



SI ONBOARD

Installation Instructions

For Spring Suspension Center Hanger

SI OnBoard - USA
5920 South 194th Street | Kent, WA 98032
Sales Support: 800-638-5111
Technical Support: 626-202-5047
E-mail: sionboard@vpgsensors.com

SI OnBoard - Canada
#106-1765 Springfield Road
Kelowna, BC V1Y 5V5
Ph: +1-800-989-1499 | +1-250-860-8450
Fax: +1-250-762-9811
E-mail: sionboard@vpgsensors.com

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Installation of Hutch Suspension with SI - I 00 Scales

The SI on-board suspension mounted trailer scale is a highly advanced electronic measuring device. Load cells mount between the center equalizer and the trailer chassis, and directly sense load weight by turning the suspension into a scale. These rugged load cells provide years of reliable performance, yet are sensitive enough to detect weight changes of just a few pounds.

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

Warning:

Installation must be in accordance with regulations of the U.S. Department of Transportation, state and local regulations, SAE recommended practices and standards, and the vehicle manufacturer's recommendations

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

This manual is primarily concerned with the installation of the load cells and associated hardware. Please refer to the appropriate owners manual for proper installation and use the transmitter and meter. Following the load cell installation, you will install the SI digital weight indicator and calibrate the scale system. Calibration is a simple electronic adjustment that compensates for installation variations. The operator's manual included with your SI digital weight indicator includes complete calibration instructions.

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

Scale System Overview

The SI electronic weighing system is designed to be used with trailers utilizing either flange mount or under mount spring suspensions. The center hanger is replaced by our load cell assembly which functions as a hanger. This load cell assembly is 1 1/8" longer than the stock hanger and it is recommended that the front and rear hangers have spacers added between them and the frame to make up the difference in height.

If the installation is a retrofit the existing hangers will have to be removed. Before removing the hangers, note their location and the distance between the hangers for re-installation. When removing hangers be careful not to gouge the main structural members of the frame. The frame should be cleaned and inspected for cracks, rusting, and other signs of damage. Proper repair or replacement should be made wherever needed prior to installation of the new hangers.

Frame Preparation

There are two important differences between the installation of the **standard center hanger** and the **SI load cell hanger assembly**. The load cell transfers the weight mainly up through its ends, not over its entire length. The lower flange must be strong enough to carry more concentrated loading in these areas. If the flange does not already have added support, it is recommended that the lower flange on channel and "I" beam frames be supported by gussets (see Figure 1).

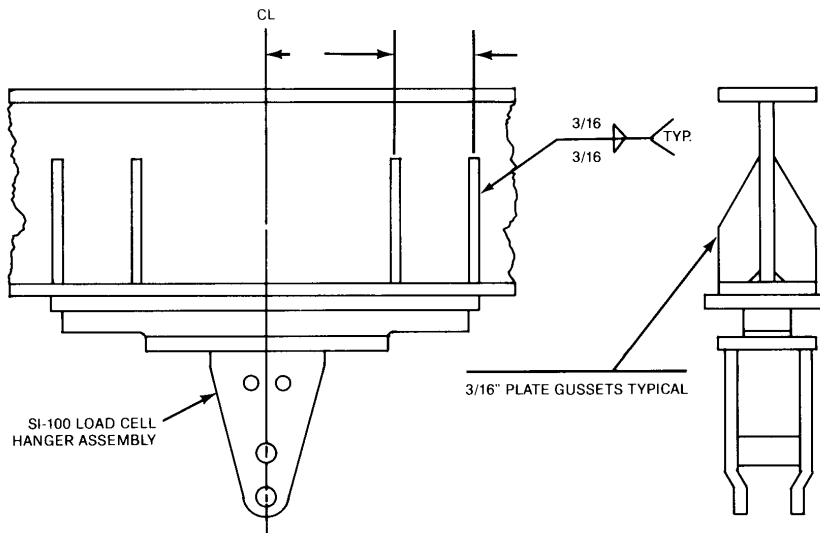


Figure 1

The second important difference from the standard installation is the location of the braces. For the load cell to work properly, no braces can run from the area above the load cell to the area below the load cell. All braces must be between members that are in the same zone (see Figure 2). The hanger and the cross tube are a good example of members that braces can be put between.

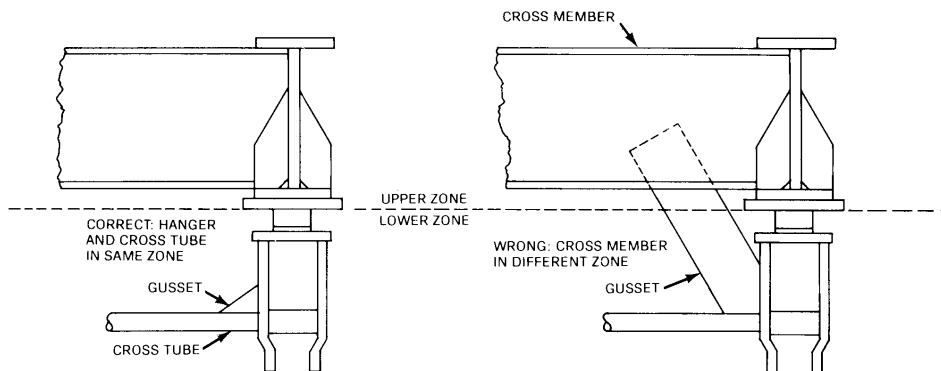


Figure 2

After the frame has been prepared as described above, all hangers and SI load cell hanger assemblies can be installed. The load cell /hanger assemblies **must** be installed with the electrical connectors facing towards the inside. This provides maximum protection for the wiring.

The hangers can be located from dimensions given in the suspension manufacturer's catalog or the measurements taken as described for retrofits. Hanger spacing is always measured from the center line of hanger to center line of hanger. Unless otherwise specified, the front and rear hangers are always located an equal distance from the center hanger. Hanger spacing should not vary more than +/- 1/16". Hangers on one side of the frame must be aligned with the hangers on the opposite side for proper alignment of axles and installation of cross tube braces. After the positions for the hangers have been located they can be installed as shown on drawings 83-00855-53.

NOTE:

This load cell assembly is 1 1/8" longer than the stock hanger and it is recommended that the front and rear hangers have spacers added between them and the frame to make up the difference in height.

Assembly Instruction for Hutch Suspension

On standard model suspensions having one adjustable and one non-adjustable torque arm on each side, install the non-adjustable torque arm on the curb side and the adjustable torque arm on the road side. On suspension models utilizing the "No-Hop" feature, two adjustable torque arms are provided for the rear axle. Torque arms should be assembled to the spring seat with the nuts facing outward toward the tires. The completed assembly of axles, springs, etc. should be rolled under the sub-frame or trailer, and the forward ends of the torque arms assembled to the hangers with nuts facing outward. When supplied, washers should be placed under the torque arm bolt nuts. The 1" torque arm bolt nuts should be tightened to 350-375 foot pounds torque.

NOTE:

*Torque readings should be taken from the nut **only**. Torquing bolt head will not produce same clamping force on bushing as tightening the nut.*

Completing the assembly:

Install the 5/8" spring retainer bolts, spacers and lock nuts into the equalizer with the nut facing to the outside.

Alignment:

After the suspension has been installed under the vehicle, the axles should be properly aligned to the trailer king pin. Prior to alignment, make certain the suspension is free and loose and has not been placed in a bind due to sharp turns or unusual maneuvers. Alignment can be accomplished with an optical device designed especially for this purpose or it can be accomplished manually in the following manner: Measure the distance from the king pin to the center line of the spindles on the front axle. It is recommended that spindle extensions be utilized. As noted in Figure 3, dimensions D & D1 must equal. Alignment can be accomplished by loosening the torque arm clamp screws on both ends of the adjustable torque arm and turning the adjustment screw. After alignment has been accomplished on the front axle, tighten the 1/2" torque arm clamp bolts 45-55 foot pounds torque in order to lock the alignment on the front axle.

Next, align any succeeding axles with the front axle by following the same procedure of loosening the torque arm clamp bolts, turning the alignment screw until dimensions Y & Y1 are equal and then tightening the clamp bolts to the proper torque. After alignment has been completed on all axles, all **1/2"** torque arm bolts should be rechecked to make certain that they are tightened to the necessary 45-55 foot pounds torque.

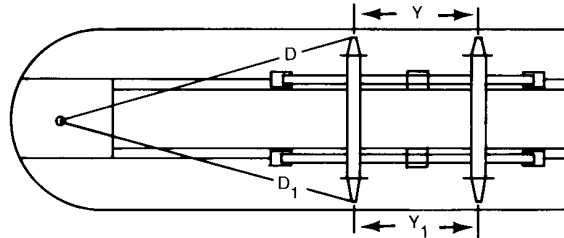


Figure 3

Visual inspection:

After proper installation and alignment of the suspension, a visual inspection of the unit should be made. These four items should be carefully checked.

- A.** Make certain that all springs are properly located on the wear pad. Twisted springs or cocked hangers will cause uneven spring contact with wear pad and will result in excessive wear on the suspension.
- B.** Check to make sure that there is sufficient clearance between the springs and the sides of the hangers and rockers. Improper spring centers and /or hanger spacing will create binding in this area and result in excessive wear.
- C.** Check the rocker beam to be sure that there is adequate clearance between the ends of the spring and the rocker beam hub when the axle is unloaded and loaded.
- D.** Double check all bolts to see that they have been tightened to the proper torque as indicated Table 1.

Maintenance:

After an initial break in period on the road, and at regular intervals there after all bolts should be checked to insure that the proper torque listed in the chart below has been maintained (see Table 1).

FASTENER SIZE	TORQUE
1" - 14 UNS	350-375 ft. lb.
7/8" - 14 UNF	275-300 ft. lb.
5/8" - 18 UNF	75-90 ft. lb.
2/8" - 18 UNF (step bolts)	125-155 ft. lb.
1/2" - 20 UNF	45-50 ft. lb.

Table 1

Remember that torque recommendations call for clean dry threads. Use of lubricants or sealant can reduce requirements.

Welding Procedure

A recommended welding process is detailed in Appendix B. Use a low hydrogen process and AWS E7018 rod or equivalent. In general, the following cautions should be noted before beginning any welding.

- a. All welding, metalworking and assembly require a qualified person using proper tools and safe work habits.
- b. High quality welding is critically important for both safety and weigh system performance.
- c. Over-welding may cause distortion and damage; under-welding may not develop sufficient structural strength.
- d. During welding, attach the ground clamp directly to the superstructure (**not** the load cell body) to which the upper bracket or bearing plates are being welded. This prevents electrical current from flowing through the load cell and destroying it.
- e. Take the standard precautions to avoid damaging the vehicle's electrical system while welding.

Warning:

When installing load cells to the trailer chassis, it is very important that the load cell IS body not be over heated. Overheating will permanently damage the load cell and is NOT covered by the manufacturer's warranty.

Use temperature indicating crayons and do not permit the load cell body temperature to exceed 225° F. Use multi-pass welds with waiting periods between passes to limit temperature. Use a low hydrogen process and AWS 7018 rod or equivalent.

(The load cell body is the 3" X 2" X 20" portion of the load cell.)

After verifying fit, weld the mounting brackets securely to superstructure. Use the weld process detailed in Appendix B and observe the cautions listed above before proceeding with any production welding.

Cable Installation

SI cables provide maximum signal strength and high reliability. Substitution of cabling other than factory-supplied cabling may cause inconsistent and erratic readings. Correct cable installation includes the following elements:

- Protect cable from sharp edges, exhaust pipes or any other potential sources of damage.
- Add weave loom (protective sheath) to cable when it's exposed to rough edges (e.g. when it passes through a hole).
- Secure cables snugly with cable ties.
- Add a service loop to cable near load cell connection to facilitate servicing of connectors.

Closely inspect the completed installation, for pinched wires, ruptured hoses, etc. This is especially important during the first operation of any moving structure such as a dump body. Align the “Keyways” and insert the cable connector into the load cell or pigtail connector. Do not force this assembly, the parts should fit together easily. While inserting the cable connector, rotate the threaded sleeve clockwise until hand tight. Ensure that the connector has been fully inserted for maximum moisture protection by wiggling the connector and tightening the threaded sleeve by hand. In areas of road salt use, a coat of Rust Paint on the connectors is recommended.

Routine Maintenance

A few simple and routine maintenance checks to help ensure your weighing system operates safely and accurately.

1. Periodically inspect all welds for signs of cracking or corrosion.
2. Check that bolts remain tightened to specified torque values (see page 4).
3. Inspect cables and connectors for damage, tightness and cleanliness.
4. Clean and repaint the load cells when rust appears.

Appendix A

Installation Checklist

- Inspect load cell mounting plates for burrs.
- Inspect frame to ensure good condition.
- Reinforce all mounting brackets, superstructures and frame members as necessary for proper strength and stability.
- Torque all bolts to specifications (see page 4).
- Insert and tighten all connectors properly (see page 5).
- Route and secure all cables in protected areas of the frame.
- Indicator installation: See “Digital Indicator Operator’s Manual”.
- System calibration: See “Digital Indicator Operator’s Manual”.
- Troubleshooting: See “On-board System Operator’s Manual”.
- Add protective undercoating to load cell and connector, when conditions require.

Appendix B

Welding Process

In general, all welding should be done in accordance with AWS Structural Steel Welding Code D1.1-93. The welding process requires a low hydrogen and AWS E7018 rod or equivalent. Weld on the bearing plates using SMAW stick, GMAW spray transfer, or FCAW. Do **NOT** use GMAW short circuit transfer. Electrode specifications are given in the table below.

Process	Size	Type	Comment
SMAW	1/8", 5/32", or 3/16"	E7018	Must be dry
FCAW	.045" THRU 1/16"	E71T or E70T-5	Gas shield,75% argon,25% CO ₂
*GMAW	.035" THRU 1/16"	E70S-6	Spray transfer, min. 90% argon

Table 2

*GMAW is not "Low Hydrogen" but is acceptable for this type of welding.

Cleaning Before Welding

Prior to welding, inspect the base and edges for oil, grease, dirt, paint or other foreign substances that would reduce weld quality. The surface of the mounting bracket, where the bearing plate attaches, must be surface ground or power wire brushed to reveal bare base metal. Expose an area the size of the bearing plate plus one inch.

In-process Cleaning

Remove all slag after each fillet weld, using a stiff wire brush or a needle scaler. Visually inspect each fillet bead before proceeding with the next bead.