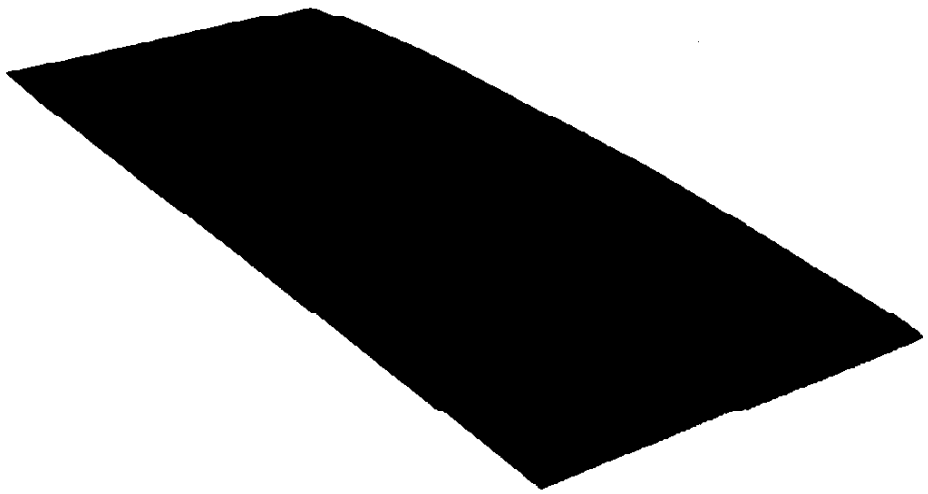
TOLEDO SCALE

TECHNICAL MANUAL



MODEL 2155

TM 002155 I02

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INDEX

INTRODUCTION

This publication is provided solely as a guide for individuals that have received Toledo Technical Training in Servicing the described Toledo Product.

Information regarding Toledo Technical Training may be obtained by writing:

Toledo Scale
Industrial Training
P.O. Box 1705
Columbus, Ohio 43216

I. GENERAL DESCRIPTION

The Toledo 2155 Full Load Cell Understructure is a self contained low profile unit with an overall height of 3 inches utilizing a rigid welded platform assembly and a support frame assembly. The platform assembly is one piece construction, assembled with a junction box access cover plate, internally mounted junction box assembly, 4 Toledo Industrial Load Cell assemblies and adjustable overload stops at each corner. The support frame consists of ball suspension load receivers and corner access cover plates at each corner. Provisions are made for mounting platform access ramps to the support frame.

II. SPECIFICATIONS

A. UNDERSTRUCTURE APPLICATIONS

1. Top of floor installations capable of four-way access with ramp accessories.
2. Shallow pit installations which places the platform surface at floor level.
3. Installation on portability frame accessory which permits the scale assembly to be easily transported to various locations.

B. STANDARD PLATFORM SIZES

3 Ft. X 3 Ft.
4 Ft. X 4 Ft.
5 Ft. X 5 Ft.

C. CAPACITY CHARTS

1. CAPACITY CHART FOR USE WITH MODEL 8139 INDICATOR.

RAM NUMBER	PLATFORM SIZE	CAPACITY	
		AVOIRDUPOIS	METRIC
0131	3' x 3'	1000 x 0.5 LB	500 x 0.2 KG.
0132		2500 x 1.0 LB	1000 x 0.5 KG.
0135		5000 x 2.0 LB	2000 x 1.0 KG.
0141	4' x 4'	1000 x 0.5 LB	500 x 0.2 KG.
0142		2500 x 1.0 LB	1000 x 0.5 KG.
0145		5000 x 2.0 LB	2000 x 1.0 KG.
0151	5' x 5'	1000 x 0.5 LB	500 x 0.2 KG.
0152		2500 x 1.0 LB	1000 x 0.5 KG.
0155		5000 x 2.0 LB	2000 x 1.0 KG.

2. CAPACITY CHART FOR USE WITH TOLEDO INDICATORS OTHER THAN THE MODEL 8139

RAM NUMBER	PLATFORM SIZE	CAPACITY	
		AVOIRDUPOIS	METRIC
0131	3' x 3'	1000 x 0.2 LB	500 x 0.1 KG.
0132		2500 x 0.5 LB	1000 x 0.2 KG.
0135		5000 x 1.0 LB	2000 x 0.5 KG.
0141	4' x 4'	1000 x 0.2 LB	500 x 0.1 KG.
0142		2500 x 0.5 LB	1000 x 0.2 KG.
0145		5000 x 1.0 LB	2000 x 0.5 KG.
0151	5' x 5'	1000 x 0.2 LB	500 x 0.1 KG.
0152		2500 x 0.5 LB	1000 x 0.2 KG.
0155		5000 x 1.0 LB	2000 x 0.5 KG.

D. END LOADING

End loading for the 2500 LB and 5000 LB capacity scales shall not exceed 80 percent of the scale capacity. 100 percent end loading is allowed for the 1000 LB capacity scale.

E. ACCURACY

Meets or exceeds National Bureau of Standards Handbook 44 Digital Scale Requirements for 5,000 increment Industrial Scales.

F. LOAD CELLS

Toledo Industrial Load Cells (cantilever compression type) with 8 feet of integral, 6-conductor, shielded, color-coded cable.

The load cell output at rated capacity is 2 Millivolts/Volt.

G. POWER SUPPLY REQUIREMENTS

Load cell power supply is provided by the digital indicator.

H. PLATFORM ASSEMBLY

One piece construction with removable junction box access cover plate.

Internally mounted junction box assembly. Internally mounted Toledo Industrial Load Cells with one load cell located at each corner.

Adjustable load cell overload stops with one stop at each corner adjacent to the load cell.

Adjustable platform check bolts on each side of the platform.

Threaded holes for lifting eye-bolts. Lifting eye-bolts are provided with the understructure.

I. SUPPORT FRAME ASSEMBLY

Internally mounted ball suspension load receivers.

Corner access cover plates.

J. ACCESS RAMP ACCESSORIES

Up to four access ramps can be installed for applications with multi-directional traffic. The ramp length is 36" long and is at a 4.8 degree angle.

K. PORTABILITY FRAME ACCESSORIES

The scale assembly may be mounted on a portability frame accessory which permits movement with a lift truck. The portability frame is equipped with 4 leveling pads allowing installation on uneven floors. A level bubble is provided which mounts beside the junction box in the platform assembly.

L. PIT FRAME ACCESSORIES

The scale assembly may be installed in a shallow pit using the pit frame accessories. The pit frame is of bolt together construction and consists of four (4) pit wall assemblies, four (4) cover plates, four (4) angle brackets, and hardware. The pit frame is meant to serve as the concrete form. Provision for suitable drainage and indicator lead must be made.

III. FLOOR OR PIT INSTALLATION

This section describes procedures for the installation of the scale for permanently mounted applications. If the scale is to be mounted on the portability accessory, follow the procedure in Section IV.

The mounting surface must be capable of withstanding the gross capacity loading requirements. The customer is responsible that this requirement be met.

Lifting equipment is required to remove, handle, and install the platform assembly. See table below for assembly weight data.

ASSEMBLY HANDLING WEIGHT DATA TABLE

Platform Size	Platform Assembly	Support Frame Assembly
3 Ft. x 3 Ft.	340 LB	30 LB
4 Ft. x 4 Ft.	440 LB	40 LB
5 Ft. x 5 Ft.	660 LB	50 LB

RAMP WEIGHT DATA TABLE

Platform Size	Ramp Weight
3 Ft. x 3 Ft.	120 LB
4 Ft. x 4 Ft.	160 LB
5 Ft. x 5 Ft.	200 LB

The frame is secured to the mounting surface at eight places with two retaining bolts at each corner. Retaining bolts are provided by Toledo scale in the shim plate kit of parts P/N 11799900A.

Tamp-in concrete floor anchors or equivalent for 1/2"-13 retaining bolts for securing frame to mounting surface must be provided by installer.

Rigid metallic conduit is required for the indicator cable. See Figure 1 for platform entrance of the indicator cable.

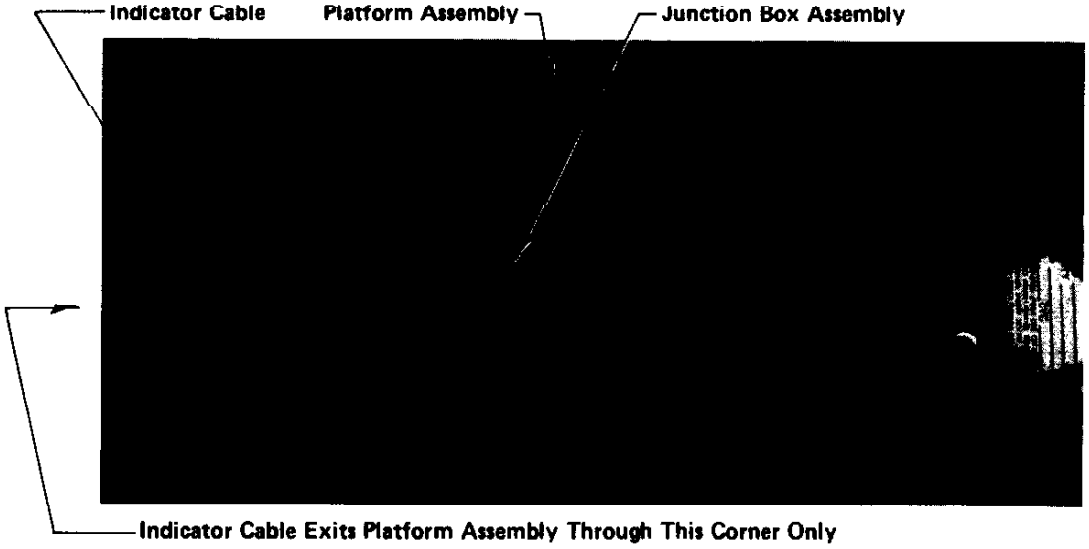


Figure 1
INDICATOR CABLE ORIENTATION

No other cables are allowed in the same conduit with the indicator cable.

NOTE: The space between the corner access cover plate and the corner suspension is very limited for conduit connection and cable protection cap. Interference with either the corner suspension or the overload stop could occur. Assemble carefully.

A. PRE-INSTALLATION PROCEDURES

The 2155 understructure is factory assembled and shipped as one integral unit.

The platform lifting eye-bolts, corner suspension load ball bearings, bearing protector sleeves, flat head allen frame retaining bolts, and metal shim plate kits are packaged with the scale.

Be sure to protect the load cell cables, platform corner mounted load cells, and associated load receivers from debris and damage during installation.

Check all understructure components so that any lost or damaged components may be obtained before starting installation.

In the case of a pit installation, be sure the pit is constructed in accordance with the layout submitted for the platform size being installed. Pit squareness is essential for proper scale installation.

The height of the scale assembly, from the bottom of the frame to the top of the platform is 3 inches. The difference between the understructure height and the depth of the pit is the thickness of the shims required to raise the platform level with the floor. The metal shims required must be placed beneath the frame in four places, between the corners of the frame and the top of the pier or pit floor.

If additional metal shim plates are required to accomplish these tasks, they must be furnished locally by others and conform to the Metal Shim Plate Configuration shown in Figure 2.

B. SUPPORT FRAME INSTALLATION

Remove the shipping straps, the platform assembly, any internal blocking, and the skid runners beneath the support frame.

The support frame is secured to the mounting surface at eight places with two retaining bolts at each corner.

The frame has eight countersunk holes 9/16" diameter for the 1/2"-13 x 1-1/2" allen flat head retaining bolts provided in the understructure kit of parts.

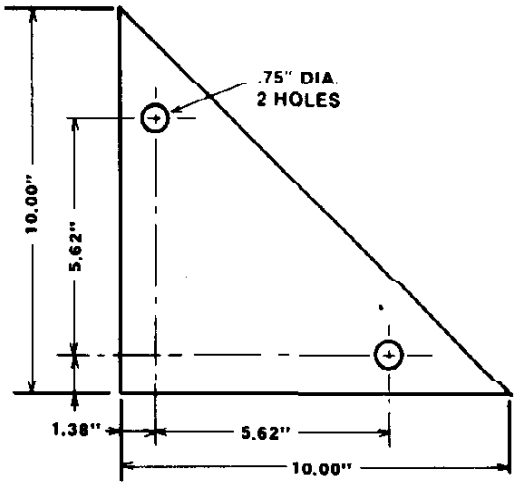


Figure 2
METAL SHIM PLATE CONFIGURATION

Figure 3
SUPPORT FRAME INSTALLATION

NOTE: There is 1/4" of clearance between the frame and bottom of the platform assembly. Care should be used to get the retaining bolts as flush as possible with the frame. THE RETAINING HOLES MUST BE PRECISELY LOCATED.

1. Place and orient the support frame at the desired weighing position while insuring that the indicator cable enters from a protected side of the scale. See Platform and Support Frame Installation Orientation Sketch in Figure 4.

NOTE: The match mark on the frame and the junction box access cover plate must be in agreement.

In a pit installation, be sure that the frame is centered in the pit before drilling mounting holes to avoid platform interference with the pit sides.

Check for squareness of the support frame before proceeding with the next step.

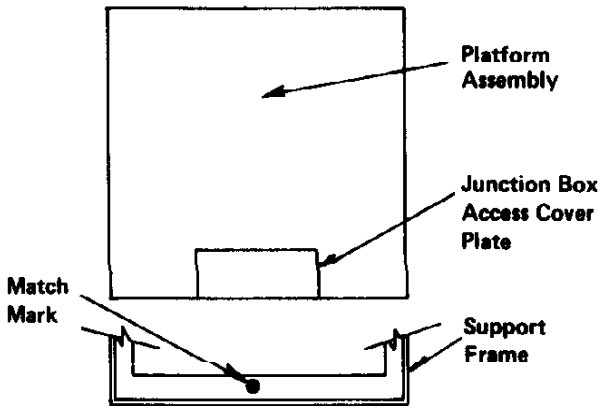


Figure 4
PLATFORM AND SUPPORT FRAME INSTALLATION ORIENTATION

2. Using the support frame as a template and holding the frame in place, drill a 3/8" diameter pilot hole at the eight places in the mounting surface.
3. Lift and move aside the support frame.
4. Drill the proper size and depth retaining hole in the mounting surface and install anchors as instructed by the floor anchor manufacturer. Anchors must be flush or just below floor level.

NOTE: Make sure the mounting surface is completely clear of all foreign materials.

5. Place support frame back in correct position. DO NOT secure the frame to the mounting surface.
6. Remove the corner access cover plates. In the case of a pit installation, also remove pit corner access cover plates.
7. Thoroughly clean and lubricate ALL ball bearing and load receiver contact surfaces. The Toledo Part Number for a 1.5 oz. tube of Magnalube Teflon lubricant is 08153600A. Place the lubricated ball bearings in the frame mounted corner load receivers.

C. PLATFORM ASSEMBLY

NOTE: THE JUNCTION BOX ACCESS COVER PLATE AND THE MATCH MARK ON THE SUPPORT FRAME MUST BE IN AGREEMENT.

1. Orient and carefully lower the platform assembly into position on the frame.

NOTE: MAKE SURE ALL 11/16" DIAMETER WEIGHING BALL BEARINGS ARE IN PLACE.

2. Remove junction box access cover plate.

D. JUNCTION BOX ASSEMBLY

The junction box assembly is part of the platform assembly.

JUNCTION BOX PROTECTIVE NOTES:

a. Protect internal components within junction box by keeping cover in place when not making connections or adjustments in the J-box.

b. Guard sealant coated cover gasket from contamination, i.e., dust, dirt and other foreign materials.

c. When the junction box cover is replaced at final assembly to junction box, make sure that the rubber gasket is correctly located. Make sure that the gasket surface is clean and sealant is applied to the contact surface of the gasket.

1. Remove the junction box cover.
2. Route the indicator cable to the junction box. The cable enters the scale base between the overload stop screw and the load cell assembly.
3. Make the required indicator cable connections. Check to be sure that all connections at terminal blocks are tight and secured against the bare wire, NOT THE INSULATION.

NOTE: Do not disturb the trim pots and jumpers.

4. Check and tighten if necessary all watertight cable connectors located on the outside of the junction box at cable entry points.

E. DIGITAL INDICATOR

1. Connect the indicator cable to the digital indicator.
2. Insert the line cord into 115 volt, 50/60 Hz separate grounded power supply.

WARNING: For continued protection against shock hazard, connect to properly grounded outlet only. DO NOT remove ground prong.

3. Program the digital indicator for weighing system calibration. Refer to the technical manual of the indicator for correct switch settings.
4. Allow the load cell digital instrumentation system to warm-up for a minimum period of fifteen (15) minutes before scale calibration.

F. ELIMINATION OF PLATFORM ROCKING

The elimination of platform rocking is accomplished by equally distributing the platform weight over all load cells.

Equalization of the platform load is most easily accomplished electronically. By comparing each individual load cell's display indication the appropriate shimming can be determined. The indications are made equal by adding or removing metal shim plates between the support frame and the mounting surface. The load cells are wired into the junction box printed circuit board as shown in Figure 5.

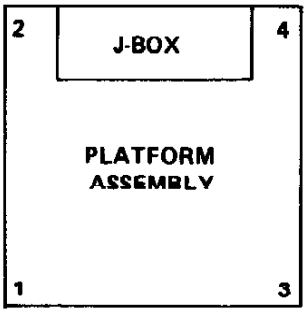


Figure 5
LOAD CELL LOCATION IN UNDERSTRUCTURE

1. Stand on the platform and determine if the platform rocks. If a rocking condition is noted add metal shim plates, placed between the frame and mounting surface, in appropriate corners, until noticable rocking is eliminated.
2. Note and record display indication with all four load cells in the weighing system. Take several readings to be certain there is no mechanical interference between the platform and the support frame assembly.
3. Remove, with care, both the plus (+) and minus (—) signal leads (output) for load cells 2, 3 and 4 from their respective terminals.
4. Note and record the display indication with only the Number 1 load cell in the weighing system.
5. Carefully remove Number 1 load cell signal leads from their respective terminals.
6. In sequence, connect, record, and remove the load cell signal leads from Numbers 2, 3 and 4. Compare the recorded display indications.
7. If the indications noted above are within ±15 percent, proceed with F9 below. If the indications noted above are not within ±15 percent proceed with F7.1 below:
   - 7.1 Remove metal shim plates from the corner(s) corresponding to high indications, or;
   - 7.2 Add metal shim plates to the corner(s) corresponding to low indications.

NOTE: Shimming effects diagonally opposite corners.

8. Repeat steps 4 through 7 until individual load cell indications are within ± 15 percent or to the nearest 1/32" shim.
9. Remove the platform and secure the support frame with shim plates to the mounting surface.
10. Place the bearing protector sleeves provided around each frame mounted load receiver to keep out dirt and foreign materials. Be sure to orient the protector sleeves such that when the platform is assembled the flatted side of the sleeve points toward the cable end of the load cell.
11. Carefully orient and replace platform into its assembled position.

NOTE: When installing the platform, check the indicator cable routing. The cable should be located between the overload stop screw and the load cell assembly. BE SURE not to damage the indicator cable during platform replacement.

12. Reconnect the signal leads for all load cells.

G. CHECK BOLT ADJUSTMENT

Check bolts have been adjusted at the factory. It should not be necessary to make check bolt adjustments unless replacing multiple load cells, multiple frame mounted receivers, platform, or

support frame.

There are eight check bolts. Two check bolts are located on each side of the platform.

1. Observe the check bolt clearance. The clearance should be no more than 7/32" and no less than 5/32".
2. Add or remove washers to obtain the required clearance.

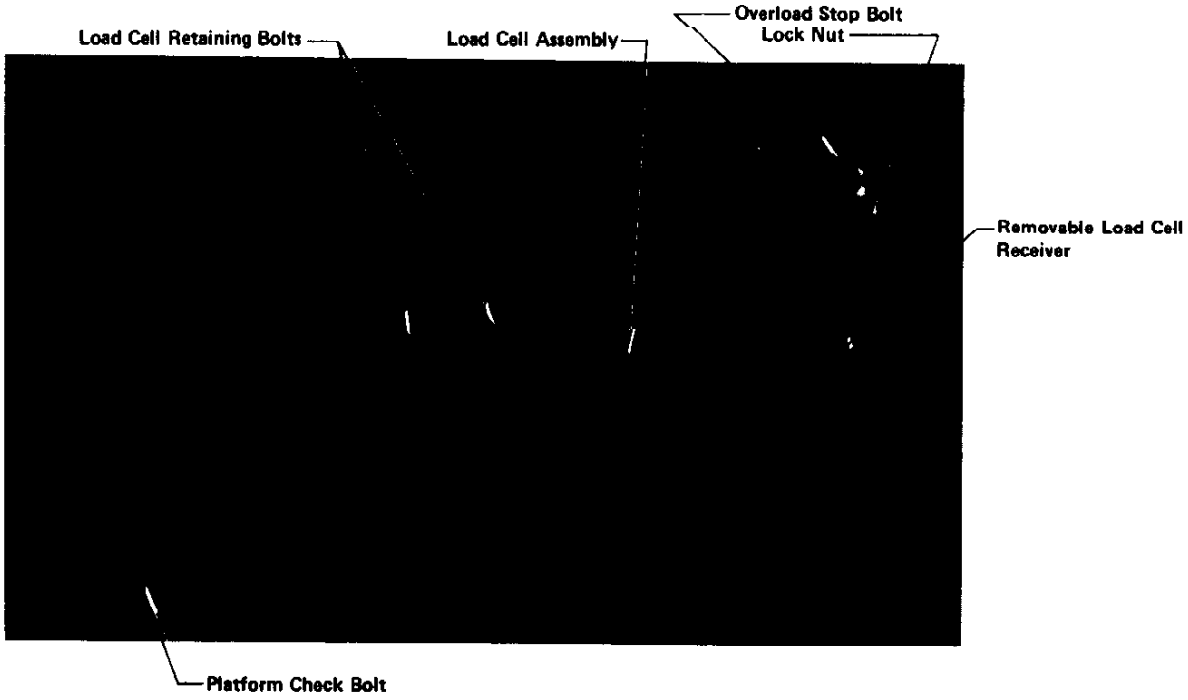


Figure 6
CORNER ASSEMBLY CONFIGURATION

H. OVERLOAD STOP ADJUSTMENT

1. Adjust the platform mounted overload stops, one stop at each corner adjacent to the load cell, as shown in Figure 6, until there is 0.045" maximum clearance between the support frame and the overload stop screw. Use a feeler gage to determine the proper setting Tighten lock nut securely.

NOTE: The overload stop in each corner must be set properly to obtain accurate measurement in the scale corners and to avoid load cell damage.

I. MOUNTING OF ACCESS RAMP ACCESSORIES

The ramps have threaded retaining holes and are bolted directly to the support frame. The ramps are not fastened to the floor.

To prevent the ramps from rocking, and to assure that the ramps do not interfere with proper scale operation, it is necessary that the ramps be situated solidly on the floor. It may be necessary to place metal shim plates under the ramps to provide full mounting floor support.

1. Position ramps in line with weigh platform.
2. Place metal shim plate(s), as required, between ramp and mounting surface until ramp is level with the top of the weigh platform.
3. Remove the platform assembly.
4. Secure ramp(s) to the frame.
5. Carefully lower platform into assembled position. Check to make sure that all corner suspension ball bearings are in place and ramp(s) and weigh platform are at the same height.

J. COVER PLATES

1. Install corner access cover plates. In the case of a pit installation, install pit corner access cover plates.
2. Apply grease to the threaded lifting holes and install the set screws provided in the shim kit of parts.

IV. INSTALLATION WITH PORTABILITY FRAME ACCESSORY

This section describes the initial installation of the Model 2155 scale using the portability frame accessory.

Lifting equipment is required to remove, handle, and install the platform assembly. See Assembly Handling Weight Data Table in Section III.

For approximate weights of the portability accessory see the table below.

PORTABILITY FRAME WEIGHT DATA TABLE

Platform Size	Portability Frame Weight
3 Ft. x 3 Ft.	35 LB
4 Ft. x 4 Ft.	60 LB
5 Ft. x 5 Ft.	75 LB

A. PRE-INSTALLATION PROCEDURES

The portability frame accessory with its hardware, platform lifting eyebolts, corner suspension load ball bearings, bearing protector sleeves, flat head allen frame retaining bolts, and metal shim plate kit are packaged with the scale.

The metal shim plate kit is not used with the portability accessory.

Be sure to protect the load cell cables, platform corner mounted load cells, and associated load receivers from debris and damage during installation.

Check all understructure components so that any lost or damaged components may be obtained before starting installation.

Remove the shipping straps, the portability frame, the platform assembly, any internal blocking, and the skid runners beneath the support frame.

B. PORTABILITY FRAME ASSEMBLY

1. Install the leveling pad feet into the threaded holes in the portability frame corners. Adjust the feet to approximately the same height. Do not tighten the lock nuts.

C. SUPPORT FRAME MOUNTING TO THE PORTABILITY FRAME

The support frame has 8 countersunk 9/16" diameter holes where it is secured to the portability frame.

1. Place the support frame onto the portability frame and secure it in place with 1/2"-13 x 2-1/4" allen flat head retaining bolts, lock washers, and hex nuts provided with the portability frame kit of parts.

D. PLATFORM ASSEMBLY

1. Thoroughly clean and lubricate ALL ball bearing and load receiver contact surfaces. The Toledo Part Number for a 1.5 oz. tube of Magnalube Teflon lubricant is 08153600A. Place the lubricated ball bearings in the frame mounted corner load receivers.
2. Place the bearing protector sleeves provided around each frame mounted load receiver to keep out dirt and other foreign materials. Be sure to orient the protector sleeve such that when the platform is assembled the flatted side of the sleeve points toward the cable end of the load cell.

NOTE: THE JUNCTION BOX ACCESS COVER PLATE AND THE MATCH MARK ON THE SUPPORT FRAME MUST BE IN AGREEMENT.

3. Orient and carefully lower the platform assembly into its assembled position on the frame.
4. Remove the junction box access cover plate.
5. Install the level bubble in the threaded hole provided inside the channel beside the junction box.

E. JUNCTION BOX ASSEMBLY

1. Remove the junction box cover. Observe the Junction Box Protective Notes in Section III.
2. Route the indicator cable to the junction box. The cable enters the scale base between the overload stop screw and the load cell assembly.
3. Make the required indicator cable connections. Check to be sure that all connections at terminals blocks are tight and secured against bare wire, NOT THE INSULATION.
4. Check and tighten if necessary all watertight cable connectors located on the outside of the junction box at cable entry points.

F. DIGITAL INDICATOR

1. Connect the indicator cable to the digital indicator.
2. Insert the line cord into 115 volt, 50/60 Hz separate grounded power supply.

WARNING: For continued protection against shock hazzard, connect to properly grounded outlet only. DO NOT remove ground prong.

3. Program the digital indicator for weighing system calibration. Refer to the technical manual of the selected indicator for the correct switch settings.

G. LEVELING PAD ADJUSTMENT

1. Stand on the platform and determine if the platform rocks. If a rocking condition is noted, adjust the leveling pad feet, in appropriate corners, until the rocking condition is eliminated.
2. Observe the level bubble inside the channel beside the junction box. Level the scale by adjusting the leveling feet.
3. Repeat steps 1 and 2 until a rocking condition is eliminated and the scale is leveled. Tighten the leveling pad lock nuts securely.

H. CHECK BOLT ADJUSTMENT

1. Follow the check bolt adjustment procedure of Section III.

I. OVERLOAD STOP ADJUSTMENT

1. Follow the overload stop adjustment procedure of Section III.

J. COVER PLATES

1. Install corner access cover plates.
2. Apply grease to the threaded lifting holes and install the set screws provided in the shim kit of parts.

K. CALIBRATION

1. Follow the calibration procedure of Section V.

L. RELOCATION PROCEDURE

1. When the scale is relocated it is only necessary to repeat Section IV.G, the leveling pad adjustment procedure. This requires the removal and replacement of the junction box access cover plate for level bubble inspection. NO FURTHER SCALE CALIBRATION IS REQUIRED.

M. SERVICING

All of the service procedures described in the subsequent sections may be used provided the leveling pad feet are properly adjusted following the procedures of Section IV.G.

V. CALIBRATION

Changing indications, instability, or cause of any mechanical friction must be corrected before proceeding with scale calibration. (See installation procedure above.)

A. 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 repeatability. 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 printed circuit board. See Figure 7. The load cells are wired to the printed circuit board as shown in Figure 5.

The test weight for the shift test must equal one-half (1/2) the rated scale capacity and must always be placed in the same concentrated area as the previous weighment. Test weights should be concentrated at the center of each quarter of the platform.

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

1. Load Cell Trimming Procedure
   - 1.1 Remove all four (4) jumper plugs from the junction box printed circuit board.
   - 1.2 Place the test weight at each of the four (4) designated locations. Note and record the displayed indications.
   - 1.3 Determine the location of the lowest indication. The corresponding load cell is NOT trimmed.
   - 1.4 Position jumper plugs for the other three (3) load cells in the "IN" circuit position.
   - 1.5 Place the test weight at the location corresponding to the lowest indication. Note and record the indication.

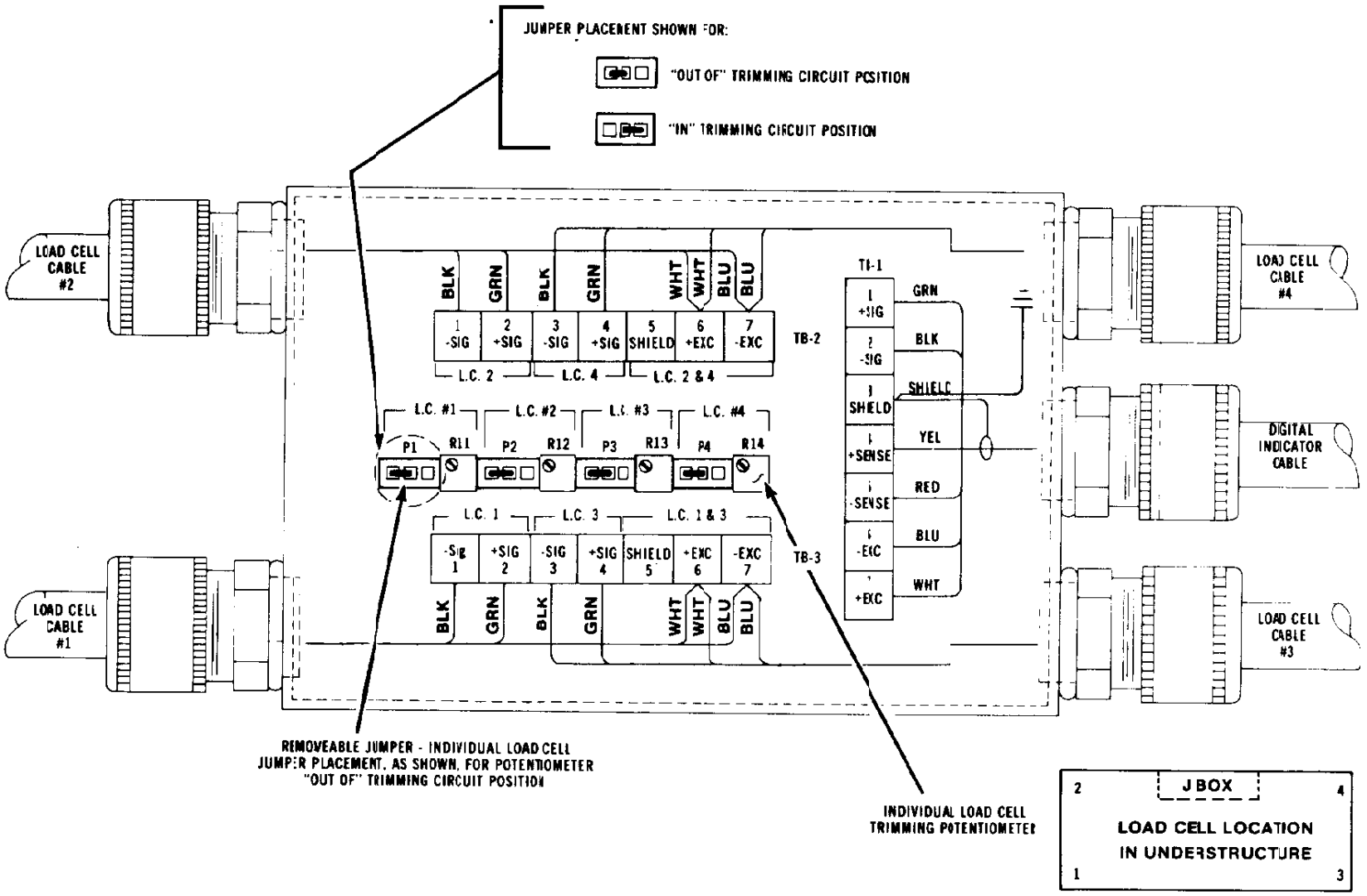


Figure 7
JUNCTION BOX PRINTED CIRCUIT BOARD

1.6 Proceeding clockwise, place the test weight at each designated location and adjust, if necessary, the trimming potentiometer corresponding to that location to obtain the indication obtained above. (Step 1.4)

NOTE: Because of the trimming potentiometers' interaction with each other, any adjustment will affect all corner indications.

1.7 Repeat Steps 1.5 and 1.6 until the indication at each designated location is the same or within the specified National Bureau of Standards Handbook 44 Digital Scale Accuracy Requirements.

B. COVER PLATES

1. Reinstall junction box cover and junction box access cover plate.

C. SCALE CALIBRATION (SPAN)

Always calibrate the scale using a test weight equal to the scale capacity.

1. With the appropriate test weight, continue with the calibration of the weighing system according to the instructions described in the manual provided with your digital indicator.

VI. LOAD CELL(S) REPLACEMENT PROCEDURE

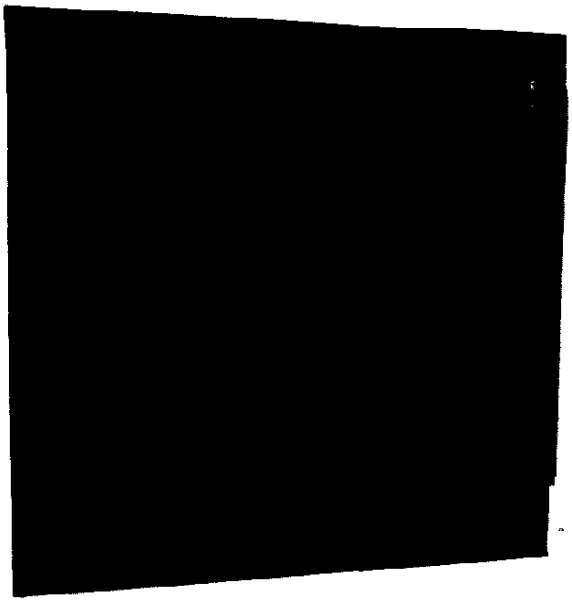
Lifting equipment is required to remove, handle, and install the platform assembly. The platform has threaded holes (5/8"-11) for removable lifting eye-bolts. Lifting eye-bolts were provided with the understructure.

Be sure to protect the platform corner mounted load cells, corner suspension parts and junction box internal components from damage, foreign materials, etc. See Assembly Handling Weight Data Table in Section III.

Four corner suspension alignment ball bearings (1" diameter), Toledo part number 11769700A, are required.

A. DISASSEMBLY

1. Digital Indicator
   - 1.1 Disconnect indicator line cord from 115 volt, 50/60 Hz power supply.
   - 1.2 Disconnect the indicator cable from the digital indicator.
2. Platform Assembly
   - 2.1 Remove the junction box access cover plate.
   - 2.2 Remove the junction box cover and disconnect the defective load cell(s) from the appropriate terminals.
   - 2.3 Loosen appropriate watertight connector(s) on junction box.
   - 2.4 Carefully remove the platform from support frame and position platform onto a stable supporting surface that allows access to the defective load cell(s) and insures that the other load cells are protected from damage while the scale is disassembled.
   - 2.5 Load cell assemblies are retained to the platform with two high strength allen head bolts. Remove defective load cell(s).



PLATFORM ASSEMBLY UNDERSIDE AND LOAD CELL CABLE ROUTING

3. Support Frame
   - 3.1 Remove weighing ball bearings and bearing protector sleeves around load receivers. One set at each corner.
   - 3.2 Remove corner access cover plate(s) or ramp(s), or in the case of a pit installation, remove pit corner access cover plate(s), if necessary to provide access to the frame mounted load receiver(s) associated with the replacement load cell(s).
   - 3.3 Remove the four retaining nuts and washers securing the frame mounted load receiver(s) corresponding to replacement load cell(s).

B. REPLACEMENT

1. Load Cell Assembly
   1.1 Thread and pull cable(s) through the understructure to the junction box. Coil up and place excess cable in the appropriate storage area.
   1.2 Secure the load cell(s) to the platform. Tighten the load cell(s) retaining bolts to 75 ft. lb using a torque wrench.
2. Alignment Ball Bearings
   2.1 Place an alignment ball bearing (1" diameter) in each corner load receiver. Be sure they are free of dirt and foreign material.
3. Platform Assembly
   3.1 Orient and replace the platform into its assembled position. Make sure all 1" diameter alignment ball bearings are in place.

NOTE: THE JUNCTION BOX ACCESS COVER PLATE AND THE MATCH MARK ON THE SUPPORT FRAME MUST BE IN AGREEMENT.

NOTE: When installing the platform, check the indicator cable routing. The cable should be located between the overload stop screw and the load cell assembly. BE SURE not to damage the indicator cable during platform replacement.

   3.2 Verify that alignment has been obtained by making sure that all of the alignment ball bearings are seated in the center of the load receivers. Be sure there is clearance between frame mounted studs and the through holes in the load receiver. This assures that the load receivers have been free to move for proper alignment.
   If alignment cannot be obtained, it will be necessary to raise the platform and relocate the load cell assembly accordingly.
   3.3 Repeat 3.1 and 3.2 until receiver alignment is obtained.
   3.4 Install washers and nuts on the two outside studs and tighten.
4. Raise platform, install washers and nuts on the two inside studs and tighten. Tighten ALL retaining nuts evenly. Secure all frame mounted load receivers.
5. Remove alignment ball bearings.

NOTE: Make sure all weighing ball bearings, the support frame and the load cell receivers are clean and that contact surfaces are lightly coated with the specified Magnalube — Teflon lubricant.

6. Place a weighing ball bearing (11/16" diameter) in each load receiver. Install a bearing protector sleeve around each load receiver. Be sure to orient the protector sleeve such that when the platform is assembled the flatted size of the sleeve points toward the cable end of the load cell.
7. Orient and replace the platform into its assembled position.

NOTE: THE JUNCTION BOX ACCESS COVER PLATE AND THE MATCH MARK ON THE SUPPORT FRAME MUST BE IN AGREEMENT.

8. Junction Box
   8.1 Make the required cable connections to the junction box terminals. See Figure 7. Make sure all connections are tight against the bare wire and not against the insulation.
   8.2 Tighten appropriate watertight connector(s) on the junction box.
   8.3 Observe the Junction Box Protective Notes in Section III. and reinstall the junction box cover. Replace the junction box access cover plate.
9. Install ramps and corner access covers, if removed. In the case of a pit installation, install pit corner access cover plates.
10. Reconnect the indicator cable to the digital indicator and the indicator line cord to 115 volt, 50/60 Hz power supply.
11. Proceed according to the calibration instructions in Section V.

VII. LOAD RECEIVER(S) REPLACEMENT PROCEDURE

Lifting equipment is required to remove, handle, and install the platform assembly. The platform has threaded holes (5/8"-11) for removable lifting eye-bolts. Lifting eye-bolts were provided with the understructure.

Be sure to protect the platform corner mounted load cells, corner suspension parts and junction box internal components from damage, foreign materials, etc. See Assembly Handling Weight Data Table in Section III.

Four corner suspension alignment ball bearings (1" diameter), Toledo Part Number 11769700A, are required.

A. LOAD CELL RECEIVER(S)

NOTE: Changing the load cell receiver(s) requires the removal of the load cell assembly(ies). See Section VI.A.

1. Disassembly
   1.1 Place and clamp load receiver end of load cell in a vise. See Figure 6. Damage may result if this procedure is not followed.
   Carefully remove the load cell receiver from the load cell.
2. Replacement
   2.1 Carefully install replacement load cell receiver into the load cell.
3. Proceed according to the Load Cell(s) Replacement procedure. See Section VI.B.

B. FRAME MOUNTED LOAD RECEIVER(S)

1. Disassembly
   1.1 Remove corner access cover plate(s) or ramp(s) if necessary to provide access to replacement frame mounted load receiver(s). In the case of a pit installation, remove pit corner access cover plates.
   1.2 Carefully remove platform assembly.
   1.3 Remove weighing ball bearings and bearing protector sleeves around load receivers. One set at each corner.
   1.4 Remove receiver retaining nuts and washers from the damaged receiver(s) ONLY. Remove load receiver(s).
2. Replacement
   2.1 Place replacement load receiver(s) over the four frame mounted threaded studs.
   2.2 Continue as outlined in Section VI.B.2 through VI.B.7.
   2.3 Install ramps and corner access covers, if removed. In the case of a pit installation, install pit corner access cover plates.

VIII. TROUBLESHOOTING

The following chapter is designed to aid in the rapid diagnosis of scale problems. The most difficult and expensive service operation is load cell replacement. Accordingly, it is recommended that all possible causes of improper scale operation be explored before attributing the problem to defective load cells. What follows is a step by step procedure which examines the most likely causes of scale malfunctioning. Before beginning be sure that the indicator is functioning properly and has been checked and calibrated with a load cell simulator. The indicator should be set to the proper number of increments and increment size by following the procedure described in the indicator manual. The zero should be set to 0 MV/V. The span should be set to 2 MV/V.

PROBLEM/SYMPTOM — UNSTABLE, BLANKED, OR EXCESSIVELY HIGH ZERO INDICATION (CANNOT BE REMOVED BY INDICATOR ADJUSTMENT)

1. Remove the junction box access cover plate and junction box cover. Be sure that the interior of the junction box is clean and dry.
2. Be sure that the junction box terminal block connections are correct and that all connections are tight and secured against the bare wire and not against the insulation.
3. Remove the platform assembly from the scale and support it such that there is no load acting on the load cells.
4. Observe the indicator. Defective load cells or a defective printed circuit board are indicated by an unstable, a blanked, or an excessively high indication.
5. Disconnect all load cells from the junction box terminal blocks. Measure the input, output, and shorted excitation output resistance of each load cell. Defective load cells are indicated by disagreement with the specifications given in Section X.
6. Individually connect load cells directly to the indicator thereby isolating the junction box printed circuit board. Defective load cells are indicated by an unstable, blanked, or an excessively high indication.
7. If all load cells are functioning properly, then the circuit board is defective.

PROBLEM/SYMPTOM — LINEARITY AND/OR HYSTERESIS ERRORS, NON-REPEATABLE, CREEPING, OR UNSTABLE INDICATIONS AT LOAD

8. With the platform removed, check that all load cells are tightly secured to the platform assembly. Load cell retaining bolts must be tightened to 75 foot-pounds.
9. Be sure that all frame mounted load receivers are tightly secured to the support frame and that load cell receivers are tightened firmly into load cells.

NOTE: Do not attempt to tighten load cell receivers while the load cells are installed in the scale. Load cell damage might result. If a loose load cell receiver is found, tighten it according to the instructions in Section VII.

10. Inspect all corner suspension components for damage. Bearing surfaces of the frame mounted load receivers, load cell receivers, and ball bearings

should be free of foreign material and corrosion.

11. Remove any debris from the support frame. Be sure that all support frame retaining bolts are tightened and the frame is secured firmly to the mounting surface.
12. Remove protective sleeves from each corner and reassemble platform assembly to the support frame.
13. Be sure that the scale is shimmed properly by comparing each individual load cell's display indication. The indications should agree within ±15 percent.
14. Be sure that the platform movement is free and floating and no rattling sounds can be heard when the platform is jostled. If the platform is not free and floating, check for mechanical interference;
    a. between the check bolts on the platform assembly and the support frame.
    b. between the corner suspension assembly and the indicator cable, the indicator conduit, or the corner access cover plates.
    c. between the platform assembly and ramp retaining bolts.
    d. between the platform assembly and the support frame retaining bolts.
    e. between the overload stop bolts and the support frame.
    f. between the frame mounted load receivers and the load cells.

PROBLEM/SYMPTOM — THE SCALE CANNOT BE SHIFT ADJUSTED

15. Check to be sure that the trimming jumper plugs are correctly oriented on the junction box printed circuit board to the "in circuit" position. See Figure 7.
16. Check that the load cell position in the understructure corresponds to the junction box printed circuit board position and that the test weight is placed over that corresponding position.
17. If steps 15 and 16 do not uncover a procedural error, either the printed circuit board is defective or one or more of the load cells are defective.

IX. UNDERSTRUCTURE DATA TABLE

1. DATA TABLE WHEN USED WITH A MODEL 8139 DIGITAL INDICATOR

Capacity		Microvolt Per Increment		Load Cell Capacity	End Loading	
LB	KG.	LB	KG.		LB	KG.
1000 x 0.5 LB	500 x 0.2 KG.	5.00 uV	4.409 uV	500 LB	1000 LB	450 KG.
2500 x 1.0 LB	1000 x 0.5 KG.	5.00 uV	5.512 uV	1000 LB	2000 LB	900 KG.
5000 x 2.0 LB	2000 x 1.0 KG	5.00 uV	5.512 uV	2000 LB	4000 LB	1800 KG.

NOTE: The microvolt per increment data is based on the Model 8139 ten volt cell excitation and load cells having two millivolts per volt rated output.

2. DATA TABLE WHEN USED WITH A TOLEDO INDICATOR OTHER THAN THE MODEL 8139 DIGITAL INDICATOR

Capacity		Microvolt Per Increment		Load Cell Capacity	End Loading	
LB	KG.	LB	KG.		LB	KG.
1000 x 0.2 LB	500 x 0.1 KG.	3.00 uV	3.307 uV	500 LB	1000 LB	450 KG.
2500 x 0.5 LB	1000 x 0.2 KG.	3.75 uV	3.307 uV	1000 LB	2000 LB	900 KG.
5000 x 1.0 LB	2000 x 0.5 KG.	3.75 uV	4.134 uV	2000 LB	4000 LB	1800 KG.

NOTE: The microvolt per increment data is based on fifteen volt load cell excitation and load cells having two millivolt per volt rated output.

X. TOLEDO INDUSTRIAL LOAD CELL DATA

Each load cell is furnished with 8 feet of integral, 6-conductor, shielded, color-coded cable.

NOTE: The load cell sense leads are removed in the scale assembly.

TERMINATION

Symbol	Wire Color
Plus (+) Excitation	White
Minus (—) Excitation	Blue
Plus (+) Signal	Green
Minus (—) Signal	Black
Plus (+) Sense	Yellow
Minus (—) Sense	Red

CHARACTERISTICS

Excitation Voltage	15 Volts (Max.) D-C
Rated Output	2 mV/V
Input (Excitation) Resistance	412 +/— 5 Ohms
Output (Signal) Resistance	440 +/— 5 Ohms
Shorted Excitation Output Resistance	235 +/— 5 Ohms

FOR YOUR NOTES

TOLEDO SCALE