prevent voltage drop.

(b) Connecting plug (prepared part) 426-06-11630 on the input side of the chassis with the end of the cable. The plug has three contacts, each of which is identified with a symbol. Connect each of the three wires to their respective contact in accordance with the following table:

Contact Symbol	Wire to be connected	
C	Ground Wire	
B	Power Circuit Wire	Supply Circuit
A	Power Circuit Wire	

PRECAUTIONS

- 1) Connect the contact and wire by soldering
- 2) Insulate the soldered area by means of rubber sleeves or tape to prevent a short circuit due to interference between wires.

3) Be sure to use plug 426-06-11630. Plugs other than the above one can not be connected to the receptacle on the power equipment described in Figure 6.

- (c) Fabricate the opposite end of cable so that it can be connected to the power equipment described in Figure 6. Figure 5 shows finished cable.

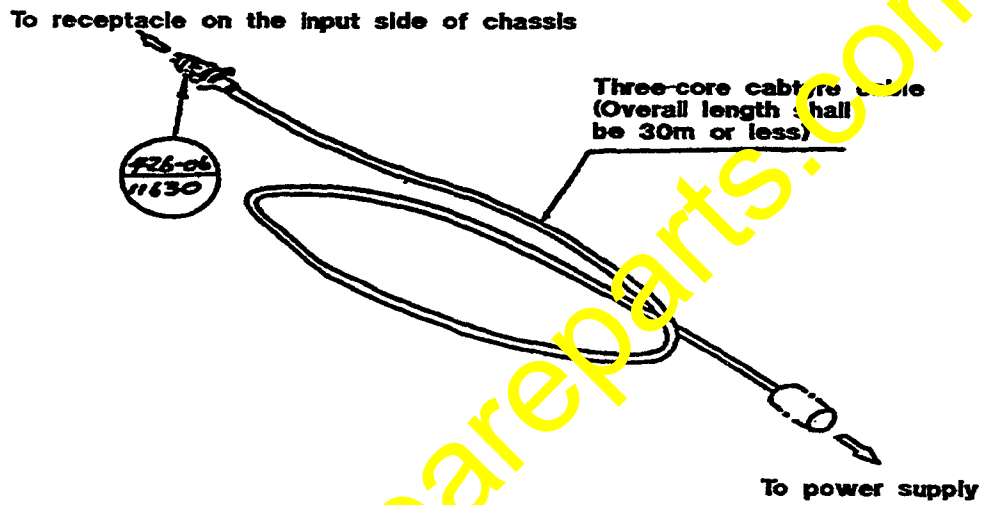
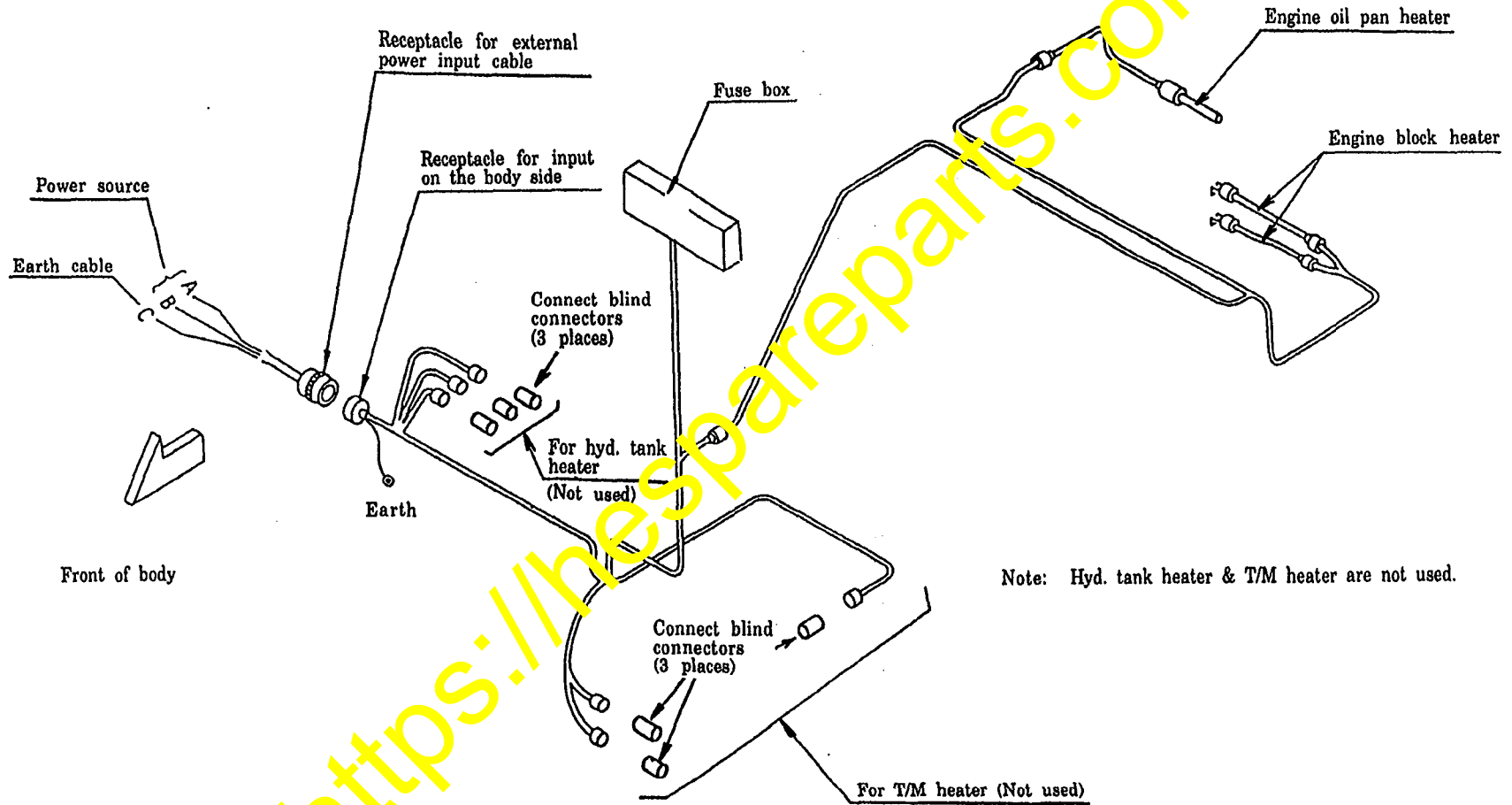
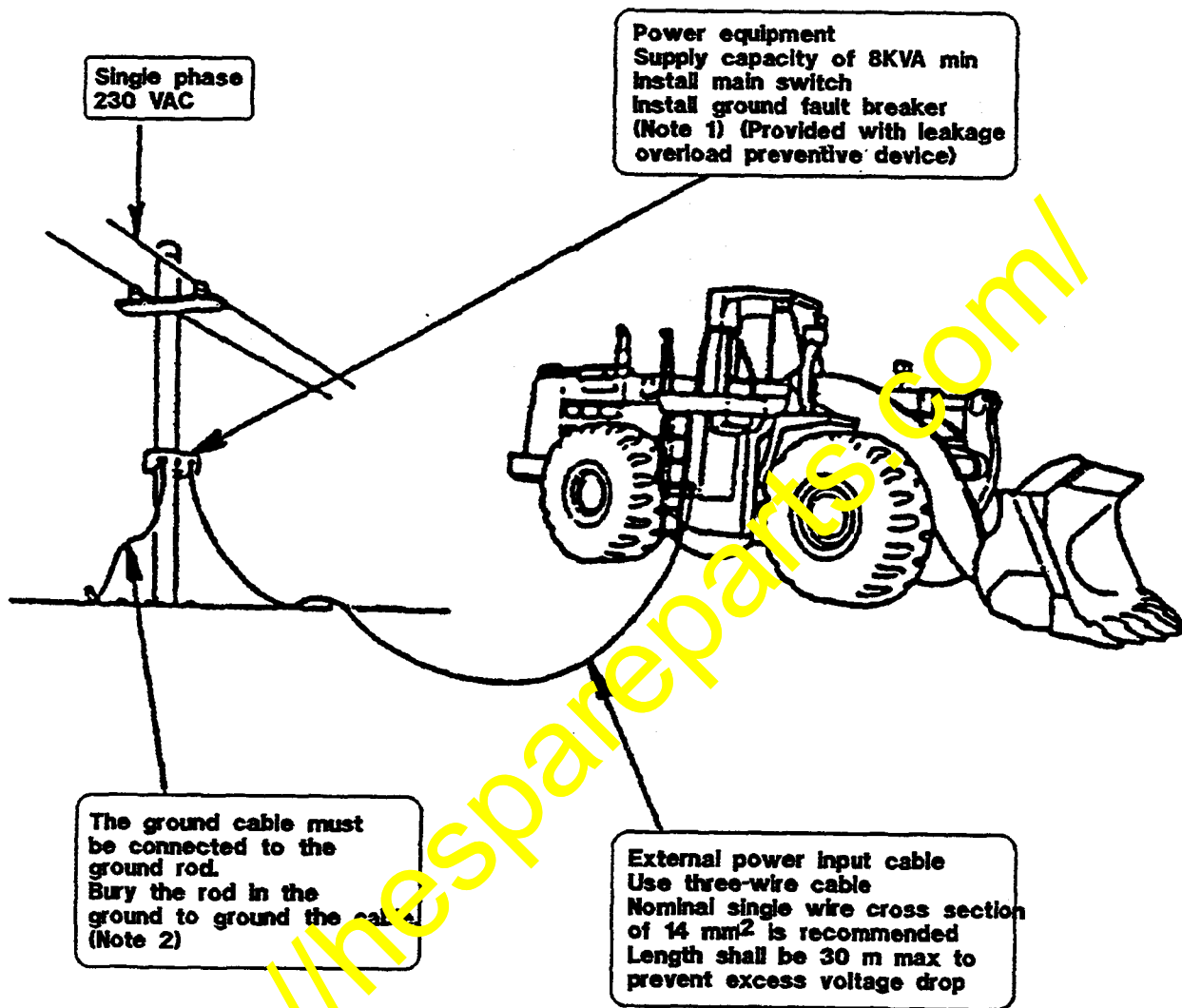


Figure 5

Figure 7 system for pre-heating heaters using external power



4. Connecting external power cable



The ground cable must be connected to the ground rod. Bury the rod in the ground to ground the cable. (Note 2)

Power equipment
Supply capacity of 8KVA min
Install main switch
Install ground fault breaker
(Note 1) (Provided with leakage
overload preventive device)

External power input cable
Use three-wire cable
Nominal single wire cross section
of 14 mm² is recommended
Length shall be 30 m max to
prevent excess voltage drop

NOTE 1: Ground fault breaker is installed to prevent a man from receiving electric shock when the supply current is leaked to the body of the vehicle.

NOTE 2: The reason why the ground cable is grounded underground is similar to Note 1.

Figure 6

5. Operation procedure

To use the preheating heaters, park the loader within close proximity to the external power receptacle, i.e.: within external supply cable range, before engine shut down.

PRECAUTIONS

- 1) Parking area should be flat.
- 2) Take actions to prevent tires from freezing to the ground.
- 3) Work equipment should be lowered to the ground.
- 4) Placing a cover over the vehicle will make the engine starting easier.
- 5) Engine oil and coolant must be filled to prescribed level.
- 6) There shall be nothing flammable on or in the vicinity of the preheating heater.
- 7) Remove flammables such as dead leaves accumulated on the engine.
- 8) Check and repair wire damage to external connecting cables or heater wiring harnesses before switching electric current on.

2. Turn on an electric current to the preheating heaters 8 hours before starting the engine to warm coolant and oil in the engine oil pan.

★ If the vehicle is not used for more than a day, turn on an electric current 12 hours before using the vehicle to warm and then start the engine according to the start-up procedures for the cold season.

PROCEDURE FOR TURNING ON AN ELECTRIC CURRENT

- (1) Connect the power equipment and the receptacle on the input side of the vehicle using a cable as shown in Figure 8.
- (2) For turning on an electric current, use the power switch (main switch) or a switch for turning on the current of the power equipment.
- (3) When using an electric heater, be sure to ground the earth cable as shown in Figure 8.

Figure 8

⚠ It is extremely dangerous to connect the cable after turning the power switch "ON". Connect the cable first.

⚠ Verify the ground cable is grounded before turning the power switch "ON".

★ The above is a generally applicable procedure. If there is any special weather conditions at the working site, it will be necessary provide an operational standard conforming with the work area.

(4) Be sure to shut off the heater power before starting the engine.

When an electric current is supplied to the electric heater while the engine is running, the heat of the engine together with the heat from the electric heater will cause overheating of coolant and lubricating oil.

★ Do not operate engine oil heater when the temperature is 90°C and above. Excessive oil temperature will accelerate deterioration of oil.

<https://hespareparts.com/>

<https://hespareparts.com/>