Survivor® PL

Low Profile Modular Railroad Track Scale

Installation Manual

RICE LAKE®
WEIGHING SYSTEMS

October 18, 2022

PN 98740 Rev E

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www.ricelake.com

Revision History

This section tracks and describes manual revisions for awareness of major updates.

Revision	Date	Description
E	October 18, 2022	Revision history established; updated graphics representing scale platform

Table i. Revision Letter History

*Technical training seminars are available through Rice Lake Weighing Systems. Course descriptions and dates can be viewed at **www.ricelake.com/training** or obtained by calling 715-234-9171 and asking for the training department.*

Contents

RICE LAKE WEBINARS

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1.0 Introduction

This manual is intended for use by service technicians responsible for installing and servicing low profile modular railroad track scales.

Manuals and additional resources are available from Rice Lake Weighing Systems at www.ricelake.com/manuals

Warranty information can be found at www.ricelake.com/warranties

NOTE: Use these instructions as general installation guidelines unless the engineering drawings furnished with the scale differ from the instructions in this manual. Engineering drawings furnished with the scale always take priority over the general installation guidelines.

1.1 Safety

Safety Definitions:

DANGER: Indicates an imminently hazardous situation that, if not avoided, will result in death or serious injury. Includes hazards that are exposed when guards are removed.

WARNING: Indicates a potentially hazardous situation that, if not avoided, could result in serious injury or death. Includes hazards that are exposed when guards are removed.

CAUTION: Indicates a potentially hazardous situation that, if not avoided, could result in minor or moderate injury.

IMPORTANT: Indicates information about procedures that, if not observed, could result in damage to equipment or corruption to and loss of data.

General Safety

Do not operate or work on this equipment unless this manual has been read and all instructions are understood. Failure to follow the instructions or heed the warnings could result in injury or death. Contact any Rice Lake Weighing Systems dealer for replacement manuals.

WARNING

Failure to heed could result in serious injury or death.

Some procedures described in this manual are potentially dangerous. These procedures are to be performed by qualified service personnel only

Do not allow children or inexperienced persons to operate this unit.

Do not operate without all shields and guards in place.

Do not use for purposes other then weight taking.

Do not place fingers into slots or possible pinch points.

Do not use any load bearing component that is worn beyond 5% of the original dimension.

Do not use this product if any of the components are cracked.

Do not exceed the rated load limit of the unit.

Do not make alterations or modifications to the unit.

Do not remove or obscure warning labels.

Keep hands, feet and loose clothing away from moving parts.

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2.0 Installation

DANGER: Crush hazard, keep hands, feet and other body parts clear when setting weigh modules in place. Moving parts can crush and cut.

Recommended Tools and Equipment

Below is a list of recommended tools and equipment necessary to assemble and install the Survivor PL Rail Scale.

- Two 10 ton bottle jacks, 12 in or shorter
- 24 wooden blocks 6 in x 6 in x 24 in oak
- 24 wooden blocks 4 in x 4 in x 24 in oak
- 24 wooden blocks 2 in x 4 in x 24 in oak
- Flat blade screw driver
- Small blade screw driver for adjusting j-box pot.
- #2 Phillips screw driver
- Transit
- Small magnetic level
- Large funnel with 1 in opening in bottom
- 24 in plastic pipe to attach to above funnel for pouring grout
- 1 5/8 in combination wrench
- 1 5/8 in socket
- 15/16 in socket
- 1 1/4 in socket
- 1 1/4 in combination wrench
- 1 1/8 in socket
- 2 in combination wrench
- 2 in socket
- 3/8 in Allen wrench
- 7/16 in socket
- Multi meter
- Pliers
- Torque wrench capable of torquing up to 250 ft lb for 1 1/4 in socket & 2 in socket
- Fish tape for pulling wires
- Line up punch for aligning holes
- Large hammer
- Latex caulk for sealing grout forms
- Caulk gun for above caulk
- 1 in x 4 in wood for building grout forms

2.1 Foundation Installation

For installation, reference the foundation drawings supplied with the scale.

- Do not start construction of the foundation without having certified prints.
- Pour the scale slab(s).
- Pour the approach slab and, if applicable, intermediate section over rebar or optional anchor bolts.
- Use Handbook 44 and AAR Handbook Guidelines for Legal for Trade

NOTE: Anchor bolts should protrude from the concrete enough for the lower base plates to be secured onto them.=

IMPORTANT: Failure to heed the following could result in damage to the concrete and equipment.

* ***The concrete foundation must cure in a moist state for at least seven days (three days for high-early concrete).***
* ***At seven days, standard concrete is approximately 75% of its maximum strength and can handle moderate loads.***
* ***Loading of a slab before it reaches 75% of maximum strength may damage the foundation.***
* ***Standard concrete does not reach full strength until after a 28-day cure.***

2.2 Scale Installation

Use the following steps to install the scale.

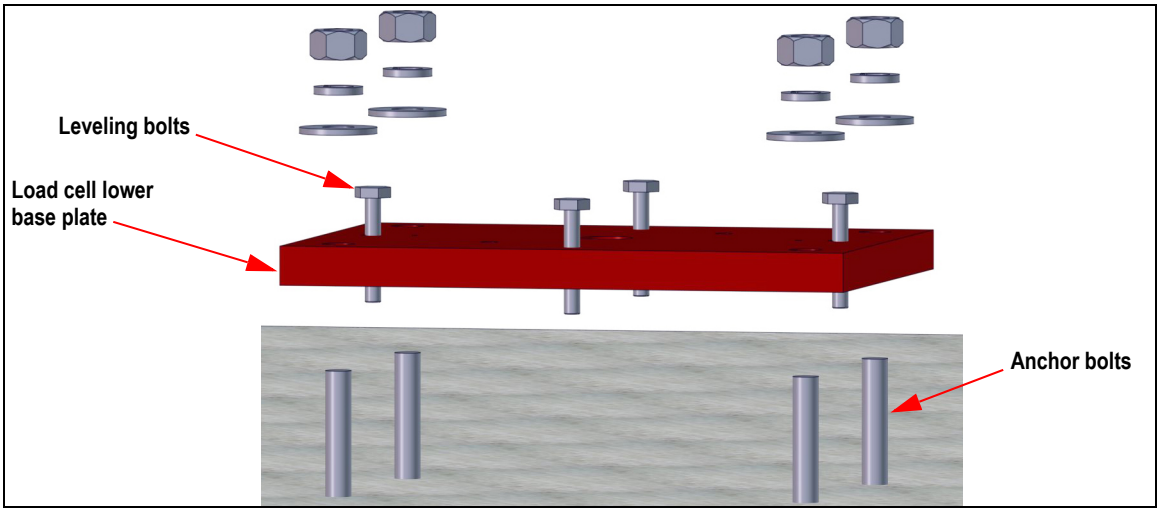

Figure 2-1. Leveling Bolts Installed into Lower Base Plate

1. Set load cell lower base plates over the pre-cast anchor bolts.
2. Install leveling bolts into base plates.

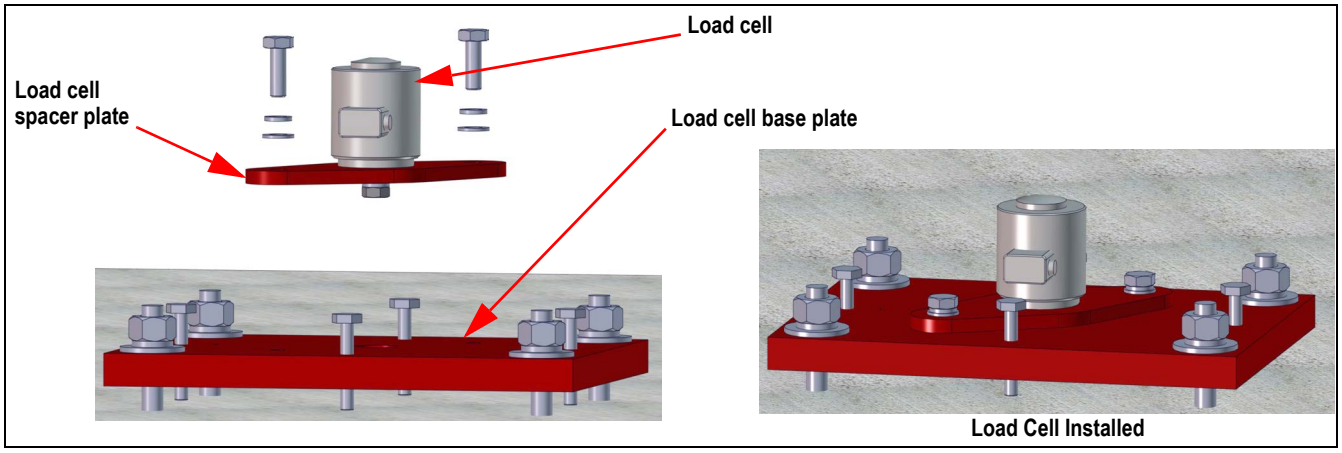

Figure 2-2. Load Cell, Spacer Block, and Base Plate

3. Install load cell, spacer plate and base plate onto lower base plates.

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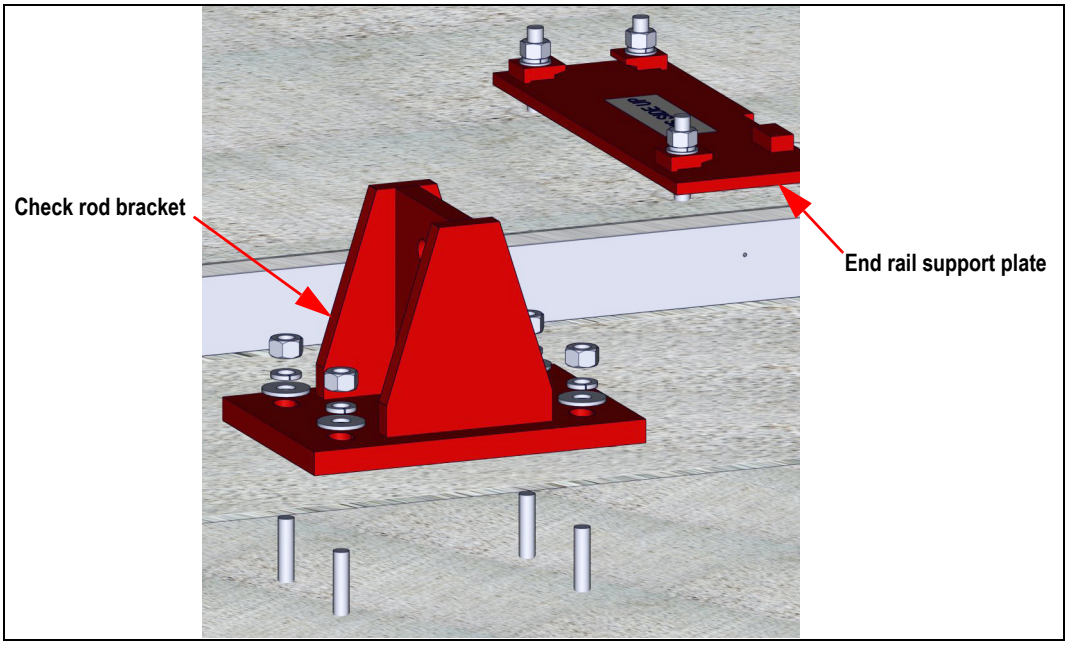

Figure 2-3. Install Brackets

4. Set longitudinal check brackets and lateral side check brackets over pre-cast anchor bolts.

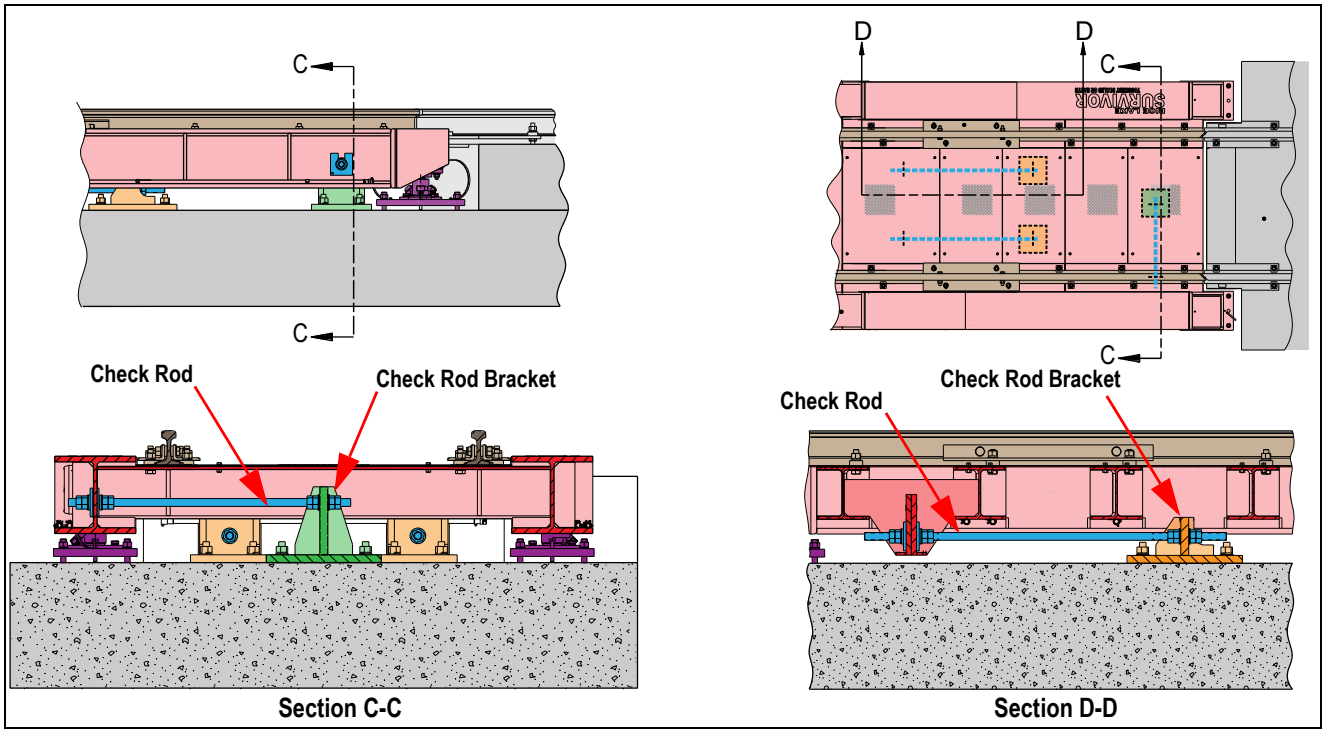

Figure 2-4. Check Rod Locations

NOTE: The rods for the checking system, should be placed beneath the scale prior to setting of the modules. Bracket quantity varies depending on number of scale sections.

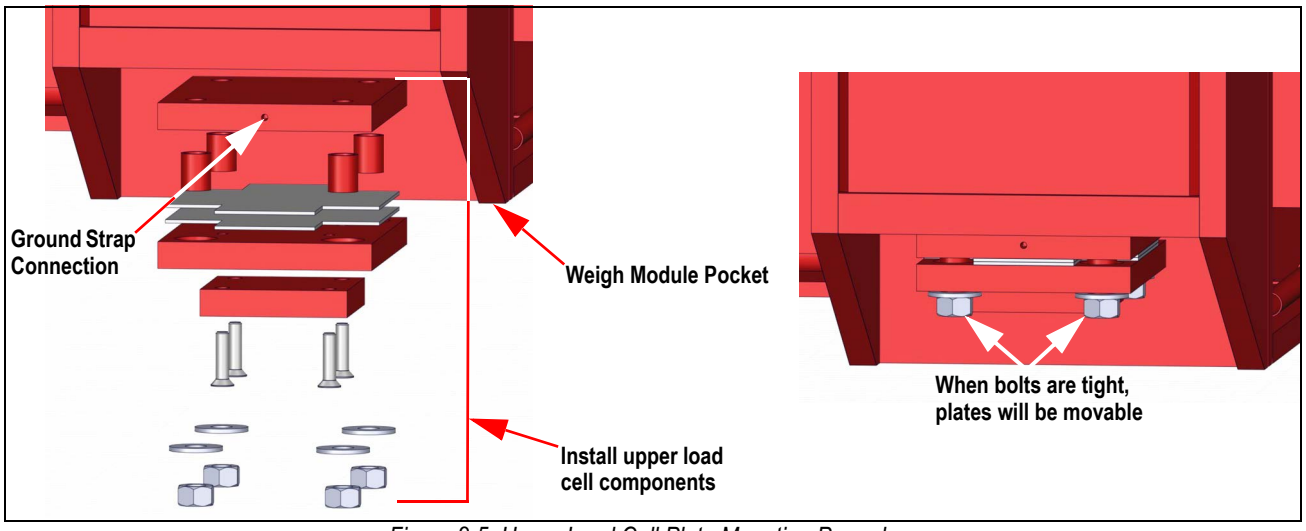

Figure 2-5. Upper Load Cell Plate Mounting Procedure

5. Remove steel top plates from weigh module. Mark the plates to identify their location for re-assembly.
6. Install bearing block, upper mount plate, spacer tubes, bearing cushions and shim plate in each load cell pocket of the weigh module.

WARNING: Crush hazard, keep hands, feet and other body parts clear when setting weigh modules in place. Moving parts can crush and cut.

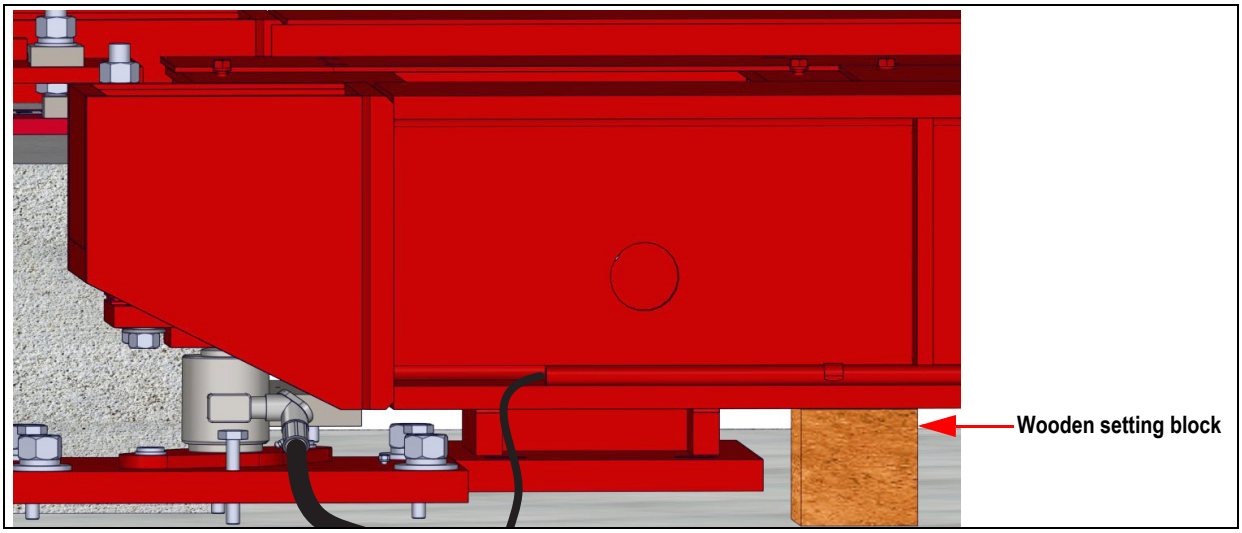

Figure 2-6. Weigh Module on Setting Blocks

7. Set the weigh module on 5 in setting blocks. Center the module between approaches.

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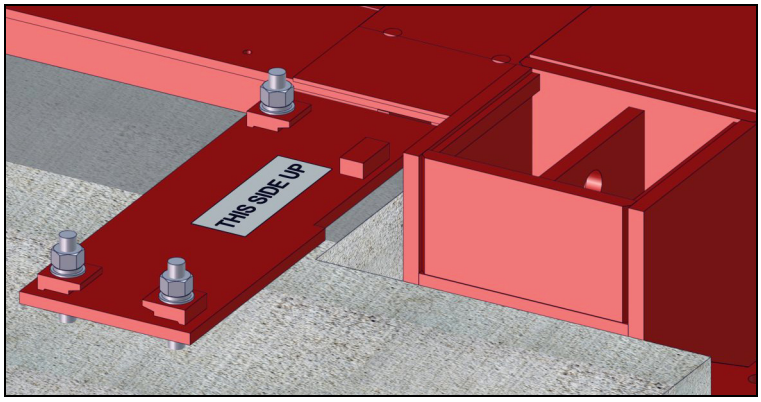

Figure 2-7. Module Elevation

8. Using a jack and shims, level the module and set its elevation between 2 1/8 in and 2 1/4 in above concrete approaches.

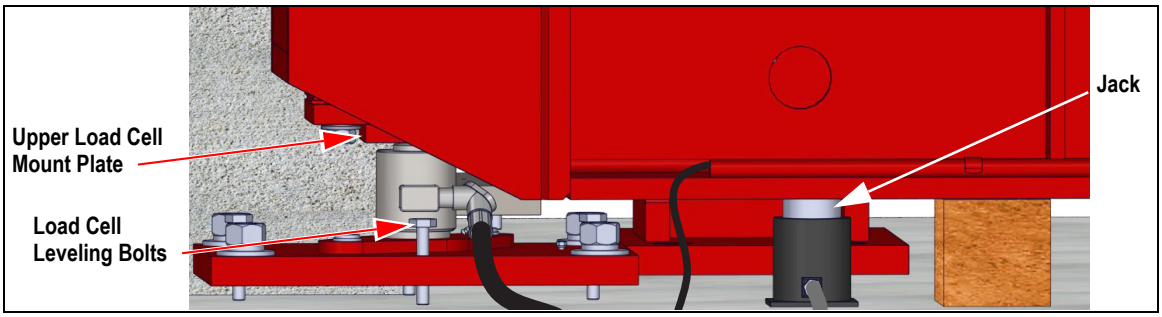

Figure 2-8. Load Cell Assembly

9. Using leveling bolts, raise and level the load cell assemblies to contact the upper mount bearing plates.

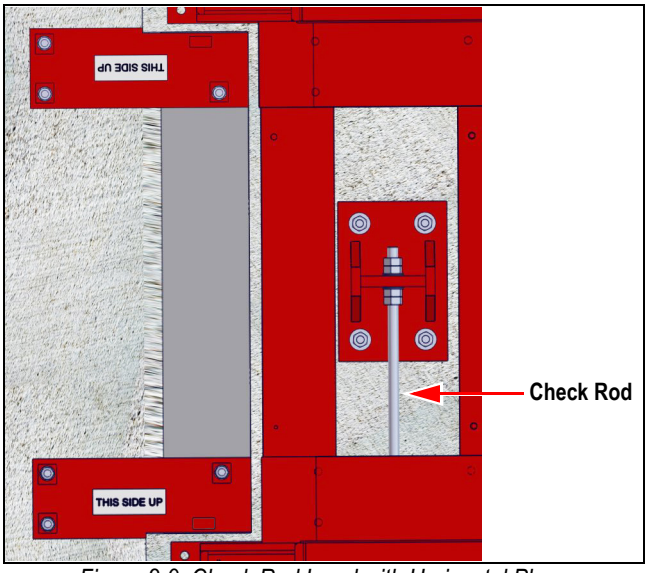

Figure 2-9. Check Rod Level with Horizontal Plane

10. Jack the weigh module to allow removal of setting blocks and shims.
11. Install the lower base plate, washers and nuts.Do not torque nuts until after plates are grouted and cured.
12. Install check rods and hardware. Ensure check rods level with a horizontal plane to within +/- 2 degree.
13. Weld spacer plates (PN 71860) to the weigh module to secure it in place.
14. Repeat steps 1-13 for the second weigh module.

2.3 Approach and Dead Space Hardware Installation

Use these instructions to install the approach and dead space hardware. Reference drawings are provided for approach and dead space details.

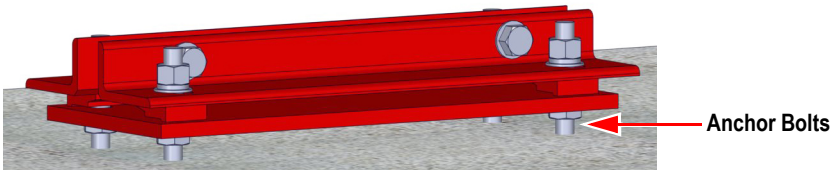

Figure 2-10. Approach Plate on Anchor Bolts

1. Install approach plates on the anchor bolts. Ensure they are at the required elevation by using shims or jam nuts beneath each plate.
2. Install dead space rail plates on the anchor bolts at the required elevation.

2.4 Rail Installation

The following instructions describe the installation of rail sections on the scale.

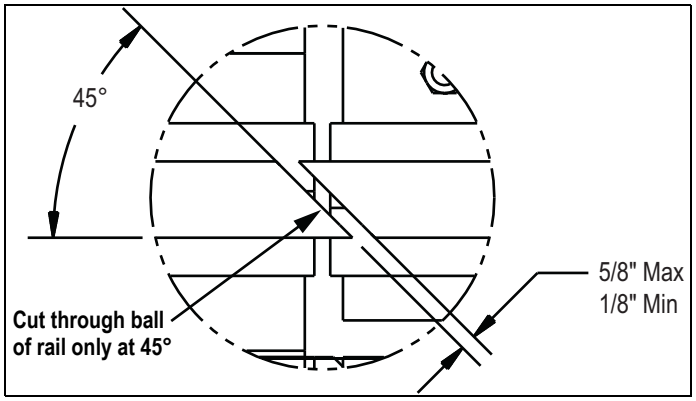

Figure 2-11. Mitered Rail Head Cut Location

1. Cut A.R.E.A. rail sections using 45° mitered rail head cuts at the weigh rail and approach rail transitions.
2. Set rail support plates over the pre-cast anchor bolts on the approach and center section foundations.
3. Set weigh rails and approach rails onto the rail support plates.
4. Shim and align rails to match elevation of scale and set the desired grade.

   Option: Install jam nuts under approach rail support plates to act as a leveling device.
5. Install rail clips and secure rails in place.
6. Install anti-creep rail anchors.

2.5 Grouting

Prior to grouting, re-check all weigh modules and rail alignment, levels and elevations.

1. Use an epoxy-type 9000 psi grout under the load cell base plates and center section rail support plates. Do not grout under the longitudinal check brackets or side check brackets.
2. After the grout has hardened, tighten/torque nuts on all anchor bolts.
3. The checking system can now be tightened. Bring the nuts up to snug.

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3.0 Junction Box and Grounding

Electrical conduit is pre-installed at the factory and only needs to be connected between the modules and from the modules to the junction box. Following conduit work, load cell cables are routed through each conduit from the load cells to the junction box. All load cell cabling used for this installation comes in the shipping container. The layout pattern for the electrical conduit on a three module rail scale installation is shown in Figure 3-1.

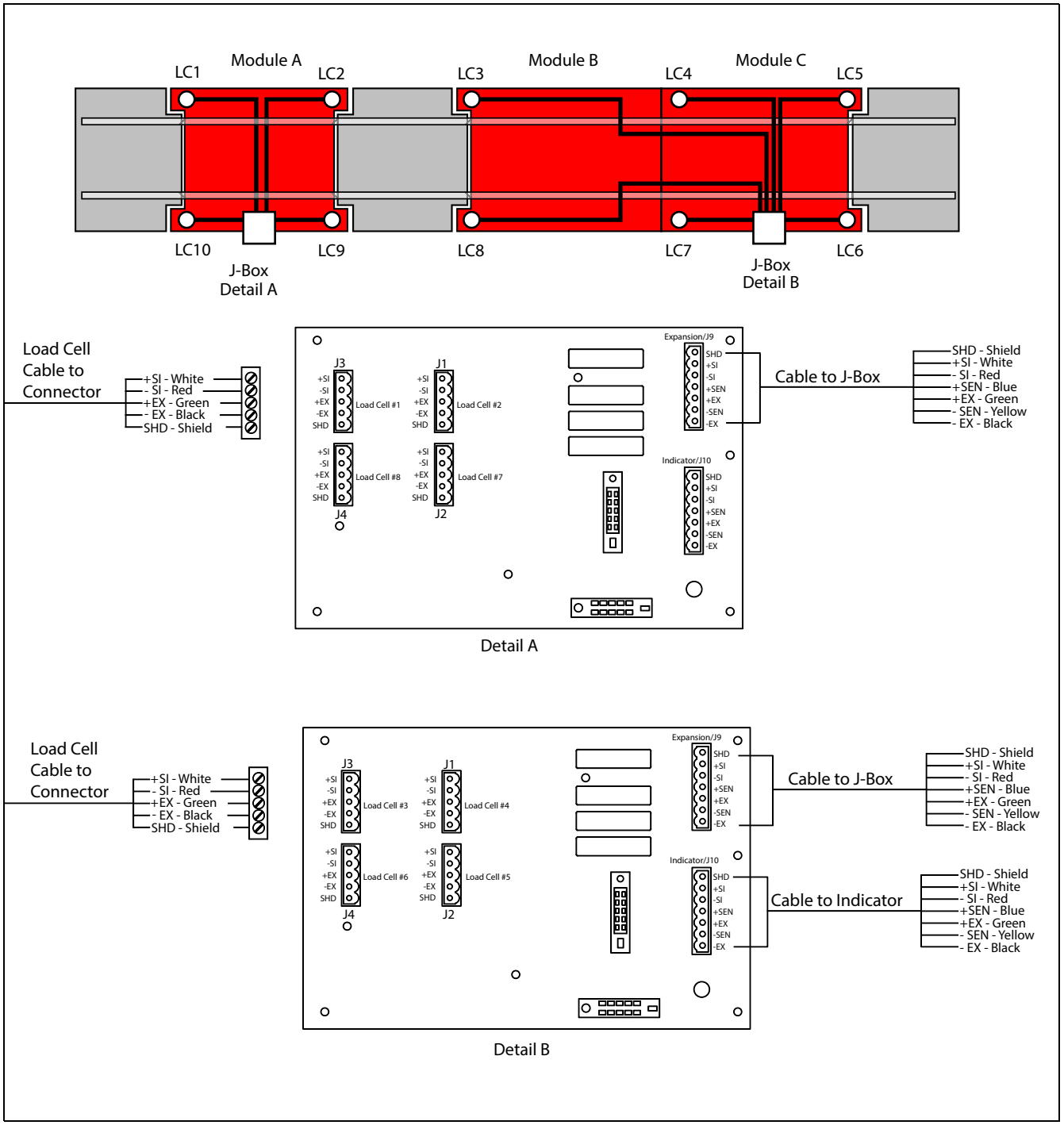

Figure 3-1. J-Box Wiring and Conduit

3.1 Load Cells to Junction Box

Each load cell is equipped with 30 ft of load cell cable, sufficient to reach a centrally-located junction box on standard scales. A conduit adapter and a 14 in section of 3/4 in flexible conduit is supplied for both ends of each load cell cable located at the load cell and at the junction box. The main conduit that runs between these 14 in flexible end sections are 3/4 in galvanized metal. The conduit is already installed on the deck.

NOTE: Flexible conduit can not come in contact with the ground. Plastic tie wraps are included in the hardware shipping box and should be used to tie up the flexible conduit.

If using a single B module, some of the conduit runs are not used. These conduit runs are used when more than one B modules are installed.

3.2 Junction Box Connections

Each junction box is large enough to hold the summing board, transient protection devices, packaged desiccant and extra load cell cable coiled inside the enclosure. An industrial corrosion inhibitor and desiccant such as the RLWS Industrial Corrosion Inhibitor (PN 16037) should be added to the junction box enclosure before final closure.

NOTE: Summing card mounted within the junction box is used to make all cable terminal connections. All terminal pins are clearly marked as to function.

3.3 Junction Box to Indicator

Fifty eight (58) feet of six-wire homerun cable is supplied for wiring the junction box to the indicator. It is run in 3/4 in galvanized metal conduit from the junction box to the indicator. Conduit for this purpose is to be obtained locally. A 30 in flexible conduit section and conduit connector is provided where this cable exits the junction box. Do not run any other electrical cables in or near the conduit to the indicator.

3.4 Indicator to Peripherals

All 3/4 in conduit for cabling from the indicator to remote displays and other peripheral devices is to be obtained locally. Conduit runs may be buried in a trench or secured above ground. Use separate conduit runs for AC power and DC data lines to avoid interference. As a general guideline, run AC and DC cables in separate trenches if possible. If DC data cables must run in the same trench as AC power lines, separate cables as much as possible (preferably more than 34 in apart).

3.5 Single-Point Ground Conductor

A bare 10 gauge solid wire is to be run from the scale frame to the grounding lug on the junction box then underground to the main AC power earth ground. If the DC transient protection board is installed, the ground conductor should also be connected to the transient protection board's ground lug.

3.6 Electrical Ground Connections

IMPORTANT: A single-point grounding system is required. Improper grounding systems can cause corrupted data from ground loop current flows and costly lightning damage to electronics.

Always strive for a single-point grounding system. Do not drive ground rods at the scale location which establishes separate earth grounds for the scale. These separate earth grounds will not share the same zero reference as the existing earth ground for the AC power system. This difference in electrical potential invites ground-loop current flow between the separate grounds, often corrupting serial data like RS-232, which depends on a stable zero reference.

In addition, a separate earth ground system at the scale can actually invite lightning or power surge damage:

- A minor power line surge should immediately be shunted to ground. If a separate ground system exists at the scale with a lower potential than the main ground, the surge may travel out to the scale ground rod, damaging load cells on its way.
- A nearby lightning ground strike may instantly raise the zero potential of a ground rod at the scale location, while leaving the scale house ground rod unaffected. That lightning surge will now take the easiest path to the lower-potential ground—through the scale wiring and back to the scale house ground, possibly damaging the indicator on its way.

Therefore, the best grounding system for the scale is the same grounding system used for the incoming AC power system. The 120 VAC power source used to power the indicator will be connected to an existing earth grounded rod system at the scale house or other building where the indicator is located. This should consist of a double ground rod system of two 5/8 inx 8 ft copper rods driven 8 ft deep at the service entrance where the local utility company brings their lines into the building.

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The local utility company can test the resistance of the existing ground rods with a clamp-on megohmeter that measures zero resistance. A reading of 3¾ or less is acceptable as a ground. If the test determines that the grounding system is inadequate, the utility company can suggest methods to improve the system. It's crucial that the scale owner authorize and make the recommended improvements to assure an adequate electrical ground. Do not connect the scale to the AC power supply until the grounding system is adequate.

Be certain each load cell grounding strap is securely connected to the top plate and bottom plate of each load cell mount. There should be metal-to-metal contact with no presence of paint or grout. This strap is designed to channel power surges on the deck around—rather than through—the load cell to ground

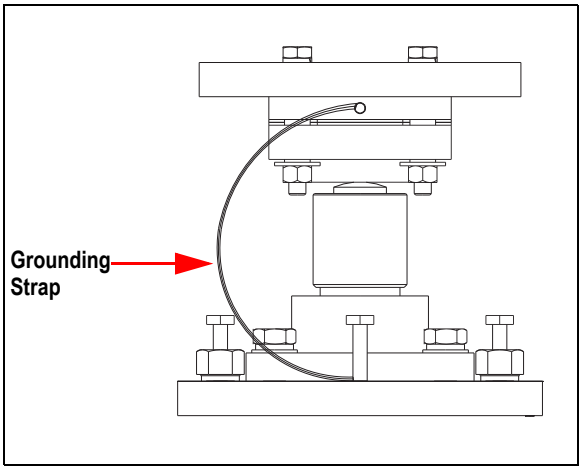

Figure 3-2. Grounding Strap on Load Cell Mount

These, and all, ground connections must be torqued to a specified value and retorqued at regular service intervals. A thick coating of anti-oxidant grease should be maintained on all ground connections to prevent corrosion.

A separate grounding system conductor must extend uninterrupted from the main service panel ground to the scale to protect load cells and scale wiring from lightning and other transient damage. This ground wire conductor must be an unsheathed #10 copper wire or larger. Run the bare ground wire conductor intact from the AC power ground rod to the scale in a separate trench. Bring the wire up from the trench near the junction box and attach it to the ground lug of the junction box. A #10 bare ground wire is run from the ground lug of the junction box to one of the junction box mounting studs on the scale frame, thus grounding the scale frame to the same single-point ground as the AC power for the indicator.

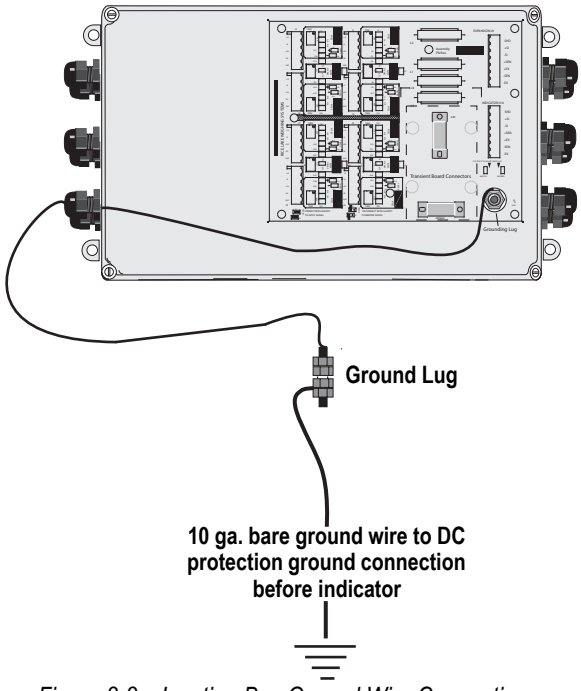

Figure 3-3. Junction Box Ground Wire Connections.

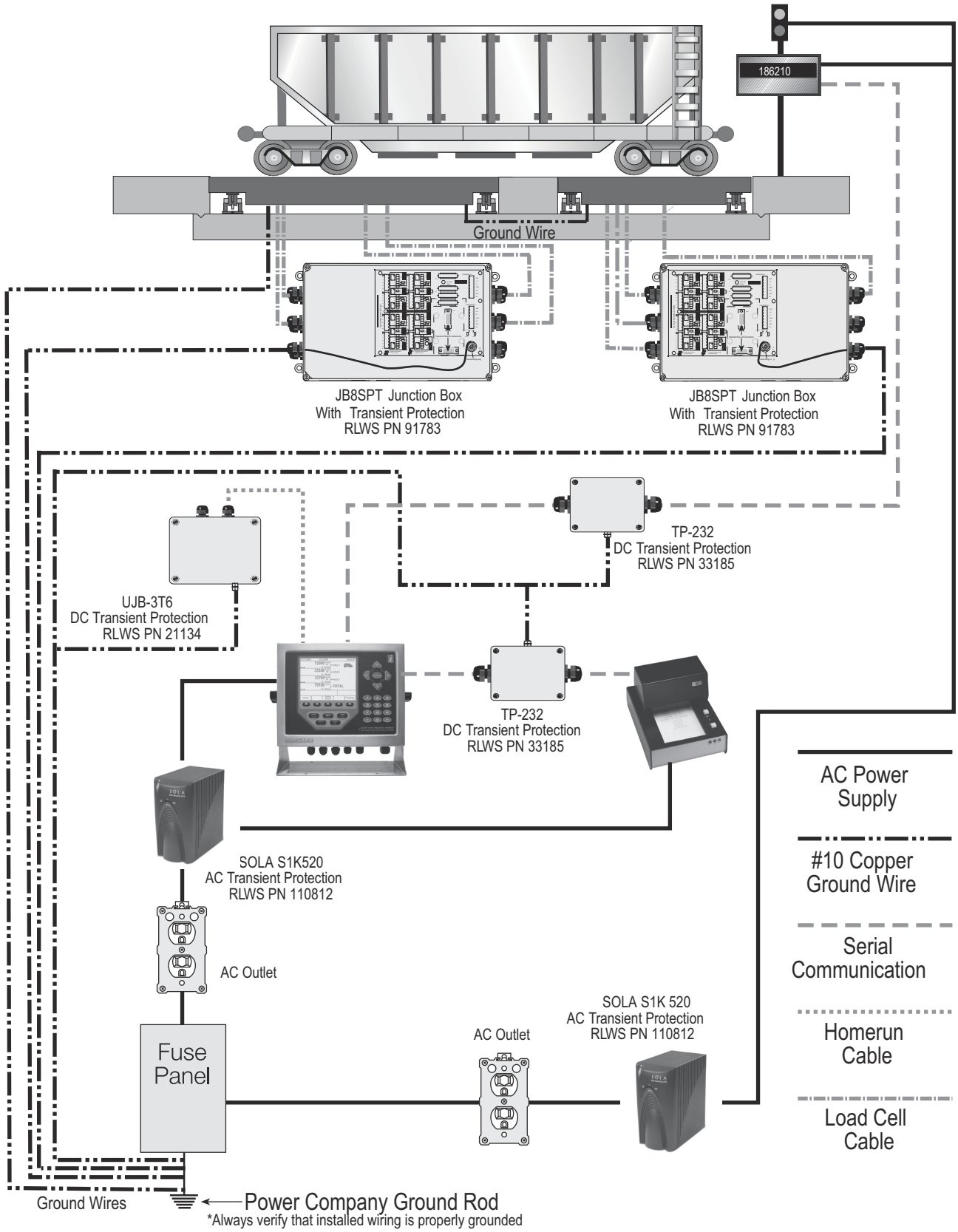

Figure 3-4. Single-Point Grounding Diagram

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4.0 Trimming and Calibration

IMPORTANT: See the Association of American Railroads (AAR Scale Handbook) at http://www.aar.org for specifications on rail testing procedures.

Load cells are trimmed as paired sections, referred to as ***Section Signal Trimming,*** until each sectional output is equal. Adjustments to each section should be done at least twice.

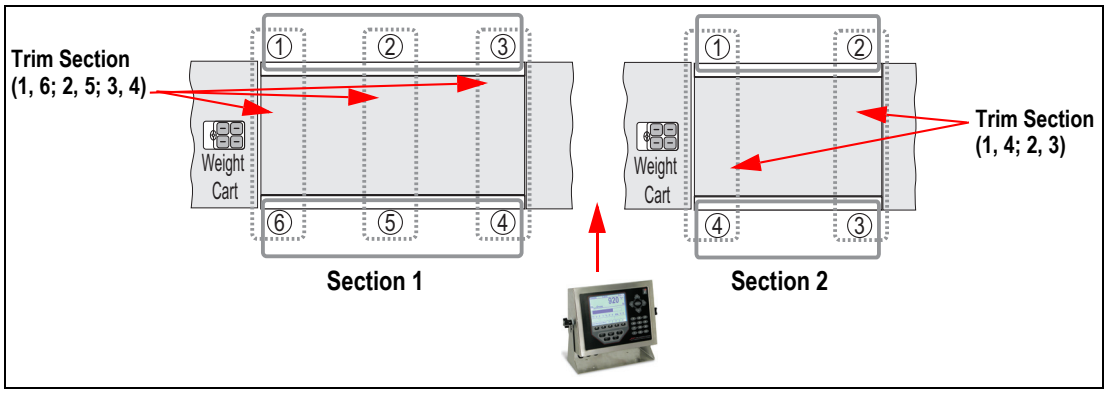

Figure 4-1. Load Cell Trimming Diagram

4.1 Equipment Required

This trimming operation can be done using a weight cart parked in various locations on the scale. Final verification of equal output trimming, however, will require test weights to be placed on the deck in various locations.

4.2 Trim Load Cells

1. Connect all load cells to the summing board terminals in the junction box.
2. Connect the main interface cable from the junction box to the indicator.
3. Turn on the indicator.
4. Turn all load cell potentiometers in the junction box clockwise until a clicking noise is heard when continuing turning. This eliminates any initial resistance so all signals are at full strength.
5. Park the loaded weight cart in the middle of the scale, with the wheels centered over the center line of the two end load cell mounts (Figure 4-2).
6. Record the indicator reading.

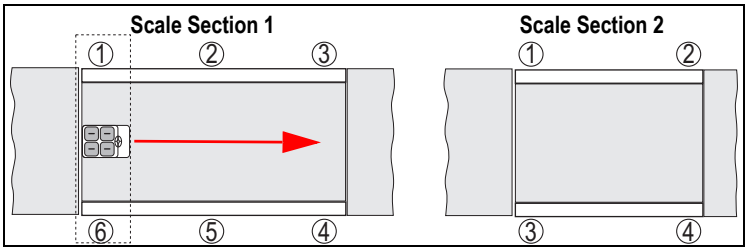

Figure 4-2. Trimming Paired Sections

7. Move the weight cart to the next load cell pair center line and record the indicator reading.
8. Continue until all pair readings have been recorded.
9. Choose the lowest reading as the reference section, do not adjust this reading.
10. Using the section potentiometers, reposition the weight cart on the other sections and trim the sections to match the reading of the reference section.
11. Recheck section readings a second time as the adjustment made may be interactive.
12. Repeat the procedure for the paired sections on ***Scale Section 2***.
13. Place railroad test car on each section for final certification.

4.2.1 Static Testing of a Track Scale

A shift test is required to ensure the scale is preforming within applicable tolerance and to verify a rail car can be accurately weighed from any direction or at any position on the scale.

Begin the shift test by documenting the current readings for the sections, in both directions, before any repairs or adjustments are made. After repairs and adjustments are made, document the readings again. A weight of at least 80,000 lb (36,300 kg) must be used for track scale certification, except for Interim Approval (returning a scale temporarily to service after repairs, refer to the AAR Scale Handbook).

Sections of the scale need to be numbered 1, 2, 3 etc., from left to right when standing at the indicator, facing the scale deck (see Figure 4-1). Normal sectional placement positions of a scale ***Test Weight Load,*** when performing a shift test, are designated from left to right (view from the indicator) as 1R, 2L, 2, 2R, 3L 3, 3R, etc. The numbers represent the sections, the letters (when affixed) indicate whether the body of the ***Test Weight Load*** lies to the left or right of the section, with one pair of wheels or jacks directly over the section.

The following are standard combinations of normal ***Test Weight Load*** placement positions (using a four-section scale as an example).

- 1R, 2, 3, 4L
- 1R, 2L, 2R, 3L, 3R, 4L

When testing a two-section scale, the standard combination of normal test car positions is 1R, Center 2L.

When using self-propelled test cars, place the entire car on the left, center and right end of the scale load receiving element. Test Weight Cars shall be uncoupled at both ends to avoid coupler error.

NOTE: Refer to the AAR Scale Handbook for more information.

4.2.2 Strain Test

In addition to the standard test, the scale should be strain tested by using a load and a scale ***Test Weight Load*** or known test weight.

1. Place the load on the scale and record its weight.
2. Add the ***Test Weight Load*** or test weight to the scale.
3. Record the combined weight and subtract the load weight from the combined weight of the load and the test weight. The difference between the value of the load and the load plus the test weight should be equal to the test weight. If not, the difference must not exceed the applicable tolerance as applied to the test weight.

NOTE: One half of the rail car can be used as a load if the scale is too short to accommodate an entire rail car plus the test weight load or test weight.

Refer to the AAR Scale Handbook for more information.

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5.0 Specifications

Gross capacity
85 tons to 170 tons

Sectional capacity
85 tons

Module sizes
12 ft 6 in, 15 ft, 18 ft, 25 ft available

Platform width
7 ft 8 in, 8 ft 7 in low profile design

Top Plate
Bolted, Checkered Steel

Rail Size
Designed for 115 lb, 132 lb, and rail

Checking Assemblies
Longitudinal and lateral checking assemblies with top access

Load Cells
100K CSP1-100K
Accessible from sides of scale

Configuration
Single, Single/Single, Single/Double, Double, Double/Double

Accuracy
0.1% in accordance with NIST, AAR, and AREMA requirements.
Based on rail cars uncoupled at both ends

Standard Features
Lightning and surge suppression kit
Rail clips for deck
Anti-creep angles
Low profile above-grade installation
Copper transient bypass cables
In-bridge conduit runs

Options
Approach rail base plates, rail clips, nuts and washers
Anchor bolts for approach rail plates
Custom sizes available
Hardware for intermediate section
Anchor bolts for load cell and check stands

Certifications
- NTEP Certified, CC#02-087, 98-009
- Measurement Canada AM-5850
- Meets Cooper E-80 design specifications
- Meets AAR and AREMA specifications

Configuration

Model	Configuration	Platform Size	Capacity	Weight (lb)
PL-12-85	Single	12 ft 6 in	85 tons	8500 lb
PL-15-85	Single	15 ft	85 tons	11250 lb
PL-18-85	Single	18 ft	85 tons	16240 lb
PL-25-85	Double	25 ft	175 tons	16380 lb
PL-12-12-170	Single/Single	12 ft 6 in + 12 ft 6 in	170 tons	17000 lb
PL-12-15-170	Single/Single	12 ft 6 in + 15 ft	170 tons	19750 lb
PL-12-18-170	Single/Single	12 ft 6 in + 18 ft	170 tons	24740 lb
PL-12-25-170	Single/Double	12 ft 6 in + 25 ft	175 tons	24880 lb
PL-15-15-170	Single/Single	15 ft + 15 ft	170 tons	22500 lb
PL-15-18-170	Single/Single	15 ft + 18 ft	170 tons	27490 lb
PL-15-25-170	Single/Double	15 ft + 25 ft	175 tons	27630 lb
PL-18-18-170	Single/Single	18 ft + 18 ft	170 tons	32480 lb
PL-18-25-170	Single/Double	18 ft + 25 ft	175 tons	32620 lb
PL-25-25-170	Double/Double	25 ft + 25 ft	175 tons	32760 lb

Table 5-1. Survivor PL Series Platform Sizes

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