

# 2256

## **Analog Floor Scales**

Service Manual

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METTLER TOLEDO

## Publication Revision History

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B14914100A	11/98	Added Class III acceptable readability data on page 1-1.

**Declaration of conformity**  
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Déclaration de conformité  
Declaración de Conformidad  
Verklaring de overeenstemming  
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**Worthington, Ohio 43085**  
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R60 OIML International Recommendation, Metrological regulation for load cells  
EEx ib IIC T4 el. Safety / el. Sicherheit / s, curit, el. (PTB Nr. Ex-95.D.2051)

Darrell Flocken, Manager - Weights & Measures  
Office of Weights and Measures  
Worthington, Ohio USA  
**September, 1996**

according to EN45014

## **INTRODUCTION**

This publication is provided solely as a guide for individuals who have received Technical Training in servicing the METTLER TOLEDO product.

Information regarding METTLER TOLEDO Technical Training may be obtained by writing to:

**METTLER TOLEDO**

1150 Dearborn Drive

Worthington, Ohio 43085-6712

ph: (614) 438-4400

fax: (614) 438-4444

## **ORDERING INFORMATION**

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Mettler Toledo warrants that the equipment covered by this warranty will be free from defects in workmanship and materials for a period of two years from date of installation or twenty six (26) months from date of shipment to the buyer, whichever comes first.

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- 1) Initial installation and ongoing scale calibration.
- 2) Damage to scale components by gross abuse, fire, flooding, explosion, water, voltage surges, or civil disturbance.
- 3) Normal maintenance or consumable items.

This warranty covers only the Model 2256 WEIGHT-PLATE® floor scale understructure. Refer to Mettler Toledo Standard Product Warranty for coverage of other scale system components including scale instrument, printer, and/or other accessories.

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## PRECAUTIONS

READ this manual BEFORE operating or servicing this equipment.

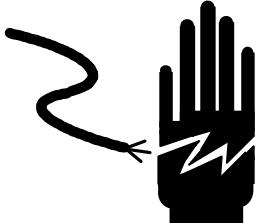

FOLLOW these instructions carefully.

SAVE this manual for future reference.

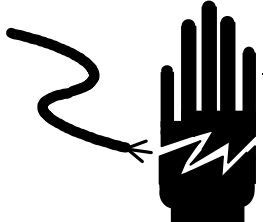

DO NOT allow untrained personnel to operate, clean, inspect, maintain, service, or tamper with this equipment.

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


CALL METTLER TOLEDO for parts, information, and service.

	 <b>WARNING</b>
	PERMIT ONLY QUALIFIED PERSONNEL TO SERVICE THIS EQUIPMENT. EXERCISE CARE WHEN MAKING CHECKS, TESTS AND, ADJUSTMENTS THAT MUST BE MADE WITH POWER ON. FAILING TO OBSERVE THESE PRECAUTIONS CAN RESULT IN BODILY HARM.

	 <b>WARNING</b>
	FOR CONTINUED PROTECTION AGAINST SHOCK HAZARD, CONNECT TO PROPERLY GROUNDED OUTLET ONLY. DO NOT REMOVE THE GROUND PRONG.

	 <b>WARNING</b>
	DISCONNECT ALL POWER TO THIS UNIT BEFORE INSTALLING, SERVICING, CLEANING, OR REMOVING THE FUSE. FAILURE TO DO SO COULD RESULT IN BODILY HARM AND/OR PROPERTY DAMAGE.

 <b>CAUTION</b>	
BEFORE CONNECTING/DISCONNECTING ANY INTERNAL ELECTRONIC COMPONENTS OR INTERCONNECTING WIRING BETWEEN ELECTRONIC EQUIPMENT, ALWAYS REMOVE POWER AND WAIT AT LEAST 30 SECONDS. FAILURE TO OBSERVE THESE PRECAUTIONS COULD RESULT IN BODILY HARM OR DAMAGE TO OR DESTRUCTION OF THE EQUIPMENT.	

	 <b>WARNING</b>
	OBSERVE PRECAUTIONS FOR HANDLING ELECTROSTATIC SENSITIVE DEVICES.

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# 1

## Specifications

### General Description

The model 2256 WEIGHT-PLATE® is a fully electronic, portable, low-profile floor scale for general purpose weighing. It is available in four platform sizes and three weight capacities:

- **Platform Size**  
 36 inches x 36 inches x 4.0 inches (91.4 cm x 91.4 cm x 10.1 cm)  
 48 inches x 48 inches x 4.0 inches (121.9 cm x 121.9 cm x 10.1 cm)  
 48 inches x 60 inches x 4.0 inches (121.9 cm x 152.4 cm x 10.1 cm)  
 60 inches x 60 inches x 4.0 inches (152.4 cm x 152.4 cm x 10.1 cm)
- **Gross Capacity**  
 3,000 lb/1,500 kg  
 6,000 lb/3,000 kg  
 10,000 lb/5,000 kg
- **Four Load Cells @ 2 m V/V each**

### Accuracy

WEIGHT-PLATE floor scales meet or exceed the National Institute of Standards and Technology (NIST) Handbook 44 requirements for Class III 5,000-division accuracy (see Table 1-1). A certificate of conformance (No. 95-111) was issued under the National Type Evaluation Program (NTEP) of the National Conference of Weights and Measures. The scale is also approved by Canadian Weights and Measures, No. AM-5160. Accuracy and performance can vary based on installation, maintenance, and specific site conditions.

Scale Capacity lb/kg	Class III Acceptable Readability	
	lb	kg
3,000 / 1,500	2,500 x 0.5 3,000 x 1	1,500 x 0.5
6,000 / 3,000	5,000 x 1 6,000 x 2	3,000 x 1
10,000 / 5,000	10,000 x 2	5,000 x 2

Table 1-1: Readability for 2256 WEIGHT-PLATE Floor Scales

## Power Supply Requirements

Load cell power supply is provided by the METTLER TOLEDO Digital Indicator. Maximum excitation voltage is 15 VDC.

## Load Cells

Four hermetically sealed load cells are provided in all 2256 WEIGHT-PLATE floor scales. Each cell is complete with an integral four-conductor, shielded, color-coded cable. The cell suspension has a retained load pin foot design for increased accuracy. Table 1-2 lists the capacities of individual load cells for each rated scale capacity.

Rated Scale Capacity	Individual Load Cell Capacity
3,000 lb	1,250 lb
6,000 lb	2,500 lb
10,000 lb	5,000 lb

Table 1-2: Load Cell Capacities

## Platform Assembly

The WEIGHT-PLATE scale platform consists of a carbon steel tread or stainless steel smooth deck plate, four analog load cells mounted at the corners, a junction box mounted under a top access cover, a bubble level, and four stainless steel load pin feet.

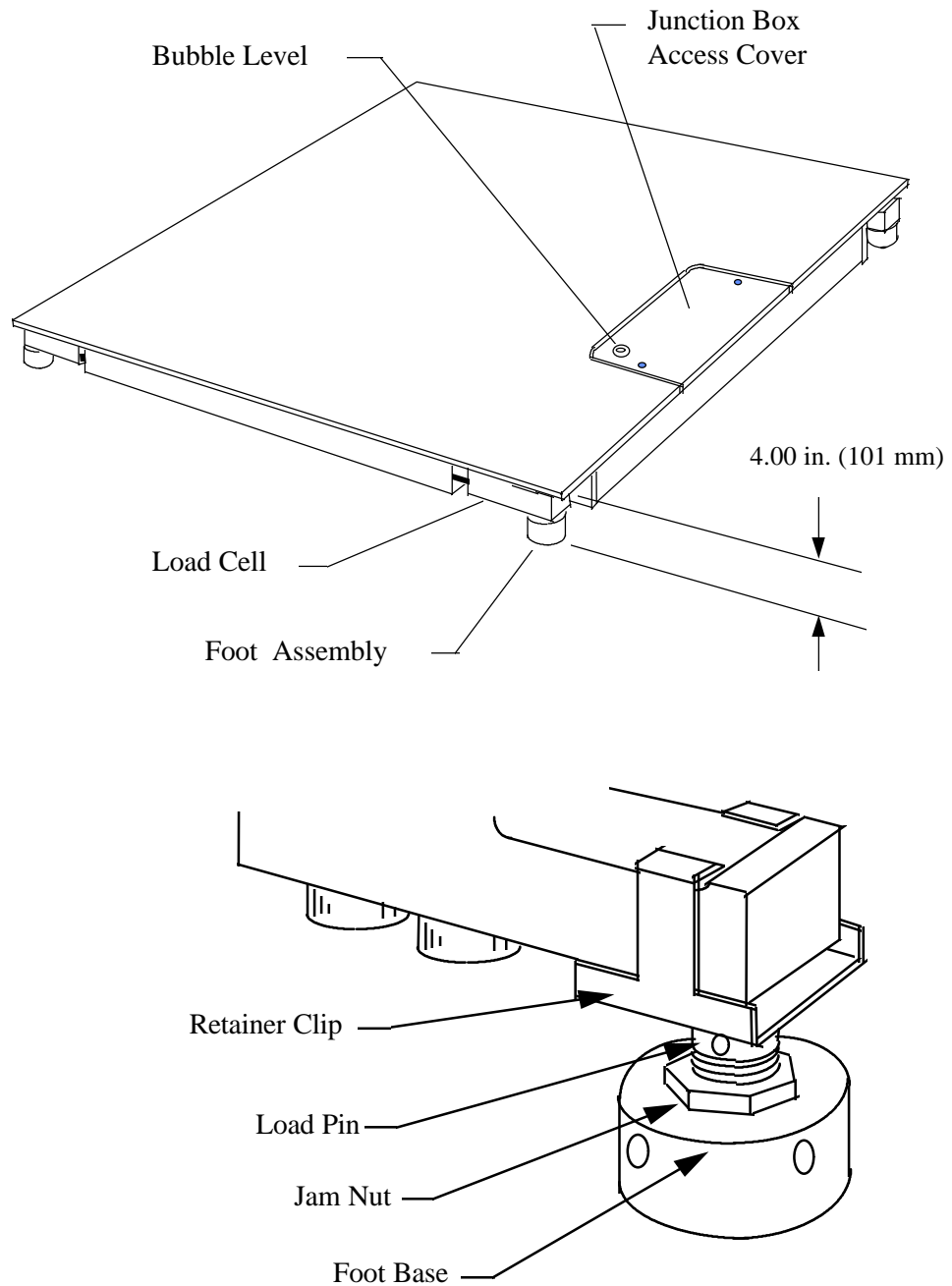


Figure 1-1: Platform Assembly

## Foot Adjustment

Holes are provided in both the load pin and the foot base to accept a small round tool. Insert one tool into the load pin, and hold it in place while using a second tool, inserted in the foot base, to adjust the height. Adjust foot assembly until the platform is level and stable.

# 2

## Inspection and Site Selection

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### Inspection

Upon delivery, visually inspect the 2256 WEIGHT-PLATE floor scale for any damage which may have occurred during shipment and handling. Inspect the following areas:

- Platform assembly
- Load cells and load pin feet
- Load cell cables
- Load cell summing junction box
- Overall platform assembly

If any damage is noted, contact your freight carrier immediately.

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### Site Selection

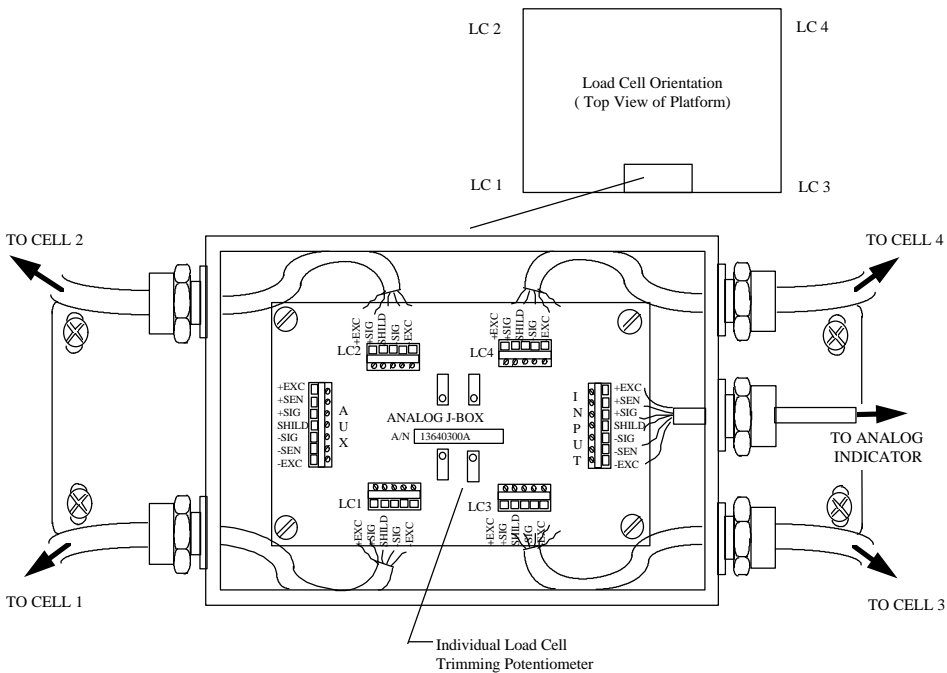
Many problems associated with floor scale weighing are caused by improper scale location. Before you begin weighing with the WEIGHT-PLATE floor scale, check the following conditions:

- Is the scale platform level?
- Is the floor/support at each corner of the scale area able to maintain support throughout the entire weighing capacity of the scale?
- Are there any heavy vibrations or wind currents at or near the scale?
- Will the scale be subjected to excessive or unusual loading due to the location or type of equipment used?

# 3

## Modes of Operation

The 2256 WEIGHT-PLATE floor scale uses an analog junction box for summing the load cell outputs. Only analog-compatible indicators will work with this scale. Connect the load cell cables and indicator cable to the junction box as shown in Figure 3-1.



Note: Turn all potentiometers fully clockwise prior to calibration.

Load Cell Wiring		Instrument Cable Wiring	
Function	Color	Function	Color
+ Excitation	Green	+ Excitation	White
		+ Sense	Yellow
+ Signal	White	+ Signal	Green
Shield	Yellow	Shield	Orange
- Signal	Red	- Signal	Black
		- Sense	Red
- Excitation	Black	- Excitation	Blue
		(Based on METTLER TOLEDO cable number 510624370)	

Figure 3-1: WEIGHT-PLATE Analog Junction Box Details and Wiring Codes

# 4

## Calibration

### Shift Adjust

Note: Before proceeding, check the shift characteristics to determine if any shift trimming is required.

Shift adjustment is used to compensate for differences in weight readings when a load is applied at different locations on the scale platform. Do not make shift adjustments until you have checked all mechanical parts and made sure that the scale provides repeatable weight readings. To check repeatability, place a test weight in the same location on the platform several times and make sure that the scale gives the same weight reading each time.

Then perform a shift test to make sure that you get the same weight reading when the weight is placed in each corner of the platform. 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. If you do not get the same weight reading at each location, perform the shift adjustment procedure described below.

### Shift Adjustment

A shift adjustment is made by adjusting the load cell trim potentiometers mounted on the junction box PCB (see Figure 3-1).

1. Remove the junction box cover and turn all potentiometers fully clockwise.
2. Successively place the test weight at each of the four designated locations (center of each scale quadrant). Record the displayed weight readings.
3. Place the test weight at the location with the lowest weight reading, and record that reading. Do not trim the load cell corresponding to that location.
4. Proceeding clockwise, place the test weight at each designated location. If necessary, adjust the trimming potentiometer corresponding to each location until each gives the same weight reading recorded in step 3.
5. Repeat this procedure until the weight readings at all the designated locations are the same or within the specified NIST Handbook 44 Tolerance Requirements.
6. Reinstall the junction box cover.

Note: Because the trim potentiometers interact with each other, any adjustment will affect weight readings at all corners.

### Scale Calibration

We recommend calibrating the scale with a test weight equal to the scale capacity. Follow the calibration instructions provided in the manual for your digital indicator.



# 5

## Routine Care and Maintenance

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### General

We recommend that you have your scale assembly inspected and calibrated periodically by an authorized METTLER TOLEDO representative. Contact your local authorized METTLER TOLEDO service representative for information about periodic inspection and calibration services.

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### Site Inspection

Make sure that the scale site remains in good condition as described in Chapter 2. Check for changes in the surrounding floor, excessive vibrations, and possible overloading conditions.

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### Platform Inspection

During periodic inspections of the scale assembly, check the following:

- Are there any unusual wear points, paths, or marks on the weighing surface?
- Is the junction box access cover on and screws in place?
- Is the junction box cover on and cover screws properly tightened?
- Are the load cell cables in good condition?
- Is there any moisture or foreign material present around or inside the junction box assembly?
- Is the instrument cable free from damage or binding the scale?
- Is there any debris or material build-up under or around the platform that could inhibit freedom of movement?
- Visually inspect the load cells and rocker pin feet for signs of unusual wear.
- Check repeatability and shift of the scale.

# 6

## Troubleshooting

### 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 2256 WEIGHT-PLATE floor scale, examine the physical location of the scale, checking for the presence of water, corrosive materials, unlevel floors, high vibrations, air currents, and/or physical damage to the scale platform. 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 30 SECONDS. FAILURE TO OBSERVE THESE PRECAUTIONS COULD RESULT IN BODILY HARM OR DAMAGE TO OR DESTRUCTION OF THE EQUIPMENT.**

### 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 WEIGHT-PLATE scale assembly and connect a load cell simulator to the indicator (analog simulators are available from METTLER TOLEDO). 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 WEIGHT-PLATE platform. If the problem reoccurs, further scale platform troubleshooting is required.

## Check Wiring

Remove power from the system, and then remove the cover from the junction box. Check the interior for moisture or any foreign material.

Make sure 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 code is as follows:

Load Cell Wiring		Instrument Cable Wiring	
Function	Color	Function	Color
+ Excitation	Green	+ Excitation	White
		+ Sense	Yellow
+ Signal	White	+ Signal	Green
Shield	Yellow	Shield	Orange
– Signal	Red	– Signal	Black
		– Sense	Red
– Excitation	Black	– Excitation	Blue
		(Based on METTLER TOLEDO cable number 510624370)	

## Check Load Cells

Check each load cell for proper bridge resistances.

Measuring Points	Resistance
Any lead to shield or ground	Infinity
+Exc (Green) to - Exc (Black)	385 Ohm minimum
+Sig (White) to - Sig (Red)	348 to 352 Ohms

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.

If the cells pass the above test, 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 5 VDC to 15 VDC depending upon the application and digital indicator used.

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 mV at 15 VDC excitation and loaded to gross capacity.

Note: Remove signal leads from terminals to measure output.

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  $\pm 1.5\%$  of the full scale output. For example, if the excitation voltage is 15 VDC, then the full scale output is 30 mV. Therefore, the no load zero output should be within  $\pm 0.45$  mV. If the load cell is out of specification, replace it.

If a load cell fails any of the above tests, replace it.

## Check Mechanical Components

Due to the simplicity of the WEIGHT-PLATE floor scale, there are few mechanical components to troubleshoot. Make sure that the platform can move freely and that there is clearance between the loading end of the load cells and the bottom of the deck. Check the following:

- Is the platform level or rocking?
- Are the rocker pin feet worn or damaged? Replace any foot that is unevenly worn or damaged.
- Are the rocker pin foot retainer clips in place or damaged? Replace any damaged or missing retainer clips.
- Is there any load cell damage. Replace any damaged load cell(s).
- Is there any apparent physical damage to the platform? Replace a platform that is bent or has broken welds.
- Are the load cell and platform mounting surfaces free of grease and other debris?
- Verify that the proper gap exists between the bottom of the deck and the load cell overload stop (see Table 6-1).

Scale Capacity	Load Cell Capacity	Overload Gap (inches)
3,000 lb	1,250 lb	0.012 - 0.018
6,000 lb	2,500 lb	0.017 - 0.023
10,000 lb	5,000 lb	-NA-

Table 6-1: Load Cell Overload Gaps

## Load Cell Replacement Procedure

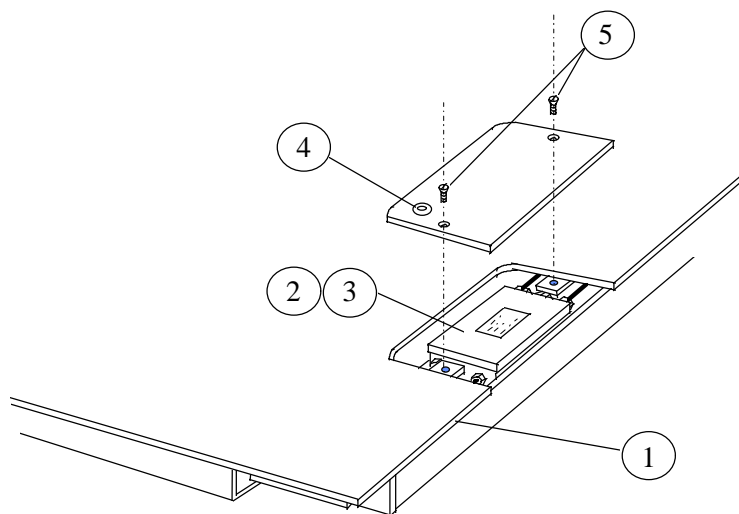
1. Remove power to the digital indicator.
2. Remove the junction box cover and locate the defective load cell terminal.
3. Disconnect the defective load cell cable from its terminal on the summing PCB.
4. Remove the cable from the enclosure.
5. Carefully position the platform onto a stable supporting surface that allows access to the defective cell and cable, as well as protecting the other cells during disassembly.
6. Attach a string to the end of the cable that is connected to the defective load cell. The string should be strong enough and long enough to pull the new load cell cable through the platform structure.
7. Remove the two load cell mounting screws, and lift the load cell from the mounting surface (retain the screws for reinstallation).
8. Carefully pull the defective load cell cable through the platform while feeding the string in at the junction box opening. Once the string is at the load cell location, detach it from the load cell cable.
9. Remove the rocker pin foot from the defective load cell and reinstall it in the new load cell.
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.
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 them (75 ft-lb for the stainless steel hexagonal head screw or 100 ft-lb for the grade 8 socket head cap screw). Verify that overload gaps are in accordance with Table 6-1.
12. Thread the load cell cable through the connector on the junction box.
13. Wire the new load cell cable to the proper terminal on the PCB according to the wiring code shown in Figure 3-1.
14. Power-up the indicator, perform shift adjust, and recalibrate the scale.

Note: Make sure the load cell and platform mounting surfaces are free of grease and other foreign materials.

# 7

## Service Parts

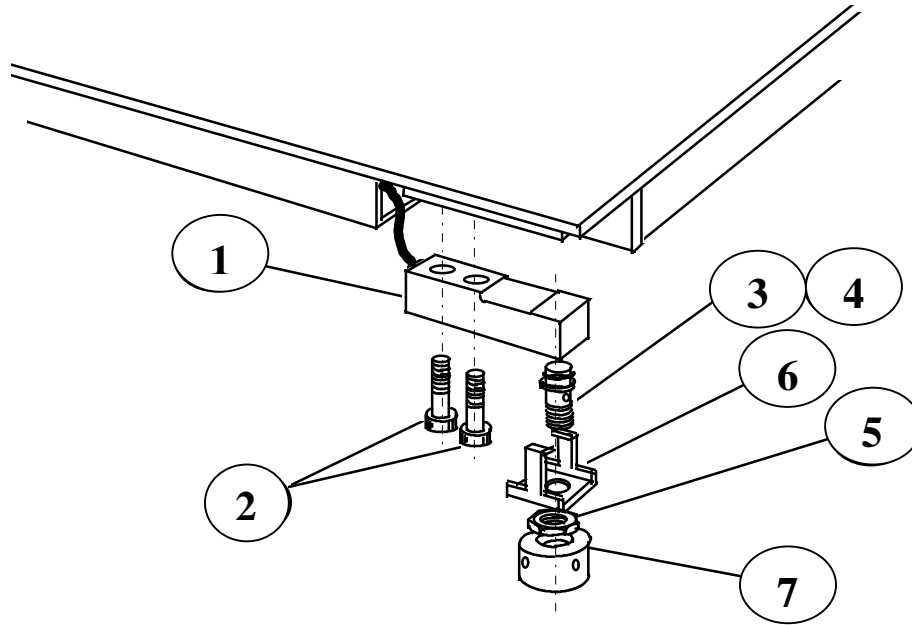
### Junction Box and Bubble Level



Ref. No.	Part Number	Description	Qty
1	TB203359-1 TB203095 TB203417-1 TB203096 TB203418-1 TB203097 TB203331-1 TB203419-1 TB203098 TB203420-1 TB203099 TB203421-1 TB203100 TB203422-1	36-inch x 36-inch Platform, Carbon Steel, 3K and 6K 48-inch x 48-inch Platform, Carbon Steel, 3K and 6K 48-inch x 48-inch Platform, Carbon Steel, 10K 48-inch x 60-inch Platform, Carbon Steel, 3K and 6K 48-inch x 60-inch Platform, Carbon Steel, 10K 60-inch x 60-inch Platform, Carbon Steel, 3K and 6K 60-inch x 60-inch Platform, Carbon Steel, 10K 36-inch x 36-inch Platform, Stainless Steel, 3K and 6K 48-inch x 48-inch Platform, Stainless Steel, 3K and 6K 48-inch x 48-inch Platform, Stainless Steel, 10K 48-inch x 60-inch Platform, Stainless Steel, 3K and 6K 48-inch x 60-inch Platform, Stainless Steel, 10K 60-inch x 60-inch Platform, Stainless Steel, 3K and 6K 60-inch x 60-inch Platform, Stainless Steel, 10K	1
2	TB100395	Analog Junction Box Assembly (Model 2256) Consists of: *13640300A Analog PCB TA 800218 Desiccant Bag	1
3	MZ0901010379	1/4 - 20 Phillips Head Screw S.S. x 1/4 inch long	4
4	TN201817	Circular Bubble Level	1
5	MZ0901010035	3/8 - 16 Flat Head Screw S.S. x 3/4 inch long	2

\* May have a letter prefix

# Load Cell and Foot



Ref. No.	Part Number	Description	Qty.
1	TB600363-1 TB600342-1 TB600343-1	1,250 lb Stainless Steel Hermetically Sealed Analog Load Cell 2,500 lb Stainless Steel Hermetically Sealed Analog Load Cell 5,000 lb Stainless Steel Hermetically Sealed Analog Load Cell	4
2	MZ0901010333 MZ0901010409 MZ0901010384 MZ0901010441	1/2-13 Socket Head Screw x 1 3/4 inches long 1/2-13 Socket Head Screw x 2 inches long 1/2-13 Hex. Head Screw S.S. x 1 3/4 inches long 1/2-13 Hex. Head Screw S.S. x 2 inches long	8
3	TA203345 TA203346	Mounting Foot Load Pin, 3K and 6K Mounting Foot Load Pin, 10K	4
4	MZ0909000005	O-Ring	4
5	MZ0901020087	Hex. Jam Nut, 7/16 - 20, SS	4
6	TA203104 TA203347	Mounting Foot Retainer Clip, 3K and 6K Mounting Foot Retainer Clip, 10K	4
7	TN203103	Mounting Foot Base	4

# 8

## Reference Material

### Reference Drawings

Refer to TB203366 for WEIGHT-PLATE floor scale general dimensions.

### Recommended Spare Parts

Part Number	Description
TB600363-1	1,250-lb Analog Load Cell
TB600342-1	2,500-lb Analog Load Cell
TB600343-1	5,000-lb Analog Load Cell
*13640300A	Analog Junction Box PCB

\* May have a letter prefix

### Load Cell Data

- Model number: 745
- Rated Capacity: 1,250 lb, 2,500 lb, 5,000 lb
- Maximum excitation voltage: 15 VDC or VAC rms
- Recommended excitation voltage: 15 VDC
- Full scale output: 2 mV/V
- Input terminal resistance: 385 Ohm minimum
- Output terminal resistance:  $350 \pm 2$  Ohms
- Temperature range compensation: -10°C to +40°C (+14°F to +104°F)
- Safe side load: 100% of full load cell rating
- Safe overload: 150% of full load cell rating



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# Publication Suggestion Report

If you have suggestions concerning this publication, please complete this form and fax it to (614) 481-7295

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PROBLEM(S) TYPE:	DESCRIBE PROBLEM(S):	INTERNAL USE ONLY
<input type="checkbox"/> <b>Technical Accuracy</b>	<input type="checkbox"/> Text <input type="checkbox"/> Illustration	
<input type="checkbox"/> <b>Completeness</b> What information is missing?	<input type="checkbox"/> Procedure/step <input type="checkbox"/> Illustration <input type="checkbox"/> Definition <input type="checkbox"/> Example <input type="checkbox"/> Guideline <input type="checkbox"/> Feature <input type="checkbox"/> Explanation <input type="checkbox"/> Other (please explain below)	<input type="checkbox"/> Info. in manual <input type="checkbox"/> Info. not in manual
<input type="checkbox"/> <b>Clarity</b> What is not clear?		
<input type="checkbox"/> <b>Sequence</b> What is not in the right order?		
<input type="checkbox"/> <b>Other Comments</b> Use another sheet for additional comments.		

Your Name: \_\_\_\_\_ Location: \_\_\_\_\_

Phone Number: (\_\_\_\_\_) \_\_\_\_\_

Fax this completed form to METTLER TOLEDO at (614) 481-7295

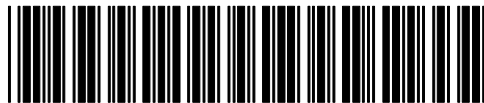
**METTLER TOLEDO**  
**Scales & Systems**

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