8520

DigiTOL® Indicator

Technical Manual

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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:

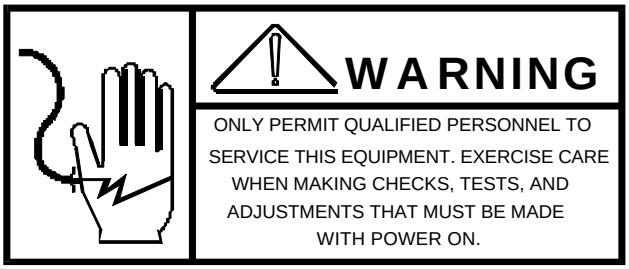
METTLER TOLEDO
Training Center
P.O. Box 1705
Columbus, Ohio 43216
(614) 438-4400

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.

CONTENTS

1. GENERAL DESCRIPTION

The Toledo Model 8520 is a versatile, high performance digital indicator suitable for a wide variety of industrial applications. It is designed to communicate digital information serially with a Toledo digital load cell. The 8520 receives continuous serial data from the digital load cell, provides calibration and initial values, and displays weight at the update rate of the digital load cell. An optional kit allows the indicator to provide excitation for up to 4-350 ohm analog load cells.

The 8520 can provide resolution for up to 60,000 displayed increments with Toledo high accuracy digital load cell bases. Increments are selectable from 1000 to 60,000. A liquid crystal display will display lb, kg, grams, and tons weight symbols. Full keyboard tare, parts counting, a flexible serial output, host communications, and more are offered in the standard 8520.

The desk and wall mount enclosure styles mean the 8520 can be used in virtually any non-hazardous industrial environment. The dust-tight and splash-proof metal desk enclosure exceeds NEMA 12 requirements and meets European IP-65 standards. The wall mount enclosure is stainless steel and meets the NEMA 4X hosedown

test. Both enclosure styles are available for use in desk top, wall, or column mounting.

1.1 FEATURES

- Bi-directional RS-232-C and 20 mA current loop (active transmit and selectable active or passive receive) data I/O.
- Accepts simple serial commands from a host to print, tare, clear, and zero the scale.
- Accepts hardwired input for remote print.
- Fixed and variable sample counting modes. Allows keyboard entry of sample or average piece weight values. Includes auto sample acceptance, minimum sample requirements, and sample enhancement.
- Digital filtering for fast, stable weight display.
- Printer output offers selectable fields of data for user flexibility.

1.2 OPTIONAL FEATURES

- Analog kit of parts for excitation of up to 4-350 ohm load cells, selectable for 2mV/V or 3mV/V load cells. Calibration of up to 20,000 displayed increments.
- Battery power kit for portable operation. A 2.6 amp-hour battery provides up to 16 continuous hours of operation with a single digital load cell.
- Internal power supply kit of parts for desk enclosure. Offers 110 VAC/220 VAC, 50 or 60 Hz operation.
- Optional weight symbols offer display panels to convert displayed weight to ounces (oz), troy ounces (ozt), pennyweight (dwt), or Spanish symbols.
- Desk enclosure mounting bracket kit allows desk unit to be mounted on desk top, wall, or column.

2. SYSTEM DESCRIPTION

2.1 INTERNAL FUNCTIONS

The Model 8520 receives its 12 volt DC operating power from one of three sources:

1. External power supply (standard on the desk enclosure and not available for the stainless steel enclosure).
2. Internal power supply (standard on the stainless steel enclosure and an option for the desk enclosure).
3. Internal battery (optional for either enclosure.

After receiving power, the Model 8520 proceeds through a self-test routine that checks the integrity of the internal RAM and ROM for correct operation. The indicator then waits for weight information to arrive from the digital scale (or optional analog scale) connected. The weight signal received from the scale is then conditioned and displayed on the liquid crystal display (LCD) of the 8520. If an error is detected, the appropriate error code will be displayed.

2.2 DISPLAY

The Model 8520 utilizes a low power custom designed liquid crystal display (LCD). The display indicates up to six digits (0.7 inches high) of weight and a decimal point or comma. Also shown on the display are prompts for low battery voltage and sample entries. “Windows" are shown around selected legends for gross weight, tare weight, net weight and zero. A sample weight display is shown in Section 5.1, Figure 3.

2.3 KEYBOARD

The 8520 contains a 4 by 5 matrix keyboard for operator interface. The keyboard is domed with tactile feel and has an embossed polycarbonate overlay with ridges to separate active key areas. Refer to Figure 4 for keyboard layout.

2.4 OPTIONS

2.4.1 ANALOG SCALE INPUT

This option allows connection of up to four 350 ohm analog load cells to either the desk or wall type 8520. A PCB is installed inside the 8520 to which the load cells are connected. A detachable connector is provided on the Analog PCB for load cell termination. A jumper on the Analog PCB selects either 2mV/V or 3mV/V load cells for use with all types of analog scales. Connection to both an analog scale and digital scale at the same time is not possible. If the Analog PCB is installed, an analog load cell or scale base must be connected. An update rate of nine readings per second is possible with the analog option. Installation instructions are included with this option.

2.4.2 INTERNAL BATTERY POWER

An internal 2.6 Amp-Hour battery can be installed which provides up to 16 hours of continuous use. The battery is recharged through a connector on the outside of the enclosure and does not have to be removed from the enclosure for recharging. The normal recharge time is approximately 16 hours with the 8520 turned off and approximately 24 hours if the 8520 remains in operation. Installation instructions are included with this option. The automatic sleep mode selectable in the 8520 will increase the operation time of the battery before recharging is required.

2.4.3 INTERNAL POWER SUPPLY

An optional Power Supply PCB may be installed into the desk enclosure if the standard external transformer is not environmentally acceptable. This option provides a line cord connection to a duplex outlet. The 110 VAC or 220 VAC power is converted to 12 volts DC inside the 8520 on the optional Power Supply PCB. Installation instructions are included with this option.

2.4.4 OPTIONAL WEIGHT LEGEND PLATES

The standard 8520 has the ability to indicate pounds, tons, grams or kilograms weight legends on the display. This kit of optional legend plates adds the following choices:

ounces (oz)
troy ounces (ozt)
pennyweight (dwt)
Spanish weight symbols

In order to install one of these legend plates, the original legend plate must be removed. Switching between various weight values is not possible using the lb/kg key on the front panel of the 8520. The procedure for installing this option can be found in Section 8.

3. SPECIFICATIONS

3.1 ELECTRICAL

3.1.1 POWER REQUIREMENTS

The U.S. version of the 8520 desk unit operates at 120 VAC (+10%, -15%) 60 Hz. The wall unit operates at either 120 VAC (+10%, -15%) 60 Hz or 220/240 VAC (+10%, -15%) 50/60 Hz. Power consumption is approximately 9 watts maximum.

The line voltage must be within these specifications. The power line for the 8520 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.

3.1.2 POWER TESTING

The Model 8520 has passed Toledo Scale's testing for correct operation during line spikes, power interruptions and voltage variations per the following specifications.

SPIKE AMPLITUDE	RISE TIME	PULSE WIDTH	REPETITION
500 Volts	5 ns	100 ns	12 Hz
1000 Volts	25 ns	1 us	1 Hz
1500 Volts	35 ns	3 us	1 Hz

VOLTAGE REDUCTION	DURATION	REPETITION
100 %	1/2 Cycle	1 Hz
50 %	1 Cycle	1 Hz
20 %	1 Cycle	1 Hz

MEASURED VOLTAGE	LINE FREQUENCY
100 VAC - 130 VAC	59.5 Hz - 60.5 Hz
102 VAC - 132 VAC	58.8 Hz - 61.2 Hz
187 VAC - 242 VAC	49.0 Hz - 51.0 Hz
204 VAC - 264 VAC	49.0 Hz - 51.0 Hz

3.1.3 U.L. AND C.S.A. STANDARDS

The Model 8520 conforms to U.L. specifications 114, Office Appliances and Equipment and 746, Polymeric Materials and also conforms to C.S.A. standard C22.2 No. 143-1975, Office Machines.

3.2 ENVIRONMENTAL

3.2.1 FCC REGULATIONS

The Model 8520 meets or exceeds FCC docket 80-284 for conducted and radiated emissions requirements. If interference occurs in residential areas, the user at his own expense will be required to take whatever measures may be required to correct the interference.

3.2.2 RADIO FREQUENCY INTERFERENCE (RFI)

The 8520 has been tested to and found to meet the U.S., U.K. and Canadian susceptibility specifications listed below. The change in weight indication may be a maximum of one display division and still meet these specifications.

FREQUENCIES	FIELD STRENGTH
27, 169, 464 MHZ	3 volts / meter
27, 464 MHZ	4 watts at 2 meters
27, 169, 464 MHZ	10 volts / meter

3.2.3 ELECTROSTATIC DISCHARGE (ESD)

The 8520 has been tested for ESD susceptibility using six kilovolts at 3.6 milijoules of energy at a repetition rate of one cycle every ten seconds. The 8520 did not sustain any hardware damage, lock-ups or memory loss.

3.2.4 OPERATING AND STORAGE TEMPERATURES

The Model 8520 will operate over a temperature range from -10ºC to 50ºC (14ºF to 122ºF) at 10 to 95% humidity, non-condensing. The storage temperature for the 8520 is from -40ºC to 60ºC (-40ºF to 140ºF) at 10 to 95% humidity, non-condensing.

3.2.5 HAZARDOUS AREAS

WARNING

In locations classified as hazardous by the National Electrical Code (NEC) because of combustible or explosive atmospheres, special precautions are required.
DO NOT USE THE 8520 IN THESE LOCATIONS

3.3 PHYSICAL

3.3.1 APPEARANCE AND DIMENSIONS

The Model 8520 desk version is charcoal black with a multi-color keyboard. The unit is 6.0" (150mm) high, 6.3" (160mm) deep and 9.5" (240mm) wide. An additional 2" (50mm) is required at the left end of the enclosure for cable attachments. This version of the 8520 weighs approximately 5 pounds (2.3 kg).

The wall enclosure is brushed stainless steel with a multi-color keyboard. The enclosure is approximately 11" (280mm) tall, 14.2" (360mm) wide and 5.5" (140mm) deep. An additional 2" (50mm) is required at the bottom of the enclosure for cable attachments. This version of the 8520 weighs approximately 14.8 pounds (6.7 kg).

3.3.2 SHIPPING INFORMATION

The shipping carton for the desk unit is 18.5" (470mm) wide, 15" (380mm) deep and 8" (200mm) high. The approximate shipping weight of the desk version is 7 pounds (3.2 kg).

The shipping carton for the stainless steel enclosure is 19.5" (500mm) wide, 17" (430mm) deep and 12" 300mm) high. The approximate shipping weight of the wall unit 19 pounds (8.6 kg).

3.3.3 CONSTRUCTION

The case of the desk version is made from extruded aluminum and the end caps are made from cast aluminum. The unit is then painted charcoal black with enamel paint. Connections to the enclosure enter through nylon cable grip bushings to seal the unit.

The wall mount version of the 8520 is constructed from type 304L stainless steel that is solution annealed. Connections to the enclosure enter through nylon cable grip bushings to seal the unit from environmental effects.

3.4 DATA INTERFACE

The standard 8520 contains a bi-directional printer port to provide either 20mA current loop or RS-232-C communications. The baud rate is selectable from 300 to 9600 baud and parity is selectable as even, odd or always a “0". Data is always in a 10 bit frame - 1 start, 7 ASCII data, 1 parity and 1 stop bit.

When programmed for demand type output, the 8520 will output a message as formatted by setup selections when the PRINT key is pressed. Transmission of a checksum character is selectable as is expanded print format. Scale motion, expanded display mode, under zero or over capacity operation will disable a print command.

When programmed for continuous type output, weight data will constantly be transmitted from the printer port every time the scale performs an A/D (analog to digital) cycle. This will normally be 9 or 10 times a second; however, certain high accuracy scales will update 4 to 5 times a second. The remote ASCII input feature of the 8520 is disabled during continuous data output.

3.5 FACTORY NUMBER REFERENCE

FACTORY NUMBER	ENCLOSURE TYPE	MARKET PLACE	TYPE OF POWER REQUIRED
8520-0001	Desk	USA & Canada	120 VAC / 60 Hz
8520-0011	Desk	Export	Refer to * Note
8520-1001	Wall	USA & Canada	120, 220, 240 VAC 50/60 Hz
8520-1011	Wall	Export	120, 220, 240 VAC 50/60 Hz

*Note: The 8520 requires a 12 VDC input at 500 mA. This power source is not supplied with the export version.

4. INSTALLATION INSTRUCTIONS

Follow these instructions carefully to install and program the Model 8520 Digital Indicator. Make sure that all requirements in the specifications section (Sections 3.1 and 3.2) 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.

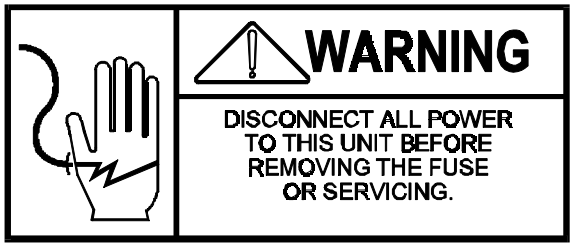
4.1 SETUP PROCEDURE (DESK ENCLOSURE)

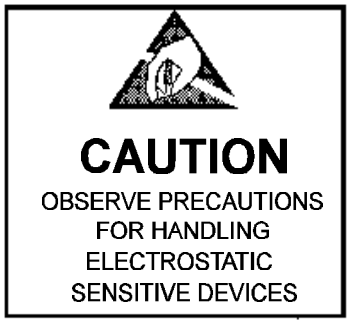
4.1.1 Examine the shipping carton for any signs of damage. IF DAMAGE IS FOUND, MAKE A CLAIM WITH THE CARRIER IMMEDIATELY.

4.1.2 Open the carton and continue the inspection checking for damaged or missing parts. The contents are:

1 - Model 8520 Indicator and Power Supply
1 - Technical Manual
1 - Bag of Miscellaneous Parts

4.1.3 Remove the left end cap (the end cap with grip bushings) from the Model 8520 by unscrewing the eight screws. Be careful not to pull the left end cap too far or the internal power supply cable or keyboard may be damaged. The Main PCB may be slid approximately one inch to the left without unplugging the keyboard.





4.1.4 Install any optional kits at this time. Follow the instructions included with each kit. The instructions for installing the optional printer output cable may be found in Section 8.1.

4.1.5 Make the appropriate load cell connections to either the Logic PCB (for digital load cells) or the optional Analog PCB (for analog load cells). REFER TO THE LOAD CELL CONNECTION PART OF THIS MANUAL (Section 6.) FOR DETAILS ON THIS CONNECTION.

4.1.6 The Model 8520 desk type indicator is now ready for programming. The programming procedure is described in Section 4.4.

4.2 SETUP PROCEDURE (WALL ENCLOSURE)

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

4.2.2 Open the carton and continue the inspection checking for damaged or missing parts. The contents are:

1 - Model 8520 Stainless Steel Indicator
1 - Technical Manual
1 - Bag of Miscellaneous Parts
1 - Bottle of Food-grade Lubricant

4.2.3 Open the enclosure by flipping the wing-type handle of each fastener up and turning it 180 degrees counter clockwise. The lower right latch does not have a wing-type handle. Use an 11/16" wrench to loosen this latch. Loosen the hinge fasteners on the RIGHT end last (be sure to loosen both of them at the same time to prevent jamming). The door will swing open from the left since the hinges are on the right.

4.2.4 Install any optional kits at this time. Follow the instructions included with each kit. The instructions for installing the optional printer output cable may be found in Section 8.1.

4.2.5 Make the appropriate load cell connections to either the Logic PCB (for digital load cells) or the optional Analog PCB (for analog load cells). REFER TO THE LOAD CELL CONNECTION PART OF THIS MANUAL (Section 6) FOR DETAILS ON THIS CONNECTION.

4.2.6 The Model 8520 wall mount indicator is now ready for programming. The programming procedure is described in Section 4.4.

4.3 SETUP SWITCH DESCRIPTIONS

The Model 8520 contains a two section DIP (dual in-line package) switch for programming. One switch disables the OFF key on the keyboard and the other enables the setup mode. This switch is located along the left edge of the Logic PCB as shown in Figure 1.

SW1-1 SETUP MODE ENABLE

ON - When this switch is flipped “on" (the switch handle down toward the printed circuit board), the display will show [- -] and the setup mode will be accessed.

OFF- With this switch in the “off" (or up) position, the 8520 will be in the normal weighing mode.

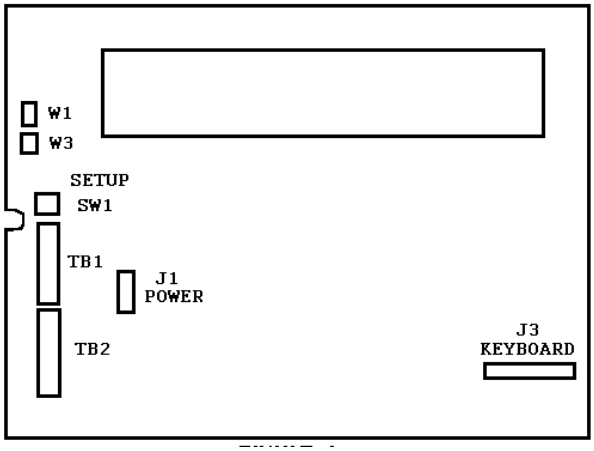


Figure 1

SW1-2 Manual ON/OFF Mode Enable

ON - With this switch ON (the switch handle down toward the printed circuit board), the ON and OFF keys and setup step [35] will operate to turn the 8520 on and off.

OFF- When this switch is off, the 8520 will remain on regardless of setup step [35] selection or the pressing of the OFF key until power is removed from the unit. The ON key remains functional.

4.4 PROGRAMMING PROCEDURE

This section of the technical manual describes the programming of the operating modes and features of the 8520 as well as the calibration. Sample displays are given to show the programming prompts. Described under each sample display are the possible selections and the effect these selections will have on the unit's operation.

NOTE: For units with software number 132785 [L 08] and later, refer to the addendum section of this manual before programming.

4.4.1 KEYBOARD FUNCTIONS DURING SETUP

The following front panel keys perform the specified functions when in the programming mode unless other instructions are given for a particular step.

PRINT - Pressing this key will accept the displayed selection for a particular step and proceed to the next prompt.

ZERO - Depressing this key will enable the programmer to back-up to the previous prompt.

CLEAR - Clears the display to permit re-entry of data.

1 - This key will enable or “turn ON” the displayed programming selection.

0 - This selection will disable or “turn OFF” the displayed programming selection.

2 THRU 9 - These digits are used to select and program certain values in the Model 8520. These digits are also used to access the setup steps.

4.4.2 PROGRAMMING EXPLANATION

The programming procedure for the Model 8520 is divided into six main groups of selections. The number of steps in a group will vary depending upon which group is selected. The complete group may be accessed to program each of the selections within the group by entering the group number (for example 30) or any one of the programming steps may be accessed individually by entering that step number (for example 33).

All setup step numbers and group numbers are listed in the following “Quick Reference Chart" and also in the next section where the complete description of each setup step is given. Use this chart as a beginning point for initial setup. The right column in the “Quick Reference Chart" shows the recommended programming selections for legal for trade applications. Verify each selection, such as calibration in pounds, to be certain it coincides with actual usage before attempting calibration.

4.4.3 QUICK REFERENCE CHART

QUICK REFERENCE CHART

STEP NUMBER	INITIAL DESCRIPTION SETUP	LEGAL FOR TRADE	
01	Scale Type	*	*
03	Number of DigiTOL Cells	*	*
05	Reset Shift Values to “1"	0	0
06	Digital Shift Adjustment	0	0
10	Calibration Group		
11	Calibration Units	0	0
12	Linearity Compensation	0	0
13	Autorange Selection	1	1
14	Scale Capacity	*	*
15	High Range Increment Size	*	*

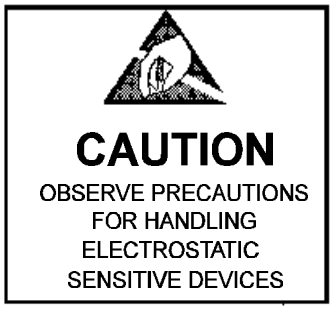
16	Mid Range Increment Size	*	*
17	Low Range Increment Size	*	*
18	Calibration Procedure	1	1
20	Zero Maintenance and Filtering Group		
21	Zero Adjustment	0	0
22	Span Adjustment	0	0
23	Auto Zero Maintenance	2	1
24	Auto Zero Capture at Power-up	1	1
25	Pushbutton Zero Range	2	1
26	Motion Detection	2	1
27	Display Filtering Rate	1	1
28	Overcapacity Blanking Value	*	*
30	Tare and Display Timer Group		
31	Keyboard Tare Enable	2	2
32	Tare Interlock	0	1
33	Digital Tare in Low Range Only	1	1
34	Autoclear Tare	0	0
35	Automatic Power-off Timer	1	0
40	Printer Output Group		
41	Demand Mode Operation	1	1
42	Baud Rate	300	300
43	Parity Selection	2	2
44	Checksum Enable	0	0
45	Autoclear Tare After Print	0	0
46	Autoprint and Print Interlock	0	1
47	Minimum Print Requirement	0	0
48	Net Sign Correction	0	0
49	Enable STX Character	1	1
51	Multiple Line Output	1	1
52	Order of Data Output	723456	723456
53	Print Weight Expanded	0	0
54	Printed Weight Legend	0	0
55	Scale Address	01	01
60	International Selection Group		
61	Analog Verification	0	0
62	Enable lb/kg Switching	1	1
63	Power-up in Pounds	1	1
64	Bracketed Printing	0	0
65	Print “PT" not “TRH"	0	0
66	Remote ASCII Input	0	0
67	Gross Window Indicates Count	0	0
68	Enable Comma	0	0
70	Parts Counting Group		
71	Enable Counting Group	1	0
72	Sampling Mode	0	0

73	Autoclear APW	1	1
74	Auto Sample Acceptance	1	0
75	Minimum Sample Requirement	1	1
76	Enable Sample Enhancement	1	1
77	APW in Pieces per Weight	2	2
78	Print Count Expanded	0	0
81	Expanded Weight Display	0	0
98	Display Individual Cell Output	0	0
99	Reset Scale to Default Parameters	0	0

* - Selection depends upon the scale base used.

4.4.4 SETUP SWITCH LOCATION AND ACCESS

In order to enter into the setup mode of the Model 8520, the setup switch (SW1-1) must be enabled. This switch is located along the left edge of the Main PCB as shown in Figure 1. To enter setup, the switch handle must be in the down position toward the printed circuit board.



When the setup switch (SW1-1 in Figure 1) is flipped down, the display of the Model 8520 will show [- -] at the left. To access any group of setup steps, enter the step number of that group using the numeric keys on the keyboard. To access any one setup step, enter that setup step number instead of the group heading number. Temporarily reinstall the left end cap and apply AC power.

[01 3] SCALE TYPE SELECTION

Determine if the scale base or load cell used with the Model 8520 will be analog (as with Models 1985, 2095, 2185 etc.) or digital (as with Models 1996, 2096, 2196, etc.) or the Model 2157 DigiTOL Floor Scale. Enter the corresponding number from the following chart.

NUMBER	TYPE OF SCALE SELECTED
0	DigiTOL™ Load Cell
1	Optional Analog Cell
2	Not Used - Do Not Select
3	Model 2157 DigiTOL Floor Scale

NOTE: Steps [03], [05] and [06] will only be accessed if “3" is selected in step [01].

[03 4] NUMBER OF DigiTOL LOAD CELLS

Select the number of load cells used with the Model 8520. This will be 4 for all applications of the 2157 Floor Scale. The number selected may be 2, 3, or 4 for other applications of DigiTOL load cells. The 8520 will automatically proceed to step [05] after a number has been entered.

[05] RESET SHIFT ADJUSTMENT VALUES TO “1"

Select the desired function for resetting the shift values to 1. This will erase any previous shift adjustments that have been done in step [06].

1 - All previous shift adjustment values will be cleared and reset to “1".
0 - The current values stored for shift adjustment will be used.

[06] DIGITAL SHIFT ADJUSTMENT

This step allows compensation for differences in output from each of the load cells used with the Model 2157 Floor Scale. To bypass this step, enter “0". After entering a “1" then pressing PRINT, the display will step through each of the load cells one at a time prompting the operator to place a test weight above each cell. The weight does not have to be a specific amount although the greater the weight used, the more accurate the shift compensation will be. After placing the weight above the cell shown on the 8520 display, press PRINT and the display will count down from 16 to 0 while a shift adjustment value is calculated. The 8520 will automatically proceed through all cells in the same manner. Refer to Figure 2 for designation of load cell numbers on the Model 2157.

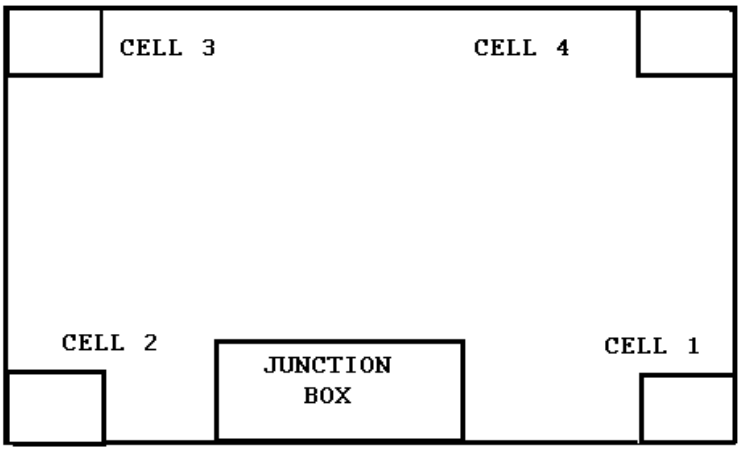


Figure 2

[10] ACCESS CALIBRATION GROUP

Entering in the digits “1" then “0" will access the calibration group. The display will begin with setup step 11 and proceed through setup step 18 in this group.

[11 0] CALIBRATION UNITS

Select the weight units with which the scale will be calibrated. Enter the corresponding number from the following chart.

NUMBER	SELECTION
0	pounds
1	kilograms
2	grams
3	metric tons

Setup step [54] will affect this also.

[12 0] LINEARITY COMPENSATION

Linearity correction compensates for parabolic nonlinearity of a load cell over the span of the scale. This is accomplished by taking a reading at zero, mid-range and at scale capacity. In order for linearity compensation to work correctly, it is important to use a test weight that is as close as possible to actual full scale capacity during calibration.

1 - Linearity compensation will be enabled.
0 - Linearity compensation will not be used.

[13 1] AUTORANGER SELECTION

The Model 8520 is capable of weighing small weights in smaller displayed increment sizes than the increment size used at full capacity. This ability to automatically switch increment sizes is called AutorangeR. Not all scale bases support the AutorangeR feature since it depends upon the resolution of the load cell used. A procedure for determining valid increment sizes is given in Section 4.6 of the 8520 technical manual.

1 - One range will be selected in which the increment size will remain the same throughout the weighing range. Setup steps [16] and [17] will be skipped when this is selected.

2 - Two ranges (AutorangeR) will be selected for use. There will be a smaller increment size used at lower weights and a larger increment size used at higher weights. Setup step [16] will be skipped when this is selected.

3 - Three ranges (AutorangeR) will be selected for use. There will be a low range increment size, a mid-range increment size and a high range increment size.

[14 100] SCALE CAPACITY

Enter the total scale capacity in the units selected in step [11] previously. Refer to the data plate and technical manual of the scale base used to verify its capacity. Enter the desired capacity using the digits on the numeric keyboard of the 8520 then press PRINT. Press the CLEAR key to clear the display if an error is made during entry.

[15 0.01] HIGH RANGE INCREMENT SIZE

The display will show the increment size and decimal point position of the last calibration of the 8520. If the displayed data is not correct, press the “0" key until the desired decimal point position is displayed then press the increment size digit (either “1", “2" or “5") on the keyboard to terminate the entry. This will select both the decimal position and increment size in one step. The selection will be entered after the increment size has been selected.

0 - Pressing this key will advance the display through all available decimal point positions.

1 - Pressing this key selects an increment size of 1 after the desired decimal point position has been determined.

2 - Pressing this key selects an increment size of 2 after the desired decimal point position has been determined.

5 - Pressing this key selects an increment size of 5 after the desired decimal point position has been determined.

[16-0.01] MID-RANGE INCREMENT SIZE

The display will show the increment size and decimal point position of the last calibration of the 8520. If the displayed data is not correct, press the “0" key until the desired decimal point is displayed then press the increment size digit (either “1", "2" or "5") on the keyboard to terminate the entry. This will select both the decimal position and increment size in one step. The selection will be entered after the increment size has been selected.

0 - Pressing this key will advance the display through all available decimal point positions.

1 - Pressing this key selects an increment size of 1 after the desired decimal point position has been determined.

2 - Pressing this key selects an increment size of 2 after the desired decimal point position has been determined.

5 - Pressing this key selects an increment size of 5 after the desired decimal point position has been determined.

[17 0.005] LOW RANGE INCREMENT SIZE

This step is accessed only if Auto-Range has been enabled in step [13]. The display will show the increment size and decimal point position of the last calibration of the 8520. If the displayed data is not correct, press the “0" key until the desired decimal point position is displayed then press the increment size digit (either “1", “2" or “5") on the keyboard to terminate the entry. This will select both the decimal position and increment size in one step. The selection will be entered after the increment size has been selected.

0 - Pressing this key will advance the display through all available decimal point positions.

1 - Pressing this key selects an increment size of 1 after the desired decimal point position has been determined.

2 - Pressing this key selects an increment size of 2 after the desired decimal point position has been determined.

5 - Pressing this key selects an increment size of 5 after the desired decimal point position has been determined.

[18 1] ACCESS CALIBRATION PROCEDURE (see Bulletin I-27-93

This step allows access to the calibration section of the 8520. Actual test weights will be required to complete this step.

1 - This will access the calibration procedure of the 8520.
0 - The calibration process will be skipped and the display will show [- -] on the display.

If calibration is accessed by programming this step as a “1", the following prompts will be displayed.

[E SCL] EMPTY SCALE

Remove all weights from the scale platform then press the PRINT key. The display will count down from 16 to 1 as zero is calculated for the scale.

[Add Ld] ADD LOAD

or

[Add FL] ADD FULL LOAD

Place test weights on the scale platform. A value as close to full capacity as possible should be used. The [Add FL] prompt will be displayed only when linearity compensation (step [12]) has been enabled. When using linearity compensation, the test weight MUST be very close to full scale capacity or the linearity adjustment may create large span errors at higher weights. After the test weights have been added to the scale, press the PRINT key.

The display will blank with only the decimal point or comma (if one is used) lit. Enter in the value of the test weight used with the numeric keys on the 8520 keyboard. The test weight value must agree with the increment size used on the scale. After the test weight value has been entered, press the PRINT key. The Model 8520 will count down from 16 to 1 while span is calculated.

[Add LO] ADD LOW LOAD

This prompt will only be shown if linearity compensation (step [12]) has been enabled. At this time, a test weight value equal to approximately one-half of scale capacity must be added to the scale. After the weight is placed on the scale, press the PRINT key.

The display will blank with only the decimal point or comma (if one is used) lit. Enter in the value of the test weight used with the numeric keys on the 8520 keyboard. The test weight value must agree with the increment size used on the scale. After the test weight value has been entered, press the PRINT key. The Model 8520 will count down from 16 to 1 while span is calculated.

[E SCL] EMPTY SCALE

This prompt will only be displayed if the optional Analog PCB is installed or if new integration factors are sent to the digital load cell. Remove all weight from the scale platform then press PRINT. The 8520 will count down from 16 to 1 as zero is verified.

[CAL d] CALIBRATION DONE

This display is shown for approximately two seconds to indicate that the calibration procedure was successful. After this prompt, the display will return to the home position and show only the [- -] display.

[20 1] ZERO MAINTENANCE AND FILTERING GROUP

Entering in the digits “2" then “0" will access the zero maintenance and filtering group. The display will begin with setup step 21 and proceed through setup step 28 in this group.

[21] ZERO ADJUSTMENT

This step readjusts zero to compensate for material build-up in hoppers or tanks etc. Unlike the zero pushbutton on the front of the Model 8520, this zero adjustment value is stored and used after a power loss.

1 - When this is selected, zero will be adjusted so that the Model 8520 will display zero. The scale must be empty when this prompt is answered since whatever is present as weight on the scale will be compensated for.

0 - No zero adjustment will be made.

[22 0] SPAN ADJUSTMENT

This step adjusts span without performing the complete calibration procedure again. When a span adjustment is made, the test weights must already be on the scale and the value of actual test weights on the scale must be known. The standard calibration must be completed to provide a reference point before attempting to use this feature.

1 - The span adjustment feature will be accessed. The display will show [000000] and the actual amount of test weight on the scale at this time must be entered using the numeric keyboard of the 8520. The increment size of the test weight used must agree with the increment size of the scale. After the value has been entered, press the PRINT key to enter it.

0 - The span adjustment mode will not be accessed.

[23 2] AUTO ZERO MAINTENANCE

Auto zero maintenance is a feature that maintains the displayed zero in the center of the zero increment. It will correct for zero drift up to a selected limit of either + 2% or + 20% of scale capacity (step [25]). This step selects the amount of the zero change which will be recaptured. Weight variations which occur at a rate of 0.14 divisions per second or slower will be compensated.

Select and enter the digit for the desired auto zero maintenance range.

NUMBER	RANGE
0	AZM disabled
1	± 0.5 divisions
2	± 1 division
3	± 3 divisions

[24 1] AUTO ZERO CAPTURE AT POWER-UP

This step programs the range for automatic zero capture when power is applied to the 8520. If auto zero capture is enabled, and the scale is outside of the zero capture range, the display will show [E E E] on the display until zero is manually captured.

Select, then enter the number representing the value required for the range of automatic zero capture at power up then press PRINT.

NUMBER	RANGE
0	AZM Zero Capture is disabled
1	± 2% of scale capacity
2	±10% of scale capacity

[25 2] PUSHBUTTON ZERO RANGE

Select, then enter the number representing the value required for the range of pushbutton zero on the Model 8520. Press the PRINT key to enter the selection.

NUMBER	RANGE
0	Pushbutton zero is disabled
1	± 2% of scale capacity
2	± 20% of scale capacity

[26 2] MOTION DETECTION RANGE

The Model 8520 includes a weight in motion detector which requires three successive weight readings within the selected range of 0 to 3 divisions for a “no motion" signal. The motion detector signal inhibits pushbutton ZERO, TARE and PRINT. If tare interlock is disabled, the “Gross" legend window on the display (or “Net" if a tare has been entered) will blank during motion.

Select, then enter the number representing the value required for the range of motion detection on the Model 8520. Press the PRINT key to enter the selection.

NUMBER	RANGE
0	Motion detection is disabled
1	0.5 scale division
2	1.0 scale division
3	2.0 scale division
4	3.0 scale division

[27 1] DISPLAY FILTERING RATE

The Model 8520 has a low pass multi-pole digital filter that is selectable for various environmental conditions. The display update rate is slowed slightly when more filtering is selected.

Select, then enter the number representing the value required for the display filtering on the Model 8520. Press the PRINT key to enter the selection.

NUMBER	RANGE
0	No filtering
1	Low filtering
2	Medium filtering
3	High filtering

[28] OVERCAPACITY BLANKING VALUE

Enter the weight value at which the 8520 indication will blank over capacity. For legal for trade applications, this must be a maximum of 105% of scale capacity. If AutorangeR has been enabled (step [13]), this value must be in the high increment range or above. Enter the weight using the numeric keys on the keyboard then press PRINT to enter.

[30] TARE AND DISPLAY

TIMER GROUP

Entering in the digits “3" then “0" will access the tare and display timer group. The display will begin with setup step 31 and proceed through setup step 35 in this group.

[31 2] KEYBOARD TARE ENABLE

Select then enter the number representing the proper operation of tare. Press the PRINT key to enter the selection.

NUMBER	RANGE
0	Tare will be disabled.
1	The numeric keys on the keyboard of the 8520 will not function.
2	Only the TARE key will operate to autotare a value on the scale Both autotare and manual digital tares will be possible via the keyboard of the 8520

[32 0] TARE INTERLOCK ENABLE

Tare interlock includes the following functions:

1. Tare weights can be cleared only at gross zero.
2. Tare can only be entered when the scale is in the gross mode.
3. Keyboard tare can be entered only at gross zero.
4. Previous tare values must be cleared before a new tare value can be entered. Multiple tares are not possible.
5. The “Gross" and “Net" legend windows will not blank during scale motion.

1 - Tare interlock and the other specific functions associated with legal for trade applications will be enabled.

0 - Tare interlock and the other legal for trade functions will be disabled.

[33 1] DIGITAL TARE IN LOW RANGE ONLY

1 - Digital tare may only be entered in the low range increment size when Autoranger has been selected. Any digital tare weight greater than the low range capacity will not be accepted. A pushbutton tare may be taken in any weight range.

0 - A digital tare may be entered in any weight range increment size when Autoranger has been selected. A pushbutton tare may be taken anytime.

[34 0] AUTOCLEAR TARE

1 - Tare will automatically clear when the scale returns to zero after settling to a no motion condition at least ten increments above net zero. The scale must return to the center of zero to clear the tare. The CLEAR key will still operate for manual clearing of tare.

0 - Tare values may only be cleared using the CLEAR key on the keyboard of the 8520.

[35 1] AUTOMATIC POWER-OFF TIMER

1 - The 8520 will turn off automatically after remaining at no motion for either five or ten minutes. The five minute limit is used for scales with less than 5000 divisions and the ten minute limit is used for scales with 5000 or more divisions. The ON key will turn the 8520 on again.

0 - The 8520 will remain on until the OFF key is pressed. Switch SW1-2 on the Main PCB will disable the operation of the OFF key so that the instrument will remain on constantly.

[40] PRINTER OUTPUT GROUP

Entering in the digits “4" then “0" will access the printer output group. The display will begin with setup step [41] and proceed through setup step [55] in this group.

[41 1]DEMAND MODE OPERATION

1 - The serial output of the Model 8520 will transmit data only when the PRINT key is pressed or when a remote print request is received. Refer to Section 7.1 of this manual for information regarding the data format.

0 - The 8520 will transmit data continuously from the serial port. Refer to the data output section of this manual (Section 7.1) for format information.

[42 300] BAUD RATE SELECTION

Select the desired baud rate for the printer output port by toggling through available selections using the 0 key. When the correct baud rate is displayed, press the 1 key or the PRINT key to enter that selection. Possible selections are: 300, 1200, 2400, 4800, or 9600 baud.

[43 2] PARITY BIT SELECTION

Select then enter the number representing the desired parity bit from the following chart. Press the PRINT key to enter the selection.

NUMBER	PARITY SELECTION
0	Parity always a "0"
1	Odd parity
2	Even parity

[44 9] CHECKSUM CHARACTER ENABLE

Checksum id defined as the 2's complement of the 7 low-order bits of the binary sum of all characters proceeding the checksum including STX and CR. Bit 8 of the checksum character is the parity bit of the 7 low order bits of checksum. This character is used as a means to verify transmitted data. The receiving device must be capable of computing and comparing a checksum character also.

1 - A checksum character will be transmitted after the carriage return (CR) character in the data output.

0 - The checksum character is disabled.

NOTE: The remaining printer group selections will be skipped if the continuous output mode (setup step [41 0] has been selected.

[45 0] AUTOCLEAR TARE AFTER PRINT

1 - Tare will automatically be cleared after a print cycle is completed.

0 - Tare will not be cleared automatically after a print.

[46 0] AUTOPRINT AND PRINT INTERLOCK

Select, then enter the number corresponding to the print features listed in the following chart. Press PRINT to enter the selection. A complete description of these features is given in Section 7.1.2 of this manual.

NUMBER	SELECTION
0	Normal print operation
1	Print interlock enabled
2	Autoprint enabled

[47 0] MINIMUM PRINT REQUIREMENT

This step selects the number of scale divisions that must be shown on the display of the Model 8520 before a print is possible. Select, then enter the number corresponding to the minimum print requirement from the following chart. Press the PRINT key to enter the selection.

NUMBER	MINIMUM PRINT
0	No minimum
1	10 divisions
2	100 divisions
3	500 divisions

[48 0] NET SIGN CORRECTION (see Bulletin I-39-93 in the addendum of this manual)

This step allows storage of a gross weight in the tare register then when the empty tare weight is placed on the scale, arranges the printer output so that the larger value is always the gross weight, the smaller value is the tare weight and the net weight will always be positive. The display will still show a negative value but the data output will not transmit the minus sign.

1 - Net sign correction will be enabled so that the data output will always show a positive net weight.

0 - The net sign correction feature will be disabled and the data output will transmit a minus sign if the display of the 8520 shows one.

[49 1] ENABLE STX CHARACTER

1 - The demand mode of data output will always begin with the start of text character STX.

0 - The start of text character STX will be deleted from the demand data output format.

[51 1] MULTIPLE LINE OUTPUT ENABLE

1 - The Model 8520 will transmit each data field (that has been selected to print) on a separate line. A carriage return character (CR) and line feed character (LF) will be added after each line of data. A maximum of six lines may be transmitted.

0 - The data output of the Model 8520 will be transmitted on a single line. The length of the line will vary depending upon which fields have been selected to print. A maximum of six fields may be transmitted.

[52] ORDER OF DATA OUTPUT

[723456]

This step selects the order of the data that will be transmitted in the demand mode. The output of the 8520 will be arranged in the order that is chosen. Select then enter the numbers from the following chart of data fields. The first number entered will be the first field printed, then the second, then the third, etc. If less than six fields are selected, press the PRINT key to end.

NUMBER	DATA FIELD
0	Field will not be sent
1	Displayed weight
2	Gross weight
3	Tare weight
4	Net weight
5	Average piece weight
6	Piece count
7	Scale ID number
8	Blank line

[53 0] PRINT WEIGHT EXPANDED

1 - The gross weight (or net weight if a tare has been entered) will be proceeded by the control character “SO” to indicate to a receiving device that this weight field is to be printed larger than the previous data if the device is capable of doing so. The control character “SI” will then follow after the field to shift the device back to the normal mode.

0 - The weight field will be printed in the same size as the other data fields.

[54 0] PRINTED WEIGHT LEGEND

This step selects the legend that follows the weight fields in the data output. If ounces, troy ounces or penny-weight is chosen, no weight symbol will be shown on the display of the 8520. The selections marked with an asterisk (*) will automatically disable the lb/kg key. In order to transmit the following legends, the 8520 must be calibrated in the corresponding units (refer to step [11]).

Select then enter the number corresponding to the selection from the following chart showing the possible selections for the printed weight legends.

NUMBER	WEIGHT LEGEND
0	Print lb or kg legend
1*	Print g legend
2*	Print oz legend - blank display legend
3*	Print oz t legend - blank display legend
4*	Print t legend
5*	Print dwt legend - blank display legend
6*	No weight legend printed or displayed

[55 34] SCALE ID ADDRESS

Enter one or two digits for the scale ID number that will be transmitted when selected to print in step [52]. A leading zero may be entered or a single digit may be entered by pressing the PRINT key after the single entry.

[60] INTERNATIONAL GROUP

Entering in the digits “6” then “0” will access the international setup group. The display will begin with setup step [61] and proceed through setup step [68] in this group.

[61 0] ANALOG VERIFICATION

Analog verification checks the output of the digital load cell (or the integrator section of the analog option) to see if it matches a value stored during calibration. This check is made approximately every four hours. if the reading is within tolerance (±1 division for capacities less than 2000d or ±2 divisions for capacities equal to or greater than 2000d) the test passes. If the test fails, an error E6 is shown on the display and further use of the scale is inhibited.

1 - Analog verification

0 - Analog verification will be disabled

[62 1] ENABLE LB/KG SWITCHING

1 - The lb/kg key on the keyboard of the Model 8520 will operate to switch between the pounds and kilogram modes. Setup step [54] may inhibit this switch.

0 - The lb/kg key will be disabled.

[63 1] POWER UP IN POUNDS

1 - The Model 8520 will power up in the pounds mode.

0 - The 8520 will power up in the kilogram mode.

[64 0] BRACKETED PRINTING

1 - The gross and/or tare printed weight fields will have a “ < “ before it and a “ > “ after it if the weight is not hand entered. If both the gross and tare weights are actual weights and neither is hand entered, the net weight will also have brackets around it.

0 - The weight fields will not have brackets around them.

[65 0] PRINT “PT" NOT “TRH"

1 - The legend for hand entered tare in the metric only mode will be “PT".

0 - The legend for hand entered tare in the metric only mode will be “TRH".

[66 0] ENABLE REMOTE ASCII INPUT

1 - The Model 8520 will be capable of receiving the ASCII characters P, T, C and Z at the printer port to perform a print, tare, clear tare and zero command respectively. This will only function in the demand mode of data output. The “pulse" print command will be disabled.

0 - Any ASCII input to the receive port will be ignored. The “pulse" print command will still function.

[67 0] GROSS WINDOW INDICATES COUNT

1 - The gross window on the display will always be on when the 8520 is in the parts counting mode.

0 - Normal mode. The gross window will be on only when the scale is in the gross weight mode.

[68 0] ENABLE COMMA

1 - A comma will replace the decimal point on the display and also in the data output.

0 - A decimal point will be used on the display and also in the data output.

[70] PARTS COUNTING GROUP

Entering in the digits “7" then “0" will access the parts counting group. The display will begin with setup step [71] and proceed through setup step [78] in this group.

[71 1] ENABLE PARTS COUNTING MODE

1 - The parts counting mode is accessible.

0 - The parts counting mode will not be accessible.

[72 0] SAMPLING MODE

Select then enter the number corresponding to the required sampling mode from the following chart. If a fixed sample size is selected, the sample size cannot be changed with the sample key.

NUMBER	SAMPLE MODE
0	Variable sample mode
1	Fixed sample size of 5 pieces
2	Fixed sample size of 10 pieces
3	Fixed sample size of 20 pieces
4	Fixed sample size of 50 pieces
5	Fixed sample size of 100 pieces

[73 0] AUTOCLEAR APW

1 - The average piece weight will automatically clear after settling at a piece count then returning to zero. The scale must return to the center of zero for autoclear to function.

0 - The average piece weight will not clear when the scale returns to zero. The APW must be cleared with the CLEAR key.

[74 1] AUTO SAMPLE ACCEPTANCE

1 - Additional sample pieces required to reach the selected minimum sample requirement ([Add 5]) are to be automatically accepted after the pieces are added.

0 - Additional sample pieces required to reach the selected minimum sample requirement must be acknowledged by pressing the SAMPLE key. The exact number ([Add 5]) must be added.

[75 1] MINIMUM SAMPLE REQUIREMENT

This allows selection of the percent of scale capacity that must be reached before an average piece weight may be calculated and a count sequence initiated. Select then enter the number corresponding to the sample requirement from the following chart.

NUMBER	MINIMUM SAMPLE
0	0.0%
1	0.02%
2	0.05%
3	0.1%

[76 1] ENABLE SAMPLE ENHANCEMENT

1 - This enables the sample enhancement feature of the 8520. A full description of sample enhancement is given is Section 5.6.

0 - The Model 8520 will operate in the normal sample mode.

[77 2] APW IN PIECES PER WEIGHT

Choose the required selection for APW entry and recall from the following chart. Enter the corresponding number from the keyboard of the 8520.

[78 0] PRINT COUNT EXPANDED

1 - The piece count will be preceded by the control character “SO" to indicate to a receiving device that the count field is to be printed larger than the previous data if the device is capable of doing so. The control character “SI" will then follow after the field to shift the device back to the normal mode.

0 - The piece count will be printed in the same size as the other data fields.

[81 0] EXPANDED WEIGHT DISPLAY

This step is to be used for evaluation of an installation or troubleshooting techniques only. The Model 8520 must not be left in this mode for normal weighing.

1 - The weight display will be expanded by 10.

0 - The weight will be displayed normally.

[98 0] DISPLAY INDIVIDUAL CELL OUTPUT

The output counts from each cell may be viewed individually to check for problems with the load cells or shimming of the base. Use the PRINT key to advance through each of the load cells one at a time and then press CLEAR to exit the procedure. Only the number of cells entered in step [03] may be accessed.

1 - Enter into the mode of viewing each load cell's output for troubleshooting purposes. Use the PRINT key to toggle through each cell's output. The CLEAR key exists this test mode.

0 - Skip the test mode for viewing each load cell's output.

[99 0] RESET SCALE TO DEFAULT PARAMETERS

1 - This selection will reset all the setup parameters to the factory settings. The prompt [SURE] will be displayed. Press “1" to reset the values or “0" to retain the present setup. All programming that has been entered into the 8520 will be over-written with the new programming.

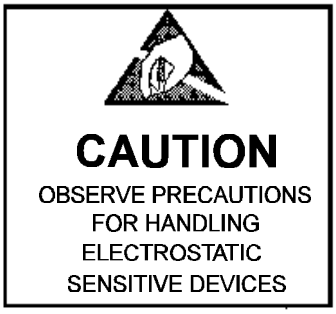
0 - The scale will retain its present programming and calibration values.

4.5 EXITING THE SETUP ROUTINE

The setup routine can be exited only when the display is showing the [- -] prompt. If a group heading (like [30]) was entered, all steps within that group must be stepped through before the [- -] will be shown again.

With the display showing [- -], move the setup switch (SW1-1) handle upward away from the printed circuit board. This switch is shown in Figure 1 at the beginning of the setup procedure. After the setup switch is disabled, the display will blank momentarily then show the weight on the scale platform.

Reinstall the left endcap of the desk unit, securing it with the eight screws, or close and latch the door of the stainless steel enclosure if the 8520 is a wall unit. Only snug the eight screws of the desk enclosure. DO NOT OVERTIGHTEN OR THE SCREWS MAY STRIP THE THREADS. If the enclosure needs to have a lead seal, remove 2 standard screws and replace with sealing screws included. Be sure to coat the door gasket of the wall unit with a thin coating of the food-grade lubricant included (part number 118251 00A) before closing the final time to create a watertight seal. The Model 8520 scale is now ready for use.



4.6 AUTORANGE SELECTION

Autorange enables the 8520 to weigh small weights in a smaller increment size than the increment size used at larger weights. This ability is limited by the resolution of the load cell used. In order to determine if a particular combination of increment sizes and scale capacity is acceptable, the following two calculations must be performed.

$$\text{*Required Counts} = \frac{\text{(Step [14] value) X 10}}{\text{(Step [17] value)}}$$

$$\text{*Actual Counts} = \frac{\text{(Step [14] value) X Output at capacity (from chart)}}{\text{Rated Capacity}}$$

Find the model number of the digital base used in the following chart then note the output counts at rated capacity for the particular capacity of base used. Use these values for the calculation for actual counts. For analog load cells, refer to the first paragraph under Limitations (4.6.2.1) described later in this section.

COUNTS AS RATED CAPACITY CHART

MODEL OF BASE	RATED CAPACITY (lb./kg)	OUTPUT COUNTS AT RATED CAPACITY (lb/kg)
1996	25/15	264,000 / 350,000
	50/30	264,000 / 350,000
	100/60	227,000 / 300,000
1997	25/15	264,000 / 350,000
	50/30	158,000 / 210,000
	100/60	317,000 / 420,000
2096	100/60	227,000 / 300,000
	250/150	266,000 / 350,000
	400/200	423,000 / 466,000
2097	100/60	315,000 / 420,000
	250/150	266,000 / 350,000
	400/200	423,000 / 466,000
2196	250/150	159,000 / 210,000
	500/300	317,000 / 420,000
	1000/600	317,000 / 420,000
2197	250/150	159,000 / 210,000
	500/300	317,000 / 420,000
	1000/600	317,000 / 420,000

4.6.1 RESULTS:

4.6.1.1 If the number of required counts is less than or equal to the number of actual counts, the scale will calibrate correctly.

4.6.1.2 If the number of required counts is no more than twice the number of actual counts, the 8520 will adjust the integration factors in the digital load cell so that the scale will calibrate correctly. This will not occur when the Model 2157 is used.

4.6.1.3 If the number of required counts is more than twice the number of actual counts, either the scale capacity (step 14) must be lowered or the low range increment size (step 17) must be increased so that a recalculation of the required counts is less than twice the number of actual counts.

4.6.2 LIMITATIONS:

4.6.2.1 When AutorangeR is selected with the analog option, the required counts cannot exceed 200,000 counts. If the calculated required counts does exceed 200,000 counts, either the scale capacity (step 14) must be lowered or the low range increment size (step 17) must be increased so that a recalculation of the required counts is less than 200,000 counts.

4.6.2.2 The number of required counts cannot exceed 600,000 when a digital load cell is used. If the calculated required counts does exceed 600,000 counts, either the scale capacity (step 14) must be lowered or the low range increment size (step 17) must be increased so that a recalculation of the required counts is less than 600,000 counts.

Example: Model 1996 Digital Scale Base

Rated Capacity - 50 pounds (from 1996 data plate)

Scale Capacity - 30 pounds (setup step [14])

High Range Increment Size - 0.01 lb (setup step [15])

Low Range Increment Size - 0.005 lb (setup step [17])

These selections would allow the Model 8520 to weigh from zero to 15 pounds by 0.005 lb increments then from 15 pounds to 30 pounds by 0.01 lb increments. The calculations are:

$$*\text{Required Counts} = \frac{30 \times 10}{0.005} = \frac{300}{0.005} = 60{,}000 \text{ Counts}$$

$$*\text{Actual Counts} \quad \frac{30 \times 264{,}000}{50} = 158{,}400 \text{ Counts}$$

These results indicate that the scale will calibrate correctly since the number of required counts is less than the number of actual counts.

5. OPERATING INSTRUCTIONS

Read the following descriptions of the functions and operation of the Model 8520 carefully. The legends on the display are explained as well as the keyboard functions and several operating sequences.

5.1 DISPLAY

The 8520 utilizes a low power custom liquid crystal display (LCD) that is a dual back plane type. It consists of six 0.7" digits with decimal points or commas. Over capacity is indicated by blanking of the display at a value selected in setup. Under zero is indicated by a minus sign at the far left of the display. The display is shown in Figure 3.

The 8520 cannot display a negative six digit net weight with a minus sign since it only has six display digits. If a negative six digit net weight occurs, the display will alternately show the weight value then six minus signs. The correct weight will be transmitted by the printer port.

When power is first applied to the instrument, the display may show [E E E] (above zero) or [-E E E] (below zero) until zero is captured. This feature can be disabled by reprogramming steps [24] and/or [32].

Before power is applied to the Model 8520, only the four legends on the right of the display are shown. These legends are not illuminated, they are printed on a reflector plate. They will have a “window" shown around them with a cursor in front of them when they are selected. All other data on the display will be shown only when required by the indicator.

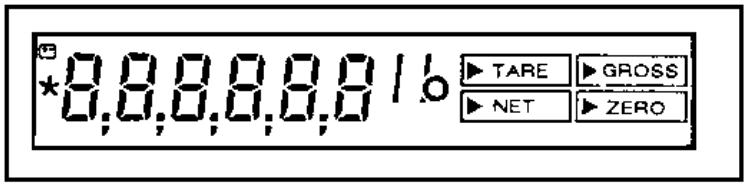


Figure 3

5.1.1 BATTERY SYMBOL

This indicates that the battery in the DC battery option is almost completely discharged. When the battery symbol is first shown, approximately one hour of battery use remains. When the battery is not low, the battery symbol will not be shown.

5.1.2 COUNTING ASTERISK

The counting asterisk indicates that the value on the display is a piece count. The weight legend after the numeric value on the display will not be shown. The asterisk will not be shown unless the 8520 is in the counting mode.

5.1.3 WEIGHT LEGENDS

lb - Shows the pounds mode has been selected.

kg - Indicates the kilogram mode has been selected.

g - Shows that the 8520 is displaying grams.

t - Indicates tons or metric tons.

oz - This is present on an optional display panel which can be inserted into the 8520 to indicate an ounce display.

oz t - This is also on an optional display panel which can be inserted into the 8520 to indicate troy ounces.

dwt - This optional display panel is used to indicate penny weight.

5.1.4 TARE

The “window" will be shown around this legend during tare entry and also during the recall of a tare value using the RECALL key.

5.1.5 NET

The net “window" will be displayed after a tare has been taken to indicate that the weight display shown is a net weight. If step [32] is programmed as “0", this “window" will blank while there is motion on the scale.

5.1.6 GROSS

The “window" around this legend indicates that the scale is in the gross weighing mode. If step [32] is programmed as “0", this “window" will blank while there is motion on the scale. This can also indicate the 8520 is in the counting mode if step [67] is programmed as a “1".

5.1.7 ZERO

The zero “window" will be shown when the 8520 is within +0.25 increments of the center of the zero increment.

5.2 KEYBOARD FUNCTIONS

The Model 8520 indicator contains a 4 X 5 matrix keyboard for operator interface. The keyboard is domed with tactile feel and has an embossed polycarbonate overlay with ridges to separate active key areas.

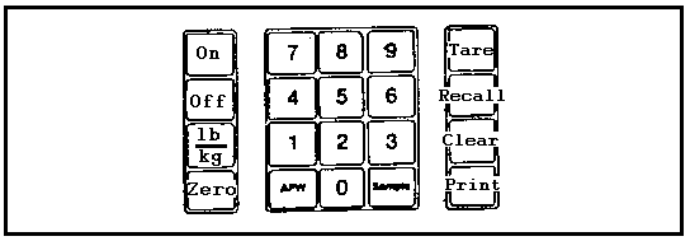


Figure 4

The numeric keys (digits 0 through 9) are used to enter digital tares and also to program setup selections in the Model 8520. Other special function keys are described next. Refer to Figure 4.

ON - This key will apply power to the electronics in the 8520 to turn the indication on. After unplugging the scale or if the scale automatically turns off, it is necessary to press this key to turn the scale back on.

OFF - This key turns the 8520 off. All power is removed from the cable to the digital load cell or to the optional analog load cell. The Main PCB still has power applied to it until the power is unplugged or until the optional battery is disconnected. If switch SW1-2 is turned off, this key is disabled. See Figure 1 for the location of SW1-2.

lb/kg - This key will alternate the 8520 display between the pound mode and the kilogram mode when setup step [62] is programmed as “1" and the scale has been programmed in either pounds or kilograms.

ZERO - Provides the ability to rezero the scale over a specific range of scale capacity selected in setup. This key can be inhibited by setup step [25] which also selects the operating range.

TARE - When the TARE key is pressed with weight on the scale, and no motion present, the tare weight will be subtracted from the gross weight to provide a net weight of zero. If the weight is removed from the scale, the net weight will be displayed as a negative value. When utilizing the AutorangeR feature, tare is only active in the range selected in step [33].

If the TARE key is pressed after entering a digital value using the numeric keys on the keyboard, the numeric value entered will be subtracted from the gross weight to provide a net weight display. A digital tare up to six digits can be entered up to full scale capacity (unless AutorangeR is enabled). The numbers are displayed as they are entered. The least significant digit (LSD) of tare entry must correspond to the increment size or the tare value

will not be accepted. With tare interlock enabled, keyboard tare may only be entered with the scale at gross zero.

RECALL -This key will recall the tare value when a net weight is displayed. The tare value will be shown for approximately two seconds then the display will return to show the net weight.

In the parts counting mode, this key will also toggle past the tare recall to recall the APW. If setup step [77] is programmed as a “0", pressing the RECALL key then the APW key in sequence will display the weight per piece value. Pressing the RECALL key then the SAMPLE key will display the piece per weight value.

CLEAR -When entering any data, a single depression of the CLEAR key will erase the data entered. A double depression will exit the entry routine. When not in the counting mode, a single depression of this key clears any tare weight that has been entered. During a counting sequence, a double depression of the CLEAR key exits the counting mode and clears both tare and APW.

PRINT - When this key is pressed with no motion on the scale, data will be transmitted from the serial port according to programming in group [40]. If motion is present, this command will be retained and acted upon when motion ceases. If the 8520 is in the continuous output mode, bit number three in status word C will toggle to indicate a print has been requested.

APW - This key must be pressed before and after hand entry of an average piece weight (APW) to inform the 8520 that the entered data is an APW. It also is used with the RECALL key to recall the weight per piece value.

SAMPLE - In the variable sample mode, this key must be pressed after hand entering a sample quantity to terminate the sample entry. This is only functional after a tare has been taken unless the tare feature is disabled.

In the fixed sample mode, pressing this key at gross zero will show the fixed sample quantity on the display for two seconds then return to zero. When this key is pressed, the 8520 divides the sample quantity into the displayed weight on the scale to calculate an APW.

It is also used in conjunction with the RECALL key to recall the piece per weight value.

5.3 INITIAL POWER-UP SEQUENCE

When power is first applied to the Model 8520, the following display sequence will occur.

5.3.1 Before the display shows any data, the 8520 performs an internal RAM test, external RAM test, NOVROM test and a ROM test. Any failures that are detected are displayed at the end of the power-up sequence.

5.3.2 After the RAM and ROM tests, the display will show the program number on the display. The standard program number is [132785]. If special software is used for a particular application, this number may be different.

5.3.3 The revision level of the software is shown next with the letter “L" in front of it. A sample display would be[L04] which indicates the 04 or fourth revision to the software. This number will increase as modifications are made to the 8520 program.

5.3.4 Next, the complete display will be shown for verification that all “windows", symbols and segments are working. During this time, the decimal point will shift from the far left position to the far right position one position at a time. All four “windows" around the legends at the right will be on.

5.3.5 The display will then show six minus signs as communication to the digital load cell or optional analog PCB is established.

5.3.6 After a weight value is obtained, the display will either show that weight or the [E E E] display indicating the scale is out of the zero range. Remove all items from the scale platter then press the ZERO key. If zero cannot be captured, the scale may need to be recalibrated. Setup steps [24] and [32]

program the ability of the 8520 to display the E's.

5.4 OPERATING SEQUENCES

5.4.1 KEYBOARD ENTERED TARE

With a gross or net weight display, a numerically entered tare may be added by the user. Upon pressing any numeric key, the display blanks except for the digit entered and the tare weight “window" is turned on.

Up to six digits are accepted as a keyboard entered tare. The decimal point is fixed at the calibrated position. Once the proper value is entered, the TARE key must be pressed and the indicator will read in the net mode. If the TARE key is not pressed, the display will go back to the gross display after five seconds.

5.4.2 COUNTING SEQUENCE - FIXED SAMPLE MODE

The 8520 can be programmed for simple one-button parts counting. The SAMPLE key value may be preset in setup for 5, 10, 20, 50 or 100 pieces as a sample quantity. (Refer to step [70]). The fixed sample quantity may be checked by pressing the SAMPLE key with the weight display at gross zero. The display shows the fixed sample quantity ([SPL 10] for example) for two seconds then returns to the normal weight display.

To count using the fixed sample mode, in either the gross or net weight mode, place the fixed sample quantity of parts on the scale and press the SAMPLE key. The display will show, for example [* 10]. Add the pieces to be counted. The display will automatically count the pieces as they are added.

5.4.3 COUNTING SEQUENCE - VARIABLE SAMPLE MODE

The Model 8520 can be programmed to allow flexible variable sample and APW (average piece weight) counting.

5.4.3.1 In the NET mode, a variable sample quantity may be entered in the following manner:

a. After taking a tare, place the sample quantity of parts on the scale.

b. Press the SAMPLE key (display blanks).

c. Enter the selected quantity of parts using the numeric section of the keyboard.

d. Press the SAMPLE key. The display shows for example [* 27]. As more pieces are added, they will be counted.

5.4.3.2 To enter an APW for counting, use the following sequence:

a. After taking a tare, place the selected number of parts on the scale.

b. Press the APW key (display blanks).

c. Enter the average piece weight for the selected parts using the numeric keys on the keyboard. Preceding zeroes in the value need not be included.

d. Press the APW key. The display shows, for example [* 83]. As more pieces are added, they will be counted.

5.4.4 RECALL KEY OPERATION

In the straight weighing mode, the RECALL key may be used to review the tare value. The 8520 will return to the net display after approximately five seconds.

In the counting mode, the RECALL key can be used to review the calculated APW and tare values. By repeatedly pressing the RECALL key, the display cycles from the count, to the calculated APW, to the tare then back to the count.

5.4.5 ON/OFF KEY OPERATION

The 8520 may be configured for one of three operations for turning the display off and on. Using switch SW1-2 on the Logic PCB, the OFF key may be disabled. The indicator can only be turned off by removing power. This selection should not be used with the battery option.

Switch SW1-2 can also be used to select a manual ON/OFF mode. In this mode, the indicator is turned on and off using the ON and OFF keys on the 8520 keyboard.

The third sequence is selectable in setup step [35]. This allows the indicator to automatically shut off if no operator usage is detected (no motion on the scale or no keyboard operation). This can be used to extend the operational life of the battery option before recharging is required. For capacities of 5000 divisions or less, the indicator times out after five minutes. For capacities greater than 5000 divisions, the time out is ten minutes.

5.5 OPERATING ZONES (COUNTING MODE)

Four distinct zones of counting exist in relation to the weight on the platter. These zones are shown in the following table and discussed more fully in the following four sections. Note that if sample enhancement is disabled zone 3 does not exist. Note also that if the minimum sample weight is chosen as 0.0% then zones 1 and 2 essentially do not exist and the APW computation may have a large error. A non-zero tare should be taken before using small sample weights when 0.0% is chosen to disable AZM.

ZONE	WEIGHT	CONDITION
1	Below Minimum APW Computation (Below 0.02% of scale capacity.)	No Sampling. Display shows [LO].
2	0.02% of scale capacity to Minimum Sample Weight.	Sampling allowed. Display shows [Add-x]
3	Minimum Sample Weight to 4% Print allowed.	Count Mode. APW Enhancement allowed. Display shows piece count.
4	4% to Scale Capacity Print allowed.	Normal Counting Mode. No Enhancement.

ZONE 1

Average piece weight (APW) cannot be accurately computed below 0.02% of scale capacity. Any attempt to enter a sample piece count by pressing the SAMPLE key will result in the message [LO] on the display. The operator should add samples and enter the new sample count until the [LO] message does not result.

ZONE 2

In setup the 8520 can be programmed to permit the operator to continuously update the average piece weight based on larger and larger samples (Setup step [76]). A minimum APW weight, as defined in Zone 1 previously, is required for the initial calculation of APW. As additional pieces are placed on the scale, each time the scale sees a motion/no-motion sequence, a new APW is calculated, based upon the new total sample weight with the sample

count calculated using the APW previously established. See Section 5.6 for further discussion of APW enhancement.

Minimum sample weight is selected during setup as 0.0%, 0.02%, 0.05% or 0.1% of scale capacity. The display shows [Add(x)], when the sample weight is below the minimum selected. (x) is the value of additional pieces required to reach the minimum sample requirement. It is calculated by using the original sample to calculate an APW, and using this APW to calculate the maximum number of pieces allowed which will permit enhancement of the APW. If this maximum is exceeded, [OVER] will be displayed and the operator should remove parts until a motion/no-motion sequence does not result in the [OVER] display. Adding pieces to the scale when [OVER] is displayed will enter the 8520 into the counting mode with enhancement disabled.

A manual sample acceptance mode is also selectable in the setup mode which requires an exact number of samples (x) be added and the SAMPLE key pressed. This results in the most accurate APW.

ZONE 3

From the minimum sample weight to 4% of scale capacity the scale is in full counting mode. Printing may be done as desired. The APW will be enhanced if selected by setup step [76] throughout this range, unless too many pieces are added to the platter. If the count of pieces added exceeds the number which can be reliably counted using the previous APW, the display shows [OVER] (over enhancement range) for 2 seconds, after which the count is again displayed. If the operator wishes to continue APW enhancement pieces must be removed until each motion/no-motion sequence no longer results in the [OVER] display. APW enhancement then occurs.

If the operator ignores the [OVER] display and adds more pieces or prints, no further APW enhancement is possible for the current transaction. Once the counting weight reaches 4% of scale capacity, APW enhancement is discontinued.

ZONE 4

From 4% to 100% of scale capacity is the normal counting zone, during which the display APW will not change and no APW enhancement is done.

5.6 AVERAGE PIECE WEIGHT ENHANCEMENT

The initial computed value of average piece weight (APW) may not have the accuracy needed to reliably count large numbers of small pieces. This problem is inherent in a single scale parts counter, since it must have the weighing range to count large quantities of parts. To compensate for this, the APW is allowed to be enhanced constantly up to 4% of scale capacity. In order to ensure a minimum APW initial accuracy, a minimum sample weight of 0.02% of scale capacity is required. APW's below this value should be accurately determined on a more sensitive scale then entered via the keyboard of the 8520.

APW enhancement is based on the fact that an inaccurate APW, while not able to count large numbers of parts, will very reliably count a small number of pieces. This count will then allow a new determination of APW based on a larger weight. Given enough enhancements the APW will become very accurate.

Enhancement occurs on a motion/no-motion sequence with the following two conditions satisfied:

1. Pieces must have been added that is, the weight must have increased (or decreased in count out mode).
2. The pieces added (or removed) must not exceed the amount which can be counted accurately with the current APW. A display of [OVER] (over enhancement range) results when this amount is exceeded.

6. LOAD CELL CONNECTIONS

Before any load cell connections are made, the type of load cell to be connected must be determined. If a standard analog load cell is to be connected, an optional Analog PCB must be installed into the 8520. If a digital

scale base is to be connected, no optional PCB's are required; however, the wiring connections for an analog scale and a digital scale are completely different.

WARNING

DISCONNECT POWER BEFORE CONNECTING LOAD CELLS

CAUTION

DO NOT CONNECT AN ANALOG SCALE BASE DIRECTLY TO THE MAIN PCB OF THE 8520 AND DO NOT CONNECT A DIGITAL SCALE BASE TO THE OPTIONAL ANALOG PCB OR DAMAGE WILL RESULT. BE SURE TO WIRE CORRECTLY. DAMAGE WILL RESULT IF CONNECTIONS ARE NOT CORRECT.

6.1 DIGITOL LOAD CELL CONNECTIONS

This section of the manual explains how to dress the 8520 end of the digital load cell cable and how to connect the cable in the 8520. If a digital scale base other than the ones described is used, refer to the technical manual for that product for cable terminations.

Each of the general purpose digital scale bases will include an interconnecting cable with them. This cable (part number 130115 00A) is dressed at the factory and should require no further preparation.

If the ten foot cable included is not long enough and additional cable is required, the recommended cable for use with the Model 8520 is Toledo Scale number 510624-370. This cable is ordered by the foot. The maximum recommended cable length is fifty feet.

NOTE: See Bulletin I-08-90 in the addendum section of this manual before connecting to the Model 1997 base.

6.1.1 CABLE PREPARATION

The following two sections include instructions for both the wall and desk enclosures. Refer to the correct section for the type of 8520 utilized.

6.1.1.1 Desk type 8520 enclosure

Prepare the 8520 end of the cable as shown in Figure 5. Insert the cable through the largest grip bushing and grommet on the left end cap. Insert the cable until the end of the outside jacket is flush with the inside edge of the grip bushing. Tighten the bushing cap securely. Secure the loop terminal of the shield wire from the cable to the inside of the left end cap. Secure with the 8-32 screw provided with the 8520.

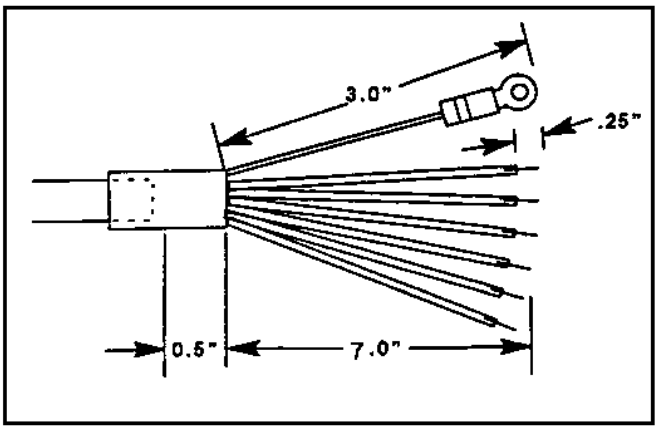


Figure 5

6.1.1.2 Wall type stainless steel 8520 enclosure.

Prepare the 8520 end of the cable as shown in Figure 6. Insert the cable through the grip bushing and grommet at the far left of the bottom of the stainless steel enclosure. Insert the cable until the end of the outside jacket is flush with the inside edge of the grip bushing. Tighten the bushing cap securely. Secure the loop terminal for shield ground of the cable to the 8-32 stud beside the grip bushing on the inside bottom of the 8520 enclosure. Use the nut already present on the ground stud.

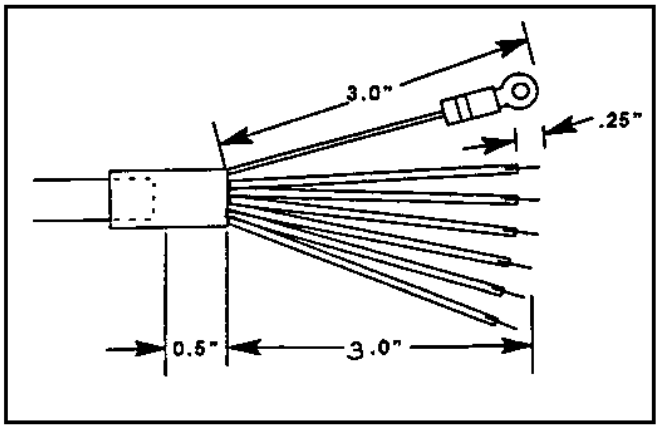


Figure 6

6.1.2. CABLE TERMINATION

The cable from a digital load cell base will attach to TB2 on the Main PCB of the 8520. The location of TB2 is shown in Figure 1.

6.1.2.1 Model 1996, 2096 and 2196 Bases

These DigiTOL bases utilizes a 9 pin connector on the base. There should be an interconnecting cable part number 130115 00A included with the base. This cable will have a nine pin mating connector at one end (to attach to the base) and the other end will be open ended with different color wires exposed to connect to TB2 of the Model 8520. Figure 7 shows the proper connections between the 8520 terminal strip TB2 and the end of the interconnecting cable part number 130115 00A. Also shown are the pin numbers at the nine pin connector on the load cell base.

Do not connect the white wire from pin 4 of the connector to the RxD-B terminal on TB2. Cut the stripped end off the white wire and tape it back so it will not short to any 8520 circuitry.

6.1.2.2 Model 1997, 2097 and 2197 Bases

The Models 1997, 2097 and 2197 Stainless Steel DigiTOL Bases utilize an open ended integral cable from the load cell with exposed colored wires to attach to TB2 in the Model 8520 Indicator. Figure 7 shows the proper connections between the 8520 terminal strip TB2 and the end of the interconnecting cable from the load cell. The wire colors are shown as well as the signal name.

Do not connect the white wire of the cable to the RxD-B terminal on TB2. Cut the stripped end off the white wire and tape it back so it will not short to any 8520 circuitry.

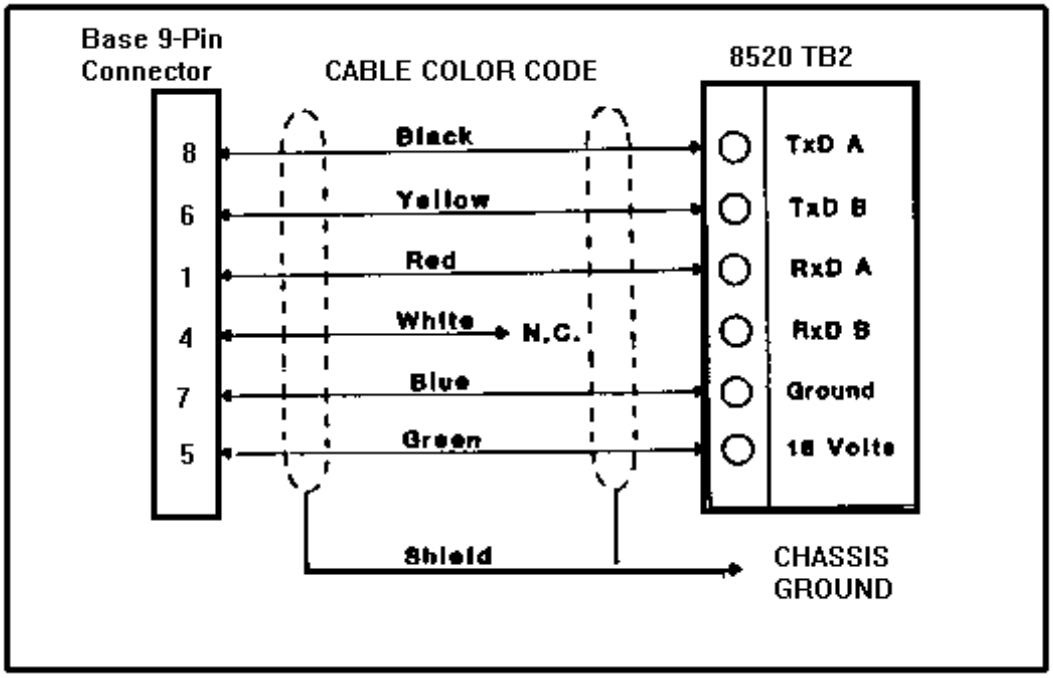


Figure 7

6.1.2.3 Model 2157 Floor Scale and DigiTOL J-Box

These models utilize an open ended cable to connect both the 8520 and junction box. The exposed wires will connect to TB2 in the 8520 and to TB5 in the junction box. Figure 8 shows the correct color code to follow when connecting the 8520 to the Model 2157 or DigiTOL J-Box.

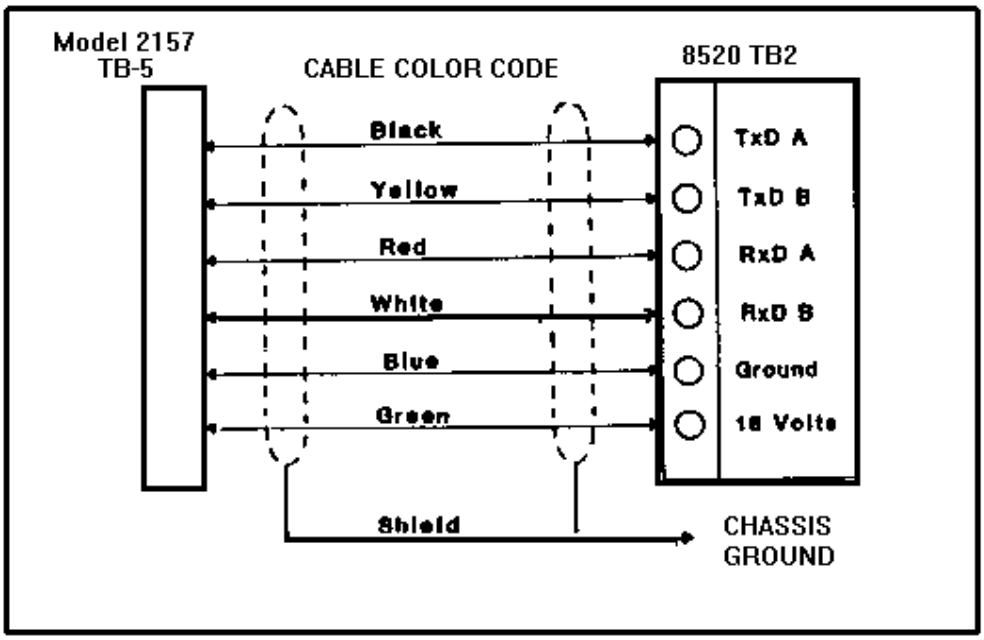


Figure 8

6.2 OPTIONAL ANALOG LOAD CELL CONNECTIONS

This section of the manual explains the load cell connections to and from a standard analog load cell or analog load cell base. The cable to the desk type 8520 from an analog load cell will attach to J2 on the optional Analog PCB using a detachable terminal block. The location of J2 is shown in Figure 9. The cable to the wall type 8520 will attach to the connector labeled LC (load cell) on the optional Analog PCB assembly. The location of this connection is also shown in Figure 9.

The recommended cable for use with the Model 8520 analog option is Toledo Scale number 510620-370. This cable is ordered by the foot. The maximum recommended cable length is 300 feet.

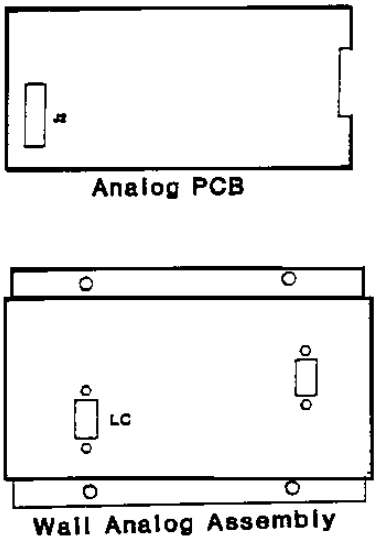


Figure 9

6.2.1 DESK TYPE 8520 ENCLOSURE.

Prepare the 8520 end of the load cell cable as shown in Figure 10. Insert the cable through the largest grip bushing and grommet on the left end cap. Insert the cable until the end of the outside jacket is flush with the inside edge of the grip bushing. Tighten the bushing cap securely.

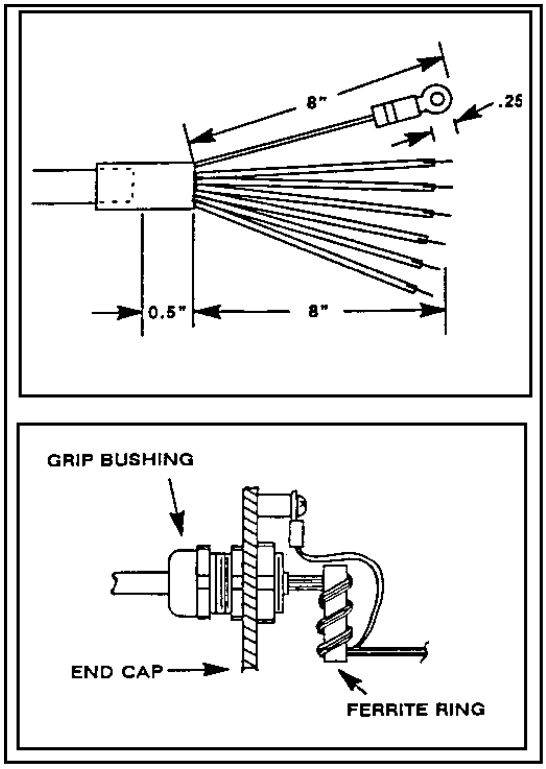


Figure 10

As shown in Figure 10, wrap four turns of the load cell cable conductors (including the shield ground wire) through the ferrite ring from the analog kit, keeping the ferrite ring as close to the cable entry point as possible. Attach the shield ground wire ring terminal to the ground post next to the grip bushing with the 8-32 X 5/16" screw supplied in the kit.

Attach the load cell cable to the six position terminal block J2 on the optional Analog PCB. Refer to Figure 9. This terminal block may be disconnected from the PCB by pulling upward. Match the signal description of the load cell cable wires to the descriptions listed next for the terminal block J2. Note the orientation of terminals 1 and 6.

J2 TERMINAL	SIGNAL DESCRIPTION	WIRE COLOR*
1	+ Signal	Green
2	- Signal	Black
3	+ Excitation	White
4	+ Sense	Yellow
5	- Sense	Red
6	- Excitation	Blue

*Using Toledo Scale number 510620-370 cable.

The load cell termination inside the desk type 8520 is now complete. The load cell connections for load cells and junction boxes are shown in the sections following the wall mount 8520 instructions. Remember to match the signal descriptions of the load cell to the descriptions for the 6 terminal plug (J2) on the optional Analog PCB.

6.2.2 WALL TYPE STAINLESS STEEL 8520 ENCLOSURE.

Prepare the 8520 end of the load cell cable as shown in Figure 11. Insert the cable through the grip bushing and grommet at the far left end of the bottom of the stainless steel enclosure. Insert the cable until the end of the outside jacket is flush with the inside edge of the grip bushing. Tighten the bushing cap securely.

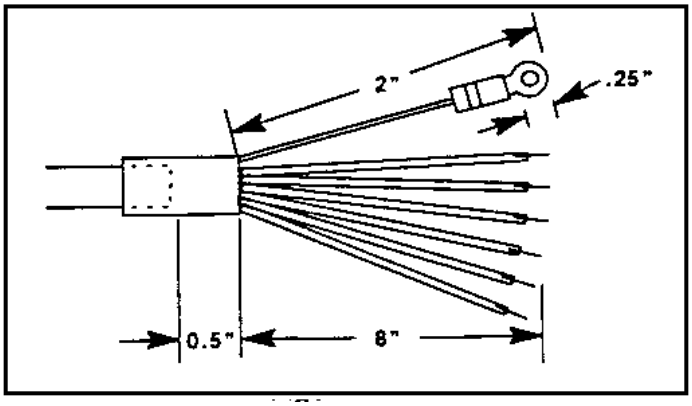


Figure 11

Solder the load cell cable that enters through the grip bushing to the male 9-pin connector supplied in the optional analog kit. Match the signal description of the load cell cable wires to the descriptions listed next for the 9-pin connector.

9-PIN CONNECTOR	SIGNAL DESCRIPTION	WIRE COLOR*
1	+ Excitation	White
2	+ Sense	Blue
4	- Sense	Red
5	- Excitation	Yellow
7	+ Signal	Green
8	- Signal	Black

* Using Toledo Scale number 510620-370 cable.

Secure the soldered 9-pin connector and load cell cable to the female 9-pin connector on the Analog box assembly using the two 4-40 screws provided. Refer to Figure 9. The load cell termination inside the wall mount 8520 is now complete. The load cell connections for load cells and junction boxes are shown in the next sections. Remember to match the signal descriptions of the load cell to the descriptions for the 9-pin connector for the optional Analog PCB.

6.2.3 STANDARD LOAD CELL INPUT/OUTPUT

6.2.3.1 Four wire load cells

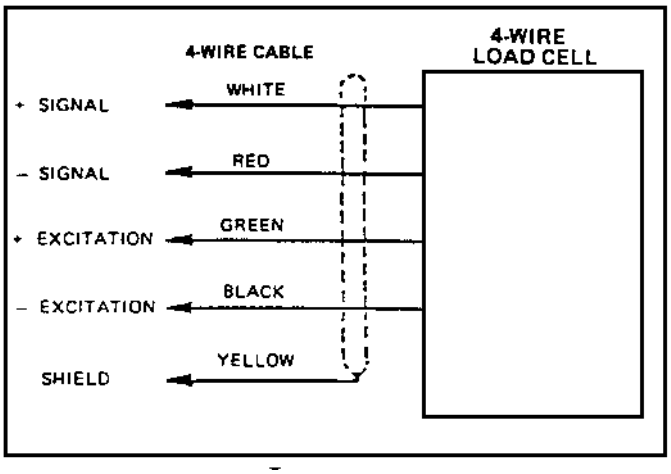


Figure 12

NOTE: When connecting a four wire load cell to the 8520, always jumper + excitation to + sense and - excitation to - sense at the junction closest to the load cell.

* When using a Model 951 load cell in tension, reverse the signal wires from that which is shown above, i.e. + Signal is red and - Signal is white.

6.2.3.2 Six wire load cells

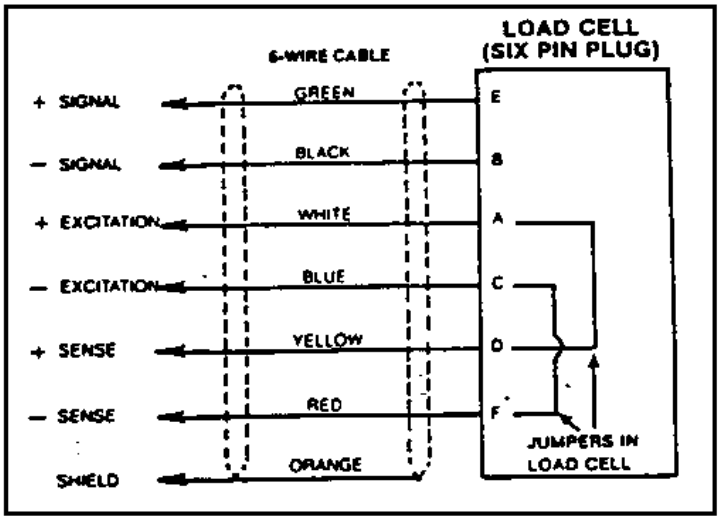


Figure 13

6.2.4 Junction Box Connections

6.2.4.1 Low Profile Style

Terminal strip TB1 is the output terminal strip to the 8520. It should be wired as shown in Figure 14.

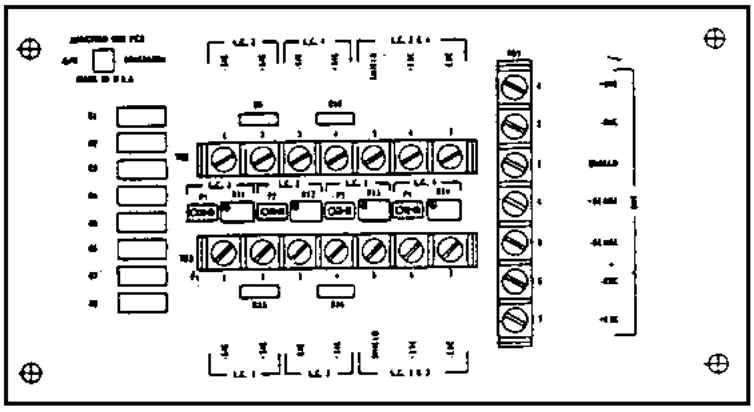


Figure 14

TB1 TERMINAL	SIGNAL DESCRIPTION
1	+ Signal
2	- Signal
3	Shield
4	+ Sense
5	- Sense
6	- Excitation
7	+ Excitation

Terminal strips TB2 and TB3 are the connections for the load cells. Wire the load cells as described next. See Section 6.2.3 for load cell color code. Note that load cell will be abbreviated as L/C in the following chart.

TERMINAL	TB2 DESCRIPTION	TB3 DESCRIPTION
1	- Signal L/C 2	- Signal L/C 1
2	+ Signal L/C 2	+ Signal L/C 1
3	- Signal L/C 4	- Signal L/C 3
4	+ Signal L/C 4	+ Signal L/C 3
5*	Shields	Shields
6**	+ Excit L/C 2 & 4	+ Excit. L/C 1 & 3
7**	- Excit L/C 2 & 4	- Excit. L.C 1 & 3

Note that no sense leads are connected from the load cells.

*A load cell shield connection is not required when all load cells are contained within one steel understructure.

**Terminals 6 and 7 will each have two wires connected to them. One wire will go to each load cell supplied.

NOTE: Toledo Scale now uses a dual shield cable. The ground shield (green with yellow stripe) connects to structure (chassis) ground in the junction box, and to the ground terminal of the 8520.

6.2.4.2 Vehicle Style

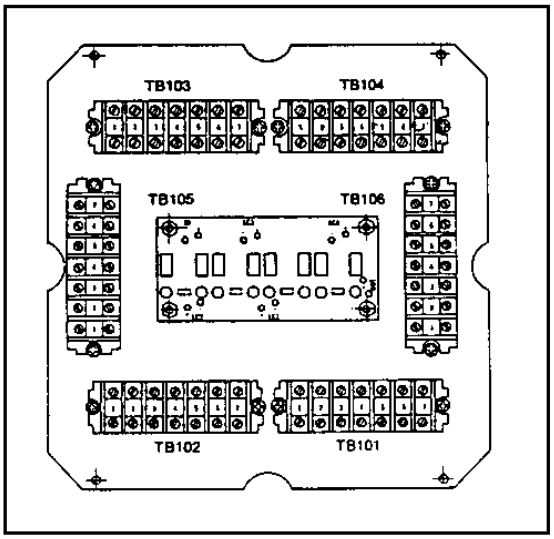


Figure 15

A load cell is connected on terminal strips TB101*, TB102, TB103 and TB104 using the following guide. See Section 6.2.3 for load cell color code.

TERMINAL	SIGNAL DESCRIPTION
1	+ Signal
2	- Signal
3	Shield
4	- Excitation
5	+ Excitation
6*	+ Sense
7*	- Sense

TB105 is the input terminal strip that another junction box output would connect to if multiple junction boxes were required. The wiring is the same as TB101 - TB104.

TB106 is the output terminal strip to the digital indicator. The wiring for this is the same as TB101 - TB104.

*Note - If four wire load cells (no sense leads) are used, there must be two jumpers installed on TB101. The two jumpers must be placed from terminal 4 to terminal 7 and from terminal 5 to terminal 6. These jumpers are not required with 6 wire cells. If four wire load cells are used, no wires will be connected to terminals 6 and 7 on TB102, TB103 and TB104.

7. SERIAL INPUT AND OUTPUT DESCRIPTIONS

The Model 8520 has a bi-directional serial port that is capable of receiving certain ASCII characters as well as transmitting selected scale data. The input & output operations will be described separately in the next sections.

7.1 DATA OUTPUT DESCRIPTIONS

The serial output of the Model 8520 can be selected as either 20mA current loop (active) or RS-232C via wire termination on the Main PCB. A six position terminal block (TB1) is provided as the output connection at the left edge of the Main PCB. The baud rate is selectable as 300, 1200, 2400, 4800 or 9600 in either the demand mode (PRINT key or remote print request) or in the continuous output mode. No handshaking is provided by the 8520.

The data will always be in a 10 bit frame:

1 - Start Bit

7 - ASCII data bits

1 - Parity Bit (even, odd or “0")

1 - Stop Bit

The maximum recommended cable length is 1000 feet for 20 mA current loop and 50 feet for RS-232C. A shielded twisted pair cable of at least 24 gauge is recommended.

7.1.1 DEMAND MODE

A checksum character and STX (start of text) character may be enabled in setup to allow flexibility in the data output. The net weight (and piece count when using the counting mode) may be printed expanded using the ASCII “SO" and “SI" characters. An optional scale ID number may also be selected to print to designate which scale the data was transmitted from.

The demand type data output will be disabled during motion, under gross zero weight and when in the expand mode. A print request will be retained during motion then data transmitted when motion ceases.

The order of the data fields transmitted are selected in setup. The output can also be selected as single line (all data on one line) or multiple line (each data field on a separate line).

7.1.1.1 Data Field Lengths

DATA FIELD	LENGTH	FIELD DESCRIPTIONS
Displayed weight (If net weight)	8 bytes	6 bytes - weight 1 byte - dp or comma 1 byte - sign or space
Displayed weight (If gross weight single line)	7 bytes	6 bytes - weight 1 byte - dp or comma 1 byte -sign (will replace msd)
Displayed weight (If gross weight multi-line)	8 bytes	6 bytes - weight 1 byte - dp or comma 1 byte -sign or space
Gross weight (single line)	7 bytes	6 bytes - weight 1 byte - dp or comma 1 byte -sign (will replace msd)
Gross weight (multi-line)	8 bytes	6 bytes - weight 1 byte - dp or comma 1 byte -sign or space
Net weight	8 bytes	6 bytes - weight 1 byte - dp or comma 1 byte -sign or space
Tare weight (single line)	7 bytes	6 bytes - weight 1 byte - dp or comma or space
Tare weight (multi-line)	8 bytes	6 bytes - weight 1 byte - dp or comma or space 1 byte - space
APW	7 bytes	6 bytes - weight 1 byte - dp or comma
Count	6 bytes	6 bytes - count
Scale ID	8 bytes	5 bytes SCALE descriptor, 1 space, 2 bytes for ID number

7.1.1.2 Data Field Legends

Each data field will have a legend (such as “lb" to indicate pounds) following it. Listed next are the available legends and their format. These legends are selected in setup step [54].

DATA FIELD	WEIGHT UNITS (___ indicates a space)
Gross weight	__lb, __kg, __g, __oz_t, or __dwt
Net weight	__lb_NET, __kg_NET, __kg_NETC (metric only), __g_NET, __oz_NET, __OZ,_t_NET, __t_NET or __dwt_NET
Tare weight	__lb_TR, __kg_TR, __kg_TRH (metric only), __kg_PT (metric only), __g_TR, __oz_TR, __oz_t_TR, __t_TR or __dwt_TR
APW	__lb_APW, __kg_APW, __g_APW, __PCS/lb, __PCS/kg, or __PCS/g
Count	__PCS

7.1.1.3 Data Output Notes

a. If a tare has not been taken but the tare and net fields have been selected to print, the tare and net lines will be removed from the data transmission.

b. Non-significant leading zeroes will be transmitted as spaces.

c. When the Model 8520 is programmed to display and print a comma in place of a decimal point (step [68 1] non-significant leading zeroes will not be suppressed.

d. All data fields are right justified.

7.1.2 DEMAND MODE FEATURES

The following print features are available in the demand mode only. Also note that if parts counting is enabled, autoprint and print interlock will function only when the Model 8520 is in the parts counting mode. These features will not function in the weight mode unless parts counting is disabled.

7.1.2.1 Print Interlock

When print interlock is enabled, only one print of a weight or count is permitted. The weight on the scale must return to a net weight less than the value selected as the minimum print in step [47] to reset the interlock. After the interlock has been reset, a single print of another weight or piece count greater than the minimum print value is possible.

7.1.2.2 Autoprint

Autoprint enables the 8520 to automatically transmit data when the weight or piece count on the scale settles to no motion. The weight on the scale must be greater than the value selected as the minimum print in step [47]. After an autoprint, the net weight on the scale must return to a weight value less than the minimum print selection (step [47]) to reset the autoprint feature. The PRINT key will remain inactive when autoprint is selected.

7.1.2.3 Net Sign Correction

Selecting this feature will enable the Model 8520 to store a tare value which is greater than the gross weight on the scale and still print a positive net weight. It does this by switching the positions of the gross and tare values. This will allow keyboard entry of a gross weight into the tare register while the actual tare weight is on the scale and then initiating a gross tare and net printout.

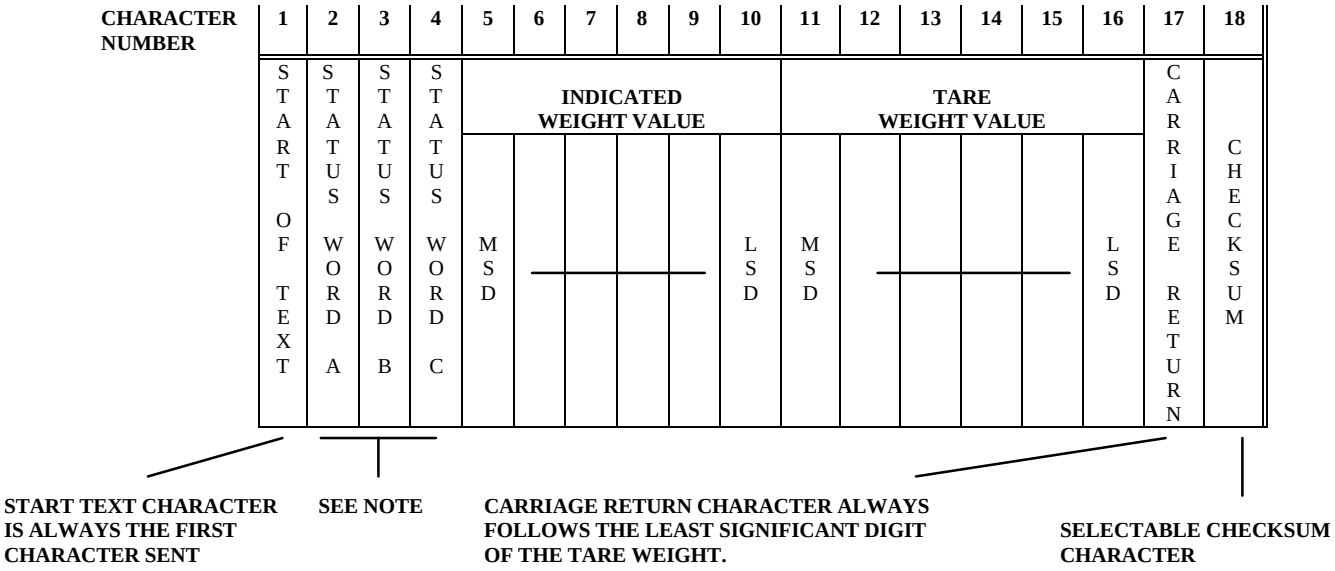
Example:

Weight entered into tare register 1	2000 lb
Actual tare weight on the scale	3000 lb
The data printed would be:	12000 lb
	3000 lb TR
	9000 lb NET

7.1.3 CONTINUOUS MODE

The mode of data output from the 8520 is selectable via the setup routine as either on demand or continuous. If the continuous mode is selected, there is only one format for which the data may be configured. The only options are the addition of a checksum character if required and parity selection. The format is:

NOTE: Definitions of the three status words follow.



STATUS WORD A DEFINITION

	DECIMAL POINT OR DUMMY ZERO LOCATION							
BIT NO.	**X00**	**X0**	**X**	**.X**	**.XX**	**.XXX**	**.XXXX**	**.XXXXX**
0	0	1	0	1	0	1	0	1
1	0	0	1	1	0	0	1	1
2	0	0	0	0	1	1	1	1

	INCREMENT SIZE		
	COUNT BY 1	COUNT BY 2	COUNT BY 5
3	1	0	1
4	0	1	1

5	ALWAYS A 1
6	ALWAYS A 0
7	EVEN PARITY

STATUS WORD B DEFINITION

BIT NO.	OPERATING PARAMETERS
0	GROSS MODE = 0/NET MODE = 1
1	POSITIVE WEIGHT = 0/NEGATIVE WEIGHT = 1
2	IN RANGE = 0/OVERCAPACITY = 1
3	NO MOTION = 0/IN MOTION = 1
4	LB MODE = 0/kg MODE = 1
5	ALWAYS A 1
6	NORMAL = 0/POWER UP = 1
7	PARITY BIT

STATUS WORD C DEFINITION

BIT NO.	OPERATING PARAMETERS
0	ALWAYS A 0
1	ALWAYS A 0
2	ALWAYS A 0
3	NORMAL = 0/PRINT BUTTON PUSHED = 1
4	NORMAL = 0/DISPLAY EXPANDED BY 10 = 1
5	ALWAYS A 1
6	NORMAL = 0/MANUAL TARE IN kg ONLY = 1
7	PARITY BIT

7.2 DATA INPUT DESCRIPTION

The Model 8520 Digital Indicator is capable of performing certain functions when a particular ASCII character is transmitted to it. This will only be functional when the 8520 is programmed for the demand type of output format.

This section explains the operation of the data input feature.

7.2.1 DESCRIPTION

The parity and baud rate of the data input must be the same as what has been selected for the data output in setup group [40]. The format of the input data must be a 10 bit frame also.

1 - start bit
7 - ASCII data bits
1 - Parity bit (even, odd or "0")
1 - Stop bit

The Carriage Return character (CR) is used to terminate a command although it is not required by the 8520. Data should not be sent if the data output of the 8520 is in process. No handshaking is provided.

7.2.2 INPUT COMMANDS

The external commands that will be recognized by the 8520 are described next with descriptions when required. The brackets <> are for clarity only and must not be transmitted. All letters sent must be capital letters. CR represents the ASCII Carriage Return character.

COMMAND FORMAT	DESCRIPTION
<Z> <CR>	Zero the scale if the scale is in the gross mode with no motion and is within the programmed zero capture range.
<T> <CR>	Tare the scale to net zero.
<C> <CR>	Clear the scale to home position.
<P> <CR>	This command tells the 8520 to transmit data.

7.2.3 OPERATION

Once a command is received by the 8520 it will take approximately 200 ms to process it. Another command, received before the original one is interpreted, will be ignored, along with all further transmission until the next command character.

Command strings should be spaced no closer than 2 seconds apart. Any character not shown in the command chart will be ignored.

7.3 INTERFACING CONNECTIONS

The serial I/O connections are made at TB1 on the left edge of the 8520 Main PCB. Two jumpers (W1 and W3) select the type of communication to be used. Refer to Figure 1.

7.3.1 TERMINAL BLOCK TB1 CONFIGURATION

The signal descriptions for each terminal of the Serial I/O terminal block TB1 are shown next.

TERMINAL	SIGNAL DESCRIPTION
1	TxD (RS-232)
2	RxD (RS-232) or 20 mA Receive (+)
3	20mA Transmit (-) Active
4	20mA Transmit (+) Active
5	20mA Receive (-)
6	Logic Ground

7.3.2 RS-232 OR 20MA SELECTION

Two jumpers (W1 and W3) at the left edge of the Main PCB above TB1 select the type of communication (20mA current loop or RS-232) to be used for the input mode of the Model 8520. If 20mA is selected, it can be active (8520 supplies the 20 mA current loop power) or passive (other device supplies the 20mA current loop power).

Use the following chart to determine which position to select for the W1 and W3 jumpers:

INPUT DESCRIPTION	W1 POSITION	W3 POSITION	TB1 TERMINAL CONNECTION
RS-232 Receive	1-2	1-2	(+) 2 (-) 6
20mA Receive (Active)	2-3	3-4	(+) 5 (-) 6
20mA Receive (Passive)	2-3	2-3	(+) 2 (-) 5

7.3.3 CONNECTION TO TB1 FOR OPTIONAL PRINTER OUTPUT CABLE -0900-0258

7.3.3.1 Model 8806 ticket printer

DB-25 PIN NUMBER	CABLE WIRE COLOR	TB1 CONNECTION	JUMPER W1 POSITION	JUMPER W3 POSITION
18	Orange	3	2-3	3-4
16	Violet	4		
12	Yellow	5		
11	Brown	6		

CAUTION

CUT THE STRIPPED ENDS OFF OF THE THREE REMAINING WIRES IN THE PRINTER HARNESS INSIDE THE 8520 AND TAPE THEM BACK SO THEY WILL NOT SHORT TO ANY 8520 CIRCUITRY.

7.3.3.2 Models 8843 and 8860 printers and other RS-232 devices

DB-25 PIN NUMBER	CABLE WIRE COLOR	TB1 CONNECTION	JUMPER W1 POSITION	JUMPER W3 POSITION
3	Blue	1	1-2	1-2
7	Black	6		

CAUTION

CUT THE STRIPPED ENDS OFF OF THE THREE REMAINING WIRES IN THE PRINTER HARNESS INSIDE THE 8520 AND TAPE THEM BACK SO THEY WILL NOT SHORT TO ANY 8520 CIRCUITRY.

7.3.3.3 Model 8855 strip printer

DB-25 PIN NUMBER	CABLE WIRE COLOR	TB1 CONNECTION	JUMPER W1 POSITION	JUMPER W3 POSITION
3	Blue	4	2-3	2-3
22	Green	3		

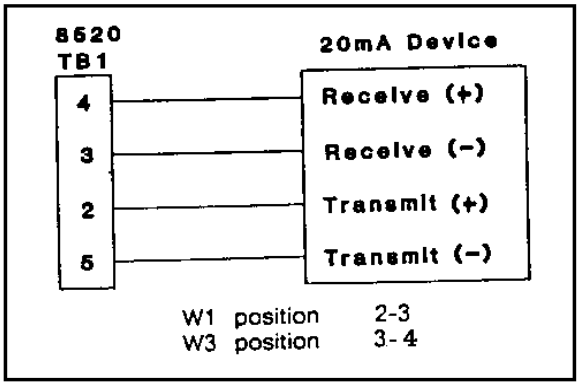
CAUTION

CUT THE STRIPPED ENDS OFF OF THE THREE REMAINING WIRES IN THE PRINTER HARNESS INSIDE THE 8520 AND TAPE THEM BACK SO THEY WILL NOT SHORT TO ANY 8520 CIRCUITRY.

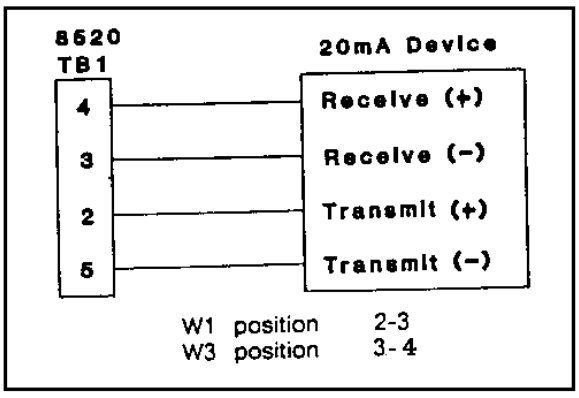
7.3.4 EXAMPLE CIRCUIT CONNECTIONS

7.3.4.1 20 mA Connections

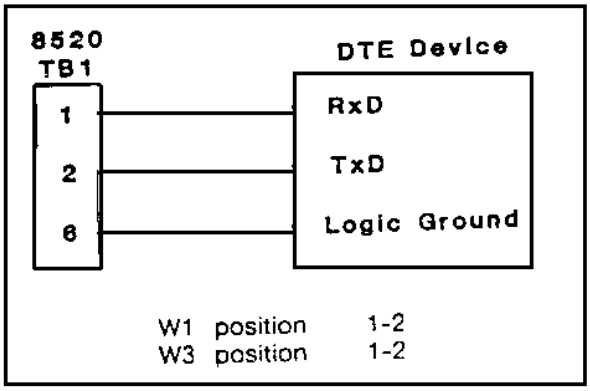
a. 8520 Transmit Active and Receive Passive



b. 8520 Transmit Active and Receive Active



7.3.4.2 RS-232-C Connections



7.4 REMOTE PULSE PRINT

In addition to receiving an ASCII character <P> to initiate a printer output, the Model 8520 can be wired so that a contact closure will initiate a print. The following diagram shown in Figure 16 is given as an example of wiring this input. The connections are made at TB1 in the 8520. Jumper W3 on the 8520 Main PCB must be positioned between pins 3 and 4. Set up step [66] must be “0".

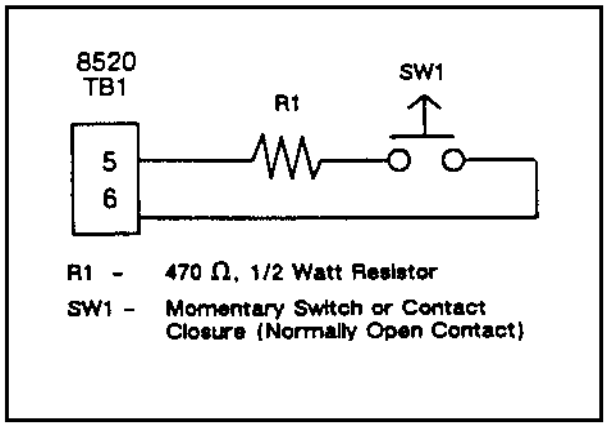


Figure 16

8. OPTIONAL ACCESSORY INSTALLATION AND PROGRAMMING

Most of the accessories for the Model 8520 will contain installation instructions. The following two options do not contain instructions. Refer to these instructions when installing either the printer output cable or the optional weight legend plate kit.

8.1 PRINTER OUTPUT CABLE

This option (0900-0258) consists of a 15 foot (4.6m) cable with a male DB-25 connector at the printer end and open wires for termination in the 8520 at the other end. The cable is designed for use with the Toledo Scale's Model 8806 ticket printer, Model 8842 document printer, Model 8860 thermal label printer and Model 8855 strip printer. The cable may also be used for standard RS-232 transmissions to other devices.

8.1.1 DESK ENCLOSURE INSTALLATION

8.1.1.1 Remove power to the 8520 by unplugging the external power supply or line cord from the AC power source. Press the OFF key on the keyboard of the 8520.

8.1.1.2 Loosen the nut for the small grip bushing on the left end cap near the front of the 8520 and remove and discard the short nylon plug from inside the bushing.

8.1.1.3 Remove the left end cap by unscrewing the eight screws securing it to the enclosure.

8.1.1.4 Gently pull the left end cap away from the enclosure until the attached wires prevent further movement. (This will normally be two or three inches.) The Logic PCB must move to the left approximately one inch to access the TB1 terminal strip. DO NOT FORCE THE LOGIC PCB ANY FURTHER LEFT OR THE KEYBOARD TAIL MAY BE DAMAGED.

8.1.1.5 Insert the printer cable (from the outside) through the grip bushing until the heat shrink tubing on the end of the sheathing is flush with the inside edge of the grip bushing.

8.1.1.6 Tighten the nut on the outside of the grip bushing to firmly hold the printer harness.

8.1.1.7 Using the 8-32 screw (R03573 00A) provided with the 8520, secure the ground loop terminal of the cable to the boss on the inside of the left end cap beside the grip bushing.

8.1.1.8 Disconnect the optional battery harness from the Logic PCB if this option is present.

8.1.1.9 Refer to Section 7.3.3 of this technical manual for wire termination instructions to the TB1 terminal strip on the Logic PCB of the 8520.

8.1.1.10 Connect the other end of the cable to the printer or other device that will be used.

8.1.1.11 Turn the setup switch SW1-1 ON and temporarily reinstall the left end cap.

8.1.1.12 Apply power to the 8520 and program section [40] in the setup for the desired printer operation then return SW1-1 to the normal position.

8.1.1.13 Slide the left end cap onto the enclosure making sure the gasket is intact and no wires are pinched.

8.1.1.14 Secure the left end cap with the eight screws removed in step

8.1.1.15 Verify correct operation of the printer output as described in this technical manual.

8.1.2 WALL ENCLOSURE INSTALLATION

8.1.2.1 Remove power to the 8520 by unplugging the line cord from the AC power source. Press the OFF key on the keyboard of the 8520.

8.1.2.2 Open the enclosure to access the electronics.

8.1.2.3 Loosen the right grip bushing on the bottom of the stainless steel enclosure then remove and discard the small nylon plug inside the bushing.

8.1.2.4 Insert the printer cable (from the outside) through the grip bushing until the heatshrink tubing on the end of the sheathing is flush with the inside edge of the grip bushing.

8.1.2.5 Tighten the nut on the outside of the grip bushing to firmly hold the printer cable.

8.1.2.6 Ground the loop terminal of the printer cable by securing the terminal under the 8-32 nut on the bottom of the enclosure near the grip bushing.

8.1.2.7 If the optional internal battery is installed, disconnect the battery harness from the Logic PCB.

8.1.2.8 Refer to Section 7.3.3 of this technical manual for wire termination instructions to the TB1 terminal strip on the Logic PCB of the 8520.

8.1.2.9 Connect the other end of the cable to the printer or other device that will be used.

8.1.2.10 Turn the setup switch SW1-1 ON and temporarily close the enclosure door.

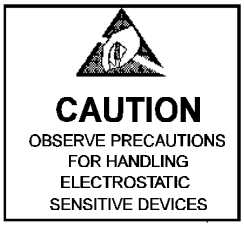
8.1.2.11 Apply power to the 8520 and program section [40] in the setup for the desired printer operation then return SW1-1 to the normal position.

8.1.2.12 Close the enclosure door and latch securely.

8.1.2.13 Verify correct operation of the printer output as described in this technical manual.

8.2 OPTIONAL LEGEND PLATES

This option (0917-0166) allows the user to select a weight legend other than pounds (lb), grams (g) or kilograms (kg) to be shown on the 8520 display. The optional legends are actually printed on a reflector plate which is inserted into the 8520 after the original plate is removed. In order for the new legend to be clearly visible, the normal weight legend must be disabled in setup step [54]. The selection for setup step [54] must match the selection for the new weight legend plate.



Procedure:

8.2.1 Remove power to the 8520 by unplugging the line cord or external power supply from the AC power source. Press the OFF key on the keyboard of the 8520.

8.2.2 Open the enclosure to access the right edge of the Logic PCB. This requires removal of the right end cap of the desk enclosure. On the wall enclosure, the Logic PCB must be removed entirely.

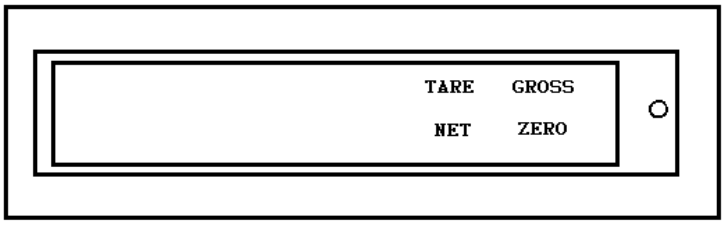
8.2.3 Remove and discard the existing legend plate (located behind the display) by grasping the aluminum plate and sliding it to the right until it is entirely free of the Logic PCB.

8.2.4 Place the new backer plate from the kit on a flat surface so that the large “dimple" beside the hole at the right end is resting on the flat surface. The backer plate will rock slightly.

8.2.5 Select the required new legend plate from the kit and remove the adhesive protection paper from the back of the plate.

8.2.6 Align the left edge of the legend plate with the left edge of the new backer plate from the kit. Center the legend plate vertically so that the same amount of space exists at the top and bottom. The hole at the right end of the backer plate will show at the right end of the new assembly. Refer to Figure 17 below.

Figure 17



8.2.7 Press the legend plate down (Do not scratch) securely onto the backer plate.

8.2.8 Slide the new legend plate into the slots behind the display on the Logic PCB. When fully inserted, the right edge of the legend backer plate will align with the right edge of the Logic PCB. Do not force the plate any further.

8.2.9 Reinstall the Logic PCB (on the wall enclosure) and close the enclosure.

8.2.10 Apply power to the 8520 and verify that the new legend plate functions satisfactorily. If another weight legend appears over top of the new legend, program setup step [54] must be changed. Refer to the programming section of this manual for that procedure.

9. PREVENTIVE MAINTENANCE

The Model 8520 Digital Indicator is designed to require a minimum of maintenance and service. This section provides instructions and procedures for maintenance of the indicator, as well as a troubleshooting guide to aid in problem analysis.

9.1 REQUIRED TOOLS AND SUPPLIES

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

Volt-Ohm Meter
Digital Load Cell Simulator
Load Cell Simulator (for analog option)
Cleaning Cloth
Static Protection Bags for PCB's
Static Wrist Strap

9.2 MAINTENANCE SCHEDULE

The frequency at which normal maintenance (cleaning and inspection) should be performed, when installed in a clean office environment, should be twice a year. However, if the unit is subject to a dusty or dirty environment the frequency should be increased as required.

9.3 CLEANING

Clean the keyboard 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.

9.4 TROUBLESHOOTING

9.4.1 PROCEDURE

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

9.4.1.2 Check fuses, primary power lines, external circuit elements 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.

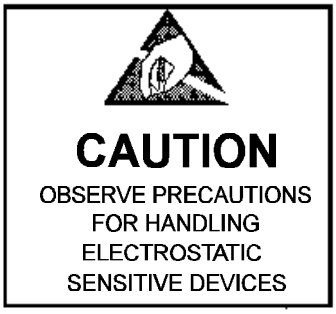
9.4.1.3 Use the electrical interconnecting diagram as an aid to locating trouble causes. Section 9.4.3 contains various voltage measurements that are average for normal operation. Use instrument probes carefully to avoid causing short circuits and damaging circuit components.

9.4.1.4 Malfunctions in the 8520 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 STORING BOTH THE NEW AND DEFECTIVE PCB.

9.4.1.5 To verify the problem as being in the removed PCB, reinstall the 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 Mettler Toledo representative.



9.4.2 ERROR MESSAGES

Before following the suggested corrective measures in the following Error Message Chart, two steps should be taken:

- 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 that one suggestion per error is given, they are listed in the order of probability of resolving the problem.

ERROR	DESCRIPTION	CORRECTIVE MEASURES
E1	Program memory error	Replace Logic PCB
E2	Internal RAM memory error	Replace Logic PCB
E3	EEROM memory error	1. Enter Setup and reprogram 2. Replace Logic PCB
E4	External RAM memory error	Replace Logic PCB
E6	Analog verify error	Replace Logic PCB
E8	No digital load cell data	1. Press CLEAR key for reset 2. Verify load cell wiring 3. Replace digital load cell 4. Replace Logic PCB
E9	Load cell out of range	Replace digital load cell
E10	Digital load cell error	1. May reset itself 2. Replace digital load cell
E11	Digital load cell error	1. May reset itself 2. Replace digital load cell
E13	Digital load cell error	1. May reset itself 2. Replace digital load cell
E21	Incorrect scale capacity	1. Press CLEAR key 2. Enter correct calibration values
E24	Illegal high range increment	Press the CLEAR key. Enter correct increment size. Refer to Section 4.5.
E25	Illegal mid-range increment	Press the CLEAR key. Enter correct increment size. Refer to Section 4.5

E26	Illegal low range increment	Press the CLEAR key. Enter correct increment size. Refer to Section 4.5
E32	Insufficient test weight	1. Press CLEAR key to clear 2. Verify correct wiring to load cells (s) 3. Check programmed load cell capacity 4. Enter legal scale capacity
E34	Test weight too large	Press CLEAR key to clear. Use test weight less than 105% of scale capacity
E35	Illegal test weight entry	Press CLEAR key to clear Enter in weight value that corresponds to increment size
E36	Insufficient digital load capacity utilized	Press CLEAR key. Restart calibration procedure.
E38	Poor build for counting	Press CLEAR key to accept the build or recalibrate with new values.
E E E	Scale not zeroed	Tare Interlock (step [32]) or zero capture at power-up (step [24]) is enabled and the scale is off zero. Press ZERO. Recalibrate scale

9.4.3 VOLTAGE TESTS

9.4.3.1 Input To Logic PCB

The Logic PCB operates from approximately 12 VDC that may be configured as one of three types of supplies: external power supply wall transformer, internal Power Supply PCB or internal battery. Each of these power sources will have slightly different input voltages to the Logic PCB. These voltages can be checked at the connector J1 on the Logic PCB. The “On" voltage is the voltage measured when the display is on and the “Off" voltage is the voltage measured with the display turned off. All voltages are measured with respect to chassis ground. If the voltage measured does not agree with the voltage listed, replace the power source.

POWER SOURCE	J1 PIN	“ON” VOLTAGE	“OFF” VOLTAGE
External	1	13.7 VDC	16.2 VDC
Internal PCB	1	14.5 VDC	17.5 VDC
Battery *	3	12.3 VDC	13.1 VDC

***Note**: Try recharging a battery with a low voltage before replacing it. A good battery should recharge within 16 hours with the 8520 display turned off.

9.4.3.2 Voltage To Load Cell

The Logic PCB provides a DC supply voltage to the digital load cell in order for the load cell to operate. If the supply voltage is not present, the load cell cannot send weight data to the 8520. This voltage can be checked at the terminal strip TB2 between pins 6 (positive) and 5 (ground).

MINIMUM VDC	NORMAL VDC	MAXIMUM VDC
17.5	19.5	22.1

This voltage is also used on the optional Analog PCB. If it is not present, there will not be any excitation voltage available for analog load cells.

9.4.3.3 Excitation Voltage

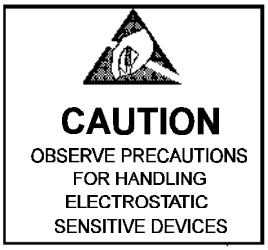
An excitation voltage of 12.5 VDC is supplied by the optional Analog PCB for analog load cells. This voltage can be checked at J2 on the Analog PCB between terminals 3 (positive) and 6 (negative). This must be checked with the load cell properly connected so there are no open sense leads. This voltage is derived from the same voltage checked in step 9.4.3.2 of this section.

9.4.3.4 Logic 5 Volt Supply

This voltage can be verified at transistor Q6 on the lower left edge of the Logic PCB. Measure between the pin on the right marked “O" (positive) and chassis ground (negative). The voltage measured should be between 4.85 VDC and 5.2 VDC. If this voltage is not within specification but the supply voltage checked in Section 9.4.3.1 is present, replace the Logic PCB.

This voltage is also utilized by the optional Analog PCB. If the voltage is not correct on the Logic PCB, the Analog PCB will not operate properly.9.5

REPLACEMENT OF LOGIC PCB



CAUTION

WHEN REPLACING THE LOGIC PCB, OR DISCONNECTING ANY HARNESS INSIDE THE MODEL 8520, REMOVE POWER FROM THE UNIT AND WAIT A MINIMUM OF 30 SECONDS BEFORE PROCEEDING OR DAMAGE MAY RESULT

After removing the Logic PCB from the Model 8520, two items MUST be removed from the PCB before returning it to Toledo Scale for repair. These two items are:

9.5.1 THE ALUMINUM LEGEND PLATE BEHIND THE DISPLAY.

Remove this by sliding the assembly to the right until it is free of the slots behind the display that hold it.

9.5.2 THE EPROM AND CARRIER ASSEMBLY.

Near the center of the Logic PCB, there is an EPROM and carrier. It is designated by a red adhesive label on top of the IC (integrated circuit) with the part number *13278500A on it. Grasp the ends of the carrier assembly and lift the carrier and EPROM from the mating socket on the PCB.

*** Note:** There may be a letter prefix to the number.

Retain these two items and install them into the replacement Logic PCB before applying power to the 8520.

There will be a piece of transparent plastic over the display of the new Logic PCB. Remove this protective film and install on the PCB being returned. This helps prevent scratches on the display.

10. GENERAL INFORMATION

10.1 RECOMMENDED SPARE PARTS

It is recommended that these spare parts be kept in stock in order to keep downtime to a minimum. The items are available through your local authorized Mettler Toledo service representative.

PART NUMBER	DESCRIPTION	QTY.
(*) 130007 00A	Logic PCB	1
(*) 130009 00A	Analog PCB	@
(*) 133225 00A	Keyboard Assembly (Desk)	1
(*) 133716 00A	Keyboard Assembly (Wall)	1

(*) - May have revision letter prefix.

@ - Quantity of 1 only when using the analog option.

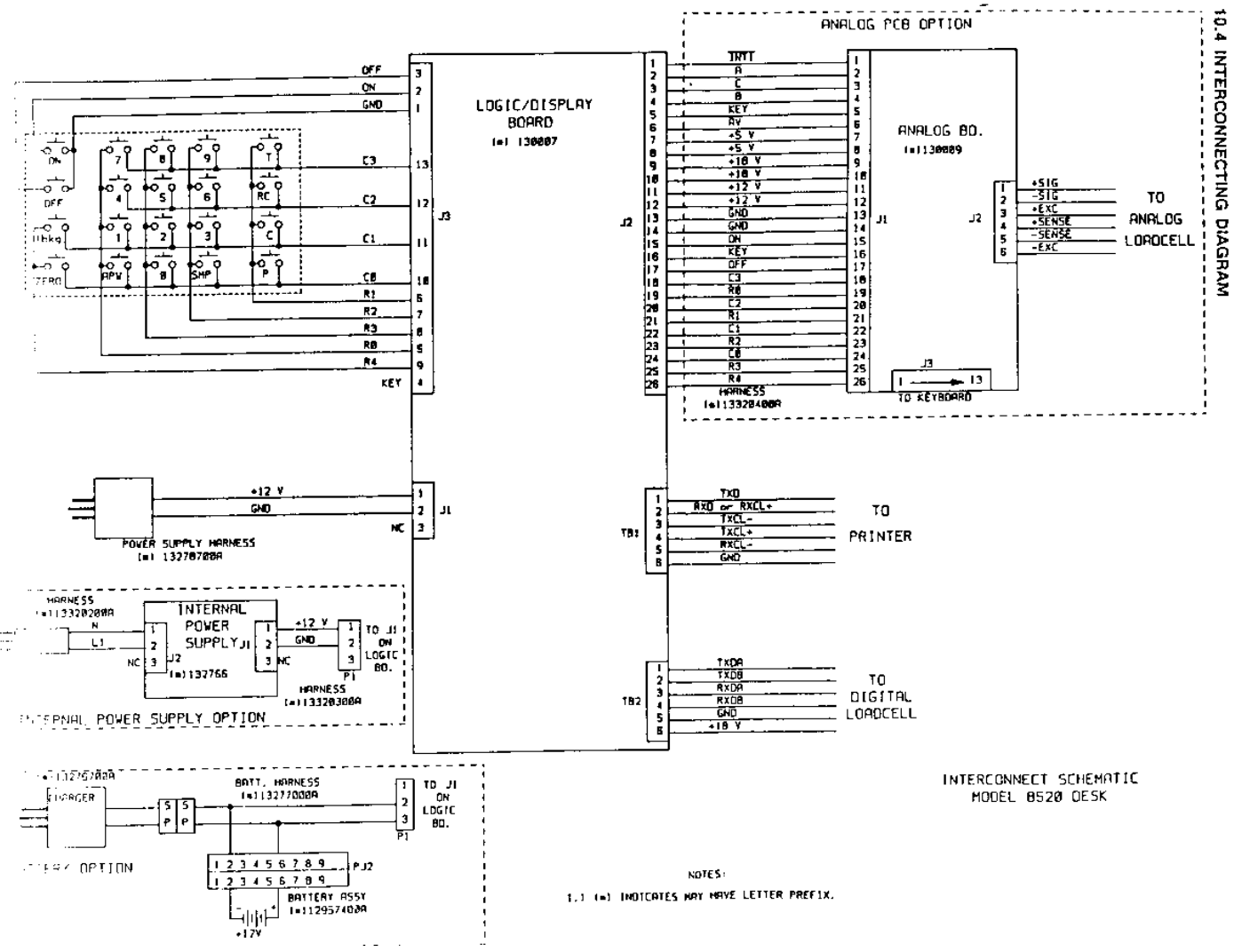
10.2 ACCESSORIES

The following accessories and kits are available for use with the Model 8520 digital indicator.

OPTION DESCRIPTION	PART NUMBER	FACTORY NUMBER
Analog Load Cell (Desk)	(*) 133201 00A	0917-0153
Analog Load Cell (Wall)	(*) 132706 00A	0917-0152
Internal Battery (Desk or Wall)	(*) 132710 00A	0919-0023
Internal Power PCB (Desk)	(*) 133200 00A	0917-0155
Wall Mount Bracket (Desk)	(*) 133206 00A	0917-0159
15’ Printer Output Cable	(*) 133218 00A	0900-0258
10’ Digital Load Cell Cable	(*) 130115 00A	0900-0245
Legend Plates	(*) 133234 00A	0917-0166

* - May have a revision letter prefix.

10.3 INTERCONNECTING DIAGRAM



11. ADDENDUM

11.1 SERVICE BULLETINS

This section contains all the service bulletins that pertain to the model 8520. Please review them before servicing this unit.

TECHNICAL UPDATE

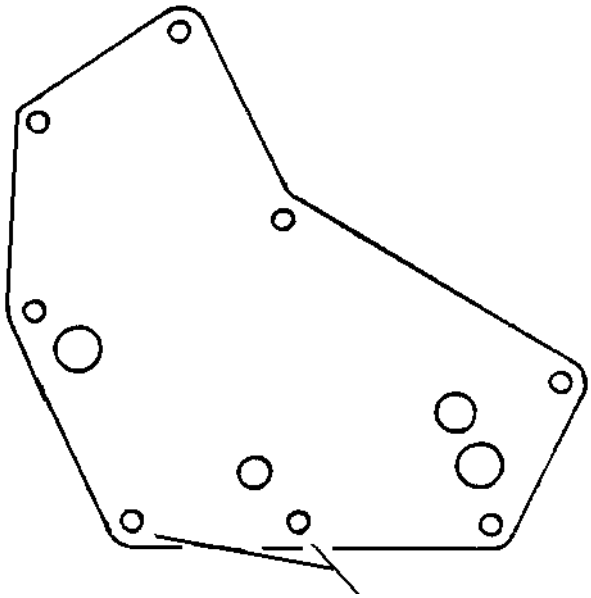
NUMBER: **I-14-89**

DATE: **5/5/89**

MODEL: **8520-0001, AND -0011 DIGITOL INDICATOR**

SUBJECT: **SEALING SCREWS**

Shipped with each 8520 desk unit are two 8-32 X 1/2 fillister head screws, part number R03573 00A. The heads of these screws have been drilled to allow of the installation of a lead seal by the weights and measures inspector. If required, removed two of the left end plate screws as shown below. Install the drilled fillister head screws and use the nylon washers from the old screws.



LEFT END CAP

REPLACE THESE TWO SCREWS

TECHNICAL UPDATE

MODEL: 8520 STAINLESS STEEL DigiTOL® INDICATOR (FACTORY NUMBERS 8520-1001 AND -1011)

SUBJECT: FERRITE RING AND CABLE GROMMET KIT INCLUDED WITH INDICATOR.

A ferrite ring, part number 135174 00A, and cable grommet kit will be included with all Toledo Scale Model 8520 stainless steel enclosure indicators shipped after May 1990, date code SR or later. This ferrite ring is supplied to increase the RFI protection of the 8520 DigiTOL® Indicator when used with the Model 1997 DigiTOL® Base.

The cable grommet kit, part number A11741900A, is included to permit the 8520 stainless steel enclosure DigiTOL® indicator to be used with various load cell cable diameters. Select the snuggest fitting cable grommet from the kit for use during load cell cable installation. Install the load cell cable as described in the Model 8520 technical manual TM008520 I01; however, before the load cell cable is terminated at TB-2 in the 8520, slip the ferrite ring over the load cell cable, inside the enclosure. Terminate the load cell cable to TB-2 and continue the installation procedure as described in TM008520 I01.

Add this information to the Model 8520 technical manual, TM008520 I01.

DATE	BULLETIN
07-13-90	I-08-90

TECHNICAL UPDATE

MODEL: **8520, 8530, 8572 AND 8581**

SUBJECT: **REPLACING MAIN LOGIC PCB'S**

When replacing the Main Logic PCB in any of the listed Indicators or Parts Counting Scales be alert to the fact that there is a component plugged into the PCB that is a separate part and is not returned with that PCB.

On the Model 8520, 8530 and 8572 Main Logic PCB's, the Eprom and Chip Carrier is a separate part from the PCB and **MUST** be removed from the defective PCB and inserted in the replacement PCB. Replace the Eprom and Chip Carrier only if the Eprom is defective.

On the Model 8581 the RAM Expander PCB (125670 00A) is a separate part and **MUST** be removed from the defective PCB and inserted in the replacement PCB. Replace the RAM Expander PCB only if the RAM Expander PCB is defective.

Replacement Main Logic PCB's for these models do not include the parts described above. No credit for these parts will be issued by Warranty or Aftermarket Parts if these parts are mistakenly returned with the Main Logic PCB.

Note: All components that are to be removed from defective PCB's before return are now marked with a pink part number label.

DATE	BULLETIN
11/20/90	I-17-90

TOLEDO SCALE
TECHNICAL BULLETIN

FOR INTERNAL USE ONLY

MODEL: 8520 DigiTOL® INDICATOR

SUBJECT: BATTERY CHARGER DRAINING BATTERY CHARGE

The 8520 battery charger (part number) will drain the charge from the 8520 battery if the charger is disconnected from AC power and the charger is left connected to the 8520 battery. To prevent the battery from being discharged DO NOT leave the battery charger connected to the 8520 when the battery charger is not connected to AC power.

Add this information to your 8520 technical manual, TM008520 I01.

DATE	BULLETIN
10/16-91	I-09-91

TECHNICAL UPDATE

NUMBER: I-27-93

DATE: 08-27-93

MODEL: 2157 DigiTOL® FLOOR SCALE, 8520 AND 8522 INDICATORS

SUBJECT: CORRECTING LOCK UP PROBLEM DURING CALIBRATION

The 8520 and 8522 DigiTOL® indicators can exhibit a lockup problem during calibration when connected to the digital j-box in the Model 2157 DigiTOL® floor scale. The lockup during calibration problem will occur if the internal DLC digital filter is disabled, setup step **[27A 0]**, when calibration is attempted.

The internal DLC digital filter enable setup step was added with the **[L 08]** revision level of the 8520 indicator software, part number **[132785]**, and to the **[L 02]** revision of the 8522 indicator software, part number **[137890]**. The revision level of the software is the second prompt displayed at power up.

The internal DLC digital filter must be enabled, setup step **[27A 1]**, in order to calibrate an 8520 or 8522 DigiTOL® indicator that is connected to the digital j-box. After calibration is completed the internal DLC digital filter can be disabled, if required by the application.

Note: The internal DLC digital filter is normally enabled, setup step **[27A 1]**, for most applications. The only applications that typically require the internal DCL filter be disabled are filling or cutoff applications.

Add this information to the 8520 technical manual, TM008520 I01, and the 8522 technical manual, TM008522 I00.

TECHNICAL UPDATE

NUMBER: I-39-93

DATE: 12-10-93

MODEL: 8520/8525 DigiTOL® INDICATOR

SUBJECT: NEW SETUP STEP SELECTION (NET SIGN CORRECTION)

An additional selection has been added to the net sign correction selection, setup step **[48]**, in the **[L09]** revision of the Model 8520 and 8525 DigiTOL® Indicators operating software. The additional selection enables absolute value (always positive) net weight display mode to satisfy customer requests for net sign correction operation and meets the Handbook 44 requirements that all digital values of like values in a system must agree with one another.

To determine the software revision in an 8520 or 8525 indicator, first turn the AC power off then back on. The indicator will display the software part number, **[132785]**, for a few seconds. After the software part number is displayed, the revision level of the software, **[L09]**, is then displayed for a few seconds, If your indicator displays a software revision level that is **[L08]** or lower then this bulletin does not apply to your indicator.

[48 0] NET SIGN CORRECTION

The step allows entry of an inbound gross weight into the tare register. If a tare weight is entered that is larger than the current weight on the platform, with net sign correction enabled, the 8520/8525 will rearrange the demand mode printer output so that the larger weight value is the gross weight, current weight on the scale is the tare weight and the difference between the two weights is displayed as a negative net weight, but is printed as a positive net weight. If absolute value net weight display is selected the net weight is also displayed as a positive value.

Press:

Print - Accept Displayed Selection

0 - Disable net sign correction. Negative net weights are printed and displayed as negative values.

1 - Select net sign corrected printing. Negative net weights are printed as positive values and are displayed as negative values.

2 - Select net sign corrected printing and display. Negative net weights are printed and displayed as positive values.

Add this information to the Model 8520 technical manual TM008520 I01 and to the Model 8525 technical manual TM008525 I01.

11.2 SOFTWARE SUPPLEMENTAL INSTRUCTIONS (SOFTWARE # 13278500A, [L08] AND LATER

The following changes have been made in the Model 8520 DigiTol® Indicator Software part number **[132785]** beginning with revision level **[L 08]**. The revision level is the second prompt displayed at power up. If the software part number displayed at the first power up prompt is not **[132785]** or the revision level displayed at the second power up prompt is not **[L 08]**, then this supplement does not apply.

1. DESCRIPTION OF CHANGES

1.1 Operational Modifications

- The Operational Sequences in count mode have been clarified. Refer to Section 3 of this supplement.
- The display now blinks when printing occurs.
- Auto print now reset either in gross or net mode regardless of motion.

1.2 Setup Modifications (Refer to Section 2 of this supplement)

- Calibration Units, setup step **[11]**, has been expanded to include ounces, troy ounces, and penny weight.
- Auto Zero Maintenance (AZM) setup step **[23]**, has been expanded to include the ranges in net mode as well as gross mode.
- A new setup step **[27A]**, DigiTOL Load Cell Filter, has been added to permit disabling of the DigiTOL load cell filter.
- An <ENQ> continuous mode has been added to the Output Data Format options, setup step **[41]**.
- Setup steps, **[45], [46], [47]**, are now accessible when "0", the continuous mode, has been selected in setup step **[41]**.
- Print Weight Unit Legend, setup step **[54]**, has been, modified to allow disabling of printing of the weight units, as chosen in setup step **[11]**, after the weight.
- Remote Control Input, setup step **[66]**, has been enhanced to allow alternative input commands.
- A new setup step **[69]**, center of Zero Legend, has been added to enable or disable the Zero cursor window.
- APW in Pieces per Weight, setup step **[77]**, has been deleted.

European default settings, settings selection 2 of setup step **[99]**, have been added.

2. SETUP PARAMETERS

2.1 Modified Setup Steps

[11 0] CALIBRATION UNITS

This step adds ounces, troy ounces, and penny weights to the selection of possible weight units. Select the weight units the 8520 will use for calibration and display of weight.

SELECTION	WEIGHT UNITS
0	lb
1	kg
2	g
3	t
4	oz
5	ozt
6	dwt

[23 2] AUTO ZERO MAINTENANCE (AZM)

AZM removes small changes in zero caused by temperature change or build up of material on the platform. this step selects the range of weight around zero that AZM operates in. AZM will adjust for zero changes at the rate of 0.03 increments per second when the weight is within the AZM range. AZM will operate over a range of weight around zero that is equal to the pushbutton zero range selected at setup step **[25]**, ± 2% or ± 20% of scale capacity.

SELECTION	AZM RANGE	LEGAL-FOR-TRADE APPLICATIONS	AZM MODE
0	AZM Disabled	Not Applicable	
1	± 0.5 Increment	Animal, Food and Retail Scales	**Gross** weight mode
2	± 1 Increment	All other Industrial Scales	at gross zero
3	± 3 Increment	Vehicle Scales	
4	± 0.5 Increment	Animal, Food and Retail Scales	**Gross** or **Net** weight
5	± 1 Increment	All other Industrial Scales	mode are gross or net
6	± 3 Increment	Vehicle Scales	zero

[27A 1] DIGITOL® LOAD CELL FILTER

DigiTOL® load cell bases provide a built in digital filter that can interfere with slow speed filling or batching operation. This filter MUST be disabled for filling applications. This step is only displayed if the 8520 is configured for DigiTOL® load cell scale base, step **[01 0]**.

0 - Disable internal load cell filter for the DigiTOL® load cells.

1 - Enable internal load cell filter for DigiTOL® load cells.

[41 1] OUTPUT DATA FORMAT

The 8520 supplies two modes of data output, demand and continuous. The demand output is variable in format and is output when a print request is made either by means of the PRINT key, an "auto" print request, or by an external print request. The standard continuous format is output every A/D update. The <Enq> continuous mode is identical to the standard continuous format except that data is output only when requested by an external device sending an ASCII <Enq> character, (hex 05).

SELECTION	DATA OUTPUT MODE
0	Continuous Format Output
1	Demand Mode Output
2	<Enq> Continuous Output

Note: ASCII character input MUST be enabled **[66 5]**, for <Enq> Continuous Mode to operate.

[54 1] PRINTED WEIGHT UNIT LEGEND

0 - Disable Weight Unit Legend Printing

1 - Enable Weight Unit Legend Printing

[66 0] REMOTE CONTROL INPUT

The 8520 serial input port can be used for a contact closure input (acts as a remote key for the function listed) or to receive single ASCII characters C, P, T, and Z into the printer port to perform clear, print, tare, and zero functions. Contact closure inputs use the 20mA current loop input interface. ASCII character input use RS-232 or 20 mA input interfaces. All remote key inputs except remote blank are momentary inputs, contact must be maintained for remote blank input.

SELECTION	FUNCTION
0	Remote Print key
1	Remote Tare key
2	Remote Zero key
3	Remote Clear key
4	Remote Blank Display
5	ASCII Character input

Note: <ENQ> Continuous mode **[41 2]** will not operate unless **ASCII character input** is enabled, step **[66 5]**.

[69 1] CENTER OF ZERO LEGEND

The 8520 has a selectable center of zero indication. The center of zero legend is illuminated when the weight on the scale is within 0.25 increments of zero.

SELECTION	ZERO LEGEND MODE
0	Disabled
1	Gross Zero
2	Gross and Net Zero

[99 0] RESET SETUP TO DEFAULT SELECTIONS

0 - Skip resetting setup to default settings.

1 - Reset listed setup parameters to the US default settings.

2 - Reset listed setup parameters to the European default settings.

[[SUrE] (Flashing)

0 - Skip resetting setup to default settings.

1 - Reset listed setup parameters to the default settings.

2.2 Setup Quick Reference Chart

STEP	DESCRIPTION	SELECTIONS
00	**Scale Configuration "GROUP" Selection**	
01	Scale Type	0= Digital Load Cell 1=8520 Analog Cell 2=N/A 3=Digital J-Box (Model 2157)
03	Number of DigiTOL Load Cells	Digital J-Box (Model 2157) only
05	Reset Shift Values to "1"	Digital J-Box (Model 2157) only
06	Digital Shift Adjustment	Digital J-Box (Model 2157) only
10	**CALIBRATION GROUP**	
11	Calibration Units	*0=pounds* 1=kilograms 2=grams 3=metric tons 4=ounces 5=troy ounces 6=penny weight
12	Linearity Compensation	*0= Linearity Disabled* 1= Linearity Enabled
13	Autorange Selection (*)	*1= Single Range Weighing Mode* 2= Double Range Weighing Mode 3= Triple Range Weighing Mode
14	Scale Capacity	
15	High Range Increment Size (*)	
16	Mid Range Increment Size	
17	Low Range Increment Size	
18	Calibration Procedure	
20	**Zero Maintenance and Filtering Group**	
21	Zero Adjustment	
22	Span Adjustment	
23	AZM Range (*)	0=Disable AZM 1=AZM within ±0.5d, Gross only *2=AZM within ±1.0d, Gross only* 3= AZM within ±3.0d, Gross only
26	Motion Detection (*)	0=Disable Motion Detection 1=±0.5 Increments 2=±1.0 Increments 3=±2 Increments 4=±3 Increments
27	Display Filtering	0=Disable Filtering *1=Light Filtering* 2=Medium Filtering 3=Heavy Filtering
27A	DigiTOL Load Cell Filter	0= Disable Internal Load Cell Filter *1=Enable Internal Load Cell Filter*
28	Overcapacity Blanking (*)	
30	**Tare and Display Blanking**	
31	Keyboard Tare Enable	0=Disable Tare 1=Pushbutton Tare Only *2=Pushbutton and Manual Tare*
32	Tare Interlock (*)	*0=Disable Tare Interlocks* 1=Enable Tare Interlocks
33	Hand Tare in Low Range Only	0=Manual Tare All Ranges *1=Manual Tare Low Range Only*
34	Auto Clear Tare	*0= Disable Auto Clear Tare* 1=Enable Auto Clear Tare
35	Automatic Power-off Timer	0=Manual On/Off only *1=Auto turn off enabled* *(5mins < 5000d, 10mins >5000d)*
40	**Printer Output Group**	
41	Output Data Format	0=Continuous Output *1=Demand Output* 2=<ENQ> Continuous Output
42	Baud Rate	*300* 2400
43	Parity Selection	0=Parity bit always a "0" 1=Odd Parity *2=Even Parity*
44	Checksum Enable	*0=Disable Checksum* 1=Enable Checksum
45	Auto Clear Tare After Print	*0=Disable Print Auto Clear Tare* 1=Enable Print Auto Clear Tare
46	Auto Print and Print Interlock	*0=Normal Operation* 1=Print Interlock 2=Auto Print
47	Minimum Print Requirement	*0=0 Increments* 1=10 Increments 2=100 Increments 3=500 Increments

		4= AZM within ±0.5d, Gross or Net 5= AZM within ±1.0d, Gross or Net 6= AZM within ±3.0d, Gross or Net			
24	Zero Capture at Power Up (*)	0=Disable Power up Zero Capture *1=Zero Capture ±2% Capacity* 2=Zero Capture ±10% Capacity	48	Net Sign Correction	*0=Disable Net Sign Correction* 1=Enable Net Sign Correction
25	Pushbuttton Zero Range (*)	0=Disable Pushbuton Zero 1=Zero Within ±2% Capacity *2=Zero within ±20% of Capacity*	49	Enable STX Character	0=Disable STX in Demand Mode *1=Enable STX in Demand Mode*

(*) - Selections depend upon the scale base used. Recommended US default selections are shown in *Italics*, setup step 99-1. Recommended European default selections, if different from US, are shown Underlined, setup step 99=2.

(continued)

STEP	DESCRIPTION	SELECTIONS	STEP	DESCRIPTION	SELECTIONS
51	Multiple Line Output	0= Single Line Output *1= Multiple Line Output*	68	Comma or Decimal Point	*0=Normal Decimal Point* 1=Comma instead of Decimal
52	Order of Data Output	*723456* 234800 0=Field Turned off 1=Displayed Weight 2=Gross Weight 3=Tare Weight 4=Net Weight 5=APW 6=Count 7=Scale ID number 8=Blank Line	69	Center of Zero Legend	0=None *1=Gross Zero* 2=Gross or Net Zero
53	Print Weight Expanded	*0=Disable Expanded Printing* 1=Enable Expanded Printing	70	**PARTS COUNTING GROUP**	
54	Printed Weight Unit Legend (*)	0=No Weight Units Legend *1=Print Weight Units Legend*	71	Parts Counting Mode	0=Disable Parts Counting Mode *1=Enable Parts Counting Mode*
55	Scale ID	*01*	72	Sampling Mode	*0=Variable sample size* 1=5 Piece Fixed Sample size 2=10 Piece Fixed sample size 3=20 Piece Fixed sample size 4=50 Piece Fixed sample size 5=100 Piece Fixed sample size
60	**INTERNATIONAL SELECTION GROUP**		73	Auto Clear APW	*0=Disable Auto clear APW* 1=Enable Auto clear APW
61	Analog Verification	*0=Disable Analog Verify* 1= Enable Analog Verify	74	Auto Sample Weight	0=Disable Auto Sample Accept *1=Enable Auto Sample Accept*
62	Enable lb/kg switching	*0=Disable lb/kg key* 1=Enable lb/kg key	75	Minimum Sample Weight	0=0.00% of Scale Capacity *1=0.02% of Scale Capacity* 2=0.05% of Scale Capacity 3=0.10% of Scale Capacity
63	Power Up in Pounds	0=Power up in kg units *1=Power up in lb units*	76	Sample Enhancement	0=Disable Sample Enhancement *1=Enable Sample Enhancement*
64	Bracketed Printing	*0= Normal Weight Printing* 1=Bracketed Measured Weights	78	Print Count Expanded	*0=off* 1=on
65	Print “PT” or “TRH”	*0=Keyboard Tare Legend “TRH”* 1=Keyboard Tare Legend “PT”	81	Expanded Weight Display	*0=Disbale Expanded Display* 1=Enable Expanded Display
66	Remote Control Input	*0=Remote Print key* 1=Remote Tare key 2=Remote Zero key 3=Remote Clear key 4=Remote Blank Display 5=ASCII Character Input	98	Display Individual Call Output	Digital J-Box (Model 2157) only
67	Gross Window Indicates Count	*0=Normal Gross window operation* 1= Gross window in counting mode.	99	Reset Default Parameters	*0=Skip Reset to Default Parameters* 1=Reset to US Default Parameters 2=Reset to European Default Parameters

(*) - Selections depend upon the scale base used. Recommended US default selections are shown in *Italics*, setup step 99-1. Recommended European default selections, if different from US, are shown Underlined, setup step 99=2.

3. COUNTING OPERATING SEQUENCE CLARIFICATIONS

The following sections should be used in place of sections 5.4, 5.5, and 5.6 when an understanding of the 8520 Parts Counting operation is needed.

3.1 PARTS COUNTING KEYS OPERATION

APW — The **APW** key can be used to access the count mode without sampling if the average piece weight (APW) of the part to be counted is known. The **APW** key is used with the **RECALL** key to display the current APW (average piece weight). Refer to Section below for counting operation.

Sample — The **SAMPLE** key is used to count parts with an unknown APW and is also used with the **RECALL** key to display the current pieces per unit weight.

In variable sample mode, the **SAMPLE** key is used to terminate sample quantity entry. A variable sample entry can only be made in the net weight mode unless tare is disabled, step [31 0].

In the fixed sample mode, pressing this key at gross zero will show the fixed sample quantity on the display for two seconds then return to zero. If the **SAMPLE** key is pressed with weight on the scale the 8520 divides the sample quantity into the displayed weight on the scale to calculate the APW (average piece weight).

3.2 PARTS COUNTING OPERATION

The 8520 supports keyboard or pushbutton tare entry, fixed or variable sampling, sample enhancement, and average piece weight entry to provide the maximum flexibility and accuracy in counting parts.

3.2.1 Sampling and Counting Accuracy

Sampling is the process of determining the average piece weight of the part to be counted. The 8520 calculates the average piece weight by dividing the sample quantity into the absolute value of the displayed weight on the scale platform. Sampling can be performed by adding pieces to an empty container or by removing pieces from a full container.

The counting accuracy of the 8520 is dependent on the proper selection of scale capacity and sample quantity. The scale capacity should be adequate to weight the largest weight required and no larger. Excess scale capacity will reduce counting accuracy for lighter parts. The sample quantity needed to accurately count a particular part is determined by three factors:

- The ratio of the average piece weight of the part to scale capacity.
- Environmental conditions: Vibration and Air Currents.
- The variation in weight from part to part.

The effects of first factor, the ratio of the average piece weight of the part to scale capacity, can be controlled by the minimum sample weight selection, step [75]. This step requires the operator to use a sample that weighs more than the specified percentage of scale capacity. In some cases where very light parts must be counted it may be more accurate to record the average piece weight (APW) for the part using a very large sample size. The recorded APW is then entered into the 8520 instead of sampling whenever this particular part is counted.

Vibration and air currents can cause counting inaccuracy by influencing the average piece weight calculation. The 8520 provides a display filter, step [27], that will reduce the effects of vibration. If problems with air currents are noted, a wind shield may be required. Severe air current problems may require relocating the scale base. Increasing the sample quantity will reduce the effects of vibration and air currents on the sample accuracy.

The third factor, variation in weight from piece to piece, is more difficult to control. Some parts, due to their construction, have a greater piece variability than others. Cast parts often have larger piece to piece variations than machined parts. Determine an adequate sample size to count a particular part by experimentation. If repeated sampling and counting operation of the same parts do not repeat within the accuracy specifications of the scale base, then the sample quantity should be increased. Highly variable parts will require that the sampling process be performed more often and with a larger sample size than parts that have a more consistent APW.

3.2.3 Sample Enhancement

Sample enhancement, step [76 1], assists the operator to achieve more accurate counting results by permitting the operator to gain the benefits of a large sample quantity without having to hand count a large sample. Sample enhancement recalculates the APW each time more parts are placed on the scale up to 4% of scale capacity.

In order to ensure the initial APW has sufficient accuracy for sample enhancement, a minimum sample weight of 0.02% of scale capacity is required. Parts that are too light for practical sampling should have their APW accurately determined on a more sensitive scale. The APW for the part can then be entered instead of sampling.

Sample enhancement works because an inaccurate APW, while not able to accurately count large numbers of parts, can reliably count a small number of pieces. This count will then allow a new determination of APW based on a larger weight. Given enough enhancements, the APW for a part can be very accurately calculated. Enhancement occurs on a motion/no-motion sequence with the following two conditions satisfied:

- Piece count must have increased, that is the weight on the scale platform must have increased (or decreased in count out mode).
- The pieces added (or removed) must not exceed the amount which can be counted accurately with the current APW. A display of [**OVER**] (over enhancement range) results when this amount is exceeded. For best enhancement results, roughly double the number of pieces on the scale each enhancement. To permit continued sample enhancements, lower the piece count until a motion/no-motion sequence results in a count display instead of the [**OVER**] display. If the piece count is increased or a print request occurs with a display of [**OVER**], then further sample enhancement is disabled and the 8520 counts normally.

3.2.3 Fixed Sample Quantity Entry

The fixed sample mode provides one button access to the parts counting mode. The sample size is preset in setup, step [72], for 5, 10, 20, 50 or 100 fixed sample quantity. To count using the fixed sample mode in either the gross or net weight mode, add or subtract the fixed sample quantity of parts to or from the scale platform and press the **SAMPLE** key. The 8520 will then display the sample quantity. The piece count is displayed as pieces are added or removed from the scale platform.

The fixed sample quantity can be displayed if desired, by pressing the **SAMPLE** key with the weight display at gross zero. The display shows the fixed sample quantity ([**SPL 10**] for example) for two seconds then returns to the normal weight display.

3.2.4 Variable Sample Quantity Entry

Variable sample mode can only be used in the net weight mode. To count using the variable sample mode in the net weight mode, add or subtract the desired sample quantity of parts to or from the scale platform.

Enter the sample quantity using the numeric section of the keyboard and press the **SAMPLE** key. The 8520 will then display the sample quantity. The piece count is displayed as pieces are added or removed from the scale.

3.2.5 Average Piece Weight Entry

The average piece weight of a part can be recalled and recorded in the count mode. This recorded APW can then be used to count the same type of parts at a later time. APW entry is normally used to count very light parts that have an average piece weight that can not be calculated without an impractically large sample quantity. APW entry is also used in applications where the parts to be counted are fairly consistent and where counting accuracy requirements are not as stringent.

To enter an APW press the **APW** key. The 8520 will then display [0.00000]. Enter the average piece weight for the selected parts using the numeric keys on the keyboard. Preceding zeroes in the value need not be entered. Press the **APW** key to accept the APW value entered. If you make a mistake entering the APW, press the **CLEAR** key to erase the APW and renter the APW. Once an APW has been entered, the piece count is displayed as pieces are added or removed from the scale platform.

3.2.6 Counting Parts into an Empty Container

Place the empty container on the scale platform and press the **TARE** key.

Add the sample pieces on the scale platform and perform either a fixed or variable sample entry, as selected in step [72], or else enter the known average piece weight value.

Place the rest of the pieces on the scale platform, the piece count is displayed as parts are added to the scale. Press the **PRINT** key to print a ticket and accumulate data if accumulation is enabled.

3.2.7 Counting Parts Out of a full container

Place the full container on the scale platform and press the **TARE** key.

Remove the sample pieces from the scale platform and perform either a fixed or variable sample entry, as selected in step [72], or else enter the known average piece weight of the part.

Enter the known tare weight of the empty container using the numeric keys on the keyboard and press the **TARE** key. The piece count of all parts currently in the container is displayed. Return the sample pieces to the scale to display the total number of parts in the container. Press the **PRINT** key to print a ticket and accumulate data if enabled.

3.3 OPERATING ZONES (Counting Mode)

Four distinct zones of counting exist in relation to the weight on the platter. These zones are shown in the following table and discussed more fully in the following four sections. Note that if sample enhancement is disable zone 3 does not exist. Note also that if the minimum sample weight is chosen as 0.0% then zones 1 and 2 essentially do not exist and the APW computation may have a large error. A non-zero tare should be taken to disable AZM, before using small sample weights when 0.0% minimum sample is selected.

3.3.1 ZONE 1: Zero To 0.02% of Scale Capacity

Average piece weight (APW) cannot be accurately computed for sample weights below 0.02% of scale capacity. Sample operations in this weight range result in the [**LO**] error

message. The operator must repeat the sample with a larger sample size until the [**LO**] message is no longer displayed.

3.3.2 ZONE 2: 0.02% of Scale Capacity to Minimum Sample Weight Selection

Zone 2 is the normal sampling range. Step [75], selects the required minimum sample weight, 0.0%, 0.02%, 0.05%, or 0.1% of scale capacity. If a sample smaller than the minimum sample weight is attempted, the 8520 will display [**Add X**], where **X** is the number of additional sample pieces that must be added to the platform to reach the minimum sample requirement. If the [**Add X**] display occurs in sampling, the 8520 will operate in one of two different ways depending on auto sample selection, step [74].

3.3.3 ZONE 3: Minimum Sample Weight to 4% of Scale Capacity

From the minimum sample weight to 4% of scale capacity the scale is in the count mode. Printing can occur. Sample enhancement, if enabled, can occur in this range, unless too many pieces are added to the scale platform. If the count of pieces added exceeds the number which can be reliably counted using the previous APW, the display shown [**OVER**] (over enhancement range) for 2 seconds, after which the count is again displayed. If the operator wishes to continue APW enhancement, then pieces must be removed from the scale platform until each motion/no-motion sequence no longer results in the [**OVER**] display. APW enhancement will then occur.

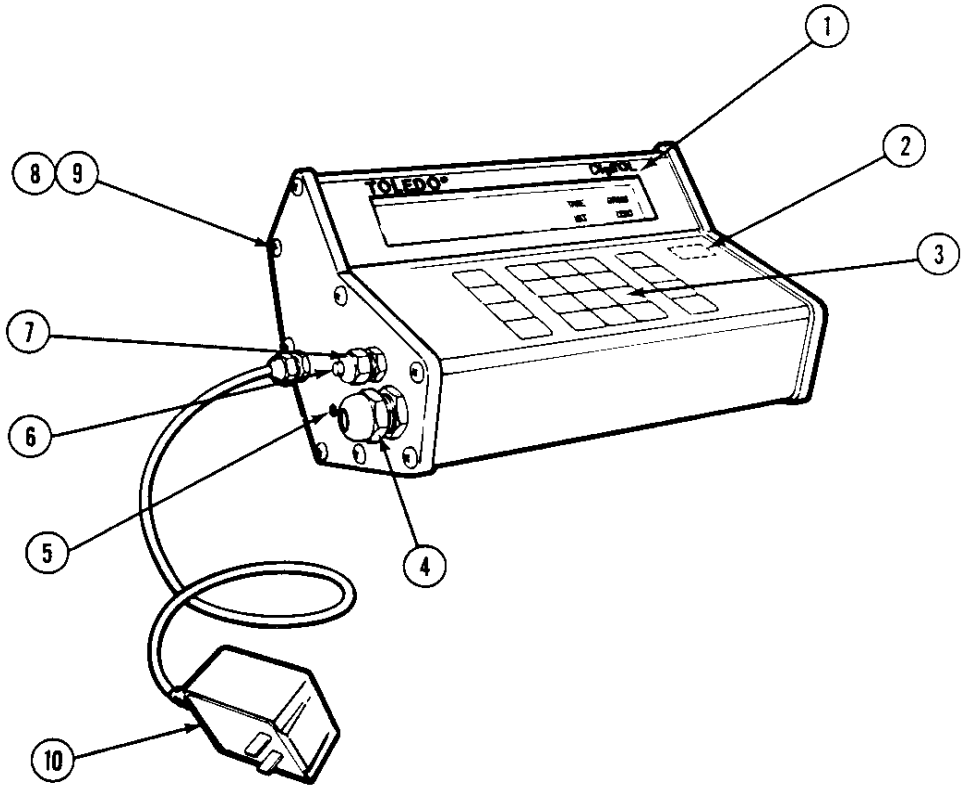
If the operator ignores the [**OVER**] display and adds more pieces to the scale platform or performs a print request, no further enhancement is possible for the current counting sequence. Once the counting weight reaches 4% of scale capacity, sample enhancement is discontinued.

3.3.4 ZONE 4: 4% to 100% of Scale Capacity

From 4% to 100% of scale capacity is the normal counting zone. Printing requests can be performed as desired. Sample enhancement is disabled.

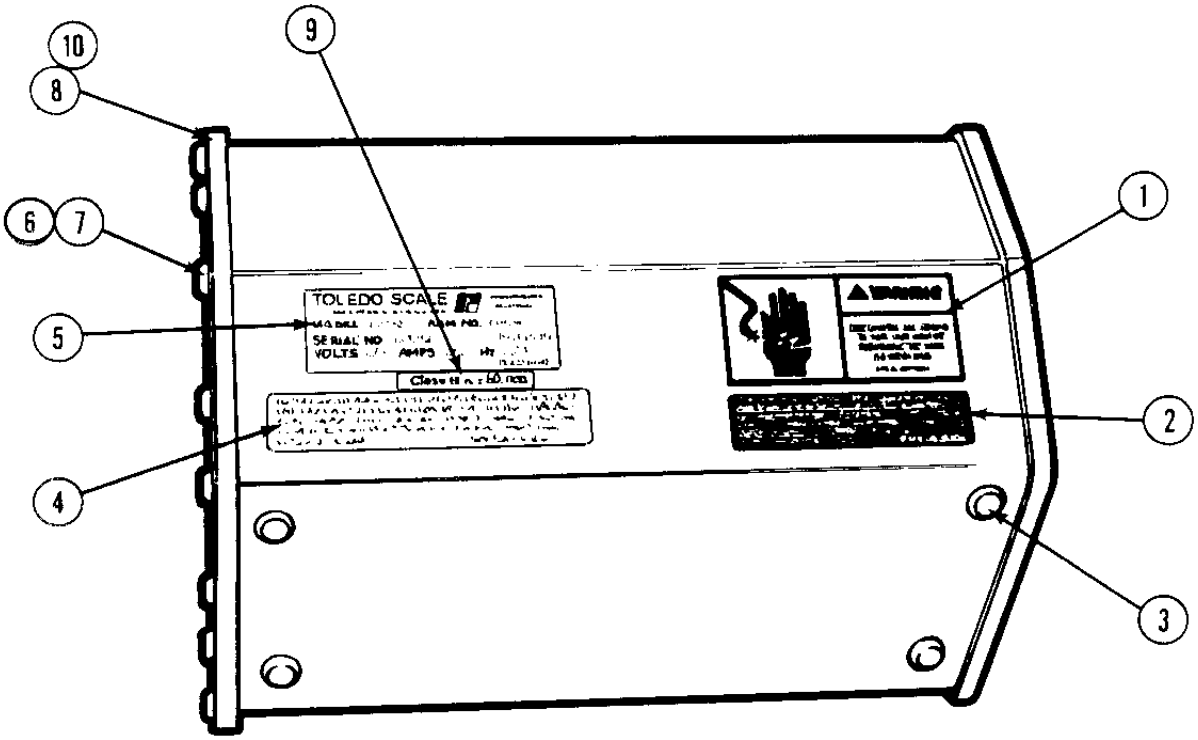
12. PARTS CATALOG

12.1 DESK ENCLOSURE - EXTERIOR FRONT



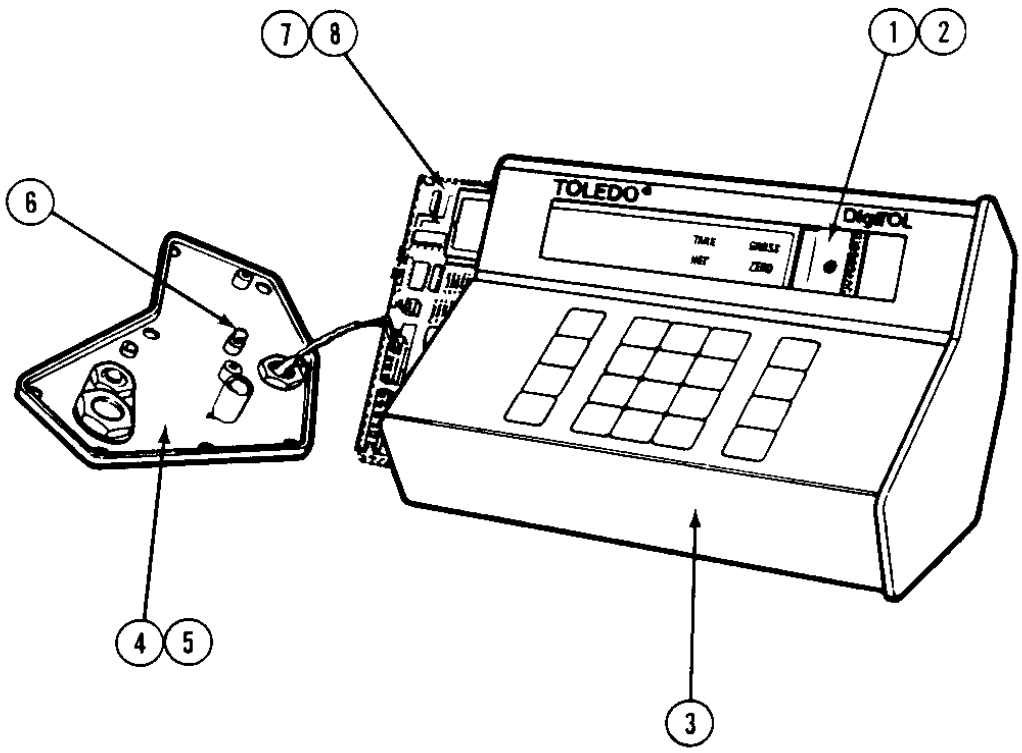
REF NO	PART NUMBER	DESCRIPTION	QTY
1	130025 00A	Display Screen	1
2	274480 002	Double-Sided Tape	2”
3	133225 00A	Keyboard Assembly	1
4	130023 00A	Grip Bushing	1
5	R03270 00A	Set Screw 1/4 X 5/16”	2
6	129038 00A	Small Plug	1
7	129018 00A	Grip Bushing	2
8	R03868 00A	Screw, 8-32 X 1/2” Truss Hd. Tapetite	8
9	133228 00A	Black Nylon Washer	8
10	132787 00A	Power Supply	1

12.2 DESK ENCLOSURE - EXTERIOR REAR



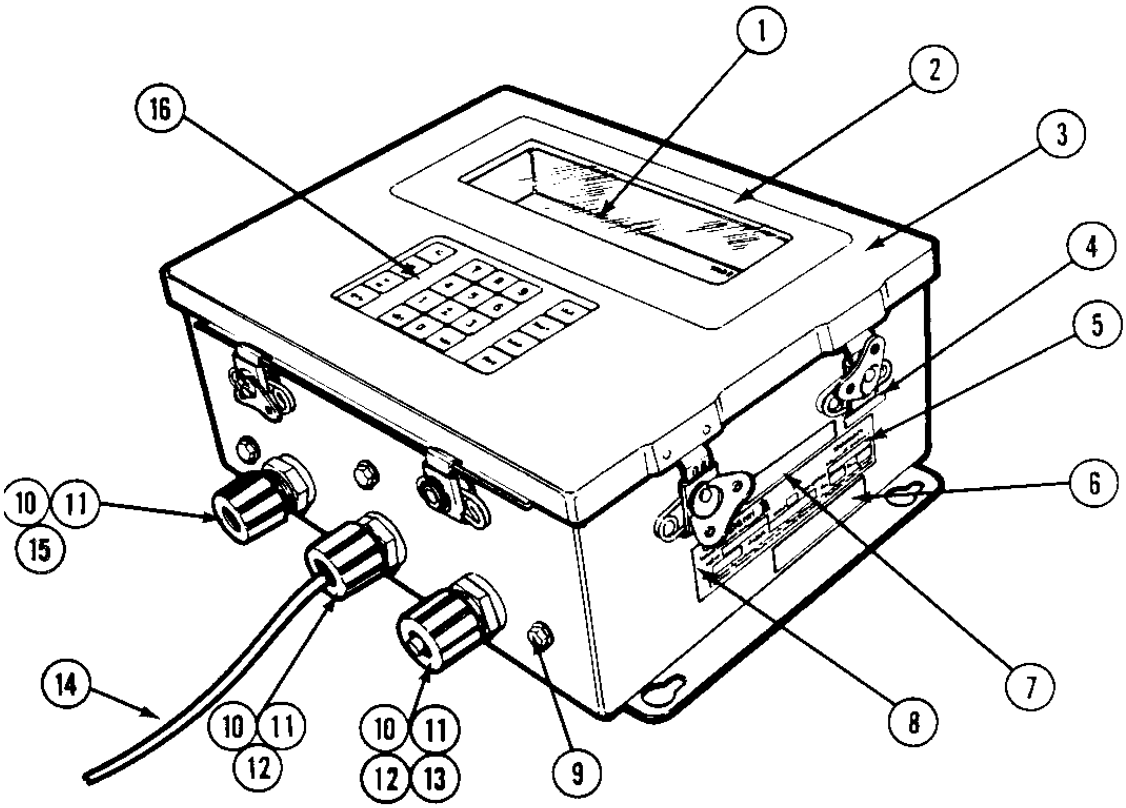
REF NO	PART NUMBER	DESCRIPTION	QTY
1	A122373 00A	Warning Label	1
2	B118540 00A	FCC Label	1
3	126971 00A	Rubber Foot	4
4	Not Available	Patent Label	1
5	Not Available	Data Label	1
6	R03868 00A	8-32 X 1/2” Truss Hd. Taptite Screw	8
7	133228 00A	Black Nylon Washer	8
8	A130018 00A	Right End Cap	1
9	134059 00A	Class II Label	1
	132818 00A	Class III/ III L Label	1
10	130019 00A	End Cap Gasket	1

12.3 DESK ENCLOSURE - INTERIOR



REF NO	PART NUMBER	DESCRIPTION	QTY
1	130029 00A	Legend Plate (English)	1
2	130030 00A	Legend Backer Plate	1
3	A130001 00A	Indicator Housing	1
4	A130017 00A	Left End Cap	1
5	130019 00A	End Cap Gasket	1
6	R03579 00A	Screw, 8-32 X 5/16” Self-Tapping	1
7	A130007 00A	Logic PCB w/o Eprom	1
8	B132785 00A	Eprom w/Carrier	1

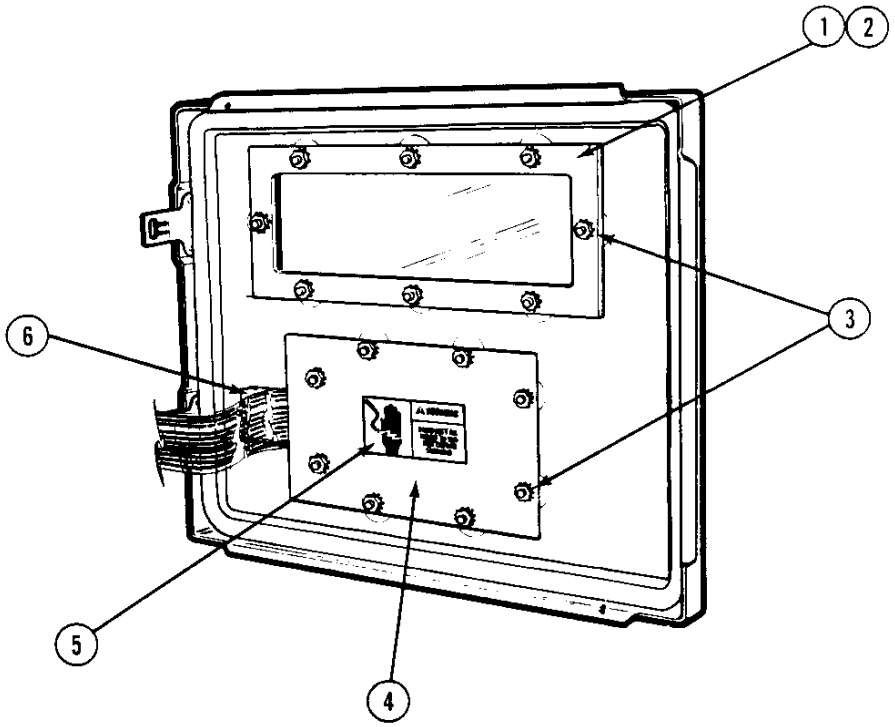
12.4 WALL ENCLOSURE - EXTERIOR



REF NO	PART NUMBER	DESCRIPTION	QTY
1	132521 00A	Lens	1
2	132632 00A	Decorative Bezel	1
3	B132517 00A	Enclosure Assembly	1
4	132059 00A	Class II Label *	1
	132818 00A	Class III/ III L Label	1
5	Not Available	Data Plate	1
6	Not Available	Patent Label	1
7	B118540 00A	FCC Label *	1
8	R03533 00A	Rivet	2
9	R03562 00A	1/4-20 X 3/8 H.H. Screw	3
10	104699 00A	“O” Ring Gasket	3
11	116240 00A	Sealing Lock Nut	3
12	117417 00A	Cord Connector	2
13	131606 00A	Plug .38 Diameter X 1.5	1
14	A130110 00A	Line Cord Assembly	1
15	117415 00A	Cord Connector	1
16	133716 00A	Keyboard Assembly	1

* 8520 - 1001

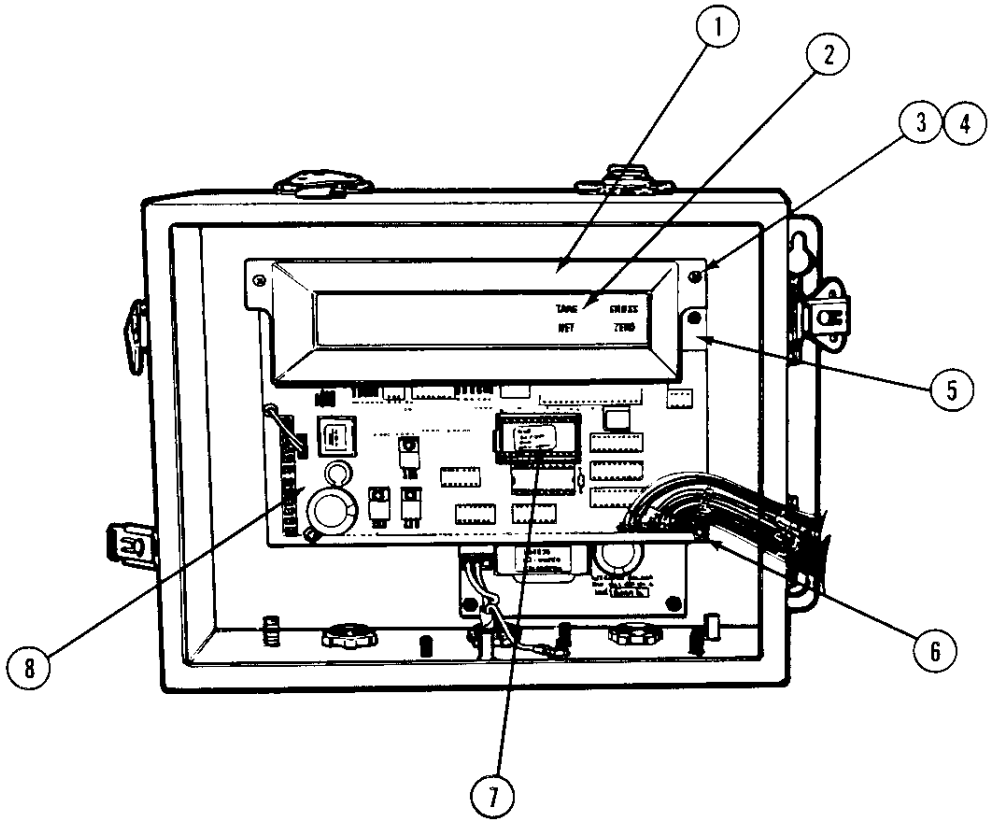
12.5 WALL ENCLOSURE - DOOR



REF NO	PART NUMBER	DESCRIPTION	QTY
1	132520 00A	Lens Clamp	1
2	132522 00A	Lens Gasket	1
3	R03298 00A	#8-32 Nut w/Lockwasher	16
4	133716 00A	Keyboard Assembly	1
5	A122373 00A	Warning Label *	1
6	112855 00A	Cable Clamp	1

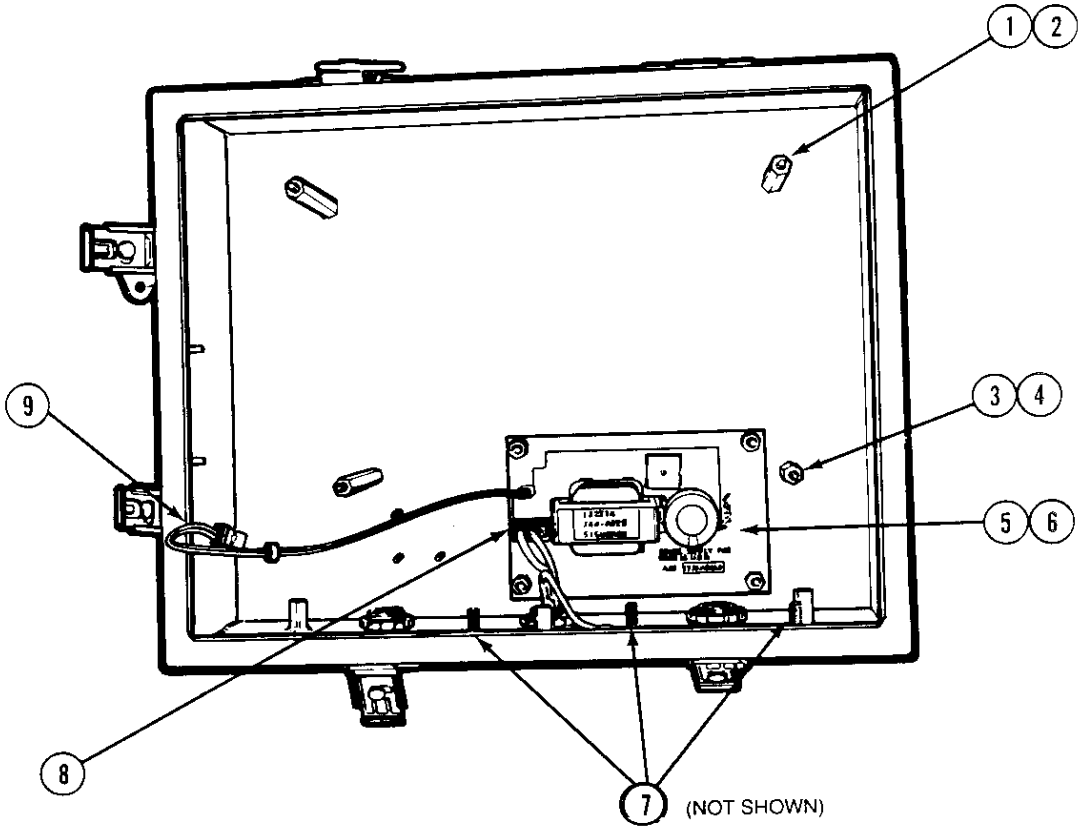
* Included with Keyboard Assembly, 133716 00A

12.6 WALL ENCLOSURE - INTERIOR



REF NO	PART NUMBER	DESCRIPTION	QTY
1	132523 00A	Bezel	1
2	130029 00A	Legend Plate (English)	1
3	R02997 00A	Screw, #6-32 X 3/8”	2
4	132698 00A	Standoff, 6-32 X 1.125 f-f	2
5	130030 00A	Legend Backer Plate	1
6	R00813 050	Hex Nut, #6-32	2
7	B132785 00A	Eprom w/carrier	1
8	A130007 00A	Logic PCB w/o Eprom	1

12.7 WALL ENCLOSURE - POWER SUPPLY



REF NO	PART NUMBER	DESCRIPTION	QTY
1	R02540 00A	#8 Flat Washer	4
2	132695 00A	#6-32 X 3.75 Standoff	4
3	R00813 050	#6-32 Nut	4
4	107502 00A	Standoff	4
5	132766 00A	Internal Power Supply PCB	1
6	132699 00A	PCB Insulator	1
7	R03298 00A	#8 Nut	3
8	097518 00A	3-pin (white) Plug	1
9	133203 00A	Output Harness	1

12.8 ACCESSORIES

The following accessories and kits are available for use with the Model 8520 digital indicator.

OPTION DESCRIPTION	PART NUMBER	FACTORY NUMBER
Analog Load Cell (Desk)	(*) 133201 00A	0917-0153
Analog Load Cell (Wall)	(*) 132706 00A	0917-0152
Internal Battery (Desk or Wall)	(*) 132710 00A	0919-0023
Internal Power PCB (Desk)	(*) 133200 00A	0917-0155
Wall Mount Bracket (Desk)	(*) 133206 00A	0917-0159
15’ Printer Output Cable	(*) 133218 00A	0900-0258
10’ Digital Load Cell Cable	(*) 130115 00A	0900-0245
Legend Plates	(*) 133234 00A	0917-0166

ANALOG KOP OPTION (DESK)

PART NUMBER	DESCRIPTION	QTY
	Ferrite Core	1
	Conn. Term.	1
	Logic- Analog Harness	1
	Conductive Lens Assembly	1
	Analog KOP Wire Assembly	1
	Model 8520 - A - CL Label	1
	#8-32 X 5/16 St. Screw	1
	8520 Analog PCB	1
	Installation instructions	1

ANALOG KOP OPTION (WALL)

PART NUMBER	DESCRIPTION	QTY
	Sub-D, M 9P Conn.	1
	Ring Terminal #8	1
	Logic/Analog Harness	1
	Model 8520-A-CL Label	1
	4-40 X 3/16 PHHD Screw	4
	8-32 w/LW Nut	5
	Washer & Grommet KOP	1
	Installation instructions	1
	Analog PCB/Shield Assembly	1

INTERNAL BATTERY KOP (DESK AND WALL)

PART NUMBER	DESCRIPTION	QTY
*104699 00A	"O" Ring Gasket	1
*116240 00A	Sealing Locknut	1
129574 00A	Battery Assembly	1
130020 00A	Adapter DC Plug	1
130021 00A	Adapter Gasket	1
130022 00A	Adapter Cover	1
*132528 00A	Battery Clamp	1
*132529 00A	Grip Pad (Battery Bkt.)	1
*132693 00A	Battery Charge Adapter	1
132711 00A	Battery KOP Installation instructions	1
132767 00A	Battery Charger (12V, 0.5A)	1
132770 00A	Battery Harness	1
*R03298 00A	8-32 Nut w/Lockwasher Nut	2
*R03779 00A	8-32 X 1/4 Phd. SS Screw	1

INTERNAL POWER SUPPLY PCB

PART NUMBER	DESCRIPTION	QTY
097518 00A	3 Pin Plug	1
122371 00A	Data Label	2
132766 00A	Internal Power Supply PCB	1
133202 00A	Power Supply Input Harness	1
133203 00A	Power Supply Output Harness	1
133211 00A	Delrin PCB Retainer	1
133219 00A	Ground Wire Assembly	1
R03579 00A	#8-32 X 5/16 Self-Tapping Screw	1
A122373 00A	Warning Label	1
B133214 00A	Power Supply Installation instructions	1

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Scales & Systems
350 West Wilson Bridge Road
Worthington, Ohio 43085-2273

P/N: B13397000A

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