THURMAN
scale

Installation & Service Manual

Railroad Track Scale

Model: 8710

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Amendment Record

Railroad Track Scale

Model: 8710

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Manufactured by Thurman Scale Company
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Disclaimer

Every effort has been made to provide complete and accurate information in this manual. However, although this manual may include a specifically identified warranty notice for the product, Thurman Scale Company makes no representations or warranties with respect to the contents of this manual, and reserves the right to make changes to this manual without notice when and as improvements are made.

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CAUTION:

THIS MANUAL IS PROVIDED AS A GUIDE FOR THE TRAINED TECHNICIAN FOR INSTALLING, CALIBRATING, AND SERVICING THE MODEL 8710 RAIL SCALE. REPAIR OR ADJUSTMENT BY UNAUTHORIZED PERSONS MAY VOID THE THURMAN SCALE WARRANTY. CALL THE LOCAL THURMAN DISTRIBUTOR FOR INSTALLATION AND SERVICE.

INFORMATION REGARDING THE NEAREST DISTRIBUTOR CAN BE OBTAINED FROM THURMAN SCALE COMPANY, 255 E. LIVINGSTON AVE., COLUMBUS, OHIO 43215. (1-800-688-9741)

CAREFULLY READ THE CONTENTS OF THIS MANUAL BEFORE PROCEEDING WITH INSTALLATION.

1. INTRODUCTION

The Model 8710 is a pit type combination railroad track scale, and vehicle scale. Two standard scale sizes are available, 60' x 10' and 72' x 10'. They can be utilized as combination railroad track scale/vehicle scales or exclusively for railroad weighing. Many of the innovative features that are incorporated in the scale allow for fast, easy installation. Special sizes are also available.

1.1 A.R.E.A. DESIGN

Model 8710 is designed to meet A.R.E.A. specifications in every detail. Weighbridge steel is designed for Cooper E-80 loading. The scale is rated at 85 tons/section, 200 ton gross and 65K dual axle (vehicle weighing CLC).

1.2 FULLY ELECTRONIC

Thurman Scale Company incorporates the use of double ended shear beam load cells for maximum accuracy and repeatability. The load cell and Thurman Scale load cell suspension are designed to be self restoring, eliminating the need for rigid check rods.
No check rods or dead-to-live connections, other than through the load cells, assure long lasting accuracy and minimum maintenance.

1.3 FACTORY ASSEMBLED

The scale is factory welded and pre-drilled for bolting of the live rails eliminating time consuming field assembly and assuring quality construction. Installation is fast and simple. The concrete deck channels, as with a typical pit type vehicle scale, are provided for field installation.

1.4 RAIL ALIGNMENT

Approach rails are held in place for proper alignment and protection from rail expansion by use of anti-creep devices (optional). The Model 8710 is prepared for 115#/YD A.R.E.A. rail. The 115#/YD A.R.E.A. rail size is the standard (minimum required by A.R.E.A./A.A.R.). Longitudinal anti-creep devices, in addition to clips, prevent live rail movement.

2.1 FOUNDATIONS

The foundation design used with the Model 8710 meets A.R.E.A. specifications, and is a pit type. The construction of the approaches can vary due to preference of site conditions. Approaches must meet A.R.E.A. specifications and/or requirements specified by the Serving Rail Line Company. 25' approach length is required on both ends of the scale. 50' approach length is required on both ends if multi-draft weighing.

2.2 FOUNDATION DRAWINGS

Complete standard pit and approach detail drawings are provided. (use latest revision)

IMPORTANT NOTE:

PRIOR TO CONSTRUCTION ENSURE THAT THE DRAWINGS WERE ISSUED BY THURMAN SCALE ENGINEERING AFTER OUR RECEIPT OF ORDER. DRAWINGS ISSUED PRIOR TO OUR RECEIPT OF THE PURCHASE ORDER ARE NOT TO BE USED FOR CONSTRUCTION.

2.3 CURING

The concrete must cure 7 - 10 days before installing the scale. The concrete will not reach full strength for 28 days. All concrete construction must conform to ACI codes, latest edition.

3. INSPECTION

Check to see if any components are damaged or if any items are missing, and notify the ship carrier immediately in order to collect damages.

The 8760 will consist of three major items:
1) 8760 module(s);
2)Instrument & load cells; and
3)Installation kit; plus lightning protection system components.

Inspect all items received for physical damage. If damage is noted, please notify your carrier immediately in order to collect damages.

CAUTION:
THE SCALE WEIGHBRIDGES (AND SOME COMPONENTS) ARE HEAVY AND AWKWARD TO HANDLE. EXERCISE EXTREME CARE WHEN LIFTING THE WEIGHBRIDGE MODULES SO AS TO AVOID PERSONAL BODILY HARM OR DAMAGE TO THE EQUIPMENT. INSURE THAT THE LIFTING DEVICE BEING USED TO MOVE THE MODULE IS OF SUFFICIENT CAPACITY TO SAFELY AND SECURELY HANDLE THE PLATFORMS.

TABLE 3 - 1 APPROXIMATE MODULE WEIGHTS (without concrete)

Scale Size	Maximum Module Weight
60' x 10'	11,000 lb per end module (2 modules), plus 6,000 lb center module
72' x 10'	11,000 lb per module (3 modules)

When the module is being moved, never place your hands or other items between the platform and the other surface. If it is necessary to place your hands under the module during the installation phase, then insure that the section is properly blocked such that it is impossible for it to move before performing this function. Failure to follow this warning could result in physical harm.

3.1 UNLOADING PROCEDURE

The modules must be lifted per the procedure shown in Figure <II>.

Hook lifting chains around crossmembers, ensure that the lifting chains are equally loaded, secure and at an angle of greater than 30° is maintained.

4. INSTALLATION SUPPLIES CHECKLIST

The following equipment or other items are required to properly install a Model 8710. These items are not supplied by Thurman Scale.

4.1 MATERIAL

1) Non-shrink, high quality grout (see drawings for specifications) and mixing tools.
2) A small supply of Never-Seez bearing compound or good quality grease.

4.2 TOOLS

1) Transit, tripod, rod
2) 6" spirit level
3) 100' chalk line
4) 100' measuring tape
5) 6' "Crow Bar" to align modules
6) Ohm meter
7) Normal installation tools including wood blocks and short hydraulic jacks

5.1 MECHANICAL INSTALLATION

5.1.1 Place 1" nuts and large diameter flat washers on the foundation anchor bolts. Washers should be at least 2" O.D. Run the nuts down approximately 5".

5.1.2 Remove any loose pieces from the modules. Place loose pieces and parts box in a safe location.

5.1.3 Place the grout plates and load cell assemblies on the foundation anchor bolts (Figure <III>.)

5.1.4 Place large diameter flat washers and 1" nuts on the foundation anchor bolts above the load cell plates - do not tighten at this time.

5.1.5 Install the two end modules prior to putting the center module in place.

5.1.6 Center the scale longitudinally in the foundation such that the clearance between the ends of the scale and end walls are equal.

5.1.7 Align the scale laterally such that the centerlines of the approach rails are in line with the scale live rail centerlines.

5.1.8 Install and tighten the four 1 1/2" threaded bolts between the center module and both end modules.

OBSERVE THE PREVIOUS CAUTION NOTICES RELATIVE TO SAFETY DURING THIS PROCEDURE

5.1.9 Adjust the elevation of the scale using the nuts on the anchor bolts at each load cell corner. The elevations of the top of the scale live rails at the four rail end points must be adjusted until they are identical and equal to the elevation established for the top of the approach rail to within 1/32". Refer to the appropriate foundation drawing. Both the elevation of the scale and the elevation of the approach rails should closely match the dimensions shown on the foundation drawings. Use a transit for this purpose.

5.1.10 Adjust the nuts on the center section load cell plate anchor bolts to level the center load cell base plates and bring them to the same elevation as the ends.

5.1.11 Carefully re-check the scale levelness and alignment as indicated above and securely tighten all anchor bolts nuts.

5.1.12 Grout under all base plates using a non-shrink high quality grout such as Embeco #636. The nominal grout allowance is 1 3/4" under the load cells. Do not grout until all approach rails have been installed and properly leveled and aligned with the scale.

5.1.13 The approach rail should be installed in accordance with the respective foundation drawings.

Anti-creep angles are recommended and are furnished as an option for attachment to the approach rails. The ends of the approach rails must be drilled or punched and miter cut, as shown on the assembly drawings. The dimensions shown provide a nominal 1/2" rail head gap.

5.1.14 The approach rails should be aligned, leveled and the rail plates, if used, grouted in the same manner as under the load cell grout plates.

5.1.15 If necessary, the elevation of the live rail at each corner of the weighbridge should be adjusted by turning the nuts on the anchor bolts under the load cell grout plates. The live and dead rails must be in line.

5.1.16 Check that there are no obstructions under the weighbridge and that there is initial load on all load cells. It will be necessary to check and adjust the center load cells (use of an ohm meter is necessary).

5.1.17 During the installation and adjustment procedure Never-Seez lubricant or equivalent should be applied to any screws removed.

5.2 WIRING

IMPORTANT NOTE:
DO NOT CUT THE CABLE ATTACHED TO THE LOAD CELLS. DOING SO MAY ADVERSELY EFFECT THE PERFORMANCE OF THE LOAD CELL BY ALTERING THE TEMPERATURE COMPENSATION CHARACTERISTICS OF THE CELL. CUTTING THE LOAD CELL CABLE WILL VOID THE WARRANTY.

5.2.1 Install the junction box assemblies on the remote J-box stands, Do not fasten the J-box stands to the pit floor until all wiring is completed. (repositioning may be required)

5.2.2 Remove the junction box cover and gasket. Do not allow dirt, dust, moisture or other debris to enter the junction box as damage to the summing board may occur.

5.2.3 Route all load cell cable and J-Box interconnect cables into the junction box cavity. It is recommended that all wires be routed through conduit installed in pit (by others).

5.2.4 Pass the interconnect cable through the sealing hub located at the end of the junction box directly over the terminal strip marked "Remote J-Box".

5.2.5 Connect the cable to the terminals of the strip marked "Remote J-Box". Make sure that the wire is connected so that the terminations match between the summing boards.

WEIGHBRIDGE MODULE
INTERCONNECTING CABLE WIRING TABLE

FUNCTION	COLOR
-Signal	White
+Signal	Green
-Sense	Blue
-Excitation	Black
+Sense	Yellow
+Excitation	Red

5.2.6 Pass the load cell cables through the appropriate sealing hubs, corresponding to the wiring diagram (Figure <V>).

5.2.7 Connect the cable to the terminals of the appropriate strips. Make sure that the wire is connected so that the terminations match the load cell wiring table.

5.2.8 Tighten the cable glands until the o-ring clamps firmly around the wire. If not tightened properly, moisture may damage may occur.

5.2.9 Route the indicator interconnect cable through the sealing hub on the junction box corresponding to the wiring diagram. (Figure <V>)

5.2.10 Attach the indicator cable to the terminal strip marked "Indicator", matching functions of the digital indicator to those marked on the summing board, (i.e. "+EX" is +Excitation, "-SI" is -Signal, etc.). The use of instruments utilizing sense lines is strongly recommended for Rail Scale applications.

Please refer to Figure <V> for the railroad scale interconnect wiring diagram and Figure <VI> for the wiring diagram with surge voltage protection.

LOAD CELL WIRING TABLE

FUNCTION	COLOR
-Signal	White
+Signal	Green
-Excitation	Black
+Excitation	Red
Shield	Bare, Yellow or Orange

5.2.11 Proper grounding is important in any electronic system. Using a quality ohm meter, verify that a good connection exists between all of the following points;

a.) each load cell case to the weighbridge
b.) each load cell shield to the j-box board shield
c.) J-box board shield to weighbridge
d.) module interconnecting cable shield to each j-box board shield
e.) indicator connecting cable shield to j-box board shield
f.) indicator connecting cable shield to indicator case ground
g.) weighbridge to a single properly placed ground rod

INSURE THAT YOUR FINGERS DO NOT TOUCH THE PROBES, AND THAT THE CABLE IS NOT PLUGGED INTO THE INSTRUMENT WHEN MAKING THIS TEST. CHECK TO SEE THAT ALL POTS ARE TURNED FULLY CLOCKWISE.

5.3 SURGE VOLTAGE PROTECTION SYSTEM

Surge Voltage Protection is included to protect the scale from lightning and the indicator from voltage spikes. Refer to the proper wiring diagram drawing for installation.

The scale should be calibrated using weights which are traceable to the National Institute of Standards and Technology (NIST). Proceed with the calibration according to this section and the proper indicator manual.

6.1 SET POTS

Each section (2 cells) is equipped with a potentiometer across the +/- signal leads. Before starting calibration, set all pots fully clockwise (to their minimum resistance, approximately 10 turns).

6.2 CALIBRATION

6.2.1 POWER UP

To start the calibration procedure, apply power to the instrument. It will take approximately 15 minutes for the scale to become thermally stable which is necessary before calibration begins.

6.2.2 ROUGH CALIBRATION

After the scale warm-up, it will be necessary to calibrate the scale. Using the calibration procedure for the instrumentation that is being used, obtain a zero adjustment, and rough span adjustment (using an approximate known weight that is easily available).

6.2.3 SECTION TEST AND ADJUSTMENT

Due to varying cable lengths and tolerance build ups, it will be necessary to adjust the trim pots and each section J-box so that the weight reading from each section is identical. It will be necessary at the start of this procedure to determine the high and low sections in this scale. Using the maximum amount of concentrated weight that is easily available, place it over each pair of cells (or as close as possible) and record the indicator reading.

If calibrating a combination scale, start sectioning with the module that has the lowest section of the entire scale system.

Trim all sections to equal the lowest section. Sections can be trimmed down by turning the appropriate J-box pots counter clockwise. It may take several turns for the pot to have any effect, and the farther you turn it, the more effect it will have per turn. When the scales are properly adjusted, the weight reading on the indicator will be the same no matter where the weight is placed on the section (it is not important at this time what the specific weight reading is).

There will be some interaction from the adjustments between sections, and scales, so it is worthwhile to recheck the reading obtained from each section or module after several adjustments.

6.3 FINAL CALIBRATION

Once all sections and modules have been adjusted so the same weight reading is obtained no matter where the weight is placed along the scale, the final calibration can be performed.

It will be necessary to obtain a known weight as close to the scale capacity as possible. Prior to applying this weight to the scale, adjust the instrument to zero as specified in the instrument manual. Once zero has been obtained, place the known weight on the scale and then adjust the span. Span and zero should then be rechecked to make sure they are accurate and adjusted properly.

6.4 CLOSING OF J-BOXES

After calibration, it is extremely important that all J-boxes be re-sealed.

IMPORTANT:

CHECK ALL BOX CONNECTORS, AND SCREWS TO MAKE SURE THEY ARE TIGHT BEFORE COMPLETING THE CALIBRATION. HOLE PLUGS MUST BE INSTALLED IN ALL UNUSED CONNECTORS.

6.5 SCALE FINISHING

Inevitably, the scale modules will be scratched and bumped in transit and installation. A can of paint is provided with the scale to touch up all of these areas to prevent rust.

7.1 FREQUENCY

The 8710 requires only minimum maintenance. It is important to keep debris from beneath the module. Periodically inspect the bumper system to assure proper gap is maintained (Figure VI). The scale will need to be repainted periodically depending on usage, location, and general paint wear. When repainting, insure that the deck is clean and any rust removed. Apply paint which conforms to the original paint specifications, for best results.

The calibration of the scale should be checked every six (6) months, or as recommended by the Authorized Thurman Scale Distributor. (Varies depending primarily on usage).

7.2 LOAD CELL REPLACEMENT

If a load cell must be replaced, proceed as follows:

7.2.1 The corner of the platform over the cell needs to be raised 1" - 2" to remove the load from the cell. No vehicles or weights should be on the scale at this time.

7.2.2 Insure that the platform is properly blocked after it has been raised before attempting to remove the load cell.

Observe the previous caution notices relative to safety during this procedure.

7.2.3 Remove the junction box cover and disconnect the defective load cell cable.

7.2.4 Remove the load cell end links.

7.2.5 Remove the load cell by lifting it off the load cell stand.

7.2.6 Place the replacement cell in position and replace the end links with load pin onto the load cell.

7.2.7 Route the load cell cable through the conduit to the junction box.

7.2.8 Tighten the load cell cable box connector where the load cell enters the junction box.

7.2.9 Connect the load cell cable to the terminal block. Insure that the colors of the load cell cable match the termination of the other load cells on the J-box PC board. Insure good connections.

7.2.10 Replace the junction box cover and gasket.

7.2.11 Place the jacking mechanism in position and remove the blocks. Slowly lower the weighbridge back onto the load cell. Make sure the load cell, end links and load pin are seated correctly and properly aligned in all directions.

7.2.12 Check the calibration of the scale using the calibrating procedure in the indicator manual and Section 6.0 in this manual.

Section 8: Specifications

8.1 LOAD CELLS

CABLE COLOR CODE

+ Excitation	Red
- Excitation	Black
+ Signal	Green
- Signal	White
Shield	Bare, Yellow, or Orange

Cable length . . . . . .35' on 100K load cells
Rated Output . . . . . .3.0 + / - .1% millivolts/volt
Non-linearity 0.03%
Repeatablilty . . . . . .+/- 0.01% scale capacity
Compensated temp. range . . . . . .0° to 150° F
Temp. effect . . . . . .Output +0.0008 of load/degrees Fahrenheit
Zero Balance 1.0%
Bridge Resistance . . . . . .(Input) 700 Ohms min.
. . . . . .(Output) 700 Ohms +/- 1%
Excitation Voltage . . . . . .10 VDC or 15 max. VDC
Safe overload . . . . . .150% of cell capacity
Ultimate overload . . . . . .300% of cell capacity
Safe side load 100%

Section 9: Troubleshooting

9.1 LOCATION

When troubleshooting a problem with a scale, it is first necessary to determine if the problem is in the scale or in the indicator. Remove the load cell connector from the back of the indicator and connect a simulator to the indicator. If the indicator does not function when using the simulator, refer to the indicator manual for further troubleshooting guidance. If the indicator functions properly, proceed as follows:

9.2 SCALE

9.2.1 Inspect all clearances around the scale for obstructions. If any obstructions are observed, remove these obstructions. Also verify bumper system clearances (Figure VI).

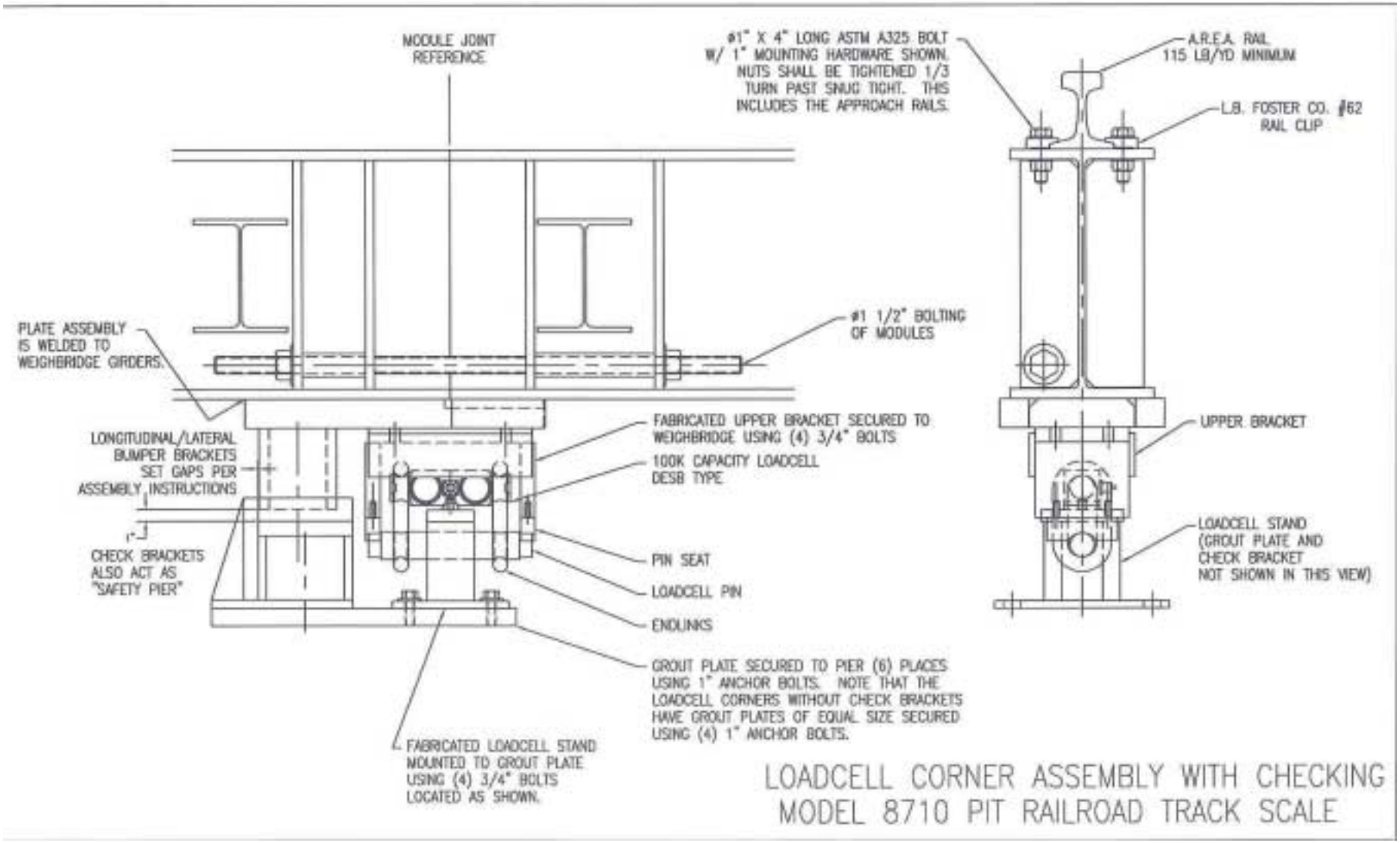
9.2.2 Remove the plates covering the NEMA IV junction boxes. Remove the junction box covers and inspect the junctions boxes. The junction boxes must be clean and dry. If the junction boxes have moisture in them, they must be thoroughly dried out. Insure that all terminals are dry and that the terminations are secure.

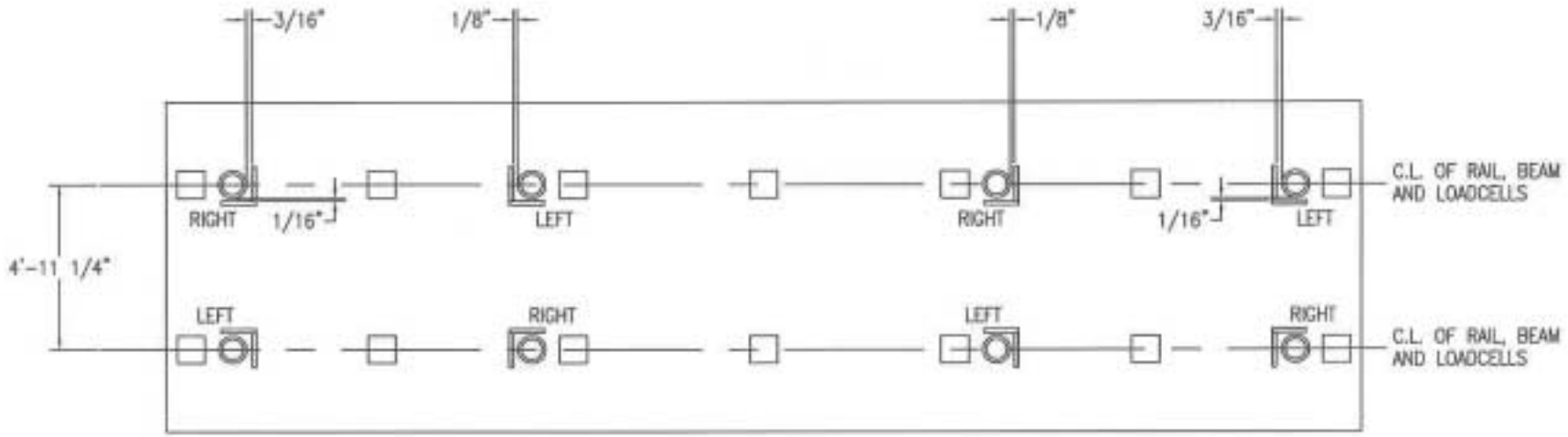
9.2.3 Using a VOM measure the resistance as described in Section 8.1. If improper resistance is detected, then disconnect the load cells one at a time until the defect is isolated. If the resistance check is okay, then proceed to the next section.

9.2.4 Place weights on each section of the scale in a consecutive manner; then move this known weight to the next section, etc. When the defective section is found, place weights directly over each load cell in that section to isolate the defective load cell. When the defective load cell is isolated, refer to Section 7.2 for replacement.

SPARE PARTS LIST

PART NUMBERS	DESCRIPTION
98974	100K DOUBLE ENDED LOAD CELL
64812	LOAD PIN
66347	LINK
65056	AC SURGE PROTECTOR
65058	DC SURGE PROTECTOR


MODULE JOINT REFERENCE
#1" X 4" LONG ASTM A325 BOLT W/ 1" MOUNTING HARDWARE SHOWN. NUTS SHALL BE TIGHTENED 1/3 TURN PAST SNUG TIGHT. THIS INCLUDES THE APPROACH RAILS.
A.R.E.A. RAIL 115 LB/YD MINIMUM
L.B. FOSTER CO. #62 RAIL CLIP
#1 1/2" BOLTING OF MODULES
PLATE ASSEMBLY IS WELDED TO WEIGHBRIDGE GIRDERS.
FABRICATED UPPER BRACKET SECURED TO WEIGHBRIDGE USING (4) 3/4" BOLTS
100K CAPACITY LOADCELL DESB TYPE
UPPER BRACKET
LONGITUDINAL/LATERAL BUMPER BRACKETS SET GAPS PER ASSEMBLY INSTRUCTIONS
LOADCELL STAND (GROUT PLATE AND CHECK BRACKET NOT SHOWN IN THIS VIEW)
CHECK BRACKETS ALSO ACT AS "SAFETY PIER"
PIN SEAT
LOADCELL PIN
ENDLINKS
GROUT PLATE SECURED TO PIER (6) PLACES USING 1" ANCHOR BOLTS. NOTE THAT THE LOADCELL CORNERS WITHOUT CHECK BRACKETS HAVE GROUT PLATES OF EQUAL SIZE SECURED USING (4) 1" ANCHOR BOLTS.
FABRICATED LOADCELL STAND MOUNTED TO GROUT PLATE USING (4) 3/4" BOLTS LOCATED AS SHOWN.
LOADCELL CORNER ASSEMBLY WITH CHECKING
MODEL 8710 PIT RAILROAD TRACK SCALE



RAIL SCALE LOADCELL AND CHECK LAYOUT
MAINTAIN CLEARANCES AS SHOWN ABOVE

FIGURE VI