CARDINAL®

OLYMPUS
TRUCK SCALES

Concrete Deck Bolt-Together Olympus Truck Scales Assembly Manual

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DISCLAIMER

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Serial Number_____

Date of Purchase _____

Purchased Form_____

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RETAIN THIS INFORMATION FOR FUTURE USE

PRECAUTIONS

Before using this product, read this manual and pay special attention to all "NOTIFICATION" symbols:

DANGER!
WARNING!
CAUTION!

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INTRODUCTION

The Cardinal Scale Olympus brand truck scales bolt together for field pouring of concrete. The 18 in/455 mm high I-beam, hip-style construction features a 8 in/200 mm high concrete deck (concrete not included). The Olympus comes in choices of six different load cells for varying capacities with analog, digital, and hydraulic offerings. These 28 in/710 mm high, low-profile side rail scales are designed to minimize costs associated with delivery to job sites.

The scale includes the foundation kit, standard rodent protection, checking, and bolt-down anchors. Anti-corrosion industrial tan powder coat paint is standard on the weighbridges. Rebar and deck sheeting are not included.

This manual must be used in conjunction with certified drawings of the particular truck scale model being installed. ***In case of conflict, the certified drawings will govern.***

This manual should be studied thoroughly (and kept available) before attempting to install the Olympus® Concrete Deck Bolt-Together Truck Scale. Safety should always be the prime consideration during all phases of the installation. Failure to comply with the instructions in this manual will void all warranty implied or stated.

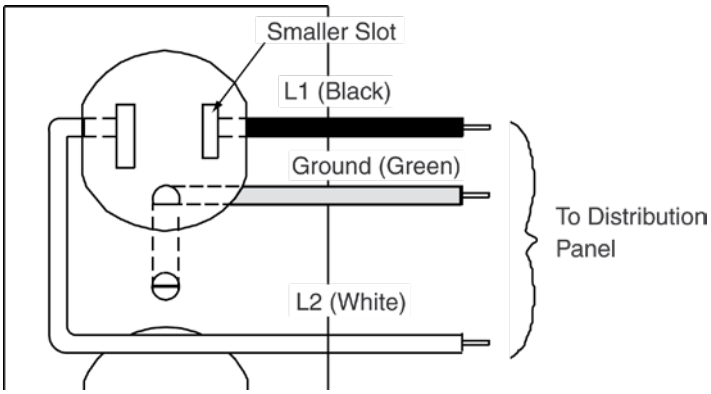
SITE PREPARATION REQUIREMENTS

Your new scale, as with any precision measuring instrument, requires an acceptable environment to operate at its peak performance and reliability. The purpose of this section is to explain how the user can provide such an environment.

Electrical Power

Most Cardinal instrumentation is designed to operate at 115V AC, 50/60 Hz. Where required, the equipment may be ordered for operation at 230V AC, 50/60 Hz. Refer to your order confirmation copy or the equipment nameplate, if you are not certain for which voltage level your scale is configured.

Power Outlet



Your weighing system will require one or more power outlets. Refer to Table A to determine the number of power outlets necessary for your system. These outlets should be of the grounded, polarized type as shown above. One additional outlet is recommended to allow a source of power for test equipment to be used during installation and service.

Table A – Power Outlet Requirements

Device	Outlets Required
Weight-Indicating Instrument	1
Printer	1
Fill Control Console	1
Traffic Control Console	1
Regulating Transformer*	1
Computer	1

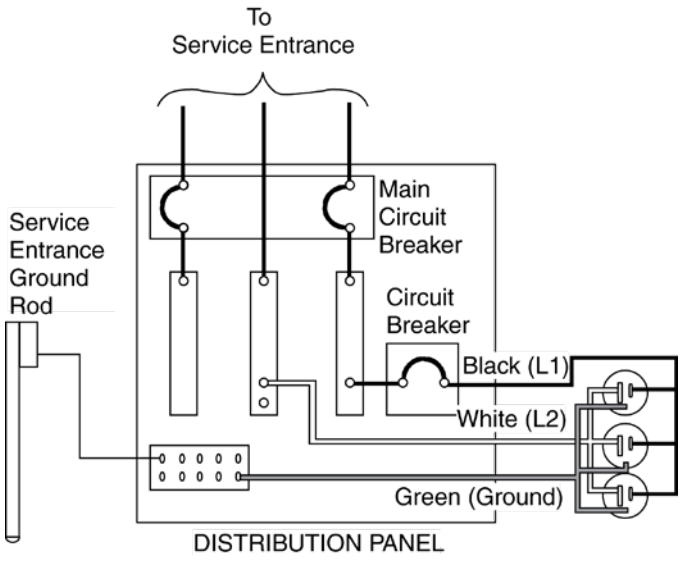
*This piece of optional equipment eliminates the need for an outlet for the weight-indicating instrument, depending on the type of regulating transformer.

SITE PREPARATION REQUIREMENTS, CONT.

The figure to the right illustrates typical wiring from the distribution panel to the power outlets used for the weighing system.

Power outlets should be on a separate circuit from the distribution panel. This circuit should be dedicated to the exclusive use of the weighing system. The power wiring should conform to local electrical codes. Services of a qualified contractor and approval by the local building inspector generally will assure compliance with this code.

To prevent electrical noise interference, make certain that all other wall outlets for use with vacuum cleaners, lighting, industrial machinery, and other equipment are on circuits separate from that used for the weighing system.



Typical Power Outlet Wiring

AC Power Fluctuations

Your Cardinal Weighing System uses one or more microcomputer systems. Many of the problems associated with computer operations are caused by fluctuations in the AC power system. Electrical noise, power interruptions, and lightning effects from the commercial power line may enter the weighing system and cause equipment failures.

Many of the disturbances that can seriously affect the operation of a weighing system originate within the building itself. These disturbances result from switching heavily inductive loads, such as welders, motors, and solenoids. These sources of disturbances must be identified and steps taken to prevent possible adverse effects on the operation of the weighing system. Examples of available alternatives include isolation transformers, power regulators, uninterruptible power supplies, or simple line filters.

Power Source

The power source should have sufficient capacity to supply the weighing system load. Consideration should be given to adding extra capacity to provide for the additional loads caused by the expansion of your system. Make certain this source is independent of other loads (i.e., air conditioning and heating equipment, convenience outlets, lighting, or office equipment, which can cause disturbances). A separate line back to the distribution panel usually provides suitable power. Make certain that a properly sized circuit breaker is installed in this line to safeguard against accidental short circuits.

Table B provides some basic guidelines in the selection of a power-conditioning device, should it be necessary to use one. Remember that this is only a guide and that a qualified technician should be consulted for the determination of the type of device suited to your application. All of the types listed are available in various sizes from Cardinal Scale or may be purchased locally.

SITE PREPARATION REQUIREMENTS, CONT.

Table B – Power Conditioning Device

	PROVIDES PROTECTION AGAINST			
Type	**Outages**	**Transients**	**Fluctuations**	**Cost**
Uninterruptible Power Supply	✓	✓	✓	High to Moderate
Voltage Regulator		✓	✓	Moderate
Isolation Transformer		✓		Low to Moderate
Line Filters		✓		Low

Voltage

Voltage (steady-state) variations shall not exceed plus (+) 10 percent or minus (-) 15 percent of the nominal value 115V AC (plus or minus 8 percent for 230V AC).

Transient variation (step or slope) changes of plus (+) or minus (-) 20 percent on the nominal value shall exist no longer than 0.1 seconds and occur no more than once every 10 seconds.

Frequency

The equipment is designed to operate at a nominal 50/60 Hertz unless specified otherwise on the equipment nameplate. The steady-state harmonic distortion should be equal to, or less than, 6 percent of the fundamental frequency amplitude.

Grounding

A ground wire must be included with the power conductors (phase or L1 and neutral or L2 wires) in the run from the distribution panel to the weighing system power outlets. The size of the ground wire must comply with The National Electrical Code or local electrical code. The ground conductor must be securely bonded to the building's grounding electrode conductor. Refer to Grounding Installation Instructions for the scale and instrument.

CAUTION! A broken or high resistance safety ground is a potentially lethal situation. Because of line-to-chassis voltage potential, it is possible to receive a shock by touching the equipment if the green wire ground is not intact. Please be sure proper grounding is connected!

AC Neutral

The AC neutral must not be confused with protective (equipment chassis) ground. As a protection for personnel, the protective equipment ground (the green wire in power line wiring) prevents the build-up of dangerous voltages on equipment. It ensures that a short circuit between L1 and the enclosure draws enough current to trip the circuit breaker immediately, rather than raising the voltage on the enclosure to a dangerous level. Do not substitute the neutral wire for the protective ground.

SITE PREPARATION REQUIREMENTS, CONT.

Safety Considerations

Safety must be a consideration in the selection of a location for your weighing system. DO NOT locate your system in an area where flammable or explosive materials are stored or processed unless your equipment is furnished in special explosive-proof enclosures. The equipment should be placed where it does not interfere with entry to or exit from the room. Periodic reviews should be made to make certain that the installation remains safe.

Lightning Protection

In areas subject to lightning strikes, certain steps must be taken by the customer to minimize the potential for lightning damage. These steps consist of the installation of lightning arresters as required by Article 280 of The National Electrical Code, the installation of a scale grounding system as described in Grounding Installation Instructions, and other surge arresting devices.

Heating and Cooling

Most standard Cardinal weighing system instrumentations are designed for the office environment. Such an environment is free of excessive dust and moisture and provides a comfortable temperature. In general, weighing equipment will perform well over a temperature range of 14° to 104° F. Some types of instruments and special systems will perform over a much wider range of temperatures.

To keep equipment cooling requirements to a minimum, the equipment should be placed out of direct sunlight and in an area where the air is free to flow around all sides of the system enclosure(s). Make certain that the enclosure is not in line with a heating or cooling vent. Such a location will subject the instrument to sudden temperature excursions and may result in an unstable weight reading.

Care should be exercised by providing a relatively dust-free environment for the operation of the printer. Accumulations of dust and dirt within the printer act as abrasives; also, as insulators that reduce the dissipation of heat from internal components. Accumulated dust and dirt can result in premature failure.

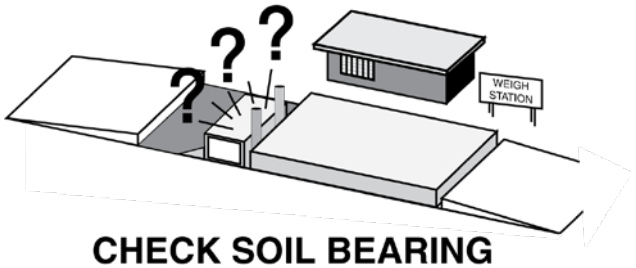
Scale Site

The site selected for installation of the scale should provide easy access, satisfactory soil bearing capacities, adequate drainage, and be within sight of the system operator. Refer to the foundation or pit drawings furnished for soil bearing requirements.

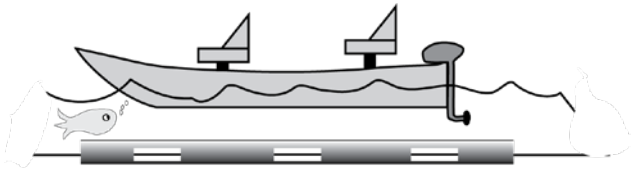
A common source of problems is the accumulation of water under and around the scale. Despite the best waterproofing techniques, prolonged exposure to water will result in erratic weight readings and may permanently damage the scale. In areas subject to water accumulation, an inexpensive alternative is to install a sump pump to remove excess water. Remember that power wiring for the sump pump must be contained in a conduit apart from the load cell conduit and separated from it a minimum of 24 inches.

SITE PREPARATION REQUIREMENTS, CONT.

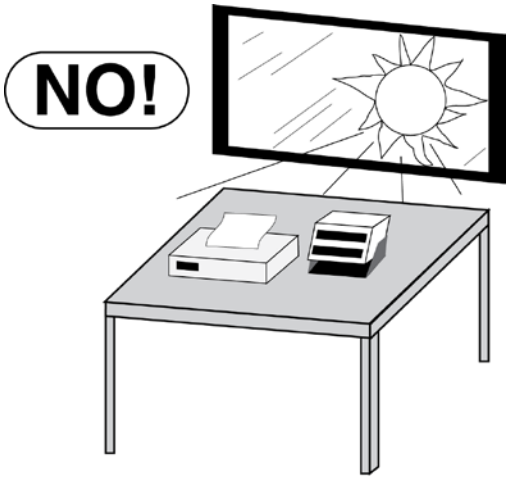
Scale Site, Cont.



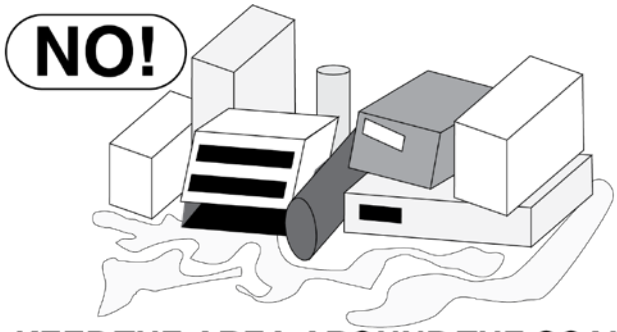
CHECK SOIL BEARING CAPABILITY



PROVIDE ADEQUATE DRAINAGE

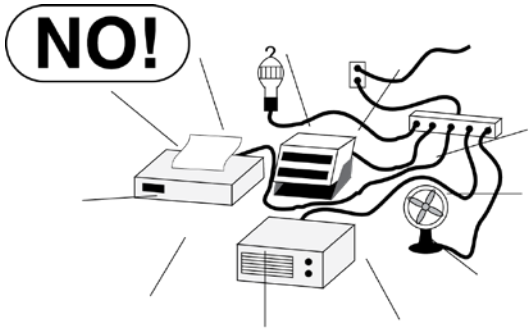


DON'T EXPOSE TO DIRECT SUNLIGHT

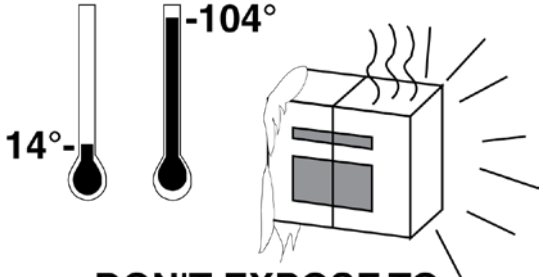


KEEP THE AREA AROUND THE SCALE CLEAR TO PROVIDE ADEQUATE AIR CIRCULATION

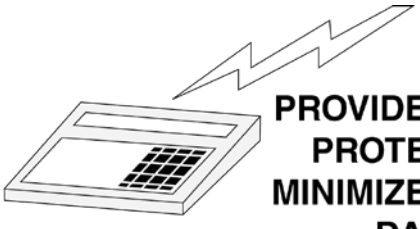
DON'T PLACE IN FRONT OF HEATING/COOLING VENTS



PROVIDE GOOD, SAFE GROUND AND CLEAN AC POWER



DON'T EXPOSE TO TEMPERATURE EXTREMES



PROVIDE ADEQUATE PROTECTION TO MINIMIZE LIGHTNING DAMAGE

INSTALLATION

Choose the Frame Assembly Method

The scale frame assembly can be done in either of two methods: side-to-side or end-to-end. Analyze your site access, equipment, manpower to ascertain which is better for you. The truck has been loaded at the factory in a way that avoids double-handling beams on site. This allows the main side rail beams and components to be unloaded and set directly in place on the scale foundation in the order they will be used.

- If a crane will be used, park the crane beside and parallel to the scale foundation, with the loaded truck parked on the other side of the crane.
- If a forklift will be used to unload and set beams, access to both sides of the truck will be needed to unload beams to avoid double handling.

Note that unloading and installing the first row of side rail beams on one side of the scale is the same in both side-to-side or end-to-end assembly methods.

Assemble Reference Beams on One Side

The main side rails on one side are placed on 8 in. blocks in their final position on the least accessible (far) side of the scale. The end side rail is set 1.5 inches from the concrete approach. If the next side rail is to be bolted to the end one, set it directly adjacent to the end one and bolt it together. If any side rail is to be the start of a separate section, leave a 1 in. end gap to separate the independent platforms. The final end section is set 1.5 inches from the other concrete approach. These beams should then be aligned straight with a string line and squared with the foundation approaches. These side rail beams become the reference to which the other side rails and all crossbeams are aligned.

Side-to-Side Assembly Method

With the side-to-side method, the side rail beams on the second side are next set into a position parallel to but about 2-inches wider than they will be in the final scale. This extra width allows clearance for the crossbeams to be lowered into position with a sling on either a crane or a forklift with an extension boom.

Lower all crossbeams into place on the side rail beam flanges and bolt them only to the first line of side rail beams you set (the reference line side). When all crossbeams are bolted to the reference side rail, check the straightness of the side rail again with a string line to be certain it hasn't moved. If it hasn't, start bringing in the side rails on the second side. Any side rails on the second side that will be end-bolted into a multi-module section <u>should</u> <u>not</u> be bolted together at the ends yet. They will be too heavy and awkward to move in the required 2 inches if combined now.

Begin bolting the crossbeams to the side rails on the second side starting at one approach end. Use chain winches (come-along) to bring in the second side rail beam the extra 2 inches as you tighten the crossbeam bolts. Keep repositioning the chain winches on the side rails as you bolt down the line of crossbeams from the approach end through all scale sections.

A forklift can be used to slide each side rail section into place rather than step-by-step with chain winches however, the forklift operator will need to be extremely careful to avoid pushing the reference side rail out of alignment.

INSTALLATION, CONT.

End-to-End Assembly Method

The end-to-end assembly method requires more blocks and doesn't use chain winches. It does require more driving on the foundation slab but allows the assembly to be done by a forklift with standard length tines

Begin by setting one row of side rail beams on 8 in. 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 side rails with a string line and square with the approaches. Bolt the adjoining side rails together where needed to the final torque settings.

Bring the crossbeams onto the pad one at a time starting at one approach end. Position each crossbeam at its final location with one end resting on the side rail flange. Bolt the crossbeam to the side rail. Rest the other end of the crossbeam at a right angle to the side rail on a block 2 inches higher than your 8 in. blocks. Repeat this for all crossbeams of the module.

When all the crossbeams for the first module are set and bolted to the reference side rail, move the opposite side rail for the open side into position with the forklift. With the crossbeams resting on the side rail flange, raise the side rail and crossbeams enough to allow the crossbeam setting blocks to be removed. Lower the side rail onto two 8 in. blocks. Bolt the crossbeams to this side rail so it pulls into the final position. Do not disturb the reference side rail positioning. Align and square this completed section with the reference line and the approaches.

Combined Modules

If a second module is to be bolted together into a multi-module platform, move the second set of crossbeams into position, and perform the same steps. When these crossbeams are bolted to the reference side rail, bring the opposite side rail into position. Lift the side rail and crossbeams, remove the 2 in. blocks, and align the side rail with the adjoining side rail so the holes in the adjoining endplates align. Bolt the side rails together. Check alignment and square with the reference line and the approaches.

Independent Modules

If the next module is not to be bolted to the first, set the side rail 1 in. from the adjoining side rail. The final side rail will end 1.5 inches from the approach.

FRAME SIDE RAIL BEAM ASSEMBLY

Whichever assembly method you chose, observe the following details:

- Use 8 in. high blocks so the deck frame will nearly match the level of the approaches.
- Don’t torque down crossbeam assembly bolts until the module is aligned and squared.
- Use a taut string line to align side rails.
- Measure diagonals with a 100' tape to assure the frame is square within 1/4 in.
- Refer to the certified drawings furnished with the scale for the numbering of components.

Multi-Module Sections Side Rail Connections

A load cell mount sits directly under each multi-module joint connection and supports both side rail beams. The mount requires a flat surface at the joint connection to bolt to. Due to slight variances in material, 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 side rail joint.

The bolts connecting the two side rails must be torqued to 640 ft/lb. Note that a large torque wrench with an extension handle will be required for this (an impact wrench cannot do this).

Positioning Side Rail Beams

Set all side rails with the cut-outs for the load cell mount down and the uncut flange up. The headed anchor studs that will be encased in the concrete deck face inward.

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

Gusset plates at the end of side rails that bolt together to form a longer section have holes in each plate for these bolts.

Numbering Side Rail Beams

All side rails are marked with large numerals as outlined in the final assembly drawing. It is advisable to review the drawing before unloading the truck. **NOTE:** Some side rails are interchangeable, while others are not and must be placed *exactly* as the drawing shows.

The truck has been loaded at the factory in a way that allows the side rails to be unloaded in order and to set them directly into position on the foundation without double handling.

FRAME CROSS BEAM ASSEMBLY

Positioning Crossbeams

Set all crossbeams with the flush end of the drain tube up. The threaded studs that attach the sheet metal support bars should be near the bottom of the cross-beam.

Numbering Crossbeams

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

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

The number 6 crossbeams are set adjacent to a load cell mount. Two extra threaded studs near each end of the number 6 beams hold short support bars over the load cell area to support the corrugated metal there when the concrete for the deck is poured. Position the number 6 beams so the extra end studs are over the load cell mount.

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

ALIGN, SQUARE, AND LEVEL THE DECK FRAME

Align and Square the Deck Frame

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

If adjustments are necessary, use a forklift or a crane to nudge the frame into alignment.

Level the Deck Frame

If the concrete foundation pad has been sloped for water drainage, add the appropriate amount to the 8 in. blocks on the low side to level the frame. Begin leveling the frame at one end of a section at the approach. With hydraulic jacks, raise the ends of the side rails until the end number 5 crossbeam is at the same level as the approach.

Insert metal shims or large washers on the 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 all cross-beam bolts to 260 ft. lb.

INSTALLING LOAD CELL MOUNTS

Attach the Girder Chair to the Side Rail

The load cell mounts may be attached in any order. Begin by removing the girder chair and bolts from the box and bolting the girder chair to the bottom of the side rail at a mount cut-out. Install each bolt into a threaded hole of the girder chair and tighten the bolts to 260 ft. lb.

Preparing the Grout Plate and Load Cell

Lift the grout plate and four leveling screws out of the box. Set the grout plate upside down and turn the four leveling screws in the grout plate until about 2 inches extends beyond the bottom of the grout plate.

Each load cell must be fitted with a 90° threaded LB conduit adapter. Install an adapter on each load cell before the cell is installed on the mount. Orient the conduit adapter so the load cell cable will point toward the outside of the scale when the load cell is mounted.

Installing the Grout Plate

Install the grout plate, load cell, and link beneath the girder chair. **NOTE:** Only install one load cell screw into the load cell at this time. Leave the other screw out until the link is placed onto the load cell and raised in the next step.

Raising the Link and Load Cell

Place the link into position around the load cell and 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.

Grout Plate and Girder Chair Alignment Check

Tighten both load cell screws to 50 ft. lb. Check to see if the grout plate is directly under the girder chair by observing how the top surface of the link is aligning with the bearing surface of the girder chair. If necessary, slide the grout plate sideways to improve the alignment. The final alignment will be done when the grout plate is raised in the next step.

Raising the Mount into the Final Position

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

To maintain a level scale deck, do not remove the shims and blocks beneath the side rails until all the load cell mounts are installed. When all load cell mounts are installed, jack the side rails at each load cell mount location just enough to remove the shims and blocks. Gently lower the side rail onto the load cell at each mount.

ANCHOR BOLTS AND GROUT INSTALLATION

Each load cell mount requires two anchor bolts to prevent lateral motion or uplift. Anchor bolts are supplied with the scale. After the anchor bolts are installed, epoxy/cement grouting is required to distribute the grout plate load evenly to the foundation.

Install Load Cell Mount Anchor Bolts

Use an industrial hammer drill with a 3/4 in. carbide masonry bit 36 in. long to drill the anchor bolt holes. This long bit allows the drill body to clear the side rail so the holes on both sides of the grout plate can be drilled 10 inches into the concrete.

IMPORTANT! To ensure the anchor bolt holes are the correct depth, remove the dust from the holes after drilling is complete. Use a vacuum (with a long nozzle) to vacuum the dust out of the holes.

Insert the anchor bolts, and then using a 1 1/8 in. socket and impact wrench, tighten the anchor bolts.

NOTE: The anchor bolts are self-threading and must be installed with an impact wrench to secure the load cell mount to the pier. Note that the impact wrench used to install the anchor bolts must have a torque rating between 3000 (min.) to 4000 (max.) inch-pounds.

Grouting

When all of the above installation procedures have been completed and verified, the grout plate should be grouted in place permanently, before loading the scale.

Begin by adjusting the grout plates on the four end load cells to get the scale deck even with the approach. Be very careful to keep the grout plates level and the cell centered and in a vertical (plumb) position. After the ends are set at the correct elevation use a transit to shoot the center sections of the scale to get them at the same elevation.

CAUTION! All load cells must be mounted in a vertical (plumb) position before grouting.

A free-flowing, non-shrinking epoxy type grout should be used. The grout should have bearing capabilities in excess of 5000 PSI. Five Star Epoxy Grout or equal is recommended. Follow carefully the manufacturer's recommendations for mixing and cure time of the grout.

A wood or metal frame must be used to contain the grout around the grout plate. The frame should be approximately one inch larger than the grout plate on each side. The free-flowing epoxy grout can then be poured into the frame, allowing it to flow completely under the grout bearing plate. Care should be exercised to ensure that no voids occur under the grout plates.

WARNING: Do not load the scale until grout is installed under the grout plates, the grout has been allowed to dry overnight, and is completely cured. The leveling bolts will not support any load beyond the dead weight of the scale.

INSTALLING AND SETTING CHECKING

Position the bolt-down check stands near the check plate's areas as shown on the final assembly drawing. Verify their position before proceeding to permanently install them.

1. Ensure the check bolt is in the open slot of the bolt-down check stands, then move them together toward the check plate, and begin engaging threaded check bolt in the check plate. Be sure the check bolt is threaded through the welded nut and plate far enough to expose enough thread to allow for full engagement of the jam nut. Make sure the bolt-down check stands are centered on the check bolt and square to the shoulders of the check bolt before drilling the anchor holes.

2. Drill suitable holes for the anchors. Note, that to allow the drill to clear the check stand, a drill bit of a minimum of 24 inches in length is required.

IMPORTANT! To ensure the anchor bolt holes are the correct depth, remove the dust from the holes after drilling is complete. Use a vacuum (with a long nozzle) to vacuum the dust out of the holes.

3. Once the bolt-down check stands have been installed, the bumper bolts should be checked for the correct positioning in the check stand and adjusted to the proper clearance.

4. The bumper bolts should be adjusted so that there is 1/8-inch clearance on both sides of the check stand plate.

5. After clearance is set, use a 1 1/4" wrench to tighten the jam nut against the check stand plate.

6. The bumper bolts adjustment should be periodically checked.

INSTALLING SUPPORT BARS AND CORRUGATED METAL

Support Bars

Steel bar stock (2 in. x 3/16 in.) bolted between the crossbeams 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. Refer to the certified drawings of the scale to ascertain where each of the different lengths is located in the frame.

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

Install all support bars onto the threaded studs per the locations shown in the certified drawings of the scale. Install a hex nut onto each stud and tighten it securely.

At each load cell mount location, the bottom flange of the 28 in. side rail beam has a cut out for the load cell. To support the sheet metal where the flange is gone, a short support bar is installed next to the cut-out for the load cell.

Corrugated Metal Sheeting

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

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

The panels must fit closely to the vertical webs of the 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 side rail beams and around the drain tube on the crossbeams. Metal-cutting snips are the best tool to use to make these cut-outs.

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 aligning it with the corrugations of the main panel. Duct tape should be used to seal the panel for the concrete deck pour.

INSTALLING DECK REBAR

Deck Rebar

Reinforcing for the concrete deck consists of #5 rebar tied on 8 in. centers. Long rebars are first tied to the bottom of the studs on each crossbeam, which locates them approximately 1.5 inches above the corrugated metal. The shorter rebars perpendicular to the crossbeams are then tied to the top of the long rebars. All rebar must be positioned 1.5 to 2 inches from the corrugated metal for maximum deck strength. 1.5 in. rebar chairs are available at construction equipment suppliers and are strongly recommended to hold the rebar 1.5 inches above the corrugated panels.

Begin laying the rebar gridwork by tying long rebars parallel to the crossbeams under the studs on each crossbeam (Rebar ties and spinner tools are available at most contractor supply outlets).

Tie the rebar parallel to the side rails under the studs on each side rail. Using these rebars along the side rails for support, set and tie long rebars each 8 inches parallel to the crossbeams.

Tie the second rebar layer perpendicular to the crossbeams and on 8 in. centers. Tie the two rebar layers together at intersections where necessary to prevent shifting during the concrete pour.

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

CONCRETE DECK INSTALLATION

Concrete Scale Deck Specifications and Installation (SPEC. #0104-A020-ES)

This specification shall consist of furnishing, placing, finishing, and curing concrete on Cardinal's Olympus Truck Scale.

1. Concrete Specifications

A. Class A (AE) concrete shall be used on all scale decks.

B. The concrete is to have a 6.5 bag mix with a minimum of 1.5 pounds per cubic yard of 0.75-inch long polypropylene fiber and compression strength of 4500 PSI.

C. The range of slump shall not exceed 3.5 inches and shall be determined in accordance with AASHTO-T119.

D. Samples for strength test shall be taken to certify the class of concrete used (record results of strength test).

2. Placing of Concrete

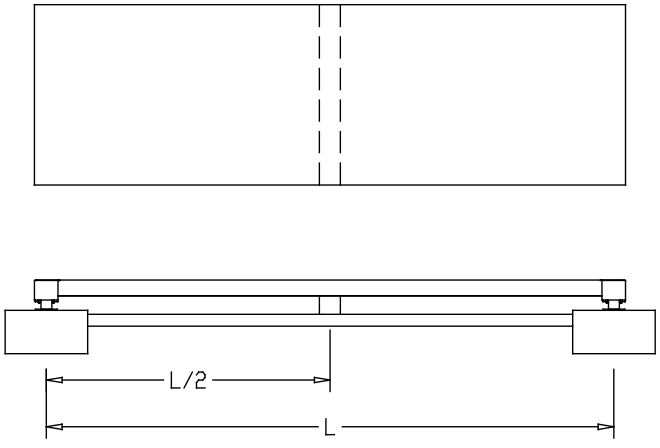
A. The temperature of the concrete mixture immediately before placement shall be between 50°F and 90°F.

B. When the ambient temperature is above 90°F the forms, steel beam flanges, and other surfaces that will come in contact with the mix, shall be cooled to below 90°F by means of water spray or other approved methods.

C. No concrete shall be placed when the air temperature is below 35°F or when forecasts indicate air temperatures below 32°F during the succeeding five days.

D. Support midpoint of decks until the concrete is cured.

NOTE: Shore weighbridges continuously laterally across weighbridge at mid-span (L2). The entire weighbridge frame must be within 1/4 inch of the same horizontal plane.



CONCRETE DECK INSTALLATION, CONT.

3. Finishing Concrete Decks

A. After the concrete has been placed and vibrated, the deck shall be struck off with a screed.

B. The screed shall have sufficient strength to retain its shape and be of sufficient length to span the lateral width of the deck.

C. During the screeding operation, an adequate supply of concrete shall be kept ahead of the screed and a slight excess shall be maintained immediately in front of the screed.

D. The contractor shall have available, on the site, fogging equipment that shall be capable of applying water to the concrete in the form of a fine fog mist in sufficient quantity to curb the effects of rapid evaporation of mixing water.

E. After the concrete has been consolidated and struck off and before the concrete becomes non-plastic, the surface of the deck shall be further finished to provide a uniform surface texture.

F. Following the finishing and before the concrete becomes non-plastic, the surface shall then receive a transverse texture produced by a wire broom (broom strokes perpendicular to the direction of traffic).

4. Curing Concrete Decks

A. Special curing considerations must be taken when placing concrete in ambient temperatures above 90°F and/or temperatures below 35°F.

B. A curing day will be considered as any consecutive 24-hour period from the time of concrete placement.

C. Immediately after finishing, the deck shall be covered with wet cotton mats or two thicknesses of wet burlap blankets. The cotton mats or burlap blankets shall be kept continuously and thoroughly wet during the curing period (a minimum of seven days).

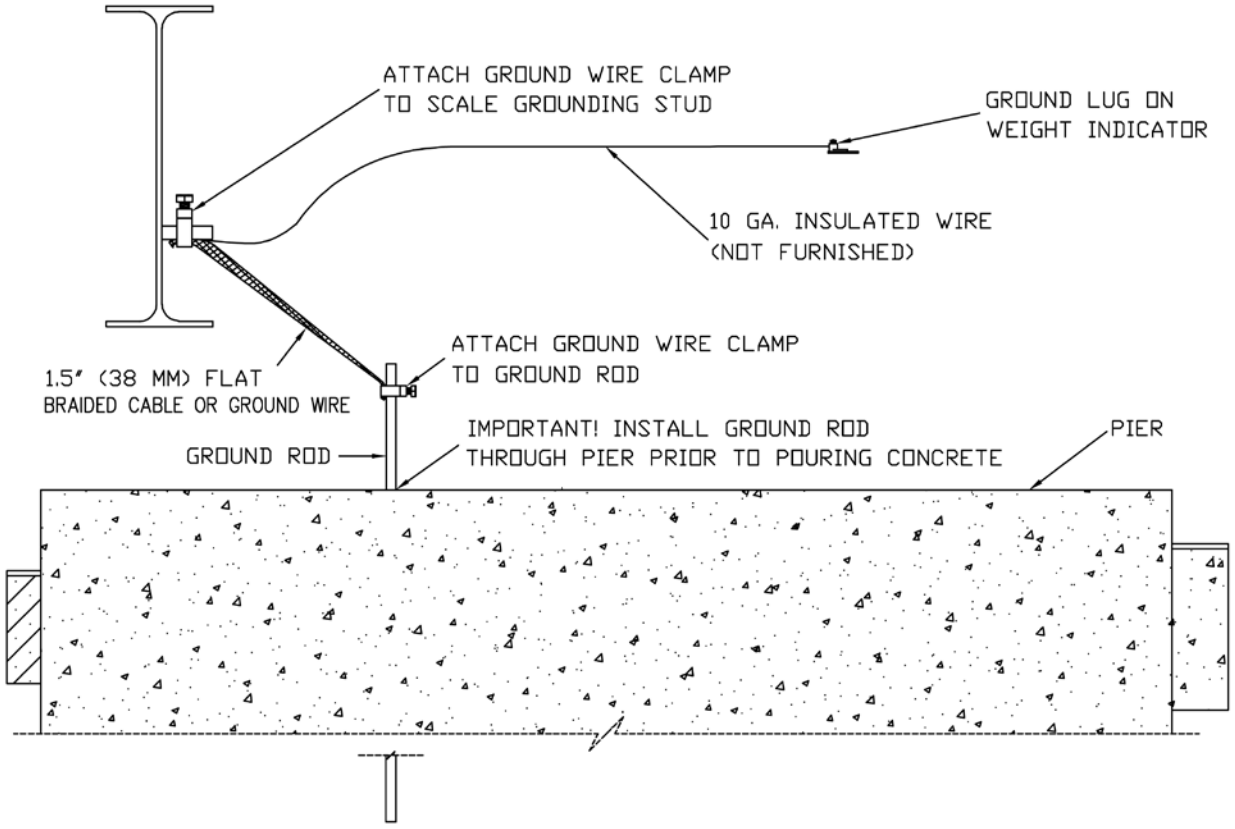
5. There shall be NO LOAD placed on the decks for a minimum of 28 days.

6. The contractor/owner is responsible for furnishing, placing, finishing, and curing concrete decks as outlined above. Deviation from the above specifications shall be at the contractor's own risk.

GROUNDING INSTALLATION INSTRUCTIONS

1. The ground rod shall be copper plated 0.5 in. (1.27 cm.) minimum diameter, with clean exterior surfaces, and shall not be covered with paint, enamel, or other materials, which are poor conductors.
2. The ground rod shall be embedded below permanent moisture level at least 8 ft. (2.44 m.) where practicable. Where rock bottom is encountered, at depth of less than 4 ft. (1.22 m.), the ground rod shall be buried in a horizontal trench.

IMPORTANT! Install the ground rod through the pier, before pouring the concrete.



Grounding Installation Diagram

3. Connect the scale grounding stud to the ground rod with a minimum of 1.5 in. (38 mm) braided cable or ground wire.
4. Connect the grounding lug on the indicator to the scale grounding stud using 10 GA insulated wire (not furnished).
5. Clamp the braided cable (or ground wire), and the 10 GA wire from the indicator ground lug, to the scale grounding stud.
6. Clamp the other end of the braided cable (or ground wire) to the ground rod to connect the scale grounding stud to the ground rod.
7. After installation of the braided cable (or ground wire), check for continuity between the conductive scale components and the ground rod.

CALIBRATION

If, after test loading the scale, it is determined that adjustments are required, follow the procedure below. This section describes the procedure necessary to calibrate a Cardinal Olympus Truck Scale with the AC Analog load cells. This information *does not* apply to the DC digital load cells, SCBD digital load cells, or the SST hydraulic load cells. Refer to their applicable manuals for calibration instructions.

1. Before any adjustments are made, turn on the power to the digital weight indicator and, when applicable, the power supply section-seal box.

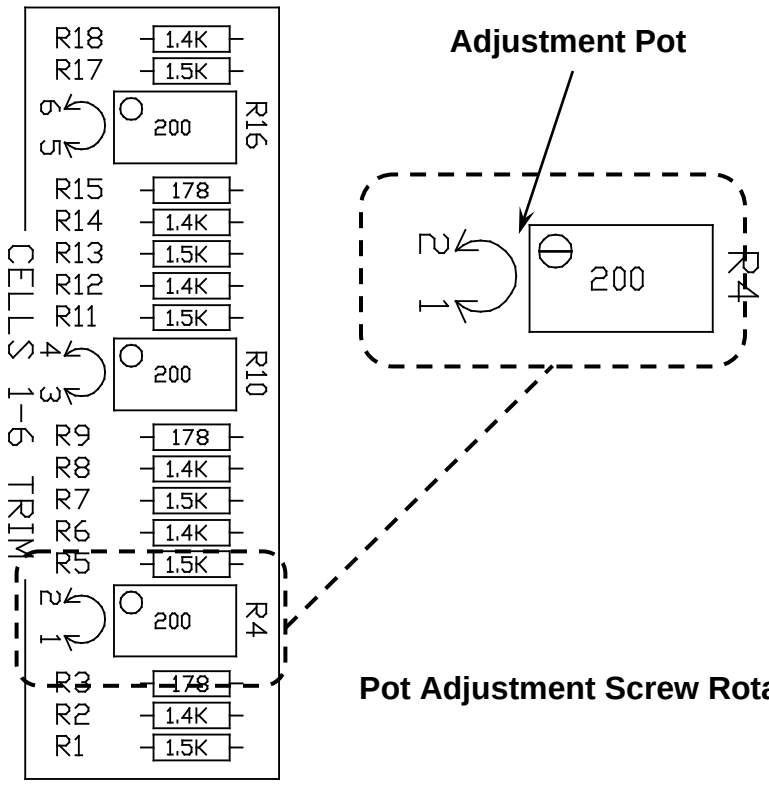
2. Drive a test truck across the scale at least three times in each direction before calibrating the scale.

3. Before any sealing can be done, the weight indicator must be calibrated to the scale. A division size of 10 lbs should be selected and the auto-zero function turned off. Refer to the Weight Indicator Installation and Technical Manual.

TRIMMING AND SECTION-SEALING

Trimming Individual Load Cells

The pots are adjusted for balance at the factory before shipment and should never be readjusted unless testing shows the necessity. Due to the consistent quality of the load cells, it is unlikely that trim adjustment will be necessary. Provisions have been made to trim (balance) the output of the two load cells that make up a section of the scale. A few governing bodies require that a side to side test be made to determine if the two load cells making up a section are within legal tolerance of each other. Do the following BEFORE section sealing the scale.



Pot Adjustment Screw Rotation Directions

1. On a Cardinal Olympus Truck Scale with analog load cells, all adjustments are made on the combination section seal/trim junction box in the scale house. Refer to the Interconnection Assembly and Diagram drawing for junction box location.

2. On the combination section seal/trim box, the trim adjustment pots are placed closest to the cell terminal blocks.

TRIMMING AND SECTION-SEALING, CONT.

3. Silkscreened next to each pot is a small diagram that shows the rotation direction of the pot adjustment screw to change the output voltage level of the load cells affected by that particular pot. See the figure on the previous page. Counter-Clockwise (CCW) rotation of the adjustment screw on pot R4 will raise the signal level of load cell 2; Clockwise (CW) rotation will raise the signal level of load cell 1.

When testing indicates that there is a difference in the displayed weight of the two load cells, the load cell with the lowest weight reading should be adjusted up-scale to agree with the other load cell. Two to four turns of the adjustment screw on the potentiometer in the appropriate direction is a good preliminary adjustment. You may or may not see a change in the displayed weight, but a change has been made.

Remove the test weights from the scale and re-zero the weight indicator. Now place the test weights on each load cell, in turn, to see how the load cells compare with each other. Continue to do this procedure until the two load cell displays agree.

You must remove test weights (or test cart) from the scale to re-zero the weight indicator each time an adjustment is made. It is important to do this since a zero shift can occur due to the adjustment. This shift can cause the displayed weights of both load cells to change.

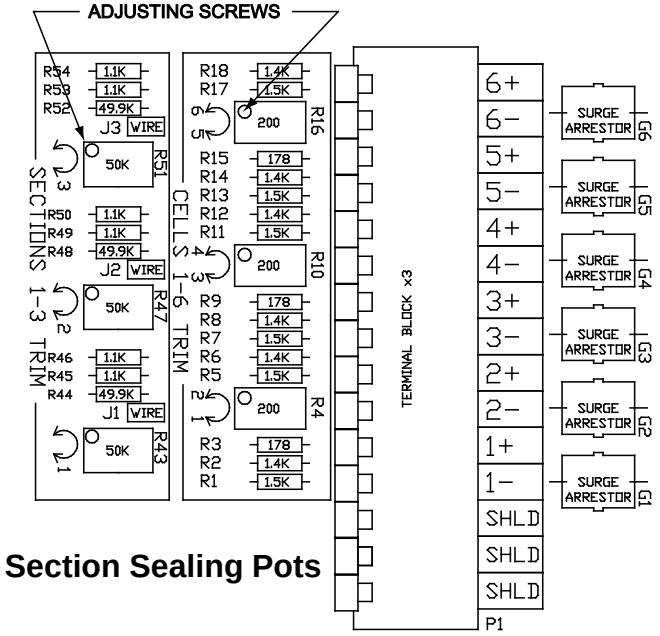
Ignore any displayed weight changes you see when adjusting the load cell signal (output). In some instances, the displayed weight reading will decrease instead of increase as expected. This is due to a shift of the zero point and is NOT indicative of the true adjustment being made. When this occurs, the displayed weight reading from the other load cell will also change (since the zero point has changed) and the weight readings from the two load cells will be moving closer together. When they agree, the adjustment is complete.

Section Sealing at Time of Installation

The weight indicator should be calibrated to the scale before section sealing.

1. The section-sealing pots are found in the combination section-seal / trim junction box located near the weight indicator. Referring to the adjacent figure, locate the pots labeled Section 1 through Section 6, or Sections 1-3 or 4-6 Trim. Note that they are 23 turn pots.

2. With no load on the scale deck, watch the display of the weight indicator and turn the adjusting screw of section 1 sealing pot, clockwise (CW) until the display no longer changes as the screw is turned. Now turn the adjusting screw counter-clockwise (CCW) five complete turns.



Section Sealing Pots

3. Do this to the section-sealing pot for each section of the scale.

TRIMMING AND SECTION-SEALING, CONT.

Section-Sealing Using A Test Truck

1. Drive the loaded test truck across the scale and record the weight obtained with the load centered over each section.

2. The section, which has the smallest displayed weight, will be the reference section and all other sections will be adjusted downscale to six (6) divisions below the reference section displayed weight.

3. Zero the display of the weight indicator before driving the test truck onto the scale.

4. Center the weight of the test truck over the section being sealed.

5. Adjust the appropriate section-sealing pot to make the displayed weight agree with the weight obtained in Step 2.

6. Drive the test truck off the scale.

7. Repeat Steps 3, 4, 5, and 6 until the displayed weight of the section being sealed agrees with the reference weight. When the weights agree without any more adjustment, move to the next section, and repeat the procedure.

When the section sealing is completed, the weight indicator must be recalibrated using a division size of 20 lb. This time turn on the auto-zero function. Refer to the Weight Indicator Installation and Technical Manual.

Section Sealing with Test Weights

1. When testing the scale with test weights on each section, place the available test weights on section 1 of the scale. Record the displayed weight. Move the test weights to each of the other sections in turn. If any section has a displayed weight that is more than 20 pounds different from the weight of section 1, the section should be adjusted.

Table C – Section-Seal Adjustment Chart

Sec.	CW	CCW	Weight Reading	
			Before Adj.	After Adj.
1				
2				
3				
4				
5				

2. The adjustment pots (See the figure on the previous page) are labeled by section numbers and identify the section with which each is associated. A clockwise (CW) rotation of the adjustment screw will raise the displayed weight reading. A counter-clockwise (CCW) adjustment will decrease the displayed weight reading.

TRIMMING AND SECTION-SEALING, CONT.

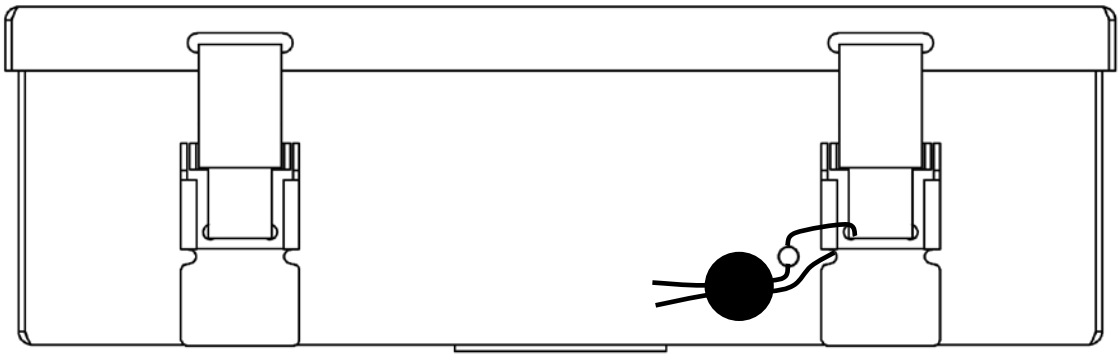
3. It is strongly suggested that a small notebook be used to record each action taken in the section sealing the scale. The pot that was adjusted, the number of turns, and the direction turned (CW or CCW) should be recorded for each adjustment as it is made. It should be remembered that not always does the display change as you adjust the section-seal pot. As you turn it, you are making a change, but you cannot see the change. Instead of changing the displayed weight, the adjustment is actually shifting zero. This has the same effect as changing the displayed weight, but there is no indication of the magnitude of the change made. When this occurs, it is necessary to unload the scale, re-zero, and resume the procedure. This does not change the relationship of the other sections to each other. It is at a time like this that the notebook record is invaluable.

When the section sealing is completed, the weight indicator instrument must be recalibrated using a division size of 20 lb. This time turn on the auto-zero function. Refer to the Weight Indicator Installation and Technical Manual for instructions.

LEAD AND WIRE SECURITY SEAL INSTALLATION

If your Olympus Truck Scale is used in a commercial application and your local metrology laws require the use of physical sealing, a lead and wire security seal can be installed to prevent the junction box from being opened to gain access to the Trim Adjustment Pots thereby preventing unauthorized trim adjustments which would affect the weight reading on the indicator. Refer to the figures below for the location and details on the installation of the security seal.

Top View – Lead and Wire Seal



Latch Side View – Lead and Wire Seal

TROUBLESHOOTING

1. Check to ensure that the bumper bolts are adjusted correctly and that they are not causing any force on the scale.

2. Open all junction boxes and check for moisture, loose connections, or damaged wiring. Check all cables for damage.

CAUTION! Be sure all restraint systems are loosened before jacking up the scale, and that they are retightened after the installation has been completed.

3. Use a jack to lift the weighbridge off each load cell. Disconnect the signal leads of the cell and check its output voltage using a meter with a 10-microvolt minimum resolution. Any load cell with a no load output more negative than a minus one (1) millivolt should be considered suspect. Record the no load outputs from each cell in Table D, Column 1.

4. While the weighbridge is off the load cell, physically check load cell assembly for any damage.

5. With the weighbridge only on the load cells and the signal wires still disconnected, record each load cell output voltage in Table D, Column 2. If there is a difference of more than one millivolt between two lateral cells, install one or more shims under the load cell stand with the lower output until the two cells' output are within one millivolt (refer to Figure No. 10). Keep in mind that the four end cells should be approximately the same and the center cells should be approximately the same. After all, shimming is complete, record all outputs for possible future use, in Table D, Column 3.

Table D – Load Cell Output Voltage Chart

	No Load	Dead Load	
Cell No.	**Col. 1 mV Output**	**Col. 2 mV Out**	**Col. 3 mV Out**
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			

TROUBLESHOOTING, CONT.

6. Check and adjust the section and calibrate the scale.

7. Check for misalignment and binding.

8. If the problem should occur again, check the load cell outputs against the values recorded in Step 5. Any appreciable change could indicate a possible defective load cell. If the load cells check OK, install a different indicator to eliminate the possibility of an indicator problem.

MAINTENANCE FOR HIGH USAGE WEIGHMENTS

1. A High Usage Weighment Scale is one with 150 or more weighments per day.

2. A weekly maintenance inspection should be performed.

- **A.** Check all load cells for alignment and clear debris around cells.

3. Check beneath the bridge for debris build-up between the foundation and the bridge. Remove debris from each end of the scale.

4. Test the scale with a truck carrying a typical load (i.e., a typical scale weighment).

- **A.** Place the truck on the scale and take a reading.
- **B.** Remove the truck, turn around, and re-enter the scale.
- **C.** The readings must repeat within ±0.2 percent of the applied load. Example: 80,000 lb truck, the readings should be within ±8 Grads (160 lb).

5. Structural Bridge Inspection

- **A.** Drive a loaded truck slowly across the scale.
- **B.** Observe the deck plate at the tandem axles.
- **C.** Excessive deflection, under the tandem axle loads, will readily reveal structural damage (i.e., a broken weld, stringer, or cross member).

6. Check Stand Bolts and Check Bolts should be inspected and adjusted every three months.

The above inspection procedure will require less than one hour but will ensure that the scale is well maintained and accurate. Quarterly, have the scale checked with known weights (i.e., a routine scale company test).

STATEMENT OF LIMITED WARRANTY

WARRANTY TERMS

Cardinal Scale Manufacturing Company warrants the equipment we manufacture against defects in material and workmanship. The length and terms and conditions of these warranties vary with the type of product and are summarized below:

PRODUCT TYPE	TERM	MATERIAL AND WORKMAN-SHIP	LIGHTNING DAMAGE See note 9	WATER DAMAGE See note 7	CORROSION See note 4	ON-SITE LABOR	LIMITATIONS AND REQUIREMENTS
WEIGHT INDICATORS	90 DAY REPLACEMENT --- 1 YEAR PARTS	YES	YES	YES	YES	NO	1, 2, 3, 5, 6 A, B, C, D
LOAD CELLS (Excluding Hydraulic)	1 YEAR	YES	YES	YES	YES	NO	1, 2, 3, 5, 6 A, B, C, D
HYDRAULIC LOAD CELLS (When purchased with Guardian Vehicle Scale)	LIFETIME	YES	YES	YES	YES	90 DAYS	1, 5, 6, 8 A, B, C, D
HYDRAULIC LOAD CELLS (When purchased separately)	10 YEARS	YES	YES	YES	YES	NO	1, 5, 6, 8, 9 A, B, C, D
VEHICLE SCALE (Deck and Below Excl. PSC Series)	5 YEARS	YES	YES	YES	YES	90 DAYS	1, 2, 3, 5, 6 A, B, C, D, E
LSC SCALE (Deck and Below)	3 YEARS	YES	YES	YES	YES	90 DAYS	1, 2, 3, 5, 6, 11 A, B, C, D
GUARDIAN FLOOR SCALES	10 YEARS	YES	YES	YES	YES	NO	1, 2, 3, 5, 6, 9, 10 A, B, C, D
ALL OTHER CARDINAL PRODUCTS	1 YEAR	YES	YES	YES	YES	NO	1, 2, 5, 6 A, B, C, D, E
REPLACEMENT PARTS	90 DAYS	YES	YES	YES	YES	NO	1, 2, 4, 5, 6 A, B, C, D
SWIM AND 760 SERIES VEHICLE SCALES	1 YEAR	YES	YES	YES	YES	90 DAYS	1, 2, 5, 6 A, B, C, D
SOFTWARE	90 DAYS	YES	N/A	N/A	N/A	NO	1, 6 B, C, D
CONVEYOR BELT SCALES (including Belt-Way)	1 YEAR	YES	YES	YES	YES	NO	1, 2, 3, 5, 6 A, B, C, D, E, F

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315-WARRANTY-CAR-M

APPLICABLE LIMITATIONS AND REQUIREMENTS

1. This warranty applies only to the original purchaser. The warranty does not apply to equipment that has been tampered with, defaced, damaged, or had repairs or modifications not authorized by Cardinal or has had the serial number altered, defaced or removed.
2. This warranty is not applicable to equipment that has not been grounded in accordance with Cardinal's recommendations.
3. This equipment must be installed and continuously maintained by an authorized Cardinal / Belt-Way dealer.
4. Applies only to components constructed from stainless steel.
5. This warranty does not apply to equipment damaged in transit. Claims for such damage must be made with the responsible freight carrier in accordance with freight carrier regulations.
6. Warranty term begins with date of shipment from Cardinal.
7. Only if device is rated NEMA 4 or better or IP equivalent.
8. Lifetime warranty applies to damages resulting from water, lightning, and voltage transients and applies only to the hydraulic load cell structure itself (does not include pressure transducers, rubber seals, o-rings, and associated wiring).
9. 10-Year prorated warranty on hydraulic load cells.
10. 1-Year warranty for scale structure.
11. PSC models' warranty coverage applies only to agricultural installations on farms up to 3,000 acres (LSC models not limited in this manner).
12. Load cell kits MUST be installed in accordance with Cardinal Scale instructions. Failure to follow these instructions will void the warranty.

EXCLUSIONS

A.) This warranty does not include replacement of consumable or expendable parts. The warranty does not apply to any item that has been damaged due to unusual wear, abuse, improper line voltage, overloading, theft, fire, water, prolonged storage or exposure while in purchaser's possession or acts of God unless otherwise stated herein.

B.) This warranty does not apply to peripheral equipment not manufactured by Cardinal. This equipment will normally be covered by the equipment manufacturer's warranty.

C.) This warranty sets forth the extent of our liability for breach of any warranty or deficiency in connection with the sale or use of our product. Cardinal will not be liable for consequential damages of any nature, including but not limited to loss of profit, delays or expenses, whether based on tort or contract. Cardinal reserves the right to incorporate improvements in material and design without notice and is not obligated to incorporate said improvements in equipment previously manufactured.

D.) This warranty is in lieu of all other warranties expressed or implied including any warranty that extends beyond the description of the product including any warranty of merchantability or fitness for a particular purpose. This warranty covers only those Cardinal products installed in the forty-eight contiguous United States and Canada.

E.) This warranty does not cover paint coatings due to the variety of environmental conditions.

F.) Do not cut load cell cables on load cells returned for credit or warranty replacement. Cutting the cable will void the warranty.

G.) Software is warranted only for performance of the functions listed in the software manual and/or the Cardinal proposal.

H.) The software warranty does not cover hardware. Warranties on hardware are provided from the hardware vendor only.

I.) The software warranty does not cover interfacing issues to non-Cardinal supplied hardware.

J.) The software warranty does not include automatic software upgrades unless purchased separately.

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