

2156

WEIGHT-PLATE

Installation and Service Manual



METTLER TOLEDO

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APPLICATION GUIDES

The only warranty of Toledo Scale is for the product it supplies under the Product Warranty Statement listed above. Weighing application guidelines pertain to Toledo Scale products

INTRODUCTION

This publication is provided as a guide for the trained technician for installing, calibrating, and servicing the 2156 Weight-Plate. Repair or adjustment by unauthorized persons voids the Toledo Scale warranty.

For information regarding your local Toledo Scale Distributor, Sales, and Service location, please contact:

Toledo Scale/Masstron Division
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Columbus, Ohio 43229
(614) 841-7300

WARNING!

This equipment generates, uses and can radiate radio frequency energy and if not installed and used properly, i.e., in accordance with the instructions manual, may cause harmful interference to radio communications. It has been tested and found to comply with the limits for a Class A computing device pursuant to Subpart J of Part 15 of FCC Rules, which are designed to provide reasonable protection against such interference when operated in a commercial environment. Operation of this equipment in a residential area is likely to cause interference in which case the user at his own expense will be required to take whatever measures may be required to correct the interference.

**TOLEDO SCALE RESERVES THE RIGHT TO MAKE REFINEMENTS
OR CHANGES WITHOUT NOTICE.**

PRECAUTIONS

- READ this manual BEFORE operating or servicing this equipment.

- FOLLOW these instructions carefully.

- SAVE this manual for future reference.

- DO NOT allow untrained personnel to operate, clean, inspect, maintain, service, or tamper with this equipment.


- ALWAYS DISCONNECT this equipment from the power source before cleaning, or performing maintenance.

- CALL Toledo Scale for parts, information, and service.

	<div>WARNING</div> <p>ONLY PERMIT QUALIFIED PERSONNEL TO SERVICE THIS EQUIPMENT. EXERCISE CARE WHEN MAKING CHECKS, TESTS, AND ADJUSTMENTS THAT MUST BE MADE WITH POWER ON.</p> <p>P/N 132036 00A</p>
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	<div>WARNING</div> <p>FOR CONTINUED PROTECTION AGAINST SHOCK HAZARD CONNECT TO PROPERLY GROUNDED OUTLET ONLY. DO NOT REMOVE THE GROUND PRONG.</p>
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	<div>WARNING</div> <p>DISCONNECT ALL POWER TO THIS UNIT BEFORE REMOVING THE FUSE OR SERVICING.</p> <p>P/N 122373 00A</p>
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<div>CAUTION</div> <p>BEFORE CONNECTING/DISCONNECTING ANY INTERNAL ELECTRONIC COMPONENTS OR INTERCONNECTING WIRING BETWEEN ELECTRONIC EQUIPMENT ALWAYS REMOVE POWER AND WAIT AT LEAST THIRTY (30) SECONDS BEFORE ANY CONNECTIONS OR DISCONNECTIONS ARE MADE. FAILURE TO OBSERVE THESE PRECAUTIONS COULD RESULT IN DAMAGE TO OR DESTRUCTION OF THE EQUIPMENT.</p>
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<div>CAUTION</div> <p>OBSERVE PRECAUTIONS FOR HANDLING ELECTROSTATIC SENSITIVE DEVICES</p>
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1.0 GENERAL DESCRIPTION

WEIGHT-PLATE Model 2156 is a full load cell low profile floor scale designed for general purpose use. Its low profile design minimizes operator effort when loading the scale platform. Units are completely self contained. Ample clearance is provided between platform and floor for easy lifting with forklift. WEIGHT-PLATES are intended for indoor, top-of-floor use. Easily adjustable corner assemblies permit the scale to be leveled on an uneven floor. WEIGHT-PLATE scales are completely factory assembled and are tested prior to shipment for reduced installation requirements. Model 2156 understructures are compatible with the entire line of Toledo Analog instruments for maximum flexibility.

2.0 SPECIFICATIONS

2.1 STANDARD SIZES

Model Number	Platform Size	Capacity	Material
2156000023	4' x 4'	5,000 lb	Carbon Steel
2156000033	4' x 5'	5,000 lb	Carbon Steel
2156000043	5' x 5'	5,000 lb	Carbon Steel

2.2 LOAD CELLS

WEIGHT-PLATE Model 2156 floor scales utilizes four (4) 2,500 pound, stainless steel precision matched load cells which eliminate the need to electrically trim the scale's corners in order to achieve specified weighing accuracies. An added benefit of the 2,500 pound load cell is the ability to load 100% of the scale's capacity along any end of the platform.

Each load cell incorporates a fully adjustable corner assembly which utilizes a swivel ball foot suspension. WEIGHT-PLATE'S adjustable corners allow installation on uneven floors or when additional clearance is required for movement via forklifts, pallet jacks, or other similar devices. An anti-skid Fabreeka pad mounted to the bottom of each corner assembly provides additional stability during weighing operations.

2.3 PLATFORM

WEIGHT-PLATE utilizes a carbon steel treadplate platform which is reinforced by formed channel. Load cells are mounted to the platform underside and the J-box is mounted in a channel covered by a removable access plate.

2.4 ACCURACY

Model 2156 WEIGHT-PLATE is designed for a weighing accuracy of one part in 2,500 and is rated at a gross capacity of 5,000 pounds with a recommended two pound graduation size. Each scale platform is factory shift tested to a maximum allowable difference between high and low corners of ± 1 pound; at 1,000 pounds, tested at 5000 division readability. The 2156 has not been submitted or tested under the National Type Evaluation Program, and therefore does not have an accuracy rating.

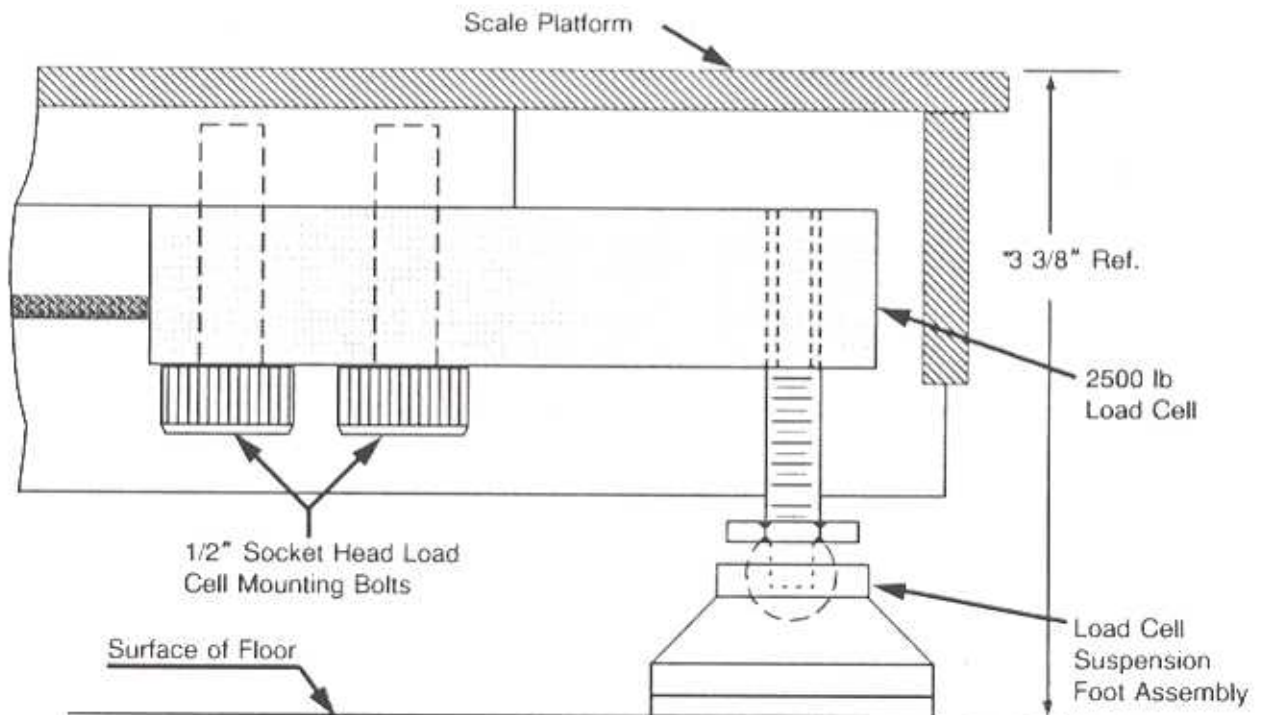
3.0 INSTALLATION

3.1 INSPECTION

Upon delivery of the 2156 WEIGHT-PLATE visually inspect the scale for any damage with particular note to each load cell assembly, load cell cable, and junction box. Report any damage at once to your freight carrier.

3.2 LOCATE AND LEVEL

Place the 2156 WEIGHT-PLATE in the desired location, level the scale and remove any corner-to-corner rocking. Adjustments in scale height are accomplished by screwing the load cell foot assembly in or out, thereby raising or lowering the individual corner. Check the platform for levelness and corner to corner rocking, and readjust if necessary. WEIGHT-PLATE corner assemblies are adjustable from a minimum overall scale profile of 3 3/8" to a maximum of 4".



(*) Nominal factory setting, adjustable from 3 3/8" to 4" in total height.

Figure 3.1 Load Cell Corner Assembly

3.3 INSTRUMENT CABLE WIRING

The scale to instrument cable is terminated within the junction box assembly of the 2156 using the "input" terminal strip on the junction box PCB.

3.3.1 Remove the junction box access cover plate

3.3.2 Thread the instrument cable through the hole provided in the scale platform

3.3.3 Remove the junction box lid. Loosen the instrument cable connector, thread the cable through the connector (pull enough cable to reach the "input" terminal), reinstall and tighten (see Figure 3.2).

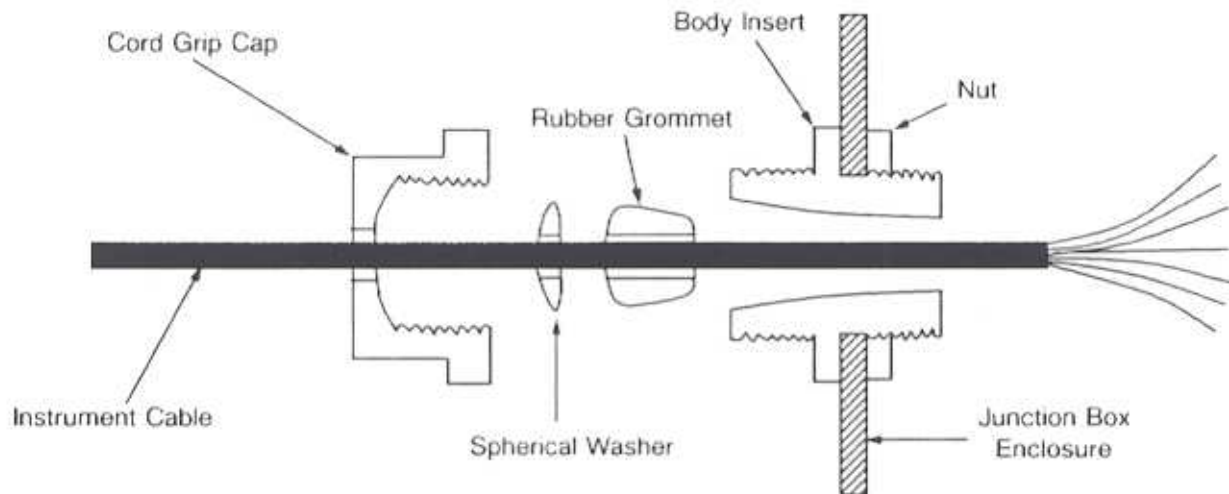
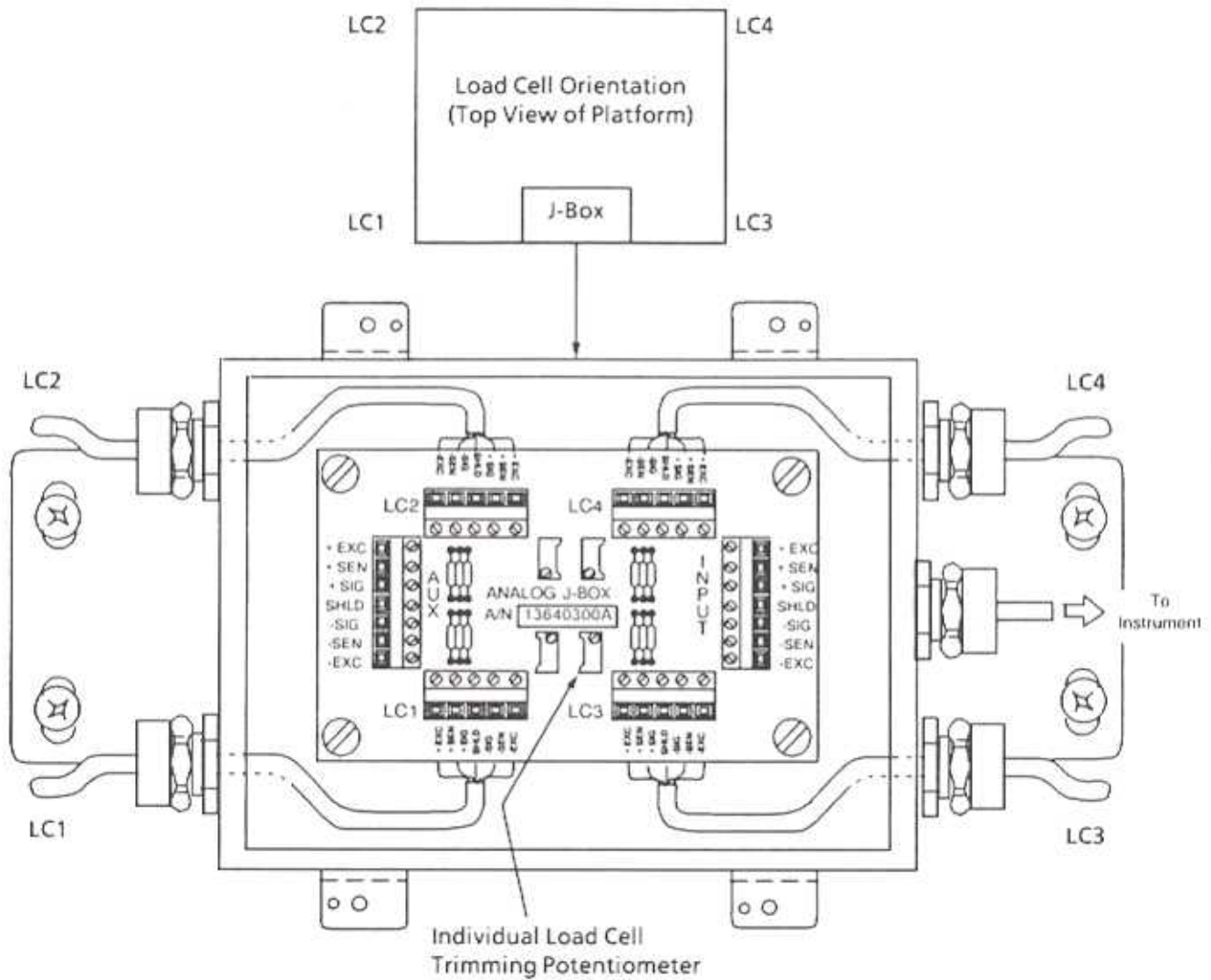


Figure 3.2 Cord Connector Details

3.3.4 Wire the instrument cable to the terminal marked "INPUT" (see Figure 3.3).



LOAD CELL WIRING		INSTRUMENT CABLE WIRING	
Function	Color	Function	Color
+ EXCITATION	GREEN	+ EXCITATION	WHITE
+ SENSE	NOT-USED	+ SENSE	YELLOW
+ SIGNAL	WHITE	+ SIGNAL	GREEN
SHIELD	YELLOW	SHIELD	ORANGE
- SIGNAL	RED	- SIGNAL	BLACK
- SENSE	NOT USED	- SENSE	RED
- EXCITATION	BLACK	- EXCITATION	BLUE
		(BASED ON TOLEDO SCALE CABLE NUMBER 510620370)	

Figure 3.3 J-Box Details and Wiring Codes

4.0 CALIBRATION

4.1 SHIFT ADJUSTMENT

Shift adjustment is a precision electrical adjustment required to bring the output voltage (signal) of each load cell into agreement with the other cells in the system. This adjustment should be made only after all mechanical parts are checked, and the scale has proven repeatable. Repeatability is checked by repeatedly placing a test weight on the same position of the platform and checking for identical indications.

Load cell trimming potentiometers are mounted on the junction box PCB. The load cells are wired to the PCB as shown in Figure 3.3. The amount of test weight used for the shift test should equal 1/2 of the rated scale capacity. Test weights should be concentrated at the center of each quadrant of the scale platform.

NOTE: THE SCALE HAS BEEN ROUGHLY SHIFT ADJUSTED AT THE FACTORY. BEFORE PROCEEDING, CHECK THE SHIFT CHARACTERISTICS TO DETERMINE IF ANY SHIFT TRIMMING IS REQUIRED. IN A NEW INSTALLATION, SHIFT ADJUSTMENT TO A PROPERLY ADJUSTED SCALE SHOULD BE MINOR.

4.2 LOAD CELL TRIMMING PROCEDURE

1. Successively place the test weight at each of the four designated locations (center of each scale quadrant). Note and record the displayed indications.
2. Determine the location with the lowest indication. The corresponding load cell is NOT trimmed.
3. Place the test weight at the location with the lowest indication. Note and record the indication.
4. Proceeding clockwise, place the test weight at each designated location; if necessary, adjust the trimming potentiometer corresponding to that location to obtain the indication recorded in step 3.

NOTE: because of the trim pots interaction with each other, any adjustment may affect other corner indications.

5. Repeat this procedure until all indications at the designated locations are the same.
6. Place dessicant bag inside junction box.
7. Reinstall junction box lid. Make sure that the rubber gasket is clean, correctly located, and sealant is applied to the contact surface of the gasket. Tighten all screws.
8. Reinstall the platform access plate.

4.3 SCALE CALIBRATION (SPAN)

It is recommended to calibrate the scale using a test weight equal to the scale capacity. With the proper test weight, continue with the calibration of the weighing system in accordance with the instructions provided in the manual of your digital indicator.

5.0 ROUTINE CARE AND MAINTENANCE

5.1 GENERAL

Once the scale is installed, it is recommended that the assembly be periodically inspected and calibrated by an authorized Toledo Scale Representative. Contact your local authorized Toledo Scale Service Representative for information on periodic inspection and calibration services.

5.2 SITE INSPECTION

Ensure that the scale site remains in good condition. Check for alterations in the surrounding floor, excessive vibrations, and possible overloading conditions.

5.3 PLATFORM INSPECTION

During periodic inspections of the scale assembly, look for the following:

1. Is there any unusual wear points, paths, or marks on the weighing surface?
2. Is the junction box lid properly sealed and all cable connectors tight against the enclosure?
3. Is there any moisture or foreign material present around or inside the junction box assembly?
4. Is the instrument cable free from damage or binding the scale?
5. Is there any debris or material buildup under the platform which could inhibit freedom of movement?
6. Visually inspect the load cells and foot assemblies for signs of unusual wear.
7. Perform shift adjustments and final calibration per the Toledo Scale digital instrument manual.

6.0 TROUBLESHOOTING

6.1 GENERAL

If operational difficulties are encountered, obtain as much information about the problem as possible. Is the problem constant or intermittent? Malfunctions can be caused by mechanical or electrical influences so be patient and use sound logic when troubleshooting. When troubleshooting a 2156 Weight-Plate scale, examine the physical location of the scale checking for the presence of the following: water, corrosive materials, unlevel floors, high vibrations or wind currents, physical damage to the scale platform. Check the scale for levelness, and to insure the platform does not rock corner-to-corner. Also check the instrument cable for damage and all connections for any loose/incorrect wiring.



CAUTION

BEFORE CONNECTING/DISCONNECTING ANY INTERNAL ELECTRONIC COMPONENTS OR INTERCONNECTING WIRING BETWEEN ELECTRONIC EQUIPMENT ALWAYS REMOVE POWER AND WAIT AT LEAST THIRTY (30) SECONDS BEFORE ANY CONNECTIONS OR DISCONNECTIONS ARE MADE. FAILURE TO OBSERVE THESE PRECAUTIONS COULD RESULT IN DAMAGE TO OR DESTRUCTION OF THE EQUIPMENT.

6.2 ISOLATE THE PROBLEM

First, determine if the problem is in the scale platform or the digital indicator. After removing power from the system, disconnect the digital indicator from the 2156 Weight-Plate scale assembly and connect a load cell simulator to the indicator (simulator available from Toledo Scale). Reapply power. If the problem is still present, consult the digital indicator manual for further troubleshooting assistance.

If the problem is **not** present with the load cell simulator attached to the indicator, remove power, disconnect the simulator and reconnect the 2156 platform. If the problem reoccurs, further scale platform troubleshooting is required.

6.3 CHECK WIRING

6.3.1 Remove power from the system. Remove the access cover plate from the platform. Remove the lid from the junction box and check the interior for moisture or any foreign material.

6.3.2 Ensure that all wiring connections are tight and that no insulation material is touching the terminal contacts. Check all cable connections for correct wiring, the wiring color codes are as follows: (see Figure 3.3)

<u>LOAD CELLS</u>		<u>INSTRUMENT CABLE</u>	
+ EXCITATION	GREEN	+ EXCITATION	WHITE
+ SENSE	NOT USED	+ SENSE	YELLOW
+ SIGNAL	WHITE	+ SIGNAL	GREEN
SHIELD	YELLOW	SHIELD	ORANGE
- SIGNAL	RED	- SIGNAL	BLACK
- SENSE	NOT USED	- SENSE	RED
- EXCITATION	BLACK	- EXCITATION	BLUE

(Instrument Cable Color Code Based upon Toledo Scale Cable No. 510620370)

6.3.3 Check all cable connectors on the J-box. Tighten any connectors found to be loose.

6.4 CHECK LOAD CELLS

- 6.4.1 Check each load cell for proper bridge resistances (see Section 7.0).
- 6.4.2 If bridge resistances are within specification, perform a "shorted signal" symmetry check. Short the signal leads together and place one multimeter lead on the shorted signals and one lead on the + excitation wire. Note the resistance value indicated. Next, remove the lead from the + excitation wire and place it on the (-) excitation wire. Both resistance values should be equal within 10 ohms.
- 6.4.3 If the cells pass the above tests, reapply power to the scale platform. Confirm that proper excitation voltage is reaching the load cells by placing multimeter leads on the excitation positions of each load cell terminal (excitation voltage can vary from 5VDC to 15VDC depending upon the application and digital indicator used). Refer to indicator manual for excitation specification.
- 6.4.4 If proper excitation voltage is reaching the load cells, check the output signal from each cell. If one cell has a particularly high or low dead-load output it is suspect. (The maximum output possible from any cell is 30 millivolts at 15VDC excitation and loaded to gross capacity).
- 6.4.5 If any cell has an unusual signal, remove all load from that cell by raising the platform. With the power still on, measure the output from the suspect load cell. The "no load" zero output should be + or - 1.0% of the full scale output. For example, if the excitation voltage is 15VDC then the full scale output is 30 millivolts. Therefore, the no load zero output should be within + or - 0.30 millivolts. If the load cell is grossly out of specification, replace it.
- 6.4.6 If a load cell fails any of the above tests, replace it per Section 8.0 of this manual.

7.0 LOAD CELL SPECIFICATIONS

7.1 TECHNICAL DATA

Capacity (lb)	2500
Rated Output (mV / V)	2.0 \pm .002
Nonlinearity (% F.S.)	0.03
Hysteresis (% F.S.)	0.05
Nonlinearity & Hysteresis (% F.S.)	0.04
Nonrepeatability (% F.S.)	0.01
Creep in 20 min. (% F.S.)	0.03
Zero Balance (% F.S.)	1.0
Compensated Temp. Range (° F / ° C)	+15 to +115 / -10 + ° +45
Temp. Effect: Output (ppm / ° C)	14.4
Zero Balance (ppm / ° C)	45
mV/V/ohm Calibration (% F.S.)	0.07
Terminal Resistance: Input (ohms min.)	350
Output (ohms)	350 \pm 2
Excitation Voltage: Max VDC or VAC rms	15
Insulation Resistance (meg ohms min.)	5000
Max. Load, Safe (% F.S.)	150
Max. Load, Ultimate (% F.S.)	300
Max. Side Load, Safe (% F.S.)	100
Deflection at Rated Load	.010

7.2 WIRING CODE

Cable Color	Description
Green	+ Excitation
Black	- Excitation
White	+ Signal
Red	- Signal
Yellow	Shield

8.0 LOAD CELL REPLACEMENT PROCEDURE

- 8.1** Remove power to the digital indicator.
- 8.2** Remove the access plate from the platform to gain access to the load cell cable junction box. Remove the junction box cover and locate the defective load cell terminal.
- 8.3** Disconnect the defective load cell cable from it's terminal on the summing PCB.
- 8.4** Loosen the water tight cable connector on the junction box and remove the cable from the enclosure.
- 8.5** Carefully raise the platform and position the platform onto a stable supporting surface that allows access to the defective cell and cable as well as offering protection to the other cells during disassembly.
- 8.6** Affix a string to the end of the defective load cell's cable. The string should be of sufficient strength and length to pull the new load cell's cable through the platform structure.
- 8.7** Load cells are fastened to the platform using two 1/2" - 13 UNC high strength socket head cap screws. Remove the two load cell mounting screws with a 3/8" hex allen socket, retaining the screws for reinstallation.
- 8.8** Carefully pull the defective load cell's cable through the platform while feeding the string in at the junction box opening. Once the string is at the load cell location, unattach it from the load cell cable.
- 8.9** Remove the foot assembly from the defective load cell and reinstall it in the new load cell (see Figure 3.1).
- 8.10** Attach the new load cell's cable to the pulling string and carefully thread the new cable through the platform into the junction box opening. Coil and store any excess cable within the platform channel containing the J-box.
- 8.11** Secure the new load cell to the platform. Apply an anti-seize compound such as "Never-Seez" to the threads of the mounting screws and tighten with a calibrated torque wrench to 70 ft-lb.
- 8.12** Thread the load cell cable through the connector on the junction box. When the cable length inside the box is sufficient, tighten the box connector (see Figure 3.2).
- 8.13** Wire the new load cell cable to the proper terminal on the PCB per the wiring code shown in Figure 3.3.
- 8.14** Place the 2156 back on the floor in its proper position. Adjust the foot assemblies to ensure levelness and prevent rocking from corner-to-corner.
- 8.15** Powerup the indicator. Perform shift adjustment and recalibrate the scale.

9.0 SPARE PARTS LIST

Part Number	Description	Quantity Req'd / Scale
TB600260	Load Cell 2500 lb	4
TA201509	Suspension Foot Assembly	4
MZ0901010333	1/2" Socket Head Load Cell Mounting Bolt	8
TB100395	Junction Box Assembly	1
13640300A	Junction Box PCB	1

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