CAMBRIDGE
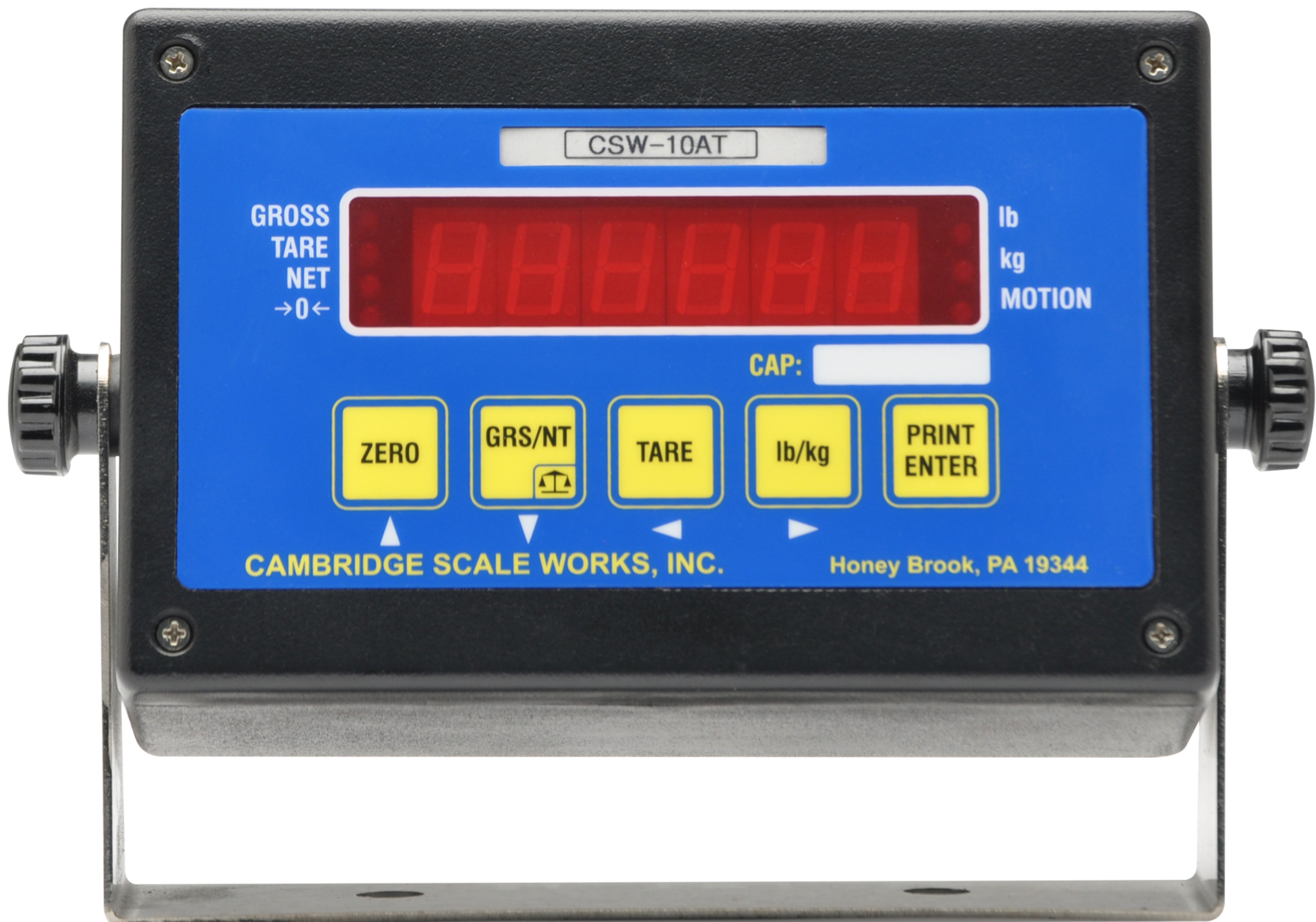
SCALE WORKS INCORPORATED
MODEL: CSW-10AT
DIGITAL WEIGHT INDICATOR

INSTALLATION, SET-UP & OPERATION

NTEP
COC # 06-070A1

MEASUREMENT CANADA
AM-5778C

Made in USA

TABLE OF CONTENTS

Meter Connections

To connect power via AC wall adapter cable to the CSW-10AT Meter. First make sure the On/Off Switch on the Rear of Meter is in the **OFF** position. Connect the Transformer to your 110VAC outlet.

Next, connect the other End of the cable to the Rear of the Meter for Power.
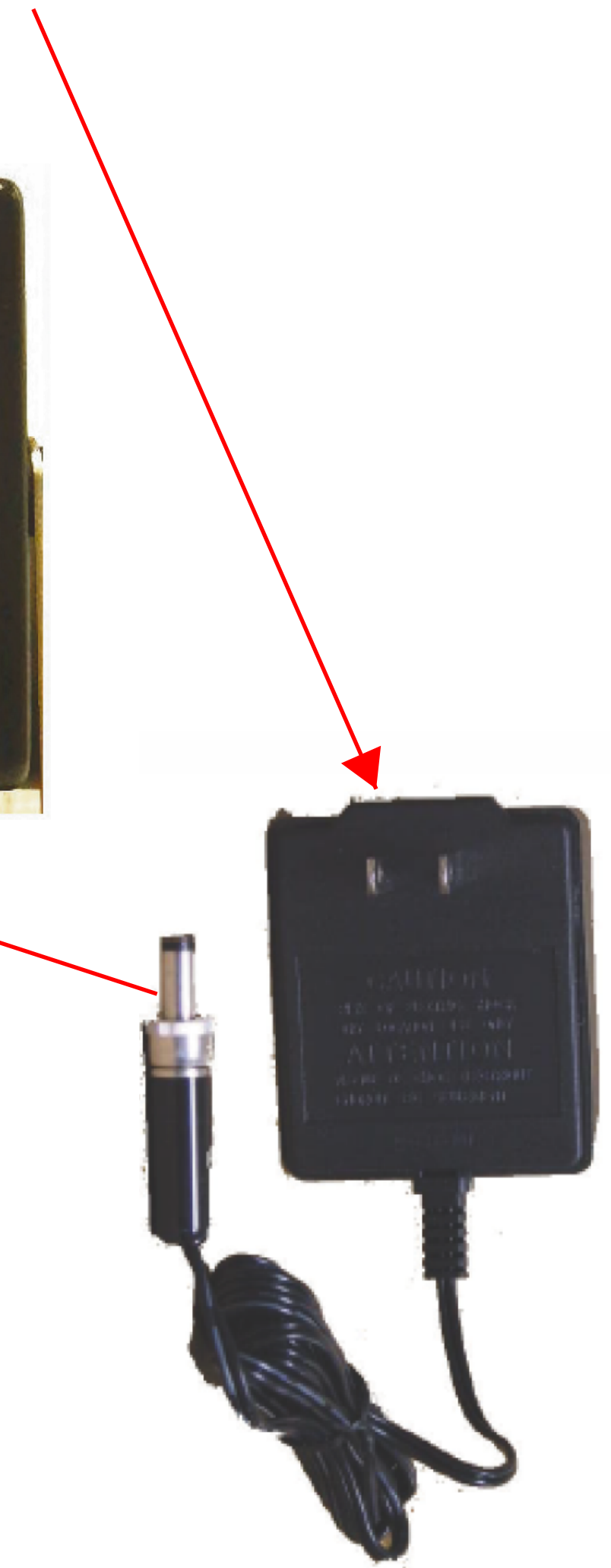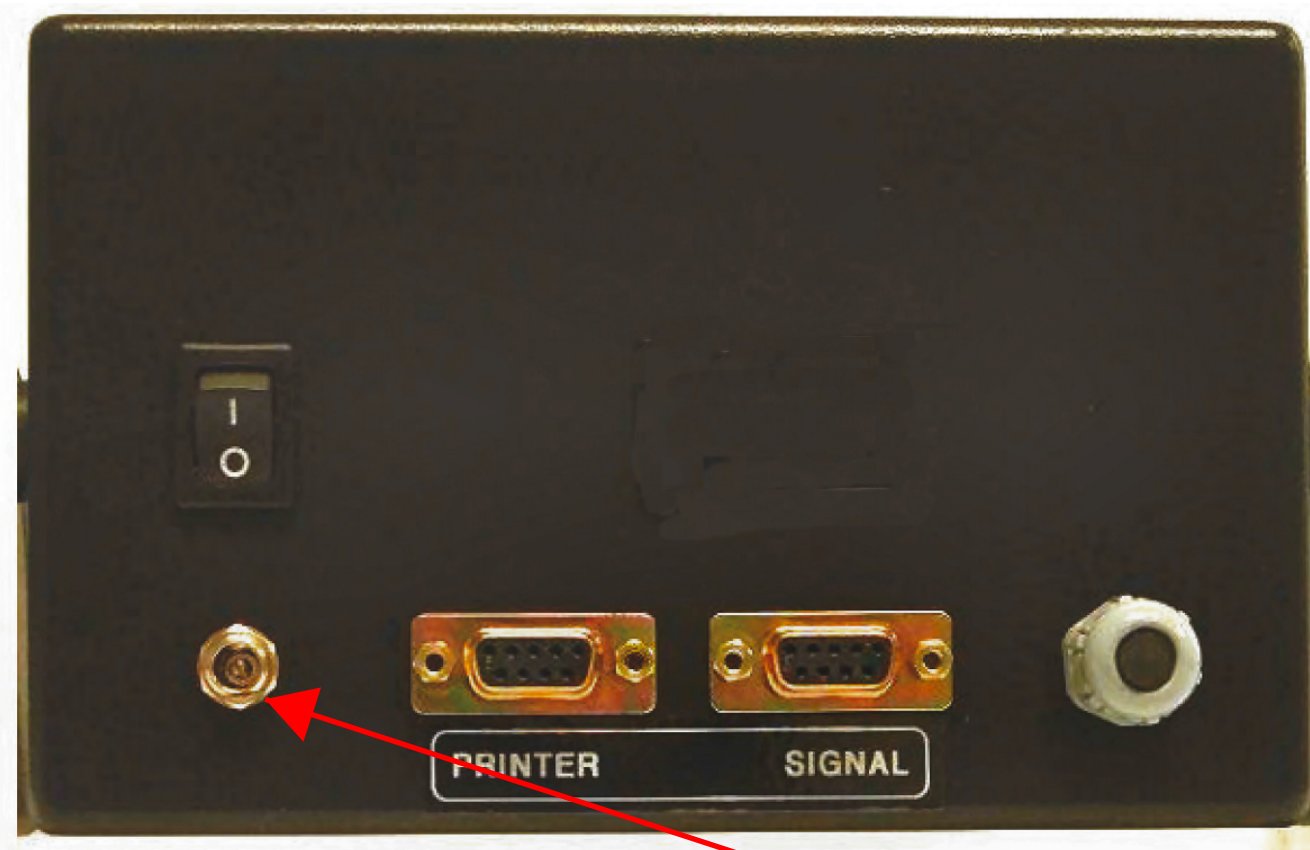
Communications port
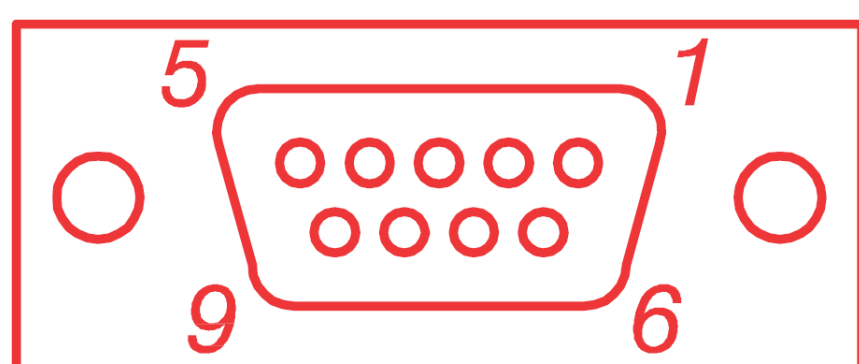
PIN #   DESCRIPTION
2 ----------- RXD
3 ----------- TXD
4 ----------- +5V
5 ------------ SGND

Signal connection

PIN #   DESCRIPTION
1 ----------- +EXC
2 ----------- -SIG
5 ----------- SHIELD   LOAD CELL
6 ----------- -EXC
7 ----------- +SIG

1.0 OPERATION
1.1 Key Functions:

ZERO 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.

GRS/NET Toggles the display between Gross weight and Net weight. This key is also used to enter setup mode. Begin by pressing and holding this key until the Parameter (*Pxxx*) Event counter is displayed, then release. Immediately after *COdE* is displayed enter in sequence (within 5 sec) *Tare*, *lb/kg*, *GRS/NET*, and *Print/Enter* the display will indicate *ScAlE*.
-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.

TARE Enters the Gross weight value into the Tare display and switches to the Net display mode.
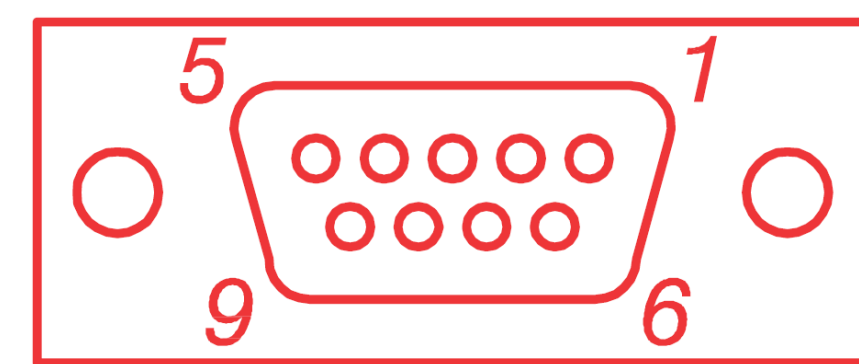If the Tare key is pressed and held for 5 seconds the current Tare value will be displayed.

lb/kg Toggles the display between pounds and kilograms.

PRINT Outputs the displayed weight data to the RS-232 Port.

Note: All keys are disabled when the scale is in motion or overload.

1.2 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.

bAt LO Will flash when the Battery voltage falls to 10.8VDC and will be displayed continuously when the voltage falls to 10.2VDC.

Err d More than 5,000 scale divisions have been selected in *S1* Ntep or *S1* Angle mode.
More than 20,000 scale divisions have been selected in *S1* NO mode.

2.0 SCALE PROCEDURE

2.1 SOFTWARE NAVIGATION FLOWCHART

SCALE	CALIBRATION	RS-232	TEST	END

SCALE column:

S1 Ntep	Ntep,no,angle (Ntep)
S2 CAPACITY	1-999,999 (5000)
S3 COUNT BY	1,2,5,/DEC (1)
S4 OVERLOAD	105% OF CAP OR ENTERED
S5 ZERO LIMIT	100%,1.9% (100%)
S6 FILTER	0 Fastest to 7 slowest (3)
S7 MOTION BAND	1 TO 99 Divisions (2)
S8 MOTION DELAY	0 to 99 UPDATES (4)

CALIBRATION column:

C1 Zero & Clear All Points	SHOW RAW COUNTS THEN 0
C2 ZERO	SHOW RAW COUNTS THEN 0
C3 SPAN POINT	SHOW ACTUAL WEIGHT
C4 SPAN POINT	
C5 SPAN POINT	
C6 SPAN POINT	
C7 SPAN POINT	
END	

RS-232 column:

R1 BAUD RATE	1200,8,N,1- 19200,8,N,1?
R2 Output Format	WT ONLY, G, N (GTN)
R3 Output Type	(Key) Polled, Continuous
R4 Receiver mode	(Disabled) Rec.,Remote
END	

TEST column:

T1 VERSION	SOFTWARE VERSION
T2 DISPLAY	LIGHT SEGMENTS
T3 BUTTONS	b1-b4, b5 EXITS
T4 A TO D	A/D RAW COUNTS
T5 SERIAL	Jumper Rx,Tx Loop Back
T6 Cal Factors ?	
T7 DEFAULT	YES, NO
END	

2.1 SOFTWARE NAVIGATION FLOWCHART (CONTINUED)

S9 Motion Display	↔	Normal, Blank, Dashes (Normal)
S10 ZERO BAND	↔	1-99 DIVISIONS(2)
S11 ZERO DELAY	↔	0-99 UPDATES(2)
S12 Zero Tracking	↔	1-99 DIVISIONS(1)
S13 Tracking DELAY	↔	1-99 1/4secinc.(0)
S14 Display lb/kg	↔	lb ,kg, lb/kg (lb/kg)
S15 SCALE ID	↔	1-99 (1) ID IN TX
S16 BRIGHTNESS	↔	1-15 (15) BRIGHTEST
S17 SLEEP MODE	↔	0 to 30 min blanks dsp (0)
S18 ANGLE LIMIT	↔	0 - 9 Deg. (6)
END		
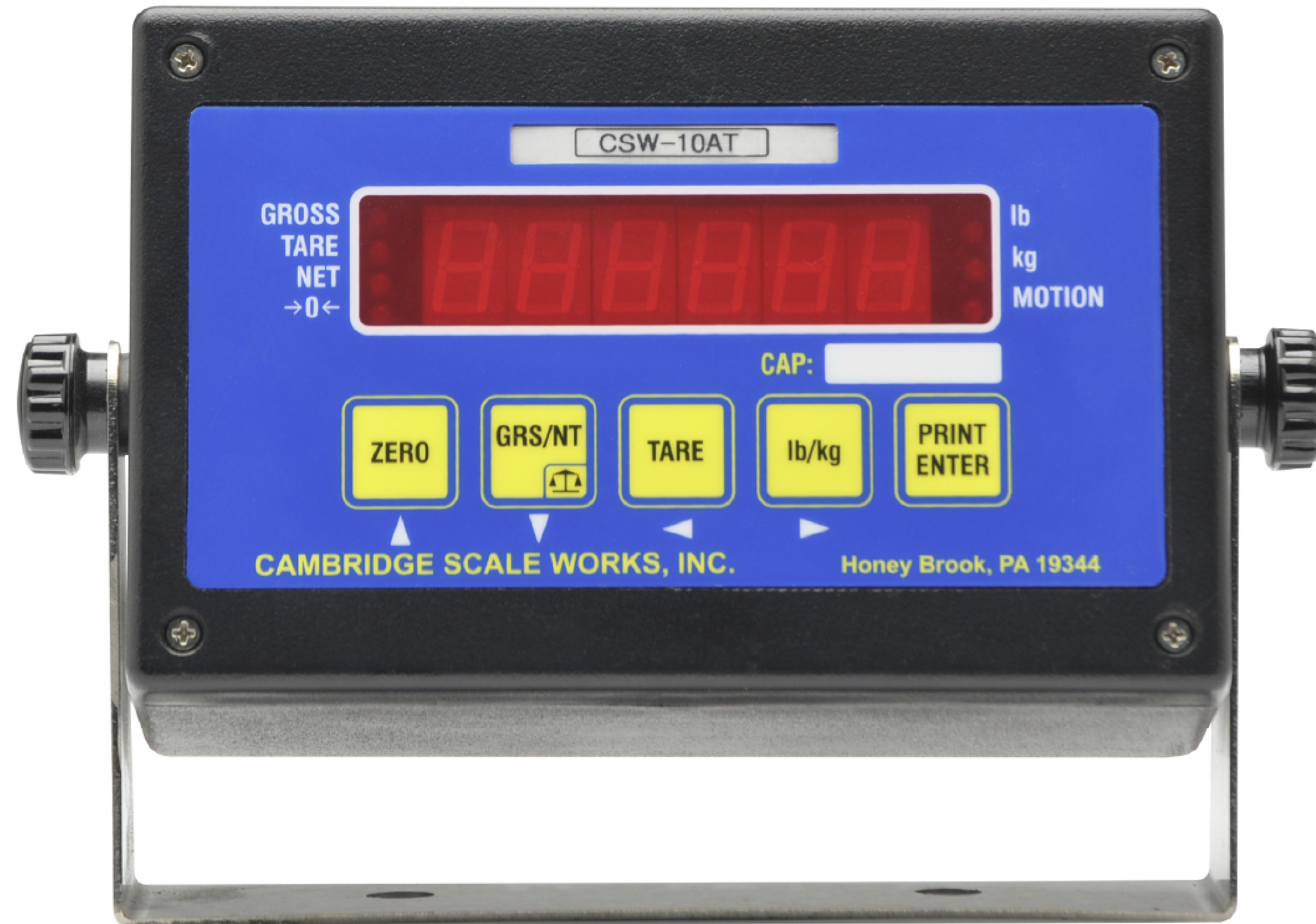
2.2 NAVIGATION KEYS

During setup you will be required to make numeric entries. (Ex: Capacity, Zero Band, etc...)
The following table outlines the keys used to perform these entries along with their function.

ZERO-------KEY IS USED TO NAVIGATE UP.
GRS/NET---KEY IS USED TO NAVIGATE DOWN.
TARE--------KEY IS USED TO NAVIGATE LEFT.
lb/kg---------KEY IS USED TO NAVIGATE RIGHT.
PRINT-------KEY IS USED TO ENTER DATA AND RETURNS.
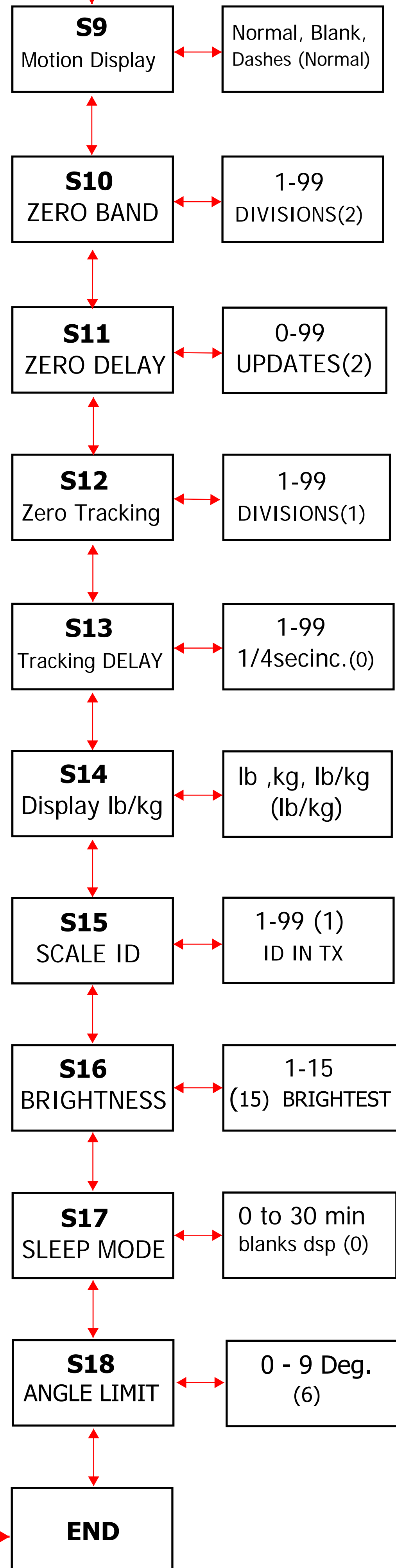
2.3 Scale Menu Definitions:

S1   NTEP   (Ntep): Maximum divisions limited to 5,000.
Scale negative message is displayed if the gross weight goes more than 10 divisions below zero. If a capacity and count by of more than 5,000 divisions is selected ***ERR d*** will be displayed and you will be returned to *S2* to select a new capacity or count by.
Angle: Enables angle correction for Legal For Trade lift truck scales.
No: 20,000 maximum division limits and no scale negative tests.

S2   Capacity   1 to 950,000 pounds (5,000).

S3   Count By   .001, .01, .1, (1), 10, 100,
.002, .02, .2, 2, 20, 200
.005, .05, .5, 5, 50, 500

S4   Over load   (105%) of scale capacity or user entered value.

S5   Zero Limit   (100%) or 1.9% of scale capacity.

S6   Filter   0 - 7 (3) 0 is the fastest response or least filtering and 7 is the slowest response or most filtering

S7   Motion Band   1 to 99 divisions (2) the weight display must be stable within the selected number of division for the motion indicator to be turned off.

S8   Motion Delay   0 to 99 updates (4) the weight display must be within the motion band for the selected number of updates for the motion indicator to be turned off.

S9   Motion   (Normal): When the scale is in motion the motion LED will
   Display   light.
Blank: When the scale is in motion the display will be blanked out.
Dashes: When the scale is in motion the display will show all Dashes.

S10 Zero Band   1 to 99 divisions (2) the weight display must return to Zero within the selected number of divisions to to be considered Zero.

S11 Zero Delay   0 to 99 updates (4) the weight display must be within
the zero band for the selected number of updates to
be considered Zero.

S12 Zero Tracking   1 to 99 divisions (2) the number of graduations
allowed to be Automatically Zeroed off.

S13 Tracking Delay   0 to 99 updates (0) the amount of time the display
must be within the allowed graduations before it will
be automatically Zeroed.
(0) disables zero tracking.

S14 Lb/Kg (Lb/KG): Allows the indicator to be switched between pounds
and kilograms by pressing the lb/kg key.
LB: This sets the display to Pounds only.
Kg: This sets the display to Kilograms only.

S15 Scale ID   (1) to 99 scale ID used in RF link output.

S16 Brightness   0 to (15) adjusts the LED display intensity 15 is
the brightest.

S17 Sleep Mode   (0) to 30 minutes. The display will turn off after the
the set amount of time elapses with no scale activity.

S18 Angle Limit   (6) Adjusts maximum angle.

END   Exits back to the main Menu.

( ) indicates Factory Set defaults.

2.4 Numeric Entries

When entering a numeric value, First press and release the *lb/kg* key to move right into the menu where the numeric value will be entered. Then press and release the *Zero* key, the first digit in the value will flash. Press and release the *ZERO* and *GRS/NET* keys to increase or decrease the digits value. Press and release the *Tare* key to move to the next digit. Repeat the steps above to adjust the digits value. Repeat all steps until the numeric value is correct, then press and release the *PRINT* key to enter the data. The display will return to the menu.

2.5 Set Up Parameters

To begin press and hold the *GRS/NET* key until the Parameter (*Pxxx*) Event counter is displayed, then release. Immediately after *COdE* is displayed, (within 5 seconds) enter in sequence *Tare, lb/kg*, *GRS/NET,* and *Print/Enter*, The display will indicate *ScAlE*.

-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.

With the display indicating *ScAlE*, press the *GRS/NET* key to move down. This allows the operator to change any of the scale Parameters *S1* thru *S17*. For example, press the *GRS/NET* key to move down until *S2* is displayed, *S2* is used to set the Capacity of the Scale. Press the *lb/kg* key to move right in the *S2* Parameter. The current capacity will be displayed. Press the *ZERO* key; the first digit will flash. Enter the capacity using the steps described in section 1.3. When the capacity is correct, press the *Print* key to enter the value. The display will return to *S2*.

Entering the Count By. Press the *GRS/NET* to move down, *S3* will be displayed. Press the *lb/kg* key to move right into this parameter. The current "Count by" will be displayed. Press the *ZERO* and *GRS/NET* keys to adjust the divisions. Press the *Tare* and *lb/kg* keys to adjust the decimal point. Press the *PRINT* key when finished to enter the data. The display will return to *S3*. Exit Set up Mode by pressing the *Tare* Key, End will be displayed, then press *Print/Enter*.

3.0 CALIBRATION PROCEDURES

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 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 in angle mode the pitch and roll offsets will also 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, press the ZERO key to enter the correct weight. Use the steps described in section 2.4 for numeric entry. When the weight is correct press the Print key to enter the new value.

C4 to 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.
You may also return to C4 to C7 later and add a new correction point without affecting any 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.

END   Exits back to the main Menu.

3.2 Calibration

Press and hold the *GRS/NET* key, as described previously in section 2.5. *ScAlE* will be displayed. Press the *lb/kg* key to move right, *CALib* will be 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* button, "0" will be displayed. Press the *Print/Enter* key to enter the data. "0" is now entered and the display returns to *C1*.

Note: With the scale completely level use C1 or C2 to zero the angles. There is no need to use both C1 and C2.

Press *GRS/NET* key to move down, *C3* will be displayed. Press the *lb/kg* key to move to the right, 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 forks level. Press the *ZERO* key, the first digit of the weight will flash. Use the *ZERO* and *GRS/NET* keys to increase or decrease the digits value. Press the *TARE* key to move left, the next digit will flash. Repeat the steps until the correct weight is entered. Press the *PRINT* key to record the data. The display will return to *C3*.

Press the *GRS/NET* key until End is displayed, then Press *PRINT*. Calibration is now complete.

3.3 Linearity Correction

If Linearity Correction is needed, Press the *GRS/NET* key (from the calibration menu) to move down to *C4*. 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 known test weight on the scale with the forks level. Press the *ZERO* Key for the first digit of the displayed weight to flash. Enter the weight as described in section 1.4, then press the *PRINT* key to record the data. Continue 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 also return to these correction points and make changes to its value without affecting any of the original calibration points.

4.0 COMMUNICATIONS SETUP

4.1 Communications Menu Definitions:

R1 Baud Rate   1200 to 115200 baud (9600), 8, n, 1

R2 Output
Format

       0 - (Gross, Tare, Net)- "CR, LF, CR, LF [32 bytes of 2Eh], CR, LF, CR, LF, Gross (lb or kg), :, six ASCII characters [indicated weight], CR, LF, Tare (lb or kg), sp, :, six ASCII characters (indicated weight), CR, LF, CR, LF, CR LF, CR, LF" [100 bytes total output].

       1 - (Weight only)- "Six ASCII Characters [indicated weight], CR, LF" [8 bytes total output].

       2 - (Net only)- "NT, Sp, Six ASCII Characters [indicated weight], Sp, lb or kg, CR, LF" [14 bytes total output].

       3 - (Gross only)- "GR, Sp, Six ASCII Charactes [indicated weight], Sp, lb or kg, CR, LF" [14 bytes total output].

R3 Output Type

       0 - Output on command, standard print.
         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 were 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 or NT or TR, six ASCII Characters (indicated weight), lb or kg, CR, LF [15 bytes total output].

       3 - RF Link Output.

       4 - Used for QSI terminal.

R4 Receiver   0 - Disabled - normal scale mode.

1 - Standard Receiver.
Receives R3.3 RF link output string displaying data as it appears on the scale. All keys are disabled except the PRINT 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.

END   Exits back to the main Menu.

( ) indicates Factory Default setting

5.0 TESTING PROCEDURES

5.1 Testing Menu Definitions:

T1 Version   Displays Software Version.

T2 Display   Lights all display segments and indicating LED s

T3 Buttons   Press the Zero key, b1 will be displayed.
Press the GRS/NET key, b2 will be displayed.
Press the Tare key, b3 will be displayed.
Press the lb/kg key, b4 will be displayed.
Pressing the print key will exit back to the menu T3.

T4 A to D   Displays Raw counts where a 1mV/V signal from the scale
will display 25,000 counts.
When in angle mode Down GRS/NET will cycle Pitch, Roll
and Raw counts.

T5 Serial   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.

T6 Setup data   Setup data will be sent out on the printer port.

T7 Default   Resets the meter back to factory defaults clearing all
calibration and setup data. "r you sure?" will be displayed
then press the Tare key to exit without Defaulting, or press
the Print key to reset the meter to factory default.

END   Exits back to the main Menu.

6.0 WARRANTY

CAMBRIDGE warrants the **CSW-10AT** to be free of defects in workmanship and/or materials for 12 months from the date of shipment. This warranty of workmanship and/or materials is valid, if in the opinion of **CAMBRIDGE**, 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's the user's responsibility to follow the proper set-up, calibration and operating procedures of the **CSW-10AT** as described in this manual. If the operator has difficulty using their **CSW-10AT** properly, please contact **CAMBRIDGE** at 1-301-724-4082. Any of our technicians will be happy to work with the user via telephone.

Thank You!

7.0 Assistance

If at any time you require assistance with your Model: CSW-10AT Meter please contact us at:

CAMBRIDGE SCALE WORKS, INC.

115 West Mary Street
Cumberland, MD 21502

Phone: (301) 724-4082
Fax: (301) 724-4964