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Johnson Industries (Shanghai) Co., Ltd TF30/T30/TF50/T50/T70/T75 Service Manual						
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Kyle Schweitzer				Stephen Jiang		

Product Browse

Matrix Retail TF30



Matrix Retail TF50



Matrix Retail T50



Matrix Retail T70/T75



Matrix Retail T30



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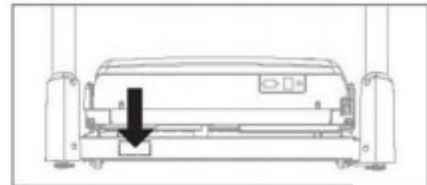
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CHAPTER 1: Serial Number Location

Serial Number Location



SERIAL NUMBER LOCATION



Before proceeding, find your equipment's serial number located on a barcode sticker and enter it in the space provided below.

SERIAL NUMBER

MODEL NAME

- ☐ TF30 ☐ T50 MATRIX TREADMILL
☐ TF50 ☐ T70

2.1 ELECTRICAL DIAGRAM

1. MCB ELECTRICAL DIAGRAM---TF30/T30/TF50/T50

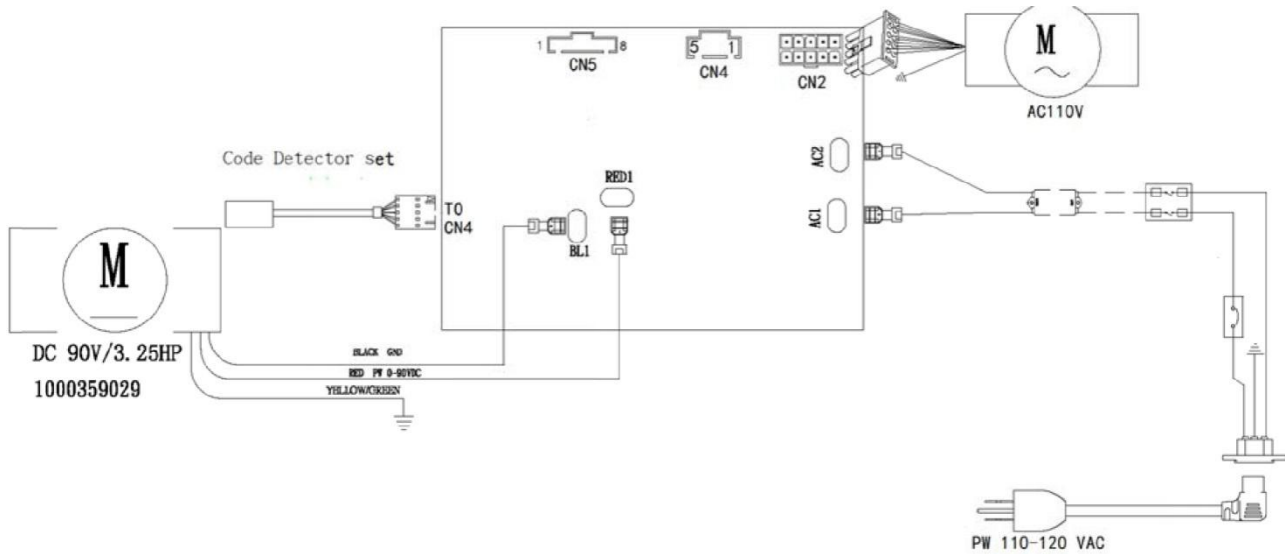


Fig-1 THE MCB TO CONSOLE PIN LAYOUT

Fig- 2 THE MCB TO SPEED SENSOR PIN LAYOUT

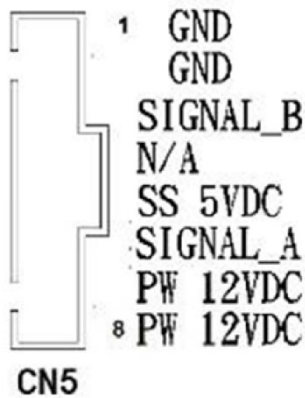
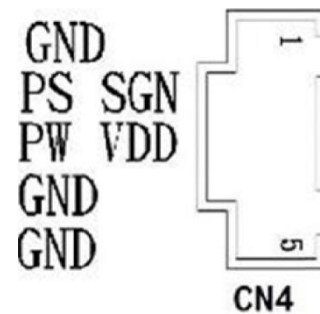
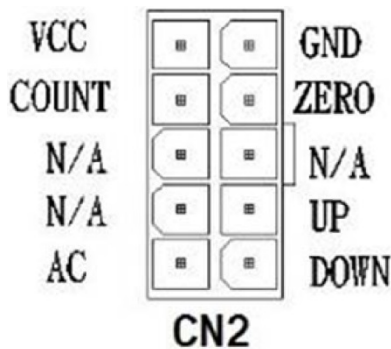


Fig-3 THE MCB TO INCLINE MOTOR PIN LAYOUT



THE PIN VOLTAGE INFORMATION



PW 110-120VAC:Power 110-120VAC
 PW 12VDC: POWER 12V DC
 PW 5VDC : POWER 5V DC
 PS 3.3VDC : PULSE SIGNAL 0 OR 3.3V DC
 SS 5VDC : SWITCH SIGNAL 0 OR 5V DC

2. MCB ELECTRICAL DIAGRAM---T70/T75

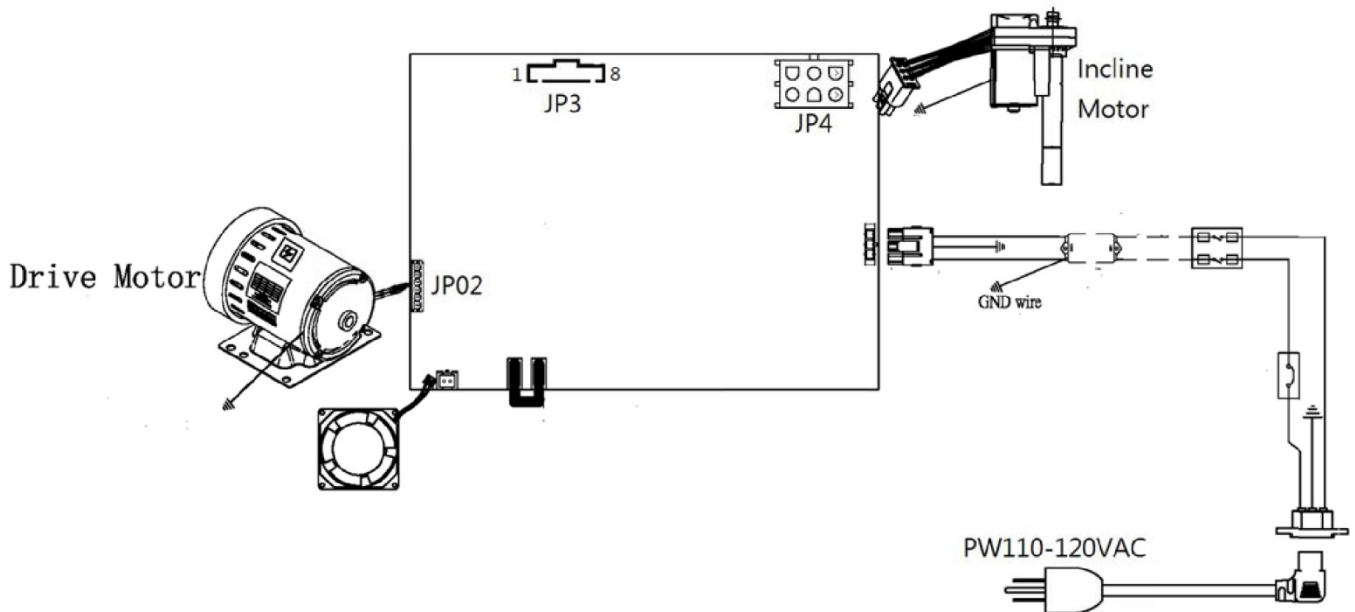
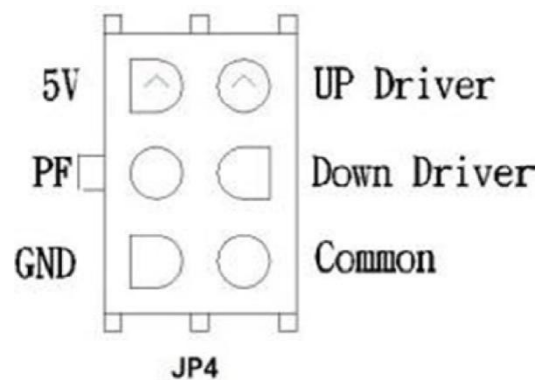
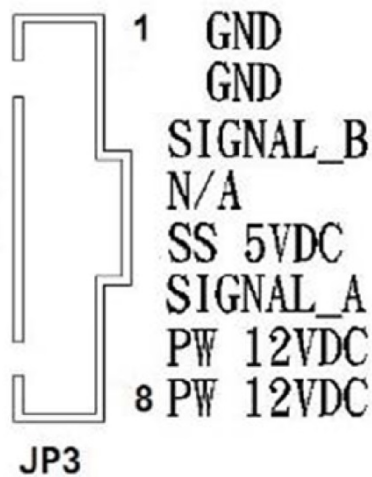


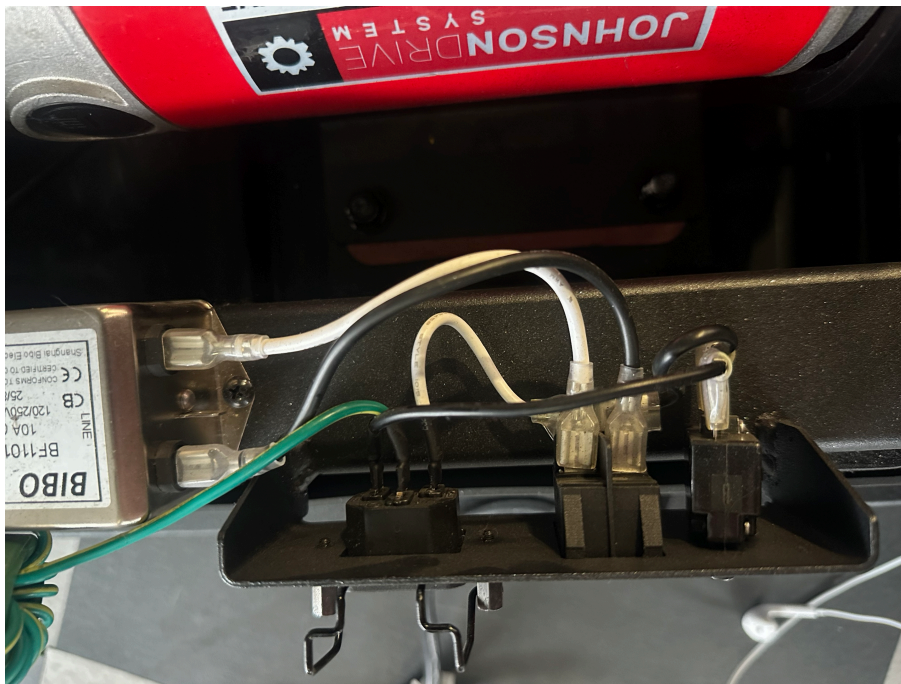
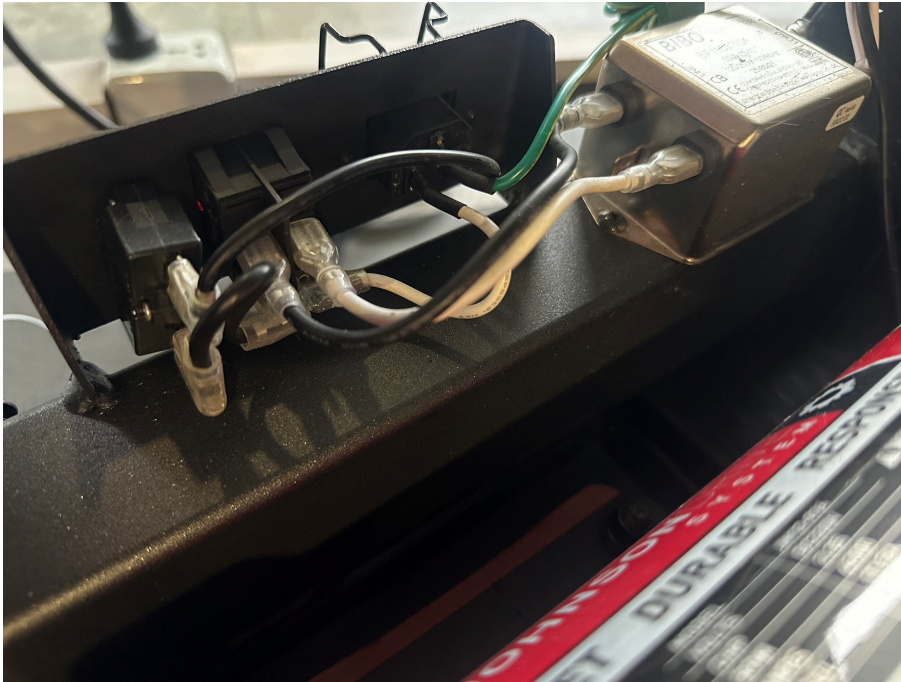
Fig -2 MCB TO INCLINE PIN LAYOUT



PW 110-120VAC:Power 110-120VAC
 PW 12VDC: POWER 12V DC
 PW 5VDC : POWER 5V DC
 PS 3.3VDC : PULSE SIGNAL 0 OR 3.3V DC
 SS 5VDC : SWITCH SIGNAL 0 OR 5V DC

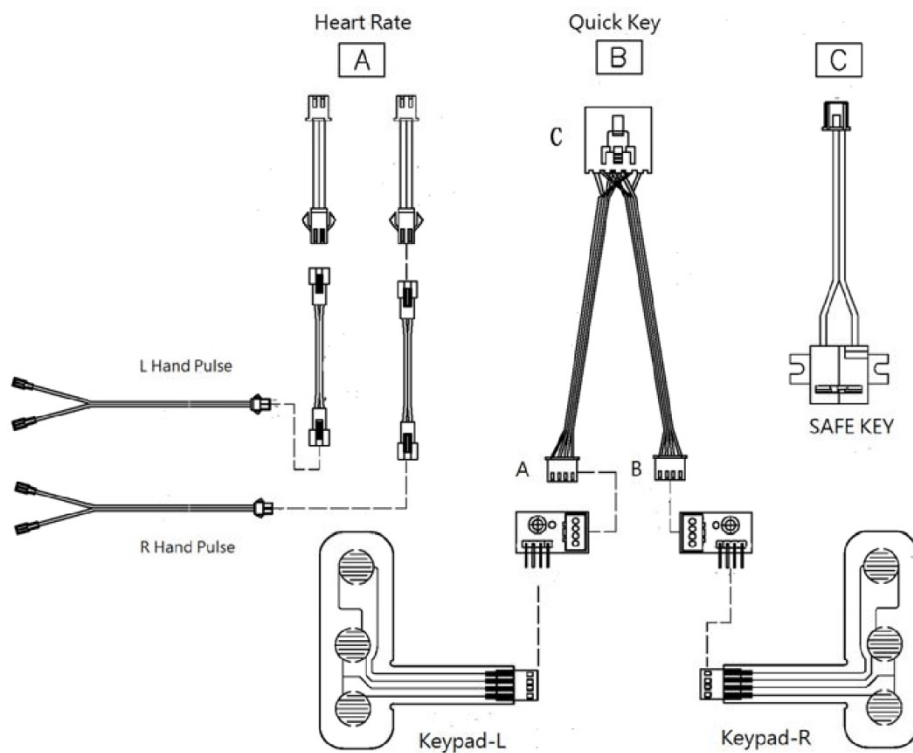
CHAPTER 2: Troubleshooting

The photos below show the power wiring connections at the circuit breaker, power switch, and power socket, which are the same on all Matrix Retail Treadmill models.

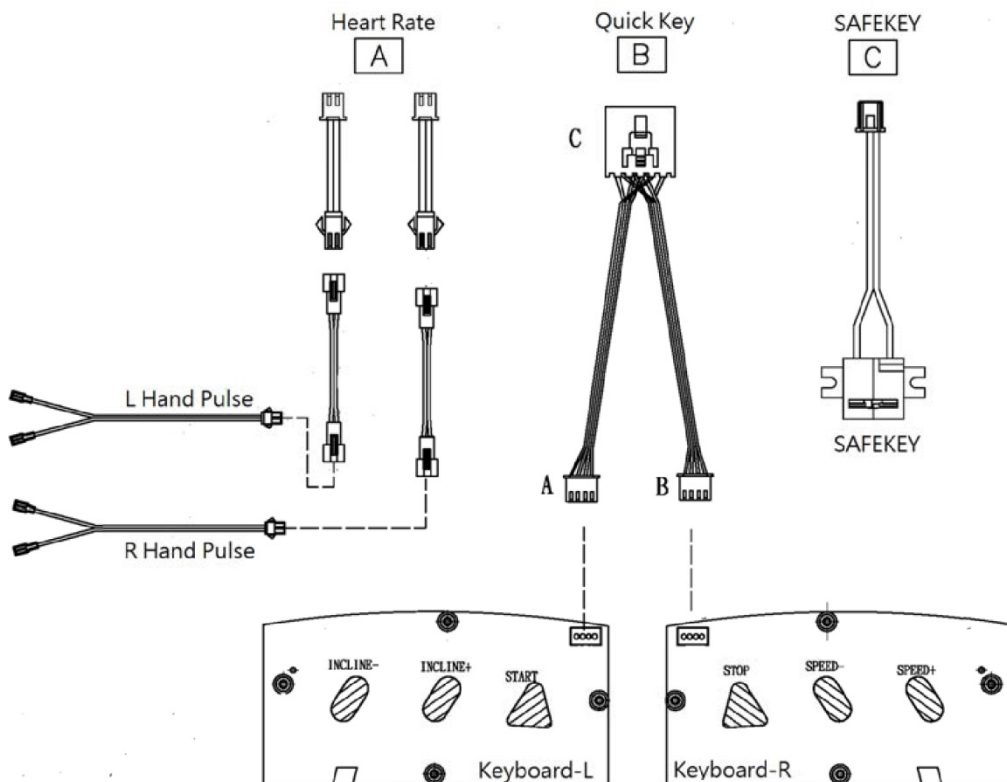


CHAPTE 2: Troubleshooting

3. CONSOLE ELECTRICAL DIGRAM---TF30/T30



4. CONSOLE ELECTRICAL DIAGRAM---TF50/T50/T70/T75



2.2 MCB INSTRUCTIONS

1. TF30/T30/TF50/T50



Fig -1

CN1	Power Line in terminals
CN2	Incline motor power cable socket
CN3	Drive motor cable terminals
CN4	Speed sensor cable socket
CN5	Console cable socket
CN6	Software burning cable socket

CHAPTE 2: Troubleshooting

2. MCB LED'S FUNCTION INDICATOR (TF30/T30/TF50/T50)

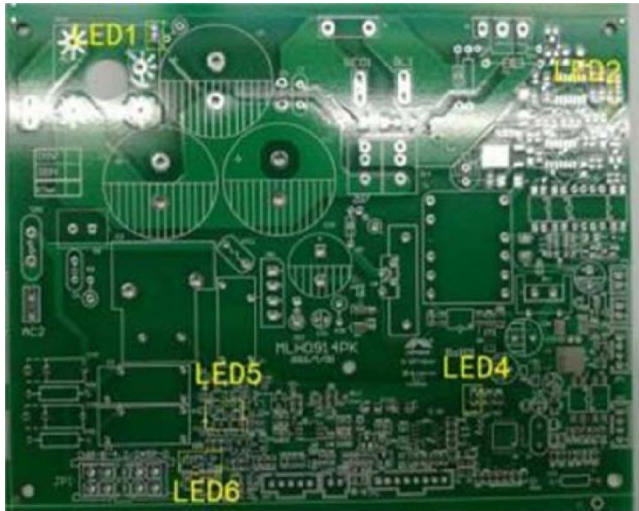


Table1-MCB LED FUNCTION (TF30/T30/TF50/T50)

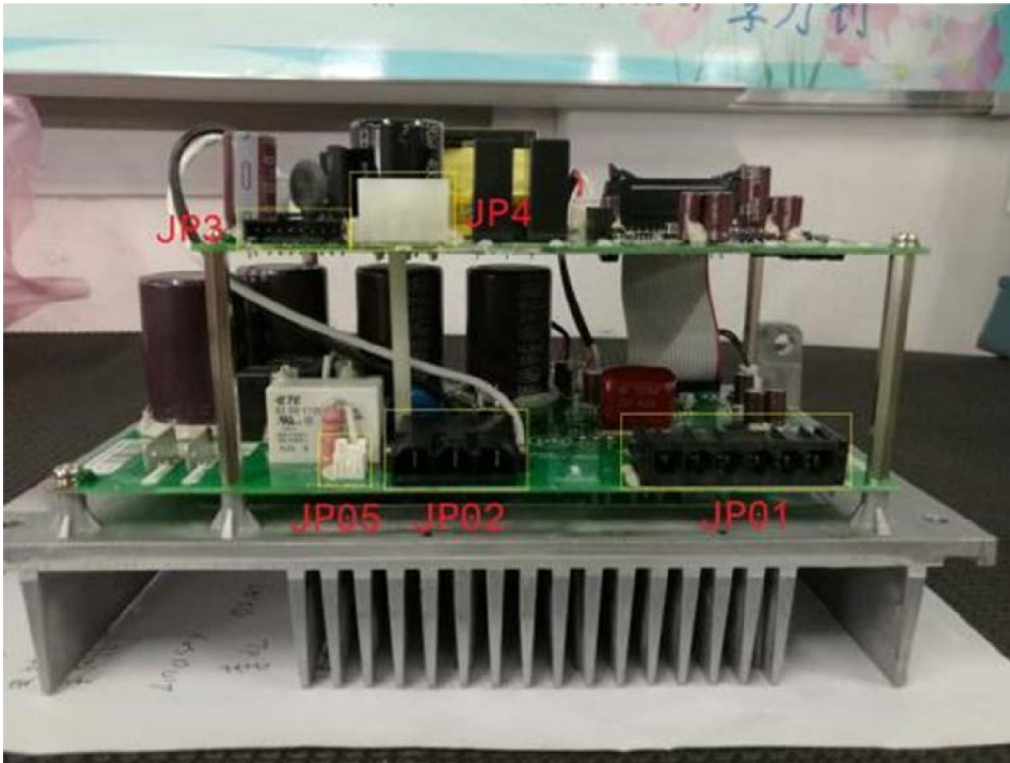
LED No	Color	Active	inactive	Function	Symptom
LED1	Red	light on	light off	Driver Motor active	Not voltage to drive motor
LED2	Green	light on	light off	MCB Power indicator	Not voltage output
LED4	Green	flash	——	MCU status see Table 2	See Table 2
LED5	Green	light on	light off	Incline down indicator	Relay not active MCB fail
LED6	Green	light on	light off	Incline up indicator	Relay not active MCB fail

Table2-MCU STATUS (LED4)

LED Flash Times	Status	Action Condition	Failure Parts
1	Normal	Flashing 1 times per seconds regularly. The CPU works well.	
2	No Feedback from the optical encoder.	1) There is no optial encoder signal over 4 seconds on low speed(less than 4 mph). 2) There is no optical encoder signal over 1 seconds on high speed(more than 4 miles).	The encoder is failed or poor connecting.
3	overload/overcurrent	The DC motor current is over the rated current and over 4 seconds.	The motor is over loaded.
4	overspeed	The motor control device has failed, or the accelerated speed is too fast.	MOSFET(IGBT) is damaged.
5	Being rapidly stopped	The safekey is off.	
6	No incline action	Incline motor block, there is no count signal feedback in the movement.	The incline has control device(relay) faile, or the incline motor is in overheat protection.
7	Communcation abnormal by UART	No communication with console, or not obey the communication protocol.	The uart circuit has failed, or the connect line is damaged.
8	No incline motor	Can't find the ZERO signal of the incline motor.	There is no incline motor connected or the zero switch is damaged.

CHAPTE 2: Troubleshooting

3. MCB CIRCUIT BOARD INSTRUCTIONS (T70/T75) (110V)



JP01	Drive motor cable socket
JP02	Power Line in socket
JP3	Console set cable socket
JP4	Incline motor cable socket
JP05	Fan cable socket

4. MCB LED'S FUNCTION INDICATOR -T70/T75 (110V)



Table3-MCB LED FUNCTION (110V)

LED No	Color	Active	Inactive	Function	Symptom
LED 1	Red	Light on	Light off	Incline up indicator	Relay not active MCB fail
LED 2	Red	Light on	Light off	Incline down indicator	Relay not active MCB fail
LED 3	Green	Light on	Light off	12V power indicator	No 12V power MCB circuit board abnormal
LED 4	Green	Flash	Light on	PWM indicator	Commands from UCB
LED 5	Green	Light on	Light off	Communication indicator	Abnormal internal communication
LED 6	Red	Light on	Light off	Fault indicator	System error when red LED turn on
LED 7	Red	Light on	Light off	Machine power indicator	No voltage

5. MCB CIRCUIT BOARD INSTRUCTIONS (T70/T75) (220V)



Fig-2

CN9	AC motor cable socket
CN1	Input power cable socket
CN13	External fan cable socket
CN7	Digital communication cable socket
CN6	Elevation motor cable socket
CN8	Adaptor power cable socket (only for T1xe / T3xe)

6. MCB LED'S FUNCTION INDICATOR -T70/T75 (220V)

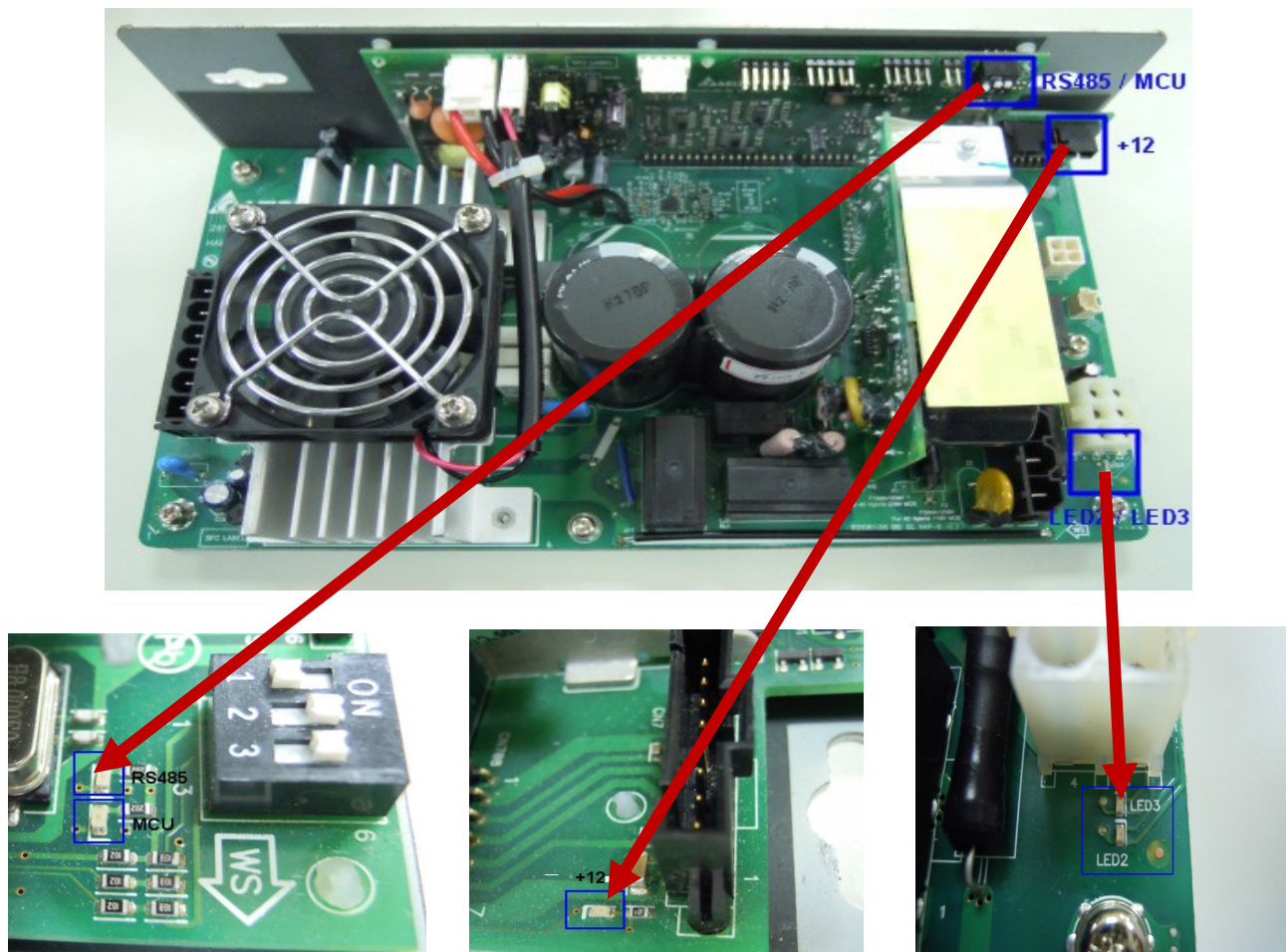


Table4-MCB LED FUNCTION (220V)

LED	REFERENCE DESIGNATOR	DESCRIPTION
RS485		Indicates if the digital communication is working normally between the console and the MCB. Blinking = Normal. Off = Fault
MCU		Indicates if the console is working normally. Blinking - Normal. Light = MCU Fault. Off = MCU No Power.
DOWN	LED2	Indicates if the console is commanding elevation down. Light = Normal. Off = No command from console received by the elevation motor.
UP	LED3	Indicates if the console is commanding elevation up. Light = Normal. Off = No command from console received by the elevation motor.
+12V		Indicates if the console voltage supply is present. Light = Normal. Off = 12 Volts are not provided by the MCB.

2.3.1. TROUBLESHOOTING – NO FUNCTION FOR SAFETY KEY

SOLUTION:

- a. Check if the safety key is totally inserted into the console.
 - If not, remove and insert again.
- b. Check if the safety key is oxidized or damaged.
 - If yes, try cleaning it or replace it.
- c. If the safety key is not damaged, check the alignment of the reed switch (safety key sensor) and wire connection in the console.

2.3.2 TROUBLESHOOTING – NO RESPONSE FOR MACHINE WHEN PRESSING START

SOLUTION:

- a. Check if the console beeps when all keys are pressed. If no, replace the keypads
- b. Enter Engineering Mode, and scroll to ENG 1 (Hardware Test). Press the “ENTER” key first and then the key “START”.
 - When press the key “SPEED + / -“, if the data on windows “TIME” & “DISTANCE” change, the Console is ok. If not, replace the UCB.
- c. Verify the motor or running belt spins freely
 - Remove any obstructions from under the running belt or motor compartment that may cause a block in movement.
- d. Check the console cable connection. Also, console cable continuity can be tested with Ohms on each wire of the cable.
- e. Test the drive motor.
 1. 30/50 series short test - Disconnect power from the unit. Remove the motor cover. Remove the red and black motor wires from the MCB. Using a jumper wire (or metal paper clip), make the connection between the red and black leads of the motor. Without the jumper wire, the running belt will move freely with little to no resistance. With the jumper wire in place there will be a great amount of resistance when trying to push the running belt. If there is resistance, the motor is good. 30/50 series battery test - Disconnect power from the unit. Remove the motor cover. Remove the red and black motor wires from the MCB. Using a DC battery from a cordless drill or other device, touch the red on the positive lead of the battery and the black to the negative lead. If the motor runs, the motor is good.
 2. 70 series windings test - Disconnect power from the unit. Remove the motor cover. Remove the motor connection from the MCB. With an Ohm meter test the resistance level between the motors three phases; pin 1 and pin 2, pin 1 and pin 3, then pin 2 and pin 3. If all three resistance levels are the same, the motor is good. If one or more are different, replace the motor.
- f. If the drive motor is ok. Then,
 - Check the connection of the speed sensor (encoder disk group) at the MCB.
 - Remove the speed sensor from the motor and clean it, then re-test.
 - If the speed sensor is clean and has a good connection but still will not operate, replace the speed sensor.
 - Replace the MCB as the last step if machine does still not run after to take above actions.

2.3. 3 TROUBLESHOOTING - INCLINE MOTOR ISSUES

SOLUTION:

- a. While using the machine press the "INCLINE" keys, the console should beep and display incline change, if no, replace the keypad.
- b. Enter Engineering Mode, and scroll to ENG 1 (Hardware Test). Press the "ENTER" key first and then the "START" key.
- c. Press the "INCLINE ▲/▼" key.

If can hear clicks from two relays and LED light (see table 2.2.2 and 2.2.4) at the MCB, the MCB is ok. Then check the connection of the elevation motor at the MCB. First try to unplug and re-plug connection. If this does not resolve the issue, replace the elevation motor.

If there is no clicks from these two relays or LED light, MCB is defective and replace the MCB.

2.3.4 TROUBLESHOOTING - NOISE ISSUES

SOLUTION:

a. Thumping noise twice per rotation on new machine.

This noise is from the roller or running belt.

- If this is a new unit, some noise is normal as the running belt forms around the rollers.
- Check that the belt is centered and tensioned correctly.
- Remove and clean the rollers if needed.
- Replace the rollers or running belt as needed.

b. High pitched “bell-like” sound from under the motor cover.

This sound is likely a moving component.

- Remove the motor cover and check the drive belt for alignment and make sure it is not slipping or is frayed / cut in any way. Replace the drive belt if needed.
- Make sure the optic disk on the motor is not rubbing the speed sensor.
- Turn the motor by hand to see if motor bearings are rubbing. Replace the motor if needed.
- Check the front and rear rollers, replace if needed.

c. Rubbing / grinding noise.

This sound is likely caused by the optic disk.

- Check that the optic disk is tight on the motor and not rubbing the speed sensor.

d. Banging or clunking sound/slapping / squeaking sound with each footstep.

The sound is likely due to the unit not being level.

- Check that all levelers are touching the ground.
- Move the treadmill to another flat surface.
- This sound is from the running deck / belt.
- Remove the side rails and tighten the deck bolts and elastomers.
- Check the deck shocks for disintegration or crumbling. Replace if needed.

e. Rubbing sound underneath the treadmill.

This sound is likely due to the air shock.

- Lubricate or replace the air shock as needed.

f. Squeaking / grinding noise when using elevation.

This sound is likely from the incline motor.

- Check that the incline motor and incline rack connection points to the main frame are tight. Replace Teflon washers on the frame as needed.
- Lubricate the incline motor worm screw and connection points with grease.
- Replace the incline motor.

2.3.5 TROUBLESHOOTING- HEART RATE FUNCTION ISSUE

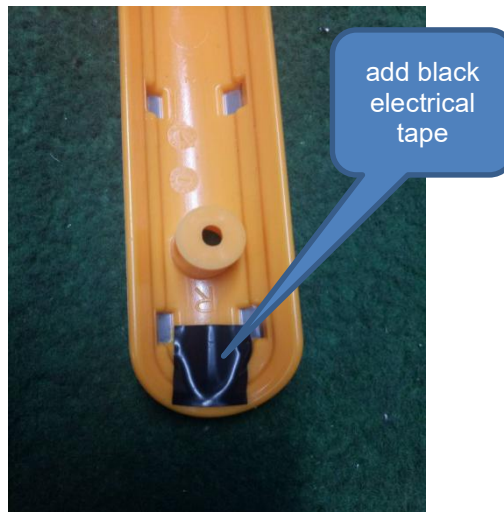
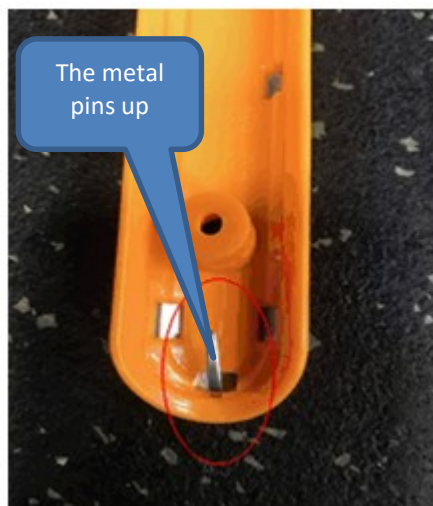
SOLUTION:

a. Telemetric heart rate:

1. Sources of interference include other machines (make sure to position consoles at least six feet apart), anything omitting electromagnetic currents, competitor's stand-alone entertainment (including Cardio Theater), fluorescent lighting, and cell phone signals.
2. Re-center the chest strap below the user's pectoral muscle and check again.
3. Replace the battery in the chest strap.

b. Heart rate grip:

1. Wet the user's hand, and then reestablish contact with the HR grip.
2. With a multi-meter set for DC voltage, place one terminal on each of the HR grip plates. The HR Grip should give a voltage reading of between 0.5 and 2.0VDC. If the voltage is not between 0.5 and 2.0VDC, remove the screws holding the HR grip together and check the connection of the HR grip wiring.
3. Remove the heart rate grip. Check if tape is over the metal pin (pin where wire is not connected). If tape is not included, bend pin down and add black electrical tape to prevent arcing.
4. Replace new HR grip if console cannot display proper HR rate.
5. Check 1-4. If still cannot work, suggest install new console.



3.1 MOTOR REPLACEMENT

1.TF30/T30/TF50/T50

- 1) Disconnect power cord.
- 2) Remove the 2 screws holding the motor cover to the frame (Fig-1)
- 3) The cover is secured to the frame with Velcro so you will have to pull up with some force (Fig -2)



Fig-1



Fig-2

- 4) Fig-3 & Fig-4 shows the motor MCB area with the motor cover removed. (Fig-3 & Fig-4)



Fig-3



Fig-4

- 5) Unplug the motor connector from LCB, speed sensor, cut any wire ties as needed.
- 6) Remove the drive belt by spinning the flywheel (or running belt) and walking the drive belt off toward the outer edge of the treadmill.
- 7) Remove the four motor bolts and remove motor.
- 8) Reverse steps to install motor. When installing Flexion drive belt, start with belt on inside of front roller pulley. Install belt on drive motor pulley.
- 9) Then by rotating the front roller pulley while applying pressure on the drive belt, roll the belt on. Continue to walk belt on until centered on both pulleys.
- 10) Test at various speeds.

2. T70/T75 ONLY

- 1) Disconnect power cord.
- 2) Remove the 2 screws holding the motor cover to the frame (Fig-1).
Note: The cover is secured to the frame with Velcro so you will have to pull up with some force (Fig-2)



Fig-1



Fig-2

- 3) Disconnect motor wires and grounds, cut any wire ties as needed.



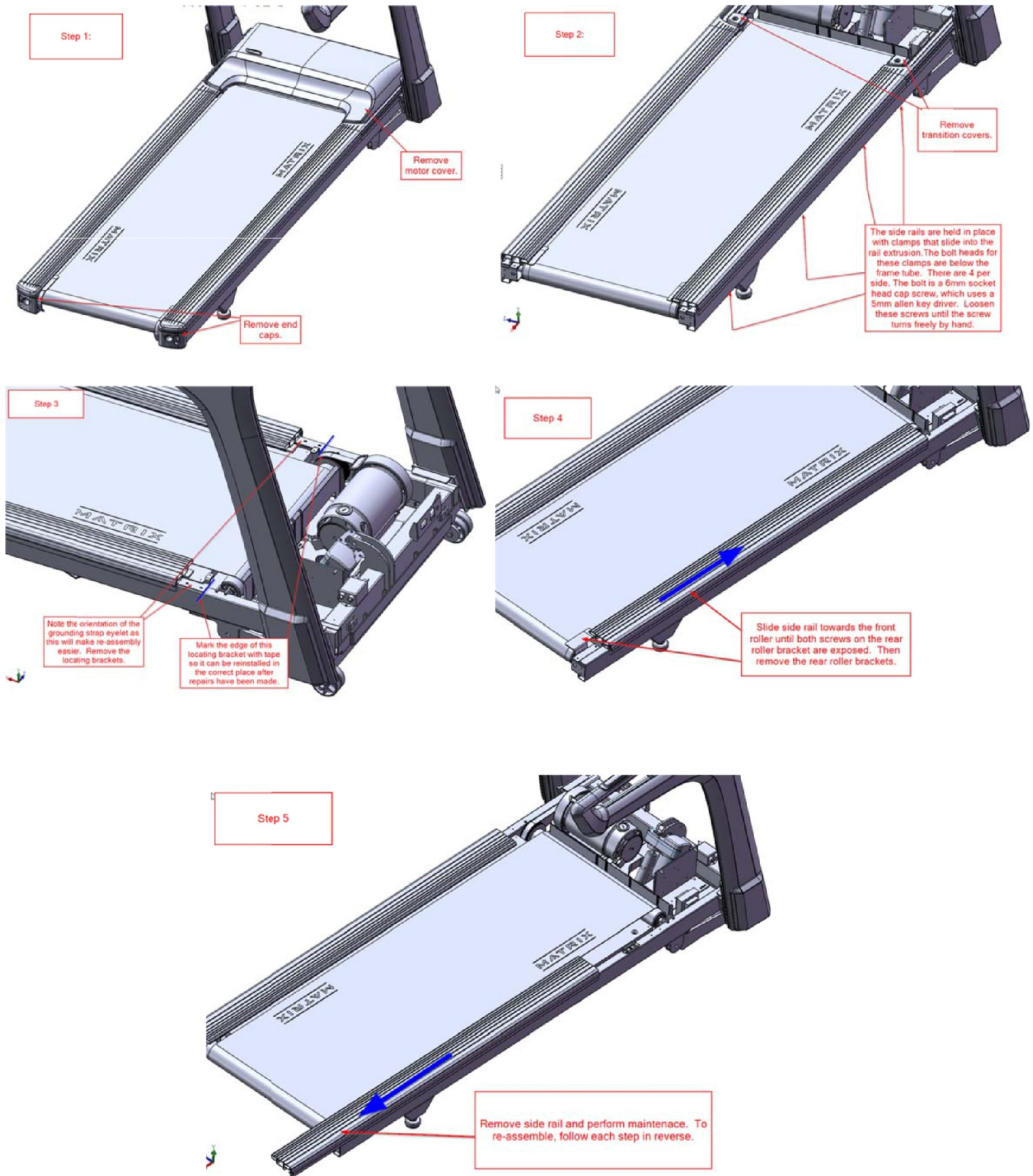
Fig-3



Fig-4

- 4) Remove spring from the belt tensioner. Remove drive belt from motor pulley.
- 5) Remove 4 bolts securing motor and remove motor from drive compartment.
- 6) Reverse steps to install motor. Replace any wire ties that were removed.
Note: When installing the drive belt, rotate by hand several rotations, make sure it is aligned with the front roller pulley.
- 7) Test at various speeds.

3.2 SIDE RAIL REPLACEMENT



3.3 REAR ROLLER REPLACEMENT

- 1) Remove side rail in section 3.2.
- 2) Remove rear roller.
- 3) Replace new rear roller and tightness bolts (Fig-1).
- 4) Reverse step 2 to step 1.

Fig-1



1 bolt each side

Note:

1. To set the correct running belt tension after replacing the belt.
2. Over or under tension can result in damage or injury.
3. Always bring tension up evenly from the left to right tensioning bolts using small adjustments.
4. Final steps of tensioning are when the running belt just stops slipping and slows the motor when trying.
To stop the belt with your feet using an abrupt stop at a walking speed.
5. Reference section 3.6 note 2 to adjust the running belt.

3.4 RUNNING DECK REPLACEMENT

- 1) Remove the motor cover as outlined in Section 3.1.
- 2) Remove rear roller as outlined in section 3.2
- 3) Remove the side rail as outline in Section 3.3.
- 4) Remove the running deck 8 bolts and ground strap.
- 5) Remove the running deck from the frame. (Fig-1)
- 6) Reverse steps 1-5 to install a new running deck.



Fig-1

Note:

1. The running deck is silicon on one side on TF30/TF50. New deck surfaces must always be matched to a new running belt and only T70-02 models is paraffin waxed deck only 1 side.
2. For the adjusting the running belt reference section 3.6 notes 2.

3.5 FRONT ROLLER REPLACEMENT

- 1) Remove the motor cover as outlined in Section 3.1.
- 2) Loosen both of the rear roller bolts to remove tension from the running belt (Fig-1).
- 3) T70-02 only: Remove the spring from the drive belt tensioner (Fig-2). The tensioner should now pivot away from the drive belt.



Fig-1

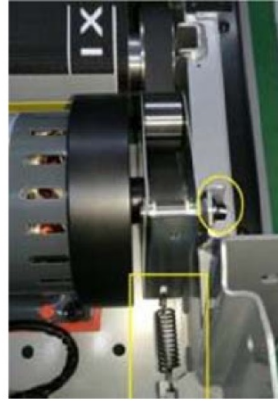


Fig-2

- 4) Remove the drive belt from the motor pulley. (Fig-1)
- 5) Remove front roller bolts and remove front roller and drive belt.
- 6) Reverse steps to replace front roller and drive belt.

3.6 RUNNING BELT REPLACEMENT

- 1) Remove the motor cover as outlined in Section 3.1.
- 2) Remove the rear roller as outlined in Section 3.2.
- 3) Remove the running deck as outlined in Section 3.4.
- 4) Remove the front roller as outlined in Section 3.5.(Fig-2)
- 5) Remove the running belt.



Fig-1

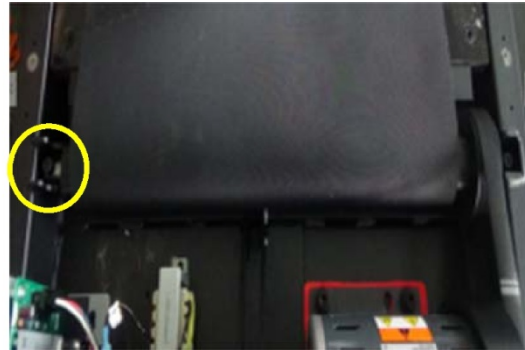


Fig-2

- 6) Reverse Steps 1-5 to install a running belt.

Note1:

1. Adjust running belt tension after replacement (Note2).
2. The running deck is silicon on one side on TF30/TF50/TF50-2. New deck surfaces must always be matched to a new running belt and only T7 -02 models is waxed deck only 1 side.

ADJUSTING THE RUNNING BELT

After placing the treadmill in the position it will be used, the belt must be checked for proper tension and centering. The belt may need to be adjusted after the first 2 hours of use. Temperature and humidity, and use cause the belt to stretch at different rates. If the belt starts to slip when a user is on it, be sure to follow the direction below.

Step1: Locate the two hex head bolt on the rear of the tread mill. The bolts are located at each end of the Frame at the back of treadmill. These bolts adjust the rear roller.

Step2: There should be an equal amount of space on either side of the running belt and the side rails. If the belt is touching one side, turn the bolts counter clockwise approximately one full turn on each side. Manually center the belt by pushing the belt toward the center. Tighten the bolts the same amount of turns as they were loosened.

Step3: While the treadmill is running at 3 mph, observe the belt position. If it is moving to the right, tighten the Right bolt by turning it clockwise 1/4 turns, and loosen the left bolt 1/4 turn. If it is moving to the left, tighten the left bolt by turning it clockwise 1/4 turn and loosen the right 1/4 turn. Repeat step 3 until the belt remains centered for several minutes.

Step4: Check the tension of the belt. The belt should be very snug. When a person walks or run on the belt, it should not hesitate or slip. If this occurs, tighten the belt by turning both bolts clockwise 1/4 turn. Repeat if necessary.

3.7 MOTOR CONTROL BOARD (MCB) REPLACEMENT

- 1) Turn off power and disconnect the power cord from the machine.
- 2) Remove the motor cover as outlined in Section 3.1.
- 3) Remove the wire connectors at the MCB. (Fig -1)
- 4) Remove the 2 screws holding each side of the MCB to the frame (Fig-2).

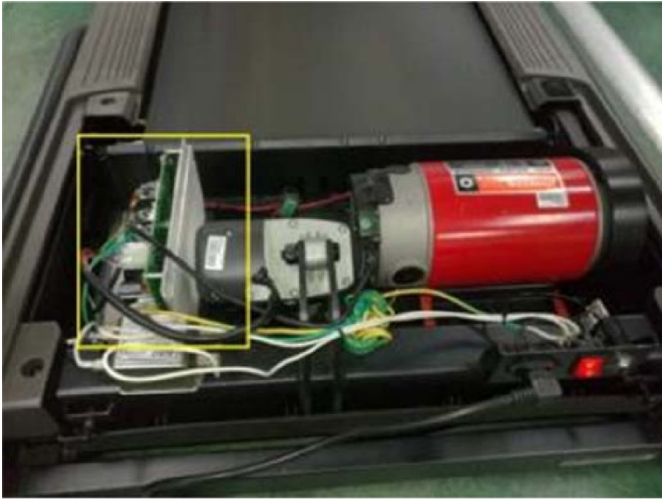


Fig-1



Fig-2

- 5) Remove the MCB.
- 6) Reverse Steps 1-5 to install a MCB. Make sure that all wires removed during Step 3 are re-connected.

Note:

Replace any wire ties removed.

3.8 INCLINE MOTOR REPLACEMENT

- 1) Turn off power to the treadmill and disconnect the power cord.
- 2) Remove the motor cover as outlined in Section 3.1.
- 3) Disconnect incline motor wires from MCB and ground. Cut any wire ties as needed.
- 4) Lift or tilt the treadmill until there is access to lower connecting bolt. (Fig-1)
- 5) Remove the bolt from the elevation rack.(Fig -2)
- 6) Remove the bolt from the elevation with spring.

Fig-1



- 7) Disconnect the incline motor from the top mounting bracket (Fig-3).
- 8) Reverse Steps 1-7 to install a new incline motor.

Fig-2



Fig-3



Fig-4



- 9) Test full range of elevation.

NOTE:

When installing a new incline motor make sure to replace the black zinc washers at the top and bottom connection points of the incline motor. Replace any wire ties that were removed.

3.9 CONSOLE REPLACEMENT

- 1) Turn off power to the treadmill and disconnect the power cord.
- 2) Remove the 4 screws holding the console from the console mast (Fig-1 and Fig-2).
- 3) Disconnect all wires from console.
- 4) Install the new console by reversing steps 1 - 3.
- 5) Turn on the power and select corresponding model (Reference XR/XER/XIR console service manual).

Fig -1



Fig-2



Fig-3



Fig-4

