



DS-1 60

Bench Scale

Service Manual

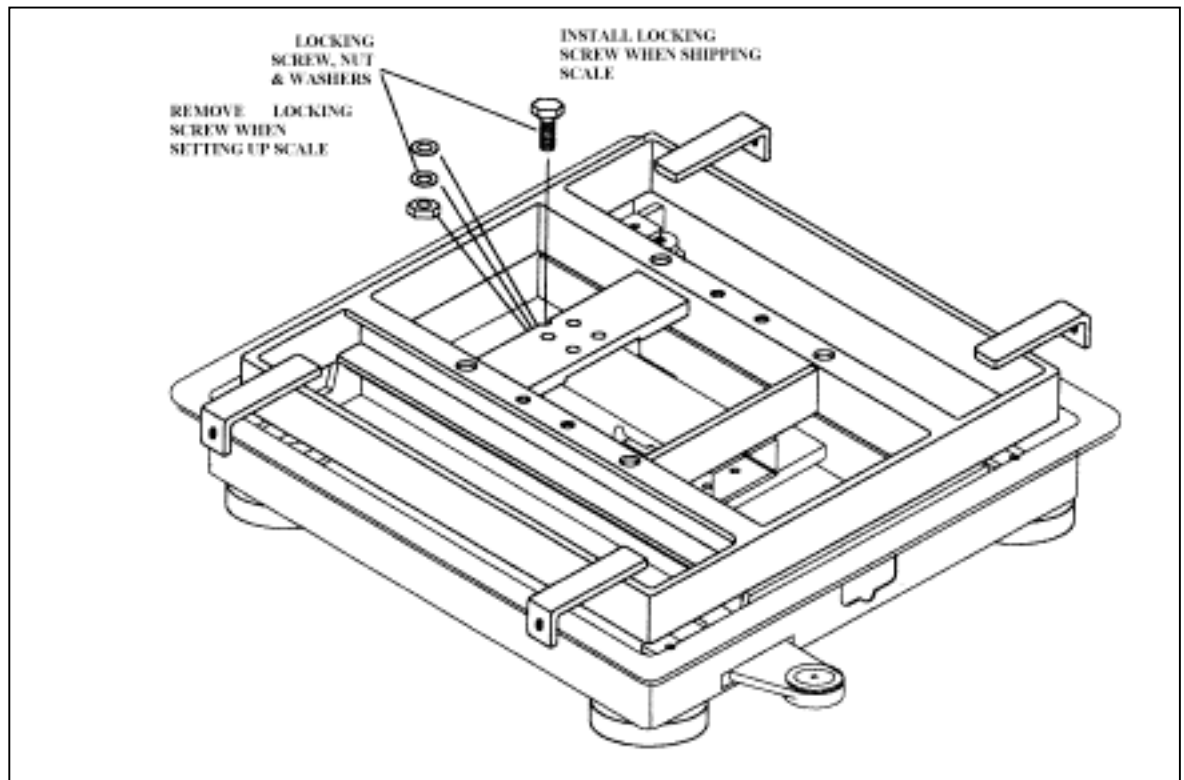
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1. Features:

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



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:

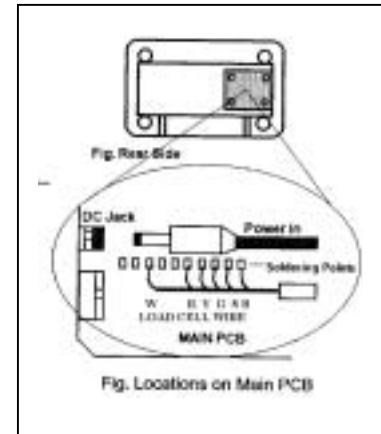
- DOUBLE INTEGRATION METHOD
- 20 times/sec. Sampling (when 1mV/V is set)
- Load Cell Output allowable Ranges
 - 0.6mV/V – 4.00mV/V
- Load Cell Impedance
 - 350Ω

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	



NOTE: When connecting DIGI load cell, wires marked * should be soldered at each soldering point as shown on the right.

- 1.1.4. Insert power cord from A/C adapter into Jack on PCB.
- 1.1.5. Pass the load cell wire through the path in rubber shield block.
- 1.1.6. Put the shield sheet and the lid in its position.

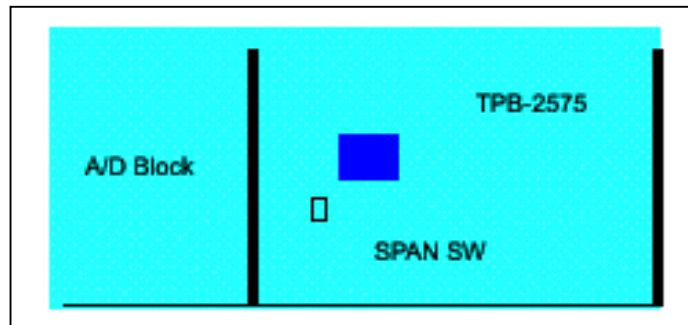
3.2. Start-up

- 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, please refer to the following pages.
- 3.3.3. To exit this mode, press the [T] key.

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, please 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
				②

↓ ↘

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 ② 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 “②” to next programming position.
 - **[↑]** to change SPEC data to either “0” or “1”.

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 0 1 = odd	1 0 = even
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 = 1 st decimal (0000.0) 1 0 = 2 nd decimal (000.00) 1 1 = 3 rd 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

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. The DS-160 has an Animal mode (SPEC 11 BIT 0), if this spec is set to "1" = effective, then calibration is locked out. To perform the calibration set spec to "0" = inhibit and reset it when calibration is complete.
- D. Minimum Display required - - - - - (1 or 2 or 5)
- E. 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. | <div></div> |
| 9. | Place the calibration weight on the platform. | <div>CAL SP</div> |
| 10. | Press [REZERO] key to calibrate the SPAN - internal count reads | <div>60000</div> |
| 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 _ , _ , _ and full capacity on scale | |

4. Machine Operation

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.

4.1. Sign Lamps

- | | |
|---------------|--|
| ▼ ZERO Lamp | ▼ sign will light when the current zero point is within _d 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. |

4.2. ZERO Resetting

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

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

4.2.2. 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.

4.3. 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.

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.)

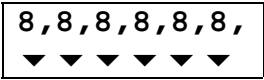
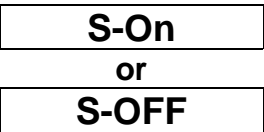

4.5.7. Remove the item.

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 0 0 0 0 blinking on & off	Time out error in data transmission Mercury SW is not level.	Press any key to restore. Level the Hg SW.

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][▲]	
SPAN SW ON/OFF Check. To check for Span SW setting	Press &hold [RE-ZERO] while pressing [T][▲][▲]	
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]	
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.

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)

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

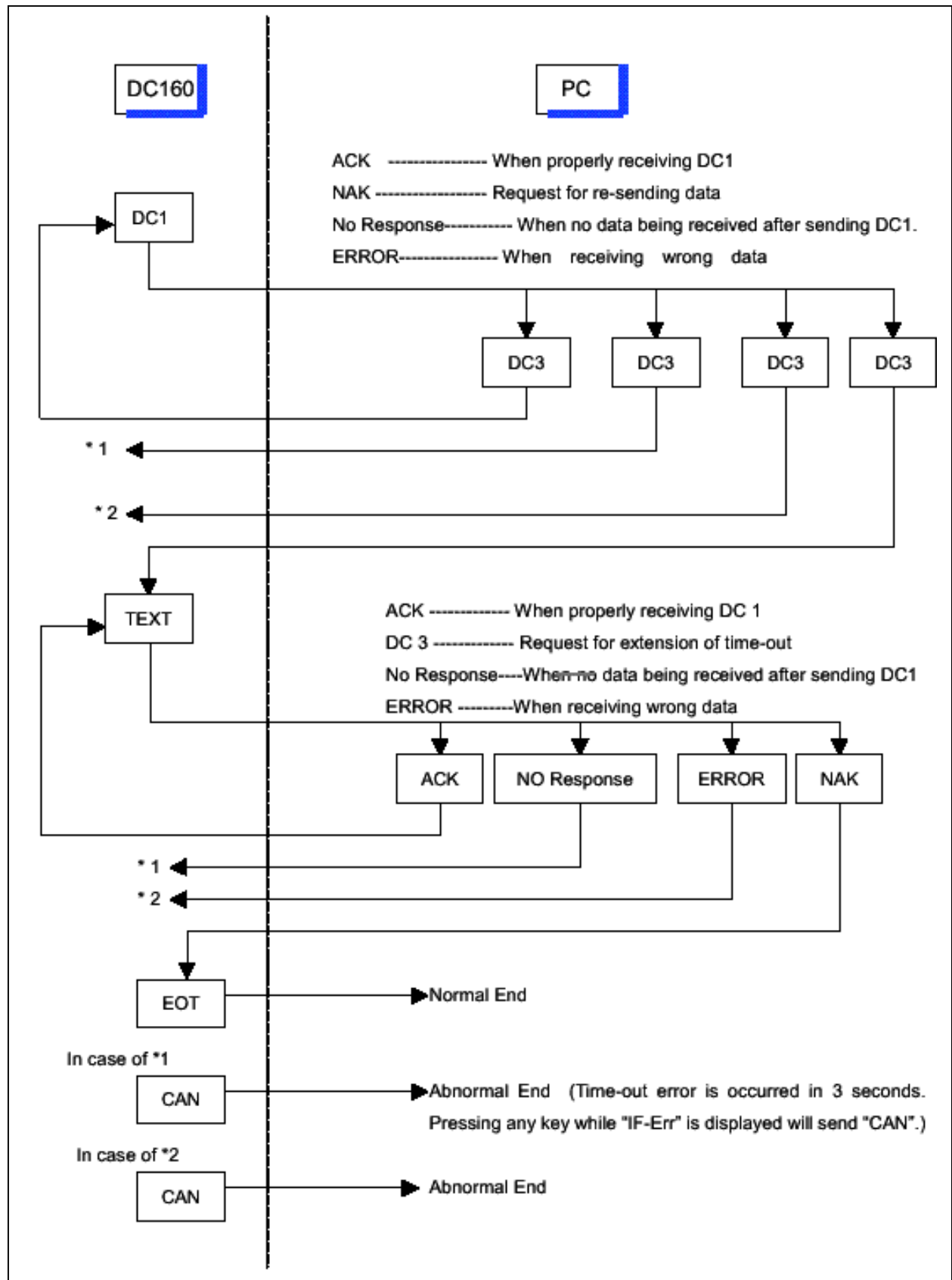
30H	30H	31H	2EH	32H	33H	30H	CR
-----	-----	-----	-----	-----	-----	-----	----

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
O 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.

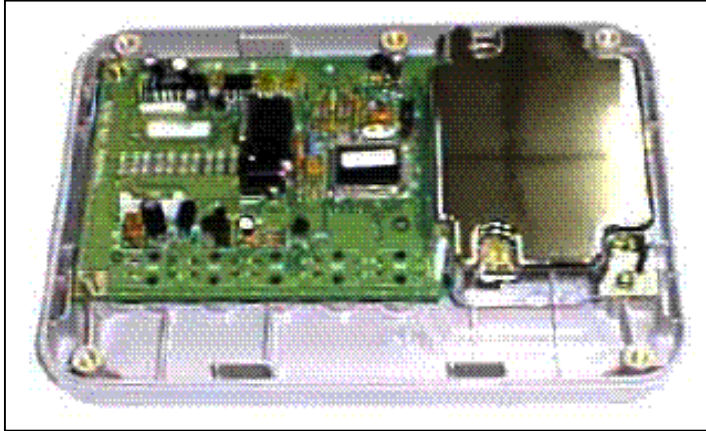
5.6. Transmission Procedures



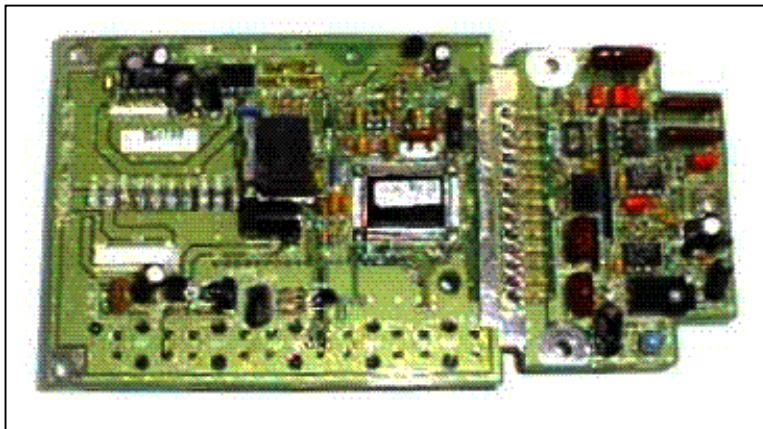
6. Disassembling

6.1. Disassembling of Indicator Block

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

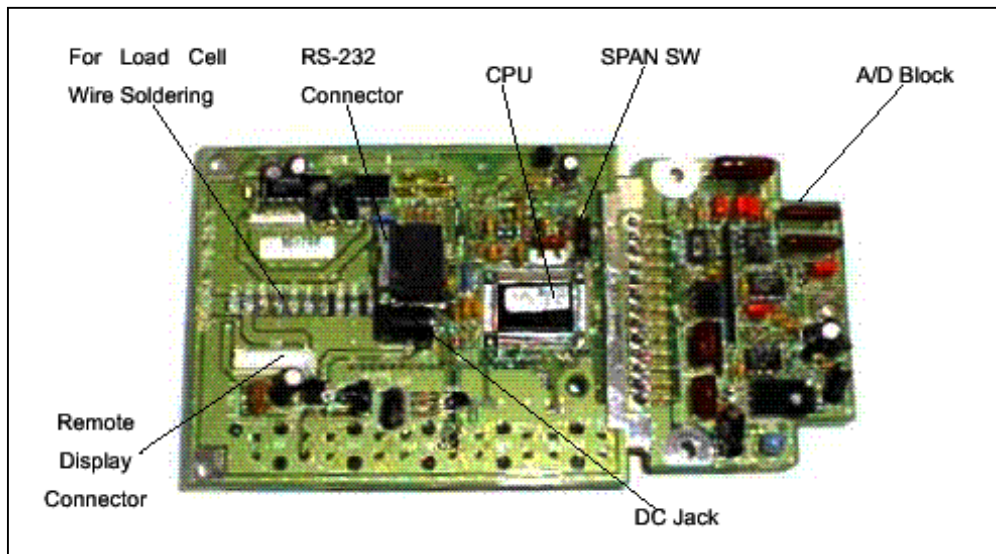


2. To remove the main PCB TPB-2574, remove 2 screws from A/D Board housing case.

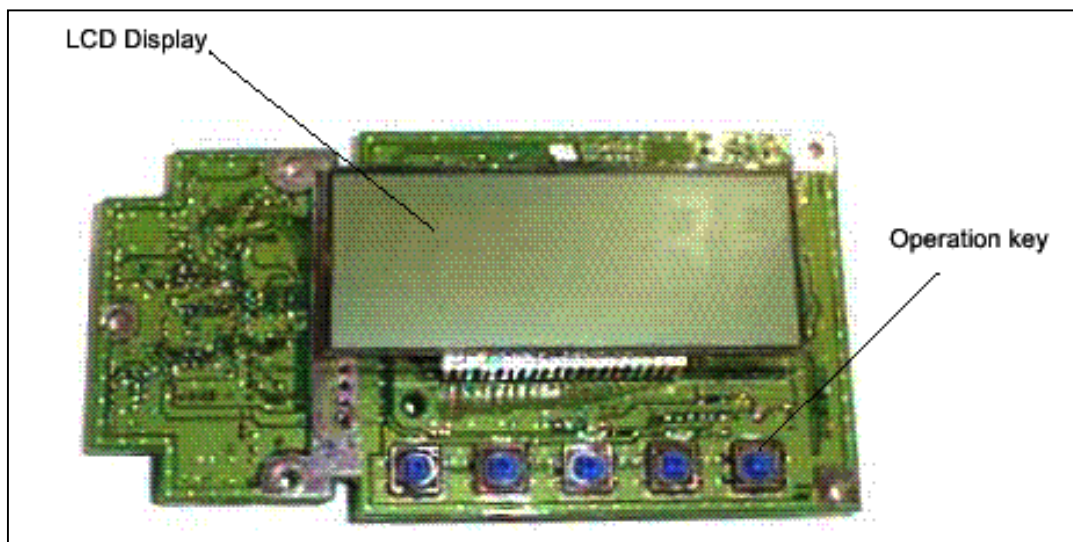


3. Remove 4 screws at the corners and 1 screw near the center of the PCB.
Then you can remove the whole PCB from the housing.

7.0. Electrical Distribution



(Component Side)



(LCD
&
Switch
Side)

8.0. SHOP NOTES:

DS-160 Limited Warranty

Rice Lake Weighing Systems (RLWS) warrants that all RLWS equipment and systems properly installed by a Distributor or Original Equipment Manufacturer (OEM) will operate per written specifications as confirmed by the Distributor/OEM and accepted by RLWS. All systems and components are warranted against defects in materials and workmanship for two (2) years.

RLWS warrants that the equipment sold hereunder will conform to the current written specifications authorized by RLWS. RLWS warrants the equipment against faulty workmanship and defective materials. If any equipment fails to conform to these warranties, RLWS will, at its option, repair or replace such goods returned within the warranty period subject to the following conditions:

- Upon discovery by Buyer of such nonconformity, RLWS will be given prompt written notice with a detailed explanation of the alleged deficiencies.
- Individual electronic components returned to RLWS for warranty purposes must be packaged to prevent electrostatic discharge (ESD) damage in shipment. Packaging requirements are listed in a publication, "Protecting Your Components From Static Damage in Shipment," available from RLWS Equipment Return Department.
- Examination of such equipment by RLWS confirms that the nonconformity actually exists, and was not caused by accident, misuse, neglect, alteration, improper installation, improper repair or improper testing; RLWS shall be the sole judge of all alleged non-conformities.
- Such equipment has not been modified, altered, or changed by any person other than RLWS or its duly authorized repair agents.
- RLWS will have a reasonable time to repair or replace the defective equipment. Buyer is responsible for shipping charges both ways.
- In no event will RLWS be responsible for travel time or on-location repairs, including assembly or disassembly of equipment, nor will RLWS be liable for the cost of any repairs made by others.

THESE WARRANTIES EXCLUDE ALL OTHER WARRANTIES, EXPRESSED OR IMPLIED, INCLUDING WITHOUT LIMITATION WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. NEITHER RLWS NOR DISTRIBUTOR WILL, IN ANY EVENT, BE LIABLE FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES.

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SHOULD THE SELLER BE OTHER THAN RLWS, THE BUYER AGREES TO LOOK ONLY TO THE SELLER FOR WARRANTY CLAIMS.

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