Service Manual

EB12EA Series Full Electric Straddle Stacker



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

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A. Maintenance List

A. Overview of main components

Table 1: Maintenance List

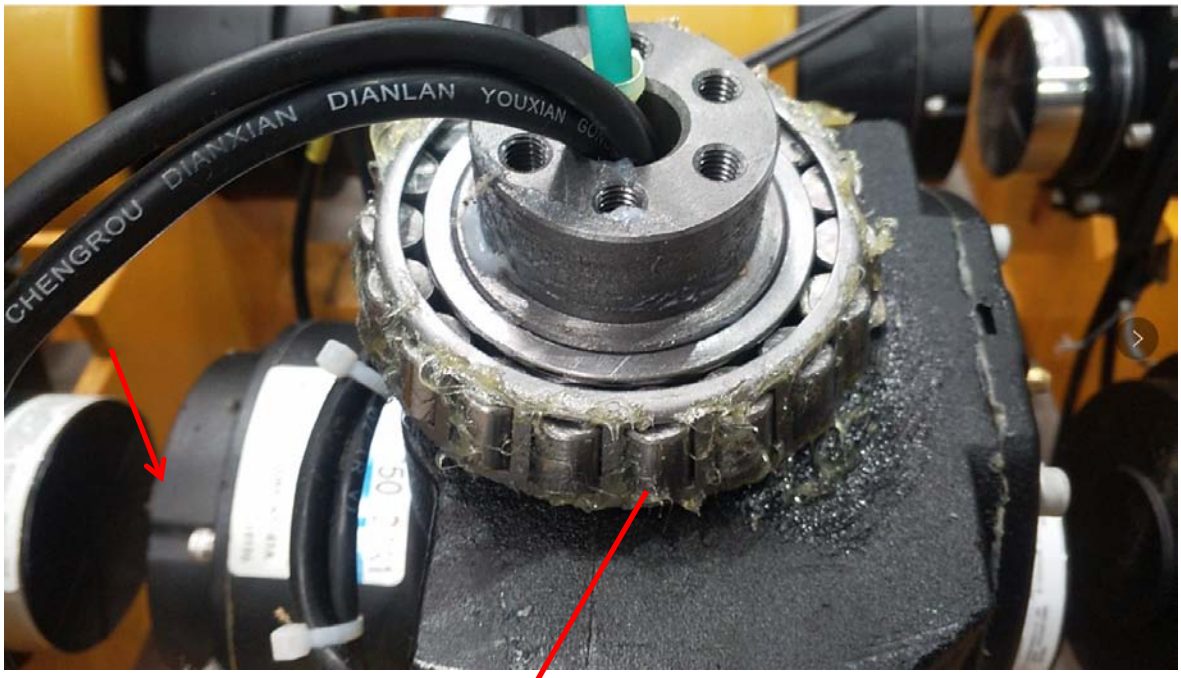
		间隔（月）			
		1	3	6	12
The hydraulic system					
1	Check the hydraulic cylinder and the piston for damage, noise, and leakage.		●		
2	Check the hydraulic connector for damage and leakage.		●		
3	Check the Hydraulic oil level and refill if necessary.		●		
4	Refill hydraulic oil after 12 Months or 1500 hours working time				●
5	Check and adjust the function of the hydraulic valve (2600lbs/3300lbs+0/+10%)				●
Mechanical systems					
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	●			
Electric 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 disk 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.

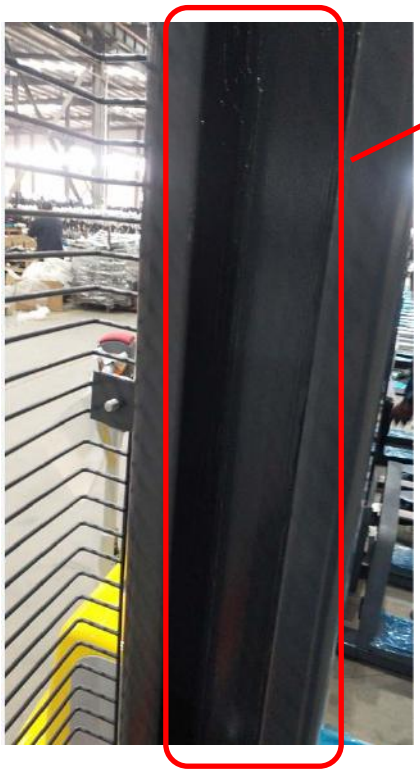
Pic. 1: Lubrication Point



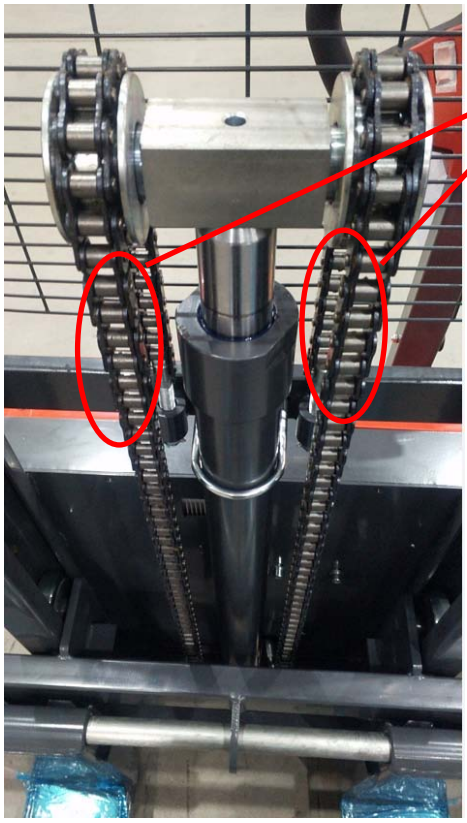
Tapered bearing

Oil Filler

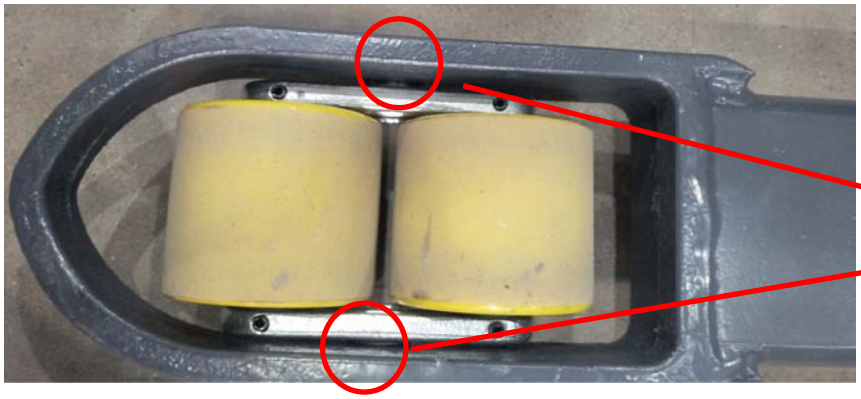




Sliding way in the mast



Chain Lubrication



Shaft Lubrication

C. Check and refill hydraulic oil

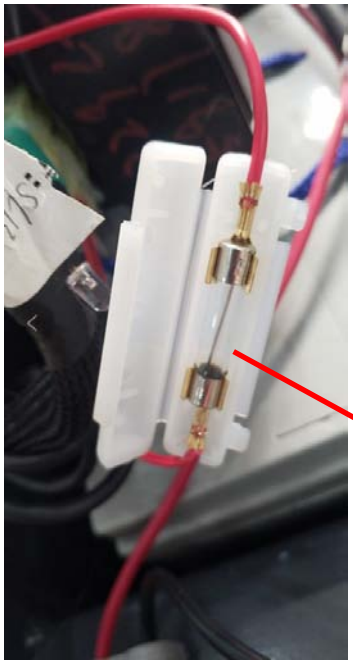
According to the temperature, the recommended hydraulic oil type as below:

Temperature	–5℃~25℃	>25℃
Model	HVLP 32， DIN 51524	HLP 46， DIN 51524
Viscosity	28.8-35.2	41.4 - 47
Oil volume	1.5 L	

Waste materials such as waste oil, 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



10A Fuse

200A Fuse



Table 2: Fuse specification

	Specification
Fuse 1	10A
Fuse 01	200A

B. Failure Analysis

Common Failure Analysis

If the vehicle still fails, follow the instructions in Chapter 6 of the 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 vehicle malfunctions and cannot be operated outside of the work area, jack up the vehicle, place a load handling device under the vehicle and secure the vehicle, then move the vehicle out of the aisle.

Controller fault code display

Table 4: 1212P fault code

Programmer display	Code	Failure phenomenon	Troubleshooting
BATTERY DISCONNECT 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
HARDWARE 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℃ or <-10℃ 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

E. Troubleshooting for common faults

Code 4.5 battery is not connected

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



At the cable connection (including other fastening point), check whether it is loosened.

Step 2: Use a multimeter to measure the cell voltage of the battery under load, Shown below:



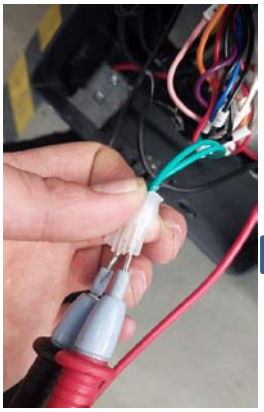
Battery cell with load measurement,

Cell voltage drop should between 2-3V.

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. Shown 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 40Ω if no resistance tested there is a problem with the brake circuit, or the brake coil is short-circuited.

Code 4.1: Motor 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, there is a motor issue. If the motor rotates normally, the controller should be issue.

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 is on or not whether the signal passes through wire to controller.

Code 4.2: Motor Voltage can't match the accelerator input, the motor or motor ring short circuit and controller failure. For 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.

C. Quick determine controller failure.

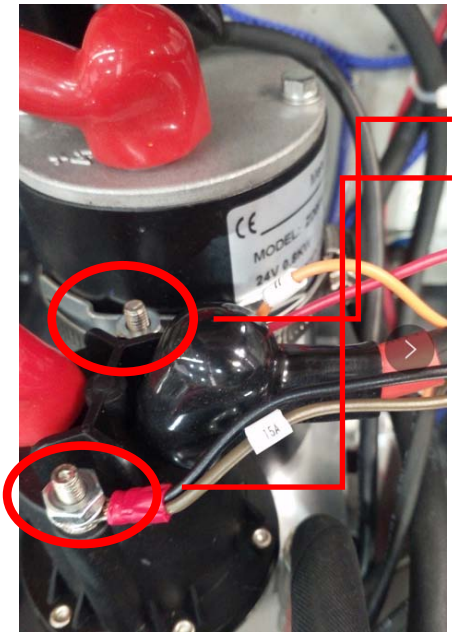
Pull out the plug of the accelerator. If the controller still reports a fault after power on. Then is a fault controller.

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. Short-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, is the motor failure

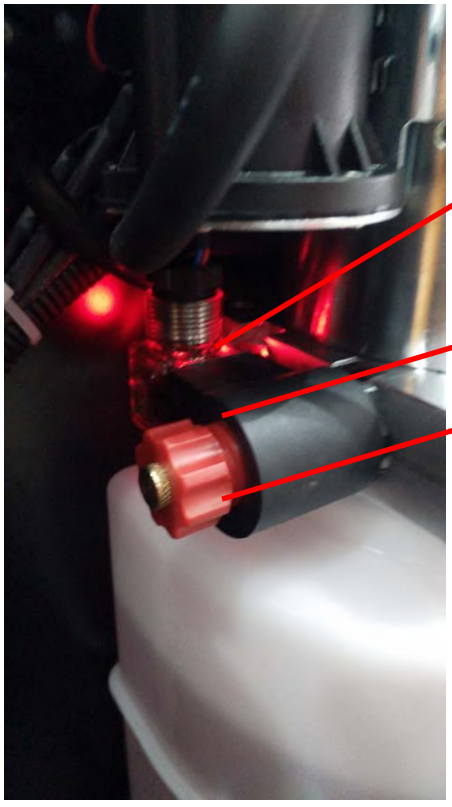
5. After all, above test finished and all result are normal, then it should be controller problem.

The unit isn't lifting up & lowering down or oil cylinder lowered itself, Troubleshooting operations as below steps:



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 a 24 Voltage. Then please check whether the metal button is well connected.

1. Press the lower button. The red light of the lower solenoid valve signal should be steady on.



The red light is signal light of lowering solenoid valve. If this light is not on, measure whether the connection between Line 16 and the handle is well connected.

If the oil cylinder is lowered after being lifted to the top. Check whether the red mark of the lower solenoid valve core is loose or not. If not clean or replace it.

2. If the truck can’t lift goods normally. For example. the truck with 1.5T loading capacity but can only lift goods less than 1T, then we can adjust the oil pump pressure to reach 1.5T loading capacity. But the operation must be carried out carefully.
3. Don’t adjust the hydraulic pressure exceed the rated load. If so, the frame may be deformed. The operating step as below:

Unscrew the pressure screw cap with a wrench.

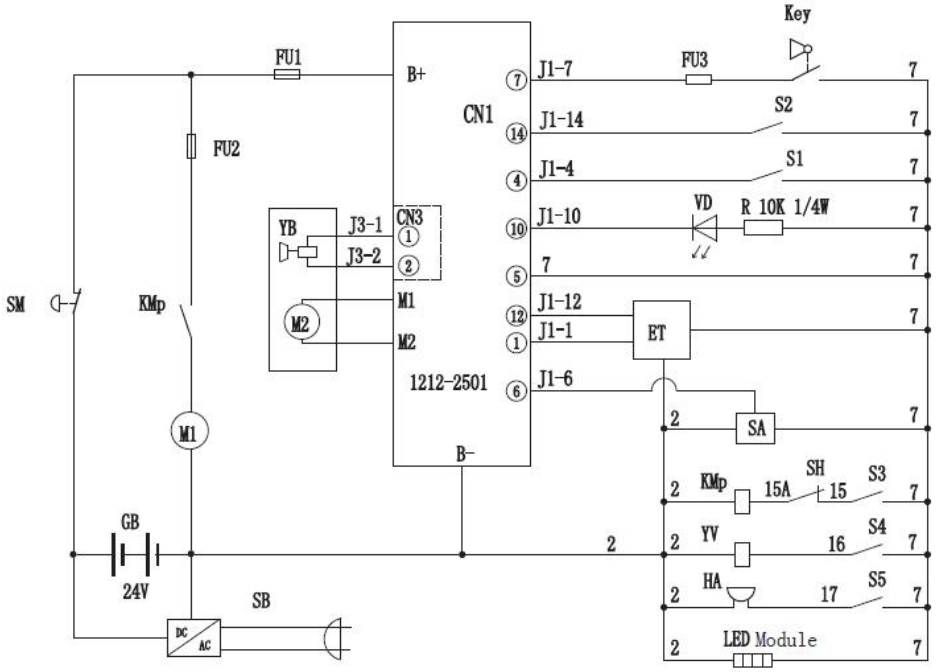


Use an Allen wrench to adjust the hydraulic pressure.

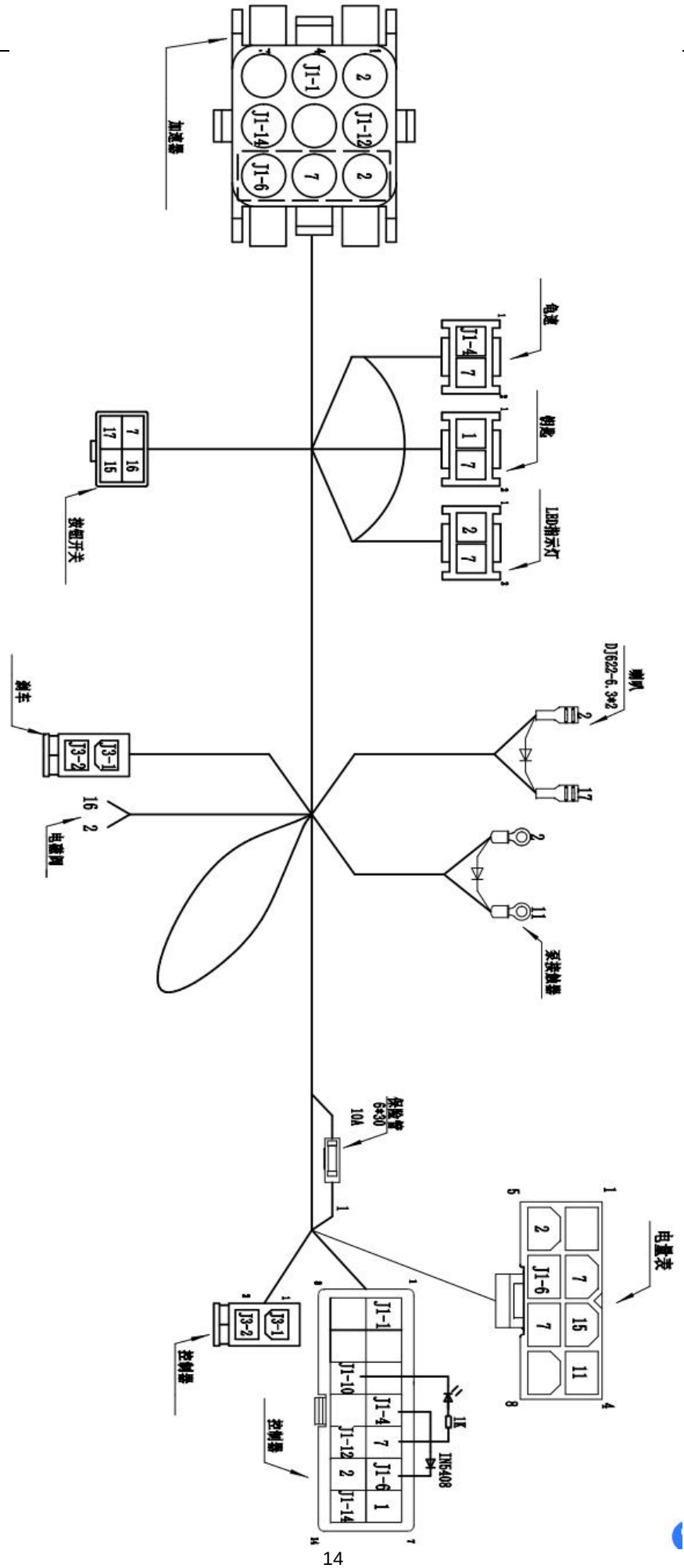


3. Wiring/circuit diagram

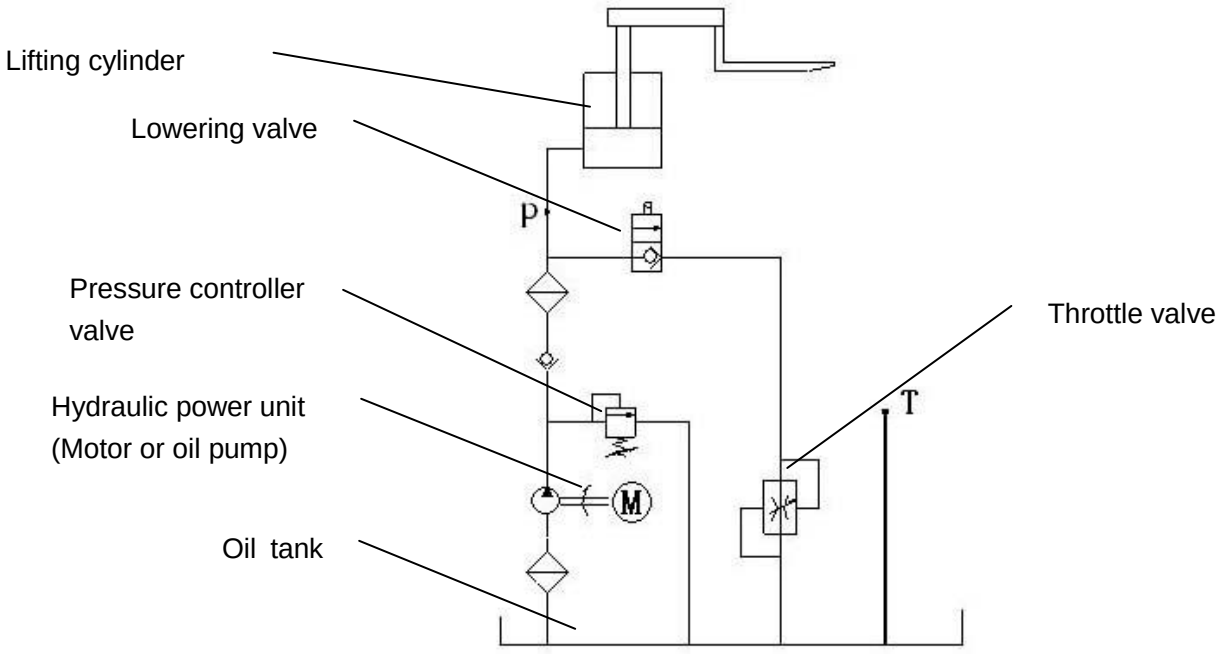
A. **Circuit diagram**



S1	Tortoise switch	S2	Emergency reverse
S3	Lift Switch	S4	Lower switch
S5	Horn Switch	KMp	Pump Contactor
SH	Height limit	HA	Horn
YV	Decline solenoid valve	SA	Interlock
LED	Power indicator	Key	Key switch
ET	Accelerator	M2	Driving motor
YB	Electromagnetic brake	SM	Emergency Stop
GB	Battery	SA	Interlock
SB	Charger	VD	Touble light
FU1 FU2 FU3	Fuse		


加速器
J1-1
J1-12
J1-14
J1-6
电源
钥匙
LED指示灯
按钮开关
喇叭
DJ622-6.3*2
刹车
电磁阀
至接触器
保险管
6*30
10A
电表表
控制器
IN5408

D. Oil hydraulic circuit

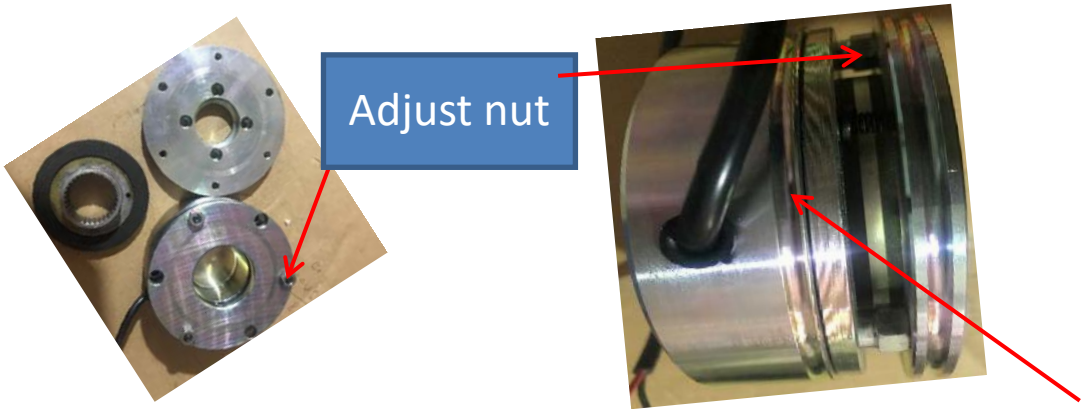


E. Hydraulic oil inspection

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 spts	Good	Mixed with other particles	Use after filtering

4. Disassembly of main parts

1. Electromagnetic brake adjustment



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 25-35CM, 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.

5. Disassemble of Driving



6. Disassembly of brake and driving wheel



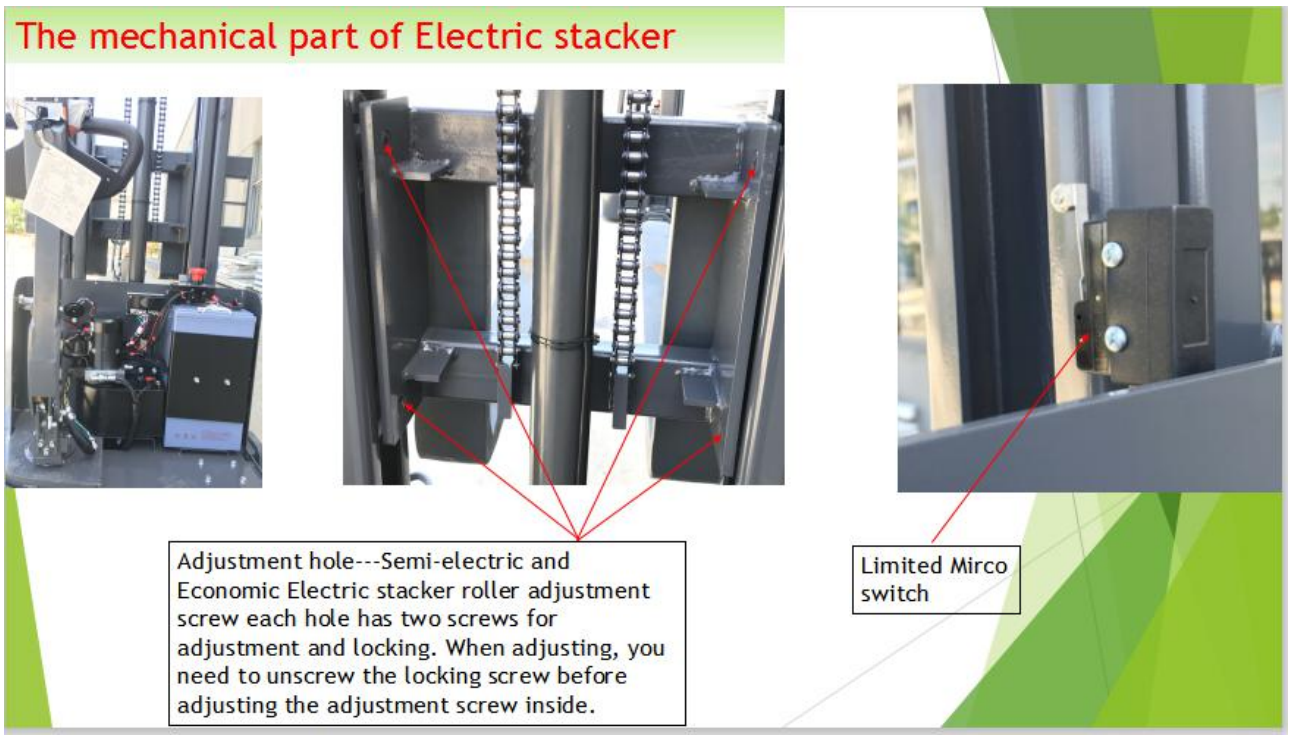
7. Driving internal gears and bearings



8. Operating handle assembly



9. The mechanical part of electric stacker



10. **Economic electric stacker fork carriage assembly**



11. Pump Motor



5. CURTIS handle programmer

Operation precautions：

Handle programmer, the main function is to facilitate unit inspection and maintenance. To avoid accidents, it is not allowed to be used to adjust the controller parameters. After modifying the parameter, it will be saved automatically, just turn off the key switch and restart the unit.

CURTIS handle programmer can be connected when the controller is powered on or off.

The unit fault code reading procedure:

1. Connect handle programmer to controller，then turn on the key switch

2. According to the menu list of CURTIS handle programmer, find: Faults.

3. Running the unit, the English Fault Code will appear when cursor is flashing. Refer to the fault code table for interpretation.

The unit signal detection

1. Connect handle programmer to controller，then turn on the key switch

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

3. If necessary, open the corresponding sub-item of the detection menu. Run the unit and observe the change of value

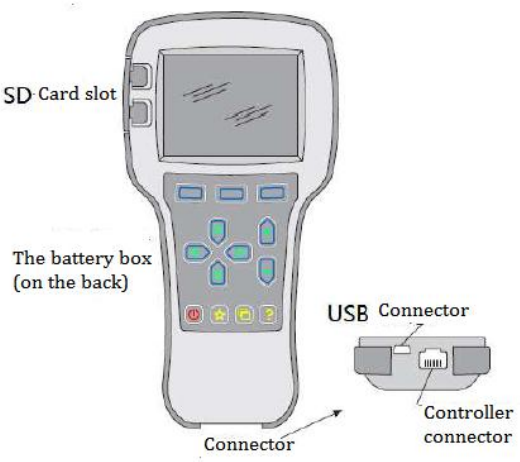
CURTIS handle programmer manual content

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



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 can program the control system

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.





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

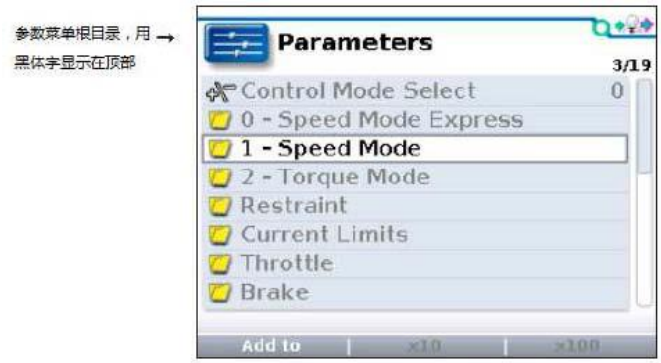
When the programmer is inserted into a power-on controller, the programmer does not have to press the power button to use it, and the programmer will automatically turn on. After pressing for a few seconds, the programmer will prompt whether it needs to be turned off. You can decide whether to turn off 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 matters 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.



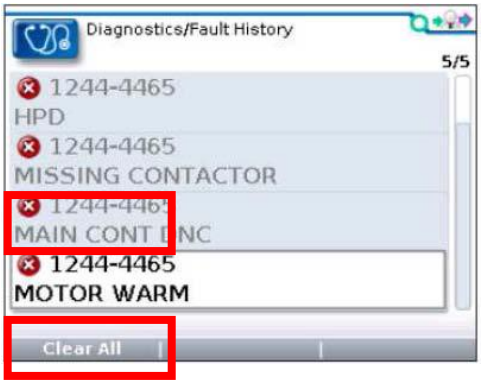


Nine menus:



Fault diagnosis menu

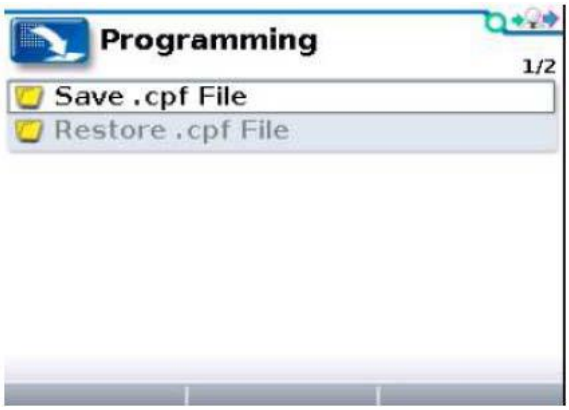
In the main menu, select the "Diagnostics" fault diagnosis icon, and press the corresponding function key of Select to enter the fault diagnosis menu. The fault diagnosis menu includes two folders: "Present Errors" current fault and "Fault History" historical fault
Note: Sometimes the fault caused by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