Crossing Manual

None

Transmit Receive Labs Inc.

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1. Home

1.1 Introduction

Welcome to the TXRX Portable Crossing Guard. This manual is intended for machine operators, maintenance technicians, and field engineers. It provides step-by-step instructions to safely and effectively operate and maintain this equipment.

> **Warning**
>
> This manual does not replace proper hands-on training. Only qualified personnel should operate or maintain this equipment.

1.1.1 How to Use This Manual

This manual is organized into clearly labeled sections for quick reference:

> **Note**
>
> If you're looking for a specific topic, refer to the Table of Contents or use the search function (for digital versions).

- **Safety Information** – Read this first. Covers required precautions and emergency procedures.
- **System Overview** – Understand the machine's components and technical limits.
- **Setup** – Step-by-step guidance for correct installation.
- **Operation** – Learn how to safely use the device and interpret status lights.
- **Maintenance** – Outlines regular tasks to ensure long-term performance.
- **Troubleshooting** – Helps diagnose and correct common issues.
- **Appendices** – Include wiring diagrams, part numbers, and calibration logs.

1.2 Safety Information

The safety instructions included at this point are general safety instructions. You will find particular safety instructions at the beginning of each chapter or at the appropriate point in the text.

> **Warning**
>
> Safety instructions are emphasized by a brightly shaded triangle and block quotes.
> Be sure to read all safety instructions before proceeding.

- Observing all safety instructions will help you to avoid accidents and prevent damage to equipment.
- Always comply with the safety instructions, even in scenarios where you are under time pressure.
- Once accidents happen, they cannot be undone.

1.2.1 Safety Warning

IMPORTANT SAFETY INFORMATION – READ BEFORE OPERATING

This equipment is intended only for use by trained and authorized personnel. All users must read, understand, and follow the instructions in this manual before installing, operating, or servicing the equipment.

Failure to comply with the instructions and safety precautions in this manual can result in serious injury, equipment damage, or death.

- Always follow lockout/tagout procedures before performing maintenance.
- Disconnect power supply before servicing.
- Do not bypass, disable, or modify any safety features.
- Use only manufacturer-approved accessories and replacement parts.

1.2.2 Safety Disclaimer

> **Equip Proper PPE**
>
> ANSI-rated Personal Protective Equipment (PPE) must be worn at all times, including safety glasses, gloves, hard hat, and protective footwear.

The manufacturer assumes no liability for damage or injury resulting from:

- Improper installation or operation.
- Unauthorized modifications.
- Use outside of intended application.
- Neglect of routine maintenance.

By operating this equipment, the user agrees to accept all responsibility for its safe use. If there is any uncertainty regarding safe operation, contact the manufacturer or a qualified supervisor before proceeding.

1.3 Tools and Equipment

- Measuring Tape
- Tamping Pick or Pickaxe
- Multimeter
- Metric Allen Key Set
- Adjustable Wrench x2
- 1/8" Slotted Screwdriver
- Utility Knife
- Cordless Drill + Drill Bits
- Ratchet and Socket Set
- Fish Tape or Pulling Rods
- Level (Bubble or Digital)
- Personal Protective Equipment (PPE): As required

2. System Overview

2.1 Trailer Assembly

- Trailer Jacks
- Battery Enclosure
- Controller Enclosure
- Arm Holder
- Solar Panel Receivers
- Counterweight Holder
- Remote Enclosure

2.2 Gate Assembly

- Actuator
- Roadway Warning Lights
- Crossbuck
- Bell
- Antenna Array
- Camera

2.3 Arm Assembly

- Long Aluminum Section
- Short Metal Section
- Middle Section
- Long End Section
- Short End Section
- Counterweight Plates
- Arm Lights

2.4 Remote

- Wireless Remote
- Charging Cradle

3. Setup

3.1 Safety

Disclaimer

Always ensure you have the correct tools and training before beginning installation.

Attempting installation without the specified tools may result in improper assembly, equipment damage, or injury.

Before beginning installation, confirm that all required tools and components are available.
Site preparation must be completed before installing the derail system.

3.1.1 Personal Protective Equipment (PPE)

PPE Advisory

All required personal protective equipment must be equipped before transport, maintenance, or assembly.

- Hard Hat
- Earplugs or Earmuffs
- Safety Glasses
- Gloves
- Steel Toe Footwear
- High Visibility Clothing

3.1.2 Tools and Equipment

- Measuring Tape
- Tamping Pick or Pickaxe
- Multimeter
- Metric Allen Key Set
- Adjustable Wrench x2
- 1/8" Slotted Screwdriver
- Level (Bubble or Digital)
- Digital Hanging Scale (Must be Rated for 300+ Lbs.)

3.2 Towing Procedure

Towing Advisory

The trailer is not registered for towing on public roads. The Portable Crossing Guard must be transported via flatbed when traversing public roads.

3.2.1 Securing Components

> **Secure Before Towing**
>
> Failure to secure all components before moving or towing the trailer may result in injury and/or damage to equipment.

Step 1: Dissasemble and Secure the Arm

- Remove arm sections one at a time. Stow sections in holder and secure with included clamp.

Step 2: Secure the Lights

Step 3: Lower the Crossbuck and Antennas

- Use the crank to lower the crossbuck and antennas

Step 4: Stow Arm Counterweights

- Ensuring Step 1 has been completed, Remove the counterweight nuts. **Do not remove the counterweight backstop.**
- Remove the counterweights one at a time. Stow on the trailer deck using the provided mounting studs, finishing with the counterweight nuts to keep them in place during transit.

3.3 Site Preparation

3.3.1 Check Clearance

Before finalizing trailer placement or beginning system operation, verify that all mounted components — particularly the arm assembly and sign structure — have adequate clearance in their intended orientation and operating range.

Step 1: Verify Arm Orientation

- Confirm that the arm assembly is installed facing the correct direction relative to the trailer frame (refer to Figure 4-3).
- The pivot or hinge side should align with the mounting reference point specified in the assembly drawing.
- Ensure there are no obstructions above or beside the arm that could interfere with its full range of motion.

Step 2: Check Sign Orientation

- The sign face should be perpendicular to the direction of approaching traffic or as required by the installation plan.
- Verify that the top and bottom edges are parallel to the trailer deck once the trailer is fully leveled.
- If applicable, confirm that the sign conforms to MUTCD visibility and height requirements. The lower edge of the sign should typically be at least 7 ft (2.1 m) above the ground surface in pedestrian areas, or as required by local code.

Step 3: Measure Operational Clearance

- With the arm extended to its full working position, measure the horizontal and vertical clearances around the structure.
- Maintain a minimum of 12 in (305 mm) of clearance from any moving or rotating component to nearby surfaces, fixtures, or cables.
- If operating near buildings or trees, confirm that the arm and sign have unrestricted motion through their full intended range.

Step 4: Lock and Secure

- After verifying clearances, tighten all pivot bolts, clamps, or lock pins to manufacturer specifications.
- Confirm that no cables or hoses are under tension or pinched during movement of the arm or sign.

3.3.2 Check Levelness

Step 1: Inspect the Ground Surface

- Choose a compact, load-bearing surface such as concrete, asphalt, or well-compacted gravel.
- Avoid locations with loose soil, soft clay, grass, or sand, as these may settle unevenly under the trailer's weight.
- Ensure there are no depressions, mounds, or large stones beneath the jack points. These can cause twisting of the frame or difficulty in leveling.

Step 2: Assess Surface Drainage

- Select an area with good runoff so water will not pool under or around the trailer.
- Avoid low-lying areas that retain moisture, which can cause the trailer to settle into the ground.

Step 3: Check for Slope and Elevation

> ⚠ **Levelness**
>
> Operating the trailer on an uneven or unstable surface can result in frame misalignment, inaccurate leveling, or equipment damage.

- Use a 2–4 ft bubble level, laser level, or straightedge and ruler to check the surface in both directions.
- The surface should not vary by more than **½ inch** over the length of the trailer (12 ft) or **¼ inch** across the width (8 ft).
- If the variation exceeds these limits, adjust by relocating the trailer or using leveling pads under the jacks.

Step 4: Prepare the Contact Area

- Clear debris, gravel clusters, or vegetation from under each jack location.
- If the surface is uneven, place solid wooden or composite blocks beneath the jacks to distribute load evenly.
- Never use rocks, bricks, or cinder blocks, as they may fracture under pressure.

3.3.3 Determine Solar Angle

For optimal charging performance, the solar panel must receive unobstructed, direct sunlight between **10:00 AM and 3:00 PM**. Ensure there is no shading from nearby structures, railcars, vegetation, or other equipment during these hours.

If the site receives limited sunlight or experiences partial shading, a second solar panel may be installed to maintain adequate system charging capacity.

Step 1: Determine Panel Direction

- For installations north of the Equator, the solar panel should face **south** for optimal efficiency.
- Observe the site and ensure that the solar panel will receive sun once installed.
- Two locations with **1/4"-20** threaded stud patterns are provided for mounting the solar panel and light assemblies.
- The solar panel must be mounted on the stud pattern closest to the side of the device that will receive the most sunlight.

Step 1: Measure Tilt Angle

The optimal tilt angle for solar panel efficiency depends on the latitude of the installation site.

- Use a maps or GPS app to measure the site latitude.
- Set the tilt angle equal to the latitude.

Example

Latitude = 38.2° → Tilt angle = **38.2°**

Step 2: Seasonal adjustments:

- Winter = **Latitude + 15°**
- Summer = **Latitude – 15°**
- Spring/Fall = **Latitude only**

Example

Spring/Fall tilt angle = **38.2°**
Winter tilt angle = 38.2° + 15° = **53.2°**
Summer tilt angle = 38.2° – 15° = **23.2°**

3.3.4 Leveling the Trailer

The trailer is equipped with four corner-mounted leveling jacks, one at each corner of the frame. These jacks are used to stabilize and level the trailer after it has been positioned at the installation site.

Level with Corner Jacks Only

Do not use the fifth-wheel jack (tongue jack) to support or level the trailer. The fifth-wheel jack is intended only for hitching and towing. Using it for leveling may cause frame distortion or unsafe loading.

Step 1: Preparing to Level

- Inspect the ground. Verify that the surface beneath each jack is firm, flat, and load-bearing. If the site is gravel or soil, place a concrete paver, composite pad, or steel plate beneath each jack foot to prevent sinking or shifting.
- Check jack condition. Ensure each jack is free of rust, bends, or mechanical damage. Confirm that all mounting bolts are tight and that the jack threads or screw mechanisms move smoothly.
- Confirm travel range. Each jack must have sufficient travel to raise the trailer until the wheels are just off the ground. This ensures all load weight is transferred to the jacks for accurate leveling.

Step 2: Leveling Procedure

- Park the trailer in the desired position and set the wheel chocks to prevent rolling.
- Disconnect the trailer from the towing vehicle if necessary.
- Lower the corner jacks, starting with the rear jacks to stabilize the frame.
- Lower each jack until it makes firm contact with the ground or paver.
- Then lower the front jacks, adjusting each incrementally.

Step 3: Adjust to Level

- Place a bubble or digital level on the trailer frame or deck.
- Adjust opposing jacks (A–C and B–D, see Figure 4-1) in small increments until the trailer is level front-to-back and side-to-side.
- Continue fine adjustments until the trailer frame is fully level and stable, and all four jacks share the load evenly.

Step 4: Verify Clearance and Levelness

- Ensure the wheels are off the ground and the jack arms are extended within safe limits.
- Check that arm, lights, and crossbuck meet MUTCD height requirements relative to roadway.
- The trailer must remain stationary and rigid when moderate force is applied to any corner.

3.4 Setup

> **Levelness**
>
> Trailer leveling must be complete before proceeding with setup.

> **Weather**
>
> Before beginning trailer setup, check weather forecast. Do not attempt setup in high winds or lighting.

3.4.1 Arm Setup

Multiple arm sections are provided for installations requiring specific arm lengths. Two metal sections are included, two middle sections, and one end section. Refer to the following table to determine the correct arm setup procedure for your specific installation length.

8'-16': use the smaller metal section + option smaller middle section + end section.

16'-22': use the larger metal section + option larger middle section + end section.

- Refer to WCH manual for counterweight setup.
- Do not remove the counterweight backstop.

3.4.2 Bell Setup

> **Bell Orientation**
>
> The direction of the bell is set by the manufacturer, please return to TXRX for reconfiguration or contact a TXRX representative for on-site instructions.

- Refer to WCH manual for bell setup.

3.4.3 Counterweight Setup

> **Counterweight Warning**
>
> Do not apply counterweight before the roadway gate arm is installed

> **Counterweight Blocker Plate**
>
> Do not remove the pre-installed counterweight blocker plate when installing the counterweights. Doing so may result in damage to equipment from improperly placed counterweights.

- Using a fish scale, weigh the arm in its final installed configuration.
- Refer to the counterweight tables in the W.C. Hayes 3590 Series OEM manual.

3.4.4 Solar Panel Setup

- Remove the banding straps holding the solar panel in place.
- Loosen the solar panel pipe receiver bolts and rotate the panel to the desired direction.
- Tighten the pipe reciever bolts to lock the solar panel rotation.
- Loosen the U-bolts and rotate the panel to the desired inclination.
- Tighten the U-bolts to lock the solar panel inclination.

3.4.5 Roadway Lights Setup

> **Roadway Lights Orientation**
>
> The direction of the roadway lights are set by the manufacturer, please return to TXRX for reconfiguration or contact a TXRX representative for on-site instructions.

3.4.6 Raising the Crossbuck and Antennas

- Pull the handle to raise the crossbuck and antenna array to 90 degrees.
- Hook the handle to the retaining cable.
- Tighten the turnbuckle to secure the mechanism.

3.5 Electrical

3.5.1 Addressing the Crossing

Binary DIP switches

3.5.2 Connecting the Solar Panel

- Connect solar jack on battery to solar plug attached to panel.
- If using two panels, use the provided Y-splitter to connect both panels to the battery input.
- Ensure all connections are secure and fully seated.

3.5.3 Connecting the Lights

Emergency disconnect is under hatch on battery box.

3.6 Software

3.6.1 Connecting the Remote

4. Operation

4.1 Local Operation

4.2 Remote Operation

5. Maintenance

5.1 Maintenance Schedule

To ensure safe operation and performance of the device, regular maintenance should be completed according to the following table. Detailed maintenance procedures are outline further in this section.

Interval	System	Task	Tools / Materials	Notes
Before Each Tow	Tires	Check tire pressure and condition	Tire pressure gauge; air compressor	Inflate to rated PSI; inspect for cracks or wear
Before Each Tow	Tongue Jack	Inspect and lubricate	Lithium grease; rags	Check for smooth movement
Every 60–90 Days (Storage)	Battery Bank (24 V AGM)	Recharge and inspect terminals	Smart 24 V charger; voltmeter; brush; gloves	Maintain 25.6–26.4 V; avoid overcharging
Every 6 Months	Solar System	Check output and sunlight exposure	Multimeter; cloth; ladder (if needed)	Clean panels; confirm clear sunlight 10 AM–3 PM
Every 6 Months	Leveling Jacks	Clean and lubricate screw shafts and pivots	Lithium grease; rags; brush; gloves	Prevents corrosion and binding
Every 12 Months (In Use)	Battery Bank (24 V AGM)	Recharge and inspect terminals	Smart 24 V charger; voltmeter; brush; gloves	Maintain 25.6–26.4 V; avoid overcharging
Every 12-24 Months	Fasteners & Hardware	Inspect and retighten	Socket set; torque wrench	Replace any rusted hardware

5.2 Jack Maintenance

To ensure smooth operation and prevent corrosion, the trailer's corner leveling jacks should be lubricated every six (6) months or after exposure to rain, road salt, or dusty environments. Regular lubrication extends jack service life and reduces wear on mechanical threads and pivot points.

5.2.1 Required Materials

- Light machine oil or multi-purpose lithium grease
- Clean rags or disposable shop towels
- Small brush or aerosol applicator with extension nozzle
- Protective gloves and eyewear

5.2.2 Lubrication Procedure

Step 1: Inspect the Jacks

- Ensure the trailer is parked on a level surface and the jacks are fully retracted.
- Visually inspect each jack for dirt, rust, or accumulated debris.
- Wipe the exposed screw shafts, pivots, and housings clean with a rag.

Step 2: Extend the Jacks

- Use the crank handle or power drive to extend each jack halfway.
- This exposes the main screw threads and inner guides for cleaning and lubrication.

Step 3: Clean the Mechanisms

- Remove any old grease, dust, or grit using a clean rag.
- For stubborn buildup, use a mild solvent (such as mineral spirits) and allow all parts to dry completely.

Step 4: Apply Lubricant

- Using a brush or nozzle, apply a thin, even coat of lithium grease to the screw threads, pivot pins, and moving joints.
- For enclosed gear housings, apply a few drops of light oil through the lubrication port (if equipped).
- Operate the jack through its full travel range twice to distribute lubricant evenly.

Step 5: Wipe and Retract

- Wipe away excess grease or oil to prevent dirt accumulation.
- Fully retract the jacks and confirm smooth operation without binding or noise.

Step 6: Repeat for all Corners

- Perform the same cleaning and lubrication process for each of the four jacks.
- Check for uniform movement and equal resistance among all jacks.

5.3 Battery Maintenance

Absorbent Glass Mat (AGM) batteries require periodic recharging to maintain capacity and ensure reliable system performance. Even when the trailer is not in active use, the batteries should be recharged on a regular schedule to prevent sulfation and capacity loss.

5.3.1 Active Systems (with Solar Input)

- When solar panels are connected and operational, the charge controller will maintain the 24 V battery bank automatically.
- Verify that system voltage remains above 25.2 V during regular use.
- If voltage drops below 24.4 V, perform a full recharge using an approved external charger.

5.3.2 Inactive or Stored Systems

- If the trailer is stored indoors or disconnected from solar power:
- Recharge every 60–90 days using a compatible 24 V AGM charger or a dual 12 V charger configured for series connection.
- Maintain resting voltage between 25.6–26.4 V for long-term storage.

5.3.3 Charging Procedure

Step 1: Inspect the Battery Bank

- Check all terminals, interconnect cables, and fuses for corrosion or looseness.
- Clean terminals using a non-metallic brush and verify tight mechanical connections.

Step 2: Select an Appropriate Charger

- Use a smart charger rated for 24 V AGM batteries with automatic bulk, absorption, and float modes.
- Charging profile should reach 28.8–29.4 V during the absorption phase and hold 26.4–27.0 V during float mode.
- Avoid unregulated or “boost” chargers, which can cause overcharging and thermal damage.

Step 3: Connect the Charger

- Attach the positive (red) lead to the battery bank’s positive (+) terminal and the negative (black) lead to the negative (–) terminal.
- Confirm correct polarity and tight contact before turning on the charger.

Step 4: Monitor Charging Progress

- Allow charging to continue until the battery reaches 100 % state of charge, as indicated by charger status or stabilized current.
- When charging completes, verify voltage has settled to approximately 26.0–26.4 V after one hour at rest.

Step 5: Disconnect and Record

- Turn off the charger, disconnect leads in reverse order, and note the recharge date, final voltage, and any observations in the maintenance log.

5.4 Before Storage or Transport

5.4.1 Disconnect Solar from Battery

> ⚠ **Warning**
>
> Keep clear of crossing arm travel path when disconnecting the battery. The crossing arm will come down immediately when powered off.

The solar panel must be disconnected when not actively in use charging the battery.

Step 1: Open Disconnect Cover

- Locate and open the quick disconnect hatch on the top of the battery box.

Step 2: Disconnect Solar Panel

- Verify all personnel, equipment, and crossing components are clear of the arm travel path.
- Flip the lever to disconnect the solar panel from the battery.
- If raised, the crossing arm will fall to its down position.

Step 3: Close Cover

- Close and latch disconnect cover.

5.4.2 Secure the CrossingArm

Step 1: Disassemble the Crossing Arm

- Verify that the arm is in the **down** position.
- Remove the crossing arm sections in reverse installation order.

Step 2: Stow the Crossing Arm

- Locate the crossing arm holder on the deck of the trailer.
- Insert the arm sections into the holder and secure with provided rubber tie straps.
- Stow the shortest fiberglass extension section inside the short metal section, to prevent it coming loose during transport.

Step 2: Remove and Stow the Counterweights

- Remove the nuts securing the counterweights.

!!! warning "Counterweight Blocker Plate Do not remove the counterweight blocker plate when removing the counterweights. Doing so may result in damage to equipment from improperly placed counterweights.

- Remove the counterweight plates in reverse installation order.
- Locate the counterweight holder on the deck of the trailer.
- Stow the counterweights and secure with the counterweight nuts.

5.4.3 Secure the Solar Panel

**Cle

5.5 Before Towing

- Check leveling and tounge jack lubrication.
- Check tire air pressure.

6. Troubleshooting