Service Manual

Pallet Truck

EPE20LI/EPE18LI/EP15SLI/EP18SLI series EP15LI

WARNING

You must understand the operation instructions in this manual before using it.
Attention:

- Please check the last page of this document and all the current product type identification on the name plate.
- Keep it for future use

Table of Contents

1. Maintain list

A. Main part overview

Table 1: Maintain list		Time interval (Month)			
		1	3	6	12
Hydraulic system					
1	Check the hydraulic cylinder and the piston for damage, noise and leakage.		•		
2	Check the hydraulic connector for damage and leakage.		•		
3	Check the Hydraulic oil level and refill if necessary.		•		
4	Refill hydraulic oil after 12 Months or 1500 hours working time				•
5	Check and adjust the function of the hydraulic valve (1500kg/2000kg+0/+10%)				•
Mechanical system					
6	Check whether the fork is deformed or broken.		•		
7	Check whether the chassis is deformed or broken.		•		
8	Check if all screws are fastened		•		
9	Check whether the push rod is deformed or broken.		•		
10	Check the gearbox for noise and leakage		•		
11	Check whether the wheel rod is deformed or broken.		•		
12	Lubricate steering bearings				•
13	Check and lubricate the pivot point		•		
14	Grease nipple	•			
Electrical system					
15	Check whether the power wiring is damaged		•		
16	Check The electrical connection		•		
17	Detect Emergency switch function		•		
18	Check the electric rive system for noise damage		•		
19	Check the Electricity meter		•		
20	Check if the correct fuse is used		•		
21	Detection warming signal		•		
22	Check the contactor		•		
23	Check for leaks in the frame (Insulation test)		•		
24	Check the function and wear of the drive controller		•		
25	Check the electrical system of the drive motor		•		
Brake system					
26	Check the brake performance. replace the brake dis or adjust the air gap if necessary		•		
Battery					
27	Check the battery voltage		•		
28	Check the terminals for corrosion and damage and lubricate the terminals		•		
29	Check whether the battery cover is damaged		•		

Charger					
30	Check whether the main cable is damaged.			•	
31	Check the startup protection program during charging			•	
Function					
32	Check the horn function	•			
33	Check the air gap of the solenoid valve	•			
34	Detect Emergency braking	•			
35	Detection of reverse braking and regenerative braking.	•			
36	Check the Emergency reverse switch function	•			
37	Check the steering function.	•			
38	Check the lifting and lowering functions	•			
39	Check the handle proximity switch function	•			
Comprehensive					
40	Check that all labels are clear and complete	•			
41	Check the bearing wheel and adjust the height, replace if it is worm.		•		
42	Perform a test run	•			

B. Lubrication point

Lubricate the marked points according to the maintenance list. The required grease specification is DIN51825 standard Grease

Pic.1: Lubrication point

Bearing lubrication

Butter filler

C. Check and refill hydraulic oil

According to the temperature, the recommended hydraulic oil type as below: Temperature	– 5℃~25℃	>25℃
Model	HVLP 32， DIN 51524	HLP 46， DIN 51524
Viscosity	28.8-35.2	41.4 - 47
Oil volume	0.4 L	

Waste materials such as waste oil, Waste batteries or other materials must be processed and recycled in accordance with national regulations .and if necessary, they must be handed over to recycling companies for recycling.

The oil level should not be lower than the minimum amount of oil required to start the truck.

If necessary. Please add oil to the filling points.

D. Check electrical fuses

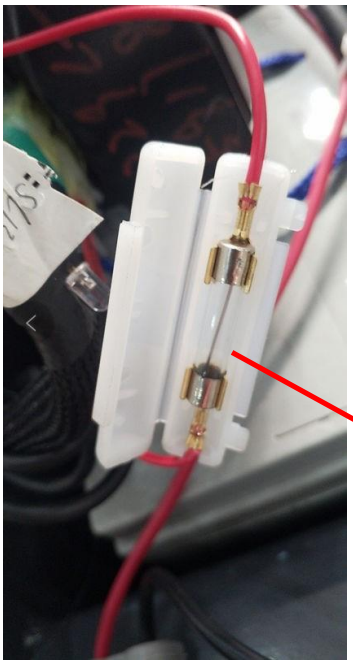


Table 2: Fuse specification

	Specification
Fuse 1	10A
Fuse 01	100A

2. Failure analysis

A. Common failure analysis

If the truck still in problem, please follow the instruction in Chapter 6 in this manual

Table 3: Failure analysis

Malfunction	Cause	Solution
Goods can't be lifted up	Overload	Only lifting max capacity shown on name plate
	Battery discharge	Charge the battery
	Lift fuse damaged	Check and replace the lifting fuse if necessary
	Low hydraulic oil level	Check and refill hydraulic oil if necessary
	Oil leakage	Check the sealing condition of the oil cylinder
Suction leak	High oiliness	Reduce oiliness
The truck can't operate	Battery is charging	Fully charge the battery, then unplug the main power plug from the outlet
	Battery disconnected	Connect the battery correctly
	Fuse is damaged	Check and replace the lifting fuse if necessary
	Low battery	Charge the battery
	Emergency switch is activated	Turn the emergency switch clockwise
	The handle is not in operating area	Bend the handle to operating area.

If the truck breaks down and can't be operated outside of the working area, Jack up the truck and place a load handing device under the truck to ensure the safety of the truck, and then move the truck to of the tunnel

B. Controller fault code display

Programmer display	Code	Failure phenomenon	Troubleshooting
BATTERY DISCONNEC T FAULT	**4.5**	Battery disconnected	1) Battery not connected 2) Poor connection to battery terminals
BRAKE OFF FAULT	**3.4**	BRAKE OFF FAULT	1) Electromagnetic brake coil shorted 2) Electromagnetic brake driver open
BRAKE ON FAULT	**3.2**	BRAKE ON FAULT	1) Electromagnetic brake coil open 2) Electromagnetic brake driver shorted
CURRENTSENSE FAULT	**4.1**	CURRENTSENSE out of range	1) Short in motor or in motor wiring 2) Controller failure
EEPROM CHECKSUM FAULT	**4.3**	EEPROM fault	1) EEPROM failure or fault
HARDWAR E FAILSAFE	**4.2**	Motor voltage out of range	1) Motor voltage does not correspond to Throttle request 2) Short in motor or in motor wiring 3) Controller failure
HPD FAULT	**3.5**	HPD fault	1) Improper sequence of throttle and KSI, push or inhibit inputs 2) Misadjusted throttle pots.

MAIN FAULT	**2.3**	Main contractor fault	1) Main contractor welded or stuck open 2) Main contractor driver fault
MAIN OFF FAULT	**2.1**	Main contractor driver off fault	1) Main contractor driver failed open
MAIN ON FAULT	**2.4**	Main contractor driver on fault	1) Main contractor driver failed Closed

OVERVOLTAGE FAULT	**1.5**	Battery voltage too high	1) battery voltage >31V 2) Truck operating with charger attached 3) intermittent battery connection
PRECHARGE FAULT	**3.3**	Pre-charge fault	1) Controller failure 2) Battery low voltage
SPEED POT FAULT	**1.3**	Speed limited pot wiper out of range	1) Speed limit pot wire(s)broken or shorted 2) Speed limit pot wire(s)open
THERMAL FAULT	**1.1**	Over-/under-temperature cut back	1) temperature>80°C or <-10°C 2) Excessive load on truck 3) Operating in extreme environment 4) Electromagnetic brake not releasing
THROTTLE FAULT	**1.2**	Pot low and/or pot wiper out of range	1) Throttle input wire open or shorted 2) throttle port defective 3) wrong throttle type selected.
UNDERVOLTAGE FAULT	**1.4**	Batter voltage too low	1) Batter voltage<17V 2) bad connection at battery or controller

C. Troubleshooting for common faults

- Code 4.5 battery is not connected

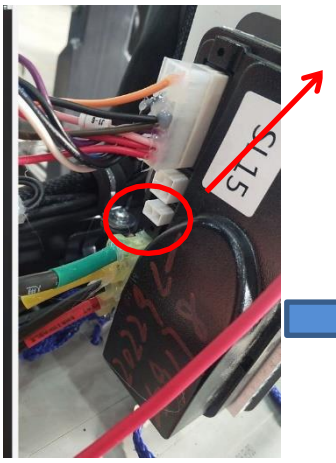
1) Check if the truck cable terminal is loosened or not. Shown as below picture:

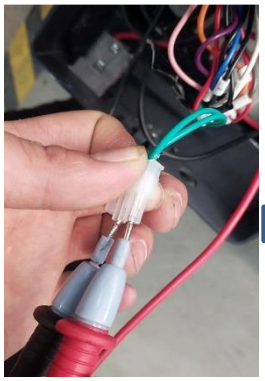
2) Use a Multimeter to measure the voltage of the battery under load

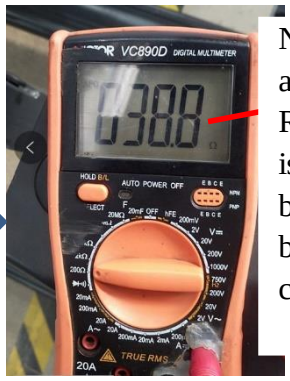
- Code 3.4 and 3.2 Electromagnetic brake cable issue or electromagnetic brake Failure

Use a multimeter to measure the resistance of the two-core plug-in on the controller. the step as below

Unplug 2-core plug in of the controller. Turn the multimeter to 200Ω, and measure the resistance between the two wires on the plug-in







Normally it should be around 40 Ω if no Resistance tested. There is a problem with the brake circuit, or the brake coil is short-circuited

- Code 4.1Motor or motor wire shot circuit or Controller failure.

Remove the motor brake disc (the brake cable is still connected), Connect the motor M1 and M2 to the positive and negative pole of the battery, and observe whether the motor rotates normally, If not, the motor failure,
If the motor rotates normally, the controller should be Failure.

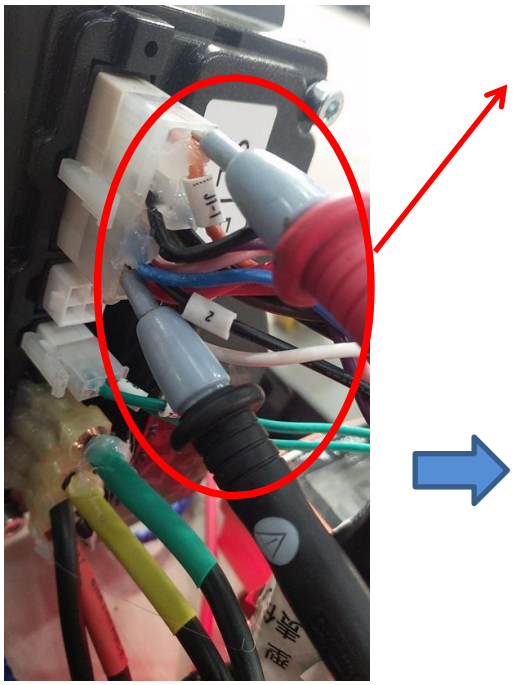
- Code 3.5 and 3.1 Operation sequence failure

1. Under normal conditions of the interlock switch, use a Multimeter to measure the voltage between J1-6 and negative pole on the 14-core plug-in of the controller. when bend the handle to operating handle. there is a voltage of about 24V.

2. If not, check the interlock switch, for example you can observe whether the switch light on or not, whether the signal pass through wire to controller.

- Code 4.2 Motor Voltage

  If the motor voltage can't match the accelerator input, The motor or motor ring short circuit and controller failure. Troubleshooting operations as below steps:



Turn the Multimeter to 24V DC, insert the pin into J1-1(Accelerator 0-5v speed signal)2(Negative). Turn the accelerator after Power-on. And observe whether the Multimeter reading has a linear change of 0-5v voltage

Please replace the controller If the voltage of the accelerator changes normally.

Quick determine controller failure.

Pull out the plug of the accelerator. If the controller still reports a fault after power on. Then there is fault controller

Controller fault light is always on. No walking. Then need to check below step one by one:

1、Measure whether there is voltage output 0-5V from the accelerator (Between J1-1 and Negative pole)

2、2Short-circuit the J1-6 on the 14-pin plug of the controller with the 7th line on the 5th pin, and turn the accelerator after restarting the truck to see if there is walking

3、The brake locked, Remove the brake (keep the brake cable connected) turn the accelerator after restarting the truck to see if it is normal

4、Remove the brake disc (keep the brake cable connected) Connected The motor M1 and M2 directly to the positive and negative poles of the battery. And observe whether the motor rotates normally. If not. The motor Failure

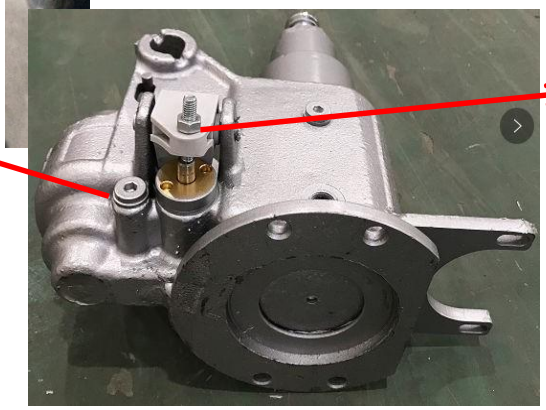
5、After all above test finished and all result are normal, then it should be controller problem.

The product can't lift and lower down or oil cylinder lower itself. Troubleshooting operations as below steps:

Hand lowering ：

Here is the coil wiring of the lifting contractor (wire No.5 & No.15) After power on, Press lifting button and then measure whether there is a voltage about 24V from these two places. If yes, and there is no sound of the contractor, then should be Contractor Failure. If there is no 24 Voltage. Then check whether the metal button is well connected

Pressure adjustment valve, note: This valve should not be over-adjusted to avoid deformation of the frame caused by overload.



This is a descending valve. If it descends slowly or automatically, adjust the tightness of the descending chain, or check the spool

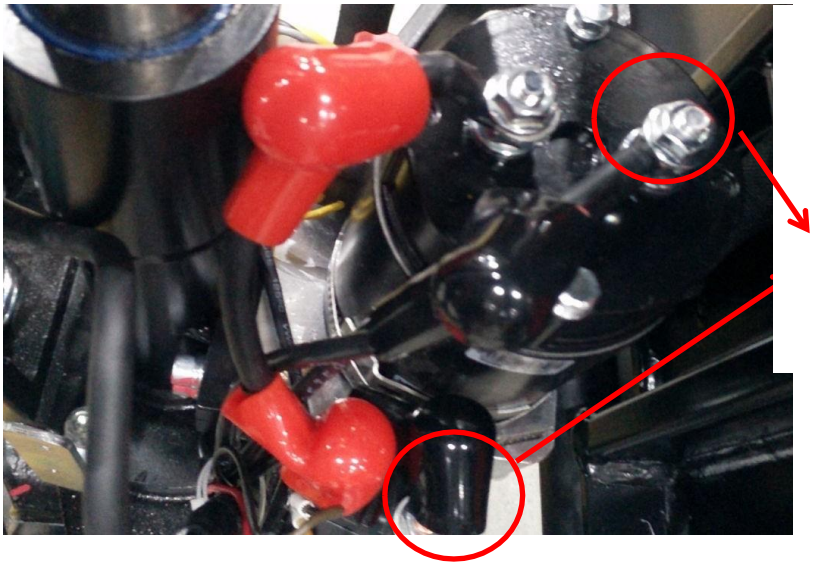
Electric lowering：

No lifting. the principle is same as Hand lowering truck. Electric lowering adds a lifting Limit switch to the lifting circuit. If there is no lift, in addition to the above steps for troubleshooting, you can check whether the limit switch work properly or not 2、 No lowering. can be check as below steps:

This is plug for drop solenoid valve. Use Multimeter to Measure Whether there is a 24V voltage between grays line & black line when you press the down Button. If yes, it should be the lowering valve body failure, replace it. If there is no voltage. Please measure whether the down button works properly or not.

The truck cannot power on, measure the battery voltage if normal or not.
Follow steps below:

1.



1. Measure the voltage between these two-part shown on the red circle. it is for battery voltage. Check if the voltage normal or not
2. If there is no voltage. Then pull the battery plug out .and measure the battery voltage from the plug (positive pole & Negative pole.

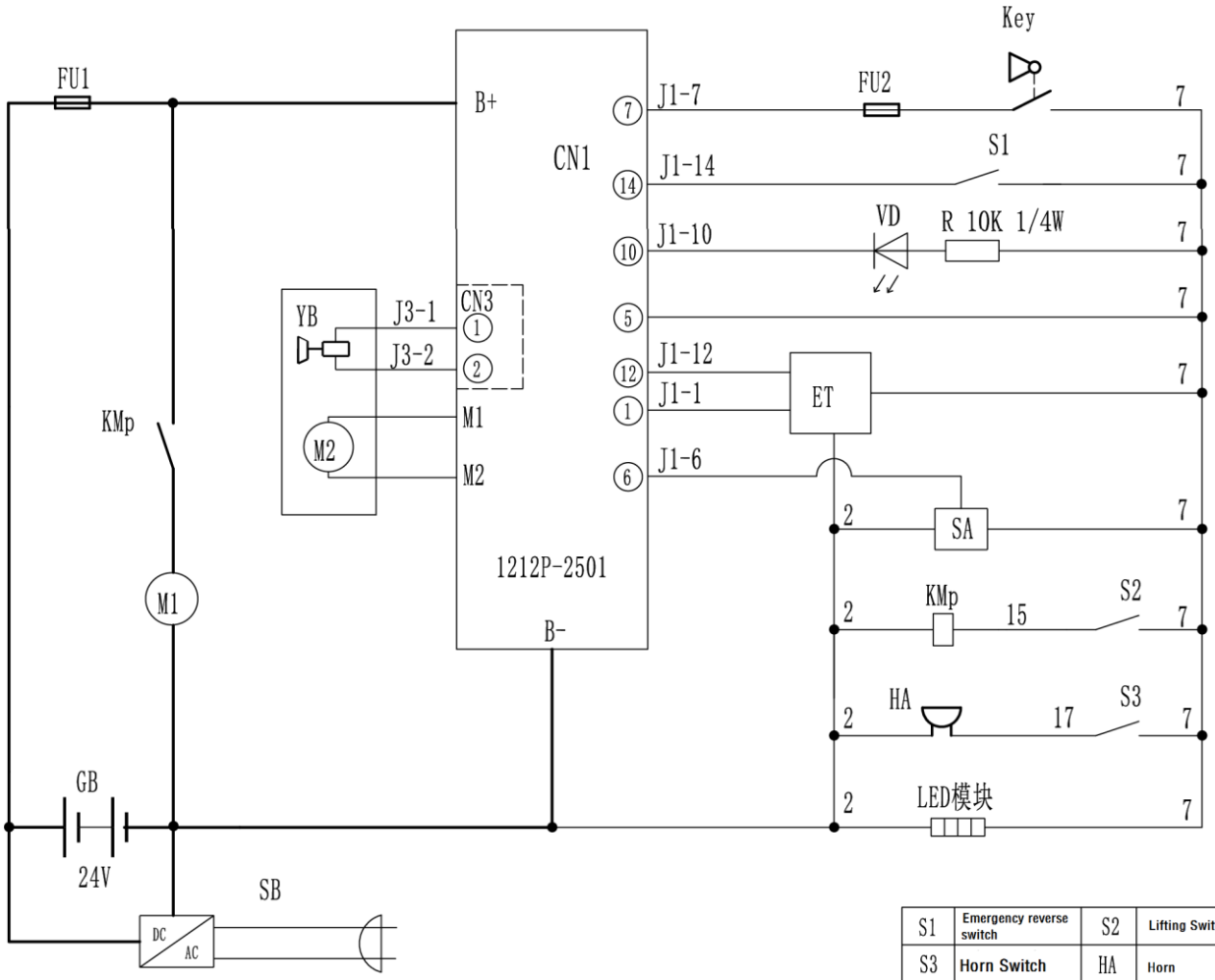
2. Observe whether the fuse is blown.

Battery charging:

When charging. This switch needs to be turned on. If the battery fails to charge, measure whether the battery voltage is normal.

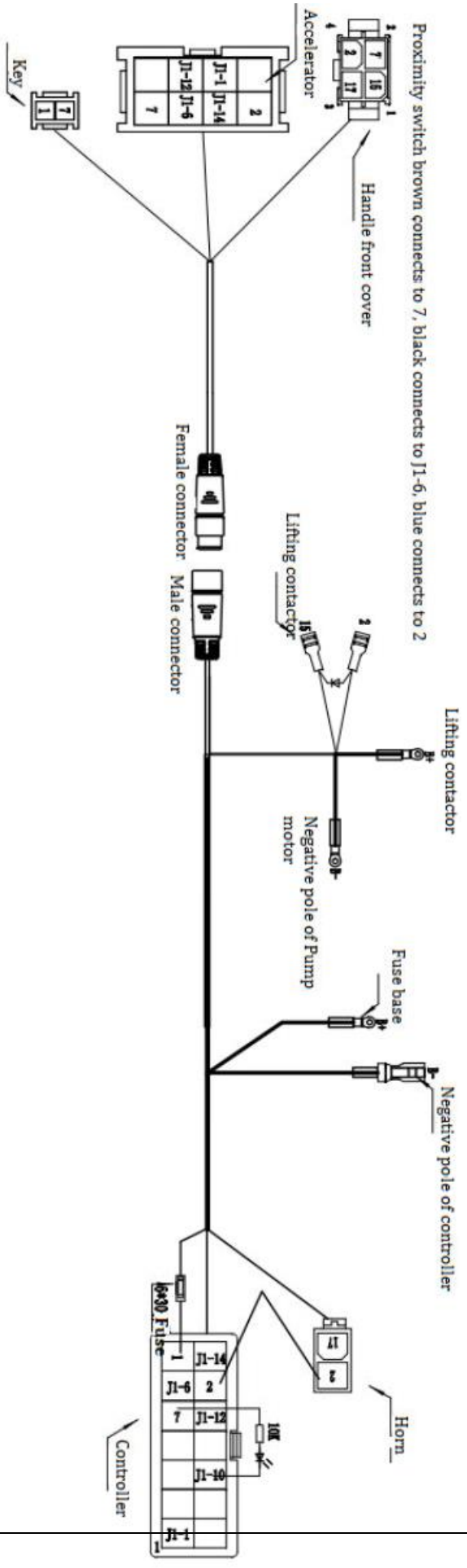
3. Wiring/circuit diagram

A. Circuit diagram

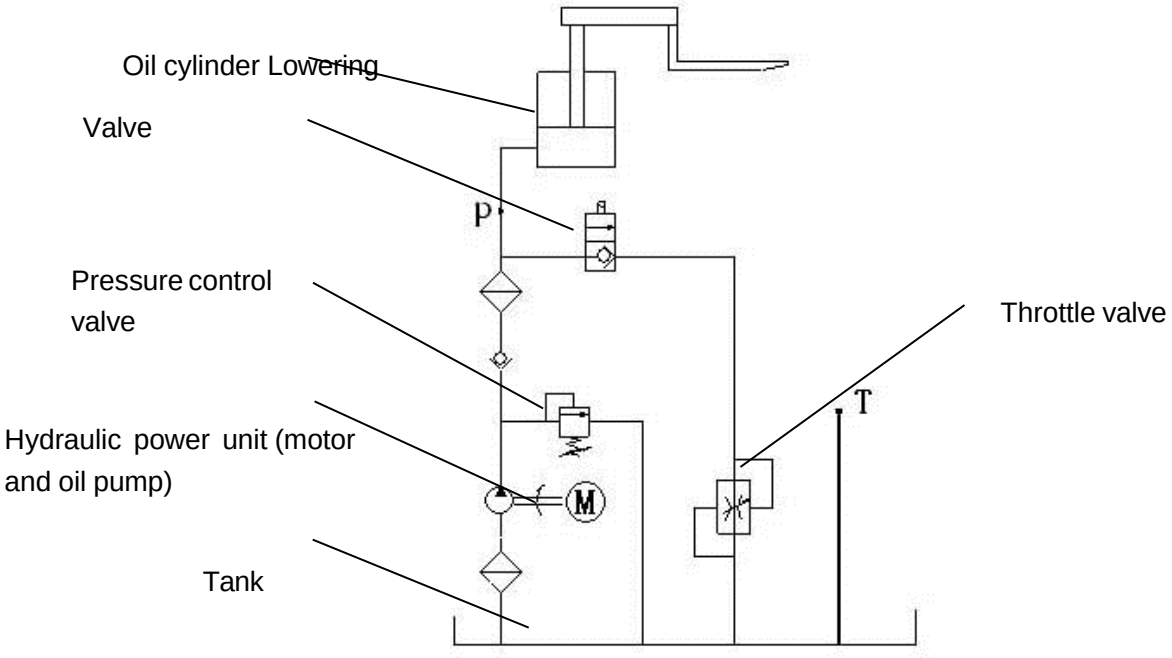


S1	Emergency reverse switch	S2	Lifting Switch
S3	Horn Switch	HA	Horn
LED	Power light	SA	Interlock switch
ET	Accelerator	Key	Key Switch
YB	Bracking	M2	Walking Motor
GB	Battery	SB	Charger
FU1 FU2	Fuse	VD	Trouble light
KMp	Pump contactor		

Wiring diagram


Proximity switch brown connects to 7, black connects to J1-6, blue connects to 2
Handle front cover
Accelerator
Key
Female connector
Male connector
Lifting contactor
Lifting contactor
Negative pole of Pump motor
Fuse base
Negative pole of controller
Horn
Controller
J1-14
J1-6
J1-12
J1-10
J1-1
6430 Fuse
10K

B. Hydraulic circuit



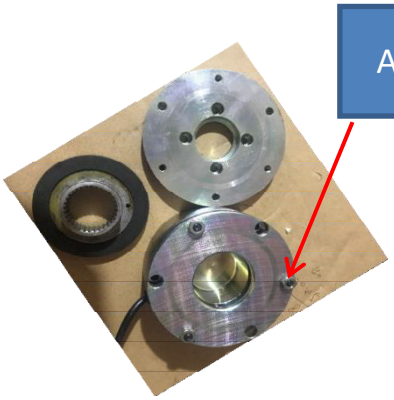
FIC.8: Hydraulic circuit

Hydraulic oil inspection

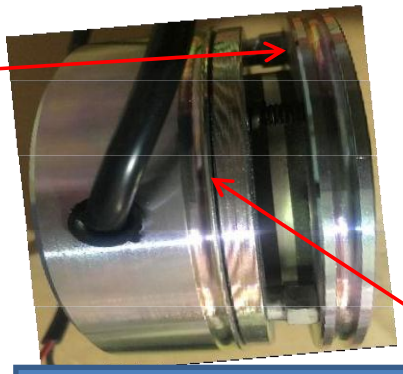
Exterior	**Smell**	**Condition**	**Result**
Clear and no color	Good	Good	Can be used
Transparent	Good	Mixed with other oil	Check the viscosity. You can use it If qualified
Color changed like milk	Good	Mixed with air and water	Separate water or replace New hydraulic oil
Color becomes dark brown	Not good	Oxidation	Replace New hydraulic oil
Color is clear but with small black spots	Good	Mixed with other particles	Use after filtering

4. Disassembly of main parts

A. Electromagnetic brake adjustment



Adjust nut



Note: The electromagnetic brake can't be properly connected when it is energized in the free state. It needs to be pulled by external force or installed.

The electromagnetic brake gap is about 25-35 CM, about one hundred yuan in thickness. It needs to be carefully and carefully adjusted to ensure that the gaps of the three adjustment surfaces are consistent, and the power will give a crisp sound.

B. Disassemble of Driving

C. Disassembly of Electromagnetic brake

D. Driving internal gears and bearings

E. Operating handle assembly

5. CURTIS Handle programmer

Operation precautions:

Handle programmer the main function is to facilitate truck inspection and maintenance. Without the
approval of the truck manufacturer, it is not allowed to adjust the controller parameters to avoid truck and personal safety accidents.
Handle programmer After modifying the parameter, it will be saved automatically, just turn off the key switch and restart the truck
CURTIS Handle programmer Can be connected when the controller is powered on or off

The truck fault code reading procedure:

Connect Handle programmer to controller , then turn on the key switch

According to the menu list of CURTIS Handle programmer, find: Faults.
Running the truck, The English Fault Code will appear when cursor is flashing. Refer to the fault code table for interpretation.

The truck signal detection

Connect Handle programmer to controller then turn on the key switch

According to the menu list of CURTIS Handle programmer, find: Monitor.

If necessary, Open the corresponding sub-item of the detection menu. Run the truck and observe the change of value

CURTIS Handle programmer Manual content

Curtis 1313 handheld programmer is used to configure the Curtis electronic control system. Through this programmer, you can adjust and save the set parameters, real-time monitoring of controller data and fault diagnosis

The programmer has 2 interfaces, one is used to communicate with the electronic

Control, the other is used to communicate

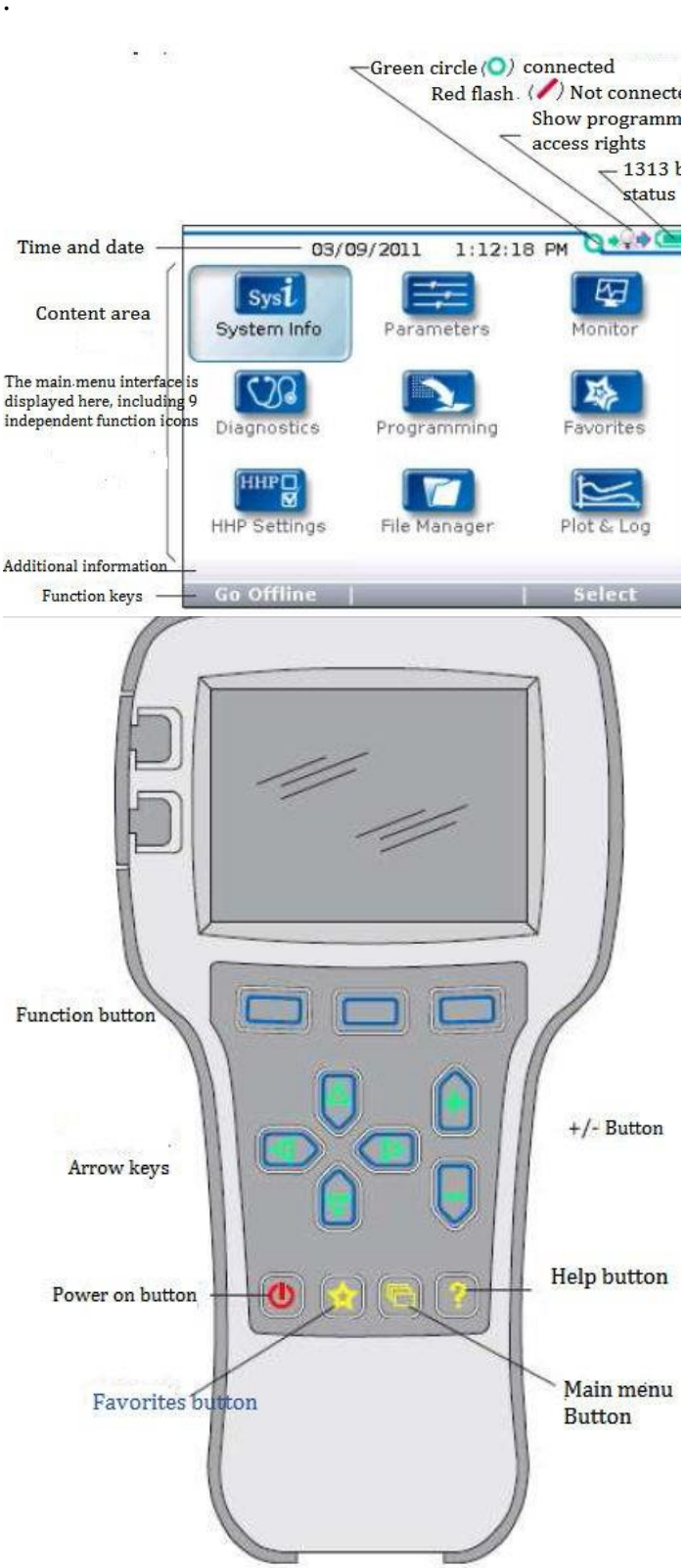
with the PC, the programmer has a battery box and a memory card Slot

Warning: The control system will affect the acceleration rate, deceleration rate, hydraulic system, and brakes of the truck. If the truck control system is programmed incorrectly or exceeds safety, a dangerous situation will occur. Only the truck manufacturer or an authorized service agent

当编程器加载完控制器的信息后，编程器上会显示主菜单。

Power on the handle programmer

Insert the connecting wire of the handheld programmer into the programming port of the controller. After connecting to the controller, the handheld programmer will automatically power on and display the control information on the programmer



Function keys

Since the functions of these three buttons are determined according to the specified content, these three buttons are blank. At any given time, the function of the button will be displayed on the upper LCD screen.

Arrow keys

The displayed information can be selected up, down, left, and right through the 4 Arrow keys. +/-keys the parameters can be added or decrease through these 2 keys. At the same time, "+" can mean "Yes" in operation, and "-" can mean "No". In some cases, it can also be used as a scrolling option.

Power button

When the programmer is inserted into a power-on controller, the programmer does not have to press the power button to use it, and the programmer will automatically turn on. After pressing for a few seconds, the programmer will prompt whether it needs to be turned off. You can decide whether to turn off by selecting "Yes" and "No" represented by the function keys. After closing the programmer, press for a few seconds, the programmer will restart.

Favorites button

There are two ways to enter the favorites menu, you can enter through "Favorites" in the main menu, or you can press this key to enter

Menu structure

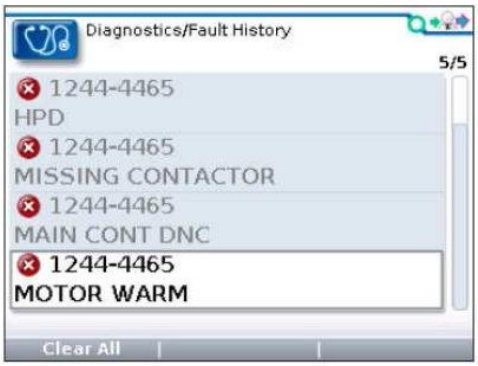
The main menu consists of nine sub-menus, each of which is displayed with a specific icon, and each item in the sub-menu is arranged hierarchically. Some menus only contain one item of information, but most menus contain multiple pieces of information. You can enter the next submenu by opening each folder. Expand the table through the grid options and enter a group of execution commands through the dialog box options. No matter which interface, you can use the left direction key to return to the previous menu. The names of all nine sub-menus are displayed in bold on the main menu and displayed below the icons. When entering the stepped menu, the name of the submenu or the path you are on will be displayed at the top of the screen

Fault diagnosis menu

In the main menu, select the "Diagnostics" fault diagnosis icon, and press the corresponding function key of Select to enter the fault diagnosis menu. The fault diagnosis menu includes two folders: "Present Errors" current fault and "Fault History" historical fault

Note: Sometimes the fault caused by the temporary event captured in the circuit is not a system fault. You can confirm whether the fault really exists by restarting the system and observing whether the fault will disappear automatically

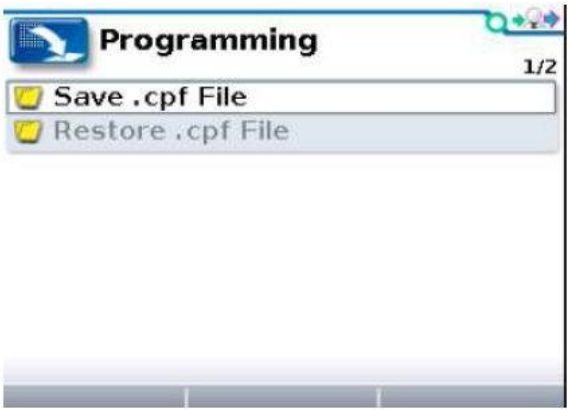
In the historical fault folder, the listed faults are all the faults encountered after the last historical fault is cleared. The historical fault can be recorded again by clearing the fault content in the entire folder.



"Clear All" is used to clear the historical fault folder. A function key will only be highlighted when there is a historical fault in the historical fault folder and will be grayed out when there is no historical fault.

Programmer menu

In the main menu, select the "Programming" icon and press the function key corresponding to "Select" to enter the menu. The parameter setting file (.cpf file) can be stored and restored through the programming menu



Save.cpf File

Use the save .cpf file function in the programming menu to back up the currently set parameters. You can save as many .cpf files as needed, and you need to name each .cpf file a different name

Restore.cpf File

Restore.cpf File can select the previously saved .cpf file to replace the current controllers .cpf file. When the entire data recovery process is completed, a dialog box will pop up on the screen to request the system to be restarted.