



SISU Cinema Track Installation Guide

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SISU

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This manual corresponds with the following versions of accompanying manuals: SISU Cinema Robotics Manual: v3.0; SISU Cinema Robotics Installation Guide: v3.0; and SISU Cinema Robotics Quick Guide - Track: v3.0.

SISU is not responsible for any damage, real or implied, resulting from the use of this document.

This document is subject to regular technical alterations.

IMPORTANT SAFETY INFORMATION

The following general safety requirements and specifications must be observed during all phases of operation of this equipment. Failure to comply with these precautions or with specific warnings elsewhere in this manual violates safety standards of design, manufacture, intended use, and could void all warranty of this system. SISU assumes no liability for the customer's failure to comply with the requirements herein.

Using the SISU Cinema Robotics track and any of its components in a manner not specified by this - and accompanying - manuals may diminish the life of the equipment and/or personnel safety measures.

Before undertaking the installation process, carefully read the following caution notices. Protection equipment may be impaired if equipment is not used in the manner specified. **This equipment contains voltage hazardous to human life and safety, and is capable of inflicting personal injury.**

DANGER!

			
<p> NEVER touch the robot or track while they are engaged or moving</p>	<p> Avoid situations where you could become pinned by the robot or the track</p>	<p> Always test programs in T1 mode before running programs at higher speeds</p>	<p> Always warn others BEFORE moving the robot or track in ANY mode</p>
			
<p> Stay outside of the robot's reach while running a program on the track</p>	<p> Beware of high voltage when adjusting, working on, or assembling the track</p>	<p> Avoid situations where you - or someone else - could get caught in the track cables</p>	<p> Carefully review and follow ALL of the safety info. given by the robot manufacturer</p>
<p> ONLY SISU TRAINED OPERATORS ARE AUTHORIZED TO OPERATE THE ROBOT SAFELY</p>			

IMPORTANT SAFETY INFORMATION



RUNNING THE ROBOT WARNINGS

Train ALL robot users to do the following:



1. **FIRST, AND BEFORE DOING ANYTHING ELSE:** check around the system and robot to make sure the area is clear of any people and/or objects that could come into contact with the robot.
2. **SECOND:** Anytime someone picks up the tablet to move the robot, the following needs to be spoken loudly enough for ALL people within the vicinity of the robot to hear:
 - **Main operator:** Clear to move?
 - **Assistant (or other) after verifying the area is clear:** All clear.
 - **Main operator:** Robot moves.
3. **OR,** when there is not an assistant available, the main operator will perform all of the safety calls and checks.

(**WARNINGS!** continued on next page)

IMPORTANT SAFETY INFORMATION



RUNNING THE ROBOT WARNINGS



DANGER: See track installation guide and robot users manuals about high voltage connections to robot controller. **Voltage is hazardous to human life.**



DANGER: Proper guarding and safety procedures must be in place when running the track.



DANGER: The track end stops are designed to withstand the impact of a crash and not damage equipment. However, it is possible to damage end stops depending how the system is mounted to the floor and the speed of the impact. If the system crashes into the end stops, inspect for any damage or loose connections. If found, discontinue use of the system and contact SISU for repair options. Contact SISU about any crash into end stops above 4m/s as this is more likely to damage them and need repairs.



DANGER: Secure the track by properly bolting it to the ground, or by adding sufficient weights to the weight carriers BEFORE moving the robot.



DANGER: NEVER touch the robot or track while they are engaged or moving.



DANGER: Avoid situations where you could be pinned by the robot or the track.



DANGER: Always test programs in T1 mode BEFORE running the programs at higher speeds.



DANGER: Stay outside of the robot's reach while running a program on the track.



DANGER: Beware of high voltage when adjusting, working on, or assembling the track.



DANGER: Avoid situations where you - or someone else - could get caught in the track cables.



DANGER: Always warn others BEFORE moving the robot in ANY mode.

(**WARNINGS!** continued on next page)

IMPORTANT SAFETY INFORMATION



USER SAFETY WARNINGS

- ! CAUTION:** Be sure to remove all people and objects that could interfere with the robot and/or track **before** moving the robot.
- ! CAUTION:** Use personal protective equipment (protective eye-ware, gloves, steel-toed shoes, etc.) when installing equipment to avoid injuries from any debris, sharp edges, or dropped equipment.
- ! CAUTION:** Observe all hazardous warning labels located on the components.
- ! CAUTION:** The track hardware is heavy; use proper lifting procedures and hoists, and reference applicable installation and users manuals.
- ! CAUTION:** Cables in the system are often moved around and can be a trip hazard.
- ! CAUTION:** The safety of any devices incorporated into the equipment during installation is the responsibility of the installer.



SYSTEM MAINTENANCE WARNINGS

- ! DANGER:** **There is a risk of electrocution and burn while performing maintenance.**
- ! CAUTION:** During service of this equipment, the main AC power connector must be disconnected from the power source.
- ! CAUTION:** The track components should be cleaned using a damp cloth with mild soap.
- ! CAUTION:** Do NOT use near liquids.
- ! CAUTION:** Store track in a dry location to prevent rusting of the rails.

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1. BEFORE YOU BEGIN

1.1 Chapter Contents

- **Icon Key** - [1.2](#)
- **General Track Specs** - [1.3](#)
- **Intended Use** - [1.4](#)
- **Environmental Conditions** - [1.5](#)
- **Robot Compatibility** - [1.6](#)
- **Inspect Before Use and Install** - [1.7](#)
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- **Service Personnel** - [1.9](#)
- **Replacement Parts** - [1.10](#)
- **Glossary Reference** - [1.11](#)
- **Contact Information** - [1.12](#)

1.2 Icon Key

The following icons will be used throughout this manual



NOTE



DANGER



CAUTION



EXAMPLE



JUMP TO

1.3 General Track Specs

	Track section	Robot pedestal
Length	Base section - 74", Additional sections - 68"	33"
Width	47" (49" with trailer jacks attached)	26.5"
Height	Variable (between 10" - 13.5")	22"
Weight	Base section (without robot) - 725 lbs, Extension sections - 198 lbs	
Weight stacks	260 lbs (each)	

! OSHA LIFT RECOMMENDATION: The OSHA recommendation for moving one additional track section WITHOUT WEIGHTS - based on its weight - would be to use a **4 person lift**.

1.4 Intended Use

The SISU Cinema Robotics track is to be used in conjunction with specified SISU Cinema robots. Its primary use is to allow the user's robot and camera to travel along an adjustable length track. This is accomplished with a mandatory base section (containing the robot), and additional extension sections of track. A cable chain threaded through the track houses all necessary cables for operating the SISU Cinema Robotics track and robot system.

1.5 Environmental Conditions

- **Operating Ambient Temperature:** Min 0C - Max 45C
- **Storage Temperature:** Min 0C - Max 45C
- **Humidity:** 90% non-condensing

! IMPORTANT: Store in a dry location to prevent rusting of the rails.

! IMPORTANT: For indoor use only.

! IMPORTANT: Do not use near liquids.

1.6 Robot Compatibility

The SISU Cinema Robotics C20 robot is compatible with the track.

1.7 Inspect Before Use and Install

- Check all parts for cracks.
- Check that all cables and connectors are not damaged, and check that they are tightly connected.

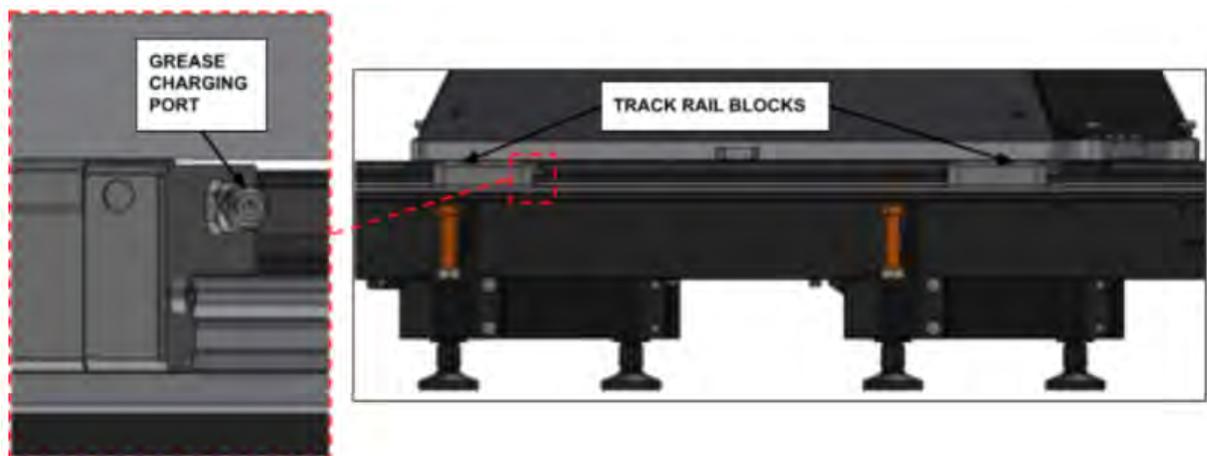
 **DANGER:** Operating with a damaged belt or damaged extension section rack can result in the robot failing to stop when expected.

 **DANGER:** If any issues are identified immediately cease use of the track until the maintenance issues are remedied.

1.8 Track Maintenance

- **Grease rail blocks:** Approximately once every 3 months, apply grease to the 4 rail blocks attached to the bottom of the pedestal. To do this, squirt grease into the grease charging ports. **Failure to regularly grease the rail blocks as per this manual's instructions can result in the track rails rusting.**

 **WARRANTY NOTE:** Rust can decrease the performance of the track. **Rust resulting from misuse and exposure outside of the suggested environmental conditions is not covered by the hardware warranty.**



(Maintenance instructions continued on next page)

- **Belt checks:** Check that the belt is in good condition each day of track usage. The belt should not have any loose wires or damage to the teeth. A healthy belt should look like this:

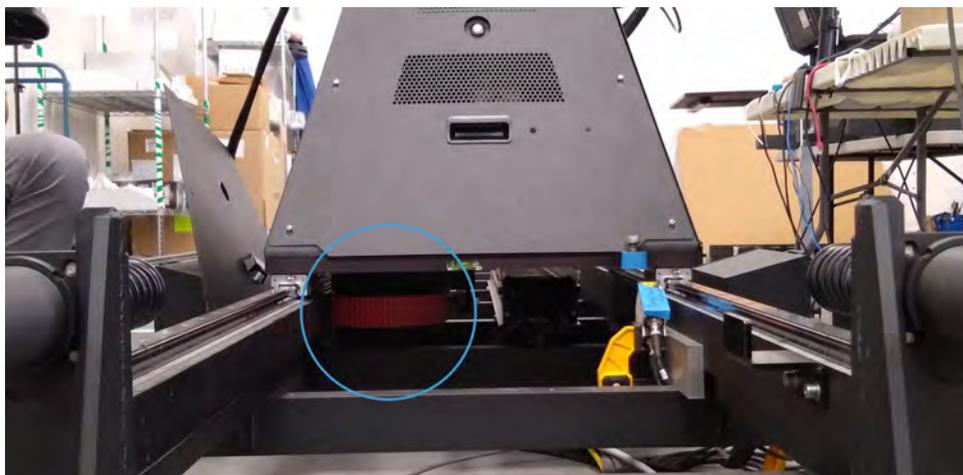


 **DANGER:** Operating with a damaged belt can cause the robot on the track to slip. This can result in the track travelling further than expected on each robot run and when stopping.

 **RED FLAKES ON BELT:** It is possible that the red material on the belt might flake off in some places. This is not a problem and is to be expected in used belts.

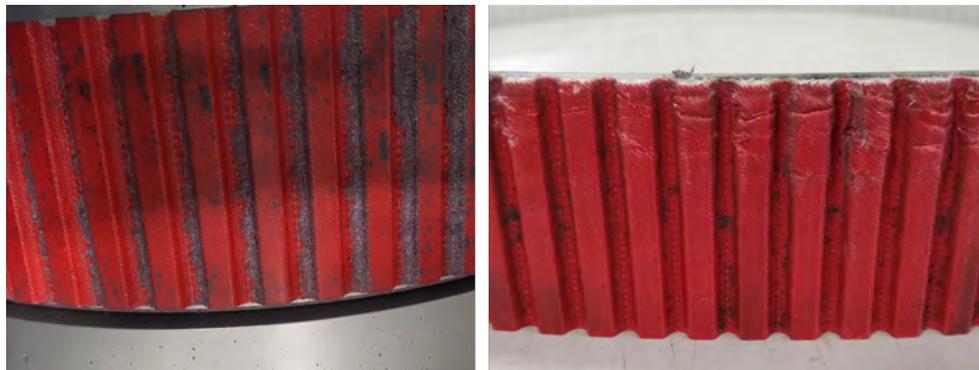
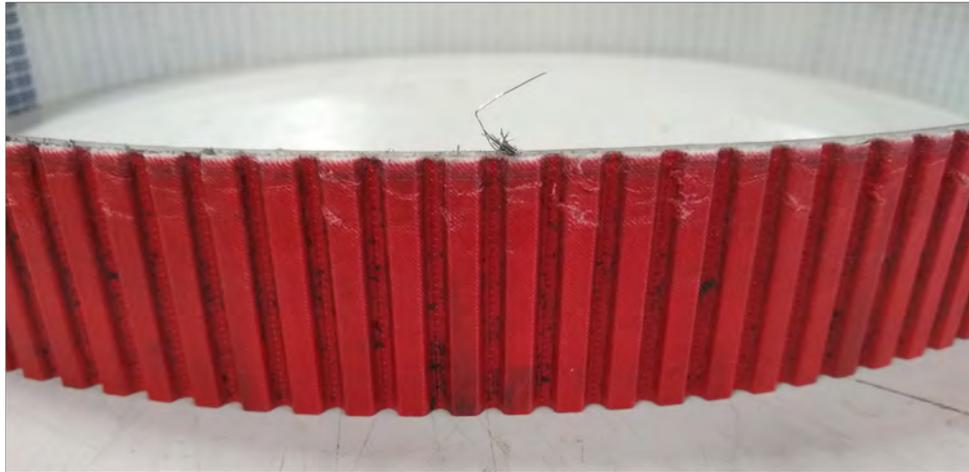
To perform a belt health check, do the following:

1. Locate the belt underneath the robot. You should be able to view it from both sides of the pedestal.



(Belt check instructions continued on next page)

2. With the robot and track OFF, inspect the belt from both sides of the track. Make sure there are no loose wires sticking out of the belt, and there is no significant damage to belt. **If wires or damage are found (as shown in the images below), contact SISU customer support and cease operation.**



DANGER: Operating with a worn belt will result in a degradation of repeatability of the track performance.

3. If damage is found, cease operation and contact SISU customer support.
- **Extension section racks check:** Inspect extension section racks for damage that could cause wear and damage to the belt.

1.9 Service Personnel

The following represent product specific risks that may affect service personnel.

-  **DANGER:** **There is a risk of electrocution and burn while performing maintenance.**
- Power off the system and wait **10 minutes** before servicing.
- To verify correct functionality, power the system on and perform start-up procedure.

1.10 Replacement Parts

If you are in need of replacement parts for your track system please contact customer support.

 **JUMP TO:** To contact customer support see section [1.12 Contact Information](#).

1.11 Glossary Reference

 **JUMP TO:** If, at any time during the reading of this manual, you are in need of the alphabetized glossary please reference section [6.3 Glossary of Used Terms](#).

1.12 Contact Information

For additional help or questions please contact SISU Cinema Robotics support:

- support@sisucinemarobotics.com
- 512-377-6075, extension 2



SECTION 1

TRACK - COMPONENTS & INSTALLATION



2. HARDWARE COMPONENTS

2.1 Chapter Contents

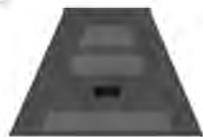
- **Hardware Maps** - [2.2](#)
 - Hardware Map A - Included with System - [2.2.1](#)
 - Hardware Map B - Optional Hardware - [2.2.2](#)
 - Hardware Map C - Full Track - [2.2.3](#)
 - Hardware Map D - Partial Track - [2.2.4](#)
 - Hardware Map E - Pedestal Controls - [2.2.5](#)



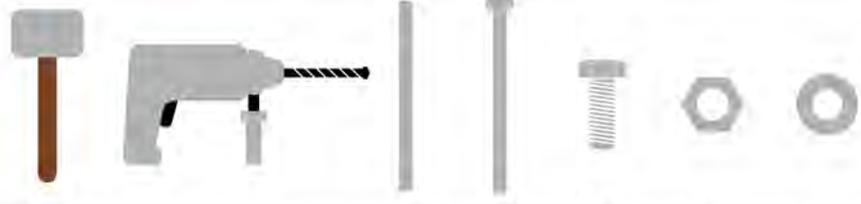
SISU CINEMA ROBOTICS HARDWARE INSTALLATION GUIDE: Please reference your **SISU Cinema Robotics Installation Guide** for detailed maps and descriptions of all pieces of the Cinema System hardware that are not specific to the track.

2.2 Hardware Maps

2.2.1 Hardware Map A - Included with System

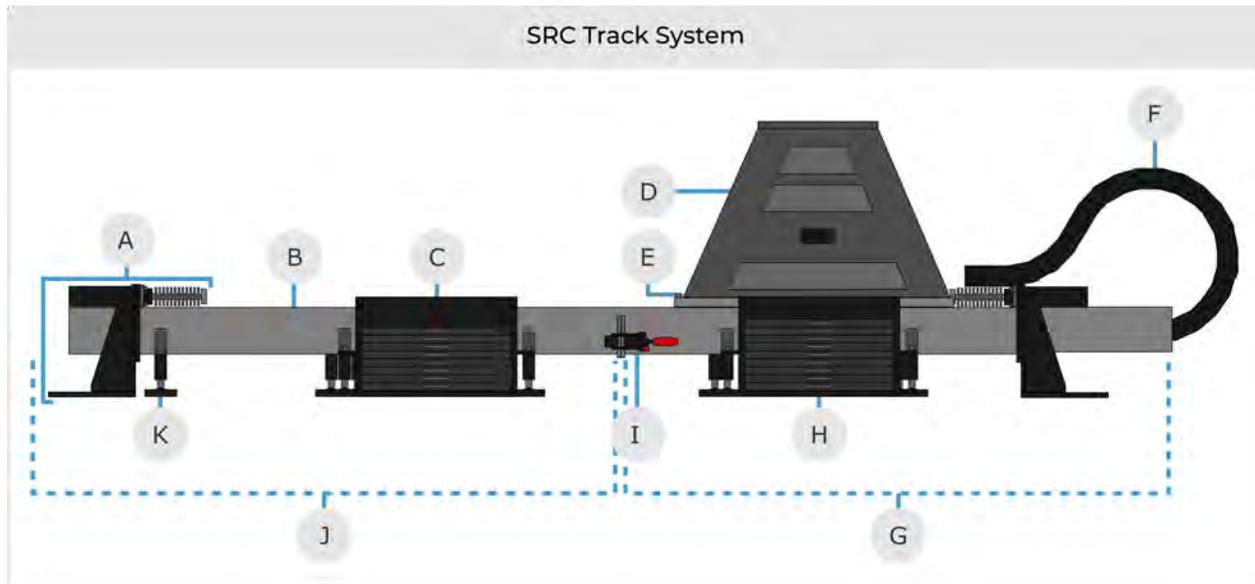
Hardware Map			
1	 <p>ALIGNMENT TOOL The alignment tool is used during assembly to ensure each track section is straight and properly aligned to other sections</p>	7	 <p>LIMIT SENSOR The limit sensor is always installed on the last section of track. It is used to communicate with the system that a distance limit has been reached</p>
2	 <p>BASE SECTION The base section is the home and transport section for the robot. The robot can be operated stand-alone from this section</p>	8	 <p>PEDESTAL The robot pedestal contains the track disconnect switch, track connections, robot connections, and options for power</p>
3	 <p>END STOPS There are two end stops on both ends of the track. They are used to safely bring the robot to a stop if needed</p>	9	 <p>TOGGLE CLAMP The toggle clamp is used to clamp the adjoining track sections together in the proper position</p>
4	 <p>EXTENSION SECTION These sections can be used and added on to customize the length of your track</p>	10	 <p>TOOL BAG The tool bag will hold all of the wrenches, the two alignment tools, and the grease gun</p>
5	 <p>GREASE GUN The grease gun should be used to regularly grease the track rails so they don't rust</p>	11	 <p>TRAILER JACKS The trailer jacks are used to lift up and move the track sections</p>
6	 <p>LEVEL The level is used during assembly to ensure that the two adjoining sections are level</p>		

2.2.2 Hardware Map B - Optional Hardware

Hardware Map NOT INCLUDED with SYSTEM	
<p>1 ANCHOR KIT - for BASE SECTION This kit can be used to anchor your base section into the ground</p>	 <p>x1 x1 x1 x20 x20 x4 x4</p>
<p>2 ANCHOR KIT - for EXTENSION SECTIONS This kit can be used to anchor an additional section into the ground</p>	 <p>x4 x4 x4 x4</p>
<p>3 SMART TRANSFORMER The smart transformer is used to run and power the track system, and can be used to power all of the different-sized robots</p>	
<p>4 WEIGHT CARRIERS The weight carriers and weights can be used as track stabilizers when you are not able to bolt the track to the ground</p>	

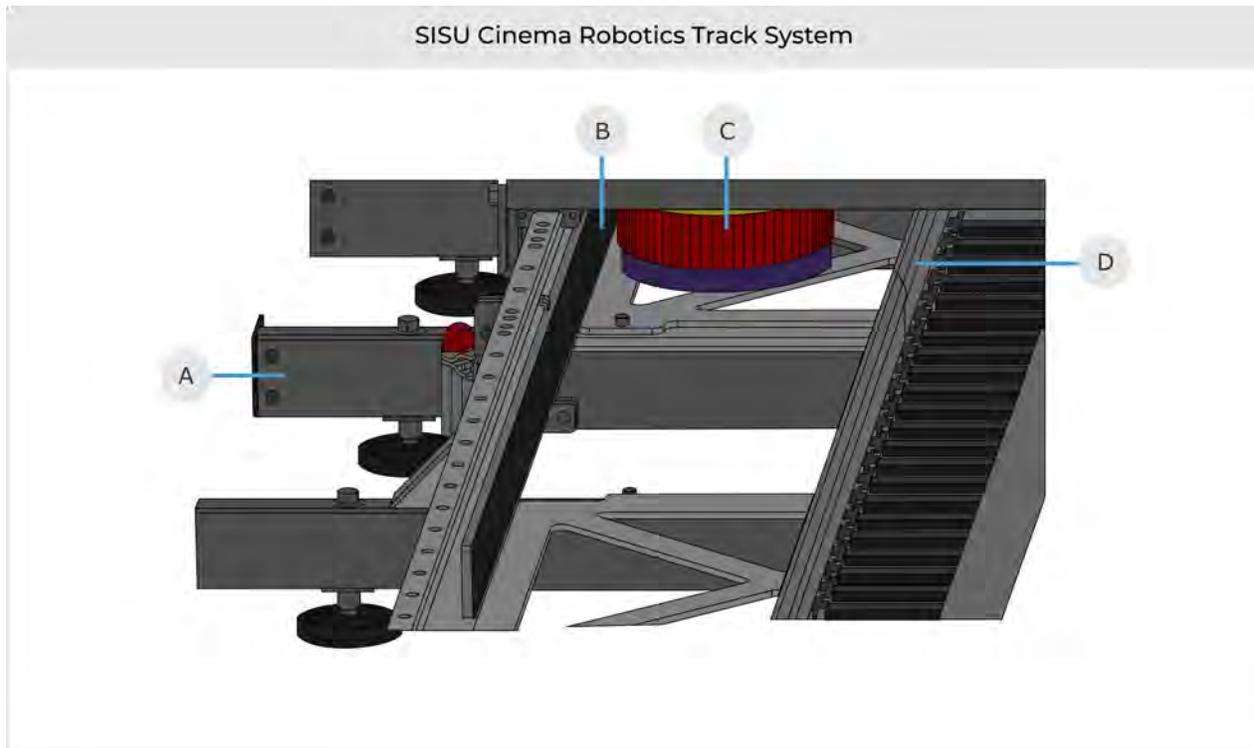
 **JUMP TO:** To contact the SISU sales team about purchasing the optional track hardware listed above, see section [1.12 Contact Information](#) or send an email to sales@sisu.us

2.2.3 Hardware Map C - Full Track



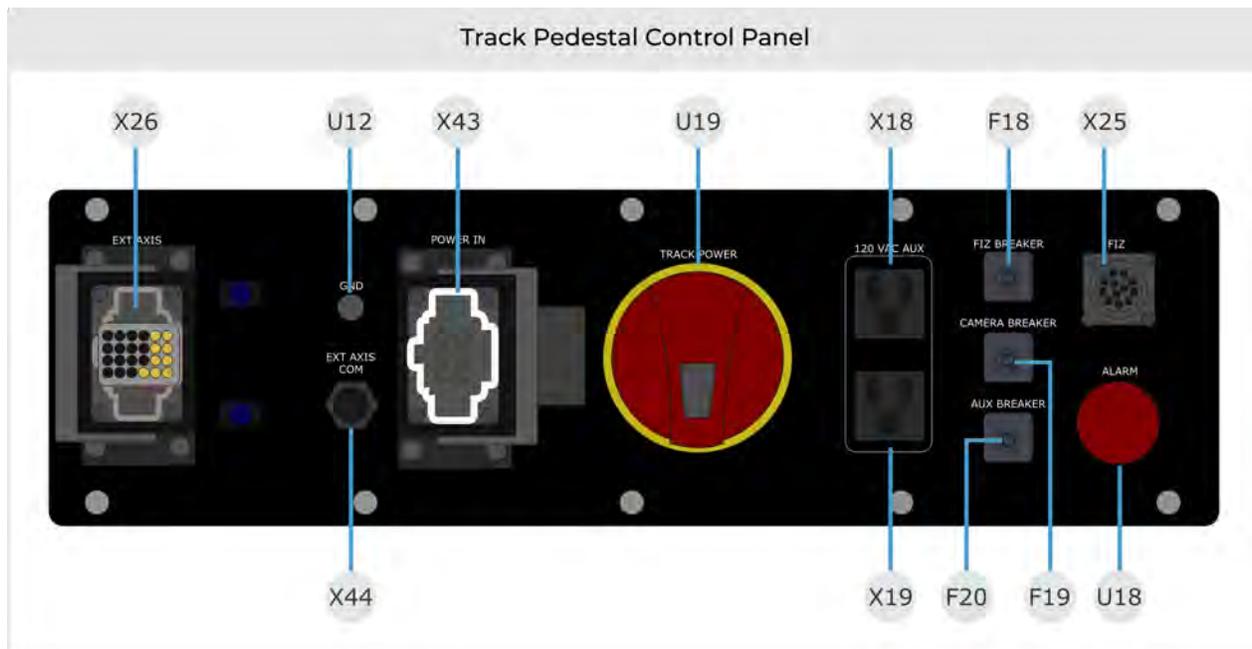
Label	Name	Description
A	End stops	Used to support track and slow robot's stop
B	Rails	Provide the guides for the track system
C	Weight carrier	Holds the weights to stabilize the track while robot is moving (only need to use if the track is not bolted into the ground)
D	Robot pedestal	Base to which the robot is attached
E	Transport lock bolt	These 3 bolts are used to secure the pedestal and robot when track is being moved or transported
F	Cable chain	Used to safely contain all robot cables while robot is moving on the track
G	Base section	This is the main track section and it contains the pedestal and robot hookups
H	Weights	Weights are placed in the weight carriers and are used to stabilize the track while robot is moving (only need to use if the track is not bolted into the ground)
I	Toggle clamp	Used to connect two track sections together
J	Additional section	A section that can be purchased to attach to the main track section and extend the length of the overall track
K	Feet	Used to support the track. Can be adjusted up to 3.5"

2.2.4 Hardware Map D - Partial Track



Label	Name	Description
A	Extendable side rails	Can be removed from the base section so it fits through a standard doorway
B	Rack	Guides the robot along the track forward and backward
C	Belt	Used with a motor to move the robot along the track
D	Trough	Used to manage cabling on the track

2.2.5 Hardware Map E - Pedestal Controls



Label	Name	Description
F18	FIZ breaker	Fuse that will pop out if something is wrong with the FIZ connectors
F19	Camera breaker	Fuse that will pop out if something is wrong with the camera connectors
F20	Aux breaker	Fuse that will pop out if something is wrong with auxiliary connectors
U12	Ground lug	Chassis ground
U18	Alarm	Currently nonfunctional. Feature to be released in SISU Lab 3.1.0
U19	Track power	Switch that turns track power ON and OFF
X18	120 vac aux	User power; limited to 5 amps (combined with X19)
X19	120 vac aux	User power; limited to 5 amps (combined with X18)
X25	FIZ	Port for cable that plugs into the FIZ motors
X26	Ext axis	Port to cable that also plugs into X21 on the SIM
X43	Power in	Port for cable that also plugs into the smart transformer
X44	Ext axis com	Port for cable that also plugs into X24 on the SIM

3. PLANNING YOUR TRACK SYSTEM LAYOUT

3.1 Chapter Contents

- **Planning your Track System Layout - 3.2**



SAFE LAYOUT: This chapter is designed to help you figure out a **SAFE** layout for all of your SISU Cinema Robotics track equipment. **Failure to follow these instructions and recommendations can lead to equipment malfunction or personnel injury.**

3.2 Planning your Track System Layout

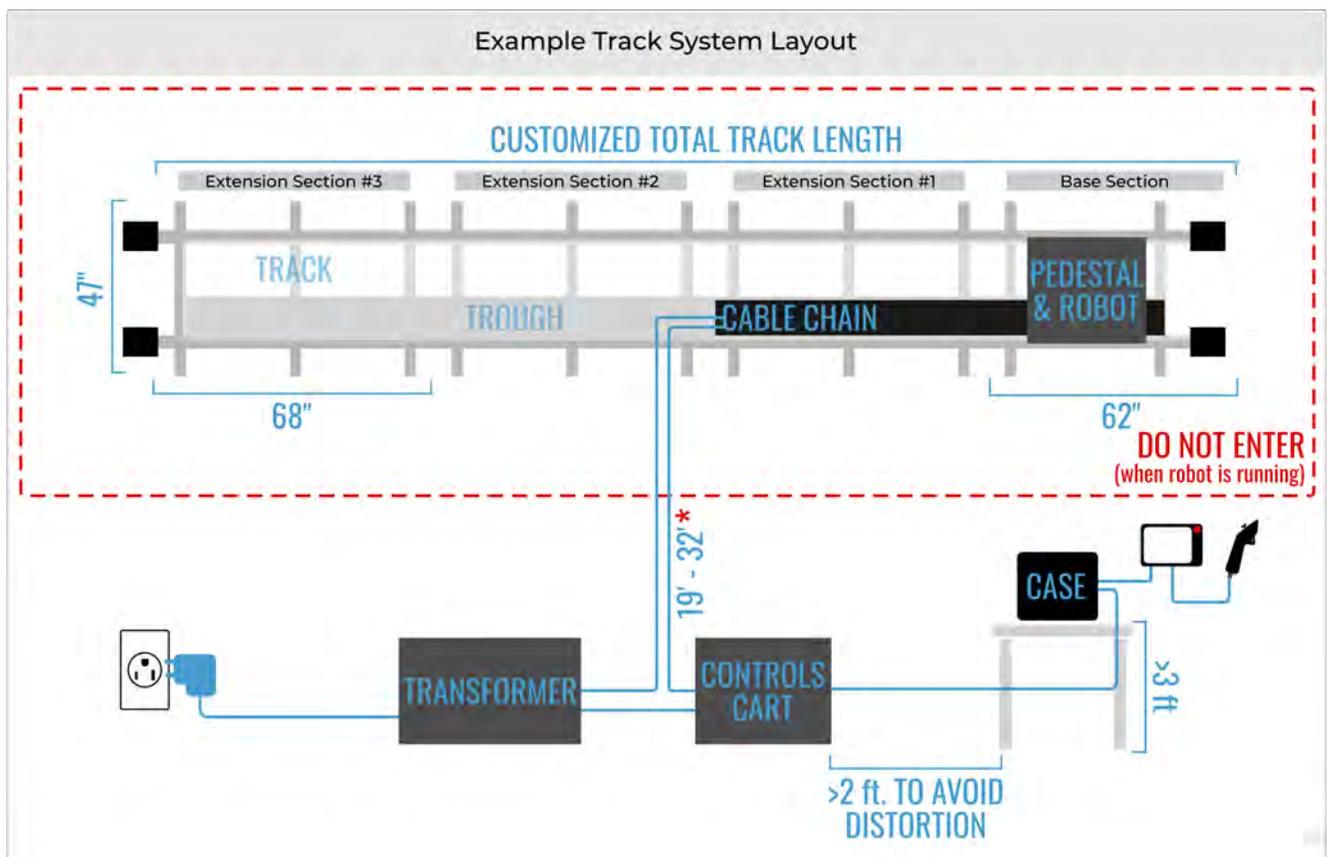
When planning out where your track system will go, make sure you meet - and follow - all of the following criteria:

1. **ADEQUATE ROOM:** Make sure you have adequate room for the entire length of your track.
2. **CORRECT POWER SUPPLY:** Make sure you have the correct power supply within reach of essential track, robot controller, and robot power sources.
3. **CABLE LENGTHS:** Make sure the length of your cables can reach the intended power supply.
4. **OVERHEAD INTERFERENCE:** Make sure you have no overhead interferences based on the height of the robot when it is on the track pedestal.
5. **LEVEL FLOOR:** **The track feet are adjustable by 3.5".** Make sure the floor on which you intend to put the track is not variable by more than 3.5" or you will have to shim underneath the feet to make it level. **(A level track is essential to the performance of the track and robot.)**

(Continued on next page)

6. **ROOM FOR ALL COMPONENTS:** Study the following diagram. Make sure that you have adequate room to correctly place equipment based on the diagram:

- Make sure there is adequate space around the track for the robot to move unobstructed.
- For planning and cable measuring purposes, note that the track cables come out of the middle of the full length of your track.
- Make sure that you have room to house your case an appropriate distance away from your metal transformer and other metal carts to avoid encountering distortion.



*The total length of the cables coming out of the track will vary depending on the length of your track (i.e. the longer your track is, the less extra length you will have coming out of the end of the cable chain)

4. INSTALLATION AND SETUP PROCEDURES

4.1 Chapter Contents

- **Uncrating the Track** - [4.2](#)
- **Assembling the Track** - [4.3](#)
- **Anchoring the Track** - [4.4](#)
- **Robot Hookups** - [4.5](#)
 - C20 Robot Hookups - [4.5.1](#)
- **Calibrating the Track** - [4.6](#)
- **Finishing System Installation** - [4.7](#)



SISU CINEMA ROBOTICS HARDWARE INSTALLATION GUIDE: Please reference your **SISU Cinema Robotics Installation Guide** for detailed instructions on how to install pieces of SISU Cinema Robotics hardware that are not specific to the track.

4.2 Uncrating the Track

Instructions for uncrating the track:

1. Cut the metal bands using a pair of tin snips or wire cutters.
2. Remove the top and crate body from both crates.
3. Remove packaging and metal bands from inside the crates.
4. Lay down the ramps in the slots on both crates (ramps double as crate walls).
5. Unbolt the four end stops from the base track pallet.
6. Use the 4 attached trailer jacks on the base track to roll it down the ramp and into your desired location.
7. Move any additional track sections off of the pallet and into your desired location using any of the following methods:
 - a) You can attach the jack stands to the additional track sections.
 - b) Use a dolly or hand truck to move additional track sections.
 - c) Carefully pick up and carry additional track sections (**these are each about 200 pounds without any attached weight carrier or weights**). Additional weights must be removed BEFORE picking up and moving the track.

 **OSHA LIFT RECOMMENDATION:** The OSHA recommendation for moving one UNWEIGHTED track section - based on its weight - would be to use a **4 person lift**.

4.3 Assembling the Track

! IMPORTANT: Failure to properly follow these instructions in their listed order can result in damage to the track or track performance issues.

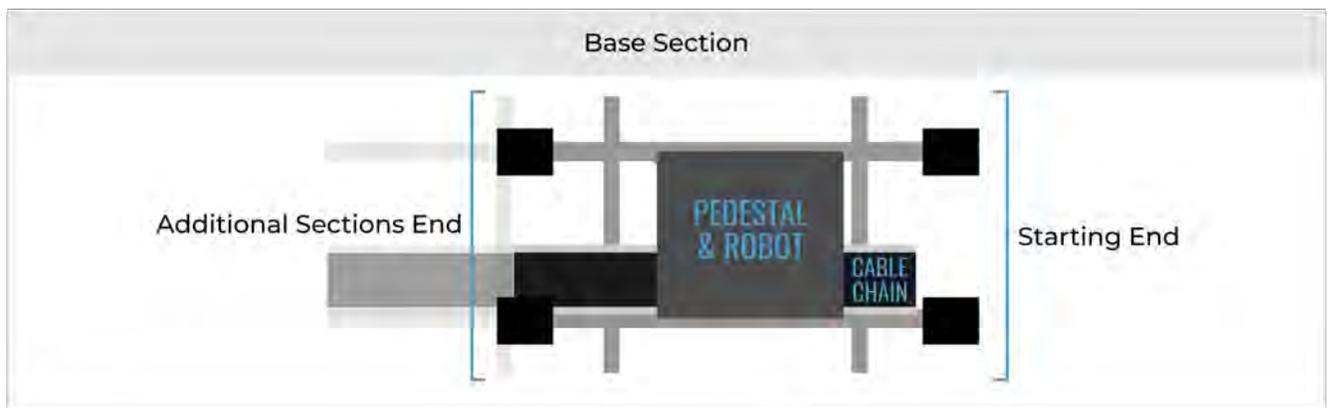
Instructions for assembling the track:

STEP 1 of 3 ASSEMBLING THE BASE SECTION

! TRACK CLOSE TO FLOOR: For optimal performance, lower the track as close to the floor as possible while also keeping it level.

1. Move the base section into the desired location. (The base section is the section with the pedestal and robot attached, and it is the only section with 2 crossbars instead of 3.)

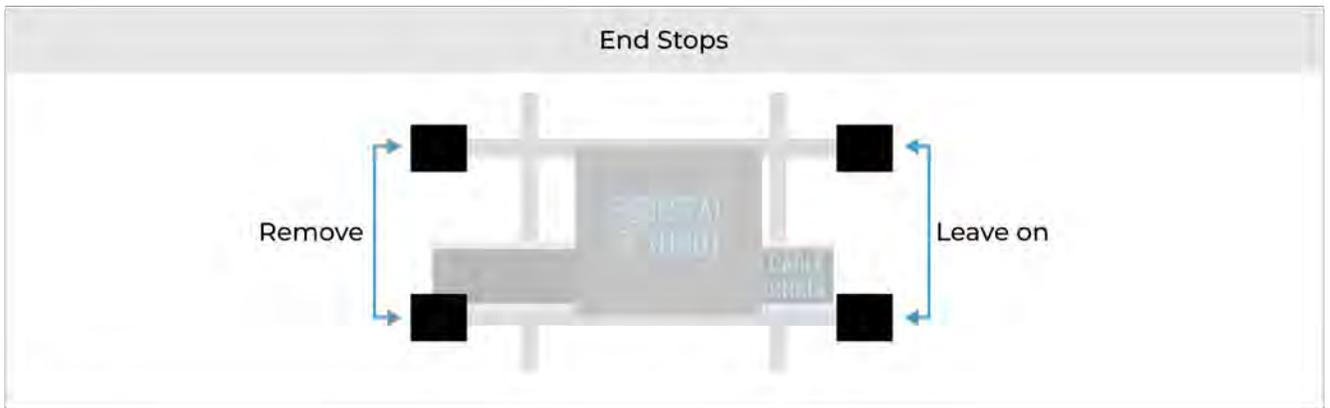
i BASE SECTION DIRECTION: Line up the base section so the end stops are facing away from where you would like to attach additional sections of track.



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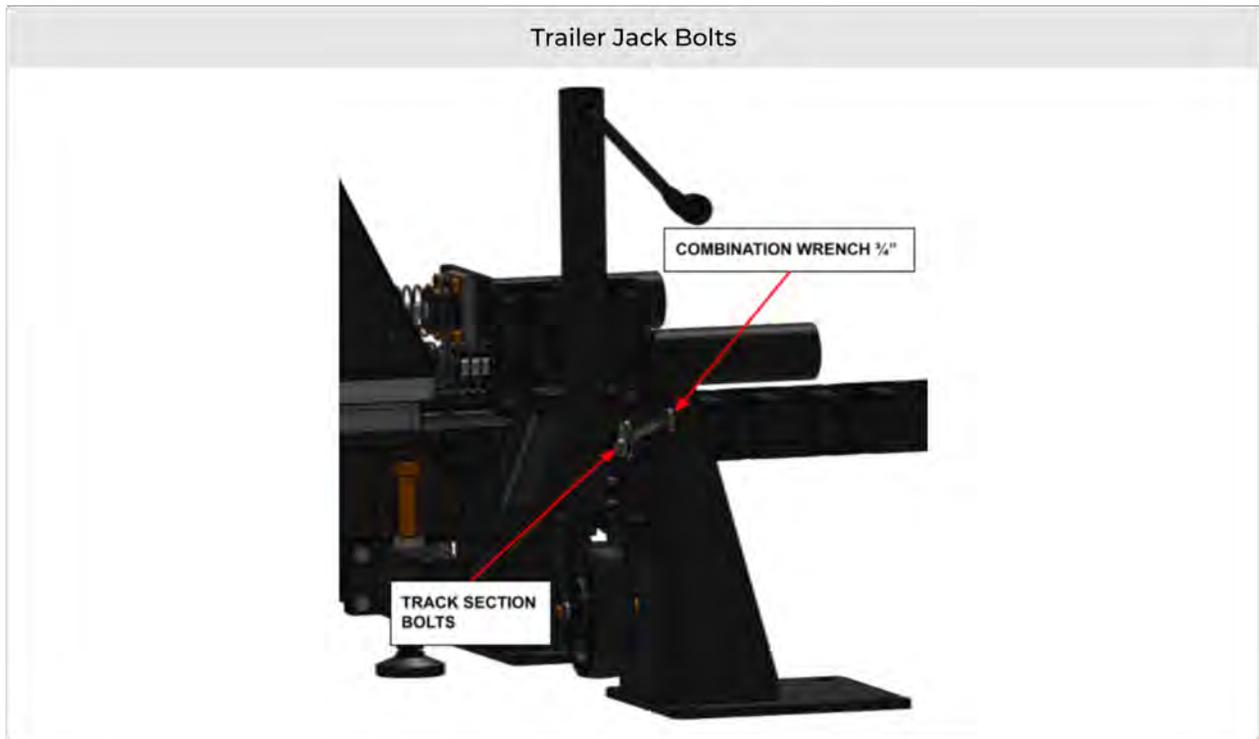
2. Remove the end stops from the side you will attach additional track sections onto. (Leave the other end stops attached.)

a)



(Continued on next page)

3. Pull up the trailer jacks so that the base is sitting on the four base feet.

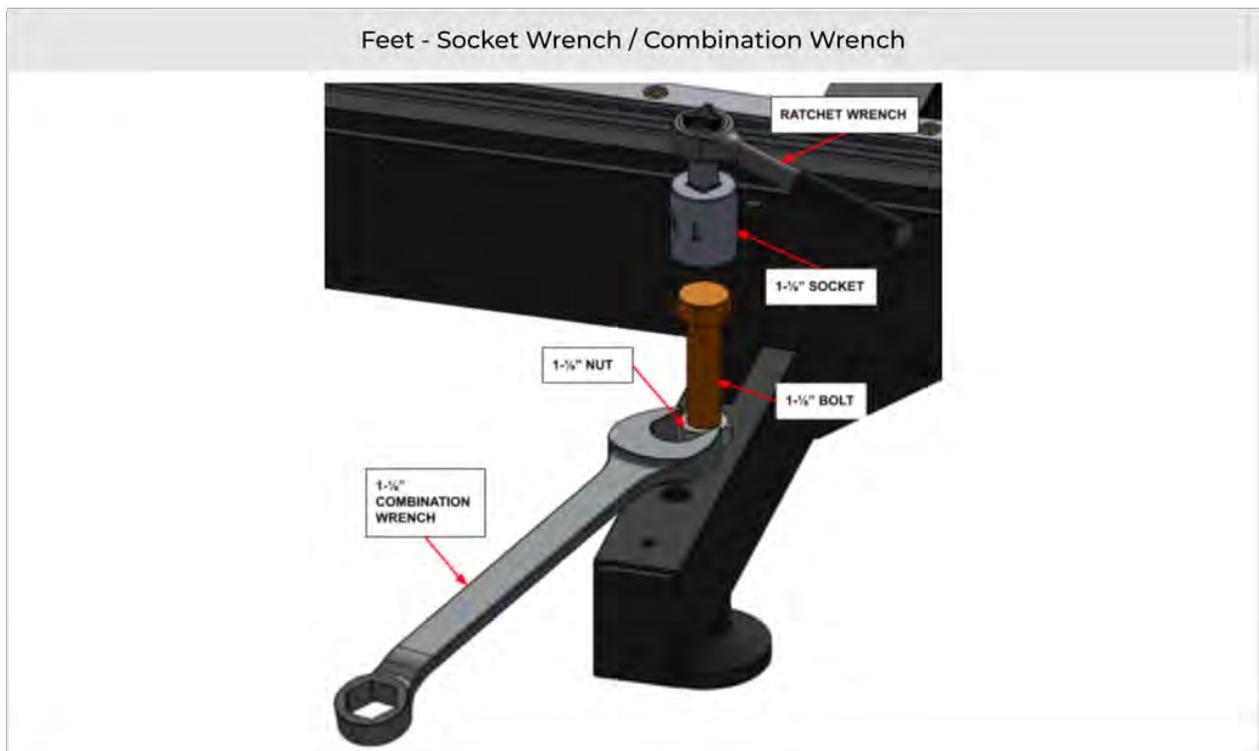
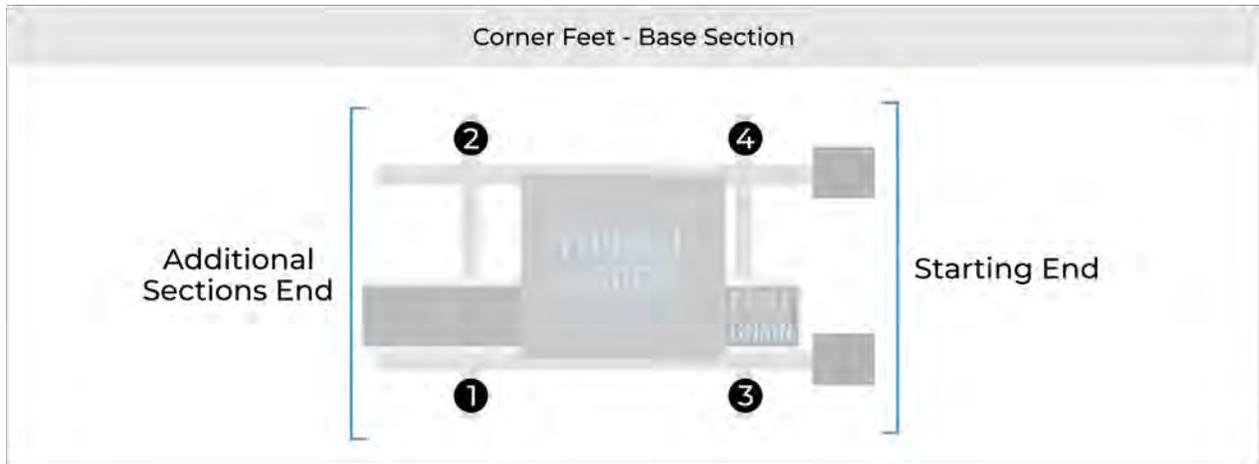


 **TRAILER JACKS:** Trailer jacks can be removed and stored, or left on the track.

(Continued on next page)

4. Lower the feet by doing the following:

- a) Lower the base feet down (1 and 3 together, then 2 and 4 together) by using the ratchet wrench and the socket.
- b) Level the base track by adjusting the feet until all 3 level bubbles on the base track are centered.
- c) When at the desired height and the base section is level, tighten the nut on each foot using the wrench.



5. Adjust the attached end stops to also be sitting on the floor.

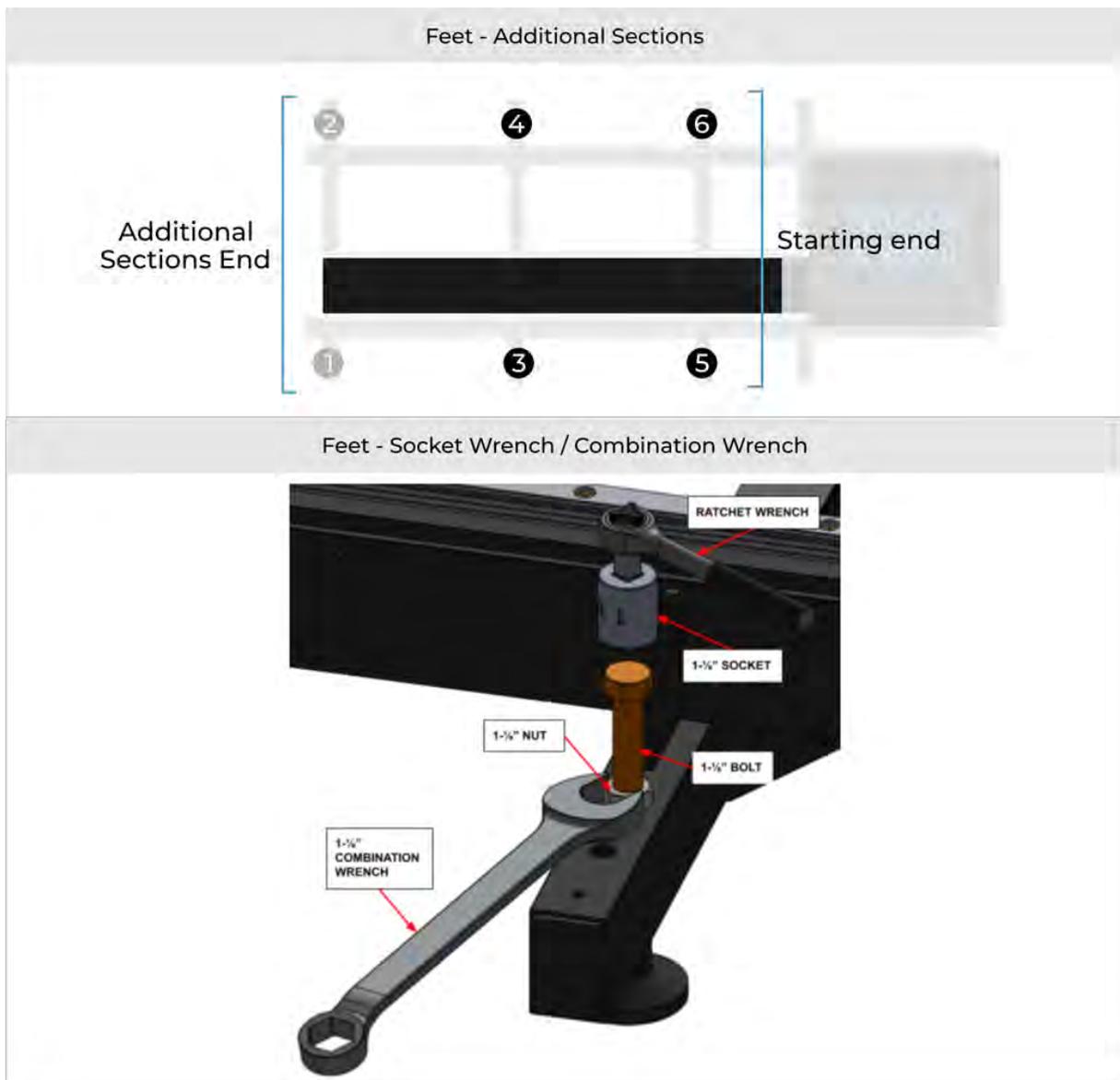
 **SLOPED FLOOR:** If your sloped floor has more than a 3.5” difference in height you will not be able to raise the feet up high enough to make the track level.

(Continued on next page - Step 2 of 3)

STEP 2 of 3 ASSEMBLING ADDITIONAL SECTIONS

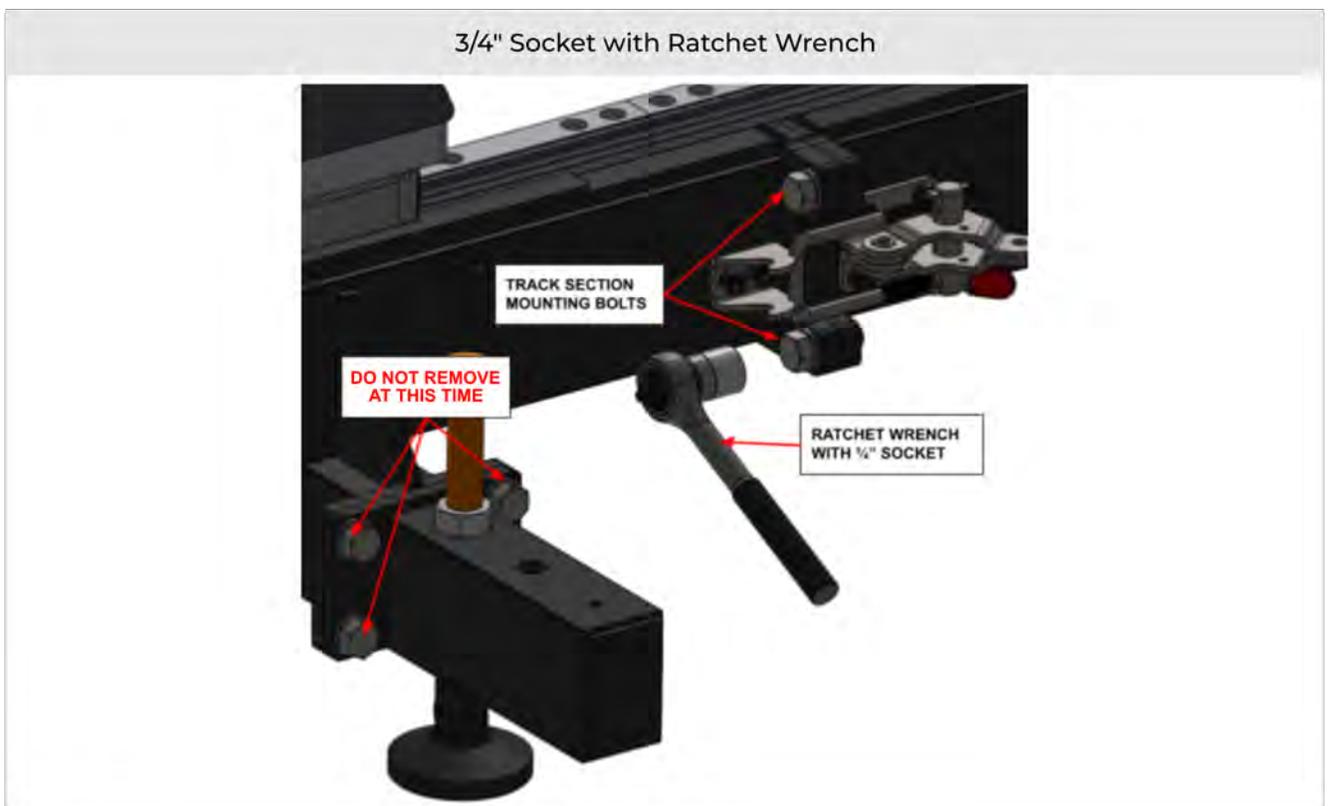
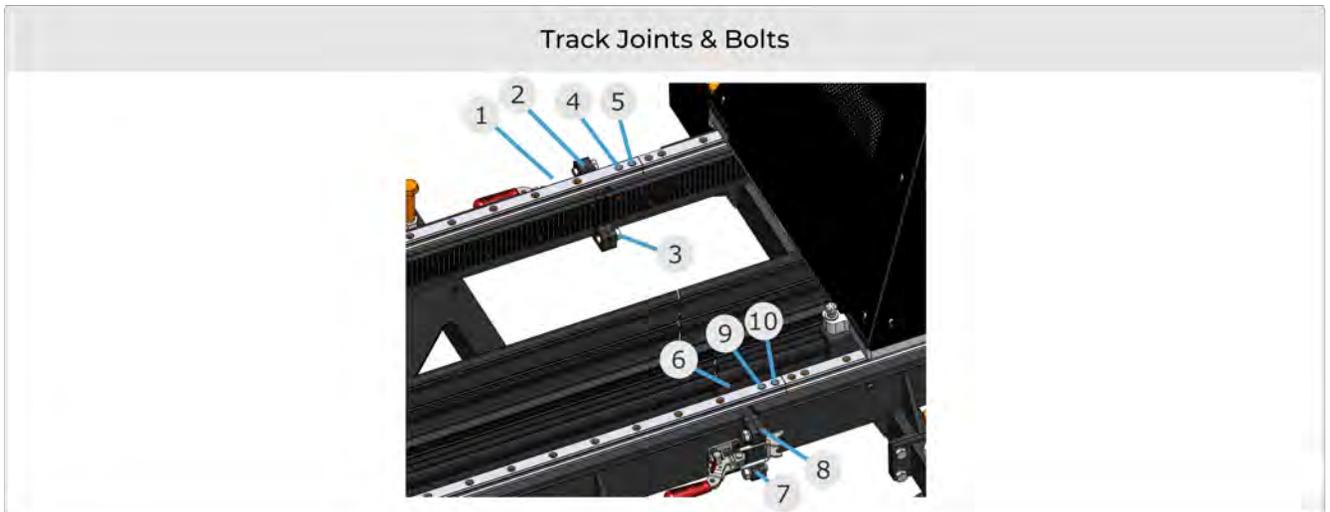
6. Move first additional section in line with the base track.
7. Raise the four feet of the additional section that are closest to where you attaching it all of the way up (feet 3-6 in below image).

! RAISING AND LOWERING FEET: Always raise the feet nuts UP to adjust the feet. Lower the feet nuts DOWN to secure feet after adjusting.



(Continued on next page)

- Remove the six (6) 1/2" hex head bolts and four (4) 8mm socket head cap screws at each of the track connection points and **save to use later for connecting additional sections**.



(Continued on next page)

- Slide the overhand of the rail section you are attaching over the top of the section you are attaching it to. Line up the rails.



- Use the two included toggle clamps to hook onto the joint between the two sections and pull the sections together until they are touching.

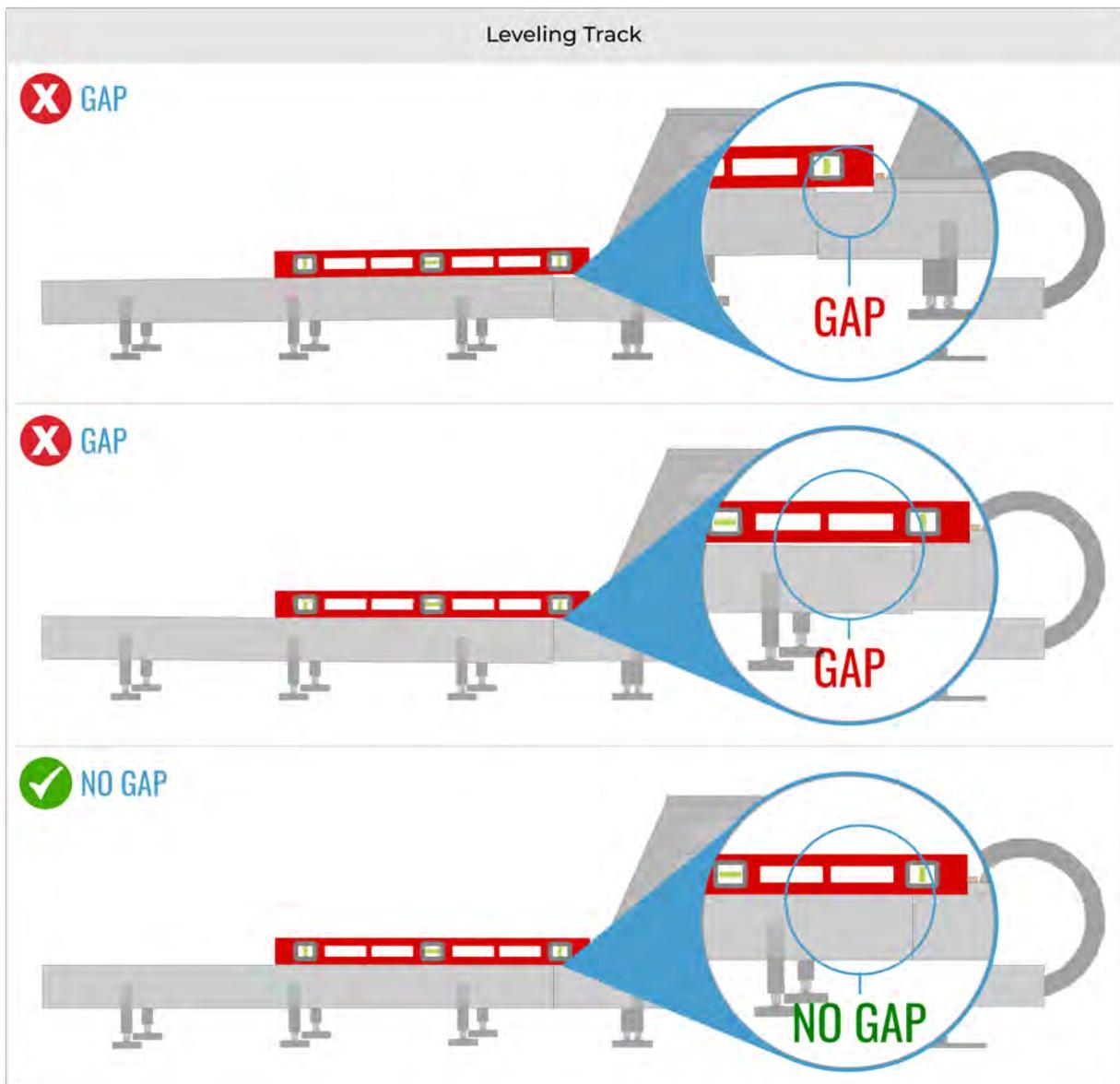
 **TIGHTNESS RULE OF THUMB:** Generally, you want to clamp these tightly with ONE hand, but not so tight that you need two hands.



(Continued on next page)

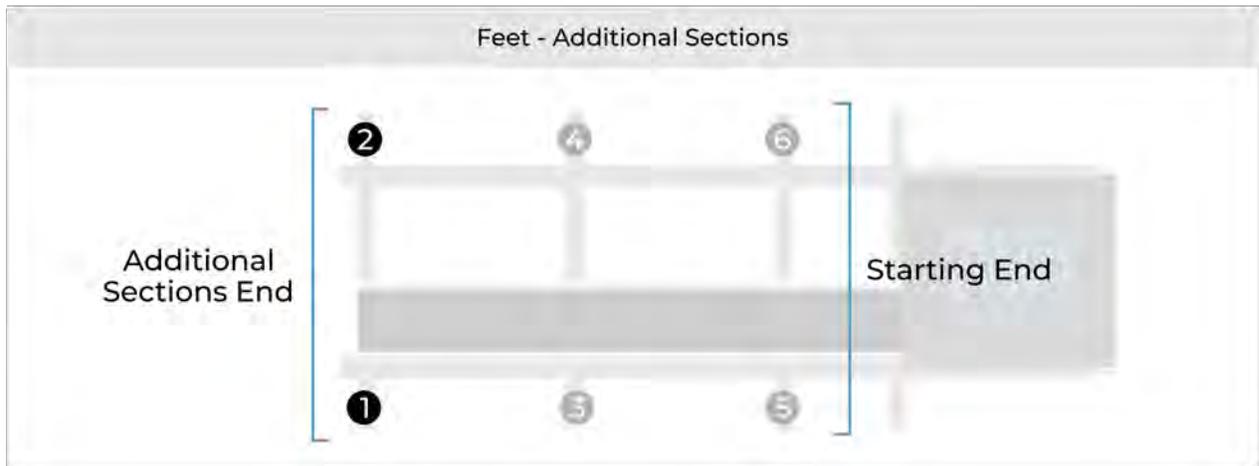
11. Place the level on top of the section that you are attaching. **Center the level on the connection point between the two sections of track as much as possible for best accuracy (might not be able to do this on the base section).** If the track is NOT level there should be a gap somewhere under the level.

 **LEVEL BUBBLE:** If the bubble on the level is not directly in the middle, your track will not be completely level. For best results, make sure that the bubble is always directly in the middle when you're leveling the track.



(Continued on next page)

- Adjust feet 1 and 2 until the gap under the level disappears, and the level reads that it is level.



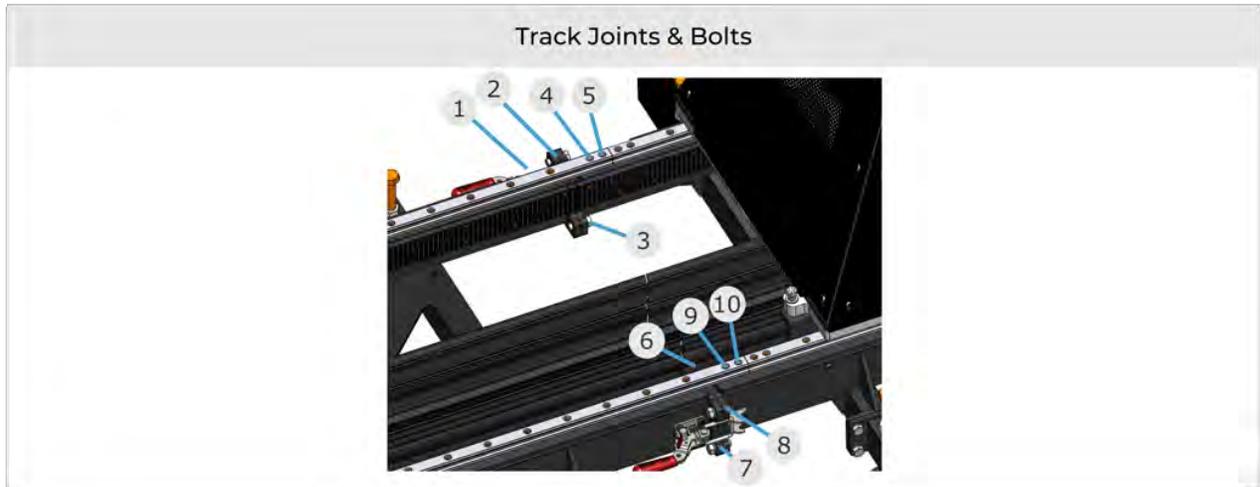
- Clamp the alignment tools onto each side where the rails of the two sections meet. Adjust the alignment tool to provide maximum clamping.

! ALIGNMENT TOOL SCREW: Use the screw at the top of the alignment tool to adjust the clamp so that it is tight. It should be difficult to clamp the alignment tool around the rails of the track.



(Continued on next page)

14. Reinstall the 10 bolts that were previously removed.

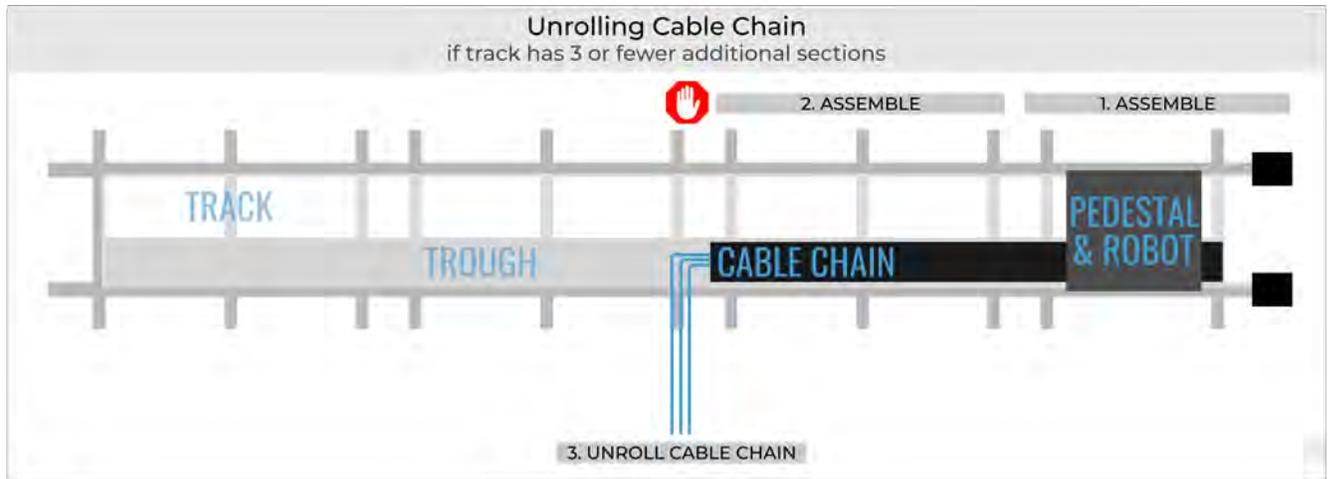


15. **Confirm the track is level between sections (no gap between the two sections with the level) and that the rail sections are smoothly together and no gaps exist. If not, repeat steps 11 - 17.**
16. If the section has a cable trough, slide the attachment bar on the trough in place and tighten with included wrench. Move the side clips into place.

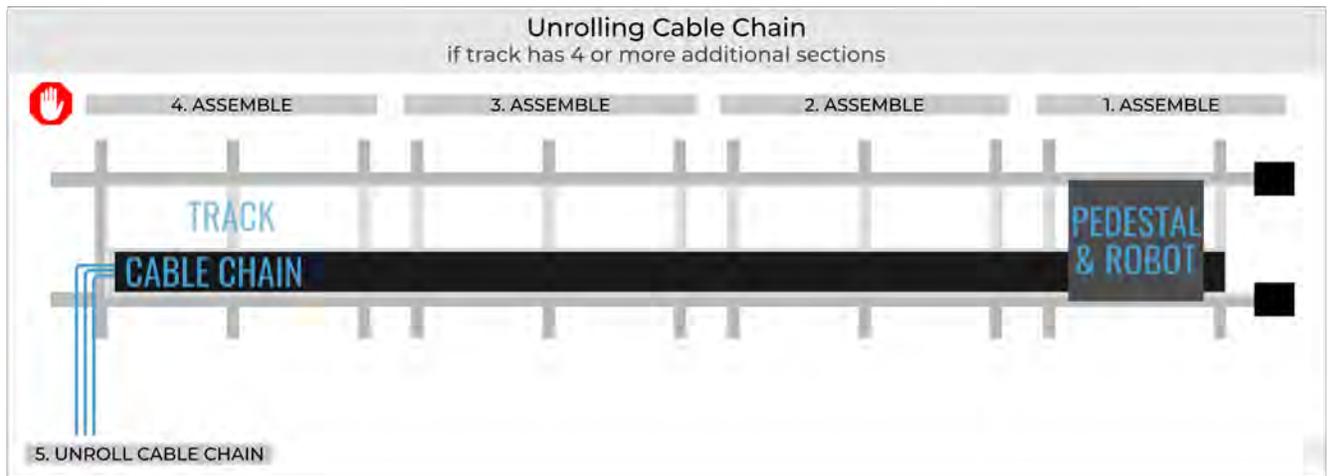


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17. **IMPORTANT:** If you have **3 or fewer** additional sections, you will unroll the cable chain after installing your first additional section (i.e. right now).



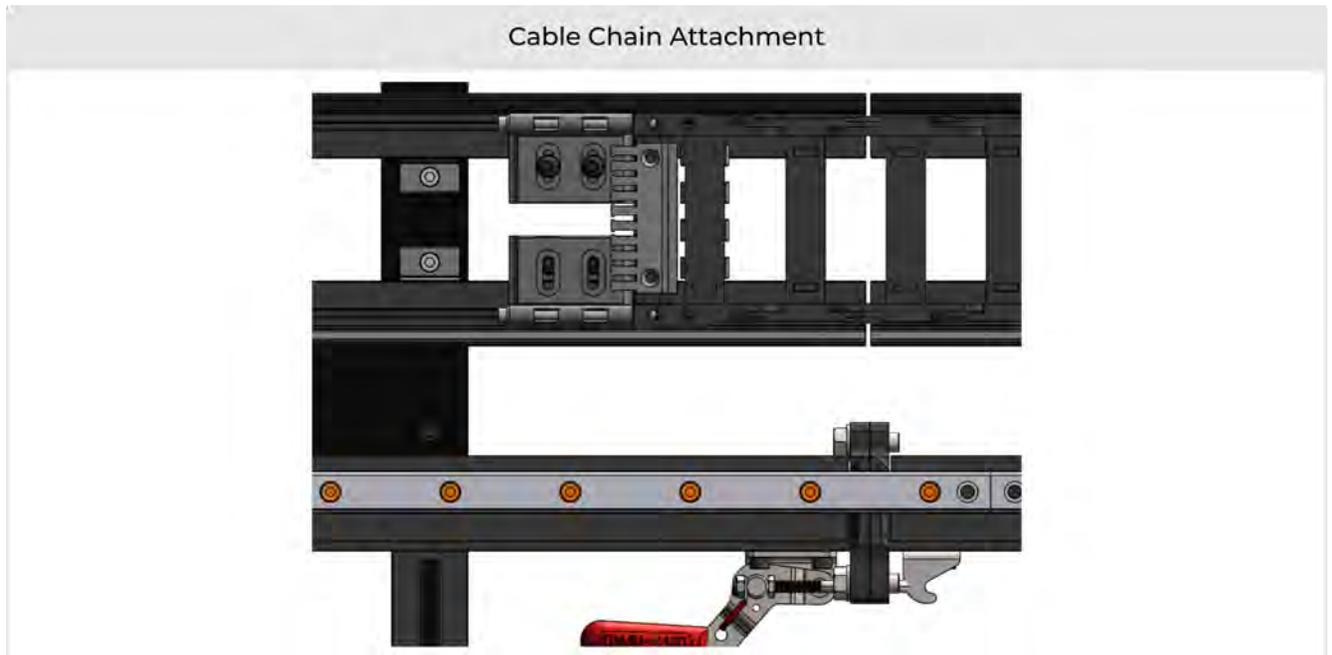
If you have **more than 3** additional sections, you will unroll the cable chain after installing the **3rd additional section**.



! CABLE CHAIN: Unrolling the cable chain in this manner (rather than at the end) will reduce assembly time.

(Continued on next page - Step 3 of 4)

18. Attach the end of the cable chain to the end of the trough by doing the following:
 - a) Remove the screws from the end of the cable chain plastic.
 - b) Place the cable chain within the attachment at the end of the trough.
 - c) Insert the screws through the attachment at the end of the trough and into the cable chain.



19. Repeat steps 7 - 19 for **any additional sections** that you might have.

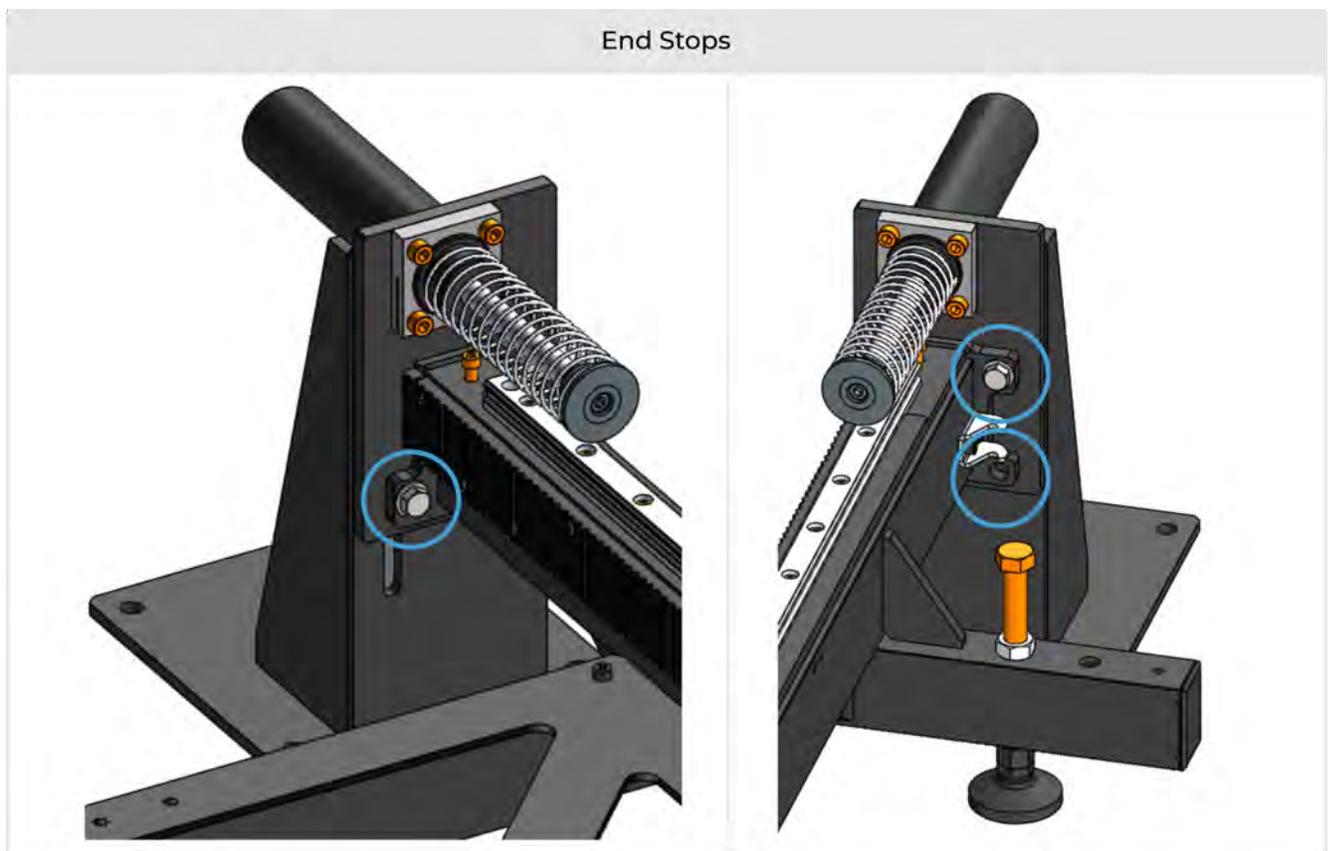
! CABLE CHAIN: Do not forget to execute steps 20-21 to unroll your cable chain after your 3rd additional section is installed if you have more than 4 additional sections in your total track length.

(Continued on next page - Step 3 of 4)

STEP 3 of 3 FINISHING TRACK ASSEMBLY

20. Install the previously removed end stops to the end of the **last installed track section**. Slide them on and bolt them.

! DAMAGED END STOPS: The track end stops are designed to withstand the impact of a crash and not damage equipment. However, it is possible to damage end stops depending on how the system is mounted to the floor and the speed of the impact. If the system crashes into the end stops, inspect them for any damage or loose connections. If any are found, discontinue use of the system and contact SISU for repair options. **Contact SISU about any crash into the end stops above 4m/s as this is more likely to damage end stops and need repairs.**

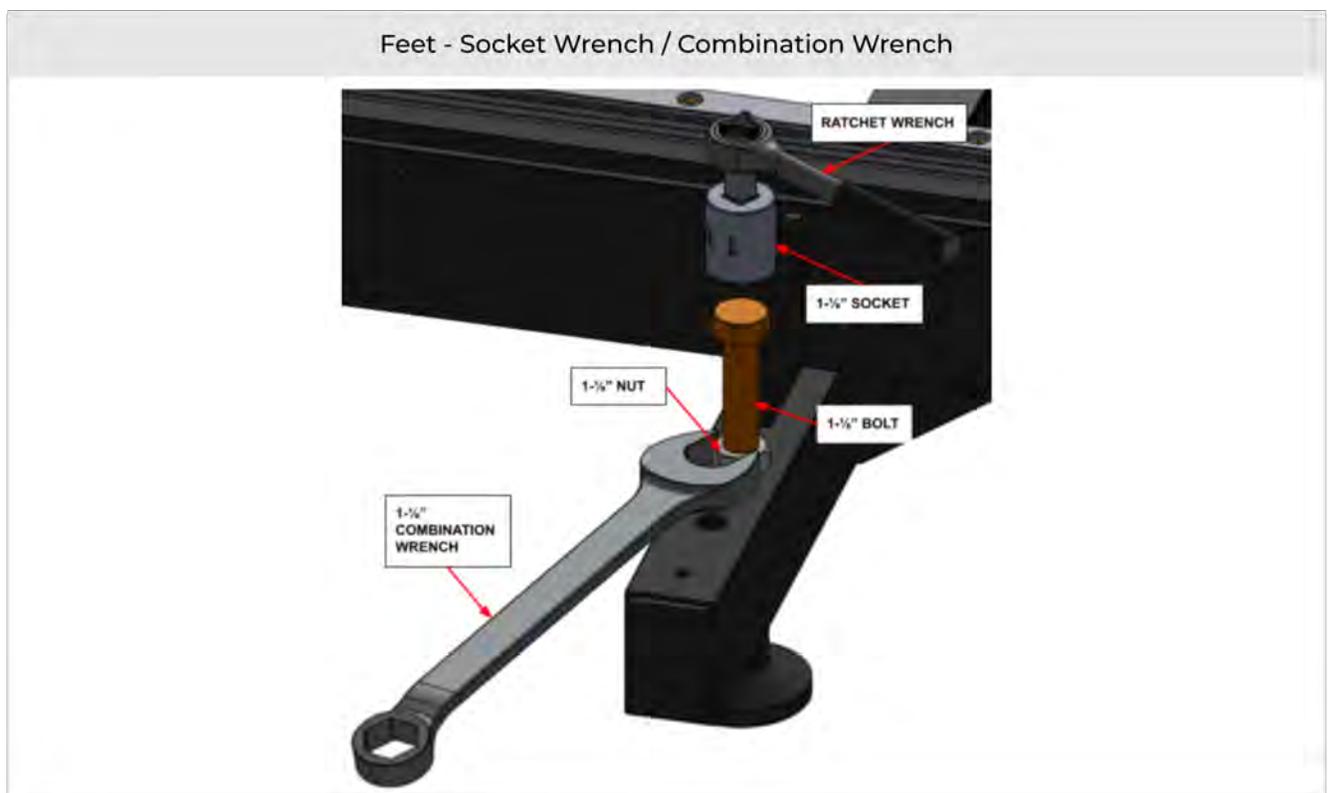
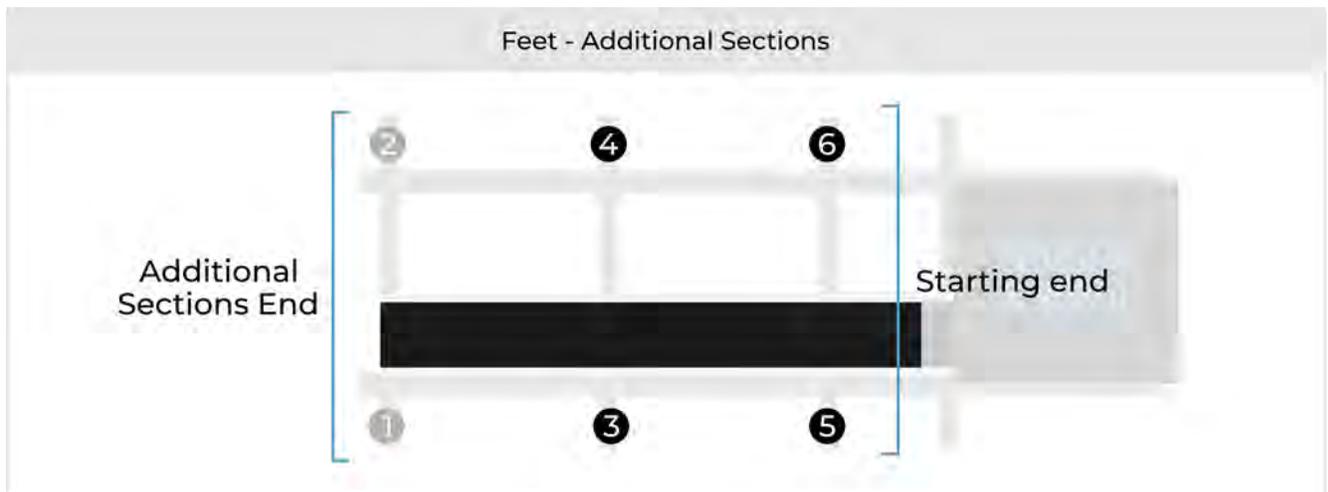


(Another graphic on next page)



(Continued on next page)

21. Adjust feet 3-6 to be finger tight (you want them to touch the floor but only using finger tight pressure). Then tighten the jam nuts for each foot with a wrench.



(Continued on next page)

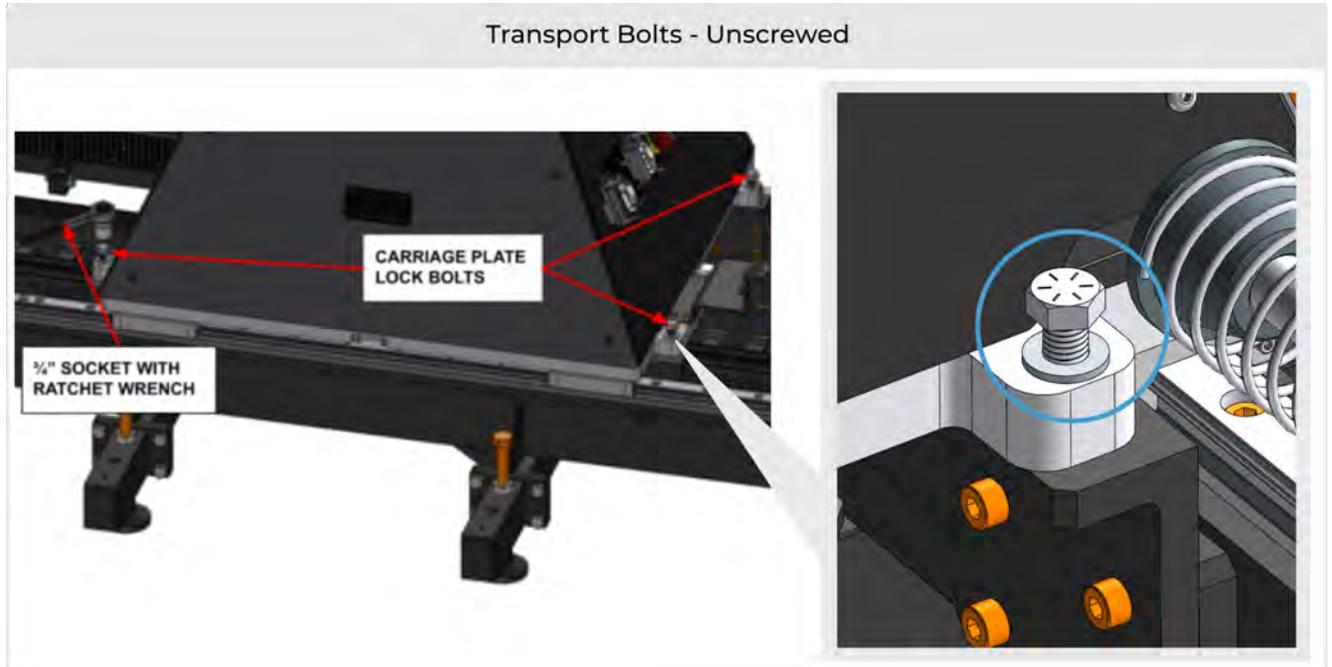
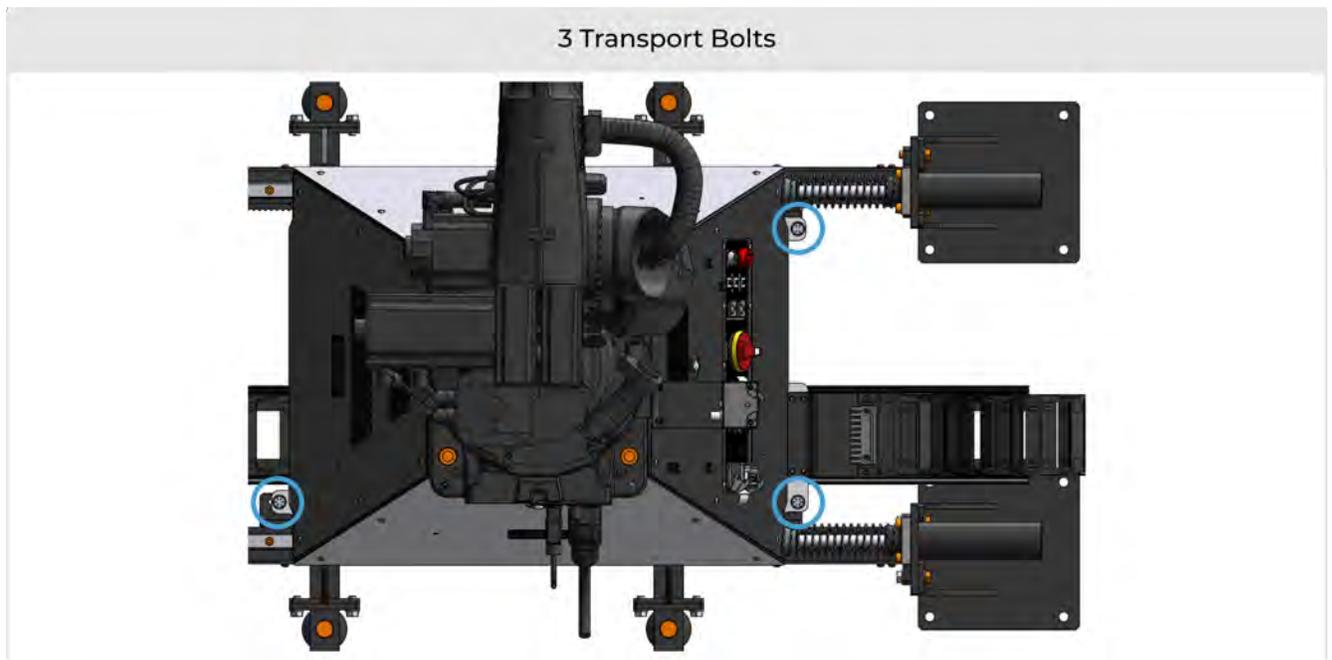
22. Check that the limit switch is installed **on the last section**. If not, remove and install it on the last section.



! ONLY USING PART OF YOUR TRACK: If you are NOT assembling the full length of your track, make sure you remove the limit switch and install it on the **last used section**.

(Continued on next page)

23. Loosen 3 transport bolts at the base of the pedestal until they spring up. The robot now has the ability to move down the track.



4.4 Anchoring the Track

! OPTIMIZING PERFORMANCE: For optimal performance of the track and robot (and to optimize your video quality), the track should be **permanently** anchored to the ground.

Instructions for **PERMANENTLY** anchoring the track:

! CONSULT A STRUCTURAL ENGINEER: Before permanently installing your track system to the floor, check with a structural engineer to determine whether or not your concrete is suitable for robot installation.

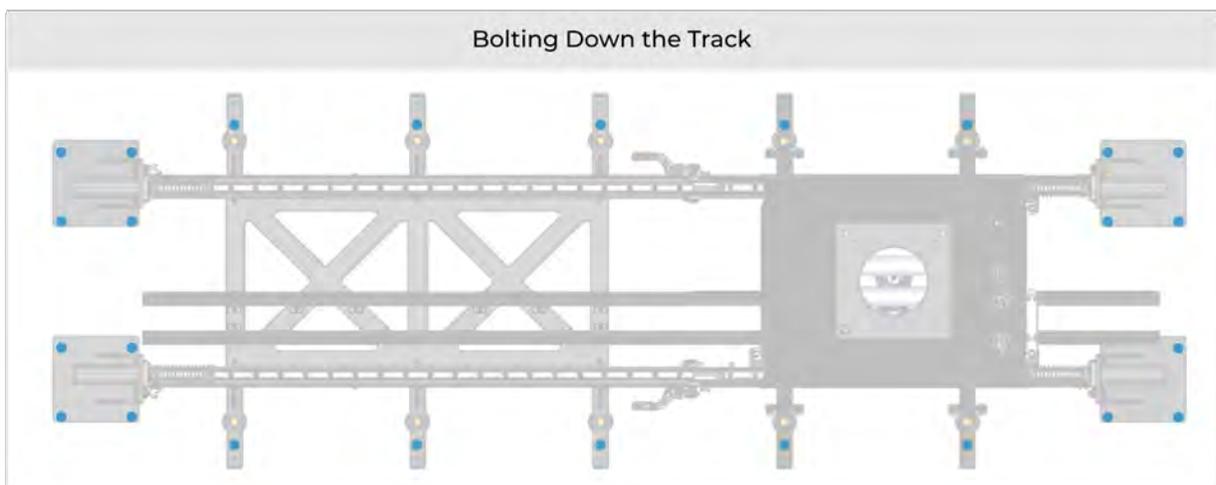
! PPE: Always wear personal protective equipment (PPE) per OSHA standards when performing this installation process.

i ANCHOR KITS: **Base section anchor kits** and **additional section anchor kits** can be purchased separately. Please contact **SISU customer support** for more information.

1. If the track is assembled but is NOT in the location where it is to be permanently installed, move the track to the exact location on the concrete floor where it is to be installed. **Check for level.**

i LEVELING ASSEMBLY STEPS: If you had to move the track after assembling it, you may need to go back and repeat some of the leveling assembly steps.

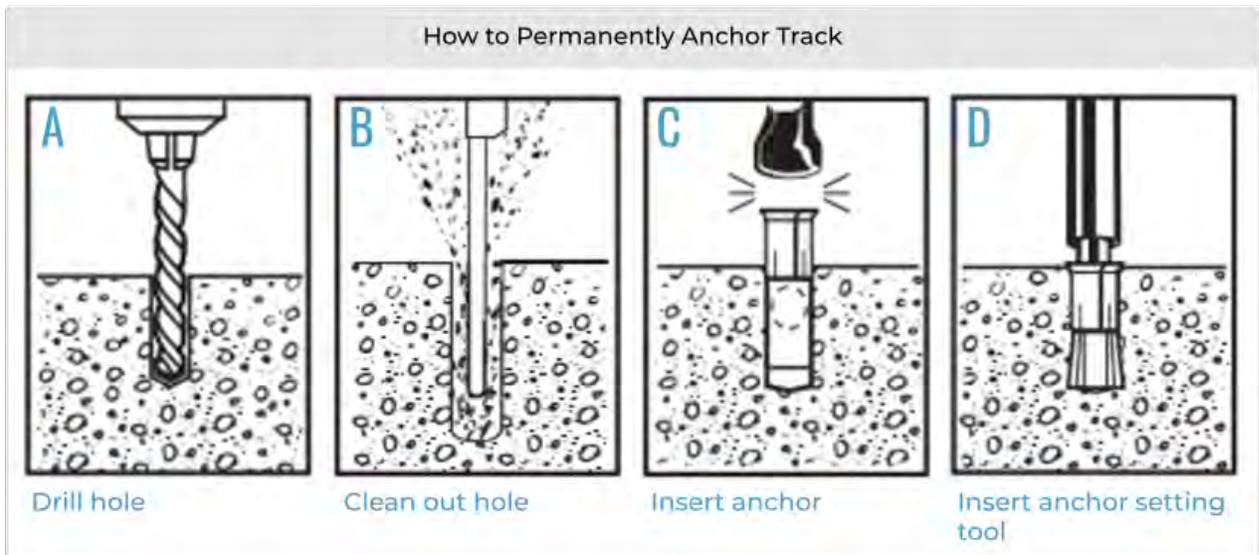
2. Use the image below to determine where you will be drilling holes to anchor the track down (locations are marked in blue).



(Instructions continued on next page)

- Using a concrete, carbide-tipped drill bit, drill a 5/8" diameter hole IN ALL NEEDED LOCATIONS (that are highlighted in blue in the above image). **The depth of each hole should be equal to OR deeper than the minimum embedment depth of 3-3/16"** (the length of the anchor). **See image A below.**

! MOUNTING HOLES DIAMETER: The mounting holes are 5/8" diameter, which is the same size as the drill bit you should be using.



- Clean out ALL newly drilled holes with a wire brush, vacuum, or compressed air. **See image B above.**
- Place a **concrete anchor** into one of the drilled holes. **See image C above.**
- Using the provided 1/2" **anchor setting tool**, insert the SMALLER diameter end of the anchor setting tool into the threaded part of each anchor. **See image D above.**
- Holding the **anchor setting tool** firmly, strike the end of the anchor setting tool with a hammer until the anchor is level with the top of the concrete and is set in place.
- Repeat steps 5-7 to install the remaining anchors.
- Insert a provided washer and 1/2" bolt into each of the installed anchors.

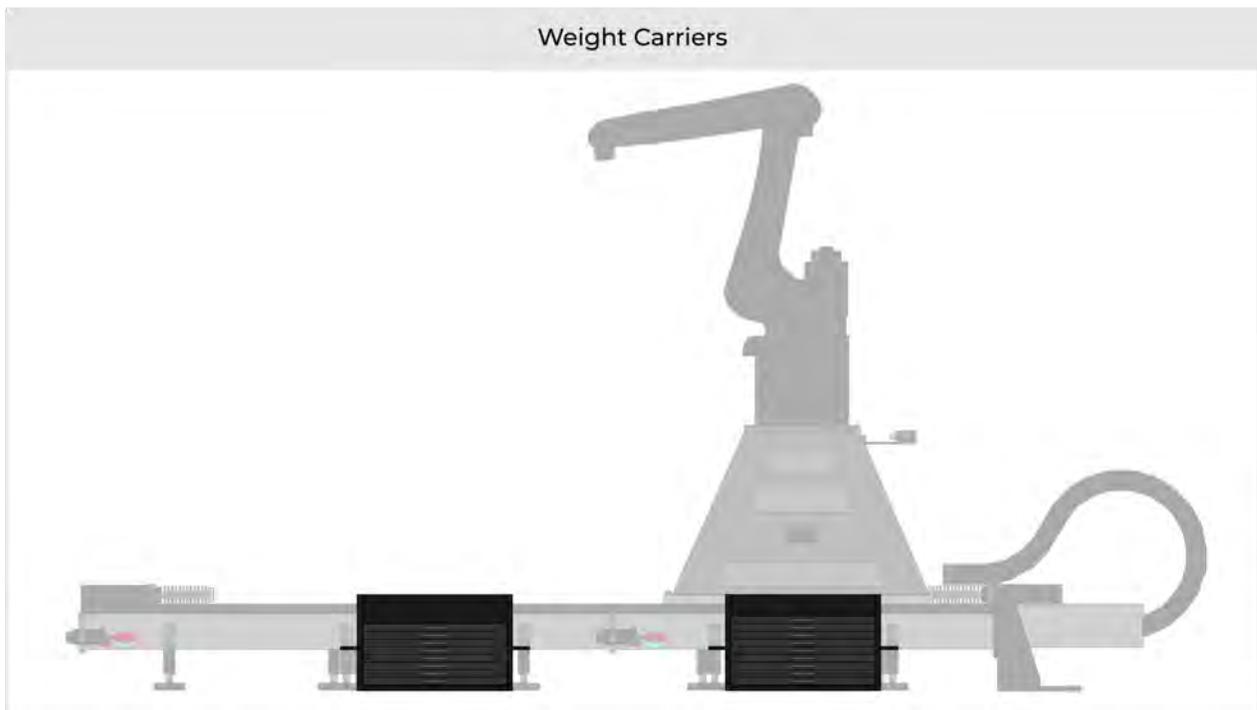
! BOLT TORQUE: All bolts should be fastened to a torque of 80 ft. lbs.

(Instructions for temporarily anchoring the track continued on next page)

Instructions for TEMPORARILY anchoring the track:

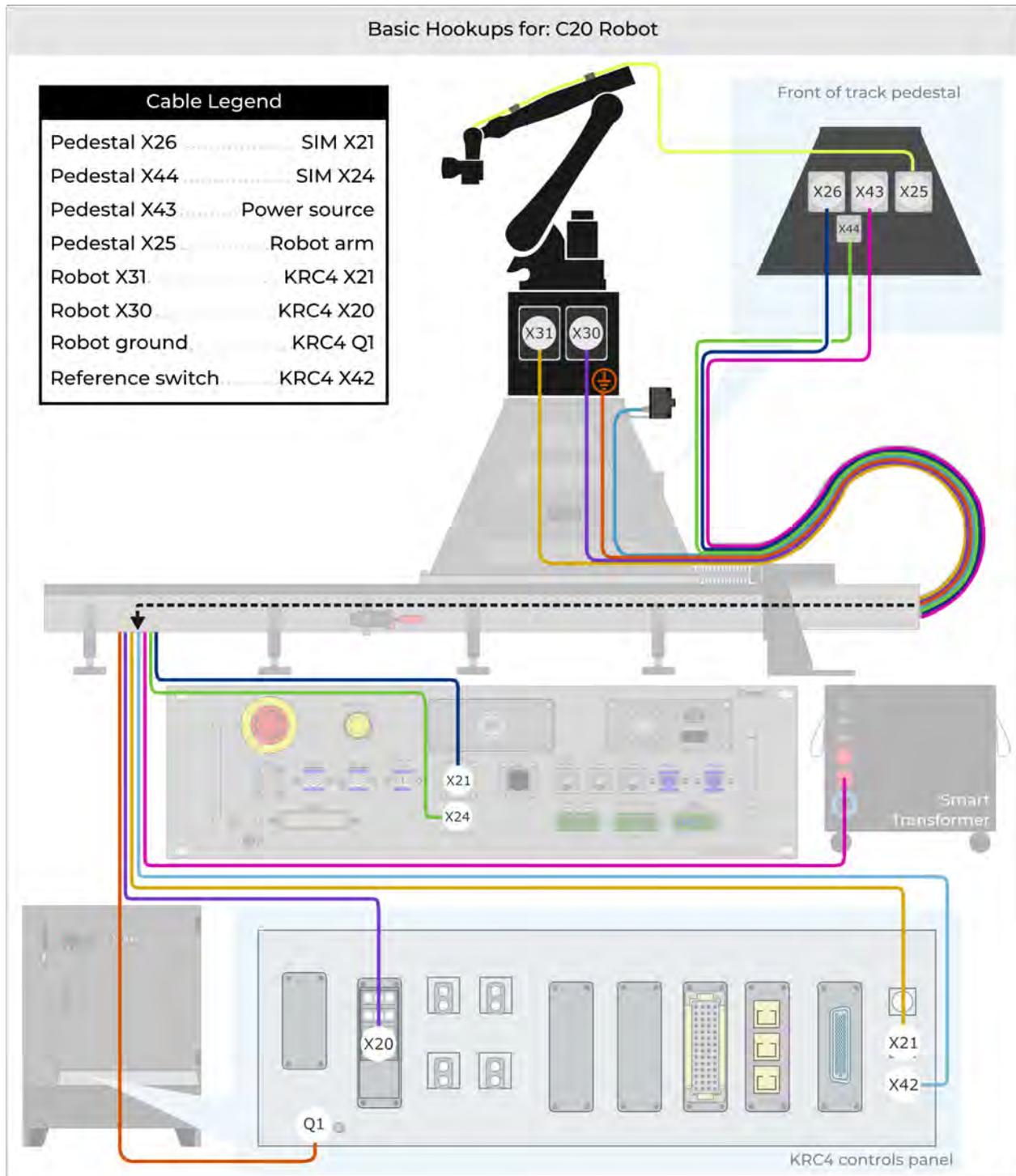
! **MOVING WEIGHT STACK:** The entire weight stack is designed to be moved with a hand truck/dolly.

1. If it is not possible to bolt the track to the floor, you have the option to attach the provided weight carriers that can screw onto the track in between the side rails, or on the back end of the track. You can then fill the weight carriers with the provided weights. **Weight carriers should be placed on every other available location on the track, as shown in the image below.**



4.5 Robot Hookups

4.5.1 C20 Robot Hookups



(Written instructions continued on next page)

Instructions for hooking up the C20 robot and track connections:

1. Locate the ground wire. Plug one end into the base of the robot arm. After being fed through the cable chain, the other end of the ground wire should be plugged into Q1 on the KRC4.
2. Locate the robot power cable. Plug one end into X30 on the base of the robot arm. After being fed through the cable chain, the other end of the robot power cable should be plugged into X20 on the KRC4.
3. Locate the robot data cable. Plug one end into X31 on the base of the robot arm. After being fed through the cable chain, the other end of the robot data cable should be plugged into X21 on the KRC4.
4. Locate the reference switch cable. Plug one end into X42 on the reference switch. After being fed through the cable chain, the other end of the reference switch cable should be plugged into X42 on the KRC4.
5. Locate the two track cables. Plug the first cable into X26 on the track pedestal. After being fed through the cable chain, the other end of the cable should be plugged into X21 on the SIM.
6. Plug the second track cable into X43 on the track pedestal. After being fed through the cable chain, the other end of the cable should be plugged into the smart transformer.
7. Locate the track ethernet cable. Plug it into X44 on the track pedestal. After being fed through the cable chain, the other end of the track ethernet cable should be plugged into X24 on the SIM.
8. Attach the FIZ cable from the track pedestal to the FIZ connection at the base of the robot.



JUMP TO: For all other system hookups, see your **SISU Cinema Robotics Installation Guide**.

4.6 Calibrating the Track

When does the track need to be calibrated?:

1. After changing the length of your track
2. If the track is ever uncalibrated
3. After an e-stop event
4. After hitting or running into the track end stops
5. After moving the safety limit switch
6. After releasing the enable button while the track is moving

Instructions for calibrating the track:

1. **Ensure that there are no obstacles along the length of the track, as the robot pedestal will move all of the way down the track during the homing process.**
2. Set the SIM to be in **T1 mode**.
3. Navigate to the **Settings** menu on your tablet.
4. Select **Track**.
5. Select **Calibrate**.

 **DURING CALIBRATION:** After you select **Calibration** you will not be able to do anything on the tablet except hit **Cancel**.

6. Track calibration will begin when you hold down the **Enable button** on your tablet.

 **LENGTH OF CALIBRATION:** Calibration can take a few minutes, depending on how long your track is.

4.7 Finishing System Installation

At this point, if all of the above track installation steps have been correctly executed, you need to jump over to your **SISU Cinema Robotics Installation Guide, sec 3.8 Connecting the SIM and KUKA Robot Controller**. Complete sections **3.8 - 3.16** before starting your first program.



CAREFUL COMPLETION OF ALL LISTED STEPS: If you start to program with your system BEFORE completing all required steps and tests in this Track Installation Guide or in the SISU Cinema Robotics Installation Guide, you will risk damaging your equipment or harming individuals working with or around the system.

5. TRANSPORTING THE TRACK

5.1 Chapter Contents

- **Disassembling the Track** - [5.2](#)
- **Moving the Assembled Track** - [5.3](#)
- **Fitting the Track Through a Standard Doorway** - [5.4](#)

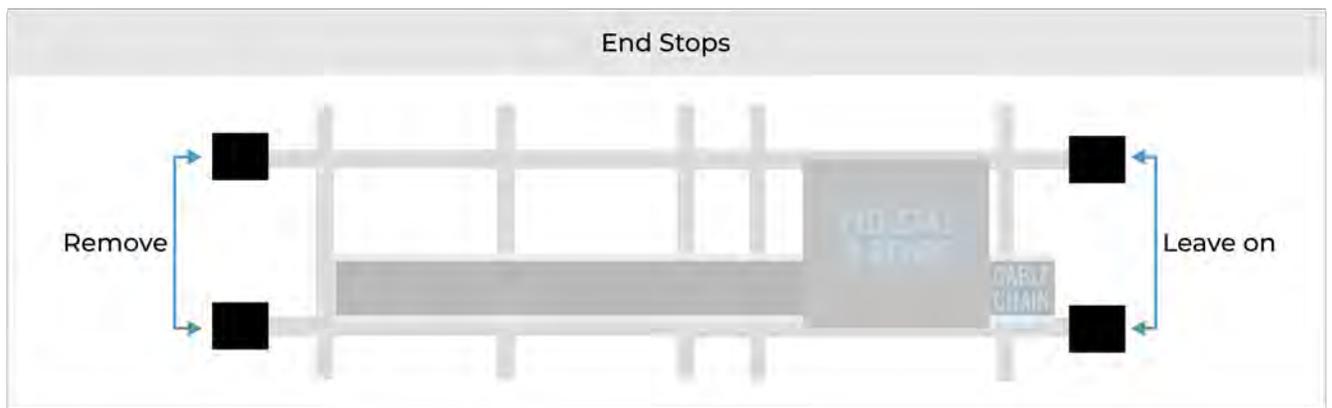


TIP ANGLE: As per OSHA recommendations, the tip angle of the robot and/or base track section while it is being moved should not exceed 10%. **Failing to follow these recommendations could result in the robot and/or base track section tipping over and becoming damaged.**

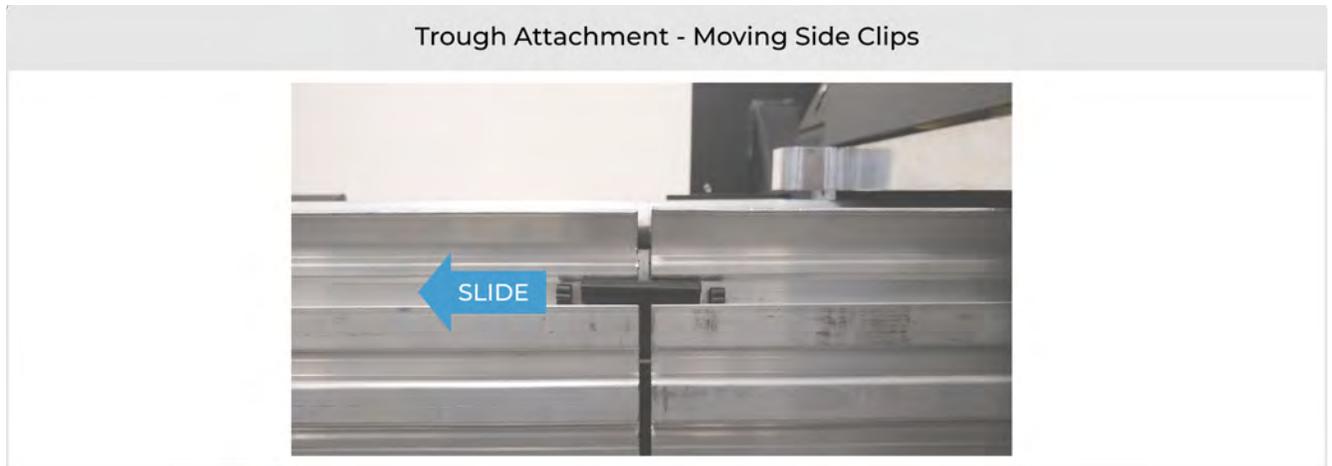
5.2 Disassembling the Track

Instructions for disassembling the track:

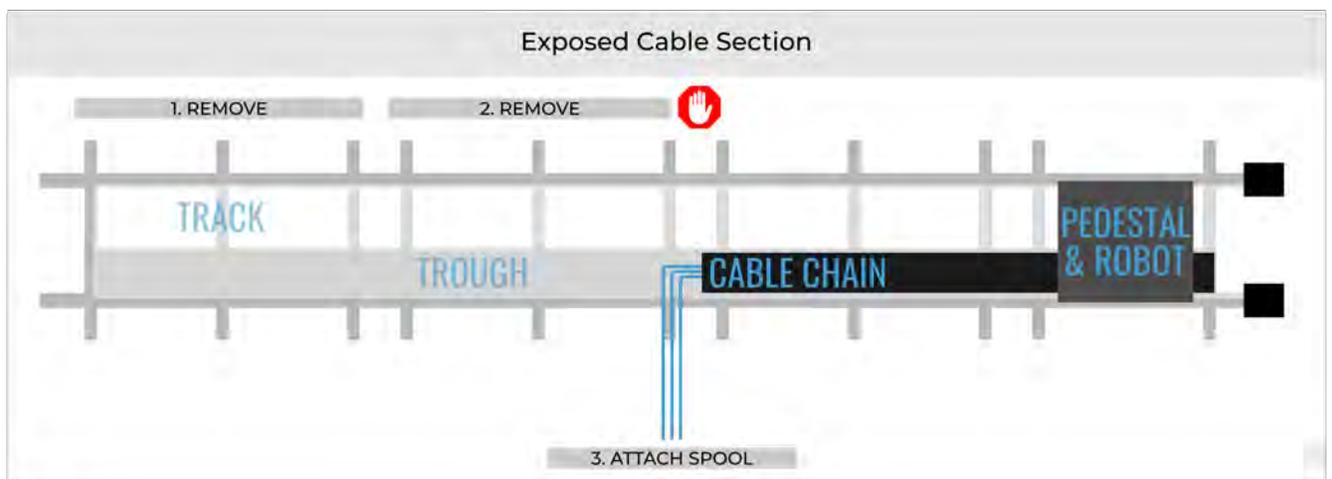
1. Move the robot to the transport position on the track and for the robot position.
2. Screw in the transport bolts. If the transport bolts do not go into their position you may need to move the track pedestal around more.
3. Follow the SISU Lab instructions to power down the robot. After safely powering down the application and robot, remove power from the robot and the track.
4. Remove the end stops from the last extension section of the track.



5. For each track section, unbolt the track connection point bolts and the rail bolts (ADD PICTURES). Unlatch the toggle clamps.
6. Disconnect the cable chain from the track trough by unscrewing from the trough. **Place the screws back into the cable chain plastic so you do not lose them.**
7. Slide the trough clips **onto the section you're removing.**



8. Loosen the trough clamp, slide it back, and reattach.
9. Slide the section back and **carefully** place it in the crate.
10. **Repeat steps 2-5 for all sections UNTIL YOU REACH THE EXPOSED CABLES.**

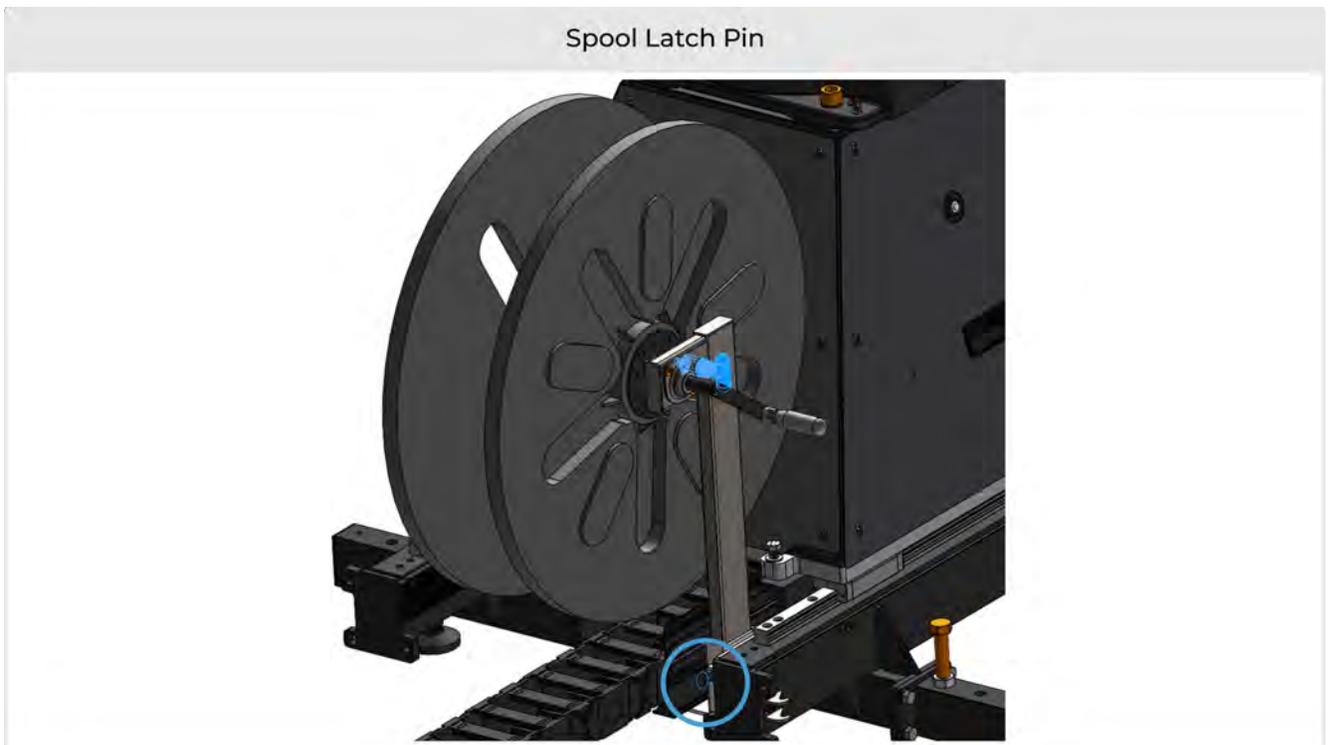


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11. Attach the cable spool to the back end of the base section.

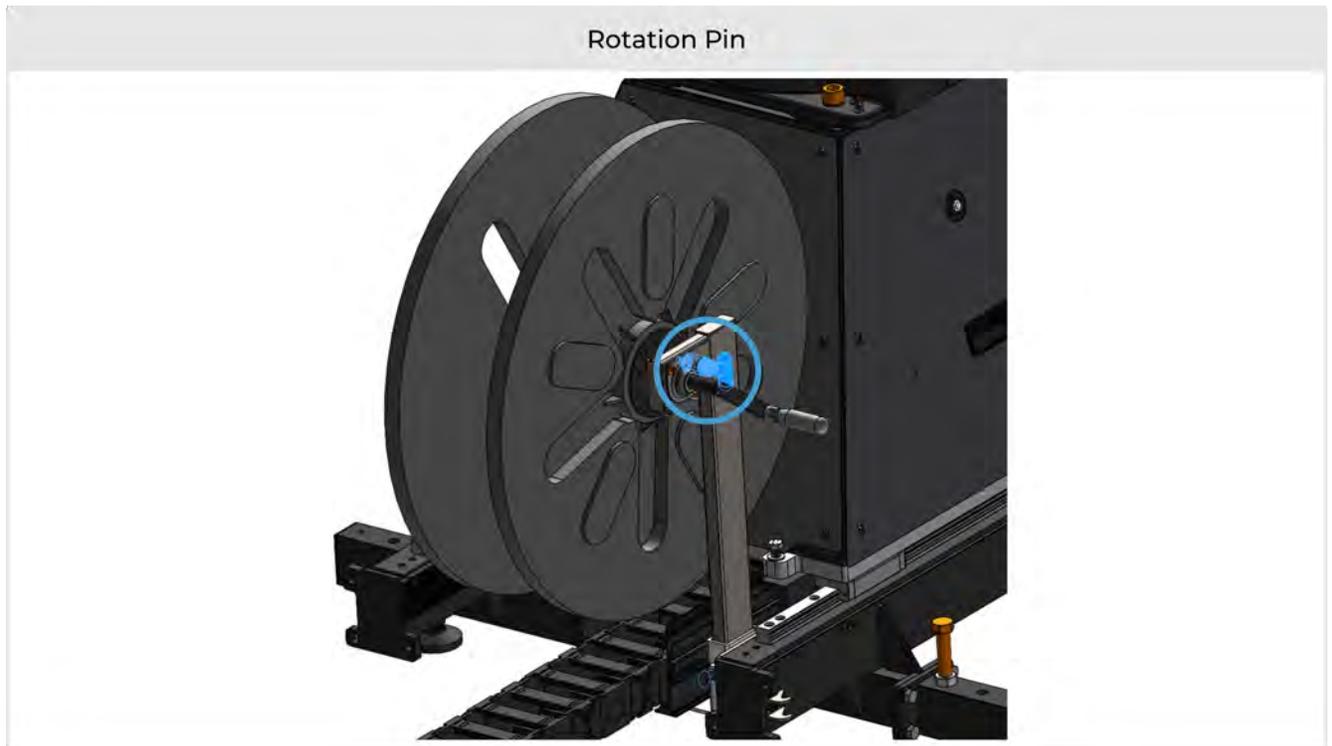


12. Pull out latch pin to make sure the cable spool drops into place.

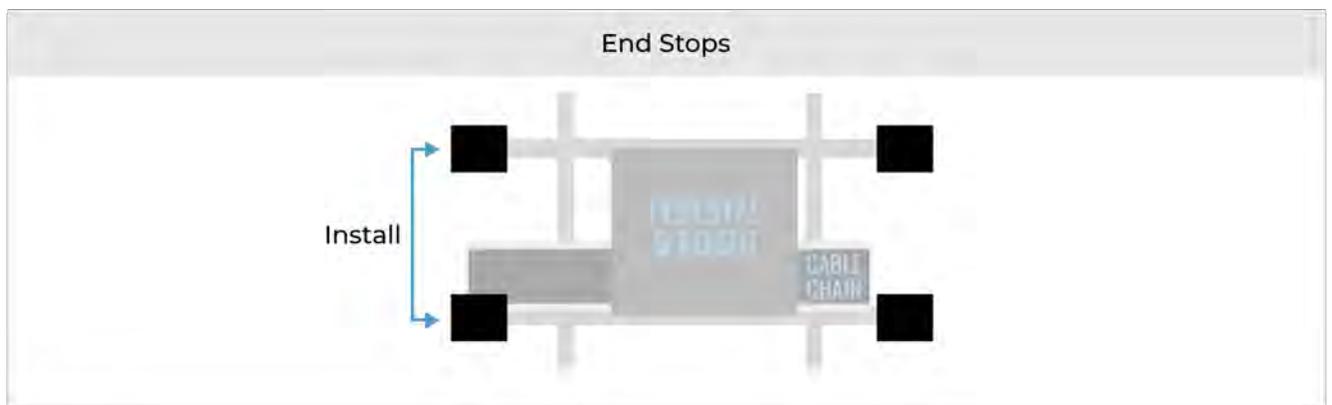


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13. Pull the rotation pin out, and twist it to lock it so that it does not prevent the spool from rotating.



14. Insert the cable connectors through the slot on the cable spool. Wrap up the cables by rotating the handle.
15. After cable chain is wrapped up, release the rotation pin to lock the spool in place.
16. Repeat steps 2 - 4 for all remaining additional track sections.
17. Place previously removed end stops onto back end of base section.



18. If needed, attach and lower the trailer jacks onto the base section.
(Continued on next page)

19. Raise the trailer jacks on one side of the track base first, then the other.
20. If going through a standard door, remove the track feet.

5.3 Moving the Assembled Track

If you need to push the track to a new locatin on the same set, you can move it without disassembling the track. Follow the instructions below for moving the assembled track.

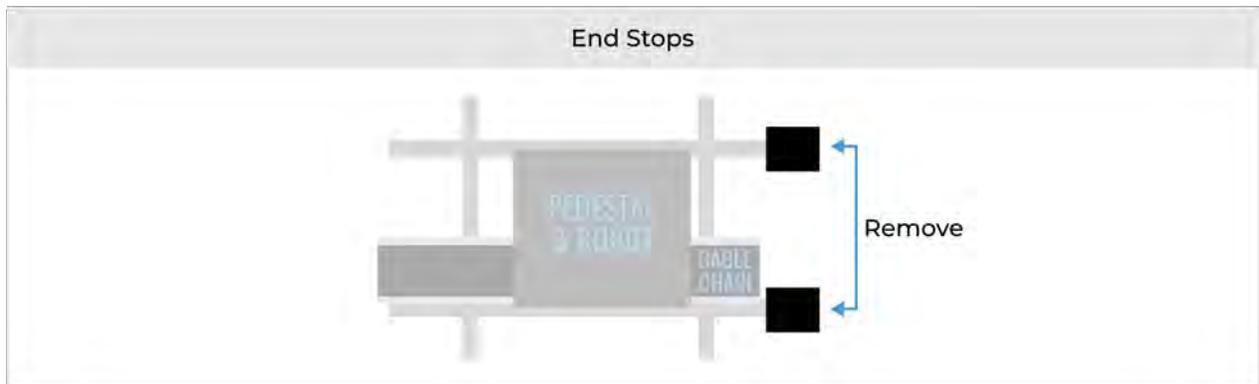
Instructions for moving the track:

1. Lower the robot to the transport position for best balance.
2. Attach at least two trailer jacks per track section.
3. Place one person at teach trailer jack on one side of the track (for the full length of the track). Lower the trailer jacks for the full length of ONE side of the track at once.
4. Confirm the feet on one side of the track are now NOT touching the ground for the full length.
5. Repeat steps 2-4 for the other side of the track.
6. The track now should have NO feet touching the ground.
7. Using several individuals on both sides of the track, push the track on the trailer jacks to the new location.
8. Lower the trailer jacks on one side of the track at once.
9. Repeat lowering the trailer jacks on the other side of the track at once.
10. Check the level and gaps at each section connection point. Re-level and adjust the feet as needed.

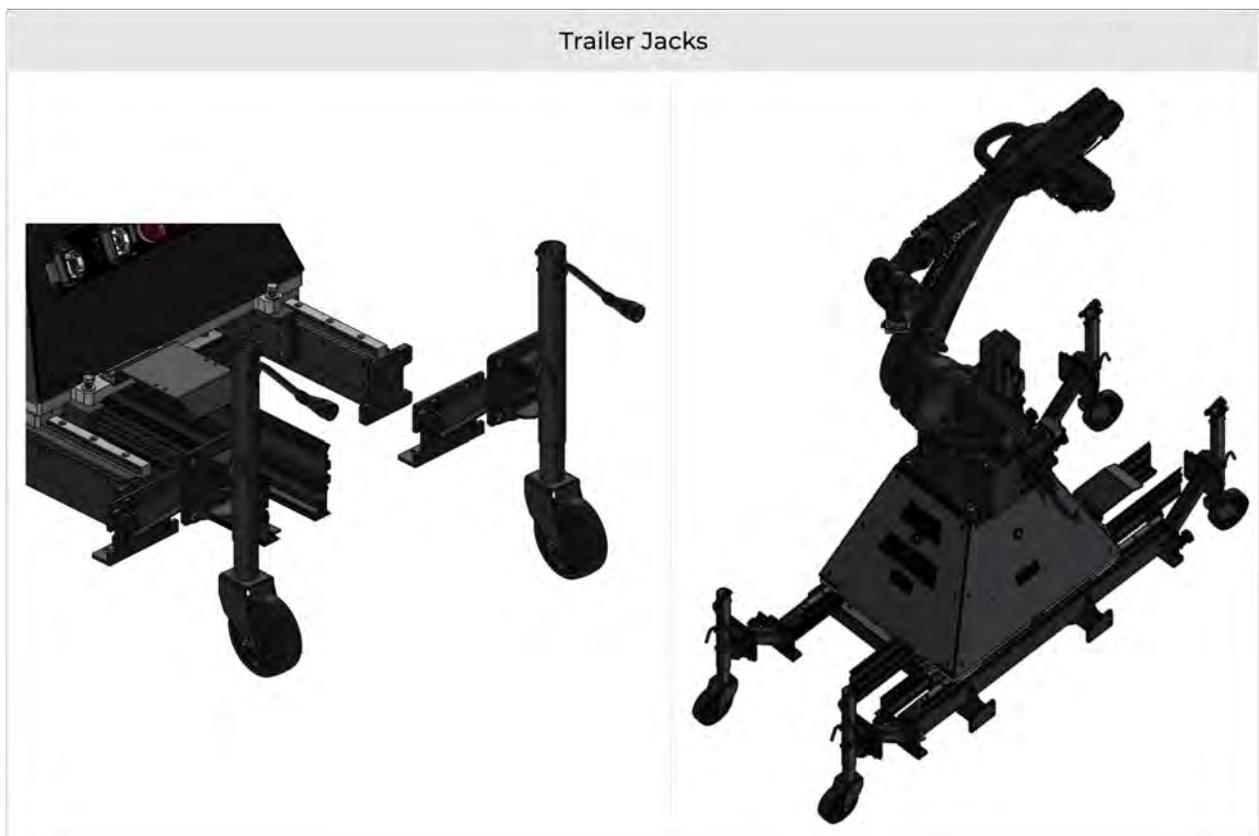
5.4 Fitting the Track Through a Standard Doorway

Instructions for fitting the **BASE SECTION** through a standard doorway:

1. Remove all other track sections from the base using the disassembly instructions.
2. Remove the end stops from the base section.



3. Mount the 4 included trailer jacks onto the **ends** of the base section (they are normally bolted onto the sides) using the bolts from the end stops.



(Continued on next page)

4. Unbolt and remove all 4 extendable side rails.



5. The base section can now be pushed through a doorway.

⚠ TIPPING: Because it is narrow and heavy, use extreme caution when pushing and moving the base section to avoid tipping.

(Fitting additional sections through door continued on next page)

Instructions for fitting EXTENSION SECTIONS through a standard doorway:

1. Extension sections can be moved through the doorway using a dolly or hand truck. You can also pick them up, turn them sideways, and walk them through the door.

! OSHA LIFT RECOMMENDATION: The OSHA recommendation for moving one additional track section - based on its weight - would be to use a **4 person lift**.



SECTION 2

GLOSSARY



6. GLOSSARY

6.1 Chapter Contents

- **Icon Key** - [6.2](#)
- **Glossary of Used Terms** - [6.3](#)

6.2 Icon Key



6.3 Glossary of Used Terms

A

ADDITIONAL TRACK SECTION: A section that can be purchased to attach to the main track section and extend the length of the overall track. Multiple additional track sections can be purchased and attached together. See section [2.2.1 Hardware Map A - Included with System](#), and section [4.3 Assembling the Track](#) step 2 for more information.

ALIGNMENT TOOL: The tool used to ensure alignment of the track sections during assembly. See section [2.2.1 Hardware Map A - Included with System](#), and section [4.3 Assembling the Track](#) step 15 for more information.

ANCHOR KITS: Anchor kits are optional, and can be purchased for either the base section, the additional track sections, or both. Anchor kits come with all necessary tools to anchor your track into the ground. See section [2.2.2 Hardware Map B - Optional Hardware](#), and section [4.4 Anchoring the Track](#) for more information.

(Continued on next page)

B

BASE TRACK SECTION: The main track section that contains the robot pedestal and robot hookups. Additional track sections can be purchased and attached to the main track section. See section [2.2.1 Hardware Map A - Included with System](#), and section [4.3 Assembling the Track](#) step 1 for more information.

BELT: The belt is housed in the pedestal, and it grabs onto the rack to move the robot up and down the track. See section [2.2.4 Hardware Map D - Partial Track](#) for more information.

C

CABLE CHAIN: Used to safely contain all robot cables while the robot is moving on the track. See section [2.2.3 Hardware Map C - Full Track](#) and section [4.5 Robot Hookups](#) for more information.

CALIBRATING THE TRACK: The track needs to be calibrated after changing the length of your track, and after powering on your system. See section [4.6 Calibrating the Track](#) for instructions.

CROSS BARS: Bars extending out of the sides of the track that have feet attached to the end.

E

END SUPPORTS/STOPS: Use at each end of the track to slow the robot's stop. See section [2.2.1 Hardware Map A - Included with System](#), and section [4.3 Assembling the Track](#) for more information.

EXTENDABLE SIDE RAILS: These are the side rails on the base section that can be detached in order to fit the base section through a standard doorway. See section [2.2.3 Hardware Map C - Full Track](#) and section [5.4 Fitting the Track Through a Standard Doorway](#) for more information.

G

GREASE GUN: The grease gun comes with the track tool kit and is used to periodically grease the track rails. See section [2.2.1 Hardware Map A - Included with System](#), and section [1.8 Track Maintenance](#) for more information.

H

HARDWARE MAP: See section [2.2 Hardware Maps](#) for hardware maps.

J

JACK STANDS: These Y-shaped stands are used to move or transport the track system. See section [2.2.1 Hardware Map A - Included with System](#) for more information.

(Continued on next page)

L

LIMIT SWITCH: The limit switch is installed on the last section of the track. See section [4.3 Assembling the Track](#) Step 4 of 4 for installation instructions.

R

RACK: The rack is attached to one side of the track and gives the belt something to grab onto to move the robot up and down the track. See section [2.2.4 Hardware Map D - Partial Track](#) for more information.

RAILS: These rails provide the sides to the track system.

REFERENCE SWITCH: The reference switch is a sensor that verifies the robot has reached its mastering position when running mastering checks. See section [4.5 Robot Hookups](#) for more information.

T

TOGGLE CLAMP: These are used to connect two track systems together. See section [2.2.1 Hardware Map A - Included with System](#), and section [4.3 Assembling the Track](#) for more information.

TRACK: The track is an adjustable length track system on which your cinema robot can travel. The package comes with a robot pedestal and the base track. Additional track sections can be purchased and attached to the base track.

TRACK PEDESTAL: This is the base to which the robot is attached. It also contains the robot hookups, and houses the motor and belt that move the robot. See section [2.2.1 Hardware Map A - Included with System](#) and section [4.5 Robot Hookups](#) for more information.

TRACK TOOL KIT: The track tool kit comes with the track system, and it consists of a tool bag, 2 alignment tools, a grease gun, a ratchet socket wrench, a combination wrench, a hex wrench, and a ratchet wrench. See section [2.2.1 Hardware Map A - Included with System](#) for more information.

TRANSPORT LOCK BOLT: These 3 bolts are used to secure the pedestal and robot when the track is being moved or transported. See section [2.2.3 Hardware Map C - Full Track](#) and section [4.3 Assembling the Track](#) step 4 of 4 for more information.

TROUGH: The trough is attached to the track sections and is what the track cable chain sits in. See section [2.2.4 Hardware Map D - Partial Track](#).

TROUGH CLIP: The trough clips are inserted into the side of the trough where two trough pieces join together. See section [4.3 Assembling the Track](#) step #19 for more information.

W

WEIGHT CARRIER: These are located along the track's side rails and hold the weights used to stabilize the track while the robot is moving. These can be purchased separately. See section [2.2.2 Hardware Map B - Optional Hardware](#) and section [4.4 Anchoring the Track](#) for more information.

WEIGHTS: Weights are placed in the weight carriers and are used to stabilize the track while the robot is moving. These can be purchased separately. See section [2.2.2 Hardware Map B - Optional Hardware](#) and section [4.4 Anchoring the Track](#) for more information.



SECTION 3

APPENDICES





7. APPENDIX A - SISU CINEMA ROBOTICS COMPLIANCE AND STANDARDS

7.1 Chapter Contents:

The SISU Cinema Robotics system conforms to the following compliances and standards:

- **Electrical Safety** - [7.2](#)
- **Standards Applied to Design** - [7.3](#)
- **Risk Assessment** - [7.4](#)

7.2 Electrical Safety

The SISU Cinema Robotics Track System is designed to meet Electrical Safety per UL/EN 61010-1:2010.

7.3 Standards Applied to Design

Principles of the following standards are applied to design:

1. EN ISO 10218-1:2011 Robots and robotic devices – Safety requirements for industrial robots – Part 1: Robots (equivalent to ANSI/RIA R.15.06-2012, Part 1)
2. EN ISO 10218-2:2011 Robots and robotic devices – Safety requirements for industrial robots – Part 2: Robot systems and integration (equivalent to ANSI/RIA R.15.06-2012, Part 2)
3. EN ISO 12100:2010 Safety of machinery – General principles for design – Risk assessment and risk reduction and RIA TR R15.306-2016 Task-based Risk Assessment Methodology

7.4 Risk Assessment

A risk assessment must be performed by the final integrator following EN ISO 12100:2010 or RIA TR R15.306-2016 to be compliant with general safety standards.