8213-0033

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

FCC NOTE

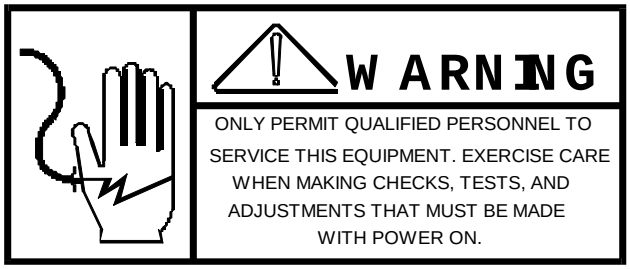
This equipment has been tested and found to comply with the limits of the United States of America FCC rules for a Class A digital device, pursuant to Part 15 of the FCC Rules and the Radio Interference Regulations of the Canadian Department of Communications. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

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.

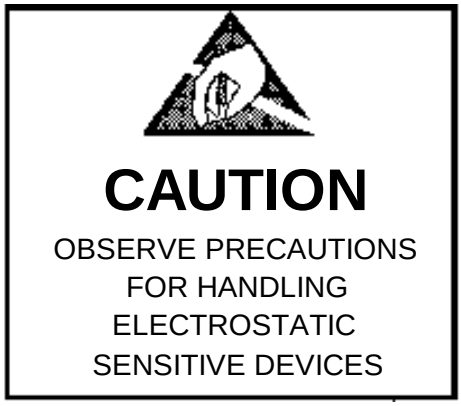
- **ALWAYS** take proper precautions when handling static sensitive devices.



- **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.

CONTENTS

1.0 GENERAL DESCRIPTION

The model 8213-40341AA is a general purpose scale which provides weight data for light capacity industrial application. The scale capacity is selectable for either 100 pounds or 50 kilograms. The 8213 is a stand alone scale including a DigiTOL® load cell, fluorescent display and bi-directional RS-232 port standard.

2.0 SPECIFICATIONS

2.1 PHYSICAL DESCRIPTION

The 8213 scale is comprised of the following major components:

2.1.1 DIE CAST BASE ASSEMBLY WITH POWER SUPPLY

the 12.5 inch x 14 inch x 4.15 inch die-cast aluminum base is fog white in color. Four screw-attached, top-adjustable mounting feet are included. A dual purpose power/zero switch is located on the front of the scale base beside the display. The AC power cord is attached to the base from underneath the scale.

2.1.2 DIE CAST SUB-PLATTER (SPIDER)

The spider is provided with rubber tips (for friction platter mount) and rubber center support. It mounts directly to the DigiTOL® load cell with two socket head cap screws. A level bubble is located on the sub-platter casting to aid in leveling the scale (Refer to Figure 1).

2.1.3 DigiTOL® LOAD CELL

The weight sensor is a 60 kg DigiTOL® load cell. The digital load cell module utilizes a moment insensitive counterforce combines with analog and digital electronics to provide digital weight information to the scale's logic electronics. New weight information is available approximately 8.8 time a second.

2.1.4 LOGIC PCB AND I/O CONNECTORS

The 8213 interface is an integral part of the scale's Logic PCB. This PCB provides display and interface capability, received raw weight information from the DigiTOL® cell, and performs all scale functions.

The DB-9 interface connector is located on the bottom of the base. Access to the connector is possible by removing an access plate. The access plate does not require tools for removal. Hex standoffs are provided to secure the interface cable to the 8213. This cable is not provided with the 8213.

2.1.5 STAINLESS STEEL PLATTER

The 12.5 inch x 14 inch stainless steel platter is removable for setup, calibration, cleaning, and for viewing the level bubble.

2.1.6 WEIGHT DISPLAY

The weight display is a five digit, green-blue vacuum fluorescent display 0.5 inches (12mm) in height. It is mounted in the scale so that it can be viewed on the long side of the base.

2.2 ELECTRICAL SPECIFICATIONS

The Model 8213-40341AA is a special version of the 8213 that can operate at either 120 VAC (+10%, -15%) by switching an internal harness and the power fuse. The line frequency must be between 49 and 61.5 Hz. Power consumption is 25 watts maximum.

The line voltage must be within these specifications. The power line for the 8213 must not be shared with equipment that generates line noise (such as motors, relays, heaters, etc.) If adverse power conditions exist, a power line conditioner may be required.

2.3 WEIGHING PERFORMANCE SPECIFICATIONS

2.3.1 CAPACITY AND INCREMENT SIZE

The scale capacity is switch selectable during setup as either 100 by 0.02 pounds or 50 by 0.01 kilograms. There is no external switch between the two.

2.3.2 WARM UP TIME

After 10 minutes of warm up time, the scale performs within the specified accuracies when the load remains on the scale no longer than 30 seconds. NOTE: A warm up time of 30 minutes is required prior to calibration.

2.3.3 SETTLING TIME

The time between application of a weight and the availability of a stable weight reading will not exceed 2.5 seconds.

2.3.4 OVER CAPACITY CONDITION

The scale will transmit a status byte instead of weight information for weights greater than scale capacity. Weight data for over capacity loads will not be transmitted. The display indicates six spaces [ ] for over capacity.

2.3.5 INITIAL WEIGHT

The 8213 can have up to 20 lb. (5 kg) of additional weight added to the platter (a conveyor for example), and still calibrate correctly. initial loads greater than this will overload the scale.

2.3.6 UNDER ZERO CONDITION

The scale will transmit a status byte instead of weight information for weights under gross zero. Weight data for under zero will not be transmitted. The display indicated six minus signs [------] for under zero.

2.3.7 ZERO INDICATION

The zero increment is +/- 0.01 lb (+/-0.005 kg) wide. The display's Zero LED is ON whenever the weight is within the zero increment.

2.3.8 AUTOMATIC ZERO MAINTENANCE

Whenever the weight is within the zero increment, zero is maintained automatically by adding or subtracting counts to/from the weight counts to bring the weight closer to the center of the zero increment. The range of this zero maintenance compensation does not exceed +/- 2% of scale capacity.

2.3.9 POWER UP ZERO

When AC power is applied to the scale, zero is automatically captured if the weight is within +/- 2% of scale capacity.

NOTE: IF SCALE CANNOT AUTOMATICALLY CAPTURE ZERO, MINUS SIGNS [------] WILL BE SHOWN ON THE DISPLAY.

2.3.10 DATA NOT VALID

A Status Byte will be transmitted instead of weight data when any of the following conditions exist:

- Scale is over capacity
- Scale is under zero
- Weight is in motion
- The scale is powered up and zero is not captured.

2.4 ENVIRONMENTAL SPECIFICATIONS

2.4.1 TEMPERATURE AND HUMIDITY

2.4.1.1 Operating Range

The scale is designed to meet specifications over a temperature range +10º to 40º C with a humidity range from 0 to 90% non-condensing.

2.4.1.2 Shipping Range

The scale is designed to withstand without damage a temperature range of -20º to 60ºC with a humidity range from 0 to 95% non-condensing.

2.4.2 POWER LINE TOLERANCES AND NOISE

Operation is within specifications for power line 'dropouts' of:

- To zero volts for 1/2 cycle or 10 ms
- To 50% of nominal (60 volts) for 1 cycle or 20 ms
- To 80% of nominal (96 volts) for 2.5 cycles or 50 ms

Performance is not affected by voltage spikes (both symmetrical and non-symmetrical) superimposed on the power line with the following specifications.

AMPLITUDE	DURATION	RISE TIME	OCCURRENCE
500v	100ns	5ns	12Hz
1000v	1µs	25ns	1Hz
1500v	3µs	35ns	1Hz

2.4.3 RADIO FREQUENCY INTERFERENCE

The scale is unaffected by transmissions of 460 MHz or 169 MHz at 4 watts with the source located 2 meters from the scale

2.4.4 ELECTROSTATIC DISCHARGE

Spark discharged of 6kv to any exposed metal surface will not cause damage to the scale. This test was run without a host computer attached.

3.0 SETUP AND CALIBRATION

Follow these instructions carefully to install and program the Model 8213 Scale. Make sure that all requirements in the specifications section (Sections 2.2 and 2.4) of this manual regarding the environment have been verified before proceeding any further. If any problems are encountered during the programming procedure, consult the troubleshooting section of this manual for assistance.

3.1 UNPACKING AND INSTALLING THE SCALE

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

3.1.2 Open the carton and remove the platter, power cord, and scale. Continue the inspection checking for damaged or missing parts. Retain the packing material for future transport of the scale.

!! CAUTION !!

Do not lift the 8213 by the spider or damage to the load cell may result. Lift the scale by the base only.

3.1.3 Place the scale on a level, stable surface where it will be used.

3.1.4 Level the scale by turning the adjustable scale feet in or out. The adjusting slot on the top of the feet are accessed through holes in the corners of the spider after removing the platter. The 8213 is in the correct position when the bubble is centered. (See Figure 1). The feet should be adjusted so the scale does not rock.

Figure 1 - Level Bubble

3.1.5 If the voltage selection is to be changed to operate from 220 VAC power, follow the procedure in Section 3.2.. If the unit will operate from a 120 VAC power line, skip Section 3.2..

3.1.6 Remove the calibration access plate located in the front-left portion of the top cover by removing the screw. (See Figure 2).

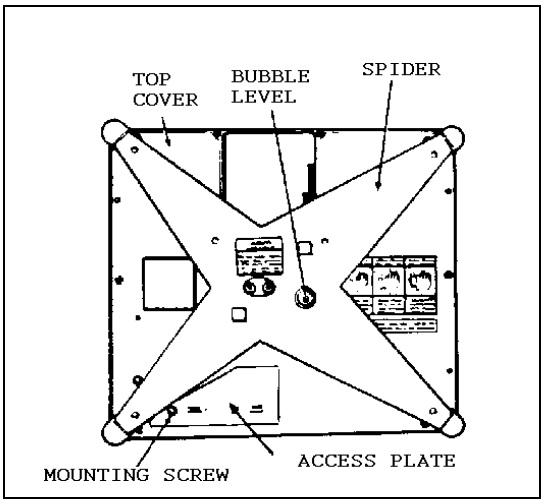


Figure 2 - Setup Access Plate

3.1.7 Refer to Section 3.3 for programming the switches on the Main PCB. The switched may be viewed through the access hole.

3.1.8 Perform the calibration procedure detailed in Section 3.4

3.1.9 After programming and calibration is complete, replace the setup access cover and secure with the sealing screw. If the scale will be used for legal-for-trade applications, a lead wire (provided by others) may be attached to the sealing screw at this time.

3.1.10 Reinstall the platter.

3.1.11 Remove the interface cable cover plate from the bottom of the scale if a hose computer will be connected. This is done by twisting the two plastic catches 90º.

3.1.12 Connect a correctly wired interface cable to the 9 pin connector on the bottom of the scale and secure with the cable clamp provided. Reinstall the cover plate over the access hole over the connector and twist the latches 90º.

3.2 CHANGING THE VOLATGE SELECTION

3.2.1 Remove AC power to the scale by unplugging the power cord from the bottom of the Model 8213 scale.

3.2.2 Remove the platter, sub-platter support and the sheet metal cover from the top of the scale.

3.2.3 Locate the transformer cavity in the left rear section of the base.

3.2.4 Access the white in-line connectors between the transformer and the line filter.

3.2.5 Unplug the two parts of the connector by pressing the two clasps on the sides of the make plug and pulling the two connectors apart. The hardness connector labeled PA will **NOT** be used for 220 VAC operation.

3.2.6 Locate the previously unused white female connector marker PB (220 VAC) in the transformer cavity.

3.2.7 Plug the PB connector into the make connector from the transformer.

3.2.8 Make sure the cables to the front zero switch and the power connector to the Logic PCB lay in the notch between the transformer cavity and the Logic PCB cavity of the base to eliminate pinching the wire during reassembly.

3.2.9 Reinstall the sheet metal cover and the sub-platter.

3.2.10 Turn the scale over to the bottom is visible.

3.2.11 Locate the fuse holder on the bottom of the scale near the line filter where the power cord attaches.

3.2.12 With a straight blade screwdriver, loosed the fuse cap by turning counterclockwise.

3.2.13 Replace the 1/4 A Slo-Blo fuse (used for 120 VAC) with the enclosed 0.125 A Slo-Blo fuse (for 220 VAC operation).

3.2.14 Reinstall the fuse cap by pressing in and turning clockwise.
3.2.15 Remove the existing fuse size label from the bottom of the base. Replace it with the 230 VAC 0.125 A Slo-Blo label included.

3.2.16 Turn the scale right side up and install the platter. The scale is now ready for installation.

3.3 PROGRAM SWITCH OPTIONS

The 8213 PCB contains a five position program switch. These switches should be set prior to applying AC power. See Figure 3.

SW1-1 BAUD RATE SELECTION
SW1-2 BAUD RATE SELECTION

SW1-1	SW1-2	BAUD RATE
OFF	OFF	1200
OFF	ON	2400
ON	OFF	4800
ON	ON	9600

S W1-3 PARITY SELECTION

Normal Operation Mode

ON- Even parity is selected.
OFF- Parity bit is always a “0”.

Calibration Mode Only

ON- Kilogram capacity and calibration.
OFF- Pound capacity and calibration.

S W1-4 DISPLAY EXPAND ENABLE

ON- The weight is displayed by 0.002 lb (0.001 kg). 10 times normal resolution.
OFF- Normal scale operation.

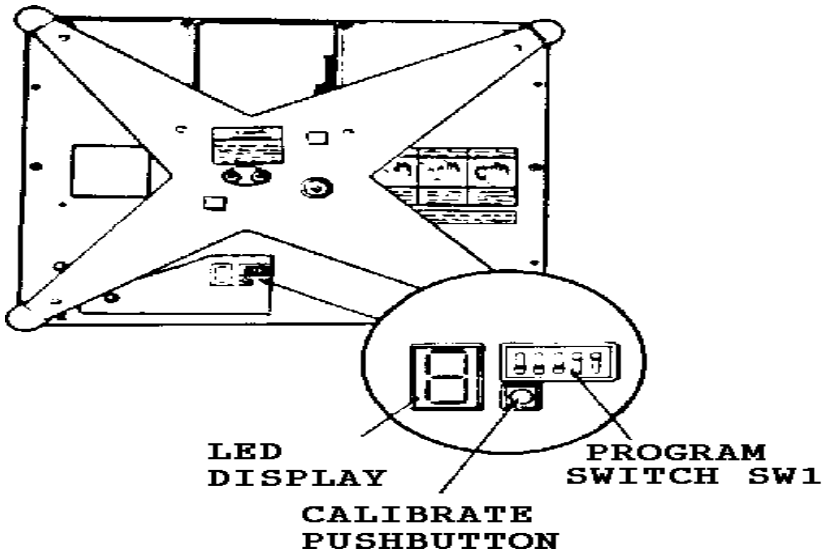


Figure 3 - Setup Switches

WARNING

FOR CONTINUES PROTECTION AGAINST SHOCK HAZARD, CONNECT TO PROPERLY GROUNDED OUTLET ONLY! DO NOT REMOVE THE GROUND PRONG.

In order to calibrate the 8213, the following tools are required:

1- 50 lb test weight (20kg weight for kilogram mode)
1- Long, thin non-conductive object.

3.4.1 The DigiTOL® cell used in the 8213 scale requires at least a 30 minute warm-up period with power applied, prior to final calibration. If the scale is not at room temperature at the start of warm-up, extend the warm-up time to at least one hour. This warm-up period will assure that the load cell has fully stabilized prior to calibration.

3.4.2 When power is applied to the scale, the display will show [------] momentarily. If all diagnostic tests are passed, it will display [0.00], and calibration is possible. If the setup access plate has not been removed, do so at this time. Refer to Step 3.1.6.

There is an LED display located next to the programming switches that is used to display prompting letters for calibration as well as certain error codes. It should now show a “0” indicating all power up diagnostic tests have been passed. See Figure 3.

NOTE: If the weight display or LED does not respond as described, proceed to the troubleshooting section of this manual.

3.4.3 Select switch S W1-3 for either pound or kilogram display and calibration weights. Refer to Section 3.3 for further information. FI the kilogram mode is selected, the enclosed capacity label 950 x 0.01 kg) must be installed over the 100 x 0.02 pound capacity script on the display lens. The other half of this label (weight in kg) covers the weight in pounds statement at the top of the display.

3.4.4 Toggle S W1-5 to the ON position using a long, thin non-conductive object. Avoid using an object that can easily be dropped into the unit.

3.4.5 Place the empty platter upside down on top of the spider. Depress the Calibrate push-button (Figure 3) until the letter “E” begins flashing then release.

3.4.6 The letter “E” will flash until the scale determines the zero setting. After zero is calculated, the display will show the letter “F”.

3.4.7 Place a 50 lb test weight on the platter. Use a 20 kg test weight for the kilogram mode.

3.4.8 Depress the Calibrate Push-button until the letter “F” begins to flash again then release.

3.4.9 When calibration is complete, the display will show the letter “C”. Remove the test weight. Toggle S W1-5 to the OFF position then position switch S W1-3 for correct parity selection for interfacing. replace the setup access plate, and the platter. A lead seal (provided by others) may be installed to seal the setup access plate, if required.

NOTE: Calibration will not be completed if there is constant motion on the scale platter. This is indicated by interrupted or periodic display blanking, and may indicate mechanical interference or an internal scale problem.

4.0 SCALE INTERFACE SPECIFICATION AND OPERATION

This section explains how to interface to the Model 87213 and the format and protocol required for communication. Each of the valid commands are shown with the correct responses also shown.

4.1 PURPOSE

The scale acts as a peripheral device to a host computer. The host computer must request weight data from the scale. The scale does not initiate a data transmission. It only responds to a host request. The host computer can also request a scale zero operation after which the scale will respond with a scale status byte This is done so that the host computer can determine whether the scale is in zeroing range and/or if the scale is at zero. A scale confidence test can be initialed by the host computer to cause the scale to perform memory tests on itself and put the results in a confidence status byte for later interrogation by the host.

4.2 DATA TRANSMISSION FORMAT

Data is transmitted and received by the scale via a half-duplex RS-232 voltage level interface in the following 11 bit frame:

1 start bit, 7 ASCII data bits, 1 parity bit and 2 stop bits.

The data transmission rate can be programmed for 1200, 2400, 4800 or 9600 baud asynchronous (see Section 3.3). Weight data is transmitted in displayed increments or in expanded increments of 0.002 lb (0.001 kg) when selected by an alternate command.

4.3 HANDSHAKING SIGNALS

Both of the handshaking lines provided (RTS and CTS) have the correct polarity voltage supplied to them internal to the 8213 so handshaking is not required. They are provided for the convenience of the host if the host requires. No connections have to be made in order for the scale interface to operate correctly.

When data is to be sent the request to send line (RTS) from the 8213 is turned ON (12VDC). The scale will wait for approximately 40 milliseconds for its clear to send line (CTS) to be turned ON (12 VDC) by the host. After the CTS is ON, the next byte of data will be sent. if CTS is not turned ON within the 40 millisecond window, the transmission will be aborted.

Between bytes of data sent by the scale there is a 250 microsecond delay to allow the host to turn CTS OFF. After all characters in a transmission have been sent, the RTS line will be turned OFF.

4.4 COMMUNICATION PROTOCOL

The host computer sends requests to the scale in the form of single ASCII characters (single ASCII characters only - no carriage return <CR> or line feed <LF> characters) to perform various tasks. Any extraneous characters sent with the single command may inhibit any 8213 response. the scale responds back to the host computer with a string of ASCII digits or an ASCVII "?" followed by a status byte. The following chart lists the commands that are recognized by the scale:

HOST COMMAND	FUNCTION DESCRIPTION	SCALE RESPONSE
W	Send normal resolution data command.	<STX>XXX.XX<CR> Normal resolution weight data OR <STX>?<status byte><CR> Scale status byte sent if the scale is in motion, under zero or over capacity.
H	Send high resolution weight data.	<STX>XXX.XXX<CR> High resolution weight data. OR <STZ>?>status byte><CR> Scale status data sent if the scale is in motion, under zero or over capacity
Z	Zero scale command. on the next A/D reading, the scale will attempt zeroing if it is within the zero capture range.	<STX>?>status byte><CR> Scale status byte.
A	Initiate a confidence test command. The scale performs tests on RAM, ROM, and NOVRAM and places the results into a confidence test status byte for future interrogation by the host.	<STYX>?<status byte><CR> A carriage return is sent to the host by the scale to indicate that the command was received.
B	Send confidence test status byte command. The scale is requested to sent the results of a previously performed confidence test (command A).	<STX><status byte><CR> Confidence test status byte.
E	Enter “echo mode” command. The scale is requested to enter a mode where incoming characters (except the command F) are not treated as commands. These characters are echoed back to the host. No <STX> or <CR> characters are added.	<STX>E<CR> The scale echoes back from the E command to indicate that the command was received.
F	Exit echo mode command. The scale is requested to exit the echo mode and treat all subsequent incoming characters as commands.	<STX>F<CR> The scale echoes back the letter F to indicate that the command was received.

NOTES: An ASCII “?” is sent by the scale to indicate that the following byte is a status byte and not weight data.

<> are used to indicate that the characters within are a description of the transmitted data and are not part of the transmitted data string.

<STX> denoted the ASCII start of text character.

<CR> denotes the ASCII carriage return.

If a confidence tests results in an error, the scale will not respond to the W, H or Z command until the error condition is cleared. A confidence test error will also cause the scale weighing operation to halt until the error condition is clears.

4.5 SCALE STATUS BYTE FORMAT

If weight is requested from the 8213 during motion or when over or under capacity, a status byte will be sent in place of the weight field. The bits of the scale status byte are defined as follows:

Bit No.	Function Description
7	Parity bit for the preceding six data bits
6	This bit is always a 1.
5	This bit is always a 1.
4	1 = Center of zero. 0 = Not at center of zero
3	1 = Outside zero capture range. 0 = Within range.
2	1 = Under zero. 0 = Within weighing range.
1	1 = Over capacity. 0 = Within weighing range.
0	1 = Scale in motion. 0 = Stable weight data.

4.6 CONFIDENCE TEST STATUS BYRE FORMAT

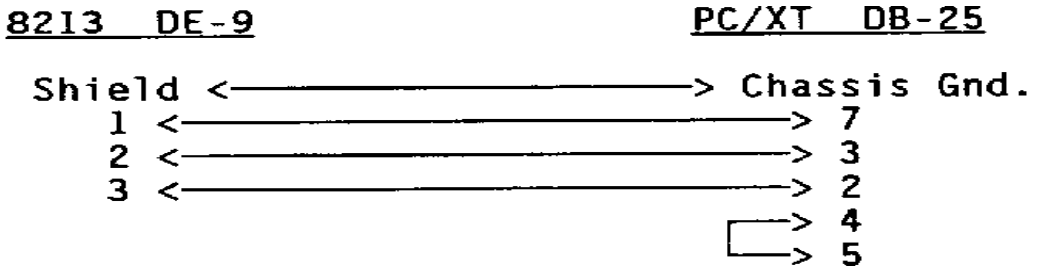
The confidence test status bits are defined as follows. Bit 6 is set to 1 after a confidence test is performed and reset to 0 after the host reads the confidence test status byte.

Bit No.	Function Description
7	Parity bit for the preceding six data bits
6	1 = New status data available. 0 = Host has read data.
5	This bit is always a 0.
4	1 = ROM test failed. 0 = ROM test passed.
3	1 = RAM test failed. 0 = RAM test passed.
2	This bit is always a 0
1	1 = NOVRAM test failed. 0 = NOVRAM test passed.
0	1 = NOVRAM test failed. 0 = NOVRAM test passed.

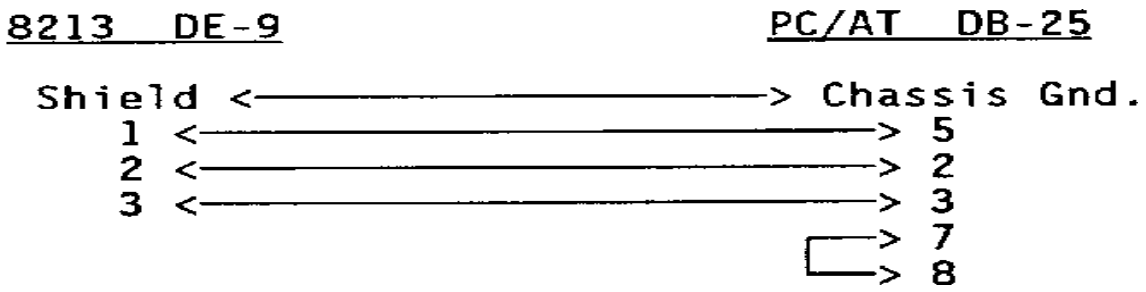
Note: The confidence byte for all tests passed is an ASCII @ (40h).

4.7 INTERFACE CABLE CONFIGURATIONS

The following wiring diagrams may be used as a guide to wiring the interconnecting cable from the host computer to the 8213. Verify the pin configuration on the host end as certain computers may not follow the standard pin locations. The type of cable recommended is 20 gauge stranded with shelf. Connect the shield to chassis ground on the host end. The maximum cable length recommended by Toledo Scale for use with RS-232 is 50 feet. If cable lengths greater than 50 are required, consult your local Toledo Scale representative for alternatives.



4.7.1 INTERFACE TO STANDARD 25 PIN PC/XT TYPE CONNECTOR



4.7.2 INTERFACE TO STANDARD 9 PIN PC/AT TYPE CONNECTOR.

5.0 PREVENTATIVE MAINTENANCE

The Model 8213 Digital Scale is designed to require a minimum of maintenance and service. This section provides instructions and procedures for maintenance of the scale, as well as troubleshooting guide to aid in problem analysis.

5.1 REQUIRED TOOLS AND SUPPLIES

The following items are recommended for proper maintenance and repairs. Common hand tools are also required.

Volt-Ohm Mater
Digital Load Cell Stimulator
Cleaning Cloth
Static Protection Bags for PCB's
Static Wrist Wrap

5.2 CLEANING

Clean the display and covers with a soft clean cloth that has been dampened with a mild window type cleaner. DO NOT USE ANY TYPE OF INDUSTRIAL SOLVENT OR THE FINISH OF THE UNIT MAY BE DAMAGED. DO NOT SPRAY CLEANER DIRECTLY ONTO THE UNIT.

5.3 TROUBLESHOOTING

5.3.1 PROCEDURE

5.3.1.1 If operational difficulties are encountered, obtain as much information as possible regarding the particular trouble, as this may eliminate a lengthy, detailed checkout procedure.

5.3.1.2 Check fuses, primary power lines, external devices and related wiring for possible defects. Failures and malfunctions often may be traced to simple causes such as loose or improper power supply connections or circuit breaker failure.

5.3.1.3 Use the electrical interconnecting diagram as an aid to locating trouble causes. Section 5.6 contains various voltage measurements that are average for normal operation. Use instrument probes carefully to avoid causing short circuits and damaging circuit components.

5.3.1.4 Malfunctions in the 8213 are best located by substitution. A printed circuit board believed to be defective may be checked by replacing it with a known good PCB, and then observing whether the problem is corrected. WHEN HANDLING A PCB, USE A STATIC WRIST STRAP THAT IS PROPERLY GROUNDED. USE A STATIC BAG FOR BOTH THE NEW AND DEFECTIVE PCB.

5.3.1.5 To verify the problem as being in the removed PCB, reinstall the suspected defective PCB and retest. This simple test will eliminate the possibility of having replaced a good PCB because of a loose or poor connection.

Be sure to consult the technical manual for proper programming. Do not automatically program the replacement PCB like the suspected faulty PCB as the problem may be a programming error.

Exchange PCB's or sub-assemblies are available from your authorized Toledo Scale representative.

5.4 ERROR CODES

Before following the suggested corrective measures in the Error Code Chart in this section, two steps should be taking:

- Power down. Wait 15 seconds then power back up.
- Verify all voltages and harness connections.

The suggested corrective measures assume these two steps have not resolved the error. If more than one suggestion per error is given, they are listed in the order of probability of resolving the problem.

! CAUTION !
When replacing the PCB or disconnecting any harnesses, remove AC power and wait a minimum of 30 seconds before preceding or damage may result.

ERROR CODE CHART		
Error Code	Description	Corrective Measure(s)
0	Normal operation (no error)	None required.
1	EPROM Checksum Error	Replace Main PCB
2	RAM Error	Replace Main PCB
3	NOVRAM Error	Replace Main PCB
4	NOVRAM Error	Replace Main PCB
5	Data I/O Error	Check baud rate and parity selections.
6	Span Factor Error	Try recalibration. Replace DigiTOL® cell.
7	DLC Timeout Error	Try recalibration. Replace DigiTOL® cell.
8	DLC Out of Range	Try recalibration. Replace DigiTOL® cell.

5.5 JUMPER POSITIONS

There are several jumpers on the Main PCB that should be verified if any operating problems are encountered. Refer to Figure 4 for the jumper locations.

W2 - Must be IN shorting the two pins together.

W3 - Must be OUT so that the two pins are not shorted.
W4 - Must be OUT so that the two pins are not shorted.
J12- Must be OPEN not shorting the two pins.

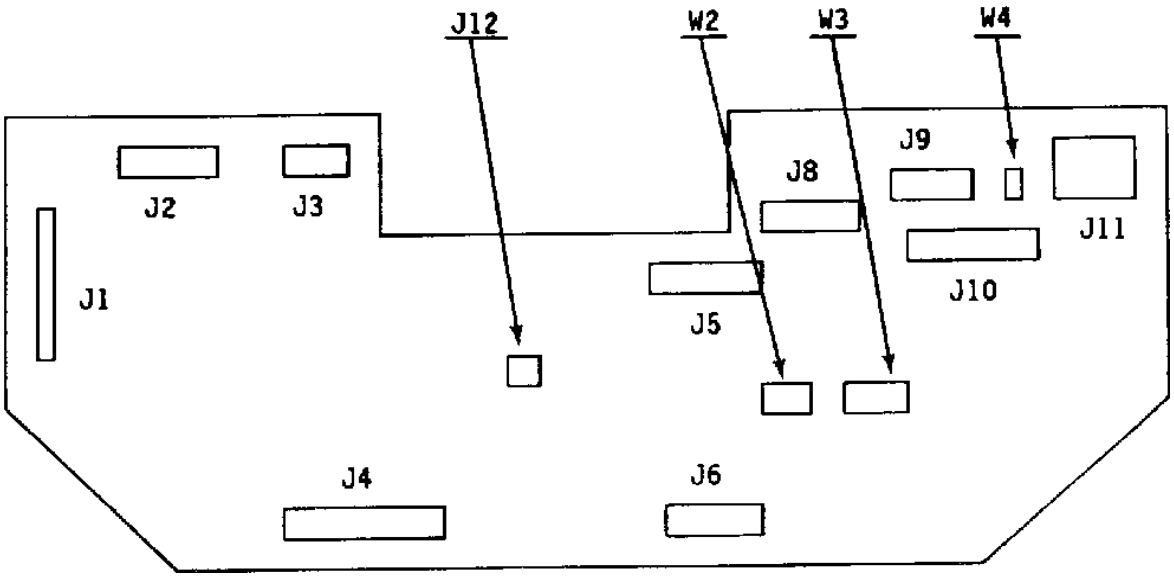


Figure 4 - Jumper and Connector Locations

5.6 VOLTAGE MEASUREMENTS

5.6.1 AC VOLTAGES

The transformer input AC voltages can be verified at the J2 connector on the Main PCB. Be sure to use the J2 pin numbers on the silk screen of the Main PCB when checking the AC voltage test points. The P2 mating connector that plugs onto J2 has pin numbers that are in reverse order. These readings were taken with an ACC input voltage of 120 VAC. With the correct AC voltage transformer harness installed, a 240 VAC input voltage should measure similar voltages.

J2 Pins	AC Voltage
1 - 3	9.2 VAC
4 - 5	20 VAC
4 - 6	20 VAC
5 - 6	40 VAC

5.6.2 DC VOLTAGES

The only two DC voltages used external to the Main PCB in the 8213 is sent to the load cell for its power source and to the display. The load cell's voltage can be checked at the J5 connector on the Main PCB. Refer to Section 5.7.2 for location and tolerance of this voltage.

Measure between J6 pin 9 and chassis ground for +39 VDC (+/- 2 VDC) used for the display. The AC ripple voltage at this test point should be 0.7 volts or less. This voltage can show a fluctuating voltage +/-5 volts of the above DC voltage and still be acceptable.

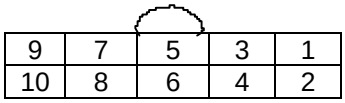
5.7 DIGITOL® CELL TEST POINTS

Note that all test points are on the Main PCB.

5.7.1 The following points were measured with respect to chassis ground with a voltmeter. Each pin show a varying voltage changing anywhere from +4.1 to +5 VDC.

J5 Pin	Signal Description
1	TxD Transmit data from cell.
3	TxD Transmit data from cell.
5	RxD Receive data to cell.
7	RxD Receive data to cell.

Top view of the J5 Connector



NOTE: The voltage variations observed will depends on the voltmeter being used. J5 pins 5 and 7 may show no change since they are the output from the Main PCB to the DigiTOL® Load Cell and are only used during calibration and at power-up. J5 pins 1 and 3 are outputs from the DLC.

5.7.2 There should be +23.5 VDC (+/-2 VDC) between J5 pin 2 to chassis ground. This voltage is used to power the DLC. The AC ripple at this test points should be 250 millivolts or less. This voltage is generated on the Main PCB.

5.8 REPLACING THE LOAD CELL

CAUTION

When replacing the PCB or disconnecting any harness remove AC power and wait a minimum of 30 seconds before proceeding or damage may result.

5.8.1 Remove the platter. Remove the spider from the load cell by removing the two 3/16 inch allen head bolts.

5.8.2 Remove the six phillips head screws from the top cover and remove the top cover.

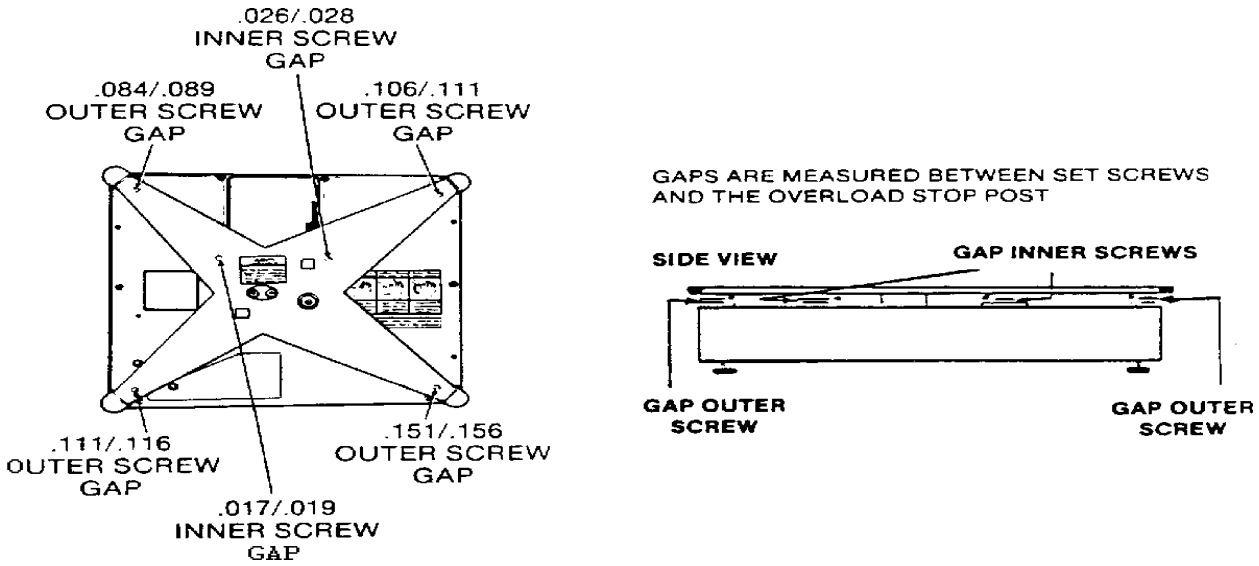
5.8.3 Remove the load cell mounting screws from the bottom of the scale base. Disconnect the harness from the load cell and remove the cell.

5.8.4 Follow these steps in reverse order to reinstall a new load cell.

5.9 OVERLOAD STOP ADJUSTMENT

The overload stop screws located in the spider are pre-set at the factory and normally require NO adjustment. Should the spider or load cell require replacement, the gaps between the overload screws and the overload posts should be set as shown in Figure 5.

Figure 5 - Overload Stops



5.10 SHIFT TEST

Figure 6 shows a sketch of the top view of the 8213 scale. The shift positions are indicated by the letters A, B, C, and D. These positions are halfway out from the center to the platter edges. The center of the platter must also be checked. The test to be performed is to apply half of full capacity load at these positions and verify that the display reading is within the tolerances in Table 1.

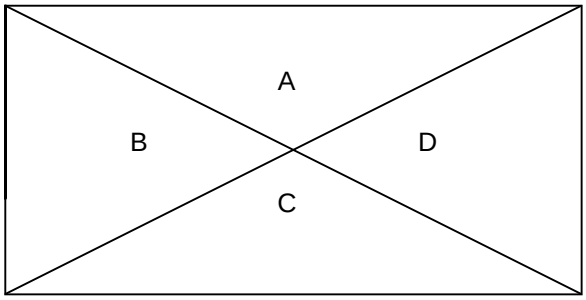


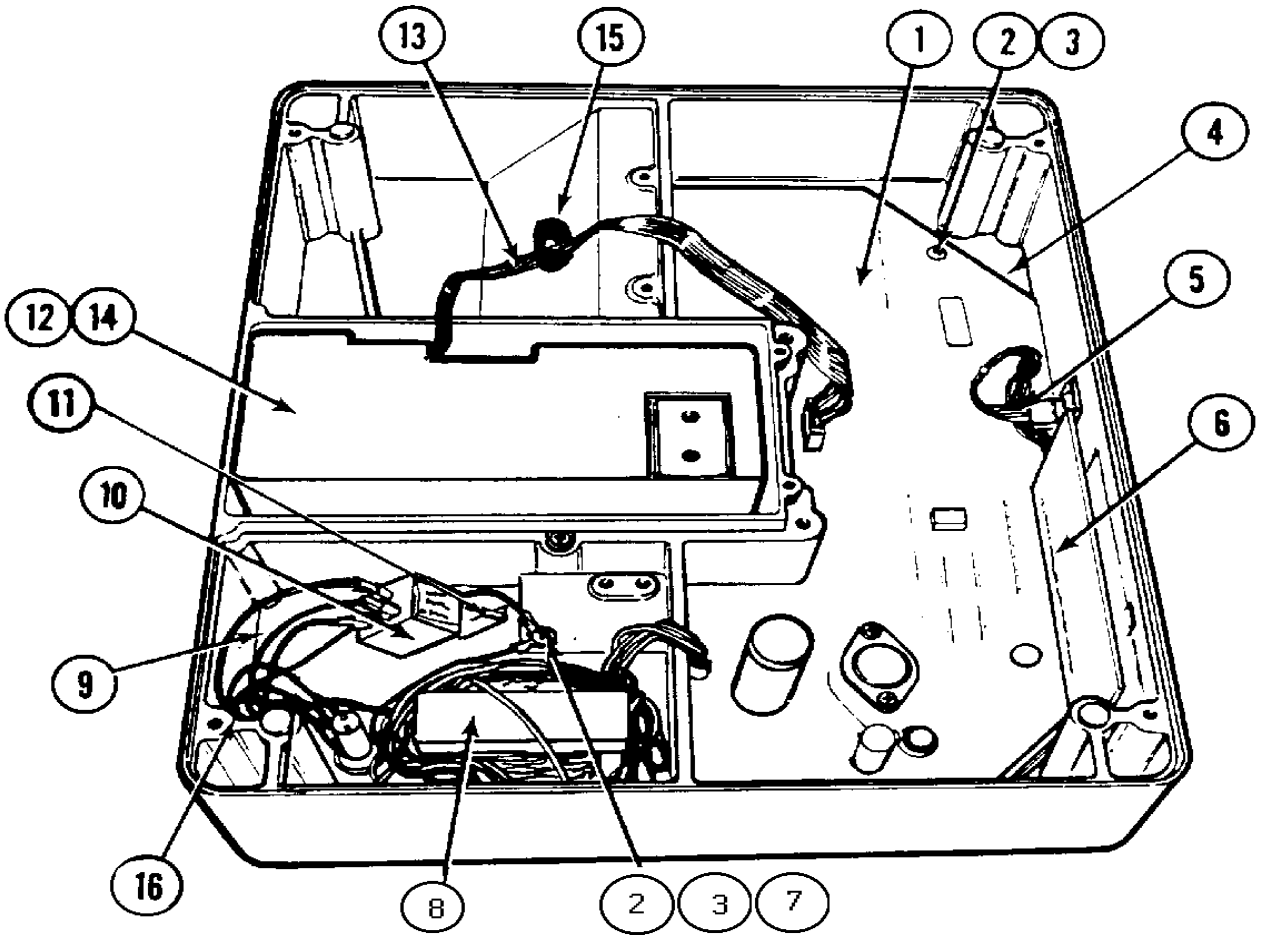
Figure 6 - Shift Test Positions

The weight indication will be within HB-44 specified tolerances during a standard shift test. This test involves placing weight of 1/2 of scale capacity places 1/2 the distance from the center to any edge of the platter.

Test Weight	Acceptance Tol.	Maintenance Tol.
50 lb 25 kg	+/- 0.03 lb +/- 0.015 kg	+/- 0.06 lb +/- 0.03 kg

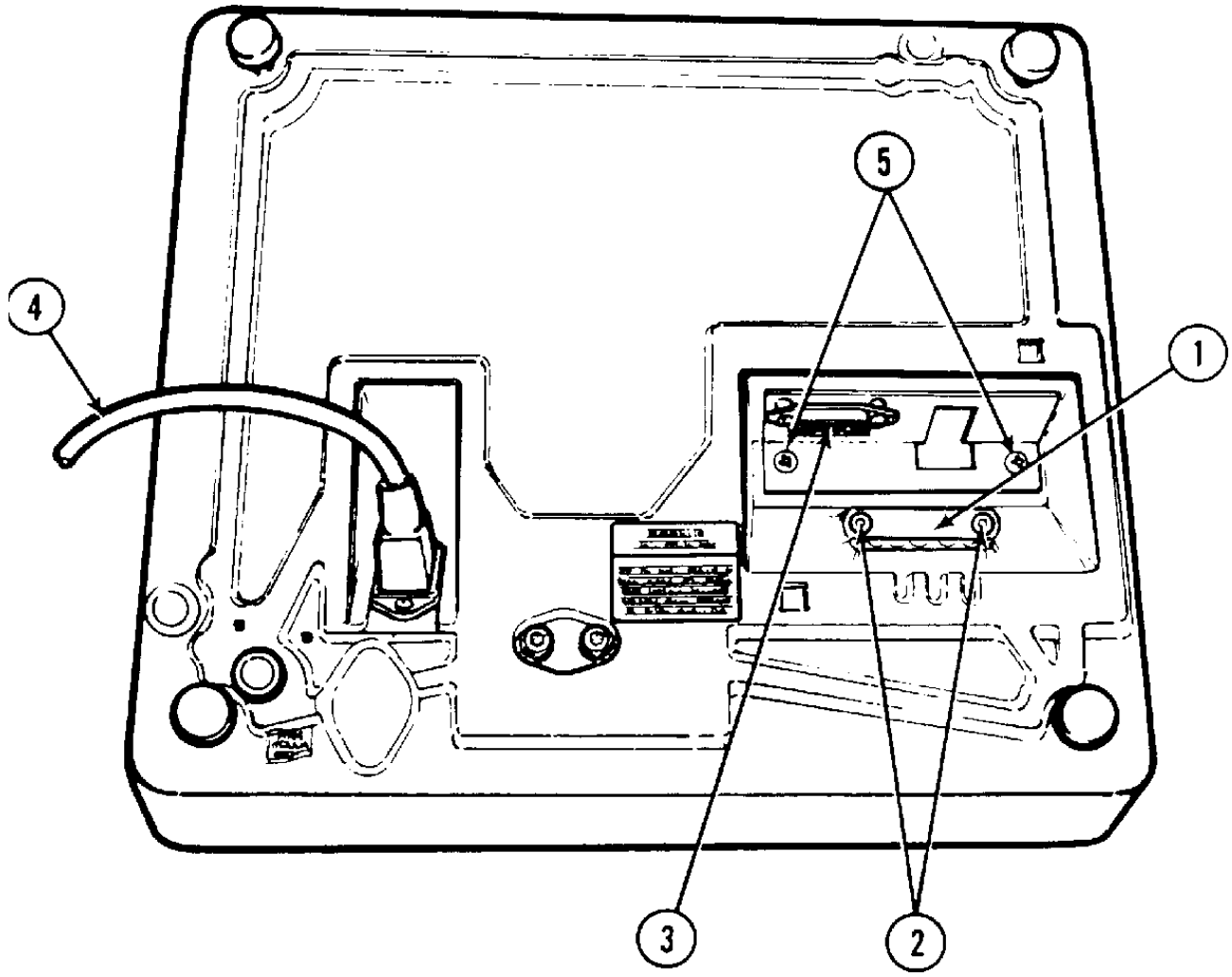
Table 1- Shift Tolerances

6.0 PARTS CATALOG
6.1 INTERIOR OF SCALE



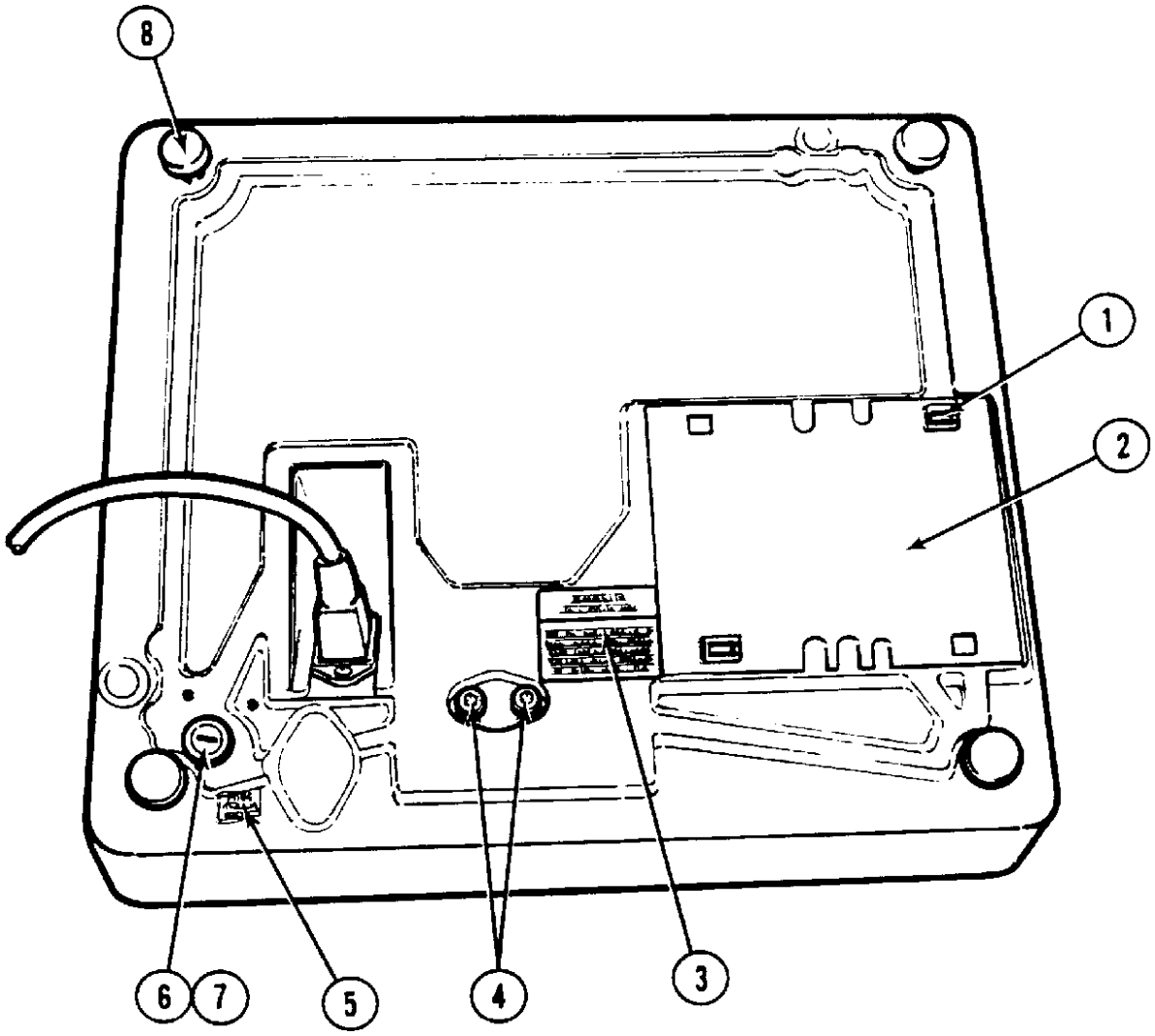
No.	Part No.	Description	Qty.
1	Y821340341AD	Main PCB	1
2	R00589 130	Washer, #8 I.T. Lock	9
3	R02180 050	Screw, #8-32 x 3/8" SI. hex	9
4	120538 00A	PCB Insulator	NS
5	B120542 00A	Harness & ON/OFF-Zero Switch	1
6	120520 00A	Display PCB	2
7	120556 00A	Ground Harness	1
8	Y821340341AF	Harness & Transformer	1
9	A120557 00A	Harness, LFI to Fuse	1
10	119932 00A	Line Filter	1
11	R03187 00A	Blind Rivet	1
12	129844 00A	Load Cell 60 kg Digital CMOS	1
13	126354 00A	Harness, Load Cell	1
14	122591 00A	Spacer Block, Load Cell	NS
15	126357 00A	Ferrite Core (For digital load cell cable)	1
16	Y821340341AG	Power Selection Harness (120/220 VAC)	1
NS- Not Shown			

6.2 BOTTOM OF EXTERNAL BASE



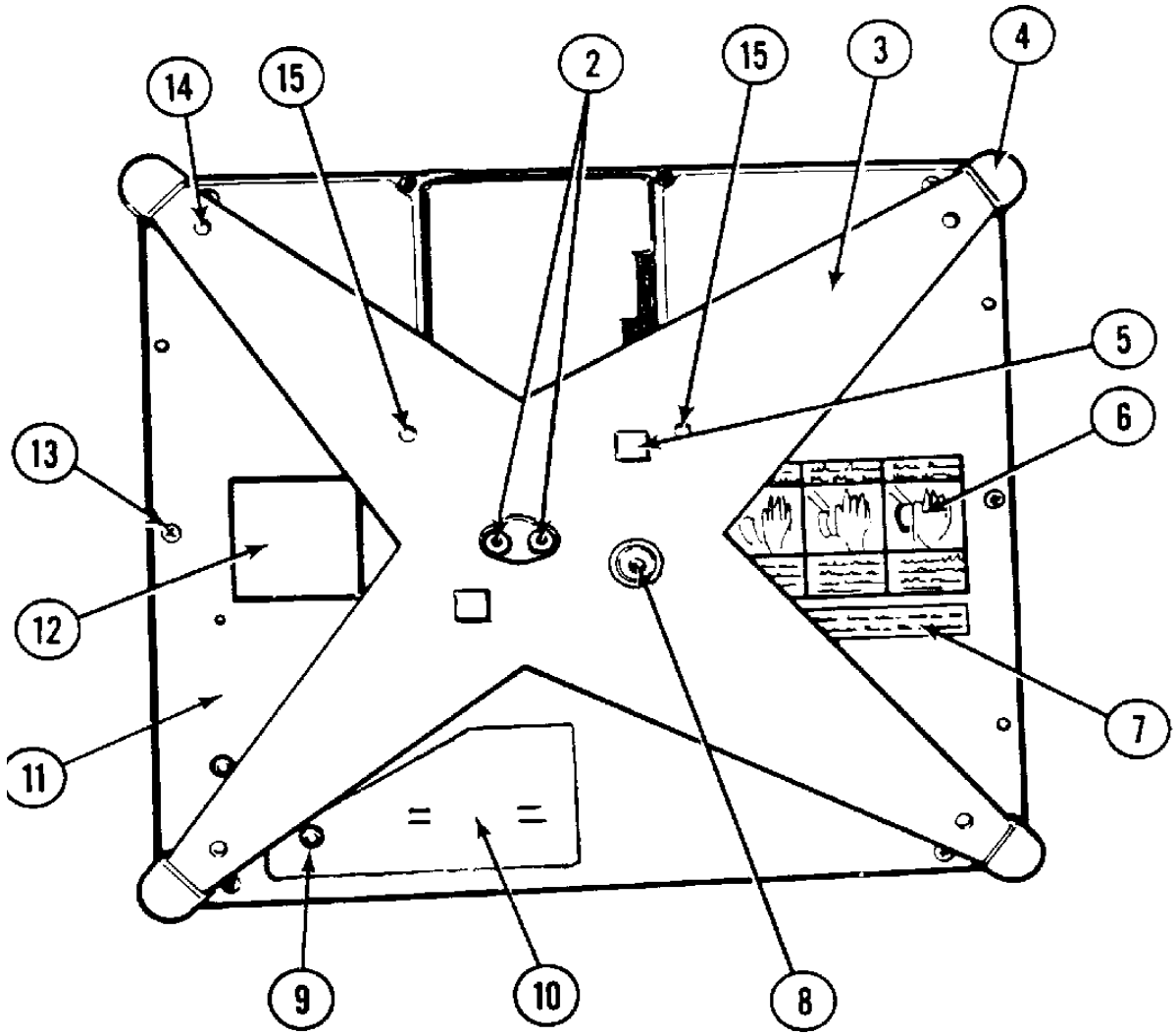
No.	Part No.	Description	Qty.
1	120512 00A	Strain Relief Plate	1
2	R03953 00A	Thumb Screw	2
3	128166 00A	Serial I/O Harness Assembly	1
4	130867 00A	Line Cord	1
5	R02180 050	Screw #8-32 x 3/8 Ph T.T.	2
NS - Not Shown			

6.3 POWER CORD & ACCESS COVER



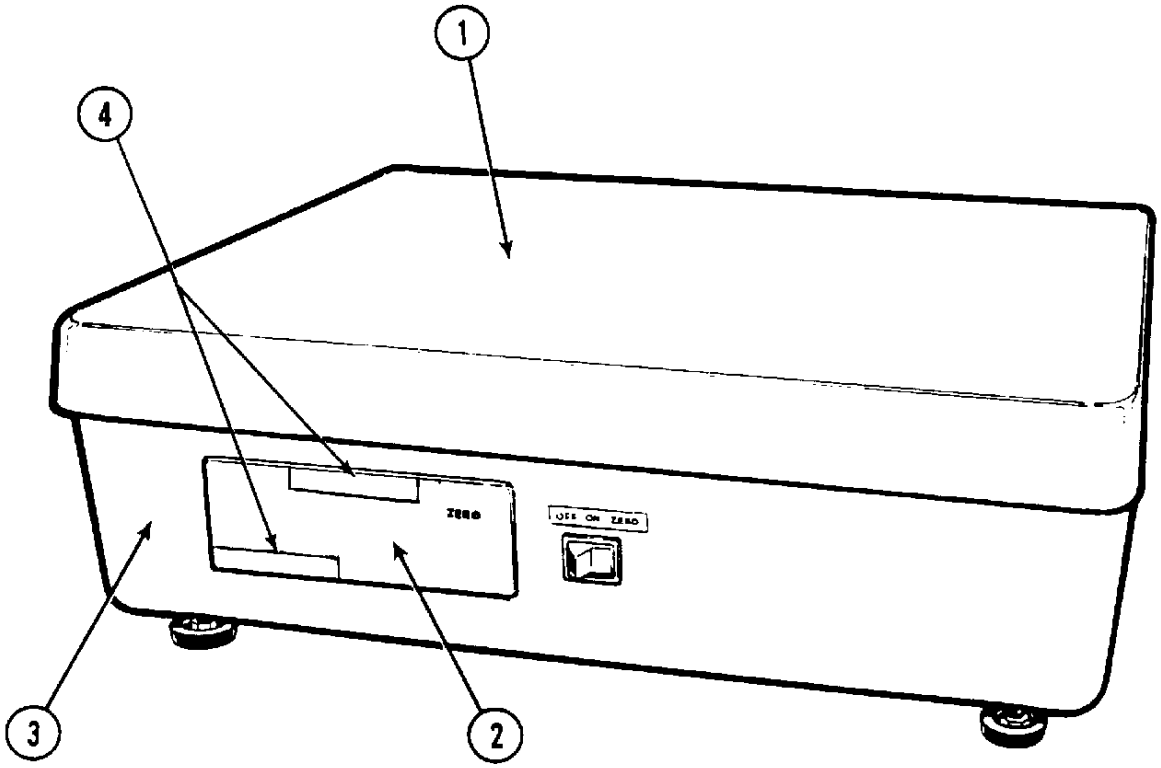
No.	Part No.	Description	Qty.
1	120513 00A	Fastener, 1/45 Turn	2
2	A120504 00A	Access Cover, I/O	1
3	119859 00A	Label, L./C Assy.	1
4	R03507 00A	Screw, Cap #1/4-28 x 1” Soc.	2
5	109458 00A	Fuse Label (120 VAC)	1
	Y821363761AC	Fuse Label (220 VAC)	1
6	095920 00A	Fuse, 1/4 A (Slo-Blo)	1
	095919 00A	Fuse, 0.125 A (Slo-Blo)	1
7	120524 00A	Fuse Holder	1
8	133155 00A	Foot Assembly	4

6.4 SPIDER & TOP COVER



No.	Part No.	Description	Qty.
2	R03507 00A	Screw, Cap #1/4-28 x1”	2
3	D120514 00A	Spider Assembly	1
4	120509 00A	Bumper Tip	4
5	122587 00A	Stick on Bumper	2
6	A122376 00A	Power Warning Label	1
7	C113971 00A	FCC Label	1
8	102689 00A	Level Bubble	1
9	R00844 130	Screw, #8-32 x 3/8”	1
10	132180 00A	Access Plate	1
11	132179 00A	Top Cover	1
12	116033 00A	Static Caution Label	1
13	R02180 050	Screw, #8-32 x 3/8” SI. HEX	6
14	R03646 00A	Screw, Set #1/4-28 x 1/2”	4
15	R03575 00A	Screw, Set #3/8-24x 1/2”	2

6.5 PLATTER & LENS



No.	Part No.	Description	Qty.
1	A120501 00B	Platter	1
2	133733 00A	Display Lens	1
3	133165 00G	Base Assembly	1
4	Y821327586AE	Kilogram Capacity Label (50 x 0.01 kg)	1

7.0 SYSTEM SCHEMATIC