

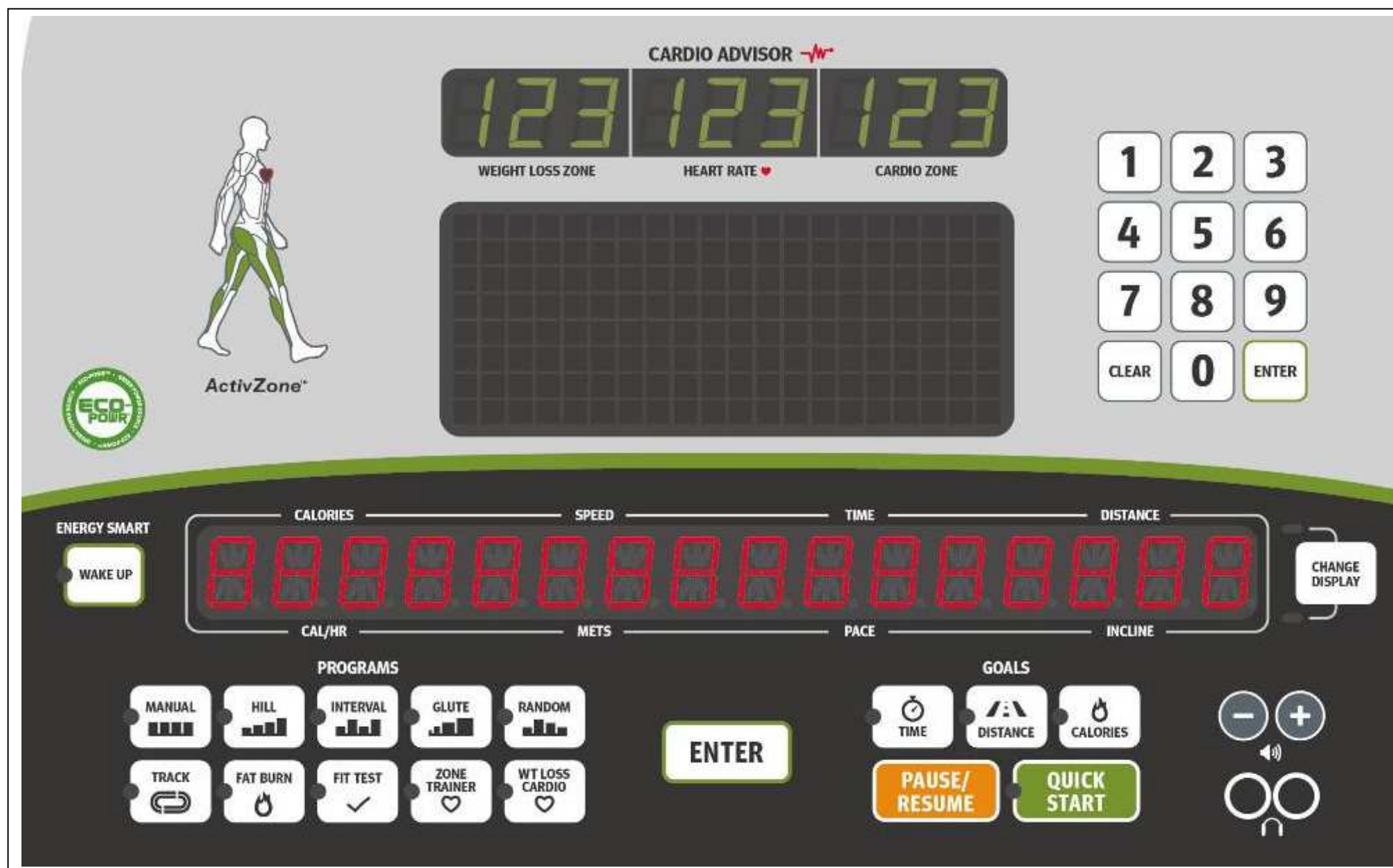
SportsArt_{FITNESS}

T645 Repair Manual (Electronics)

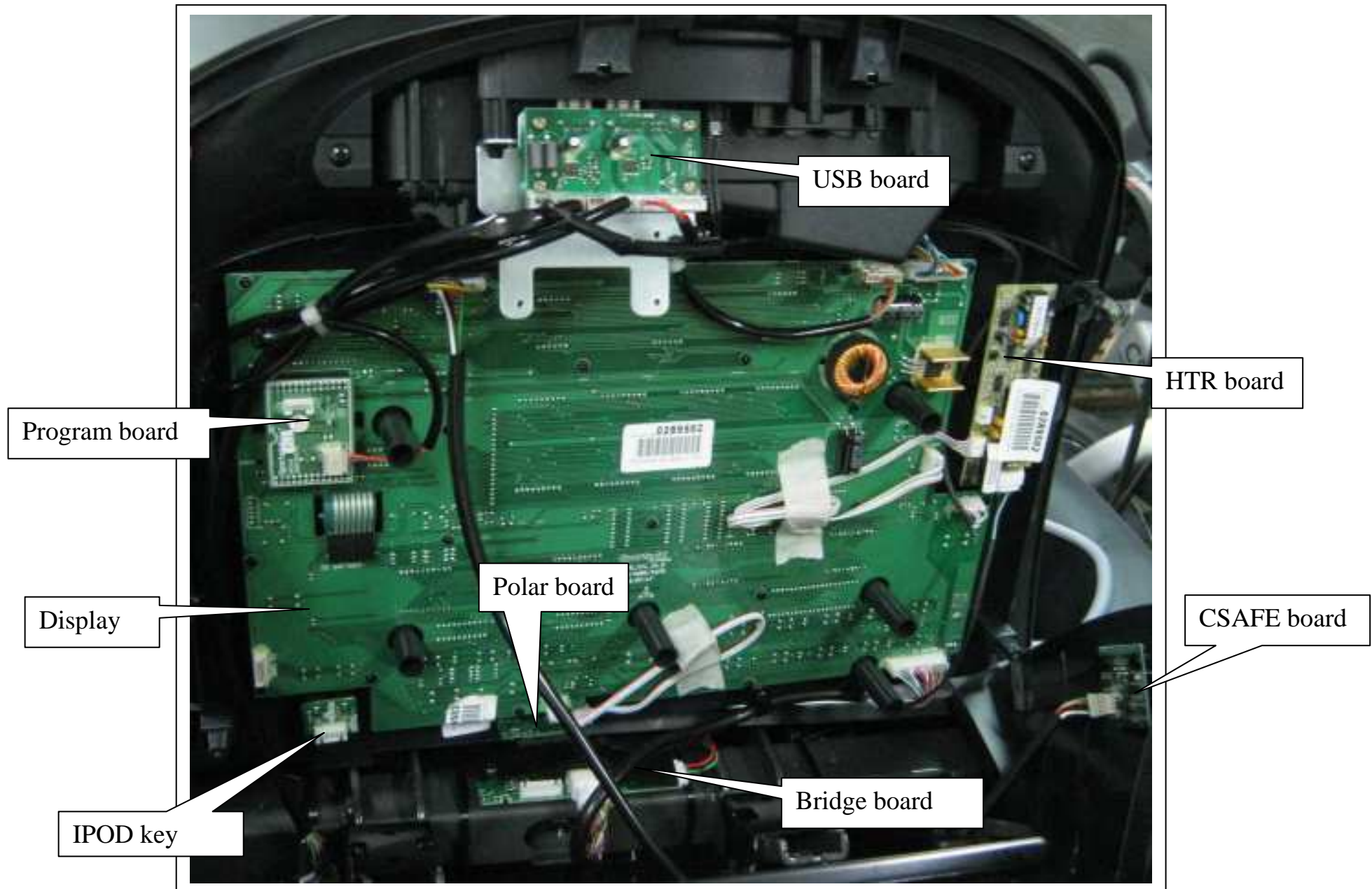




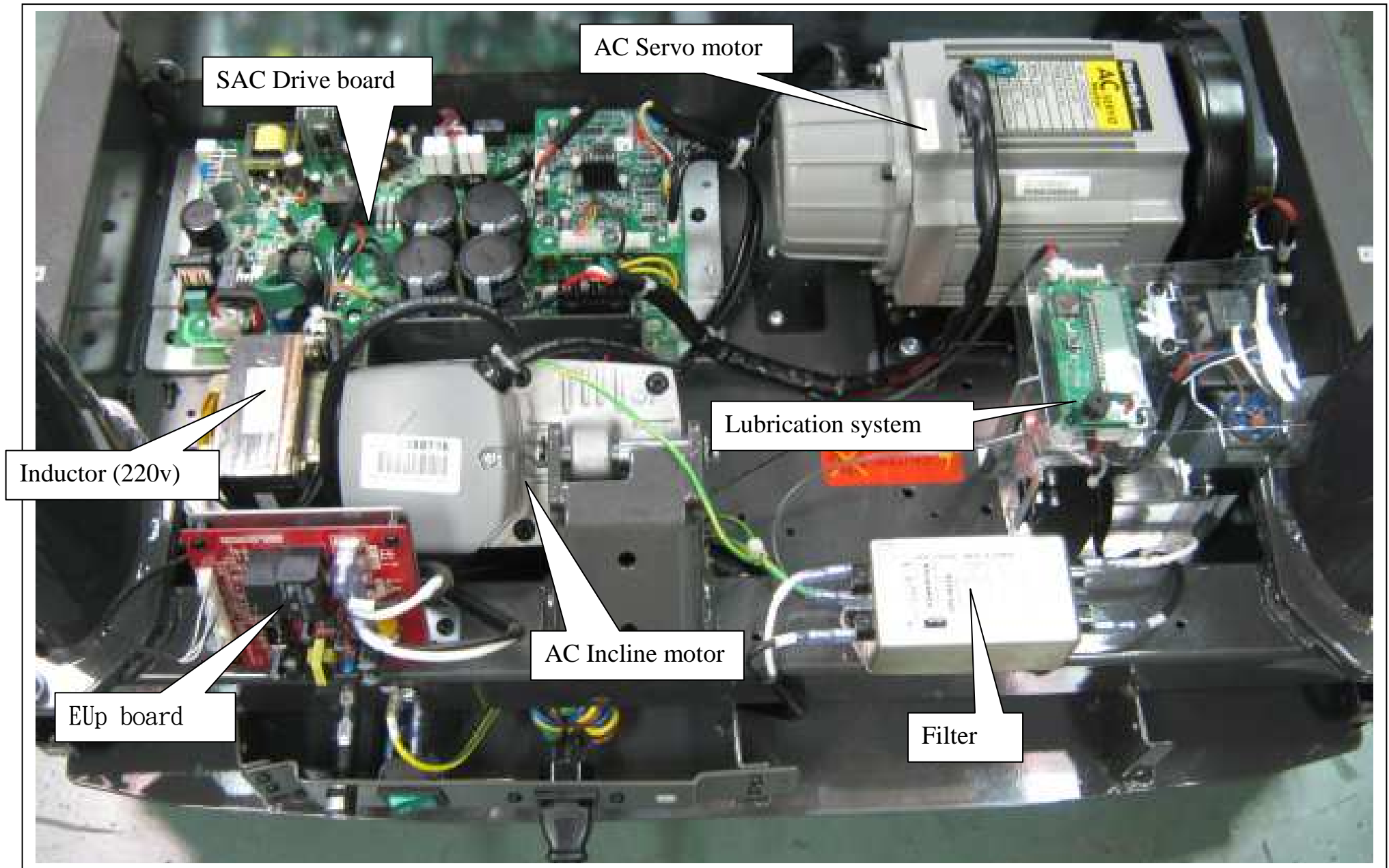




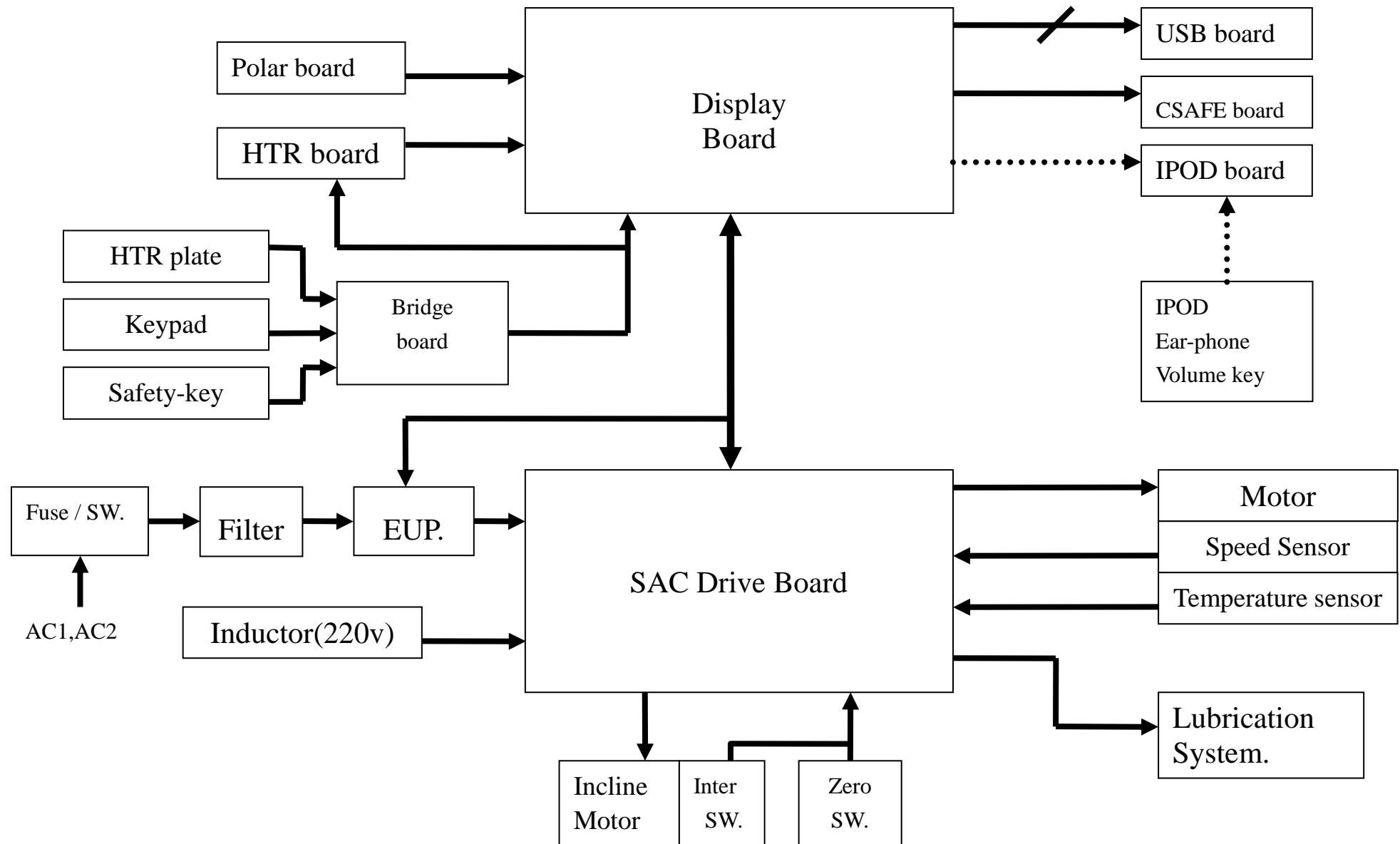
1-3. Component Placement- T645 Display



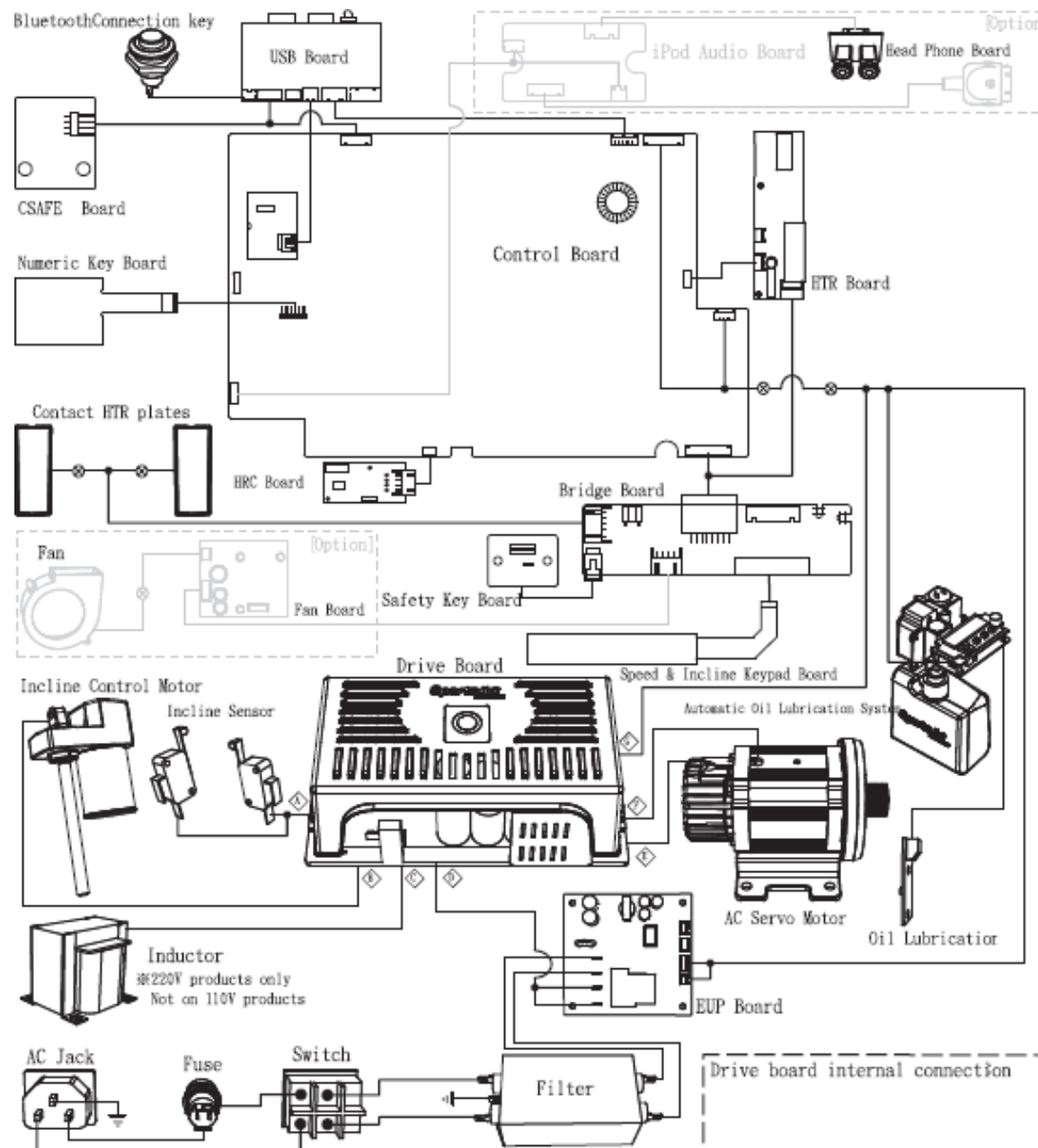
1-3. Component Placement - T645 Drive Compartment



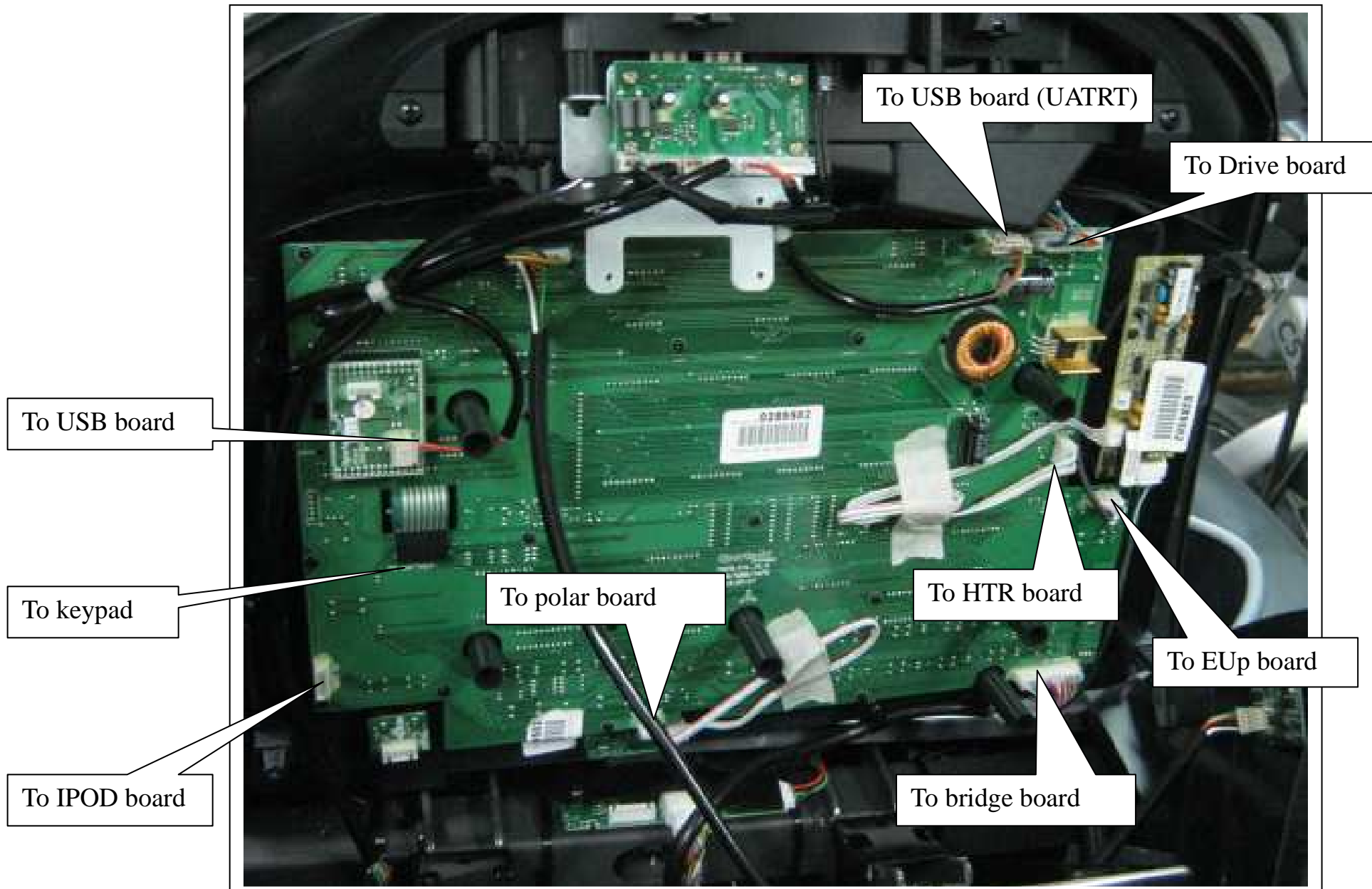
1-4. Block Diagram of Electronic Components - T645



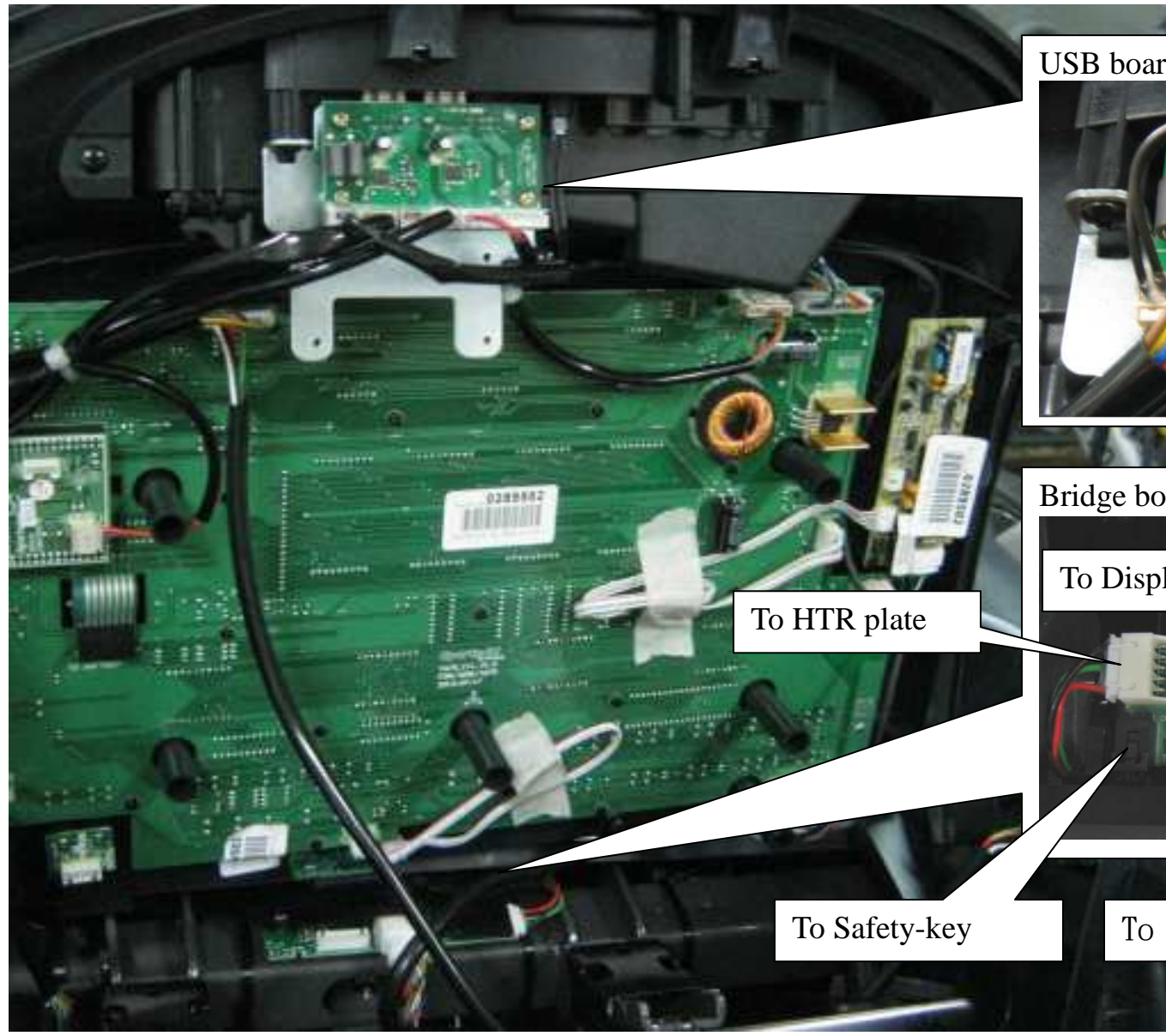
1-4. Connection-T645



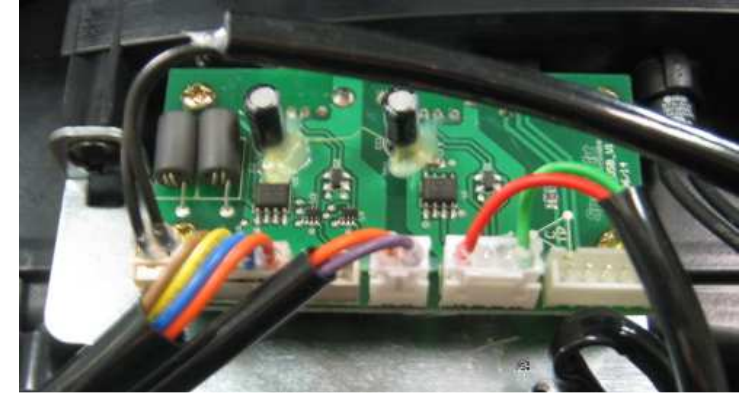
1-5. Cable Connections - T645 Display



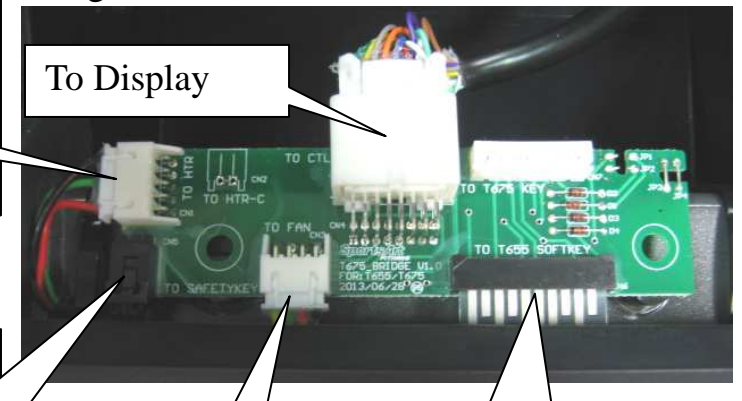
1-5.Cable Connections - T645 Display



USB board



Bridge board



To HTR plate

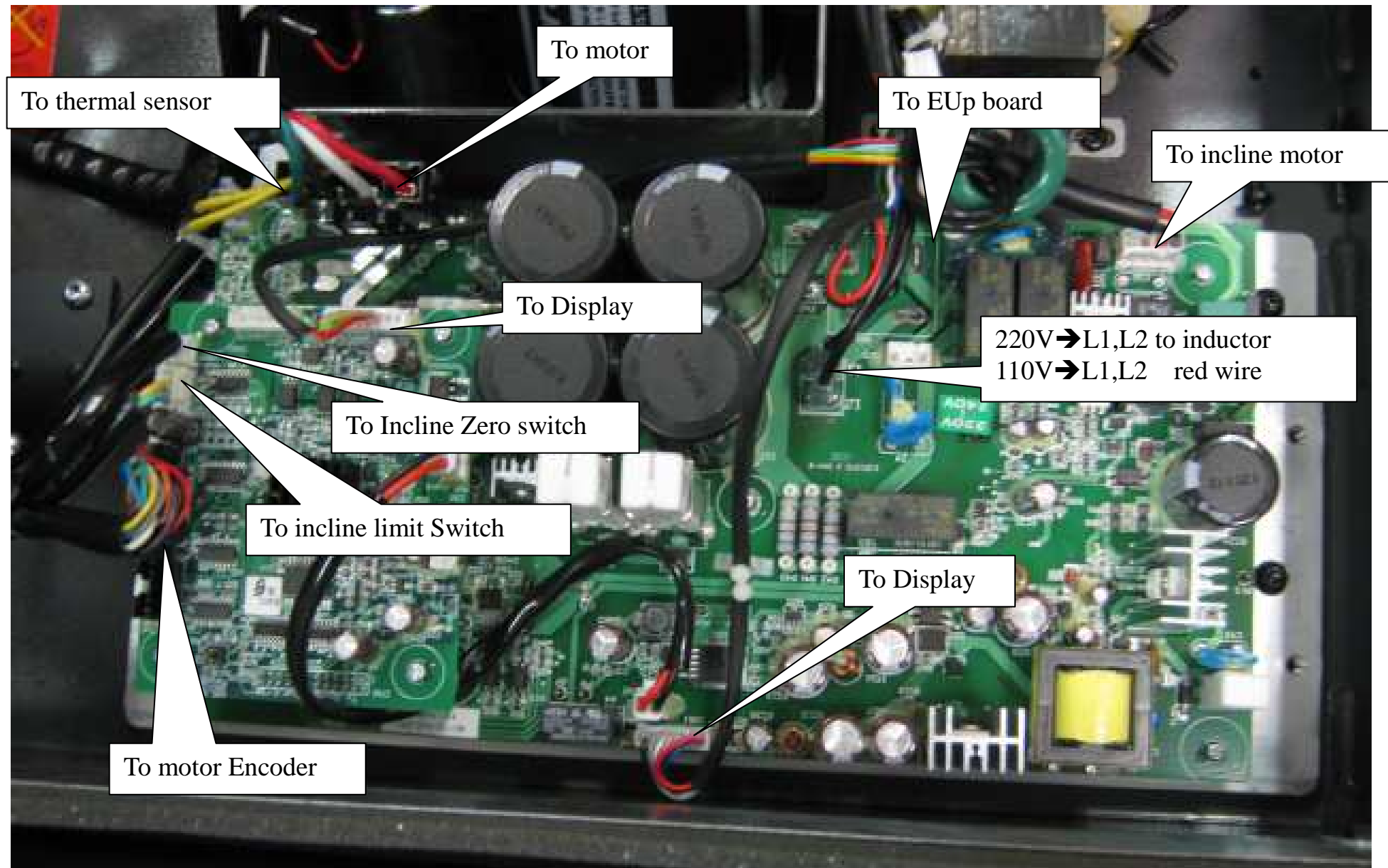
To Display

To Safety-key

To Fan

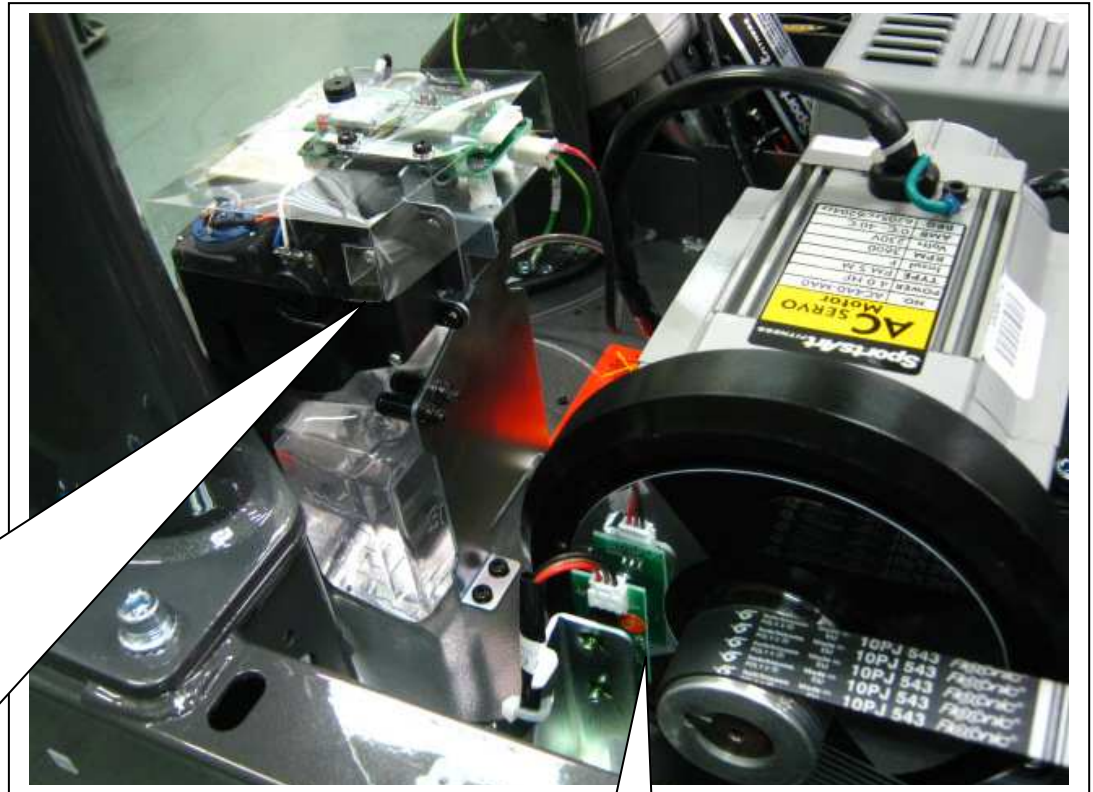
To lower keypad

1-5. Cable Connections - T645 SAC Drive board



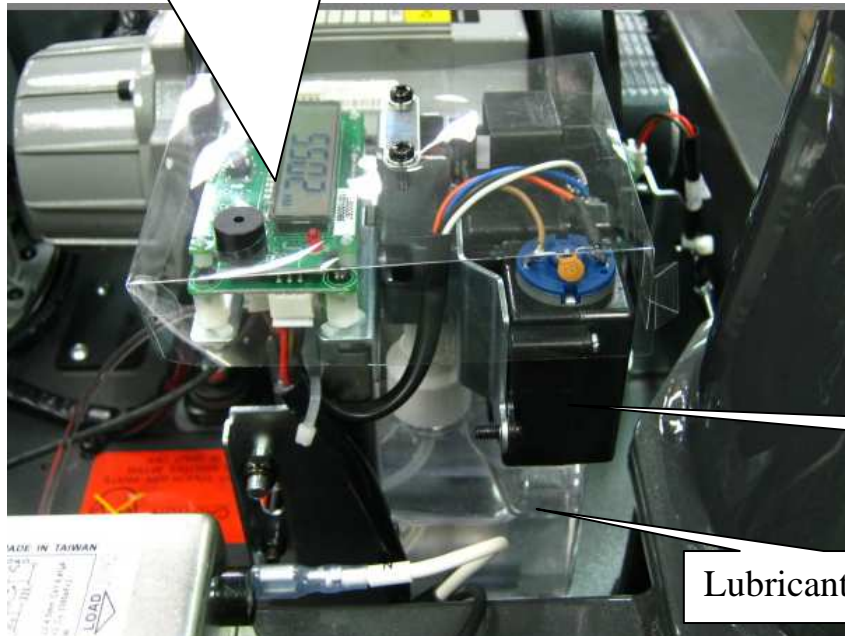
1-5. Cable Connections - Lubrication system

Display



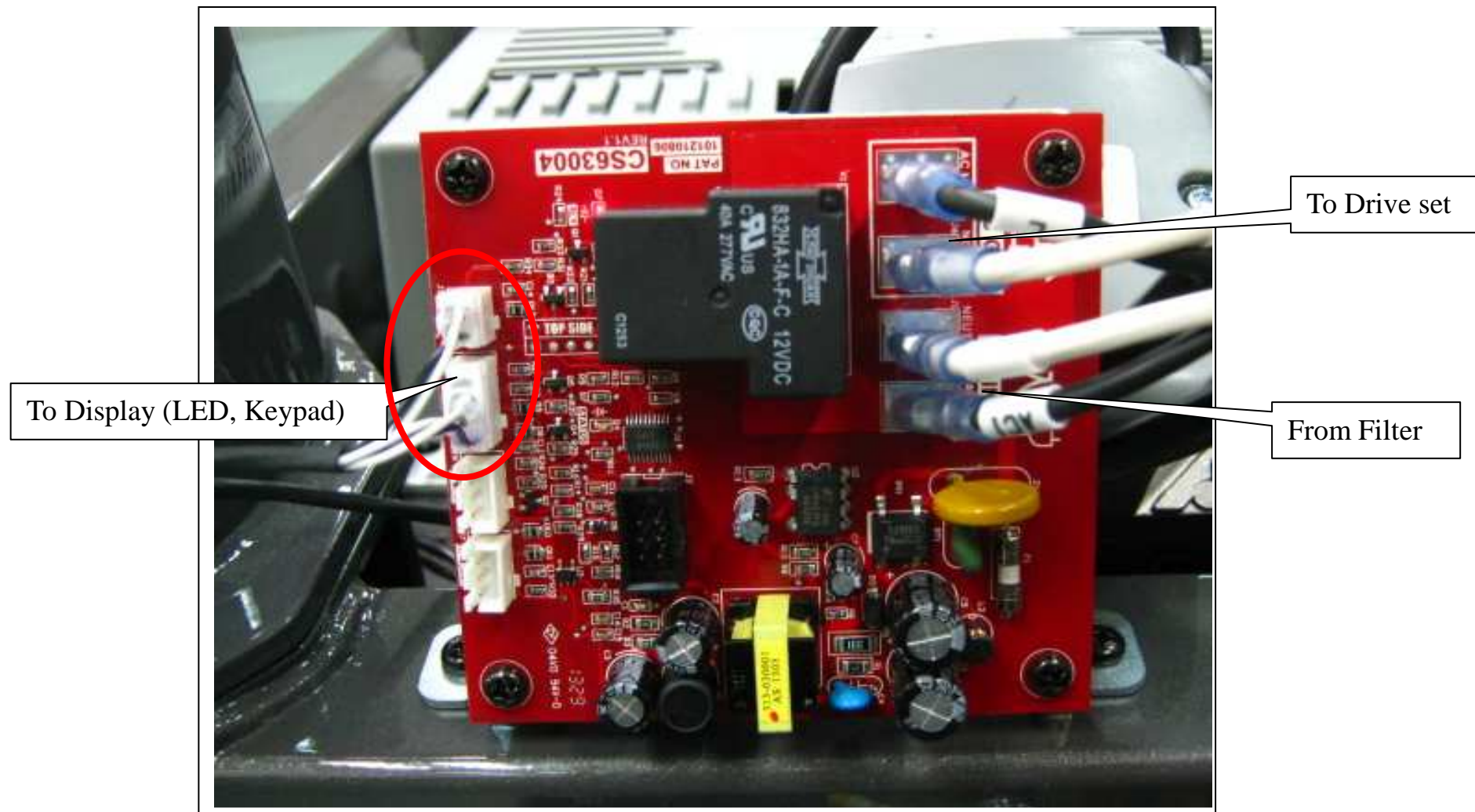
Motor & VR unit

Speed sensor



Lubricant bottle

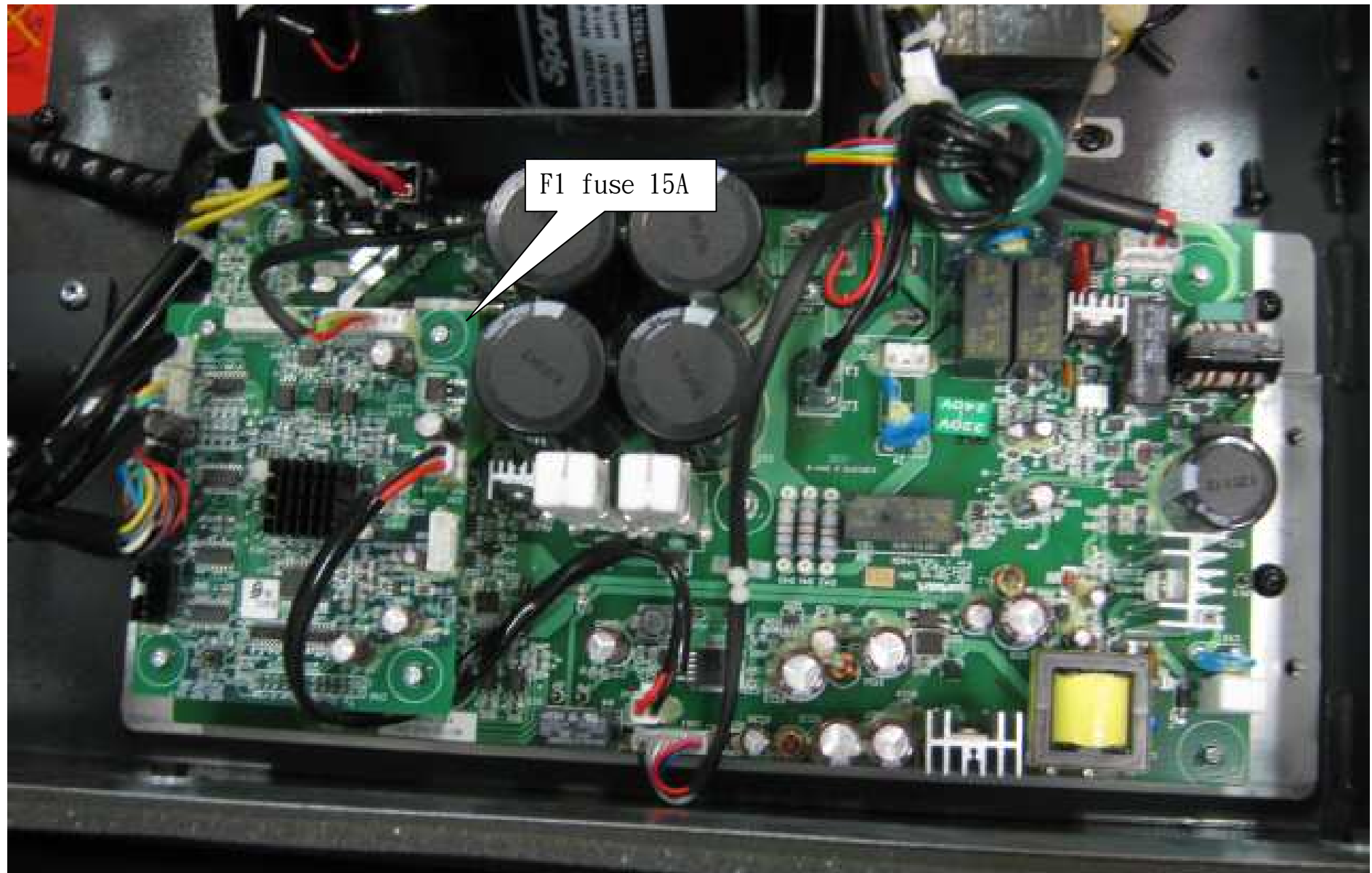
1-5.Cable connections-EUp board



1-6.Indicator LEDs - T645 Display Board



1-6.Indicator LEDs - T645 Drive Board



Troubleshooting

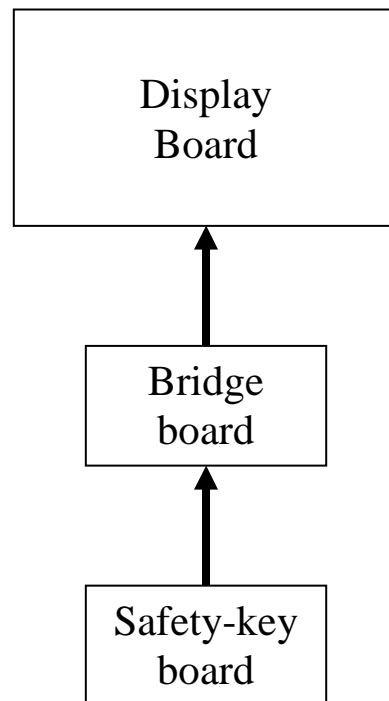
Model: T645

Malfunction: Safety key malfunction

Circumstance: Put the safety key in place; the display shows no reaction; "Safety key" error message appears.

Possible causes: Safety key board malfunction

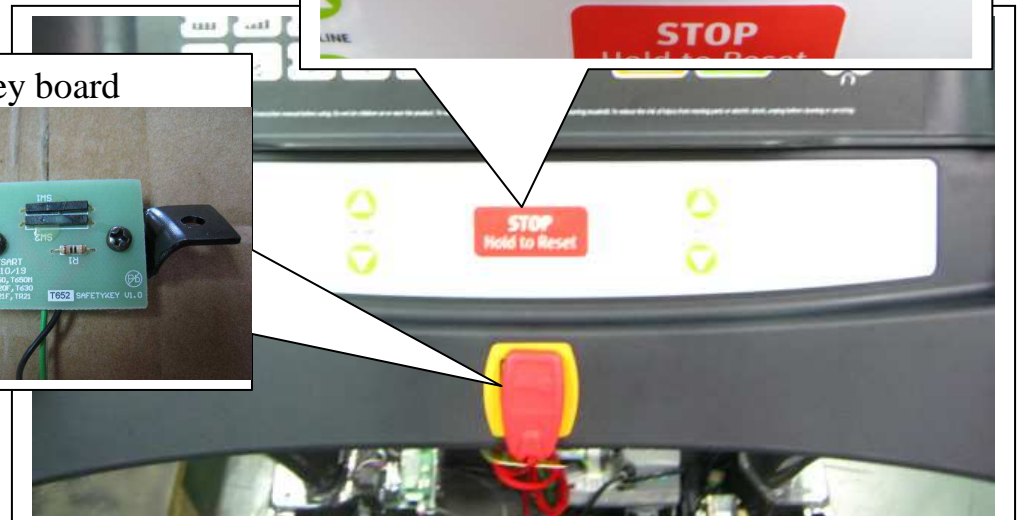
Troubleshooting: 1. Inspect the safety key magnet.
2. Inspect the bridge board wire connections.
3. Test or replace the safety key board.



Safety-key cable connection

Safety-key board

Bridge board



Troubleshooting

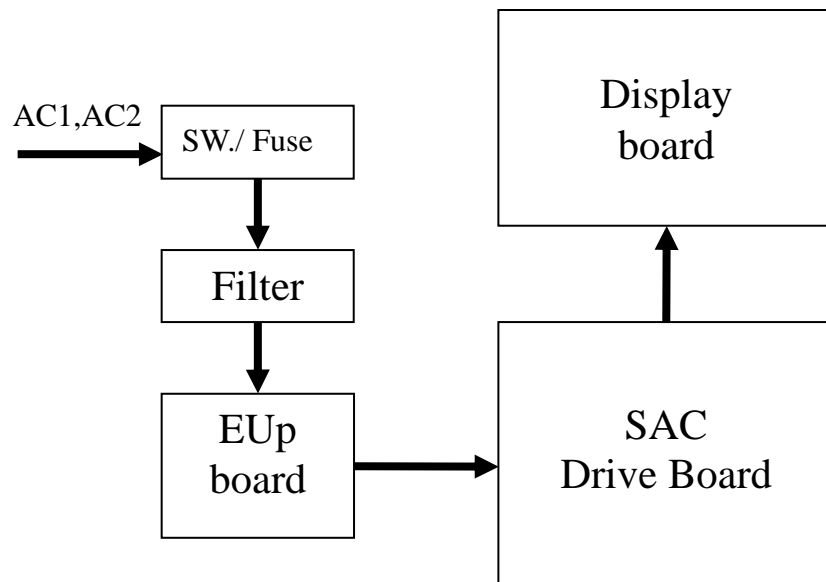
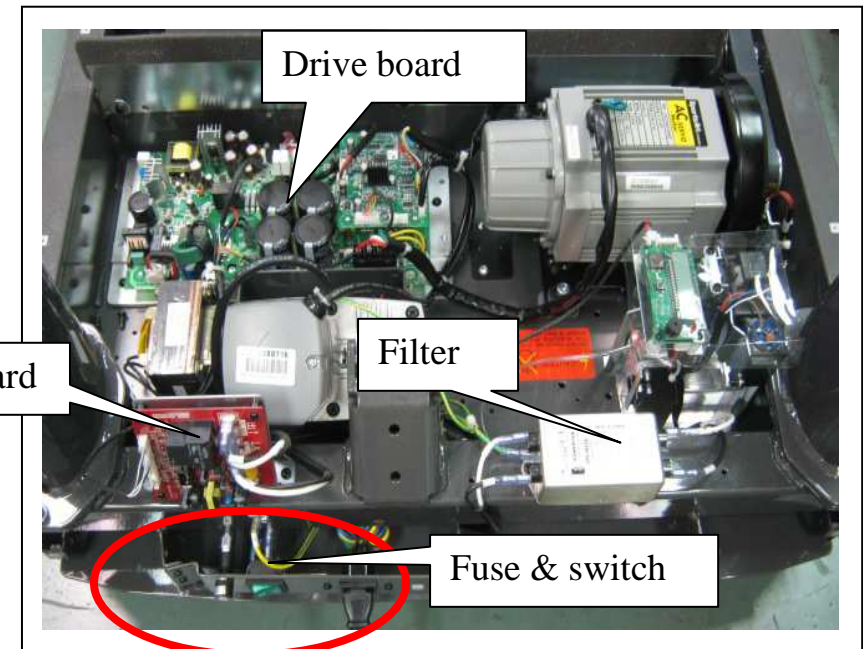
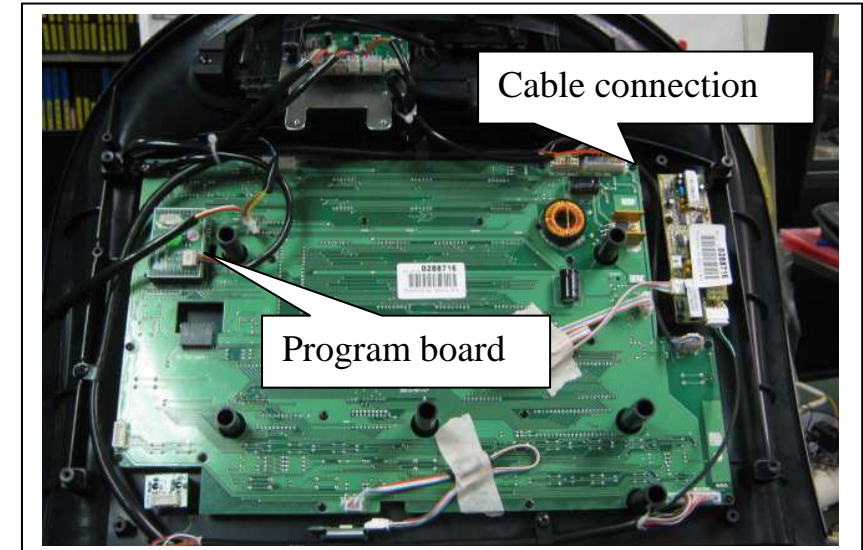
Model: T645

Malfunction: Unit will not start operating.

Circumstance: Turn POWER ON; the display does not light.

Possible cause: Incoming power issue; component failure.

Troubleshooting: 1. Inspect the main fuse and power switch.
2. Inspect all cable connections.
3. Inspect drive board power LED. Or replace the drive board as a test.
4. Inspect the display power LED and main IC.
5. Replace the EUp board



Troubleshooting

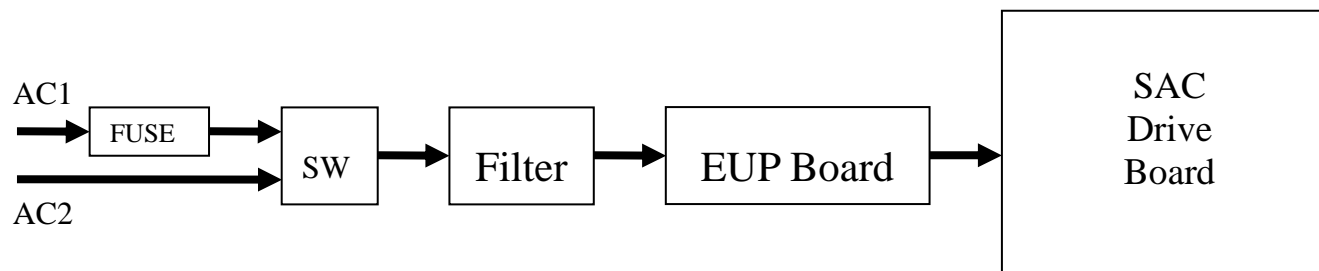
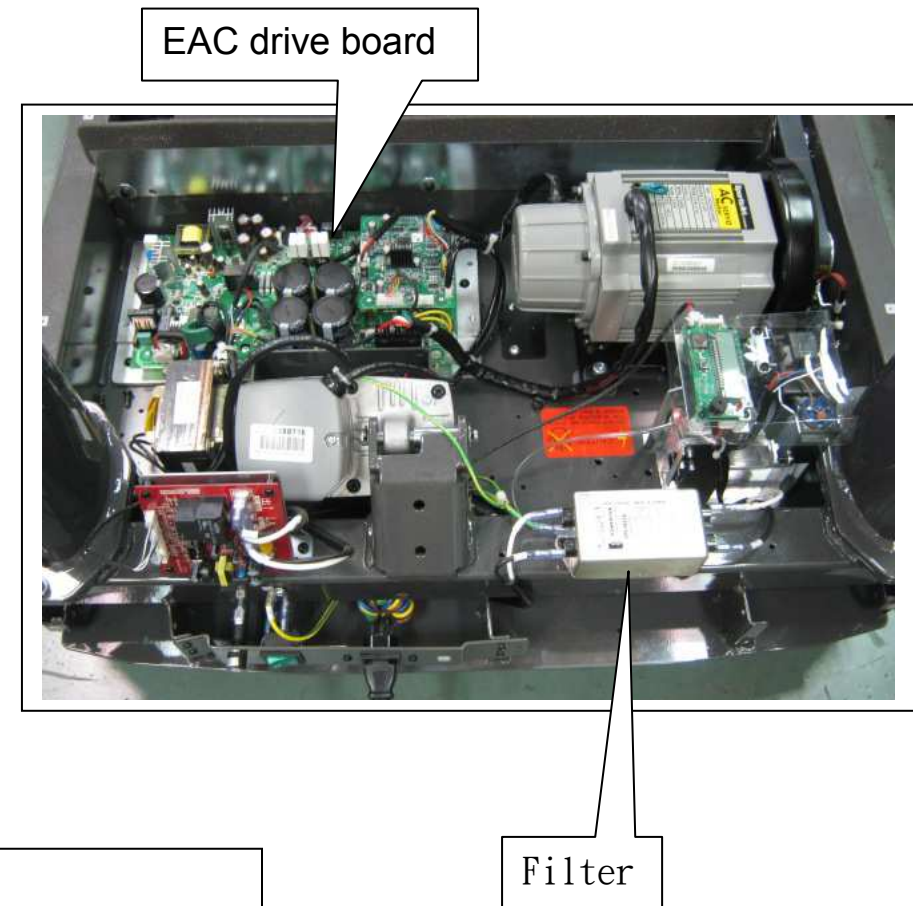
Model: T645

Malfunction: The fuse has burnt.

Circumstance: Turn on the unit. The fuse breaks.

Possible causes: 1. Components have an electrical short.
2. Drive board component malfunction.

Troubleshooting: 1. Inspect cable insulation for tears.
2. Remove the power cable and take continuity readings: There should be no continuity between AC1 and frame. There should be no continuity between AC2 and frame.
3. Check components for signs of electrical shorts. Replace the drive board as a test.
4. Replace the filter as a test.



Troubleshooting

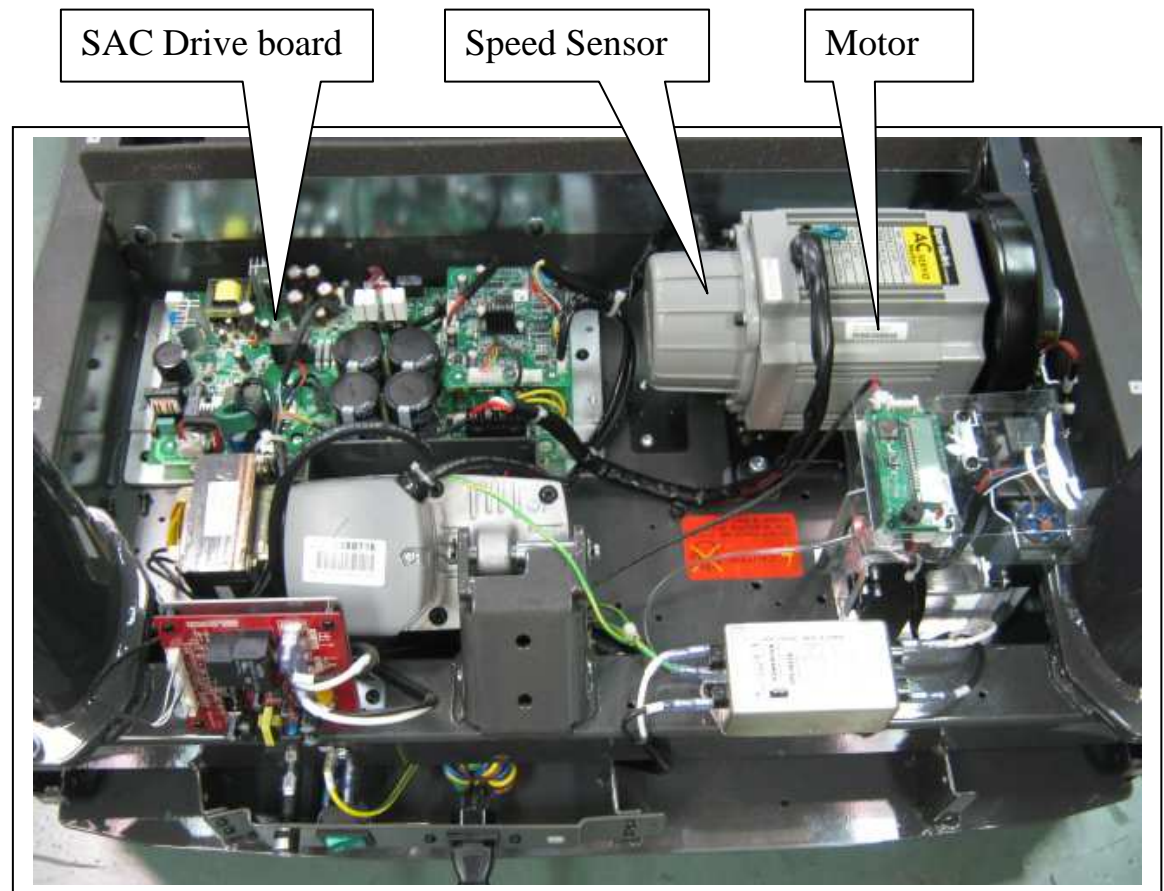
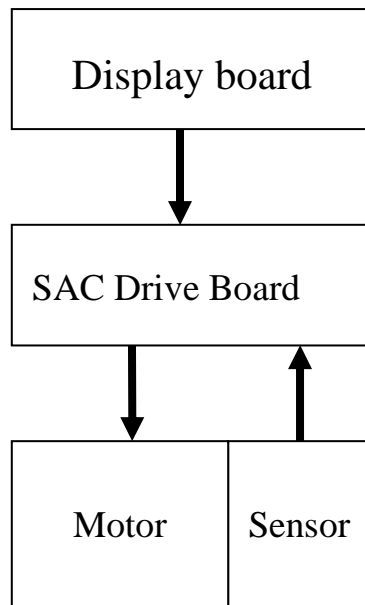
Model: T645

Malfunction: The fuse has burnt.

Circumstance: Press the SPEED key; the fuse breaks.

Possible causes: 1. The motor has an electrical short.
2. Drive board malfunction

Troubleshooting: 1. Replace the drive board.
2. Replace the motor as a test.
3. Replace the encoder as a test.



Troubleshooting

Model: T645

Malfunction: The fuse has burnt.

Circumstance: While in operation, the fuse breaks.

Possible causes: 1. Fuse holder connection

2. Walk deck or walk belt is worn.

3. EAC drive board malfunction

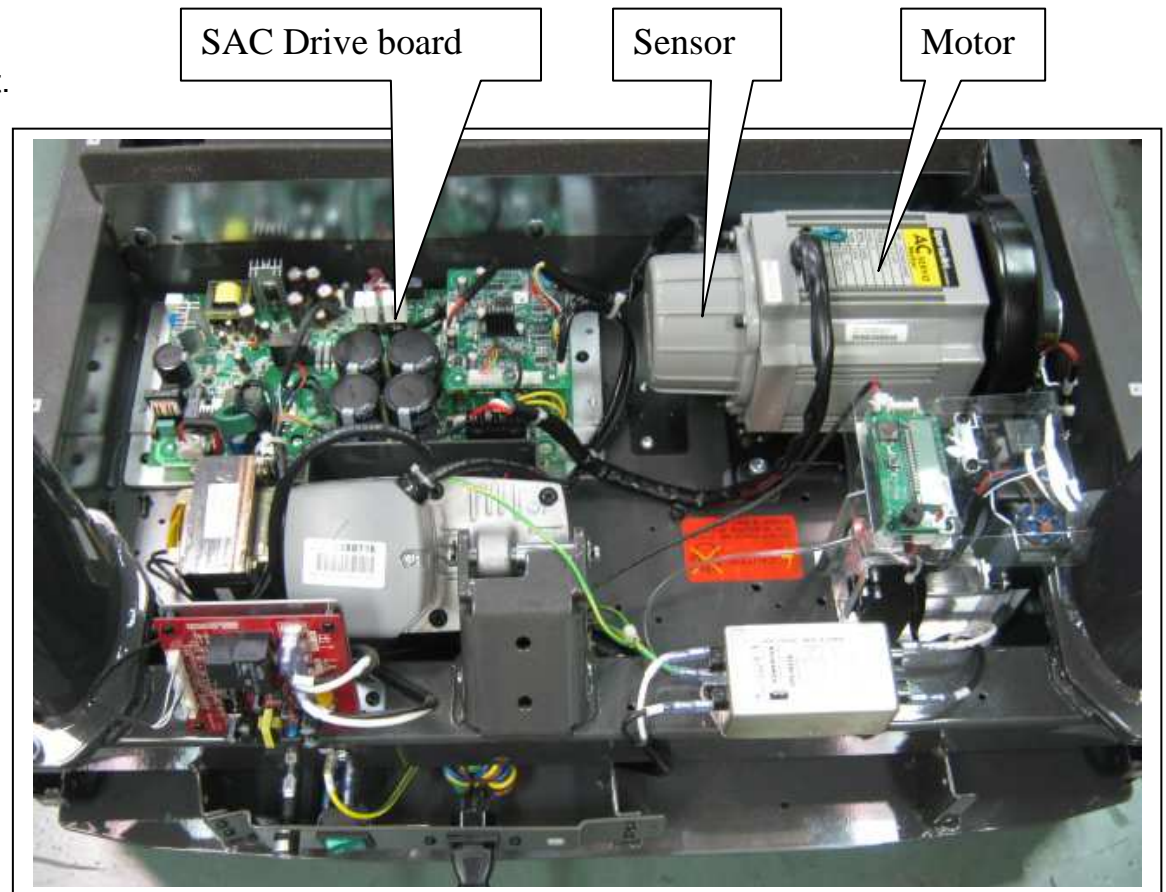
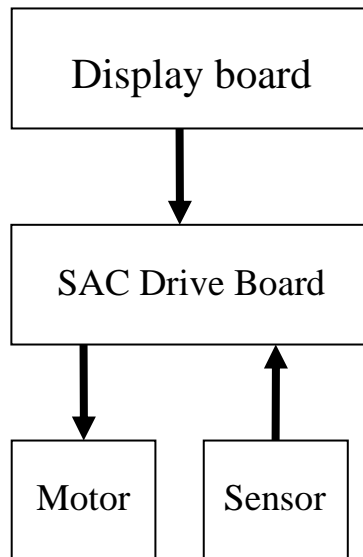
Troubleshooting: 1. Inspect the fuse and fuse holder installation.

2. Inspect mechanical parts:

A. walk belt lubrication and wear

B. walk belt tightness

3. Replace the EAC drive board as a test.



Troubleshooting

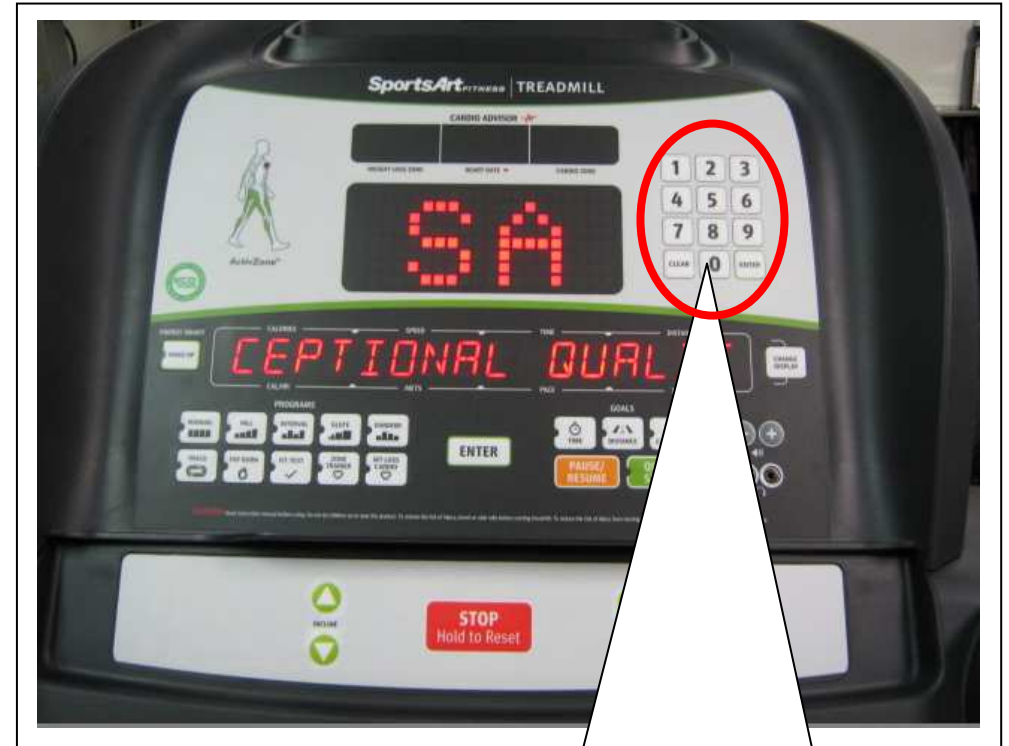
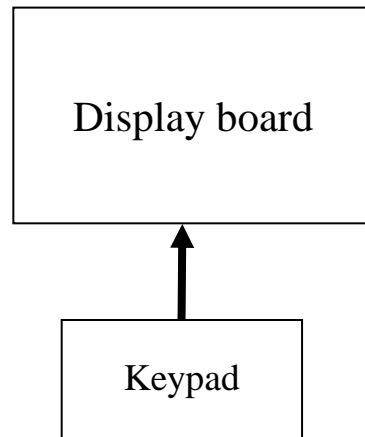
Model: T645

Malfunction: keypad malfunction

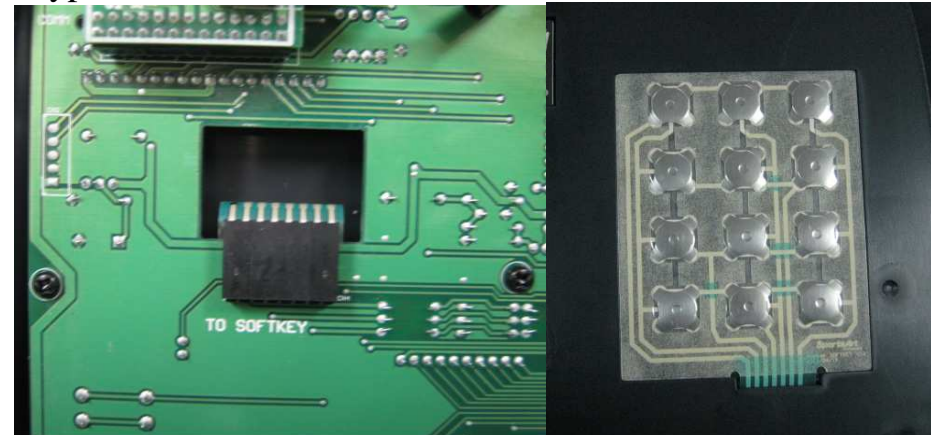
Circumstance: Press display board keys. There is no reaction,
or keys operate continuously.

Possible causes: 1. keypad is bad

Troubleshooting: 1. Inspect the keypad connection.
2. Replace the keypad.



keypad



Troubleshooting

Model: T645

Malfunction: Soft key malfunction

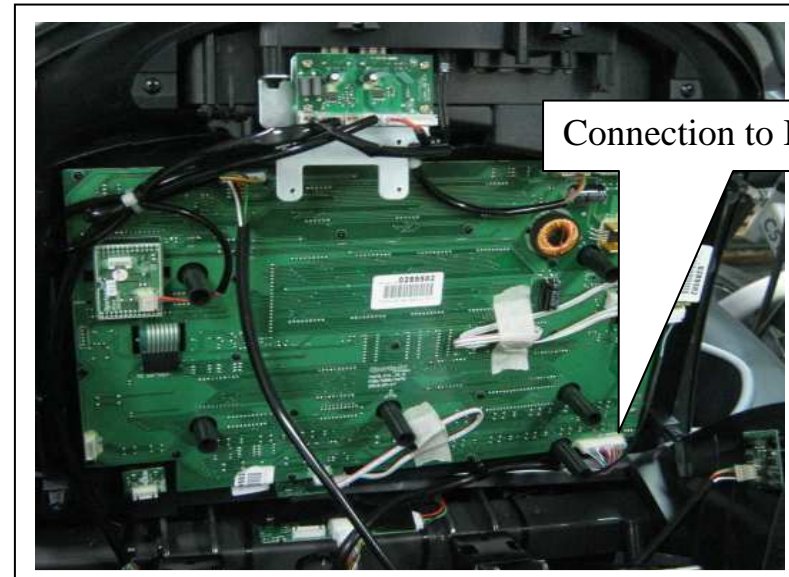
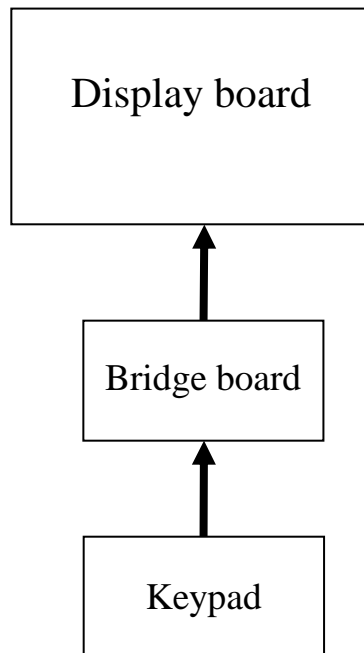
Circumstance: Press display board keys. There is no reaction, or keys operate continuously.

Possible causes: 1. keypad are not connected properly at the bridge board.

2. Soft keys are bad.

Troubleshooting: 1. Inspect the keypad connection at the bridge board.

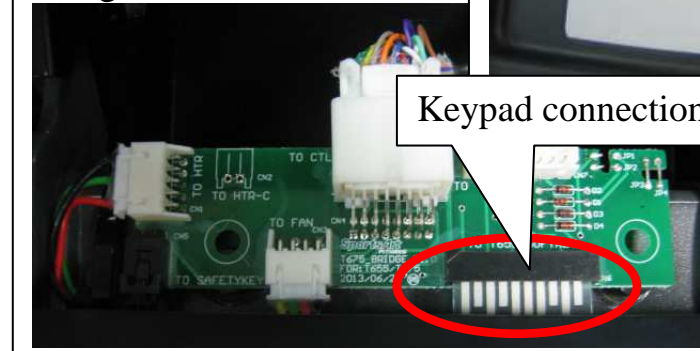
2. Replace the keypad.



Connection to Bridge board



Bridge board



Keypad connection

keypad



Troubleshooting

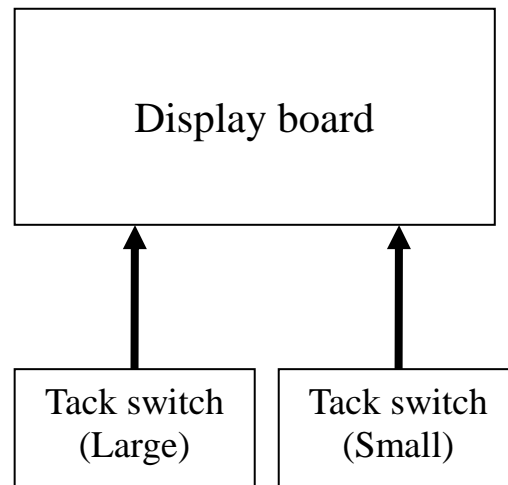
Model: T645

Malfunction: Key malfunction – display keys

Circumstance: Press display keys; there is no reaction;
Or keys operate continuously.

Possible causes: 1. Display key switch malfunction:
2. Key cushions are out of place.

Troubleshooting: 1. Inspect key cushions.
2. Replace display key switches.



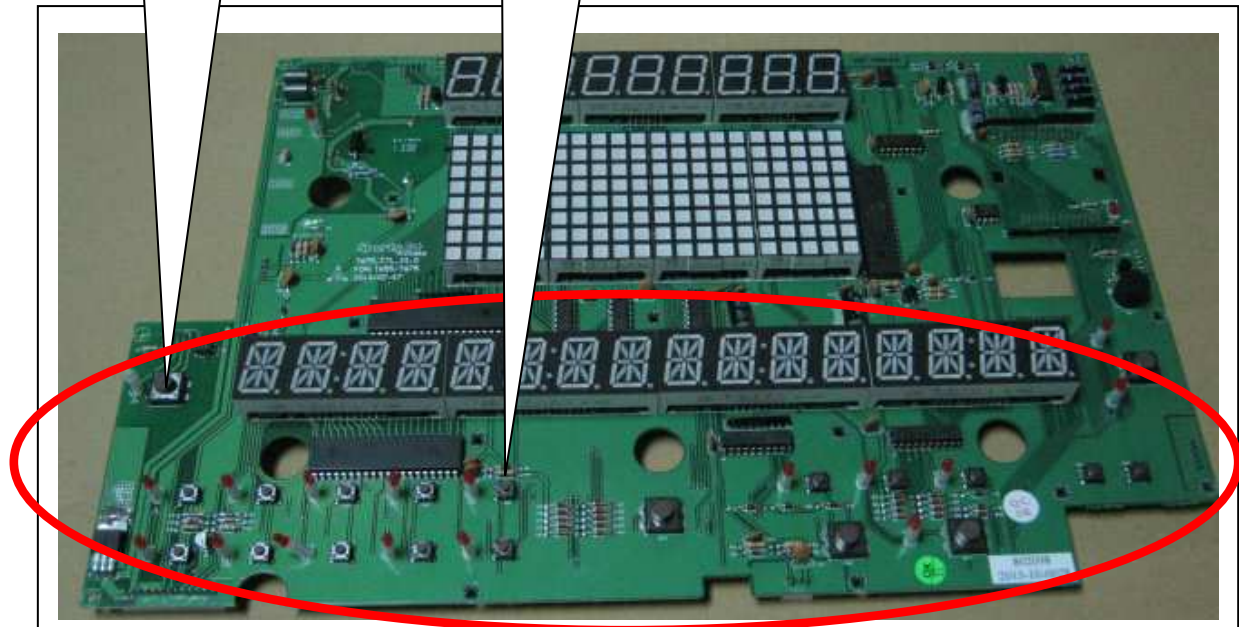
Tack switch
(large)



Tack switch
(small)



Key cushion



Troubleshooting

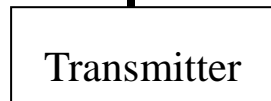
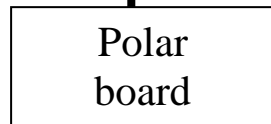
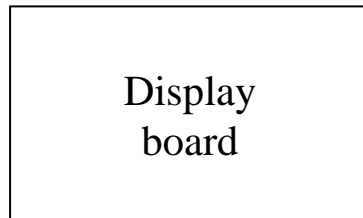
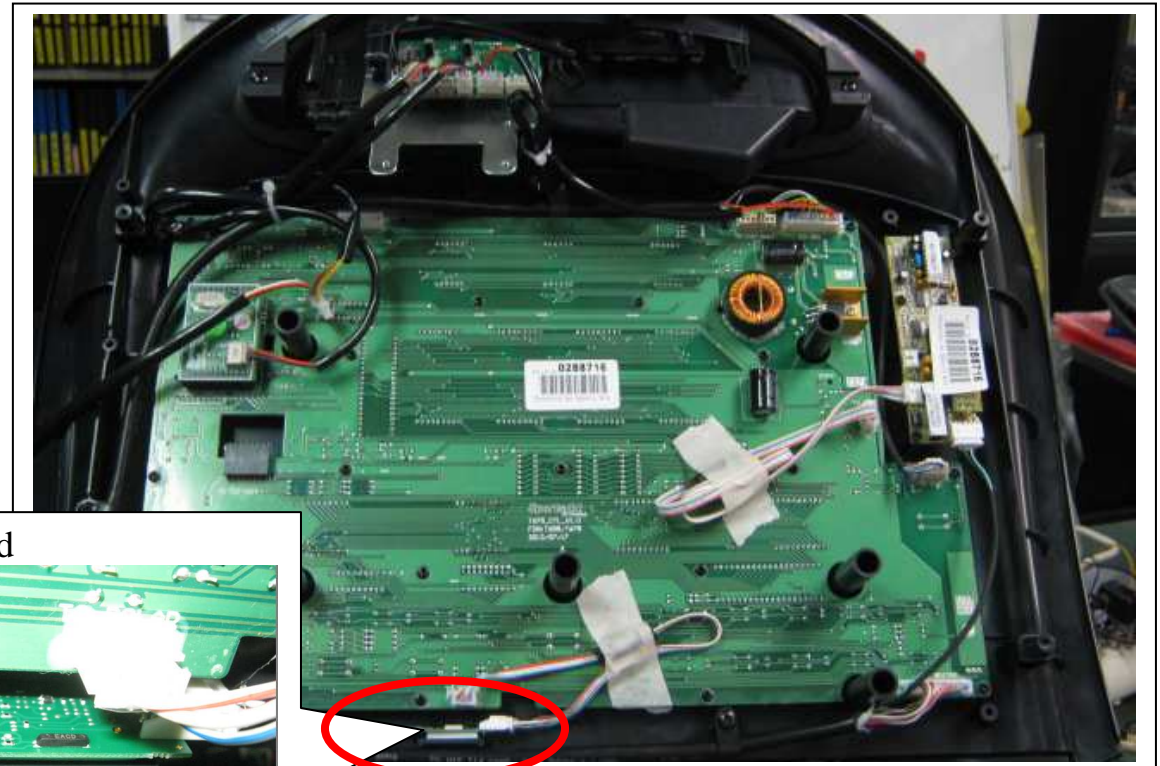
Model: T645

Malfunction: Telemetry heart rate malfunction

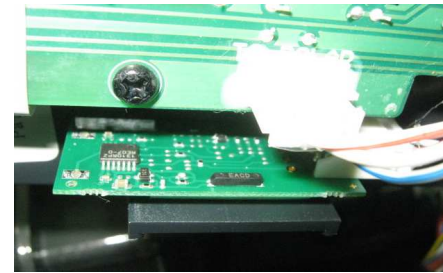
Circumstance: Telemetry heart rate reading does not appear or the value is incorrect.

Possible cause: 1. Telemetry heart rate batteries
2. Heart rate receiver
3. Environmental interference, for example, lights and speakers

Troubleshooting: 1. Replace telemetry heart rate transmitter or its batteries
2. Inspect telemetry receiver board cable connections
3. Replace the telemetry receiver board as a test.



Polar board



Polar T34 transmitter



Troubleshooting

Model: T645

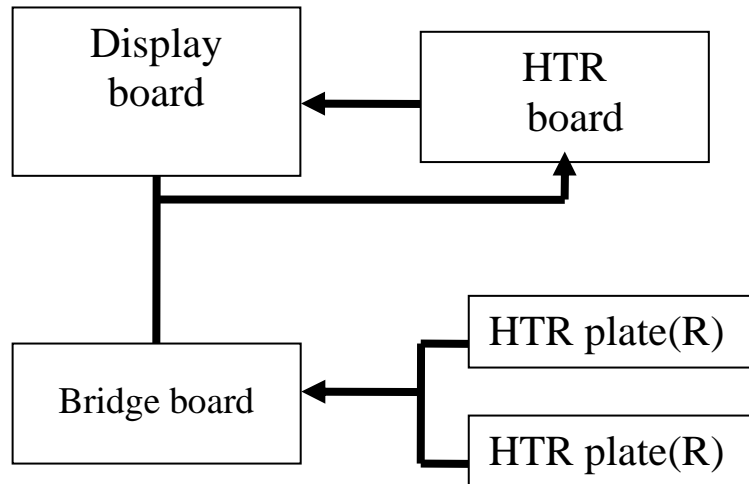
Malfunction: Contact heart rate (Heart touch rate - HTR)

Circumstance: Place hands on contact heart rate plates; heart rate value is incorrect.

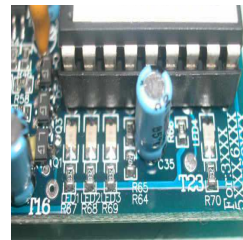
Possible causes: 1. HTR cable is not connected.
2. HTR board malfunction
3. Display cable connections

Troubleshooting: 1. Inspect display cable connections.
2. Inspect bridge board HTR cable connections.
3. Inspect contact heart rate cable connections.
4. Inspect HTR board LEDs.
5. Replace the HTR board.

Indicator	Name	Explanation
LED1	Telemetry heart rate indicator	Flashes to indicate incoming telemetry heart rate signal.
LED2	HTR contact indicator	Lights to indicate that someone is touching heart rate contact plates.
LED3	HTR heart rate signal indicator	Flashes to indicate incoming contact heart rate signal.
LED4	Heart rate signal output LED	Each flash represents an outgoing heart rate signal.



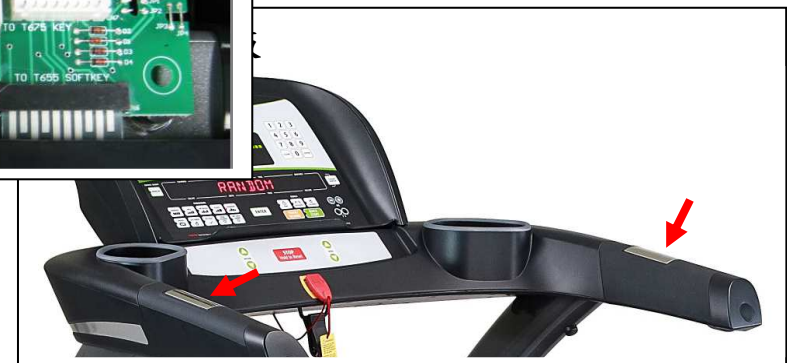
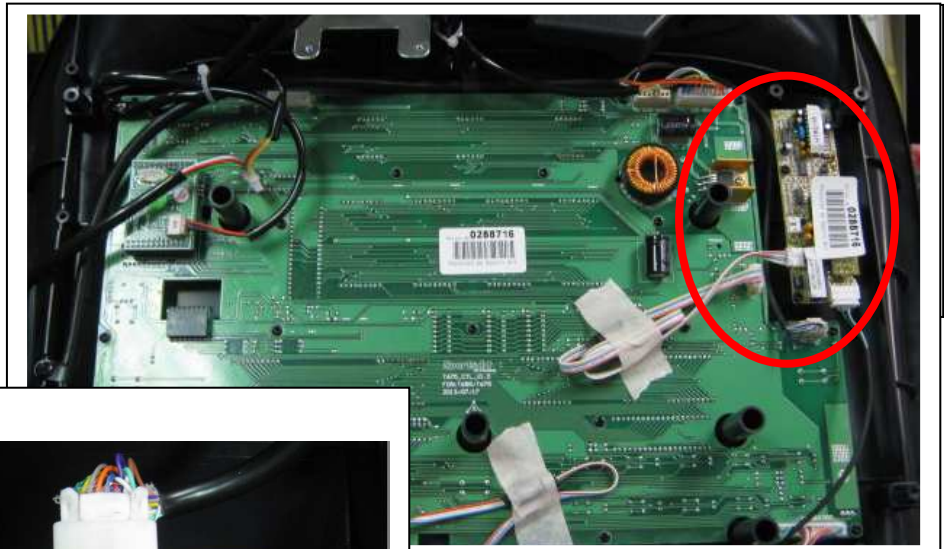
HTR LED



Bridge board



HTR 接線



Troubleshooting

Model: T645

Malfunction: Incline will not operate upward or downward.

Circumstance: Press incline keys; there is no incline action.

Possible causes: 1. Zero switch has malfunctioned.

2. Cables are not connected.

3. Incline motor is not operating.

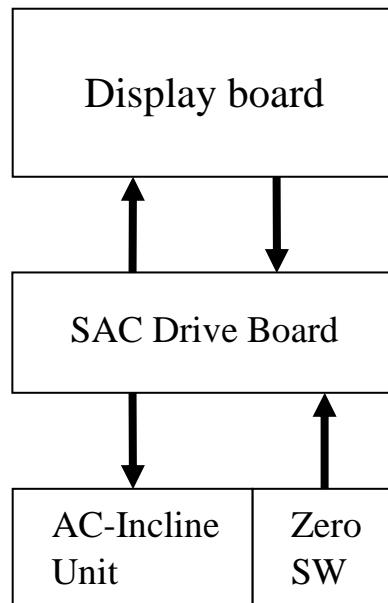
Troubleshooting: 1. Inspect drive board cable connections.

2. Inspect zero switch calibration.

3. Inspect incline signal indicators on the drive board and measure incline output voltage.

4. Listen for the sound of incline gear grinding.

5. Feel the incline motor. Is it hot? If it is hot, the drive board could be malfunctioning. Replace the drive board.



Zero switch

Incline	Zero switch	Drive board LED
0%	on	lit
1-15%	off	No lit

Incline gear box

Incline motor voltage

Direction	Incline cable	Incline voltage
up	White - black	110v or 220v
down	White - Red	110v or 220v

Troubleshooting

Model: T645

Malfunction: ERR0R_1_1_

Circumstance: Press the SPEED key; ERR0R_1_1_ appears.

Possible cause: 1.EAC drive board malfunction

2. Motor sensor malfunction

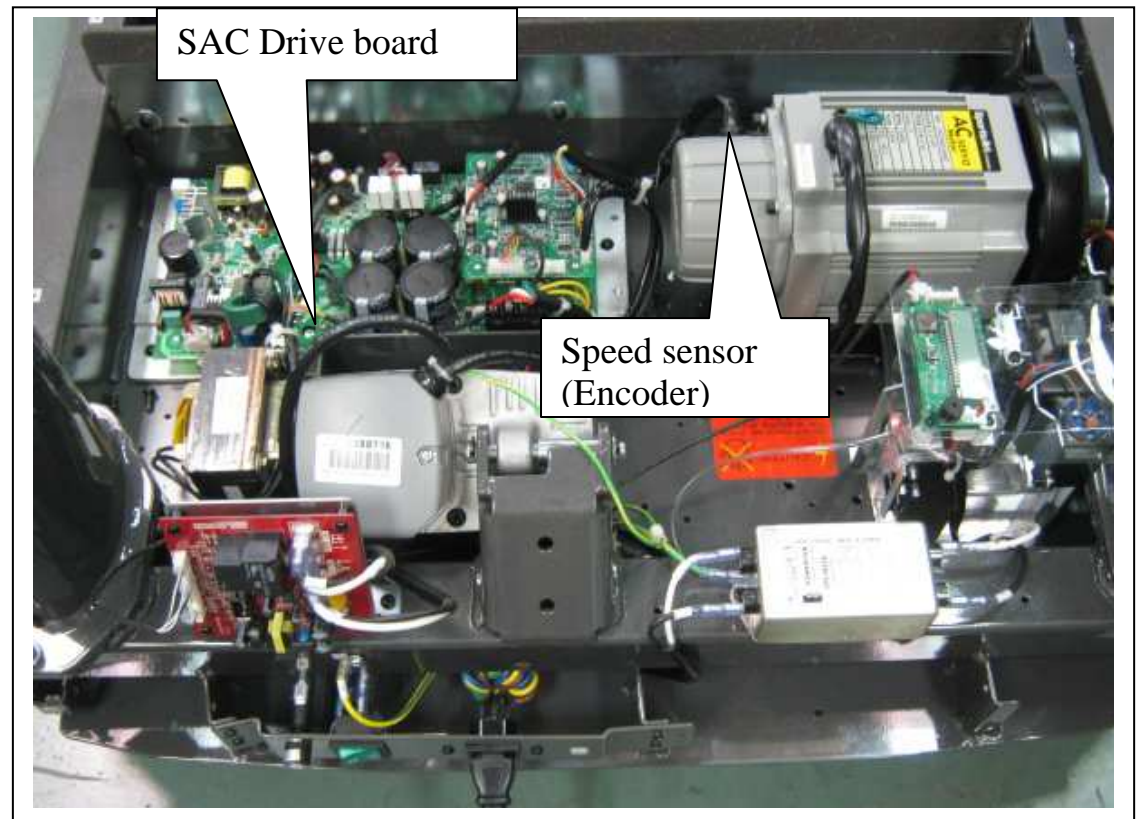
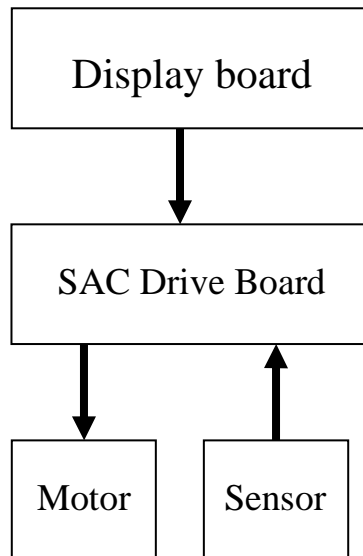
3. Motor malfunction

Troubleshooting: 1. Inspect cable connections.

2. Inspect or replace EAC drive board.

3. Replace the encoder or motor.

(Motor failure would be extremely rare.)



Troubleshooting

Model: T645

Malfunction: ERR0R_1_2

Circumstance: Display shows ERR0R_1_2. Speed is reduced to half.

Possible cause: 1. Severe walk deck and belt wear

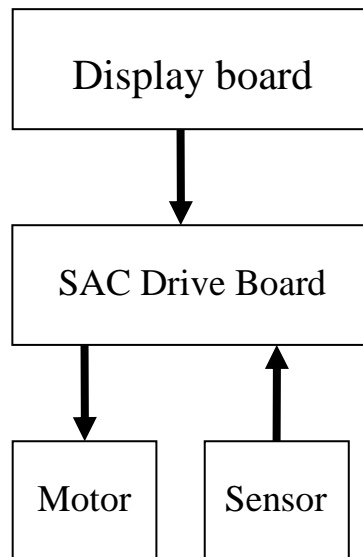
2. Motor thermal sensor malfunction or poor cable connection

Troubleshooting: 1. When the error appears, inspect whether the motor is hot.

If it is hot, walk deck or belt may be worn. Lubricate or replace the walk belt.

2. If not, inspect thermal sensor cable connections.

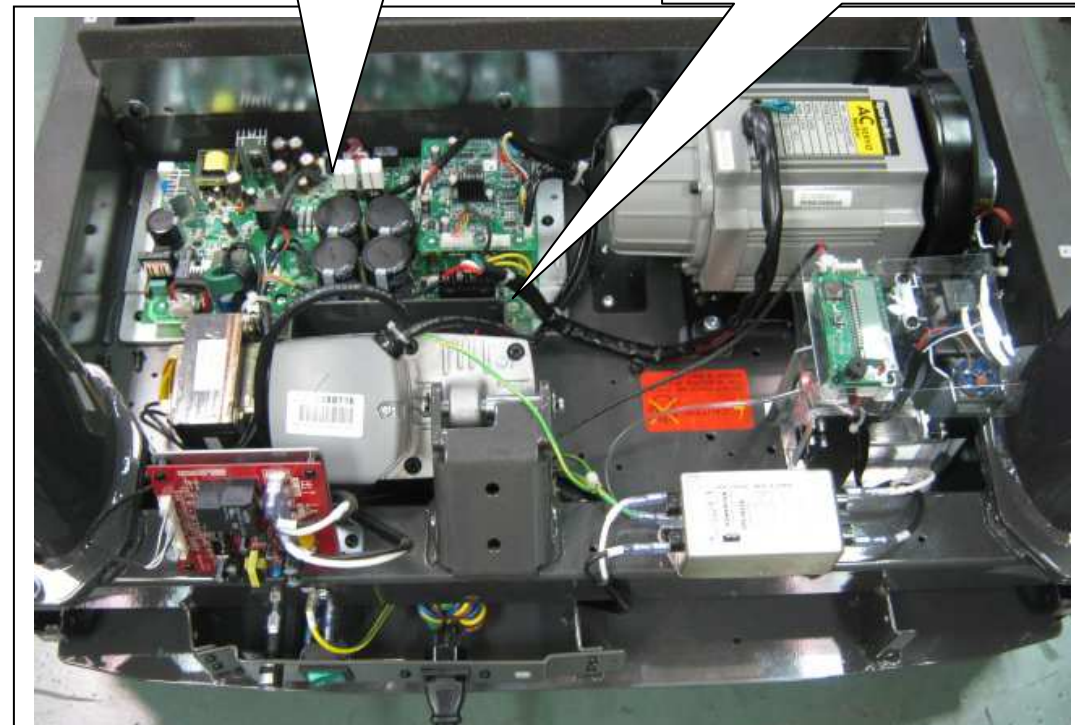
3. If the motor is not hot, and the cable is connected, the motor thermal sensor could be malfunctioning.



Thermal sensor cables



SAC drive board



Troubleshooting

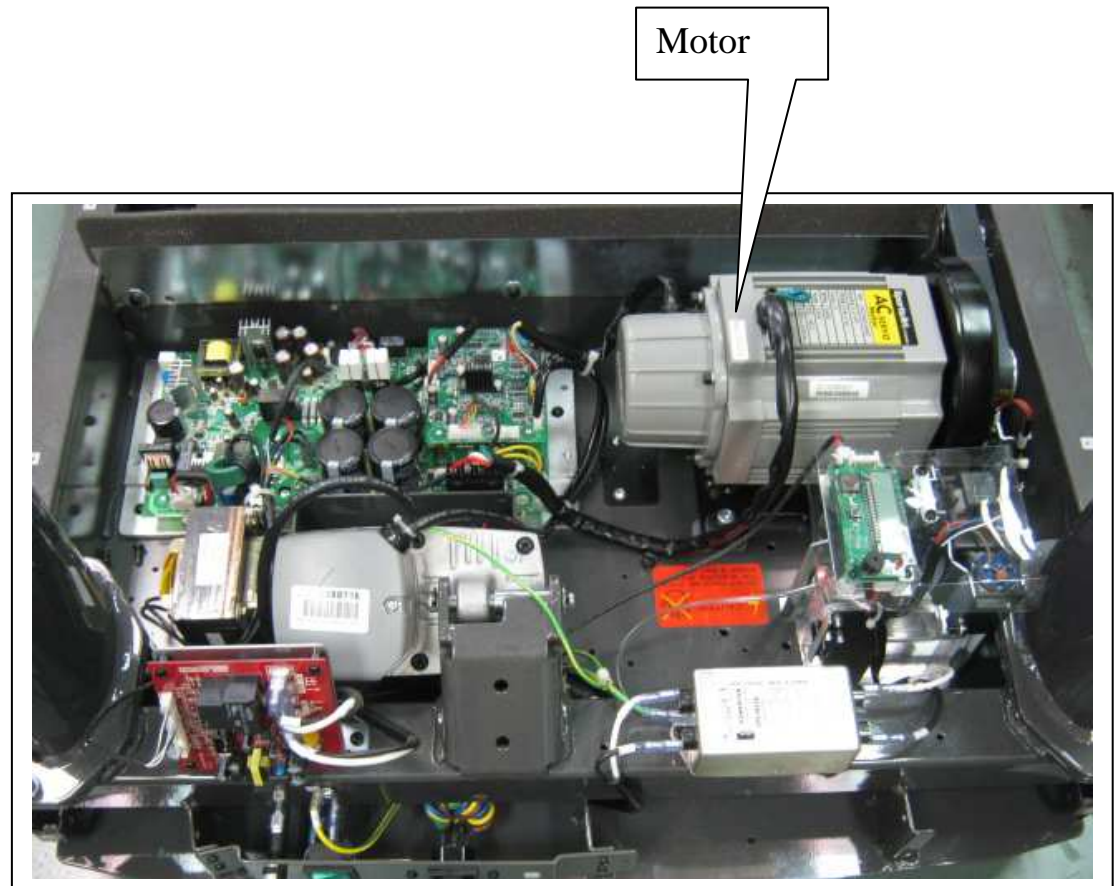
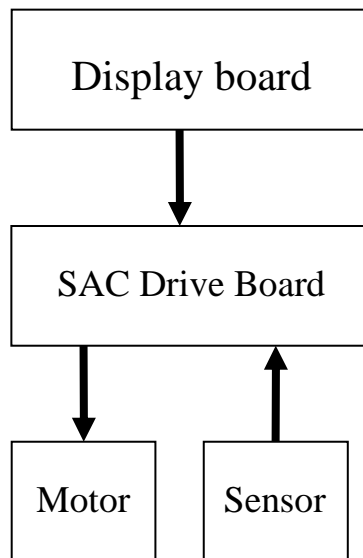
Model: T645

Malfunction: ERR0R_1_3_

Circumstance: Display shows ERR0R_1_3_.

Possible cause: 1. Motor malfunction

Troubleshooting: 1. Re-start unit and inspect for error message.
2. Stop the treadmill ten minutes and test again.
3. Inspect drive belt.
4. Replace the motor as a test.



Troubleshooting

Model: T645

Malfunction: ERR0R_2_1_, ERR0R_2_2_

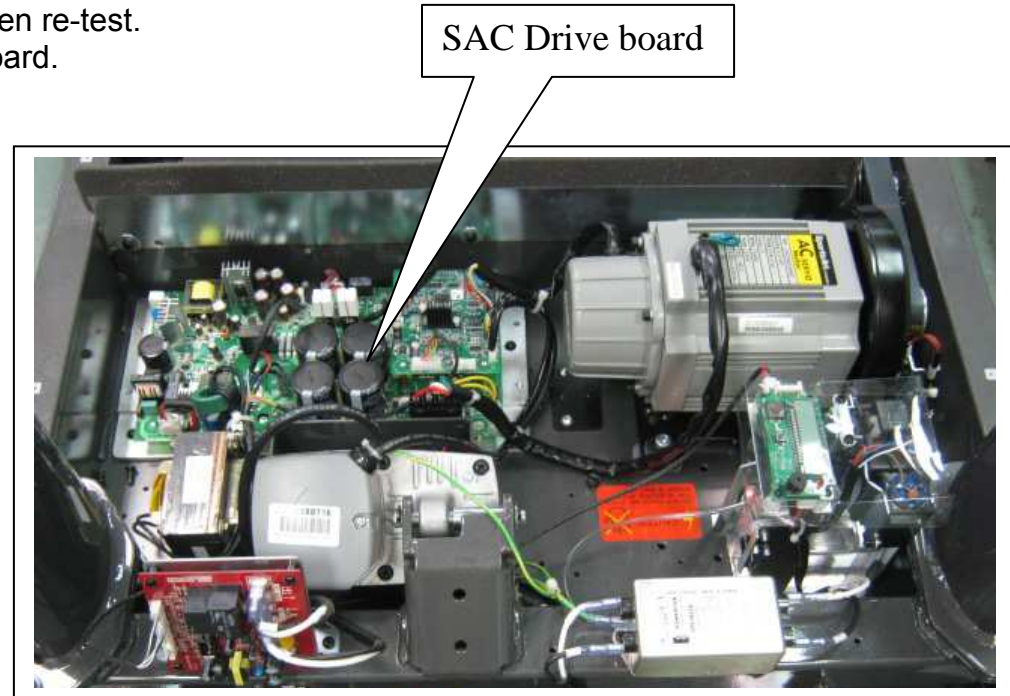
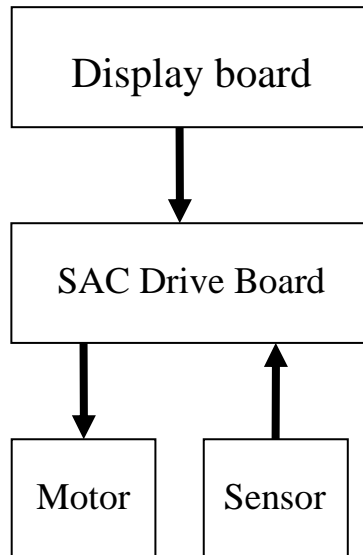
Circumstance: Display shows ERR0R_2_1_.

Possible cause: 1. EAC drive board IGBT heat or current is excessive.

Troubleshooting: 1. Re-start unit and test again.

2. Stop operating the unit for ten minutes. Then re-test.

3. If issue persists, replace the EAC drive board.



Troubleshooting

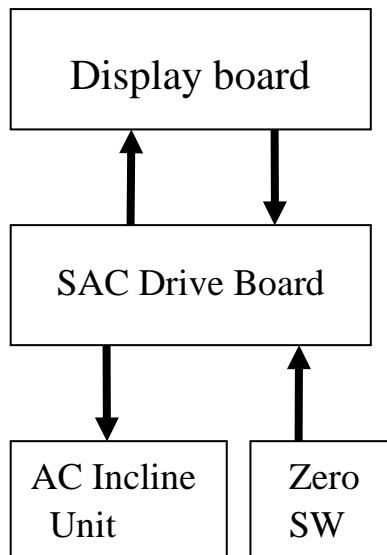
Model: T645

Malfunction: ERROR_3_1_

Circumstance: Turn off unit. Incline does not return to level.

Possible cause: 1. When the treadmill starts, the incline lowers, activating the zero switch, calibrating the incline.
2. Drive board or motor malfunction
3. If the incline was at the highest position when it hit the zero switch, but the zero switch didn't react, the zero switch is malfunctioning.

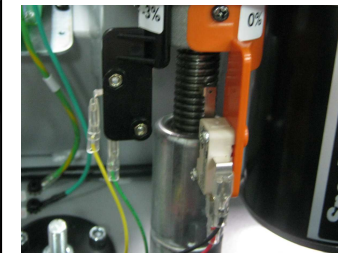
Troubleshooting: 1. Touch the incline motor. Is it hot? If so, the drive board is malfunctioning. Replace the drive board.
2. Turn on unit. Does the incline operate downward? If not, the incline and drive board could be defective.
3. Test the zero switch. Does it switch on/off?



Zero switch

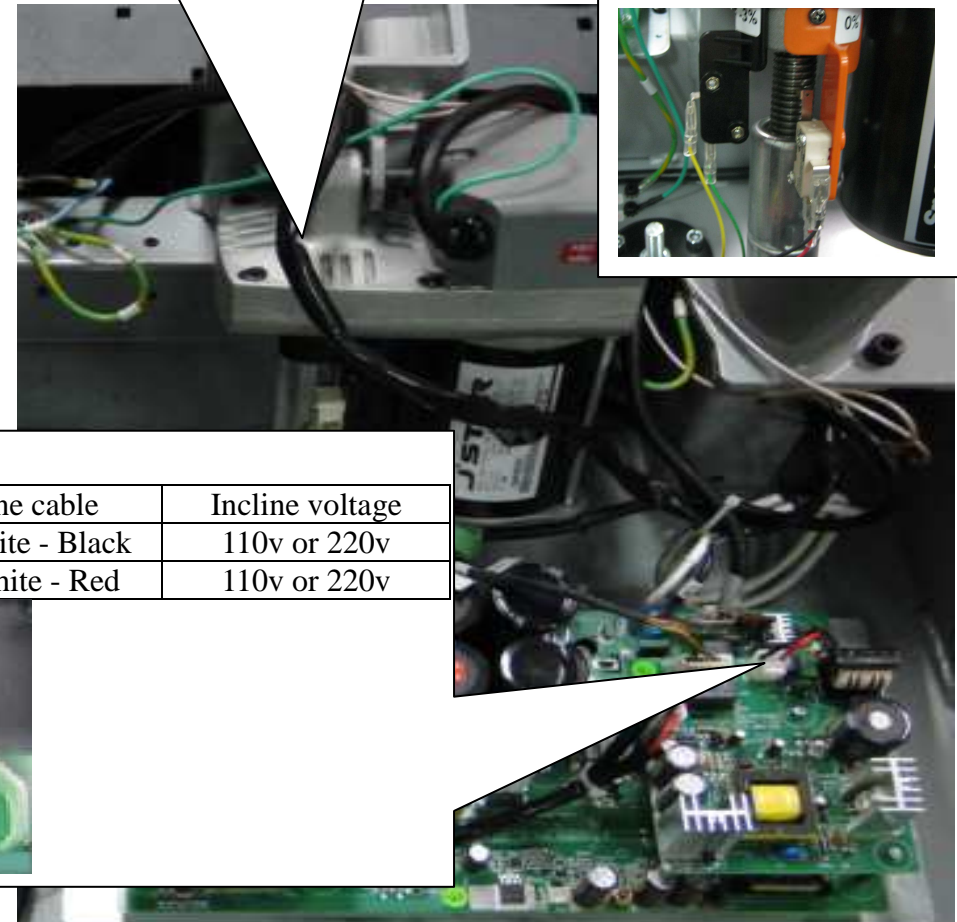
Position	Incline	Zero switch	Drive board LED
0%	Hits switch	on	lit
1-15%	Does not hit switch	off	not lit

Zero switch



Incline voltage

Direction	incline cable	Incline voltage
up	White - Black	110v or 220v
down	White - Red	110v or 220v



Troubleshooting

Model: T645

Malfunction: ERROR_4_2, ERROR_4_3

Circumstance: Turn on power switch, and display show "ERROR_4_2" or "ERROR_4_3"

Possible cause: 1. EAC drive board and display CPU signal transmission
Error

Troubleshooting: 1.ERROR_4_2: Exterior power supply voltage is too high

ERROR_4_3: Exterior power supply voltage is too low

2.Estimate the exterior power supply voltage is too high or too low.

Normal range: 110V (110-130V)

220V (200-250V)

3. The drive board detects an abnormality if the exterior power supply voltage is normal.

Please check the specification of the power if the exterior power supply voltage is too low.



Troubleshooting

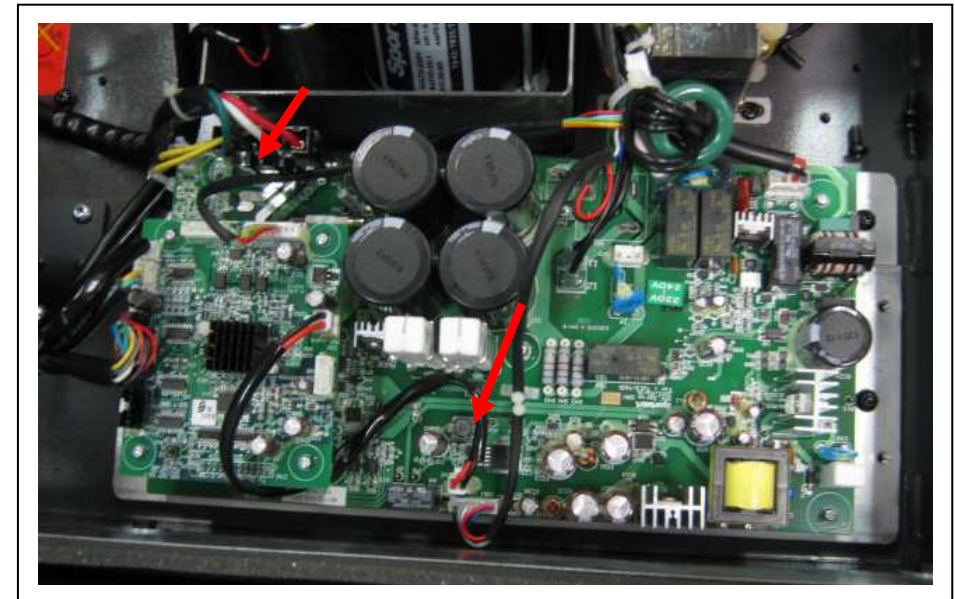
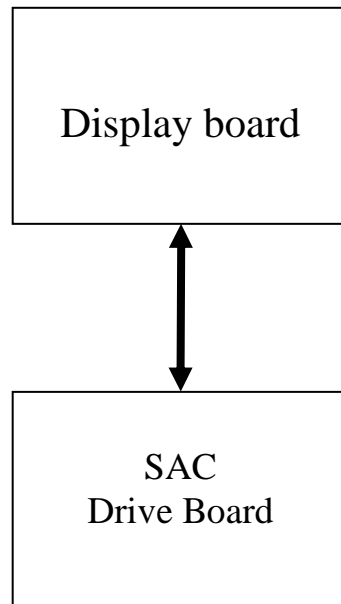
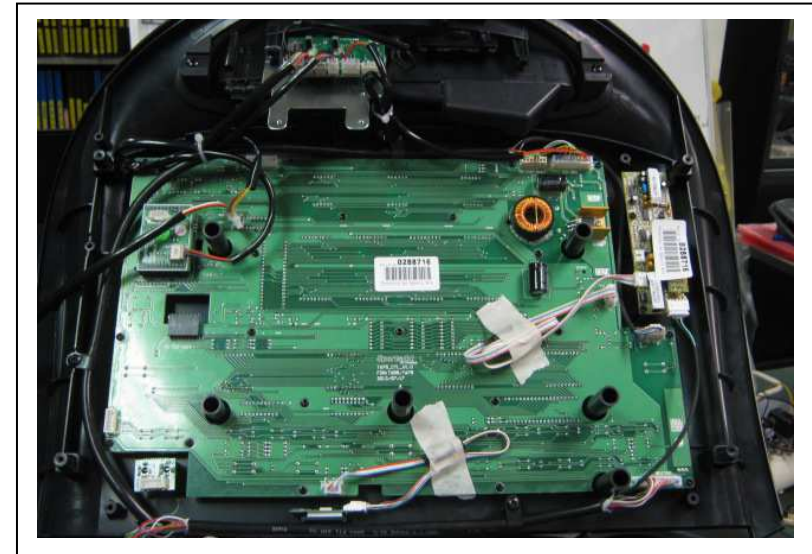
Model: T645

Malfunction: ERROR_8_1_

Circumstance: Start unit. Display shows ERROR_8-1.

Possible cause: 1. EAC drive board and display CPU signal transmission Error

Troubleshooting: 1. At start up, the display and drive board communicate. If there is no communication, ERROR_8_1_ appears.
2. When ERROR_8_1_ appears, re-start the unit. Sometimes, normal communication and operation resumes.
3. If ERROR_8_1_ still appears, inspect all cable connections, or replace the drive board.



Troubleshooting

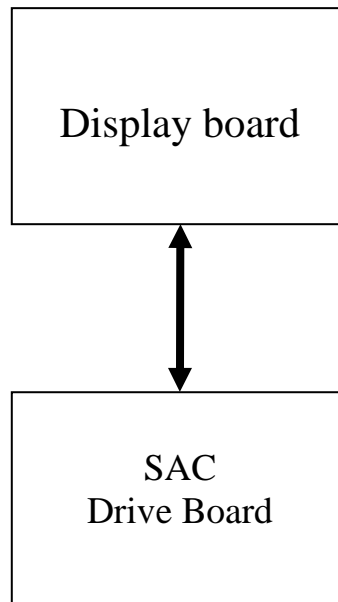
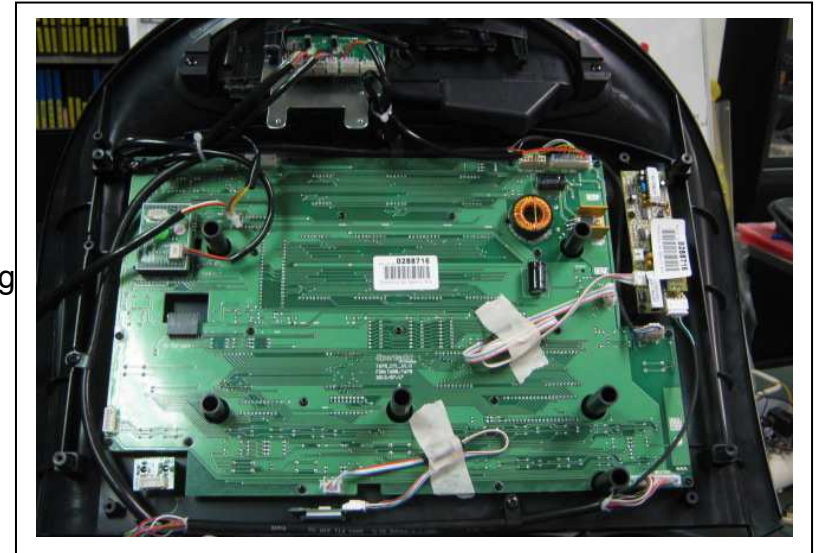
Model: T645

Malfunction: ERROR_8_2_

Circumstance: In operation, the display shows ERROR_8_2_.

Possible cause: 1. Interference disrupts communication between the display and EAC drive board.

Troubleshooting: 1. Inspect cable connections between the display and drive boards.
2. When this error appears, re-start the unit. Sometimes, re-starting the unit restores normal communication and operation.
3. If re-starting the unit does not eliminate ERROR_8_2_, replace the EAC drive board.



Troubleshooting

Model: T645

Malfunction item: ERROR_8_3_

Troubleshooting: ERROR_8_3_ on display while using treadmill

Possible causes: 1. There is an interference caused SAC board to shut down

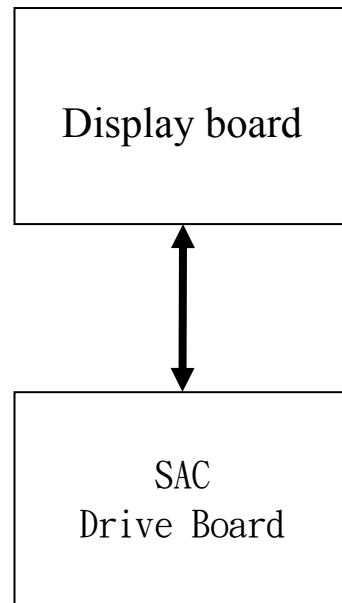
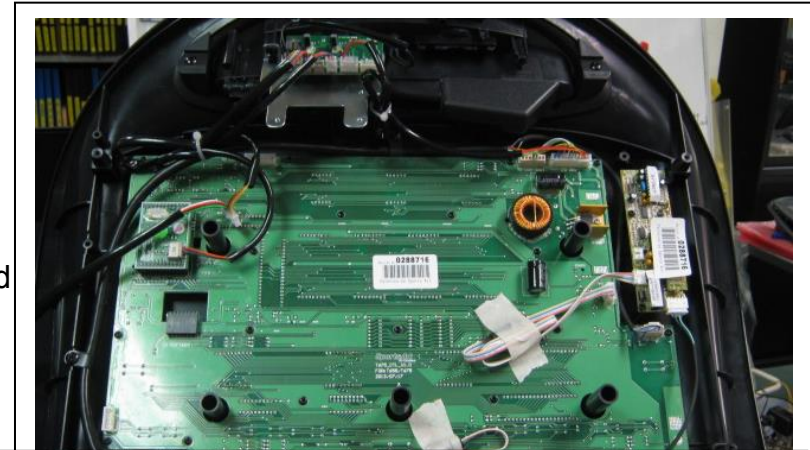
Troubleshooting: 1. If this occurs occasionally, reset the treadmill to use it again.

This is just a drive board's self-protective function.

2. If this occurs frequently:

A. Check for proper wiring between control board to drive board

B. Replace drive board



Other descriptions:

Model: T645

Item: Error message list

ERROR_1_1_ : Serve motor encoder abnormal; power reset to recover
ERROR_1_2_ : Serve motor too hot; reduce speed to protect
ERROR_1_3_ : Serve motor over loading; power reset to recover
ERROR_2_1_ : IGBT over current; recover in 10 minutes
ERROR_2_2_ : IGBT too hot; reduce speed to protect
ERROR_3_1_ : Incline motor zero setting abnormal
POWER OFF : Power switch at OFF position
ERROR_4_2_ : Power source voltage too low; wait until it returns to normal to restart
ERROR_4_3_ : Power source voltage too high; wait until it returns to normal to restart
ERROR_8_1_ : Communication error during power on
ERROR_8_2_ : Communication error during normal operation
ERROR_8_3_ : Server shut down due to interference

Other descriptions:

Model: T645

Item: KPH/MPH switch and total distance, time, control board/drive board software version display

Method: 1. Press <CHANGE DISPLAY> key for 3 seconds to enter user preference & settings.

A. English and Metric setting

The display will show " UNIT-MPH (for English) " or " UNIT-KPH (for Metric) "; press INCLINE<▲><▼> key to select MPH/KPH; then <ENTER> key to confirm after selection.

B. Program timer setting

The display will show "TIME LIMIT- YES" or "TIME LIMIT- NO" to indicate if there is a timer activated. Press INCLINE<▲> <▼> key to set YES/NO; press <ENTER> to confirm. When selection is YES, the display will show " TIME- XX:00" with default timer of 30mn. Press INCLINE<▲>/<▼> or numeric key pads to set the new timer from 5-60 minutes; afterwards, press <ENTER> to confirm.

C. Energy saving (EUP) timer setting

The display shows " ZZZ TIMER- XXMIN" to indicate the energy saving timer setting. Press INCLINE<▲>/<▼> to adjust from 5-600 minutes. Afterwards, press <ENTER> to confirm. If the timer setting is less than 5 minutes, the EUP function will not be activated.

D. Language setting

The display shows "GERMAN", " XX MILE H>H" or " XX KM H>H" to indicate the language setting. Press INCLINE<▲>/<▼> to change the language setting. Press <ENTER> to confirm after setting.

E. Total distance display

The display will show "DIST-XXXXXXXKM" or "DIST-XXXXXXXMILE" for total distance; press <ENTER> to exit.

F. Total time display

The display shows "TIME-XXXXXXHOUR" for total time; press <ENTER> to exit.

G. Control board software version display

The display shows "CTL T655-XX" for software version; press <ENTER> to exit.

H. Drive board software version display

The display shows "DRV SERVO-BB" for software version display; press <ENTER> to exit.

Other descriptions:

Model: T645

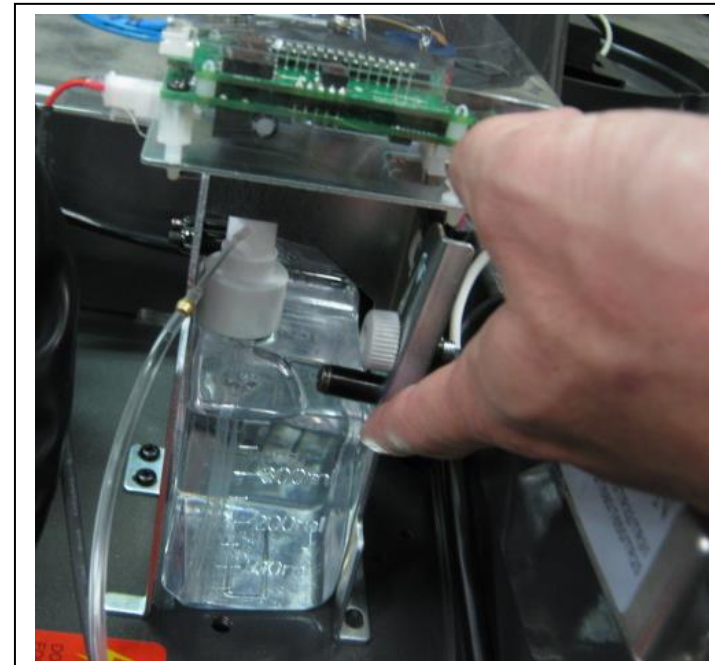
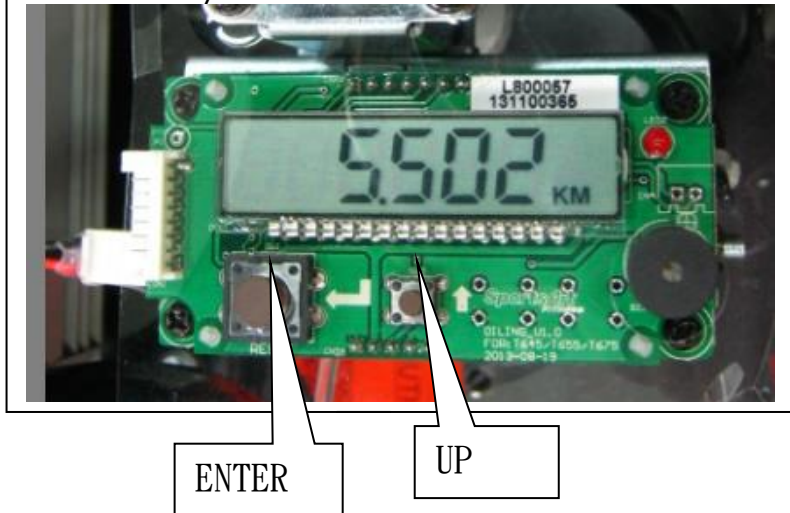
Item: Self-lubrication system operation

System: The system is consisting of control board, lubrication motor VR, speed sensor and lubricant bottle

Operation process:

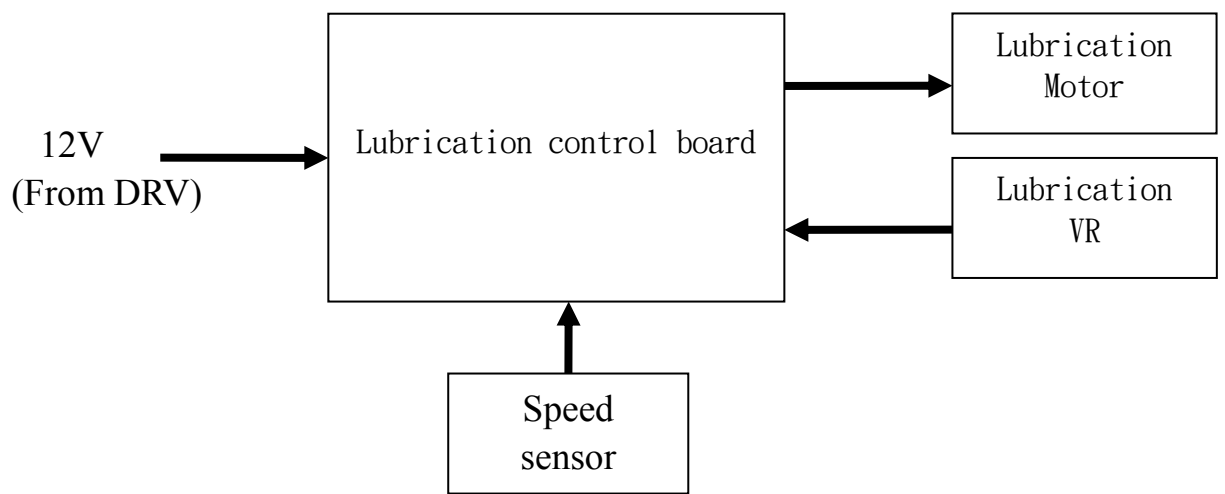
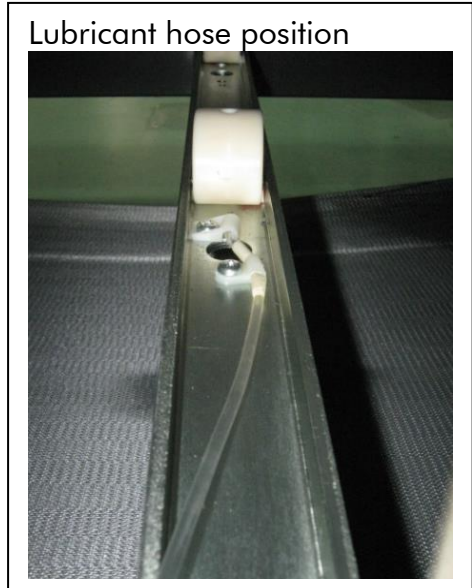
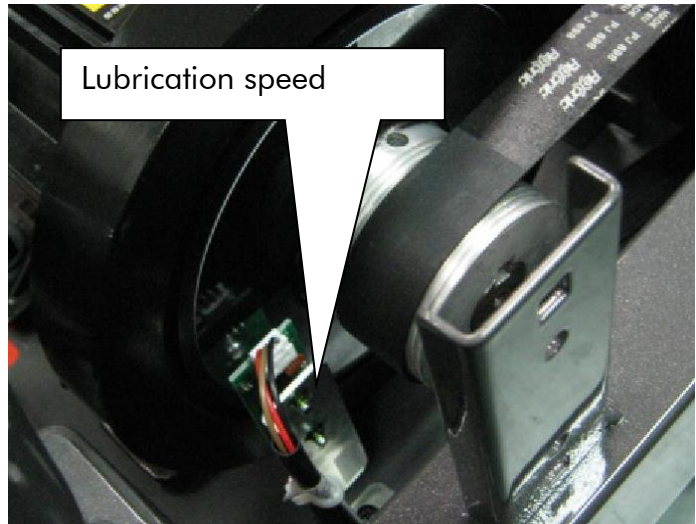
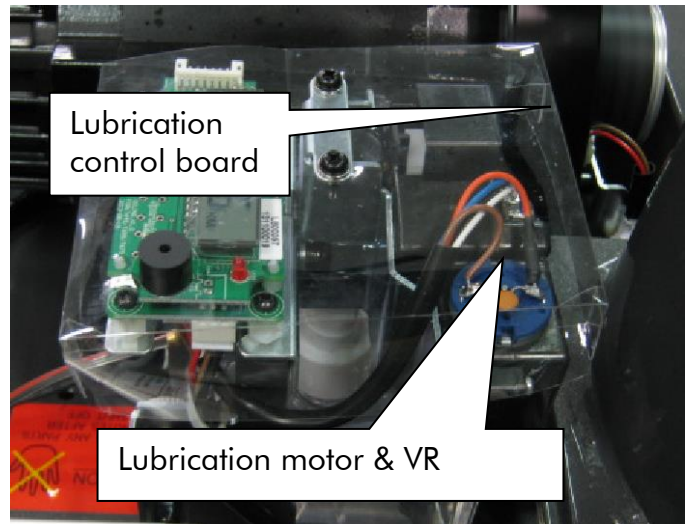
1. When the treadmill is in motion, the lubrication control board will track the mileage. When it reaches 1000Km, the program will perform lubrication procedure.
2. When it enters self-lubrication procedure, the motor will start and drip about 49 drops of lubricant; total of 10cc.
3. The bottle holds 400cc of lubricant; it lasts 40 times of self-lubrication procedures and about 40000Km distance. The distance display will reset to 0 each time the self-lubrication is performed.
4. Lubrication display -
Press <RESET> key to display total distance in mile & km; total time
Press <UP> key to display total exercise distance, speed and software version
5. When the lubrication procedure performs exceed 40 times, the display will show "CH O'L" and beeping sound; that means it is time to replace the lubricant bottle.
6. Untighten the screws shown on below figure and push the metal plate to remove the lubricant bottle when replacing lubricant bottle. Swap the bottles out with the existing cap.
7. The self-lubrication system is an independent system from the main console; it is operating under its own programming and detecting system.

Lubrication system control board



Other descriptions:

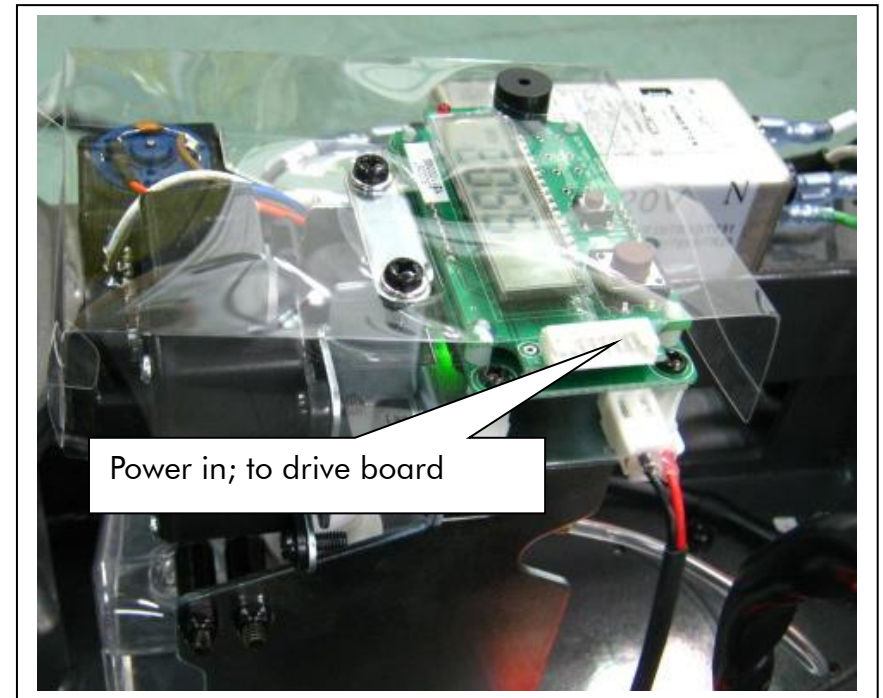
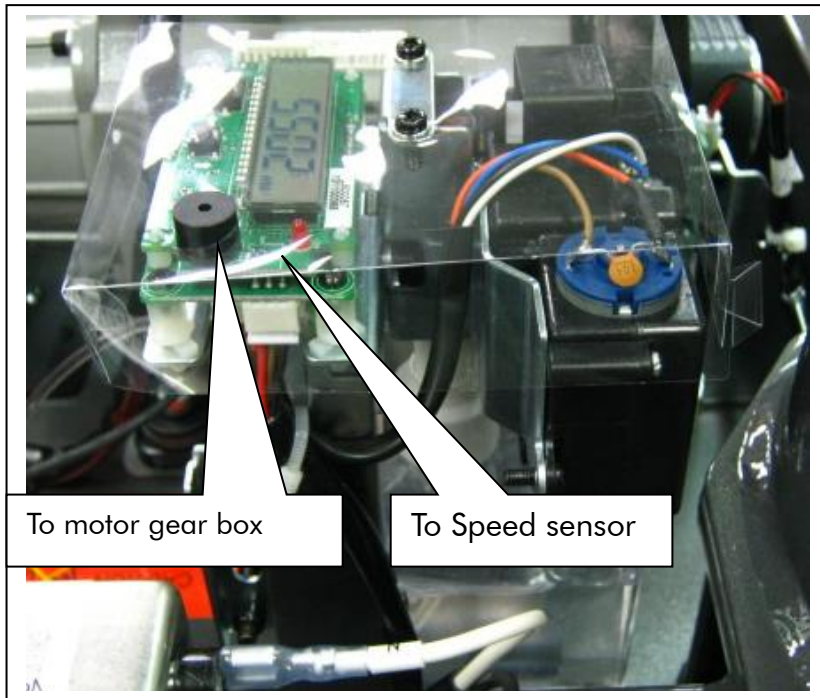
Model: T645
Item: Self-lubrication system wiring and block diagram



Other descriptions:

Model: T645

Item: Lubrication wiring

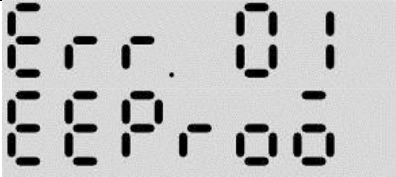
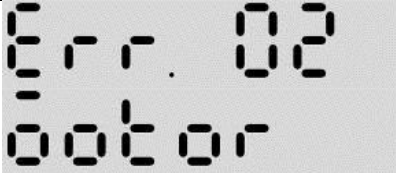


Other descriptions:

Model: T645

Item: Lubrication error messages and troubleshooting

Troubleshooting:

Error messages	Malfunction description	Possible causes	Components replacement suggestion
Total distance is not accumulating	Motor is running, however the total distance is not accumulating	Speed sensor issue	1. Check speed sensor wiring 2. Replace speed sensor
	ERR 01, EEPROM message on lubrication display	Control board wiring issue	1. 12V Check if the power source on lubrication control board is about 12V 2. Check lubrication control board wiring 3. Replace lubrication control board
	ERR 02, MOTOR message on lubrication display	Lubrication motor gear box VR issue	1. Check lubrication control board wiring 2. Replace lubrication motor gear box VR

Other descriptions:

Model: T645

Item: Lubricant bottle replacement

SportsArt_{FITNESS}

Step1. Untighten the screws shown here



Step2. Push the metal plate and take the bottle out



Step3. Put the new bottle in with existing cap and tighten the screws back to finish.



Other descriptions:

Model: T645

Item: Energy saving system operation

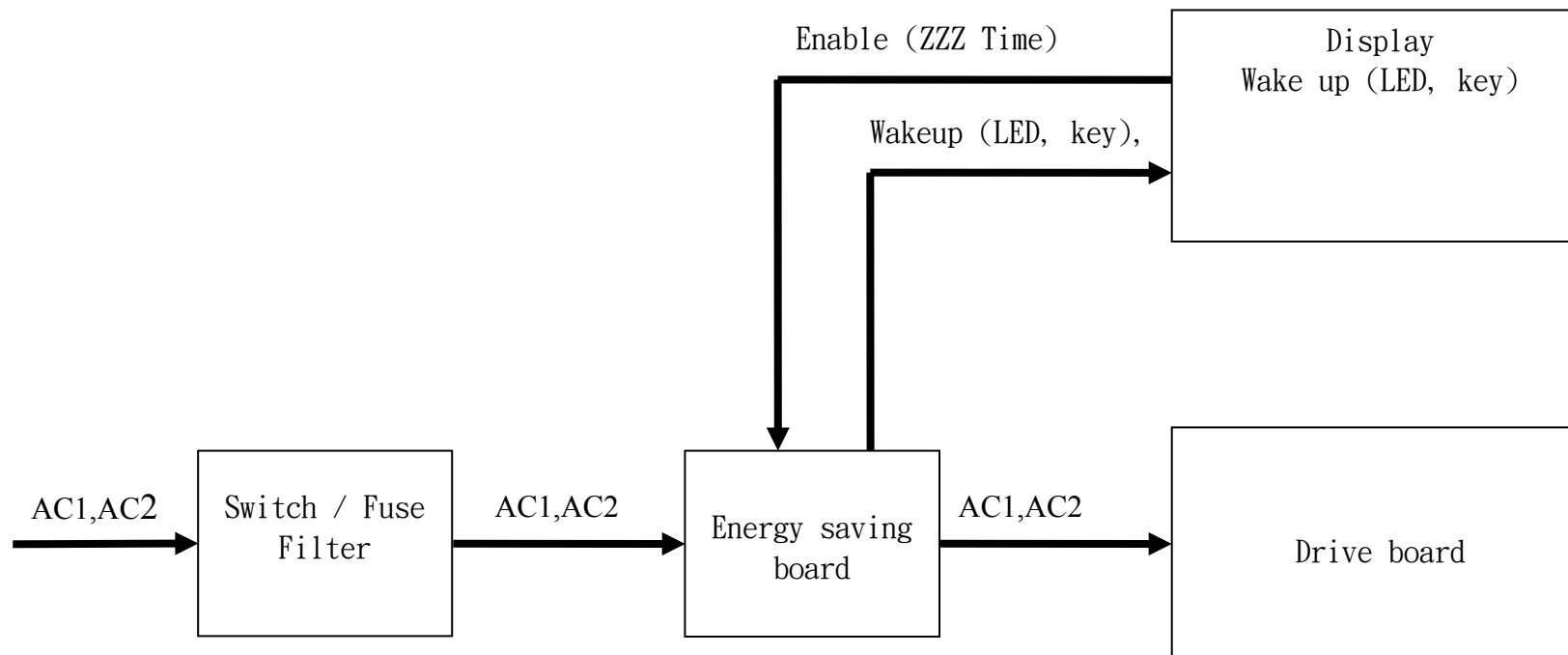
Function: Turn off the power source to drive board and reduce the energy consumption down to under 5W when product is not in use.

Operation procedure: 1. When turn on the power, energy saving board will send AC1 /AC2 to drive board and start running the console.
Wake up indicator light will turn green.

2. When treadmill is in idle mode and no key pressing passes energy saving timer limit, the treadmill will enter energy saving mode and wake up light will turn to red to indicate that. Energy saving board will cut off the power to drive board to save energy.

3. When “Wake Up” key is pressed during energy saving mode to wake up the treadmill, the board will once again send the power to drive board and return treadmill into in use mode. The indicator light will turn green again.

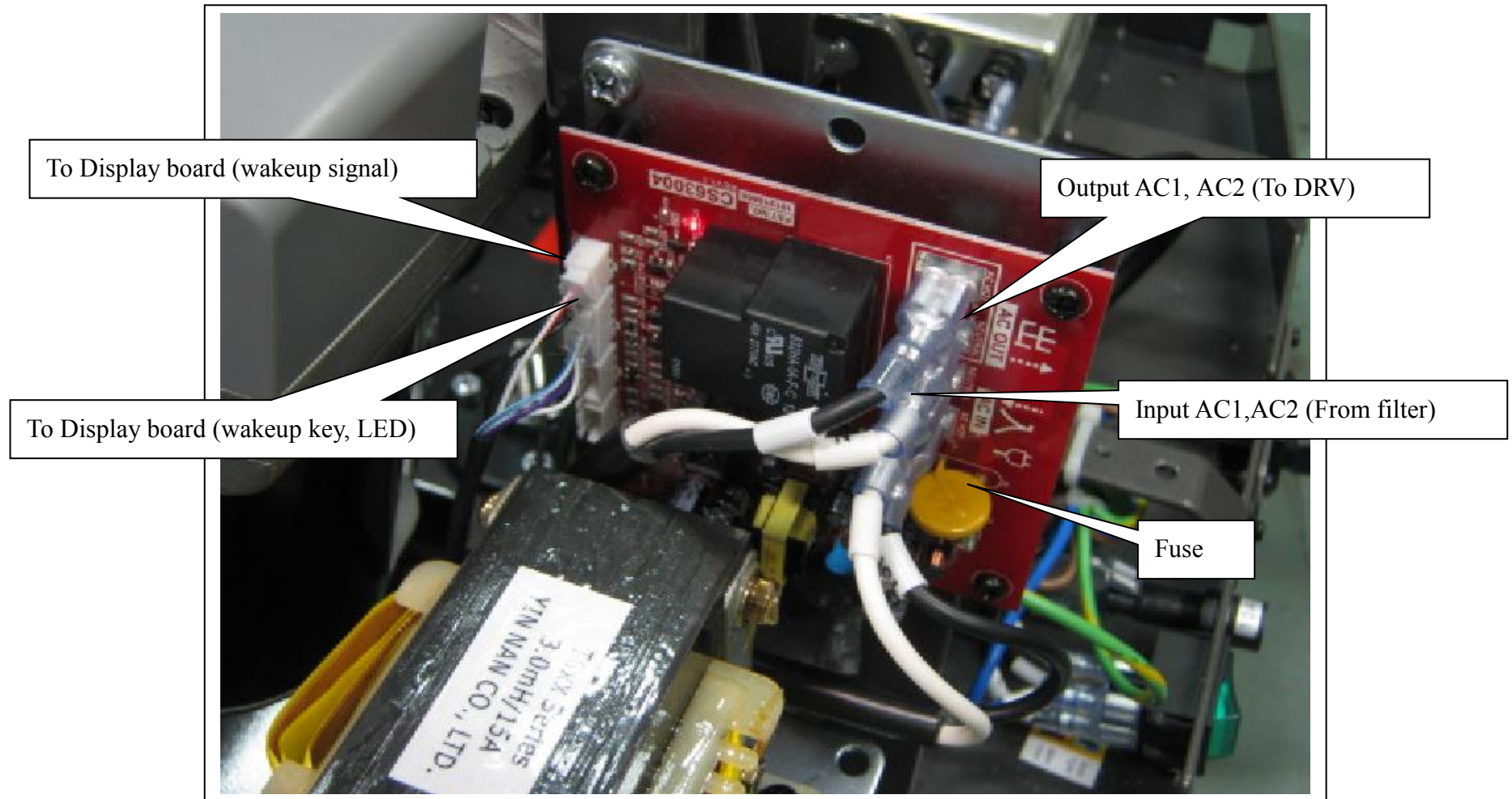
4. Energy saving timer can be set by pressing <Display change> key for 3 seconds. Once it enters <ZZZ TIME>, it can be adjusted from 5min – 600min.



Other descriptions:

Model: T645
Item: Energy saving system wiring

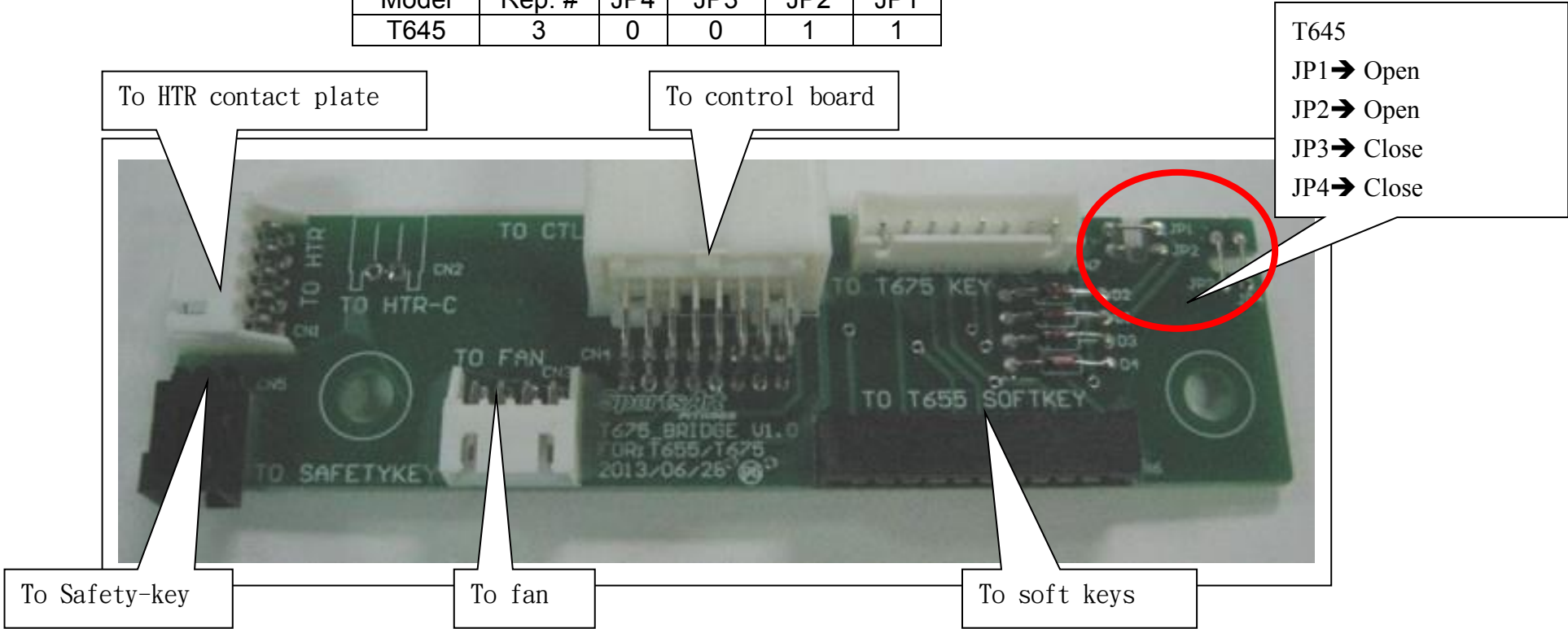
SportsArt_{FITNESS}



Other descriptions:

Model: T645
Item: Bridge board operation
Function: 1. Connect the wiring to the lower soft keys, fan, HTR contact plates
2. Coordinate the programming on the drive board to set product model no.
Descriptions: Model no. setting: 0 - close , 1 - open

Model	Rep. #	JP4	JP3	JP2	JP1
T645	3	0	0	1	1

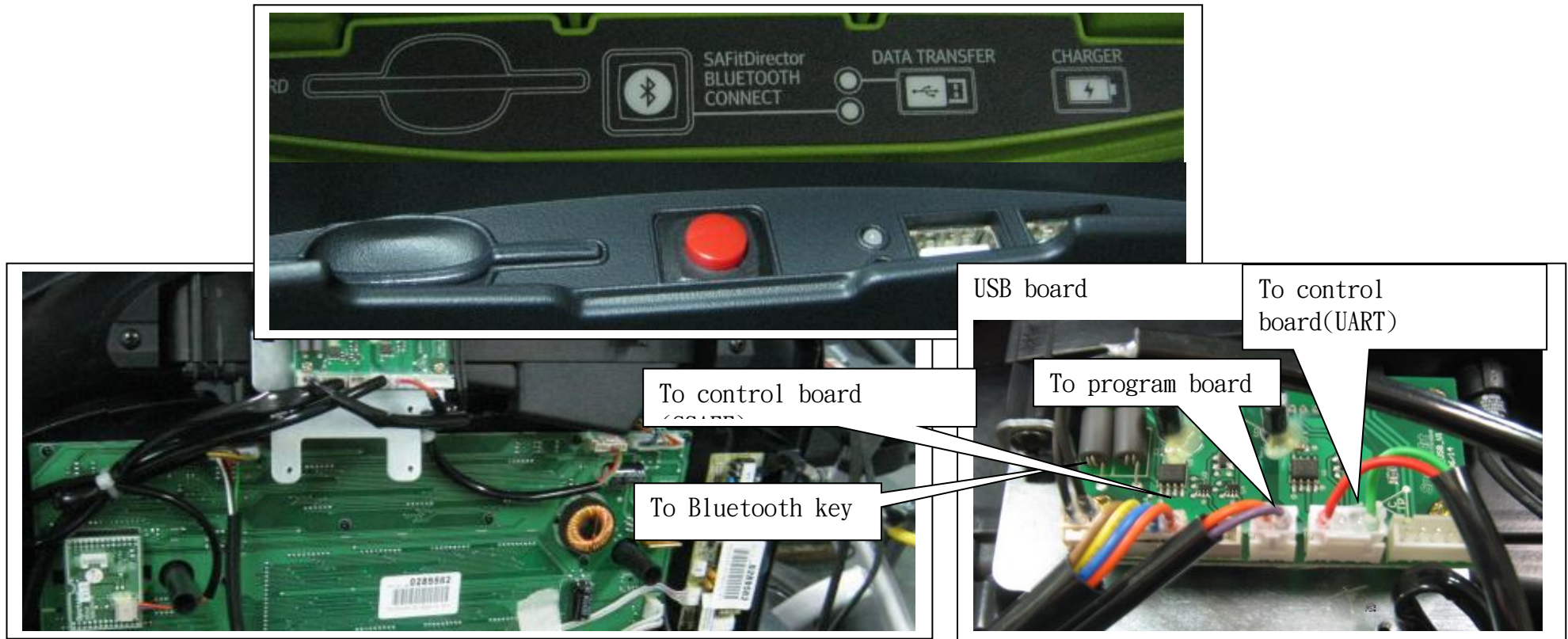


Other descriptions:

Model: T645

Item: USB board

Function: 1.Charger: Cell phone charging (USB)
2.Data Transfer: Workout data transfer or program update
3.Blue tooth connect: Bluetooth data transmission key & LED indicator
4.Member Card: Member card slot (reserved)



Other descriptions:

Model: T645

Item: Language setting

Description: 1. Programming language setting procedure; such as German, French...

Setting procedure: 1. Press <CHANGE DISPLAY> key for 3 second, it will enter user preference setting. Continuing pressing <ENTER> key until the display shows "GERMAN "or "0 MILE H>H" for language setting. See below for all the available languages. Use INCLINE <▲>/<▼> key to change the setting and <ENTER> key to confirm.

2. Country language code

GERMAN	➔	0 KM	H_H
FRENCH	➔	1 KM	H_H
POLISH	➔	2 KM	H_H
SPAINLISH	➔	3 KM	H_H
JAPANESE	➔	5 KM	H_H
US. ENGLISH	➔	6 MILE	H_H
UK. ENGLISH	➔	10 KM	H_H
SWEDISH	➔	11 KM	H_H

Inspection and measurement

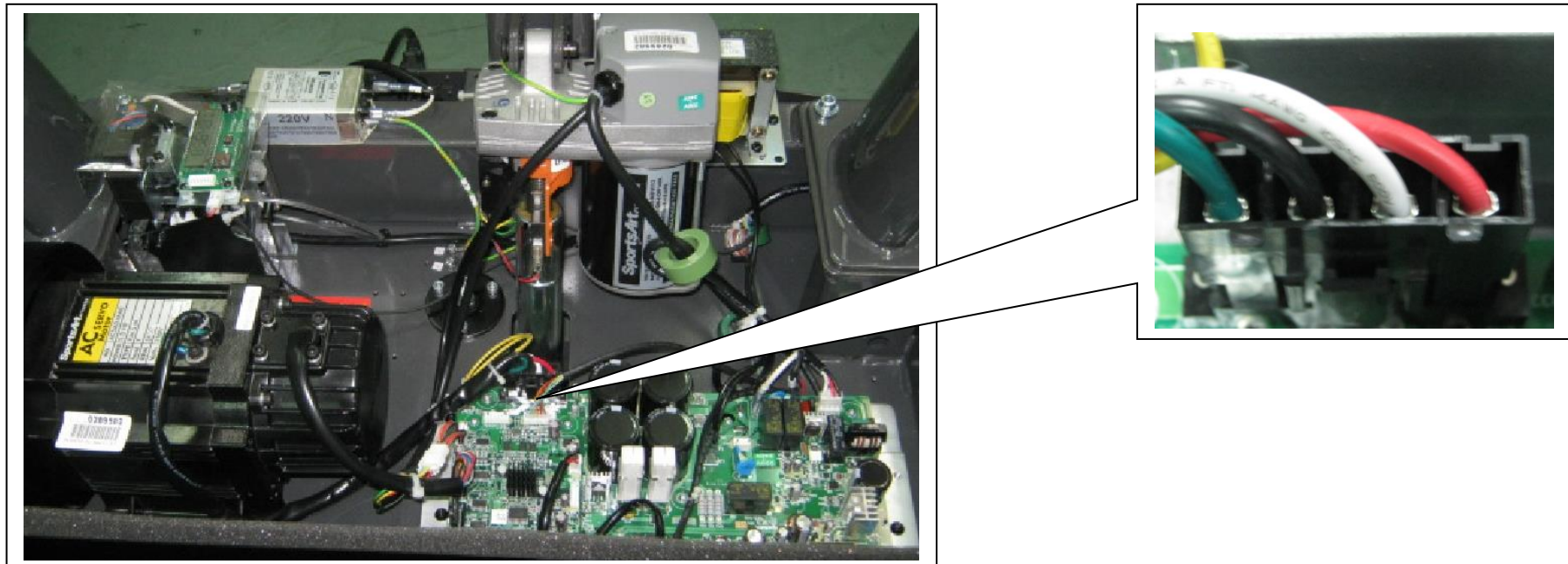
Model: T645

Testing item: AC serve motor circuit breaker inspection

Method: 1. Unplug the motor wires and use a volt meter setting at Ohms setting to measure. The reading should be as below:

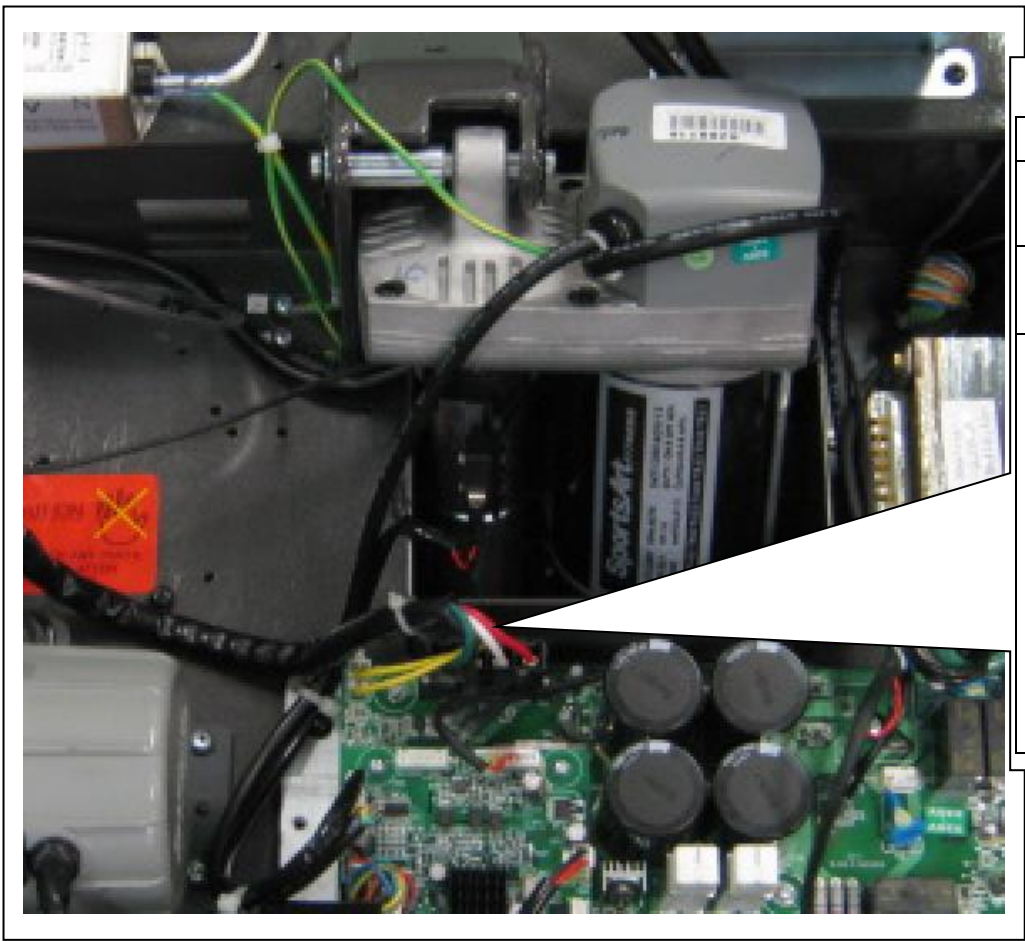
Motor wiring	Ohms reading	Note
Green — Black	No reading	Green = ground
Green — White	No reading	Green = ground
Green — Red	No reading	Green = ground
Black — White	Shorted	
Black — Red	Shorted	
White — Red	Shorted	

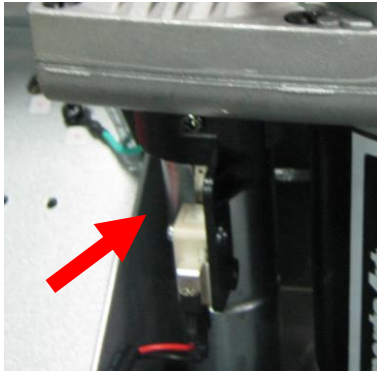
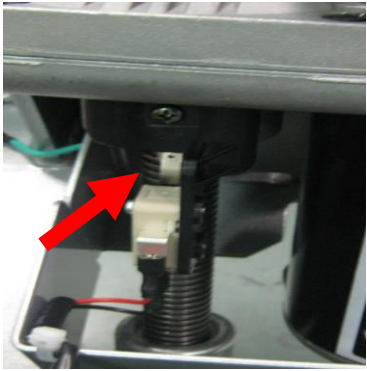
2. If Black to White; Black to Red or White to Red has a shorted occurring, it means there is a breaker issue with the motor and the display should show an error message of ERROR 1_3_.



Inspection and measurement

- Model: T645
- Testing item: Incline Zero% limit switch test
- Method:
1. Turn the power on and start the treadmill, the incline should return to 0% position. At this time, the incline will reach 0% limit switch.
 2. If the incline setting is “0%”, then the incline column will touch the zero switch & zero switch will be on (close).
 3. If the incline setting is between 1 – 15%, then the incline column will not touch the zero switch and it will be off (open).

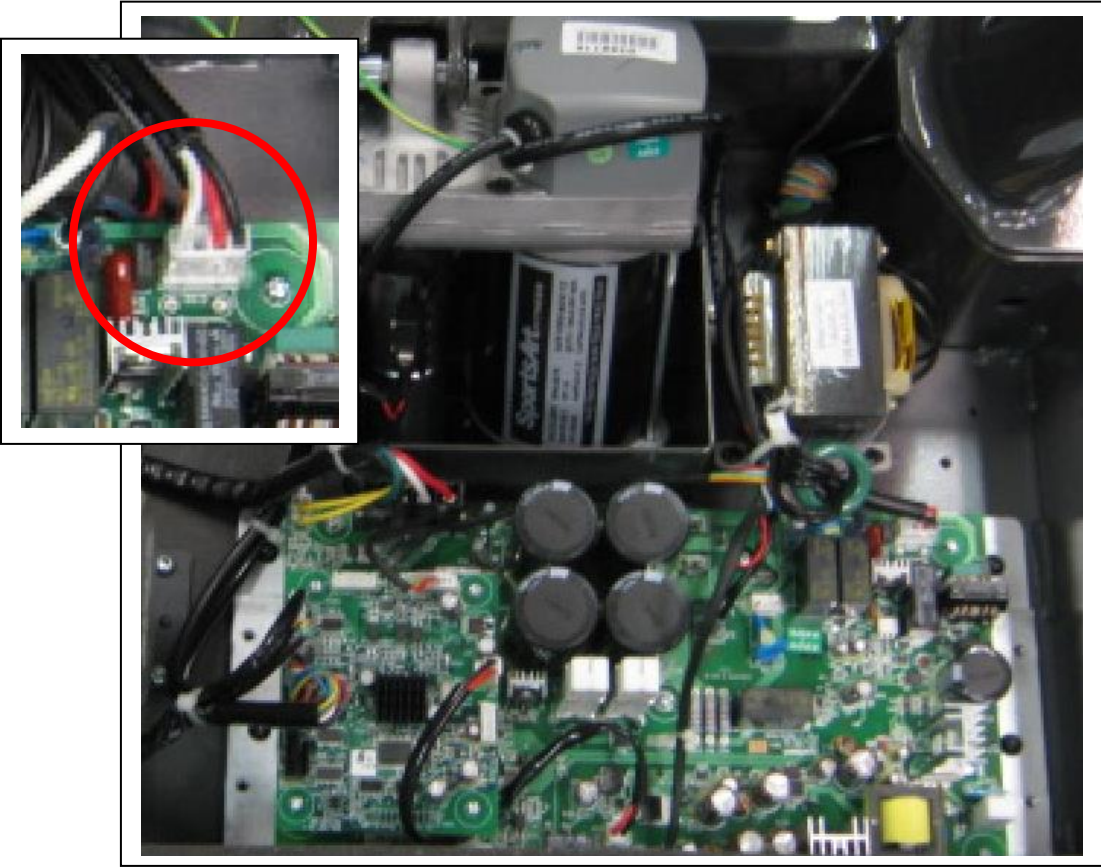
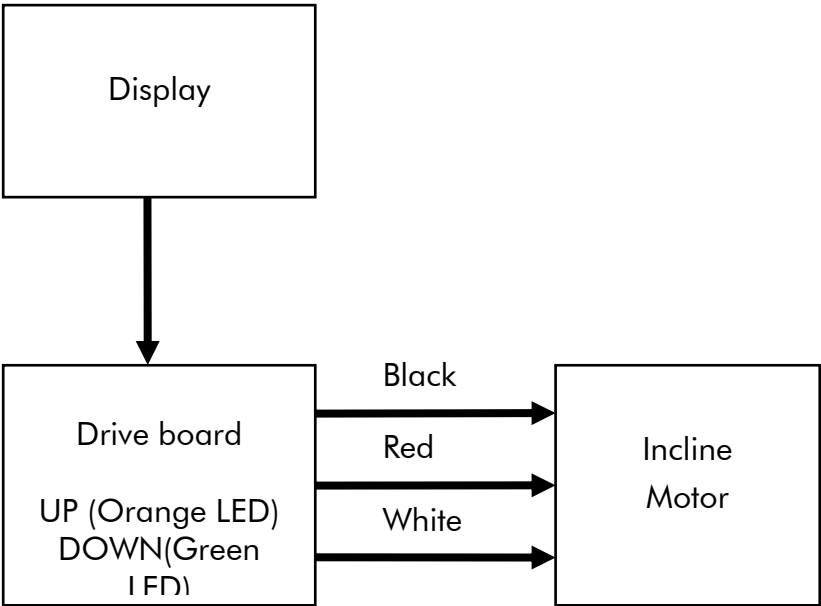


Zero 開關		
Incline	0%	1-15%
Incline column	Touch the switch	Not touch the switch
Zero switch	on	off
Diagram		

Inspection and measurement

- Model: T645
- Testing item: Incline motor voltage test
- Method:
- 1. Set the volt meter to AC > 300V setting
 - 2. Press INCLINE<▲>/<▼> key; the incline indicator should light up. Measure the incline motor voltage output at this time.
 - 3. Voltage spec. as below:

Display	Drive board	Incline motor wiring	Incline action
Press <▲> key	UP (Orange LED)	White - Black → 110V or 220V	Up
Press <▼> key	DOWN(Green LED)	White - Red → 110V or 220V	Down



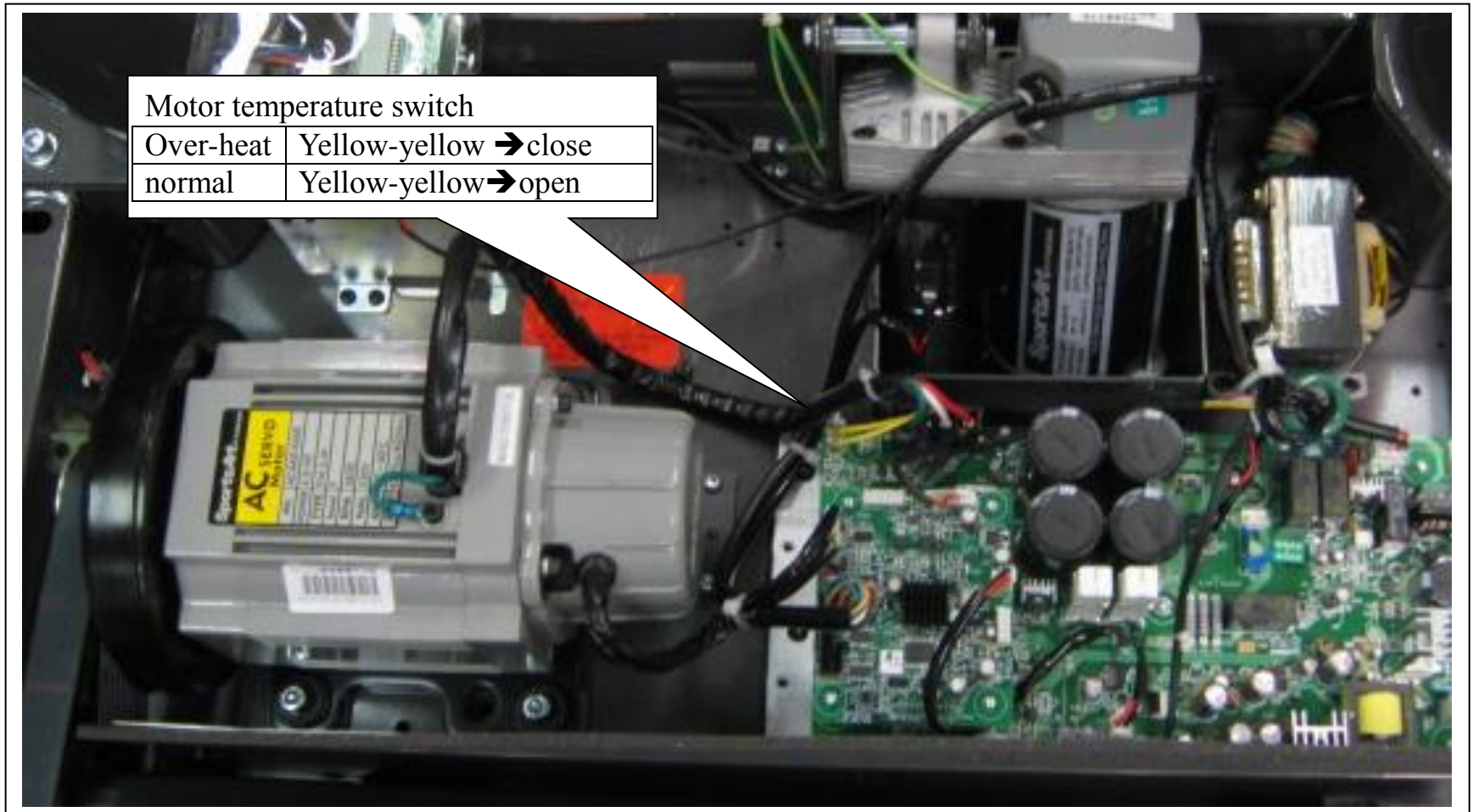
Inspection and measurement

Model: T645

Testing item: Motor temperature switch test

Method:

1. When the temperature is normal, there is no abnormality on the display. Unplug the motor temperature switch wiring, the display will show the message of "SERVICE REQUIRED..."
2. If the display shows a message of "SERVICE REQUIRED..." after using for a while and the motor temperature is hot, the ends of the yellow wire will be shorted.



Inspection and measurement

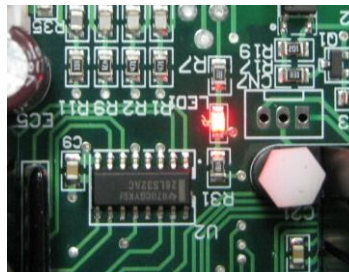
Model: T645

Testing item: Motor Encoder signal test

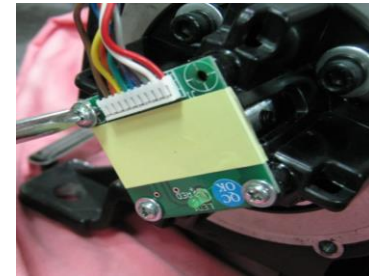
Method: 1. If "ERROR 1_1" message appears when power on, there could be an Encoder issue. Remove the motor cover to see if the Encoder board is damaged.

2. When the motor is turning, the Encoder indicator on the drive board will light up

Encoder indicator



Encoder



DSP board

