

# C A M B R I D G E

## SCALE WORKS INCORPORATED

### MODEL: CSW-20AT-B DIGITAL WEIGHT INDICATOR

## INSTALLATION, SET-UP & OPERATION



COC # 06-070A1



MEASUREMENT CANADA  
AM-5778C



Made in USA

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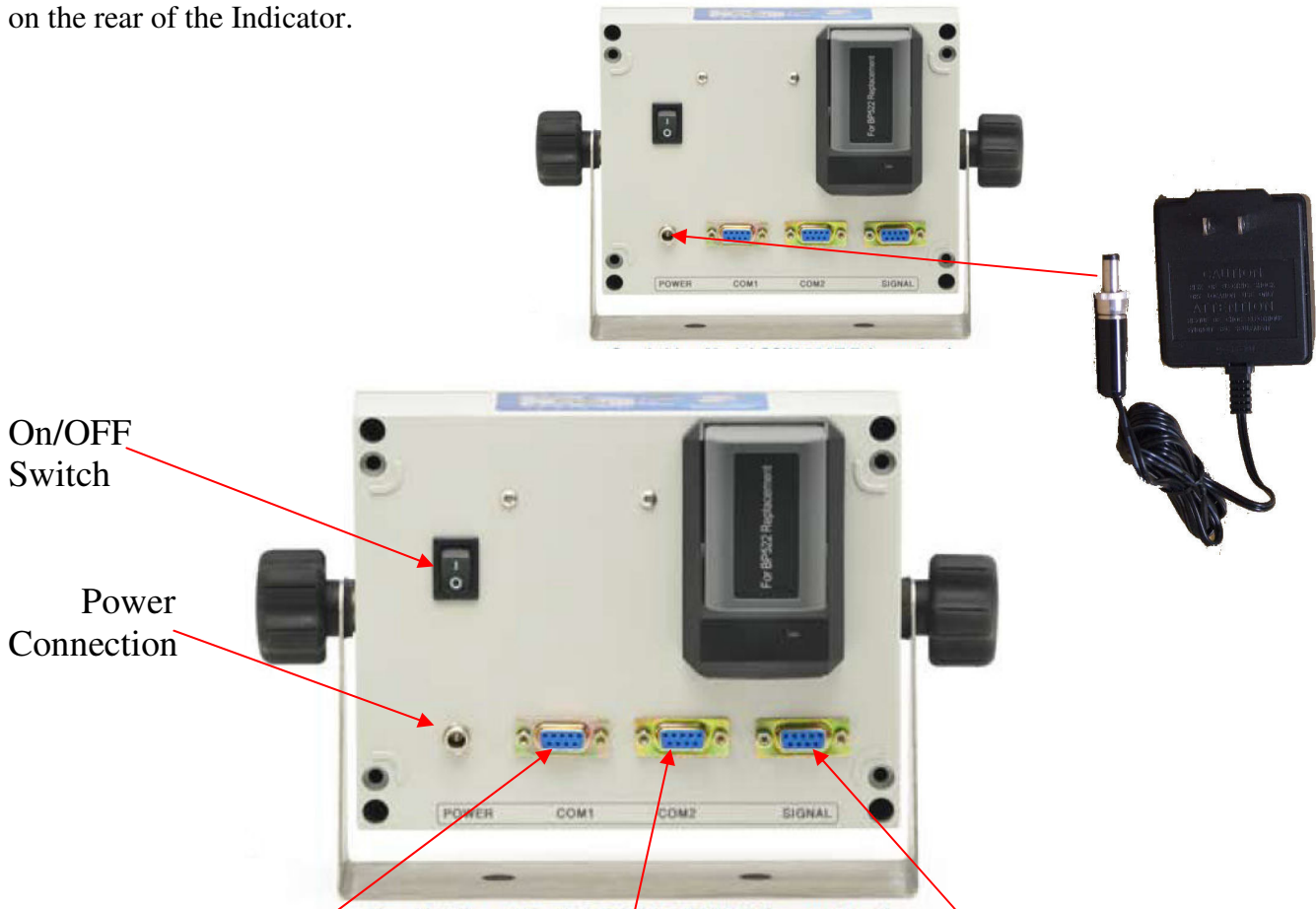
MANUAL P/N 5999-1035-00 (2/14)

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## METER CONNECTIONS

To connect power via AC wall adapter cable to the **CSW-20AT** meter. First make sure the On/Off switch on the rear of the meter is in the **OFF** position. Connect the wall adapter to a 110VAC outlet. Next, connect the other end of the cable to the power connector located on the rear of the Indicator.



On/OFF  
Switch

Power  
Connection

COM1

COM2

SIGNAL



Pin # Description

- 1 ----- Shield
- 2 ----- RXD
- 3 ----- TXD
- 4 ----- +5V
- 5 ----- SGND

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- 1 ----- Shield
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Pin # Description

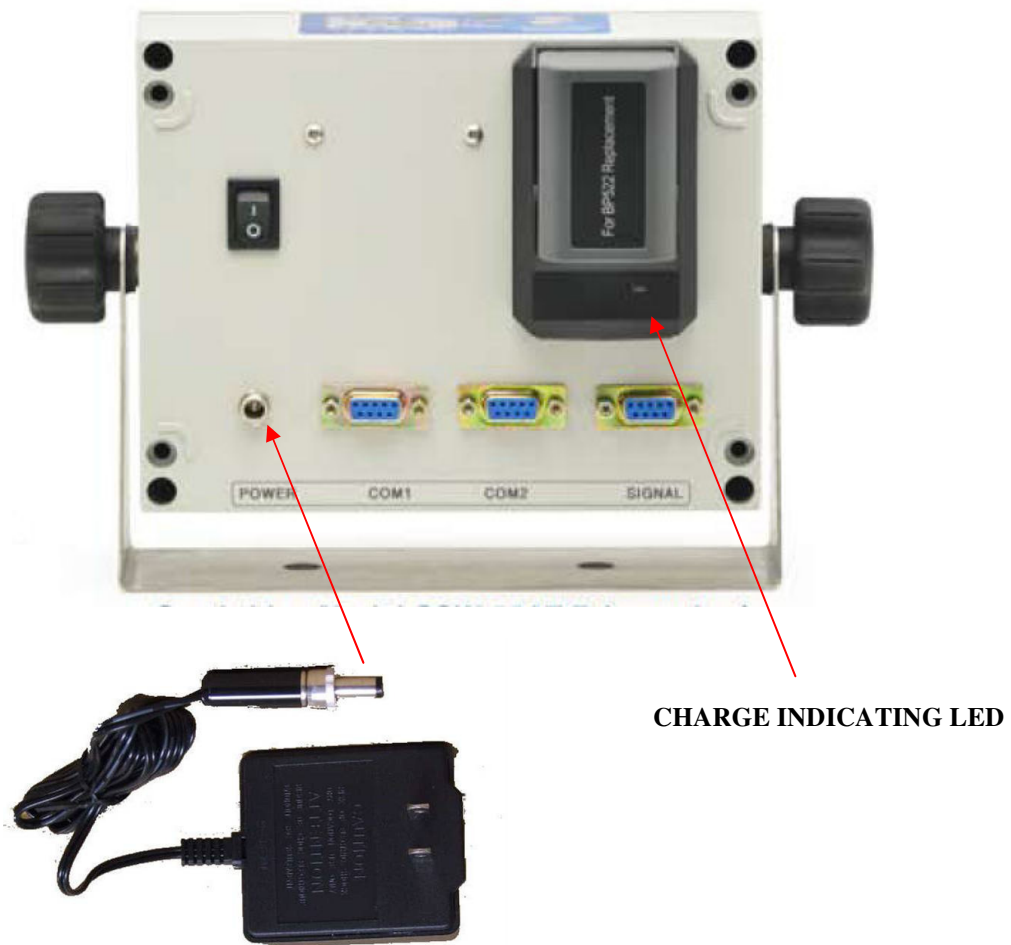
- 1 ----- +EXC
- 2 ----- -SIG
- 5 ----- Shield
- 6 ----- -EXC
- 7 ----- +SIG

# 1.0 OPERATION

## 1.1 Charging The Battery

When the battery voltage falls to 6.5VDC, as described previously, **bAt LO** will be displayed continuously. The battery needs to be charged at this time.

With the on/off switch in the OFF position, connect one end of the power adapter to a 110VAC outlet. Next connect the other end of the adapter to the power jack on the rear of the meter. The charge indicating led will be orange while the battery is being charged and turns green when the battery is fully charged. Turn the on/off switch to the ON position and the meter will be fully operational as the battery is being charged.



## 1.0 OPERATION

### 1.2 Key Functions

|                              |   |
|------------------------------|---|
| <b>Numeric Keys (0-9, .)</b> | Used to enter numeric values and choices.   |
| <b>ZERO</b>                  | Brings the scale to a zero balance reading. If the zero Key is pressed and held for 5 seconds the Calibration zero value will be displayed.   |
| <b>GRS/NET</b>               | <p>Toggles the display between Gross weight and Net weight. This key is also used to enter Setup &amp; Calibration Mode. To enter press and hold this key until the Parameter and Calibration Event counters are displayed, then release. When Code is displayed, enter in sequence TARE, lb/kg, GRS/NET, and PRINT/ENTER. The display will indicate ScAIE.</p> <p><b>Note: P xxx and C xxx are event counters that will increment each time one or more changes are made to the Scale or Calibration Parameters.</b></p>                                     |
| <b>TARE</b>                  | <p>Enter Tare weights by applying a load to the scale, then press the tare key. A Tare weight may also be entered by using the numeric keys to enter a value, then press Tare.</p> <p><b>Note: If Ntep or Angle is enabled the tare can only be keyed in when the displayed weight is in the zero band. If Non-Ntep is enabled the Tare can be entered anytime.</b></p> <p>To view the current Tare value, press and hold the tare key for 3 second. Clearing a Tare can be completed by 1.) Enter a 0 then press the Tare key or 2.) Press the zero key.</p> |
| <b>Lb/kg</b>                 | Toggles the display between pounds and kilograms.   |
| <b>PIECE COUNTING</b>        | When adding piece weight, use the numeric keypad to enter the weight value (with a decimal place) then press Piece/count. When adding the number of pieces, use the numeric keypad to enter a whole number (with no decimal place then press the Piece/Count key. Pressing the Piece/Count key will toggle between pieces and the average piece weight display.   |
| <b>PIECE COUNTING</b>        | Press GRS/NET to switch to weighing mode and PIECE/COUNT key to view the piece count. Enter 0 and press PIECE/COUNT to clear the piece weight.  |
| <b>TOTAL</b>                 | With a weight on the scale press the TOTAL key to total the weight. Enter 0 and press the TOTAL key to display the current total. When TOTAL is pressed while the displayed weight is in the zero band, the current total will be displayed, printed and cleared.   |

**ID** When the ID key is pressed, the last 6 digits of an ID number will be displayed. To clear an ID number press ID then while the current ID number is displayed press Zero. To enter a new ID number, press the ID key and enter a value up to 20 digits then press PRINT/ENTER. If a barcode scan is received on COM2 (02h, up to 20 ASCII characters, 0dh, 0ah) the alphanumeric value will be stored in the ID. The ID No. will be cleared after the total is cleared or ZERO is pressed. ID No. will be printed just under the time and date. If the ID No. is "0" this line will not be printed.

**SET/POINT (Optional)** Press the SET/POINT key then the up arrow, to set the upper limit. Set hi will be displayed then "0" will be displayed. Using the numeric keypad, enter the desired value and press the PRINT/ENTER key. Press the SET/POINT key then the up arrow, to set the lower limit. Set Lo will be displayed then "0" will be displayed. Using the numeric keypad, enter the desired value and press the PRINT/ENTER key. **If "0" is entered for the upper or lower limit, the Setpoint option will be disabled.**

### 1.3 Error Messages:

**ScnEg** When the weight is more than 10 divisions negative from the zero calibration point.

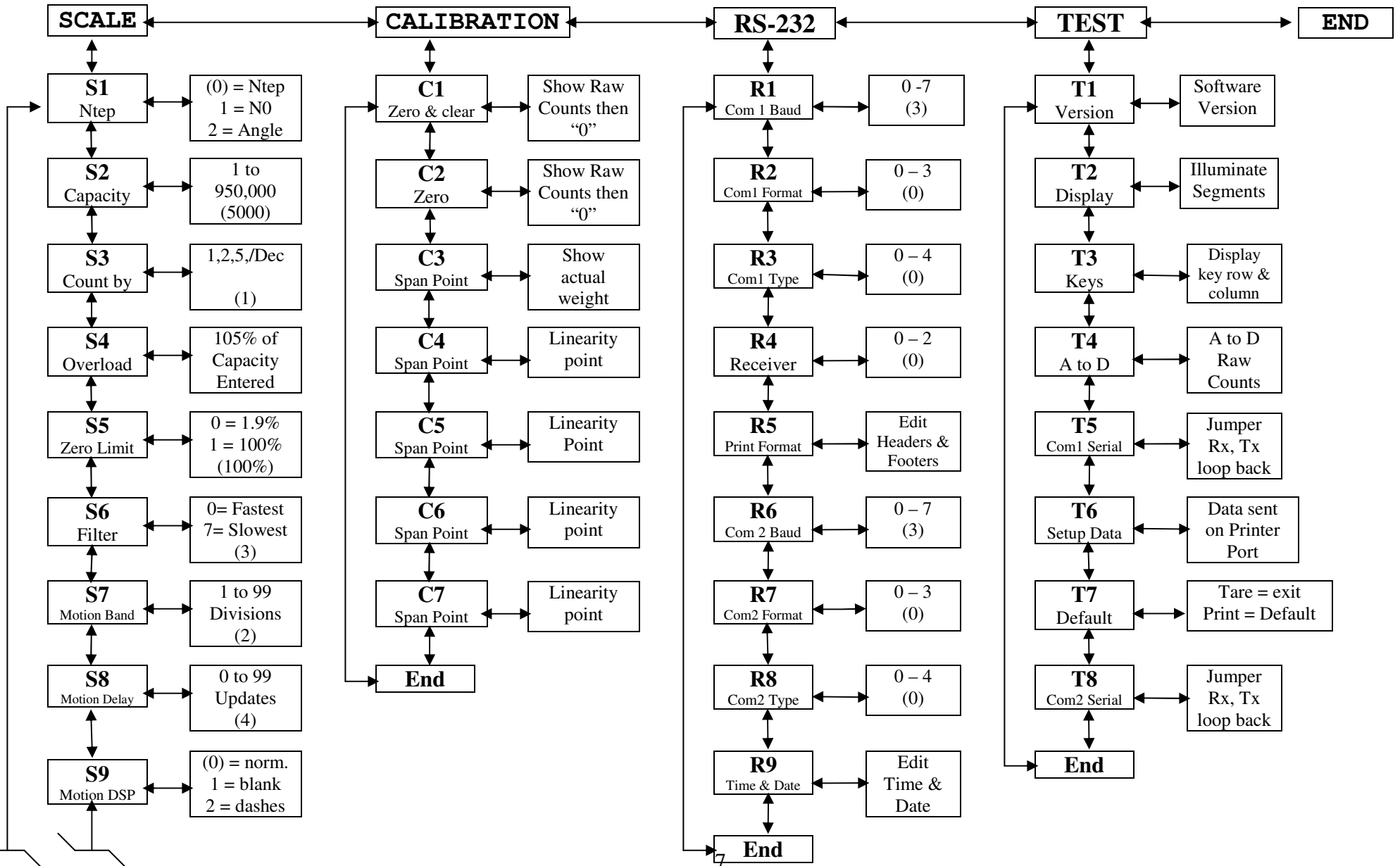
**OLD** The scale is in an overload condition.

**BAtLo** Will flash when the battery voltage falls to 10.8VDC and will be displayed constantly when the voltage falls to 10.2VDC.

**Err d** More than 5000 scale divisions have been selected in S1Ntep or S1 Angle mode. More than 20,000 scale divisions have been selected in S1 No Mode.

----- Displayed when an entry was not accepted.

## 2.0 SCALE PROCEDURE: 2.1 Software Navigation Flowchart

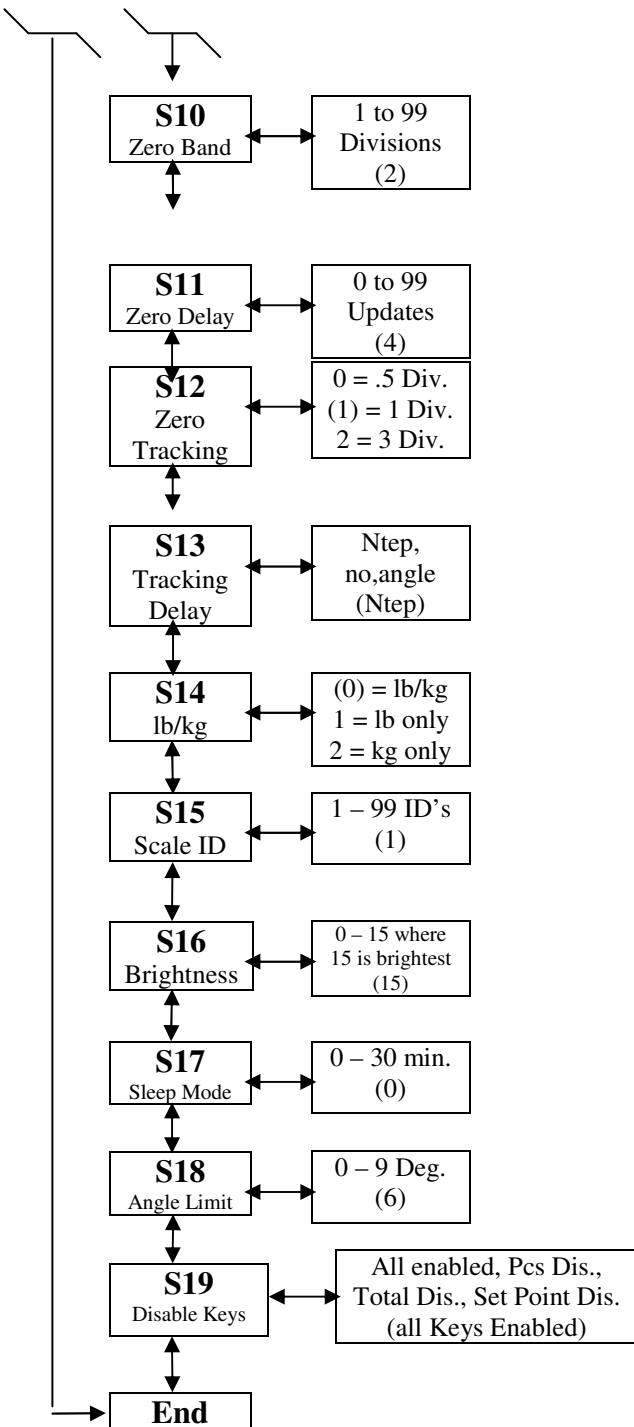


## 2.1 Software Navigation Flowchart



During setup you will be required to enter choices and numeric values. Enter These values using the numeric keys on the keypad. Next navigate the flowchart By using the keys described below.

ZERO ----- Key is used to move up.  
 GRS/NET ----- Key is used to move down.  
 lb/kg ----- Key is used to move right.  
 TARE ----- Key is used to move left.  
 PRINT/ENTER --- Key is used to enter data.





## 2.2 Scale Menu Definitions:

Enter Calibration / Setup mode by Pressing and holding the GRS/NET key until Parameter and calibration event counters are displayed, then release the key. When code is displayed, enter in sequence TARE, lb/kg, GRS/NET, and PRINT/ENTER. ScAlE will be displayed. Press the down arrow key to enter the scale menu. Press the right arrow key to enter each sub menu.

-P xxx, C xxx are event counters that will increment each time one or more changes are made to the Scale or Calibration Parameters.

- |                        |   |
|------------------------|---|
| <b>S1 Ntep</b>         | <b>0</b> Non-Ntep mode 20,000 maximum division limit and no scale negative tests.<br><b>1</b> NTEP mode (Default)<br><b>2</b> Angle mode. Press the right arrow key to enter. use the numeric keypad to enter the desired selection (0,1, or 2), then press the PRINT/ENTER key to save and exit. S1 will be displayed. |
| <b>S2 Capacity</b>     | 1 to 950,000 pounds. 5000 (Default) Press the right arrow key to enter. use the numeric keypad to enter the desired capacity then press the PRINT/ENTER key to save and exit. S2 will be displayed.   |
| <b>S3 Count By</b>     | .001, .01, .1, 1, .002, .02, .2, 2, .005, .05, .5, 5. 1(default) Use the up and down arrow keys to choose the count by. Use the left and right arrow keys to choose the decimal place, then press the PRINT/ENTER key to save and exit. S3 will be displayed.   |
| <b>S4 Overload</b>     | (105%) of the scale capacity. Press the right arrow key to enter. Use the numeric keypad to enter the desired safe overload then press the PRINT/ENTER key to save and exit. S4 will be displayed.  |
| <b>S5 Zero Limit</b>   | <b>0</b> 1.9%<br><b>1</b> 100% (Default) Press the right arrow key to enter. use the numeric keypad To enter the desired selection (0 or 1), then press the PRINT/ENTER key to save and exit. S5 will be displayed.   |
| <b>S6 Filter</b>       | 0 to 7, Where 0 is the fastest response and least filtering And 7 is the slowest response or most filtering. 3 (Default) Press the right arrow key to enter. Use the numeric keypad to enter the value, then Press the PRINT/ENTER key to save and exit. S6 will be displayed.  |
| <b>S7 Motion Band</b>  | 1 to 99 divisions. The weight display must be stable within the selected number of divisions for the motion indicator to be turned off. 2 (Default) Press the right arrow key to enter. Use the numeric keypad to enter the value, then press the PRINT/ENTER key to and exit. S7 will be displayed.                    |
| <b>S8 Motion Delay</b> | 0 to 99 updates. The weight display must be within the motion band for the selected number of updates in order to turn off the motion indicator. 4 (Default) Press the right arrow key to enter. Use the numeric keypad enter the value, then press the PRINT/ENTER key to save and exit. S7 will be displayed.         |

- S9 Motion Display**
- 0** Normal (Default)
  - 1** Blank
  - 2** Dashes
- Press the right arrow key to enter. Use the numeric keypad to enter the desired selection (0, 1, or 2), then press the PRINT/ENTER key to save and exit. S9 will be displayed.
- S10 Zero Band** 1 to 99 divisions. The weight display must return to zero within the selected number of divisions to be considered zero. 2 (Default) Press the right arrow key to enter. Use the numeric keypad to enter the value, then press the PRINT/ENTER key to save and exit. S10 will be displayed.
- S11 Zero Delay** 0 to 99 updates. The weight display must be within the zero band for the selected number of updates to be considered zero. 4 (Default) Press the right arrow key to enter. Use the numeric keypad to enter the value, then press the PRINT/ENTER key to save and exit. S11 will be displayed.
- S12 Zero Tracking**
- 0** 0.5 divisions.
  - 1** 1 division. (Default)
  - 2** 3 division
- Press the right arrow key to enter. Use the numeric keypad to enter the desired selection (0, 1, or 2), then press the PRINT/Enter key to save and exit. S12 will be displayed.
- S13 Tracking Delay** 0 to 99 updates. The amount of time that the display within the allowed graduations before it will automatically be zeroed. 0 (Default) Press the right arrow key to enter. Use the numeric keypad to enter the value, then press the PRINT/ENTER key to save and exit. S13 will be displayed.
- S14 lb/kg**
- 0** lb/kg (Default)
  - 1** lb only
  - 2** kg only
- Press the right arrow key to enter. Use the keypad to enter the selection (0, 1, or 2), then press the PRINT/ENTER key to save and exit. S14 will be displayed.
- S15 Scale ID** 1 to 99 Scale ID used in RF link output. 1 (Default) Press the right arrow key, and use the keypad to enter a value, then press the PRINT/ENTER key. S15 will be displayed.
- S16 Brightness** 0 to 15. Adjusts the LED display intensity where 15 is the brightest. 15 (Default) Press the right arrow key to enter. Use the up and down arrow keys to increase or decrease the brightness, then press the PRINT/ENTER key to save and exit. S16 will be displayed.
- S17 Sleep Mode** 0 to 30 minutes. The display will turn off after the set time elapses, with no scale activity. 0 (Default). Press the right arrow key to enter. Use the numeric keypad to enter the value, then press the PRINT/ENTER key to save and exit. S17 will be displayed.

- S18 Angle Limit** 0 to 9 Degrees. 6 (Default). Press the right arrow key, and use the keypad to enter a value, then press the PRINT/ENTER. S18 will be displayed.
- S19 Disable Keys**
- 0** All keys enabled (Default)
  - 1** Pieces disabled
  - 2** Total disabled
  - 3** Setpoint entry disabled (setpoint will still function).
  - 4** Pieces, Total and Setpoint disabled.
  - 5** All keys but ZERO and PRINT/ENTER will be disabled. Press the right arrow key, and Use the keypad to enter a selection (0, 1, 2, 3,4, or 5 ), then press the PRINT/ENTER key to save and exit. S19 will be displayed.

### 3.0 CALIBRATION PROCEDURE:

#### 3.1 Calibration Menu Definitions:

- C1 Zero All** Raw counts, (Pitch and Roll if in angle mode) will be displayed. When ZERO is pressed an analog zero is done and all calibration span points will be cleared. If the indicator is in angle mode the Pitch and Roll offsets will also be Zeroed.
- C2 Zero** Zeroed raw counts, (Pitch and Roll if in angle mode) will be displayed. When ZERO is pressed an analog zero is done and all calibration span points will NOT be cleared. If the indicator is in angle mode the Pitch and Roll offsets will be Zeroed.
- C3 Span Point** The last Calibration weight will be displayed then the actual weight on the scale will be displayed. **If you do not wish to change the span point, press the TARE key to exit without making any changes.** If the displayed weight does not match the known test weight, use the numeric keypad to enter the correct weight. Press the PRINT/ENTER key to save and exit. The display will return to C3.
- C4-C7 Span Points** C4 to C7 are for linearity correction. They can be used in order and in any quantity or not at all if no correction is necessary to C7 may be entered at any time without effecting the original calibration points. The last calibration weight will be displayed then the actual weight on the scale will be displayed. If no calibration weight has been entered at this span point “notset” will be displayed then the actual weight on the scale is displayed. If the displayed weight does not match the known test weight, follow the steps described for C3 Span Point on adjusting the weight and entering the value.

#### 3.2 Calibration:

Press and hold the GRS/NET key, as described previously in section 2.2. ScAIE Will be displayed. Press the lb/kg key to move right until Callb is displayed. Press the GRS/NET key to move down, C1 will be displayed. Press the lb/kg key to move right, The raw counts will be displayed. With no weight on the scale and the scale level, press the ZERO key, “0” will be displayed. Press the PRINT/ENTER key to save the Entry. “0” is now entered and the display will return to C1.

## 3.2 Calibration Continued:

Press the GRS/NET key to move down until C3 is displayed. Press the lb/kg key to enter. The last calibrated weight will flash then the current weight on the scale is displayed. Place a known test weight on the scale, with the scale level. Using the numeric keypad, enter the actual weight and press the PRINT/ENTER key to save and exit. The display will return to C3.

## 3.3 Linearity Correction

If Linearity Correction is needed, Press the GRS/NET key (from the Calibration menu) to move down until C4 is displayed. Press the lb/kg key to move right, the last calibrated weight will flash or “notset” will flash if this point has not been previously set. Next the current weight on the scale will be displayed. Place a different known test weight (not the same test weight that was used for C3) on the scale. Using the numeric keypad, enter the actual weight and press the PRINT/ENTER key to save and exit. The display will return to C4. Repeat these steps for C5, C6 and C7.

Linearity Correction points (C4-C7) can be used in any order and in any quantity or not at all if no correction is necessary. After calibration is complete you may return to these correction points and make changes to its value without affecting any of the original calibration points.

## 3.4 Quick Calibration

- I. With no weight on the scale.
  - A. Enter Setup / Calibration mode as described previously in the beginning Of section 2.2. “Scale” will be displayed.
  - B. Press the lb/kg key. “CALibr” will be displayed.
  - C. Press the GRS/NET key until “C2” is displayed.
  - D. Press the lb/kg Key to enter C2. The zero Calibration number will be displayed.
  - E. Press the ZERO key. “0” will be displayed.
  - F. Press the PRINT/ENTER key to enter the new zero calibration. “C2” will be displayed.
  - G. Press the GRS/NET key. “C3” will be displayed.
  - H. Press the lb/kg key to enter C3. The last span weight will flash, then the current weight on the scale will be displayed.
- II. Place a known weight, as close to the capacity as possible, on the scale.
  - A. Using the numeric keypad enter the correct value for the known weight.
  - B. Press the PRINT/ENTER key to enter the new calibration. “C3” will be displayed.
  - C. Press the TARE key. “End?” will be displayed.
  - D. Press the PRINT/ENTER key to exit Setup / Calibration mode.

### 3.5 Quick Calibration Linearity Correction

- I. With no weight on the scale.
  - A. Enter Setup / Calibration mode as described previously in the beginning of section 2.2. "Scale" will be displayed.
  - B. Press the lb/kg key. "CALibr" will be displayed.
  - C. Press the GRS/NET key until C4 is displayed.
  - D. Press the lb/kg key to enter C4. "nOtset" or the last calibrated weight will flash, then the current weight on the scale will be displayed.
- II. Place a known weight on the scale.
  - A. Using the numeric keypad enter the correct value for the known weight.
  - B. Press the PRINT/ENTER key to enter the new calibrated linearity correction point. "C4" will be displayed.
  - C. Press the TARE key. "End?" will be displayed
  - D. Press the PRINT/ENTER key to exit Setup / Calibration mode.

If additional Linearity correction points are desired, Follow the steps above for C5, C6, and/or C7.

## 4.0 COMMUNICATIONS SETUP

### 4.1 Communications Menu Definitions:

|           |                  |          |  |
|-----------|------------------|----------|--|
| <b>R1</b> | <b>Baud Rate</b> | <b>0</b> | 1200   |
|           | <b>COM1</b>      | <b>1</b> | 2400   |
|           |                  | <b>2</b> | 4800   |
|           |                  | <b>3</b> | 9600 (Default)   |
|           |                  | <b>4</b> | 19200  |
|           |                  | <b>5</b> | 38400  |
|           |                  | <b>6</b> | 57600  |
|           |                  | <b>7</b> | 115200   |
|           |                  |          | Press the right arrow key to enter. use the numeric keypad to enter the desired selection (0 - 7), then press the PRINT/ENTER key to save and exit. R1 will be displayed.            |
| <b>R2</b> | <b>Output</b>    | <b>0</b> | Gross, Tare, Net (Default)   |
|           | <b>Format</b>    | <b>1</b> | Weight only  |
|           | <b>COM1</b>      | <b>2</b> | Net only   |
|           |                  | <b>3</b> | Gross only press the right arrow key to enter. use the numeric keypad to enter the desired selection (0 - 3), then press the PRINT/ENTER key to save and exit. R2 will be displayed. |
| <b>R3</b> | <b>Output</b>    | <b>0</b> | Output on command. Standard Print. (Default)   |
|           | <b>Type</b>      |          | Output as selected by R2 Output Format. If "Q" is received on the serial port the scale will output the same as if the print key is pressed. The same holds true for Z = ZERO        |
|           | <b>COM1</b>      |          | U = lb/kg,<br>D = GRS/NET<br>T = TARE  |

- 1 Slave Display output (numeric only) continuous Stx, Six ASCII Characters (indicated weight), CR, LF (9 Bytes total Output).
- 2 Slave Display output (alphanumeric) continuous Stx, GR, NT, or TR, Six ASCII Characters (indicated weight), lb, kg, CR, LF (15 Bytes total output).
- 3 RF Link Output.
- 4 Used for QSI Terminal. Press the right arrow key to enter. use the numeric keypad to enter the desired selection (0 - 4), then press the PRINT/ENTER key to save and exit. R3 will be displayed.

- R4 Receiver**
- 0 Disabled (Normal Scale Mode). (Default)
  - 1 Standard Receiver. Receives R3-3 RF Link output string data as it appears on the scale. All keys are disabled with the exception of the PRINT/ENTER key.
  - 2 Remote control. Receives R3-3 RF Link output string displaying data as it appears on the scale and allows full control of all scale meter functions.

**R5 Printer Format**

While R5 is being displayed press 1, 2 or 3 to edit the 3 (30 character) header lines that will be printed at the top of each ticket. Press 1, r5 1 will be displayed, then 01 000 is displayed. This is the first character of line 1. Edit by using the numeric keypad to enter the 3 digit code for the character of choice (Codes are shown in table 4.1 on the following page). After entering the code, the display will advance to the next character to be edited. The left and right arrow keys can be used to go back and adjust codes that have been entered incorrectly. When the code is entered, press PRINT/ENTER to save the data. The display will return to R5. Follow these steps to edit lines 2 and 3. A sample header, footer worksheet, and sample tickets are shown in figure 4.1 page 16-18. If a line is cleared, no other line will be printed below it. An entire line can be cleared by entering the desired line pressing the ZERO key then press the PRINT/ENTER Key. The display will return to R5 and the line is cleared. While R5 is being displayed press 4 to edit the footer line that will be printed at the bottom of each ticket. Use the steps described above to edit this line. If this line is cleared nothing will be printed.

- R6 Baud Rate COM2**
- 0 1200
  - 1 2400
  - 2 4800
  - 3 9600 (Default)
  - 4 19200
  - 5 38400
  - 6 57600
  - 7 115200
- Press the right arrow key to enter. use the numeric keypad enter the desired selection (0 - 7), then press the PRINT/ENTER key to save and exit. R6 will be displayed.

## 4.1 Communications Menu Definitions Continued:

**TABLE 4.1**

|           |           |             |          |          |          |           |             |              |             |          |          |          |
|-----------|-----------|-------------|----------|----------|----------|-----------|-------------|--------------|-------------|----------|----------|----------|
| <b>LF</b> | <b>CR</b> | <b>(sp)</b> | <b>!</b> | <b>“</b> | <b>#</b> | <b>\$</b> | <b>%</b>    | <b>&amp;</b> | <b>‘</b>    | <b>(</b> | <b>)</b> | <b>*</b> |
| 010       | 013       | 032         | 033      | 034      | 035      | 036       | 037         | 038          | 039         | 040      | 041      | 042      |
| <b>+</b>  | <b>,</b>  | <b>-</b>    | <b>.</b> | <b>/</b> | <b>:</b> | <b>;</b>  | <b>&lt;</b> | <b>=</b>     | <b>&gt;</b> | <b>?</b> | <b>@</b> |          |
| 043       | 044       | 045         | 046      | 047      | 058      | 059       | 060         | 061          | 062         | 063      | 064      |          |

|          |          |          |          |          |          |          |          |          |          |  |
|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|--|
| <b>0</b> | <b>1</b> | <b>2</b> | <b>3</b> | <b>4</b> | <b>5</b> | <b>6</b> | <b>7</b> | <b>8</b> | <b>9</b> |  |
| 048      | 049      | 050      | 051      | 052      | 053      | 054      | 055      | 056      | 057      |  |

|          |          |          |          |          |          |          |          |          |          |          |          |          |
|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|
| <b>A</b> | <b>B</b> | <b>C</b> | <b>D</b> | <b>E</b> | <b>F</b> | <b>G</b> | <b>H</b> | <b>I</b> | <b>J</b> | <b>K</b> | <b>L</b> | <b>M</b> |
| 065      | 066      | 067      | 068      | 069      | 070      | 071      | 072      | 073      | 074      | 075      | 076      | 077      |
| <b>N</b> | <b>O</b> | <b>P</b> | <b>Q</b> | <b>R</b> | <b>S</b> | <b>T</b> | <b>U</b> | <b>V</b> | <b>W</b> | <b>X</b> | <b>Y</b> | <b>Z</b> |
| 078      | 079      | 080      | 081      | 082      | 083      | 084      | 085      | 086      | 087      | 088      | 089      | 090      |

|          |          |          |          |          |          |          |          |          |          |          |          |          |
|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|
| <b>a</b> | <b>b</b> | <b>c</b> | <b>d</b> | <b>e</b> | <b>f</b> | <b>g</b> | <b>h</b> | <b>i</b> | <b>j</b> | <b>k</b> | <b>l</b> | <b>m</b> |
| 097      | 098      | 099      | 100      | 101      | 102      | 103      | 104      | 105      | 106      | 107      | 108      | 109      |
| <b>n</b> | <b>o</b> | <b>p</b> | <b>q</b> | <b>r</b> | <b>s</b> | <b>t</b> | <b>u</b> | <b>v</b> | <b>w</b> | <b>x</b> | <b>y</b> | <b>z</b> |
| 110      | 111      | 112      | 113      | 114      | 115      | 116      | 117      | 118      | 119      | 120      | 121      | 122      |

- R7 Output Format COM2**
- 0** Gross, Tare, Net (Default)
  - 1** Weight only
  - 2** Net only
  - 3** Gross only

Press the right arrow key to enter. use the numeric keypad to enter the desired selection (0 - 3), then press the PRINT/ENTER key to save and exit. R7 will be displayed.

- R8 Output**
- 0** Output on command. Standard Print. (Default)

**Type  
COM2**

Output as selected by R2 Output Format. If “Q” is received on the serial port the scale will output the same as if the print key is pressed. The same holds true for Z = ZERO

U = lb/kg,

D = GRS/NET

T = TARE

- 1 Slave Display output (numeric only) continuous Stx, Six ASCII Characters (indicated weight), CR, LF (9 Bytes total Output).
- 2 Slave Display output (alphanumeric) continuous Stx, GR, NT, or TR, Six ASCII Characters (indicated weight), lb, kg, CR, LF (15 Bytes total output).
- 3 RF Link Output.
- 4 Used for QSI Terminal.

Press the right arrow key to enter. use the numeric key to enter the desired selection (0 - 3), then press the PRINT/ENTER key to save and exit. R8 will be displayed.

**R9 Time & Date**

While R9 is being displayed press 1. r9 1 will be displayed, then the date. To change the dated, use the numeric keypad to enter the Month first, then enter the day of the month, and Last enter the year. Then press PRINT/ENTER. The display Will return to r 9. While R9 is being displayed press 2. r9 2 will be displayed, then the time. To change the time, use the numeric keypad, enter the hour first then enter the minutes (in 24 hr., format) and press PRINT/ENTER. The display will return to R9.



Figure 4.1

4.1.a Completed Worksheet

**Header message work sheet**

|     |     |     |     |     |     |     |     |     |      |     |     |     |     |     |      |     |     |     |     |     |      |     |     |     |    |    |    |    |    |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|-----|-----|-----|-----|-----|------|-----|-----|-----|-----|-----|------|-----|-----|-----|----|----|----|----|----|
| 01  | 02  | 03  | 04  | 05  | 06  | 07  | 08  | 09  | 10   | 11  | 12  | 13  | 14  | 15  | 16   | 17  | 18  | 19  | 20  | 21  | 22   | 23  | 24  | 25  | 26 | 27 | 28 | 29 | 30 |
| 067 | 097 | 109 | 098 | 114 | 105 | 100 | 103 | 101 | 032  | 083 | 099 | 097 | 108 | 101 | 032  | 087 | 111 | 114 | 107 | 115 | 032  | 073 | 110 | 099 |    |    |    |    |    |
| C   | a   | m   | b   | r   | i   | d   | g   | e   | (sp) | S   | c   | a   | l   | e   | (sp) | W   | o   | r   | k   | s   | (sp) | I   | n   | c   |    |    |    |    |    |

|     |     |     |     |     |      |     |     |     |     |     |     |     |      |     |     |     |     |      |     |     |    |    |    |    |    |    |    |    |    |
|-----|-----|-----|-----|-----|------|-----|-----|-----|-----|-----|-----|-----|------|-----|-----|-----|-----|------|-----|-----|----|----|----|----|----|----|----|----|----|
| 01  | 02  | 03  | 04  | 05  | 06   | 07  | 08  | 09  | 10  | 11  | 12  | 13  | 14   | 15  | 16  | 17  | 18  | 19   | 20  | 21  | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 |
| 049 | 049 | 053 | 048 | 048 | 032  | 066 | 101 | 100 | 102 | 111 | 114 | 099 | 032  | 082 | 111 | 097 | 100 | 032  | 078 | 069 |    |    |    |    |    |    |    |    |    |
| 1   | 1   | 5   | 0   | 0   | (sp) | B   | e   | d   | f   | o   | r   | d   | (sp) | R   | o   | a   | d   | (sp) | N   | E   |    |    |    |    |    |    |    |    |    |

|     |     |     |     |     |     |     |     |     |     |      |     |     |      |     |     |     |     |     |    |    |    |    |    |    |    |    |    |    |    |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|-----|-----|------|-----|-----|-----|-----|-----|----|----|----|----|----|----|----|----|----|----|----|
| 01  | 02  | 03  | 04  | 05  | 06  | 07  | 08  | 09  | 10  | 11   | 12  | 13  | 14   | 15  | 16  | 17  | 18  | 19  | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 |
| 067 | 117 | 109 | 098 | 101 | 114 | 108 | 097 | 110 | 100 | 032  | 077 | 068 | 032  | 050 | 049 | 053 | 048 | 050 |    |    |    |    |    |    |    |    |    |    |    |
| C   | u   | m   | b   | e   | r   | l   | a   | n   | d   | (sp) | M   | D   | (sp) | 2   | 1   | 5   | 0   | 2   |    |    |    |    |    |    |    |    |    |    |    |

**Footer message work sheet**

|     |     |     |     |      |     |     |      |     |      |     |     |      |     |     |     |     |     |     |     |     |     |      |     |     |     |     |     |     |    |
|-----|-----|-----|-----|------|-----|-----|------|-----|------|-----|-----|------|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|-----|-----|-----|-----|-----|-----|----|
| 01  | 02  | 03  | 04  | 05   | 06  | 07  | 08   | 09  | 10   | 11  | 12  | 13   | 14  | 15  | 16  | 17  | 18  | 19  | 20  | 21  | 22  | 23   | 24  | 25  | 26  | 27  | 28  | 29  | 30 |
| 084 | 104 | 105 | 115 | 032  | 073 | 115 | 032  | 065 | 032  | 051 | 048 | 032  | 067 | 104 | 097 | 114 | 097 | 067 | 116 | 101 | 114 | 032  | 070 | 111 | 111 | 116 | 101 | 114 |    |
| T   | h   | i   | s   | (sp) | I   | s   | (sp) | A   | (sp) | 3   | 0   | (sp) | C   | h   | a   | r   | a   | c   | t   | e   | r   | (sp) | F   | o   | o   | t   | e   | r   |    |

# 4.1.b Blank Worksheet

## Header message work sheet

|    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |  |
|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|--|
| 01 | 02 | 03 | 04 | 05 | 06 | 07 | 08 | 09 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 |  |
|    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |  |

|    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |  |
|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|--|
| 01 | 02 | 03 | 04 | 05 | 06 | 07 | 08 | 09 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 |  |
|    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |  |

|    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |  |
|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|--|
| 01 | 02 | 03 | 04 | 05 | 06 | 07 | 08 | 09 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 |  |
|    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |  |

## Footer message work sheet

|    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |  |
|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|--|
| 01 | 02 | 03 | 04 | 05 | 06 | 07 | 08 | 09 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 |  |
|    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |  |

### Figure 4.1.c Sample Ticket

Cambridge Scale Works Inc  
11500 Bedford Road NE  
Cumberland MD 21502  
3:45 pm 05/15/2007

Id# 1234567890

Gross(lb): 1200  
Tare(lb): 200  
Net(lb): 1000

Avg Pc Wt(lb) .500000  
Pieces 2000

Weigh From Scale S/N: 07-12730

### Figure 4.1.d Sample Ticket

Cambridge Scale Works Inc  
11500 Bedford Road NE  
Cumberland MD 21502  
3:45 pm 05/15/2007

Wt# 1 550  
Wt# 2 450  
Total wt. 1000 lb

Avg Pc Wt(lb) .500000  
Pieces 2000

**If the average piece weight is 0 then the Average Piece weight and Pieces will not be Printed on the tickets.**

## 5.0 TESTING PROCEDURES

### 5.1 Testing Menu Definitions:

|                            |   |
|----------------------------|---|
| <b>T1 Software Version</b> | Displays the software version. Press PRINT/ENTER to exit.   |
| <b>T2 Display</b>          | Flashes all display segments then all indicating Enunciators. Press PRINT/ENTER to exit.  |
| <b>T3 Keys</b>             | Press each key to display the row and column of that key. Press the PRINT/ENTER to exit.  |
| <b>T4 A to D</b>           | Displays Raw counts where a 1mV/V signal from the scale will display 25,000 counts. When the indicator is in angle mode, Press the GRS/NET key to cycle Pitch, Roll and Raw counts. Press the PRINT/ENTER Key to exit.  |
| <b>T5 Serial COM1</b>      | Serial Communications can be verified by connecting pins 2 and 3 on the serial port. A single character will be echoed and pass or fail will be displayed. Press the PRINT/ENTER key to exit.   |
| <b>T6 Setup Data</b>       | Setup data will be sent out on the printer port.  |
| <b>T7 Default</b>          | Resets the indicator back to the factory settings. This will clear all calibration and setup data. "r you sure?" will be displayed. Press the TARE key to exit without Defaulting, or press the print key to reset the indicator to the factory default settings. |
| <b>T8 Serial COM2</b>      | Serial Communications can be verified by connecting pins 2 and 3 on the serial port. A single character will be echoed and pass or fail will be displayed. Press the PRINT/ENTER key to exit.   |

## 6.0 Troubleshooting Guide

| <b>Error Message Or Problem</b>       | <b>Description</b>   | <b>Possible Solution</b>   |
|---------------------------------------|--|--|
| <b>Err d</b>                          |  | <ul style="list-style-type: none"> <li>- More than 5000 scale divisions have been selected in Ntep or Angle Mode.</li> <li>- Zeroing a weight larger than scale capacity.</li> </ul>   |
| <b>oLd</b>                            | The scale is in an over load condition.  | <ul style="list-style-type: none"> <li>- Check signal / load cell cable for damage or loose connections</li> </ul>   |
| <b>SCnEg</b>                          | The Scales weight is more than 10 divisions negative from the zero calibration point in Ntep or Angle mode.          | <ul style="list-style-type: none"> <li>-Check for any debris interfering with the scale structure.</li> <li>-Check signal/load cell cable for damage or loose connections.</li> <li>-Re establish “C2” the zero calibration point.</li> </ul>  |
| <b>AngErr</b>                         | Data communications from the angle sensor has been lost.   | <ul style="list-style-type: none"> <li>-Check signal/Load cell cable for damage or loose connections.</li> <li>-If the scale system is not a CSW-10-LFT, change “S1” Parameter to the Ntep or no setting.</li> </ul>   |
| <b>Bat Lo</b>                         | Flashes when the battery voltage falls to 10.8V, and will be displayed contently when the voltage falls below 10.2V. | <ul style="list-style-type: none"> <li>-Verify the battery is fully charged.</li> <li>-Check cables for any damages.</li> <li>-Check the power connections. They should be clean and tight.</li> </ul>   |
| <b>No Display</b>                     |  | <ul style="list-style-type: none"> <li>-Disconnect all cables except for power, and then turn the indicator on. If the display lights up, inspect all cables.</li> <li>-Check the AC adapters output.</li> <li>-Check for an open fuse or low battery on DC powered systems.</li> <li>-Verify that all power connections are clean and tight.</li> </ul> |
| <b>Weight Readings Are Incorrect.</b> |  | <ul style="list-style-type: none"> <li>-Check for any Debris interfering with the scale structure.</li> <li>-Check The signal/load cell cable for damage or loose connections.</li> <li>-Verify that each load cell responds equally to an applied weight.</li> <li>-Recalibrate system with a known weight.</li> </ul>                                  |

## 6.0 Troubleshooting Guide

| <b>Error Message Or Problem</b>          | <b>Description</b> | <b>Possible Solution</b>   |
|--|--------------------|--|
| <b>Weights will not Repeat.</b>          |                    | <ul style="list-style-type: none"> <li>-Check for any Debris interfering with the scale structure.</li> <li>-Verify that each load cell responds equally to an applied weight.</li> </ul>  |
| <b>Unstable Readings</b>                 |                    | <ul style="list-style-type: none"> <li>-Check signal / load cell cable for damage or loose connections</li> <li>-Check for any Debris interfering with the scale structure.</li> <li>-Make sure the Junction Box and cable connections are clean and dry.</li> <li>-Check for a loose or bad load cell connection.</li> <li>-If the system has been recalibrated, Verify that the displayed weight is not greater than 200 percent of the known weight.</li> <li>-Check for a load cell problem. Connect 1 load cell at a time to find the unstable cell.</li> </ul> |
| <b>Wireless Keypad will not respond.</b> |                    | <ul style="list-style-type: none"> <li>-Check the battery in the wireless keypad</li> <li>-Check for the antenna on the scale to be installed and undamaged.</li> <li>-Check that the switch settings on the wireless keypad match the switch settings on the scale indicator PC board.</li> </ul>   |

## 7.0 WARRANTY

**CAMBRIDGE** warrants the **CSW-20AT** to be free of defects in workmanship and/or materials for 12 months from the date of delivery. This warranty of workmanship and or materials may be considered as unconditional, provided that the opinion of **CAMBRIDGE** is that the equipment has not been mechanically, environmentally, or electrically abused.

This warranty is limited, at the option of **CAMBRIDGE**, to repair, replace or an appropriate credit adjustment, not to exceed the original equipment sale price paid to **CAMBRIDGE**. **CAMBRIDGE** assumes no liability in connection with the sales of its products beyond that stated above.

Warranty replacement parts and or repair services are performed at the factory in Cumberland, Maryland or by an authorized service group approved by **CAMBRIDGE**.

Warranty does not include travel expense if a factory technician is requested to perform repairs at a location other than the factory.

It is the user's responsibility to follow the proper set-up, calibration and operating procedures of the **CSW-20AT** as described in this manual. If the operator has difficulty using their **CSW-20AT** properly, please contact **CAMBRIDGE** at 1-301-724-4082. Any one of our technicians will be happy to work with the user via telephone.

Thank You!

## 8.0 ASSISTANCE:

If at any time and you require assistance with your **Model: CSW-20AT** Indicator please contact us at:

### **CAMBRIDGE SCALE WORKS, INC.**

11500 Bedford Road  
Cumberland, MD 21502

Phone: (301) 724-4082

Fax: (301) 724-4964