SURVIVOR® SRX

Siderail Truck Scale

Installation Manual

RICE LAKE
WEIGHING SYSTEMS

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An ISO 9001 registered company

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www.ricelake.com

Contents

1.0 Introduction

This manual is intended for use by technicians responsible for installing and servicing the SRX series truck scale. The SRX truck scale has been designed so that an on-site installations quick and efficient. A well-organized, experienced installation crew should be able to install a typical 70'x 11' truck scale in one day.*

** These estimated times may vary.*

Note

This booklet covers all SRX–Series truck scale installations. Use these instructions as general installation guidelines unless the blueprints furnished with the specific scale ordered directly contradict this instruction booklet. Blueprints furnished with the specific scale always take priority over these generic SRX–Series installation guidelines.

Refer to the blueprints furnished with the scale for all component numbering sequences.

Manuals are available for viewing and/or downloading from the Rice Lake Weighing Systems website at www.ricelake.com/manuals

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

1.1 Safety

Safety Signal 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 unit.

Do not operate without all shields and guards in place.

Do not use for purposes other than weight measurement.

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.

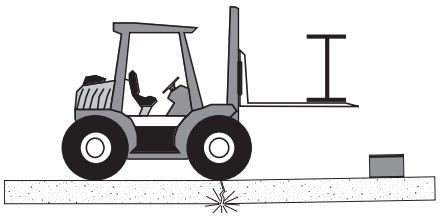
1.2 Installation

The individual components and modular sections of the SURVIVOR® Siderail truck scales assemble smoothly following a proven construction sequence. Some of the steps may change slightly depending on the lifting equipment (crane or forklift) that is available. Assembling a single-platform gross weighing scale or a multi-platform axle weighing model will require slightly different steps, but the general assembly order for all scales will be roughly the same.

- Assemble siderails and cross beams loosely on 12" setting blocks
- Level and align frame to final position and tighten all bolts to final torque values
- Set mounts and load cells
- Install mount anchor bolts and grout beneath mount plates
- Install support bars, corrugated sheet metal, and rebar for concrete deck
- Pour and finish concrete deck
- Install conduit, cabling, and junction boxes

1.2.1 Foundation Slab Cure Period

Standard concrete reaches full strength after a 28-day cure. Note that the concrete foundation slab must cure in a moist state for at least seven days (three days for high-early concrete) before driving on it. At seven days, standard concrete is at approximately 75% of its maximum strength and can be driven on. Driving a loaded forklift on the slab before it reaches 75% of maximum strength may damage the foundation.



1.2.2 Delivery, Crane Rental, and Assembly Estimates

When scheduling scale delivery and crane/forklift rental for the unloading and frame placement, arrange a full day and a crew of at least two assemblers. A two-man crew with crane or forklift can normally unload the scale and set, align, and bolt all components in place on the first day.*

The next day, a crew of three or four can normally prepare the scale deck for concrete, pour and finish it before evening.*

The third day, a crew of two can grout load cell base plates, run all conduit, and connect electronic equipment.*

When the concrete deck has cured, the scale can be corner-trimmed and calibrated with test weights and placed into service.

** These estimated times may vary.*

1.2.3 Recommended Equipment and Tools

- Crane with a minimum 6,000 lb capacity, or Forklift with 8' fork extensions
- Air compressor and impact wrench with 1" drive
- 3/4" rotary hammer drill
- 3/4" x 36" masonry carbide bit
- Low-profile (12" ht.) 10-ton hydraulic jacks
- 12" setting blocks
- Chain winches (2) with 16' chains and hooks
- Torque wrench to 200 ft.lbs. with extension handle
- Box end and 1" drive socket wrenches to 1-1/2"
- 4' bubble level or laser level
- Small torpedo level
- Chalkline
- 100' measuring tape
- 25' measuring tape
- Hammers and maul
- Hacksaw, metal snips
- 1-1/2" rebar chairs and metal ties
- Rebar twist tie spinner tool
- Concrete vibrator (for deck concrete pour)
- Concrete trowels, edger, bull float, broom
- Hand tools for wiring and conduit installation

1.2.4 Determine Frame Assembly Sequence

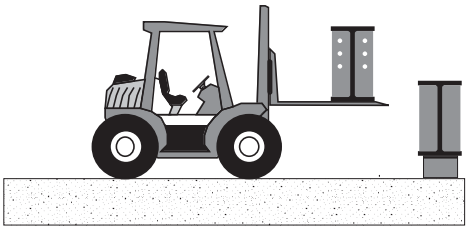
The scale assembly sequence can be done in two ways: side-to-side or end-to-end. Analyze the site access, equipment and manpower to determine which is better. The truck has been loaded in a way that avoids double-handling beams on site. Main siderail beams and components can be unloaded and set directly in place on the scale foundation in the order they will be used.

If using a crane, park the crane beside and parallel to the scale foundation, with the loaded truck parked on the other side of the crane.

If using a forklift to unload and set beams, access to both sides of the truck is required to unload beams in order to avoid double handling.

The first assembly step – unloading and setting the first row of siderail beams on one side of the scale—is the same in both side-to-side or end-to-end assembly sequences.

Assemble Reference Beams on One Side



Place the main siderails for the least accessible side on 12" setting blocks in their final position.

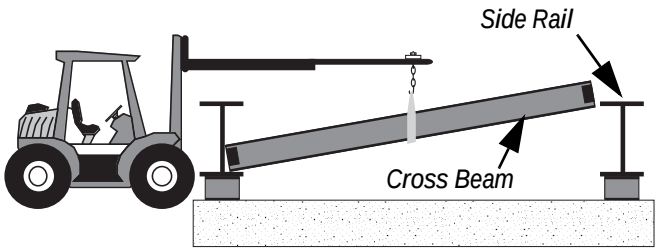
1. Set the end siderail 1.5" from the concrete approach.
2. If the next siderail is to be bolted to the end one, set it directly adjacent.
3. Leave a 1/4” gap and use splice plates, then bolt it.

Note *If any siderail is to be the start of a separate section, leave a 1" end gap to separate independent platforms.*

4. Set the final end section 1.5" from the other concrete approach.
5. Align these reference siderails with a string line and square with the approaches.
6. Continue the installation with either Option 1 or Option 2.

Note *This line of siderail beams becomes the reference line to which the other siderail and all cross beams are aligned.*

Option 1 – Side-to-Side Assembly Sequence



1. Place the siderail beams on the second side in position parallel to the first side, but leave about 2" of clearance for the cross beams to be lowered into position with a sling on either a crane or extension-boom forklift as shown at right.
2. Lower all cross beams into place on the siderail beam flanges.
3. Bolt them *only* to the first line of siderail beams (reference rail installed above).
4. When all cross beams are bolted to the reference siderail, check the straightness of the siderail again with a string line to be certain it hasn’t moved.
5. Start bringing in the siderails on the second side. Any siderails on the second side that will be end-bolted into a multi-module section should not be bolted together at the ends yet—they will be too heavy and awkward to move in the required 2" if combined now.
6. Begin bolting the cross beams to the siderails on the second side starting at one approach end.
7. Use chain winches (comealongs) to bring in the second siderail beam the extra 2" as tightening the cross beam bolts.
8. Keep repositioning the chain winches on the siderails while bolting down the line of cross beams from the approach end through all scale sections.

IMPORTANT *A forklift can be used to slide each siderail section into place rather than step-by-step with chain winches. This must be done carefully or the reference siderail can be pushed out of alignment.*

Option 2 – End-to-End Assembly Sequence

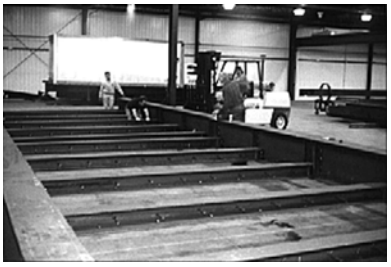
This method requires more setting blocks, but no chain winches. More driving on the slab is necessary, but the assembly can be done by a forklift with standard length tines.

1. Begin by setting one row of siderail beams on 12" setting blocks as in the previous method. If access is limited to one side, drive across the pad and position these on the limited-access side.
2. Align these reference siderails with a string line and square with the approaches.
3. Bolt adjoining siderails together where needed to final torque settings.

4. Bring the cross beams onto the pad one at a time starting at one approach end. Position each cross beam at its final location with one end resting on the siderail flange.
5. Bolt the cross beam to the siderail. Rest the other end of the cross beam at a right angle to the siderail on a setting block 2" higher than the 12" blocks.
6. Repeat for all cross beams of the module.
7. When all cross beams for the first module are set and bolted to the reference siderail, move the opposite siderail for the open side into position with the forklift.

8. With the cross beams resting on the siderail flange, raise the siderail and cross beams enough to allow the cross beam setting blocks to be removed.
9. Lower the siderail onto two 12" setting blocks.
10. Bolt the cross beams to this siderail so it pulls into final position.
11. Do not disturb the reference siderail positioning. Align and square this completed section with the reference line and approaches.

Combined Modules:



1. If a second module is to be bolted together into a multi-module platform, move the second set of cross beams into position and perform the same steps.
2. When these cross beams are bolted to the reference siderail, bring the opposite siderail into position.
3. Lift the siderail and cross beams, remove the 2" setting blocks, and align the siderail with the adjoining siderail so the six holes in the adjoining end plates align.
4. Bolt the siderails together.
5. Check alignment and square with the reference line and approaches.

Independent Modules:

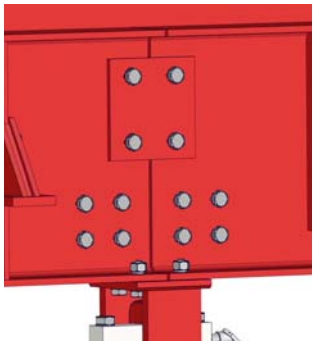
If the next module is not to be bolted to the first, set the siderail 1" from the adjoining siderail. The final siderail will end 1.5" from the approach.

2.0 Assemble Frame Siderails and Cross Beams

Whichever assembly sequence selected, observe the following details.

- Use 12" high setting blocks so the deck frame will nearly match the level of the approaches.
- Don't torque down cross beam assembly bolts tightly until the module is aligned and squared.
- Use a taut string line to align siderails.
- Measure diagonals with a 100' tape to assure frame is square within 1/4".

2.1 Connecting Siderails into Multi-Module Sections

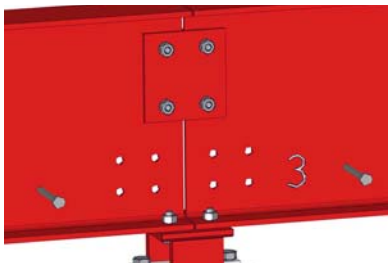


A load cell mount sits directly under each multi-module joint splice and bears on both siderail beams. The mount requires a flat surface at the joint to bolt to. Because of material variances from the mill, the two beams may not be exactly the same height. Always align the *bottom* of the beams when bolting together to create a flat surface for the mounts top plate. Let any extra height protrude at the top of the siderail joint.

2.2 Siderail Beam Identification and Positioning

The following sections outline the positioning and numbering of the SRX truck scale siderail beams.

2.2.1 Siderail Positioning



Set all siderails with the bolt holes for the load cell mount down and the flange up. The headed anchor rods (Nelson studs) that will be encased in the concrete deck face inward.

Gusset plates at the ends of single siderails which form an independent section are solid.

Gusset plates at the end of siderails which bolt together to form a longer section have two holes in each plate for these bolts as shown at left.

2.2.2Siderail Numbering

All siderails are clearly marked with large numerals keyed to the final assembly drawing. Preview the drawing before beginning to unload the truck. Some siderails are interchangeable, while others are not and must be placed exactly as the assembly drawing shows.

The truck will be loaded so the siderails can be unloaded in order and set directly into position on the foundation without double handling. See the truck loading diagram included with this manual.

2.3 Cross Beam Identification and Positioning

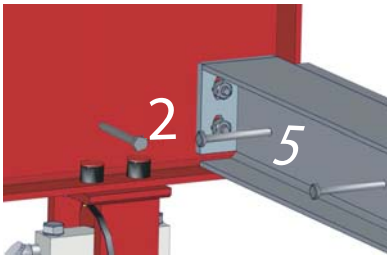
The following sections outline the positioning and numbering of the SRX truck scale cross beams.

2.3.1 Cross Beam Positioning

Set all cross beams in so end plate of beam is flush on top side.

2.3.2 Cross Beam Numbering

Cross beams are marked with numbers 5, 6, or 7 on the web.



Number 5 cross beams attach on the ends of a scale section. The welded plate and angle extension face to the end of the section. The headed anchor rods face inward where they will be encased in the concrete deck.

Number 7 cross beams are set adjacent to a load cell mount. Angle on the beam should face joint.

Number 6 cross beams make up the rest of the beams in the middle area of each module. Short modules may have only one or two #6 cross beams, while longer modules may have four or more. The #5 beams are similar to #6 beams, except the angle iron on #5 does not reach the ends of the beams.

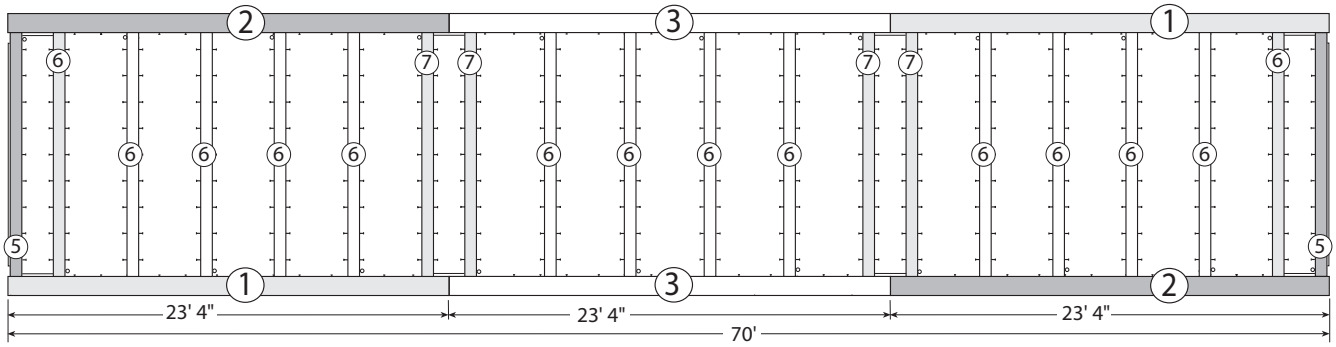


Figure 2-1. Beam Positions

3.0 Level and Align Frame

The following sections cover the steps in aligning and leveling the SRX truck scale deck.

3.1 Align and Square Deck

Align the siderails with a string line and square the entire frame by measuring diagonals with a 100' tape. As the siderails may not be perfectly vertical, measuring diagonals across the top flanges of the siderails may not reflect the true squareness of the deck. The most accurate measurement will be diagonally from the center web of the siderails at the level of the deck top.

If adjustments are necessary, a fork lift or crane can be used to nudge the frame into alignment.

3.2 Level Frame

If the concrete foundation pad has been sloped for water drainage, add the appropriate amount to the 12" setting blocks on the low side to level the frame. Begin leveling the frame at one end of a section at the approach.

1. With hydraulic jacks, raise the ends of the siderails until the end No. 5 cross beam is at the same level as the approach. Insert metal shims (large washers work well) on the setting blocks to maintain this level.

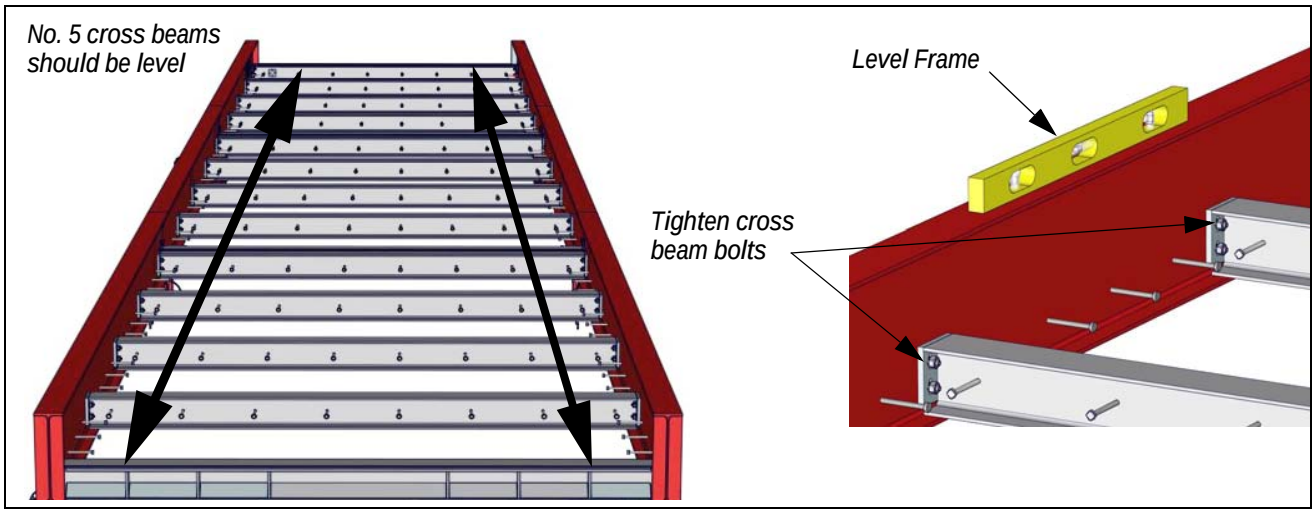


Figure 3-1. Level the Frame

2. Move down the scale toward the other end, jacking and shimming until the entire deck is level in both directions.
3. When the entire deck frame is level, torque down all cross beam bolts to 200 ft. lb.
4. Tighten the splice plate bolts.

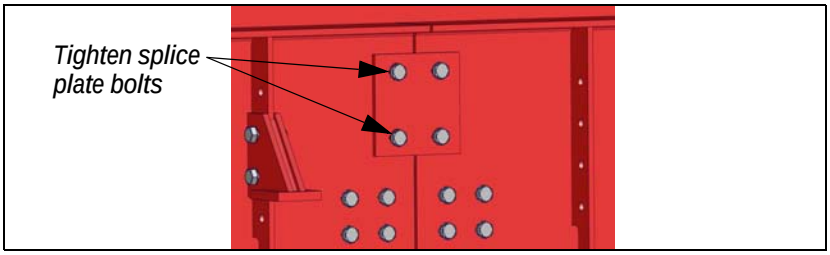


Figure 3-2. Splice Plate Bolts

4.0 Set Load Cell Mounts

This section covers the steps in setting the load cell mounts on the SRX series truck scale.

4.1 Attach Mount Chair

The mounts may be attached in any order.

1. Begin each mount by removing the girder chair and four bolts from the mount box and bolting the chair on the bottom of the siderail at a mount location.
2. Insert each bolt into the hole, apply nuts and washers, and tighten each of the four bolts to 200 ft.lb.

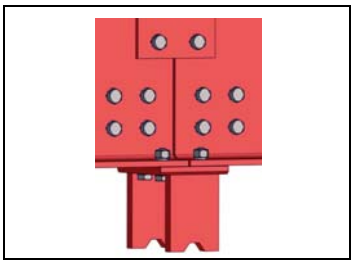


Figure 4-1. Mount Chair

4.2 Prepare Baseplate and Load Cell

1. Lift the baseplate and four leveling screws out of the box.
2. Set the plate upside down and turn the four leveling screws into the baseplate so about 2" extends beyond the bottom surface as shown at right.
3. Each load cell must be fitted with a 90° threaded LB conduit adapter. Install an adapter on each load cell now before the cell goes into the mount.
4. Orient the adapter so the cable points toward the outside of the scale when mounted.

IMPORTANT *Avoid twisting the cable as rotating the cable in the load cell body could damage the load cell.*

Figure 4-2. Baseplate and Load Cell

4.3 Set Baseplate

1. Set the baseplate, load cell, and link beneath the chair. Only one of the load cell screws is inserted into the cell now. Leave the other screw out until the link is placed onto the load cell and raised in the next step.

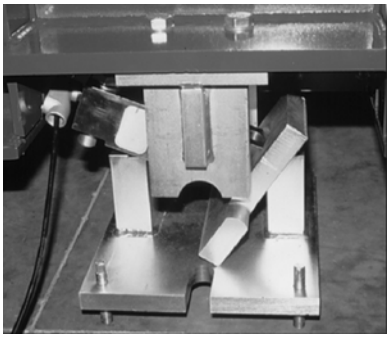


Figure 4-3. Baseplate

4.4 Raise Link and Load Cell

1. Place the link into position around the load cell.
2. Insert the second load cell screw.
3. Raise the link and load cell until both ends of the load cell are on the supports and the load cell screws can be started.

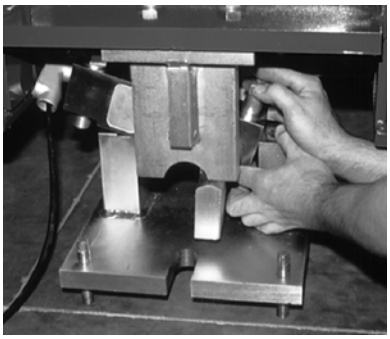


Figure 4-4. Raise Link & Load Cell

4.5 Tighten Load Cell Screws

1. Turn in and tighten both load cell screws to 50 to 75 ft.lb.
2. The baseplate should be directly under the chair by how the top convex surface of the link is aligning with the concave bearing surface of the chair.
3. If necessary, slide the baseplate sideways to improve the alignment. The final alignment will be done when the baseplate is raised in the next step.

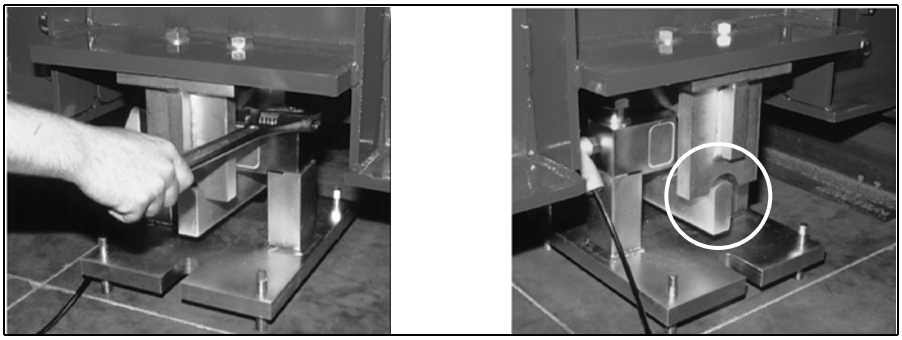


Figure 4-5. Tighten Screws

4.6 Raise Mount to Final Position

1. Turn the leveling screws to raise the mount until the link is centered in the chair bearing and lightly touching.
2. Level the plate in both directions.When the baseplate is directly under the chair, the link will be hanging exactly vertical when centered in the chair. Approximately 1/4" of link should protrude beyond each side of the chair.
3. If adjustment is necessary, tap baseplate edges lightly with a hammer to slide the entire mount sideways.

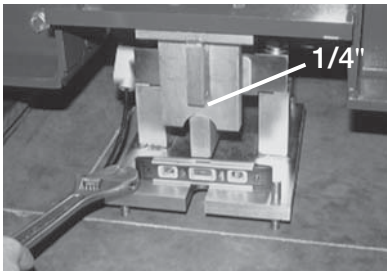


Figure 4-6. Final Position

4.7 Attach Flexible Conduit Sections

A 36" section of flexible conduit is included for each load cell. One end is threaded for mating with the LB connector at the load cell. The other end adapts to 3/4" galvanized rigid conduit.

1. Thread the load cell cable through the flexible section and turn the threaded end into the LB connector.
2. When all are set, jack siderails at each mount location just enough to remove shims and blocks. Gently lower the siderail onto the load cell at each mount.

IMPORTANT *To maintain level of scale deck, don't remove shims and blocks beneath siderails until all mounts are set.*

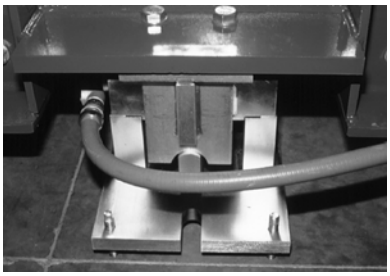


Figure 4-7. Flexible Conduit

5.0 Install Anchor Bolts and Grout

Each mount requires two anchor bolts to prevent lateral motion or uplift. 7" x 3/4" anchor bolts with expansion heads as shown at right are supplied with the scale.

After anchor bolts are set, epoxy/cement grouting is required to distribute the baseplate load evenly to the foundation.

Figure 5-1. Anchor Bolts

5.1 Anchor Bolts

Use an industrial hammer drill with a 3/4" carbide masonry bit at least 36" long to drill anchor bolt holes. This long bit allows the drill body to clear the siderail so the hole can be drilled nearly vertical. Hold the bit as close to vertical as possible and drill a 3/4" hole at least 6" into the concrete beneath each anchor bolt slot on both sides of the baseplate.

Place a washer and nut on each anchor bolt to protect the threads and drive anchors into drilled holes until washer is against baseplate.

IMPORTANT *Do Not tighten anchor bolts at this time*

Figure 5-2. Install Anchor Bolts

5.2 Grouting

Erect temporary dams around each baseplate and inject 9,000 psi non-shrinking, epoxy/cement grout. Take care not to leave air voids; the baseplate must have even support from continuous grout contact.

IMPORTANT *Tighten anchor bolts after grout is set.*

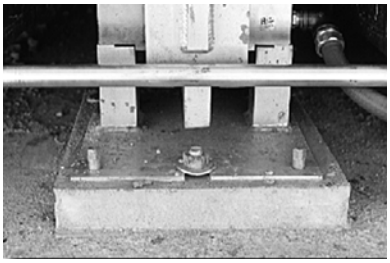


Figure 5-3. Grouting

6.0 Install Deck Rebar

6.1 Deck Rebar

Reinforcing for the concrete deck consists of #5 rebar tied on 8" centers. Long rebars are first tied to the bottom of the Nelson studs on each cross beam, which locates them approximately 1.5" above the bottom of the beam. The shorter rebars perpendicular to the cross beams are then tied to the top of the long rebars. It is important that all rebar be positioned 1.5" - 2" from the bottom of the beam for maximum deck strength. 1.5" rebar “chairs” are available at construction equipment suppliers and are strongly recommended to hold the rebar 1.5" above the corrugated steel.

1. Install corrugated sheeting and “shore up” on the install.
2. Begin laying the rebar gridwork by tying long rebars parallel to the cross beams *under* the Nelson studs on each cross beam (Rebar ties and spinner tools are available at most contractor supply outlets).
3. Tie rebar parallel to the siderails *under* the Nelson studs on each siderail. Using these rebars along the siderails for support, set and tie long rebars each 8" parallel to the cross beams.

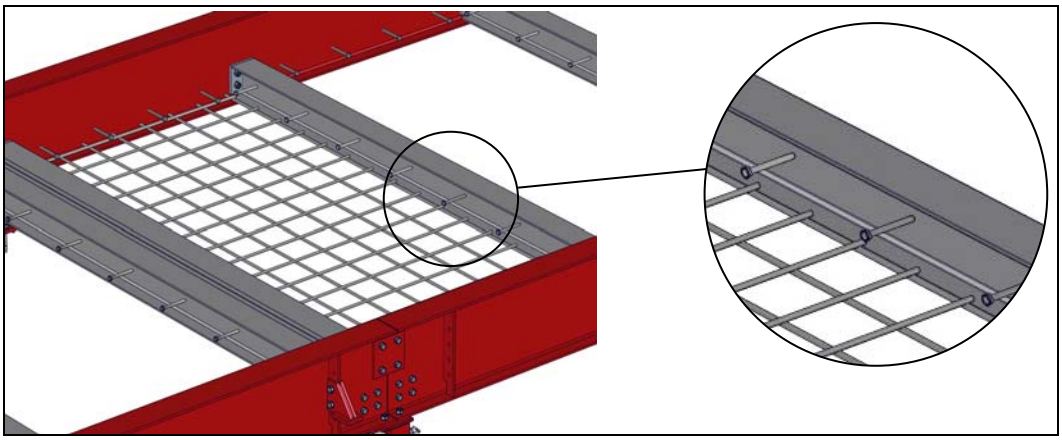


Figure 6-1. Deck Rebar

4. Tie the second rebar layer perpendicular to the cross beams and on 8" centers. Tie the two rebar layers together at intersections where necessary to prevent shifting during the concrete pour.
5. Insert and tie 1.5" concrete chairs beneath rebar intersections where necessary to prevent sagging and maintain the minimum 1.5" distance from the top of the corrugated steel.

7.0 Pour and Finish Concrete Deck

With a concrete crew of three experienced workers, a 70'-90' scale 14' wide can be poured and finished in approximately three hours. Access to only one side of the scale is necessary as most concrete trucks carry extension chutes at least 16' long. If possible, order concrete in front-unloading trucks. The truck will be moving slowly while filling each bay and the improved driver-visibility with front-unloading makes that process faster and more accurate.

Figure 7-1. Pour Concrete

To protect against unsightly concrete splatters on the inside of the siderail beams, tape 4-6 mil plastic against the inside surface of the siderails starting at the finished deck level (top of cross beams) and running up the siderail several inches. If applied carefully, the bottom tape strip can serve as a screed guide for the concrete deck surface against the siderails.

7.1 Pour Concrete

1. With as little water added by the driver on-site as possible, mix the concrete in the truck for a standard 4" slump.
2. Position the unloading chute at the far side of the scale over the first bay.
3. Begin filling the first bay, having the truck slowly move away from the scale to fill the bay uniformly.

Figure 7-2. Fill Bay

4. To ensure concrete flowing evenly into beam cavities and encasing all Nelson studs and rebar, a concrete vibrator is highly recommended. These units are available for rent at most construction equipment rental sources. They work very quickly to level concrete, settle out surface stones, and leave a stone-free cream layer at the top surface to make finishing easier.

Figure 7-3. Concrete Vibrator

5. After vibrating to approximate level, screed the concrete to the level of the cross beams with a 2 x 4 board cut to the appropriate length. As this first bay is too narrow to use a wide bull float, the final surface leveling should be done with a magnesium hand float.

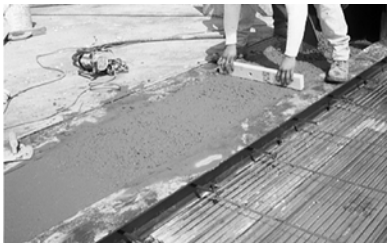


Figure 7-4. Screed Concrete

6. With the bay level and floated, finish against the siderails with either a magnesium float or steel trowel for a neat deck line level with the exposed cross beams.

Figure 7-5. Finish Against Siderails

7. If plastic-film splatter guards were used on the siderails, the bottom tape strip will serve as a guide for the finished deck level between cross beams.
8. When the first bay has been floated with a magnesium float and has set enough for finishing, use a radius edger to finish the metal/concrete joint at each cross beam.

Figure 7-6. Radius Edger

9. Move to the next section and pour and vibrate that section.

Figure 7-7. Move to Next Section

10. Use a screed board cut to the appropriate length for this section. This section will be wide enough to use a bull float to assure a level surface.

Figure 7-8. Level Surface

11. Finishing the edge along the siderail can be done from outside the scale to eliminate using kneeboards on the fresh concrete.
12. Continue with each section in the same manner. As a general guideline, scales over 70 feet long may require two or more concrete truck deliveries. A short break between trucks will allow time to finish float and edge poured sections while waiting for the next concrete truck.
13. For a non-skid surface, use a stiff bristle broom for a brushed finish when the concrete has set enough for final finishing.

Figure 7-9. Finish Surface

7.2 Cure Completed Concrete Deck

The concrete deck must be maintained in a moist state for at least seven days for a satisfactory cure. If the top surface of the deck is allowed to dry out during this time, the finished surface will be prone to unsightly spalling and be weakened from surface cracking.

A moist surface can be maintained by covering the entire deck with a continuous 4-6 mil sheet of polyethylene plastic turned up and dammed at the ends and kept filled with 1" of water.

Alternately, an epoxy-based concrete curing solution can be sprayed or rolled onto the deck surface immediately after final finishing and while the concrete surface is still moist. As the epoxy curing solution will also seal in concrete stains on the exposed beams, clean off stains with a damp sponge before applying the curing solution to the deck. Epoxy-based concrete curing products are available at contractor-supply companies.

IMPORTANT *Do not use the petroleum-based or paraffin-based waterproofing agents advertised for wood decks and concrete patios available at hardware stores or lumberyards. These products are not curing agents, and will allow the deck surface to rapidly dry out.*

8.0 Install Conduit, Cabling, and J-Boxes

Load cells are supplied with 60' cables. Since each cell is temperature-compensated for the supplied cable length, do not change any cable length. There will be room to coil excess cable inside the junction box after making final connections.

All cabling must be enclosed in 3/4" weatherproof conduit from the load cell to the junction box in accordance with applicable electrical codes. NEMA 4 junction boxes are supplied from the factory with 30" sections of flexible conduit and waterproof conduit adapters where necessary to maintain NEMA 4 integrity.

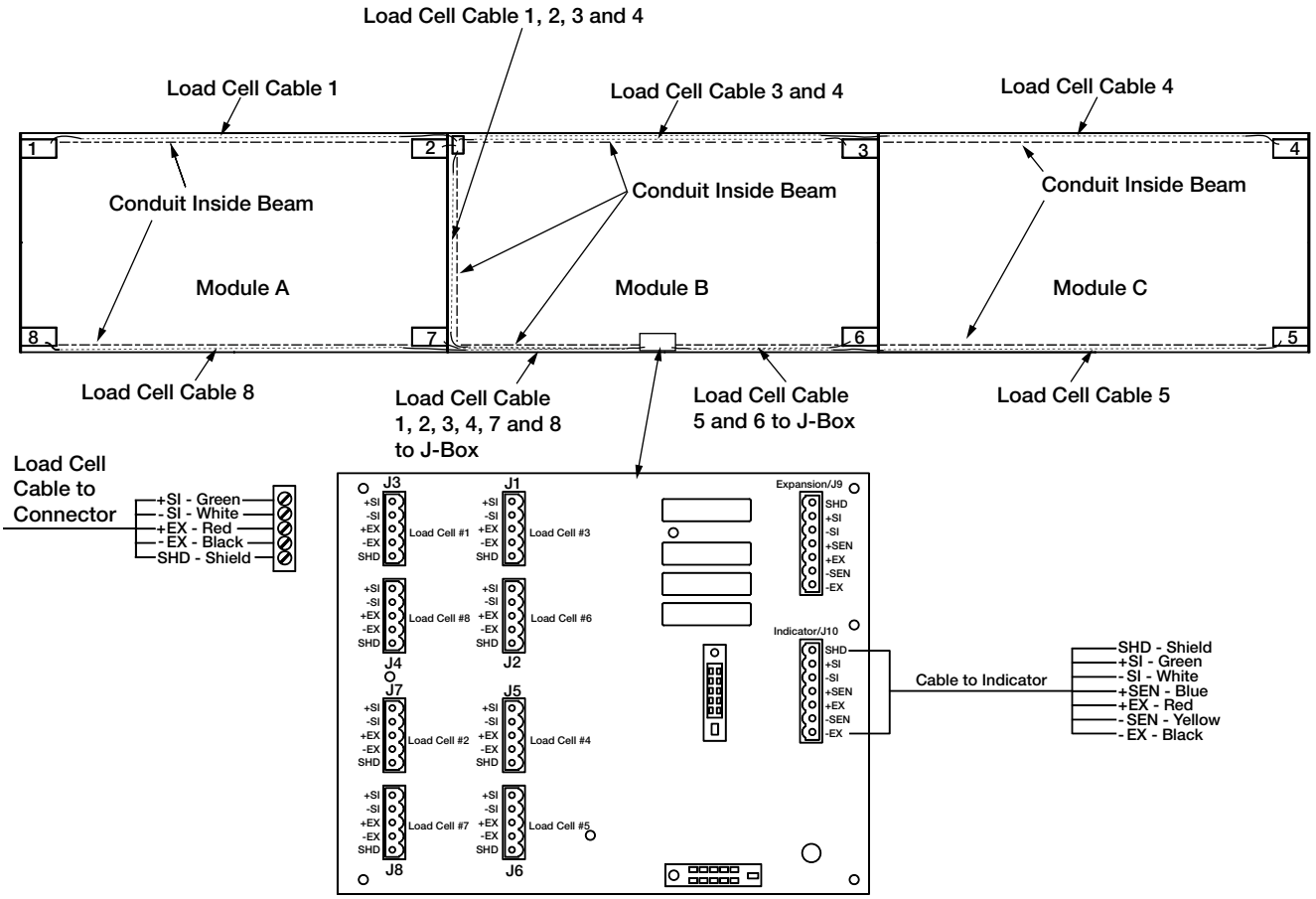


Figure 8-1. J-Box Wiring and conduit Runs for a Four Section/Three Module Scale

8.1 Flexible Conduit Sections

All areas of cabling where rigid conduit might affect load cell deflection must use flexible cable sections. This includes cable sections adjacent to load cells as in the photo at left. In this application, a threaded LB fitting connects the flexible section to the rigid conduit running beneath the scale deck to the junction box on the opposite siderail.

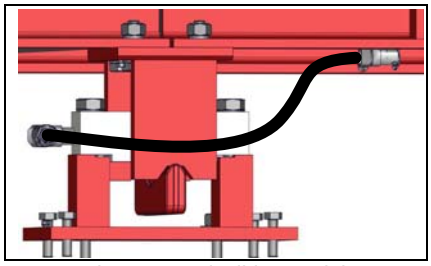


Figure 8-2. Flexible Conduit

Note *The conduit runs on one side of the scale, on top of the lower flange. The conduit on the other side of the scale must cross the modules at the cross beams.*

Figure 8-3. Scale Sections

For axle-weighing scales, flexible cable sections must also be used between separate scale sections to allow free movement of the two independent decks. A circular loop of flexible conduit between separate scale sections provides extra assurance against binding.

8.2 Electrical Ground Connections

Grounding requirements for outdoor electronic scales is a concept that often results in improper grounding systems that corrupt data from ground-loop current flows, cause costly lightning damage to load cells or both.

As a general rule, always strive for a single-point grounding system. Do not drive ground rods at the scale location which establishes a separate earth ground for the scale. This separate earth ground 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 two grounds, often corrupting data communication 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 powerline surge in the scale house electrical supply 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 less. 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" x 8' copper rods driven 8' deep at the service entrance where the local utility company brings their lines into the building. 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. This strap is designed to channel power surges on the deck around—rather than through—the load cell to ground. These, and all, ground connections must be torqued tightly and re-tightened at regular service intervals. A thick coating of anti-oxidant grease should be maintained on all ground connections to prevent corrosion.

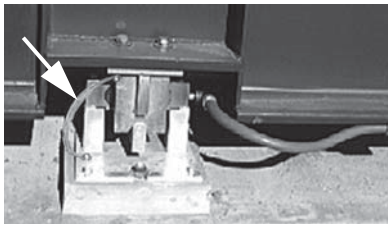


Figure 8-4. Ground Strap

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. Then use a short length of #10 wire to ground the scale frame by running a ground wire from the junction box ground lug to a mounting bolt for the junction box on the scale frame.

8.3 Junction Boxes

Each junction box is large enough to hold the summing board, optional transient protection devices, packaged desiccant, and extra load cell cable coiled inside the enclosure.

In a single-platform scale, the single junction box location is determined by the length of the load cell cables and the four pre-drilled mounting holes in the siderail beams. In a multi-axle scale with independent sections, each section requires its own junction box to sum the load cell signals from that section.

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

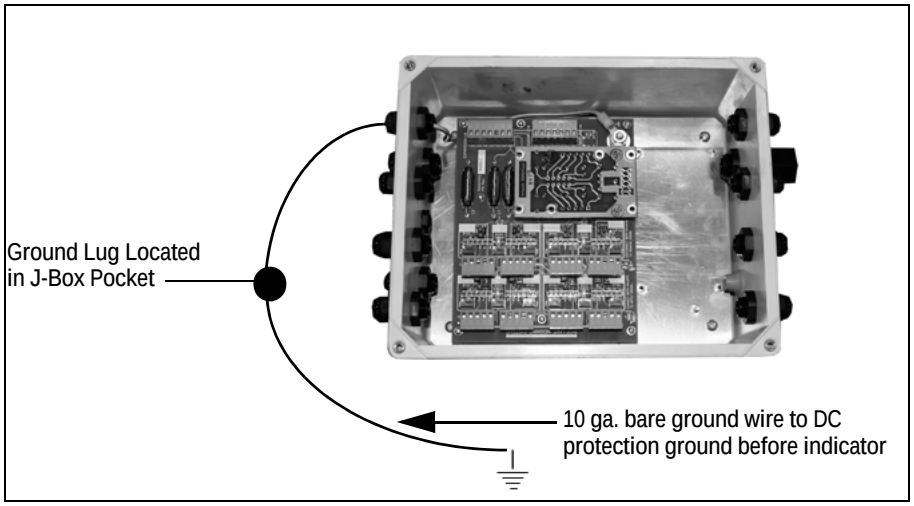


Figure 8-5. J-Box Grounding

A ground lug on the bottom of the j-box is used to connect the buried ground cable from the AC power ground rod.

A DC transient protection board can be conveniently located within the junction box to help protect load cells from power surges. If that option is used, run a short #10 ground wire from the board's ground connection to the inner ground lug of the junction box.

An industrial corrosion inhibitor and desiccant such as our Industrial Corrosion Inhibitor (PN 16037) should be added to the junction box enclosure before final closure. This 2.5" desiccant "ball" protects an enclosure up to 5 ft^3 from internal corrosion for approximately one year.

8.4 Transient Protection Insurance

A two-year lightning protection package comes standard on all SRX scales. The individual components of this comprehensive package are designed to protect AC and DC portions of the system, as well as any serial communication lines. The lightning protection package includes:

- DC transient protection board(s) mounted within the junction box(es). This DC transient protector handles up to eight load cells and also protects serial communication lines. Scales with more than eight load cells will require a DC transient protection board in each junction box.
- Self-contained DC transient protection unit in homerun cable at indicator.
- #10 bare ground conductor cable buried in earth from scale frame to DC transient board in junction box to DC transient board at indicator and finally to the AC power ground lug.
- 120 VAC uninterruptable power supply/surge protector in AC line before indicator.

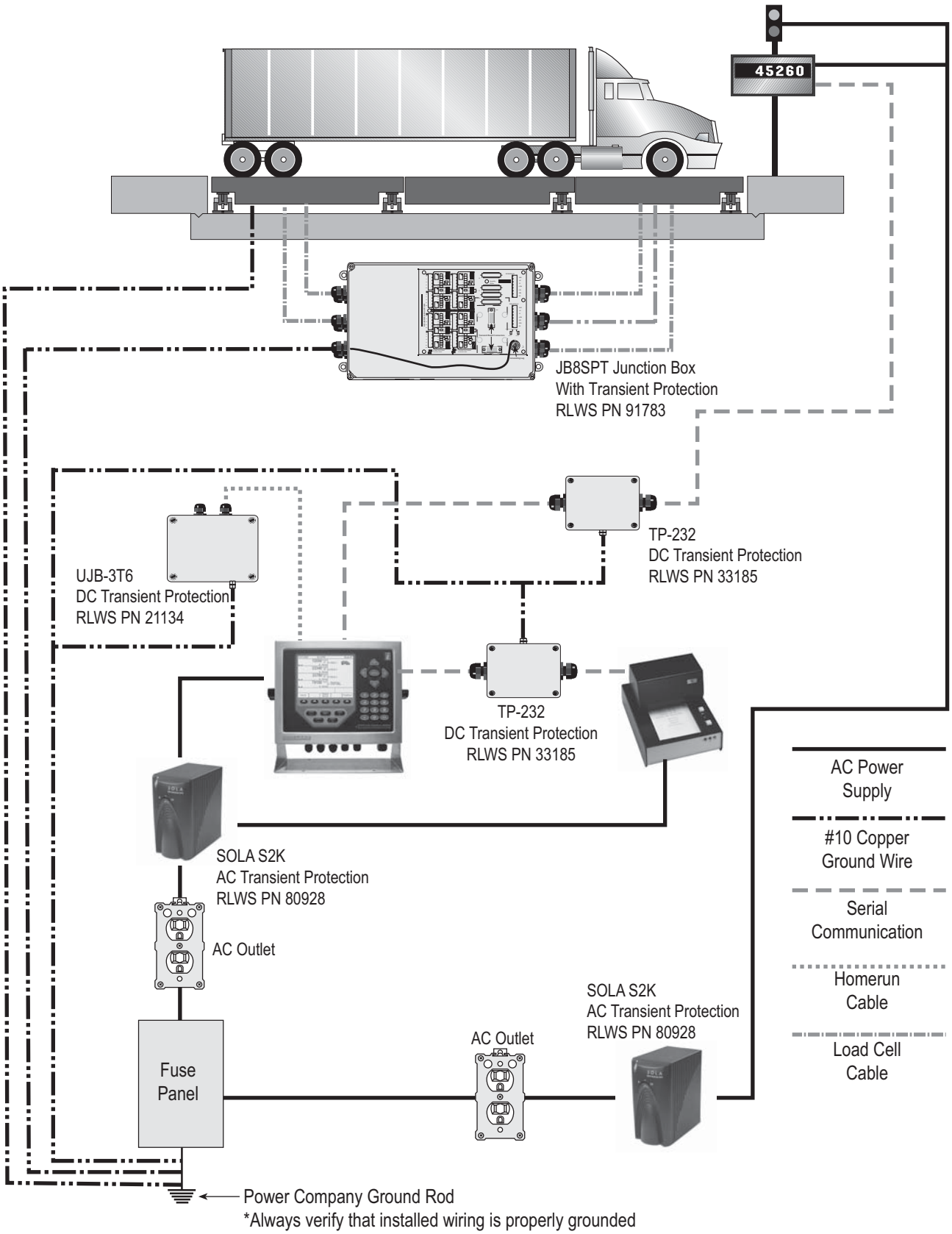


Figure 8-6. Junction Box with DC Transient Protection Board

8.5 Overview and Equipment Required

Load Cell Trimming

Individual load cell signal trimming (equalizing the signal output from each load cell) must be done first along each side of the scale so all cells on a side have equal signal output. Adjustments are somewhat interactive, so each side should be done at least twice.

Once that is done, load cell *pairs*—one from each side—are trimmed as paired sections until each sectional output is equal. Adjustments to each section should also be done at least twice.

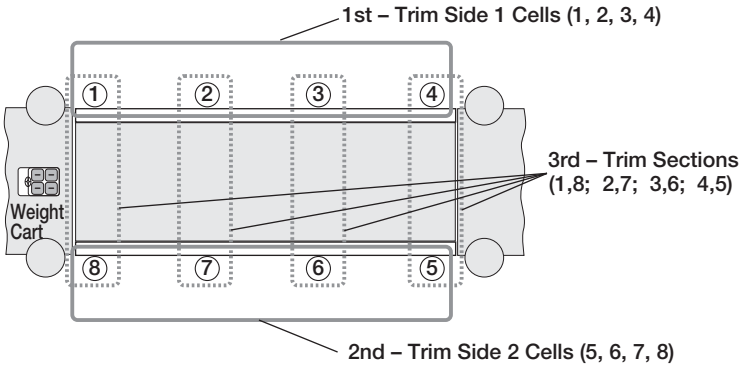


Figure 8-7. Load Cell Trimming Diagram

Equipment Required

Both of these trimming operations can be done using only 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.

8.6 Trimming Individual Cells

Connect all load cells to the summing board terminals in the junction box, and connect the main interface cable from the junction box to the indicator. Power up the indicator.

Turn all load cell potentiometers (individual and section) in the junction box clockwise until a clicking noise is heard. This eliminates any initial resistance so all signals are at full strength.

Side 1

The first objective is to adjust individual load cells along one side of the scale for equal signal output when equal weight is put on those cells. For convenience, that side of the scale will be referred to as Side 1. The trimming weight used is loaded weight cart.

1. Park the cart as close as possible to Side 1 being trimmed with the wheels centered over the end load cell mount (No. 1 in drawing to right). Record the indicator reading. Remember that the scale is still uncalibrated, so the indicator readings are simply raw counts rather than weight units.

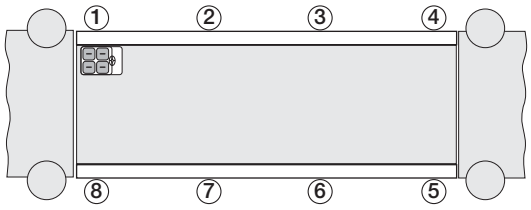


Figure 8-8. Trimming Load Cell Number One

2. Move the cart directly over mount No. 2 and record that reading. Move the cart directly over mount No. 3 and record that reading. Move the cart so the wheels are centered directly over mount No. 4 (turn the weight cart so all wheels remain on the scale if needed) and record the reading.

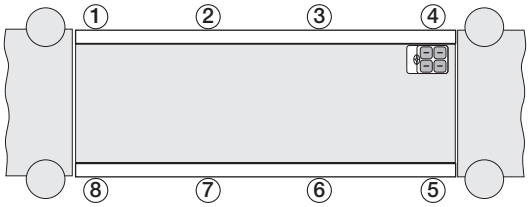


Figure 8-9. Trimming Load Cell Numbers Two, Three, and Four

3. The lowest reading of the four is reference cell. Do not change that cell's signal. Use the individual cell potentiometers for the other three cells to reduce those signals to match the reference cell. Remember all pots were turned to full signal (0 resistance) before starting. The signal cannot be increased on any cell, only decreased by trimming with the pots.
4. Note that the best trim is always the least trim. If one of the four readings differs from the others by more than 5% of the displayed counts, there is probably a mechanical problem with that load cell mount causing the large difference. Find it and correct it before going on. Check for binding, an out-of-level or misaligned link, or similar problems with the load cell and mount. Do not try to trim down large signal differences with resistance pots—it will only add larger problems for later because of interaction between mounts.
5. Park the loaded weight cart over one of the high-reading cells on Side 1. Turn that cell's individual potentiometer until the displayed reading equals the recorded reference cell reading. Repeat for other two high-reading cells on side 1.
6. As adjustments are somewhat interactive, repeat the process in Steps 1 through 5 until all four cells on Side 1 read within 1% of each other.
7. Side 2. Move to the Side 2 of the scale. Load each cell in turn with the weight cart and record readings on those four cells in the same way. The cell that reads the closest to the Side 1 reference cell is the one used as a reference cell for trimming the other cells on side 2.

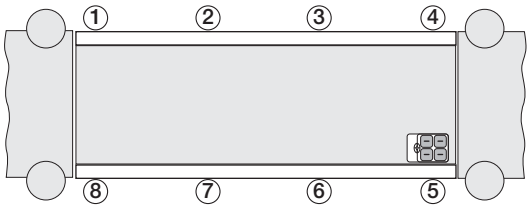


Figure 8-10. Trimming Load Cell Number Five

Note *The reference cell on Side 2 should be the same as the Side 1 readings. Move the weight cart over the cell chosen for the Side 2 reference cell. Adjust the cell's individual pot to equal the final Side 1 readings. In the example at left, Cell 8 has been chosen as the Side 2 reference cell*

8. Reload the other Side 2 cells (5, 6, 7 in the example) in turn with the weight cart and adjust their individual pots so their readings are equal to the Side 2 reference cell (8 in the example).

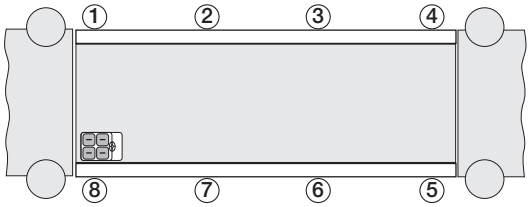


Figure 8-11. Trimming Load Cell Number Eight

9. Repeat Steps 7 through 9 if needed to get all Side 2 cells reading within 1% of each other and within 1% of the Side 1 reference cell.

8.7 Trimming Paired Sections

Pairs of load cells on opposite sides of the scale must be trimmed for equal sectional output. This process is called section signal trimming.

1. Park the loaded weight cart in the middle of the scale and directly over an imaginary line connecting an end pair of cells (1 and 8 in the example at right). Record the indicator reading.

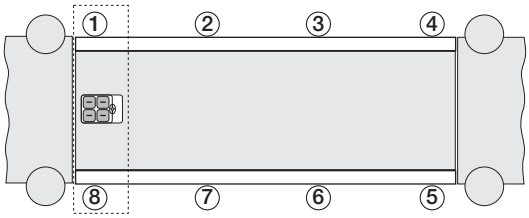


Figure 8-12. Trimming Paired Section 1:8

2. Move the weight cart directly over the next paired cell section and record the indicator reading.

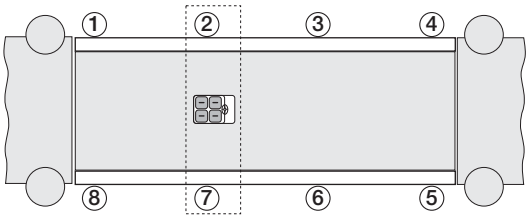


Figure 8-13. Trimming Paired Sections 2:7, 3:6, and 4:5

Do the same for the last two paired sections (cells 3, 6 and 4, 5).

3. Choose the lowest reading of the four as the reference section, which will not be adjusted. Using the *section* potentiometers, reload the other three sections in turn and trim the sections to match the reading of the reference section. Recheck section readings a second time as the adjustment made may be somewhat interactive.
4. As a final verification of the load cell trimming, do a final corner check. Place a 1000 lb. weight on one corner of the platform and record the raw-count reading on the indicator. Move the weight to all the other corners in turn and record those readings. The readings should be within 1% of each other.

8.8 Calibration with Test Weights

The calibration procedure can only be done after all trimming as described above has been completed. A qualified scale technician with a test weight truck and the expertise to access the scale indicator's Setup or Calibration mode must perform the calibration procedure.

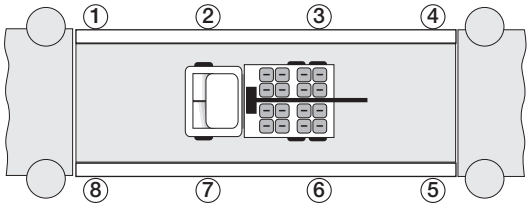


Figure 8-14. Calibration with Test Weights

Equipment Required

Truck scales are routinely calibrated using 25% of the capacity weight of the scale. Certified Class F test weights equaling at least 12.5% of the scale's capacity will be required for calibrating a commercial legal-for-trade truck scale. In addition, some type of weight for a substitution test of an additional 12.5% of the capacity will be required. This can be the test-weight truck, bags of sand, or any convenient items easy to load onto the scale. This total calibration weight of 25% of scale capacity (12.5% test weights, 12.5% substitution weight) is required by weights and measures officials for commercial truck scales in most states. Check with local weights and measures officials for the requirements in the jurisdiction.

Industrial scales not used for legal-for-trade transactions do not require certified test weights. Weight equal to 25% of scale capacity is recommended for calibrating such scales.

See *Handbook 44* for detailed calibration requirements and procedures.

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