1997

Technical Manual
and
Parts Catalog

INTRODUCTION

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

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

METTLER TOLEDO
Training Center
P.O. Box 1705
Columbus, Ohio 43216
(614) 438-4400

PRECAUTIONS

- **READ** this manual before operating or servicing this equipment.

- **ALWAYS REMOVE POWER** and wait at least 30 seconds **BEFORE** connecting or disconnecting any internal harnesses. Failure to observe these precautions may result in damage to, or destruction of the equipment.

- **ALWAYS** take proper precautions when handling static sensitive devices.

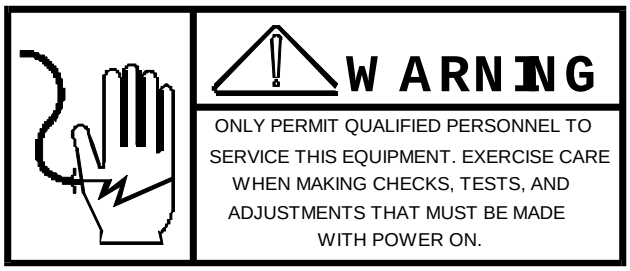
- **DO NOT** connect or disconnect a load cell scale base to the equipment with power connected or damage will result.

- **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 servicing.

- **CALL** METTLER TOLEDO for parts, information, and service.



1.0 GENERAL DESCRIPTION

The Model 1997 is a digital scale base intended for industrial weighing / counting applications requiring washdown capabilities. The Model 1997 is available in 25 lb. (15 lb.), 50 lb. (25 kg.), and 100 lb. (60 kg.) capacities. The Model 1997 digital scale base is intended for use only with the Toledo Model, 8510-20XX Panel Mount, 8510-10XX SS, 8520, and 8530 DigiTOL Indicators. The Model 1997 can also be used with the Toledo Model 8582 parts counter as a remote digital scale for sampling or bulk counting.

2.0 SPECIFICATIONS

2.1 PHYSICAL SPECIFICATIONS

2.1.1 Dimensions and Weight

Dimensions:
Platter: 315 MM x 350 MM
(Top) (12.4 in. X 13.9 in.)
Base Height: Maximum: 128 mm (5 in.)
Minimum: 120 mm (4.75 in.)

Actual Weight:
14 kg (31 lb)

Shipping Weight:
16 kg (35 lb)

2.1.2 Construction

Frame: Cast Stainless Steel
Platter: 16 gauge type 304/304L Stainless Steel

2.1.3 Digital Load Cell

The digital load cell used in the Model 1997 is the hermetically sealed stainless steel version of the Toledo DigiTOL digital load cell. The digital load cell module utilizes a moment insensitive counterforce combined with analog and digital electronics.

The A/D conversion is completed at the load cell allowing digital weight data to be sent directly to the indicator. Resolution is 700,000 counts at 2.35 mV/V. The update rate is fixed at 8.8 per second.

2.2 ELECTRICAL SPECIFICATIONS

The power to operate the digital load cell in the Model 1997 is provided by the digital indicator or parts counter used with the 1997 base. The supplied power must be between 18 to 24 Volts DC at 33 milliamps maximum. The maximum allowable cable length between the Model 1997 base and the indicator is 50 feet (16 m).

2.3 ENVIRONMENTAL SPECIFICATIONS

2.3.1 Operating Temperature

The Model 1997 is designed to meet specifications over a temperature range between -10 C to 45 C (14 F to 113 F) with relative humidity ranging between 10 to 95% non-condensing.

2.3.2 Storage Temperature

The Model 1997 is designed to withstand storage temperature range between -40 C to 70 C (-40 F to 158 F) with relative humidity ranging between 10 to 95 % non- condensing.

2.3.3 Application

The Model 1997 is rated NEMA 6P, where dust, lint, splashing or external condensation of non-corrosive liquids, and falling or hose-directed water may be present. Typical examples of misapplication include: but are not limited to:

- Immersions
- Corrosive chemical or acid environments.

2.3.4 Hazardous Areas

DO NOT USE THE MODEL 1997 IN LOCATIONS CLASSIFIED HAZARDOUS BY THE NATIONAL ELECTRICAL CODE (NEC) BECAUSE OF COMBUSTIBLE OR EXPLOSIVE ATMOSPHERES OR DUST.

2.4 FACTORY NUMBER GUIDE

Factory	Load Cell	Allowable	Maximum	Recommended Scale Indication

Number	Capacity	Backweight	Capacity	
1997-0001	30 kg	15 lb / 8 kg	40 lb / 18 kg	25 lb x 0.005 lb / 10 kg x 0.002 kg
1997-0002	100 kg	90 lb / 40 kg 40 lb / 15 kg	140 lb / 65 kg	50 lb x 0.01 lb / 25 kg x 0.005 kg 100 lb x 0.02 lb / 50 kg x 0.01 kg

2.5 AGENCY APPROVALS

The model 1997 meets or exceeds the NIST H44 500 d or Canada OIML 300 d specifications. The 1997 meets or exceeds FCC docket 80-824 for radiated and conducted RFI emissions and meets Canadian and U.K. specifications for RFI susceptibility.

3.0 INSTALLATION PROCEDURE

3.1 UNPACKING

3.1.1 Examine the shipping container for any signs of damage. IF SHIPPING DAMAGE IS FOUND, MAKE A CLAIM WITH THE CARRIER IMMEDIATELY.

3.1.2 Open the shipping carton, remove the packing material, and lift the platter from the carton.

3.1.3 Next, using the lower frame lift the Model 1997 scale base from the container.

CAUTION

EXERCISE CARE TO AVOID DAMAGING THE METAL BELLOWS ON THE LOAD CELL ASSEMBLY.

3.1.4 Place the Model 1997 scale base on a level, firm surface. Retain the shipping container for future transport of the scale.

3.2 SETUP

3.2.1 Place the Model 1997 on a level, firm surface where it will be used. Level the scale by turning the adjustable feet on the base in or out while using the level bubble as a guide (Figure 3.1). The scale must be adjusted so it is stable and does not rock. When the scale is

level and stable, tighten the jam nuts on the feet to lock them in place.

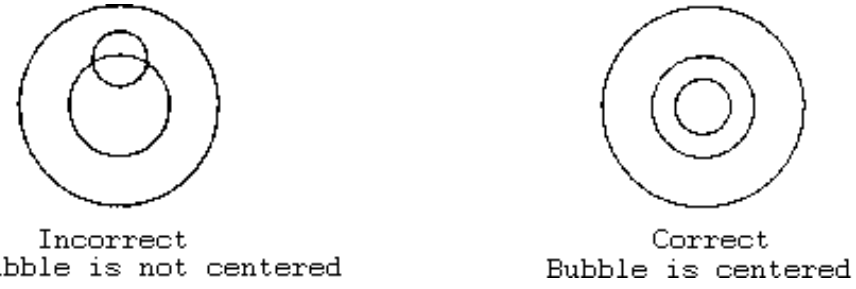


Figure 3.1 Level Indicator

3.2.2 Refer to Section 4.0, Input/Output Connections, for load cell cable connection instructions. After connecting the load cell cable to the digital indicator, apply power to the indicator and allow a 30 minute warm-up period with power applied before calibrating the scale. Refer to the appropriate indicator technical manual for calibration instructions. Refer to Section 2.4 for recommended capacity and increment configurations for the 1997 digital scale base.

4.0 INPUT/OUTPUT CONNECTIONS

CAUTION

THE 1997 IS A DIGITAL SCALE BASE INTENDED FOR USE ONLY WITH CERTAIN TOLEDO DIGITAL INDICATORS. BEFORE CONNECTING THE BASE TO A DIGITAL INDICATOR, VERIFY THE LOAD CELL PORT IS SETUP FOR A DIGITAL SCALE BASE. REFER TO THE APPROPRIATE TECHNICAL MANUAL FOR DETAILS. FAILURE TO DO SO MAY RESULT IN DAMAGE TO THE LOAD CELL, INDICATOR OR BOTH.

The model 1997 is shipped with a standard 10 ft. six conductor 20 gauge load cell cable attached and hermetically sealed to the digital load cell. Connection to a digital indicator is made by soldering the DB-9 Male 9-pin connector supplied with the indicator to the 1997 cable, or by wiring the cable directly to a terminal block as used in the 8510 SS and 8520 Digital Indicators. Use the wire color code in Table 1 to match the correct wire to the DB-9 connector or to the terminal block.

The Model 1997 is powered by the indicator. The load cell cable carries power for the scale base and data to and from the scale base. The digital load cell uses an RS422 voltage level to communicate with the indicator. The RS422 output may be utilized as either RS422 or TTL depending upon the indicator used. The input is single using RxD A only. The 1997 does not use RxD B. The load cell cable must be wired as follows for the following indicators, (use the wire color codes to match to the connector):

Signal Description	1997 Cable Wire Color	*8510 Panel Mount - 20XX DB-9	**8510 SS-10XX 4 - Pos. Term. Block TB1	**8510 SS-10XX 6 - Pos. Term. Block TB1	***8520 J2	8572, 8582, Desk/ Wall, 8530 Desk/ Rack	8530 Wall
RxD A	Red	1	2	3	RxD A	1	A
****BATT IN	White	NC	NC	NC	NC	NC	NC
+ 20 VDC IN	Green	5	1	6	+ 20 V	5	E
TxD B	Yellow	NC	NC	2	TxD B	6	F
GND	Blue	7	4	5	GND	7	G
TxD A	Black	8	3	1	TxdD A	8	H

NC = Not Connected

Table 1 1997 Load Cell Cable Wiring Guide

NOTE(S):

***** The Model 8510-20XX is the Panel Mount version of the 8510 which must have the internal digital load cell harness, part number 13358900A, installed to operate the Model 1997 base. The 8510-20XX is shipped with a DB-9 connector which must be soldered onto the 1997 load cell cable.

** The model 8510-10XX is the stainless steel version of the 8510 which includes the over / under feature. The 8510-10XX SS Indicator uses a terminal strip, the TB1 on the Power Supply PCB, for load cell connections. The old-style version uses a 4-position terminal block, and the new-style version uses a 6-position terminal block. Verify whether the 8510 SS has the 4 or 6 position terminal block, and use the correct wiring termination as listed in Table 1.

*** The 8520 Digital Indicator has screw terminal blocks for connecting the digital load cell. The terminal blocks are located inside of the 8520 and are labeled with the same terminology as the 1997 signal description as shown above. To connect the 1997 to the 8520, match the signal descriptions. For example, RxD A at the 8520 terminal block would be connected to RxD A on the 1997 cable.

**** The white wire is not used for this application. Tape the wire end back with insulating tape to prevent shorting on other components.

CAUTION

The WHITE WIRE in the load cell cable MUST NOT BE CONNECTED. DAMAGE TO THE LOAD CELL IN THESE BASES MAY RESULT IF THIS WHITE WIRE IS CONNECTED TO THE 8510. Fold back and tape this wire to prevent shorting.

5.0 MECHANICAL ADJUSTMENTS

5.1 OVERLOAD STOP ADJUSTMENTS

The overload stop gaps must be checked and reset if the top or bottom frame, and load cell is replaced. To set the gaps, insert the proper size gap gauge between the screw and post, (Refer to Figure 5.1) then turn the screw until the proper gap is measured. Refer to Figure 5.2 for the location of the overload stops and Table 2 for the gap settings per Factory Number.

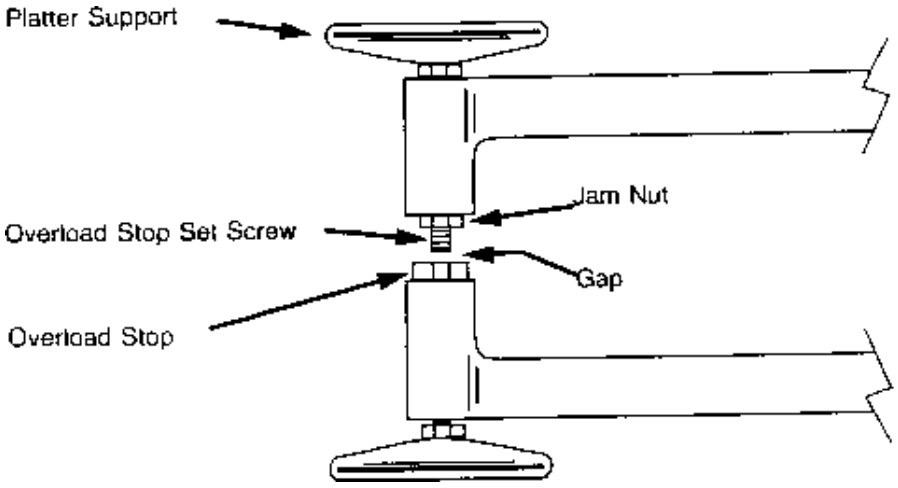


Figure 5.1 Overload Stop Part

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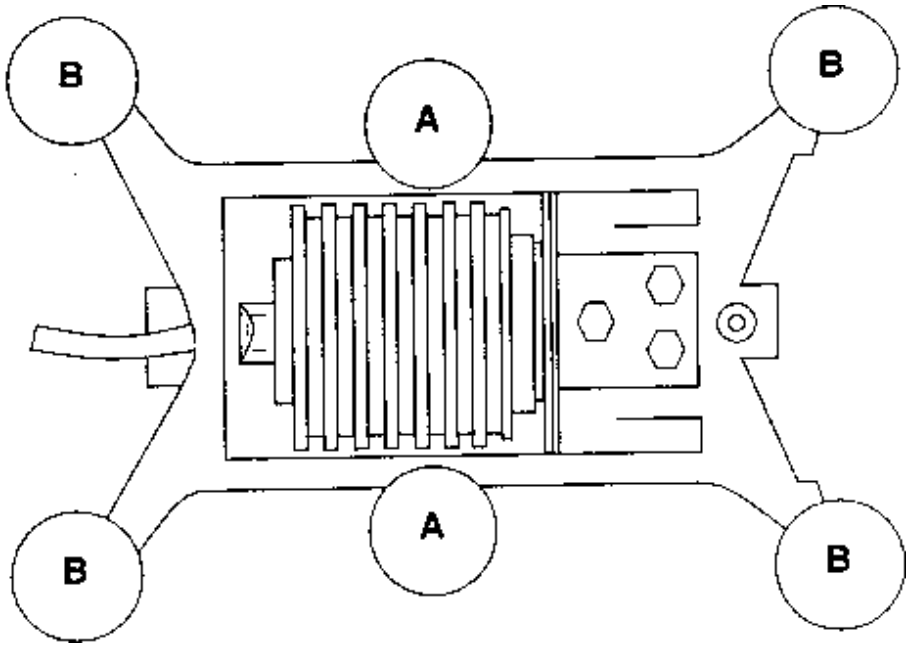


Figure 5.2 Overload Stop Locations

Stop Position	1997-0001 Overload Gap In Inches	1997-0002 Overload Gap In Inches
A	0.011 +/- 0.001	0.017 +/- 0.001
B	0.027 +/- 0.003	0.049 +/- 0.003

Table 2 Overload Gap Specifications for Figure 5.2

5.2 SHIFT TEST

A shift test verifies that all sections of the scale platter weigh within tolerance. If the 1997 does not pass the shift test, verify overload stop settings before replacing the load cell. No adjustment for shift is possible.

Place test weights equal to one-half scale capacity sequentially at each of the positions A, B, C, and D as shown in Figure 5.3. Note the indicator reading at each position.

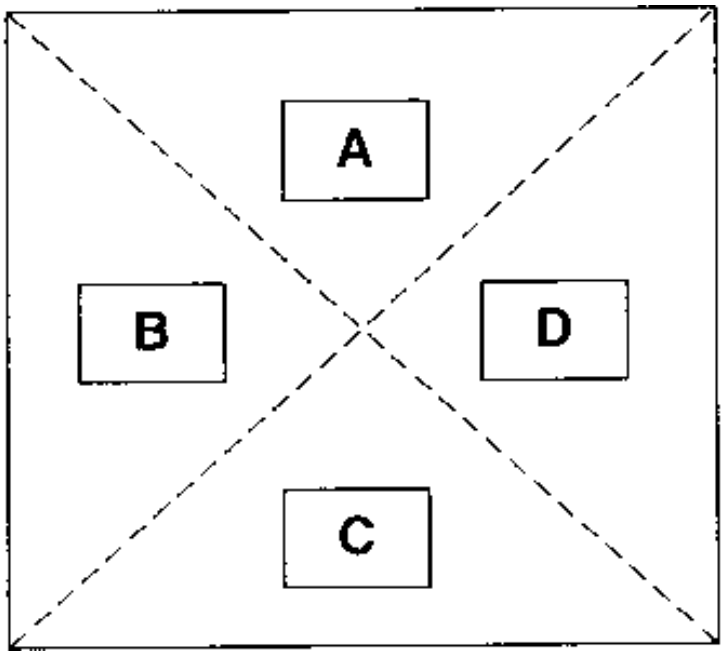


Figure 5.3 Platter Diagram For Shift Test

Positions A, B, C, and D are centered halfway between the center and the edges of the scale platter. The following Table 3 shows the tolerances in d (divisions) for the shift test.

Scale Capacity	Test Weight	Acceptance (New Scale) Tolerance	Maintenance Tolerance (Scale in Service)
5,000 d	2,500 d	+/- 1.5 d	+/- 3 d
3,000 d	1,500 d	+/- 1.0 d	

Table 3 Tolerance Table For Shift Test

5.3 DIGITAL LOAD CELL REPLACEMENT

CAUTION

BEFORE CONNECTING OR DISCONNECTING THE LOAD CELL CABLE FROM THE INDICATOR, YOU MUST WAIT AT LEAST 30 SECONDS AFTER REMOVING POWER TO THE INDICATOR. FAILURE TO OBSERVE THIS PRECAUTION MAY RESULT IN DAMAGE TO THE LOAD CELL, THE INDICATOR OR BOTH.

The digital load cell is secured to the top and bottom frame by three hex head bolts on each end. To remove the load cell follow these steps:

5.3.1 Disconnect power to the indicator. After waiting a minimum of 30 seconds, disconnect the load cell cable from the indicator.

5.3.2 Remove the scale platter. Loosen and remove the top load cell mounting bolts that secure the top frame to the load cell. Set the top frame aside.

5.3.3 Remove the bottom load cell mounting bolts. The load cell assembly can now be removed from the lower base.

5.3.4 When reinstalling a digital load cell, reverse the preceding steps. Lubricate the bolt threads and under the bolt head before reassembly. Using a torque wrench, tighten the mounting bolts to 35 ft/lb.

5.3.5 To properly align the top and bottom frames, center the overload set screws at the corners above their respective overload stops. Refer to Figure 5.1.

5.3.6 The overload stop settings must be checked and adjusted (if needed). Refer to Section 5.1 for the Overload Stop adjustments.

5.3.7 Connect the load cell cable to the indicator. After connection to the indicator has been made, apply power and allow the indicator and base to warm up for 30 minutes. Calibration with test weights will then be required. Refer to the indicator's technical manual for the calibration procedure. After calibration, refer to Section 5.2 for shift test instructions.

6.0 TROUBLESHOOTING

6.1 GENERAL

Knowledge of what parts in a " system" perform what functions will aid in isolating specific components that may be malfunctioning. The 1997 load cell receives a raw DC voltage supply from the indicator and serial transmissions from the indicator. In return the 1997 load cell supplies

the indicator with digital transmissions that represent weight or error messages.

Troubleshooting in this case is determining if the 1997 is receiving proper supply voltage nd serial transmissions from the indicator. If the required voltage and transmissions are sent to the 1997 load cell, but data is not being transmitted back to the indicator, the 1997 load cell has an internal malfunction. In this case, the load cell would need to be replaced.

6.2 SEQUENCE OF COMMUNICATION

The following is a short summary of the sequence of communication between the 1997 digital load cell and Toledo digital indicator.

6.2.1 When power is applied, the digital indicator provides 20 VDC to the 1997 load cell.

6.2.2 The digital load cell converts the 20 VDC raw supply to a 5 VDC regulated voltage.

6.2.3 The digital indicator transmits information to the digital load cell once after initial power up.

6.2.4 The digital load cell performs an A to D cycle and begins to transmit weight data to the indicator. If errors are detected, the load cell will send an error message.

6.3 VOLTAGE MEASUREMENTS

6.3.1 Table 4 shows the voltages that should be observed with a Digital Volt Meter when using the 1997 with the Toledo 8510, 8520, and 8530 indicators, and the 8582 counting scale.

Voltage Range	8510-20XX	8510-10XX	8520	8530	8582
+20 VDC MIN	17.5 VDC	17.2 VDC	17.5 VDC	17.5 VDC	20.7 VDC
+20 VDC MAX	23.0 VDC	23.6 VDC	22.1 VDC	19.9 VDC	24.9 VDC
+ 20 MAX RIPPLE	100 mV	100 mV	25 mV	25 mV	75 mV
RxD to GND	4.5 - 5.0 VDC	4.5 - 5.0 VDC	4.5 - 5.0 VDC	4.5 - 5.0 VDC	4.5 - 5.0 VDC
TxD A to GND	4.1 - 4.7 VDC	4.1 - 5.0 VDC	N/A	N/A	N/A
TxD A to TxD B	N/A	N/A	4.6 - 4.9 VDC	4.6 - 4.9 VDC	4.6 - 4.9 VDC

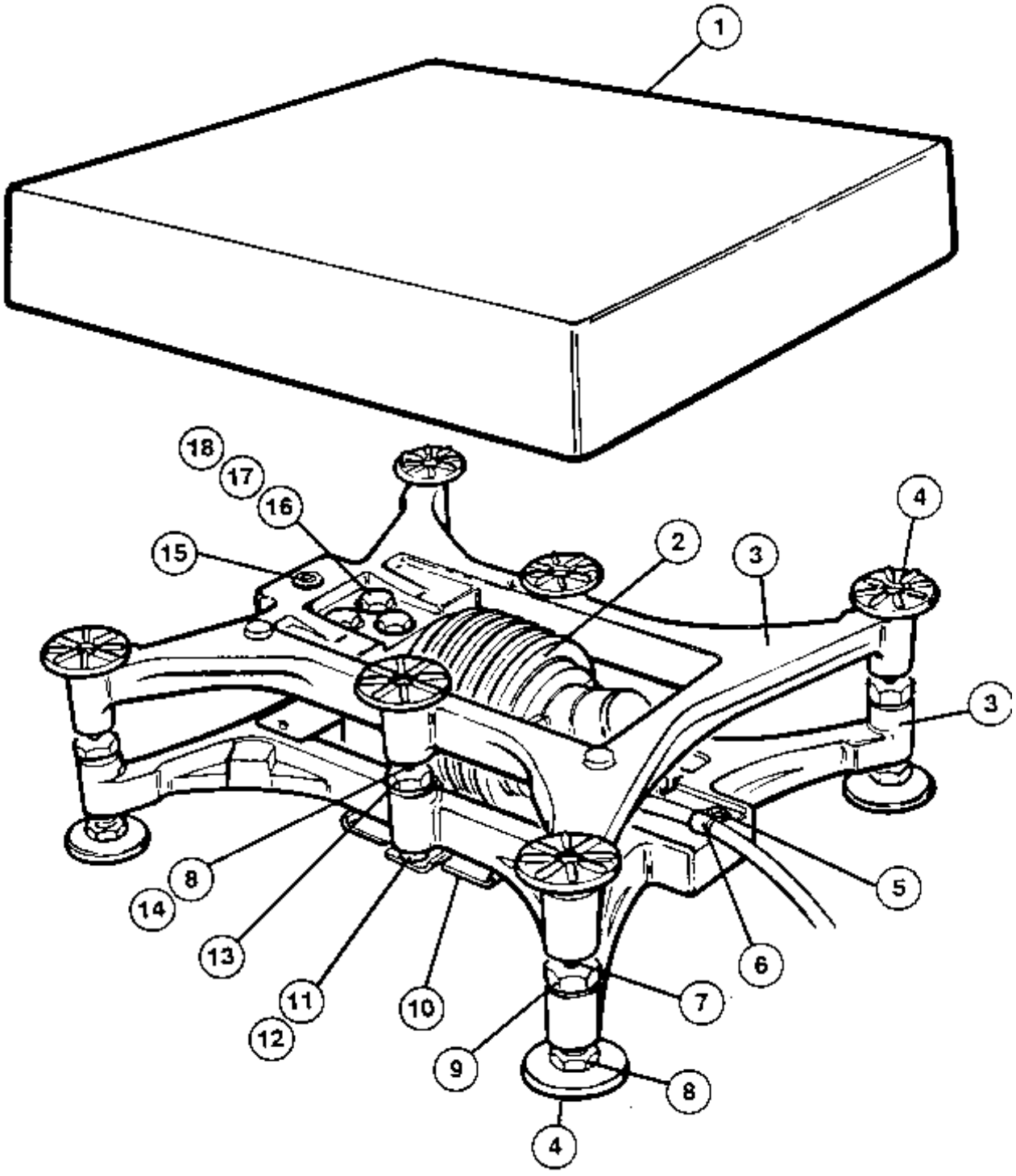
Table 4 Load Cell Voltages

6.3.2 If the voltages are within the parameters of Table 4, measure RxD to logic ground
again while you apply power to the indicator. The voltage should start at 0 VDC
then climb to between 3.4 to 3.6 VDC and stay there for about one half second.
This confirms the indicator is transmitting the start up data to the load cell when
power is applied.

6.4 ERROR CODES

Refer to the technical manual of the indicator used with the Model 1997 for definition of any error codes that appear on the display. Some error codes may be generated by the 1997. These are documented in the indicator technical manual also.

7.0 1997 REPLACEMENT PARTS



7.0 1997 REPLACEMENT PARTS

Ref. #	Part Number	Description	Qty.
1	13255300A	Platter	1
2	A13067800A	Load Cell Assb., Herm./30kg/SS (1997-0001)	1
	B13067900A	Load Cell Assb., Herm./100kg/SS (1997-0002)	1
	141416	Load Cell Assb., Herm./100kg/SS (1997-0102)	1
3	A13333100A	Machined Frame	2
4	A13253600A	Foot/Platter Pad	10
5	R0357700A	Screw, 10-32 x 1/2″ SS	1
6	12476400A	Cable Clamp	1
7	13257900A	Setscrew, Outside	4
8	R0391500A	Nut, Hex 3/8 - 24 SS	16
9	13257800A	Overload Stop, Outside	4
10	13418300A	Plate, Load Cell Protection	1
11	13418400A	Spacer	2
12	R0286000A	Screw, 3/8 - 24 x 5/8″ Hex/Cap	2
13	A13299000A	Overload Stop, Inside	2
14	A13305600A	Setscrew, Inside	2
15	10268900A	Level Indicator	1
16	R0389700A	Nut, Hex 3/8 - 24 SS	6
17	R0389900A	Washer, Flat .406″ ID SS	6
18	R0390600A	Screw, Hex 3/8 - 24 x 1-1/4″ SS	6

8.0 ACCESSORIES

Part Number	Description	Sales Number
13304800A	19″ Stand Mounted Stainless Column for Mounting 8520 and 8530 Wall Mount Indicators	0924 - 0038
A13423800A	Adjustable Height Stainless Stand With Casters	0924 - 0036
A13649100A	18″ Stainless Steel Column to Mount 8510SS to Scale Base	0924 - 0049