# PT20 TROUBLE SHOOTING


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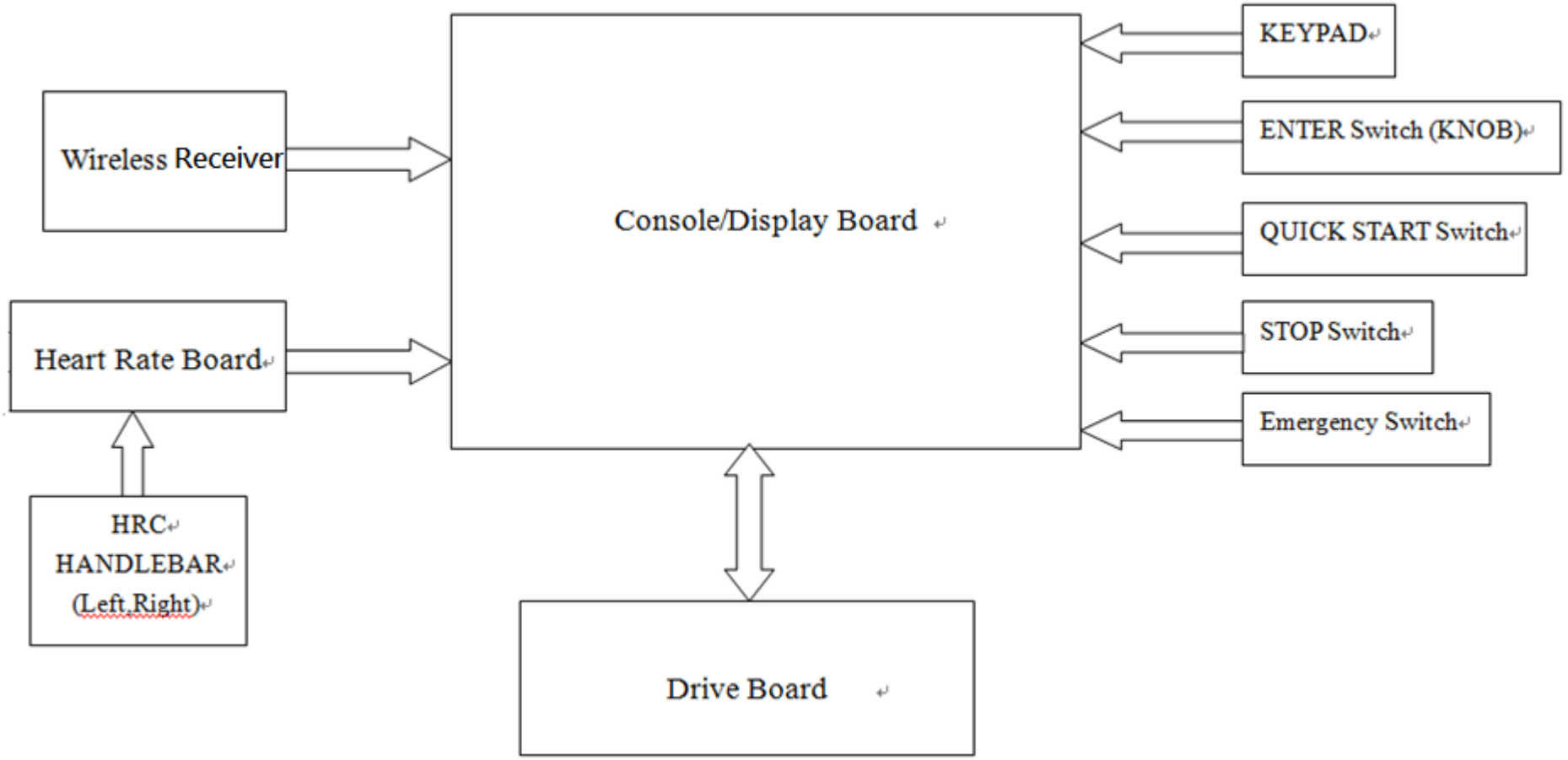
**A. DAILY AND WEEKLY MAINTENAC**

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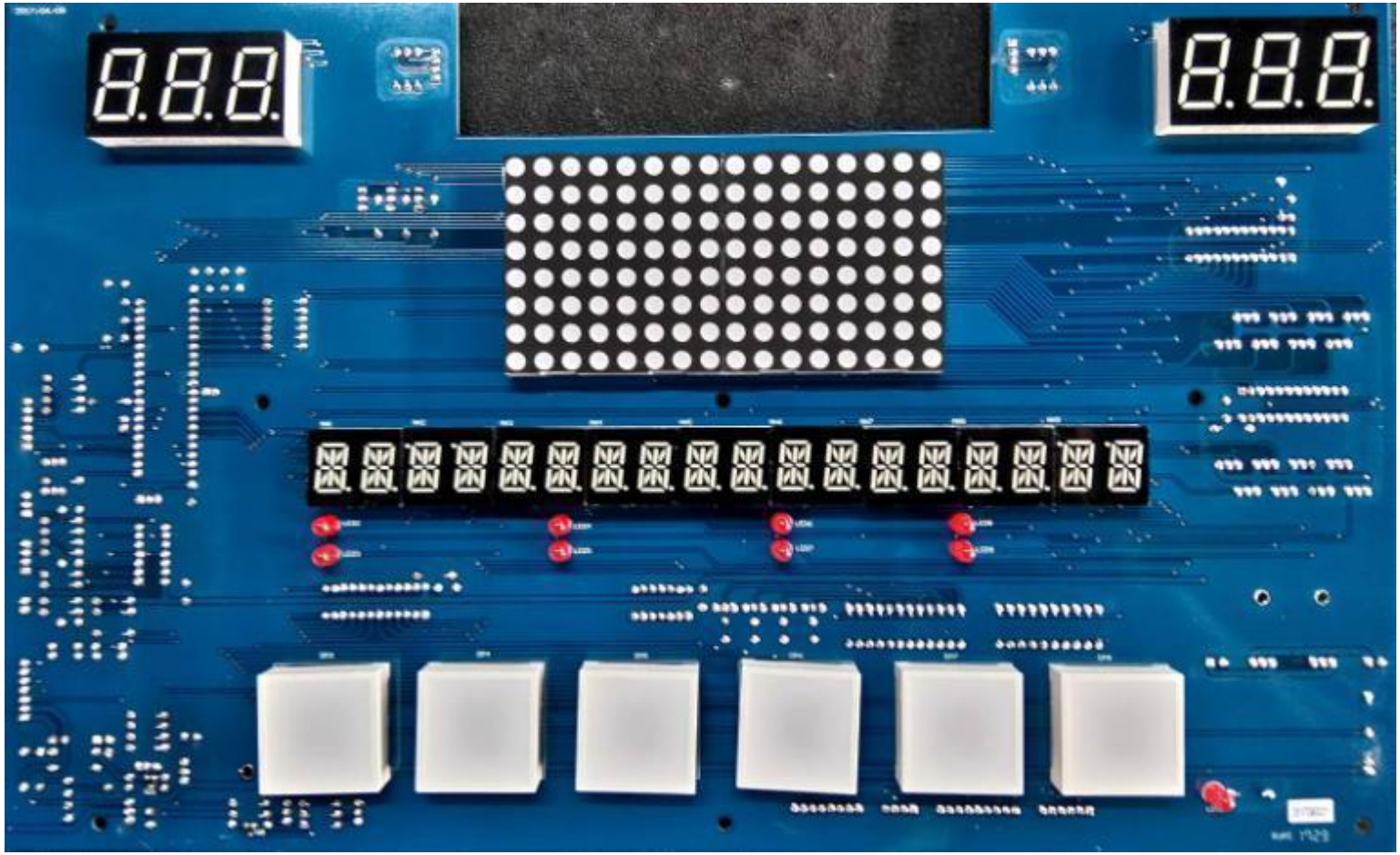
**C. ADVANCED MAINTENANCE**

## 1. DISPLAY

### A. DISPLAY/CONTROL BOARD WIRE CONNECTION DIAGRAM



**B. DISPLAY/CONTROL BOARD(9530117) WIRE CONNECTION**



JP1 : SPEED/INCLINE BUTTONS ON THE CONSOLE
JP2 : SPEED/INCLINE BUTTONS ON THE HANDLE BARS
JP3 : START & STOP
JP4 : ENCODER KEY
JP6 : ISP
JP7 : SAFEKEY

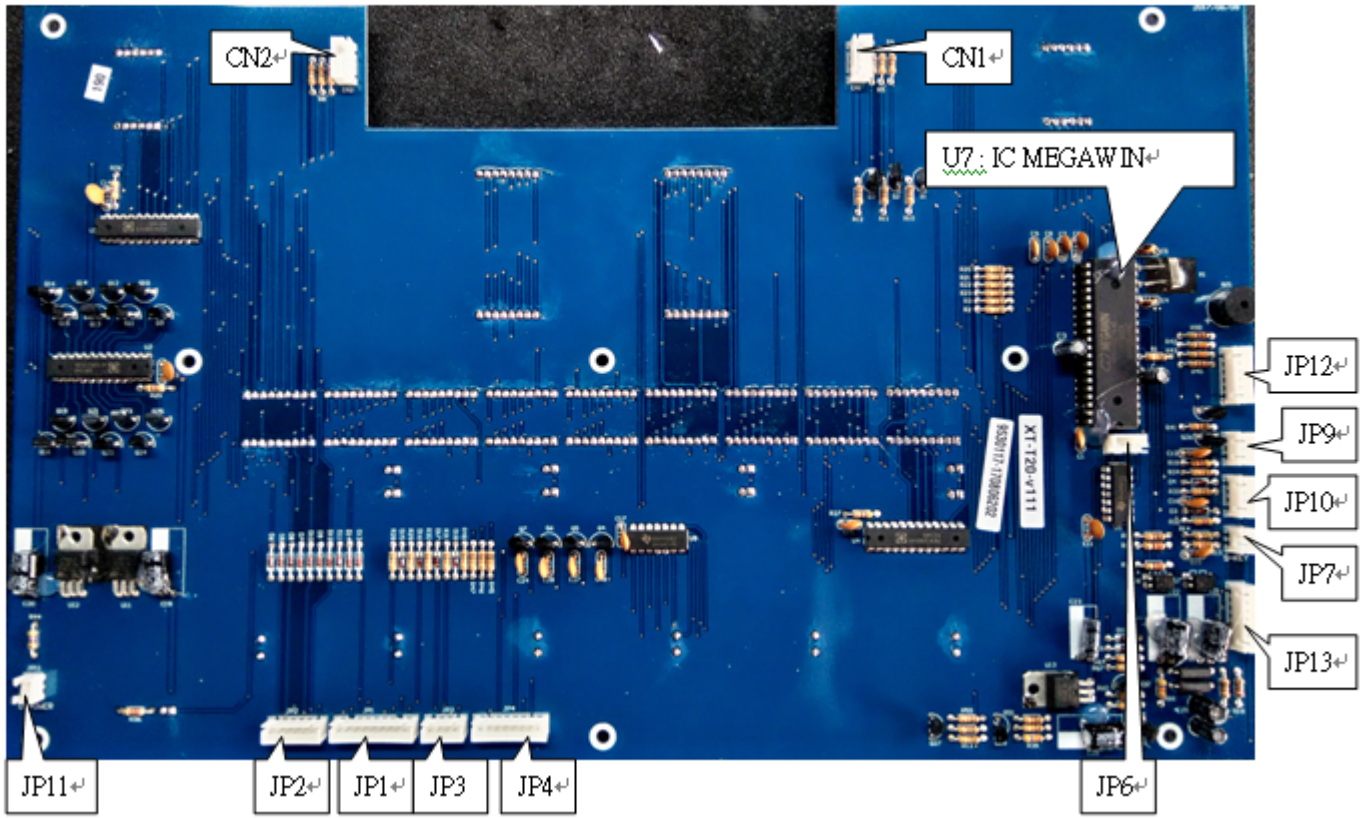
JP9 : Wireless Receiver
1. PLUSE
2. VCC
3. GND

JP10 : Heart Rate Board
1. VCC
2. GND
3. PLUSE
4. +12V

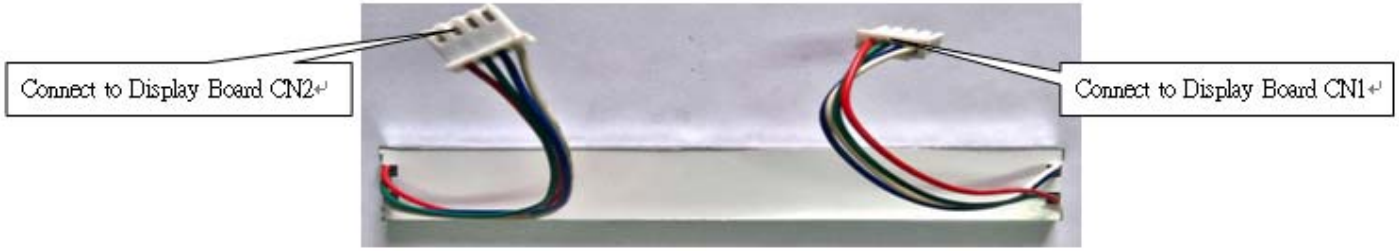
JP11 : USB POWER
JP12 : BT

JP13 : Drive Board
1. FDC+
2. FDC-
3. RXI
4. TXO
5. +5V
6. SAFEKEY
7. +5V

CN1/CN2 : BACKLIT BOARD



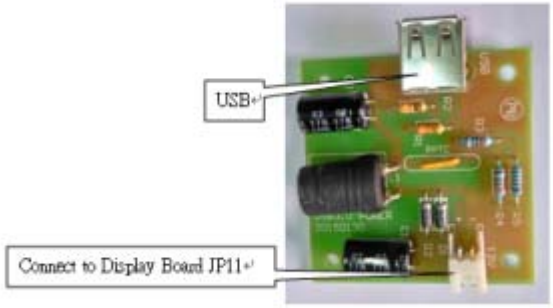
BACKLIT BOARD(9530118)




BLUE TOOTH MODULE(9530101)

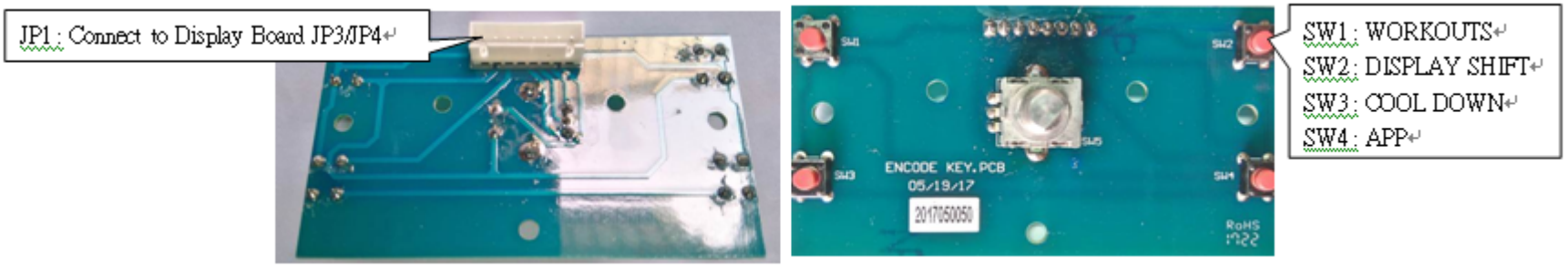



USB CHARGE BOARD(9530102)

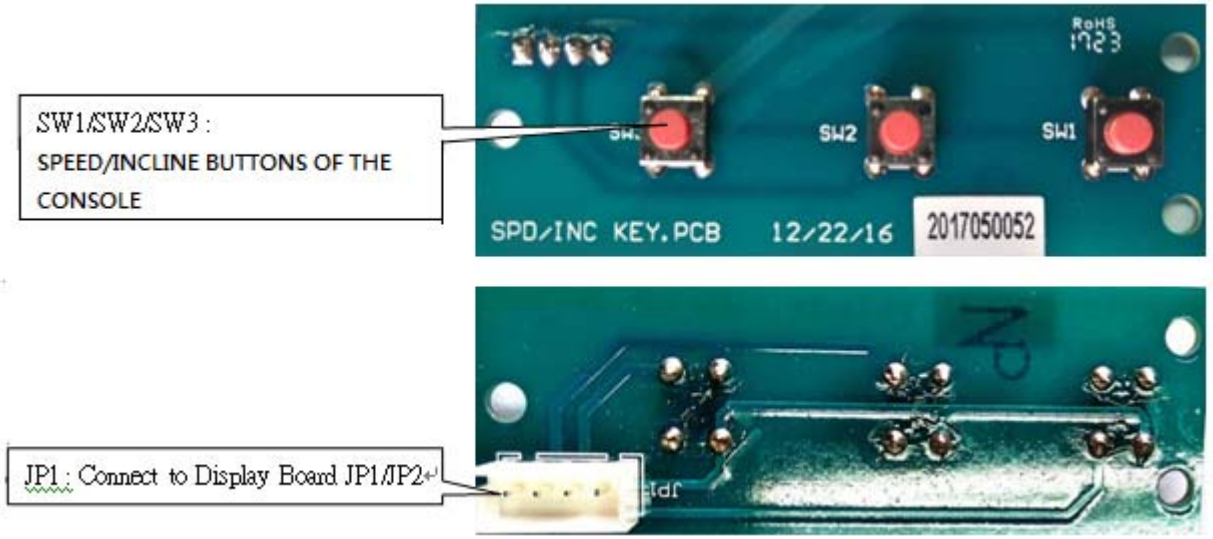


## 2. BUTTON BOARD(9530119/9530120) WIRE CONNECTION

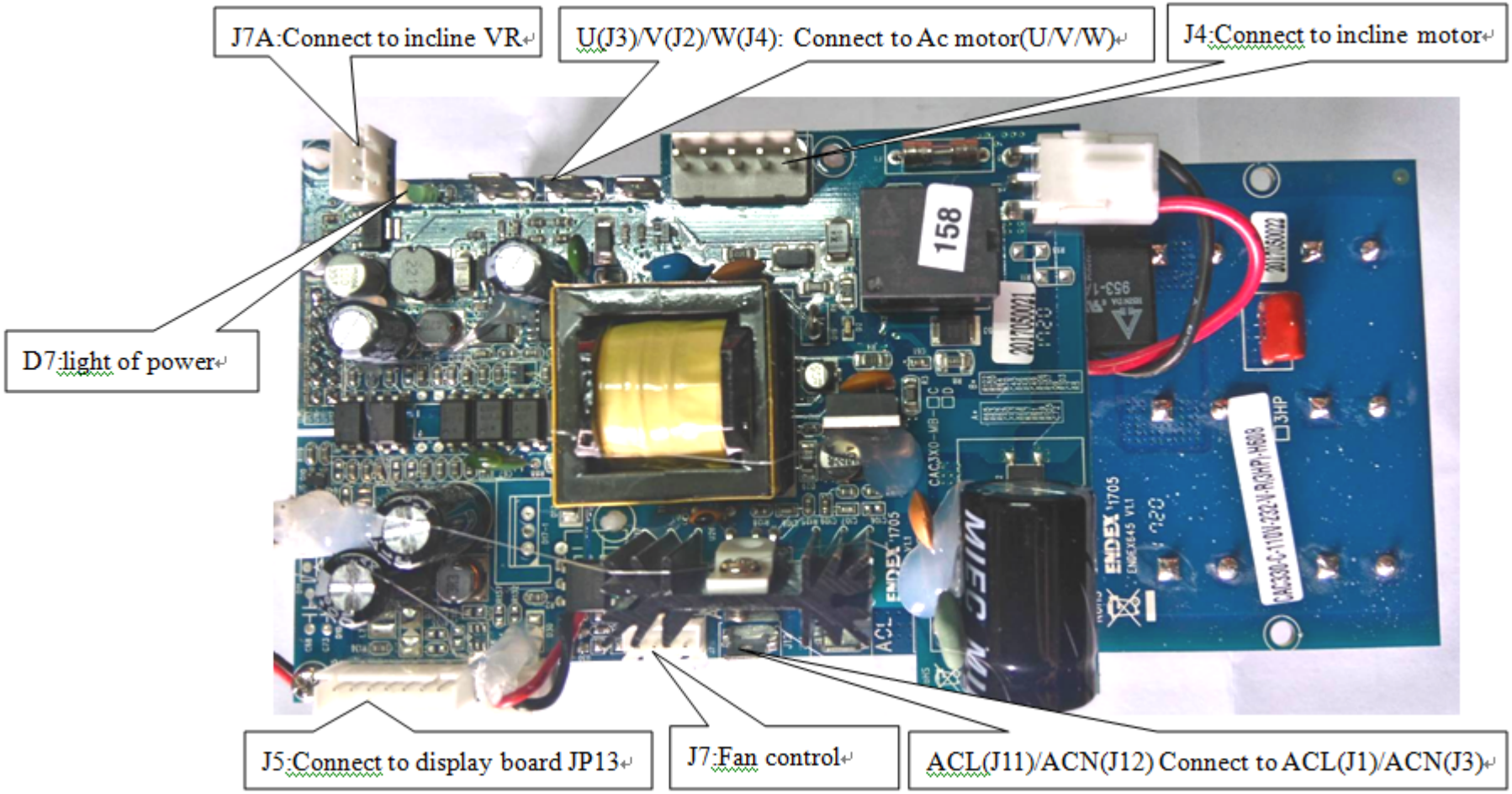
ROTATING BUTTON(9530119)



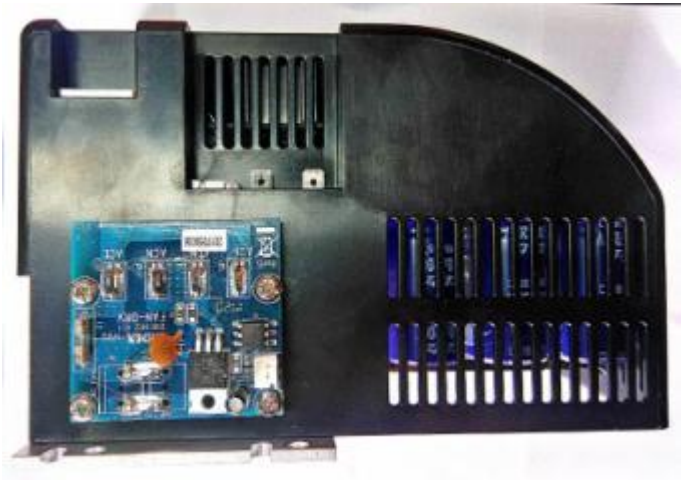

BUTTON BOARD(9530120)

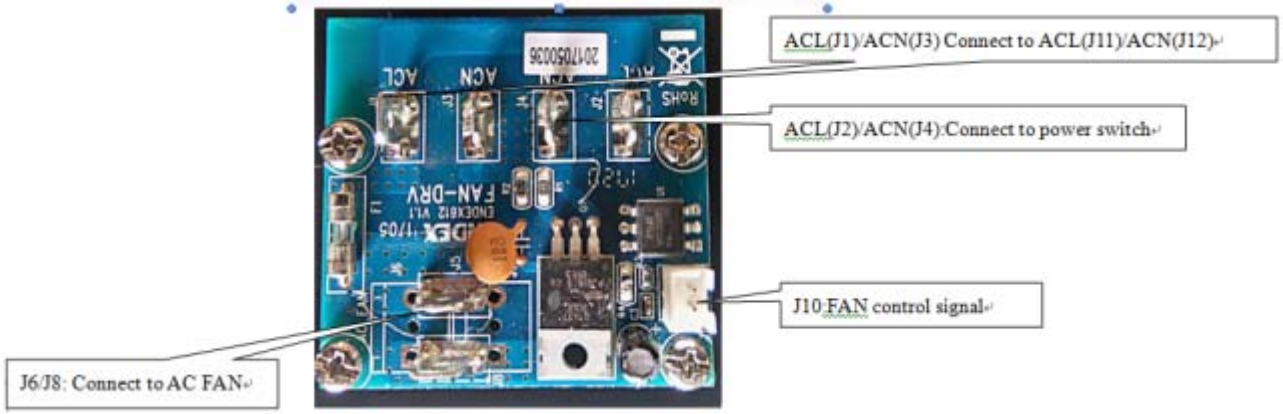


### 3. MCB PLACEMENT AND DEFINITION(110V-9520056/220V-9520057)



**FAN control board**





## 4. ERROR CODE AND TROUBLE SHOOTING

### A. E6/E7: Incline motor movements are abnormal.

a. Definition:

E6: Incline motor does not operate

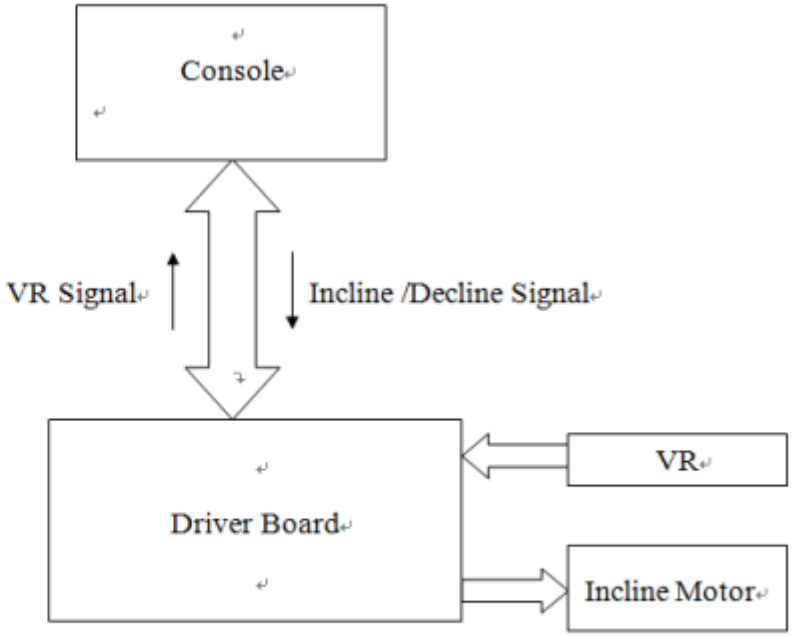
E7: Incline motor VR(voltage) error.

b. Configuration:

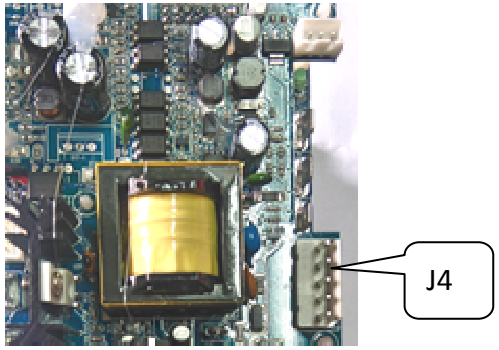




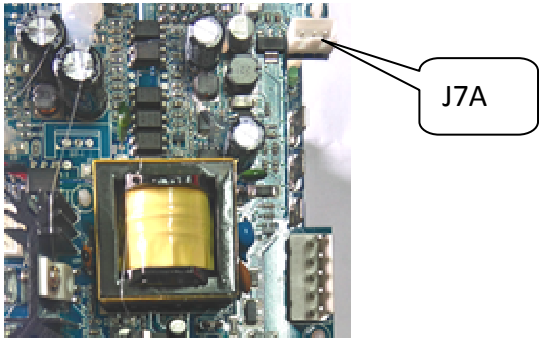




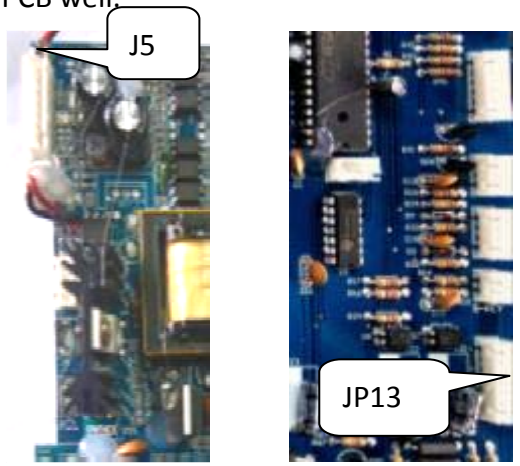
**c. Trouble shooting-E6**

| E6 Status | Problem Analysis | Error Checking and Trouble Shooting Step |
|---|---|---|
| Power on, press START. Drive motor turns on, press INCLINE UP/DOWN, incline motor doesn't work. After 5 seconds, E6 shows on the console.   | Incline motor power cable is not plugged in properly. | Make sure the incline motor power cable is plugged in J4 socket of MCB.   |
| | The bolt and nut which are on the top of the incline motor is too tight and impact the movement of changing angle during motor inclining or declining. | Follow the elevation motor replacement procedure to check whether the bolt and nut are too tight. |
| | The screw of the front leg support is too tight, so the front leg support cannot move smoothly. | Follow the elevation motor replacement procedure to check if screw in the front leg support is too tight. |
| | Nut of motor tube is too tight and can not back to original point automatically. | Follow the elevation motor replacement procedure to check if nut of motor tube is too tight. |

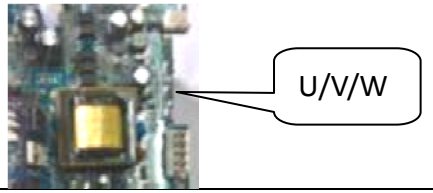
**d. Trouble shooting-E7**

| E7 Status | Problem Analysis | Error Checking and Trouble Shooting Step |
|---|---|---|
| Power on, press START. Drive motor turns on, press INCLINE UP/DOWN, incline motor doesn't work. After 5 seconds, E6 shows on the console.   | Incline motor signal cable is not plugged in properly. | Check if Incline signal cable connects with J7A of MCB properly.   |
| | Incline motor is too high or too low which is out of normal ADC range. | In standby mode, press STOP and START together and hold for 3 seconds to enter test mode. Do incline test to force incline motor incline or decline. Incline window shows ADC value. Standard value of -3% is 25 and standard value of 15% is 223-224. Press and hold INCLINE + or – to let value back to 100, then incline motor will back to normal. |

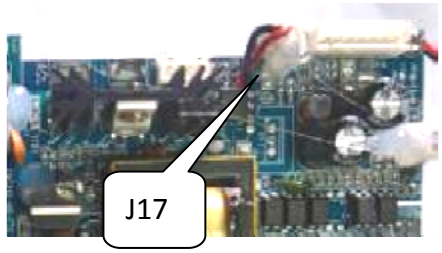
**B. UART:**

| UART Status | Problem Analysis | Error Checking and Trouble Shooting Step |
|---|---|---|
| Power on and console works. After pressing START, drive motor doesn't work and UART ERROR displays on the console.<br> | MCB communication error. | 1. Turn off the treadmill, and then turn on again to see if communication can back to normal.<br>2. If not, please check if the cable connects J5 of MCB and JP13 of PCB well.<br><br>3. Use multimeter to measure each color's wire of the cable and see if each wire is short. (Turn the meter to Ω, use red and black probes to touch both sides of same color wire of the cable. If number shows on the meter, the wire is good.) Every color's wire needs to be measured.<br>If steps above can not solve the problem, please replace the MCB. |

**C. AC9:** Drive motor cable(U/V/W) connection abnormal

| AC9 Status | Problem Analysis | Error Checking and Trouble Shooting Step |
|---|---|---|
| Power on and console works. After pressing START, drive motor doesn't work. AC9 shows on the display after 5 seconds.   | Drive motor U/V/W cable doesn't connect well. | Check U/V/W cable of drive motor if it connects with MCB well. It is better unplug the cable and then connect again.   |

**D. AC1:** Under voltage error

| AC1 Status | Problem Analysis | Error Checking and Trouble Shooting Step |
|---|---|---|
| Power on and console works. After pressing START, drive motor works in the beginning, and then stops. AC1 shows on the display after 5 seconds.   | Power input is lower than the standard. | 1. Check if J17 connects well.<br>2. Power off and then power on again. If AC1 still shows, it means power input is too low and needs to be improved.   |

**E. OTHER ERROR CODES**

| ERROR CODES | Problem Analysis | Error Checking and Trouble Shooting Step |
|---|---|---|
| AC2: Voltage overload | Power input overload | Turn off and then turn on the power again. If AC2 still shows, input power needs to be measured and improved. |
| AC3: Over voltage | Power input over max. value | Turn off and then turn on the power again. If AC3 still shows, input power needs to be measured and improved. |
| AC4: Current overload | Current is over the standard. | Power off and then power on, AC4 can be gone. |
| AC5: Over current | Over current max. value | Power off and then power on, AC4 can be gone. |
| AC6: MCB is broken | DC-Bus voltage can not be built in 20 seconds | Check fuse and bridge rectifier. If fuse is good, then MCB needs to be checked. |
| AC7: IGBT hardware short protect | | Power off and then power on, AC4 can be gone. If not, MCB needs to be checked. |
| AC8: Emergent stop input terminal broken circuit protect. | | Check connected cable between PCB and MCB if it connects well |
| E4: Current is too big.   | Current is too big and “CHECK BELT” shows on the screen. Please do run belt maintenance. | If accumulated workout distance reaches 3125 ML/5000km, when turn on the treadmill, “LUBE BELT” is showed. Please spray lubricant oil. After spraying, press STOP and hold for 3 seconds to clean “LUBE BELT”. Also enter engineer mode to clear accumulated workout distance. |

**5. ENGINEER MODE**

A. Under standby mode, press “STOP” and “SPEED +” and hold for around 3 seconds to enter.

B. When enter into engineer mode, 『VERSION x.xx (PCB)/ xxxx(MCB)』 PCB software is showed, then press “ENTER”.




C.『SET UNIT = MILE/KM』. Please press +/- button of speed or incline to set unit, then press “ENTER”.



D. 『 xxxx H / xxxx KM』. Accumulated workout hours/distance is showed, then press “ENTER”. Press “STOP” + “ENTER” and hold for around 3 seconds, accumulated workout hours/distance can be clear.




E. 『 LUBE xxxx KM』. Mileage for maintenance is showed, then press “ENTER”.

## 6. TEST MODE

A. Under standby mode, press “STOP” and “START” and hold for around 3 seconds to enter.

a. INCLINE TEST: ADC value is showed in incline window. ADC value of -3% is 25 and ADC value of 15% is 223-224. Press +/- of incline to test or press ENTER.
When E7 error code is showed, press and hold incline +/- to adjust ADC value about 100. This can help incline motor to back to normal.




b. LED test: all LED light on and off. Press ENTER.




c. LED COM scan. Press ENTER.



d. LED DATA scan. Press ENTER.



e. Button test: KEY TEST shows on the screen. Press every button and button name will be showed on the screen.




f. Take off safety key to leave the test mode.

## 7. PARTS TEST

### A. POWER SWITCH TEST




a. Set multimeter to Ohm mode and turn the power switch to “OFF”. Place probes on A-C and B-C to measure, and measurements should be more than 0 ohm which means they are in open circuit.
b. Turn the power switch to “ON”. Measure A-C and B-D and reading should be greater than 0 Ohm which means they are in open circuit.
c. If measurement does not match a and b, replace the power switch.

### B. MCB FUSE TEST




a. Set multimeter to Ohm mode, and place probes on both side of fuse.
b. The reading of the multimeter should show less than 1 Ohm. If not, replace the fuse.

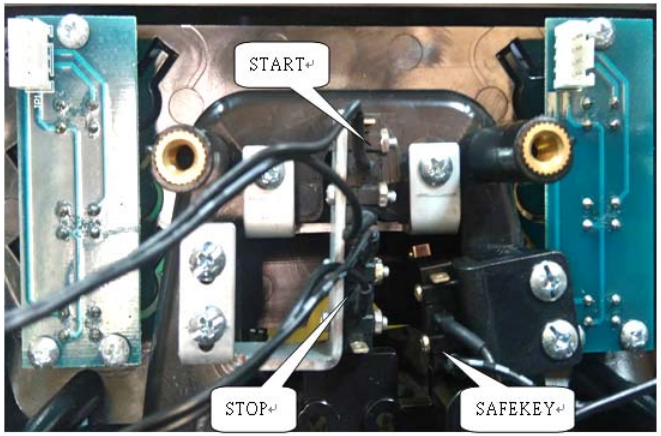
**C. CONTROLLER SWITCH TEST**




a. Set multimeter to Ohm mode, and place probes on both side of the controller switch sensor. Press the controller switch and the measured value should less than 1 Ohm. Un-press the controller switch, there is no value.

b. If measured value does not fit a, controller switch sensor needs to be replaced.

**D. SAFETY KEY/STOP/START SWITCH SENSOR TEST**







a. Set multimeter to Ohm mode, and place probes on both sides of SAFETY KEY/STOP/START switch. Press SAFETY KEY/ STOP/ START switch, the measured value should be less than Ohm. Un-press the switch, there is no value.

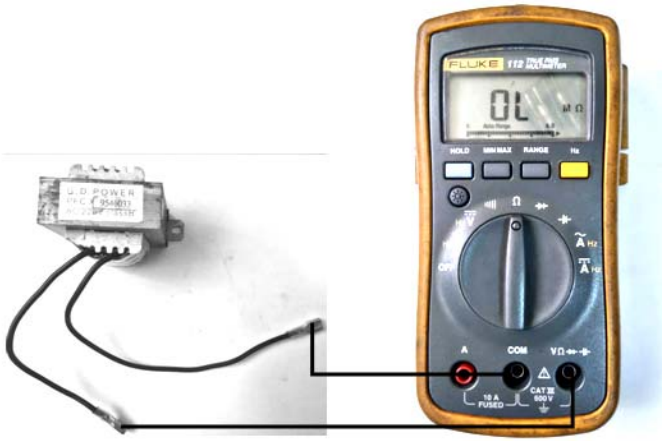
b. If measured value does not fit a, SAFETY KEY/STOP/START switch sensor needs to be replaced.

**E. FILTER TEST**



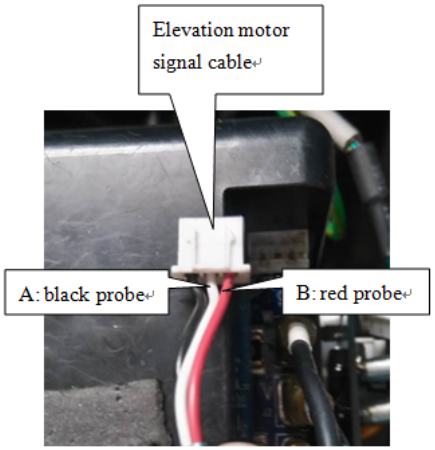

a. Set multimeter to Ohm mode, and place probes on A-B and C-D as picture shows. Reading should be less than 1 Ohm.
b. Place probes on A-E, B-E, C-E, D-E to measure resistance, all measurements should be open circuit.
c. If results do not match a and b, replace filter.

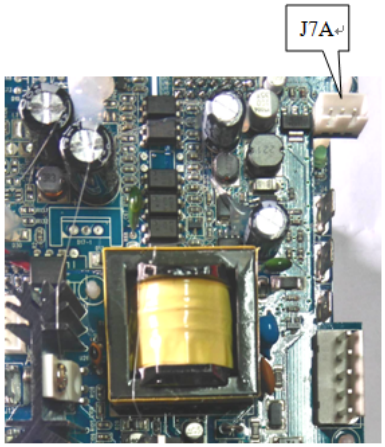
F. **INDUCTOR TEST**




a. Set multimeter to Ohm mode, and place probes on inductor's connectors.
b. Reading should show less than 1 Ohm. If not, replace inductor.

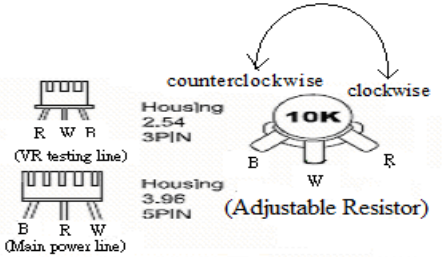
## G. ELEVATION MOTOR VR TEST

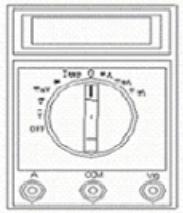



a. Set multimeter to DC Voltage mode. Plug off elevation motor signal cable. Red probe touches red cable(B) and black probe touches white cable(A). When elevation motor is in -3%, measured value should be around 0.95-1.0 KΩ. When elevation motor is in 0%, measured value should be around 2.0~2.5 KΩ. When elevation motor is in 15%, measured value should be around 9.0~9.5 KΩ.

## H. ELEVATION MOTOR'S ADJUSTABLE RESISTOR(VR) TEST

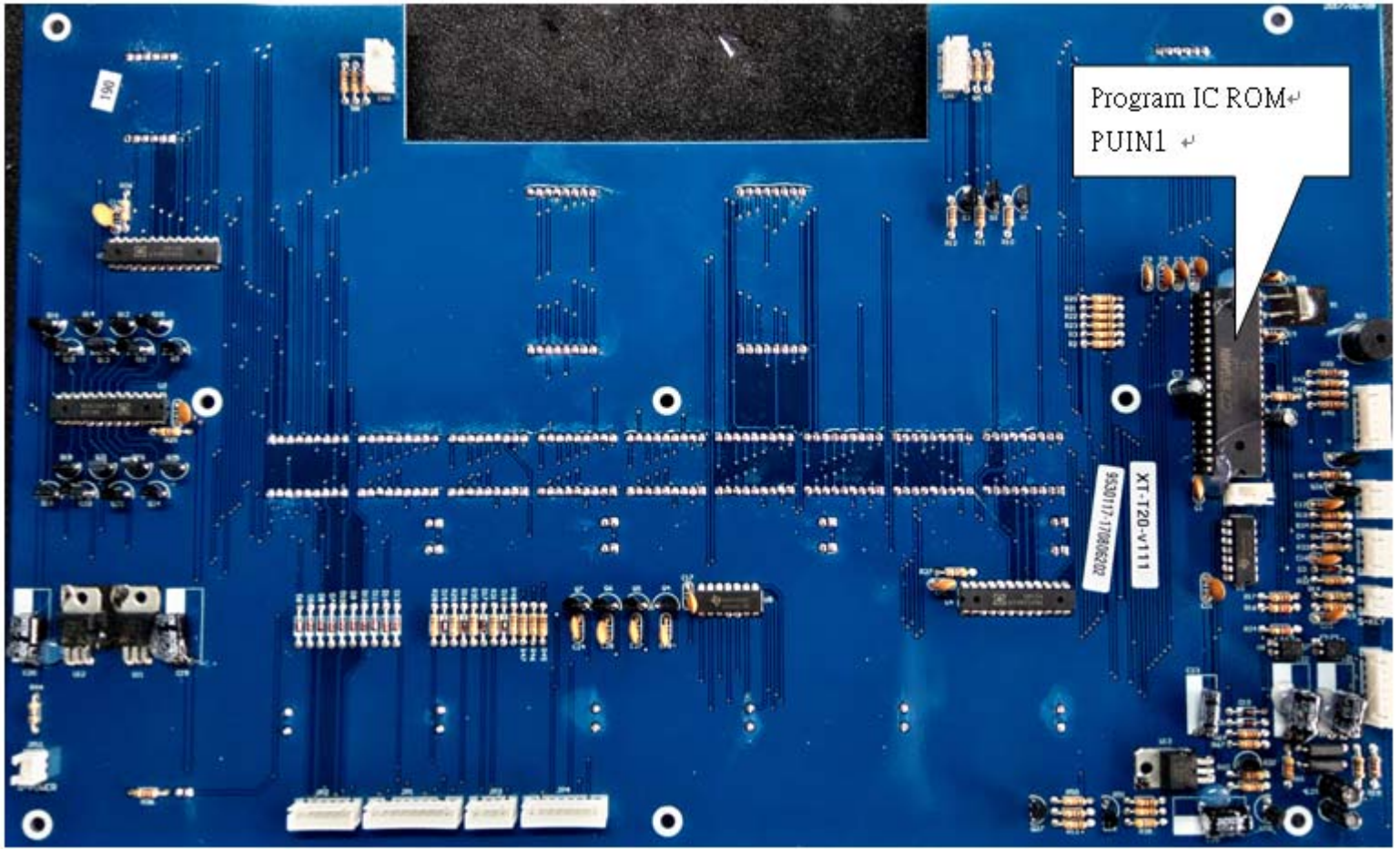


| Main Power Line | VR Testing Line |
|---|---|
| R ← up → R<br>W ← com → W<br>B ← down → B | W+R |

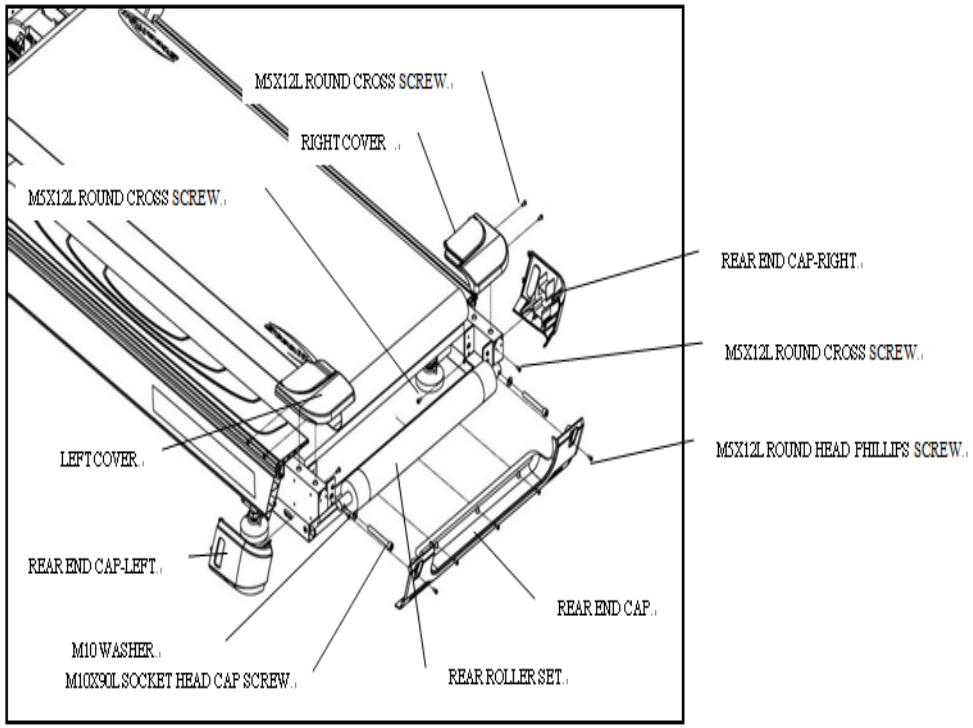
a. Separate adjustable resistor (VR) and testing wire.
b. Set multimeter to Ohm mode, place probes on adjustable resistor's pin.
c. Turn adjustable resistor clockwise to the end, measurement should be close to 10 KΩ when W to B and 0 Ω when W to R. Turn VR in the counterclockwise, the measurement should be close to 0 Ω when B to W and 10 KΩ when W to R.
d. If measurement is 0.5 KΩ different from above status, the VR needs to be replaced

## 8. LOCATION OF IC CHIP(PCB)



## 9. PARTS REPLACEMENT

### A. REAR ROLLER REPLACEMENT



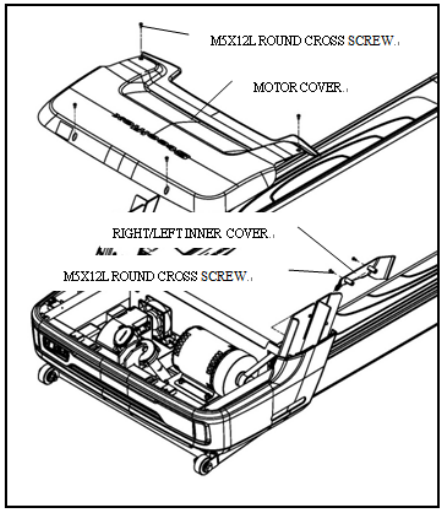

**Uninstall**

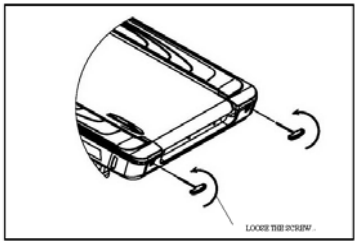
a. Power off.
b. Loosen screws of rear end cap and take it off.
c. Loosen screws of right and left covers and take them off.
d. Loosen screws of right and left rear end caps and take them off.
e. Loosen adjusted bolts of rear roller and take the roller off from side.

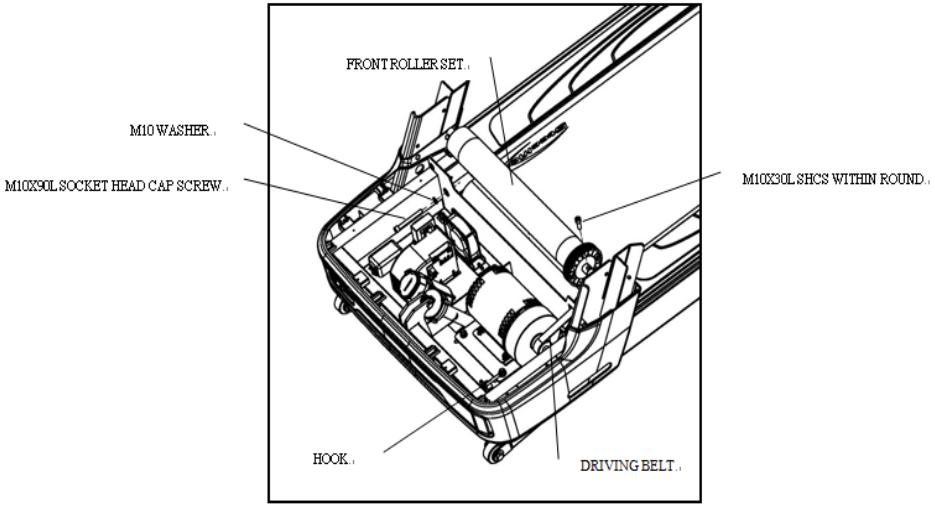
**Install**

a. Put a new rear roller through run belt from one side. Tighten both sides' adjusted bolts.
b. Install right and left rear end caps and tighten screws.
c. Install right and left covers and tighten screws.
d. Install rear end cap and tighten screws.
e. Adjust run belt tightness by adjusting rear roller adjusted bolts.
f. Power on and make the treadmill runs in low speed to see if the run belt tends to one side or slip. Adjust run belt until it does not slip.

## B. FRONT ROLLER REPLACEMEN





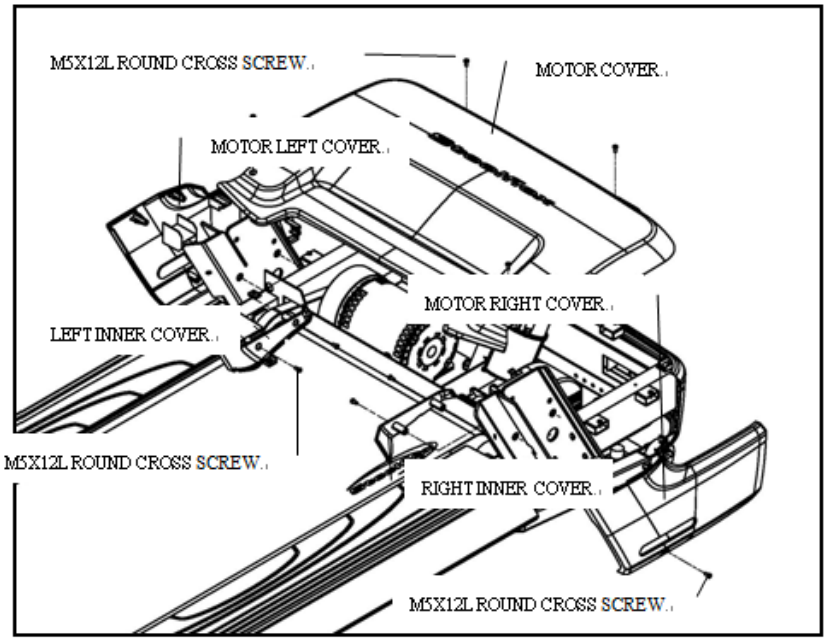

### Uninstall

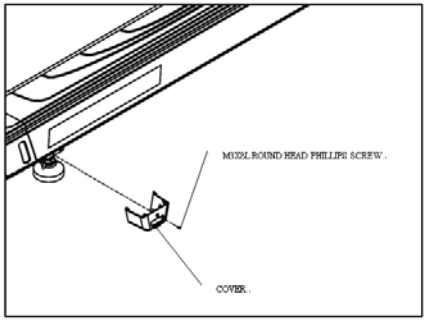
a. Plug off. Loosen all screws of motor cover and take it off.
b. Loosen screws of right and left covers and take them off.
c. Loosen rear roller adjusted bolts to loose the run belt.
d. Loosen fixed hook adjusted bolt, then take off drive belt.
e. Loosen both sides' screws of front roller, then take it off.
f. Loosen both sides adjusted screws of front roller and take it off.

### Install

a. Install a front roller from side through the run belt, then tighten both sides' screws.
b. Install drive belt on the flywheel of drive motor and front roller. Be sure they are in a line.
c. Adjust fixed hook. When adjusting, make sure it does not slip.
d. Install right and left covers and tighten screws.
e. Install motor cover ad tighten screws.
f. Adjust rear roller adjusted bolts.
g. Power on and make the treadmill runs in low speed to see if the run belt tends to one side or slip. Adjust run belt until it does not slip.

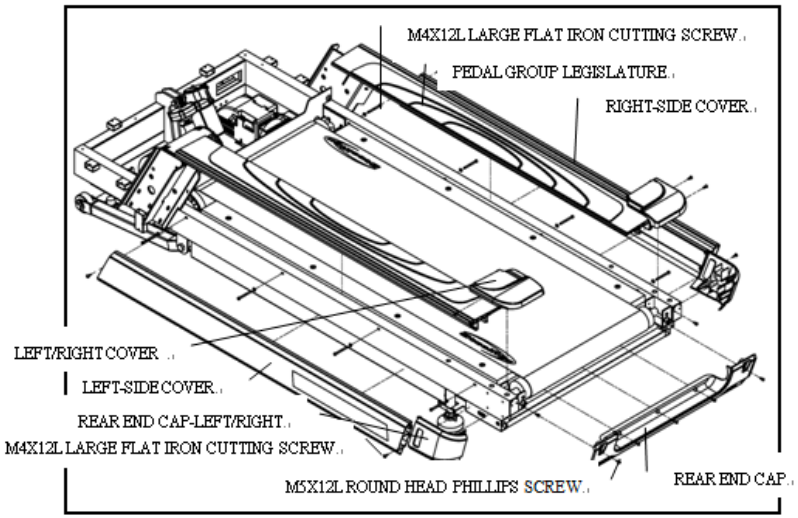
## C. RUN DECK REPLACEMENT

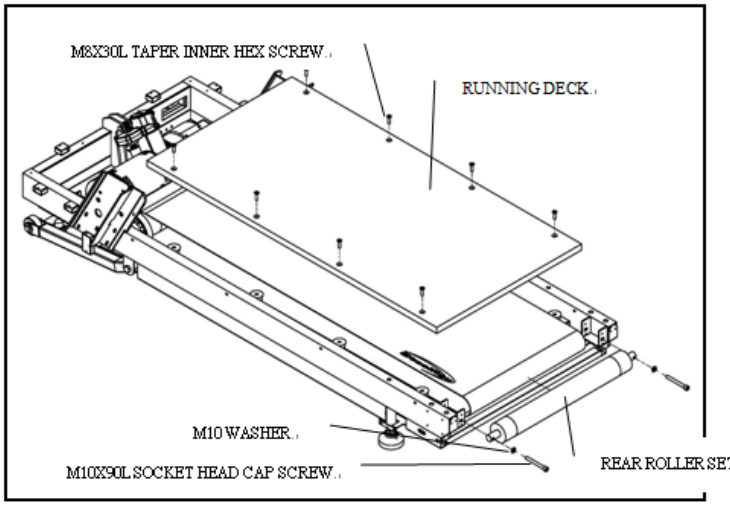



**Uninstall**

a. Plug off. Loosen all screws of motor cover and take it off.
b. Loosen screws of right and left inner motor covers and take them off.
c. Loosen screws of right and left motor covers and take them off.
d. Loosen screws of right and left foot covers and take them off.
e. Loosen screws of rear end cap and take it off.
f. Loosen screws of right and left rear top end caps and take them off.
g. Loosen screws of right and left rear side end caps and take them off.
h. Loosen screws of right and left side rails and take them off.
i. Loosen screws of right and left top side rails and take them off.
j. Loosen adjusted bolts of rear roller and take it off.
k. Loosen screws of run deck, then take it out from a side.

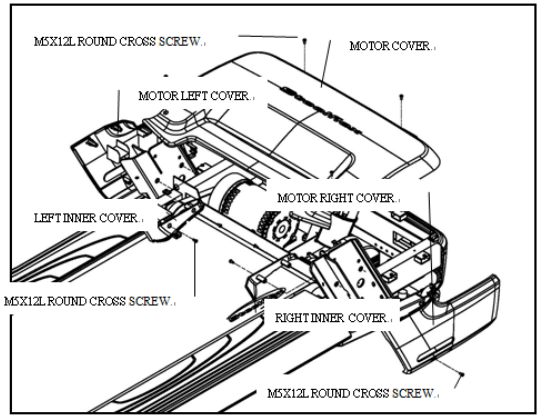


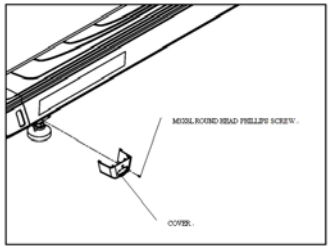



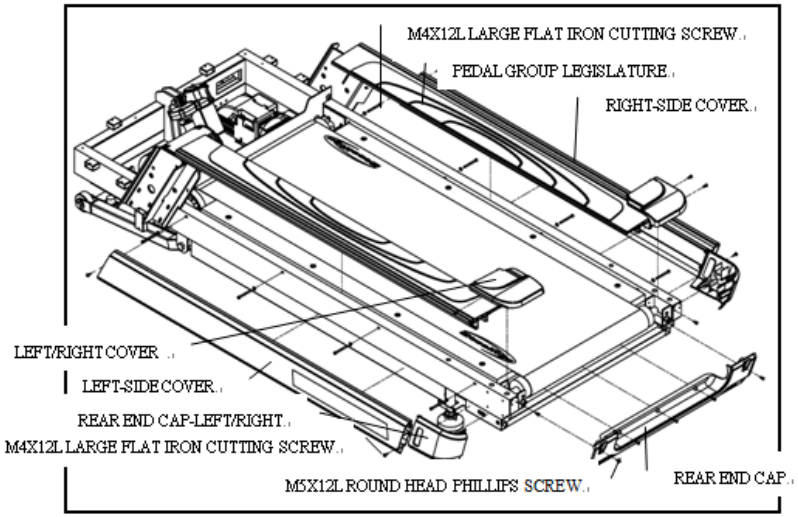

**Install**

a. Install a run deck through run belt, then tighten screws of run deck.
b. Install rear roller through run belt and tighten adjusted bolts.
c. Install right and left top side rails and tighten screws.
d. Install right and left side rails and tighten screws.
e. Install right and left rear side end caps and tighten screws.
f. Install right and left rear top end caps and tighten screws.
g. Install rear end cap and tighten screws.
h. Install right and left foot covers and tighten screws.
i. Install right and left motor covers and tighten screws.
j. Install right and left inner motor covers and tighten screws.
k. Install motor cover and tighten screws.
l. Adjust rear roller adjusted bolts for run belt tightness.
m. Power on and make the treadmill runs in low speed to see if the run belt tends to one side or slip. Adjust run belt until it does not slip.

## D. RUN BELT REPLACEMENT

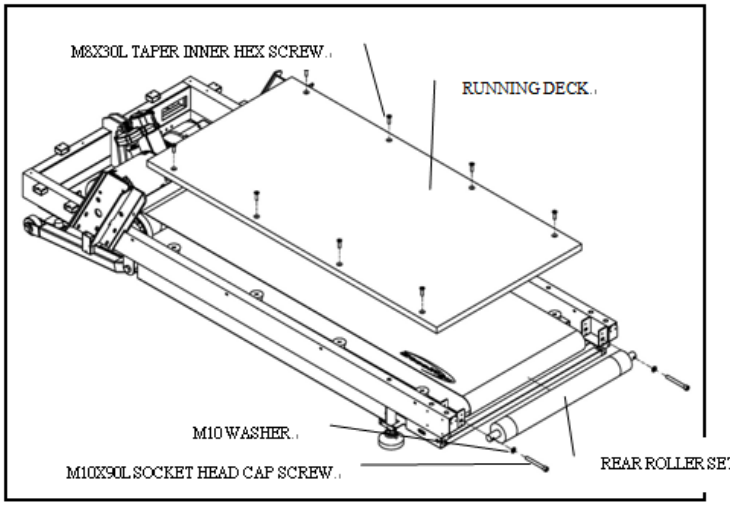


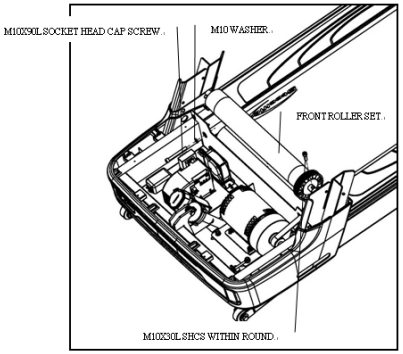



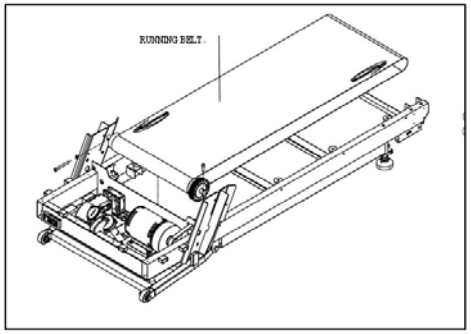



**Uninstall**

a. Plug off. Loosen all screws of motor cover and take it off.
b. Loosen screws of right and left inner motor covers and take them off.
c. Loosen screws of right and left motor covers and take them off.
d. Loosen screws of right and left foot covers and take them off.
e. Loosen screws of rear end cap and take it off.
f. Loosen screws of right and left rear top end caps and take them off.
g. Loosen screws of right and left rear side end caps and take them off.
h. Loosen screws of right and left side rails and take them off.
i. Loosen screws of right and left top side rails and take them off.
j. Loosen adjusted bolts of rear roller and take it off.
k. Loosen screws of run deck, then take it out from a side.
l. Loosen screws of front roller, then take it out.
m. Take the run belt off.




**Install**

a. Install front roller through run belt, and then tighten screws.

b. Install a run deck through run belt, then tighten screws of run deck.

c. Install rear roller through run belt and tighten adjusted bolts.

d. Install right and left top side rails and tighten screws.

e. Install right and left side rails and tighten screws.

f. Install right and left rear side end caps and tighten screws.

g. Install right and left rear top end caps and tighten screws.

h. Install rear end cap and tighten screws.

i. Install right and left foot covers and tighten screws.

j. Install right and left motor covers and tighten screws.

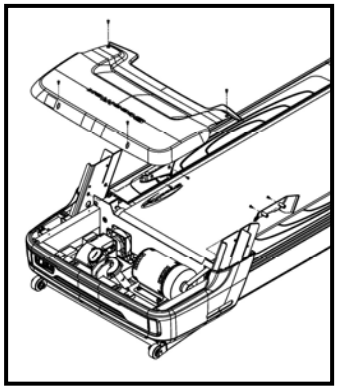
k. Install right and left inner motor covers and tighten screws.

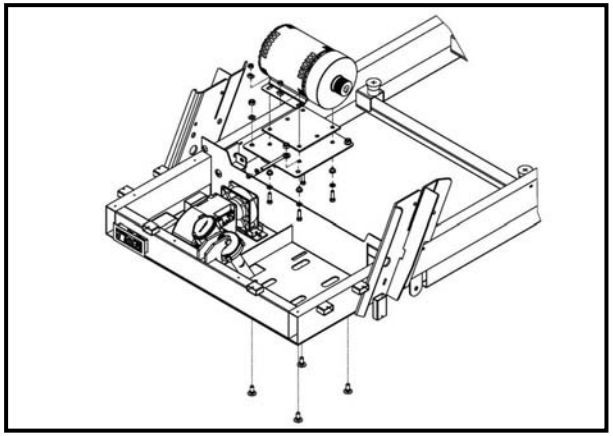
l. Install motor cover and tighten screws.

m. Adjust rear roller adjusted bolts for run belt tightness.

n. Power on and make the treadmill runs in low speed to see if the run belt tends to one side or slip. Adjust run belt until it does not slip.

## E. DRIVE MOTOR REPLACEMET





**Uninstall:**

a. Plug off.
b. Loosen screws of motor cover and take it off.
c. Unplug connected UVW cable from MCB and grounding cable.
d. Loosen adjusted bolt.
e. Loosen screws of motor base and take of the drive motor.

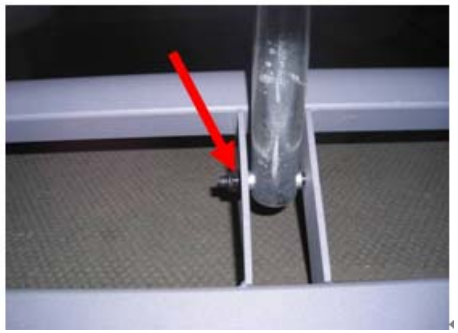
**Install:**

a. Put a new drive motor on the base and tighten screws.
b. Tighten motor grounding cable screw and plug connected UVW cable with MCB.
c. Install drive belt on the drive wheel of the motor and flywheel of front roller. Make sure driving belt is aligned with wheels.
d. Tighten adjusted bolt.
e. Install motor cover back and tighten screws.
f. Plug in and power on. Have the treadmill run in lowest speed to see if drive motor work normal.

## F. ELEVATION MOTOR REPLACEMENT







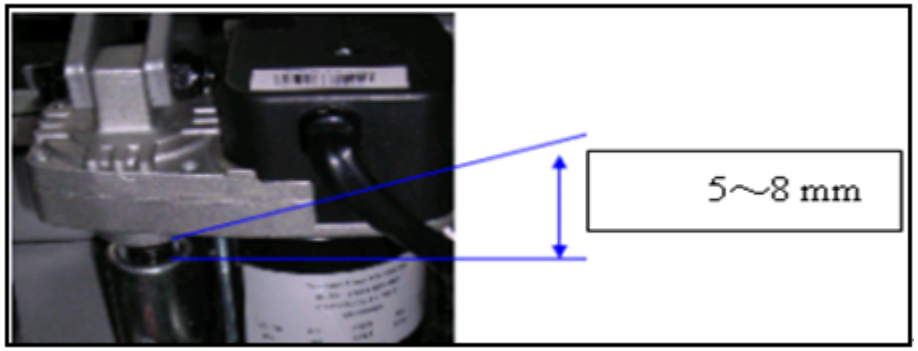
**Uninstall:**

a. Plug off.
b. Loosen screws of motor cover and take it off.
c. Loosen elevation motor grounding cable screw and unplug cable connect of elevation motor from elevation control board.
d. Loosen and take off the nut on the top of elevation motor.
a. Use a piece of wood to lift up the frame as left picture shows which makes front foot un-touched the ground. Take off screw and nut from elevation tube.
e. Take off screw on the top of elevation motor.
f. Move elevation motor.

**Install:**

a. Replace a new elevation motor, and tighten bolt and nut on the top of the motor.
b. Tighten Screw of elevation motor grounding cable.
   Check after step b:
   i. Move the elevation motor manually to make sure top bolt and nut are not too tight to impact the movement of the elevation motor. (Too tight might cause “E6”).
   ii. Check whether front leg support fixed screws are not too tight. (Too tight might cause “E6”)
c. Make sure the lifting screw pipe is suspended in middle of air.

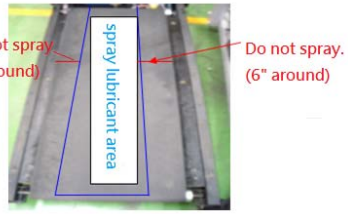


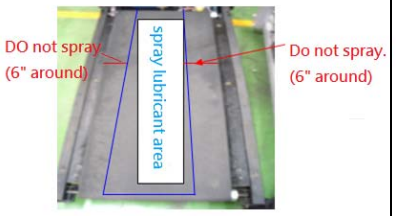



d. Power on the treadmill and press “START”. Then press DOWN button of incline to 0%. Wait for elevation motor moving back to initial position. Then press DOWN of incline again and wait for elevation motor decreases to -3%. Once it backs to -3%, power off.
e. Screw the lifting screw pipe to 5~8mm closed to the top same height as the machine.
f. Tighten bolt and nut of the lifting pipe and the front leg support. (Tighten the bolt first, then loosen 1/4 circle.)
g. Power on the treadmill to test the elevation function again.

## 10. STEPS FOR SPRAYING LUBRICANT ON THE RUN BELT

When accumulated workout distance reaches 3125 miles/5000 km, “LUBE BELT” will show on the screen. Please follow steps below to spray silicone. When silicone spray is done, press STOP and hold for 3 seconds to clear “LUBE BELT”. Then enter engineer mode to clear accumulated workout distance.

| | |
|---|---|
| | Step 1: Power off. |
| | Step 2: Loosen screws of motor cover and take the motor cover off. |
| | Step 3: Loosen adjust screws of rear roller to loosen the run belt. |
|  | Step 4: Inspect run belt situation.<br>Lift run belt as left picture shows. Touch back of run belt by hand to feel if there is enough lubricant.<br>If run belt needs to be lubricated, please wipe down to clean run deck and roller. |
|    | Step 5:<br>Lift right side of belt and spray lubricant as shown on the left. When spraying, lift and pull the run belt and make the run belt turns a full revolution.<br>Notice:<br>When spraying lubricant, please spray in center area. Please don’t spray on the side area. |

| | |
|---|---|
|    | Step 6:<br>Lift left side of belt and spray lubricant as shown on the left. When spraying, lift and pull the run belt and make sure the run belt turns a full revolution.<br>Notice:<br>When spraying lubricant, please spray in center area. Please don't spray on the side. |
| | Step 7: Power on.<br>Press "START", and increase speed to 1MPH(1.6 KPH). Have someone walk on the treadmill to absorb the spray.<br>Please notice:<br>DO NOT make the treadmill run in high speed when you've just sprayed lubricant. If lubricant is not absorbed, lubricant will spray out to drive motor and MCB. |
| Remark:<br>For each preventative maintenance, spray 30-50 cc. lubricant is suggested. | |

## 11. CLEARANCE

If there is lots of cotton or sands on/below the run belt, please follow steps below to do clearance.

Step 1: Power off.

Step 2: Loosen screws of motor cover and take it off.

Step 3: Loosen adjusted bolts (turn counterclockwise 20 circles) of rear roller until the run belt is loose.

Step 4: Pull up the run belt from one side and use tender cloth dip soap water to clear run deck, back of run belt, front roller and rear roller.

Step 5: Tighten adjusted bolts (turn clockwise 20 circles) of rear roller until the run belt tights enough.

Step 6: Power on and make the treadmill run in lowest speed and check the run belt. If run belt slips or shifts to one side, adjust both sides' adjusted bolts. Turn 1/4 circle for every adjustment.

## 12. MAINTENANCE

### A. DAILY AND WEEKLY MAINTENAC

a. Plastic covers: use tender cloth dip soap water and wipe all cover parts.

b. Handle bars, side rails, and run belt clean: use tender cloth dip soap water and wipe Handle bars, side rails, and top surface of the run belt.

P.S. Avoiding damage on electronic parts, do not leave water which drops on the treadmill and the run belt.

**B.MONTHLY MAINTENANCE**

a. Clean inside of the motor chamber: Open the motor cover, and clean dust and dirt on all parts by using the vacuum cleaner.
b. Check run belt: Check the tightness of the run belt and make sure the run belt stays in center as picture below.

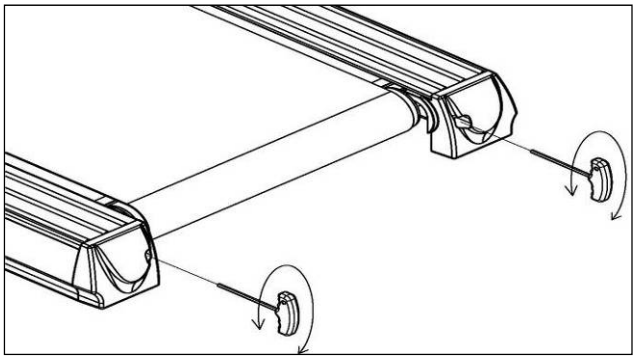



c. Check all LED lights, buttons and HR sensor if all functions are ok.
d. Use clean cloth to wipe the bottom surface of the run belt and run deck as picture.

**C. ADVANCED MAINTENANCE:**

a. Check the driving belt abrasion status and cleanness. Make sure the driving belt is aligned with driving wheels on the motor and the front roller, and tightness of the driving belt. Check whether any sliding situation happen between the driving belt and front roller driving wheel.
b. Check all LED lights, buttons and HR sensor if all functions are ok.
c. Check front roller and rear roller and bearings and clean them.
d. Check if run belt situation is still good. For every 2000KM, replace a new run belt is suggested. If run belt is too old, it might make treadmill current increase too much and burn the MCB.

e. The run belt sliding adjustment as picture below



It will reduce life time of the run belt if the belt is too tight, please adjust its tightness based on users' weight.

Adding pressure on the run belt by walking to test tightness of the run belt.

a. Check the tightness among run belt, front roller and rear roller. Run belt slips if they are too loose.

b. Abnormal noise happens when the run belt is too tight.

c. Check if front and rear rollers work normal.

d. Adjust run belt tightness by adjust adjusted bolts of rear roller. Turn clockwise to tight the run belt. Turn counterclockwise to loose the run belt. Turn 1/4 circle for each adjustment. Power on and let the treadmill run in lowest speed and check if run belt slips or shift to one side. Turn 1/4 circle for each adjustment.

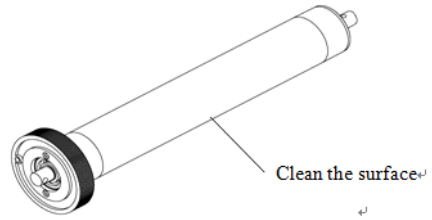
f. Drive belt sliding adjustment

a. Check if drive belt, front roller wheel and drive motor wheel are too loose and make the drive belt slips.

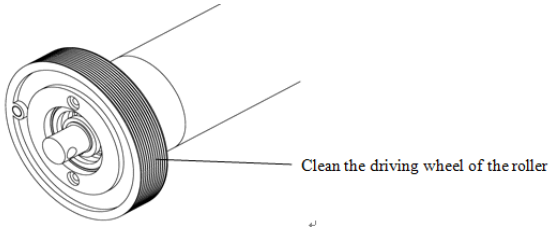
b. If drive belt is too loose and slips, fixed hook of drive motor can be adjusted.
Turn clockwise to tighten and turn counterclockwise to loosen until it does not slip.



g. Front roller and rear roller maintenance




Clean surface of rollers – clean surface of rollers which contact the run belt as left picture.




Clean driving wheel surface of the rollers – clean dust and dirt on the wheel as left picture.

h. MCB fan maintenance

a. If MCB fan makes noise, take the fan off.

b. Clean then fan, and then use WD-40 to maintain.

