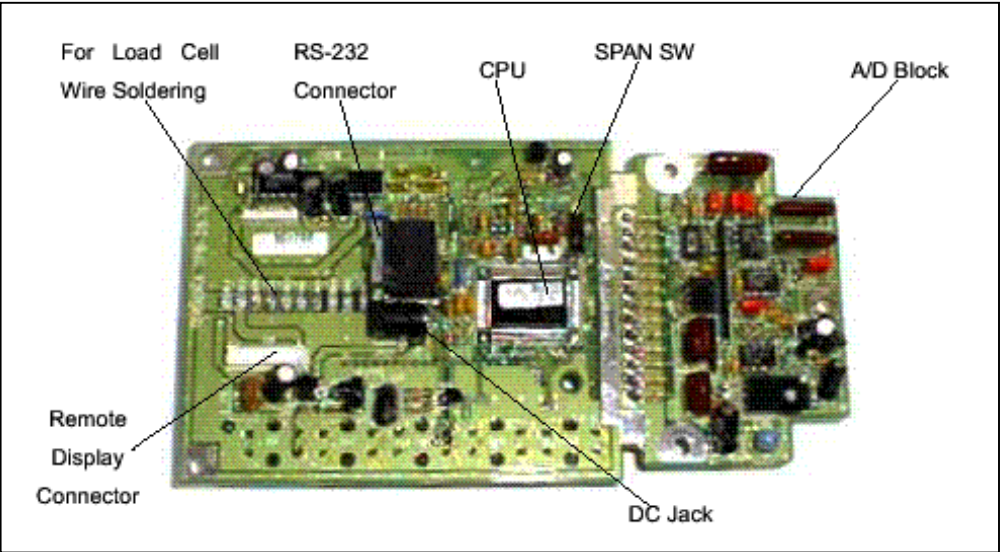**DIGI**

SERVICE MANUAL

MODEL: **DS-160**

DIGI AMERICAS
80 OAK STREET
NORWOOD, NJ
07648
PHONE:201-784-3400
FAX: 201- 784-3770
INTERNET: www.digiamericas.com
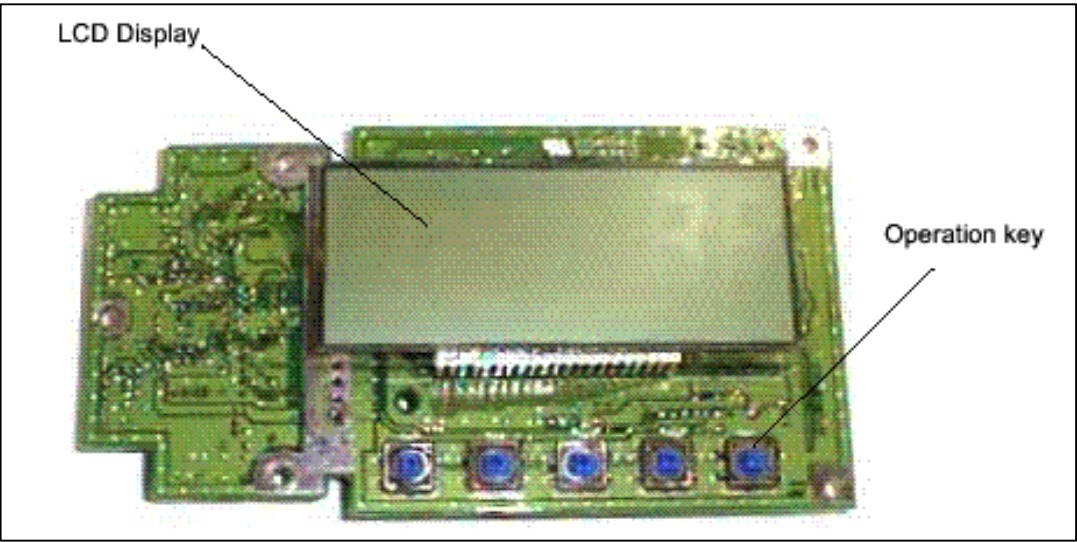
EDITION	MONTH	YEAR
1ST	JANUARY	2001
2ND		
3RD		
4TH		
5TH		
6TH		

8.0. SHOP NOTES:

7.0. Electrical Distribution

(Component Side)

(LCD & Switch Side)

1. Features:

The DS –160 is a Digital-weighing Scale. Below are the features of this model.

- DC-12V – 18v Power Input via A/C Adapter
- 7 x Segments & 6 Digits LCD Panel
- 5 x Operation Keys
- 1 x Weighing Platform
- Desk Top/Wall-Hanging Type
- RS-232C I/F (1 Channel) available for Output to PC ------------ Option
- Remote Display I/F available for Max. 4 Displays ---------------- Option
- Hg (Mercury) SW I/F for Level Detection ------------------------- Option
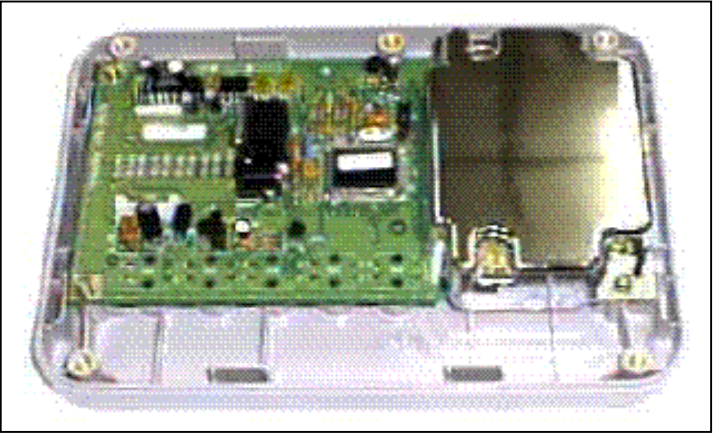
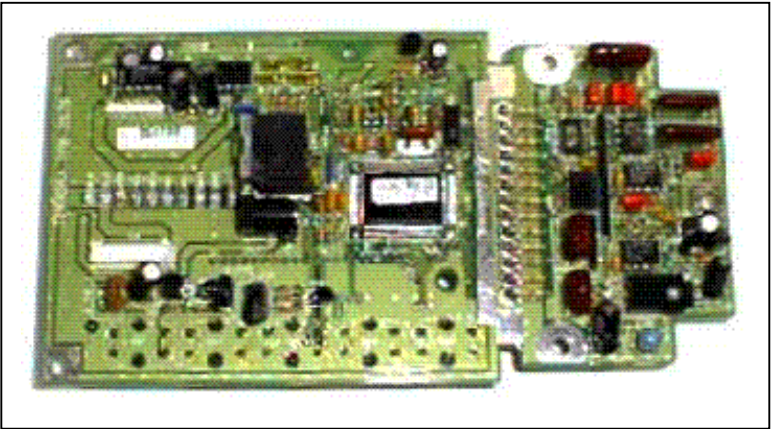### 1.1. Unlocking Procedure
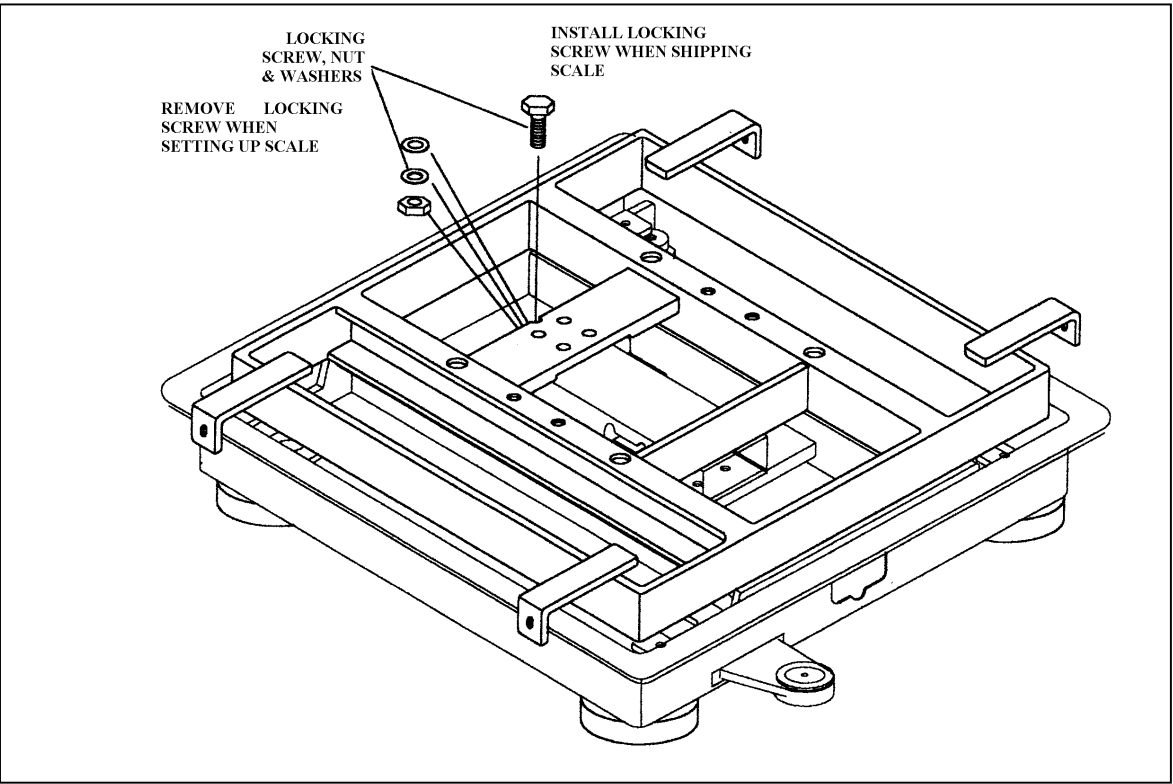
6. Disassembling

6.1. Disassembling of Indicator Block

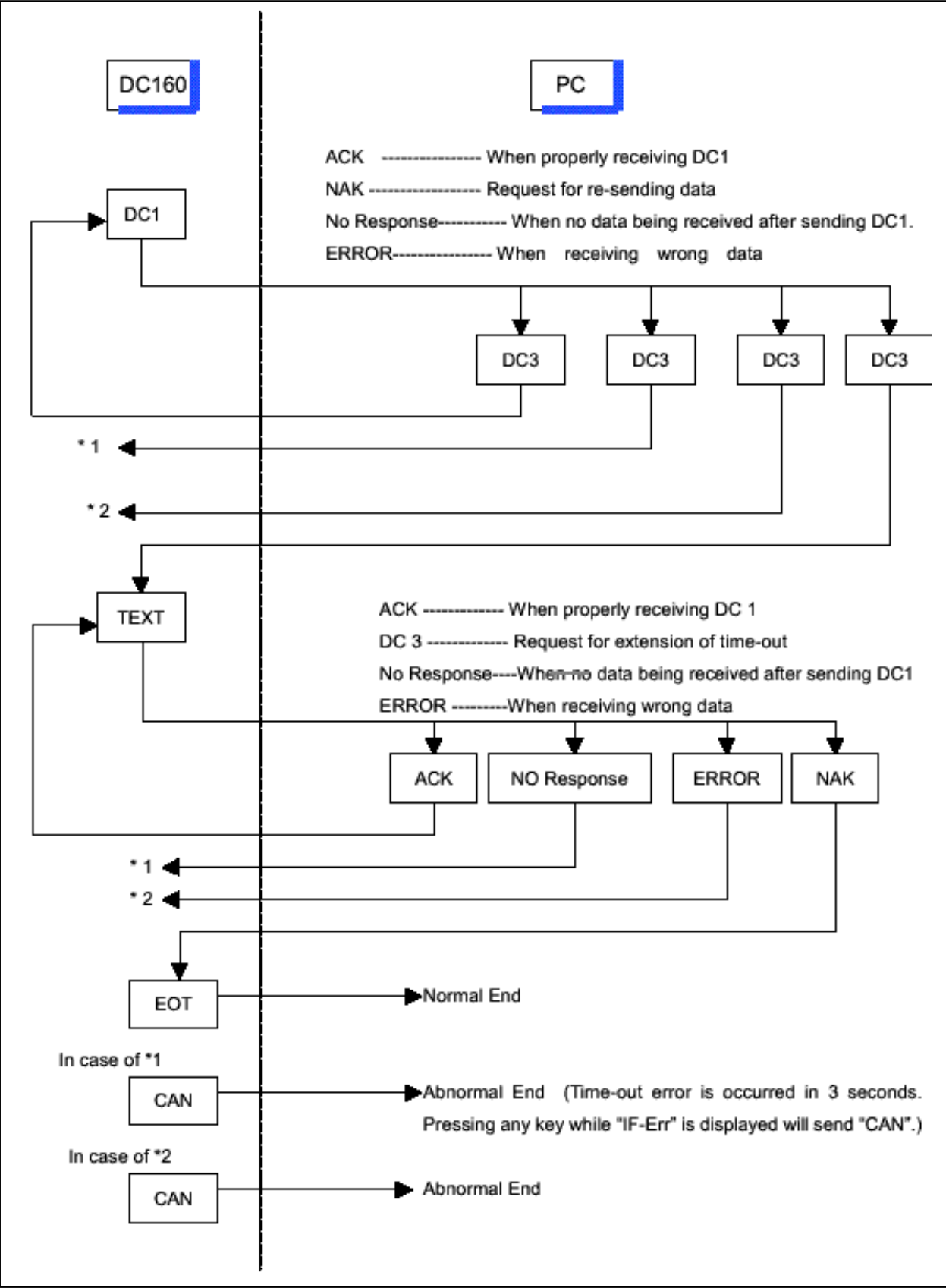1. Remove 5 screws from the rear side of the housing cover.

2. To remove the main PCB TPB-2574, remove 2 screws from A/D Board housing case.

3. Remove 4 screws at the corners and 1 screw near the center of the PCB. Then you can remove the whole PCB from the housing.

5.6. Transmission Procedures

ACK ------------- When properly receiving DC1
NAK ------------- Request for re-sending data
No Response---------- When no data being received after sending DC1.
ERROR-------------- When receiving wrong data

DC160 — PC

DC1

DC3   DC3   DC3   DC3

* 1
* 2

TEXT

ACK ------------ When properly receiving DC 1
DC 3 ------------ Request for extension of time-out
No Response----When no data being received after sending DC1
ERROR ---------When receiving wrong data

ACK   NO Response   ERROR   NAK

* 1
* 2

EOT → Normal End

In case of *1
CAN → Abnormal End (Time-out error is occurred in 3 seconds. Pressing any key while "IF-Err" is displayed will send "CAN".)

In case of *2
CAN → Abnormal End

2. Specifications

2.1. General Specifications:

- Power Source   DC-12V – 18V (recommendable adapter output DC15V 0.3A)
- Operation Temperature   10°C - 40°C (14°F - 104°F)
- Operation Humidity   15 % - 85 % RH(non-condensing)
- Weighing Device   Load Cell (output range 0.6mV/V – 4.00mV/v
- Dimensions   200mm/5.9" (w) x140mm/5.5" (h) x 50mm/2.0" (d)

2.2. Approved Standards:
This model complies with the following standards:

- UL   • CSA   • DC Mark   • FCC A   • CISRR 22B   • RFI   • OIML

2.3. Weighing Specification:

- Internal Resolution   1/60,000
- Display Resolution   1/1,000 – 1/7,500
- Single Interval Method

### 2.4 A/D Converter Specification:

- DOUBLE INTEGRATION METHOD
- 20 times/sec. Sampling (when 1mV/V is set)
- Load Cell Output allowable Ranges   • 0.6mV/V – 4.00mV/V
- Load Cell Impedance   • 350Ω

3. Set-up Procedure:

3.1. Initial Set-Up Procedure

3.1.1. Remove the rear lid removing 4 screws.
3.1.2. Remove a shield sheet which covers the PCB.
3.1.3. Solder load cell wires to specified points on PCB.

Silk on PCB	Signal	CNW-6410
BLK	F.G.	BLACK
SLD∗	F.G.	
GRN∗	LOAD CELL OUTPUT(+)	GREEN
YEL∗	LOAD CELL OUTPUT(-)	YELLOW
RED∗	L/C APPLIED VOLTAGE(+)	RED
RS-	SENSE(-)	ORANGE
RS+	SENSE(+)	BLUE
WHT∗	L/C APPLIED VOLTAGE(-)	WHITE
GND	GND FOR MERCURY SW	
HGSW	INPUT OF MERCURY SW	

Fig. Rear Side

Fig. Locations on Main PCB
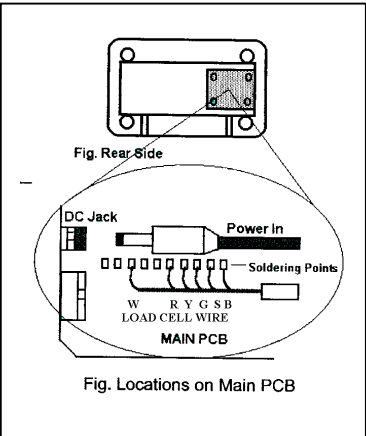
✍NOTE: When connecting DIGI load cell, wires marked ∗ should be soldered at each soldering point as shown on the right.

3.1.4. Insert power cord from A/C adapter into Jack on PCB.
3.1.5. Pass the load cell wire through the path in rubber shield block.
3.1.6. Put the shield sheet and the kid in its position.

3.2. Start–up

- Specification data and weight calibration are required for proper operation.
1. Press [ON/OFF] key to turn on the scale.
   The software version number is displayed. Ex. Ver.0.04. all segments count up, the display blanks, then shows all 8's.

- If "Lo-Vol is displayed , this indicates that the input voltage is too low to operate the scale. The input drop detection circuit is equipped to prevent the unit from mal-functioning when the voltage drops.
  To exit this error, reset the scale by turning off and on.

3.3. SPEC's Data Setting for RS232C Communication

3.3.1. Press and hold **[REZERO]** key, while holding **[REZERO]** key, press the **[T]** key 3 times.   (**[REZERO] + [T] [T] [T])**
3.3.2. For setting procedures, pleases refer to the following pages.
3.3.3. To exit this mode, press the **[T]** key.

5.5. Text Format

Net Weight Data	CR	Tare Weight	CR	LF
← 7 Byte →	←1 Byte→	←7 Byte →	←1 Byte →	←1 Byte →

←	Text Data 17 Byte	→

Example:

In case of Net weight = 1.230lb. , tare weight = - 0.450lb.

a) Text Format

0	0	1	.	2	3	0	CR	-	0	0	.	4	5	0	CR	LF

b) ASCII Code

30H	30H	31H	2EH	32H	33H	30H	CR

2DH	30H	30H	2EH	34H	35H	30H	CR	LF

NOTE:

- Net weight and tare weight excluding a sign is transmitted shifting to the right.

- When it is minus data (2DH) or (30H), net and tare weight data are transmitted setting 2DH or 30H into the left-most 1byte of each 7 bytes data.

- In case of over weight, the data will be transmitted as follows:

  a. With header

  0 O V 0 0 0 0 0 CR 4 ? ? ? ? ? ? ? CR LF

  b. Without header

  O V 0 0 0 0 0 CR 4 ? ? ? ? ? ? ? CR LF

- Decimal point is transmitted as [,] Comma 2CH , [.] period 2EH.

5.0. RS-232 Data Output

5.1. General

This function is provide as standard for sending weight data (net & tare weight) to peripheral units such as PC, thus enabling the use of data transaction and analysis.

5.2. Transmission SPEC

- **Baud Rate** 1200, 2400, 4800, 9600, 19200 (Spec 00 bit 2 – 0)
- **Start Bit** 1 Bit
- **Stop Bit** 1 Bit or 2 Bit (Spec 01 bit 3)
- **Data Bit** 7 Bit or 8 Bit (Spec 01 bit 2)
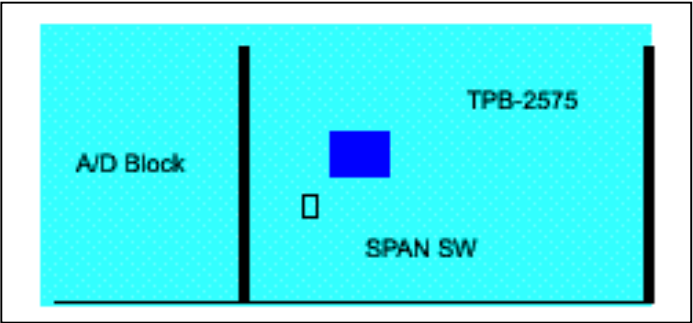- **Parity Bit** Even, Odd, or None (Spec 01 bit 1 – 0)

5.3. Text command (ASCII Code)

CR	(0DH)	End of data
LF	(0AH)	End of text
0 – 9	(30H – 39H)	Numeric data
_	(2DH)	Minus sign
.	(2EH)	Decimal point

5.4. Connector and signals (at CN – 2)

Connector	8 – pin modular		
Pin configuration	Pin # 3	GND	
	Pin # 6	TXD	(Send Data)
	Pin #8	RXD	(Receive Data)

3.4. SPEC's Data Setting for Weight & Measure

3.4.1. Turn on the SPAN SW.(SW6 on the Main Board)
3.4.2. Press and hold **[REZERO]** key, while holding **[REZERO]** key, press the **[←]** key 3 times.   (**[REZERO] + [←][←][←]**)
3.4.3. For setting procedures, pleases refer to the following pages.
3.4.4. To exit this mode, press the **[T]** key.

3.5. How to Set /Change Spec Data

- As introduced in the previous section, there are 2 procedures for entering Spec data.
  3.5.1. **[T] [T] [T])** while holding **[REZERO]** for spec no. 0 – 3
  3.5.2. **[←][←][←]**while holding **[REZERO]** for spec no.4 – 15

  In the case of 3.5.2.,the following display will appear.

	Bit 3	Bit 2	Bit1	Bit 0
04	1	1	0	0

SPEC NO.   SPEC data

- The two leftmost digits indicate the SPEC No. example - 04
- The remaining 4 digits indicate SPEC numeric data, example – 1100
- The ▼ under a digit indicates the current programmable position.
- When setting or changing SPEC data, the key switches function as follows:

- **[REZERO]** key advances to the next SPEC No.
- **[T]** key saves data and exits Spec mode.
- **[←]** key moves "▼" to next programming position.
- **[↑]** to change SPEC data to either "0" or "1".

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3.6. SPEC Data List
3.6.1. [T] [T] [T] while holding [REZERO] key.

Spec no.	Bit 3	Bit 2	Bit 1	Bit 0
Spec 00	➢ [1] **RS-232 connection** 0 = not connected 1 = connected	0 0 0 = 1200 0 0 1 = 2400	➢ [1] **Baud rate (bps)** 0 1 0 = 4800 0 1 1 = 9600	1 0 0 = 19200 other combinations N/A
Spec 01	➢ [1] **Stop bit** 0 = 1 bit 1 = 2 bit	➢ [1] **Data length** 0 = 7 bits 1 = 8 bits	➢ [1] **Parity bit** 0 0 =no parity 1 0 = even 0 1 = odd	
Spec 02	➢ [1] **RS-232 communication method** 0 0 = stream output (continuous output) 0 1 = output with [↑] key press 1 1 = output by external command		➢ [1] **Stable of text data** 0 = inhibit 1 = allow	➢ [1] **Header of text data** 0 = without 1 = with
Spec 03	Not used set to "0 0 0"			➢ [1] **Transmission condition** 0 = stable only 1 = both stable or unstable

3.6.2. W & M SPECS [←][←][←] while holding [REZERO] key.

Spec no.	Bit 3	Bit 2	Bit 1	Bit 0
Spec 04	**Loadcell output sensitivity (mV/V)** 0 0 0 0 = 3.80 – 4.00 1 0 0 0 = 1.95 – 2.15 0 0 0 1 = 3.60 – 3.80 1 0 0 1 = 1.75 – 1.95 0 0 1 0 = 3.35 – 3.60 1 0 1 0 = 1.45 – 1.75 0 0 1 1 = 3.15 – 3.35 1 0 1 1 = 1.20 – 1.45 0 1 0 0 = 2.90 – 3.15 1 1 0 0 = 0.97 – 1.20 0 1 0 1 = 2.65 – 2.90 1 1 0 1 = 0.80 – 0.97 0 1 1 0 = 2.40 – 2.65 1 1 1 0 = 0.70 – 0.80 0 1 1 1 = 2.15 – 2.40 1 1 1 1 = 0.60 – 0.70			
Spec 05	**Decimal point** 0 = period 1 = comma	Not used	**Position Of Decimal Point** 0 0 = no decimal (00000) 0 1 = 1st decimal (0000.0) 1 0 = 2nd decimal (000.00) 1 1 = 3rd decimal (00.000)	
Spec 06	**Zero tracking when tare** 0 = no 1 = yes	➢ [2] **Digital tare** 0 = no 1 = yes	**Tare accumulate** 0 = no 1 = yes	**Tare range** 0 = 50% 1 = 100% of capacity

4.7. Quick Maintenance Operation Table

Key operation	Functions	Display
LCD Segment Check **All segments light up.** **Press any key to exit.**	Press &hold [RE-ZERO] while pressing [←][T] [←]	8 , 8 , 8 , 8 , 8 , 8 , ▼ ▼ ▼ ▼ ▼ ▼
SPAN SW ON/OFF Check. To check for Span SW setting	Press &hold [RE-ZERO] while pressing [T] [←][←]	**S-On** or **S-OFF**
Internal Count Display To display A/D raw data. Press [↑] to display internal count. Press [T] to exit	Press &hold [RE-ZERO] while pressing [←] [←] [T]	0
SPAN Adjustment To calibrate scale	Press &hold [RE-ZERO] while pressing [←] [T] [T]	Refer To 3.7.
SPEC Setting for RS-232C To set spec # 00 – 03 Press [T] key to exit.	Press &hold [RE-ZERO] while pressing [T] [T] [T]	Refer To 3.3.
SPEC Setting for W & M To set spec # 04 – 15 Press [T] key to exit.	Press &hold [RE-ZERO] while pressing [←] [←][←]	Refer To 3.4.

4.5. Digital tare weight reduction

4.5.1 Press **[←]** key to shift to the digit where the tare weight is to be set.

Selected digit will blink.

4.5.2. Press **[↑]** key to enter the. Each time this key is pressed, the selected digit will

increment by 1 only.

4.5.3. Repeat step #1 &2 until desired tare weight is set at each digit.

4.5.4. Press **[T]** key.

4.5.5. If the weight is within the available range of tare reduction, the display will show the weight

with a minus "–" sign (example – 10.59) and the tare "▾" lamp will light up.

If it is out of range, the display will return to 0.00.

4.5.6. Weigh an item (example 100lb.)

4.5.7. Remove the item.

4.5.9. Press **[T]** key to clear the tare weight.

4.6. Error Display

Error	Probable cause	Remedy
8 8 8 8 8 8 Lock – up 8 8 8 8 8 8 Lighting	Zero- point is out of range. Span sw still is on.	Need to re-calibrate the scale. Turn off Span sw.
Lo-VOL	Power supply voltage dropped	Turn power off and on. Check power supply voltage.
IF-ERR	Time out error in data transmission	Press any key to restore.
0 0 0 0 blinking on & off	Mercury SW is not level.	Level the Hg SW.

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Spec no.	Bit 3	Bit 2	Bit 1	Bit 0
Spec 07	Re-Zero When Tare 0 = no 1 = yes	Minus Weight Display 0 = -9e 1 = no limit	Power-On Start Range 0 = +/- 10% 1 = unlimited	Re-zero Tracking Range 0 = +/- 2% 1 = unlimited
Spec 08	➤ [3] Internal Count Display When Span Sw Is Off 0 = inhibit1 = allow	Gravity Adjustment (Japan Market) 0 = inhibit	➤ [3] Calibration Protected By Span Sw 0 = yes 1 = no	➤ [4] Weight data hold on function when power is shut off 0 = inhibit 1 =effective
Spec 09 - 10	Not used set to "0 0 0 0"			
Spec 11	➤ [5] One touch tare 0 = inhibit 1 = allow	➤ [6] Mercury sw output condition 0 = active low 1 = active high	➤ [7] Mercury sw connection 0 = not connected 1 = connected	➤ [8] Animal mode 0 = inhibit 1 = effective
Spec 12	Not used set to "0 0 0"			➤ [8] Weight stability condition in animal mode 0 = tight 1 = loose
Spec 13 – 15	Not used set to "0 0 0 0"			

Notes:
➤ 1   RS-232 Connection - - Net weight and tare weight data are transmitted via RS-232 port.

➤ 2   Digital Tare Reduction - -Tare weight that is digitally input by arrow keys.

➤ 3   SPAN SW - - -SPAN switch is located on silk no. SW6 of main board PCB-2575.

➤ 4   Weight Data Hold On Function - - For example, A 100 lb drum is being weighed when a power failure occurs.
If this function is enabled, the scale will read previous weight data (100lb). However as the zero point data is held
only when zero re- setting, the correct weight data can only be read the first time the on key is pressed.

➤ 5   One Touch Tare Reduction - - With an empty container on the platform, press **[T]** key. The range of tare
reduction is selectable either 50% or 100% capacity (spec 6 bit 0)

➤ 6   Mercury Sw. - - When Mercury Switch is out of level, if a high level output appears at the switch output, it is an
"active-high" and if a low level output appears, it is "active-low".

➤ 7   Mercury Sw. Connection - - This switch is equipped on scale side and is used to know the level of scale
signal.

➤ 8   Animal Mode - - This mode is provided for weighing animals, the animal mode changes the weight stability
condition.

3.7. Weight Calibration (SPAN Adjustment)

Before performing calibration procedure check the following:

A.　　Decimal Point Position according to capacity weight - - (SPEC-05 BIT1-0)

B.　　LOAD CELL Output Sensitivity - - - - - - - - - - - - - - - - - (SPEC-04 BIT 3-0)

C.　　 Minimum Display required - - - - - - - - - - - - - - - - - - - (1 or 2 or 5)

D.　　The DS-160 pole must be mounted to the base before performing calibration.

Note: Frame grounding of the load cell requires the unit to be assembled before calibration, it will not weigh correctly if it is assembled after calibration.

Next is the adjusting procedure

Set Span Sw to ON. (SW6 on main board) (see spec 8 bit1)

1. Press and hold **[REZERO]** key while pressing **[←] [T] [T].**

- 　　　　1

2. Press **[↑]** key to set the minimum division

✍ **NOTE:** Display will read 1 2 5 alternately each time the **[↑]** key is pressed

- 　　　　2

3. Press **[REZERO]** key to advance to the next step.

− 000.00

4. Set capacity weight by using the arrow keys

5.1. Enter capacity weight at the digit above "�" by pressing **[↑]** key.

− 100.00

5.2. Move the "➘" to the next digit according to capacity by pressing **[←]** key.

− 150.00

Example: In case of 150 lb. capacity scale as shown on the right.

6. Press **[REZERO]** key to advance to the next step, then enter

the weight to be used to calibrate the scale using **[↑] [←]** keys.

150.00

Example: Calibrating with 150 lb. of weight.

✍**NOTE:** When using less than 30%of capacity a weighing error may occur.

7.　　Press **[REZERO]** key to advance to the next step.

When finished with minimum display calibration, the display will be as shown.

CAL 0

8.　　Press **[REZERO]** key to calibrate the zero point.

9.　　Place the calibration weight on the platform.

CAL SP

10.　　Press **[REZERO]** key to calibrate the SPAN - internal count reads

60000

11.　　Press **[T]** key to exit from calibration mode.

12.　　Set SPAN SW to off position (see spec 8 bit1)

13.　　Check to see if the weight is correct when placing ¼ , ½ , ¾ and full capacity on scale

---

4. Machine Operation

4.1. Key Functions

[ON/OFF] key - - - To turn on or off the scale**.**

[RE-ZERO] key - - To re-zero the scale in operation mode**.**

[T] key - - - - - - - To set the tare weight.

[←] key- - - - - - - - To set digital tare weight value. /moves the indicator "➘" to next programming position.

 [↑] key- - - - - - - - To set digital tare weight value. /to change the numeric data.

4.2. Sign Lamps

➘ ZERO Lamp　　　　➘ sign will light when the current zero point is within ¼d
　　　　　　　　　　　　of true zero and true zero.

➘ TARE Lamp　　　　➘ sign will light when tare weight is set.

➘ STABLE Lamp　　　➘ sign will light when weight / scale is in stable condition.

4.3. ZERO Resetting

4.3.1. Place some weight on the platform. (example 1lb)

4.3.2. Press **[RE-ZERO]** key. Zero re-setting will be performed.

4.3.3. If the weight is within the available Zero re-setting range, the display will return to 0.00. If the weight is out of range, the display will lock up with all 8's.

4.4. One Touch Tare Reduction

4.4.1　Place tare weight on platform. (example: 1lb.)

4.4.2　Press **[T]** key.

4.4.3　If the weight is within the available range of tare reduction, the display will return to 0.00 and the tare " ➘ "lamp will light up. If it is out of range, the weight will remain in the display.

4.4.4　Weigh an item by placing on the platform. (example: 10lb.)

4.4.5　Remove the item from the platform.

4.4.6　Press **[T]** key to clear the tare weight.