



SI ONBOARD

Installation Instructions

For Logging Truck Scales

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Introduction

The SI on-board logging truck scale is highly advanced electronic measuring device. Weight is “sensed” by two load cells that are mounted beneath each log bunk bolster. These rugged load cells are strong enough to provide years of reliable service, yet are sensitive enough to detect a change in weight of just a few pounds.

SI scales are available for all types of log truck bunks. Due to differences in the models, there may be minor assembly variations. The installation process is virtually the same whether it is being performed as a retrofit or to a new vehicle.

It is extremely important to follow these installation guidelines and use the specified materials to ensure that the completed assembly will maintain its high strength and maximum safety. It will also result in minimum installation costs, high accuracy and long life for your scale system.

Warning

Failure to follow these instructions could cause a hazardous operating condition.

Upon completion of the load cell installation, you will need to install the SI 9100 digital meter, transmitter and cabling. You also need to calibrate the scale system. Complete instructions for these procedures can be found in the **Operator's Manual** included with your SI 9100 digital meter.

Warning

Installation must be in accordance with regulations of the U.S. Department of Transportation, State and local regulations, SAE recommended practices and standard, and tractor and trailer manufacturer's specifications.

International users: Installation must be in accordance with the regulations of city, state, province and country, as they may apply to installations outside of the USA.

An installation checklist has been provided on page 12 of this manual. Refer to it during installation and check off the important steps as they are completed

Frame Preparation

SI load cells are mounted in one of two ways, depending upon the type of log truck or trailer frame configuration.

The first type is the Channel Frame, found on log trucks and some trailers, particularly “short logger” trailer (see Figure 1). It includes two longitudinal channel frame rails with lateral cross-members for the rigidity. On this type of frame, the load cell is mounted to a piece of structural angle which is bolted to the channel frame rails.

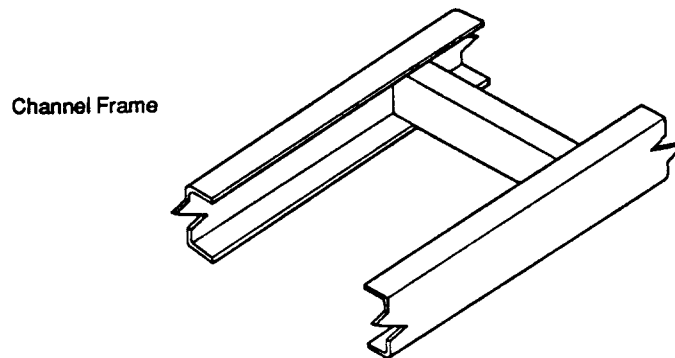


Figure 1

The second frame type is the welded box frame, found on most of “long logger” trailers and some “short logger” trailers (see Figure 2). The load cells are mounted on this type of frame using a base made from a flat, steel plate.

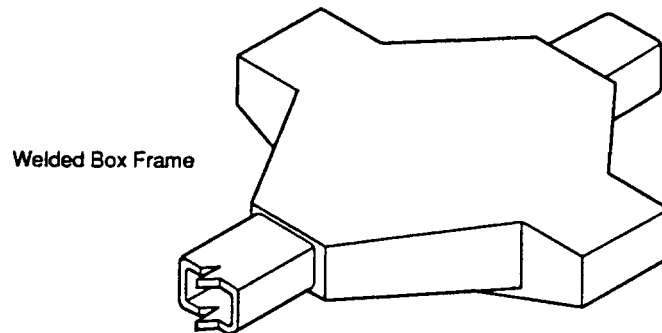


Figure 2

The instructions on the following pages detail the preparation needed for each frame type in order to properly mount SI scales. Regardless of the specific mounting used, every good truck installation should provide a rigid support for the load cells, particularly under the bearing blocks.

Channel Frame Mounting

Fabricate and attach two “frame mounting angles” to the tractor frame rails. These angles add extra strength to the assembly and allow you to weld the load cell bearing blocks in place.

Fabricate the frame mounting angles as shown in Figure 3. They should have minimum dimensions of 4" X 4" X 36" long X ½" thick (102 mm X 102 mm X 914 mm X 13 mm) angle. Material must meet or exceed the specifications for ASTM A36 steel.

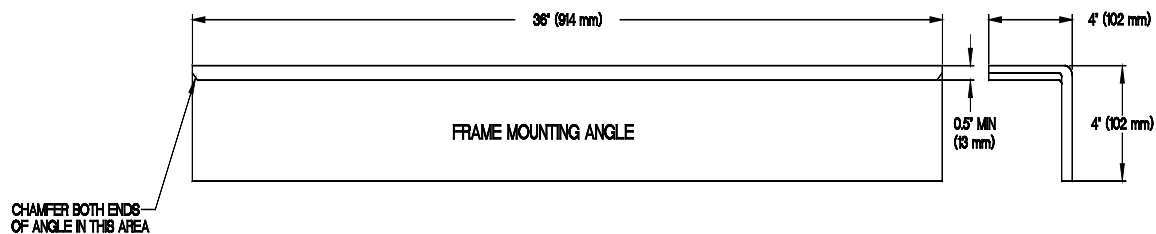


Figure 3

Remove all the burrs and sharp edges on the angles, especially at the end of the angles where they sit on the frame's top flange. Grind a chamfer on the underside of the angle's top flange to prevent sharp edges from contacting the channel frame's top flange.

Inspect the channel frame rails to ensure they are clean, straight and free of cracks, corrosion, pitting, burrs, or any other imperfections. These imperfections may affect the installation and fit of the frame mounting angles, or the strength of the frame.

Set the mounting angles in the place on the channel frame rails. Determine if and where the mounting angles must be cut out to allow clearance for existing bolts, rivets, spring hangers, etc. on the channel frame. Mark these locations on the mounting angles, allowing for a minimum 1" (25mm) radius- **no sharp corners**. Remove angles, cut out as required, and grind edges smooth.

Clamp the mounting angle tightly to the channel frame. Ensure that both the top and side legs are in tight contact with the frame for the full length of the mounting angles. Be sure that clearances and cutouts are correct. Locate and drill holes for 5/8" (16mm) mounting bolts using a maximum spacing of 8" (203 mm). Spacing of 5" to 6" (127mm to 152mm) is recommended (see Figure 4).

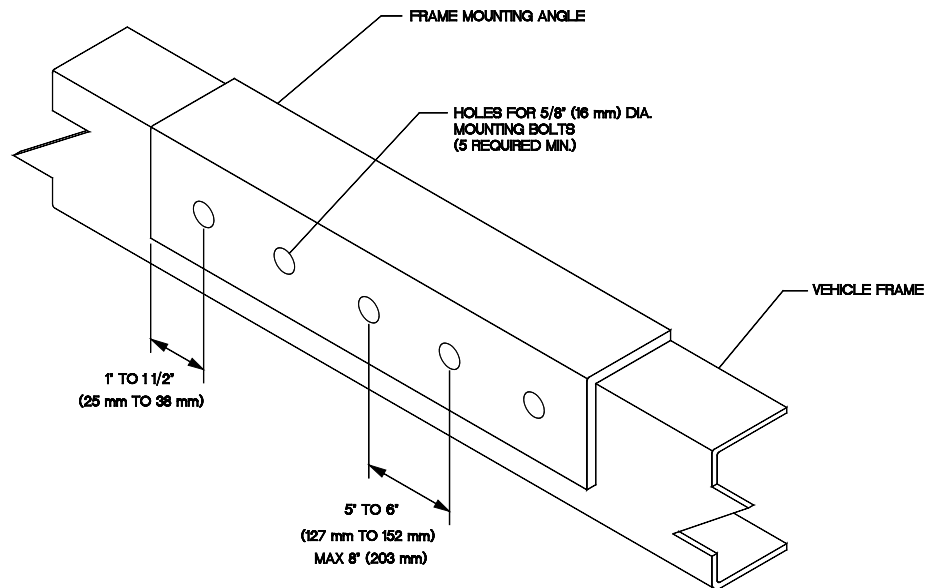


Figure 4

Notes:

Bolt holes in mounting structures MUST be drilled, not burned. Holes should not be oversized more than 1/32" to ensure a snug fit for bolts.

Use a MINIMUM of 5 bolts per mounting angle. Also, locate bolts within 1" to 1 1/2" (25mm to 38mm) of each end of the mounting angle. Do the same for the edge of each cutout deeper than 1" (25mm).

Attach the mounting angles using SAE Grade 8 bolts, Grade C lock nuts, and a hardened washer under the lock nut. The bolts must be a minimum of 3 to 4 threads pass end of lock nut. Tighten all bolts to the proper torque value listed in table 2 on page 12.

Notes:

The surface upon which the load cell bearing blocks attached must be extremely rigid between the bearing blocks to ensure the load cell will operate properly. Failure to provide a solid base for the load cell can result in non-linear and erratic weight readings.

Welded Box Frame Mounting

Fabricate and attach two “base plates” to the top surfaces of the welded box frame section. These plates add extra strength to the assembly and provide a flat rigid platform on which to weld the load cell bearing plates.

The base plates should have minimum dimensions of 25" X 4" X 3/4" thick (635mm X 102mm X 19mm) (see Figure 5). Plate material must meet or exceed the specifications for ASTM A36 steel. Remove all burrs and sharp edges from the plates.

Inspect the box frame to ensure it is clean, straight and free of cracks, corrosion, pitting, burrs, or any other imperfections. These imperfections may affect the installation and fit of the load cell base plate, or the strength of the frame.

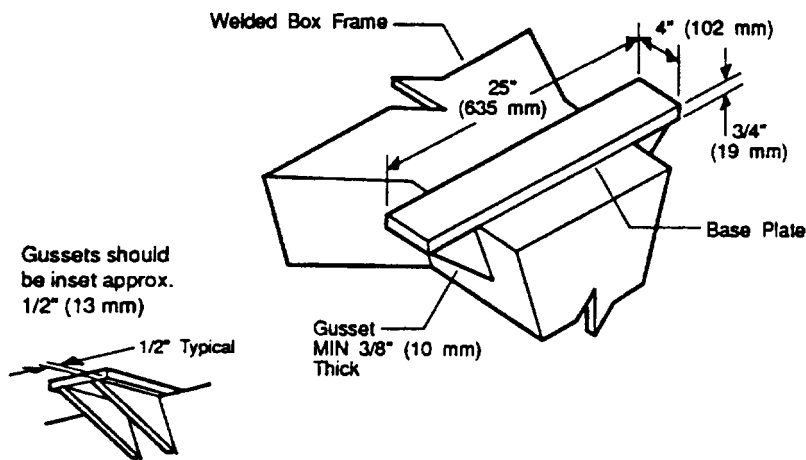


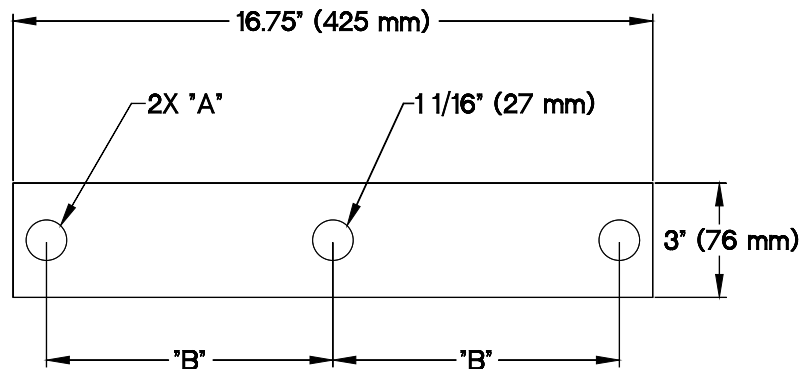
Figure 5

Set the base plates in place on the box frame. If the mounting plate extends beyond the top surface of the box frame for more than 1" (25mm), the overhanging portion must be supported by gussets welded to vertical surfaces of the box frame. The gussets should be ASTM A36 steel and a minimum of 3/8" thick (10mm) (see Figure 5).

Position the base plates so that they are flat and parallel, and the top surfaces are coplanar. A straight edge can assist in checking these features. Weld base plates securely to the box frame using a low hydrogen process and AWS E7018 rod or equivalent. See page 10 for suggested weld preparation and procedures.

Bunk Preparation

Load cell installation requires two pressure bars, one for each call, in order to mount the load cells to the bridge beam. The material must meet or exceed the specifications for ASTM A36 steel. The dimensions of the pressure bars should be 16 ³/₄" X 3" X ¹/₂" thick (425 mm X 76 mm X 13mm) (see Figure 6).



Installation Type	"A"	"B"
Standard	1 1/16" (27mm)	7.5" (192mm)
General Trailer Only	15/16" (24mm)	5.75" (146mm)

Figure 6

Gussets are required to support the portion of the pressure bars extending past the bridge beam (see Figure 7). The gussets should be a minimum of 3/8" thick (10mm) and installed vertically. If installed at an angle other than 90° to the mounting bar, thickness should be 1/2" MINIMUM (13mm). In both cases the material must meet or exceed the specifications for ASTM A36 steel.

Determine the location of the pressure bars on the bridge beam in order for the load cells to be centered on the frame's mounting structure. Provide an access hole in the bridge beam for installation and tightening of the center load cell mounting bolt. Tack weld pressure bars and gussets and check for position to each other. Weld pressure bars and gussets securely to the bridge beam using a low hydrogen process and AWS E7018 rod or equivalent. See this manual for the suggested welding preparation and procedures.

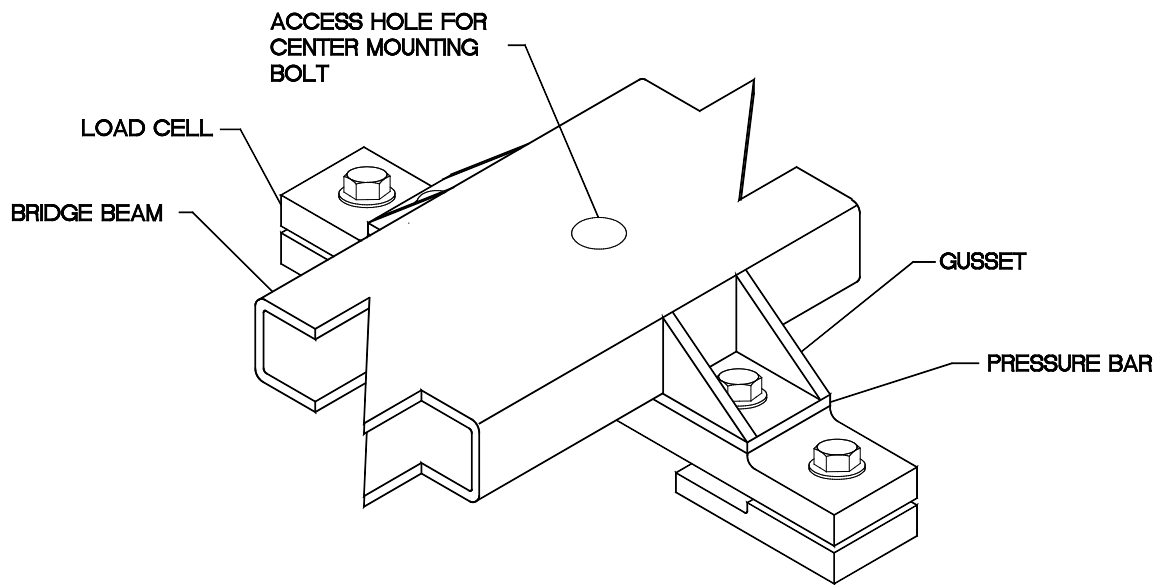


Figure 7

Attach the load cells to the bridge beam assembly with the mounting hardware provided with your SI system. Tighten all the fasteners to the torque value listed on the bolt torque value table (page 10).

Note:

All mounting hardware is SAE Grade 8 or equivalent. In the event damages or missing fastener are to be replaced, use only ASE Grade 8 quality or equivalent.

Final Scale Assembly

The bridge beam/load cell assembly is now ready to be mounted on the tractor or trailer frame. Check for the proper bunk location and place the entire bridge beam/load cell assembly onto the mounting angles or base plates. Square the assembly to the frame (see Figure 8).

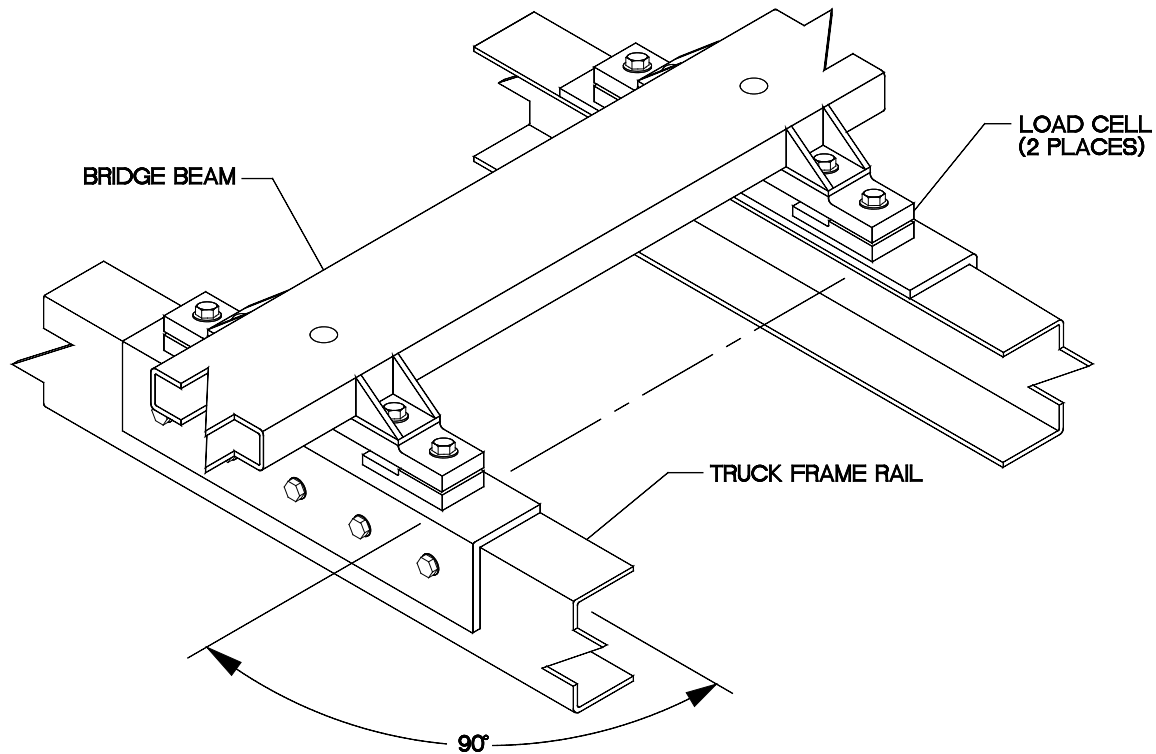


Figure 8

If all bearing plates are not in contact with the mounting angles, balance the bridge beam/ load cell assembly so that the gap is distributed evenly between two opposite bearing plates and mounting surfaces. Shim any gap greater than 1/8" (3mm) when balanced.

Caution:

Please read the welding procedure on the following pages COMPLETELY before proceeding. The welding of bearing plates is most crucial step in the installation process.

Take precautions to ensure that the vehicle electrical system is not damaged by welding. ATTECH GROUND STRAP DIRECTLY TO VEHICLE FRAME (NOT BUNK) WHEN WELDING TO PREVENT ELECTRICAL CURRENT FLOW THROUGH LOAD CELL.

Complete the attachment of the bridge beam/ load cell assembly in the following order (in accordance with the welding procedures on the following pages).

1. Tack weld the bearing plates to the mounting angles or base plates.
2. Remove slag from tacks and “feather” end of tack with a grinder to provide a smooth transition for the root pass as it passes through tack. Welding can be completed without disassembly of load cells from bearing plates.
3. Alternate welds from side-to-side and end-to-end to avoid weld distortion.

Welding procedure

The procedure has been prepared to guide the welder on the proper method for welding bearing plates to frame mounting members.

Warning:

All welding, metal working, and assembly must be performed by a qualified person using proper tools and safe work habits. When welding, use a procedure that assure a sound, good quality weld. Over-welding may cause distortion and damage; under-welding may not develop sufficient strength.

Caution:

Take precautions to ensure that the vehicle electrical system is not damaged by welding. Attach ground strap directly to vehicle frame when welding to prevent electrical current flow through load cells.

Welding Process:

Use a low hydrogen process and AWS E7018 rod or equivalent. The bearing plate may be welded use SMAW stick, GMAW spray transfer, or FCAW. The user should not use GMAW short circuit transfer.

Welding Configuration:

The bearing blocks should be attached using a multi-pass fillet weld sequence as shown in Figure 9.

Deposited Weld Metal Fillet Sizes:

The finish multi-pass fillet assembly should be a minimum of ½” (13mm) as shown in Figure 9.

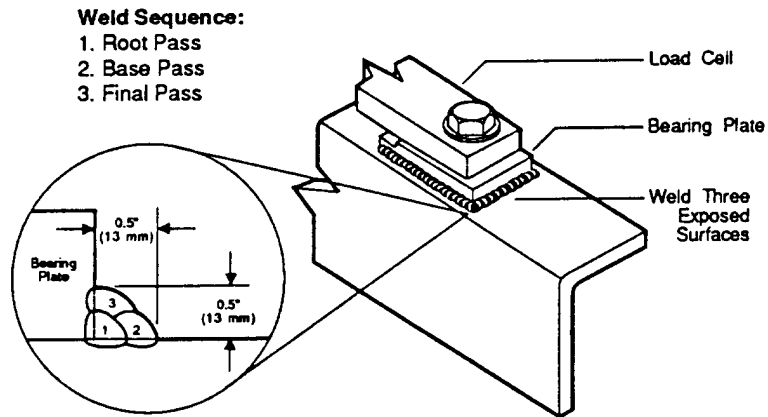


Figure 9

Fillet Metal:

The electrode should be in Table 1:

Electrode specification:

Process	Size	Type	Comment
SMAW	1/8, 5/32, or 3/16	E7018	Must be dry
FCAW	.045 to 3/32	E71T-5 or E70T-5	Gas shielded
GMAW	.035 to 1/16	E70S-6	Spray transfer

Table 1

Preheat:

The bearing blocks and frame mounting surface should be warmed in preparation for welding to reduce shrinkage stress. Any suitable torch arrangement is satisfactory. Spot heating should be avoided. The preheat temperature should be a minimum of 70°F and a maximum of 150° F.

Cleaning Before Welding:

The bearing plates will come to customer ready for welding. Edges of the bearing plates should be visually inspected to verify that there is no oil, grease, dirt, paint or other foreign substance that will reduce the weld quality. The mounting angles should be surface ground or power wire brushed so as to remove all paint, primer, or other surface coating. An area the size of the bearing block plus one inch needs to be cleaned and grounded to bare base metal.

In process Cleaning:

Each fillet bead should be visually inspected with all slag cover removed, before proceeding with next bead. A stiff wire brush or needle scalar may be used for slag removal.

Final Inspection:

Long service life depends on quality application of the fillet welds and THE FINAL SIZE OF THE FILLETS. There shall be no undercut on either the upper leg (bearing plate) or the lower leg (frame base metal). Any undercut shall be repaired with an additional fillet or continued by grinding to remove the mechanical notch. Visually inspect all weld stops and starts. Weld craters should be filled. All weld stops shall be staggered. A light coat of primer and paint may be applied after final inspection.

Periodic Inspection:

These primary load carrying fillet welds should be inspected during routine maintenance.

Warning:

Heat from welding may loosen bolts. Therefore, all torque values should be rechecked after installation when all welds have cooled.

Bolt Torque Value

Torque value can vary significantly depending upon the lubricating of the threads. The following values are based upon new, clean threads. SI recommends the use of a thread lubricant such as Locktite 767 or equivalent, to prevent the seizing of threads over long period of time. These torque values can be used for bolts with this lubricant, without over-stressing bolts.

All bolts are to be SAE Grade 8, all lock nuts Grade C. Use only new bolts and lock nuts.

Screw size	1-1/8" -12 UNF Gr.8	5/8" -18 UNF Gr.8
Torque value	1000 ft•lb	225~250 ft•lb

Table 2

Cable Installation

SI cables are specially designed to provide maximum single strength and high reliability. Substitution of cabling other than SI supplied cabling may cause inconsistent and erratic readings. Care should be taken when routing the cables to provide protection from the sharp edges, exhaust pipe or any other potential damage. Secure in place with cable ties to a snug fit (see Figure 10).

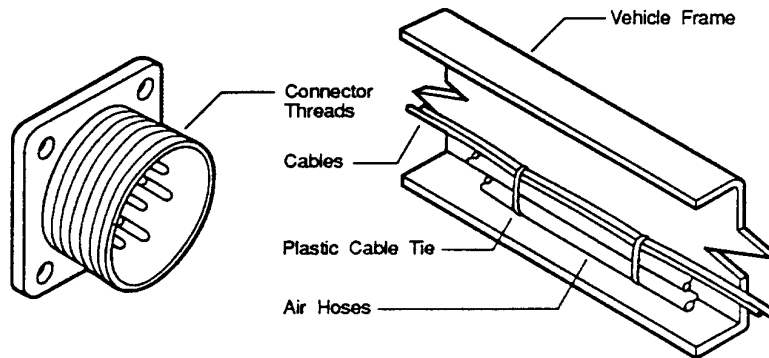


Figure 10

Connect the cable connector to the load cells. Assembly of the cable connector to the load cell should not be forced. Align the “Keyways” and insert the cable connector into the load cell. As the cable connector is being inserted, rotate the threaded sleeve clockwise until hand tight. Ensure the connector has been fully inserted for maximum moisture protection by wriggling the connector and re-tightening the sleeve.

Figure 11 shows the typical cable routing diagrams for “long” and “short logger” trucks.

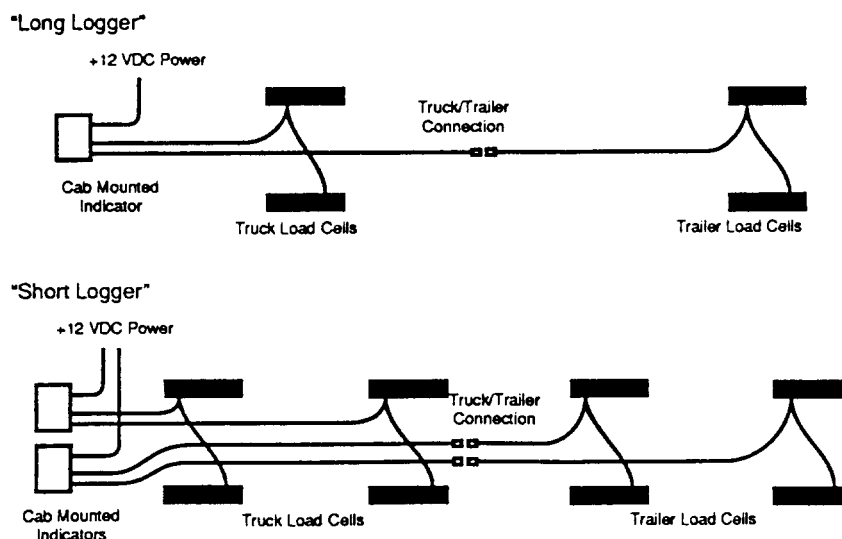


Figure 11

Routine Maintenance

Listed below are four simple steps that should be periodically performed to ensure safety, and to maintain your scale system in top operating condition.

1. Inspect all welds for signs of cracking or corrosion.
2. Retighten all fasteners to specified torque values.
3. Inspect cables and connectors for damage and tightness.
4. Clean truck/trailer connection.

Installation Checklist

- ☐ Bridge beams have been cleaned and inspected for damage.
- ☐ Mounting angles or plates have been inspected for burrs, inconsistencies, and tureens.
- ☐ Frames have been inspected and are in good condition.
- ☐ Surfaces for load cell bearing plates are rigid or have been reinforced.
- ☐ All welds “triple pass or equivalent” (See welding procedure)
- ☐ All bolts are torqued to the specifications.
- ☐ All connectors properly inserted tight and facing inward.
- ☐ All cables routed and secured in protected areas of the frame.
- ☐ Indicator installation per meter user’s manual.
- ☐ System Calibration: See meter user’s manual.
- ☐ Troubleshooting: See meter user’s manual.