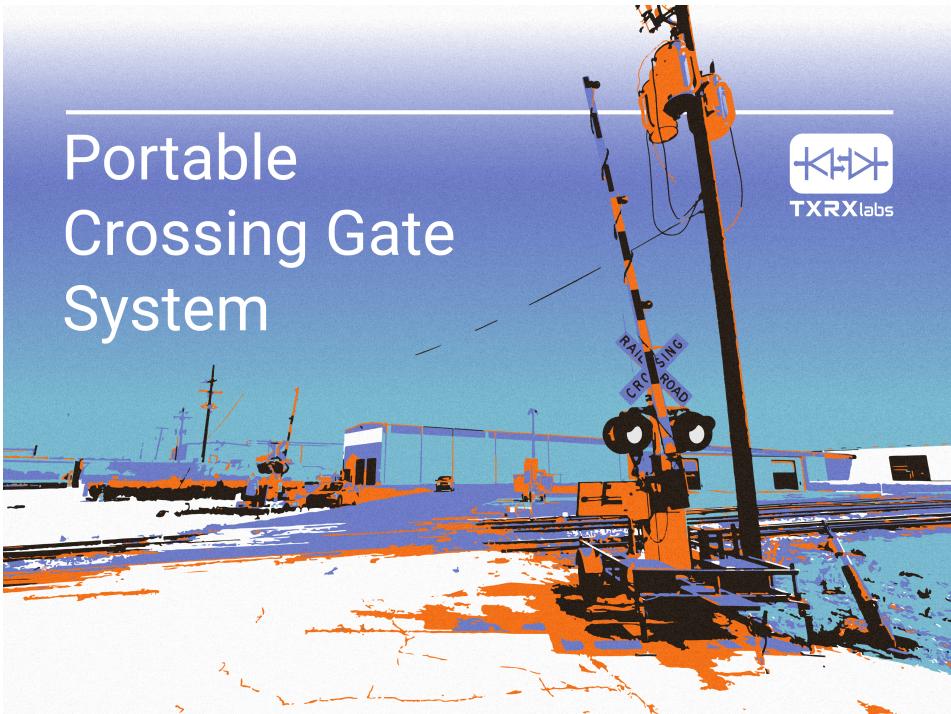


Portable Crossing Gate System



Portable Crossing Gate

Usage and Installation Manual

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.

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.

1.1.2 Supplemental Documents

The content of this manual covers custom parts designed and produced by TXRX. Regulatory information and instructions regarding the crossing gate is available in the following supplemental documents:

Western-Cullen-Hayes, Inc: Model 10 Signals Equipped With 3590 Series Gate Mechanism - Service and Installation Manual

- Included with crossing assembly inside controller enclosure.
- Referred to throughout this document as "WCH Manual".
- Published by the original equipment manufacturer of the crossing gate actuator, pole, bell, lights and arm components, Western-Cullen-Hayes, Inc.
- Contains setup, operation, and troubleshooting documentation for WCH crossing components referenced throughout the text.
- Available free of charge online at http://www.wch.com/manuals/wch_3590.pdf

United States Federal Highway Administration: Manual on Uniform Traffic Control Devices for Streets and Highways, 11th Edition

- Referred to throughout this document as "MUTCD".
- Available free of charge online at www.mutcd.fhwa.dot.gov
- Chapter 8D "Traffic Control for Railroad and Light Rail Transit Grade Crossings" contains regulatory and standards information applicable to the crossing gate system.

 **Note**

Pay special attention to MUTCD standards if installing the crossing gate on public roads.

1.2 Safety Information

IMPORTANT SAFETY INFORMATION – READ BEFORE OPERATING

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. Warnings will appear in the following format:

Example Warning

Safety information is emphasized by a brightly shaded triangle and block quotes in the text. 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

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

Personnel Warning

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

Equip Proper PPE

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

Liability Warning

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.

A Operator Warning

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.

2. System Overview

2.1 Trailer Assembly

- Trailer Jacks
- Battery Enclosure
- Controller Enclosure
- Arm Holders
- Solar Panel Mount Points
- Counterweight Holder
- Remote Enclosure
- Camera

2.2 Solar Assembly

- Solar Panel Assembly (2 panels may be ordered as an option)
- Solar Panel Pipe Receiver
- Solar Y-Splitter (only included with 2 panel installations)

2.3 Gate Assembly

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

2.4 Arm Assembly

- 8' Aluminum Arm Section
- 6' Aluminum Arm Section
- 8' Fiberglass Arm Section
- 8' Fiberglass Arm End Section
- 4' Fiberglass End Section
- Counterweight Plates
- Counterweight Hardware
- Arm Retaining Hardware
- Arm Lights
- Arm Light Mounting Hardware

2.5 Remote

- Wireless Remote
- Charging Cradle

3. Setup

3.1 Preface

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/Fish Scale (Reccomend 60+ Lbs. rating)
- Cordless Drill with Drill Bit Set

3.1.3 Towing

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.

- Follow the procedure described in the **Maintenance** section titled "Before Storage or Transport".

3.2 Site Preparation

3.2.1 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.
- 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

Electrical Lines

Do not attempt setup in area where the arm may be in conflict with electrical/power lines.

- Determine the required arm length needed for the installation site.
- 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.

3.2.2 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 bubble level or laser level to check the surface in both directions.
- The surface should not vary by more than $\frac{1}{2}$ inch over the length of the trailer (12 ft) or $\frac{1}{4}$ 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.

3.2.3 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.
- Controller enclosure may be moved along battery enclosure rails to allow clearance for the solar panel.
- 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 = $38.2^\circ + 15^\circ = \mathbf{53.2^\circ}$

Summer tilt angle = $38.2^\circ - 15^\circ = \mathbf{23.2^\circ}$

3.2.4 Leveling the Trailer

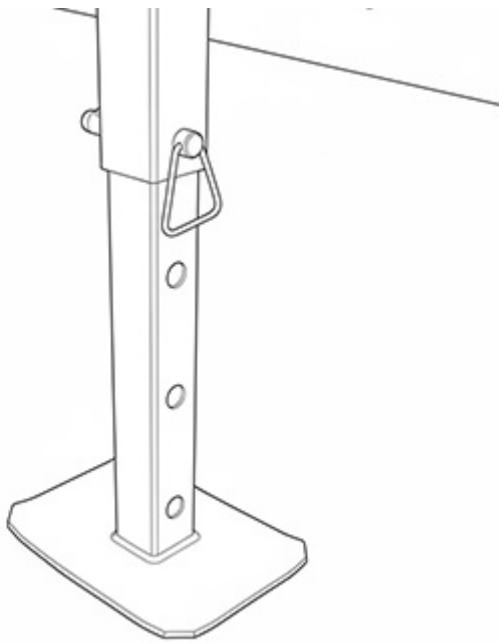


Figure 1: Leveling Jack

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.

3.2.5 Determining Arm Length

Multiple arm sections are provided for installations requiring specific arm lengths. Before proceeding with arm installation, determine the

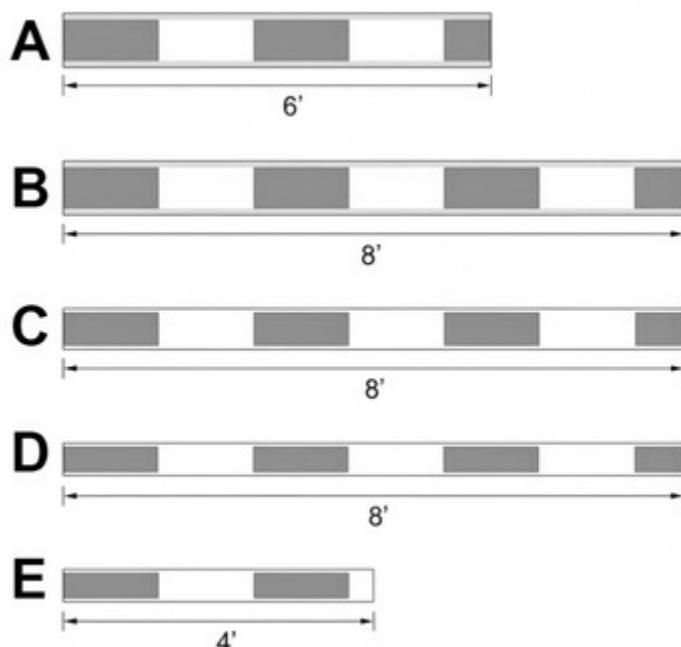


Figure 2: Provided Crossing Arm Sections

Designation	Description	Length
A	Aluminum Arm Section	8 ft.
B	Aluminum Arm Section	6 ft.
C	Fiberglass Arm Section	8 ft.
D	Fiberglass Arm End Section	8 ft.
E	Fiberglass End Section	4 ft.

For installations from 5'-8": use sections B + E.

For installations from 8'-22": use sections A + C + D.

3.3 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 lightning.

3.3.1 Crossing Arm Setup

Tip

Refer to the Western Cullen Hayes service and Installation manual for detailed arm installation and counterweighting instructions.

Step 1: Unload the Arm Sections

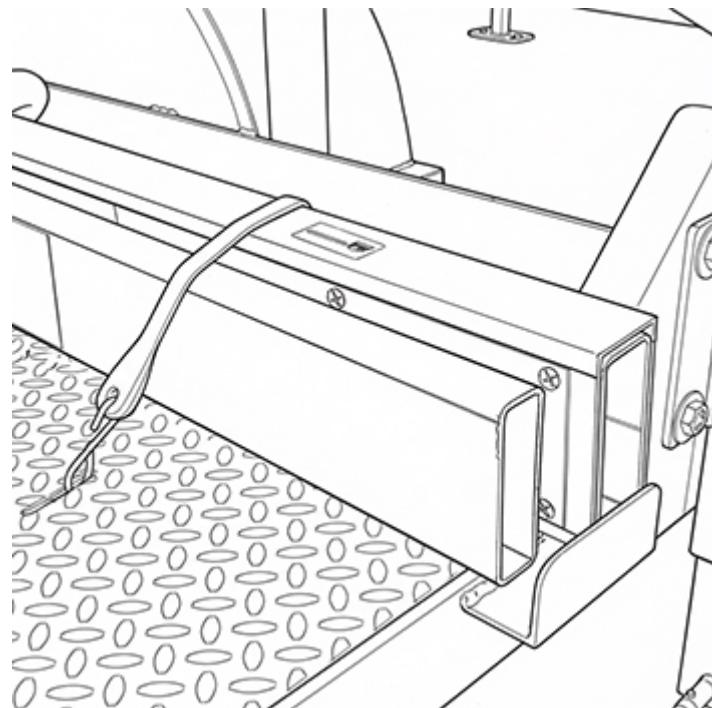


Figure 3: Crossing Arm Sections in Holder

- Ensure proceeding steps have been completed to determine the correct arm length.
- Locate the crossing arm sections in the holders on the left and right sides of the trailer.
- Remove the rubber tie straps securing the arm sections and lift sections upward to remove.

Step 2: Assemble the Crossing Arm

- Install the arm sections in sequential order. Use only the sections needed for the installation length.
- Allow telescoping sections to overlap by at least 12".

Step 3: Secure the Crossing Arm

- Verify that telescoping arm sections overlap by at least 12".
- Using a 3/8" drill bit, drill bolt holes through each of the overlapping sections, 8" away from the end of each section per the diagram.
- Remove any metal or fiberglass shavings from the drilled holes.
- Insert provided 3/8" bolts, washers, and nuts to secure the arm.
- Snug arm bolts with a wrench, do not overtighten.

3.3.2 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.

Step 1: Apply Initial Counterweight

- Remove the counterweight retaining nuts.
- Place one counterweight on each side of the crossing arm.

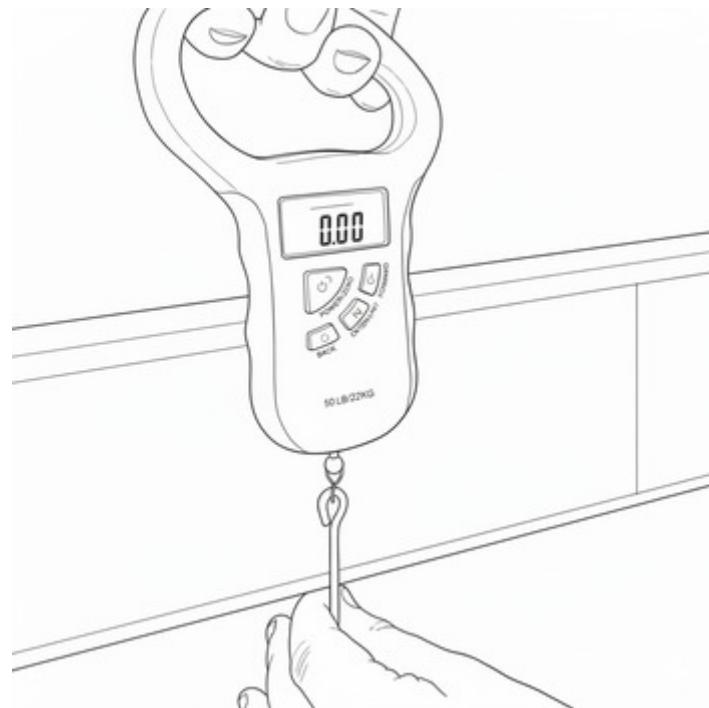
Step 2: Weigh the Arm

Figure 4: Calibrating Arm Counterweight

- Using a digital hanging scale/fish scale, weigh the arm in its final installed configuration.
- Place the scale 10 feet from the center of the arm pivot point.
- Refer to the counterweight tables located on Page 22 of the W.C. Hayes 3597 Series OEM manual - "TABLE OF WEIGHT AND VERTICAL TORQUE VALUES FOR FIBERGLASS AND ALUMINUM/FIBERGLASS GATE ARMS: OBLONG COUNTERWEIGHTS WITH ALUMINUM COUNTERWEIGHT ARMS"
- Add or remove counterweight plates, checking with scale until proper weight is reached for arm length.

Step 3: Secure Counterweight

- Add counterweight retaining nuts and washers to secure plates. Tighten til snug, do not overtighten.
- Stow unused counterweights in counterweight holder.

3.3.3 Solar Panel Setup**Step 1: Set Solar Panel Rotation**

- 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 receiver bolts to lock the solar panel rotation.

Step 2: Set Solar Panel Inclination

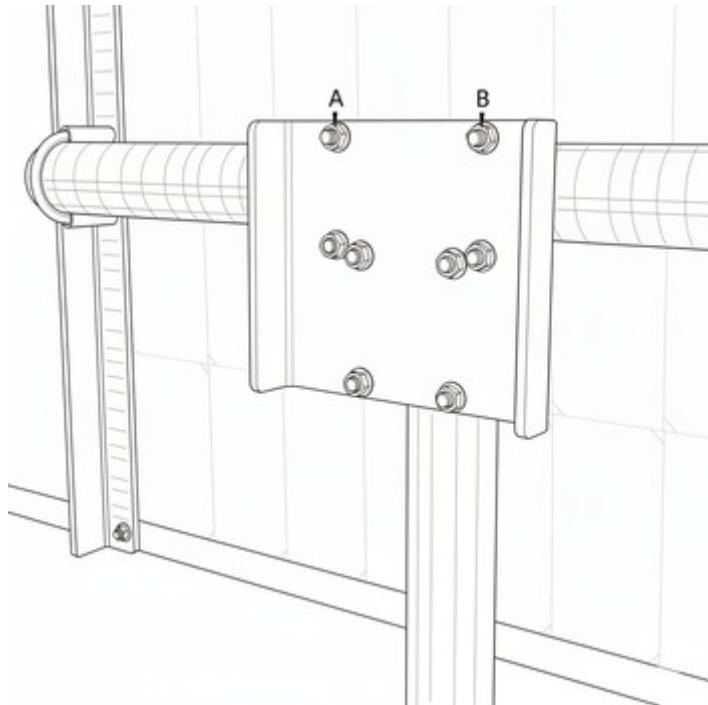


Figure 5: Solar Panel U-Bolts

- Loosen the U-bolt nuts labeled **A** and **B** until the panel tilts freely.
- Rotate the panel to the desired inclination.
- Tighten U-bolt nuts **A** and **B** to lock the solar panel inclination.
- Snug U-bolts with a wrench so that the solar panel will not fall out of position. Do not overtighten nuts.

3.3.4 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.

3.3.5 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.

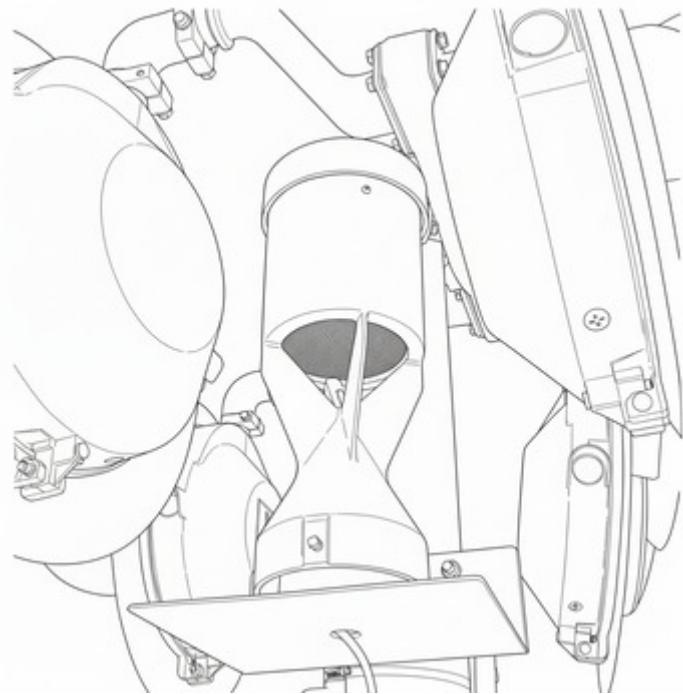


Figure 6: Crossing Bell

- Refer to Western Cullen Hayes manual for detailed bell instructions.

3.3.6 Crossbuck and Antenna Setup

- Locate the turnbuckle attached via cable to the crossbuck assembly.
- Pull down on the turnbuckle, raising the crossbuck assembly to a 90° angle.

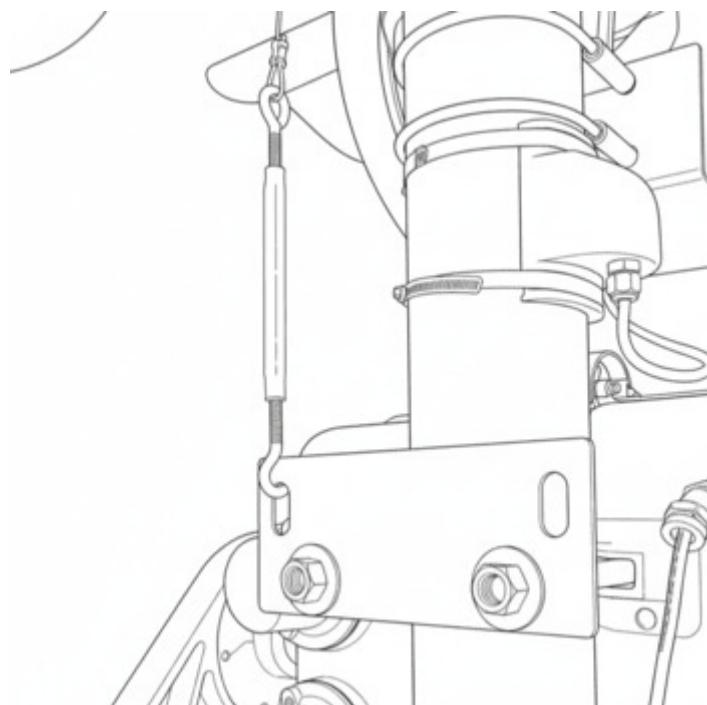


Figure 7: Turnbuckle Attachment to Retaining Plate

- Hook the turnbuckle to the retaining plate as shown in the above figure.
- Tighten the turnbuckle until all slack is removed from the cable, securing the crossbuck assembly.

3.4 Electrical

3.4.1 Addressing the Crossing

Within the controller enclosure, an array of DIP switches are visible. These switches set the address of the crossing.

- The DIP switches use binary addressing to allow one remote to be used with multiple crossing systems.
- Each crossing in an installation must use a unique address.

3.4.2 Connecting the Solar Panel

- Connect battery solar jack 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.

3.4.3 Connecting the Gate Arm Lights

- The crossing lights are located in the remote storage box on the trailer deck.
- Refer to the page 15 of the W.C. Hayes 3597 Series OEM manual for detailed installation instructions.
- Use the provided self-tapping screws to mount the lights to the arm.
- Use the provided cable clips to affix the cable. Leave slack in the cable for drip points.
- For installation distances, refer to page 15, figure 8 of the W.C. Hayes 3597 Series OEM manual - "Suggested Roadway Gate Arm Light Spacing"
- Connect light cable to controller.
- Ensure all connections are secure and fully seated, and that lights are receiving power.

4. Operation

4.1 Local Operation

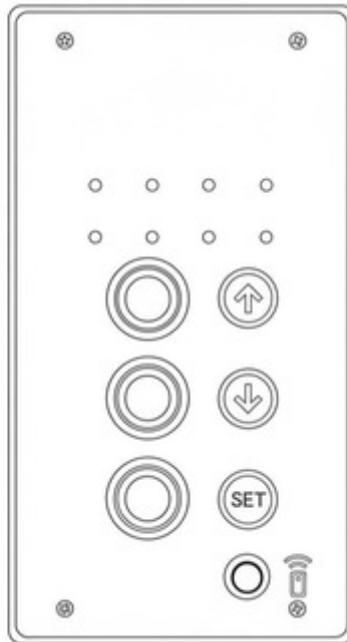


Figure 1: Crossing Gate Local Controller

Controls for local operation of the gate can be found on the front of the controller enclosure. Unlatch the smaller outer enclosure to reveal the control buttons.

4.1.1 Lowering the Gate Arm

- Ensure the gate travel path is clear.
- Press the DOWN arrow button. The roadway lights and bell will activate shortly before the arm begins to move.
- The lights and bell will remain on when the gate is in the down position.

4.1.2 Raising the Gate Arm

- Ensure the gate travel path is clear.
- Press the UP arrow button.
- Wait for the arm to stop moving and the roadway lights and bell to turn off.

4.2 Remote Operation

The crossing gate remote and wireless charger are stored in an attached weatherproof enclosure for operator convenience.

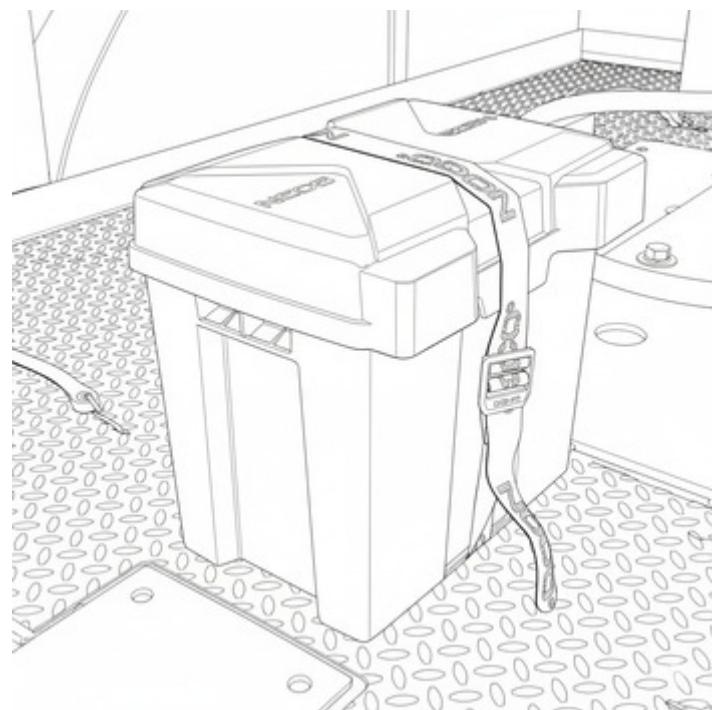


Figure 2: Remote Storage Box

⚠ Seal Enclosure

Always double-check that the enclosure is closed and the strap is tightly secured to prevent weather damage.

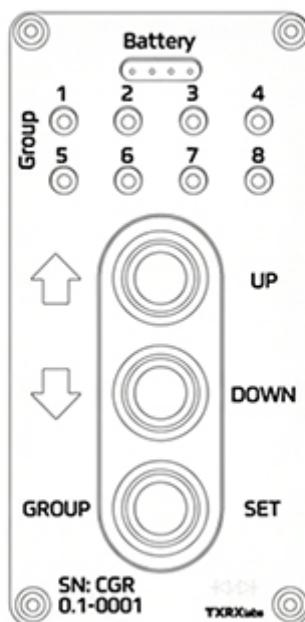


Figure 3: Crossing Gate Remote

4.2.1 Wake Remote

The remote will automatically go into sleep mode after 30 seconds to preserve battery life.

- Press any button to wake the remote.
- Remote will return to sleep mode after 30 seconds if no buttons are pressed.

4.2.2 Viewing List of Paired Crossings

- Press and hold the `SET` button for 2-5 seconds.
- LEDs will flash blue when viewing mode is active.

Crossings and Crossing Groups

The Portable Crossing Gate System allows for the programming and control of multiple crossing groups using the remote.

- In viewing mode, the top row of LEDs indicates the active group, while the bottom row indicates the number of crossings in that group.
- Use the arrow buttons to cycle through groups.
- Crossings are listed in binary, with the number of the group and crossing indicated by the number of illuminated LEDs.

4.2.3 Pairing a crossing

- Hold the `UP` arrow button to enter teach mode.
- The LEDs will flash yellow 3-4 times to indicate teach mode is active.
- With the remote in teach mode, bring it next to the local controller on the crossing you want to pair.
- Press the small pairing button on the bottom right corner of the local controller to send a pairing signal.
- When the crossing is paired, the remote LEDs will flash yellow.

Grouping

Ensure that opposing crossings are paired in the same group.

4.2.4 Lowering the Gate Arm

- Ensure the gate travel path is clear.
- Ensure the correct crossing gate/group is selected.
- Press any button once to wake the remote.
- Press the `DOWN` arrow button. The roadway lights and bell will activate shortly before the arm begins to move.
- The lights and bell will remain on when the gate is in the down position.

4.2.5 Raising the Gate Arm

- Ensure the gate travel path is clear.
- Ensure the correct crossing gate/group is selected.
- Press any button once to wake the remote.
- Press the `UP` arrow button.
- Wait for arm to stop moving and the roadway lights and bell to turn off.

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 outlined 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	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

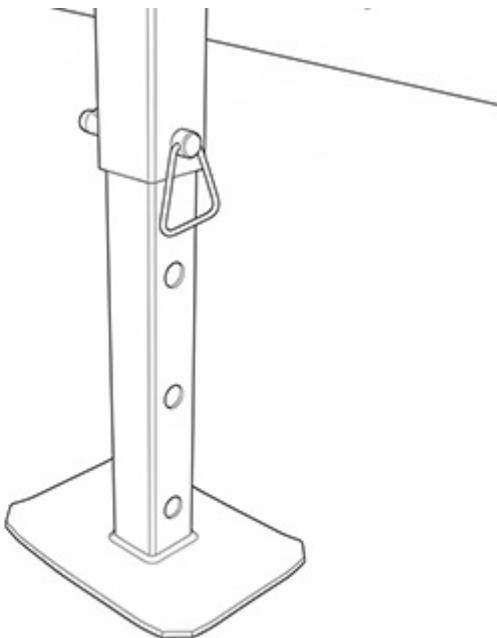


Figure 1: Leveling Jack

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.

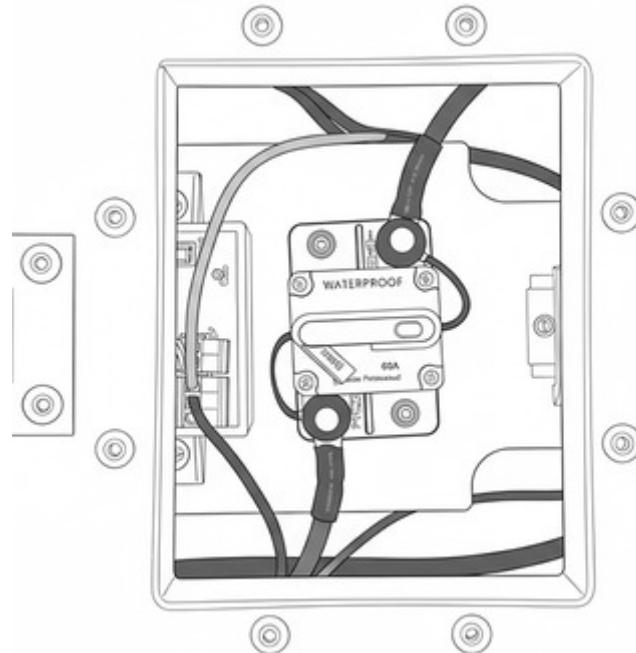
Step 1: Open Disconnect Cover

Figure 2: Solar Disconnect

- 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 Crossing Arm**Step 1: Remove the Lights**

- Disconnect the lights from the controller.
- Unscrew the self-tapping screws fastening the lights to the arm.
- Stow the lights in the accessory box.

Step 1: Disassemble the Crossing Arm

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

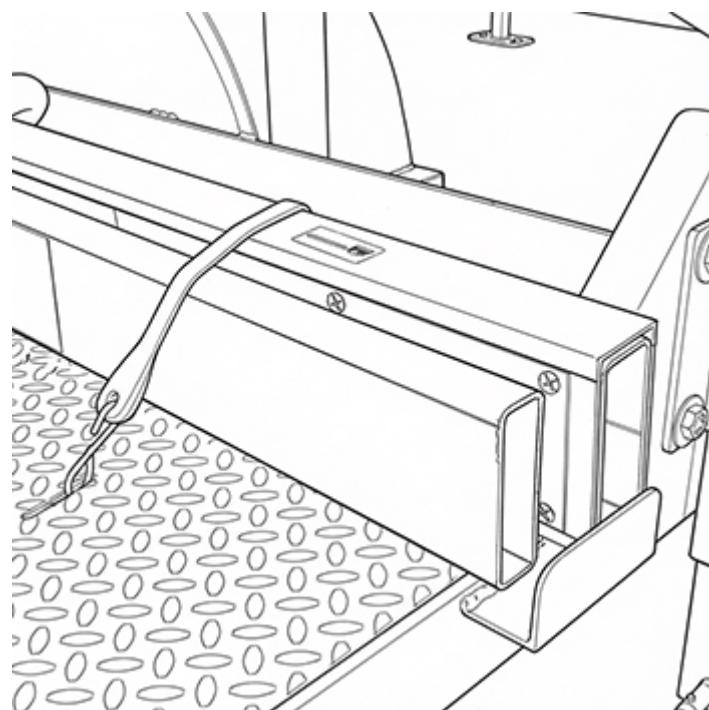
Step 2: Stow the Crossing Arm

Figure 3: Crossing Arm Stowed in Holder

- 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 3: 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.

Step 4: Secure the Arm

- Use banding straps around the actuator mechanism to prevent the arm from moving.
- Wrap actuator and arm with shrink-wrap for protection during transport and storage.

5.4.3 Secure the Solar Panel

- Rotate solar panel to shipping position.
- Secure the solar panel using banding straps.

5.4.4 Towing Instructions

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.

- Check leveling and tongue jack lubrication.
- Check tire air pressure.
- Fully retract leveling jacks using the crank, and attach the pin to secure jacks in highest location.
- Ensure that leveling jacks are pinned at the highest hole location before moving the trailer to avoid damage to equipment.
- Only use tongue jack during towing.

6. Troubleshooting

6.1 Status Light

- The crossing gate system includes a status light located on the controller enclosure.
- Solid red light: Normal operation.
- Blinking red light: Error state.
- No Light: System is off, no power.

If in an error state, use a voltmeter to check the battery voltage level. If needed, recharge the batteries using a smart 24V charger.

6.2 Crossing Gate

- Refer to WCH manual for crossing gate actuator troubleshooting instructions.