

RailBoss®

Railroad Track Scale

Installation Manual



RICE LAKE[®]
WEIGHING SYSTEMS

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updates can be found on our website:

www.ricelake.com

Revision History

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

Revision	Date	Description
L	March 2, 2023	Established revision history

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.

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Rice Lake continually offers web-based video training on a growing selection of product-related topics at no cost. Visit www.ricelake.com/webinars

1.0 Introduction

This manual is intended for use by technicians responsible for installing and servicing the RailBoss® Railroad Track Scale.



IMPORTANT: Use the instructions in this manual as general installation guidelines, unless they differ from the engineering drawings that are furnished with the scale. Engineering drawings always take priority over the manual.



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

Warranty information is available at www.ricelake.com/warranties

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.

Do not allow minors (children) or inexperienced persons to operate this equipment.

Do not operate without all shields and guards in place.

Do not use for purposes other than 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 equipment if any of the components are cracked.

Do not exceed the rated load limit of the equipment.

Do not make alterations or modifications to the equipment.

Do not remove or obscure warning labels.

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

1.2 FCC Compliance

United States

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

Canada

This digital apparatus does not exceed the Class A limits for radio noise emissions from digital apparatus set out in the Radio Interference Regulations of the Canadian Department of Communications.

Le présent appareil numérique n'émet pas de bruits radioélectriques dépassant les limites applicables aux appareils numériques de la Class A prescrites dans le Règlement sur le brouillage radioélectrique édicté par le ministère des Communications du Canada.

1.3 Overview

The RailBoss Railroad Track Scale is available as a double-draft and full-draft system.

A double-draft system weighs one set of rail trucks (four wheels) at a time. This is good for rail cars that do not fit on a full-draft scale or for installations consisting of only one four-rail section.

A full-draft system weighs both sets of rail trucks at the same time. It requires a dual-channel A/D input card installed in the indicator and two four-rail sections of the RailBoss scale.

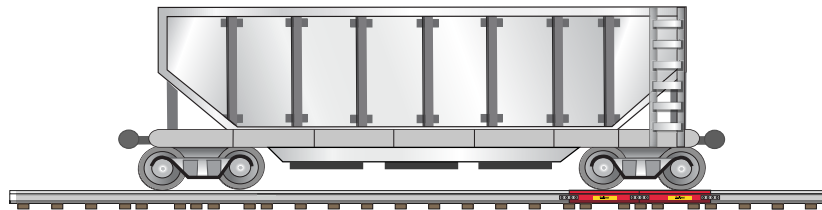


Figure 1-1. Double-Draft Installation

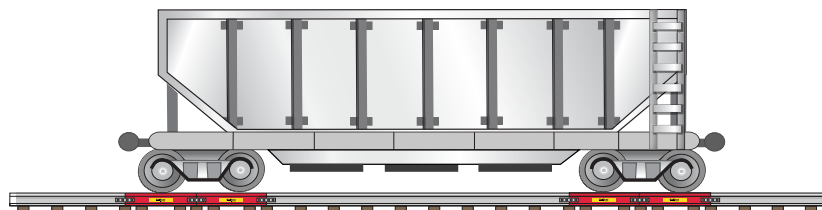


Figure 1-2. Full-Draft Installation



NOTE: Actual installation of rail sections, including rail cutting, tie positioning and rail installation is recommended to be performed by a properly authorized rail contractor.

2.0 Installation

Typical installations take approximately six to eight hours. Use the instructions below as a general installation guideline unless the engineering drawings furnished with the scale are different. Engineering drawings always take priority over these general installation guidelines.



WARNING: The RailBoss scale is heavy and could cause bodily harm if any body parts get caught under it when installing. Take necessary safety precautions when installing, including wearing safety shoes and using the proper tools.

Unpack the contents of the shipment and verify the contents are correct. If any parts were damaged in shipment, notify Rice Lake Weighing Systems and the shipper immediately.

Components included:

- RailBoss scale joint bars and hardware
- Conduit and cable
- TuffSeal® junction box (one for double-draft, two for full-draft)

Recommended tools:

- Rail saw
- Rail drill
- Rail lifters
- Anchor and spike extractor
- Striking hammer
- Pneumatic hammer and wrench
- Assorted mechanical and electrical tools

2.1 Prior to Installation

Prior to the installation date, inspect the site, paying close attention to rail size and existing track condition.

2.1.1 Rail Size

Before installing the RailBoss scale, ensure the rail size matches the existing rail size. If the rail size does not match, compromise bars are needed.

2.1.2 Condition of Existing Track

Existing rail and railroad ties should be in good condition. Rail must adhere to main line standards (maximum deflection 1/4" under load).

Existing ties and ballast should not show signs of damage or rot. Replacement of existing ties is recommended to ensure the RailBoss scale properly functions.

2.2 Preparing and Cutting Existing Rail

1. Clear the existing ballast surrounding the track where RailBoss section(s) are to be installed.
2. Measure and mark the four cutting locations (eight cuts for a full draft installation) of track to be replaced. See [Figure 2-8 on page 10](#).


 **IMPORTANT:** *Cutout lengths should be approximately 141.25". Verify the exact dimensions with the supplied drawing(s).*



Figure 2-1. Existing Track Cleared of Ballast

3. Clear out the area underneath the rail where cutting will occur.
4. Remove the existing railroad spikes and tie plates within two feet on either side of each cut location.



Figure 2-2. Cutting Existing Track

5. Secure a rail saw to existing track at the cutting marks established in Step 2. Once mounted, completely cut through the rail.

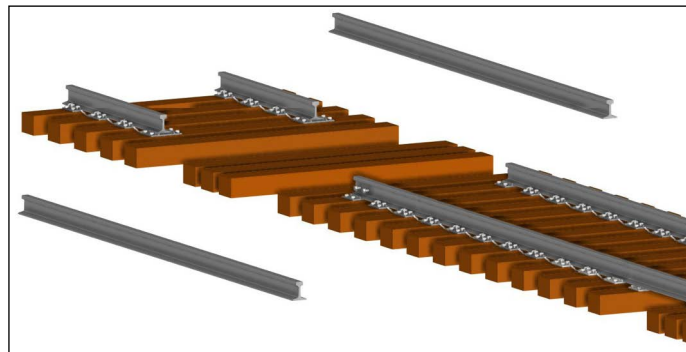


Figure 2-3. Rail Cutting Complete

6. Once all cuts have been made, remove the loose rails from the area.

2.3 Tie Spacing and RailBoss Mounting

1. Use a backhoe to dig through existing ballast and remove the existing ties.



NOTE: Installing new ties is recommended; if existing ties are in good condition, they still need to be removed to allow for alignment and spacing needs beneath the RailBoss sections.

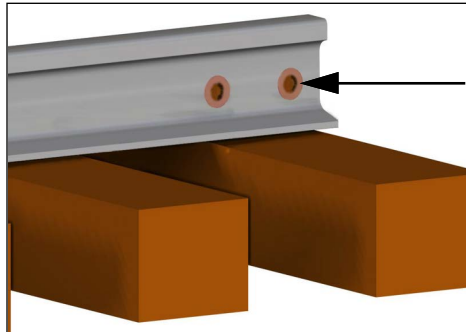


Figure 2-4. Holes Drilled in Existing Rail

2. Drill two standard-spaced 1 1/4" holes in existing rail to allow for RailBoss mounting.

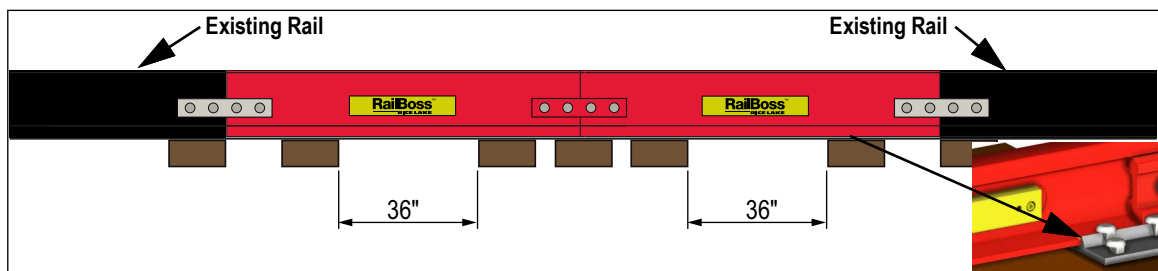


Figure 2-5. Tie Spacing in Relation to Existing Rail and Installed RailBoss

3. Place ties in position, 36" apart, according to the marks at the base of the RailBoss being inserted.



NOTE: Position the rails so that the cables are on the inside.

4. Adjust ballast beneath ties as needed to maintain plumb using a plate compactor or earth tamper.

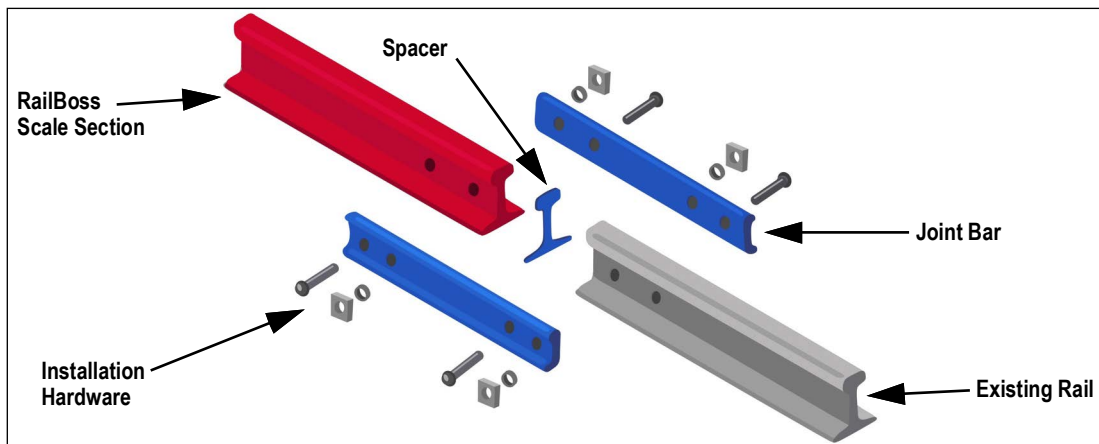


Figure 2-6. Installing RailBoss Scale Sections to Existing Rail



IMPORTANT: For proper installation, isolation joint bars and spacer are required. (Figure 2-6)

5. Install scale sections by positioning spacer between RailBoss section and existing rail, then insert bolts through pre-drilled holes in the RailBoss and joint bars (or compromise bars if needed).
6. Finger-tighten one nut on each bolt. Four hole joint bars must be used to join in-bound and out-bound rails with RailBoss rails. Use of six hole joint bars is not permitted.

7. Use a pneumatic wrench to tighten nuts on all joint or compromise bars.

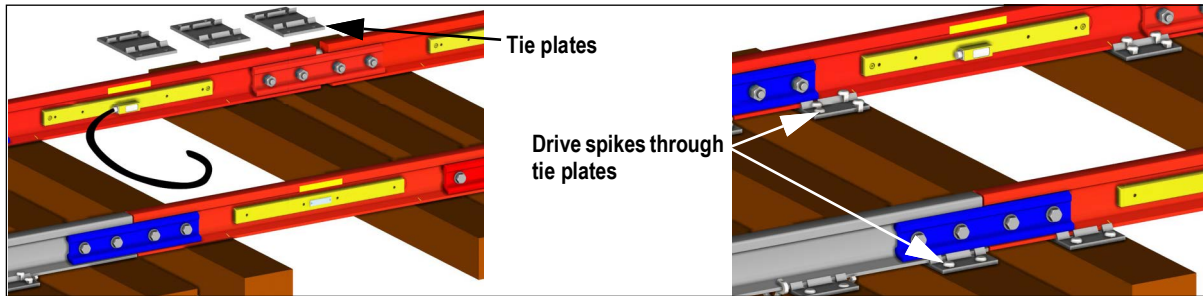


Figure 2-7. RailBoss Sections

8. Ensure tie spacing is correct, then drive spikes to attach tie plates to the rail ties; drive spikes fully into place with a pneumatic hammer if available.



NOTE: Ensure the RailBoss is not hit during spike installation.

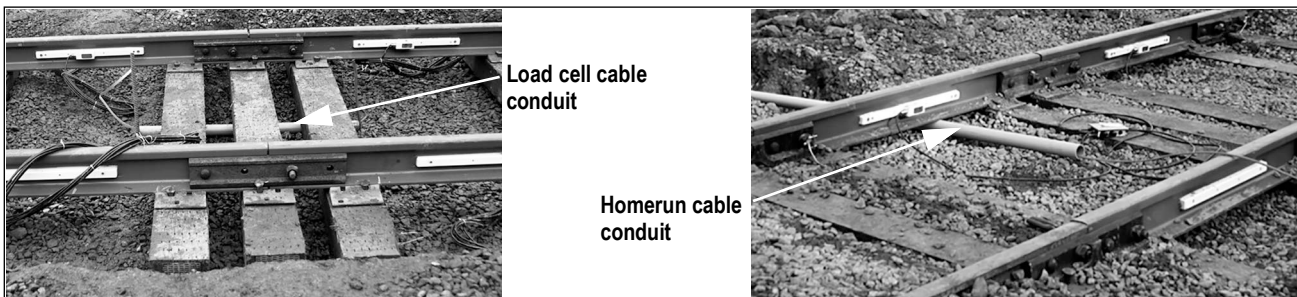


Figure 2-8. Load Cell Cable and Homerun Cable Conduit

9. Place watertight conduit (not included) beneath the three center rail ties and route load cell cables to the desired junction box location. Watertight conduit should also be placed beneath the RailBoss track to run homerun cable to the scale house indicator.
10. Replace ballast and spread evenly; do not compact ballast until installation of ground rods is complete. See [Section 4.1 on page 13](#).
11. Ensure there is 1/8" minimum clearance between the RailBoss rail sections. This is to accommodate expansion and contraction of metal during temperature changes.

3.0 Junction Box Installation

The TuffSeal® junction box (PN 119987) has been designed to connect and trim four load cells per board. One junction box is required per www.RiceLake.com section (one junction box = four rails for double draft systems, two junction boxes = eight rails for full draft systems).



WARNING: Electrostatic Charging Hazard — to prevent Electrostatic charging hazard, the equipment shall only be cleaned with a damp cloth. Sparks can ignite flammable liquid vapors and powders.

3.1 Junction Box Wiring

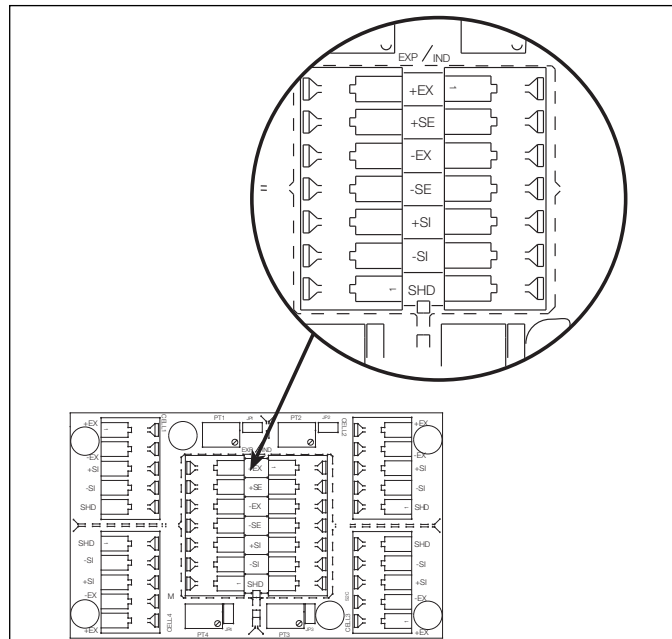


Figure 3-1. Expansion Port Wiring Location

V2 – Yellow Cover		V1 – White Cover	
Color	Function	Color	Function
Green	+EXCITATION	Red	+EXCITATION
Black	-EXCITATION	Black	-EXCITATION
White	+SIGNAL	Green	+SIGNAL
Red	-SIGNAL	White	-SIGNAL

Table 3-1. RailBoss Wiring Assignments

1. Route the load cell cables through the cord grip assemblies and leave the grips loose until final closure.
2. Before connecting load cell wires to the terminals, strip the wire insulation back 1/4" to expose the wire. The spring-loaded terminals accommodate 12-28 gauge wire.
3. To connect the load cell wires to the appropriate connectors, push in the quick-connect lever with a small screwdriver. While holding the lever, insert the appropriate wire into the exposed wire opening.
4. Release the screwdriver to allow the spring-loaded gate to close and lock the wire in place.

3.2 920i Wiring

1. Route the cable through the cord grip and ground the shield wire.
2. Remove connector J1 from the A/D card. The connector plugs into a header on the A/D card. Wire the load cell cable from the load cell or junction box to connector J1 as shown in Table 3-2.

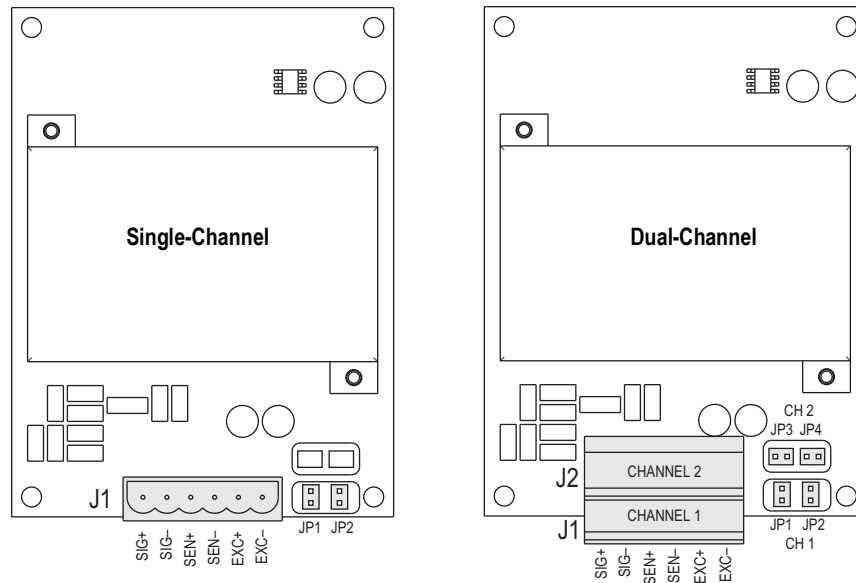


Figure 3-2. A/D Cards

A/D Card Connector Pin	Function
1	+SIG
2	-SIG
3	+SENSE
4	-SENSE
5	+EXC
6	-EXC

Table 3-2. A/D Card Pin Assignments



NOTE: For 6-wire load cell connections to connector J1, remove jumpers JP1 and JP2.

For 6-wire load cell connections to connector J2 (dual A/D cards), remove jumpers JP3 and JP4.

3. If using 6-wire load cell cable (with sense wires), remove jumpers JP1 and JP2 before reinstalling connector J1. For 4-wire installation, leave jumpers JP1 and JP2 on. For 6-wire load cell connections on dual-channel A/D cards, remove jumpers JP3 and JP4 for connections to J2.
4. When connections are complete, reinstall load cell connector on the A/D card and use two cable ties to secure the load cell cable to the inside of the enclosure.



NOTE: Because cables could be exposed to water or other liquids, bend a short downward loop in all cables near the cord grips so any fluids draining down the cables will drip off before reaching the junction box.

4.0 Grounding

For proper installation, Rice Lake Weighing Systems requires the installation of the RailBoss grounding system to protect the RailBoss scale from surges. Rail track scales of all types can be exposed to surges or lightning that may hit the rail at even very long distances from the scale. It is recommended that scale sections be isolated from the rail track on both ends of each section. Eight-foot ground rods should be driven between the rails, and a copper wire connected to the rail on each side with a 10-gauge copper wire. Rail joint bar isolators should also be installed at each end of RailBoss sections.

Replacement Part Numbers

Part No.	Description
126111	Rail Joint Bar Isolator kit, 90RA Full or Double Draft
112702	Rail Joint Bar Isolator kit, 115 RE Full or Double Draft
119771	Rail Joint Bar Isolator kit, 132 RE Full or Double Draft

Table 4-1. Rail Joint Bar Isolator Kits

Part No.	Description	Grounding Kit Contents (Qty)
126112	Grounding kit, 90RA Double Draft	119913, 8' Copper bonded steel ground rod (2) 119916, Ground rod clamp (2) 119917, Pipe clamp, grounding (4) 119920, Copper wire, 10 ga. 25' (1)
126113	Grounding kit, 90RA Full Draft	
119800	Grounding kit, 115 RE Double Draft	
119801	Grounding kit, 115 RE Full Draft	
119802	Grounding kit, 132 RE Double Draft	
119803	Grounding kit, 132 RE Full Draft	

Table 4-2. Grounding Kit Part Numbers

4.1 Grounding System Installation

Use 8' ground rods (included). Placement of ground rods can vary, depending on ground hardness, they should be as close to the center of the track as possible.

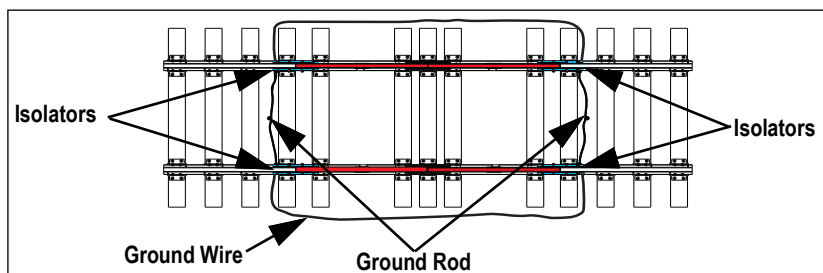


Figure 4-1. Ground Rod Locations – Double-Draft System

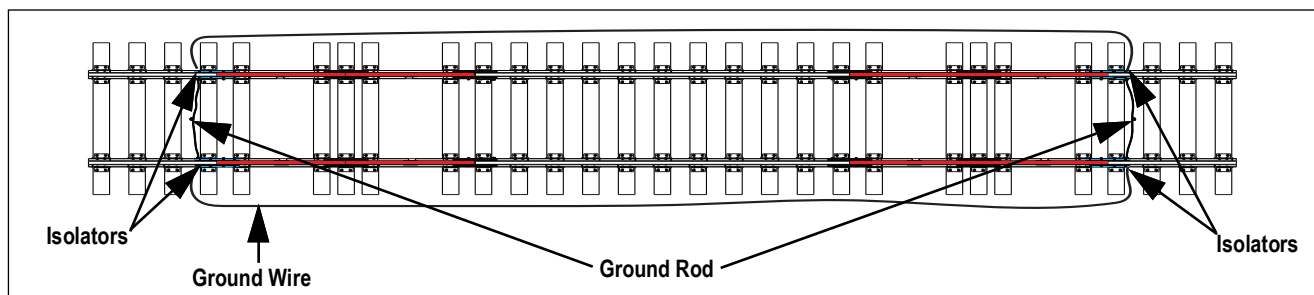


Figure 4-2. Ground Rod Locations – Full-Draft System

4.1.1 Installation

1. Install ground rods at the locations specified in [Figure 4-1](#) and [Figure 4-2](#). Rods should be driven into the ground so the tip is approximately at the height of the railroad tie surface.
2. Once rods are installed, compact the ballast, ensure there is a solid ballast foundation under the ties.
3. Install ground rod clamps on ground rods.

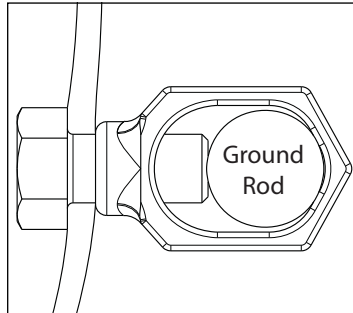


Figure 4-3. Ground Clamp Installation

4. Install pipe grounding clamps on joint bar bolts.

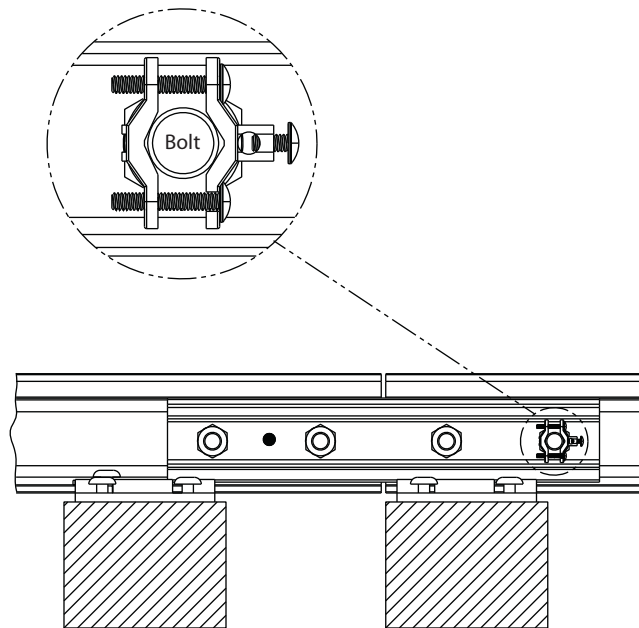


Figure 4-4. Ground Clamp Installed on Joint Bar Bolts

5. Route 10-gauge copper wire from the pipe grounding clamps to the ground rod clamps and cut to length.
6. Install the UPS (uninterrupted power system).

4.2 Transient Protection

! IMPORTANT: Improper grounding systems can cause costly lightning damage to electronics. Always strive for a single-point grounding system. Refer to the product manual for proper grounding techniques.

The illustration below gives a general overview of a properly grounded system.

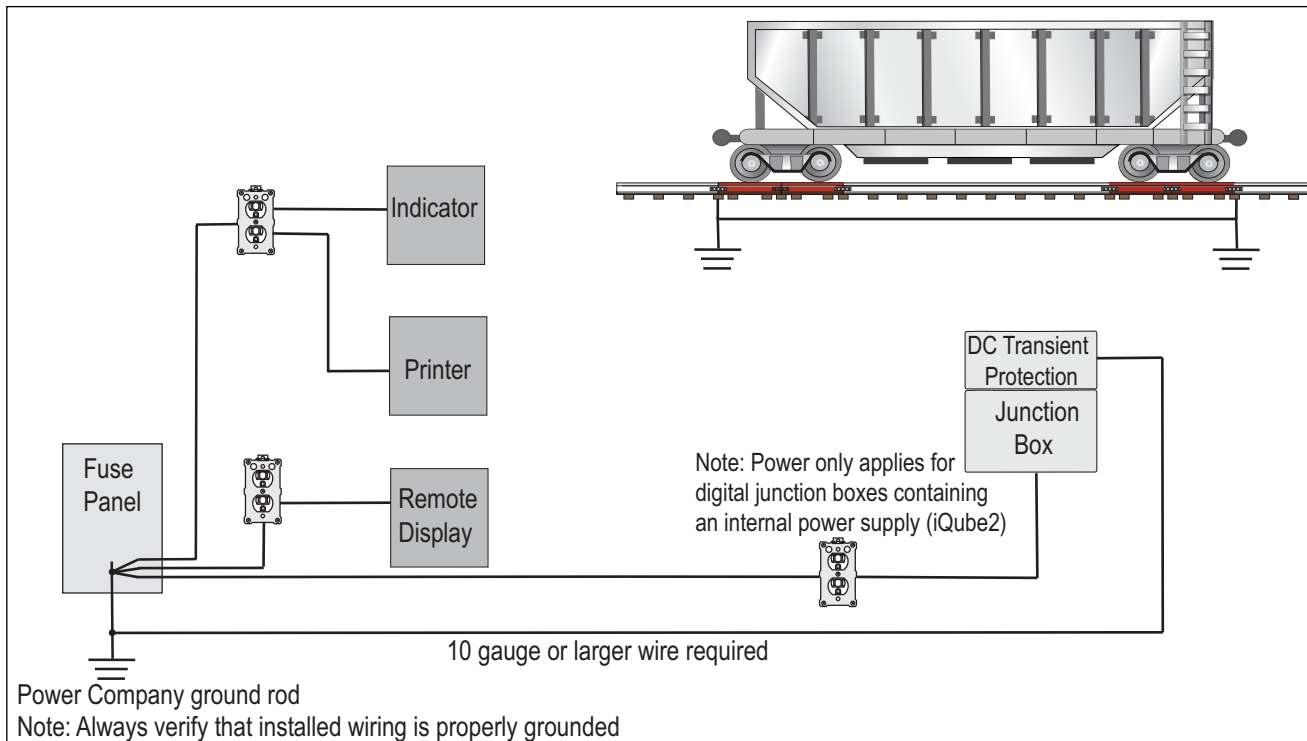


Figure 4-5. Railroad Scale Single Point Grounding Example

Once the system is properly grounded, tamp the ballast so that it is not loose.

NOTE: Avoid tamping the ballast too firmly.

5.0 Calibration

The RailBoss Calibrator (sold separately) is a specially designed tool to calibrate the RailBoss scale.



CAUTION: Take all necessary safety precautions when installing the scale carriage including wearing safety shoes, protective eye wear and using the proper tools.

Do not place hands, feet or any body part between the RailBoss Calibrator and the RailBoss rail or any possible pinching locations.

5.1 Using the RailBoss Calibrator

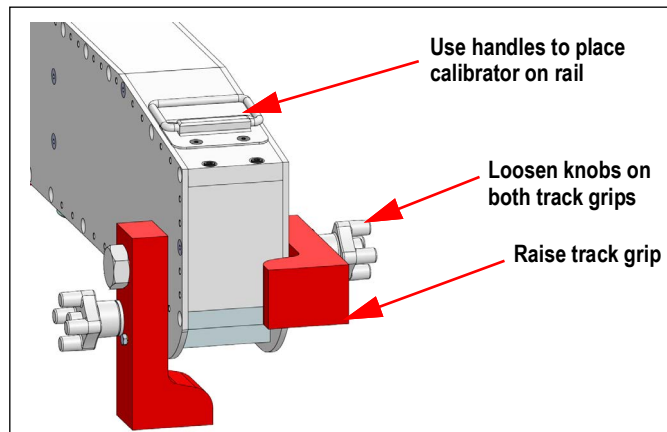


Figure 5-1. RailBoss Calibrator Track Grips

1. Ensure track grips are arranged as shown in [Figure 5-1](#) prior to placing the RailBoss Calibrator on the track.

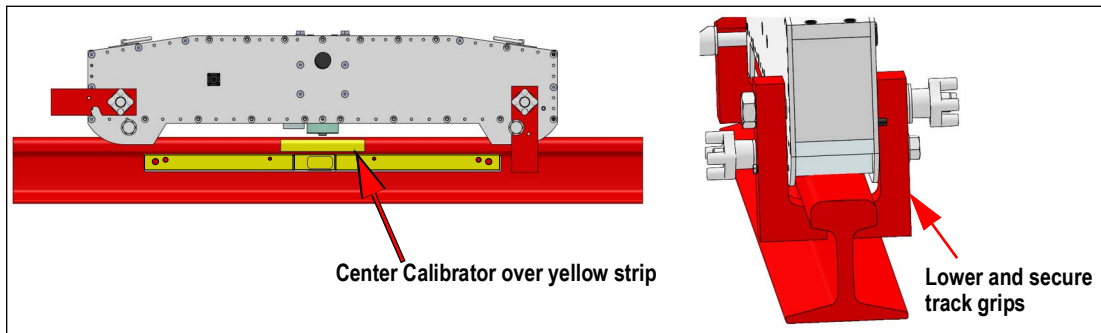


Figure 5-2. RailBoss Calibrator on RailBoss Scale

2. Place the RailBoss Calibrator on the RailBoss rail, centering the calibrator load cell over the center of the yellow reflective strip.



IMPORTANT: This ensures a correct reading from the rail.

3. Lower and secure the track grips.

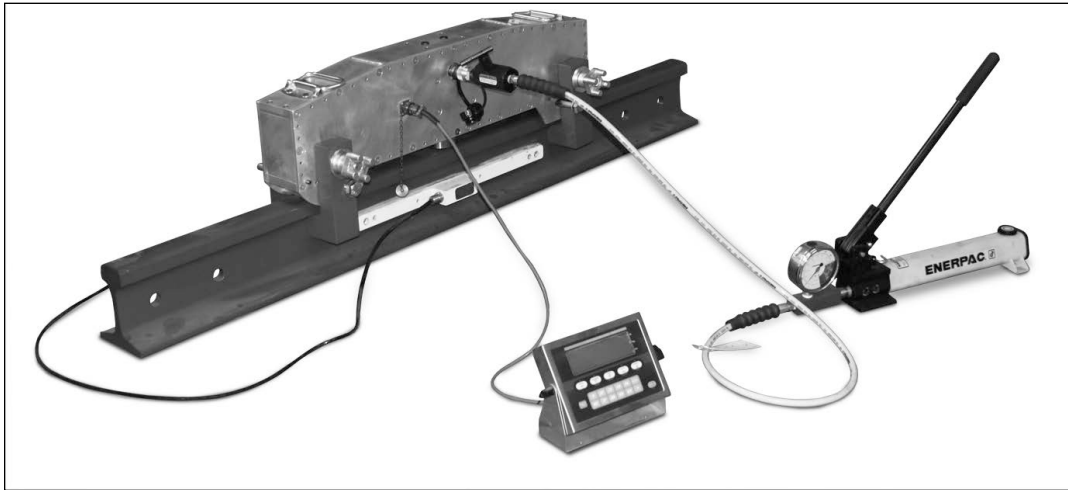


Figure 5-3. Indicator and Hydraulic Pump Attached to RailBoss Calibrator

- Attach the indicator and hydraulic pump once the calibrator is securely fitted over the RailBoss live rail.

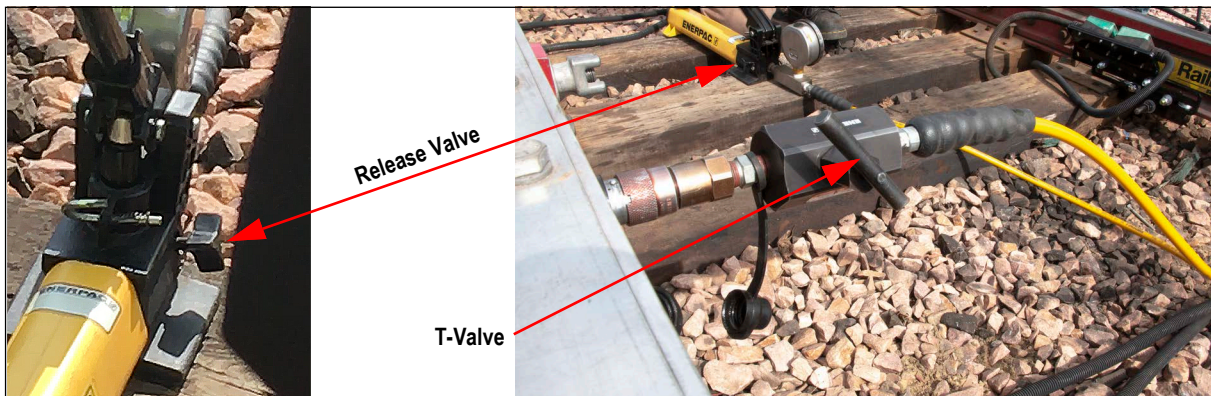


Figure 5-4. Relief Valve Locations on the Hydraulic Pump and Calibrator

- Ensure the t-valve on the RailBoss Calibrator is open and turn the release valve located on the side of the pump, clockwise to close the valve and engage the pump.
- Pump until the weight reaches 30,000 lb. Turn the release valve on the pump counterclockwise to open the valve to release pressure until the weight returns to zero.
- Repeat Steps 5 and 6, ten more times before attempting to calibrate.



NOTE: Hydraulic cylinders tend to bleed down at a slow rate.

- Calibrate the indicator to match the scale's 30,000 lb load. If weight is not stable, repeat Steps 4 through 6.
- Repeat this procedure for each RailBoss rail.
- Disconnect the hydraulic pump and indicator from the calibrator once calibration is complete on all RailBoss rails.

5.2 Trimming the Junction Box

Trimming is a process of equalizing the output from multiple individual load cells. If needed, load cell output can be individually trimmed with potentiometers. Whenever a substantial amount of trim (more than 5% of normal output), seems necessary to equalize output, check for other possible problems. The best trim is always the least amount of trim. Proceed with trimming only when all errors have been corrected except cell mismatch and cable extension or reductions.

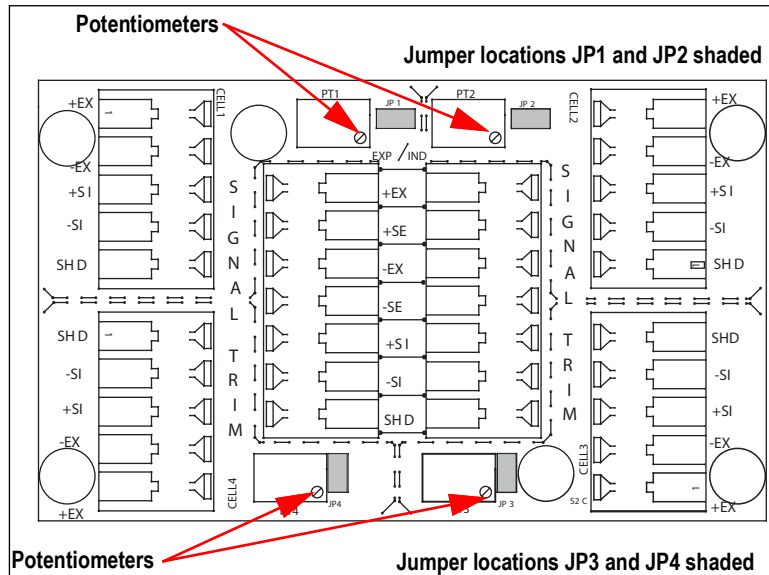


Figure 5-5. Signal Trim Main Board

Use the following steps to properly trim the JB4SP junction box.

1. Make sure jumpers are in place to enable trimming of the cells corresponding to each load cell.
2. Turn all potentiometers fully clockwise to give maximum signal output from each cell.
3. Zero the indicator and place the RailBoss Calibrator over each load cell in turn. The recommended test weight amount is 30,000 lb.
4. Record the value displayed on the indicator after the calibrator is placed on each load cell. Allow the scale to return to zero each time to check for friction or other mechanical problems. Select the load cell which has the lowest value as the reference point. This load cell will not be trimmed.
5. Replace the same test load over each load cell in turn. Using the corresponding potentiometer, trim each cell down to equal the reference load cell. Check all load cells again for repeatability and repeat steps 3 and 4 if needed.
6. Pull excess cable out of the enclosure and tighten the cord grip assemblies. To be watertight, each cord grip must be tightened until the rubber sleeve begins to protrude from the hub.
7. Unused hubs must be properly plugged to prevent moisture entry. See the Rice Lake Electronic Replacement Parts Catalog to order extra hole plugs.
8. Remove the desiccant bag from the plastic bag and insert the desiccant bag into the junction box before closing. Inspect the desiccant bag during normal service and change as needed.
9. Replace the cover and torque the cover screws to 15 in-lb in an alternating pattern to be certain the gasket is compressed equally in all locations.

5.3 Calibrating the 920i

The 920i can be calibrated using the front panel, serial commands, or iRev 4. Each method consists of:

- Zero calibration
- Entering the test weight value
- Span calibration

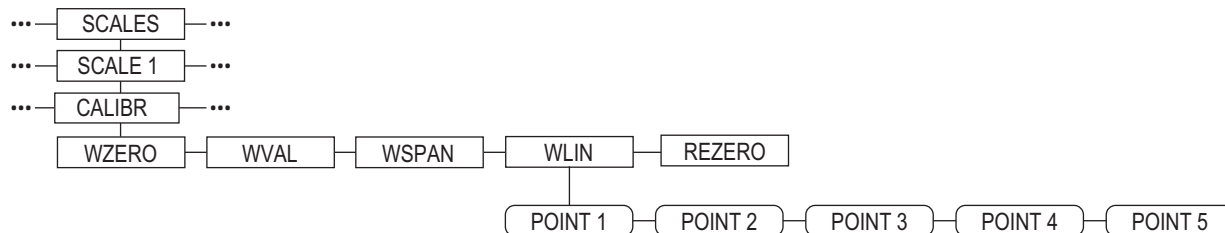


Figure 5-6. Calibration (CALIBR) Menu

5.3.1 Front Panel Calibration

The CALIBR menu (under the SCALES menu) is used to calibrate the 920i. The zero, span, and linear calibration point displays provide a set of softkeys used specifically for calibration procedures:

- +/-** Toggles to allow entry of negative or positive values
- Last Zero** Recalls the last established zero value to allow calibration without removing tests weights or product from scale
- Calibrate** Performs calibration for the selected point
- Temp Zero** Temporarily zeros the displayed weight of a non-empty scale. After span calibration, the difference between the temp zero and the previously calibrated zero value is used as an offset.
- Millivolts (Counts)** Toggles between display of captured A/D counts and captured millivolts values; allows entry of calibration values in mV or counts.

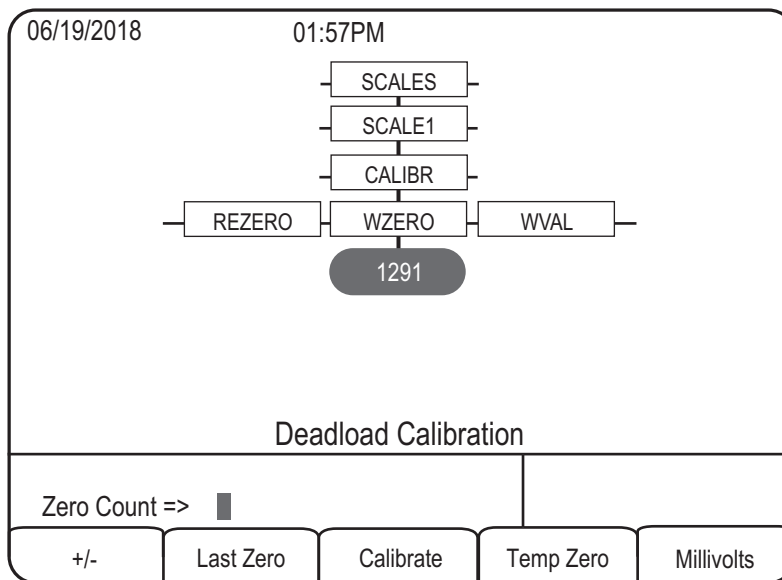












Figure 5-7. WZERO Calibration Display

To calibrate the indicator using the front panel, do the following:

1. Ensure the junction box trimming procedure has been successfully completed.
2. Place the indicator in setup mode by removing the large fillister-head screw from the enclosure and inserting a non-conductive tool into the access hole and press the setup button. The indicator display changes to show scale configuration menus.
3. With the **SCALES** menu highlighted, press , then select Scale 1.
4. Press  again (**GRADS** parameter highlighted), then press  to highlight the **CALIBR** menu (Figure 5-6).
5. Press  to go to zero calibration (**WZERO**). See Figure 5-7.
6. Ensure scale reading is at zero, then press  to show the current WZERO value.
7. Press the **Calibrate** softkey to calibrate zero. When complete, the new A/D count for the zero calibration is displayed.
8. Press  to save the zero calibration value and go to the next prompt (**WVAL**).
9. With **WVAL** highlighted, press  to show the stored calibration weight value.
10. Use the numeric keypad to enter the actual value of the RailBoss Calibrator load to be used (30,000 lb is recommended).
11. Press  to save the value and go to the next prompt, span calibration (**WSPAN**).
12. Use the RailBoss Calibrator to place a 30,000 lb load on the scale. Press  again to show the current **WSPAN** value.
13. Press the **Calibrate** softkey to calibrate span. When complete, the new A/D count for the span calibration is displayed.
14. Press  to save the span calibration value and go to the next prompt (**WLIN**).
15. When complete, press the **Save and Exit** softkey to exit setup mode.

iRev Calibration

The iRev 4 Calibration Wizard provides step-by-step scale calibration. With the 920i connected to a PC, select the Calibration Wizard from the Tools menu on the iRev 4 Scales display, then follow the steps listed below to calibrate the scale.

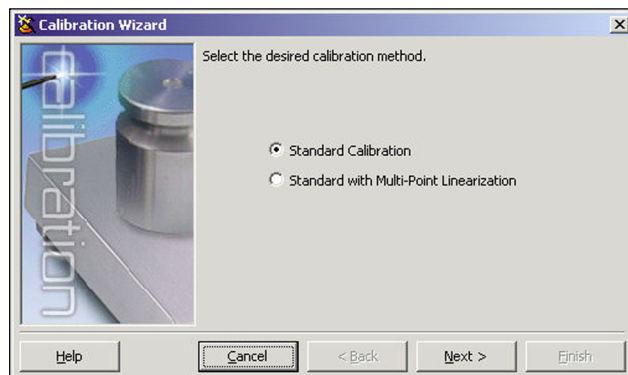


Figure 5-8. iRev 4 Calibration Wizard

1. Select Standard Calibration.
2. Press the **Next** button to continue.

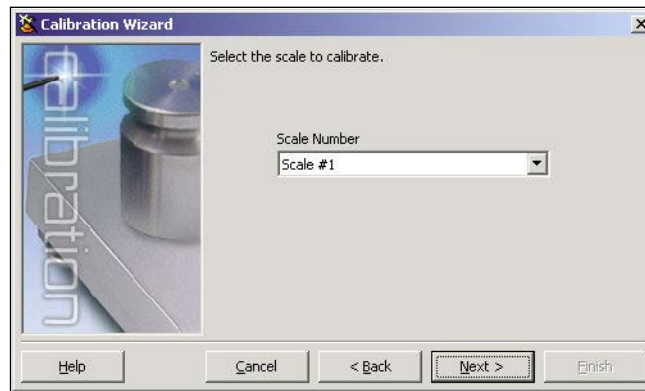


Figure 5-9. iRev 4 Scale Selection Display

3. Select the scale to calibrate (Scale #1).

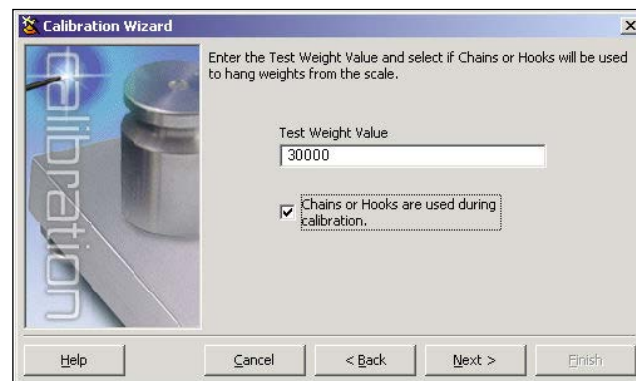


Figure 5-10. iRev 4 Test Weight Value Display

4. Enter the RailBoss Calibrator load value used to calibrate the scale (30,000 lb).
5. Check the box if chains or hooks are used during the calibration process.

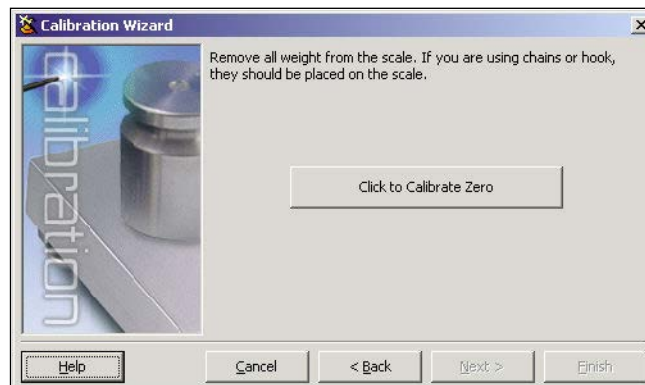


Figure 5-11. iRev 4 Zero Calibration Display

6. Ensure the scale load is at zero.
7. Press **Calibrate Zero** to perform the zero calibration. A message appears when the process is complete.



Figure 5-12. iRev 4 Span Calibration Display

8. Using the RailBoss Calibrator, apply the 30,000 lb load to the scale.
9. Press **Calibrate Span** to perform the span calibration. A message displays when the process is complete.
10. Review the new calibration values, then press **Finish** to close the Calibration Wizard. To restore the current calibration values, press **Cancel**.

6.0 Specifications

Load Cells

40,000 lb

Accuracy

+/- 0.25% error typical, interchangeable with other gauged rail products

Full Draft Scale Capacity

320,000 lb

Axle Capacity

80,000 lb

FCC Statement



The 920i complies with Part 15 of the FCC Rules. Operation is subject to the following conditions:

- This device may not cause harmful interference.
- This device must accept any interference received, including interference that may cause undesired operation.
- Radio certificate number:
 - US: R68WIPORTG
 - Canada: 3867A-WIPORTG



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