



SI ONBOARD

Installation Instructions

For Stationary Fifth-Wheel Scale

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Introduction

The SI on-board fifth wheel scale is highly advanced electronic measuring device. Weight is “sensed” by two load cells that are mounted between the tractor frame and fifth wheel. 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 most popular fifth wheels. 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 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 11 of this manual. Refer to it during installation and check off the important steps as they are completed

Fifth Wheel Preparation

The first step in scale installation is to prepare the fifth wheel to accept the SI fifth wheel load cells.

The existing fifth wheel assembly has two support brackets secured to the plate with pivot pins (see Figure 1). These support brackets must be removed.

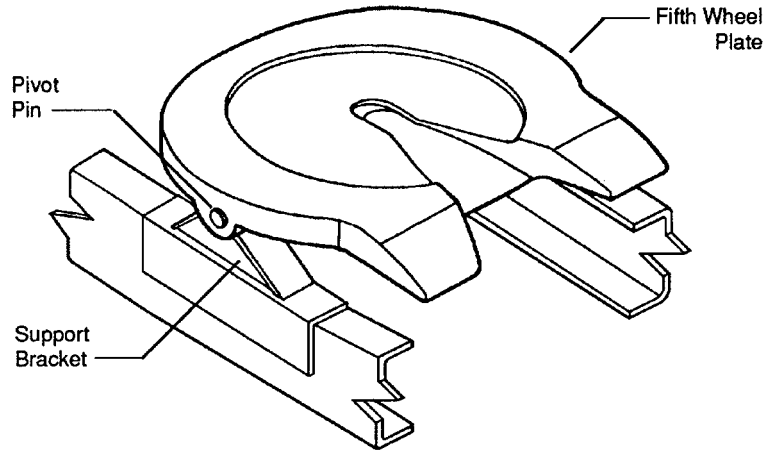


Figure 1

Begin by removing the pivot pins from the original fifth wheel plate assembly. Then remove the fifth wheel plate and set aside. If the installation is retrofit, the existing brackets must be removed from the truck frame. Discard the existing brackets and mounting hardware.

Notes:

All fifth wheels must be thoroughly cleaned and inspected for damage prior to installation the fifth wheel load cells. DO NOT use faulty components in the fifth wheel installation.

Frame Preparation

The next step is to fabricate and attach two frame mounting angles to the tractor frame rails. The angles add extra strength to the assembly and allow you to weld the load cell bearing plates in place.

Fabricate the frame mounting angles as shown in Figure 2. They should have minimum dimensions of 5" X 4" X 36" long X 1/2" thick (127 mm X 102 mm X 914 mm X 13 mm). Material must meet or exceed the specifications for ASTM A36 steel.

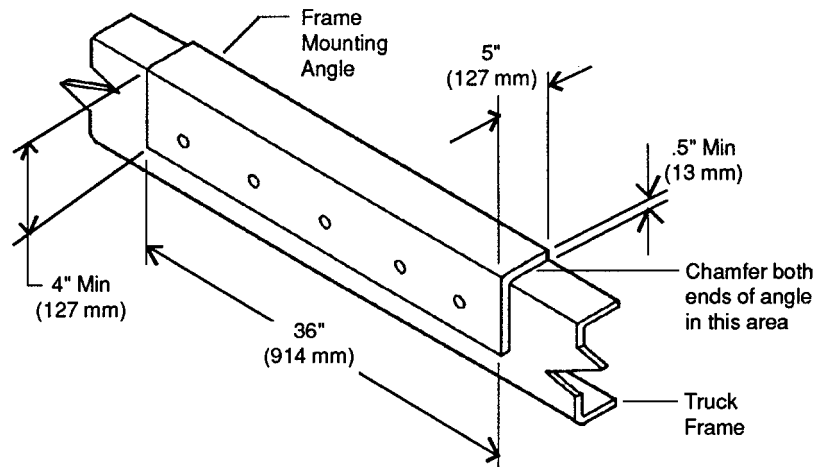


Figure 2

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 truck frame's top flange.

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

Warning:

DOT regulations require that the fifth wheel centerline be located a minimum of 1" forward of the suspension centerline.

Set the mounting angles in the place on the truck 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 location on the mounting angles, allowing for a minimum 1" (25mm) radius and no sharp corners. Remove angles, cut out as required, and grind edges smooth.

Clamp the mounting angle tightly to the truck 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.

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 nut 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 9.

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.

Fifth Wheel/Load Cell Assembly

The load cells are shipped with the proper trunnion already attached. Attach the load cell/trunnion assemblies to the fifth wheel plate using the pivot pins. Should the load cell/trunnion not match the fifth wheel, contact the SI factory service department.

Notes:

Load cells should be attached to the fifth wheel so that the cable connectors are faced inward for maximum protection.

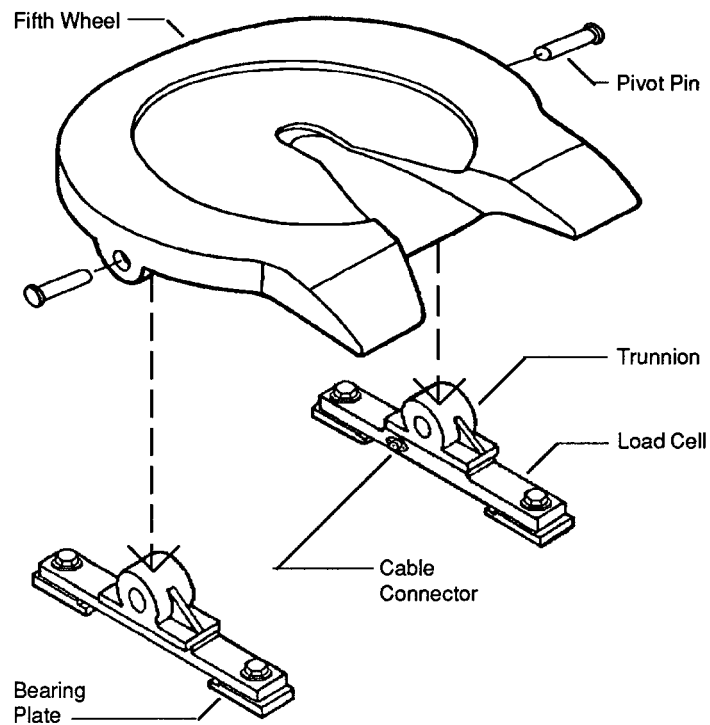


Figure 3

Final Scale Assembly

The fifth wheel load cell assembly is now ready to be mounted on the truck frame.

Check the proper fifth wheel location and place the entire fifth wheel load cell assembly on to the mounting angles. Square the assembly to the frame rails as shown in Figure 4.

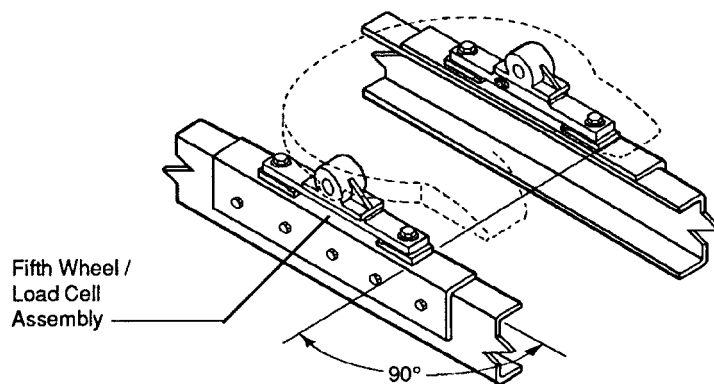


Figure 4

If all bearing plates are not in contact with the mounting angles, balance the fifth wheel load cell assembly so that the gap is distributed between two opposite bearing plates and mounting angles. 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 TRUCK FRAME (NOT FIFTH WHEEL) WHEN WELDING TO PREVENT ELECTRICAL CURRENT FLOW THROUGH LOAD CELL.

Complete the attachment of the fifth wheel/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.
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 which 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 using 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 5.

Deposited Weld Metal Fillet Sizes:

The finish multi-pass fillet assembly should be a minimum of 1/2" (13mm) as shown in Figure 5.

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

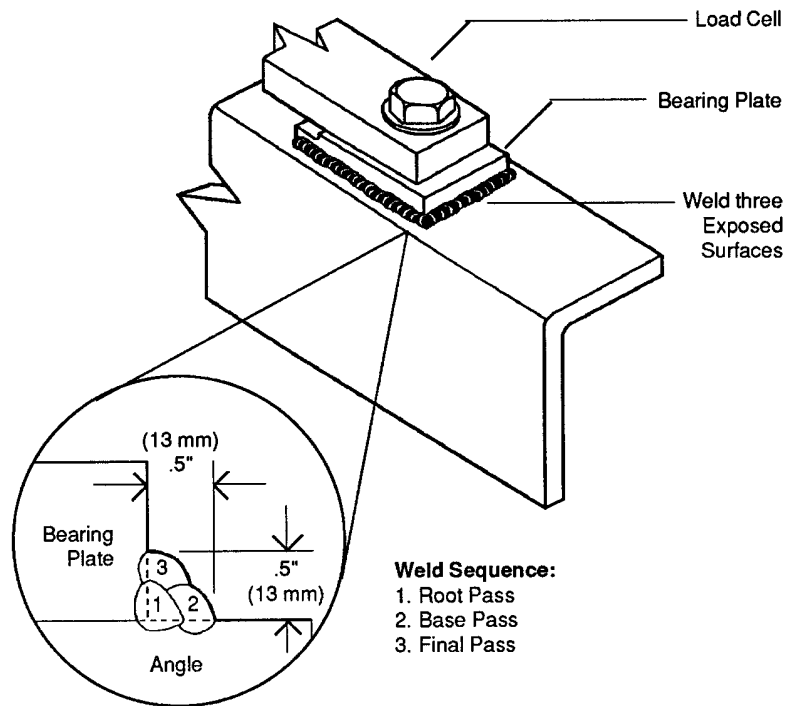


Figure 5

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 Loctite 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.

Application	Fastener Size	Torque Value
Frame Mount	5/8"-18 UNF	225 ~ 250 ft•lb
Load Cell Mount	1 1/4" -12 UNF	1000 ft•lb
Trunnion Mount	3/4" -16 UNF	380 ~ 420 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 (see Figure 6). Secure in place with cable ties to a snug fit.

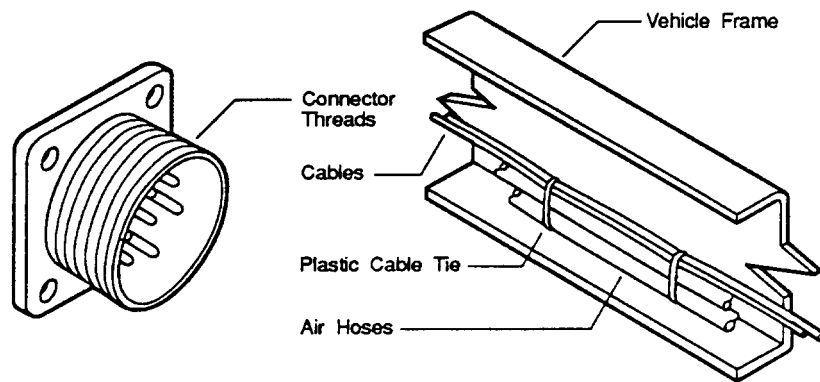


Figure 6

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.

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

- Fifth wheel has been cleaned and inspected for damage.
- Mounting angles have been inspected for burrs, inconsistencies, and tureens.
- Truck 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.