MARK ROBERTS MOTION CONTROL

ROUND RAIL

QUIET TRACK FOR BROADCAST RIGS

QUICK START GUIDE

QSG Product code: MRMC-2118-00
Producct Covered: TALOS-08-A12

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Contact information	
Mark Roberts Motion Control Ltd. Unit 3, South East Studios Blindley Heath Surrey RH7 6JP United Kingdom	
Telephone:	+44 (0) 1342 838000
E-mail:	info@mrmoco.com (sales and general enquiries) support@mrmoco.com (customer support)
Web:	www.mrmoco.com www.mrmocorentals.com

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Chapter 1 **Assembling the track**

Safety

- Due to the size and weight of track sections, it is recommended that you use at least **two** people to assemble it.

- Motion control rigs have powerful motors that can injure, so take care not to get near the rig while it is switched on.
- Do not step over the track when the rig is switched on — walk around it instead.

Overview

Thank you for using Round Rail and Cable Chain System from Mark Roberts Motion Control (MRMC). The track is designed to help you achieve pixel-perfect repeatability of your camera moves by supplying smooth, rigid support when using large motion control robots such as the Talos over long distances.

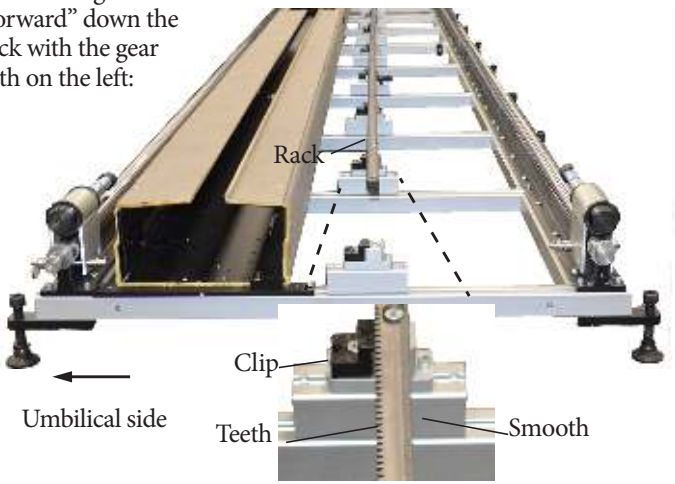
Before you start

When deciding on the location and orientation of the track, keep in mind the following important points:

- Before laying the track, **assess the site** to see how level and firm the ground or floor is. If you will be laying more than two track sections on a reasonably level floor, laying the middle section first and working outward can help prevent any unevenness of the floor from accumulating from section to section, beyond the ability of the track height adjustment range to cope. Beyond this range you will need to use additional supports to keep the track flat and level.

- The track is **not reversible** due to the cable chain and rack, which has teeth on one side. You must lay all sections the same way around. If your track does not have the rack installed yet, look at the rack clips on the track, which will grip the rail on the teeth side when you install the rail later.

View looking "Forward" down the track with the gear teeth on the left:



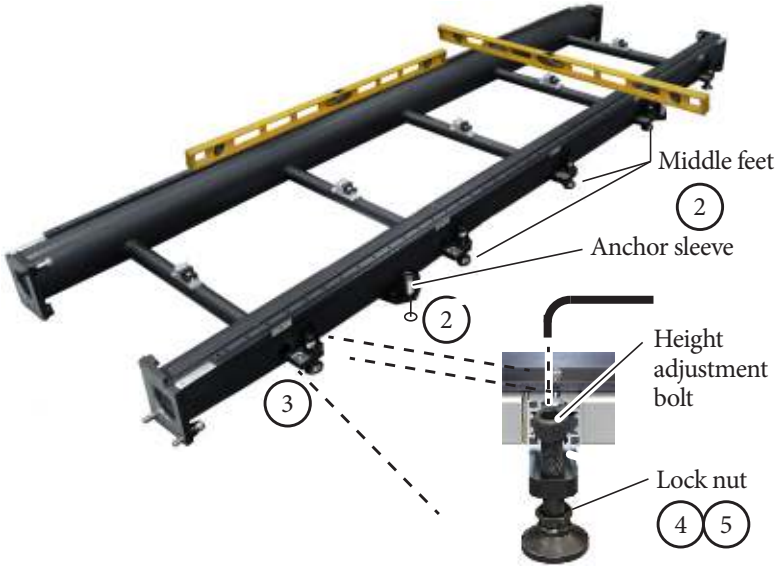
- Keep in mind where the **umbilical cable** comes out on the rig.
- Each track section has 12 **feet** for supporting and levelling the track, and 2 **anchor brackets** for holding the track down.

Foot, which takes the weight of the track and rig

Anchor bracket, which holds the track down on the ground.

Laying the first track section

1. Lay the first track section on the ground, on its feet.
2. Raise the six middle feet of the track section (three on each rail) and the two threaded anchor sleeves so they do not touch the ground, leaving the rail to rest on the four corner feet.



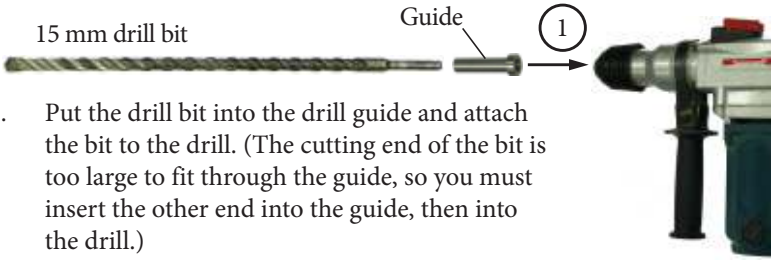
3. Level the track in both length and width directions using a spirit level, by adjusting the four corner feet of the track. Make sure all four corner feet are touching the ground (no wobble).

> Hint
>
> The four corner feet also determine the track height. If you are laying track on a level floor, try to use the middle of the height adjustment range so that subsequent sections have some leeway (in their feet) to cater for any unevenness in the floor.

4. Tighten the lock nuts up against the track on the corner feet, being careful not to change the height.
5. Lower the middle feet until they touch the ground (finger tight against the ground) and then tighten the lock nuts on them.

Anchoring the track

Secure the track to the floor by using bolts or screws through the six track anchor brackets. Anchoring the track to the floor gives you more repeatable stability than using weights. The following procedure tells you how to anchor the track to a concrete floor.

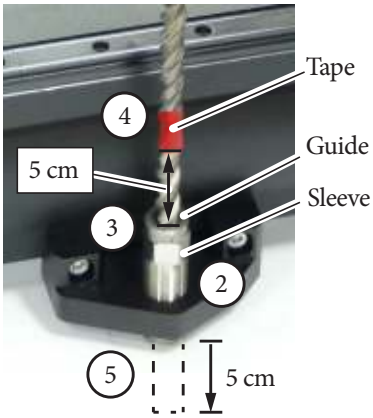


1. Put the drill bit into the drill guide and attach the bit to the drill. (The cutting end of the bit is too large to fit through the guide, so you must insert the other end into the guide, then into the drill.)

2. On one of the track anchor brackets, screw the sleeve all the way down to the floor, finger tight.

3. Insert the drill bit and guide into the threaded sleeve on the anchor bracket, so the drill bit is against the floor.

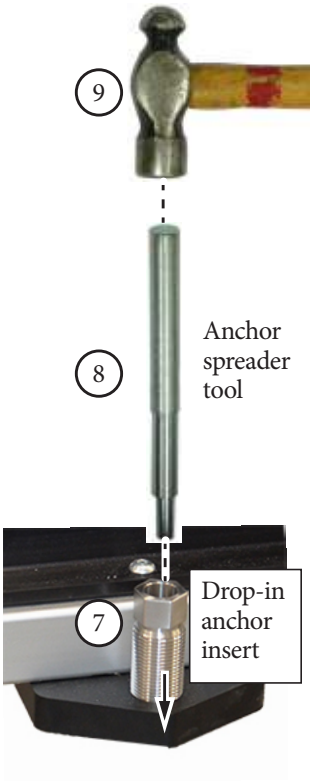
4. Put tape around the drill bit 5 cm above the guide. This will help you gauge the depth of the hole in the next step.



5. Drill a hole 5 cm deep into the concrete. When the tape reaches the top of the guide, drilling is complete.

6. Remove the drill bit and guide from the sleeve and clean the hole.

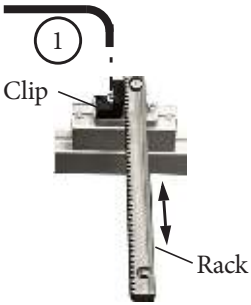
7. Put the drop-in anchor insert, threads upward, through the sleeve and into the hole in the concrete, all the way to the bottom.
8. Insert the anchor spreader tool into the drop-in anchor insert.
9. Hit the top of the anchor spreader tool with a hammer until the anchor is fully spread in the concrete, **being careful not to hit the track**.
10. Remove the anchor spreader tool.
11. With the sleeve still finger-tight against the floor, insert the retaining bolt through the sleeve and into the drop-in anchor insert, and tighten.



12. Repeat steps 2 to 11 for the other three anchor brackets on the track section.

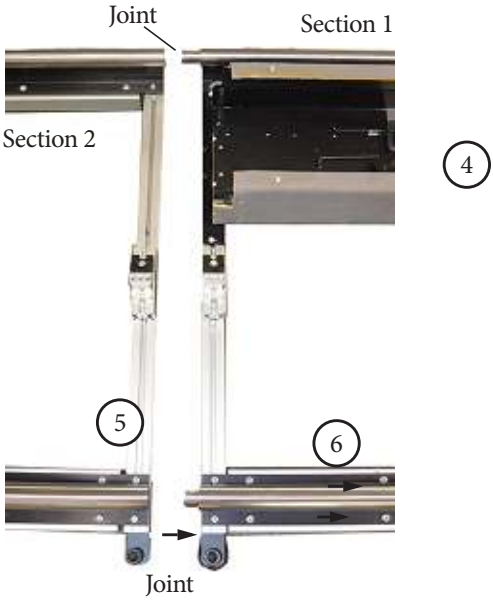
Laying subsequent track sections

1. If any of your track sections already have a rack installed, loosen the rack clips so you can temporarily slide the rack along the track and out of the way when you are joining the track sections.



2. Lay the next track section in line with the previously laid track section and as close to it as possible, making sure it is the right way around (see the notes on page 2).

3. Raise the middle feet and anchor sleeves of the new track section so they do not touch the ground.



4. Adjust the height of the new track section to match that of the previous section by adjusting the two corner feet nearest to the joint (one on each rail).

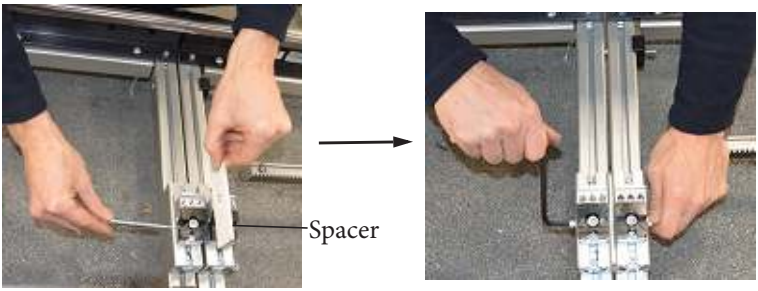
5. Level the new track section with a spirit level by adjusting the two corner feet furthest from the joint (one on each rail).

6. Slide the new track section along the floor against the previous track to firmly engage the ends of the rails. (Slide the new section — not the previous section.) Use the matching coloured stickers as guides to join the rails.

   You might need to repeat steps 4 to 6 until you get good alignment of the rails at the joint.

7. In order to secure the two lengths of rail together, add the 2 x clamps on either side of the joint.

8. Use a spacer to add a third large screw in the centre of the joint to firmly secure the two rails together.



9. On the new track section, tighten the lock nuts up against the track on the four corner feet.

10. On the new section, lower the six middle feet until they touch the ground (finger tight against the ground) and then tighten the lock nuts on them.

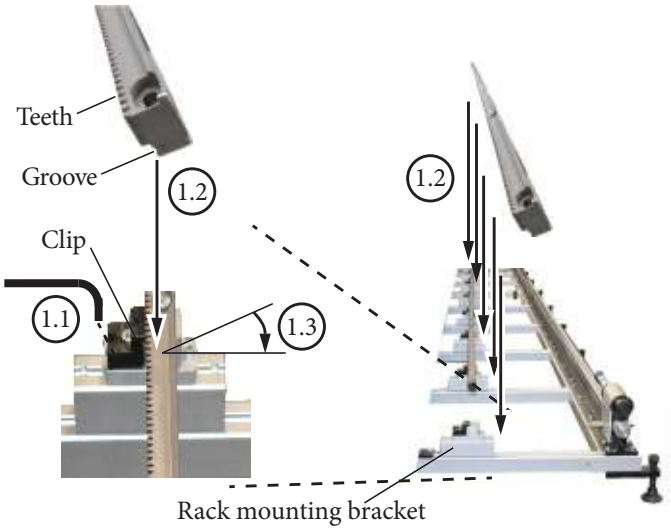
11. Anchor the new track section to the floor as you did for the previous track section, using the procedures in *Anchoring the track* on page 5.

Repeat steps 1 to 11 in this section to lay additional sections of track.

Mounting the rack

1. If your track sections do not yet have the racks mounted on them, do this now for each track section as follows:

    1.1 Loosen all the rack clips on the track section.



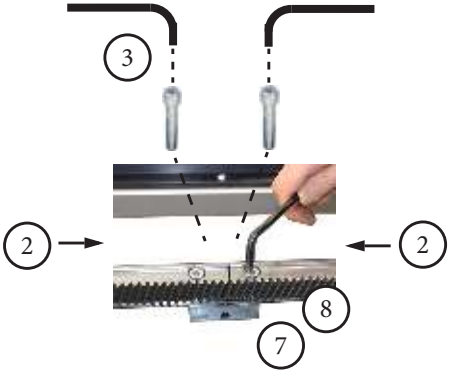
    1.2 Lay the rack into the brackets on the track, tilted as shown, making sure that the clips on the track go into the groove on the rack, just under the teeth.

    1.3 Twist the rack to lay flat in the brackets. Do not tighten the clips yet.

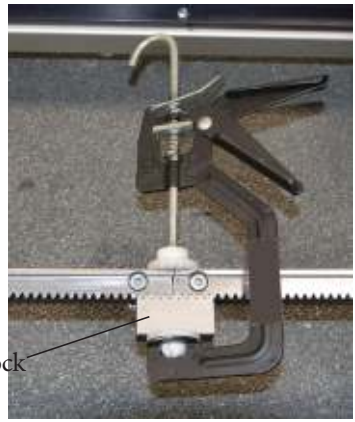
    1.4 Repeat steps 1.1 to 1.3 for each track section.

2. In the middle of the track, slide two of the racks together end-to-end, so that the so that the rack screw holes line up with the rack mounting brackets. You can insert screws in them to check that they line up. Do not tighten the screws yet.

3. Align a rack clamp under the joint and insert the two retaining bolts through the ends of the racks and into the clamp (one on each side of the joint), and tighten.

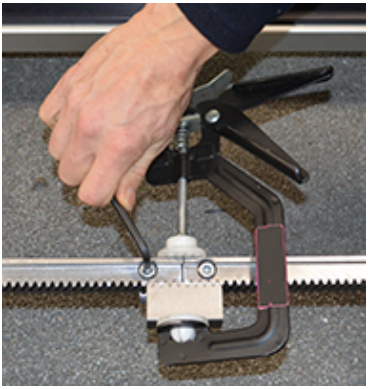


4. Make sure the rack joint has the correct spacing by clamping a rack matching block to it, teeth meshed, using a vice. Do not fully tighten the screws on the clamp yet.



5. Tighten **all** rack clips on the two adjoining sections of track.

6. Secure the rack with the bolt through the rack at every mounting bracket.
7. Tighten the screws on the clamp.

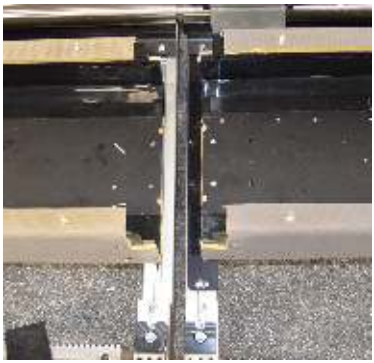


8. Remove the vice and rack matching block.
9. Repeat steps 1 to 6 to mount the rack on all remaining sections of track, working outwards from the centre track section.

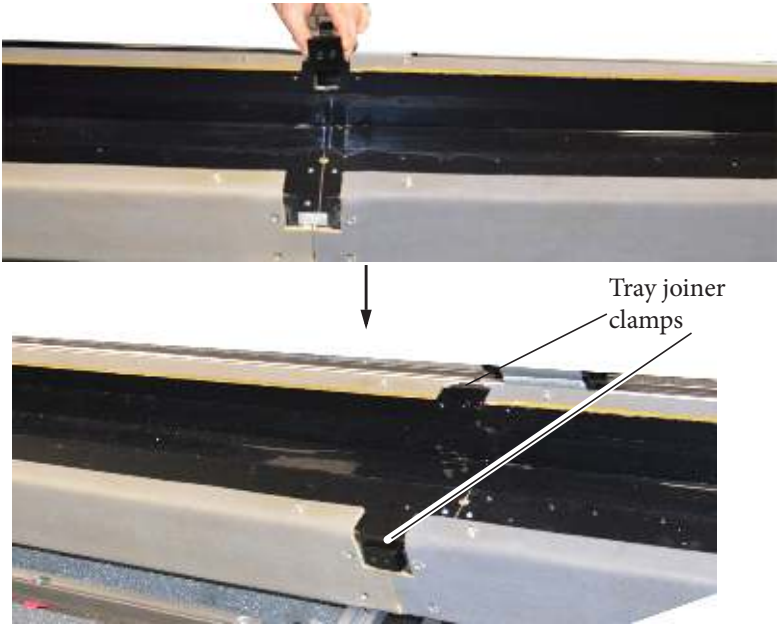
Mounting the Cable Chain Tray

1. Two people lift and place the cable chain tray over the first rail on the teeth side of the rack.

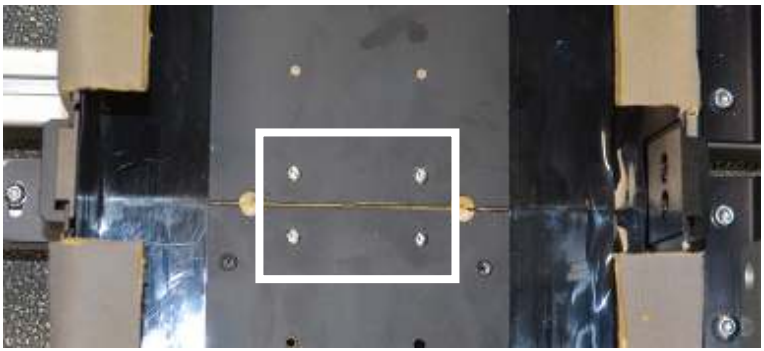
2. Similarly place all the trays on the rails ensuring that the screw holes at the end of the trays align with those near the rail joints.



3. Loosen the 2 x screws on the tray joiner clamp and slide it between the two trays. When in place tighten the 2 x screws. Similarly add the clamp to the other side of the rail joint.



4. Tighten the 4xscrews to secure the trays to the round rail.



5. Use the supplied adhesive tape to carefully line the two edges of the tray floor and the walls along the entire length of the cable

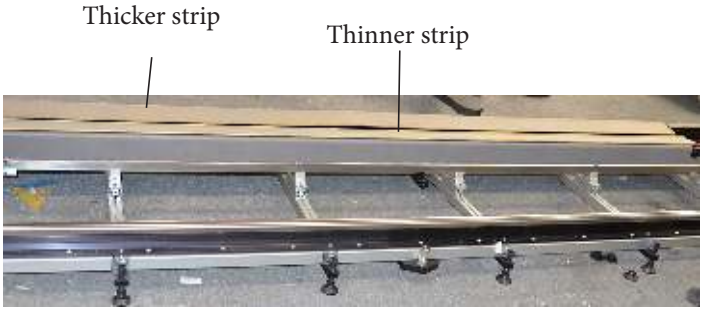
management tray in order to minimize friction when the chain management system moves within the tray.

Mounting Talos on the Track

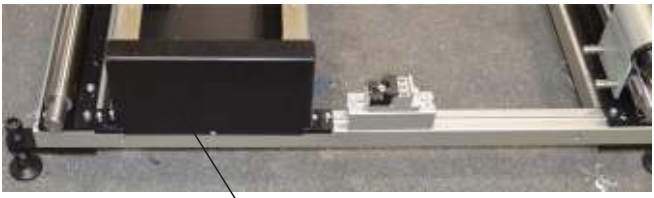
1. Roll the rig to a position just off the end of the track, raise the rig on its wheels high enough to go over the track using the wheel cranks, and rotate the rig on its wheels to be the correct way around so that the track motor gear on the rig underside is on the toothed side of the rack. **Do not engage the teeth yet; just make sure the rig is the correct way around for the track.**
2. On the underside of the rig, remove the pinch wheel if you haven't already done so and push the track motor out of the way on its sliding bearings, so that the track motor gear will not interfere with the Rack on the track. (For details of removing the pinch wheel, follow the procedure on page 19 in reverse order.) **Do not slide the pinion gear too far away from the rack when moving it into place, the rear (inner) track motor mounting bolt will hit the racking as you drop the rig down, preventing it from settling onto the bearings.**
3. Push the rig on its wheels over the track about a metre, being careful not to push the track motor gear against the rack while moving.
4. Carefully lower the rig onto the track, ensuring that the track motor gear on the underside of the rig clears the rack.
5. Apply the brakes to the wheels to keep them from pivoting against the track (the brakes affect both rotation and pivot), and raise the wheels off the ground so the full rig weight is taken by the track.

6. .Add the cable chain to the tray such that the panel can be mounted at the end of the rails and the bracket at other end can be secured with Talos.

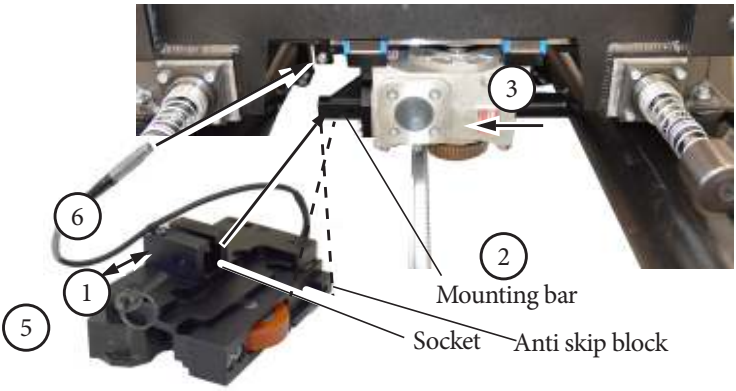
7. Secure the cable chain with the cable tray top.
8. Attach the track motor pinch wheel on the underside of the rig, described in *Attaching the track motor pinch wheel to Talos* on page 19.
9. Add the cable tray cover strips along the length of the track. The thicker one is for the side closer to the edge of the rail and thinner one for the other side. Secure using nylocks.



10. Secure the cable tray cover (using 2 x screws) at the end of the round rail track to close the tray opening.

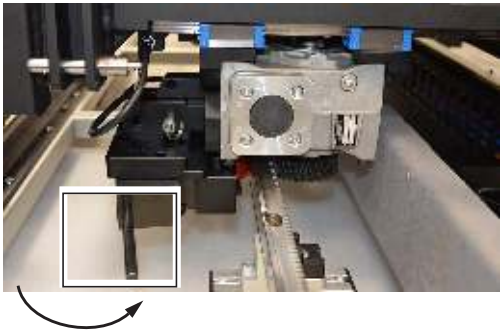


Attaching the track motor pinch wheel to Talos



1. On the separately supplied pinch wheel assembly, remove the brass retaining pin by pulling on the ring.
2. Mount the pinch wheel assembly onto the track motor on the rig underside, by sliding the track motor gear against the rack and putting the pinch wheel Socket onto the track motor Mounting bar.
3. Push the track motor slightly towards the rail racking so that the track motor gear is in mesh with the rack.
4. Replace the retaining pin in the pinch wheel assembly by pushing on the ring (not the sleeve), to hold the assembly in place on the track motor.

5. Use the lever into the pinch wheel CAM to pull it towards the rack until it snaps into position. This holds the track motor gear firmly against toothed side of the rack.



6. Connect the pinch wheel cable and use cable ties to hold it securely up away from the track.

> Hint
>
> The Limits and Datum magnets on the track are physically swappable (see page 29). Make sure you connect the Limit cable from the rig to the pinch wheel switch that is over the Limit magnet position on the track, and ditto for the Datum cable.

Mounting the Bumpers on Track

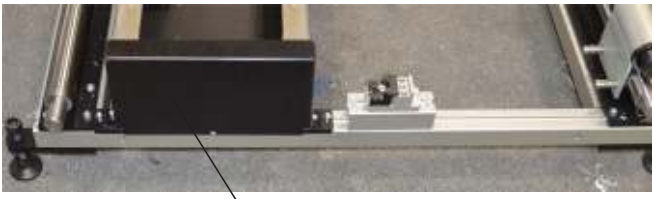
1. Insert one of the bumpers on to the rails.
2. Insert the 2 x retaining pins through the bumper bracket and the rails.
3. Repeat steps 1 to 2 to mount the other three bumpers in the remaining 3 corners of the track.

Adjusting Track Levelling after Mounting the Rig

You may need to adjust the round rail levelling once you have mounted the rig. To do this:

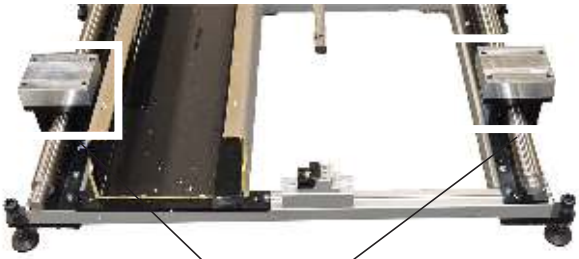
1. Remove the buffers from the round rail track, if mounted.
2. If the rig is already mounted and cables connected, remove the umbilical connectors from the rig. Unscrew the main connector panel from the tray and wheel the rig out of the track.

3. Remove the end cover from the tray by unscrewing 2 x screws.



Tray cover

4. Slide the rail levelling sliders on both sides of the round rail.



Rail levelling sliders

5. Level the section using a spirit level. Continue along the entire length as well as the sides until the track is perfectly levelled.

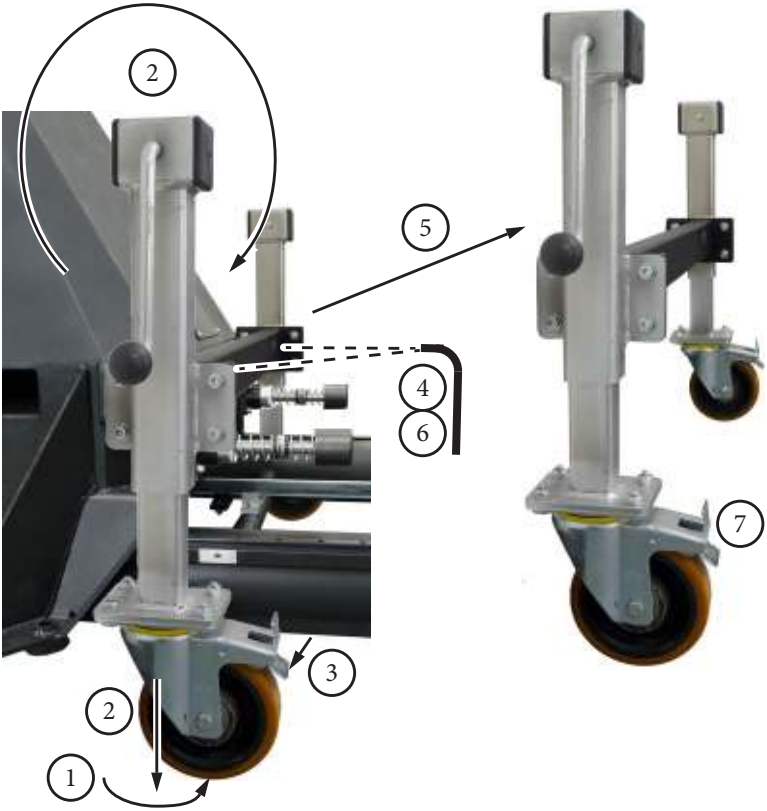
Adjusting the Rig Wheels on the Round Rail

When mounted, the wheels of the rig to completely rest on the round rail for smooth and precise movement. One way to ensure this is by turning the wheels by hand, if they are not tight and you are able to turn them then they need adjustment.

1. Using a spanner, hold the locking nut in place and using an allen key unscrew the jacking screw slightly.
2. Now loosen the locking nut until you are able to move the wheels by hand.
3. Adjust the wheels so they align and sit properly on the round rail.
4. Tighten the jacking screw and the locking nut. The wheels should be tight and unable to move by hand.

Removing the trolley wheels from Talos

After mounting the rig on the track you can remove the two trolley wheel units that are on either side of the rig.



1. With the base of the rig supported by the track, pivot the wheels away from the rig.
2. Turn the cranks to lower the wheels to the ground.
3. Apply the wheel brakes.
4. Remove the two bolts holding the wheel trolley unit on the rig.
5. Lift the wheel unit away from the rig.
6. Insert the two wheel trolley retaining bolts back into the rig base, for safe keeping.

7. If you are going to store the wheels for weeks or months, release the wheel brakes so they don't leave a dent in the wheel rubber.

Notes

Notes

Mounting the Limit Switch and Datum Switch magnets on the rack

About track limits

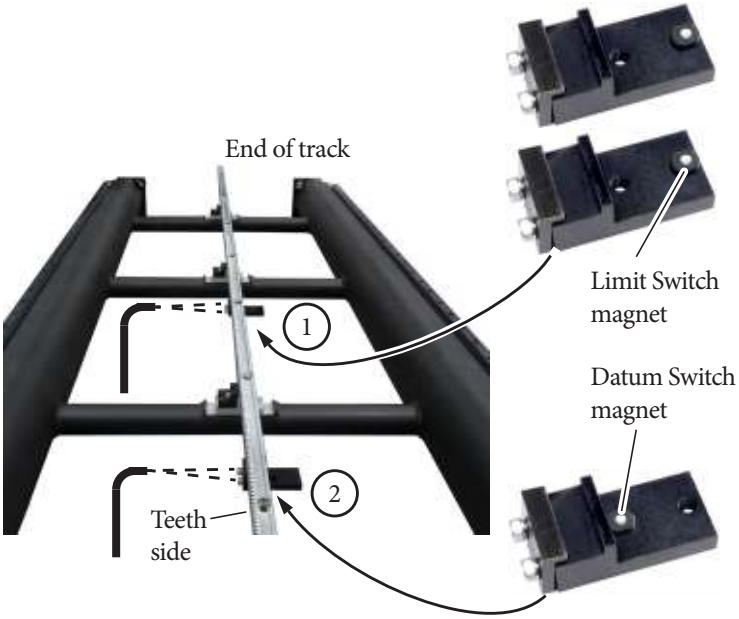
In a track-mounted rig there are typically three devices for limiting movement along the track to prevent the rig going off the end of the track:

- **Soft limits** - You configure these in the Flair Motion Control Software that controls the rig. When the system is working correctly the soft limits act as a barrier to other parts of the software such as programmed moves or live commands, so that no part of the software can move the rig beyond the soft limits.
- **Limit and Datum Switches** - The **Limit Switch** consists of a magnetic sensor located on the track motor pinch wheel on the underside of the rig, and two magnets which you mount at each end of the rack. The position of the magnets along the rack defines the ultimate limits, along the track, for the rig electronics. You define the soft limits within the range of the Limit Switch magnets, so that if the soft limits fail for some reason and the rig reaches one of the Limit Switch magnets, the system electronics automatically shut down any further movement and apply the brakes. A similar switch called the **Datum Switch** is used in combination with a single Datum magnet which you also mount on the rack but at a different distance from it. The Datum Switch defines a fixed reference point on the track for the electronics. The Flair software can then use this position as the home position or zero point, from which all movements and soft limits along the track are measured.
- **Buffers** - These are steel plates that physically prevent the rig from going off the end of the track if the previous two limits fail. Spring-loaded bumpers on the rig help to prevent damage to the rig or track, but you should never intentionally use the buffers to stop the rig.

Mounting the magnets

Although you can mount the magnets for the Limit Switch and Datum Switch on the rack at any time, you ordinarily do this after mounting the

rig on the track so that you can precisely adjust the height of the magnets relative to the magnet sensors on the pinch wheel on the underside of the rig.



The bracket that holds the magnet has two holes, and there is no convention regarding which hole to use for the Limit magnets and which to use for the Datum magnet. Whichever arrangement is used, the two brackets with an identical arrangement are used for the Limits at the ends of the track, and the bracket with the magnet in the other hole is used for the Datum which is between the Limits.

The track motor pinch wheel on the underside of the rig has two switches (sensors) that run over these two magnet positions — one switch for the Limits and one for the Datum.

1. Mount the two Limit Switch magnets (the two brackets that have the magnet in the same hole) onto the underside of the rack — one at each end of the track about a metre from the end. The actual distance depends on your requirements and on which side of the rig your Limit Switch is on (located on the track motor pinch wheel on the underside of the rig). Position the magnet along the rack so the

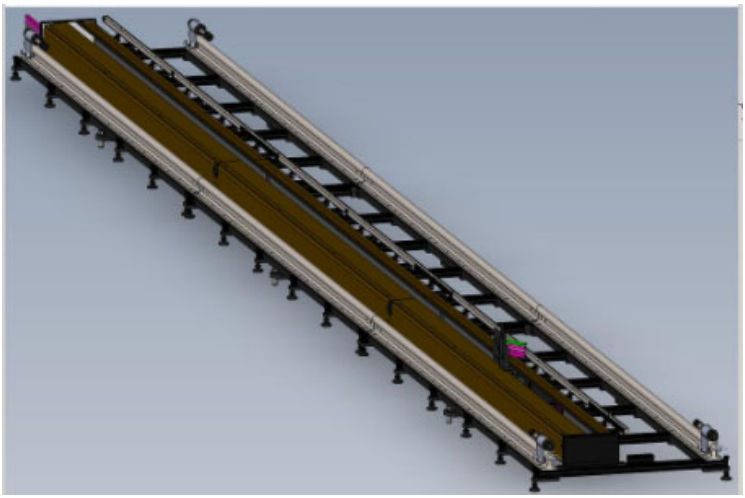
Limit Switch on the pinch wheel goes over the magnet before the rig hits the physical end of the track with plenty of room to spare.

2. Mount the Datum Switch magnet (the bracket that has the magnet in the other hole) onto the underside of the rack, usually about 0.2 metres in from one of the Limit Switch magnets depending on your requirements.

3. Power up the rig and roll it slowly over each magnet, checking for clearance between the magnet on the rack and the sensor on the pinch wheel assembly on the underside of the rig. Adjust the height of the magnet (by loosening and re-tightening the bracket, and screwing or unscrewing the magnet in the threaded hole) to give 1 to 2 mm of clearance between the magnet and the sensor.

> Caution
>
> Mounting the magnets too high can damage them, as they can come into contact with the pinch wheel assembly on the underside of the rig.
>
> To adjust the magnet when the rig is over it, remember to observe safety procedures to disengage the robot and make use of the E-stops so that the rig does not move when you are working under it.

Notes



Mark Roberts Motion Control Ltd.
Unit 3, South East Studios, Blindley Heath, Surrey RH7 6JP
United Kingdom
Telephone: +44 (0) 1342 838000
info@mrmoco.com
www.mrmoco.com