Precision Loads™
RICE LAKE

On-Board Weighing Systems

Installation & Service Manual

RICE LAKE®
WEIGHING SYSTEMS

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An ISO 9001 registered company

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www.ricelake.com

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Technical training seminars are available through Rice Lake Weighing Systems. Course descriptions and dates can be viewed at ***www.ricelake.com/training*** *or obtained by calling 715-234-9171 and asking for the training department.*

Version 1.0, March 25, 2018

1.0 Introduction

This manual is intended for use by technicians responsible for installing and servicing On-Board Weighing Systems.

This manual contains instructions for installing various types of On-board Weighing Systems (non Legal-for-Trade systems). For straight trucks, this manual includes rigid underbody mounting instructions in four and six point configurations, as well as underbody load pin installation instructions for tipping bodies and hoist chassis. Tipping body installations can be either Lift-to-Weigh or Live-Weigh system types.

For tractor/trailer applications, this manual covers a variety of installation instructions, which include air pressure transducers for tractor and/or trailer air-ride suspensions, and load cell mounting instructions for tractor 5th wheels and/or trailer kingpin plates, equalizing spring suspensions, suspension sub-frame mounts and single point suspension trunnion mounts.

Authorized distributors and their employees can view or download this manual from the Rice Lake Weighing Systems distributor site at **www.ricelake.com**.

1.1 Safety

Safety Signal Definitions:

DANGER *Indicates an imminently hazardous situation that, if not avoided, will result in death or serious injury. Includes hazards that are exposed when guards are removed.*

WARNING *Indicates a potentially hazardous situation that, if not avoided, could result in serious injury or death. Includes hazards that are exposed when guards are removed.*

CAUTION *Indicates a potentially hazardous situation that, if not avoided, could result in minor or moderate injury.*

IMPORTANT *Indicates information about procedures that, if not observed, could result in damage to equipment or corruption to and loss of data.*

General Safety

Do not operate or work on this equipment unless this manual has been read and all instructions are understood. Failure to follow the instructions or heed the warnings could result in injury or death. Contact any Rice Lake Weighing Systems dealer for replacement manuals.

WARNING

Failure to heed could result in serious injury or death.

Do not allow minors (children) or inexperienced persons to operate this unit.

Do not operate without all shields and guards in place.

Do not jump on the scale.

Do not use for purposes other than weight taking.

Do not place fingers into slots or possible pinch points.

Do not use any load bearing component that is worn beyond 5% of the original dimension.

Do not use this product if any of the components are cracked.

Do not exceed the rated load limit of the unit.

Do not make alterations or modifications to the unit.

Do not remove or obscure warning labels.

Keep hands, feet and loose clothing away from moving parts.

1.2 Considerations Before Installation

This manual is intended to provide information for the mounting of On-Board Weighing Systems sensors in a variety of applications. In applying the installation procedures, which follow, some fundamental precautions and recommendations must be observed by the installer:

- Rice Lake Weighing Systems' On-Board Scales are designed for applications covering a broad range of vehicle types. The installer however, needs to be aware of any significant variations in mountings, variations in load sensor models, specifications and system configurations.
- Installation procedures are basically identical for both new vehicle mountings and retro-fit mountings, however the installer must ensure, in the case of retro-fit mountings, that all vehicle structures are free from cracks, excessive wear, corrosion, alignment problems, etc. that can affect safety and scale performance.
- Load cells, load cell bearing plates, mounting brackets and load cell hardware should be painted upon installation to help protect the installation from corrosion. Industry appropriate, quality enamel paint is recommended. For environments where high concentrations of salts are used on road surfaces, underbody coating is recommended (3M™ Underseal™ part number 3M-8883 Universal Rubberized Undercoating). Load cells, bearing plates, brackets and hardware should be periodically inspected for any evidence of rust or corrosion. If areas of corrosion are present, they should be cleaned with a wire brush and re-painted or undercoated. Any load cell connector must be connected or capped during painting or undercoating.
- The instructions outlined herein are designed to ensure that a correct installation will provide maximum safety, optimum system performance and accuracy, a long operating life, and reasonable installation costs. It is therefore extremely necessary that the installer comply with all guidelines and material specifications outlined in this manual, with special emphasis on detail and inspection of work.
- Installation must comply with appropriate regulations of the U.S. Department of Transportation (DOT), state and local regulations, the recommended standards and practices of the Society of Automotive Engineers (SAE), standards of the American Welding Society (AWS), and the recommendations of the truck, trailer and body, hoist and/or suspension manufacturer.

Failure to observe these recommendations and instructions could result in a hazardous operating condition.

2.0 Recommended Service Tools

In addition to metalworking, welding and mechanical lifting equipment commonly required to install on-board scale systems, some necessary tools include:

2.1 Load Cells, Transducer and Load Pins

- 3/4" or 1" drive torque wrench
- Socket for 5/8" bolt (15/16" socket), for chassis brackets if used.
- Socket for 3/4" bolt (1-1/8" socket)
- Socket for 1" bolt (1-1/2" socket)
- Socket for 1-1/8" bolt (1-11/16" socket)
- Socket for 1-1/4" bolt (1-7/8" socket)
- Drift punch and hammer (tabbed anti-rotation plate)
- Pipe thread sealing tape or Teflon thread sealant (air transducer)
- Alignment Shaft (2.00" CRS or as required; for welding hinge cheek plates)
- Pry Bar
- Wire brush and grinder
- Serviceable thread locking compound
- Flashlight

Dummy Load Cells

Dummy load cells are sometimes used by OEM installers to prepare for load cells being installed by the vehicle owner once a vehicle is delivered. Dummy load cells may also be used by installers to perform final welding of body brackets and bearing plates for perfect fitting and alignment of load cell installations. Rice Lake Weighing Systems can supply installers with dummy load cells for any RLWS model load cell or load pin.

2.2 Indicators and Cables

- Load simulator, dual 4-pin
- Volt/Ohm meter up to 2000 M Ohms or Rice Lake Weighing Systems load cell/transducer field tester
- Narrow flat blade screwdriver for indicator terminals
- Cable ties, wire cutter
- Wire Stripper for 16-20 AWG wire

3.0 Load Cell Assemblies and General Specifications

3.1 Feed Wagon Cantilever Beam

Model PL9000-11 load cell is designed for use in feed wagon and other light duty agricultural on-board scale applications. Rated dynamic capacity of the load cell is 7000 lbs (3175 kg). The single tie-down bolt used is 1-1/4 -12UNF x 2.50" L and must be torqued to 1000 lb/ft. The body bracket mounting bolt holes require 3/4" coarse thread Grade 8 bolts requiring a minimum torque of 400 lb/ft.

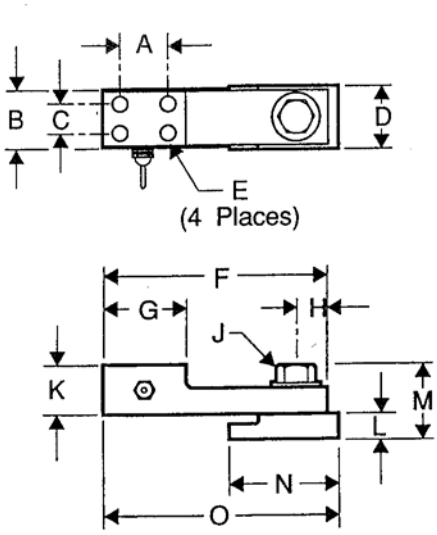


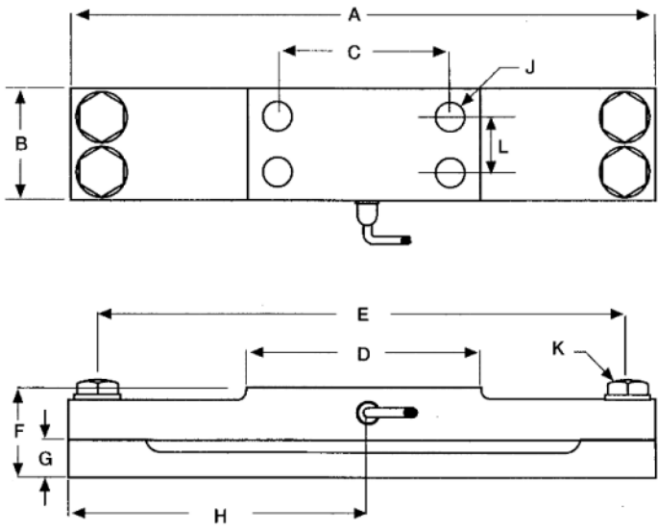
Figure 3-1. Model PL9000-11 Specifications

A	2.3" (58 mm)
B	2.84" (72 mm)
C	1.42" (36 mm)
D	3.0" (76 mm)
E	3/4-10 UNC x 1.0" (25 mm) deep, 4 places
F	10.8" (274 mm)
G	4.0" (102 mm)
H	1.5" (38 mm)
J	1 1/4-12 x 2 1/8" UNF SAE Grade 8 bolt and flat washer
K	2.3" (58 mm)
L	1.2" (30 mm)
M	3.4" (86 mm)
N	5.3" (135 mm)
O	11.3" (287 mm)

Table 3-1. Model PL9000-11 Specifications

3.2 Low Profile Bending Beam Load Cell

Model PL9000-14 load cell is designed for low profile use in a variety of on-board scale applications including four and six point under-body mounts and body rest mounts for dump body and hoist chassis applications. Rated dynamic capacity is 10,000 lb (4500 kg) per load cell. The load cell is supplied with a single piece bearing plate. Four 3/4"-16UNF x 2.00"L Grade 8 hex head cap screws bolt the load cell to its bearing plate. Angle brackets bolt to the load cell with four 3/4"-16UNF Grade 8 bolts, to a bolt depth of 0.875" (22 mm). All eight 3/4" bolts used on the load cell must be torqued to 400 lb/ft. This model load cell is also spring mounted in under-body applications.



A	13.00" (330 mm)
B	2.84" (72 mm)
C	3.00" (76 mm)
D	4.60" (117 mm)
E	11.50" (292 mm)
F	2.33" (59 mm)
G	1.00" (25 mm)
H	6.50" (165 mm)
J	.75 x 16 UNF x .75 (19 mm) deep, 4 places
K	.75 - 16 UNF x 1.75 SAE grade 8 bolts
L	1.50" (38 mm)

Figure 3-2. Model PL9000-14 Specifications

3.3 Under-Body Shear Beam Load Cell

Model PL9000-14.4 load cell is designed for under-body and body rest mounts in four and six point system kit configurations. Rated dynamic capacity of the load cell is 12,500 lb (5700 kg). End bolts of the load cell are 1-1/8"-12UNF x 3.25" L Grade 8 and two bolts and washers are required for cell tie down. The load cell is supplied with a single-piece bearing plate. Brackets mount to the load cell with two 1" diameter bolts. Bolt torque for the 1" bolt is 800 lb/ft (1085 Nm). This model load cell is also spring mounted in under-body applications.

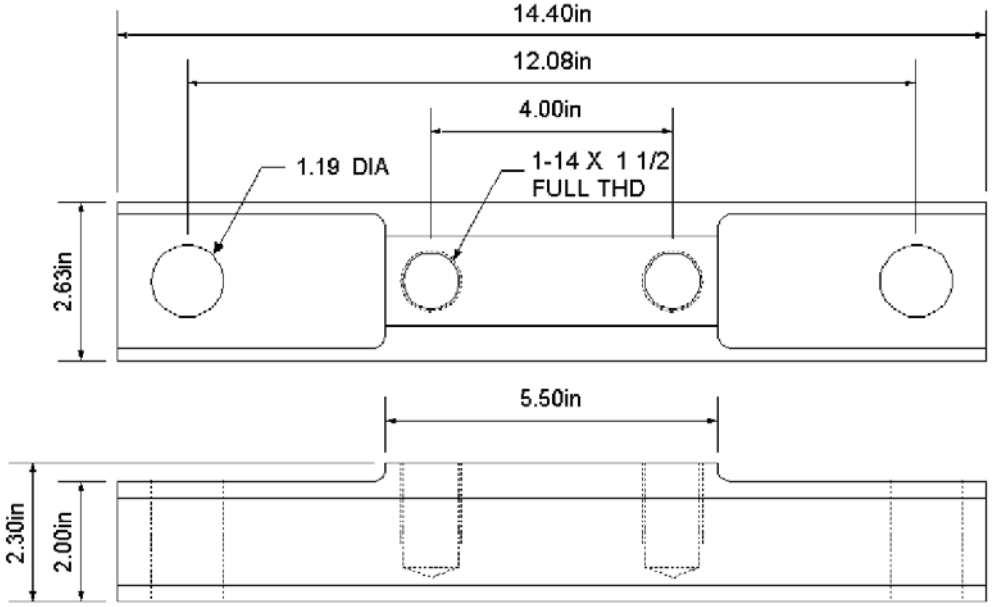
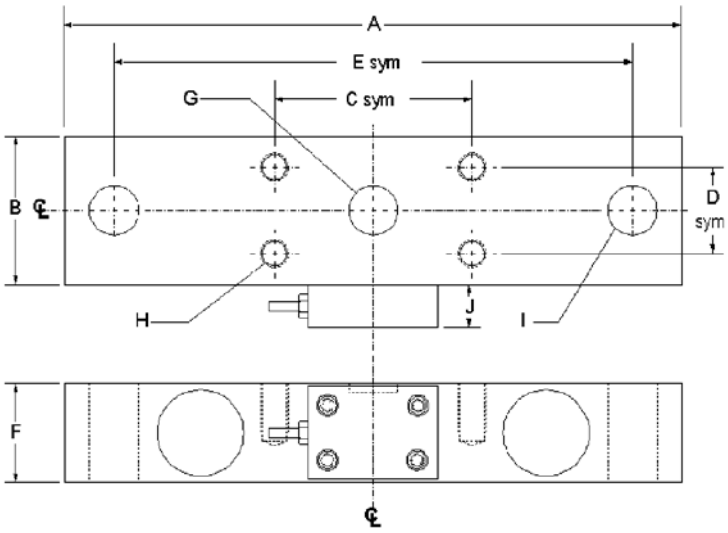


Figure 3-3. Model PL9000-14.4 Cell Specifications

3.4 Heavy Duty Shear Beam Load Cell

Model PL9000-16 load cell is used in very heavy duty on-board scale applications, particularly with the bolt-on clamp assembly for single point trunnion mounts. This load cell can also be used in 5th wheel, body pivot or body rest mounts due to its high dynamic weighing capacity. The load cell has a dynamic rated capacity of 40,000 lb (18,100 kg). A single piece bearing plate is supplied with the load cell which assembles to the cell with two 1-1/8" -12UNF x 3.25" L Grade 8 bolts and washers. The top bolt pattern of the load cell is identical to the PL9000-50 load cell allowing it to be fit with Holland and Fontaine 5th wheel trunnions. Model PL9000-50S Shear Slugs are required when assembling a PL9000-16 load cell. The 1-1/8" bolts must be torqued to 1000 lb/ft (1355 Nm), and the four each 3/4" bolts used with this load cell must be torqued to 400 lb/ft (542 Nm).



A	16.25" (412.8 mm)
B	3.375" (85.7 mm)
C	7.00" (177.8 mm)
D	1.625" (41.3 mm)
E	13.50" (342.9 mm)
F	2.125" (54 mm)
G	1.00" DIA x .25" DP (25.40 mm DIA x 6.35 mm DP)
H	.75-16 UNF x 1.00" (25.4 mm) DP 4 PM
I	1 3/16" (30.16 mm) DIA 2 PL
J	1.00" (25.4 mm)

Figure 3-4. Model PL9000-16 Specifications

3.5 Underbody/Axle Scale Load Cell

Model PL9000-22 load cell uses two separate bearing plates, one per end. The load cell is used for underbody mounts, and in axle scales as a replacement for load cells of other manufacturers. Rated dynamic capacity of the load cell is 12500 lb (5670 kg). For axle scales, the load cell is rated at 30,000 lb (13600 kg) static capacity. The load cell assemblies are fastened to bearing plates with a 1"-14 UNF x 2.50" L Grade 8 hex head cap screw. The top surface of the load cell has three 1"-14UNF bolt holes and two 7/8"-14UNF bolt holes for mounting of brackets or weighbridge ends. The 7/8" and 1" bolts must all be torqued to 800 lb/ft (1084 Nm), except bolts used for spring mounts. Check for thread depth and bolt penetration into the cell to ensure the outer top surface bolts in the load cell ear cannot bottom-out under load. See “Bolt Torque Values” on page 58 for cautions on bolt length for “eared” load cells.

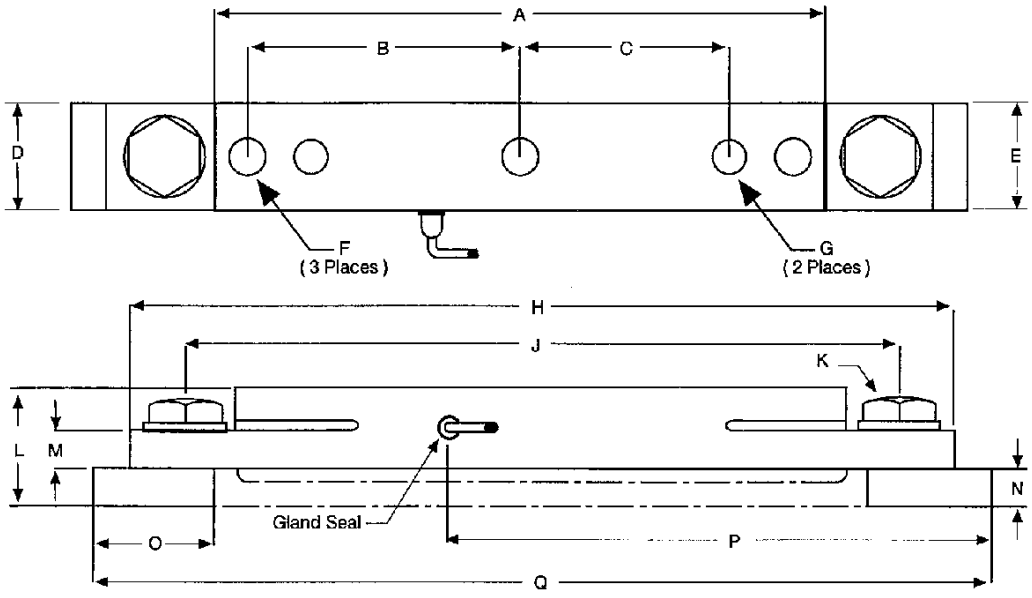


Figure 3-5. Model PL9000-22 Specifications

A	16.74" (425 mm)
B	7.50" (190 mm)
C	5.75" (146 mm)
D	3.0" (76 mm)
E	2.84" (72 mm)
F	1-14 UNS x 0.8" (20 mm) deep, 3 places
G	7/8 - 14 UNF x 0.8" (20 mm) deep, 2 places
H	22.6" (574 mm)
J	19.6" (498 mm)
K	1-14 UNS x 2.5" SAE Grade 8 bolt and flat washer)
L	3.575" (91 mm)
M	1.275" (32 mm)
N	1.2" (30 mm)
O	3.3" (84 mm)
P	13.8" (351 mm)
Q	24.6" (625 mm)

Table 3-2. Model PL9000-22 Specifications

3.6 Heavy Duty Bunk / Underbody Load Cell

Model PL9000-26 load cell is a heavy duty shear beam load cell used for kingpin plate, underbody and under-bunk (beneath a log bunk) mounts. Dynamic capacity of the load cell is 20,000 lb (9000 kg). The cell is tied down to two separate bearing plates, one at each end using 1-1/8" -12UNF x 3.25" Long Grade 8 hex head cap screws. These bolts must be torqued to 1000 lb/ft (1355 Nm). The top surface of the load cell has a bolt pattern which is identical to the Model PL9000-22 cell, three 1"-14UNF bolt holes and two 7/8"-14UNF bolt holes, each with a 1.00" thread depth. The 7/8" and 1" bolts must all be torqued to 800 lb/ft (1084 Nm), except bolts used for spring mounts in underbody applications.

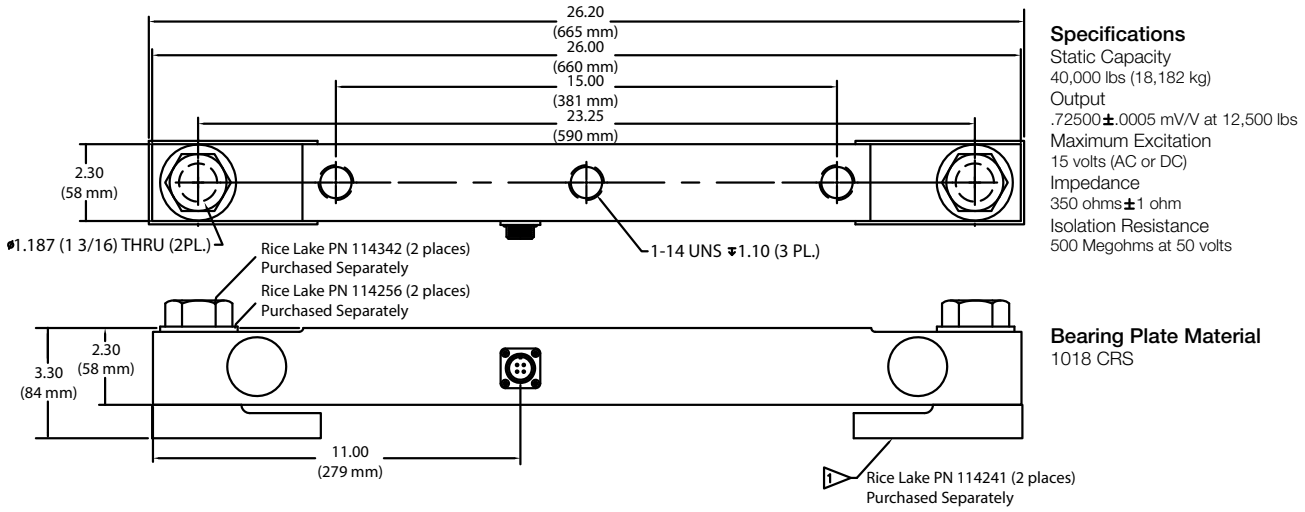


Figure 3-6. Model PL9000-26 Specifications

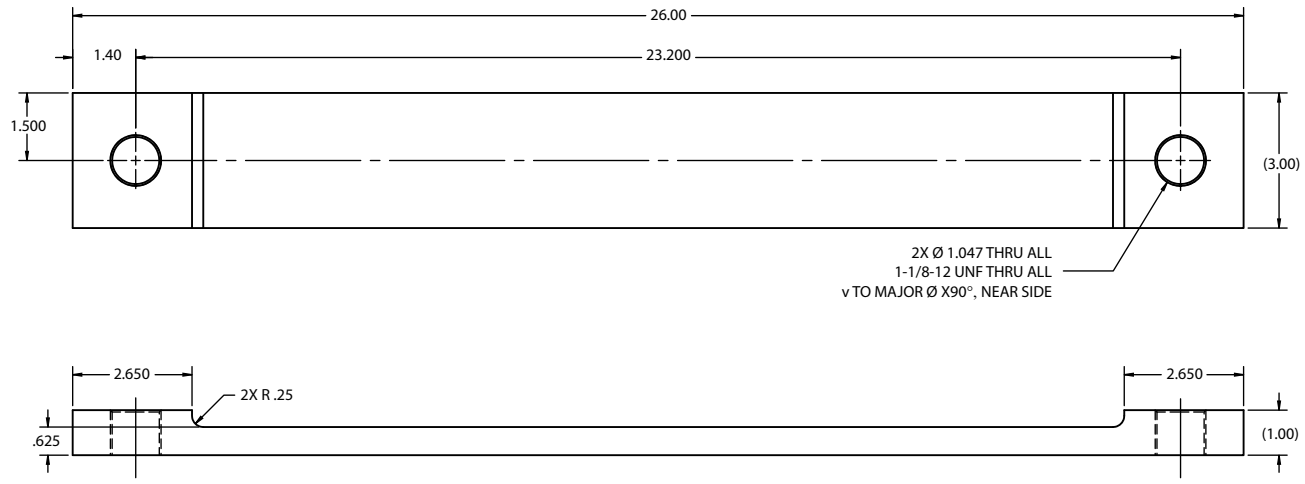


Figure 3-7. Optional Bearing Plate Specifications

3.7 5th Wheel / Suspension Load Cell

Model PL9000-50 load cell is designed primarily for dual use as both a 5th wheel load cell and a cell for spring suspension hanger mounts. Rated dynamic capacity of the load cell is 12,500 lb (5700 kg). The load cell is tied down to two separate bearing plates, one per end, with 1-1/4" -12UNF x 2.50" L Grade 8 hex head cap screws and hardened flat washers. These bolts must be torqued to 1000 lb/ft (1355 Nm). The bracket support surface of the load cell has four 3/4" - 16UNF bolt holes and a shear slug recess. Bolt hole depth is 0.875 inches (22 mm). The PL9000-50S shear slug must be used with the load cell assembly and all 3/4" bolts must be torqued to 400 lb/ft (542 Nm).

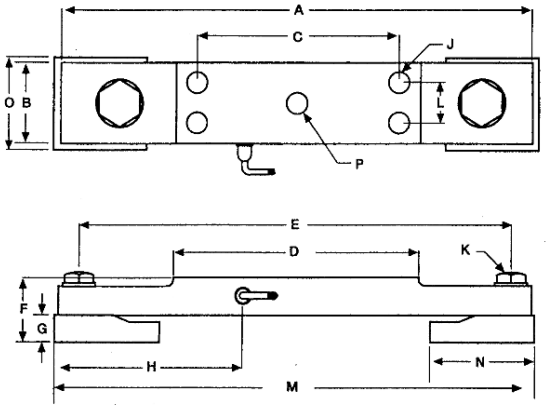


Figure 3-8. Model PL9000-50 Specifications

A	22.60" (574 mm)
B	2.88" (73 mm)
C	7.00" (178 mm)
D	8.63" (219 mm)
E	19.60" (498 mm)
F	2.80" (71 mm)
G	1.20" (30 mm)
H	9.00" (229 mm)
J	.75 x 16 UNF x .75 (19 mm) deep, 4 places
K	1.25" - 12 UNF x 2.50" L SAE grade 8 bolts, plated
L	1.625" (41 mm)
M	23.675" (601 mm)
N	5.25" (133 mm)
O	3.00" (76 mm)
P	1" Dia. x .19" deep (Shear slug)

Table 3-3. Model PL9000-50 Specifications

3.8 Load Pins

Hinge pivot and lift cylinder load pins built by Rice Lake Weighing Systems are available in many sizes and capacities ranging from 1.00" diameter to 4.00" diameter. Full length hinge bars are also available as direct replacements for tipping bodies with hinge bars. All load pins are supplied with collars and bolts with locknuts to secure pin position. Pins are built with internal lubrication facilities by special order only. The installer must ensure that all load pin installations can receive required lubrication. See Figure 3-9 for an example of a typical pin and collar assembly.

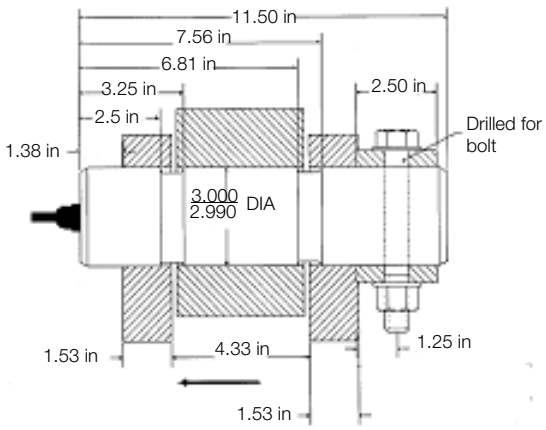


Figure 3-9. Typical Pin and Collar Assembly

3.9 Air Pressure Transducer

Model PL9000-200 pressure transducers are fully assembled at the factory. Do not attempt to open these, as they are factory encapsulated, and breaking the seal voids warranty. Rice Lake Weighing Systems can supply push-on fittings for 1/4", 5/16, 3/8 and 1/2 inch air line, as well as metric sizes. The Model PL9000-200 assembly contains a dual element transducer for dual ported leveling valve suspensions. See Figure 4-5 on page 14 for specifications.

4.0 Applications

4.1 Air Pressure Transducer

- Air pressure transducer units are factory-sealed and do not contain field serviceable parts. Do not attempt to open these units as they are internally encapsulated and breaking this seal voids warranty of the unit.

Figure 4-1. Air Pressure Transducer Units

- The model PL9000-101 assembly contains a single pressure transducer element, while the PL9000-201 is a dual element transducer. Dual transducer assemblies can be used with either dual or single-ported leveling valve suspensions. Dual transducer models are recommended for all tractor and straight truck applications and for any trailer applications involving the weighing of loads on uneven (off-road) surfaces.
- If a drop axle (tag or pusher) is installed on the straight truck, tractor or trailer, check to see how the height control valve is configured for air supply to the axle. Rice Lake Weighing Systems does not recommend installing air pressure sensors on lift axles for most applications. Scale calibration and normal scale operation should always be performed with the lift axle raised to achieve the most reliable readings.
- For best operating results, Rice Lake Weighing Systems recommends the use of a Haldex Immediate Response height control valve. The Haldex model number 905-54-241 valve may be purchased from Rice Lake Weighing Systems or through a local Haldex supplier. This valve has dual port supply to the air bags with a rated operating pressure of 160 psi (10.9 bar). The valve adjusts air pressure with no time delay to maintain desired chassis position.

Figure 4-2. Height Control Value (shown on side)

- Air pressure transducer kits may be used with other half system kits containing load cells and load pins. Examples are 5th wheel load cell kits, hanger suspension load cells, trunnions and kingpin plate kits used with air transducer half systems in 2, 3 and 4 channel full systems to provide a complete tractor/trailer onboard scale. Load cell/pin and air sensor half systems always operate on separate indicator channels.

Figure 4-3. 5th Wheel Load Cell Kit

Note **Rice Lake Weighing Systems recommends the installer use 5th wheel or kingpin plate load cell mounts for weighing over the tractor drive axles, and underbody load cells in sub-frame mounts for rear trailer suspension weighing.**

4.1.1 Installation Procedure

1. Exhaust all air from the air suspension system. The truck brakes should be on and the tires should be blocked. For trailer installations, trailer kingpin should be supported on a 5th wheel or landing gear and the trailer brakes should be on or tires should be blocked.

Note **Different height control valves have varying air flow rates. The rate of air refill flow can affect the weight values displayed on the scale system if the height control valve has a slow rate of air flow to reach full ride height. To provide a fast response to weight changes while loading, the Haldex model #905-54-241 height control valve is a recommended air flow valve.**

Optional: Remove the existing leveling valve and replace with the Haldex unit. Follow Haldex instructions on mounting the new height control valve. Fitting size of the Haldex unit is 1/4" N.P.T. (12mm x 1.5 metric version). Haldex valves may be purchased from Rice Lake Weighing Systems.

2. The air pressure transducer must be installed to the air lines between the left and right side air bags, for both single and dual-ported leveling valves. See figures 4-4 and 4-5.

Note **Clean and remove any paint from the air line before inserting air line into the tees and fittings. Chipped paint on the air line can result in air leaks at the fitting ends. Use pipe thread seal tape on all fitting ends. Rice Lake Weighing Systems recommends the use of push-on type air fittings and tees. All tees and fittings used must be DOT approved. For dual sensor transducer installations, keep the lengths of the air line used from the sensor to the tee fittings as equal as possible on both sides. See Figure 4-4.**

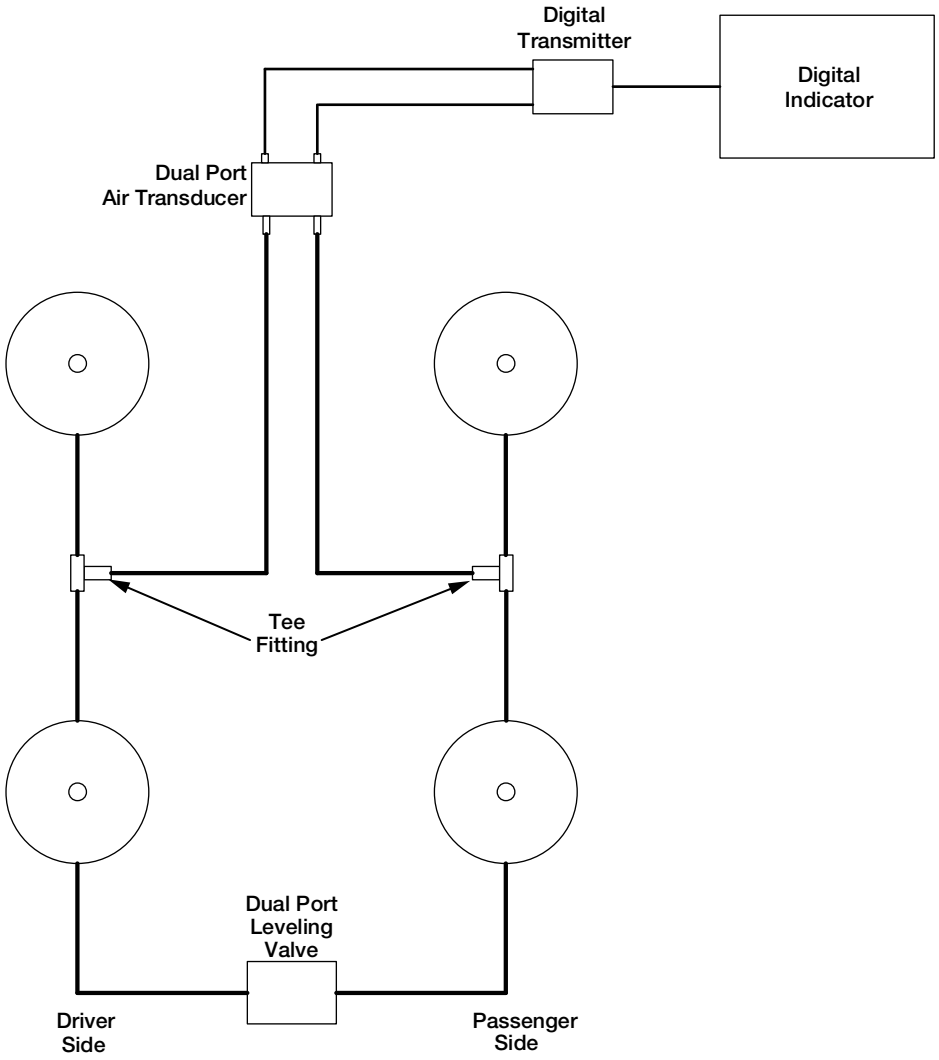


Figure 4-4. Block Diagram

Note **If tractor air suspension, connect to indicator channel 1 terminals. If trailer air suspension, connect to indicator channel 2 terminals.**

3. Mount the transducer using the two 9/32" (7 mm) diameter mounting holes in the case. Use 1/4" bolts (2) with flat washers (2) and nylock nuts or locking flange nuts (2). The installer may drill this size hole in the chassis or a cross-member and use a through-bolt and lock nut to mount the transducer, or the transducer may be mounted to a separate plate (min 1/4" thick) which picks up existing chassis bolt holes. Do not excessively over tighten any of the mounting bolts. Select a mounting location that is protected from road hazards, petrochemicals and moving machinery, and is still accessible for inspection and testing. See Figure 4-5.

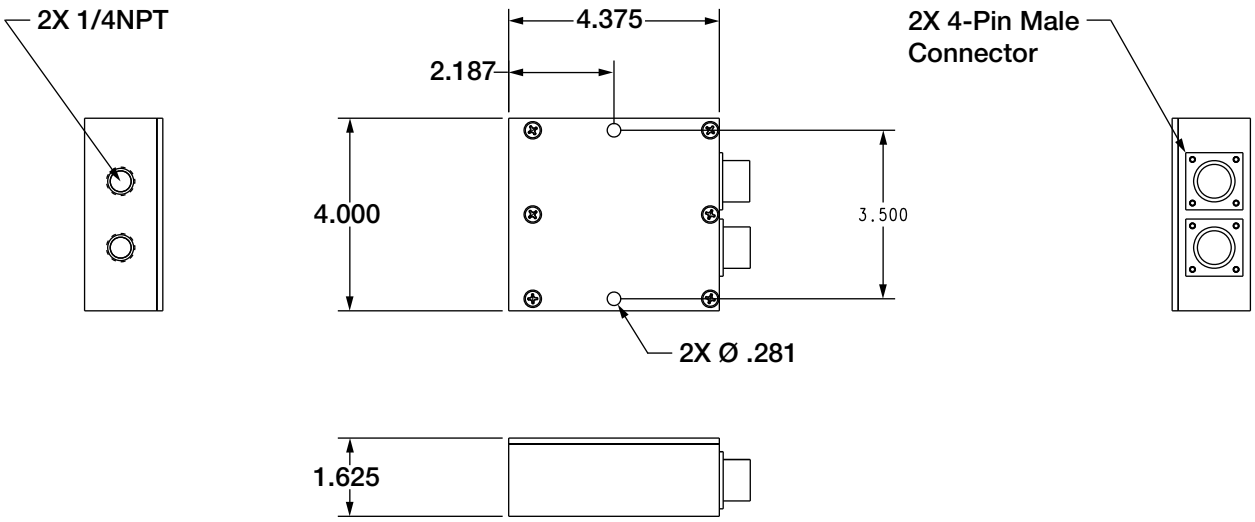


Figure 4-5. Transducer Mounting Example

4. Torque all air pressure fittings to 25 ft/lbs (34 Nm). Do not over tighten.
5. Pressurize the air suspension system and check for leaks.

Mount the Transmitter

See “Service Notes” on page 15 for correct model number transmitters to be used with Air Pressure Transducers.

IMPORTANT **Air pressure transducers are much higher output devices than Rice Lake Weighing Systems load cells and load pins, therefore transmitter models used with load cells and load pins will not function correctly with air pressure transducers.**

Mount the single or dual lead transmitter within 3' (1 m) of the location selected for mounting the air transducer (dual lead transmitters have cable leads that are 48" and 60" long (122 and 152 cm L). Select a location that is protected from all road hazards, handling equipment, branches, moving parts, pivoting parts, petrochemicals, corrosives and other machinery, but is accessible for inspection and testing. Cabling should never be taut.

Figure 4-6. Lead Transmitter

Install Interconnecting Cables

1. Plug transmitter leads into 4-pin pressure transducer output connector(s) and screw tight.
2. Run the 2-wire truck or trailer cable from the three pin transmitter connector into the truck cab or trailer connector, ensuring protection of the cable from moving parts, road hazards, heat, corrosives, etc. Provide for a small service loop in the two-wire cable. Do not attach the two-wire cable to air lines.
3. Tie the cable down using heavy-duty cable ties at no more than 18" intervals.

IMPORTANT **The stainless steel transmitter is a sealed, encapsulated unit and is not field serviceable. Do not attempt to weld-on or open the unit or remove the unit's connectors or cable strain relief parts. Opening the unit will void Rice Lake warranty coverage.**

Driver Notes

When positioning a trailer for loading do not hard brake the vehicle, as this could result in torquing of the suspension and potential scale errors. Softly brake the trailer into loading position then apply the parking brake once the tractor and trailer brakes are released.

Service Notes

Service Notes	Fittings and Tees (Weatherhead)
Transducer Adapter Thread: 1/4 NPT (female)	1868 X 4 (1/4 NPT Fitting)
Fitting Tightness Torque: Maximum 25 ft/lbs	1868 X 6 (3/8 NPT Fitting)
Pressure Rating: 250 psi (17 bar) per sensor	1868 X 8 (1/2 NPT Fitting)
Output: 0-100 mV	1864 X 4 (1/4 NPT Tee)
Isolation: Greater than 1000 M ohms	1864 X 6 (3/8 NPT Tee)
Pinouts: A=Exc+ B=Sig+ C=Sig(-) D=Exc (-)	1864 X 8 (½ NPT Tee)

Table 4-1. Service Notes

Transmitter Model Numbers

Transmitter Model Numbers		Application/Description
Underside Stamp	RLWS Model	
7052	114191	Standard Dual Lead Air Transmitter
7051	114197	Standard Single Lead Air Transmitter
8052	114193	Auto ID System (9705) Dual Lead Air Transmitter
8051		Auto ID System (9705) Single Lead Air Transmitter
XXXX	XXXX	Dual Lead Air Transmitter. Replacement for 9100 system transmitter.

Table 4-2. Transmitter Model Numbers

4.1.2 Slip Spring/Torque Arm Air Suspension

Some air suspensions may not transmit air bag pressure changes as accurately as desired due to mechanical influences of a slip spring and torque arm linkage. These types of suspensions are less common and used in older models of truck and trailer manufacturers, but such suspensions may require using other onboard scale solutions, such as 5th wheel or kingpin plate load cells.

4.1.3 Technical Specifications

Sensor, Rated Capacity	250 psi (17 bar)
Safe Overload	2 times rated pressure
Sensor Material	17-4 PH Stainless Steel
Temperature Operating Range	-4°F to 176°F (-20°C to +80°C)
Pressure Connection	Female ¼ NPT
Electrical Connection	4-pin male, molded nylon, MIL-spec equivalent, non-corrosive
Enclosure Sealing	Encapsulation
Enclosure Material	6061-T6 Anodized Aluminum Block

Table 4-3. Air Pressure Transducer Technical Specifications

4.2 Underbody Load Cell Mounts

Load cell models typically used for underbody mounting are the PL9000-11 (light duty agriculture bodies only), the PL9000-14 low profile bending beam, the PL9000-14.4 and the PL9000-16 heavy duty shear beams, the PL9000-22 bending beam, and the PL9000-26 shear beam for high capacity applications. See Section 6.8 on page 65 for mounting bracket drawings. This section of the manual refers specifically to the mounting of PL9000-14.4 load cells. Refer to load cell dimensional drawings in See Section 3.0 on page 4 for information on bolt centers and sizes for load cell models for underbody mounting.

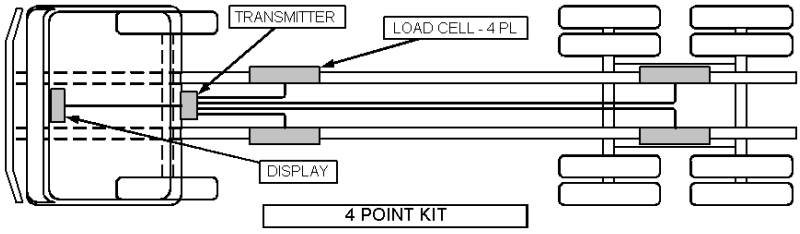


Figure 4-7. 4 Point Underbody Load Cell Kit

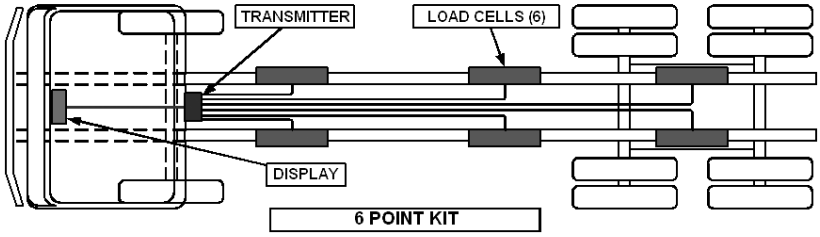


Figure 4-8. 6 Point Underbody Load Cell Kit

Before Getting Started

- Review Section 2.0 on page 3 to ensure you have all the tools required.
- Review section 4.2.3 on page 22.
- Rice Lake Weighing Systems recommends that trucks and trailers be thoroughly cleaned prior to retrofit installations.
- Ensure that all load cells are properly spaced with respect to chassis and body length. Typical maximum spacing between load cell centerlines is in the approximate range of 100" (254 cm) for PL9000-14, PL9000-14.4, and PL9000-16 load cells, and 144" (365 cm) for PL9000-22 and PL9000-26 load cells. This calculation must also take into consideration the type and strength of the underbody runner or sub-frame, and the type of loads being supported. See Section 4.2.3 on page 22. Decisions on load cell spacing must be made by the install of the scale system.
- Ensure that the rated dynamic capacity of the load cell being used is appropriate for the specific vehicle and loading practices involved. If in doubt concerning loading capacities, check with the vehicle owner.

- Optimum system performance is only achievable when the load cells are installed between the body (tank, bin, flatbed, container, etc.) and the vehicle chassis, thus carrying the entire mass of the body and its payload. Any structure, such as braces, rigid (non-flex) piping or tubing, pressure-retaining cylinders, and the like, which can provide a load path between body and chassis that bypasses the load cells, will adversely affect system performance.

4.2.1 Underbody Mounting Brackets

Note Refer to Section 6.8 on page 65 for bracket sizing for other model load cells.

Body Bracket

Steel angle typically used is 6" x 4" x 1/2" thick. Minimum angle length for the PL9000-14.4 load cell is 16" (406 mm). Never use an angle which is less than half an inch in thickness. For weaker body sub-frames, longer angle lengths (for example, 35" (889 mm), see drawing below) add reinforcement to the runner. Body sub-frame strength should determine the degree and type of reinforcing necessary. The installer must make these determinations. The installer must ensure that body sub-frame remains strong and rigid, without sag between load cell mounting points. See Section 4.2.3 on page 22.

Avoid 90 degree welds to the body sub-frame. Weld body brackets continuous for 6" every 12" of bracket on all sides including underside. Alternate weld process on the top, bottom and side areas of the bracket to avoid overheating and warpage. Plug welds on the 6" flange (mounted to the body sub-frame) are recommended.

Never weld to a load cell. If assembled body angles (with load cells) are used for alignment and positioning, clamp assemblies in place, then remove load cells for final welding of the brackets.

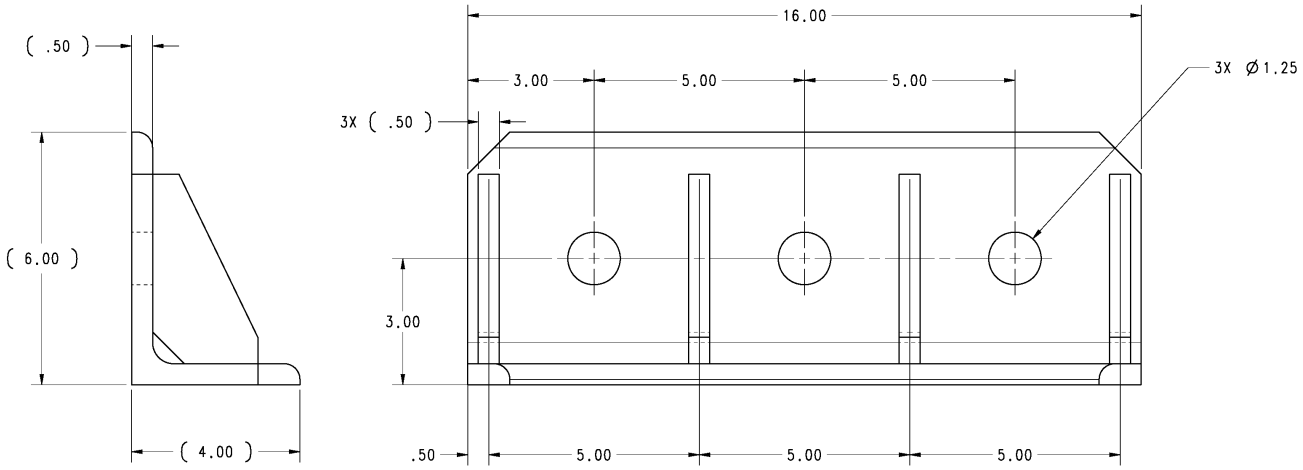


Figure 4-9. Body Bracket

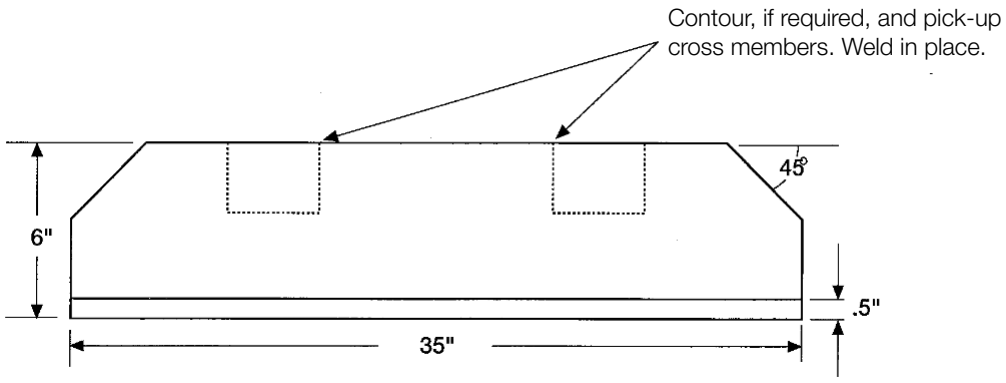


Figure 4-10. Extended Body Bracket for More Reinforcement

Chassis Bracket

Steel angle typically used is 6" x 4" x 1/2" thick. Chassis angle length for the PL9000-14.4 load cell is 8.50" (216 mm). Refer to appendices for dimensions of brackets for other load cell models. Never use material which is less than half an inch thick. The 6" flange is bolted to the truck chassis. Drill bolt holes in steel angle to diameter specified for load cell mounting bolts. Do not punch holes. Brackets should be mounted to the truck chassis using a minimum of four each 3/4" Grade 8 bolts per bracket. These bolts, washers and locknuts are not supplied. Rice Lake Weighing Systems recommends utilizing as many pre-existing chassis bolt holes as is possible for mounting chassis brackets, to minimize drilling into existing chassis rails.

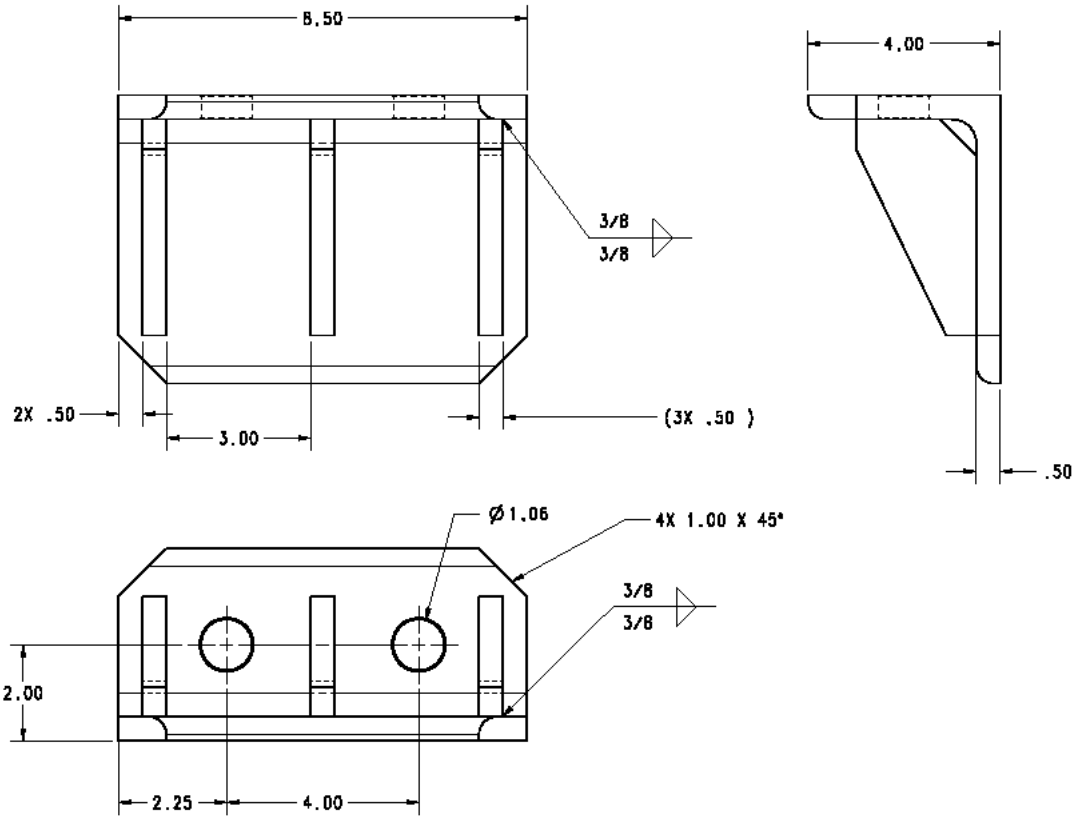


Figure 4-11. Chassis Bracket

Gussets

For the 6 x 4 angle, gusset sizes are typically 5" x 3" x 1/2" thick flat bar. Trim 90 degree corner off each gusset to fit inside the dimensions of the angle. Weld both sides of the gusset in place. Trim any protruding ends. For body brackets, position 2 gussets in the angle to support each end of each load cell bearing plate (total four gussets). For chassis brackets, position 3 gussets per bracket. Allow adequate clearance for load cell and chassis bolt heads and sockets, and always ensure access to all bolts for inspection and torque maintenance.

Note In some cases, the vertical wall of the body runner does not perfectly align with the vertical wall of the truck chassis. The installer must adapt the horizontal flanges of the body or chassis brackets and the position of the load cell placement on these flanges to compensate for any vertical alignment differences. For example, use 4" or 6" flange sizes as appropriate.

4.2.2 Underbody Mounting of Load Cells

Positioning

Establish locations for positioning of body and chassis angles. For packer bodies, the rearmost load cells should be positioned as far rearwards as possible. Allow enough room for welding to the end of the body bracket. Positions of brackets must take into account locations of fuel tank, battery box, toolbox, spring hangers, proximity to tires and fenders, etc. Contouring of brackets is usually preferable to relocation of these items.

Spacing

For the PL9000-14, PL9000-14.4, and PL9000-16 models, spacing between load cell centerlines should typically be in the approximate range of 100" (254 cm). For the PL9000-22 and PL9000-26 load cells, spacing between load cell centerlines should not exceed 144" (365 cm). These are general guidelines only. Body sub-frame strength should determine load cell spacing and the amount of sub-frame reinforcing required. The installer must make these determinations. See Section 4.2.3 on page 22 for reference.

Body Angles

Bracket material used is typically 6" x 4" x 1/2" thick angle, with the 6" flange mounted to the chassis or body runner. Do not use material that is less than 1/2" thick. Angle bracket length is a minimum of 16" for the PL9000-14.4 load cell, and 15" for the PL9000-14 cell shown in Figure 4-12 but for weaker body sub-frames, longer angles (up to 35" long) as well as other reinforcing techniques may be considered.

Figure 4-12. Body Angle Bracket for the PL9000-14 Load Cell

Body Spring Mounts

For 4-point underbody installations, the front two load cells are mounted with coil springs. For 6-point installations, the front four cells are mounted with coil springs. Coil springs have an uncompressed height of 3 inches for both the 3/4" springs and for the 1" body coil springs. When mounting the coils, compress the springs using the bolts supplied by 1/4 to 3/8 inch. The installer must also be aware of thread depth of the bolts used to mount springs. When using 1/2" angle, and the tabbed washer plate supplied, compressing each coil by 1/4" to 3/8" allows for the 1"-14UNF x 4.50" bolts of the PL9000-14.4 assembly to thread 1.125 inch into the load cell bolt holes. See Figure 4-15. For the PL9000-14 load cell assembly (Figure 4-14) compressing the 3/4" coil by 3/8" allows for the 3/4" PL9000-16UNF x 4.00"L bolts to thread 0.75" into the load cell.

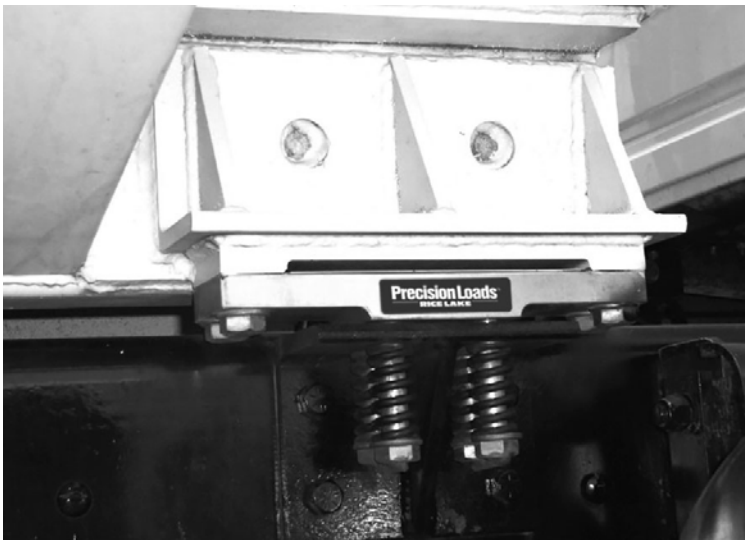


Figure 4-13. PL9000-14 Load Cell Coil Spring Mount Assembly

Note Use a serviceable thread lockers on all load cell bolts

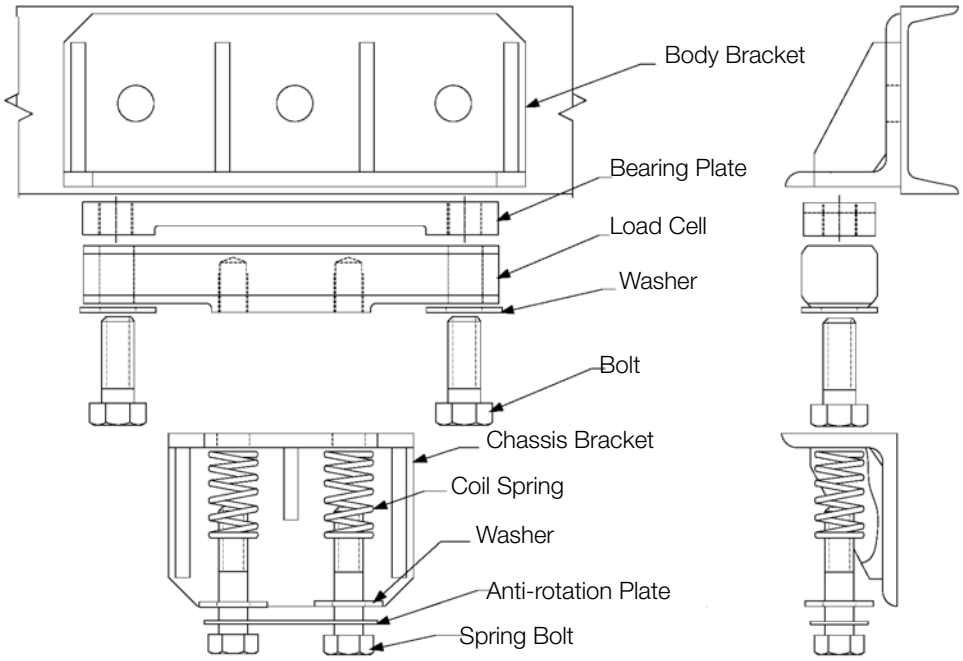


Figure 4-14. Mounting Springs, PL9000-14.4 Load Cell Installation

Fixed Mounts

Underbody load cell kits typically consists of both spring and fixed-mounted load cells. Four point kits as well as six-point kits normally have the two load cells fixed-mounted as shown below for the model PL9000-14.4 underbody installation. Always ensure access to all load cell mounting bolts for both maintenance and inspection.

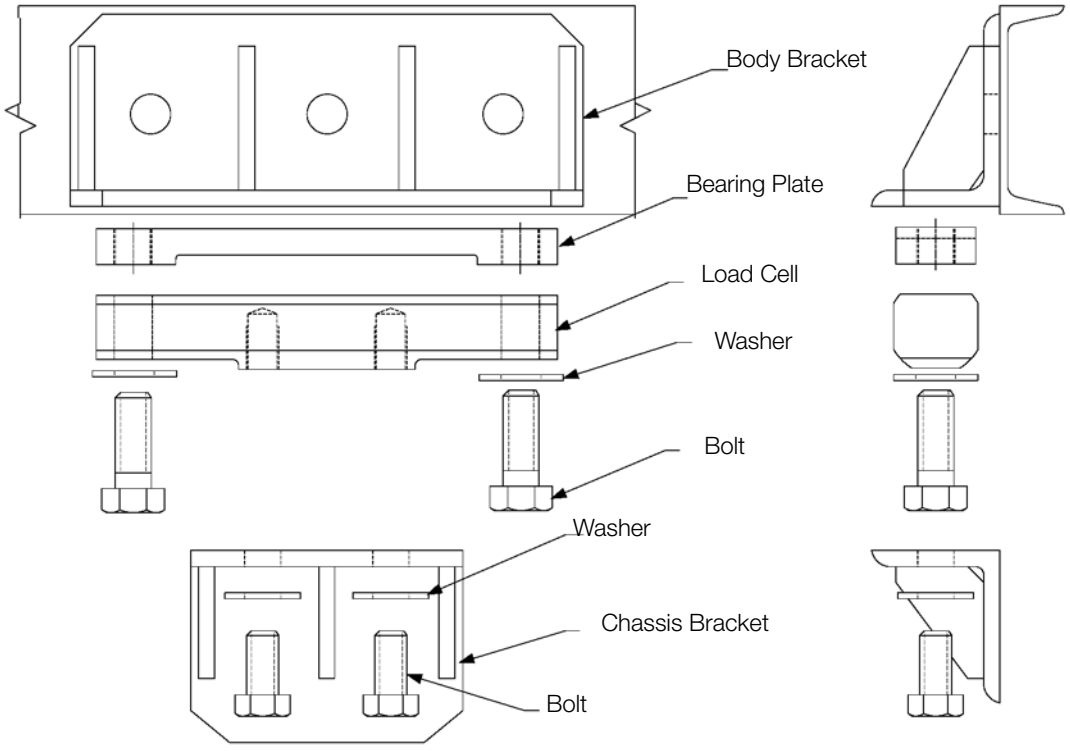


Figure 4-15. Fixed Mounting

Bolt Locking Tab Plates

To prevent bolt rotation and potential loosening, which could result in a hazardous operating condition, Rice Lake Weighing Systems supplies underbody load cell kits with stainless steel plates (20 gauge thick) that allow the installer to bend tabs into position against the bolt hex head. Use a drift punch and hammer to bend tabs in place. Tabbed plates are recommended for any installation in which bolts are installed facing downwards and are not torqued to full tightness, such as spring bolts. A serviceable thread locker must always be used when installing all load cell bolts, whether or not a tabbed plate is also used. See Figure 4-16.

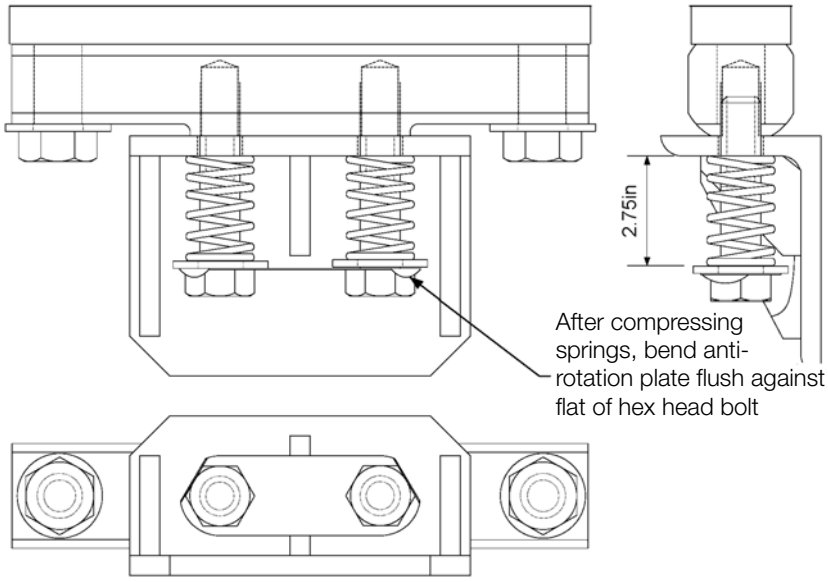


Figure 4-16. Anti-Rotation Tab Plate Installation

Load Cell Position

For load cells with side-mounted output cables (glanded) or integral connectors, position the output cable or connector to face inwards, and to pass through the gap between the chassis and body sub-frame. Ensure there is no contact or rubbing of the cable, connector or strain relief gland to any fixed structure or moving part.

Note Cable glands are not field serviceable and must never be loosened or removed.

If load cell cable or connector must face outwards, a shroud or protection plate must be installed.

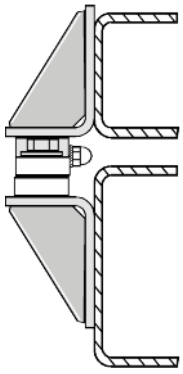


Figure 4-17. Load Cell Position

Bolt Torques

Torque all bolts after heat from welding installation has cooled. See Section 6.1 on page 58 for torque values, cautions and tightening of body spring bolts.

Welding

See Section 6.3 on page 59 for Bearing Plates. Never weld directly to the load cell. Load cell bearing plates and body angles should always be clamped in place first for positioning, then load cells should be removed from the assembly before final welding. Do not allow weld current to pass through any load cell. Disconnect all battery terminals before performing any welding. When welding bearing plates to the body angles, do not overheat. Avoid any possible warpage of the bearing plates. Alternate weld process on sides and ends. Clean and paint all brackets with a metal primer after drilling and welding. Observe all guidelines of the American Welding Society and DOT regulations.

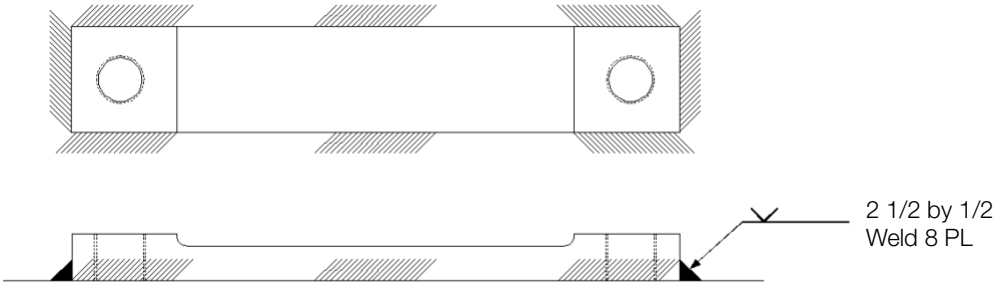


Figure 4-18. Bearing Plate

Note

- **Clean bearing plate before welding**
- **Remove load cell before final welding or use a dummy load cell**
- **Avoid plate warpage. Do not overheat the bearing plate/alternate ends and sides**
- **Clean any weld slag and spatter after welding and ensure bolt holes are clean and free of debris**
- **Weld to be single/double or triple pass, minimum 1/2" total fillet size**

4.2.3 Stress Concentrations and Frame Reinforcing

Under loading conditions, all body and frame structures will experience deflection of some type. For example, bending, flexing, twisting, or sagging. When load cells are installed underbody or in a suspension sub-frame, the installer must take steps to ensure that loads supported at key points by load cells do not cause excessive stress concentrations on body structural members that might result in deformation, cracking or other serious condition.

To help distribute areas of concentrated stress, added rigidity and stiffness of body and frame structures may be required. In these cases, Rice Lake Weighing Systems recommends the use of:

- Extended length body angles which are adequately gusseted
- Frame gloving
- The addition of fishplate reinforcement

  and/or
- Cross strapping between body frame rails

Note **Excessive bending, sagging or oil-canning of a structure not only creates a hazardous condition for the strength of the structure, but may also affect the performance of the load cells and on-board weighing systems.**

The installer is solely responsible for determining if a body or frame requires stiffening or reinforcing. Due to the wide variations in body types, there is no specific reinforcing technique that applies universally. However, some general techniques are presented below for installers to consider as they assess any reinforcing that is required for a particular installation of load cells. An initial inspection of a truck or trailer body, sub-frame and chassis should be conducted prior to an installation to check for any signs of wear, corrosion, cracking, misalignment or areas of weakness.

Extended Body Angles

As shown in the diagrams above, it is sometimes recommended to utilize body angles which extend up to 35 inches (89 cm) or more to give a particular body sub-frame more rigidity. In some extreme cases, installers may consider running a section of angle the entire length of a body runner for maximum installation rigidity. Plug welds should be utilized on all applications of extended body angles as well as gusseting where appropriate. Skip welding of these extended angles is recommended and 90 degree welds are to be avoided. Extended angles should be contoured to pick up body cross members or body gussets which should then be welded to the body angle.

Frame Gloving

Glove sections also provide frame reinforcement, and these can be externally welded or internally bolted. Sometimes when thinner structural members are used in trailer fabrication, such as stainless steel tank trailers, gloving a section from 1/4" up to 7/16" or 1/2" is the best solution for providing adequate rigidity. Glove sections should always extend 10 to 12 inches (25 to 30 cm) beyond the end of a load cell body angle bracket. Plug welds are advised for welded glove sections. Avoid 90 degree welds. See Figure 4-19.

Reinforcing with Fishplate

If body or body frame structures are less than 3/8" (9.5 mm), a general rule of thumb is that it will require reinforcing. Applying sections of plate for this reinforcing (fishplating) is a means to meet rigidity requirements and have a total body or frame thickness up to 7/16 or 1/2 inch. As in the case with frame gloving, the application of fishplate should extend 10 to 12 inches beyond the end of a load cell body angle bracket. Plugs welds are recommended for fishplating, and 90 degree welds must be avoided.

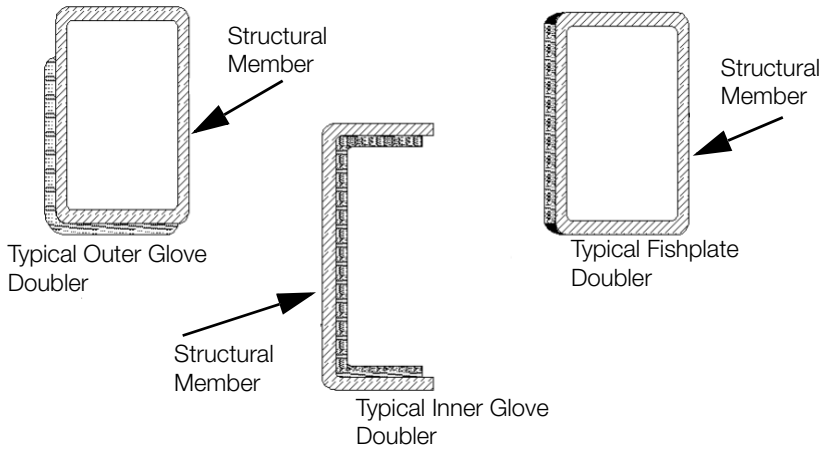


Figure 4-19. Fishplate and Frame Gloving Example

Cross Strapping

To "box in" an installation and provide additional rigidity, the installer may want to consider welding cross straps between parallel body frame rails at each location where load cells are installed. These transversally mounted straps may be simple 3/8" x 4" wide material welded to the underside of each body runner.

4.2.4 Underbody Load Cell Mounting

Precautions

- Do not allow weld current to flow through load cells as this can damage a load cell
- Protect load cell cables from damage, pinching and exposure to welding slag and heat
- Avoid weld overheating which can warp steel and cause alignment or pre-load problems
- Deburr all surfaces of brackets and avoid sharp edges

Typical Installation

1. Make sure that the truck and body are pressure washed or steam cleaned before installation (retrofit scale installations).
2. Remove rear wheels and other items which obstruct open access to the truck chassis and body sub-frame (such as fuel tanks, battery box, toolbox, air dryer, etc.). Disconnect the battery terminals. Clean the body runners well so they can be welded.
3. Fabricate four small steel blocks (six for 6-point installations), approximately 4" x 3" x 1" thick. These spacer blocks are to be positioned between body and chassis. Deburr these blocks.

4. Detach the body from the chassis. Elevate the body using overhead lifting or air jack units and place the spacer blocks between body and chassis, at the approximate points where the load cells will be installed.

   Exact positioning of the load cells and brackets should be established at this point, and the chassis and body brackets should be fabricated (See Section 4.2.1 on page 17).

5. The body should now rest 1" off the chassis at all four corners and the middle, and be squarely above the chassis. Note the position of body crossmembers which may require body angles to be notched. Mark positions for the body angles. Prepare the body runner surfaces by grinding off all burrs and any paint so the weld surfaces are clean, bare and flat.
6. Tack weld load cell bearing plates to body angle. Mount load cell to bearing plate and position the entire assembly on body runners using C-clamps to establish preferred positioning for chassis angles. Carefully mark locations of both body and chassis angles.
7. Remove the entire assembly. Remove load cell and final weld the bearing plate to the body angle. Remount the body angle to sub-frame runner, then tack and final weld the body angle in place. Ensure correct alignment of all parts. Let cool.
8. Re-mount the load cells and chassis brackets. Mark the bolt hole positions on the chassis brackets. Drill chassis brackets. Bolt on chassis brackets and load cells. Front (and middle position) load cells are mounted with coil springs. Load cell cables should be directed inwards and tucked inside truck chassis.
9. Clean and paint all brackets with a metal primer after drilling and welding. Mount transmitter in a central location so that all load cell cables can be connected. Plug-in all cables and tie down using heavy duty cable ties every 18 inches or so. Protect cables where exposed with heavy duty split loom or spiral wrap.
10. Remove spacer blocks. Set all bolt torques per specification. Apply the bolt torque specification labels to the vehicle as defined in section 6.1 on page 58.

4.2.5 Liquid Fertilizer Spreading Applications

This procedure is used to protect Precision Load On-Board Scales used in liquid fertilizer spreading applications.

1. Clean load cells thoroughly using acetone or denatured alcohol.
2. Paint load cells with a high-quality brand name epoxy paint (marine quality epoxy).
3. Spray the load cells after washing the truck and as often as need between washings to keep load cells coated with oil.

If a failed load cell corrodes due to lack of protection, the protection of the remaining load cells must immediately be addressed. The above steps are standard procedure for other exposed steel structures of the spreader truck which operators must periodically perform.

4.3 Kingpin Plate Mounts

Sensor models typically used for kingpin plate installations are the PL9000-22 load cell with single piece bearing plate shown in Figure 4-20, and the PL9000-26 shear beam load cell, also with single-piece bearing plate. The PL9000-22 load cell is 22.63" long (575 mm) while the PL9000-26 measures 26" (660 mm) in total length.

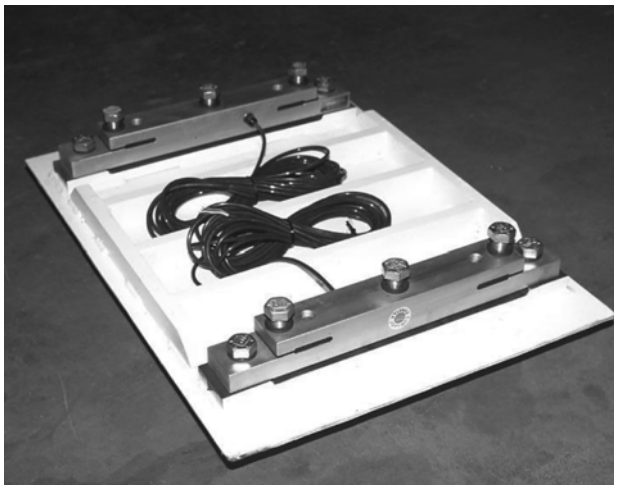


Figure 4-20. PL9000-22 Kingpin Plate Mount

4.3.1 Skid Plate Preparation

General

Two critically important points which must be observed by the installer for accurate and safe kingpin plate mountings are

- There must be adequate clearance between the kingpin skid plate and the trailer body sub-frame, at all times
- The kingpin skid plate itself must be stiff and provide rigid support to the sensors

So the rigidity of the installation is maximized, both kingpin plate load cells should be positioned so that most of the combined area of both load cell single-piece bearing plates is aligned directly over the truck fifth wheel plate when the kingpin and fifth wheel are coupled. Installation rigidity requirements can also be met if the kingpin skidplate used has a material thickness of 3/4" to 1" (19 to 25 mm). Thinner skid plates will generally require a reasonable amount of added stiffening.

Skid Plate Inspection

Inspect the skid plate to ensure it is flat , clean and shows no signs of cracks or wear. Look for any evidence of bending, warpage, corrosion, pitting, burns or other characteristics which can affect the strength and performance capabilities of the installation or the correct fit of the load cell bearing plates.

Load Cell Installation to Skid Plate

The surface to which the load cell bearing plates are installed must be smooth and flat. The installer must ensure that once the load cell bearing plates have been welded in place, and the cells mounted, the top surface of both cells must be co-planar, with no evidence of any twisting or distortion of the skid plate. Consideration should be given to tack welding temporary stiffening members to the skid plate to prevent the possibility of plate distortion caused by the welding of the single piece bearing plates.

For most fifth wheel models, it is recommended to position the load cells on the kingpin skid plate at a lateral parallel spacing of 26.50" to 28" apart (67 to 71 cm). Both load cells should be centered on the kingpin skid plate so that load cell bearing plates are positioned directly over the location of the coupled fifth wheel plate.

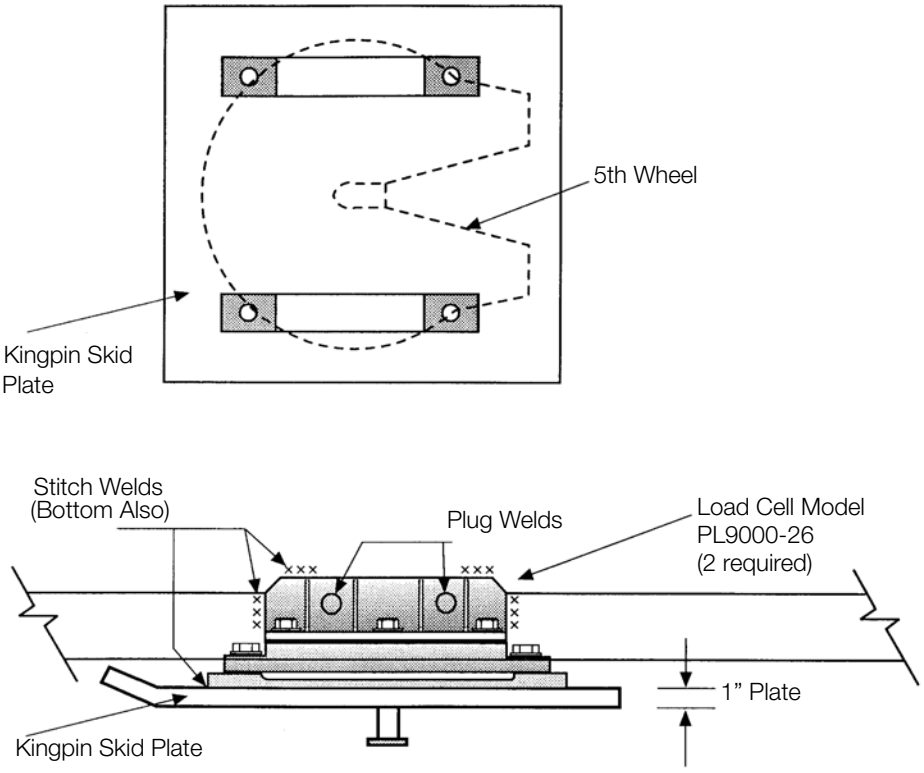


Figure 4-21. Kingpin Inside View

Note **Locate kingpin plate load cells on the skid plate to cover as much of the coupled 5th wheel plate area as possible.**

In cases where the trailer body sub-frame will determine the positioning of the load cells to the skid plate, it may not be possible to mount the cells directly over the center position of the fifth wheel plate. Rice Lake Weighing Systems recommends that a 1" (25 mm) thick skid plate be used for such installations to ensure adequate rigidity. Load cells should always be centered (fore to aft) on the kingpin skid plate.

In order to provide adequate stiffening of the kingpin skid plate in areas of the load cell bearing plates, the installer should consider using gussets and outboard stiffeners as well as internal structural reinforcing to ensure a rigid kingpin plate.

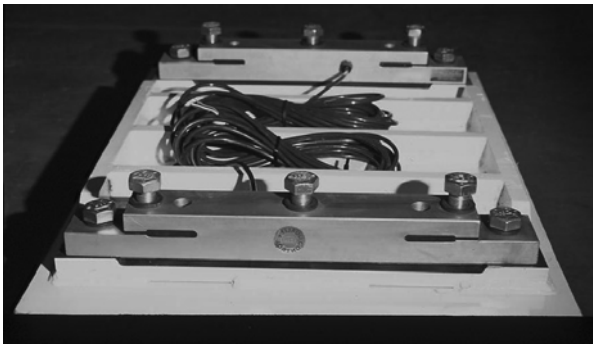


Figure 4-22. Kingpin Reinforced

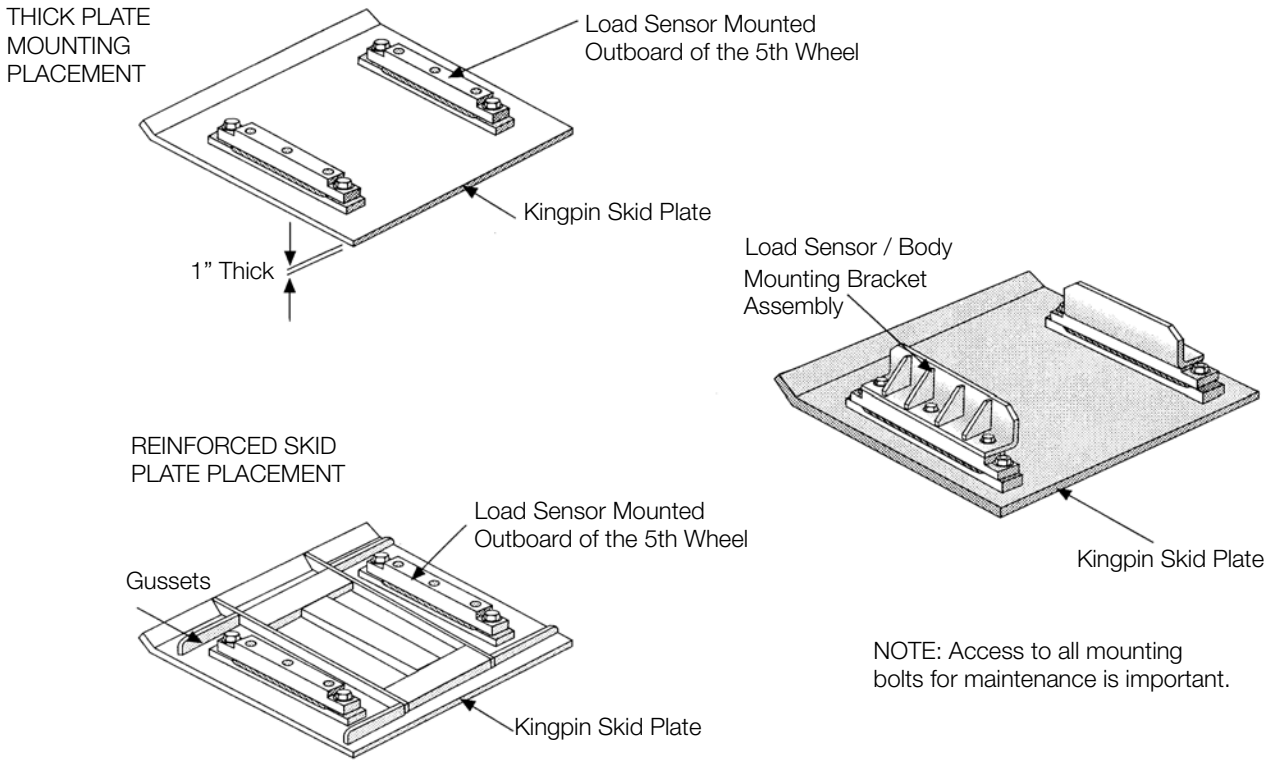


Figure 4-23. Kingpin Installation

4.3.2 Trailer Body Preparation

General

Brackets are generally required to mount load cells to the sub-frame of the body. These brackets are typically welded in place, however the installer must ensure that the trailer sub-frame is acceptable for weld-mounting prior to welding to any frame.

Note **In the case of aluminum body sub-frames, the installer must glove the aluminum sub-frame with a bolted steel liner to which the load cell angles will be welded. Typically, such glove sections will use 3/8" (10 mm) material and will be professionally lined with materials that prevent electrolysis between steel and aluminum.**

Trailer sub-frame crossmembers are commonly located in the area of the kingpin plate. If existing crossmembers will interfere with the recommended positioning of the load cells as described herein, then re-positioning of the crossmembers may be required to allow for correct positioning of the load cell mounting angles.

Since crossmembers provide rigidity to the trailer sub-frame, it is important for the installer to locate load cell mounting brackets close to the crossmembers if possible, thus enhancing the structural strength of the installation. Longer mounting angles to the body sub-frame add to added installation rigidity.

To prevent distortion or twisting of the sub-frame, stiffening may be required. The installer must assess any potential for a weak frame area, and must consider the type of frame involved, the relative position of existing crossmembers, and the best method of stiffening to be used, whether by glove section, web stiffeners, etc. See Section 4.2.3 on page 22.

Rice Lake Weighing Systems recommends that load cells mounting brackets be made of no less than 0.50 inch (13 mm) thick heavy steel construction. Angle iron mounting brackets must always be gusseted in the areas between the top load cell mounting bolts. Refer to Appendix drawings.

Prior to mounting of the load cell brackets, inspect all body sub-frame rails to ensure they are clean and straight (providing a flat mounting surface for the mounting bracket is sometimes required). Look for any evidence of cracking or corrosion, pitting, burrs or other characteristics which can adversely affect the strength of the installation, or the correct fit of the load cell angles.

Access to the load cell bolts for the final installation and post-installation bolt torque maintenance is important. Always ensure that adequate space and clearance is provided beneath the trailer sub-frame for access to all load cell mounting bolts.

Correct alignment of the installation is critical to proper system performance. Always ensure that all frame members are kept straight and do not bend, warp or crack when cutting or welding takes place. Avoid 90° angle welds.

4.3.3 Installation Procedure

1. Assemble the trailer sub-frame mounting brackets to the top of the load cell using the 1 inch diameter top mounting bolts supplied. Both Model PL9000-22 and PL9000-26 load cells use these (three) top bolts. The installer must ensure that the top mounting bolts used are of the correct length so that sufficient thread engagement into the cell is ensured and also that longer bolts do not bottom-out in the tapped holes of the load cell. The PL9000-22 load cell uses three 1"-14UNF x 1.50"L bolts and the PL9000-26 load cell uses three 1"-14UNF x 2"L bolts. Bolts which are not secure, and either too long or too short, could result in a hazardous operating condition. Check carefully for correct bolt length. Section 6.1 on page 58
2. Tighten all three top bolts. Assemble the load cells by bolting up the single piece bearing plates into position. Tighten the bearing plate bolts.
3. Cable output from the load cell should always face inward towards the longitudinal center of the body. If this is not possible to ensure access to the cable connector, protect outward facing cables from potential damage.
4. To install the load cell mounting brackets (angles) to the trailer sub-frame, position temporary spacers between the kingpin skid plate and the trailer frame rails to allow for a clearance after installation of 1/2 to 3/4" (13 to 19 mm). In lifting and positioning the kingpin plate assembly into its final assembly position, verify its correct alignment with the trailer sub-frame.
5. Tack weld (or bolt) both load cell mounting angles to the trailer sub-frame rails. Verify correct alignment of the kingpin plate and the trailer sub-frame rails.
6. Tack weld the load cell bearing plates to the kingpin skid plate. Verify alignment of the skid plate and body. Ensure that the load cell bearing plates rest flatly on the skid plate, Shim any gaps that are found to be greater than 1/32" (1 mm).
7. Disassemble the load cell and remove the kingpin plate. Review Section 6.3 on page 59 before proceeding. Perform final welding of the two load cell mounting angles to the trailer sub-frame rails.
8. Perform final welding of the load cell bearing plates per instructions for welding single-piece bearing plates. Observe all cautions.
9. Let all welds cool. Remove any welding slag and spatter. Reassemble the load cells to the bearing plates on the kingpin plate. Lift the kingpin plate into position and bolt the load cells into the six (three per side) top mounting bolt holes of the load cell mounting angles. Tighten all bolts to the correct torque values specified in this manual. Verify correct alignment and gap spacing between kingpin skid plate and body rails.

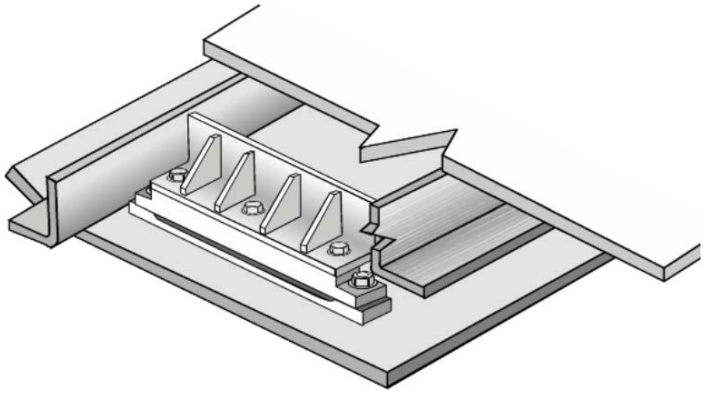


Figure 4-24. Kingpin Installation Diagram

Note **Since crossmembers provide rigidity to the trailer sub-frame, it is important for the installer to locate load cell mounting brackets close to the crossmembers if possible, thus enhancing the structural strength of the installation. Longer mounting angles to the body sub-frame add to added installation rigidity.**

These assembly instructions assume that all bolts must be accessible for tightening to proper torque values during installation and for post-installation maintenance. Rice Lake Weighing Systems never recommends that load cell installations be made in which mounting bolts are not fully accessible at all times for inspection and maintenance.

4.4 Equalizer Hanger Mounts

The bending beam load cell typically used for center equalizer hanger mounts is the PL9000-50. Hanger modification information contained in section 6.6 on page 63 pertains to the use of PL9000-50 load cells with Hutch H-7700, Hutch H-9700, and Transpro Model 86 and 88 suspensions. For suspensions using cast hangers, contact Rice Lake Weighing Systems as the hanger modification specifications are different, and typically require the use of countersinking flat head allen bolts into the hanger plate to accommodate full equalizer pivot motion. For widespread leaf spring suspensions and suspensions of other manufacturers, contact Rice Lake Weighing Systems for hanger modification information.

Note **Suspension equalizer hanger load cell mounts are not recommended for high accuracy on-board scale applications, such as split-load and deliver systems requiring accurate measurements of incremental loads. For high accuracy applications, Rice Lake Weighing Systems recommends the installer use a suspension sub-frame mount in which four load cells are positioned between the trailer frame and a suspension sub-frame.**

Before Getting Started

- Identify equalizer hanger type (manufacturer, axle spread, fabricated or cast). Section 6.6 on page 63
- In order to achieve the proper spacing required by the load cell and to maintain the proper position of the hanger in the suspension, it may be necessary to countersink the bolts which bolt the hanger to the load cell. Typically with 1/2" plate being used for the hanger modification, use 3/4-16UNF x 1.500" flat head Allen bolts (Grade 8 - part number PL9000-50FHB). This will allow the equalizer to move freely without contacting the load cell bolt heads.
- Inspect all areas of the equalizer hanger and trailer frame for any signs of rust, wear, deterioration, frame cracking or previous repair work.

4.4.1 Preparation

1. Clean the area of the hanger and trailer frame thoroughly.
2. Remove front wheels of the tandem axle group or front and center wheels if a triaxle.
3. Remove equalizer bolts (burn off huck if present).
4. Remove equalizer from center hanger.
5. Remove torque arm bolts.
6. Cut the cross tube that connects both equalizer hangers.
7. Mark the centerline of the hanger before it is removed from the frame.
8. Burn the old hanger off the frame. Take special care not to damage the frame rails with the cutting torch.

9. Clean the underside of the frame on both sides with a grinder until the underside of the frame rail is smooth and clean.
10. Inspect the area where the load cell bearing plate(s) will be welded and remove any burrs, debris, paint or undercoating.
11. Mark the centerline of the load cell assembly so the centerline of the load cell is aligned with the centerline mark of the center equalizer hanger.

4.4.2 Assembly

1. Assemble the load cell and clamp it into place on the frame so the marked centerlines are aligned.
2. Normally equalizer hangers are laterally centered on the trailer frame and while these hangers are typically 4 to 5" in width, the load cells are typically 3" in width. Center the load cell bearing plate(s) to the cross dimension of the trailer frame. If in doubt, assemble the load cell and modified hanger, clamp this assembly to the trailer frame, and adjust the lateral position to align with the equalizer, springs and torque arm.
3. Once the load cell bearing plate(s) are correctly positioned, centered and clamped, tack weld to the frame. Re-check alignment before final welding. It is normally recommended that clamps remain in place for final welding, if possible.
4. For final welding of the bearing plate(s) the load cell must be removed. Attempting to weld bearing plates with load cells assembled can result in load cell damage and void the warranty.

Note Stick welding is generally preferred over wire feed for final welding of the bearing plate(s) to the trailer frame.

5. Follow welding procedures in Section 6.3 on page 59.

   Allow welds to thoroughly cool before assembling load cells and modified hangers.
6. Assemble modified hangers to the load cells. Use a thread locking compound on all bolt threads. Ensure the bolts used are Grade 8 and are of the correct thread depth.

   Generally, the bolt hole depth of the PL9000-50 load cell is 0.875". A 3/4 inch bolt depth into the load cell is optimum. Bottoming out a longer bolt can create a hazardous operating condition. Use calipers to measure thread depth of the load cell bolt holes where the hanger attaches, the thickness of the modified hanger plate being used and thickness of the washer (if applicable) to ensure (1) adequate thread depth into the load cell is achieved and (2) bolts cannot bottom out in the load cell.

Note Rice Lake Weighing Systems provides modified hangers using plates with countersunk bolt holes or with standard through-bolt holes, depending on the hanger model. For hanger plates without countersunk holes, hardened (F-436) washers must be used with all bolts.

7. Measure new shaft or tube to connect the two center equalizer hangers laterally. Measure 1/4" past the outside of the hanger hole so the shaft or tube can be welded on the outside of the hanger. Solid shaft or a thick-walled tube is recommended.
8. Weld the shaft or tube in place on both the outside and inside of the hanger.
9. Reassemble equalizer and torque arm to the hanger on each side of the suspension.
10. Paint the hanger assembly and load cell bearing plate(s) with a high quality enamel paint or spray with an underbody coating material such as 3M #8883 Universal Rubberized Undercoating.

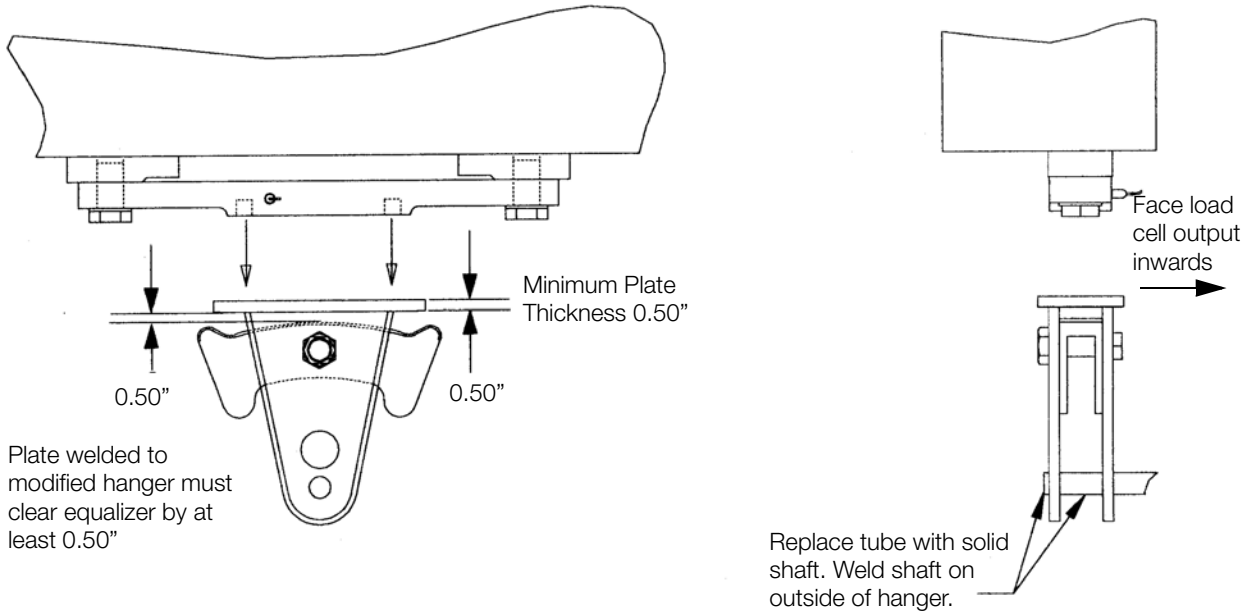


Figure 4-25. Hutch Hanger Install

Note

When handling load cells, care must be taken to protect the output cable from damage. When welding load cell bearing plates, the load cells must be removed and all cables must be away from any heat or flame.

Concerning triaxle and quad-axle suspensions, two load cells are used per side (four load cells total) at the center equalizer hangers. Triaxle suspension hanger mount load cell installations may not operate as well in some off-level ground conditions as on flat, level surfaces.

Inspecting the Installation

Ensure that all leaf springs seat properly on their wear pads and their positioning within the equalizer is correct. Check all bolts of the hanger, equalizer and torque arm to make sure they are all tight to manufacturer's specifications.

4.5 Fixed 5th Wheel Mounts

Preliminary Information

If tractor has a slider assembly, remove it completely, except for the outer frame angles. Standard Rice Lake Weighing Systems 5th wheel load cell systems are for fixed mounting only. Contact Rice Lake Weighing Systems for information on slider assemblies.

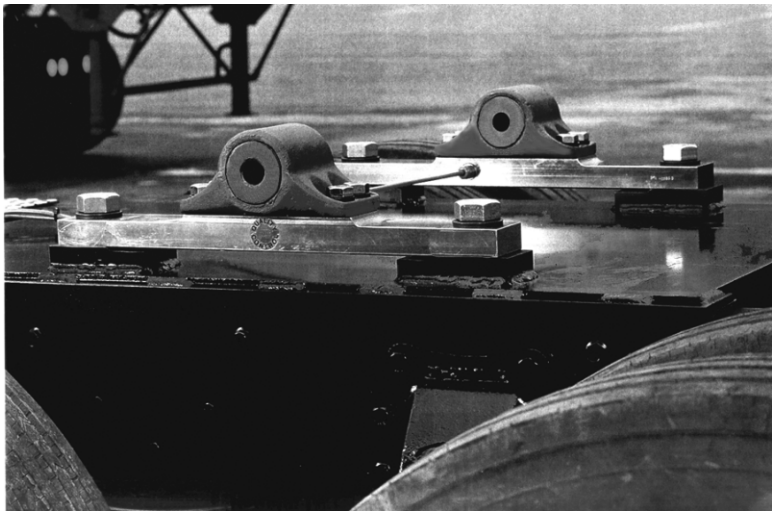


Figure 4-26. 5th Wheel Mounts

Standard 5th wheel kits are available for Holland and Fontaine 5th wheels. For other manufacturers of 5th wheels, contact Rice Lake Weighing Systems for appropriate load cell models. Use PL9000-50 or PL9000-16 load cells for Holland and Fontaine assemblies, however the PL9000-26 heavy duty shear beam load cell may be used to mount 5th wheel trunnions of other manufacturers, typically in Holland or Simplex Quick Change applications.

Figure 4-27. PL9000-50F Fontaine 5th Wheel Load Cell Kit

The following instructions apply to standard tractor 5th wheel installations.

Note **For Pole Trailers and Frameless End Dump Trailers: For 5th wheel mounts involving pole trailers and frameless end dump trailers or other applications requiring blocking the 5th wheel plate, contact Rice Lake Weighing Systems for additional instructions and parts required. See Section 6.0 on page 58.**

4.5.1 Installation Procedure

1. Determine the exact location where the 5th wheel assembly will be installed and mark the location.

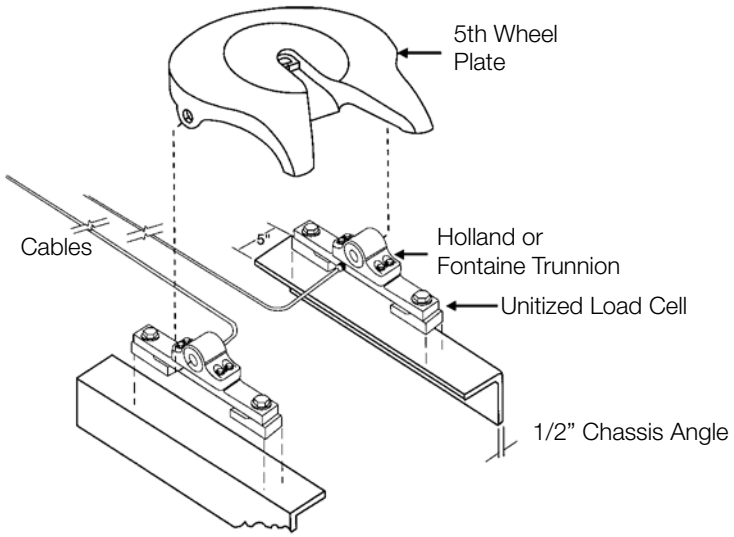


Figure 4-28. 5th Wheel Exploded View

2. Install a base plate transversally between the chassis rails which will be bolted to the outer frame angles. Use minimum 3/8" steel plate, minimum 30" in length and wide enough for bolts to bolt through the frame angle bolt holes.
3. When mounting the base plate, use a minimum of six (6) bolts per side to bolt the plate into the frame angles. Use minimum 3/4" Grade 8 bolts and locknuts.
4. After bolting the base plate to the chassis angles, weld the base plate to the angles at the seams in a skip weld manner (3" weld, 6" off, for example), and around the corners.
5. One the base plate is fully welded and bolted in place, assemble the 5th wheel load cells with bearing plates, bolts, washers, shear slugs and 5th wheel trunnions with bushings. Use a thread locking compound and torque the trunnion bolts (4 x 3/4"-16UNF x 1.500"L with flat washers) in place to mount the 5th wheel trunnion on each load cell. Be sure to include the shear slugs provided with each assembly.

Note Do not tighten the end bolts of the load cell at this point. These bolts only need to be hand-tight.

6. Mount the load cell assemblies to the base plate in the approximate position desired.

Note Make sure load cell output cables face INWARDS for all 5th wheel installations. A pass-through hole may be drilled in the base plate to allow load cell cables to pass to the underside of the plate or inside of the chassis rails. Use split loom, split fuel line or spiral wrap to protect the cables. Cables must not be allowed to contact any sharp edges.

7. With assembled load cells in position, use an overhead lift to carefully lower the 5th wheel plate onto the two load cell trunnions. Pin the 5th wheel plate into the trunnions.
8. Use an accurate tape measure or calipers to position the 5th wheel load cell assemblies so the 5th wheel is accurately centered (+/- 1/16" on each side and at front and rear).
9. When the complete assembly is centered and aligned correctly, tack weld the bearing plates in place.
10. After tacking all four bearing plates, unbolt the four load cell end bolts (2 bolts per load cell) and carefully elevate the 5th wheel plate and load cells off the bearing plates, and away from the welding area.
11. Clean the tack welds and area of the base plate around the load cell bearing plates.
12. Perform final welds on all bearing plates per welding guidelines in Section 6.3 on page 59.
13. Let welds cool.
14. Remount load cells and 5th wheel plate to the cooled bearing plates. Install the load cell end bolts and washers using a thread locking compound and torque to specification.
15. Apply paint or underbody coating to all bare metal surfaces such as the load cell bearing plates and trunnions.
16. Bolt torques: After one or two weeks of use, re-check all bolt torque values.

Note Rice Lake Weighing Systems supplies poly bushings for all 5th wheel trunnions and recommends these be used for replacement parts as well.

Additional shear protection may be added to the bearing plate mounts if desired. When adding additional shear plate, plate must be ground to fit against original bearing plate welds. Avoid weld spatter onto the top of the bearing plate. Any spatter on this top surface must be removed before mounting of the load cells.

Pole Trailers. In some cases, 5th wheel mounts such as pole trailers and end dump trailers must use heady duty coil springs at the front and rear positions of the 5th wheel plate to keep the plate from riding on the ends of the load cells. Contact Rice Lake Weighing Systems for information on the use of these coils. See Section 6.9 on page 69.

Quick Change Applications. Rice Lake Weighing Systems manufactures quick change trunnion straps for fitting Holland or Simplex 5th wheels to our PL9000-26 Load Cells. The Holland Quick Change assembly fits all Holland standard capacity 2000, 3500 and 3600 series 5th wheel plates and the Simplex assembly fits standard capacity Simplex 5th wheel plates. Contact Rice Lake Weighing Systems for details, part numbers and fitting instructions.

For Holland 5th Wheel trunnions, it does not matter which direction the bushing enters the trunnion, flat side or beveled side. The bevel is added to the bushing to better enable starting it into the steel trunnion.

When installing Holland 5th Wheel trunnions the 5th wheel load cells, the flat side of the trunnion faces OUTWARD, the tapered side faces INWARDS.

4.6 Hinge and Hoist Pivot Pin Installation

Pivot load pins supplied are custom sized to fit the specific hinge and ram bracketry of the vehicle. The process of installation requires removal of existing pins, and replacements of these pins with load pins and collars.

Figure 4-29. Hinge Pivot Installation

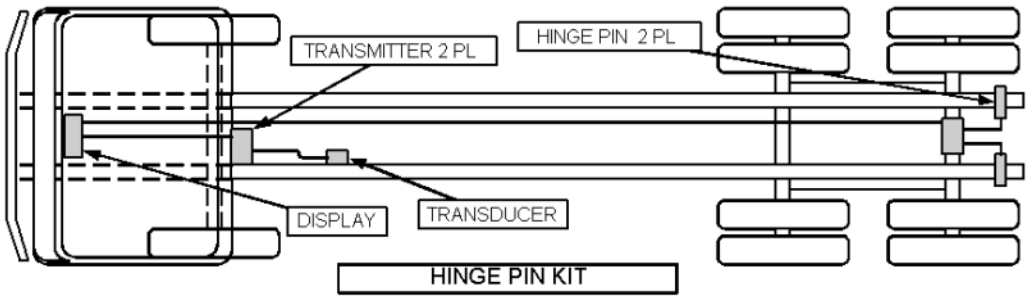


Figure 4-30. Block Diagram of Hinge Pin Kit

Note **All pivot pin installations require lubrication facilities. Normally lubrication is provided through the central pivot area. However, some pivot pins themselves contain the facilities for pivot area lubrication. Be certain that if you are replacing a pivot pin which has internal lubrication facilities, the replacement load pin also contains internal lubrication fittings.**

4.6.1 Installation Procedure

1. For removal of existing hinge and ram pins the body must be supported either by means of an overhead lifting mechanism or an underneath set of jacks. Once the body of the vehicle is securely supported, remove the existing hinge pins and any securing hardware present for those pins (collars, washers, etc.). Use a pry bar if binding occurs.
2. Clean the surface area of the cheek plate where the new load pin collar will be welded in place. This surface should be ground flat to bare metal and free from any paint or grease.
3. Inspect and clean the inside of the cheek plate holes so they are free of burrs, rust or dirt.
4. Install new load pins with the connector cables facing inwards for rear dual hinges. For lift cylinder load pins, cable connectors normally face inwards for dual cylinder mounts, but the installer must determine the best direction for facing the output cable in all cases, so there is no exposure to possible damage from moving parts, road hazards, etc.

Note When load pin is mounted so that its center position supports the truck body, the load pin UP ARROW(^) should face upwards. When the load pin is mounted so that its outer ends support the truck body, and center position is supported by the chassis, the load pin UP ARROW (^) should face downwards (v). If a pin reads increasingly negative under increasing load, then it's position must be rotated 180 degrees.

IMPORTANT Do not pound on the load pin with a hammer or sledge. Tapping the load pin is acceptable but always buffer the impact with a wooden block. If the load pin does not go into the pivot or cheek plates by hand, or with moderate tapping, the capturing holes need to be aligned better, or opened up with a grinder.

5. Fit the collars to the load pins so they are tight to the pivot cheek plate. Install the bolt supplied through the collar and load pin so the bolt is in a precisely vertical position.
6. Tack weld the collar in place. Remove the bolt and the load pin from the pivot area.

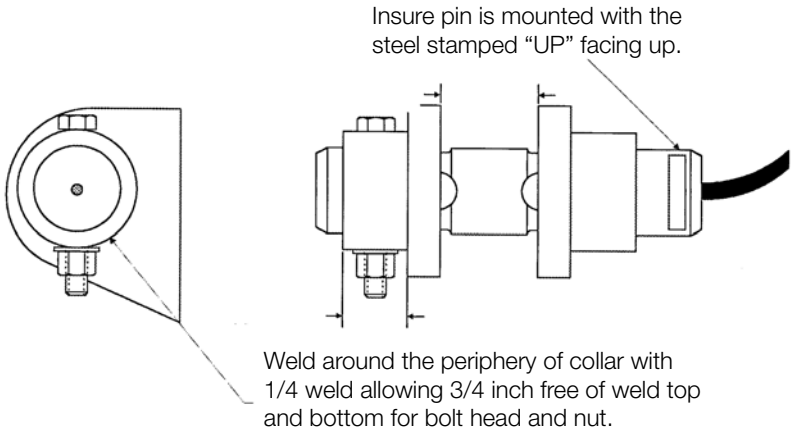


Figure 4-31. Typical Hinge Pin Install

7. Tack-welded collars may now be final-welded in place. Some installers prefer to re-insert the old pivot pins in place during welding to maintain pivot positions and prevent movement or warpage during welding. See drawing.

IMPORTANT Rice Lake Weighing Systems cautions against welding collars with load pins in place, as this can cause damage to the load pin.

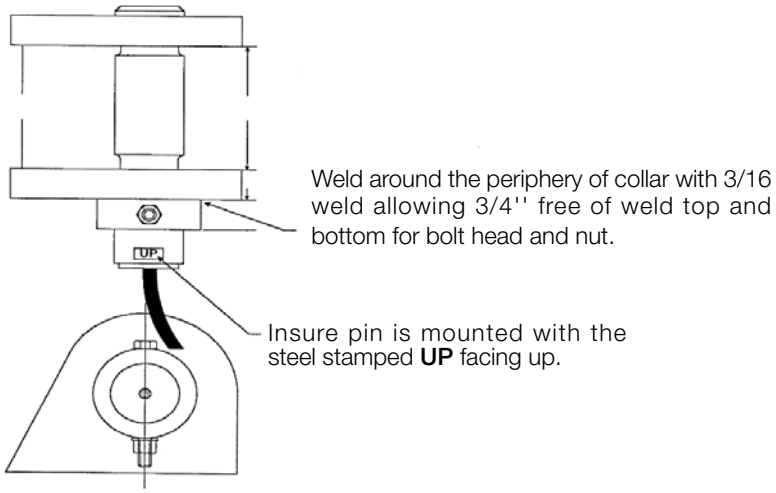


Figure 4-32. Typical Hoist Pin Install

8. Allow collars to cool after welding. Re-insert load pins and bolt in place.

   All load pins have an **UP ^** mark on the end of the pin opposite the cable end. Make sure that the load pin is installed so that the **UP ^** mark faces upwards when load pin is bolted through collar.
9. Bolts used in collars to lock load pin position must always have the bolt head on top and the locknut below the collar.
10. Relax body off jacks or overhead lift. Test the installation by raising and lowering the body with the hoist cylinder. Look for any excess friction or binding.

11. Apply paint or underbody coating to the complete pivot area ensuring all bare metal surfaces and welds are covered.
12. Thoroughly lubricate the pivot areas.

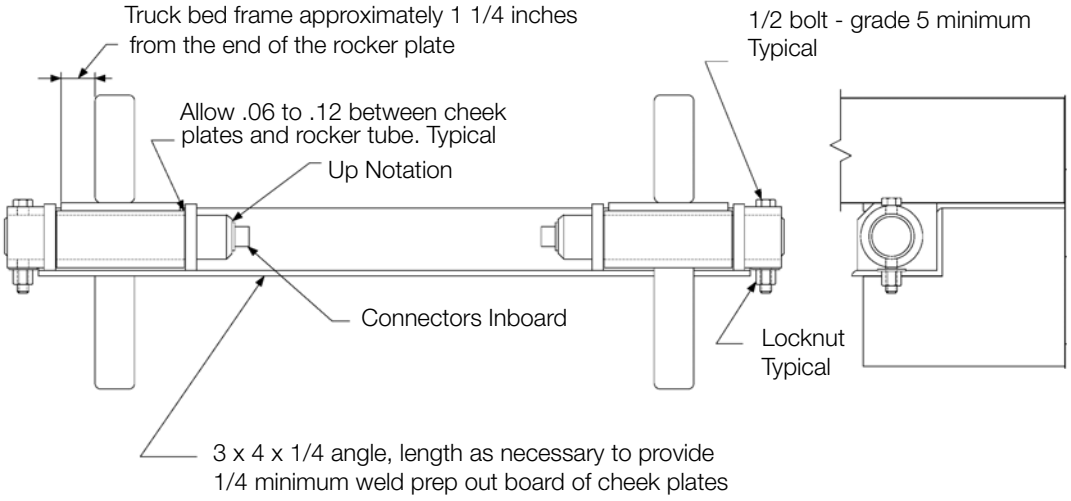


Figure 4-33. Typical Rear Hinge Pin Installation

Note **HINGE RISER: Add 0.75" or 1" thick shim plate to elevate body runners off chassis if the installation involves frame mount load cells with hinge pins for live weigh system kits, as shown in Figure 4-34.**

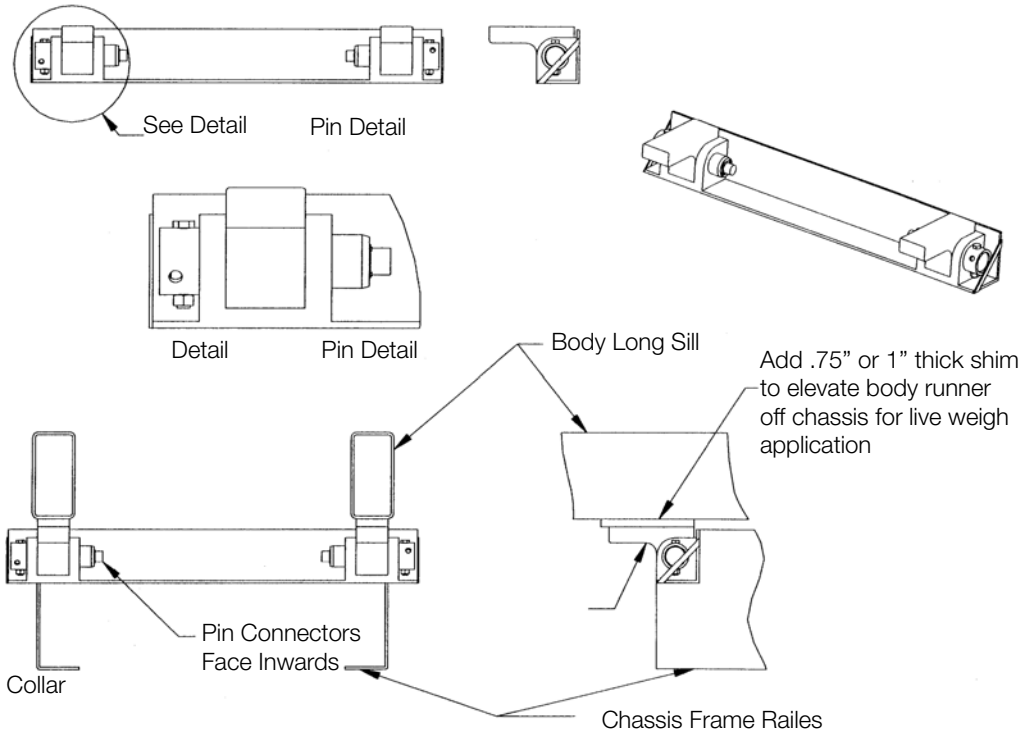


Figure 4-34. Hinge Riser

4.6.2 Hinge Bar and Lift Cylinder Pin

Hinge Bar

Once installed, the rear pivot hinge bar must pass through the chassis and pivot plate bushings without binding or pre-loading. Section 6.7 on page 64.

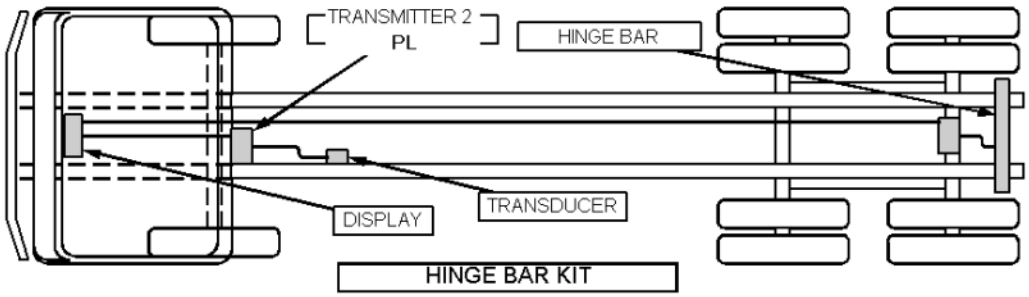


Figure 4-35. Block Diagram of Typical Hinge Bar Kit

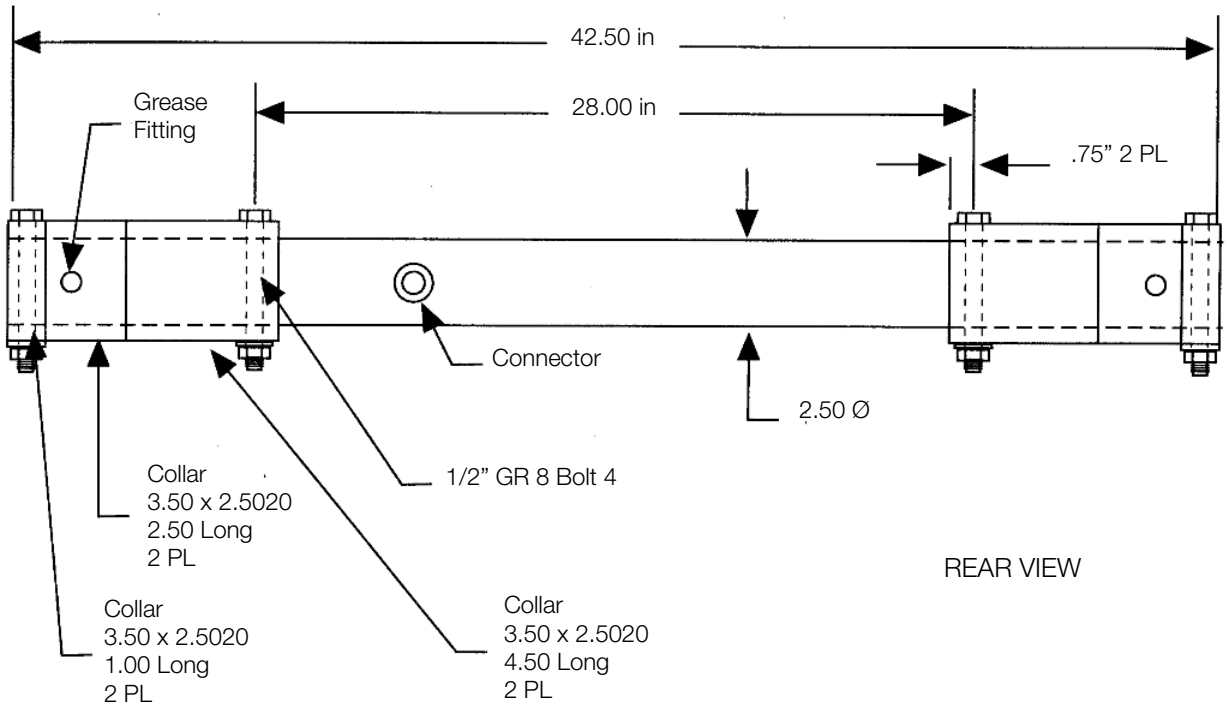


Figure 4-36. Hinge Bar Drawing

Note **Shims are provided to support body off of chassis rails in order to prevent final installation from pre-loading the hinge bar. If the installer can ensure hinge bar will have free movement in final installation, then shims may not be required.**

1. Remove old bushings with plasma cutter or torch. The installation of new bushings requires precise alignment to ensure body remains in previous operating position even if bushing/hinge bar size increases in diameter.
2. Install chassis bushings first. Use hinge bar for alignment and for tack welding bushings in place. Then remove hinge bar for final welding of bushings. Tack welds for bushings should be strong enough to prevent any possible movement of bushing after hinge bar is removed for final welding of the bushing.
3. After chassis bushings completed, go to hinge plate bushings for removal and replacement with new bushings. Again use the hinge bar for alignment, tack weld hinge plate bushings firmly in place, remove hinge bar and complete final welding of the bushings.
4. Maintain 1/16" (0.0625 inch) clearance between chassis and hinge plate bushings. Install bolts and lock nuts to hinge bar/bushings.
5. Install lubrication fitting and ensure the hinge bar is adequately lubricated.

Note **Whether hinge bar connector faces outwards or inwards (inwards is preferable) the UP notation stamped on the end of the hinge bar must always be on the topside of the hinge bar in normal rest position.**

Hoist Load Pin

1. Remove any existing collar when installing hoist load pin, and replace with the collar provided. Use the load pin for locating and aligning pin and collar position, tack weld the collar in place, remove load pin and final weld the collar per instructions.
2. Install bolt and locknut. Observe the **UP** notation stamped on the end of the hoist pin. Ensure the shear grooves in each end of the pin overlap both sides of the mounting hardware (cheek plates and cylinder).

4.7 Body Rest Mounts

For installations of on-board systems on tipping bodies or hoist chassis which require live weighing, as opposed to Lift-to-Weigh applications, body-rest load cell installations are required. Rice Lake Weighing Systems typically supplies body rest kits in four or six point configurations, with two load pins typically installed at the rear hinge pivots. The front two (or four) load cells used for body rest mounting utilizing Groove-Lock hardware is typically the model PL9000-14.4 shear beam load cell.

Figure 4-37. Body Rest Mount Kit for Live Weigh Applications

The kits are furnished with groove lock hardware components as shown in Figure 4-37.

4.7.1 Installation Procedure

1. Install the pivot pins at the rear hinge points as instructed in Section 4.6 on page 33, except the hinge pivot bracket is removed and a 3/4" (19 mm) or 1" (25 mm) spacer is installed on each side to elevate the body or hoist chassis sub-frame, off of the main chassis rails.
2. Position 2 or 4 spacer blocks of 3/4" or 1" thickness at the desired load cell positions at the front (and middle if a six point) of the body or hoist chassis sub-frame. The entire sub-frame should now be off the main chassis, equally on all sides.

Note Any remaining pressure in the lift cylinder(s) should be bled off.

3. Locate and mark positioning for the load cell mounts on each side of the chassis and body or hoist sub-frame rails.
4. Clamp chassis angles to the truck frame rails on each side in the desired locations (front and center mounts). Location of the chassis bracket should avoid and rotation or movement of the lift cylinders from relaxed to fully upright position, as well as chassis-mounted items that are not easily moved, and should attempt to utilize as many preexisting chassis bolt holes as possible (to minimize the drilling of new holes).

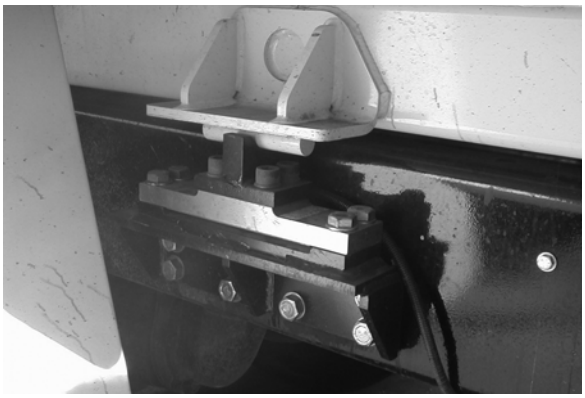


Figure 4-38. Body Rest Mount Installed Using PL9000-14 Load Cell

Note **Chassis angles must be sized for the bearing plate spacing of the load cell being used. For example, a minimum 16'' (41 cm) length for the PL9000-14.4 load cell.**

5. Mount the load cells on the chassis angles along with Groove Lock hardware parts to establish location of the body angles on the body or hoist chassis sub-frame. The decision on the location of the body angles must also consider possible movement of equipment or obstructions on the sub-frame (example: roll-off hoist chassis) and strength of the body sub-frame itself (example: location of cross members). The installer must provide reinforcing to any body sub-frame which may require it. Examples of sub-frame reinforcing are the addition of frame doubler, additional cross-member straps, gussets to the body structure, etc.

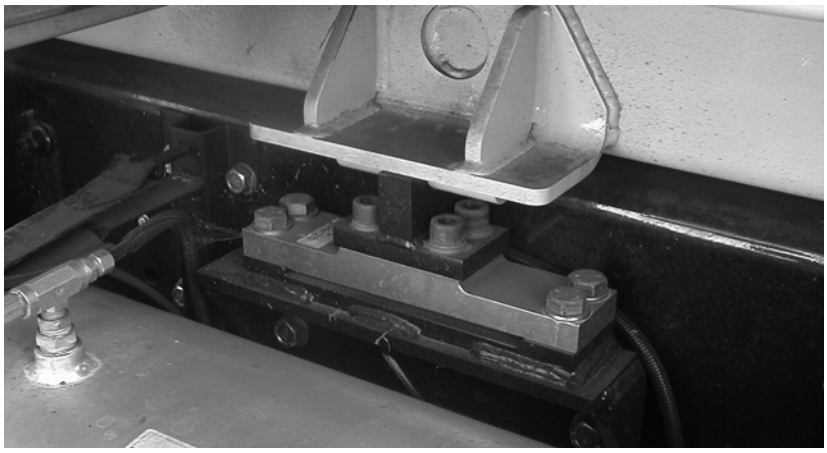


Figure 4-39. Body Rest Installation Example

6. Mark the positions of both the body and chassis brackets at each load cell mounting location. Tack weld the Groove Lock plate to the underside flange of the body angle bracket at each load cell location. Remove clamped assemblies.
7. With the body angles removed, final weld the Groove Lock plate (round stock assembly) to the underside flange of each body angle. Allow to cool.
8. Drill and bolt chassis angles to main truck frame at the marked locations.

Note **Top mounting surfaces of the chassis angles must be flat, clean, bare metal.**

9. Position fully unitized (assembled with bearing plates and bolts) load cells on chassis angles and clamp bearing plates to chassis angles. Remove the load cells from the bearing plates. Weld the bearing plates in place per the instructions in “Welding Specifications” on page 59. Allow welds to cool.
10. Re-mount the load cells (bolts need only be hand-tight), and the Groove Lock hardware. Position and clamp the body angles in place for tack welding.

Note **The area where the body angles will be welded to the body sub-frame must be flat, clean, bare metal.**

11. Clamp the body angles to the sub-frame.
12. Remove the load cells for final welding. Final weld the body angles to the body sub-frame.
13. Once all welds have cooled, remount the load cells and Groove Lock hardware at each location. Use a serviceable thread locker on all bolt threads used to bolt the Groove Lock plate assembly into the load cell, and to bolt the load cells into the bearing plates. Torque all bolts to specification.

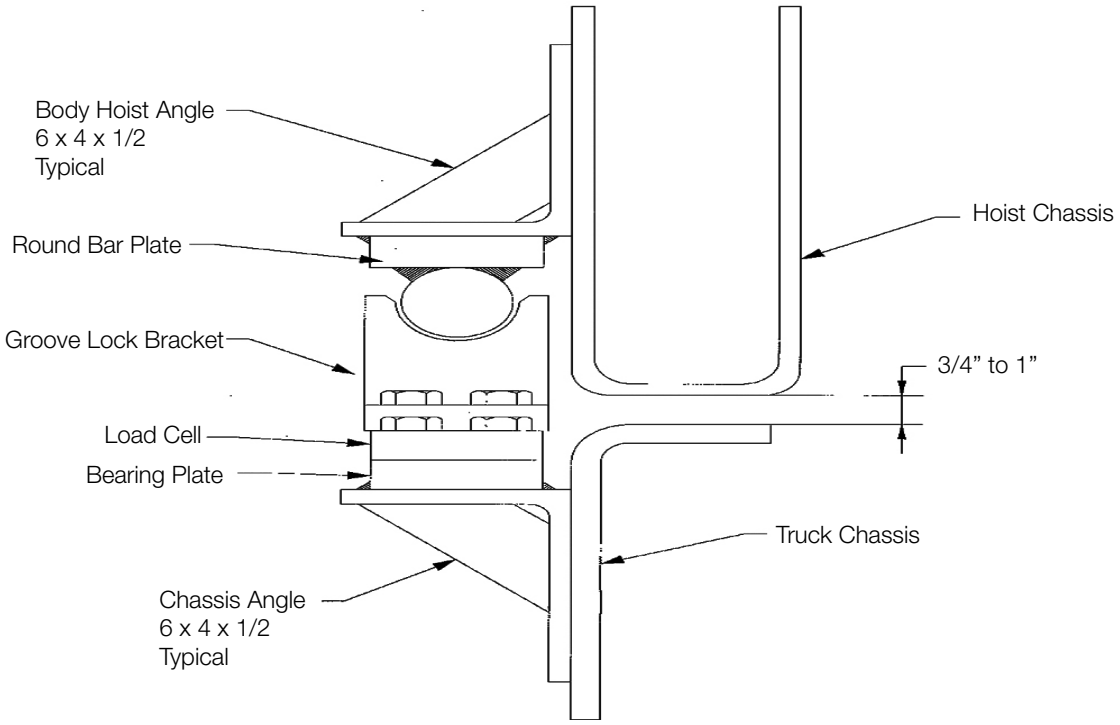


Figure 4-40. Groove Lock End View Showing PL9000-14 Load Cell

Note **Rice Lake Weighing Systems recommends that load cell cables face inwards if possible, to provide better protection. If the load cell output cables cannot face inwards, Rice Lake Weighing Systems recommends a protective cover plate be welded to the chassis angle which provides protection to the cable and that split loom, spiral wrap, split fuel line or other protection be fit to the load cell cables.**

14. Remove all spacer blocks. Body sub-frame should rest on all load cells with Groove Lock hardware centered on load cells. Raise and lower body to verify proper alignment and seating.

CAUTION **Installer must ensure that the hoist cylinder(s) do not retain pressure in the down (relaxed) position as that will pull on the body rest load cells and affect the weight readings. All cylinder pressure must be relieved when cylinders are relaxed and load cells are weighing load. Slow, creeping weight changes are a sign that pressure may still be present in the lift cylinder(s). For example, in roll-off applications with dual acting lift cylinders, the pressure on the down side of the cylinder must be relieved, typically by disengaging the PTO pump and lowering the lever used for raising the hoist. A lever securing mechanism may be required to hold the lever in its down position if pressure retention problems are experienced. Contact Rice Lake Weighing Systems if assistance is required.**

4.8 Trunnion Load Pin Installation

Trunnion load pins are available in 48 inch and 54 inch lengths, to replace the 4" diameter trunnion tube of single point trailer suspensions.

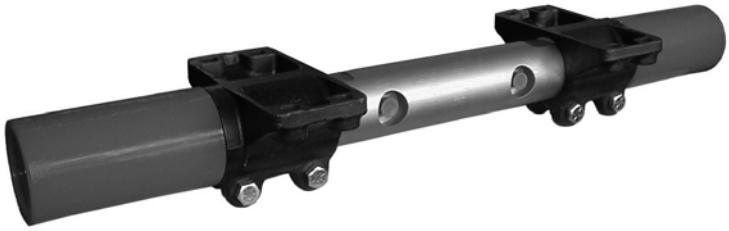


Figure 4-41. 48" Trunnion Load Pin

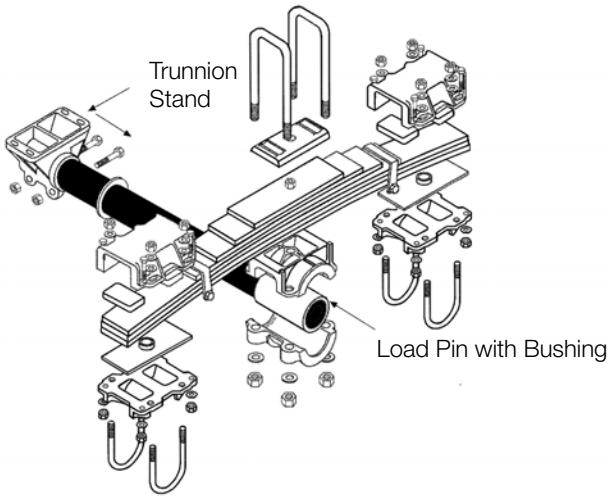


Figure 4-42. Exploded View of a Trunnion Installation

When installing a trunnion load pin in a single point trailer suspension,

1. Ensure the trailer is on a level surface.
2. Clean all exposed bolt threads on the trailer stands.
3. If retro-fitting a new trunnion to an older suspension, sand the center of the dead axle tube in the area between the stands to ease removal of the old tube.
4. Loosen the spring u-bolts. It may be necessary to cut off the existing u-bolts and replace with new.
5. Remove the existing dead axle tube.
6. Sand and clean the inside of each stand clamp. Eliminate all rust if present.
7. Position the trunnion load pin so the machined flats (anti-rotation flats) are facing up. When installing a trunnion load pin, ensure the trailer is on a level surface. Do not put any grease, oil or other lubricant on the trunnion load pin.
8. When passing the trunnion through the stand clamps, some tightness is typical. Do not pound on the end of the load pin with a sledge hammer directly. Instead, use a block of wood with the sledge hammer, or some other means to uniformly drive the load pin, which does not deform the end of the load pin itself. Note the UP ARROW ^ on one end of the trunnion load pin. Before tightening the stand clamps after centering the load pin, make sure the UP ARROW is perfectly vertical to within 3 degrees.
9. Ensure the bolts and nuts of the stands are tightened and torqued to the specifications of the manufacturer. Torque measurements must be taken from the nut only.

Note **After the first two weeks of use of the trunnion load pin, re-check all stand bolts and nuts and u-bolts and nuts to verify correct torque values. These bolts and nuts should be checked at 4 month intervals thereafter.**

10. When reassembling the suspension, use two new neoprene (poly) bushings on the trunnion instead of rubber bushings. Rice Lake Weighing Systems can furnish poly bushings for all trunnion load pin installations
11. As a general rule, mount a protective shroud or plate to cover the connector area of the load pin and mating cable connector if they are exposed in any way. Split loom or cable wrap on any exposed areas of cable is advised for protection of the cable from damage. Tie down the cable at least every 18 inches.
12. After the trunnion load pin installation is complete including coupling of both connectors, the load pin and stands should be painted with a high quality enamel paint, or covered with an underbody coating such as 3M™ Universal Rubberized Undercoating (3M part number 8883).

Note **Machined notches are provided at the top surface of the load pin to enable the installer to mount flat bar retainers to prevent trunnion rotation. Weld the flat bar retainers to the trailer stands for preventing trunnion rotation, but never weld directly to the trunnion or allow the trunnion groove areas to become overheated (greater than 140 degrees F. 60 degrees C).**

Never weld to the trunnion load pin under any condition as this voids load pin warranty and may damage the load pin.

4.9 Sandshoe Load Pin for Landing Gear

On-board scale applications in which a trailer is loaded without the presence of a tractor utilize weighing equipment, which is installed to the trailer rear suspension, such as spring suspension hanger load cells, single point trunnion load cells or air ride suspension transducers, and load pins installed in certain types of pivoting sandshoes on trailer landing legs. If your landing legs use removable pivoting sandshoes, such as those built by Holland, Jost or Binkley with 2" diameter pivots, our standard load pin sandshoe assembly can be installed as a direct replacement. For landing legs with welded or fabricated, non-pivoting feet, contact Rice Lake Weighing Systems.

Sandshoe assemblies are provided with retractable coil cables between the load pin output cable and the transmitter. This cable facilitates lowering and raising of the sandshoes for weighing and driving positions.

Note Rice Lake Weighing Systems furnishes kits that include one load pin per landing leg and a modified, reinforced sandshoe assembly with integral load pin collars welded in place. Do not attempt to use replacement part sandshoes from parts suppliers as these do not contain integral collars nor have they been reinforced for adequate support strength, as have the RLWS sandshoes.

The installer must be aware of the terrain on which the sandshoes will be placed for weighing. These surfaces must be flat and rigid, preferably leveled pavement. Sandshoes, which are placed on surfaces that are out-of-level, or provide poor sandshoe support, will not yield accurate weighing results and could result in damage to the sandshoe structure over time. The installer must also be aware of terrain over which the trailer is transported, so that high road surface areas such as railroad track crossings, which could contact the sandshoes, can be avoided.

Stand-alone trailer applications that typically utilize sandshoe load pins, by definition, are not coupled to tractors and therefore do not have a 12 or 24 Vdc power source available to supply the scale. These applications generally require an external source of 12 or 24 Vdc power for scale operation.

Stand-alone trailer applications which typically utilize sandshoe load pins and also involve trailer air-ride suspensions, by definition, are not coupled to tractors and therefore do not have air re-supply capability for the air system reservoir, which is depleted during use. These applications require an external air supply source to maintain air to the suspension. A Timbren GA120 air supply valve kit is recommended for use when supplying air to the rear trailer air suspension that bypasses the braking system. Loss of air pressure to brakes can result in movement of the trailer during loading which can be detrimental to the landing gear. Do not supply air to the trailer suspension in these applications through the existing glandhand air connections.

4.9.1 Installation Procedure

1. With front of the trailer fully supported, elevate the landing legs, and remove the existing sandshoes.
2. Install the new sandshoes and load pins. Ensure that the load pin has the arrow sign or UP sign in the correct direction, so the load pin operates with the correct polarity.
3. Lock pins in place using the ½-20UNF x 3.50"L Grade 8 bolt, with bolt head facing UP, through the collar and load pin holes. Install with washer and nylock nut. The installer should determine if the output cable of the load pin should face inwards or outwards.
4. The installer is responsible for mounting a protective tube on the upper body of the landing leg assembly to pass the load pin output cable and mating coil cable through. See Figures 4-43 and 4-44. The outside diameter of the mating connector to the load pin cable is 1.25" (32 mm)
5. Adding a protective angle, as shown in Figures 4-43 and 4-44, is recommended to provide protection to the exposed area of the cable. Test the installation by raising and lowering the landing leg.

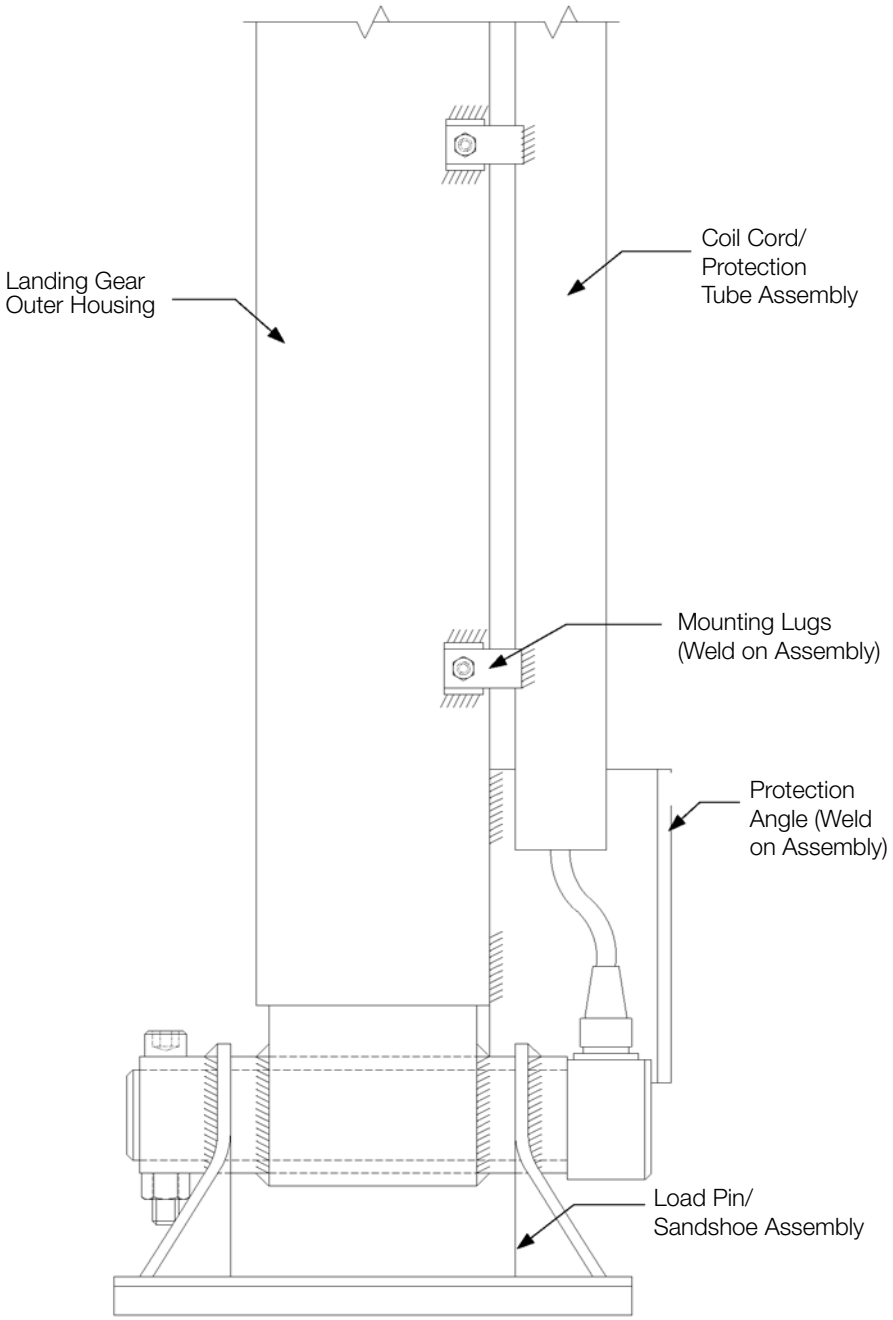


Figure 4-43. Typical Load Pin Landing Gear Installation Aft View

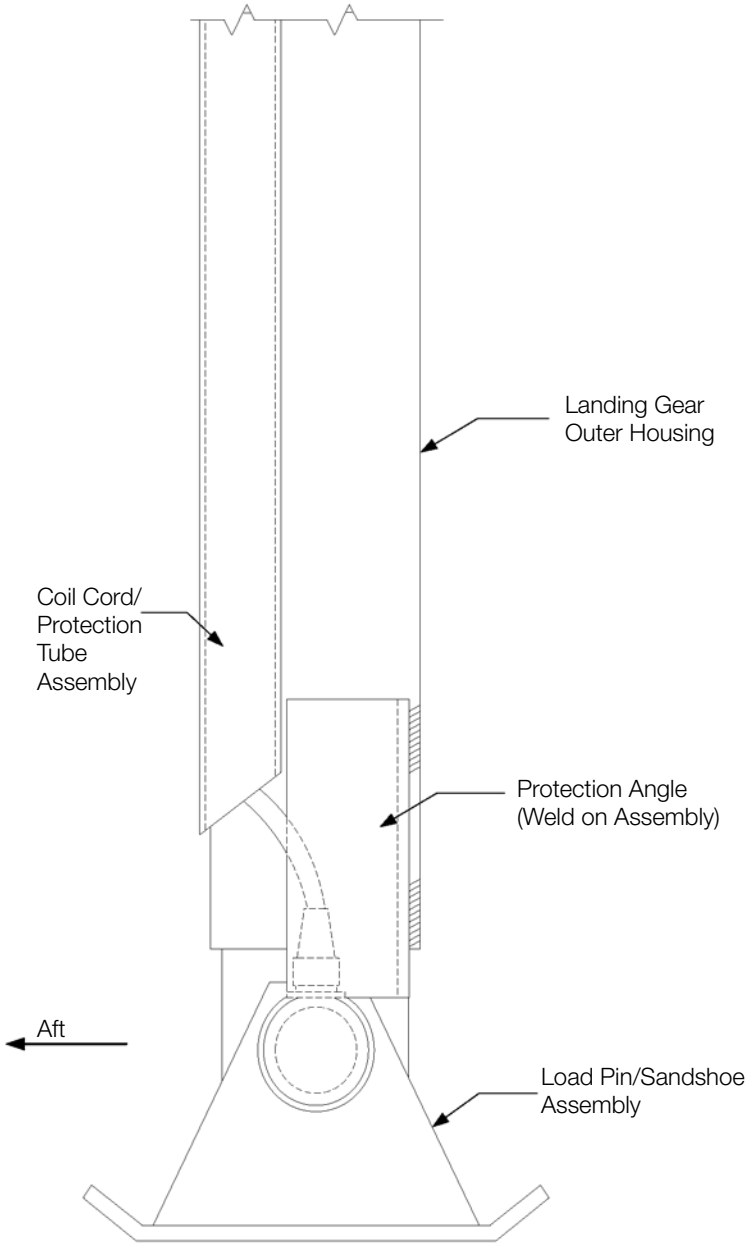


Figure 4-44. Typical Load Pin Landing Gear Installation Outboard View

4.10 Single Point Suspension Clamp Load Cell Mount Installation

The Model 117667 Clamp Load Cell Kit is designed for installation to a 4.00" diameter trunnion tube (dead axle) of a single point trailer suspension.

Model 117667 load cell assembly consists of:

- One 117666 Heavy Duty Load Cell (2 per kit)
- One 116436 Bearing Plate (2 per kit)
- Two 114342 load cell tie-down bolts, 1-1/8" -12UNF x 3.25"L, Grade 8 (4 per kit)
- Two 114256 Washers, 1-1/8", F436 (4 per kit)
- One Lower Clamp Unit (2 per kit)
- One Upper Clamp Unit (2 per kit)
- Hardware

Two load cell assemblies are required per single point trunnion suspension installation.

Base Mounting Plates Required:

Two flat steel plates of 1018 CRS, typically 3/4" thick with minimum dimensions of 4.50" x 17.50", with clean, smooth surfaces on both top and bottom.

Note: The actual size of this mounting plate will be determined by the installer, based on the dimensions of the underside trailer mounting surface dimensions, which could require larger plate. The above dimensions are minimum size for the load cell bearing plate used.

Other Materials Normally Used:

- A bubble level
- Serviceable thread locker
- Torque wrench and cheater bar capable of ensuring 1000 lb/ft.
- Safety Blocks or Stands
- Metal Primer or Automotive Underbody Sealer
- Allen wrench (for the cable clamp)
- Cable Ties

IMPORTANT

When installing clamp load cells to the single point suspension it is critically important that the factory alignment of the suspension be maintained. The installer must ensure that suspension alignment requirements are met to the manufacturer's specifications. Contact the trailer manufacturer if necessary. Rice Lake Weighing Systems assumes no responsibility for trailer or suspension alignment problems which might occur.

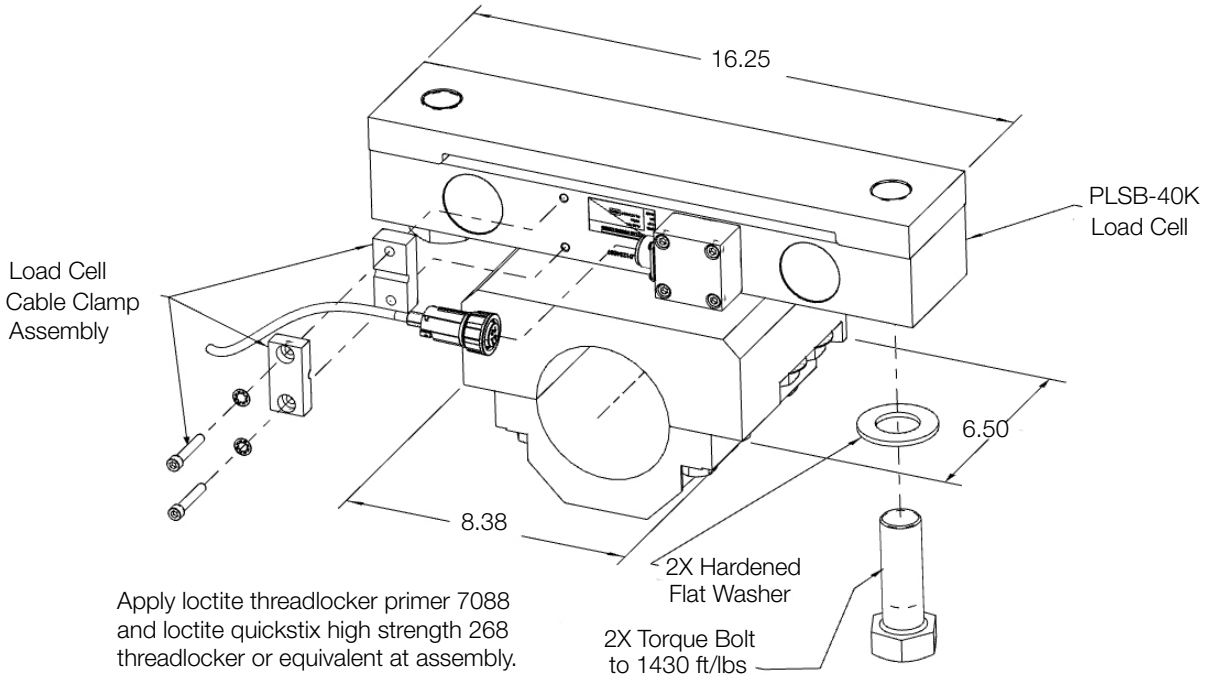


Figure 4-45. Load Cell Cable Clamp Assembly

Preliminary Load Cell and Trunnion Assembly

1. Assemble the load cell and bearing plates with the bolts supplied without torquing bolts tight.
2. Mount the two load cell clamp assemblies to the trunnion tube with the load cell connectors facing inwards (towards each other).

Prior to Installation

A visual inspection of the trailer is recommended, particularly for retrofit installations. Inspect all mounting and structural surfaces to which the load cell bearing plate will be welded. These surfaces must be flat, parallel, absolutely rigid, and free of any signs of cracking, corrosion or other deterioration. Any evidence of problems with these surfaces must be repaired before installing load cells.

Preparation:

1. With the trailer coupled to the tractor, use heavy duty hydraulic jacks or a forklift at the rear of the empty trailer to slightly lift the weight of the trailer onto the jacks or forks.

WARNING

Using this procedure is not recommended unless the trailer is coupled to a tractor, or the installer has taken adequate safety measures to ensure the trailer cannot move during the course of the installation.

Place blocks or floor stands beneath the trailer, so workers underneath are protected. Use blocks at the tires to also prevent movement of the trailer suspension.

Removal of Trunnion Stands:

1. Remove any bolts and nuts which are part of the trunnion stands between the single point trunnion (dead axle) and the trailer underside supports.

Note

These are typically the bolts and nuts that clamp the stands to the dead axle or that are used at the top of the stands where the stands mount to the trailer underside supports.

2. Using a cutting torch, remove the stands from the trailer underside support areas (2). Discard the old stands.
3. When cooled, check the trunnion tube for smoothness and conformity.

Note

The new clamp must fit tightly and uniformly onto the existing trunnion tube. If the tube has excessive wear and does not have a uniform outer surface it should be replaced.

Preparation of Trailer Supports and Braces:

1. With both trunnion stands completely removed, carefully roll the complete suspension forward for access to the trailer underside supports. Do not allow the suspension to move laterally as this could affect trailer alignment.
2. Grind underside of trailer supports to a flat, smooth surface.

3. Roll suspension back into position.
4. Assemble each load cell to its bearing plate and part of the load cell clamp that bolts to the load cell itself. DO NOT use thread locker at this point, but ensure bolt are correctly seated and tight.
5. Using the hydraulic jacks or forklift slightly lift the trailer upwards.
6. Position each load cell, bearing plate and clamp over the trunnion tube (dead axle) so it aligns with the trailer underside supports.
7. Slide into position the 3/4" thick flat mounting plates (identified above) so they are centered between the load cell bearing plate and the trailer underside support on each side.
8. With both load cell clamp assemblies firmly and securely mounted to the trunnion tube, and evenly aligned beneath the trailer underside supports, TACK WELD THE 3/4" BASE PLATE TO THE TRAILER UNDERSIDE SUPPORTS.
9. Lift the trailer slightly and remove the load cell assembly (clamp, load cell and load cell bearing plate). For final welding of the base plates to the trailer underside supports, it may be necessary to roll the suspension forward, for good access to welding surfaces.

Welder must weld the base plate to the trailer underside supports all the way around, i.e. on all four sides. It might be necessary to raise the trailer slightly for better access to these base plate welds, particularly the inside welds closest to the suspension leaf springs. Follow welding recommends, alternate sides and ends to avoid overheating and potential warpage.

Welding the Load Cell Bearing Plates:

1. When cooled, roll the suspension back into position, and remount the clamp load cell assemblies, so that load cell bearing plates are flat on the base plates just welded. This will require lowering the trailer onto the bearing plates using the jacks or forklift.
2. Ensure all load cell bolts are tight.
3. Ensure there is no weld spatter on either the bearing plate or base plate surfaces that might affect a tight, flat fit.
4. Tack weld the load cell bearing plates to the base plates recently welded to the trailer underside supports.
5. Remove the four 1-1/8” load cell bolts, lift the trailer slightly, and slide the load cell/clamp assembly out (to the center, then lift out).
6. Perform final welding of the load cell bearing plates.

   RECOMMENDED: Use duct tape or some other material to cover the threaded bearing plate holes and prevent entry into the holes of weld spatter. Also ensure there is no weld spatter on the bearing plate surfaces which contact the load cells.

Mounting Load Cells and Clamping Plates:

1. When cooled, re-mount the load cells and bolt them into the bearing plates (two 1-1/8" bolts per load cell).
2. Ensure all bolt align correctly before torquing. Use a serviceable thread locker on all threads of the 1-1/8" bolts. Torque these bolts to 1000 lb/ft.
3. Tighten all clamp bolts and use the thin tabbed bolt-head locking plates to ensure bolts cannot rotate loose. Do not bend plates until final assembly testing is complete.

Finishing the Installation:

1. Remove the load cell cable clamp and mount the load cell cables to the output connector.
2. Install the load cell cable clamp over the cable connecting to the load cell. This clamp is intended to protect the connector of the load cell, in the event of cable pulling (from log branches or ground protruding items for example), by causing the cable to the load cell to break first and not cause damage to the load cell connector.
3. Tie down all cables so they are not exposed to any type of damage.
4. Apply a primer or automotive underbody spray protector to the exposed steel of the base plates, load cell bearing plates and trailer underside mounts.
5. Lower the trailer onto the load cells. Check load cell test numbers on the digital indicator in the cab.

Post Installation

After approximately two weeks of trailer hauling, visually check all welds, check bolt torques of the 1-1/8" bolts, and perform a new scale calibration. Because the load cell steel and all steel used in the installation is new and takes a few loads to properly seat the installation, a re-cal is recommended. The 1-1/8" load cell bolts must be checked at each normal PM interval.

IMPORTANT Do not weld the bearing plates while they are attached to the load cells as this may result in damage to the load cell from overheating or arcing on the load cell. Improper grounding of weld current may also destroy load cells, so they must be completely removed for final welding. See Section 6.3 on page 59.

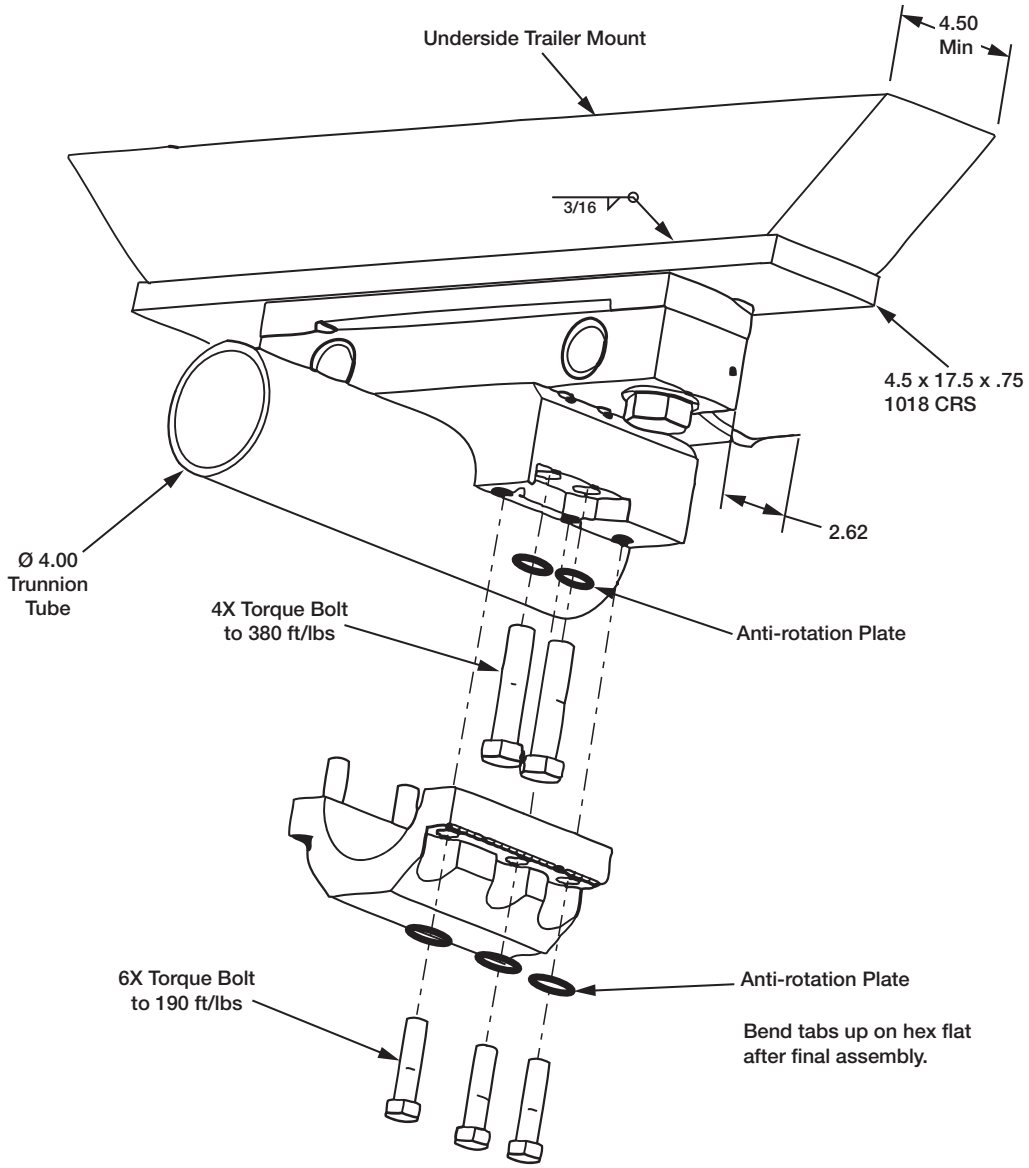


Figure 4-46. Final Assembly

Bolt Size	
1-1/8" -12 UNF x 3.25"L Bolt	1000 to 1200 lb/ft. (1355-1626 Nm)
Clamp Bolts and Locknuts	380 to 420 lb/ft (542 to 600 Nm)

Table 4-4. Specifications

Connections:

1. Connect the trailer transmitter leads (2) to the load cell connectors.

Note The transmitter has a RED lead (with red heat shrink tubing) and a BLACK lead (no heat shrink, which identifies the load cell for diagnostics testing in the meter program).

2. Mount the transmitter in a protected area of the trailer under structure.
3. Tie down all cables so they are not exposed to any type of damage.
4. Run the two-wire cable from the transmitter to connector at front of the trailer. See Section 6.4 on page 61.

4.11 PL9710 and PL9740 Output Ports

Rice Lake Weighing Systems Model PL9710 and PL9740 digital indicators are equipped with three rear panel serial ports for driving printer(s), remote displays, an on-board computer and other peripheral devices capable of accepting RS-232 or RS-485 interfaces.

Figure 4-47. Digital Indicator

Figure 4-48. Remote Display (left) and Printer (right)

The PL6050 in-cab printer uses a single four wire cable. Two wires are serial connections which connect to the PL9710 COM 1 terminals GND (white wire) and TXD (green wire). The baud rate required for running the PL6050 printer is 9600 baud, which is also the default setting of the PL9710 indicator. The other two wires connect to the POWER terminals at rear of the PL9710 (12 Vdc, Red + and Black -).

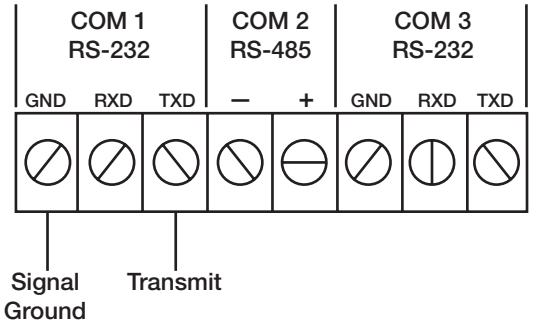


Figure 4-49. Model PL9710 Printer Connections

Selectable Baud Rates	1200, 2400, 4800, 9600 (default) and 19200 baud
Baud Selection: Printer Setup Mode	Hold down MENU key for 7 seconds. The display will show SETUP SERIAL PORT
Parity	None
Stop Bit	1
Data	8 bits
Transmission Selection	On-command or continuous (Printer Setup Mode)
Continuous Transmission Format	<status> <mode> <polarity> <weight> <unit> <terminate>

Table 4-5. RS-232 Interface Specifications

5.0 Service and Troubleshooting

5.1 System Maintenance

This section of the manual is intended to assist the user with techniques for system maintenance and troubleshooting. Maintenance of the on-board scale is very simple but needs to be done at regular intervals. For service issues make sure you have original test numbers to work with, as these test numbers help locate a problem source quickly. Scale meters are built with very simple but effective internal system diagnostics programs that isolate component performance.

With reference to on-board scale service and repair procedures that involve load cells, load pins, trunnions and air transducers, some fundamental precautions and recommendations must be observed by servicing personnel:

- Servicing personnel must ensure that all vehicle structures are free from cracks, excessive wear, corrosion, alignment problems, etc. that can affect safety and scale performance.
- The instructions outlined herein are designed to ensure that a properly serviced installation will provide maximum safety, optimum system performance and accuracy, and a long operating life. It is therefore extremely necessary that the installer comply with all guidelines and material specifications outlined in this manual, with special emphasis on detail and inspection of work.
- Service and repair work must be in compliance with appropriate regulations of the U.S. Department of Transportation (DOT), state and local regulations, the recommended standards and practices of the Society of Automotive Engineers (SAE), standards of the American Welding Society (AWS), and the recommendations of the truck, trailer and body, hoist and/or suspension manufacturer.

WARNING **Failure to observe these recommendations and instructions could result in a hazardous operating condition.**

Maintenance of the On-Board Scale System typically consists of just a few functions, which should be performed at regular cycles.

5.2 Calibration

System calibration needs to be performed at the time of original scale installation. Rice Lake Weighing Systems recommends that scale calibration be repeated about one month after original scale installation to adjust for any mechanical influences that "seat" a new scale.

There is no typical interval for scale calibration that can be universally specified. Instead, operators should keep comparison data of on-board scale loads as compared to weights obtained from certified platform scales or pre-measured loads. If this is not possible, six-month re-calibration intervals are recommended.

5.3 Sensor Maintenance

5.3.1 Load Cells

For all bolt-down load cells, it is critically important that all mounting and locating bolts have their recommended torque values maintained at specified values. Torque values in lb/ft and Nm are shown in “Bolt Torque Values” on page 58. In addition to load cell bolt torque values, service personnel must also monitor the torque values of bolts used to mount load cell bracketry. For load cell bolts, which mount with coil springs, ensure that bolt tightening compresses the coil by at least 0.25 inch, and that a serviceable bolt thread locking material is used (See Section 5.7.1 on page 52).

5.3.2 Load Pins

For hinge pivot and ram-mount load pins, thorough pin lubrication is critical to proper scale performance. Ensure all load pins used in roll-off, dump body, waste water tank and other pin applications are always well-lubricated.

5.3.3 Visual Inspection

At the end of each day, service personnel should perform visual inspections that look for: signs of wear or “polishing”; any sign of weld cracking or failure; any evidence of excessive corrosion; evidence of potential chassis, body runner or support structure cracking or bending. When the RLWS load cells were originally installed, instructions specified that mounting brackets required clean, flat, rigid and co-planar surfaces for welding. If these surfaces have become cracked, corroded or out of alignment, then corrective action must be taken to ensure proper performance and safety of the on-board scale installation.

5.4 Cables and Connectors

5.4.1 Cables

Inspect for any loosening of cables that might result in exposure to damage. Repair by adding more cable ties to tighten up the cable run.

5.4.2 Connections

Rice Lake Weighing Systems uses special connectors which do not corrode and can withstand extremely cold conditions. However, systems of other manufacturers use aluminum Mil-Spec connectors which can corrode over time, and these systems sometimes use load sensors or electronics. When aluminum connectors are present, especially in environments with high humidity or road salts, the connectors should be periodically cleaned and protected with plumbers tape. If a Mil-Spec connector is severely corroded, contact Rice Lake Weighing Systems for replacement information.

Figure 5-1. PL9000-15 Load Cell with Connector

5.4.3 Truck/Trailer Connector

This is a common location for scale system problems. The system uses a 2-wire digital link from transmitter to indicator, but the connections between truck and trailer must be kept free from failures due to dirt or grease, freezing and thawing and inadequate wire connections. Cheaper connectors will expand and contract during temperature change, possibly causing a NO CONNECTION error message, especially if ice is present. If you have a NO CONNECTION CHAN 2 error message, test the truck/trailer connections by bypassing the connector with a short piece of two-wire cable.

5.5 System Troubleshooting

Identifying the Problem

This is the most important part of handling a scale system problem.

Answer these questions:

Are weight values inaccurate?

- Are the errors large or small as a percentage of load?
- Is the inaccuracy always high or always low, or both high and low?
- Is this only on some loads or all loads?
- On a tractor/trailer, is the problem with CH-1 or CH-2, or both?

Is the scale unstable?

- Is the instability slight? For example, less than 100 lbs? Or is instability over a wide range?
- Is the zero reset unstable only in the Load/Deliver mode?
- Is the scale always unstable, or only sometimes? When?

Are all indicator functions stable?

- Does the scale remain powered all of the time?
- Can you access and use all functions?

5.5.1 Error Messages

If the scale is powered and weights are displayed, turn off the scale indicator. After a few seconds, turn it on and watch the lower liquid crystal display for an error or problem message. The scale will go through a short start-up cycle, then after a few seconds a message might be displayed, such as LOW POWER or NO CONNECTION CHANNEL 1 or CHANNEL 2 RED SIDE DEFECTIVE, as examples. See Section 5.10 on page 55 for a complete list of error messages.

Verify

Before moving to the TEST mode, if the message shows ERR CH-1 or ERR CH-2, go to the back terminal of the indicator and swap the CH-1 and CH-2 cables. The ERR message should switch to the opposite channel. If it does not there may be an internal problem with the indicator.

No Power

If the scale does not power ON, check the input power at the rear terminals of the indicator with a volt meter. There should be 11.5 to 16 VDCpresent. If not, you must check the power source, power wiring or power line fusing. If there is 11.5 to 16 VDC present, unplug the White and Black wires from the transmitter(s), and press the ON key. If the indicator does not power on with the transmitter disconnected and a verified 11.5 to16 Vdc, then the indicator may need repair at the factory. If the indicator does power ON, reconnect the transmitter cable and begin a process of disconnecting reach cable, then each load cell until indicator powers ON.

5.5.2 Test

If the scale is powered, and there is no error message in the start-up cycle, enter the TEST mode as indicated in “Test Mode” on page 57.

Note **Model 9700 meters are always dual or four channel units, while model 9710 meters may be single or dual channel units.**

For dual channel units, the LCD shows CH-1: RED and BLACK values and CH-2 RED and BLACK values.

Note **For single lead transmitters the RED and BLACK values are identical. For dual lead transmitters, the lead from the transmitter with a red band of heat-shrink tubing on it is the RED side; the lead without any heat-shrink is the BLACK side.**

For single channel units, the LCD shows: LC-1, LC-2, LC-3 and LC-4 values for 4-lead transmitters and additionally LC-5 and LC-6 values for 6-lead transmitters. Each transmitter label shows which cable lead corresponds to LC-1, LC-2, etc. and the cable lead also has a red band of heat-shrink tubing to designate the lead number.

On-Board Weighing Systems sensors are very accurately balanced, but the load cells of other manufacturers may not be. Typical test values for a load cell, load pin or transducer can be from 25,000 to 39,000 (empty vehicle). Test numbers outside of this range are suspicious. Test numbers sometime change by 1, 2 or a few counts while being observed. However, the fluctuation of test numbers by more than a few counts is a sign that something might be wrong with that lead or sensor.

As the vehicle is loaded, test numbers will increase proportionally. While loading, if you notice one of the test numbers is slowly increasing or decreasing but the load is stable, that load sensor may be failing. Another sign of impending failure would be if one of the test numbers increases much greater or less than the other test number(s) on that same channel.

Record these numbers and compare them to original test numbers recorded after first scale calibration. Look for large differences in previous and current test numbers.

Short Circuit Test

Use an ordinary paper clip to make a "jumper" and insert it into pin sockets B and C (pin sockets A and F for 7-pin connectors) on the connector of the transmitter lead which has been disconnected from a load sensor. You should get a 32,000 to 33,000 count test number for that lead.

5.5.3 Isolate

If you suspect a problem with a RED test number on channel 2, go to the channel two transmitter and swap the leads. If the problem remains on RED after swapping, there may be a problem with the transmitter or transmitter cable lead. If the suspected problem test number transfers to BLACK, the problem is probably with the load cell, pin or transducer.

Another method for isolation involves the use of a load simulator (a test device you can purchase from Rice Lake Weighing Systems). When a bad test number is suspected, go to that transmitter lead, disconnect it from the load cell/pin/transducer, and connect the simulator to the transmitter lead. If the indicator responds correctly to the simulator, then the problem is usually with the load cell/pin/transducer.

Sometimes when testing a single channel system with three, four or six-lead transmitters, it may be necessary to disconnect one lead at a time to observe changes in the display. When doing this, always reconnect the lead disconnected before moving to the next lead if no problem is found.

Note A disconnected lead will usually give a test number of 65000+ count range.

5.5.4 Calibration

Some of the system problems identified above are related to calibration. For example, system accuracy problems which are small errors, or "always-high"/"always-low" errors are usually calibration-related. Recalibrating the system is recommended. Also, whenever any major component of a system is replaced (load cell, transmitter, indicator), re-calibration should be performed.

Other Issues to Consider

Intermittent errors can often be traced back to cable issues. If this is happening, note any error message on the LCD. The cable between the transmitter and indicator is usually the most vulnerable and should be visually inspected for breaks, cracks, pinches or flattened spots.

Other problems can occur only at certain load levels. This is typically due to a load cell "bottoming out" under load, in which its deflection is restricted. This is rare, but if it occurs, inspection of all load cells and load cell bolts is required. For load cells with single piece bearing plates and kingpin load cells, make sure there has been no build-up of debris between the load cell and the slot of the bearing plates which can restrict normal load cell deflection.

Stability and accuracy of the scale can be affected by the powering of other truck equipment which draws power from the scale. If this occurs, check the power wiring to the scale to isolate it from other powered equipment such as PTO's, pumps, crane's etc.

Note The power cable must be connected directly to the batteries. Do not connect scale power to an accessory terminal on the ignition switch, fuse panel, or behind the dash. The scale must have a CLEAN 12V source.

Check for error sources due to weight transfer around (not through) the load cells. Non-flexible tubing or piping, or other attachments which transmit load or force which the load cells cannot measure must be avoided or remedied (with flex joints) to prevent system errors. Also, installations in which the possibility exists for a cantilevering effect between front and rear load cells (such an extended heavy pumping station) can cause non-linear weighing to occur at lighter loads. In cases of extreme end loading, the load cells must be mounted as far forward or rearward as possible between body and chassis to prevent any possible cantilever effects.

5.6 Cal Factors

Recording the Cal Factor (found in the Set-Up Mode) for each channel calibrated, after calibration is completed, allows you to have an important reference for checking problems later. Also, if you ever change meters, you can enter cal factors into a new or replacement indicator to maintain the system calibration stored in the previous indicator.

When looking for problems in a system, refer to the recorded Cal Factor values. Any major changes are a sign that re-calibration may be required, OR a component has failed.

5.7 Application-Specific Service Notes

5.7.1 Spring-mounted Load Cells

When mounting coil springs to load cells, the installer or service person must ensure that spring-mounting bolts are tightened so that springs are compressed by a minimum of 0.25 inch (7 mm). The installer must also be aware of thread depth of the mounting bolts for springs. These bolts must be threaded into the load cell bolt holes to a minimum depth which is equal to the diameter of the bolt. For example, a 3/4" bolt must be screwed into the load cell to a depth of 0.75 inch (19 mm). A serviceable thread locking material is recommended for spring-bolt installations.

Figure 5-2. Spring Mounted Load Cell

5.7.2 Trunnion Load Pins

Typical service issues of trunnion load pins involve damage to attaching cables and connectors which may be exposed, or rotation of the trunnion itself. When connecting cable leads to trunnion load pin connectors, the installer must ensure some means of protection to prevent exposure of these leads to flying road debris, log branches, loading equipment, etc. To prevent load pin rotation, the trunnion has two machined flat notches (which must always face UP when a pin is installed). These notches are 2 inches wide. Flat bar sections should be welded to the trailer that align with these machined flat notches of the pin to retain and prevent the pin from rotation.

Figure 5-3. Trunnion Load Pin

Note **Never weld to the trunnion load pin itself as this can destroy the circuitry of the load pin, as well as weaken its structural integrity.**

Rice Lake Weighing Systems only recommends the use of neoprene (poly) bushings with trunnion load pins, as these do not deteriorate like rubber bushings. High quality poly bushings are available from Rice Lake Weighing Systems.

5.8 Lift-to-Weigh Program

When servicing on-board systems that have Lift-to-Weigh program as part of the PL9700 indicator, the following guidelines are recommended:

- Always verify the system functions with the body elevated (Test numbers, Cal Factor etc.). Elevation should be only a few inches off the truck chassis.
- Verify all L-1, L-2 and L-3 dimensions entered into the Setup Menu. If these numbers have been changed, the calibration function will not be correct. The algorithm which calculates axle weights is dependent on correctly-entered dimensional values.
- The Lift-to-Weigh calibration sequence always requires the Empty and Full calibration entries to be entered twice consecutively.

Figure 5-4. Lift-to-Weigh Truck

5.8.1 Air Pressure Transducers

There are very few service issues relating to air transducer units after initial installation. For the system to operate accurately and reliably, all pressure connections must always be leak-free. If the system shows signs of unstable weight readings and large errors under load, all pressure connections must be checked immediately.

Note **Do not allow the female transducer adapter fitting to rotate when tightening air line fittings.**

Use a 3/4" open end/box end wrench to hold the female transducer adapter fitting in place while using a 9/16" open/box end wrench to tighten the air line fitting. When connecting air hose to the push-on air line fitting, make sure the hose is clean and free from paint. See “Air Pressure Transducer” on page 11.

More typical problems with air transducer systems involve old or sticking leveling valves that do not respond properly to loaded weights, or are affected by air leaks. The correct service repair in these cases are replacement of the leveling valve itself. Rice Lake Weighing Systems recommends the Immediate Response Valve (part nr. 905-54-241) manufactured by Haldex, which is available from Rice Lake Weighing Systems. Diagnosis of this problem is unstable weight readings, large loading errors, or errors which occur while loading but normalize when the vehicle moves or is on level ground.

In very cold climate conditions (sub-freezing), it is possible that moisture exists in the air tank or air lines which, when frozen, will affect the performance of the air transducer. If this occurs, the air tank must be bled in a warm environment. Contact the local truck/trailer equipment supplier for anti-freeze products that can be used in the air system.

5.9 Connector Pin-outs, Color Codes

4-Pin Connector	7-Pin Connector	3-Pin Connector
A=RED=Excitation+	A=WHITE=Signal-	A=WHITE
B=GREEN=Signal+	F=GREEN=Signal+	B=Jumpered to C
C=WHITE=Signal-	C=BLACK=Exc-	C=BLACK
D=BLACK=Excitation-	D=RED=Exc+	

Table 5-1. Color Codes

For systems using the Interlink connector system, please contact Rice Lake Weighing Systems for assistance.

5.10 .Error Messages

Ch.1 Red side defective
The red-banded wire may be damaged between the load cell and the channel 1 transmitter.

- The load cell connected to the red-banded wire of channel 1 may be defective.
- Swap the two load-cell cables. If the message is the same, the red-banded wire is damaged, possibly pinched or cut. If the message changes to read the black side is defective, then the load cell is the problem.

Ch.1 Blk side defective
The black wire may be damaged between the load cell and the channel 1 transmitter.

- The load cell connected to the black wire of channel 1 may be defective.
- Swap the two load-cell cables. If the message is the same, the black wire is damaged, possibly pinched or cut. If the message changes to say the red side is defective, then the load cell is the problem.

Ch.2 Red side defective
The red-banded wire may be damaged between the load cell and the channel 2 transmitter.

- The load cell connected to the red-banded wire of channel 2 may be defective.
- Swap the two load-cell cables. If the message is the same, the red-banded wire is damaged, possibly pinched or cut. If the message changes to read the black side is defective, then the load cell is the problem.

Ch.2 Blk side defective
The black wire may be damaged between the load cell and the channel 2 transmitter.

- The load cell connected to the black wire of channel 2 may be defective.
- Swap the two load-cell cables. If the message is the same, the black wire is damaged, possibly pinched or cut. If the message changes to say the red side is defective, then the load cell is the problem.

Ch.1 not connected
Channel 1 is not connected to its transmitter.

- The channel 1 wire may have been disconnected at the back of the indicator.
- The channel 1 wire may be damaged between the channel 1 transmitter and the indicator. Disconnect the channel 1 wires from the indicator. Assuming channel 2 is working, connect the channel 2 wires to the channel 1 terminals. If the message stays the same, the indicator is defective. If the message goes away and channel 1 works again, then the wire is the problem. Check for a cut wire or a connector unplugged.

Ch.2 not connected
Channel 2 is not connected to its transmitter.

- The channel 2 wire may have been disconnected at the back of the indicator.
- The channel 2 wire may be damaged between the channel 2 transmitter and the indicator. Disconnect the channel 1 wires from the indicator. Assuming channel 1 is working, connect the channel 2 wires to the channel 1 terminals. If the message stays the same, the indicator is defective. If the message goes away and channel 2 works again, then the wire is the problem. Check for a cut wire or a connector unplugged.

ERROR Reset Ch1 empty weight out-of-range 3000

The difference between the original empty weight and the current empty weight is too large for the recall empty weight command to function. The difference is limited to 3000 lbs or 2500 kgs.

Check for other problems, such as:

- Bent or distorted load cell
- Damaged load-cell mounting
- Bent truck or trailer frame
- Defective load cell

ERROR Ch1 cable shorted. Check all connections

The channel 1 wires are shorted together or shorted to the truck frame.

- Disconnect the channel 1 wires from the back of the indicator. If the error message remains, the indicator is defective. If the message goes away, check the channel 1 wire.
- The channel 1 wires may be damaged between the load cell and the transmitter or between the transmitter and the indicator.
- Check all wires for cuts or for pinched areas.
- Check for worn insulation where the wire could be shorted to the truck or trailer frame.

ERROR Ch2 cable shorted. Check all connections

The channel 2 wires are shorted together or shorted to the truck frame.

- Disconnect the channel 2 wires from the back of the indicator. If the error message remains, the indicator is defective. If the message goes away, check the channel 2 wire.
- The channel 2 wires may be damaged between the load cell and the transmitter or between the transmitter and the indicator.
- Check all wires for cuts or for pinched areas.

Check for worn insulation where the wire could be shorted to the truck or trailer frame.

No signal Ch.1

The signal from the channel 1 transmitter is not being received at the indicator.

- Disconnect the black and white channel 1 wires from the back of the indicator. Assuming channel 2 is working, move the black and white channel 2 wires from channel 2 to the channel 1 terminals. If the error message remains, then the indicator is defective.
- If the error message goes away and channel 1 again works, check for a cut wire between the indicator and the channel 1 transmitter. Check also for a good connection at the channel 1 transmitter.

No signal Ch.2

The signal from the channel 2 transmitter is not being received at the indicator.

- Disconnect the black and white channel 2 wires from the back of the indicator. Assuming channel 1 is working, move the black and white channel 1 wires from channel 1 to the channel 2 terminals. If the error message remains, then the indicator is defective.
- If the error message goes away and channel 2 again works, check for a cut wire between the indicator and the channel 2 transmitter. Check also for a good connection at the channel 2 transmitter.

Bad signal Ch.1

The quality of the signal from the channel 1 transmitter is poor.

- Disconnect the channel 1 wires from the back of the indicator. Assuming channel 2 is working, move the channel 2 wires from the channel 2 terminals to the channel 1 terminals. If the error message remains, then check the voltage at the power cable. If should be between 11.5 and 16 volts.
- If the voltage is good, then make sure the power lead is connected directly to the battery. Power from any other source may be too “noisy”.
- If the error message still remains, then the indicator may be defective.
- If the message is gone when the channel 2 wires are substituted for channel 1, then the channel 1 transmitter is defective or the connector may not be plugged in correctly.

Bad signal Ch.2

The quality of the signal from the channel 2 transmitter is poor.

- Disconnect the channel 2 wires from the back of the indicator. Assuming channel 1 is working, move the channel 1 wires from the channel 1 terminals to the channel 1 terminals. If the error message remains, then check the voltage at the power cable. If should be between 11.5 and 16 volts.
- If the voltage is good, then make sure the power lead is connected directly to the battery. Power from any other source may be too “noisy”.
- If the error message still remains, then the indicator may be defective.
- If the message is gone when the channel 1 wires are substituted for channel 2, then the channel 2 transmitter is defective or the connector may not be plugged in correctly.

LOW POWER - Input Power required 11VDC to 16VDC

The power voltage to the indicator from the battery is less than 11 volts or greater than 16 volts.

- Make sure the power cable is adequately connected at the terminal strip on the back of the indicator.
- Measure the voltage at the power cable at the back of the indicator. It should be between 11 volts and 16 volts. If not, measure the voltage where the power cable is connected to the battery. If the voltage is greater than 16 volts, check the charging system of the truck.
- Make sure the power cable connections at the battery are clean and tight. The cable must be connected directly to the batteries and not to an accessory, ignition, or other connection in the dash.

5.11 Test Mode

Test numbers provide a way to verify that the system’s load cells are working as they should. Since the test number is related to the actual output of the load cell, it will also give you a warning of impending load cell failure. With a properly working system, the test numbers for all the load cells should be similar. Load cells that are perfectly balanced (meaning no offset) will have test numbers very close to 32,767 when the truck is unloaded. Many load cells are not perfectly balanced, which means the test numbers will be somewhere between 25,000 and 39,000. If you record a test number outside of the 25,000 to 39,000 range, the load cell has an abnormal offset and may be ready to fail.

As the truck is loaded, the test numbers should increase proportionately. For example, suppose the channel 1 test numbers were 32,546 (black) and 33,275 (red) when the truck was empty. When loaded, the test numbers should increase and the test number for the red load cell should still be slightly larger than the black load cell test number.

If you notice one of the test numbers slowly increasing or decreasing but the load is stable, that load cell output may be drifting and the load cell may be failing. Another sign of impending failure would be if one of the test numbers increase much greater or less than the other for that channel.

The following steps will show you how to get test numbers for each load cell. If the system is working properly, record the empty weight test numbers for future reference. If you change load cells, be sure to change the appropriate test number.

5.11.1 Recording Test Numbers

Use the following procedure to record test numbers.

1. Press the **Menu** key to get the Function menu.

If you do not continue with the operating within 15 seconds, the indicator will reset to the normal weighing mode and you will need to start again.

   The information display will show Reset Empty Weight.
2. Press the **Menu** key again to show Select Mode.
3. Press **Test** key to select the test mode.

   The display will briefly show Select Test Mode.

   The weight display will show Test during all of the following steps.
4. Press the **Ch-1** key to display the channel 1 test numbers.

   Record the test numbers.
5. Press the **Ch-2** key to display the channel 2 test numbers.

   Record the test numbers.
6. Press the **Cancel** key to return to the normal weighing mode.
7. The display will briefly show CANCEL - Test Mode.

6.0 Appendix

6.1 Bolt Torque Values

For secure and accurate scale system operation, ensure that all load sensor mounting bolts and locating bolts are correctly tightened to torque specifications. Torque values can vary significantly depending on the lubrication of the bolt threads. The following values shown are based on clean, new threads in as received condition, without additional lubrication. Rice Lake Weighing Systems recommends the use of a thread lubricant such as Loctite 767 or equivalent to prevent the seizing of threads over a long period of time. If replacing any load sensor bolts, use only plated SAE Grade 8 (or ISO/DIN 10.9) specification bolts and Grade C lock nuts. Use only new bolts and lock nuts.

Bolt Size	Part Number	Required Torque	
1-1/4" -12UNF x 2.50L	PL9000-13C	1000 lb fft	1355 Nm
1-1/8" -12UNF x 3.25L	PL9000-26C	1000 lb fft	1355 Nm
1" -14UNF x 1.50L	PL9000-22A	760-840 lb fft	1085 Nm
1" -14UNF x 2.00L	PL9000-22C	760-840 lb fft	1085 Nm
1" -14UNF x 4.50L	PL9000-22D	760-840 lb fft	1085 Nm
3/4" -16UNF x 1.50L	PL9000-17C	380-420 lb fft	542 Nm
3/4" -16UNF x 2.00L	PL9000-17D	380-420 lb fft	542 Nm
Bolts for Spring Mounts	Tighten Spring Bolts so that each Body Spring is compressed by approximately 1/4 inch (7 mm)		

Table 6-1. Load Sensor Locating and Mounting Bolts

Note **For Model PL9000-13 and PL9000-22 load cells, it is important to be cautious for the possibility of bolts being bottomed-out in the load cell "ears". These model load cells, and models of other manufacturers, have "ears" which extend the bolting surface out over the main beam of the load cell body, and if bolts in these ear sections bottom-out onto the main beam of the cell, mechanical bending will be restricted, resulting in poor weighing results and possible damage to the cell. Use a flat blade tool to slide into the slotted area of each load cell ear to make sure there is at least 1/8" (3 mm) gap between the main beam and the bottom of the load cell bolt.**

Bolt thread depth. The installer must always ensure that there is both sufficient thread depth of all bolts which screw into load cells and bearing plates, and ALSO that these bolts cannot bottom out in the load cell or bearing plate. Sufficient thread depth is achieved when the depth of the bolt into the load cell or bearing plate threaded holes is equal to or greater than the diameter of the bolt.

A bolt which bottoms-out in a load cell or bearing plate is too long and will result in a hazardous operating condition. Also, when mounting load cell models with "ears", the installer must ensure that bolts threaded into the ears cannot bottom out against the load cell body under any condition, as this will affect both accuracy and safety of the installation.

In order to minimize the potential for these hazards, the following precautionary steps should be taken. It must be noted that the sole responsibility to ensure these measures are strictly controlled at all times remains with the installer.

Measure the thickness of the bracket/trunnion material, and add the thickness of the washer (typically 0.125" or 3.5 mm), and nominal thread depth of 0.875" (22 mm). Subtract the length of the bolt. Any length exceeding the above sum may result in bottoming out of the bolt and a hazardous operating condition. Any length less than this sum may not provide sufficient thread engagement.

Note **Standard bolt sizes for the 1"-14THD bolts used with PL9000-22 load cells are 1.50" Long (33mm), 2.00" Long (51mm) and 2.50" Long (64mm). Other length requirements may necessitate custom-sized bolt lengths.**

6.2 Spring Bolt Mountings

The mounting of on-board load cells in rigid straight truck applications such as refuse packer bodies, rigid tanker mounts, etc. typically require the installer to provide stress relief of the body in the load cell installation. Stress relief is necessary in preventing possible damage to the body or other structural members. For these applications, RLWS provides specifically-manufactured body coil springs and extended bolts, in two types, depending on the model of load cell being used.

Load Cell Model	Body Spring Part No.	Bolt Part No.	Size
PL9000-13	PL9000-02S 1" Coil	PL9000-22D	1"-14UNF x 4.50" L
PL9000-14	PL9000-01S 3/4" Coil	PL9000-17F	3/4"-16UNF x 4.00"L
PL9000-14.4	PL9000-02S 1" Coil	PL9000-22D	1"-14UNF x 4.50" L
PL9000-16	PL9000-01S 3/4" Coil	PL9000-17F	3/4"-16UNF x 4.00"L
PL9000-17	PL9000-01S 3/4" Coil	PL9000-17F	3/4"-16UNF x 4.00"L
PL9000-22	PL9000-02S 1" Coil	PL9000-22D	1"-14UNF x 4.50"L
PL9000-26	PL9000-02S 1" Coil	PL9000-22D	1"-14UNF x 4.50"L

Table 6-2. Spring Bolt Mounting Specifications

The above bolt lengths are supplied on the basis that the following installation requirements are met by the installer:

- The bolt lengths supplied require the use of 1/2" or 5/8" thick mounting brackets. Any bracket thickness greater than 5/8" may require longer bolts. Rice Lake Weighing Systems does not ever recommend the use of bracket material which is less than 1/2" thick.
- The stainless steel tabbed anti-rotation plates supplied must be used when mounting coil springs and bolts.
- The body springs supplied should be compressed by the mounting bolts on final installation by approximately 1/4" to 3/8" (9.5 mm). A serviceable thread locker should be applied to the bolt threads during final installation.
- If any of the bolts are found to bottom-out in the load cell, they must be removed and replaced with a shorter length bolt. Bottoming out of the bolts cannot be tolerated as it creates and unsafe operating condition and possible damage to the load cells or other components. It is the installer's responsibility to ensure that all bolts used in the installation are of the correct length.

If replacing supplied bolts, the installer must use SAE Grade 8 bolts only, and all recommended bolt torque specifications must be observed.

6.3 Welding Specifications

Preliminary Information

Welding, metalworking and assembly should only be performed by qualified personnel experienced in welding on vehicle body structures and sub-frames. Only welding equipment of the highest quality should be used in the welding of load cell bearing plates. When welding use procedures that ensure high quality welds. Over welding may result in distortion and damage, while under welding may not develop adequate strength.

Rice Lake Weighing Systems recommends removal of load cell after tacking bearing plates in position so that final welding is performed without load cell being subjected to excessive heat, weld current, or cable damage.

If welding with load cells in position, the installer must ensure that electrical current cannot flow through the load cell. All load cell terminals must be shorted together. Attach the ground strap directly to the vehicle frame member to which the bearing plates will be welded. Never weld directly to a load cell.

Always disconnect battery terminals before performing any welding.

Welding Process

For welding the bearing plates, use a low hydrogen process and AWS E7018 rod or equivalent. Welding may be by Shielded Metal Arc Weld (SMAW) stick, Flux Core Arc Weld (FCAW), or Gas Metal Arc Weld (GMAW) spray transfer. Do not use GMAW short circuit transfer.

Weld Configuration

Welding of the bearing plates may only be done by triple-pass fillet weld sequence. For load cells with single-piece bearing plates, weld all three sides on each end with 2.50" or 3" solid weld runs (see drawing and instructions below). For load cells with dual bearing plates, weld each bearing plate on the two outer sides and end only. Welding the inside surface of the bearing plate is not necessary, but not harmful either as long as the bearing plate maintains its correct position. See Figure 6-1, “Weld Sequence,” on page 60.

Fillet Size

The minimum size of the finished triple-pass fillet may not be less than 1/2 inch. See Figure 6-1, “Weld Sequence,” on page 60.

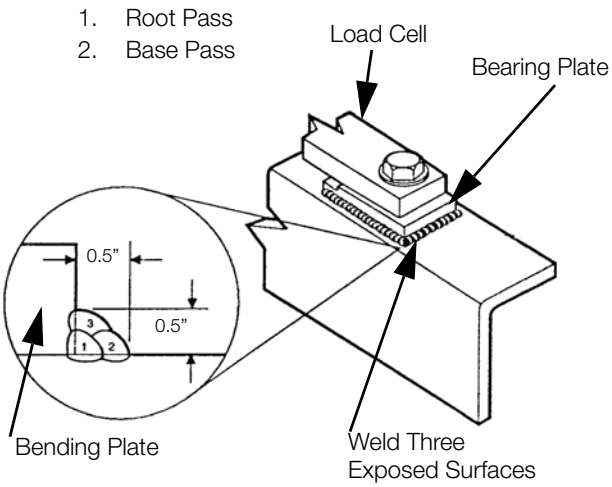


Figure 6-1. Weld Sequence

Electrode

Specifications of the electrode are as follows:

Process	Size	Type	Company
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 6-3. Electrode Specifications

6.3.1 Preparation

All bearing plates must be inspected by the installer and cleaned prior to welding to remove any dirt, paint, rust, grease, oil or other material from the bare metal surfaces. The angle brackets to which the bearing plates will be welded must also be cleaned to bare metal. Use a surface grinder or power wire brush to ensure that the bearing plate mounting areas of the brackets are clean, flat bare metal. Never use bearing plates that have been removed from another installation.

6.3.2 Installation Procedure

1. Preheating of the bearing plates and the angle bracket surface is necessary prior to welding in order to minimize shrinkage stresses. Use an acceptable torch arrangement and preheat to a minimum of 70 degrees F (20 degrees C) and a maximum of 150 degrees F (65 degrees C).
2. Tack weld all bearing plates to angle brackets with load cells mounted to ensure correct positioning. Rice Lake Weighing Systems recommends removal of load cells prior to final welding of the bearing plates. The installer must ensure that the electrode is directed away from the underside of the load cell.
3. Remove slag from tack welds and "feather" end of tack with a grinder to provide a smooth transition for the final weld root pass as it passes through the tack. Each fillet bead must be visually inspected with all slag cover removed before proceeding to the next bead.
4. Alternate weld passes end to end, side to side to avoid bracket distortion.

6.3.3 Inspection

All welds must have sufficient penetration to ensure the strength and safety of the installation. The final size of the triple-pass fillets must not be less than 1/2 inch. No undercut is permitted on either the bearing plate leg of the weld or on the angle bracket surface leg of the weld. Repair any undercut with additional fillet or by means of a contour using a grinder to remove the notch. All weld stops and starts must be visually inspected. Fill any weld craters. Visually inspect the angle bracket for any evidence of warpage or distortion. Weld-induced stresses can adversely affect load cell performance.

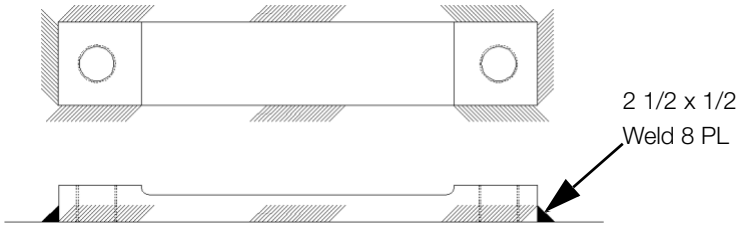


Figure 6-2. Weld Example of Single Piece Bearing Plate

6.3.4 Bolt Torque Verification

After welds have thoroughly cooled, all load cell mounting bolts must be checked for proper torque values. Refer to the “Bolt Torque Values” on page 58 and on the label provided with the scale system.

In some cases it is acceptable to weld bearing plates directly to outboard substructures and to utilize full-length welds on load cell bearing plates. These applications require bearing plates to be welded from underneath, thus the installer must pay special attention to weld quality and the potential for warpage from overheating.

Plug welds are commonly used when mounting body angles to sub-frames or sub-frame fishplate. When welding angles to the body sub-frame, avoid 90-degree welds, as these can become a source for sub-frame cracking.

Always weld the underside of the body angle to the body sub-frame for the entire length of the angle. In other areas of the angle, weld continuously for 6 inches every 12 inches of angle. Never use angle which is less than 1/2 inch thick.

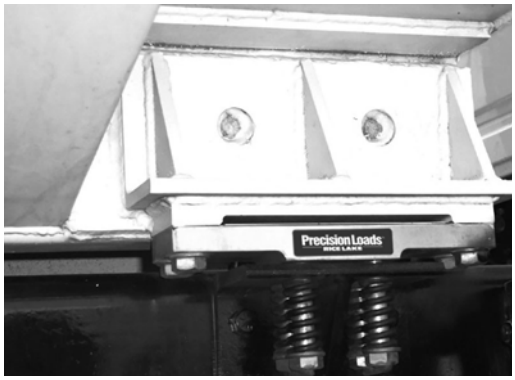


Figure 6-3. Example of Plug Weld

6.4 Transmitter Installation and Cabling

When installing PL9700 series transmitters and cabling on trucks and trailers, observe the following procedures.

Figure 6-4. Four Lead Transmitter

6.4.1 Transmitter location

Once all load cells, transducers or load pins have been installed, select a mounting location for the transmitter. Typically all cable leads from the load cells and load pins measure 30 inches (76 cm) in length. Air and hydraulic pressure sensors have output connectors mounted on the transducer enclosure and do not have leads.

Standard transmitters have leads which measure as follows:

- Single lead transmitter: 60 inches (152 cm)
- Dual lead transmitter: 48 inches (122 cm); 60 inches (152 cm)
- Four lead transmitter (Figure 6-4): 144 inch leads x 4 (366 cm each)
- Six lead transmitters: 144 inch leads x 4; 216 inch leads x 2 (548 cm)

Locate the transmitter(s) in areas protected from handling equipment, exposure to moving parts, road hazards, pivoting parts, tree branches, etc. Cabling should never be taut.

6.4.2 Mounting the transmitter

Mount the transmitter using the two 0.275 inch (7mm) mounting holes in the case flanges. The installer may drill a 1/4" hole in the chassis or a crossmember, using through bolts and locknuts to mount the transmitter, or the transmitter may be mounted to a separate plate (min 1/4" thick) which picks up existing chassis bolt holes. Use 1/4" diameter mounting bolts. Do not over tighten the mounting bolts.

6.4.3 Installing the Cables

Plug the transmitter leads into the load cell leads or pressure transducer connectors. Run the two-wire cable from the three-pin transmitter connector to the truck cab or tractor/trailer connector. In routing the two-wire cable, provide protection of the cable from moving parts, road hazards, heat, corrosives, etc. Do not attach the two-wire cable to air lines. Provide for a small service loop in the two-wire cable at each end. Tie all cables down using heavy duty cable ties at no greater than 18 inch (45 cm) intervals.

Cab Entry Point - Cab Over Vehicles

Tip the cab to access the main cable entry point and run the two-wire cable along the route of any existing cable in this location, tie-wrapping as you go.

Cab Entry Point - Conventional Vehicles

Run the two-wire cable along the route of any existing cabling and through the existing cable access point.

IMPORTANT **The stainless steel transmitter is a sealed, encapsulated and riveted unit and is NOT field serviceable. Do not attempt to weld on or open the transmitter, or to remove the unit's connector or cable strain relief parts. Opening or altering the unit will void warranty coverage.**

6.4.4 Power Access

Access the auxiliary equipment power from either the fuse panel or the manufacturer's dedicated power source connector. The truck manufacturer usually provides a dedicated power access point to be used by companies fitting non-standard apparatus. Whenever possible, these must be used.

It is important that the power is taken from dedicated points like this and not randomly accessed from anywhere else. If you are unsure where to access power from, contact the dealership where the vehicle was purchased.

Note **All electrical equipment should be protected with a 3 amp fuse fitted as close to the power source as possible.**

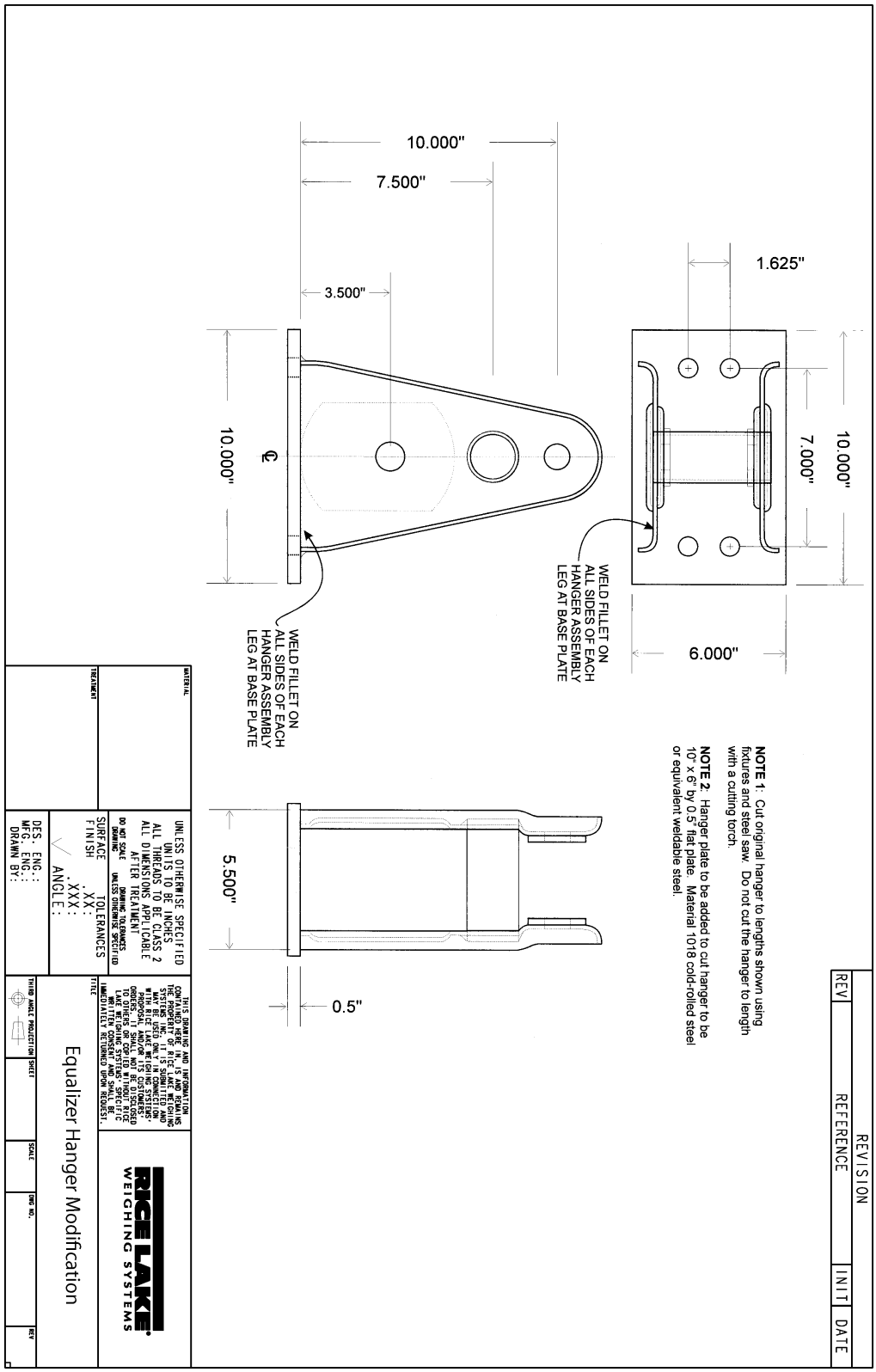
6.5 Liquid Fertilizer Spreading Applications

Load cells must be protected if used in liquid fertilizer spreading applications. Use the following steps to protect the precision loads model onboard scales.

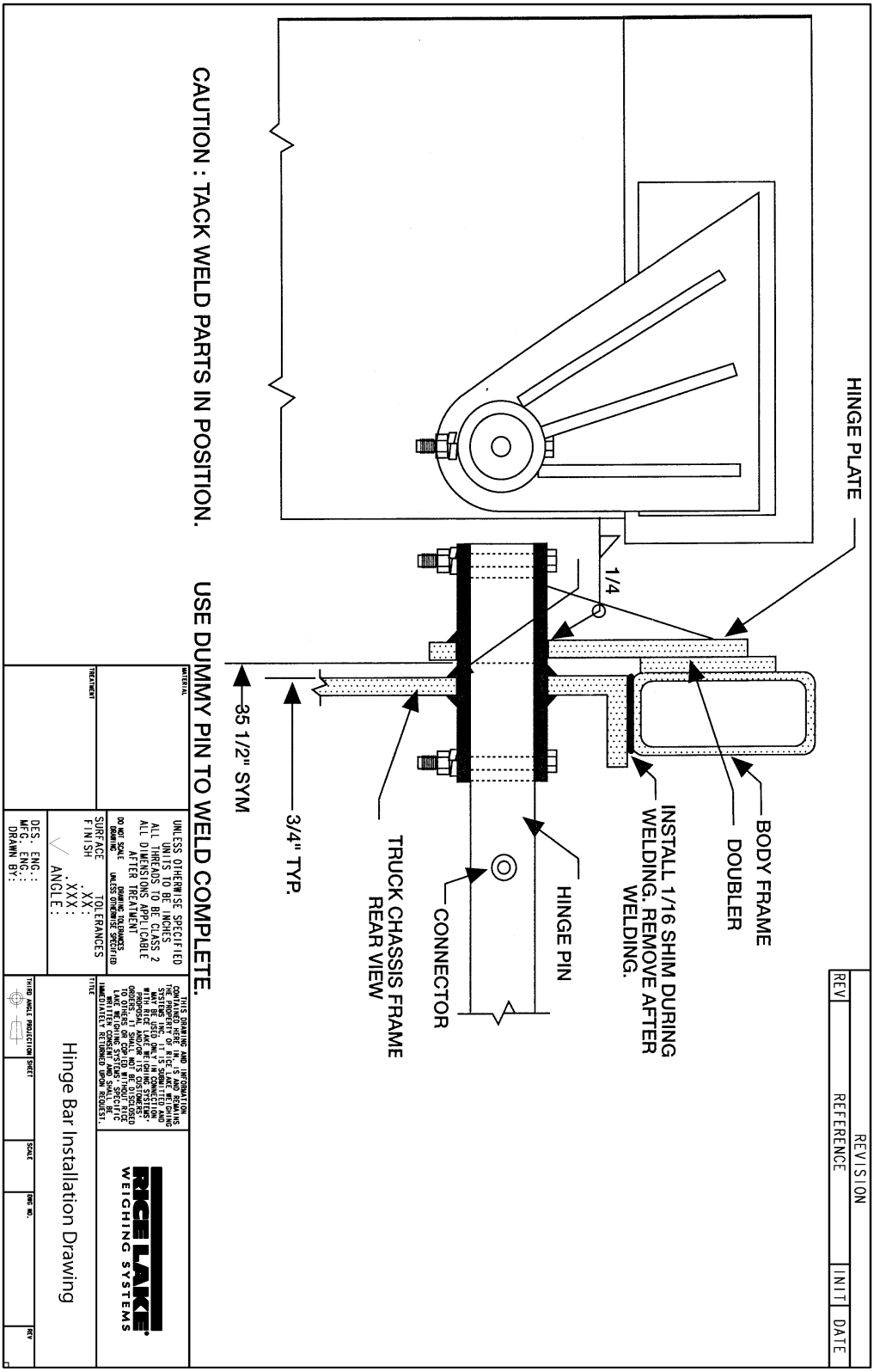
1. Clean the load cells thoroughly using acetone or denatured alcohol.
2. Paint the load cells with a high quality brand name epoxy paint. Consider a marine quality epoxy.
3. Periodically spray the painted load cell with oil, as often as possible, after washing the truck first. Keep epoxy painted load cells coated with oil.

If a failed load cell was corroded due to lack of protection, the owner then needs to address the protection of the remaining load cells. The above steps are standard procedures for other exposed steel structures of the spreader truck which operators must periodically perform.

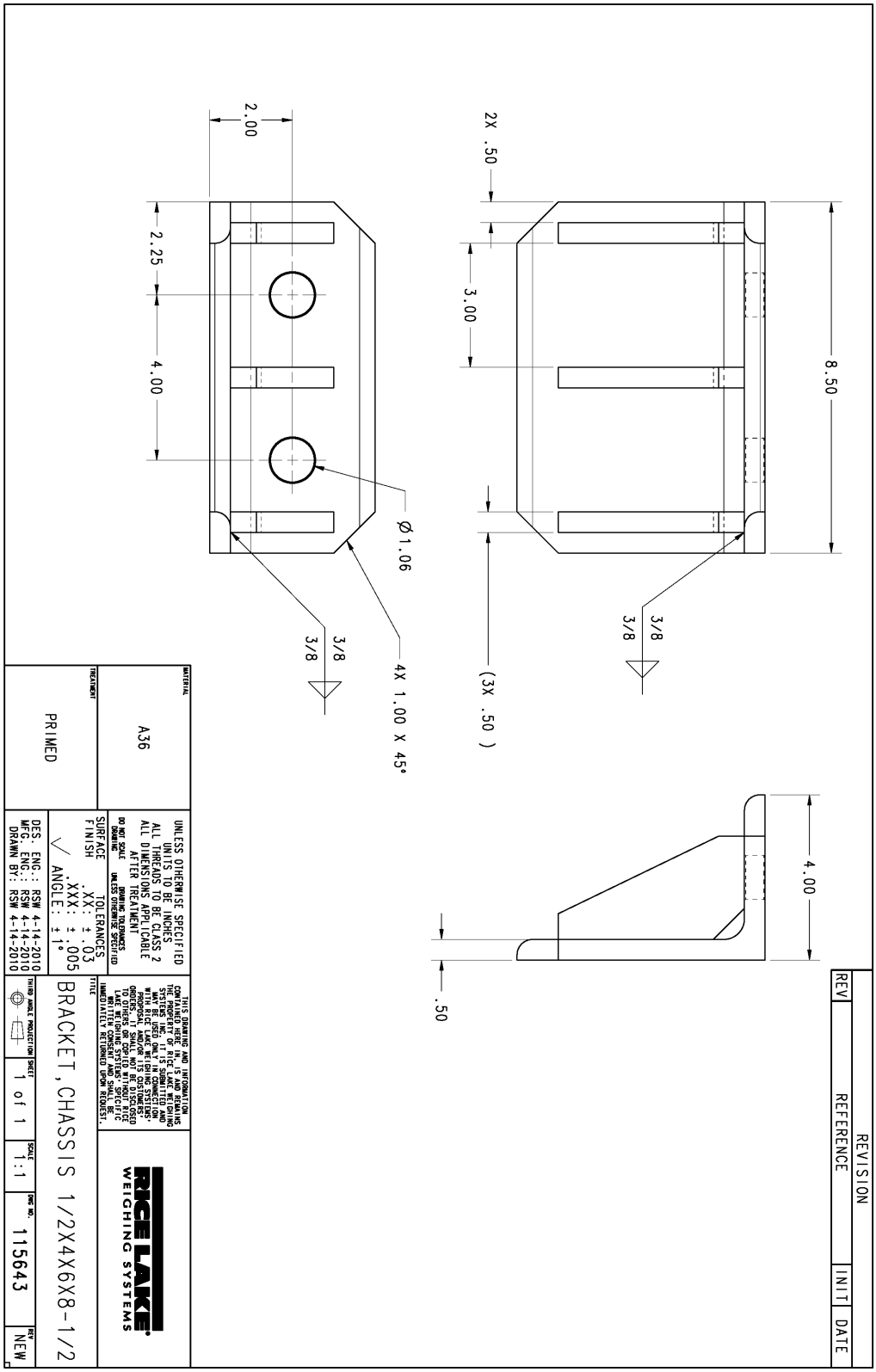
6.6 Equalizer Hanger Modification



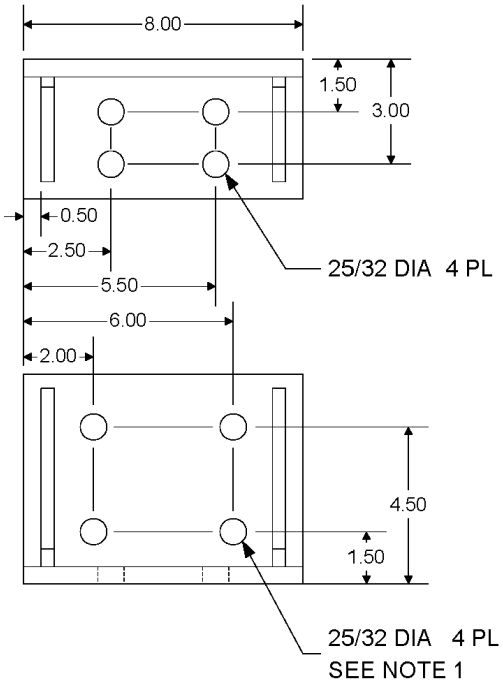
6.7 Hinge Bar Installation Drawing

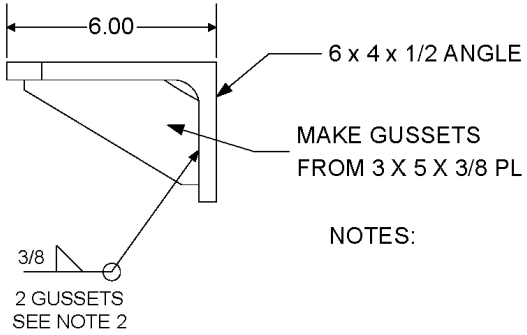


6.8 Underbody Load Cell Chassis and Body Brackets Drawings



REVISION			
REV	REFERENCE	INIT	DATE





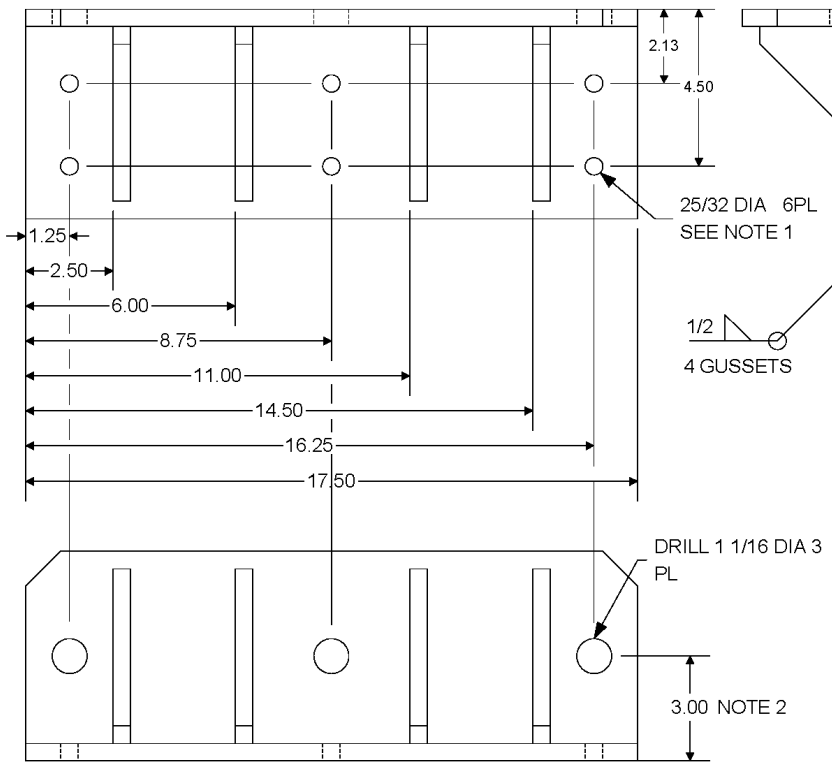
NOTES:

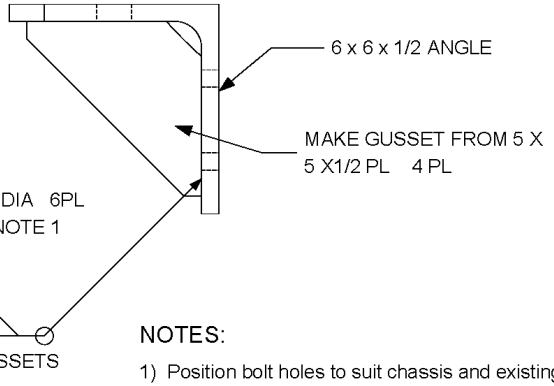
1) Position bolt holes to suit chassis and existing holes where possible. Use a minimum of 4 bolt holes.

2) Welds per ANSI/AWS DI.I Structural Welding Code.

MATERIAL	UNLESS OTHERWISE SPECIFIED UNITS TO BE INCHES ALL THREADS TO BE CLASS 2 ALL DIMENSIONS APPLICABLE AFTER TREATMENT DO NOT SCALE DRAWING — DRAWING TOLERANCES UNLESS OTHERWISE SPECIFIED	THIS DRAWING AND INFORMATION CONTAINED HERE IN, IS AND REMAINS THE PROPERTY OF RICE LAKE WEIGHING SYSTEMS INC. IT IS SUBMITTED AND MAY BE USED ONLY IN CONNECTION WITH RICE LAKE WEIGHING SYSTEMS' PROPOSAL AND/OR ITS CUSTOMERS' ORDERS. IT SHALL NOT BE DISCLOSED TO OTHERS OR COPIED WITHOUT RICE LAKE WEIGHING SYSTEMS' SPECIFIC WRITTEN CONSENT AND SHALL BE IMMEDIATELY RETURNED UPON REQUEST.	RICE LAKE WEIGHING SYSTEMS
TREATMENT	SURFACE FINISH ✓ — TOLERANCES .XX: .XXX: ANGLE: DES. ENG.: MFG. ENG.: DRAWN BY:	TITLE: Chassis Bracket for the Model PL9000-14 Load Cell	
		THIRD ANGLE PROJECTION — SHEET — SCALE — DWG NO. — REV	

REVISION			
REV	REFERENCE	INIT	DATE





NOTES:

1) Position bolt holes to suit chassis and existing holes where possible. Use a minimum of 5 bolt holes.

2) Modify this dimension if required on installation.

3) Welds per ANSI/AWS DI.I Structural Welding Code.

MATERIAL

TREATMENT

UNLESS OTHERWISE SPECIFIED
UNITS TO BE INCHES
ALL THREADS TO BE CLASS 2
ALL DIMENSIONS APPLICABLE
AFTER TREATMENT
DO NOT SCALE DRAWING — DRAWING TOLERANCES UNLESS OTHERWISE SPECIFIED

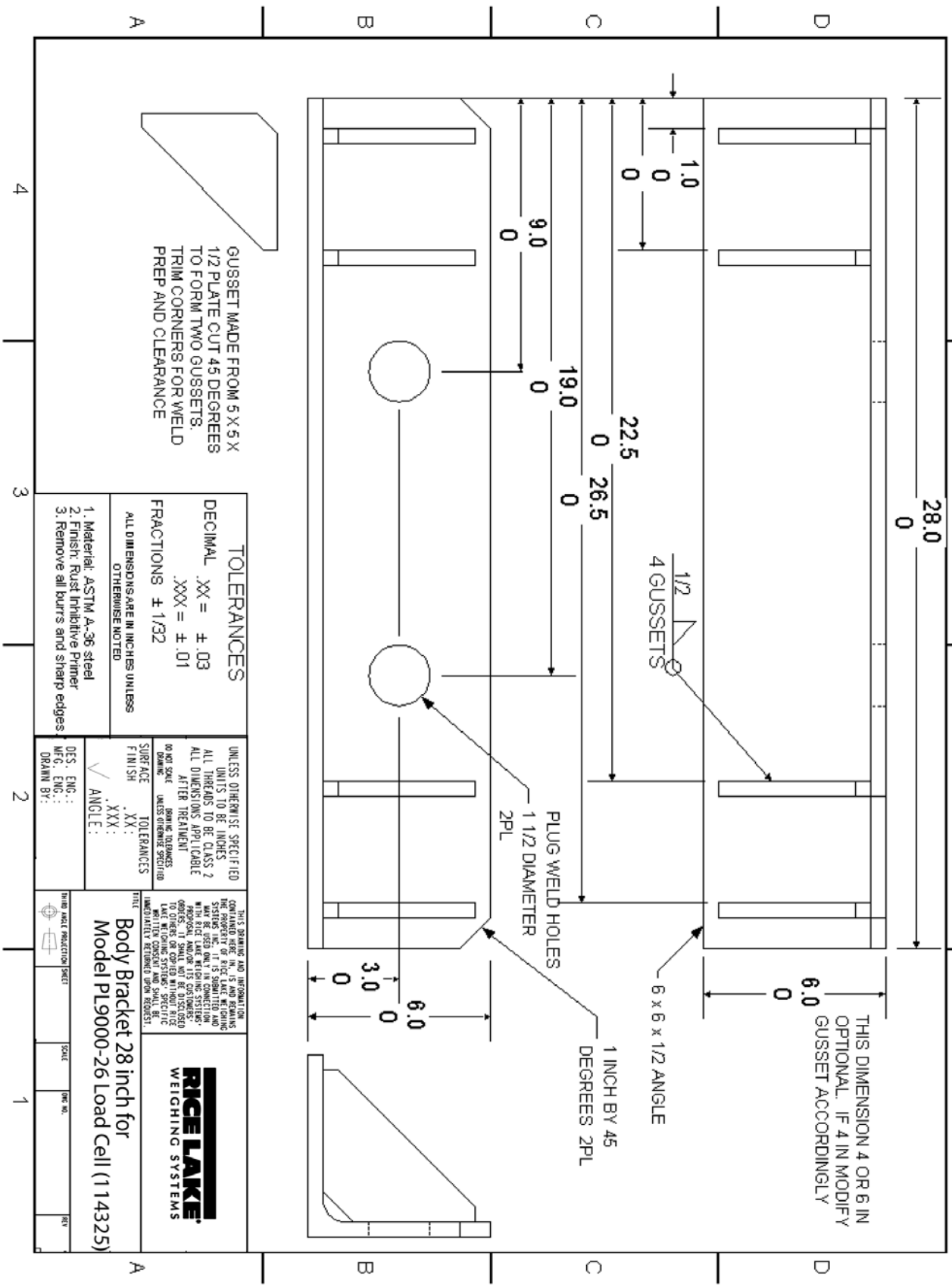
SURFACE FINISH √ TOLERANCES .XX: .XXX: ANGLE:

DES. ENG.:
MFG. ENG.:
DRAWN BY:

RICE LAKE WEIGHING SYSTEMS

TITLE: Chassis Bracket for the Model PL9000-22 and PL9000-26 Load Cell

THIRD ANGLE PROJECTION | SHEET | SCALE | DWG NO. | REV


28.0
0
1.0
0
0
22.5
0
26.5
0
19.0
0
9.0
0
1/2
4 GUSSETS
PLUG WELD HOLES
1 1/2 DIAMETER
2PL
6 x 6 x 1/2 ANGLE
1 INCH BY 45
DEGREES 2PL
THIS DIMENSION 4 OR 6 IN
OPTIONAL. IF 4 IN MODIFY
GUSSET ACCORDINGLY
6.0
0
6.0
0
3.0
0
GUSSET MADE FROM 5 X 5 X
1/2 PLATE CUT 45 DEGREES
TO FORM TWO GUSSETS.
TRIM CORNERS FOR WELD
PREP AND CLEARANCE
TOLERANCES
DECIMAL .XX = ± .03
.XXX = ± .01
FRACTIONS ± 1/32
ALL DIMENSIONS ARE IN INCHES UNLESS
OTHERWISE NOTED
1. Material: ASTM A-36 steel
2. Finish: Rust Inhibitive Primer
3. Remove all burrs and sharp edges
UNLESS OTHERWISE SPECIFIED
UNITS TO BE INCHES
ALL THREADS TO BE CLASS 2
ALL DIMENSIONS APPLICABLE
AFTER TREATMENT
DO NOT SCALE DRAWING
DRAWING TOLERANCES
UNLESS OTHERWISE SPECIFIED
SURFACE FINISH
TOLERANCES
.XX:
.XXX:
ANGLE:
DES:
ENG:
MFG:
ENG:
DRAWN BY:
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SYSTEMS AND IS LOANED HEREWITH AND
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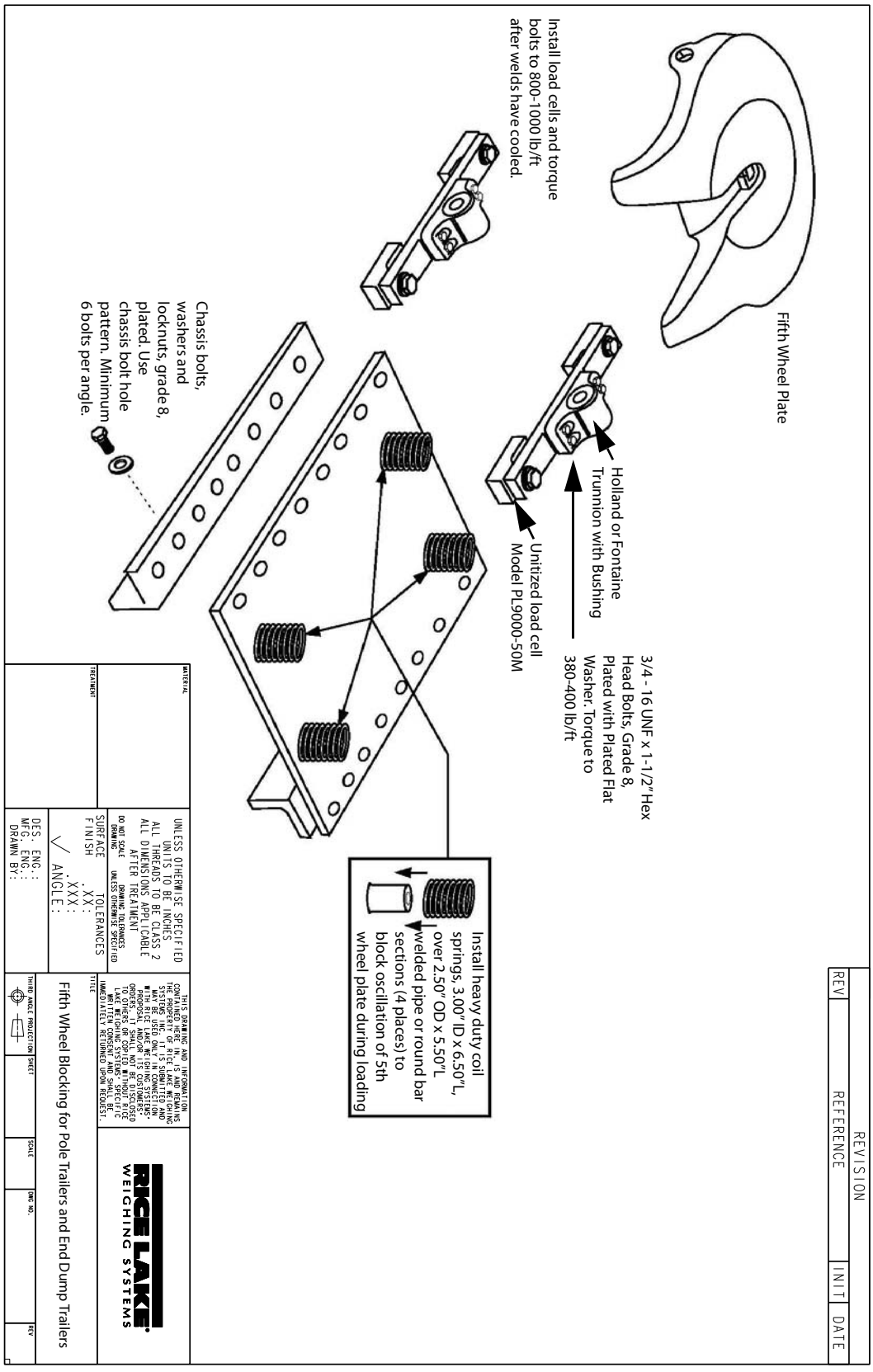
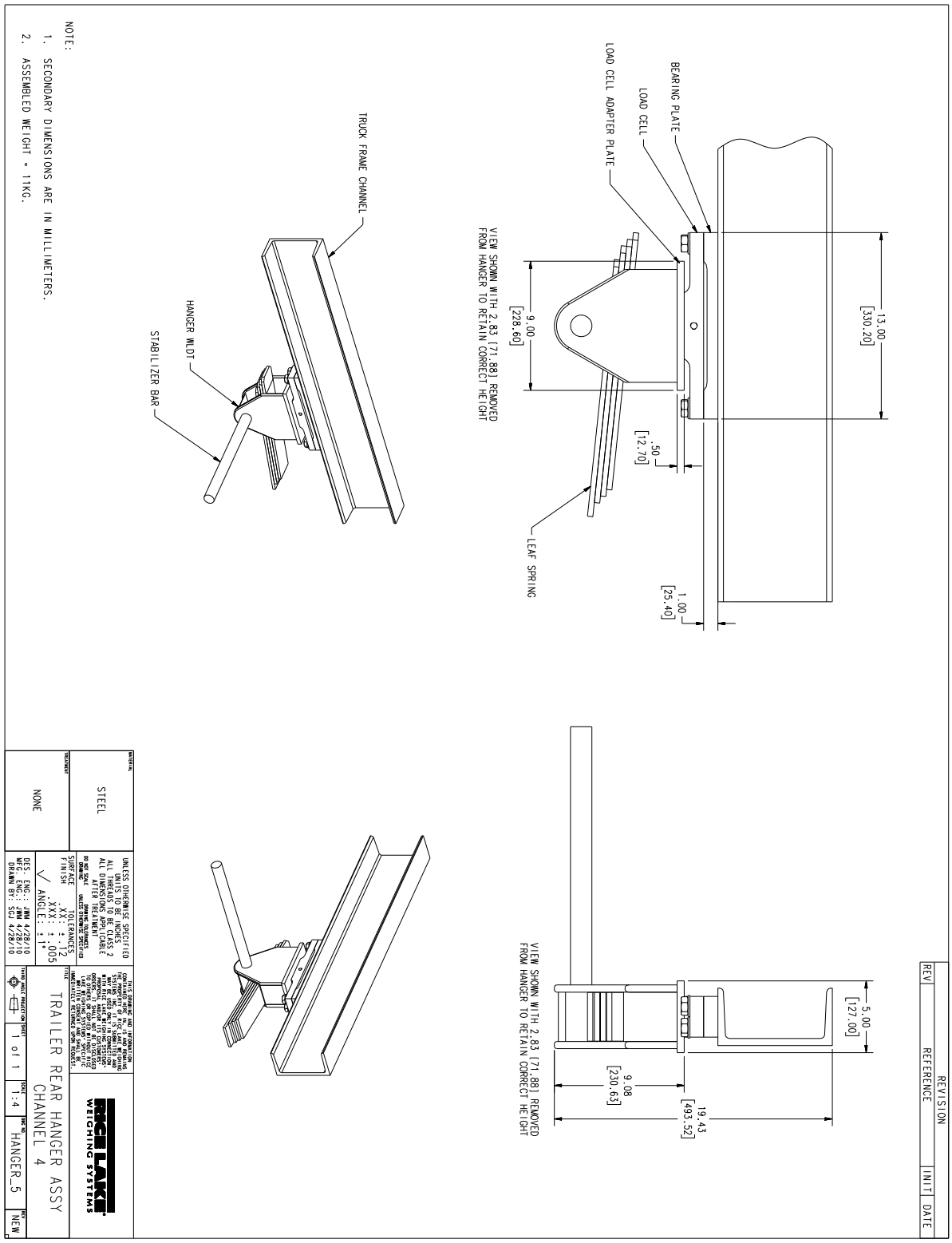
PROPOSAL AND/OR ITS CUSTOMERS'
ORDERS. IT SHALL NOT BE DISCLOSED
TO OTHERS, COPIED OR REPRODUCED
WITHOUT RICE LAKE WEIGHING SYSTEMS' SPECIFIC
WRITTEN CONSENT AND SHALL BE
IMMEDIATELY RETURNED UPON REQUEST.
RICE LAKE
WEIGHING SYSTEMS
TITLE
Body Bracket 28 inch for
Model PL9000-26 Load Cell (114325)
THIRD ANGLE PROJECTION
SHEET
SCALE
DWG NO.
REV
A
B
C
D
1
2
3
4

6.9 5th Wheel Mounts for Pole Trailers and Dump Trailers



6.10 Trailer Rear Hanger Assembly



6.11 PL9710 Indicators with PL9774 Limit Setpoint Option

For Model PL9710 Indicators used with a Model PL9774 Limit Setpoint module, the following instructions apply.

Note For dual limit setpoint applications, Model PL9710 indicators must be ordered with the dual limit setpoint option software installed. Standard PL9710 indicators will not contain this option software, it must be added by Rice Lake Weighing Systems.

6.11.1 System Configurations

The PL9774 Limit Setpoint option may be used with single channel on-board scale system configurations (3, 4, 5 or 6-point load cell kits) connected to indicator channel one (CH-1). Also tractor/trailer scale systems using PL9710 indicator set for dual channel operation (CH-1, CH-2, TOTAL) may also be configured with the PL9774 Limit Setpoint option. However, limits are only operable in the Total Gross weight mode. Limit Setpoint control for each individual channel of a dual channel indicator is available by special order only.

6.11.2 Limit Module Connections

Model PL9774 Limit Setpoint Module is typically supplied with an 8 ft (2.43 m) lead for inter connection to the PL9710 indicator, and a 15 ft (4.57 m) lead for inter connection to lights/alarms and light/alarm power source. See Figure 6-5 for help wiring your particular application.

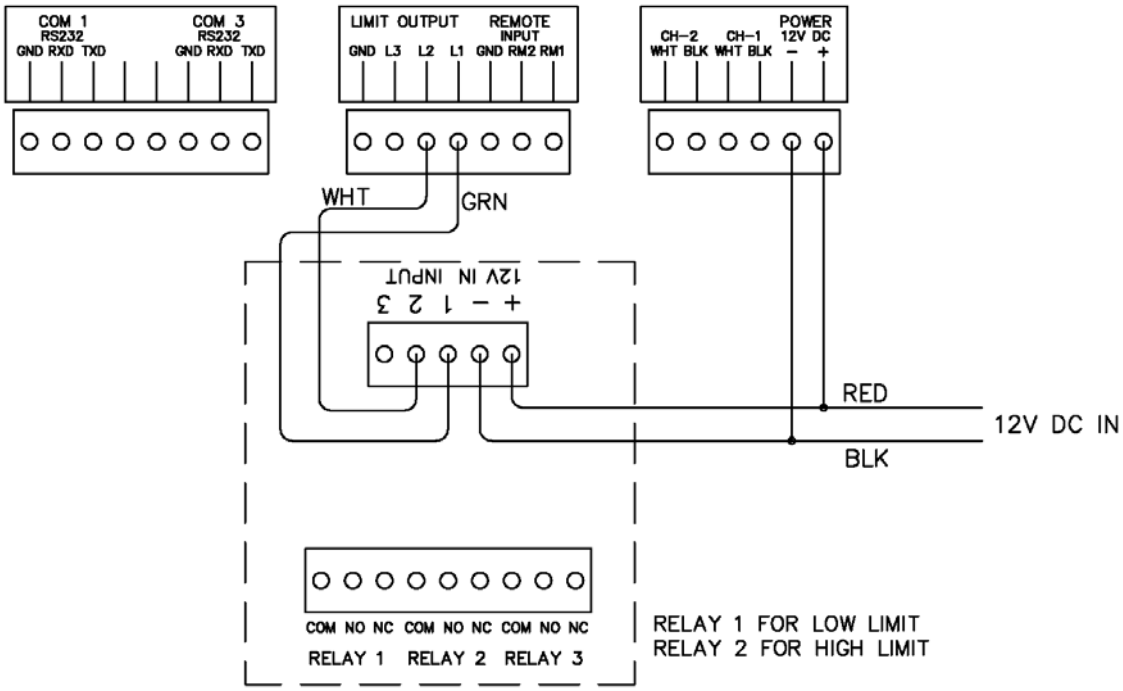


Figure 6-5. Relay Box Wiring Diagram

The 8 ft lead to the indicator has four conductors. The Black and Red conductors may be wired to the GND and +12Vdc terminals as shown on the rear terminal strip of the PL9710. The Green conductor connects to terminal L1 (Limit 1) and the White conductor connects to terminal L2 (Limit 2) on the rear strip of the PL9710. The 15 ft Red (Power) lead of the PL9774 is wired to the positive power source of the lights or alarms being used, with light/alarm ground wired to the negative power source terminal. Green (L1) and White (L2) conductors are wired to the positive terminals of the light or alarm as shown in Figure 6-6.

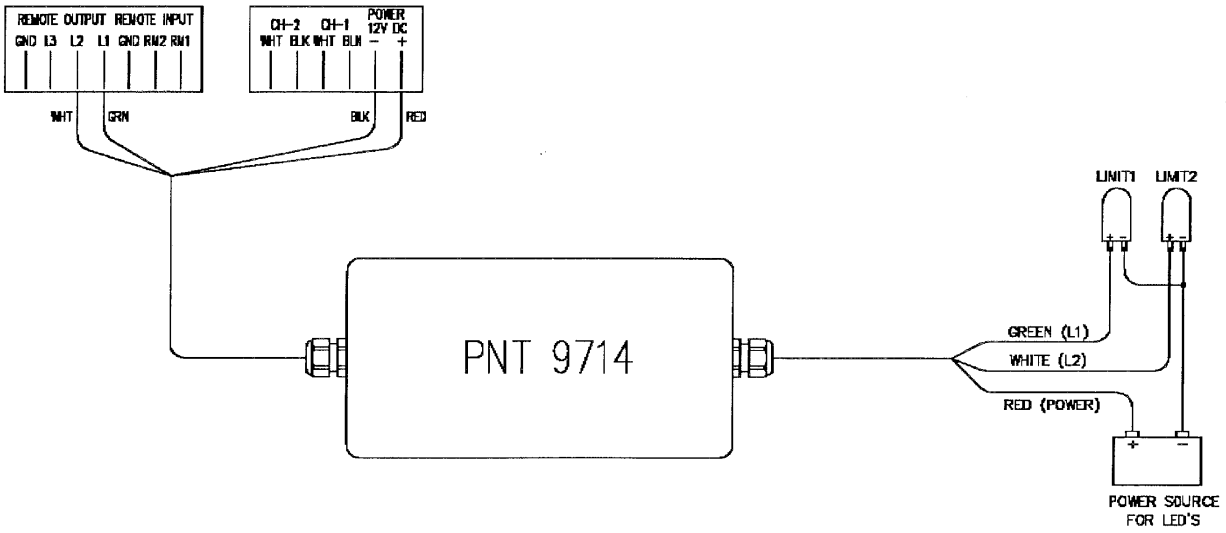


Figure 6-6. Digital Output Drawing

6.11.3 Program Setup

To set limits and limit deadband,

1. Press the **Menu** key for 5 seconds to enter the **Setup** mode.

2. Advance to **Set Limit 1** by pressing the **Up Arrow** key on the upper right area of the PL9710.
3. Enter the value desired for Limit 1.
4. After entering the screen will ask you to enter a Limit 1 deadband.
   The factory default setting is +/- 500 for the deadband.
5. Change the deadband if desired, otherwise press **Cancel** and forward to **Set Limit 2.**
6. Enter the value desired for Limit 2, followed by either change to or **Cancel** of the desired deadband for Limit 2.
7. Exit the **Setup** mode.

6.11.4 Operation

Verify Limit 1 and Limit 2 setpoint operation. If using lights, Limit 1 will activate once the setpoint threshold is reached. Limit 1 will deactivate when Limit 2 is reached. Either flashing or continuous lights or LED's may be used.

Specifications

Relay Rating:	250 Vac/Vdc, 5 amp
Module Size:	3"W x 7"L x 2"H (76 mm x 178 mm x 51 mm) NOTE: For in-cab mounting only.
Deadband:	A relay trips when the display is equal to or greater than the limit. The relay will be untripped if the display drops to a value that is less than the limit minus that deadband value.

Note **Module is for in-cab mounting only. Module not to be installed externally unless housed inside a weatherproof enclosure.**

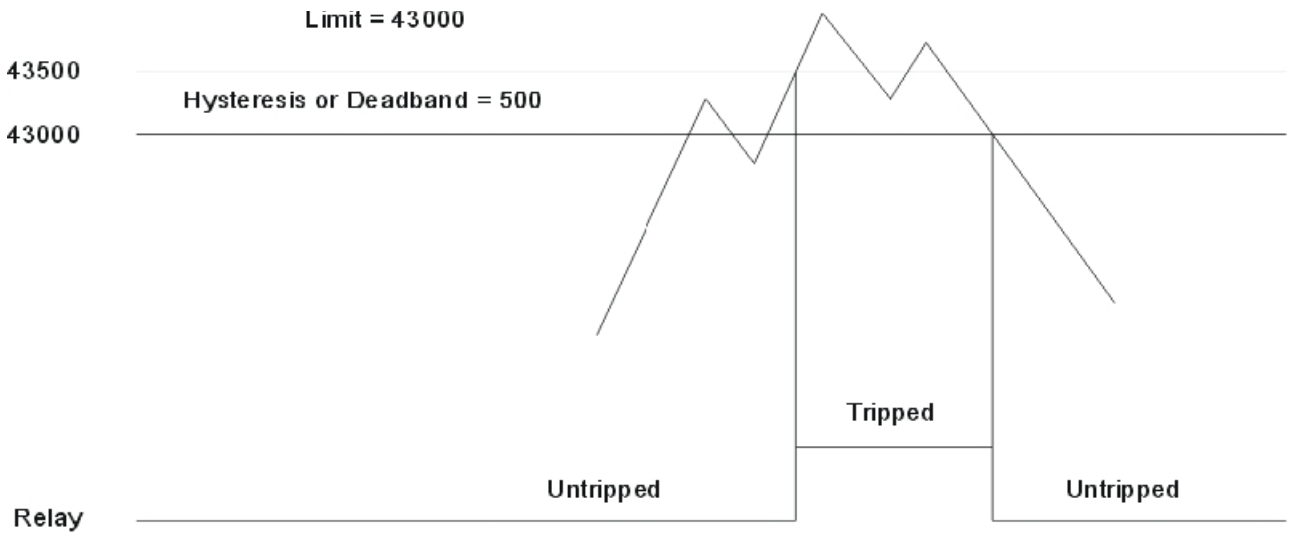
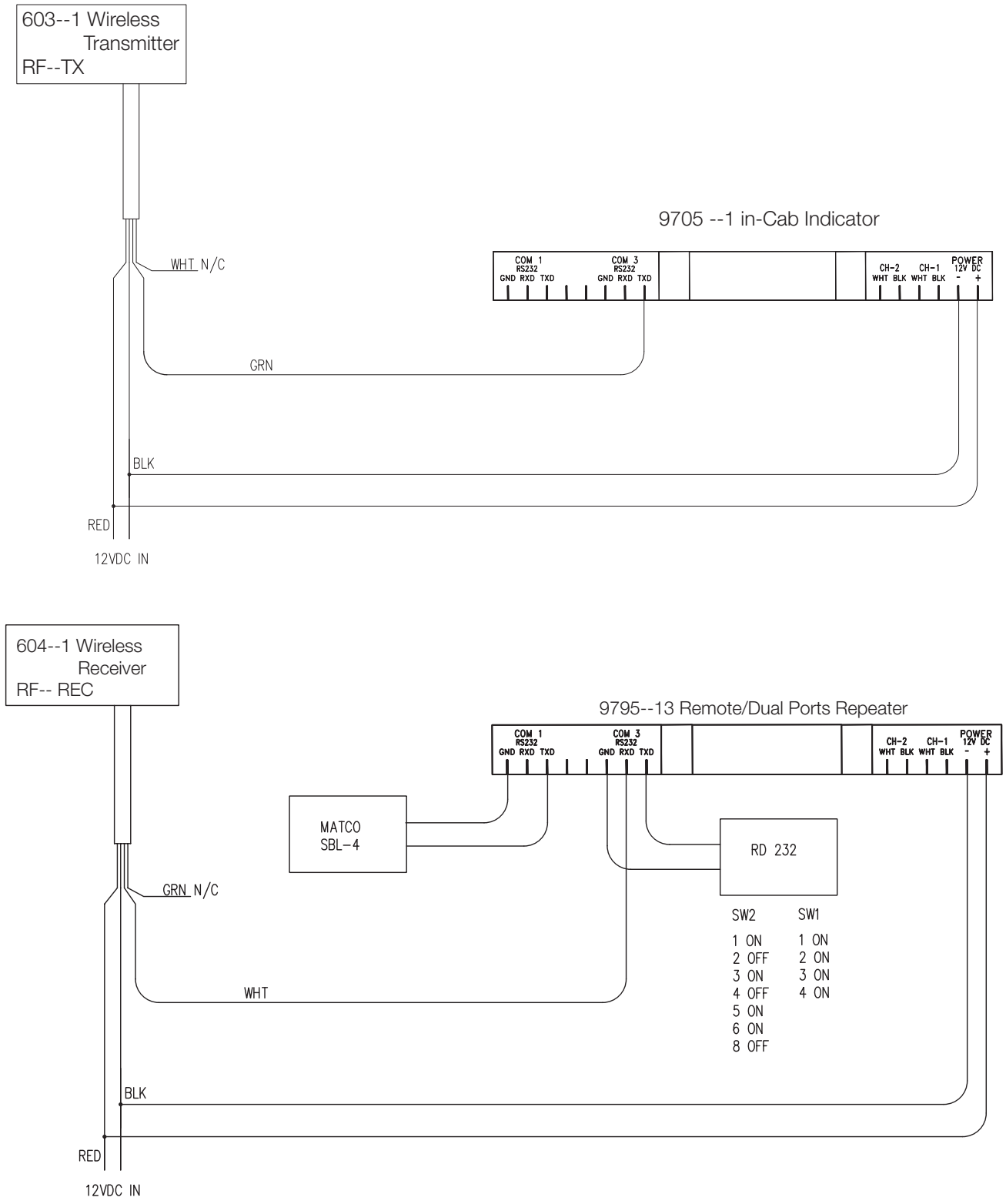


Figure 6-7. Typical Relay Limit Operation

6.12 Transfer Station Wireless Interconnect Between Tractor and Bay



Hardware Warranty Statement

Rice Lake Weighing Systems (RLWS) warrants that all RLWS brand equipment and systems properly installed by a Distributor or Original Equipment Manufacturer (OEM) will operate per written specifications as confirmed by the Distributor/OEM and accepted by RLWS. All systems and components are warranted against defects in materials and workmanship for two (2) years, unless otherwise stated.

RLWS warrants that the equipment sold hereunder will conform to the current written specifications authorized by RLWS. RLWS warrants the equipment against faulty workmanship and defective materials. If any equipment fails to conform to these warranties, RLWS will, at its option, repair or replace such goods returned within the warranty period subject to the following conditions:

Upon discovery by Buyer of such non-conformity, RLWS will be given prompt written notice with a detailed explanation of the alleged deficiencies.

Individual electronic components returned to RLWS for warranty purposes must be packaged to prevent electrostatic discharge (ESD) damage in shipment. Packaging requirements are listed in a publication, "Protecting Your Components From Static Damage in Shipment," available from RLWS Equipment Return Department.

Examination of such equipment by RLWS confirms that the non-conformity actually exists, and was not caused by accident, misuse, neglect, alteration, improper installation, improper repair, or improper testing. RLWS shall be the sole judge of all alleged non-conformities.

Such equipment has not been modified, altered, or changed by any person other than RLWS or its duly authorized repair agents.

RLWS will have a reasonable time to repair or replace the defective equipment. Buyer is responsible for shipping charges both ways

In no event will RLWS be responsible for travel time or on-location repairs, including assembly or disassembly of equipment. Nor will RLWS be liable for the cost of any repairs made by others.

Installer is completely responsible for the design and fitting of the installation, and any changes which might result in voidance of the warranty of the manufacturer of equipment to which the products are installed.

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RLWS AND BUYER AGREE THAT RLWS' SOLE AND EXCLUSIVE LIABILITY HEREUNDER IS LIMITED TO REPAIR OR REPLACEMENT OF SUCH GOODS. IN ACCEPTING THIS WARRANTY, THE BUYER WAIVES ANY AND ALL OTHER CLAIMS TO WARRANTY.

SHOULD THE SELLER BE OTHER THAN RLWS, THE BUYER AGREES TO LOOK ONLY TO THE SELLER FOR WARRANTY CLAIMS.

No terms, conditions, understanding, or agreements purporting to modify the terms of this warranty shall have any legal effect unless made in writing and signed by a corporate officer of RLWS and the Buyer.

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