

**Installation Manual**  
**MasterRad MX-30**  
**Chiro Radiographic System**

## Contents

|                                   |    |
|-----------------------------------|----|
| Introduction:.....                | 2  |
| SECTION I: INSTALLATION .....     | 3  |
| Section II: Troubleshooting:..... | 17 |
| Section III: Appendixes .....     | 21 |

## Introduction:

### **Important! .. X-ray Protection**

**X-RAY EQUIPMENT IS DANGEROUS TO BOTH PATIENT AND OPERATOR UNLESS  
MEASURES OF PROTECTION ARE STRICTLY OBSERVED**

X-ray equipment if not properly used may cause injury. Accordingly, the instructions herein should be thoroughly read and understood before attempting to place this equipment in operation. We will be glad to assist and cooperate in placing this equipment

Although this apparatus I built to the highest safety and incorporated a high degree of protection against x-radiation other than the useful beam, no practical precautions to prevent the possibility of any persons carelessly, unwisely, or unknowingly exposing themselves or other to x-radiation.

It is important that everyone working with x-radiation be properly trained and take adequate steps to insure protection against injury. The manufacturer assumes that all operator and service personnel authorized to use, install, calibrate and maintain this equipment is cognizant of the danger of excessive exposure to x-radiation, is sufficiently trained and has the required knowledge for it. The equipment herein described which may result from exposure to x-radiation.

Various protective material and devices are available. It is recommended that such materials and devices be used.

## **SECTION I: INSTALLATION**

### **1. TOOLS**

The following hand tools are required for the installation:

- Standard service engineers tool kit.
- Electric drill motor and assorted bits.

### **2. Pre-installation checks**

Prior to beginning installation, it is recommended to inspect the site and verify that the x-ray room complies with requirements such as:

- Space requirements to allow installation and system movements must consider the maximum dimensions and travels of the equipment.

Maximum Height 96 in (8 ft)

Maximum Width 132 in (11 ft)

Maximum Length 180 in (15 ft)

- Conduits and walls are ready to install the system.
- Electricity installation:
  - Main supply: Single phase, 50/60 Hz  
115/208/230/240 V ~
  - Minimum Power input required: 400 VA



**Hardware Installation:**

1. Refer to the layout of the room
2. Locate and unscrew the 10 x allen flat head screws #10-32 screws

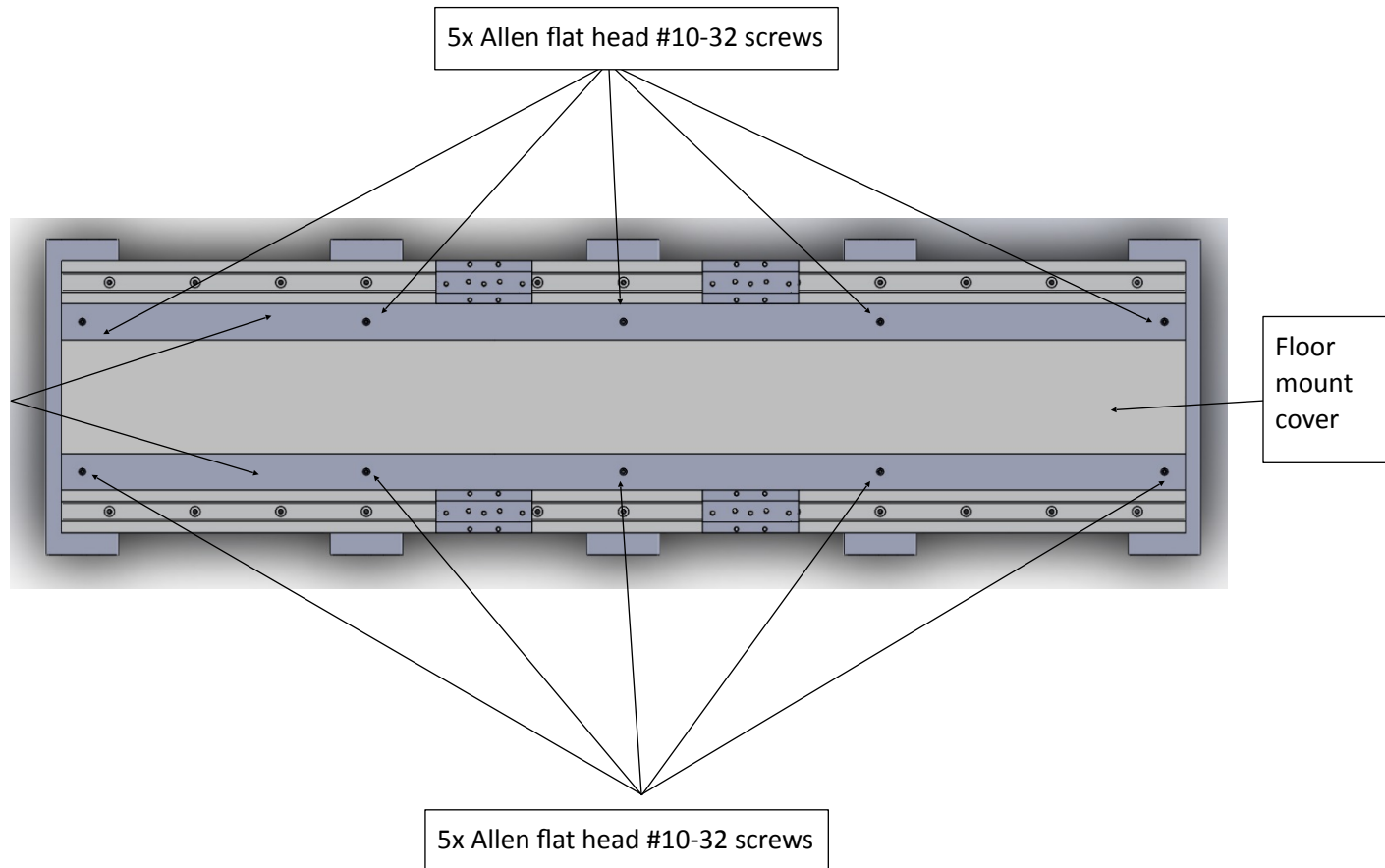


Figure 1: take the bare strips and the floor mount cover

3. Take off the 2 brake strips and the floor mount cover
4. Place the floor mount 6" from the back wall.
5. Mark the place of the anchor on the floor.
6. Using a 3/8" cement drill bit, Drill 7 mounting holes (refer to figure 2)

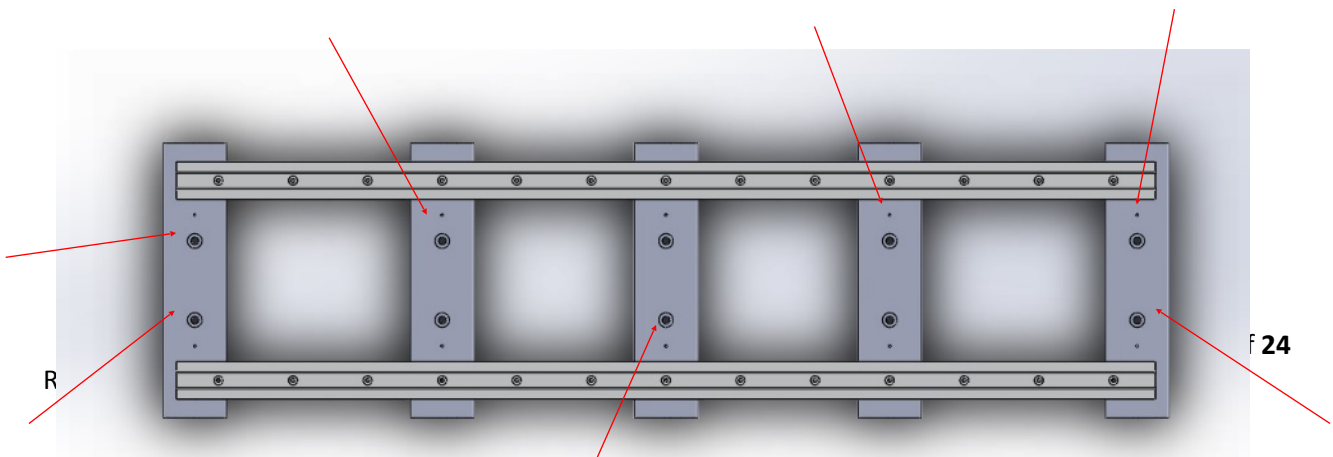
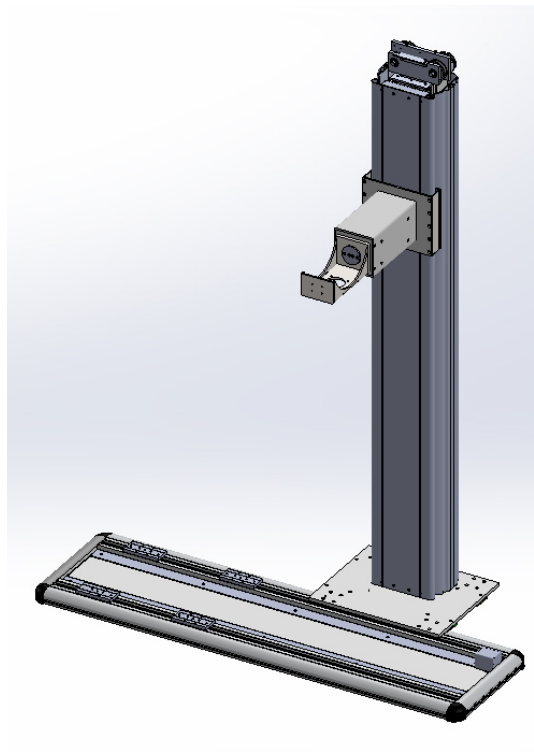


Figure 2: floor mount mounting holes

7. Place the washer and the nut on the anchor, as it will be hard to place them after hammering the anchors in the floor.
8. Use the hammer to fix the anchor into the ground. **(Make sure that the anchors are deep enough in the floor, so it will clear the cover on top. )**
9. Place the top cover and the 2 brake strips using the provided screws. (refer to figure 1)
10. Place the tube stand on the floor mount. (figure 3) **(requires 2 people minimum)**



*Figure 3: place the tube stand on the floor mount.*

11. Align the tube mount base with the 4 carts on the floor mount.
12. Use the 16 xM6 screws to connect the tube stand to the floor mount. (figure 4)

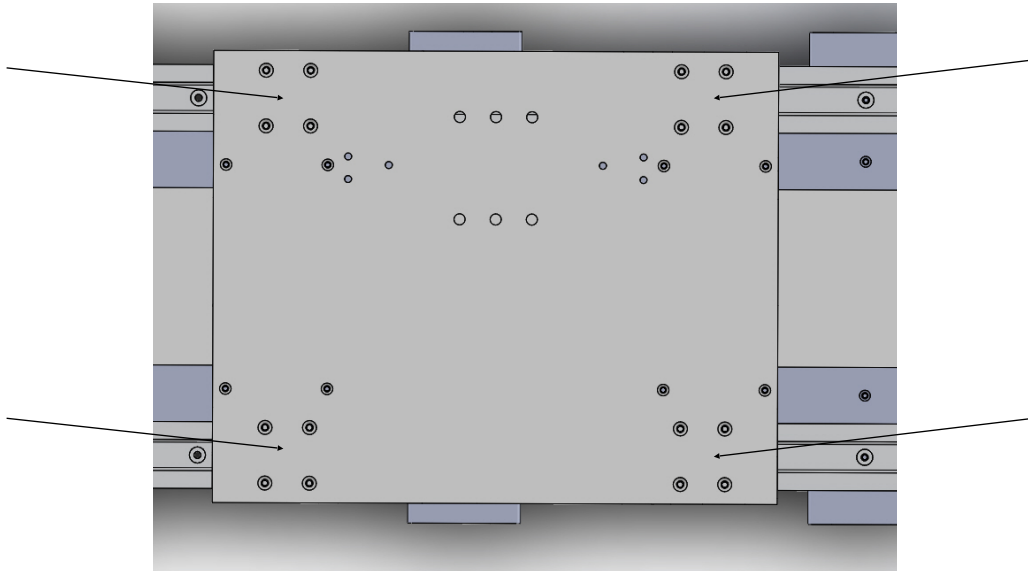


Figure 4: 16x M6 screws

13. Place the 4 side covers and the 4 corners simply by connecting them and place them around the floor mount (refer to figure 5)
14. Make sure that the side cover with the cable tray attached is at the back side.

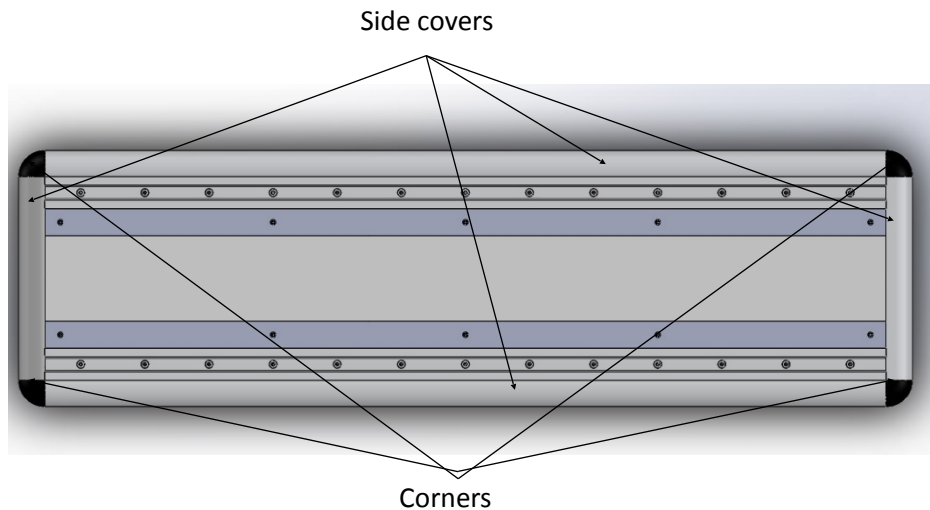


Figure 5: showing the top cover, brake strips, side cover and corner.

15. Connect grey draw wire sensor at the back right of the floor mount at its designated place. (use the three screws provided)
16. Place the sensor's cover by inserting the cover's lip into the floor mount cover's groove.

17. Connect the wire to the cart.
18. Guide the wire through the cable tray and to the relay at the back of the tube stand.
19. Locate black draw wire sensor at the bottom of the tube stand.
20. Attached the wire to the bottom of the arm holder.
21. Mount the control panel through the 4 provided screws on the front of the arm.
22. Attach the bracket provided to the top of the tube stand.
23. Mount the front cladding (extrusion) to on the bracket.
24. Repeat 1.22 and 1.23 for the chest stand.
25. Attach the plastic part at the end of the cable tray to the cart (use the designated supplied screws)



## **2. Tube , collimator, and generator installation**

**(all cables are going to the back of the tube stand and through the cable tray)**

- 2.1. Place the tube on top of the arm.
- 2.2. Place the collimator ring at the bottom of the arm below the tube through the arm
- 2.3. Place the collimator below the arm as shown in the picture, then screw the collimator inside screws to fix the collimator to the collimator ring.
  - 2.3.1.(refer to the collimator Manual)

Refer to the following pages for proper cable management and connections for the tube, collimator and generator

**3.**

**3.1. Collimator: (refer to the collimator manual)**

**3.1.1.**Align the tube using the screws found with the metal plates inside of the blue binder. (note: there are two different types of screws used according to the type of X-ray tube).

**3.1.2.**There are two main tools used to install collimator;

**3.1.2.1.**Allenkey for screws

**3.1.2.2.**Allenkey for the mounting plate

**3.1.3.**remove the collimator mounting plate

**3.1.4.**connect the collimator mounting plate to the tube using the screws **previously used to align and keep tube in place**

**3.1.5.**place collimator on to mounting plate and tighten all four screws in order to secure collimator on the tube arm

**3.1.6.**connect collimator to CPI generator cable then other collimator cable located at the back of the table to foot pedal cable ( there is only one way to connect the cables)



Figure 8: showing the 4 mounting holes at the bottom of the arm to mount the tube and the collimator ring

### **3.2. Tube: (refer to the generator and the tube manual)**

**3.2.1.**Place tube on holder so that it is stable

**3.2.2.**Unscrew the tap (be gentle with cap screws as they are easy to strip)

**3.2.3.**Grey tube wire is connected to the tube with the wire side labeled 1,2,3, etc.

**3.2.4.**Connect the grey wire as follow inside the tube to its relative number: (refer to figure 9)

**3.2.4.1.**Black wire is 1

**3.2.4.2.**Red wire is 2

**3.2.4.3.**Yellow wire is 3

**3.2.4.4.**White wire is 5

**3.2.4.5.**Blue wire is 6

**3.2.5.**Get the wire through the built in zip tie in order to adjust the fix the wgrey wire in place inside the tube



Hooking up Wiring to Tube

Black is 1, red is 2, yellow is 3, white is 5, and blue is 6

3.2.6.Screw the cap back on

3.2.7.Feed the loose

end of the grey cable through the arm and through to the bottom access point

### 3.3. **Generator connections:**

3.3.1.Connect the high-tension cables to the tubes.

3.3.1.1. Connect one cable to the positive end on the tube

3.3.1.2.Connect the second cable to the negative end on the tube.

3.3.2.Remove the cover for the electrical CPI generator

3.3.3.Connect the high-tension cable it their designate place,

3.3.3.1.Apply silicon on the top of the wire head and distribute it all over the head of the cable, you end up with a thin layer of silicon that cover the head of high-tension cable.

3.3.3.2.Connect the positive end of the cable to the positive end inside the generator and so for the negative

3.3.3.3.Connect the membrane console to the 15 pin "D" type connector to J19 on the generator's control board.

3.3.4.Close the generator cover



3.3.5. Organize the cables through the cable tray

3.3.6. Connect the power cable to the wall disconnect.

Note: most of the other wiring is connected for you as a courtesy.

#### **4. Chest Stand mounting:**

- 4.1. Place the chest stand 40" from the nearest edge of the floor mount.
- 4.2. Make sure it aligns with the laser and the light field from the collimator.
- 4.3. Mark the anchor places.
- 4.4. Using the 3/8" cement drill bit (for any other types of flooring, please contact us for the appropriate fixture), Drill 4 mounting holes.
- 4.5. Use the 3/8"-16 anchors provided to fix the chest stand to the ground.

## 5. Electrical connections

5.1. Mount the relay box to the back of the tube stand

5.2. Connect the wires to the relay box as follow:

5.2.1.



1. Use the lemo connector (black wire with silver head)
  - a. Connect the cable to the back of the control panel.
  - b. Guided the cable through the top of the arm and to the back of the tube stand.
  - c. Connect the cable to the first top connector
2. Connect the floor mount draw wire sensor

3. Connect the tube stand draw wire sensor
4. Skip
5. Connect the power off brakes of the tube stand
6. Connect the rotation brakes (wire from the arm)
7. Skip
8. Connect the floor mount brakes
9. Skip
10. Skip
11. Power cable

## 6. **DR Panel , workstation installation:**

### 6.1. **DR Panel: (refer to figure 11)**

6.1.1. Remove the DR panel from the packing (take care don't drop it or hit).

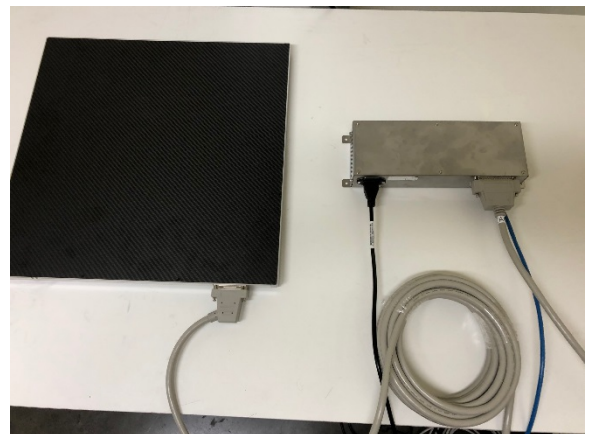
6.1.1.1. Connect the DR Panel to the power box to the 25 Pin connector's cable (female connector).

6.1.1.2. Connect the male side of the cable to the power box.

6.1.1.3. Position the DR Panel inside the table panel bucky.

6.1.1.4. Connect the cat6 cable from power box to the Ethernet port on the workstation.

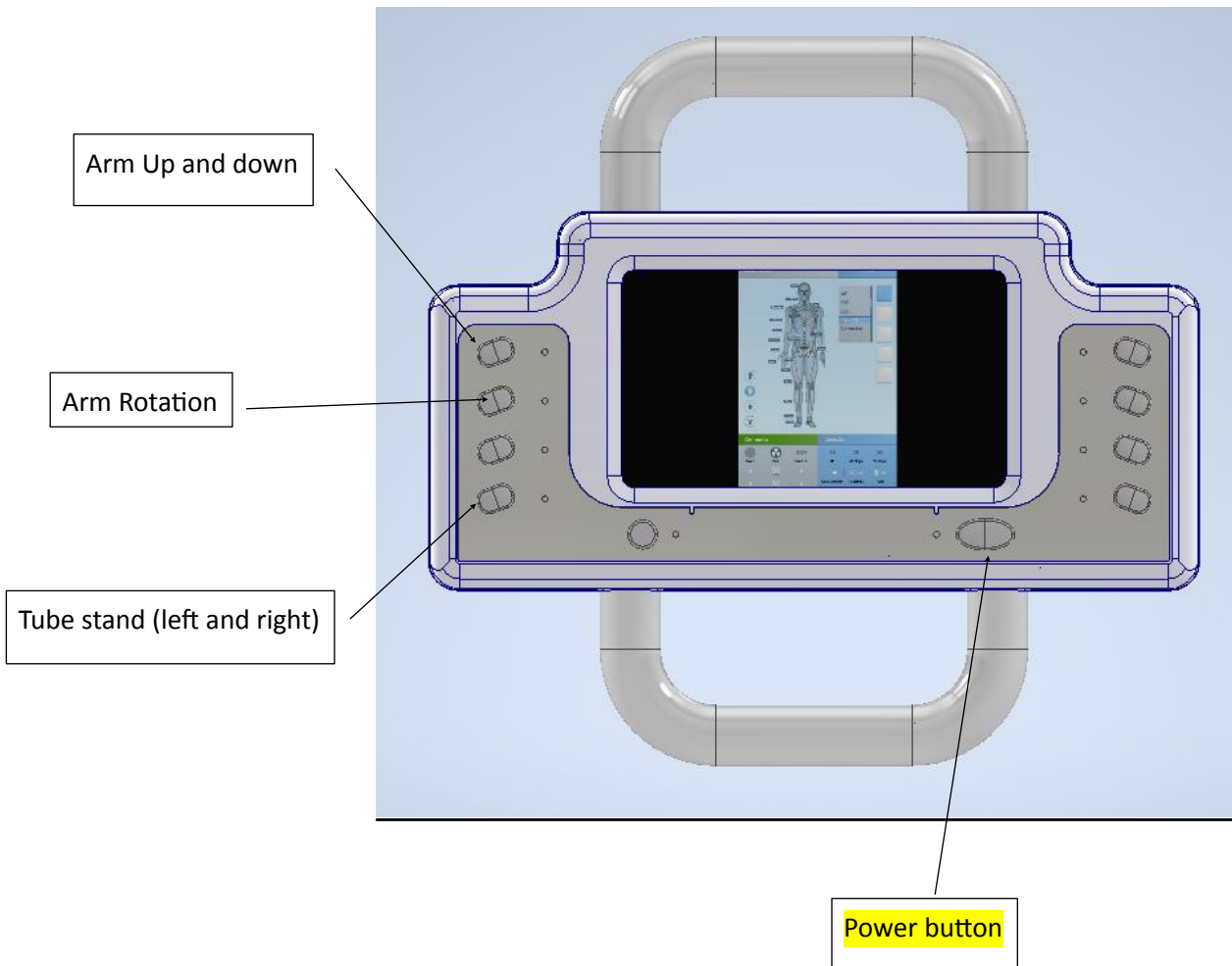
6.1.2. To be able to use it, you need to power on both the power box and the workstation, then open Voyance software on the workstation (Kindly consult the user manual of Voyance for more details).



Note : Mount the column's top cap for the tube stand and the chest stand, by the provided M4 screws.

**7. Control panel: system movement**

**7.1. Buttons are the same on both sides**



## **Section II: Troubleshooting:**

### **1. Mechanical:**

#### **a. Movements:**

- i. Up and down (applies for tube stand and chest stand):

If you observe any struggle in the movement, check the following:

1. Check the brakes on the top of the column:
  - a. Locate the top cap of the column.
  - b. Locate the 4x flat head M4 screws on the top of the cap, take them off as well as the cap.
  - c. Press on button for up and down
    - i. Chest stand: the button is on the bucky handle.
    - ii. Tube stand: the button is located on the control panel.
  - d. If you hear a click when you press the button, then the electrics are good. Keep checking.
  - e. Otherwise, contact your distributor to fix this issue.
2. Check the pulleys at the top of the column:
  - a. Locate the top cap of the column.
  - b. Locate the 4x flat head M4 screws on the top of the cap, take them off as well as the cap.
  - c. Press the button for up and down
    - i. Chest stand: the button is on the bucky handle.
    - ii. Tube stand: the button is located on the control panel.
  - d. If the pulleys are rotating smoothly, then the pulleys and the bearings are ok. keep checking.
  - e. Otherwise, contact your distributor to fix this issue.
3. Check the Side bearing on the side of the column:
  - a. Locate the top cap of the column.
  - b. Locate the 4x flat head M4 screws on the top of the cap, take them off as well as the cap.
  - c. Locate the side aluminum on both sides of the column.

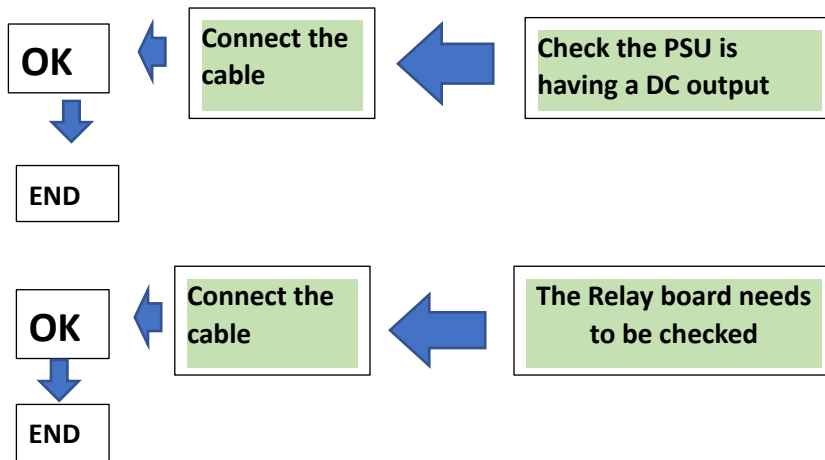
- d. Locate the six (three for each side) flat head allen M4 screws on the back of the column that hold the sides.
  - e. Locate the 4 (2 on each side) flat head screws on the top
  - f. Take the side off.
  - g. Examine the system by going up and down.
  - h. Look for any obstacles.
  - i. If there is nothing in the way, then side bearings are ok. Keep checking
  - j. Otherwise, contact your distributor to fix this issue.
4. Check the counterbalance Teflon guides:
- a. Locate the top cap of the column.
  - b. Locate the 4x flat head M4 screws on the top of the cap, take them off as well as the cap.
  - c. Bring the arm all the way to the bottom.
  - d. Locate the front cladding.
  - e. Locate the 8 flat head M4 (4 on the top and 4 at the bottom)
  - f. Take off the screws, then slide the front cladding up and out.
  - g. Look at the 4 Teflon guides on the counterbalance.
  - h. If there are marks on the side walls from the teflon or if the teflon parts are loose, then the teflon parts needs to be tighten more.
  - i. Otherwise, keep checking if the issue is not resolved.
- ii. Side to side (floor mount):
- 1. Check the brakes underneath the tube stand:
    - a. Press on the button for the side to side movement
    - b. Check if the brakes are working
    - c. If yes, then the electrics are ok. Keep checking.
    - d. Otherwise, contact your distributor to fix this issue.

1. Jammed or hard to rotate
  - a. Locate the 8x M8 screws on the front side of the arm ( 4 on each side)
  - b. Loosen the screws and test the rotation.
  - c. If it works then it is not an electric issue.
  - d. Otherwise, it is an electric issue.

2. **Electrical:**

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graph TD; Start([Start]) --> Step1[Control panel is not working]; Step1 --> Step2[Power button on]; Step2 --> Step3[Check the control cable is connected]; Step3 --> Step4[Connect the cable]; Step4 --> End1([END]); Step1 --> Step5[Power button off]; Step5 --> Step6[Press power Button]; Step6 --> Step7[Didn't work]; Step7 --> Step8[Check if the relay box is on]; Step8 --> Step9[Connect the cable]; Step9 --> End2([END]); Step6 --> End3([END]);
```

The flowchart for electrical troubleshooting starts with 'Control panel is not working'. It branches into two paths. The first path involves turning the power button on, checking the control cable, and connecting it, leading to 'END'. The second path involves turning the power button off, pressing it, and if it 'Didn't work', checking the relay box, connecting the cable, and leading to 'END'. There is also a direct 'END' path from pressing the power button.

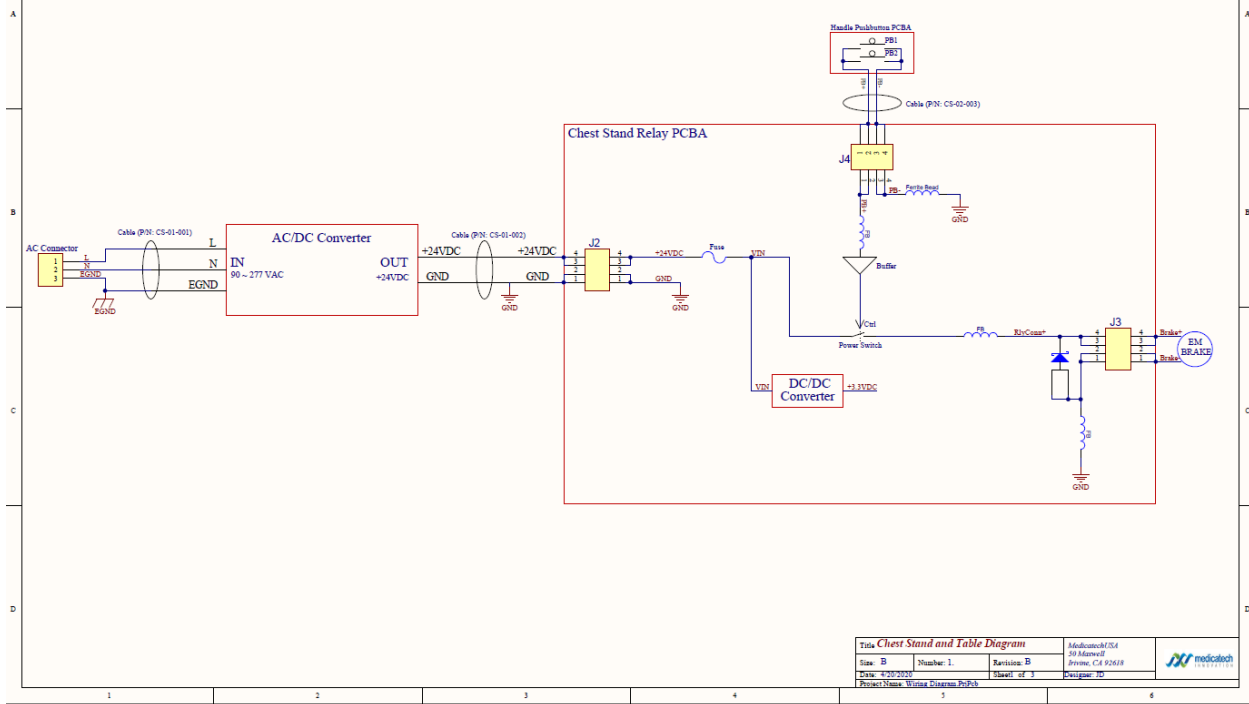


### Section III: Appendixes

#### Appendix I:

ELECTRIAL DRAWINGS

## Chest Stand and Table Diagram



## Control Panel Diagram

