SURVIVOR® SR

Siderail Truck Scale

Assembly Instructions

This booklet covers all SR–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 SR–Series installation guidelines.

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

RICE LAKE WEIGHING SYSTEMS
Industrial Solutions on a Global Scale®
ISO 9001 REGISTERED

45698

Contents

1.0 Overview

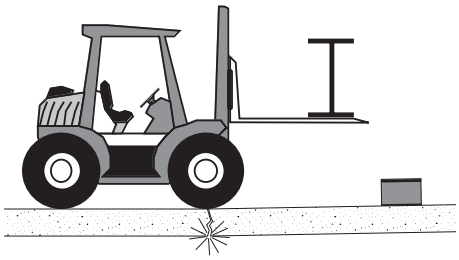
The individual components and modular sections of the SURVIVOR Siderail truck scales assemble smoothly following a proven construction sequence. Some of the steps may change slightly depending on the lifting equipment (crane or forklift) you have available. Assembling a single-platform gross weighing 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 8" 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

1.1 Scheduling Construction

1.1.1 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 quick-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.



1.1.2 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, make electrical connections, 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.

1.1.3 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 (8" ht.) 10-ton hydraulic jacks
8" setting blocks
Chain winches (2) with 16' chains and hooks
Torque wrench to 700 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
Hack saw, 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 Determine Frame Assembly Sequence

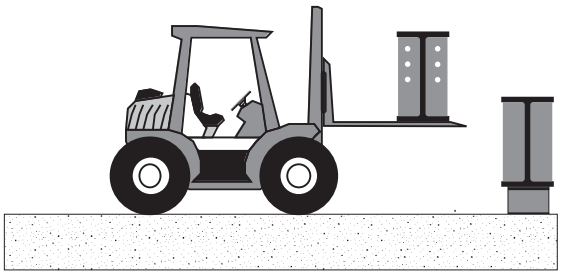
The scale assembly sequence can be done in either of two ways: side-to-side or end-to-end. Analyze your site access, equipment, and manpower to determine which is better for you. The truck has been loaded in a way that avoids double-handling beams on site. Main siderail beams and components can be unloaded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

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, you'll need access to both sides of the truck to unload beams in order to avoid double handling.

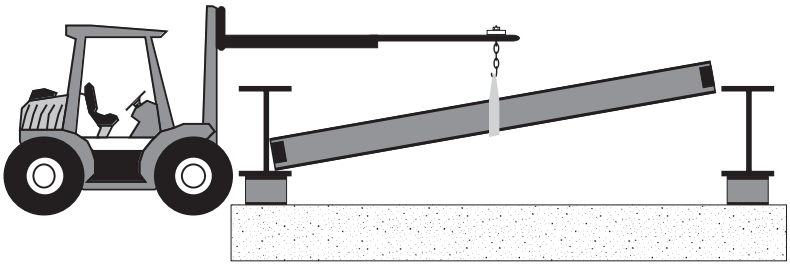
The first assembly step —unloading and setting the first row of siderail beams on one side of the scale—is the same in both side-to-side or end-to-end assembly sequences.

1.2.1 Assemble Reference Beams on One Side



Main siderails on one side are placed on 8" setting blocks in their final position on the far (least accessible) side of the scale. The end siderail is set 1.5" from the concrete approach. If the next siderail is to be bolted to the end one, set it directly adjacent and bolt it. If any siderail is to be the start of a separate section, leave a 1" end gap to separate independent platforms. The final end section is set 1.5" from the other concrete approach. These beams are aligned straight with a string line and squared with the foundation approaches. This line of siderail beams becomes the reference line to which the other siderail and all cross beams are aligned.

1.2.2 Side-to-Side Assembly Sequence



With this method, the siderail beams on the second side are next set into position parallel but about 2" wider than they will be in the final scale. This extra width allows 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.

Lower all cross beams into place on the siderail beam flanges and bolt them *only* to the first line of siderail beams you set—the reference line side. 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. If it hasn't, you can 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.

Begin bolting the cross beams to the siderails on the second side starting at one approach end. Use chain winches ("comealongs") to bring in the second siderail beam the extra 2" as you tighten the cross beam bolts. Keep repositioning the chain winches on the siderails as you bolt down the line of cross beams from the approach end through all scale sections.

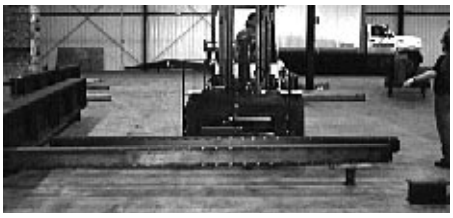
A forklift can be used to slide each siderail section into place rather than step-by-step with chain winches. Your forklift operator must have a delicate touch though or your reference siderail can be pushed out of alignment.

1.2.3 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.

Begin by setting one row of siderail beams on 8" 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. Align these reference siderails with a string line and square with the approaches. Bolt adjoining siderails together where needed to final torque settings.

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. 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 your 8" blocks. Repeat for all cross beams of the module.



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. 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. Lower the siderail onto two 8" setting blocks.

Bolt the cross beams to this siderail so it pulls into final position. Do not disturb the reference siderail positioning. Align and square this completed section with the reference line and approaches.

Combined Modules: 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. When these cross beams are bolted to the reference siderail, bring the opposite siderail into position. 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. Bolt the siderails together. Check alignment and square with the reference line and approaches.

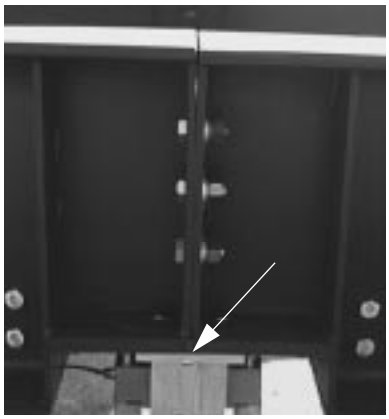
Independent Modules: If the next module is not to be bolted to the first, set the siderail 1" from the adjoining siderail. The final siderail will end 1.5" from the approach.

2.0 Assemble Frame Siderails and Cross Beams

Whichever assembly sequence you chose, observe the following details.

- Use 8" 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

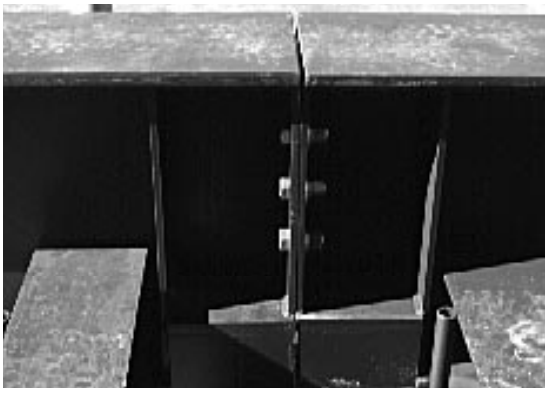


A load cell mount sits directly under each multi-module joint splice and bears on both siderail beams. The mount requires a flat surface at the joint to bolt to. Because of material variances from the mill, the two beams may not be exactly the same height. Always align the *bottom* of the beams when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

The six bolts connecting the two siderails must be torqued to 640 ft/lb. This cannot be done with an impact wrench—a large torque wrench with extension handle will be required

2.2 Siderail Beam Identification and Positioning

2.2.1 Siderail Positioning



Set all siderails with the cut-outs for the load cell mount down and the uncut 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 three holes in each plate for these bolts as shown at left.

2.2.2 Siderail Numbering

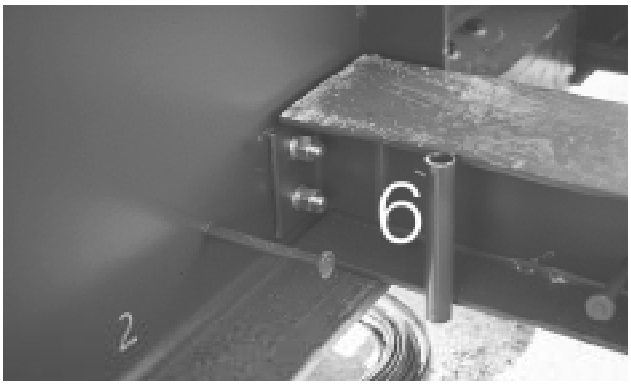
All siderails are clearly marked with large numerals keyed to the final assembly drawing. Preview the drawing before beginning to unload the truck. You will note that some siderails are interchangeable, while others are not and must be placed exactly as the assembly drawing shows.

The truck will be loaded such that you can unload the siderails in order and set them directly into position on the foundation without double handling. See the truck loading diagram for your scale model included with this manual.

2.3 Cross Beam Identification and Positioning

2.3.1 Cross Beam Positioning

Set all cross beams with the flush end of the drain tube up. The 3/8" threaded studs that attach the sheet metal support bars should be near the bottom of the cross beam web.



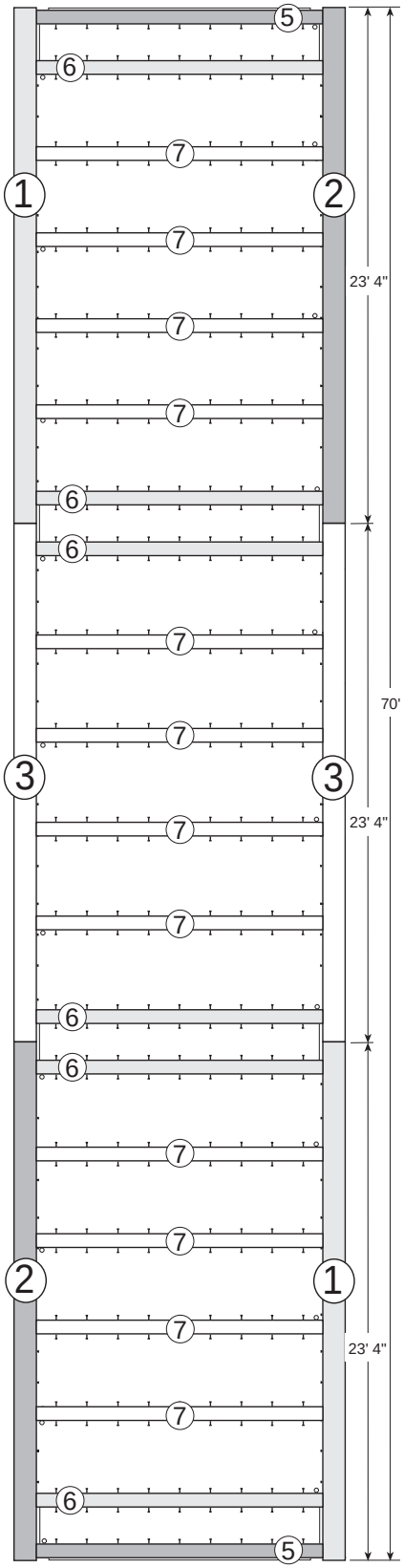
2.3.2 Cross Beam Numbering

Cross beams are marked with numbers **5**, **6**, or **7** on the web near the drain tube.

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 6 cross beams are set adjacent to a load cell mount. Two extra 3/8" threaded studs near each end of #6 beams hold short support bars over the load cell area to support the corrugated metal there when the deck is poured. Position #6 beams so the extra end studs are over the load cell mount.

Number 7 cross beams make up the rest of the beams in the middle area of each module. Short modules may have only one or two #7 cross beams, while longer modules may have four or more. The #7 beams are similar to #6 beams, but don't have the extra 3/8" threaded studs near their ends. Any #7 beam can be reversed end-for-end so drain tubes can be staggered from side to side for even drainage from the deck.



3.0 Level and Align Frame and Bolt Tightly

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 8" setting blocks on the low side to level the frame. Begin levelling the frame at one end of a section at the approach. With hydraulic jacks, raise the ends of the siderails until the end #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.

Move down the scale toward the other end, jacking and shimming until the entire deck is level in both directions.

When the entire deck frame is level, torque down all cross beam bolts to 260 ft.lb.

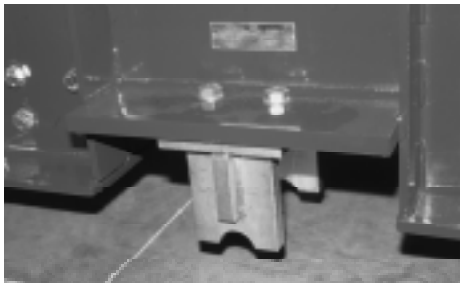
4.0 Set Load Cell Mounts

The load cell mounts on the SR scales are set into position and raised with the built-in levelling screws until the load cells, links, and chairs contact the levelled scale frame. Once a mount and load cell have been raised into final position, it will only be necessary to jack up the siderail a fraction of an inch to remove the setting block and shims beneath the siderail so the weighbridge bears on the load cell.

The load cells are installed with the mounts, so complete any necessary welding on the scale before installing mounts and load cells. Welding is not necessary for any normal construction step of the basic scale, but may be needed if you are attaching special or auxiliary equipment.

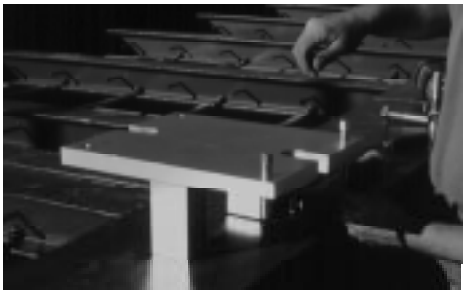
4.0.1 Attach Mount Chair

The mounts may be attached in any order. 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 cut-out. Turn each bolt into the threaded hole in the girder chair and tighten each of the four bolts to 260 ft.lb.



4.0.2 Prepare Baseplate and Load Cell

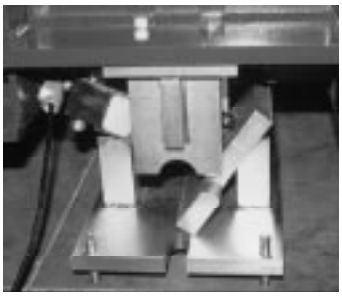
Lift the baseplate and four levelling screws out of the box. Set the plate upside down and turn the four levelling screws into the baseplate so about 2" extends beyond the bottom surface as shown at right.



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. Orient the adapter so the cable will point toward the outside of the scale when mounted.

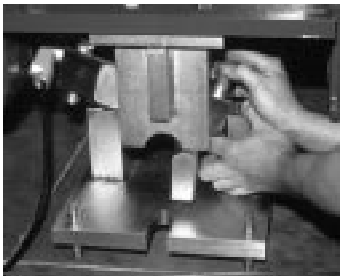
4.0.3 Set Baseplate

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



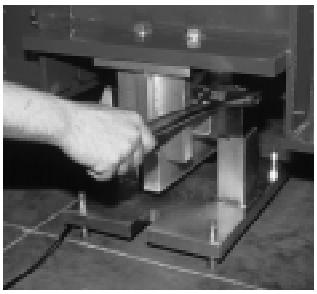
4.0.4 Raise Link and Load Cell

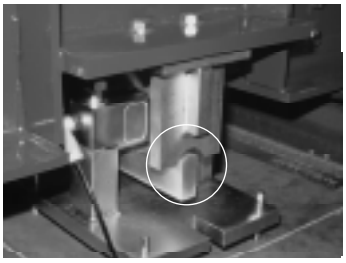
Place the link into position around the load cell. Insert the second load cell screw. Raise the link and load cell until both ends of the load cell are on the supports and the load cell screws can be started.



4.0.5 Tighten Load Cell Screws

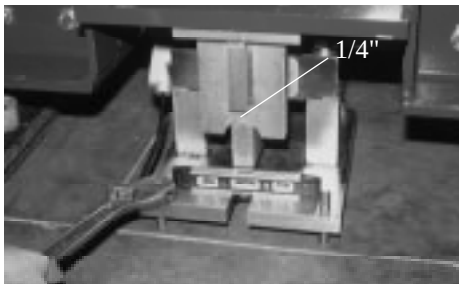
Turn in and tighten both load cell screws to 50 ft.lb. minimum.





You can now tell if the baseplate is directly under the chair by how the top convex surface of the link is aligning with the concave bearing surface of the chair. 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.

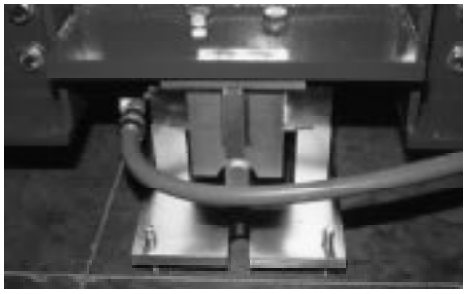
4.0.6 Raise Mount into Final Position



Turn the leveling screws to raise the mount until the link is centered in the chair bearing and lightly touching. 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. If adjustment is necessary, tap baseplate edges lightly with a hammer to slide the entire mount sideways.

4.0.7 Attach Flexible Conduit Sections

A 30" 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. Thread the load cell cable through the flexible section and turn the threaded end into the LB connector.



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

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.

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 solid against baseplate. Tighten nuts until the heads expand and the bolts are solidly anchored.

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.

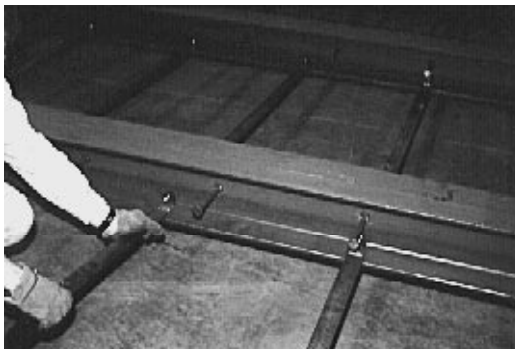
6.0 Install Support Bars, Corrugated Metal, and Deck Rebar

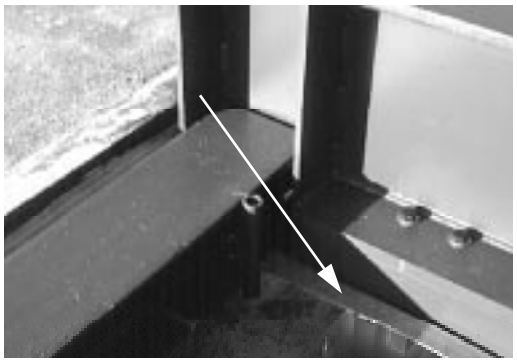
6.1 Support Bars

2" x 3/16" steel bar stock bolted between cross beams support the corrugated sheet metal that forms the bottom surface for the concrete deck pour. Several different lengths of support bars are necessary for most scale lengths. See the attached blueprint of the scale to determine where each of the different lengths are located in the frame.

Unload the support bars from the hardware box on the truck. Each group of similar-length bars is bundled separately and marked. Keep equal length bars together in separate piles.

Install all support bars onto the 3/8" threaded studs per locations shown in the blueprint. Turn a hex nut onto each stud and tighten securely.





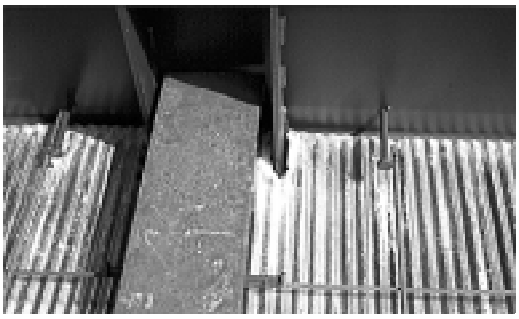
At each load cell mount location, the bottom flange of the 24" siderail I-beam has been cut out for the load cell window. To support the sheet metal where the flange is gone, a short support bar is installed next to the load cell window as shown at right.

6.2 Corrugated Metal Sheeting

Lay in 28 gauge, 3/4" corrugated galvanized panels (1-1/4" wide corrugations) to support the concrete deck pour. Lay the panels parallel to the cross beams so they are resting on the support bars and the I-beam flanges. Overlap adjoining panels at least 9" or three full corrugations. Overlap ends at least 12".

CAUTION! Do not use galvanized panels lighter than 28 gauge, or with corrugations more than 1-1/4” wide!

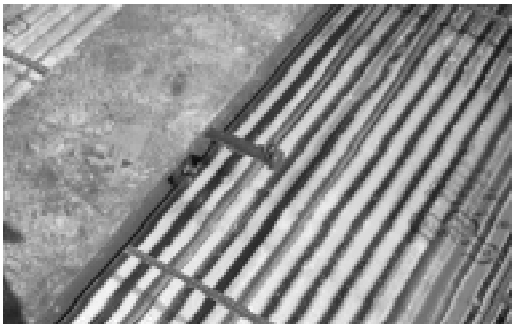
Panels must fit closely to vertical webs of all I-beams to prevent concrete runout during the deck pour. Cut out accurate slots in the corrugated metal for clearance around the vertical gussets in the siderail beams and around the drain tubes on the cross beams. A metal-cutting snips is the best tool for this work.



Cut out clearance sections in the panels for drain tubes where necessary. Slide the main panel into place, then make a larger overlapping panel section with a slot cut out for the drain tube. Slide the overlapping panel into place aligned with corrugations of the main panel. Use duct tape to seal the panel for the concrete deck pour.

6.3 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 corrugated metal. 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 corrugated metal 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 panels.



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).

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.

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.

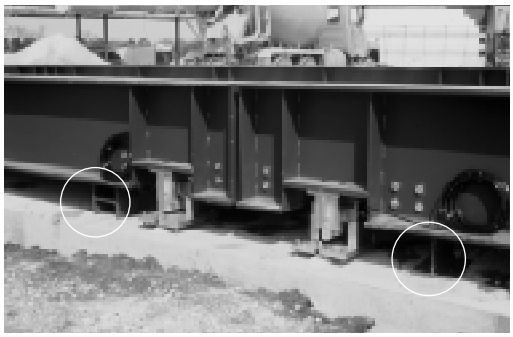
Insert and tie 1.5" concrete chairs beneath rebar intersections where necessary to prevent sagging and maintain the minimum 1.5" distance from the top of the corrugated metal.

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.

To protect against unsightly concrete splatters on the inside of the siderail beams, you may want to 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.

Rather than rest the weighbridge on the load cells, you may wish to raise the siderails a fraction of an inch and rest them on temporary blocks as shown at right. This is rarely necessary, but may prevent damage from a concrete redi-mix truck accidentally backing into the scale frame and damaging the load cells with a large lateral shock force.

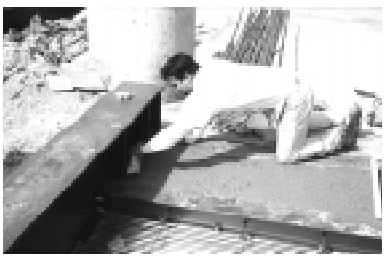


With as little water added by the driver on-site as possible, mix the concrete in the truck for a standard 4" slump.

Position the unloading chute at the far side of the scale over the first bay. Begin filling the first bay, having the truck slowly move away from the scale to fill the bay uniformly.

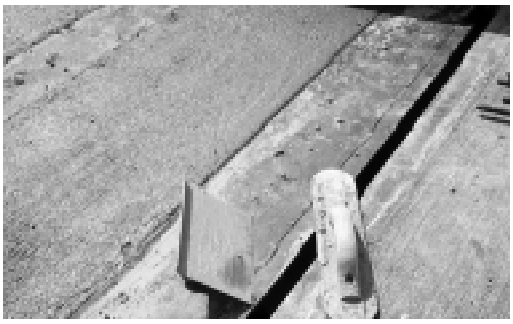
To ensure concrete flowing evenly into beam cavities and encasing all Nelson studs and rebar, a concrete vibrator is highly recommended. These units are available for rent at most construction equipment rental sources. They work very quickly to level concrete, settle out surface stones, and leave a stone-free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

After vibrating to approximate level, screed the concrete to the level of the cross beams with a 2x4 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.



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. If you have taped plastic-film splatter guards on the siderails, the bottom tape strip will serve as a guide for the finished deck level between cross beams.

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.



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

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. Finishing the edge along the siderail can be done from outside the scale to eliminate using kneeboards on the fresh concrete.

Continue with each section in the same manner. As a general guideline, a 90' x 14' deck 8" thick should require approximately 30-32 cubic yards of concrete, necessitating two or possibly three concrete trucks. A short break between trucks will allow time to finish float and edge poured sections while waiting for the next concrete truck. Don’t forget to clean out concrete from the drain tubes on each bay.

For a non-skid surface, use a stiff bristle broom for a brushed finish when the concrete has set enough for final finishing.

Curing the 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.

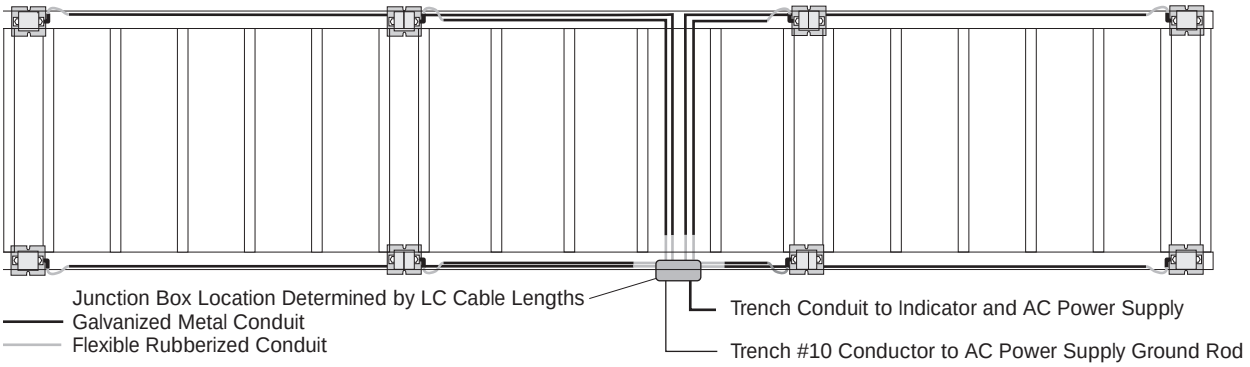
A moist surface can be maintained by covering the entire deck with a continuous 4-6 mil sheet of polyethylene plastic turned up and dammed at the ends and kept filled with 1" of water. Alternately, an epoxy-based concrete curing solution can be sprayed or rolled onto the deck surface immediately after 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. 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.

Typical Example of Conduit Runs on 70' x 14' 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.

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 poorly-understood concept that often results in improper grounding systems that corrupt data from ground-loop current flows, invite costly lightning damage to load cells, or both.

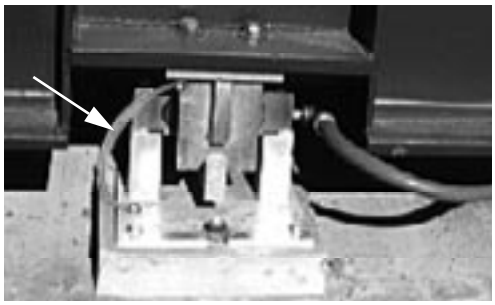
As a general rule, always strive for a **single-point grounding** system. Do not drive ground rods at the scale location which establishes a separate earth ground for the scale. This separate earth ground will not share the same zero reference as the existing earth ground for the AC power system. This 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 3Ω 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 retightened at regular service intervals. A thick coating of anti-oxidant grease should be maintained on all ground connections to prevent corrosion.



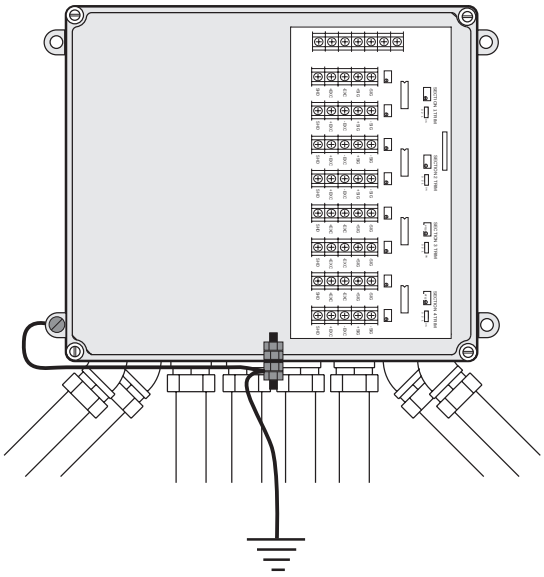
A separate grounding system conductor must extend uninterrupted from the main service panel ground to the scale to protect load cells and scale wiring from lightning and other transient damage. This ground wire conductor must be an unsheathed #10 copper wire or larger. Run the bare ground wire conductor 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. 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 NEMA 4 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.



A ground lug on the bottom of the junction 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 lightning protection package is available as an option for all SR 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 optional lightning protection package includes:

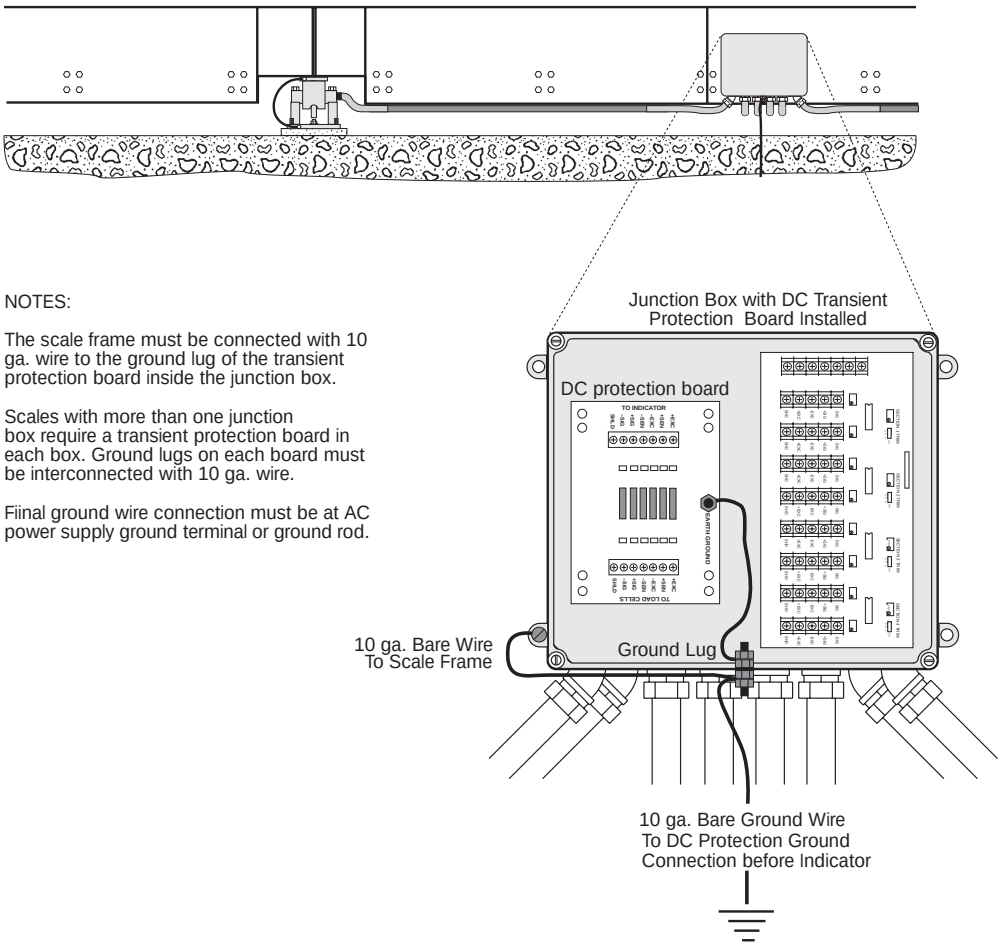
DC transient protection board(s) mounted within the junction box(es). This DC transient protector handles up to eight load cells and also protects serial communication lines. Scales with more than eight load cells will require a DC transient protection board in each junction box.

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.

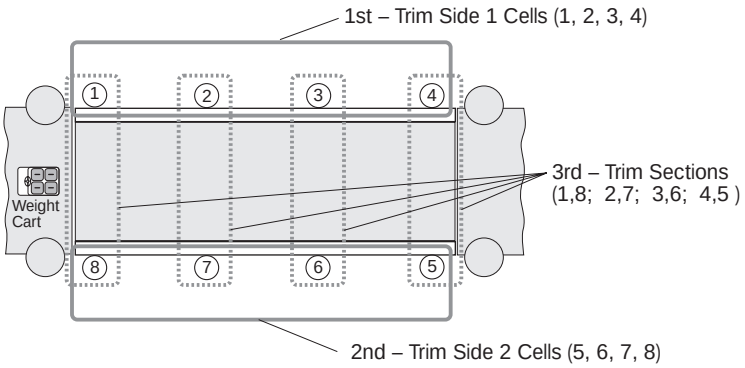
All elements of the optional package must be installed in order to apply for the Lightning Protection Extended Warranty Coverage.



8.5 Trimming and Calibration

8.5.1 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.

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.

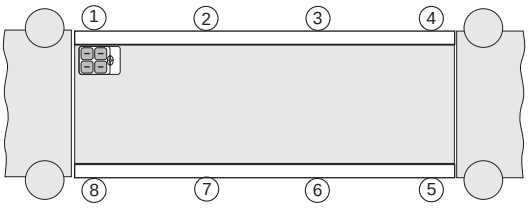
8.5.2 Trimming Individual Cells

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.

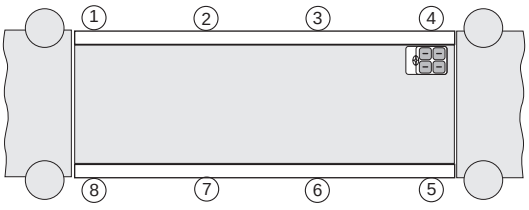
Turn all load cell potentiometers (individual and section) in the junction box counterclockwise until a clicking noise is heard when you continue turning. This eliminates any initial resistance so all signals are at full strength. You're now ready to do **individual signal trimming**.

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 you will use will be the loaded weight cart.

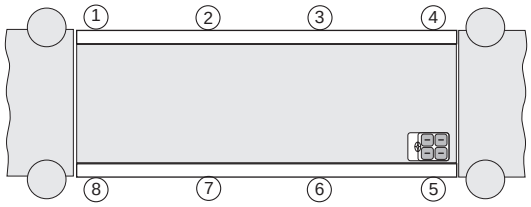
1. Park the cart as close as possible to side 1 being trimmed with the wheels centered over the end load cell mount (no. 1 in drawing to right). Record the indicator reading. Remember that the scale is still uncalibrated, so the indicator readings are simply raw counts rather than weight units.



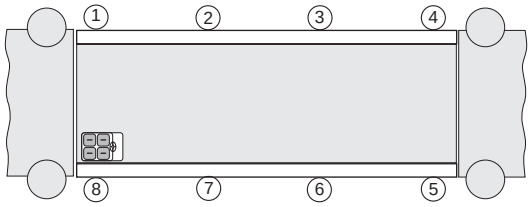
2. Move the cart directly over mount no. 2 and record that reading. Move the cart directly over mount no. 3 and record that reading. Move the cart so the wheels are centered directly over mount no. 4 (you may have to turn the weight cart around so all wheels remain on the scale) and record the reading.



3. The lowest reading of the four will be your reference cell. You won't change that cell's signal. Instead you'll use the individual cell potentiometers for the other three cells to reduce those signals to match your reference cell. Remember that you turned all pots to full signal (0 resistance) before starting. So you can't increase the signal from any cell—you can only decrease signal 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—you'll only add larger problems for yourself in the future because of interaction between mounts.
5. Park the loaded weight cart over one of the high-reading cells. Turn that cell's individual potentiometer until the displayed reading equals your recorded reference cell reading. Repeat for the other two high-reading cells on side 1.
6. As adjustments are somewhat interactive, repeat the process in steps 1-5 until all fours cells on side 1 read within 1% of each other.
7. **Side 2.** Move to 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 which *reads the closest to the side 1 reference cell* will be used as your reference cell for trimming the other cells on side 2.



8. **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.

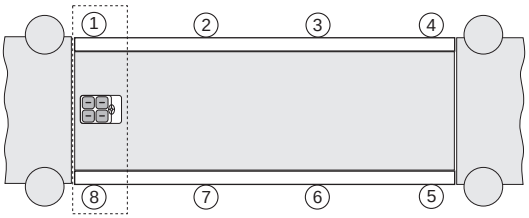


9. Reload the other side 2 cells (5, 6, 7 in the example) in turn with the weight cart and adjust their individual pots so their readings are equal to the side 2 reference cell (8 in the example).
10. Repeat steps 7-9 if needed to get all side 2 cells reading within 1% of each other and within 1% of the side 1 reference cell.

8.5.3 Trimming Paired Sections

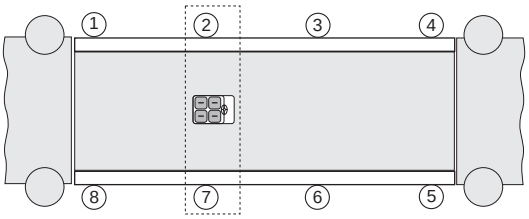
Now that you've trimmed all individual load cells for equal output, pairs of load cells on opposite sides of the scale must be trimmed for equal sectional output. This process is called **section signal trimming**.

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.



2. Move the weight cart directly over the next paired cell section (2, 7 in the example) and record the indicator reading.

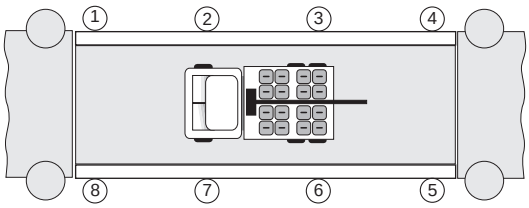
   Do the same for the last two paired sections (cells 3, 6 and 4,5),



3. Choose the lowest reading of the four as your 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 adjustments made may be somewhat interactive.
4. As a final verification of the load cell trimming, do a final corner check. Place a 1,000 lb weight on one corner of the platform (or platforms if an axle-weighing, multi-section scale) 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.

8.5.4 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.



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 your local weights and measures officials for the requirements in your 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.