

Revolver Turntable Setup: From the Crate to Your First Cue

Circles are hard! A turntable is one of the trickiest machines to set up, and that's not on you. Most turntable trouble comes from small steps that are easy to skip or don't seem important at the time. This guide walks you through every one of them, in the order you'd do them on stage. Take them one at a time and don't skip ahead. Each step sets up the next, and the payoff is a turntable that lands where you expect it to, every time. Plan on about half a day with two people.

Safety: Turntables move people and heavy scenery. Keep hands, hair and loose clothing away from the drive wheel. Before you work on the Revolver, press the E-stop or unplug the E-stop cable from the Stagehand. Step on or off the turntable only when it's stopped.

WHAT YOU NEED

- Revolver, Stagehand, Showstopper E-stop, and the motor and signal cables from your kit
- An M12 encoder cable, **only** if you use a Pivot or a Stagehand AC (Stagehand Classic)
- 208 V, 3-phase power (L15-30 or L21-30). See the Electrical FAQ.
- A Windows 11 computer with Spikemark 6, set to IP address 192.168.10.245. See the Computer FAQ.
- 3/8 in lag bolts or bolts for at least 4 mounting holes
- A 1-7/8 in wrench (or 10 in Channel-Locks), a 5/32 in hex key, rubbing alcohol, clean rags, string, and spike tape

Using a Pivot? A Pivot is optional. It reads the turntable's position at its center instead of at the edge. If you use one, **run the M12 encoder cable to the center before you finish building the turntable.** Otherwise you'll have to fish it underneath later. Plan the cable path, too: a wheels-down turntable (casters attached to the turntable) needs elevated rails so the casters don't run over the cable, or else build a wheels-up turntable (casters attached to the floor). See *Pivot vs. Dancer Wheel Encoder* and docs.creativeconners.com.

STEP 1: PLACE AND SECURE THE REVOLVER

The scenery should move. The machine should not.

1. Slide the motor sled **back** toward the rear of the frame. Stop where you can still reach the bolt holes in the bottom frame between the back rail frame and the sled. This puts the sled where it can travel at least 1 in forward and 1 in back as the springs push it against the turntable.
2. **Keep the sled in that position** while you move the whole frame into place. Set the Revolver so the drive wheel touches the turntable's drive edge. The "tongue" under the drive wheel may need to slide under the turntable edge.
3. Aim the drive wheel at the center of the turntable. Stretch a string from the center of the turntable to the center of the motor shaft. The string should pass straight through the center of the drive wheel shaft. This makes the drive wheel push straight into the edge, not at an angle.

[GRAPHIC: string alignment] Top view: string from the turntable center, through the drive wheel shaft center, to the motor shaft center.

4. Before you bolt it down, check all four:

- The sled is still pulled back.
- The drive wheel touches the drive edge.
- The string passes through all three centers.
- The sled has room to move both forward and back.

5. Bolt or lag **all 4 corners** of the base to the floor with 3/8 in hardware. If you can't reach a hole at the tongue, use the nearest hole by the encoder instead.

[GRAPHIC: Revolver base mounting holes] Callouts on the 4 corner holes, plus the alternate hole by the encoder.

Don't run the Revolver until it's bolted down. An unsecured machine walks away from the turntable, and the drive wheel loses contact.

STEP 2: MAKE THE CONNECTIONS

1. Connect the motor cable and the signal cable from the Revolver to the Stagehand.
2. Using a Pivot or a Stagehand AC (Classic)? Connect the M12 encoder cable too. See *Pivot vs. Dancer Wheel Encoder*.
3. Connect the Stagehand to the Showstopper E-stop system and to the network switch.
4. Plug the Stagehand into 208 V, 3-phase power.

Route the cables carefully. Keep signal and encoder cables 6–12 in away from motor and power cables, and cross them only at 90°. Don't leave coiled power cables on or near the signal or encoder line. Electrical noise causes position errors that are hard to track down.

STEP 3: CLEAN THE WHEELS AND SET THE TENSION

Most turntable problems come from slip, and dust is the biggest cause. A dusty wheel is **very** slippery.

Clean

1. Wipe the drive wheel and the encoder wheel with rubbing alcohol until they feel tacky.
2. Clean the turntable's drive edge the same way.
3. Sweep or vacuum away as much dust as you can around the Revolver and the drive edge.

Find the dip

1. Pull the sled all the way back, so the drive wheel no longer touches the turntable.
2. Turn the turntable slowly by hand. Watch the gap between the drive wheel and the edge.
3. Find where the gap is **largest**. This is the "dip" (the low spot) in the drive edge. Mark it.
4. Turn the turntable so the dip sits at the Revolver. Set all tension here.

Drive wheel

1. Push the sled forward until the drive wheel touches the edge.
2. Tighten the two tensioning nuts until the springs compress about **1 in**.
3. Leave some spring travel so the wheel can ride over bumps in the edge.

Hear loud electronic or "robotic" noise from the motor? The tension is often too tight. Back the nuts off a little.

Encoder wheel

[GRAPHIC: encoder mount] Callouts on the 2 cap screws to loosen and the hex bolt used for tension.

1. Loosen the 2 cap screws shown above.
2. Center the encoder wheel on the height of the drive edge. The wheel must run **parallel** to the top of the turntable.
3. Use the hex bolt at the end of the shaft to add spring tension (about 1 in of pull after the wheel touches the edge), then tighten the cap screws.
4. Check: the encoder wheel doesn't spin freely, and it takes real force to pull it away from the edge.

STEP 4: TEST FROM THE STAGEHAND ONLY

Do this test **with the computer off**. You don't need Spikemark yet.

1. Clear the turntable, then release the E-stop. The Stagehand shows **DISCONNECTED** and its IP address.
2. Hold **FWD** and slowly turn the jog knob clockwise.
3. Check two things:
 - The turntable turns **clockwise**.
 - The encoder count on the Stagehand display goes **up**.
4. Hold **REV** and jog. The turntable turns counterclockwise and the count goes **down**.

YOU SEE	FIX
Turntable turns the wrong way	Swap two motor phases. Not sure how? Email support.
Turntable turns the right way, but the count goes the wrong way	Swap the encoder A/B wires, or turn the encoder upside down where possible. Not sure? Email support.
Motion is jerky or the drive wheel squeals	Clean the wheels and check the drive wheel tension (Step 3).

Cues won't run until FWD turns clockwise and counts up. Fix this now. Spikemark has no setting that reverses it.

STEP 5: CHECK FOR ENCODER SLIP

1. Put a strip of spike tape across the turntable edge and the surround so the two halves line up. These are your **home marks**.
2. Put a second mark on the top of the encoder wheel and a matching mark on the turntable.
3. Jog FWD one full turn until the home marks line up, then jog REV back to the home marks.
4. Check the encoder marks. They should line up within 1/2 in.

If they don't:

- Clean the wheels and the drive edge again.
- Check the drive edge for jumps, skips, gaps, obstacles or slick spots, and fix them.
- Last resort: add grip tape to the drive edge. It works, but it wears the wheels out faster.

STEP 6: GET SPIKEMARK READY

1. Turn on the computer. Open Spikemark from the **Start** menu.
2. Make sure only one copy is open. Hover over the Spikemark icon in the taskbar; you should see just one window.
3. Select **File > Spikemark Options**. In the **Spikemark IP Address** drop-down, select **192.168.10.245**, then select **Save**.
4. Press **Ctrl** + **N** for a new show (or **Ctrl** + **O** to open one; don't double-click a show file).
5. Press **Ctrl** + **S** and save the show with a clear name.

Can't see the motor cards? On smaller screens, the top section (playbacks and 3D view) can cover the area where the motor cards appear. Drag the thick divider line below the top section upward to make room.

[GRAPHIC: splitter pane] Callout on the divider line between the top section and the Axis Dashboard / card area.

STEP 7: ADD THE REVOLVER

1. Select **Machine Library** in the menu bar.
2. Drag **Revolver** into the axis list. [VERIFY IN V6: library entry name for v2/v3 and drop target]
3. In the **Revolver Diameter** window:
 - Enter the turntable **Diameter** in feet.
 - Select the **Encoder Resolution**. Check the model number on the encoder: it has **5000** or **10000** in it. Not sure? Pick one. The position scale in Step 11 corrects it either way.
4. Close the Machine Library with the small **chevrons** at the bottom center of the library. They collapse it back into the toolbar, and they're easy to miss.
5. Select the Revolver's card. Its settings fill the **Properties Panel** on the right side of the screen. Enter a clear name (for example, **Turntable**) at the very top right of the Properties Panel.

The Machine Library sets the **Axis Type** to Rotator for you. If you build your own machine instead, set **Axis Type** to **Rotator** in the **Schematic** section of the Properties Panel. It makes cues say "rotates" and makes the 3D view spin.

STEP 8: CONNECT

Every device on the network shares the first three numbers of its address. The last number is unique to each device.

[GRAPHIC: IP addressing] The docs site graphic: first 3 octets identical (192.168.10), last octet unique per device.

1. Check the Stagehand display for its IP address. A new Stagehand is **192.168.10.32**.
2. In the right-hand Properties Panel, find the **Network** section and enter the same **IP Address**.
3. Set **Show Mode** (top of the screen) to **Live**.
4. Press **Ctrl** + **T**, or select **Connect** in the Network section.
5. In the **Hardware** section of the Properties Panel, compare **Firmware Installed** with **Most Recent Firmware**. If they differ, update the firmware, then turn the Stagehand off and on again.

Still Disconnected? Check the computer's IP address (Computer FAQ) and the network cable, and make sure no other copy of Spikemark is open.

Reading the motor card

[GRAPHIC: motor card callouts] 1. Name. 2. Status icon. 3. Limit triangles. 4. Current position. 5. Card turns yellow outside the soft limits.

- **Status icon:** the first icon shows the Stagehand's state.  (idle) is normal at rest.  means Spikemark isn't talking to the Stagehand.
- **Limit triangles:** one for forward, one for reverse. Filled means clear. Outlined means that limit is active and blocking motion in that direction.
- **Position:** the turntable's current position, in degrees.

See a load cell mismatch  right away? That's common, and a turntable doesn't need its load alarms. Pick one fix:

- In the **Load Cell** section of the Properties Panel, select **Configure**, then **Accept Stagehand Values**, and wait about 5 seconds for the values to load.
- Or select **Disable Load Alarms**  in the Load Cell section.

STEP 9: CHECK THE JOG DIRECTION LABELS

1. Press **F10** to open the **Jog Workspace**.
2. In the jog section, check the direction labels: forward should read **Clockwise** and reverse **Counter Clockwise**. Set them if they don't.

3. Use the jog sliders to jog a short distance each way. The turntable should turn the way each label says. This is your second direction check.

STEP 10: SET THE SOFT LIMITS

Soft limits stop cues and Move to Position commands from going too far. **Jogging can still go past them**, and the motor card turns yellow when it's outside them.

1. In the **Position** section of the Properties Panel, set the maximum forward position to at least **1440** and the minimum reverse position to at least **-1440** (4 turns each way).
2. Will the show turn more than 4 turns in one direction? Enter that many turns in degrees instead (turns × 360).
3. Press **Ctrl** + **S**.

STEP 11: SET HOME AND CALCULATE THE POSITION SCALE

The position scale tells Spikemark how many encoder counts make one degree. A good scale is the base for everything that follows, so take your time.

Set home

1. Jog the turntable until the home marks line up.
2. At the top of the Properties Panel, select the blue **position number**. The **Reset Position** window opens.
3. Enter **0** as the **New Position**, and select **OK**.

The position count lives on the Stagehand, not in Spikemark. When you switch between Simulator and Live, check that Spikemark's position matches the real turntable. If you swap Stagehands, reset the position at the home marks.

Calculate the scale

Before you start:

- **Be precise.** Stop exactly on the mark. Don't go past it and come back; any slop in the drive adds error.
- **Be gentle.** Start and stop the jog slowly. Sudden starts and stops cause tiny slips.
- **Go slow.** It's tedious, but slow jogging prevents slip.

1. In the **Position** section of the Properties Panel, select **Position Scale**. It's a link beside the box, not the box itself, and it's easy to miss.
2. Select **Reset Zero**.
3. Jog clockwise exactly **4 full turns**, stopping on the home marks.
4. Enter **1440** as the **Distance traveled**, and select **Use New Scale**.
5. Press **Ctrl** + **S**. **A position scale that isn't saved is lost when the show reopens.**

Check it: jog or move back to 0 and look at the home marks.

YOU SEE	WHAT IT MEANS
Marks line up, Spikemark reads 0	The scale is good.
The turntable went past the marks, but Spikemark says 0	Slip. Recheck cleaning, tension and the drive edge (Steps 3 and 5).
The turntable stopped short of the marks, but Spikemark says 0	It's gaining counts. The scale may be wrong, there may be electrical noise, or the encoder wheel may ramp up a bump in one direction and drop off it in the other. Redo the scale, check cable routing, then email support.
The marks line up, but Spikemark hasn't reached 0 yet	Typical of slip. Recheck Steps 3 and 5.

"It never lands on exactly 0 or 360." That's expected. The **Target Tolerance** starts at 0.25°, so a move counts as complete within 0.25° of the target. What matters is that where the turntable stops matches what Spikemark shows. You can lower the tolerance after you tune the motor (see the end of this guide). Lowering it now often stops cues from completing.

STEP 12: FIND THE REAL TOP SPEED

Cues faster than the machine can go end in a position fault. This is one of the most-skipped steps.

1. Clear the turntable.
2. In the Jog Workspace, jog clockwise at full speed.
3. Watch **Speed** in the **Speed** section of the Properties Panel. It flickers between two numbers.
4. Take the average of the two numbers, or a little below it. The higher number is almost always faster than the drive can really go.
5. Enter that value as **Max Speed**, and press **Ctrl** + **S**.

STEP 13: MAKE YOUR FIRST MOVE

Use **Move to Position** in the Jog Workspace. Before every move, check these 4 things:

1. **The right motor is selected.** Only the turntable shows in the Axis Dashboard.
2. **The start is right.** The turntable is really where Spikemark says it is.
3. **The target is right.** The target position goes where you intend.
4. **Speed and accel fit the move.** Start slow. Set the accel to about 1/2 to 1/3 of the speed.

Then move to **90**, and move back to **0**. The home marks should line up.

STEP 14: UNDERSTAND POSITIONS AND SPIKES

Positions are **absolute**: a number means a spot on the turntable, not a distance to turn. **180** and **540** are the same spot ($540 = 360 + 180$).

- Starting from **0**: going to **180** is a half turn, and going to **540** is 1-1/2 turns. Both go clockwise.
- Starting from **360** (the same spot as 0): going to **180** turns **backward** (counterclockwise), and going to **540** turns **forward** (clockwise).

So the number you pick controls the direction and how far it turns.

A **spike** is a named position, like spike tape on the deck. Add spikes for your scene positions (for example, **Scene 1** = **0** and **Scene 2** = **180**). See *Simple Spikes*: docs.creativeconners.com/docs/spikemark-6/spikes/simple-spikes

Need it to turn the same direction every time, or keep spinning? That takes Dynamic Spikes (for example, Nearest Forward Multiple with a factor of 360). Use either Dynamic Spikes or regular spikes for all of the turntable's cues. Don't mix the two.

STEP 15: WRITE AND RUN YOUR FIRST CUE

1. Build a cue that moves the turntable to **Scene 2**. See *Cue Structure*: docs.creativeconners.com/docs/spikemark-6/cues/cue-structure
2. For this first test, set the speed to about **1/3 of your Max Speed** and the accel to **1/2 of that speed**.
3. Build a second cue back to **Scene 1**, and press **Ctrl** + **S**.
4. Clear the turntable. Load Cue 1 (it turns red), press **GO** once, and watch it land on the mark. Then run Cue 2. See *Playbacks*: docs.creativeconners.com/docs/spikemark-6/running-cues/playbacks

WHEN IT JOGS BUT WON'T RUN A CUE

First, find out why it stopped. The card's status icon shows only the **most recent** fault. A position fault  is the usual cause, but if the stop also triggered a drive or brake fault, that hides the real cause. Select **Window > Log**

Viewer, scroll to the bottom, and find the line where it faulted.

How a position fault works. Spikemark compares where the turntable should be with where it is. If the difference is bigger than **Max Position Error** for longer than **Position Lag Time**, Spikemark stops the move. Both settings are in the Advanced section of the Properties Panel. See *Max Position Error*: docs.creativeconners.com/docs/spikemark/position-scale/max-position-error

IT FAULTS...	LIKELY CAUSE	TRY
Near the start of the cue	Proportional Gain too low, accel too aggressive, or slip	Lower the accel, then tune (below). Check for slip.
In the middle of the move	A slippery spot on the drive edge, or the cue is faster than the machine can go	Check the drive edge. Check Max Speed (Step 12) and slow the cue down.

Tune the motor. Most turntables start with too little Proportional Gain, especially with heavy scenery. See *Motor Tuning*: docs.creativeconners.com/docs/spikemark/position-scale/motor-tuning. Work in the **Tuning** section of the Properties Panel, and test with a cue after each change:

1. **Raise Proportional Gain** in small steps until the cue runs without faulting.
2. **Jitter at the start or end of the move?** Add Derivative: start with **Derivative Gain** and **Derivative Sampling** , and build from there.
3. **Struggles to reach the final position?** Add a little Integral (**Integral Gain** , **Integral Limit**) instead of more Proportional Gain.
4. **Overshoots and comes back before stopping?** The Integral Gain is too high. Lower it.

Still stuck? Email support@creativeconners.com with the show file, the logs and a photo of the screen.

EVERY DAY BEFORE THE SHOW

- Check that the turntable reads at the home marks. If it doesn't, find out why before you reset it.
- Keep the drive edge and the wheels clean.
- Load a cue only when you're about to run it. Press **GO** once and wait a second.
- Don't reset position between loading a cue and running it.
- Save the show, and keep a backup on a USB drive.

Questions: support@creativeconners.com (include the show file, the logs and a photo of the screen)

Urgent, show-stopping problem: 401.289.2942 ext 2