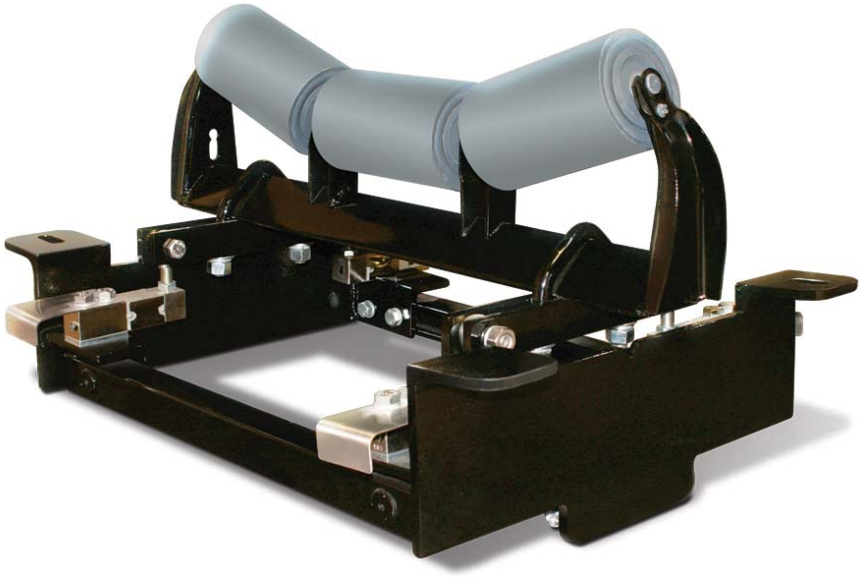
BCi Weigh Frame

Belt Scale

Technical Manual



RICE LAKE®
WEIGHING SYSTEMS

July 9, 2018

PN 180547

An ISO 9001 registered company

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The most current version of this publication, software, firmware and all other product updates can be found on our website:

www.ricelake.com

Contents

1.0 Introduction

This manual is intended for use by service technicians responsible for installing and servicing the *BCi Weigh Frame Belt Scale*.

This manual can be viewed and downloaded from the Rice Lake Weighing Systems website at www.ricelake.com

Warranty information can be found on the website at www.ricelake.com/warranties

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.

Some procedures described in this manual require work inside the indicator enclosure. These procedures are to be performed by qualified service personnel only.

Take all necessary safety precautions when installing the scale carriage including wearing safety shoes, protective eye wear and using the proper tools.

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 then weight taking.

Do not place fingers into slots or possible pinch points.

Do not use load bearing components 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.

Do not use near water.

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

1.2 Overview

A belt conveyor scale continuously measures bulk material as it is moved along a conveyor. The system requires two general parameters to operate:

- Weight of the material being moved along the conveyor belt
- Speed at which the material is moved along the conveyor belt

The weight of the material on the belt is determined by weighing a section of the conveyor belt loaded with material and subtracting the average weight of the unloaded belt. The speed at which the material is moving is determined by measuring the speed of an idler or wheel in contact with the conveyor belt. The weight and speed are combined to give a running total and a rate of flow for the material. Optimum operation of the scale system requires the components to be installed correctly, periodically calibrated and properly maintained.

Typical applications where belt conveyor scales are used:

- Mining
- Quarries
- Bulk material blending
- Truck/barge/rail loading
- Process control applications

In addition, a belt conveyor scale can compute the total mass of the material conveyed over a given period of time and while it is in motion. The *BCi* is durable and one of the most accurate scales in its class. The integrator easily handles capacities up to 10,000 tons per hour with unsurpassed accuracy. It's innovative integrator fits a wide variety of applications - from simple inventory reporting to automated load-out.

1.3 Belt Conveyor Scale System Components

The main components of a basic belt conveyor scale are:

- Scale carriage
- Load cells
- Belt travel pickup speed sensor (not shown)
- Electronic integrator (BCi)

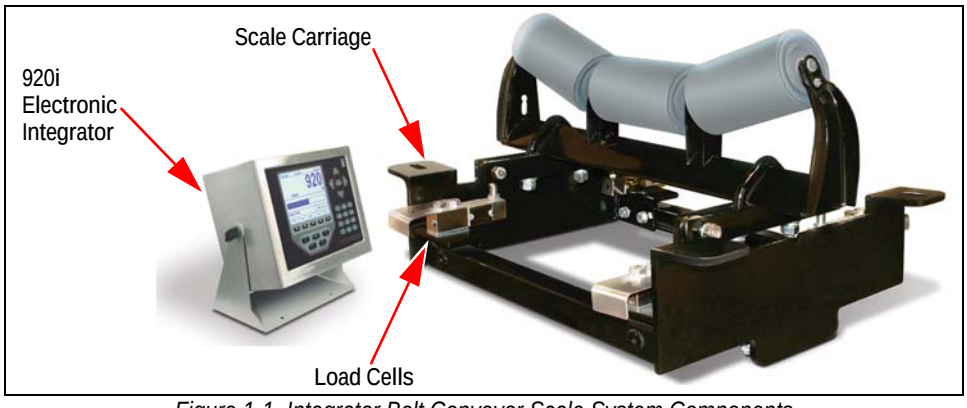

Figure 1-1. Integrator Belt Conveyor Scale System Components

2.0 Integrator Hardware Installation

This section describes procedures for assembling the scale carriage, adding the idlers to the scale carriage and wiring.

WARNING *Take all necessary safety precautions when setting up the integrator In-motion belt scale system, including wearing safety shoes, protective eye wear and using the proper tools.*

2.1 Unpacking and Assembly

Upon receipt of the shipping pallet, visually inspect all components to make sure that they are included and undamaged. The shipping carton should contain the scale carriage, the integrator and a parts kit. If any parts were damaged in shipment, notify Rice Lake Weighing Systems and the shipper immediately.

Note *To ensure that all products received from the manufacturer are in good shape upon arrival, it is recommended to fully inspect all contents and properly complete the bill of lading.*

2.2 Scale Carriage Installation

The location must be chosen for installation of the scale carriage prior to installation. See the Belt Scale Reference Guide (PN 180546) for information on selecting a location.

Use the following steps to assemble the carriage. Tools required for assembly include a 3/4" wrench and a small screwdriver to work with the junction box. Figure 2-1 shows the component parts of the scale carriage to be assembled.

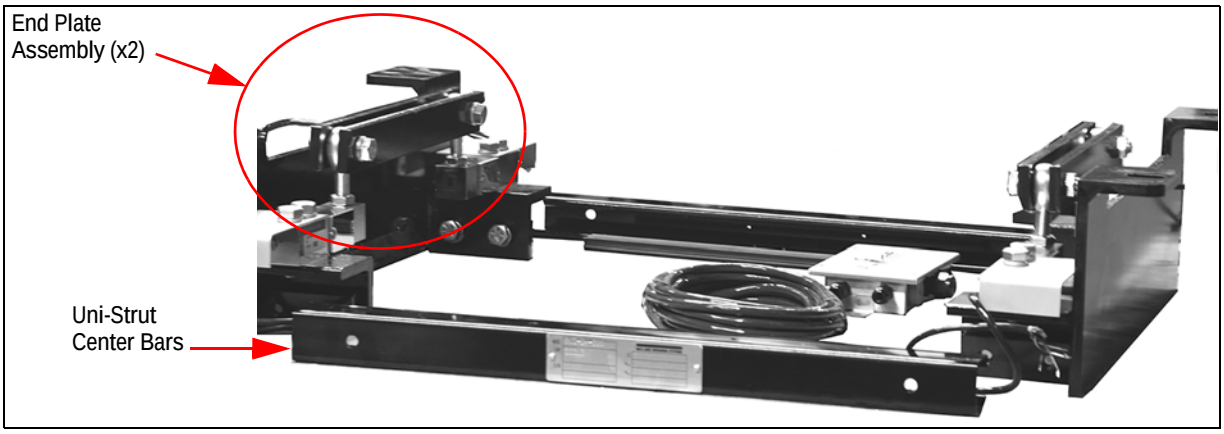

Figure 2-1. Scale Carriage Component Parts

Note *The steps for assembling the scale carriage may vary depending on the site location and size of carriage.*

1. Space the two end plate assemblies far enough apart so that the uni-strut center bars slide into the channels on the end plate assembly.
2. Center the uni-strut center bar equally between the end plate assemblies. There should be roughly a 5/8" gap on each side and the drilled mounting holes (for junction box placement), should be facing up.

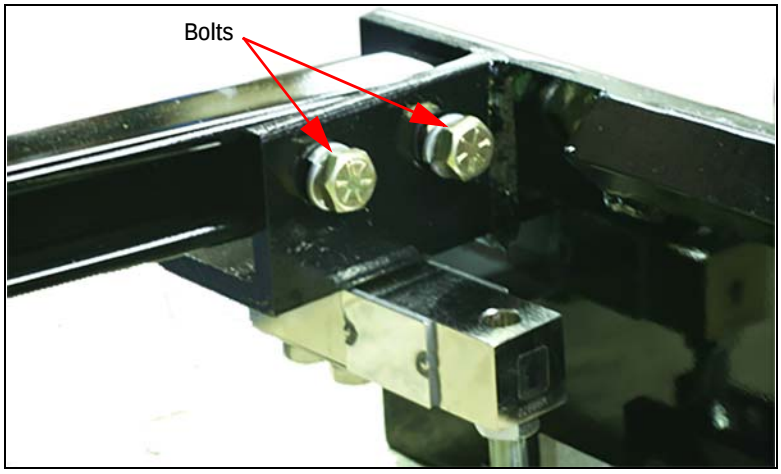

Figure 2-2. Uni-Strut Center Bars on End Plate Assembly

3. Insert the bolts and washers through the end bracket and the uni-strut bar.
4. Tighten the bolts in Secure the uni-strut center bars to the end plate assembly by tightening the bolts using a 3/4" wrench.

2.3 Load Cells

There are four strain gauge load cells located on the corners of the weigh idler. These sensors support the weight of the conveyor belt and the material moving along on the belt. The weight signals from the load cells are combined and processed by the integrator.

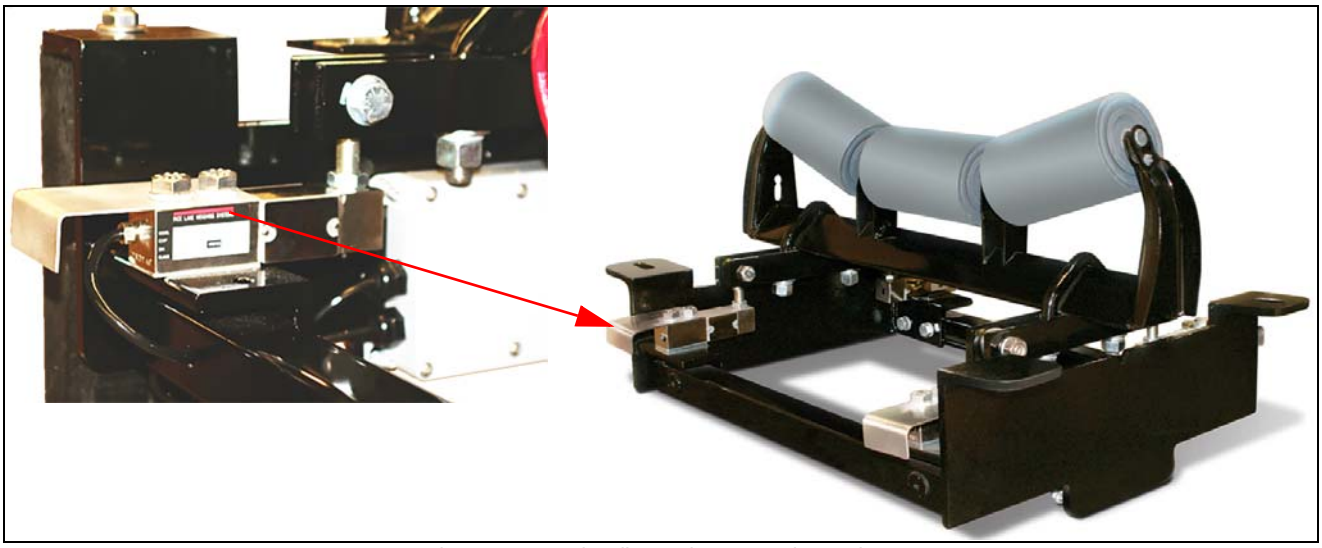

Figure 2-3. Load Cell Location on Scale Carriage

2.4 Junction Box Installation

The In-Motion Belt Scale uses the TuffSeal® JB4SS (PN 88956) junction box. It is a four-channel signal trim junction box with an expansion board enclosed. The junction box is a stainless steel NEMA Type 4X enclosure that comes with a standard Prevent® breather vent which inhibits the buildup of pressure cause by sudden temperature or environmental changes.

Figure 2-4. TuffSeal Junction Box

Use the following steps to install the junction box.

1. Align the junction box with the mounting holes in the uni-strut center bar.
2. Secure to the bar using the included screws.
3. Attach the ground lug as shown in Figure 2-5 on page 5.

Figure 2-5. Ground Lug

2.4.1 Wire Junction Box

The four channel TuffSeal JB4SS has been designed to connect and trim up to four load cells per board. However, it is possible to use this junction box with other combinations.

1. Run the load cell cables through the channels on the scale carriage to the junction box.

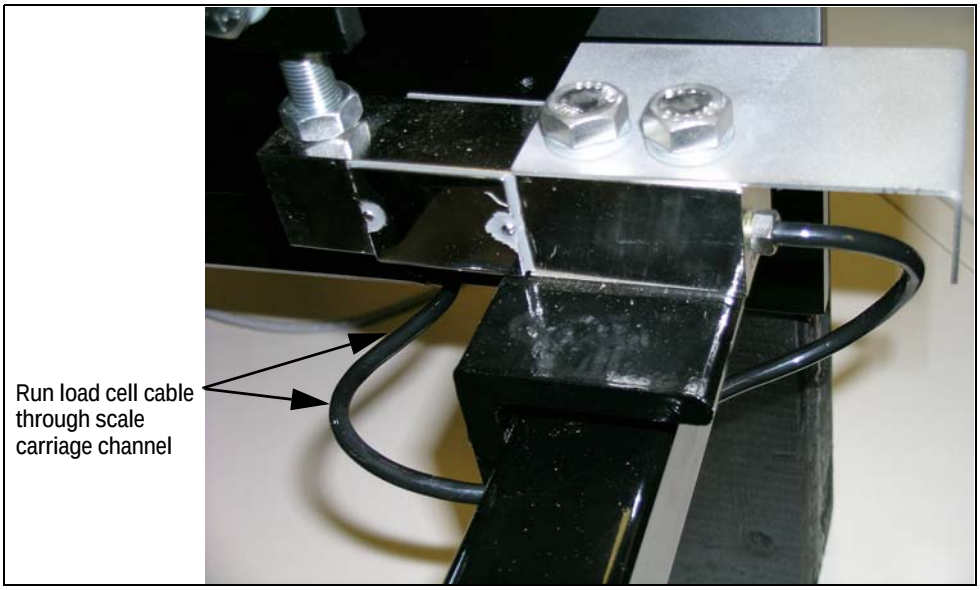

Figure 2-6. Route Load Cell Cable From Load Cell to Junction Box

2. Remove the cover of the junction box to expose the interior.
3. Wire the junction box by running the load cell cable inside of the junction box.

Figure 2-7. Junction Box Interior

Use Table 2-1 to wire the load cell cables.

Wire Color	Signal
Red	+EX
Black	-EX
Green	+SIG
White	-SIG
Silver Braid	SHIELD

Table 2-1. Load Cell Wiring

4. Use the expansion port on the main board to connect multiple junction boxes in series to accommodate applications having more than four load cells. Figure 2-8 illustrates the expansion port wiring location.

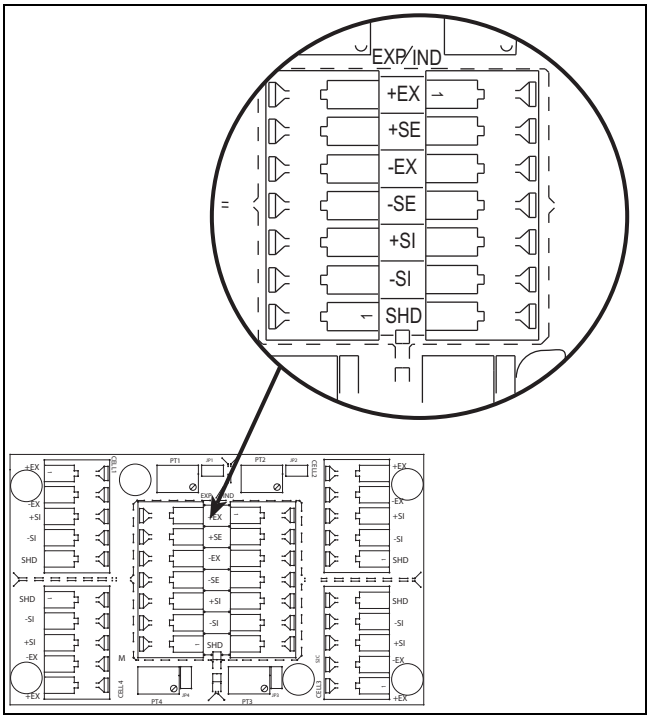

Figure 2-8. Expansion Port Location

5. Once all of the cables are attached and the scale carriage is completely assembled, take the uni-strut closure strip and seal the middle bars.

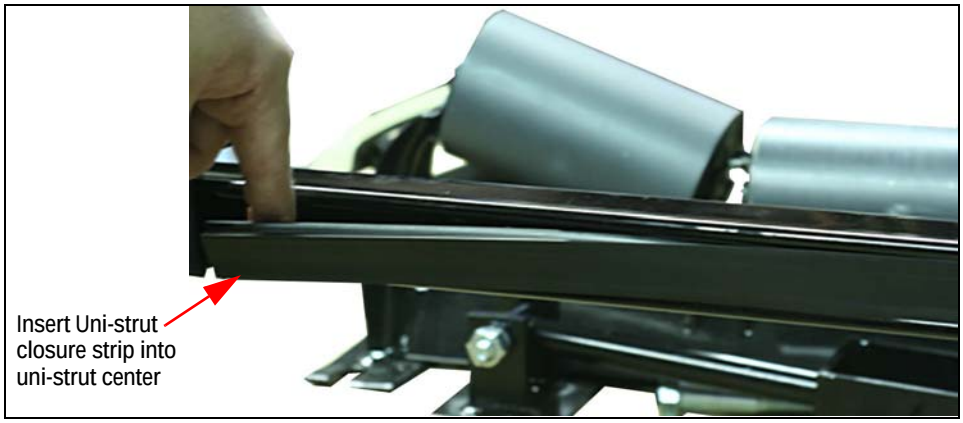

Figure 2-9. Insert Uni-strut Closure Strip

2.4.2 Trimming Procedure

Trimming is a process of equalizing the output from multiple individual load cells. If needed, load cell output can be individually trimmed with potentiometers.

Whenever a substantial amount of trim (more than 5% of normal output), seems necessary to equalize output, check for other possible problems. The best trim is always the least amount of trim. When all errors except cell mismatch and cable extensions or reductions have been corrected, continue with the trimming.

Use the following steps to properly trim the JB4SS junction box.

1. Determine the number of load cells needed.
2. Make sure jumpers are in place to enable trimming of the cells corresponding to each load cell. See Figure 2-10 for the location of jumpers JP1, JP2, JP3 and JP4.

Note *Jumpers for any unused cells must be removed.*

3. Set all potentiometers fully clockwise to give maximum signal output from each cell. See Figure 2-10 for location of potentiometers.

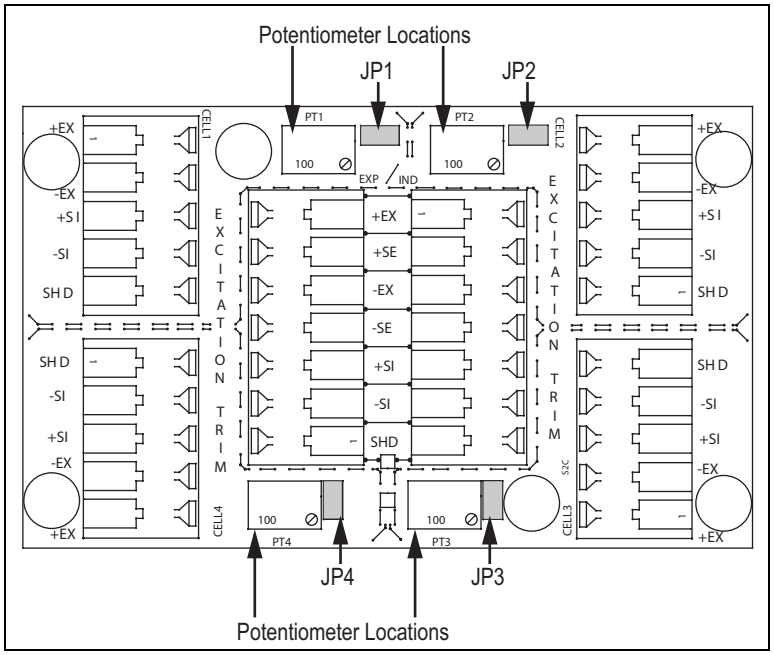

Figure 2-10. Potentiometer Location

Note *Refer to the TuffSeal installation manual (PN 184803) for additional information on the junction box.*

4. Determine the lowest value and turn the potentiometers counter-clockwise to trim all other values to match the lowest value.
5. Remove all weight from the scale and zero the indicator. Place calibrated test weights over each load cell or section. The amount of test weights to be used will depend on the scale configuration. For specific recommendations, refer to the Handbook 44, published by the National Institute of Standards and Technology (NIST).
6. Record the value displayed on the indicator after the test weight is placed in turn over each load cell, or over each section. Select the load cell or section that has the lowest value as the reference point. This load cell or section will not be trimmed.
7. Place the same test load over each cell or section in turn. Using the corresponding potentiometer, trim each cell or section down to equal the reference point. Check zero after every adjustment to avoid zero shift, as load cell corrections are interactive.
8. Check load cells or sections again and repeat steps 7 and 8 as needed.

2.5 Attaching Idlers

This section gives direction on mounting the idlers to the carriage once the scale carriage is assembled.

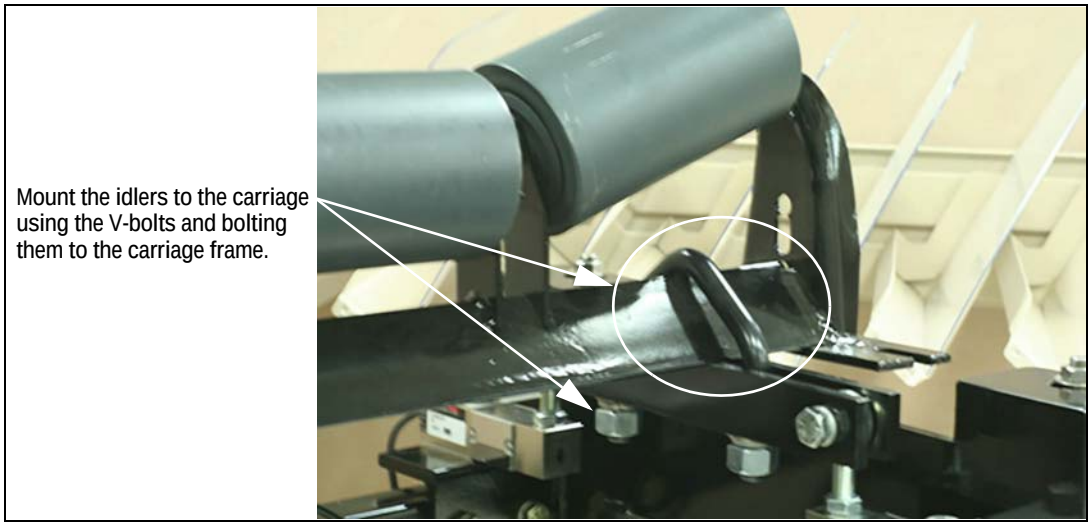

Figure 2-11. Mount Idlers to Scale Carriage

Note *V-bolts can be purchased separately from RLWS.*

PN 98806 - fits 3" angles
PN 99323 - fits 4" angles

Figure 2-12. Mount Idlers to Scale Carriage Using V-Bolts

Mount the idlers to the scale carriage using the large V-bolts and bolting them to the scale carriage frame.

If the scale carriage requires the relocation of cross bracing directly under the scale, any bracing that is removed must be relocated or replaced so as to not reduce the structural integrity of the conveyor. The minimum clearance under the scale is 6.5" as measured from the top mounting surface. If the return conveyor belt is less than 6.5" from the top of the frame, the scale carriage requires extra shimming or the return idlers require relocation. The return side of the conveyor belt must not contact the bottom of the scale when the conveyor is operating.

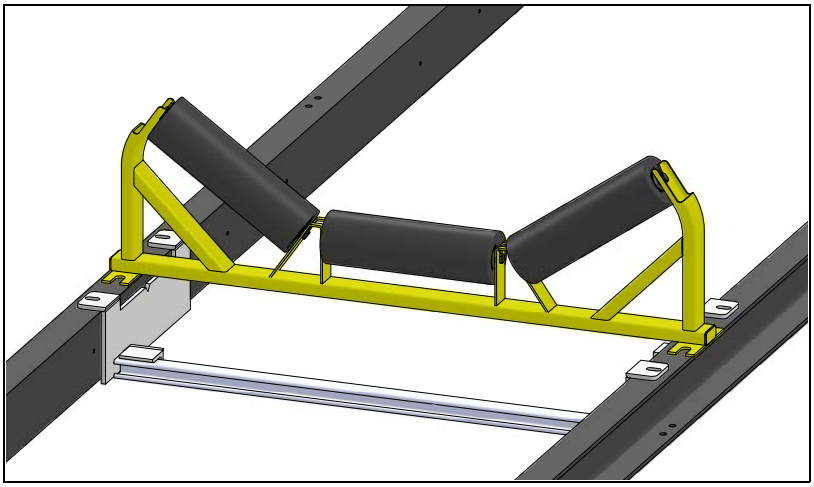

Figure 2-13. Scale Carriage Location Cross-Bracing

The idler spacing for the scale has been predetermined; however, the three idlers before and after the scale should be moved to match the same spacing.

Splices in the conveyor frame work in the scale area are required to be permanently joined. Additional bracing may be required under the conveyor frame work to minimize deflection and vibration under the load as any additional bouncing decreases the scale's accuracy.

The 3rd idler before and the 3rd idler after the scale should be shimmed 1/4" higher than the adjacent idlers. These will be the first and last idlers in the scale area.

The first and last scale idlers should be shimmed level across the conveyor. If the idlers adjacent to the scale area are greater than 1/4" lower than the scale area, the adjacent idlers should be shimmed to ramp up to the scale area in 1/4" increments.

Figure 2-14. Level Idlers

The idler on the scale should be mounted to the scale weigh pads. The existing mounting feet should be removed and the new feet welded on at the correct spacing for the pads.

Apply alignment string lines across the scale area idlers, stretching over the third idler before and the third idler after the scale carriage.

The scale frame should be shimmed to match the weigh idler to the plane drawn by the alignment strings.

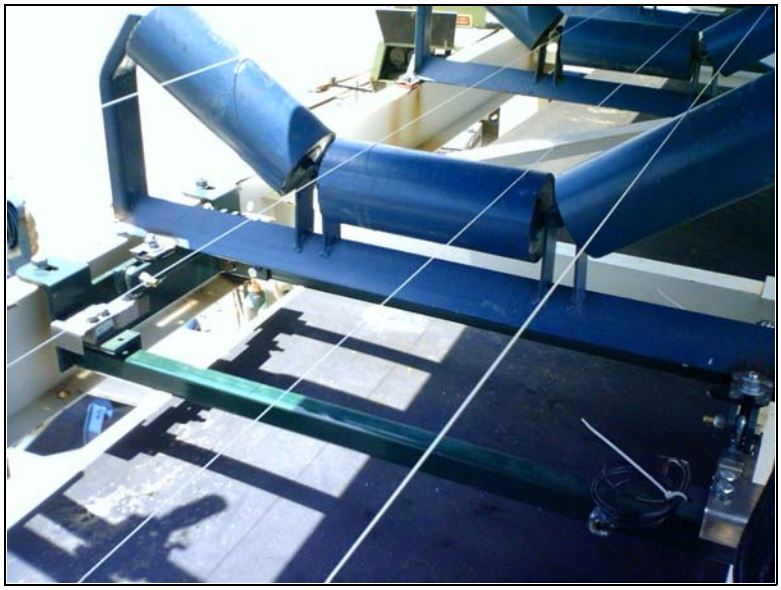

Figure 2-15. Carriage Alignment

Recheck the level of the scale carriage and weigh idler.

The other idlers in the scale area should be shimmed to match the alignment strings. The finished aligned scale area idlers should be equally spaced, level, and in a plane 1/4" higher than the adjacent idlers on the conveyor.

2.6 Scale Carriage Replacement Parts

This section lists replacement parts for the integrator In-Motion Belt Scale System.

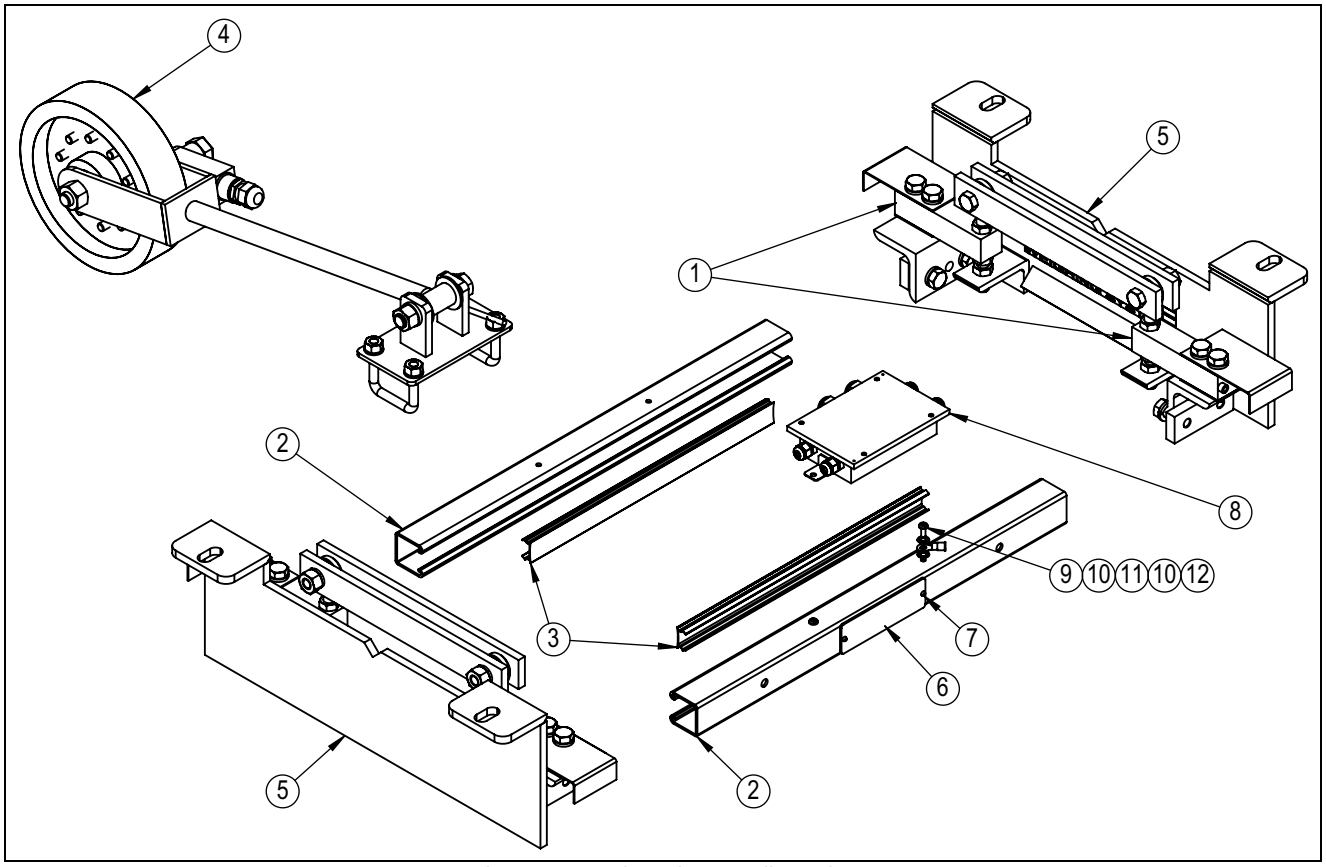

Figure 2-16. Belt Scale Parts Illustration

Item No.	Part No.	Description	Qty
1	17341	Load Cell, 500 lb capacity	2
	17342	Load Cell, 1000 lb capacity	2
2	- - - - -	Unistrut ,Connecting Bar, Consult Factory	2
3	- - - - -	Unistrut Closure Strip, Consult Factory	2
4	94969	Speed Wheel Assembly (1)	1
5	96730	End Plate Assembly, 500 lb capacity	2
	96732	End Plate Assembly, 1000 lb capacity	2
8	88956	Junction Box, JB4SS 4 Channel	1
12	22066	Nut, Mach Screw 10-32NF	2
9	14878	Machine Screw, 10-32 x 1/2	2
6	16863	Label, Belt Scale	1
7	14905	Drive Screws, 4 x 3/8 (2)	2
10	31546	Lock Washer, 1/4 Internal	2
11	43810	Connecting Ring Terminal, 1/4"	1
NS	110821	Angle Bracket, Belt Scale	2
NS	97416	Shim Kit, 50 ea. of 1/16	1
NS	98117	Tube, Kraft 4" ID x 72"	1
NS	15611	Cable Assembly, 6 Conductor	1

Table 2-2. Scale Carriage Replacement Parts

3.0 Integrator Permanent Field Record

Keep this record to record maintanence performed on the BCi.

Conveyor Number _____

Date _____

Scale Capacity (Tons per Hour) _____

Load Cell mv/v (Average) _____

Total Load Cell Build = #4 x #7 _____

Number of Weigh Idlers _____

Number of Load Cells _____

Idler Spacing _____

Load Cell Capacity _____

Conveyor Belt Length _____

Pulses per Revolution _____

Number of Test Revolutions _____

Zero Counts _____

Material Factor _____

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